FINAL REPORT

BIT MISSION 7062

1 October 1965

Cy 5 of 6 cys
TCS-445102-65
Handle Via
TALENT-KEYHOLE
Channels Only

FINAL REPORT

BIT MISSION 7062

1. ~~(S)~~ MISSION SUMMARY.

1.1 ~~(S)~~ Program Objectives.

The objective of the BIT program is to determine if and when the radar system associated with the signal [redacted] acquires and tracks the Agena vehicle. The BIT system, designed to fulfill this objective, covers the frequency range from 153 to 163 Mc to determine if signals are present which have characteristics similar to [redacted]. On those signals which qualify, the system will measure frequency, PRF, and signal amplitude along with the time of intercept to enable an analyst to identify the signal characteristics and to estimate a geographical area within which the emitter is located.

1.2 ~~(S)~~ Mission Highlights.

During orbit 39 of this mission, the BIT system intercepted a signal identified as the [redacted] This signal, intercepted from 0744:51Z to 0746:23Z on 20 August, employed a frequency scan with a 10.5-second period and an approximate PRF of 25. The signal remained in the scanning mode during the entire intercept period and gave no observable indication of interest in the presence of the Agena vehicle.

The [redacted] signal was also noted on orbit 38 from 0613:22Z to 0615:02Z; however, the intercept is of little value since it consisted of only six frequency measurements. This was a back lobe intercept made as the vehicle passed north and east of Sary Shagan and it serves only to indicate that the emitter was active.

No other signals of interest were noted during this mission which covered the period from 17 through 24 August.

TCS-445102-65
Handle Via
TALENT-KEYHOLE
Channels Only

1.3 (S) Flight Summary.

Vehicle Number	1618
Launch Date	17 August 1965
Launch Time	2158 Z
Inclination	70 degrees
Apogee	227.5 nautical miles
Perigee	97.9 nautical miles
Period	90.4 minutes

2. (S) MISSION COVERAGE.

2.1 (S) Operational Coverage.

This mission lasted for 112 orbits and covered the period from launch to 2142Z on 24 August. Although the mission life was scheduled to be 200 orbits, it was prematurely terminated due to the failure of the tape recorder which BIT shares with the primary payload.

The unit was programmed to operate on every orbit while the vehicle was over Europe and Asia. In addition, it was operated throughout the entire orbit twice each day to provide a check of signal activity in the Southern Hemisphere.

2.2 (S) System Coverage.

The BIT system shown in Figure 1, monitors the 154.5- to 163-Mc frequency range with a receiver detection sensitivity of -55 dbm. With the inclusion of the effects of the antenna pattern with different polarizations and aspect angles, the over-all detection sensitivity of the system ranges from -58 dbm to -46 dbm. Signals intercepted by the receiver are checked by a pulse width qualifier to determine if

FIRE BOX SYSTEM

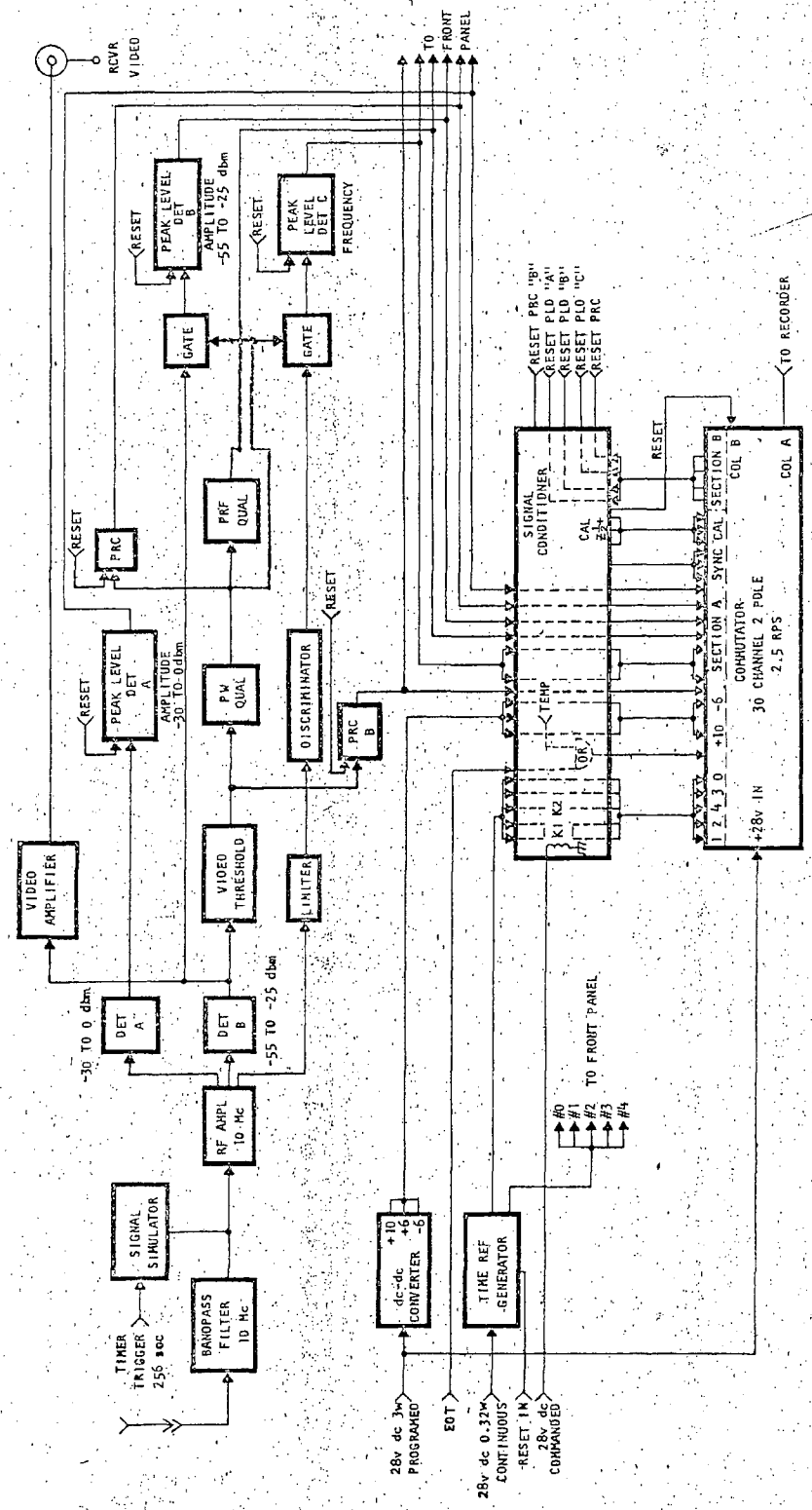


Figure 1

TCS-445102-65
Handle Via
TALENT-KEYHOLE
Channels Only

2.2 (S) -- Continued.

the pulse width is greater than 25 microseconds. The qualified pulses are counted in a total pulse counter, PRC, over the commutator read-in interval of 400 milliseconds and are measured to determine their amplitude and RF frequency. On previous systems the amplitude and frequency measurements also required PRF qualification but on this unit the PRF Qualifier is bypassed. It is, however, still used to accurately check the PRF to determine if it falls within the 95- to 101-pps acceptance band or harmonics of this range. If a signal has a power level at the receiver in excess of -30 dbm, its amplitude will be measured in the PLD-A channel regardless of the PRF or pulse width. The RF frequency of the high amplitude pulses will not be read unless the signal also satisfies the pulse width criterion.

3. (S) MISSION RESULTS.

3.1 (S) PRF Qualified Intercepts.

[redacted]

3.2 (S) Pulse Width Qualified Intercepts.

[redacted]

3.2 ~~(S)~~ -- Continued.

[redacted]

[redacted]

[redacted]

TCS-445102-65
Handle Via
TALENT-KEYHOLE
Channels Only

[redacted]

~~TOP SECRET~~ [redacted]

[redacted]

TCS-445102-65
Handle Via
TALENT-KEYHOLE
Channels Only

[redacted]

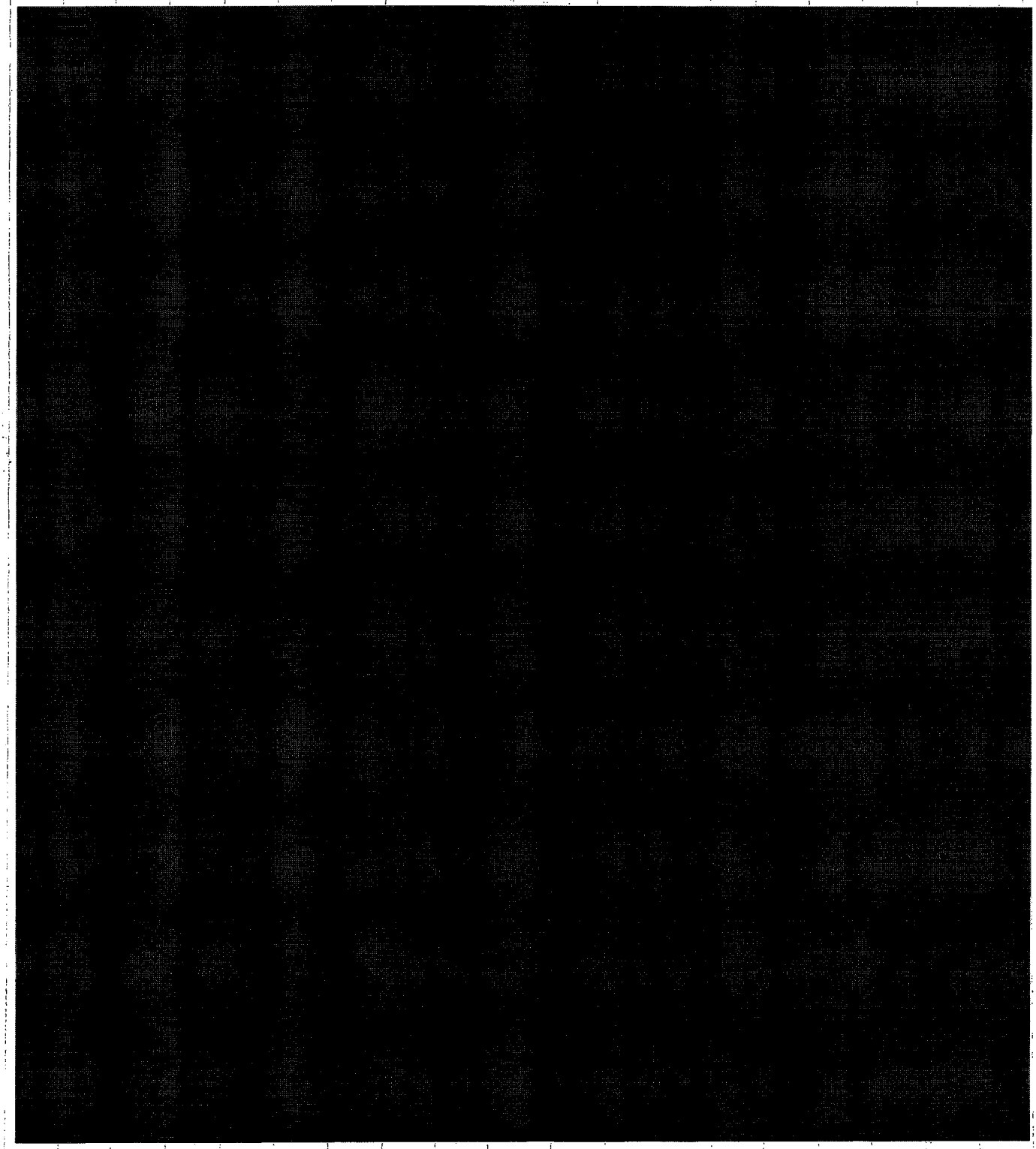
RADAR LOOK ANGLES
VEHICLE 1618
ORBIT 39

Figure 4

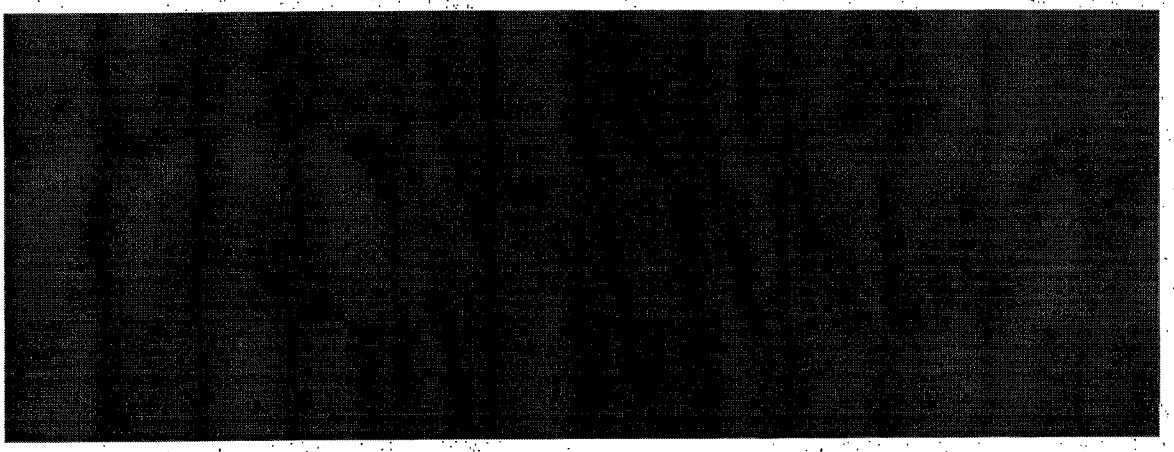
[redacted]

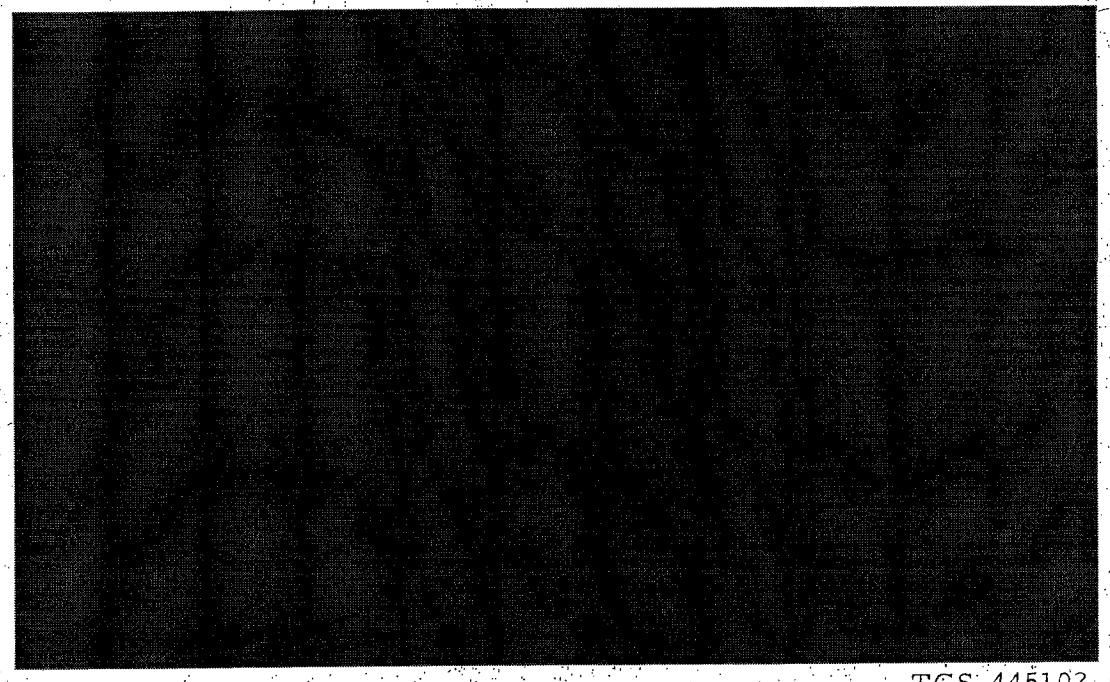
ELEVATION (DEG.)

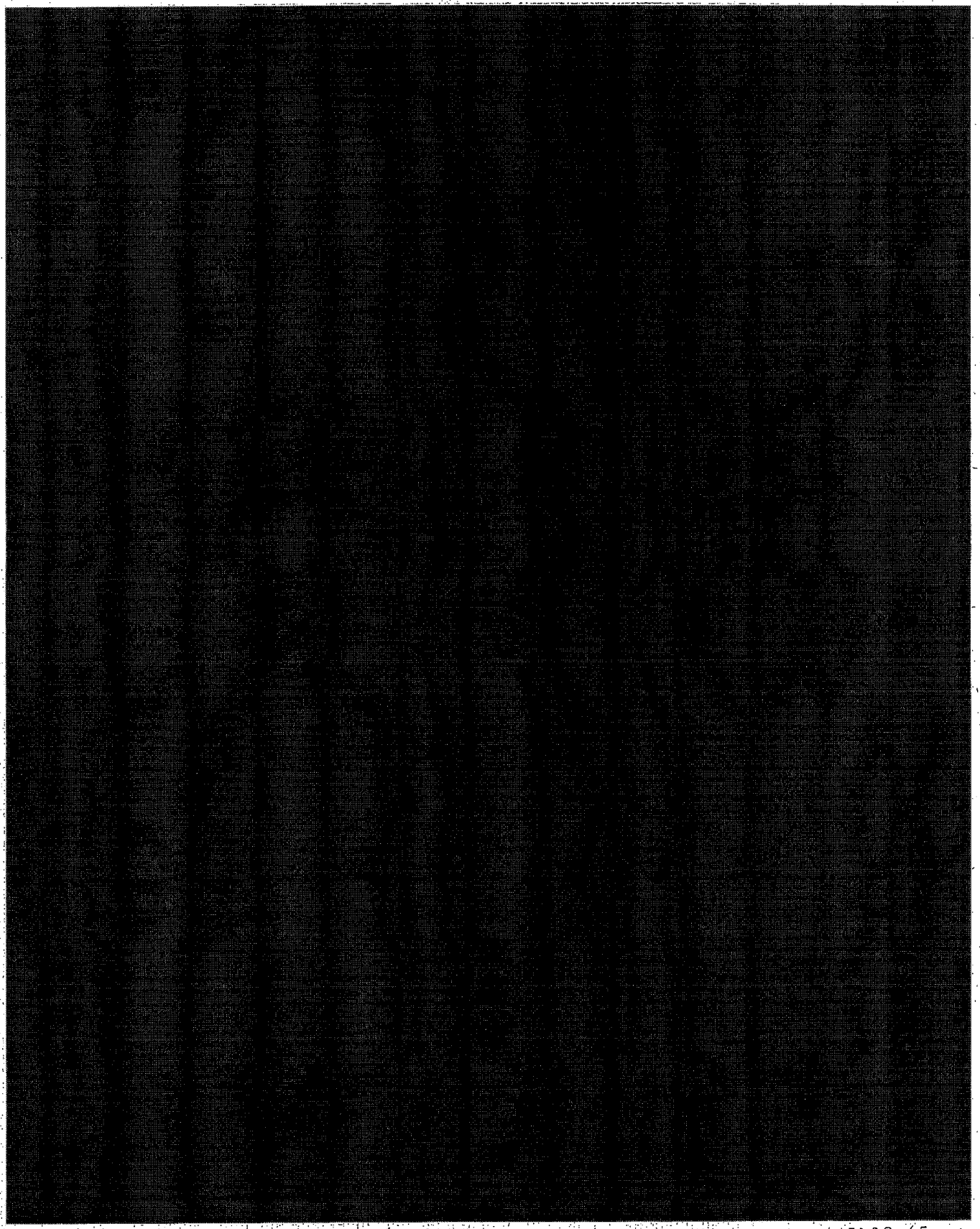
AZIMUTH (DEG.)



3.2 (S) -- Continued.







3.2 ~~(S)~~ -- Continued.

[redacted]

[redacted]

4. ~~(S)~~ SYSTEM PERFORMANCE.

4.1 ~~(S)~~ System Specifications.

A summary of the system specifications for the BIT system used on this mission is given below. The block diagram of the system is shown in Figure 1.

Minimum Detectable Signal	-55 dbm PLD-B -29 dbm PLD-A
Minimum Acceptable Pulse Width	25 microseconds

4.1 (S) -- Continued.

PRF Qualifier Range	95 to 101 pps 189- 201 pps (2nd Harmonic)
RF Pass band	
-52 dbm	154.4 to 161.4 Mc
-25 dbm	147 to 170.3 Mc

4.2 (S) System Operation.

The BIT system functioned normally throughout the duration of the 112 orbit mission. The system response to the calibrator showed that the circuits maintained their original calibration with the exception of PLD-C. The reading in this channel had to be corrected by 0.4 Mc because it indicated that the crystal controlled calibrator frequency was 160.4 Mc rather than 160.0 Mc.

The unit used on this mission was modified after mission 7060 so that the measurement gates for PLD-B and PLD-C would open only during the 20-microsecond duration of the PRC multivibrator. Once the Pulse Width Qualifier accepted a pulse, the multivibrator would fire to generate the "Read" gate and to add one count to the PRC. This greatly reduces the possibility of interference because an interfering pulse must occur during the 20-microsecond gate rather than any time during the pulse which is approximately [redacted] As indicated in the data from this mission, this modification reduced the interference but did not completely eliminate it. Data from other sources show that there are several (4 to 8) [redacted] emitters in the signal environment around Sary Shagan. The density of pulses produced by these multiple signals is sufficient to generate interference even with the 20-microsecond "Read" gate. To more completely eliminate this type of interference, it would have been more desirable to make only one amplitude and frequency sample during the commutator read in period rather than having the circuits read the maximum values of all pulses received during the read in period.

This mission was prematurely terminated because the tape recorder which records the BIT output failed after orbit 112. This recorder, provided by the primary program, records both the BIT data and data from the primary system. Real time data received while the vehicle was over the tracking stations showed the BIT system to be functioning normally after the recorder failure.