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From: Director, U.S. Naval Research Laboratory, Washington, D.C. 20390
To: Director of Naval Intelligence (OP-922Y3)

Subj: Mission 7104; technical description of

Ref: (a) DNI ltr OP922Y3/bmb BYE-19721-64 of 21 April 1964

Encl: (1) Ten copies of technical description
(2) Ten copies of description of albedo experiment

1. In accordance with the request contained in reference (a) enclosures (1) and (2) are hereby forwarded.

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5400-18:HOL:pk
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16 March 1965

TECHNICAL DESCRIPTION FOR MISSION 7104

I. DESCRIPTION OF THE BASIC FUNCTION

Four satellites have been prepared by the Naval Research Laboratory for launch into orbit from the Pacific Test Range on or about 9 March 1965, for use in the PROGRAM-C (POPPY) ELINT collection effort of MISSION 7104. The satellites will be known by their respective assigned nomenclature: 7104A, 7104B, 7104C and 7104D. The thirty-two collection systems contained in these four satellites are designed to fulfill these two basic functions:

(1) Perform general search surveillance of the electromagnetic spectrum from 155 to 9,500 megacycles against pulsed type emissions.

(2) To enchance the Radar-Order-Of-Battle location data from within the Sino-Soviet-Bloc.

Each SIGINT collection system is designed to cover a specific portion of the frequency spectrum with five bands duplicated in two of the satellites. Each satellite contains eight discrete collection systems which are further divided into two groups, (four Primary and four Alternate systems). Either the Primary or the Alternate group may be used at any period of time but they both cannot be utilized simultaneously. The collection systems of the Primary group are numbered P1, P2, P3, and P4 in order of increasing frequency of the collection system. For example the lowest-frequency collection system in the Primary group of the 7104C satellite is referred to as 7104C-P1; likewise 7104D-A4 is the highest frequency collection band of the 7104D Alternate group.

II. OVERALL OPERATIONAL DESCRIPTION

The basic POPPY type collection system uses a very simple crystal-video type receiver designed for an operational life of at least one year in orbit. Up to four of the collection systems in each satellite may be commanded "ON" and at the end of a fifty minute period they are automatically "RESET" (turned Off) by a timing system in the satellite. When the pulsed signals from a radar of medium or high power illuminate the satellite with sufficient signal strength, the signal is intercepted by one of the satellite collection systems, then it is stretched in time duration to either 135 or 200 microseconds (narrow and wide respectively) and then retransmitted on a pulse-for-pulse basis by the Data-Link system contained

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in the satellite. The radar's pulse repetition rate and the radar scan characteristics are preserved, in the data being radiated from these satellites. The frequency of the intercepted radar signal is determined by the Band-Pass filter utilized in the particular satellite collection system.

The pulse data from these satellite transponding systems are received and recorded along with precise timing information at [redacted] ground-based stations situated around the periphery at the Sino Soviet Bloc. Provision is made at these stations to allow the monitoring of two satellites at the same time by redundant receiving and recording equipment. (b)(1) (b)(3)

The first two stabilized satellites (7104C then 7104D) are designed to separate from [redacted] (7104B then 7104A) by about fifteen (15) miles per day with an anticipated incremental separation between the satellites [redacted] (7104C and 7104D) of about 1.75 n. mi/day and 1.3 n. mi/day for the relative separation between [redacted] (7104A and 7104B). Separation distance and speed between 7104C and 7104D is to be controlled by a pair of remote controllable low-level thrusters aimed along the flight line of the three-axis stabilized satellite (7104D).

III. SYSTEM CHARACTERISTICS

The specific payload characteristics are given in the Table #1 below.

Item or Characteristic	7104A	7104B	7104C	7104D
Weight, in flight (lbs)	102.6 ±1/2	105.9 ±1/2	122.3 ±1/2	129. ±2
Diameter (inches)	24	24	24	24
Separation velocity from launch vehicle (mi/day)	43.9	42.6	25.6	27.35
Telemetry (chan-A) (mc)	136.80056	136.5296	136.73941	136.76641
Radiated Power (mw) Channel-A	53	33	50	75
Channel-B (DL#1)	714	579	533	333
Channel-C (DL#2)	850	500	511	617

Table #1 - Specifications for MISSION 7104 Payloads

A. Satellite Collection Systems:

The majority of the characteristics of the ELINT collection systems in 7104A, B, C and D are given in the following Tables #2, 3, 4 and 5, respectively.

1. Receiving antenna systems

The antenna systems of 7104A and B both utilize the basic symmetrical system of six monopole elements located on the modified spherical shell of the satellite. Slight degradations in the classic omni-directional antenna collection coverage result from the proximity of other antenna elements and the departure of satellite shape from that of a true sphere.

Above a frequency of 3800 mc/s the antenna element utilized is the dipole. These elements are arranged in groups around the equatorial band of the satellite so that the resultant pattern looks outward from the satellite and covers a particular sector with reception of both horizontal and vertical polarization.

MISSION 7104A	PRIMARY BANDS				ALTERNATE BANDS			
	P1	P2	P3	P4	A1	A2	A3	A4
RECEIVER BAND-PASS								
Upper 3 db (mc)	202	720	930	1080	292	655	3090	4180
Lower 3 db (mc)	165	595	685	815	230	550	2650	3180
Upper 10 db (mc)	204	725	935	1085	293	658	3130	4200
Lower 10 db (mc)	164	590	670	810	228	545	2630	3140
COLLECTION ANTENNA	Common with A-1	Common with P-4		See P-2	Common with P-1	Common with A-3	See A-2	
Number (#)	6	6	6	6	6	6	6	6
Type	Monopole	Monopole	Monopole	Monopole	Monopole	Monopole	Monopole	Monopole
Location	No, So + 4 EQ	37^{o} Lat.	37^{o} Lat.	37^{o} Lat.	No, So, +4EQ	37^{o} Lat.	37^{o} Lat.	37^{o} Lat.
PREAMPLIFIERS								
Number (#)	0	0	0	0	0	0	0	0
VIDEO AMPLIFIERS								
Number (#)	1	1	1	1	1	1	1	1
DATA LINK SYSTEM (Xmtr #)	2	1	2	1	2	1	2	1
Pulse Width (μsec)	135	200	200	135	200	135	135	200
OVERALL SYSTEM								
Filter Sensitivity (-dbm)	55	56	54	54	55	55	57	58
System Sens. (w/cm^2)	1.2×10^{-11}	1.5×10^{-11}	3×10^{-11}	3.5×10^{-11}	1.2×10^{-11}	1.5×10^{-11}	3.4×10^{-10}	1×10^{-9}
Input Pulse Width (μsec)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Table #2 - ELINT Characteristics of 7104A

MISSION 7104B	PRIMARY BANDS P1	P2	P3	P4	ALTERNATE BANDS A1	A2	A3	A4
RECEIVER BAND-PASS								
Upper 3 db (mc)	202	555	1085	2370	245	655	2900	3320
Lower 3 db (mc)	165	440	815	1820	200	550	2290	2940
Upper 10 db (mc)	204	565	1090	2390	247	660	2920	3340
Lower 10 db (mc)	164	430	810	1790	198	545	2250	2920
COLLECTION ANTENNA	Common with A1	Common with P4		See P2	Common with P1			
Number (#)	5	6	6	6	5	6	6	6
Type - All Monopole								
Location	So + 4 EQ	37° Lat.	37° Lat.	37° Lat.	So + 4 EQ	37° Lat.	37° Lat.	37° La[illegible]
PREAMPLIFIERS								
Number (#)	0	0	0	0	0	0	0	0
VIDEO AMPLIFIERS								
Number (#)	1	1	1	1	1	1	1	1
DATA LINK SYSTEM Xmtr (#)	2	2	1	1	2	1	2	1
Pulse Width (μsec)	135	200	135	200	200	200	135	135
OVERALL SYSTEM								
Filter Sensitivity (dbm)	-55	-55	-55	-57	-56	-55	-57	-57
System Sens. (w/cm²)	2×10^{-11}	1.5×10^{-11}	1.5×10^{-11}	2×10^{-10}	2×10^{-11}	1.5×10^{-11}	2×10^{-10}	2×10^{-10}
Input Pulse Width (μsec)	.4	.4	.4	.4	.4	.4	.4	.4

Table #3 - ELINT Characteristics of 7104B

MISSION 7104C	PRIMARY BANDS				ALTERNATE BANDS			
	P1	P2	P3	P4	A1	A2	A3	A4
RECEIVER BAND-PASS								
Upper 3 db (mc)	184	1860	5350	5900	345	455	1360	4900
Lower 3 db (mc)	155.5	1345	4850	5350	278	345	1070	3800
Upper 10 db (mc)	185	1880	5400	5950	350	470	1370	5000
Lower 10 db (mc)	154.5	1320	4750	5250	275	330	1050	3680
COLLECTION ANTENNA								
Number (#)	3	3	4	4	5	3	3	4
Type	Monopole	Monopole	Dipole	Dipole	Monopole	Monopole	Monopole	Dipole
Location	No. Hemi	No. Hemi.	Equator	Equator	Eq. + SoPole	So. Hemi.	So. Hemi.	Equator
PREAMPLIFIERS								
Number (#)	0	0	4	4	0	0	0	0
VIDEO AMPLIFIERS								
Number (#)	1	1	1	1	1	1	1	4
DATA LINK SYSTEM Xmtr (#)	1	2	2	1	2	2	1	1
Pulse Width (μsec)	135	135	200	200	135	200	135	200
OVERALL SYSTEM								
Filter Sensitivity (dbm)	-50	-53	-65	-65	-55	-56	-57	-57
System Sens. (w/cm^2)	6×10^{-11}	1×10^{-10}	6×10^{-10}	6×10^{-10}	1.2×10^{-11}	2×10^{-11}	1.3×10^{-10}	4.8×10^{-10}
Input Pulse Width (μsec)	.4	.4	.1	.1	.4	.4	.4	.1

Table #4 - ELINT Characteristics of 7104C

MISSION 7104D	PRIMARY BANDS P1	P2	P2 *	P3	P4	ALTERNATE BANDS A1	A2	A3	A4
RECEIVER BAND-PASS									
Upper 3 db (mc)	184	5350	5370	7300	7950	6250	8400	9050	9500
Lower 3 db (mc)	155.5	4850	4860	6750	7300	5850	7850	8400	9050
Upper 10 db (mc)	185.0	5400	5450	7400	8000	6850	8500	9200	9550
Lower 10 db (mc)	154.5	4800	4820	6650	7200	5700	7750	8250	8900
COLLECTION ANT.									
Az. of coverage ±3db			150°/260°	005°/225°	95°/335°	015°/120°	115°/230°	355°/135°	40°/[illegible]°
Number (#)	3	3	1	2	2	2	2	2	2
Type	monopole	dipole	dipole	dipole	dipole	dipole	dipole	dipole	dipo[illegible]
Location	37° N. Hemi.	Eq.	Eq.	Eq.	Eq.	Eq.	Eq.	Eq.	Eq.
PREAMPLIFIERS									
Number (#)	0	3	2	4	4	2	4	4	4
VIDEO AMPLIFIERS									
Number (#)	1	1		1	1	1	1	1	1
DATALINK SYS. Xmtr #	1	2		2	1	2	2	1	1
Pulse Width (μsec)	135	200		135	200	200	135	200	135
OVERALL SYSTEM									
Filter Sens. (dbm)	-50	-65	-75	-63	-76	-65	-78	-80	-79
Sys. Sens. (w/cm^2)	6×10^{-11}	4.7×10^{-10}	4.7×10^{-11}	4.7×10^{-10}	4.7×10^{-11}	4.7×10^{-10}	9×10^{-12}	2.8×10^{-11}	3.7×10^{-11}
Input pw (μsec) min.	.4	.1	.1	.1	.1	.1	.1	.1	.1

Table #5 - ELINT Characteristics of 7104D

*High Sensitivity P2 Channel

All of the collection bands above the frequency of 5900 mc utilize only two dipole-type receiving antenna elements, separated around the equatorial band of the satellite by either 45° or 67-1/2°. The azimuth sector of coverage which results from this spaced and inter meshed dipole system on satellite 7104D is shown in Table #5, where the three db points are given for the receiving antenna patterns of each frequency band. This reduction to two channels, in the intercept antenna and receiver design on 7104D, has been necessary mostly to accommodate the relatively large volume of RF Preamplifier and Filter elements which has been necessary to obtain the higher sensitivities being required for 7104D. Since this particular satellite is to be three-axis stabilized, the geographical coverage provided by this asymmetrical reception antenna coverage, is continuously known and will provide additional emitter location information by the significant sector DF information. The space around the satellite which is available for collection antennas is limited and for this reason it has been necessary to reduce to a minimum, the number of collection antenna elements. In the collection bands covering the frequency range below 3320 mc it has been expedient to combine two antenna requirements into a single element without degrading the POPPY system objectives. This was done for three pairs of collection bands in each 7104A and 7104B.

2. Preamplifiers are used only in the frequency range above 4850 mc. The design of these preamplifiers utilizes tunnel-diode elements which are integrated into the band-pass filter proper. This single stage preamplifier is utilized in the frequency range from 4850 mc to 7300 mc. Above this 7300 mc frequency a dual or two stage type rf preamplifier is being utilized which provides about 10 to 15 db improvement in receiver sensitivity over that obtained with the single stage preamplifier.

3. Video Amplifiers utilized in the POPPY systems are of the same basic types which have been employed for three years. Design is conservative in the areas of power consumption and reliability as well as size and weight. There are minor differences which reflect the changes in the requirements for faster rise times or longer pulse durations. There are multiple input receptacles which connect the several collection antennas

and filter-detector channels to the single video amplifier. Where high sensitivity is extremely important in a collection band, a separate video amplifier is utilized with each channel of reception, (necessitating separate threshold circuits for each channel of reception) so that the noise from only one crystal detector is present with the signal at the particular threshold device which compares the signal level with the receiver noise amplitude. This technique is used in 7104C-A4 (3800 to 4900 mc) so that the system sensitivity is about 7 db higher than the equivalent collection band in the 7103A-4.

4. Sensitivity

Tables, #2, 3, 4 and 5 give at the bottom a list of sensitivity labeled Filter Sensitivity (-dbm). This is the tangential-signal-level attainable with one channel of the receiving system, separated from the threshold device and the combination losses of several channels connected together in a single video amplifier.

The next line is labeled "System Sens. (w/cm^2). This is the power density necessary at the Satellite in order for it to respond solidly, pulse-for-pulse, to an illuminating signal.

"Input Pulse Width (μsec)" is merely the design rise-time utilized in the particular video amplifier design of each collection band.

B. <u>Satellite Modulator-Transmitter System</u>

The crystal-video type collection systems up to this point are not particularly unique except for their high reliability and conservative design and efficiency. The output from each video amplifier is fed to a separate threshold detector and a monostable multivibrator which is used to stretch the input pulse to 135 microseconds in time duration for some of the collection systems and to 200 microseconds in duration for the other collection systems. The monostable multivibrator then keys on the transmitter for the duration of the pulse, either 135 or 200 microseconds.

I. Data Link Systems

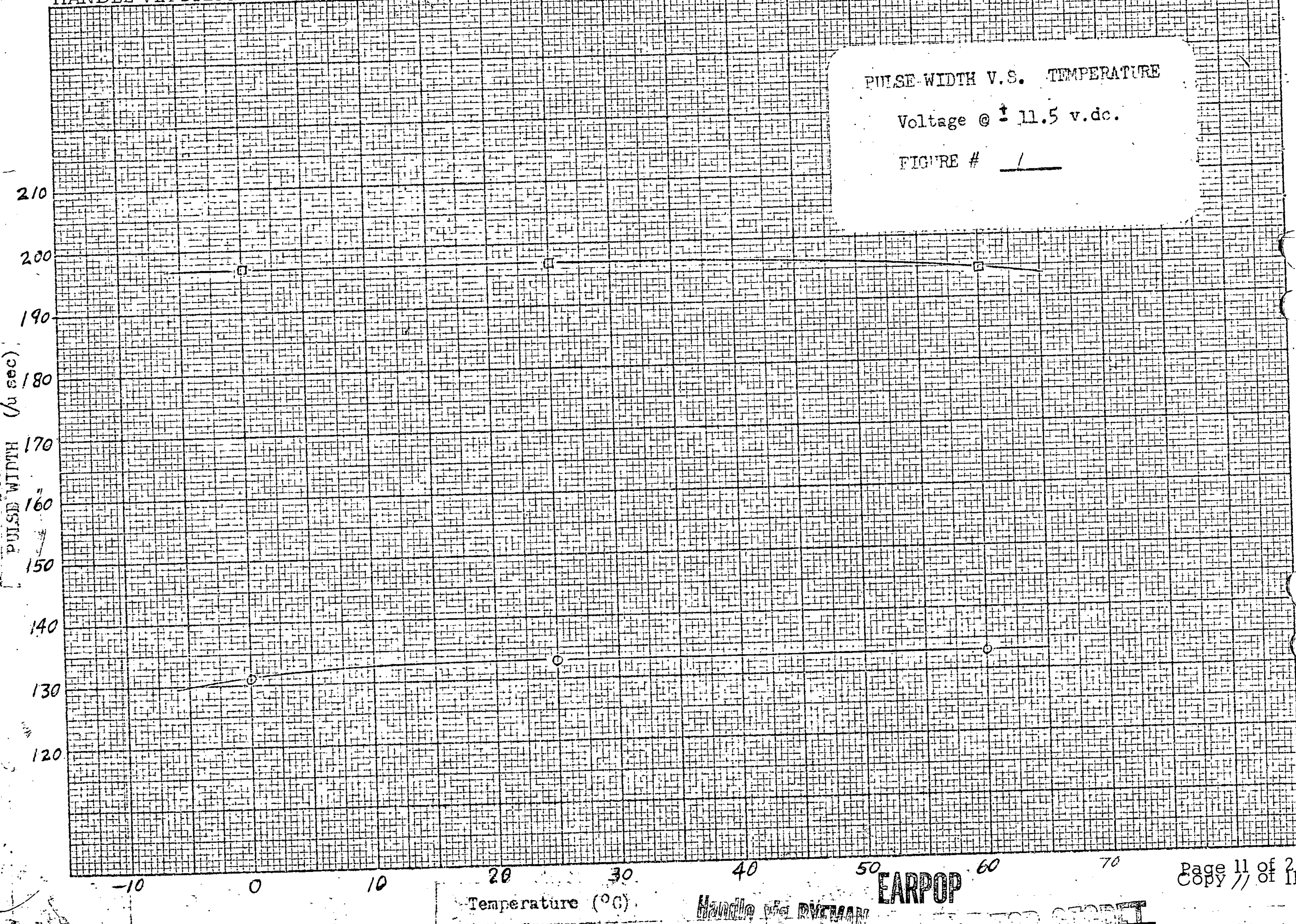
Table~~s #2, 3, 4 and 5~~ 1 gives the value in milliwatts which is radiated from the turnstile transmitting antennas of each satellite. The radiated power from these four satellites exceeds by a slight margin the power available from the 7103 satellites. The characteristics of the Modulator which result from changes in temperature and voltage are given in Figures #1, 2 and 3.

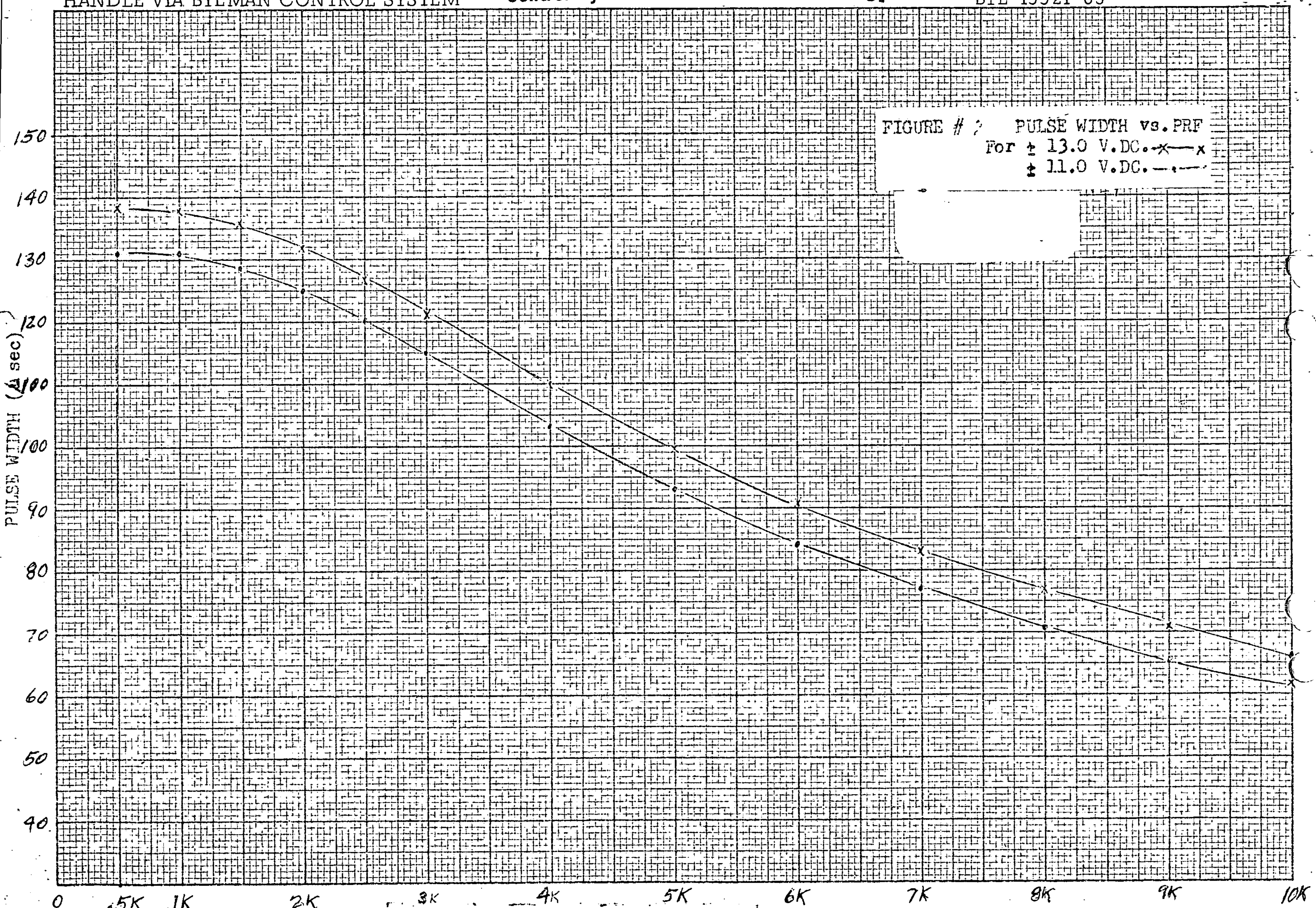
Figure #2, and #3 show for two voltage extremes, the Modulator pulse width for changes is the input pulse repetition frequency (PRF). This reduction in output pulse width with increasing (PRF) is a design feature to increase the PRF range and resolution of the POPPY systems using the "Narrow" pulse format.

(b)(1)
(b)(3)

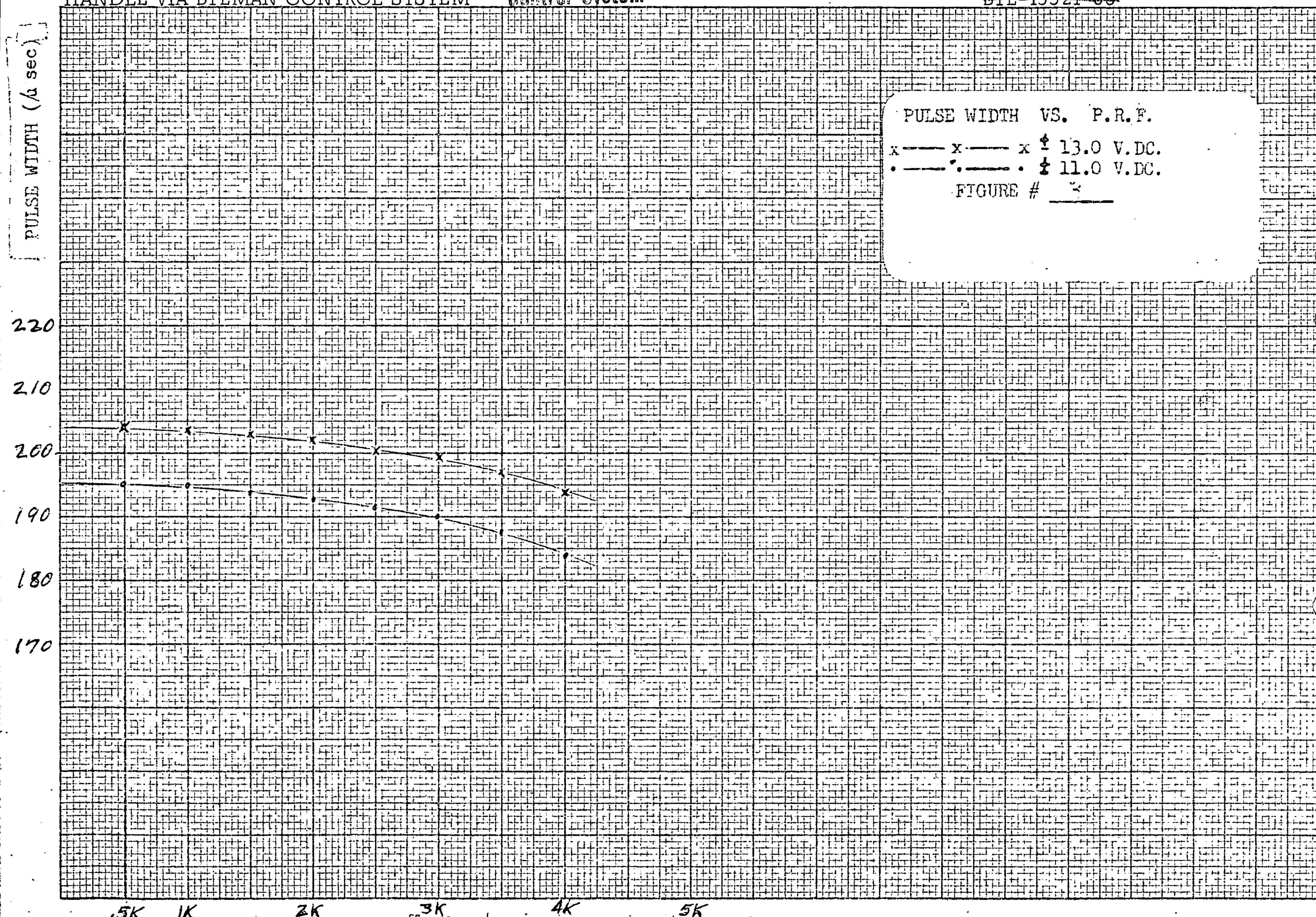
[redacted]

Fig. 4 and major paper 12/20/64 have [redacted] in 48 550-655 MHz


PULSE-WIDTH V.S. TEMPERATURE
Voltage @ ± 11.5 v.dc.
FIGURE # 1
PULSE WIDTH (μ sec)
210
200
190
180
170
160
150
140
130
120
-10
0
10
20
30
40
50
60
70
Temperature (°C)



PULSE REPETITION FREQUENCY (pps)



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(b)(1)
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Input Pulse Width	Sync Pulse (dbm)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	42.5	40	39	36.5	34.5	33.5	31.5	30	28	24	19	15	13½	11½	10½	9
2	44.0	41	40	39	37	35	33	32	31	29	27	22	19	16	14½	13
3	45	41.5	40½	39½	38	36	34	33	31½	30½	29	25½	22	19	17	15
5	45	41.5	40½	40	39	37	35	33	32	31	30	28	25	21½	19	18
7	45	42	41	40	39	37½	35	33½	32	31	30	29	26½	23	21	19½
10	45	42	41	40	39	37½	35½	33½	32½	31	30	29	26½	24	22	20½
15	45	42	41	40	39	38	36	34	33	31½	31	29½	28½	26	24	22
25	45	42	41	40	39	38	36	34	33	32	31	30	29	27½	26	25

Table #6 - Input Signal Level versus Pulse Time Duration

C. Payload Telemetry

The telemetry transmission is of the FM/AM type where the sensors monitoring the voltages and temperatures for housekeeping purposes are frequency modulated and utilize the IRIG channels #3 and #4 redundantly. The format utilized is 1/2 second samples repeated every eight seconds for 7104A, B and C, and every 16 seconds for the 7104D payload.

The signal using IRIG #3 and #4 have in the eighth, ninth, tenth, and eleventh segments a level change which indicates when the first, second, third or fourth collection bands, respectively, are turned on. Segment number 12 indicates by level change when the Alternate group is utilized.

Detailed description of Segment assignments is given in Table #7.

IRIG #3 and 4 1/2 second Segment	Description of monitor function
# 1	
# 2	
# 3	
# 4	
# 5	
# 6	
# 7	
# 8	
# 9	
#10	
#11	
#12	
#13	
#14	
#15	
#16	

(b)(1)
(b)(3)

Table #7 - Telemetry Housekeeping Segment Assignment

D. COMSEC Plans

At present there is no encryption of the data, however every attention has been paid to limiting the probability of detection by specific design considerations. The power output of the data link transmitter is limited so that the four bay receiving antenna array consisting of ten element YAGI antennas coupled to a very low noise receiver with high frequency-stability, is required to detect the signal, when the satellites are at altitudes of 500 nautical miles. No residual power is radiated from the data link transmitter between the data pulses; the data channel responds on a pulse to pulse basis for the period of the stretched pulse. Bandwidth of the data transmission system is minimized through the use of stretched pulses. Studies have indicated that interception of the data signals by conventional countermeasures equipment and installations is literally impossible. Only through the use of high gain antennas and considerable knowledge of the orbital elements would interception be possible.

IV. GROUND SUPPORT EQUIPMENT

[redacted]

(b)(1)
(b)(3)

<u>Characteristics of the Receiving-Recording system.</u>

1. Receivers utilized are a 4 to 6 db low noise converter and a R-390A/URR receiver. The Data-Link (Channel B and C) receiving antennas are a four-bay array of ten element YAGI mounted for reception of vertically polarized signals. The YAGI antennas are aimed upward at an angle of about 15° from the horizon, and has a gain of about 16 db. The half power beamwidths

in azimuth are about 22° and in vertical coverage it is about 55°. Antennas are trainable in azimuth only through the use of planetary gear drive connected to a steering wheel mounted on the vertical mast. In the consolidation complexes, [redacted] this arrangement is being replaced with a pair of identical antennas mounted on an eight foot high tower instead of the roof of the HUT, with antenna training being accomplished by remotely controlled motor drive system. (b)(1) (b)(3)

2. Tracking. The satellites of Mission 7104 will be tracked in the same manner used on all the previous Program "C" collection experiments; monitoring the 136 mc telemetry signal with a receiver channel connected to an antenna which is elevated about 15° and manually trainable in azimuth. The azimuthal tracking is accomplished by use of a lobe switching DF arrangement on the two ten-element YAGI antennas used with this Channel-A receiver. The antenna for reception, Channel-A, has been designed for minimum side lobe structure and provides about 25° half-power beamwidth. The vertical half power beamwidth is about 55°.

The receiver used for tracking is similar to those used for the reception of the transponded ELINT data; UHF-to-HF low-noise converters followed by modified R-390A/URR communication receivers with 27 Kc IF bandwidth.

3. Recording System. The Model GR-2800 magnetic tape recorder built by the Consolidated Electrodynamic Corp. is presently being used throughout the Mission 7103 data collection effort and will be available for Mission 7104 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 ELINT experiment transponded data utilizing tracks #1, #3, #5, and #7, and timing information on tracks #2, #4, and #6 via Analogue electronics. The center frequency of the FM carrier is 27 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 10-1/2 inch diameter reel is 24 minutes, more than enough for the recording of one satellite on its passage across the horizon of the collection site.

4. Timing System for Data Collection System.

The Astrodata Model 6140-500 Time Code Generator (TCG) is utilized to generate a 20-bit binary-coded decimal (BCD) timing signal for recording on Tracks 6 and 4 on the data tape so that absolute time may be derived during the analysis process. The carrier frequency of the timing signal is 2,000 cycles per second. The primary reference oscillator from which the Astrodata TCG derives its basic accuracy is a AN/URQ-10 which has a fractional frequency error of less than 5 parts in 10^{-10} or one millisecond drift in a period of 30 days, after a period of operation of at least three months.

The 1 megacycle sine wave signal from the AN/URQ-10 is used to drive the Astrodata time code generator. The 100 kilocycle signal from the AN/URQ-10 is then divided down to 50 kc and 60 cycles per second. The 50 kc signal is recorded on tracks 2 and 6 of the tape with the Data. The 60 cycle signal is used to drive the capstan motor on the tape recorder so that the tape speed as well as the 50 kc and Time Code are directly related to the accuracy of the Primary frequency standard (the AN/URQ-10) at each site. Careful checks are maintained on the drift of this standard oscillator and when the departure from the local time observatory signal is sufficient, an adjustment is made in the oscillator and the time code generator.

V. DATA PROCESSING

All Data from the Mission 7104 satellites like that from the predecessors of 7103, 7102, and 7101, will be delivered to NSA Fort Meade for processing. Certain of the data will be sent to SAC for additional independent analytical treatment for ROB SIOP purposes. NSA and SAC must provide the additional details concerning the processing of the 7104 data.

VI. ESTIMATE OF SYSTEM PERFORMANCE

Accuracy of pulse period as well as antenna scan rate surpasses that now realized at most conventional peripheral sites. PRI is read and reported to 0.01 cycle. Levels of performance have demonstrated that in each intercept band, every known signal type (of suitable power level) have been intercepted, giving the system a high confidence level. RF acceptance bands are carefully checked to assure that there are no spurious responses which might give rise to false intercept results. The reliability of the system's performance has been exceptionally good throughout the entire life (over one year). Compatibility of payload components in the vehicle as well as RFI problems have always been worked out prior to launch.

7101 with two years in orbit and 7103A, B, and C with one year in orbit with no degradation of performance, have demonstrated a very high confidence rating in the reliability of these Satellite designs. Mission 7104 has utilized the same simplicity and redundancy in design and therefore should have at least one year in orbit.

With the extension of frequency coverage, duplicate coverage in some instances and the increase in sensitivity it can be expected that Mission 7104 will exceed the performance of 7103.

Figure 5 through Figure 11 are offered as typical examples of the receiving antenna patterns utilized on Mission 7104.

(b)(1)
(b)(3)

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NRL EARTH ALBEDO EXPERIMENT

The availability of earth satellite vehicles permits an over-all study of the earth's planetary condition as seen from space. When viewed from the outside, the earth should show a variability much greater than that observed on other planets, due to continually changing amounts of cloud and snow cover and of atmospheric dust. As a result there are daily changes in the percentage of sunlight scattered back into space. The sunlight absorbed by earth constitutes the input energy which drives the earth's weather machine. The dominant factor producing variations in this input energy is the changing reflectivity of earth.

The NRL Earth Albedo Experiment constitutes a measure of integrated sunlight back-scattered from earth. The Albedo Experiment looks at the portion of earth directly below the satellite. The instrumentation adds up the total intensity of visible earth light striking the bottom of the satellite and provides an accurate orbital coverage of back-scattered light. If read-out once a day, the device provides a daily planetary albedo index. If read-out at night once an orbit, it provides an average reflectance value once per orbit, i.e. about 15 longitudinal indices per day. The sum of the daily longitudinal indices would equal the daily planetary albedo index.

The NRL Earth Albedo Experiment should show up daily changes in planetary albedo index associated with changes in the over-all earth meteorologic condition. The daily changes are expected to be superimposed on long term changes associated with variations in the angle between the earth-sun line and the satellite orbital plane. The daily changes should correlate with cloud cover and storm patterns as determined by TIROS type vehicles. The Albedo Experiment is expected to provide quantitative data of good comparative accuracy. It is a first step towards obtaining quantitative zonal albedo indices and the related zonal solar heat input function. This type of data is expected to be of higher quantitative accuracy than that derivable from TIROS type systems, and represents an area integration of the more detailed cloud structural view furnished by TIROS pictures.

The instrumentation constituting the Earth Albedo Experiment consists of a visible light photometer, photometer current to digital converter and an accumulating counter shift register with non-erasible readout. The instrumentation is a light sensitive version of the successful Radose experiment flown in 1963. The planned flight package consists of two such units pointing toward earth together with a radose integrating dosimeter.

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