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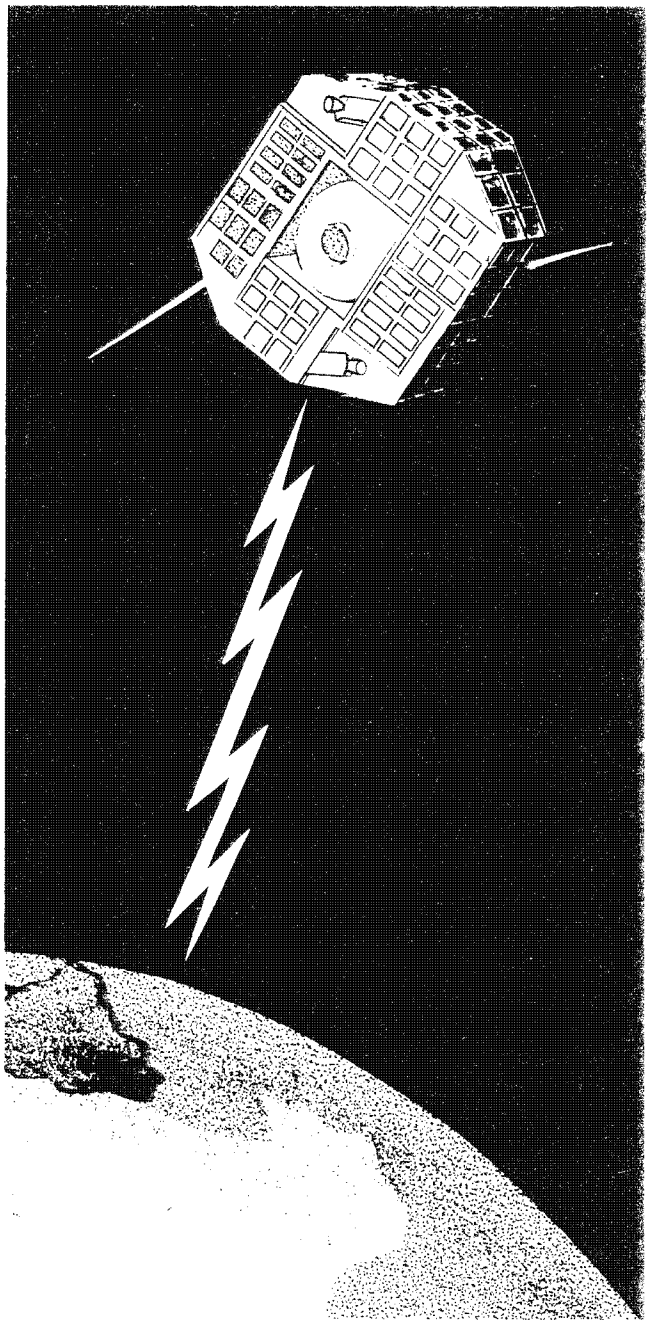

DESCRIPTION OF SIGINT MISSION 7343

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SIGINT MISSION 7343 DESCRIPTION

1. GENERAL INFORMATION

SIGINT Mission 7343 is a satellite ELINT intercept system which performs General Search for

[redacted]

This mission description discusses the following:

A. System Block Diagram (Figure 1.)

B. Antenna Subsystem

C. Receiver Subsystem

(1) Frequency Coverage and Measurement

(2) Performance Characteristics

(3) Calibration Subsystem

D. System Output

INTERCEPT SYSTEM BLOCK DIAGRAM

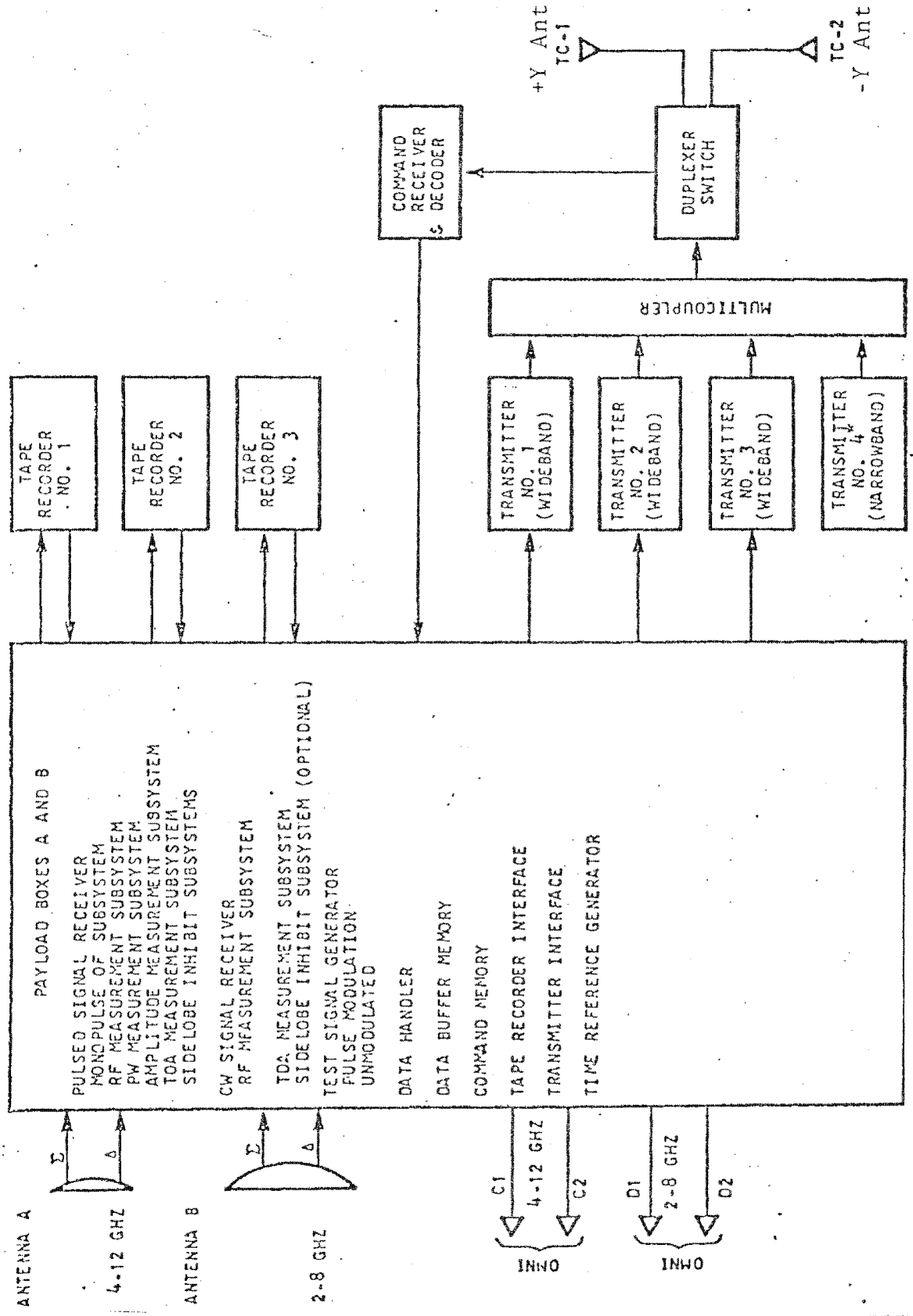


Figure 1.

2. ANTENNA SYSTEM

Mission 7343 uses two antenna systems, one for intercept and one for command and telemetry.

A. Intercept Antennas and Geopositioning System

A total of seven antennas are used for

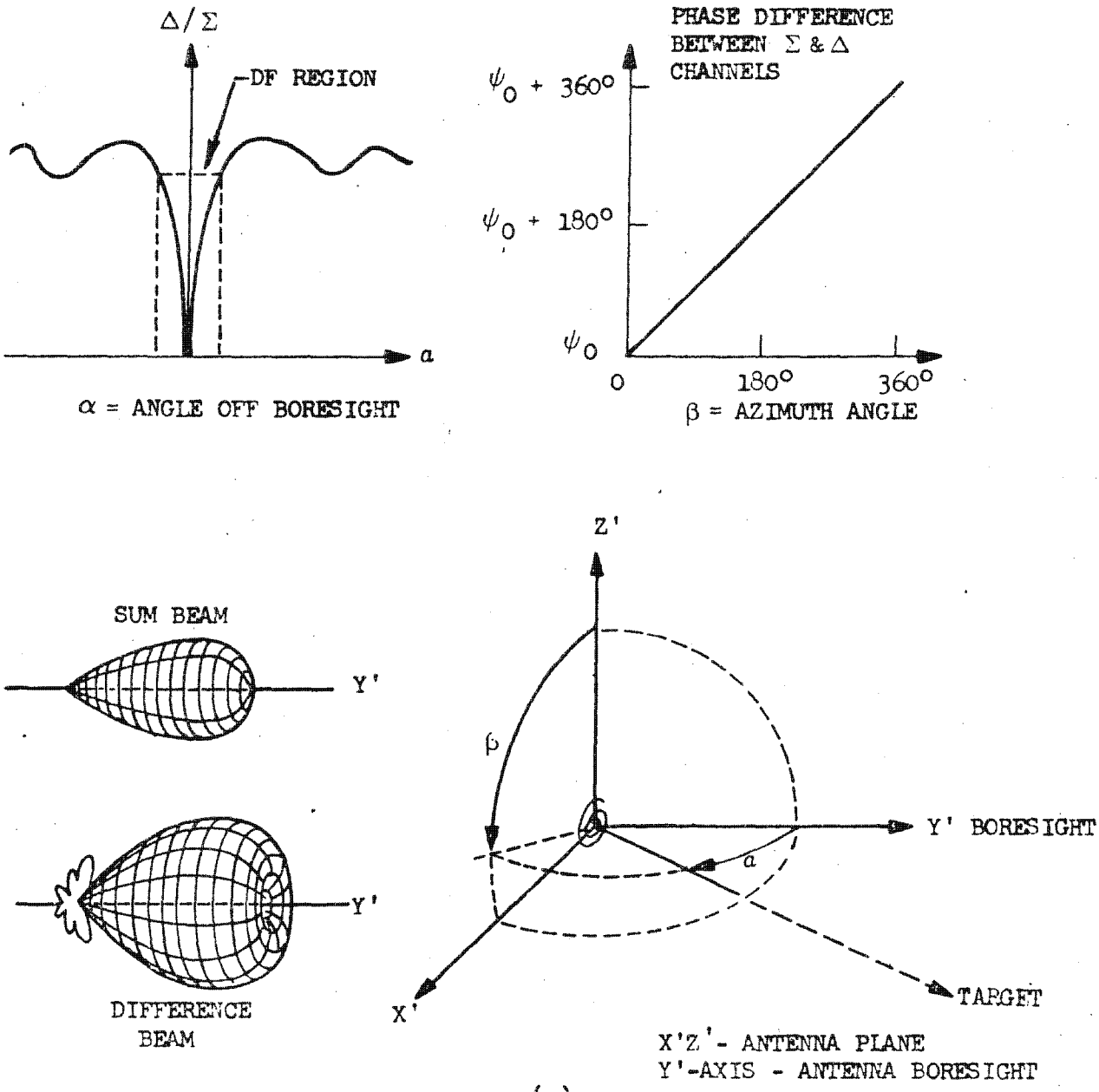
[redacted]

The two high-gain antennas cover the 2 to 8 GHz band, and the 4 to 8 GHz band. The feeds for these dishes are four-arm spirals whose arms are connected to a beam-forming network (see Figure 2.)

[redacted]

[redacted] The signals from the wide beam antennas are combined in the payload to provide the equivalent of two sidelobe inhibit antennas, one covering the 2-8 GHz band and the second covering the 4-12 GHz band. The inhibit signal is used to reject

SUM AND DIFFERENCE DF BEAM RELATIONSHIP



(c)

Figure 2.

signals received via all but the main lobes of the high-gain antennas.

The omni inhibit antennas are positioned on three deployable booms so that their amplitude patterns cover the side lobes and back lobes of the high gain antennas. On two of the booms, one antenna covers the band from 2 to 8 GHz and the other antenna covers the band from 4 to 12 GHz. The antenna on the third boom reduces close in side lobe poke through to the 4 to 8 GHz antenna.

3. RECEIVER SYSTEM

A. Frequency Coverage and Measurement

Mission 7343 provides selectable frequency coverage over the RF range of 2 to 12 GHz using the five contiguous bands defined in Table 1. In a given collection mode, either bands 2A and 3B (normal configuration) or bands 2B and 3A (alternate configuration) may be selected, while bands 1, 4 and 5 are available for use at all times. The entire 2-GHz frequency range of a selected band is collected simultaneously.

Although possible, a five band collection mode is not necessarily desirable. When band 3 is assigned to the 2-8 GHz antenna, the antenna beamwidth is reduced to the extent that sufficient data

may not be collected for signal reconstruction. This condition is further degraded when the 2-8 GHz antenna is shared by band 3 with one or more other bands; and is particularly significant for [redacted] [redacted]

TABLE 1

FREQUENCY COVERAGE BANDS

Band	Frequency Coverage (GHz)	Antenna (GHz)
1	2-4	2-8
2A	4-6	4-12
2B	4-6	2-8
3A	6-8	4-12
3B	6-8	2-8
4	8-10	4-12
5	10-12	4-12

[redacted]

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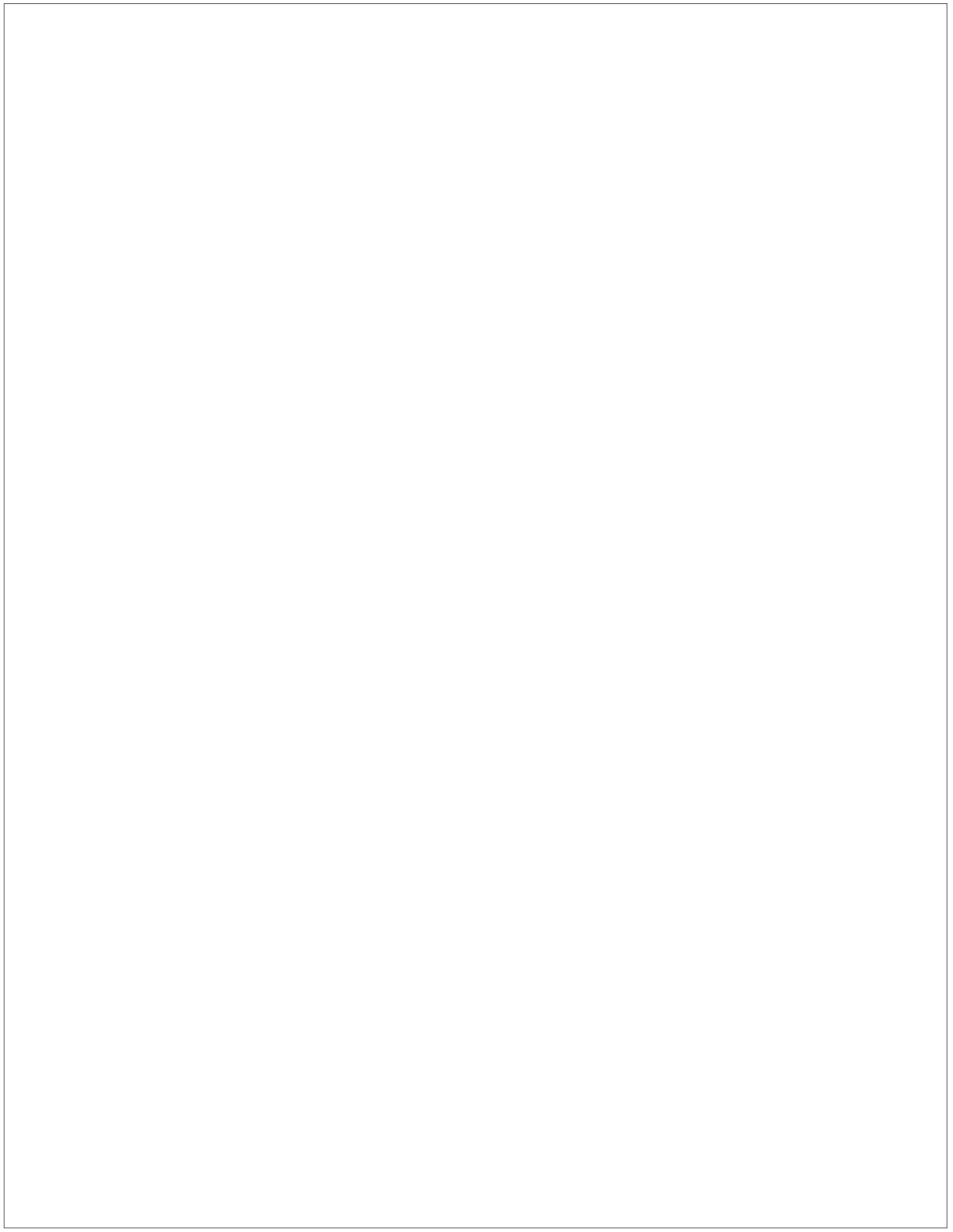

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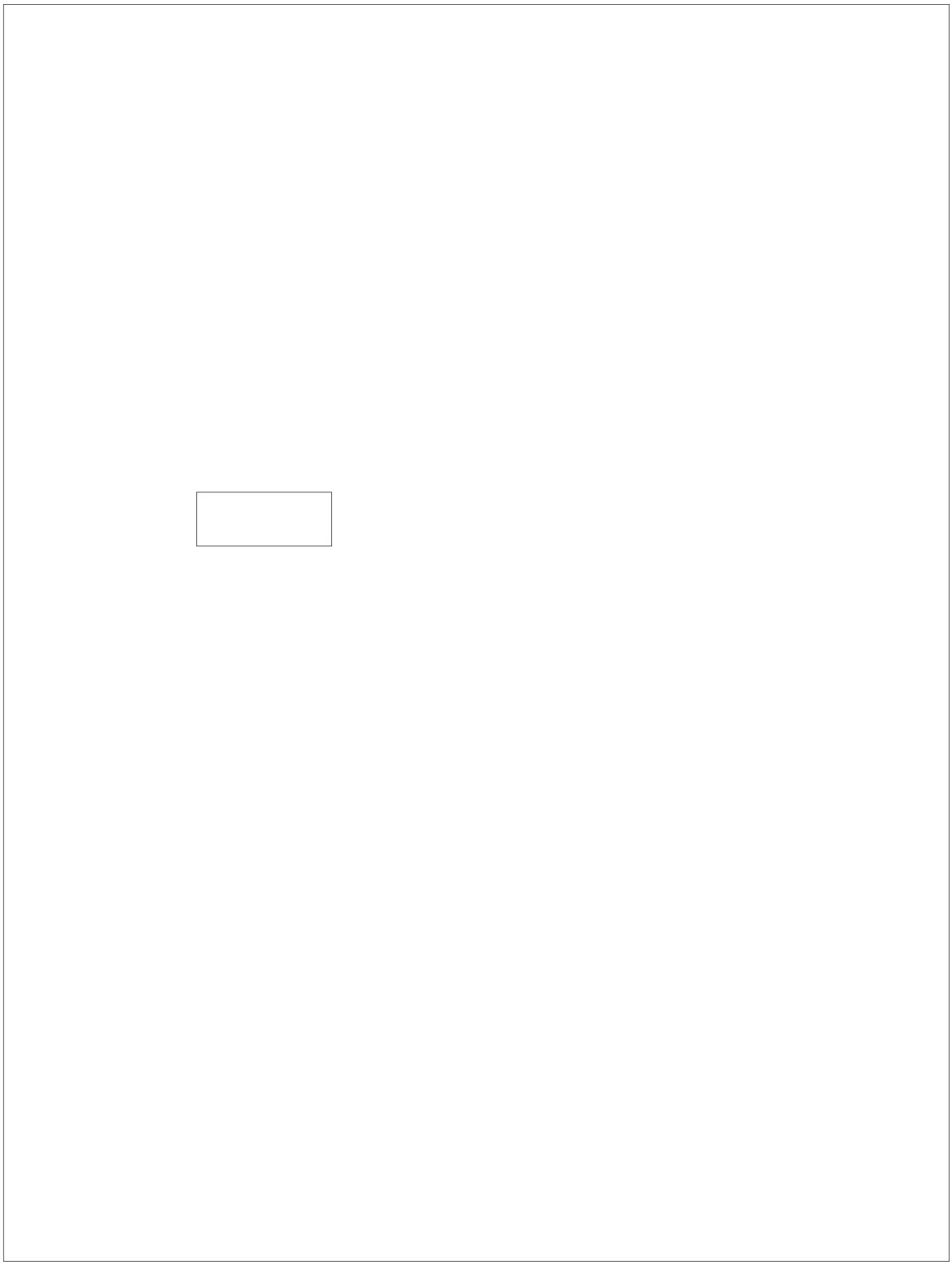
(2) Dynamic Range -

All system requirements are met over an input dynamic range of 35 db. System requirements include data accuracy, all inhibit functions, and spurious responses.

(3) Peak Power Measurement -

Received peak pulse power in the sum channel is measured to an accuracy of ±3 db with 95 percent confidence over the specified receiver dynamic range. On multiple-frequency signals, the peak power measurement represents the total received power and not that of the individual frequencies.



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(c) CW Dynamic Range.

The requirements of the CW frequency measurement are met over a sum channel input dynamic range of 40 db. Frequency measurement requirements include data accuracy and pulsed signal rejection. For each band, the lower limit on dynamic range is established by the minimum sensitivity in each band.

(d) CW Channel Sensitivity.

The CW channel has the following sensitivity for each of the input RF bands:

RF Band	Sensitivity (dbm +2 db)
1, 2, 3	-93
4, 5	-94

With this input power, the probability of detection is 0.5, and the false alarm rate is less than one per second.

(e) Pulsed Signal Rejection.

The CW system rejects any single pulse which has a pulsewidth of 7 usec or less.

C. Calibration Subsystem

The system contains an on-board Test Signal Generator that generates and inserts pulsed calibration test signals into the sum and difference channels and both omni channels at the system input.

The calibration test signal generator provides the following capabilities:

(1) Allows determination of DF system amplitude and phase imbalances.

(2) Verifies operation of the pulsed signal frequency measurement subsystem.

(3) Verifies operation of the pulse-width measurement subsystem.

(4) Verifies operation of the sum channel video subsystem.

(5) Verifies the amplitude inhibit operation of the omni channels.

(6) Verifies the amplitude inhibit operation of the difference channel.

(7) Verifies the operation of the CW frequency measurement subsystem.

4. SYSTEM OUTPUT

Analog video data are also recorded on a 1 MHz bandwidth tape recorder. These data are subsequently readout at a 4:1 ratio by remote tracking stations in

the spacecraft control network. The system includes three recorders, one of which is usually in back up status. Each recorder can store a total of 20 minutes of intercept data prior to readout. The system can be tasked for twelve revs per day and an average of 150 minutes of intercept per day. The former constraint is due to tracking station location and the latter to spacecraft power.