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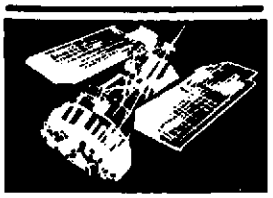
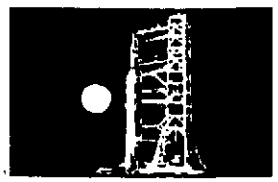
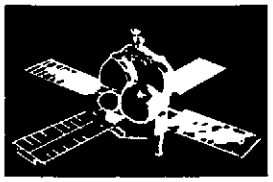
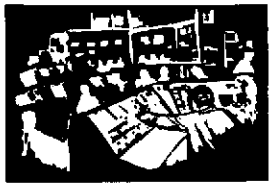
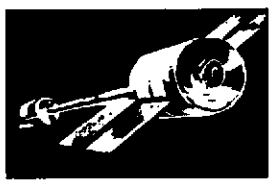
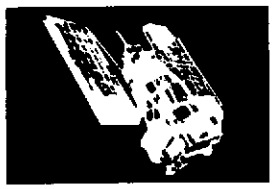
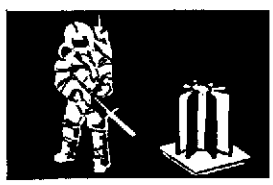
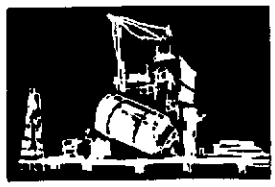
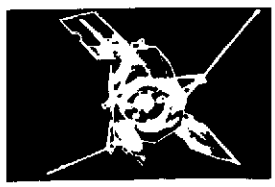











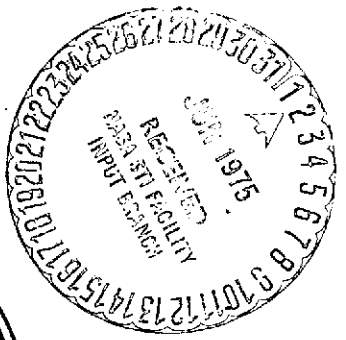
NASA CR-143744

75SDS4215
21 MARCH 1975

LANDSAT 2 LAUNCH AND FLIGHT ACTIVATION EVALUATION REPORT 22 TO 26 JANUARY 1975 LAUNCH THROUGH ORBIT 50 AND ORBIT ADJUST OPERATION

Prepared by
GE LANDSAT OPERATION CONTROL CENTER

For
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Goddard Space Flight Center
Greenbelt, Maryland 20771



GENERAL ELECTRIC

Contract NAS5-21808

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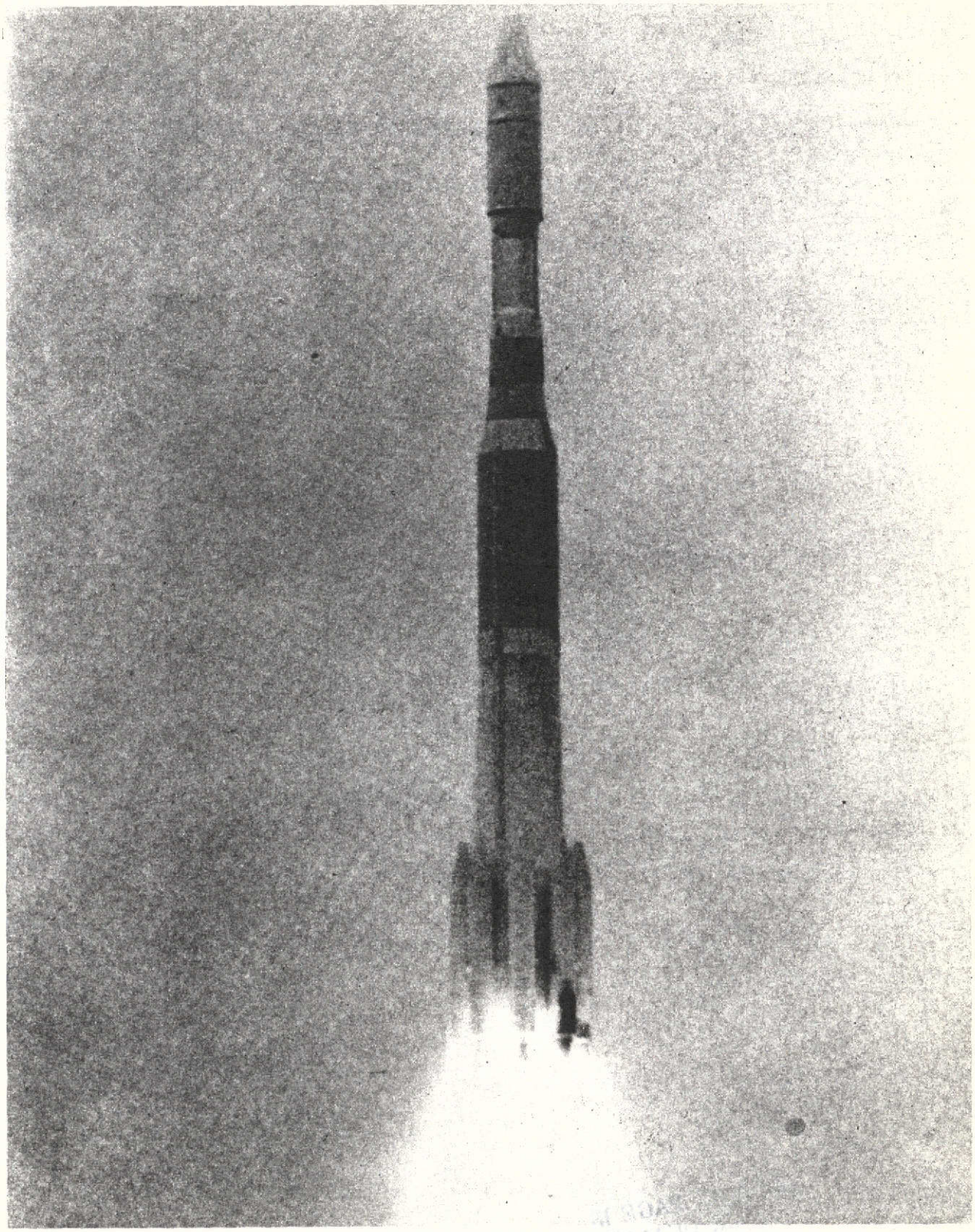
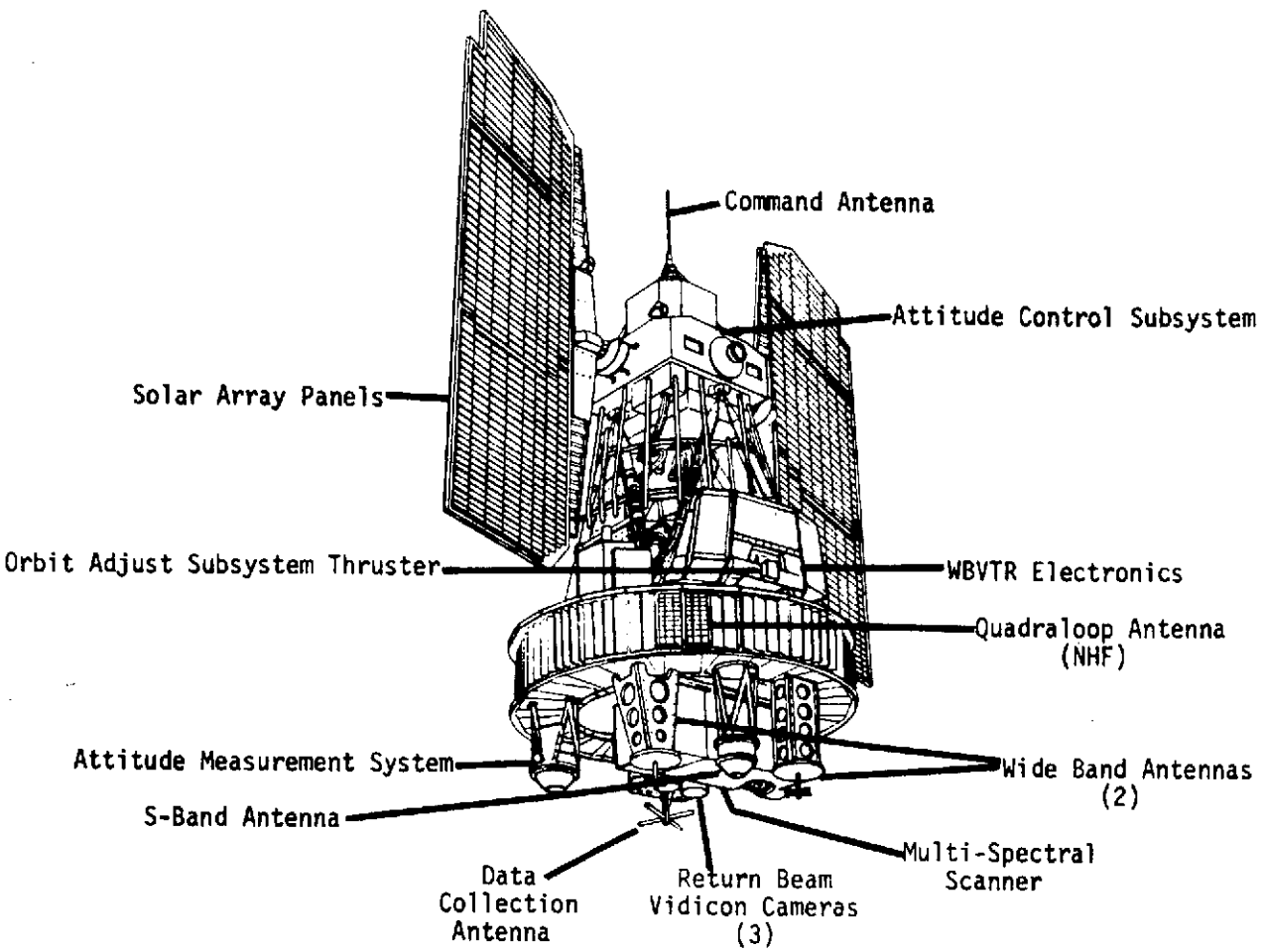
Approved: Thomas W. Winchester
Thomas W. Winchester

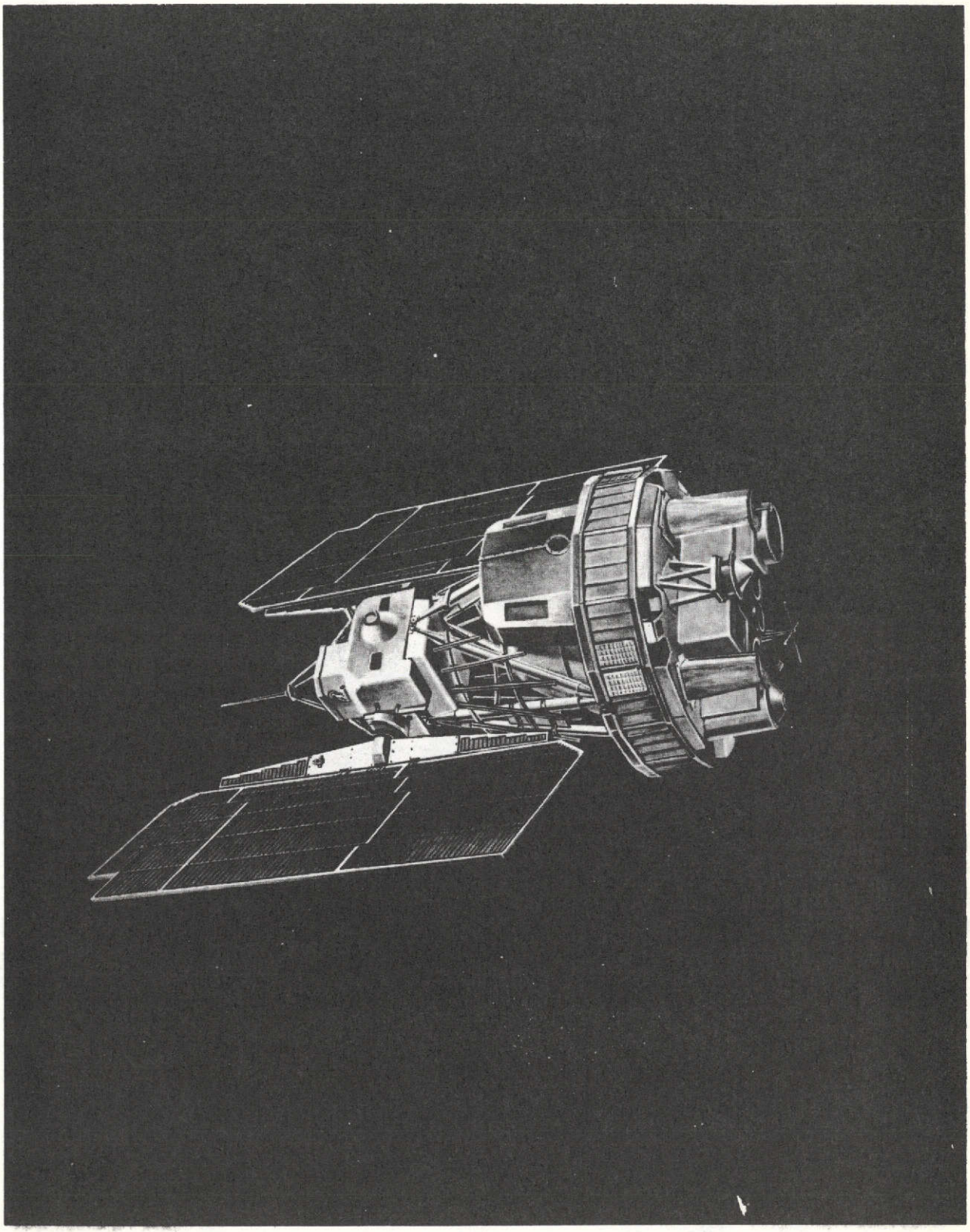
SPACE DIVISION
Valley Forge Space Center
P. O. Box 8555 • Philadelphia, Penna. 19101

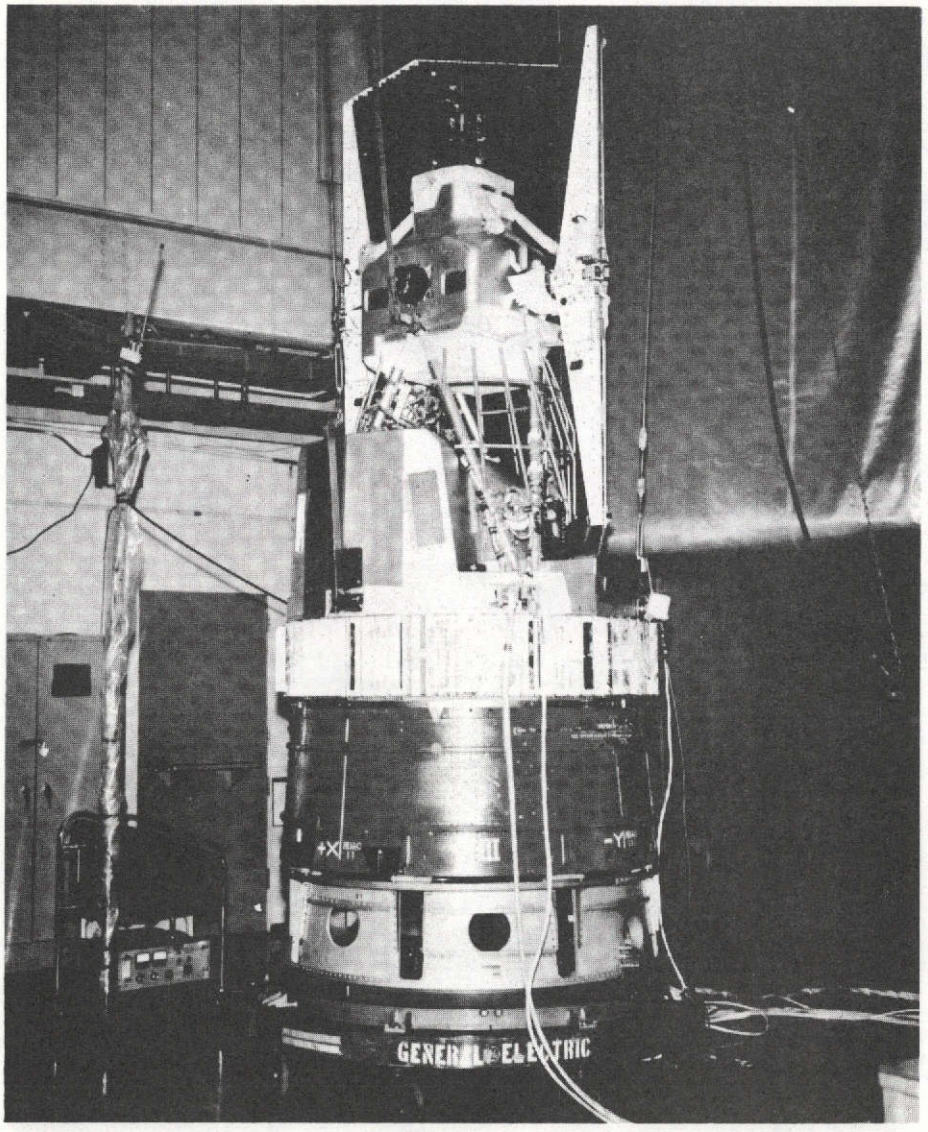
GENERAL ELECTRIC



OBSERVATORY CONFIGURATION







LANDSAT Observatory Launch Configuration

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SECTION 1

INTRODUCTION

SECTION 1
INTRODUCTION

This document contains the results of the analysis conducted on the telemetry data from the prelaunch, launch and flight activation phases of LANDSAT-2 spacecraft. It is presented by subsystem sections and provides for interrelationships as they exist between several subsystems. A brief statement of subsystem characteristics precedes flight evaluation statements. The appendix contains a total list of components flown on LANDSAT-2 and a complete listing of commands and telemetry functions for reference.

Flight data is compared to baseline data established at the $20^{o}C$ plateau during thermal vacuum testing of the spacecraft. Evaluation guidelines were derived from the specifications developed from the LANDSAT program objectives, i.e., The primary mission objective of LANDSAT-2 is the acquisition of multispectral images of the surface of the earth. To accomplish this objective, two different types of multispectral sensors are used; a three camera return beam vidicon (RBV) system, and a four-channel multispectral scanner (MSS).

A secondary objective is the use of the LANDSAT-2 receiving, frequency translating, and transmitting equipment as a relay system to gather data from fixed earth-based sensor platforms which are operated by individual investigators.

Systematic, repetitive earth coverage under nearly constant observation conditions is required for maximum utility of the multispectral imagery to be collected by LANDSAT-2. A circular sun-synchronous orbit provides the optimum repetitive observations conditions.

LANDSAT-1 has been in orbit since July 23, 1972, and has its orbital parameters adjusted to make all descending equatorial crossings have the same sun angle, and to repeat the sub-vehicle earth trace every 251 orbits (18 days). LANDSAT-2 has essentially the same orbit, but is adjusted so that the combination of LANDSAT-1 and LANDSAT-2 provide repeat coverage of the sub-vehicle earth trace every 9 days.

The first 50 orbits are covered in this report.

SECTION 2

SUMMARY

SECTION 2

SUMMARY - ORBITS 1-50

The LANDSAT-2 spacecraft was launched from the Western Test Range on 22 January 1975 at 022:17:55:51.604. The launch and orbital injection phase of the spaceflight were nominal and deployment of the spacecraft followed predictions.

POWER SUBSYSTEM (PWR)

After separation, the solar paddles deployed successfully, slewed to proper position, and began normal sun tracking. The array current averaged 14.7 amperes and reached a peak current of 15.8 amperes. Battery voltages were 33.2 VDC at max charge, and the end-of-night voltages were about 28.6 VDC. Battery temperatures averaged 19.0°C. All compensation and auxiliary loads completed checkout successfully. In Orbit 2 the shunt loads drew current, showing that the automatic shunt dissipators were operable.

ATTITUDE CONTROL SUBSYSTEM (ACS)

Following a nominal separation at 18:54:55 and subsequent stabilization, the ACS continued to operate normally. Roll, pitch, and yaw position and rates specification were met successfully. Existing levels of spacecraft disturbance torques resulted in an average of 1-2 gates of +R and 0-1 gates +P polarities per orbit. Analyses are continuing to evaluate the nature of the disturbances and to define subsequent compensation via the use of the Magnetic Moment Compensating Assembly (MMCA). The yaw mode was commanded to "normal" during interrogation 1 Alaska.

The overall performance of the ACS has been excellent.

COMMAND/CLOCK SUBSYSTEM (CMD)

All command functions have performed well. From separation of the spacecraft, real time, COMSTOR and ECAM commands have been executed in a timely and exact manner. All

difficulties associated with commanding have been directly relatable to acquisition/pointing and non-spacecraft problems.

TELEMETRY SUBSYSTEM (TLM)

Normal telemetry was consistently received with both the USB and VHF down links being exercised. All functions in the telemetry matrix are normal and within expected limits. All telemetry indicates that the spacecraft telemetry subsystem performance has been nominal.

ORBIT ADJUST SUBSYSTEM (OAS)

Health functions of the OAS were normal. In-plane orbital corrections were made by firing the -X and +X thrusters. The test burns on these thrusters lasted 4.8 seconds each and the longest burns were of 420 seconds duration. All operations were normal. Tracking data have confirmed the desired corrections. About 6.69 pounds of hydrazine were used during these maneuvers.

MAGNETIC MOMENT COMPENSATING ASSEMBLY (MMCA)

Telemetry function 4002 was defective prior to launch. Other health functions of the MMCA were normal. The unit was not activated during the period of this report. Insertion of dipole values was deferred pending evaluation of the ACS performance. ACS gating during this period has averaged less than one gate in the +R, -R and +P direction per orbit.

UNIFIED "S" BAND/PREMODULATION PROCESSOR (USBE)

The USBE functioned normally throughout this period. Carrier and subcarrier frequencies and formats were present for commands, telemetry, (1 kb real time and 24 kb playback) ranging, and data collection system transmissions. Power output was nominal.

SEPARATION AND UNFOLD SUBSYSTEM (SUS)

The separation subsystem performed as expected. The 2.5 second timer initiated paddle unfold. Before separation the subsystem properly restrained the paddles, disabled the primary and redundant matrix A drivers, provided -24.5 VDC to the Attitude Control reset line, and provided telemetry signals indicating that the spacecraft was still mated to the Delta Vehicle. After separation all circuits were activated, separation was confirmed, and paddles were deployed properly. Both separation switches closed as expected.

THERMAL SUBSYSTEM (THM)

The operation of the thermal subsystem in both the sensory ring and the ACS was within the expected limits at all locations. Average temperatures were: ACS baseplate 20.5^{o}C, sensory ring 18.9^{o}C, and center section 19.3^{o}C. The shutter position average at Orbit 50 was 42.8^{o}.

ELECTRICAL INTERFACE SUBSYSTEM (EIS)

All EIS functions that were exercised during launch and activation were executed and confirmed. After launch, power switching was held to a minimum. Operation of time code processing, search track data processing, back-up timer operation, signal switching, and power switching was confirmed.

NARROWBAND TAPE RECORDERS (NBTR)

Both NBTR's operated in a nominal manner. Both recorders were ON and recording during the launch phase. NBTR-1 was played back over Alaska in orbit 1. During orbit 2, both NBTR-1 and 2 were played back. Data was satisfactory and continued to be normal throughout this report period. Telemetry points on the recorders were normal.

WIDEBAND TELEMETRY SUBSYSTEM (WBTS)

Both WB links were activated during Orbit 12 in the 10 watt mode. All subsystem telemetry data was normal. The high power mode (20 watts) was tested in Orbit 13, and all telemetry was normal. Carrier-to-noise ratio in the wideband ground receiver IF was measured as a function of satellite elevation angle and checked against the RF link budget. Both links agreed within 2 dB with calculated performance, and link margins appear more than adequate for all RBV and MSS data. Prelaunch RBV and MSS data were played back over the wideband links in Orbit 15, and all data appeared normal. MSS minor frame sync errors measured were the same as measured prior to launch. (5 errors per 10 seconds at Goldstone). Both wideband RF links, including receiving site equipment, performed as predicted throughout this period.

ATTITUDE MEASUREMENT SENSOR (AMS)

The AMS power was applied during Orbit 6, and the unit has performed as expected since then. ACS fine control agrees with AMS output.

WIDEBAND VIDEO TAPE RECORDERS (WBVTR)

Both recorders were OFF and at mid-tape position during launch. During Orbit 5, the recorders were rewound in preparation for playing back of data recorded prior to launch.

In Orbit 15, prelaunch RBV data from WBVTR1 and MSS data from WBVTR2 were played back, and all data was good. MSS Sun Cal data was recorded on WBVTR2 in Orbit 21 and playbacks of prelaunch recorded data was made on both WBVTR's. WBVTR2 telemetry values and MFSE counts were nominal.

RETURN BEAM VIDICON (RBV)

The RBV subsystem was activated over Greenbelt during Orbits 40 and 41. All cameras were turned on, each operating separately and then all together. Telemetry values and MFSE counts were nominal.

The RBV was not operated again during this report period.

MULTI-SPECTRAL SCANNER (MSS)

The MSS was activated over Goldstone during Orbit 19. All operations were nominal. During Orbit 21, a sun cal occurred over Alaska. Subsequent to activation the MSS scanned 54 R/T scenes (185 KM x 185 KM) through Orbit 50, each consisting of images from 4 spectral bands obtained from the United States.

DATA COLLECTION SYSTEM (DCS)

The DCS receiver was powered during Orbit 5, and the DCS system received and re-transmitted the normal number of messages. Telemetry was nominal.

SECTION 3

SPACECRAFT ACTIVATION SEQUENCE

SECTION 3

SPACECRAFT ACTIVATION SEQUENCE

The following paragraphs describe the activation sequence for the Spacecraft through Orbit 50. This sequence is subdivided by orbit and interrogation. For each interrogation, the stations and activities are listed. Only initial activations with associated times are shown. All subsequent commanding was normal.

Prelaunch (WTR, OCC)

1. Start NBTR2 in record at 17:23:51 GMT
2. Start NBTR1 in record at 17:28:37 GMT
3. Switch to internal power at 17:42:00 GMT

Orbit 0/1 (WTR, WINKFIELD, TAN, MAD, ULA, HAW)

1. Lift off at 022:17:55:51.604
2. Separation at 18:54:55
3. Ascending Node 18:57:12
4. Confirmed Controls Stabilization of S/C, 18:56:01
5. Satellite Night to Day Transition 19:17:03
6. Enable USB Transmitters 18:57:36
7. Established Command Ability 19:10:02
8. USB Ranging ON 19:11:27
9. Playback of NBTR1 19:26:00
10. RMP-A, Low Motor Voltage 19:34:51

Orbit 2 (MAD, ULA, HAW, ACN)

1. Confirmed ability to turn auxiliary and compensation loads on and off. 21:05:53
2. Playback of NBTR2. 21:06:58

Orbit 3 (MAD, ULA, GWM)

1. Verified spacecraft status, stored and real time command capability.

Orbit 4 (ENT, ULA, GWM)

1. Verified spacecraft status, stored and real time command capability.

Orbit 5 (ENT, ULA)

1. Wideband Video-2 Recorder ON 01:59:08
2. Wideband Video-1 Recorder ON 01:59:15
3. WBVTR-2 Rewind 01:59:22
4. WBVTR-1 Rewind 01:59:22
5. WBVTR-2 OFF 02:01:20
6. WBVTR-1 OFF 02:01:21
7. DCS Receiver-1 ON 02:02:08

Orbit 6 (ENT, GDS, ULA)

1. Attitude Measurement Sensor ON 03:51:44

Orbit 7 (GDS, ULA)

1. Verified spacecraft status and command capability

Orbit 8 (HAW, ULA)

1. Verified spacecraft status and command capability

Orbit 9 (HAW, ULA)

1. Verified spacecraft status and command capability

Orbit 10 (MAD, ACN, GWM)

1. Verified spacecraft status and command capability

Orbit 11 (BDA)

1. Verified spacecraft status and command capability

Orbit 12 (ENT, ULA)

1. Wideband power amplifiers 1 and 2 ON 10 watts (no modulation) 14:29:31, OFF 14:36:53
2. Wideband frequency modulator inverter, ON 14:29:41, OFF 14:36:55

Orbit 13 (ENT, EGD)

1. Wideband power amplifier-1 ON 20 watts (no modulation) 16:10:39, OFF 16:17:55
2. Wideband power amplifier-2 ON 20 watts (no modulation) 16:10:37, OFF 16:17:53

Orbit 14 (ULA, EGD)

1. Enabled and configured RBV/MSS filters. Real time RBV data on filter A and real time 2 MSS data on filter B 17:56:28

2. Wideband power amplifiers 1 and 2 ON 17:58:37 , 20 watts. (WBPA reduced to 10 watts 18:06:23 - no modulation

3. WBPA's OFF 18:05:55

Orbit 15 (ULA)

1. WBVTR-1 Playback mode ON 19:32:06, OFF 19:51:44

2. WBVTR-2 Playback mode ON 19:34:20, OFF 19:51:44

Orbit 16 (ULA, MAD, HAW)

1. Verified spacecraft status and command capability

Orbit 17 (ACN, MAD, ULA, GWM)

1. Verified spacecraft status and command capability

Orbit 18 (GWM, ENT, ULA)

1. Verified spacecraft status and command capability

Orbit 19 (MIL, ENT, ULA)

1. Commanded MSS band and modes ON/OFF in sequence, then total system operated (including WBVTR-2 Rec) 02:15:12.

Orbit 20 (GDS, ULA, ENT)

1. Verified spacecraft status and command capability

Orbit 21 (GDS, ULA)

1. MSS System ON 05:38:44, Sun cal performed (WBVTR-2, ON; WBPA-2, ON)

Orbit 22 (ULA, HAW)

1. Verified spacecraft status and command capability

Orbit 23 (HAW, ULA, MAD, ACN, GWM)

1. Verified spacecraft status and command capability

Orbit 24 MAD, ACN, GWM)

1. Verified spacecraft status and command capability

Orbit 25 (BDA)

1. Verified spacecraft status and command capability

Orbit 26 (ENT, MIL)

1. Real time MSS operations

Orbit 27 (ENT, GDS)

1. Real time MSS operations

Orbit 28 (ULA, GDS)

1. Real time MSS operations

Orbit 29 (ULA, MAD, HAW)

1. Real time MSS operations
2. ECAM activated in the Load mode and Program mode

Orbit 30 (MAD, ULA, HAW, ACN)

1. ECAM A and load B

Orbit 31 (MAD, ULA, GWM)

1. Routine operations

Orbit 32 (ENT, ULA, GWM)

1. Orbit adjust - X thruster test at 00:34:00.8

Orbit 33 thru 39

1. Routine operations

Orbit 40 (ENT, BDA)

1. RBV initial turn ON-OFF

Orbit 41 (ENT, EGD)

1. RBV test on each camera and on all

Orbit 42 thru Orbit 44

1. Routine operations

Orbit 45 (MAD, ULA, GWM)

1. Switched to MSFN-B/STADAN A. USB-B and VHF-A now being used

Orbit 46 (ENT, ULA, GWM)

1. Routine operations

Orbit 47 (MIL, ENT, ULA)

1. Sun cal, MSS

Orbits 48 thru Orbit 50

1. Routine operations

SECTION 4

ORBITAL PARAMETERS

SECTION 4

ORBITAL PARAMETERS

The LANDSAT-2 spacecraft was launched from the Western Test Range in a Near Polar Orbit on 22 January 1975 at 17:55:51.604 z. The official international designation is 1975-4A and the mission tracking and telemetry number is 7500401.

Following are the Brouwer mean orbital elements for satellite 1975-4A (LANDSAT-2) computed and issued by the Goddard Space Flight Center.

Table 4-1. Elements of the Mission Orbit

	Planned	Post Launch[1]	Post Orbit Adjusts[2]
1. Apogee	907.7 km	915.03 km	916.84 km
2. Perigee	907.7 km	901.56 km	898.47 km
3. Inclination	99.098* deg	99.095 deg	99.096 deg
4. Semi-major axis	7285.820* km	7286.462 km	7285.820 km
5. Eccentricity	0.0001*	0.000925	0.001260
6. Anomalistic Period	103.152 min	103.165 min	103.1514 min
7. Distance between adjacent ground tracks at the equator	159.375 km	165.57 km	159.35 km
8. Average cycle duration	18 days	18 days	18 days
9. Delta days in standard cycle (LANDSAT-1 and LANDSAT-2)	9	12	9
10. Phasing between LANDSAT-1 and-2	135-225°	131.9°	196.6°

*The 3-sigma uncertainties for the inclination, semimajor axis, and eccentricity are ±0.1 deg, +22.2 or -24.1 km and 0.002 respectively.

1 EPOCH 75 Y 01 m 250 at 00 hrs 34.00 min. U.T.

2 EPOCH 75 Y 02 m 060 at 22 hrs 36.00 min. U.T.

The mission requirement for LANDSAT-2 was to place the satellite in a sun synchronous orbit with 18 day ground track repeat cycle, and to phase it at an angle of 135 to 225° with LANDSAT-1.

Also required was a combined full coverage of the earth, using both LANDSAT-1 and LANDSAT-2, in 9 days. These requirements have been achieved satisfactorily with in-plane orbital corrections of LANDSAT-2 which placed the satellites 9 days apart in the 18 day ground track repeat cycle.

Figure 4-1 shows the first and subsequent orbit tracks of LANDSAT-2. All descending equatorial crossings occur at approximately 9:30 a.m. local time. All ascending crossings are in local darkness.

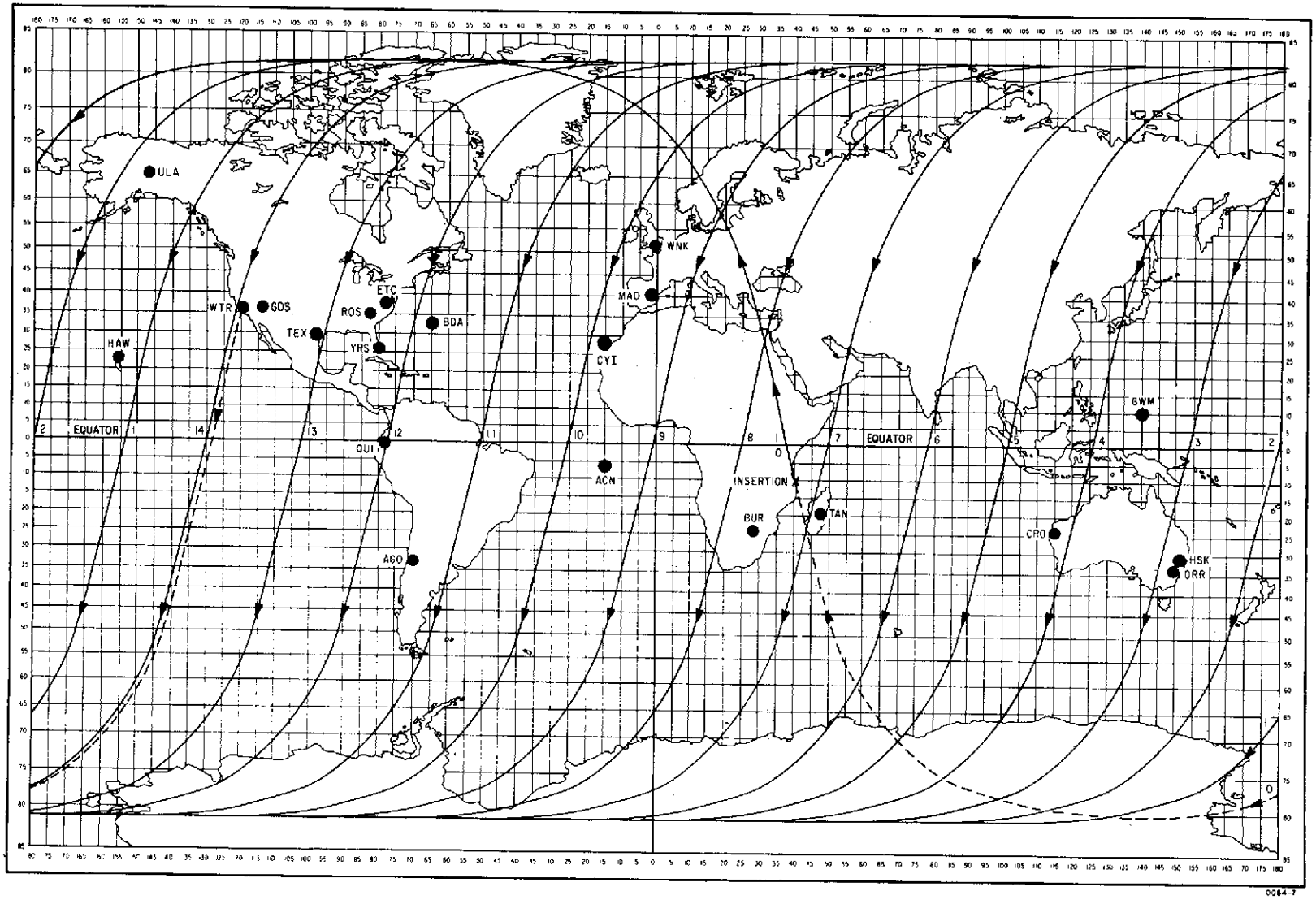

Figure 4-1. Subsatellite Plot of the LANDSAT-2 Spacecraft

SECTION 5

POWER SUBSYSTEM

SECTION 5

POWER SUBSYSTEM

The power subsystem includes two solar array platform assemblies to convert solar energy to electrical energy; eight storage modules to store electrical energy; one auxiliary load controller and two auxiliary load panels to dissipate excess electrical power; one power control module and one payload regulator module to regulate and distribute power. See Figure 5-1 for functional block diagram,and Figure 5-2 and Figure 5-3 for hardware illustration.

The power subsystem provides unregulated and regulated power to satisfy the electrical load requirements of the spacecraft. Unregulated power is supplied with a voltage range of -26 vdc to -37.5 vdc. The regulated power bus is -24.5 $\pm$ 0.5 vdc with an output dc impedance of 0.01 ohm and an output ac impedance of 0.1 ohm at frequencies up to 10 KHz. The power control module can deliver up to 20 amperes and the payload regulator module can deliver up to 26 amperes under these conditions.

The Power Subsystem was launched in the configuration shown in Table 5-1.

Table 5-1. Power Subsystem Launch Configuration

	MODE	CMD		MODE	CMD
BATT 1	ON	353	SHUNT LD D	ON	437
BATT 2			COMP LD 1	OFF	355
BATT 3			COMP LD 2		
BATT 4			COMP LD 3		
BATT 5			COMP LD 4		
BATT 6			COMP LD 5		
BATT 7			COMP LD 6		
BATT 8			COMP LD 7		
AUX LD 1	OFF	374	COMP LD 8		
AUX LD 2			TR CHARGE	NORM	346
AUX LD 3			PRM	ON	727
AUX LD 4			PRM FTAP	ON	622
AUX LD 5			PSM BUSS	EN	655
SHUNT LD A	ON	437	SW TMP PWR	ON	614
SHUNT LD B			SPACECRAFT	REG 1	SEL
SHUNT LD C			PAYLOAD	REG 3	SEL

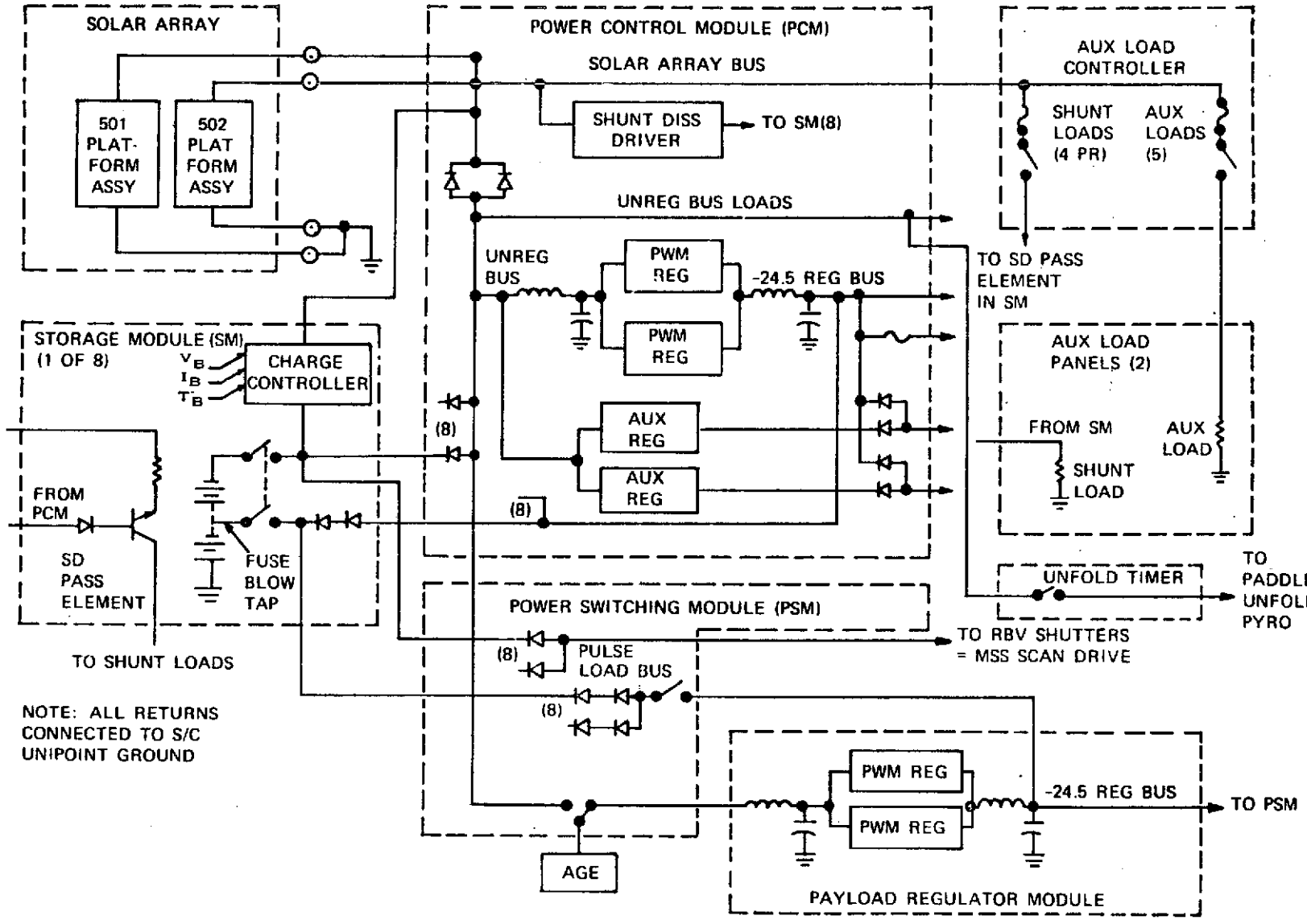

Figure 5-1. Functional Block Diagram, LANDSAT-2 Power Subsystem

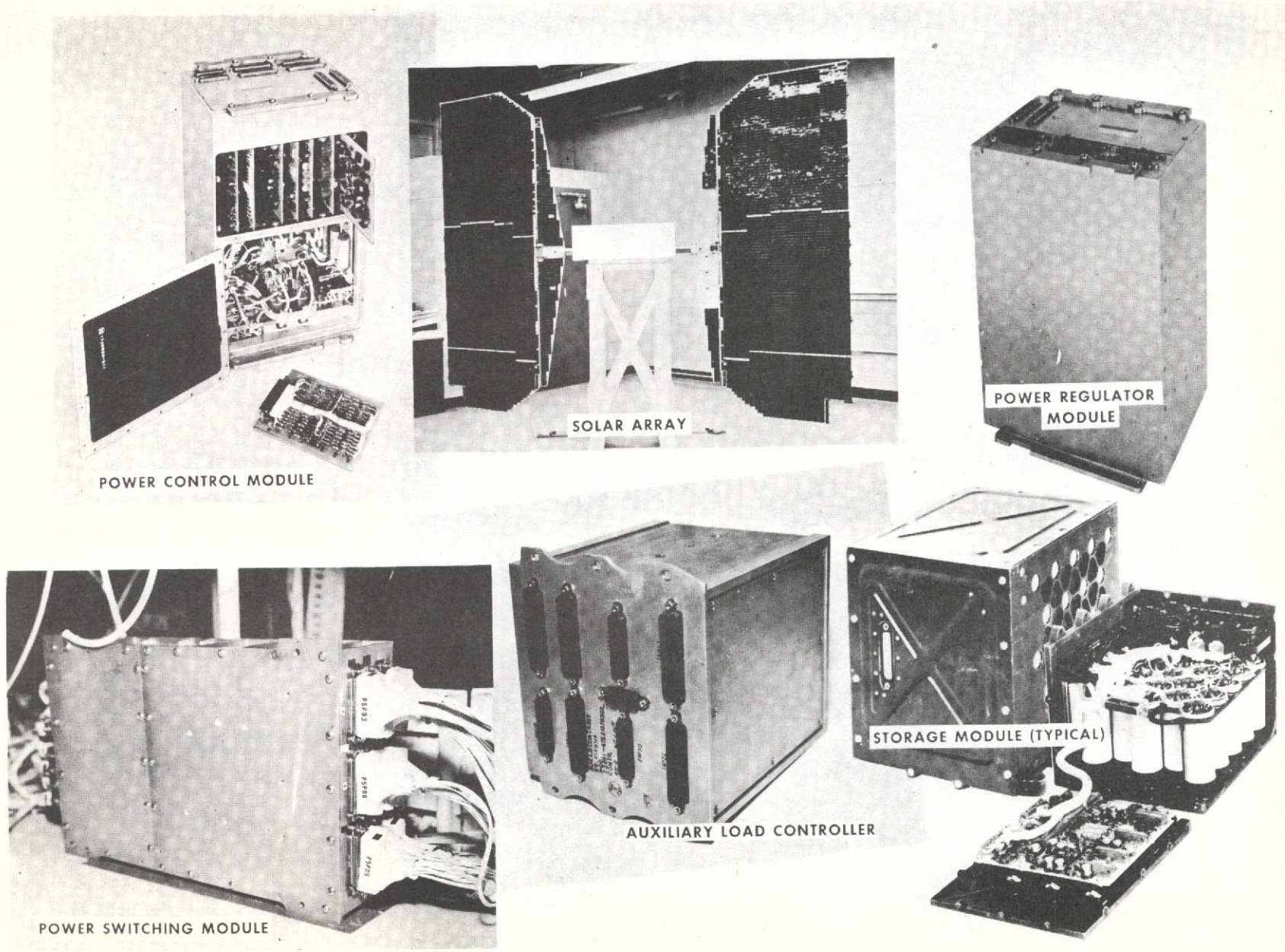

Figure 5-2. LANDSAT-2 Power Subsystem

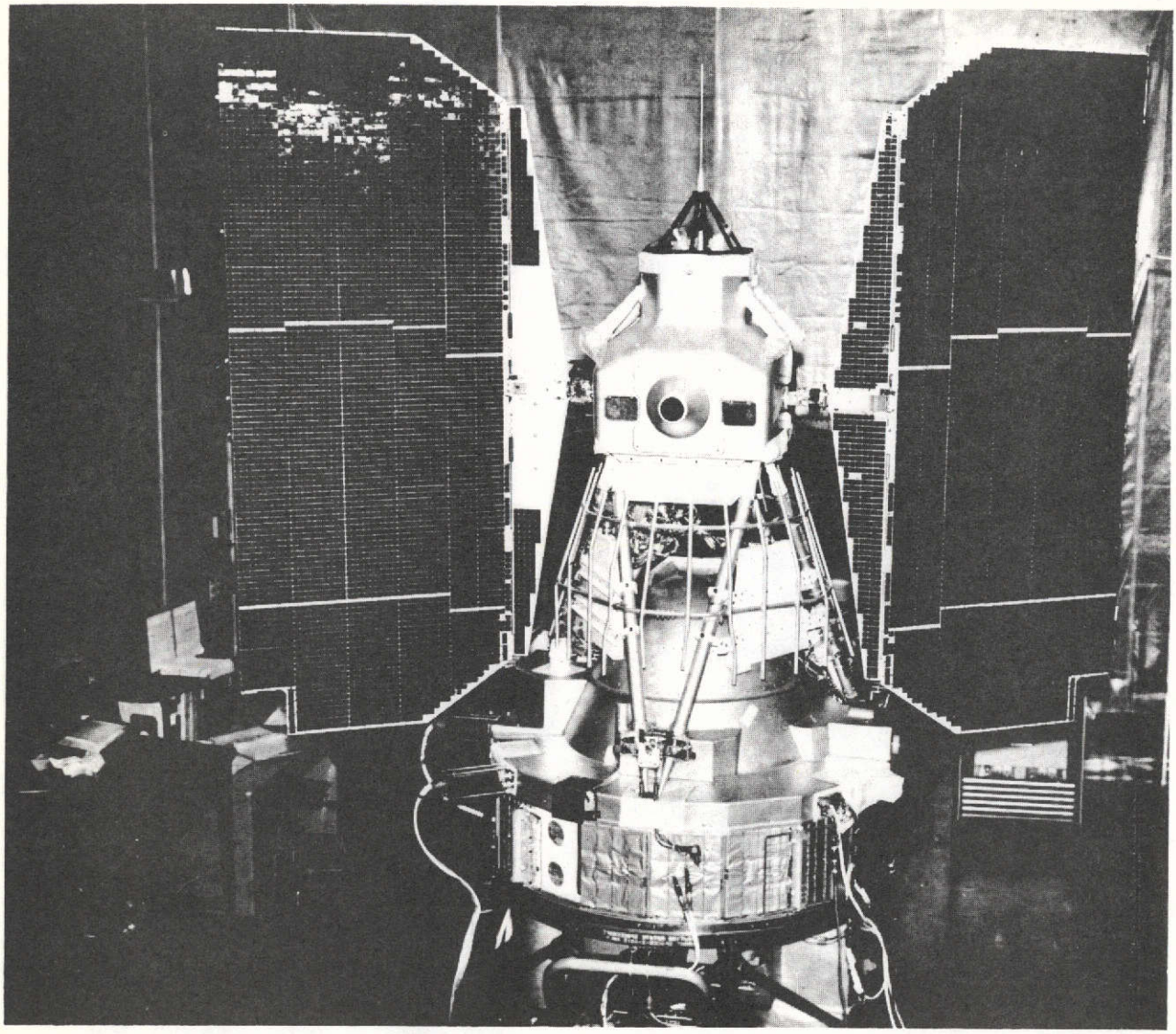

Figure 5-3. LANDSAT-2 Observatory Solar Array Deployment

Performance

The battery packs in the LANDSAT-2 power subsystem were on low level charge until 17:42:00 GMT when the spacecraft was switched to internal power prior to launch. The batteries powered the spacecraft for approximately one hour and 40 minutes until 19:21 GMT when the solar array current became high enough to supply the load and begin recharging the batteries. The maximum depth of discharge was 30.3%. The voltage was 29.6 at this point with a current of less than 50 milliamperes.

For comparison to LANDSAT-1 data, a time of 19:09:35 GMT was taken when the battery voltages were near their minimum voltage due to high currents and deep discharge. Table 5-2 shows this comparison. The higher current shows that the LANDSAT-2 data would have slightly higher voltages than LANDSAT-1 data if adjusted to the same conditions. The voltages are quite adequate to safely supply the LANDSAT-2 mission.

Table 5-2. Comparison of Battery Discharge Characteristics

Spacecraft	Current Spread (Amperes)	Depth of Discharge (%)	Voltage Average (Volts)	Temperature Range (DGC)
LANDSAT-1	0.72-0.82	27.8	28.21	18.8-21.5
LANDSAT-2	0.89-1.00	27.8	28.29	16.1-20.3

End of night voltages, average battery temperatures, and temperature spread between batteries is shown in Table 5-3. Battery performance is normal.

The solar drives were launched with both panels in the normal mode. After deployment at night the right solar panel began slewing to align itself normal to the sun (see Figure 5-4). The left panel sun sensor did not clear the albedo shield until approximately 7 minutes into day one at which time it also began slewing to align itself to the sun. Final alignment to the sun was not complete until near the end day in Orbit 2. Orbit 3 shows the normal solar array signature with its two shadow areas resulting from the sensory ring shadow on the right panel near sunrise and sunset; and earthshine implinging on the panels when they are jointly receiving direct energy from the sun and reflected sun energy from the earth. At midday there is no earthshine and the solar array had a current of 15.37[a] at an unregulated bus voltage of 31.9 volts. This point will be used to monitor solar array degradation in future reports. The Solar Array Average Energy was 1123 ampere-minutes in early orbits. Based on the above results the power subsystem is anticipated to fully support LANDSAT-2 mission with adequate power.

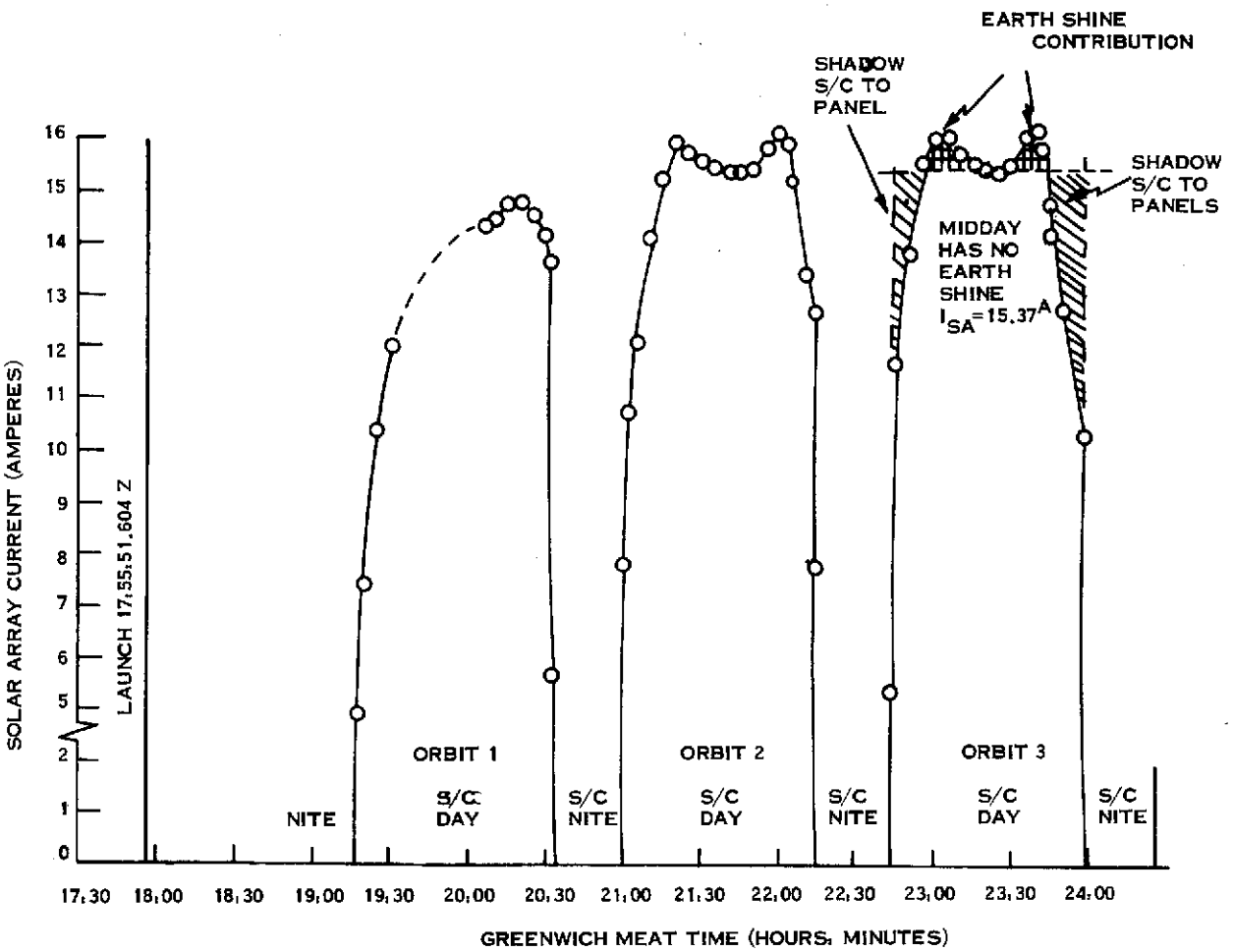

Figure 5-4. Initial Acquisition of Solar Array Current

During Orbit 7 the shunt limiter went into operation when battery taper began. The maximum unregualted bus voltage during shunt limiter operation was 37.4 volts which indicates that the solar array bus voltage was being held at approximately 38.0 volts since it is a diode drop away. This is within the voltage specification of 38.0 $\pm$ 0.150 volts.

The auxiliary loads and compensation load command capability were verified in Orbit 2. In Orbit 2 compensation loads 1, 2, 3, 4, 5, 7 and 8 were turned on as scheduled to provide more even heating of the spacecraft until normal operation began. All compensation loads except 6 remained on thru Orbit 50.

Auxiliary loads were not required during Orbit 1, to allow a preplanned overcharge to be given to the batteries. In Orbit 2 auxiliary loads 1, 2, 3, 4 were turned on as scheduled by power management. Normal auxiliary load programming proceeded as planned by power management in subsequent orbits.

Table 5-3 shows major power subsystem parameters and Table 5-4 shows power subsystem telemetry for selected orbits. All regulated voltages are stable and in close agreement with ground measurements. Some parameters in Table 5-4 may be slightly different than Table 5-3 because 5-3 uses a time span for power management (night followed by a day) different from the time span which is used in Table 5-4 which is the playback period from the NBTR.

Table 5-3. LANDSAT-2 Major Power Subsystem Parameters

Pwr. Mgmt. Orbit No.	2	7	26	50
Batt 1 Max	32.05	33.85	33.51	33.43
2 Chge	31.95	33.91	33.40	33.40
3 Volt	31.98	34.03	33.43	33.35
4	32.00	33.79	33.54	33.45
5	31.96	33.68	33.42	33.42
6	32.05	33.67	33.50	33.41
7	31.99	33.79	33.54	33.45
8	31.99	33.70	33.53	33.45
Average	32.00	33.80	33.48	33.42
Batt 1 End-of-Night	29.32	29.32	29.49	29.32
2 Volt	29.38	29.29	29.46	29.38
3	29.32	29.32	29.49	29.32
4	29.34	29.34	29.52	29.34
5	29.40	29.40	29.48	29.40
6	29.31	29.31	29.48	29.31
7	29.34	29.42	29.51	29.34
8	29.34	29.34	29.51	29.34
Average	29.34	29.34	29.49	29.34
Batt 1 Chge	12.07	12.26	12.50	12.76
2 Share	11.75	12.14	11.89	11.68
3 (%)	12.60	12.81	12.41	12.24
4	12.28	12.20	12.10	11.99
5	13.02	12.89	12.84	12.84
6	13.15	13.09	13.31	13.35
7	12.69	12.77	12.85	12.90
8	12.43	11.84	12.09	12.24
Batt 1 Load	12.14	12.20	12.50	12.60
2 Share	12.62	12.81	12.69	12.70
3 (%)	13.06	13.07	12.77	12.67
4	12.64	12.50	12.47	12.44
5	12.29	12.38	12.40	12.34
6	12.49	12.80	12.81	12.70
7	12.40	12.48	12.39	12.47
8	12.35	11.75	11.98	12.04
Batt 1 Temp	17.39	18.68	19.86	21.46
2 in	17.60	18.83	19.53	20.25
3 (°C)	16.51	17.20	17.97	18.60
4	18.08	20.04	20.73	20.83
5	21.80	22.94	24.33	24.98
6	20.80	21.92	23.23	24.26
7	20.59	22.14	23.54	24.71
8	19.78	21.09	22.21	23.63
Average	19.07	20.36	21.43	22.34
S/C Reg Bus Pwr. (W)				
Comp Load Pwr. (W)				
(P/O S/C Reg Bus Pwr)				
P/L Reg Bus Pwr. (W)				
C/D Ratio	1.09	1.21	1.13	1.15
Total Charge (A-M)	197.4	280.6	256.3	271.9
Total Discharge (A-M)	181.5	232.6	228.0	237.2
Solar Array (A-M)	1106	1096	1110	1106
S.A. Peak I (Amp)	16.15	16.05	16.25	16.05
Sun Angle (Deg)				
Max R Pad Temp (°C)				
Min R Pad Temp (°C)				
Max L Pad Temp (°C)				
Min L Pad Temp (°C)				

Table 5-4. LANDSAT 2 Power Subsystem Analog Telemetry

(Average Value for Data Received in NBTR Playback)

Function	Description	Unit	Orbits		
			T/V*	3	50
6001	Batt 1 Disc I	Amp	**	0.87	1.01
6002	2		**	0.88	1.01
6003	3		**	0.89	1.00
6004	4		**	0.86	1.00
6005	5		**	0.88	0.99
6006	6		**	0.93	1.02
6007	7		**	0.88	1.00
6008	8		**	0.86	0.97
6011	Batt 1 Chg I	Amp	**	0.34	0.47
6012	2		**	0.33	0.43
6013	3		**	0.36	0.45
6014	4		**	0.35	0.44
6015	5		**	0.37	0.47
6016	6		**	0.37	0.49
6017	7		**	0.36	0.47
6018	8		**	0.36	0.45
6021	Batt 1 Volt	VDC	**	30.69	31.50
6022	2		**	30.67	31.48
6023	3		**	30.68	31.49
6024	4		**	30.68	31.49
6025	5		**	30.69	31.50
6026	6		**	30.69	31.49
6027	7		**	30.71	31.52
6028	8		**	30.68	31.49
6031	Batt 1 Temp	DGC	**	17.41	21.59
6032	2		**	17.53	20.53
6033	3		**	16.28	18.80
6034	4		**	18.17	20.90

Table 5-4. LANDSAT 2 Power Subsystem Analog Telemetry (Cont'd)

(Average Value for Data Received in NBTR Playback)

Function	Description	Unit	Orbits		
			T/V*	3	50
6035	5		**	21.85	25.16
6036	6		**	20.74	24.37
6037	7		**	20.50	24.83
6038	8		**	19.79	23.75
6040	Rt. Pad Temp	DGC	**	29.59	28.96
6041	Rt Pad VM	VDC	**	32.82	33.72
6042	Rt. Pad VN	VDC	**	32.52	33.46
6044	Lt. Pad Temp	DGC	**	26.51	25.56
6045	Lt. Pad VF	VDC	**	33.45	34.40
6046	Lt. Pad VG	VDC	**	33.54	34.48
6050	S/C UR Bus V	VDC	**	30.86	31.73
6051	S/C RG Bus V	VDC	24.56	24.54	24.57
6052	Aux Reg AV	VDC	23.36	23.35	23.36
6053	Aux Reg BV	VDC	23.35	23.35	23.37
6054	Solar I	Amp	**	14.95	14.81
6055	S/C RG Bus I	Amp	**	6.83	***
6056	S/C RG Bus I	Amp	**	6.84	7.23
6058	PC Mod T1	DGC	**	18.70	21.67
6059	PC Mod T2	DGC	**	17.80	20.44
6070	P/L RG Bus V	VDC	24.60	24.57	24.61
6071	P/L UR Bus V	VDC	**	30.90	31.85
6072	P/L RG Bus I	Amp	**	0.41	***
6073	P Aux AV	VDC	23.51	23.46	23.47
6074	P Aux BV	VDC	23.48	23.43	23.46
6075	PR Mod T1	DGC	**	18.60	20.84
6076	PR Mod T2	DGC	**	20.28	22.13
6079	Fuse Blow V	VDC	**	24.45	24.48
6080	Shunt 1 I	Amp	**	0.0	0.0
6081	2		**	0.0	0.0
6082	3		**	0.0	0.0
6083	4		**	0.0	0.0
6084	5		**	0.0	0.0
6085	6		**	0.0	0.0
6086	7		**	0.0	0.0
6087	8		**	0.0	0.0
6100	P/L RG Bus I	Amp	**	0.41	0.38
Total No.	Major Frames	Frm	**	369	396

*T/V (20°C)

**Data from T/V not applicable

SECTION 6

ATTITUDE CONTROL SUBSYSTEM

SECTION 6
ATTITUDE CONTROL SUBSYSTEM

The Attitude Control Subsystem (ACS) consists of 13 major component parts, plus a thermal subsystem mounted to a structure composed of mounting surfaces above a honeycomb baseplate. Solar paddles are attached to two separate shafts, with individual drive motors to provide greater reliability in solar tracking.

The major requirement of the ACS is to provide satellite alignment with the local earth vertical and orbit velocity to within $\pm$ 0.7 degree in pitch and roll and $\pm$ 1 degree in yaw. The instantaneous angular rates about the axes during normal operation are required to be less than .10 degree/second.

To accomplish this, a 3-axis active ACS is provided, using horizon scanners for roll and pitch attitude error sensing, and a rate gyro used in a gyro-compassing mode to sense yaw attitude. Included also is a yaw rate gyro to sense yaw rate in an acquisition mode. The torquing subsystem uses a combination of reaction jets to provide net momentum control and large control torques when required. Flywheels are utilized for fine control and residual momentum storage. See Figure 6-1 for the ACS functional block diagram, and Figure 6-2 for the hardware configuration.

The ACS subsystem was launched in the mode shown in Table 6-1.

LANDSAT-2 was launched from the Western Test Range on 22 January 1975 at 17:55:51 hours GMT.

During the orbit insertion - preseparation phase of the launch activity - ACS telemetry received after shroud ejection indicated a normal ride with all ACS systems functioning properly.

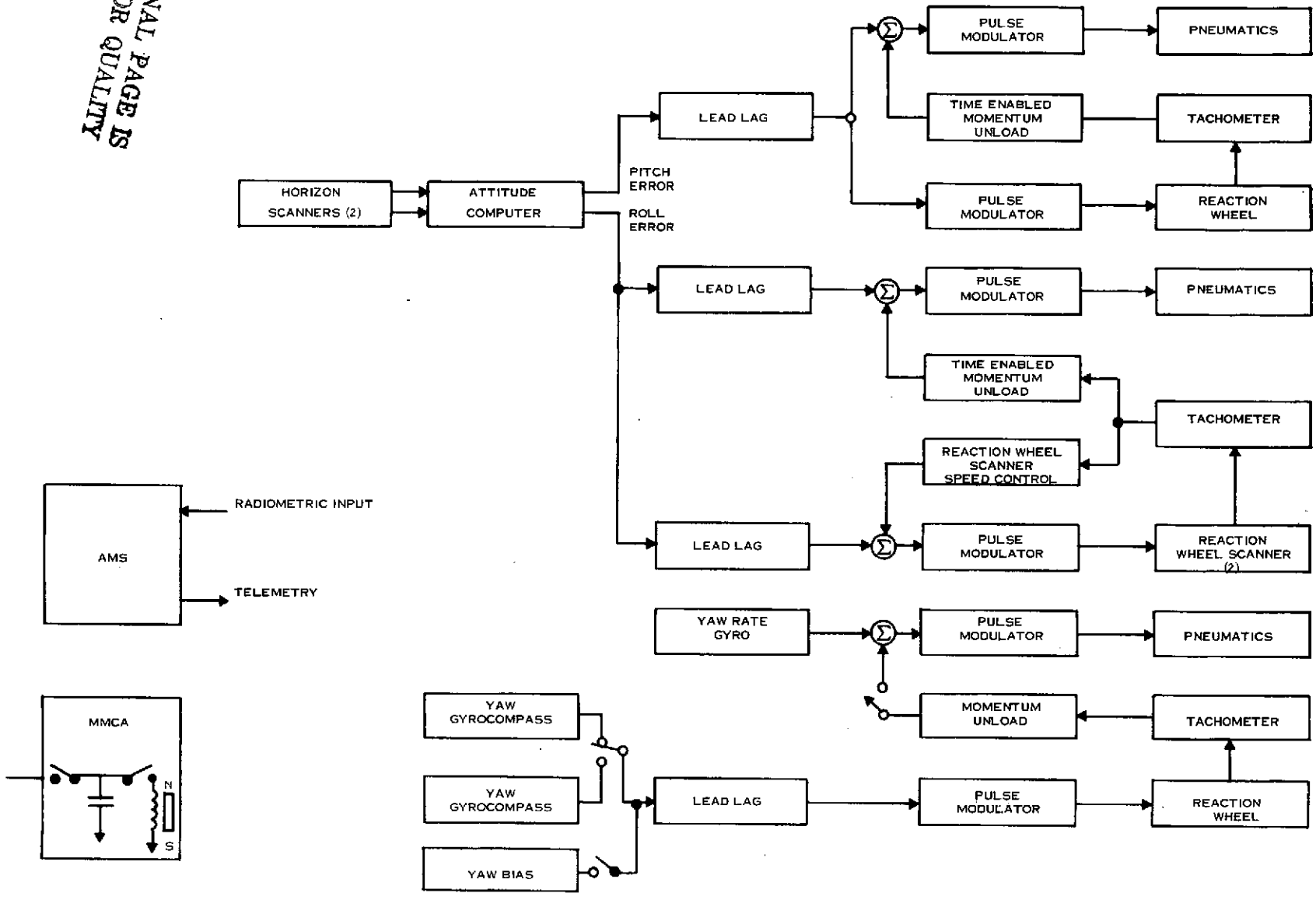

Figure 6-1. Attitude Control Subsystem Block Diagram

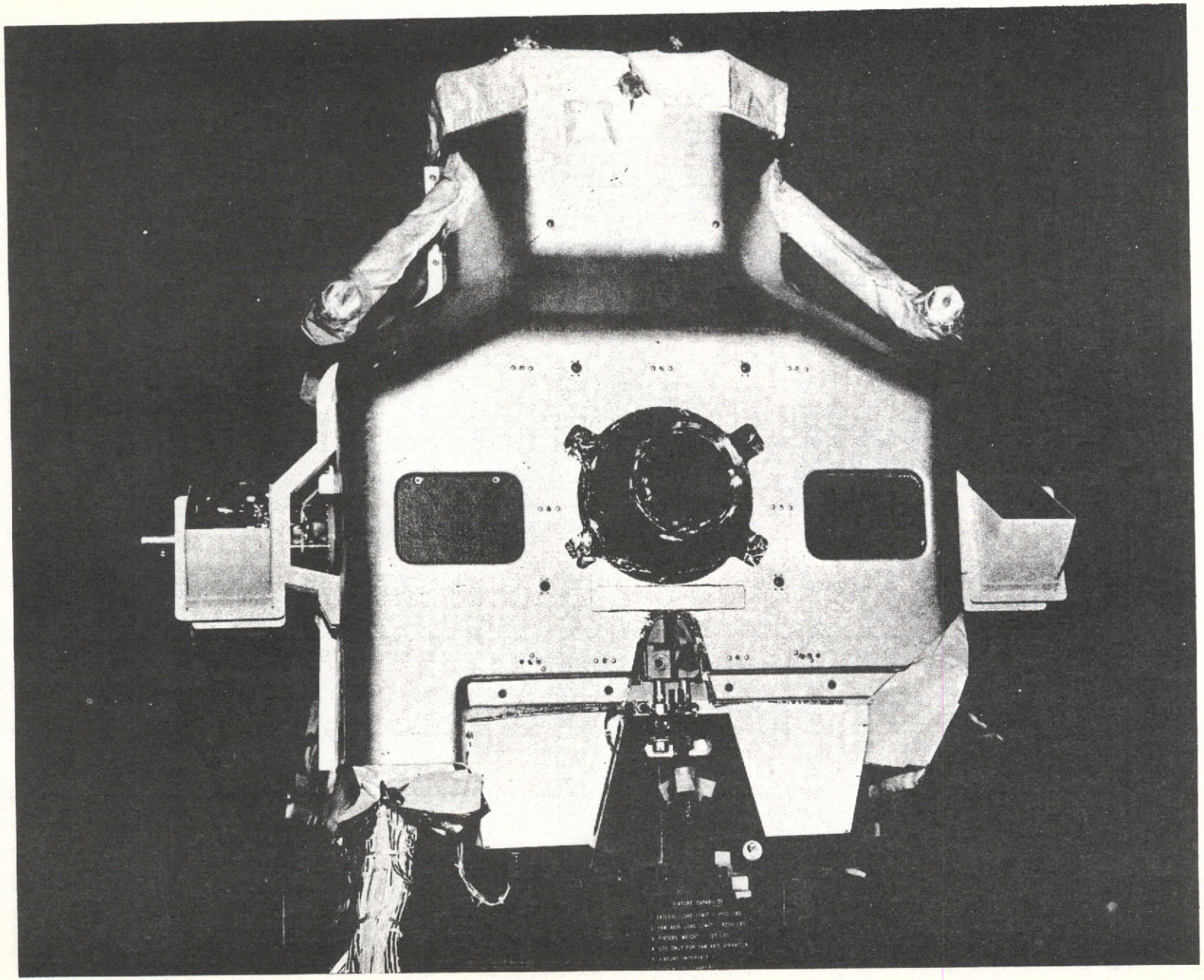

Figure 6-2. Attitude Control Subsystem

Table 6-1. Attitude Control Subsystem Launch Mode

ACS Subsystem		Cmd	Verification (Event No.)
LO VOLT INT	RESET	044	Pneumatics Enable (164)
RSAD RATE	NORM	425	SAD Right Rate - Normal (178)
LSAD RATE	NORM	244	SAD Left Rate - Normal (176)
RSAD RATE	EN	311	Right SAD CCW Reset, CW (177)
LSAD RATE	EN	365	Left SAD RESET CW, CCW (175)
RSAD PWR	FUSE	674	SAD Right Power - FUSD (191)
LSAD PWR	FUSE	713	SAD Left Power FUSD (190)
PNEU	EN	040	Pneumatics - Enable (164)
PNEU INTLK	DIS	042	Pneumatics Interlock - Bypass (165)
PMB MODE	DIS	104	None
P POS BIAS	+	145	Pitch Bias - Position (185)
0.6 PPB	DIS	663	Pitch Bias -4.87, (1048)
2.0 PPB	DIS	661	4.87 TMV (1048)
2.9 PPB	DIS	122	4.87 TMV (1048)
P UNLOAD	EN	165	Pitch - Roll Unload, Both (169)
R UNLOAD	EN	161	Pitch - Roll Unload, Both (169)
TACH	EN	064	R DFT ST - Normal (188)
TACH GAIN	NORM	100	R DFT ST - Normal (188)
YAW WHEEL	EN	163	Yaw Wheel Enable (180)
YAW POS BIAS	+	160	Yaw Bias 6.35 RMV (1049)
0.1 YPB	DIS	120	Yaw Bias 6.35 TMV (1049)
0.3 YPB	DIS	060	Yaw Bias 6.35 TMV (1049)
0.6 YPB	DIS	623	Yaw Bias 6.35 TMV (1049)
RLNA/YAW	DIS	102	RLNA - Yaw - Disable (179)
YAW MODE	ACQ	204	Yaw Mode - Acquisition (162)
0.A Mode	DIS	221	Orbit Adj - Disable (163)
400 RPM INT	EN	203	400 RPM - Enable (189)
RMP B	EN	223	Select RMP - No. 2 (170)
RMP B HTR	ON	305	RP2 Stat Normal (173)
RMP B MTR	ON	304	RP2 Stat Normal (173)
RMP A MTR	ON		
AND HTR	ON	307	RMP A OFF
		271	RMP A MOTOR START
		307	RMP A OFF
		326	RMP A ON
		271	RMP A MOTOR START
			8 SEC DELAY
		326	RMP A ON
			30 SEC DELAY
		370	RMP A HTR ON
EN SCAN SEL	A	636	Scanners Both 1 (194)
SSM	LOCK	675	Scanner - Lock (192)

The Delta vehicle began its pitch-up maneuver at 18:47:30 hours GMT. Qualitative attitude error telemetry information - roll coarse error, pitch coarse error and yaw gyro rate - received from LANDSAT-2 prior to rear scanner uncovering indicate that by pitch-up completion (18:54:00), the spacecraft was well aligned with its normal attitude coordinates (see Figure 6-3).

LANDSAT-2 separated from the Delta vehicle at 22:18:54:55. Two and one half seconds later, the paddle unfold timer functioned on schedule and the solar paddles deployed completely.

Seventeen and one half seconds after separation (18:55:12) the ACS was activated, and acquisition in roll, pitch, and yaw was accomplished in a classical, textbook fashion with a minimal amount of ACS gas used.

Fifty two and one-half seconds after separation the SADS were activated and both drove at normal bias rate during spacecraft night.

As the spacraft entered daylight at 19:17:03, both SADS performed normally. The RSAD began to slew and acquire because its sun sensor was exposed; while the LSAD lagged behind until 19:44:30, when its sun sensor cleared the albedo shield. It began to slew and by 20:26:30, both SADS were in synch and aligned properly with the sun.

Solar current was demonstrated prominently by 19:20:00.

LANDSAT-2's first ascending node crossing occurred at 18:57:12, and by 18:59:00 the ACS was operating normally.

The spacecraft was commanded into the YAW NORMAL mode at 19:10:47, and ACS PNEUMATICS were disabled at 19:11:46.

RMPA lower motor voltage was commanded at 19:34:50.

Day to night transition occurred at 20:31:52; the second ascending node crossing followed at 20:40:38 and finally, RMP A was commaned OFF at 21:14:06, during Orbit 2 Alaska.

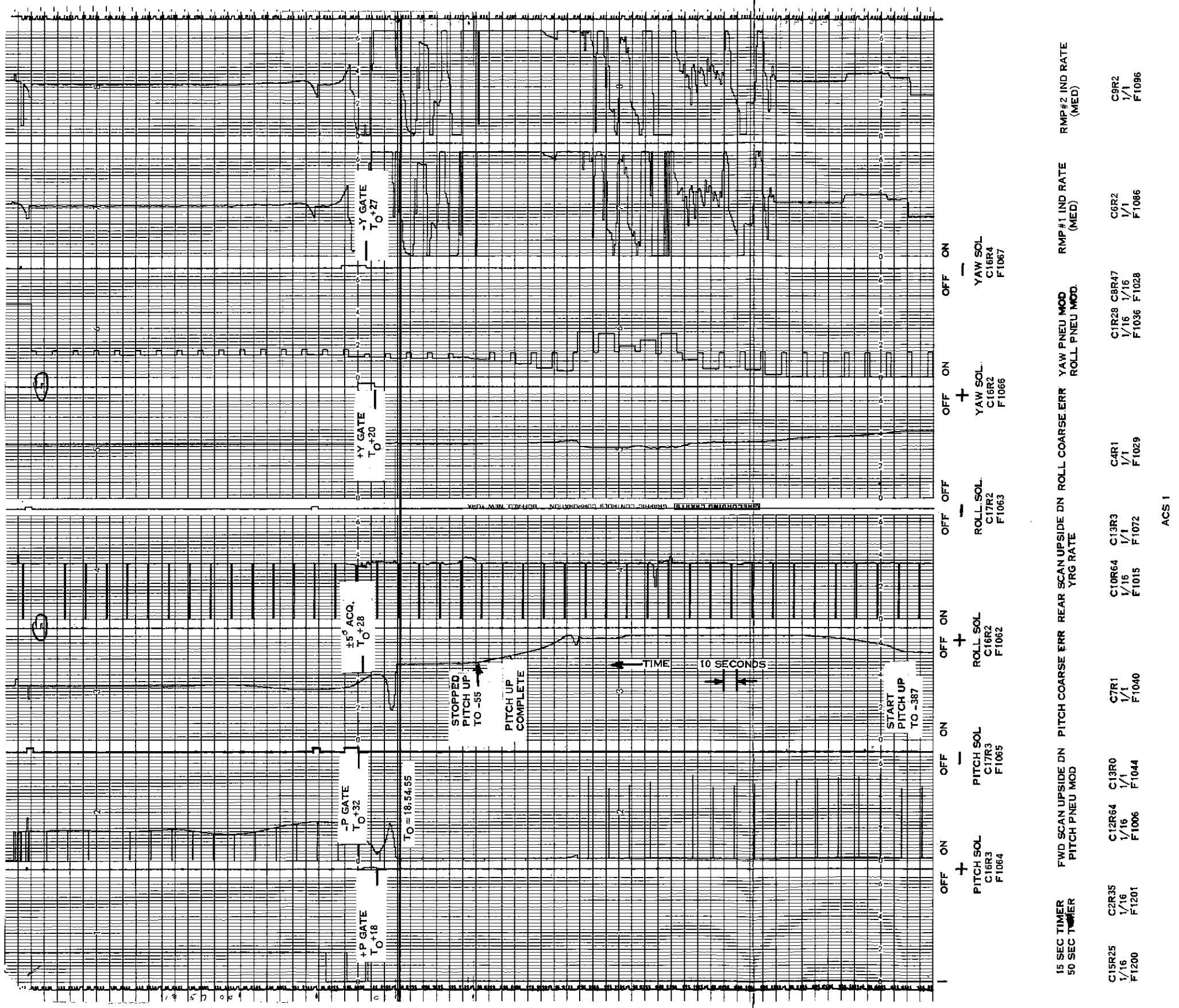

Figure 6-3A. Separation - Acquisition Telemetry

FOLDOUT FRAME 1

FOLDOUT FRAME 2

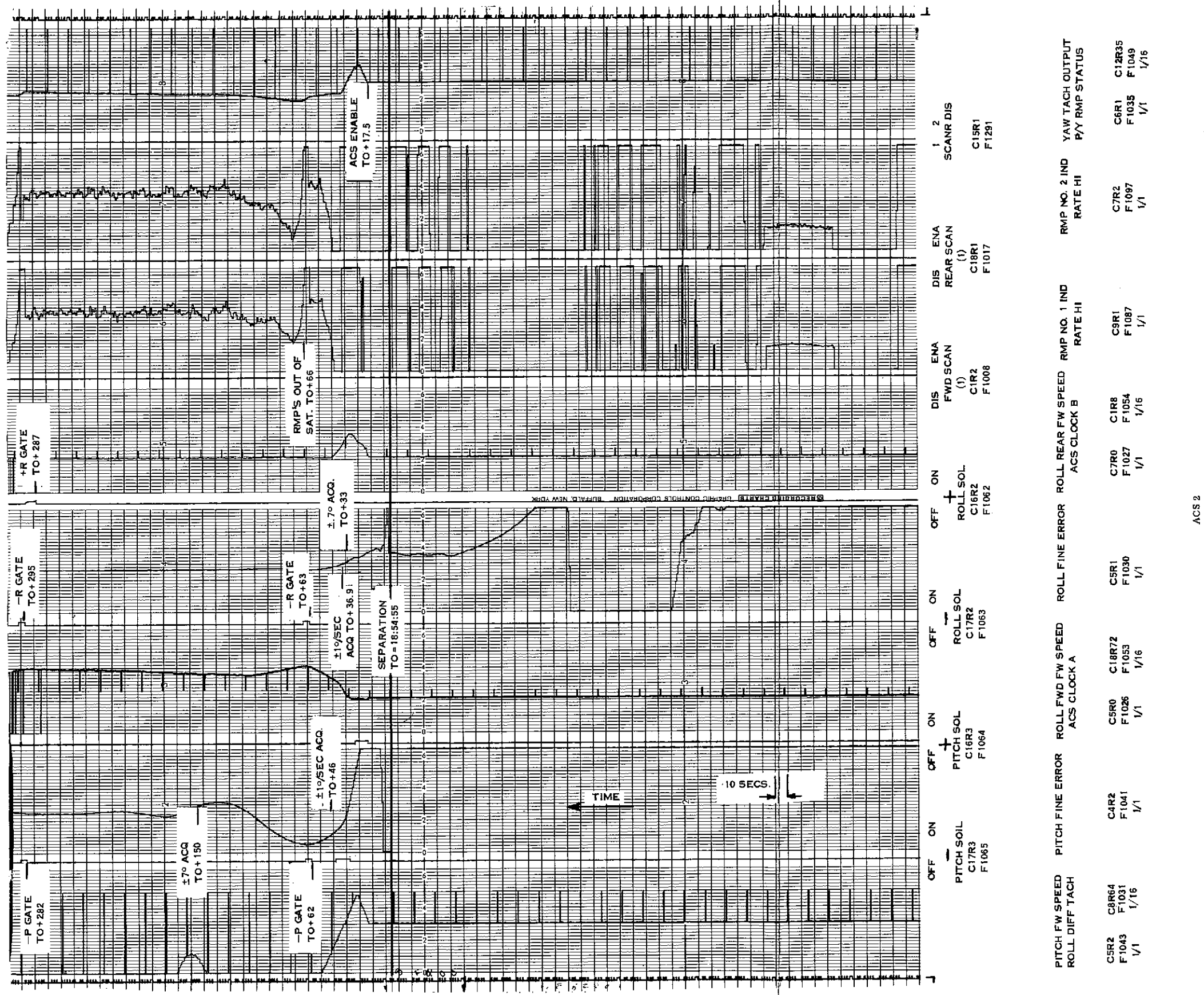

Figure 6-3B. Separation - Acquisition Telemetry

FOLDOUT FRAME 1

FOLDOUT FRAME 2 6-9/10

Figure 6-3C. Separation - Acquisition Telemetry

FOLDOUT FRAME 1

FOLDOUT FRAME 2

ACS SYSTEMS ACQUISITION TELEMETRY EVALUATION

The ACS system functioned flawlessly during the attitude acquisition phase of launch operations and demonstrated its ability to rapidly acquire and maintain spacecraft normal attitude with a minimum number of corrective maneuvers.

Acquisition in pitch, roll, and yaw was deemed successfully accomplished when the spacecraft's normal attitude was oriented and maintained within the following dynamic constraints:

PITCH & ROLL

- Angular position error within the $\pm 5^{\circ}$ control deadband
- The flywheels have captured, and control of the spacecraft is maintained via flywheel operation rather than pneumatics
- The flywheel speeds are below saturation levels
- The angular position error within the $\pm .7^{\circ}$ control deadband, can be maintained via flywheel activity
- The angular position rates of change are equal to or below $.1^{\circ}$/SEC

YAW

- The spacecraft has acquired in PITCH AND ROLL within the $\pm 5^{\circ}$ deadband
- The YAW gyro is running below saturation
- The RMP HI mode is out of saturation
- The YAW rate is equal to or below $.25^{\circ}$/SEC

LANDSAT-2's separation and attitude acquisition times were determined by evaluating the telemetry strip charts (Figure 6-3) generated during this phase of launch operations and then confirming the activation times of principle ACS subsystems vis the DLP program.

Chronology consistent with the criteria defining spacecraft attitude acquisition is summarized in Table 6-2.

Table 6-2. LANDSAT 2 - Attitude Acquisition Chronology

Acquisition Criteria	Roll	Pitch	Yaw
$\pm 5^{o}$ deadband control	T_o (18:54:55)	T_o + 28 secs (18:55:23)	-
$\pm .7^{o}$ deadband control	T_o + 33 secs (18:55:28)	T_o + 150 secs (18:57:25)	-
$\pm .1^{o}$/sec error rate	T_o + 36.9 secs (18:55:31.9)	T_o + 46 secs (18:55:41)	-
RMP's (HI mode) out of saturation	-	-	T_o + 66 secs (18:56:01)
Yaw rate $\leqslant .25^{o}$/sec	-	-	T_o + 66 secs (18:56:01)
Full Acquisition	36.9 sec	150 secs	150

(T_o = time of separation)

PITCH AND ROLL ERROR RATE DETERMINATION

Pitch and roll error rates are not telemetered functions; consequently, in order to determine the instants in time when the spacecraft had acquired in pitch and roll with an angular rate of change less than $\pm .1^{o}$/sec, it was necessary to employ a technique that utilized pitch and roll angular error telemetry, recorded as a differentiable function of time.

Function 1041 (Pitch Fine Error) and Function 1030 (Roll Fine Error) were replotted in engineering units (degrees) as a function of time from points taken directly from the strip charts.

The resulting pitch error and roll error curves were then graphically differentiated, using a modified mean value theorem approach. This technique provided the slope of a point on the error curve as a function of time.

The slopes were plotted against the same time scale as the error curves, with each slope data point (ordinate) in synch with its corresponding point on the error curve.

The resulting "rate" curves, Figures 6-4 and 6-5, then defined the times when acquisition occurred according to "rate" criteria.

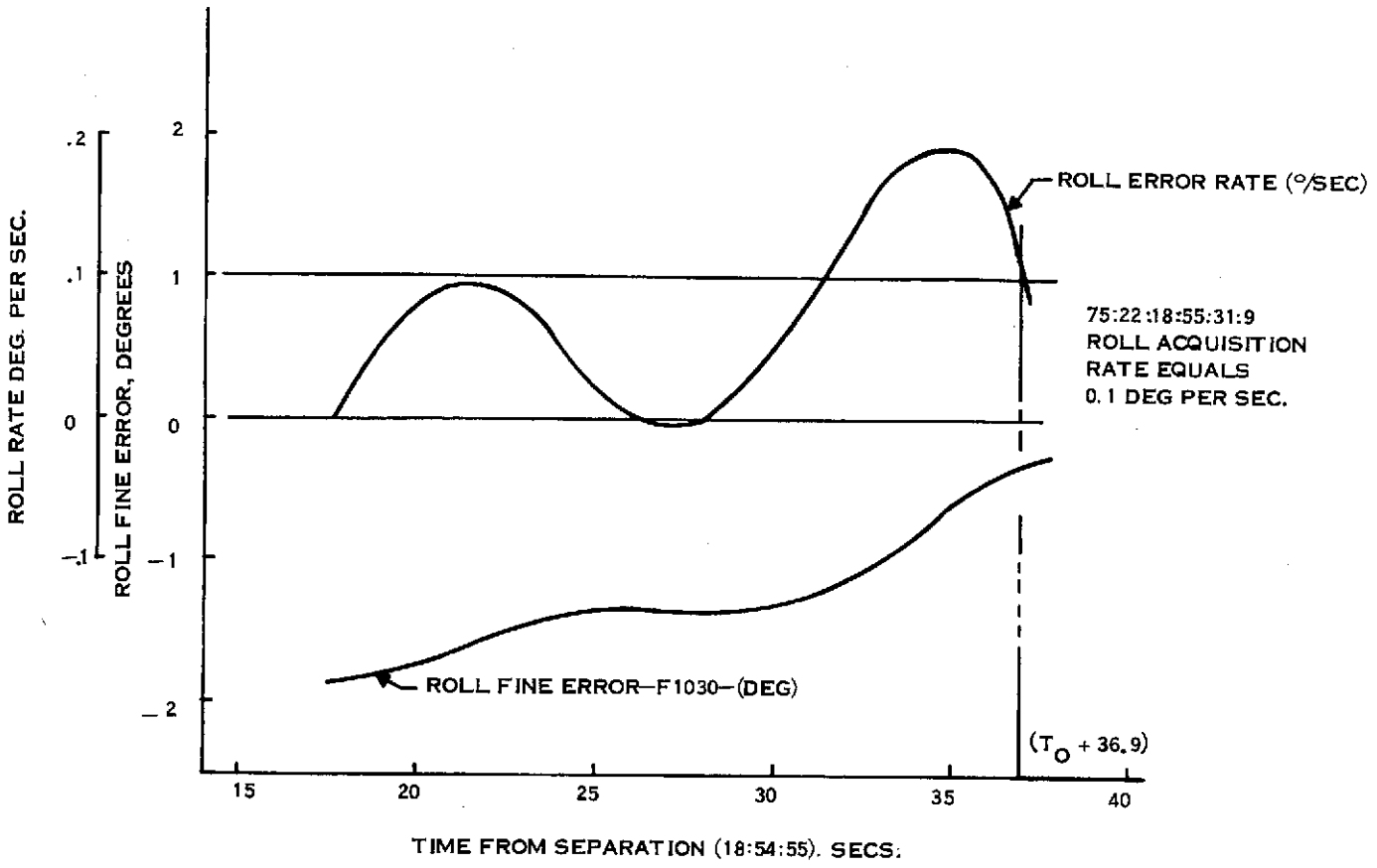

Figure 6-4. LANDSAT-2 Roll Rate Acquisition

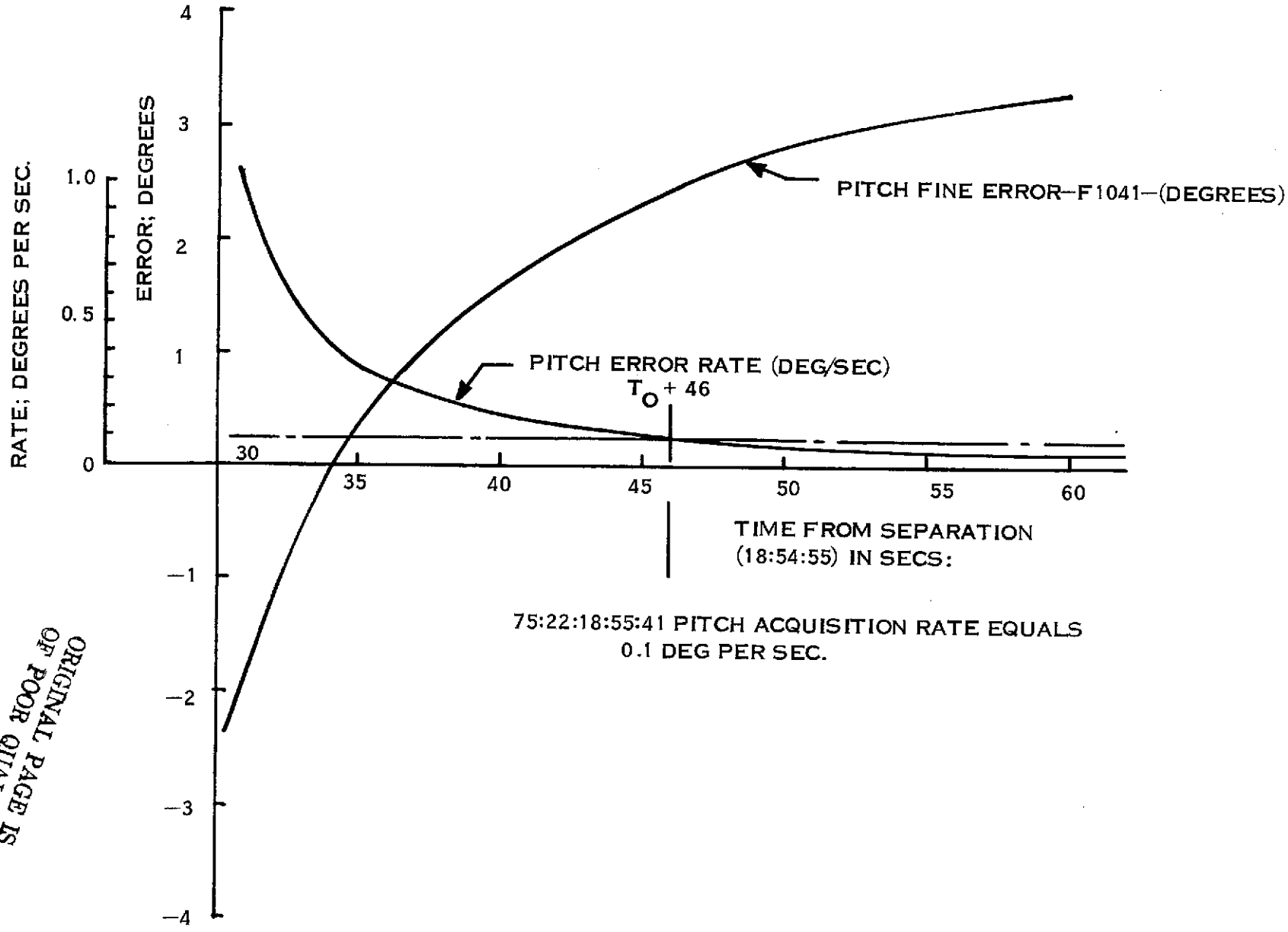

Figure 6-5. LANDSAT-2 Pitch Rate Acquisition

ROLL ACQUISITION EVALUATION

Roll acquisition was accomplished with facility shortly after separation. The Delta vehicle assisted in this operation by pre-positioning LANDSAT-2 almost within the $\pm 5^{o}$ control deadband, even before separation.

Figure 6-3, Roll Coarse Error, shows the roll attitude error beginning to decrease with the commencement of the pitch-up maneuver (T_o -425). Roll Fine Error shows the spacecraft being oriented to near roll acquisition attitude at the completion of the pitch-up maneuver (T_o -55).

Separation (T_o = 18:54:55 GMT) generated roll attitude perturbations, but these motions damped out rapidly and at ACS systems enable (T_o + 17.5) the spacecraft was within the $\pm 5^{o}$ control deadband.

Roll error continued to decrease after ACS activation and entered the $\pm .7^{o}$ control deadband at (T_o +33) seconds.

Roll forward flywheel speed began to increase, and one - roll gate at (T_o +63) was required to assist the flywheels in controlling roll attitude within the $\pm .7^{o}$ deadband.

Figure 6-4 shows the spacecraft's roll rates from activation through 0.1^{o}/SEC roll rate acquisition. The curve was not extended in time beyond the 0.1^{o}/SEC roll rate acquisition point because roll fine error was approaching zero in an asymptotic manner with no rapid changes in slope indicated. Table 6-3 summarizes LANDSAT 2's Roll Acquisition Chronology.

Table 6-3. Roll Acquisition Telemetry Data

Activity	Time	1029 Roll Coarse Error(Deg)	1030 Roll Fine Error(Deg)	* Roll Rate(Deg/Sec)	1026 Roll Fwd (RPM)	1027 Roll Rear (RPM)
Separation	T_O 18:54:55	-5.5^O	SAT	-	615	615
Separation + 10 Sec	T_O +10 18:55:05		-2.15^O	-	615	615
ACS Loop Enable	T_O +17.5 18:55:12.5		-1.85	0	615	615
$\pm.7^O$ Fine Error Dead Band Acquisition	T_O +33 18:55:28		$-.70^O$	$+.19^O$/Sec	625	923
$\pm.1^O$/Sec Roll Rate Dead Band Acquisition	T_O +36.9 18:55:31:9		$-.32^O$	$+.1^O$/Sec	908	818
(1063) -Roll Sol	T_O +63 18:55:58		$+.36^O$		1093	615
(1062) +Roll Sol	T_O +287 18:59:31		$+.36^O$		1064	615
(1063) -Roll Sol	T_O +295 18:59:39		$+.36^O$		1064	615

*Calculated - See Figure 6-4

PITCH ACQUISITION EVALUATION

The Pitch Coarse Error and Pitch Fine Error telemetry channels shown in Figure 6-3 presents the chronology of LANDSAT-2's pitch acquisition.

A smooth and accurate pitch-up maneuver terminated with the spacecraft in an approximate -18.5^O pitch attitude. This value is qualitative because the spacecraft's rear scanner was covered by the solar paddles during the pitch-up/separation operation.

A +pitch gate occurred almost immediately after ACS loop activation at (T_O +17.5). The resulting impulsive torque was adequate to orient the spacecraft within the $\pm 5^O$ control deadband at (T_O +28).

A -pitch gate at (T_O +32) was necessary to reduce the pitch error further and to dampen the spacecraft's pitch rate.

Pitch rate acquisition occurred at (T_O +46) as shown in Figure 6-5.

A final -pitch gate occurred at (T_o +62) and this action reduced the pitch error to within the $\pm 0.7^o$ deadband by (T_o +150).

Pitch flywheel activity was smooth and responsive during the entire pitch acquisition phase, and its performance since acquisition has been normal. Its wheel speeds ranged from -185 rpm to +1170 rpm. Table 6-4 summarizes LANDSAT 2's pitch acquisition chronology.

Table 6-4. Pitch Acquisition Telemetry Data

Activity	Time	1040 Pitch Coarse Error (Deg)	1041 Pitch Fine Error (Deg)	* Pitch Error Rate (Deg/Sec)	1043 Pitch Flywheel Speed (RPM)
Separation	To 18:54:55	-18.5	-	-	-10.0 CCW
Separation + 10	To +10 18:55:05	-4.6	-	-	-10.0 CW
ACS Loop Enable	To +17.5 18:55:12.5	-11.25	-	-	-10.0 CCW
+ Pitch Gate (1064)	To +18 18:55:13	-11.25	-	-	-10.0 CCW
$\pm 5^o$ Pitch Error Acquisition	To +28 18:55:23	-5.	-	-	-180.0 CCW
- Pitch Gate (1065)	To +32 18:55:27	-	-1.09	$+.71^o$/Sec	-95 CW
$\pm .1^o$/Sec Error Rate Acquisition	To +46 18:55:41	-	2.45	$+.1^o$/Sec	183 CW
- Pitch Gate (1065)	To +62 18:55:57	-	3.45	-	-660 CCW
$\pm .7^o$ Fine Error Acquisition	To +150 18:57:25	-	-.7	-	260 CW
- Pitch Gate (1065)	To +282 18:59:37	-	-.1	-	730 CW

*Calculated-See Figure 6-5

YAW ACQUISITION EVALUATION

The yaw rate gyro remained essentially constant at -0.0313^{o}/sec during the acquisition phase of the launch activity as can be seen in Figure 6-3.

Exceptions occurred during the following intervals:

Activity	Time	Yaw Rate Error
• pitch-up maneuver	T_o -198	$+1.453^{o}$/sec
• pitch-up conclusion	T_o -55	$-.4009^{o}$/sec
• + yaw gate	T_o +20	$+.1754^{o}$/sec
• - yaw gate	T_o +27	$+.1754^{o}$/sec

The maximum yaw rate error ($+0.175^{o}$/sec) occurred after ACS activation when the yaw tach output reached -520 rpm and a minus yaw gate occurred (T_o +27). After the -yaw gate occurred, the yaw error rate returned to -0.0313^{o}/sec. The duration of each of the rate perturbations was approximately 10 seconds long. The RMP's in HI rate were out of saturation initially at (T_o +43), however, the -pitch and -roll gates which occurred at (T_o +62) momentarily disturbed the RMP's stability and the RMP's re-entered saturation. Restabilization and acquisition occurred at (T_o +66). Table 6-5 summarizes LANDSAT 2's yaw acquisition chronology.

Table 6-5. Yaw Acquisition Telemetry Data

Activity	Time	1035 Yaw Tach Output (RPM)	1087 RMP1 Ind. Rate HI°/SEC	1097 RMP2 Ind. Rate HI°/SEC
Separation	T_o 18:54:55	0	Saturated	Saturated
Separation $+10^{o}$	T_o 18:55:05	0	Saturated	Saturated
Activation	T_o +17.5 18:55:12.5	0	Saturated	Saturated
(1066) +Yaw Gate	T_o +20 18:55:15	-180	Saturated	Saturated
Max - RPM	T_o +26 18:55:21	-465	Saturated	Saturated
(1067) -Yaw Gate	T_o +27 18:55:22	-405	Saturated	Saturated
RMP's out of Saturation (Acquisition)	T_o +66 18:56:01	+650	$.00236^{o}$/SEC	$.00142^{o}$/SEC

POST SEPARATION PERFORMANCE

The ACS has performed well since launch. Following stabilization of the spacecraft, the pneumatics were disabled and pneumatic gates in pitch have occurred at a rate of ≈1 per orbit. Roll gating is ≈2 per orbit. Pneumatics unloading is accomplished by stored momentary enable commands. The commands are timed to occur in the umbra and away from the SN/SD and SD/SN transition. The remaining useable impulse at the end of orbit 29 was 537.493 lb/sec.

Yaw mode was commanded normal during Orbit 1 Alaska. RMP2 has been selected as the prime instrument, and has been enabled since launch. RMP1 was turned off in Orbit 2, Alaska.

ACS THERMAL PERFORMANCE

Temperature and pressure have remained normal, with the forward scanner being an exception. The forward scanner developed a leak prior to launch and has continued to leak at a constant rate. At the end of 40 orbits, the SCEST mean value pressure reading for Function 1003 was 9.550 PSI.

ACS VOLTAGES AND CURRENTS

All voltages and currents have been within specified limits (see Table 6-6).

MAGNETIC MOMENT COMPENSATION

The Magnetic Moment Compensation system was not enabled during the first 40 orbits.

Tables 6-7 through 6-13 are offered as a summary of spacecraft performance from T/V through actual in-orbit operation.

Table 6-6. Subsystem Temperature and Pressure Averages

Function	Units	Orbits		
		0/1	T/V* 25°C Values	29
1084 RMP 1 Gyro Temperature	DGC	79.64	78.5	19.33(1)
1094 RMP 2 Gyro Temperature	DGC	76.06	78.0	74.00
1222 SAD RT MTR HSNG Temp.	DGC	27.67	27.6	19.50
1242 SAD LT MTR HSNG Temp.	DGC	25.68	26.7	26.87
1223 SAD RT MTR WNDNG Temp.	DGC	28.82	28.5	21.76
1243 SAD LT MTR WNDNG Temp.	DGC	27.26	26.0	30.23
1228 SAD RT HSG Pressure	PSI	7.40	7.30	7.26
1248 SAD LT HSG Pressure	PSI	7.27	7.25	7.28
1007 FWD Scanner MTR Temp. 2.90	DGC	23.10	27.0	22.07
1016 Rear Scanner MTR Temp. 2.37	DGC	26.13	29.0	24.19
1003 FWD Scanner Pressure	PSI	9.57(2)	5.4	9.59(2)
1012 Rear Scanner Pressure	PSI	6.19	6.86	6.21
1212 Gas Tank Pressure 3.67	PSI	1921.8	1270.0	1948.0
1210 Gas Tank Temperature	DGC	20.33	23.7	20.66
1213 Manifold Pressure	PSI	66.19	71.7	53.98
1211 Manifold Temperature	DGC	19.52	20.5	19.18
1059 CLG Power Supply Card Temp.	DGC	36.50	34.0	39.00
1260 THO1 EBP	DGC	25.14	29.8	24.29
1261 THO2 EBP	DGC	23.42	29.0	20.29
1262 THO3 EBP	DGC	26.86	30.4	18.29
1263 THO1 STS	DGC	17.28	NA	6.54
1264 THO2 STS	DGC	D	NA	D
1265 THO3 STS	DGC	18.84	NA	8.46
1266 THO4 STS	DGC	16.24	NA	-2.78
1267 THO5 STS	DGC	16.76	NA	9.62
1224 SAD R FSST	DGC	15.17	30.0	35.00
1244 SAD L FSST	DGC	17.89	25.0	50.00

* Thermal Vacuum Test Data
(1) RMP-1 Left off after initial test in Orbit 1
(2) Prelaunch leak - refer to text
NA = Not Applicable
D = Defective telemetry point

Table 6-7. ACS Voltages and Currents

Function	Units	Orbits 0/1	Orbits T/V* 25°C Values	Orbits 29
1081 RMP 1 MTR Volts	VDC	36.39	36.1	OFF
1082 RMP 1 MTR Current	Amps	0.26	0.252	OFF
1080 RMP 1 Supply Volts	VDC	-23.33	-23.7	OFF
1091 RMP 2 MTR Volts	VDC	29.82	30.1	29.99
1092 RMP 2 MTR Current	Amps	0.10	0.108	0.10
1090 RMP 2 Supply Volts	VDC	-23.52	-23.5	-23.63
1220 SAD RT MTR WNDNG Volts	VDC	-5.61	5.7	-5.47
1240 SAD LT MTR WNDNG Volts	VDC	-5.64	5.7	-5.08
1227 SAD RT -15 VDC Conv.	VDC	15.11	15.6	15.14
1247 SAD LT -15 VDC Conv.	VDC	15.22	15.7	15.23
1056 CLB $\pm$ 6 VDC	TMV	2.35	2.32	2.35
1055 CLB $\pm$ 10 VDC	TMV	2.87	2.87	2.88
1057 CLB Power Supply Volts	TMV	2.95	2.95	2.97
4006 MMCA Roll Coil	TMV	2.99	3.00**	2.99
4005 MMCA Pitch Coil	TMV	3.12	3.20**	3.15
4004 MMCA Yaw Coil	TMV	3.05	3.00**	3.05

*Thermal Vacuum Test Data
**20°C T/V Values

Table 6-8. Pre-Launch R/T CRT Hardcopy on the Pad

```
**********************************************************************************
**********************************************************************************
***.   REAL TIME SET ACS                                                       ***
***.SADECAM TIME   10/28/356/E TIME    022/17/45/19   RMB          1          2    ***
***.PRESS     7.26      7.42  RSI  PNEUMATICS         GYRB T      79.64      75.50  DGC***
***.HSG T    24.09      5.54  DGC  TNK P 1911.43  PSI  MTR  I       0.25H      0.10L AMP***
***.+15 V    15.31     15.21  VDC  TNK T   19.33  DGC  MTR  V      36.25H     29.73  PKV***
***.F SS T   15.26     15.17  DGC  MAN P   72.99H PSI  HTR PWR     13.42      13.00  WTS***
***.R SS T   16.99     19.64  DGC  MAN T   19.17  DGC  PKG T       83.50      30.50  DGC***
***.SS PRE    3.05      3.05  TMV  CLB        PITCH     ROLL   (REAR)        YAW      ***
***.MT W T   23.68     25.88  DGC  F/W SPD    -2.66                        -11.53  RPM  ***
***.MT W V  -24.95    -24.09  VDC  CRS ERR     0.35      0.00                      DEG  ***
***.TACH      0.18H    -0.29  D/M  FNE ERR     0.14     -0.36                      DEG  ***
***.SCANNERS   FWD      REAR       M-D CW      0.00      4.70      5.49     0.00  PCT  ***
***.FW SP   627.75   615.00  RPM  M-D CCW     0.00      0.00      0.00     0.00  PCT  ***
***.PRESS     9.46H     6.10  PSI  PNE MOD               1.27                0.00  TMV  ***
***.MTR T    21.37     25.16  DGC  SBL DC      0.39      0.00                0.00  PCT  ***
***.PRE T    21.36     25.56  DGC  PITCH TAC   0.00                                RPM  ***
***.REF T    17.89     26.50  DGC  YAW RATE GYRO      TEMPS-DGC      CLB VOLTAGES-TMV ***
***.LEPLSE    0.95      0.00H MS   SPEED     4.75  TMV BPL1   24.57  +-10V     2.87H  ***
***.TRPLSE    0.00H     1.00  MS   RATE      0.00  D/S BPL2   23.14  +-6V      2.35   ***
***.UP/DN     0.70      0.70  DEG  HSG T   28.39  DGC BPL3   25.99  PS V      2.95H  ***
**********************************************************************************
**********************************************************************************

                                SCE1 CONSOLE    022/17/46/50
```

Table 6-9. Orbit 1 R/T CRT Display Hardcopy Post Launch

```
**********************************************************************************
**********************************************************************************
***.   REAL TIME SET ACS                                                       ***
***.SADECAM TIME   10/13/185/C TIME    022/19/49/51   RMP          1          2    ***
***.PRESS     7.26      7.42  PSI  PNEUMATICS         GYRB T      70.00L     73.50L DGC***
***.HSG T    24.48      5.31  DGC  TNK P 1923.78  PSI  MTR  I       0.21       0.10  AMP***
***.+15 V    15.19     15.21  VDC  TNK T   20.33  DGC  MTR  V      32.69      30.01  PKV***
***.F SS T   16.84      7.00  DGC  MAN P   54.35  PSI  HTR PWR      0.07       6.29  WTS***
***.R SS T   16.49     -0.54  DGC  MAN T   18.83  DGC  PKG T       30.32      28.24  DGC***
***.SS PRE    1.67      3.05  TMV  CLB        PITCH     ROLL   (REAR)        YAW      ***
***.MT W T   26.66     27.05  DGC  F/W SPD  -122.66                      1406.90  RPM  ***
***.MT W V   -8.23H    -5.18  VDC  CRS ERR     0.00      0.00                      DEG  ***
***.TACH     10.51      3.28H D/M  FNE ERR    -0.12     -0.80H                     DEG  ***
***.SCANNERS   FWD      REAR       M-D CW      0.00      5.09     10.19     0.00  PCT  ***
***.FW SP   622.22  1026.06  RPM  M-D CCW     2.36      0.00      0.00   100.00  PCT  ***
***.PRESS     9.68H     6.30  PSI  PNE MOD               1.25                -0.20  TMV  ***
***.MTR T    24.82     25.80  DGC  SBL DC      0.00      0.00                0.00  PCT  ***
***.PRE T    23.68     26.93  DGC  PITCH TAC   0.17                                RPM  ***
***.REF T    19.64     29.16  DGC  YAW RATE GYRO      TEMPS-DGC      CLB VOLTAGES-TMV ***
***.LEPLSE   13.80     12.00  MS   SPEED     0.00  TMV BPL1   23.71  +-10V     2.87H  ***
***.TRPLSE   12.30     14.00  MS   RATE      2.00  D/S BPL2   22.28L +-6V      2.35   ***
***.UP/DN     0.70      0.70  DEG  HSG T   24.64  DGC BPL3   24.57  PS V      2.95H  ***
**********************************************************************************
**********************************************************************************

                                SCE1 CONSOLE    022/19/52/54
```

Table 6-10. Attitude Control System Alignment Data (Prelaunch)

Control Axes to Spacecraft Axes	Spec	Measured
Pitch Axis	0.25°	-2' 6"
Roll Axis	0.25°	+0' 9"
Yaw Axis	0.25°	-0' 51"
Pneumatic Nozzles	**Spec**	**Measured (Max)**
Pitch	40'	4'
Roll	40'	2'
Yaw	40'	7.5'

Table 6-11. Unfold Subsystem

Components		
Unfold Timer	S/N 6549349	
Unfold Switch	S/N 4-32116	
Separation Switches	S/N 209 & 211	
Unfold Motors	S/N 112 & 113	
Cable Cutter Assembly	S/N 55 & 81	
Performance	**Spec**	**Pre-Launch Measurements**
Unfold Timer Fire Time 1	2.7 ± 0.6 Sec	2.8 Sec
Unfold Timer Fire Time 2	5.3 ± 1.2 Sec	5.65 Sec
Squib Fire Current 2	≥ 4 Amp Ea.	7 Amp Ea.
Squib Fire Current 2	≥ 4 Amp Ea.	7 Amp Ea.
Paddle Open Time (-Y)	≤ 40 Sec	25.2 Sec
(+Y)	≤ 25 Sec	16.2 Sec

Pre-Launch Problem Summary

No Problems Throughout Environmental Test Program

Table 6-12. Attitude Control Subsystem

Parameter	Spec	Pre-Launch Measurement
15 Second Timer	14.4 to 18 Sec	16 Secs
50 Second Timer	42.5 to 57.5 Sec	51 Secs
Pitch Pneu. Threshold	$5.5^{o} \pm 0.8^{o}$	5.85^{o}
Roll Pneu. Threshold	$5.1^{o} \pm 0.8^{o}$	5.7^{o}
Yaw Pneu. Threshold	0.07 to 0.13^{o}/Sec	0.103^{o}/Sec
Pitch Position Bias	4.7 ± 0.5^{o}	5.0^{o}
Yaw Position Bias	1.0^{o} (Trend)	0.978^{o}
Left Solar Array Drive		
Normal Rate	3.33 ± 0.33^{o}/Min	3.30^{o}/Min
High Rate	3.90 ± 0.4^{o}/Min	3.90^{o}/Min
Right Solar Array Drive		
Normal Rate	3.33 ± 0.33^{o}/Min	3.45^{o}/Min
High Rate	3.9 ± 0.4^{o}/Min	4.04^{o}/Min
Momentum Bias Speed	1060 ± 150 RPM	1000 RPM
Pneumatics		
Primary Seat Leak	1 SCC/Hr	0.12 SCC/Hr
External Leak	10 SCC/Hr	< 0.1 SCC/Hr

Table 6-13. Attitude Control Subsystem LANDSAT-2 Performance

	Spacecraft Goals	
	Attitude	Rate
Roll	0.7^{o}	0.015^{o}/Sec
Pitch	0.7^{o}	0.015^{o}/Sec
Yaw	1.0^{o}	0.015^{o}/Sec

SECTION 7

TELEMETRY SUBSYSTEM

SECTION 7

TELEMETRY SUBSYSTEM

The Narrow Band Telemetry samples, encodes, formats, and transmits data from spacecraft service and payload subsystem to earth receiving stations. The subsystem processes and coherently retransmits an S-Band signal, including a ranging code for use in orbit determination. The subsystem provides timing and synchronizing signals to spacecraft service and payload subsystems. See Figure 7-1 and 7-2 for functional block diagram, and Figure 7-3 for hardware illustration. The units in this subsystem are closely associated with those described in Section 11, Unified S-Band/Premodulation Processor, and Section 8, Command/Clock Subsystem.

The Telemetry subsystem was launched in the ON mode and has been operating continuously providing data from the spacecraft either to ground stations, to the narrow band recorders, or to both. The launch configuration is given in Table 7-1 and typical telemetry values in Table 7-2. Total performance has been excellent. Prelaunch performance is shown in Table 7-3 for the VHF transmitter.

Table 7-1. Telemetry Subsystem Launch Mode

	MODE	CMD		MODE	CMD
POWER 1	ON	522	ANALOG MUX	A	262
POWER 2	ON	520	DIGITAL MUS	A	300
MEM WRITE	OFF	361	MEMORY	A	240
VER MEM	OFF	422	FOR LOG	A	302
MTX VER O/R	ON	341	VHF XMTR	YES	400
B. t 1	OFF	401	VHF XMTR O/R	ON	342
B. t 0	OFF	343			
FOR PROG	ON	462	VHF Transmitter		
MTX VER	NORM	502			
MEM/VER O/R	ON	500	VHF MODE	RT	207
PRE REG ON	A	460	VHF PB O/R	ON	230
PRE REG OUT	A	463	VHF RF PWR	LO	210
BUFF AMP	A	440	VHF PWR 1	ON	206
SEL SEQ	A	242	VHF PWR 2	ON	170
A/D CONV	A	260	VHF XMTR	A	231

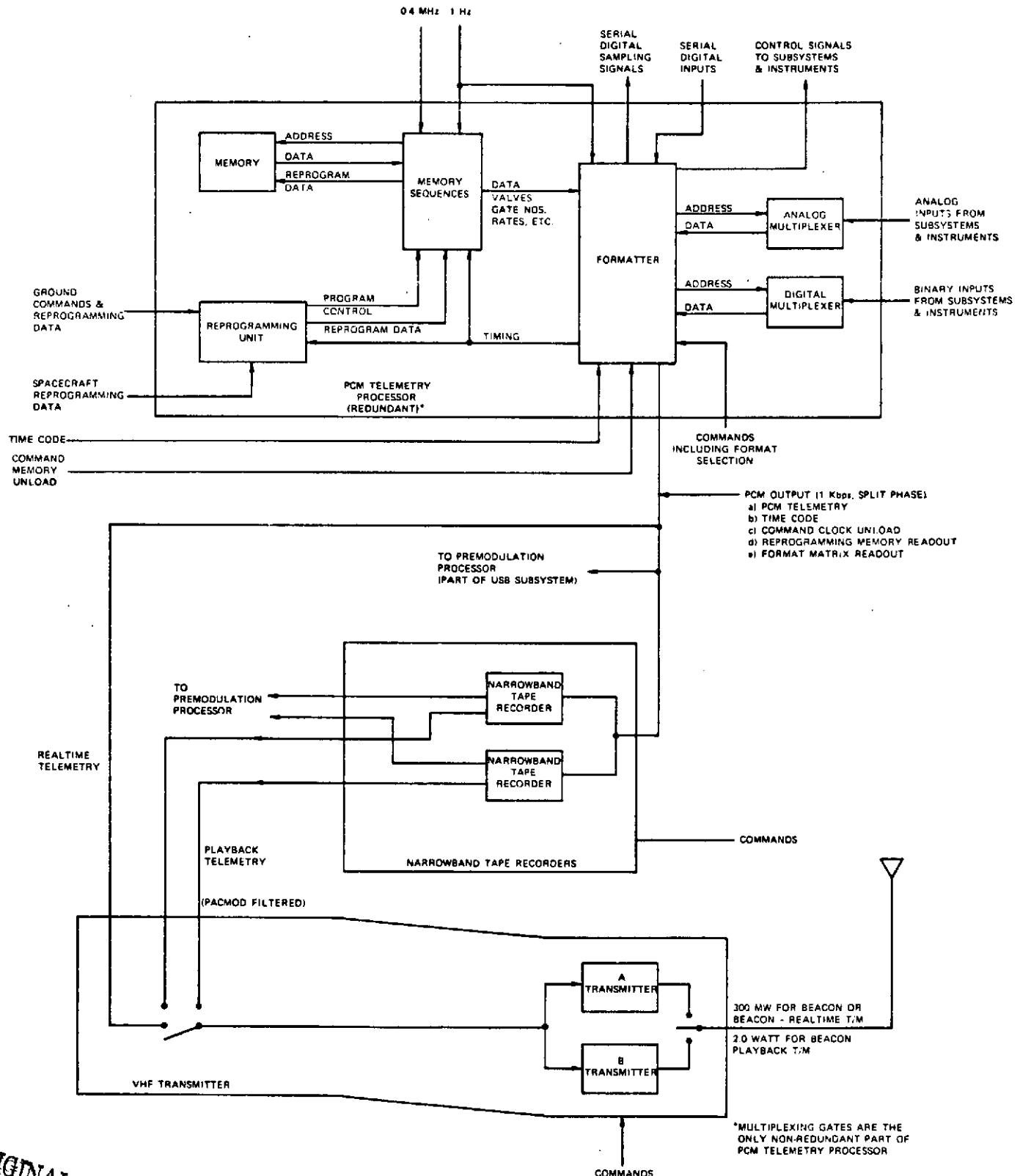

Figure 7-1. Narrowband Telemetry Block Diagram

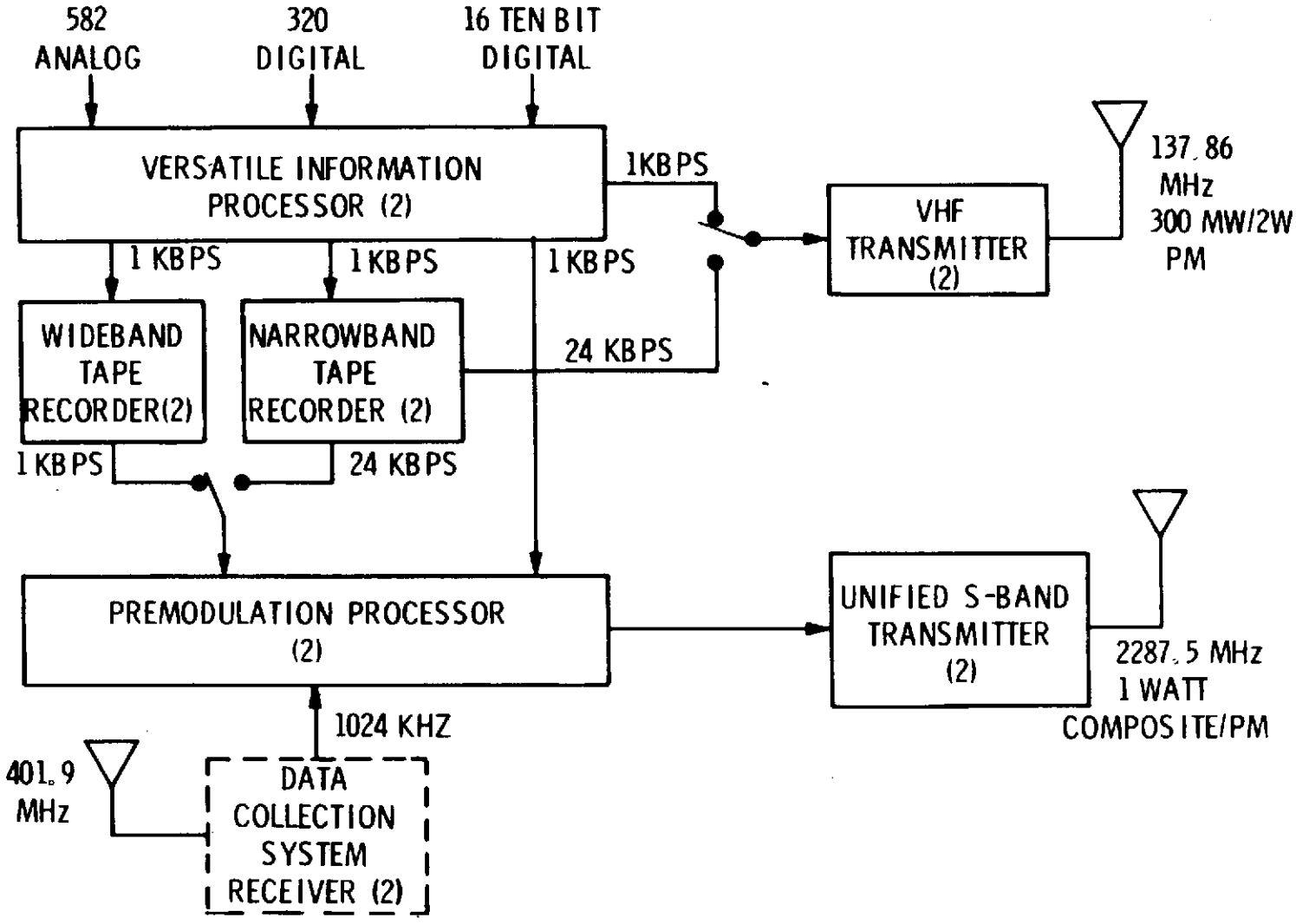

Figure 7-2. Narrowband Telemetry and Command Subsystem Block Diagram (Down Link)

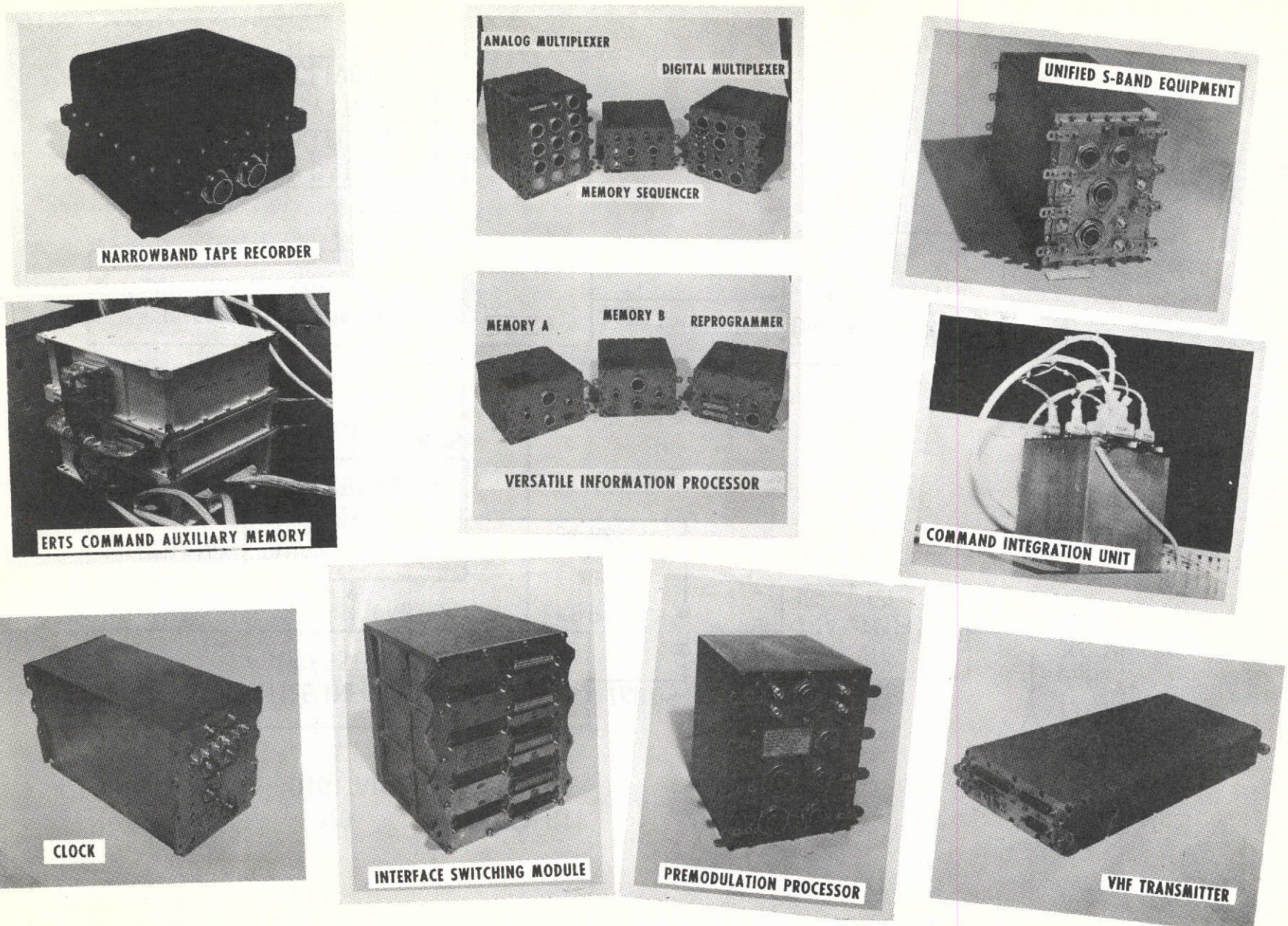

Figure 7-3. Narrowband Telemetry and Command Subsystem

Table 7-2. TMP Telemetry Values

Function No.	Function Name	Unit	Orbit O-1	T/V* 20° Plateau	Orbit 35
9001	Memory Sequencer A Converter	VDC	4.45	4.46	4.45
9002	Memory Sequencer B Converter	VDC	OFF**	4.55	OFF**
9003	Memory Sequencer Temp	°C	15.00	25.00	20.00
9004	Formatter A Converter	VDC	4.50	4.50	4.52
9005	Formatter B Converter	VDC	OFF**	4.55	OFF**
9006	Dig. Mux A Converter	VDC	4.20	4.22	4.22
9007	Dig. Mux B Converter	VDC	OFF**	4.20	OFF**
9008	Formatter/Dig Mux Temp	°C	17.50	25.00	25.00
9009	Analog Mux A Converter	VDC	4.02	4.02	4.02
9010	Analog Mux B Converter	VDC	OFF**	3.87	OFF**
9011	A/D Converter A Voltage	VDC	4.02	4.02	4.02
9012	A/D Converter B Voltage	VDC	OFF**	4.07	OFF**
9013	Analog Mux, A/D Conv. Temp	°C	17.50	28.00	25.00
9014	Preregulator A Voltage	VDC	3.99	3.99	4.00
9015	Preregulator B Voltage	VDC	OFF**	4.01	OFF**
9016	Reprogrammer Temp	°C	17.50	22.00	22.50
9017	Memory A Converter	VDC	4.45	4.45	4.45
9018	Memory A Temp	°C	12.50	17.00	17.50
9019	Memory B Converter	VDC	OFF**	4.50	OFF**
9020	Memory B Temp	°C	12.50	17.3	17.50
9100	Reflected Power (Xmtr A)	dBm	15.29	14.7	18.29
9101	Xmtr A-20 VDC	VDC	3.97	3.97	3.80
9103	Xmtr A Temp	°C	23.59	20.5	27.73
9105	Xmtr A Power Output	dBm	25.79	25.7	27.73

* Thermal Vacuum Test data
** Not turned on since Prelaunch

Table 7-3. VHF Transmitter

Component				
VHF Transmitter	FT 0004			
Pre-Launch Performance				
	1 KBPS real time 24 KBPS playback	Data Good		
		Spec	A	B
	Power Output-Low Mode	300 MV	365 MW	390 MW
	High Mode	2 W	2.8 W	2.9 W

SECTION 8

COMMAND/CLOCK SUBSYSTEM

SECTION 8
COMMAND/CLOCK SUBSYSTEM

The Command and Clock Subsystem consists of the following modules: VHF Receiver; Command Integration; Command Clock; and ECAM. The first three modules are located in the sensory ring, and ECAM is located inside the USB antenna mount. Parts of two other modules (Unified S-Band Equipment and Premodulation Processor) provide one of the two primary inputs to the Command and Clock Subsystem, but are not considered part of the subsystem.

The Command and Clock Subsystem performs the following functions:

1. Receives, processes, and stores command information from the USB and VHF ground station.
2. Receives, processes, and stores command information from the USB and VHF ground stations and executes these commands at the predetermined time.
3. Receives and transfers serial data to the TMP for reprogramming its memory.
4. Provides an accurate time base upon which all spacecraft activities can be planned, referenced, and measured.
5. Generates Minitrack 36-bit time code data which is stored and transmitted with TMP, RBV, and MSS data so that the time reference cited above may be used to process data in the ground station.
6. Generates standard frequencies and motor drive signals used by other subsystems.

The LANDSAT-2 System Command Matrix provides for 512 commands as noted in Appendix B.

Figure 8-1 is a simplified block diagram and Figure 8-2 is a modulation format.

The LANDSAT-2 command subsystem was launched in the configuration given in Table 8-1, and activated with the separation and unfold contact closure which occrrred at 18:54:55 near Tananarive in orbit 0.

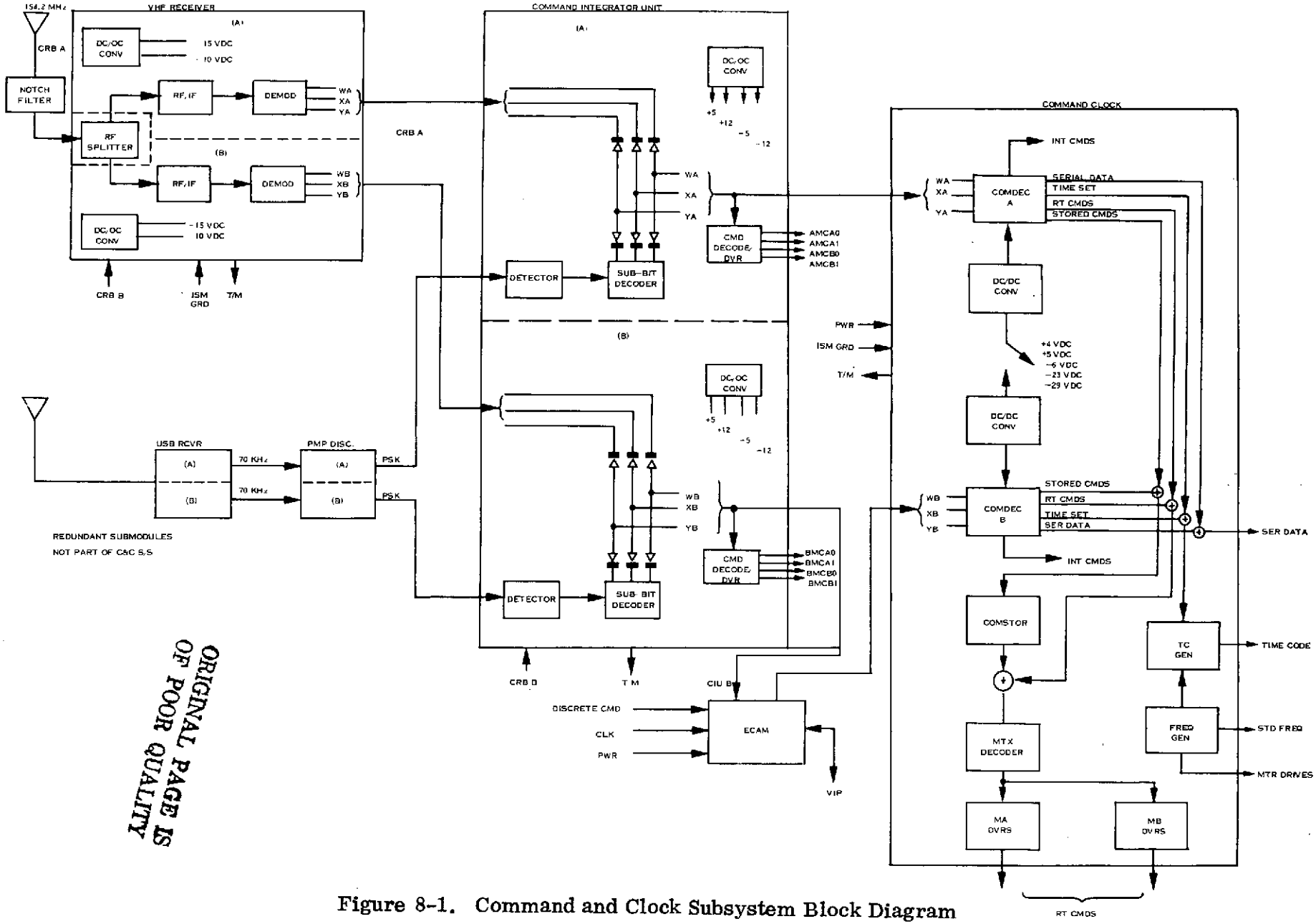

Figure 8-1. Command and Clock Subsystem Block Diagram

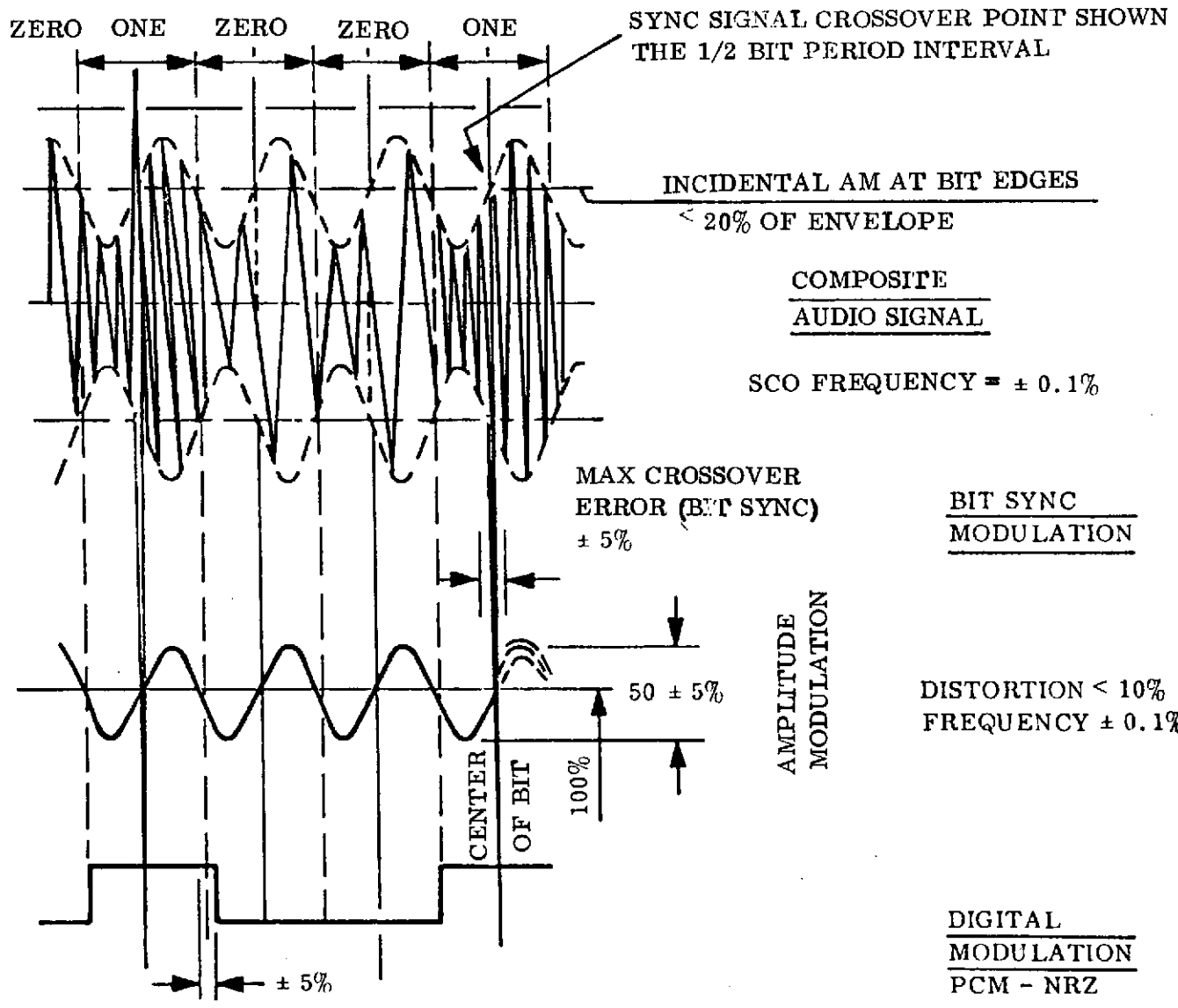

Figure 8-2. Composite STADAN Audio Waveform

Table 8-1. Command/Clock Subsystem Launch Mode

	Mode	Cmd
COMSTOR A	OFF	055
COMSTOR B	OFF	025
MTX DECODER	PR1	011
MTX A DRIVE	PR1	012
MTX B DRIVE	PR1	013
OSCILLATOR	PR1	014
FREQ. GEN	PR1	015
VERIFY	TOCK	457
MSFN/STADAN	A/B	616
CLOCK FUSE	1A	653
CIU CH B	ON	782
CIU CH A	ON	786
CLOCK PS/COM	ON	783
ECAM	OFF	

A summary of telemetry values is provided in Table 8-2. Flight data correlates very closely with Thermal Vacuum test data values. Ground software problems are delaying availability of some of the telemetry.

Command processing of both real time and stored commands have been normal. No spurious or unexecuted commands have been observed. (Some commanding difficulties have been experienced, but all cases have been coincidental with low elevation at the station, lock on side lobes, or similar ground transmission difficulties.)

The time base provided for spacecraft activities planning has been well within specifications during this period. Clock drift has been less than -2 MS per orbit during this period.

Spacecraft time code, transmitted via RBV, MSS, and Tlm has been reliable and accurate.

All frequency outputs to other subsystems have been nominal.

Table 8-3 shows the pre-launch performance of the Command Clock subsystem.

Table 8-2. Command/Clock Telemetry Summary

Function No.	Name	Mode	Units	Orbit 0/1	Thermal Vac 20° Plateau	Orbit 35
8005	Pri. Power Supply Temp.	-	°C	29.93	37.89	38.82
8006	Red. Power Supply Temp.	-	°C	27.61	36.31	36.93
8007	Pri. Osc. Temp.	-	°C	24.35	27.84	28.70
8008	Red Osc. Temp.	-	°C	23.48	26.95	27.82
8009	Pri. Osc. Output	-	TMV	1.02	1.06	1.06
8010	Red. Osc. Output	-	TMV	0.0	1.16	3.20
8011	100 KHz	Pri. - Red.	TMV	3.15	3.16	3.17
8012	10 KHz	Pri. - Red.	TMV	3.04	3.05	3.08
8013	2.5 KHz	Pri. - Red.	TMV	2.95	2.96	3.01
8014	400 Hz	Pri. - Red.	TMV	4.43	4.45	4.17
8015	Pri. + 4V Power Supply	Pri. Clk ON	VDC	NA	2.05	NA
8016	Red. + 4V Power Supply	Red. Clk ON	VDC	NA	2.01	NA
8017	Pri. + 6V Power Supply	Pri. Clk ON	VDC	NA	2.31	NA
8018	Red. + 6V Power Supply	Red. Clk ON	VDC	NA	2.31	NA
8019	Pri. - 6V Power Supply	Pri. Clk ON	VDC	NA	5.23	NA
8020	Red. - 6V Power Supply	Red. Clk ON	VDC	NA	5.23	NA
8021	Pri. - 23V Power Supply	Pri. Clk ON	VDC	NA	5.70	NA
8022	Red. - 23V Power Supply	Red. Clk ON	VDC	NA	5.66	NA
8023	Pri. - 29V Power Supply	Pri. Clk ON	VDC	NA	5.29	NA
8024	Red. - 29V Power Supply	Red. Clk ON	VDC	NA	5.28	NA
8101	CIU A - 12V	CIU A ON	VDC	3.96	3.96	3.79
8102	CIU B - 12V	CIU B ON	VDC	3.95	3.95	3.78
8103	CIU A - 5V	CIU A ON	VDC	4.14	4.15	3.93
8104	CIU B - 5V	CIU B ON	VDC	4.10	4.10	3.90
8105	CIU A Temp.	CIU A ON	°C	20.69	22.52	26.01
8106	CIU B Temp.	CIU B ON	°C	18.98	20.52	23.35
8201	Receiver RF-A Temp.	-	°C	NA	30.05	NA
8202	Receiver RF-B Temp.	-	°C	28.18	26.08	29.09
8203	D MOD A Temp.	-	°C	26.05	39.03	28.95
8204	D MOD B Temp.	-	°C	35.68	29.18	37.73
8205	Receiver A AGC	Receiver A ON	DBM	OFF**	-56.94	OFF**
8206	Receiver B AGC	Receiver B ON	DBM	-85.72	-61.46	-87.83
8207	Amp. A Output	Receiver A ON	TMV	OFF**	1.49	OFF**
8202	Amp. B Output	Receiver B ON	TMV	1.76	1.55	2.10
8209	Freq. Shift Key A Out	Receiver A ON	TMV	OFF**	1.08	OFF**
8210	Freq. Shift Key B Out	Receiver B ON	TMV	1.10	1.11	1.11
8211	Amp. A Output	Receiver A ON	TMV	OFF**	1.11	OFF**
8212	Amp. B Output	Receiver B ON	TMV	1.13	1.13	1.13
8215	D MOD A - 15V	Receiver A ON	TMV	OFF**	4.87	OFF**
8216	D MOD B - 15V	Receiver B ON	TMV	4.77	4.78	4.77
8217	Regulator A - 10V	Receiver A ON	TMV	OFF**	5.40	OFF**
8218	Regulator B - 10V	Receiver B ON	TMV	5.30	5.33	5.32

* Thermal Vacuum Test Data
** A component not used since Pre-launch
NA - not available due to processing problem - MIT 710

Table 8-3. Command and Clock Subsystem Pre-Launch Performance Summary

- ALL OPERATIONAL MODES EXERCISED SATISFACTORILY
- BOTH COMSTORS OPERATED. ALL STORED COMMANDS EXECUTED PROPERLY
- ALL CIU COMMANDS EXECUTED PROPERLY
- NO TIME CODE OR CLOCK FREQUENCY ANOMALIES
- ALL SERIAL DATA COMMANDS TO ECAM OPERATED PROPERLY
- ALL ECAM STORED COMMAND LOCATIONS (512) EXERCISED. ALL ECAM STORED COMMANDS EXECUTED PROPERLY.
- ALL ECAM SMART FUNCTIONS EXERCISED AND FUNCTIONED PROPERLY.
- VHF RCVR THRESHOLD

SPEC	A	B	MARGIN
-107 DBM	-108 DBM	-107 DBM	31.6 DB

PROBLEM	RESOLUTION
CIU	
• NONE	
VHFR	
• AGC VARIES WITH TEMPERATURE. TRACKING SINCE LAST REVIEW.	• NO PROBLEM - REPEATABLE AT ANY GIVEN TEMPERATURE. HAS NOT CHANGED, DOES NOT AFFECT SPACECRAFT OPERATION. ACCEPT AS IS.
ECAM	
• STOPS PROCESSING DATA WHEN REDUNDANT SYSTEM SWITCHED IN (EBPR 268, 5/29/74).	• INTERRUPTS CAUSED BY RE-CONFIGURATION OF COMMAND CLOCK AND/OR VIP. RESTRAINT ADDED.
• SMART FUNCTIONS EXECUTED WHEN VIP RECONFIGURED (EBPR 309, 6/1/74).	• INADEQUATE SYNC CRITERIA. CRITERIA MADE TIGHTER - PROBLEM RESOLVED. SOFTWARE MODIFIED TO SOLVE PROBLEM.
COMMAND CLOCK	
• POWER SUPPLY INSTABILITY AT HIGH TEMPERATURE (P/S TEMP 50°C) AND LIGHTLY LOADED, (EBPR 276, 5/29/74 MR D08198).	• UNIT REMOVED FROM SPACECRAFT AND RETURNED TO CAL COMP FOR REPAIR. (PRIOR TO T/V #2).
• EXECUTED "COMP LOAD #2 ON" COMMAND WHEN THE REDUNDANT CLOCK P/S WAS TURNED ON. EBPR (530, 10/25/74).	• PROBABLY CAUSED BY NOISE AT P/S TURN-ON. HAS NEVER REPEATED. CLOCK P/S TURN ON IS NOT A NORMAL OPERATIONAL EVENT (BOTH SUPPLIES ON AT LAUNCH AND REMAIN ON).

SECTION 9

ORBIT ADJUST SUBSYSTEM (OAS)

SECTION 9

ORBIT ADJUST SUBSYSTEM (OAS)

The Orbit Adjust Subsystem (OAS) is a monopropellant hydrazine fueled propulsion system consisting of three thruster assemblies, a propellant feed system, a support structure and the necessary interconnect plumbing, brackets, and electrical harnessing. The propellant feed system consists of a single tank for storage of both the propellant and pressurant. The feed system operates in a blow-down mode during which the engine thrust decays from an initial level of 0.85 LB_f to a final value of 0.25 LB_f as the 67 LB_m of propellant is consumed.

The operation of the propulsion subsystem permits the flow of hydrazine propellant into a combustion chamber containing a catalyst. Within the chamber, the catalyst spontaneously decomposes the hydrazine into ammonia, hydrogen, and nitrogen gases having a temperature of approximately 1800^{o}F. These gases are then expanded through a conical nozzle to produce thrust. See Figures 9-1 and 9-2 for functional block diagrams and Figure 9-3 for hardware configuration.

The OAS was launched in the OFF mode and remained OFF except as noted in Table 9-1.

Table 9-1.

Orbit	Burn Time (Sec)	Semi Major Axis** (KM)	Performance % of Plan	N_2H_4 Used (LB_m)
-*	-	7286.462	-	-
32	4.8	7286.501	105.41	0.02
71	4.8	7286.434	90.00	0.02
79	420	7289.977	107.07	1.62
86	420	7293.191	107.02	1.51
163	420	7290.237	97.00	1.42
191	360	7287.816	97.58	1.15
212	308.8	7285.820	101.52	0.95
Average Force $\approx$ 0.79 LB_f				

*After Injection

**Post Burn

In Orbit 32 a 4.8 sec burn was performed to test the alignment of the -X thruster. A similar firing was performed later in Orbit 71 on the +X thruster. In both cases the firing was normal. In Orbit 79 an orbit adjust sequence for LANDSAT-2 was initiated to phase the satellite with LANDSAT-1 in the 18 day ground track repeat cycle. A firing on the -X thruster in this orbit lasted for 420 seconds, and was normal in all respects. In Orbit 86 the -X thruster was again fired for a duration of 420 sec, which brought the semi-major axis of the orbit to 7293.19 km. Later, in Orbits 163 and 191, the +X thruster was fired for a duration of 420 and 360 seconds respectively. The final maneuver in this sequence was performed with a firing on the +X thruster in Orbit 212. The burn lasted for 308.8 seconds. Tracking data has confirmed satisfactory achievement of all objectives of this orbit adjust sequence. A summary of the orbit adjust maneuvers is given in Table 9-1. The typical performance characteristics of the +X and -X thrusters are shown in Figures 9-4 thru 9-7.

Housekeeping functions of the OAS were normal. Table 9-2 gives average telemetry values for the OFF quiescent state.

Table 9-2. OAS Telemetry Values

Function		Units	Average Values		
No.	Name		Orbit 0-1	20°C Plateau*	Orbit 50
2001	Prop. Tank Temp.	°C	18.35	19.0	23.03
2003	Thrust Chamber No. 1 (-x) Temp	°C	25.38	19.7	24.84
2004	Thrust Chamber No. 2 (+x) Temp	°C	20.47	18.3	37.34
2005	Thrust Chamber No. 3 (-y) Temp	°C	40.33	18.0	47.22
2006	Line Pressure	Psia	531.71	15.0**	545.60

*Thermal Vacuum Test Data. The Thruster Chamber heaters were duty cycled to maintain the chamber temperatures between +5°C and +40°C.

**(Orbit Adjust Tank not Loaded)

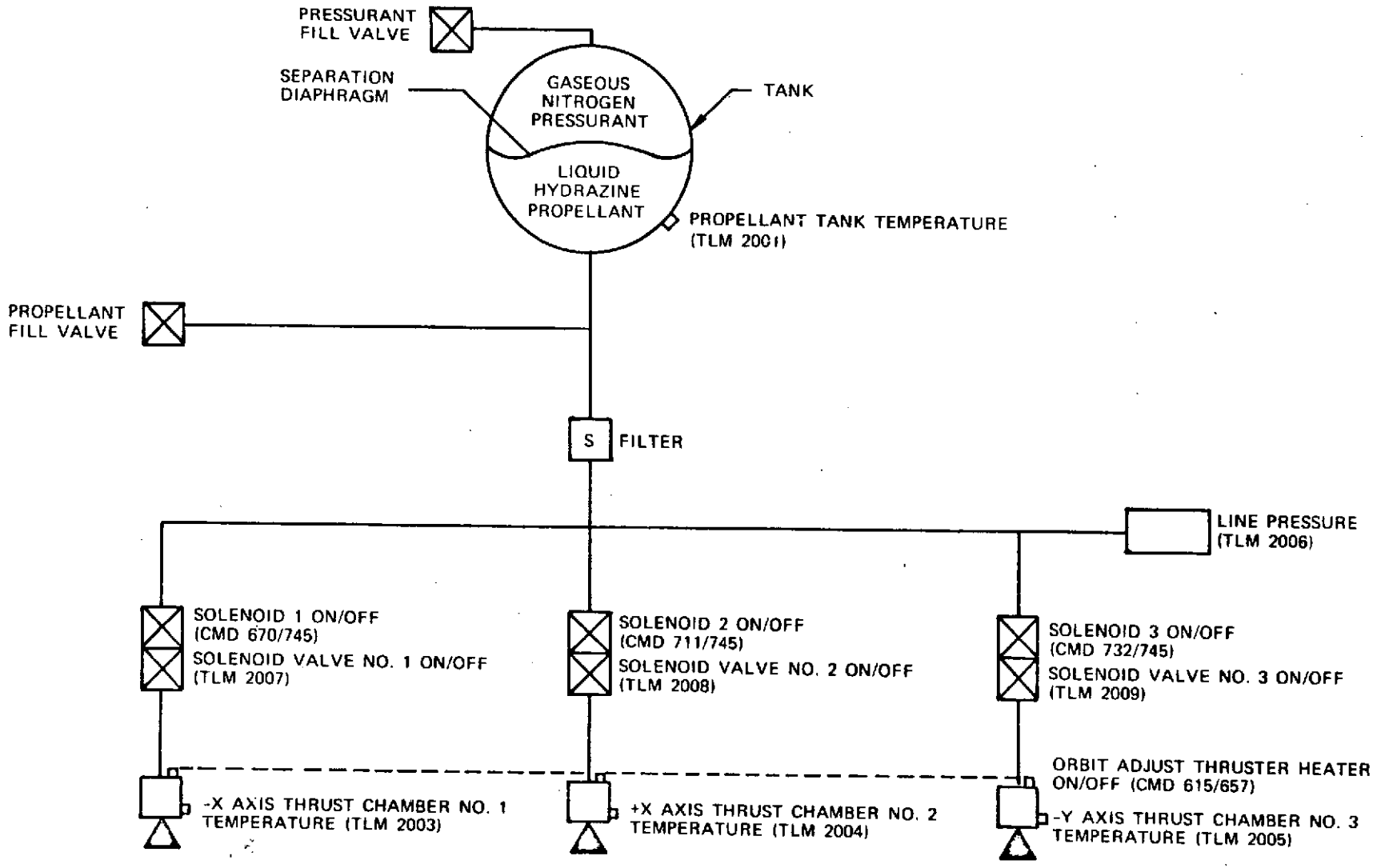

Figure 9-1. Orbit Adjust Subsystem Block Diagram

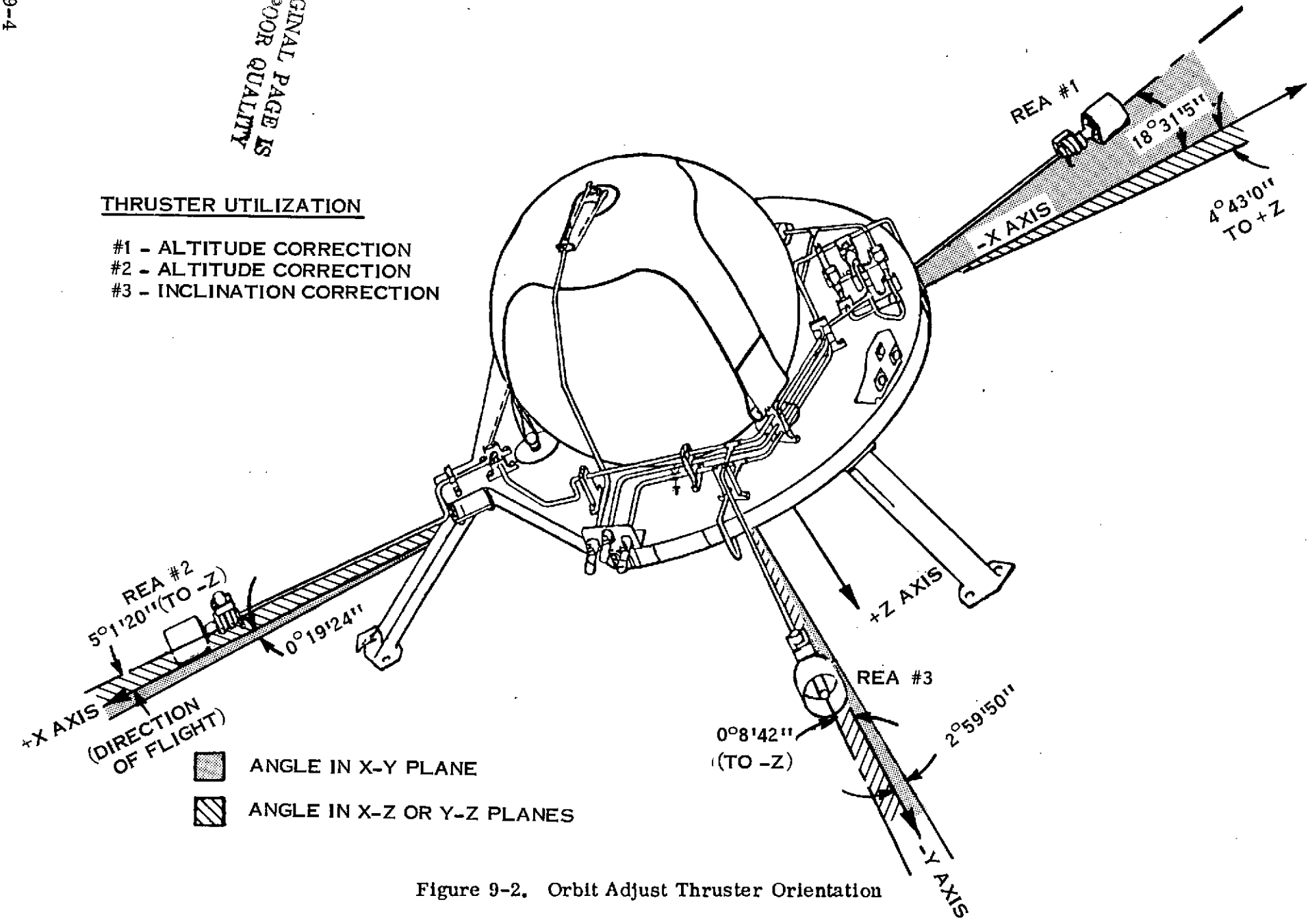

Figure 9-2. Orbit Adjust Thruster Orientation

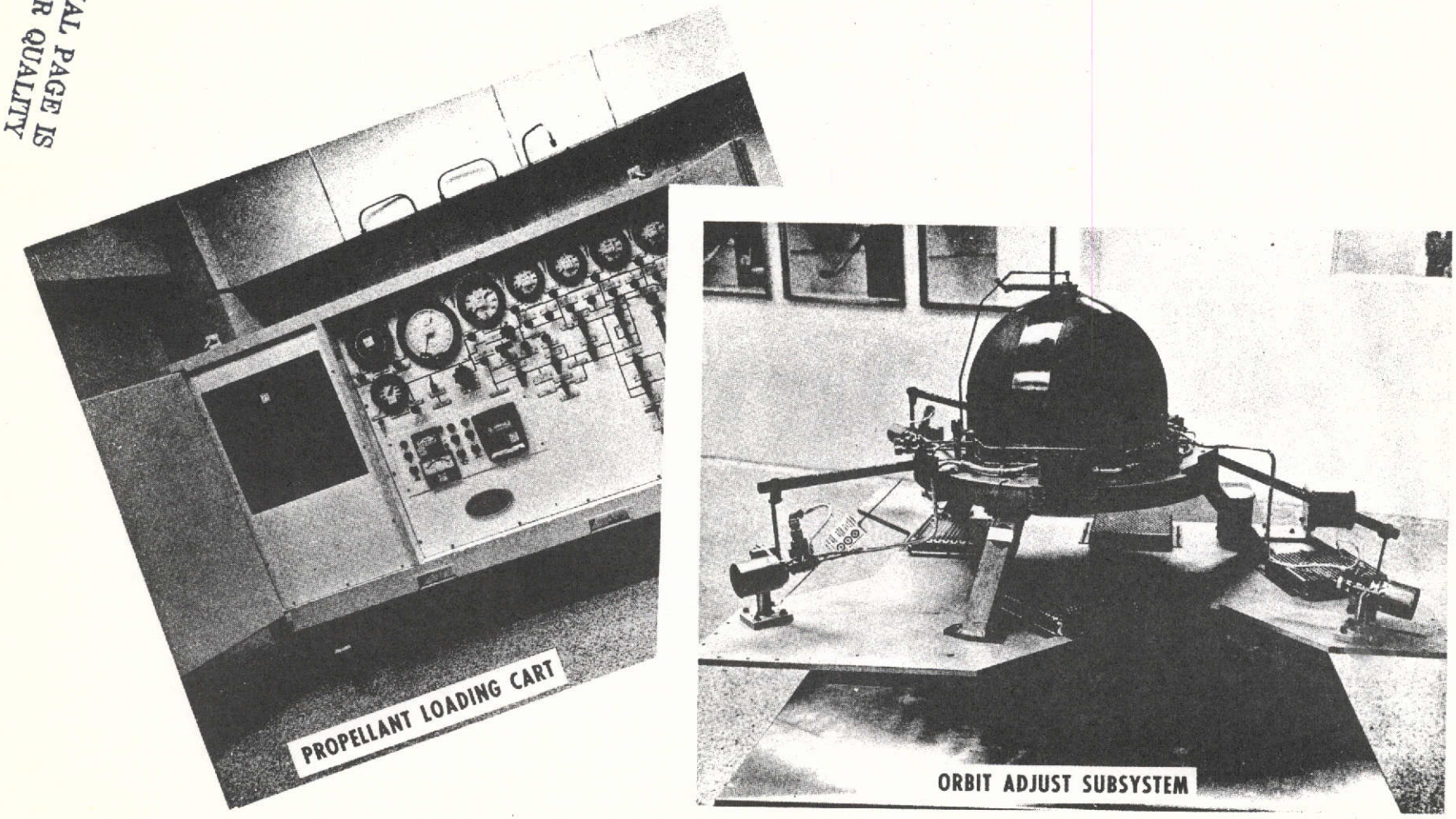

Figure 9-3. Orbit Adjust Subsystem

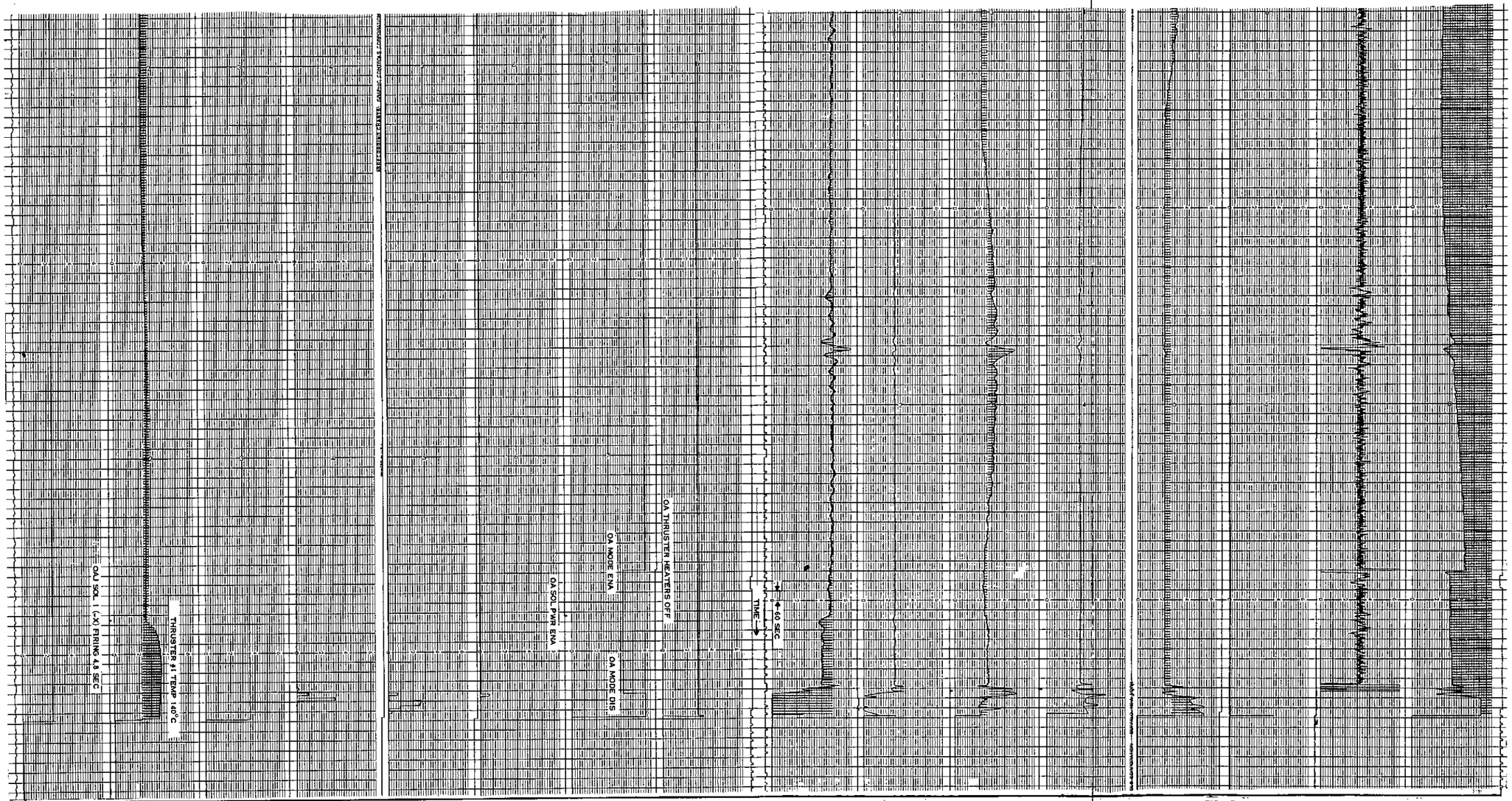

Figure 9-4. Performance Characteristics

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2

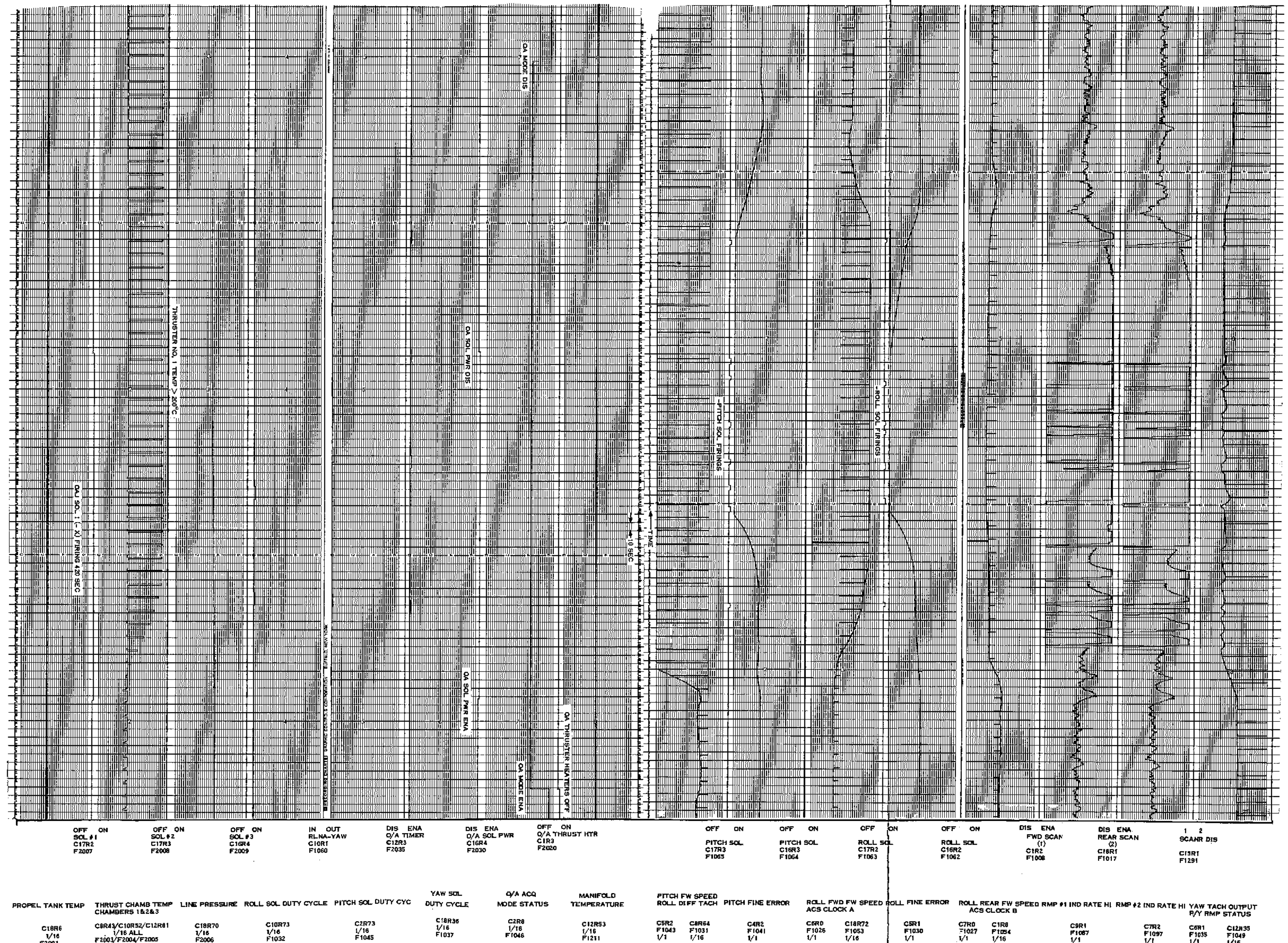

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Figure 9-5. Performance Characteristics

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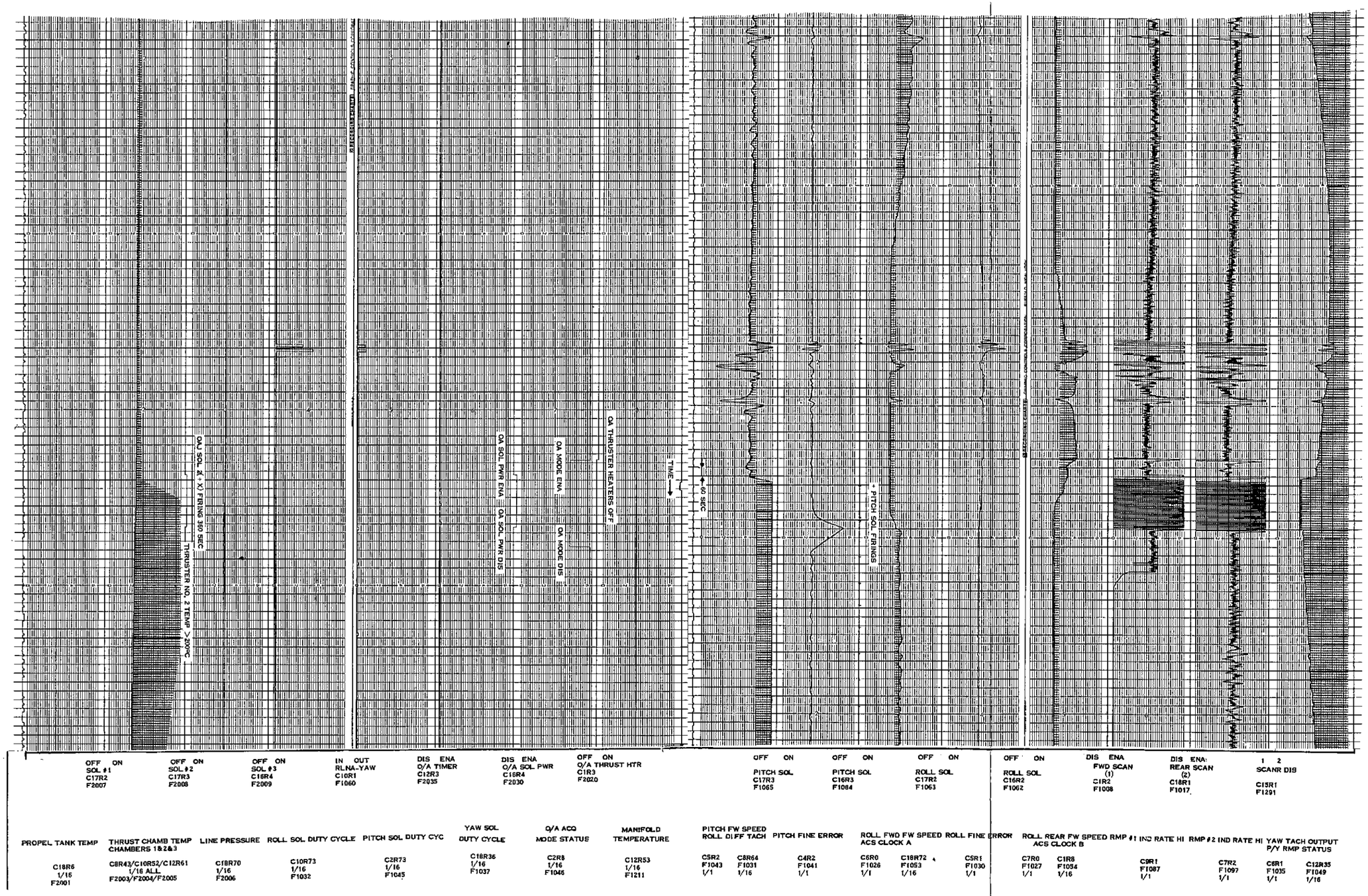

Figure 9-6. Performance Characteristics

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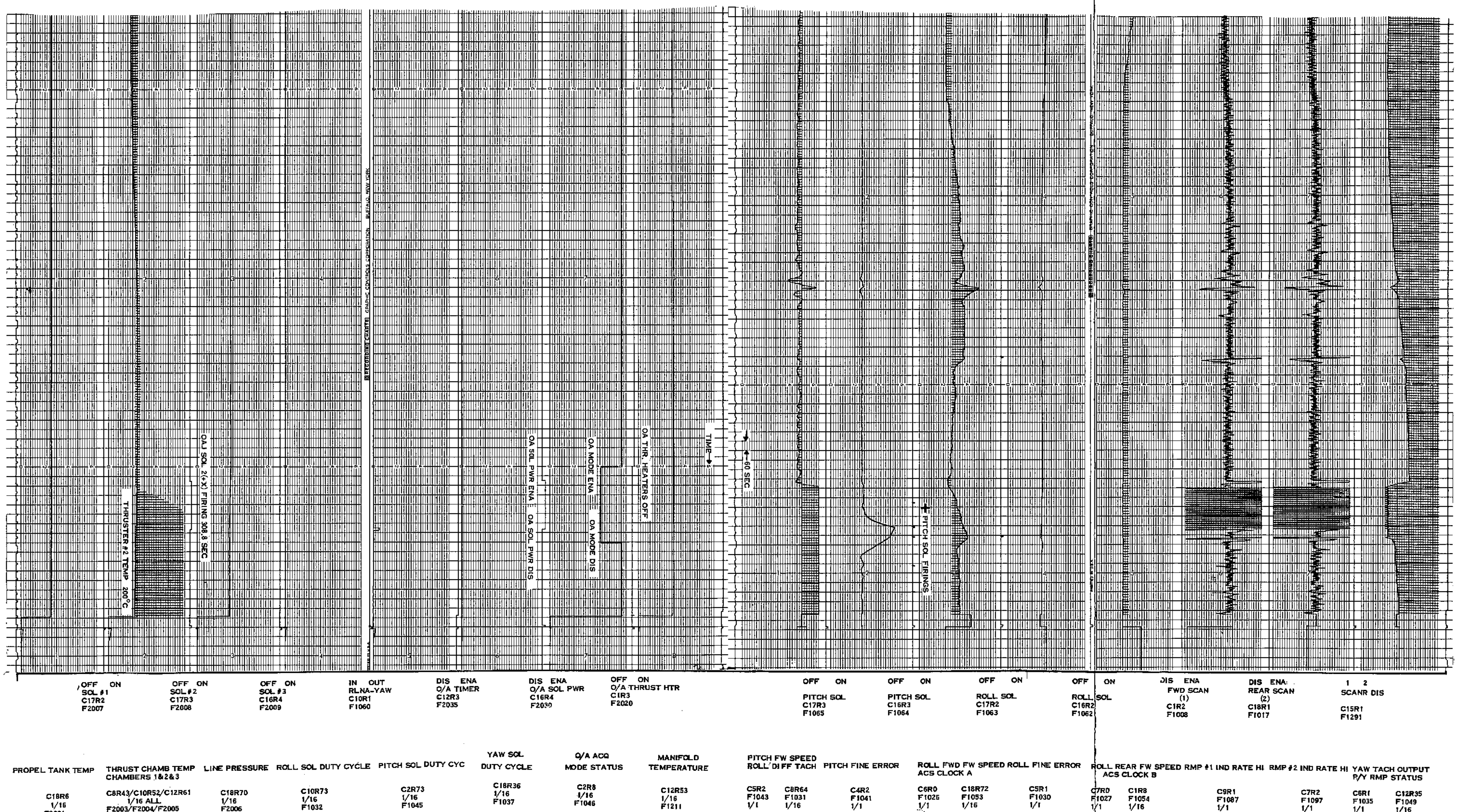

Figure 9-7. Performance Characteristics

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SECTION 10

MAGNETIC MOMENT COMPENSATING ASSEMBLY (MMCA)

SECTION 10

MAGNETIC MOMENT COMPENSATING

ASSEMBLY (MMCA)

The purpose of the MMCA is to provide means for generating magnetic dipole moments sufficient to cancel those residual dipole moments that may exist on the spacecraft. The MMCA consists of three mutually perpendicular, chargeable, permanent magnetic rods. Activation of the charging and discharging mechanism is by commands. See Figure 10-1 for functional block diagram.

The MMCA was launched in the OFF mode as noted in Table 10-1.

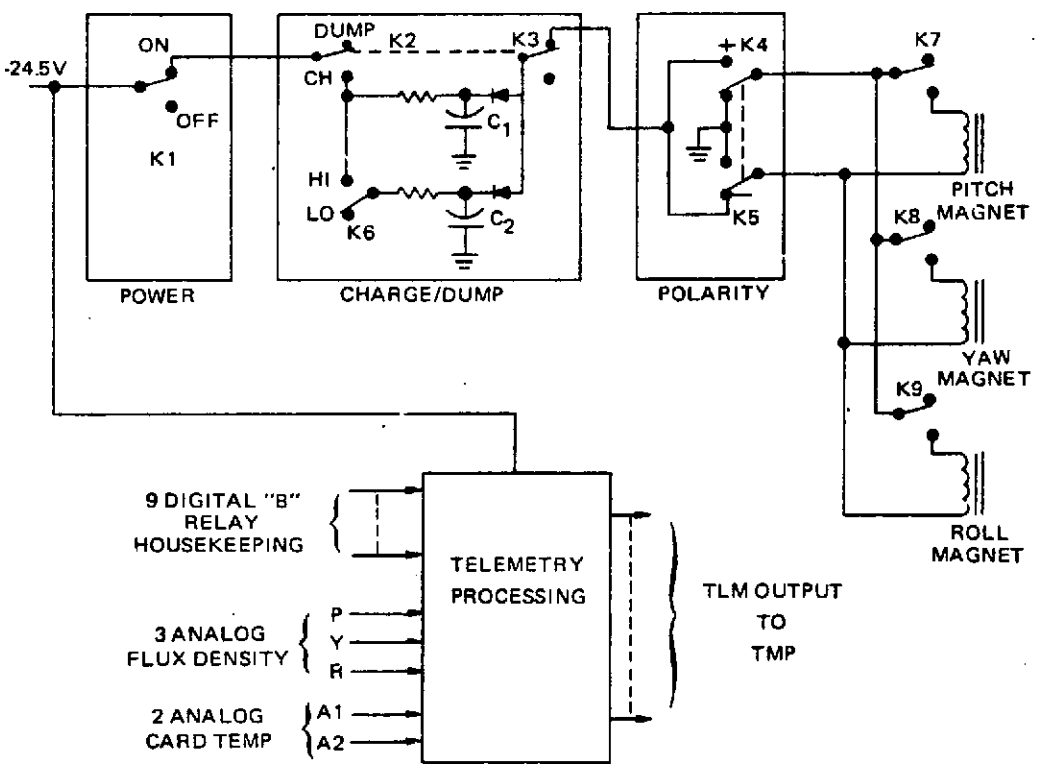


Figure 10-1. MMCA Functional Block Diagram

Table 10-1. MMCA Launch Mode

	MODE	CMD
POWER	OFF	765
CAPACITOR	HI	744
CAPACITOR	DUMP	706
POLARITY	+	742
PITCH COIL	OUT	702
ROLL COIL	OUT	761
YAW COIL	OUT	704

Housekeeping functions of the MMCA were normal. The unit was not activated; insertion of dipole values was deferred pending evaluation of the ACS performance. Gating during orbits in this period has averaged 0.8 gates in the +R, 0.1 gates in the -R, and 0.5 gates in the +P direction per orbit. Table 10-2 gives average telemetry values.

Table 10-2. MMCA Telemetry Values

Number	Name	Units	Orbit 0-1	T/V 20°C Plateau*	Orbit 50
4001	A1 Board Temp	°C	21.54	21.3	20.56
4002	A2 Board Temp	°C	**	20.6	**
4003	Hall Current	TMV	3.40	3.40	3.40
4004	Yaw Flux Density	TMV	3.05	3.00	3.05
4005	Pitch Flux Density	TMV	3.12	3.20	3.15
4006	Roll Flux Density	TMV	2.99	3.00	2.99

*Thermal Vacuum Test Data

**Defective Telemetry Function

SECTION 11

UNIFIED S-BAND/PREMODULATION PROCESSOR (USB/PMP)

SECTION 11
UNIFIED S-BAND/PREMODULATION PROCESSOR (USB/PMP)

The Unified S-Band Equipment (USBE) consists of two S-Band transmitter/receiver pairs (transponders). Each transmitter/receiver pair normally operates as a separate unit. Only one of the two is powered at any given time, but it is possible to cross-strap them by ground command. When cross-strapped, the receiver of one transponder and the transmitter of the other are powered. The USB Receiver receives the uplink RF signal, demodulates the command and ranging subcarriers, and, when possible, provides a phase-locked oscillator signal for the down-link USB transmitter. A ranging (psuedo-random noise-PRN) signal is demodulated and is available for modulation of the downlink upon ground command. The subcarrier containing command information is sent to the PMP. One of the USB receivers is powered at all times. The USB transmitter uses either the phase-locked oscillator of the USB receiver or, if sufficient signal for phase-lock is not present, an auxiliary oscillator for the transmitter RF driver. Back-up modes allow and sometimes require use of the auxiliary oscillator or the receiver oscillator (phase-locked or free-running) at all times. Modulation of the USB transmitter comes from the PMP, and may or may not have the PRN ranging signal added. Switching permits either transmitter to be ON or OFF, but both transmitters ON simultaneously is not possible. Protection against inadvertent leaving ON of either transmitter (and/or either of the wide band power amplifiers) is provided by a 32 minute cutoff timer. See Figure 11-1 for Functional Block diagram. Figures 11-2 and 11-3 are modulation formats.

The USBE was launched in the OFF mode, as noted in Table 11-1, and activated after separation in Orbit 0 near Tananarive. Commands were successfully uplinked in orbit 1 at Madrid and have continued to be normal since that time. Table 11-2 gives average telemetry values. Table 11-3 gives prelaunch measured data.

At launch, the operational mode was MSFN A/STADAN B, which employs USB-A section for both receiver and transmitter. In orbit 45, the operational mode was changed to MSFN

B/STADAN A at 23:08:13 on 25 January. This mode employs the B section of the USB. A comparison of the two telemetry readings can be seen in Table 11-2.

Table 11-1. USB/PMP Launch Mode

	Mode	CMD
USB XMTR PWR	EN	347
USB XMTR	DIS	757
AUX OSC	EN	150
SEL XMTR	A	126
RANGING	OFF	146
MOD INPUT	NORM	147

Table 11-2. USB/PMP Telemetry Values

Function No.	Function Name	Mode	Units	Orbit 15	T/V* Average Value 20° Plateau	Orbit 50
11001	USB Receiver AGC	Receiver A Low	DBM	-112.72	NA	-120.24
11002	USB Transmitter Power	Transmitter A ON	WTS	1.36	1.40	1.36
11003	Receiver Error	Receiver A Normal	KHz	-2.15	NA	-4.87
11004	USB Transponder Temp.	Transponder ON	$^{\circ}$C	25.88	22.33	29.12
11005	USB Transponder Pres.	Transponder ON	PSI	17.08	16.99	17.09
11007	USB Transmitter A-15V	Transmitter A ON	VDC	2.36	2.35	OFF
11008	USB Transmitter B-15V	Transmitter B ON	VDC	OFF	2.39	2.40
11009	USB Ranging Mode-15-V	Ranging ON Disc. A ON	VDC	2.07	2.07	2.05
11101	PMP A Voltage	Discrim. A ON	VDC	-15.10	-15.22	OFF
11102	PMP B Voltage	Discrim. B ON	VDC	OFF	-15.07	-14.96
11103	PMP A Temp.	TLM Power ON	$^{\circ}$C	37.30	NA	32.37
11104	PMP B Temp.	TLM Power ON	$^{\circ}$C	28.34	NA	35.16

Table 11-3. Unified S-Band Subsystem

Components

USBE EAB-QM
PMP EAB-FT2

Pre-Launch Performance

	Spec	Measured A	Measured B
XMTR RF power output	1W	1.20W	1.18W
RCVR CMD threshold	-95 DBM	-105 DBM	-100 DBM
Range delay variation	40 NSEC P-P	10.9 NSEC P-P	5.7 NSEC P-P

Pre-Launch Problem Summary

No problems throughout environmental test program

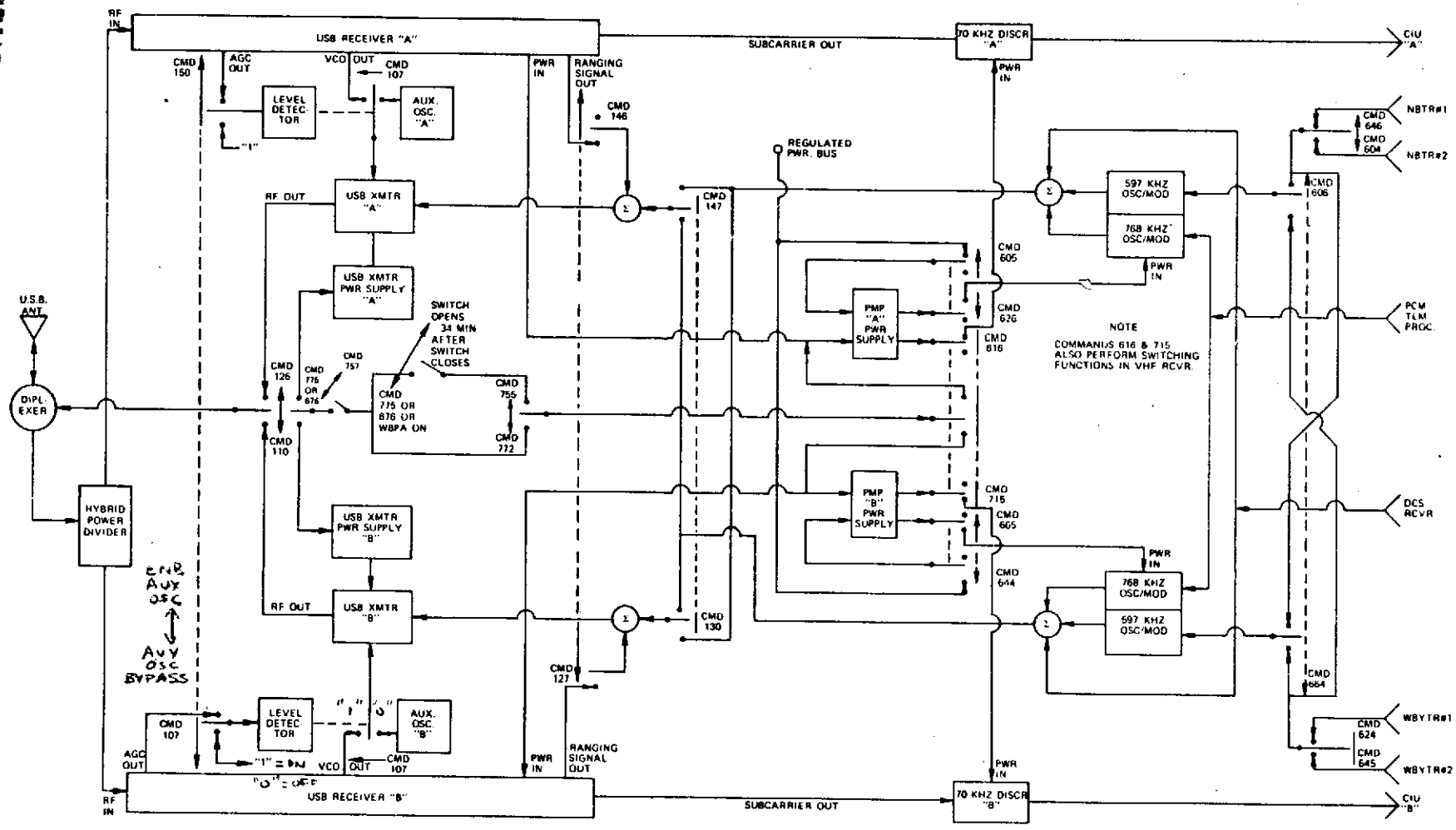


Figure 11-1. USBE/PMP Functional Block Diagram

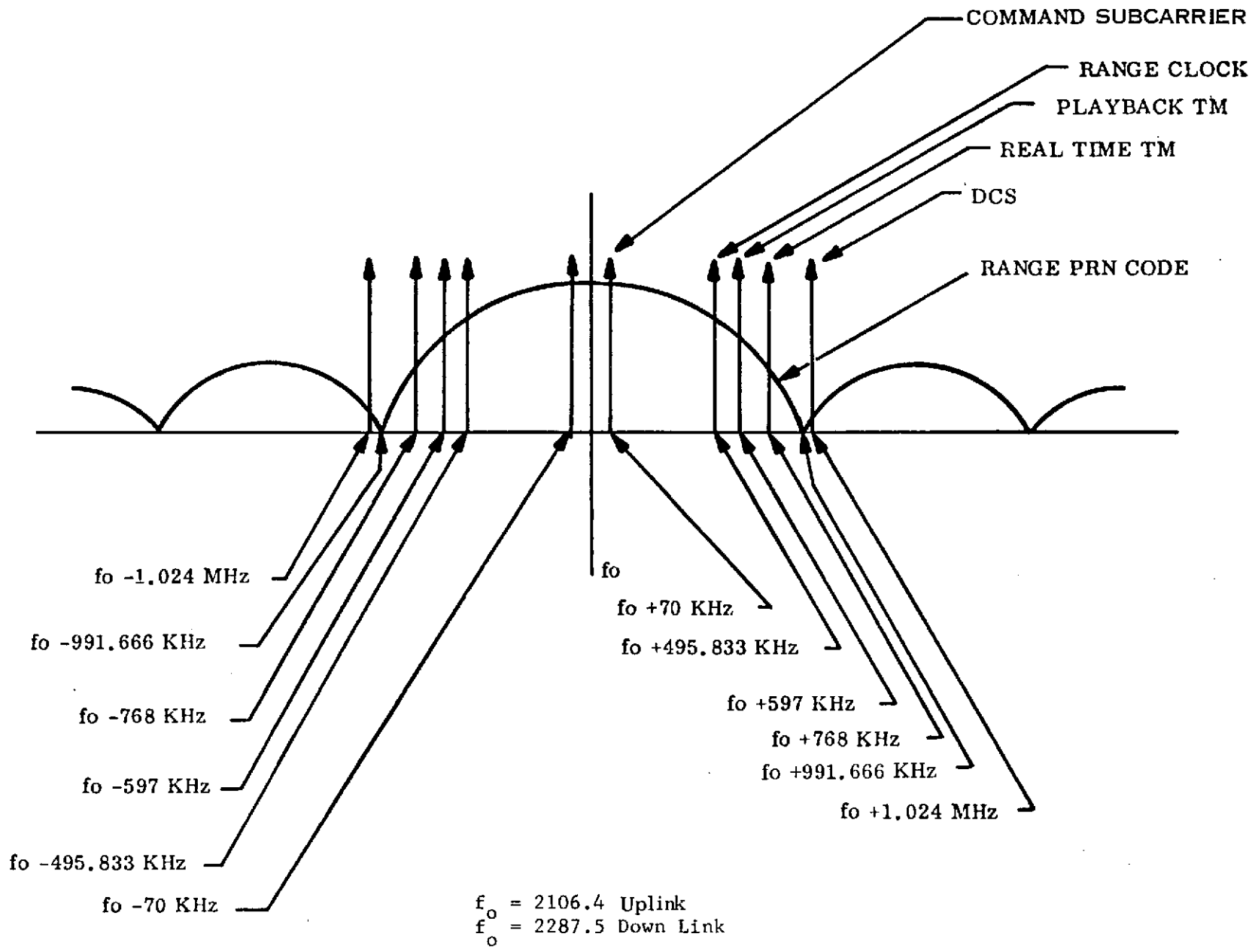
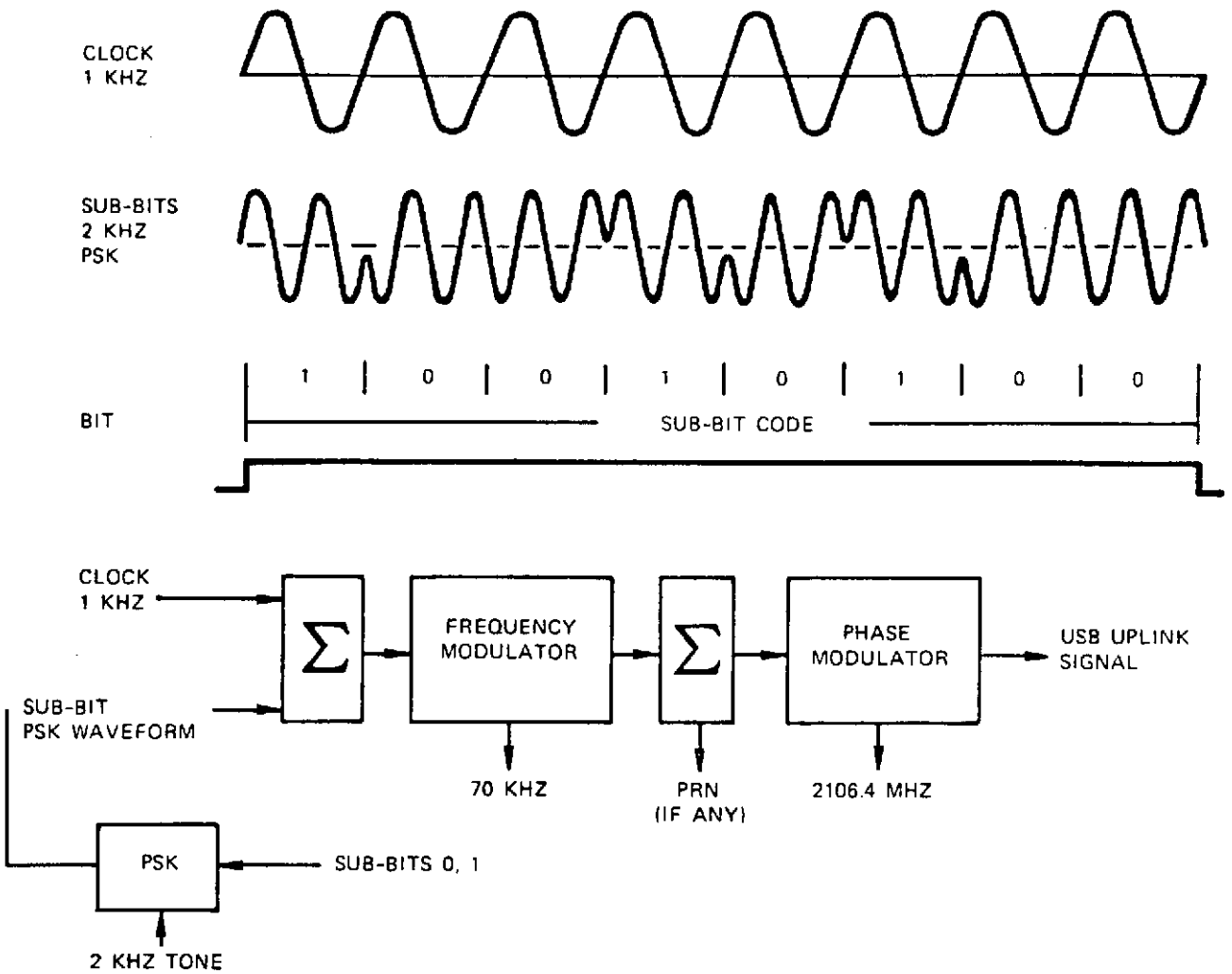


Figure 11-2. S-Band Transmission Spectrum



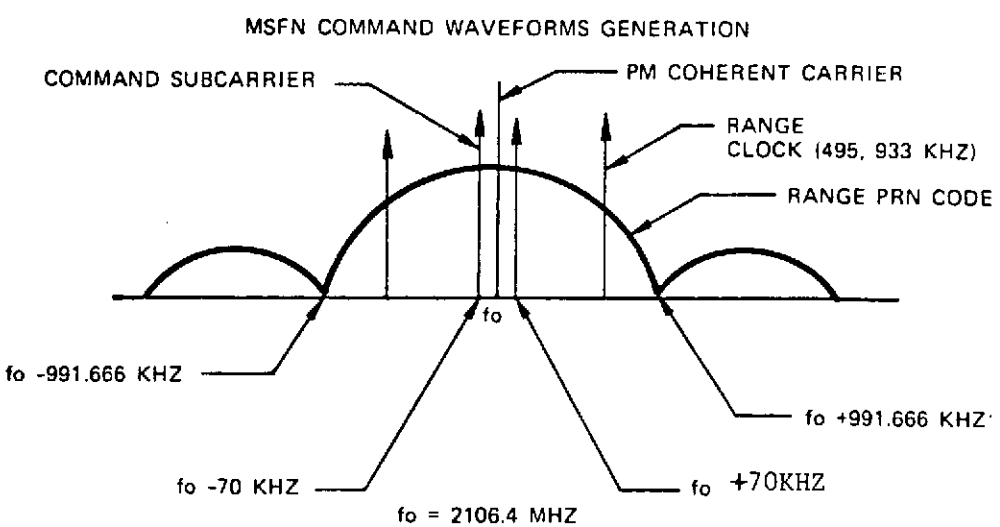


Figure 11-3. MSFN/USB Uplink Modulation

SECTION 12

SEPARATION AND UNFOLD SUBSYSTEM

SECTION 12

SEPARATION AND UNFOLD SUBSYSTEM

The Separation and Unfold Subsystem consists of the following components: Unfold Timer, Unfold Switch, Separation Switches, Unfold Motors, and Cable Cutter Assembly. At programmed separation time, the launch vehicle provides power to fire four electro-explosive bolt cutters to effect spacecraft separation. See Figures 12-1 and 12-2 for mechanical arrangement, and Figure 12-3 for Functional Block Diagram.

The separation subsystem performed as expected. The 2.5 second timer caused paddle unfold. Before separation the subsystem properly restrained the paddles, disabled the primary and redundant matrix A drivers, provided -24.5 VDC to the attitude control reset line, and provided telemetry signals indicating that the spacecraft was still mated to the Delta Vehicle. After separation all circuits were activated and separation was confirmed by referring to the strip chart ACS telemetry functions listed below:

Function No.	Title	Delta Activation Time From Separation (Δ Seconds)
1240	SAD left MTR WNDG voltage	52.5
1220	SAD right MTR WNDG voltage	52.5
1027	Roll rear flywheel speed	17.5
1035	Yaw tach output	17.5
1040	Pitch coarse error	17.5
1043	Pitch flywheel speed	17.5

All of these functions have known activation delta times from separation, and all are read each second in the telemetry matrix.

By measuring the delta times backwards, i.e., from activation to separation, all of the functions indeed commence from the same baseline in time, and hence confirm the separation time.

It was necessary to employ this technique because the separation switch functions normally used to monitor separation were removed from the software programs.

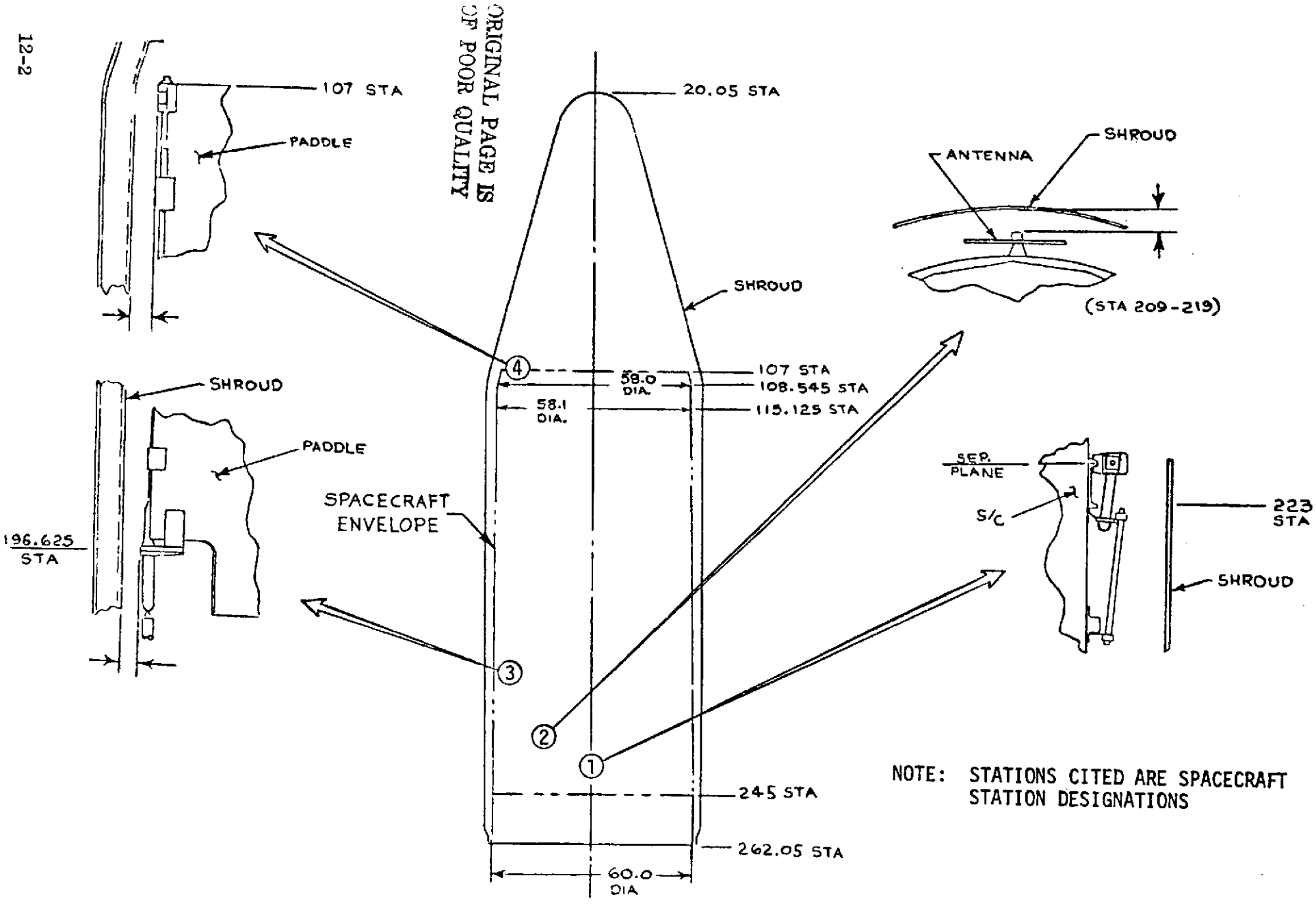


Figure 12-1. ERTS Observatory/Shroud Envelope and Minimum Clearances

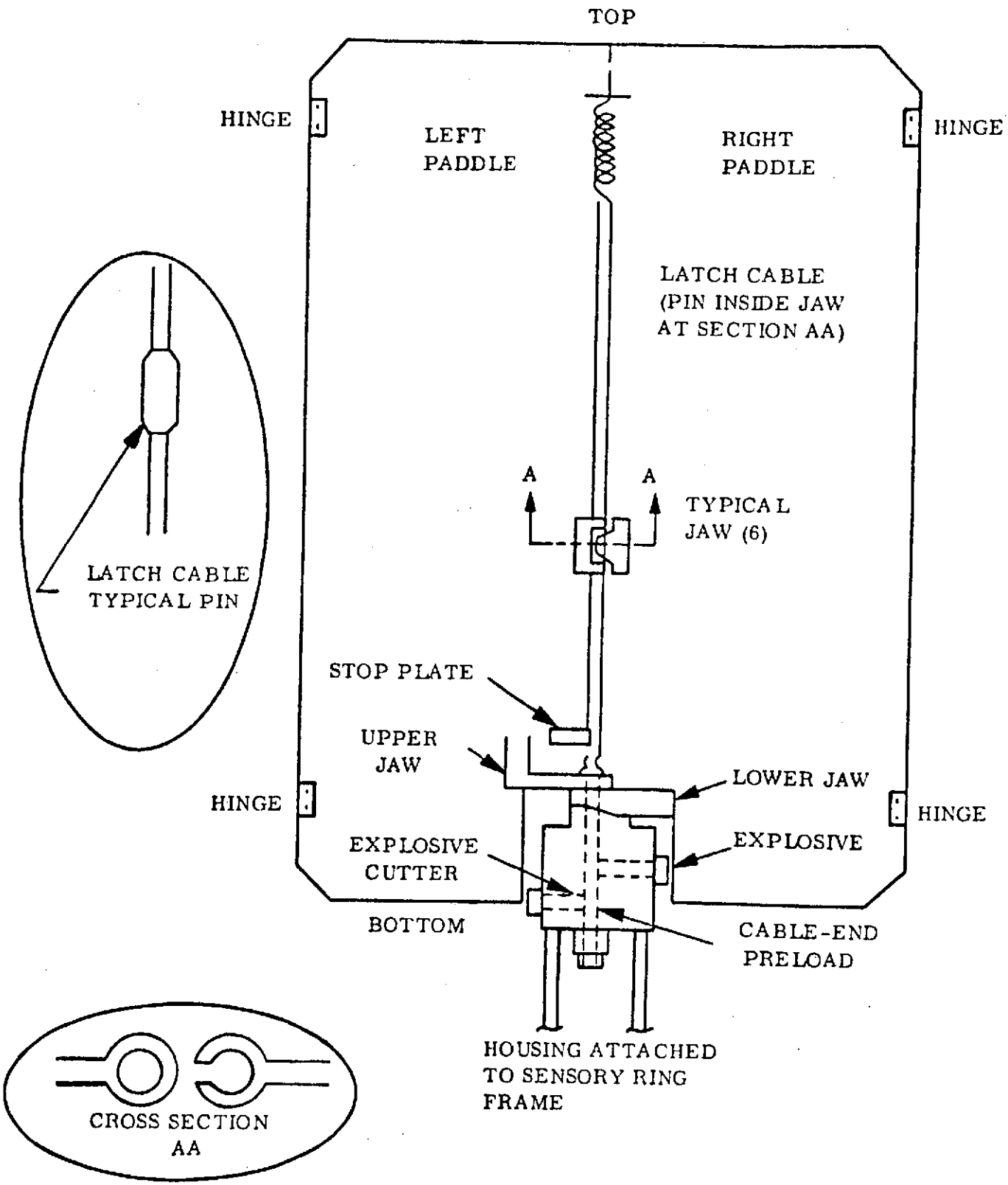


Figure 12-2. Separation and Unfold Subsystem Mechanical Details

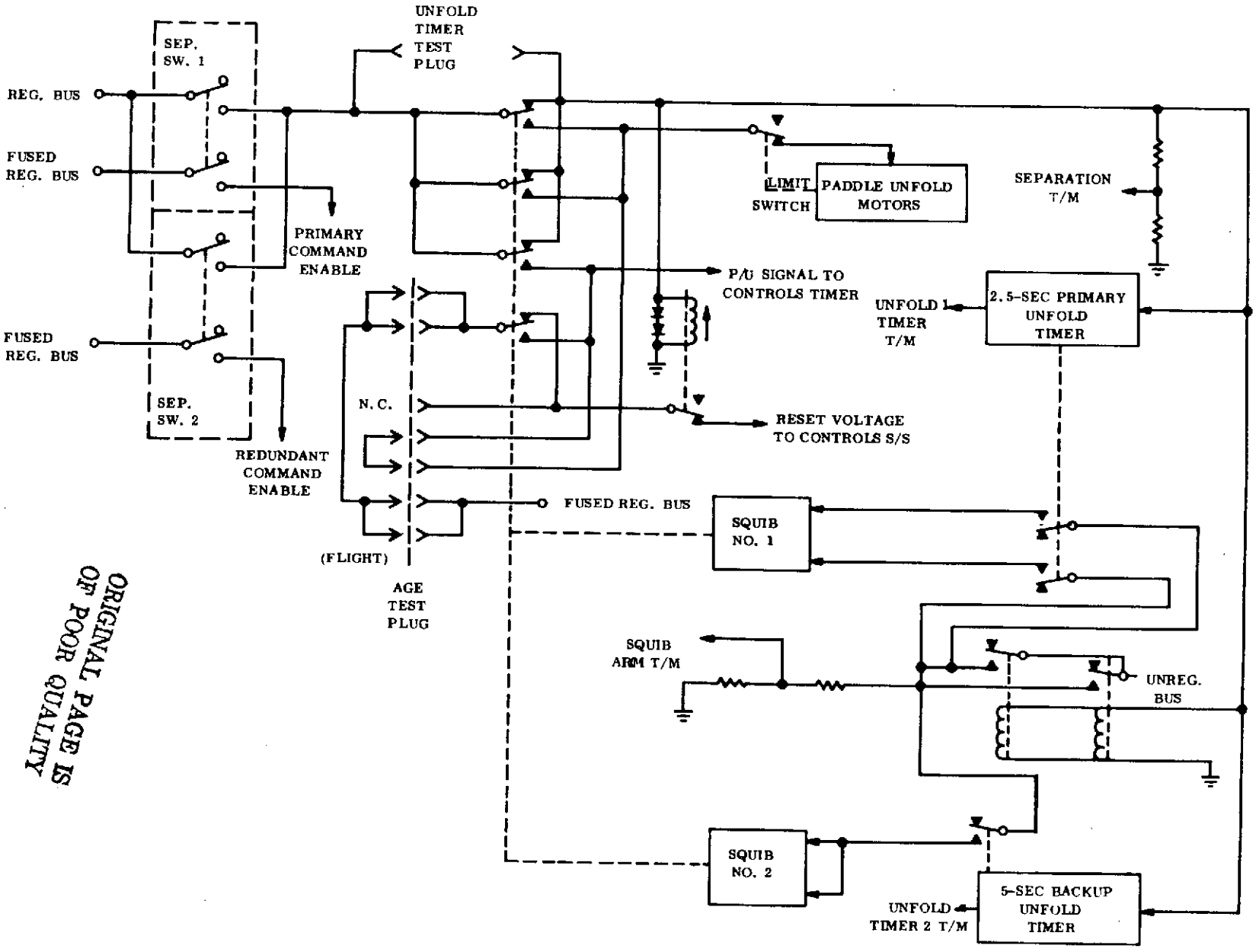


Figure 12-3. Separation and Unfold Subsystem Functional Block Diagram

SECTION 13

ELECTRICAL INTERFACE SUBSYSTEM

SECTION 13

ELECTRICAL INTERFACE SUBSYSTEM

The EIS is a collection of three modules: The Auxiliary Processor Unit (APU) (See Figure 13-1 for functional block diagram); The Power Switching Module (PSM) (See Figure 13-2 for functional block diagram) and the Interface Switching Module (ISM). Together they perform a variety of electrical interfacing functions including: power switching, telemetry signal generation, switching logic, power fusing, signal switching (Data) time code processing, automatic "shut-off" timers.

The EIS contains a variety of telemetry points all of which are associated with other subsystems and have been discussed in those sections.

The Launch mode of the APU is given in Table 13-1.

Table 13-1. APU Launch Mode

	Mode	Cmd
POWER	ON	656
MOD	STBY	050
P/L TIMER	DIS	720
SEARCH TRACK	NORM	631
USB/WPA TIM	EN	755

All EIS functions which were exercised during launch and activation were executed and confirmed. After launch power switching was held to a minimum. Operation of time code processing, search track data processing, back-up timer operation, signal switching and power switching was confirmed as commands were executed.

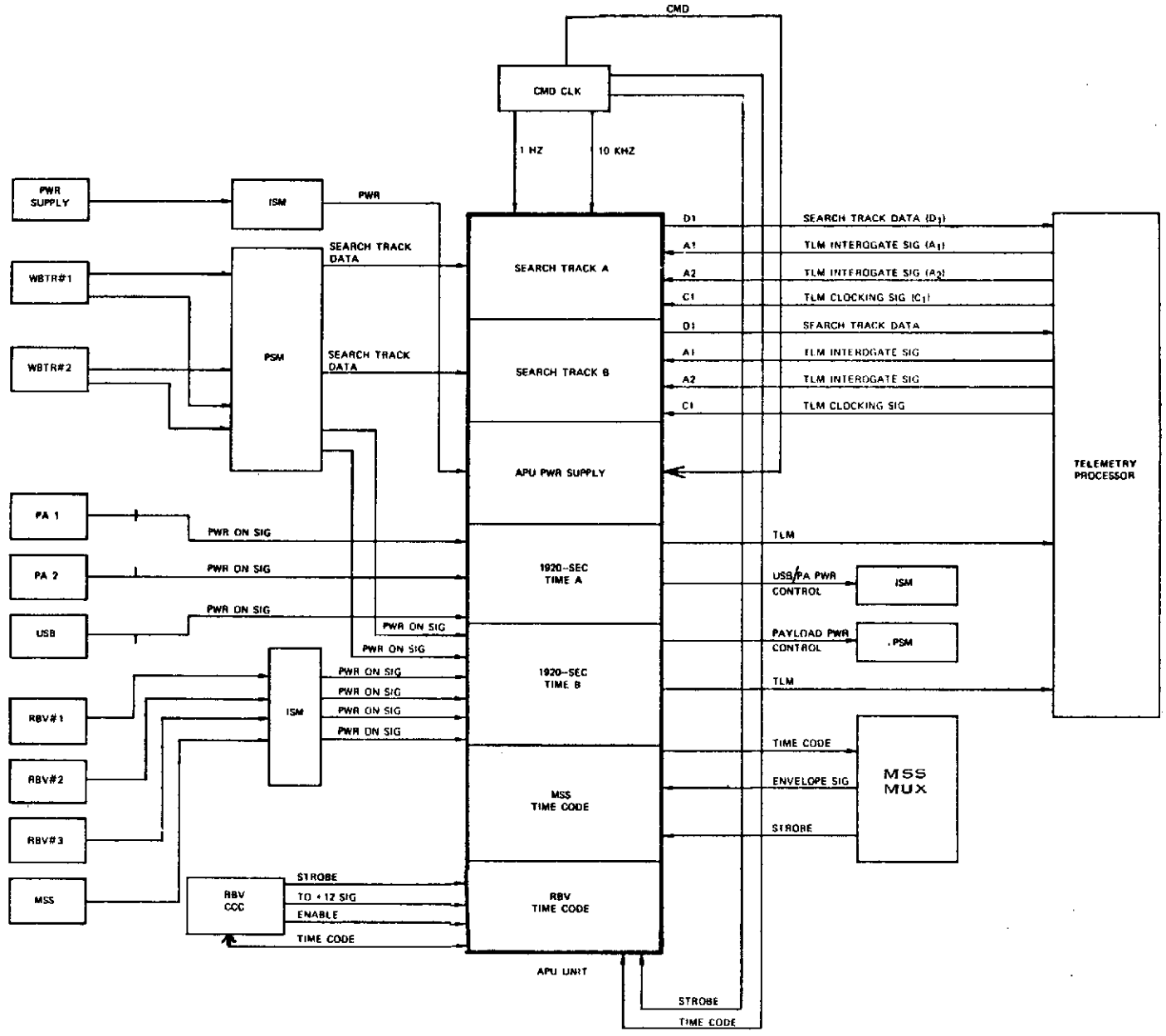


Figure 13-1. APU Functional Block Diagram

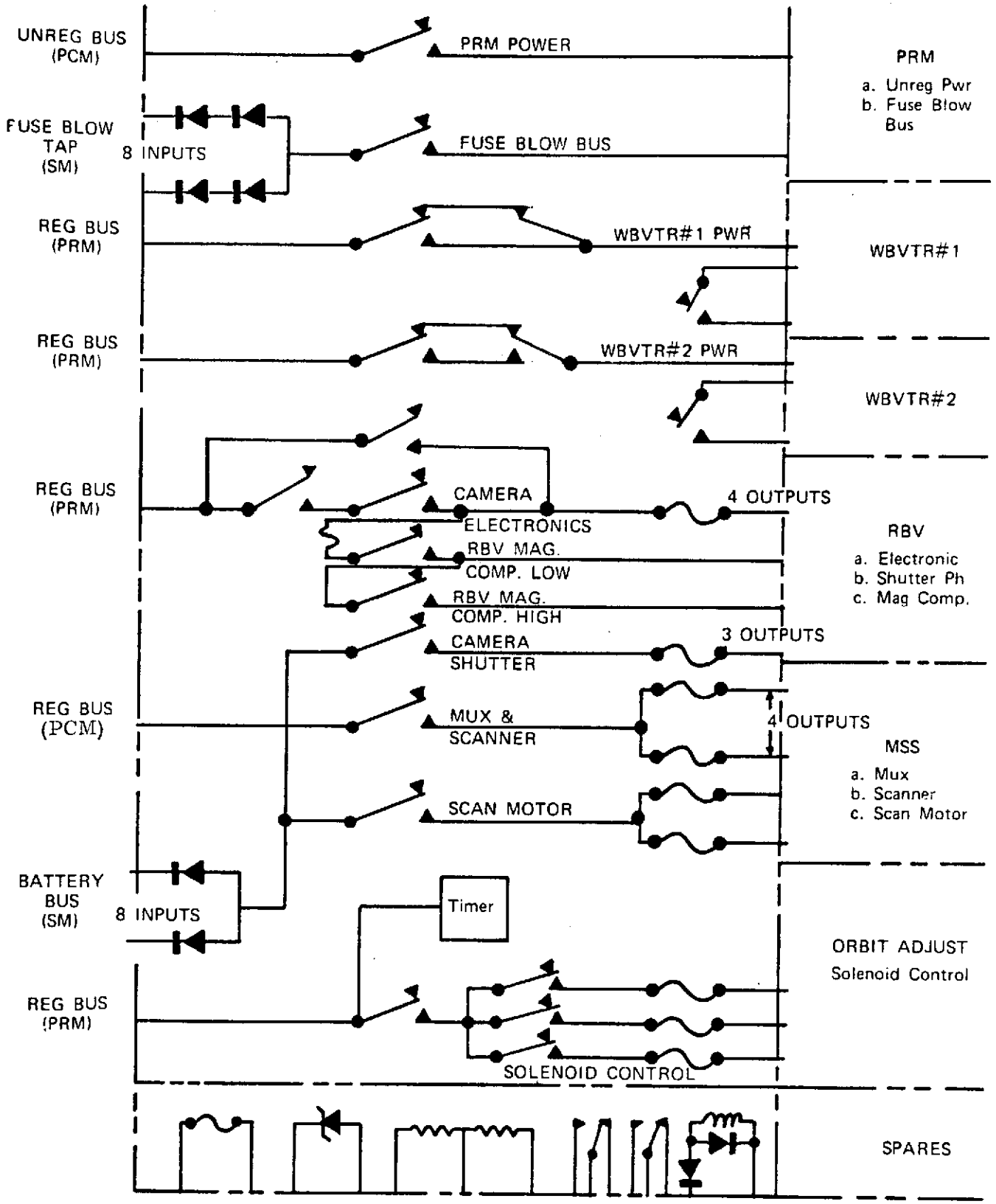


Figure 13-2. PSM Functional Block Diagram

SECTION 14

THERMAL CONTROL SUBSYSTEM

SECTION 14
THERMAL CONTROL SUBSYSTEM

Thermal control of the spacecraft is required in order to provide a mounting surface temperature of $20^{\circ} \pm 10^{\circ}C$ for all equipment mounting internal to the spacecraft. The LANDSAT-2 spacecraft is composed of three separate elements; the solar arrays, the Attitude Control Subsystem and the sensory ring. These elements are thermally decoupled such that the environment for mission support and payload equipment is provided by the sensory ring Thermal Control Subsystem. The subsystem is composed of both semipassive and passive elements. The semipassive elements are shutters and heaters. Shutters are located on each of the 18 peripheral compartments and are actuated by two-phase fluid-fill bellows assemblies. The heaters are energized by ground command. Passive control, in the form of insulation and coatings, works in conjunction with the semipassive elements to maintain the thermal balance of the vehicle. Figure 14-1 is a block diagram of the Thermal Control Subsystem.

In LANDSAT-2 the thermal control functions were balanced prior to launch and maintained their balance, within expected tolerances, throughout powered flight and orbital operations.

The thermal subsystem in both the sensory ring and the ACS performed within expected limits at all locations.

Typical average temperatures were: ACS baseplate $20.5^{\circ}C$; sensory ring $18.9^{\circ}C$; and center section $19.3^{\circ}C$. The shutter position average at Orbit 50 was 42.8°.

Table 14-1 provides typical average telemetry values for the Zener modules obtained during thermal vacuum testing and early flight operations.

In Orbit 2 compensation loads 1, 2, 3, 4, 5, 7 and 8 were turned on as scheduled to provide more even heating of the spacecraft until normal operation began. All compensation loads except 6 remained on thru Orbit 50.

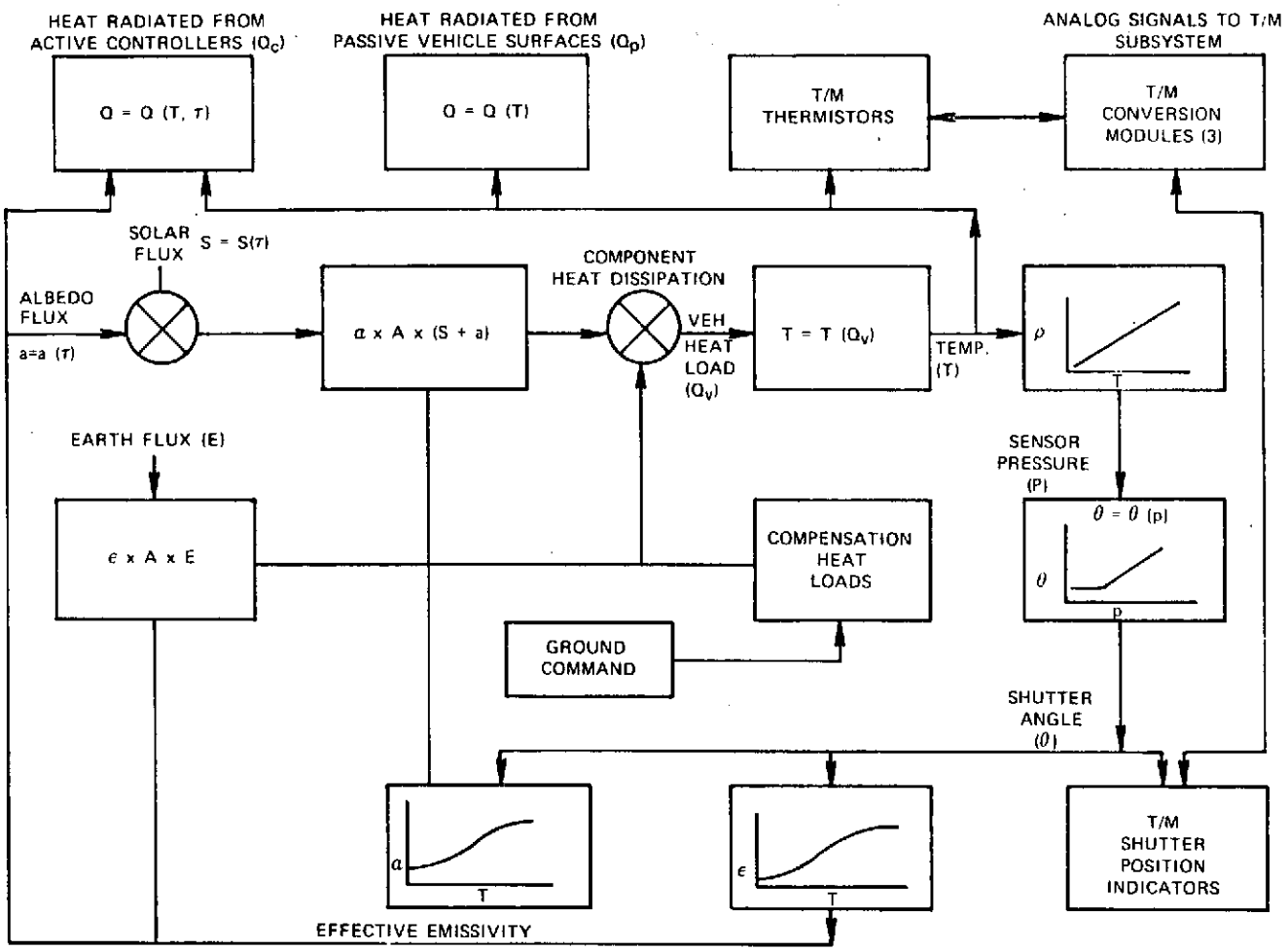


Figure 14-1. Functional Block Diagram of Thermal Control Subsystem

Table 14-1. Thermal Telemetry Values

Function No.	Function Name	Unit	Average Values		
			Orbit 0-1	25 °C* Plateau	Orbit 50
7080	TLM Conv. Mod. Q1 Thermistor Zener	VDC	4.85	4.85	4.86
7081	TLM Conv. Mod. Q2 Thermistor Zener	VDC	4.88	4.90	4.90
7082	TLM Conv. Mod. Q3 Thermistor Zener	VDC	5.02	5.03	5.05
7083	TLM Conv. Mod. Q1 Shutter Zener	VDC	4.95	4.95	4.97
7084	TLM Conv. Mod. Q2 Shutter Zener	VDC	4.96	4.96	4.99
7085	TLM Conv. Mod. Q3 Shutter Zener	VDC	5.14	5.15	5.17

*Thermal Vacuum Test Data

SECTION 15

NARROWBAND TAPE RECORDER (NBTR)

SECTION 15

NARROWBAND TAPE RECORDER (NBTR)

The NBTR consists of a single-track recording mechanism and the associated electronics necessary for proper amplification and filtering of the RECORD and PLAYBACK signals and for control of the record mechanism. The recorder is completely contained in one box.

The NBTR records 1 KBPS data from the Telemetry Processor, and, upon command, plays back the stored data with simultaneous outputs to the VHF Transmitter and to the Premodulation Processor. The playback speed is 24 times the record speed, and the output data rate is therefore 24 KBPS. The NBTR erases the tape immediately after playback.

The recorder has a capacity for recording 210 minutes of data, and stops automatically when it reaches end-of-tape. Plyaback is accomplished on command, effecting a reversal in tape direction at 24 times the record rate. Playback can be commanded at any time before the recorder reaches end-of-tape.

The LANDSAT-2 spacecraft contains two Narrowband Tape Recorders, providing a total sequential recording capability of 420 minutes. A simplified block diagram of the Narrowband Tape Recorder is given in Figure 15-1.

The Narrowband Tape Recorders were launched in the record mode as shown in Table 15-1.

The launch mode was verified from telemetry on the CRT display and on the strip charts.

Table 15-1. Narrowband Tape Recorders Launch Mode

	MODE	CMD
NBTR 1	REC	543
NBTR 2	REC	601

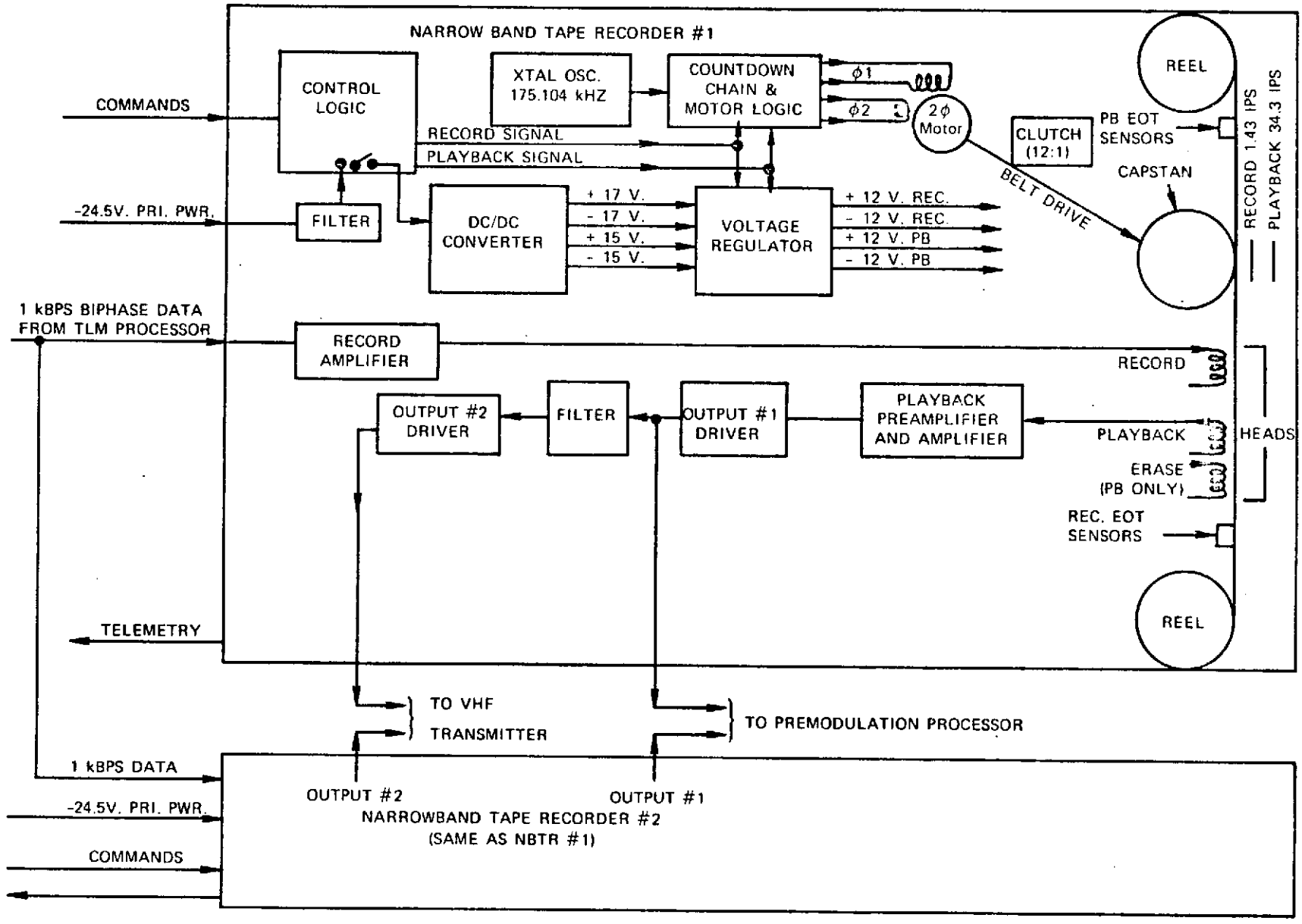


Figure 15-1. Narrowband Tape Recorder Block Diagram

Initial Turn ON

Prior to launch on January 22, 1975, NBTR1 was put in record at 17:28:37Z and NBTR2 was put in record at 12:23:51Z. In Orbit 1 at Alaska, NBTR-1 was played back at 16:26:00 and returned to the Record mode at 19:33:04. NBTR-2 was played back at 21:06:58 and returned to Record at 21:13:09 to take its turn alternating with NBTR-1. Thereafter the recorders were alternated in the RECORD mode, and performed their PLAYBACK generally after 1 minute of overlap of the two recorders in the RECORD mode.

Table 15-2 gives the record history for subsequent orbits.

Table 15-3 shows typical telemetry values. All are nominal.

Table 15-4 shows the pre-launch performance of the NBTR's.

Table 15-2. LANDSAT-2 NBTR Record Times

P/B Orbit	Nbr.	Start Time	FME	End Time	FME	% Smooth	% BAP	STA
0		022:17:29:03	001	19:18:39	412	0.39	0.24	A
1	A	022:17:24:15	001	19:33:03	484	0.40	0.21	1A
2	B	022:20:06:07	001	21:13:19	253	0.81	0.98	2A
3	A	022:21:13:35	001	22:51:43	369	0.09	0.00	A
4	B	022:22:51:43	001	00:30:39	372	0.04	0.00	A
5	A	023:00:30:23	001	01:56:15	325	6.35	6.17	N
6	B	023:01:56:15	001	03:49:35	426	3.29	3.15	A
7	A	023:03:49:35	001	05:30:55	361	6.62	6.62	A
8	B	023:05:30:55	001	07:15:11	392	0.68	0.01	A
9	A	023:07:15:11	001	08:58:55	390	0.07	0.07	A
10	B							
11								
12	A	023:08:58:39	001	12:26:39	781	10.0	9.82	N
13	B	023:12:26:23	001	15:52:15	773	0.07	0.00	N
14	A	023:15:51:59	001	17:49:51	443	0.63	0.51	G
15	B	023:17:49:35	001	19:31:43	384	0.07	0.00	A
16	A	023:19:31:27	001	21:13:35	384	0.24	0.17	A
17	B	023:21:13:35	001	22:55:43	384	18.28	18.28	A
18								
19	B	024:00:25:19	001	01:59:11	353	0.08	0.00	A
20	A	024:01:59:27	001	03:54:39	433	0.44	0.38	A
21	B	024:03:54:23	001	05:37:03	386	0.07	0.00	A
22	A	024:05:36:47	001	07:21:19	393	0.07	0.01	A
23	B	024:07:21:03	001	09:05:03	391	0.07	0.00	A
24								
25								
26	A	024:09:05:03	001	12:33:03	781	0.06	0.00	N
27	B	024:12:32:47	001	15:52:47	751	0.07	0.00	N
28	A	024:15:52:31	001	17:55:27	462	0.09	0.00	A
29	B	024:17:55:27	001	19:37:03	382	0.07	0.00	A
30	A	024:19:35:59	001	21:19:59	391	0.16	0.00	A
31	B	024:21:19:11	001	23:01:51	386	0.06	0.00	A
32	A	024:23:01:35	001	00:43:59	385	0.31	0.24	A
33	B	025:00:43:43	001	02:08:47	320	0.00	0.00	N
34	A	025:02:08:31	001	04:00:47	422	0.05	0.00	A
35	B	025:04:00:31	001	06:08:47	482	0.21	0.00	A
36	A	025:05:39:27	001	07:25:51	400	0.70	0.02	A
37	B	025:07:25:35	001	09:05:35	376	0.05	0.00	A
38								
39								
40		LOST						
41	B	025:12:34:07	001	15:37:51	690	0.06	0.00	N
42	A	025:15:37:51	001	17:52:31	506	0.03	0.00	A
43	B	025:17:55:27	001	19:37:19	383	0.24	0.24	A
44	A	025:19:37:19	001	21:19:59	386	0.29	0.25	A
45	B	025:21:19:43	001	23:01:51	384	0.35	0.29	A
46	A	025:23:01:51	001	00:30:23	333	0.05	0.00	N
47	B	026:00:30:23	001	02:09:03	371	0.05	0.00	N
48	A	026:02:09:03	001	04:05:35	438	0.05	0.00	A
49	B	026:04:03:11	001	05:41:19	369	0.07	0.00	A
50	A	026:05:41:19	001	07:26:39	396	0.05	0.00	A

Table 15-3. Narrow Band Tape Recorder Telemetry Values

Func. No.	Name	* T/V Value 20°C Plateau	Orbit 36/37
10001	A-Motor Current (ma)		
	Record	128	132.0
	P/B	107	108.0
10101	B-Motor Current (ma)		
	Record	153	148.5
	P/B	149	143.6
10002	A-Pwr Supply Cur. (ma)		
	Record	185	170.5
	P/B	425	410
10102	B-Pwr Supply Cur. (ma)		
	Record	260	260
	P/B	480	481
10003	A-Recorder Temp (DGC)	30.7	26.1
10103	B-Recorder Temp (DGC)	28.5	27.0
10004	A-Supply Volt	24.9	24.87
10104	B-Supply Volt	24.6	24.55

*Thermal Vacuum Test Data

Table 15-4. Pre-Launch Performance of the Narrowband Tape Recorder

Components

NBTR 1 EAB-QM1
NBTR 2 EAB-FT4

Pre-Launch Performance

Parameter	Spec	NBTR 1	NBTR 2
Record Time	$\geqslant$210 min	216.5 min	216 min

Data quality judged by brush recorder outputs and computer synopsis - quality good

SECTION 16

WIDE BAND TELEMETRY SUBSYSTEM

SECTION 16

WIDE BAND TELEMETRY SUBSYSTEM

The Wide Band Telemetry Subsystem (WBTS) consists of two 10/20 watt S-Band FM Transmitters and associated filters, antennas, and signal conditioning equipment. The subsystem is used to transmit Return Beam Vidicon (RBV) video data and Multispectral Scanner (MSS) digital data to LANDSAT ground stations. The RBV and MSS data can be transmitted in real time as it is being generated, or recorded on either of two Video Tape Recorders (or both) and played back through the WBTS when in view of a ground station. A Functional Block Diagram is shown in Figure 16-1 and the physical configuration is illustrated in Figure 16-2.

The WBTS was launched in the OFF mode and in the configuration shown in Table 16-1. Verification of this mode was obtained in the telemetry from Madrid and Alaska playback early in Orbit 1. The Check Compare (Table 8) on the CRT verified there were no exceptions to the commanded configuration.

Initial Turn-ON

The Wide Band Telemetry Subsystem was initially turned on in the 10 watt mode in Orbit 12 while over Greenbelt/Merritt Island. At 14:29:31 both wide band power amplifiers were turned on together, with Inverter A ON at 14:29:41. Filters A and B were both inhibited to allow only the unmodulated carrier to radiate.

The power amplifiers were both turned OFF at 14:36:53 and inverter A turned OFF at 14:36:55. All telemetry values were nominal as shown in Table 16-3.

Table 16-1. Wide Band Telemetry Subsystem Launch Mode

	Mode	CMD
WBPA1, 2 EN	PRIME/RED	776/754
WBPA 1	OFF	561
OUTPUT SEL 1	LO	541
WBPA 2	OFF	067
OUTPUT SEL 2	LO	047
RBV Bias	A	546
DATA WBPA	PRIME	705

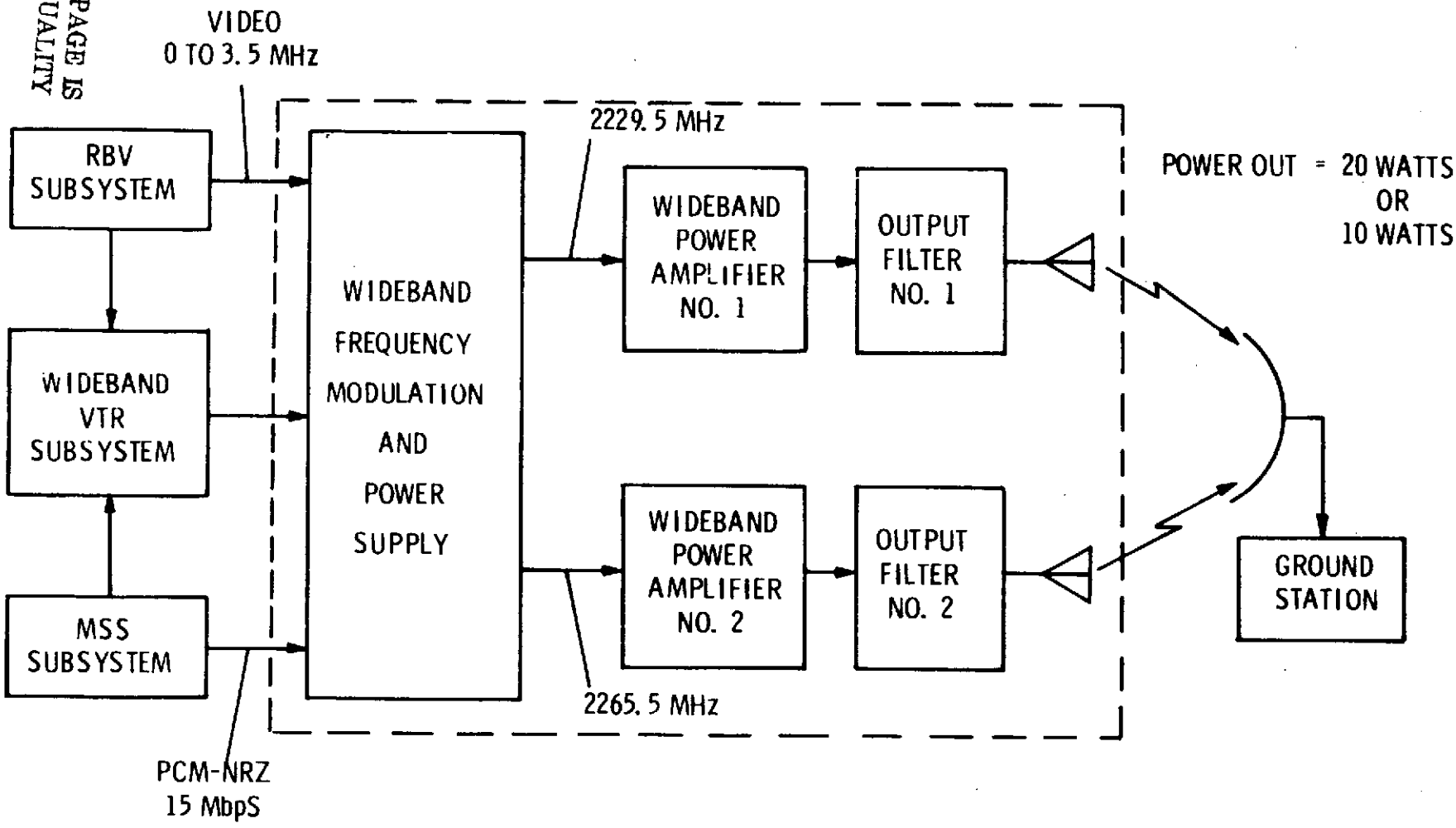


Figure 16-1. Wideband Telemetry Subsystem Block Diagram

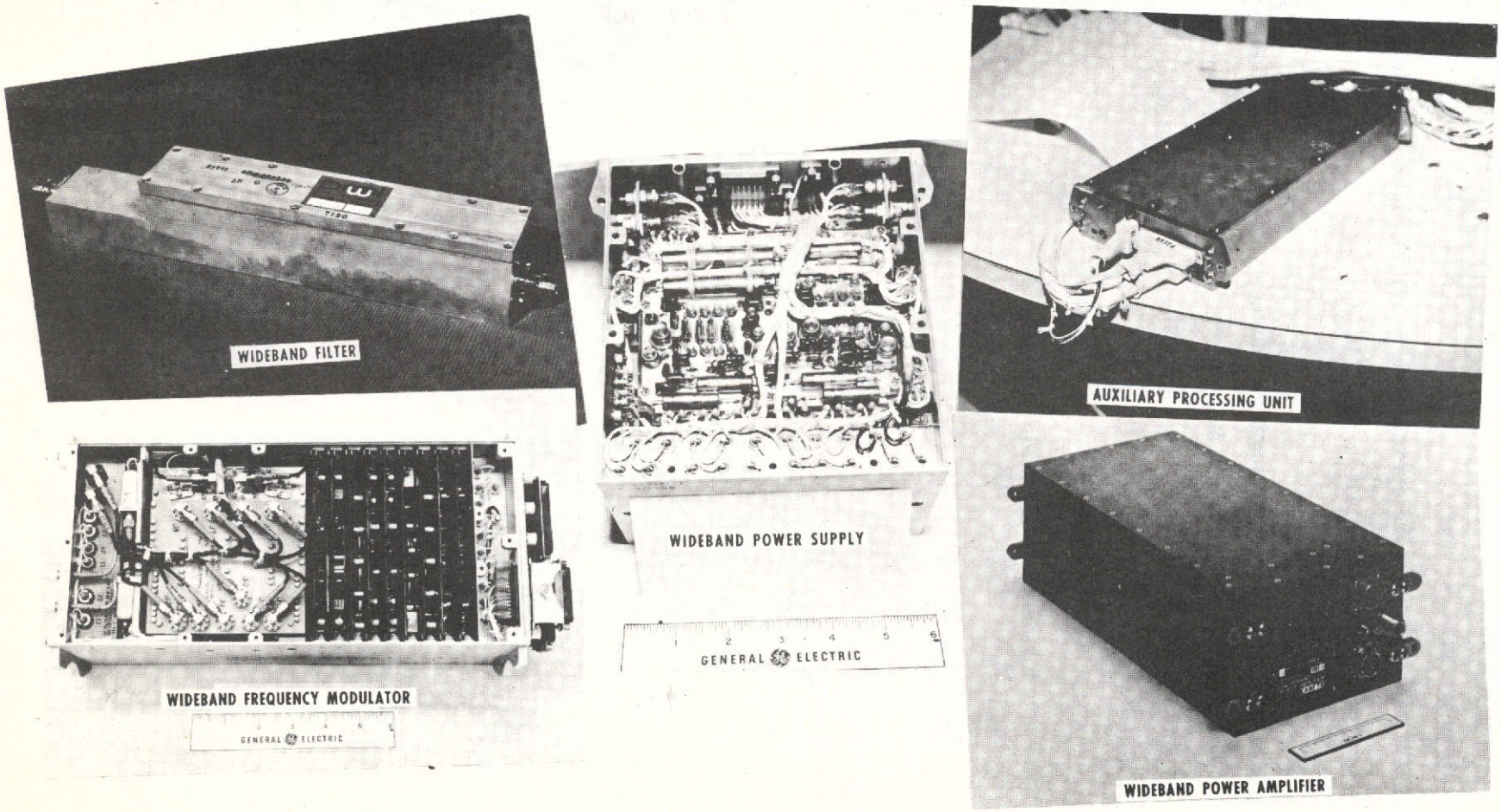


Figure 16-2. Wideband Telemetry Subsystem

Subsequent Operations

In Orbit 13 both power amplifiers were operated in the 20 watt mode with both filters inhibited. The sequence of events is shown in Table 16-2.

Wide Band Power Amplifier-1 was subsequently operated in Orbits 41, 46 and 47. WBPA-2 was subsequently operated in Orbits 19, 26, 27, 28, 42, 46 and 47. The entire subsystem operated normally throughout these orbits, as shown in the telemetry values of typical orbits shown in Table 16-3.

Prelaunch subsystem performance is shown in Table 16-4.

Table 16.2 Operations of WPA

WBPA-1	CMD	WBPA-2
16:10:39	Power ON	16:10:37
16:10:41	Inverter ON	16:10:41
16:13:56	Sel 20 watt output	16:14:15
16:17:55	Power OFF	16:17:53

Table 16-3. Wide Band Telemetry Subsystem

(1)	Name	T/V (2)		Telemetry Values	
		10W	20W	10W Orbit 16	20W Orbit 47
12001	Temp, TWT Coll. (DGC)	30.1	33.6	28.14	34.38
12101		27.9	31.2	25.93	30.00
12002	Cur, Helix (MA)	3.30	3.85	3.20	4.29
12102		4.03	4.56	4.28	4.41
12003	Cur, TWT Cath. (MA)	33.20	46.10	32.77	46.04
12103		34.09	46.78	33.93	46.42
12004	Fwd Power (DBM) (3)	40.61	42.68	40.61	42.83
12104		40.93	43.71	41.01	43.81
12005	Refl Power (DBM) (3)	22.34	27.0	21.11	26.50
12105		34.55	36.45	36.03	37.50
12227	Con. Volt, Loop Stress (MHz) (4)	1.54		1.80	2.14
12228		2.53		1.48	1.51
12229	Temp. Mod (DGC)	19.5		19.00	18.51
12232	+15 VDC Pwr Sup (TMV) (5)	2.65		2.65	2.65
12234	-15 VDC Pwr Sup (TMV) (5)	4.07		4.20	4.27
12236	+5 VDC Pwr Sup (TMV) (5)	3.55		3.55	3.57
12238	-5 VDC Pwr Sup (TMV) (5)	4.08		4.17	4.20
12240	-24 VDC Unreg. Pwr (TMV) (5)	5.86		5.88	6.20
12242	Temp, Inv. (DGC)	23.7		23.42	24.12

NOTES:

(1) Function numbers for WPA-1=120XX; for WPA-2=121XX
(2) Thermo-Vacuum Test data for comparison
(3) Pwr outputs of 10 or 20 watts can be selected
(4) Any reading other than zero or -7.5 is acceptable
(5) Only power supply A operated during these orbits

Table 16-4. Wideband Telemetry Subsystem

Components	S/N
Wideband Power Supply	6549508
Wideband Frequency Modulator	6549505
Wideband Power Amplifier (2)	FT3 & FT4
Wideband Filter (2)	4 & 8

Pre-Launch Performance

		Spec	Measured
Modulator A Freq. Stab.		2229.5 MHz	2229.5 MHz
			+0 KHz
		±335 KHz	-270
Modulator B Freq. Stab.		2265.5 MHz	2265.5 MHz
			+0
		±338 KHz	-280 KHz
Power Amp No. 1 Output*	High	+40.6 DBM	+41.3 DBM
	Low	+37.6 DBM	+38.6 DBM
Power Amp. No. 2 Output*	High	+40.6 DBM	+40.8 DBM
	Low	+37.6 DBM	+37.8 DBM

PROBLEM SUMMARY

Problem

- Jumps in helix current telemetry seen in both WBPA's.

  WBPA 1 - 1.1 MA

  WBPA 2 - 0.65 MA

  EBPR 435, 9/3/74

  EBPR 520, 10/17/74

- No degradation of performance observed. WBPA's in LANDSAT-1 also show helix current telemetry jumps (once per 2 or 3 transmissions).

*Includes 2 DB transmit circuit loss

SECTION 17

ATTITUDE MEASUREMENT SENSOR (AMS)

SECTION 17

ATTITUDE MEASUREMENT SENSOR (AMS)

The AMS is a passive radiometric balance sensor which operates in the 14 - 16 micron IR Band. This band pass was selected to take advantage of the earth's horizon predictability in the 14-16 micron region, and to improve the off-null accuracy by ground based correction. The entire earth disk is imaged by a germanium lens to a focal surface containing four light pipes (four field of view sectors). See Figure 17-1 for functional block diagram, and Figure 17-2 for hardware illustration. AMS Telemetry Values are shown in Table 17-1.

The AMS was launched in the OFF mode (CMD 774), turned ON during Orbit 6 and has been performing normally since then.

Table 17-1. AMS Telemetry Values

Function No.		Units	Average Value		
			Orbit 7	20°C Plateau	Orbit 50
3004	Case - Temp 1	°C	15.74	20.9	19.00
3005	Assembly - Temp 2	°C	15.28	20.5	18.70

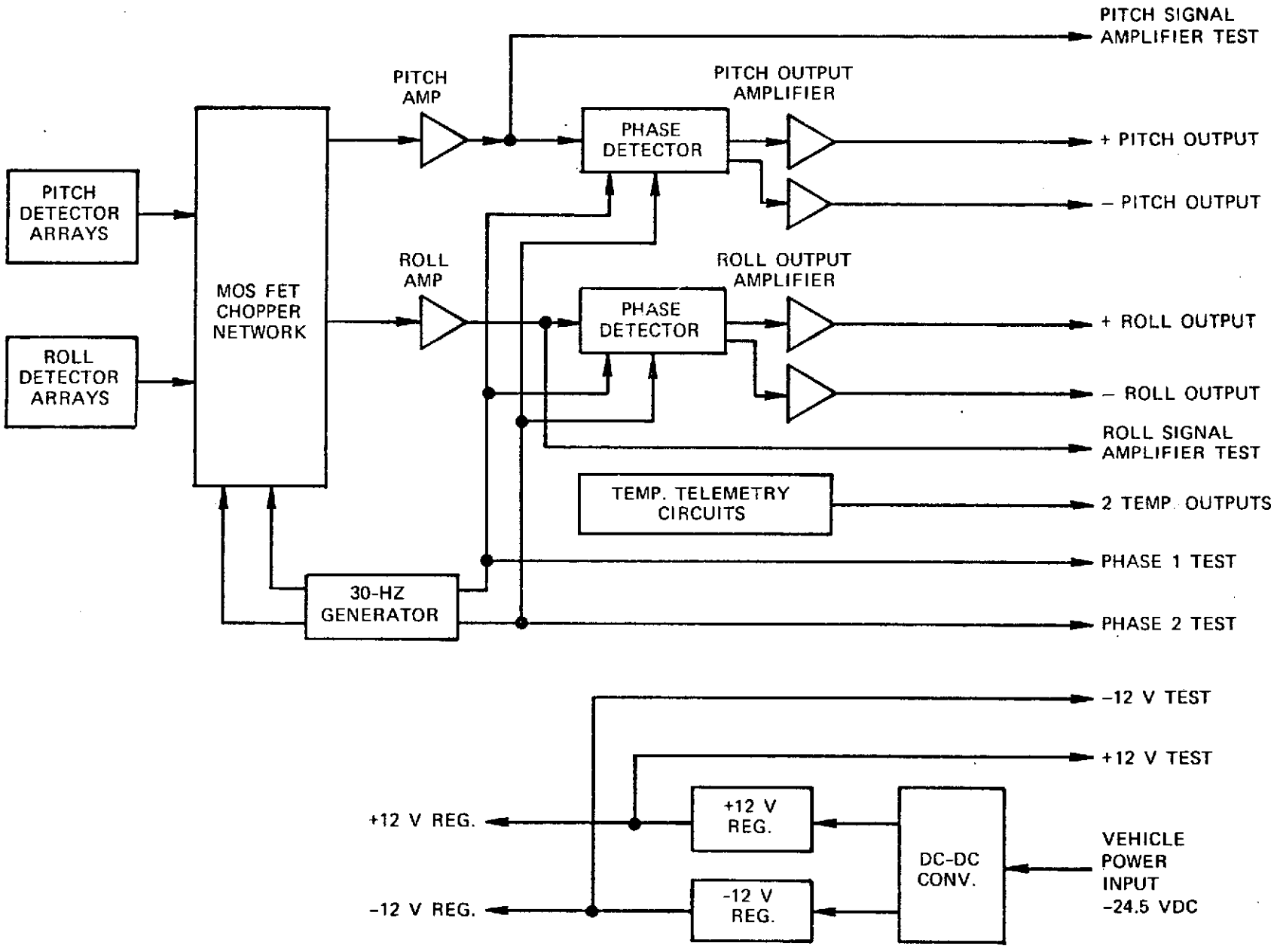


Figure 17-1. AMS Block Diagram

Figure 17-2. Attitude Measurement Sensor

SECTION 18

WIDEBAND VIDEO TAPE RECORDERS (WBVTR)

SECTION 18

THE WIDEBAND VIDEO TAPE RECORDERS (WBVTR)

The Wideband Video Tape Recorder (WBVTR) Subsystem is comprised of two rotating-head, magnetic tape recorders, each housed in two enclosures: (1) a pressurized housing for the Transport Unit (TU) and; (2) an unpressurized enclosure for the Electronics Unit (EU). The TU includes the transport mechanism, the video head wheel, record amplifiers, playback pre-amplifiers, and transport controls. The EU includes the record and playback formatting circuitry, the voltage converter, motor control circuits and command and control circuits.

The primary function of either WBVTR is to selectively record, store, and playback analog data from the Return Beam Vidicon (RBV) cameras or digital data from the Multispectral Scanner (MSS) Subsystem. Additional record and playback channels are provided on the tape. These include a prerecorded Search Track Signal for providing tape position information, an Auxiliary Track for recording PCM telemetry data, and a servo control track for playback speed control. A transverse recording technique utilizing four rotating heads is used for Wideband RBV and MSS data. The narrowband data, (servo control, PCM data, and search pattern) are recorded longitudinally with fixed heads. See Figures 18-1 and 18-2 for functional block diagrams. Figures 18-3, 4 and 5 show physical configuration. The launch and activation evaluation follows.

LAUNCH MODE

The Wideband Video Tape Recorders 1 and 2 (WBVTR-1 and 2) were launched in the mode shown in Table 18-1. This launch mode was verified by OCC during prelaunch checkout at WTR, and subsequently by narrow band recorder playback from Alaska.

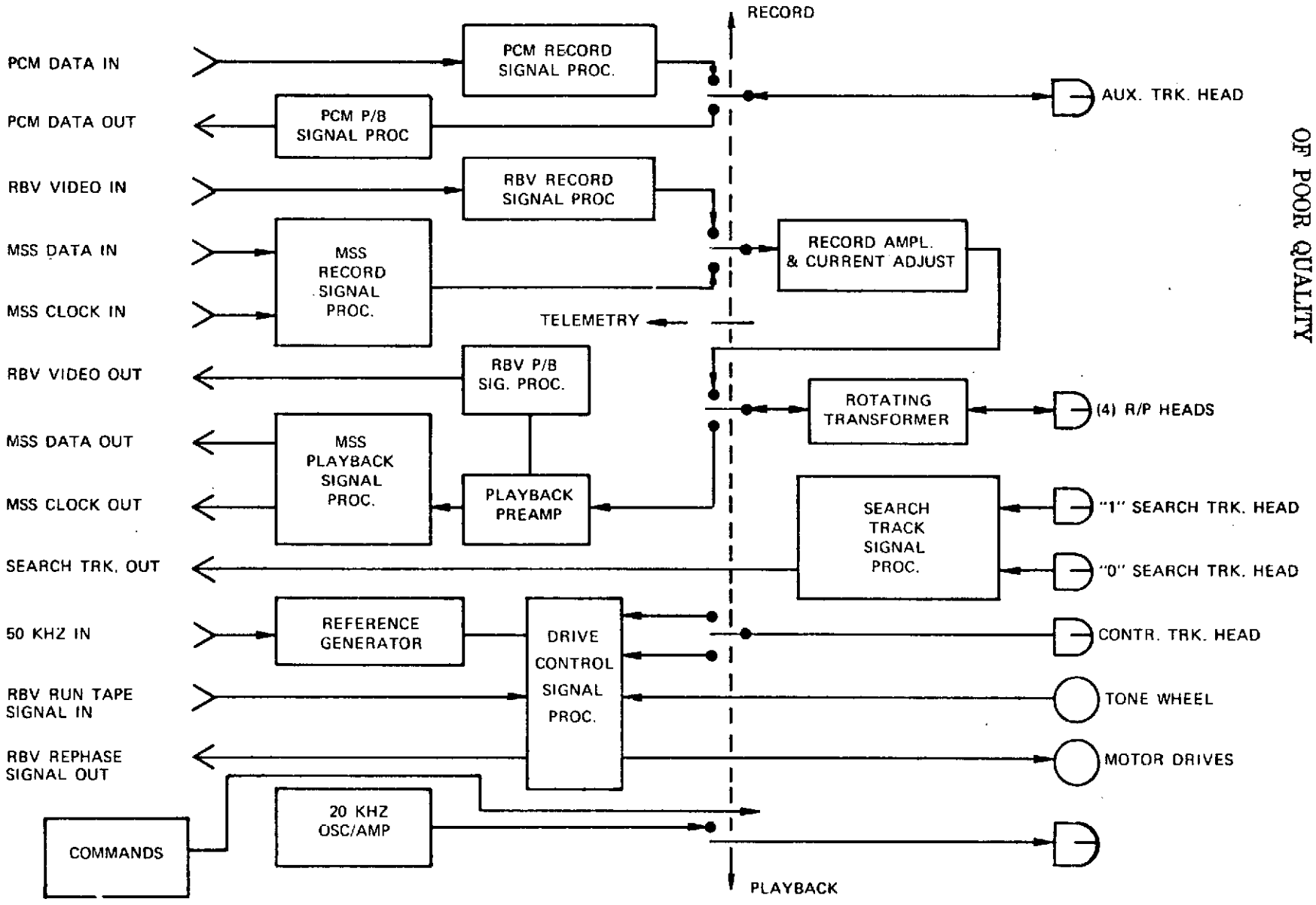


Figure 18-1. WBVTR Functional Block Diagram

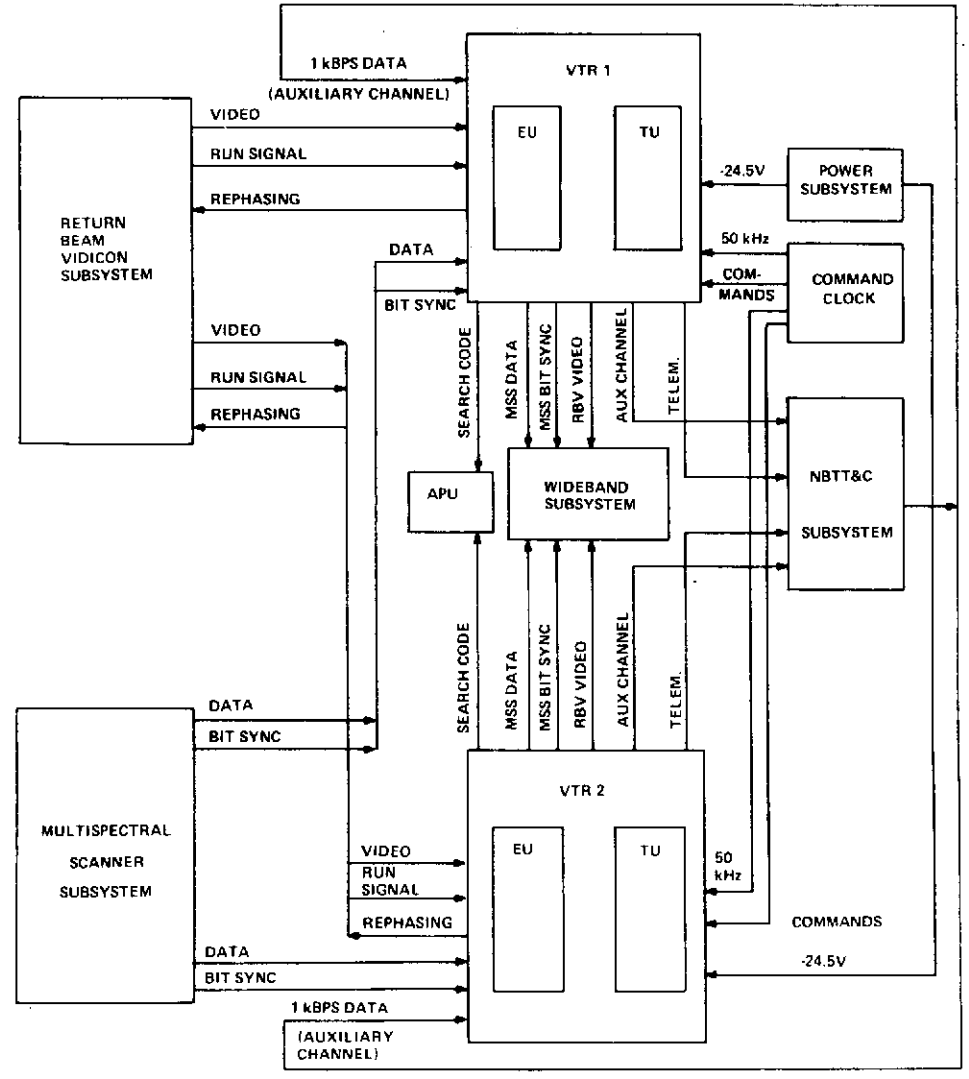


Figure 18-2. WBVTR Block Diagram

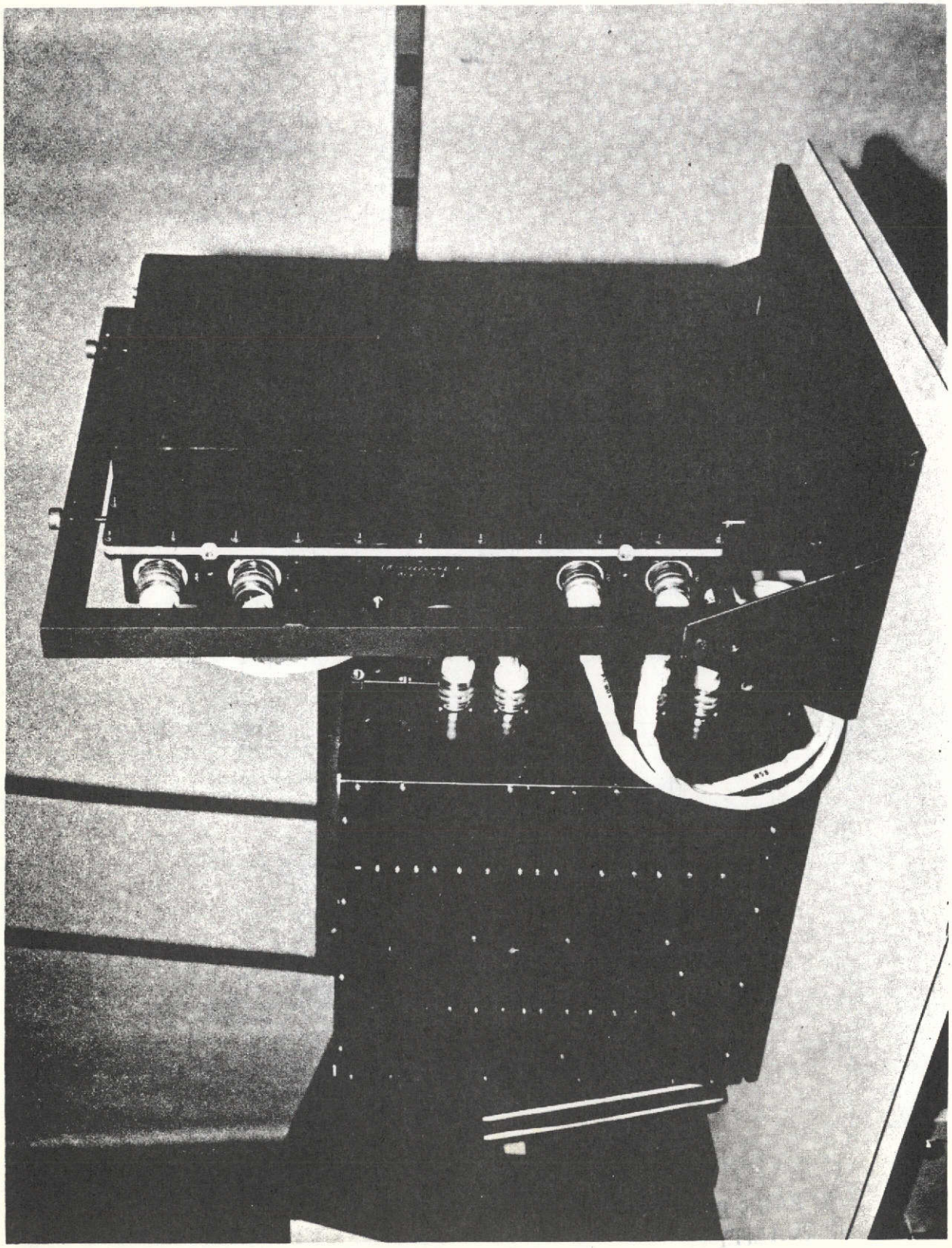


Figure 18-3. Wideband Video Tape Recorder

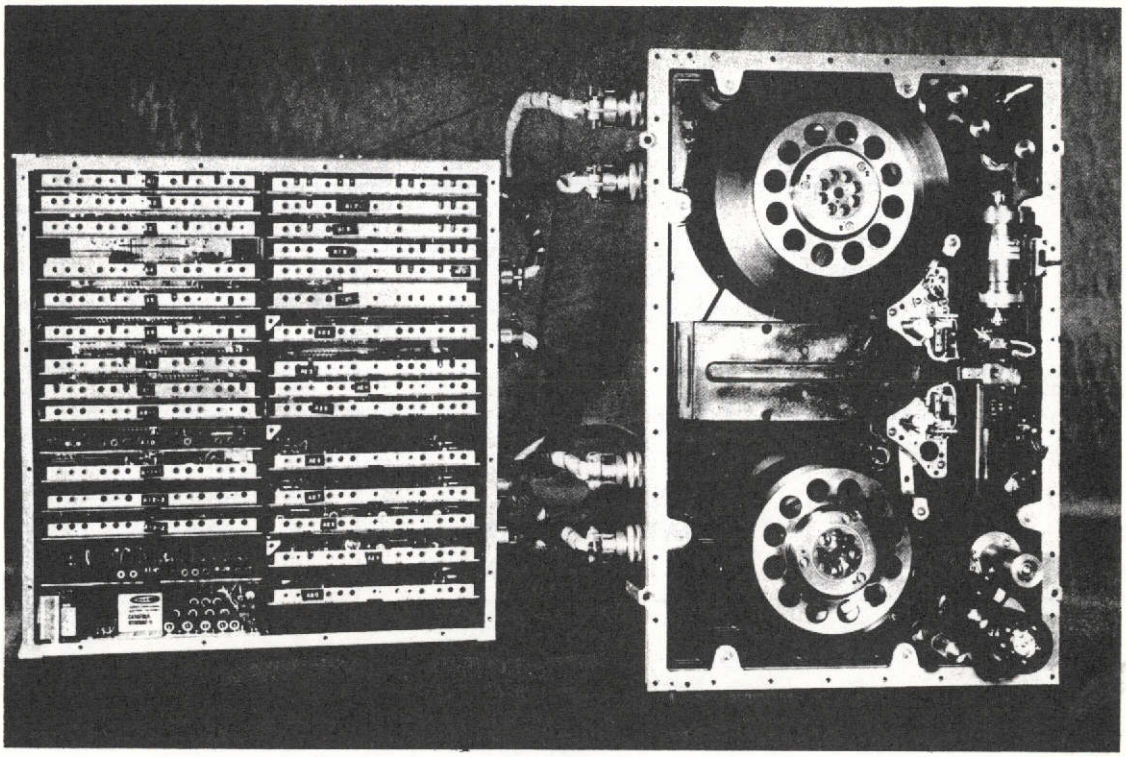


Figure 18-4. Wideband Video Tape Recorder

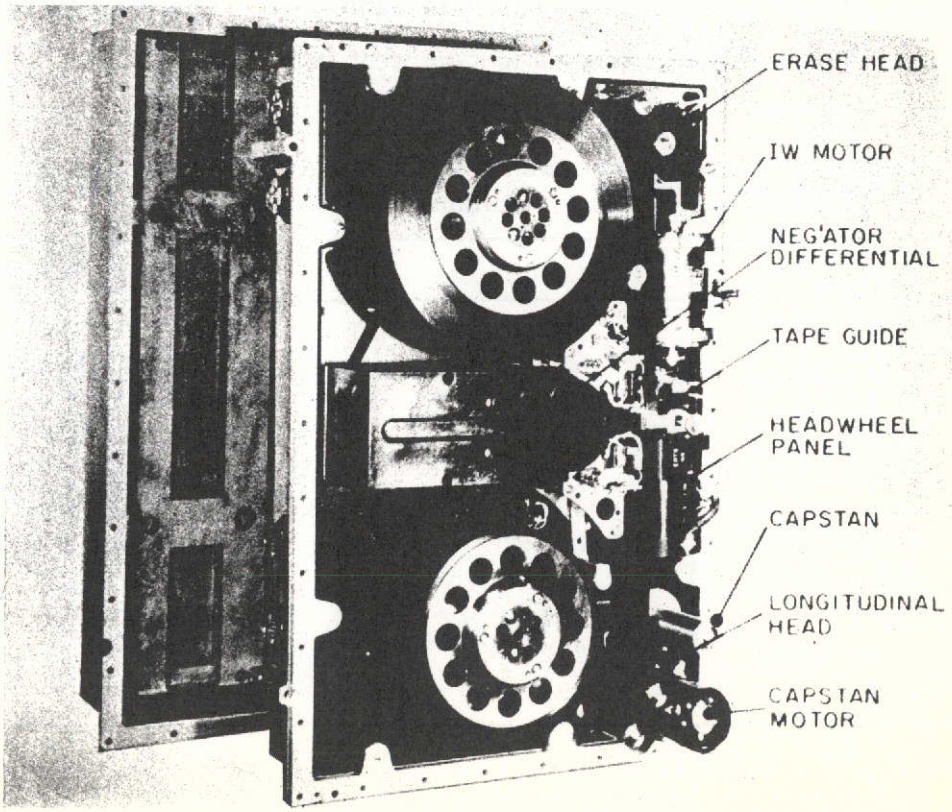


Figure 18-5. WBVTR Transport

Table 18-1. Launch Configuration

	Mode	Cmd
WBVTR 1	OFF	651
WBVTR 2	OFF	712
RBV STBY	1	464
MSS STBY	2	572
VO PROT 2	EN	554
VO PROT 1	EN	467
SEARCH TRA	NORM	563
WBVTR-1	TAPE POSITION	900
WBVTR-2	TAPE POSITION	919

ACTIVATION

Initial activation of the WBVTR subsystem occurred in Orbit 5. Both recorders were rewound from their launch position near mid-tape for a duration of about 2 minutes. The applicable series of commands are shown in Table 18-2. The footage count of WBR-1 went from 900 to 423; the WBR-2 footage went from 919 to 423.

Table 18-2. Series of Commands for Initial Activation of WBVTR
Orbit 5, 23 January 1975

Time	Cmd	Activity
01:59:08	650	WBR-2 ON Prime
01:59:10	572	WBR-2 STBY MSS
01:59:15	607	WBR-1 ON Prime
01:59:17	464	WBR-1 STBY RBV
01:59:22	465	WBR-1 FAST R/W
	552	WBR-2 FAST R/W
02:01:06	071	APU Norm Mode
02:01:17	572	WBR-2 STBY MSS
02:01:19	464	WBR-1 STBY RBV
02:01:20	712	WBR-2 OFF
02:01:21	651	WBR-1 OFF

SUBSEQUENT OPERATIONS

Table 18-3 shows the subsequent use of the WBVTR subsystem. All operations were nominal. Telemetry values and MFSE counts are normal and are shown in Tables 18-4, 18-5, and 18-6. All values are nominal.

Tables 18-7 and 18-8 show the prelaunch performance of the WBVTR. Table 18-8 lists the components and ground operating time.

Table 18-3. History of WBVTR Use

Mode	Orbits	
	WBR-1	WBR-2
Record	40, 41	19, 21
Rewind	5, 16, 17, 34, 46	5, 16, 17, 26, 31, 46
Playback	15, 17, 33 & 47 (pre-launch recorded) 46 (rec. at RBV activation)	15, 17, 46, 47 (recorded pre-launch) 26 (MSS sun cal)

Table 18-4. WBVTR Telemetry Values

WBVTR-1 Functions			Telemetry Values in Orbits	
Number	Name		T/V	ORB 45/46
13022	Pressure, Trans	(PSI)	16.46	16.52
13023	Temp Trans	(DgC)	19.1	20.74
13024	Temp Elec	(DgC)	31.8	25.00
13032	Lim Volt Out	(VPP)	1.47	1.48
13034	+5.6 VDC Conv	(VDC)	5.54	5.70
13200	-24.5 VDC	(VDC)	NA	1.82
13201	-12 VDC	(VDC)	NA	2.44
13202	Temp APU	(DgC)	NA	29.06

WBVTR-2 Functions			Telemetry Values in Orbits	
Number	Name		T/V	ORB 45/46
13122	Pressure, Trans	(PSI)	16.22	16.12
13123	Temp Trans	(DgC)	18.9	21.50
13124	Temp Elec	(DgC)	31.2	23.50
13132	Lim Volt Out	(VPP)	1.3	1.30
13134	+5.6 VDC	(VDC)	5.57	5.71
13200	-24.5 VDC	(VDC)	NA	1.82
13201	-12 VDC	(VDC)	NA	2.44
13202	Temp APU	(DgC)	NA	29.06

NA = not available

Table 18-5. Function Values by Mode in Orbit

WBVTR-1 Function/Description	T/V	ORB 31/46
13029 - Input P/B Voltage		
Record	0.0	0.0
Playback	0.57	0.60
Rewind	0.0	0.0
Standby	0.0	0.0
13028 - Capstan Motor Current		
Record	0.32	0.31
Playback	0.29	0.26
Rewind	0.23	0.19
Standby	0.0	0.0
13030 - Headwheel Motor Current		
Record	0.50	0.50
Playback	0.495	0.49
Rewind	0.41	0.44
Standby	0.41	0.45
13031 - Recorder Input Current		
Record	3.58	3.69
Playback	3.92	3.37
Rewind	2.18	2.23
Standby	1.79	1.78
13033 - Servo Voltage		
Record	0.0	0.0
Playback	49.99	50.01
Rewind	0.0	0.0
Standby	0.0	0.0
13026 - Capstan Motor Speed		
Record	89.77	88.61
Playback	89.37	88.35
Rewind	100.12	100.2
Standby	0.0	0.0
13027 - Headwheel Motor Speed		
Record	97.5	96.72
Playback	96.86	97.28
Rewind	98.96	98.6
Standby	99.12	98.39

Table 18-6. Function Values by Mode in Orbit

WBVTR-2 Function/Description	T/V	ORB 31/46
13129 - Input P/B Voltage		
Record	0.0	0.0
Playback	0.37	0.35
Rewind	0.0	0.0
Standby	0.0	0.0
13128 - Capstan Motor Current		
Record	0.33	0.33
Playback	0.34	0.33
Rewind	0.16	0.20
Standby	0.0	0.0
13130 - Headwheel Motor Current		
Record	0.47	0.47
Playback	0.46	0.48
Rewind	0.43	0.44
Standby	0.45	0.43
13131 - Recorder Input Current		
Record	2.88	2.90
Playback	3.11	3.14
Rewind	1.79	1.80
Standby	1.18	1.51
13133 - Servo Voltage		
Record	0.0	0.0
Playback	48.92	49.00
Rewind	0.0	0.0
Standby	0.0	0.0
13126 - Capstan Motor Speed		
Record	108.66	112.10
Playback	108.38	112.10
Rewind	130.09	120.43
Standby	0.0	0.0
13127 - Headwheel Motor Speed		
Record	98.41	98.08
Playback	98.11	97.04
Rewind	99.95	98.6
Standby	101.72	100.79

Table 18-7. Pre-Launch WBVTR History

DATE	ACTIVITY
5/28 - 6/12/74	1ST THERMAL VACUUM TEST. VTR 1 - FT 2 VTR 2 - FT 2
	EACH RECORDER SHOWED RISING ERROR RATE DURING 30 MINUTE TESTS, MORE PRONOUNCED AT HIGH TEMPERATURE. FT 1 ERROR RATE CONSIDERABLY HIGHER THAN FT 2 ERROR RATE.
	MINOR FRAME SYNC ERRORS IN TEN SECONDS NEAR BOT & EOT

VTR	PRE TV	20°C	35°C	10°C	20°C
FT 2	6-14	12-70	20-85	3-5	3-10
FT 1	5-130	10-160	20-480	5-75	8-95

	OBSERVED CHANGE (HIGHER) CAPSTAN MOTOR CURRENT TELEMETRY IN VACUUM ON FT 2.
	OBSERVED SEVERAL INSTANCES OF SIMULTANEOUS PBOT & SBOT ON FT 2.
6/16/74	POST TV TESTS
	1. DETERMINE IF FT 1 RECORD CURRENT (1 DB) WAS OPTIMUM - IT WAS.
	2. DETERMINE IF SIMULTANEOUS MSS ERROR BURSTS & AUX TRACK DROPOUTS WERE CONTROL TRACK ANOMALY - THEY ARE.
	3. DETERMINE IF SUBSTITUTE TELEMETRY BOARD NORMALIZES CAPSTAN MOTOR CURRENT TELEMETRY ON FT 2 - IT DIDN'T
6/21/74	FT 1 & FT 2 RETURNED TO RCA.
7/16/74	FT 6 DELIVERED TO GE. TESTS RUN WITH FT 6 IN EACH OF VTR 1 & 2 POSITIONS, MSS ERRORS VERY LOW IN EACH POSITION. SEARCH TRACK ERRORS NOTED IN 12 PLACES.
7/23/74 - 7/26/74	MSS DATA TESTS WITH FT 1 IN VTR 1 POSITION AND FT 6 IN VTR 2 POSITION. FT 6 LOW ERROR RATE. FT 1 RELATIVELY LOW, BUT RISING ERROR RATE. (5-30)
7/29/74 - 7/31/74	MSS DATA TESTS WITH FT 2 IN VTR 1 POSITION AND FT 6 IN VTR 2 POSITION. FT 2 SHOWED RISING ERROR RATE ON 3 SUCCESSIVE PLAYBACKS. FT 6 SHOWED LOW ERROR RATE WITH SAME DATA.
8/2/74 - 8/13/74	SERIES OF TESTS WITH FT 2 AND FT 6 IN FLIGHT SPACECRAFT AS VTR 1 AND 2, AND WITH FT 1 ON BIT BOARD. TESTS DISCLOSED PATTERN SENSITIVITY, AND CHARACTER OF ERRORS WAS NOTED AND ANALYZED. FT 1 WAS RETURNED TO RCA FOR FURTHER ANALYSIS, WHERE MODIFICATIONS WERE DEVELOPED AND APPLIED TO FT 1.
8/28/74	PRE-THERMAL/VACUUM TESTS. FT 2 SHOWED HIGH AND RISING ERROR RATE DURING 30 MINUTE TEST (150-450). FT 6 SHOWED GOOD ERROR RATE (5-5).
9/3/74 - 9/10/74	SECOND SPACECRAFT THERMAL VACUUM TEST. FT 2 SHOWED RISING ERROR RATE, AND HIGH (70-100) AT HIGH TEMPERATURE. FT 6 SHOWED CONSISTENTLY LOW ERROR RATE.
10/4/74	FT 1, WITH MODIFICATIONS, DELIVERED TO GE AND PLACED IN BONDED STOCK.
10/16/74 - 10/18/74	SPACECRAFT VIBRATION TEST. VTR 1-FT 2. VTR 2-FT 6. DURING SPACECRAFT CONFIDENCE TESTS RUN BEFORE, BETWEEN AND AFTER VIBRATIONS, FT 2 SHOWED HIGHER ERROR RATE ON EACH SECOND PLAYBACK OF MSS DATA.
10/29/74 - 10/30/74	POST VIBRATION 30-MINUTE MSS DATA TEST SHOWED HIGH ERROR RATE (100-230) ON FT 2. SECOND AND THIRD PB'S ALSO HIGH. FT 6 GOOD.
10/30 - 10/31/74	LIMITER/DEMOD BOARDS REMOVED FROM FT 2 EU AND SENT TO RCA FOR SINGLE MODIFICATION. BOARDS RETURNED TO GE AND REPLACED IN EU. ERROR RATE HIGH (150-900).
11/5 - 11/8/74	COMPLETION OF MODIFICATIONS TO FT 2 AT GE. FINAL TESTS SHOWED VERY GOOD ERROR RATE WITH NO RISE (5-5).
11/9 - 11/12/74	FT 2 EU REMOVED FROM SPACECRAFT FOR VIBRATION AND THERMAL TESTS (UNPOWERED) AT RCA. EU BENCH TEST AT GE WITH ENGINEERING MODEL T/V. EU INSTALLED ON SPACECRAFT. MSS DATA FROM 11/8/74 PLAYED BACK AND NEW 30-MINUTE RECORD/PLAYBACK TEST RUN. LOW ERROR RATE WITH NO RISE (5-5).

Table 18-8. Pre-Launch WBVTR Problem Summary

PROBLEM	RESOLUTION
• VTR FT-2 CAPSTAN MOTOR CURRENT TELEMETRY INCREASED IN VACUUM. EBPR 271. 5/29/74.	• CAUSED BY SATURABLE REACTOR IN TELEMETRY CIRCUIT AFFECTED BY VACUUM. RCA REPLACED SATURABLE REACTOR. MR D08193.
• SIMULTANEOUS AUXILIARY TRACK DROPOUT WITH MSS DATA ERROR BURST. EBPR 375, 6/11/74 (SN FT-2) EBPR 378, 7/15/74 (SN FT-6).	• OCCURS RELATIVELY INFREQUENTLY ON ALL VTR'S, INCLUDING ERTS A. DUE TO MOMENTARY LOSS OF LOCK IN CAPSTAN SERVO LOOP. ACCEPT AS IS. MP D08168 FT 2, MR D08194 FT 6.
• RISING MSS MINOR FRAME SYNC ERROR RATE. EBPR'S 097 10/19/74 124 2/28/74 133 3/21/74	• LONG SERIES OF TESTS AT RCA AND GE REVEALED SOME PROBLEMS WITHIN VTR'S. RCA RECOMMENDED AND MADE MODIFICATIONS TO SN FT 1 AND FT 2: 1. DECREASE RINGING (MAKE HF ROLL OFF SMOOTHER) IN MSS PB CIRCUITS. 2. INCREASE TIME CONSTANT OF DC RESTORER. 3. DECREASE AMPLITUDE OF PILOT TONE (1.5 MHZ) SIGNAL IN RECORD CIRCUITS. MR D08150 FT 1, MR D08195 FT 2.
• SEARCH TRACK NUMBERS ERRATIC ON VTR FT-6. EBPR 377 7/18/74.	• ABOUT 20 NUMBERS (OUT OF 3600) SOMETIMES READ OUT INCORRECTLY, APPARENTLY DUE TO EXTRA BITS (OR NOISE) ON TAPE. INCORRECT NUMBERS HAVE NO HARMFUL EFFECT TO OPERATION SINCE NUMBERS ARE HIGHLY REDUNDANT. ACCEPT AS IS. MR D08170.
• PRESSURE TELEMETRY DROPPED AND RETURNED TO NORMAL A FEW MINUTES LATER. VTR FT-6, EBPR 462 9/6/74.	• POTENTIOMETERS SHOW OCCASIONAL NOISE. OCCURRED ALSO ON ERTS A. ACCEPT AS IS. MR D08267.
• TAPE TRANSPORT UNIT FT-2 TELEMETRY INDICATED BOTH PRIMARY AND SECONDARY BEGINNING OF TAPE INDICATIONS. (5/28/74) EBPR 262, MR D08196.	• RETURNED TO CONTRACTOR AND REWORKED. CLOSED.

RBV DATA

- NO SIGNIFICANT DEGRADATION OF RBV DATA.

MSS DATA

- BOTH VTR'S HAVE MSS MINOR FRAME SYNC ERRORS BELOW 10 ERRORS IN 10 SECONDS. AVERAGE APPROXIMATELY 5 IN 10 SECONDS.
- NO SIGNIFICANT RISE IN ERRORS DURING 30 MINUTE PLAYBACK.

Table 18-9. WBVTR Components

- IN SPACECRAFT

		TAPE CONTACT TIME (AS OF 11/25/74)
VTR 1	S/N FT-2	522 HOURS
VTR 2	S/N FT-6	114.5 HOURS

- EXPECTED LIFE FOR EACH RECORDER - 1,000 HOURS

SECTION 19

RETURN BEAM VIDICON SYSTEM (RBV)

SECTION 19

RETURN BEAM VIDICON SYSTEM (RBV)

Ground scene information is viewed through three Return Beam Vidicon (RBV) Camera Sensors as they are simultaneously exposed. The RBV sensors convert the scene information in three unique spectral bands into low-level analog signals. The Camera Electronics convert this information into a video format that is fed to the Camera Controller Combiner (CCC), where the three camera videos are combined with sync, blanking, and timing signals and with coding information to produce a single composite video format. The Camera Controller Combiner controls the operating modes of the cameras and the generation of the composite video signal. The cameras may be commanded for single exposure, cyclic exposure, and calibration. The composite video signal is either stored on a Wideband Video Tape Recorder for later playback, or transmitted in real time through the spacecraft Wideband Telemetry Subsystem. An auxiliary video signal from each camera may also be applied directly to the Wideband Telemetry System without passing through CCC. See Figure 19-1 for functional block diagram, and Figure 19-2 for physical illustration. An equipment list is shown in Appendix A.

The RBV subsystem was launched in the mode shown in Table 19-1. Verification of this mode was obtained by telemetry early in Orbit 1 at Madrid and later by playback from Alaska.

INITIAL TURN-ON

The Return Beam Videcon Subsystem (RBV) was first turned ON in Orbit 40 for 1 minute and 2 seconds with Camera 1, but was turned OFF before shutter operated. WBVTR-1 was in record mode but received no data. All telemetry was nominal.

The RBV was turned on again in Orbit 41 on 25 January 1975 while over Greenbelt. The sequence of activities is shown in Table 19-2. Telemetry (Table 19-3), quick-look pictures, and the A-scope of the TR-70 all showed nominal sync pulses and video data.

SUBSEQUENT OPERATIONS

The RBV was not operated again during this report period; therefore, no RBV scenes are available for processing.

Table 19-4 shows the pre-launch performance of the RBV.

Table 19-1. Return Beam Vidicon Subsystem Launch Mode

	MODE	CMD
CALIBRATE	EN	372
APERTURE CORR	OUT	431
EXPOSURE	4	454
CYCLE	CONT	470
CATH REACT	OFF	371
MAG COMP	EN	677
MAG COMP	HI	753
THER MOD 1	EN	770
THER MOD 2	EN	730
THER MOD 3	EN	672
RBV PWR	OFF	731
CCC	OFF	432
CAM 1	OFF	511
CAM 2	OFF	510
CAM 3	OFF	512

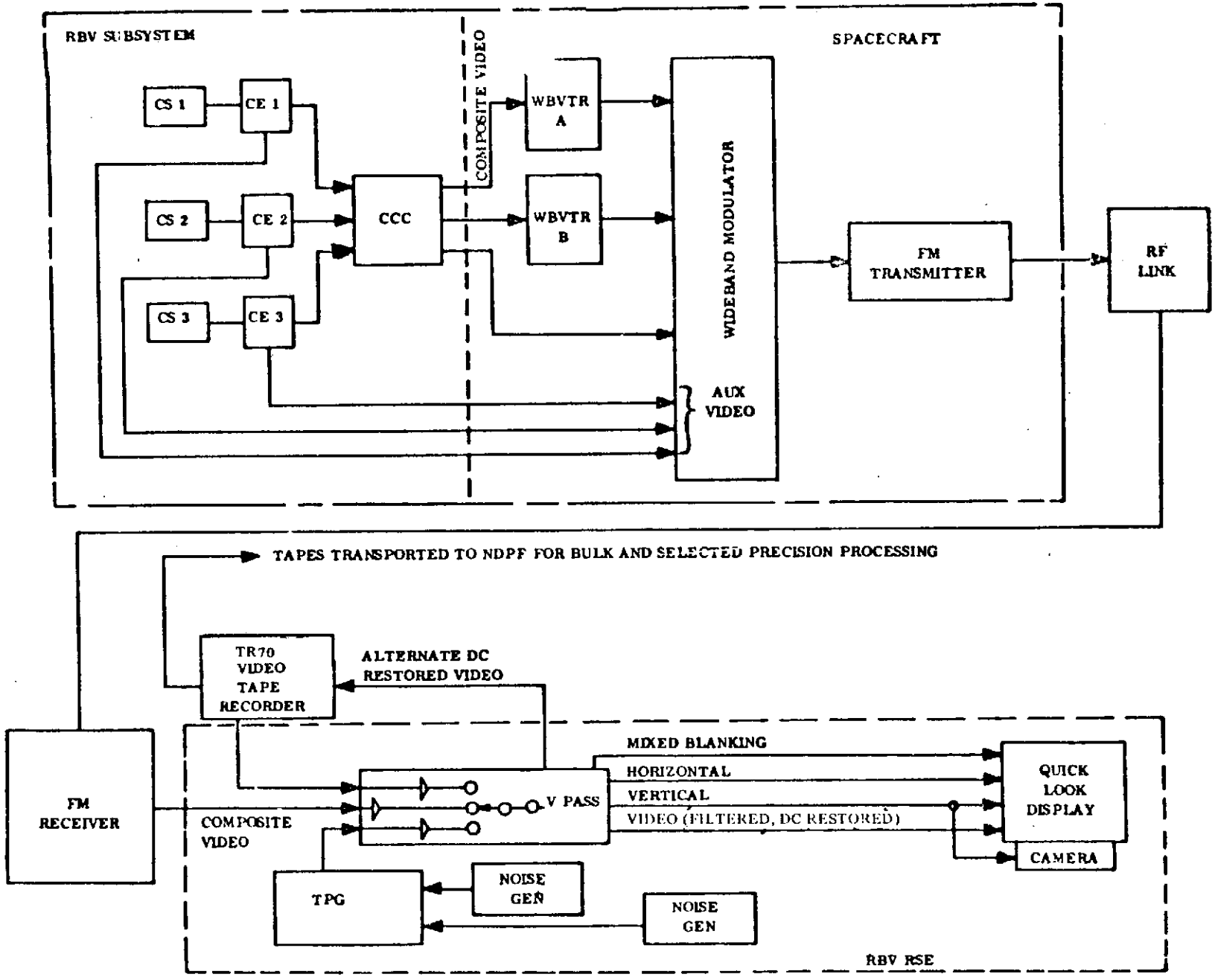


Figure 19-1. Return Beam Vidicon System Functional Block Diagram

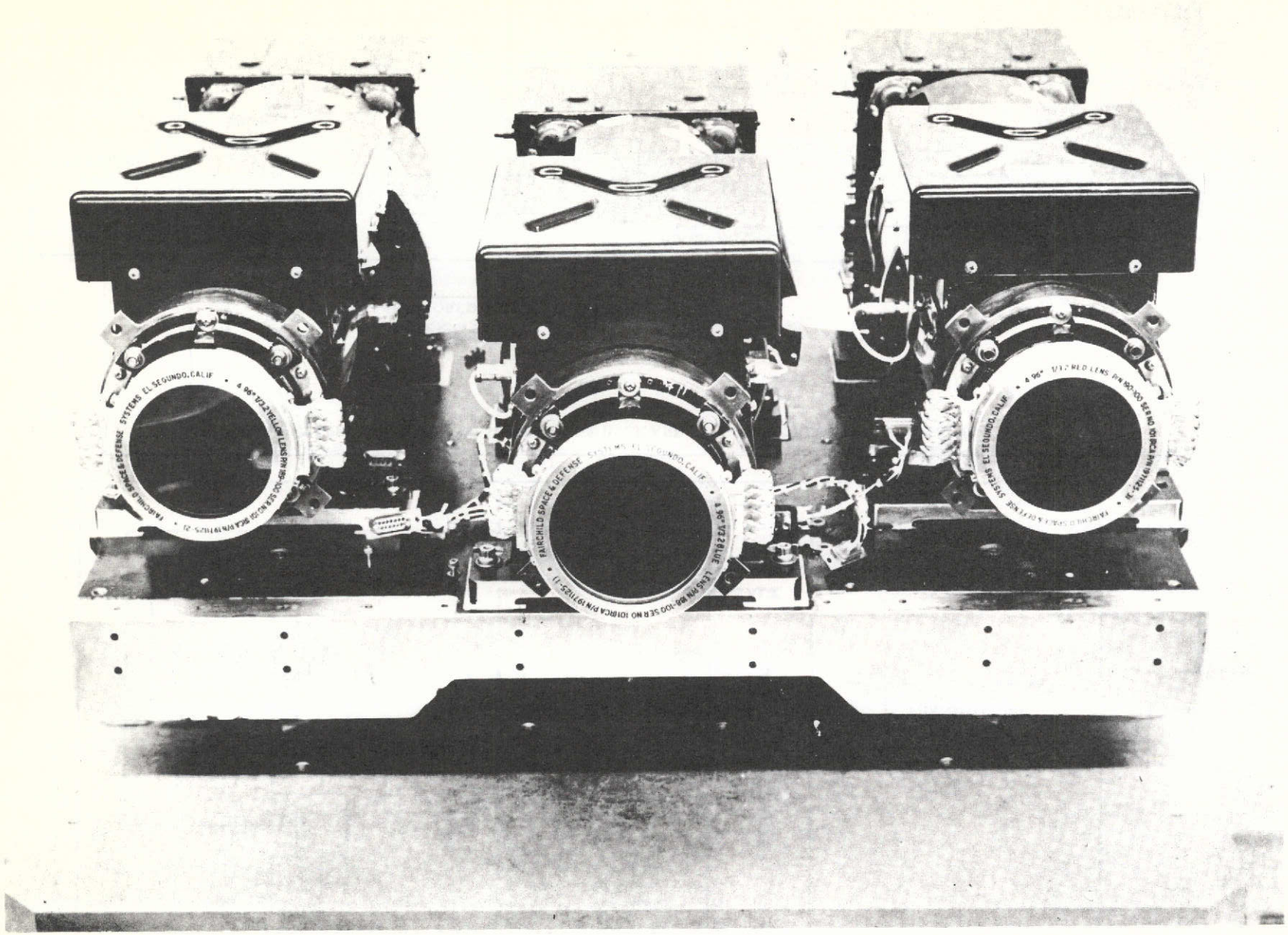


Figure 19-2. Return Beam Vidicom

Table 19-2. RBV Initial Turn-ON, Orbit 41, 25 January 1975

Time	Activity
16:21:04	WPA-1 ON
16:23:12	WBR-1 RECORD
16:23:59	CAM 1 ON
16:24:00	RBV ON
16:25:51	RBV OFF
	CAM 1 OFF
16:26:23	CAM 2 ON
	RBV ON
16:27:59	RBV OFF
	CAM 2 OFF
16:28:31	CAM 3 ON
	RBV ON
16:30:23	RBV OFF
	CAM 3 OFF
16:30:56	CAM 1 ON
	CAM 2 ON
	CAM 3 ON
	RBV ON
16:34:01	WBR-1 OFF
16:34:07	RBV OFF
	WPA-1 OFF

Table 19-3. RBV Telemetry Values

Func. No.	Name	Telemetry Values	
		T. V. Norm	Orbit 41
14001	CCC Board Temp (DGC)		19.939
14002	CCC PWR Sup. Temp (DGC)		21.047
14003	15V SUPPLY (TMV)		3.950
14004	+6V, -5.25 PWR. SUP (TMV)		3.075
14100	VIDEO OUTPUT VOLT (TMV)	0.96	
14200		0.93	
14300		1.06	
14102	COMBINED ALIGNMENT CUR (TMV)	3.75 to 4.02	3.950
14202		3.87 to 4.10	3.875
14302		3.80 to 4.05	3.850
14103	TEMP. IN ELEC. UNIT (DGC)		24.363
14203			20.387
14303			25.363
14104	TEMP IN LV: PWR SUP (DGC)		23.363
14204			18.834
14304			26.023
14105	DEFL PWR SUP +10 (TMV)	3.92 to 4.07	3.950
14205			3.950
14305			4.000
14106	L.V. PWR. Sup. +6 , -6.3 (TMV)	3.65 to 3.80	3.700
14206			3.650
14306			3.725
14107	Current in Ther. Elec (TMV)	2.53	2.650
14207			2.500
14307			2.575
14108	Vidicon Fili. Cur. (TMV)	1.80 to 3.50	2.550
14208			2.400
14308			2.575
14111	Target Volt. to Vidicon (TMV)	3.03	3.025
14211			3.050
14311			3.225
14120	Vert. Defl. Volt. (TMV)	4.05	4.050
14220			4.275
14320			4.275
14114	Temp Vidicon Face Plate (DGC)	21.99	21.997
14214			21.059
14314			22.398
14115	Temp Focus Coil (DGC)	24.17	20.940
14215			20.387
14315			21.940

Table 19-4. Return Beam Vidicon Subsystem

- COMPONENTS

CAMERA CONTROLLER COMBINER	S/N 003
CAMERA ELECTRONICS 1 (BLUE)	S/N 003
CAMERA ELECTRONICS 2 (YELLOW)	S/N 002
(REPLACED ON 8/19/74 WITH)	S/N 004
CAMERA ELECTRONICS 3 (RED)	S/N 008
CAMERA SENSOR 1 (BLUE)	S/N 003
CAMERA SENSOR 2 (YELLOW)	S/N 002
(REPLACED ON 8/19/74 WITH)	S/N 004
CAMERA SENSOR 3 (RED)	S/N 008
RBV MAGNET MOMENT ASSEMBLY	S/N 49513

- PRE-LAUNCH PERFORMANCE

ALL EVALUATION PARAMETERS ARE SATISFACTORY.

PRE-LAUNCH PERFORMANCE SUMMARY

	(SPEC)			(RCA)			(GE)		
	BLUE	YELLOW	RED	BLUE	YELLOW	RED	BLUE	YELLOW	RED
• SIGNAL/NOISE (A. C. OUT)	33DB	33DB	25DB	34.1DB	37.3DB	30.8DB	34.3DB	35.2DB	30.6DB
• RADIANCE OUTPUT									
A) REPEATABILITY OF INTERNAL CALIBRATION LEVELS									
CAL 0	REPEATABILITY WITHIN			.270	.244	.343	.274	.238	.330
CAL 1	50 MV (CAMERA TEMPER-			.460	.566	.441	.462	.580	.439
CAL 2	ATURE A CONSTANT)			.938	1.086	.869	.936	1.052	.864
B) WHITE SHADING-% (CENTER)	15	15	15	16	19.1	15.3	17.4	11.0	13.5
• RASTER SIZE									
HORIZONTAL %	REPEATABILITY			100.08	100.00	100.26	100.04	100.14	100.56
VERTICAL %				100.28	100.16	100.78	100.24	100.26	100.76
• VERTICAL RESOLUTION (CENT. 59 LP) %	REPEATABILITY			30	31	32	34	38	35
• HORIZONTAL RESOLUTION (CENT. 59 LP) %	REPEATABILITY			26	26	32	27	31	43

PROBLEM	RESOLUTION
• HORIZONTAL CENTERING SHIFT - RED CAMERA - 6 TIMES AT GE (5/20/74 AND DURING AUGUST AND SEPT. 1974, EBPR 302, MR D08197.) - BLUE CAMERA - ONCE AT RCA - YELLOW CAMERA, S/N 004, 3 TIMES AT RCA - YELLOW CAMERA, S/N 002, SHIFT NEVER OBSERVED.	• UNABLE TO ISOLATE PROBLEM THROUGH EXTENSIVE TESTING AT RCA AND GE SHIFT OBSERVED IN $\approx$ 1% OF DATA, SHIFT HAS NOT OCCURRED SINCE T/V ORBIT D-10, 9/7/74, ACCEPT AS IS.
• LOSS OF VIDEO FROM BLUE AND YELLOW CAMERAS DURING THERMAL VACUUM TEST. HIGH VOLTAGE TRANSFORMER FAILED IN BOTH CAMERAS. (6/1/74 AND 6/5/74, EBPR 310, MR D08200 AND EBPR 342, MR D08190.)	• HIGH VOLTAGE TRANSFORMER REDESIGNED. TRANSFORMERS REPLACED IN ALL CAMERAS.
• CAL 2 LEVEL OF YELLOW CAMERA IS SATURATED AND THEREFORE UNUSEABLE (8/21/74, EBPR 404, MR 08266).	• ACCEPT AS IS. USE CAL 1 LEVEL FOR INFLIGHT CALIBRATION CHECK.
• VERTICAL PORTION OF RESEAU MARKS MISSING ON CAL 2 OF YELLOW CAMERA. (9/5/74, EBPR 446).	• CAUSED BY AMPLIFIER SATURATION. CAMERA PERFORMANCE IS NOT DEGRADED. ACCEPT AS IS.
• HORIZONTAL JITTER IN RED CAMERA ANCHOR MARK; ANCHOR MARK ALSO NOT VERTICAL. (9/6/74, EBPR 461).	• SUSPECT JITTER RELATED TO HORIZONTAL PROBLEMS. • ANCHOR MARK WAS NOT ETCHED VERTICALLY ON TUBE. ACCEPT AS IS.
• MULTILINE JUMP DURING YELLOW CAMERA OPERATION (9/7/74, EBPR 466).	• ONE TIME ONLY OCCURRENCE. ACCEPT AS IS.

SECTION 20

MULTISPECTRAL SCANNER SUBSYSTEM

SECTION 20

MULTISPECTRAL SCANNER SUBSYSTEM

The Multispectral Scanner (MSS) system consists of spacecraft and ground equipment which permits images of the earth to be obtained simultaneously in 4 or 5 spectral bands. The LANDSAT-2 MSS uses a 4-band scanner operating in the solar reflected spectral region from 0.5 to 1.1 micrometers (microns) wave length, and scans cross track swatchs of 0.5 km width (at a 496-nm altitude), imaging six scan lines across in each of the four spectral bands simultaneously. The object plane is scanned by means of an oscillating flat mirror between the scene and the double reflector telescope optical chain. The 11.56 degree cross-track field-of-view is scanned as the mirror oscillates approximately $\pm$2.89 degrees 13.62 times per second about its nominal position as shown in Figure 20-1.

The instantaneous field-of-view of each detector subtends an earth-area square of 256 feet on a side from the nominal orbit altitude. Field stops are formed for each line imaged during a scan, and for each spectral band, by the square input end of an optical fiber. Six of these fibers in each of four bands are arranged in a 4 x 6 matrix in the focal plane of the telescope. See Figure 20-2 for functional block diagram, and Figure 20-3 for pictorial view. An equipment list is shown in Appendix A.

The Multispectral Scanner (MSS) was launched in the OFF mode, except that the Rotating Shutter was commanded ON to distribute the launch mode stresses around the bearing. The complete launch configuration is shown in Table 20-1. Verification of this configuration was obtained from telemetry in Orbit 1 at Madrid, and by playback from Orbit 1 at Alaska.

In Orbit 1 at Alaska, the rotating shutter (and the enabling primary power switch for MSS) was commanded OFF at 19:29:45.

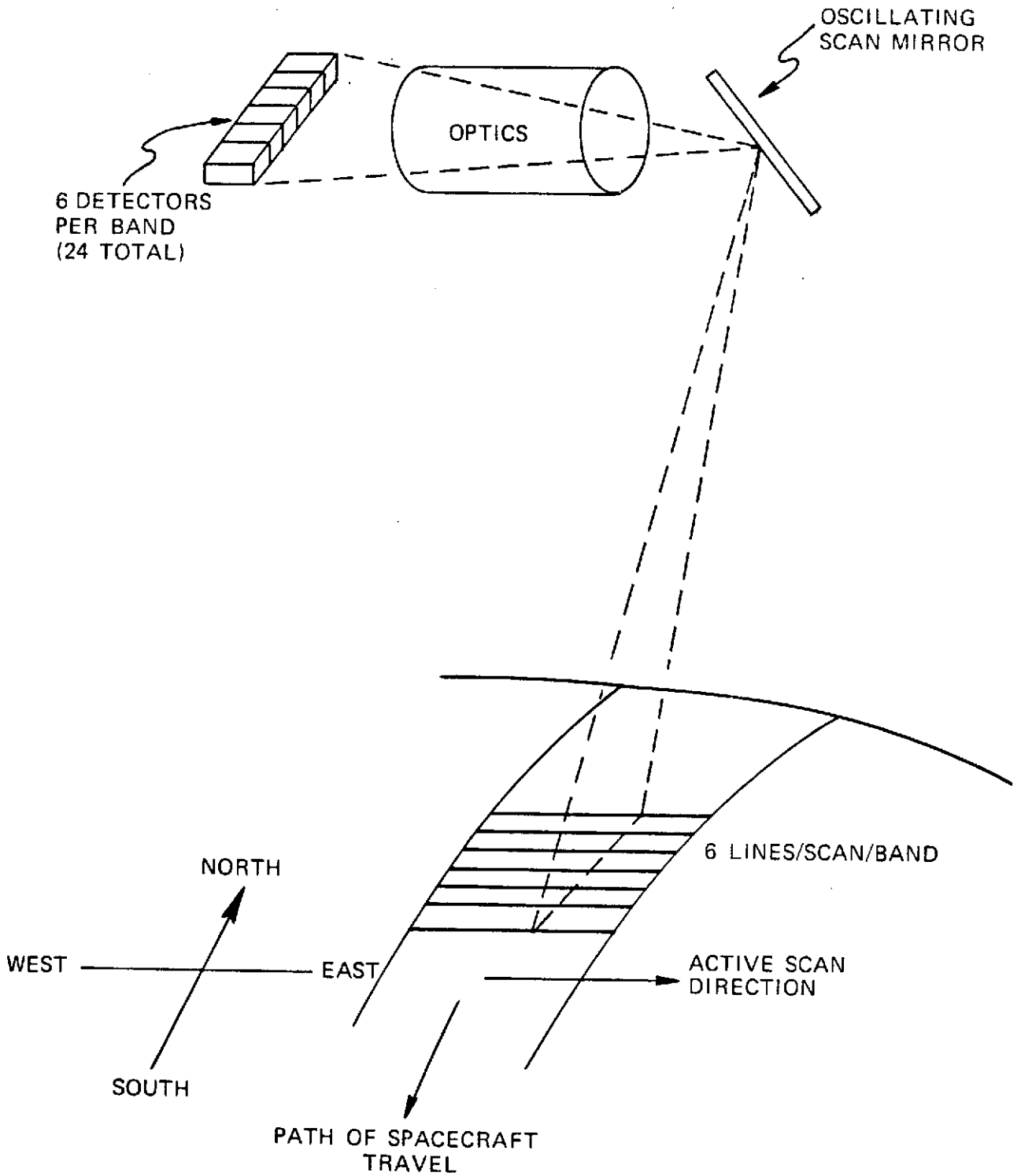


Figure 20-1. MSS Scanning Arrangement

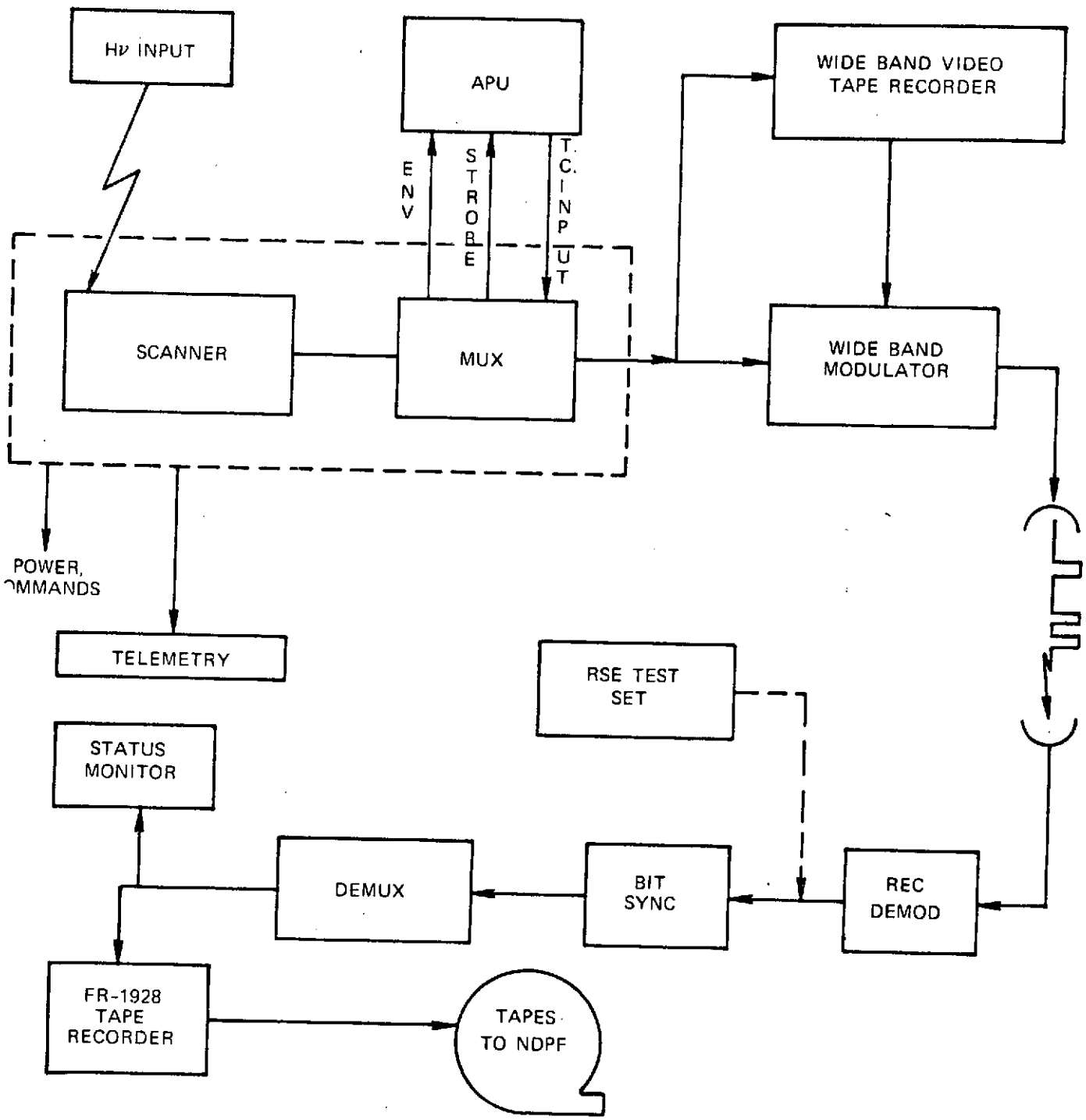


Figure 20-2. Simplified Functions Block Diagram of the Overall MSS System

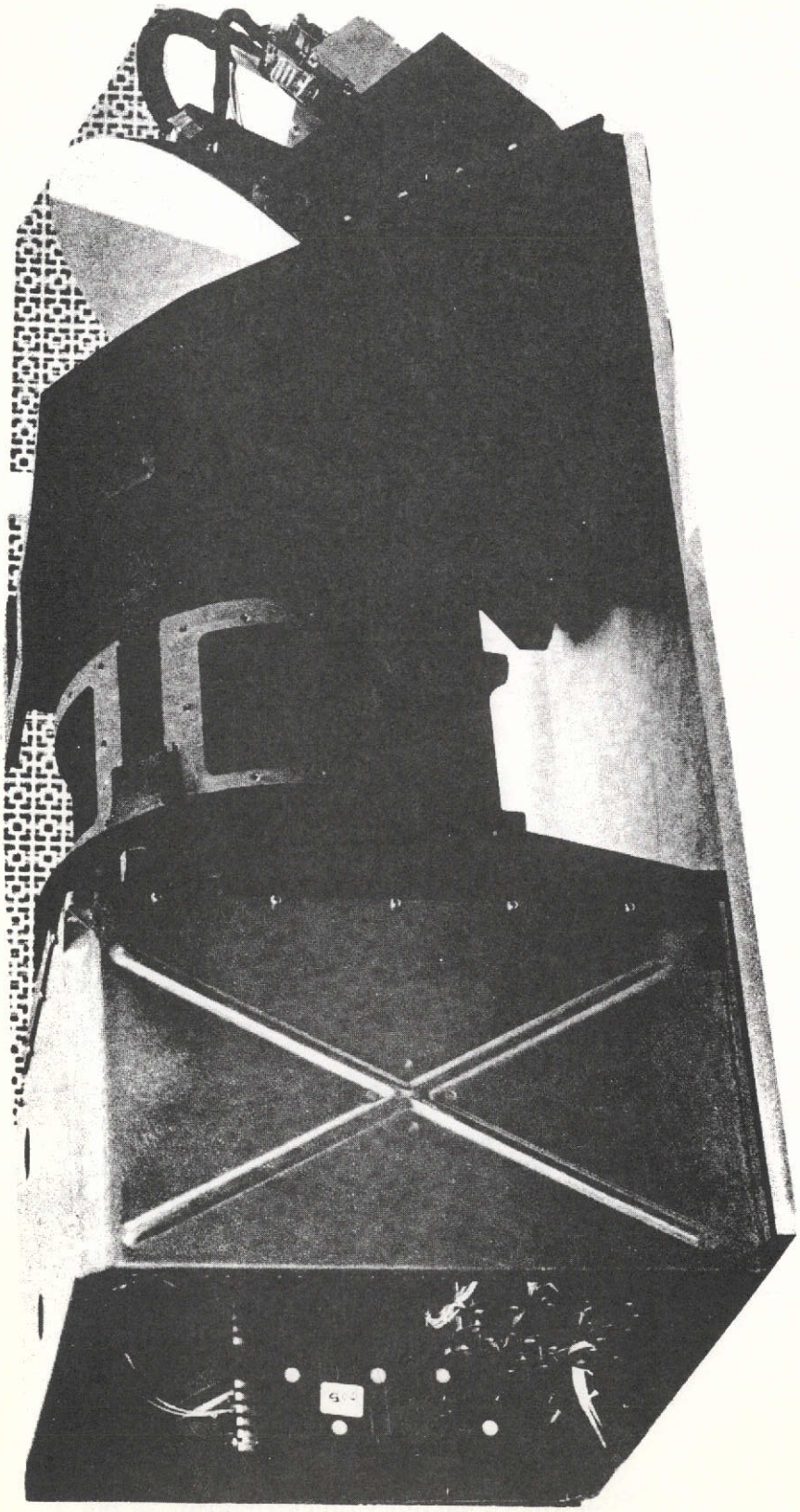


Figure 20-3. Multispectral Scanner

Table 20-1. Multispectral Scanner Subsystem Launch Mode

	Mode	Cmd
MSS BOTH	EN	632
SYSTEM PWR	ON	052
HIGH VOLT	OFF	073
SEL INV	A	053
BAND 1	OFF	076
BAND 2	OFF	132
BAND 3	OFF	135
BAND 1 HV	A	054
BAND 2 HV	A	055
BAND 3 HV	A	056
BAND 1 HV	OFF	176
BAND 2 HV	OFF	233
BAND 3 HV	OFF	232
SHUTTER	A	214
ROT SHUTTER	ON	152
CAL LAMP	A	117
CAL LAMP	OFF	177
SCAN PWR	1	217
SCAN MON	OFF	172
SCAN MON	A	255
SCAN MIRROR	INH	256
SCAN MIR PWR	1	312
MIR SCAN	OFF	335
MUX	INH	276
MUX MODE	COMP	315
HEATER	OFF	735
SYS ON/OFF	NORM	316
BAND 1 GAIN	LO	175
BAND 2 GAIN	LO	174

INITIAL TURN-ON

The initial turn-on of the MSS subsystem was in Orbit 19 during a Merritt Island/Greenbelt/Alaska pass. The commands and execution times are shown in Table 20-2.

The WBPA-2 was turned on by stored command at 02:00:16.

Telemetry values, video and strip charts were normal.

Table 20-2. MSS Initial Turn-On Orbit 19, 24 January 1975

Cmd	Activity	Time		
		H	M	S
VIA MERRITT ISLAND				
775	USB ON	01	57	14
316	MSS ON NORM	01	59	57
316	MSS ON NORM	02	01	29
650	WBR-2 ON	02	01	59
572	WBR-2 STBY	02	02	03
513	WBR-2 REC	02	02	16
156	CAL LAMP ON	02	02	24
153	SCAN MON ON	02	02	34
277	SCAN MIR NORM	02	02	44
314	MID SCAN CODE ON	02	02	55
610	MSS ENABLE	02	03	05
257	MUX NORM	02	07	26
052	MSS SYS ON	02	07	33
212	BN 2 HV ON	02	07	51
233	BN 2 HV OFF	02	08	04
132	BN 2 OFF	02	08	17
114	BN 3 ON	02	08	45
112	MSS HV ON	02	08	58
213	BN 3 HV ON	02	09	09
VIA GREENBELT				
057	BN 1 ON	02	10	26
157	BN 1 HV ON	02	10	40
113	BN 2 ON	02	10	48
212	BN 2 HV ON	02	10	57
VIA ALASKA				
073	MSS SYS OFF	02	14	47
766	PYLDS OFF	02	15	10
067	WBPA-2 OFF	02	15	23
757	USB OFF	02	22	54

SUBSEQUENT OPERATIONS

In Orbit 21 a sun calibration was performed while over Alaska. Configuration was prime, compressed, low, with mid-scan code ON. The results as reported by Alaska are shown in Table 20-3.

Table 20-3. MSS Sun Calibration in Orbit 21 Reported by ALASKA

START TIME OF SUN CAL PULSE	05:47:02
DELAY TIME FROM LINE ST. (MS)	18
PEAK AMPLITUDE	
SENSOR	VOLTS (on 4V FULL SCALE)
1	3.0
2	3.1
5	3.1
7	3.6
8	3.5
12	3.3
13	3.0
15	3.2
18	3.2
19	2.2
20	2.1
23	2.2

The MSS was also operated in Orbits 27, 28 and 42 in realtime operations; and in Orbit 40 to Record on WBR-1. A second sun calibration was made in Orbit 47 with results similar to those of Orbit 21.

Typical telemetry values are shown in Table 20-4. Table 20-5 shows the pre-launch performance of the MSS.

In Appendix E the same MSS scene is shown in 5 successive figures, F-1 thru F-5, one for each of the four bands, and the final one a composite of 3 bands

Table 20-4. MSS Telemetry

Function	Name	* T.V. Norm	Orbits 27
15040	MUX -6 VDC (TMV)	3.92	4.05
15041	A/D SUPPLY (TMV)	5.74	5.95
42	AVERAGE DENSITY (TMV)	1.72	1.71
43	FIBER OPTICS PLATE 1 TEMP (DGC)	22.30	18.13
44	FIBER OPTICS PLATE 2 TEMP (DGC)	22.30	17.87
45	MUX TEMP (DGC)	25.59	23.38
46	ELEC COVER TEMP (DGC)	23.09	20.25
47	PWR. SUP. TEMP. (DGC)	23.85	19.45
48	SCAN MIR REG. TEMP (DGC)	23.44	18.30
49	SCAN MIR DRIVE ELEC. TEMP. (DGC)	24.34	18.96
15150	SCAN MIR DRIVE COVER TEMP (DGC)	22.50	17.26
51	SCAN MIR TEMP (DGC)	21.87	17.26
52	ROT. SHUT HOUSING TEMP (DGC)	22.58	23.26
53	SCAN MIR REG VOLT (TMV)	4.56	4.7
54	CAL LAMP CURRENT (TMV)	1.18	1.17
55	BAND 1 15 VDC (TMV)	4.97	4.98
56	BAND 2 15 VDC (TMV)	5.00	5.00
57	BAND 3 15 VDC (TMV)	4.88	4.95
58	BAND 4 15 VDC (TMV)	4.83	5.00
59	TLM 15 VDC (TMV)	5.04	5.06
15060	+12 VDC +6 VDC (TMV)	4.92	5.03
61	LOGIC +5 VDC (TMV)	4.86	4.81
62	RECT. +19 VDC (TMV)	4.97	5.03
63	RECT. -19 VDC (TMV)	3.54	3.60
64	BAND 1 HVA (TMV)	4.95	4.95
65	BAND 1 HVB (TMV)	5.03	OFF
66	BAND 2 HVA (TMV)	4.72	4.70
67	BAND 2 HVB (TMV)	4.70	OFF
68	BAND 3 HVA (TMV)	4.75	4.72
69	BAND 3 HVB (TMV)	4.65	OFF
15070	SHUT MOT. CONTR. INTEG (TMV)	2.49	2.60
15071	SCAN MIRROR DRIVE CLOCK (TMV)	1.93	2.00

*Thermal Vacuum Test Data at 20°C.

Table 20-5. Multispectral Scanner

COMPONENT SUMMARY

- SCANNER S/N-2
- MUX S/N-1
- LINE FILTER S/N-4

PRE-LAUNCH PERFORMANCE SUMMARY

PARAMETER	SPEC	PRE-LAUNCH MEASUREMENT				
			LIN	COMP		
• SIGNAL/NOISE	B1 90	MEAN	109.6	108.8	WORST CASE S1, CL	80.2
	B2 69	MEAN	96.6	82.5	WORST CASE S10, CL	69.1
	B3 45	MEAN	72.9	66.6	WORST CASE S14, CL	59.4
	B4 104	MEAN	133.0	-	WORST CASE S20, LL	108.0
• HORIZONTAL MTF	> 33% (SWR)	ALL CHANNELS > 39%				
• CROSS AXIS JITTER	±30 μRAD	MEAN = 1.1 μRAD MAX = 5.2 μRAD				
• SCAN SYMMETRY		0.4990 (NO. WORDS TO MSC/TOTAL LINE LENGTH)				
• LINE LENGTH VARIATION	±2 WORDS LINE TO LINE	MAX ± 2 WORDS OVER 35 MINUTES 9 WORDS OVER 18°C CHANGE MEAN = 3247 @ 23°C				

Table 20-5. Multispectral Scanner (Cont'd)

PARAMETER	SPEC		PRE-LAUNCH MEASUREMENT				
• VIDEO STABILITY			2% VARIATION OVER 17 MINUTES AFTER 3 MINUTE WARMUP.				
	NOMINAL			MEAN	MAX (SEN)		MIN (SEN)	
• GAIN (22°C, COMP LO) (QL/MW CM^{-2} STEAR.$^{-1}$ (VACUUM)	B1	25.80	B1	26.14	26.97	(6)	25.07	(1)
	B2	32.00	B2	34.39	35.91	(10)	32.64	(12)
	B3	36.36	B3	38.45	39.96	(18)	36.10	(13)
	B4	13.91	B4	13.10	13.34	(24)	12.62	(22)
• OFFSET (22°C, COMP LO) QUANTUM LEVEL (FULL RANGE - 64 QL'S)	>0		B1	+1.00	+1.38	(5)	+0.73	(3)
	<0.8		B2	+0.79	+1.03	(12)	+0.52	(7)
	(LINEAR MODE		B3	+0.75	+1.01	(17)	+0.35	(14)
	IN SPEC.)		B4	+0.82	+1.28	(23)	+0.43	(22)
• TEMP. SENSITIVITY (10 TO 35°C)			% GAIN CHANGE/°C					
			B1	-0.21%	-0.32%	(1)	-0.06%	(4)
			B2	-0.35%	-0.39%	(8)	-0.22%	(10)
			B3	-0.43%	-0.49%	(18)	-0.22%	(13)
			B4	+0.30%	+0.35%	(21)	+0.029%	(23)

Table 20-5. Multispectral Sensor (Cont'd)

PARAMETER	SPEC	PRE-LAUNCH MEASUREMENT			
• TEMP REPEATABILITY (10°C TO 35°C)		ALL BANDS ± 2.0%			
		LAMP A		LAMP B	
		UNCOR	COR	UNCOR	COR
• CAL WEDGE CORRECTION WITH TEMP. (10°C TO 35°C) % CHANGE/°C (MEAN VALUES)	B1	-.286	-.098	-.254	-.038
	B2	-.405	-.062	-.370	-.052
	B3	-.469	-.054	-.459	-.027
	B4	+.399	+.111	+.366	+.082
		MEAN		WORST CASE	
• VIDEO SENSITIVITY TO HOVIS SPHERE TARGET (NORMALIZED TO FULL SCALE) % GAIN CHANGE OVER A ZERO RADIANCE INPUT COMPUTED FROM CAL WEDGE	B1	+4.3%		S3, +6%	
	B2	+4.2%		S8, +6%	
	B3	+2.8%		S18, +5%	
	B4	-0.1%		S24, +0.5%	

Table 20-5. Multispectral Sensor (Cont'd)

PRE-LAUNCH MSS RADIOMETRIC CALIBRATION

THREE CALIBRATIONS

- POST INTEGRATION (5/74)
- POST TV II (9/74)
- POST VIBRATION (10/74)

	POST INTEGRATION	
	POST TV 11	POST VIBRATION
REPEATABILITY	BANDS 1-3 $-0.8 \pm 0.6\%$	BANDS 1-3 $-1.5 \pm 0.8\%$
(CORRECTED)	BAND 4 $+0.2 \pm 0.5\%$	BAND 4 $-1.0 \pm 0.4\%$
REPEATABILITY	BANDS 1-3 $+3.3 \pm 1\%$*	BANDS 1-3 $-1.4 \pm 0.8\%$*
(CORRECTED)	BAND 4 $-3.4 \pm 0.5\%$	BAND 4 $-2.6 \pm 0.5\%$

*SENSOR 8 = +6.2%, +3.7%
SENSOR 10 = +6.8%, +4.2%

Table 20-5. Multispectral Sensor (Cont'd)

PRE-LAUNCH PROBLEM SUMMARY

	PROBLEM	RESOLUTION
V/T I	• VIDEO (0.5 MSEC) OCCURS PROCEEDING PREAMBLE, CAUSES DEMUX TO MISS LINE START OR FIND FALSE LINE START. EBPR 306.	• REPHASE SHUTTER SUCH THAT SHUTTER OPENS DURING PREAMBLE. PROBLEM DID NOT APPEAR IN V/T II.
V/T I	• SCAN MONITOR A AND B OUT OF ALIGNMENT BELOW 20°C. EBPR 293, MR D08191, MR D08199.	• RE-ALIGN SCAN MONITORS, PROBLEM DID NOT APPEAR IN V/T II.
V/T	• APPARENT GAIN CHANGE IN CAL WEDGE FROM AMBIENT TO VACUUM. B1 - 13% B2 - 3% B3 - 7% B4 + 11%	• PROBLEM REPEATABLE, WAS OBSERVED AT HAC, EXTERNAL TARGET REMAINED CONSTANT. CALIBRATION IS STABLE AND REPEATABLE IN VACUUM. ACCEPT AS IS.
POST VIB	• SUN CAL MIRROR ALIGNMENT OFF 2° IN AZIMUTH FROM HAC DATA. EBPR 535, D07204.	• ACCEPT AS IS. INSPECTION REVEALED THAT MIRROR WAS FIRMLY IN PLACE. NO APPARENT MOVEMENT.

SECTION 21

DATA COLLECTION SUBSYSTEM (DCS)

SECTION 21

DATA COLLECTION SUBSYSTEM (DCS)

The Data Collection System is designed to relay data from randomly distributed Data Collection Platforms (DCP) through the LANDSAT-2 spacecraft to either receiving sites, Greenbelt, Md. or Goldstone, Calif. The DCS system is designed to collect and provide at least one message from each of up to 1000 Data Collection Platforms in the continental United States every 12 hours, with a probability of 0.95, with a nominal LANDSAT S/C orbit and both ground stations operating. See Figure 21-1 for system description, Figure 21-2 for functional block diagram, and Figure 21-3 for pictorial view. See Appendix A for hardware listing.

The Data Collection System was launched in the mode shown in Table 21-1. Verification of this mode was obtained by CRT displays and strip charts from telemetry received from Madrid and playback from Alaska early in Orbit 1. About 100 DCS ground station platforms were operational at launch time.

INITIAL-TURN-ON

DCS Receiver No. 1 was turned ON at 02:02:08 in Orbit 5, and has been left ON since. The equipment operated normally. Telemetry values are shown in Table 21-2. In Orbit 6, the first complete orbit after turn-on, 348 messages were received, most of them simultaneously at Greenbelt and Goldstone.

Table 21-1. Data Collection System Launch Mode

	Mode	CMD
Receiver 1	OFF	407
Receiver 2	OFF	406

SUBSEQUENT OPERATIONS

Overall performance of the Data Collection System during the remaining orbits has been well within the system design. PIR-U-1N23-ERTS-130 in Appendix F demonstrates that effectiveness of the DCS with LANDSAT-2 is at least as high as that with LANDSAT-1. An average of over 5 messages are being received from each platform each 12 hours.

Table 21-2. DCS Telemetry Values

Func. No.	Name	* 20°C Plateau	Orbits				
			5	15	25	36	49
16001	Receiver 1 Sig Strength (DBM)**	-199	-123.34	-122.71	-123.40	-121.66	-124.35
16002	Receiver 1 Temp (DGC)	23.4	22.54	24.02	24.42	24.40	24.45
16003	Rec-1 Pwr Input Volt (VDC)	2.37	2.35	2.37	2.37	2.37	2.37
16004	Receiver 2 Sig Volt (DBM)	-119	F	F	F	F	F
16005	Receiver 2 Temp (DGC)	22.3	F	F	F	F	F
16006	Receiver 2 Input Volt (VDC)	2.35	F	F	F	F	F

*Thermal Vacuum Test Data

**This value is for a CW carrier only; it is not valid during DCS message reception.

F=Receiver 2 was OFF

Table 21-3 describes pre-launch subsystem performance.

Table 21-3. DCS Subsystem

- Component

  Receiver A S/N EAB-FT-2
  Receiver B S/N EAB-FT-3

- Pre-Launch Performance

DCS Performance	Level	Receiver No. 1	Receiver No. 2	Spec
Dynamic Range	-70 to -121 DBM input signal strength	2.0 PP	2.0 PP	2.0 $\pm$ 0.2 PP
Translation Frequency	F up -F down	400.525 MHz	400.524 MHz	400.526 $\pm$ .006 MHz
Miss Rate	-119 DBM	0.7×10^{-2}	1.3×10^{-2}	$< 5 \times 10^{-2}$ @ -117 DBM
Error Rate	-119 DBM	$< 10^{-5}$	$< 10^{-5}$	$< 10^{-3}$ @ -117 DBM

- Pre-Launch Problem Summary

  No problems throughout environmental test program.

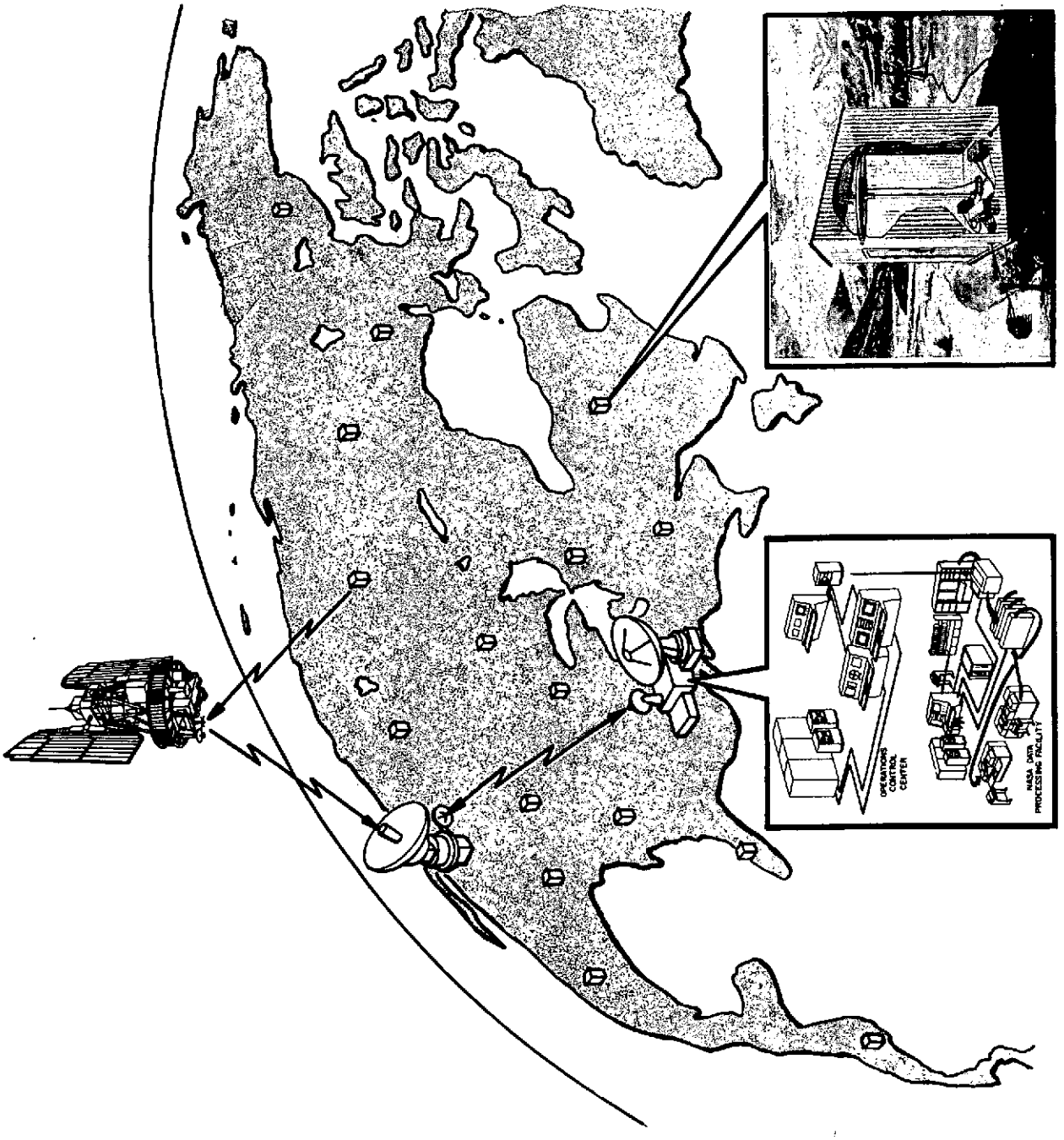


Figure 21-1. LANDSAT-2 Data Collection System

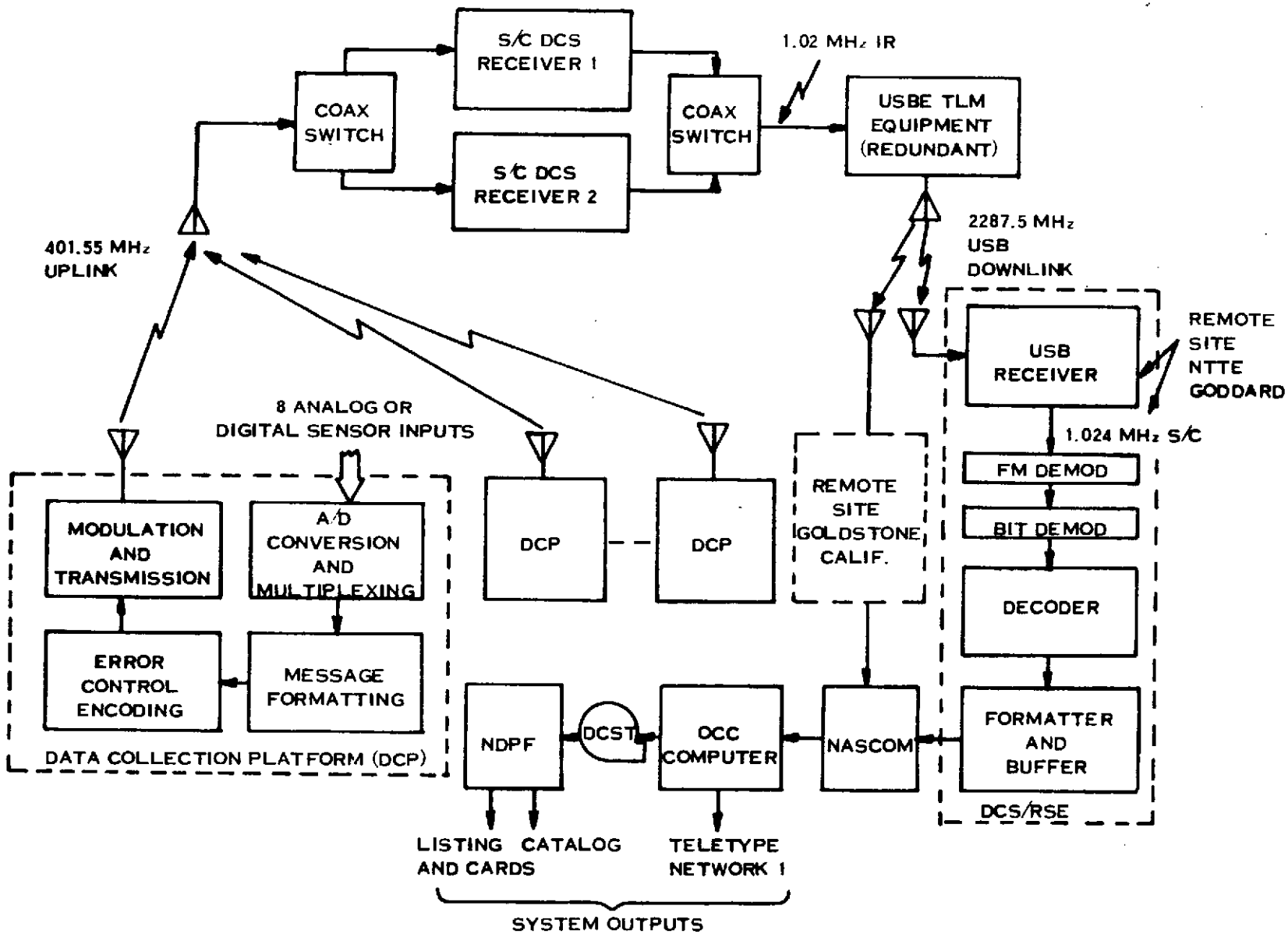


Figure 21-2. Data Collection Data Flow

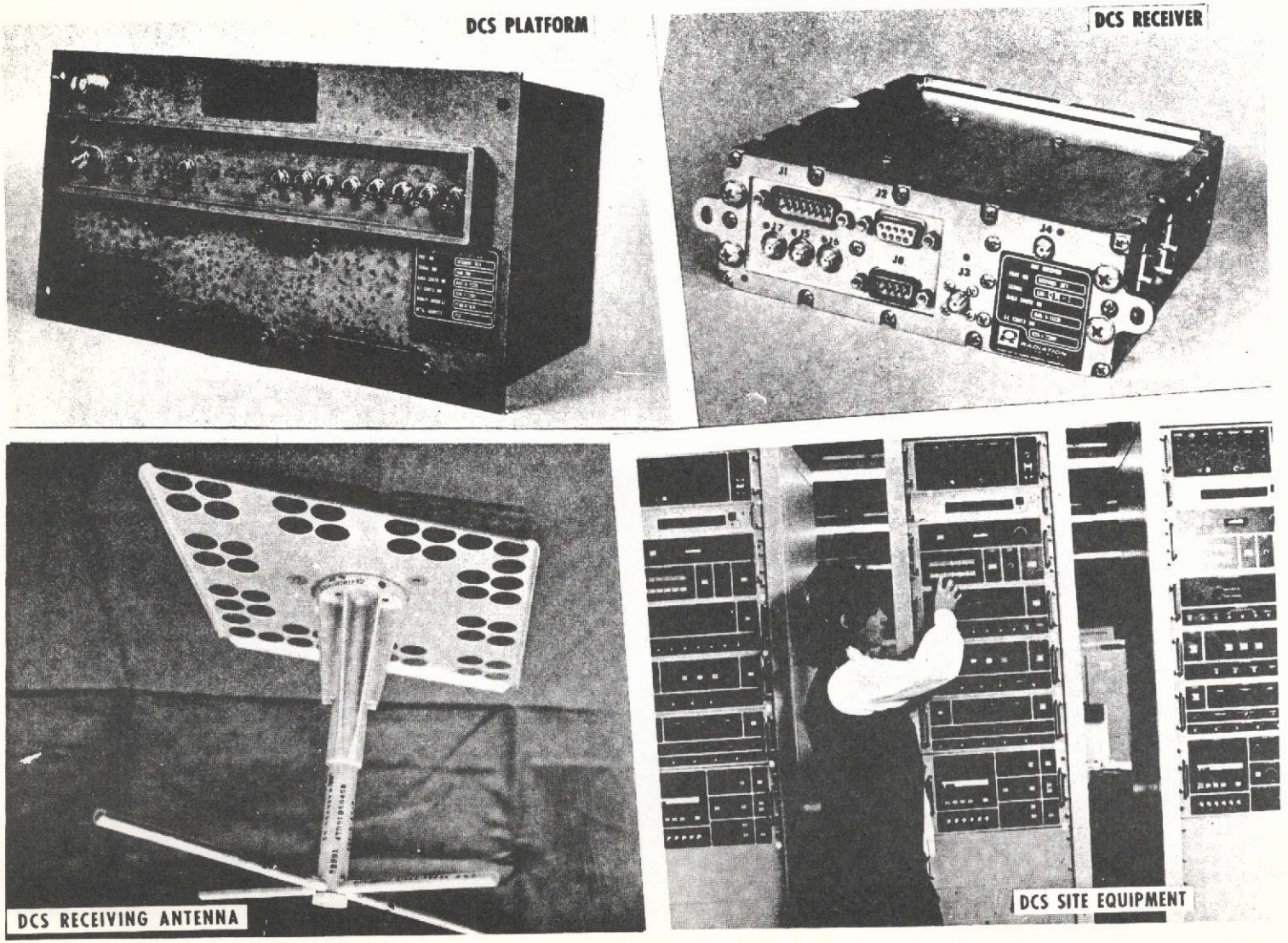
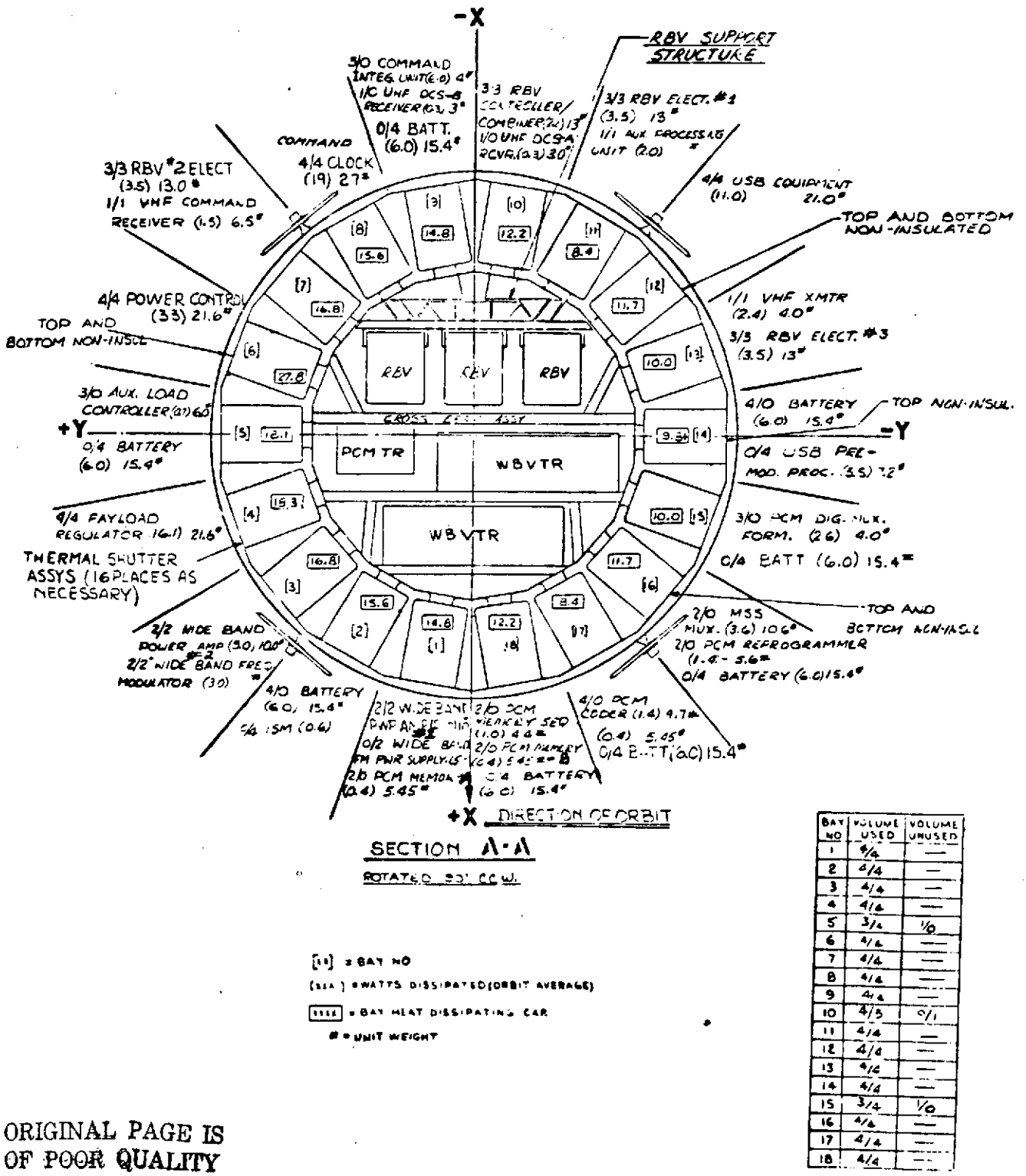


Figure 21-3. Data Collection Subsystem

APPENDIX A

LANDSAT-2 CONFIGURATION



SECTION A-A

ROTATED 90° CCW.

[ ] = BAY NO

( ) = WATTS DISSIPATED (ORBIT AVERAGE)

= BAY HEAT DISSIPATING CAP

= UNIT WEIGHT

BAY NO	VOLUME USED	VOLUME UNUSED
1	4/4	—
2	4/4	—
3	4/4	—
4	4/4	—
5	3/4	1/0
6	4/4	—
7	4/4	—
8	4/4	—
9	4/4	—
10	4/3	0/1
11	4/4	—
12	4/4	—
13	4/4	—
14	4/4	—
15	3/4	1/0
16	4/4	—
17	4/4	—
18	4/4	—

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Figure A-1. LANDSAT-2 Equipment and Payload Location

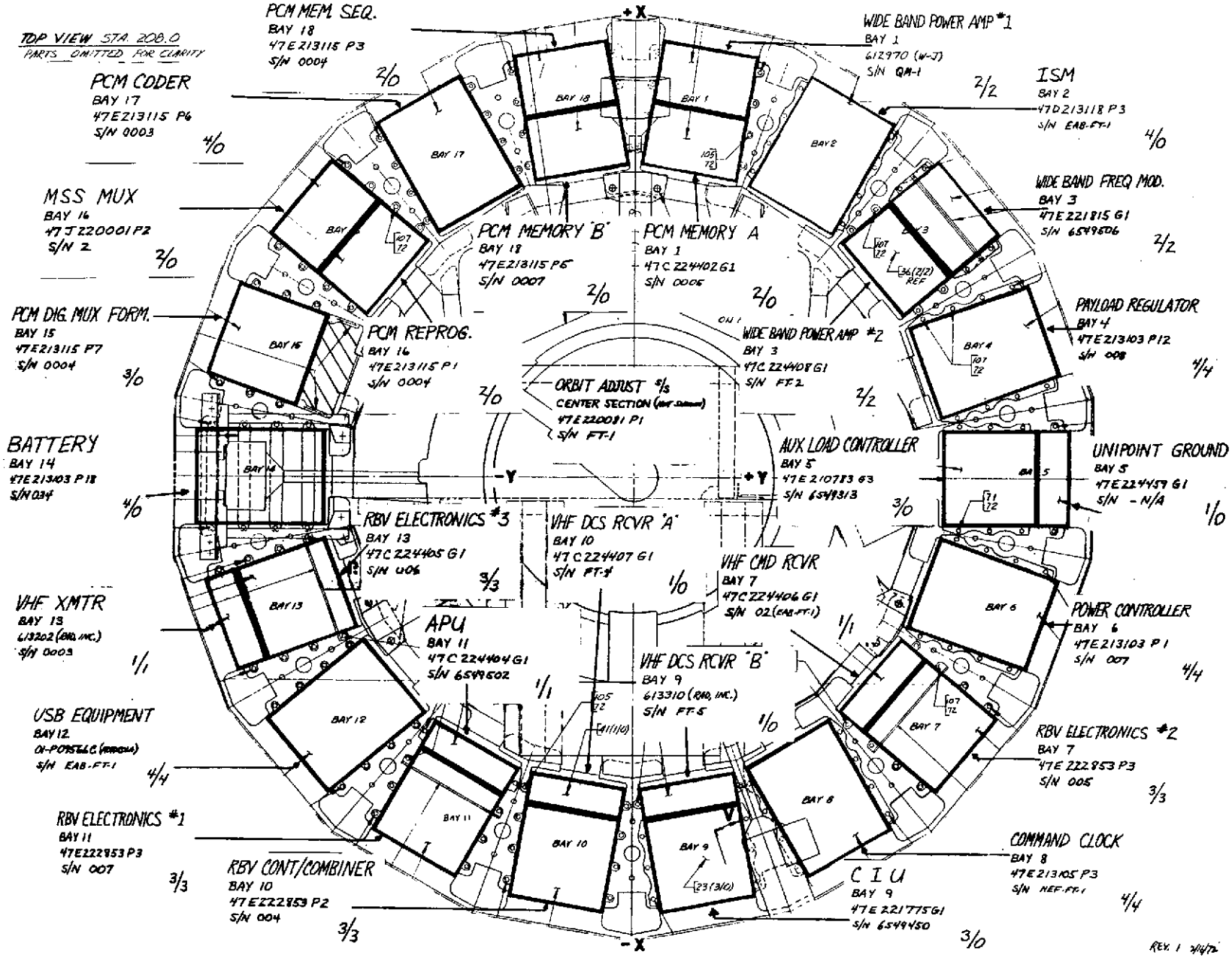

Figure A-2. LANDSAT-2 Equipment and Payload Location

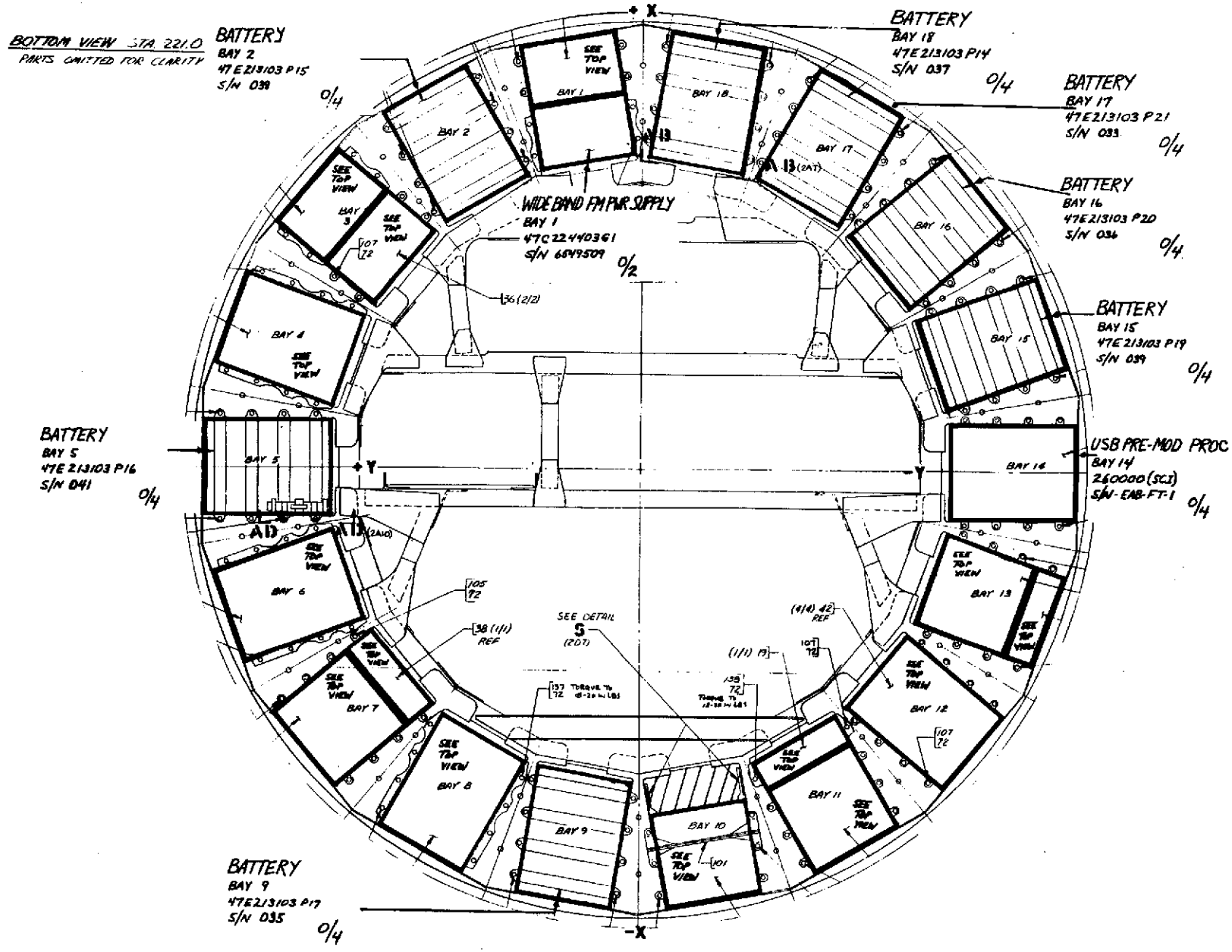

Figure A-3. LANDSAT-2 Equipment and Payload Location

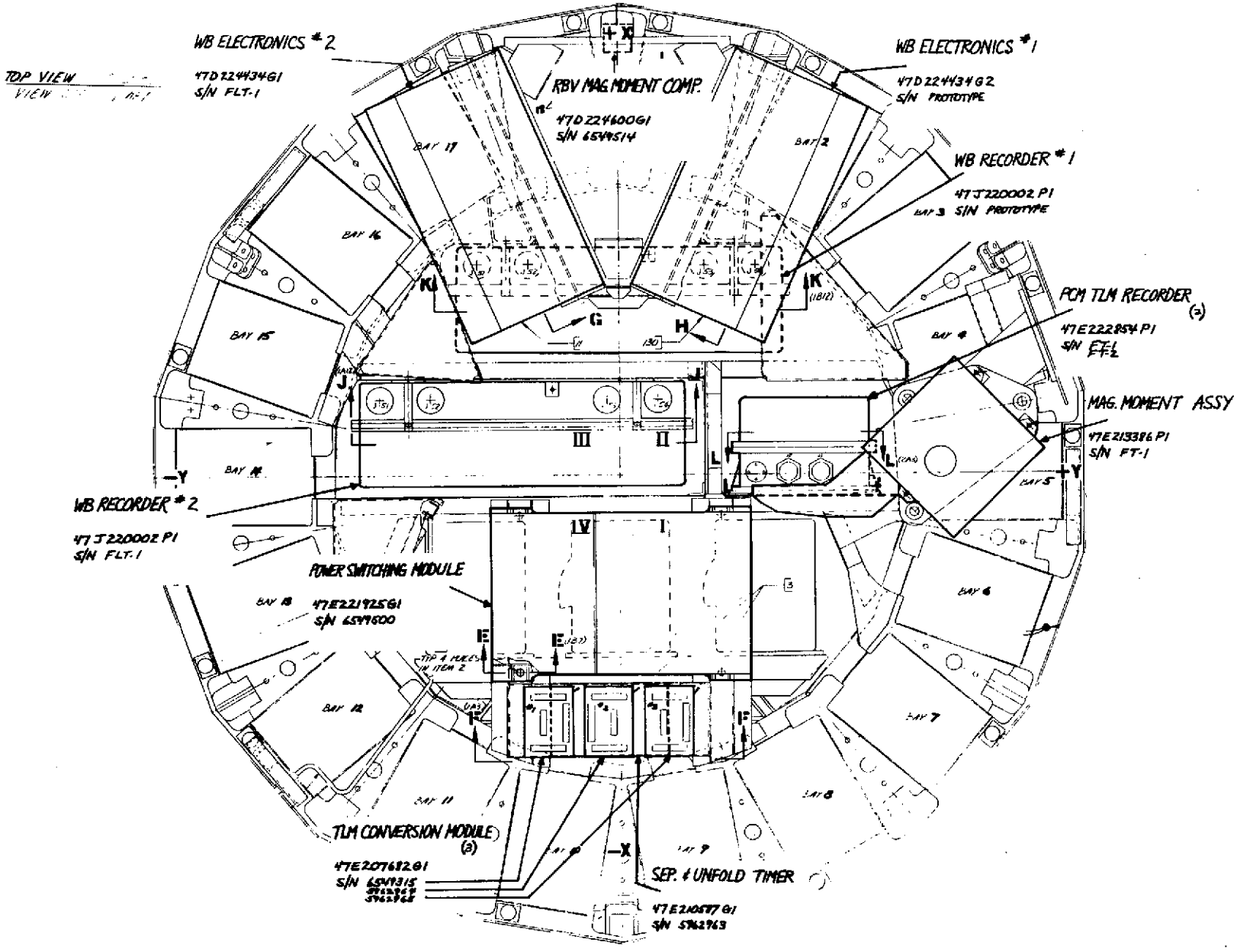

Figure A-4. LANDSAT-2 Equipment and Payload Location

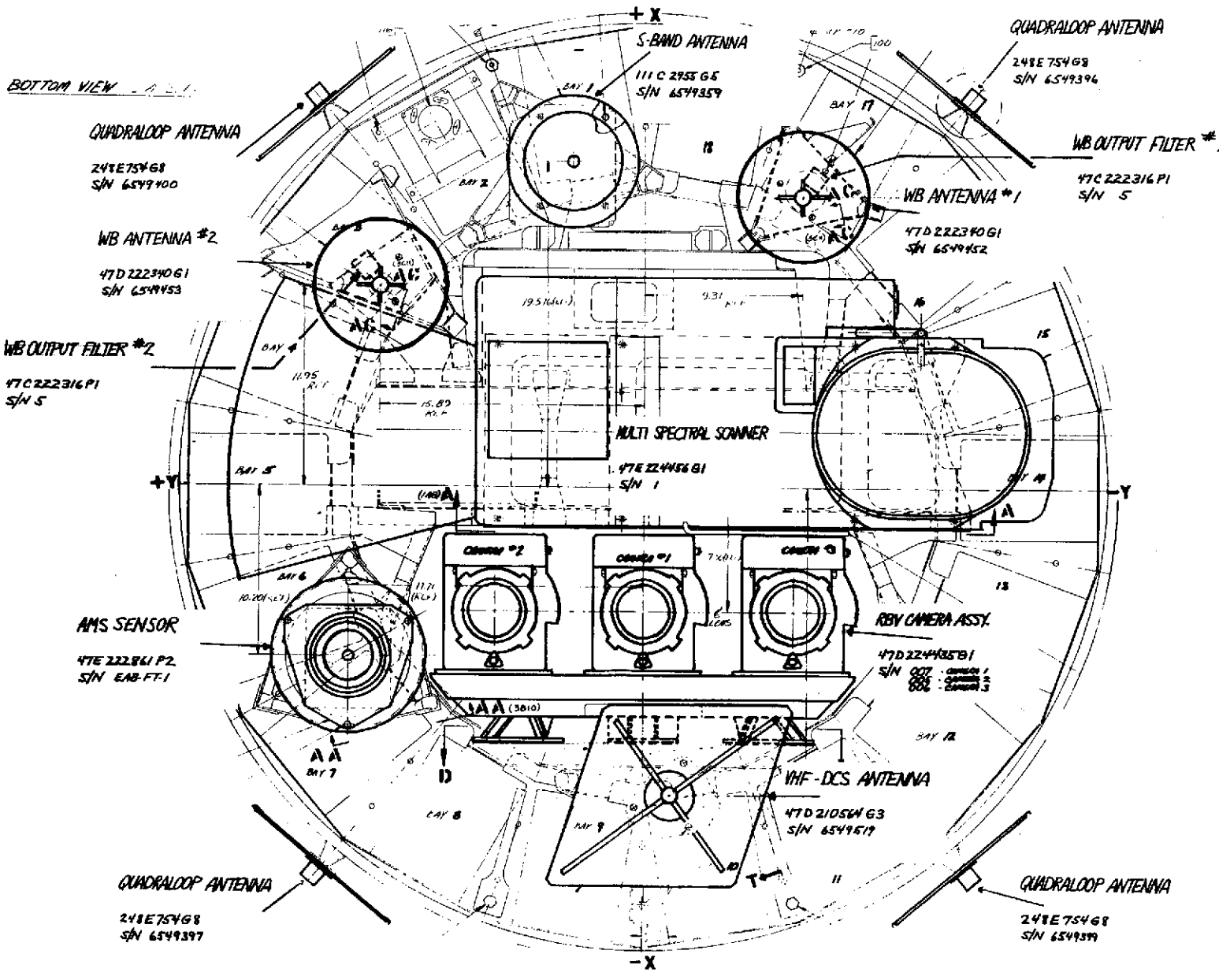

Figure A-5. LANDSAT-2 Equipment and Payload Location

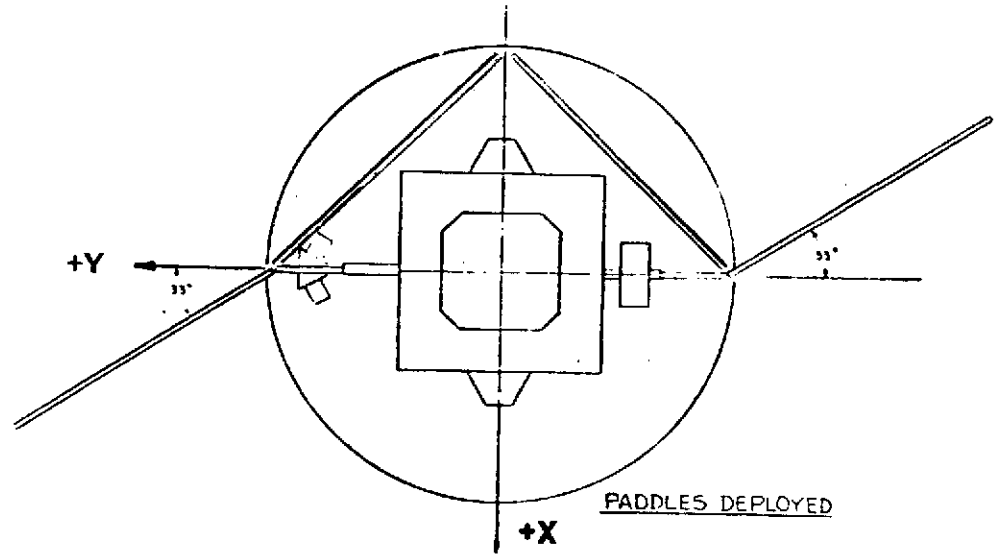

Figure A-6. LANDSAT-2 Equipment

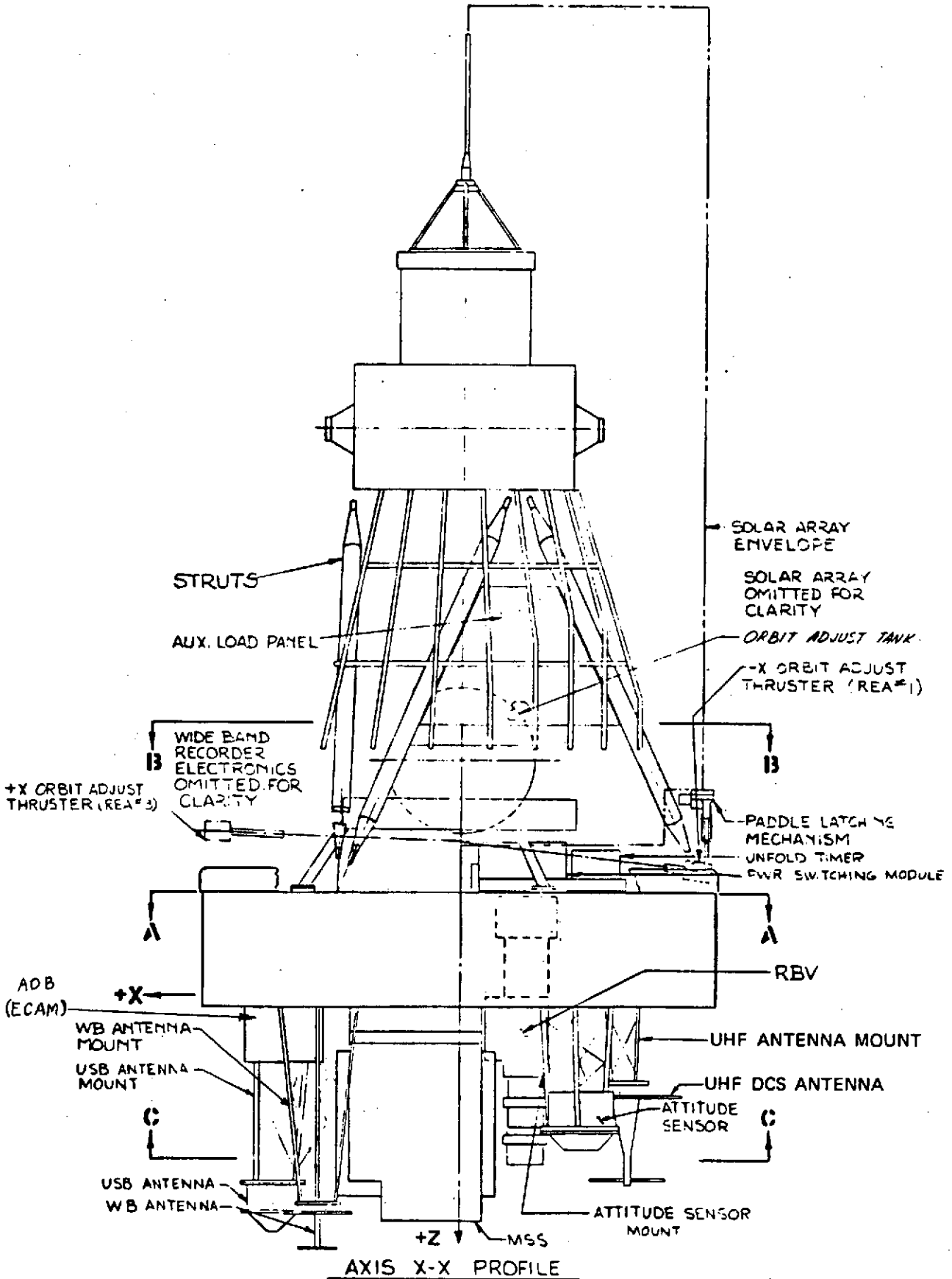

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Figure A-7. LANDSAT-2 Configuration

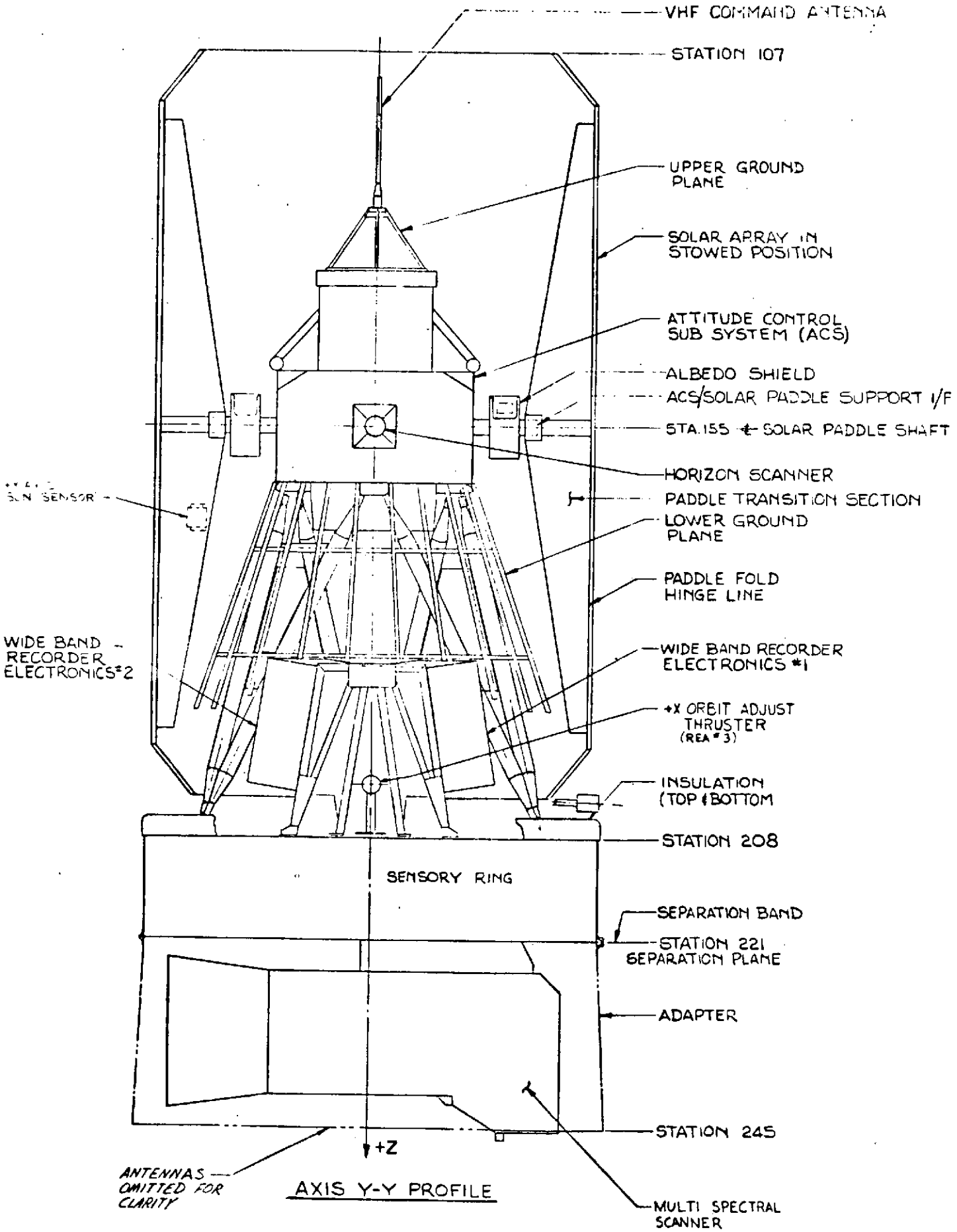

Figure A-8. LANDSAT-2 Configuration

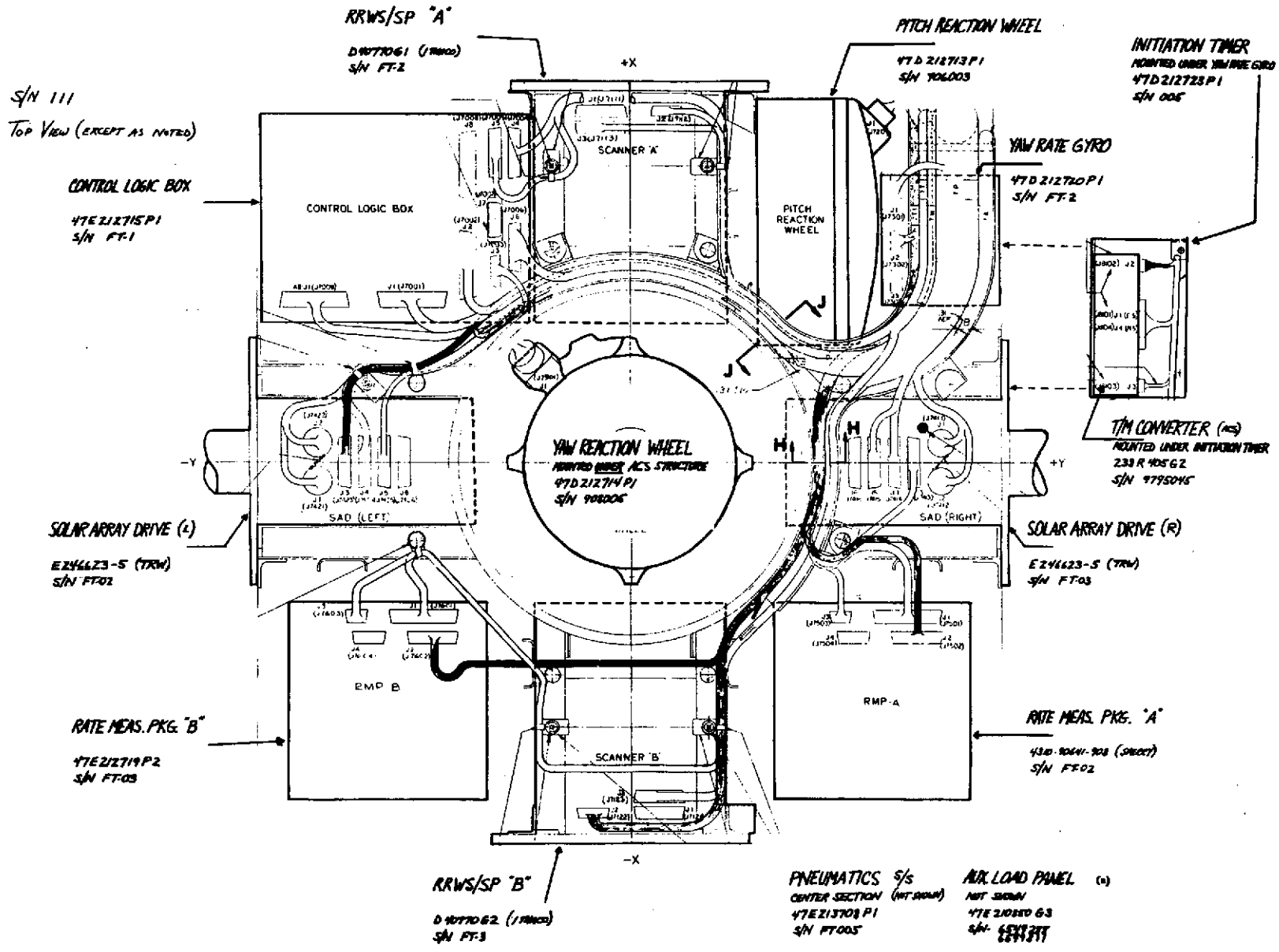

Figure A-9. LANDSAT-2 Attitude Control System

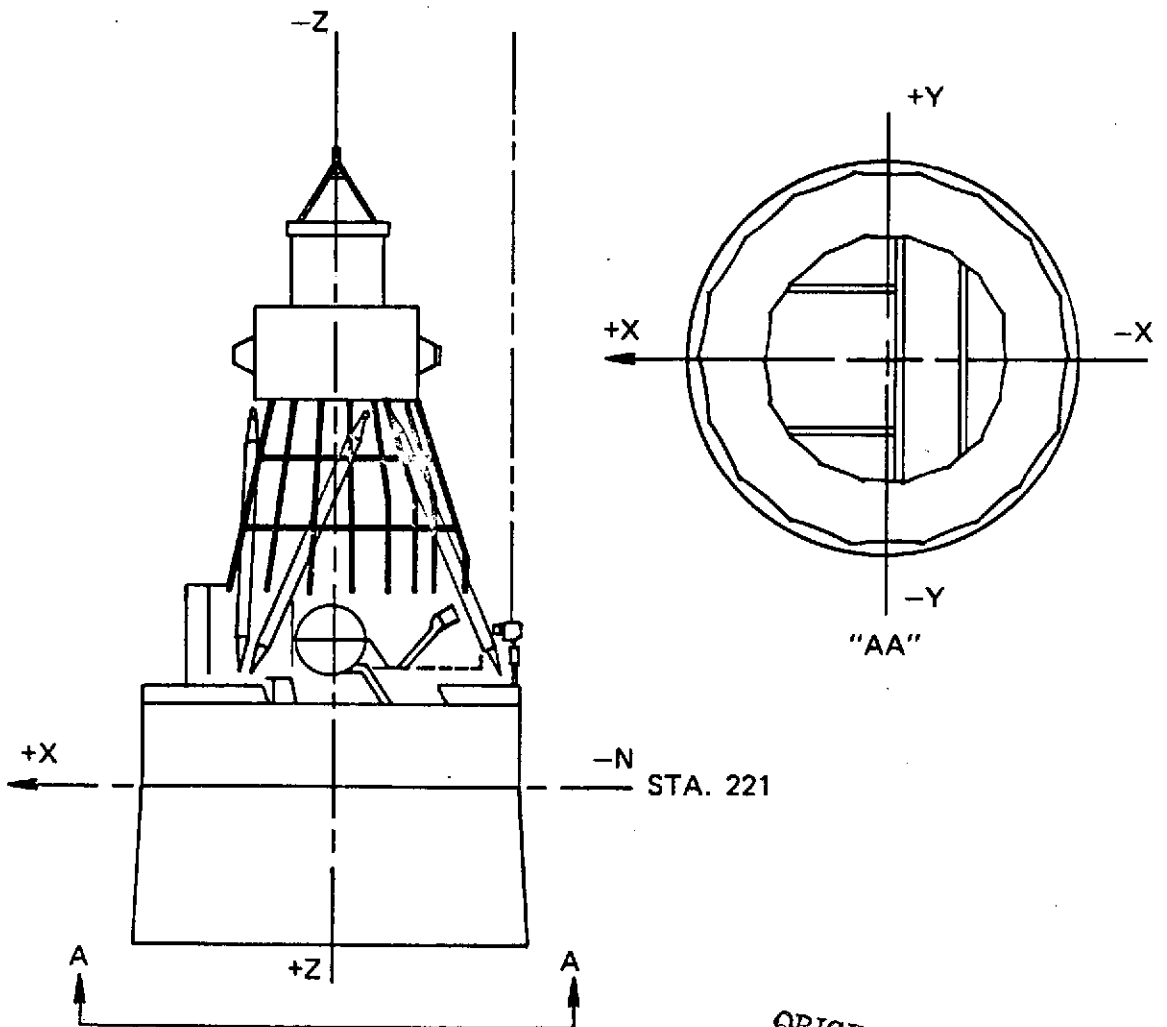

Figure A-10. LANDSAT-2 Observatory Reference Axes

CONFIGURATION MANAGEMENT — SPACE SYSTEMS

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

(LANDSAT 2)

Revision Status of Pages

SHEET #	INITIAL ISSUE	REV A	REV B	REV C	REV D	REV E	REV F	REV G
1 (INDEX)	4/12/74	11/6/74						
2	4/12/74	11/6/74						
3	4/12/74	5/20/74						
4	4/12/74							
5	4/12/74							
6	4/12/74	11/6/74						
7	4/12/74							
8	4/12/74							
9	4/12/74	11/6/74						
10	4/12/74							
11	4/12/74							
12	4/12/74							
13	4/12/74							
14	4/12/74							
15	4/12/74							
16	4/12/74							
17	4/12/74							
18	4/12/74							
19	4/12/74	5/20/74	12/16/74					
20	4/12/74	11/6/74	12/16/74					

Note 1. Those items which have been added or changed in this revision are noted with heavy black lines in the right margin.

2. Change-out log since January 1, 1973 appears on back of cover sheet.

ISSUED BY CONFIGURATION MANAGEMENT OFFICE

December 16, 1974

CONFIGURATION CHANGES SINCE JANUARY 1, 1973

NOMENCLATURE	DRAWING NO.	REMOVED		REPLACED		COMMENTS
		DATE	S.N.	DATE	S.N.	
Batteries	2265943-501	3/27/73	049-056	3/27/73	057-064	Install Flight batteries
PCM TLM Recorder #1	202635-001	3/27/73	EAB-FT3	3/27/73	EAB-QM1	Qual Unit has better test history
MSS Multiplexer	3241140-100	4/12/73	1	10/11/73	ENG.	Return to Hughes for rework
Power Control Module	1759712-502	5/10/73	010	5/25/73	010	Reworked
USBE	01-P09566C001	5/30/73	EAB-QM	5/31/73	EAB-FT1	Test Anomaly (D03770)
Batteries	2265943-501	7/24/73	059, 062	10/8/73	ENG 008, 009	Flight units in cold storage
Batteries	2265943-501	7/26/73	057, 058, 060, 061, 063, 064	3/11/74	057, 058 060, 061 063, 064	Cold storage
MSS Scanner	43727	11/9/73	ENG	12/3/73	2	Install Flight Unit
WB Frequency Mod. Modulator	47E221815G1	11/13/73	6549507	11/29/73	6549505	Install Flight Unit
WBFM Power Supply	47C223321G1	11/29/73	6549510	11/29/73	6549508	Install Flight Unit
MSS Multiplexer	3241140-110	11/13/73	ENG	12/3/73	1	Reinstall after rework
MSS Scanner	43727	12/26/73	2	4/4/74	2	Removed for special test
RBV MMCA	47D224600G1	1/2/74	6549513	3/6/74	6549513	
RBV CCC	2265336-501	1/7/74	003	1/18/74	003	
VIP Memory B	608191G10	1/29/74	008	2/12/74	008	Memory was reprogrammed
Batteries	2265943-501	3/11/74	ENG 008, 009	3/11/74	059, 062	Reinstall Flight batteries
USBE	01-P09566C001	3/13/74	EAB-FT1	3/13/74	EAB-QM	Test anomaly (D07227)
APU	47E221855G1	4/24/74	6549504	4/24/74	6549502	Test anomaly (D08157)
WBVTR Elect. #2	8370323-501	5/10/74	FLT1	5/16/74	FLT1	Removed for rework
RBV Electronics #2	1976466-501	6/16/74	002	8/19/74	004	Removed for rework
RBV CCC	2265336-501	6/16/74	003	7/25/74	002	Test anomaly (D08159)
WBVTR Electronics #2	8370323-501	6/16/74	FLT1	7/15/74	FLT6	Trouble-shoot MR D08150
WBVTR Electronics #1	8370323-501	6/16/74	FLT2	7/16/74	FLT6	Test anomaly (D08193)
RBV Camera #2	1976477-501	6/17/74	002	8/19/74	004	Removed for rework
Command Clock	20001-102-301	6/17/74	EAB-FT2	6/17/74	F003	Test anomaly (D08198)
WBVTR #2	8358497-501	6/21/74	FLT1	7/15/74	FLT6	Trouble-shoot MR D08150
WBVTR #1	8358497-501	6/21/74	FLT2	7/16/74	FLT6	Test Anomaly (D08193)
WBVTR Electronics #1	8370323-501	7/17/74	FLT6	7/23/74	FLT1	Trouble-shoot MR D08150
WBVTR #1	8358497-501	7/17/74	FLT6	7/23/74	FLT1	Trouble-shoot MR D08150
Command Clock	20001-102-301	7/21/74	F003	7/22/74	EAB-FT2	Returned after rework
MSS Scanner	43727	7/15/74	2	7/24/74	2	Reworked
MSS Scanner	43727	7/25/74	2	7/29/74	2	Reworked
WBVTR #1	8358497-501	7/26/74	FLT1	7/26/74	FLT2	Trouble-shoot MR D08150
WBVTR Electronics #1	8370323-501	7/26/74	FLT1	7/26/74	FLT2	Trouble-shoot MR D08150
RBV CCC	2265336-501	8/16/74	002	8/19/74	003	Returned after rework.
ECAM	GF1308902	8/16/74	101	8/20/74	101	Reworked
WBVTR Electronics #1	8370323-501	11/8/74	FLT2	11/11/74	FLT 2	Reworked

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

INDEX

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
COMMAND INTEGRATION UNIT	GE-SS	47E221775G1	AN -5	6549449
Chassis Ass'y A1	GE-SS	47D221813G1	AN -3	PQ516
Cordwood Module A3	GE-SS	47D221797G1	AN -4	PQ245
Cordwood Module A5	GE-SS	47D221798G1	AN -5	PQ216
Cordwood Module A6	GE-SS	47D221796G1	AN -4	PR401
Cordwood Module A7	GE-SS	47D221799G1	AN -4	PP880
Cordwood Module A8	GE-SS	47E221800G1	AN -3	PP883
Stick Module A9	GE-SS	47E221801G1	None	PP694
Stick Module A12	GE-SS	47E221804G1	AN -1	PP686
Stick Module A13	GE-SS	47E221805G1	None	PP692
Stick Module A14	GE-SS	47E221806G1	AN -2	PP691
Stick Module A15	GE-SS	47E221807G1	AN -1	PP688
Cordwood Module A16	GE-SS	47E221852G1	AN -2	PP817
Stick Module A17	GE-SS	47E221853G1	AN -3	PP835
Cordwood Module A18	GE-SS	47E221851G1	AN -5	PP383
Chassis Ass'y A2	GE-SS	47D221813G2	AN -3	PQ477
Cordwood Module A3	GE-SS	47D221797G1	AN -4	PQ246
Cordwood Module A5	GE-SS	47D221798G1	AN -5	PQ217
Cordwood Module A6	GE-SS	47D221796G1	AN -4	PQ635
Cordwood Module A7	GE-SS	47D221799G1	AN -4	PP881
Cordwood Module A8	GE-SS	47E221800G1	AN -3	PP882
Stick Module A9	GE-SS	47E221801G1	None	PQ415
Stick Module A12	GE-SS	47E221804G1	AN -1	PQ315
Stick Module A13	GE-SS	47E221808G1	None	PP689
Stick Module A14	GE-SS	47E221806G1	AN -2	PP690
Stick Module A15	GE-SS	47E221807G1	AN -1	PP687
Cordwood Module A16	GE-SS	47E221852G1	AN -2	PP815
Stick Module A17	GE-SS	47E221853G1	AN -3	PP836
Cordwood Module A18	GE-SS	47D221851G1	AN -5	PQ386
Chassis Ass'y A3	GE-SS	47D221811G1	AN -4	PQ431
P.C. Bd. Ass'y A1	GE-SS	47D221918G1	AN -6	PQ349
Rect. & Filter Module A2	GE-SS	47D221793G1	None	PP415
P.C. Bd. Ass'y A3	GE-SS	47D221919G1	AN -5	PQ350
Rect. & Filter Module A4	GE-SS	47D221793G1	None	PP238
SEP. & UNFOLD TIMER	GE-SS	47E210587G1	AN -2	6549349
Comp. Assy. A1	GE-SS	47E210585G1	AN -1	PO501
AUX LOAD PANEL #1	GE-SS	47E210850G3	AN -11	6549346
AUX LOAD PANEL #2	GE-SS	47E210850G3	AN -11	6549345
TELEMETRY CONVERSION MODULE #1	GE-SS	47E207682G1	AN -15	6549337
TELEMETRY CONVERSION MODULE #2	GE-SS	47E207682G1	AN -15	6549338
TELEMETRY CONVERSION MODULE #3	GE-SS	47E207682G1	AN -15	6549334
UNFOLD SWITCH		133B1943P2	AN-4	4-32116

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE		SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
AUX. PROCESSING UNIT		GE-SS	47E221855-G1	AN-14	6549502
Housing Assy. 1		GE-SS	47E221899-G1	AN-6	N/A
IC Chassis Assy. 2		GE-SS	47E221884-G1	AN-4	PP906
Module A1		GE-SS	47E221861-G1	AN-3	PP216
Module A2		GE-SS	47E221862-G1	AN-1	PP281
Module A3		GE-SS	47E221861-G1	AN-3	PP210
Module A4		GE-SS	47E221862-G1	AN-1	PP412
Module A5		GE-SS	47E221867-G1	AN-3	PP172
Module A6		GE-SS	47E221868-G1	AN-6	PP196
Module A7		GE-SS	47E221868-G1	AN-6	PP179
Module A8		GE-SS	47E221865-G1	AN-2	PP253
Module A9		GE-SS	47E221866-G1	AN-2	PP171
Module A10		GE-SS	47E221863-G1	AN-1	PP170
Module A11		GE-SS	47E221864-G1	AN-3	PP203
Module A12		GE-SS	47E221869-G1	AN-2	PP173
Module A13		GE-SS	47E221870-G1	AN-1	PP174
Module A14		GE-SS	47E221871-G1	AN-2	PP209
Module A15		GE-SS	47E221872-G1	AN-1	PP244
Module A16		GE-SS	47E221873-G1	AN-2	PP227
Module A17		GE-SS	47E221874-G1	AN-1	PP178
Module A18		GE-SS	47D221875-G1	AN-1	PP418
Module A19		GE-SS	47D221881-G1	AN-6	PP198
Module A20		GE-SS	47D221875-G1	AN-1	PP417
Module A21		GE-SS	47D221881-G1	AN-6	PP195
Module A22		GE-SS	47D221882-G1	AN-2	PP150
Module A23		GE-SS	47D221880-G1	AN-3	PP199
Module A24		GE-SS	47D221875-G1	AN-1	PP416
Module A25		GE-SS	47D221881-G1	AN-6	PP197
Module A26		GE-SS	47D221876-G1	AN-3	PP204
PC Bd. Assy. A27		GE-SS	47D221894-G1	AN-6	PP533
PC Bd. Assy. A28		GE-SS	47D221897-G1	AN-1	PP901
Module A29		GE-SS	47D221906-G1	AN-4	Unknown
WB FREQ. MOD. ASS'Y.		GE-SS	47E221815G1	AN-9	6549505
PW Board Ass'y A1		GE-SS	47E221832G1	AN-7	PQ286
PW Board Ass'y A2		GE-SS	47E221832G1	AN-7	PQ444
PW Board Ass'y A3		GE-SS	47D221830G1	AN-3	PQ192
PW Board Ass'y A4		GE-SS	47D221834G1	AN-4	PQ037
PW Board Ass'y A5		GE-SS	47E221826G1	AN-6	PQ015
PW Board Ass'y A6		GE-SS	47E221828G1	AN-5	PQ038
PW Board Ass'y A7		GE-SS	47E221830G1	AN-3	PQ284
PW Board Ass'y A8		GE-SS	47D221836G1	AN-8	PQ334
PW Board Ass'y A9		GE-SS	47D221836G1	AN-8	PQ597
Ref. Osc. X4 Mult.	A11	GE-SS	47E223316G1	AN-2	PQ039
Volt Reg/VCO	A15	GE-SS	47E223311G1	AN-7	PQ026
Volt Reg/VCO	A16	GE-SS	47E223311G1	AN-7	PQ025
Volt Reg/VCO	A17	GE-SS	47E223311G2	AN-7	PQ028
Volt Reg/VCO	A18	GE-SS	47E223311G2	AN-7	PQ027
Diode Module	A19	GE-SS	47E223380G1	AN-1	PQ001
Stripline		GE-RESD	47D178444G1	Rev F	MY583-A1
Dis. If. Lim.	A12	GE-RESD	47C148186P1	Rev B	MY585-A1

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
TEMPERATURE CONTROLLER -BAY 1	GE-SS	47E213640G5	AN-7	6549466
Bellows	Flexonics	47C213633P1	AN-2	FX566-A92
TEMPERATURE CONTROLLER -BAY 2	GE-SS	47E213640G5	AN-7	6549460
Bellows	Flexonics	47C213633P1	AN-2	FX566-A93
TEMPERATURE CONTROLLER -BAY 3	GE-SS	47E213640G5	AN-7	6549379
Bellows	Flexonics	47C213633P1	AN-2	FX566-A20
TEMPERATURE CONTROLLER -BAY 4	GE-SS	47E213640G5	AN-7	6549378
Bellows	Flexonics	47C213633P1	AN-2	FX566-A35
TEMPERATURE CONTROLLER -BAY 5	GE-SS	47E213640G5	AN-7	6549465
Bellows	Flexonics	47C213633P1	AN-2	FX566-A57
TEMPERATURE CONTROLLER -BAY 7	GE-SS	47E213640G5	AN-7	6549459
Bellows	Flexonics	47C213633P1	AN-2	FX566-A62
TEMPERATURE CONTROLLER -BAY 8	GE-SS	47E213640G5	AN-7	6549456
Bellows	Flexonics	47C213633P1	AN-2	FX566-A78
TEMPERATURE CONTROLLER -BAY 9	GE-SS	47E213640G5	AN-7	6549464
Bellows	Flexonics	47C213633P1	AN-2	FX566-A64
TEMPERATURE CONTROLLER-BAY 10	GE-SS	47E213640G5	AN-7	6549474
Bellows	Flexonics	47C213633P1	AN-2	FX566-A76
TEMPERATURE CONTROLLER-BAY 11	GE-SS	47E213640G5	AN-7	6549455
Bellows	Flexonics	47C213633P1	AN-2	FX566-A79
TEMPERATURE CONTROLLER-BAY 12	GE-SS	47E213640G5	AN-7	6549386
Bellows	Flexonics	47C213633P1	AN-2	FX566-A41
TEMPERATURE CONTROLLER-BAY 13	GE-SS	47E213640G5	AN-7	6549380
Bellows	Flexonics	47C213633P1	AN-2	FX566-A8
TEMPERATURE CONTROLLER-BAY 14	GE-SS	47E213640G5	AN-7	6549458
Bellows	Flexonics	47C213633P1	AN-2	FX566-A73
TEMPERATURE CONTROLLER-BAY 15	GE-SS	47E213640G5	AN-7	6549457
Bellows	Flexonics	47C213633P1	AN-2	FX566-A58
TEMPERATURE CONTROLLER-BAY 16	GE-SS	47E213640G5	AN-7	6549461
Bellows	Flexonics	47C213633P1	AN-2	FX566-A77
TEMPERATURE CONTROLLER-BAY 17	GE-SS	47E213640G5	AN-7	6549462
Bellows	Flexonics	47C213633P1	AN-2	FX566-A49
TEMPERATURE CONTROLLER-BAY 18	GE-SS	47E213640G5	AN-7	6549463
Bellows	Flexonics	47C213633P1	AN-2	FX566-A70

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE		SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
WBFM POWER SUPPLY		GE-SS	47E223321G1	AN-11	6549508
Post Reg. Ass'y		GE-SS	47D223325G1	AN-5	PP913
XSTR Brkt. Ass'y		GE-SS	47B223342G2	AN-8	PQ193
Pwr Trans. Ass'y		GE-SS	47D223356G1	AN-1	PQ720
Pwr Trans. Ass'y		GE-SS	47D223356G1	AN-1	PQ721
Conv. Ass'y	A1	GE-SS	47D223305G1	AN-5	PP870
Conv. Ass'y	A3	GE-SS	47D223305G2	AN-5	PP871
Cap Module	A5	GE-SS	47E223309G1	None	PP532
Diode Module	A6	GE-SS	47D223310G1	AN-1	PP530
Rect. Ass'y	A7	GE-SS	47C223324G1	AN-2	PP897
Rect. Ass'y	A8	GE-SS	47C223324G1	AN-2	PP898
Diode Ass'y	A9	GE-SS	47C223349G1	None	PP877
POWER SWITCHING MODULE		GE-SS	47E221925G2	AN-11	6549501
Relay Ass'y	A1	GE-SS	47D221956G1	AN-1	PQ593
Relay Ass'y	A2	GE-SS	47D221956G1	AN-1	PQ589
Relay Ass'y	A3	GE-SS	47D221956G1	AN-1	PQ592
Relay Ass'y	A4	GE-SS	47D221956G1	AN-1	PQ591
Relay Ass'y	A5	GE-SS	47D221956G1	AN-1	PQ590
Telem. Resistor Ass'y	A6	GE-SS	47D221954G1	AN-3	PQ587
Diode Ass'y	A7	GE-SS	47D221955G1	AN-2	PQ588
Fuse Ass'y	A8	GE-SS	47D221953G1	AN-2	PQ585
Fuse Ass'y	A9	GE-SS	47D221953G2	AN-2	PQ586
Relay Bd Ass'y	A10	GE-SS	47D221886G1	AN-3	PQ434
Relay Panel, Top	A11	GE-SS	47D221969G2	AN-4	PS148
Relay Panel, Bot.	A12	GE-SS	47D221970G2	AN-5	PS273
COMMAND RECEIVER		RCA	2271145-502	R	EAB-FT2
A4 Receiver Assembly		RCA	2270108-501	F	003
A1 IF Amp. Board		RCA	2271156-501	D	001
A2 IF Amp. Board		RCA	2271156-501	D	002
A3 Osc. & RF Amp. Board		RCA	2270106-501	C	001
A4 Osc. & RF Amp. Board		RCA	2270106-501	C	002
Demodulator Comp.		RCA	2271154-501	K	06
Demodulator Comp.		RCA	2271154-501	K	07
Regulator & Telemetry		RCA	2271153-501	F	03
Antenna Coupler		RCA	2262728-501	B	06
Diode Board Assembly		RCA	1974688-501	A	03
Comp. Board Assembly		RCA	2262746-501	E	05
RBV MMCA		GE-SS	47D224600G1	AN-2	6549513
Coil Housing		GE-SS	47D224605G1	None	DJ098
Panel Assembly		GE-SS	47C224608G1	AN-3	PR010
Coil Assembly		GE-SS	47D224602G1	AN-2	PQ900

CONSOLIDATED CONFIGURED ARTICLES LIST

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NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
DCS RECEIVER "A"	Radiation	613310G1	C1	EAB-FT2
Preselector Assembly	Radiation	529220G1	A	0003
Second IF	Radiation	124226G1	C1	0002
Limiter	Radiation	124227G1	A	0002
Relay	Radiation	124228G1	A	0008
First IF	Radiation	124229G1	C1	0003
R.F. Amplifier	Radiation	124230G1	B1	0006
Power Supply	Radiation	124231G1	A	0002
Osc. & X6 VHF Receiver	Radiation	124232G1	A	0002
First Doubler	Radiation	124233G1	A	0003
Second Doubler	Radiation	124234G1	A	0002
Buffer Amplifier	Radiation	124609G1	A	0002
DCS RECEIVER "B"	Radiation	613310G1	C1	EAB-FT3
Preselector Assembly	Radiation	529220G1	A	0006
Second IF	Radiation	124226G1	C1	0003
Limiter	Radiation	124227G1	A	0003
Relay	Radiation	124228G1	A	0006
First IF	Radiation	124229G1	C1	0002
R.F. Amplifier	Radiation	124230G1	B1	0008
Power Supply	Radiation	124231G1	A	0003
Osc. & X6 VHF Receiver	Radiation	124232G1	A	0003
First Doubler	Radiation	124233G1	A	0001
Second Doubler	Radiation	124234G1	A	0001
Buffer Amplifier	Radiation	124609G1	A	0003
PREMOD. PROCESSOR	SCI	2600000-1	A	EAB-FT2
Electronics Assy.	SCI	2600060-1	A	003
PCB Assy., Pwr. Filter	SCI	2600037-1	A	002
PCB Assy., Pwr. Supply	SCI	2600049-1	A	002
PCB Assy., Pwr. Supply	SCI	2600049-1	A	007
PCB Assy., Sec. Sw.	SCI	2600068-1	B	005
PCB Assy., Tape Rec. Sw.	SCI	2600043-1	B	003
PCB Assy., 597KHZ Mod.	SCI	2600031-1	A	003
PCB Assy., 768KHZ Mod.	SCI	2600034-1	B	001
PCB Assy., CSSN	SCI	2600046-1	A	004
PCB Assy., Discriminator	SCI	2600040-1	A	006
PCB Assy., Discriminator	SCI	2600040-1	A	002
AUX LOAD CONTROLLER	GE-SS	47E210783G4	AN-10	6549352
Relay Panel A1	GE-SS	47E210781G1	AN-11	PP134
Relay Panel A2	GE-SS	47E210787G1	AN-14	P0573
ADAPTER	GE-SS	47J213521G1	AN-2	010
PREFLIGHT DISCONNECT	KINETICS	47E211225P2	None	0012
SEPARATION SWITCHES (ADAPTER)	MINN.-H	133B1902P2	AN-5	212, 215
SEPARATION SWITCHES (SPACECRAFT)	MINN.-H	133B1902P2	AN-5	209, 211

CONSOLIDATED CONFIGURED ARTICLES LIST

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NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
Unified S-Band Equipment	Motorola	01-P09566C001	E	EAB - QM
Frequency Multiplier 1A7		01-P09568C001	C	A102
Frequency Multiplier 1A17		01-P09568C001	C	A101
Wide Band Detector 1A4		01-P09570C001	D	A102
Limiter Amplifier AR001		01-P09627C001	None	A111
Limiter Amplifier AR002		01-P09627C001	None	A115
Limiter Amplifier AR003		01-P09627C001	None	A102
Limiter Amplifier AR006		01-P09627C001	None	A104
Divider 19-9.5MC A002		01-P09632C001	A	A102
Buffer Amplif. 9.5MC AR005		01-P09635C001	None	A102
Signal Driver A001		01-P09644C001	B	A102
Ref Driver A003		01-P09646C001	B	A102
Subcarrier Amp. AR007		01-P09648C001	None	A102
Ranging Ampl. AR004		01-P09650C001	A	A102
Wide Band Detector 1A14		01-P09570C001	D	A101
Limiter Amp. AR001		01-P09627C001	None	A101
Limiter Amp. AR002		01-P09627C001	None	A106
Limiter Amp. AR003		01-P09627C001	None	A109
Limiter Amp. AR006		01-P09627C001	None	A110
Divider 19-9.5MC A002		01-P09632C001	A	A101
Buffer Amp. 9.5MC AR005		01-P09635C001	None	A101
Signal Driver A001		01-P09644C001	B	A101
Ref. Driver A003		01-P09646C001	B	A101
Subcarrier Amp. AR007		01-P09648C001	None	A101
Ranging Amp. AR004		01-P09650C001	A	A101
Auxiliary Osc. PM 1A9		01-P09553C001	H	A101
Switching Network A001		01-P09557C001	None	A101
Auxiliary Osc. PM 1A19		01-P09553C001	H	A102
Switching Network A001		01-P09557C001	None	A103
Voltage Control Osc. 1A8		01-P09548C001	F	A101
Voltage Control Osc 1A18		01-P09548C001	F	A102
Narrow Band Detector 1A2		01-P09544C001	E	A102
Narrow Band Detector 1A12		01-P09544C001	E	A101
IF Amplifier Mixer 1A1		01-P09540C001	D	A102
IF Amplifier Mixer 1A11		01-P09540C001	D	A101
RF Converter 1A3		01-P09572C001	E	A101
RF Converter 1A13		01-P09572C001	E	A104
Pow. Amp/X30 Mult PM 1A10		01-P09585C001	H	A101
Helical Resonator A002		01-P09658C001	None	A101
Filter-Power Amp. A001		01-P09711C001	None	A101
Freq. Mult X3		01-P09714C001	A	A101
S Band Power Amp.		01-P09589C001	F	A101
Pow. Amp/X30 Mult PM 1A20		01-P09585C001	H	A102
Helical Resonator A002		01-P09658C001	None	A102
Filter-Power Amp. A001		01-P09711C001	None	A102
Freq. Mult X3		01-P09714C001	A	A102
S Band Power Amp		01-P09589C001	F	A104
Diplexer 1A21		01-P09602C001	D	A102
Power Converter XMTR 1A5		01-P09577C001	G	A101
Regulator A001		01-P09689C001	C	A104

CONSOLIDATED CONFIGURED ARTICLES LIST

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NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
Unified S-Band Equip. (Cont.)	Motorola			EAB-QM (continued)
Power Converter XMTR 1A15		01-P09577C001	G	A102
Regulator A001		01-P09689C001	C	A102
Power Converter RCVR 1A6		01-P09740C001	G	A102
Regulator A001		01-P09689C001	C	A103
Power Converter RCVR 1A16		01-P09740C001	G	A101
Regulator A001		01-P09689C001	C	A101
Connector/EMI Box 1A22		01-P09604C001	G	A101
Cable Assembly W1		30-P02306D001	D	A101
Cable Assembly W2		30-P02306D002	D	A101
Cable Assembly W3		30-P02306D003	D	A101
Cable Assembly W4		30-P02306D004	D	A101
Cable Assembly W5		30-P02306D005	D	A101
Cable Assembly W6		30-P02306D006	D	A101
Cable Assembly W7		30-P02306D007	D	A101
Cable Assembly W8		30-P02306D008	D	A101
Cable Assembly W9		30-P02306D009	D	A101
Cable Assembly W10		30-P02306D010	D	A101
Cable Assembly W11		30-P02306D011	D	A101
Cable Assembly W12		30-P02306D012	D	A101
Cable Assembly W13		30-P02306D013	D	A101
Cable Assembly W14		30-P02306D014	D	A101
Cable Assembly W15		30-P02306D015	D	A101
Cable Assembly W16		30-P02306D016	D	A102
Cable Assembly W17		30-P02306D017	D	A102
Cable Assembly W18		30-P02306D018	D	A101
Cable Assembly W19		30-P02306D019	D	A101
Cable Assembly W20		30-P02306D020	D	A101
Cable Assembly W21		30-P02306D021	D	A101
Cable Assembly W22		30-P02306D022	D	A101
Cable Assembly W23		30-P02306D023	D	A101
Cable Assembly W24		30-P02306D024	D	A101
Cable Assembly W25		30-P02319D001	B	A101
Cable Assembly W26		30-P02307D001	B	A101
Cable Assembly W27		30-P02307D002	B	A101
Cable Assembly W28		30-P02318D001	C	A101
Cable Assembly W29		30-P02317D001	B	A101
Cable Assembly W30		30-P02320D001	C	A102
Cable Assembly W31		30-P02321D001	B	A101
Cable Assembly W32		30-P02306D025	D	A101
Cable Assembly W33		30-P02306D026	D	A101
Wide Band Filter #1	Peninsula	Model F1522B	None	4
Wide Band Filter #2	Peninsula	Model F1522B	None	8

CONSOLIDATED CONFIGURED ARTICLES LIST

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NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
POWER SUBSYSTEM	RCA			
CONTROL MODULE	RCA	1759712-502	AG	010
A-1 Fuse Board Assy.	RCA	1759561-501	G	017
A-2 Fuse Board Assy.	RCA	1759561-502	G	019
A-3 C.F. Regulator Board	RCA	1759567-501	B	020
A-4 C.F. Regulator Board	RCA	1759567-501	B	017
A-5 Regulated Buss	RCA	1759570-501	E	015
A-6 Aux. Reg. & Trickle	RCA	1759569-501	C	015
A-7 Shunt Dis. Dr. Telem.	RCA	1759577-501	F	015
A-8 Current, Sens. & Telem.	RCA	1759582-501	D	015
A-9 Harness Assy.	RCA	1849873-501	E	017
A-10 Sw. Bd. Assy.	RCA	1966502-501	C	015
A-11 Diode & Fil. Bd. Assy.	RCA	1966505-501	C	015
A-12 Filter Board Assy.	RCA	1965840-501	None	015
A-13 Cap. Assy.	RCA	1768958-501	B	018
A-14 Cap. Assy.	RCA	1768757-501	B	015
A-15 Heat Sink Assy.	RCA	1849560-501	D	015
A-16 Bracket Heat Sink Assy.	RCA	1768982-501	C	015
A-17 Filter Assy.	RCA	2263400-501	G	015
Inductor Assy.	RCA	1768483-501	D	015
Inductor Assy.	RCA	1768941-501	C	015
PAYLOAD REGULATOR MODULE	RCA	1759712-503	AG	011
A-1 Fuse Board Assy.	RCA	1759561-501	G	002
A-2 Fuse Board Assy.	RCA	1759561-502	G	019
A-3 C.F. Regulator Board	RCA	1759567-501	B	018
A-4 C.F. Regulator Board	RCA	1759567-501	B	016
A-5 Regulated Buss	RCA	1759570-501	E	016
A-6 Aux. Reg. & Trickle	RCA	1759569-501	C	016
A-7 Shunt Dis. Dr. Telem.	RCA	1759577-501	F	016
A-8 Current, Sens. & Telem.	RCA	1759582-501	C	016
A-9 Harness Assy.	RCA	1849873-501	E	018
A-10 Sw. Bd. Assy.	RCA	1966502-501	C	016
A-11 Diode & Fil. Bd. Assy.	RCA	1966505-501	C	016
A-12 Filter Board Assy.	RCA	1965840-500	None	016
A-13 Cap. Assy.	RCA	1768958-501	B	019
A-14 Cap. Assy.	RCA	1768757-501	B	016
A-15 Heat Sink Assy.	RCA	1849560-501	D	016
A-16 Bracket Heat Sink Assy.	RCA	1768982-501	C	016
A-17 Filter Assy.	RCA	2263400-501	E	016
Inductor Assy.	RCA	1768483-501	D	016
Inductor Assy.	RCA	1768941-501	C	016
SOLAR PLATFORM & ARRAY	RCA	2271152-501	B	102
Platform Motor Drive	RCA	2271118-501	F	101
Motor Mount Subassembly	RCA	2271109-501	G	101
Drive Motor Assy.	RCA	1751589-501	D	113
Motor	RCA	1751588-1		101
SOLAR PLATFORM & ARRAY	RCA	2271152-502	B	102
Platform Motor Drive	RCA	2263808-501	M	104
Motor Mount Subassembly	RCA	1976768-501	K	104
Drive Motor Assy.	RCA	1751589-501	D	112
Motor	RCA	1751588-1		033

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NOMENCLATURE	SUPPLIER	DWG & PART NO	REV	SERIAL NO.
BATTERY MODULE ASSY	RCA	2265943-501	K	57
Electronic Bd.	RCA	1759578-502	J	59
Electronic Bd.	RCA	1849843-502	G	59
Relay & Harness, Bkt. Assy.	RCA	1849822-502	E	65
Heat Sink, Wiring Assy.	RCA	1849598-502	G	57
BATTERY MODULE ASSY	RCA	2265943-501	K	58
Electronic Bd.	RCA	1759578-502	J	62
Electronic Bd.	RCA	1849843-502	G	62
Relay & Harness, Bkt. Assy.	RCA	1849822-502	E	58
Heat Sink, Wiring Assy.	RCA	1849598-502	G	58
BATTERY MODULE ASSY	RCA	2265943-501	K	59
Electronic Bd.	RCA	1759578-502	J	61
Electronic Bd.	RCA	1849843-502	G	61
Relay & Harness, Bkt. Assy.	RCA	1849822-502	E	59
Heat Sink, Wiring Assy.	RCA	1849598-502	G	59
BATTERY MODULE ASSY	RCA	2265943-501	K	60
Electronic Bd.	RCA	1759578-502	J	60
Electronic Bd.	RCA	1849843-502	G	60
Relay & Harness, Bkt. Assy.	RCA	1849822-502	G	55
Heat Sing, Wiring Assy.	RCA	1849598-502	G	60
BATTERY MODULE ASSY	RCA	2265943-501	K	61
Electronic Bd.	RCA	1759578-502	J	63
Electronic Bd.	RCA	1849843-502	G	63
Relay & Harness, Bkt. Assy.	RCA	1849822-502	E	61
Heat Sink, Wiring Assy.	RCA	1849598-502	G	61
BATTERY MODULE ASSY	RCA	2265943-501	K	62
Electronic Bd.	RCA	1759578-502	J	65
Electronic Bd.	RCA	1849843-502	G	65
Relay & Harness, Bkt. Assy.	RCA	1849822-502	E	62
Heat Sink, Wiring Assy.	RCA	1849598-502	G	62
BATTERY MODULE ASSY	RCA	2265943-501	K	63
Electronic Bd.	RCA	1759578-502	J	66
Electronic Bd.	RCA	1849843-502	G	66
Relay & Harness, Bkt. Assy.	RCA	1849822-502	E	63
Heat Sink, Wiring Assy.	RCA	1849598-502	G	63
BATTERY MODULE ASSY	RCA	2265943-501	K	64
Electronic Bd.	RCA	1759578-502	J	64
Electronic Bd.	RCA	1849843-502	G	64
Relay & Harness, Bkt. Assy.	RCA	1849822-502	E	64
Heat Sink, Wiring Assy.	RCA	1849598-502	G	64

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
VERSATILE INFORMATION PROCESSOR	RADIATION	607640G10	B3	FLT-001
Reprogrammer		608141G5	D1	005
Elec. Assy.		608140G3	B	0005
Serial Regulator		520110G2	C	0005
Command Relays		520111G4	D	0005
Command Relays		520112G2	C	0005
Output Buffer Amplifier		520113G2	C1	0005
Heat Sink		411483G2	C	0005
Digital Multiplexer		608091G6	D2	005
Elec. Assy.		608090G6	G1	0005
Dig. Gates Assy. A1		520060G2	A	0017
Dig. Gates Assy. A2		520060G2	A	0018
Dig. Gates Assy. A3		520060G2	A	0020
Dig. Gates Assy. A4		520060G2	A	0019
Dig. Sequencer Assy. A5		520062G2	A	0006
Decoder Matrix A6		520063G2	B	0005
DC/DC Converter P.S. A7		520081G1	A	0004
Out. Reg. & T.C. Buffer A8		520086G1	A	0008
Out. Reg. & T.C. Buffer A9		520086G1	A	0007
Dig. Add. & Ser. Data A10		520087G1	C	0008
Dig. Add. & Ser. Data A11		520087G1	C	0007
Dig. Ctr.& CMD. A12		520089G2	B2	0006
Dig. Ctr. & CMD A13		520089G2	B2	0005
Formatter, DC/DC Conv. A14		520085G1	A	0004
Dig. Interface Buff. A15		520084G1	B	0008
Dig. Interface Buff. A16		520084G1	B	0007
Memory Sequencer		608241G3	E2	005
Elec. Assy.		608240G3	C1	0005
Cont & Out Reg Assy A1		520232G1	D	0008
Funct Gen & Repr Assy A2		520233G1	D1	0008
Instr Ctr & Comp Assy A3		520234G2	D1	0008
Cont & Output Reg Assy A4		520232G1	D	0007
Funct Gen & Repr Assy A5		520233G1	D1	0007
Instr Ctr & Comp Assy A6		520234G2	D1	0007
DC/DC Converter Assy A7		520235G1	D	0004
Memory A		608191G9	D2	008
Elec. Assy.		608190G9	F1	0008
Section I Assy. A1		520170G3	G1	0001
Mem. Amp. Assy, Sec I		520161G4	E1	0018
Memory Array Assy, Sec II		519218G3	C	0001
Memory Array, Sec. I		520168G3	C	0014
Mem. Amp. Assy. Sec. I		520161G4	D	0016
Decode Assy Sec. I & III A2		520184G1	D	0006
Bit Driver, Sec II A3		520185G3	G2	0006
B.D. & Data Reg. Sec III A4		520186G2	D	0006
Decoder, Sec. II A5		520183G1	C	0006
Assy. Sec. II & III A6		520171G3	D2	0001

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
V.I.P. (continued)				
Memory A (continued)				(008)
Mem. Array Assy, Sec II		519218G4	C	0004
Mem. Array Sec II		520168G4	C	0017
Mem. Amp Assy II & III		520182G2	D1	0006
Mem. Array Assy, Core		519220G2	E1	0001
Mem. Array Assy, Core		520169G2	B	0008
DC/DC Converter A7		520187G1	C1	0007
Memory B		608191G10	D2	009
Elec. Assy.		608190G10	F1	0009
Section I Assy. A1		520170G3	G1	0002
Mem. Amp. Assy, Sec I		520161G4	E1	0015
Memory Array Assy, Sec II		519218G3	D1	0003
Memory Array Sec. I		520168G3	C	0016
Mem. Amp. Assy. Sec. I		520161G4	E1	0017
Decode Assy Sec I & II A2		520184G1	E1	0007
Bit Driver, Sec II A3		520185G3	G2	0007
B.D. & Data Reg Sec II A4		520186G2	D	0007
Decoder, Sec. II A5		520183G1	C	0007
Assy. Sec. II & III A6		520171G3	D2	0002
Mem. Array Assy, Sec II		519218G4	D1	0005
Mem. Array, Sec II		520168G4	C	0018
Mem. Amp. Assy, II & III		520182G2	D1	0007
Mem. Array Assy, Core		519220G2	E1	0002
Mem. Array Assy, Core		520169G2	B	0009
DC/DC Converter A7		520187G1	C1	0008
Analog Multiplexer		608041G5	D1	005
Elec. Assy.		608040G3	E1	0005
Coder, Analog Assy A1		520033G1	E2	0007
DC/DC Conv. Card Assy. A2		520034G1	B2	0008
DC/DC Conv. Card Assy. A3		520034G1	B2	0007
Coder Analog Assy. A4		520033G1	E2	0008
Analog Matrix Assy. A5		520031G1	A	0008
DC/DC Conv. &pwr. Assy A6		520032G1	C1	0004
Analog Matrix Assy. A7		520031G1	A	0007
Analog Gates Assy. A8		520030G1	B	0055
Analog Gates Assy A9		520030G1	B	0030
Analog Gates Assy. A10		520030G1	B	0032
Analog Gates Assy. A11		520030G1	B	0036
Analog Gates Assy. A12		520030G1	B	0035
Analog Gates Assy. A13		520030G1	B	0034
Analog Gates Assy. A14		520030G1	B	0031
Analog Gates Assy. A15		520030G1	B	0029
Analog Gates Assy. A16		520030G1	B	0028

CONSOLIDATED CONFIGURED ARTICLES LIST

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NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
MMCA	Ithaco	D40634G4	C	NEF-EAB-FT3
A1 Card		D40614G1	A	11650
A1 Card		D40615G1	A	11653
Orbit Adjust Subsystem	Rkt.Rsrch.	26058-9	D	FT3
Thruster Assembly		25111-49	L	319
Thruster Assembly		25111-49	L	325
Thruster Assembly		25111-59	L	304A
Trans. Box & Connector		24949-5	F	103
Attitude Measurement Sensor	Quantic	51877-01	D	FT2
IR Telescope Assembly		51788-01	G	003
Housing Assembly		51903-01	E	003
Objective Lens Assembly		51791-01	C	003
Filter Assembly		51797-01	A	003
Heat Sink Assembly		51807-01	C	003
Chopper Board Assembly		51878-01	E	005
Signal Board - Lower		51849-01	B	004
Signal Board - Upper		51853-01	B	004
Signal Board Assembly		51909-01	C	004
Connector Assembly		51907-01	C	004
DC-DC Converter Bd. Assembly		51873-01	E	004
Regulator Board Assembly		51883-01	G	004
Output Board Assembly		51890-01	C	004
WIDEBAND POWER AMP. #1	Watkins-Johnson	612970	E	FT4
Traveling Wave Tube	"	612965	B	11
LV Pwr Supply Assy.	"	612982	B	405
Card Ass'y No. 1, LV	"	612984	B	405
Card Ass'y No. 2, LV	"	612986	B	405
HV Pwr Supply Ass'y	"	612980	B	405
Card Ass'y No. 1, HV	"	612997	B	305
Card Ass'y No. 2, HV	"	612999	B	305
Card Ass'y Turn-On Con.	"	612944	B	405
Cable Ass'y, RF	"	612977	B	39
Cable Ass'y, RF	"	612978	B	26
Cable Ass'y, RF	"	612979	B	22
Thermistor	"	612957	None	10

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
WIDEBAND POWER AMPLIFIER #2	Watkins-Johnson	612970	E	FT3
Traveling Wave Tube	"	612965	B	8
LV Pwr Supply Ass'y	"	612982	B	404
Card Ass'y No. 1, LV	"	612984	B	404
Card Ass'y No. 2, LV	"	612986	B	404
HV Pwr Supply Ass'y	"	612980	D	404
Card Ass'y No. 1, HV	"	612997	B	404
Card Ass'y No. 2, HV	"	612999	B	404
Card Ass'y Turn-On Con.	"	612944	B	404
Cable Ass'y, RF	"	612977	B	38
Cable Ass'y, RF	"	612978	B	27
Cable Ass'y, RF	"	612979	B	23
Thermistor	"	612957	None	006
PCM TLM RECORDER #1	Leach	202835-001	B	EAB-QM1
Preamp, Digital	Leach	202911-001	B	911001
Repr & Erase Con, Rec Logic	Leach	202915-001	B	915002
Amplifier, Record/Repr.	Leach	202920-001	B	920001
Motor Drive & Telemetry	Leach	202925-001	B	925001
Transport Group Subass'y	Leach	202930-001	A	930001
Lt. Source & Sensor Ass'y	Leach	202932-001	None	932001
Electronic Switch, Mtr Invt.	Leach	202965-001	None	965001
Electronic Switch, Mtr Invt.	Leach	202965-001	None	965002
Power Supply	Leach	202966-001	None	966001
Vtg Reg & Current Telemetry	Leach	202973-001	A	973001
Filter, EOT Backup	Leach	11-16195	A	195001
Magnetic Tape	Leach	1/4 - 551	None	508
PCM TLM RECORDER #2	Leach	202835-001	B	EAB-FT4
Preamp, Dig Repr & Erase	Leach	202911-001	B	911005
Control, Recorder Logic	Leach	202915-001	B	915001
Amplifier, Record/Repr.	Leach	202920-001	B	920005
Motor Drive & Telemetry	Leach	202925-001	B	925005
Transport Group Subass'y	Leach	202930-001	B	930005
Lt. Source & Sensor Ass'y	Leach	202932-001	None	932005
Electronic Switch, Mtr Invt.	Leach	202965-001	None	965009
Electronic Switch, Mtr Invt.	Leach	202965-001	None	965010
Power Supply	Leach	202966-001	None	966005
Vtg Reg & Current Telemetry	Leach	202973-001	A	973005
Filter, EOT Backup	Leach	11-16195	A	195005
Magnetic Tape	Leach	1/4 - 551	None	510

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
COMMAND CLOCK SUBASSEMBLY	Calcomp	20001-102-301	None	EAB-FT2
Motor Drive Ass'y	Calcomp	10812-502-000	3	F013
Frequency Amplifier Ass'y 1	Calcomp	10814-502-111	7	F013
Time Code Ass'y	Calcomp	10816-502-000	3	F015
Frequency Amplifier Ass'y 2	Calcomp	10818-502-201	None	F013
Comstor Memory Ass'y	Calcomp	10820-502-000	4	F013
Comstor Logic Ass'y	Calcomp	10822-502-000	1	F013
Comdec Ass'y	Calcomp	20438-502-000	1	F013
Telemetry Ass'y	Calcomp	10826-502-000	4	F013
Matrix Ass'y	Calcomp	10828-502-000	5	F013
Power Supply #1	Calcomp	10830-502-201	None	F014
Power Supply #2	Calcomp	10832-502-101	6	F013
Oscillator (A)	Calcomp	10003-502		F016
Oscillator (B)	Calcomp	10003-502		F015
INTERFACE SWITCHING MODULE	Calcomp	20002-102	1	EAB-FT2
Relay Network No. 2B	Calcomp	10326-502-100	3	F3011
Relay Network No. 1	Calcomp	10323-502-000	3	F3011
Relay Network No. 1	Calcomp	10323-502-000	3	F3012
Relay Network No. 2B	Calcomp	10326-502-100	3	F3012
Resistor Network	Calcomp	20431-502-000	1	F3004
Relay Network No. 1	Calcomp	10323-502-000	3	F3013
Relay Network No. 2B	Calcomp	10326-502-100	3	F3014
Resistor Network	Calcomp	20431-502-000	1	F3006
Relay Network No. 4B	Calcomp	10475-502-000	2	F3006
Relay Network No. 2B	Calcomp	10326-502-100	3	F3015
Relay Network No. 1	Calcomp	10323-502-000	3	F3015
Relay Network No. 1	Calcomp	10323-502-000	3	F3014
Cable No. 1 - Jumper	Calcomp	10111-401-000	4	F3007
Cable No. 1 - Jumper	Calcomp	10111-401-000	4	F3008
Cable No. 1 - Jumper	Calcomp	10111-401-000	4	F3009
Cable No. 2 - Jumper	Calcomp	10110-401-000	2	F3012
Cable No. 2 - Jumper	Calcomp	10110-401-000	2	F3006
Cable No. 2 - Jumper	Calcomp	10110-401-000	2	F3007
Cable No. 2 - Jumper	Calcomp	10110-401-000	2	F3005
Cable No. 4 - Jumper	Calcomp	10146-401-000	3	F3002
Cable No. 6 - Jumper	Calcomp	10269-401-000	5	F3006
Cable No. 6 - Jumper	Calcomp	10269-401-000	5	F3005
Cable No. 9 - Jumper	Calcomp	20205-401-000	None	F3006
Cable No. 9 - Jumper	Calcomp	20205-401-000	None	F3005

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NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
Attitude Control System	GE-SS	47E213514G2	AN-10	114
Telemetry Conversion Module	GE-SS	238R405G2		6549356
Structure/Thermal Subsystem	FHC	831-11-1000-1	A	FT4
Louver, Ht. Shld, & Supt.	FHC	831-11-0300-11	D	6
Louver Support Assembly	FHC	831-11-0301-21	G	6
Heat Shield Assembly	FHC	831-11-0306-31	K	6
Louver Assembly	FHC	831-11-0120-31	B	6
Temperature Sensing Inst.	FHC	831-11-0142-21	G	6
Albedo Shield, Left	FHC	831-11-0210-61	C	6
Albedo Shield, Right	FHC	831-11-0210-62	C	6
Temperature Sensing Inst.	FHC	831-11-0142-31	G	6
Pitch Reaction Wheel	Bendix	X1903155-2	D	EAB-FT-02R
Wheel, Hub, & Rotor Ass'y.	Bendix	X1875403-1	A	202
Shaft & Stator Assembly	Bendix	X1875402-1	B	203
Shaft, Final Machining	Bendix	X1875404-1	B	203
Motor Rotor	Bendix	X1877013-1	A	208
Motor Stator	Bendix	X1877036-1	C	7107003
Yaw Reaction Wheel	Bendix	X1898720-2	D	EAB-FT-02R
Flywheel & Rotor Assembly	Bendix	X1898721-1	C	202
Housing & Closure Mach.Asy.	Bendix	X1891422-1	C	201
Motor Stator	Bendix	X1877036-1	C	7107002
Bearing Sleeve	Bendix	X1898717-1	A	202
Shouldered Shaft	Bendix	X1898730-1	B	202
Labyrinth Seal	Bendix	X1898728-1	None	204
Locking Ring	Bendix	X1898729-1	B	202
Control Logic Box	Ithaco	D40778G2	C	FT-10
A1 Card	Ithaco	D40721G1	D	11619
A2 Card	Ithaco	D40752G1	C	11621
A3 Card	Ithaco	D40753G1	C	11622
A4 Card	Ithaco	D40754G1	C	15036
A5 Card	Ithaco	D40755G1	D	11626
A6 Card	Ithaco	D40253G2	D	11615
A7 Card	Ithaco	D40253G2	D	11616
A8 Card	Ithaco	D40728G1	D	11628
A9 Card	Ithaco	D40179G2	F	11524
RRWS/Signal Processor Asy. #1	Ithaco	D40770G3	D	FT-14
Signal Processor	Ithaco	D40769G3	B	11629
A1 Card	Ithaco	C30302G2	I	11676
A2 Card	Ithaco	C31066G1	C	11659
A3 Card	Ithaco	C31167G1	B	11669
Roll Reaction Wheel Scanner	Bendix	X1871380-2		

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
Attitude Control System (cont)				
RRWS/Signal Processor Asy.#2	Ithaco	D40770G4	D	FT-15
Signal Processor	Ithaco	D40769G4	B	11640
A1 Card	Ithaco	C30302G2	I	11677
A2 Card	Ithaco	C31066G1	C	11660
A3 Card	Ithaco	C31167G1	B	11670
Roll Reaction Wheel Scanner	Bendix	X1871380-2		
Pneumatics Subsystem	TRW	113580	E1	008
Solenoid Valves				
+ Pitch		PT2-3030-1	G	17
- Pitch		PT2-3030-1	G	18
+ Roll		PT2-3030	G	33
- Roll		PT2-3030	G	24
+ Yaw		PT2-3030	G	34
- Yaw		PT2-3030	G	32
Supt.Nozzle Tube Assemblies				
+ Yaw		116599-5	C	074
- Yaw		116599-6	C	076
+ Yaw		113586-5	C	069
- Yaw		113586-6	C	072
Nozzles				
+ Pitch		113591-3	B	011
- Pitch		113591-3	B	013
+ Roll		113593-3	B4	014
- Roll		113593-3	B4	025
+ Yaw		113593-3	B4	018
- Yaw		113593-3	B4	016
+ Yaw		113593-3	B4	020
- Yaw		113593-3	B4	023
Regulator		PT2-3032	E	05
Low Pressure Transducer		PT2-3068	C	88
High Pressure Transducer		PT2-3033-1	F	1004
Gas Temperature Transducer		PT2-3083	B	0004
Manifold Temp. Transducer		PT2-3035-2	F	0004
Pressure Vessel		C113441-2	A4	12
Fill Valve		C263256-1	E1	28485-2
Manifold		113582-3	F1	008
Mounting Platform		113581-7	E2	008
LLPS Filter		C120631-1	None	008
Junction Box		233586-5	D3	008
Initiation Timer	GE-SS	47E221985G1	AN-9	6549484

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
Attitude Control System (cont.)				
Solar Array Drive, RH	TRW	E246623-7		FT04
A1 Electronics		E235406-4	J3	FT01
A2 Electronics		E235397-4	G2	FT01
Wabble Gear		233773-3	E5	FT06
Motor		264666	A2*	13, 23
Sun Sensor		E242143-1	C2	FT23, FT24
Voltage Regulator		E250692-1	D2	FT08
Transducer		PT2-3039	C	1009
Potentiometer		PT2-3040	A	684891
Slip Ring		C232457-1	B1	9
Solar Array Drive, LH	TRW	E246623-7		FT-005F
A1 Electronics		E235406-4	J3	005
A2 Electronics		E235397-4	G2	005F
Wabble Gear		233773-3	E5	R005
Motor		264666	A2	4
Sun Sensor		E242143-1	B5	003F,004F
Voltage Regulator		E250692-1	A	005
Transducer		PT2-3039	C	1016
Potentiometer		PT2-3040	A	216583
Slip Ring		C232457-1	B1	008
Rate Measuring Package A	Sperry	4310-90641-905	G	FT08
Rate Loop Elect. Card	Sperry	4216-67676	F	13
Power Conditioning Card	Sperry	4331-91544	A	20
Heater Controller Card	Sperry	4216-67678	K	13
Telem. Sig. Cond. Card	Sperry	4216-67679	I	15
Relay Card A	Sperry	4331-91545	None	20
Relay Card B	Sperry	4216-67681	C	20
Inverter Subassembly	Sperry	4331-91579	None	16
RFI Assembly	Sperry	4310-90627	C	15
RMP Cable Harness	Sperry	4216-90956-2	F	15
Gyro, Rate Integrating	Northrop	P/N 67516	None	N8
Normalization Assembly	Sperry	4331-91578	None	18
Rate Measuring Package B	Sperry	4310-90641-903	E	NIM-D-FT03
Rate Loop Elect. Card	Sperry	4216-67676	E	6A
Power Conditioning Card	Sperry	4216-67677	F	6A
Heater Controller Card	Sperry	4216-67678	J	6A
Telem. Sig. Cond. Card	Sperry	4216-67679	G	6A
Relay Card A	Sperry	4310-90848	None	6A
Relay Card B	Sperry	4310-90841	A	6A
Inverter Subassembly	Sperry	4310-90633	F	6A
RFI Assembly	Sperry	4310-90627	A	6A
RMP Cable Harness	Sperry	4216-90956-2	D	6A
Gyro, Rate Integrating	Sperry	1200941	D	11
Normalization Assembly	Sperry	4310-90843	F	11

* E.O. A1 Not Incorporated

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ERTS SPACECRAFT 903

NOMENCLATURE	SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
Attitude Control System (cont)				
Yaw Rate Gyro	Northrop	63861-302	J	FT3
Choke, Module		63880-301	C	102
Transformer, Module		63881-301	C	102
Thermistor, Module		63866-302	E	104
Gyroscope, Rate		79142-301	E	D-975
P.C. Component Board		63876-302	H	N3
P.C. Component Board		63877-302	G	N3
P.C. Component Board		63878-302	J	N3
P.C. Component Board		63879-302	H	N3
Package Assembly		63843-302	M	NEF/EAB-FT3
Component Board		63844-302	E	N3
Paddle Damper, RH	GE-SS	248E126G4	AN-19	6549641
Paddle Damper, LH	GE-SS	248E126G4	AN-19	6549642
Wideband Antenna #1	GE-SS	47D222340G1	-4	6549589
Wideband Antenna #2	GE-SS	47D222340G1	-4	6549588
DCS Antenna	GE-SS	47D210564G3	-6	6549518
Command Antenna	GE-SS	113C7468G1	-3	6549515
S-Band Antenna	GE-SS	111C2955G5	-8	6549365
Quadraloop Antenna #1	GE-SS	248E754G8	-6	6549494
#2	GE-SS	248E754G8	-6	6549495
#3	GE-SS	248E754G8	-6	6549496
#4	GE-SS	248E754G8	-6	6549497

CONSOLIDATED CONFIGURED ARTICLES LIST

ERTS SPACECRAFT 903

NOMENCLATURE		SUPPLIER	DWG & PART NO.	REV	SERIAL NO.
VHF TRANSMITTER		RADIATION	613202G1	A1	FT0004
Electrical Assembly			613205G1	None	0003
RF Transmitter Assenbly			613203G1	B2	0003
Oscillator/Buffer	A1		529611G1	A5	0004
Phase Modulator	A2		529738G1	A2	0003
Limiter Tripler	A3		529612G1	A7	0004
Driver Amplifier	A4		418053G1	A7	0007
300 MV Amplifier	A5		529609G1	A5	0007
2 W Amplifier	A6		529610G1	A7	0005
Output Filter	A7		418054G1	A4	0008
Oscillator/Buffer	A8		529611G1	A5	0006
Phase Modulator	A9		529738G1	A2	0006
Limiter Tripler	A10		529612G1	A7	0007
Driver Amplifier	A11		418053G1	A7	0008
300 MV Amplifier	A12		529609G1	A5	0008
2 W Amplifier	A13		529610G1	A7	0009
Output Filter	A14		418054G1	A4	0007
Isolator	A15		115479-102	NA	10
Power Reg. Elec. Assembly			613209G1	A	0003
Power Regulator			529615G1	A2	0004
Filter Modulator			529732G1	A2	0003

GOVERNMENT FURNISHED EQUIPMENT

Return Beam Vidicon	RCA	2265041-501		
Camera Sensor (Blue) #2	RCA	1976477-501		004
Camera Sensor (Yellow) #1	RCA	1976477-502		003
Camera Sensor (Red) #3	RCA	1976477-503		008
Camera Cont./Combiner	RCA	2265336-501		003
Camera Electronics #1	RCA	1976466-501		003
Camera Electronics #2	RCA	1976466-501		004
Camera Electronics #3	RCA	1976466-501		008
Wide Band Video Tape Recorder	RCA	202835-001		
Transport Unit 1	RCA	8358497-501		FLT2
Transport Unit 2	RCA	8358497-501		FLT6
Electronics Unit 1	RCA	8370323-501		FLT2
Electronics Unit 2	RCA	8370323-501		FLT6
Multi Spectral Scanner System	Hughes	3241000-100		002
Multiplexer	Hughes	3241140-100		001
Scanner	(SBRC)	43727		002
MSS Line Filter	Hughes	3241160-100		004
ECAM	GSFC	GF1308902	2	P-FLT

APPENDIX B

COMMAND MATRIX

Table B-1. LANDSAT-2 Commands

CMD #	Command Function	CMD #	Command Function
000	Spare (Clock)	035	Select Red Freq. Generator
001	Pri COMSTOR On & Fill	036	Spare (Clock)
002	Spare (Clock)	037	Spare (Clock)
003	Pri COMSTOR Verify	040	Pneumatics Enable
004	Pri COMSTOR Copy	041	0.3° Yaw Position Bias Enable
005	Pri COMSTOR Off	042	Pneu Interlock Bypass Disable
006	Pri COMSTOR Activate	043	Spare
007	Serial Data Transfer On	044	Pneu Low Voltage Interlock Reset
010	CMD Execution Counter Reset	045	Differential Tach Disable
011	Select Pri Matrix Decoder	046	WBPA 2 Power On
012	Select Pri Matrix A Drivers	047	WBPA 2 Select 10W Output
013	Select Pri Matrix B Drivers	050	APU Standby Mode
014	Select Pri Oscillator	051	ECAM Load
015	Select Pri Freq. Generator	052	MSS System On
016	Spare (Clock)	053	MSS Select Inverter A
017	Load Time Code	054	MSS Select Band 1 High Voltage A
020	Non-Keyed PS/COMDECS Off	055	MSS Select Band 2 High Voltage A
021	Red COMSTOR On & Fill	056	MSS Select Band 3 High Voltage A
022	Spare (Clock)	057	MSS Band 1 On
023	Red COMSTOR Verify	060	0.3° Yaw Position Bias Disable
024	Red COMSTOR Copy	061	Pneumatics Disable
025	Red COMSTOR Off	062	Spare
026	Red COMSTOR Activate	063	Pneu Interlock Bypass Enable
027	Spare (Clock)	064	Differential Tach Enable
030	Spare (Clock)	065	ECAM Execute
031	Select Red Matrix Decoder	066	Spare
032	Select Red Matrix A Drivers	067	WBPA 2 Power Off
033	Select Red Matrix B Drivers	070	Spare
034	Select Red Oscillator	071	APU Normal Mode

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function	CMD #	Command Function
072	MSS Select Inverter B	127	USB Ranging On
073	MSS System Off	130	USB Modulation Input Crossed
074	MSS Select Band 2 High Voltage B	131	Spare
075	MSS Select Band 1 High Voltage B	132	MSS Band 2 Off
076	MSS Band 1 Off	133	Spare (MSS)
077	MSS Select Band 3 High Voltage B	134	MSS Band 4 Off
100	Differential Tach Normal Gain	135	MSS Band 3 Off
101	0.1° Yaw Position Bias Enable	136	MSS Select Calibration Lamp B
102	RLNA into Yaw Disable	137	Spare (MSS)
103	2.9° Pitch Position Bias Enable	140	Roll Unload Disable
104	Pitch Momentum Bias Disable	141	Negative Yaw Position Bias
105	ECAM Run A	142	Yaw Wheel Disable
106	WBPA 2 Select 20W Output	143	Spare
107	USB Bypass Aux Oscillator	144	Pitch Unload Disable
110	USB Select Transmitter B	145	Positive Pitch Position Bias
111	Spare	146	USB Ranging Off
112	MSS High Voltage On	147	USB Modulation Input Normal
113	MSS Band 2 On	150	USB Enable Aux Oscillator
114	MSS Band 3 On	151	Spare
115	MSS Band 4 On	152	MSS Rotating Shutter Driver On
116	Spare (MSS)	153	MSS Scan Monitor On
117	MSS Select Calibration Lamp A	154	MSS Band 1 High Gain
120	0.1° Yaw Position Bias Disable	155	MSS Band 2 High Gain
121	Differential Tach High Gain	156	MSS Calibration Lamp On
122	2.9° Pitch Position Bias Disable	157	MSS Band 1 High Voltage On
123	RLNA into Yaw Enable	160	Positive Yaw Position Bias
124	Negative Pitch Position Bias	161	Roll Unload Enable
125	Pitch Momentum Bias Enable	162	Pneumatics Momentary Enable
126	USB Select Transmitter A	163	Yaw Wheel Enable

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function	CMD #	Command Function
164	ECAM Run B	222	400 RPM Interlock Disable
165	Pitch Unload Enable	223	Rate Measuring Package B Enable
166	VHF Xmtr Playback Mode 2	224	Spare
167	VHF Xmtr Power 1 Off	225	Yaw Normal Mode
170	VHF Xmtr Power 2 On	226	Spare
171	VHF Xmtr Playback Override Off	227	VHF Xmtr High Power Mode
172	MSS Scan Monitor Off	230	VHF Xmtr Playback Override On
173	MSS Rotating Shutter Driver Off	231	VHF Select Xmtr A
174	MSS Band 2 Low Gain	232	MSS Band 3 High Voltage Off
175	MSS Band 1 Low Gain	233	MSS Band 2 High Voltage Off
176	MSS Band 1 High Voltage Off	234	Spare (MSS)
177	MSS Calibration Lamp Off	235	MSS Sel Shutter Monitor Source B
200	Orbit Adjust Mode Enable	236	MSS Scanner Power Line 2
201	ECAM On	237	Spare (MSS)
202	Rate Measuring Package A Enable	240	TMP Select Memory Unit A
203	400 RPM Interlock Enable	241	Spare
204	Yaw Acquisition Mode	242	TMP Select Memory Sequencer A
205	Spare	243	Spare
206	VHF Xmtr Power 1 On	244	Left SAD Normal Rate
207	VHF Xmtr Realtime Mode	245	ECAM Zero Time
210	VHF Xmtr Low Power Mode	246	Battery 1 Off
211	VHF Xmtr Power 2 Off	247	Rate Measuring Package B Htr Off
212	MSS Band 2 High Voltage On	250	VHF Select Xmtr B
213	MSS Band 3 High Voltage On	251	VHF Xmtr Playback Mode 1
214	MSS Sel Shutter Monitor Source A	252	Spare (MSS)
215	Spare (MSS)	253	Spare (MSS)
216	Spare (MSS)	254	Spare (MSS)
217	MSS Scanner Power Line 1	255	MSS Select Scan Monitor Source A
220	ECAM Off	256	MSS Scan Mirror Inhibit
221	Orbit Adjust Mode Disable	257	MSS Mux Normal

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function	CMD #	Command Function
260	TMP Select A/D Converter A	315	MSS Mux Compression Mode
261	TMP Select Memory Unit B	316	MSS System ON/OFF Normal
262	TMP Select Analog Mux A	317	Spare (MSS)
263	TMP Select Memory Sequencer B	320	Spare
264	Battery 5 Off	321	TMP Select Digital Mux B
265	Battery 6 Off	322	Spare
266	Rate Measuring Package B Off	323	TMP Select Formatter Logic B
267	Battery 2 Off	324	ECAM Output Enable
270	Right Sad Disable	325	Left SAD High Rate
271	RMP A Motor Start	326	RMP A On
272	Spare (MSS)	327	Battery 8 Off
273	Spare (MSS)	330	RMP B Lower Motor Voltage
274	MSS Select Scan Monitor Source B	331	Battery 4 Off
275	Spare (MSS)	332	Spare (MSS)
276	MSS Mux Inhibit	333	MSS Mux Linear Mode
277	MSS Scan Mirror Normal	334	Spare (MSS)
300	TMP Select Digital Mux A	335	MSS Mid Scan Code Off
301	TMP Select A/D Converter B	336	MSS Scan Mirror Power Line 2
302	TMP Select Formatter Logic A	337	MSS System ON/OFF Override
303	TMP Select Analog Mux B	340	TMP Memory Write On
304	Rate Measuring Package B Mtr On	341	TMP Matrix Verify Override On
305	RMP B Heater & Electronics On	342	TMP No Mod to VHF Override On
306	Battery 7 Off	343	TMP Program Control Bit 0 Off
307	Rate Measuring Package A Off	344	Left SAD Disable
310	Battery 3 Off	345	Spare 8 Set
311	Right Sad Enable	346	Trickle Charge Normal
312	MSS Scan Mirror Power Line 1	347	Enable USBX Off
313	Spare (MSS)	350	DCS Receiver 2 On
314	MSS Mid Scan Code On	351	RBV Primary Control Enable

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function
352	RBV Cathode Reactivation On
353	All Batteries On
354	Shunt Load A Off
355	All Comp Loads Off
356	Aux Load 1 On
357	Aux Load 2 On
360	Spare 8 Reset
361	TMP Memory Write Off
362	TMP Program Control Bit 0 On
363	TMP Program Control Bit 1 On
364	Disable USBX Off
365	Left SAD Enable
366	DCS Receiver 1 On
367	Trickle Charge Override
370	Rate Measuring Package A Htr On
371	RBV Cathode Reactivation Off
372	RBV Enable Calibration
373	Verify Tick
374	All Aux Loads Off (A)
375	Shunt Load B Off
376	Comp Load 1 On
377	Comp Load 2 On
400	TMP Data to VHF Xmtr
401	TMP Program Control Bit 1 Off
402	TMP Matrix Verify Override Off
403	TMP Verify Memory On
404	Right SAD High Rate
405	RBV Camera 3 On
406	DCS Receiver 2 Off
407	DCS Receiver 1 Off
410	Rate Measuring Package A Lower Motor Voltage
411	RBV/CCC Power On
412	RBV Aperture Corrector In
413	All Aux Loads Off (B)
414	Comp Load 3 On
415	Shunt Load C Off
416	Comp Load 4 On
417	Comp Load 5 On
420	TMP No Mod to Override Off
421	TMP No Mod to VHF Xmtr
422	TMP Verify Memory Off
423	Spare
424	RBV Primary Control Disable
425	Right SAD Normal Rate
426	WBVTR 1 Record
427	RBV Single Cycle
430	RBV Start Prepare
431	RBV Aperature Corrector Out
432	RBV CCC Power Off
433	RBV Camera 1 On
434	Comp Load 6 On
435	Aux Load 3 On
436	Aux Load 4 On
437	All Shunt Loads On
440	TMP Select Xmtr Buffer AMP A
441	TMP Matrix Verify On
442	TMP Power 2 Off

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function	CMD #	Command Function
443	TMP Force Program 00 Off	500	TMP Memory Write/Verify Ovrd On
444	WBVTR 1 Volt Protect Relay Reset	501	TMP Pre-Regulator Output B
445	WBVTR 1 Record Current Adjust	502	TMP Matrix Normal
446	WBVTR 1 RBV Enable	503	TMP Power 1 Off
447	WBVTR 1 Playback	504	WBVTR 1 Fast Forward
450	RBV Exposure 1	505	WBVTR 1 MSS Standby
451	RBV Exposure 2	506	WBVTR 1 Voltage Protect Disable
452	RBV Exposure 5	507	WBVTR 1 Lap
453	RBV Exposure 3	510	RBV Camera 2 Off
454	RBV Exposure 4	511	RBV Camera 1 Off
455	Aux Load 5 On	512	RBV Camera 3 Off
456	Shunt Load D Off	513	WBVTR 2 Record
457	Verify Tock	514	RT 1 Data to MSS Filter A
460	TMP Pre-Regulator A On	515	RT Data to RBV Filter A
461	TMP Select Xmtr Buffer AMP B	516	RT 2 Data to MSS Filter B
462	TMP Force Program 00 On	517	WBVTR 1 Data to RBV Filter B
463	TMP Pre-Regulator Output A	520	TMP Power 2 On
464	WBVTR 1 RBV Standby	521	TMP Memory Write/Verify Ovrd Off
465	WBVTR 1 Fast Rewind	522	TMP Power 1 On
466	WBFM Select VCO B1	523	TMP Pre-Regulator B On
467	WBVTR 1 Voltage Protect Enable	524	WBFM Select VCO A1
470	RBV Continuous Cycle	525	WBFM Inverter A Power On
471	RBV Camera 2 On	526	WBFM Enable Modulator A AFC
472	RBV Start Calibrate	527	WBFM Inverter B Power Off
473	RBV Disable Calibrate	530	WBFM Disable Modulator B AFC
474	Aux Data to RBV Filter A	531	WBVTR 2 Data to RBV Filter B
475	RT 1 Data to MSS Filter B	532	WBVTR 2 Record Current Adjust
476	RT Data to RBV Filter B	533	WBVTR 2 RBV Enable
477	Enable RBV Filter B	534	WBVTR 2 Playback

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function
535	RT 2 Data to MSS Filter A
536	WBVTR 1 Data to RBV Filter A
537	WBVTR 1 Data to MSS Filter B
540	WBPA 1 Power On
541	WBPA 1 Select 10W Output
542	NBTR 2 Playback Mode
543	NBTR 1 Record Mode
544	Enable RBV Filter A
545	WBFM Disable Modulator A AFC
546	Select RBV Bias A
547	WBFM Select VCO A2
550	WBFM Inverter B Power On
551	WBVTR 2 RBV Standby
552	WBVTR 2 Fast Rewind
553	WBVTR 2 Voltage Protect Relay Reset
554	WBVTR 2 Voltage Protect Enable
555	Enable MSS Filter A
556	WBVTR 1 Data to MSS Filter A
557	WBVTR 2 Data to RBV Filter A
560	Orbit Adjust Timer Enable
561	WBPA 1 Power Off
562	NBTR 1 Power Off
563	WBVTR Search Track Switched
564	Select RBV Bias B
565	WBFM Select VCO B2
566	WBFM Inverter A Power Off
567	WBFM Enable Modulator B AFC
570	WBVTR 2 Data to MSS Filter B
571	WBVTR 2 Fast Forward
572	WBVTR 2 MSS Standby
573	WBVTR 2 Voltage Protect Disable
574	WBVTR 2 Lap
575	Aux Data to RBV Filter B
576	Enable MSS Filter B
577	WBVTR 2 Data to MSS Filter A
600	WBPA 1 Select 20W Output
601	NBTR 2 Record Mode
602	0.6°Yaw Position Bias Enable
603	Orbit Adjust Timer Disable
604	Select NBTR 2
605	PMP Modulator A On
606	Select NBTR
607	WBVTR 1 On (Primary)
610	MSS Enable (Primary)
611	Spare
612	RBV No. 1 Thermoelectric Module Disable
613	ISM Disable Selected Scanner
614	ISM Switched Telemetry Power On
615	Orbit Adjust Thruster Heater On
616	MSFN to CIU A/STADAN to CIU B
617	Disable PSM Relay Buss
620	NBTR 2 Power Off
621	NBTR 1 Playback Mode
622	Payload Reg Module Fuse Tap On
623	0.6° Yaw Position Bias Disable
624	Select WBVTR 1
625	Inhibit WBFM RBV/A MSS B Filters
626	PMP Modulator A Off

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function	CMD #	Command Function
627	Orbit Adjust On 1	664	PMP Select WBVTR
630	WBVTR 1 Control Normal	665	PMP Modulator B Off
631	WBVTR Search Track Normal	666	Inhibit WBFM RBV B/MSS A Filters
632	MSS Enable (Both)	667	RBV On (Primary)
633	Right SAD Unfused	670	PSM Solenoid 1 On
634	CMD Clock Relays on 5A Fuse	671	WBVTR 2 Control Normal
635	ISM Separation Switch Bypass	672	RBV No. 3 Thermoelectric Module Ena
636	ISM Enable Scan & Select A	673	ISM Switched Telemetry Power Off
637	ECAM Smart Disable	674	Right SAD Fused
640	2.0° Pitch Position Bias Enable	675	Lock Single Scanner Mode
641	PSM Inverter A Power to WBFM	676	Enable USB Xmtrs (Redundant)
642	0.6° Pitch Position Bias Enable	677	RBV Magnetic Compensator Enable
643	WBVTR 1 Control Reversed	700	MMCA Power On
644	PMP Modulator B On	701	Enable Payload Timer Signal
645	Select WBVTR 2	702	MMCA Pitch Coil Out
646	Select NBTR 1	703	Inhibit Data to RBV Filter A
647	MSS Disable	704	MMCA Yaw Coil Out
650	WBVTR 2 On (Primary)	705	Prime Data to WBPA 1/2
651	WBVTR 1 Off	706	MMCA Capacitor Dump
652	Spare 1 (Non-Latch)	707	RBV No. 2 Thermoelectric Module Dis
653	CMD Clock Relays on 1A Fuse	710	RBV On (Redundant)
654	Left SAD Unfused	711	PSM Solenoid 2 On
655	Enable PSM Relay Bus	712	WBVTR 2 Off
656	APU Power On	713	Left SAD Fused
657	Orbit Adjust Thruster Heater Off	714	Unlock Single Scanner Mode
660	PSM Inverter B Power to WBFM	715	MSFN to CIU B/STADAN to CIU A
661	2.0° Pitch Position Bias Disable	716	Attitude Sensor Power On
662	MSS Enable (Redundant)	717	Spare (Non-Latch)
663	0.6° Pitch Position Bias Disable	720	Disable Payload Timer Signal

Table B-1. LANDSAT-2 Commands (Cont'd)

CMD #	Command Function
721	MMCA Pitch Coil In
722	Inhibit Data to RBV Filter B
723	MMCA Yaw Coil In
724	Summed Data to WBPA 1
725	MMCA Capacitor Charge
726	WBVTR 2 Control Reverse
727	Payload Reg Module On
730	RBV No. 2 Thermoelectric Module Ena
731	RBV Off
732	PSM Solenoid 3 On
733	Switch Payload Regulator
734	ISM Enable Scan & Select B
735	~~MSS Heater Off~~ ECAM SMART ENABLE
736	RBV Magnetic Compensator Lo Mode
737	APU Power Off
740	MMCA Roll Coil In
741	Inhibit Data to MSS Filter A
742	MMCA Polarity Positive
743	Summed Data to WBPA 2
744	MMCA Capacitor High
745	PSM Solenoids Off
746	Orbit Adjust On 2
747	RBV On Both
750	Payload Reg Module Off 1
751	RBV No. 3 Thermoelectric Module Dis
752	RBV Magnetic Compensator Disable
753	RBV Magnetic Compensator Hi Mode
754	Enable WBPA (Redundant)
755	Enable USB/WBPA Timer Signal
756	Comp Load 7 On
757	Disable USB Xmtrs
760	Inhibit Data to MSS Filter B
761	MMCA Roll Coil Out
762	MMCA Capacitor Low
763	MMCA Polarity Negative
764	Orbit Adjust Off
765	MMCA Power Off
766	Payloads Off
767	Payload Reg Module Fuse Tap Off
770	RBV No. 1 Thermoelectric Module Ena
771	Payload Reg Module Off 2
772	Disable USB/WBPA Timer Signal
773	Comp Load 8 On
774	Attitude Sensor Power Off
775	Enable USB Xmtrs (Primary)
776	Enable WBPA (Primary)
777	Spare
780	Switch Spacecraft PWM Regualtor
781	CIU Channel B Off
782	CIU Ch B On/Sw STDN/MSFN Cmd Link
783	CMD Clock Pwr Supply/Comdecs On/ ECAM Output Disable
784	Switch Spacecraft PWM Regulator
785	CIU Channel A Off
786	CIU Ch A On/Sw STDN/MSFN Cmd Link
787	CMD Clock Pwr Supply/Comdecs On/ ECAM Output Disable

FOLDOUT FRAME 1

Table B-2. LANDSAT-2 Command Matrix

MB \ MA	000	001	002	003	004	005	006	007	010	011	012	013	014	015	016	017
000	CLOCK (000) SPARE	CLOCK (001) PRIMARY COMSTOR ON & FILL 003,005,006	CLOCK (002) SPARE	CLOCK (003) PRIMARY COMSTOR VERIFY 001,005,006	CLOCK (004) PRIMARY COMSTOR COPY	CLOCK (005) PRIMARY COMSTOR OFF 001	CLOCK (006) PRIMARY COMSTOR ACTIVATE 001,003,005	CLOCK (007) SERIAL DATA TRANSFER ON	CLOCK (010) COMMAND EXECUTION COUNTER RESET	CLOCK (011) SELECT PRIMARY MATRIX DECODER 031	CLOCK (012) SELECT PRIMARY MATRIX A DRIVERS 032	CLOCK (013) SELECT PRIMARY MATRIX B DRIVERS 033	CLOCK (014) SELECT PRIMARY OSCILLATOR 034	CLOCK (015) SELECT PRIMARY FREQ GENERATOR 035	CLOCK (016) SPARE	CLOCK (017) LOAD TIME CODE
020	CLOCK (020) TURN NON-KEYED PS/COMDEC OFF CAI CB1	CLOCK (021) REDUNDANT COMSTOR ON & FILL 023,025,026	CLOCK (022) SPARE	CLOCK (023) REDUNDANT COMSTOR VERIFY 021,025,026	CLOCK (024) REDUNDANT COMSTOR COPY	CLOCK (025) REDUNDANT COMSTOR OFF 021	CLOCK (026) REDUNDANT COMSTOR ACTIVATE 021,023,025	CLOCK (027) SPARE	CLOCK (030) SPARE	CLOCK (031) SELECT REDUNDANT MATRIX DECODER 011	CLOCK (032) SELECT REDUNDANT MATRIX A DRIVERS 012	CLOCK (033) SELECT REDUNDANT MATRIX B DRIVERS 013	CLOCK (034) SELECT REDUNDANT OSCILLATOR 014	CLOCK (035) SELECT REDUNDANT FREQ GENERATOR 015	CLOCK (036) SPARE	CLOCK (037) SPARE
040	ACS (040) PNEUMATICS ENABLE 061	ACS (041) 0.3° YAW POS BIAS ENABLE 060	ACS (042) PNEUMATICS INTERLOCK BYPASS DISABLE 063		ACS (044) PNEUMATICS LOW VOLTAGE INTERLOCK RESET	ACS (045) DIFF TACH DISABLE 064	WBPA 2 (046) POWER ON 067	WBPA 2 (047) SELECT 10 WATT OUTPUT 106	APU (050) STANDBY MODE 071	ECAM (051) ECAM LOAD 065	MSS (052) SYSTEM ON 073	MSS (053) SELECT INV. A 072	MSS (054) SELECT BAND 1 HIGH VOLTAGE A 075	MSS (055) SELECT BAND 2 HIGH VOLTAGE A 074	MSS (056) SELECT BAND 3 HIGH VOLTAGE A 077	MSS (057) BAND 1 ON 076
060	ACS (060) 0.3° YAW POS BIAS DISABLE 041	ACS (061) PNEUMATICS DISABLE 040		ACS (063) PNEUMATICS INTERLOCK BYPASS ENABLE 042	ACS (064) DIFF TACH ENABLE 045	ECAM (065) ECAM EXECUTE 051		WBPA 2 (067) POWER OFF 046		APU (071) NORMAL MODE 070	MSS (072) SELECT INV. B 053	MSS (073) SYSTEM OFF 052	MSS (074) SELECT BAND 2 HIGH VOLTAGE B 055	MSS (075) SELECT BAND 1 HIGH VOLTAGE B 054	MSS (076) BAND 1 OFF 057	MSS (077) SELECT BAND 3 HIGH VOLTAGE B 056
100	ACS (100) DIFF TACH NORMAL GAIN 121	ACS (101) 0.1° YAW POS BIAS ENABLE 120	ACS (102) RLNA INTO YAW DISABLE 123	ACS (103) 2.9° PITCH POS BIAS ENABLE 122	ACS (104) PITCH MOMENTUM BIAS MODE DISABLE 125	ECAM (105) ECAM RUN A 164	WBPA 2 (106) SELECT 20 WATT OUTPUT 047	USB XPDR (107) BYPASS AUX OSC 150	USB XPDR (110) SELECT XMTR B 126		MSS (112) HIGH VOLTAGE ON	MSS (113) BAND 2 ON 152	MSS (114) BAND 3 ON 135	MSS (115) BAND 4 ON 134	MSS (116) BAND 5 ON 137	MSS (117) SELECT CALIBRATION LAMP A 136
120	ACS (120) 0.1° YAW POS BIAS DISABLE 101	ACS (121) DIFF TACH HIGH GAIN 100	ACS (122) 2.9° PITCH BIAS DISABLE 103	ACS (123) RLNA INTO YAW ENABLE 102	ACS (124) NEGATIVE PITCH POSITION BIAS 145	ACS (125) PITCH MOMENTUM BIAS MODE ENABLE 104	USB XPDR (126) SELECT XMTR A 110	USB XPDR (127) RANGING ON 146	USB XPDR (130) MODULATION INPUT CROSSED 147		MSS (132) BAND 2 OFF 113	MSS (133) DOOR MOTOR POWER OFF 257	MSS (134) BAND 4 OFF 115	MSS (135) BAND 3 OFF 114	MSS (136) SELECT CALIBRATION LAMP B 117	MSS (137) BAND 5 OFF 116
140	ACS (140) ROLL UNLOAD DISABLE 161	ACS (141) NEGATIVE YAW POS BIAS 160	ACS (142) YAW WHEEL DISABLE 163		ACS (144) PITCH UNLOAD DISABLE 165	ACS (145) POSITIVE PITCH POSITION BIAS 124	USB XPDR (144) RANGING OFF 127	USB XPDR (147) MODULATION INPUT NORMAL 130	USB XPDR (150) ENABLE AUX OSC 101		MSS (152) ROTATING SHUTTER DRIVER ON 133	MSS (153) SCAN MONITOR ON 172	MSS (154) BAND 1 HIGH GAIN 175	MSS (155) BAND 2 HIGH GAIN 174	MSS (156) CALIBRATION LAMP ON 177	MSS (157) BAND 1 HIGH VOLTAGE ON 176
160	ACS (160) POSITIVE YAW POS BIAS 141	ACS (161) ROLL UNLOAD ENABLE 140	ACS (162) PNEUMATICS MOMENTARY ENABLE	ACS (163) YAW WHEEL ENABLE 142	ECAM (164) ECAM RUN B 105	ACS (165) PITCH UNLOAD ENABLE 144	VHF XMTR (164) PLAYBACK NBTR 2 207,237	VHF XMTR (167) POWER #1 OFF 206	VHF XMTR (170) POWER #2 ON 211	VHF XMTR (171) PLAYBACK OVERIDE OFF 250	MSS (172) SCAN MONITOR OFF 153	MSS (173) ROTATING SHUTTER DRIVER OFF 152	MSS (174) BAND 2 LOW GAIN 155	MSS (175) BAND 1 LOW GAIN 154	MSS (176) BAND 1 HIGH VOLTAGE OFF 157	MSS (177) CALIBRATION LAMP OFF 156
200	ACS (200) ORBIT ADJUST MODE ENABLE 221	ECAM (201) ECAM ON 220	ACS (202) RMP A ENABLE 223	ACS (203) 400 RPM INTERLOCK ENABLE 222	ACS (204) YAW ACQUISTION MODE 225		VHF XMTR (204) POWER #1 ON 167	VHF XMTR (207) REAL TIME MODE 166,251	VHF XMTR (210) LOW POWER MODE 227	VHF XMTR (211) POWER #2 OFF 170	MSS (212) BAND 2 HIGH VOLTAGE ON 233	MSS (213) BAND 3 HIGH VOLTAGE ON 232	MSS (214) SELECT SHUTTER MONITOR SOURCE A 235	MSS (215) DOOR OPEN DIRECTION 234	MSS (216) DOOR OVER RIDE ACTIVATE 273	MSS (217) SCANNER POWER LINE 1 236
220	ECAM (220) ECAM OFF 201	ACS (221) ORBIT ADJUST MODE DISABLE 200	ACS (222) 400 RPM INTERLOCK DISABLE 203	ACS (223) RMP B ENABLE 202		ACS (225) YAW NORMAL MODE 204		VHF XMTR (227) HIGH POWER MODE 210	VHF XMTR (230) PLAYBACK OVERRIDE ON 171	VHF XMTR (231) SELECT XMTR A 250	MSS (232) BAND 3 HIGH VOLTAGE OFF 231	MSS (233) BAND 2 HIGH VOLTAGE OFF 232	MSS (234) DOOR CLOSE DIRECTION 215	MSS (235) SELECT SHUTTER MONITOR SOURCE B 214	MSS (236) SCANNER POWER LINE 2 211	MSS (237) DOOR MOTOR POWER ON 133
240	TMP (240) SELECT MEMORY UNIT A 261		TMP (242) SELECT MEMORY SEQUENCER UNIT A 263		ACS (244) LEFT SAD NORMAL RATE 325	ECAM (245) ECAM ZERO TIME	POWER (246) BATTERY #1 OFF 353	ACS (247) RMP B HEATER OFF 305	VHF XMTR (250) SELECT XMTR B 251	VHF XMTR (251) PLAYBACK NBTR 1 166,211	MSS (252) DOOR MOVE	MSS (253) BAND 5A GAIN STEP	MSS (254) DOOR HOLD ON 275	MSS (255) SELECT SCAN MONITOR SOURCE A 274	MSS (256) SCAN MIRROR INHIBIT 277	MSS (257) MUX NORMAL 276
260	TMP (260) SELECT A/D CONVERTER A 301	TMP (261) SELECT MEMORY UNIT B 240	TMP (262) SELECT ANALOG MUX A 303	TMP (263) SELECT MEMORY SEQUENCER UNIT B 242	POWER (264) BATTERY #5 OFF 353	POWER (265) BATTERY #6 OFF 353	ACS (266) RMP B OFF 247,304,305,330	POWER (267) BATTERY #2 OFF 353	ACS (270) RIGHT SAD DISABLE 311	ACS (271) RMP A MOTOR START 301,326,329,410	MSS (272) BAND 5B GAIN STEP	MSS (273) DOOR OVER RIDE RESET 216	MSS (274) SELECT SCAN MONITOR SOURCE B 255	MSS (275) DOOR HOLD OFF 254	MSS (276) MUX INHIBIT 257	MSS (277) SCAN MIRROR NORMAL 256
300	TMP (300) SELECT DIGITAL MUX A 321	TMP (301) SELECT A/D CONVERTER B 260	TMP (302) SELECT FORMATTER LOGIC A 323	TMP (303) SELECT ANALOG MUX B 262	ACS (304) RMP B MOTOR ON 266	ACS (305) RMP B HEATER (ELEC) ON 266	POWER (306) BATTERY #7 OFF 353	ACS (307) RMP A OFF 271,326	POWER (310) BATTERY #3 OFF 353	ACS (311) RIGHT SAD ENABLE 270	MSS (312) SCAN MIRROR POWER LINE 1 336	MSS (313) DOOR OVER RIDE SAFETY-SAFE 334	MSS (314) MID SCAN CODE ON 339	MSS (315) MUX COMPRESSION MODE 333	MSS (316) SYSTEM ON/OFF NORMAL 337	MSS (317) RADIATION COOLER POWER ON 335
320		TMP (320) SELECT DIGITAL MUX B 300		TMP (323) SELECT FORMATTER LOGIC B 302	ECAM (324) ECAM OUTPUT ENABLE	ACS (325) LEFT SAD HIGH RATE 244	ACS (326) RMP A ON 307	POWER (327) BATTERY #8 OFF 353	ACS (330) RMP B LOWER MOTOR VOLTAGE 266	POWER (331) BATTERY #4 OFF 353	MSS (332) RADIATION COOLER POWER OFF 317	MSS (333) MUX LINEAR MODE 315	MSS (334) DOOR OVER RIDE SAFETY ARM 313	MSS (335) MID SCAN CODE OFF 314	MSS (336) SCAN MIRROR POWER LINE 2 312	MSS (337) SYSTEM ON/OFF OVERRIDE 316
340	TMP (340) MEMORY WRITE ON 361	TMP (341) MATRIX VERIFY OVERRIDE ON 402	TMP (342) NO MODULATION TO VHF XMTR OVERRIDE ON 420	TMP (343) PROGRAM CONTROL BIT 2° OFF 362	ACS (344) LEFT SAD DISABLE 365	PSM (345) SPARE 8 SET 360	POWER (344) TRICKLE CHARGE NORMAL 367	PSM (347) ENABLE USBX OFF 364	DCS (350) RCVR 2 ON 406	PSM (351) RBV PRIMARY CONTROL ENABLE 424	RBV (352) CATHODE REACTIVATION ON 371	POWER (353) ALL BATTERIES ON	POWER (354) SHUNT LOAD A OFF 437	POWER (355) ALL COMP LOADS OFF.	POWER (356) AUX LOAD #1 ON 376,413	POWER (357) AUX LOAD #2 ON 376,413
360	PSM (360) SPARE 8 RESET 345	TMP (361) MEMORY WRITE OFF 340	TMP (362) PROGRAM CONTROL BIT 2° ON 343	TMP (363) PROGRAM CONTROL BIT 2° ON 401	PSM (364) DISABLE USBX OFF 347	ACS (365) LEFT SAD ENABLE 344	DCS (366) RCVR 1 ON 407	POWER (367) TRICKLE CHARGE OVERRIDE 346	ACS (370) RMP A HEATER ON 309,275	RBV (371) CATHODE REACTIVATION OFF 352	RBV (372) ENABLE CALIBRATION 473	POWER (373) VERIFY TICK 457	POWER (374) ALL AUX LOADS OFF (A)	POWER (375) SHUNT LOAD B OFF 437	POWER (376) COMP LOAD #1 ON 355	POWER (377) COMP LOAD #2 ON 355
400	TMP (400) VIP DATA TO VHF XMTR 421	TMP (401) PROGRAM CONTROL BIT 2' OFF 363	TMP (402) MATRIX VERIFY OVERRIDE OFF 341	TMP (403) VERIFY MEMORY ON 422	ACS (404) RIGHT SAD HIGH RATE 425	RBV (405) CAMERA 3 ON 512	DCS (406) RCVR 2 OFF 350	OCS (407) RCVR 1 OFF 366	ACS (410) RMP A LOWER MOTOR VOLTAGE 271	RBV (411) CCC POWER ON 432	RBV (412) APERATURE CORRECTOR IN 431	POWER (413) ALL AUX LOADS OFF (B)	POWER (414) COMP LOAD 3 ON 355	POWER (415) SHUNT LOAD C OFF 437	POWER (416) COMP LOAD 4 ON 355	POWER (417) COMP LOAD 5 ON 355
420	TMP (420) NO MODULATION TO VHF XMTR OVERRIDE OFF 342	TMP (421) NO MODULATION TO VHF XMTR 400	TMP (422) VERIFY MEMORY OFF 403		PSM (424) RBV PRIMARY CONTROL DISABLE 361	ACS (425) RIGHT SAD NORMAL RATE 404	WBVTR1 (426) RECORD 407,414,415,504,505	RBV (427) SINGLE CYCLE 470	RBV (430) START PREPARE	RBV (431) APERATURE CORRECTOR OUT 412	RBV (432) CCC POWER OFF 411	RBV (433) CAMERA 1 ON 511	POWER (434) COMP LOAD 6 ON 355	POWER (435) AUX LOAD 3 ON 376,413	POWER (436) AUX LOAD 4 ON 376,413	POWER (437) ALL SHUNT LOADS ON
440	TMP (440) SELECT XMTR BUFFER AMP A 461	TMP (441) MATRIX VERIFY ON 502	TMP (442) POWER NO. 2 OFF 520	TMP (443) FORCE PROGRAM 0,0 OFF 462	WBVTR1 (444) VOLTAGE PROTECT RELAY RESET	WBVTR1 (445) RECORD CURRENT ADJUST	WBVTR1 (446) RBV ENABLE 414,464,465,504,505	WBVTR1 (447) PLAYBACK 451,452,453,454	RBV (450) EXPOSURE 1 450,452,453,454	RBV (451) EXPOSURE 2 450,451,453,454	RBV (452) EXPOSURE 5 450,451,452,454	RBV (453) EXPOSURE 3 450,451,452,453	RBV (454) EXPOSURE 4	POWER (455) AUX LOAD 5 ON 376,413	POWER (456) SHUNT LOAD D OFF 437	POWER (457) VERIFY TOCK 373
460	TMP (460) PRE-REG A ON 523	TMP (461) SELECT XMTR BUFFER AMP B 440	TMP (462) FORCE PROGRAM 0,0 ON 443	TMP (463) PRE-REG OUTPUT A 501	WBVTR1 (464) RBV STANDBY 414,447,465,504,505	WBVTR1 (465) FAST REWIND 414,447,464,504,505	WBFM (466) SELECT VCO B1 365	WBVTR1 (467) VOLTAGE PROTECT ENABLE 506	RBV (470) CONTINUOUS CYCLE 427	RBV (471) CAMERA 2 ON 510	RBV (472) START CALIB.	RBV (473) DISABLE CALIB 372	WBFM (474) AUX DATA TO RBV FILTER A 703	WBFM (475) DATA TO MSS FILTER B 740	WBFM (476) RT DATA TO RBV FILTER B 722	WBFM (477) ENABLE RBV FILTER B 566
500	TMP (500) MEMORY WRITE/VERIFY OVERRIDE ON 521	TMP (501) PRE-REG OUTPUT B 463	TMP (502) MATRIX NORMAL 441	TMP (503) POWER NO. 1 OFF 522	WBVTR1 (504) FAST FOWARD 414,447,464,465,505	WBVTR1 (505) MSS STANDBY 414,447,464,465,504	WRVTR1 (506) VOLTAGE PROTECT DISABLE 467	WBVTR1 (507) LAP	RBV (510) CAMERA 2 OFF 471	RBV (511) CAMERA 1 OFF 433	RBV (512) CAMERA 3 OFF 405	WBVTR2 (513) RECORD 534,551,552,571,572	WBFM (514) DATA TO MSS FILTER A 741	WBFM (515) RT DATA TO RBV FILTER A 703	WBFM (516) DATA" TO MSS FILTER B 760	WBFM (517) WBVTR 1 DATA TO RBV FILTER B 722
520	TMP (520) POWER NO. 2 ON 442	TMP (521) MEMORY WRITE/VERIFY OVERRIDE OFF 500	TMP (522) POWER NO. 1 ON 503	TMP (523) PRE-REG B ON 460	WBFM (524) SELECT VCO A1 347	WBFM (525) INVERTER A POWER ON 344	WBFM (526) ENABLE MODULATOR A AFC 345	WBFM (527) INVERTER B POWER OFF 886	WBFM (530) DISABLE MODULATOR B AFC 367	WBFM (531) WBVTR 2 DATA TO RBV FILTER B 722	WBVTR2 (532) RECORD CURRENT ADJUST	WBVTR2 (533) RBV ENABLE	WBVTR2 (534) PLAYBACK 519,551,552,571,572	WBFM (535) DATA" TO MSS FILTER A 741	WBFM (536) WBVTR 1 DATA TO RBV FILTER A 703	WBFM (537) WBVTR 1 DATA TO MSS FILTER B 760
540	WBPA1 (540) POWER ON 561	WBPA1 (541) SELECT 10 WATT OUTPUT 600	NBTR2 (542) PLAYBACK MODE 601,620	NBTR1 (543) RECORD MODE 502,621	WBFM (544) ENABLE RBV FILTER A 635	WBFM (545) DISABLE MODULATOR A AFC 324	WBFM (546) SELECT RBV BIAS A 364	WBFM (547) SELECT VCO A2 526	WBFM (550) INVERTER B POWER ON 527	WBVTR2 (551) RBV STANDBY 518,554,572,573,574	WBVTR2 (552) FAST REWIND 518,520,551,553,574	WBVTR2 (553) VOLTAGE PROTECT RELAY RESET 554	WBVTR2 (554) VOLTAGE PROTECT ENABLE 575	WBFM (555) ENABLE MSS FILTER A 566	WBFM (556) WBVTR 1 DATA TO MSS FILTER A 741	WBFM (557) WBVTR 2 DATA TO RBV FILTER A 705
560	PSM (560) ORBIT ADJUST TIMER ENABLE 603	WBPA1 (561) POWER OFF 540	NBTR2 (562) POWER OFF 543,621	PSM (563) WBVTR SEARCH TRACK SWITCHED 634	WBFM (564) SELECT RBV BIAS B 546	WBFM (565) SELECT VCO B2 464	WBFM (566) INVERTER A POWER OFF 525	WBFM (567) ENABLE MODULATOR B AFC 530	WBFM (570) WBVTR 2 DATA TO MSS FILTER B 740	WBVTR2 (570) FAST FOWARD	WBVTR2 (572) MSS STANDBY 518,520,551,553,573	WBVTR2 (573) VOLTAGE PROTECT DISABLE 554	WBVTR2 (574) LAP	WBFM (575) AUX DATA TO RBV FILTER B 722	WBFM (576) ENABLE MSS FILTER B 566	WBFM (577) WBVTR 2 DATA TO MSS FILTER A 741
600	WBPA1 (600) SELECT 20 WATT OUTPUT 541	NBTR2 (601) RECORD MODE 542,620	ACS (602) 0.6° YAW POS BIAS ENABLE 623	PSM (603) ORBIT ADJUST TIMER DISABLE 560	PMP (604) SELECT NBTR 2 646	PMP (605) MODULATOR A ON 626	PMP (606) SELECT NBTR 664	PSM (601) WBVTR 1 ON (PRIMARY) 651,766	PSM (610) MSS ENABLE (PRI) 697		PSM (612) RBV #1 TEM DISABLE 770	ISM (613) DISABLE SELECTED SCANNER 634,739	ISM (614) SWITCHED TELEMETRY POWER ON 673	ISM (615) ORBIT ADJUST THRUSTER HEATER ON 651	ISM (616) MSFN TO CIU A/ STADAN TO CIU B CA10,CB10,715	ISM (617) DISABLE PSM RELAY BUS 655
620	NBTR2 (620) POWER OFF 542,601	NBTR1 (621) PLAYBACK MODE 543,562	PSM (622) PRM FUSE TAP ON 767	ACS (623) 0.6° YAW POS BIAS DISABLE 602	PMP (624) SELECT WBVTR 1 645	PSM (625) INHIBIT WBFM RBV A/MSS B FILTERS 644,554	PMP (626) MODULATOR A OFF 605	PSM (621) ORBIT ADJUST ON (1) 745,764	PSM (630) WBVTR 1 CONTROL NORMAL 643	PSM (631) WBVTR SEARCH TRACK NORMAL 853	PSM (632) MSS ENABLE (BOTH) 697	ISM (633) RIGHT SAD UNFUSED 676	ISM (634) CMD CLK RELAYS ON SA FUSE 683	ISM (635) SEPARATION SWITCH BYPASS 617	ISM (636) ENABLE SCAN & SELECT A 613,735	ISM (637) ECAM SMART DISABLE 735
640	ACS (640) 2.0° PITCH POS BIAS ENABLE 661	PSM (641) INVERTER A PWR TO WBFM 660	ACS (642) 0.6° PITCH POS BIAS ENABLE 663	PSM (643) WBVTR 1 CONTROL REVERSED 630	PMP (644) MODULATOR B ON 665	PMP (645) SELECT WBVTR 2 624	PMP (646) SELECT NBTR 1 604	PSM (641) MSS DISABLE 610,658,667	PSM (650) WBVTR 2 ON (PRIMARY) 712,764	PSM (651) WBVTR 1 OFF 607	PSM (652) SPARE 1 NON-LATCH	ISM (653) CMD CLK RELAYS ON IA FUSE 684	ISM (654) LEFT SAD UNFUSED 715	ISM (655) ENABLE PSM RELAY BUS 617	ISM (656) APU POWER ON 737	ISM (657) ORBIT ADJUST THRUSTER HEATER OFF 618
660	PSM (660) INVERTER B PWR TO WBFM 661	ACS (661) 2.0° PITCH POS BIAS DISABLE 640	PSM (662) MSS ENABLE (RED) 667	ACS (663) 0.6° PITCH POS BIAS DISABLE 642	PMP (664) SELECT WBVTR 606	PMP (665) MODULATOR B OFF 644	PSM (666) INHIBIT WBFM RBV B/MSS A FILTERS 671,555	PSM (667) RBV ON (PRIMARY) 751,764	PSM (670) SOLENOID 1 ON 745,761	PSM (671) WBVTR 2 CONTROL NORMAL 760	PSM (672) RBV #3 TEM ENABLE 751	ISM (673) SWITCHED TELEMETRY POWER OFF 616	ISM (674) RIGHT SAD FUSED 685	ISM (675) LOCK GSM 714	ISM (676) ENABLE USB XMTRS (RED) 757	PSM (677) RBV MAGNETIC COMPENSATOR ENABLE 772
700	MMCA (700) POWER ON 769	PSM (701) ENABLE PAYLOAD TIMER SIGNAL 720	MMCA (702) PITCH COIL OUT 721	PSM (703) INHIBIT DATA TO RBV FILTER A 634,555,556,576	MMCA (704) YAW COIL OUT 743	PSM (705) PRIME DATA TO WBPA 1 / WBPA 2 726,795	MMCA (706) CAP DUMP 725	PSM (707) RBV #2 TEM DISABLE 750	PSM (710) RBV ON (REDUNDANT) 731,766	PSM (711) SOLENOID 2 ON 745,767	PSM (712) WBVTR 2 OFF 650	ISM (713) LEFT SAD FUSED 654	ISM (714) UNLOCK SSM 615	ISM (715) MSFN TO CIU B/ STADAN TO CIU A CA10,CB10,716	ISM (716) ATTITUDE SENSOR POWER ON 774	ISM (717) SPARE NON-LATCH
720	PSM (720) DISABLE PAYLOAD TIMER SIGNAL 701	MMCA (721) PITCH COIL IN 702	PSM (722) INHIBIT DATA TO RBV FILTER B 634,555,556,576	MMCA (723) YAW COIL IN 704	PSM (724) SUMMED DATA TO WBPA 1 703	MMCA (725) CAP CHARGE 706	PSM (726) WBVTR2 CONTROL REVERSED 671	PSM (727) PRM ON 756,776	PSM (730) RBV #2 TEM ENABLE 707	PSM (731) RBV OFF 667,710,747	PSM (732) SOLENOID 3 ON 745,761	ISM (733) SWITCH PAYLOAD REGULATOR	ISM (734) ENABLE SCAN & SELECT B 613,636	ISM (735) ECAM SMART ENABLE 637	PSM (736) RBV MAGNETIC COMPENSATOR LOW MODE 773	ISM (737) APU POWER OFF 686
740	MMCA (740) ROLL COIL IN 761	PSM (741) INHIBIT DATA TO MSS FILTER A 634,555,556,576	MMCA (742) POLARITY POSITIVE 763	PSM (743) SUMMED DATA TO WBPA 2 705	MMCA (744) CAP HIGH 762	PSM (745) SOLENOIDS OFF 621	PSM (746) ORBIT ADJUST ON (2) 745,764	PSM (747) RBV ON (BOTH) 731,766	PSM (750) PRM OFF (1) 727	PSM (751) RBV #3 TEM DISABLE 672	PSM (752) RBV MAGNETIC COMPENSATOR DISABLE 677	PSM (753) RBV MAGNETIC COMPENSATOR HIGH MODE 756	ISM (754) ENABLE WBPA (RED)	ISM (755) ENABLE USB XMTR/ WBPA TIMER SIGNAL 717	ISM (756) COMP LOAD 7 ON 355	ISM (757) DISABLE USB XMTRS 634,739
760	PSM (760) INHIBIT DATA TO MSS FILTER B 635,555,556,576	MMCA (761) ROLL COIL OUT 740	MMCA (762) CAP LOW 764	MMCA (763) POLARITY NEGATIVE 742	PSM (764) ORBIT ADJUST OFF 627,746	MMCA (765) POWER OFF 700	PSM (766) PAYLOADS OFF 689,693,697,710	PSM (767) PRM FUSE TAP OFF 632	PSM (770) RBV #1 TEM ENABLE 612	PSM (771) PRM OFF (2) 727	ISM (772) DISABLE USB XMTR WPBA TIMER SIGNAL 758	ISM (773) COMP LOAD 8 ON 558	ISM (774) ATTITUDE SENSOR POWER OFF 786	ISM (775) ENABLE USB XMTRS (PRI) 727	ISM (776) ENABLE WBPA (PRI)	

COMMAND DESIGNATION	CIU COMMAND
CA00 $(140)_8$	SWITCH S/C REGULATOR
CA01 $(141)_8$	CIU CHANNEL B OFF
CA10 $(142)_8$	CIU CHANNEL B ON SWITCH STADAN/MSFN COMMAND LINKS
CA11 $(100)_8$	COMMAND CLOCK PS/COMDECS ON ECAM OUTPUT DISABLE
CB00 $(282)_8$	SWITCH S/C REGULATOR
CB01 $(070)_8$	CIU CHANNEL A OFF
CB10 $(284)_8$	CIU CHANNEL A ON SWITCH STADAN/MSFN COMMAND LINKS
CB11 $(083)_8$	COMMAND CLOCK PS/COMDECS ON ECAM OUTPUT DISABLE

FOLDOUT FRAME 2

FOLDOUT FRAME 3

APPENDIX C

TELEMETRY MATRIX

1000 - ATTITUDE CONTROL SUBSYSTEM

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	FORWARD SCANNER SIGNAL PROCESSOR								
1001	FWD SCAN LEAD EARTH PULSE	FSC L EP	ALOG	1/16	$A_{10}6$	15 09	$4T8_0$-81	7_{112}-7	$6T_{00}$-73
1002	FWD SCAN TRAIL EARTH PULSE	FSC T EP	ALOG	1/16	$A17_0$	18 18	4T82-61	7_{112}-6	$6T_{00}$-72
1003	FWD SCAN PRESSURE	FSC PRES	ALOG	1/16	A233	18 27	4T84-01	7_{112}-4	$6T_{00}$-70
1004	FWD SCAN PREAMP. CARD TEMP	FSC PA T	ALOG	1/16	A298	02 37	4T86-81	7_{112}-10	$6T_{00}$-76
1005	FWD SCAN REF PROCESSOR CARD TEMP	FSC RP T	ALOG	1/16	A526	15 69	4T94-48	7_{112}-8	$6T_{00}$-74
1006	FWD SCAN UPSIDE DOWN	FSC UPDN	ALOG	1/16	$A49_0$	12 64	4T92-81	7_{112}-11	$6T_{00}$-77
1007	FWD SCAN MOTOR TEMP.	FSC TEMP	ALOG	1/16	A554	15 73	4T94-81	7_{112}-5	$6T_{00}$-71
	REAR SCANNER SIGNAL PROCESSOR								
1010	REAR SCAN LEAD EARTH PULSE	RSC L EP	ALOG	1/16	$A10_5$	12 09	$4T8_0$-01	7_{122}-6	$6T_{01}$-42
1011	REAR SCAN TRAIL EARTH PULSE	RSC T EP	ALOG	1/16	A169	15 18	4T82-01	7_{122}-7	$6T_{01}$-43
1012	REAR SCAN PRESSURE	RSC PRES	ALOG	1/16	A232	15 27	4T84-17	7_{122}-4	$6T_{01}$-40
1013	REAR SCAN PREAMP CARD TEMP	RSC PA T	ALOG	1/16	A297	01 37	4T86-01	7_{122}-10	$6T_{01}$-46
1014	REAR SCAN REF PROCESSOR CARD TEMP	RSC RP T	ALOG	1/16	A424	02 55	$4T9_0$-17	7_{122}-8	$6T_{01}$-44
1015	REAR SCAN UPSIDE DOWN	RSC UPDN	ALOG	1/16	A489	10 64	4T92-01	7_{122}-11	$6T_{01}$-47
1016	REAR SCAN MOTOR TEMP	RSC TEMP	ALOG	1/16	A553	12 73	4T94-01	7_{122}-5	$6T_{01}$-41
	CONTROL LOGIC BOX								
1020	ROLL LEAD AMP OUTPUT	R LD AMP	ALOG	1/1	A627	11 01	$4T96$-8_0	7_{001}-24	$6T_{00}$-21 FM 10-11
1021	ROLL DIFF TACH AMP OUTPUT	R DF TCH	ALOG	1/1	A628	13 01	4T96-77	7_{001}-7	$6T_{00}$-6 FM 10-11
1022	ROLL REAR MOTOR DRIVER (CCW)	RRMD CCW	ALOG	1/16	$A10_4$	10 09	$4T8_0$-17	7_{001}-6	$6T_{00}$-5
1023	ROLL FWD MOTOR DRIVER (CCW)	RFMD CCW	ALOG	1/16	A168	12 18	4T82-17	7_{001}-8	$6T_{00}$-7
1024	ROLL FWD MOTOR DRIVER (CW)	RFMD CW	ALOG	1/16	A235	02 28	4T84-30	7_{001}-41	$6T_{00}$-36
1025	ROLL REAR MOTOR DRIVER (CW)	RRMD CW	ALOG	1/16	A422	18 54	$4T9_0$-54	7_{001}-39	$6T_{00}$-34
1026	ROLL FWD FLYWHEEL SPEED	RFFW SPD	ALOG	1/1	$A6_03$	06 00	4T96-69	7_{001}-22	$6T_{00}$-19
1027	ROLL REAR FLYWHEEL SPEED	RRFW SPD	ALOG	1/1	$A6_04$	07 00	4T96-30	7_{001}-40	$6T_{00}$-35
1028	ROLL PNEUMATICS MODULATOR	R PN MOD	ALOG	1/16	A369	08 47	4T88-08	7_{001}-25	$6T_{00}$-22
1029	ROLL COARSE ERROR	R ER CRS	ALOG	1/1	$A6_05$	04 01	4T96-29	7_{001}-42	$6T_{00}$-37
1030	ROLL FINE ERROR	R ER FNE	ALOG	1/1	$A6_06$	05 01	$4T96$-5_0	7_{001}-1	$6T_{00}$-1
1031	ROLL DIFF TACH AMP STATUS	R DFT ST	ALOG	1/16	A488	08 64	4T92-17	7_{001}-35	$6T_{00}$-75
1032	ROLL SOLENOID DUTY CYCLE	R SOL DC	ALOG	1/16	A552	10 73	4T94-17	7_{001}-5_0	$6T_{00}$-45
1033	YAW MOTOR DRIVER (CW)	Y MD CW	ALOG	1/16	$A10_2$	02 09	$4T8_0$-54	7_{001}-28	$6T_{00}$-25
1034	YAW MOTOR DRIVER (CCW)	Y MD CCW	ALOG	1/16	A166	08 18	4T82-54	7_{001}-11	$6T_{00}$-10
1035	YAW TACH AMP OUTPUT	Y TACH	ALOG	1/1	$A6_07$	06 01	4T96-74	7_{001}-12	$6T_{00}$-11
1036	YAW PNEUMATICS MODULATOR	Y PN MOD	ALOG	1/16	A234	01 28	4T84-81	7_{001}-45	$6T_{00}$-40
1037	YAW SOLENOID DUTY CYCLE	Y SOL DC	ALOG	1/16	A296	18 36	4T86-17	7_{001}-16	$6T_{00}$-15
1038	PITCH MOTOR DRIVER (CCW)	P MD CCW	ALOG	1/16	A362	08 46	4T88-81	7_{001}-43	$6T_{00}$-38
1039	PITCH MOTOR DRIVER (CW)	P MD CW	ALOG	1/16	A421	15 54	$4T9_0$-31	7_{001}-47	$6T_{00}$-42
1040	PITCH COARSE ERROR	P ER CRS	ALOG	1/1	$A6_08$	07 01	4T96-16	7_{001}-26	$6T_{00}$-23
1041	PITCH FINE ERROR	P ER FNE	ALOG	1/1	$A6_10$	04 02	4T96-07	7_{001}-34	$6T_{00}$-31

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
1042	PITCH TACH	P TACH	ALOG	1/16	A486	C1 64	4T92-54	7001-17	6T00-16
1043	PITCH FLYWHEEL SPEED	P FW SPD	ALOG	1/1	A611	05 02	4T96-82	7001-27	6T00-24
1044	PITCH PNEUMATIC MODULATOR	P PN MOD	ALOG	1/1	A612	13 00	4T96-52	7001-10	6T00-9 FM 10-11
1045	PITCH SOLENOID DUTY CYCLE	P SOL DC	ALOG	1/16	A550	C2 73	4T94-54	7001-33	6T00-30
1046	D.A./ACQ MODE STATUS	DA/AQ ST	ALOG	1/16	A095	02 08	4T80-74	7001-18	6T00-79
1047	(0.6)(0.3)(0.4) DEG. YAW BIAS STATUS	YBIAS ST	ALOG	1/16	A159	C8 17	4T82-74	7001-3	6T00-9
1048	(0.5)(1.6)(3.2) DEG PITCH POSIT BIAS STATUS	PBIAS ST	ALOG	1/16	A230	10 27	4T84-54	7001-2	6T00-78
1049	PLUS OR MINUS PITCH POSIT BIAS/ YAW POSIT BIAS/ RMP A/B STATUS	PYPMP ST	ALOG	1/16	A287	12 35	4T86-74	7001-20	6T00-17
1050	PITCH AND ROLL MOM. UNLOAD	PR UNLD	ALOG	1/16	A361	02 46	4T88-01	7001-37	6T00-32
1051	LOW VOLTAGE-PNEU INTERLOCK	LV/P INT	ALOG	1/16	A420	12 54	4T90-52	7001-46	6T00-41
1052	PNEU INTERLOCK BYPASS AND YAW FINE CONTROL	YFN C EN	ALOG	1/16	A485	18 63	4T92-31	7001-29	6T00-26
1053	SLB PHASE A CLOCK	CLOCK A	ALOG	1/16	A548	18 72	4T94-52	7001-38	6T00-33
1054	SLB PHASE B CLOCK	CLOCK B	ALOG	1/16	A094	C1 08	4T80-50	7001-21	6T00-18
1055	SLB PLUS OR MINUS 10 VOLT SUPPLY	+/- 10V	ALOG	1/16	A158	C2 17	4T82-50	7001-23	6T00-20
1056	SLB PLUS OR MINUS 6 VOLT SUPPLY	+/- 6V	ALOG	1/16	A229	C8 27	4T84-31	7001-9	6T00-08
1057	SLB POWER SUPPLY VOLTAGE	P/S VOLT	ALOG	1/16	A360	C1 46	4T88-17	7001-30	6T00-27
1058	SLB MOTOR DRIVER CARD TEMP.	MTR DR T	ALOG	1/16	A484	15 63	4T92-52	7001-4	6T00-3
1059	SLB POWER SUPPLY CARD TEMP.	PS CRD T	ALOG	1/16	A549	C1 73	4T94-31	7001-13	6T00-12
1060	RLNA INTO YAW OUT/IN	RLNA-YAW	DIG B	1/16	2B48	10 01	4T02-34	7001-36	6T00-81
1061	400 RPM INTERLK DIS/EN	400 RPM	DIG B	1/16	2B49	12 01	4T02-10	7001-44	6T00-39
1062	ROLL ( ) SOLENOID ON/OFF	R + SOL	DIG B	1/1	8B33	16 02	4T02-31	7001-15	6T00-14
1063	ROLL - SOLENOID ON/OFF	R - SOL	DIG B	1/1	5B34	17 02	4T04-74	7001-48	6T00-43
1064	PITCH ( ) SOLENOID ON/OFF	P SOL	DIG B	1/1	5B35	16 03	4T04-28	7001-49	6T00-44
1065	PITCH (-) SOLENOID ON/OFF	P - SOL	DIG B	1/1	5B36	17 03	4T06-74	7001-32	6T00-29
1066	YAW ( ) SOLENOID ON/OFF	Y SOL	DIG B	1/1	7B33	16 02	4T02-70	7001-31	6T00-28
1067	YAW (-) SOLENOID ON/OFF	Y - SOL	DIG B	1/1	3B37	16 04	4T06-66	7001-14	6T00-13
	YAW RATE GYRO (YRG)								
1070	YRG HOUSING TEMPERATURE	YRG HS T	ALOG	1/16	A093	18 07	4T80-29	7302-3	6T01-13
1071	YRG WHEEL SPEED	YRG+PD+	ATOG+	1/16	AA57	01 17	4T82-29	7302-5	6T01-14
1072	YRG INDICATED RATE	YRG RATE	ALOG	1/1	A613	13 04	4T96-31	7302-1	6T01-12 FM 10-1
	RATE MEASURING PACKAGE NO 1								
1080	RMP SUPPLY VOLTAGE NO 1	RP1 PS V	ALOG	1/16	A220	01 26	4T84-30	7502-3	6T01-60
1081	RMP MOTOR VOLTAGE NO 1	RR1 -0 V	A -++-	1/1	1+8	10	4T86-50	7502-4	6T0 -61
1082	RMP MOTOR CURRENT NO 1	RP1 MT I	ALOG	1/16	A351	15 44	4T88-74	7502-5	6T01-62
1083	RMP A HEATER POWER	RMP HTRP	ALOG	1/16	A415	18 53	4T90-74	7502-7	6T01-64
1084	RMP GYRO TEMPERATURE NO 1	RP1 GY T	ALOG	1/16	A479	01 63	4T92-74	7502-9	6T01-65
1085	RMP PACKAGE TEMP NO 1	RP1 PK T	ALOG	1/16	A543	02 72	4T94-74	7502-10	6T01-66
1086	RMP INDICATED RATE (MEDIUM RESOLUTION) NO 1	RP1 IR M	ALOG	1/1	A614	06 02	4T96-54	7502-12	6T01-68

C-14	FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	1087	RMP INDICATED RATE (HIGH RESOLUTION) NO 1	RP_1 IR H	ALOG	1/1	$A6_0{}^9$	0^9 01	$4T96-03$	75_02-11	$6T_01-57$
	~~1088~~	~~RMP RELAY GROUP A STATUS NO 1~~	~~RP_1 ASTA~~	~~ALOG~~	~~1/16~~	~~$A_0{}^92$~~	~~$15\ 0^7$~~	~~$4T8_0-30$~~	~~75_02-1~~	~~$6T_01-58$~~
	1089	RMP RELAY GROUP B STATUS NO 1	RP_1 BSTA	ALOG	1/16	$A156$	18 16	$4T82-30$	75_02-2	$6T_01-59$

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
1090	RMP SUPPLY VOLTAGE NO 2	RP2 PS V	ALOG	1/16	A219	18 25	4T84-69	7602-3	6T01-54
1091	RMP MOTOR VOLTAGE NO 2	RP2 MT V	ALOG	1/16	A285	08 35	4T86-29	7602-4	6T01-63
1092	RMP MOTOR CURRENT NO 2	RP2 MT I	ALOG	1/16	A350	12 44	4T88-50	7602-5	6T01-69
1093	RMP HEATER POWER NO 2	RP2 HTRP	ALOG	1/16	A414	15 53	4T90-50	7602-7	6T01-78
1094	RMP GYRO TEMPERATURE NO 2	RP2 GY T	ALOG	1/16	A478	18 62	4T92-50	7602-9	6T01-79
1095	RMP PACKAGE TEMPERATURE NO 2	RP2 PK T	ALOG	1/16	A542	21 72	4T94-50	7602-10	6T01-80
1096	RMP INDICATED RATE (MEDIUM RESOLUTION) NO 2	RP2 IR M	ALOG	1/1	A616	09 02	4T96-17	7602-12	00/ 08
1097	RMP INDICATE RATE (HIGH RESOLUTION) NO 2	RP2 IR H	ALOG	1/1	A617	07 02	4T96-01	7602-11	6T01-81
1098	RMP RELAY GROUP A STATUS NO 2	RP2 ASTA	ALOG	1/16	A091	12 07	4T80-69	7602-1	6T01-51
1099	RMP RELAY GROUP B STATUS NO 2	RP2 BSTA	ALOG	1/16	A155	15 16	4T82-69	7602-2	6T01-52
	INITATION TIMER								
1200	INITIATION TIMER T15	15S TMR	ALOG	1/16	A218	15 25	4T84-43	8003-8	6T00-84
1201	INITIATION TIMER T50	50S TMR	ALOG	1/16	A284	02 35	4T86-30	8003-9	6T00-85
1202	INITIATION TIMER RESET ON/OFF	TIMR RST	DIG B	1/16	4B38	01 00	4T85-01	8003-7	6T00-83
	PNEUMATICS								
1210	GAS TANK TEMPERATURE	TANK T	ALOG	1/16	A349	10 44	4T88-29	7702-3	6T01-53
1211	MANIFOLD TEMPERATURE	MANFLD T	ALOG	1/16	A413	12 53	4T90-29	7702-5	6T01-55
1212	GAS TANK PRESSURE (HIGH)	TANK P	ALOG	1/16	A477	15 62	4T92-29	7702-9	6T01-57
1213	MANIFOLD PRESSURE (LOW)	MANFLD P	ALOG	1/16	A541	18 71	4T94-29	7702-7	6T01-56
	SOLAR ARRAY DRIVE (RIGHT)								
1220	SAD RIGHT MTR. WINDING VOLT	SDR MWDV	ALOG	1/1	A619	09 00	4T96-36	7413-11	6T00-48
1221	SAD RIGHT TACH OUTPUT	SDR TACH	ALOG	1/1	A520	05 03	4T96-15	7413-16	6T00-52
1222	SAD RIGHT MECH HOUSING TEMP	SDR MHGT	ALOG	1/16	A090	10 07	4T80-43	7413-9	6T00-46
1223	SAD RIGHT MTR WINDING TEMP	SDR MWDT	ALOG	1/16	A154	12 16	4T82-43	7413-10	6T00-47
1224	SAD RIGHT END SUN SENSOR TMP	SDR ESST	ALOG	1/16	A217	12 25	4T84-24	7413-22	6T00-56
1225	SAD RIGHT REAR SUN SUNSOR TEMP	SDR RSST	ALOG	1/16	A283	01 35	4T86-69	7413-21	6T00-57
1226	SAD RIGHT SUN SENSOR PREAMP OUTPUT	SDR SSPA	ALOG	1/16	A348	08 44	4T86-30	7413-18	6T00-54
1227	SAD RIGHT +15V CONVERTER	SDR +15V	ALOG	1/16	A412	10 53	4T90-30	7413-20	6T00-56
1228	SAD RIGHT HOUSING PRESSURE	SDR PRES	ALOG	1/16	A476	12 62	4T92-30	7413-14	6T00-50
1229	SAD RIGHT RATE BIAS NORMAL/HIGH	SDR RATE	DIG B	1/16	2B50	15 01	4T04-34	7413-17	6T00-53
1230	SAD RIGHT PHASE SWITCH CW/CCW	SDR PHSW	DIG B	1/16	2B51	18 01	4T04-10	7413-12	6T00-49

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	SOLAR ARRAY DRIVE (LEFT)								
124_0	SAD LEFT MTR WINDING VOLT	SDL MWDV	ALOG	1/1	A621	06 03	4T96-53	7423-11	6T01-20
1241	SAD LEFT TACH OUTPUT	SDL TACH	ALOG	1/1	A622	07 03	4T96-33	7423-16	6T01-24
1242	SAD LEFT MECH HOUSING TEMP	SDL MHGT	ALOG	$1/16$	$A540$	15 7_1	4T94-30	7423-9	6T01-18
1243	SAD LEFT MTR WINDING TEMP	SDL MWDT	ALOG	$1/16$	A_089	08 0^7	$4T8_0$-24	7423-10	6T01-19
1244	SAD LEFT FWD SUN SENSOR TEMP	SDL FSST	ALOG	$1/16$	A153	10 16	4T82-24	7423-22	6T01-30
1245	SAD LEFT REAR S/S TEMP	SDL RSST	ALOG	$1/16$	$A2_16$	1_0 25	4T84-11	7423-21	6T01-29
1246	SAD LEFT SUN SENSOR PREAMP OUTPUT	SDL SSPA	ALOG	$1/16$	A282	18 34	4T86-43	7423-18	6T01-26
1247	SAD LEFT -15V CONVERTER	SDL -15V	ALOG	$1/16$	A347	02 44	4T88-69	7423-20	6T01-28
1248	SAD LEFT HOUSING PRESSURE	SDL PRES	ALOG	$1/16$	$A4_{11}$	08 53	$4T9_0$-69	7423-14	6T01-22
1249	SAD LEFT RATE BIAS NORMAL/HI	SDL RATE	DIG B	$1/16$	$2B52$	01 02	$4T_06$-34	7423-17	6T01-25
125_0	SAD LEFT PHASE SWITCH CW/CCW	SDL PHSW	DIG B	$1/16$	2B53	02 02	$4T_06$-10	7423-12	6T01-21
NOTE	-- ALSO SEE ELECTRICAL INTERFACE S/S								
	ACS STRUCTURAL TEMPERATURES								
126_0	BASEPLATE 1 TEMP -Y	$TH_{01}BP$-Y	ALOG	$1/16$	A475	1_0 62	$4T_92$-69	8_{102}-17	6T01-76
126_1	BASEPLATE 2 TEMP X	$TH_{02}BP$ X	ALOG	$1/16$	A539	12 7_1	4T94-69	8_{102}-28	6T01-75
126_2	BASEPLATE 3 TEMP Y	$TH_{03}BP$ Y	ALOG	$1/16$	A_088	02 0^7	$4T8_0$-11	8_{102}-29	6T01-74
1263	THERMAL SHIELD 4 TEMP Y	$TH_{04}TS$ Y	ALOG	$1/16$	$A4_52$	08 16	$4T_82$-11	8_{102}-31	6T01-73
1264	THERMAL SHIELD 5 TEMP -X	$TH_{05}TS$-X	ALOG	$1/16$	$A2_15$	08 25	4T84-46	8_{102}-12	6T01-72
1265	THERMAL SHIELD 6 TEMP -Y	$TH_{06}TS$-Y	ALOG	$1/16$	$A28_1$	15 34	4T86-24	8_{102}-11	6T01-71
1266	THERMAL SHIELD 7 TEMP X	$TH_{07}TS$ X	ALOG	$1/16$	A346	01 44	4T88-43	8_{102}-10	6T01-70
1267	THERMAL SHIELD 8 TEMP Z	$TH_{08}TS$ Z	ALOG	$1/16$	$A4_{10}$	02 53	$4T9_0$-43	8_{102}-30	6T01-77
1268	LOUVER HOUSING XEND 9 TEMP	$TH_{01}LH$ X	ALOG	$1/16$	A474	08 62	4T92-43	8_{102}-16	6T01-10
1269	LOUVER HOUSING MIDPOINT 10 TEMP	$TH_{02}LH$	ALOG	$1/16$	A536	1_0 7_1	4T94-43	8_{102}-19	6T01-23
127_0	FWD IR SCANNER MTG 11 TMP	$TH_{01}FSC$	ALOG	$1/16$	A_087	01 0^7	$4T8_0$-46	8_{102}-15	6T01-27
127_1	REAR IR SCANNER MTG 12 TEMP	$TH_{02}RSC$	ALOG	$1/16$	$A15_1$	02 16	4T82-46	8_{102}-14	6T01-35
1272	PNEU CYL AT MTG INTERFACE 13 TEMP	$TH_{01}LCY$	ALOG	$1/16$	$A2_14$	02 25	4T84-13	8_{102}-18	6T01-26
1273	LOWER STRUCTURE AT BASE OF CYLINDER 14 TEMP	$TH_{01}LSCB$	ALOG	$1/16$	$A28_0$	12 34	4T86-11	8_{102}-13	6T01-38
1274	PNEU CYL TOP 15 TEMP	$TH_{01}UCY$	ALOG	$1/16$	A345	18 43	4T88-24	8_{102}-32	6T01-39
1275	LEFT SAD RADIATOR 16 TEMP X	$TH_{01}LRAD$	ALOG	$1/16$	A247	15 32	4T86-72	8_{102}-33	6T01-45
1276	RIGHT SAD RADIATOR 17 TEMP -X	$TH_{01}RRAD$	ALOG	$1/16$	A473	02 62	4T92-24	8_{102}-34	6T01-48
1277	ICM ZENER VOLTAGE	ICM ZN V	ALOG	$1/16$	A537	08 7_1	4T94-24	8_{102}-20	6T01-24
1278	YAW NOZZLE ARM 20 TEMP	$TH_{01}YNZL$	ALOG	$1/16$	A344	15 43	4T88-11	8_{102}-37	6T01-83
1279	RIGHT+X RADIATOR 18 TEMP	$TH_{01}RR$ X	ALOG	$1/16$	A449	15 58	4T92-23	8_{102}-35	6T01-49
128_0	LOUVER HOUSING -X END 19 TEMP	$TH_{03}LH$-X	ALOG	$1/16$	A456	15 59	4T92-12	8_{102}-36	6T01-50

NUMBER 2000 - ORBIT ADJUST SUBSYSTEM

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FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	ORBIT ADJUST S/S								
2001	PROPELLANT TANK TEMPERATURE	P TANK T	ALOG	1/16	A086	18 06	4T80-13	5003-C	
2003	THRUST CHAMBER NO. 1 TEMPERATURE	CHMB 1 T	ALOG	1/16	A341	08 43	4T88-51	5003-Y	
2004	THRUST CHAMBER NO.2 TEMPERATURE	CHMB 2 T	ALOG	1/16	A405	10 52	4T90-51	5003-Z	
2005	THRUST CHAMBER NO.3 TEMPERATURE	CHMB 3 T	ALOG	1/16	A469	12 61	4T92-51	5003-a	
2006	LINE PRESSURE	LINE P	ALOG	1/16	A534	18 70	4T94-13	5003-R	
2007	SOLENOID VALVE NO.1 ON/OFF	SOLND 1	DIG B	1/1	7834	17 02	4T04-77	5003-A	
2008	SOLENOID VALVE NO.2 ON/OFF	SOLND 2	DIG B	1/1	7836	17 03	4T06-77	5003-C	
2009	SOLENOID VALVE NO.3 ON/OFF	SOLND 3	DIG B	1/1	7837	16 04	4T06-70	5003-E	
	NOTE SEE ELECTRICAL INTERFACE S/S								

3000 - ATTITUDE MEASUREMENT SENSOR SUBSYSTEM

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	ATTITUDE MEASUREMENT SENSOR								
3000	+ROLL SIGNAL	ROLL +	ALOG	$1/1$	A623	09 03	4T96-18	$5G_{03}$-A	
3001	-ROLL SIGNAL	ROLL -	ALOG	$1/1$	A624	05 04	4T96-09	$5G_{03}$-B	
3002	+PITCH SIGNAL	PITCH +	ALOG	$1/1$	A625	06 04	4T96-06	$5G_{03}$-E	
3003	-PITCH SIGNAL	PITCH -	ALOG	$1/1$	A626	04 04	4T96-06	$5G_{03}$-F	
3004	TEMPERATURE NO.1 (CASE)	CASE T_1	ALOG	$1/16$	$A4_08$	18 52	$4T9_0$-11	$5G_{03}$-J	
3005	TEMPERATURE NO.2 (I.R. ASSEMBLY)	ASSY T_2	ALOG	$1/16$	A472	01 62	$4T9_2$-11	$5G_{03}$-K	

NOTE SEE ELECTRICAL INTERFACE S/S

MAGNETIC MOMENTS COMPENSATING ASSY.
4000

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	IAT CONN
4001	BOARD A_1 TEMP	A_1 BRD T	ALOG	1/16	A491	15 64	4T92-36	5G08-20	
4002	BOARD A_2 TEMP	A_2 BRD T	ALOG	1/16	A555	18 73	4T94-36	5G08-19	
4003	HALL SENSOR CURRENT	HALL CUR	ALOG	1/16	A064	15 03	4T80-10	5G08-21	
4004	YAW FLUX DENSITY	Y FLUX D	ALOG	1/16	A128	18 12	4T82-10	5G08-17	
4005	PITCH FLUX DENSITY	P FLUX D	ALOG	1/16	A384	10 49	4T90-10	5G08-16	
4006	ROLL FLUX DENSITY	R FLUX D	ALOG	1/16	A320	05 40	4T88-10	5G08-18	
4007	POWER ON/OFF	POWER	DIG B	1/16	1863	12 03	4T08-61	5G08-09	
4008	CAPACITOR DUMP/CHARGE	CAP	DIG B	1/16	2839	C2 00	4T08-02	5G08-10	
4010	POLARITY (+)/(-)	POL	DIG B	1/16	2841	10 00	4T02-19	5G08-07	
4012	CAPACITOR HI/LO	CAPTANCE	DIG B	1/16	2843	15 00	4T04-19	5G08-12	
4013	YAW COIL OUT/IN	Y COIL	DIG B	1/16	2844	18 00	4T06-57	5G08-05	
4014	PITCH COIL OUT/IN	P COIL	DIG B	1/16	2845	C1 01	4T06-19	5G08-04	
4015	ROLL COIL OUT/IN	R COIL	DIG B	1/16	2846	C2 01	4T08-57	5G08-06	

NUMBER 5000 - MECHANICAL SUBSYSTEM

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	IAT CONN
	MECHANICAL SUBSYSTEM								
5001	SQUIB ARM POWER	SQIB PWR	DIG B	1/1	0833	16 02	4T02-39	5P30-A	
5002	SPACECRAFT SEPARATION SW,	SEP SW	DIG B	1/1	0834	17 02	4T04-84	5P30-H	
5003	UNFOLD TIMER 1 FIRED (2.5 SEC)	UF 1 2.5	DIG B	1/1	0835	16 03	4T04-39	5P30-C	
5004	UNFOLD TIMER 2 FIRED (5.0 SEC)	UF 2 5.0	DIG B	1/1	0836	17 03	4T06-84	5P30-F	

NUMBER 6000 - POWER SUBSYSTEM

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	BATTERIES 1 THRU 8								
5001	BATTERY 1 DISCHARGE CURRENT	BAT1 DIS	ALOG	1/16	A096	C8 08	4T80-16	1P04-02	5714-28
5002	BATTERY 2 DISCHARGE CURRENT	BAT2 DIS	ALOG	1/16	A160	10 17	4T82-16	1P03-02	5712-18
5003	BATTERY 3 DISCHARGE CURRENT	BAT3 DIS	ALOG	1/16	A224	12 26	4T84-16	1P21-02	5712-23
5004	BATTERY 4 DISCHARGE CURRENT	BAT4 DIS	ALOG	1/16	A288	15 35	4T86-16	2P15-02	5710-59
5005	BATTERY 5 DISCHARGE CURRENT	BAT5 DIS	ALOG	1/16	A352	18 44	4T88-16	3P04-02	
5006	BATTERY 6 DISCHARGE CURRENT	BAT6 DIS	ALOG	1/16	A416	01 54	4T90-16	4P03-02	5714-51
5007	BATTERY 7 DISCHARGE CURRENT	BAT7 DIS	ALOG	1/16	A480	02 63	4T92-16	4P09-02	5714-55
5008	BATTERY 8 DISCHARGE CURRENT	BAT8 DIS	ALOG	1/16	A544	C8 72	4T94-16	4P15-02	5714-59
5011	BATTERY 1 CHARGE CURRENT	BAT1 CHG	ALOG	1/16	A097	10 08	4T80-03	1P04-03	5714-29
5012	BATTERY 2 CHARGE CURRENT	BAT2 CHG	ALOG	1/16	A161	12 17	4T82-03	1P03-03	5712-19
5013	BATTERY 3 CHARGE CURRENT	BAT3 CHG	ALOG	1/16	A225	15 26	4T84-03	1P21-03	5712-24
5014	BATTERY 4 CHARGE CURRENT	BAT4 CHG	ALOG	1/16	A289	18 35	4T86-03	2P15-03	5710-60
5015	BATTERY 5 CHARGE CURRENT	BAT5 CHG	ALOG	1/16	A353	01 45	4T88-03	3P04-03	
5016	BATTERY 6 CHARGE CURRENT	BAT6 CHG	ALOG	1/16	A589	15 78	4T96-73	4P03-03	5714-52
5017	BATTERY 7 CHARGE CURRENT	BAT7 CHG	ALOG	1/16	A481	C8 63	4T92-03	4P09-03	5714-56
5018	BATTERY 8 CHARGE CURRENT	BAT8 CHG	ALOG	1/16	A545	10 72	4T94-03	4P15-03	5714-60
5021	BATTERY 1 VOLTAGE	BAT1 VLT	ALOG	1/16	A098	12 08	4T80-07	1P04-04	5714-30
5022	BATTERY 2 VOLTAGE	BAT2 VLT	ALOG	1/16	A162	15 17	4T82-07	1P03-04	5712-20
5023	BATTERY 3 VOLTAGE	BAT3 VLT	ALOG	1/16	A226	18 26	4T84-07	1P21-04	5712-25
5024	BATTERY 4 VOLTAGE	BAT4 VLT	ALOG	1/16	A290	C1 36	4T86-07	2P15-04	5710-61
5025	BATTERY 5 VOLTAGE	BAT5 VLT	ALOG	1/16	A354	C8 45	4T88-07	3P04-04	
5026	BATTERY 6 VOLTAGE	BAT6 VLT	ALOG	1/16	A418	C8 54	4T90-07	4P03-04	5714-53
5027	BATTERY 7 VOLTAGE	BAT7 VLT	ALOG	1/16	A482	10 63	4T92-07	4P09-04	5714-57
5028	BATTERY 8 VOLTAGE	BAT8 VLT	ALOG	1/16	A546	12 72	4T94-07	4P15-04	5714-61
5031	BATTERY NO. 1 TEMPERATURE	BAT1 TMP	ALOG	1/16	A099	15 08	4T80-82	1P04-05	5714-31
5032	BATTERY NO. 2 TEMPERATURE	BAT2 TMP	ALOG	1/16	A163	18 17	4T82-82	1P03-05	5712-21
5033	BATTERY NO. 3 TEMPERATURE	BAT3 TMP	ALOG	1/16	A227	C1 27	4T84-82	1P21-05	5712-26
5034	BATTERY NO. 4 TEMPERATURE	BAT4 TMP	ALOG	1/16	A291	C2 36	4T86-82	2P15-05	5710-62
5035	BATTERY NO. 5 TEMPERATURE	BAT5 TMP	ALOG	1/16	A355	C8 45	4T88-82	3P04-05	
5036	BATTERY NO. 6 TEMPERATURE	BAT6 TMP	ALOG	1/16	A419	10 54	4T90-82	4P03-05	5714-54
5037	BATTERY NO. 7 TEMPERATURE	BAT7 TMP	ALOG	1/16	A483	12 63	4T92-82	4P09-05	5714-58
5038	BATTERY NO. 8 TEMPERATURE	BAT8 TMP	ALOG	1/16	A547	15 72	4T94-82	4P15-05	5714-62

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
6040	502 PADDLE TEMPERATURE	RT PAD T	ALOG	1/16	A292	08 36	4T86-52	7417-P	5715-31
6041	502 PADDLE VOLTAGE #N#	RPAD V P	ALOG	1/16	A357	12 45	4T88-31	7417-R	5715-28
6042	502 PADDLE VOLTAGE #M#	RPAD V O	ALOG	1/16	A294	12 36	4T86-54	7417-S	5715-29
	SOLAR ARRAY PADDLE 501 (LEFT)								
6044	501 PADDLE TEMPERATURE	LT PAD T	ALOG	1/16	A356	10 45	4T88-52	7427-P	5715-30
6045	501 PADDLE VOLTAGE #F#	LPAD V F	ALOG	1/16	A293	10 36	4T86-31	7427-S	5715-27
6046	501 PADDLE VOLTAGE #G#	LPAD V G	ALOG	1/16	A358	15 45	4T88-54	7427-R	5715-26
	POWER CONTROL MODULE(PCM)								
6050	UNREGULATED BUS VOLTAGE	UR BUS V	ALOG	1/16	A100	18 08	4T80-52	2P03-04	5710-63
6051	REGULATED BUS VOLTAGE	RG BUS V	ALOG	1/16	A165	02 18	4T82-31	2P03-05	5710-64
6052	AUXILIARY REGULATOR #A## VOLTAGE	AUX A V	ALOG	1/16	A164	01 18	4T82-52	2P03-06	5710-65
6053	AUXILIARY REGULATOR #B##,VOLTAGE	AUX B V	ALOG	1/16	A228	02 27	4T84-52	2P03-07	5710-66
6054	SOLAR ARRAY CURRENT	SOLAR I	ALOG	1/16	A101	01 09	4T80-31	2P03-08	5710-67
6055	REGULATED BUS CURRENT	RG BUS I	ALOG	1/1	A600	11 00	4T96-11	2P03-10	5710-68 FM 10-11
6056	REGULATED BUS CURRENT	RG BUS I	ALOG	1/1	A618	04 03	4T96-81	2P03-09	5710-69
6058	PCM THERMISTOR NO. 43 HOT SPOT (RT_1)	PCMOD T_1	ALOG	1/16	A192	01 22	4T84-10	P5T04-36	
6059	PCM THERMISTOR NO. 35 MODULE TEMP (RT_2)	PCMOD T_2	ALOG	1/16	A256	02 31	4T86-10	P5T12-11	
6060	TRICKLE CHARGE OVERRIDE/NORMAL	TRKL CHG	DIG B	1/16	0B58	18 02	4T04-23	2P03-15	5710-70
6061	PWM REGULATOR 1/2	PWM REG	DIG B	1/16	0B44	18 00	4T06-68	2P03-02	5710-71
	PAYLOAD REGULATOR MODULE(PRM)								
6070	PAYLOAD REG. BUS VOLTAGE	PRG BS V	ALOG	1/16	A200	02 23	4T84-12	1P09-05	5712-32
6071	PAYLOAD UNREG. BUS VOLTAGE	PUR BS V	ALOG	1/16	A265	10 32	4T86-26	1P09-04	5712-27
6072	PAYLOAD REG. BUS CURRENT	PRG BS I	ALOG	1/1	A615	11 03	4T96-34	1P09-10	5712-28 FM 10-11
6073	PAYLOAD AUX. REG. VOLTAGE A	PAUX A V	ALOG	1/16	A264	08 32	4T86-12	1P09-06	5712-29
6074	PAYLOAD AUX. REG. VOLTAGE B	PAUX B V	ALOG	1/16	A328	10 41	4T88-12	1P09-07	5712-30
6075	PRM THEMISTOR NO. 38 TOP OUTBOARD	PRMOD T_1	ALOG	1/16	A193	02 22	4T84-23	P5T12-17	
6076	PRM THERMISTOR NO.69 CENTER INBOARD	PRMOD T_2	ALOG	1/16	A257	08 31	4T86-23	P5T12-18	
6077	PWM REGULATOR 3/4	PWM REG	DIG B	1/16	0B43	15 00	4T04-40	1P09-02	5712-31
6100	PAYLOAD REG. BUS CURRENT	PRG BS I	ALOG	1/1	A633	17 04	4T96-02	1P09-09	5712-26
	NOTE SEE ELECTRICAL INTERFACE S/S								

NUMBER 7_{000} - THERMAL SUBSYSTEM

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	THERMAL SUBSYSTEM								
7_{001}	SEPARATOR NO.1,TOP INBOARD	$TH_{01}STI$	ALOG	1/16	A120	15 11	$4T8_0$-05	$5T_04$-07	
7_{002}	SEPARATOR NO.2, BOTTOM OUTBOARD	TH_02SBO	ALOG	1/16	A121	18 11	$4T8_0$-02	$5T_12$-07	
7_{003}	SEPARATOR NO.3, TOP INBOARD	TH_03STI	ALOG	1/16	A122	01 12	$4T8_0$-19	$5T_20$-07	
7_{004}	TEMP CONTROL BELLOWS NO. 10	$TH_{10}TCB$	ALOG	1/16	A123	02 12	$4T8_0$-76	$5T_04$-25	
7_{005}	SEPARATOR NO.4, TOP INBOARD	TH_04STI	ALOG	1/16	A124	08 12	$4T8_0$-79	$5T_12$-25	
7_{006}	SEPARATOR NO.5, BOTTOM OUTBOARD	TH_05SBO	ALOG	1/16	A125	10 12	$4T8_0$-58	$5T_20$-25	
7_{007}	REAR BULKHEAD GAS -X THRUSTER	TH_0AS-X	ALOG	1/16	A126	12 12	$4T8_0$-35	$5T_04$-26	
7_{008}	SEPARATOR NO.6, TOP OUTBOARD	TH_06STO	ALOG	1/16	A127	15 12	$4T8_0$-57	$5T_12$-26	
7_{009}	SEPARATOR NO.6, BOTTOM INBOARD	TH_06SBI	ALOG	1/16	A184	18 20	$4T8_2$-05	$5T_20$-26	
7_{010}	SEPARATOR NO.7, TOP INBOARD	TH_07STI	ALOG	1/16	A185	01 21	$4T8_2$-02	$5T_04$-19	
7_{011}	SEPARATOR NO.8, TOP OUTBOARD	TH_08STO	ALOG	1/16	A186	02 21	$4T8_2$-19	$5T_12$-19	
7_{012}	SEPARATOR NO.9, BOTTOM INBOARD	TH_09SBI	ALOG	1/16	A187	08 21	$4T8_2$-76	$5T_20$-19	
7_{013}	SEPARATOR NO.10, BOTTOM OUTBOARD	$TH_{10}SBO$	ALOG	1/16	A188	10 21	$4T8_2$-79	$5T_04$-35	
7_{014}	SEPARATOR NO.11, TOP INBOARD	$TH_{11}STI$	ALOG	1/16	A189	12 21	$4T8_2$-58	$5T_12$-35	
7_{015}	SEPARATOR NO.12, BOTTOM OUTBOARD	TH_12SBO	ALOG	1/16	$A190$	15 21	$4T8_2$-35	$5T_20$-35	
7_{016}	SEPARATOR NO.13, TOP INBOARD	TH_13STI	ALOG	1/16	$A191$	18 21	$4T8_2$-57	$5T_04$-33	
7_{017}	RRV BEAM CENTER LINE	THRBVCL	ALOG	1/16	A248	01 30	$4T84$-05	$5T_12$-33	
7_{018}	SEPARATOR NO.14, TOP OUTBOARD	TH_14STO	ALOG	1/16	A249	02 30	$4T84$-02	$5T_20$-33	
7_{019}	VRTR RADIATOR BAY 4 OUTBOARD	TH_04NBR	ALOG	1/16	$A250$	08 30	$4T84$-19	$5T_04$-31	
7_{020}	SEPARATOR NO.15, BOTTOM INBOARD	TH_15SBI	ALOG	1/16	$A251$	10 30	$4T84$-76	$5T_12$-31	
7_{021}	SEPARATOR NO.16, TOP INBOARD	TH_16STI	ALOG	1/16	$A252$	12 30	$4T84$-79	$5T_20$-31	
7_{022}	SEPARATOR NO.17, BOTTOM INBOARD	TH_17SBI	ALOG	1/16	$A253$	15 30	$4T84$-56	$5T_04$-29	
7_{023}	SEPARATOR NO.18, BOTTOM OUTBOARD	TH_18SBO	ALOG	1/16	$A254$	18 30	$4T84$-35	$5T_12$-29	
7_{030}	UPPER RING AT BAY NO.3	TH_03BUR	ALOG	1/16	$A255$	01 31	$4T84$-57	$5T_20$-29	
7_{033}	UPPER RING AT BAY NO.12	TH_12BUR	ALOG	1/16	$A314$	10 39	$4T86$-19	$5T_20$-16	
7_{035}	UPPER RING AT BAY NO.18	TH_18BUR	ALOG	1/16	$A316$	15 39	$4T86$-79	$5T_12$-14	
7_{040}	TEMPERATURE CONTROL BELLOWS NO.1	TH_01TCB	ALOG	1/16	$A317$	18 39	$4T86$-58	$5T_20$-14	
7_{041}	TEMPERATURE CONTROL BELLOWS NO.2	TH_02TCB	ALOG	1/16	$A318$	01 40	$4T86$-35	$5T_04$-12	
7_{042}	TEMPERATURE CONTROL BELLOWS NO. 3	TH_03TCB	ALOG	1/16	$A319$	02 40	$4T86$-57	$5T_12$-12	
7_{043}	TEMPERATURE CONTROL BELLOWS NO.4	TH_04TCB	ALOG	1/16	A376	08 48	$4T88$-05	$5T_20$-12	
7_{044}	TEMPERATURE CONTROL BELLOWS NO.5	TH_05TCB	ALOG	1/16	A377	10 48	$4T88$-02	$5T_04$-11	
7_{045}	TEMPERATURE CONTROL BELLOWS NO. 7	TH_07TCB	ALOG	1/16	A378	12 48	$4T88$-19	$5T_20$-11	
7_{046}	TEMPERATURE CONTROL BELLOWS NO9	TH_09TCB	ALOG	1/16	A379	15 48	$4T88$-76	$5T_04$-17	
7_{047}	SPARE								
7_{048}	TEMPERATURE CONTROL BELLOWS NO.11	$TH_{11}TCB$	ALOG	1/16	$A38_0$	18 48	4T88-79	$5T_20$-17	
7_{049}	TEMPERATURE CONTROL BELLOWS NO12	TH_12TCB	ALOG	1/16	$A38_1$	01 49	$4T88$-58	$5T_04$-37	
7_{050}	TEMPERATURE CONTROL BELLOWS NO.13	TH_13TCB	ALOG	1/16	A382	02 49	$4T88$-35	$5T_12$-37	
7_{051}	TEMPERATURE CONTROL BELLOWS NO. 14	TH_14TCB	ALOG	1/16	A383	08 49	$4T88$-57	$5T_20$-37	
7_{052}	TEMPERATURE CONTROL BELLOWS NO. 16	TH_16TCB	ALOG	1/16	$A44_0$	10 57	$4T9_0$-05	$5T_12$-36	
7_{053}	TEMPERATURE CONTROL BELLOWS NO. 17	TH_17TCB	ALOG	1/16	$A51_9$	15 68	$4T94$-28	$5T_20$-36	
7_{054}	TEMPERATURE CONTROL BELLOWS NO. 18	TH_18TCB	ALOG	1/16	A442	15 57	$4T9_0$-19	$5T_04$-34	
7_{060}	SHUTTER ASSEMPLY BAY NO. 1	SH_01	ALOG	1/16	$A11_9$	12 11	$4T8_0$-56	$5T_04$-23	

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
7_{061}	SHUTTER ASSEMBLY BAY NO. 2	SH_02	ALOG	$1/1^6$	A_183	15 20	$4T8_2$-56	$5T_{12}$-23	
7_{062}	SHUTTER ASSEMBLY BAY NO. 3	SH_03	ALOG	$1/1^6$	A223	10 26	4T84-74	$5T_{20}$-23	
7_{063}	SHUTTER ASSEMBLY BAY NO. 4	SH_04	ALOG	$1/1^6$	A_311	01 39	4T86-56	$5T_04$-21	
7_{064}	SHUTTER ASSEMBLY BAY NO. 5	SH_05	ALOG	$1/1^6$	A375	02 48	4T88-56	$5T_{12}$-21	
7_{065}	SHUTTER ASSEMBLY,BAY NO. 7	SH_07	ALOG	$1/1^6$	A439	08 57	$4T9_0$-56	$5T_04$-22	
7_{067}	SHUTTER ASSEMBLY,BAY NO. 9	SH_09	ALOG	$1/1^6$	A567	12 75	4T94-56	$5T_{20}$-22	
7_{068}	SHUTTER ASSEMBLY,BAY NO. 10	SH_10	ALOG	$1/1^6$	A_118	10 11	$4T8_0$-55	$5T_04$-4	
7_{069}	SHUTTER ASSEMBLY,BAY NO. 11	SH_11	ALOG	$1/1^6$	A182	12 20	$4T8_2$-55	$5T_{12}$-4	
7_{070}	SHUTTER ASSEMBLY,BAY NO. 12	SH_12	ALOG	$1/1^6$	A222	08 26	4T84-55	$5T_{20}$-4	
7_071	SHUTTER ASSEMBLY,BAY NO. 13	SH_13	ALOG	$1/1^6$	A_310	18 38	4T86-55	$5T_04$-3	
7_072	SHUTTER ASSEMBLY,BAY NO. 14	SH_14	ALOG	$1/1^6$	A374	01 48	4T88-55	$5T_{12}$-3	
7_073	SHUTTER ASSEMBLY,BAY NO. 15	SH_15	ALOG	$1/1^6$	A438	09 57	$4T9_0$-55	$5T_{20}$-3	
7_074	SHUTTER ASSEMBLY,BAY NO. 16	SH_16	ALOG	$1/1^6$	A_501	02 66	$4T9_2$-32	$5T_04$-2	
7_075	SHUTTER ASSEMBLY,BAY NO. 17	SH_17	ALOG	$1/1^6$	A566	10 75	4T94-55	$5T_{12}$-2	
7_076	SHUTTER ASSEMBLY,BAY NO. 18	SH_18	ALOG	$1/1^6$	A_117	08 11	$4T8_0$-32	$5T_{20}$-2	
7_080	T/M CONV.MOD.,Q_1 THER. ZENER	$ZNVQ_1TH$	ALOG	$1/1^6$	A_181	10 20	$4T8_2$-32	$5T_04$-20	
7_081	T/M CONV. MOD.,Q_2 THER. ZENER	$ZNVQ_2TH$	ALOG	$1/1^6$	A221	02 26	4T84-29	$5T_{12}$-20	
7_082	T/M CONV. MOD.,Q_3 THER. ZENER	$ZNVQ_3TH$	ALOG	$1/1^6$	A_309	15 38	4T86-32	$5T_{20}$-20	
7_083	T/M CONV. MOD.,Q_1 SHUTTER ZENER	$ZNVQ_1SH$	ALOG	$1/1^6$	A373	18 47	4T88-32	$5T_04$-6	
7_084	T/M CONV. MOD.,Q_2 SHUTTER ZENER	$ZNVQ_2SH$	ALOG	$1/1^6$	A437	01 57	$4T9_0$-32	$5T_{12}$-6	
7_085	T/M CONV. MOD.,Q_3 SHUTTER ZENER	$ZNVQ_3SH$	ALOG	$1/1^6$	A_500	01 66	$4T9_2$-77	$5T_{20}$-6	
7_090	PSM MOUNT	THPSMH	ALOG	$1/1^6$	A443	18 57	$4T9_0$-78	$5T_{12}$-18	
7_091	INDEPENDANT ATTITUDE SENSOR MTG.	THIASM	ALOG	$1/1^6$	A444	01 58	$4T9_0$-79	$5T_{12}$-34	
7_092	RBV RADIATOR	THRBVR	ALOG	$1/1^6$	A445	09 58	$4T9_0$-58	$5T_{20}$-34	
7_093	RBV CAMERA SUPPORT BEAM(CENTER)	THRBVRC	ALOG	$1/1^6$	A446	08 58	$4T9_0$-35	$5T_{20}$-32	
7_094	WBVTR RADIATOR (ROOT)	THWBRRR	ALOG	$1/1^6$	A447	10 58	$4T9_0$-57	$5T_04$-32	
7_095	WBVTR RADIATOR (CENTER)	THWBRRC	ALOG	$1/1^6$	A_504	12 66	$4T9_2$-05	$5T_{12}$-32	
7_096	WBVTR HEAT STRAP	THWBRHS	ALOG	$1/1^6$	A_505	15 66	$4T9_2$-02	$5T_{12}$-10	
7_097	WB ELECTRONICS MOUNT OVER BAY NO. 1	TH_01WBE	ALOG	$1/1^6$	A_506	18 66	$4T9_2$-19	$5T_{20}$-10	
7_098	WB ELECTRONICS MOUNT OVER BAY NO. 8	TH_08WBE	ALOG	$1/1^6$	A_507	01 67	$4T9_2$-78	$5T_04$-18	
7_099	WBVTR 1, INBOARD OF SEPARATOR 3	TH_03WBP	ALOG	$1/1^6$	A_508	02 67	$4T9_2$-79	$5T_04$-30	
7_100	WBVTR 1, INBOARD OF SEPARATOR 17	TH_17WBR	ALOG	$1/1^6$	A_509	08 67	$4T9_2$-58	$5T_{12}$-30	
7_101	WBVTR 1, CENTER	THC_1WBR	ALOG	$1/1^6$	A_510	10 67	$4T9_2$-35	$5T_{20}$-30	
7_102	WBVTR 2, INBOARD OF BAY 4	TH_04WBR	ALOG	$1/1^6$	A_511	12 67	$4T9_2$-57	$5T_04$-28	
7_103	WBVTR 2 BEAM INBOARD OF BAY 15	TH_15WBR	ALOG	$1/1^6$	A568	15 75	$4T9_4$-05	$5T_{12}$-28	
7_104	WBVTR 2, BEAM CENTER	THC_2WBR	ALOG	$1/1^6$	A569	18 75	$4T9_4$-02	$5T_{20}$-28	
7_105	WBTR BEAM INBOARD OF SEPARATOR NO.6	TH_06NBR	ALOG	$1/1^6$	$A57_0$	01 76	$4T9_4$-19	$5T_04$-15	
7_106	WBTR BEAM INBOARD OF SEPARATOR NO.14	TH_14NBR	ALOG	$1/1^6$	$A57_1$	02 76	$4T9_4$-78	$5T_{12}$-15	
7_107	WBTR BEAM CENTER	THCHNBR	ALOG	$1/1^6$	$A57_2$	08 75	$4T9_4$-79	$5T_{20}$-15	
7_108	WSS MOUNT NEAR SEPARATOR NO. 14	TH_14WSS	ALOG	$1/1^6$	A573	10 76	4T94-58	$5T_04$-13	
7_109	REAR BULKHEAD OAS -Y THRUSTER	TH-YOAS	ALOG	$1/1^6$	A574	12 76	4T94-35	$5T_{12}$-13	
7_110	WSS MOUNT NEAR CENTER OF WBVTR BEAM	THCWHSS	ALOG	$1/1^6$	A575	15 76	$4T9_4$-57	$5T_{20}$-13	
7_111	REAR BULKHEAD OAS X THRUSTER	TH XOAS	ALOG	$1/1^6$	A_503	10 66	$4T9_2$-56	$5T_04$-10	

NOTE SEE ELECTRICAL INTERFACE S/S

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*                                       *
*   NUMBERS 8000, 9000, 10000, & 12000  *
*      COMMUNICATIONS AND DATA HANDLING *
*                                       *
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FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	IAT CONN
	COMMAND CLOCK NO.8000								
8001	PRIMARY W CHANNEL INPUT (DATA)	PRI W IN	ALOG	1/16	A116	02 11	4T80-77	2C13-37	5710-01
8002	PRIMARY X CHANNEL INPUT (STROBE)	PRI X IN	ALOG	1/16	A180	08 20	4T82-77	2C13-36	5710-02
8003	REDUNDANT W CHANNEL INPUT (DATA)	RED W IN	ALOG	1/16	A114	18 10	4T80-06	2C13-08	5710-03
8004	REDUNDANT X CHANNEL INPUT (STROBE)	RED X IN	ALOG	1/16	A178	01 20	4T82-06	2C13-23	5710-04
8005	PRIMARY POWER SUPPLY TEMPERATURE	PPS TEMP	ALOG	1/16	A247	18 29	4T84-56	2C13-30	5710-05
8006	REDUNDANT POWER SUPPLY TEMPERATURE	RPS TEMP	ALOG	1/16	A245	12 29	4T84-32	2C13-29	5710-06
8007	PRIMARY OSCILLATOR TEMPERATURE	POSC TMP	ALOG	1/16	A308	12 38	4T86-77	2C13-33	5710-07
8008	REDUNDANT OSCILLATOR TEMPERATURE	ROSC TMP	ALOG	1/16	A306	08 38	4T86-06	2C13-32	5710-08
8009	PRIMARY OSCILLATOR OUTPUT	POSC OUT	ALOG	1/16	A372	15 47	4T88-77	2C13-31	5710-09
8010	REDUNDANT OSCILLATOR OUTPUT	ROSC OUT	ALOG	1/16	A370	10 47	4T88-06	2C13-28	5710-10
8011	100 KHZ MASTER CLOCK	100KHZ	ALOG	1/16	A371	12 47	4T88-80	2C13-18	5710-11
8012	10KHZ	10KHZ	ALOG	1/16	A435	15 56	4T90-80	2C13-09	5710-12
8013	2.5 KHZ	2.5KHZ	ALOG	1/16	A498	15 65	4T92-06	2C13-34	5710-13
8014	400 HZ PH A/PH B	400HZ AB	ALOG	1/16	A564	02 75	4T94-77	2C13-22	5710-14
8015	PRIMARY +4 VDC	PRI 4V	ALOG	1/16	A436	18 56	4T90-77	2C13-04	5710-15
8016	REDUNDANT +4VDC	RED 4V	ALOG	1/16	A434	12 56	4T90-06	2C13-11	5710-16
8017	PRIMARY +6.0 VDC	PRI 6V	ALOG	1/16	A499	18 65	4T92-80	2C13-10	5710-17
8018	REDUNDANT +6.0VDC	RED 6V	ALOG	1/16	A497	12 65	4T92-08	2C13-05	5710-18
8019	PRIMARY -6.0VDC	PRI -6V	ALOG	1/16	A565	08 75	4T94-32	2C13-15	5710-19
8020	REDUNDANT -6.0VDC	RED -6V	ALOG	1/16	A563	01 75	4T94-80	2C13-06	5710-20
8021	PRIMARY -23 VDC	PRI -23V	ALOG	1/16	A115	01 11	4T80-80	2C13-01	5710-21
8022	REDUNDANT -23VDC	RED -23V	ALOG	1/16	A246	15 29	4T84-55	2C13-02	5710-22
8023	PRIMARY -29VDC	PRI -29V	ALOG	1/16	A179	02 20	4T82-80	2C13-13	5710-23
8024	REDUNDANT -29VDC	RED -29V	ALOG	1/16	A307	10 38	4T86-80	2C13-03	5710-24
8025	PRIMARY POWER SUPPLY ON/OFF	PPWR SUP	DIG B	1/16	7862	10 03	4T08-76	2C11-17	5710-25
8026	REDUNDANT POWER SUPPLY ON/OFF	RPWR SUP	DIG B	1/16	1839	02 00	4T08-41	2C11-33	5710-26
8027	POWER SUPPLY SELECT PRI./RED.	PWR SLCT	DIG B	1/16	0841	10 00	4T02-40	2C11-16	5710-27
8028	PRIMARY COMSTOR ON/OFF	PCOMSTOR	DIG B	1/16	1845	01 01	4T06-42	2C11-19	5710-28
8029	REDUNDANT COMSTOR ON/OFF	RCOMSTOR	DIG B	1/16	0840	08 00	4T02-68	2C11-36	5710-29
8030	MATRIX DECODER PRIMARY/REDUNDANT	MTX DCDR	DIG B	1/16	0842	12 00	4T04-68	2C11-08	5710-30
8031	MATRIX DRIVER A PRIMARY/REDUNDANT	MTX DR A	DIG B	1/16	1852	01 02	4T06-20	2C11-02	5710-31
8032	MATRIX DRIVER B PRIMARY/REDUNDANT	MTX DR B	DIG B	1/16	0849	12 01	4T02-38	2C11-24	5710-32
8033	FREQUENCY GEN. PRIMARY/REDUNDANT	FREQ GEN	DIG B	1/16	0847	08 01	4T08-40	2C11-09	5710-33
8034	SELECT OSCILLATOR PRIMARY/REDUNDANT	OSC SLCT	DIG B	1/16	0848	10 01	4T02-43	2C11-34	5710-34
8035	SERIAL DATA TRANSFER YES/NO	SER DATA	DIG B	1/16	0854	08 02	4T08-43	2C11-35	5710-35
8036	SERIAL DATA ERROR YES/NO	DATA ERR	DIG B	1/16	0861	08 03	4T06-62	2C11-18	5710-36
8037	1 HZ (A) YES/NO	1HZ (A)	DIG B	1/16	1859	01 03	4T04-61	2C13-19	5710-37
8038	1 HZ (B) YES/NO	1HZ (B)	DIG B	1/16	3851	18 01	4T04-24	2C13-07	5710-38
8039	PRIMARY Y CHAN. INPUT(ENABLE) YES/NO	PRI Y IN	DIG B	5/1	6832	14 00	4T02-32	2C13-20	5710-39
8040	REDUN. Y CHAN. INPUT(ENABLE) YES/NO	RED Y IN	DIG B	5/1	9832	14 00	4T02-56	2C13-21	5710-40
8041	COMMAND EXECUTE COUNTER BIT 1	CMD EX 1	DIG B	1/1	1833	16 02	4T02-41	2C11-12	5710-41

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
B_{042}	COMMAND EXECUTE COUNTER BIT 2	CMD EX 2	DIG B	1/1	2833	16 02	4T02-02	2C11-26	5710-42
B_{043}	COMMAND EXECUTE COUNTER BIT 4	CMD EX 4	DIG B	1/1	3833	16 02	4T02-66	2C11-27	5710-43
B_{044}	COMMAND EXECUTE COUNTER BIT 8	CMD EX 8	DIG B	1/1	4833	16 02	4T02-59	2C11-13	5710-44
B_{045}	COMMAND EXECUTE COUNTER BIT 16	CMD EX16	DIG B	1/1	5833	16 02	4T02-2B	2C11-14	5710-45
B_{046}	COMMAND EXECUTE COUNTER BIT 32	CMD EX32	DIG B	1/1	6833	16 02	4T02-47	2C11-29	5710-46
B_{047}	PRIMARY COMSTOR FILL YES/NO	PCOMSTRF	DIG B	1/1	1834	17 02	4T04-60	2C11-21	5710-47
B_{048}	REDUNDANT COMSTOR FILL YES/NO	RCOMSTRF	DIG B	1/1	1837	16 04	4T06-41	2C11-22	5710-48
B_{049}	PRIMARY COMSTOR ACTIVATE YES/NO	PCOMSTRA	DIG B	1/1	0837	16 04	4T06-39	2C11-10	5710-49
B_{050}	REDUNDANT COMSTOR ACTIVATE YES/NO	RCOMSTRA	DIG B	1/1	2836	17 03	4T06-82	2C11-23	5710-50
B_{051}	PRIMARY COMSTOR VERIFY YES/NO	PCOMSTRV	DIG B	1/1	1835	16 03	4T04-41	2C11-28	5710-51
B_{052}	REDUNDANT COMSTOR VERIFY YES/NO	RCOMSTRV	DIG B	1/1	2834	17 02	4T04-82	2C11-11	5710-52
B_{053}	PRIMARY COMDEC IN-SYNC YES/NO	PCD SYNC	DIG B	1/1	1836	17 03	4T06-60	2C11-01	5710-53
B_{054}	REDUNDANT COMDEC IN-SYNC YES/NO	RCD SYNC	DIG B	1/1	2835	16 03	4T04-02	2C11-03	5710-54
B_{055}	PRIMARY COMDEC DATA ERROR YES/NO	PCD ERR	DIG B	5/1	0832	14 00	4T02-84	2C11-20	5710-55
B_{056}	REDUNDANT COMDEC DATA ERROR YES/NO	RCD ERR	DIG B	5/1	3832	14 00	4T02-09	2C11-37	5710-56
	NOTE SEE ELEC. INTERFACE S/S								
	COMMAND INTEGRATOR UNIT								
B_{101}	-12V MONITOR A	CIUA-12V	ALOG	1/16	A244	10 29	4T84-77	2C48-05	
B_{102}	-12V MONITOR B	CIUB-12V	ALOG	1/16	A403	09 52	4T90-47	2C50-05	
B_{103}	-5V MONITOR A	CIUA-5V	ALOG	1/16	A562	18 74	4T94-06	2C48-06	
B_{104}	-5V MONITOR B	CIUB-5V	ALOG	1/16	A467	18 61	4T92-47	2C50-06	
B_{105}	TEMPERATURE A	CIU A T	ALOG	1/16	A305	09 38	4T86-08	2C48-07	
B_{106}	TEMPERATURE B	CIU B T	ALOG	1/16	A588	12 78	4T96-76	2C50-07	
B_{107}	CHANNEL A ON/OFF	CHANNL A	DIG B	1/16	1840	08 00	4T02-37	2C48-01	
B_{108}	CHANNEL B ON/OFF	CHANNL B	DIG B	1/16	3856	12 02	4T02-06	2C50-01	
B_{109}	COMMAND INPUT A CLK/CIU	CMD IN A	DIG B	5/1	2832	14 00	4T02-82	2C48-02	
B_{110}	COMMAND INPUT B CLK/CIU	CMD IN B	DIG B	1/1	3835	16 03	4T04-66	2C50-02	
B_{111}	MSFN ENABLE A YES/NO	MSF A EN	DIG B	1/1	3836	17 03	4T06-09	2C48-03	
B_{112}	MSFN ENABLE B YES/NO	MSF B EN	DIG B	1/1	2837	16 04	4T06-02	2C50-03	
	VHF COMMAND RECEIVER								
B_{201}	TEMPERATURE RF/IF A	RF A T	ALOG	1/16	A330	15 41	4T88-45	2C06-35	
B_{202}	TEMPERATURE RF/IF B	RF B T	ALOG	1/16	A412	12 10	4T80-09	2C06-37	
B_{203}	TEMERATURE DEMOD A	DMOD A T	ALOG	1/16	A561	15 74	4T94-08	2C06-02	
B_{204}	TEMERATURE DEMOD B	DMOD B T	ALOG	1/16	A176	15 19	4T82-09	2C06-05	
B_{205}	AGC RECEIVER A	RCVA AGC	ALOG	1/1	A598	04 00	4T96-13	2C06-07	
B_{206}	AGC RECEIVER B	RCVB AGC	ALOG	1/1	A599	05 00	4T96-46	2C06-09	
B_{207}	AUDIO AMPLIFIER A OUTPUT	AMPA OUT	ALOG	1/16	A243	08 29	4T84-80	2C06-11	
B_{208}	AUDIO AMPLIFIER B OUTPUT	AMPB OUT	ALOG	1/16	A304	01 38	4T86-09	2C06-13	
B_{209}	FSK DEMODULATOR A OUTPUT	FSKA OUT	ALOG	1/16	A368	02 47	4T88-09	2C06-15	

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN	
8_{210}	FSK DEMODULATOR B OUTPUT	FSKB OUT	ALOG	1/16	A496	10 65	$4T9_{2}$-09	$2C_{0}6$-17		
8_{211}	AM DEMODULATOR A OUTPUT	AM A OUT	ALOG	1/16	A432	08 56	$4T9_{0}$-09	$2C_{0}6$-19		
8_{212}	AM DEMODULATOR B OUTPUT	AM B OUT	ALOG	1/16	$A56_{0}$	12 74	4T94-09	$2C_{0}6$-21		
8_{213}	SUBCARRIER LEVEL DET A OUTPUT	DETA OUT	ALOG	1/1	$A6_{01}$	11 04	4T96-24	$2C_{0}6$-23	FM 10*11	
8_{214}	SUBCARRIER LEVEL DET B OUTPUT	DETB OUT	ALOG	1/1	$A6_{02}$	13 03	4T96-43	$2C_{0}6$-25	FM 10*11	
8_{215}	-15.7V DEMOD POWER A	DMDA-15V	ALOG	1/16	A533	15 7_{0}	$4T94-5_{1}$	$2C_{0}6$-27		
8_{216}	-15.7V DEMOD POWER B	DMDB-15V	ALOG	1/16	A596	15 79	$4T96-7_{1}$	$2C_{0}6$-29		
8_{217}	-10 REG VOLTS A	REGA-10V	ALOG	1/16	$A0_{71}$	15 04	$4T8_{0}$-28	$2C_{0}6-3_{1}$		
8_{218}	-10 REG VOLTS B	REGB-10V	ALOG	1/16	A434	15 13	$4T8_{2}$-75	$2C_{0}6$-33		
8_{219}	REC/DEMOD POWER A/B	R/D SLCT	DIG B	1/16	1843	15 00	4T04-42	$2C_{0}6$-04		
8_{220}	REC/DEMOD POWER B/A	SLCT R/D	DIG B	1/16	8852	01 02	$4T_{06}$-5_{0}	$2C_{0}6$-06		
	ECAM									
8301	ECAM ON/OFF	ECAM	DIG B	1/16	0851	18 01	4T04-38	1C05-2		
8_{302}	ECAM OUTPUT ENA/DIS	ECAM OUT	DIG B	1/16	$6B6_{1}$	08 03	$4T_{06}$-7_{0}	1C05-1		
8_{303}	ECAM INHIBIT YES/NO	ECAM INH	DIG B	5/1	5B32	14 00	4T04-74	1C05-6		
8_{304}	ECAM EXECUTE/LOAD	ECAM EXC	DIG B	1/1	9B33	16 02	$4T_{02}$-16	1C05-4		
8_{305}	ECAM RUN A/B	ECAM RUN	DIG B	1/1	7B35	16 03	$4T_{04}$-7_{0}	1C05-5		
8_{306}	ECAM PROGRAM/COMMAND	ECAM PGM	DIG B	1/1	3834	17 02	4T04-9	1C05-3		
8311	ECAM MEMORY TEMPERATURE	MEMORY T	ANAL	1/16	$A15_{0}$	01 16	$4T8_{2}$-13	1C05-8		
8319	ECAM POWER SUPPLY TEMP.	PWR SP T	ANAL	1/16	$A3_{15}$	12 39	4T86-78	1C05-7		
17_{010}	ECAM VERIFY SLOW	ECAM VFY	DIG A	1/1	DA_{04}	11 04	$4T3_{0}$-29	1C11-7		
17_{011}	ECAM VERIFY SLOW	ECAM VFY	DIG A	1/1	DA_{04}	13 04	$4T3_{0}$-29	1C11-7		
17_{012}	ECAM VERIFY FAST	ECAM VFY	DIG A	5/1	DA_{04}	11 00	$4T3_{0}$-29	1C11-7		
17_{013}	ECAM VERIFY FAST	ECAM VFY	DIG A	5/1	DA_{04}	13 00	$4T3_{0}$-29	1C11-7		

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	TELEMETRY PROCESSOR (TMP)								
9001	MEMORY SEQUENCOR DC/DC CONVERTER A VOLTAGE	MSEQ A V	ALOG	1/16	A111	10 10	4T80-18	P4T56-2	
9002	MEMORY SEQUENCER DC/DC CONVERTER B VOLTAGE	MSEQ B V	ALOG	1/16	A558	08 74	4T94-33	P4T56-3	
9003	MEMORY SEQUENCER MODULE TEMPERATURE	MEMSEQ T	ALOG	1/16	A242	02 29	4T84-06	P4T56-6	
9004	FORMATTER DC/DC CONVERTER A VOLTAGE	FMTR A V	ALOG	1/16	A175	10 19	4T82-18	P4T20-1	
9005	FORMATTER DC/DC CONVERTER B VOLTAGE	FMTR B V	ALOG	1/16	A494	02 65	4T92-33	P4T20-6	
9006	DIG MUX DC/DC CONVERTER A VOLTAGE	DMUX A V	ALOG	1/16	A241	01 29	4T84-05	P4T20-7	
9007	DIG MUX DC/DC CONVERTER B VOLTAGE	DMUX B V	ALOG	1/16	A430	01 56	4T90-33	P4T20-18	
9008	FORMATTER/DIGITAL MUX MODULE TEMP	F/DMUX T	ALOG	1/16	A240	18 28	4T84-09	P4T20-37	
9009	ANALOG MUX DC/DC CONVERTER A VOLTAGE	AMUX A V	ALOG	1/16	A303	18 37	4T86-18	P4T74-4	
9010	ANALOG MUX DC/DC CONVERTER B VOLTAGE	AMUX B V	ALOG	1/16	A366	18 46	4T88-33	P4T74-5	
9011	A/D CONVERTER DC/DC CONVERTER A VOLTAGE	CONV A V	ALOG	1/16	A367	01 47	4T88-18	P4T74-14	
9012	A/D CONVERTER DC/DC CONVERTER B VOLTAGE	CONV B V	ALOG	1/16	A302	15 37	4T86-33	P4T74-15	
Z013	ANALOG MUX A/D CONVERTER MODULE TEMP	AMUX T	ALOG	1/16	A512	15 67	4T94-10	P4T74-6	
9014	PREREGULATOR A VOLTAGE	PREG A V	ALOG	1/16	A431	02 56	4T90-18	P4T40-3	
9015	PREREGULATOR B VOLTAGE	PREG B V	ALOG	1/16	A239	15 28	4T84-18	P4T40-4	
9016	REPROGRAMMER MODULE TEMP	REPROG T	ALOG	1/16	A448	10 58	4T92-10	P4T40-5	
9017	MEMORY A DC/DC CONVERTER VOLTAGE	MEM A V	ALOG	1/16	A495	08 65	4T92-18	P1T05-13	
9018	MEMORY A MODULE TEMPERATURE	MEM A T	ALOG	1/16	A559	10 74	4T94-18	P1T05-11	
9019	MEMORY B DC/DC CONVERTER VOLTAGE	MEM B V	ALOG	1/16	A174	10 19	4T82-33	P4T50-13	
9020	MEMORY B MODULE TEMPERATURE	MEM B T	ALOG	1/16	A110	08 10	4T80-33	P4T50-11	
9021	POWER 1 OFF/ON	POWER 1	DIG B	1/16	1844	18 00	4T06-37	P4T40-1	
9022	POWER 2 OFF/ON	POWER 2	DIG B	1/16	9863	12 03	4T08-54	P4T40-2	
9023	MEMORY WRITE RELAY ON/OFF	MEM RITE	DIG B	1/16	1847	08 01	4T08-42	P4T40-14	
9025	MEMORY (A/B)	MEMORY	DIG B	1/16	1849	12 01	4T02-67	P4T40-06	
9026	MEMORY SEQUENCER (A/B)	MEM SEQ	DIG B	1/16	1850	15 01	4T04-20	P4T40-10	
9029	A/D CONVERTER STATUS (A/B)	A/D CONV	DIG B	1/16	1851	18 01	4T04-67	P4T40-7	
9030	ANALOG MUX (A/B)	ANAL MUX	DIG B	1/16	0855	10 02	4T08-36	P4T40-11	
9031	DIGITAL MUX (A/B)	DIG MUX	DIG B	1/16	0856	12 02	4T02-23	P4T40-8	
9032	FORMATTER LOGIC STATUS A/B	FORMATTR	DIG B	1/16	0857	15 02	4T02-62	P4T40-13	
9033	XMTR BUF AMP STATUS A/B	BUFF AMP	DIG B	1/16	1853	02 02	4T06-67	P4T40-15	
	VHF TRANSMITTER								
9100	REFLECTED POWER	REFL PWR	ALOG	1/16	A109	02 10	4T80-53	3T03-03	5714-01
9101	TRANSMITTER A -20 VDC OUTPUT	XMTA-20V	ALOG	1/16	A173	08 19	4T82-53	3T03-23	5714-02
9102	TRANSMITTER B -20 VDC OUTPUT	XMTB-20V	ALOG	1/16	A238	12 28	4T84-33	3T03-09	5714-03
9103	TRANSMITTER A TEMPERATURE	XMTR A T	ALOG	1/16	A301	12 37	4T86-53	3T03-01	5714-04
9104	TRANSMITTER B TEMPERATURE	XMTR B T	ALOG	1/16	A365	15 46	4T88-53	3T03-14	5714-05
9105	XMTR A, RF POWER OUTPUT	A RF PWR	ALOG	1/16	A340	02 43	4T88-71	3T03-16	5714-06

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FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
$9_{10}6$	XMTR B, RF POWER OUTPUT	B RF PWR	ALOG	1/16	A429	18 55	$4T9_0$-53	$3T_03$-18	5714-07
$9_{10}9$	POWER MODE A HIGH/LOW	PWR MD A	DIG B	1/16	1861	08 03	$4T_06$-61	$3T_03$-12	5714-10
$9_{11}0$	STORED DATA INPUT NBIR1/NBIR2	STRD IN	DIG B	1/16	9862	10 03	$4T_08$-73	$3T_03$-05	5714-11
$9_{11}1$	DATA INPUT REALTIME/STORED	DATA IN	DIG B	1/16	1856	12 02	$4T_02$-21	$3T_03$-10	5714-12
$9_{11}2$	POWER MODE B HIGH/LOW	PWR MD B	DIG B	1/16	7851	18 01	$4T_04$-71	$3T_03$-11	5714-13
	NARROWBAND TAPE RECORDER NO. 1								
10001	MOTOR CURRENT 1	MOTR I 1	ALOG	1/16	A428	15 55	$4T9_0$-15	$5N_03$-*F	5709-04
10002	POWER SUPPLY CURRENT 1	PS CUR 1	ALOG	1/16	A493	01 65	$4T9_2$-53	$5N_03$-*J	5709-03
10003	RECORDER TEMPERATURE 1	RCDR T 1	ALOG	1/16	A557	02 74	4T94-53	$5N_03$-M	5709-02
10004	POWER SUPPLY VOLTAGE 1	PS VLT 1	ALOG	1/16	$A10^8$	01 10	$4T8_0$-15	$5N_03$-L	5709-01
10005	RECORD MODE 1 ON/OFF	RECORD 1	DIG B	1/16	3838	01 00	$4T_08$-09	$5N_03$-P	5709-13
10006	PLAYBACK MODE 1 ON/OFF	PLAYBK 1	DIG B	1/16	3839	02 00	$4T_08$-66	$5N_03$-*E	5709-14
10007	RECORD END OF TAPE PRIMARY 1 YES/NO	REOT P 1	DIG B	1/16	3840	08 00	$4T_02$-58	$5N_03$-R	5709-15
10008	RECORD END OF TAPE SECONDARY 1 YES/NO	REOT S 1	DIG B	1/16	3841	10 00	$4T_02$-44	$5N_03$-S	5709-16
10009	PLAYBACK END OF TAPE PRIMARY 1 YES/NO	PEOT P 1	DIG B	1/16	3842	12 00	$4T_04$-58	$5N_03$-T	5709-17
10010	PLAYBACK END OF TAPE SECONDARY 1 YES/NO	PEOT S 1	DIG B	1/16	3843	15 00	$4T_04$-44	$5N_03$-V	5709-18
10011	RECORDER PRESSURE 1 LOW/NOR	RCDR P 1	DIG B	1/16	8863	12 03	$4T_08$-12	$5N_03$-N	5709-12
	NARROWBAND TAPE RECORDER NO. 2								
10101	MOTOR CURRENT 2	MOTR I 2	ALOG	1/16	A172	02 19	$4T82$-15	$5N_04$-*F	5709-23
10102	POWER SUPPLY CURRENT 2	PS CUR 2	ALOG	1/16	A237	10 28	$4T84$-53	$5N_04$-*J	5709-22
10103	RECORDER TEMPERATURE 2	RCDR T 2	ALOG	1/16	$A300$	10 37	$4T86$-15	$5N_04$-M	5709-21
10104	POWER SUPPLY VOLTAGE 2	PS VLT 2	ALOG	1/16	A364	12 46	$4T88$-15	$5N_04$-L	5709-20
10105	RECORD MODE 2 ON/OFF	RECORD 2	DIG B	1/16	3844	18 00	$4T_06$-58	$5N_04$-P	5709-32
10106	PLAYBACK MODE 2 ON/OFF	PLAYBK 2	DIG B	1/16	3845	01 01	$4T_06$-44	$5N_04$-*E	5709-33
10107	PRIMARY 2 YES/NO	REOT P 2	DIG B	1/16	3846	02 01	$4T_08$-58	$5N_04$-R	5709-34
10108	RECORD END OF TAPE SECONDARY 2 YES/NO	REOT S 2	DIG B	1/16	3847	08 01	$4T_08$-44	$5N_04$-S	5709-35
10109	PLAYBACK END OF TAPE PRIMARY 2 YES/NO	PEOT P 2	DIG B	1/16	3848	10 01	$4T_02$-17	$5N_04$-T	5709-36
10110	PLAYBACK END OF TAPE SECONDARY 2 YES/NO	PEOT S 2	DIG B	1/16	3849	12 01	$4T_02$-24	$5N_04$-V	5709-37
10111	RECORDER PRESSURE 2 LOW/NOR	RCDR P 2	DIG B	1/16	1857	15 02	$4T_02$-61	$5N_04$-N	5709-31
	UNIFIED S-BAND EQUIPMENT (USB)								
11001	RECEIVER AGC VOLTAGE	RCVR AGC	ALOG	1/16	A427	12 55	$4T9_0$-36	$3U31$-N	5714-17
11002	XMTR OUTPUT POWER LEVEL	XMTR PWR	ALOG	1/16	A492	18 64	$4T92$-15	$3U31$-T	5714-18
11003	RECEIVER STATIC PHASE ERROR	RCVR ERR	ALOG	1/16	A556	01 74	4T94-15	$3U31$-N	5714-19
11004	TRANSPONDER TEMPERATURE	TRSPDR T	ALOG	1/16	$A10^7$	18 09	$4T8_0$-36	$3U31$-P	5714-20

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
11005	TRANSPONDER PRESSURE	TRSPDR P	ALOG	1/16	A171	01 19	4T82-36	3U31-U	5714-21
11006	RECEIVER A/B	RECEIVER	DIG B	1/16	3B50	15 01	4T04-17	3U29-M	5714-22
11007	XMTR A ON/OFF -15V	XMTA-15V	ALOG	1/16	A078	15 05	4T80-48	3U29-T	5717-40
11008	XMTR B ON/OFF -15V	XMTB-15V	ALOG	1/16	A141	15 14	4T82-73	3U29SR-U	5717-42
11009	RANGING MODE ON/OFF -15V	RNG -15V	ALOG	1/16	A204	15 23	4T84-76	3U29-N	5717-19
11010	AUX OSCILLATOR BYPASS/ENABLED	AUX OSCL	DIG B	1/16	3B53	02 02	4T06-24	3U29-S	5714-26
11011	MODULATION INPUT NORMAL/CROSSED	MOD IN	DIG B	1/16	3B54	08 02	4T08-17	3U29-R	5714-27
	PREMODULATOR PROCESSOR (PMP).								
11102	POWER SUPPLY B VOLTAGE	PWR B V	ALOG	1/16	A299	08 37	4T84-15 4T86-36	3U05-L 3U05-M	5714-34 5714-35
11103	TEMPERATURE A	TEMP A	ALOG	1/16	A363	10 46	4T88-36	3U05-A	5714-36
11104	TEMPERATURE B	TEMP B	ALOG	1/16	A426	10 55	4T90-81	3U05-B	5714-37
11105	DISCRIMINATOR A ON/OFF	DISCR A	DIG B	1/16	3B57	15 02	4T02-07	3U05-H	5714-38
11106	DISCRIMINATOR B ON/OFF	DISCR B	DIG B	1/16	3B58	18 02	4T04-06	3U05-J	5714-39
11107	MODULATOR A ON/OFF	MODLTR A	DIG B	1/16	3B59	01 03	4T04-07	3U05-P	5714-40
11108	MODULATOR B ON/OFF	MODLTR B	DIG B	1/16	3B60	02 03	4T06-06	3U005-R9	5714-41
11109	WBTR 1/2	WBTR SLT	DIG B	1/16	3B61	08 03	4T06-07	3U05-S	5714-42
11110	WBVTR 1/2	WBVTR SL	DIG B	1/16	3B62	10 03	4T08-06	3U05-T	5714-43
11111	RECORDER IN NBTR/WBVTR	RCDR IN	DIG B	1/16	0B63	12 03	4T08-62	3U05-U	5714-44
	WIDEBAND POWER AMPLIFIER NO. 1								
12001	COLLECTOR TEMP 1	CLTR T 1	ALOG	1/16	A343	12 43	4T88-46	1W17-J	5712-40
12002	HELIX CURRENT 1	HELX I 1	ALOG	1/16	A407	15 52	4T90-48	1W17-D	5712-41
12003	CATHODE CURRENT 1	CATH I 1	ALOG	1/16	A471	18 61	4T92-46	1W17-C	5712-42
12004	FORWARD POWER 1	FWD PW 1	ALOG	1/16	A536	02 71	4T94-11	1W17-A	5712-43
12005	REFLECTED POWER 1	RFL PW 1	ALOG	1/16	A576	18 76	4T96-10	1W17-B	5712-44
12006	HEATER STATUS 1 ON/OFF	HTR ST 1	DIG B	1/16	2B54	08 02	4T08-34	1W23-A	5712-45
12008	POWER MODE 1 HIGH/LOW	PWR MD 1	DIG B	1/16	2B56	12 02	4T02-08	1W23-J	5712-47
	WIDEBAND POWER AMPLIFIER NO. 2.								
12101	COLLECTOR TEMP 2	CLTR T 2	ALOG	1/16	A342	10 43	4T88-13	1W29-J	5712-48
12102	HELIX CURRENT 2	HELX I 2	ALOG	1/16	A406	12 52	4T90-13	1W29-D	5712-49
12103	CATHODE CURRENT 2	CATH I 2	ALOG	1/16	A470	15 61	4T92-13	1W29-C	5712-50
12104	FORWARD POWER 2	FWD PW 2	ALOG	1/16	A535	01 71	4T94-46	1W29-A	5712-51
12105	REFLECTED POWER 2	RFL PW 2	ALOG	1/16	A597	18 79	4T96-51	1W29-B	5712-52
12106	HEATER STATUS 2 ON/OFF	HTR ST 2	DIG B	1/16	2B58	18 02	4T04-08	1W35-A	5712-53
12108	POWER MODE 2 HI/LOW	PWR MD 2	DIG B	1/16	2B60	02 03	4T06-08	1W35-J	5712-55
	WIDEBAND FREQUENCY MODULATOR								
12200	RBV FILTER A OUT/IN	RBV FL A	DIG B	1/16	9B54	08 02	4T08-33	1W46-10	
12201	RBV FILTER B OUT/IN	RBV FL B	DIG B	1/16	8B55	10 02	4T08-34	1W46-29	
12202	AUX. DATA TO RBV FILT. A YES/NO	AX TO RA	DIG B	1/16	9B39	02 00	4T08-16	1W46-01	
12203	AUX. DATA TO RBV FILT. B YES/NO	AX TO RB	DIG B	1/16	9B40	08 00	4T02-49	1W46-21	
12204	RT DATA TO RBV FILT. A YES/NO	RT TO RA	DIG B	1/16	1B41	10 00	4T02-42	1W46-02	
12205	RT DATA TO RBV FILT. B YES/NO	RT TO RB	DIG B	1/16	9B42	12 00	4T04-49	1W46-22	
12206	TAPE 1 DATA TO RBV FILT. A YES/NO	T1 TO RA	DIG B	1/16	9B43	15 00	4T04-79	1W46-03	
12207	TAPE 1 DATA TO RBV FILT. B YES/NO	T1 TO RB	DIG B	1/16	9B44	18 00	4T06-49	1W46-23	
12208	TAPE 2 DATA TO RBV FILT. A YES/NO	T2 TO RA	DIG B	1/16	9B45	01 01	4T05-79	1W46-04	
12209	TAPE 2 DATA TO RBV FILT. B YES/NO	T2 TO RB	DIG B	1/16	9B46	02 01	4T08-49	1W46-24	

FUNC NO.	TLM FUNCTION		ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
12210	MSS FILTER A	OUT/IN	MSS FL A	DIG B	1/16	9856	12 02	$4T_{02}$-73	$1W46-3_0$	
12211	MSS FILTER B	OUT/IN	MSS FL B	DIG B	1/16	9857	15 02	$4T_{02}$-54	1W46-11	
12212	RT DATA* TO MSS FILT. A	YES/NO	RT* M A	DIG B	1/16	5847	08 01	$4T_{08}$-11	1W46-25	
12213	RT DATA* TO MSS FILT. B	YES/NO	RT* M B	DIG B	1/16	9848	10 01	$4T_{02}$-33	1W46-06	
12214	RT DATA** TO MSS FILT. A	YES/NO	RT** M A	DIG B	1/16	7863	12 03	$4T_{08}$-45	1W46-26	
12215	RT DATA** TO MSS FILT. B	YES/NO	RT** M B	DIG B	1/16	9852	C1 02	$4T_{06}$-34	1W46-07	
12216	TAPE 1 DATA TO MSS FILT. A	YES/NO	T_1 TO MA	DIG B	1/16	9849	12 01	$4T_{02}$-05	1W46-27	
12217	TAPE 1 DATA TO MSS FILT. B	YES/NO	T_1 TO MB	DIG B	1/16	9850_0	15 01	$4T_{04}$-33	1W46-08	
12218	TAPE 2 DATA TO MSS FILT. A	YES/NO	T_2 TO MA	DIG B	1/16	9851_1	18 01	$4T_{04}$-05	1W46-28	
12219	TAPE 2 DATA TO MSS FILT. B	YES/NO	T_2 TO MB	DIG B	1/16	9855	10 02	$4T_{08}$-05	1W46-09	
12220	MODULATOR A, VCO A_1/A_2		MODA VCO	DIG B	1/16	9860_0	02 03	$4T_{06}$-73	1W46-05	
12221	MODULATOR B, VCO B_1/B_2		MODB VCO	DIG B	1/16	9861_1	08 03	$4T_{06}$-54	$1W46-20_0$	
12222	MODULATOR A, AFC	OUT/IN	MODA AFC	DIG B	1/16	9858	18 02	$4T_{04}$-73	1W46-12	
12223	MODULATOR B, AFC	OUT/IN	MODB AFC	DIG B	1/16	9859	C1 03	$4T_{04}$-54	$1W46-3_1$	
12224	DATA OUTPUT A NORMAL/SUMMED		DATA A	DIG B	1/16	9838	C1 00	$4T_{08}$-82	1W46-17	
12225	DATA OUTPUT B NORMAL/SUMMED		DATA B	DIG B	1/16	9841_1	10 00	$4T_{02}$-79	1W46-35	
12226	RBV BIAS A/B		RBV BIAS	DIG B	1/16	9847	08 01	$4T_{08}$-79	1W46-13	
12227	MODULATOR A, LOOP STRESS		MODA L S	ALOG	1/16	A466	C2 61	$4T9_2$-44	1W46-14	
12228	MODULATOR B, LOOP STRESS		MODB L S	ALOG	1/16	A586	0P 78	4T96-45	1W46-33	
12229	WBM TEMPERATURE		WBM TEMP	ALOG	1/16	A338	18 42	4T88-44	1W46-15	
	WBM POWER INVERTER									
12230	WBM INVERTER A	OFF/ON	INVRTR A	DIG B	1/16	9838	C1 00	$4T_{08}$-56	$1W11-0_7$	$5712-7_0$
12231	WBM INVERTER B	OFF/ON	INVRTR B	DIG B	1/16	2847	C8 01	$4T_{08}$-19	$1W11-0_8$	5712-71
12232	15 REG. VOLTAGE A		15V A	ALOG	1/16	A113	15 10	$4T_{60}$-08	$1W05-1_3$	5712-72
12233	15 REG VOLTAGE B		15V B	ALOG	1/16	A213	C1 25	$4T84-5_1$	$1W05-1_4$	5712-73
12234	-15 REG VOLTAGE A		-15V A	ALOG	1/16	A212	1P 24	$4T64-7_1$	$1W05-0_3$	5712-74
12235	-15 REG VOLTAGE B		-15V B	ALOG	1/16	A339	C1 43	4T88-47	$1W05-0_4$	5712-75
12236	5 REG VOLTAGE A		5V A	ALOG	1/16	$A4_{02}$	C1 52	$4T9_0$-44	$1W05-1_1$	5712-76
12237	5 REG VOLTAGE B		5V B	ALOG	1/16	$A4_{04}$	C8 52	$4T9_0$-71	$1W05-1_2$	5712-77
12238	-5 REG VOLTAGE A		-5V A	ALOG	1/16	A177	18 19	$4T8_2$-06	$1W05-0_5$	5712-78
12239	-5 REG VOLTAGE B		-5V B	ALOG	1/16	A468	1_0 6_1	$4T9_2$-71	$1W05-0_6$	5712-79
12240	-24.5 MONITOR NO. 1 A/B		-24.5 M1	ALOG	1/16	A211	15 24	4T64-47	$1W05-01$	$5712-8_0$
12241	-24.5 MONITOR NO. 2 A/B		-24.5 M2	ALOG	1/16	$A59_0$	18 78	4T96-48	$1W05-02$	$5712-8_1$
12242	WBM INVERTER TEMP		INVRTR T	ALOG	1/16	A587	1_0 78	4T96-72	$1W11-0_3$	$5712-8_2$

13000,14000,15000,16000
PAYLOAD SYSTEM

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /POW	VIP CONN	S/S CONN	IAT CONN
	WIDEBAND VIDEO TAPE RECORDER 1								
13001	MSS STANDBY 1 YES/NO	MSS SBY1	DIG B	1/1	4834	17 02	4T04-1	5W16-*R	
13002	RBV STANDBY 1 YES/NO	RBV SBY1	DIG B	1/1	4835	16 03	4T04-59	5W16-*O	
13003	RECORD 1 YES/NO	WB RCD 1	DIG B	1/1	4836	17 03	4T06-1	5W16-*H	
13004	PLAYBACK 1 YES/NO	WB PBK 1	DIG B	1/1	4837	16 04	4T06-59	5W16-*I	
13005	FAST REWIND 1 YES/NO	REWIND 1	DIG B	1/16	2862	10 03	4T08-8	5W16-*J	
13006	FAST FWD 1 YES/NO	FOWARD 1	DIG B	1/16	2863	12 03	4T08-22	5W16-*S	
13007	RBV ENABLE 1 YES/NO	RBV EN 1	DIG B	1/1	6834	17 02	4T04-32	5W16-*F	
13008	PRIMARY END OF TAPE 1 YES/NO	P EOT 1	DIG B	1/16	4839	02 00	4T08-59	5W16-N	
13009	SECONDARY END OF TAPE 1 YES/NO	S EOT 1	DIG B	1/16	4840	08 00	4T02-83	5W16-M	
13010	PRIMARY BEGIN OF TAPE 1 YES/NO	P BOT 1	DIG B	1/16	4841	10 00	4T02-18	5W16-*E	
13011	SECONDARY BEGIN OF TAPE 1 YES/NO	S BOT 1	DIG B	1/16	4842	12 00	4T04-83	5W16-P	
13012	RBV RUN TAPE 1 YES/NO	RBV TP 1	DIG B	1/1	6835	16 03	4T04-47	5W16-*G	
13013	LAP NO 1 YES/NO	LAP 1	DIG B	1/16	4843	15 00	4T04-18	5W16-R	
13014	MSS/RBV STATUS NO 1 MSS/RBV	STATUS 1	DIG B	1/16	4844	18 00	4T06-83	5W16-*T	
13015	CURRENT SET TO 4DB NO 1 IN/OUT	4DB SET1	DIG B	1/16	4845	01 01	4T06-18	5W16-U	
13016	CURRENT SET TO 2 DB NO 1 IN/OUT	2DB SET1	DIG B	1/16	4846	02 01	4T08-84	5W16-V	
13017	CURRENT SET TO 1 DB NO 1 IN/OUT	1DB SET1	DIG B	1/16	4847	08 01	4T08-18	5W16-W	
13018	CONVERTER PRIMARY PWR 1 ON/OFF	CNV PWR1	DIG B	1/16	4849	12 01	4T02-69	5W16-*D	
13019	VOLTAGE PROTECT 1 ENABLE/DISABLE	VLT PRT1	DIG B	1/16	4850	15 01	4T04-3	5W16-T	
13020	PRIMARY VOLTAGE RANGE NO 1 IN/OUT	P V RNG1	DIG B	1/16	4851	18 01	4T04-69	5W16-*P	
13021	VOLTAGE PROTECT RELAY 1 OPEN/CLOSED	V PR RY1	DIG B	1/16	4852	01 02	4T06-3	5W16-S	
13022	TU PRESSURE 1	TU PRS 1	ALOG	1/16	A065	18 03	4T80-23	5W16-*A	
13023	TU TEMPERATURE 1	TU TEMP1	ALOG	1/16	A129	01 13	4T82-23	5W16-*B	
13024	EU TEMPERATURE 1	EU TEMP1	ALOG	1/16	A194	08 22	4T04-25	5W16-C	
13025	TAPE FOOTAGE 1	TAPE FT1	ALOG	1/16	A258	10 31	4T86-25	5W16-Z	
13026	CAPSTAN MOTOR SPEED 1	CPST MS1	ALOG	1/16	A321	10 40	4T88-23	5W16-B	
13027	HWP MOTOR SPEED 1	HWP MS 1	ALOG	1/16	A386	15 49	4T90-25	5W16-G	
13028	CAPSTAN MOTOR CURRENT 1	CPST MI1	ALOG	1/16	A450	18 58	4T92-25	5W16-J	
13029	PLAYBACK VOLTAGE 1	P/B V 1	ALOG	1/16	A513	18 67	4T94-23	5W16-E	
13030	HWP MOTOR CURRENT NO 1	HWP MI 1	ALOG	1/16	A595	12 79	4T96-47	5W16-H	
13031	RECORDER INPUT CURRENT 1	R IN I 1	ALOG	1/1	A629	07 04	4T96-32	5W16-*C	
13032	LIMITER VOLTAGE NO 1	LMTR V 1	ALOG	1/16	A066	01 04	4T80-25	5W16-D	
13033	SERVO VOLTAGE NO 1	SERV V 1	ALOG	1/16	A130	02 13	4T82-25	5W16-F	
13034	CONVERTER OUTPUT 5.6V 1	5.6CNV1	ALOG	1/16	A400	15 51	4T90-04	5W16-K	
	WIDEBAND VIDEO TAPE RECORDER NO 2								
13101	MSS STANDBY 2 YES/NO	MSS SBY2	DIG B	1/1	6837	16 04	4T06-47	5W40-*R	
13102	RBV STANDBY 2 YES/NO	RBV SBY2	DIG B	1/1	8835	16 03	4T04-31	5W40-*O	
13103	RECORD 2 YES/NO	WB RCD 2	DIG B	1/1	8836	17 03	4T06-51	5W40-*H	
13104	PLAYBACK 2 YES/NO	WB PBK 2	DIG B	1/1	8837	16 04	4T06-31	5W40-*I	
13105	FAST REWIND 2 YES/NO	REWIND 2	DIG B	1/16	4853	02 02	4T06-69	5W40-*J	

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
$13_{10}6$	FAST FORWARD 2 YES/NO	FOWARD 2	DIG B	1/16	4854	08 02	$4T_08$-3	$5W4_0$-*S	
$13_{10}7$	RBV ENABLE 2 YES/NO	RBV EN 2	DIG B	1/1	9834	17 02	$4T_04$-56	$5W4_0$-*F	
$13_{10}8$	PRIMARY END OF TAPE 2 YES/NO	P EOT 2	DIG B	1/16	4855	10_0 02	$4T_08$-69	$5W4_0$-N	
$13_{10}9$	SECONDARY END OF TAPE 2 YES/NO	S EOT 2	DIG B	1/16	4856	12 02	$4T_02$-35	$5W4_0$-M	
$13_{11}0$	PRIMARY BEGIN OF TAPE 2 YES/NO	P BOT 2	DIG B	1/16	4857	15 02	$4T_02$-36	$5W4_0$-*F	
$13_{11}1$	SECONDARY BEGIN OF TAPE 2 YES/NO	S BOT 2	DIG B	1/16	4858	18 02	$4T_04$-35	$5W4_0$-P	
$13_{11}2$	RBV RUN TAPE 2 YES/NO	RBV TP 2	DIG B	1/1	9835	16 03	$4T_04$-1_6	$5W4_0$-*G	
$13_{11}3$	LAP NO 2 YES/NO	LAP 2	DIG B	1/16	4859	01 03	$4T_04$-36	$5W4_0$-R	
$13_{11}4$	MSS/RBV STATUS 2 MSS/RBV	STATUS 2	DIG B	1/16	$485A_0$	0_2 0_3	$4T_06$-35	$5W4_0$-*T	
$13_{11}5$	CURRENT SET 4 DB 2 IN/OUT	4DB SET2	DIG B	1/16	485_1	08 03	$4T_06$-36	$5W4_0$-U	
$13_{11}6$	CURRENT SET 2 DB 2 IN/OUT	2DB SET2	DIG B	1/16	4862	10 03	$4T_08$-35	$5W4_0$-V	
$13_{11}7$	CURRENT SET 1 DB 2 IN/OUT	1DB SET2	DIG B	1/16	4863	1_2 0_3	$4T_08$-36	$5W4_0$-W	
$13_{11}8$	CONVERTER PRIMARY PWR 2 ON/OFF	CNV PWR2	DIG B	1/16	6838	01 00	$4T_08$-32	$5W4_0$-*D	
$13_{11}9$	VOLTAGE PROTECT 2 EN/DIS	VLT PRT2	DIG B	1/16	6839	02 00	$4T_08$-47	$5W4_0$-T	
$13_{12}0$	PRIMARY VOLT. RANGE NO 2 IN/OUT	P V RNG2	DIG B	1/16	684_0	08 00	$4T_02$-75	$5W4_0$-*P	
13121	VOLTAGE PROTECT RELAY 2 OPEN/CLOSED	V PR RY2	DIG B	1/16	6841	10 00	$4T_02$-25	$5W4_0$-S	
13122	TU PRESSURE 2	TU PRS 2	ALOG	1/16	$A1_95$	1_0 22	4T84-68	$5W4_0$-*A	
$13_{12}3$	TU TEMPERATURE 2	TU TEMP2	ALOG	1/16	A259	1_2 31	4T86-68	$5W4_0$-*B	
13124	EU TEMPERATURE 2	EU TEMP2	ALOG	1/16	A322	12 4_0	4T68-25	$5W4_0$-C	
13125	TAPE FOOTAGE 2	TAPE FT2	ALOG	1/16	A387	18 49	$4T9_0$-68	$5W4_0$-Z	
$13_{12}6$	CAPSTAN MOTOR SPEED 2	CPST MS2	ALOG	1/16	$A45_1$	01 59	$4T9_2$-68	$5W4_0$-B	
13127	HWP MOTOR SPEED 2	HWP MS 2	ALOG	1/16	A514	01 68	4T94-25	$5W4_0$-G	
13128	CAPSTAN MOTOR CURRENT 2	CPST MI2	ALOG	1/16	A594	1_0 79	4T96-44	$5W4_0$-J	
$13_{12}9$	PLAYBACK VOLTAGE 2	P/B V 2	ALOG	1/16	A_067	0_2 0_4	$4T8_0$-68	$5W4_0$-E	
13130	HWP MOTOR CURRENT 2	HWP MI 2	ALOG	1/16	A131	08 13	$4T8_2$-68	$5W4_0$-H	
13131	RECORDER INPUT CURRENT 2	R IN I 2	ALOG	1/1	$A63_0$	09 04	4T96-55	$5W4_0$-*C	
$13_{13}2$	LIMITER VOLTAGE 2	LMTR V 2	ALOG	1/16	A196	1_2 22	$4T84$-7_0	$5W4_0$-D	
13133	SERVO VOLTAGE 2	SERV V 2	ALOG	1/16	$A26_1$	18 31	4T86-14	$5W4_0$-F	
13134	CONVERTER OUTPUT 5.6V NO 2	5.6CNV2	ALOG	1/16	A463	15 6_0	$4T9_2$-49	$5W4_0$-K	
	RBV CAMERA CONTROLLER								
$14_{00}0$	CALIBRATE ENABLE/DISABLE	CALIBRAT	ALOG	1/16	A324	1_8 4_0	$4T88$-7_0	$3R_14$-0_4	
$14_{00}1$	CCC BOARD TEMPERATURE	CCC BD T	ALOG	1/16	A388	01 5_0	$4T9_0$-7_0	$3R_14$-15	
$14_{00}2$	CCC POWER SUPPLY TEMPERATURE	CCC PS T	ALOG	1/16	A452	02 59	$4T9_2$-7_0	$3R_03$-01	5710-75
$14_{00}3$	PLUS OR MINUS 15 VOLT SUPPLY	15V SPLY	ALOG	1/16	$A5_15$	0_2 68	4T94-68	$3R_03$-0_3	5710-76
$14_{00}4$	6, -5.25 VOLT SUPPLY	6-5.25V	ALOG	1/16	A593	08 79	4T96-27	$3R_03$-0_4	5710-77
$14_{00}5$	APERTURE CORRECTOR OUT/IN	APT CORR	DIG B	1/16	6842	12 00	$4T_04$-75	$3R_14$-03	
$14_{00}6$	CYCLE CONT/SING	CYCLE	DIG B	1/16	6843	15 00	$4T_04$-25	$3R_14$-07	
$14_{00}7$	EXPOSURE C ON/OFF	EXPOSR C	DIG B	1/16	2857	15 02	$4T_02$-22	$3R_14$-05	
$14_{00}8$	EXPOSURE A ON/OFF	EXPOSR A	DIG B	1/16	6845	01 01	$4T_06$-25	$3R_14$-09	
$14_{00}9$	EXPOSURE B ON/OFF	EXPOSR B	DIG B	1/16	6846	0_2 01	$4T_08$-75	$3R_14$-1_0	
$14_{01}0$	1.6 MHZ CLOCK ON/OFF	1.6MHZ	DIG B	1/16	6847	08 01	$4T_08$-25	$3R_14$-11	
$14_{01}1$	HORIZONTAL SYNC ON/OFF	HOR SYNC	DIG B	1/16	6848	1_0 01	$4T_02$-52	$3R_14$-12	
$14_{01}2$	VERTICAL SYNC ON/OFF	VER SYNC	DIG B	1/16	6849	1_2 01	$4T_02$-26	$3R_14$-13	
$14_{01}3$	1HZ SYNC ON/OFF	1HZ SYNC	DIG B	1/16	685_1	18 01	$4T_04$-26	$3R_14$-14	

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
14_{014}	-24.5 VOLT INPUT ON/OFF	-24V IN	DIG B	$1/_{16}$	6852	01 02	$4T_{06}$-52	$3R_{03}$-02	5710-78
14_{015}	CCC POWER ON/OFF	CCC PWR	DIG B	$1/_{16}$	6853	02 02	$4T_{06}$-26	$3R_{03}$-05	5710-79
14_{016}	CATHODE REACTIVATION ON/OFF	CTH REAC	DIG B	$1/_{16}$	6854	0^{R} 02	$4T_{08}$-52	$3R_{14}$-0^{R}	
	28V CAMERA 1								
14_{100}	VIDEO OUTPUT 1	VID OUT_1	ALOG	$1/_{16}$	A_{068}	0^{R} 04	$4T_{80}$-7_0	$2R_{06}$-01	
14_{101}	FOCUS CURRENT 1	FOC I 1	ALOG	$1/_{16}$	A132	1_0 13	$4T_{82}$-7_0	$2R_{06}$-02	
14_{102}	COMBINED ALIGNMENT CURRENT 1	ALGN I 1	ALOG	$1/_{16}$	A_{198}	1^{R} 22	$4T_{84}$-75	$2R_{06}$-04	
14_{103}	TEMPERATURE ELECTRONICS 1	ELEC T 1	ALOG	$1/_{16}$	A262	0_1 32	4T86-75	$2R_{06}$-05	
14_{104}	TEMPERATURE LOW-VOLTAGE PWR SUPPLY 1	LVPS T 1	ALOG	$1/_{16}$	A325	01 41	4T88-14	$2R_{06}$-07	
14_{105}	DEFLECTION POWER SUPPLY 1	DFL PS 1	ALOG	$1/_{16}$	A389	0_2 5_0	$4T_{90}$-14	$2R_{06}$-12	
14_{106}	LOW VOLTAGE POWER SUPPLY 1	LV PWS 1	ALOG	$1/_{16}$	A453	0^{R} 59	$4T_{92}$-14	$2R_{06}$-10	
14_{107}	THERMOELECTRIC UNIT CURRENT 1	THMO I 1	ALOG	$1/_{16}$	A_{516}	0^{R} 68	$4T_{94}$-7_0	$2R_{06}$-03	
14_{108}	VIDICON FILAMENT CURRENT 1	VFIL I 1	ALOG	$1/_{16}$	A_{592}	6_2 79	$4T_{96}$-04	$5R_{08}$-09	570^{R}-01
14_{109}	G_1 VOLTAGE 1	G_1 VLT 1	ALOG	$1/_{16}$	A_{069}	1_0 04	$4T_{80}$-14	$5R_{08}$-03	570^{R}-02
14_{110}	TARGET VOLTAGE 1	TGT V 1	ALOG	$1/_{16}$	A133	1^{R} 13	$4T_{82}$-14	$5R_{08}$-11	570^{R}-03
14_{111}	VIDICON CATHODE CURRENT 1	VCTH I 1	ALOG	$1/_{16}$	A_{199}	6_1 23	$4T_{84}$-2^{R}	$5R_{08}$-01	570^{R}-04
14_{112}	HORIZONTAL DEFLECTION OUTPUT 1	HOR DEF_1	ALOG	$1/_{16}$	A263	0^{R} 32	$4T_{86}$-2^{R}	$5R_{08}$-04	570^{R}-05
14_{113}	VERTICAL DEFLECTION OUTPUT 1	VER DEF_1	ALOG	$1/_{16}$	A326	0^{R} 41	$4T_{88}$-75	$5R_{08}$-05	570^{R}-06
14_{114}	TEMPERATURE FACEPLATE 1	FPLT T 1	ALOG	$1/_{16}$	A_{390}	0^{R} 5_0	$4T_{90}$-25	$5R_{08}$-14	570^{R}-07
14_{115}	TEMPERATURE YOKE/FOCUS COIL 1	Y/FC T 1	ALOG	$1/_{16}$	A454	1_0 59	$4T_{92}$-75	$5R_{08}$-0^{R}	570^{R}-08
14_{116}	-24.5V POWER IN NO. 1 ON/OFF	-24 IN 1	DIG B	$1/_{16}$	6856	1^{R} 02	$4T_{02}$-55	$2R_{06}$-06	
14_{117}	-28 VOLT SHUTTER CURRENT 1 ON/OFF	SHTR I 1	DIG B	$5/_1$	$4B_{32}$	14 00	$4T_{02}$-6_0	$2R_{06}$-13	
14_{120}	5_{00} VOLTS 1 ON/OFF	5_{00}V 1	ALOG	$1/_{16}$	A197	15 22	4T84-14	$5R_{08}$-0^{R}	570^{R}-10
	28V CAMERA 2								
14_{200}	VIDEO OUTPUT 2	VID OUT2	ALOG	$1/_{16}$	A_{517}	1_0 68	4T94-14	3R24-01	
14_{201}	FOCUS CURRENT 2	FOC I 2	ALOG	$1/_{16}$	A_{591}	6_1 79	$4T_{96}$-45	$3R_{24}$-02	
14_{202}	COMBINED ALIGNMENT CURRENT 2	ALGN I 2	ALOG	$1/_{16}$	A_{070}	1^{R} 0^{4}	$4T_{80}$-75	$3R_{24}$-0^{4}	
14_{203}	TEMPERATURE, ELECTRONICS 2	ELEC T 2	ALOG	$1/_{16}$	A135	1^{R} 13	$4T_{82}$-2^{R}	$3R_{24}$-05	
14_{204}	TEMPERATURE, LOW VOLTAGE PWR SUP 2	LVPS T 2	ALOG	$1/_{16}$	A_{2n1}	0^{R} 23	$4T_{84}$-2^{R}	$3R_{24}$-07	
14_{205}	DEFLECTION POWER SUPPLY NO 2	DFL PS 2	ALOG	$1/_{16}$	A266	1^{R} 32	$4T_{86}$-45	$3R_{24}$-12	
14_{206}	LOW VOLTAGE POWER SUPPLY 2	LV PWS 2	ALOG	$1/_{16}$	A327	0^{R} 41	$4T_{88}$-2^{R}	$3R_{24}$-10	
14_{207}	THERMOELECTRIC UNIT CURRENT 2	THMO I 2	ALOG	$1/_{16}$	A391	1_0 5_0	$4T_{90}$-2^{R}	$3R_{24}$-03	
14_{208}	VIDICON FILAMENT CURRENT 2	VFIL I 2	ALOG	$1/_{16}$	A455	1^{R} 59	$4T_{92}$-2^{R}	$5R_{18}$-02	570^{R}-24
14_{209}	G_1 VOLTAGE 2	G_1 VLT 2	ALOG	$1/_{16}$	A_{518}	1^{R} 68	$4T_{94}$-75	$5R_{18}$-03	570^{R}-25
14_{210}	TARGET VOLTAGE NO 2	TGT V 2	ALOG	$1/_{16}$	A577	6_1 77	$4T_{96}$-25	$5R_{18}$-11	570^{R}-26
14_{211}	VIDICON CATHODE CURRENT NO 2	VCTH I 2	ALOG	$1/_{16}$	A_{072}	1^{R} 0^{4}	$4T_{80}$-12	$5R_{18}$-01	570^{R}-27
14_{212}	HORIZONTAL DEFLECTION OUTPUT 2	HOR DEF2	ALOG	$1/_{16}$	A136	01 14	$4T_{82}$-12	$5R_{18}$-04	570^{R}-28
14_{213}	VERTICAL DEFLECTION OUTPUT 2	VER DEF2	ALOG	$1/_{16}$	A_{202}	1_0 23	$4T_{84}$-45	$5R_{18}$-05	570^{R}-29
14_{214}	TEMPERATURE, FACEPLATE 2	FPLT T 2	ALOG	$1/_{16}$	A268	1^{R} 32	$4T_{86}$-76	$5R_{18}$-14	570^{R}-30
14_{215}	TEMPERATURE, YOKE/FOCUS COIL 2	Y/FC T 2	ALOG	$1/_{16}$	A_{329}	1^{R} 41	$4T_{88}$-2^{R}	$5R_{18}$-0^{R}	570^{R}-31
14_{216}	-24.5V POWER IN, NO. 2 ON/OFF	-24 IN 2	DIG B	$1/_{16}$	$6B_{60}$	6^{R} 03	$4T_{06}$-55	$3R_{24}$-06	
14_{217}	-28 VOLT SHUTTER CURRENT 2 ON/OFF	SHTR I 2	DIG B	$5/_1$	$4B_{32}$	14 00	$4T_{02}$-1	$3R_{24}$-13	
14_{220}	5_{00} VOLTS 2 ON/OFF	5_{00}V 2	ALOG	$1/_{16}$	A_{260}	15 31	$4T_{86}$-7_0	$5R_{18}$-0^{R}	570^{R}-33

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	RBV CAMERA 3								
143_{00}	VIDEO OUTPUT 3	VID OUT3	ALOG	1/16	A392	12 50	$4T9_0$-12	$3R4_0$-01	
143_{01}	FOCUS CURRENT 3	FOC I 3	ALOG	1/16	A457	1F 59	4T92-26	$3R4_0$-02	
143_{02}	COMBINED ALIGNMENT CURRENT 3	ALGN I 3	ALOG	1/16	$A5_{20}$	18 68	4T94-12	$3R4_0$-04	
143_{03}	TEMPERATURE, ELECTRONICS 3	ELEC T 3	ALOG	1/16	A578	02 77	4T96-25	$3R4_0$-05	
143_{04}	TEMPERATURE, LOW VOLTAGE POWER SUPPLY 3	LVPS T 3	ALOG	1/16	$A_0$73	G_1 0_5	$4T_{80}$-26	$3R4_0$-07	
143_{05}	DEFLECTION POWER SUPPLY 3	DFL PS 3	ALOG	1/16	A137	02 14	4T82-26	$3R4_0$-12	
143_{06}	LOW VOLTAGE POWER SUPPLY 3	LV PWS 3	ALOG	1/16	$A2_03$	12 23	4T84-72	$3R4_0$-10	
143_{07}	THERMOELECTRIC UNIT CURRENT 3	THMO I 3	ALOG	1/16	A269	G_1 33	4T86-73	$3R4_0$-03	
143_{08}	VIDICON FILAMENT CURRENT 3	VFIL I 3	ALOG	1/16	$A33_1$	1F 41	4T88-72	$5R2^B$-02	57_0^B-34
143_{09}	G_1 VOLTAGE NO 3	G_1 VLT 3	ALOG	1/16	A394	1F 50	$4T9_0$-45	$5R2^B$-03	57_0^B-35
143_{10}	TARGET VOLTAGE 3	TGT V 3	ALOG	1/16	A458	G_1 6_0	4T92-45	$5R2^B$-11	57_0^B-36
143_{11}	VIDICON CATHODE CURRENT 3	VCTH I 3	ALOG	1/16	$A5_{21}$	01 69	4T94-26	$5R2^B$-01	57_0^B-37
143_{12}	HORIZONTAL DEFLECTION OUTPUT 3	HOR DEF3	ALOG	1/16	A579	0F 77	4T96-65	$5R2^B$-04	57_0^B-38
143_{13}	VERTICAL DEFLECTION OUTPUT 3	VER DEF3	ALOG	1/16	A_074	02 05	$4T8_0$-45	$5R2^B$-05	57_0^B-39
143_{14}	TEMPERATURE, FACEPLATE 3	FPLT T 3	ALOG	1/16	A138	0B 14	4T82-45	$5R2^B$-14	57_0^B-40
143_{15}	TEMPERATURE, YOKE/FOCUS COIL 3	Y/FC T 3	ALOG	1/16	$A2_05$	1F 23	4T84-73	$5R2^B$-06	57_0^B-41
143_{16}	+24.5V POWER IN, NO.3 ON/OFF	+24 IN 3	DIG B	1/16	8B38	G_1 00	$4T_08$-51	$3R4_0$-06	
143_{17}	-28 VOLT SHUTTER CURRENT 3 ON/OFF	SHTR I 3	DIG B	5/1	7B32	14 00	$4T_02$-77	$3R4_0$-13	
143_{20}	5_{00} VOLTS 3 ON/OFF	5_{00}V 3	ALOG	1/16	A323	15 40	4T88-68	$5R2^B$-08	57_0^B-43
	MULTISPECTRAL SCANNER								
150_{02}	MAIN INVERTER A/B	MAIN INV	DIG B	1/16	8B42	12 00	$4T_04$-27	$5M_07$-02	
150_{03}	BAND 1 HIGH VOLTAGE A/B	HV_1 SLCT	DIG B	1/16	8B43	15 00	$4T_04$-4	$5M_07$-03	
150_{04}	BAND 2 HIGH VOLTAGE A/B	HV_2 SLCT	DIG B	1/16	8B44	1F 00	$4T_06$-27	$5M_07$-04	
150_{05}	BAND 3 HIGH VOLTAGE A/B	HV_3 SLCT	DIG B	1/16	8B45	G_1 01	$4T_06$-4	$5M_07$-05	
150_{06}	HIGH VOLTAGE ON/OFF	HI VOLT	DIG B	1/16	8B46	02 01	$4T_08$-27	$5M_07$-06	
150_{07}	BAND 1 HIGH VOLTAGE ON/OFF	BND 1 HV	DIG B	1/16	8B47	0B 01	$4T_08$-4	$5M_07$-07	
150_{08}	BAND 2 HIGH VOLTAGE ON/OFF	BND 2 HV	DIG B	1/16	8B48	10 01	$4T_02$-54	$5M_07$-08	
150_{09}	BAND 3 HIGH VOLTAGE ON/OFF	BND 3 HV	DIG B	1/16	8B49	12 01	$4T_02$-30	$5M_07$-09	
150_{10}	BAND 1 LOW VOLTAGE ON/OFF	BND 1 LV	DIG B	1/16	$8B5_0$	15 01	$4T_04$-50	$5M_07$-10	
150_{11}	BAND 2 LOW VOLTAGE ON/OFF	BND 2 LV	DIG B	1/16	$8B5_1$	1F 01	$4T_04$-30	$5M_07$-11	
150_{12}	BAND 3 LOW VOLTAGE ON/OFF	BND 3 LV	DIG B	1/16	8B53	02 02	$4T_06$-30	$5M_07$-12	
150_{13}	BAND 4 LOW VOLTAGE ON/OFF	BND 4 LV	DIG B	1/16	8B54	0B 02	$4T_08$-50	$5M_07$-13	
150_{14}	BAND 5 LOW VOLTAGE ON/OFF	BND 5 LV	DIG B	1/16	8B57	15 02	$4T_02$-72	$5M_07$-14	
150_{15}	CALIBRATION LAMP A/B	CLMP SLT	DIG B	1/16	8B56	12 02	$4T_02$-81	$5M_07$-15	
150_{16}	CALIBRATION LAMP ON/OFF	CAL LAMP	DIG B	1/16	8B57	15 02	$4T_02$-12	$5M_07$-20	
150_{17}	SCAN MONITOR ON/OFF	SCAN MON	DIG B	1/16	8B58	1F 02	$4T_04$-81	$5M_07$-17	
150_{18}	BAND 1 GAIN HIGH/LOW	BND 1 GN	DIG B	1/16	8B59	G_1 03	$4T_04$-12	$5M_07$-18	
150_{19}	BAND 2 GAIN HIGH/LOW	BND 2 GN	DIG B	1/16	$8B6_0$	02 03	$4T_06$-81	$5M_07$-19	
150_{20}	ROTATING SHUTTER ON/OFF	ROT SHTR	DIG B	1/16	$8B6_1$	0B 03	$4T_06$-12	$5M_07$-16	

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FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
15_{023}	SHUTTER MONITOR SOURCE A/B	SHTR MON	DIG B	1/16	8B62	10 03	$4T_{08}$-8_1	$5P_{07}$-21	
15_{027}	MUX ON/OFF	MULTPLXR	DIG B	1/16	5B43	15 00	$4T_{04}$-11	$4P_{02}$-0^8	
15_{028}	MUX-NORM/INHIBIT	MUX STAT	DIG B	1/16	5B44	1B 00	$4T_{06}$-14	$5P_{07}$-36	
15_{029}	MUX MODE STATUS COMPRES/LINEAR	MUX MODE	DIG B	1/16	$5B4_0$	0B 00	$4T_{02}$-14	$4P_{02}$-09	
15_{030}	MID SCAN CODE OFF/ON	MID SCAN	DIG B	1/16	7B58	1B 02	$4T_{04}$-76	$4P_{02}$-11	
15_{031}	SCAN MONITOR SOURCE A/B	SCN SRCE	DIG B	1/16	$5B4_1$	10 00	$4T_{02}$-11	$5P_{07}$-30	
15_{032}	SCANNER POWER LINE 1/2	SCANR PL	DIG B	1/16	5B42	12 00	$4T_{04}$-14	$5P_{07}$-32	
15_{033}	SCAN MIRROR ON/OFF	SCN MIRR	DIG B	1/16	5B39	02 00	$4T_{08}$-2^8	$5P_{07}$-24	
15_{034}	SCAN MIRROR POWER LINE 1 YES/NO	SCNM PL1	DIG B	1/16	$7B6_1$	0B 03	$4T_{06}$-45	$5P_{07}$-2^8	
15_{035}	SCAN MIRROR POWER LINE 2 YES/NO	SCNM PL2	DIG B	1/16	$7B6_0$	02 03	$4T_{06}$-76	$5P_{07}$-29	
15_{036}	SCAN MIRROR MODE NORMAL/INHIBIT	SCNM MDE	DIG B	1/16	5B45	01 01	$4T_{06}$-11	$5P_{07}$-34	
15_{037}	SCAN MIRROR PWR LINE 1/2	SMPL SLT	DIG B	1/16	5B46	02 01	$4T_{08}$-14	$5P_{07}$-35	
15_{039}	SYSTEM ON-OFF STATUS NORM/OVRD	SYS STAT	DIG B	1/16	9B53	02 02	$4T_{06}$-05	$5P_{07}$-33	
15_{040}	MUX -6V G.P. POWER SUPPLY	MUX -6V	ALOG	1/16	$A27_0$	02 33	$4T_{06}$-46	$4P_{02}$-01	
15_{041}	A/D CONVERTER REF SUPPLY	A/D SPLY	ALOG	1/16	A332	01 42	$4T_{08}$-76	$4P_{02}$-03	
15_{042}	AVERAGE DENSITY OF DATA TRANSITIONS	AVG DENS	ALOG	1/16	A395	01 51	$4T_{90}$-72	$4P_{02}$-04	
15_{043}	FIBER OPTICS PLATE 1 TEMPERATURE	FOPT 1 T	ALOG	1/16	A459	02 60	$4T_{92}$-72	$5P_{11}$-04	
15_{044}	FIBER OPTICS PLATE 2 TEMPERATURE	FOPT 2 T	ALOG	1/16	A522	02 69	$4T_{94}$-45	$5P_{11}$-05	
15_{045}	MUX TEMPERATURE	MUX TEMP	ALOG	1/16	$A58_0$	10 77	$4T_{96}$-70	$4P_{02}$-05	
15_{046}	ELECTRONICS COVER TEMPERATURE	EL CVR T	ALOG	1/16	A075	0B 05	$4T_{80}$-72	$5P_{11}$-06	
15_{047}	POWER SUPPLIES TEMPERATURE	P SPLY T	ALOG	1/16	A139	10 14	$4T_{82}$-72	$5P_{11}$-07	
15_{048}	SCAN MIRROR REGULATOR TEMP	SM REG T	ALOG	1/16	$A20_6$	01 24	$4T_{84}$-48	$5P_{11}$-08	
15_{049}	SCAN MIRROR DRIVE ELECTRONICS TEMP	SMDR E T	ALOG	1/16	$A27_1$	0B 33	$4T_{86}$-45	$5P_{11}$-09	
15_{050}	SCAN MIRROR DRIVE COIL TEMP	SMDR C T	ALOG	1/16	A333	02 42	$4T_{88}$-73	$5P_{11}$-10	
15_{051}	SCAN MIRROR TEMPERATURE	SCN MR T	ALOG	1/16	A396	02 51	$4T_{90}$-74	$5P_{11}$-11	
15_{052}	ROTATING SHUTTER HOUSING TEMP	RSH HG T	ALOG	1/16	$A58_2$	15 77	$4T_{96}$-75	$5P_{11}$-31	
15_{053}	SCAN MIRROR REGULATED VOLTAGE	SM REG V	ALOG	1/16	A523	08 69	$4T_{94}$-72	$5P_{11}$-34	
15_{054}	CALIBRATION LAMP CURRENT	CALAMP I	ALOG	1/16	$A58_1$	12 77	$4T_{96}$-14	$5P_{11}$-13	
15_{055}	BAND 1 PLUS AND MINUS 15 VDC REGULATOR	BND1 15V	ALOG	1/16	A076	10 05	$4T_{80}$-76	$5P_{11}$-14	
15_{056}	BAND 2 PLUS AND MINUS 15 VDC REGULATOR	BND2 15V	ALOG	1/16	$A14_0$	1B 14	$4T_{82}$-76	$5P_{11}$-15	
15_{057}	BAND 3 PLUS AND MINUS 15 VDC REGULATOR	BND3 15V	ALOG	1/16	$A20_7$	02 24	4T84-49	$5P_{11}$-16	
15_{058}	BAND 4 PLUS AND MINUS 15 VDC REGULATOR	BND4 15V	ALOG	1/16	A272	10 33	$4T_{86}$-04	$5P_{11}$-17	
15_{059}	-15 TLM REGULATED VOLTAGE	TLM -15V	ALOG	1/16	A334	08 42	$4T_{88}$-46	$5P_{11}$-12	
15_{060}	12 VDC -6VDC REGULATOR	12-6VDC	ALOG	1/16	A397	0B 51	$4T_{90}$-73	$5P_{11}$-19	
15_{061}	5 VDC LOGIC REGULATOR	LOGIC 5V	ALOG	1/16	A461	10 60	$4T_{92}$-73	$5P_{11}$-20	
15_{062}	19 VDC RECTIFIER OUTPUT	RECT 19V	ALOG	1/16	A524	10 69	$4T_{94}$-76	$5P_{11}$-21	
15_{063}	-19 VDC RECTIFIER OUTPUT	RECT-19V	ALOG	1/16	A583	1B 77	$4T_{96}$-28	$5P_{11}$-22	
15_{064}	HIGH VOLTAGE MONITOR BAND 1 (A)	BND1 HVA	ALOG	1/16	$A07^7$	12 05	$4T_{80}$-73	$5P_{11}$-23	
15_{065}	HIGH VOLTAGE MONITOR BAND 1 (B)	BND1 HVB	ALOG	1/16	A142	1B 14	$4T_{82}$-48	$5P_{11}$-24	
15_{066}	HIGH VOLTAGE MONITOR BAND 2 (A)	BND2 HVA	ALOG	1/16	$A20_8$	0B 24	$4T_{84}$-04	$5P_{11}$-25	

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
15_{067}	HIGH VOLTAGE MONITOR BAND 2 (B)	BND2 HVB	ALOG	1/16	A273	12 33	4T66-27	$5P_{11}$-26	
15_{068}	HIGH VOLTAGE MONITOR BAND 3 (A)	BND3 HVA	ALOG	1/16	A335	10 42	4T88-49	$5P_{11}$-27	
15_{069}	HIGH VOLTAGE MONITOR BAND 3 (B)	BND3 HVB	ALOG	1/16	A398	10 51	$4T9_0$-45	$5P_{11}$-28	
15_{070}	SHUTTER MOTOR CONTROL INTEGRATOR OUTPUT	SHTR MCI	ALOG	1/16	A462	12 60	$4T9_2$-48	$5P_{11}$-29	
15_{071}	SCAN MIRROR DRIVE CLOCK	SMDR CLK	ALOG	1/16	A525	12 69	4T94-73	$5P_{11}$-37	
15_{072}	BAND 5A GAIN BIT 1 1/0	5A GN B_1	DIG. B	1/16	1855	10 02	$4T_08$-67	$5P_07$-23	
15_{073}	BAND 5A GAIN BIT 2 1/0	5A GN B_2	DIG. B	1/16	2855	10 02	$4T_08$-10	$5P_07$-25	
15_{074}	BAND 5A GAIN BIT 3 1/0	5A GN B_3	DIG. B	1/16	3855	10 02	$4T_06$-24	$5P_07$-26	
15_{075}	BAND 5B GAIN BIT 1 1/0	5B GN B_1	DIG. B	1/16	2859	01 03	$4T_04$-22	$5P_07$-40	
15_{076}	BAND 5B GAIN BIT 2 1/0	5B GN B_2	DIG. B	1/16	6859	01 03	$4T_04$-72	$5P_07$-41	
15_{077}	BAND 5B GAIN BIT 3 1/0	5B GN B_3	DIG. B	1/16	7859	01 03	$4T_04$-45	$5P_07$-42	
15_{083}	DOOR MOTOR POWER ON/OFF	DR MTR P	DIG. B	1/16	3852	01 02	$4T_06$-17	$5P_07$-22	
15_{084}	DOOR DIRECTION OPEN/CLOSE	DR DIR	DIG. B	1/16	0850	15 01	$4T_04$-43	$5P_07$-38	
15_{085}	DOOR MOVING YES/NO	DR MVNG	DIG. B	1/1	8834	17 02	$4T_04$-51	$5P_07$-44	
15_{086}	DOOR HOLD ON/OFF	DR HOLD	DIG. B	1/16	1860	02 03	$4T_06$-21	$5P_07$-43	
15_{087}	DOOR CLOSED YES/NO	DR CLSD	DIG. B	1/16	8839	02 00	$4T_08$-31	$5P_07$-47	
15_{088}	DOOR OUTGAS YES/NO	DR OTGS	DIG. B	1/16	2840	08 00	4T02-57	$5P_07$-48	
15_{089}	DOOR OPEN YES/NO	DR OPEN	DIG. B	1/16	2842	12 00	4T04-57	$5P_07$-49	
15_{090}	DOOR OVERRIDE RESET/ACTUATE	DR OVRD	DIG. B	1/16	7857	15 02	4T02-45	$5P_07$-45	
15_{091}	DOOR OVERRIDE SAFE/ARM	DR OVRD	DIG. B	1/16	6862	10 03	4T08-55	$5P_07$-46	
15_{092}	OUTGAS HEATER ON/OFF	OTGS HTR	DIG. B	1/16	3863	12 03	$4T_08$-07	$5P_07$-50	
15_{101}	CHN 1 SCANNER VIDEO OUTPUT	CH_1 SVO	ALOG	1/16	A079	18 05	$4T_80$-49	$5P_15$-01	
15_{102}	CHN 2 SCANNER VIDEO OUTPUT	CH_2 SVO	ALOG	1/16	A080	01 06	$4T_80$-04	$5P_15$-02	
15_{103}	CHN 3 SCANNER VIDEO OUTPUT	CH_3 SVO	ALOG	1/16	A081	02 06	$4T_80$-27	$5P_15$-03	
15_{104}	CHN 4 SCANNER VIDEO OUTPUT	CH4 SVO	ALOG	1/16	A082	08 06	$4T_80$-44	$5P_15$-04	
15_{105}	CHN 5 SCANNER VIDEO OUTPUT	CH5 SVO	ALOG	1/16	A083	10 06	$4T_80$-47	$5P_15$-05	
15_{106}	CHN 6 SCANNER VIDEO OUTPUT	CH6 SVO	ALOG	1/16	A084	12 06	$4T_80$-71	$5P_15$-06	
15_{107}	CHN 7 SCANNER VIDEO OUTPUT	CH7 SVO	ALOG	1/16	A143	01 15	$4T_82$-49	$5P_15$-08	
15_{108}	CHN 8 SCANNER VIDEO OUTPUT	CH8 SVO	ALOG	1/16	A144	02 15	$4T_82$-04	$5P_15$-09	
15_{109}	CHN 9 SCANNER VIDEO OUTPUT	CH9 SVO	ALOG	1/16	A145	08 15	$4T_82$-27	$5P_15$-10	
15_{110}	CHN 10 SCANNER VIDEO OUTPUT	CH_{10} SVO	ALOG	1/16	A146	10 15	$4T_82$-44	$5P_15$-11	
15_{111}	CHN 11 SCANNER VIDEO OUTPUT	CH_{11} SVO	ALOG	1/16	A147	12 15	$4T_82$-47	$5P_15$-12	
15_{112}	CHN 12 SCANNER VIDEO OUTPUT	CH_{12} SVO	ALOG	1/16	A148	15 15	$4T_82$-71	$5P_15$-13	
15_{113}	CHN 13 SCANNER VIDEO OUTPUT	CH_{13} SVO	ALOG	1/16	A274	15 33	4T86-44	$5P_15$-15	
15_{114}	CHN 14 SCANNER VIDEO OUTPUT	CH_{14} SVO	ALOG	1/16	A275	18 33	4T86-47	$5P_15$-16	
15_{115}	CHN 15 SCANNER VIDEO OUTPUT	CH_{15} SVO	ALOG	1/16	A276	01 34	$4T86$-71	$5P_15$-17	

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	IAT CONN
15_{116}	CHN 16 SCANNER VIDEO OUTPUT	CH_{16} SVO	ALOG	$1/16$	A277	02 34	$4T86-5_1$	$5M_{15}-18$	
15_{117}	CHN 17 SCANNER VIDEO OUTPUT	CH_{17} SVO	ALOG	$1/16$	A278	08 34	$4T86-13$	$5M_{15}-19$	
15_{118}	CHN 18 SCANNER VIDEO OUTPUT	CH_{18} SVO	ALOG	$1/16$	A279	1_0 34	$4T86-46$	$5M_{15}-37$	
15_{119}	CHN 19 SCANNER VIDEO OUTPUT	CH_{19} SVO	ALOG	$1/16$	$A52_7$	18 69	$4T94-49$	$5M_{15}-22$	
15_{120}	CHN 20 SCANNER VIDEO OUTPUT	CH_{20} SVO	ALOG	$1/16$	$A52_8$	01 7_0	$4T94-0_4$	$5M_{15}-23$	
15_{121}	CHN 21 SCANNER VIDEO OUTPUT	CH_{21} SVO	ALOG	$1/16$	$A52_9$	09 7_0	$4T94-2_7$	$5M_{15}-24$	
15_{122}	CHN 22 SCANNER VIDEO OUTPUT	CH_{22} SVO	ALOG	$1/16$	$A53_0$	08 7_0	4T94-44	$5M_{15}-25$	
15_{123}	CHN 23 SCANNER VIDEO OUTPUT	CH_{23} SVO	ALOG	$1/16$	$A53_1$	1_0 7_0	4T94-47	$5M_{15}-26$	
15_{124}	CHN 24 SCANNER VIDEO OUTPUT	CH_{24} SVO	ALOG	$1/16$	$A53_2$	12 7_0	$4T94-7_1$	$5M_{15}-27$	
15_{126}	CHANNEL 26 SCANNER VIDEO OUTPUT	CH_{26} SVO	ANALOG	$1/16$	A393	15 5_0	$4T9_0-26$	$5M_{15}-30$	
	DCS RECEIVER								
16_{001}	RECEIVER 1 SIG STRENGTH	$RCVR_1$ SG	ALOG	$1/16$	A149	18 15	$4T82-5_1$	$3D_04-2$	
16_{002}	RECEIVER 1 TEMPERATURE	RCVR 1 T	ALOG	$1/16$	$A20_9$	1_0 24	$4T84-2_7$	$3D_04-1$	
16_{003}	RECEIVER 1 PWR SUPPLY VOLTAGE	RCVR 1 V	ALOG	$1/16$	A336	12 42	$4T88-0_4$	$3D_04-3$	
16_{004}	RECEIVER 2 SIGNAL STRENGTH	$RCVR_2$ SG	ALOG	$1/16$	A399	12 51	$4T9_0-49$	$2D_04-2$	
16_{005}	RECEIVER 2 TEMPERATURE	RCVR 2 T	ALOG	$1/16$	A464	1_0 6_0	$4T9_2-0_4$	$2D_04-1$	
16_{006}	RECEIVER 2 PWR SUPPLY VOLTAGE	RCVR 2 V	ALOG	$1/16$	A584	01 78	4T96-12	$2D_04-3$	
	NOTE ALSO SEE ELEC. 1.F. S/S								

P/O 1000,2000,6000,7000,8000,11000
12000,13000,14000,15000 ELEC IF S/S

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	INTERFACE SWITCHING MODULE (ISM)								
	(PART OF ACS S/S)								
100^{8}	SCANNER 1 EN/DIS	SCAN 1	DIG B	$1/16$	5B52	01 02	$4T_{06}$-15	$4X_{05}$-10	5717_{-05}
1017	SCANNER 2 EN/DIS	SCAN 2	DIG B	$1/16$	$5B5_1$	18 01	$4T_{04}$-46	$4X_{05}$-12	5717_{-06}
1231	SAD RIGHT POWER UNFUSED/FUSED	SDR PWR	DIG B	$1/16$	5B55	10 02	$4T_{08}$-48	$4X_{05}$-27	5717_{-12}
1251	SAD LEFT POWER UNFUSED/FUSED	SDL PWR	DIG B	$1/16$	5B54	08 02	$4T_{08}$-15	$4X_{05}$-25	5717_{-11}
129_0	SINGLE SCANNER MODE UNLOCK/LOCK	SGL SCNR	DIG B	$1/16$	5B48	10 01	$4T_{02}$-15	$4X_{05}$-14	5717_{-07}
1291	SCANNER DISABLE SELECT 2/1	SCAN DIS	DIG B	$1/16$	$5B5_0$	15 01	$4T_{04}$-15	$4X_{05}$-8	5717_{-04}
1292	RIGHT COSINE POT OUT	COS SIGR	ALOG	$1/16$	A312	02 39	4T86-05	$4X_{05}$-16	5717_{-16}
1293	LEFT COSINE POT OUT	COS SIGL	ALOG	$1/16$	A313	08 39	4T86-02	$4X_{03}$-16	5717_{-13}
	(PART OF OA S/S)								
2020	OA THRUSTER HEATERS ON/OFF	THRS HTR	DIG B	$1/16$	5B59	01 03	$4T_{04}$-46	$4X_{03}$-07	5717_{-07}
	(PART OF ATT. SENS. S/S)								
300^{6}	ATTITUDE SENSOR ON/OFF	ATT SENS	DIG B	$1/16$	5B53	02 02	$4T_{06}$-48	$4X_{05}$-6	5717_{-03}
	(PART OF THERMAL S/S)								
7127	COMP. LOAD 7 ON/OFF	CMP LD 7	DIG B	$1/16$	5B61	08 03	$4T_{06}$-46	$4X_{05}$-4	5717_{-02}
7128	COMP. LOAD 8 ON/OFF	CMP LD 8	DIG B	$1/16$	5B62	10 03	$4T_{08}$-53	$4X_{05}$-2	5717_{-01}
713_0	AUX. LOAD PANNEL 1, TEMP.	AUX P1 T	ALOG	$1/16$	A_085	15 06	$4T_{60}$-51	$4X_{03}$-48	5717_{-15}
7131	AUX. LOAD PANNEL 2, TEMP.	AUX P2 T	ALOG	$1/16$	A210	12 24	4T84-44	$4X_{05}$-48	5717_{-17}
	(PART OF C. AND D.H. S/S)								
8_{06_0}	SEP SWITCH 1 BYPASS NO/YES	SS 1BYPS	DIG B	$1/16$	5856	12 02	$4T_{02}$-53	$4X_{05}$-19	5717_{-08}
8_{061}	SEP SWITCH 2 BYPASS NO/YES	SS 2BYPS	DIG B	$1/16$	5857	15 02	$4T_{02}$-46	$4X_{05}$-21	5717_{-09}
8113	CLOCK FUSED PWR. PRI/RED	CLK FUSE	DIG B	$1/16$	5858	18 02	$4T_{04}$-53	$4X_{05}$-23	5717_{-10}
11020	USB XMTR PRIMARY POWER OFF/ON	P USB PW	DIG B	$1/16$	7B43	15 00	$4T_{04}$-29	$4X_{03}$-12	5717_{-22}
11021	USB XMTR REDUNDANT POWER OFF/ON	R USB PW	DIG B	$1/16$	1B42	12 00	$4T_{04}$-37	$4X_{03}$-08	5717_{-20}
12000	WIDEBAND POWER AMPLIFIERS PRIMARY POWER OFF/ON	P WPA PW	DIG B	$1/16$	7B42	12 00	$4T_{04}$-13	$4X_{03}$-14	5717_{-23}
12100	WIDEBAND POWER AMPLIFIERS REDUNDANT POWER OFF/ON	R WPA PW	DIG B	$1/16$	6B44	18 00	$4T_{06}$-75	$4X_{03}$-10	5717_{-21}
	(PART OF A.P.U.)								
13210	APU USB/PA P.U.T.SIGNAL ENA/DIS	U/P TSIG	DIG B	$1/16$	7B44	18 00	$4T_{06}$-13	$4X_{03}$-04	5717_{-18}

FUNC NO.	TLM FUNCTION		ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	(PART OF PAYLOAD S/S)									
$14_{11}8$	CAMERA NO. 1	ON/OFF	CAMERA 1	DIG B	1/16	6B55	10 02	$4T_08$-26	4X11-42	5717-32
$14_{21}8$	CAMERA NO. 2	ON/OFF	CAMERA 2	DIG B	1/16	$2B6_1$	08 03	$4T_06$-22	4X11-45	5717-35
$14_{31}8$	CAMERA NO. 3	ON/OFF	CAMERA 3	DIG B	1/16	6B63	12 03	$4T_08$-72	$4X_01$-42	5717-09
15_{001}	MSS SYSTEM	ON/OFF	MSS SYST	DIG B	1/16	8B41	10 00	$4T_02$-04	4X23-41	5717-37
15_038	MSS HEATER ON/OFF		MSS HTR	DIG B	1/16	$5B6_0$	02 03	$4T_06$-53	$4X_03$-2	5717-24
	POWER SWITCHING MODULE (PSM)									
	(PART OF OA S/S)									
2030	OA SOL POWER ENA/DIS		SOL PWR	DIG B	1/1	5B37	16 04	$4T_06$-28	$5P_13$-12	5715-13
2035	OA TIMER ENA/DIS		OA TIMER	DIG B	1/16	5B63	12 03	$4T_08$-46	$5P_13$-26	5715-01
	(PART OF POWER S/S)									
6_079	PAYLOAD FUSE BLOW BUS VOLTAGE		FS BLO V	ALOG	1/16	A337	15 42	4T88-27	$5P_13$-10	5715-11
6_101	PSM IN RELAY CONFIGURATION MIXED/COMM		PRM AGE	DIG B	1/16	$6B5_0$	15 01	$4T_04$-52	$5P_13$-32	5715-12
6_102	PSM RELAY BUS ENA/DIS		PSM RLYS	DIG B	1/16	$1B5_8$	18 02	$4T_04$-21	$4X_03$-21	5717-26
	(PART OF A.P.U.)									
132_09	APU S PAYLOAD B.U.T. SIG ENA/DIS		PL TSIG	DIG B	1/16	7B46	02 01	$4T_08$-13	$5P_13$-04	5715-09
13211	SEARCH TRACK (1+2) DATA TO APU (A+B) NORM/SWITCHED		ST DATA	DIG B	1/16	7B45	01 01	$4T_06$-29	$5P_13$-08	5715-06
	(PART OF PAYLOAD S/S)									
15_000	MSS POWER ENABLE/DISABLE		MSS PWR	DIG B	1/16	7B47	08 01	$4T_08$-29	$5P_13$-47	5715-10
14_017	RBV SHUTTER PWR ON/OFF		SHTR PWR	DIG B	1/16	5B49	10 01	$4T_02$-48	$5P_13$-23	5715-07
144_00	RBV MAGNETIC COMPENSATOR ENA/DIS		MAG COMP	DIG B	1/16	5B38	01 00	4T08-74	$5P_15$-12	5715-32
144_01	RBV MAGNETIC COMP CURRENT HIGH/LOW		MG CMP I	DIG B	1/16	$8B4_0$	08 00	$4T_02$-27	$5P_15$-24	5715-47
14_121	RBV 1 THERMOELECTRIC MOD ENA/DIS		THM MD 1	DIG B	1/16	7B41	10 00	$4T_02$-29	$5P_13$-35	5715-05
14221	RBV 2 THERMOELECTRIC MOD ENA/DIS		THM MD 2	DIG B	1/16	7B38	01 00	4T08-77	$5P_13$-46	5715-02
14321	RBV 3 THERMOELECTRIC MOD ENA/DIS		THM MD 3	DIG B	1/16	7B39	02 00	$4T_08$-70	$5P_13$-38	5715-03
	PART OF C AND DH S/S									
11_022	USB XMTRS OFF SIG ENA/DIS		USBYOFF	DIG B	1/16	$7B4_0$	08 00	$4T_02$-13	$5P_15$-48	5715-04
13_035	VTR 1 CONTROL NORM/REVERSED		VTR 1 CON	DIG B	1/16	1B38	01 00	$4T_08$-60	$5P_13$-31	SPLICE
13135	VTR 2 CONTROL NORM/REVERSED		VTR 2 CON	DIG B	1/16	1B46	09 01	$4T_08$-37	$5P_13$-41	SPLICE
14_018	RBV PRIMARY CONTROL ENA/DIS		RBV PCON	DIG B	1/16	1B54	08 02	4T08-20	5P13-49	SPLICE

FUNC NO.	TLM FUNCTION		ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /POW	VIP CONN	S/S CONN	IAT CONN
	AUX PROCESSING UNIT APU									
13200	-24.5 INPUT POWER		APU-24.5	ALOG	1/16	A401	18 51	4T90-27	3E06-13	
13201	-12V SUPPLY		APU -12V	ALOG	1/16	A465	01 61	4T92-27	3E06-15	
13202	TEMPERATURE		APU TEMP	ALOG	1/16	A585	02 78	4T96-26	3E06-14	
13207	34 MIN. PL R.U.T. START SIG. ON/OFF		34M PL	DIG B	1/16	7B48	10 01	$4T_{02}-8_0$	$3E_06-04$	
13208	34 MINUTE USB/PA R.U.T. START SIGNAL ON/OFF		34M U/PA	DIG B	1/16	7B49	12 01	$4T_{02}-7_1$	$3E_06-07$	
13212	POWER MODE	NORM/STBY	PWR MODE	DIG B	1/16	1B48	10 01	$4T_{02}-20$	$3E_06-16$	
	THE FOLLOWING ARE UTILIZED AS SPECIAL FUNCTIONS									
17_{000}	SEARCH TRACK 1, 1/2 DATA		STK_1 1/2	DIG A	1/1	DA_{00}	16 00	$4T_30-31$	$3E_04-09$	
17_{001}	SEARCH TRACK 1, 2/2 DATA		STK_1 2/2	DIG A	1/1	DA_{01}	17 00	$4T_30-33$	$3E_04-10$	
17_{002}	SEARCH TRACK 2, 1/2 DATA		STK2 1/2	DIG A	1/1	DA_{02}	16 01	$4T_30-30$	$3E_04-11$	
17_{003}	SEARCH TRACK 2, 2/2 DATA		STK2 2/2	DIG A	1/1	DA_{03}	17 01	$4T_30-17$	$3E_04-12$	

FUNC NO.	TLM FUNCTION	ACRONYM	SIGNL TYPE	SAMP SEC	GATE ADDR	COLUMN /ROW	VIP CONN	S/S CONN	INT CONN
	(PART OF POWER S/S)								
5080_0	SHUNT LOAD 1 CURRENT	$SHUNT_1$ I	ALOG	$1/16$	$A103_0$	C8 09	$4T8_0$-34	1P42-05	
5081	SHUNT LOAD 2 CURRENT	$SHUNT_2$ I	ALOG	$1/16$	A167	10 18	4T82-34	1P42-06	
5082	SHUNT LOAD 3 CURRENT	SHUNT3 I	ALOG	$1/16$	$A231_1$	12 27	4T84-34	1P42-07	
5083	SHUNT LOAD 4 CURRENT	SHUNT4 I	ALOG	$1/16$	A295	15 36	4T86-34	1P42-18	
5084	SHUNT LOAD 5 CURRENT	SHUNT5 I	ALOG	$1/16$	A359	18 45	4T88-34	1P42-19	
5085	SHUNT LOAD 6 CURRENT	SHUNT6 I	ALOG	$1/16$	A423	C1 55	$4T9_0$-34	1P42-20	
5086	SHUNT LOAD 7 CURRENT	SHUNT7 I	ALOG	$1/16$	A487	C2 64	4T92-34	1P42-08	
5087	SHUNT LOAD 8 CURRENT	SHUNT8 I	ALOG	$1/16$	$A551_1$	C8 73	4T94-34	1P42-21	
5089	SHUNT LOAD #A# ON/OFF	SHUNT A	DIG B	$1/16$	0^B38	01 00	4T08-84	1P42-39	
5090_0	SHUNT LOAD #B# ON/OFF	SHUNT B	DIG B	$1/16$	0^B45	01 01	$4T_06$-40	1P42-02	
5091	SHUNT LOAD #C# ON/OFF	SHUNT C	DIG B	$1/16$	0^B52	01 02	4T06-43	1P42-01	
5092	SHUNT LOAD #D# ON/OFF	SHUNT D	DIG B	$1/16$	0^B59	01 03	4T04-62	1P42-42	
5093	AUXILIARY LOAD 1 ON/OFF	AUX LD 1	DIG B	$1/16$	0^B39	02 00	4T08-39	1P42-03	
5094	AUXILIARY LOAD 2 ON/OFF	AUX LD 2	DIG B	$1/16$	0^B46	02 01	4T08-68	1P42-04	
5095	AUXILIARY LOAD 3 ON/OFF	AUX LD 3	DIG B	$1/16$	0^B53	02 02	4T06-38	1P42-36	
5096	AUXILIARY LOAD 4 ON/OFF	AUX LD 4	DIG B	$1/16$	0^B60	02 03	4T06-23	1P42-37	
5097	AUXILIARY LOAD 5 ON/OFF	AUX LD 5	DIG B	$1/16$	0^B62	10 03	4T08-23	1P42-38	
	(PART OF THERMAL S/S)								
7121	COMP LOAD 1 ON/OFF	CMP LD 1	DIG B	$1/16$	7850_0	15 01	4T04-80	1P42-09	
7122	COMP LOAD 2 ON/OFF	CMP LD 2	DIG B	$1/16$	7852	01 02	4T06-80	1P42-27	
7123	COMP LOAD 3 ON/OFF	CMP LD 3	DIG B	$1/16$	7853	02 02	4T06-71	1P42-28	
7124	COMP LOAD 4 ON/OFF	CMP LD 4	DIG B	$1/16$	7854	08 02	4T08-80	1P42-22	
7125	COMP LOAD 5 ON/OFF	CMP LD 5	DIG B	$1/16$	7855	10 02	4T08-71	1P42-23	
7126	COMP LOAD 6 ON/OFF	CMP LD 6	DIG B	$1/16$	7856	12 02	4T02-76	1P42-24	
	(PART OF C+DH S/S)								
9057	TICK/TOCK TIC/TOC	TIC/TOC	DIG B	1/1	9836	17 03			

APPENDIX D

STRIP CHART PAYLOAD SIGNATURES

APPENDIX D

STRIP CHART PAYLOAD SIGNATURES

Figure D-1 is a strip chart (General Status 2) showing characteristic signatures of payload equipment. This record is made from a Narrowband tape recorder playback showing 22 frames of Wide Band Video tape recording. RBV, MSS, WBVTR-1 and WBVTR-2 were operating during this time period. The Wide Band Down Links were off. Increasing time is from right to left. The 17 pens are alternately analog and digital. The parameter values drawn by each pen are described below.

Pen #1 shows Greenwich Mean Time at the time of recording, as measured by the recording ground station. For example, the last time code, (left hand side) reads (binary):

01 0010 010 1001 000 0000 which converts to 12:29 digital.

Pen #2 shows spacecraft regulated bus current. The MSS is supplied from this bus. The first step-up (reading right to left) is the time of MSS turn-on. It reads 1.28 TMV (4.57 amps) before turn-on and 1.76 TMV (6.19 amps) after turn-on, the delta 1.62 amps being the MSS current demand.

Pen #3 shows two digital functions, the short duration function being MSS System ON, and the long duration function being Hi Voltage ON. (The elevated region is ON.) The non-coincidence in time between this Pen and Pen #2 is due to the sequential sampling format.

Pen #4 again shows duplexed functions, both relating to the Wide Band Power Amplifier No. 1. The bottom horizontal lines (reading zero, showing the WBPA was OFF) show the voltage of the +15 V A supply; and the top horizontal lines (reading 2.0 TMV equal to 17.0^{o}C) show the temperature of the collector.

Pen #5 shows the duplexed functions of RBV 24 Volts ON and RBV Shutter Power ON.

Pen #6 is similar to Pen #4 except it shows the parameters for WBPA No. 2 which is normally associated with the MSS.

Pen #7 shows duplexed function for RBV Magnetic Compensator ON and CCC Power ON.

Pen #8 shows the duplexed functions of Wideband Video Tape Recorder footages, the top horizontal lines associated with WBVTR-1 and the bottom lines with WBVTR-2. At the beginning of the RECORD session, the footage read 2.23 TMV (equal to 10.03 Min) for WBVTR-1 and 2.77 TMV (equal to 16.63 Min) for WBVTR-2. At the end, the corresponding footages are 20.43 min for WBVTR-1, and 25.79 min. for WBVTR-2.

Pen #9 shows whether WBVTR-1 is in Rewind. It reads zero (depressed) showing that WBVTR-1 is not in the Rewind mode.

Pen #10 shows WBVTR-1 input current. At Record Command, the current rose to 3.95 TMV (equal to 3.59 amps) after a brief saturation transient in excess of 8.18 amps. This transient is a characteristic signature of WBVTR turn-ON.

Pen #11 is duplexed to show Record and Playback modes. Because of the fast run time of the strip recorder, the brief interval between sampling and the mode displayed, the line blurred, making reading impossible.

Pen #12 duplexes the reflected power in the antenna systems of WBPA 1 and 2. Because both these systems were OFF, the readings are zero.

Pen #13 shows whether WBVTR-2 was in Standby or Rewind mode. It can be seen the top horizontal segment went to zero at start of record, terminating the Standby mode.

Pen #14 shows the Payload Regulated bus current, with its easily recognizable characteristic signature of RBV and WBVTR activity. After turn-on and warm-up, the WBVTR's can be seen suddenly increasing the current drain and producing characteristic WBVTR turn-on transient, WBVTR-2 first followed immediately by WBVTR-1. 22 RBV camera exposures and readouts can be seen. During this interval, it can be seen from Pen #8, that the scenes are being recorded on the moving tape. Turn-OFF is seen to be simultaneous for RBV, MSS and both video tape recorders.

Pen #15 shows whether WBVTR-2 is in Record or Playback mode. Again the fast speed of the strip chart and the proximity of sampling times obscures the message.

Pen #16 is identical to Pen #10 showing Recorder Input Current except that it relates to WBVTR-2. It can be seen that Recorder 2 comes on before Recorder 1.

Pen #17 shows GMT as measured in the Spacecraft at the time of data sampling.

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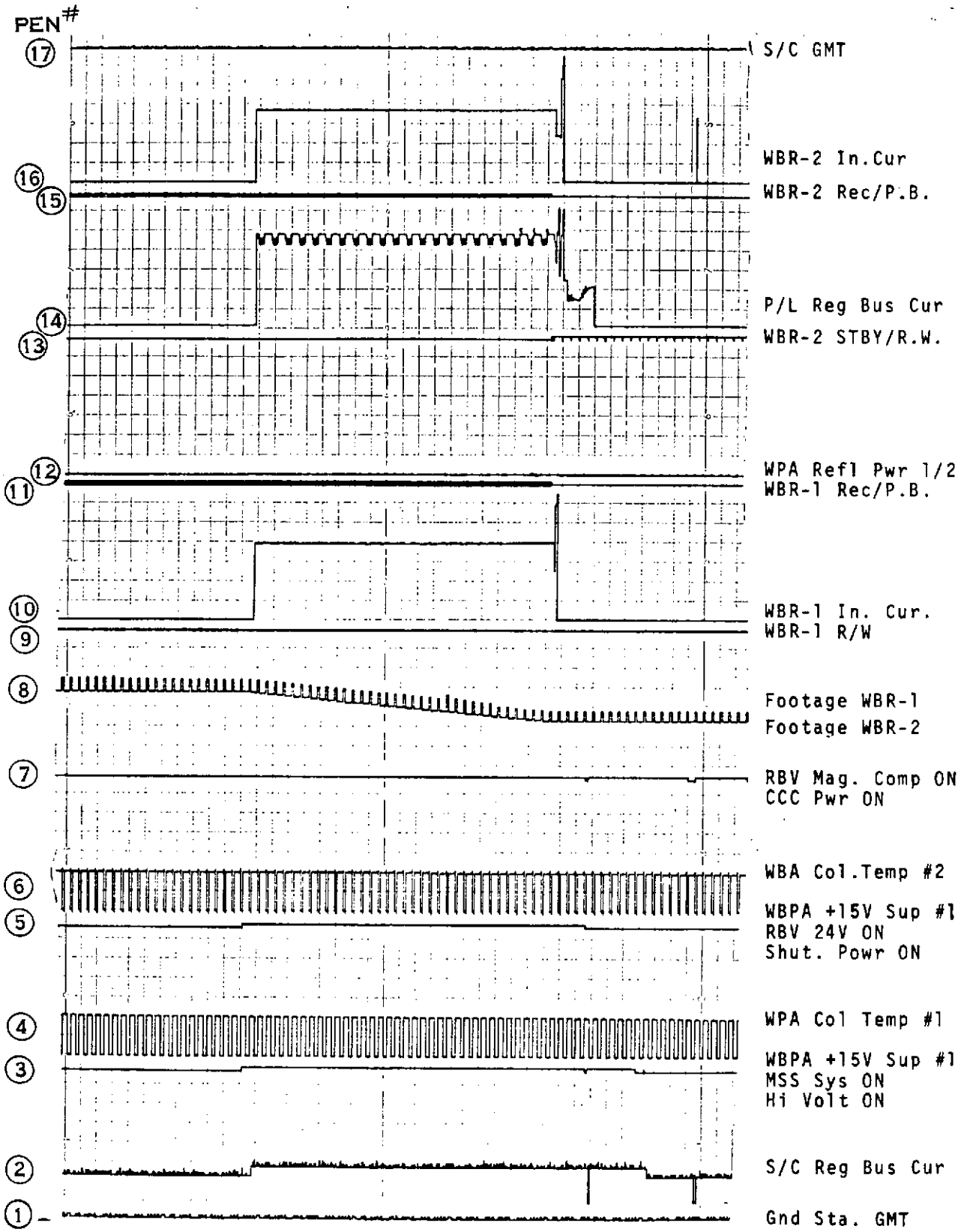

Figure D-1. Characteristic Strip Chart Payload Signatures

APPENDIX E

MSS PHOTOGRAPHS

APPENDIX E

MSS PHOTOGRAPHS

Representative imagery from the MSS is shown in the following figures. Spectral bands are given in Table E-1.

Table E-1. MSS Imagery

Figure	Band	Wavelength (Microns)	System
E-1	1	(0.5 - 0.6)	MSS
E-2	2	(0.6 - 0.7)	MSS
E-3	3	(0.7 - 0.8)	MSS
E-4	4	(0.8 - 1.1)	MSS
E-5	4, 5 and 7	(*B&W Composite)	MSS

*B&W Composites of MSS use three bands - 4, 5 and 7; or 4, 6 and 7.
Note: Band Imagery is annotated MSS 4, 5, 6, 7, and 457 (composite).

All photographs sow the same ground scene, 185 x 185 square kilometers in area. The scene covers a segment of the California coast from Monterey (bottom center) to Napa (top edge near left). The Golden Gate just above San Francisco is at upper left. Stockton is located just under circular break in clouds (right of center, just below top). Clouds cover the San Joaquin Valley. Sacramento is 30 miles to north of picture center. Pacific Ocean is at lower left. San Pablo Bay and San Francisco Bay are clearly visible near San Francisco, and at lower right San Luis Reservoir is seen. Water pollution is seen in San Francisco Bay, intense near Oakland International Airport and stretching across the Bay to near San Francisco International Airport.

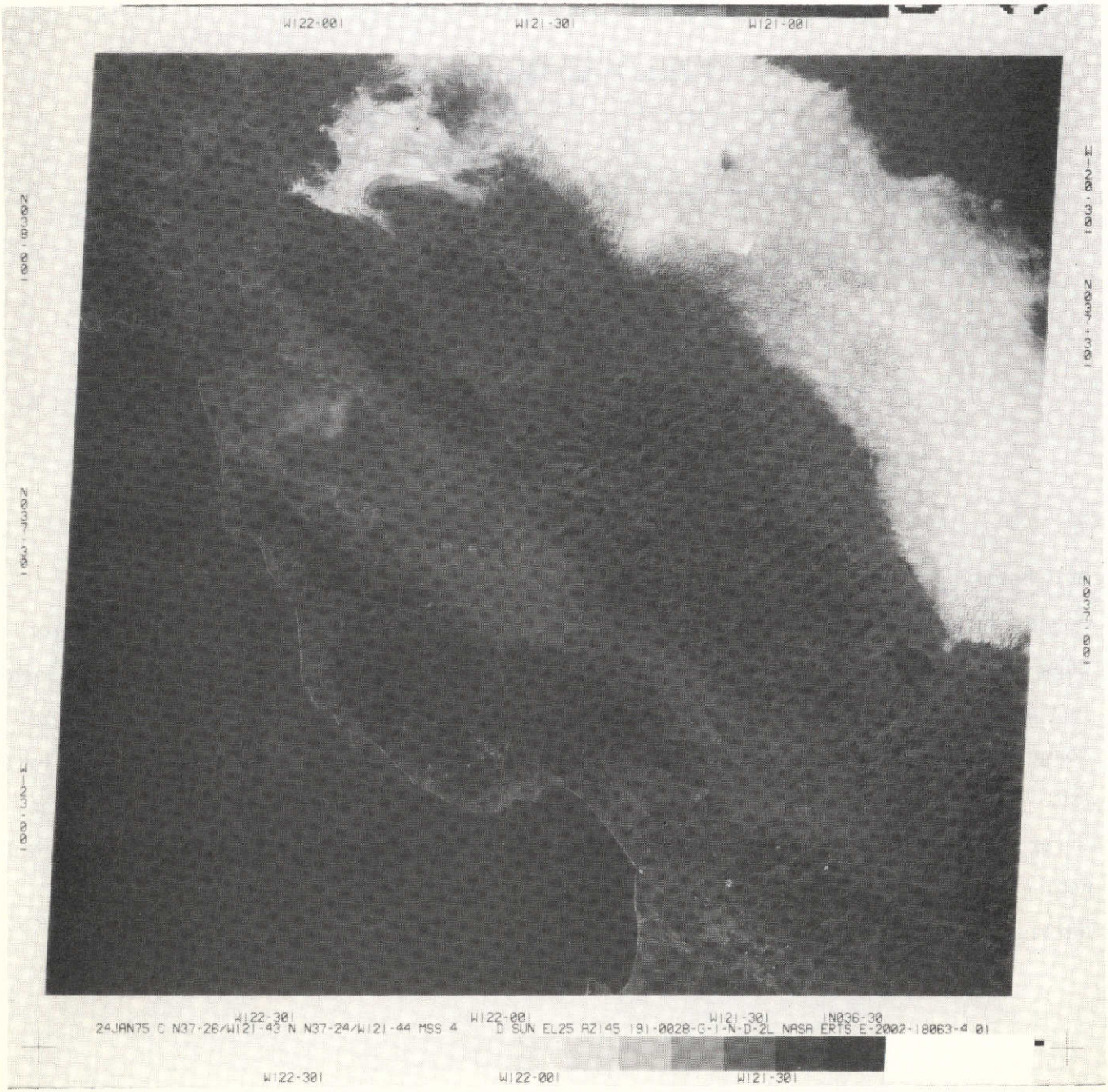

Figure E-1.

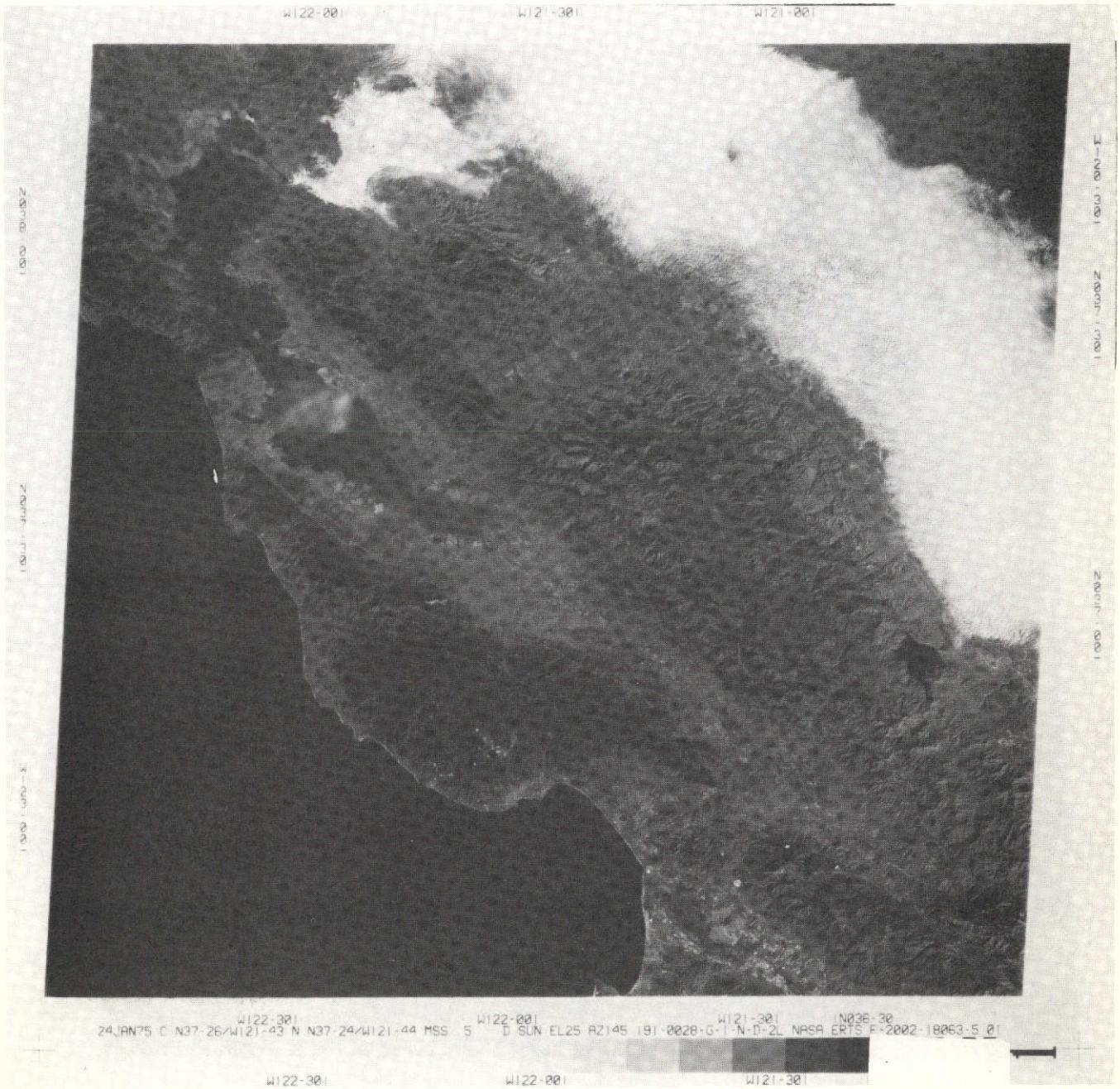
W122-00|
W121-30|
W121-00|
W122-30|
W122-00|
W121-30|
W038-30
24JAN75 C N37-26/W121-43 N N37-24/W121-44 MSS 5 D SUN EL25 AZ145 |91-0028-G-| N-D-2L NASA ERTS E-2002-18063-5 0|
W122-30|
W122-00|
W121-30|

Figure E-2.

Figure E-3.

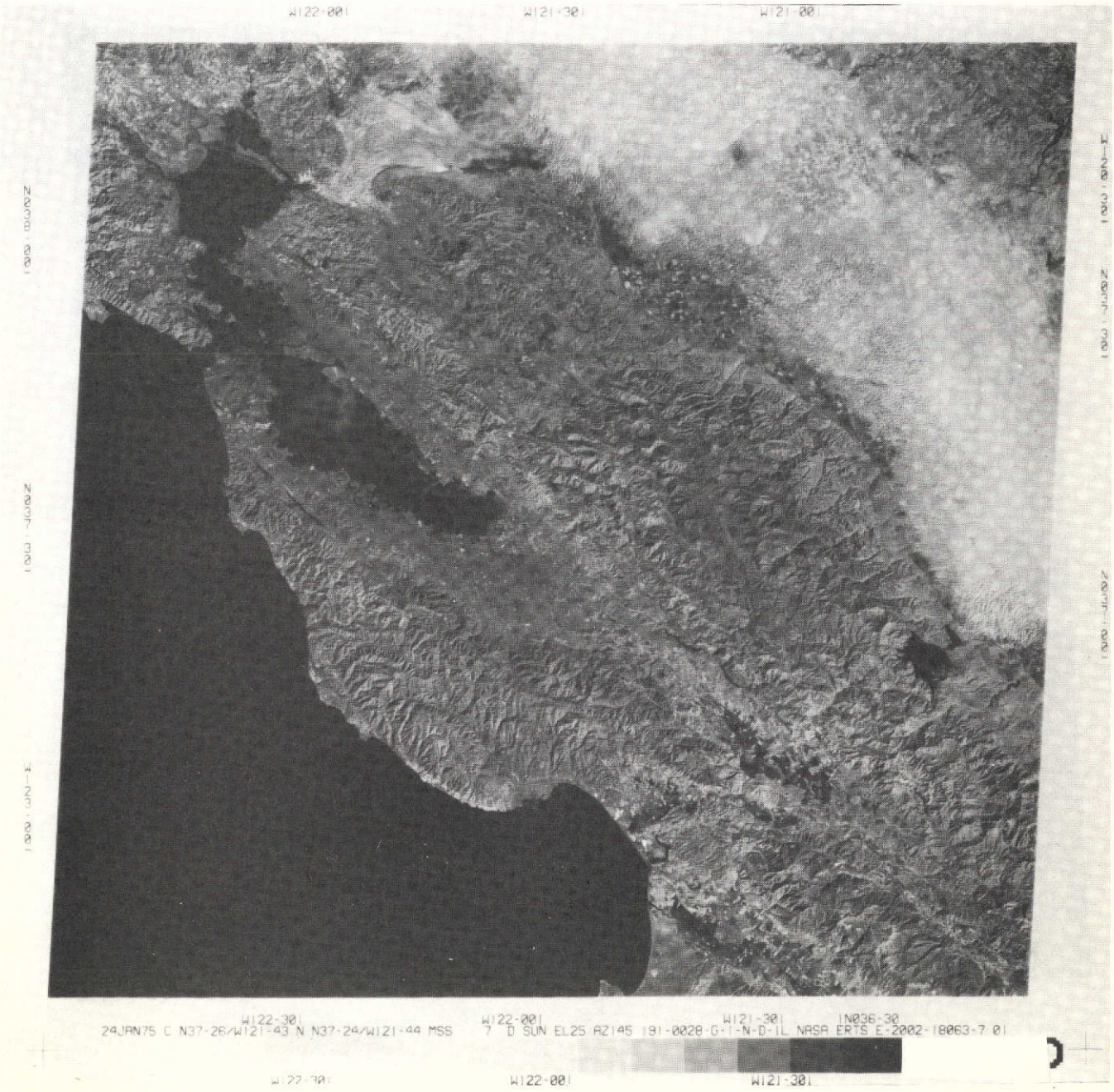

Figure E-4.

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Figure E-5.

APPENDIX F

PIR U-1N23-ERTS-130

DCS OPERATIONS IN LANDSAT 2

GENERAL ELECTRIC
SPACE DIVISION
PHILADELPHIA

PROGRAM INFORMATION REQUEST / RELEASE

*CLASS. LTR.	OPERATION	PROGRAM	SEQUENCE NO.	REV. LTR.
PIR NO. U	— 1N23	— ERTS	— 130	

*USE "C" FOR CLASSIFIED AND "U" FOR UNCLASSIFIED

FROM	TO
K.S. Rizk	T.W. Winchester

DATE SENT	DATE INFO. REQUIRED	PROJECT AND REQ. NO.	REFERENCE DIR. NO.
12 February 1975			

SUBJECT

DCS Operations in LANDSAT-2

INFORMATION REQUESTED/RELEASED

INTRODUCTION

The Data Collection Subsystem (DCS) was turned off in LANDSAT-1 after orbit 12690 on January 19, 1975, and has remained off ever since. In LANDSAT-2 the DCS was turned on in orbit 5 on January 22, 1975, and has remained on since. This study is to compare the effectiveness of the system before and after the changeover.

SUMMARY

The effectiveness of the Data Collection System is at least as good with LANDSAT-2 as with LANDSAT-1.

DISCUSSION

Using a data span from a month before the launch of LANDSAT-2 to the present, it is possible to plot the continuity and trend of DCS messages received in OCC. With this data it is possible to compare the effectiveness of the DCS in LANDSAT-1 with that in LANDSAT-2.

Figure 1 shows the number of DCS messages received daily at OCC, and the number of active platforms each day.

Despite a substantial decrease in the number of active platforms since LANDSAT-2 assumed DCS operations, the total number of messages received has remained substantially the same. The sinusoidal effect of orbital drift on the earth's surface during the 18-day cycle is apparent in Figure 1 for both LANDSAT-1 and LANDSAT-2.

In order to provide a more equitable comparison, a plot was made in Figure 2 of the messages per day per platform. From this it can be seen that the Data Collection System using LANDSAT-2 is at least as effective as that using LANDSAT-1.

The data in Figures 1 and 2 permit an examination of 1-station versus 2-station operation. In the first 3 days, the Greenbelt DCS ground station equipment was inoperative leaving only the Goldstone station to receive messages. In that period about 610 messages were received daily, about 6.5 messages per day per platform. At a time 18 days later, when the orbital ground traces on the earth were the same, both stations were operating. The daily message count was then about 930, about 9 messages per day per platform.

From Figure 2, the average number of messages received per day per platform is about 10 for LANDSAT-1 and about 11 for LANDSAT-2.

K. S. Rizk

K.S. Rizk, Systems Engineer

Dist.: B. Phucas, H. Boys, Oper Supr., R. Devlin, E. Painter, L. Gonzales, L. Smith, J. Seitner, K. Rizk (4), J. Williamson

PAGE NO. ____ OF ____

RETENTION REQUIREMENTS

COPIES FOR	MASTERS FOR
1 MO.	3 MOS.
3 MOS.	6 MOS.
6 MOS.	12 MOS.
MOS.	MOS.
	DO NOT DESTROY

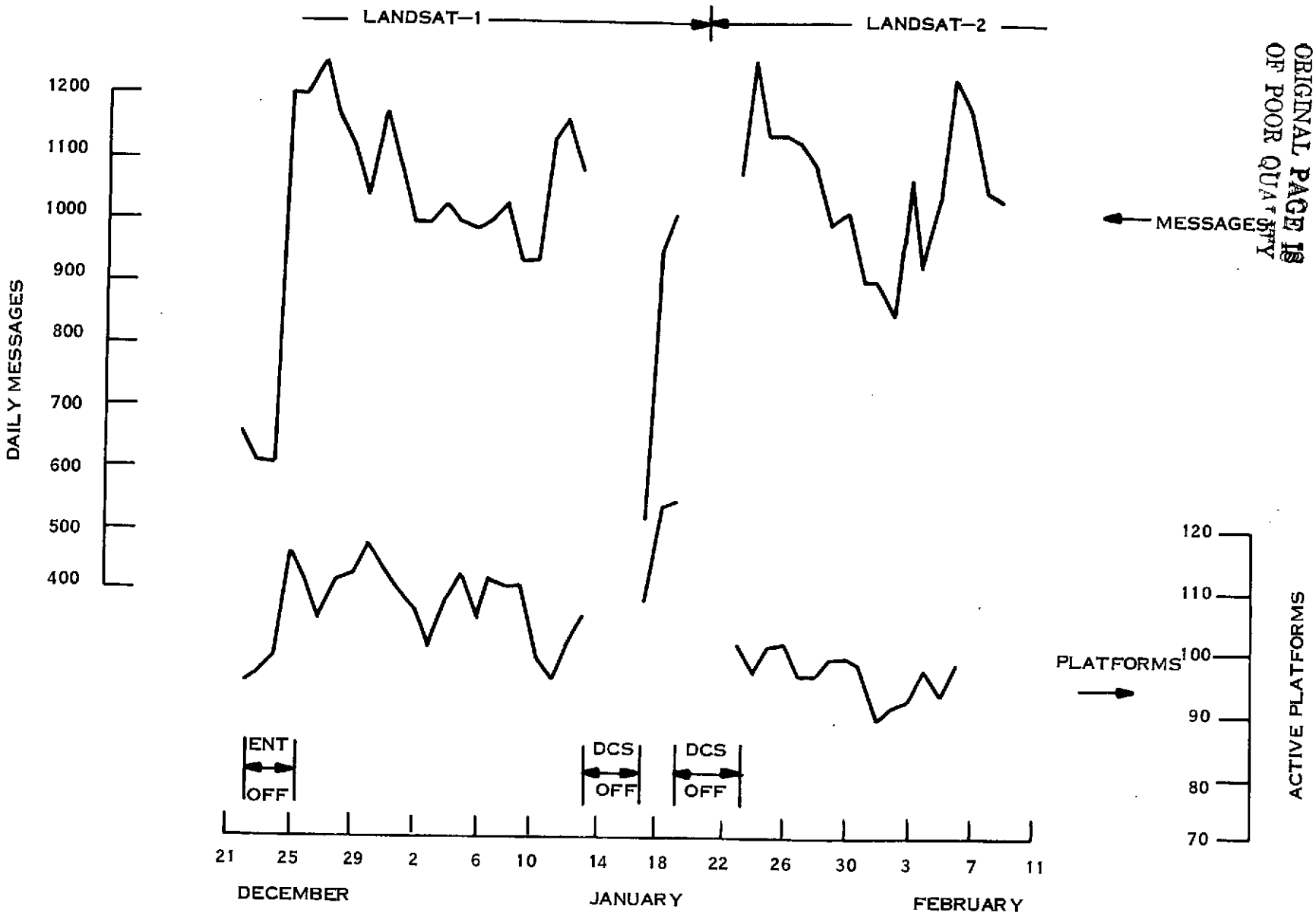

Figure 1. Data Collection System Performance

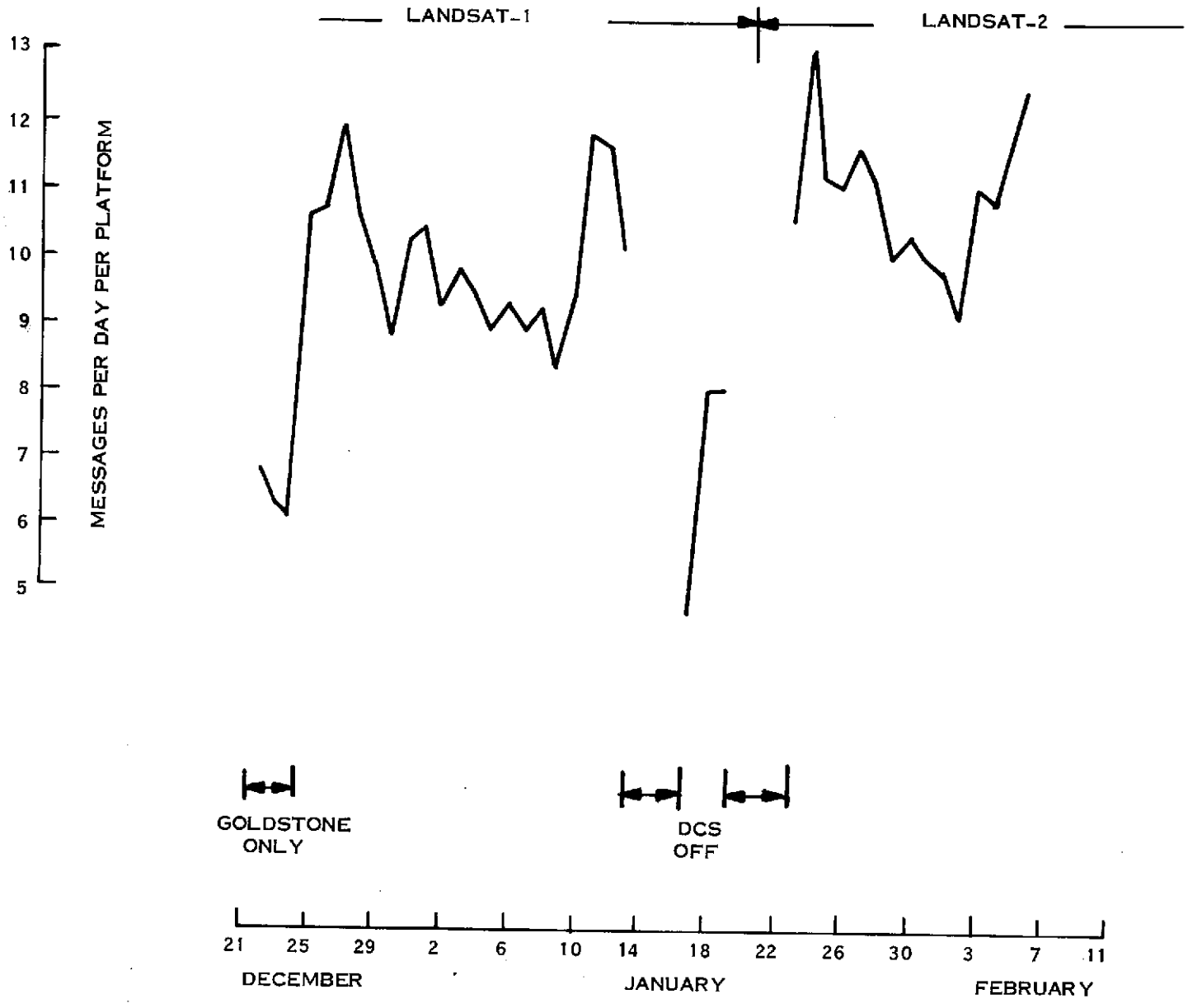

Figure 2. DCS Normalized Performance

APPENDIX G

SPACECRAFT ORBIT REFERENCE TABLES

LANDSAT-2

SPACECRAFT ORBIT REFERENCE TABLES

FROM JANUARY 1975 THROUGH DECEMBER 1975

ORBITS 0 THROUGH 16123

FLIGHT DAY 0 THROUGH 1156

LANDSAT-2

JAN , 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
22	22	0	0 - 3	150 - 153	11	-1
23	23	1	4 - 17	154 - 167	12	-1
24	24	2	18 - 31	168 - 181	13	-1
25	25	3	32 - 45	182 - 195	14	-1
26	26	4	46 - 59	196 - 209	15	-1
27	27	5	60 - 73	210 - 223	16	-1
28	28	6	74 - 87	224 - 237	17	-1
29	29	7	88 - 95	238 - 245	18	-1
	29	7	96 - 101	9 - 14	1	0
30	30	8	102 - 115	15 - 28	2	0
31	31	9	116 - 129	29 - 42	3	0

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FEB. 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	32	10	130 - 131	43 - 44	4	0
	32	10	132 - 143	59 - 70	5	0
2	33	11	144 - 157	71 - 84	6	0
3	34	12	158 - 167	85 - 94	7	0
	34	12	168 - 171	109 -112	8	0
4	35	13	172- 185	113-126	9	0
5	36	14	186- 198	127-139	10	0
6	37	15	199- 212	140-153	11	0
7	38	16	213- 226	154-167	12	0
8	39	17	227- 240	168-181	13	0
9	40	18	241- 254	182-195	14	0
10	41	19	255- 268	196-209	15	0
11	42	20	269- 282	210-223	16	0
12	43	21	283- 296	224-237	17	0
13	44	22	297- 310	238-251	18	0
14	45	23	311- 324	1- 14	1	1
15	46	24	325- 338	15- 28	2	1
16	47	25	339- 352	29- 42	3	1
17	48	26	353- 366	43- 56	4	1
18	49	27	367- 380	57- 70	5	1
19	50	28	381- 394	71- 84	6	1
20	51	29	395- 408	85- 98	7	1
21	52	30	409- 422	99-112	8	1
22	53	31	423- 436	113-126	9	1
23	54	32	437- 449	127-139	10	1
24	55	33	450- 463	140-153	11	1
25	56	34	464- 477	154-167	12	1
26	57	35	478- 491	168-181	13	1
27	58	36	492- 505	182-195	14	1
28	59	37	506- 519	196-209	15	1

LANDSAT-2

MAR. 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	60	38	520- 533	210-223	16	1
2	61	39	534- 547	224-237	17	1
3	62	40	548- 561	238-251	18	1
4	63	41	562- 575	1- 14	1	2
5	64	42	576- 589	15- 28	2	2
6	65	43	590- 603	29- 42	3	2
7	66	44	604- 617	43- 56	4	2
8	67	45	618- 631	57- 70	5	2
9	68	46	632- 645	71- 84	6	2
10	69	47	646- 659	85- 98	7	2
11	70	48	660- 673	99-112	8	2
12	71	49	674- 687	113-126	9	2
13	72	50	688- 700	127-139	10	2
14	73	51	701- 714	140-153	11	2
15	74	52	715- 728	154-167	12	2
16	75	53	729- 742	168-181	13	2
17	76	54	743- 756	182-195	14	2
18	77	55	757- 770	196-209	15	2
19	78	56	771- 784	210-223	16	2
20	79	57	785- 798	224-237	17	2
21	80	58	799- 812	238-251	18	2
22	81	59	813- 826	1- 14	1	3
23	82	60	827- 840	15- 28	2	3
24	83	61	841- 854	29- 42	3	3
25	84	62	855- 868	43- 56	4	3
26	85	63	869- 882	57- 70	5	3
27	86	64	883- 896	71- 84	6	3
28	87	65	897- 910	85- 98	7	3
29	88	66	911- 924	99-112	8	3
30	89	67	925- 938	113-126	9	3
31	90	68	939- 951	127-139	10	3

LANDSAT-2

APR, 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	91	69	952- 965	140-153	11	3
2	92	70	966- 979	154-167	12	3
3	93	71	980- 993	168-181	13	3
4	94	72	994- 1007	182-195	14	3
5	95	73	1008- 1021	196-209	15	3
6	96	74	1022- 1035	210-223	16	3
7	97	75	1036- 1049	224-237	17	3
8	98	76	1050- 1063	238-251	18	3
9	99	77	1064- 1077	1- 14	1	4
10	100	78	1078- 1091	15- 28	2	4
11	101	79	1092- 1105	29- 42	3	4
12	102	80	1106- 1119	43- 56	4	4
13	103	81	1120- 1133	57- 70	5	4
14	104	82	1134- 1147	71- 84	6	4
15	105	83	1148- 1161	85- 98	7	4
16	106	84	1162- 1175	99-112	8	4
17	107	85	1176- 1189	113-126	9	4
18	108	86	1190- 1202	127-139	10	4
19	109	87	1203- 1216	140-153	11	4
20	110	88	1217- 1230	154-167	12	4
21	111	89	1231- 1244	168-181	13	4
22	112	90	1245- 1258	182-195	14	4
23	113	91	1259- 1272	196-209	15	4
24	114	92	1273- 1286	210-223	16	4
25	115	93	1287- 1300	224-237	17	4
26	116	94	1301- 1314	238-251	18	4
27	117	95	1315- 1328	1- 14	1	5
28	118	96	1329- 1342	15- 28	2	5
29	119	97	1343- 1356	29- 42	3	5
30	120	98	1357- 1370	43- 56	4	5

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MAY, 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	121	99	1371- 1384	57- 70	5	5
2	122	100	1385- 1398	71- 84	6	5
3	123	101	1399- 1412	85- 98	7	5
4	124	102	1413- 1426	99-112	8	5
5	125	103	1427- 1440	113-126	9	5
6	126	104	1441- 1453	127-139	10	5
7	127	105	1454- 1467	140-153	11	5
8	128	106	1468- 1481	154-167	12	5
9	129	107	1482- 1495	168-181	13	5
10	130	108	1496- 1509	182-195	14	5
11	131	109	1510- 1523	196-209	15	5
12	132	110	1524- 1537	210-223	16	5
13	133	111	1538- 1551	224-237	17	5
14	134	112	1552- 1565	238-251	18	5
15	135	113	1566- 1579	1- 14	1	6
16	136	114	1580- 1593	15- 28	2	6
17	137	115	1594- 1607	29- 42	3	6
18	138	116	1608- 1621	43- 56	4	6
19	139	117	1622- 1635	57- 70	5	6
20	140	118	1636- 1649	71- 84	6	6
21	141	119	1650- 1663	85- 98	7	6
22	142	120	1664- 1677	99-112	8	6
23	143	121	1678- 1691	113-126	9	6
24	144	122	1692- 1704	127-139	10	6
25	145	123	1705- 1718	140-153	11	6
26	146	124	1719- 1732	154-167	12	6
27	147	125	1733- 1746	168-181	13	6
28	148	126	1747- 1760	182-195	14	6
29	149	127	1761- 1774	196-209	15	6
30	150	128	1775- 1788	210-223	16	6
31	151	129	1789- 1802	224-237	17	6

LANDSAT-2

JUN.1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFFRENCE ORBITS	REF DAY	CYCLE NO.
1	152	130	1803- 1816	238-251	18	6
2	153	131	1817- 1830	1- 14	1	7
3	154	132	1831- 1844	15- 28	2	7
4	155	133	1845- 1858	29- 42	3	7
5	156	134	1859- 1872	43- 56	4	7
6	157	135	1873- 1886	57- 70	5	7
7	158	136	1887- 1900	71- 84	6	7
8	159	137	1901- 1914	85- 98	7	7
9	160	138	1915- 1928	99-112	8	7
10	161	139	1929- 1942	113-126	9	7
11	162	140	1943- 1955	127-139	10	7
12	163	141	1956- 1969	140-153	11	7
13	164	142	1970- 1983	154-167	12	7
14	165	143	1984- 1997	168-181	13	7
15	166	144	1998- 2011	182-195	14	7
16	167	145	2012- 2025	196-209	15	7
17	168	146	2026- 2039	210-223	16	7
18	169	147	2040- 2053	224-237	17	7
19	170	148	2054- 2067	238-251	18	7
20	171	149	2068- 2081	1- 14	1	8
21	172	150	2082- 2095	15- 28	2	8
22	173	151	2096- 2109	29- 42	3	8
23	174	152	2110- 2123	43- 56	4	8
24	175	153	2124- 2137	57- 70	5	8
25	176	154	2138- 2151	71- 84	6	8
26	177	155	2152- 2165	85- 98	7	8
27	178	156	2166- 2179	99-112	8	8
28	179	157	2180- 2193	113-126	9	8
29	180	158	2194- 2206	127-139	10	8
30	181	159	2207- 2220	140-153	11	8

LANDSAT-2

JUL, 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	182	160	2221- 2234	154-167	12	8
2	183	161	2235- 2248	168-181	13	8
3	184	162	2249- 2262	182-195	14	8
4	185	163	2263- 2276	196-209	15	8
5	186	164	2277- 2290	210-223	16	8
6	187	165	2291- 2304	224-237	17	8
7	188	166	2305- 2318	238-251	18	8
8	189	167	2319- 2332	1- 14	1	9
9	190	168	2333- 2346	15- 28	2	9
10	191	169	2347- 2360	29- 42	3	9
11	192	170	2361- 2374	43- 56	4	9
12	193	171	2375- 2388	57- 70	5	9
13	194	172	2389- 2402	71- 84	6	9
14	195	173	2403- 2416	85- 98	7	9
15	196	174	2417- 2430	99-112	8	9
16	197	175	2431- 2444	113-126	9	9
17	198	176	2445- 2457	127-139	10	9
18	199	177	2458- 2471	140-153	11	9
19	200	178	2472- 2485	154-167	12	9
20	201	179	2486- 2499	168-181	13	9
21	202	180	2500- 2513	182-195	14	9
22	203	181	2514- 2527	196-209	15	9
23	204	182	2528- 2541	210-223	16	9
24	205	183	2542- 2555	224-237	17	9
25	206	184	2556- 2569	238-251	18	9
26	207	185	2570- 2583	1- 14	1	10
27	208	186	2584- 2597	15- 28	2	10
28	209	187	2598- 2611	29- 42	3	10
29	210	188	2612- 2625	43- 56	4	10
30	211	189	2626- 2639	57- 70	5	10
31	212	190	2640- 2653	71- 84	6	10

LANDSAT-2

AUG, 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	213	191	2654- 2667	85- 98	7	10
2	214	192	2668- 2681	99-112	8	10
3	215	193	2682- 2695	113-126	9	10
4	216	194	2696- 2708	127-139	10	10
5	217	195	2709- 2722	140-153	11	10
6	218	196	2723- 2736	154-167	12	10
7	219	197	2737- 2750	168-181	13	10
8	220	198	2751- 2764	182-195	14	10
9	221	199	2765- 2778	196-209	15	10
10	222	200	2779- 2792	210-223	16	10
11	223	201	2793- 2806	224-237	17	10
12	224	202	2807- 2820	238-251	18	10
13	225	203	2821- 2834	1- 14	1	11
14	226	204	2835- 2848	15- 28	2	11
15	227	205	2849- 2862	29- 42	3	11
16	228	206	2863- 2876	43- 56	4	11
17	229	207	2877- 2890	57- 70	5	11
18	230	208	2891- 2904	71- 84	6	11
19	231	209	2905- 2918	85- 98	7	11
20	232	210	2919- 2932	99-112	8	11
21	233	211	2933- 2946	113-126	9	11
22	234	212	2947- 2959	127-139	10	11
23	235	213	2960- 2973	140-153	11	11
24	236	214	2974- 2987	154-167	12	11
25	237	215	2988- 3001	168-181	13	11
26	238	216	3002- 3015	182-195	14	11
27	239	217	3016- 3029	196-209	15	11
28	240	218	3030- 3043	210-223	16	11
29	241	219	3044- 3057	224-237	17	11
30	242	220	3058- 3071	238-251	18	11
31	243	221	3072- 3085	1- 14	1	12

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SEP, 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	244	222	3086- 3099	15- 28	2	12
2	245	223	3100- 3113	29- 42	3	12
3	246	224	3114- 3127	43- 56	4	12
4	247	225	3128- 3141	57- 70	5	12
5	248	226	3142- 3155	71- 84	6	12
6	249	227	3156- 3169	85- 98	7	12
7	250	228	3170- 3183	99-112	8	12
8	251	229	3184- 3197	113-126	9	12
9	252	230	3198- 3210	127-139	10	12
10	253	231	3211- 3224	140-153	11	12
11	254	232	3225- 3238	154-167	12	12
12	255	233	3239- 3252	168-181	13	12
13	256	234	3253- 3266	182-195	14	12
14	257	235	3267- 3280	196-209	15	12
15	258	236	3281- 3294	210-223	16	12
16	259	237	3295- 3308	224-237	17	12
17	260	238	3309- 3322	238-251	18	12
18	261	239	3323- 3336	1- 14	1	13
19	262	240	3337- 3350	15- 28	2	13
20	263	241	3351- 3364	29- 42	3	13
21	264	242	3365- 3378	43- 56	4	13
22	265	243	3379- 3392	57- 70	5	13
23	266	244	3393- 3406	71- 84	6	13
24	267	245	3407- 3420	85- 98	7	13
25	268	246	3421- 3434	99-112	8	13
26	269	247	3435- 3448	113-126	9	13
27	270	248	3449- 3461	127-139	10	13
28	271	249	3462- 3475	140-153	11	13
29	272	250	3476- 3489	154-167	12	13
30	273	251	3490- 3503	168-181	13	13

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OCT. 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	274	252	3504- 3517	182-195	14	13
2	275	253	3518- 3531	196-209	15	13
3	276	254	3532- 3545	210-223	16	13
4	277	255	3546- 3559	224-237	17	13
5	278	256	3560- 3573	238-251	18	13
6	279	257	3574- 3587	1- 14	1	14
7	280	258	3588- 3601	15- 28	2	14
8	281	259	3602- 3615	29- 42	3	14
9	282	260	3616- 3629	43- 56	4	14
10	283	261	3630- 3643	57- 70	5	14
11	284	262	3644- 3657	71- 84	6	14
12	285	263	3658- 3671	85- 98	7	14
13	286	264	3672- 3685	99-112	8	14
14	287	265	3686- 3699	113-126	9	14
15	288	266	3700- 3712	127-139	10	14
16	289	267	3713- 3726	140-153	11	14
17	290	268	3727- 3740	154-167	12	14
18	291	269	3741- 3754	168-181	13	14
19	292	270	3755- 3768	182-195	14	14
20	293	271	3769- 3782	196-209	15	14
21	294	272	3783- 3796	210-223	16	14
22	295	273	3797- 3810	224-237	17	14
23	296	274	3811- 3824	238-251	18	14
24	297	275	3825- 3838	1- 14	1	15
25	298	276	3839- 3852	15- 28	2	15
26	299	277	3853- 3866	29- 42	3	15
27	300	278	3867- 3880	43- 56	4	15
28	301	279	3881- 3894	57- 70	5	15
29	302	280	3895- 3908	71- 84	6	15
30	303	281	3909- 3922	85- 98	7	15
31	304	282	3923- 3936	99-112	8	15

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NOV, 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	305	283	3937- 3950	113-126	9	15
2	306	284	3951- 3963	127-139	10	15
3	307	285	3964- 3977	140-153	11	15
4	308	286	3978- 3991	154-167	12	15
5	309	287	3992- 4005	168-181	13	15
6	310	288	4006- 4019	182-195	14	15
7	311	289	4020- 4033	196-209	15	15
8	312	290	4034- 4047	210-223	16	15
9	313	291	4048- 4061	224-237	17	15
10	314	292	4062- 4075	238-251	18	15
11	315	293	4076- 4089	1- 14	1	16
12	316	294	4090- 4103	15- 28	2	16
13	317	295	4104- 4117	29- 42	3	16
14	318	296	4118- 4131	43- 56	4	16
15	319	297	4132- 4145	57- 70	5	16
16	320	298	4146- 4159	71- 84	6	16
17	321	299	4160- 4173	85- 98	7	16
18	322	300	4174- 4187	99-112	8	16
19	323	301	4188- 4201	113-126	9	16
20	324	302	4202- 4214	127-139	10	16
21	325	303	4215- 4228	140-153	11	16
22	326	304	4229- 4242	154-167	12	16
23	327	305	4243- 4256	168-181	13	16
24	328	306	4257- 4270	182-195	14	16
25	329	307	4271- 4284	196-209	15	16
26	330	308	4285- 4298	210-223	16	16
27	331	309	4299- 4312	224-237	17	16
28	332	310	4313- 4326	238-251	18	16
29	333	311	4327- 4340	1- 14	1	17
30	334	312	4341- 4354	15- 28	2	17

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DEC, 1975

DATE	GMT DAY	FLIGHT DAY	SPACECRAFT ORBITS	REFERENCE ORBITS	REF DAY	CYCLE NO.
1	335	313	4355- 4368	29- 42	3	17
2	336	314	4369- 4382	43- 56	4	17
3	337	315	4383- 4396	57- 70	5	17
4	338	316	4397- 4410	71- 84	6	17
5	339	317	4411- 4424	85- 98	7	17
6	340	318	4425- 4438	99-112	8	17
7	341	319	4439- 4452	113-126	9	17
8	342	320	4453- 4465	127-139	10	17
9	343	321	4466- 4479	140-153	11	17
10	344	322	4480- 4493	154-167	12	17
11	345	323	4494- 4507	168-181	13	17
12	346	324	4508- 4521	182-195	14	17
13	347	325	4522- 4535	196-209	15	17
14	348	326	4536- 4549	210-223	16	17
15	349	327	4550- 4563	224-237	17	17
16	350	328	4564- 4577	238-251	18	17
17	351	329	4578- 4591	1- 14	1	18
18	352	330	4592- 4605	15- 28	2	18
19	353	331	4606- 4619	29- 42	3	18
20	354	332	4620- 4633	43- 56	4	18
21	355	333	4634- 4647	57- 70	5	18
22	356	334	4648- 4661	71- 84	6	18
23	357	335	4662- 4675	85- 98	7	18
24	358	336	4676- 4689	99-112	8	18
25	359	337	4690- 4703	113-126	9	18
26	360	338	4704- 4716	127-139	10	18
27	361	339	4717- 4730	140-153	11	18
28	362	340	4731- 4744	154-167	12	18
29	363	341	4745- 4758	168-181	13	18
30	364	342	4759- 4772	182-195	14	18
31	365	343	4773- 4786	196-209	15	18