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SPECIAL HANDLING

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FINAL REPORT

BIT MISSION 7058

1 June 1965

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SAFSS 546173-65
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FINAL REPORT
BIT MISSION 7058

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 and accepts only those signals 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.

There were no intercepts made of the [REDACTED] signal during this mission which was prematurely terminated by a commutator failure after orbit 100. The BIT system functioned properly during the useful life of the mission which covered the period from approximately 2200Z on 29 April to 0600Z on 6 May 1965.

An unidentified signal was intercepted on 5 May 1965 at 2320Z (orbit 96) while the vehicle passed over the Arctic Ocean northwest of Alaska. From the characteristics of this intercept, it is concluded that the emitter neither detected nor tracked the Agena vehicle.

1.3 ~~(S)~~ Flight Summary.

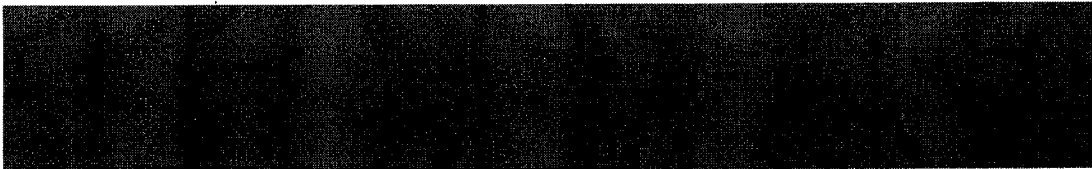
Vehicle Number	1614
Launch Time	2140Z
Launch Date	29 April 1965
Inclination	85 degrees
Apogee	264 nautical miles
Perigee	100 nautical miles
Period	91 minutes

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The BIT system was programmed on during each of the 100 orbits of the useful mission life while the vehicle was over the northern hemisphere with an emphasis on the coverage over Europe, the USSR, and Asia. On 15 of the orbits the unit was programmed on throughout the period while the vehicle was over the southern hemisphere. Data were received from all of the orbits which were programmed for operation.

2.2 ~~(S)~~ System Coverage.

The BIT system shown in Figure 1, monitors the 154 to 162 Mc frequency range with a receiver 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 the pulse width is greater than -25 microseconds. The pulses which qualify 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 and succeeding units the PRF Qualifier is bypassed. The PRF Qualifier is, however, still used to accurately check the PRF to determine if it falls within the 94 to 100 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 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.3.2 ~~(S)~~ Non Qualified Intercepts.~~SECRET~~

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FIRE BOX SYSTEM

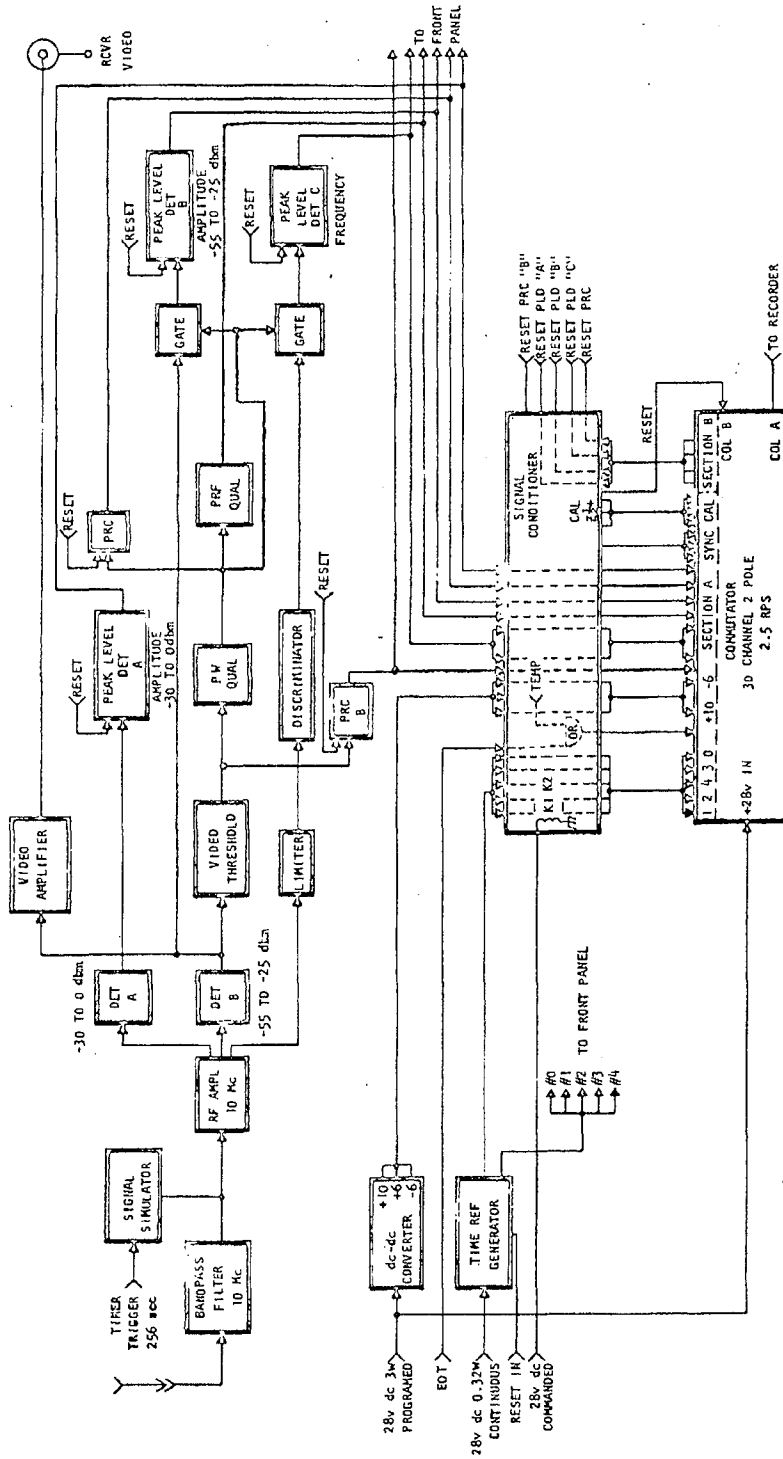


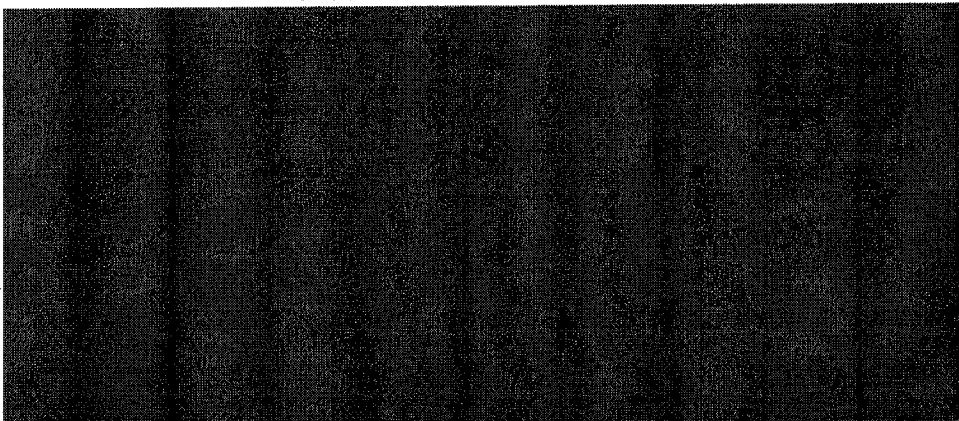
Figure 1

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



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

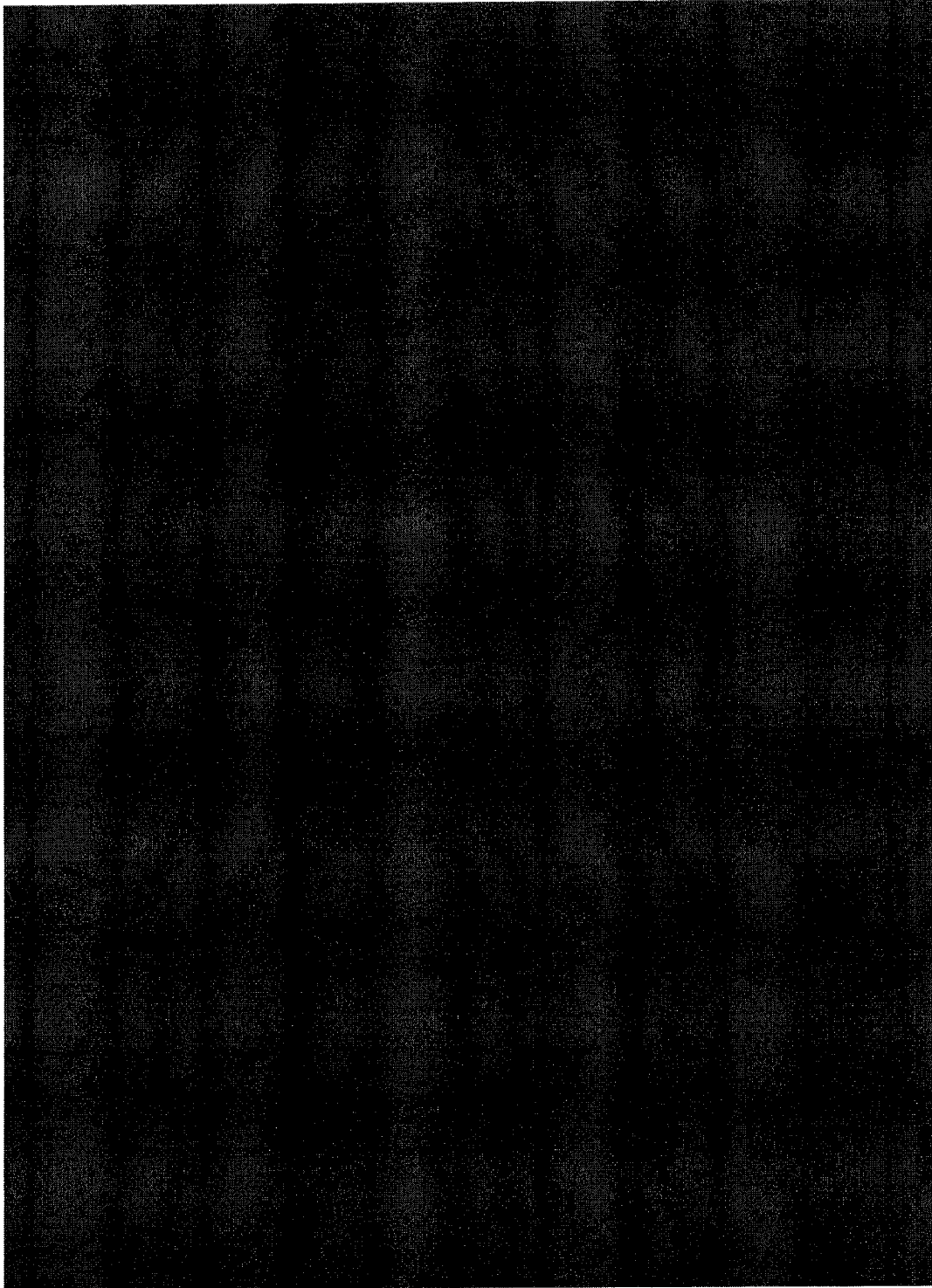
4.1 ~~(S)~~ System Specifications.

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

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ORBIT 96
INTERCEPT
MISSION 7058

Figure 2

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~~SECRET~~4.1 ~~(S)~~ -- Continued.

Minimum Detectable Signal	-55 dbm PLD-B -30 dbm PLD-A
Minimum Acceptable Pulse Width	25 microseconds
PRF Qualifier Range	94-100 pps 188-201 pps (2nd Harmonic)
RF Passband	
-52 dbm	153.8 to 162.1 Mc
-25 dbm	147.3 to 169.8 Mc

4.2 ~~(S)~~ System Operation.

The BIT system functioned normally throughout the useful mission life which ended after orbit 100 when the commutator failed. The scheduled mission life was 200 orbits. The system response to the Signal Simulator indicated the qualification circuitry operated properly and that the measurement circuitry maintained their original calibration levels.

The BIT unit used on this mission had to be rewired so that the commutator would run continuously rather than be programmed on and off with the system. This failure indicates that the wiring modification is not the complete solution to the commutator reliability problem. During the last few orbits, the speed of the commutator was varying over about a 25 per cent range. Sometime after read in on orbit 100 and read out on orbit 101, the device slowed to a complete stop. This was a failure mode different from those noted previously.

This system, along with three of the remaining four units, was modified so that PRF Qualification was not required to get low range amplitude (Channel B) and frequency measurements. The pulses which pass the Pulse Width Qualifier are used to generate the enable gates to permit measuring the amplitude and frequency on a pulse-by-pulse basis. The PRF Qualifier is still used to indicate when a PRF falls within the 94 to 100 pps range but it no longer has a gate control function.

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