[redacted] REPORT NO. AM 164

DATE: 6 July 1962

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Handle via BYEMAN
Control System

[redacted]

[redacted]

TECHNICAL DESCRIPTION

STOPPER

RECONNAISSANCE SYSTEM

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Approved by:

W. M. HARRIS

SECRET Special Handling

[redacted]

[redacted]

Preliminary Report
June 28, 1963

[redacted]

[illegible]

[illegible] will be available [illegible] to begin in April of 19[illegible], at a nominal rate of two per month.

[illegible]: Sylvania Electric Products Inc. will provide the [illegible] receivers and signal logic subsystems. Lockheed Missiles & Space Company will provide the antennas, commutator, recorder, programmer, data link and [illegible] power subsystems.

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[illegible] [redacted]

[illegible]

[illegible] the vehicle will [illegible] during each orbit [illegible] recovery sequence is initiated, at which time the system is disabled. The playback of the recorded data will be transmitted over one of the vehicle [illegible] links, and will be recorded on the ground at three [illegible] tracking stations, [illegible], [illegible], and Hawaii. Readout and turn-on times will be controlled by the vehicle Fairchild timer, pre-programmed before launch. Real-time data will also be transmitted over the [illegible] link during readout.

[illegible] Specific Payload Characteristics

1. Antenna: The antenna assembly consists of three elements in a single structure. One element feeds the two low frequency channels, 1 and 2, through a diplexer, and covers the range of 160 mc to 1000 mc. The second element feeds channel 3, and covers the frequency range of 1000 to 2500 mc. Both of these elements are logaritmic spirals, circularly polarized, and have a major lobe type of pattern with maximum response directed earthward, and a gain varying from a maximum of isotropic to a nominal minus 6db at the horizon.

The third element is a narrow band monopole with a reflector designed to reproduce the pattern of the vehicle S-band beacon antenna. It covers the range of beacon frequencies, and feeds channel 4 which recognizes attempts to elicit transponder responses.

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[illegible]

[illegible]

[illegible] all pulses [illegible] threshold. The [illegible] pulse counts are [illegible] to commutated telemetry [illegible] analog 0 to 5 volt levels related to the rates at which long and short pulses are received at high enough amplitude in each of the [illegible] channels. These rates are individually averaged over the previous one [illegible] of time to produce the analog voltage value which is then sampled by the commutator at this same one-second interval.

The analog voltage output of each pulse rate counter is fed to another threshold circuit followed by relay logic which is activated whenever a [illegible] level of activity is detected. The relay will remain closed for five minutes after activity ceases.

b. The beacon subsystem consists of an S-band superheterodyne receiver operating at the frequencies of 2725 mc ± 5 mc, and 2950 mc ± 5 mc (signal and image). Bandwidth of the receiver is 10 mc and sensitivity is -65 dbm. The S-band antenna is fed to an RF bandpass filter which contains a rejection notch centered at the vehicle transponder frequency, followed by a crystal

[illegible]

[illegible] digital [illegible] logic dete[illegible] [illegible] recognitions [illegible] attempts [illegible] by [illegible] commands from the satellite system. [illegible] rates at which pulse-pairs are received [illegible] spacings correspond to each of the seven time delays used in [illegible] satellite program and the rates of receipt for pulse-pairs [illegible] three [illegible] pulse spacings. These ten rates are all [illegible] continuously averaged over a one-second interval and fed to [illegible] commutator points which are being sampled at one-second intervals. The analog voltage representing each of these rates is related to a logarithmic function of the pulse-pair reception rate, so that a low repetition rate interrogation procedure can be detected.

The recognition logic used to detect attempts to command the vehicle is divided into two sub-sections, 'Logic A' and 'Logic B'. Multiple-tone FM command systems using the Type XI 15-Command Decoder are monitored with Logic A. The tones and pulse spacings used are noted in LMSC specification 7004777 (Secret). One of the six different pulse-spacings used is connected to Logic A by use of an external switch, set before flight presumably to the spacing used by the satellite vehicle.

[illegible]

[illegible] two [illegible] levels [illegible] [illegible] [illegible] voltage levels will [illegible] in the [illegible].

[illegible] digital [illegible] command system is monitored by 'Logic B'. [illegible] individually, for the reception of validated [illegible] [illegible]-program commands, or "words", and for the reception of invalid commands, or errors. Verification includes checking pulse position, word lengths of the two types of commands, and the parity-checking relations which are meant to apply. Logic B is permanently connected to the channels of the time-delay-comparison circuitry corresponding to the appropriate pulse spacings used with this system.

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[illegible]

[illegible] Type [illegible] [illegible] part no. 1[illegible]
[illegible], [illegible] [illegible]

[illegible]

[illegible]	[illegible] VDC
Power	Less than 5 watts record and 8 watts reproduce at 28 VDC input.
Input impedance	250 K, all modes
Signal input	0 to 5.3 volts
Frequency response	dc to 1[illegible] cps
Output impedance	Less than 1 K ohms (short circuit proof)
Output signal level	0-5.3 ± 0.2 V peak
Temperature range	0 to 16[illegible]° [illegible]. (operating)
Record speed	.9 ips
Reproduce speed	23.4 ips (X26)
Tape capacity	833 feet, maximum
Record time	180 minutes minimum 190 minutes maximum
Weight	7.3 lbs.
No. of channels	2 FM (± 40% VCO, center freq. 850 cps)
Linearity	When the output (during playback) versus input (recorded) between 0 to 5.3 V is plotted, the curve does not deviate from the line by more than ± 0.2 V at any intermediate point.
Speed control	Accomplished by a precision frequency [illegible] oscillator synchronizing a DC to AC motor inverter, which in turn drives a 400 cycle 8000 rps synchronous motor.

[illegible]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible] watts
[illegible]	0.65 lbs.

[illegible]

[illegible]
Transmitter: [illegible] part no. 1561.95-3. VHF [illegible]

RF Power Output:	2 watts
Deviation:	± 125 kc
Weight:	1 lb. 12 oz.

Subcarrier used for read-out of recorded data: Channel 9 (98 kc ± 15% deviation)

Subcarrier used for read-out of real-time data: Channel 12

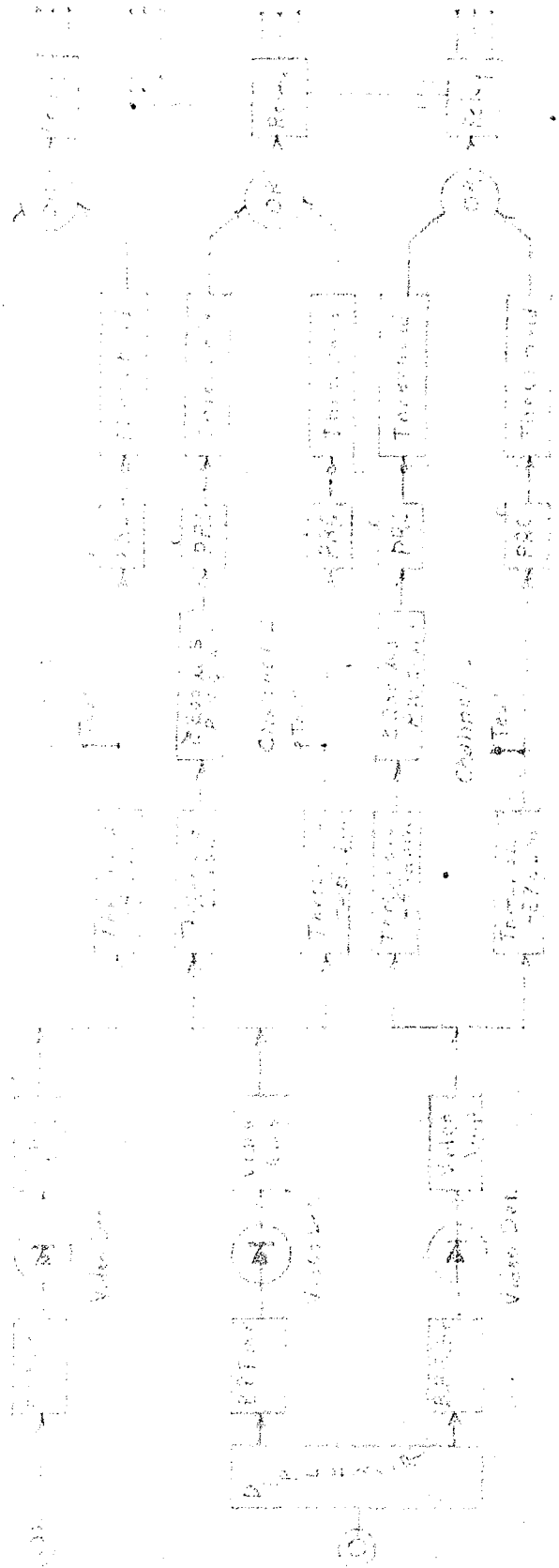

FIGURE 1

~~SECRET~~

SPECIAL HANDLING

[redacted]

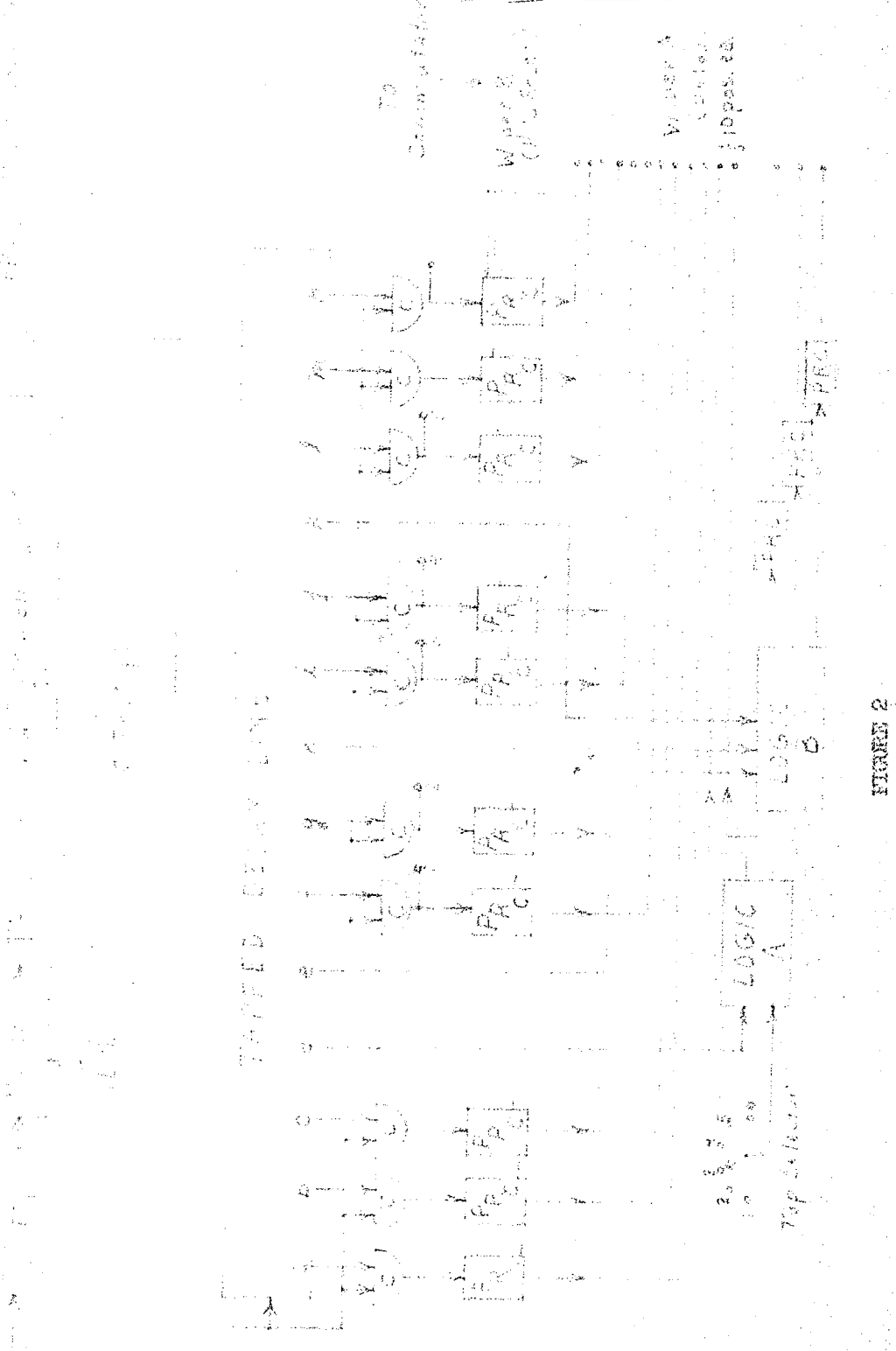

FIGURE 2

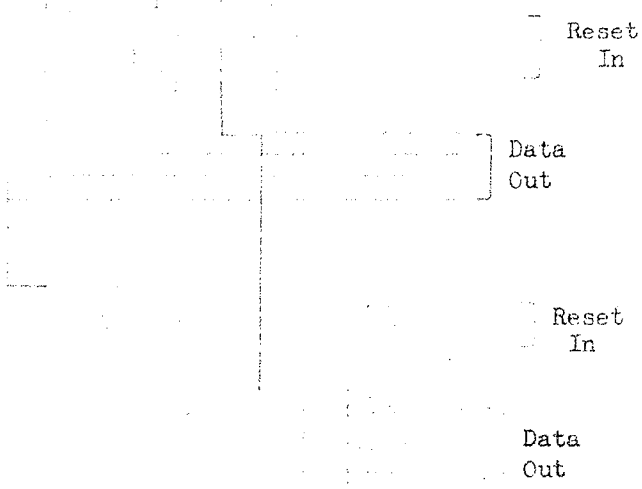

FIGURE 3