~~TOP SECRET~~ HANDLE VIA BYEMAN CONTROL SYSTEM

PROGRAM "C"

TECHNICAL DESCRIPTION OF MISSION 7106

10 December 1969

NAVAL RESEARCH LABORATORY
Washington, D.C. 20390

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TECHNICAL DESCRIPTION OF MISSION 7106

I. INTRODUCTION

A. Background

The launch of Mission 7106 marked the eleventh launch and twenty-second, twenty-third, twenty-fourth, and twenty-fifth spacecraft that the Naval Research Laboratory has built for the purposes of ELINT Collection. The last six launches and twenty spacecraft have been provided under the sponsorship of the NRO, whereas the first five launches and five spacecraft were under Navy sponsorship. The NRO sponsored phase has the Code-word POPPY and the Navy sponsored phase was known as DYNO, or GRAB.

Certain factors have characterized both phases of the program. Chief among these are small, long-life spacecraft injected into approximately 500 nautical miles, circular, 70° inclination orbits and carrying ELINT payloads which consist of many crystal-video type receiving systems. These receivers detect the main lobes of all radars within the receiver's R.F. band pass and transpond, on a pulse-for-pulse basis using stretched pulses, in real-time to strategically located POPPY ground-stations.

Details of the overall system, which are contained in the text of this document, will show how the POPPY system is capable of providing "outputs" such as early detection of new emitters, weapon system information, emitter location, and technical information such as PRF, scan rate, and the frequency band of the emitters. Mission 7106 covers the complete frequency spectrum from 154 MHz to 10.0 GHz, and also a portion of K-Band (14.6-15.1 GHz).

B. Launch and Orbital Parameters of Mission 7106

1. Launch: Mission 7106 was launched from the Pacific Missile Test Range, Vandenberg AFB, California, aboard a Thorad-Agena vehicle on 30 September 1969 at 13:40:02.63 ZULU. The four spacecraft which comprise Mission 7106 were the primary payloads on this launch. Appendix 1 shows the primary payloads mounted on the Agena. Carried as secondary payloads were five smaller spacecraft from NRL and a Lockheed P-11. This made a total of ten spacecraft on one vehicle.

The launch resulted in a good orbit with the following parameters:

Apogee: 506.4 NM
Perigee: 490.8 NM
Inclination: 70.0168 degrees
Period: 103.466 MIN.

The only vehicle factor which was not nominal was that in the 57th revolution (REV 57), the Agena apparently exploaded. This anomaly has caused considerable concern and raised several questions which may never be completely resolved. Undoubtedly, steps will be taken to avoid a similar occurrence on future Agena launches.

2. Spacecraft Spacing: Sixty-six minutes and ten seconds (66:10) after lift-off the four primary spacecraft were simultaneously separated from the front end of the stabilized Agena vehicle with calibrated springs. The relative separation velocities were chosen to result in the four spacecraft arriving at their optimum spacing approximately one month after launch.

One of the reasons for using 3-Axis stabilization on the spacecraft of this Mission, is that it provides a stable platform from which the microthruster system can be operated. The capability thus achieved is the option to increase or decrease the orbital velocity of each spacecraft. Since all four spacecraft were injected into orbit by the same vehicle, they are all traveling at the same speed, (approximately 24,000 ft/sec). The spacecraft are first simultaneously separated with individual calibrated springs of different energies. (See Appendix 2.) The four spacecraft therefore drift apart at a predetermined rate and when they reach the desired separation distance, the microthruster system is activated in such a direction as to cancel their vary small differences in velocity. The differences in velocity are typically on the order of 0.1 ft/sec. At the end of the thrusting period, the spacecraft are the desired distances apart and are traveling at the same speed. The delicate balance of the "parked" orbital spacing will gradually degrade as one spacecraft is affected slightly more by aerodynamic drag than its mates. The microthrusters will be used as necessary to correct for spacing errors.

[redacted]

[redacted]

II. DESCRIPTION OF THE BASIC FUNCTIONS

A. Four POPPY satellite spacecraft developed by the Naval Research Laboratory were launched from the Pacific Missile Range on 30 September 1969. These satellites are for use in the Program "C" (POPPY) SIGINT data collection effort, and will be known by their respective nomenclature as 7106A (ALPHA), 7106B (BRAVO), 7106C (CHARLIE), and 7106D (DELTA).

B. The four satellites are designed with a total of 82 multiplied ELINT collection bands to fulfill two basic requirements:

1. Early recognition and location of major weapons systems within the denied Soviet and CHICOM areas.

2. Provide parametric measurements through which one may detect, in any part of the world where crisis situations may develop, the advancements in radar technology which may be applied to future weapon and space systems.

C. Mission 7106 capabilities expand [redacted] on POPPY's proven and highly successful history of satellite design and data collection in support of the following intelligence priorities:

1. Timely discovery of the existence of previously unknown emitter sub-systems.

2. Technical assessment of new sub-systems to ascertain their function, capabilities and limitations before they are deployed into a major overall weapon system.

3. Electronic Order of Battle (EOB) surveillance with a timely periodic determination of the locations of known emitter sub-systems and sampling by geographic area to disclose a measure of the activity level as well as the inter-relationships and usable patterns of these sub-systems relative to the overall weapons systems.

III. OVERALL OPERATIONAL DESCRIPTION

Each of the four spacecraft of Mission 7106 is equipped with at least twenty ELINT data collection systems, any combination of which may be tasked at one time.

Each of the 82 ELINT collection bands for Mission 7106 employs carefully calibrated and well documented rf band-pass filters which define the particular frequency spectrum and response characteristics.

[redacted]

V. SPACECRAFT CHARACTERISTICS

A. Physical Characteristics

All four spacecraft utilize the same general structure as employed for 7105B, 7105C and 7105D. The 7106 structure (Appendix 51) can be described as a 12-sided multiface, 27 inches in diameter and 34 inches high. The spacecraft weights are as follows:

1. 7106A-----235 lbs.
2. 7106B-----223 lbs.

[redacted] 7106B----- 247 lbs.

4. 7106C----- 236 lbs.

The collection antennas are located symmetrically around the polar axis at various latitudes of the spacecraft. In addition to these receiving antennas there is a turnstile array which is deployed downward toward the earth on the end of a four foot boom. This turnstile antenna system serves the two data link transmitters and provides an omni-directional radiation pattern.

A second turnstile antenna array located on the north (upper) hemisphere of the spacecraft is used in conjunction with the Telemetry transmitter as well as with the Command receiver.

Solar cells are located in three circumferential bands oriented at the + 20°, + 45° and - 20° latitudes of the spacecraft.

B. Stabilization

Each of the four spacecraft is equipped with a Three-Axis Gravity Gradient System (GGS). This system has been successfully developed on the POPPY program and it satisfies the following requirements for the POPPY system:

1. A stable, earth centered, satellite for mounting the horizon-to-horizon ELINT collection antennas.

2. A proper alignment of the solar panels for optimum battery charging capability.

3. A stable flight-oriented platform for the microthrusting operations used to adjust satellite spacing.

C. Thrusters

All four spacecraft have the ammonia vapor microthruster which is very similar to the system used so successfully on the 7105B spacecraft over the past two years. This system coupled with the 3-axis GGS system will permit maintaining optimum spacing between all four spacecraft for the entire useful life of the mission. This system provides a very low thrust to spacecraft in orbit without disturbing the gravity gradient stabilization. The thrust level is in the order

of 10 micro-pounds and is produced by exhausting anhydrous ammonia gas through a nozzle. There are two complete systems on each payload; this provides either fore or aft thrust capability for redundancy when used in conjunction with the yaw maneuver. The two systems share a common tank. Each system consists of two valves, two plenum chambers, three pressure switches and a nozzle. The electronic control consists of an on-off relay, a cycle relay, and a transistor switch. Each nozzle has a 4 watt heater which decomposes the ammonia vapor exhaust and increases its specific impulse. These heaters can be turned on or off by command.

D. Thermal Design

All surfaces of the spacecraft not covered with the solar cells are covered with a vapor-deposited aluminum and then coated with a layer of vapor-deposited silicon monoxide to provide a second surface mirror. This passive thermal design will keep the spacecraft electronics at a temperature well within the $-10^{\circ}C$ to $60^{\circ}C$ range for the sunlight condition of the normal POPPY orbit. The electronics temperature range experienced operationally is approximately $+5^{\circ}C$ to $+45^{\circ}C$.

E. Power Supply

The power supply system consists of an 18 cell, nickel-cadmium battery-pack with a 5 ampere-hour capacity which is recharged through an array of solar cells. The solar cells are mounted on the main body of the multifaced spacecraft so as to optimize spherical symmetry and thus minimize variations in power due to sun orientation. The solar cells provide a peak power of approximately 24 watts which in minimum sun is capable of supporting an average load of 11 watts. This takes into account the eclipse factor, recharging efficiency and variations in sun orientation.

The solar cell recharging system is designed to support a 50 percent operational tasking duty cycle which provides the capability for continuous tasking in the northern hemisphere.

F. Command and Control System

1. The command and control systems used in the four spacecraft for Mission 7106 are similar to those used in Mission 7105 with the important operational differences listed below:

a. The number of individual commands that can be sent to each spacecraft has been increased from forty to eighty.

b. A different "RESET" tone pair is used for each spacecraft as compared to the previous POPPY missions which had a common RESET, and all spacecraft within range of the command signal would reset even though the reset was desired on only a single spacecraft.

2. The on-board timer is programmable so that the execution of all ELINT collection commands may be delayed in 10-minute increments for up to 140 minutes following the command being sent to the spacecraft.

3. The duration of operation for the ELINT collection systems is either the normal 50-minute cycle period or a new period of 20 minutes. This 20-minute cycle period is for use in the engineering evaluation effort at the domestic R&D site at

4. For back-up operation, the timer system can be bypassed, thus allowing any combination of ELINT bands to be turned on and off only by direct commands from ground stations. In this mode, the only reset available is a command transmitted from one of the POPPY command stations (no timer-actuated Reset).

G. Telemetry System

The housekeeping telemetry on all four spacecraft is the type as opposed to the analog system used in the past. The analog system is retained as a secondary or back-up system and will be used for read-out of the spacecraft engineering status by those stations which are not yet equipped with the necessary decommutation equipment. This system samples inputs cyclicly. Typical of the analog inputs are the spacecraft temperatures at various critical locations, the battery-bus voltage levels, pressure sensor values, etc. Typical of the digital inputs are the for the command system which describe the state of command with regard to the ELINT systems. Almost all of the digital data is available in the analog system as a back-up. See Appendix 52 through 59. The most significant improvement which results from use of the telemetry system is the relative speed and reliability with which the ground station operator can properly and safely command the spacecraft and verify the entire command system status.

H. Transmitters

1. Each of the spacecraft employs three transmitters, one for telemetry and two for ELINT data transmission. The frequency and radiated power of each is tabulated in Appendix 60. It should be understood that all the power levels given in the table take into account all losses between the transmitter and antenna. These include insertion losses of filters, hybrids, isolators and transmission lines.

VI. MISSION GROUND STATIONS

A. Ground Based Data Receiving Systems

The pulses which are transponded from Mission 7106 via the two data down-link channels from each spacecraft are intercepted by a chain of POPPY collection sites situated around the Sino Soviet Bloc land-mass. These data collection sites are equipped with two identical analog receiving-recording complexes. are equipped with the transmitter complex for interrogating or commanding the spacecraft for operational tasking. employ Field Digitizing Systems.

B. Station Locations

Mission 7106 Ground Stations for receiving the POPPY data are located around the world as follows:

Command Control (Interrogation) Stations are co-located with the data receiving complexes at

The POPPY receiving site in was phased out in October 1969 and the load from this vital data receiving site will be transferred to until a new site location can be obtained. At the present time, the site is under study for potential installation of a semi-unattended receiving system which will allow the POPPY system to operate efficiently, with less impact on the overall station effort, especially during "ALERT" periods.

C. Antenna System

The satellites of MISSION 7106 are tracked manually in the same manner used previously, i.e., by observing the predicted azimuth and elevation versus time values promulgated by COMNAVSECGRU. Of great assistance to the operator is the monitoring of the channel which is continuously radiating "housekeeping" data.

Two high gain antenna arrays are used at each data receiving station to receive all four spacecraft simultaneously. These antennas are remotely steerable in elevation as well as azimuth.

In addition, the Command-Control Stations have a third "AZ - EL" antenna used for tracking, receiving telemetry, and transmitting.

D. Receivers

The DATA RECEIVERS utilized in are the special purpose RS-1A Receiver/APU systems. This same type receiver will also be used in by February, 1970.

These are custom designed solid-state pulse receivers which are synthesizer-controlled, have linear phase response, and a unique automatic noise control system. Each receiver is carefully calibrated to eliminate in all of the data link receiving channels.

Each receiver incorporates an Analog Processing Unit (APU) which accurately establishes the fifty percent amplitude of the received data pulse over a wide range of signal input levels. For each input pulse, a clean, noise-free pulse is generated for use in the digitizing system.

The ground station at [redacted] is equipped with a simplified model of RS-1A receivers without the self-contained APU, since this station has no digitizing system.

[redacted] is currently using R-390A/URR receivers, but this station is scheduled to convert to the simplified RS-1A (without the APU) by February, 1970.

E. Data Recording System

The Model GR-2800 magnetic tape recorder built by the Consolidated Electrodynamic Corporation is presently being used throughout the POPPY Mission Ground Stations and will be available for MISSION 7106 data recording. This machine is a basic 100 kc (at 60 ips) instrumentation type seven track magnetic tape recorder. Provision is made for FM type recording of four tracks of SIGINT transponded data utilizing tracks #1, #3, #5, and #7, and timing information on tracks #2, #4, and #6 using analog electronics. The center frequency of the FM carrier is 54 kc at the 30 inch-per-second tape speed used for the recording. With this tape speed, and the use of one mil-thick 1/2 inch width magnetic tape, the total recording time on a 14 1/2 inch reel is 48 minutes, which is more than enough for recording the data from two satellite passages.

F. Timing System

[redacted]

G. Digitizing System

Field DIGITIZING SYSTEMS have been operational in [redacted] since June, 1967, and [redacted] station since April, 1969.

The station at [redacted] s scheduled to be equipped with the digitizing system in late 1970. The pace-setting aspect for this schedule is the site modification necessary to accomodate a system of this size and complexity.

The field digitizer system will, in addition to improving the overall data timing accuracy, enable the full utilization of all four of the Mission 7106 spacecraft simultaneously. Each of the sites has extensive analysis capability to assist in the real time appraisal of the data. This provides a potential for a quick reaction alert capability within minutes after a new or unusual Signal Of Interest (SOI) is detected.

VII. DATA PROCESSING

[redacted]

VIII. OPERATIONAL PERFORMANCE

MISSION 7106 is designed with an ELINT Collection capability surpassing all other POPPY systems. Dual frequency coverage has been extended to include the entire frequency range of 154 MHZ to 10,000 MHZ and also a small portion of K-Band. Quadruple coverage is provided in a considerable portion of this spectrum.

[redacted]

POPPY systems inherently measure Pulse Repetition Interval (PRI) and [redacted] with accuracies far surpassing those realized at conventional ground based intercept sites. PRI is measured and reported to better than [redacted]

The outstanding level of POPPY system performance is demonstrated by the fact that in each intercept band every known radar of sufficient power level has been intercepted.

MISSION 7105 (launched in May, 1967) with two and a half years in orbit, is still operational with no measurable degradation of the data.

After the first two months in orbit, MISSION 7106 engineering evaluation and operational tasking show that all 82 ELINT Collection bands are performing properly.

IX. COMSEC PLANS

[redacted]

[redacted]

X. APPENDIX - MISSION 7106 TECHNICAN DESCRIPTION

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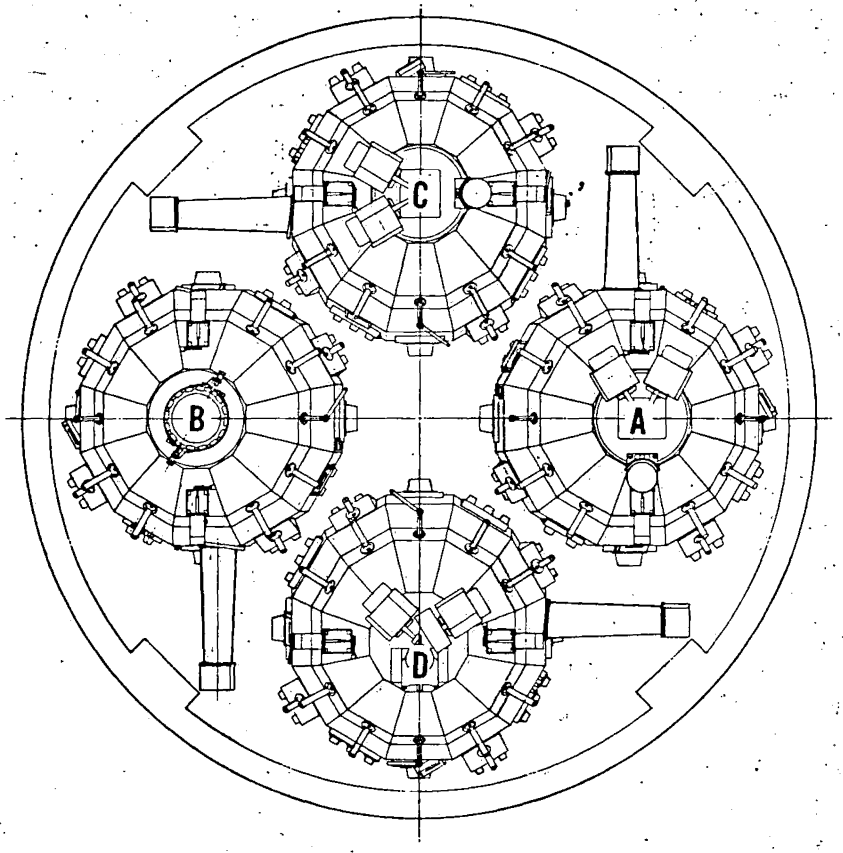
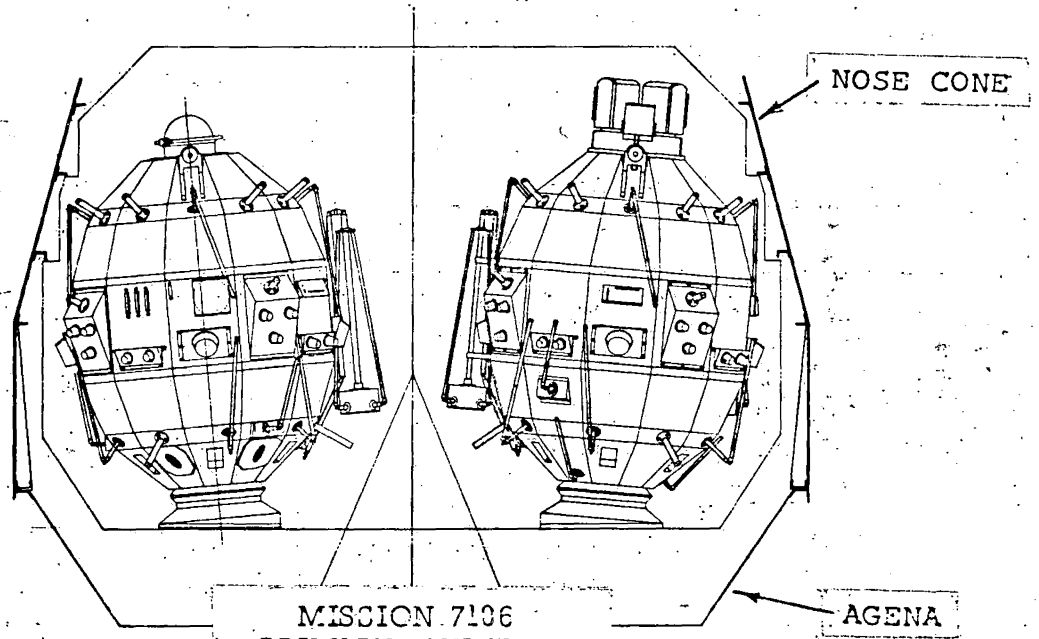
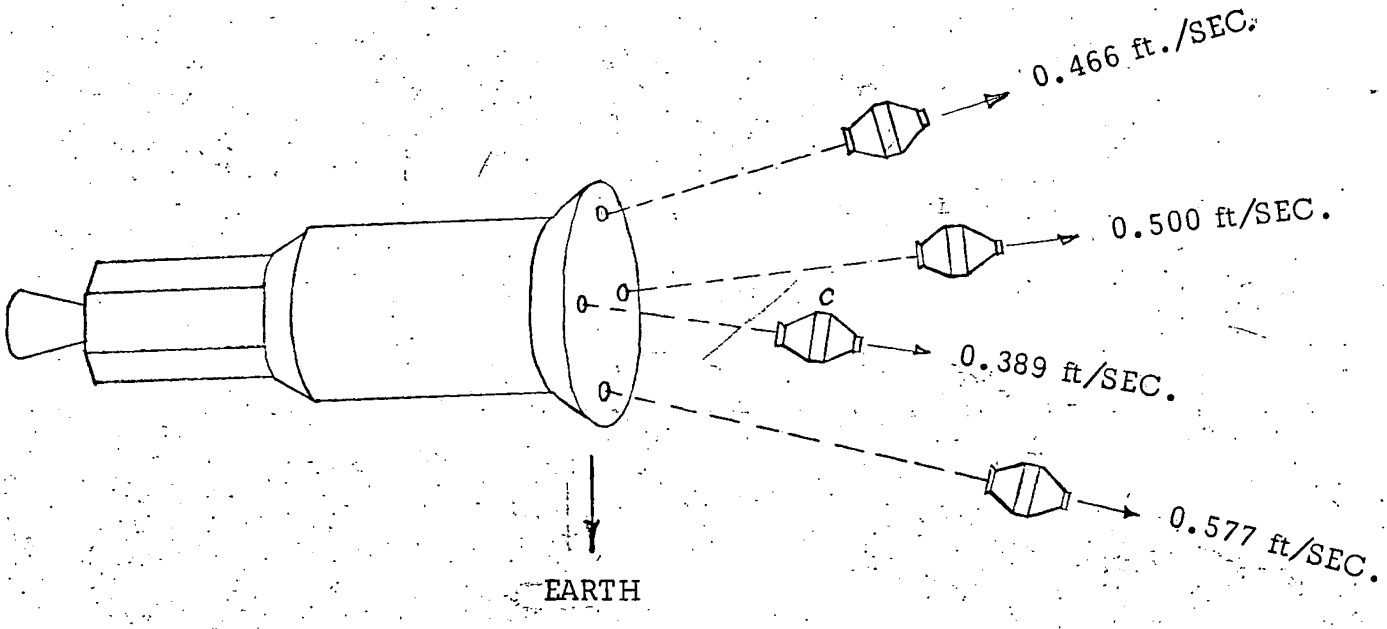




MISSION 7196
PRIMARY PAYLOADS
POSITIONED ON AGENA

Appendix 1

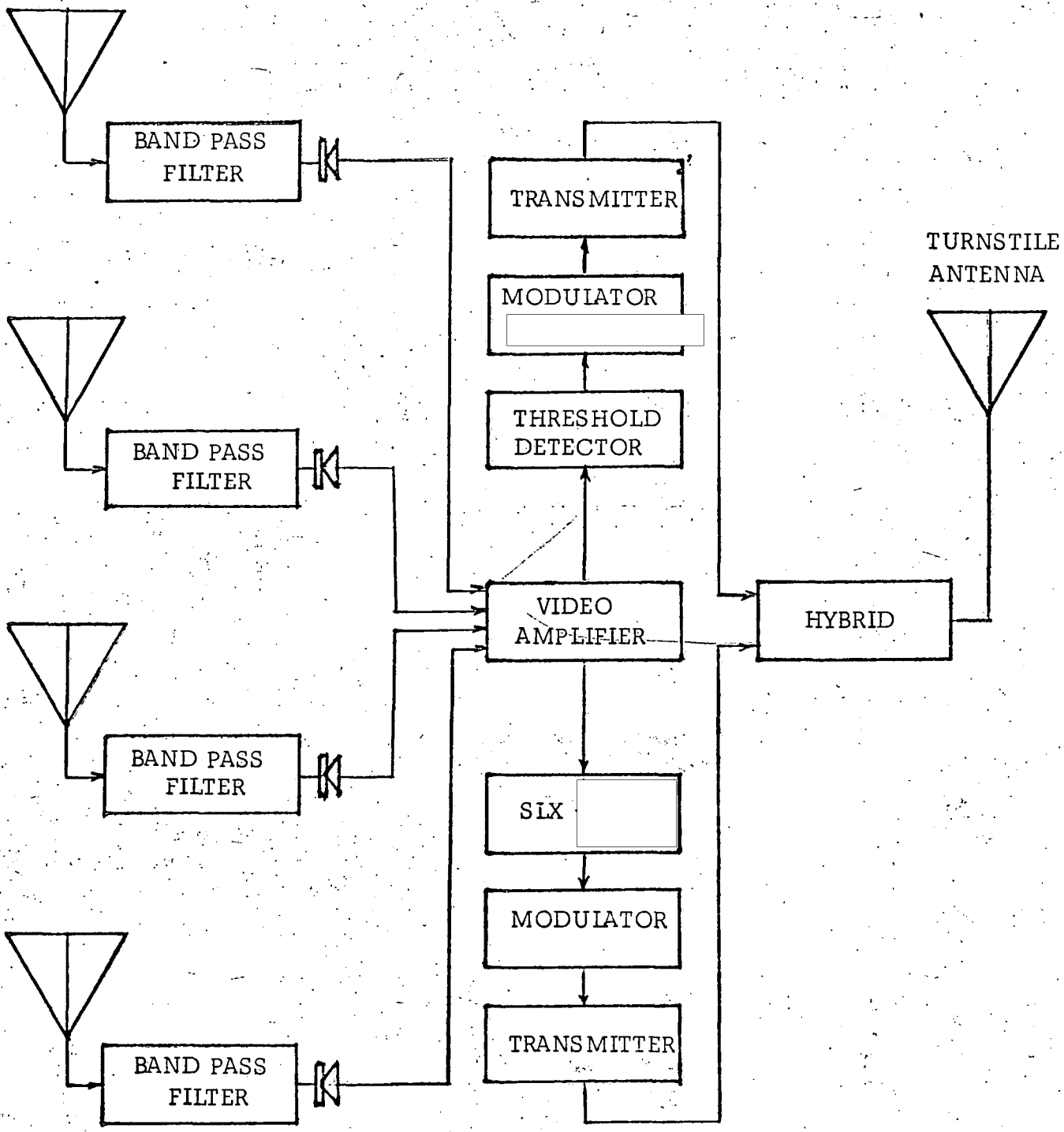


SEPARATION OF MISSION 7106 SPACECRAFT

FROM AGENA

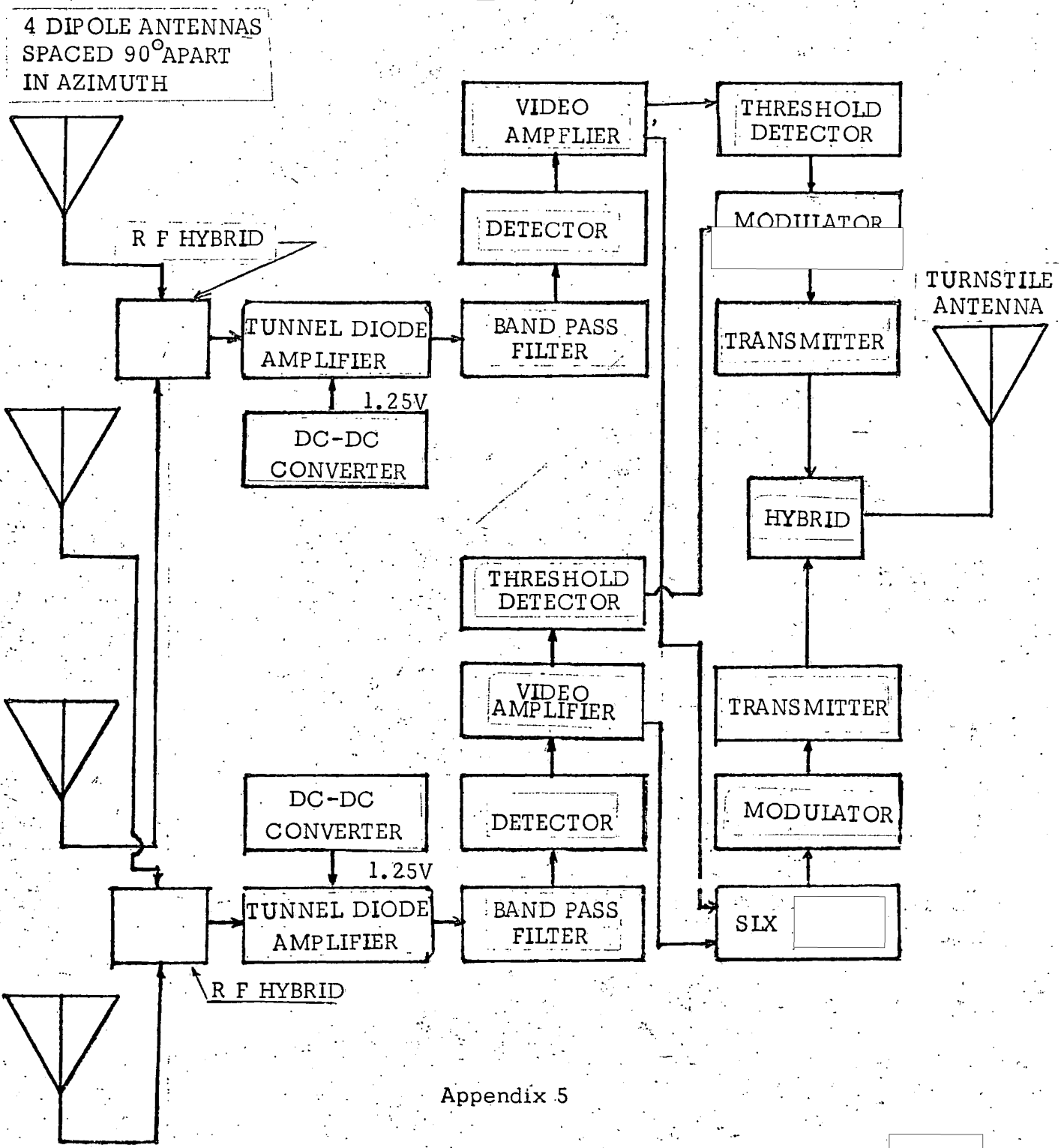
Appendix 2

TYPICAL RECEIVER FOR FREQUENCY RANGES BELOW 3600 MHZ



Appendix 4

[redacted] L COLLECTION RECEIVER FOR FREQUENCIES ABOVE 3600 MHZ



Appendix 5

MISSION 7106 FREQUENCY COVERAGE AND TRANSMITTER PULSE WIDTH ASSIGNMENTS

BAND NO.	A	X-MTR & PULSE WIDTH	B	BAND NO.	C	X-MTR & PULSE WIDTH	D
1	153.9 - 165.8		153.7 - 165.5	1	153.8 - 166		153.3 - 165
2	165 - 200 *		164 - 201 *	2	164 - 200 *		164.5 - 200
3	199 - 242		199 - 242	3	240 - 352		242 - 353
4	350 - 452 *		347 - 452 *	4	350 - 450 *		350 - 452
5	450 - 550		450 - 550	5	- -		- -
6	550 - 650		548 - 652	6	548 - 652		548 - 652
7	648 - 822		650 - 822	7	836 - 971 *		836 - 971
8	818 - 923 *		818 - 923 *	8	1082 - 1203		1080 - 1203
9	923 - 1093 *		923 - 1092 *	9	1200 - 1808		1200 - 1810
10	1790 - 2100 *		1790 - 2100 *	10	1793 - 2102		1790 - 2102
11	2085 - 2593		2085 - 2593	11	2080- 2595*		2080 - 2590
12	2557 - 2693		2557 - 2695	12	---		---
13	2677 - 2930		2673 - 2930	13	2680 - 2930		2675 - 2928
14	2922 - 3137		2923 - 3125	14	2920 - 3125		2920 - 3125
15	3105 - 3315		3105 - 3315	15	3105 - 3320		3105 - 3323
16	5220 - 5875		5235 - 5910	16	3275 - 3615		3280 - 3615
17	5820 - 6790*		5800 - 6720*	17	3595 - 4050		3595 - 4050
18	8580 - 9360		8560 - 9380	18	4010 - 4880		4020 - 4870
19	9315 - 9570		9305 - 9550	19	4830 - 5260		4825 - 5250
20	9450 - 10,040		9470 - 10,070	20	6690 - 7350*		6675 - 7320 *
				21	7300 - 7915 *		7290 - 7925 *
				22	7860 - 8600		7880 - 8620
				23	14750 - 15110		14595 - 14970

* Calibrated for absolute signal level measurement.

Appendix 6

MISSION 7106 BAND 1

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	153.9-165.8	153.7-165.5	153.8-166	153.3-165
10 db	153.2-167	152.8-166.8	152.7-167.2	152.4-166
20 db	152.6-167.6	152.2-167.5	152.3-167.6	152-166.7
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY(dbm)	-38	-39.5	-43	-43
POWER DENSITY (dbm/cm^2)	-72.5	-74	-77	-77
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	0	0	0	0
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 7

MISSION 7106 BAND 2

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	165-200	164-201	164-200	1645-200
10 db	163-201	163-202.5	162.5-202	163-202
20 db	161.5-202	161.5-204	161-203	162-203
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-47	-46.5	-45.5	-46
POWER DENSITY (dbm/cm^2)	-80	-80	-78	-78
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	0	0	0	0
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 8

MISSION 7106 BAND 3

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	199-242	199-242	240-352	242-353
10 db	197-244	198-243	239-353	240-355
20 db	195-245	196-245	233-357	234-357
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-47.5	-47	-57	-60
POWER DENSITY (dbm/cm^2)	-75	-74.5	-84	-87
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	0	0	0	0
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 9

SION 7106 BAND 4

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ):				
STD. SENS.				
3 db	350-452	347-452	350-450	350-452
10 db	346-454	344-456	345-455	340-453
20 db	340-459	339-459	336-462	335-460
HIGH SENS.				
3 db	NA	NA	NA	351-449
10 db	NA	NA	NA	348-451
20 db	NA	NA	NA	337-455
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-48.5	-48	-56.5	
POWER DENSITY (dbm/cm^2)	-75	-74.5	-83	
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	0	0	0	0
IV. X-MTR. & PW				
PULSE WIDTH (u sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			
				CW OR HIGH SENSITIVITY

NOTE: The CW option produces a 250 p.p.s. output when a CW r-f input signal is present.

MISSION 7106 BAND 5

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	450-550	450-550	NO BAND 5 IN C. OR D.	
10 db	447-552	447-554		
20 db	437-559	437-559		
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-48	-48		
POWER DENSITY (dbm/cm^2)	-71	-72		
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	0	0		
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 11

MISSION 7106 BAND 6

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ):				
STD. SENS.				
3 db	550-650	548-652	548-652	548-652
10 db	543-655	541-657	543-658	543-658
20 db	538-661	532-663	533-665	534-664
HIGH SENS.				
3 db			548-651	
10 db			543-656	
20 db			535-662	
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-49	-49.5	STD. -48.5 HIGH -65	-49
POWER DENSITY (dbm/cm^2)	-71.5	-71	STD. -70.5 HIGH -87	-71
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	2	2	2	2
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			
			HIGH SENSITIVITY	

[redacted]SSION 7106 BAND 7

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ):				
STD. SENS.				
3 db	648-822	648-822	836-971	836-971
10 db	641-827	644-830	831-975	831-975
20 db	630-834	634-836	824-980	824-980
HIGH SENS.				
3 db	NA	NA	832-971	NA
10 db	NA	NA	824-975	NA
20 db	NA	NA	820-982	NA
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-48.5	-48.5	STD. -47 HIGH -62.5	-47
POWER DENSITY (dbm/cm^2)	-69.5	-69.5	STD. -65 HIGH -80.5	-65
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	2	2	2	2
IV. X-MTR. & PW	[redacted]			
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			
			HIGH SENSITIVITY	

Appendix 13

MISSION 7106 BAND 8

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	818-923	818-923	1082-1203	1080-1203
10 db	813-928	812-928	1075-1206	1075-1207
20 db	803-934	804-934	1070-1210	1070-1212
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-47.5	-49	-64	-63
POWER DENSITY (dbm/cm^2)	-65	-66.5	-81	-80
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	2	2	2	2
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 14

MISSION 7106 BAND 9

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	923-1093	923-1092	1200-1808	1200-1810
10 db	917-1100	917-1100	1180-1830	1180-1830
20 db	910-1106	908-1106	1155-1860	1155-1850
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-49.5	-49	-50.5	-49
POWER DENSITY (dbm/cm^2)	-66.5	-66	-65.5	-64
III. ANTENNA SYSTEM:				
TYPE	MONOPOLE ARRAY			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	2	2	2	2
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 15

MISSION 7106 A & B BAND 10

	7106 A	7106 A	7106 B	7106 B
I. RF BANDPASS (MHZ)	HOR.POL.	VERT. POL.	HOR.POL.	VERT. POL.
3 db	1790-2100	1795-2100	1790-2100	1797-2103
10 db	1780-2113	1780-2110	1780-2113	1782-2116
20 db	1765-2130	1765-2125	1765-2130	1765-2135
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-49	-48	-49	-50
POWER DENSITY (dbm/cm^2)	-62	-61	-62	-63
III. ANTENNA SYSTEM:				
TYPE	DIPOLES	MONOPOLE	DIPOLES	MONOPOLE
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	6	2	6	2
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			
	SELECTABLE POLARIZATION			

Appendix 16

...SSION 7106 C & D BAND 10

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ):				
STD. SENS.				
3 db	SEPARATE TABULATION		1793-2102	1790-2102
10 db			1780-2112	1780-2112
20 db			1760-2130	1765-2127
HIGH SENS.				
3 db				1795-2105
10 db				1782-2115
20 db				1767-2130
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)			-49.5	STD. -56.5 HIGH -67
POWER DENSITY (dbm/cm^2)			-63	STD. -70 HIGH -80.5
III. ANTENNA SYSTEM:				
TYPE			DIPOLES	
PATTERN			OMNIDIRECTIONAL	
GAIN (db)			3	3
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:			PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT	
				HIGH SENSITIVITY

MISSION 7106 A & B BAND 11

	7106 A	7106 A	7106 B	7106 B
I. RF BANDPASS (MHZ)	HOR. POL	VERT. POL.	HOR. POL.	VERT. POL.
3 db	2085-2593	2090-2590	2085-2593	2090-2590
10 db	2068-2610	2067-2606	2068-2610	2067-2606
20 db	2046-2630	2040-2630	2040-2630	2040-2630
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY(dbm)	-50.5	-50	-48	-52
POWER DENSITY (dbm/cm²)	-61.5	-61	-61.5	-62
III. ANTENNA SYSTEM:				
TYPE	DIPOLES	MONOPOLE	DIPOLES	MONOPOLE
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	6	2	6	2
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			
	SELECTABLE POLARIZATION			

Appendix 18

[redacted] SSION 7106 C & D BAND 11

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ):				
STD. SENS.	SEPARATE TABULATION (PREVIOUS TABLE)			
3 db			2080-2595	2080-2590
10 db			2062-2605	2065-2600
20 db			2040-2630	2040-2630
HIGH SENS.				
3 db				2085-2590
10 db				2070-2600
20 db				2045-2625
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY(dbm)			-50	STD. -57
				HIGH -67
POWER DENSITY (dbm/cm²)			-61	STD. -68
				HIGH -77.5
III. ANTENNA SYSTEM:				
TYPE			DIPOLES	
PATTERN			OMNIDIRECTIONAL	
GAIN (db)			3	3
IV. X-MTR. & PW			[redacted]	
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			
				HIGH SENSITIVITY

MISSION 7106 BAND 12

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	2557-2692	2557-2695	NO BAND 12 IN C & D	
10 db	2550-2705	2545-2707		
20 db	2535-2720	2535-2720		
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-53.5	-53		
POWER DENSITY (dbm/cm^2)	-63.5	-63		
III. ANTENNA SYSTEM:				
TYPE	WAVEGUIDE & MONOPOLE			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	4	4		
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 20

[redacted] MISSION 7106 BAND 13

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	2677-2930	2673-2930	2680-2930	2675-2928
10 db	2662-2942	2665-2942	2665-2940	2662-2953
20 db	2645-2960	2650-2962	2643-2960	2647-2965
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY(dbm)	-52	-53	-51.5	-52.5
POWER DENSITY (dbm/cm^2)	-61	-62	-60.5	-61.5
III. ANTENNA SYSTEM:				
TYPE	WAVEGUIDE			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	4	4	4	4
IV. X-MTR. & PW	[redacted]			
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 21

MISSION 7106 BAND 14

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	2922-3137	2923-3125	2920-3125	2920-3125
10 db	2913-3138	2910-3135	2910-3138	2910-3137
20 db	2900-3150	2895-3145	2895-3150	2900-3160
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-53	-54.5	-52	-51.5
POWER DENSITY (dbm/cm^2)	60.5	62	-60	-59
III. ANTENNA SYSTEM:				
TYPE	WAVEGUIDE			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	4	4	4	4
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 22

MISSION 7106 BAND 15

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	3105-3315	3105-3315	3105-3320	3105-3323
10 db	3090-3332	3090-3332	3090-3330	3090-3330
20 db	3070-3350	3070-3350	3070-3345	3072-3347
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-53	-53.5	-53	-53
POWER DENSITY (dbm/cm^2)	-60	-60.5	-60	-60
III. ANTENNA SYSTEM:				
TYPE	WAVEGUIDE			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	4	4	4	4
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Appendix 23

MISSION 7106 BAND 16

HOR A-Vert B-HOR B Vert

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	5220-5875	5235-5910	3275-3615	3280-3615
10 db	5195-5915	5200-5935	3255-3625	3260-3625
20 db	5160-5945	5180-5970	3235-3645	3235-3640
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	STD SLM -75.5 CW	-74.5	-52	-53
POWER DENSITY (dbm/cm²)	-78.5	-77.5	59.5	60.5
III. ANTENNA SYSTEM:				
TYPE	DIPOLES		WAVEGUIDE	
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	3	3	4	4
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

MISSION 7106 BAND 17

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	5820-6790	5800-6720	3595-4050	3595-4050
10 db	5785-6830	5770-6770	3580-4070	3580-4070
20 db	5740-6860	5730-6810	3560-4100	3560-4100
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-74.5	-76.5	-66.5	-68.5
POWER DENSITY (dbm/cm²)	-77	-79	-73	-75
III. ANTENNA SYSTEM:				
TYPE	DIPOLES			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	3	3	3	3
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

Append

~~TOP SECRET~~ HANDLE VIA BYEMAN CONTROL SYSTEM

MISSION 7106 BAND 18

	7106A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	8580-9360	8560-9380	4010-4880	4020-4870
10 db	8520-9415	8520-9430	3990-4915	4000-4900
20 db	8480-9470	8490-9475	3960-4960	3960-4940
II. SYSTEM SENSITIVITY: EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-73.5	-72.5	-66.5	-65
POWER DENSITY (dbm/cm^2)	-74	-73	-72	-70
III. ANTENNA SYSTEM:				
TYPE	DIPOLES			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	3	3	3	3
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

MISSION 7106 BAND 19

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)			*	*
3 db	9315-9570	9305-9550	4830-5260	4825-5250
10 db	9295-9600	9280-9585	4815-5280	4810-5280
20 db	9275-9625	9260-9615	4790-5305	4785-5305
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-74.5	-74.5	HIGH -75.5 STD. -66.5	HIGH -74.5 STD. -63
POWER DENSITY (dbm/cm^2)	-73.5	-73.5	HIGH -81 STD. -70.5	HIGH -80 STD. -68.5
III. ANTENNA SYSTEM:				
TYPE	DIPOLES			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	3	3	3	3
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

* HIGH & STD. are identical

MISSION 7106 BAND 20

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	9450-10040	9470-10070	6690-7350	6675-7320
10 db	9405-10080	9425-10120	6655-7370	6645-7360
20 db	9350-10135	9375-10170	6615-7400	6610-7400
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)	-74	-76	-74	-75
POWER DENSITY (dbm/cm^2)	-72.5	-74.5	75.5	-76.5
III. ANTENNA SYSTEM:				
TYPE	DIPOLES			
PATTERN	OMNIDIRECTIONAL			
GAIN (db)	3	3	3	3
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:	PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT			

A

[redacted] ISSION 7106 BAND 21

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	NO BAND 21		7300-7915	7290-7925
10 db			7270-7940	7265-7960
20 db			7245-7970	7235-8000
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)			-76	-74
POWER DENSITY (dbm/cm^2)			-77	75
III. ANTENNA SYSTEM:				
TYPE			DIPOLES	
PATTERN			OMNIDIRECTIONAL	
GAIN (db)			3	3
IV. X-MTR. & PW			[redacted]	
PULSE WIDTH (μ sec)				
V. OPTIONS:			PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT	

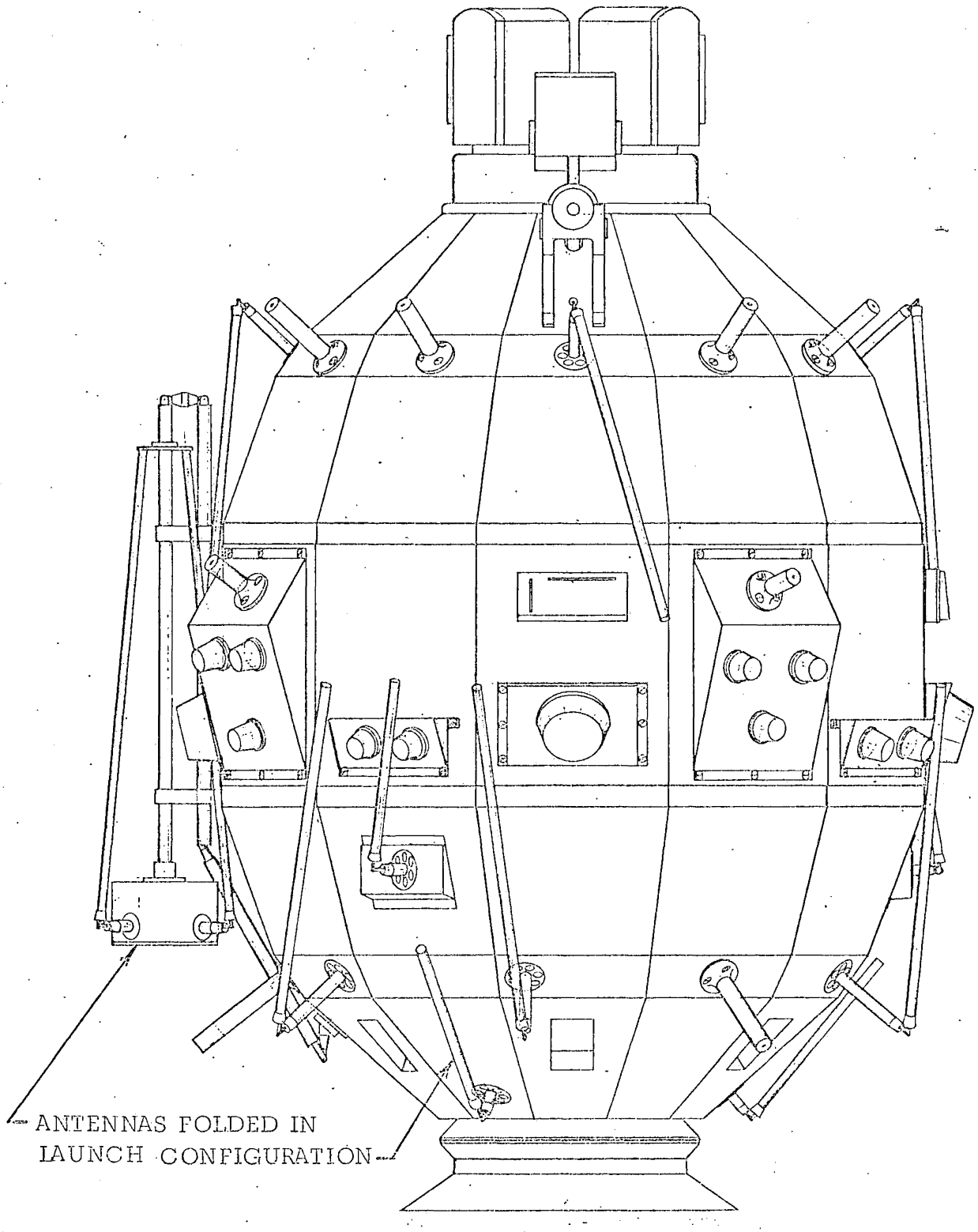
MISSION 7106 BAND 22

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	NO BAND 22		7860-8600	7880-8620
10 db			7810-8640	7850-8660
20 db			7760-8680	7810-8700
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)			-74	-74
POWER DENSITY (dbm/cm²)			-74	-74
III. ANTENNA SYSTEM:				
TYPE			DIPOLES	
PATTERN			OMNIDIRECTIONAL	
GAIN (db)			3	3
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:			PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT	

Appendix 30

MISSION 7106 BAND 23

	7106 A	7106 B	7106 C	7106 D
I. RF BANDPASS (MHZ)				
3 db	NO BAND 23		14750-15110	14595-14970
10 db			14715-15190	14540-15015
20 db			14665-15250	14500-15055
II. SYSTEM SENSITIVITY:				
EFFECTIVE THRESHOLD SENSITIVITY (dbm)			-98	-97
POWER DENSITY (dbm/cm^2)			-94	-93
III. ANTENNA SYSTEM:				
TYPE			HORN	
PATTERN			60° BEAM ± 60° OF FLIGHT-LINE	
GAIN (db)			16	16
IV. X-MTR. & PW				
PULSE WIDTH (μ sec)				
V. OPTIONS:			PULSE WIDTH OR SIGNAL LEVEL MEASUREMENT	
			CHOICE OF 3 ANTENNA PATTERNS	



VCO CH 5
DL RPI COMMUTATOR SEGMENT ALLOCATIONS

Seg. No.	Function	Description
1	0% Calibrate	Low Bandedge Calibrate
2	100% Calibrate	High Bandedge Calibrate
3	DL 1 RPI	10% - DL 1 Off 60% - DL 1 On
4	DL 2 RPI	20% - DL 2 Off 60% - DL 2 On
5	DL 3 RPI	10% - DL 3 Off 60% - DL 3 On
6	DL 4 RPI	20% - DL 4 Off 60% - DL 4 On
7	DL 5 RPI	10% - DL 5 Off 60% - DL 5 On
8	DL 6 RPI	20% - DL 6 Off 60% - DL 6 On
9	DL 7 RPI	10% - DL 7 Off 60% - DL 7 On
10	DL 8 RPI	20% - DL 8 Off 60% - DL 8 On
11	DL 9 RPI	10% - DL 9 Off 60% - DL 9 On
12	DL 10 A-B RPI	20% - DL 10 A Off; DL 10 B Off 40% - DL 10 A Off; DL 10 B On 60% - DL 10 A On; DL 10 B Off 80% - DL 10 A On; DL 10 B On
13	DL 11 A-B RPI	10% - DL 11 A Off; DL 11 B Off 40% - DL 11 A Off; DL 11 B On 60% - DL 11 A On; DL 11 B Off 80% - DL 11 A On; DL 11 B On
14	DL 12 RPI	20% - DL 12 Off 60% - DL 12 On
15	DL 13 RPI	10% - DL 13 Off 60% - DL 13 On
16	DL 14 RPI	20% - DL 14 Off 60% - DL 14 On
17	DL 15 RPI	10% - DL 15 Off 60% - DL 15 On
18	DL 16 A & B RPI	20% - DL 16 A Off; DL 16 B Off 40% - DL 16 A Off; DL 16 B On 60% - DL 16 A On; DL 16 B Off 80% - DL 16 A On; DL 16 B On
19	DL 17 A & B RPI	10% - DL 17 A Off; DL 17 B Off 40% - DL 17 A Off; DL 17 B On 60% - DL 17 A On; DL 17 B Off 80% - DL 17 A On; DL 17 B On
20	DL 18 A & B RPI	20% - DL 18 A Off; DL 18 B Off 40% - DL 18 A Off; DL 18 B On 60% - DL 18 A On; DL 18 B Off 80% - DL 18 A On; DL 18 B On

VCO CH 5 (Continued)

Seg. No.	Function	Description
21	DL 19 A & B RPI	10% - DL 19 A Off; DL 19 B Off 40% - DL 19 A Off; DL 19 B On 60% - DL 19 A On; DL 19 B Off 80% - DL 19 A On; DL 19 B On
22	DL 20 A & B RPI	20% - DL 20 A Off; DL 20 B Off 40% - DL 20 A Off; DL 20 B On 60% - DL 20 A On; DL 20 B Off 80% - DL 20 A On; DL 20 B On
23	Retep On-Off RPI	10% - Retep Off 60% - Retep On
24	Spare	20% - Quiescent
25	Execute On-Off RPI DL System On-Off RPI	10% - Execute Off; DL Sys. Off 40% - Execute On; DL Sys. Off 80% - Execute On; DL Sys. On
26	R & D On-Off RPI	20% - R & D On 60% - R & D Off
27	[redacted]	
28	DL Mod Xing RPI	10% - DL Mod Norm. 60% - DL Mod X'd
29	Unique Mode RPI DL Conv. RPI (READS CORRECTLY ONLY AFTER EXECUTE)	20% - Unique Mode Out; DL Conv. On 40% - Unique Mode Out; DL Conv. Bypass 60% - Unique Mode In; DL Conv. On 80% - Unique Mode In; DL Conv. Bypass
30	DL Timer Bypass RPI DL Timer Long-Short RPI	10% - Timer Bypass On; Timer Long 40% - Timer Bypass Off; Timer Long 60% - Timer Bypass On; Timer Short 80% - Timer Bypass Off; Timer Short
31	Timer CMD 1 RPI	0% - 0V - 100 20% - 1V - 010 40% - 2V - 001
32	Timer CMD 2 RPI	0% - 0V - 10000 20% - 1V - 01000 40% - 2V - 00100 60% - 3V - 00010 80% - 4V - 00001

Appendix 53

VCO CH 5
DL RPI COMMUTATOR SEGMENT ALLOCATIONS

Seg. No.	Function	Description
1	0% Calibrate	Low Bandedge Calibrate
2	100% Calibrate	High Bandedge Calibrate
3	DL 1 RPI	10% - DL 1 Off 60% - DL 1 On
4	DL 2 RPI	20% - DL 2 Off 60% - DL 2 On
5	DL 3 RPI	10% - DL 3 Off 60% - DL 3 On
6	DL 4 RPI	20% - DL 4 Off 60% - DL 4 On
7	DL 5 RPI	10% - DL 5 Off 60% - DL 5 On
8	DL 6 RPI	20% - DL 6 Off 60% - DL 6 On
9	DL 7 RPI	10% - DL 7 Off 60% - DL 7 On
10	DL 8 RPI	20% - DL 8 Off 60% - DL 8 On
11	DL 9 RPI	10% - DL 9 Off 60% - DL 9 On
12	DL 10 A-B RPI	20% - DL 10 A Off; DL 10 B Off 40% - DL 10 A Off; DL 10 B On 60% - DL 10 A On; DL 10 B Off 80% - DL 10 A On; DL 10 B On
13	DL 11 A-B RPI	10% - DL 11 A Off; DL 11 B Off 40% - DL 11 A Off; DL 11 B On 60% - DL 11 A On; DL 11 B Off 80% - DL 11 A On; DL 11 B On
14	DL 12 RPI	20% - DL 12 Off 60% - DL 12 On
15	DL 13 RPI	10% - DL 13 Off 60% - DL 13 On
16	DL 14 RPI	20% - DL 14 Off 60% - DL 14 On
17	DL 15 RPI	10% - DL 15 Off 60% - DL 15 On
18	DL 16 A & B RPI	20% - DL 16 A Off; DL 16 B Off 40% - DL 16 A Off; DL 16 B On 60% - DL 16 A On; DL 16 B Off 80% - DL 16 A On; DL 16 B On
19	DL 17 A & B RPI	10% - DL 17 A Off; DL 17 B Off 40% - DL 17 A Off; DL 17 B On 60% - DL 17 A On; DL 17 B Off 80% - DL 17 A On; DL 17 B On

VCO CH 5 (Continued)

Seg. No.	Function	Description
20	DL 18 A & B RPI	20% - DL 18 A Off; DL 18 B Off 40% - DL 18 A Off; DL 18 B On 60% - DL 18 A On; DL 18 B Off 80% - DL 18 A On; DL 18 B On
21	DL 19 A & B RPI	10% - DL 19 A Off; DL 19 B Off 40% - DL 19 A Off; DL 19 B On 60% - DL 19 A On; DL 19 B Off 80% - DL 19 A On; DL 19 B On
22	DL 20 A & B RPI	20% - DL 20 A Off; DL 20 B Off 40% - DL 20 A Off; DL 20 B On 60% - DL 20 A On; DL 20 B Off 80% - DL 20 A On; DL 20 B On
23	Retep On-Off RPI	10% - Retep Off 60% - Retep On
24	Spare	20% - Quiescent
25	Execute On-Off RPI DL System On-Off RPI	10% - Execute Off; DL Sys. Off 40% - Execute On; DL Sys. Off 80% - Execute On; DL Sys. On
26	R & D On-Off RPI	20% - R & D On 60% - R & D Off
27		
28	DL Mod Xing RPI	10% - DL Mod Norm. 60% - DL Mox X'd
29	Unique Mode RPI DL Conv. RPI (READS CORRECTLY ONLY AFTER EXECUTE)	20% - Unique Mode Out; DL Conv. On 40% - Unique Mode Out; DL Conv. Bypass 60% - Unique Mode In; DL Conv. On 80% - Unique Mode In; DL Conv. Bypass
30	DL Timer Bypass RPI DL Timer Long-Short RPI	10% - Timer Bypass On; Timer Long 40% - Timer Bypass Off; Timer Long 60% - Timer Bypass On; Timer Short 80% - Timer Bypass Off; Timer Short
31	Timer CMD 1 RPI	0% - 0V - 100 20% - 1V - 010 40% - 2V - 001
32	Timer CMD 2 RPI	0% - 0V - 10000 20% - 1V - 01000 40% - 2V - 00100 60% - 3V - 00010 80% - 4V - 00001

VCO CH 5
DL RPI COMMUTATOR SEGMENT ALLOCATIONS

Seg. No.	Function	Description
1	0% Calibrate	Low Bandedge Calibrate
2	100% Calibrate	High Bandedge Calibrate
3	DL 1 RPI	10% - DL 1 Off 60% - DL 1 On
4	DL 2 RPI	20% - DL 2 Off 60% - DL 2 On
5	DL 3 RPI	10% - DL 3 Off 60% - DL 3 On
6	DL 4 RPI	20% - DL 4 Off 60% - DL 4 On
7	DL 22 A & B RPI	10% - DL 22 A Off; DL 22 B Off 40% - DL 22 A Off; DL 22 B On 60% - DL 22 A On; DL 22 B Off 80% - DL 22 A On; DL 22 B On
8	DL 6 HI-STD RPI	20% - DL 6 STD Off; DL 6 HI Off 40% - DL 6 STD Off; DL 6 HI On 60% - DL 6 STD On; DL 6 HI Off 80% - DL 6 STD On; DL 6 HI On
9	DL 7 HI-STD RPI	10% - DL 7 STD Off; DL 7 HI Off 40% - DL 7 STD Off; DL 7 HI On 60% - DL 7 STD On; DL 7 HI Off 80% - DL 7 STD On; DL 7 HI On
10	DL 8 RPI	20% - DL 8 Off 60% - DL 8 On
11	DL 9 RPI	10% - DL 9 Off 60% - DL 9 On
12	DL 10 RPI	20% - DL 10 Off 60% - DL 10 On
13	DL 11 RPI	10% - DL 11 Off 60% - DL 11 On
14	DL 23 A & B RPI	20% - DL 23 A Off; DL 23 B Off 40% - DL 23 A Off; DL 23 B On 60% - DL 23 A On; DL 23 B Off 80% - DL 23 A On; DL 23 B On
15	DL 13 RPI	10% - DL 13 Off 60% - DL 13 On
16	DL 14 RPI	20% - DL 14 Off 60% - DL 14 On
17	DL 15 RPI	10% - DL 15 Off 60% - DL 15 On
18	DL 16 RPI	20% - DL 16 Off 60% - DL 16 On
19	DL 17 A & B RPI	10% - DL 17 A Off; DL 17 B Off 40% - DL 17 A Off; DL 17 B On 60% - DL 17 A On; DL 17 B Off 80% - DL 17 A On; DL 17 B On

VCO CH 5 (Continued)

Seg. No.	Function	Description
20	DL 18 A & B RPI	20% - DL 18 A Off; DL 18 B Off 40% - DL 18 A Off; DL 18 B On 60% - DL 18 A On; DL 18 B Off 80% - DL 18 A On; DL 18 B On
21	DL 19 A & B RPI	10% - DL 19 A Off; DL 19 B Off 40% - DL 19 A Off; DL 19 B On 60% - DL 19 A On; DL 19 B Off 80% - DL 19 A On; DL 19 B On
22	DL 20 A & B RPI	20% - DL 20 A Off; DL 20 B Off 40% - DL 20 A Off; DL 20 B On 60% - DL 20 A On; DL 20 B Off 80% - DL 20 A On; DL 20 B On
23	DL 21 A & B RPI	10% - DL 21 A Off; DL 21 B Off 40% - DL 21 A Off; DL 21 B On 60% - DL 21 A On; DL 21 B Off 80% - DL 21 A On; DL 21 B On
24	Retep On-Off RPI DL 19 A HI RPI	20% - Retep Off; DL 19 A HI Off 40% - Retep Off; DL 19 A HI On 60% - Retep On; DL 19 A HI Off 80% - Retep On; DL 19 A HI On
25	Execute On-Off RPI DL System On-Off RPI	10% - Execute Off; DL Sys. Off 40% - Execute On; DL Sys. Off 80% - Execute On; DL Sys. On
26	R & D On-Off RPI DL 19 B HI RPI	20% - R & D On; DL 19 B HI Off 40% - R & D On; DL 19 B HI On 60% - R & D Off; DL 19 B HI Off 80% - R & D Off; DL 19 B HI On
27		
28	DL Mod Xing RPI	10% - DL Mod. Norm. 60% - DL Mod. X'd
29	Unique Mode RPI DL Conv. RPI (READS CORRECTLY ONLY AFTER EXECUTE)	20% - Unique Mode Out; DL Conv. On 40% - Unique Mode Out; DL Conv. Bypass 60% - Unique Mode In; DL Conv. On 80% - Unique Mode In; DL Conv. Bypass
30	DL Timer Bypass RPI DL Timer Long-Short RPI	10% - Timer Bypass On; Timer Long 40% - Timer Bypass Off; Timer Long 60% - Timer Bypass On; Timer Short 80% - Timer Bypass Off; Timer Short
31	Timer CMD 1 RPI	0% - 0V - 100 20% - 1V - 010 40% - 2V - 001
32	Timer CMD 2 RPI	0% - 0V - 10000 20% - 1V - 01000 40% - 2V - 00100 60% - 3V - 00010 80% - 4V - 00001

VCO CH 5
DL RPI COMMUTATOR SEGMENT ALLOCATIONS

Seg. No.	Function	Description
1	0% Calibrate	Low Bandedge Calibrate
2	100% Calibrate	High Bandedge Calibrate
3	DL 1 RPI	10% - DL 1 Off 60% - DL 1 On
4	DL 2 RPI	20% - DL 2 Off 60% - DL 2 On
5	DL 3 RPI	10% - DL 3 Off 60% - DL 3 On
6	DL 4 HI-STD RPI	20% - DL 4 STD Off; DL 4 HI Off 40% - DL 4 STD Off; DL 4 HI On 60% - DL 4 STD On; DL 4 HI Off 80% - DL 4 STD On; DL 4 HI On
7	DL 22 A & B RPI	10% - DL 22 A Off; DL 22 B Off 40% - DL 22 A Off; DL 22 B On 60% - DL 22 A On; DL 22 B Off 80% - DL 22 A On; DL 22 B On
8	DL 6 RPI	20% - DL 6 Off 60% - DL 6 On
9	DL 7 RPI	10% - DL 7 Off 60% - DL 7 On
10	DL 8 RPI	20% - DL 8 Off 60% - DL 8 On
11	DL 9 RPI	10% - DL 9 Off 60% - DL 9 On
12	DL 10 HI-STD RPI	20% - DL 10 STD Off; DL 10 HI Off 40% - DL 10 STD Off; DL 10 HI On 60% - DL 10 STD On; DL 10 HI Off 80% - DL 10 STD On; DL 10 HI On
13	DL 11 HI-STD RPI	10% - DL 11 STD Off; DL 11 HI Off 40% - DL 11 STD Off; DL 11 HI On 60% - DL 11 STD On; DL 11 HI Off 80% - DL 11 STD On; DL 11 HI On
14	DL 23 A & B RPI	20% - DL 23 A Off; DL 23 B Off 40% - DL 23 A Off; DL 23 B On 60% - DL 23 A On; DL 23 B Off 80% - DL 23 A On; DL 23 B On
15	DL 13 RPI	10% - DL 13 Off 60% - DL 13 On
16	DL 14 RPI	20% - DL 14 Off 60% - DL 14 On
17	DL 15 RPI	10% - DL 15 Off 60% - DL 15 On
18	DL 16 RPI	20% - DL 16 Off 60% - DL 16 On
19	DL 17 A & B RPI	10% - DL 17 A Off; DL 17 B Off 40% - DL 17 A Off; DL 17 B On 60% - DL 17 A On; DL 17 B Off 80% - DL 17 A On; DL 17 B On

VCO CH 5 (Continued)

Seg. No.	Function	Description
20	DL 18 A & B RPI	20% - DL 18 A Off; DL 18 B Off 40% - DL 18 A Off; DL 18 B On 60% - DL 18 A On; DL 18 B Off 80% - DL 18 A On; DL 18 B On
21	DL 19 A & B RPI	10% - DL 19 A Off; DL 19 B Off 40% - DL 19 A Off; DL 19 B On 60% - DL 19 A On; DL 19 B Off 80% - DL 19 A On; DL 19 B On
22	DL 20 A & B RPI	20% - DL 20 A Off; DL 20 B Off 40% - DL 20 A Off; DL 20 B On 60% - DL 20 A On; DL 20 B Off 80% - DL 20 A On; DL 20 B On
23	DL 21 A & B RPI	10% - DL 21 A Off; DL 21 B Off 40% - DL 21 A Off; DL 21 B On 60% - DL 21 A On; DL 21 B Off 80% - DL 21 A On; DL 21 B On
24	Retep On-Off RPI DL 19 A HI RPI	20% - Retep Off; DL 19 A HI Off 40% - Retep Off; DL 19 A HI On 60% - Retep On; DL 19 A HI Off 80% - Retep On; DL 19 A HI On
25	Execute On-Off RPI DL System On-Off RPI	10% - Execute Off; DL Sys. Off 40% - Execute On; DL Sys. Off 80% - Execute On; DL Sys. On
26	R & D On-Off RPI	20% - R & D On; DL 19 B HI Off 40% - R & D On; DL 19 B HI On 60% - R & D Off; DL 19 B HI Off 80% - R & D Off; DL 19 B HI On
27		
28	DL Mod Xing RPI DL 4 CW RPI	10% - DL Mod Norm., DL 4 CW Off 40% - DL Mod Norm., DL 4 CW On 60% - DL Mod X'd; DL 4 CW Off 80% - DL Mod X'd; DL 4 CW On
29	Unique Mode RPI DL Conv. RPI (READS CORRECTLY ONLY AFTER EXECUTE	20% - Unique Mode Out; DL Conv. On 40% - Unique Mode Out; DL Conv. Bypass 60% - Unique Mode In; DL Conv. On 80% - Unique Mode In; DL Conv. Bypass
30	DL Timer Bypass RPI DL Timer Long-Short RPI	10% - Timer Bypass On; Timer Long 40% - Timer Bypass Off; Timer Long 60% - Timer Bypass On; Timer Short 80% - Timer Bypass Off; Timer Short
31	Timer CMD 1 RPI	0% - 0V - 100 20% - 1V - 010 40% - 2V - 001