Annual Operation Report on Amateur Radio Technology Demonstration Satellite "NEXUS"

January 21, 2020

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NEXUS, an amateur radio technology demonstration satellite was developed by Japan Amateur Satellite Association (JAMSAT) and NEXUS project team in Department of Aerospace Engineering, College of Science and Technology, Nihon University, Japan, and launched by Japanese Epsilon#4 rocket from the Uchinoura Space Center at JST 9:50:20, 18 January 2019.

We would like to express our deep appreciation to all concerned and report the results of the operation after the launch, i.e. one year's operation from 18 January 2019 to 18 January 2020.

1. Operation results

We have the following results from the operation in the last one year (Table 1). The detail of the mission is described in the below sections.

Table 1 Operation results in last one year after launch

Date	Time (JST)	Event
2019/1/18	09:50:20	Seven satellites including NEXUS were launched by Epsilon#4 rocket from Uchinoura Space Center in JAXA.
	11:23:59	First path of NEXUS at Nihon University Ground Station (NUGS): CW beacon from NEXUS was received. The initial command was sent to NEXUS and NUGS received the answer "UPLINK IS OK". Thus, we confirmed that the command was uplinked appropriately. We got many reception reports from amateur radio people, too.
	20:21:23	NUGS sent the command for the check of every communication line between each bus subsystem, and confirmed from the answer of NEXUS by CW beacon that all of the communication lines aer active. We streamed the operation at NUGS on YouTube (https://www.youtube.com/watch?v=x_4EB7pwWrk).
	21:56:21	Data downlink using GMSK 9600bps by the bus transmitter (Nishi-Musen 301A): We confirmed from the initial sensing data just after the deployment from the rocket that the sensor data was normal, the electric power was balanced, and the thermal balance was established.
1/19	21:32:05	Data downlink using AFSK 1200bps by the bus transmitter (Nishi-Musen 301A).
1/21	10:18:28	Downlink of a VGA image data shot by CAM system
	20:52:13	Downlink of a VGA image data shot by CAM system: We confirmed that the image was taken above Iceland.
	22:34:29	Temporary shutdown of CW by wrong command
1/22	19:02:04	Restart of CW
1/23	09:36:28	Mission achievement: verification of the FSK transmitter
	21:45:18	Mission achievement: verification of the $\pi/4$ shift QPSK transmitter
		The reception reports surpassed 100!
1/26	08:34:35	Mission achievement: verification of the linear transponder
	19:11:26	Downlink of SSTV fixed image
1/27	21:56:13	Downlink of Digi-Talker voice.
1/29	10:39:51	The sensor data showed that the angular velocity of the satellite was going up to about 15deg/sec.
1/31		The OSCAR number FO-99 was given to NEXUS by AMSAT.
2/2	10:50:37	Downlink of a 2592x1944 image data (maximum size) shot at January 25. We confirmed that the antenna and the dark space were in the image.
2/4		The reception reports surpassed 200!

2/6	20:00:44	The practical examination of the communication was conducted in the presence of Kanto Regional Bureau of Telecommunications JAPAN and The Japan Amateur Radio UNION (JARL). We passed the examination, and the license for the ground station (JS1YAW) and for the satellite (JS1YAV) are issued.
2/12	10:28:56	Downlink of an image data shot at February 4 (size: 2592x1944): South-east offshore of Japanese archipelago over the Pacific Ocean showed up.
2/17	10:18:05	Downlink of time-lapse images shot at February 15.
2/22~3/1		CW downlink operation was conducted to find the cause of the increase of the angular velocity.
3/13		The reception reports surpassed 300!
3/14	19:58:38	Trial operation of the linear transponder: we succeeded the communication with the other station.
3/17	10:00:05	Demonstration of the linear transponder with the mobile station at the venue of the JAMSAT Symposium 2019 held in Kyoto.
3/24	09:07:18	Start of the operation of the linear transponder over Japan.
4/5	08:02:51	Trial sensing of RSSI (received signal strength indicator)
	20:11:08	Downlink of the trial data of RSSI: The RSSI was measured appropriately by the linear transponder subsystem.
5/4	10:23:02	Downlink of an image data shot at April 26 (size: 2592x1944): The compression ratio of the image was changed correctly.
5/26		The adjustment of the direction of the antennas of NUGS for the increase of the amount of the receiving packet data with the full support of JA0FKM.
6/9		The reception reports surpassed 400!
6/22,23		Operation of the linear transponder over Thai and Germany. After these operations, we officially started the operation of the linear transponder abroad.
6/26	21:02:30	Downlink of moving image data (size: VGA, frame rate: 7.5fps, number of images: 100, date: February 21): The moving images are taken and saved correctly.
7/19	08:35:46	Downlink of moving image data (size: VGA, frame rate: 16.88fps, number of images: 200, date: June 2): The moving images with the maximum frame rate are taken and saved correctly.
9/9		Typhoon 15 hit Chiba area. The antennas of NUGS were partially broken.
9/12		Repair of the antennas fully supported by JA0FKM and JI1SZP
10/12		Typhoon 19 hit Chiba area. The antennas were damaged again. The antenna of the circular polarization was disabled, which has not fixed yet.
10/19		The reception reports surpassed 500!
10/21	08:02:06	Downlink of data using the FSK transmitter with 19.2bps. The bit rate of the FSK transmitter was changed correctly.
12/15		The correction of the direction of the antennas of NUGS damaged by the Typhoon 15 and 19. The work of the correction was fully supported by JA0FKM, JA1OGZ, JA3NAS, JA1NWR, and JF1PTU
2020/01/18	09:50:20	One year has passed since the launch!

2. Mission status

NEXUS has seven missions as shown in Table 2. It achieved four of the missions colored with blue. The results of those 4 missions and the progress of the remains 3 missions were shown in the followings.

Table 2 Seven missions of NEXUS

Success level	Mission		Achievement rate
Minimum success	Mission#1	Demonstration of the newly developed π/4 shift QPSK transmitter	100%
	Mission#2	Demonstration of the newly developed FSK transmitter	100%
Full success	Mission#3	Verification of practicality of the π/4 shift QPSK transmitter	30%
	Mission#4	Verification of practicality of the FSK transmitter	50%
	Mission#5	Demonstration of the newly developed linear transponder	100%
	Mission#6	Verification of practicality of N-CAM	100%
Extra success	Mission#7	Mapping of RSSI (received signal strength indicator) of 145Mhz band around 500km altitude	50%

Mission#1: Demonstration of π/4 shift QPSK transmitter (achievement rate: 100%)

We defined that the Mission#1 is achieved if the data from the π/4 shift QPSK transmitter with 38400bps is downlinked to NUGS. The mission was achieved in the night operation at January 23, 2019. The signal was received by using Yagi-Uda antenna at NUGS, and the received signal was amplified in two steps and the amplified signal was input to the SDR(Blade RF x115) and demodulated. The pre-amplifier (32dB) and the broadband amplifier (30db) made by Kawagoe-Musen was used. Fig. 1 shows the signal condition at the demodulation in SDR.

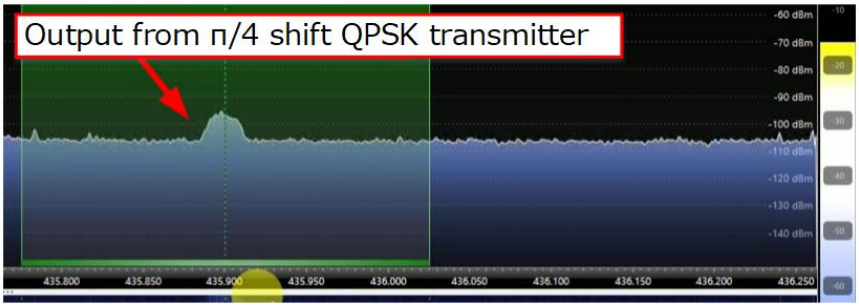


Fig. 1 Signal condition at demodulation (p/4 shift QPSK transmitter)

In that operation, a packet was downlinked with the π/4 shift QPSK modulation, and it was confirmed that the π/4 shift QPSK transmitter works well. Thus, we judged that Mission#1 was achieved.

Mission#2: Demonstration of FSK transmitter (achievement rate: 100%)

We defined that the Mission#2 is achieved if the data from the FSK transmitter with the specified bit rate between 1200 and 19200 bps is downlinked to NUGS. The mission was achieved in the daytime operation at January 23, 2019. The signal was received by using Yagi-Uda antenna at NUGS. The received signal was amplified by the pre-amplifier made by Kawagoe-Musen, and the amplified signal was input to the receiver (IC-9100 by ICOM). After that, the signal was translated to the digital-data by the hardware TNC (TNC-555 by TASCO), and the output data is input to the PC in NUGS. Fig. 2 shows the signal condition at the demodulation monitored by SDR.

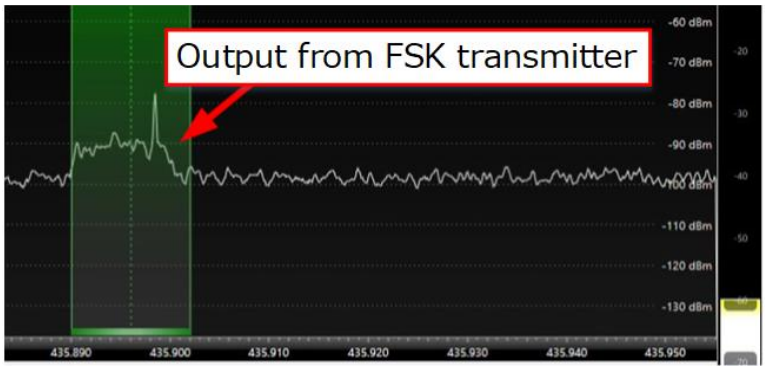


Fig. 2 Signal condition at demodulation (FSK transmitter)

In that operation, 260 packets from the FSK transmitter with GMSK modulation were downlinked, and it was confirmed that the FSK transmitter works well. Thus, we judged that Mission#2 was achieved.

Mission#3: Verification of practicality of π/4 shift QPSK transmitter (achievement rate: 30%)

We defined that the Mission#3 is achieved if the data form the π/4 shift QPSK transmitter is downlinked and the net communication speed is more than 300% of the conventional transmitter (the bus transmitter of NEXUS). Though Mission#1 was completed, only one packed was demodulated because the S/N of the used SDR (Blade RF) was low. In order to increase the S/N, we are now developing the demodulator composed of the LimeSDR and the GNU Radio. We have got the good constellation diagram as in Fig. 3 so far by adjusting the parameters of the LimeSDR such as gain, LNA using GNU Radio.

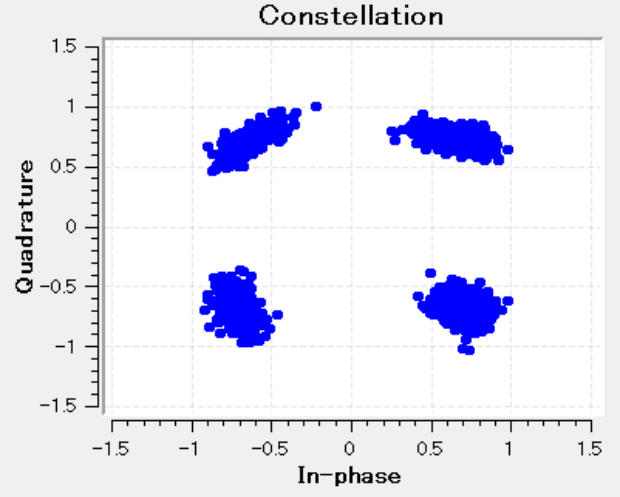


Fig. 3 Constellation diagram of the demodulated signal (π/4 shift QPSK transmitter)

The π/4 shift QPSK transmitter in NEXUS uses the CCSDS protocol with Reed-Solomon code, so that the analysis of the downlinked data needs the detection of the synchronization code, unscramble, and the decryption of the Reed Solomon code. We confirmed that the detection of the synchronization code and unscramble are working well. We are going to implement the decryption of the Reed Solomon code and the analysis of the data made with AX.25 protocol into the receiving software, and the ground test to confirm the increase of the S/N. Then, we will verify the high-speed communication with NEXUS on orbit.

Mission#4: Verification of practicality of FSK transmitter (achievement rate: 50%)

We defined that the Mission#4 is achieved if the data from the FSK transmitter is downlinked and the net communication speed is more than 150% of the conventional transmitter (the bus transmitter of NEXUS). Table 3 compares the net communication speed of the FKS transmitter with that of the bus transmitter.

Table 3 Comparison of net communication speed with GMSK9600bps

	Polarization			
	Horizontal	Vertical	Circular	average
Bus transmitter[bps]	1634	1935	1013	1527
FSK transmitter[bps]	2863	2743	1498	2368

This table shows that the net communication speed depends on the polarization, but even the averaged value of the FSK transmitter is about 155% of that of the bus transmitter. Thus, the net communication speeds of the FSK transmitter is more than 150% of that of the bus transmitter, so that Mission#4 is achieved for 9600bps. We are now comparing the net communication speed for the bit rate other than 9600bps.

Mission#5: Demonstration of linear transponde (achievement rate: 100%)

We defined that the Mission#5 is achieved if the voice data is relayed by the linear transponder. The mission was achieved in the daytime operation at January 26, 2019. The voice (LSB) was sent from NUBS. The transmission frequency was fixed to 145.915MHz, and the output power was about 10W. The uplinked voice was directly downlinked with 425MHz band to other stations. Fig. 4 shows the received signal around 435 MHz at the other station.

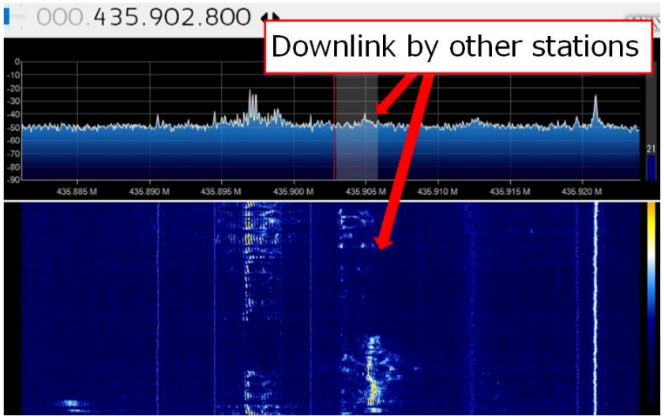


Fig. 4 Signal condition around 435MHz (provided by (JA1OGZ)

Thus, the voice transmitted from NUGS with 145MHz band was downlinked to the other stations with 435MHz band in that operation, so that we judged that Mission#5 was achieved. We activate the linear transponder of NEXUS not only in the operation at Japan but also various region in the world. The detail of the operation result of the linear transponder is described in Chapter 5.

Mission#6: Verification of practicality of N-CAM (achievement rate: 100%)

We defined that the Mission#6 is achieved if N-CAM take a Full HD image of the earth and the image is downlinked to NUGS. The mission was achieved in the daytime operation at February 12, 2019. The shooting area is the south-east offshore of Japanese archipelago over the Pacific Ocean, the size of the image is 2592x1944, and the shooting date was February 4, 2019. Fig. 5 shows the downlinked images.


Fig. 5 Images taken at February 4, 2019(maximum size)

The object in the right figure of Fig. 5 is the antenna for command reception of NEXUS. During the storage of the antenna, it was bend with a large flexure so that the strain exceeded the elastic region and the antenna has a plastic deformation. We had already supposed that deformation and confirmed that it does not give any influence on the communication. Unfortunately, the plastic deformation occurs such as the command reception antenna deforms around the satellite, so that the part of the antenna is within the angle of view of N-CAM.

The antenna is not in the left figure of Fig. 5, which is because the auto adjustment of exposure worked based on the earth in the upper right and is lost in the dark space area. In that operation, the image larger than Full HD (1920x1080px) taken by N-CAM was downlinked. Thus, we confirmed that N-CAM works normally, and the high-resolution image can be obtained, and judged that Mission#6 was achieved.

After that operation, N-CAM has taken many images with various size and moving images. For example, N-CAM took the moving images of SVGA with maximum frame rate (16.88fps) at June 2, 2019. The shooting area is over China. The excerpt images are shown in Fig. 6.

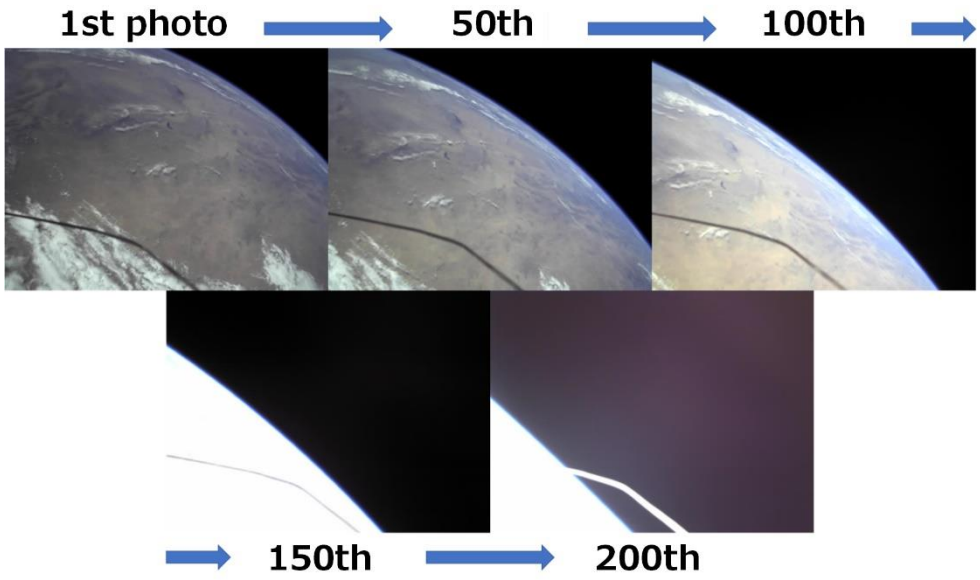


Fig. 6 Excerpt moving images taken at June 2, 2019(SVGA)

N-CAM can change the exposure, compression ratio of JPEG, and so on. The compression ratio can be changed from 0 (no compression) to 30, i.e. 31 levels, and the default value is 8. N-CAM took the image with the half of the default compression ratio, i.e. 4, at April 26 and May 5, 2019. Fig. 7 shows the images taken at those date.

Fig. 7 Images (compression ratio is changed). Left: April 26, 2019, Right: May 5, 2019

The left figure of Fig. 7 was shot over Australia, and the right figure was shot over Africa. Senegal and Mauritania are in the right image. These images are taken with lowest compression ratio ever N-CAM took, so that the images with the highest resolution so far. The images and the moving images are archived at our web site (http://sat.aero.cst.nihon-u.ac.jp/nexus/3_SatImages.html). We will be very glad if you visit our web site.

Mission#7: Mapping of RSSI of 145Mhz band around 500km altitude (achievement rate: 50%)

We defined that the Mission#7 is achieved if the RSSI (received signal strength indicator) is measured on orbit by using the linear transponder and make the map of RSSI around 145MHz on orbit. In order to check the function of RSSI measurement of the linear transponder, NEXUS measured the RSSI at 10second intervals over Japan at April 5, 2019. During that time, NEXUS got the voice from NUGS. The result is shown in Fig. 8.

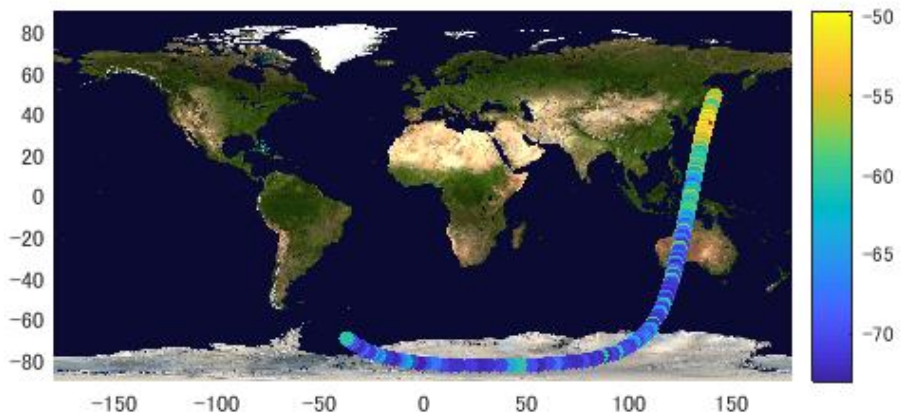


Fig. 8 Measurement of RSSI (April 5, 2019)

Fig. 8 shows that the color that indicate the strength of the signal varied around Japan, and the measured range is general. Thus, we confirmed that the linear transponder measures the RSSI normally.

The measured RSSI on the linear transponder board in NEXUS is output in voltage, so that we should translate the downlinked voltage data to the RSSI on the ground. During this process, we use the calibration function obtained by the ground experiment. However, the RSSI at April 5 translated with the calibration function obtained previously was higher than expected. We thought the calibration function has some error and conducted the ground experiment again to obtain the revised calibration function. NEXUS is measuring the RSSI all over the world, and we are making the map using the revised calibration function now. Fig. 9 shows the RSSI map obtained so far.

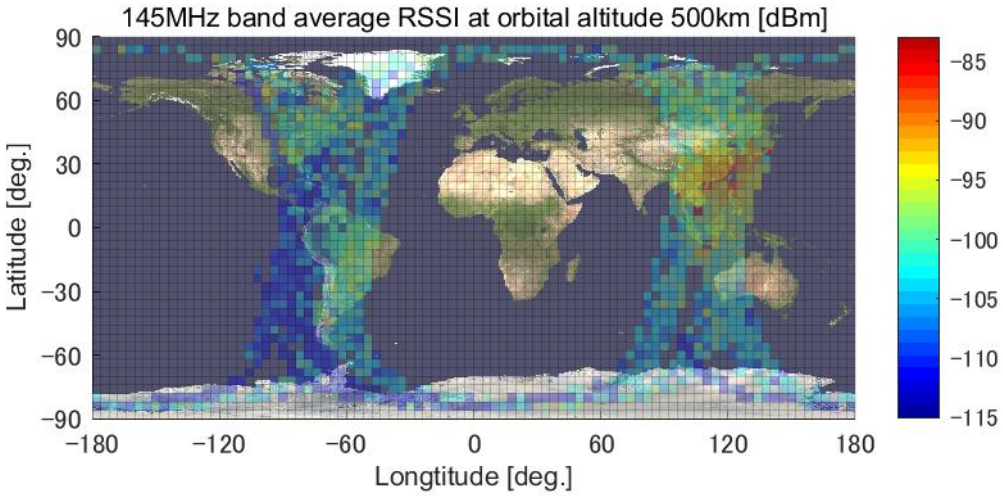


Fig. 9 RSSI map (January 18, 2020)

3. Publication

We published the operation result of NEXUS in conferences listed in Table 4. The detail is shown in our web site:

http://sat.aero.cst.nihon-u.ac.jp/nexus/4_Paper.html

We will submit a journal paper soon.

Table 4 Presentation in conferences

Conference, Event	Date	Presenter	Presentation title
9th Space Takumi Conference	2019/3/13	Kiyoshi Yamaguchi	Initial Operation Result of Amateur Satellite Communication Technology Demonstration Satellite NEXUS
JAMSAT Symposium 2019	2019/3/17	Koichiro Yamada	Report on Launch and Mission Progress of NEXUS
2nd Support day of amateur radio station JAPAN	2019/3/23	Hitomi Fujii	CubeSat "NEXUS" and Satellite Communication
32nd ISTS	2019/6/18	Ryota Nakamura	Initial Operation Result of Amateur Satellite Communication Technology Demonstration Satellite NEXUS
Ham fair 2019	2019/8/31~9/1	All	# Poster presentation
2019 IEICE Society Conference JAPAN	2019/9/11	Takeru Nakamura	Evaluation of Amateur Satellite Communication Using CubeSat "NEXUS"
Special open house of Tsukuba Space Center	2019/10/5	Riku Sato	# Poster presentation
63rd Space Sciences and Technology Conference JAPAN	2019/11/7	Hitomi Fujii	Mission Progress of Amateur Communication Technology Demonstration Satellite "NEXUS"

4. Problems

NEXUS has been operated smoothly, but there are a few problems as follows;

1) The command execution time can be specified to the time between the command uplink time and the time 3.6hours after the command uplink time

The bus system of NEXUS consists of five subsystems, i.e. EPS (Electric Power Supply system), SG (Sensor Group), C&DH (Command and Data Handling system), CW (CW generation system), and FMR (Flight Management Receiver system). The system diagram of FMR is shown in Fig. 10. The command signal received at the receiver in FMR is digitized by the model and sent to the MPUs of each subsystem through the MPU in FMR.

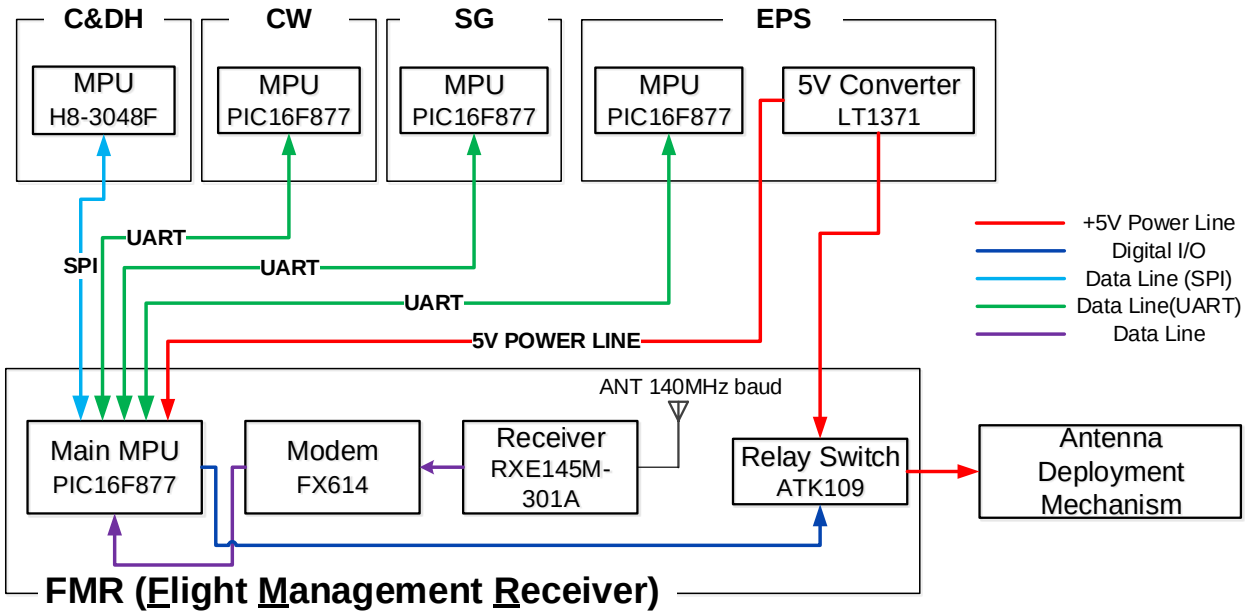


Fig. 10 System diagram of FMR

The uplink command for NEXUS adopts the set-command method in which more than one command

are packaged into one packet and uplinked to NEXUS, and each command includes the data of execution time. The FMR receives the set-command (command set) and sends each command when its execution time comes. We designed the software so that we can specify the execution time between the time FMR receives the uplink command, *Tr*, and about 932 hours after *Tr*. However, we have found through the operation of NEXUS that we can specify the time until only about 3.6 hours after *Tr*. This is because we misdefined the type of the variable that counts the time after *Tr*. This variable counts up 1 in every 0.2 second, and it should store the data with 3 bites. Thus, it should be able to count 16777215count*0.2s = 3355443s, i.e. 932hours. However, it can store data with only 2 bites because of the mis-definition of the type of the variable. Therefore, it can count only 65535count*0.2s = 13107s =3.64hours. However, this problem does not give any serious influence on the mission of NEXUS. We have been operating NEXUS by specifying the execution time within 3.6 hours.

2) The information of the switch status in the satellite is sometimes different from the actual status

The EPS (electric power supply subsystem) controls the power distribution to every instrument (subsystem) in NEXUS and has the information of the ON/OFF status of all instruments (switch information). We found several times the bug that the switch information is different from the actual ON/OFF status of each instrument. The most serious problem induced by this bug is that the HK data sensing by C&DH (Command and Data Handling subsystem) and SG (Sensor Group) is not executed correctly.

The sensing of HK data of NEXUS is mainly conducted by SG, and the sensed data is distributed to all subsystems in every 0.5 second, and each subsystem takes care of those data if necessary. In case that the HK data is stored in the memory of the satellite, EPS turned on C&DH and then C&DH write the data to the ROM in C&DH after C&DH receives the sensor data from SG. In this case, EPS controls whether SG sends the HK data to C&DH or not by monitoring the switch information, i.e. if the switch information of C&DH is "ON", the HK data is sent to C&DH, but is not send if the switch information is "OFF". Therefore, the HK data is not sent from SG to C&DH if the switch information has the bug and it is "OFF" even though the actual power status of C&DH is "ON". Then, the data is not stored in the ROM even if the command for "HK data storage" is uplinked. We experienced such a case several times. However, such a case rarely occurs, so that the influence of this bug on the operation is small. The reason of the bug of the switch information may be single event by the radiation, but we have not determined the reason yet and are investigating now.

3) Increase of angular velocity

We found from the HK sensing data obtained at a few days after the launch that the angular velocity of the satellite was increasing. After that, we have been monitoring and recording the angular velocity at every operation. Fig. 11 shows the change of the angular velocity from 10 days after the launch to now.

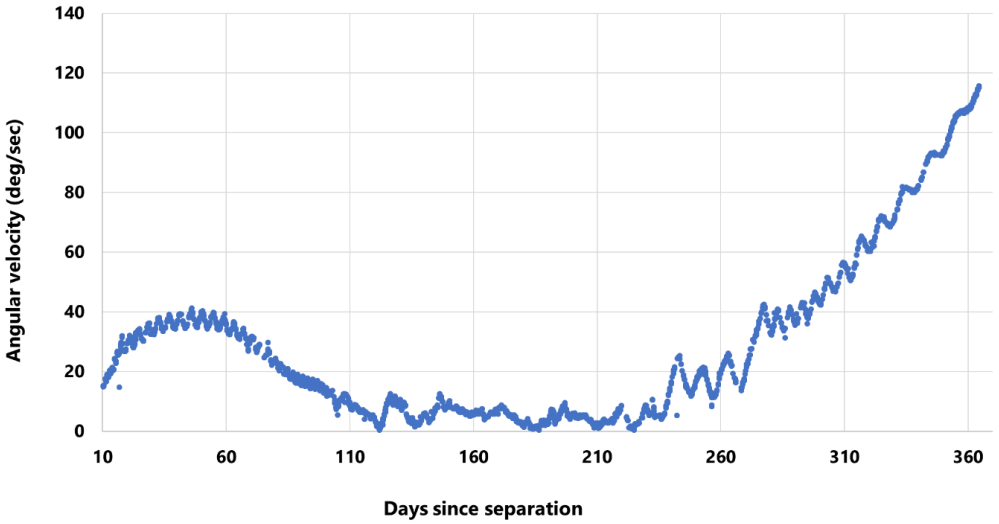


Fig. 11 Change of angular velocity of NEXUS

The angular velocity increased until about 50 days after the launch (about 40deg/s). After that, it decreased and kept small until 230 days after the launch. However, it began to increase again, and it is now almost 120deg/s (the direction of the spin axis in the satellite body coordinate turned over). The main reason of the increase of angular velocity may be the torque induced by the interaction of the earth magnetic field and the electric current in the satellite, but we have not clarified the reason yet. We have been investigating the reason with the support of several people.

5. Achievement of "amateur operation"

In order to have NEXUS, an amateur radio satellite to provide the amateur radio people the opportunity of the improvement of satellite communication skill, we conducted the operations as listed in Table 5 which we call "amateur operation". Those operations have been conducted along with the mission operation just after the initial operation phase, and will be continued in the later phase of the operation after the mission will be completed.

Table 5 List of "amateur operation"

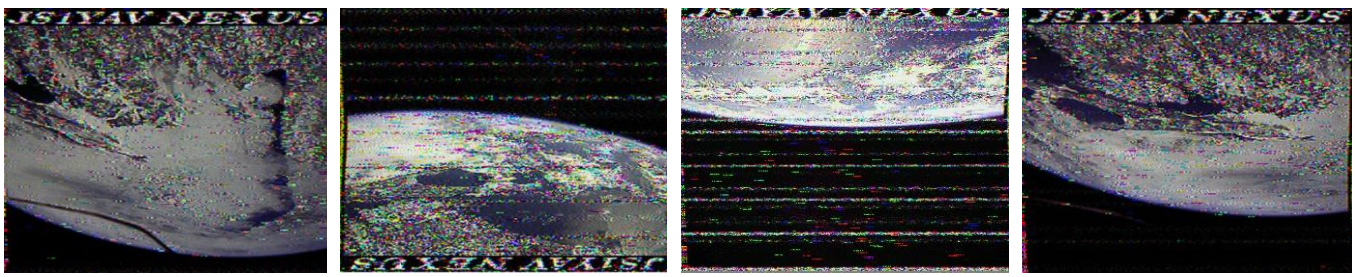
No.	Operation
1	Downlink of SSTV image
2	Downlink of digi-talker voice
3	Uplink of voice to the linear transponder and the relay of the voice by the linear transponder

5.1. Downlink of SSTV image

NEXUS sends two kinds of SSTV images, one of which is the fixed image and the other is the image taken by N-CAM on orbit. There are four fixed images stored in the memory of NEXUS. The number of the camera images is four so far, too. The frequency of the SSTV is 437.075MHz, and the mode is Scottie1. Fig. 12 and Fig. 13 shows the fixed images and the camera images downlinked at NUGS, respectively.

Fixed image SSTV1 2019/01/27 at NUGS | Fixed image SSTV2 2019/02/03 at NUGS | Fixed image SSTV3 2019/02/10 at NUGS | Fixed image SSTV4 2019/02/17 at NUGS

Fig. 12 List of SSTV of fixed images received at NUGS

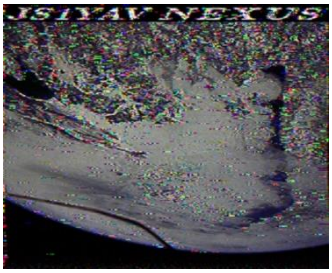


Camera image SSTV1 2019/04/03 at NUGS | Camera image SSTV2 2019/04/04 at NUGS | Camera image SSTV3 2019/04/05 at NUGS | Camera image SSTV4 2019/04/08 at NUGS

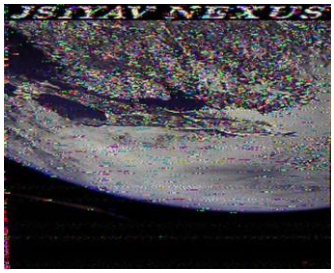
Fig. 13 List of SSTV of camera images received at NUGS

Many amateur radio people cooperated the reception of STTV images. Fig. 14 shows the SSTV images and the callsigns reported until 18 January 2020. We appreciate so much for the cooperation.

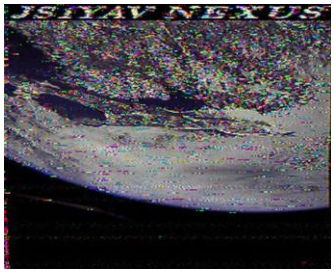
Fixed image SSTV1
2019/03/24 JA1GDE



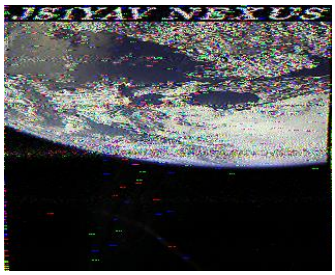
Camera image SSTV1
2019/04/03 JA1GDE



Camera image SSTV4
2019/04/04 JO1PTD

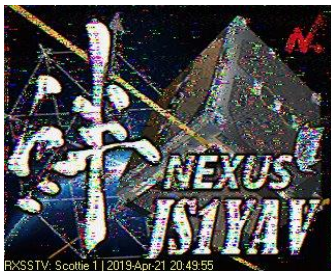


Camera image SSTV4
2019/04/08 JA1GDE



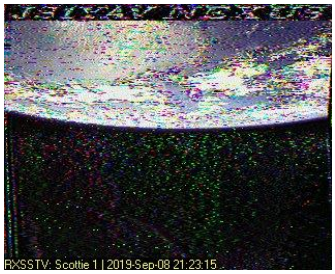
Camera image SSTV4
2019/04/15 JH4DHX

Fixed image SSTV1
2019/04/21 JA1GDE

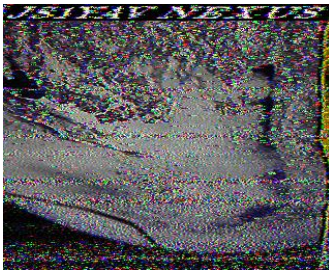


Fixed image SSTV1
2019/04/21 JF1PTU

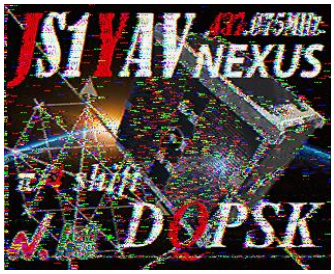
Fixed image SSTV1
2019/08/24 K7WDO



Camera image SSTV3
2019/09/08 JH4DHX

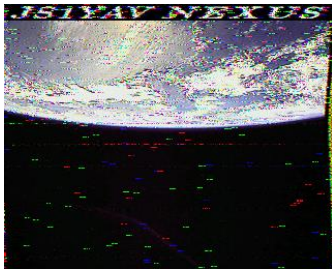


Camera image SSTV1
2019/09/15 JH4DHX

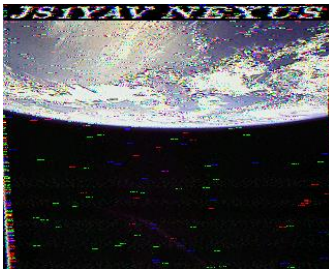


Fixed image SSTV2
2019/10/06 JH4DHX

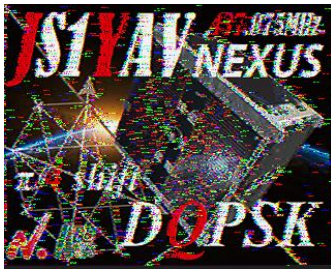
Fixed image SSTV4
2019/10/20 JH4DHX



Camera image SSTV3
2019/10/27 JH4DHX



Camera image SSTV3
2019/11/10 JH4DHX



Fixed image SSTV2
2019/11/24 JH4DHX

Fixed image SSTV4
2019/12/01 JH4DHX

Fig. 14 List of Callsigns that received the SSTV image data

5.2. Downlink of digi-talker voice

Many people cooperated the reception of the digi-talker voice. We appreciate so much for the cooperation. Table 6 shows the callsigns of the stations that cooperated the reception of the digi-talker voice.

Table 6 List of Callsign that received the digi-talker voice (honorific titles are omitted)

JA0CAW,JA0FKM,JA1GDE,JA6PL,JA2MJA,JH4DHX,JK2XXK,JS2GGD,JS2GTK

5.3. Relay of voice data uplinked to linear transponder

The linear transponder is used by many amateur radio people. Table 7 shows the callsigns of the stations that exchanged the voice data with NUGS.

Table 7 List of Callsign that exchanged the voice with NUGS (honorific titles are omitted)

No.	Callsign	No.	Callsign
1	JA0FKM	10	JH1JBP
2	JA0CAW	11	JA3FWT
3	JH4MGU	12	JH4MBU
4	JH3BUM	13	JR6DI
5	7L3AEO	14	JH1EMH
6	JA3FAW	15	JR6RMK
7	JA4NDU	16	JK2XXK
8	JH3FWT	17	JH1UVJ
9	JA1OGZ	18	JH4DHX

The linear transponder is operated not only in Japan but also in other regions. We got the report from the stations marked red in Fig. 15 that they exchanged the voice.

Fig. 15 Distribution of the communication points

5.4. Utilization of reception reports

All the reception reports are used for the health monitoring of NEXUS. The transitions of the battery voltage and the angular velocity are analyzed by combining the data from the reception reports and the downlink data at NUGS such as Fig. 16 and Fig. 17.

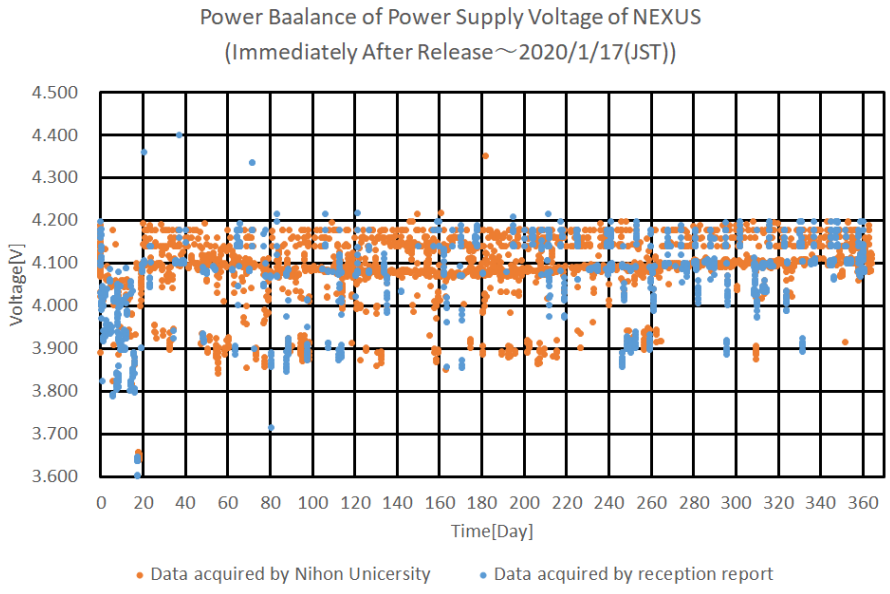


Fig. 16 Relation between the elapsed time since the launch and the battery voltage

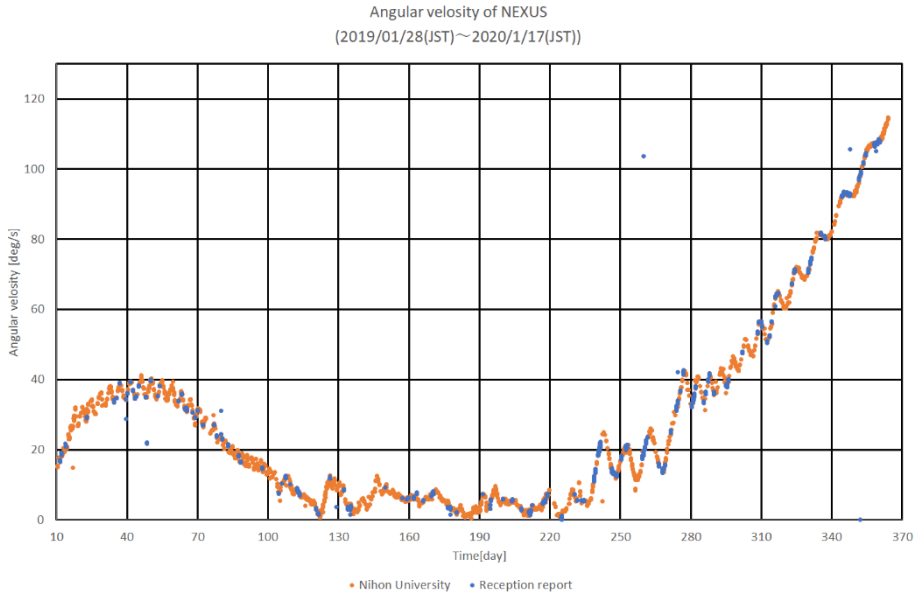


Fig. 17 Relation between the elapsed time from 28 January 2019 and the angular velocity

Finally, the callsigns of the stations we got the reception repots are listed in Table 8. We appreciate so much for your cooperation.

Please note that only the callsigns of the stations that uploaded the reception reports at our web site (http://nexusform.scienceontheweb.net/) are listed in this table.

Table 8 List of Callsign (honorific titles are omitted)

No.	Callsign	No.	Callsign	No.	Callsign
1	BX2ABT	22	JE1HJJ	43	JO1PTD
2	EA4GPX	23	JE6RJA	44	JO1XWH
3	EA4GSX	24	JF1EUY	45	JQ1YCZ
4	G3NR	25	JF1PTU	46	JQ1ZZZ
5	GW8TIX	26	JF2AIA	47	JR6MMK
6	HS3LSE	27	JG1LXL	48	JS2GGD
7	IU2GZZ	28	JG1TWP	49	JS2GTK
8	JA0CAW	29	JH1DIS	50	JS6RTJ
9	JA0FKM	30	JH1OKL	51	K7WDO
10	JA0OAV	31	JH2HTQ	52	KC7MG
11	JA1CPA	32	JH2IRH	53	N0TEL
12	JA1GDE	33	JH3BUM	54	N1AIA
13	JA1JBF	34	JH4DHX	55	PD0OXW
14	JA1OGZ	35	JH4WHW	56	PV8DX
15	JA2MJA	36	JH4XSY	57	R6DIU
16	JA3TDW	37	JH7CKF	58	SP9XK
17	JA6EGM	38	JH9YYL	59	SV2HWM
18	JA6PL	39	JI1LVH	60	VE2GVB
19	JA7KPI	40	JI1SZP	61	Science Club in Tokyo Tech High School of Science and Technology
20	JE0JDY	41	JN4RYW		
21	JE1CVL	42	JO1LDY		

6. Future

We will complete the remained three missions within this fiscal year (until this March) and prepare for the

later phase of the operation as shown in Table 9. In the later phase, we will open the operation of NEXUS to the amateur radio people so that more and more amateur radio people enjoy NEXUS.

Table 9 Future operations

January	– Investigation of the cause of the rapid increase of angular velocity – Completion of π/4 shift QPSK decoder
February	– Evaluation of communication by FSK 19.2k – Evaluation of communication by π/4 shift QPSK decoder – Application of the change of license of ground station to mobile one
March	– Collection of RSSI data – Completion of all mission – Completion of nominal operation phase of NEXUS
After April	Later phase of operation (operation by amateur radio people)

7. Acknowledgement

We received more than 500 reception reports during the last one year since the launch. We also received the many reception reports and the support messages on SNS such as twitter from the amateur radio people all over the world. Those reception reports are used for the analysis of NEXUS. We are encouraged so much by those valuable reports. We would like to take this opportunity to express our appreciation to you all.

8. Detail of operation

The detail of the operation from the morning of January 18, 2019 to the morning of January 18, 2020 is listed in the tables from Table 10 to Table 62.

Table 10 Detail of Operation from 18 January 2019 to 24 January 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
18/01/2019	1	Time(JST) : 11:23:59 11:25:06 11:26:14 Max Elevation : 0.42 [deg]	Sunshine	・First Uplink	・ To confirm that the antenna deployment was successful and that the CW beacon of the bus transmitter could be received as an uplink response from the ground station.	・Bus voltage : 4.160[V]	・ We have received many reports that NEXUS CW beacons are powerful. ・ Confirmed that the bus receiver can receive commands from the ground station. ・ Confirmed that antenna deployment was successful. ・ Confirmed that the bus transmitter can transmit CW beacons.
	2	Time(JST) : 20:21:23 20:27:00 20:32:40 Max Elevation : 40.03 [deg]	Shade	・ Check all communication lines ・ OBJECT B tracking	・ To confirm that communication lines between bus systems are established.	・Bus voltage : 3.999[V]	・Confirmed that the communication line between the bus systems is established. ・ About OBJECT estimation (orbit estimation) Seven of OBJECT A to G were confirmed, and one of them was NEXUS.
	3	Time(JST) : 21:56:21 22:00:53 22:05:28 Ｍａｘ Elevation : 10.24 [deg]	Shade	・ Initial sensing data downlink using GMSK modulation of bus transmitter ・ OBJECT C tracking	・ To confirm that the GMSK modulation of the bus transmitter can be downlinked. ・ To confirm that the initial state of the satellite and the values of sensors are normal from the initial sensing data.	・Bus voltage : 4.025[V] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 30 Circularly polarization : 40	・ Confirmed that downlink using GMSK modulation of the bus transmitter is possible.
19/01/2019	1	Time(JST) : 07:53:33 07:56:14 07:58:55 Max Elevation : 2.54 [deg]	Sunshine	・ Initial sensing data downlink using GMSK modulation of bus transmitter ・ OBJECT F tracking → We wanted to track OBJECT G, but did not enter the visible range, so We track OBJECT F	・ To confirm that the initial state of the satellite and the values of sensors are normal from the initial sensing data.	・Bus voltage : 4.028[V]	・ We confirmed that the Bus voltage was 3.9V or higher, but since the satellite was out of the visible range, the downlink of GMSK modulation could not be performed.
	2	Time(JST) : 09:24:33 09:30:21 09:35:59 Max Elevation : 83.38 [deg]	Sunshine	・ Initial sensing data downlink using GMSK modulation of bus transmitter ・ OBJECT F tracking	・ To confirm that the initial state of the satellite and the values of sensors are normal from the initial sensing data.	・Bus voltage : 4.018[V] ・Recieved packet number Horizontal polarization : 47 Vertical polarization : 45 Circularly polarization : 21	
	3	Time(JST) : 10:59:43 11:03:10 11:06:37 Max Elevation : 4.91 [deg]	Sunshine	・CAM (ROMO) status information downlink using GMSK modulation of the bus transmitter ・ OBJECT F tracking	・ To check the image data size of the initial shooting of CAM.	・Bus voltage : 4.021[V] ・Recieved packet number Horizontal polarization : 285 Vertical polarization : 149 Circularly polarization : 5	・ Confirmed that data can be read from the CAM ROMO and downlinked. ・Judged as a black image based on the size of the downlink image data.
	4	Time(JST) : 19:58:39 20:03:55 20:09:14 Max Elevation : 21.29 [deg]	Shade	・CAM (ROMO) status information downlink using GMSK modulation of the bus transmitter ・ OBJECT F tracking	・ To check the image data size of the initial shooting of CAM.	・Bus voltage : 4.038[V] ・Recieved packet number Horizontal polarization : 174 Vertical polarization : 135 Circularly polarization : 179	・Judged as a black image based on the size of the downlink image data. ・ OBJECT estimation (orbit estimation) OJECT J is added, and it flies in the order of OBJECT J G F E D C B A. One of these appears to be a rocket component.
	5	Time(JST) : 21:32:05 21:37:21 21:42:42 Max Elevation : 20.07 [deg]	Shade	・ Real-time sensing using AFSK modulation of bus transmitter ・ OBJECT F tracking	・ To confirm that the bus transmitter can perform AFSK modulation. ・ To confirm that real-time C&DH sensing is possible.	・Bus voltage : 4.033[V] ・Recieved packet number Horizontal polarization : 249 Vertical polarization : 260 Circularly polarization : 188	・ Confirmed that downlink can be performed using AFSK modulation of the bus transmitter. ・As a result of checking the downlink sensing data, there was a bug in the data. ・ Since the Doppler shifts matched well, NEXUS was determined to be OBJECT F.
20/01/2019	1	Time(JST) 09:05:16 09:10:57 09:16:31	Sunshine	・ CAM photography shooting at Sunshine	・ To downlink image data of the earth.	・Bus voltage : 4.029[V]	
	2	Time(JST) : 10:39:44 10:44:09 10:48:33 Max Elevation : 10.06 [deg]	Sunshine	・CAM (ROM1) status information downlink using GMSK modulation of the bus transmitter	・ To check the data size of the image taken with January 20 1st pass.	・Bus voltage : 4.033[V] ・Recieved packet number Horizontal polarization : 146 Vertical polarization : 120 Circularly polarization : 32	・ As a result of checking the image data size from the status information in ROM1 of the CAM, it was found that the possibility of overexposure was high.
	3	Time(JST) : 19:40:44 19:45:31 19:50:19 Max Elevation : 12.92 [deg]	Shade	・ Real-time sensing using GMSK modulation of bus transmitter ・ Camera shooting command uplink	To take CAM images again.	・Bus voltage : 4.068[V]	・The CAM shooting command was uplink just before LOS, so it could not be passed.
	4	Time(JST) : 21:13:13 21:18:49 21:24:31 Max Elevation : 34.51 [deg]	Shade	・ Confirm that the CAM shooting command sent in the January 20 3rd pass is not passed → CAM shooting command transmission ・ Confirm that the CAM shooting command sent in the January 20 3rd pass is passed → Status information downlink of CAM(EOMO) ・ Data sensing using GMSK modulation of bus transmitter	・ To shoot CAM.	・Bus voltage : 4.063[V] ・Recieved packet number Horizontal polarization : 101 Vertical polarization : 24 Circularly polarization : 32	・ Confirmed that the CAM shooting command sent in the January 20 3rd pass was not passed. ・ Uplinked a command to perform CAM shooting at the boundary of the sundhine, and confirm that it has been received.
21/01/2019	1	Time(JST) : 08:44:44 08:50:05 08:55:21 Max Elevation : 22.31 [deg]	Sunshine	・CAM (ROM1) status information downlink using GMSK modulation of the bus transmitter	・ To check the data size of the image taken with January20 4th pass.	・Bus voltage : 4.093[V] ・Recieved packet number Horizontal polarization : 1 Vertical polarization : 34 Circularly polarization : 119	・ As a result of checking the image data size based on the status information in ROM1 of the CAM, it was found that there was a possibility that a photograph was taken without overexposure.
	2	Time(JST) : 10:18:28 10:23:35 10:28:37 Max Elevation : 18.12 [deg]	Sunshine	・CAM (ROM1)Image data downlink using GMSK modulation of the bus transmitter	・ To downlink the image data taken by the 4th pass of January20.	・Bus voltage : 4.058[V] ・Recieved packet number Horizontal polarization : 99 Vertical polarization : 115 Circularly polarization : 27 ・Received image data VGA(640×480)	・ As a result of analyzing the image data, it was confirmed that the satellite antenna and the earth were taken.
	3	Time(JST) : 19:21:03 19:24:57 19:28:52 Max Elevation : 6.66 [deg]	Shade	・ CAM image data transfer ・ Image data downlink using GMSK modulation of bus transmitter	・ To downlink image data that may show the earth.	・Bus voltage : 4.073[V] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 45 Circularly polarization : 0	
	4	Time(JST) : 20:52:13 20:57:59 21:03:51 Max Elevation : 69.24 [deg]	Shade	・ Image data downlink using GMSK modulation of bus transmitter	・ To downlink image data that may show the earth.	・Bus voltage : 4.071[V] ・Recieved packet number Horizontal polarization : 854 Vertical polarization : 636 Circularly polarization : 282 ・Received image data VGA(640×480)	・ After analyzing the image data, it was confirmed that the satellite antenna and the earth were clearly visible in the photograph.
	5	Time(JST) : 22:30:01 22:32:14 22:34:29 Max Elevation : 1.64 [deg]	Shade	・ Sensing data downlink using GMSK modulation of bus transmitter	・ Based on the fact that there was a bug in real-time sensing data using AFSK modulation of the bus transmitter, to perform sensing data downlink with GMSK modulation and confirm that the downlinked data was normal.	・Bus voltage : 4.058[V] ・Recieved packet number Horizontal polarization : 61 Vertical polarization : 0 Circularly polarization : 0	・ Because the elevation angle was low and the pass time was short, data could not be acquired much.
22/01/2019	1	Time(JST) : 08:24:25 08:29:10 08:33:50	Sunshine	・ Real-time data downlink using FSK transmitter	・ To confirm that downlink with FSK transmitter communication speed of 9600bps is possible.	－	・The CW beacon could not be confirmed at the ground station.
	2	Time(JST) : 09:57:24 10:02:56 10:08:22 Max Elevation : 32.47 [deg]	Sunshine	・ CW normal operation	・ To confirm that the CW beacon is transmitted.	－	・ CW beacon could not be confirmed because I forgot to enter the CW restart command on the 5th pass last night. ・ The uplink did not pass. ・ We found that the cause of the uplink failure was that the output of the uplink radio was low. Another reason is that it was difficult to adjust the uplink frequency reliably because the CW beacon could not hear the sound.
	3	Time(JST) : 19:02:04 19:04:28 19:06:52 Max Elevation : 2.04 [deg]	Shade	・ CW normal operation	・ To confirm that the CW beacon is transmitted.	－	・ The uplink did not pass. ・ The cause of the uplink failure may be that the maximum elevation angle is as low as 2.04 degrees.
	4	Time(JST) : 20:31:28 20:37:13 20:43:02 Elevation : 59.13 [deg]	Shade	・ CW normal operation	・ To confirm that the CW beacon is transmitted.	・Bus voltage : 4.058[V]	・ Confirm that CW has restarted ・ Confirm that satellite status is normal from CW telemetry data.
	5	Time(JST) : 22:07:12 22:11:12 22:15:15	Shade	・ Real-time data downlink using 9600bps communication speed of FSK transmitter	・ To confirm that a downlink using a communication speed of 9600 bps of the FSK transmitter is possible.	・Bus voltage : 4.054[V]	・ The uplink did not pass.
23/01/2019	1	Time(JST) : 08:04:29 08:08:10 08:11:49 Max Elevation : 5.48 [deg]	Sunshine		・ To confirm that the uplink passes.	・Bus voltage : 4.045[V]	・ Based on the fact that the uplink did not pass in the previous operation, the frequency adjustment was improved and the uplink was tried again, but the uplink did not pass.
	2	Time(JST) : 09:36:28 09:42:12 09:47:50 Max Elevation : 64.77 [deg]	Sunshine	・ Real-time data downlink using 9600bps communication speed of FSK transmitter	・ To confirm that a downlink using a communication speed of 9600 bps of the FSK transmitter is possible.	・Bus voltage : 4.055[V] ・Recieved packet number Horizontal polarization : 123 Vertical polarization : 83 Circularly polarization : 0	・ Based on the fact that the uplink did not pass through the previous path, the frequency adjustment was improved and the uplink was tried again, and was successful. ・ Confirmed that a downlink using the FSK transmitter's communication speed of 9600 bps was established, and that the data could be demodulated by the ground station TNC.
	3	Time(JST) : 11:12:30 11:14:59 11:17:28 Max Elevation : 2.25 [deg]	Sunshine	・ CW normal operation ・ Linear transponder operation	・ To check the status of the satellite. ・ To check the operation of the linear transponder.	・Bus voltage : 4.049[V]	The frequency adjustment was improved and the uplink was tried again, and was successful. The operation of the linear transponder was confirmed by LSB (transmission) and USB (reception), but the bandwidth of LSB transmission was narrow, and it was difficult for us to match the frequency with our skill. As a result, it was not possible to downlink a clean sound (the voice of a person who was slightly mixed with mechanical sounds was heard). "
	4	Time(JST) : 20:10:59 20:16:30 20:22:05 Max Elevation : 30.60 [deg]	Shade	・ Save sensing data to C&DH ROM ・ Real-time data downlink using 9600bps communication speed of FSK transmitter	・ To compare whether the value of the sensor fluctuates at the time of RF emission and at the time of no emission (use sensing data as continuous data as much as possible).	・Bus voltage : 4.046[V] ・Recieved packet number Horizontal polarization : 613 Vertical polarization : 507 Circularly polarization : 295	・Even when the FSK transmitter was used, the phenomenon that data values fluctuated was observed.
	5	Time(JST) : 20:10:59 20:16:30 20:22:05 Max Elevation : 30.60 [deg]	Shade	・ Confirmed operation of π / 4 shift QPSK transmitter → Downlink between test data and Reed-Solomon data	・To confirm that test data can be demodulated using downlink and ground station software using a π / 4 shift QPSK transmitter.	・Bus voltage : 4.036[V] ・Recieved packet number 1 packet	・ Confirmed that test data downlink using π / 4 shift QPSK transmitter was possible and that data could be demodulated by ground station software. ・ The elevation angle was low, and the reception status of the π / 4 shift QPSK transmitter was considered to be poor. In addition, it is Shade, and the power state was also weaker than Sunshine.
24/01/2019	1	Time(JST) : 7:45:46 7:47:06 7:48:26 Max Elevation : 0.54 [deg]	Sunshine	・ CW normal operation	・ To confirm the recovery of consumed power using mission communication equipment. ・ Because the elevation angle is low and the pass time is short.	・Bus voltage : 4.047[V]	・ Power recovery after operation using mission communication equipment was confirmed.
	2	Time(JST) : 9:15:41 9:21:25 9:27:02 Max Elevation : 61.57 [deg]	Sunshine	・ Confirmed operation of π / 4 shift QPSK transmitter → Downlink between test data and Reed-Solomon data	・To confirm that test data can be demodulated using downlink and ground station software using a π / 4 shift QPSK transmitter.	・Bus voltage : 4.012[V]	-Although the radio wave of the π / 4 shift QPSK transmitter itself was strong, it could not be demodulated due to the influence of interference on the downlink frequency.
	3	Time(JST) : 10:50:34 10:54:29 10:58:23 Max Elevation : 6.93 [deg]	Sunshine	・ Sensing data downlink using GMSK modulation of bus transmitter	・ To downlink the sensing data stored in the ROM of C & DH by the 4th pass of January24. ・ To compare whether the value of the sensor fluctuates at the time of RF emission and at the time of no emission (use sensing data as continuous data as much as possible).	・Bus voltage : 4.003[V] ・Recieved packet number Horizontal polarization : 320 Vertical polarization : 207 Circularly polarization : 0	・ As a result of comparing downlink data, it was found that RF radiation affected some sensor data.
	4	Time(JST) : 19:50:45 19:55:51 20:00:59 Max Elevation : 17.33 [deg]	Shade	・ Initial sensing data downlink using GMSK modulation of bus transmitter	・ To confirm the Angular velocity of NEXUS immediately after the release from the data of 200 seconds immediately after the release of NEXUS.	・Bus voltage : 4.018[V] ・Recieved packet number Horizontal polarization : 161 Vertical polarization : 325 Circularly polarization : 0	・ Angular velocity of NEXUS immediately after release was about 3.5deg/s.
	5	Time(JST) 21:23:51 21:29:18 21:34:49 Max Elevation : 25.16 [deg]	Shade	・ Initial sensing data downlink using GMSK modulation of bus transmitter	・ To confirm the Angular Velocity when the antenna is deployed from the data 100 seconds before and after the start of Nichrome wire heating.	・Bus voltage : 4.012[V] ・Recieved packet number Horizontal polarization : 745 Vertical polarization : 833 Circularly polarization : 283	・ From the Angular Velocity data for 100 seconds before and after the start of Nichrome wire heating, it was confirmed that the Angular Velocity increased for a moment, and it is probable that the antenna was deployed at this time.

Table 11 Detail of Operation from 25 January 2019 to 31 January 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
1/25/2019	1	AOS(JST) : 08:55:03 LOS(JST) : 09:05:59 Max Elevation : 30.47 [deg]	Sunshine	・CW operation(435.900MHz) ・Erasing image data in CAM ROM and taking images (JPEG, maximum resolution 2592 × 1944)	・To capture the highest resolution image.	・Bus voltage : 4.031[V]	
	2	AOS(JST) : 10:29:09 LOS(JST) : 10:38:38 Max Elevation : 13.39 [deg]	Sunshine	・CW operation(435.900MHz) ・CAM ROM status downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the size of the CAM image taken with the 1st pass of 25 Jan. and determine whether it is a black image or something.	・Bus voltage : 4.060 [V] ・Recieved packet number Horizontal polarization : 612 Vertical polarization : 443 Circularly polarization : 230	
	3	AOS(JST) : 19:30:51 LOS(JST) : 19:39:41 Max Elevation : 9.61 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the angular velocity. ・To check the initial sensing data.	・Bus voltage : 4.058 [V] ・Recieved packet number Horizontal polarization : 31 Vertical polarization : 121 Circularly polarization : 0	
	4	AOS(JST) : 21:02:43 LOS(JST) : 21:14:14 Max Elevation : 47.89 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Test operation of π / 4 shift QPSK transmitter (38400bps,435.900MHz)	・To check the angular velocity. ・In order to verify the operation of π / 4 shift QPSK transmitter under favorable conditions with a large elevation angle.	・Bus voltage : 4.053 [V]	
1/26/2019	1	AOS(JST) : 08:34:35 LOS(JST) : 08:44:39 Max Elevation : 16.52 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Test operation of linear transponder	・To demonstrate the operation of the linear transponder with JAMSAT people and practice the operation of the linear transponder.	・Bus voltage : 4.030[V]	・The linear transponder was operated at a transmission frequency of 145.915 MHz (fixed on the transmission side) and a transmission power of 10 W, and the JAMSAT people adjusted the reception side (USB). First, CW transmission was performed from the Nihon univercity ground station, and it was confirmed that reception (USB) was possible. After that, voice transmission (LSB) was also performed, and it was confirmed that reception was possible.
	2	AOS(JST) : 10:07:58 LOS(JST) : 10:18:32 Max Elevation : 23.74 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Test operation of linear transponder	・To demonstrate the operation of the linear transponder with JAMSAT people and practice the operation of the linear transponder.	・Bus voltage : 4.020 [V]	
	3	AOS(JST) : 19:11:26 LOS(JST) : 19:18:02 Max Elevation : 9.62 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・SSTV operation(FM,437.075MHz)	・To check the angular velocity. ・To verify the operation of the SSTV.	・Bus voltage : 4.044[V]	・SSTV downlink was performed only with Horizontal polarization. As a result, part of the image could be downlinked. Therefore, the function of SSTV is not considered to have failed. However, in the obtained image, some parts were stripped and some were not. This is because the acquisition was performed only with horizontal polarization. Also, since the elevation angle was 4 degrees and the trajectory conditions were
	4	AOS(JST) : 20:41:50 LOS(JST) : 20:53:30 Max Elevation : 84.59 [deg]	Shade	・CW operation(435.900MHz) ・Test operation of linear transponder	・To demonstrate the operation of the linear transponder with JAMSAT people and practice the operation of the linear transponder.	・Bus voltage : 4.030 [V]	
	5	AOS(JST) : 22:18:28 LOS(JST) : 22:25:04 Max Elevation : 4.00 [deg]	Shade	・CW operation(435.900MHz) ・HK data sensing command uplink	・To check the angular velocity.	・Bus voltage : 4.024 [V]	
1/27/2019	1	AOS(JST) : 08:14:25 LOS(JST) : 08:22:54 Max Elevation : 8.45 [deg]	Sunshine	・CW operation(435.900MHz) ・SSTV operation(FM,437.075MHz)	・To verify the operation of the SSTV.	・Bus voltage : 4.046 [V]	・Complete SSTV image was downlinked.
	2	AOS(JST) : 09:46:58 LOS(JST) : 09:58:07 Max Elevation : 44.50 [deg]	Sunshine	・CW operation(435.900MHz) ・Test operation of π / 4 shift QPSK transmitter (38400bps.435.900MHz)	・To check the angular velocity. ・In order to verify the operation of π / 4 shift QPSK transmitter under favorable conditions with a large elevation angle.	・Bus voltage : 4.011 [V]	・Downlink of "Synchronization code + Reed-Solomon" was performed, and the demodulator was adjusted.
	3	AOS(JST) : 11:24:30 LOS(JST) : 11:25:13 Max Elevation : 0.18 [deg]	Sunshine	・CW operation(435.900MHz) ・SSTV operation(FM,437.075MHz)	・To verify the operation of the SSTV.	－	・Uplink was not able to pass because of low elevation and short pass time. ・Bus voltage could not be confirmed by CW reception.
	4	AOS(JST) : 20:21:13 LOS(JST) : 20:32:36 Max Elevation : 42.25 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 26 Jan..	・Bus voltage : 4.052 [V]	・Uplink was not recieved. It may have had some effect that the operation of the ground station software was changed and the operation verification was performed by EM until immediately before, but the cause is not known.
	5	AOS(JST) : 21:56:13 LOS(JST) : 22:05:18 Max Elevation : 9.92 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Digitalker operation(FM,437.075MHz)	・To check the angular velocity. ・To verify the operation of the Digitalker.	・Bus voltage : 4.062 [V]	・I was able to downlink the sound of the digital talker clearly.
1/28/2019	1	AOS(JST) : 07:54:50 LOS(JST) : 08:00:27 Max Elevation : 2.85 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 26 Jan..	・Bus voltage : 4.032 [V]	・Since the uplink passed just before LOS, Nihon University could not do the downlink.
	2	AOS(JST) : 09:26:06 LOS(JST) : 09:37:27 Max Elevation : 88.85 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・π/4 shift QPSK (435.900MHz) transmitter test operation	・To check the angular velocity. ・In order to verify the operation of π / 4 shift QPSK transmitter under favorable conditions with a large elevation angle.	・Bus voltage : 4.029 [V]	・In this setting, it is not possible to get too many packets yet, so we will create a VER that can be analyzed from the WAV file and check whether the decoding rate will improve.
	3	AOS(JST) : 11:01:30 LOS(JST) : 11:08:00 Max Elevation : 4.28 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 26 Jan..	・Bus voltage : 4.011 [V] ・Recieved packet number Horizontal polarization : 115 Vertical polarization : 69 Circularly polarization : 8	
	4	AOS(JST) : 20:00:50 LOS(JST) : 20:11:35 Max Elevation : 23.07 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・FSK transmitter (GMSK,9600bps,435.900MHz) test operation	・To check the angular velocity. ・To transmit test data (0101 pattern) by FSK transmitter and adjust demodulation software.	・Bus voltage : 4.047 [V]	・There were a few cases where pattren could be obtained continuously.
	5	AOS(JST) : 21:34:33 LOS(JST) : 21:45:03 Max Elevation : 18.58 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 26 Jan..	・Bus voltage : 4.050 [V] ・Recieved packet number Horizontal polarization : 162 Vertical polarization : 189 Circularly polarization : 208	
1/29/2019	1	AOS(JST) : 09:05:22 LOS(JST) : 09:16:32 Max Elevation : 42.81 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 26 Jan..	・Bus voltage : 4.061 [V] ・Recieved packet number Horizontal polarization : 462 Vertical polarization : 326 Circularly polarization : 166	
	2	AOS(JST) : 10:39:51 LOS(JST) : 10:48:31 Max Elevation : 9.65 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz)	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 26 Jan..	・Bus voltage : 4.029 [V] ・Recieved packet number Horizontal polarization : 211 Vertical polarization : 318 Circularly polarization : 46	・From the HK data sensed from the 5th pass on 26 Jan., the magnitude of Angular velocity was about 15deg/s.
	3	AOS(JST) : 19:40:45 LOS(JST) : 19:50:22 Max Elevation : 13.13 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・FSK transmitter (GMSK,9600bps,435.900MHz) test operation	・To check the angular velocity. ・To transmit test data (0101 pattern) by FSK transmitter and adjust demodulation software.	・Bus voltage : 4.062 [V]	・There were a few cases where pattren could be obtained continuously.
	4	AOS(JST) : 21:13:15 LOS(JST) : 21:24:33 Max Elevation : 33.97 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Image data downlink using FSK transmitter (GMSK,9600bps,435.900MHz) →size : 227328, SSC=53, SP=0, ESC=53, EP=151	・To check the angular velocity. ・To downlink photos taken with the 2nd pass on 25 Jan..	・Bus voltage : 4.062 [V] ・Recieved packet number Horizontal polarization : 1301 Vertical polarization : 1373 Circularly polarization : No operation	・The CAM image is downlinked in six times. → This time (1/6) downlinked
1/30/2019	1	AOS(JST) : 08:44:48 LOS(JST) : 08:55:20 Max Elevation : 22.31 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・FSK transmitter (GMSK,9600bps,435.900MHz) test operation	・To check the angular velocity. ・To transmit test data (0101 pattern) by FSK transmitter and adjust demodulation software.	・Bus voltage : 4.047 [V]	・There were a few cases where pattren could be obtained continuously. ・Angular velocity : 18.97 [deg/s]
	2	AOS(JST) : 10:18:33 LOS(JST) : 10:28:34 Max Elevation : 17.56 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・FSK transmitter (GMSK,9600bps,435.900MHz) test operation	・To check the angular velocity. ・To transmit test data (0101 pattern) by FSK transmitter and adjust demodulation software.	・Bus voltage : 4.027 [V]	・There were a few cases where pattren could be obtained continuously. ・Angular velocity : 19.11 [deg/s]
	3	AOS(JST) : 19:2:03 LOS(JST) : 19:28:55 Max Elevation : 6.78 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Image data downlink using FSK transmitter (GMSK,9600bps,435.900MHz) →size : 227328, SSC=53, SP=152, ESC=53, EP=303	・To check the angular velocity. ・To downlink photos taken with the 2nd pass on 25 Jan..	・Bus voltage : 4.061 [V] ・Recieved packet number Horizontal polarization : 13 Vertical polarization : 33 Circularly polarization : No operation	・Angular velocity : 18.42 [deg/s]
	4	AOS(JST) : 20:52:15 LOS(JST) : 21:03:52 Max Elevation : 67.96 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Image data downlink using FSK transmitter (GMSK,9600bps,435.900MHz) →size : 227328, SSC=53, SP=152, ESC=53, EP=303	・To check the angular velocity. ・To downlink photos taken with the 2nd pass on 25 Jan..	・Bus voltage : 4.062 [V] ・Recieved packet number Horizontal polarization : 740 Vertical polarization : 813 Circularly polarization : No operation	・Angular velocity : 18.15 [deg/s]
	5	AOS(JST) : 22:30:07 LOS(JST) : 22:34:27 Max Elevation : 67.96 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data sensing command uplink	・To check the angular velocity. ・To observe long-term changes in angular velocity.	・Bus voltage : 3.984 [V]	・Angular velocity : 19.03 [deg/s]
1/31/2019	1	AOS(JST) : 08:24:28 LOS(JST) : 08:33:47 Max Elevation : 11.99 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the FSK transmitter (GMSK,9600bps,435.900MHz)	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 30 Jan..	・Bus voltage : 4.045 [V] ・Recieved packet number Horizontal polarization : 5 Vertical polarization : 5 Circularly polarization : No operation	・The radio interference was strong.
	2	AOS(JST) : 09:57:27 LOS(JST) : 10:08:18 Max Elevation : 31.58 [deg]	Sunshine	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK,9600bps,437.075MHz) ・Image data downlink using bus transmitter (GMSK,9600bps,437.075MHz) →size : 227328, SSC=304, SP=152, ESC=53, EP=455	・To check the angular velocity. ・To downlink HK data that we got on the 5th pass on 30 Jan..	・Bus voltage : 4.012 [V] ・Recieved packet number(HK) Horizontal polarization : 35 Vertical polarization : 85 Circularly polarization : 88 ・Recieved packet number Horizontal polarization : 284 Vertical polarization : 171 Circularly polarization : No operation	・Since the situation of FF value occurred in the middle of downlinked HK data, we shifted to CAM image data downlink.
	3	AOS(JST) : 19:02:02 LOS(JST) : 19:06:54 Max Elevation : 2.11 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ	・To check the angular velocity.	・Bus voltage : 3.945 [V]	・From the switch information, it was found that the heater power was ON because the battery temperature was low.
	4	AOS(JST) : 20:31:29 LOS(JST) : 20:43:03 Max Elevation : 60.16 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Image data downlink using FSK transmitter (GMSK,9600bps,435.900MHz) →size : 227328, SSC=53, SP=456, ESC=53, EP=607	・To check the angular velocity. ・To downlink photos taken with the 2nd pass on 25 Jan..	・Bus voltage : 4.058 [V] ・Recieved packet number Horizontal polarization : 1123 Vertical polarization : 1165 Circularly polarization : No operation	・Angular velocity : 19.58 [deg/s]
	5	AOS(JST) : 22:07:15 LOS(JST) : 22:15:14 Max Elevation : 6.65 [deg]	Shade	・CW custom operation(435.900MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data sensing commnad uplink	・To check the angular velocity. ・To observe long-term changes in angular velocity.	・Bus voltage : 4.039 [V]	・Angular velocity : 20.04 [deg/s]

Table 12 Detail of Operation from 1 February 2019 to 7 February 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2/1/2019	1	AOS(JST) : 08:04:30 LOS(JST) : 08:11:45 Max Elevation : 5.40 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send C&DH OFF command	・To check the angular velocity. ・To end sensing for 6 orbits since last night and to turn off the power of C & DH.	・Bus voltage : 4.016 [V] ・Angular velocity : 21.24 [deg/s]	
	2	AOS(JST) : 9:36:30 LOS(JST) : 9:47:45 Max Elevation : 63.36 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・To check the angular velocity. ・To end sensing for 6 orbits since last night and to turn off the power of C & DH.	・Bus voltage : 3.928 [V] ・Angular velocity : 21.09 [deg/s] ・Recieved packet number Horizontal polarization : 460 Vertical polarization : 453 Circularly polarization : 250	
	3	AOS(JST) : 11:12:38 LOS(JST) : 11:17:17 Max Elevation : 1.97 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・To check the angular velocity.	・Bus voltage : 3.933 [V] ・Angular velocity : 20.76 [deg/s]	
	4	AOS(JST) : 20:10:58 LOS(JST) : 20:22:05 Max Elevation : 30.98 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・To check the angular velocity. ・To downlink HK data got on the 5th pass of 31 Jan..	・Bus voltage : 3.983 [V] ・Angular velocity : 20.24 [deg/s] ・Recieved packet number Horizontal polarization : 224 Vertical polarization : 578 Circularly polarization : 151	
	5	AOS(JST) : 21:45:19 LOS(JST) : 21:5:11 Max Elevation : 13.63 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz) →Size : 227328, SSC=608, SP=53, ESC=53, EP=759	・To check the angular velocity. ・To downlink a part of CAM image data.	・Bus voltage : 3.981 [V] ・Angular velocity : 20.80 [deg/s] ・Recieved packet number Horizontal polarization : 943 Vertical polarization : 1012 Circularly polarization : No operation	
2/2/2019	1	AOS(JST) : 09:15:42 LOS(JST) : 09:26:57 Max Elevation : 62.22 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・To check the angular velocity.	・Bus voltage : 3.969 [V] ・Angular velocity : 24.10 [deg/s] ・Recieved packet number Horizontal polarization : 935 Vertical polarization : 777 Circularly polarization : No operation	
	2	AOS(JST) : 10:50:37 LOS(JST) : 10:58:15 Max Elevation : 6.59 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・CAM image downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size : 227328, SSC=53, SP=760, ESC=53, EP=887	・To check the angular velocity. ・To downlink a part of CAM image data.	・Bus voltage : 3.947 [V] ・Angular velocity : 24.12 [deg/s]	
	3	AOS(JST) : 19:50:44 LOS(JST) : 19:55:51 Max Elevation : 17.49 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz) →Canceled →Confirm that Battery voltage is 3.9 V or less and send C&DH OFF command	・To check the angular velocity. ・To downlink HK data got on the 5th pass of 31Jan..	・Bus voltage : 3.862[V] ・Angular velocity : 23.14 [deg/s]	・Since the bus voltage was less than 3.9 V, the HK data downlink was not performed. ・Battery voltage dropped because C & DH / ON had been on for more than 12 hours since morning operation. C & DH / OFF command was sent to recharge the battery.
	4	AOS(JST) : 21:23:51 LOS(JST) : 21:34:47 Max Elevation : 24.75 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the FSK transmitter (GMSK, 9600 bps, 435.900 MHz)	・To check the angular velocity. ・Since the in-orbit HK data downlink could not be performed on the 3rd path of 2 Feb., we used an FSK transmitter that can expect more packets than the bus transmitter.	・Bus voltage : 3.884 [V] ・Angular velocity : 23.48 [deg/s] ・Recieved packet number Horizontal polarization : 1209 Vertical polarization : 1433 Circularly polarization : No operation	
2/3/2019	1	AOS(JST) : 08:55:02 LOS(JST) : 09:00:30 Max Elevation : 30.49 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Linear transponder test operation (UP : 145.900～145.930 MHz/ DOWN : 435.880～435.910 MHz)	・To check the angular velocity. ・To check the response from the linear transponder and measure the electric field strength of the received linear transponder.	・Bus voltage : 3.884 [V] ・Angular velocity : 26.38 [deg/s]	・The linear transponder was operated at a transmission frequency of 145.915 MHz (fixed on the transmission side) and a transmission power of 10 W, and the JAMSAT people adjusted the reception side (USB). Although a voice transmission (LSB) was performed and the response was slightly heard at the Nihon Univercity, the electric field strength could not be measured.
	2	AOS(JST) : 10:29:10 LOS(JST) : 10:38:30 Max Elevation : 12.95 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Linear transponder test operation (UP : 145.900～145.930 MHz/ DOWN : 435.880～435.910 MHz)	・To check the angular velocity. ・To check the response from the linear transponder and measure the electric field strength of the received linear transponder.	・Bus voltage : 3.916 [V] ・Angular velocity : 26.81 [deg/s]	・The linear transponder was operated at a transmission frequency of 145.915 MHz (fixed on the transmission side) and a transmission power of 10 W, and the JAMSAT people adjusted the reception side (USB). Although a voice transmission (LSB) was performed and the response was slightly heard at the Nihon Univercity, the electric field strength could not be measured.
	3	AOS(JST) : 19:30:49 LOS(JST) : 19:39:38 Max Elevation : 9.67 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Digitalker operation(FM,437.075MHz)	・To check the angular velocity. ・To verify the operation of the Digitalker.	・Bus voltage : 3.940 [V] ・Angular velocity : 25.90 [deg/s]	・The digital talker voice was successfully downlinked.
	4	AOS(JST) : 21:02:41 LOS(JST) : 21:14:11 Max Elevation : 47.05 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・SSTV operation(FM,437.075MHz)	・To check the angular velocity. ・To verify the operation of the SSTV.	・Bus voltage : 3.933 [V] ・Angular velocity : 26.00 [deg/s]	・The image was obtained by downlinking the SSTV image data stored in the C & DH ROM.
2/4/2019	1	AOS(JST) : 08:34:33 LOS(JST) : 08:44:31 Max Elevation : 16.40 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send CAM shooting command (JPEG, resolution 2592 × 1944)	・To check the angular velocity. ・To demonstrate the practicality of the small camera system (N-CAM).	・Bus voltage : 4.002 [V] ・Angular velocity : 26.82 [deg/s]	・A command was sent so that CAM photography could be performed over Japan, and the uplink was successfully completed.
	2	AOS(JST) : 10:07:57 LOS(JST) : 10:18:23 Max Elevation : 23.09 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Turn off the automatic control of the heater and send the HK data sensing command on orbit for about 6 lap.	・To check the angular velocity. ・To confirm the effect of heater on angular velocity.	・Bus voltage : 3.984 [V] ・Angular velocity : 26.63 [deg/s]	・Although the heater automatic control OFF command was sent, it was suspected that the heater was not turned off from the switch information because the heater was not turned off and the battery voltage did not recover. → As a result of checking the EPS program, it was found that when the heater was turned on, sending this command did not turn off the heater automatic control.
	3	AOS(JST) : 19:11:22 LOS(JST) : 19:17:57 Max Elevation : 4.28 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send all switch Off command	・To check the angular velocity. ・To turn off the heater.	・Bus voltage : 3.602 [V] ・Angular velocity : 28.4 [deg/s]	・ Because the heater was always turned on before turning off the heater with the All switch off command, we thought that the heater would go into the power saving mode and the heater would turn off. This indicates that the orbiter was on orbit with the heater on for about 9 hours (about 6 orbits around the orbit). ・From the results of the power analysis, although NEXUS could be expected to switch to the power saving mode, the fact that it did not switch means that there is a mismatch between the current satellite state and the analysis conditions. After recovery, about 9 hours of HK data will be downlinked and compared with the analysis result.
	4	AOS(JST) : 20:41:47 LOS(JST) : 20:53:25 Max Elevation : 85.73 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.646 [V] ・Angular velocity : 29.05 [deg/s]	
	5	AOS(JST) : 22:18:28 LOS(JST) : 22:24:56 Max Elevation : 3.84 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.666 [V] ・Angular velocity : 29.05 [deg/s]	
2/5/2019	1	AOS(JST) : 08:14:22 LOS(JST) : 08:22:45 Max Elevation : 8.35 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.658 [V] ・Angular velocity : 31.97 [deg/s]	
	2	AOS(JST) : 09:46:55 LOS(JST) : 09:46:55 Max Elevation : 43.52 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.653 [V] ・Angular velocity : 31.75 [deg/s]	
	3	AOS(JST) : 18:53:31 LOS(JST) : 18:54:49 Max Elevation : 0.14 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.535 [V]	・Battery recharge states is not so good.
	4	AOS(JST) : 20:21:08 LOS(JST) : 20:32:30 Max Elevation : 42.63 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send Heater always OFF command and CW power saving mode command.	・battery recharge and checking the angular velocity.	・Bus voltage : 3.669 [V]	
	5	AOS(JST) : 21:56:10 LOS(JST) : 22:05:10 Max Elevation : 9.70 [deg]	Shade	・CW power saving operation(437.075MHz)	・Battery recharge	・Bus voltage : 3.714 [V]	
2/6/2019	1	AOS(JST) : 07:54:45 LOS(JST) : 08:00:16 Max Elevation : 2.76 [deg]	Sunshine	・CW power saving operation(437.075MHz)	・Battery recharge	・Bus voltage : 4.013 [V]	・After confirming the Bus voltage of 4.0 V or more, it was planned to shift to the CW custom mode. However, because the elevation angle was low and the pass time was short, decoding at TNC could not be performed, and the Bus voltage during operation could not be confirmed. After LOS, decoding was performed visually from the SDR screen.
	2	AOS(JST) : 09:26:01 LOS(JST) : 09:37:16 Max Elevation : 89.81 [deg]	Sunshine	・CW power saving operation(437.075MHz) ・Send CW custom mode command.	・To confirm the recovery of Bus voltage and monitor Angular velocity again.	・Bus voltage : 4.003 [V] ・Angular velocity : 27.01 [deg/s]	
	3	AOS(JST) : 11:01:28 LOS(JST) : 11:07:45 Max Elevation : 4.01 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, Battery temparture, GyroX, GyroY, GyroZ	・To check the battery voltage and angular velocity when the heater is off.	・Bus voltage : 4.055 [V] ・Angular velocity : 26.67 [deg/s] ・Battery temparture1 : -7.35 [℃] ・Battery temparture2 : -7.35 [℃]	
	4	AOS(JST) : 20:00:44 LOS(JST) : 20:11:26 Max Elevation : 23.14 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, Battery temparture, GyroX, GyroY, GyroZ ・Send line check command	・To check the battery voltage and angular velocity when the heater is off.	・Bus voltage : 4.091 [V] ・Angular velocity : 27.11 [deg/s] ・Battery temparture1 : -2.82 [℃] ・Battery temparture2 : -0.38 [℃]	・The Ministry of Internal Affairs and Communications came to Nihon University and conducted a new ground station and satellite station inspection. The line check command was uplinked, and it was confirmed that the line check result was returned from the satellite as UPLINK
	5	AOS(JST) : 21:34:28 LOS(JST) : 21:44:54 Max Elevation : 18.24 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, Battery temparture, GyroX, GyroY, GyroZ ・Send CW power saving mode command.	・Angular velocity tended to increase during CW custom operation from 3rd to 5th on 6 Feb., whereas Angular velocity tended to decrease during CW power saving operation from 2nd to 3rd on 6 Feb..	・Bus voltage : 4.099 [V] ・Angular velocity : 27.43 [deg/s] ・Battery temparture1 : -2.31 [℃] ・Battery temparture2 : 0.92 [℃]	
2/7/2019	1	AOS(JST) : 09:05:15 LOS(JST) : 09:16:19 Max Elevation : 42.87 [deg]	Sunshine	・Confirm Angular velocity after sending CW custom mode command ・Send CW power saving mode command.	・Only when it enters the visible range of the Nihon University, switch to the CW custom mode to check the Angular velocity.	・Bus voltage : 4.144 [V] ・Angular velocity : 29.53 [deg/s]	
	2	AOS(JST) : 10:39:46 LOS(JST) : 10:48:17 Max Elevation : 9.33 [deg]	Sunshine	・Confirm Angular velocity after sending CW custom mode command ・CAM status downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・In order to determine whether there is an image that shows the earth from the size of the image data captured by CAM on the 1st path of 4 Feb..	・Bus voltage : 4.179 [V] ・Recieved packet number Horizontal polarization : 335 Vertical polarization : 265 Circularly polarization : 64	
	3	AOS(JST) : 19:02:02 LOS(JST) : 19:06:54 Max Elevation : 2.11 [deg]	Shade	・Confirm Angular velocity after sending CW custom mode command ・Send CW power saving mode command.	・Only when it enters the visible range of the Nihon University, switch to the CW custom mode to check the Angular velocity.	・Bus voltage : 4.077 [V] ・Angular velocity : 30.79 [deg/s] ・Battery temparture1 : -6.66 [℃] ・Battery temparture2 : -4.33 [℃]	
	4	AOS(JST) : 22:07:15 LOS(JST) : 22:15:14 Max Elevation : 6.65 [deg]	Shade	・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・To downlink HK data got on the 2nd pass of 6 Feb..	・Bus voltage : 4.107 [V] ・Recieved packet number Horizontal polarization : 426 Vertical polarization : 476 Circularly polarization : 121	

Table 13 Detail of Operation from 8 February 2019 to 14 February 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2/1/2019	1	AOS(JST) : 08:04:30 LOS(JST) : 08:11:45 Max Elevation : 5.40 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send C&DH OFF command	・To check the angular velocity. ・To end sensing for 6 orbits since last night and to turn off the power of C & DH.	・Bus voltage : 4.016 [V] ・Angular velocity : 21.24 [deg/s]	
	2	AOS(JST) : 9:36:30 LOS(JST) : 9:47:45 Max Elevation : 63.36 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・To check the angular velocity. ・To end sensing for 6 orbits since last night and to turn off the power of C & DH.	・Bus voltage : 3.928 [V] ・Angular velocity : 21.09 [deg/s] ・Recieved packet number Horizontal polarization : 460 Vertical polarization : 453 Circularly polarization : 250	
	3	AOS(JST) : 11:12:38 LOS(JST) : 11:17:17 Max Elevation : 1.97 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・To check the angular velocity.	・Bus voltage : 3.933 [V] ・Angular velocity : 20.76 [deg/s]	
	4	AOS(JST) : 20:10:58 LOS(JST) : 20:22:05 Max Elevation : 30.98 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・To check the angular velocity. ・To downlink HK data got on the 5th pass of 31 Jan..	・Bus voltage : 3.983 [V] ・Angular velocity : 20.24 [deg/s] ・Recieved packet number Horizontal polarization : 224 Vertical polarization : 578 Circularly polarization : 151	
	5	AOS(JST) : 21:45:19 LOS(JST) : 21:5:11 Max Elevation : 13.63 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz) →Size : 227328, SSC=608, SP=53, ESC=53, EP=759	・To check the angular velocity. ・To downlink a part of CAM image data.	・Bus voltage : 3.981 [V] ・Angular velocity : 20.80 [deg/s] ・Recieved packet number Horizontal polarization : 943 Vertical polarization : 1012 Circularly polarization : No operation	
2/2/2019	1	AOS(JST) : 09:15:42 LOS(JST) : 09:26:57 Max Elevation : 62.22 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・To check the angular velocity.	・Bus voltage : 3.969 [V] ・Angular velocity : 24.10 [deg/s] ・Recieved packet number Horizontal polarization : 935 Vertical polarization : 777 Circularly polarization : No operation	
	2	AOS(JST) : 10:50:37 LOS(JST) : 10:58:15 Max Elevation : 6.59 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・CAM image downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size : 227328, SSC=53, SP=760, ESC=53, EP=887	・To check the angular velocity. ・To downlink a part of CAM image data.	・Bus voltage : 3.947 [V] ・Angular velocity : 24.12 [deg/s]	
	3	AOS(JST) : 19:50:44 LOS(JST) : 19:55:51 Max Elevation : 17.49 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz) →Canceled →Confirm that Battery voltage is 3.9 V or less and send C&DH OFF command	・To check the angular velocity. ・To downlink HK data got on the 5th pass of 31Jan..	・Bus voltage : 3.862[V] ・Angular velocity : 23.14 [deg/s]	・Since the bus voltage was less than 3.9 V, the HK data downlink was not performed. ・Battery voltage dropped because C & DH / ON had been on for more than 12 hours since morning operation. C & DH / OFF command was sent to recharge the battery.
	4	AOS(JST) : 21:23:51 LOS(JST) : 21:34:47 Max Elevation : 24.75 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・HK data downlink using the FSK transmitter (GMSK, 9600 bps, 435.900 MHz)	・To check the angular velocity. ・Since the in-orbit HK data downlink could not be performed on the 3rd path of 2 Feb., we used an FSK transmitter that can expect more packets than the bus transmitter.	・Bus voltage : 3.884 [V] ・Angular velocity : 23.48 [deg/s] ・Recieved packet number Horizontal polarization : 1209 Vertical polarization : 1433 Circularly polarization : No operation	
2/3/2019	1	AOS(JST) : 08:55:02 LOS(JST) : 09:00:30 Max Elevation : 30.49 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Linear transponder test operation (UP : 145.900～145.930 MHz/ DOWN : 435.880～435.910 MHz)	・To check the angular velocity. ・To check the response from the linear transponder and measure the electric field strength of the received linear transponder.	・Bus voltage : 3.884 [V] ・Angular velocity : 26.38 [deg/s]	・The linear transponder was operated at a transmission frequency of 145.915 MHz (fixed on the transmission side) and a transmission power of 10 W, and the JAMSAT people adjusted the reception side (USB). Although a voice transmission (LSB) was performed and the response was slightly heard at the Nihon Univercity, the electric field strength could not be measured.
	2	AOS(JST) : 10:29:10 LOS(JST) : 10:38:30 Max Elevation : 12.95 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Linear transponder test operation (UP : 145.900～145.930 MHz/ DOWN : 435.880～435.910 MHz)	・To check the angular velocity. ・To check the response from the linear transponder and measure the electric field strength of the received linear transponder.	・Bus voltage : 3.916 [V] ・Angular velocity : 26.81 [deg/s]	・The linear transponder was operated at a transmission frequency of 145.915 MHz (fixed on the transmission side) and a transmission power of 10 W, and the JAMSAT people adjusted the reception side (USB). Although a voice transmission (LSB) was performed and the response was slightly heard at the Nihon Univercity, the electric field strength could not be measured.
	3	AOS(JST) : 19:30:49 LOS(JST) : 19:39:38 Max Elevation : 9.67 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Digitalker operation(FM,437.075MHz)	・To check the angular velocity. ・To verify the operation of the Digitalker.	・Bus voltage : 3.940 [V] ・Angular velocity : 25.90 [deg/s]	・The digital talker voice was successfully downlinked.
	4	AOS(JST) : 21:02:41 LOS(JST) : 21:14:11 Max Elevation : 47.05 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・SSTV operation(FM,437.075MHz)	・To check the angular velocity. ・To verify the operation of the SSTV.	・Bus voltage : 3.933 [V] ・Angular velocity : 26.00 [deg/s]	・The image was obtained by downlinking the SSTV image data stored in the C & DH ROM.
2/4/2019	1	AOS(JST) : 08:34:33 LOS(JST) : 08:44:31 Max Elevation : 16.40 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send CAM shooting command (JPEG, resolution 2592 × 1944)	・To check the angular velocity. ・To demonstrate the practicality of the small camera system (N-CAM).	・Bus voltage : 4.002 [V] ・Angular velocity : 26.82 [deg/s]	・A command was sent so that CAM photography could be performed over Japan, and the uplink was successfully completed.
	2	AOS(JST) : 10:07:57 LOS(JST) : 10:18:23 Max Elevation : 23.09 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Turn off the automatic control of the heater and send the HK data sensing command on orbit for about 6 lap.	・To check the angular velocity. ・To confirm the effect of heater on angular velocity.	・Bus voltage : 3.984 [V] ・Angular velocity : 26.63 [deg/s]	・Although the heater automatic control OFF command was sent, it was suspected that the heater was not turned off from the switch information because the heater was not turned off and the battery voltage did not recover. → As a result of checking the EPS program, it was found that when the heater was turned on, sending this command did not turn off the heater automatic control.
	3	AOS(JST) : 19:11:22 LOS(JST) : 19:17:57 Max Elevation : 4.28 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send all switch Off command	・To check the angular velocity. ・To turn off the heater.	・Bus voltage : 3.602 [V] ・Angular velocity : 28.4 [deg/s]	・ Because the heater was always turned on before turning off the heater with the All switch off command, we thought that the heater would go into the power saving mode and the heater would turn off. This indicates that the orbiter was on orbit with the heater on for about 9 hours (about 6 orbits around the orbit). ・From the results of the power analysis, although NEXUS could be expected to switch to the power saving mode, the fact that it did not switch means that there is a mismatch between the current satellite state and the analysis conditions. After recovery, about 9 hours of HK data will be downlinked and compared with the analysis result.
	4	AOS(JST) : 20:41:47 LOS(JST) : 20:53:25 Max Elevation : 85.73 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.646 [V] ・Angular velocity : 29.05 [deg/s]	
	5	AOS(JST) : 22:18:28 LOS(JST) : 22:24:56 Max Elevation : 3.84 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.666 [V] ・Angular velocity : 29.05 [deg/s]	
2/5/2019	1	AOS(JST) : 08:14:22 LOS(JST) : 08:22:45 Max Elevation : 8.35 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.658 [V] ・Angular velocity : 31.97 [deg/s]	
	2	AOS(JST) : 09:46:55 LOS(JST) : 09:46:55 Max Elevation : 43.52 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.653 [V] ・Angular velocity : 31.75 [deg/s]	
	3	AOS(JST) : 18:53:31 LOS(JST) : 18:54:49 Max Elevation : 0.14 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ	・battery recharge and checking the angular velocity.	・Bus voltage : 3.535 [V]	・Battery recharge states is not so good.
	4	AOS(JST) : 20:21:08 LOS(JST) : 20:32:30 Max Elevation : 42.63 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, GyroX, GyroY, GyroZ ・Send Heater always OFF command and CW power saving mode command.	・battery recharge and checking the angular velocity.	・Bus voltage : 3.669 [V]	
	5	AOS(JST) : 21:56:10 LOS(JST) : 22:05:10 Max Elevation : 9.70 [deg]	Shade	・CW power saving operation(437.075MHz)	・Battery recharge	・Bus voltage : 3.714 [V]	
2/6/2019	1	AOS(JST) : 07:54:45 LOS(JST) : 08:00:16 Max Elevation : 2.76 [deg]	Sunshine	・CW power saving operation(437.075MHz)	・Battery recharge	・Bus voltage : 4.013 [V]	・After confirming the Bus voltage of 4.0 V or more, it was planned to shift to the CW custom mode. However, because the elevation angle was low and the pass time was short, decoding at TNC could not be performed, and the Bus voltage during operation could not be confirmed. After LOS, decoding was performed visually from the SDR screen.
	2	AOS(JST) : 09:26:01 LOS(JST) : 09:37:16 Max Elevation : 89.81 [deg]	Sunshine	・CW power saving operation(437.075MHz) ・Send CW custom mode command.	・To confirm the recovery of Bus voltage and monitor Angular velocity again.	・Bus voltage : 4.003 [V] ・Angular velocity : 27.01 [deg/s]	
	3	AOS(JST) : 11:01:28 LOS(JST) : 11:07:45 Max Elevation : 4.01 [deg]	Sunshine	・CW custom operation(437.075MHz) →Battery voltage, Battery temparture, GyroX, GyroY, GyroZ	・To check the battery voltage and angular velocity when the heater is off.	・Bus voltage : 4.055 [V] ・Angular velocity : 26.67 [deg/s] ・Battery temparture1 : −7.35 [℃] ・Battery temparture2 : −7.35 [℃]	
	4	AOS(JST) : 20:00:44 LOS(JST) : 20:11:26 Max Elevation : 23.14 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, Battery temparture, GyroX, GyroY, GyroZ ・Send line check command	・To check the battery voltage and angular velocity when the heater is off.	・Bus voltage : 4.091 [V] ・Angular velocity : 27.11 [deg/s] ・Battery temparture1 : −2.82 [℃] ・Battery temparture2 : −0.38 [℃]	・The Ministry of Internal Affairs and Communications came to Nihon University and conducted a new ground station and satellite station inspection. The line check command was uplinked, and it was confirmed that the line check result was returned from the satellite as UPLINK OK. The new ground station and NEXUS passed the inspection.
	5	AOS(JST) : 21:34:28 LOS(JST) : 21:44:54 Max Elevation : 18.24 [deg]	Shade	・CW custom operation(437.075MHz) →Battery voltage, Battery temparture, GyroX, GyroY, GyroZ ・Send CW power saving mode command.	・Angular velocity tended to increase during CW custom operation from 3rd to 5th on 6 Feb., whereas Angular velocity tended to decrease during CW power saving operation from 2nd to 3rd on 6 Feb..	・Bus voltage : 4.099 [V] ・Angular velocity : 27.43 [deg/s] ・Battery temparture1 : −2.31 [℃] ・Battery temparture2 : 0.92 [℃]	
2/7/2019	1	AOS(JST) : 09:05:15 LOS(JST) : 09:16:19 Max Elevation : 42.87 [deg]	Sunshine	・Confirm Angular velocity after sending CW custom mode command ・Send CW power saving mode command.	・Only when it enters the visible range of the Nihon University, switch to the CW custom mode to check the Angular velocity.	・Bus voltage : 4.144 [V] ・Angular velocity : 29.53 [deg/s]	
	2	AOS(JST) : 10:39:46 LOS(JST) : 10:48:17 Max Elevation : 9.33 [deg]	Sunshine	・Confirm Angular velocity after sending CW custom mode command ・CAM status downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・In order to determine whether there is an image that shows the earth from the size of the image data captured by CAM on the 1st path of 4 Feb..	・Bus voltage : 4.179 [V] ・Recieved packet number Horizontal polarization : 335 Vertical polarization : 265 Circularly polarization : 64	
	3	AOS(JST) : 19:02:02 LOS(JST) : 19:06:54 Max Elevation : 2.11 [deg]	Shade	・Confirm Angular velocity after sending CW custom mode command ・Send CW power saving mode command.	・Only when it enters the visible range of the Nihon University, switch to the CW custom mode to check the Angular velocity.	・Bus voltage : 4.077 [V] ・Angular velocity : 30.79 [deg/s] ・Battery temparture1 : −6.66 [℃] ・Battery temparture2 : −4.33 [℃]	
	4	AOS(JST) : 22:07:15 LOS(JST) : 22:15:14 Max Elevation : 6.65 [deg]	Shade	・HK data downlink using the bus transmitter (GMSK, 9600 bps, 437.075 MHz)	・To downlink HK data got on the 2nd pass of 6 Feb..	・Bus voltage : 4.107 [V] ・Recieved packet number Horizontal polarization : 426 Vertical polarization : 476 Circularly polarization : 121	

Table 14 Detail of Operation from 15 February 2019 to 21 February 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2/15/2019	1	AOS(JST) : 07:54:27 LOS(JST) : 07:59:55 Max Elevation : 2.73 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1, Battery temp.2,GyroX,GyroY,GyroZ ・Send CW power saving mode command	・To check angular velocity and battery temperature.	・Bus voltage : - [V] ・Angular velocity : 34.73 [deg/s] ・Battery temp.1 : 1.11 [℃] ・Battery temp.2 : -0.60 [℃]	・Bus voltage could not be obtained due to the influence of interference and noise.
	2	AOS(JST) : 09:25:42 LOS(JST) : 09:36:55 Max Elevation : 89.72 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Continuous shooting command uplink ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To verify the operation of the continuous shooting function of CAM.	・Bus voltage : 4.169 [V] ・Angular velocity : 35.02 [deg/s] ・Battery temp.1 : -0.99 [℃] ・Battery temp.2 : -4.24 [℃]	・The continuous shooting command was sent at 09:30:00 (JST), and it was confirmed that the uplink passed.
	3	AOS(JST) : 11:01:12 LOS(JST) : 11:07:22 Max Elevation : 3.87 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Cam ROM status downlink using the bus transmitter (AFSK,1200bps,437.075MHz) ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To determine if the image taken on 2nd path of 15 Feb. is black.	・Bus voltage : 4.139 [V] ・Recieved packet number Horizontal polarization : 46 Vertical polarization : 42 Circularly polarization : 13	
	4	AOS(JST) : 20:00:29 LOS(JST) : 20:11:05 Max Elevation : 22.90 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:281088,SC_S=50,SSC=50,SP=0,ESC=50,EP=363 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data shot in 4 Feb.	・Bus voltage : 4.192 [V] ・Angular velocity : 36.05 [deg/s] ・Battery temp.1 : 5.28 [℃] ・Battery temp.2 : -3.93 [℃]	・There was an error in the CAM command for downlinking continuously shot images, and a location where no image data was stored was read from the CAM ROM.
	5	AOS(JST) : 21:34:14 LOS(JST) : 21:44:33 Max Elevation : 17.86 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size=281088,SC_S=50,SSC=50,SP=0,ESC=50,EP=363 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data shot on 1st path, 15 Feb.	・Bus voltage : 4.095 [V] ・Angular velocity : 34.75 [deg/s] ・Battery temp.1 : 5.14 [℃] ・Battery temp.2 : -4.19 [℃] ・Recieved packet number Horizontal polarization : 1056 Vertical polarization : 1235 Circularly polarization : 381	・With this operation, four of the image data shot continuously in 2nd path of 15 Feb. were acquired. ・Currently, 4 out of 15 image data are acquired.
2/16/2019	1	AOS(JST) : 09:04:56 LOS(JST) : 09:15:58 Max Elevation : 42.94 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:281088,SC_S=50,SSC=50,SP=364,ESC=50,EP=727 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data shot on 1st path, 15 Feb.	・Bus voltage : 4.107 [V] ・Angular velocity : 36.19 [deg/s] ・Recieved packet number Horizontal polarization : 208 Vertical polarization : 188 Circularly polarization : 200	・Battery temperarture could not be obtained due to the influence of interference and noise.
	2	AOS(JST) : 10:39:27 LOS(JST) : 10:47:54 Max Elevation : 9.18 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:281088,SC_S=50,SSC=50,SP=364,ESC=50,EP=727 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data shot on 1st path, 15 Feb.	・Bus voltage : 4.127 [V] ・Angular velocity : 36.16 [deg/s] ・Battery temp.1 : 5.05 [℃] ・Battery temp.2 : -7.80 [℃] ・Recieved packet number Horizontal polarization : 405 Vertical polarization : 415 Circularly polarization : 50	・Attempts were made to acquire eight image data shot consecutively in 2nd path of 15 Feb. in 1st and 2nd path of 16 Feb. but 47 out of 572 packets required for image restoration were missing. ・Since there is a loss in the image data, the image data in the same range is downlinked in 3rd path of 16 Feb..
	3	AOS(JST) : 19:40:22 LOS(JST) : 19:45:06 Max Elevation : 12.89 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:281088,SC_S=50,SSC=50,SP=364,ESC=50,EP=727 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data shot on 1st path, 15 Feb.	・Bus voltage : 4.100 [V] ・Recieved packet number Horizontal polarization : 546 Vertical polarization : 583 Circularly polarization : 68	・Angular velocity and battery temperarture could not be obtained due to the influence of interference and noise. ・Attempted downlink of the same range of image data as 1st and 2nd path of 16 Feb., but lost 2 packets. ・Due to the lack of image data, the same range of image data downlink is performed on the 4th path of 16 Feb..
	4	AOS(JST) : 21:12:53 LOS(JST) : 21:24:00 Max Elevation : 32.82 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:281088,SC_S=50,SSC=50,SP=728,ESC=51,EP=75 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data shot on 1st path, 15 Feb.	・Bus voltage : 4.096 [V] ・Angular velocity : 34.40 [deg/s] ・Battery temp.1 : 6.10 [℃] ・Battery temp.2 : -2.26 [℃] ・Recieved packet number Horizontal polarization : 1014 Vertical polarization : 1149 Circularly polarization : 859	・Attempted downlink of the same range of image data as 1st and 2nd path of 16 Feb., and there was no loss. ・With this operation, nine image data shot continuously in 2nd path of 15 Feb. could be acquired. ・Currently, 13 out of 15 image data are acquired.
2/17/2019	1	AOS(JST) : 08:44:19 LOS(JST) : 08:49:44 Max Elevation : 22.21 [deg]	Sunshine	・Digi talker operation(437.075MHz) ・Send CW power saving mode command	・To check angular velocity and battery temperature.	・Bus voltage : 4.139 [V]	
	2	AOS(JST) : 10:18:05 LOS(JST) : 10:27:57 Max Elevation : 16.98 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:281088,SC_S=50,SSC=50,SP=516,ESC=50,EP=535 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data shot on 1st path, 15 Feb.	・Bus voltage : 4.139 [V] ・Angular velocity : 32.64 [deg/s] ・Battery temp.1 : 0.140 [℃] ・Battery temp.2 : 0.970 [℃] ・Recieved packet number Horizontal polarization : 1362 Vertical polarization : 1332 Circularly polarization : 667	・With this operation, two pieces of image data taken continuously in 2nd path of 15 Feb. could be obtained. ・Currently, 15 out of 15 image data are acquired.
	3	AOS(JST) : 19:20:38 LOS(JST) : 19:28:19 Max Elevation : 6.52 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Send CW power saving mode command	・To check angular velocity and battery temperature.	・Bus voltage : 4.072 [V] ・Angular velocity : 32.00 [deg/s] ・Battery temp.1 : -4.37 [℃] ・Battery temp.2 : -1.54 [℃]	
	4	AOS(JST) : 20:51:49 LOS(JST) : 21:03:17 Max Elevation : 66.37 [deg]	Shade	・SSTV Operation(FM,Scottie1,437.075MHz) ・Send CW power saving mode command	・To verify the operation of SSTV.	・Bus voltage : 4.110 [V]	
2/18/2019	1	AOS(JST) : 08:23:55 LOS(JST) : 08:33:10 Max Elevation : 11.88 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Send CW power saving mode command	・To check angular velocity and battery temperature.	・Bus voltage : 4.135 [V] ・Angular velocity : 32.77 [deg/s] ・Battery temp.1 : 1.60 [℃] ・Battery temp.2 : 2.99 [℃]	
	2	AOS(JST) : 09:56:56 LOS(JST) : 10:07:39 Max Elevation : 30.79 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=59,SP=0,ESC=59,EP=343 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.071 [V] ・Angular velocity : 33.30 [deg/s] ・Battery temp.1 : 10.2 [℃] ・Battery temp.2 : 0.88 [℃] ・Recieved packet number Horizontal polarization : 1130 Vertical polarization : 958 Circularly polarization : 738	・Acquired 1/6 of the image data (JPEG, 2592 × 1944) taken at 1st path, 4 Feb..
	3	AOS(JST) : 20:31:01 LOS(JST) : 20:42:25 Max Elevation : 60.44 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=59,SP=324,ESC=59,EP=687 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.113 [V] ・Angular velocity : 33.26 [deg/s] ・Battery temp.1 : -0.80 [℃] ・Battery temp.2 : 2.31 [℃] ・Recieved packet number Horizontal polarization : 1073 Vertical polarization : 1204 Circularly polarization : 877	・Acquired 2/6 of the image data (JPEG, 2592 × 1944) taken at 1st path, 4 Feb..
	4	AOS(JST) : 22:06:51 LOS(JST) : 22:14:33 Max Elevation : 6.18 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・HK data sensing command uplink ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To check the angular velocity value.	・Bus voltage : 4.063 [V] ・Angular velocity : 34.49 [deg/s] ・Battery temp.1 : -0.80 [℃] ・Battery temp.2 : 2.31 [℃]	・Confirmed that the uplink of HK data acquisition (0.5 second interval) command for one orbit of the orbit passed.
2/19/2019	1	AOS(JST) : 08:03:55 LOS(JST) : 08:11:05 Max Elevation : 5.32 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1, Battery temp.2,GyroX,GyroY,GyroZ ・Send CW power saving mode command	・To check angular velocity and battery temperature.	・Bus voltage : 4.099 [V] ・Angular velocity : 36.15 [deg/s] ・Battery temp.1 : 0.71 [℃] ・Battery temp.2 : 3.48 [℃]	
	2	AOS(JST) : 09:35:56 LOS(JST) : 09:47:04 Max Elevation : 62.27 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=59,SP=688,ESC=59,EP=1023 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.097 [V] ・Recieved packet number Horizontal polarization : 329 Vertical polarization : 279 Circularly polarization : 53	・Angular velocity and battery temperarture could not be obtained due to the influence of interference and noise. ・Of the data required for image restoration, 118 packets were missing. ・Since there was a loss in the image data, the same range of image data downlink is performed in 3rd path of 19 Feb..
	3	AOS(JST) : 20:10:28 LOS(JST) : 20:21:24 Max Elevation : 30.59 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=59,SP=688,ESC=59,EP=1023 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.104 [V] ・Angular velocity : 37.37 [deg/s] ・Recieved packet number Horizontal polarization : 844 Vertical polarization : 565 Circularly polarization : 402	・Battery temperature could not be obtained due to interference and noise.
	4	AOS(JST) : 21:44:51 LOS(JST) : 21:54:28 Max Elevation : 13.00 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=59,SP=896,ESC=59,EP=903 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.093 [V] ・Angular velocity : 37.44 [deg/s] ・Recieved packet number Horizontal polarization : 331 Vertical polarization : 277 Circularly polarization : Operation nothing	・Battery temperature could not be obtained due to interference and noise. ・Since the required packets were got during operation, the downlink was suspended and switched to CW operation. ・Acquired 3/6 of the image data (JPEG, 2592 × 1944) taken at 1st path, 4 Feb..
2/20/2019	1	AOS(JST) : 09:15:04 LOS(JST) : 09:26:15 Max Elevation : 62.63 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=60,SP=364,ESC=60,EP=723 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.139 [V] ・Angular velocity : 38.16 [deg/s] ・Battery temp.1 : 6.33 [℃] ・Battery temp.2 : -6.89 [℃] ・Recieved packet number Horizontal polarization : 1027 Vertical polarization : 813 Circularly polarization : 683	・Of the data required for image restoration, 23 packets were missing. ・Since there was a loss in the image data, the same range of image data downlink is performed in 3rd path of 20 Feb..
	2	AOS(JST) : 10:50:01 LOS(JST) : 10:57:29 Max Elevation : 62.63 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1, Battery temp.2,GyroX,GyroY,GyroZ ・Send CW power saving mode command	・To check angular velocity and battery temperature.	・Bus voltage : 4.160 [V] ・Angular velocity : 37.77 [deg/s] ・Battery temp.1 : -1.86 [℃] ・Battery temp.2 : -3.61 [℃]	
	3	AOS(JST) : 19:50:12 LOS(JST) : 20:00:13 Max Elevation : 17.05 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=60,SP=364,ESC=60,EP=319 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.101 [V] ・Angular velocity : 36.63 [deg/s] ・Recieved packet number Horizontal polarization : 412 Vertical polarization : 470 Circularly polarization : 178	・Battery temperature could not be obtained due to interference and noise.
	4	AOS(JST) : 21:23:19 LOS(JST) : 21:34:03 Max Elevation : 23.85 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=60,SP=0,ESC=60,EP=319 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.097 [V] ・Angular velocity : 36.35 [deg/s] ・Recieved packet number Horizontal polarization : 982 Vertical polarization : 1378 Circularly polarization : 750	・Battery temperature could not be obtained due to interference and noise. ・Acquired 5/6 of the image data (JPEG, 2592 × 1944) taken at 1st path, 4 Feb..
2/21/2019	1	AOS(JST) : 08:54:21 LOS(JST) : 09:05:09 Max Elevation : 30.50 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=60,SP=364,ESC=60,EP=723 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.160 [V] ・Angular velocity : 31.34 [deg/s] ・Recieved packet number Horizontal polarization : 213 Vertical polarization : 332 Circularly polarization : 116	・Battery temperature could not be obtained due to interference and noise. ・Since there was a loss in the image data, the same range of image data downlink is performed on the 3rd path of 21 Feb..
	2	AOS(JST) : 10:28:30 LOS(JST) : 10:37:44 Max Elevation : 12.65 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・Send CW power saving mode command	・To check angular velocity and battery temperature.	・Bus voltage : 4.194 [V] ・Angular velocity : 34.50 [deg/s] ・Battery temp.1 : -0.99 [℃] ・Battery temp.2 : -1.23 [℃]	
	3	AOS(JST) : 19:30:15 LOS(JST) : 19:38:50 Max Elevation : 9.27 [deg]	Shade	・Real time HK data downlink using the bus transmitter (AFSK, 1200bps, ・Send CW power saving mode command	・The purpose of this operation is to perform real-time sensing by shifting the timing of RF emission and sensing, check whether the sensor data is normal, and see the continuous time change of Angular velocity.	・Bus voltage : 4.106 [V] ・Angular velocity : 33.60 [deg/s] ・Recieved packet number Horizontal polarization : 6 Vertical polarization : 17 Circularly polarization : 8	・Battery temperature could not be obtained due to interference and noise.
	4	AOS(JST) : 21:02:07 LOS(JST) : 21:13:24 Max Elevation : 45.77 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,Battery temp.1,Battery temp.2,GyroX,GyroY,GyroZ ・・Image data downlink using the FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:447232,SC_S=59,SSC=60,SP=364,ESC=60,EP=723 ・Send CW power saving mode command	・To check angular velocity and battery temperature. ・To get image data (JPEG, 2592×1944) shot on 1st path, 4 Feb.	・Bus voltage : 4.105 [V] ・Angular velocity : 33.58 [deg/s] ・Recieved packet number Horizontal polarization : 1080 Vertical polarization : 1142 Circularly polarization : 402	・Battery temperature could not be obtained due to interference and noise. ・Acquired 6/6 of the image data (JPEG, 2592 × 1944) taken at 1st path, 4 Feb..

Table 15 Detail of Operation from 22 February 2019 to 28 February 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2/22/2019	1	AOS(JST) : 08:33:49 LOS(JST) : 08:43:45 Max Elevation : 16.38 [deg]	Sunshine	・No operation			
	2	AOS(JST) : 10:07:14 LOS(JST) : 10:17:35 Max Elevation : 22.75 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, Battery temperature 1, Battery temperature 2, GyroZ ・CW power saving mode transition command uplink	・ To verify whether the increase of Angular velocity can be suppressed while suppressing power consumption and power generation of solar cells as much as possible only by CW operation.	・Bus voltage : 4.107 [V]	・Angular velocity data could not be included in CW telemetry due to a command error, so there was no Angular velocity data in this operation.
	3	AOS(JST) : 19:10:48 LOS(JST) : 19:17:05 Max Elevation : 3.92 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.104 [V] ・Angular velocity : 34.73 [deg/s]	
	4	AOS(JST) : 20:41:11 LOS(JST) : 20:52:35 Max Elevation : 86.29 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.110 [V] ・Angular velocity : 34.74 [deg/s]	
	5	AOS(JST) : 22:17:57 LOS(JST) : 22:24:02 Max Elevation : 3.40 [deg]	Shade	・No operation			
2/23/2019	1	AOS(JST) : 08:13:35 LOS(JST) : 08:21:58 Max Elevation : 8.35 [deg]	Sunshine	・No operation			
	2	AOS(JST) : 09:46:09 LOS(JST) : 09:57:09 Max Elevation : 43.08 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.139 [V] ・Angular velocity : 36.92 [deg/s]	
	3	AOS(JST) : 20:20:29 LOS(JST) : 20:31:38 Max Elevation : 42.01 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.104 [V] ・Angular velocity : 37.65 [deg/s]	
	4	AOS(JST) : 21:55:34 LOS(JST) : 22:04:17 Max Elevation : 9.14 [deg]	Shade	・No operation			
2/24/2019	1	AOS(JST) : 07:53:56 LOS(JST) : 07:59:27 Max Elevation : 2.78 [deg]	Sunshine	・No operation			
	2	AOS(JST) : 09:25:12 LOS(JST) : 09:36:26 Max Elevation : 89.72 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.141 [V] ・Angular velocity : 39.02 [deg/s]	
	3	AOS(JST) : 11:00:41 LOS(JST) : 11:06:52 Max Elevation : 3.89 [deg]	Sunshine	・No operation			
	4	AOS(JST) : 20:20:29 LOS(JST) : 20:31:38 Max Elevation : 42.01 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.096 [V] ・Angular velocity : 38.38 [deg/s]	
	5	AOS(JST) : 21:55:34 LOS(JST) : 22:04:17 Max Elevation : 9.14 [deg]	Shade	・No operation			
2/25/2019	1	AOS(JST) : 09:04:24 LOS(JST) : 09:15:28 Max Elevation : 43.05 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.096 [V] ・Angular velocity : 38.38 [deg/s]	
	2	AOS(JST) : 10:38:55 LOS(JST) : 10:47:24 Max Elevation : 9.23 [deg]	Sunshine	・No operation			
	3	AOS(JST) : 19:39:56 LOS(JST) : 19:49:15 Max Elevation : 12.56 [deg]	Shade	・No operation			
	4	AOS(JST) : 21:12:26 LOS(JST) : 21:23:26 Max Elevation : 32.37 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.104 [V] ・Angular velocity : 35.13 [deg/s]	
2/26/2019	1	AOS(JST) : 08:43:45 LOS(JST) : 08:54:13 Max Elevation : 22.32 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.127 [V] ・Angular velocity : 34.53 [deg/s]	
	2	AOS(JST) : 10:17:32 LOS(JST) : 10:27:26 Max Elevation : 17.08 [deg]	Sunshine	・No operation			
	3	AOS(JST) : 19:20:12 LOS(JST) : 19:27:42 Max Elevation : 6.25 [deg]	Shade	・No operation			
	4	AOS(JST) : 20:51:22 LOS(JST) : 21:02:42 Max Elevation : 66.12 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.106 [V] ・Angular velocity : 34.44 [deg/s]	
	5	AOS(JST) : 22:29:33 LOS(JST) : 22:32:59 Max Elevation : 0.96 [deg]	Shade	・No operation			
2/27/2019	1	AOS(JST) : 08:23:21 LOS(JST) : 08:32:38 Max Elevation : 11.99 [deg]	Sunshine	・No operation			
	2	AOS(JST) : 09:56:21 LOS(JST) : 10:07:07 Max Elevation : 30.99 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.141 [V] ・Angular velocity : 35.96 [deg/s]	
	3	AOS(JST) : 19:01:15 LOS(JST) : 19:05:30 Max Elevation : 1.64 [deg]	Shade	・No operation			
	4	AOS(JST) : 20:30:32 LOS(JST) : 20:41:48 Max Elevation : 59.85 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.110 [V] ・Angular velocity : 37.17 [deg/s]	
	5	AOS(JST) : 22:06:23 LOS(JST) : 22:13:55 Max Elevation : 5.95 [deg]	Shade	・No operation			
2/28/2019	1	AOS(JST) : 08:03:19 LOS(JST) : 08:10:33 Max Elevation : 5.42 [deg]	Sunshine	・No operation			
	2	AOS(JST) : 09:35:20 LOS(JST) : 09:46:32 Max Elevation : 62.57 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.179 [V] ・Angular velocity : 39.23 [deg/s]	
	3	AOS(JST) : 11:11:33 LOS(JST) : 11:15:57 Max Elevation : 1.78 [deg]	Sunshine	・No operation			
	4	AOS(JST) : 20:09:58 LOS(JST) : 20:20:46 Max Elevation : 30.04 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.179 [V] ・Angular velocity : 39.23 [deg/s]	
	5	AOS(JST) : 21:44:22 LOS(JST) : 21:53:51 Max Elevation : 12.72 [deg]	Shade	・No operation			

Table 16 Detail of Operation from 1 March 2019 to 7 March 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
3/1/2019	1	AOS(JST) : 07:44:32 LOS(JST) : 07:47:06 Max Elevation : 0.54 [deg]	Sunshine	・No operation.			
	2	AOS(JST) : 09:14:27 LOS(JST) : 09:25:41 Max Elevation : 62.68 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・ To verify whether the increase of Angular velocity can be suppressed while suppressing power consumption and power generation of solar cells as much as possible only by CW operation.	・Bus voltage : 4.179 [V] ・Angular velocity : 39.22 [deg/s]	
	3	AOS(JST) : 10:49:24 LOS(JST) : 10:56:56 Max Elevation : 6.43 [deg]	Sunshine	・No operation.			
	4	AOS(JST) : 19:49:41 LOS(JST) : 19:59:35 Max Elevation : 16.65 [deg]	Shade	・No operation.			
	5	AOS(JST) : 21:22:48 LOS(JST) : 21:33:24 Max Elevation : 23.51 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CW power saving mode transition command uplink	・Same as above	・Bus voltage : 4.100 [V] ・Angular velocity : 36.95 [deg/s]	・The CW operation, which was performed as part of identifying the cause of the increase in Angular velocity, will be completed today.
3/2/2019	1	AOS(JST) : 08:53:43 LOS(JST) : 09:04:35 Max Elevation : 30.67 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:14,0～503Page)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.113 [V] ・Angular velocity : 35.89 [deg/s] ・Recieved packet number Horizontal polarization : 61 Vertical polarization : 75 Circularly polarization : 56	
	2	AOS(JST) : 10:27:52 LOS(JST) : 10:37:10 Max Elevation : 12.83 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:14,0～503Page)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18..	・Bus voltage : 4.160 [V] ・Angular velocity : 35.66 [deg/s] ・Recieved packet number Horizontal polarization : 444 Vertical polarization : 288 Circularly polarization : 59	
	3	AOS(JST) : 19:29:43 LOS(JST) : 19:38:10 Max Elevation ; 8.97 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:14,504～1023Page)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.096 [V] ・Angular velocity : 34.63 [deg/s] ・Recieved packet number Horizontal polarization : 56 Vertical polarization : 256 Circularly polarization : 129	
	4	AOS(JST) : 21:01:35 LOS(JST) : 21:12:45 Max Elevation : 45.48 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:15,0～1023Page)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.099 [V] ・Angular velocity : 34.64 [deg/s] ・Recieved packet number Horizontal polarization : 1235 Vertical polarization : 1429 Circularly polarization : 1210	
3/3/2019	1	AOS(JST) : 08:33:10 LOS(JST) : 08:43:10 Max Elevation : 16.53 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・DigiTalker	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.178 [V] ・Angular velocity : 35.14 [deg/s]	
	2	AOS(JST) : 10:06:35 LOS(JST) : 10:17:00 Max Elevation : 23.04 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・DigiTalker	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.144 [V] ・Angular velocity : 35.09 [deg/s]	
	3	AOS(JST)20:40:37 LOS(JST) : 20:51:55 Max Elevation : 85.78 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・SSTV	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.105 [V] ・Angular velocity : 36.18 [deg/s]	
3/4/2019	1	AOS(JST) : 08:12:54 LOS(JST) : 08:21:22 Max Elevation : 8.48 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:14,0～503Page)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18. ・Recover lost packet data.	・Bus voltage : 4.119 [V] ・Angular velocity : 38.21 [deg/s]	
	2	AOS(JST) : 09:45:28 LOS(JST) : 09:56:32 Max Elevation : 43.58 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:16,0～sec:16,511)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.178 [V] ・Angular velocity : 38.55 [deg/s] ・Recieved packet number Horizontal polarization : 952 Vertical polarization : 695 Circularly polarization : 531	
	3	AOS(JST) : 20:19:54 LOS(JST) : 20:30:56 Max Elevation : 41.29 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:16,512～sec:17,511)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.100 [V] ・Angular velocity : 39.32 [deg/s] ・Recieved packet number Horizontal polarization : 1218 Vertical polarization : 1174 Circularly polarization : 777	
	4	AOS(JST) : 21:54:59 LOS(JST) : 22:03:34 Max Elevation : 8.94 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:17,512～sec:17,767)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.089 [V] ・Angular velocity : 39.40 [deg/s] ・Recieved packet number Horizontal polarization : 1109 Vertical polarization : 990 Circularly polarization : 390	
3/5/2019	1	AOS(JST) : 07:53:13 LOS(JST) : 07:58:51 Max Elevation : 2.89 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:14,0～503Page)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18. ・Recover lost packet data.	・Bus voltage : 4.110 [V] ・Angular velocity : 40.78 [deg/s] ・Recieved packet number Horizontal polarization : 13 Vertical polarization : 22 Circularly polarization : 0	・Radio interference : strong.
	2	AOS(JST) : 09:24:30 LOS(JST) : 09:35:49 Max Elevation : 89.82 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:17,768～sec:18,255)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.157 [V] ・Angular velocity : 40.62 [deg/s] ・Recieved packet number Horizontal polarization : 715 Vertical polarization : 941 Circularly polarization : 488	・Radio interference : strong.
	3	AOS(JST) : 10:59:57 LOS(JST) : 11:06:17 Max Elevation : 4.05 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:16,0～sec:16,511)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18. ・Recover lost packet data.	・Bus voltage : 4.161 [V] ・Angular velocity : 40.37 [deg/s] ・Recieved packet number Horizontal polarization : 170 Vertical polarization : 73 Circularly polarization : 15	・Radio interference : strong.
	4	AOS(JST) : 19:59:27 LOS(JST) : 20:09:48 Max Elevation : 21.99 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:18,256～sec:19,255)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.095 [V] ・Angular velocity : 39.78 [deg/s] ・Recieved packet number Horizontal polarization : 471 Vertical polarization : 416 Circularly polarization : 181	
	5	AOS(JST) : 21:33:12 LOS(JST) : 21:43:16 Max Elevation : 17.27 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:19,256～sec:19,767)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.086 [V] ・Angular velocity : 39.52 [deg/s] ・Recieved packet number Horizontal polarization : 1102 Vertical polarization : 1318 Circularly polarization : 728	
3/6/2019	1	AOS(JST) : 09:03:40 LOS(JST) : 09:14:49 Max Elevation : 43.15 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:19,768～sec:20,255)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.160 [V] ・Angular velocity : 37.86 [deg/s] ・Recieved packet number Horizontal polarization : 550 Vertical polarization : 707 Circularly polarization : 598	・Radio interference : strong.
	2	AOS(JST) : 10:38:11 LOS(JST) : 10:46:46 Max Elevation : 9.47 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval)(ROM1,sec:14,0～503Page)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18. ・Recover lost packet data.	・Bus voltage : 4.174 [V] ・Angular velocity : 37.56 [deg/s] ・Recieved packet number Horizontal polarization : 129 Vertical polarization : 80 Circularly polarization : 32	Radio interference : very strong.
	3	AOS(JST) : 19:39:18 LOS(JST) : 19:48:29 Max Elevation : 12.21 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM,(ROMO) status information downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) ・all switch off→Movie data transition (CAM,ROMO,SC52→CDH,ROMO,SC40)	・To check Angular velocity. ・To prepare for downlink of image data (JPEG, VGA) captured by CAM movie in 1st of February 19.	・Bus voltage : 4.104 [V] ・Angular velocity : 36.63 [deg/s] ・Recieved packet number Horizontal polarization : 31 Vertical polarization : 18 Circularly polarization : 39	・Radio interference : strong.
	4	AOS(JST) : 21:11:48 LOS(JST) : 21:22:41 Max Elevation : 32.19 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920 SC_S:52, SSC:52, SP:0, ESC:52, EP:255	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.091 [V] ・Angular velocity : 35.72 [deg/s] ・Recieved packet number Horizontal polarization : 1343 Vertical polarization : 1165 Circularly polarization : 982	
3/7/2019	1	AOS(JST) : 08:43:00 LOS(JST) : 08:53:33 Max Elevation : 22.50 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920 SC_S:52, SSC:52, SP:256, ESC:52, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.121 [V] ・Angular velocity : 34.95 [deg/s] ・Recieved packet number Horizontal polarization : 233 Vertical polarization : 228 Circularly polarization : 185	
	2	AOS(JST) : 10:16:47 LOS(JST) : 10:26:46 Max Elevation : 17.43 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920 SC_S:52, SSC:52, SP:256, ESC:52, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.079 [V] ・Angular velocity : 35.12 [deg/s] ・Recieved packet number Horizontal polarization : 837 Vertical polarization : 569 Circularly polarization : 131	
	3	AOS(JST) : 19:19:34 LOS(JST) : 19:26:54 Max Elevation : 5.99 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920 SC_S:52, SSC:52, SP:424, ESC:52, EP:455	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.101 [V] ・Angular velocity : 35.01 [deg/s] ・Recieved packet number Horizontal polarization : 148 Vertical polarization : 27 Circularly polarization : 15	・Radio interference : weak.
	4	AOS(JST) : 20:50:42 LOS(JST) : 21:01:56 Max Elevation : 66.43 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920 SC_S:52, SSC:52, SP:512, ESC:52, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.095 [V] ・Angular velocity : 34.86 [deg/s] ・Recieved packet number Horizontal polarization : 1146 Vertical polarization : 1291 Circularly polarization : 873	・Radio interference : weak. ・At present, 18 out of 100 image data of CAM movie shot at 1st of February 19 were obtained.

Table 17 Detail of Operation from 8 March 2019 to 14 March 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
3/8/2019	1	AOS(JST) : 08:22:34 LOS(JST) : 08:31:57 Max Elevation : 12.15 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:52,SP:768,ESC:52, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.194 [V] ・Angular velocity : 36.77 [deg/s] ・Recieved packet number Horizontal polarization : 254 Vertical polarization : 202 Circularly polarization : 131	・Radio interference : very strong
	2	AOS(JST) : 09:55:35 LOS(JST) : 10:06:26 Max Elevation : 31.56 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:52,SP:768,ESC:52, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.139 [V] ・Angular velocity : 37.32 [deg/s] ・Recieved packet number Horizontal polarization : 714 Vertical polarization : 491 Circularly polarization : 358	・Radio interference : strong
	3	AOS(JST) : 19:00:39 LOS(JST) : 19:04:38 Max Elevation : 1.44 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ	・To check Angular velocity. ・Because the elevation angle is low.	・Bus voltage : 4.095 [V] ・Angular velocity : 37.59 [deg/s]	
	4	AOS(JST) : 20:29:51 LOS(JST) : 20:541:01 Max Elevation : 58.90 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:53,SP:0,ESC:53, EP:255	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.102 [V] ・Angular velocity : 37.83 [deg/s] ・Recieved packet number Horizontal polarization : 958 Vertical polarization : 1037 Circularly polarization : 867	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 22:05:42 LOS(JST) : 22:13:08 Max Elevation : 5.83 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:53,SP:832,ESC:52, EP:867	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.094 [V] ・Angular velocity : 38.19 [deg/s] ・Recieved packet number Horizontal polarization : 844 Vertical polarization : 1037 Circularly polarization : 867	・Radio interference : weak ・No packet loss. ・26 images out of 100 CAM movie shots were restored.
3/9/2019	1	AOS(JST) : 08:02:30 LOS(JST) : 08:09:52 Max Elevation : 5.56 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:53,SP:256,ESC:53, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.100 [V] ・Angular velocity : 39.57 [deg/s] ・Recieved packet number Horizontal polarization : 58 Vertical polarization : 37 Circularly polarization : 0	・Radio interference : very strong
	2	AOS(JST) : 09:34:32 LOS(JST) : 09:45:50 Max Elevation : 63.34 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:53,SP:256,ESC:53, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.057 [V] ・Angular velocity : 40.08 [deg/s] ・Recieved packet number Horizontal polarization : 681 Vertical polarization : 584 Circularly polarization : 428	・Radio interference : strong
	3	AOS(JST) : 11:10:44 LOS(JST) : 11:15:22 Max Elevation : 1.99 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:09:16 LOS(JST) : 20:19:57 Max Elevation ; 29.41 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:53,SP:256,ESC:53, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.095 [V] ・Angular velocity : 40.26 [deg/s] ・Recieved packet number Horizontal polarization : 1004 Vertical polarization : 1177 Circularly polarization : 562	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:43:38 LOS(JST) : 21:53:02 Max Elevation : 12.59 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:53,SP:512,ESC:53, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 3.891 [V] ・Angular velocity : 40.16 [deg/s] ・Recieved packet number Horizontal polarization : 1071 Vertical polarization : 1284 Circularly polarization : 230	・Radio interference : weak ・No packet loss. ・28 images out of 100 CAM movie shots were restored.
3/10/2019	1	AOS(JST) : 07:43:37 LOS(JST) : 07:46:28 Max Elevation : 0.65 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:13:37 LOS(JST) : 09:24:58 Max Elevation : 62.44 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:53,SP:768,ESC:53, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.105 [V] ・Angular velocity : 39.39 [deg/s] ・Recieved packet number Horizontal polarization : 984 Vertical polarization : 1255 Circularly polarization : 679	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 10:48:33 LOS(JST) : 10:56:14 Max Elevation : 6.70 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:54,SP:0,ESC:54, EP:255	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.113 [V] ・Angular velocity : 38.82 [deg/s] ・Recieved packet number Horizontal polarization : 604 Vertical polarization : 853 Circularly polarization : 170	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 19:48:57 LOS(JST) : 19:58:44 Max Elevation : 16.24 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:54,SP:256,ESC:54, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.095 [V] ・Angular velocity : 37.16 [deg/s] ・Recieved packet number Horizontal polarization : 349 Vertical polarization : 646 Circularly polarization : 409	・Radio interference : weak
	5	AOS(JST) : 21:22:03 LOS(JST) : 21:32:34 Max Elevation : 23.42 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:54,SP:256,ESC:54, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.090 [V] ・Angular velocity : 37.29 [deg/s] ・Recieved packet number Horizontal polarization : 1170 Vertical polarization : 1399 Circularly polarization : 966	・Radio interference : weak ・No packet loss.
3/11/2019	1	AOS(JST) : 08:52:52 LOS(JST) : 09:03:50 Max Elevation : 30.85 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:54,SP:512,ESC:54, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.141 [V] ・Angular velocity : 35.73 [deg/s] ・Recieved packet number Horizontal polarization : 58 Vertical polarization : 342 Circularly polarization : 188	・Radio interference : strong
	2	AOS(JST) : 10:27:00 LOS(JST) : 10:36:27 Max Elevation : 13.21 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:54,SP:512,ESC:54, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.179 [V] ・Angular velocity : 35.07 [deg/s] ・Recieved packet number Horizontal polarization : 703 Vertical polarization : 618 Circularly polarization : 213	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 19:28:59 LOS(JST) : 19:37:17 Max Elevation : 8.68 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:54,SP:768,ESC:55, EP:127	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.101 [V] ・Angular velocity : 34.48 [deg/s] ・Recieved packet number Horizontal polarization : 98 Vertical polarization : 375 Circularly polarization : 0	・Radio interference : weak
	4	AOS(JST) : 21:00:48 LOS(JST) : 21:11:53 Max Elevation : 45.68 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:54,SP:768,ESC:55, EP:127	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.094 [V] ・Angular velocity : 34.42 [deg/s] ・Recieved packet number Horizontal polarization : 1146 Vertical polarization : 1216 Circularly polarization : 244	・Radio interference : weak ・33 images out of 100 CAM movie shots were restored.
3/12/2019	1	AOS(JST) : 08:32:18 LOS(JST) : 08:42:25 Max Elevation : 16.73 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:128,ESC:55, EP:383	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.179 [V] ・Angular velocity : 35.21 [deg/s] ・Recieved packet number Horizontal polarization : 179 Vertical polarization : 332 Circularly polarization : 0	・Radio interference : strong
	2	AOS(JST) : 10:05:42 LOS(JST) : 10:16:15 Max Elevation : 23.61 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:128,ESC:55, EP:383	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.144 [V] ・Angular velocity : 35.49 [deg/s] ・Recieved packet number Horizontal polarization : 322 Vertical polarization : 453 Circularly polarization : 4	・Radio interference : strong ・33.5 images out of 100 CAM movie shots were restored.
	3	AOS(JST) : 19:09:32 LOS(JST) : 19:15:27 Max Elevation : 3.47 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder operation(Downlink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.111 [V] ・Angular velocity : 35.86 [deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:39:49 LOS(JST) : 20:51:02 Max Elevation : 84.68 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder test operation(Downlink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.094 [V] ・Angular velocity : 36.01 [deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:16:37 LOS(JST) : 22:22:27 Max Elevation : 3.17 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder test operation(Downlink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.090 [V] ・Angular velocity : 36.01 [deg/s]	・Radio interference : weak ・Although communication with other stations was not possible due to frequency adjustment, the own loop succeeded for the first time. Since we could not communicate with other stations, we plan to conduct a linear transponder test operation on March 14..
3/13/2019	1	AOS(JST) : 08:12:00 LOS(JST) : 08:20:35 Max Elevation : 8.65 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:128,ESC:55, EP:383	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.141 [V] ・Angular velocity : 36.36 [deg/s] ・Recieved packet number Horizontal polarization : 76 Vertical polarization : 27 Circularly polarization : 9	・Radio interference : very strong
	2	AOS(JST) : 09:44:34 LOS(JST) : 09:55:46 Max Elevation : 44.50 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:128,ESC:55, EP:383	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.140 [V] ・Angular velocity : 38.37 [deg/s] ・Recieved packet number Horizontal polarization : 920 Vertical polarization : 857 Circularly polarization : 682	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 11:22:12 LOS(JST) : 11:23:29 Max Elevation : 0.14 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:19:06 LOS(JST) : 20:30:03 Max Elevation : 40.45 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:384,ESC:55, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.094 [V] ・Angular velocity : 39.05 [deg/s] ・Recieved packet number Horizontal polarization : 1098 Vertical polarization : 1113 Circularly polarization : 412	・Radio interference : weak
	5	AOS(JST) : 21:54:09 LOS(JST) : 22:02:41 Max Elevation : 8.89 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:768,ESC:55, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.084 [V] ・Angular velocity : 38.96 [deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : 0	・Radio interference : very strong ・ Because the FSK transmitter was in the unmodulated state, the number of acquired packets was 0 for all polarizations. ・ As a result of verification by EM, it was found that when downlink command using FSK transmitter was uplinked again while downlinking with FSK transmitter, the FSK transmitter was in an unmodulated state. ・Originally, we knew that this was the specification at the development stage, but we could not get "UPLINK IS OK" for CW due to the influence of illegal radio on this path. Even with LimeSDR, the output from the FSK transmitter could not be confirmed, so it was judged that the first command was actually passed though it passed, and the second command was transmitted. ・35 images out of 100 CAM movie shots were restored.
3/14/2019	1	AOS(JST) : 07:52:16 LOS(JST) : 07:58:04 Max Elevation : 3.03 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:768,ESC:55, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.094 [V] ・Angular velocity : 39.78 [deg/s] ・Recieved packet number Horizontal polarization : 3 Vertical polarization : 9 Circularly polarization : 3	・Radio interference : very strong
	2	AOS(JST) : 09:23:35 LOS(JST) : 09:35:01 Max Elevation : 88.98 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:768,ESC:55, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.108 [V] ・Angular velocity : 39.57 [deg/s] ・Recieved packet number Horizontal polarization : 956 Vertical polarization : 668 Circularly polarization : 507	・Radio interference : normal
	3	AOS(JST) : 10:59:00 LOS(JST) : 11:05:32 Max Elevation : 4.34 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:592,ESC:55, EP:607	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.160 [V] ・Angular velocity : 39.29 [deg/s] ・Recieved packet number Horizontal polarization : 72 Vertical polarization : 51 Circularly polarization : 0	・Radio interference : strong
	4	AOS(JST) : 19:58:38 LOS(JST) : 20:08:54 Max Elevation : 21.52 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder test operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.091 [V] ・Angular velocity : - [deg/s]	・Radio interference : weak ・Angular velocity data could not be obtained due to the frequency tracking of the linear transponder.
	5	AOS(JST) : 21:32:21 LOS(JST) : 21:42:22 Max Elevation : 17.27 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder test operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.083 [V] ・Angular velocity : 37.97 [deg/s]	・Radio interference : weak ・Communication with other stations succeeded for the first time.

Table 18 Detail of Operation from 15 March 2019 to 21 March 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
3/15/2019	1	AOS(JST) : 09:02:44 LOS(JST) : 09:14:01 Max Elevation : 43.20 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:56,SP:0,ESC:56, EP:255	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.134 [V] ・Angular velocity : 36.64 [deg/s] ・Recieved packet number Horizontal polarization : 560 Vertical polarization : 727 Circularly polarization : 548	・Radio interference : strong ・Packet loss number : 5
	2	AOS(JST) : 10:37:14 LOS(JST) : 10:46:00 Max Elevation : 9.85 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:1008,ESC:55, EP:1015	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.144 [V] ・Angular velocity : 35.99[deg/s] ・Recieved packet number Horizontal polarization : 520 Vertical polarization : 475 Circularly polarization : 0	・Radio interference : strong ・2 packet recoverd.
	3	AOS(JST) : 19:38:28 LOS(JST) : 19:47:34 Max Elevation : 11.92 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:56,SP:256,ESC:56, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.100 [V] ・Angular velocity : 34.59 [deg/s]	・Downlink was not possible because this path did not pass through the uplink. The cause may be interference in the 145 MHz band, but the exact cause is unknown. This is probably a problem on the ground station side, so check the settings of the ground station and verify by EM whether there is a bug in the uplink software. → This was due to an error in the use procedure of the ground station software.
	4	AOS(JST) : 21:10:56 LOS(JST) : 21:21:47 Max Elevation : 32.37 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder test operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.101 [V] ・Angular velocity : 34.42 [deg/s]	・Radio interference : weak ・ Confirm that the uplink has passed. ・ Communicated with JA0FKM using linear transponder operation.
3/16/2019	1	AOS(JST) : 08:42:04 LOS(JST) : 08:52:44 Max Elevation : 22.70 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:56,SP:0,ESC:56, EP:255 ・Linear transponder operation reservation command uplink	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.179 [V] ・Angular velocity : 34.20 [deg/s] ・Recieved packet number Horizontal polarization : 215 Vertical polarization : 369 Circularly polarization : 176	・Radio interference : weak ・The loss for 5 packets of March 15, 1st was recovered.
	2	AOS(JST) : 10:15:49 LOS(JST) : 10:25:58 Max Elevation : 17.96 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder test operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.057 [V] ・Angular velocity : 34.30 [deg/s]	・ Check the own loop by operating the linear transponder.
	3	AOS(JST) : 19:18:43 LOS(JST) : 19:25:57 Max Elevation : 5.79 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:768,ESC:55, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.100 [V] ・Angular velocity : 34.18 [deg/s] ・Recieved packet number Horizontal polarization : 73 Vertical polarization : 135 Circularly polarization : 60	・Radio interference : weak
	4	AOS(JST) : 20:49:49 LOS(JST) : 21:01:00 Max Elevation : 258.72 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:768,ESC:55, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.095 [V] ・Angular velocity : 34.61 [deg/s] ・Recieved packet number Horizontal polarization : 1384 Vertical polarization : 1804 Circularly polarization : 1216	・Radio interference : weak
	5	AOS(JST) : 22:28:02 LOS(JST) : 22:31:14 Max Elevation : 0.85 [deg]	Shade	・No operation.	・Because the elevation angle is low.		
3/17/2019	1	AOS(JST) : 08:21:36 LOS(JST) : 08:31:07 Max Elevation : 12.33 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:55,SP:768,ESC:55, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.141 [V] ・Angular velocity : 35.89 [deg/s] ・Recieved packet number Horizontal polarization : 575 Vertical polarization : 777 Circularly polarization : 370	・Radio interference : weak
	2	AOS(JST) : 09:54:36 LOS(JST) : 10:05:37 Max Elevation : 32.38 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder demonstration(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To attempt communication with the JAMSAT symposium held in Kyoto in the linear transponder demonstration.	・Bus voltage : 4.011 [V] ・Angular velocity : 36.39 [deg/s]	・Immediately after AOS, check own loop. ・ Check own loop at the JAMSAT symposium. ・I could not communicate with the JAMSAT symposium. CW communication with another station was confirmed.
	3	AOS(JST) : 18:59:48 LOS(JST) : 19:03:37 Max Elevation : 1.29 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST)20:28:57 LOS(JST) : 20:40:04 Max Elevation : 57.73 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:56,SP:256,ESC:55, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.100 [V] ・Angular velocity : 36.94 [deg/s] ・Recieved packet number Horizontal polarization : 7 Vertical polarization : 0 Circularly polarization : 1041	・Radio interference : weak ・Due to insufficient wiring of the ground station equipment, the number of packets for horizontal and vertical polarization was extremely small. After the pass, the wiring was reviewed and it was confirmed that it operated normally. ・Packet loss number : 17
	5	AOS(JST)22:04:46 LOS(JST) : 22:12:11 Max Elevation : 5.86 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:56,SP:256,ESC:55, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 3.906 [V] ・Angular velocity : 37.27 [deg/s] ・Recieved packet number Horizontal polarization : 849 Vertical polarization : 703 Circularly polarization : 217	・Radio interference : weak The loss for 17 packets of March 17, 4th was recovered. ・40 images out of 100 CAM movie shots were restored.
3/18/2019	1	AOS(JST) : 08:01:31 LOS(JST) : 08:09:00 Max Elevation : 5.70 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:56,SP:768,ESC:56, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.112 [V] ・Angular velocity : 38.35 [deg/s] ・Recieved packet number Horizontal polarization : 131 Vertical polarization : 214 Circularly polarization : 44	・Radio interference : weak
	2	AOS(JST) : 09:33:33 LOS(JST) : 09:44:58 Max Elevation : 64.67 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:56,SP:768,ESC:56, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.144 [V] ・Angular velocity : 38.16 [deg/s] ・Recieved packet number Horizontal polarization : 551 Vertical polarization : 450 Circularly polarization : 0	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 11:09:36 LOS(JST) : 11:14:34 Max Elevation : 2.26 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:57,SP:0,ESC:57, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.179 [V] ・Angular velocity : 38.14 [deg/s] ・Recieved packet number Horizontal polarization : 91 Vertical polarization : 15 Circularly polarization : 0	・Radio interference : strong
	4	AOS(JST) : 20:08:20 LOS(JST) : 20:18:59 Max Elevation : 28.84 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:57,SP:0,ESC:57, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.093 [V] ・Angular velocity : 37.26 [deg/s] ・Recieved packet number Horizontal polarization : 581 Vertical polarization : 531 Circularly polarization : 85	・Radio interference : weak
	5	AOS(JST) : 21:42:41 LOS(JST) : 21:52:04 Max Elevation : 12.68 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:57,SP:0,ESC:57, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 3.919 [V] ・Angular velocity : 37.42 [deg/s] ・Recieved packet number Horizontal polarization : 1076 Vertical polarization : 1273 Circularly polarization : 7	・Radio interference : weak ・No packet loss.
3/19/2019	1	AOS(JST) : 07:42:32 LOS(JST) : 07:45:38 Max Elevation : 0.77 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:12:37 LOS(JST) : 09:24:05 Max Elevation : 61.98 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:57,SP:512,ESC:57, EP:767	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.134 [V] ・Angular velocity : 36.29 [deg/s] ・Recieved packet number Horizontal polarization : 1073 Vertical polarization : 805 Circularly polarization : 138	・Radio interference : normal ・No packet loss.
	3	AOS(JST) : 10:47:30 LOS(JST) : 10:55:24 Max Elevation : 7.06 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:57,SP:768,ESC:58, EP:255	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.179 [V] ・Angular velocity : 35.72 [deg/s] ・Recieved packet number Horizontal polarization : 264 Vertical polarization : 230 Circularly polarization : 51	・Radio interference : strong
	4	AOS(JST) : 19:48:00 LOS(JST) : 19:57:44 Max Elevation : 15.94 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:57,SP:768,ESC:58, EP:255	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 3.919 [V] ・Angular velocity : 34.14 [deg/s] ・Recieved packet number Horizontal polarization : 313 Vertical polarization : 608 Circularly polarization : 11	・Radio interference : weak
	5	AOS(JST) : 21:21:05 LOS(JST) : 21:31:35 Max Elevation : 23.67 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:57,SP:768,ESC:58, EP:255	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 3.927 [V] ・Angular velocity : 38.82 [deg/s] ・Recieved packet number Horizontal polarization : 1280 Vertical polarization : 1520 Circularly polarization : 257	・Radio interference : weak ・No packet loss.
3/20/2019	1	AOS(JST) : 08:51:50 LOS(JST) : 09:02:56 Max Elevation : 30.92 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:58,SP:256,ESC:58, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.139 [V] ・Angular velocity : 33.08 [deg/s] ・Recieved packet number Horizontal polarization : 542 Vertical polarization : 677 Circularly polarization : 88	・Radio interference : normal
	2	AOS(JST) : 10:25:57 LOS(JST) : 10:35:34 Max Elevation : 13.69 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:58,SP:256,ESC:58, EP:511	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.160 [V] ・Angular velocity : 32.87 [deg/s] ・Recieved packet number Horizontal polarization : 1072 Vertical polarization : 902 Circularly polarization : 177	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 19:28:01 LOS(JST) : 19:36:16 Max Elevation : 8.50 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:58,SP:512,ESC:58, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.100 [V] ・Angular velocity : 32.44 [deg/s] ・Recieved packet number Horizontal polarization : 158 Vertical polarization : 429 Circularly polarization : 26	・Radio interference : weak
	4	AOS(JST) : 20:59:48 LOS(JST) : 20:59:48 Max Elevation : 46.49 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM movie data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:2193920,SC_S:52,SSC:58,SP:512,ESC:58, EP:1023	・To check Angular velocity. ・To downlink the movie data (JPEG, VGA) taken by the CAM movie at the 1st of February 19.	・Bus voltage : 4.112 [V] ・Angular velocity : 33.24 [deg/s] ・Recieved packet number Horizontal polarization : 397 Vertical polarization : 627 Circularly polarization : 97	・Radio interference : weak ・56 images out of 100 CAM movie shots were restored. ・Stop the movie data downlink once.
3/21/2019	1	AOS(JST) : 08:31:15 LOS(JST) : 08:41:28 Max Elevation : 16.85 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:00,SSC:00,SP:00,ESC:00,EP:195	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD)	・Bus voltage : 4.101 [V] ・Angular velocity : 33.83 [deg/s] ・Recieved packet number Horizontal polarization : 319 Vertical polarization : 344 Circularly polarization : 36	・Radio interference : weak
	2	AOS(JST) : 10:04:38 LOS(JST) : 10:15:20 Max Elevation : 24.32 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:00,SSC:00,SP:00,ESC:00,EP:195	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD)	・Bus voltage : 4.128 [V] ・Angular velocity : 33.96 [deg/s] ・Recieved packet number Horizontal polarization : 1482 Vertical polarization : 1318 Circularly polarization : 270	・Radio interference : weak ・Of the 50 initial shooting images, half of one were restored, but they were black.
	3	AOS(JST) : 19:08:34 LOS(JST) : 19:14:23 Max Elevation : 3.35 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:00,SSC:00,SP:196,ESC:00,EP:387	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD)	・Bus voltage : 4.096 [V] ・Angular velocity : 34.57 [deg/s] ・Recieved packet number Horizontal polarization : 11 Vertical polarization : 17 Circularly polarization : 0	・;Radio interference : weak
	4	AOS(JST) : 20:38:48 LOS(JST) : 20:50:00 Max Elevation : 83.04 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:00,SSC:00,SP:196,ESC:00,EP:387	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD)	・Bus voltage : 4.083 [V] ・Angular velocity : 35.04 [deg/s] ・Recieved packet number Horizontal polarization : 1019 Vertical polarization : 1319 Circularly polarization : 489	・Radio interference : weak ・Of the 50 initial shooting images, one of them were restored, but they were black.
	5	AOS(JST) : 22:15:33 LOS(JST) : 22:21:27 Max Elevation : 3.28 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:02,SSC:02,SP:00,ESC:02,EP:195	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD)	・Bus voltage : 4.095 [V] ・Angular velocity : 34.86 [deg/s] ・Recieved packet number Horizontal polarization : 442 Vertical polarization : 62 Circularly polarization : 36	・Radio interference : weak

Table 19 Detail of Operation from 22 March 2019 to 28 March 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
3/22/2019	1	AOS(JST) : 08:10:56 LOS(JST) : 08:19:37 Max Elevation : 8.76 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:02,SSC:02,SP:00,ESC:02,EP:195	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD)	・Bus voltage : 4.109 [V] ・Angular velocity : 36.15 [deg/s] ・Recieved packet number Horizontal polarization : 35 Vertical polarization : 56 Circularly polarization : 11	・Radio interference : strong
	2	AOS(JST) : 09:43:29 LOS(JST) : 09:54:49 Max Elevation : 45.69 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:02,SSC:02,SP:00,ESC:02,EP:195	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD) ・To recover lost packets on March 22, 1st.	・Bus voltage : 4.117 [V] ・Angular velocity : 36.33 [deg/s] ・Recieved packet number Horizontal polarization : 585 Vertical polarization : 575 Circularly polarization : 396	・Radio interference : strong ・No packet loss. ・Of the 50 initial shooting images, half of one were restored, but they were black.
	3	AOS(JST) : 11:20:43 LOS(JST) : 11:22:56 Max Elevation : 0.41 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:18:03 LOS(JST) : 20:28:59 Max Elevation : 39.64 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Initial shooting image data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) →Size:99072,SC_S:02,SSC:02,SP:196,ESC:02,EP:387	・To check Angular velocity. ・To check the initial shooting image data(JPEG,Full HD)	・Bus voltage : 4.090 [V] ・Angular velocity : 35.77 [deg/s] ・Recieved packet number Horizontal polarization : 1186 Vertical polarization : 1308 Circularly polarization : 470	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:53:04 LOS(JST) : 22:01:39 Max Elevation : 9.07 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・CAM, ROM sector erase command uplink	・To check Angular velocity. ・To erase ROM sector information of CAM.	・Bus voltage : 4.080 [V] ・Angular velocity : 35.72 [deg/s]	
3/23/2019	1	AOS(JST) : 07:51:10 LOS(JST) : 07:57:05 Max Elevation : 3.12 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:22:29 LOS(JST) : 09:334:02 Max Elevation : 87.68 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ	・To check Angular velocity.	・Bus voltage : 4.158 [V] ・Angular velocity : 34.21 [deg/s]	・Radio interference : strong
	3	AOS(JST) : 10:57:50 LOS(JST) : 11:04:37 Max Elevation : 4.67 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 19:57:34 LOS(JST) : 20:07:49 Max Elevation ; 21.17 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval) (ROM1,SSC:20,SP:256～ESC:21,EP:255)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.096 [V] ・Angular velocity : 32.38 [deg/s] ・Recieved packet number Horizontal polarization : 610 Vertical polarization : 841 Circularly polarization : 79	・Packet loss number : 2
	5	AOS(JST) : 21:31:15 LOS(JST) : 21:41:18 Max Elevation : 17.59 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval) (ROM1,SSC:21,SP:256～ESC:21,EP:767)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.086 [V] ・Angular velocity : 32.13 [deg/s] ・Recieved packet number Horizontal polarization : 1148 Vertical polarization : 779 Circularly polarization : 95	・No packet loss.
3/24/2019	1	AOS(JST) : 09:01:38 LOS(JST) : 09:13:00 Max Elevation : 42.93 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder operation(Downlink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.107 [V] ・Angular velocity : 31.28 [deg/s]	・ Communicate with JA0CAW with linear transponder.
	2	AOS(JST) : 10:36:05 LOS(JST) : 10:45:01 Max Elevation : 10.27 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Liner transponder operation(Downlink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To Liner transponder test operation.	・Bus voltage : 4.117 [V] ・Angular velocity : 31.45 [deg/s]	・Although own loop could be confirmed by the liner transponder operation, communication with other stations could not be performed.
	3	AOS(JST) : 19:37:23 LOS(JST) : 19:46:27 Max Elevation : 11.73 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.113 [V] ・Angular velocity : 31.10 [deg/s]	
	4	AOS(JST) : 21:09:49 LOS(JST) : 21:20:41 Max Elevation : 33.08 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・SSTV(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.090 [V] ・Angular velocity : 30.99 [deg/s]	
3/25/2019	1	AOS(JST) : 08:40:56 LOS(JST) : 08:51:42 Max Elevation : 22.72 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval) (ROM1,SSC:20,SP:256～ESC:21,EP:255)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.144 [V] ・Angular velocity : 32.51 [deg/s] ・Recieved packet number Horizontal polarization : 335 Vertical polarization : 451 Circularly polarization : 53	・Radio interference : strong ・Packet loss number : 13
	2	AOS(JST) : 10:14:40 LOS(JST) : 10:24:58 Max Elevation : 18.56 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval) (ROM1,SSC:22,SP:256～ESC:22,EP:511)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.140 [V] ・Angular velocity : 32.60 [deg/s] ・Recieved packet number Horizontal polarization : 1254 Vertical polarization : 1113 Circularly polarization : 129	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 19:17:37 LOS(JST) : 19:24:49 Max Elevation : 5.68 [deg]	Shade	・No operation.	・Because there is no operator.		
	4	AOS(JST) : 20:48:41 LOS(JST) : 20:59:53 Max Elevation : 69.10 [deg]	Shade	・No operation.	・Because there is no operator.		
	5	AOS(JST) : 22:26:46 LOS(JST) : 22:30:15 Max Elevation : 1.02 [deg]	Shade	・No operation.	・Because there is no operator.		
3/26/2019	1	AOS(JST) : 08:20:27 LOS(JST) : 08:30:03 Max Elevation : 12.39 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval) (ROM1,SSC:21,SP:768～ESC:22,EP:255)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.057 [V] ・Angular velocity : 34.28 [deg/s] ・Recieved packet number Horizontal polarization : 345 Vertical polarization : 401 Circularly polarization : 40	・Radio interference : strong
	2	AOS(JST) : 09:53:27 LOS(JST) : 10:04:34 Max Elevation : 33.34 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval) (ROM1,SSC:21,SP:768～ESC:22,EP:255)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18. ・To recover lost packets on March 26, 1st.	・Bus voltage : 4.094 [V] ・Angular velocity : 34.43 [deg/s] ・Recieved packet number Horizontal polarization : 1092 Vertical polarization : 991 Circularly polarization : 448	・Radio interference : strong
	3	AOS(JST) : 18:58:44 LOS(JST) : 19:02:26 Max Elevation : 1.22 [deg]	Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:27:48 LOS(JST) : 20:38:56 Max Elevation : 56.40 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA OFF 10 second interval sensing (ROM0,SSC:14,SP:0～ESC:14,EP:137)	・To check Angular velocity. ・To confirm HK data of transponder PA OFF status in shade.	・Bus voltage : 4.088 [V] ・Angular velocity : 32.79 [deg/s]	
	5	AOS(JST) : 22:03:34 LOS(JST) : 22:11:06 Max Elevation : 6.08 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA OFF sensing data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) (ROM0,SSC:14,SP:0～ESC:14,EP:139)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.080 [V] ・Angular velocity : 32.56 [deg/s] ・Recieved packet number Horizontal polarization : 524 Vertical polarization : 372 Circularly polarization : 0	・Radio interference : weak
3/27/2019	1	AOS(JST) : 08:00:21 LOS(JST) : 08:07:55 Max Elevation : 5.75 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA OFF 10 second interval sensing (ROM0,SSC:17,SP:0～ESC:17,EP:137)	・To check Angular velocity. ・To confirm HK data of transponder PA OFF status in sunshine.	・Bus voltage : 4.177 [V] ・Angular velocity : 31.30 [deg/s]	
	2	AOS(JST) : 09:32:22 LOS(JST) : 09:43:55 Max Elevation : 66.25 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA OFF sensing data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) (ROM0,SSC:17,SP:0～ESC:17,EP:139)	・To check Angular velocity. ・To downlink the HK data that started sensing on the 1st pass of March 27.	・Bus voltage : 4.114 [V] ・Angular velocity : 31.05 [deg/s] ・Recieved packet number Horizontal polarization : 586 Vertical polarization : 391 Circularly polarization : 0	・Radio interference : strong
	3	AOS(JST) : 11:08:19 LOS(JST) : 11:13:37 Max Elevation : 2.56 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:07:11 LOS(JST) : 20:17:50 Max Elevation : 28.37 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA OFF 10 second interval sensing (ROM0,SC:15,SC:16)	・To check Angular velocity. ・To confirm HK data of PA transponder PA ON status in shade.	・Bus voltage : 4.097 [V] ・Angular velocity : 29.19 [deg/s]	
	5	AOS(JST) : 21:41:29 LOS(JST) : 21:50:57 Max Elevation : 13.03 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA ON sensing data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) (ROM0,SSC:16,SP:0～ESC:16,EP:119,After PA ON)	・To check Angular velocity. ・ To downlink the data sensed on March 27, 4th (from PA ON of the linear transponder to the end of sensing).	・Bus voltage : 4.112 [V] ・Angular velocity : 29.00 [deg/s] ・Recieved packet number Horizontal polarization : 12 Vertical polarization : 42 Circularly polarization : 46	・Radio interference : normal
3/28/2019	1	AOS(JST) : 07:41:21 LOS(JST) : 07:44:32 Max Elevation : 0.81 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:11:26 LOS(JST) : 09:22:59 Max Elevation : 61.08 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA ON 10 second interval sensing (ROM0,SC:18,SC:19)	・To check Angular velocity. ・To confirm HK data of transponder PA ON status in sunshine.	・Bus voltage : 4.161 [V] ・Angular velocity : 29.10 [deg/s]	
	3	AOS(JST) : 10:46:16 LOS(JST) : 10:54:22 Max Elevation : 7.43 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA ON sensing data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) (ROM0,SSC:15,SP:0～ESC:15,EP:19,Until PA ON)	・To check Angular velocity. ・ To downlink the data sensed on March 27, 4th (From the start of sensing to before the linear transponder PA ON).	・Bus voltage : 4.079 [V] ・Angular velocity : 29.53 [deg/s] ・Recieved packet number Horizontal polarization : 156 Vertical polarization : 14 Circularly polarization : 31	・Radio interference : strong
	4	AOS(JST) : 19:46:50 LOS(JST) : 19:56:34 Max Elevation : 15.74 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA ON sensing data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) (ROM0,SSC:18,SP:0～ESC:18,EP:19,Until PA ON)	・To check Angular velocity. ・To downlink the data sensed on March 28, 1st (From the start of sensing to before the linear transponder PA ON).	・Bus voltage : 4.100 [V] ・Angular velocity : 29.60 [deg/s] ・Recieved packet number Horizontal polarization : 386 Vertical polarization : 120 Circularly polarization : 336	・Radio interference : weak
	5	AOS(JST) : 21:19:52 LOS(JST) : 21:30:26 Max Elevation : 24.31 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage, GyroX, GyroY, GyroZ ・Linear transponder PA ON sensing data downlink using FSK transmitter (GMSK, 9600bps, 435.900MHz) (ROM0,SSC:19,SP:0～ESC:19,EP:119,After PA ON)	・To check Angular velocity. ・To downlink the data sensed on March 28, 1st (from PA ON of the linear transponder to the end of sensing).	・Bus voltage : 4.093 [V] ・Angular velocity : 29.59 [deg/s] ・Recieved packet number Horizontal polarization : 1243 Vertical polarization : 1597 Circularly polarization : 873	・Radio interference : weak

Table 20 Detail of Operation from 29 March 2019 to 4 April 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
3/29/2019	1	AOS(JST) : 08:50:39 LOS(JST) : 09:01:48 Max Elevation : 30.79[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CW stop sensing command uplink	・To check Angular velocity. ・To check the value of the temperature sensor during CW radiation and CW interruption.	・Bus voltage : 4.160[V] ・Angular velocity : 31.40[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:24:43 LOS(JST) : 10:34:29 Max Elevation : 14.17[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CW stop sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,sec20,0～sec20,139	・To check Angular velocity. ・To check the value of the temperature sensor during CW radiation and CW interruption.	・Bus voltage : 4.160[V] ・Angular velocity : 31.32[deg/s] ・Recieved packet number Horizontal polarization : 664 Vertical polarization : 498 Circularly polarization : 17	・Radio interference : strong
	3	AOS(JST) : 19:26:50 LOS(JST) : 19:35:05 Max Elevation : 8.40[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・TRP PA ON sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE16,SP0,EP119(After PA ON)	・To check Angular velocity. ・To recover lost packets on March 28, 5th.	・Bus voltage : 3.885[V] ・Angular velocity : 31.61[deg/s] ・Recieved packet number Horizontal polarization : 204 Vertical polarization : 347 Circularly polarization : 336	・Radio interference : weak
	4	AOS(JST) : 20:58:35 LOS(JST) : 21:09:43 Max Elevation : 47.90[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROM sector erase of CDH →ROM0,SE14,15 ・Real-time sensing data downlink at 2.0 second intervals →Bus transmitter, AFSK 1200bps,437.075MHz →Downlink with software with time stamp	・To check Angular velocity. ・ To secure the sensing data storage area. ・ To check the value of the temperature sensor during real-time sensing.	・Bus voltage : 4.080[V] ・Angular velocity : 31.61[deg/s] ・Recieved packet number Horizontal polarization : 179 Vertical polarization : 201 Circularly polarization : 165	・Radio interference : weak
3/30/2019	1	AOS(JST) : 08:30:02 LOS(JST) : 08:40:20 Max Elevation : 16.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation sensing(sunshine) command uplink →ROM0,SE14,SE15 ・Liner transponder operation (Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To check the value of the temperature sensor duringLiner transponder operation(sunshine). ・For amateur operation.	・Bus voltage : 4.160[V] ・Angular velocity : 31.38[deg/s]	・Radio interference : normal ・We could hear our own voice and couldn't exchange messages.
	2	AOS(JST) : 10:03:24 LOS(JST) : 10:14:14 Max Elevation : 25.04[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation (Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.178[V] ・Angular velocity : 31.29[deg/s]	・Radio interference : strong ・We could hear our own voice and couldn't exchange messages. ・We could hear SSB and CW at several stations, but they couldn't exchange callsigns or reports because they had articulation of 1.
	3		Shade	・No operation.	・Because there is no operator.		
	4		Shade	・No operation.	・Because there is no operator.		
	5		Shade	・No operation.	・Because there is no operator.		
3/31/2019	1	AOS(JST) : 08:09:43 LOS(JST) : 08:18:27 Max Elevation : 8.76[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation (Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 28.12[deg/s]	・Radio interference : strong ・We could hear our own voice and couldn't exchange messages. ・We could hear SSB and CW at several stations, but they couldn't exchange callsigns or reports because they had articulation of 1.
	2	AOS(JST) : 09:42:15 LOS(JST) : 09:53:41 Max Elevation : 46.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation (Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.141[V] ・Angular velocity : 27.48[deg/s]	・Radio interference : strong ・We could hear our own voice and exchange messages with "JA0CAW". ・Some stations called SSB at the end of the pass, but could not communicate.
	3		Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:16:49 LOS(JST) : 20:27:47 Max Elevation : 38.91[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz) ・ROM sector erase of CDH →ROM0,SE17	・To check Angular velocity. ・To secure the sensing data storage area. ・For amateur operation.	・Bus voltage : 4.097[V] ・Angular velocity : 26.44[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:51:46 LOS(JST) : 22:00:29 Max Elevation : 9.45[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation sensing(shade) command uplink →ROM0,SE17,SE21 ・Liner transponder operation (Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・To check the value of the temperature sensor duringLiner transponder operation(shade). ・For amateur operation.	・Bus voltage : 4.091[V] ・Angular velocity : 26.98[deg/s]	・Radio interference : weak
4/1/2019	1	AOS(JST) : 07:49:57 LOS(JST) : 07:55:53 Max Elevation : 3.11[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder release sensing (sunshine) downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE14,SP0,EP19(Until PAON)	・To check Angular velocity. ・To check the sensing data of march 30, 1st.	・Bus voltage : 4.189[V] ・Angular velocity : 28.28[deg/s] ・Recieved packet number Horizontal polarization : 39 Vertical polarization : 39 Circularly polarization : 2	・Radio interference : strong
	2	AOS(JST) : 09:21:15 LOS(JST) : 09:32:52 Max Elevation : 86.05[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder release sensing (sunshine) downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE15,SP0,EP119(After PAON)	・To check Angular velocity. ・To check the sensing data of march 30, 1st.	・Bus voltage : 4.179[V] ・Angular velocity : 28.34[deg/s] ・Recieved packet number Horizontal polarization : 628 Vertical polarization : 304 Circularly polarization : 408	・Radio interference : strong
	3	AOS(JST) : 10:56:32 LOS(JST) : 11:03:32 Max Elevation : 4.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder release sensing (shade) downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE17,SP0,EP19(Until PAON)	・To check Angular velocity. ・To check the sensing data of march 30, 5th.	・Bus voltage : 4.149[V] ・Angular velocity : 28.44[deg/s] ・Recieved packet number Horizontal polarization : 108 Vertical polarization : 1 Circularly polarization : 2	・Radio interference : strong
	4	AOS(JST) : 19:56:19 LOS(JST) : 20:06:36 Max Elevation : 20.94[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder release sensing (shade) downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE21,SP0,EP119(After PAON)	・To check Angular velocity. ・To check the sensing data of march 30, 5th.	・Bus voltage : 4.090[V] ・Angular velocity : 29.05[deg/s] ・Recieved packet number Horizontal polarization : 590 Vertical polarization : 23 Circularly polarization : 381	・Radio interference : weak
	5	AOS(JST) : 21:29:57 LOS(JST) : 21:40:07 Max Elevation : 18.19[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder release sensing (shade) downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE17,SP0,EP19(Until PAON)	・To check Angular velocity. ・To check the sensing data of march 31, 5th. ・To recover loss packet.	・Bus voltage : 4.090[V] ・Angular velocity : 29.05[deg/s] ・Recieved packet number Horizontal polarization : 1341 Vertical polarization : 1573 Circularly polarization : 657	・Radio interference : weak
4/2/2019	1	AOS(JST) : 09:00:22 LOS(JST) : 09:11:49 Max Elevation : 42.33[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Shooting image sommand uplink for SSTV →N-CAMのROM0,SE40,41,42,43	・To check Angular velocity. ・To downlink images taken by N-CAM using SSTV.	・Bus voltage : 4.133[V] ・Angular velocity : 29.83[deg/s]	・Radio interference : strong
	2	AOS(JST) : 10:34:48 LOS(JST) : 10:43:53 Max Elevation : 10.66[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data transition comand uplink →From : CAM,ROM0,SE40 →To : CDH,ROM0,SE54	・To check Angular velocity. ・To downlink images taken by N-CAM using SSTV.	・Bus voltage : 4.097[V] ・Angular velocity : 29.43[deg/s]	・Radio interference : strong
	3	AOS(JST) : 19:36:07 LOS(JST) : 19:45:13 Max Elevation : 11.65[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image SSTV(437.075MHz) →C&DHのROM0,SE54	・To check Angular velocity. ・To downlink the first of four N-CAM images using SSTV.	・Bus voltage : 4.085[V] ・Angular velocity : 28.58[deg/s]	・Radio interference : strong ・ The Shooting image was downlinked with SSTV, but there is a bug in the image data, so the N-CAM shooting is performed again after checking the N-CAM image data size.
	4	AOS(JST) : 21:08:31 LOS(JST) : 21:19:28 Max Elevation : 34.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROM status of CAM downlink →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To check the data size of the shooting image of CAM.	・Bus voltage : 4.083[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 813 Vertical polarization : 455 Circularly polarization : 523	・Radio interference : weak
	5		Shade	・No operation.	・Because the elevation angle is low.		
4/3/2019	1	AOS(JST) : 08:39:31 LOS(JST) : 09:19:49 Max Elevation : 22.52[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROM sector erace of CAM →ROM0,SE40～SE49 ・ROM sector erace of C&DH →ROM0,SE54	・To check Angular velocity. ・To secure a storage area for shooting image data.	・Bus voltage : 4.140[V] ・Angular velocity : 26.33[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:13:22 LOS(JST) : 10:23:47 Max Elevation : 19.11[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Shooting image sommand uplink for SSTV →N-CAM,ROM0,SE40,41,42,43	・To check Angular velocity. ・To downlink the N-CAM images using SSTV.	・Bus voltage : 4.178[V] ・Angular velocity : 26.13[deg/s]	・Radio interference : normal
	3	AOS(JST) : 19:16:20 LOS(JST) : 19:23:33 Max Elevation : 5.66[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data transition command uplink →From:N-CAM,ROM0,SE40 →To:C&DH,ROM0,SE54	・To check Angular velocity. ・To downlink the first of four N-CAM images using SSTV.	・Bus voltage : 4.112[V] ・Angular velocity : 24.79[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:47:22 LOS(JST) : 20:58:39 Max Elevation : 71.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Shooting image SSTV(437.075MHz) →C&DH,ROM0,SE54	・To check Angular velocity. ・To downlink the first of four N-CAM images using SSTV.	・Bus voltage : 4.094[V] ・Angular velocity : 24.71[deg/s]	・Radio interference : weak ・The earth was shown in the image downlinked by SSTV.
	5		Shade	・No operation.	・Because the elevation angle is low.		
4/4/2019	1	AOS(JST) : 08:19:11 LOS(JST) : 08:28:48 Max Elevation : 12.28[deg]	Sunshine	・CW power saving operation(437.075MHz) →Bus voltage,Bus current,Battery temperature,5V Regulator temperature ・Image data transition command uplink →From:N-CAM,ROM0,SE41 →To:C&DH,ROM0,SE55	・To check Angular velocity. ・To downlink the second of four N-CAM images using SSTV.	・Bus voltage : 4.179[V] ・Angular velocity : -[deg/s]	・Radio interference : weak ・Angular velocity could not be obtained because CW power saving command was sent on April 3, 4th. Send the command to change to CW custom mode in the following operation.
	2	AOS(JST) : 09:52:09 LOS(JST) : 10:03:21 Max Elevation : 34.26[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data transition command uplink →From:N-CAM,ROM0,SE42 →To:C&DH,ROM0,SE56	・To check Angular velocity. ・To downlink the third of four N-CAM images using SSTV.	・Bus voltage : 4.063[V] ・Angular velocity : 25.53[deg/s]	・Radio interference : weak
	3		Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:26:28 LOS(JST) : 20:37:40 Max Elevation : 55.05[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Shooting image SSTV(437.075MHz) →C&DH,ROM0,SE55	・To check Angular velocity. ・To downlink the second of four N-CAM images using SSTV.	・Bus voltage : 4.096[V] ・Angular velocity : 25.54[deg/s]	・Radio interference : weak ・The earth was shown in the image downlinked by SSTV.
	5	AOS(JST) : 22:02:09 LOS(JST) : 22:09:54 Max Elevation : 6.48[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Shooting image SSTV(437.075MHz) →C&DH,ROM0,SE56	・To check Angular velocity. ・To downlink the third of four N-CAM images using SSTV.	・Bus voltage : 4.085[V] ・Angular velocity : 25.59[deg/s]	・Radio interference : weak ・The earth was shown in the image downlinked by SSTV.

Table 21 Detail of Operation from 5 April 2019 to 11 April 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
4/5/2019	1	AOS(JST) : 07:59:04 LOS(JST) : 08:06:37 Max Elevation : 5.67[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data transition command uplink →From:N-CAM,ROM0,SE43 →To:C&DH,ROM0,SE57	・To check Angular velocity. ・To downlink the fourth of four N-CAM images using SSTV.	・Bus voltage : 4.139[V] ・Angular velocity : 27.40[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:31:03 LOS(JST) : 09:42:40 Max Elevation : 68.01[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink →Measurement interval:10s,Measurement number:2	・To check Angular velocity. ・To measure the RSSI.	・Bus voltage : 4.139[V] ・Angular velocity : 27.40[deg/s]	・Radio interference : weak
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:05:50 LOS(JST) : 20:16:33 Max Elevation : 28.01[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To measure the RSSI.	・Bus voltage : 4.082[V] ・Angular velocity : 26.54[deg/s] ・Recieved packet number Horizontal polarization : 897 Vertical polarization : 851 Circularly polarization : 507	・Radio interference : weak
	5	AOS(JST) : 21:40:05 LOS(JST) : 21:49:42 Max Elevation : 13.61[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Shooting image SSTV(437.075MHz) →C&DH,ROM0,SE57	・To check Angular velocity. ・To downlink the fourth of four N-CAM images using SSTV.	・Bus voltage : 4.073[V] ・Angular velocity : 26.07[deg/s]	・Radio interference : weak
4/6/2019	1		Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:10:06 LOS(JST) : 09:21:42 Max Elevation : 59.74[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation (Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.141[V] ・Angular velocity : 24.14[deg/s]	・Radio interference : weak
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 19:45:28 LOS(JST) : 19:55:16 Max Elevation : 15.65[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Shooting image SSTV(437.075MHz) →C&DH,ROM0,SE54	・To check Angular velocity. ・To downlink the first of four N-CAM images using SSTV.	・Bus voltage : 4.095[V] ・Angular velocity : 23.14[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:18:28 LOS(JST) : 21:29:10 Max Elevation : 25.29[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.095[V] ・Angular velocity : 22.17[deg/s]	・Radio interference : weak
4/7/2019	1	AOS(JST) : 08:49:18 LOS(JST) : 09:00:29 Max Elevation : 30.21[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Downlink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.112[V] ・Angular velocity : 23.18[deg/s]	・Radio interference : weak ・We could hear our own voice and couldn't exchange messages.
	2	AOS(JST) : 10:23:21 LOS(JST) : 10:33:13 Max Elevation : 14.59[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Downlink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.112[V] ・Angular velocity : 23.07[deg/s]	・Radio interference : weak ・We could hear our own voice and couldn't exchange messages.
	3	AOS(JST) : 19:25:27 LOS(JST) : 19:33:45 Max Elevation : 8.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.074[V] ・Angular velocity : 23.05[deg/s]	・Radio interference : strong
	4	AOS(JST) : 20:57:10 LOS(JST) : 21:08:24 Max Elevation : 49.85[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.083[V] ・Angular velocity : 23.49[deg/s]	・Radio interference : weak
4/8/2019	1	AOS(JST) : 08:28:41 LOS(JST) : 08:38:58 Max Elevation : 16.56[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real-time sensing data downlink at 2.0 second intervals →Bus transmitter, AFSK 1200bps,437.075MHz →Downlink with software with time stamp	・To check Angular velocity. ・To check the sensing data in real time.	・Bus voltage : 4.097[V] ・Angular velocity : 24.48[deg/s] ・Recieved packet number Horizontal polarization : 74 Vertical polarization : 95 Circularly polarization : 10	・Radio interference : strong
	2	AOS(JST) : 10:02:02 LOS(JST) : 10:12:55 Max Elevation : 25.70[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROM sector erace of C&DH →ROM0,SE40～51	・To check Angular velocity. ・ To secure the sensing data storage area.	・Bus voltage : 4.139[V] ・Angular velocity : 24.40[deg/s]	
	3		Shade	・No operation.	・Because there is no operator.		
	4	AOS(JST) : 20:36:08 LOS(JST) : 20:47:29 Max Elevation : 78.67[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit using FSK transmitter (GMSK, 9600bps, 435.900MHz) (90 min 0.5 sec interval) →ROM1,SE22,SP512～SE23,SP511	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.084[V] ・Angular velocity : 23.07[deg/s] ・Recieved packet number Horizontal polarization : 942 Vertical polarization : 840 Circularly polarization : 421	・Radio interference : weak
	5	AOS(JST) : 22:12:40 LOS(JST) : 22:19:06 Max Elevation : 3.96[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.072[V] ・Angular velocity : 22.77[deg/s]	
4/9/2019	1	AOS(JST) : 08:08:21 LOS(JST) : 08:17:03 Max Elevation : 8.56[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Angular velocity shooting command uplink	・To check Angular velocity. ・To check the automatic shooting mode for shooting at equal intervals based on the Angular velocity data of N-CAM.	・Bus voltage : 4.177[V] ・Angular velocity : 21.31[deg/s]	・Command uplink time : 08:14:03(JST)
	2	AOS(JST) : 09:40:52 LOS(JST) : 09:52:20 Max Elevation : 48.30[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROM status of CAM downlink →FSK transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To check the image data size shooting on April 9, 1st.	・Bus voltage : 4.176[V] ・Angular velocity : 22.32[deg/s] ・Recieved packet number Horizontal polarization : 720 Vertical polarization : 807 Circularly polarization : 432	・Radio interference : weak
	3		Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:15:21 LOS(JST) : 20:26:25 Max Elevation : 38.19[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:00,SP:00,ESC:00,EP:511	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.095[V] ・Angular velocity : 20.39[deg/s] ・Recieved packet number Horizontal polarization : 242 Vertical polarization : 195 Circularly polarization : 0	・Radio interference : weak ・Due to poor connection between the ground station equipment and the control PC, circularly polarized downlink could not be performed.
	5	AOS(JST) : 21:50:15 LOS(JST) : 21:59:10 Max Elevation : 10.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:00,SP:00,ESC:00,EP:511	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.085[V] ・Angular velocity : 20.25[deg/s] ・Recieved packet number Horizontal polarization : 631 Vertical polarization : 147 Circularly polarization : 161	・Radio interference : weak
4/10/2019	1		Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:19:50 LOS(JST) : 09:31:29 Max Elevation : 83.93[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:00,SP:00,ESC:00,EP:511	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.107[V] ・Angular velocity : 22.20[deg/s] ・Recieved packet number Horizontal polarization : 1066 Vertical polarization : 930 Circularly polarization : 719	・Radio interference : normal
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 19:54:51 LOS(JST) : 20:05:12 Max Elevation : 20.75[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:00,SP:512,ESC:00,EP:1023	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.083[V] ・Angular velocity : 22.77[deg/s] ・Recieved packet number Horizontal polarization : 511 Vertical polarization : 751 Circularly polarization : 211	・Radio interference : weak
	5	AOS(JST) : 21:28:26 LOS(JST) : 21:38:45 Max Elevation : 19.05[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:00,SP:512,ESC:00,EP:1023	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.075[V] ・Angular velocity : 22.57[deg/s] ・Recieved packet number Horizontal polarization : 1042 Vertical polarization : 1357 Circularly polarization : 368	・Radio interference : weak
4/11/2019	1	AOS(JST) : 08:58:57 LOS(JST) : 09:10:23 Max Elevation : 41.25[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:01,SP:00,ESC:01,EP:255	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.075[V] ・Angular velocity : 21.62[deg/s] ・Recieved packet number Horizontal polarization : 816 Vertical polarization : 1098 Circularly polarization : 471	・Radio interference : normal
	2	AOS(JST) : 10:33:20 LOS(JST) : 10:42:31 Max Elevation : 10.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:01,SP:256,ESC:01,EP:511	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 21.36[deg/s] ・Recieved packet number Horizontal polarization : 891 Vertical polarization : 430 Circularly polarization : 154	・Radio interference : weak
	3	AOS(JST) : 19:34:38 LOS(JST) : 19:43:48 Max Elevation : 11.60[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:01,SP:512,ESC:02,EP:511	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.112[V] ・Angular velocity : 19.33[deg/s] ・Recieved packet number Horizontal polarization : 232 Vertical polarization : 3 Circularly polarization : 20	・Radio interference : weak
	4	AOS(JST) : 21:06:59 LOS(JST) : 21:18:05 Max Elevation : 35.80[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:01,SP:256,ESC:01,EP:511	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.086[V] ・Angular velocity : 19.35[deg/s] ・Recieved packet number Horizontal polarization : 1162 Vertical polarization : 662 Circularly polarization : 479	・Radio interference : weak

Table 22 Detail of Operation from 12 April 2019 to 18 April 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
4/12/2019	1	AOS(JST) : 08:38:13 LOS(JST) : 08:49:00 Max Elevation : 21.98[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:01,SP:512,ESC:01,EP:615	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.128[V] ・Angular velocity : 19.45[deg/s] ・Recieved packet number Horizontal polarization : 272 Vertical polarization : 37 Circularly polarization : 9	・Radio interference : strong
	2	AOS(JST) : 10:11:54 LOS(JST) : 10:22:22 Max Elevation : 19.58[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:01,SP:512,ESC:01,EP:615	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 19.36[deg/s] ・Recieved packet number Horizontal polarization : 966 Vertical polarization : 602 Circularly polarization : 332	・Radio interference : normal
	3	AOS(JST) : 19:14:50 LOS(JST) : 19:22:06 Max Elevation : 5.65[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:01,SP:256,ESC:01,EP:259	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.090[V] ・Angular velocity : 19.49[deg/s] ・Recieved packet number Horizontal polarization : 15 Vertical polarization : 37 Circularly polarization : 1	・Radio interference : weak
	4	AOS(JST) : 20:23:27 LOS(JST) : 20:57:13 Max Elevation : 74.25[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM shooting image data downlink →Size:660224 SC_S:00,SSC:02,SP:144,ESC:02,EP:531	・To check Angular velocity. ・To downlink the image data shooting on April 9, 1st.	・Bus voltage : 4.086[V] ・Angular velocity : 19.76[deg/s] ・Recieved packet number Horizontal polarization : 1370 Vertical polarization : 1892 Circularly polarization : 875	・Radio interference : weak ・CAM shooting image data downlink finished. ・All 18 pictures were downlinked.
	5		Shade	・No operation.	・Because the elevation angle is low.		
4/13/2019	1	AOS(JST) : 08:17:44 LOS(JST) : 08:27:16 Max Elevation : 11.92[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.061[V] ・Angular velocity : 20.92[deg/s]	・We could hear our own voice and couldn't exchange messages.
	2	AOS(JST) : 09:50:39 LOS(JST) : 10:01:53 Max Elevation : 35.17[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.161[V] ・Angular velocity : 20.75[deg/s]	・We could hear our own voice and couldn't exchange messages.
	3		Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:24:54 LOS(JST) : 20:36:12 Max Elevation : 17.59[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Shooting image SSTV(437.075MHz) →C&DHのROM0,SE54	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.088[V] ・Angular velocity : 19.14[deg/s]	
	5	AOS(JST) : 22:00:29 LOS(JST) : 22:08:30 Max Elevation : 7.02[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.083[V] ・Angular velocity : 18.44[deg/s]	
4/14/2019	1	AOS(JST) : 07:57:37 LOS(JST) : 08:05:01 Max Elevation : 5.40[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 17.77[deg/s]	・Radio interference : weak ・I could not confirm my loop because of the low elevation angle. ・Uplink was performed by USB at the beginning due to a setting error, and switched to LSB in the middle of the pass.
	2	AOS(JST) : 09:29:33 LOS(JST) : 09:41:09 Max Elevation : 70.13[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.088[V] ・Angular velocity : 19.14[deg/s]	・Radio interference : weak ・I was able to communicate with "JH3BUM" and "JH4MGU". ・Until now, we used headphones to prevent howling, but we found that the speaker output was sufficient.
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:04:14 LOS(JST) : 20:15:03 Max Elevation : 27.59[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Shooting image SSTV(437.075MHz) →C&DHのROM0,SE55	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.096[V] ・Angular velocity : 17.50[deg/s]	
	5	AOS(JST) : 21:38:25 LOS(JST) : 21:48:15 Max Elevation : 4.39[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.080[V] ・Angular velocity : 17.87[deg/s]	
4/15/2019	1		Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:08:34 LOS(JST) : 09:20:09 Max Elevation : 57.72[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →FSK transmitter,GMSK 9600bps,435.900MHz →ROM1,SE23,SP512～SE23,SP1023	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.144[V] ・Angular velocity : 19.46[deg/s] ・Recieved packet number Horizontal polarization : 848 Vertical polarization : 677 Circularly polarization : 629	・Radio interference : normal
	3	AOS(JST) : 10:43:20 LOS(JST) : 10:51:39 Max Elevation : 7.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →FSK transmitter,GMSK 9600bps,435.900MHz →ROM1,SE24,SP0～SE24,SP1023	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.161[V] ・Angular velocity : 19.69[deg/s] ・Recieved packet number Horizontal polarization : 367 Vertical polarization : 352 Circularly polarization : 59	・Radio interference : strong
	4	AOS(JST) : 19:43:52 LOS(JST) : 19:53:43 Max Elevation : 15.50[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →FSK transmitter,GMSK 9600bps,435.900MHz →ROM1,SE24,SP0～SE24,SP563	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.080[V] ・Angular velocity : 18.54[deg/s] ・Recieved packet number Horizontal polarization : 248 Vertical polarization : 148 Circularly polarization : 207	・Radio interference : weak
	5	AOS(JST) : 21:16:48 LOS(JST) : 21:2739 Max Elevation : 26.57deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE24,SP0～SE24,SP563	・To check Angular velocity. ・To downlink the HK data that started sensing on the 4th pass of February 18.	・Bus voltage : 4.075[V] ・Angular velocity : 18.05[deg/s] ・Recieved packet number Horizontal polarization : 1054 Vertical polarization : 1294 Circularly polarization : 55	・Radio interference : weak
4/16/2019	1	AOS(JST) : 08:47:45 LOS(JST) : 08:58:53 Max Elevation : 29.24[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE0,SP0～SE0,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.132[V] ・Angular velocity : 16.71[deg/s] ・Recieved packet number Horizontal polarization : 238 Vertical polarization : 423 Circularly polarization : 231	・Radio interference : weak
	2	AOS(JST) : 10:21:46 LOS(JST) : 10:31:40 Max Elevation : 14.39[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE0,SP0～SE0,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.178[V] ・Angular velocity : 16.51[deg/s] ・Recieved packet number Horizontal polarization : 500 Vertical polarization : 200 Circularly polarization : 69	・Radio interference : strong
	3	AOS(JST) : 19:23:50 LOS(JST) : 19:32:11 Max Elevation : 8.33[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE0,SP512～SE1,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.091[V] ・Angular velocity : 16.24[deg/s] ・Recieved packet number Horizontal polarization : 83 Vertical polarization : 236 Circularly polarization : 0	・Radio interference : weak
	4	AOS(JST) : 20:55:29 LOS(JST) : 21:06:52 Max Elevation : 52.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE0,SP512～SE1,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.086[V] ・Angular velocity : 16.53[deg/s] ・Recieved packet number Horizontal polarization : 1253 Vertical polarization : 873 Circularly polarization : 0	・Radio interference : weak
	5		Shade	・No operation.	・Because the elevation angle is low.		
4/17/2019	1	AOS(JST) : 08:27:08 LOS(JST) : 08:37:19 Max Elevation : 15.98[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE1,SP512～SE1,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.139[V] ・Angular velocity : 18.51[deg/s] ・Recieved packet number Horizontal polarization : 285 Vertical polarization : 68 Circularly polarization : 141	・Radio interference : weak
	2	AOS(JST) : 10:00:26 LOS(JST) : 10:11:20 Max Elevation : 26.32[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE1,SP512～SE1,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.160[V] ・Angular velocity : 18.71[deg/s] ・Recieved packet number Horizontal polarization : 1186 Vertical polarization : 618 Circularly polarization : 328	・Radio interference : normal
	3	AOS(JST) : 19:04:22 LOS(JST) : 19:10:13 Max Elevation : 3.27[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE0,SP368～SE0,SP371	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.072[V] ・Angular velocity : 18.27[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : 0	・Radio interference : weak ・The reason why the number of received packets was 0 for all polarizations was that the maximum elevation angle (3.27 degrees) was low. We confirmed that the uplink was passed by SDR and that the ground station equipment was operating normally. The CW signal was weak all the time, and satellite time could not be read.
	4	AOS(JST) : 20:34:27 LOS(JST) : 20:45:55 Max Elevation : 75.85[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE2,SP0～SE2,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.072[V] ・Angular velocity : 18.08[deg/s] ・Recieved packet number Horizontal polarization : 118 Vertical polarization : 156 Circularly polarization : 197	・Radio interference : weak ・The TNC setting was not working properly with the uplink software. In the second half of the pass, we confirmed that we were on the fourth uplink. As a result, the number of received packets was small despite the maximum elevation angle of 75.93 degrees.
	5	AOS(JST) : 22:10:50 LOS(JST) : 22:17:39 Max Elevation : 4.47[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE2,SP0～SE2,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.072[V] ・Angular velocity : 18.08[deg/s] ・Recieved packet number Horizontal polarization : 389 Vertical polarization : 194 Circularly polarization : 26	・Radio interference : weak
4/18/2019	1	AOS(JST) : 08:06:48 LOS(JST) : 08:15:20 Max Elevation : 8.15[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE2,SP0～SE2,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.158[V] ・Angular velocity : 16.29[deg/s] ・Recieved packet number Horizontal polarization : 69 Vertical polarization : 0 Circularly polarization : 0	・Radio interference : weak
	2	AOS(JST) : 09:39:15 LOS(JST) : 09:50:42 Max Elevation : 49.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE2,SP0～SE2,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.174[V] ・Angular velocity : 15.84[deg/s] ・Recieved packet number Horizontal polarization : 878 Vertical polarization : 567 Circularly polarization : 555	・Radio interference : strong
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:13:40 LOS(JST) : 20:24:49 Max Elevation : 37.28[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE3,SP0～SE3,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.093[V] ・Angular velocity : 15.39[deg/s] ・Recieved packet number Horizontal polarization : 967 Vertical polarization : 142 Circularly polarization : 728	・Radio interference : weak
	5	AOS(JST) : 21:48:27 LOS(JST) : 21:57:38 Max Elevation : 10.69[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE3,SP0～SE3,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.086[V] ・Angular velocity : 15.93[deg/s] ・Recieved packet number Horizontal polarization : 797 Vertical polarization : 304 Circularly polarization : 264	・Radio interference : weak

Table 23 Detail of Operation from 19 April 2019 to 25 April 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
4/19/2019	1		Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:18:12 LOS(JST) : 09:29:48 Max Elevation : 81.07[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE4,SP0～SE4,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.162[V] ・Angular velocity : 18.37[deg/s] ・Recieved packet number Horizontal polarization : 980 Vertical polarization : 513 Circularly polarization : 617	・Radio interference : weak
	3	AOS(JST) : 10:53:24 LOS(JST) : 11:00:37 Max Elevation : 5.40[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE0,SP368～SE0,SP371	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.158[V] ・Angular velocity : 18.25[deg/s] ・Recieved packet number Horizontal polarization : 243 Vertical polarization : 29 Circularly polarization : 14	・Radio interference : weak
	4	AOS(JST) : 19:53:08 LOS(JST) : 20:03:34 Max Elevation : 20.44[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE4,SP512～SE5,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.078[V] ・Angular velocity : 17.17[deg/s] ・Recieved packet number Horizontal polarization : 583 Vertical polarization : 183 Circularly polarization : 498	・Radio interference : weak
	5	AOS(JST) : 21:26:39 LOS(JST) : 21:37:09 Max Elevation : 20.10[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE4,SP512～SE5,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.073[V] ・Angular velocity : 17.32[deg/s] ・Recieved packet number Horizontal polarization : 1227 Vertical polarization : 830 Circularly polarization : 632	・Radio interference : weak
4/20/2019	1	AOS(JST) : 08:36:34 LOS(JST) : 08:47:14 Max Elevation : 21.11[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.149[V] ・Angular velocity : 15.72[deg/s]	・Radio interference : strong ・We could hear our own voice and communicate with JH4DHX/3.
	2	AOS(JST) : 10:10:12 LOS(JST) : 10:20:40 Max Elevation : 20.00[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.161[V] ・Angular velocity : 15.21[deg/s]	・Radio interference : strong ・We could hear our own voice and couldn't exchange messages.
	3		Shade	・No operation.	・Because there is no operator.		
	4		Shade	・No operation.	・Because there is no operator.		
	5		Shade	・No operation.	・Because there is no operator.		
4/21/2019	1	AOS(JST) : 08:36:34 LOS(JST) : 08:47:14 Max Elevation : 21.11[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.177[V] ・Angular velocity : 17.64[deg/s]	・Radio interference : normal ・We could hear our own voice and couldn't exchange messages.
	2	AOS(JST) : 10:10:12 LOS(JST) : 10:20:40 Max Elevation : 20.00[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation(Uplink frequency fixed) →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.160[V] ・Angular velocity : 17.76[deg/s]	・Radio interference : normal ・We could hear our own voice and couldn't exchange messages.
	3	AOS(JST) : 19:13:08 LOS(JST) : 19:20:24 Max Elevation : 5.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.075[V] ・Angular velocity : 17.17[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:44:01 LOS(JST) : 20:55:33 Max Elevation : 77.70[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.075[V] ・Angular velocity : 16.40[deg/s]	・Radio interference : weak
	5		Shade	・No operation.	・Because the elevation angle is low.		
4/22/2019	1	AOS(JST) : 08:16:04 LOS(JST) : 08:25:27 Max Elevation : 11.35[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE5,SP512～SE5,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.174[V] ・Angular velocity : 14.72[deg/s] ・Recieved packet number Horizontal polarization : 137 Vertical polarization : 81 Circularly polarization : 16	・Radio interference : normal
	2	AOS(JST) : 09:48:57 LOS(JST) : 10:00:09 Max Elevation : 36.14[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE5,SP512～SE5,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.144[V] ・Angular velocity : 14.60[deg/s] ・Recieved packet number Horizontal polarization : 980 Vertical polarization : 620 Circularly polarization : 453	・Radio interference : normal
	3		Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:23:06 LOS(JST) : 20:34:31 Max Elevation : 51.68[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE6,SP0～SE6,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.096[V] ・Angular velocity : 15.09[deg/s] ・Recieved packet number Horizontal polarization : 1061 Vertical polarization : 124 Circularly polarization : 1064	・Radio interference : weak
	5	AOS(JST) : 21:58:35 LOS(JST) : 22:0653 Max Elevation : 7.63[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE6,SP940～SE6,SP947	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.084[V] ・Angular velocity : 15.39[deg/s] ・Recieved packet number Horizontal polarization : 958 Vertical polarization : 401 Circularly polarization : 482	・Radio interference : weak
4/23/2019	1	AOS(JST) : 07:56:00 LOS(JST) : 08:03:08 Max Elevation : 4.96[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE7,SP0～SE7,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.160[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 48 Vertical polarization : 13 Circularly polarization : 37	・Radio interference : strong
	2	AOS(JST) : 09:27:50 LOS(JST) : 09:39:22 Max Elevation : 72.74[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE7,SP0～SE7,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.179[V] ・Angular velocity : 17.40[deg/s] ・Recieved packet number Horizontal polarization : 1023 Vertical polarization : 354 Circularly polarization : 648	・Radio interference : strong
	3		Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:02:27 LOS(JST) : 20:13:20 Max Elevation : 27.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE7,SP512～SE8,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.085[V] ・Angular velocity : 16.03[deg/s] ・Recieved packet number Horizontal polarization : 914 Vertical polarization : 146 Circularly polarization : 427	・Radio interference : weak
	5	AOS(JST) : 21:36:32 LOS(JST) : 21:46:35 Max Elevation : 15.25[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE7,SP512～SE8,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.079[V] ・Angular velocity : 15.48[deg/s] ・Recieved packet number Horizontal polarization : 1283 Vertical polarization : 445 Circularly polarization : 547	・Radio interference : weak
4/24/2019	1		Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:06:51 LOS(JST) : 09:18:20 Max Elevation : 55.15[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE7,SP0～SE7,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.149[V] ・Angular velocity : 14.28[deg/s] ・Recieved packet number Horizontal polarization : 618 Vertical polarization : 322 Circularly polarization : 704	・Radio interference : weak
	3	AOS(JST) : 10:41:35 LOS(JST) : 10:49:55 Max Elevation : 8.14[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE7,SP0～SE7,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.160[V] ・Angular velocity : 14.50[deg/s] ・Recieved packet number Horizontal polarization : 224 Vertical polarization : 147 Circularly polarization : 36	・Radio interference : strong ・Recently, since the number of packets received for vertical polarization is smaller than that for horizontal polarization, the squelch of vertical polarization was slightly reduced to receive packets.
	4	AOS(JST) : 19:42:04 LOS(JST) : 19:51:59 Max Elevation : 15.26[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE9,SP0～SE9,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.093[V] ・Angular velocity : 15.34[deg/s] ・Recieved packet number Horizontal polarization : 410 Vertical polarization : 87 Circularly polarization : 191	・Radio interference : weak
	5	AOS(JST) : 21:14:56 LOS(JST) : 21:25:57 Max Elevation : 28.02[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE9,SP0～SE9,SP1023	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.082[V] ・Angular velocity : 15.30[deg/s] ・Recieved packet number Horizontal polarization : 1262 Vertical polarization : 1605 Circularly polarization : 947	・Radio interference : weak
4/25/2019	1	AOS(JST) : 08:46:02 LOS(JST) : 08:57:02 Max Elevation : 27.93[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE10,SP0～SE10,SP511	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.169[V] ・Angular velocity : 16.65[deg/s] ・Recieved packet number Horizontal polarization : 454 Vertical polarization : 442 Circularly polarization : 301	・Radio interference : normal
	2	AOS(JST) : 10:20:00 LOS(JST) : 10:29:53 Max Elevation : 15.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE10,SP512～SE10,SP767	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 972 Vertical polarization : 321 Circularly polarization : 245	・Radio interference : normal
	3	AOS(JST) : 19:42:04 LOS(JST) : 19:51:59 Max Elevation : 15.26[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE10,SP768～SE11,SP767	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.111[V] ・Angular velocity : 15.26[deg/s] ・Recieved packet number Horizontal polarization : 44 Vertical polarization : 102 Circularly polarization : 16	・Radio interference : weak
	4	AOS(JST) : 21:14:56 LOS(JST) : 21:25:57 Max Elevation : 28.02[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →FSK transmitter,GMSK 9600bps,435.900MHz →ROM0,SE10,SP768～SE11,SP767	・To check Angular velocity. ・To downlink the initial sensing data.	・Bus voltage : 4.080[V] ・Angular velocity : 14.84[deg/s] ・Recieved packet number Horizontal polarization : 1237 Vertical polarization : 1496 Circularly polarization : 819	・Radio interference : weak
	5		Shade	・No operation.	・Because the elevation angle is low.		

Table 24 Detail of Operation from 26 April 2019 to 2 May 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
4/26/2019	1	AOS(JST) : 08:25:24 LOS(JST) : 08:35:25 Max Elevation : 15.19[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Shooting change compression ratio image command Uplink(JPEG,max)	・To check Angular velocity. ・To shoot images with different compression ratios.	・Bus voltage : 4.111[V] ・Angular velocity : 15.21[deg/s]	・Radio interference : normal
	2	AOS(JST) : 09:58:39 LOS(JST) : 10:09:30 Max Elevation : 26.91[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To check the size of the shooting image.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 844 Vertical polarization : 755 Circularly polarization : 305	・Radio interference : strong
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:32:35 LOS(JST) : 20:44:09 Max Elevation : 72.72[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 804 Vertical polarization : 796 Circularly polarization : 506	・Radio interference : weak
	5	AOS(JST) : 22:08:49 LOS(JST) : 22:16:00 Max Elevation : 5.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : 0	・Radio interference : weak ・There was no received packet due to a command error.
4/27/2019	1		Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:37:28 LOS(JST) : 09:48:50 Max Elevation : 51.55[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.149[V] ・Angular velocity : 15.54[deg/s]	・Radio interference : weak ・We could hear our own voice and couldn't exchange messages.
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:11:48 LOS(JST) : 20:23:01 Max Elevation : 36.16[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.089[V] ・Angular velocity : 13.65[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:08:49 LOS(JST) : 22:16:00 Max Elevation : 5.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.082[V] ・Angular velocity : 12.88[deg/s]	・Radio interference : weak
4/28/2019	1		Sunshine	・No operation.	・Because the elevation angle is low.		
	2	AOS(JST) : 09:16:25 LOS(JST) : 09:27:55 Max Elevation : 77.69[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.187[V] ・Angular velocity : 13.37[deg/s]	・Radio interference : weak ・We could hear our own voice and couldn't exchange messages.
	3		Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 19:51:17 LOS(JST) : 20:01:44 Max Elevation : 20.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.085[V] ・Angular velocity : 14.27[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:24:42 LOS(JST) : 21:35:23 Max Elevation : 5.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.078[V] ・Angular velocity : 14.71[deg/s] Horizontal polarization : 885 Vertical polarization : 1007 Circularly polarization : 0	・Radio interference : weak ・Due to a command mistake, SSTV was suddenly changed to image downlink.
4/29/2019	1	AOS(JST) : 08:55:30 LOS(JST) : 09:06:44 Max Elevation : 37.61[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.141[V] ・Angular velocity : 13.89[deg/s] Horizontal polarization : 435 Vertical polarization : 213 Circularly polarization : 224	・Radio interference : weak
	2	AOS(JST) : 10:29:49 LOS(JST) : 10:39:00 Max Elevation : 11.40[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.161[V] ・Angular velocity : 13.62[deg/s] Horizontal polarization : 476 Vertical polarization : 128 Circularly polarization : 52	・Radio interference : weak
	3	AOS(JST) : 19:31:04 LOS(JST) : 19:40:17 Max Elevation : 11.22[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:256, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.080[V] ・Angular velocity : 12.17[deg/s] Horizontal polarization : 117 Vertical polarization : 175 Circularly polarization : 52	・Radio interference : weak
	4	AOS(JST) : 19:51:17 LOS(JST) : 20:01:44 Max Elevation : 20.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:256, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.089[V] ・Angular velocity : 11.82[deg/s] Horizontal polarization : 624 Vertical polarization : 319 Circularly polarization : 333	・Radio interference : weak
4/30/2019	1	AOS(JST) : 08:34:46 LOS(JST) : 08:45:15 Max Elevation : 20.01[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:512, ESC:03, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.178[V] ・Angular velocity : 12.35[deg/s] Horizontal polarization : 67 Vertical polarization : 96 Circularly polarization : 21	・Radio interference : weak
	2	AOS(JST) : 10:08:22 LOS(JST) : 10:18:46 Max Elevation : 20.36[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:512, ESC:03, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.141[V] ・Angular velocity : 12.22[deg/s] Horizontal polarization : 784 Vertical polarization : 1795 Circularly polarization : 356	・Radio interference : weak
	3	AOS(JST) : 19:11 : 17 LOS(JST) : 19:18:30 Max Elevation : 5.39[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:768, ESC:03, EP:1023 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.0806V] ・Angular velocity : 13.41[deg/s] Horizontal polarization : 17 Vertical polarization : 34 Circularly polarization : 0	・Radio interference : weak
	4	AOS(JST) : 20:42:05 LOS(JST) : 20:53:43 Max Elevation : 81.47[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:03, SP:768, ESC:03, EP:1023 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.086[V] ・Angular velocity : 13.12[deg/s] Horizontal polarization : 519 Vertical polarization : 577 Circularly polarization : 230	・Radio interference : weak
5/1/2019	1	AOS(JST) : 08:14:17 LOS(JST) : 08:23:35 Max Elevation : 10.62[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:0, ESC:04, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.112[V] ・Angular velocity : 13.62[deg/s] Horizontal polarization : 3 Vertical polarization : 31 Circularly polarization : 4	・Radio interference : weak
	2	AOS(JST) : 09:47:05 LOS(JST) : 10:18:46 Max Elevation : 37.18[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:0, ESC:04, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.199[V] ・Angular velocity : 13.57[deg/s] Horizontal polarization : 564 Vertical polarization : 524 Circularly polarization : 299	・Radio interference : weak
	3		Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:21:11 LOS(JST) : 20:32:38 Max Elevation : 49.60[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:256, ESC:04, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.088[V] ・Angular velocity : 11.45[deg/s] Horizontal polarization : 701 Vertical polarization : 753 Circularly polarization : 327	・Radio interference : weak
	5	AOS(JST) : 21:56:32 LOS(JST) : 22:05:06 Max Elevation : 8.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:248, ESC:04, EP:251→Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.084[V] ・Angular velocity : 11.61[deg/s] Horizontal polarization : 312 Vertical polarization : 349 Circularly polarization : 63	・Radio interference : weak
5/2/2019	1	AOS(JST) : 07:54:14 LOS(JST) : 08:01:00 Max Elevation : 4.40[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.178[V] ・Angular velocity : 9.55[deg/s] Horizontal polarization : 0 Vertical polarization : 2 Circularly polarization : 0	・Radio interference : weak
	2	AOS(JST) : 09:25:58 LOS(JST) : 09:37:24 Max Elevation : 75.87[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 10.41[deg/s] Horizontal polarization : 575 Vertical polarization : 656 Circularly polarization : 218	・Radio interference : weak
	3	AOS(JST) : 11:01:40 LOS(JST) : 11:07:29 Max Elevation : 3.22[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.141[V] ・Angular velocity : 10.41[deg/s] Horizontal polarization : 83 Vertical polarization : 54 Circularly polarization : 0	・Radio interference : weak
	4	AOS(JST) : 20:00:31 LOS(JST) : 20:11:25 Max Elevation : 26.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767→Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.090[V] ・Angular velocity : 8.08[deg/s] Horizontal polarization : 213 Vertical polarization : 458 Circularly polarization : 301	・Radio interference : weak
	5	AOS(JST) : 21:34:31 LOS(JST) : 21:444:44 Max Elevation : 16.11[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Change compression ratio image data downlink Size:599808 SC_S:03, SSC:04, SP:768, ESC:04, EP:1023 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To downlink the image data shooting on April 26, 1st.	・Bus voltage : 4.086[V] ・Angular velocity : 7.45[deg/s] Horizontal polarization : 413 Vertical polarization : 623 Circularly polarization : 181	・Radio interference : weak

Table 25 Detail of Operation from 3 May 2019 to 9 May 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
03/05/2019	1	AOS(JST) : 09:04:59 LOS(JST) : 09:16:20 Max Elevation : 52.16[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:599808 SC_S:03, SSC:05, SP:00, ESC:05, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 8.16[deg/s] Horizontal polarization : 399 Vertical polarization : 271 Circularly polarization : 348	・Radio interference : weak
	2	AOS(JST) : 10:39:40 LOS(JST) : 10:47:59 Max Elevation : 8.27[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:599808 SC_S:03, SSC:05, SP:00, ESC:05, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 5.43[deg/s] Horizontal polarization : 346 Vertical polarization : 233 Circularly polarization : 33	・Radio interference : weak
	3	AOS(JST) : 19:40:09 LOS(JST) : 19:50:03 Max Elevation : 14.85[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:599808 SC_S:03, SSC:05, SP:00, ESC:05, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.112[V] ・Angular velocity : 9.175[deg/s] Horizontal polarization : 60 Vertical polarization : 30 Circularly polarization : 65	・Radio interference : weak
	4	AOS(JST) : 21:12:55 LOS(JST) : 21:24:04 Max Elevation : 29.50[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:599808 SC_S:03, SSC:05, SP:112, ESC:05, EP:295 →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.080[V] ・Angular velocity : 8.358[deg/s] Horizontal polarization : 431 Vertical polarization : 294 Circularly polarization : 224	・Radio interference : weak
04/05/2019	1	AOS(JST) : 08:44:09 LOS(JST) : 08:54:59 Max Elevation : 26.40[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 10.60[deg/s] Horizontal polarization : 234 Vertical polarization : 101 Circularly polarization : 148	・Radio interference : weak
	2	AOS(JST) : 10:18:05 LOS(JST) : 10:27:55 Max Elevation : 15.45[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink Size:2193920 SC_S:52, SSC:59, SP:0, ESC:59, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the movie taken on 2/19, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 5.43[deg/s] Horizontal polarization : 577 Vertical polarization : 209 Circularly polarization : 222	・Radio interference : weak
	3	AOS(JST) : 19:20:08 LOS(JST) : 19:28:26 Max Elevation : 14.85[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink Size:2193920 SC_S:52, SSC:59, SP:0, ESC:59, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the movie taken on 2/19, 1st.	・Bus voltage : 4.085[V] ・Angular velocity : 10.97[deg/s] Horizontal polarization : 10 Vertical polarization : 5 Circularly polarization : 16	・Radio interference : weak
	4	AOS(JST) : 20:51:37 LOS(JST) : 21:03:12 Max Elevation : 29.50[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink Size:2193920 SC_S:52, SSC:59, SP:0, ESC:59, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.084[V] ・Angular velocity : 10.36[deg/s] Horizontal polarization : 494 Vertical polarization : 394 Circularly polarization : 408	・Radio interference : weak
05/05/2019	1	AOS(JST) : 08:23:31 LOS(JST) : 08:33:19 Max Elevation : 14.26[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation	・Bus voltage : 4.189[V] ・Angular velocity : 11.37[deg/s]	・Radio interference : weak ・The local loop was confirmed, but communication with other stations was not possible.
	2	AOS(JST) : 09:56:43 LOS(JST) : 10:07:30 Max Elevation : 27.54[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation	・Bus voltage : 4.149[V] ・Angular velocity : 11.50[deg/s]	・Radio interference : weak ・The local loop was confirmed, but communication with other stations was not possible.
	3	AOS(JST) : 19:00:43 LOS(JST) : 19:06:22 Max Elevation : 2.94[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Compression rate change image shooting command uplink	・To confirm angular velocity. ・To capture compression rate image	・Bus voltage : 4.083[V] ・Angular velocity : 12.34[deg/s]	・Radio interference : weak ・Compression rate change image shooting command uplink →Over Africa, Weather:Sunny, Sunshine →Uplink:19:03:00(JST)
	4	AOS(JST) : 20:30:35 LOS(JST) : 20:42:11 Max Elevation : 69.33[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To check the size of the captured image.	・Bus voltage : 4.085[V] ・Angular velocity : 12.47[deg/s] Horizontal polarization : 571 Vertical polarization : 274 Circularly polarization : 295	・Radio interference : weak
	5	AOS(JST) : 22:06:41 LOS(JST) : 22:14:09 Max Elevation : 5.50[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ Image migration command uplink →Migration origin : CAMROMO,SC20 →Migration destination : CDHROM1,SC34	・To confirm angular velocity. ・To transfer image data to C&DH ROM.	・Bus voltage : 4.082[V] ・Angular velocity : 12.45[deg/s]	・Radio interference : weak
06/05/2019	1	AOS(JST) : 08:03:14 LOS(JST) : 08:11:11 Max Elevation : 6.91[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:00, ESC:20, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.178[V] ・Angular velocity : 9.73[deg/s] Horizontal polarization : 69 Vertical polarization : 0 Circularly polarization : 17	・Radio interference : weak
	2	AOS(JST) : 09:35:31 LOS(JST) : 09:46:47 Max Elevation : 53.62[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:00, ESC:20, EP:255→Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.158[V] ・Angular velocity : 12.53[deg/s] Horizontal polarization : 548 Vertical polarization : 464 Circularly polarization : 416	・Radio interference : weak
	3		Sunshine	・No operation.	・Low elevation.		
	4	AOS(JST) : 20:09:48 LOS(JST) : 20:21:02 Max Elevation : 34.76[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:256, ESC:20, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.089[V] ・Angular velocity : 12.02[deg/s] Horizontal polarization : 330 Vertical polarization : 163 Circularly polarization : 51	・Radio interference : weak
	5	AOS(JST) : 21:44:24 LOS(JST) : 21:53:59 Max Elevation : 12.09[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:256, ESC:20, EP:511→Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 12.48[deg/s] Horizontal polarization : 291 Vertical polarization : 163 Circularly polarization : 51	・Radio interference : weak
07/05/2019	1		Sunshine	・No operation.	・Low elevation.		
	2	AOS(JST) : 09:14:27 LOS(JST) : 09:25:49 Max Elevation : 73.72[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:256, ESC:20, EP:511→Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.141[V] ・Angular velocity : 11.62[deg/s] Horizontal polarization : 489 Vertical polarization : 271 Circularly polarization : 327	・Radio interference : weak
	3	AOS(JST) : 10:49:34 LOS(JST) : 10:56:48 Max Elevation : 5.62[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:212, ESC:20, EP:215→Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.196[V] ・Angular velocity : 11.62[deg/s] Horizontal polarization : 189 Vertical polarization : 101 Circularly polarization : 5	・Radio interference : weak
	4	AOS(JST) : 19:49:17 LOS(JST) : 19:59:43 Max Elevation : 34.76[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:512, ESC:20, EP:767→Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.084[V] ・Angular velocity : 10.96[deg/s] Horizontal polarization : 112 Vertical polarization : 324 Circularly polarization : 126	・Radio interference : weak
	5	AOS(JST)21 : 22:37 LOS(JST) : 21:33:25 Max Elevation : 12.09[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:512, ESC:20, EP:767→Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 9.330[deg/s] Horizontal polarization : 180 Vertical polarization : 502 Circularly polarization : 132	・Radio interference : weak
08/05/2019	1	AOS(JST) : 08:53:32 LOS(JST) : 09:04:36 Max Elevation : 35.41[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:512, ESC:20, EP:767→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.093[V] ・Angular velocity : 9.811[deg/s] Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : 11	・Radio interference : weak
	2	AOS(JST) : 10:27:48 LOS(JST) : 10:36:57 Max Elevation : 11.59[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:512, ESC:20, EP:767→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 9.260[deg/s] Horizontal polarization : 436 Vertical polarization : 51 Circularly polarization : 67	・Radio interference : weak
	3	AOS(JST) : 19:29:05 LOS(JST) : 19:38:13 Max Elevation : 10.79[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:512, ESC:20, EP:767→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.089[V] ・Angular velocity : 8.177[deg/s] Horizontal polarization : 112 Vertical polarization : 324 Circularly polarization : 126	・Radio interference : weak
	4	AOS(JST) : 21:01:11 LOS(JST) : 21:12:37 Max Elevation : 41.98[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:20, SP:768, ESC:21, EP:255→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.083[V] ・Angular velocity : 8.043[deg/s] Horizontal polarization : 1297 Vertical polarization : 949 Circularly polarization : 1115	・Radio interference : weak
09/05/2019	1	AOS(JST) : 08:32:47 LOS(JST) : 08:43:04 Max Elevation : 18.80[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:21, SP:00, ESC:21, EP:255→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 7.757[deg/s] Horizontal polarization : 199 Vertical polarization : 48 Circularly polarization : 236	・Radio interference : weak
	2	AOS(JST) : 10:06:20 LOS(JST) : 10:16:40 Max Elevation : 20.80[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:21, SP:00, ESC:21, EP:255→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 7.368[deg/s] Horizontal polarization : 1006 Vertical polarization : 435 Circularly polarization : 451	・Radio interference : weak
	3	AOS(JST) : 19:09:20 LOS(JST) : 19:16:23 Max Elevation : 5.06[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:21, SP:256, ESC:21, EP:767→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.083[V] ・Angular velocity : 7.754[deg/s] Horizontal polarization : 0 Vertical polarization : 10 Circularly polarization : 2	・Radio interference : weak
	4	AOS(JST) : 20:40:01 LOS(JST) : 20:51:40 Max Elevation : 85.57[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:674048 SC_S:20, SSC:21, SP:256, ESC:21, EP:767→FSK transmitter,GMSK 9600bps,435.900MHz	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.084[V] ・Angular velocity : 7.610[deg/s] Horizontal polarization : 1111 Vertical polarization : 716 Circularly polarization : 700	・Radio interference : weak
	5	AOS(JST) : 22:17:01 LOS(JST) : 22:22:56 Max Elevation : 3.09[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image migration command uplink →Migration origin : CAMROMO,SC11 →Migration destination : CDHROM1,SC38	・To confirm angular velocity. ・To transfer image data to C&DH ROM.	・Bus voltage : 4.075[V] ・Angular velocity : 7.894[deg/s]	・Radio interference : weak

Table 26 Detail of Operation from 10 May 2019 to 16 May 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
10/05/2019	1	AOS(JST) : 08:12:18 LOS(JST) : 08:21:10 Max Elevation : 9.82[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:21, SP:768, ESC:21, EP:1023	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.17[V] ・Angular velocity : 8.34[deg/s] ・Recieved packet number Horizontal polarization : 65 Vertical polarization : 1 Circularly polarization : 0	・Radio interference : strong
	2	AOS(JST) : 09:45:03 LOS(JST) : 09:56:05 Max Elevation : 38.45[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:21, SP:768, ESC:21, EP:1023	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.144[V] ・Angular velocity : 8.967[deg/s] ・Recieved packet number Horizontal polarization : 798 Vertical polarization : 479 Circularly polarization : 0	・Radio interference : weak
	3		Shade	No operation.	・Low elevation.		
	4	AOS(JST) : 20:19:06 LOS(JST) : 20:30:33 Max Elevation : 47.17[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:21, SP:256, ESC:21, EP:767	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.083[V] ・Angular velocity : 8.65[deg/s] ・Recieved packet number Horizontal polarization : 977 Vertical polarization : 618 Circularly polarization : 732	・Radio interference : middle
	5	AOS(JST) : 21:54:20 LOS(JST) : 22:03:05 Max Elevation : 8.77[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:21, SP:256, ESC:21, EP:767	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.075[V] ・Angular velocity : 8.46[deg/s] ・Recieved packet number Horizontal polarization : 909 Vertical polarization : 472 Circularly polarization : 76	・Radio interference : weak
11/05/2019	1	AOS(JST) : 07:52:19 LOS(JST) : 07:58:39 Max Elevation : 3.80[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:22, SP:0, ESC:22, EP:255	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.141[V] ・Angular velocity : 8.090[deg/s] ・Recieved packet number Horizontal polarization : 16 Vertical polarization : 0 Circularly polarization : 8	・Radio interference : strong
	2	AOS(JST) : 09:23:54 LOS(JST) : 09:35:14 Max Elevation : 79.69[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:22, SP:0, ESC:22, EP:255	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.121[V] ・Angular velocity : 8.272[deg/s] ・Recieved packet number Horizontal polarization : 470 Vertical polarization : 214 Circularly polarization : 135	・Radio interference : weak
	3	AOS(JST) : 10:59:34 LOS(JST) : 11:05:24 Max Elevation : 3.32[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:22, SP:0, ESC:22, EP:255	・To confirm angular velocity. ・To downlink the image taken on 5/5, 3rd.	・Bus voltage : 4.177[V] ・Angular velocity : 8.110[deg/s] ・Recieved packet number Horizontal polarization : 194 Vertical polarization : 77 Circularly polarization : 0	・Radio interference : strong
	4	AOS(JST) : 19:58:27 LOS(JST) : 20:09:18 Max Elevation : 25.11[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:22, SP:256, ESC:22, EP:587	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.084[V] ・Angular velocity : 7.58[deg/s] ・Recieved packet number Horizontal polarization : 1309 Vertical polarization : 533 Circularly polarization : 512	・Radio interference : weak
	5	AOS(JST) : 21:32:21 LOS(JST) : 21:42:40 Max Elevation : 16.91[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:22, SP:0, ESC:22, EP:255	・Low elevation.	・Bus voltage : 4.078[V] ・Angular velocity : 7.06[deg/s] ・Recieved packet number Horizontal polarization : 1323 Vertical polarization : 623 Circularly polarization : 232	・Radio interference : weak
12/05/2019	1	AOS(JST) : 09:02:54 LOS(JST) : 09:14:07 Max Elevation : 48.91[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 6.968[deg/s]	・Radio interference : weak ・The local loop was confirmed, but communication with other stations was not possible.
	2	AOS(JST) : 10:37:33 LOS(JST) : 10:45:51 Max Elevation : 8.44[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.180[V] ・Angular velocity : 6.964[deg/s]	・Radio interference : weak ・We could hear our own voice and the callsign up to JH4 but we couldn't hear it aftar that.
	3	AOS(JST) : 19:38:05 LOS(JST) : 19:47:53 Max Elevation : 14.20[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Angular velocity shutter command uplink	・Low elevation.	・Bus voltage : 4.086[V] ・Angular velocity : 6.47[deg/s]	・Radio interference : weak ・Angular velocity shutter command uplink(50 images) →Save to ROM0, SC23 of CAM →JPEG,VGA →Uplink at 19:42:00(JST)
	4	AOS(JST) : 21:10:45 LOS(JST) : 21:21:58 Max Elevation : 30.99[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To downlink the image taken on 5/12, 3rd.	・Bus voltage : 4.083[V] ・Angular velocity : 76.42[deg/s] ・Recieved packet number Horizontal polarization : 704 Vertical polarization : 545 Circularly polarization : 404	・Radio interference : weak
13/05/2019	1	AOS(JST) : 08:42:04 LOS(JST) : 08:52:43 Max Elevation : 24.78[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:674048 SC_S:20, SSC:21, SP:1008, ESC:21, EP:1015	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.091[V] ・Angular velocity : 6.85[deg/s] ・Recieved packet number Horizontal polarization : 1082 Vertical polarization : 275 Circularly polarization : 90	・Radio interference : strong
	2	AOS(JST) : 10:15:57 LOS(JST) : 10:25:45 Max Elevation : 15.79[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:11, SSC:11, SP:0, ESC:11, EP:255	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 6.88[deg/s] ・Recieved packet number Horizontal polarization : 936 Vertical polarization : 335 Circularly polarization : 160	・Radio interference : strong
	3	AOS(JST) : 19:18:06 LOS(JST) : 19:26:13 Max Elevation : 7.43[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:11, SSC:11, SP:0, ESC:11, EP:511	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.083[V] ・Angular velocity : 7.12[deg/s] ・Recieved packet number Horizontal polarization : 253 Vertical polarization : 325 Circularly polarization : 4	・Radio interference : strong
	4	AOS(JST) : 20:49:28 LOS(JST) : 21:01:04 Max Elevation : 61.79[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:11, SSC:11, SP:0, ESC:11, EP:511	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.078[V] ・Angular velocity : 6.78[deg/s] ・Recieved packet number Horizontal polarization : 1328 Vertical polarization : 1478 Circularly polarization : 1187	・Radio interference : weak
	5		Shade	No operation.	・Low elevation.		
14/05/2019	1	AOS(JST) : 08:21:26 LOS(JST) : 08:30:59 Max Elevation : 13.28[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:38, SP:512, ESC:38, EP:767	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.184[V] ・Angular velocity : 4.10[deg/s] ・Recieved packet number Horizontal polarization : 306 Vertical polarization : 124 Circularly polarization : 29	・Radio interference : weak
	2	AOS(JST) : 09:54:34 LOS(JST) : 10:05:17 Max Elevation : 28.41[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:38, SP:512, ESC:38, EP:767	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 6.15[deg/s] ・Recieved packet number Horizontal polarization : 614 Vertical polarization : 486 Circularly polarization : 299	・Radio interference : weak
	3	AOS(JST) : 18:58:44 LOS(JST) : 19:04:02 Max Elevation : 2.56[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image transfer command uplink	・Low elevation.	・Bus voltage : 4.088[V] ・Angular velocity : 6.53[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:28:25 LOS(JST) : 20:40:00 Max Elevation : 65.45[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:38, SP:768, ESC:38, EP:1023	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st..	・Bus voltage : 4.074[V] ・Angular velocity : 5.87[deg/s] ・Recieved packet number Horizontal polarization : 468 Vertical polarization : 561 Circularly polarization : 470	・Radio interference : weak
	5	AOS(JST) : 22:04:23 LOS(JST) : 22:12:03 Max Elevation : 5.94[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:38, SP:768, ESC:38, EP:1023	・Low elevation.	・Bus voltage : 4.074[V] ・Angular velocity : 5.77[deg/s] ・Recieved packet number Horizontal polarization : 229 Vertical polarization : 77 Circularly polarization : 7	・Radio interference : weak
15/05/2019	1	AOS(JST) : 08:01:09 LOS(JST) : 08:08:47 Max Elevation : 6.22[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:39, SP:0, ESC:39, EP:255	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 6.016[deg/s] ・Recieved packet number Horizontal polarization : 356 Vertical polarization : 283 Circularly polarization : 23	・Radio interference : strong
	2	AOS(JST) : 09:33:20 LOS(JST) : 09:44:32 Max Elevation : 56.39[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:39, SP:0, ESC:39, EP:255	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.178[V] ・Angular velocity : 5.609[deg/s] ・Recieved packet number Horizontal polarization : 980 Vertical polarization : 895 Circularly polarization : 379	・Radio interference : strong
	3		Sunshine	No operation.	・Low elevation.		
	4	AOS(JST) : 20:07:38 LOS(JST) : 20:46:57 Max Elevation : 32.98[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:39, SP:256, ESC:39, EP:767	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.085[V] ・Angular velocity : 5.556[deg/s] ・Recieved packet number Horizontal polarization : 1645 Vertical polarization : 882 Circularly polarization : 874	・Radio interference : weak
	5	AOS(JST) : 21:42:07 LOS(JST) : 21:51:48 Max Elevation : 12.71[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:38, SP:924, ESC:38, EP:1015	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.080[V] ・Angular velocity : 5.870[deg/s] ・Recieved packet number Horizontal polarization : 1160 Vertical polarization : 306 Circularly polarization : 279	・Radio interference : weak
16/05/2019	1		Sunshine	No operation.	・Low elevation.		
	2	AOS(JST) : 09:12:15 LOS(JST) : 09:23:30 Max Elevation : 69.17[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:39, SP:768, ESC:39, EP:1023	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.141[V] ・Angular velocity : 5.46[deg/s] ・Recieved packet number Horizontal polarization : 1484 Vertical polarization : 914 Circularly polarization : 510	・Radio interference : middle
	3	AOS(JST) : 10:47:19 LOS(JST) : 10:54:35 Max Elevation : 5.79[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:39, SP:768, ESC:39, EP:1023	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.149[V] ・Angular velocity : 5.12[deg/s] ・Recieved packet number Horizontal polarization : 189 Vertical polarization : 26 Circularly polarization : 4	・Radio interference : strong
	4	AOS(JST) : 19:47:07 LOS(JST) : 19:57:26 Max Elevation : 18.37[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:40, SP:0, ESC:40, EP:255	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.084[V] ・Angular velocity : 4.792[deg/s] ・Recieved packet number Horizontal polarization : 1144 Vertical polarization : 802 Circularly polarization : 512	・Radio interference : weak
	5	AOS(JST) : 21:20:20 LOS(JST) : 21:31:11 Max Elevation : 23.33[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38, SSC:40, SP:256, ESC:40, EP:467	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.112[V] ・Angular velocity : 4.551[deg/s] ・Recieved packet number Horizontal polarization : 1013 Vertical polarization : 802 Circularly polarization : 512	・Radio interference : weak

Table 27 Detail of Operation from 17 May 2019 to 23 May 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
17/05/2019	1	AOS(JST) : 08:51:19 LOS(JST) : 09:02:14 Max Elevation : 1.09[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:42,SP:0,ESC:42,EP:255	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.158[V] ・Angular velocity : 4.813[deg/s] ・Recieved packet number Horizontal polarization : 1417 Vertical polarization : 611 Circularly polarization : 179	・Radio interference : strong
	2	AOS(JST) : 10:25:32 LOS(JST) : 10:34:40 Max Elevation : 11.90[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38,SSC:40,SP:256,ESC:40,EP:463	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 5.161[deg/s] ・Recieved packet number Horizontal polarization : 909 Vertical polarization : 105 Circularly polarization : 43	・Radio interference : strong
	3	AOS(JST) : 19:26:55 LOS(JST) : 19:35:52 Max Elevation : 10.13[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:42,SP:512,ESC:42,EP:1023	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.075[V] ・Angular velocity : 5.077[deg/s] ・Recieved packet number Horizontal polarization : 737 Vertical polarization : 524 Circularly polarization : 150	・Radio interference : strong
	4	AOS(JST) : 19:47:07 LOS(JST) : 19:57:26 Max Elevation : 18.37[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:42,SP:512,ESC:42,EP:1023	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.074[V] ・Angular velocity : 5.469[deg/s] ・Recieved packet number Horizontal polarization : 1532 Vertical polarization : 1102 Circularly polarization : 852	・Radio interference : weak
18/05/2019	1	AOS(JST) : 08:30:33 LOS(JST) : 08:40:38 Max Elevation : 17.58[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:43, SP:0, ESC:43, EP:255	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 4.192[deg/s] ・Recieved packet number Horizontal polarization : 680 Vertical polarization : 843 Circularly polarization : 309	・Radio interference : strong
	2	AOS(JST) : 10:04:02 LOS(JST) : 10:14:21 Max Elevation : 21.47[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:43, SP:0, ESC:43, EP:255	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.100[V] ・Angular velocity : 4.729[deg/s] ・Recieved packet number Horizontal polarization : 1046 Vertical polarization : 487 Circularly polarization : 386	・Radio interference : strong
	3	AOS(JST) : 19:07:12 LOS(JST) : 19:13:57 Max Elevation : 4.55[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38,SSC:39,SP:768,ESC:39,EP:1023	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.080[V] ・Angular velocity : 3.460[deg/s] ・Recieved packet number Horizontal polarization : 116 Vertical polarization : 132 Circularly polarization : 8	・Radio interference : weak
	4	AOS(JST) : 20:37:43 LOS(JST) : 20:49:20 Max Elevation : 89.64[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:643072 SC_S:38,SSC:40,SP:0,ESC:40,EP:255	・To confirm angular velocity. ・To downlink the image taken on 4/26, 1st.	・Bus voltage : 4.082[V] ・Angular velocity : 3.206[deg/s] ・Recieved packet number Horizontal polarization : 1619 Vertical polarization : 768 Circularly polarization : 769	・Radio interference : weak
	5	AOS(JST) : 22:14:33 LOS(JST) : 22:10:45 Max Elevation : 3.45[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CDH sector erase →ROM0,SE14～39およびROM1,SE26～41	・Low elevation. ・To secure data storage area.	・Bus voltage : 4.071[V] ・Angular velocity : 3.093[deg/s]	・Radio interference : weak
19/05/2019	1	AOS(JST) : 08:10:04 LOS(JST) : 08:18:40 Max Elevation : 9.02[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.178[V] ・Angular velocity : 1.937[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with JA0CAW.
	2	AOS(JST) : 09:42:43 LOS(JST) : 09:53:42 Max Elevation : 40.31[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.149[V] ・Angular velocity : 2.088[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with JA0CAW.
	3		Shade	No operation.	・Low elevation.		
	4	AOS(JST) : 20:16:48 LOS(JST) : 20:28:11 Max Elevation : 0.30[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Compression rate change image shooting command uplink		・Bus voltage : 4.179[V] ・Angular velocity : 1.666[deg/s]	・Radio interference : weak ・Uprink at 20:20:00(JST). ・Taken over South America.
	5	AOS(JST) : 21:51:55 LOS(JST) : 22:00:48 Max Elevation : 9.25[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →ROM0,Bus transmitter,GMSK,9600bps,437.075MHz	・Low elevation.	・Bus voltage : 4.082[V] ・Angular velocity : 2.348[deg/s] ・Recieved packet number Horizontal polarization : 594 Vertical polarization : 40 Circularly polarization : 154	・Radio interference : weak
20/05/2019	1	AOS(JST) : 07:50:09 LOS(JST) : 07:56:00 Max Elevation : 3.20[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To confirm angular velocity.	・Bus voltage : 4.178[V] ・Angular velocity : 1.010[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:21:34 LOS(JST) : 09:32:48 Max Elevation : 84.56[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:42,SSC:43,SP:768,ESC:43,EP:1023	・To confirm angular velocity. ・To downlink the image taken on 4/9, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 1.103[deg/s] ・Recieved packet number Horizontal polarization : 1460 Vertical polarization : 1018 Circularly polarization : 1140	・Radio interference : strong
	3	AOS(JST) : 10:57:09 LOS(JST) : 11:03:06 Max Elevation : 3.52[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image transfer command uplink →Migration origin:N-CAM,ROM0,SE26 →Migration destination:C&DH,ROM1,SE46	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.144[V] ・Angular velocity : 2.531[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:56:09 LOS(JST) : 20:06:52 Max Elevation : 23.68[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:42,SSC:44,SP:0,ESC:44,EP:387	・To confirm angular velocity. ・To downlink the image taken on 4/9, 1st.	・Bus voltage : 4.084[V] ・Angular velocity : 2.116[deg/s] ・Recieved packet number Horizontal polarization : 1447 Vertical polarization : 548 Circularly polarization : 345	・Radio interference : weak
	5	AOS(JST) : 21:29:57 LOS(JST) : 21:40:18 Max Elevation : 17.68[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:623104 SC_S:42,SSC:44,SP:260,ESC:44,EP:267	・To confirm angular velocity. ・To downlink the image taken on 4/9, 1st.	・Bus voltage : 4.075[V] ・Angular velocity : 1.307[deg/s] ・Recieved packet number Horizontal polarization : 1506 Vertical polarization : 372 Circularly polarization : 363	・Radio interference : weak
21/05/2019	1	AOS(JST) : 09:00:32 LOS(JST) : 09:11:38 Max Elevation : 45.49[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:1342208 SC_S:46,SSC:46,SP:0,ESC:46,EP:255	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.149[V] ・Angular velocity : 2.853[deg/s] ・Recieved packet number Horizontal polarization : 1318 Vertical polarization : 1130 Circularly polarization : 314	・Radio interference : strong
	2	AOS(JST) : 10:35:08 LOS(JST) : 10:43:28 Max Elevation : 8.75[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:1342208 SC_S:46,SSC:46,SP:256,ESC:46,EP:767	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.160[V] ・Angular velocity : 2.122[deg/s] ・Recieved packet number Horizontal polarization : 313 Vertical polarization : 197 Circularly polarization : 9	・Radio interference : strong
	3	AOS(JST) : 19:35:48 LOS(JST) : 19:45:24 Max Elevation : 13.30[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:1342208 SC_S:46,SSC:46,SP:256,ESC:46,EP:767	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.083[V] ・Angular velocity : 3.665[deg/s] ・Recieved packet number Horizontal polarization : 1430 Vertical polarization : 827 Circularly polarization : 1	・Radio interference : weak
	4	AOS(JST) : 21:08:21 LOS(JST) : 21:19:33 Max Elevation : 32.57[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:1342208 SC_S:46,SSC:46,SP:768,ESC:47,EP:255	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.075[V] ・Angular velocity : 1.307[deg/s] ・Recieved packet number Horizontal polarization : 1506 Vertical polarization : 372 Circularly polarization : 363	・Radio interference : weak
	5		Shade	・No operation.	・Low elevation.		
22/05/2019	1	AOS(JST) : 08:39:41 LOS(JST) : 08:50:11 Max Elevation : 23.16[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:1342208 SC_S:46, SSC:46, SP:0, ESC:46, EP:127	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.162[V] ・Angular velocity : 5.436[deg/s] ・Recieved packet number Horizontal polarization : 1158 Vertical polarization : 878 Circularly polarization : 147	・Radio interference : middle
	2	AOS(JST) : 10:13:31 LOS(JST) : 10:23:19 Max Elevation : 16.36[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →Size:2193920 SC_S:52, SSC:58, SP:512, ESC:58, EP:767	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.177[V] ・Angular velocity : 5.572[deg/s] ・Recieved packet number Horizontal polarization : 820 Vertical polarization : 406 Circularly polarization : 98	・Radio interference : strong
	3	AOS(JST) : 19:15:50 LOS(JST) : 19:23:39 Max Elevation : 6.78[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →Size:2193920 SC_S:52,SSC:58,SP:592,ESC:58,EP:599	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.082[V] ・Angular velocity : 7.066[deg/s] ・Recieved packet number Horizontal polarization : 496 Vertical polarization : 315 Circularly polarization : 25	・Radio interference : weak
	4	AOS(JST) : 20:47::03 LOS(JST) : 20:58:36 Max Elevation : 65.83[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →Size:2193920 SC_S:52,SSC:58,SP:768,ESC:59,EP:255	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.074[V] ・Angular velocity : 6.419[deg/s] ・Recieved packet number Horizontal polarization : 1303 Vertical polarization : 1649 Circularly polarization : 1069	・Radio interference : weak
	5	AOS(JST) : 22:25:08 LOS(JST) : 22:29:01 Max Elevation : 1.22[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image transfer command uplink →Migration origin:N-CAMのROM0,SE38,N-CAMのROM0,SE32 →Migration destination:C&DHのROM1,SE22,C&DHのROM1,SE26	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.071[V] ・Angular velocity : 8.033[deg/s]	・Radio interference : weak ・Uplink failed due to low elevation
23/05/2019	1	AOS(JST) : 08:19:04 LOS(JST) : 08:28:23 Max Elevation : 12.33[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →Size:2193920 SC_S:52,SSC:59,SP:256,ESC:59,EP:511	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.174[V] ・Angular velocity : 9.32[deg/s] ・Recieved packet number Horizontal polarization : 380 Vertical polarization : 141 Circularly polarization : 63	・Radio interference : strong
	2	AOS(JST) : 09:52:07 LOS(JST) : 10:02:48 Max Elevation : 29.72.20[deg]	Sunshine	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →Size:2193920 SC_S:52,SSC:59,SP:256,ESC:59,EP:511	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 9.09[deg/s] ・Recieved packet number Horizontal polarization : 1043 Vertical polarization : 389 Circularly polarization : 357	・Radio interference : strong
	3	AOS(JST) : 18:56:35 LOS(JST) : 19:01:20 Max Elevation : 2.02[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image transfer command uplink →Migration origin:N-CAM,ROM0,SE38,N-CAM,ROM0,SE32 →Migration destination:C&DH,ROM1,SE22,C&DH,ROM1,SE26	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.158[V] ・Angular velocity : 9.581[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:26:01 LOS(JST) : 20:37:30 Max Elevation : 60.99[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:1028608 SC_S:22,SSC:22,SP:0,ESC:22,EP:511	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.080[V] ・Angular velocity : 10.48[deg/s] ・Recieved packet number Horizontal polarization : 1170 Vertical polarization : 827 Circularly polarization : 995	・Radio interference : weak
	5	AOS(JST) : 22:01:50 LOS(JST) : 22:09:39 Max Elevation : 6.33[deg]	Shade	・CW custom oleration(437.075MHz) (437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:0,ESC:26,EP:511	・To confirm angular velocity. ・To downlink the compression rate change image taken on 4/26, 1st.	・Bus voltage : 4.074[V] ・Angular velocity : 10.268[deg/s] ・Recieved packet number Horizontal polarization : 809 Vertical polarization : 263 Circularly polarization : 76	・Radio interference : weak

Table 28 Detail of Operation from 24 May 2019 to 30 May 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
24/05/2019	1	AOS(JST) : 07:58:49 LOS(JST) : 08:06:06 Max Elevation : 5.56[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:1028608 SC_S:22,SSC:22,SP:0,ESC:22,EP:511	・To confirm angular velocity. ・To downlink the compression rate change image taken on 4/26, 1st.	・Bus voltage : 4.162[V] ・Angular velocity : 11.229[deg/s] ・Recieved packet number Horizontal polarization : 146 Vertical polarization : 237 Circularly polarization : 17	・Radio interference : strong
	2	AOS(JST) : 09:30:52 LOS(JST) : 09:42:00 Max Elevation : 60.11[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:0,ESC:26,EP:255	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : 11.192[deg/s] ・Recieved packet number Horizontal polarization : 836 Vertical polarization : 239 Circularly polarization : 398	・Radio interference : strong
	3	AOS(JST) : 11:07:12 LOS(JST) : 11:11:18 Max Elevation : 1.52[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uprink	・To confirm angular velocity. ・To take an image.	・Bus voltage : 4.141[V] ・Angular velocity : 11.532[deg/s]	・Radio interference : strong ・Uplink failed due to misconfiguration of ground station
	4	AOS(JST) : 20:05:14 LOS(JST) : 20:16:15 Max Elevation : 30.84[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:256,ESC:26,EP:767	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 12.28[deg/s] ・Recieved packet number Horizontal polarization : - Vertical polarization : - Circularly polarization : -	・Radio interference : weak ・Uplink failed due to misconfiguration of ground station
	5	AOS(JST) : 21:39:36 LOS(JST) : 21:49:20 Max Elevation : 13.28[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:128,ESC:26,EP:135	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.083[V] ・Angular velocity : 12.14[deg/s] ・Recieved packet number Horizontal polarization : - Vertical polarization : - Circularly polarization : -	・Radio interference : weak ・Uplink failed due to misconfiguration of ground station
25/05/2019	1		Sunshine	・No operation.	・Low elevation.		
	2	AOS(JST) : 09:09:46 LOS(JST) : 09:20:57 Max Elevation : 64.31[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:256,ESC:26,EP:511	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 10.075[deg/s] ・Recieved packet number Horizontal polarization : 1051 Vertical polarization : 558 Circularly polarization : 335	・Radio interference : strong
	3	AOS(JST) : 10:44:46 LOS(JST) : 10:52:09 Max Elevation : 6.11[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:128,ESC:26,EP:135	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.144[V] ・Angular velocity : 9.386[deg/s] ・Recieved packet number Horizontal polarization : 169 Vertical polarization : 54 Circularly polarization : 4	・Radio interference : strong
	4	AOS(JST) : 19:44:44 LOS(JST) : 19:54:51 Max Elevation : 17.16[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:512,ESC:26,EP:1023	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.083[V] ・Angular velocity : 9.537[deg/s] ・Recieved packet number Horizontal polarization : 1224 Vertical polarization : 388 Circularly polarization : 370	・Radio interference : weak
	5	AOS(JST) : 21:17:50 LOS(JST) : 21:28:41 Max Elevation : 24.41[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:512,ESC:26,EP:1023	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 8.822[deg/s] ・Recieved packet number Horizontal polarization : 935 Vertical polarization : 529 Circularly polarization : 341	・Radio interference : strong
26/05/2019	1	AOS(JST) : 08:48:50 LOS(JST) : 08:59:38 Max Elevation : 30.91[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.161[V] ・Angular velocity : 10.171[deg/s] ・Recieved packet number Horizontal polarization : 45 Vertical polarization : 442 Circularly polarization : 301	・Radio interference : weak ・We could hear our own voice and call sign "JE1FOO".Thank you called.We try next orbit again.
	2	AOS(JST) : 10:23:00 LOS(JST) : 10:32:11 Max Elevation : 12.42[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz ・8 sectors (4000s) 0.5s interval HK data sensing	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 972 Vertical polarization : 321 Circularly polarization : 245	・Radio interference : weak ・We could hear our own voice and exchange messages with 7L3AEO,JA0CAW,JA3FAW,JA4NDU.
	3	AOS(JST) : 19:24:34 LOS(JST) : 19:33:14 Max Elevation : 9.31 [deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uprink	・To confirm angular velocity. ・To take an image.	・Bus voltage : 4.080[V] ・Angular velocity : 11.38[deg/s]	・Radio interference : weak ・Uplink at 19:29:00
	4	AOS(JST) : 20:56:24 LOS(JST) : 21:07:48 Max Elevation : 47.06[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・To downlink the image size taken on 5/26, 3rd. →Bus transmitter, GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To confirm image size taken on 5/26,3rd	・Bus voltage : 4.082[V] ・Angular velocity : 11.21[deg/s] ・Recieved packet number Horizontal polarization : 925 Vertical polarization : 918 Circularly polarization : 949	・Radio interference : weak
27/05/2019	1	AOS(JST) : 08:28:05 LOS(JST) : 08:38:00 Max Elevation : 16.44[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:14,0～sec:14,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.161[V] ・Angular velocity : 9.812[deg/s] ・Recieved packet number Horizontal polarization : 713 Vertical polarization : 986 Circularly polarization : 540	・Radio interference : middle
	2	AOS(JST) : 10:01:30 LOS(JST) : 10:11:49 Max Elevation : 22.48[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:14,0～sec:14,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.139[V] ・Angular velocity : 9.711[deg/s] ・Recieved packet number Horizontal polarization : 813 Vertical polarization : 755 Circularly polarization : 567	・Radio interference : middle
	3	AOS(JST) : 19:04:55 LOS(JST) : 19:11:14 Max Elevation : 3.91[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:15,0～sec:15,127	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.085[V] ・Angular velocity : 8.711[deg/s] ・Recieved packet number Horizontal polarization : 33 Vertical polarization : 114 Circularly polarization : 36	・Radio interference : weak
	4	AOS(JST) : 20:35:15 LOS(JST) : 20:46:46 Max Elevation : 84.20[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:15,0～sec:15,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.088[V] ・Angular velocity : 8.534[deg/s] ・Recieved packet number Horizontal polarization : 879 Vertical polarization : 968 Circularly polarization : 806	・Radio interference : weak
	5	AOS(JST) : 22:11:55 LOS(JST) : 22:18:18 Max Elevation : 3.77[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM sector erase →ROMO,sc0～sc41	・Low elevation. ・To secure image data storage area.	・Bus voltage : 4.083[V] ・Angular velocity : 8.336[deg/s]	・Radio interference : weak
28/05/2019	1	AOS(JST) : 08:07:37 LOS(JST) : 08:15:57 Max Elevation : 8.29[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:27,SP:0,ESC:27,EP:255	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 9.610[deg/s] ・Recieved packet number Horizontal polarization : 437 Vertical polarization : 78 Circularly polarization : 212	・Radio interference : strong
	2	AOS(JST) : 09:40:10 LOS(JST) : 09:51:09 Max Elevation : 42.85[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:27,SP:0,ESC:27,EP:255	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.111[V] ・Angular velocity : 9.486[deg/s] ・Recieved packet number Horizontal polarization : 1003 Vertical polarization : 282 Circularly polarization : 730	・Radio interference : strong
	3	AOS(JST) : 20:14:21 LOS(JST) : 20:25:34 Max Elevation : 41.05[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:27,SP:256,ESC:27,EP:767	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.078[V] ・Angular velocity : 10.24[deg/s] ・Recieved packet number Horizontal polarization : 1728 Vertical polarization : 370 Circularly polarization : 1229	・Radio interference : weak
	4	AOS(JST) : 21:49:20 LOS(JST) : 21:58:16 Max Elevation : 9.70[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:26,SP:572,ESC:26,EP:827	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 8.822[deg/s] ・Recieved packet number Horizontal polarization : 935 Vertical polarization : 529 Circularly polarization : 341	・Radio interference : strong
29/05/2019	1	AOS(JST) : 07:47:46 LOS(JST) : 07:53:10 Max Elevation : 2.67[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:14,780～sec:14,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.162[V] ・Angular velocity : 5.436[deg/s] ・Recieved packet number Horizontal polarization : 1158 Vertical polarization : 878 Circularly polarization : 147	・Radio interference : middle
	2	AOS(JST) : 09:19:00 LOS(JST) : 09:30:12 Max Elevation : 89.79[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:14,780～sec:14,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.177[V] ・Angular velocity : 5.572[deg/s] ・Recieved packet number Horizontal polarization : 820 Vertical polarization : 406 Circularly polarization : 98	・Radio interference : strong
	3	AOS(JST) : 10:54:29 LOS(JST) : 11:00:39 Max Elevation : 3.85[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:14,780～sec:14,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.082[V] ・Angular velocity : 7.066[deg/s] ・Recieved packet number Horizontal polarization : 496 Vertical polarization : 315 Circularly polarization : 25	・Radio interference : weak
	4	AOS(JST) : 19:53:42 LOS(JST) : 20:04:14 Max Elevation : 22.04[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:16,0～sec:16,511	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.074[V] ・Angular velocity : 6.419[deg/s] ・Recieved packet number Horizontal polarization : 1303 Vertical polarization : 1649 Circularly polarization : 1069	・Radio interference : weak
	5	AOS(JST) : 21:27:22 LOS(JST) : 21:37:44 Max Elevation : 18.44[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROMO,sec:16,512～sec:16,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.071[V] ・Angular velocity : 8.033[deg/s]	・Radio interference : weak ・Uplink failed due to low elevation
30/05/2019	1	AOS(JST) : 08:57:58 LOS(JST) : 09:09:00 Max Elevation : 42.28[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26, SSC:27, SP:768, ESC:27, EP:1023	・To confirm angular velocity. ・To downlink the compression rate change image taken on 4/26, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 9.282[deg/s] ・Recieved packet number Horizontal polarization : 1887 Vertical polarization : 1100 Circularly polarization : 1320	・Radio interference : weak
	2	AOS(JST) : 10:32:29 LOS(JST) : 10:40:57 Max Elevation : 9.25[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26, SSC:28, SP:0, ESC:28, EP:511	・To confirm angular velocity. ・To downlink the compression rate change image taken on 4/26, 1st.	・Bus voltage : 4.176[V] ・Angular velocity : 9.675[deg/s] ・Recieved packet number Horizontal polarization : 836 Vertical polarization : 290 Circularly polarization : 131	・Radio interference : middle
	3	AOS(JST) : 19:33:22 LOS(JST) : 19:42:42 Max Elevation : 12.27[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26, SSC:28, SP:0, ESC:28, EP:511	・To confirm angular velocity. ・To downlink the compression rate change image taken on 4/26, 1st.	・Bus voltage : 4.078[V] ・Angular velocity : 8.984[deg/s] ・Recieved packet number Horizontal polarization : 1350 Vertical polarization : 583 Circularly polarization : 580	・Radio interference : weak
	4	AOS(JST) : 21:05:48 LOS(JST) : 21:16:56 Max Elevation : 34.29[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:756992 SC_S:26,SSC:28,SP:512,ESC:28,EP:1023	・To confirm angular velocity. ・To downlink the compression rate change image taken on 4/26, 1st.	・Bus voltage : 4.074[V] ・Angular velocity : 8.799[deg/s] ・Recieved packet number Horizontal polarization : 1698 Vertical polarization : 1321 Circularly polarization : 1092	・Radio interference : weak

Table 29 Detail of Operation from 31 May 2019 to 6 June 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
31/05/2019	1	AOS(JST) : 08:37:07 LOS(JST) : 08:47:30 Max Elevation : 21.74[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:17,0～sec:17,511	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.160[V] ・Angular velocity : 5.883[deg/s] ・Recieved packet number Horizontal polarization : 972 Vertical polarization : 1025 Circularly polarization : 481	・Radio interference : weak
	2	AOS(JST) : 10:10:52 LOS(JST) : 10:20:45 Max Elevation : 17.23[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:17,512～sec:17,1023	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.77[V] ・Angular velocity : 5.189[deg/s] ・Recieved packet number Horizontal polarization : 1085 Vertical polarization : 790 Circularly polarization : 885	・Radio interference : weak
	3	AOS(JST) : 19:13:27 LOS(JST) : 19:20:53 Max Elevation : 6.02[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:18,0～sec:18,255	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.078[V] ・Angular velocity : 4.600[deg/s] ・Recieved packet number Horizontal polarization : 206 Vertical polarization : 57 Circularly polarization : 143	・Radio interference : weak
	4	AOS(JST) : 20:44:30 LOS(JST) : 20:55:57 Max Elevation : 70.51[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:18,256～sec:19,255	・To confirm angular velocity. ・To downlink the HK data taken on 2/18, 4th.	・Bus voltage : 4.079[V] ・Angular velocity : 4.410[deg/s] ・Recieved packet number Horizontal polarization : 852 Vertical polarization : 579 Circularly polarization : 1155	・Radio interference : weak
	5		Shade	・No operation.	・Low elevation.		
01/06/2019	1	AOS(JST) : 08:16:29 LOS(JST) : 08:25:39 Max Elevation : 11.52[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →Size:2193920 SC_S:52,SSC:59,SP:512,ESC:59,EP:767	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.149[V] ・Angular velocity : 3.900[deg/s] ・Recieved packet number Horizontal polarization : 332 Vertical polarization : 203 Circularly polarization : 87	・Radio interference : strong
	2	AOS(JST) : 09:49:28 LOS(JST) : 10:00:12 Max Elevation : 31.57[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink →Size:2193920 SC_S:52,SSC:59,SP:512,ESC:59,EP:767	・To confirm angular velocity. ・To downlink the image taken on 2/19, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 3.560[deg/s] ・Recieved packet number Horizontal polarization : 1377 Vertical polarization : 564 Circularly polarization : 891	・Radio interference : strong
	3	AOS(JST) : 18:54:22 LOS(JST) : 18:58:22 Max Elevation : 1.42[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image transfer command uplink →Migration origin:N-CAMのROM0,SE45 →Migration destination:C&DHのROM0,SE34	・To confirm angular velocity. ・To downlink the image taken on 5/19, 4th.	・Bus voltage : 4.179[V] ・Angular velocity : 3.241[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:23:28 LOS(JST) : 20:34:49 Max Elevation : 56.27[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:711424 SC_S:30,SSC:30,SP:0,ESC:30,EP:511	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.079[V] ・Angular velocity : 3.602[deg/s] ・Recieved packet number Horizontal polarization : 1711 Vertical polarization : 917 Circularly polarization : 1324	・Radio interference : weak
	5	AOS(JST) : 21:59:09 LOS(JST) : 22:07:03 Max Elevation : 6.68[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・N-CAM Compression rate change image downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:711424 SC_S:30,SSC:30,SP:512,ESC:30,EP:767	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.073[V] ・Angular velocity : 3.664[deg/s] ・Recieved packet number Horizontal polarization : 973 Vertical polarization : 424 Circularly polarization : 357	・Radio interference : weak
02/06/2019	1	AOS(JST) : 07:56:16 LOS(JST) : 08:03:17 Max Elevation : 5.01[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.144[V] ・Angular velocity : 4.078[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with "JA0FKM/1".
	2	AOS(JST) : 09:28:13 LOS(JST) : 09:39:22 Max Elevation : 64.85[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.161[V] ・Angular velocity : 3.292[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with "JA0FKM/1, JH3FWT".
	3	AOS(JST) : 11:04:22 LOS(JST) : 11:08:53 Max Elevation : 1.88[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie shooting command uplink	・To confirm angular velocity. ・To take a movie.	・Bus voltage : 4.189[V] ・Angular velocity : 2.678[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:02:42 LOS(JST) : 20:13:32 Max Elevation : 28.55[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・AFSK real-time data downlink every 2 seconds →Bus transmitter,AFSK 1200bps,437.075MHz	・To confirm angular velocity. ・To correct the difference between satellite time and real time. ・ Riarutaimusenshingu no dēta o kakunin suru tame. 23/5000 To confirm real-time sensing data.	・Bus voltage : 4.077[V] ・Angular velocity : 4.487[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:36:57 LOS(JST) : 21:46:41 Max Elevation : 13.84[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・0.5 second interval (4000s) sensing command uplink	・To confirm angular velocity. ・To sensing HK data.	・Bus voltage : 4.073[V] ・Angular velocity : 3.760[deg/s]	・Radio interference : weak
03/06/2019	1	AOS(JST) : 07:37:43 LOS(JST) : 07:39:06 Max Elevation : 0.15[deg]	Sunshine	・No operation.	・Low elevation.		
	2	AOS(JST) : 09:07:06 LOS(JST) : 09:18:16 Max Elevation : 59.49[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:18,256～sec:18,767	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.139[V] ・Angular velocity : 2.631[deg/s] ・Recieved packet number Horizontal polarization : 1404 Vertical polarization : 1492 Circularly polarization : 1171	・Radio interference : weak
	3	AOS(JST) : 10:42:01 LOS(JST) : 10:49:36 Max Elevation : 6.63[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:18,0～sec:18,255	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.160[V] ・Angular velocity : 2.405[deg/s] ・Recieved packet number Horizontal polarization : 462 Vertical polarization : 169 Circularly polarization : 198	・Radio interference : weak
	4	AOS(JST) : 19:42:13 LOS(JST) : 19:52:05 Max Elevation : 15.84[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:18,768～sec:19,255	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.082[V] ・Angular velocity : 1.605[deg/s] ・Recieved packet number Horizontal polarization : 831 Vertical polarization : 380 Circularly polarization : 523	・Radio interference : weak
	5	AOS(JST) : 21:15:11 LOS(JST) : 21:25:59 Max Elevation : 25.55[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:19,256～sec:19,767	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.078[V] ・Angular velocity : 1.691[deg/s] ・Recieved packet number Horizontal polarization : 1042 Vertical polarization : 764 Circularly polarization : 981	・Radio interference : weak
04/06/2019	1	AOS(JST) : 08:46:09 LOS(JST) : 08:56:54 Max Elevation : 28.96[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:19,768～sec:20,255	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.139[V] ・Angular velocity : 3.037[deg/s] ・Recieved packet number Horizontal polarization : 921 Vertical polarization : 296 Circularly polarization : 850	・Radio interference : strong
	2	AOS(JST) : 10:20:14 LOS(JST) : 10:29:35 Max Elevation : 13.21[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:20,256～sec:20,767	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.161[V] ・Angular velocity : 2.941[deg/s] ・Recieved packet number Horizontal polarization : 885 Vertical polarization : 180 Circularly polarization : 555	・Radio interference : strong
	3	AOS(JST) : 19:22:05 LOS(JST) : 19:30:24 Max Elevation : 8.40[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:16,628～sec:16,931	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.085[V] ・Angular velocity : 2.580[deg/s] ・Recieved packet number Horizontal polarization : 495 Vertical polarization : 289 Circularly polarization : 480	・Radio interference : weak
	4	AOS(JST) : 20:53:46 LOS(JST) : 21:05:04 Max Elevation : 50.20[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:20,768～sec:21,255	・To confirm angular velocity. ・To downlink the compression rate change image taken on 5/5, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 2.945[deg/s] ・Recieved packet number Horizontal polarization : 1088 Vertical polarization : 1048 Circularly polarization : 832	・Radio interference : weak
05/06/2019	1	AOS(JST) : 08:25:24 LOS(JST) : 08:35:13 Max Elevation : 15.48[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:21,256～sec:21,511	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.160[V] ・Angular velocity : 2.466[deg/s] ・Recieved packet number Horizontal polarization : 206 Vertical polarization : 10 Circularly polarization : 281	・Radio interference : strong
	2	AOS(JST) : 09:58:44 LOS(JST) : 10:09:10 Max Elevation : 23.93[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:21,512～sec:21,1023	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.179[V] ・Angular velocity : 2.225[deg/s] ・Recieved packet number Horizontal polarization : 498 Vertical polarization : 255 Circularly polarization : 383	・Radio interference : middle
	3		Shade	・No operation.	・Low elevation.		
	4	AOS(JST) : 20:32:37 LOS(JST) : 20:44:00 Max Elevation : 78.20[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM1,sec:14,0～sec:14,1023	・To confirm angular velocity. ・To downlink the HK data taken on 6/2, 5th.	・Bus voltage : 4.084[V] ・Angular velocity : 2.733[deg/s] ・Recieved packet number Horizontal polarization : 409 Vertical polarization : 328 Circularly polarization : 376	・Radio interference : strong
	5	AOS(JST) : 22:09:06 LOS(JST) : 22:15:39 Max Elevation : 4.08[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:11,768～sec:11,1023	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.077[V] ・Angular velocity : 3.582[deg/s] ・Recieved packet number Horizontal polarization : 103 Vertical polarization : 126 Circularly polarization : 44	・Radio interference : strong
06/06/2019	1	AOS(JST) : 08:04:57 LOS(JST) : 08:13:07 Max Elevation : 7.69[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:12,0～sec:12,255	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.177[V] ・Angular velocity : 3.590[deg/s] ・Recieved packet number Horizontal polarization : 200 Vertical polarization : 55 Circularly polarization : 44	・Radio interference : weak
	2	AOS(JST) : 09:37:25 LOS(JST) : 09:48:27 Max Elevation : 46.25[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Initial sensing data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0,sec:12,256～sec:12,767	・To confirm angular velocity. ・To downlink the remaining initial sensing data.	・Bus voltage : 4.139[V] ・Angular velocity : 4.183[deg/s] ・Recieved packet number Horizontal polarization : 1099 Vertical polarization : 1185 Circularly polarization : 882	・Radio interference : weak
	3	AOS(JST) : 11:15:00 LOS(JST) : 11:16:16 Max Elevation : 0.13[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・0.5 second interval (4000s) sensing command uplink	・To confirm angular velocity. ・To sensing HK data.	・Bus voltage : 4.128[V] ・Angular velocity : 4.183[deg/s]	・Radio interference : weak
	4		Shade	・No operation.	・No opelation		
	5		Shade	・No operation.	・No opelation		

Table 30 Detail of Operation from 7 June 2019 to 13 June 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
07/06/2019	1	AOS(JST) : 07:45:11 LOS(JST) : 07:50:12 Max Elevation : 2.23[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.149[V] ・Angular velocity : 6.274[deg/s] Horizontal polarization : 23 Vertical polarization : 0 Circularly polarization : 2	・Radio interference : weak
	2	AOS(JST) : 09:16:14 LOS(JST) : 09:27:28 Max Elevation : 83.64[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 5.918[deg/s] Horizontal polarization : 607 Vertical polarization : 101 Circularly polarization : 406	・Radio interference : strong
	3	AOS(JST) : 10:51:36 LOS(JST) : 10:58:05 Max Elevation : 4.38[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 5.875[deg/s] ・Angular velocity : 5.918[deg/s] Horizontal polarization : 74 Vertical polarization : 49 Circularly polarization : 28	・Radio interference : strong
	4	AOS(JST) : 19:51:05 LOS(JST) : 20:01:23 Max Elevation : 20.33[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.079[V] ・Angular velocity : 5.471[deg/s] ・Recieved packet number Horizontal polarization : 509 Vertical polarization : 517 Circularly polarization : 357	・Radio interference : weak
	5	AOS(JST) : 21:24:38 LOS(JST) : 21:34:58 Max Elevation : 19.26[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.075[V] ・Angular velocity : 5.989[deg/s] ・Recieved packet number Horizontal polarization : 344 Vertical polarization : 540 Circularly polarization : 351	・Radio interference : weak
08/06/2019	1	AOS(JST) : 08:55:11 LOS(JST) : 09:06:13 Max Elevation : 39.40[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 5.086[deg/s] ・Recieved packet number Horizontal polarization : 1296 Vertical polarization : 1394 Circularly polarization : 1020	・Radio interference : middle
	2	AOS(JST) : 10:29:38 LOS(JST) : 10:38:19 Max Elevation : 10.00[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.149[V] ・Angular velocity : 5.435[deg/s] ・Recieved packet number Horizontal polarization : 908 Vertical polarization : 960 Circularly polarization : 558	・Radio interference : weak
	3	AOS(JST) : 19:30:46 LOS(JST) : 19:39:48 Max Elevation : 11.18[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 4.548[deg/s] ・Recieved packet number Horizontal polarization : 682 Vertical polarization : 698 Circularly polarization : 224	・Radio interference : weak
	4	AOS(JST) : 21:03:03 LOS(JST) : 21:14:08 Max Elevation : 36.33[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 4.334[deg/s] ・Recieved packet number Horizontal polarization : 1079 Vertical polarization : 1272 Circularly polarization : 1062	・Radio interference : weak
09/06/2019	1	AOS(JST) : 08:34:20 LOS(JST) : 08:44:40 Max Elevation : 20.53[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation	・Bus voltage : 4.178[V] ・Angular velocity : 3.228[deg/s]	・Radio interference : weak ・The local loop was confirmed, but communication with other stations was not possible.
	2	AOS(JST) : 10:08:01 LOS(JST) : 10:18:03 Max Elevation : 18.45[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation	・Bus voltage : 4.162[V] ・Angular velocity : 3.029[deg/s]	・Radio interference : weak ・The local loop was confirmed, but communication with other stations was not possible.
	3	AOS(JST) : 19:10:54 LOS(JST) : 19:17:54 Max Elevation : 5.22[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To check the size of the captured image.	・Bus voltage : 4.079[V] ・Angular velocity : 3.929[deg/s]	・Radio interference : weak ・Uplink failed due to ground station setting error.
	4	AOS(JST) : 20:41:46 LOS(JST) : 20:53:06 Max Elevation : 76.07[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTVOperation(437.075MHz)	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.084[V] ・Angular velocity : 3.708[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:19:20 LOS(JST) : 22:23:55 Max Elevation : 1.79[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To confirm angular velocity.	・Bus voltage : 4.066[V] ・Angular velocity : 3.787[deg/s]	・Radio interference : weak
10/06/2019	1	AOS(JST) : 08:13:43 LOS(JST) : 08:22:46 Max Elevation : 10.84[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 5.487[deg/s] ・Recieved packet number Horizontal polarization : 837 Vertical polarization : 891 Circularly polarization : 423	・Radio interference : weak
	2	AOS(JST) : 09:46:36 LOS(JST) : 09:57:27 Max Elevation : 34.03[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.144[V] ・Angular velocity : 4.258[deg/s] ・Recieved packet number Horizontal polarization : 795 Vertical polarization : 840 Circularly polarization : 487	・Radio interference : weak
	3	AOS(JST) : 18:52:05 LOS(JST) : 18:55:06 Max Elevation : 0.79[deg]	Shade	Low elevation, No operation.			
	4	AOS(JST) : 20:20:45 LOS(JST) : 20:31:56 Max Elevation : 51.45[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.085[V] ・Angular velocity : 4.432[deg/s] ・Recieved packet number Horizontal polarization : 1223 Vertical polarization : 1243 Circularly polarization : 959	・Radio interference : weak
	5	AOS(JST) : 21:56:16 LOS(JST) : 22:04:16 Max Elevation : 7.09[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 4.345[deg/s] ・Recieved packet number Horizontal polarization : 639 Vertical polarization : 653 Circularly polarization : 179	・Radio interference : weak
11/06/2019	1	AOS(JST) : 07:53:32 LOS(JST) : 08:00:18 Max Elevation : 4.55[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.141[V] ・Angular velocity : 5.883[deg/s] ・Recieved packet number Horizontal polarization : 304 Vertical polarization : 387 Circularly polarization : 123	・Radio interference : weak
	2	AOS(JST) : 09:25:20 LOS(JST) : 09:36:34 Max Elevation : 70.53[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.178[V] ・Angular velocity : 6.010[deg/s] ・Recieved packet number Horizontal polarization : 672 Vertical polarization : 1021 Circularly polarization : 651	・Radio interference : weak
	3	AOS(JST) : 11:01:18 LOS(JST) : 11:06:21 Max Elevation : 2.41[deg]	Sunshine	Low elevation, No operation.			
	4	AOS(JST) : 19:59:59 LOS(JST) : 20:10:36 Max Elevation : 26.27[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 6.796[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : 0	・Radio interference : weak ・Uplink failed because the security byte was the same as the previous path.
	5	AOS(JST) : 21:34:05 LOS(JST) : 21:43:51 Max Elevation : 14.50[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:1	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.084[V] ・Angular velocity : 6.706[deg/s] ・Recieved packet number Horizontal polarization : 820 Vertical polarization : 728 Circularly polarization : 665	・Radio interference : weak
12/06/2019	1	AOS(JST) : 09:04:13 LOS(JST) : 09:15:26 Max Elevation : 54.99[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.149[V] ・Angular velocity : 8.511[deg/s] Horizontal polarization : 764 Vertical polarization : 750 Circularly polarization : 338	・Radio interference : middle
	2	AOS(JST) : 10:39:02 LOS(JST) : 10:46:55 Max Elevation : 7.34[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.128[V] ・Angular velocity : -[deg/s] Horizontal polarization : 141 Vertical polarization : 135 Circularly polarization : 25	・Radio interference : strong
	3	AOS(JST) : 19:39:30 LOS(JST) : 19:49:07 Max Elevation : 14.53[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 8.226[deg/s] Horizontal polarization : 381 Vertical polarization : 386 Circularly polarization : 157	・Radio interference : weak
	4	AOS(JST) : 21:12:21 LOS(JST) : 21:23:06 Max Elevation : 26.95[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 8.873[deg/s] Horizontal polarization : 395 Vertical polarization : 594 Circularly polarization : 197	・Radio interference : weak
13/06/2019	1	AOS(JST) : 08:43:16 LOS(JST) : 08:54:01 Max Elevation : 27.27[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : 11.18[deg/s] Horizontal polarization : 545 Vertical polarization : 461 Circularly polarization : 388	・Radio interference : weak
	2	AOS(JST) : 10:17:17 LOS(JST) : 10:26:50 Max Elevation : 14.29[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.199[V] ・Angular velocity : 11.25[deg/s] Horizontal polarization : 400 Vertical polarization : 222 Circularly polarization : 179	・Radio interference : weak
	3	AOS(JST) : 19:19:25 LOS(JST) : 19:27:22 Max Elevation : 7.50[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.079[V] ・Angular velocity : 12.47[deg/s] Horizontal polarization : 94 Vertical polarization : 88 Circularly polarization : 43	・Radio interference : weak
	4	AOS(JST) : 20:50:56 LOS(JST) : 21:02:09 Max Elevation : 54.13[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.078[V] ・Angular velocity : 12.58[deg/s] Horizontal polarization : 557 Vertical polarization : 428 Circularly polarization : 501	・Radio interference : weak

Table 31 Detail of Operation from 14 June 2019 to 20 June 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
14/06/2019	1	AOS(JST) : 08:22:31 LOS(JST) : 08:32:17 Max Elevation : 14.66[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:711424 SC_S:30, SSC:30, SP:768, ESC:30, EP:1023 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.144[V] ・Angular velocity : 11.97[deg/s] Horizontal polarization : 967 Vertical polarization : 97 Circularly polarization : 173	・Radio interference : weak ・13 packet loss.
	2	AOS(JST) : 09:55:47 LOS(JST) : 10:06:22 Max Elevation : 25.84[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:711424 SC_S:30, SSC:30, SP:768, ESC:30, EP:1023 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.149[V] ・Angular velocity : 11.47[deg/s] Horizontal polarization : 1568 Vertical polarization : 358 Circularly polarization : 563	・Radio interference : weak
	3	AOS(JST) : 18:59:57 LOS(JST) : 19:05:07 Max Elevation : 2.53[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To check the size of the captured image.	・Bus voltage : 4.075[V] ・Angular velocity : 10.07[deg/s] Horizontal polarization : 2 Vertical polarization : 3 Circularly polarization : 7	・Radio interference : weak
	4	AOS(JST) : 20:29:47 LOS(JST) : 20:41:02 Max Elevation : 71.73[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:711424 SC_S:30, SSC:31, SP:0, ESC:31, EP:511 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 4/26, 1st.	・Bus voltage : 4.079[V] ・Angular velocity : 10.23[deg/s] Horizontal polarization : 1547 Vertical polarization : 190 Circularly polarization : 996	・Radio interference : weak ・1 packet loss,
	5	AOS(JST) : 22:06:05 LOS(JST) : 22:12:49 Max Elevation : 4.46[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Compression rate change image downlink Size:711424 SC_S:30, SSC:30, SP:864, ESC:30, EP:955 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 4/26, 1st.	・Bus voltage : 4.071[V] ・Angular velocity : 10.04[deg/s] Horizontal polarization : 820 Vertical polarization : 352 Circularly polarization : 207	・Radio interference : weak
15/06/2019	1	AOS(JST) : 08:02:05 LOS(JST) : 08:10:06 Max Elevation : 7.18[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 8.164[deg/s] ・Recieved packet number Horizontal polarization : 129 Vertical polarization : 203 Circularly polarization : 23	・Radio interference : weak
	2	AOS(JST) : 09:34:27 LOS(JST) : 09:45:36 Max Elevation : 50.50[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.199[V] ・Angular velocity : 11.25[deg/s] ・Recieved packet number Horizontal polarization : 543 Vertical polarization : 502 Circularly polarization : 369	・Radio interference : weak
	3	AOS(JST) : 11:11:23 LOS(JST) : 11:14:08 Max Elevation : 0.66[deg]	Sunshine	Low elevation, No operation.			
	4	AOS(JST) : 20:08:53 LOS(JST) : 20:19:46 Max Elevation : 34.56[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.085[V] ・Angular velocity : 7.388[deg/s] ・Recieved packet number Horizontal polarization : 536 Vertical polarization : 630 Circularly polarization : 438	・Radio interference : weak
	5	AOS(JST) : 21:43:36 LOS(JST) : 21:52:39 Max Elevation : 10.73[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the Initial sensing data .	・Bus voltage : 4.069[V] ・Angular velocity : 7.309[deg/s] ・Recieved packet number Horizontal polarization : 221 Vertical polarization : 230 Circularly polarization : 51	・Radio interference : weak
16/06/2019	1	AOS(JST) : 07:42:25 LOS(JST) : 07:47:03 Max Elevation : 1.85[deg]	Sunshine	Low elevation, No operation.			
	2	AOS(JST) : 09:13:15 LOS(JST) : 09:24:34 Max Elevation : 77.28[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation	・Bus voltage : 4.140[V] ・Angular velocity : 8.084[deg/s]	・Radio interference : weak ・We could hear our own voice and "P","X","D" but could not exchange messages. .
	3	AOS(JST) : 10:48:29 LOS(JST) : 10:55:23 Max Elevation : 5.06[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation	・Bus voltage : 4.177[V] ・Angular velocity : 8.294[deg/s]	・Radio interference : weak ・We could hear our own voice and "JH1UOO" but could not exchange messages.
	4	AOS(JST) : 19:48:17 LOS(JST) : 19:58:21 Max Elevation : 18.70[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To confirm angular velocity.	・Bus voltage : 4.080[V] ・Angular velocity : 8.265[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:21:41 LOS(JST) : 21:32:01 Max Elevation : 20.32[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To confirm angular velocity.	・Bus voltage : 4.079[V] ・Angular velocity : 8.074[deg/s]	・Radio interference : weak
17/06/2019	1	AOS(JST) : 08:52:13 LOS(JST) : 09:03:16 Max Elevation : 36.78[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : 4.144[V] ・Angular velocity : 8.972[deg/s] ・Recieved packet number Horizontal polarization : 618 Vertical polarization : 391 Circularly polarization : 429	・Radio interference : weak
	2	AOS(JST) : 10:26:33 LOS(JST) : 10:35:31 Max Elevation : 10.97[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : 4.179[V] ・Angular velocity : 9.805[deg/s] ・Recieved packet number Horizontal polarization : 479 Vertical polarization : 159 Circularly polarization : 141	・Radio interference : weak
	3	AOS(JST) : 19:27:59 LOS(JST) : 19:36:43 Max Elevation : 10.15[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : 4.075[V] ・Angular velocity : 10.20[deg/s] ・Recieved packet number Horizontal polarization : 262 Vertical polarization : 113 Circularly polarization : 26	・Radio interference : weak
	4	AOS(JST) : 21:00:07 LOS(JST) : 21:11:08 Max Elevation : 38.94[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : 4.075[V] ・Angular velocity : 9.364[deg/s] ・Recieved packet number Horizontal polarization : 597 Vertical polarization : 350 Circularly polarization : 412	・Radio interference : weak
18/06/2019	1	AOS(JST) : 08:31:21 LOS(JST) : 08:41:41 Max Elevation : 19.44[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : 4.139[V] ・Angular velocity : 9.109[deg/s] ・Recieved packet number Horizontal polarization : 322 Vertical polarization : 135 Circularly polarization : 263	・Radio interference : strong ・Sensing data is not saved.
	2	AOS(JST) : 10:04:57 LOS(JST) : 10:15:12 Max Elevation : 20.01[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : 4.144[V] ・Angular velocity : 8.940[deg/s] ・Recieved packet number Horizontal polarization : 532 Vertical polarization : 203 Circularly polarization : 302	・Radio interference : strong ・Sensing data is not saved.
	3	AOS(JST) : 19:08:11 LOS(JST) : 19:14:44 Max Elevation : 4.47[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 7.800[deg/s] ・Recieved packet number Horizontal polarization : 43 Vertical polarization : 81 Circularly polarization : 41	・Radio interference : weak ・6/7_2ndのロス回収
	4	AOS(JST) : 20:38:50 LOS(JST) : 20:50:05 Max Elevation : 82.65[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/6, 3rd.	・Bus voltage : 4.083[V] ・Angular velocity : 7.815[deg/s] ・Recieved packet number Horizontal polarization : 484 Vertical polarization : 487 Circularly polarization : 369	・Radio interference : weak
	5	AOS(JST) : 22:16:09 LOS(JST) : 22:21:06 Max Elevation : 2.17[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz)	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : -[V] ・Angular velocity : -[deg/s]	・Radio interference : weak ・Sensing command uplink.
19/06/2019	1	AOS(JST) : 08:10:45 LOS(JST) : 08:19:44 Max Elevation : 10.25[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/18, 5th.	・Bus voltage : 4.139[V] ・Angular velocity : 7.478[deg/s] ・Recieved packet number Horizontal polarization : 246 Vertical polarization : 13 Circularly polarization : 54	・Radio interference : weak
	2	AOS(JST) : 09:43:32 LOS(JST) : 09:54:33 Max Elevation : 37.13[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/18, 5th.	・Bus voltage : 4.178[V] ・Angular velocity : 7.685[deg/s] ・Recieved packet number Horizontal polarization : 603 Vertical polarization : 309 Circularly polarization : 408	・Radio interference : weak
	3	AOS(JST) : 18:49:52 LOS(JST) : 18:51:24 Max Elevation : 0.20[deg]	Shade	Low elevation, No operation.			
	4	AOS(JST) : 20:17:49 LOS(JST) : 20:28:53 Max Elevation : 46.81[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/18, 5th.	・Bus voltage : 4.082[V] ・Angular velocity : 7.616[deg/s] ・Recieved packet number Horizontal polarization : 515 Vertical polarization : 513 Circularly polarization : 401	・Radio interference : weak
	5	AOS(JST) : 21:53:11 LOS(JST) : 22:01:19 Max Elevation : 7.61[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/18, 5th.	・Bus voltage : 4.078[V] ・Angular velocity : 7..566[deg/s] ・Recieved packet number Horizontal polarization : 243 Vertical polarization : 314 Circularly polarization : 80	・Radio interference : weak
20/06/2019	1	AOS(JST) : 07:50:36 LOS(JST) : 07:57:11 Max Elevation : 4.14[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the Initial sensing data .	・Bus voltage : 4.162[V] ・Angular velocity : 7.903[deg/s] ・Recieved packet number Horizontal polarization : 45 Vertical polarization : 87 Circularly polarization : 7	・Radio interference : weak
	2	AOS(JST) : 09:22:17 LOS(JST) : 09:33:38 Max Elevation : 77.03[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the Initial sensing data .	・Bus voltage : 4.160[V] ・Angular velocity : 8.179[deg/s] ・Recieved packet number Horizontal polarization : 409 Vertical polarization : 96 Circularly polarization : 289	・Radio interference : weak
	3	AOS(JST) : 10:58:02 LOS(JST) : 11:03:41 Max Elevation : 3.08[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To confirm angular velocity.	・Bus voltage : 4.160[V] ・Angular velocity : 8.369[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:57:04 LOS(JST) : 20:07:31 Max Elevation : 24.15[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the Initial sensing data .	・Bus voltage : 4.082[V] ・Angular velocity : 8.227[deg/s] ・Recieved packet number Horizontal polarization : 531 Vertical polarization : 577 Circularly polarization : 346	・Radio interference : weak
	5	AOS(JST) : 21:31:02 LOS(JST) : 21:40:51 Max Elevation : 15.36[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, GMSK9600bps, 437.075MHz), Data block number:3	・To confirm angular velocity. ・To downlink the HK data taken on 6/9, 5th.	・Bus voltage : 4.075[V] ・Angular velocity : 8.233[deg/s] ・Recieved packet number Horizontal polarization : 341 Vertical polarization : 451 Circularly polarization : 194	・Radio interference : weak

Table 32 Detail of Operation from 21 June 2019 to 27 June 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
21/06/2019	1	AOS(JST) : 09:01:10 LOS(JST) : 09:12:27 Max Elevation : 50.82[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:711424 SC_S:30, SSC:31, SP:512, ESC:31, EP:767 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.162[V] ・Angular velocity : 7.540[deg/s] ・Recieved packet number Horizontal polarization : 1412 Vertical polarization : 1446 Circularly polarization : 986	・Radio interference : middle
	2	AOS(JST) : 10:35:52 LOS(JST) : 10:44:07 Max Elevation : 8.24[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:711424 SC_S:30, SSC:31, SP:432, ESC:31, EP:435 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 6.981[deg/s] ・Recieved packet number Horizontal polarization : 582 Vertical polarization : 275 Circularly polarization : 22	・Radio interference : strong
	3	AOS(JST) : 19:36:38 LOS(JST) : 19:45:59 Max Elevation : 13.32[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:711424 SC_S:30, SSC:31, SP:768, ESC:32, EP:2553 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.089[V] ・Angular velocity : 6.715[deg/s] ・Recieved packet number Horizontal polarization : 1411 Vertical polarization : 1223 Circularly polarization : 477	・Radio interference : weak
	4	AOS(JST) : 21:09:19 LOS(JST) : 21:20:04 Max Elevation : 28.77[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:711424 SC_S:30, SSC:32, SP:256, ESC:32, EP:731 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.078[V] ・Angular velocity : 6.612[deg/s] ・Recieved packet number Horizontal polarization : 1521 Vertical polarization : 1911 Circularly polarization : 1276	・Radio interference : weak
22/06/2019	1	AOS(JST) : 08:40:13 LOS(JST) : 08:51:00 Max Elevation : 25.75[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:34, SP:00, ESC:34, EP:255 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 6.713[deg/s] ・Recieved packet number Horizontal polarization : 878 Vertical polarization : 455 Circularly polarization : 570	・Radio interference : weak
	2	AOS(JST) : 10:14:08 LOS(JST) : 10:23:58 Max Elevation : 15.61[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:34, SP:00, ESC:34, EP:255 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : 7.015[deg/s] ・Recieved packet number Horizontal polarization : 415 Vertical polarization : 28 Circularly polarization : 122	・Radio interference : strong
	3	AOS(JST) : 19:16:34 LOS(JST) : 19:24:11 Max Elevation : 6.68[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink →Germany, Friedrichshafen	・To confirm angular velocity. ・We could hear For TRP overseas operation	・Bus voltage : 4.079[V] ・Angular velocity : 7.208[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:47:55 LOS(JST) : 20:59:05 Max Elevation : 59.06[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink →Thailand, Bangkok	・To confirm angular velocity. ・We could hear For TRP overseas operation	・Bus voltage : 4.069[V] ・Angular velocity : 7.497[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:27:10 LOS(JST) : 22:28:23 Max Elevation : 15.36[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink →Thailand, Bangkok	・To confirm angular velocity. ・We could hear For TRP overseas operation	・Bus voltage : 3.930[V] ・Angular velocity : 7.081[deg/s]	・Radio interference : weak
23/06/2019	1	AOS(JST) : 08:19:28 LOS(JST) : 08:29:23 Max Elevation : 13.92[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation	・Bus voltage : 4.047[V] ・Angular velocity : 6.806[deg/s]	・Radio interference : weak ・We could hear our own voice but could not exchange messages.
	2	AOS(JST) : 09:52:39 LOS(JST) : 10:03:27 Max Elevation : 28.17[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink →Thailand, Bangkok	・To confirm angular velocity. ・We could hear For TRP overseas operation	・Bus voltage : 4.149[V] ・Angular velocity : 6.501[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:57:15 LOS(JST) : 19:01:47 Max Elevation : 1.950[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink →Germany, Friedrichshafen	・To confirm angular velocity. ・We could hear For TRP overseas operation	・Bus voltage : 4.177[V] ・Angular velocity : 6.389[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:26:47 LOS(JST) : 20:37:56 Max Elevation : 65.650[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink(Bus transmitter, AFSK1200bps, 437.075MHz), Data block number:2	・To confirm angular velocity. ・To correct satellite time	・Bus voltage : 4.084[V] ・Angular velocity : 6.474[deg/s]	・Radio interference : weak ・Downlink is failed.
	5	AOS(JST) : 22:02:53 LOS(JST) : 22:09:52 Max Elevation : 4.920[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink →Thailand, Bangkok	・To confirm angular velocity. ・We could hear For TRP overseas operation	・Bus voltage : 4.082[V] ・Angular velocity : 6.329[deg/s]	・Radio interference : weak
24/06/2019	1	AOS(JST) : 07:59:04 LOS(JST) : 08:06:58 Max Elevation : 6.72[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:34, SP:256, ESC:34, EP:511 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.158[V] ・Angular velocity : 5.967[deg/s] ・Recieved packet number Horizontal polarization : 281 Vertical polarization : 914 Circularly polarization : 215	・Radio interference : middle ・
	2	AOS(JST) : 09:31:19 LOS(JST) : 09:42:38 Max Elevation : 55.56[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:34, SP:433, ESC:34, EP:448 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 5.901[deg/s] ・Recieved packet number Horizontal polarization : 1474 Vertical polarization : 1400 Circularly polarization : 829	・Radio interference : strong
	3	AOS(JST) : 11:07:49 LOS(JST) : 11:11:40 Max Elevation : 1.31[deg]	Sunshine	Low elevation, No operation.			
	4	AOS(JST) : 20:05:54 LOS(JST) : 20:16:38 Max Elevation : 31.67[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:34, SP:512, ESC:34, EP:1023 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.083[V] ・Angular velocity : 6.372[deg/s] ・Recieved packet number Horizontal polarization : 1823 Vertical polarization : 463 Circularly polarization : 1348	・Radio interference : weak
	5	AOS(JST) : 21:40:27 LOS(JST) : 21:49:37 Max Elevation : 11.48[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:35, SP:0, ESC:35, EP:255 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.077[V] ・Angular velocity : 6.390[deg/s] ・Recieved packet number Horizontal polarization : 1173 Vertical polarization : 614 Circularly polarization : 697	・Radio interference : weak
25/06/2019	1	AOS(JST) : 07:39:30 LOS(JST) : 07:43:45 Max Elevation : 1.51[deg]	Sunshine	Low elevation, No operation.			
	2	AOS(JST) : 09:10:08 LOS(JST) : 09:21:33 Max Elevation : 71.11[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:35, SP:256, ESC:35, EP:767 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.178[V] ・Angular velocity : 5.791[deg/s] ・Recieved packet number Horizontal polarization : 1925 Vertical polarization : 1171 Circularly polarization : 1346	・Radio interference : weak
	3	AOS(JST) : 10:45:13 LOS(JST) : 10:52:35 Max Elevation : 5.89[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:35, SP:768, ESC:35, EP:1023 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 5.963[deg/s] ・Recieved packet number Horizontal polarization : 240 Vertical polarization : 162 Circularly polarization : 54	・Radio interference : strong
	4	AOS(JST) : 19:45:18 LOS(JST) : 19:55:11 Max Elevation : 17.24[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:35, SP:768, ESC:35, EP:1023 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 5.317[deg/s] ・Recieved packet number Horizontal polarization : 1732 Vertical polarization : 55 Circularly polarization : 987	・Radio interference : weak
	5	AOS(JST) : 21:18:33 LOS(JST) : 21:28:56 Max Elevation : 21.71[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image downlink Size:604416 SC_S:34, SSC:36, SP:0, ESC:36, EP:315 →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 5/26, 3rd.	・Bus voltage : 4.071[V] ・Angular velocity : 5.541[deg/s] ・Recieved packet number Horizontal polarization : 1325 Vertical polarization : 453 Circularly polarization : 1138	・Radio interference : weak
26/06/2019	1	AOS(JST) : 08:49:06 LOS(JST) : 09:00:13 Max Elevation : 34.44[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 2/19, 1st.	・Bus voltage : 4.149[V] ・Angular velocity : 6.043[deg/s] ・Recieved packet number Horizontal polarization : 1858 Vertical polarization : 1667 Circularly polarization : 1271	・Radio interference : weak
	2	AOS(JST) : 10:23:20 LOS(JST) : 10:32:38 Max Elevation : 12.12[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 2/19, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 5.246[deg/s] ・Recieved packet number Horizontal polarization : 947 Vertical polarization : 404 Circularly polarization : 206	・Radio interference : strong
	3	AOS(JST) : 19:25:03 LOS(JST) : 19:33:31 Max Elevation : 9.24[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 2/19, 1st.	・Bus voltage : 4.080[V] ・Angular velocity : 6.289[deg/s] ・Recieved packet number Horizontal polarization : 879 Vertical polarization : 52 Circularly polarization : 262	・Radio interference : weak
	4	AOS(JST) : 20:57:01 LOS(JST) : 21:08:02 Max Elevation : 42.28[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 2/19, 1st.	・Bus voltage : 4.077[V] ・Angular velocity : 6.011[deg/s] ・Recieved packet number Horizontal polarization : 1743 Vertical polarization : 909 Circularly polarization : 210	・Radio interference : weak
27/06/2019	1	AOS(JST) : 08:28:15 LOS(JST) : 08:38:35 Max Elevation : 18.45[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.141[V] ・Angular velocity : 5.550[deg/s] ・Recieved packet number Horizontal polarization : 939 Vertical polarization : 720 Circularly polarization : 623	・Radio interference : middle
	2	AOS(JST) : 10:01:45 LOS(JST) : 10:12:15 Max Elevation : 21.83[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.141[V] ・Angular velocity : 5.999[deg/s] ・Recieved packet number Horizontal polarization : 1683 Vertical polarization : 873 Circularly polarization : 798	・Radio interference : weak
	3	AOS(JST) : 19:05:19 LOS(JST) : 19:11:27 Max Elevation : 3.83[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.079[V] ・Angular velocity : 5.688[deg/s] ・Recieved packet number Horizontal polarization : 93 Vertical polarization : 0 Circularly polarization : 17	・Radio interference : strong
	4	AOS(JST) : 20:35:45 LOS(JST) : 20:46:57 Max Elevation : 89.85[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter, GMSK, 9600bps, 435.900MHz	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.077[V] ・Angular velocity : 5.809[deg/s] ・Recieved packet number Horizontal polarization : 1697 Vertical polarization : 1819 Circularly polarization : 945	・Radio interference : weak
	5	AOS(JST) : 22:12:46 LOS(JST) : 22:18:11 Max Elevation : 2.68[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To confirm angular velocity. ・To check the size of the captured image.	・Bus voltage : 4.065[V] ・Angular velocity : 6.423[deg/s]	・Radio interference : weak ・Uplink failed due to ground station setting error.

Table 33 Detail of Operation from 28 June 2019 to 4 July 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
28/06/2019	1	AOS(JST) : 8:07:39 LOS(JST) : 8:16:34 Max Elevation : 9.68[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:31, SP:0, ESC:31, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 6.225[deg/s] ・Recieved packet number Horizontal polarization : 732 Vertical polarization : 848 Circularly polarization : 344	・Radio interference : middle
	2	AOS(JST) : 9:40:21 LOS(JST) : 9:51:33 Max Elevation : 40.75[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:31, SP:256, ESC:31, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.161[V] ・Angular velocity : 7.089[deg/s] ・Recieved packet number Horizontal polarization : 1433 Vertical polarization : 1300 Circularly polarization : 807	・Radio interference : strong
	3	AOS(JST) : 20:14:45 LOS(JST) : 20:25:43 Max Elevation : 42.64[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:31, SP:720, ESC:31, EP:727	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 6.221[deg/s] ・Recieved packet number Horizontal polarization : 1892 Vertical polarization : 448 Circularly polarization : 1097	・Radio interference : weak
	4	AOS(JST) : 21:49:56 LOS(JST) : 21:58:17 Max Elevation : 8.32[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:31, SP:768, ESC:31, EP:1023	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.070[V] ・Angular velocity : 6.897[deg/s] ・Recieved packet number Horizontal polarization : 1032 Vertical polarization : 184 Circularly polarization : 222	・Radio interference : weak
29/06/2019	1	AOS(JST) : 7:47:34 LOS(JST) : 7:53:55 Max Elevation : 3.74[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:32, SP:0, ESC:32, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.161[V] ・Angular velocity : 6.432[deg/s] ・Recieved packet number Horizontal polarization : 49 Vertical polarization : 245 Circularly polarization : 5	・Radio interference : weak
	2	AOS(JST) : 9:19:06 LOS(JST) : 9:30:35 Max Elevation : 83.95[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:32, SP:0, ESC:32, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 1466[V] ・Angular velocity : 5.854[deg/s] ・Recieved packet number Horizontal polarization : 1466 Vertical polarization : 1352 Circularly polarization : 675	・Radio interference : weak
	3	AOS(JST) : 10:54:39 LOS(JST) : 11:00:54 Max Elevation : 3.84[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM Status downlink →Bus transmitter,GMSK 9600bps,437.075MHz →ROM0	・To confirm angular velocity. ・To check the CAMROM capacity.	・Bus voltage : 4.144[V] ・Angular velocity : 6.000[deg/s] ・Recieved packet number Horizontal polarization : 221 Vertical polarization : 229 Circularly polarization : 67	・Radio interference : weak
	4	AOS(JST) : 19:54:01 LOS(JST) : 20:04:20 Max Elevation : 22.32[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:32, SP:256, ESC:32, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.074[V] ・Angular velocity : 6.840[deg/s] ・Recieved packet number Horizontal polarization : 1491 Vertical polarization : 1596 Circularly polarization : 1098	・Radio interference : weak
	5	AOS(JST) : 21:27:50 LOS(JST) : 21:37:45 Max Elevation : 16.51[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:32, SP:512, ESC:32, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.070[V] ・Angular velocity : 6.296[deg/s] ・Recieved packet number Horizontal polarization : 1699 Vertical polarization : 2236 Circularly polarization : 1312	・Radio interference : weak
30/06/2019	1	AOS(JST) : 8:58:00 LOS(JST) : 9:09:22 Max Elevation : 46.99[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.178[V] ・Angular velocity : 6.338[deg/s]	・Radio interference : weak ・We could hear our own voice but could not exchange messages.
	2	AOS(JST) : 10:32:34 LOS(JST) : 10:41:12 Max Elevation : 9.23[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.141[V] ・Angular velocity : 6.007[deg/s]	・Radio interference : weak ・We could hear our own voice exchange messages with "JA1OGZ".
	3	AOS(JST) : 19:33:35 LOS(JST) : 19:42:45 Max Elevation : 12.29[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →FSK transmitter, GMSK9k6, 435.900MHz →ROM1,sec:14,0～sec:14,255	・To confirm angular velocity. ・To confirm the sensing data during TRP operation.	・Bus voltage : 4071[V] ・Angular velocity : 7.321[deg/s] ・Recieved packet number Horizontal polarization : 909 Vertical polarization : 1136 Circularly polarization : 144	・Radio interference : weak
	4	AOS(JST) : 21:06:08 LOS(JST) : 21:16:56 Max Elevation : 31.14[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real-time data downlink every 2 seconds →Bus transmitter, AFSK1k2, 437.075MHz	・To confirm angular velocity. ・To correct satellite time and real time.	・Bus voltage : 4.066[V] ・Angular velocity : 7.591[deg/s] ・Recieved packet number Horizontal polarization : 211 Vertical polarization : 218 Circularly polarization : 148	・Radio interference : weak
01/07/2019	1	AOS(JST) : 8:37:03 LOS(JST) : 8:47:52 Max Elevation : 24.30[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:32, SP:768, ESC:32, EP:1023	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 5.826[deg/s] ・Recieved packet number Horizontal polarization : 1525 Vertical polarization : 1094 Circularly polarization : 193	・Radio interference : weak
	2	AOS(JST) : 10:10:53 LOS(JST) : 10:20:58 Max Elevation : 17.09[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:33, SP:0, ESC:33, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.141[V] ・Angular velocity : 5.587[deg/s] ・Recieved packet number Horizontal polarization : 1325 Vertical polarization : 1425 Circularly polarization : 691	・Radio interference : middle
	3	AOS(JST) : 19:13:35 LOS(JST) : 19:20:54 Max Elevation : 6.00[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:33, SP:256, ESC:33, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.074[V] ・Angular velocity : 4.268[deg/s] ・Recieved packet number Horizontal polarization : 343 Vertical polarization : 448 Circularly polarization : 5	・Radio interference : weak
	4	AOS(JST) : 20:44:44 LOS(JST) : 20:55:55 Max Elevation : 65.09[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:33, SP:256, ESC:33, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.701[V] ・Angular velocity : 4.139[deg/s] ・Recieved packet number Horizontal polarization : 2083 Vertical polarization : 2288 Circularly polarization : 1231	・Radio interference : weak
	5	AOS(JST) : 22:23:10 LOS(JST) : 22:25:58 Max Elevation : 0.64[deg]	Shade	Low elevation, No operation.			
02/07/2019	1	AOS(JST) : 8:16:19 LOS(JST) : 8:26:01 Max Elevation : 13.18[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:33, SP:768, ESC:33, EP:1023	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.158[V] ・Angular velocity : 4.927[deg/s] ・Recieved packet number Horizontal polarization : 364 Vertical polarization : 576 Circularly polarization : 152	・Radio interference : middle
	2	AOS(JST) : 9:49:24 LOS(JST) : 10:00:24 Max Elevation : 30.81[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:33, SP:928, ESC:33, EP:1003	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 914 Vertical polarization : 1006 Circularly polarization : 727	・Radio interference : middle
	3	AOS(JST) : 18:54:24 LOS(JST) : 18:58:21 Max Elevation : 1.40[deg]	Shade	Low elevation, No operation.			
	4	AOS(JST) : 20:23:37 LOS(JST) : 20:34:44 Max Elevation : 59.15[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:0, ESC:34, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 4.740[deg/s] ・Recieved packet number Horizontal polarization : 605 Vertical polarization : 663 Circularly polarization : 533	・Radio interference : middle
	5	AOS(JST) : 21:59:30 LOS(JST) : 22:06:49 Max Elevation : 5.65[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:220, ESC:34, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.077[V] ・Angular velocity : 4.784[deg/s] ・Recieved packet number Horizontal polarization : 231 Vertical polarization : 440 Circularly polarization : 39	・Radio interference : middle
03/07/2019	1	AOS(JST) : 7:55:57 LOS(JST) : 8:03:42 Max Elevation : 6.24[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:256, ESC:34, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : 5.061[deg/s] ・Recieved packet number Horizontal polarization : 557 Vertical polarization : 534 Circularly polarization : 313	・Radio interference : strong
	2	AOS(JST) : 9:28:05 LOS(JST) : 9:39:33 Max Elevation : 61.23[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:256, ESC:34, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.149[V] ・Angular velocity : 4.903[deg/s] ・Recieved packet number Horizontal polarization : 143 Vertical polarization : 83 Circularly polarization : 35	・Radio interference : strong
	3	AOS(JST) : 11:04:15 LOS(JST) : 11:08:59 Max Elevation : 2.00[deg]	Sunshine	Low elevation, No operation.			
	4	AOS(JST) : 20:02:45 LOS(JST) : 20:13:25 Max Elevation : 29.21[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:512, ESC:34, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.069[V] ・Angular velocity : 5.910[deg/s] ・Recieved packet number Horizontal polarization : 883 Vertical polarization : 713 Circularly polarization : 625	・Radio interference : middle
	5	AOS(JST) : 21:37:08 LOS(JST) : 21:46:29 Max Elevation : 12.49[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:336, ESC:34, EP:451	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.066[V] ・Angular velocity : 5.851[deg/s] ・Recieved packet number Horizontal polarization : 678 Vertical polarization : 787 Circularly polarization : 486	・Radio interference : middle
04/07/2019	1	AOS(JST) : 7:36:33 LOS(JST) : 7:40:18 Max Elevation : 1.14[deg]	Sunshine	Low elevation, No operation.			
	2	AOS(JST) : 9:06:54 LOS(JST) : 9:18:26 Max Elevation : 65.25[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:768, ESC:34, EP:1023	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : 5.873[deg/s] ・Recieved packet number Horizontal polarization : 914 Vertical polarization : 1047 Circularly polarization : 627	・Radio interference : middle
	3	AOS(JST) : 10:41:51 LOS(JST) : 10:49:39 Max Elevation : 6.78[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:636, ESC:34, EP:639	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.162[V] ・Angular velocity : 6.484[deg/s] ・Recieved packet number Horizontal polarization : 256 Vertical polarization : 398 Circularly polarization : 30	・Radio interference : strong
	4	AOS(JST) : 19:42:11 LOS(JST) : 19:51:55 Max Elevation : 16.04[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:34, SP:484, ESC:34, EP:491	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.073[V] ・Angular velocity : 6.183[deg/s] ・Recieved packet number Horizontal polarization : 476 Vertical polarization : 661 Circularly polarization : 314	・Radio interference : middle
	5	AOS(JST) : 21:15:16 LOS(JST) : 21:25:46 Max Elevation : 23.52[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:35, SP:0, ESC:35, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.075[V] ・Angular velocity : 5.854[deg/s] ・Recieved packet number Horizontal polarization : 632 Vertical polarization : 721 Circularly polarization : 450	・Radio interference : middle

Table 34 Detail of Operation from 5 July 2019 to 11 July 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
05/07/2019	1	AOS(JST) : 8:45:52 LOS(JST) : 8:57:02 Max Elevation : 32.19[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:35, SP:0, ESC:35, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 6.461[deg/s] ・Recieved packet number Horizontal polarization : 895 Vertical polarization : 883 Circularly polarization : 488	・Radio interference : weak
	2	AOS(JST) : 10:20:01 LOS(JST) : 10:29:36 Max Elevation : 13.35[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:35, SP:256, ESC:35, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.174[V] ・Angular velocity : 6.895[deg/s] ・Recieved packet number Horizontal polarization : 369 Vertical polarization : 536 Circularly polarization : 198	・Radio interference : strong
	3	AOS(JST) : 19:21:57 LOS(JST) : 19:30:12 Max Elevation : 8.50[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:35, SP:340, ESC:35, EP:483	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.075[V] ・Angular velocity : 5.962[deg/s] ・Recieved packet number Horizontal polarization : 84 Vertical polarization : 557 Circularly polarization : 67	・Radio interference : weak
	4	AOS(JST) : 20:53:45 LOS(JST) : 21:04:50 Max Elevation : 46.53[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:35, SP:512, ESC:35, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.078[V] ・Angular velocity : 6.058[deg/s] ・Recieved packet number Horizontal polarization : 678 Vertical polarization : 1018 Circularly polarization : 582	・Radio interference : weak
06/07/2019	1	AOS(JST) : 8:25:02 LOS(JST) : 8:35:21 Max Elevation : 17.43[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:35, SP:768, ESC:35, EP:1023	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : 7.323[deg/s] ・Recieved packet number Horizontal polarization : 293 Vertical polarization : 364 Circularly polarization : 127	・Radio interference : strong
	2	AOS(JST) : 9:58:27 LOS(JST) : 10:09:10 Max Elevation : 23.85[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:35, SP:860, ESC:35, EP:995	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.178[V] ・Angular velocity : 7.224[deg/s] ・Recieved packet number Horizontal polarization : 685 Vertical polarization : 861 Circularly polarization : 555	・Radio interference : strong
	3	AOS(JST) : 19:02:17 LOS(JST) : 19:08:04 Max Elevation : 3.30[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP:0, ESC:36, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.071[V] ・Angular velocity : 7.134[deg/s] ・Recieved packet number Horizontal polarization : 34 Vertical polarization : 122 Circularly polarization : 10	・Radio interference : weak
	4	AOS(JST) : 20:32:30 LOS(JST) : 20:43:43 Max Elevation : 82.34[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP:256, ESC:36, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.077[V] ・Angular velocity : 6.664[deg/s] ・Recieved packet number Horizontal polarization : 528 Vertical polarization : 653 Circularly polarization : 454	・Radio interference : weak
	5	AOS(JST) : 22:09:13 LOS(JST) : 22:15:11 Max Elevation : 3.35[deg]	Shade	Low elevation, No operation.			
07/07/2019	1	AOS(JST) : 8:04:28 LOS(JST) : 8:13:16 Max Elevation : 9.06[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 5.806[deg/s]	・Radio interference : weak ・We could hear our own voice but could not exchange messages.
	2	AOS(JST) : 9:37:03 LOS(JST) : 9:48:25 Max Elevation : 44.84[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation (Uplink frequency fixed.) →Uplink : 145.930～145.900MHz →Downlink : 435.880～435.910MHz	・To confirm angular velocity. ・For amateur operation.	・Bus voltage : 4.141[V] ・Angular velocity : 7.737[deg/s]	・Radio interference : weak ・Uplink failed due to operation miss.
	3	AOS(JST) : 11:14:24 LOS(JST) : 11:16:25 Max Elevation : 0.34[deg]	Sunshine	Low elevation, No operation.			
	4	AOS(JST) : 20:11:31 LOS(JST) : 20:22:27 Max Elevation : 39.06[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie shooting command uplink(Over Russia, SVGA)	・To confirm angular velocity. ・To take a movie.	・Bus voltage : 4.069[V] ・Angular velocity : 8.043[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:46:30 LOS(JST) : 21:55:08 Max Elevation : 9.25[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →FSK transmitter, GMSK9k6, 435.900MHz →ROM1,sec:15,0～sec:15,255	・To confirm angular velocity. ・To confirm the sensing data during TRP operation.	・Bus voltage : 4.071[V] ・Angular velocity : 7.831[deg/s] ・Recieved packet number Horizontal polarization : 993 Vertical polarization : 1302 Circularly polarization : 660	・Radio interference : weak
08/07/2019	1	AOS(JST) : 7:44:27 LOS(JST) : 7:50:30 Max Elevation : 3.29[deg]	Sunshine	Low elevation, No operation.			
	2	AOS(JST) : 9:15:49 LOS(JST) : 9:27:24 Max Elevation : 88.88[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP:256, ESC:36, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 7.498[deg/s] ・Recieved packet number Horizontal polarization : 823 Vertical polarization : 921 Circularly polarization : 465	・Radio interference : weak
	3	AOS(JST) : 10:51:11 LOS(JST) : 10:57:58 Max Elevation : 4.63[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP192:, ESC:36, EP:195	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.139[V] ・Angular velocity : 7.498[deg/s] ・Recieved packet number Horizontal polarization : 236 Vertical polarization : 167 Circularly polarization : 54	・Radio interference : weak
	4	AOS(JST) : 19:50:48 LOS(JST) : 20:01:02 Max Elevation : 20.80[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP:512, ESC:36, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.074[V] ・Angular velocity : 8.748[deg/s] ・Recieved packet number Horizontal polarization : 678 Vertical polarization : 705 Circularly polarization : 355	・Radio interference : weak
	5	AOS(JST) : 21:24:26 LOS(JST) : 21:34:33 Max Elevation : 18.02[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP:624, ESC:36, EP:627	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.004[V] ・Angular velocity : 8.534[deg/s] ・Recieved packet number Horizontal polarization : 409 Vertical polarization : 539 Circularly polarization : 273	・Radio interference : weak
09/07/2019	1	AOS(JST) : 8:54:42 LOS(JST) : 9:06:08 Max Elevation : 43.36[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP:768, ESC:36, EP:1023	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.149[V] ・Angular velocity : 6.544[deg/s] ・Recieved packet number Horizontal polarization : 820 Vertical polarization : 838 Circularly polarization : 461	・Radio interference : strong
	2	AOS(JST) : 10:29:10 LOS(JST) : 10:38:09 Max Elevation : 10.28[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:36, SP188, ESC:36, EP:195	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.163[V] ・Angular velocity : 7.188[deg/s] ・Recieved packet number Horizontal polarization : 597 Vertical polarization : 463 Circularly polarization : 108	・Radio interference : strong
	3	AOS(JST) : 19:30:24 LOS(JST) : 19:39:25 Max Elevation : 11.45[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:37, SP:0, ESC:37, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 7.836[deg/s] ・Recieved packet number Horizontal polarization : 317 Vertical polarization : 490 Circularly polarization : 135	・Radio interference : weak
	4	AOS(JST) : 21:02:46 LOS(JST) : 21:13:42 Max Elevation : 34.20[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:37, SP:256, ESC:37, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.079[V] ・Angular velocity : 7.688[deg/s] ・Recieved packet number Horizontal polarization : 190 Vertical polarization : 416 Circularly polarization : 133	・Radio interference : weak
10/07/2019	1	AOS(JST) : 8:33:46 LOS(JST) : 8:44:34 Max Elevation : 22.80[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:37, SP:256, ESC:37, EP:511	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.178[V] ・Angular velocity : 6.384[deg/s] ・Recieved packet number Horizontal polarization : 571 Vertical polarization : 406 Circularly polarization : 429	・Radio interference : strong
	2	AOS(JST) : 10:07:31 LOS(JST) : 10:17:51 Max Elevation : 18.66[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:37, SP:0, ESC:37, EP:207	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 6.440[deg/s] ・Recieved packet number Horizontal polarization : 660 Vertical polarization : 512 Circularly polarization : 371	・Radio interference : strong
	3	AOS(JST) : 19:10:25 LOS(JST) : 19:17:31 Max Elevation : 5.44[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:37, SP:512, ESC:37, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 6.482[deg/s] ・Recieved packet number Horizontal polarization : 78 Vertical polarization : 234 Circularly polarization : 35	・Radio interference : weak
	4	AOS(JST) : 20:41:24 LOS(JST) : 20:52:39 Max Elevation : 72.21[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:37, SP:512, ESC:37, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.082[V] ・Angular velocity : 6.11[deg/s] ・Recieved packet number Horizontal polarization : 624 Vertical polarization : 664 Circularly polarization : 520	・Radio interference : weak
	5	AOS(JST) : 22:19:15 LOS(JST) : 22:23:12 Max Elevation : 1.32[deg]	Shade	Low elevation, No operation.			
11/07/2019	1	AOS(JST) : 8:13:04 LOS(JST) : 8:22:41 Max Elevation : 12.35[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:37, SP:768, ESC:37, EP:1023	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 6.043[deg/s] ・Recieved packet number Horizontal polarization : 723 Vertical polarization : 282 Circularly polarization : 348	・Radio interference : strong
	2	AOS(JST) : 9:46:03 LOS(JST) : 9:57:13 Max Elevation : 33.71[deg]	Sunshine	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:38, SP:0, ESC:38, EP:255	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.177[V] ・Angular velocity : 6.121[deg/s] ・Recieved packet number Horizontal polarization : 1129 Vertical polarization : 520 Circularly polarization : 677	・Radio interference : weak
	3	AOS(JST) : 18:51:25 LOS(JST) : 18:54:47 Max Elevation : 1.00[deg]	Shade	Low elevation, No operation.			
	4	AOS(JST) : 20:20:18 LOS(JST) : 20:31:26 Max Elevation : 53.69[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:38, SP:256, ESC:38, EP:767	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.090[V] ・Angular velocity : 5.444[deg/s] ・Recieved packet number Horizontal polarization : 1312 Vertical polarization : 1430 Circularly polarization : 871	・Radio interference : weak
	5	AOS(JST) : 21:55:57 LOS(JST) : 22:03:41 Max Elevation : 6.54[deg]	Shade	・CW custom oleration(437.075MHz)(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie downlink →FSK transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:37, SP:632, ESC:37, EP:643	・To confirm angular velocity. ・To downlink the Image data taken on 6/2, 3rd.	・Bus voltage : 4.080[V] ・Angular velocity : 5.386[deg/s] ・Recieved packet number Horizontal polarization : 900 Vertical polarization : 880 Circularly polarization : 88	・Radio interference : weak

Table 35 Detail of Operation from 12 July 2019 to 18 July 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
7/12/2019	1	AOS(JST) : 7:52:44 LOS(JST) : 8:00:16 Max Elevation : 5.66[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:37, SP:772, ESC:37, EP:919	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.062[V] ・Angular velocity : 5.551[deg/s] ・Recieved packet number Horizontal polarization : 233 Vertical polarization : 358 Circularly polarization : 0	・Radio interference:midium ・7packets loss
	2	AOS(JST) : 9:24:44 LOS(JST) : 9:36:19 Max Elevation : 67.49[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:38, SP:768, ESC:39, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.107[V] ・Angular velocity : 5.568[deg/s] ・Recieved packet number Horizontal polarization : 986 Vertical polarization : 1043 Circularly polarization : 618	・Radio interference:strong ・63packets loss
	3	AOS(JST) : 11:00:39 LOS(JST) : 11:06:04 Max Elevation : 2.70[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:59:27 LOS(JST) : 20:10:05 Max Elevation : 27.14[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:39, SP:256, ESC:39, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.086[V] ・Angular velocity : 5.283[deg/s] ・Recieved packet number Horizontal polarization : 1544 Vertical polarization : 1668 Circularly polarization : 1047	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:33:39 LOS(JST) : 21:43:16 Max Elevation : 13.80[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:37, SP:812, ESC:37, EP:919	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.078[V] ・Angular velocity : 5.474[deg/s] ・Recieved packet number Horizontal polarization : 1231 Vertical polarization : 1135 Circularly polarization : 458	・Radio interference:weak ・packet loss nothing
7/13/2019	1	AOS(JST) : 7:33:36 LOS(JST) : 7:36:33 Max Elevation : 0.68[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 9:03:34 LOS(JST) : 9:15:09 Max Elevation : 59.58[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:38, SP:788, ESC:39, EP:223	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.160[V] ・Angular velocity : 4.527[deg/s] ・Recieved packet number Horizontal polarization : 1179 Vertical polarization : 670 Circularly polarization : 520	・Radio interference:strong ・16packets loss
	3	AOS(JST) : 10:38:23 LOS(JST) : 10:46:34 Max Elevation : 7.67[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:38, SP:104, ESC:38, EP:111	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.139[V] ・Angular velocity : 4.619[deg/s] ・Recieved packet number Horizontal polarization : 317 Vertical polarization : 172 Circularly polarization : 108	・Radio interference:strong ・packet loss nothing
	4	AOS(JST) : 19:38:53 LOS(JST) : 19:48:33 Max Elevation : 15.03[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:39, SP:512, ESC:39, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.080[V] ・Angular velocity : 4.907[deg/s] ・Recieved packet number Horizontal polarization : 1001 Vertical polarization : 1245 Circularly polarization : 456	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:11:49 LOS(JST) : 21:22:30 Max Elevation : 25.85[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:38, SP:956, ESC:39, EP:219	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.073[V] ・Angular velocity : 5.105[deg/s] ・Recieved packet number Horizontal polarization : 1420 Vertical polarization : 1605 Circularly polarization : 1038	・Radio interference:weak ・packet loss nothing
7/14/2019	1	AOS(JST) : 8:42:32 LOS(JST) : 8:53:42 Max Elevation : 29.89[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear Transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.141[V] ・Angular velocity : 5.014[deg/s]	・Radio interference:weak
	2	AOS(JST) : 29.89 LOS(JST) : 10:26:26 Max Elevation : 14.61[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear Transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.167[V] ・Angular velocity : 5.014[deg/s]	・Radio interference:weak ・Communicated with JR6DI.
	3	AOS(JST) : 19:18:41 LOS(JST) : 19:26:48 Max Elevation : 7.88[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM status downlink →Bus transmitter, GMSK9k6, 437.075MHz →ROM0	・To check the angular velocity. ・To check the CAMROM capacity.	・Bus voltage : 4.084[V] ・Angular velocity : 3.288[deg/s] ・Recieved packet number Horizontal polarization : 391 Vertical polarization : 642 Circularly polarization : 130	・Radio interference:weak ・packet loss nothing
	4	AOS(JST) : 20:50:19 LOS(JST) : 21:01:31 Max Elevation : 51.84[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Realtime HK data downlink →Bus transmitter, AFSK1k2, 437.075MHz	・To check the angular velocity. ・To correct satellite time to real time.	・Bus voltage : 4.083[V] ・Angular velocity : 4.055[deg/s] ・Recieved packet number Horizontal polarization : 232 Vertical polarization : 243 Circularly polarization : 182	・Radio interference:weak
7/15/2019	1	AOS(JST) : 8:21:43 LOS(JST) : 8:31:57 Max Elevation : 16.28[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:39, SP:768, ESC:39, EP:1023	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.144[V] ・Angular velocity : 3.177[deg/s] ・Recieved packet number Horizontal polarization : 865 Vertical polarization : 656 Circularly polarization : 56	・Radio interference:weak ・packet loss nothing
	2	AOS(JST) : 9:55:02 LOS(JST) : 10:05:55 Max Elevation : 25.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:40, SP:0, ESC:40, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.139[V] ・Angular velocity : 3.278[deg/s] ・Recieved packet number Horizontal polarization : 1348 Vertical polarization : 1242 Circularly polarization : 510	・Radio interference:weak ・packet loss nothing
	3	AOS(JST) : 18:59:05 LOS(JST) : 19:04:34 Max Elevation : 2.87[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:29:05 LOS(JST) : 20:40:22 Max Elevation : 74.73[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:40, SP:256, ESC:40, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.088[V] ・Angular velocity : 2.899[deg/s] ・Recieved packet number Horizontal polarization : 1319 Vertical polarization : 1520 Circularly polarization : 954	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 22:05:30 LOS(JST) : 22:12:04 Max Elevation : 4.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:40, SP:512, ESC:40, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.075[V] ・Angular velocity : 2.809[deg/s] ・Recieved packet number Horizontal polarization : 370 Vertical polarization : 475 Circularly polarization : 61	・Radio interference:weak ・26packets loss
7/16/2019	1	AOS(JST) : 8:01:11 LOS(JST) : 8:09:47 Max Elevation : 8.31[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:40, SP:512, ESC:40, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.139[V] ・Angular velocity : 3.223[deg/s] ・Recieved packet number Horizontal polarization : 255 Vertical polarization : 475 Circularly polarization : 64	・Radio interference:midium ・16packets loss
	2	AOS(JST) : 9:33:39 LOS(JST) : 9:45:07 Max Elevation : [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:40, SP:512, ESC:40, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.178[V] ・Angular velocity : 2.991[deg/s] ・Recieved packet number Horizontal polarization : 736 Vertical polarization : 804 Circularly polarization : 510	・Radio interference:weak ・packet loss nothing
	3	AOS(JST) : 11:10:25 LOS(JST) : 11:13:46 Max Elevation : 0.95[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 20:08:07 LOS(JST) : 20:19:04 Max Elevation : 35.97[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:41, SP:0, ESC:41, EP:256	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.080[V] ・Angular velocity : 2.584[deg/s] ・Recieved packet number Horizontal polarization : 687 Vertical polarization : 864 Circularly polarization : 551	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:42:54 LOS(JST) : 21:51:53 Max Elevation : 10.42[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter,GMSK 9600bps,437.075MHz →Size:3345920 SC_S:30, SSC:41, SP:744, ESC:41, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.075[V] ・Angular velocity : 2.809[deg/s] ・Recieved packet number Horizontal polarization : 409 Vertical polarization : 557 Circularly polarization : 73	・Radio interference:weak ・packet loss nothing
7/17/2019	1	AOS(JST) : 7:41:16 LOS(JST) : 7:46:52 Max Elevation : 2.72[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 9:12:25 LOS(JST) : 9:24:03 Max Elevation : 81.51[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:41, SP:256, ESC:41, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.179[V] ・Angular velocity : 1.940[deg/s] ・Recieved packet number Horizontal polarization : 1206 Vertical polarization : 1269 Circularly polarization : 666	・Radio interference:weak ・1packets loss
	3	AOS(JST) : 10:47:37 LOS(JST) : 10:54:51 Max Elevation : 5.38[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:41, SP:344, ESC:41, EP:351 ・CDH ROM Sector erase →ROM0,sec40～49	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass. ・To secure the capacity of CDH ROM.	・Bus voltage : 4.141[V] ・Angular velocity : 2.970[deg/s] ・Recieved packet number Horizontal polarization : 455 Vertical polarization : 335 Circularly polarization : 83	・Radio interference:strong ・packet loss nothing
	4	AOS(JST) : 19:47:25 LOS(JST) : 19:57:37 Max Elevation : 19.50[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:41, SP:512, ESC:41, EP:767 ・Movie data migration →CAMROM0,sec13→CDHROM0,sec40	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass. ・To transfer video data stored in CAMROM to CDHROM.	・Bus voltage : 4.086[V] ・Angular velocity : 1.747[deg/s] ・Recieved packet number Horizontal polarization : 1309 Vertical polarization : 1713 Circularly polarization : 801	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:20:53 LOS(JST) : 21:31:14 Max Elevation : 19.89[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:41, SP:768, ESC:41, EP:1023	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.077[V] ・Angular velocity : 1.903[deg/s] ・Recieved packet number Horizontal polarization : 1393 Vertical polarization : 1449 Circularly polarization : 902	・Radio interference:weak ・packet loss nothing
7/18/2019	1	AOS(JST) : 8:51:19 LOS(JST) : 9:02:43 Max Elevation : 39.74[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:42, SP:0, ESC:42, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.179[V] ・Angular velocity : 2.743[deg/s] ・Recieved packet number Horizontal polarization : 1288 Vertical polarization : 1307 Circularly polarization : 683	・Radio interference:weak ・packet loss nothing
	2	AOS(JST) : 10:25:40 LOS(JST) : 10:34:55 Max Elevation : 11.30[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:42, SP:256, ESC:0, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.139[V] ・Angular velocity : 2.417[deg/s] ・Recieved packet number Horizontal polarization : 146 Vertical polarization : 36 Circularly polarization : 81	・Radio interference:strong ・253packets loss
	3	AOS(JST) : 19:27:02 LOS(JST) : 19:27:02 Max Elevation : 10.74[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:42, SP:512, ESC:42, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.077[V] ・Angular velocity : 3.088[deg/s] ・Recieved packet number Horizontal polarization : 1091 Vertical polarization : 1002 Circularly polarization : 206	・Radio interference:weak ・packet loss nothing
	4	AOS(JST) : 20:59:15 LOS(JST) : 21:10:20 Max Elevation : 38.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:42, SP:256, ESC:42, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.072[V] ・Angular velocity : 3.058[deg/s] ・Recieved packet number Horizontal polarization : 752 Vertical polarization : 903 Circularly polarization : 375	・Radio interference:weak ・packet loss nothing

Table 36 Detail of Operation from 19 July 2019 to 25 July 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
7/19/2019	1	AOS(JST) : 8:30:24 LOS(JST) : 8:41:06 Max Elevation : 21.15[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3345920 SC_S:30, SSC:42, SP:768, ESC:42, EP:785	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 2 June, 3rd pass.	・Bus voltage : 4.177[V] ・Angular velocity : 4.036[deg/s] ・Recieved packet number Horizontal polarization : 1112 Vertical polarization : 933 Circularly polarization : 803	・Radio interference:weak ・packet loss nothing
	2	AOS(JST) : 10:04:02 LOS(JST) : 10:14:33 Max Elevation : 20.26[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:40, SP:0, ESC:40, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.107[V] ・Angular velocity : 4.242[deg/s] ・Recieved packet number Horizontal polarization : 928 Vertical polarization : 857 Circularly polarization : 277	・Radio interference:weak ・2packets loss
	3	AOS(JST) : 19:07:07 LOS(JST) : 19:14:00 Max Elevation : 4.96[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:40, SP:0, ESC:40, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.080[V] ・Angular velocity : 3.156[deg/s] ・Recieved packet number Horizontal polarization : 148 Vertical polarization : 327 Circularly polarization : 152	・Radio interference:weak ・packet loss nothing
	4	AOS(JST) : 20:37:54 LOS(JST) : 20:49:15 Max Elevation : 80.15[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CDH ROM Sector erase →ROM0,sec40～49	・To check the angular velocity. ・To secure the capacity of CDH ROM.	・Bus voltage : 4.077[V] ・Angular velocity : 2.872[deg/s]	・Radio interference:weak ・We confirmed that the command passed.
	5	AOS(JST) : 22:15:16 LOS(JST) : 22:20:13 Max Elevation : 2.13[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data migration →CAMROM0,sec13→CDHROM0,sec40	・To check the angular velocity. ・To transfer video data saved in CAMROM to CDHROM again.	・Bus voltage : 4.073[V] ・Angular velocity : 2.454[deg/s]	・Radio interference:weak ・We confirmed that the command passed.
7/20/2019	1	AOS(JST) : 8:09:43 LOS(JST) : 8:19:08 Max Elevation : 11.36[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →FSK Transmitter, GMSK9k6, 435.900MHz →ROM1,sec:16,0～sec:16,255	・To check the angular velocity. ・To confirm the sensing data during the operation of the transponder.	・Bus voltage : 4.179[V] ・Angular velocity : 2.286[deg/s] ・Recieved packet number Horizontal polarization : 593 Vertical polarization : 710 Circularly polarization : 532	・Radio interference:strong ・Data was lost due to a switch information bug in the satellite.
	2	AOS(JST) : 9:42:35 LOS(JST) : 9:53:51 Max Elevation : 36.85[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV overseas operation command uplink →China, Beijing	・To check the angular velocity. ・For SSTV overseas operation.	・Bus voltage : 4.160[V] ・Angular velocity : 1.163[deg/s]	・Radio interference:weak ・packet loss nothing
	3	AOS(JST) : 18:48:19 LOS(JST) : 18:51:03 Max Elevation : 0.64[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:16:49 LOS(JST) : 20:28:01 Max Elevation : 48.87[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →FSK Transmitter, GMSK9k6, 435.900MHz →ROM1,sec:17,0～sec:17,255	・To check the angular velocity. ・To confirm the sensing data during the operation of the transponder.	・Bus voltage : 4.084[V] ・Angular velocity : 1.230[deg/s] ・Recieved packet number Horizontal polarization : 1455 Vertical polarization : 1638 Circularly polarization : 1299	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:52:13 LOS(JST) : 22:00:26 Max Elevation : 7.60[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →FSK Transmitter, GMSK9k6, 435.900MHz →ROM1,sec:18,0～sec:18,255	・To check the angular velocity. ・To confirm the sensing data during the operation of the transponder.	・Bus voltage : 4.073[V] ・Angular velocity : 1.519[deg/s] ・Recieved packet number Horizontal polarization : 915 Vertical polarization : 1084 Circularly polarization : 110	・Radio interference:weak ・Data was lost due to a switch information bug in the satellite.
7/21/2019	1	AOS(JST) : 7:49:27 LOS(JST) : 7:56:37 Max Elevation : 4.95[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear Transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.139[V] ・Angular velocity : 1.107[deg/s]	・Radio interference:weak ・We could hear our own voice.
	2	AOS(JST) : 9:21:17 LOS(JST) : 9:32:54 Max Elevation : 74.41[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear Transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 0.735[deg/s]	・Radio interference:weak ・We could hear our own voice. ・We exchange messages with "JH1JBP, JA3FWT, JH4MBU, JR6DI".
	3	AOS(JST) : 10:56:59 LOS(JST) : 11:02:57 Max Elevation : 3.35[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:55:59 LOS(JST) : 20:06:38 Max Elevation : 25.33[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CDH ROM Sector erase →ROM0,SC30～SC37,ROM1,SC30～43	・To check the angular velocity. ・To secure the capacity of CDH ROM.	・Bus voltage : 4.083[V] ・Angular velocity : 1.575[deg/s]	・Radio interference:weak ・We confirmed that the command passed.
	5	AOS(JST) : 21:30:00 LOS(JST) : 21:39:56 Max Elevation : 15.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM sector erase →ROM1,SC0～62	・To check the angular velocity. ・To secure CAMROM capacity.	・Bus voltage : 4.083[V] ・Angular velocity : 1.324[deg/s]	・Radio interference:weak ・We confirmed that the command passed.
7/22/2019	1	AOS(JST) : 7:31:00 LOS(JST) : 7:32:10 Max Elevation : 0.11[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 9:00:07 LOS(JST) : 9:11:40 Max Elevation : 53.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:40, SP:0, ESC:40, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.165[V] ・Angular velocity : 1.485[deg/s] ・Recieved packet number Horizontal polarization : 1996 Vertical polarization : 2024 Circularly polarization : 856	・Radio interference:weak ・packet loss nothing
	3	AOS(JST) : 10:34:48 LOS(JST) : 10:43:18 Max Elevation : 8.50[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:40, SP:256, ESC:40, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.177[V] ・Angular velocity : 1.669[deg/s] ・Recieved packet number Horizontal polarization : 419 Vertical polarization : 651 Circularly polarization : 46	・Radio interference:weak ・10packets loss
	4	AOS(JST) : 19:35:27 LOS(JST) : 19:45:05 Max Elevation : 14.14[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:40, SP:256, ESC:40, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.083[V] ・Angular velocity : 1.125[deg/s] ・Recieved packet number Horizontal polarization : 1146 Vertical polarization : 1770 Circularly polarization : 976	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:08:13 LOS(JST) : 21:19:07 Max Elevation : 28.68[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:40, SP:512, ESC:40, EP:1023	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.079[V] ・Angular velocity : 1.121[deg/s] ・Recieved packet number Horizontal polarization : 1439 Vertical polarization : 2002 Circularly polarization : 1479	・Radio interference:weak ・packet loss nothing
7/23/2019	1	AOS(JST) : 8:39:07 LOS(JST) : 8:50:11 Max Elevation : 27.48[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:41, SP:0, ESC:41, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.160[V] ・Angular velocity : 1.603[deg/s] ・Recieved packet number Horizontal polarization : 1709 Vertical polarization : 1093 Circularly polarization : 1156	・Radio interference:weak ・packet loss nothing
	2	AOS(JST) : 10:13:03 LOS(JST) : 10:23:05 Max Elevation : 15.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:41, SP:256, ESC:41, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.160[V] ・Angular velocity : 1.885[deg/s] ・Recieved packet number Horizontal polarization : 1028 Vertical polarization : 703 Circularly polarization : 389	・Radio interference:strong ・packet loss nothing
	3	AOS(JST) : 19:15:18 LOS(JST) : 19:23:16 Max Elevation : 7.34[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:41, SP:512, ESC:41, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.080[V] ・Angular velocity : 0.639[deg/s] ・Recieved packet number Horizontal polarization : 801 Vertical polarization : 614 Circularly polarization : 529	・Radio interference:weak ・packet loss nothing
	4	AOS(JST) : 20:46:45 LOS(JST) : 20:58:06 Max Elevation : 58.10[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:41, SP:768, ESC:42, EP:255)	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.079[V] ・Angular velocity : 0.436[deg/s] ・Recieved packet number Horizontal polarization : 1492 Vertical polarization : 1790 Circularly polarization : 1142	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 22:25:48 LOS(JST) : 22:27:36 Max Elevation : 0.25[deg]	Shade	No operation due to low elevation.			
7/24/2019	1	AOS(JST) : 8:18:19 LOS(JST) : 8:28:22 Max Elevation : 14.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.160[V] ・Angular velocity : 1.603[deg/s] ・Recieved packet number Horizontal polarization : 1709 Vertical polarization : 1093 Circularly polarization : 1156	・Radio interference:weak packets loss nothing
	2	AOS(JST) : 9:51:31 LOS(JST) : 10:02:31 Max Elevation : 28.15[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.160[V] ・Angular velocity : 2.204[deg/s] ・Recieved packet number Horizontal polarization : 2087 Vertical polarization : 1432 Circularly polarization : 1156	・Radio interference:strong packet loss nothing
	3	AOS(JST) : 18:55:48 LOS(JST) : 19:00:58 Max Elevation : 2.48[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:25:32 LOS(JST) : 20:36:55 Max Elevation : 67.62[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.084[V] ・Angular velocity : 2.857[deg/s] ・Recieved packet number Horizontal polarization : 1759 Vertical polarization : 1638 Circularly polarization : 1293	・Radio interference:weak packet loss nothing
	5	AOS(JST) : 22:01:39 LOS(JST) : 22:08:51 Max Elevation : 5.17[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.074[V] ・Angular velocity : 3.541[deg/s] ・Recieved packet number Horizontal polarization : 1072 Vertical polarization : 1370 Circularly polarization : 349	・Radio interference:weak packet loss nothing
7/25/2019	1	AOS(JST) : 7:57:49 LOS(JST) : 8:06:07 Max Elevation : 7.43[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.179[V] ・Angular velocity : 3.051[deg/s] ・Recieved packet number Horizontal polarization : 477 Vertical polarization : 195 Circularly polarization : 1	・Radio interference:midium 18packets loss
	2	AOS(JST) : 09:16:02 LOS(JST) : 09:27:19 Max Elevation : 65.81[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.149[V] ・Angular velocity : 2.723[deg/s] ・Recieved packet number Horizontal polarization : 1072 Vertical polarization : 1370 Circularly polarization : 349	・Radio interference:weak 14packets loss
	3	AOS(JST) : 11:06:34 LOS(JST) : 11:10:45 Max Elevation : 1.51[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 20:04:36 LOS(JST) : 20:15:36 Max Elevation : 33.29[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.082[V] ・Angular velocity : 3.521[deg/s] ・Recieved packet number Horizontal polarization : 1572 Vertical polarization : 1567 Circularly polarization : 933	・Radio interference:weak packet loss nothing
	5	AOS(JST) : 21:39:11 LOS(JST) : 21:48:33 Max Elevation : 11.77[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.072[V] ・Angular velocity : 2.560[deg/s] ・Recieved packet number Horizontal polarization : 1086 Vertical polarization : 1226 Circularly polarization : 716	・Radio interference:weak packet loss nothing

Table 37 Detail of Operation from 26 July 2019 to 1 August 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
7/26/2019	1	AOS(JST) : 7:38:05 LOS(JST) : 7:43:00 Max Elevation : 2.03[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 9:08:56 LOS(JST) : 9:20:33 Max Elevation : 74.04[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.144[V] ・Angular velocity : 2.842[deg/s] ・Recieved packet number Horizontal polarization : 2381 Vertical polarization : 1938 Circularly polarization : 1854	・Radio interference:midium packets loss nothing
	3	AOS(JST) : 19:43:56 LOS(JST) : 19:54:07 Max Elevation : 18.34[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.162[V] ・Angular velocity : 3.142[deg/s] ・Recieved packet number Horizontal polarization : 486 Vertical polarization : 447 Circularly polarization : 183	・Radio interference:weak 32packets loss
	4	AOS(JST) : 19:43:56 LOS(JST) : 19:54:07 Max Elevation : 18.34[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.075[V] ・Angular velocity : 3.289[deg/s] ・Recieved packet number Horizontal polarization : 1776 Vertical polarization : 1758 Circularly polarization : 779	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:17:13 LOS(JST) : 21:27:50 Max Elevation : 22.08[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.074[V] ・Angular velocity : 2.707[deg/s] ・Recieved packet number Horizontal polarization : 2101 Vertical polarization : 1260 Circularly polarization : 862	・Radio interference:weak packets loss nothing
7/27/2019	1	AOS(JST) : 8:47:51 LOS(JST) : 8:59:10 Max Elevation : 36.16[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uplink →Sunshine, over Australia	・To check the angular velocity. ・To take an image.	・Bus voltage : 4.144[V] ・Angular velocity : 2.842[deg/s]	・Radio interference:weak
	2	AOS(JST) : 10:22:06 LOS(JST) : 10:31:32 Max Elevation : 12.26[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink(the US, Washington D.C.)	・To check the angular velocity. ・For overseas amateur operation	・Bus voltage : 4.162[V] ・Angular velocity : 3.142[deg/s]	・Radio interference:weak
	3	AOS(JST) : 19:23:35 LOS(JST) : 19:32:26 Max Elevation : 10.08[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink(the UK, London)	・To check the angular velocity. ・For overseas amateur operation	・Bus voltage : 4.082[V] ・Angular velocity : 2.682[deg/s]	・Radio interference:weak
	4	AOS(JST) : 20:55:37 LOS(JST) : 21:06:53 Max Elevation : 42.48[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uplink →Shade time, over China	・To check the angular velocity. ・To take an image.	・Bus voltage : 4.071[V] ・Angular velocity : 2.862[deg/s]	・Radio interference:weak
7/28/2019	1	AOS(JST) : 8:26:57 LOS(JST) : 8:26:57 Max Elevation : 19.38[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.169[V] ・Angular velocity : 5.096[deg/s]	・Radio interference:weak We could hear our own voice but couldn't exchange messages.
	2	AOS(JST) : 10:00:29 LOS(JST) : 10:11:06 Max Elevation : 21.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.139[V] ・Angular velocity : 4.614[deg/s]	・Radio interference:weak We could hear our own voice and exchange messages with "JH1EMH".
	3	AOS(JST) : 19:03:43 LOS(JST) : 19:10:24 Max Elevation : 4.51[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM status downlink →Bus transmitter, GMSK9.6k, 437.075MHz	・To check the angular velocity. ・To check the amount of data in the captured image.	・Bus voltage : 4.080[V] ・Angular velocity : 6.599[deg/s] ・Recieved packet number Horizontal polarization : 65 Vertical polarization : 0 Circularly polarization : 21	・Radio interference:weak packets loss nothing
	4	AOS(JST) : 20:34:18 LOS(JST) : 20:45:46 Max Elevation : 88.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RealtimeHK data downlink →Bus transmitter, AFSK1.2k, 437.075MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.080[V] ・Angular velocity : 7.218[deg/s] ・Recieved packet number Horizontal polarization : 218 Vertical polarization : 241 Circularly polarization : 194	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 22:11:16 LOS(JST) : 22:17:04 Max Elevation : 3.020[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data migration command uplink	・To check the angular velocity. ・To transfer images stored in CAM to CDH.	・Bus voltage : 4.073[V] ・Angular velocity : 7.363[deg/s]	・Radio interference:weak
7/29/2019	1	AOS(JST) : 8:06:18 LOS(JST) : 8:15:26 Max Elevation : 10.25[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.069[V] ・Angular velocity : 7.300[deg/s] ・Recieved packet number Horizontal polarization : 2381 Vertical polarization : 1938 Circularly polarization : 1854	・Radio interference:strong packets loss nothing
	2	AOS(JST) : 9:39:03 LOS(JST) : 9:50:21 Max Elevation : 40.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.074[V] ・Angular velocity : 7.184[deg/s] ・Recieved packet number Horizontal polarization : 1123 Vertical polarization : 937 Circularly polarization : 690	・Radio interference:midium packets loss nothing
	3	AOS(JST) : 18:45:15 LOS(JST) : 18:47:07 Max Elevation : 0.29[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data migration command uplink	・To check the angular velocity. ・To transfer images stored in CAM to CDH.	・Bus voltage : 4.119[V] ・Angular velocity : -[deg/s]	・Radio interference:weak
	4	AOS(JST) : 20:13:14 LOS(JST) : 20:24:30 Max Elevation : 44.66[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.084[V] ・Angular velocity : 6.658[deg/s] ・Recieved packet number Horizontal polarization : 2071 Vertical polarization : 2087 Circularly polarization : 1683	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:48:25 LOS(JST) : 21:57:04 Max Elevation : 8.78[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.077[V] ・Angular velocity : 6.666[deg/s] ・Recieved packet number Horizontal polarization : 1073 Vertical polarization : 1561 Circularly polarization : 627	・Radio interference:weak packets loss nothing
7/30/2019	1	AOS(JST) : 7:46:08 LOS(JST) : 7:52:47 Max Elevation : 4.13[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.177[V] ・Angular velocity : 4.464[deg/s] ・Recieved packet number Horizontal polarization : 242 Vertical polarization : 429 Circularly polarization : 308	・Radio interference:midium packets loss nothing
	2	AOS(JST) : 9:17:45 LOS(JST) : 9:29:21 Max Elevation : 81.88[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.160[V] ・Angular velocity : 2.757[deg/s] ・Recieved packet number Horizontal polarization : 1813 Vertical polarization : 1378 Circularly polarization : 1154	・Radio interference:strong packets loss nothing
	3	AOS(JST) : 10:53:17 LOS(JST) : 10:59:37 Max Elevation : 3.93[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.179[V] ・Angular velocity : 3.513[deg/s] ・Recieved packet number Horizontal polarization : 294 Vertical polarization : 246 Circularly polarization : 77	・Radio interference:midium packets loss nothing
	4	AOS(JST) : 19:52:26 LOS(JST) : 20:03:06 Max Elevation : 23.70[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.082[V] ・Angular velocity : 3.723[deg/s] ・Recieved packet number Horizontal polarization : 1725 Vertical polarization : 1982 Circularly polarization : 1450	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:26:16 LOS(JST) : 21:36:30 Max Elevation : 17.14[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.070[V] ・Angular velocity : 3.635[deg/s] ・Recieved packet number Horizontal polarization : 1344 Vertical polarization : 1854 Circularly polarization : 1264	・Radio interference:weak packets loss nothing
7/31/2019	1	AOS(JST) : 8:56:36 LOS(JST) : 9:08:04 Max Elevation : 48.59[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.144[V] ・Angular velocity : 4.118[deg/s] ・Recieved packet number Horizontal polarization : 1007 Vertical polarization : 1029 Circularly polarization : 870	・Radio interference:strong packets loss nothing
	2	AOS(JST) : 10:31:11 LOS(JST) : 10:39:53 Max Elevation : 9.26[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.177[V] ・Angular velocity : 4.464[deg/s] ・Recieved packet number Horizontal polarization : 304 Vertical polarization : 462 Circularly polarization : 230	・Radio interference:strong packets loss nothing
	3	AOS(JST) : 19:31:57 LOS(JST) : 19:41:30 Max Elevation : 13.30[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.084[V] ・Angular velocity : 4.349[deg/s] ・Recieved packet number Horizontal polarization : 662 Vertical polarization : 882 Circularly polarization : 280	・Radio interference:weak 5packets loss
	4	AOS(JST) : 21:04:32 LOS(JST) : 21:15:38 Max Elevation : 31.90[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.078[V] ・Angular velocity : 4.325[deg/s] ・Recieved packet number Horizontal polarization : 1240 Vertical polarization : 1438 Circularly polarization : 942	・Radio interference:weak packets loss nothing
8/1/2019	1	AOS(JST) : 8:35:37 LOS(JST) : 8:46:31 Max Elevation : 25.01[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.144[V] ・Angular velocity : 5.654[deg/s] ・Recieved packet number Horizontal polarization : 465 Vertical polarization : 694 Circularly polarization : 512	・Radio interference:strong 14packets loss
	2	AOS(JST) : 10:09:28 LOS(JST) : 10:19:36 Max Elevation : 17.00[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.149[V] ・Angular velocity : 5.836[deg/s] ・Recieved packet number Horizontal polarization : 633 Vertical polarization : 437 Circularly polarization : 186	・Radio interference:strong 27packets loss
	3	AOS(JST) : 19:11:50 LOS(JST) : 19:19:39 Max Elevation : 6.79[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.082[V] ・Angular velocity : 6.386[deg/s] ・Recieved packet number Horizontal polarization : 228 Vertical polarization : 328 Circularly polarization : 120	・Radio interference:weak 58packets loss
	4	AOS(JST) : 20:43:05 LOS(JST) : 20:54:35 Max Elevation : 65.10[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.079[V] ・Angular velocity : 7.009[deg/s] ・Recieved packet number Horizontal polarization : 1232 Vertical polarization : 1379 Circularly polarization : 1062	・Radio interference:weak 4packets loss
	5	AOS(JST) : 22:21:15 LOS(JST) : 22:24:54 Max Elevation : 1.07[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data migration command uplink	・To check the angular velocity. ・To transfer images stored in CAM to CDH.	・Bus voltage : 4.069[V] ・Angular velocity : 6.419[deg/s]	・Radio interference:weak

Table 38 Detail of Operation from 2 August 2019 to 8 August 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
8/2/2019	1	AOS(JST) : 8:14:51 LOS(JST) : 8:24:38 Max Elevation : 13.54[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.144[V] ・Angular velocity : 5.654[deg/s] ・Recieved packet number Horizontal polarization : 465 Vertical polarization : 694 Circularly polarization : 512	・Radio interference:strong 1packets loss
	2	AOS(JST) : 9:47:57 LOS(JST) : 9:58:59 Max Elevation : 30.42 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.149[V] ・Angular velocity : 5.836[deg/s] ・Recieved packet number Horizontal polarization : 633 Vertical polarization : 437 Circularly polarization : 186	・Radio interference:strong 4packets loss
	3	AOS(JST) : 18:52:26 LOS(JST) : 18:57:14 Max Elevation : 2.07 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data migration command uplink	・To check the angular velocity. ・To transfer images stored in CAM to CDH.	・Bus voltage : 4.082[V] ・Angular velocity : 8.304[deg/s]	・Radio interference:strong
	4	AOS(JST) : 20:21:55 LOS(JST) : 20:33:22 Max Elevation : 61.17 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.082[V] ・Angular velocity : 8.304[deg/s] ・Recieved packet number Horizontal polarization : 983 Vertical polarization : 1066 Circularly polarization : 788	・Radio interference:weak 3packets loss
	5	AOS(JST) : 21:57:45 LOS(JST) : 22:05:30 Max Elevation : 6.21 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Video data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 27 July, 1st pass.	・Bus voltage : 4.084[V] ・Angular velocity : 8.436[deg/s] ・Recieved packet number Horizontal polarization : 581 Vertical polarization : 604 Circularly polarization : 132	・Radio interference:weak 7packets loss
8/3/2019	1	AOS(JST) : 7:54:26 LOS(JST) : 8:02:17 Max Elevation : 6.43[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uplink	・To check the angular velocity. ・To take an image.	・Bus voltage : 4.140[V] ・Angular velocity : 8.927[deg/s]	・Radio interference:weak
	2	AOS(JST) : 9:26:35 LOS(JST) : 9:38:04 Max Elevation : 60.00[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uplink	・To check the angular velocity. ・To take an image.	・Bus voltage : 4.161[V] ・Angular velocity : 8.764[deg/s]	・Radio interference:strong
	3	AOS(JST) : 11:02:46 LOS(JST) : 11:07:29 Max Elevation : 1.99[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink(Russia, Luzaevka)	・To check the angular velocity. ・For overseas amateur operation	・Bus voltage : 4.139[V] ・Angular velocity : 8.489[deg/s]	・Radio interference:strong
	4	AOS(JST) : 20:01:00 LOS(JST) : 20:12:01 Max Elevation : 30.85[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CDH sector erase command uplink	・To check the angular velocity. ・To delete the data stored in the ROM of the CDH	・Bus voltage : 4.082[V] ・Angular velocity : 7.029[deg/s]	・Radio interference:weak
	5	AOS(JST) : 21:35:22 LOS(JST) : 21:45:06 Max Elevation : 13.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink(Argentina, Buenos Aires)	・To check the angular velocity. ・For overseas amateur operation	・Bus voltage : 4.080[V] ・Angular velocity : 7.351[deg/s]	・Radio interference:weak
8/4/2019	1	AOS(JST) : 7:34:57 LOS(JST) : 7:38:51 Max Elevation : 1.24[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 9:05:22 LOS(JST) : 9:16:54 Max Elevation : 66.55[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.180[V] ・Angular velocity : 6.262[deg/s]	・Radio interference:weak We could hear our own voice but couldn't exchange messages.
	3	AOS(JST) : 10:40:19 LOS(JST) : 10:48:07 Max Elevation : 6.69[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.179[V] ・Angular velocity : 5.247[deg/s]	・Radio interference:weak We could hear our own voice but couldn't exchange messages.
	4	AOS(JST) : 19:40:21 LOS(JST) : 19:50:30 Max Elevation : 17.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM status downlink →Bus transmitter, GMSK9.6k, 437.075MHz	・To check the angular velocity. ・To check the amount of data in the captured image.	・Bus voltage : 4.084[V] ・Angular velocity : 5.081[deg/s] ・Recieved packet number Horizontal polarization : 640 Vertical polarization : 810 Circularly polarization : 543	・Radio interference:weak
	5	AOS(JST) : 21:13:28 LOS(JST) : 21:24:19 Max Elevation : 24.51[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data migration command uplink	・To check the angular velocity. ・To transfer images stored in CAM to CDH.	・Bus voltage : 4.082[V] ・Angular velocity : 4.938[deg/s]	・Radio interference:weak
8/5/2019	1	AOS(JST) : 8:44:18 LOS(JST) : 8:55:28 Max Elevation : 32.60[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.107[V] ・Angular velocity : 4.647[deg/s] ・Recieved packet number Horizontal polarization : 964 Vertical polarization : 853 Circularly polarization : 574	・Radio interference:midium 2packets loss
	2	AOS(JST) : 10:18:27 LOS(JST) : 10:28:01 Max Elevation : 13.15[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.119[V] ・Angular velocity : 4.540[deg/s] ・Recieved packet number Horizontal polarization : 1045 Vertical polarization : 1044 Circularly polarization : 183	・Radio interference:strong packets loss nothing
	3	AOS(JST) : 19:20:03 LOS(JST) : 19:28:47 Max Elevation : 9.39[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.088[V] ・Angular velocity : 5.010[deg/s] ・Recieved packet number Horizontal polarization : 758 Vertical polarization : 964 Circularly polarization : 92	・Radio interference:weak packets loss nothing
	4	AOS(JST) : 20:51:54 LOS(JST) : 21:03:20 Max Elevation : 47.54[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.080[V] ・Angular velocity : 5.283[deg/s] ・Recieved packet number Horizontal polarization : 1735 Vertical polarization : 1679 Circularly polarization : 1305	・Radio interference:weak packets loss nothing
8/6/2019	1	AOS(JST) : 8:23:26 LOS(JST) : 8:33:43 Max Elevation : 17.51[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.179[V] ・Angular velocity : 5.748[deg/s] ・Recieved packet number Horizontal polarization : 834 Vertical polarization : 1259 Circularly polarization : 725	・Radio interference:midium packets loss nothing
	2	AOS(JST) : 9:56:51 LOS(JST) : 10:07:31 Max Elevation : 23.42[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.141[V] ・Angular velocity : 6.028[deg/s] ・Recieved packet number Horizontal polarization : 1053 Vertical polarization : 657 Circularly polarization : 624	・Radio interference:strong packets loss nothing
	3	AOS(JST) : 19:00:16 LOS(JST) : 19:06:41 Max Elevation : 4.02[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.085[V] ・Angular velocity : 5.221[deg/s] ・Recieved packet number Horizontal polarization : 34 Vertical polarization : 127 Circularly polarization : 17	・Radio interference:weak packets loss nothing
	4	AOS(JST) : 20:30:37 LOS(JST) : 20:42:11 Max Elevation : 83.37[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.084[V] ・Angular velocity : 5.300[deg/s] ・Recieved packet number Horizontal polarization : 1584 Vertical polarization : 1521 Circularly polarization : 1399	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 22:07:14 LOS(JST) : 22:13:45 Max Elevation : 3.95[deg]	Shade	No operation due to low elevation.			
8/7/2019	1	AOS(JST) : 8:02:50 LOS(JST) : 8:11:35 Max Elevation : 9.02[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.160[V] ・Angular velocity : 5.023[deg/s] ・Recieved packet number Horizontal polarization : 468 Vertical polarization : 448 Circularly polarization : 294	・Radio interference:strong packets loss nothing
	2	AOS(JST) : 9:35:26 LOS(JST) : 9:46:43 Max Elevation : 43.94[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.169[V] ・Angular velocity : 5.130[deg/s] ・Recieved packet number Horizontal polarization : 641 Vertical polarization : 559 Circularly polarization : 411	・Radio interference:strong 6packets loss
	3	AOS(JST) : 11:12:55 LOS(JST) : 11:14:34 Max Elevation : 0.23[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing command uplink	・To check the angular velocity. ・For HK data sensing.	・Bus voltage : 4.139[V] ・Angular velocity : 6.054[deg/s]	・Radio interference:weak
	4	AOS(JST) : 20:09:35 LOS(JST) : 20:20:53 Max Elevation : 40.83[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.091[V] ・Angular velocity : 4.818[deg/s] ・Recieved packet number Horizontal polarization : 1198 Vertical polarization : 1353 Circularly polarization : 907	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:44:32 LOS(JST) : 21:53:36 Max Elevation : 10.02[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.082[V] ・Angular velocity : 5.140[deg/s] ・Recieved packet number Horizontal polarization : 643 Vertical polarization : 849 Circularly polarization : 391	・Radio interference:weak packets loss nothing
8/8/2019	1	AOS(JST) : 7:42:48 LOS(JST) : 7:48:45 Max Elevation : 3.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.139[V] ・Angular velocity : 4.568[deg/s] ・Recieved packet number Horizontal polarization : 8 Vertical polarization : 6 Circularly polarization : 2	・Radio interference:strong
	2	AOS(JST) : 9:14:09 LOS(JST) : 9:25:39 Max Elevation : 89.92[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.158[V] ・Angular velocity : 4.783[deg/s] ・Recieved packet number Horizontal polarization : 802 Vertical polarization : 726 Circularly polarization : 579	・Radio interference:strong packets loss nothing
	3	AOS(JST) : 10:49:32 LOS(JST) : 10:56:11 Max Elevation : 4.44[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.134[V] ・Angular velocity : 5.313[deg/s] ・Recieved packet number Horizontal polarization : 23 Vertical polarization : 12 Circularly polarization : 0	・Radio interference:strong
	4	AOS(JST) : 19:48:49 LOS(JST) : 19:48:49 Max Elevation : 22.09[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.089[V] ・Angular velocity : 4.598[deg/s] ・Recieved packet number Horizontal polarization : 1057 Vertical polarization : 848 Circularly polarization : 682	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:22:28 LOS(JST) : 21:32:57 Max Elevation : 19.03[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK Transmitter, GMSK9k6, 435.900MHz	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.082[V] ・Angular velocity : 4.833[deg/s] ・Recieved packet number Horizontal polarization : 923 Vertical polarization : 1166 Circularly polarization : 661	・Radio interference:weak 2packets loss

Table 39 Detail of Operation from 9 August 2019 to 16 August 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2019/8/9	1	AOS(JST) : 8:53:00 LOS(JST) : 9:04:19 Max Elevation : 43.35[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter, GMSK9k6, 437.075MHz →Data block num. 2	・To check the angular velocity. ・To downlink the HK data of the movie shooting performed on 7 Aug..	・Bus voltage : 4.174[V] ・Angular velocity : 5.063[deg/s] ・Recieved packet number Horizontal polarization : 812 Vertical polarization : 1080 Circularly polarization : 734	・Radio interference:midium packets loss nothing
	2	AOS(JST) : 10:27:29 LOS(JST) : 10:36:19 Max Elevation : 9.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter, GMSK9k6, 437.075MHz →Data block num. 2	・To check the angular velocity. ・To downlink the HK data of the movie shooting performed on 7 Aug..	・Bus voltage : 4.149[V] ・Angular velocity : 5.454[deg/s] ・Recieved packet number Horizontal polarization : 522 Vertical polarization : 570 Circularly polarization : 289	・Radio interference:midium packets loss nothing
	3	AOS(JST) : 19:28:21 LOS(JST) : 19:37:48 Max Elevation : 12.40[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter, GMSK9k6, 437.075MHz →Data block num. 2	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.085[V] ・Angular velocity : 4.766[deg/s] ・Recieved packet number Horizontal polarization : 224 Vertical polarization : 478 Circularly polarization : 305	・Radio interference:midium packets loss nothing
	4	AOS(JST) : 21:00:45 LOS(JST) : 21:12:02 Max Elevation : 35.51[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus transmitter, GMSK9k6, 437.075MHz →Data block num. 2	・To check the angular velocity. ・To downlink the movie data (JPEG, VGA) of the movie shooting performed on 3 Aug., 1st pass.	・Bus voltage : 4.089[V] ・Angular velocity : 5.252[deg/s] ・Recieved packet number Horizontal polarization : 687 Vertical polarization : 830 Circularly polarization : 636	・Radio interference:weak packets loss nothing
2019/8/10	1	Operation was not performed due to a power outage due to equipment inspection.					
	2						
	3	AOS(JST) : 19:08:18 LOS(JST) : 19:15:53 Max Elevation : 6.17[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data migration command uplink	・To check the angular velocity. ・To transfer images stored in CAM to CDH.	・Bus voltage : 4.083[V] ・Angular velocity : 4.930[deg/s]	・Radio interference:weak
	4	AOS(JST) : 20:39:20 LOS(JST) : 20:50:56 Max Elevation : 72.79[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink(midium国, 上海)	・To check the angular velocity. ・For overseas amateur operation	・Bus voltage : 4.085[V] ・Angular velocity : 5.400[deg/s]	・Radio interference:weak
	5	AOS(JST) : 22:16:57 LOS(JST) : 22:21:44 Max Elevation : 1.90[deg]	Shade	No operation due to low elevation.			
2019/8/11	1	Operation was not performed due to a power outage due to equipment inspection.					
	2						
	3	AOS(JST) : 18:49:03 LOS(JST) : 18:53:19 Max Elevation : 1.58[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uplink →over Australia, Shade	・To check the angular velocity. ・For taking a picture	・Bus voltage : 4.139[V] ・Angular velocity : 5.399[deg/s]	・Radio interference:weak
	4	AOS(JST) : 20:18:11 LOS(JST) : 20:29:42 Max Elevation : 55.18[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.085[V] ・Angular velocity : 5.400[deg/s]	・Radio interference:weak We could hear our own voice and exchange messages with "JR6DI".
	5	AOS(JST) : 21:53:46 LOS(JST) : 22:02:00 Max Elevation : 7.27[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.056[V] ・Angular velocity : 5.152[deg/s]	・Radio interference:weak We could hear our own voice and exchange messages with "JR6RMK, JR6DOI".
2019/8/12	1	AOS(JST) : 7:50:57 LOS(JST) : 7:58:14 Max Elevation : 5.35[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:49, SP:256, ESC:49, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.160[V] ・Angular velocity : 4.199[deg/s] ・Recieved packet number Horizontal polarization : 366 Vertical polarization : 445 Circularly polarization : 224	・Radio interference:weak ・packet loss nothing
	2	AOS(JST) : 9:22:55 LOS(JST) : 9:34:19 Max Elevation : 66.62[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:49, SP:256, ESC:49, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.149[V] ・Angular velocity : 4.453[deg/s] ・Recieved packet number Horizontal polarization : 1829 Vertical polarization : 1952 Circularly polarization : 1446	・Radio interference:weak ・packet loss nothing
	3	AOS(JST) : 10:58:53 LOS(JST) : 11:04:01 Max Elevation : 2.43[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:57:18 LOS(JST) : 20:08:18 Max Elevation : 28.45[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:49, SP:512, ESC:49, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.078[V] ・Angular velocity : 4.077[deg/s] ・Recieved packet number Horizontal polarization : 1867 Vertical polarization : 2010 Circularly polarization : 1587	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:31:29 LOS(JST) : 21:41:30 Max Elevation : 14.75[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:49, SP:16, ESC:49, EP:243	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.071[V] ・Angular velocity : 3.985[deg/s] ・Recieved packet number Horizontal polarization : 1717 Vertical polarization : 1890 Circularly polarization : 1324	・Radio interference:weak ・packet loss nothing
2019/8/13	1	AOS(JST) : 7:32:01 LOS(JST) : 7:34:13 Max Elevation : 0.39[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 9:01:42 LOS(JST) : 9:13:05 Max Elevation : 59.10[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:49, SP:768, ESC:49, EP:1023	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.174[V] ・Angular velocity : 3.704[deg/s] ・Recieved packet number Horizontal polarization : 1109 Vertical polarization : 1420 Circularly polarization : 1182	・Radio interference:weak ・packet loss nothing
	3	AOS(JST) : 10:36:32 LOS(JST) : 10:44:30 Max Elevation : 7.28[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:0, ESC:50, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.179[V] ・Angular velocity : 3.928[deg/s] ・Recieved packet number Horizontal polarization : 395 Vertical polarization : 587 Circularly polarization : 357	・Radio interference:weak ・21packets loss
	4	AOS(JST) : 19:36:42 LOS(JST) : 19:46:45 Max Elevation : 15.98[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:0, ESC:50, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.086[V] ・Angular velocity : 3.554[deg/s] ・Recieved packet number Horizontal polarization : 645 Vertical polarization : 967 Circularly polarization : 594	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 21:09:38 LOS(JST) : 21:20:40 Max Elevation : 27.12[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:256, ESC:50, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.078[V] ・Angular velocity : 3.858[deg/s] ・Recieved packet number Horizontal polarization : 1084 Vertical polarization : 1478 Circularly polarization : 1045	・Radio interference:weak ・packet loss nothing
2019/8/14	1	AOS(JST) : 8:40:39 LOS(JST) : 8:51:35 Max Elevation : 29.13[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:512, ESC:50, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.179[V] ・Angular velocity : 2.829[deg/s] ・Recieved packet number Horizontal polarization : 881 Vertical polarization : 1062 Circularly polarization : 1013	・Radio interference:weak ・packet loss nothing
	2	AOS(JST) : 10:14:42 LOS(JST) : 10:24:19 Max Elevation : 14.06[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:768, ESC:50, EP:1023	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.174[V] ・Angular velocity : 2.988[deg/s] ・Recieved packet number Horizontal polarization : 698 Vertical polarization : 837 Circularly polarization : 406	・Radio interference:weak ・4packets loss
	3	AOS(JST) : 19:16:27 LOS(JST) : 19:24:58 Max Elevation : 8.60[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:840, ESC:50, EP:1023	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.080[V] ・Angular velocity : 2.723[deg/s] ・Recieved packet number Horizontal polarization : 400 Vertical polarization : 743 Circularly polarization : 406	・Radio interference:weak ・3packets loss
	4	AOS(JST) : 20:48:06 LOS(JST) : 20:59:38 Max Elevation : 53.26 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:256, ESC:50, EP:511	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.077[V] ・Angular velocity : 2.183[deg/s] ・Recieved packet number Horizontal polarization : 1312 Vertical polarization : 1249 Circularly polarization : 1243	・Radio interference:weak ・packet loss nothing
	5	AOS(JST) : 22:27:56 LOS(JST) : 22:28:25 Max Elevation : 0.02[deg]	Shade	No operation due to low elevation.			
2019/8/15	1	AOS(JST) : 8:19:48 LOS(JST) : 8:29:46 Max Elevation : 15.62[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:512, ESC:50, EP:767	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.160[V] ・Angular velocity : 1.267[deg/s] ・Recieved packet number Horizontal polarization : 756 Vertical polarization : 1068 Circularly polarization : 718	・Radio interference:weak ・packet loss nothing
	2	AOS(JST) : 9:53:06 LOS(JST) : 10:03:46 Max Elevation : 25.17[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:50, SP:768, ESC:50, EP:1023	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.178[V] ・Angular velocity : 1.267[deg/s] ・Recieved packet number Horizontal polarization : 756 Vertical polarization : 1068 Circularly polarization : 718	・Radio interference:weak ・packet loss nothing
	3	AOS(JST) : 18:56:45 LOS(JST) : 19:02:46 Max Elevation : 3.42[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:26:50 LOS(JST) : 20:38:27 Max Elevation : 75.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:51, SP:0, ESC:51, EP:255	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.080[V] ・Angular velocity : 1.805[deg/s] ・Recieved packet number Horizontal polarization : 717 Vertical polarization : 731 Circularly polarization : 595	・Radio interference:weak ・5packets loss
	5	AOS(JST) : 22:03:08 LOS(JST) : 22:10:15 Max Elevation : 4.85[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK Transmitter,GMSK 9600bps,435.900MHz →Size:3218176 SC_S:40, SSC:51, SP:256, ESC:51, EP:512	・To check the angular velocity. ・To downlink the image data (JPEG, VGA) of the movie shooting performed on 7 July, 4rd pass.	・Bus voltage : 4.078[V] ・Angular velocity : 2.056[deg/s] ・Recieved packet number Horizontal polarization : 283 Vertical polarization : 207 Circularly polarization : 109	・Radio interference:weak ・118packets loss

Table 40 Detail of Operation from 16 August 2019 to 22 August 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
8/16/2019	1	AOS(JST) : 08:25:24 LOS(JST) : 08:35:25 Max Elevation : 15.19[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting command uplink	・To check the angular velocity. ・To shoot images with different compression ratios.	・Bus voltage : 4.111[V] ・Angular velocity : 15.21[deg/s]	・Radio interference:midium
	2	AOS(JST) : 09:58:39 LOS(JST) : 10:09:30 Max Elevation : 26.91[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To shoot images with different compression ratios.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 844 Vertical polarization : 755 Circularly polarization : 305	・Radio interference:strong
	3		Sunshine	・No operation	・Because the elevation is low.		
	4	AOS(JST) : 20:32:35 LOS(JST) : 20:44:09 Max Elevation : 72.72[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 804 Vertical polarization : 796 Circularly polarization : 506	・Radio interference:weak
	5	AOS(JST) : 22:08:49 LOS(JST) : 22:16:00 Max Elevation : 5.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : 0	・Radio interference:weak ・There was no packet obtained due to a command error.
8/17/2019	1		Sunshine	・No operation	・Because the elevation is low.		
	2	AOS(JST) : 09:37:28 LOS(JST) : 09:48:50 Max Elevation : 51.55[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.149[V] ・Angular velocity : 15.54[deg/s]	・Radio interference:weak ・We could hear our own voice but couldn't exchange messages.
	3		Sunshine	・No operation	・Because the elevation is low.		
	4	AOS(JST) : 20:11:48 LOS(JST) : 20:23:01 Max Elevation : 36.16[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation(437.075MHz)	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.089[V] ・Angular velocity : 13.65[deg/s]	・Radio interference:weak
	5	AOS(JST) : 22:08:49 LOS(JST) : 22:16:00 Max Elevation : 5.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation(437.075MHz)	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.082[V] ・Angular velocity : 12.88[deg/s]	・Radio interference:weak
8/18/2019	1		Sunshine	・No operation	・Because the elevation is low.		
	2	AOS(JST) : 09:16:25 LOS(JST) : 09:27:55 Max Elevation : 77.69[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.187[V] ・Angular velocity : 13.37[deg/s]	・Radio interference:weak ・We could hear our own voice but couldn't exchange messages.
	3		Sunshine	・No operation	・Because the elevation is low.		
	4	AOS(JST) : 19:51:17 LOS(JST) : 20:01:44 Max Elevation : 20.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation(437.075MHz)	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.085[V] ・Angular velocity : 14.27[deg/s]	・Radio interference:weak
	5	AOS(JST) : 21:24:42 LOS(JST) : 21:35:23 Max Elevation : 5.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.078[V] ・Angular velocity : 14.71[deg/s] Horizontal polarization : 885 Vertical polarization : 1007 Circularly polarization : 0	・Radio interference:weak ・Due to a command mistake, SSTV operation was changed to Image data downlink.
8/19/2019	1	AOS(JST) : 08:55:30 LOS(JST) : 09:06:44 Max Elevation : 37.61[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.141[V] ・Angular velocity : 13.89[deg/s] Horizontal polarization : 435 Vertical polarization : 213 Circularly polarization : 224	・Radio interference:weak
	2	AOS(JST) : 10:29:49 LOS(JST) : 10:39:00 Max Elevation : 11.40[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:0, ESC:03, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.161[V] ・Angular velocity : 13.62[deg/s] Horizontal polarization : 476 Vertical polarization : 128 Circularly polarization : 52	・Radio interference:weak
	3	AOS(JST) : 19:31:04 LOS(JST) : 19:40:17 Max Elevation : 11.22[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:256, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.080[V] ・Angular velocity : 12.17[deg/s] Horizontal polarization : 117 Vertical polarization : 175 Circularly polarization : 52	・Radio interference:weak
	4	AOS(JST) : 19:51:17 LOS(JST) : 20:01:44 Max Elevation : 20.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:256, ESC:03, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.089[V] ・Angular velocity : 11.82[deg/s] Horizontal polarization : 624 Vertical polarization : 319 Circularly polarization : 333	・Radio interference:weak
8/20/2019	1	AOS(JST) : 08:34:46 LOS(JST) : 08:45:15 Max Elevation : 20.01[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:512, ESC:03, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.178[V] ・Angular velocity : 12.35[deg/s] Horizontal polarization : 67 Vertical polarization : 96 Circularly polarization : 21	・Radio interference:weak
	2	AOS(JST) : 10:08:22 LOS(JST) : 10:18:46 Max Elevation : 20.36[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:512, ESC:03, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.141[V] ・Angular velocity : 12.22[deg/s] Horizontal polarization : 784 Vertical polarization : 1795 Circularly polarization : 356	・Radio interference:weak
	3	AOS(JST) : 19:11 : 17 LOS(JST) : 19:18:30 Max Elevation : 5.39[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:768, ESC:03, EP:1023 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.0806V] ・Angular velocity : 13.41[deg/s] Horizontal polarization : 17 Vertical polarization : 34 Circularly polarization : 0	・Radio interference:weak
	4	AOS(JST) : 20:42:05 LOS(JST) : 20:53:43 Max Elevation : 81.47[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:03, SP:768, ESC:03, EP:1023 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.086[V] ・Angular velocity : 13.12[deg/s] Horizontal polarization : 519 Vertical polarization : 577 Circularly polarization : 230	・Radio interference:weak
8/21/2019	1	AOS(JST) : 08:14:17 LOS(JST) : 08:23:35 Max Elevation : 10.62[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:0, ESC:04, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.112[V] ・Angular velocity : 13.62[deg/s] Horizontal polarization : 3 Vertical polarization : 31 Circularly polarization : 4	・Radio interference:weak
	2	AOS(JST) : 09:47:05 LOS(JST) : 10:18:46 Max Elevation : 37.18[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:0, ESC:04, EP:255 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.199[V] ・Angular velocity : 13.57[deg/s] Horizontal polarization : 564 Vertical polarization : 524 Circularly polarization : 299	・Radio interference:weak
	3		Shade	・No operation	・Because the elevation is low.		
	4	AOS(JST) : 20:21:11 LOS(JST) : 20:32:38 Max Elevation : 49.60[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:256, ESC:04, EP:511 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.088[V] ・Angular velocity : 11.45[deg/s] Horizontal polarization : 701 Vertical polarization : 753 Circularly polarization : 327	・Radio interference:weak
	5	AOS(JST) : 21:56:32 LOS(JST) : 22:05:06 Max Elevation : 8.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:248, ESC:04, EP:251→Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.084[V] ・Angular velocity : 11.61[deg/s] Horizontal polarization : 312 Vertical polarization : 349 Circularly polarization : 63	・Radio interference:weak
8/22/2019	1	AOS(JST) : 07:54:14 LOS(JST) : 08:01:00 Max Elevation : 4.40[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.178[V] ・Angular velocity : 9.55[deg/s] Horizontal polarization : 0 Vertical polarization : 2 Circularly polarization : 0	・Radio interference:weak
	2	AOS(JST) : 09:25:58 LOS(JST) : 09:37:24 Max Elevation : 75.87[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.139[V] ・Angular velocity : 10.41[deg/s] Horizontal polarization : 575 Vertical polarization : 656 Circularly polarization : 218	・Radio interference:weak
	3	AOS(JST) : 11:01:40 LOS(JST) : 11:07:29 Max Elevation : 3.22[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.141[V] ・Angular velocity : 10.41[deg/s] Horizontal polarization : 83 Vertical polarization : 54 Circularly polarization : 0	・Radio interference:weak
	4	AOS(JST) : 20:00:31 LOS(JST) : 20:11:25 Max Elevation : 26.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:512, ESC:04, EP:767→Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.090[V] ・Angular velocity : 8.08[deg/s] Horizontal polarization : 213 Vertical polarization : 458 Circularly polarization : 301	・Radio interference:weak
	5	AOS(JST) : 21:34:31 LOS(JST) : 21:444:44 Max Elevation : 16.11[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:599808 SC_S:03, SSC:04, SP:768, ESC:04, EP:1023 →Bus transmitter,GMSK 9600bps,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 26 Apr., 1st pass.	・Bus voltage : 4.086[V] ・Angular velocity : 7.45[deg/s] Horizontal polarization : 413 Vertical polarization : 623 Circularly polarization : 181	・Radio interference:weak

Table 41 Detail of Operation from 23 August 2019 to 29 August 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
8/23/2019	1	AOS(JST) : 08:36:53 LOS(JST) : 08:47:35 Max Elevation : 25.94[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:28,0～sec:28,511	・To check the angular velocity. ・To downlink the HK data acquired on 7 Aug., 3rd.	・Bus voltage : 4.179[V] ・Angular velocity : 3.677[deg/s] Horizontal polarization : 611 Vertical polarization : 837 Circularly polarization : 431	・Radio interference:weak ・packets loss nothing
	2	AOS(JST) : 10:10:49 LOS(JST) : 10:20:30 Max Elevation : 15.07[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:28,512～sec:28,1023	・To check the angular velocity. ・To downlink the HK data acquired on 7 Aug., 3rd.	・Bus voltage : 4.160[V] ・Angular velocity : 4.439[deg/s] Horizontal polarization : 413 Vertical polarization : 556 Circularly polarization : 252	・Radio interference:weak ・packets loss nothing
	3	AOS(JST) : 19:412:47 LOS(JST) : 19:20:59 Max Elevation : 7.67[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:29,0～sec:29,255	・To check the angular velocity. ・To downlink the HK data acquired on 7 Aug., 3rd.	・Bus voltage : 4.089[V] ・Angular velocity : 5.787[deg/s] Horizontal polarization : 272 Vertical polarization : 506 Circularly polarization : 218	・Radio interference:weak ・packets loss nothing
	4	AOS(JST) : 20:44:13 LOS(JST) : 20:55:48 Max Elevation : 59.62[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:29,256～sec:29,767	・To check the angular velocity. ・To downlink the HK data acquired on 7 Aug., 3rd.	・Bus voltage : 4.088[V] ・Angular velocity : 5.969[deg/s] Horizontal polarization : 772 Vertical polarization : 1088 Circularly polarization : 684	・Radio interference:weak ・packets loss nothing
	5	AOS(JST) : 22:22:48 LOS(JST) : 22:25:46 Max Elevation : 0.69[deg]	Shade	No operation due to low elevation.			
8/24/2019	1	AOS(JST) : 08:16:03 LOS(JST) : 08:25:41 Max Elevation : 13.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK,9600bps,437.075MHz	・To check the angular velocity. ・To check the image data size.	・Bus voltage : 4.166[V] ・Angular velocity : 6.338[deg/s]	・Radio interference:strong packets loss nothing
	2	AOS(JST) : 09:49:14 LOS(JST) : 09:59:54 Max Elevation : 27.22[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation uplink (the US, Colorado)	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.178[V] ・Angular velocity : 5.137[deg/s]	・Radio interference:weak We confirmed that the command passed.
	3	AOS(JST) : 18:53:14 LOS(JST) : 18:58:39 Max Elevation : 2.70[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation command uplink (Berlin)	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.080[V] ・Angular velocity : 6.575[deg/s]	・Radio interference:weak We confirmed that the command passed.
	4	AOS(JST) : 20:22:59 LOS(JST) : 20:34:34 Max Elevation : 67.34[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM image SSTV operation	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.074[V] ・Angular velocity : 6.006[deg/s]	・Radio interference:weak
	5	AOS(JST) : 21:59:01 LOS(JST) : 22:06:34 Max Elevation : 5.69[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CDH sector erace command uplink	・To check the angular velocity. ・To delete data stored in CDH.	・Bus voltage : 4.071[V] ・Angular velocity : 7.321[deg/s]	・Radio interference:weak We confirmed that the command passed.
8/25/2019	1	AOS(JST) : 07:55:35 LOS(JST) : 08:03:20 Max Elevation : 6.55[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.139[V] ・Angular velocity : 6.411[deg/s]	・Radio interference:weak ・We could hear our own voice and exchange messages with "JA0CAW".
	2	AOS(JST) : 09:27:49 LOS(JST) : 09:38:59 Max Elevation : 53.91[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.178[V] ・Angular velocity : 7.081[deg/s]	・Radio interference:weak ・We could hear our own voice but couldn't exchange messages.
	3	AOS(JST) : 11:04:27 LOS(JST) : 11:07:53 Max Elevation : 1.04[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 20:02:01 LOS(JST) : 20:13:11 Max Elevation : 33.60[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Realtime HK data downlink →Bus taransmitter, AFSK1200bps, 437.075MHz	・To check the angular velocity. ・For synchronize satellite time with real time.	・Bus voltage : 4.094[V] ・Angular velocity : 6.971[deg/s] Horizontal polarization : 246 Vertical polarization : 217 Circularly polarization : 240	・Radio interference:weak
	5	AOS(JST) : 21:36:33 LOS(JST) : 21:46:10 Max Elevation : 12.42[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation →Bus taransmitter, 437.075MHz	・To check the angular velocity. ・For amateur operation	・Bus voltage : 4.085[V] ・Angular velocity : 7.462[deg/s]	・Radio interference:weak
8/26/2019				No operation			
8/27/2019				No operation			
8/28/2019	1	AOS(JST) : 08:24:30 LOS(JST) : 08:34:37 Max Elevation : 17.91[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:29,768～sec:29,1023	・To check the angular velocity. ・To downlink the HK data acquired on 7 Aug., 3rd.	・Bus voltage : 4.144[V] ・Angular velocity : 4.613[deg/s] Horizontal polarization : 491 Vertical polarization : 448 Circularly polarization : 454	・Radio interference:strong 89packets loss
	2	AOS(JST) : 09:58:01 LOS(JST) : 10:08:17 Max Elevation : 21.02[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:20,0～sec:20,255	・To check the angular velocity. ・To downlink the sensing data when operating the transponder.	・Bus voltage : 4.139[V] ・Angular velocity : 4.794[deg/s] Horizontal polarization : 737 Vertical polarization : 446 Circularly polarization : 592	・Radio interference:strong Sensing data was not stored and it was F-stuffed data. This is probably due to a bug in the EPS switch information.
	3	AOS(JST) : 19:01:05 LOS(JST) : 19:07:50 Max Elevation : 4.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:20,0～sec:20,255	・To check the angular velocity. ・To downlink the sensing data when operating the transponder.	・Bus voltage : 4.089[V] ・Angular velocity : 3.830[deg/s] Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : 0	・Radio interference:weak The packet could not be obtained because the uplink was delayed and the elevation was low.
	4	AOS(JST) : 20:31:36 LOS(JST) : 20:43:13 Max Elevation : 89.80[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter,GMSK,9k6,437.075MHz →ROM1,sec:20,0～sec:20,255	・To check the angular velocity. ・To downlink the sensing data when operating the transponder.	・Bus voltage : 4.090[V] ・Angular velocity : 3.636[deg/s] Horizontal polarization : 475 Vertical polarization : 308 Circularly polarization : 390	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 22:08:28 LOS(JST) : 22:14:36 Max Elevation : 3.39[deg]	Shade	No operation due to low elevation.			
8/29/2019	1	AOS(JST) : 08:03:51 LOS(JST) : 08:12:29 Max Elevation : 9.16[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus taransmitter,AFSK1k2,437.075MHz →Size:170496 SC_S:30, SSC:30, SP:0, ESC:30, EP:63	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.139[V] ・Angular velocity : 1.315[deg/s] Horizontal polarization : 109 Vertical polarization : 146 Circularly polarization : 105	・Radio interference:weak 1packets loss
	2	AOS(JST) : 09:36:32 LOS(JST) : 09:47:29 Max Elevation : 39.57[deg]	Sunshine	No operation due to ground station equipment power outage, No operation			
	3	AOS(JST) : 18:42:37 LOS(JST) : 18:44:29 Max Elevation : 0.29[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:10:32 LOS(JST) : 20:21:53 Max Elevation : 44.27[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus taransmitter,AFSK1k2,437.075MHz →Size:170496 SC_S:30, SSC:30, SP:0, ESC:30, EP:63	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.086[V] ・Angular velocity : 1.511[deg/s] Horizontal polarization : 215 Vertical polarization : 214 Circularly polarization : 192	・Radio interference:weak 3packets loss
	5	AOS(JST) : 21:45:39 LOS(JST) : 21:54:30 Max Elevation : 9.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus taransmitter,AFSK1k2,437.075MHz →Size:170496 SC_S:30, SSC:30, SP:0, ESC:30, EP:7	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.074[V] ・Angular velocity : 1.738[deg/s] Horizontal polarization : 168 Vertical polarization : 177 Circularly polarization : 159	・Radio interference:weak packets loss nothing

Table 42 Detail of Operation from 30 August 2019 to 5 September 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
8/30/2019	1	AOS(JST) : 07:43:45 LOS(JST) : 07:49:40 Max Elevation : 3.27[deg]	Sunshine	・No operation	・Because the elevation is low.		
	2	AOS(JST) : 9:15:11 LOS(JST) : 9:26:25 Max Elevation : 83.56[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.075MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.178[V] ・Angular velocity : 0.988[deg/s] Horizontal polarization : 821 Vertical polarization : 648 Circularly polarization : 732	・Radio interference:weak packets loss nothing
	3	AOS(JST) : 10:50:48 LOS(JST) : 10:56:40 Max Elevation : 3.42[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.075MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.160[V] ・Angular velocity : 1.667[deg/s] Horizontal polarization : 17 Vertical polarization : 159 Circularly polarization : 55	・Radio interference:weak 16packets loss
	4	AOS(JST) : 19:49:42 LOS(JST) : 20:00:25 Max Elevation : 23.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.075MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.091[V] ・Angular velocity : 1.188[deg/s] Horizontal polarization : 767 Vertical polarization : 552 Circularly polarization : 732	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:23:29 LOS(JST) : 21:33:51 Max Elevation : 17.72[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.075MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.086[V] ・Angular velocity : 1.281[deg/s] Horizontal polarization : 688 Vertical polarization : 184 Circularly polarization : 563	・Radio interference:weak packets loss nothing
8/31/2019	1	AOS(JST) : 8:54:00 LOS(JST) : 9:05:05 Max Elevation : 45.74[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie shooting command uplink →the US East Coast, SVGA, Shade time	・To check the angular velocity. ・To shoot videos in the shade.	・Bus voltage : 4.179[V] ・Angular velocity : 0.469[deg/s]	・Radio interference:weak We confirmed that the command passed.
	2	AOS(JST) : 10:28:35 LOS(JST) : 10:36:54 Max Elevation : 8.67[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Transponder operation command uplink (Topeka, Kansas, the US)	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 0.965[deg/s]	・Radio interference:weak We confirmed that the command passed.
	3	AOS(JST) : 19:29:11 LOS(JST) : 19:38:46 Max Elevation : 13.18[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie shooting command uplink →Over Japan, SVGA, Shade time	・To check the angular velocity. ・To shoot videos in the shade..	・Bus voltage : 4.090[V] ・Angular velocity : 2.399[deg/s]	・Radio interference:weak We confirmed that the command passed.
	4	AOS(JST) : 21:01:43 LOS(JST) : 21:12:55 Max Elevation : 32.82[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check the angular velocity. ・To obtain RSSI data.	・Bus voltage : 4.089[V] ・Angular velocity : 2.342[deg/s]	・Radio interference:weak We confirmed that the command passed.
9/1/2019	1	AOS(JST) : 8:32:58 LOS(JST) : 8:43:28 Max Elevation : 23.14[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.161[V] ・Angular velocity : 2.545[deg/s]	・Radio interference:weak ・We could hear our own voice and exchange messages with "7L3AEO".
	2	AOS(JST) : 10:06:48 LOS(JST) : 10:16:35 Max Elevation : 16.33[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.139[V] ・Angular velocity : 2.311[deg/s]	・Radio interference:weak ・We could hear our own voice and exchange messages with "JR6DI".
	3	AOS(JST) : 19:09:04 LOS(JST) : 19:16:50 Max Elevation : 6.65[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM status downlink →Bus taransmitter, GMSK9k6, 437.075MHz	・To check the angular velocity. ・To check the image data size.	・Bus voltage : 4.090[V] ・Angular velocity : 2.669[deg/s] Horizontal polarization : 236 Vertical polarization : 383 Circularly polarization : 123	・Radio interference:weak packets loss nothing
	4	AOS(JST) : 20:40:15 LOS(JST) : 20:51:48 Max Elevation : 66.83[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink →FSK Transmitter,GMSK9k6,435.900MHz	・To check the angular velocity. ・For RSSI data downlink	・Bus voltage : 4.090[V] ・Angular velocity : 2.584[deg/s] Horizontal polarization : 236 Vertical polarization : 383 Circularly polarization : 123	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 22:18:15 LOS(JST) : 22:22:16 Max Elevation : 1.31[deg]	Shade	・No operation	・Because the elevation is low.		
9/2/2019	1	AOS(JST) : 8:12:11 LOS(JST) : 8:21:30 Max Elevation : 12.24[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.141[V] ・Angular velocity : 3.226[deg/s] Horizontal polarization : 316 Vertical polarization : 523 Circularly polarization : 359	・Radio interference:weak packets loss nothing
	2	AOS(JST) : 9:45:13 LOS(JST) : 9:55:55 Max Elevation : 29.85[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.139[V] ・Angular velocity : 2.871[deg/s] Horizontal polarization : 933 Vertical polarization : 933 Circularly polarization : 714	・Radio interference:weak packets loss nothing
	3	AOS(JST) : 18:49:42 LOS(JST) : 18:54:19 Max Elevation : 1.89[deg]	Shade	・No operation	・Because the elevation is low.		
	4	AOS(JST) : 20:19:03 LOS(JST) : 20:30:32 Max Elevation : 59.71[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.094[V] ・Angular velocity : 3.409[deg/s] Horizontal polarization : 659 Vertical polarization : 768 Circularly polarization : 625	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:54:50 LOS(JST) : 22:02:42 Max Elevation : 6.48[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.086[V] ・Angular velocity : 3.939[deg/s] Horizontal polarization : 259 Vertical polarization : 259 Circularly polarization : 63	・Radio interference:weak packets loss nothing
9/3/2019	1	AOS(JST) : 7:51:47 LOS(JST) : 7:59:01 Max Elevation : 5.46[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:176, ESC:30, EP:179 →Bus transmitter, AFSK1k2, 437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.179[V] ・Angular velocity : 4.788[deg/s] Horizontal polarization : 74 Vertical polarization : 113 Circularly polarization : 57	・Radio interference:weak packets loss nothing
	2	AOS(JST) : 9:23:49 LOS(JST) : 9:34:57 Max Elevation : 60.86[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:176, ESC:30, EP:179 →Bus transmitter, AFSK1k2, ,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.160[V] ・Angular velocity : 4.492[deg/s] Horizontal polarization : 215 Vertical polarization : 205 Circularly polarization : 141	・Radio interference:weak 12packets loss
	3	AOS(JST) : 11:00:07 LOS(JST) : 11:04:16 Max Elevation : 1.57[deg]	Shade	・No operation	・Because the elevation is low.		
	4	AOS(JST) : 19:58:07 LOS(JST) : 20:09:06 Max Elevation : 30.13[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:320, ESC:30, EP:447 →Bus transmitter, AFSK1k2, 437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.095[V] ・Angular velocity : 4.515[deg/s] Horizontal polarization : 237 Vertical polarization : 61 Circularly polarization : 198	・Radio interference:weak 4packets loss
	5	AOS(JST) : 21:32:26 LOS(JST) : 21:42:13 Max Elevation : 13.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:240, ESC:30, EP:255 →Bus transmitter, AFSK1k2, ,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.088[V] ・Angular velocity : 5.943[deg/s] Horizontal polarization : 188 Vertical polarization : 223 Circularly polarization : 198	・Radio interference:weak packets loss nothing
9/4/2019	1	AOS(JST) : 7:32:41 LOS(JST) : 7:35:04 Max Elevation : 0.46[deg]	Sunshine	・No operation	・Because the elevation is low.		
	2	AOS(JST) : 9:02:32 LOS(JST) : 9:13:43 Max Elevation : 63.03[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.179[V] ・Angular velocity : 7.117[deg/s] Horizontal polarization : 762 Vertical polarization : 792 Circularly polarization : 534	・Radio interference:weak packets loss nothing
	3	AOS(JST) : 10:37:30 LOS(JST) : 10:44:56 Max Elevation : 6.23[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.178[V] ・Angular velocity : 7.473[deg/s] Horizontal polarization : 369 Vertical polarization : 249 Circularly polarization : 178	・Radio interference:strong packets loss nothing
	4	AOS(JST) : 19:37:27 LOS(JST) : 19:47:31 Max Elevation : 16.71[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.093[V] ・Angular velocity : 8.386[deg/s] Horizontal polarization : 532 Vertical polarization : 861 Circularly polarization : 557	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:10:30 LOS(JST) : 21:21:22 Max Elevation : 25.05[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.975MHｚ, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.089[V] ・Angular velocity : 8.762[deg/s] Horizontal polarization : 738 Vertical polarization : 879 Circularly polarization : 651	・Radio interference:weak packets loss nothing
9/5/2019	1	AOS(JST) : 8:41:25 LOS(JST) : 8:52:12 Max Elevation : 30.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:320, ESC:30, EP:447 →Bus transmitter, AFSK1k2, 437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.144[V] ・Angular velocity : 8.602[deg/s] Horizontal polarization : 230 Vertical polarization : 162 Circularly polarization : 155	・Radio interference:weak 8packets loss
	2	AOS(JST) : 10:15:33 LOS(JST) : 10:24:47 Max Elevation : 12.66[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:448, ESC:30, EP:511 →Bus transmitter, AFSK1k2, ,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.160[V] ・Angular velocity : 7.718[deg/s] Horizontal polarization : 186 Vertical polarization : 124 Circularly polarization : 127	・Radio interference:weak packets loss nothing
	3	AOS(JST) : 19:17:08 LOS(JST) : 19:25:42 Max Elevation : 8.97[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:360, ESC:30, EP:439 →Bus transmitter, AFSK1k2, 437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.094[V] ・Angular velocity : 6.591[deg/s] Horizontal polarization : 173 Vertical polarization : 162 Circularly polarization : 97	・Radio interference:weak packets loss nothing
	4	AOS(JST) : 20:48:54 LOS(JST) : 21:00:18 Max Elevation : 48.83[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:512, ESC:30, EP:575 →Bus transmitter, AFSK1k2, ,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.088[V] ・Angular velocity : 7.304[deg/s] Horizontal polarization : 227 Vertical polarization : 236 Circularly polarization : 202	・Radio interference:weak packets loss nothing

Table 43 Detail of Operation from 6 September 2019 to 12 September 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2019/9/6	1	AOS(JST) : 8:20:30 LOS(JST) : 8:30:22 Max Elevation : 15.98[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:360, ESC:30, EP:439 →Bus transmitter, AFSK1k2, 437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.169[V] ・Angular velocity : 5.961[deg/s] Horizontal polarization : 179 Vertical polarization : 198 Circularly polarization : 152	・Radio interference:weak packets loss nothing
	2	AOS(JST) : 9:53:53 LOS(JST) : 10:04:14 Max Elevation : 23.03[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink Size:170496 SC_S:30, SSC:30, SP:512, ESC:30, EP:575 →Bus transmitter, AFSK1k2, ,437.075MHz	・To check the angular velocity. ・To downlink the image taken on 27 July, 1st pass.	・Bus voltage : 4.178[V] ・Angular velocity : 0.988[deg/s] Horizontal polarization : 821 Vertical polarization : 648 Circularly polarization : 732	・Radio interference:weak packets loss nothing
	3	AOS(JST) : 18:57:22 LOS(JST) : 19:03:28 Max Elevation : 3.62[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.075MHz, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.160[V] ・Angular velocity : 1.667[deg/s] Horizontal polarization : 17 Vertical polarization : 159 Circularly polarization : 55	・Radio interference:weak 16packets loss
	4	AOS(JST) : 20:27:34 LOS(JST) : 20:39:04 Max Elevation : 80.79[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.075MHz, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.091[V] ・Angular velocity : 1.188[deg/s] Horizontal polarization : 767 Vertical polarization : 552 Circularly polarization : 732	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 22:04:07 LOS(JST) : 22:04:07 Max Elevation : 4.07[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink →Bus taransmitter, GMSK9k6, 437.075MHz, Data block num. 2	・To check the angular velocity. ・For HK data downlink	・Bus voltage : 4.086[V] ・Angular velocity : 1.281[deg/s] Horizontal polarization : 688 Vertical polarization : 184 Circularly polarization : 563	・Radio interference:weak packets loss nothing
2019/9/7	1	AOS(JST) : 7:59:53 LOS(JST) : 7:59:53 Max Elevation : 7.94[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie shooting command uplink →the US East Coast, SVGA, Shade time	・To check the angular velocity. ・To shoot videos in the shade.	・Bus voltage : 4.179[V] ・Angular velocity : 0.469[deg/s]	・Radio interference:weak We confirmed that the command passed
	2	AOS(JST) : 10:28:35 LOS(JST) : 10:36:54 Max Elevation : 44.43[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Transponder operation command uplink (Topeka, Kansas, the US)	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 0.965[deg/s]	・Radio interference:weak We confirmed that the command passed.
	3	AOS(JST) : 20:06:31 LOS(JST) : 20:17:42 Max Elevation : 39.17[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie shooting command uplink →Over Japan, SVGA, Shade time	・To check the angular velocity. ・To shoot videos in the shade..	・Bus voltage : 4.090[V] ・Angular velocity : 2.399[deg/s]	・Radio interference:weak We confirmed that the command passed.
	4	AOS(JST) : 21:41:24 LOS(JST) : 21:50:27 Max Elevation : 10.16[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check the angular velocity. ・To obtain RSSI data.	・Bus voltage : 4.089[V] ・Angular velocity : 2.342[deg/s]	・Radio interference:weak We confirmed that the command passed.
2019/9/8	1	AOS(JST) : 7:39:57 LOS(JST) : 7:45:05 Max Elevation : 23.14[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.161[V] ・Angular velocity : 2.545[deg/s]	・Radio interference:weak ・We could hear our own voice and exchange messages with "7 L3AEO".
	2	AOS(JST) : 9:11:03 LOS(JST) : 9:22:15 Max Elevation : 86.21[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.139[V] ・Angular velocity : 2.311[deg/s]	・Radio interference:weak ・We could hear our own voice and exchange messages with "JR6DI".
	3	AOS(JST) : 10:46:28 LOS(JST) : 10:52:47 Max Elevation : 6.65[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM status downlink →Bus taransmitter, GMSK9k6, 437.075MHz	・To check the angular velocity. ・To check the image data size.	・Bus voltage : 4.090[V] ・Angular velocity : 2.669[deg/s] Horizontal polarization : 236 Vertical polarization : 383 Circularly polarization : 123	・Radio interference:weak packets loss nothing
	4	AOS(JST) : 19:45:43 LOS(JST) : 19:56:10 Max Elevation : 21.07[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink →FSK Transmitter,GMSK9k6,435.900MHz	・To check the angular velocity. ・For RSSI data downlink	・Bus voltage : 4.090[V] ・Angular velocity : 2.584[deg/s] Horizontal polarization : 236 Vertical polarization : 383 Circularly polarization : 123	・Radio interference:weak packets loss nothing
	5	AOS(JST) : 21:19:17 LOS(JST) : 21:29:43 Max Elevation : 19.28[deg]	Shade	・No operation	・Because the elevation is low.		
2019/9/9	1			Operation canceled due to typhoon approach			
	2			Operation canceled due to typhoon approach			
	3	AOS(JST) : 19:25:15 LOS(JST) : 19:34:27 Max Elevation : 11.64[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.086[V] ・Angular velocity : 5.220[deg/s]	・Radio interference:weak
	4	AOS(JST) : 20:57:33 LOS(JST) : 21:08:44 Max Elevation : 36.24[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
2019/9/10	1	AOS(JST) : 8:28:50 LOS(JST) : 8:39:09 Max Elevation : 20.71[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	2	AOS(JST) : 10:02:32 LOS(JST) : 10:12:29 Max Elevation : 18.00[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.117[V] ・Angular velocity : 5.213[deg/s]	・Radio interference:weak
	3	AOS(JST) : 19:05:13 LOS(JST) : 19:12:25 Max Elevation : 5.53[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	4	AOS(JST) : 20:36:07 LOS(JST) : 20:47:34 Max Elevation : 75.40[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.088[V] ・Angular velocity : 5.428[deg/s]	・Radio interference:strong
	5	AOS(JST) : 22:13:39 LOS(JST) : 22:18:23 Max Elevation : 1.91[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
2019/9/11	1	AOS(JST) : 8:08:04 LOS(JST) : 8:17:05 Max Elevation : 10.85[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	2	AOS(JST) : 9:40:58 LOS(JST) : 9:51:45 Max Elevation : 33.34[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.160[V] ・Angular velocity : 4.241[deg/s]	・Radio interference:weak
	3	AOS(JST) : 18:46:09 LOS(JST) : 18:49:33 Max Elevation : 1.01[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	4	AOS(JST) : 20:14:56 LOS(JST) : 20:26:14 Max Elevation : 52.28[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.084[V] ・Angular velocity : 4.819[deg/s]	・Radio interference:weak
	5	AOS(JST) : 21:50:27 LOS(JST) : 21:58:35 Max Elevation : 7.27[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
2019/9/12	1	AOS(JST) : 7:47:45 LOS(JST) : 7:54:28 Max Elevation : 4.49[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	2	AOS(JST) : 9:19:33 LOS(JST) : 9:30:43 Max Elevation : 69.66[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.144[V] ・Angular velocity : 5.329[deg/s]	・Radio interference:weak
	3	AOS(JST) : 10:55:32 LOS(JST) : 11:00:26 Max Elevation : 2.26[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	4	AOS(JST) : 19:54:01 LOS(JST) : 20:04:46 Max Elevation : 26.73[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.095[V] ・Angular velocity : 5.914[deg/s]	・Radio interference:weak It was confirmed that the command passed through the antenna after repair.
	5	AOS(JST) : 21:28:07 LOS(JST) : 21:38:00 Max Elevation : 14.79[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		

Table 44 Detail of Operation from 13 September 2019 to 19 September 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2019/9/13	1	AOS(JST) : 8:58:17 LOS(JST) : 9:09:25 Max Elevation : 54.94[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	2	AOS(JST) : 10:33:05 LOS(JST) : 10:40:53 Max Elevation : 7.18[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.177[V] ・Angular velocity : 8.169[deg/s]	・Radio interference:weak
	3	AOS(JST) : 19:33:24 LOS(JST) : 19:43:07 Max Elevation : 14.80[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	4	AOS(JST) : 21:06:13 LOS(JST) : 21:17:06 Max Elevation : 27.44[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.095[V] ・Angular velocity : 10.18[deg/s]	・Radio interference:weak
2019/9/14	1	AOS(JST) : 8:37:11 LOS(JST) : 8:47:51 Max Elevation : 26.94[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation command uplink (Australia)	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.178[V] ・Angular velocity : 12.26[deg/s]	・Radio interference:weak We confirmed that the command passed.
	2	AOS(JST) : 10:11:11 LOS(JST) : 10:20:39 Max Elevation : 14.11[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.158[V] ・Angular velocity : 12.41[deg/s]	・Radio interference:weak ・We could hear our own voice and exchange messages with "JA0CAW".
	3	AOS(JST) : 19:13:09 LOS(JST) : 19:21:13 Max Elevation : 7.67[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation →Bus taransmitter, 437.075MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.093[V] ・Angular velocity : -[deg/s]	・Radio interference:weak
	4	AOS(JST) : 20:44:39 LOS(JST) : 20:55:59 Max Elevation : 55.01[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Trasnsponder operation command uplink (Buenos Aires, Argentine)	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.085[V] ・Angular velocity : 13.74[deg/s]	・Radio interference:weak We confirmed that the command passed.
2019/9/15	1	AOS(JST) : 8:16:17 LOS(JST) : 8:25:56 Max Elevation : 14.33[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.144[V] ・Angular velocity : 16.16[deg/s]	・Radio interference:weak ・We could hear our own voice but couldn't exchange messages.
	2	AOS(JST) : 9:49:31 LOS(JST) : 10:00:02 Max Elevation : 25.70[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Linear transponder operation →Send frequency : 145.930～145.900MHz →Receive frequency : 435.880～435.910MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.139[V] ・Angular velocity : 2.311[deg/s]	・Radio interference:weak ・We could hear our own voice but couldn't exchange messages.
	3	AOS(JST) : 18:53:32 LOS(JST) : 18:58:50 Max Elevation : 2.63[deg]	Shade	・No operation	・Because the elevation is low.		
	4	AOS(JST) : 20:23:21 LOS(JST) : 20:34:43 Max Elevation : 71.07[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation →Bus taransmitter, 437.075MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.093[V] ・Angular velocity : 18.29[deg/s]	・Radio interference:weak
	5	AOS(JST) : 21:59:35 LOS(JST) : 22:06:33 Max Elevation : 4.77[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation →Bus taransmitter, 437.075MHz	・To check the angular velocity. ・For amateur operation.	・Bus voltage : 4.086[V] ・Angular velocity : -[deg/s]	・Radio interference:weak
2019/9/16	1	AOS(JST) : 7:55:43 LOS(JST) : 8:03:35 Max Elevation : 6.88[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	2	AOS(JST) : 9:28:02 LOS(JST) : 9:39:07 Max Elevation : 50.80[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.160[V] ・Angular velocity : 20.03[deg/s]	・Radio interference:weak
	3	AOS(JST) : 11:04:59 LOS(JST) : 11:07:38 Max Elevation : 0.61[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	4	AOS(JST) : 20:02:19 LOS(JST) : 20:13:18 Max Elevation : 34.43[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.095[V] ・Angular velocity : 21.28[deg/s]	・Radio interference:weak
	5	AOS(JST) : 21:36:59 LOS(JST) : 21:46:11 Max Elevation : 11.17[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
2019/9/17	1			No operation			
	2			No operation			
	3			No operation			
	4	AOS(JST) : 19:41:34 LOS(JST) : 19:51:43 Max Elevation : 18.67[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	5	AOS(JST) : 21:14:55 LOS(JST) : 21:25:24 Max Elevation : 21.05[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.095[V] ・Angular velocity : 24.35[deg/s]	・Radio interference:weak
2019/9/18	1	AOS(JST) : 8:45:31 LOS(JST) : 8:56:27 Max Elevation : 35.56[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.179[V] ・Angular velocity : 24.90[deg/s]	・Radio interference:weak
	2	AOS(JST) : 10:19:50 LOS(JST) : 10:28:44 Max Elevation : 10.98[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	3	AOS(JST) : 19:21:09 LOS(JST) : 19:29:55 Max Elevation : 10.12[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	4	AOS(JST) : 20:53:13 LOS(JST) : 21:04:21 Max Elevation : 40.40[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.085[V] ・Angular velocity : 24.81[deg/s]	・Radio interference:weak
2019/9/19	1	AOS(JST) : 8:24:31 LOS(JST) : 8:34:42 Max Elevation : 18.65[deg]	Sunshine	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	2	AOS(JST) : 9:58:04 LOS(JST) : 10:08:15 Max Elevation : 20.16[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.179[V] ・Angular velocity : 22.53[deg/s]	・Radio interference:weak
	3	AOS(JST) : 19:01:13 LOS(JST) : 19:07:47 Max Elevation : 4.42[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		
	4	AOS(JST) : 20:31:48 LOS(JST) : 20:43:08 Max Elevation : 85.34[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・Bus voltage, To check the angular velocity.	・Bus voltage : 4.094[V] ・Angular velocity : 20.37[deg/s]	・Radio interference:weak
	5	AOS(JST) : 22:08:56 LOS(JST) : 22:14:17 Max Elevation : 2.55[deg]	Shade	・No operation	・Operation changed to CW operation once in the morning and afternoon because of antenna failure due to typhoon.		

Table 45 Detail of Operation from 19 September 2019 to 25 September 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
9/19/2019	1	AOS(JST) : 8:24:31 LOS(JST) : 8:34:42 Max Elevation : 18.65[deg]	Sunshine	・No operation.	・Since the antenna failed due to the typhoon, operation was shifted to CW operation once in the afternoon.		
	2	AOS(JST) : 09:58:04 LOS(JST) : 10:08:15 Max Elevation : 20.16[deg]	Sunshine	・CW custom operation(437.075MHz)	・Bus voltage, To check Angular velocity.	・Bus voltage : 4.176[V] ・Angular velocity : 16.75[deg/s]	・Radio interference : strong
	3	AOS(JST) : 19:01:13 LOS(JST) : 19:07:47 Max Elevation : 4.42[deg]	Shade	・No operation.	・Since the antenna failed due to the typhoon, operation was shifted to CW operation once in the afternoon.		
	4	AOS(JST) : 20:31:48 LOS(JST) : 20:43:08 Max Elevation : 72.72[deg]	Shade	・CW custom operation(437.075MHz)	・Bus voltage, To check Angular velocity.	・Bus voltage : 4.094[V] ・Angular velocity : 20.37[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:08:56 LOS(JST) : 22:14:17 Max Elevation : 2.55[deg]	Shade	・No operation.	・Since the antenna failed due to the typhoon, operation was shifted to CW operation once in the afternoon.		
9/20/2019	1	AOS(JST) : 8:03:47 LOS(JST) : 8:12:32 Max Elevation : 9.65[deg]	Sunshine	・No operation.	・Since the antenna failed due to the typhoon, operation was shifted to CW operation once in the afternoon.		
	2	AOS(JST) : 09:36:31 LOS(JST) : 09:47:27 Max Elevation : 37.90[deg]	Sunshine	・CW custom operation(437.075MHz)	・Bus voltage, To check Angular velocity.	・Bus voltage : 4.144[V] ・Angular velocity : 18.61[deg/s]	
	3	AOS(JST) : 18:42:55 LOS(JST) : 18:44:08 Max Elevation : 0.13[deg]	Shade	・No operation.	・Since the antenna failed due to the typhoon, operation was shifted to CW operation once in the afternoon.		
	4	AOS(JST) : 20:11:48 LOS(JST) : 20:23:01 Max Elevation : 36.16[deg]	Shade	・CW custom operation(437.075MHz)	・Bus voltage, To check Angular velocity.	・Bus voltage : 4.096[V] ・Angular velocity : 17.43[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:45:54 LOS(JST) : 21:54:16 Max Elevation : 20.16[deg]	Shade	・No operation.	・Since the antenna failed due to the typhoon, operation was shifted to CW operation once in the afternoon.		
9/21/2019	1	AOS(JST) : 07:43:33 LOS(JST) : 07:49:45 Max Elevation : 3.64[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real-time HK data downlink(Bus transmitter,AFSK1.2k,437.075MHz)	・To check Angular velocity. ・ To check if the satellite's uplink reception function is not impaired	・Bus voltage : 4.179[V] ・Angular velocity : 15.45[deg/s] Horizontal polarization : 7 Vertical polarization : 3 Circularly polarization : 0	・Radio interference : weak
	2	AOS(JST) : 09:15:06 LOS(JST) : 09:26:21 Max Elevation : 80.02[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation command uplink(Puerto Rico, San Juan)	・To check Angular velocity. ・For amateur overseas operation.	・Bus voltage : 4.163[V] ・Angular velocity : 15.33[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:50:48 LOS(JST) : 10:56:28 Max Elevation : 3.14[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting commnad uplink	・To check Angular velocity. ・To shoot an image.	・Bus voltage : 4.178[V] ・Angular velocity : 15.08[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:49:46 LOS(JST) : 20:00:15 Max Elevation : 20.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation command uplink(Puerto Rico, San Juan)	・To check Angular velocity. ・For amateur overseas operation	・Bus voltage : 4.097[V] ・Angular velocity : 14.415[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:23:38 LOS(JST) : 21:33:37 Max Elevation : 5.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 3.891[V] ・Angular velocity : 14.68[deg/s] Horizontal polarization : 885 Vertical polarization : 1007 Circularly polarization : 0	・Radio interference : weak ・We could hear our own voice and exchange messages with "JA0CAW".
9/22/2019	1	AOS(JST) : 08:53:51 LOS(JST) : 09:05:00 Max Elevation : 48.01[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.178[V] ・Angular velocity : 13.07[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with "JA0CAW".
	2	AOS(JST) : 10:28:29 LOS(JST) : 10:36:43 Max Elevation : 8.37[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.149[V] ・Angular velocity : 13.57[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with "JK2XXK".
	3	AOS(JST) : 19:29:12 LOS(JST) : 19:38:32 Max Elevation : 12.99[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・DigiTalker(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.095[V] ・Angular velocity : 13.01[deg/s]	・Radio interference : weak
	4	AOS(JST) : 21:01:47 LOS(JST) : 21:12:40 Max Elevation : 30.33[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.089[V] ・Angular velocity : 12.88[deg/s]	・Radio interference : weak
9/23/2019	1	AOS(JST) : 08:32:45 LOS(JST) : 08:43:21 Max Elevation : 24.22[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:134656 SC_S:34, SSC:34, SP:128, ESC:34, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 1st.	・Bus voltage : 4.199[V] ・Angular velocity : 11.97[deg/s] Horizontal polarization : 1347 Vertical polarization : 1449 Circularly polarization : 0	・Radio interference : strong ・No packet loss.
	2	AOS(JST) : 10:06:37 LOS(JST) : 10:16:24 Max Elevation : 15.94[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:170496 SC_S:30, SSC:30, SP:692, ESC:30, EP:755 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 1st.	・Bus voltage : 4.179[V] ・Angular velocity : 12.28[deg/s] Horizontal polarization : 1442 Vertical polarization : 1281 Circularly polarization : 324	・Radio interference : normal ・No packet loss.
	3	AOS(JST) : 19:11 : 17 LOS(JST) : 19:18:30 Max Elevation : 5.39[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:134656 SC_S:34, SSC:34, SP:256, ESC:34, EP:511 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 1st.	・Bus voltage : 4.095[V] ・Angular velocity : 12.91[deg/s] Horizontal polarization : 392 Vertical polarization : 649 Circularly polarization : 0	・Radio interference : weak ・Packet loss number : 5
	4	AOS(JST) : 20:42:05 LOS(JST) : 20:53:43 Max Elevation : 81.47[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:134656 SC_S:34, SSC:34, SP:512, ESC:34, EP:1023 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 1st.	・Bus voltage : 4.094[V] ・Angular velocity : 12.62[deg/s] Horizontal polarization : 1786 Vertical polarization : 1797 Circularly polarization : 927	・Radio interference : weak ・No packet loss.
9/24/2019	1	AOS(JST) : 08:11:53 LOS(JST) : 08:21:23 Max Elevation : 12.92[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:134656 SC_S:34, SSC:34, SP:336, ESC:34, EP:387 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 1st.	・Bus voltage : 4.177[V] ・Angular velocity : -[deg/s] Horizontal polarization : 833 Vertical polarization : 968 Circularly polarization : 0	・Radio interference : strong ・Angular velocity could not be received due to interference. ・No packet loss.
	2	AOS(JST) : 09:44:59 LOS(JST) : 09:55:42 Max Elevation : 29.11[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:160768 SC_S:32, SSC:32, SP:0, ESC:32, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 4th.	・Bus voltage : 4.139[V] ・Angular velocity : 13.57[deg/s] Horizontal polarization : 1671 Vertical polarization : 1650 Circularly polarization : 85	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 18:49:38 LOS(JST) : 18:53:56 Max Elevation : 1.68[deg]	Shade	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 20:18:59 LOS(JST) : 20:30:12 Max Elevation : 61.62[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:160768 SC_S:32, SSC:32, SP:256, ESC:32, EP:767 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 4th.	・Bus voltage : 4.099[V] ・Angular velocity : 14.58[deg/s] Horizontal polarization : 1201 Vertical polarization : 671 Circularly polarization : 369	・Radio interference : weak ・Packet loss number : 22
	5	AOS(JST) : 21:54:55 LOS(JST) : 22:02:14 Max Elevation : 5.55[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:160768 SC_S:32, SSC:32, SP:768, ESC:32, EP:1019 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 4th.	・Bus voltage : 4.091[V] ・Angular velocity : 15.13[deg/s] Horizontal polarization : 631 Vertical polarization : 434 Circularly polarization : 15	・Radio interference : weak ・Packet loss number : 4
9/25/2019	1	AOS(JST) : 07:51:23 LOS(JST) : 07:58:54 Max Elevation : 5.96[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:160768 SC_S:32, SSC:32, SP:900, ESC:32, EP:1007 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 4th.	・Bus voltage : 4.139[V] ・Angular velocity : 16.48[deg/s] Horizontal polarization : 23 Vertical polarization : 185 Circularly polarization : 0	・Radio interference : strong Due to a command mistake, the ROM read an empty location, and the data was filled with F.
	2	AOS(JST) : 09:23:30 LOS(JST) : 09:34:43 Max Elevation : 58.81[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:160768 SC_S:32, SSC:32, SP:532, ESC:32, EP:723 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 4th.	・Bus voltage : 4.179[V] ・Angular velocity : 16.85[deg/s] Horizontal polarization : 1426 Vertical polarization : 1393 Circularly polarization : 384	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 10:59:53 LOS(JST) : 11:03:55 Max Elevation : 1.46 [deg]	Sunshine	・No operation.	・Because the elevation angle is low.		
	4	AOS(JST) : 19:57:59 LOS(JST) : 20:08:44 Max Elevation : 30.21[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:118528 SC_S:36, SSC:36, SP:0, ESC:36, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 4th.	・Bus voltage : 4.091[V] ・Angular velocity : 17.97[deg/s] Horizontal polarization : 1578 Vertical polarization : 752 Circularly polarization : 7	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:32:24 LOS(JST) : 21:41:46 Max Elevation : 12.33[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:118528 SC_S:36, SSC:36, SP:256, ESC:36, EP:463 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the image data shooting on July 27, 4th.	・Bus voltage : 4.086[V] ・Angular velocity : 18.03[deg/s] Horizontal polarization : 1310 Vertical polarization : 1032 Circularly polarization : 178	・Radio interference : weak ・No packet loss.

Table 46 Detail of Operation from 26 September 2019 to 3 October 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
9/26/2019	1	AOS(JST) : 7:31:58 LOS(JST) : 7:35:14 Max Elevation : 0.88[deg]	Sunshine	・Movie data transition command uplink ・CW custom operation(437.075MHz)	・To transfer videos shot by the camera to CDH. ・To check Angular velocity.	・Bus voltage : 4.161[V] ・Angular velocity : -[deg/s]	・Radio interference : strong ・Angular velocity could not be obtained due to interference.
	2	AOS(JST) : 9:02:11 LOS(JST) : 9:13:28 Max Elevation : 65.89[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:99328 SC_S:34, SSC:34, SP:0, ESC:34, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・・To downlink the image data shooting on August 3, 2nd.	・Bus voltage : 4.071[V] ・Angular velocity : 18.68[deg/s] Horizontal polarization : 413 Vertical polarization : 556 Circularly polarization : 252	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 10:37:11 LOS(JST) : 10:44:36 Max Elevation : 6.14[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:99328 SC_S:34, SSC:34, SP:256, ESC:34, EP:391 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・・To downlink the image data shooting on August 3, 2nd.	・Bus voltage : 4.144[V] ・Angular velocity : 18.41[deg/s] Horizontal polarization : 1887 Vertical polarization : 1639 Circularly polarization : 563	・Radio interference : weak ・Packet loss numder : 99
	4	AOS(JST) : 19:37:16 LOS(JST) : 19:47:06 Max Elevation : 16.47[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:99328 SC_S:34, SSC:34, SP:256, ESC:34, EP:391 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・・To downlink the image data shooting on August 3, 2nd.	・Bus voltage : 4.095[V] ・Angular velocity : 19.13[deg/s] Horizontal polarization : 1171 Vertical polarization : 665 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:10:23 LOS(JST) : 21:20:55 Max Elevation : 23.19[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:99584 SC_S:36, SSC:36, SP:0, ESC:36, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・・To downlink the image data shooting on August 3, 2nd.	・Bus voltage : 4.090[V] ・Angular velocity : 20.14 [deg/s] Horizontal polarization : 1630 Vertical polarization : 1057 Circularly polarization : 483	・Radio interference : weak ・No packet loss.
9/27/2019	1	AOS(JST) : 8:41:00 LOS(JST) : 8:51:56 Max Elevation : 31.70[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data dowlink Size:99584 SC_S:36, SSC:36, SP:256, ESC:36, EP:391 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・・To downlink the image data shooting on August 3, 2nd.	・Bus voltage : 4.189[V] ・Angular velocity : 20.23[deg/s] Horizontal polarization : 1587 Vertical polarization : 1520 Circularly polarization : 28	・Radio interference : normal ・No packet loss.
	2	AOS(JST) : 10:15:10 LOS(JST) : 10:24:28 Max Elevation : 12.58[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:0, ESC:40, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.162[V] ・Angular velocity : 20.11[deg/s] Horizontal polarization : 841 Vertical polarization : 416 Circularly polarization : 5	・Radio interference : strong ・Packet loss numder : 13
	3	AOS(JST) : 19:16:54 LOS(JST) : 19:25:14 Max Elevation : 8.71[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:0, ESC:40, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.097[V] ・Angular velocity : 19.26[deg/s] Horizontal polarization : 868 Vertical polarization : 689 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 20:48:43 LOS(JST) : 20:59:49 Max Elevation : 45.69[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:256, ESC:40, EP:511→FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.090[V] ・Angular velocity : 20.74[deg/s] Horizontal polarization : 1630 Vertical polarization : 1057 Circularly polarization : 721	・Radio interference : weak ・No packet loss.
9/28/2019	1	AOS(JST) : 8:20:01 LOS(JST) : 8:30:06 Max Elevation : 16.89[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.132[V] ・Angular velocity : 21.13[deg/s]	・Radio interference : weak
	2	AOS(JST) : 9:53:26 LOS(JST) : 10:03:54 Max Elevation : 22.86[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ SSTV (Bus transmitter, 437.075MHz) over Bnakok (Thai) command uplink	・To check Angular velocity. ・For amateur overseas operation	・Bus voltage : 4.179[V] ・Angular velocity : 21.19[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:57:06 LOS(JST) : 19:02:57 Max Elevation : 3.39[deg]	Shade	・No operation.	・Because of low elevation		
	4	AOS(JST) : 20:27:20 LOS(JST) : 20:38:34 Max Elevation : 83.69[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19.2kbps, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK19.2kbps and to confirm whether it can be decoded by the ground station.	・Bus voltage : 4.094 [V] ・Angular velocity : -[deg/s]	・Radio interference : strong ・Our ground station failed in frequency matching and could not decode, but received a report on Twitter that it could be decoded by another station. ・Angular velocity could not be obtained due to interference..
	5	AOS(JST) : 22:04:04 LOS(JST) : 22:10:00 Max Elevation : 3.28[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ SSTV (Bus transmitter, 437.075MHz) over Chile (Puermont) command uplink	・To check Angular velocity. ・For amateur overseas operation	・Bus voltage : 4.083[V] ・Angular velocity : 21.33[deg/s]	・Radio interference : weak
9/29/2019	1	AOS(JST) : 7:59:20 LOS(JST) : 8:07:51 Max Elevation : 8.59[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.133[V] ・Angular velocity : 20.10[deg/s]	・Radio interference : weak ・We could not hear our own voice.
	2	AOS(JST) : 9:31:54 LOS(JST) : 9:31:54 Max Elevation : 43.67[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation Uplink : 145.930~145.900MHz, Downlink : 435.880~435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.140[V] ・Angular velocity : 18.99[deg/s]	・Radio interference : weak ・We could hear our own voice and couldn't exchange messages.
	3	AOS(JST) : 20:06:12 LOS(JST) : 20:17:09 Max Elevation : 39.50[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.097[V] ・Angular velocity : 17.52[deg/s]	・Radio interference : weak
	4	AOS(JST) : 21:41:12 LOS(JST) : 21:49:49 Max Elevation : 9.16[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROMstatus downlink →Bus transmitter,GMSK 9600bps,437.075MHz	・To check Angular velocity. ・To check the size of the image data.	・Bus voltage : 4.088[V] ・Angular velocity : 17.11[deg/s] Horizontal polarization : 68 Vertical polarization : 34 Circularly polarization : 20	・Radio interference : weak
9/30/2019	1	AOS(JST) : 7:39:14 LOS(JST) : 7:44:53 Max Elevation : 2.89[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:512, ESC:40, EP:767 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : -[V] ・Angular velocity : -[deg/s] Horizontal polarization : - Vertical polarization : - Circularly polarization : -	・Radio interference : strong ・No uplink because voltage could not be obtained due to radio interference.
	2	AOS(JST) : 9:10:30 LOS(JST) : 9:21:52 Max Elevation : 88.80[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:512, ESC:40, EP:767 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 15.72[deg/s] Horizontal polarization : 1853 Vertical polarization : 1591 Circularly polarization : 384	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 10:45:55 LOS(JST) : 10:52:21 Max Elevation : 4.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:768, ESC:40, EP:1023 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.149[V] ・Angular velocity : 15.20[deg/s] Horizontal polarization : 460 Vertical polarization : 387 Circularly polarization : 3	・Radio interference : weak ・Packet loss numder : 37
	4	AOS(JST) : 19:45:21 LOS(JST) : 19:55:35 Max Elevation : 20.85[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:772, ESC:40, EP:1003→FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.096[V] ・Angular velocity : 14.36[deg/s] Horizontal polarization : 1536 Vertical polarization : 1066 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:19:00 LOS(JST) : 21:29:05 Max Elevation : 17.89[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:41, SP:0, ESC:41, EP:255→FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.094[V] ・Angular velocity : 13.57 [deg/s] Horizontal polarization : 1556 Vertical polarization : 738 Circularly polarization : 280	・Radio interference : weak ・No packet loss.
10/1/2019	1	AOS(JST) : 8:49:15 LOS(JST) : 9:00:26 Max Elevation : 42.21[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:41, SP:256, ESC:41, EP:511 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 13.00[deg/s] Horizontal polarization : 1759 Vertical polarization : 1749 Circularly polarization : 295	・Radio interference : weak ・No packet loss.
	2	AOS(JST) : 10:23:43 LOS(JST) : 10:32:26 Max Elevation : 9.81[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:41, SP:512, ESC:41, EP:767 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 12.59[deg/s] Horizontal polarization : 648 Vertical polarization : 557 Circularly polarization : 15	・Radio interference : strong ・Packet loss numder : 68
	3	AOS(JST) : 19:24:49 LOS(JST) : 19:33:48 Max Elevation : 11.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink FSK transmitter, GMSK9k6, 435.900MHz)(Size:2048000 SC_S:40, SSC:41, SP:512, ESC:41, EP:759 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.100[V] ・Angular velocity : 8.581[deg/s] Horizontal polarization : 997 Vertical polarization : 534 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 20:57:11 LOS(JST) : 21:08:04 Max Elevation : 34.03[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:41, SP:768, ESC:41, EP:1023→FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.093[V] ・Angular velocity : 11.78[deg/s] Horizontal polarization : 1646 Vertical polarization : 916 Circularly polarization : 732	・Radio interference : weak ・No packet loss.
10/2/2019	1	AOS(JST) : 8:28:10 LOS(JST) : 8:38:43 Max Elevation : 21.88[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:42, SP:0, ESC:42, EP:255 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.082[V] ・Angular velocity : 11.39[deg/s] Horizontal polarization : 1253 Vertical polarization : 940 Circularly polarization : 220	・Radio interference : normal ・No packet loss.
	2	AOS(JST) : 10:01:53 LOS(JST) : 10:12:00 Max Elevation : 18.17[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:42, SP:256, ESC:42, EP:511 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 11.62[deg/s] Horizontal polarization : 961 Vertical polarization : 898 Circularly polarization : 36	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 19:04:44 LOS(JST) : 19:11:43 Max Elevation : 5.30[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:40, SP:768, ESC:40, EP:1023 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.089[V] ・Angular velocity : 11.59[deg/s] Horizontal polarization : 325 Vertical polarization : 99 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 20:35:40 LOS(JST) : 20:46:52 Max Elevation : 72.31[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:42, SP:768, ESC:43, EP:255→FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.085[V] ・Angular velocity : 11.58[deg/s] Horizontal polarization : 161 Vertical polarization : 4 Circularly polarization : 26	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 22:13:31 LOS(JST) : 22:17:23 Max Elevation : 1.27[deg]	Shade	・No operation.	・Because of low elevation		
10/3/2019	1	AOS(JST) : 8:07:19 LOS(JST) : 8:16:39 Max Elevation : 11.66[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:42, SP:516, ESC:42, EP:767 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.158[V] ・Angular velocity : 12.96[deg/s] Horizontal polarization : 715 Vertical polarization : 547 Circularly polarization : 0	・Radio interference : strong ・No packet loss.
	2	AOS(JST) : 9:40:15 LOS(JST) : 9:51:13 Max Elevation : 33.38[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:42, SP:768, ESC:42, EP:1023→FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.199[V] ・Angular velocity : 12.46[deg/s] Horizontal polarization : 1586 Vertical polarization : 1426 Circularly polarization : 607	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 18:45:41 LOS(JST) : 18:48:44 Max Elevation : 0.82[deg]	Shade	・No operation.	・Because of low elevation		
	4	AOS(JST) : 20:14:25 LOS(JST) : 20:25:30 Max Elevation : 53.04[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:42, SP:512, ESC:42, EP:767 →FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.089[V] ・Angular velocity : 13.65[deg/s] Horizontal polarization : 1478 Vertical polarization : 1038 Circularly polarization : 315	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:50:02 LOS(JST) : 21:57:44 Max Elevation : 6.50[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink Size:2048000 SC_S:40, SSC:42, SP:768, ESC:43, EP:255→FSK transmitter,GMSK 9600bps,435.900MHz	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.083[V] ・Angular velocity : 13.62[deg/s] Horizontal polarization : 174 Vertical polarization : 245 Circularly polarization : 2	・Radio interference : weak ・Packet loss numder : 123

Table 47 Detail of Operation from 4 October 2019 to 10 October 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2019/10/4	1	AOS(JST) : 07:46:53 LOS(JST) : 07:54:02 Max Elevation : 5.10[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:43,SP:516,ESC:43,EP:743	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : -[deg/s] ・Raceived packet number Horizontal polarization : 261 Vertical polarization : 394 Circularly polarization : 0	・Radio interference : weak ・Packet loss number : 72
	2	AOS(JST) : 09:18:47 LOS(JST) : 09:30:10 Max Elevation : 68.47[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:43,SP:768,ESC:43,EP:1023	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.17[V] ・Angular velocity : 15.71[deg/s] ・Horizontal polarization : 1331 Vertical polarization : 1275 Circularly polarization : 284	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 10:54:44 LOS(JST) : 10:59:53 Max Elevation : 2.46[deg]	Sunshine	No operation.			
	4	AOS(JST) : 19:53:26 LOS(JST) : 20:03:59 Max Elevation : 26.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:43,SP:544,ESC:43,EP:743	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.099[V] ・Angular velocity : 17.87[deg/s] ・Horizontal polarization : 1525 Vertical polarization : 1605 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:27:36 LOS(JST) : 21:37:10 Max Elevation : 13.78[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:44,SP:0,ESC:44,EP:255	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.090[V] ・Angular velocity : 18.87[deg/s] ・Horizontal polarization : 1470 Vertical polarization : 869 Circularly polarization : 161	・Radio interference : weak ・No packet loss.
2019/10/5	1	AOS(JST) : 07:28:03 LOS(JST) : 07:29:41 Max Elevation : 0.21[deg]	Sunshine	Because of low elevation, No operation.			
	2	AOS(JST) : 08:57:28 LOS(JST) : 09:08:50 Max Elevation : 57.19[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK test operation →FSK transmitter, GMSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.160[V] ・Angular velocity : -[deg/s] ・Horizontal polarization : 640 Vertical polarization : - Circularly polarization : -	・Radio interference : strong
	3	AOS(JST) : 10:32:16 LOS(JST) : 10:40:16 Max Elevation : 7.45[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Linear transponder overseas operation uplink → Worcester, Ohio, United States	・To check Angular velocity. ・ For Liner transponder operation overseas operation.	・Bus voltage : 4.149[V] ・Angular velocity : 19.35[deg/s]	・Radio interference : weak ・ Uplink passed.
	4	AOS(JST) : 19:32:45 LOS(JST) : 19:42:17 Max Elevation : 14.56[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Linear transponder overseas operation uplink → Rio de Janeiro, Brazil	・To check Angular velocity. ・ For Liner transponder operation overseas operation.	・Bus voltage : 4.096[V] ・Angular velocity : 20.8[deg/s]	・Radio interference : weak ・ Uplink passed.
	5	AOS(JST) : 21:05:38 LOS(JST) : 21:16:14 Max Elevation : 25.96[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker →Bus transmitter, 437.075MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.077[V] ・Angular velocity : 20.80[deg/s]	・Radio interference : weak
2019/10/6	1	AOS(JST) : 08:36:18 LOS(JST) : 08:47:14 Max Elevation : 28.37[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.119[V] ・Angular velocity : 22.32[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with "JH4DHX".
	2	AOS(JST) : 10:10:18 LOS(JST) : 10:20:00 Max Elevation : 14.48[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.140[V] ・Angular velocity : 22.18[deg/s]	・Radio interference : weak ・We could hear our own voice and exchange messages with "JA0CAW".
	3	AOS(JST) : 19:12:27 LOS(JST) : 19:20:20 Max Elevation : 7.46[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real-time HK data downlink(2.0 second interval) →Bus transmitter, AFSK1k2, 437.075MHz	・To check Angular velocity. ・ To correct satellite time and real time.	・Bus voltage : 4.095[V] ・Angular velocity : 22.55[deg/s] ・Horizontal polarization : 68 Vertical polarization : 36 Circularly polarization : 0	・Radio interference : weak
	4	AOS(JST) : 20:43:59 LOS(JST) : 20:55:06 Max Elevation : 52.68[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV →Bus transmitter, 437.075MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.094[V] ・Angular velocity : 23.44[deg/s]	・Radio interference : weak
2019/10/7	1	AOS(JST) : 08:15:20 LOS(JST) : 08:25:18 Max Elevation : 15.28[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:44,SP:256,ESC:44,EP:511	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.077[V] ・Angular velocity : 20.80[deg/s]	・Radio interference : weak ・No packet loss.
	2	AOS(JST) : 9:48:36 LOS(JST) : 9:59:21 Max Elevation : 26.13[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:44,SP:512,ESC:44,EP:767	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 23.83[deg/s] ・Horizontal polarization : 1131 Vertical polarization : 1252 Circularly polarization : 283	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 18:52:47 LOS(JST) : 18:57:53 Max Elevation : 2.48[deg]	Shade	Because of low elevation, No operation.			
	4	AOS(JST) : 20:22:37 LOS(JST) : 20:33:47 Max Elevation : 72.42[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:44,SP:768,ESC:44,EP:1023	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.105[V] ・Angular velocity : 25.10[deg/s] ・Horizontal polarization : 1303 Vertical polarization : 1927 Circularly polarization : 481	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:58:58 LOS(JST) : 22:05:30 Max Elevation : 4.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:45,SP:0,ESC:45,EP:255	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.086[V] ・Angular velocity : 24.99[deg/s] ・Horizontal polarization : 564 Vertical polarization : 653 Circularly polarization : 22	・Radio interference : weak ・Packet loss number : 5
2019/10/8	1	AOS(JST) : 07:54:41 LOS(JST) : 08:02:57 Max Elevation : 7.59[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:45,SP:72,ESC:45,EP:195	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.177[V] ・Angular velocity : 25.42[deg/s] ・Horizontal polarization : 609 Vertical polarization : 831 Circularly polarization : 0	・Radio interference : strong ・No packet loss.
	2	AOS(JST) : 09:27:04 LOS(JST) : 09:38:23 Max Elevation : 50.85[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:45,SP:0,ESC:45,EP:255	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 26.09[deg/s] ・Horizontal polarization : 1268 Vertical polarization : 1107 Circularly polarization : 276	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 11:03:50 LOS(JST) : 11:07:03 Max Elevation : 0.89[deg]	Sunshine	Because of low elevation, No operation.			
	4	AOS(JST) : 20:01:31 LOS(JST) : 20:12:19 Max Elevation : 34.41[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:45,SP:512,ESC:45,EP:1023	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.097[V] ・Angular velocity : 25.59[deg/s] ・Horizontal polarization : 1896 Vertical polarization : 118 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:36:14 LOS(JST) : 21:45:10 Max Elevation : 10.47[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:46,SP:0,ESC:46,EP:255	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.095[V] ・Angular velocity : 25.44[deg/s] ・Horizontal polarization : 1081 Vertical polarization : 1242 Circularly polarization : 82	・Radio interference : weak ・No packet loss.
2019/10/9	1	AOS(JST) : 07:34:45 LOS(JST) : 07:39:45 Max Elevation : 2.14[deg]	Sunshine	Because of low elevation, No operation.			
	2	AOS(JST) : 09:05:40 LOS(JST) : 09:17:09 Max Elevation : 77.53[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:46,SP:256,ESC:46,EP:767	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.179[V] ・Angular velocity : 23.09[deg/s] ・Horizontal polarization : 2172 Vertical polarization : 298 Circularly polarization : 354	・Radio interference : weak ・Packet loss number : 1
	3	AOS(JST) : 10:40:51 LOS(JST) : 10:48:00 Max Elevation : 5.40[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:46,SP:608,ESC:46,EP:611	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 22.90[deg/s] ・Horizontal polarization : 688 Vertical polarization : 128 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 19:40:42 LOS(JST) : 19:50:42 Max Elevation : 18.48[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:46,SP:768,ESC:46,EP:1023	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.097[V] ・Angular velocity : 21.87[deg/s] ・Horizontal polarization : 1151 Vertical polarization : 556 Circularly polarization : 0	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:14:06 LOS(JST) : 21:24:21 Max Elevation : 20.10[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →FSK transmitter, GMSK9k6, 435.900MHz →Size:2048000 SC_S:40,SSC:47,SP:0,ESC:47,EP:255	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.090[V] ・Angular velocity : 21.99[deg/s] ・Horizontal polarization : 1329 Vertical polarization : 937 Circularly polarization : 442	・Radio interference : weak ・No packet loss.
2019/10/10	1	AOS(JST) : 08:44:26 LOS(JST) : 08:55:40 Max Elevation : 37.21[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:256,ESC:47,EP:319	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.160[V] ・Angular velocity : 20.58[deg/s] ・Horizontal polarization : 141 Vertical polarization : 95 Circularly polarization : 22	・Radio interference : weak ・Packet loss number : 2
	2	AOS(JST) : 10:18:44 LOS(JST) : 10:27:55 Max Elevation : 11.46[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:280,ESC:47,EP:307	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.179[V] ・Angular velocity : 19.37[deg/s] ・Horizontal polarization : 158 Vertical polarization : 85 Circularly polarization : 21	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 19:20:13 LOS(JST) : 19:28:52 Max Elevation : 9.97[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:320,ESC:47,EP:383	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.112[V] ・Angular velocity : -[deg/s] ・Horizontal polarization : 42 Vertical polarization : 13 Circularly polarization : 0	・Radio interference : weak ・54・No packet loss.
	4	AOS(JST) : 20:52:19 LOS(JST) : 21:03:17 Max Elevation : 38.97[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:384,ESC:47,EP:447	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.094[V] ・Angular velocity : 18.03[deg/s] ・Horizontal polarization : 159 Vertical polarization : 182 Circularly polarization : 103	・Radio interference : weak ・No packet loss.

Table 48 Detail of Operation from 11 October 2019 to 17 October 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
10/11/2019	1	AOS(JST) : 8:23:22 LOS(JST) : 8:33:52 Max Elevation : 19.73[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.179[V] ・Angular velocity : 17.63[deg/s] ・Horizontal polarization : - Vertical polarization : - Circularly polarization : -	・Radio interference : weak ・we could not decode.
	2	AOS(JST) : 9:56:56 LOS(JST) : 10:07:23 Max Elevation : 20.79[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting commnad uplink	・To check Angular velocity. ・To shooting image.	・Bus voltage : 4.140[V] ・Angular velocity : 16.73[deg/s] ・Horizontal polarization : - Vertical polarization : - Circularly polarization : -	・Radio interference : weak ・ Uplink passed.
	3	No operation due to typhoon					
	4						
	5						
10/12/2019	1						
	2						
	3						
	4						
10/13/2019	1						
	2						
	3						
	4	AOS(JST) : 19:48:40 LOS(JST) : 19:59:03 Max Elevation : 23.52[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROM sector erase of CAM →ROM0,sec30～53, ROM1,sec22～37)	・To check Angular velocity. ・ To secure the storage area for CAM and ROM.	・Bus voltage : 4.100[V] ・Angular velocity : 14.76[deg/s]	・Radio interference : weak ・ Uplink passed.
	5	AOS(JST) : 21:22:34 LOS(JST) : 21:32:24 Max Elevation : 15.65[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAMROMstatus downlink →ROM1	・To check Angular velocity. ・ To check the CAMROM status.	・Bus voltage : 4.100[V] ・Angular velocity : 14.57[deg/s] ・Horizontal polarization : 679 Vertical polarization : 455 Circularly polarization : -	・Radio interference : weak ・ Uplink passed.
10/14/2019	1	AOS(JST) : 08:52:34 LOS(JST) : 09:04:00 Max Elevation : 49.61[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:448,ESC:47,EP:511	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.139[V] ・Angular velocity : 15.86[deg/s] ・Horizontal polarization : 168 Vertical polarization : 0 Circularly polarization : -	・Radio interference : weak ・7 packet loss..
	2	AOS(JST) : 10:27:10 LOS(JST) : 10:35:44 Max Elevation : 8.91[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:512,ESC:47,EP:575	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.149[V] ・Angular velocity : 16.35[deg/s] ・Horizontal polarization : 109 Vertical polarization : 79 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 19:28:01 LOS(JST) : 19:37:18 Max Elevation : 12.92[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:324,ESC:47,EP:383	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.089[V] ・Angular velocity : -[deg/s] ・Horizontal polarization : 35 Vertical polarization : 72 Circularly polarization : -	・Radio interference : weak ・22 packet loss..
	4	AOS(JST) : 21:00:38 LOS(JST) : 21:11:24 Max Elevation : 29.61 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40,SSC:47,SP:448,ESC:47,EP:511	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.094[V] ・Angular velocity : 17.59[deg/s] ・Horizontal polarization : 55 Vertical polarization : 109 Circularly polarization : -	・Radio interference : weak ・6 packet loss..
10/15/2019	1	AOS(JST) : 08:31:25 LOS(JST) : 08:42:19 Max Elevation : 25.35 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40, SSC:47, SP:468, ESC:47, EP:511	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.177[V] ・Angular velocity : 19.22[deg/s] ・Horizontal polarization : 196 Vertical polarization : 208 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	2	AOS(JST) : 10:05:16 LOS(JST) : 10:15:20 Max Elevation : 16.63 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40, SSC:47, SP:340, ESC:47, EP:383	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.178[V] ・Angular velocity : 20.24[deg/s] ・Horizontal polarization : 190 Vertical polarization : 156 Circularly polarization : -	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 19:07:47 LOS(JST) : 19:15:16 Max Elevation : 6.39 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40, SSC:47, SP:576, ESC:47, EP:639	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.100[V] ・Angular velocity : 21.56[deg/s] ・Horizontal polarization : 65 Vertical polarization : 91 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 20:39:02 LOS(JST) : 20:50:12 Max Elevation : 61.76 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Movie data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:2048000 SC_S:40, SSC:47, SP:640, ESC:47, EP:703	・To check Angular velocity. ・To downlink the movie data shooting on August 31, 1st.	・Bus voltage : 4.094[V] ・Angular velocity : 17.59[deg/s] ・Horizontal polarization : 199 Vertical polarization : 210 Circularly polarization : -	・Radio interference : strong ・No packet loss.
	5	AOS(JST) : 22:17:48 LOS(JST) : 22:19:54 Max Elevation : 0.36 [deg]	Shade	Because of low elevation, No operation.			
10/16/2019	1	AOS(JST) : 8:10:29 LOS(JST) : 8:20:18 Max Elevation : 13.71 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →(Size:721664 SC_S:26, SSC:26, SP:0, ESC:26, EP:63)	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.177[V] ・Angular velocity : 23.67[deg/s] ・Horizontal polarization : 172 Vertical polarization : 151 Circularly polarization : -	・Radio interference : normal ・7 packet loss..
	2	AOS(JST) : 9:43:35 LOS(JST) : 9:54:36 Max Elevation : 30.01 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:721664 SC_S:26, SSC:26, SP:64, ESC:26, EP:127	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.179[V] ・Angular velocity : 22.70[deg/s] ・Horizontal polarization : 172 Vertical polarization : 151 Circularly polarization : -	・Radio interference : normal ・52 packet loss..
	3	AOS(JST) : 21:00:38 LOS(JST) : 21:11:24 Max Elevation : 29.61 [deg]	Shade	Because of low elevation, No operation.			
	4	AOS(JST) : 20:17:42 LOS(JST) : 20:28:51 Max Elevation : 61.98 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:721664 SC_S:26,SSC:26,SP:128,ESC:26,EP:255	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.101[V] ・Angular velocity : 24.19[deg/s] ・Horizontal polarization : 172 Vertical polarization : 151 Circularly polarization : -	・Radio interference : weak ・52 packet loss..
	5	AOS(JST) : 21:53:40 LOS(JST) : 22:00:50 Max Elevation : 5.34 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:721664 SC_S:26,SSC:26,SP:12,ESC:26,EP:63	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.093[V] ・Angular velocity : 25.52[deg/s] ・Horizontal polarization : 94 Vertical polarization1279 Circularly polarization : -	・Radio interference : weak ・1 packet loss..
10/17/2019	1	AOS(JST) : 07:49:54 LOS(JST) : 07:57:49 Max Elevation : 6.55 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:721664 SC_S:26,SSC:26,SP:252,ESC:26,EP:319	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.178[V] ・Angular velocity : 25.64[deg/s] ・Horizontal polarization : 87 Vertical polarization : 93 Circularly polarization : -	・Radio interference : strong ・18 packet loss..
	2	AOS(JST) : 09:22:04 LOS(JST) : 09:33:33 Max Elevation : 59.53 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:721664 SC_S:26,SSC:26,SP:132,ESC:26,EP:255	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.144[V] ・Angular velocity : 27.10[deg/s] ・Horizontal polarization : 185 Vertical polarization : 118 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 10:58:16 LOS(JST) : 11:02:54 Max Elevation : 1.91[deg]	Sunshine	Because of low elevation, No operation.			
	4	AOS(JST) : 19:56:38 LOS(JST) : 20:07:20 Max Elevation : 30.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:721664 SC_S:26, SSC:26, SP:284, ESC:26, EP:319	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.100[V] ・Angular velocity : 27.50[deg/s] ・Horizontal polarization : 164 Vertical polarization : 50 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:31:04 LOS(JST) : 21:40:21 Max Elevation : 12.12[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →Bus transmitter, AFSK1k2, 437.075MHz →Size:721664 SC_S:26, SSC:26, SP:320, ESC:26, EP:383	・To check Angular velocity. ・To downlink the image data shooting on Octorber 16, 1st.	・Bus voltage : 4.085[V] ・Angular velocity : 27.66[deg/s] ・Horizontal polarization : 164 Vertical polarization : 50 Circularly polarization : -	・Radio interference : weak ・No packet loss.

Table 49 Detail of Operation from 18 October 2019 to 24 October 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
10/18/2019	1	AOS(JST) : 07:30:14 LOS(JST) : 07:34:17 Max Elevation : 1.34 [deg]	Sunshine	Because of low elevation, No operation.			
	2	AOS(JST) : 09:00:42 LOS(JST) : 09:12:15 Max Elevation : 66.90 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.149[V] ・Angular velocity : 30.78[deg/s] ・Horizontal polarization : - Vertical polarization : - Circularly polarization : -	・Radio interference : weak ・we could not decode.
	3	AOS(JST) : 10:35:38 LOS(JST) : 10:43:26 Max Elevation : 6.69[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.189[V] ・Angular velocity : 38.88[deg/s] ・Horizontal polarization : 523 Vertical polarization : - Circularly polarization : -	・Radio interference : weak
	4	AOS(JST) : 19:35:51 LOS(JST) : 19:45:40 Max Elevation : 16.50 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.100[V] ・Angular velocity : 29.91[deg/s] ・Horizontal polarization : 531 Vertical polarization : - Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:08:59 LOS(JST) : 21:19:28 Max Elevation : 22.98[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.094[V] ・Angular velocity : 31.16[deg/s] ・Horizontal polarization : 1680 Vertical polarization : - Circularly polarization : -	・Radio interference : weak
10/19/2019	1	AOS(JST) : 07:30:14 LOS(JST) : 07:34:17 Max Elevation : 32.78 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image shooting commnad uplink →JPEG, max	・To check Angular velocity. ・To shooting image..	・Bus voltage : 4.140[V] ・Angular velocity : 31.67[deg/s]	・Radio interference : weak ・ Uplink passed.
	2	AOS(JST) : 10:13:36 LOS(JST) : 10:23:12 Max Elevation : 13.27 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Linear transponder overseas operation uplink →Worcester, Ohio, United States	・To check Angular velocity. ・ For Liner transponder operation overseas operation.	・Bus voltage : 4.141[V] ・Angular velocity : 32.10[deg/s]	・Radio interference : weak ・ Uplink passed.
	3	AOS(JST) : 19:15:25 LOS(JST) : 19:23:46 Max Elevation : 8.77 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ Linear transponder overseas operation uplink →Madrid, Spain	・To check Angular velocity. ・ For Liner transponder operation overseas operation.	・Bus voltage : 4.097[V] ・Angular velocity : 32.92[deg/s]	・Radio interference : weak ・ Uplink passed.
	4	AOS(JST) : 20:47:15 LOS(JST) : 20:58:20 Max Elevation : 45.50 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real-time HK data downlink(2.0 second interval) →Bus transmitter, AFSK1k2, 437.075MHz	・To check Angular velocity. ・ To correct satellite time and real time.	・Bus voltage : 4.088[V] ・Angular velocity : 34.01[deg/s]	・Radio interference : weak
10/20/2019	1	AOS(JST) : 08:18:26 LOS(JST) : 08:28:48 Max Elevation : 17.65 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 34.65[deg/s]	・No uplink from Nihon University due to Circularly polarization antenna failure.
	2	AOS(JST) : 09:51:51 LOS(JST) : 10:02:35 Max Elevation : 23.77 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 34.29[deg/s]	・No uplink from Nihon University due to Circularly polarization antenna failure.
	3	AOS(JST) : 18:55:32 LOS(JST) : 19:01:27 Max Elevation : 3.47[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・ROM sector erase of CAM →ROM1,sec0～sec7,sec22～51	・To check Angular velocity. ・ To secure the storage area for CAM and ROM.	・Bus voltage : 4.100[V] ・Angular velocity : 35.98[deg/s]	・Radio interference : weak ・ Uplink passed.
	4	AOS(JST) : 20:25:47 LOS(JST) : 20:37:02 Max Elevation : 83.79[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV →Bus transmitter, 437.075MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.100[V] ・Angular velocity : 36.94[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:02:32 LOS(JST) : 22:08:27 Max Elevation : 3.28 [deg]	Shade	Because of low elevation, No operation.			
10/21/2019	1	AOS(JST):07:57:41 LOS(JST):08:06:31 Max Elevation:9.14 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.179[V] ・Angular velocity : 37.78[deg/s]	・Radio interference : strong
	2	AOS(JST):07:57:41 LOS(JST):08:06:31 Max Elevation:44.83 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.139[V] ・Angular velocity : 37.81[deg/s]	・Radio interference : strong
	3	AOS(JST) : 11:07:32 LOS(JST) : 11:09:40 Max Elevation : 0.38 [deg]	Sunshine	Because of low elevation, No operation.			
	4	AOS(JST) : 20:04:36 LOS(JST) : 20:15:35 Max Elevation : 17.4 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.097[V] ・Angular velocity : 39.52[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:02:32 LOS(JST) : 22:08:27 Max Elevation : 3.28 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.093[V] ・Angular velocity : 39.95[deg/s]	・Radio interference : weak
10/22/2019	1	AOS(JST) : 07:37:29 LOS(JST) : 07:43:33 Max Elevation : 3.30 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.174[V] ・Angular velocity : -[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:08:49 LOS(JST) : 09:20:26 Max Elevation : 88.55 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・FSK19.2kbps test operation →FSK transmitter, FSK19k2, 435.900MHz	・To check Angular velocity. ・ To confirm the operation of FSK transmitter, 19k2bps ground station receiving system.	・Bus voltage : 4.179[V] ・Angular velocity : 41.86[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:44:09 LOS(JST) : 10:51:00 Max Elevation : 4.71 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing(90 minutes, 0.5 second interval) command uplink	・To check Angular velocity. ・ To store HK data.	・Bus voltage : 4.141[V] ・Angular velocity : 41.83[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:43:42 LOS(JST) : 19:53:58 Max Elevation : 20.99 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:30,0～sec:30,511	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.097[V] ・Angular velocity : 41.66[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:17:20 LOS(JST) : 21:27:28 Max Elevation : 18.03 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:30,512～sec:30,1023	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.091[V] ・Angular velocity : 42.50[deg/s]	・Radio interference : weak
10/23/2019	1	AOS(JST) : 08:47:31 LOS(JST) : 08:58:57 Max Elevation : 42.98 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:31,0～sec:31,511	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.161[V] ・Angular velocity : 41.48[deg/s] ・Horizontal polarization : 860 Vertical polarization : 909 Circularly polarization : -	・Radio interference : weak
	2	AOS(JST) : 10:21:57 LOS(JST) : 10:30:58 Max Elevation : 10.45 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:31,512～sec:31,1023	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.189[V] ・Angular velocity : 42.08[deg/s] ・Horizontal polarization : 427 Vertical polarization : 96 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 19:23:06 LOS(JST) : 19:32:10 Max Elevation : 11.53 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:32,0～sec:32,511	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.105[V] ・Angular velocity : 39.86[deg/s] ・Horizontal polarization : 454 Vertical polarization : 274 Circularly polarization : -	・Radio interference : weak
	4	AOS(JST) : 20:55:27 LOS(JST) : 21:06:25 Max Elevation : 34.39 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:32,512～sec:32,1023	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.100[V] ・Angular velocity : 38.09[deg/s] ・Horizontal polarization : 553 Vertical polarization : 500 Circularly polarization : -	・Radio interference : weak
10/24/2019	1	AOS(JST) : 08:26:24 LOS(JST) : 08:37:12 Max Elevation : 22.51 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:33,0～sec:33,511	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.144[V] ・Angular velocity : 37.10[deg/s] ・Horizontal polarization : 860 Vertical polarization : 909 Circularly polarization : -	・Radio interference : weak
	2	AOS(JST) : 10:00:06 LOS(JST) : 10:10:29 Max Elevation : 10.45 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:33,512～sec:33,1023	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.139[V] ・Angular velocity : 37.06[deg/s] ・Horizontal polarization : 760 Vertical polarization : 429 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 19:02:56 LOS(JST) : 19:10:03 Max Elevation : 5.47 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:34,0～sec:34,255	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.101[V] ・Angular velocity : 35.40[deg/s] ・Horizontal polarization : Vertical polarization : Circularly polarization : -	・Radio interference : weak
	4	AOS(JST) : 10:00:06 LOS(JST) : 10:10:29 Max Elevation : 10.45 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data downlink for one orbit (90 min 0.5 sec interval) →Bus trasmitter, GMSK9k6, 437.075 MHz →ROM0,sec:33,512～sec:33,1023	・To check Angular velocity. ・ To downlink HK data.	・Bus voltage : 4.100[V] ・Angular velocity : 36.49[deg/s] ・Horizontal polarization : 811 Vertical polarization : 601 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 22:11:39 LOS(JST) : 22:15:45 Max Elevation : 1.43 [deg]	Sunshine	Because of low elevation, No operation.			

Table 50 Detail of Operation from 25 October 2019 to 31 October 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
10/25/2019	1	AOS(JST) : 08:05:31 LOS(JST) : 08:15:05 Max Elevation : 12.11 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:35,0～sec:35,255	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.186[V] ・Angular velocity : 33.01[deg/s] ・Horizontal polarization : 386 Vertical polarization : 618 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 09:38:27 LOS(JST) : 09:49:39 Max Elevation : 34.52 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:35,256～sec:35,767	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.177[V] ・Angular velocity : 33.41[deg/s] ・Horizontal polarization : 656 Vertical polarization : 740 Circularly polarization : -	・Radio interference : strong
	3	AOS(JST) : 18:43:45 LOS(JST) : 18:47:07 Max Elevation : 1.00 [deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:12:35 LOS(JST) : 20:23:46 Max Elevation : 53.04 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:35,768～sec:36,255	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.108[V] ・Angular velocity : 33.41[deg/s] ・Horizontal polarization : 548 Vertical polarization : 568 Circularly polarization : -	・Radio interference : weak ・3 packet loss.
	5	AOS(JST) : 21:48:11 LOS(JST) : 21:56:01 Max Elevation : 6.74 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:35,256～sec:35,511	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.100[V] ・Angular velocity : 32.26[deg/s] ・Horizontal polarization : 548 Vertical polarization : 568 Circularly polarization : -	・Radio interference : weak ・3 packet loss.
2019/10/26	1	AOS(JST) : 07:45:01 LOS(JST) : 07:52:26 Max Elevation : 5.44 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Shooting image command uplink →Over Papua New Guinea	・To check Angular velocity. ・To shoot image.	・Bus voltage : 4.163[V] ・Angular velocity : 33.70[deg/s] ・Horizontal polarization : - Vertical polarization : - Circularly polarization : -	・Radio interference : weak
	2	AOS(JST) : 09:16:56 LOS(JST) : 09:28:32 Max Elevation : 69.72 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・・Liner transponder operation abroad command uplink →America, Washington D.C.	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.179[V] ・Angular velocity : 33.94[deg/s]	・Radio interference : weak ・Uplink was succeeded.
	3	AOS(JST) : 19:51:33 LOS(JST) : 20:02:13 Max Elevation : 26.82 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →the UK, London	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.107[V] ・Angular velocity : 35.41[deg/s]	・Radio interference : weak ・Uplink was succeeded.
	4	AOS(JST) : 21:25:42 LOS(JST) : 21:35:24 Max Elevation : 14.16 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM satus downlink →ROM1	・To check Angular velocity. ・To check CAM ROM status.	・Bus voltage : 4.091[V] ・Angular velocity : 35.36[deg/s] ・Horizontal polarization : 523 Vertical polarization : 258 Circularly polarization : -	・Radio interference : weak
2019/10/27	1	AOS(JST) : 07:25:53 LOS(JST) : 07:28:19 Max Elevation : 0.46 [deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 08:55:35 LOS(JST) : 09:07:09 Max Elevation : 57.28 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 37.67[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	3	AOS(JST) : 10:30:19 LOS(JST) : 10:38:38 Max Elevation : 8.01 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 37.73[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	4	AOS(JST) : 19:30:49 LOS(JST) : 19:40:29 Max Elevation : 14.82 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation. →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 37.73[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:03:41 LOS(JST) : 21:14:25 Max Elevation : 26.63 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.090[V] ・Angular velocity : 39.34[deg/s]	・Radio interference : weak
10/28/2019	1	AOS(JST) : 08:34:22 LOS(JST) : 08:45:29 Max Elevation : 28.75 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:36,512～sec:36,767	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.189[V] ・Angular velocity : 40.92[deg/s] ・Horizontal polarization : 723 Vertical polarization : 420 Circularly polarization : -	・Radio interference : weak
	2	AOS(JST) : 10:08:21 LOS(JST) : 10:18:17 Max Elevation : 15.19 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:36,768～sec:36,1023	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.189[V] ・Angular velocity : 40.92[deg/s] ・Horizontal polarization : 678 Vertical polarization : 216 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 19:10:26 LOS(JST) : 19:18:30 Max Elevation : 7.72 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:37,0～sec:37,255	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.099[V] ・Angular velocity : 40.40[deg/s] ・Horizontal polarization : 136 Vertical polarization : 89 Circularly polarization : -	・Radio interference : weak ・44 packet loss.
	4	AOS(JST) : 20:41:59 LOS(JST) : 20:53:14 Max Elevation : 53.90 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:37,256～sec:37,1023	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.096[V] ・Angular velocity : 40.59[deg/s] ・Horizontal polarization : 840 Vertical polarization : 828 Circularly polarization : -	・Radio interference : weak ・2 packet loss.
10/29/2019	1	AOS(JST) : 08:13:22 LOS(JST) : 08:23:30 Max Elevation : 15.57 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:37,8～sec:37,127	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.149[V] ・Angular velocity : 38.35[deg/s] ・Horizontal polarization : 501 Vertical polarization : 675 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 09:46:36 LOS(JST) : 09:57:33 Max Elevation : 27.13 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:38,0～sec:38,255	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.160[V] ・Angular velocity : 38.16[deg/s] ・Horizontal polarization : 696 Vertical polarization : 943 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 18:50:41 LOS(JST) : 18:56:03 Max Elevation : 2.72 [deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:20:34 LOS(JST) : 20:31:52 Max Elevation : 71.77 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:38,256～sec:38,767	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.105[V] ・Angular velocity : 36.37[deg/s] ・Horizontal polarization : 685 Vertical polarization : 723 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:56:50 LOS(JST) : 22:03:39 Max Elevation : 4.58 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:38,768～sec:38,1023	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.096[V] ・Angular velocity : 36.44[deg/s] ・Horizontal polarization : 166 Vertical polarization : 271 Circularly polarization : -	・Radio interference : weak
2019/10/30	1	AOS(JST) : 07:52:40 LOS(JST) : 08:01:05 Max Elevation : 7.78 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:39,0～sec:39,255	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.119[V] ・Angular velocity : -[deg/s] ・Horizontal polarization : 228 Vertical polarization : 427 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 09:25:02 LOS(JST) : 09:36:31 Max Elevation : 52.37 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:39,256～sec:39,767	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.139[V] ・Angular velocity : 34.82[deg/s] ・Horizontal polarization : 708 Vertical polarization : 807 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 11:01:32 LOS(JST) : 11:05:26 Max Elevation : 1.30 [deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:59:24 LOS(JST) : 20:10:22 Max Elevation : 34.63 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:39,768～sec:40,255	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.108[V] ・Angular velocity : 33.59[deg/s] ・Horizontal polarization : 921 Vertical polarization : 904 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:34:04 LOS(JST) : 21:43:13 Max Elevation : 11.02 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:40,256～sec:40,511	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.104[V] ・Angular velocity : 33.97[deg/s] ・Horizontal polarization : 402 Vertical polarization : 83 Circularly polarization : -	・Radio interference : weak
2019/10/31	1	AOS(JST) : 07:32:40 LOS(JST) : 07:37:50 Max Elevation : 2.26 [deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 09:03:36 LOS(JST) : 09:15:13 Max Elevation : 76.37 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:40,512～sec:40,767	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.113[V] ・Angular velocity : 31.31[deg/s] ・Horizontal polarization : 757 Vertical polarization : 727 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 10:38:41 LOS(JST) : 10:46:09 Max Elevation : 5.87 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →Bus transmitter,GMSK9k6,437.075 MHz →ROM0,sec:31,516～sec:31,671	・To check Angular velocity. ・To downlink HK sensing data.	・Bus voltage : 4.1[V] ・Angular velocity : 34.51[deg/s] ・Horizontal polarization : 109 Vertical polarization : 11 Circularly polarization : -	・Radio interference : strong
	4	AOS(JST) : 19:38:31 LOS(JST) : 19:48:42 Max Elevation : 18.82 [deg]	Shade	No operation.			
	5	AOS(JST) : 21:11:53 LOS(JST) : 21:22:21 Max Elevation : 20.98 [deg]	Shade	No operation.			

Table 51 Detail of Operation from 1 November 2019 to 7 November 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
11/1/2019	1	AOS(JST) : 08:42:31 LOS(JST) : 08:15:05 Max Elevation : 37.03[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:384,ESC:26,EP:767	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.177[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 1260 Vertical polarization : 1025 Circularly polarization : -	・Radio interference : weak ・No packet loss
	2	AOS(JST) : 10:16:34 LOS(JST) : 10:25:58 Max Elevation : 10.28[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:768,ESC:26,EP:1023	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.178[V] ・Angular velocity : 38.15[deg/s] ・Recieved packet number Horizontal polarization : 642 Vertical polarization : 460 Circularly polarization : -	・Radio interference : strong ・37 packet loss
	3	AOS(JST) : 19:17:58 LOS(JST) : 19:26:49 Max Elevation : 10.29[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:132,ESC:26,EP:255	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.099[V] ・Angular velocity : 39.71[deg/s] ・Recieved packet number Horizontal polarization : 266 Vertical polarization : 147 Circularly polarization : -	・Radio interference : weak ・17 packet loss
	4	AOS(JST) : 20:50:03 LOS(JST) : 21:01:13 Max Elevation : 40.53[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:768,ESC:26,EP:1023	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.095[V] ・Angular velocity : 39.78[deg/s] ・Recieved packet number Horizontal polarization : 1163 Vertical polarization : 787 Circularly polarization : -	・Radio interference : weak ・No packet loss
2019/11/2	1	AOS(JST) : 08:21:13 LOS(JST) : 08:31:48 Max Elevation : 19.72[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・To downlink image shot at CAM ROM sector erase →ROM1,sec52～58	・To check Angular velocity. ・To create CAM ROM space.	・Bus voltage : 4.160[V] ・Angular velocity : 41.43[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:54:44 LOS(JST) : 10:05:21 Max Elevatio : 21.58[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →Bangkok, Thailand	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.158[V] ・Angular velocity : 41.59[deg/s]	・Radio interference : weak ・Uplink was succeeded.
	3	AOS(JST) : 18:57:54 LOS(JST) : 19:04:36 Max Elevatio : 4.61[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →Copenhagen, Denmark	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.093[V] ・Angular velocity : 40.78[deg/s]	・Radio interference : weak ・Uplink was succeeded.
	4	AOS(JST) : 20:28:31 LOS(JST) : 20:39:55 Max Elevatio : 85.66[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real time HK data downlink(2 sec interval) →Bus transmitter, AFSK1k2, 437.075MHz	・To check Angular velocity. ・To synchronize satellite time with real time.	・Bus voltage : 4.082[V] ・Angular velocity : 40.48[deg/s] ・Recieved packet number Horizontal polarization : 163 Vertical polarization : 116 Circularly polarization : -	・Radio interference : weak
2019/11/3	1	AOS(JST) : 8:00:22 LOS(JST) : 8:09:33 Max Elevation : 10.41[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 39.14[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	2	AOS(JST) : 9:33:06 LOS(JST) : 9:44:25 Max Elevation : 39.90[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.160[V] ・Angular velocity : 39.37[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	3	AOS(JST) : 18:39:11 LOS(JST) : 18:41:10 Max Elevation : 0.340[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:07:15 LOS(JST) : 20:18:27 Max Elevation : 45.55[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.104[V] ・Angular velocity : 37.64[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:42:28 LOS(JST) : 21:50:57 Max Elevation : 8.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation. →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.097[V] ・Angular velocity : 36.96[deg/s]	・Radio interference : weak
2019/11/4	1	AOS(JST) : 7:39:59 LOS(JST) : 7:46:42 Max Elevation : 4.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:140,ESC:26,EP:259	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.160[V] ・Angular velocity : 36.21[deg/s] ・Recieved packet number Horizontal polarization : 70 Vertical polarization : 184 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	2	AOS(JST) : 9:11:36 LOS(JST) : 9:23:13 Max Elevation : 81.65[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:27,SP:0,ESC:27,EP:255	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.179[V] ・Angular velocity : 35.63[deg/s] ・Recieved packet number Horizontal polarization : 1456 Vertical polarization : 1580 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 10:47:07 LOS(JST) : 10:53:29 Max Elevation : 3.95[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:46:14 LOS(JST) : 19:56:50 Max Elevation : 23.85[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:140,ESC:26,EP:259	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.160[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 958 Vertical polarization : 240 Circularly polarization : -	・Radio interference : medium ・No packet loss.
	5	AOS(JST) : 21:20:05 LOS(JST) : 21:30:12 Max Elevation : 16.64 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:256,ESC:26,EP:511	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.078[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 638 Vertical polarization : 227 Circularly polarization : -	・Radio interference : medium ・4 packet loss
2019/11/5	1	AOS(JST) : 8:50:15 LOS(JST) : 9:01:44 Max Elevation : 48.53[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:27,SP:256,ESC:27,EP:511	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.139[V] ・Angular velocity : 36.18[deg/s] ・Recieved packet number Horizontal polarization : 1261 Vertical polarization : 582 Circularly polarization : -	・Radio interference : weak ・3 packet loss
	2	AOS(JST) : 10:24:48 LOS(JST) : 10:33:32 Max Elevation : 9.38[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:27,SP:512,ESC:27,EP:767	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.178[V] ・Angular velocity : 36.81[deg/s] ・Recieved packet number Horizontal polarization : 871 Vertical polarization : 377 Circularly polarization : -	・Radio interference : medium ・6 packet loss
	3	AOS(JST) : 19:25:32 LOS(JST) : 19:35:03 Max Elevation : 13.28[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:768,ESC:26,EP:1023	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.106[V] ・Angular velocity : 37.38[deg/s] ・Recieved packet number Horizontal polarization : 662 Vertical polarization : 472 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 20:58:08 LOS(JST) : 21:09:09 Max Elevation : 31.25[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:26,SP:768,ESC:26,EP:1023	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.101[V] ・Angular velocity : 37.81[deg/s] ・Recieved packet number Horizontal polarization : 1407 Vertical polarization : 549 Circularly polarization : -	・Radio interference : weak ・No packet loss.
2019/11/6	1	AOS(JST) : 8:29:04 LOS(JST) : 8:39:59 Max Elevation : 24.90[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:28, SP:256, ESC:28, EP:511	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.178[V] ・Angular velocity : - [deg/s] ・Recieved packet number Horizontal polarization : 985 Vertical polarization : 414 Circularly polarization : -	・Radio interference : medium ・No packet loss.
	2	AOS(JST) : 10:02:52 LOS(JST) : 10:13:04 Max Elevation : 17.23[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:27,SP:512,ESC:27,EP:767	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.177[V] ・Angular velocity : 40.57[deg/s] ・Recieved packet number Horizontal polarization : 1423 Vertical polarization : 817 Circularly polarization : -	・Radio interference : weak ・1 packet loss
	3	AOS(JST) : 19:05:14 LOS(JST) : 19:13:00 Max Elevation : 6.72[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:27,SP:472,ESC:27,EP:507	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.099[V] ・Angular velocity : 41.49[deg/s] ・Recieved packet number Horizontal polarization : 117 Vertical polarization : 46 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 20:36:29 LOS(JST) : 20:47:54 Max Elevation : 17.23[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26,SSC:27,SP:544,ESC:27,EP:759	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.091[V] ・Angular velocity : 42.21[deg/s] ・Recieved packet number Horizontal polarization : 1311 Vertical polarization : 1029 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 22:14:43 LOS(JST) : 22:18:05 Max Elevation : 0.92[deg]	Shade	No operation due to low elevation.			
2019/11/7	1	AOS(JST) : 8:08:06 LOS(JST) : 8:17:53 Max Elevation : 13.42[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:27, SP:448, ESC:27, EP:455	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.158[V] ・Angular velocity : 43.15[deg/s] ・Recieved packet number Horizontal polarization : 628 Vertical polarization : 242 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	2	AOS(JST) : 9:41:10 LOS(JST) : 9:52:14 Max Elevation : 31.01[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:28, SP:512, ESC:28, EP:767	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.161[V] ・Angular velocity : - [deg/s] ・Recieved packet number Horizontal polarization : 1163 Vertical polarization : 409 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 18:45:40 LOS(JST) : 18:50:21 Max Elevation : 1.97[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:15:06 LOS(JST) : 20:26:29 Max Elevation : 60.94[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:28, SP:512, ESC:28, EP:767	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.100[V] ・Angular velocity : 42.32[deg/s] ・Recieved packet number Horizontal polarization : 1070 Vertical polarization : 717 Circularly polarization : -	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:50:56 LOS(JST) : 21:58:34 Max Elevation : 6.08[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:28, SP:488, ESC:28, EP:491	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.088[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 639 Vertical polarization : 297 Circularly polarization : -	・Radio interference : weak ・No packet loss.

Table 52 Detail of Operation from 8 November 2019 to 14 November 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
11/8/2019	1	AOS(JST) : 7:47:30 LOS(JST) : 7:55:19 Max Elevation : 6.31[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:28, SP:768, ESC:28, EP:1023	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.141[V] ・Angular velocity : 42.99[deg/s] ・Recieved packet number Horizontal polarization : 285 Vertical polarization : 84 Circularly polarization : -	・Radio interference : medium ・No packet loss
	2	AOS(JST) : 09:19:36 LOS(JST) : 09:25:24 Max Elevation : 61.66[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:27, SP:440, ESC:27, EP:463	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.189[V] ・Angular velocity : 41.18[deg/s] ・Recieved packet number Horizontal polarization : 712 Vertical polarization : 529 Circularly polarization : -	・Radio interference : weak ・No packet loss
	3	AOS(JST) : 19:53:59 LOS(JST) : 20:04:56 Max Elevation : 30.42[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:26, SP:0, ESC:26, EP:255	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.107[V] ・Angular velocity : 39.60[deg/s] ・Recieved packet number Horizontal polarization : 1272 Vertical polarization : 465 Circularly polarization : -	・Radio interference : weak ・No packet loss
	4	AOS(JST) : 21:28:20 LOS(JST) : 21:37:59 Max Elevation : 13.14[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:721664 SC_S:26, SSC:26, SP:256, ESC:26, EP:511	・To check Angular velocity. ・To downlink image shot at 1st operation on Octobar 16.	・Bus voltage : 4.100[V] ・Angular velocity : 39.21[deg/s] ・Recieved packet number Horizontal polarization : 1335 Vertical polarization : 416 Circularly polarization : -	・Radio interference : weak ・No packet loss
2019/11/9	1	AOS(JST) : 7:27:53 LOS(JST) : 7:31:36 Max Elevation : 1.16[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 08:58:11 LOS(JST) : 09:09:45 Max Elevation : 64.54[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Shooting image command uplink →Over Brazil, 52 minutes after uplink →Max frame rate, SVGA	・To check Angular velocity. ・To shoot image..	・Bus voltage : 4.178[V] ・Angular velocity : 38.36[deg/s]	・Radio interference : weak ・No packet loss ・Uplink time:09:04:02(JST) ・Movie shooting start time:09:56:06(JST) ・Movie shooting finish time:10:02:06(JST)
	3	AOS(JST) : 10:33:04 LOS(JST) : 10:41:00 Max Elevation : 7.02[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image transfer commnad uplink cam,rom1,sc14⇒cdh,rom0,sc44 cam,rom1,sc8⇒cdh,rom0,sc46	・To check Angular velocity. ・To taransfer shooting image from CAM to C&DH.	・Bus voltage : 4.179[V] ・Angular velocity : 37.52[deg/s]	・Radio interference : weak ・No packet loss
	4	AOS(JST) : 19:33:09 LOS(JST) : 19:43:12 Max Elevation : 16.84[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.108[V] ・Angular velocity : 38.14[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	5	AOS(JST) : 21:06:13 LOS(JST) : 21:17:01 Max Elevation : 24.56[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.101[V] ・Angular velocity : 37.79[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
2019/11/10	1	AOS(JST) : 08:36:55 LOS(JST) : 08:48:05 Max Elevation : 31.65[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.177[V] ・Angular velocity : 39.62[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	2	AOS(JST) : 10:11:01 LOS(JST) : 10:20:41 Max Elevation : 13.70[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.100[V] ・Angular velocity : 39.58[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	3	AOS(JST) : 19:12:40 LOS(JST) : 19:21:16 Max Elevation : 9.09 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation. →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.108[V] ・Angular velocity : 40.67[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:44:27 LOS(JST) : 20:55:49 Max Elevation : 48.27 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.100[V] ・Angular velocity : 40.98[deg/s]	・Radio interference : weak
2019/11/11	1	AOS(JST) : 08:15:51 LOS(JST) : 08:26:07 Max Elevation : 16.98[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:44, SP:0, ESC:44, EP:511	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage : 4.178[V] ・Angular velocity : 43.34[deg/s] ・Recieved packet number Horizontal polarization:804 Vertical polarization:925 Circularly polarization:-	・Radio interference : strong ・43 packet loss
	2	AOS(JST) : 09:49:13 LOS(JST) : 09:59:58 Max Elevation : 24.47[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:44, SP:36, ESC:44, EP:427	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.189[V] ・Angular velocity:43.8[deg/s] ・Recieved packet number Horizontal polarization:1507 Vertical polarization:1479 Circularly polarization:-	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 18:52:43 LOS(JST) : 18:58:56 Max Elevation : 3.75[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:22:57 LOS(JST) : 20:34:28 Max Elevation : 81.17[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:44, SP:512, ESC:44, EP:1023	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.105[V] ・Angular velocity:44.77[deg/s] ・Recieved packet number Horizontal polarization:904 Vertical polarization:943 Circularly polarization:-	・Radio interference : weak ・25 packet loss.
	5	AOS(JST) : 21:59:29 LOS(JST) : 22:06:03 Max Elevation : 4.03[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:45, SP:0, ESC:45, EP:143	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.105[V] ・Angular velocity:44.77[deg/s] ・Recieved packet number Horizontal polarization:904 Vertical polarization:943 Circularly polarization:-	・Radio interference : weak ・23 packet loss.
2019/11/12	1	AOS(JST) : 07:55:05 LOS(JST) : 08:03:44 Max Elevation : 8.64[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:44, SP:576, ESC:44, EP:767	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.189[V] ・Angular velocity:46.38[deg/s] ・Recieved packet number Horizontal polarization:588 Vertical polarization:426 Circularly polarization:-	・Radio interference : strong ・10 packet loss.
	2	AOS(JST) : 09:27:35 LOS(JST) : 09:38:57 Max Elevation : 46.47[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:44, SP:584, ESC:44, EP:747	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.160[V] ・Angular velocity:46.61[deg/s] ・Recieved packet number Horizontal polarization:1309 Vertical polarization:1222 Circularly polarization:-	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 11:04:36 LOS(JST) : 11:07:16 Max Elevation : 0.59[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 20:01:44 LOS(JST) : 20:12:57 Max Elevation : 39.33[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:44, SP:768, ESC:44, EP:995	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.101[V] ・Angular velocity:46.12[deg/s] ・Recieved packet number Horizontal polarization:1309 Vertical polarization:531 Circularly polarization:-	・Radio interference : strong ・No packet loss.
	5	AOS(JST) : 21:36:36 LOS(JST) : 21:45:41 Max Elevation : 10.22[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:45, SP:12, ESC:45, EP:135	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.094[V] ・Angular velocity:45.79[deg/s] ・Recieved packet number Horizontal polarization:892 Vertical polarization:417 Circularly polarization:-	・Radio interference : strong ・No packet loss.
2019/11/13	1	AOS(JST) : 07:34:55 LOS(JST) : 07:40:37 Max Elevation : 2.88[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 09:06:07 LOS(JST) : 09:17:40 Max Elevation : 85.14[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46, SSC:46, SP:0, ESC:46, EP:255	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.160[V] ・Angular velocity:45.05[deg/s] ・Recieved packet number Horizontal polarization:1546 Vertical polarization:880 Circularly polarization:-	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 10:41:22 LOS(JST) : 10:48:19 Max Elevation : 4.94[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46, SSC:46, SP:256, ESC:46, EP:511	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.160[V] ・Angular velocity:44.38[deg/s] ・Recieved packet number Horizontal polarization:397 Vertical polarization:48 Circularly polarization:-	・Radio interference : strong ・110 packet loss.
	4	AOS(JST) : 19:40:46 LOS(JST) : 19:51:17 Max Elevation : 21.22[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46,SSC:46,SP:256,ESC:46,EP:511	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.106[V] ・Angular velocity:43.56[deg/s] ・Recieved packet number Horizontal polarization:770 Vertical polarization:657 Circularly polarization:-	・Radio interference : weak ・1 packet loss.
	5	AOS(JST) : 21:14:20 LOS(JST) : 21:24:49 Max Elevation : 19.52[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46,SSC:46,SP:512,ESC:46,EP:767	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.101[V] ・Angular velocity:43.94[deg/s] ・Recieved packet number Horizontal polarization:1018 Vertical polarization:1080 Circularly polarization:-	・Radio interference : weak ・No packet loss.
2019/11/14	1	AOS(JST) : 08:44:47 LOS(JST) : 08:56:06 Max Elevation : 40.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46, SSC:46, SP:768, ESC:46, EP:1023	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.189[V] ・Angular velocity:42.99[deg/s] ・Recieved packet number Horizontal polarization:862 Vertical polarization:819 Circularly polarization:-	・Radio interference : strong ・No packet loss.
	2	AOS(JST) : 10:19:09 LOS(JST) : 10:28:12 Max Elevation : 10.73[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Half-day sensing command uplink	・To check Angular velocity. ・To store HK data.	・Bus voltage : 4.179[V] ・Angular velocity : 42.70[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:20:08 LOS(JST) : 10:28:12 Max Elevation : 11.80[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・All power OFF command uplink	・To check Angular velocity. ・To stop HK data sensing.	・Bus voltage : 4.083[V] ・Angular velocity : 42.50[deg/s]	・Radio interference : weak ・The uplink could not pass because of a problem with the ground station settings.
	4	AOS(JST) : 20:52:26 LOS(JST) : 21:03:41 Max Elevation : 36.90[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.046[V] ・Angular velocity : 42.43[deg/s]	・the HK data downlink was changed to CW custom operation because there was a problem with the ground station settings. ・Confirmed that the HK data sensing stop command uplink was passed on this path. ・Radio interference : weak

Table 53 Detail of Operation from 15 November 2019 to 21 November 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
11/15/2019	1	AOS(JST) : 08:23:37 LOS(JST) : 08:34:15 Max Elevation : 21.32[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:14,0～sec:14,511	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.189[V] ・Angular velocity:42.99[deg/s] ・Recieved packet number Horizontal polarization:299 Vertical polarization:56 Circularly polarization:−	・Radio interference : strong ・33 packet loss
	2	AOS(JST) : 09:57:15 LOS(JST) : 10:07:37 Max Elevation : 19.46[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:14,0～sec:14,511	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.178[V] ・Angular velocity:44.22[deg/s] ・Recieved packet number Horizontal polarization:1003 Vertical polarization:534 Circularly polarization:−	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 18:59:55 LOS(JST) : 19:07:17 Max Elevation : 5.71[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:15,0～sec:15,255	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.107[V] ・Angular velocity:−[deg/s] ・Recieved packet number Horizontal polarization:1 Vertical polarization:19 Circularly polarization:−	・Radio interference : medium ・181 packet loss
	4	AOS(JST) : 20:30:49 LOS(JST) : 20:42:23 Max Elevation : 76.78[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:15,256～sec:15,767	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.102[V] ・Angular velocity:44.22[deg/s] ・Recieved packet number Horizontal polarization:1153 Vertical polarization:709 Circularly polarization:−	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 22:08:14 LOS(JST) : 22:13:17 Max Elevation : 2.18[deg]	Shade	No operation due to low elevation.			
2019/11/16	1	AOS(JST) : 08:02:42 LOS(JST) : 08:02:42 Max Elevation : 11.29[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM satus downlink →ROM1	・To check Angular velocity. ・To check CAM ROM status.	・Bus voltage:4.178[V] ・Angular velocity:47.72[deg/s] ・Recieved packet number Horizontal polarization:221 Vertical polarization:77 Circularly polarization:−	・Radio interference : weak ・No packet loss.
	2	AOS(JST) : 09:35:34 LOS(JST) : 09:46:42 Max Elevation : 35.64[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・C&DH ROM sector erase. →ROM0,sec14～21	・To check Angular velocity. ・To secure the ROM capacity of C&DH.	・Bus voltage:4.139[V] ・Angular velocity:47.78[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:40:38 LOS(JST) : 18:44:21 Max Elevation : 1.19[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:09:29 LOS(JST) : 20:20:55 Max Elevation : 51.71[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real HK data doenlink(AFSK1k2, 437.075MHz)	・To check Angular velocity. ・To synchronize real time and satellite time.	・Bus voltage:4.102[V] ・Angular velocity:49.28[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:44:55 LOS(JST) : 21:53:16 Max Elevation : 7.70[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM satus downlink →ROM0	・To check Angular velocity. ・To check CAM ROM status.	・Bus voltage:4.097[V] ・Angular velocity:49.69[deg/s] ・Recieved packet number Horizontal polarization:250 Vertical polarization:38 Circularly polarization:−	・Radio interference : weak
2019/11/17	1	AOS(JST) : 07:42:14 LOS(JST) : 07:49:15 Max Elevation : 4.79[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.141[V] ・Angular velocity : 51.33[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	2	AOS(JST) : 09:14:01 LOS(JST) : 09:25:30 Max Elevation : 73.09[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 51.46[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	3	AOS(JST) : 10:49:45 LOS(JST) : 10:55:28 Max Elevation : 3.08[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:48:25 LOS(JST) : 19:59:18 Max Elevation : 26.74[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.101[V] ・Angular velocity : 51.57[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:22:27 LOS(JST) : 21:32:32 Max Elevation : 15.52[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation. →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.090[V] ・Angular velocity : 51.27[deg/s]	・Radio interference : weak
2019/11/18	1	AOS(JST) : 08:52:37 LOS(JST) : 09:04:01 Max Elevation : 53.71[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46, SSC:47, SP:0, ESC:47, EP:256	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.160[V] ・Angular velocity:−[deg/s] ・Recieved packet number Horizontal polarization:1364 Vertical polarization:856 Circularly polarization:−	・Radio interference : strong ・No packet loss. ・It was F-filled data because a sector without data was read.
	2	AOS(JST) : 10:27:18 LOS(JST) : 10:35:37 Max Elevation : 8.18[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46, SSC:46, SP:404, ESC:46, EP407	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.179[V] ・Angular velocity:−[deg/s] ・Recieved packet number Horizontal polarization:315 Vertical polarization:181 Circularly polarization:−	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 19:27:38 LOS(JST) : 19:37:31 Max Elevation : 14.96[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:228864 SC_S:46, SSC:46, SP:836, ESC:46, EP:843	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.104[V] ・Angular velocity:49.68[deg/s] ・Recieved packet number Horizontal polarization:1009 Vertical polarization:954 Circularly polarization:−	・Radio interference : weak ・No packet loss.
	4	AOS(JST) : 21:00:25 LOS(JST) : 21:11:29 Max Elevation : 28.81[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Image data downlink →FSK transmitter,GMSK9k6,435.900MHz →Size:297984 SC_S:44, SSC:45, SP:0, ESC:45, EP:143	・To check Angular velocity. ・To downlink image shot at 2nd operation on Octobar 11.	・Bus voltage:4.096[V] ・Angular velocity:49.21[deg/s] ・Recieved packet number Horizontal polarization:1422 Vertical polarization:256 Circularly polarization:−	・Radio interference : weak ・No packet loss.
2019/11/19	1	AOS(JST) : 8:31:23 LOS(JST) : 8:42:17 Max Elevation : 26.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:15,768～sec:16,255	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.192[V] ・Angular velocity:48.51[deg/s] ・Recieved packet number Horizontal polarization:638 Vertical polarization:850 Circularly polarization:−	・Radio interference : strong ・No packet loss.
	2	AOS(JST) : 10:05:18 LOS(JST) : 10:15:10 Max Elevation : 15.47[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:16,256～sec:16,767	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.119[V] ・Angular velocity:48.12[deg/s] ・Recieved packet number Horizontal polarization:213 Vertical polarization:133 Circularly polarization:−	・Radio interference : strong ・63 packet loss
	3	AOS(JST) : 19:07:14 LOS(JST) : 19:15:29 Max Elevation : 7.87[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:16,768～sec:16,1023	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.108[V] ・Angular velocity:47.63[deg/s] ・Recieved packet number Horizontal polarization:271 Vertical polarization:379 Circularly polarization:−	・Radio interference : weak ・3 packet loss
	4	AOS(JST) : 20:38:42 LOS(JST) : 20:50:14 Max Elevation : 57.82[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:17,0～sec:17,511	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.104[V] ・Angular velocity:46.93[deg/s] ・Recieved packet number Horizontal polarization:1391 Vertical polarization:880 Circularly polarization:−	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 22:17:30 LOS(JST) : 22:19:56 Max Elevation : 0.46[deg]	Shade	No operation due to low elevation.			
2019/11/20	1	AOS(JST) : 08:10:21 LOS(JST) : 08:20:12 Max Elevation : 14.36[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:17,512～sec:17,1023	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.178[V] ・Angular velocity:46.93[deg/s] ・Recieved packet number Horizontal polarization:484 Vertical polarization:88 Circularly polarization:−	・Radio interference : weak ・7 packet loss
	2	AOS(JST) : 09:43:31 LOS(JST) : 09:54:21 Max Elevation : 27.63[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:18,0～sec:18,511	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.179[V] ・Angular velocity:47.23[deg/s] ・Recieved packet number Horizontal polarization:874 Vertical polarization:540 Circularly polarization:−	・Radio interference : strong ・No packet loss.
	3	AOS(JST) : 18:47:26 LOS(JST) : 18:52:59 Max Elevation : 2.84[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:17:15 LOS(JST) : 20:28:49 Max Elevation : 68.72[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:18,512～sec:18,1023	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.112[V] ・Angular velocity:46.66[deg/s] ・Recieved packet number Horizontal polarization:1018 Vertical polarization:873 Circularly polarization:−	・Radio interference : weak ・No packet loss.
	5	AOS(JST) : 21:53:19 LOS(JST) : 22:00:44 Max Elevation : 5.48[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:16,928～sec:16,943	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.101[V] ・Angular velocity:46.90[deg/s] ・Recieved packet number Horizontal polarization:456 Vertical polarization:267 Circularly polarization:−	・Radio interference : weak ・No packet loss.
2019/11/21	1	AOS(JST) : 07:49:40 LOS(JST) : 07:57:39 Max Elevation : 6.88[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:15,138～sec:15,503	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4109[V] ・Angular velocity:−[deg/s] ・Recieved packet number Horizontal polarization:201 Vertical polarization:40 Circularly polarization:−	・Radio interference : weak ・31 packet loss
	2	AOS(JST) : 09:21:55 LOS(JST) : 09:33:15 Max Elevation : 54.83[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:19,0～sec:19,511	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.160[V] ・Angular velocity:48.50[deg/s] ・Recieved packet number Horizontal polarization:867 Vertical polarization:571 Circularly polarization:−	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 10:58:20 LOS(JST) : 11:02:18 Max Elevation : 1.38[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:56:04 LOS(JST) : 20:07:15 Max Elevation : 34.00[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage:4.102[V] ・Angular velocity:49.47[deg/s]	・Radio interference : weak ・The Sensing data douwnlink was scheduled, but it was not possible to pass through the uplink due to a misconfiguration of the trajectory calculation software.
	5	AOS(JST) : 21:30:36 LOS(JST) : 21:40:11 Max Elevation : 12.22[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:19,512～sec:19,1023	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.112[V] ・Angular velocity:49.64[deg/s] ・Recieved packet number Horizontal polarization:878 Vertical polarization:421 Circularly polarization:−	・Radio interference : weak ・No packet loss.

Table 54 Detail of Operation from 22 November 2019 to 28 November 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
2019/11/22	1	AOS(JST) : 07:29:51 LOS(JST) : 07:34:07 Max Elevation : 1.53[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 09:00:27 LOS(JST) : 09:11:52 Max Elevation : 71.48[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:15,0～sec:15,255	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.199[V] ・Angular velocity:51.64[deg/s] ・Recieved packet number Horizontal polarization: Vertical polarization: Circularly polarization:−	・Radio interference : weak ・No packet loss.
	3	AOS(JST) : 10:35:29 LOS(JST) : 10:42:54 Max Elevation : 5.96[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:17,800～sec:17,1003	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.179[V] ・Angular velocity:−[deg/s] ・Recieved packet number Horizontal polarization:261 Vertical polarization:100 Circularly polarization:−	・Radio interference : medium ・1 packet loss
	4	AOS(JST) : 19:35:10 LOS(JST) : 19:45:31 Max Elevation : 18.73[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Sensing data douwnlink. →FSK transmitter,GMSK9k6,435.900MHz →ROM1,sec:14,150～sec:14,483	・To check Angular velocity. ・To downlink image shot at 2nd operation on November 14.	・Bus voltage:4.104[V] ・Angular velocity:52.93[deg/s] ・Recieved packet number Horizontal polarization:1316 Vertical polarization:661 Circularly polarization:−	・Radio interference : medium ・1 packet loss
	5	AOS(JST) : 21:08:25 LOS(JST) : 21:19:13 Max Elevation : 22.81[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage:4.099[V] ・Angular velocity:53.21[deg/s]	・Radio interference : medium
2019/11/23	1	AOS(JST) : 08:39:08 LOS(JST) : 08:50:13 Max Elevation : 34.15[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage:4.160[V] ・Angular velocity:55.78[deg/s] ・Recieved packet number Horizontal polarization:0 Vertical polarization:0 Circularly polarization:−	・Radio interference : strong ・Carry over to the next path because downlink was not possible due to strong interference.
	2	AOS(JST) : 10:13:20 LOS(JST) : 10:22:38 Max Elevation : 12.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage:4.160[V] ・Angular velocity:55.65[deg/s] ・Recieved packet number Horizontal polarization:998 Vertical polarization:763 Circularly polarization:−	・Radio interference : strong
	3	AOS(JST) : 19:14:36 LOS(JST) : 19:23:35 Max Elevation : 10.29[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.102[V] ・Angular velocity : 56.29[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	4	AOS(JST) : 20:46:35 LOS(JST) : 20:58:01 Max Elevation : 43.82[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.093[V] ・Angular velocity : 56.30[deg/s]	・Radio interference : weak
2019/11/24	1	AOS(JST) : 08:18:01 LOS(JST) : 08:28:16 Max Elevation : 18.03[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179[V] ・Angular velocity : 56.39[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	2	AOS(JST) : 09:51:28 LOS(JST) : 10:01:56 Max Elevation : 22.01[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.178[V] ・Angular velocity : 56.33[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	3	AOS(JST) : 18:54:31 LOS(JST) : 19:01:19 Max Elevation : 4.62[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation. →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.099[V] ・Angular velocity : 55.72[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:25:02 LOS(JST) : 20:36:39 Max Elevation : 89.65[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・SSTV operation →Bus transmitter,437.075 MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.099[V] ・Angular velocity : 54.98[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:01:50 LOS(JST) : 22:08:02 Max Elevation : 3.47[deg]	Shade	No operation due to low elevation.			
2019/11/25	1	AOS(JST) : 7:57:10 LOS(JST) : 8:05:54 Max Elevation : 9.23[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage : 4.139[V] ・Angular velocity : 54.47[deg/s] ・Recieved packet number Horizontal polarization : 521 Vertical polarization : 600 Circularly polarization : −	・Radio interference : weak
	2	AOS(JST) : 9:29:47 LOS(JST) : 9:40:56 Max Elevation : 41.49[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.139[V] ・Angular velocity : 54.39[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:35:48 LOS(JST) : 18:37:48 Max Elevation : 0.32[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:03:44 LOS(JST) : 20:15:07 Max Elevation : 43.86[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz		・Bus voltage:4.104[V] ・Angular velocity:52.94[deg/s] ・Recieved packet number Horizontal polarization:0 Vertical polarization:0 Circularly polarization:−	・Radio interference : strong ・Carry over to the next path because downlink was not possible due to strong interference.
	5	AOS(JST) : 21:38:48 LOS(JST) : 21:47:43 Max Elevation : 9.42[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage:4.101[V] ・Angular velocity:54.55[deg/s] ・Recieved packet number Horizontal polarization:802 Vertical polarization:368 Circularly polarization:−	・Radio interference : weak
2019/11/26	1	AOS(JST) : 07:36:53 LOS(JST) : 07:42:51 Max Elevation : 3.31[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 09:08:15 LOS(JST) : 09:19:38 Max Elevation : 86.82[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.139[V] ・Angular velocity : 54.39[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:43:42 LOS(JST) : 10:50:02 Max Elevation : 41.49[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.018[V] ・Angular velocity : 51.49[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:42:42 LOS(JST) : 19:53:26 Max Elevation : 23.37[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage : 4.106[V] ・Angular velocity : 50.70[deg/s] ・Recieved packet number Horizontal polarization : 944 Vertical polarization : 1090 Circularly polarization : −	・Radio interference : weak
	5	AOS(JST) : 21:16:26 LOS(JST) : 21:26:52 Max Elevation : 18.15[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.101[V] ・Angular velocity : 50.75[deg/s]	・Radio interference : weak
2019/11/27	1	AOS(JST) : 08:46:52 LOS(JST) : 08:58:05 Max Elevation : 44.27[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage : 4.101[V] ・Angular velocity : −[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 69 Circularly polarization : −	・Radio interference : medium
	2	AOS(JST) : 10:21:22 LOS(JST) : 10:29:59 Max Elevation : 9.44[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.160[V] ・Angular velocity : 51.48[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:21:59 LOS(JST) : 19:31:35 Max Elevation : 13.06[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage : 4.100[V] ・Angular velocity : 52.19[deg/s] ・Recieved packet number Horizontal polarization : 574 Vertical polarization : 937 Circularly polarization : −	・Radio interference : weak
	4	AOS(JST) : 20:54:27 LOS(JST) : 21:05:44 Max Elevation : 33.86[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.100[V] ・Angular velocity : 52.44[deg/s]	・Radio interference : weak
2019/11/28	1	AOS(JST) : 08:25:39 LOS(JST) : 08:36:13 Max Elevation : 22.57[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI data downlink. →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI data.	・Bus voltage : 4.179[V] ・Angular velocity : 54.17[deg/s] ・Recieved packet number Horizontal polarization : 715 Vertical polarization : 655 Circularly polarization : −	・Radio interference : strong
	2	AOS(JST) : 09:59:23 LOS(JST) : 10:09:25 Max Elevation : 17.51[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.100[V] ・Angular velocity : 55.05[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:01:41 LOS(JST) : 19:09:27 Max Elevation : 6.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.100[V] ・Angular velocity : 55.93[deg/s] ・Recieved packet number Horizontal polarization : 149 Vertical polarization : 436 Circularly polarization : −	・Radio interference : weak
	4	AOS(JST) : 20:32:47 LOS(JST) : 20:44:24 Max Elevation : 69.41[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink.	・To check Angular velocity. ・To sensing RSSI data.	・Bus voltage : 4.097[V] ・Angular velocity : 56.35[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:10:33 LOS(JST) : 22:15:01 Max Elevation : 1.63[deg]	Shade	No operation due to low elevation.			

Table 55 Detail of Operation from 29 November 2019 to 5 December 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
29/11/2019	1	AOS(JST) : 08:04:41 LOS(JST) : 08:14:01 Max Elevation : 11.91[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.189[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 431 Vertical polarization : 303 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 09:37:38 LOS(JST) : 09:48:31 Max Elevation : 32.04[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.199[V] ・Angular velocity : 59.03[deg/s]	・Radio interference : medium
	3	AOS(JST) : 18:42:08 LOS(JST) : 18:46:41 Max Elevation : 1.84[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:11:23 LOS(JST) : 20:22:55 Max Elevation : 57.52[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.101[V] ・Angular velocity : 60.94[deg/s] ・Recieved packet number Horizontal polarization : 78 Vertical polarization : 0 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:47:02 LOS(JST) : 21:55:08 Max Elevation : 6.97[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.093[V] ・Angular velocity : 61.51[deg/s]	・Radio interference : weak
30/11/2019	1	AOS(JST) : 07:44:07 LOS(JST) : 07:51:16 Max Elevation : 6.97[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CDH,ROM sector erase →ROM0,sec0～10, ROM0,sec44～46	・To check Angular velocity. ・To create CDH ROM space.	・Bus voltage : 4.161[V] ・Angular velocity : 63.36[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:16:02 LOS(JST) : 09:27:19 Max Elevation : 65.81[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →Argentina, Santa Fe	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.139[V] ・Angular velocity : 63.53[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:52:02 LOS(JST) : 10:54:29 Max Elevation : 2.21[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:50:15 LOS(JST) : 20:01:17 Max Elevation : 29.26[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →Spain,Madrid	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.105[V] ・Angular velocity : 64.17[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:24:27 LOS(JST) : 21:34:25 Max Elevation : 14.38[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real time HK data downlink(AFSK1k2,437.075MHz)	・To check Angular velocity. ・ To synchronize ground time and satellite time.	・Bus voltage:4.089[V] ・Angular velocity:64.24[deg/s] ・Recieved packet number Horizontal polarization:207 Vertical polarization:123 Circularly polarization:-	・Radio interference : weak
1/12/2019	1	AOS(JST) : 07:25:11 LOS(JST) : 07:26:45 Max Elevation : 0.200[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 08:54:35 LOS(JST) : 09:05:51 Max Elevation : 58.59[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.160V] ・Angular velocity : 65.31[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	3	AOS(JST) : 10:29:24 LOS(JST) : 10:37:13 Max Elevation : 7.07[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.179V] ・Angular velocity : 64.92[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	4	AOS(JST) : 19:29:25 LOS(JST) : 19:39:29 Max Elevation : 16.29[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digi-talker operation →Bus transmitter,437.075MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.104V] ・Angular velocity : 64.54[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:02:21 LOS(JST) : 21:13:22 Max Elevation : 26.59[deg]	Shade	・CW custom operation(437.075MHz) →SSTV operation →Bus transmitter,437.075MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.094V] ・Angular velocity : 64.58[deg/s]	・Radio interference : weak
2/12/2019	1	AOS(JST) : 08:33:18 LOS(JST) : 08:44:06 Max Elevation : 28.45[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.196[V] ・Angular velocity : 64.01[deg/s] ・Recieved packet number Horizontal polarization : 658 Vertical polarization : 803 Circularly polarization : -	・Radio interference : weak
	2	AOS(JST) : 10:07:18 LOS(JST) : 10:16:49 Max Elevation : 13.88[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.179[V] ・Angular velocity : 63.92[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:08:55 LOS(JST) : 19:17:28 Max Elevation : 8.72[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.101[V] ・Angular velocity : 62.79[deg/s]	・Radio interference : weak ・Command was uplinked late in this operation because the setting of GS device was wrong. Downlink will be carried out early in the next operation.
	4	AOS(JST) : 20:40:34 LOS(JST) : 20:52:06 Max Elevation : 52.41[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.. ・To downlink RSSI sensing data..	・Bus voltage : 4.094[V] ・Angular velocity : 62.27[deg/s] ・Recieved packet number Horizontal polarization : 630 Vertical polarization : 291 Circularly polarization : -	・Radio interference : weak
3/12/2019	1	AOS(JST) : 8:12:13 LOS(JST) : 8:22:01 Max Elevation : 15.07[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.141[V] ・Angular velocity : 61.81[deg/s] ・Recieved packet number Horizontal polarization : 183 Vertical polarization : 94 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 9:45:28 LOS(JST) : 9:56:01 Max Elevation : 25.17[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.139[V] ・Angular velocity : 61.93[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:49:00 LOS(JST) : 18:55:01 Max Elevation : 3.44[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:19:04 LOS(JST) : 20:30:40 Max Elevation : 75.77[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.107[V] ・Angular velocity : 60.51[deg/s] ・Recieved packet number Horizontal polarization : 610 Vertical polarization : 388 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:55:21 LOS(JST) : 22:02:25 Max Elevation : 4.78[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.100[V] ・Angular velocity : 60.64[deg/s]	・Radio interference : weak
4/12/2019	1	AOS(JST) : 07:51:27 LOS(JST) : 07:59:30 Max Elevation : 7.30[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.194[V] ・Angular velocity : 60.95[deg/s] ・Recieved packet number Horizontal polarization : 3 Vertical polarization : 25 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 09:23:48 LOS(JST) : 09:34:55 Max Elevation : 49.31[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.139[V] ・Angular velocity : 60.49[deg/s]	・Radio interference : weak
	3	AOS(JST) : 11:00:44 LOS(JST) : 11:03:23 Max Elevation : 0.61[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:57:49 LOS(JST) : 20:09:04 Max Elevation : 37.07[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.108[V] ・Angular velocity : 60.44[deg/s] ・Recieved packet number Horizontal polarization : 1094 Vertical polarization : 294 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:32:31 LOS(JST) : 21:41:54 Max Elevation : 11.22deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.105[V] ・Angular velocity : 60.11[deg/s]	・Radio interference : weak
5/12/2019	1	AOS(JST) : 07:31:28 LOS(JST) : 07:36:04 Max Elevation : 1.83[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 09:02:17 LOS(JST) : 09:13:33 Max Elevation : 78.02[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.179[V] ・Angular velocity : 63.26[deg/s] ・Recieved packet number Horizontal polarization : 969 Vertical polarization : 697 Circularly polarization : -	・Radio interference : strong
	3	AOS(JST) : 10:37:28 LOS(JST) : 10:44:20 Max Elevation : 4.99[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.139[V] ・Angular velocity : 61.47[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:36:51 LOS(JST) : 19:47.20 Max Elevation : 20.17[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.111[V] ・Angular velocity : 62.00[deg/s] ・Recieved packet number Horizontal polarization : 560 Vertical polarization : 916 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:10:15 LOS(JST) : 21:20:56 Max Elevation : 21.07[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.106[V] ・Angular velocity : 62.04[deg/s]	・Radio interference : weak

Table 56 Detail of Operation from 6 December 2019 to 12 December 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
6/12/2019	1	AOS(JST) : 08:40:55 LOS(JST) : 08:51:54 Max Elevation : 36.43[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.140[V] ・Angular velocity : 62.04[deg/s] ・Recieved packet number Horizontal polarization : 1023 Vertical polarization : 816 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 10:15:13 LOS(JST) : 10:24:08 Max Elevation : 10.89[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.139[V] ・Angular velocity : 63.58[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:16:13 LOS(JST) : 19:25:23 Max Elevation : 11.13[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.101[V] ・Angular velocity : 64.75[deg/s] ・Recieved packet number Horizontal polarization : 172 Vertical polarization : 395 Circularly polarization : -	・Radio interference : medium
	4	AOS(JST) : 20:48:21 LOS(JST) : 20:59:44 Max Elevation : 39.99[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.101[V] ・Angular velocity : 65.18[deg/s]	・Radio interference : medium
7/12/2019	1	AOS(JST) : 08:19:44 LOS(JST) : 08:29:57 Max Elevation : 18.92[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Shooting image command uplink →Over Australia	・To check Angular velocity. ・To shoot image.	・Bus voltage : 4.156[V] ・Angular velocity : 66.90[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:53:17 LOS(JST) : 10:03:28 Max Elevation : 19.99[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →America,Tallahassee	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.140[V] ・Angular velocity : 67.27[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:56:02 LOS(JST) : 19:03:08 Max Elevation : 5.18[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →Ingland, London	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.102[V] ・Angular velocity : 68.34[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:26:44 LOS(JST) : 20:38:21 Max Elevation : 82.99[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Shooting image command uplink →Over Brazil	・To check Angular velocity. ・To shoot image.	・Bus voltage : 4.091[V] ・Angular velocity : 68.59[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:03:50 LOS(JST) : 22:09:29 Max Elevation : 2.80[deg]	Shade	No operation due to low elevation.			
8/12/2019	1	AOS(JST) : 07:58:50 LOS(JST) : 08:07:36 Max Elevation : 9.71[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.139[V] ・Angular velocity : 70.54[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	2	AOS(JST) : 09:31:33 LOS(JST) : 09:42:28 Max Elevation : 37.58[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.158[V] ・Angular velocity : 70.88[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken.
	3	AOS(JST) : 18:36:58 LOS(JST) : 18:39:55 Max Elevation : 0.73[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 18:36:58 LOS(JST) : 18:39:55 Max Elevation : 0.73[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.102[V] ・Angular velocity : 71.41[deg/s]	・Radio interference : medium
	5	AOS(JST) : 21:40:38 LOS(JST) : 21:49:17 Max Elevation : 8.50[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM status downlink →Bus transmitter,GMSK9k6,437.075MHz	・To check Angular velocity. ・To check the size of CAM image.	・Bus voltage : 4.095[V] ・Angular velocity : 71.19[deg/s] ・Recieved packet number Horizontal polarization : 1023 Vertical polarization : 816 Circularly polarization : -	・Radio interference : weak
9/12/2019	1	AOS(JST) : 07:38:27 LOS(JST) : 07:44:36 Max Elevation : 54.73[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.178[V] ・Angular velocity : 72.03[deg/s] ・Recieved packet number Horizontal polarization : 157 Vertical polarization : 4 Circularly polarization : -	・Radio interference : weak
	2	AOS(JST) : 09:09:58 LOS(JST) : 09:21:11 Max Elevation : 79.77[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.144[V] ・Angular velocity : 72.21[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:45:37 LOS(JST) : 10:51:18 Max Elevation : 3.16[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:44:19 LOS(JST) : 19:55:07 Max Elevation : 24.98[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.085[V] ・Angular velocity : 71.01[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : -	・Radio interference : weak ・Success of command uplink was cheked, however packets couldn't be received. Same comand will be uplinked in the next operation.
	5	AOS(JST) : 21:18:12 LOS(JST) : 21:28:26 Max Elevation : 16.70[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.095[V] ・Angular velocity : 72.27[deg/s] Horizontal polarization : 500 Vertical polarization : 583 Circularly polarization : -	・Radio interference : weak
10/12/2019	1	AOS(JST) : 08:48:32 LOS(JST) : 08:59:38 Max Elevation : 47.63[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.158[V] ・Angular velocity : 71.54[deg/s] ・Recieved packet number Horizontal polarization : 658 Vertical polarization : 735 Circularly polarization : -	・Radio interference : weak
	2	AOS(JST) : 10:23:08 LOS(JST) : 10:31:21 Max Elevation : 8.37[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.064[V] ・Angular velocity : 71.91[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:23:33 LOS(JST) : 19:33:14 Max Elevation : 13.90[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.082[V] ・Angular velocity : 70.38[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : -	・Radio interference : weak ・Success of command uplink was cheked, however packets couldn't be received. Same comand will be uplinked in the next operation.
	4	AOS(JST) : 20:56:09 LOS(JST) : 21:07:18 Max Elevation : 31.04[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.022[V] ・Angular velocity : 70.48[deg/s] Horizontal polarization : 283 Vertical polarization : 43 Circularly polarization : -	・Radio interference : weak
11/12/2019	1	AOS(JST) : 08:27:16 LOS(JST) : 08:37:47 Max Elevation : 23.77[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : -[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 0 Vertical polarization : 0 Circularly polarization : -	・Radio interference : strong ・Command was not uplinked because bus voltage and angular velosity couldn't be obtained due to mutch noise.
	2	AOS(JST) : 10:01:05 LOS(JST) : 10:10:50 Max Elevation : 15.96[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.141[V] ・Angular velocity : 69.93[deg/s] ・Recieved packet number Horizontal polarization : 322 Vertical polarization : 98 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 19:03:10 LOS(JST) : 19:11:06 Max Elevation : 7.09[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Digitalker operation(437.075MHz)	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.110[V] ・Angular velocity : -[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:34:26 LOS(JST) : 20:45:58 Max Elevation : 63.15[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.101[V] ・Angular velocity : 69.42[deg/s]	・Radio interference : weak
	5	AOS(JST) : 22:12:41 LOS(JST) : 22:16:09 Max Elevation : 0.97[deg]	Shade	No operation due to low elevation.			
12/12/2019	1	AOS(JST) : 8:06:14 LOS(JST) : 8:15:36 Max Elevation : 12.51[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.179[V] ・Angular velocity : 69.40[deg/s] ・Recieved packet number Horizontal polarization : 292 Vertical polarization : 371 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 9:39:16 LOS(JST) : 9:49:56 Max Elevation : 29.29[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.177[V] ・Angular velocity : 69.37[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:43:29 LOS(JST) : 18:48:25 Max Elevation : 2.19[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 20:12:59 LOS(JST) : 20:24:28 Max Elevation : 62.67[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data..	・Bus voltage : 4.114[V] ・Angular velocity : 68.70[deg/s] ・Recieved packet number Horizontal polarization : 997 Vertical polarization : 537 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:48:50 LOS(JST) : 21:56:32 Max Elevation : 6.11[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI..	・Bus voltage : 4.104[V] ・Angular velocity : 68.59[deg/s]	・Radio interference : weak

Table 57 Detail of Operation from 13 December 2019 to 19 December 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
13/12/2019	1	AOS(JST) : 7:45:36 LOS(JST) : 7:52:53 Max Elevation : 5.57[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.178[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 156 Vertical polarization : 216 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 9:17:37 LOS(JST) : 9:28:45 Max Elevation : 59.96[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.179[V] ・Angular velocity : 69.32[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:53:55 LOS(JST) : 10:58:00 Max Elevation : 1.51[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:51:48 LOS(JST) : 20:02:49 Max Elevation : 31.19[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.113[V] ・Angular velocity : 69.66[deg/s] ・Recieved packet number Horizontal polarization : 241 Vertical polarization : 999 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:26:09 LOS(JST) : 21:35:51 Max Elevation : 13.12[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.105[V] ・Angular velocity : 69.80[deg/s]	・Radio interference : weak
14/12/2019	1	AOS(JST) : 07:26:15 LOS(JST) : 7:28:44 Max Elevation : 0.51[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 08:56:07 LOS(JST) : 09:07:17 Max Elevation : 63.47[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →America,Washington D.C.	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.179[V] ・Angular velocity : 70.66[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:31:04 LOS(JST) : 10:38:28 Max Elevation : 6.20[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CAM ROM status downlink →Bus transmitter,GMSK9k6,437.075MHz →ROM1	・To check Angular velocity. ・To check the size of CAM image.	・Bus voltage : 4.179[V] ・Angular velocity : -[deg/s] ・Recieved packet number Horizontal polarization : 10 Vertical polarization : 8 Circularly polarization : -	・Radio interference : weak
	4	AOS(JST) : 19:30:54 LOS(JST) : 19:41:01 Max Elevation : 17.16[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation abroad command uplink →Scotland,Edinburgh	・To check Angular velocity. ・For Liner transponder operation abroad.	・Bus voltage : 4.110[V] ・Angular velocity : 71.28[deg/s]	・Radio interference : weak
	5	AOS(JST) : :31:04 LOS(JST) : 10:38:28 Max Elevation : 6.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Real time HK data downlink(AFSK1k2,437.075MHz)	・To check Angular velocity. ・To synchronize ground time and satellite time.	・Bus voltage:4.106[V] ・Angular velocity:71.35[deg/s] ・Recieved packet number Horizontal polarization:67 Vertical polarization:41 Circularly polarization:-	・Radio interference : weak
15/12/2019	1	AOS(JST) : 08:34:47 LOS(JST) : 08:45:33 Max Elevation : 30.16[deg]	Sunshine	No operation due to adjustment of antenna direction.			
	2	AOS(JST) : 10:08:53 LOS(JST) : 10:18:07 Max Elevation : 12.70[deg]	Sunshine	No operation due to adjustment of antenna direction.			
	3	AOS(JST) : 19:10:21 LOS(JST) : 19:18:59 Max Elevation : 9.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.110[V] ・Angular velocity : 74.29[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken. ・Radio interference : weak
	4	AOS(JST) : 20:42:08 LOS(JST) : 20:53:31 Max Elevation : 47.70[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Liner transponder operation →Uplink frequency : 145.930～145.900MHz →Downlink frequency : 435.880～435.910MHz	・To check Angular velocity. ・For amateur operation.	・Bus voltage : 4.104[V] ・Angular velocity : 74.36[deg/s]	・No uplink from Nihon University because circularly polarization antenna is broken. ・Radio interference : weak
16/12/2019	1	AOS(JST) : 08:13:39 LOS(JST) : 08:23:29 Max Elevation : 15.8 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.139[V] ・Angular velocity : 76.33[deg/s] ・Recieved packet number Horizontal polarization : 515 Vertical polarization : 383 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 09:46:59 LOS(JST) : 09:57:21Max Elevation : 23.22 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.179[V] ・Angular velocity : 76.51[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:50:20 LOS(JST) : 18:56:32 Max Elevation : 3.76[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:20:34 LOS(JST) : 20:32:04 Max Elevation : 82.08[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.110[V] ・Angular velocity : 77.38[deg/s] ・Recieved packet number Horizontal polarization : 733 Vertical polarization : 213 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 21:57:07 LOS(JST) : 22:03:38 Max Elevation : 3.97[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.112[V] ・Angular velocity : 77.71[deg/s]	・Radio interference : weak
17/12/2019	1	AOS(JST) : 7:52:49 LOS(JST) : 8:00:59 Max Elevation : 7.79[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To downlink RSSI sensing data.	・Bus voltage : 4.161[V] ・Angular velocity : 79.41[deg/s] ・Recieved packet number Horizontal polarization : 192 Vertical polarization : 187 Circularly polarization : -	・Radio interference : strong
	2	AOS(JST) : 9:25:16 LOS(JST) : 9:36:15 Max Elevation : 45.20 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・RSSI sensing command uplink	・To check Angular velocity. ・To measure RSSI.	・Bus voltage : 4.140[V] ・Angular velocity : 79.92[deg/s]	・Radio interference : weak
	3	AOS(JST) : 11:03:10 LOS(JST) : 11:03:41 Max Elevation : 0.02[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:59:17 LOS(JST) : 20:10:28 Max Elevation : 39.53 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.108[V] ・Angular velocity : 80.89[deg/s]	・Radio interference : weak ・Carry out only CW custom operation and let satellite in CW power saving mode to prevent angular velocity from increasing.
	5	AOS(JST) : 21:34:09 LOS(JST) : 21:34:09 Max Elevation : 10.10 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.108[V] ・Angular velocity : -[deg/s]	・Radio interference : weak
18/12/2019	1	AOS(JST) : 07:32:42 LOS(JST) : 07:37:40 Max Elevation : 2.20[deg]	Sunshine	No operation due to absence of operaters			
	2	AOS(JST) : 09:03:42 LOS(JST) : 09:14:53 Max Elevation : 84.17 [deg]	Sunshine				
	3	AOS(JST) : 10:39:02 LOS(JST) : 10:45:28 Max Elevation : 4.30[deg]	Sunshine				
	4	AOS(JST) : 19:38 : 16 LOS(JST) : 19 : 48 : 43 Max Elevation : 21.12 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.091[V] ・Angular velocity : -[deg/s]	・Radio interference : medium
	5	AOS(JST) : 21:11:48 LOS(JST) : 21:22:14 Max Elevation : 19.29 [deg]	Shade	No operation			
19/12/2019	1	AOS(JST) : 21:34:09 LOS(JST) : 21:34:09 Max Elevation : 10.10 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.162[V] ・Angular velocity : 81.54[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:16:41 LOS(JST) : 10:25:20 Max Elevation : 9.98 [deg]	Sunshine	No operation			
	3	AOS(JST) : 19:17:34 LOS(JST) : 19:26:46 Max Elevation : 11.60 [deg]	Shade	No operation			
	4	AOS(JST) : 20:49:50 LOS(JST) : 21:01:01 Max Elevation : 36.51 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.107[V] ・Angular velocity : 81.44[deg/s]	・Radio interference : weak

Table 58 Detail of Operation from 20 December 2019 to 26 December 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
20/12/2019	1	AOS(JST) : 8:21:03 LOS(JST) : 8:31:18 Max Elevation : 19.99 [deg]	Sunshine	No operation			
	2	AOS(JST) : 09:54:41 LOS(JST) : 10:04:41 Max Elevation : 18.60 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.119[V] ・Angular velocity : 81.21[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:57:19 LOS(JST) : 19:04:30 Max Elevation : 5.46 [deg]	Shade	No operation			
	4	AOS(JST) : 20:28:10 LOS(JST) : 20:39:38 Max Elevation : 76.54 [deg]	Shade	No operation			
	5	AOS(JST) : 22:05:37 LOS(JST) : 22:10:29 Max Elevation : 2.02 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.119[V] ・Angular velocity : 81.21[deg/s]	・Radio interference : weak
21/12/2019	1	AOS(JST) : 8:00:05 LOS(JST) : 8:08:59 Max Elevation : 10.34 [deg]	Sunshine	No operation			
	2	AOS(JST) : 9:32:53 LOS(JST) : 9:43:42 Max Elevation : 34.84 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.119[V] ・Angular velocity : 81.21[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:38:06 LOS(JST) : 18:41:21 Max Elevation : 0.92 [deg]	Sunshine	No operation			
	4	AOS(JST) : 20:06:46 LOS(JST) : 20:18:04 Max Elevation : 51.13 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.111[V] ・Angular velocity : 80.89[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:42:12 LOS(JST) : 21:50:25 Max Elevation : 7.49 [deg]	Shade	No operation			
22/12/2019	1	AOS(JST) : 7:39:36 LOS(JST) : 7:46:03 Max Elevation : 4.07 [deg]	Sunshine	No operation			
	2	AOS(JST) : 9:11:15 LOS(JST) : 9:22:25 Max Elevation : 73.90 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.178[V] ・Angular velocity : 80.31[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:47:05 LOS(JST) : 10:52:18 Max Elevation : 2.61 [deg]	Sunshine	No operation			
	4	AOS(JST) : 19:45:38 LOS(JST) : 19:56:21 Max Elevation : 26.10 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.111[V] ・Angular velocity : 80.24[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:19:39 LOS(JST) : 21:29:36 Max Elevation : 7.49 [deg]	Shade	No operation			
23/12/2019	1	AOS(JST) : 8:49:46 LOS(JST) : 9:00:52 Max Elevation : 73.90 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 80.94[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:24:28 LOS(JST) : 10:32:27 Max Elevation : 7.69 [deg]	Sunshine	No operation			
	3	AOS(JST) : 19:24:49 LOS(JST) : 19:34:28 Max Elevation : 14.38 [deg]	Sunshine	No operation			
	4	AOS(JST) : 20:57:33 LOS(JST) : 21:08:27 Max Elevation : 28.41 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.113[V] ・Angular velocity : 81.25[deg/s]	・Radio interference : weak
24/12/2019	1	AOS(JST) : 8:28:28 LOS(JST) : 8:39:02 Max Elevation : 25.25 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 80.94[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:02:21 LOS(JST) : 10:11:57 Max Elevation : 14.97 [deg]	Sunshine	No operation			
	3	AOS(JST) : 19:04:22 LOS(JST) : 19:12:19 Max Elevation : 7.34 [deg]	Shade	No operation			
	4	AOS(JST) : 20:35:46 LOS(JST) : 20:47:07 Max Elevation : 57.77 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : -[deg/s]	・Radio interference : strong
	5	AOS(JST) : 22:14:48 LOS(JST) : 22:16:34 Max Elevation : 0.24 [deg]	Shade	No operation			
25/12/2019	1	AOS(JST) : 8:07:22 LOS(JST) : 8:16:52 Max Elevation : 13.32 [deg]	Sunshine	No operation			
	2	AOS(JST) : 9:40:29 LOS(JST) : 9:51:04 Max Elevation : 27.49 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.141[V] ・Angular velocity : 84.30[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:44:37 LOS(JST) : 18:49:38 Max Elevation : 2.35 [deg]	Shade	No operation			
	4	AOS(JST) : 20:14:15 LOS(JST) : 20:25:36 Max Elevation : 67.23 [deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.111[V] ・Angular velocity : 85.08[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:50:19 LOS(JST) : 21:57:30 Max Elevation : 5.20 [deg]	Shade	No operation			
26/12/2019	1	AOS(JST) : 7:46:39 LOS(JST) : 7:54:11 Max Elevation : 13.32 [deg]	Sunshine	No operation			
	2	AOS(JST) : 9:40:29 LOS(JST) : 9:51:04 Max Elevation : 27.49 [deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.128[V] ・Angular velocity : 86.80[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:55:20 LOS(JST) : 10:58:50 Max Elevation : 1.09 [deg]	Sunshine	No operation			
	4	AOS(JST) : 19:53:01 LOS(JST) : 20:03:56 Max Elevation : 32.61 [deg]	Shade	No operation due to absence of operaters			
	5	AOS(JST) : 21:27:31 LOS(JST) : 21:36:52 Max Elevation : 11.86 [deg]	Shade				

Table 59 Detail of Operation from 27 December 2019 to 2 January 2020

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
27/12/2019	1	AOS(JST) : 07:26:58 LOS(JST) : 07:30:21 Max Elevation : 0.95[deg]	Sunshine	No operation			
	2	AOS(JST) : 08:57:15 LOS(JST) : 09:08:26 Max Elevation : 68.40[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.161[V] ・Angular velocity : 89.54[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:32:17 LOS(JST) : 10:39:28 Max Elevation : 5.69[deg]	Sunshine	No operation			
	4	AOS(JST) : 19:32:04 LOS(JST) : 19:42:06 Max Elevation : 17.68[deg]	Shade	No operation			
	5	AOS(JST) : 21:05:16 LOS(JST) : 21:15:50 Max Elevation : 22.36[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 90.57[deg/s]	・Radio interference : weak
28/12/2019	1	AOS(JST) : 08:35:21 LOS(JST) : 08:46:42 Max Elevation : 32.21[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.160[V] ・Angular velocity : 91.78[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:10:02 LOS(JST) : 10:19:08 Max Elevation : 12.00[deg]	Sunshine	No operation			
	3	AOS(JST) : 19:11:28 LOS(JST) : 19:20:03 Max Elevation : 9.45[deg]	Shade	No operation			
	4	AOS(JST) : 20:43:22 LOS(JST) : 20:54:33 Max Elevation : 43.67[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.104[V] ・Angular velocity : 92.34[deg/s]	・Radio interference : weak
29/12/2019	1	AOS(JST) : 08:14:40 LOS(JST) : 08:24:39 Max Elevation : 16.91[deg]	Sunshine	No operation			
	2	AOS(JST) : 09:48:04 LOS(JST) : 09:58:23 Max Elevation : 22.05[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.179[V] ・Angular velocity : 93.01[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:51:23 LOS(JST) : 18:57:37 Max Elevation : 3.89[deg]	Shade	No operation			
	4	AOS(JST) : 20:21:45 LOS(JST) : 20:33:05 Max Elevation : 87.67[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ	・To check Angular velocity.	・Bus voltage : 4.106[V] ・Angular velocity : 93.12[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:58:34 LOS(JST) : 22:04:25 Max Elevation : 3.15[deg]	Shade	No operation			
30/12/2019	1	AOS(JST) : 07:53:46 LOS(JST) : 08:02:11 Max Elevation : 8.49[deg]	Sunshine	No operation			
	2	AOS(JST) : 09:26:18 LOS(JST) : 09:37:18 Max Elevation : 42.46[deg]	Sunshine	No operation			
	3	AOS(JST) : 20:00:24 LOS(JST) : 20:11:28 Max Elevation : 41.52[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing command uplink	・To check Angular velocity.	・Bus voltage : 4.106[V] ・Angular velocity : 93.40[deg/s]	・Radio interference : weak
	4	AOS(JST) : 21:35:26 LOS(JST) : 21:44:04 Max Elevation : 9.02[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity.	・Bus voltage : 4.106[V] ・Angular velocity : 93.40[deg/s]	・Radio interference : weak
31/12/2019	1	AOS(JST) : 07:33:29 LOS(JST) : 07:38:58 Max Elevation : 2.74[deg]	Sunshine	No operation			
	2	AOS(JST) : 09:04:42 LOS(JST) : 09:15:56 Max Elevation : 89.60[deg]	Sunshine	No operation			
	3	AOS(JST) : 10:40:08 LOS(JST) : 10:46:21 Max Elevation : 3.94[deg]	Sunshine	No operation			
	4	AOS(JST) : 19:39:20 LOS(JST) : 19:49:41 Max Elevation : 21.75[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing (heater ON for 30 minutes) command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.111[V] ・Angular velocity : 92.71[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:13:00 LOS(JST) : 21:23:08 Max Elevation : 7.68[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.062[V] ・Angular velocity : 92.71[deg/s]	・Radio interference : weak
1/1/2020	1	AOS(JST) : 08:43:14 LOS(JST) : 08:54:18 Max Elevation : 41.78[deg]	Sunshine	No operation			
	2	AOS(JST) : 10:17:42 LOS(JST) : 10:26:15 Max Elevation : 9.52[deg]	Sunshine	No operation			
	3	AOS(JST) : 19:18:35 LOS(JST) : 19:27:43 Max Elevation : 11.86[deg]	Sunshine	No operation			
	4	AOS(JST) : 20:50:58 LOS(JST) : 21:01:55 Max Elevation : 33.57[deg]	Shade	No operation			
2/1/2020	1	AOS(JST) : 08:21:58 LOS(JST) : 08:32:22 Max Elevation : 21.37[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing (heater ON for 30 minutes) command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 92.60[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:55:39 LOS(JST) : 10:05:38 Max Elevation : 17.85[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.149[V] ・Angular velocity : 92.31[deg/s] ・Recieved packet number Horizontal polarization : 743 Vertical polarization : 182 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 18:58:17 LOS(JST) : 19:05:27 Max Elevation : 5.60[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing (for 90 minutes, at 10 sec interval) command uplink	・To check Angular velocity. ・To check sensing normally.	・Bus voltage : 4.113[V] ・Angular velocity : 92.66[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:29:14 LOS(JST) : 20:40:31 Max Elevation : 71.06[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To check sensing data.	・Bus voltage : 4.069[V] ・Angular velocity : 92.34[deg/s] ・Recieved packet number Horizontal polarization : 1356 Vertical polarization : 940 Circularly polarization : -	・Radio interference : weak
	5	AOS(JST) : 22:07:05 LOS(JST) : 22:11:01 Max Elevation : 1.30[deg]	Shade	No operation			

Table 60 Detail of Operation from 3 January 2020 to 9 January 2020

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
3/1/2020	1	AOS(JST) : 08:00:56 LOS(JST) : 08:10:04 Max Elevation : 11.20[deg]	Sunshine	・CW custom operation(437.075MHz) →CDH switch ON command uplink	・To check Angular velocity. ・judge whether switch information is normal or not.	・Bus voltage : 4.178[V] ・Angular velocity : 92.67[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:33:49 LOS(JST) : 09:44:39 Max Elevation : 33.19[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.149[V] ・Angular velocity : 92.31[deg/s] ・Recieved packet number Horizontal polarization : 743 Vertical polarization : 182 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 18:38:57 LOS(JST) : 18:42:20 Max Elevation : 1.01[deg]	Shade	No operation			
	4	AOS(JST) : 20:07:47 LOS(JST) : 20:18:57 Max Elevation : 54.05[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing (for 90 minutes, at 10 sec interval) command uplink	・To check Angular velocity. ・To check sensing normally.	・Bus voltage : 4.117[V] ・Angular velocity : 93.75deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:43:24 LOS(JST) : 21:51:10 Max Elevation : 6.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・To check sensing data.	・Bus voltage : 4.106[V] ・Angular velocity : 94.03[deg/s] ・Recieved packet number Horizontal polarization : 73 Vertical polarization : 95 Circularly polarization : -	・Radio interference : weak
4/1/2020	1	AOS(JST) : 07:40:20 LOS(JST) : 07:47:12 Max Elevation : 4.70[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing (heater ON for 30 minutes) command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 95.01[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:12:09 LOS(JST) : 09:23:23 Max Elevation : 69.43[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.160[V] ・Angular velocity : 95.00[deg/s] ・Recieved packet number Horizontal polarization : 519 Vertical polarization : 749 Circularly polarization : -	・Radio interference : weak
	3	AOS(JST) : 10:48:05 LOS(JST) : 10:53:05 Max Elevation : 2.37[deg]	Sunshine	No operation			
	4	AOS(JST) : 19:46:37 LOS(JST) : 19:57:14 Max Elevation : 26.96[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK data sensing (for 90 minutes, at 10 sec interval) command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 95.76[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:20:45 LOS(JST) : 21:30:23 Max Elevation : 13.92[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・HK sensing data downlink →FSK transmitter,GMSK9k6,435.900MHz	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 3.916[V] ・Angular velocity : 96.10[deg/s] ・Recieved packet number Horizontal polarization : 602 Vertical polarization : 109 Circularly polarization : -	・Radio interference : weak
5/1/2020	1	AOS(JST) : 08:50:37 LOS(JST) : 09:01:51 Max Elevation : 4.70[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・CDH ROM sector erase →ROM0,SC14-20,ROM1,SC14-29	・To check Angular velocity. ・To create CDH ROM space.	・Bus voltage : 4.139[V] ・Angular velocity : 97.85[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:25:23 LOS(JST) : 10:33:18 Max Elevation : 69.43[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink Uplink at the zenith→Uplink near the zenith,ON after 10s,OFF after 41min,ON after 88min,OFF after 136min	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.179[V] ・Angular velocity : 98.09[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:25:44 LOS(JST) : 19:35:20 Max Elevation : 14.71[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink Uplink at the zenith→Uplink near the zenith,ON after 20min,OFF after 67min	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : -[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:58:35 LOS(JST) : 21:09:15 Max Elevation : 26.25[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink Uplink at the zenith→Uplink near the zenith,ON after 21min,OFF after 69min,ON after 116min,163min	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 98.98[deg/s]	・Radio interference : weak
6/1/2020	1	AOS(JST) : 08:29:16 LOS(JST) : 08:40:01 Max Elevation : 27.06[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink Uplink at the zenith→Uplink near the zenith,ON after 10s,OFF after 36min	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.144[V] ・Angular velocity : 100.71[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:03:13 LOS(JST) : 10:12:49 Max Elevation : 14.50[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink Uplink at the zenith→Uplink near the zenith,ON after 10s,OFF after 39min,ON after 85min,OFF after 133min	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.196[V] ・Angular velocity : 100.69[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:05:14 LOS(JST) : 19:13:10 Max Elevation : 7.51[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink Uplink at the zenith→Uplink near the zenith,ON after 19min,OFF after 66min	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.108[V] ・Angular velocity : 101.67[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:36:44 LOS(JST) : 20:47:54 Max Elevation : 53.42[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink Uplink at the zenith→Uplink near the zenith,ON after 21min,OFF after 68min,ON after 115min,OFF after 163min	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.107[V] ・Angular velocity : 101.74[deg/s]	・Radio interference : weak
7/1/2020	1	AOS(JST) : 8:08:07 LOS(JST) : 8:17:51 Max Elevation : 14.39[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 103.47[deg/s]	・Radio interference : weak
	2	AOS(JST) : 9:41:19 LOS(JST) : 9:51:57 Max Elevation : 26.52[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.196[V] ・Angular velocity : 103.22[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:45:24 LOS(JST) : 18:50:30 Max Elevation : 2.46[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:15:19 LOS(JST) : 20:26:23 Max Elevation : 71.34[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.114[V] ・Angular velocity : 104.02[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:51:26 LOS(JST) : 21:58:07 Max Elevation : 4.42[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.107[V] ・Angular velocity : 104.10[deg/s]	・Radio interference : weak
8/1/2020	1	AOS(JST) : 7:47:19 LOS(JST) : 7:55:14 Max Elevation : 6.89[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.179[V] ・Angular velocity : 105.26[deg/s]	・Radio interference : weak
	2	AOS(JST) : 9:19:34 LOS(JST) : 9:30:46 Max Elevation : 52.77[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.196[V] ・Angular velocity : 103.22[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:56:14 LOS(JST) : 10:59:31 Max Elevation : 0.94[deg]	Sunshine	No operation due to low elevation.			
	4	AOS(JST) : 19:53:53 LOS(JST) : 20:04:42 Max Elevation : 33.86[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.104[V] ・Angular velocity : 105.96[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:28:31 LOS(JST) : 21:37:33 Max Elevation : 10.82[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.107[V] ・Angular velocity : 104.10[deg/s]	・Radio interference : weak
9/1/2020	1	AOS(JST) : 07:27:21 LOS(JST) : 07:31:38 Max Elevation : 1.55[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 08:57:59 LOS(JST) : 09:09:19 Max Elevation : 73.12[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.177[V] ・Angular velocity : 106.47[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:33:05 LOS(JST) : 10:40:13 Max Elevation : 5.52[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.140[V] ・Angular velocity : 106.63[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:32:53 LOS(JST) : 19:42:52 Max Elevation : 18.14[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 106.41[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:06:11 LOS(JST) : 21:16:31 Max Elevation : 20.76[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.106[V] ・Angular velocity : 106.63[deg/s]	・Radio interference : weak

Table 61 Detail of Operation from 10 January 2020 to 16 January 2020

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
10/1/2020	1	AOS(JST) : 08:36:33 LOS(JST) : 08:47:35 Max Elevation : 34.58[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.136[V] ・Angular velocity : 107.13[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:10:46 LOS(JST) : 10:19:55 Max Elevation : 11.74[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Heater ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Heater ON and Angular velocity.	・Bus voltage : 4.160[V] ・Angular velocity : 107.21[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:12:13 LOS(JST) : 19:20:48 Max Elevation : 9.68[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 106.95[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:44:13 LOS(JST) : 20:55:14 Max Elevation : 40.57[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.083[V] ・Angular velocity : 106.88[deg/s]	・Radio interference : weak
11/1/2020	1	AOS(JST) : 08:15:18 LOS(JST) : 08:25:33 Max Elevation : 18.21[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.178[V] ・Angular velocity : 107.24[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:48:47 LOS(JST) : 09:59:10 Max Elevation : 21.50[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.178[V] ・Angular velocity : 107.16[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:52:05 LOS(JST) : 18:58:22 Max Elevation : 4.05[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.107[V] ・Angular velocity : 107.01[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:22:33 LOS(JST) : 20:33:46 Max Elevation : 87.51[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.112[V] ・Angular velocity : 106.89[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:59:37 LOS(JST) : 22:04:53 Max Elevation : 2.51[deg]	Shade	No operation due to low elevation.			
12/1/2020	1	AOS(JST) : 07:54:20 LOS(JST) : 08:03:06 Max Elevation : 9.36[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.149[V] ・Angular velocity : 107.55[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:26:59 LOS(JST) : 09:38:05 Max Elevation : 40.82[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.199[V] ・Angular velocity : 107.47[deg/s]	・Radio interference : weak
	3	AOS(JST) : 20:01:09 LOS(JST) : 20:12:08 Max Elevation : 43.39[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 107.29[deg/s]	・Radio interference : weak
	4	AOS(JST) : 21:36:19 LOS(JST) : 21:44:38 Max Elevation : 8.20[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.090[V] ・Angular velocity : 107.26[deg/s]	・Radio interference : weak
13/1/2020	1	AOS(JST) : 07:33:55 LOS(JST) : 07:39:59 Max Elevation : 3.40[deg]	Sunshine	No operation due to low elevation.			
	2	AOS(JST) : 09:05:19 LOS(JST) : 09:16.43 Max Elevation : 85.91[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.179[V] ・Angular velocity : 108.26[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:40:48 LOS(JST) : 10:47:02 Max Elevation : 3.85[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.149[V] ・Angular velocity : 107.80[deg/s]	・Radio interference : weak
	4	AOS(JST) : 19:40:02 LOS(JST) : 19:50:20 Max Elevation : 22.39[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 108.04[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:13:48 LOS(JST) : 21:23:43 Max Elevation : 16.50[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.086[V] ・Angular velocity : 107.84[deg/s]	・Radio interference : weak
14/1/2020	1	AOS(JST) : 08:43:49 LOS(JST) : 08:55:04 Max Elevation : 44.81[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 108.93[deg/s]	・Radio interference : weak
	2	AOS(JST) : 10:18:19 LOS(JST) : 10:26:56 Max Elevation : 9.38[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.177[V] ・Angular velocity : 108.68[deg/s]	・Radio interference : weak
	3	AOS(JST) : 19:19:13 LOS(JST) : 19:28:21 Max Elevation : 12.18[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 109.29[deg/s]	・Radio interference : weak
	4	AOS(JST) : 20:51:42 LOS(JST) : 21:02:30 Max Elevation : 31.46[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.088[V] ・Angular velocity : 109.03[deg/s]	・Radio interference : weak
15/1/2020	1	AOS(JST) : 08:22:30 LOS(JST) : 08:33:09 Max Elevation : 22.92[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.189[V] ・Angular velocity : 110.27[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:56:14 LOS(JST) : 10:06:18 Max Elevation : 17.57[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.149[V] ・Angular velocity : 108.28[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:58:51 LOS(JST) : 19:06:05 Max Elevation : 5.82[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.106[V] ・Angular velocity : 111.04[deg/s]	・Radio interference : weak
	4	AOS(JST) : 18:58:51 LOS(JST) : 19:06:05 Max Elevation : 5.82[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.113[V] ・Angular velocity : 111.15[deg/s]	・Radio interference : weak
	5	AOS(JST) : 18:58:51 LOS(JST) : 19:06:05 Max Elevation : 5.82[deg]	Shade	No operation due to low elevation.			
16/1/2020	1	AOS(JST) : 08:01:24 LOS(JST) : 08:10:52 Max Elevation : 12.19[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.179[V] ・Angular velocity : 112.18[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:34:22 LOS(JST) : 09:45:19 Max Elevation : 32.31[deg]	Sunshine	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.144[V] ・Angular velocity : 112.25[deg/s]	・Radio interference : weak
	3	AOS(JST) : 18:39:23 LOS(JST) : 18:43:01 Max Elevation : 1.19[deg]	Shade	No operation due to low elevation.			
	4	AOS(JST) : 20:08:25 LOS(JST) : 20:19:30 Max Elevation : 56.78[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.110[V] ・Angular velocity : 113.11[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:44:09 LOS(JST) : 21:51:36 Max Elevation : 5.94[deg]	Shade	・CW custom operation(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera switch ON in sunshine command uplink	・To check Angular velocity. ・Check relationship between Camera switch ON and Angular velocity.	・Bus voltage : 4.085[V] ・Angular velocity : 112.93[deg/s]	・Radio interference : weak

Table 62 Detail of Operation from 17 January 2020 to 18 January 2019

Day	Pass number	Operation				Operation result	
		Operation condition	Sunshine/Shade	Verification items	Verification purpose	Analysis result	Remarks
17/1/2020	1	AOS(JST) : 07:40:43 LOS(JST) : 07:48:03 Max Elevation : 5.43[deg]	Sunshine	・CW custom oleration(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera power ON command uplink during sunshine	・ To confirm Angular velocity. ・ To confirm the relationship between camera power ON and Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 114.44[deg/s]	・Radio interference : weak
	2	AOS(JST) : 09:12:39 LOS(JST) : 09:24:03 Max Elevation : 66.23[deg]	Sunshine	・CW custom oleration(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera power ON command uplink during sunshine	・ To confirm Angular velocity. ・ To confirm the relationship between camera power ON and Angular velocity.	・Bus voltage : 4.161[V] ・Angular velocity : 114.56[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:48:38 LOS(JST) : 10:53:40 Max Elevation : 2.34[deg]	Sunshine	No operation			
	4	AOS(JST) : 19:47:11 LOS(JST) : 19:57:46 Max Elevation : 27.88[deg]	Shade	・CW custom oleration(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera power ON command uplink during sunshine	・ To confirm Angular velocity. ・ To confirm the relationship between camera power ON and Angular velocity.	・Bus voltage : 4.108[V] ・Angular velocity : 115.22[deg/s]	・Radio interference : weak
	5	AOS(JST) : 21:21:25 LOS(JST) : 21:30:51 Max Elevation : 13.06[deg]	Shade	・CW custom oleration(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera power ON command uplink during sunshine		・Bus voltage : 4.088[V] ・Angular velocity : 115.52[deg/s]	・Radio interference : weak
18/1/2020	1	AOS(JST) : 07:21:25 LOS(JST) : 07:23:43 Max Elevation : 0.42[deg]	Sunshine	No operation			
	2	AOS(JST) : 08:51:06 LOS(JST) : 09:02:30 Max Elevation : 58.88[deg]	Sunshine	・CW custom oleration(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ ・Camera power ON command uplink during sunshine	・ To confirm Angular velocity. ・ To confirm the relationship between camera power ON and Angular velocity.	・Bus voltage : 4.139[V] ・Angular velocity : 117.20[deg/s]	・Radio interference : weak
	3	AOS(JST) : 10:25:53 LOS(JST) : 10:33:52 Max Elevation : 7.34[deg]	Sunshine	・CW custom oleration(437.075MHz) →Bus voltage,GyroX,GyroY,GyroZ・CAM Shooting command uplink	・ To confirm Angular velocity. ・ To take a commemorative photo of the first anniversary of the launch.	・Bus voltage : 4.160[V] ・Angular velocity : 117.48[deg/s]	・Radio interference : weak
	4						
	5						

Appendix

A.1. Overview of NEXUS

NEXUS is the abbreviation of "NExt generation X Unique Satellite", and the word "NEXUS" has the meaning as "bonds" and "connection". NEXUS is a 10cm cubic satellite with about 1.3kg weight, i.e. 1U CubeSat, and the fourth nanosatellite for Nihon University.

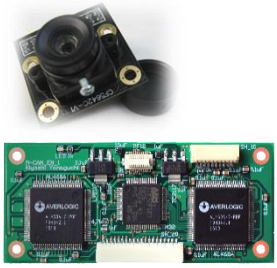
NEXUS has 1) a linear transponder, 2) an FSK transmitter, 3) π/4 shift QPSK transmitter, and 4) a small camera system (N-CAM), and the main mission of NEXUS is the demonstration of these instruments in space.

図 1　NEXUS

Linear transponder

FSK transmitter

π/4 shift QPSK transmitter



N-CAM

図 2　Mission instruments

In last several years (about five years), the number of the launched CubeSat increased rapidly. Many of those CubeSats used the amateur band for the communication with the ground station. However, the conventional transmitters for CubeSat have relatively low communication speed, or large power consumption or quite expensive even if they have high communication speed. Thus, there is few transmitters with small sized, low cost, and easy-to-use.

Based on such background, the objective of NEXUS is to develop and demonstrate the low-cost transmitters with relatively high performance. We hope our transmitters will be used in future CubeSats after the mission of NEXUS will be completed. In addition, we will open the detail of the design of N-CAM for the people who develop such a small camera system.

You can see the detail of the mission instruments and the satellite system in our web site:

http://sat.aero.cst.nihon-u.ac.jp/nexus/1_System.html

The mission of NEXUS is as follows. The detail of NEXUS is appeared in our web site:

http://sat.aero.cst.nihon-u.ac.jp/nexus/1_Mission.html

Success level	Mission	
Minimum success	Mission#1	Demonstration of the newly developed π/4 shift QPSK transmitter
	Mission#2	Demonstration of the newly developed FSK transmitter
Full success	Mission#3	Verification of practicality of the π/4 shift QPSK transmitter
	Mission#4	Verification of practicality of the FSK transmitter
	Mission#5	Demonstration of the newly developed linear transponder
	Mission#6	Verification of practicality of N-CAM
Extra success	Mission#7	Mapping of RSSI (received signal strength indicator) of 145Mhz band around 500km altitude

A.2. Operation plan before launch and actual operation status

The operation planned before the launch is listed in Table 63.

Table 63 Operation plan

Just after launch	Conformation of downlink and uplink with NEXUS Start of initial operation
1 month later	Completion of Initial operation (check of whole satellite system and the missioninstruments)
2 months later	Achievement of Mission#1: demonstration of π/4 shift QPSK transmitter
3 months later	Achievement of Mission#2: demonstration of FSK transmitter [Minimum success]
4 months later	Achievement of Mission#5: demonstration of linear transponder
5 months later - 12 months later (as maximum)	Achievement of Mission#3: verification of practicality of N-CAM
	Achievement of Mission#3: verification of practicality of π/4 shift QPSK transmitter
	Achievement of Mission#4: verification of practicality of FSK transmitter [Full success]
	Achievement of Mission#7: mapping of RSSI at 145MHz band around 500km altitude [Extra success]
12 months late (as maximum)	Completion of all missions
Henceforth	Transition to operation by amateur radio people

On the other hand, the actual operation is as listed in Table 64.

Table 64 Actual operation status

Just after launch	Conformation of downlink and uplink with NEXUS Start of initial operation
9 days later	Completion of Initial operation (check of whole satellite system and the missioninstruments)
5 days later	Achievement of Mission#1: demonstration of π/4 shift QPSK transmitter
5 days later	Achievement of Mission#2: demonstration of FSK transmitter [Minimum success]
8 days later	Achievement of Mission#5: demonstration of linear transponder
16 days later	Achievement of Mission#3: verification of practicality of N-CAM
	Achievement of Mission#3: verification of practicality of π/4 shift QPSK transmitter
	Achievement of Mission#4: verification of practicality of FSK transmitter [Full success]
	Achievement of Mission#7: mapping of RSSI at 145MHz band around 500km altitude [Extra success]
	Completion of all missions
	Transition to operation by amateur radio people