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-68
EIF240-R038-68
47 Pages
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A BRIEFING ON

CONVOY

4 SEPTEMBER 1968

HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

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BIF240-R038-68

CONVOY BRIEFING AGENDA

- A. INTRODUCTION
- B. SYSTEM DESCRIPTION
 - 1. CONVOY REQUIREMENTS SUMMARY
 - 2. CONVOY INTEGRATION WITH STRAWMAN VEHICLE
 - 3. CONVOY FUNCTIONAL DESCRIPTION
 - 4. SEARCH AND ACQUISITION TECHNIQUE
 - 5. TRACKING TECHNIQUE
 - 6. OUTPUT DATA CHARACTERISTICS
- C. OPERATIONAL DESCRIPTION
 - 1. FREQUENCY-AMPLITUDE TRACK CRITERIA
 - 2. GROUND COVERAGE - THRESHOLD ERP PARAMETERS
 - 3. OPERATIONAL COMMANDS, FUNCTIONS,
RESTRICTIONS AND SEQUENCES
- D. DATA REDUCTION TECHNIQUES
 - 1. DIGITAL DATA
 - 2. ANALOG DATA
- E. SUMMARY - REVIEW

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CONVOY REQUIREMENTS SUMMARY

- PROVIDE HIGH QUALITY WIDE BAND PRE DETECTED DATA ON 3 FREQUENCY AGILE EMITTERS.
- INTEGRATED INTO STRAWMAN VEHICLE 2735.
- WEIGHT \leq 75 LB POWER \leq 110 W
- COMPATIBLE WITH EXISTING STRAWMAN HARDWARE.
- MUST USE MINIMUM IMPACT ANTENNAS.
- MUST AUTOMATICALLY SEARCH FOR, LOCK ON TO, AND TRACK THE 3 TARGETS IN THE DEFINED INTERFERENCE ENVIRONMENT.

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BIF240-R038-66

REQUIREMENTS SUMMARY (CONT'D)

• ASSUMED TARGET CHARACTERISTICS

TARGET	FREQ. MHZ	PW/PRF	SCAN RATE	MOP
			25 MHZ/SEC	.337 USEC PSK
DOGHOUSE	300-405 400-425	CW	250 MHZ/SEC	?
HENHOUSE				

50X1

• MANDATORY RECORDING MODES.

- A) SINGLE BEAM -- ALL TARGETS.
- B) BEAM 1 & 2 SIMULTANEOUSLY [] DOGHOUSE.
- C) BEAM 1 OR 2 OF [] & H/H.

• DESIRED RECORDING MODES.

- A) BEAM 1 & 2 [] & H/H.
- B) BEAM 1 OR 2 D & 1 OR 2 []
- C) BEAM 1 OR 2 D/H & H/H.

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REQUIREMENTS SUMMARY (CON'T)

- INTERFERENCE ENVIRONMENT

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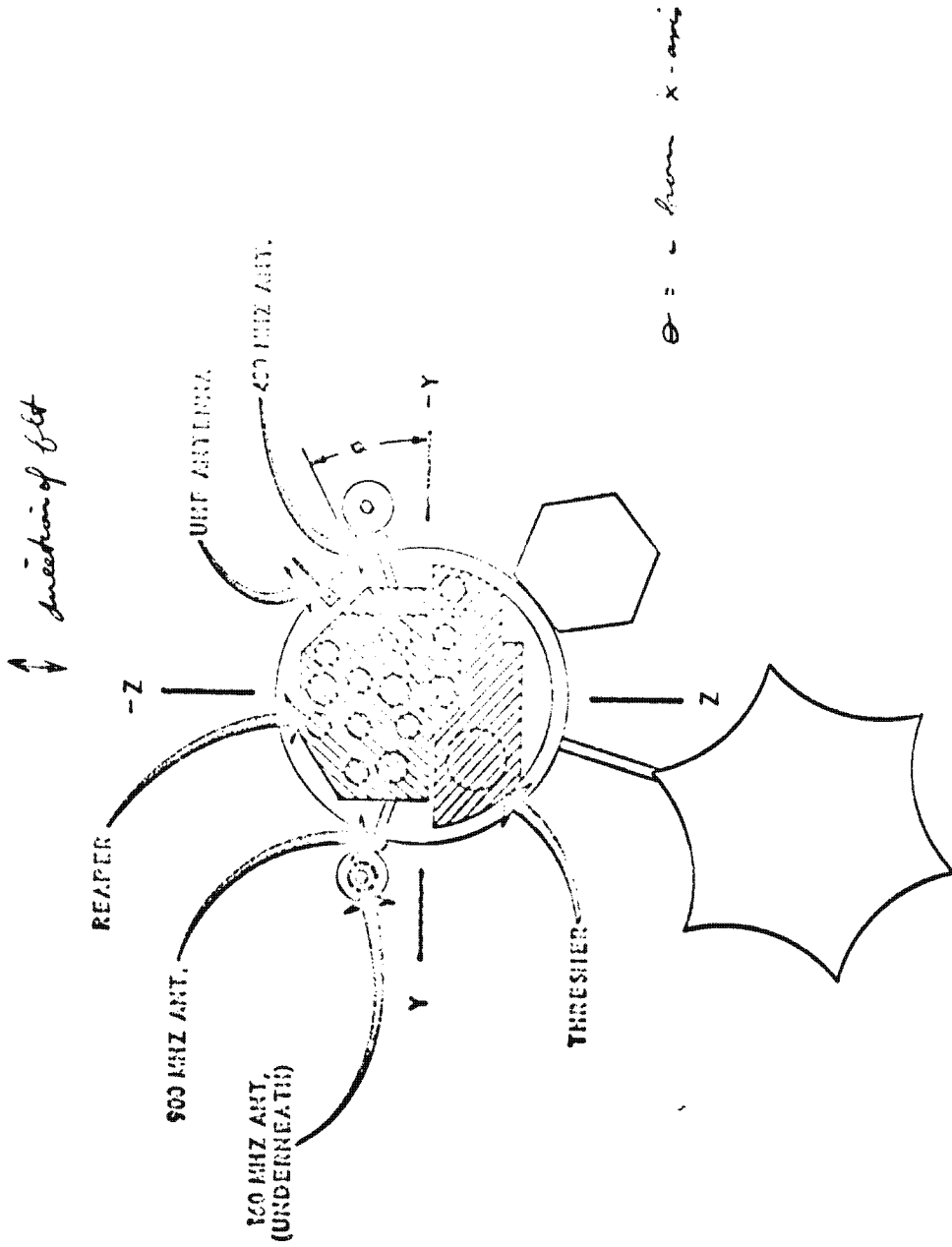
DOOROUSE: BMEWS
 FM BROADCAST STATIONS

- L.O. FREQUENCY STABILITY 1 PART IN 10^6 OVER 1 MSEC.
- FREQUENCY MEASUREMENT ACCURACY ± 500 KHz (B),
 ± 200 KHz (D), ± 250 KHz (K)
- AMPLITUDE ACCURACY 3 db.
- SIGNAL STRENGTH -87 TO 6 dBm

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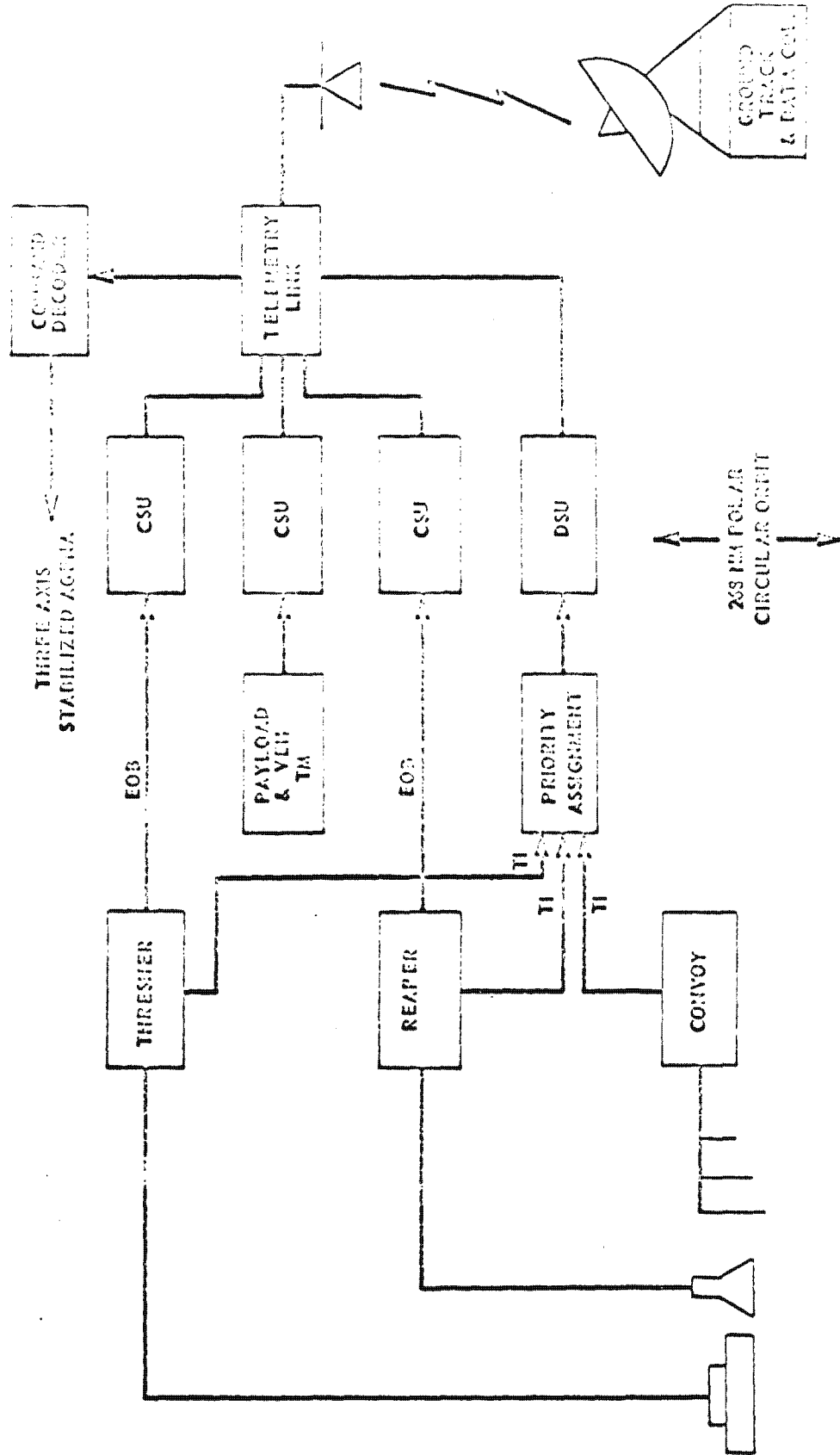
BIF240-R038-68



ANTENNA COORDINATE SYSTEM
(origin of vehicle from nose position)

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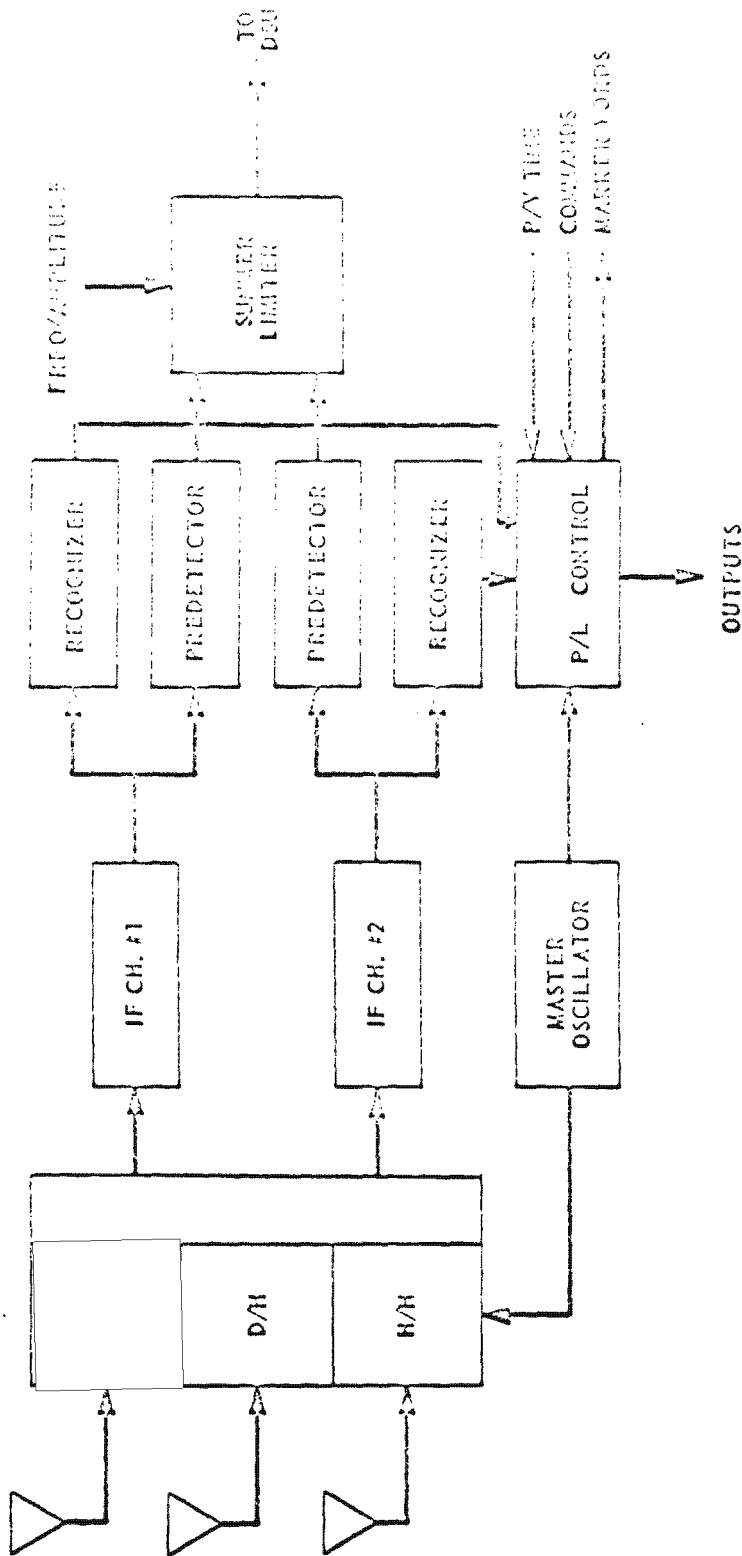
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- CONTROL CAPABILITY:
MODE SELECTION
SENSITIVITY CONTROL
OVERRIDE
TIME RESET



SIMPLIFIED CONVOY BLOCK DIAGRAM

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CONVOY OPERATING MODES

MODE	SIGNALS
1	H ONLY
2	DJ ONLY
3	DL ONLY
4	[] ONLY
5	[] ONLY
6	H & DJ
7	H & DL
8	H & []
9	H & []
10	DL []
11	DL []
12	DJ []
13	DL []

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MODES 6-9: H ONLY, NO DSU REQUEST

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RECOGNITION CRITERIA

- RENHOUSE &
 - MIN-MAX PW: 200-1200 USEC
 - MIN-MAX PRI: 6-64 MILLISEC

- DOOROUSE
 - SWEEP RATE CONFIRM. > 0.645 MHz/10 MILLISEC
(64.5 MHz/SEC)

 - SHORT PULSE REJECTION: 200 μSEC

 - CW AVOIDANCE: PERIODIC LOGGING

- COMMANDABLE OVERRIDE FOR PW, PRI, SWEEP RATE CRITERIA

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SIF240-R038-68

SEARCH ACQUISITION TECHNIQUE

- SEARCH & RETRIEVE
 - SCAN FREQUENCY BAND (STEP & DWELL)
 - DETECT AND STORE SIGNAL PRESENCE AT EACH STEP
 - DETECT MINIMUM PW - BASED ON STORED SAMPLES
 - STOP SCAN AT SIGNAL FREQUENCY, SET RECEIVER GAIN
 - CHECK MAXIMUM PW CRITERIA
 - CHECK PRI CRITERIA (REQUIRES 2ND PW CONFIRM)
 - START RECORD/TRACK

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SEARCH ACQUISITION TECHNIQUE

- DOGHOUSE
 - SCAN FREQUENCY BAND (STEP & DWELL)
 - DETECT & STORE SIGNAL PRESENCE AT EACH STEP
 - DETECT MINIMUM SIGNAL DURATION
 - STOP SCAN & SET GAIN - IF NOT LOGGED CW
 - CONFIRM SWEEP RATE
 - START RECORD/TRACK

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FREQUENCY SEARCH TRACK SUMMARY

BAND	SEARCH/TRACK MHz <i>Size of L.O. req. etc</i>	SEARCH DWELL TIME USEC.
H	1.929/.161	6
DL	2.571/.643	3
DU	2.571/.643	3
		3
		3

50X1

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FREQUENCY SEARCH TRACK SUMMARY

BAND	SEARCH/TRACK MHz <i>Size of C.O. req. step</i>	SEARCH DWELL TIME USEC.
H	1.929/.161	6
DL	2.571/.643	3
DJ	2.571/.643	3
		3
		3

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TRACKING HIGHLIGHTS

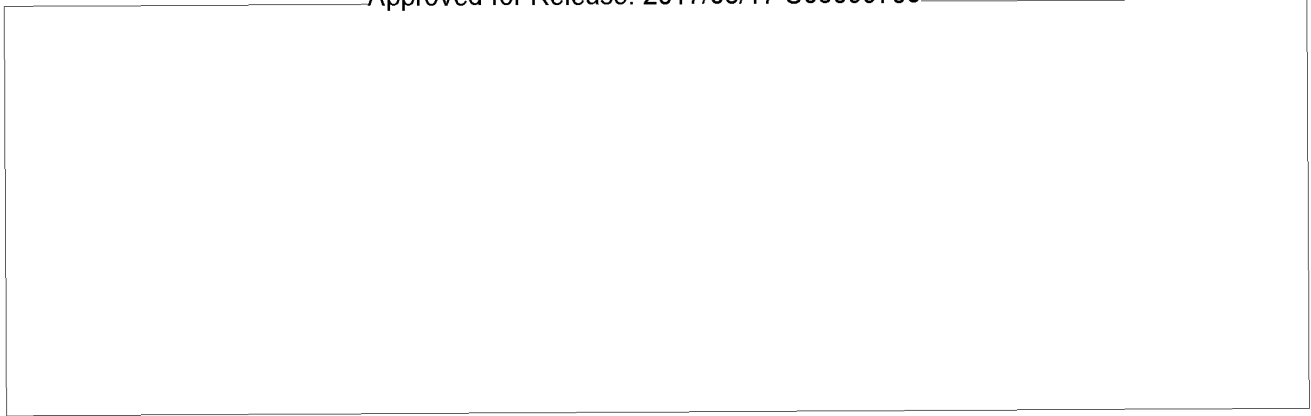
- STOPS FAST FREQ. SEARCH.
- SAMPLES AND ADJUSTS IF FREQ. AND AMPLITUDE EVERY 32 USEC.
- MAINTAINS OUTPUT FREQ. AND AMPLITUDE WITHIN DYNAMIC RANGE OF DSU.
- CHECKS FOR LOSS OF SIGNAL.
- OUTPUTS ANALOG PRE-D SIGNAL TO DSU UNTIL LOSS OF SIGNAL.

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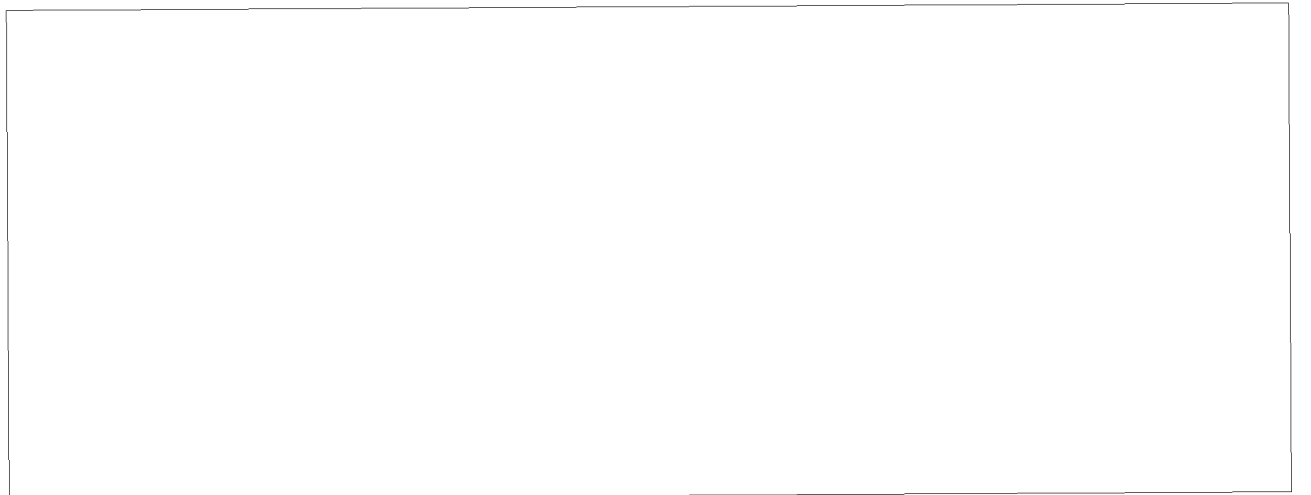
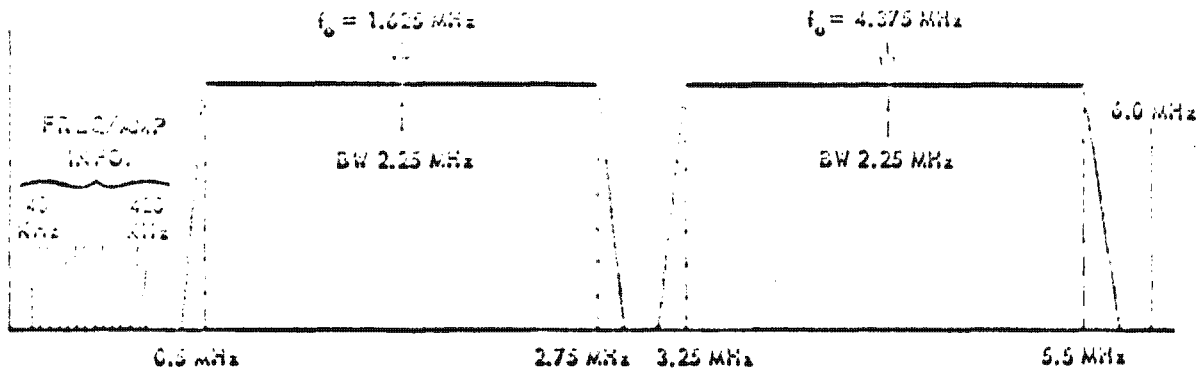
RECORD TRACK MODE FEATURES

- ^{Two} INDEPENDENT SCAN/TRACK CONTROL
- RECORD STARTS AFTER RECOGNITION
- PRIORITY INTERRUPT TO DSU
- TWO FREQUENCY MULTIPLEXED PRE-D OUTPUTS
- CHECK & SET AMPLITUDE & FREQUENCY ON EACH PULSE PERIODICALLY.
- RECORD CONTINUES AS LONG AS RECOGNITION MAINTAINED

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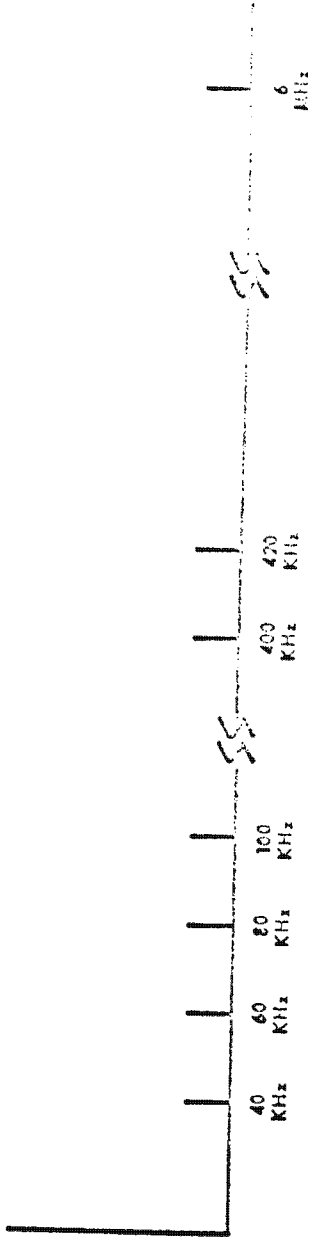


DUAL [redacted]
BOGHOUSE U AND L, BOGHOUSE L
AND [redacted] AND
BOGHOUSE L.



ANALOG DATA FORMAT

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Amplifier: (settable on console)
 RF: 0, 5, 10, 20, 30
 IF: 0, 10, 20, 30
 (adaptive)

6 TONES FOR L.O. STEP (12 TONES TOTAL)

4 TONES FOR ATTENUATOR STEP (8 TONES TOTAL)

4 TONES FOR TIME SYNC. 6 turns/sec from Primary Vehicle P/C

1 TONE (6 MHz) FOR TIME REFERENCE

CONVOY ANALOG TONE FORMAT

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CONVOY MARKER WORD FORMAT

BIT	FUNCTION	BIT	FUNCTION
1	ID BIT (=1)	24	LSB
2	SPARE	25	..
3	CH 1	26	
4	FLOOR - (^{RF} scan ^{scanning} continuity)	27	
5	CH 2	28	
6	FLOOR ..	29	
7	SPARE	30	
8	PW CONFIRM BYPASS	31	
9	PRI CONFIRM BYPASS	32	TIME
10	SWEEP RATE CONFIRM BYPASS	33	(SECONDS)
11	MODE SELECT BIT #1	34	
12	MODE SELECT BIT #2	35	
13	MODE SELECT BIT #3	36	
14	MODE SELECT BIT #4	37	
15	MODE SELECT BIT #5	38	
16	SYNTHESIZER #1 SCAN/TRACK	39	
17	SYNTHESIZER #2 SCAN/TRACK	40	
18	SPARE	41	
19	SPARE	42	∇
20	SPARE	43	MSB
21	SPARE	44	LSB
22	SPARE	45	TIME (DAYS)
23	SPARE	46	MSB
		47	PARITY BIT (EVEN)
		48	ID BIT (=0)

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CONVOY T/W DATA

T/W PT

1	PRIME POWER
2-13	VOLTAGE MONITORS
14-23	TEMPERATURE
24-27	ENVIRONMENT ACTIVITY
28	MAIN PWR RELAY
29	P/W ENABLE RELAY
30-34	MODE SELECT RELAYS
35-36	ATTENUATOR FLOOR, CH 2
37-40	NORMAL MODE OVERRIDE MONITORS
41-42	ATTENUATOR FLOOR, CH 1
44-45	RF MONITORS
47-48	TIME ENCODER
49	DSU REQUEST MONITOR
43, 45	SPARE

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CONVOY PERFORMANCE SUMMARY

FREQUENCY

B. 855 - 910 MHz, 972 - 977 MHz

D. 380 - 405 MHz, 400 - 425 MHz

H. 155 - 165 MHz

SENSITIVITY

B. -87 dBm to +6 dBm

D. -87 dBm to +6 dBm

H. -87 dBm to +6 dBm

> 12 db S/N

VARIABLE IN TWO 30 DB STEPS

L.O. STABILITY

1 PART IN 10⁶ IN 1 MSEC.

MEASUREMENT ACCURACY

FREQ. D. ± 200 KHz

B. ± 500 KHz

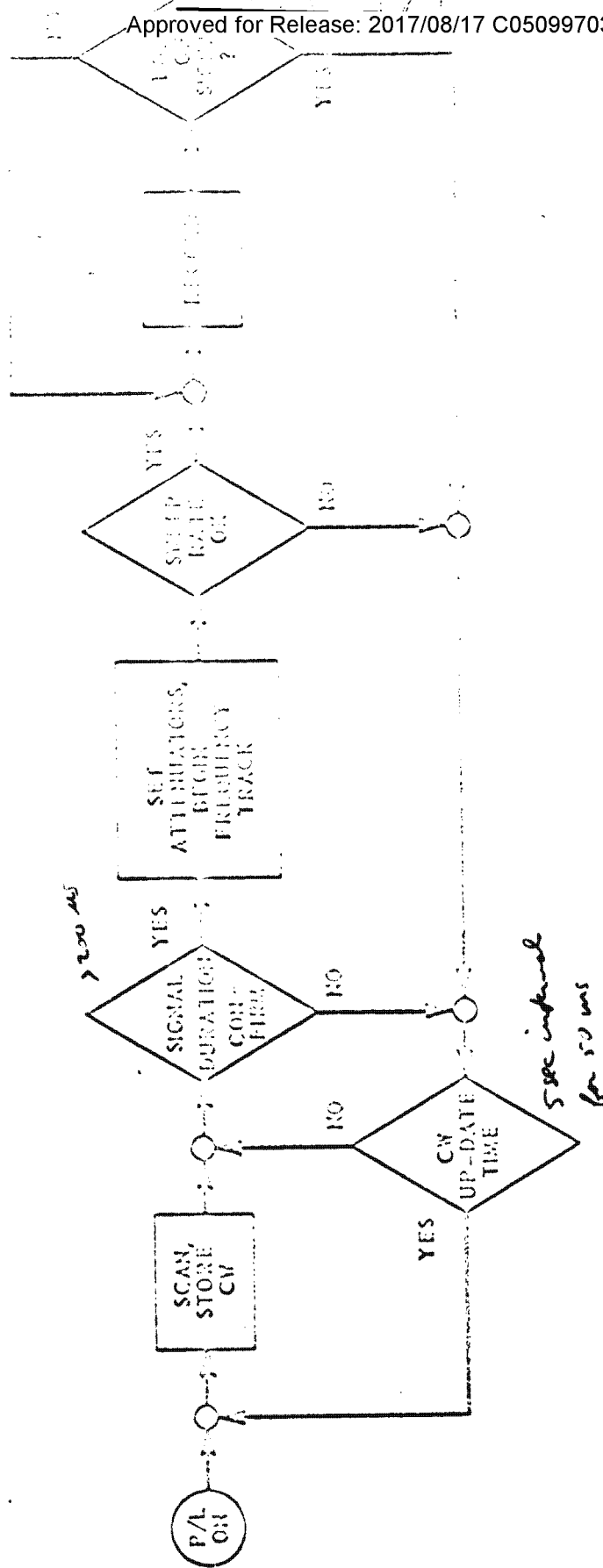
H. ± 250 KHz

AMPLITUDE: 3 DB R.M.S.

FUNCTION

RECOGNIZE & TRACK 3 EMITTERS IN BOTH FREQ. & AMPLITUDE, OUTPUT WIDE BAND ANALOG DATA TO RECORDER.

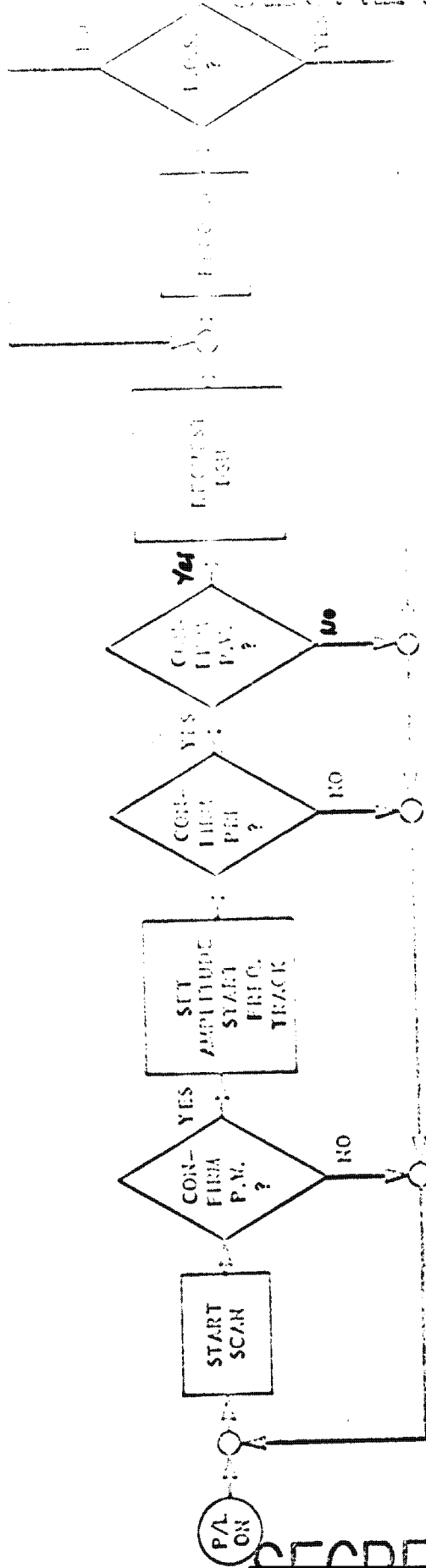
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STABILIZED FLOW DIAGRAM (PROCESS 1000)

5 sec interval for 50 ms

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if signal drops > 30 db, resume scan; if drop is less than 30 db, reattempt atten.

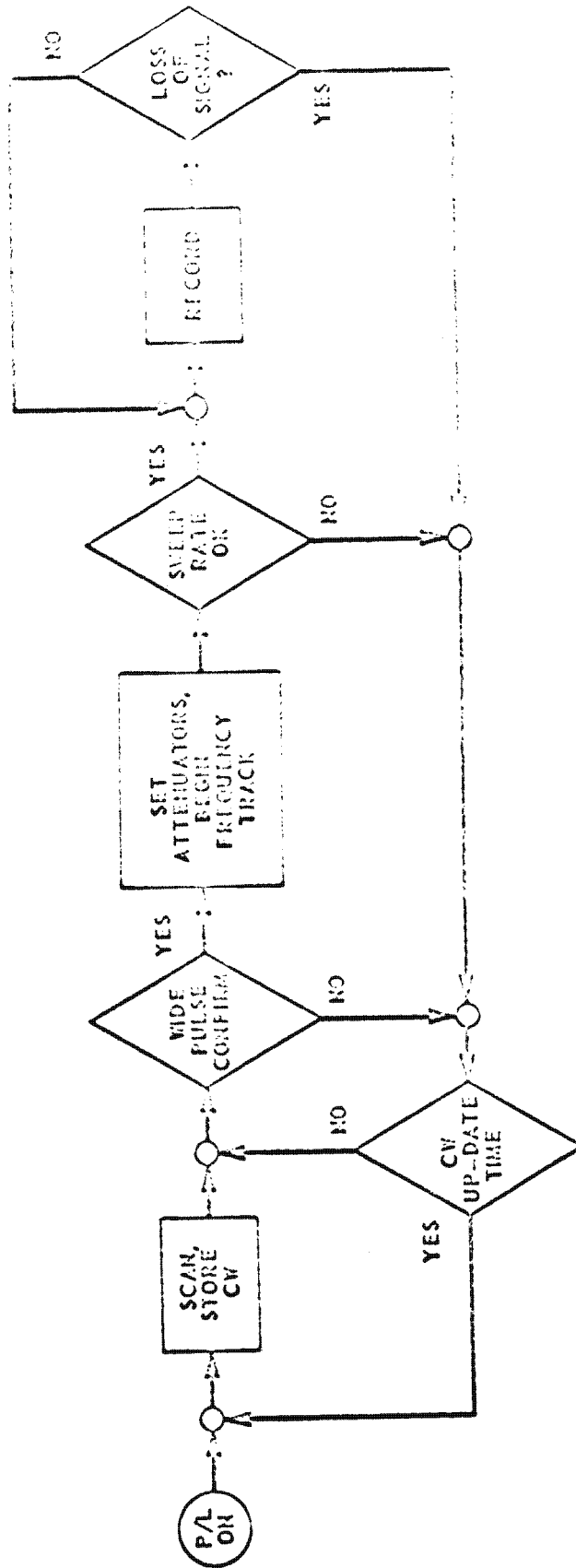
Track maintained in both directions for both freq & amplitude

SIMPLIFIED FLOW DIAGRAM AND REVISIONS



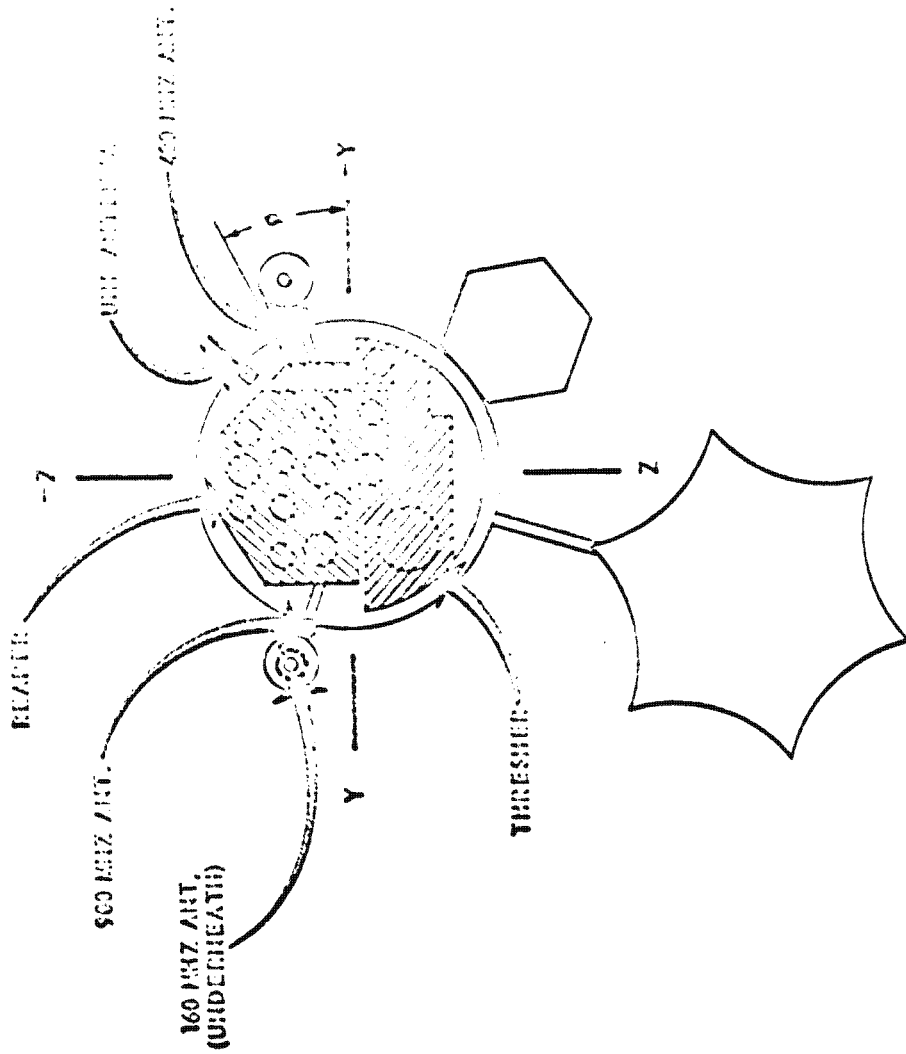
50X1

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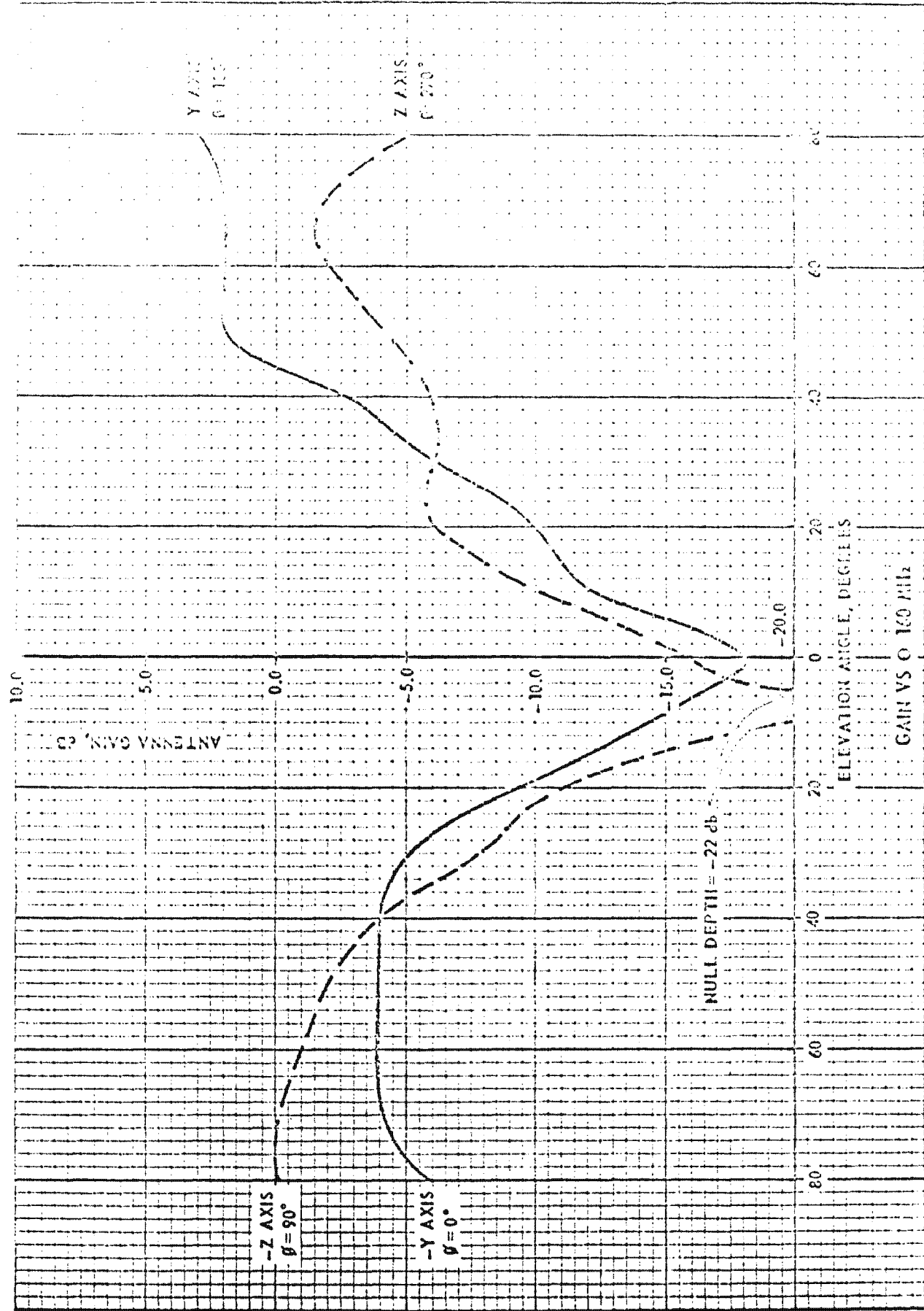
SECRETIFIED FLOW DIAGRAM (DOGHOUSE 7000)

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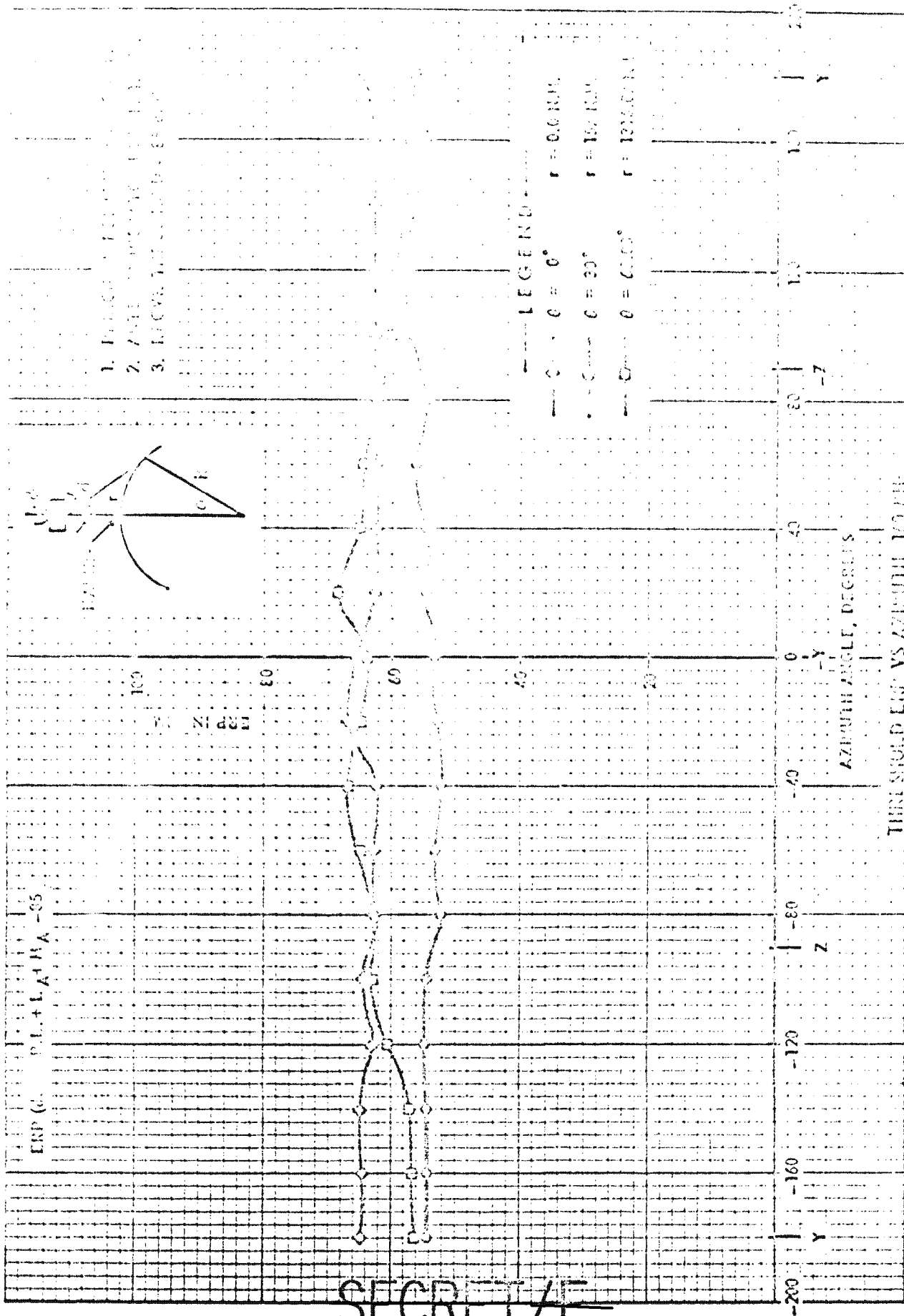


ANTENNA COORDINATE SYSTEM

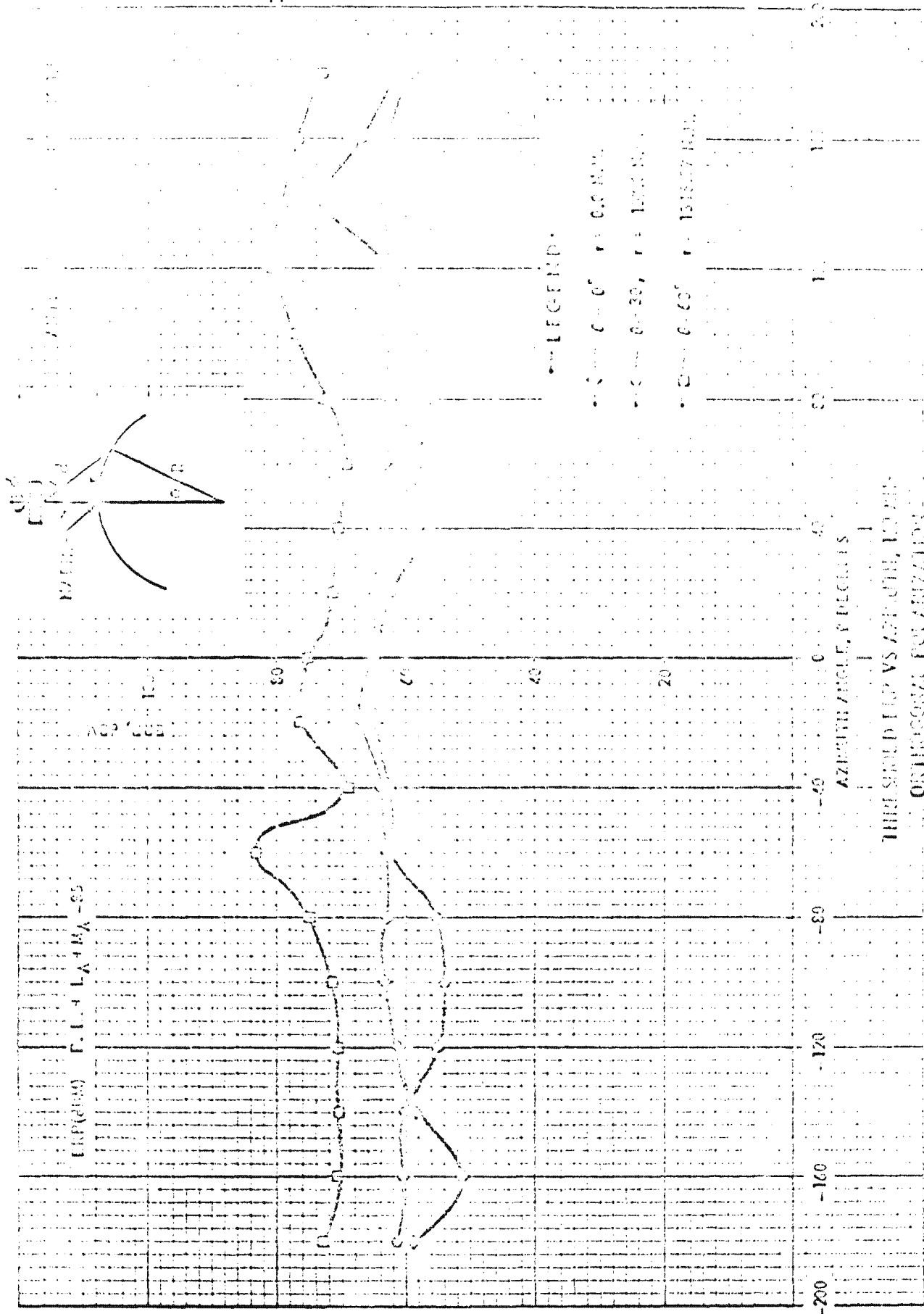
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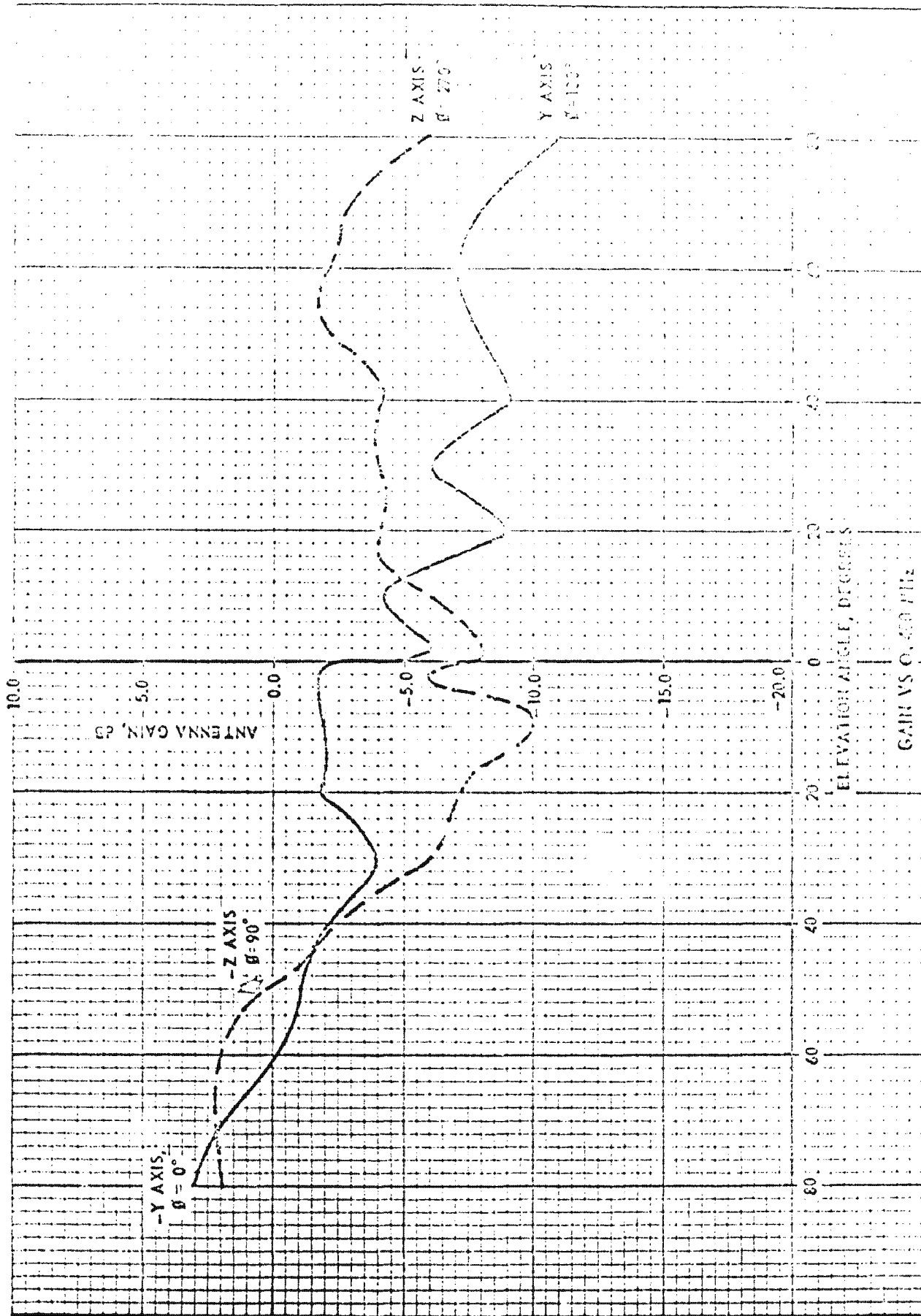
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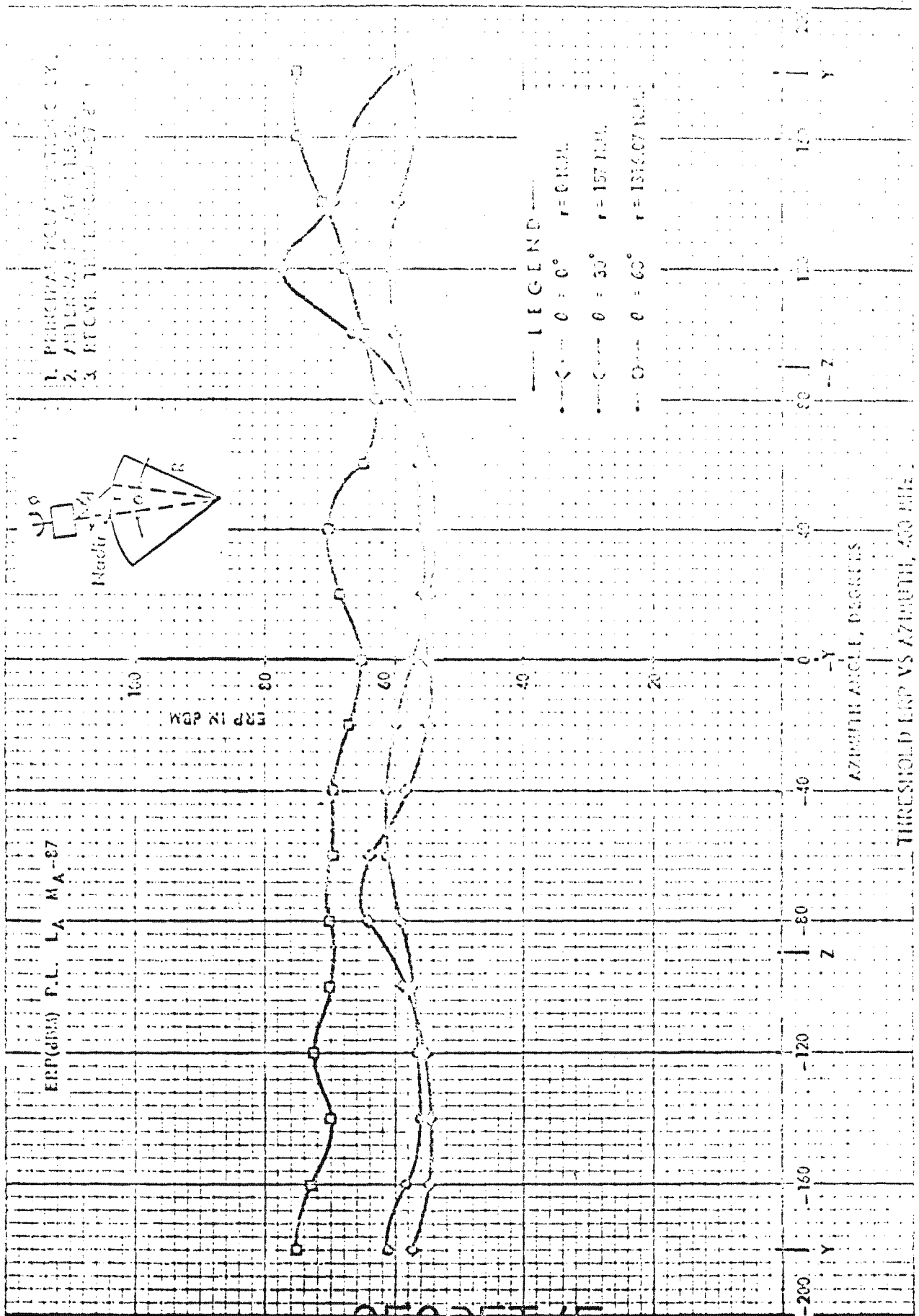
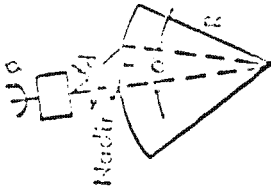


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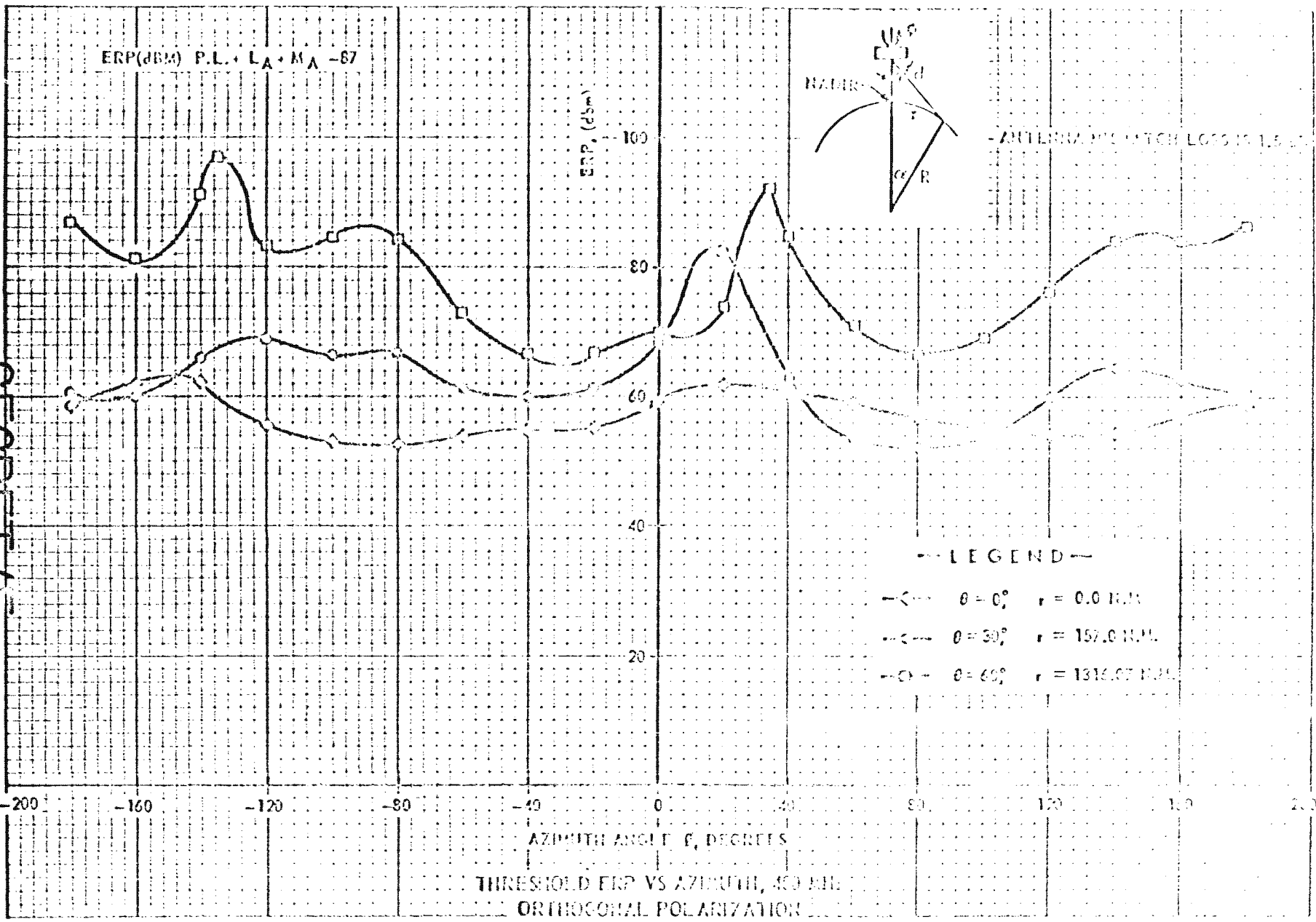


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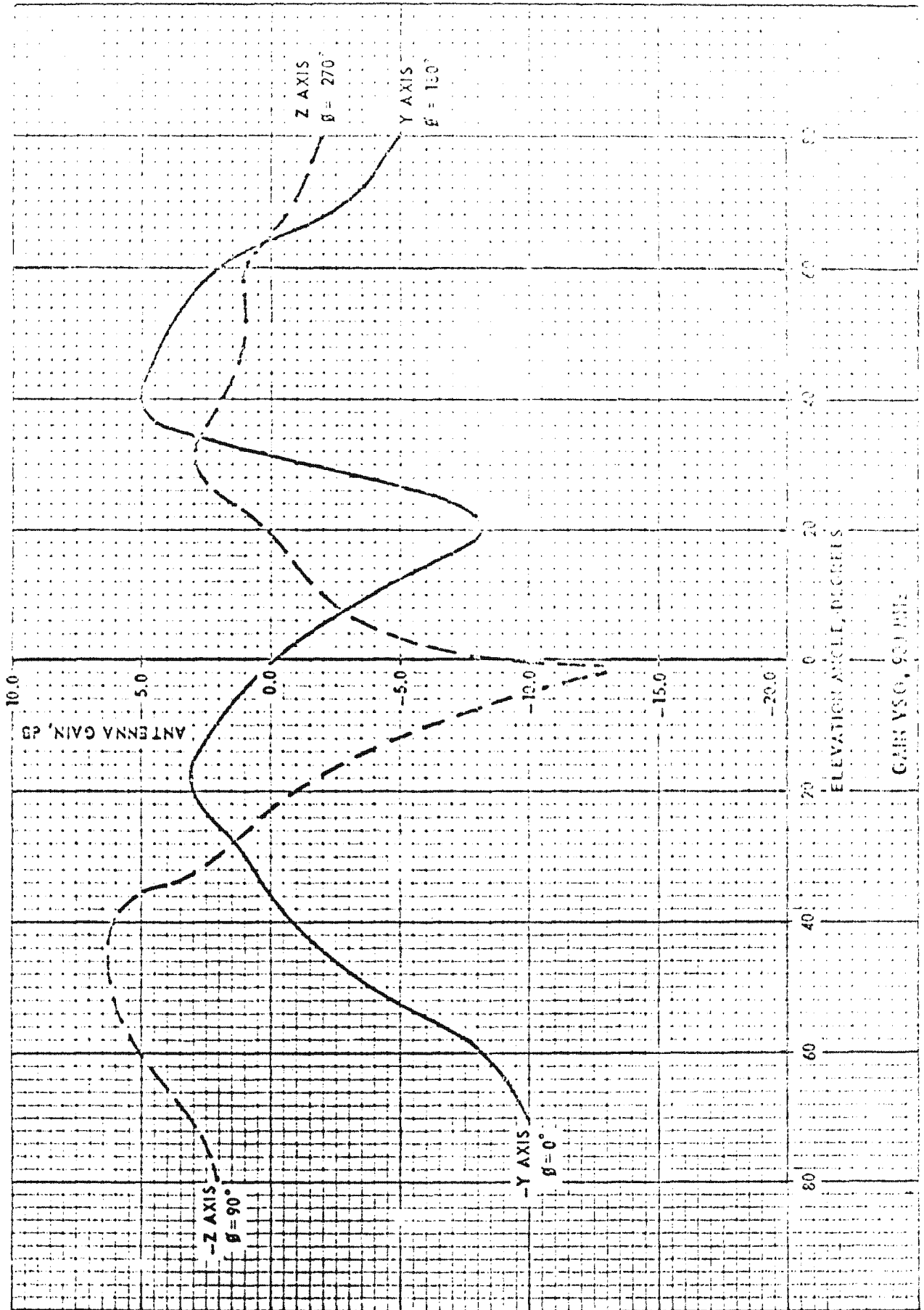
- 1. PRRKIPAS TCUA 7700000000000000
- 2. ANTENNA 7700000000000000
- 3. RECEIVER 7700000000000000



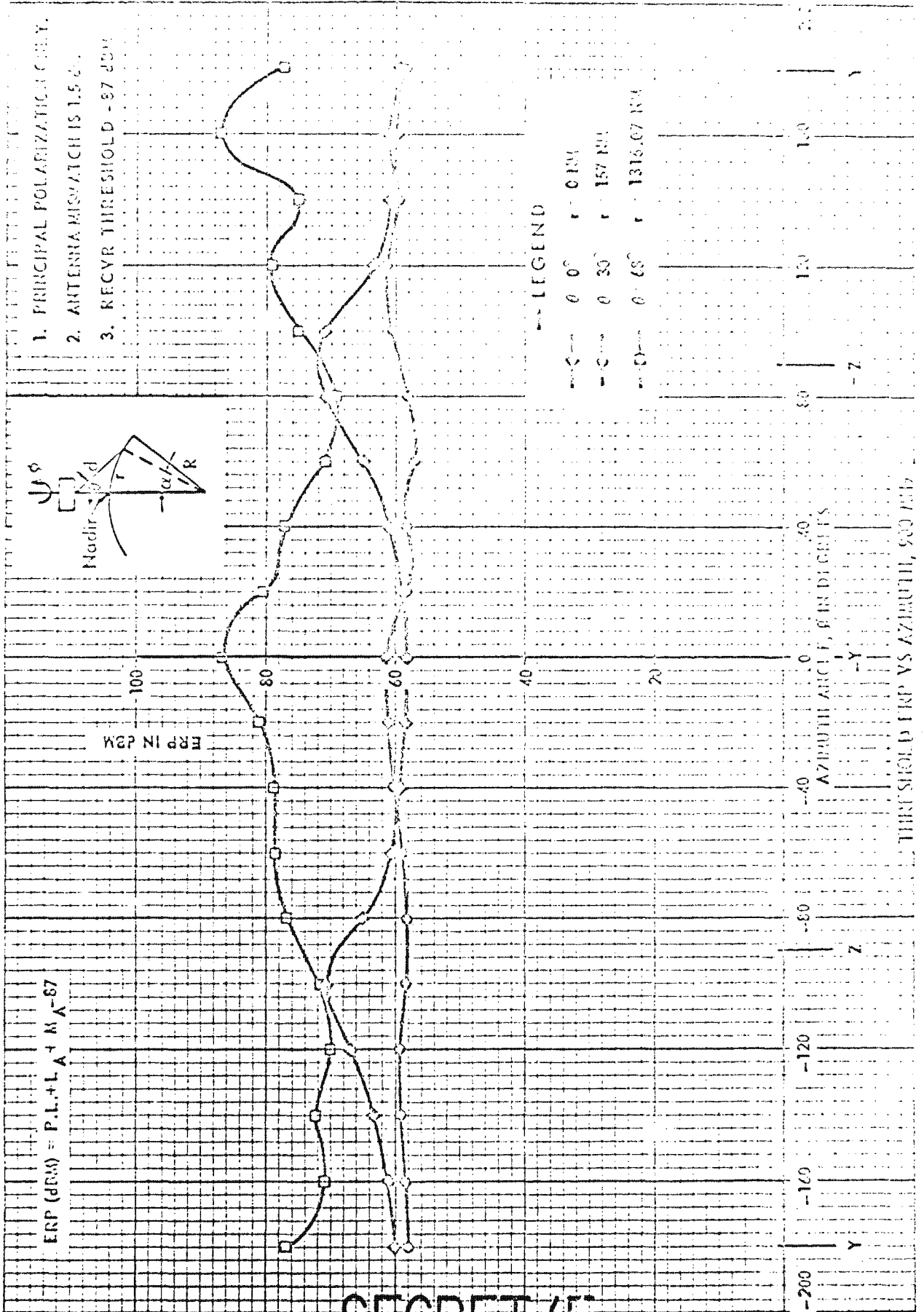
THRESHOLD ERP VS AZIMUTH, 400 MHz



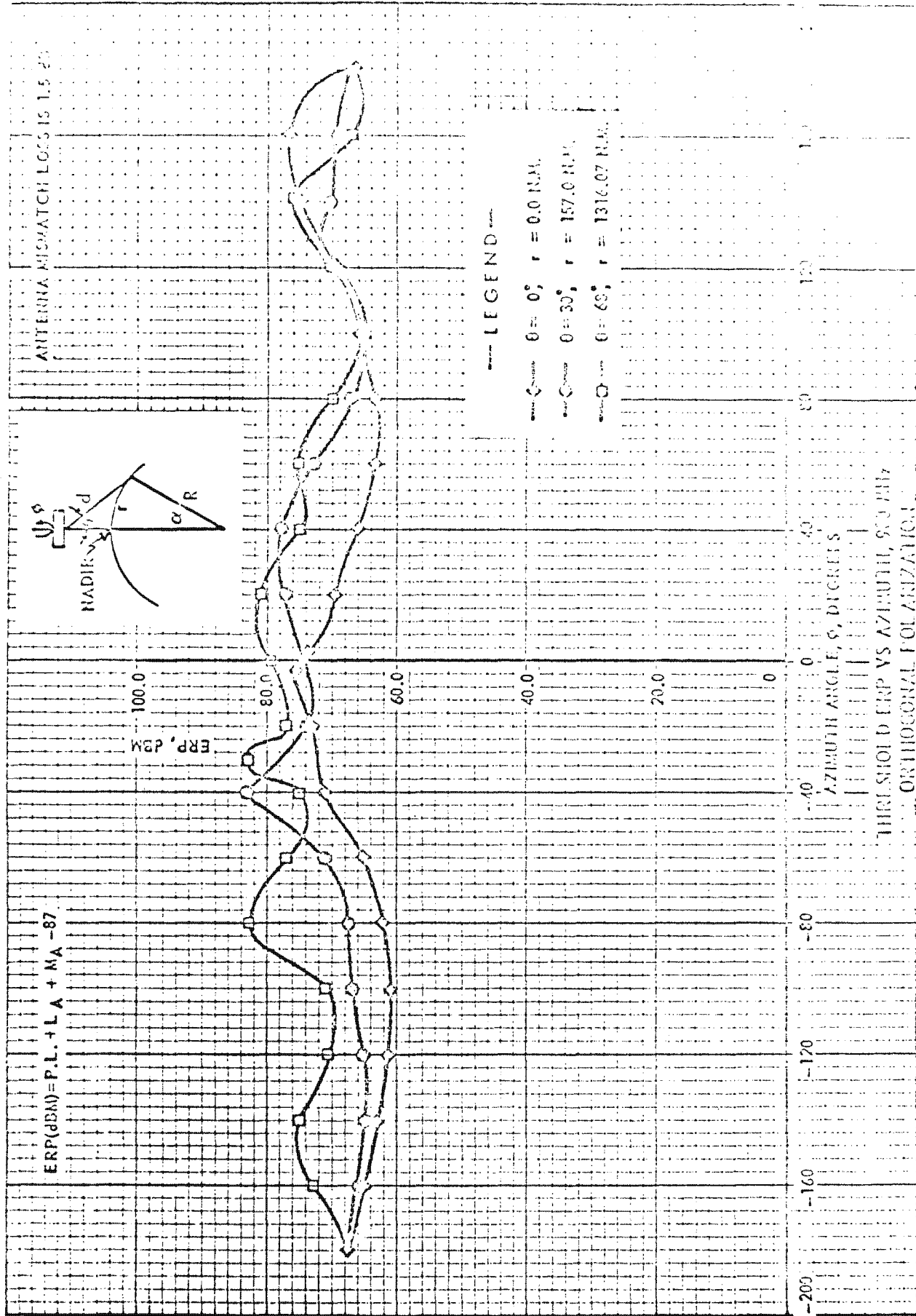
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COMMAND		FUNCTION	EXECUTION
K1	POWER CONTROL	MAIN POWER ON	NSPC/RTC
K2		MAIN POWER OFF	NSPC/RTC
K3		PAYLOAD ENABLE/DISABLE	NSPC/RTC/VSPC
K4	MODE CONTROL	MODE SELECT BIT 1	VSPC
K5		MODE SELECT BIT 2	VSPC
K6		MODE SELECT BIT 3	VSPC
K7		MODE SELECT BIT 4	VSPC
K8		MODE SELECT BIT 5	VSPC
K9	MINIMUM ATTENUATION CONTROL	CH. I MIN. ATTENUATION BIT 1	VSPC
K10		CH. I MIN. ATTENUATION BIT 2	VSPC
K11		CH. II MIN. ATTENUATION BIT 1	VSPC
K12		CH. II MIN. ATTENUATION BIT 2	VSPC
K13	PRE-D BLANKING	PRE-D BLANKING ENABLE	NSPC/RTC
K14		PRE-D BLANKING DISABLE	NSPC/RTC
K15		BYPASS PW CONFIRM	NSPC/RTC
K16	RECOGNIZER BYPASS	BYPASS PRI CONFIRM	NSPC/RTC
K17		BYPASS SWEEP RATE CONFIRM	NSPC/RTC
K18		RESET K15-K17	NSPC/RTC
K19		TIME ACCUMULATOR RESET	RTC

TO D.T.
VSPC

for malfunction purposes

CONVOY COMMAND REQUIREMENTS

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CONTROL BIT STATES					MODE	SIGNALS PROCESSED
1	2	3	4	5		
0	0	0	0	0	1	H
0	0	0	0	1	2	DU
0	0	0	1	0	3	DL
0	0	0	1	1	6	H DU
0	0	1	0	0	10	D U DL
0	0	1	0	1	7	H DL
0	0	1	1	0	4	
0	0	1	1	1	5	
0	1	0	0	0	11	
0	1	0	0	1	2	DU
0	1	0	1	0	3	DL
0	1	0	1	1	8	H
0	1	1	0	0	10	D U DL
0	1	1	0	1	9	H
0	1	1	1	0	12	DU
0	1	1	1	1	13	DL
1	0	0	0	0	13	DL
1	0	0	0	1	12	DU
1	0	0	1	0	9	H
1	0	0	1	1	10	D U DL
1	0	1	0	0	8	H
1	0	1	0	1	3	DL
1	0	1	1	0	2	DU
1	0	1	1	1	11	
1	1	0	0	0	5	
1	1	0	0	1	4	
1	1	0	1	0	7	H DL
1	1	0	1	1	10	D U DL
1	1	1	0	0	6	H DU
1	1	1	0	1	3	DL
1	1	1	1	0	2	DU
1	1	1	1	1	1	H

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CONVOY COMMAND CODES

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CONTROL BITS		MINIMUM ATTENUATION
MSB	LSB	
0	0	0 db
0	1	30 db
1	0	30 db
1	1	60 db

MINIMUM ATTENUATION CONTROL CODES

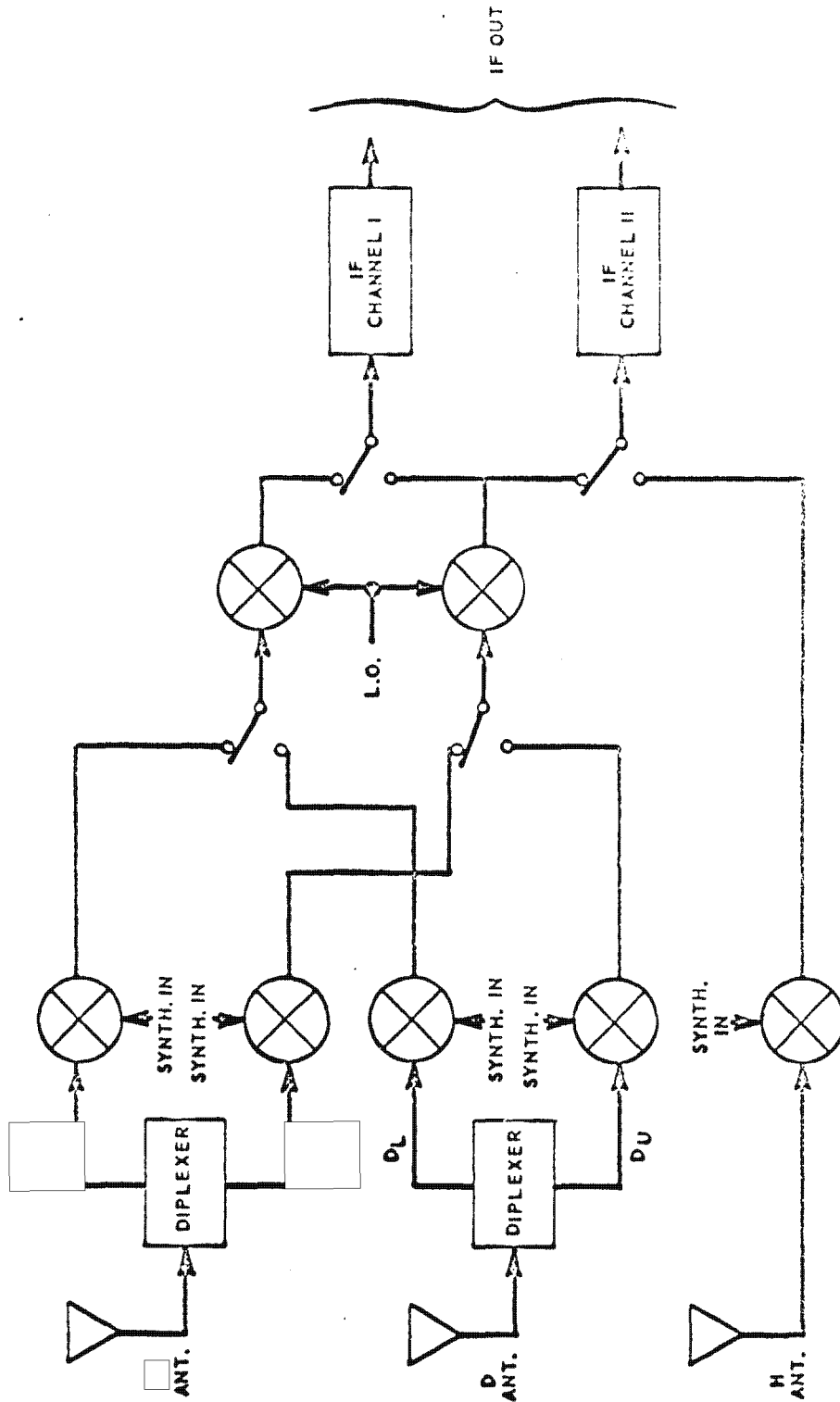
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COMMAND RESTRICTIONS

1. 10 SECOND DELAY BETWEEN MAIN POWER ON
AND PAYLOAD ENABLE.

2. MINIMUM ATTENUATION COMMANDS FOR UPPER
BAND RF SIGNALS VARY DEPENDING ON
OPERATING MODE.

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SIMPLIFIED CHANNEL SWITCHING DIAGRAM

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BIF240-R036-08

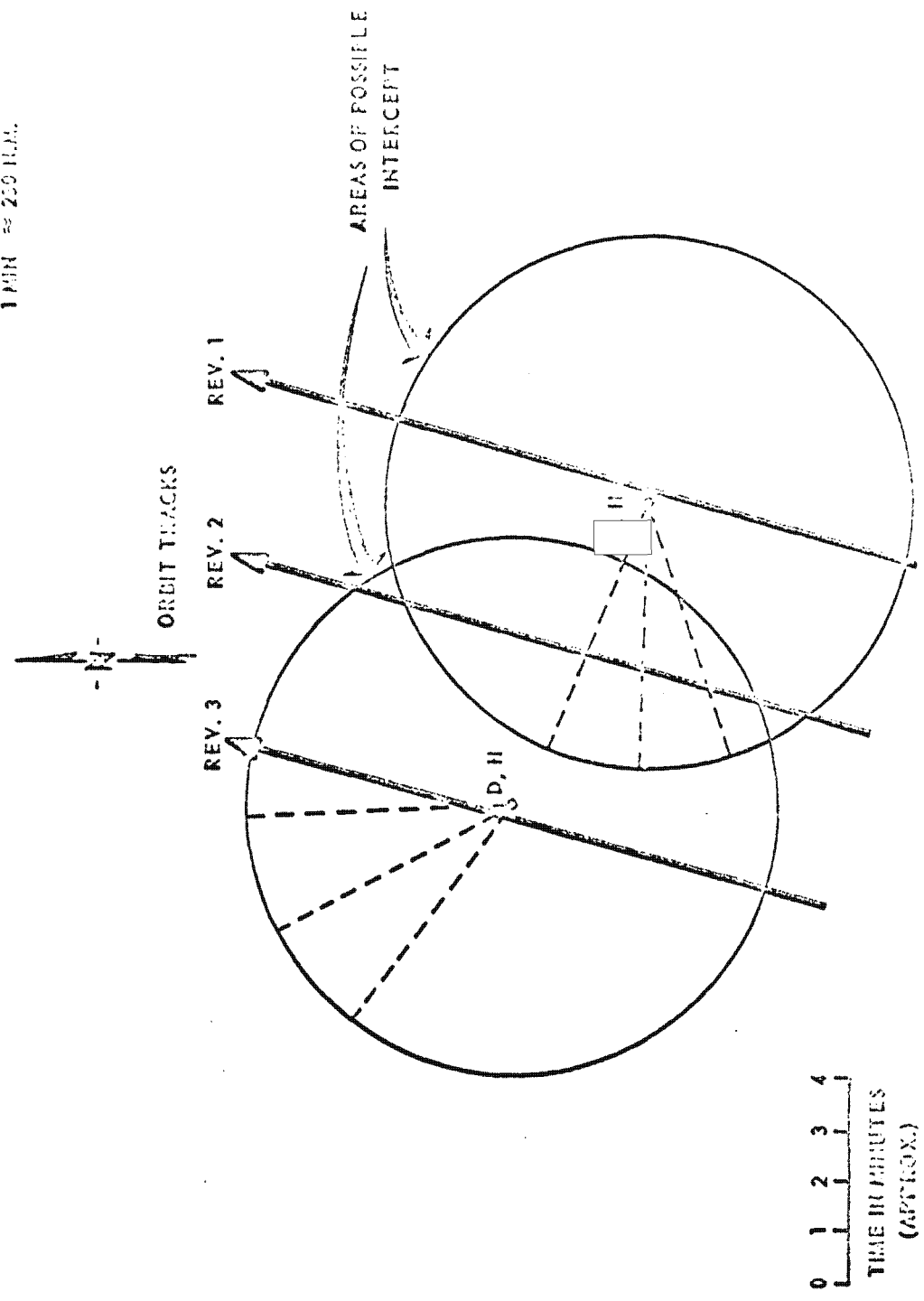
MODE	CHANNEL I	CHANNEL II
1	-	H
2	D _U	-
3	D _L	-
4	<input type="text"/>	-
5	<input type="text"/>	-
6	D _U	H
7	D _L	H
8	<input type="text"/>	H
9	<input type="text"/>	H
10	D _L	D _U
11	<input type="text"/>	<input type="text"/>
12	<input type="text"/>	D _U
13	D _L	<input type="text"/>

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CONVOY RECEIVING CHANNEL ASSIGNMENTS

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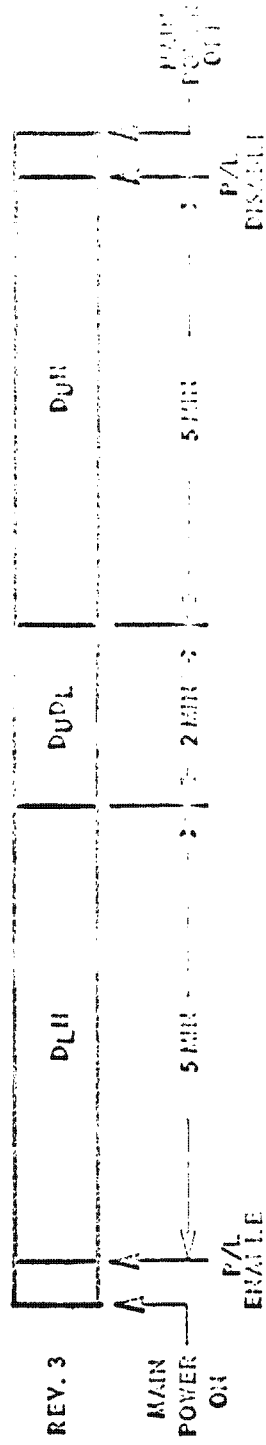
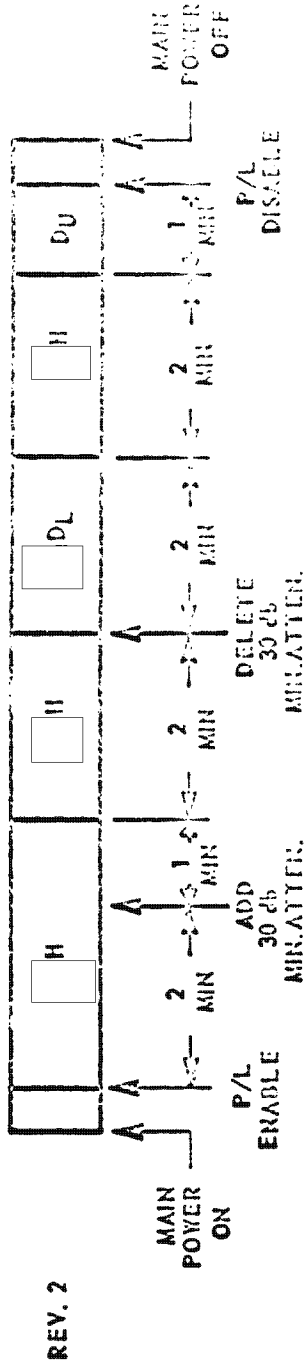
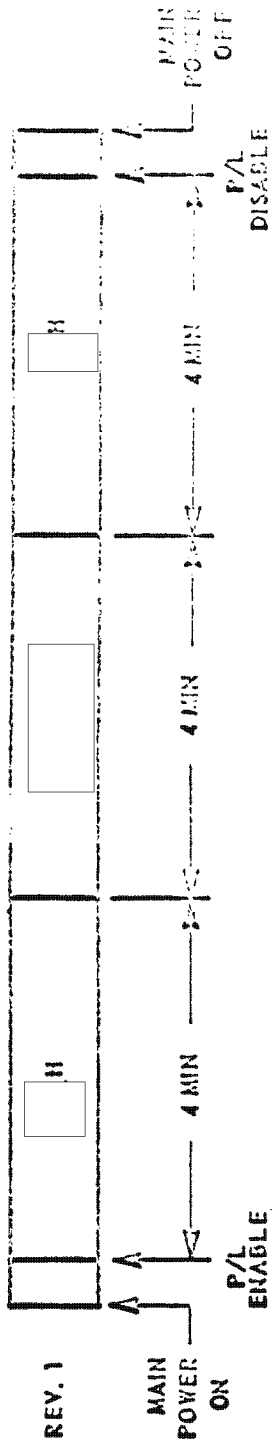
1 MIN ≈ 200 H.M.



REPRESENTATIVE SATELLITE GEOMETRY -- WIDE SEPARATION
(3 SUCCESSIVE PASSES)

50X1

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POSSIBLE MODE SEQUENCES - VIDEO STATE SEPARATION

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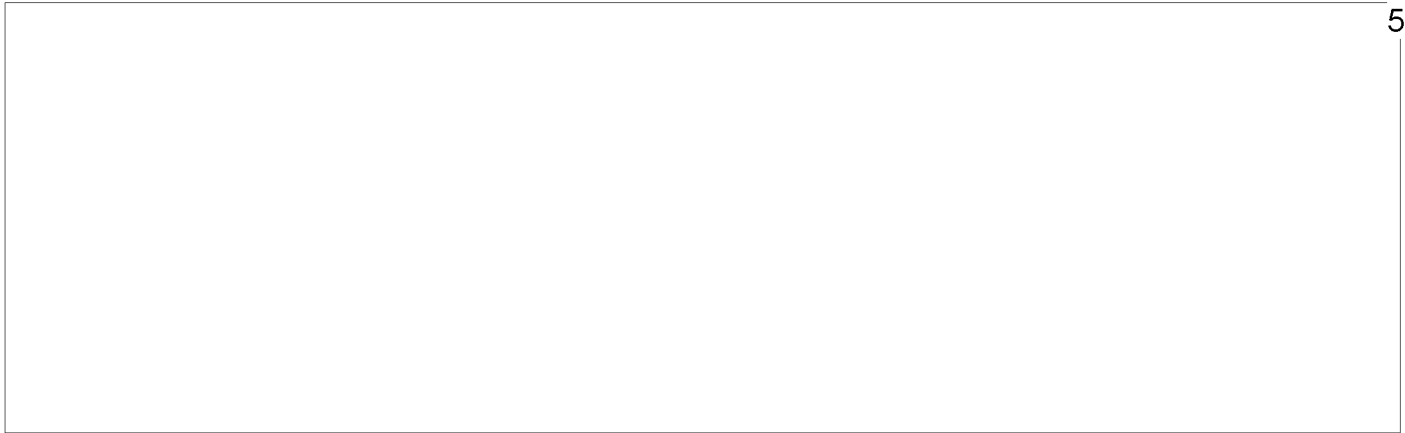
50X1

CONVOY MARKER WORD FORMAT

BIT	FUNCTION	BIT	FUNCTION
1	ID BIT (=1)	24	LSB
2	SPARE	25	
3	} CH 1	26	
4		27	
5	} CH 2	28	
6		29	
7	SPARE	30	
8	PW CONFIRM BYPASS	31	
9	PRI CONFIRM BYPASS	32	TIME
10	SWEEP RATE CONFIRM BYPASS	33	(SECONDS)
11	MODE SELECT BIT #1	34	
12	MODE SELECT BIT #2	35	
13	MODE SELECT BIT #3	36	
14	MODE SELECT BIT #4	37	
15	MODE SELECT BIT #5	38	
16	SYNTHESIZER #1 SCAN/TRACK	39	
17	SYNTHESIZER #2 SCAN/TRACK	40	
18	SPARE	41	
19	SPARE	42	
20	SPARE	43	MSB
21	SPARE	44	LSB
22	SPARE	45	TIME (DAYS)
23	SPARE	46	MSB
		47	PARITY BIT (EVEN)
		48	ID BIT (=0)

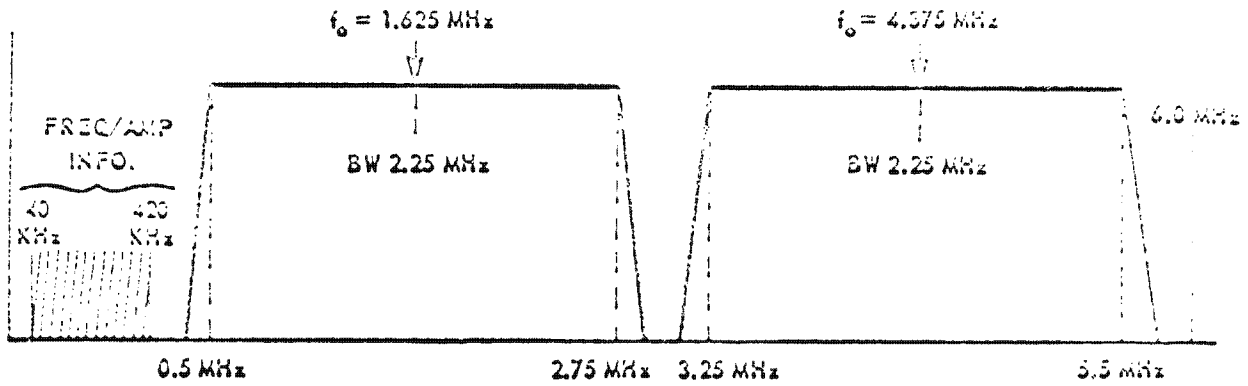
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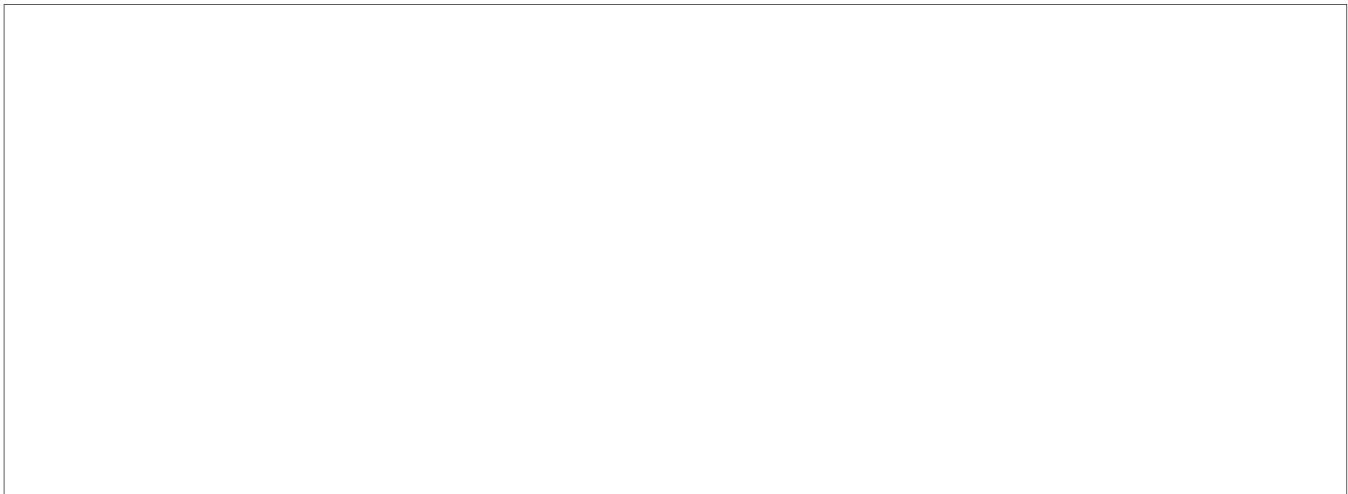


DUAL BEAM: [redacted]
DOORHOUSE U AND L, DOORHOUSE L
AND [redacted] U AND
DOORHOUSE L.

50X1



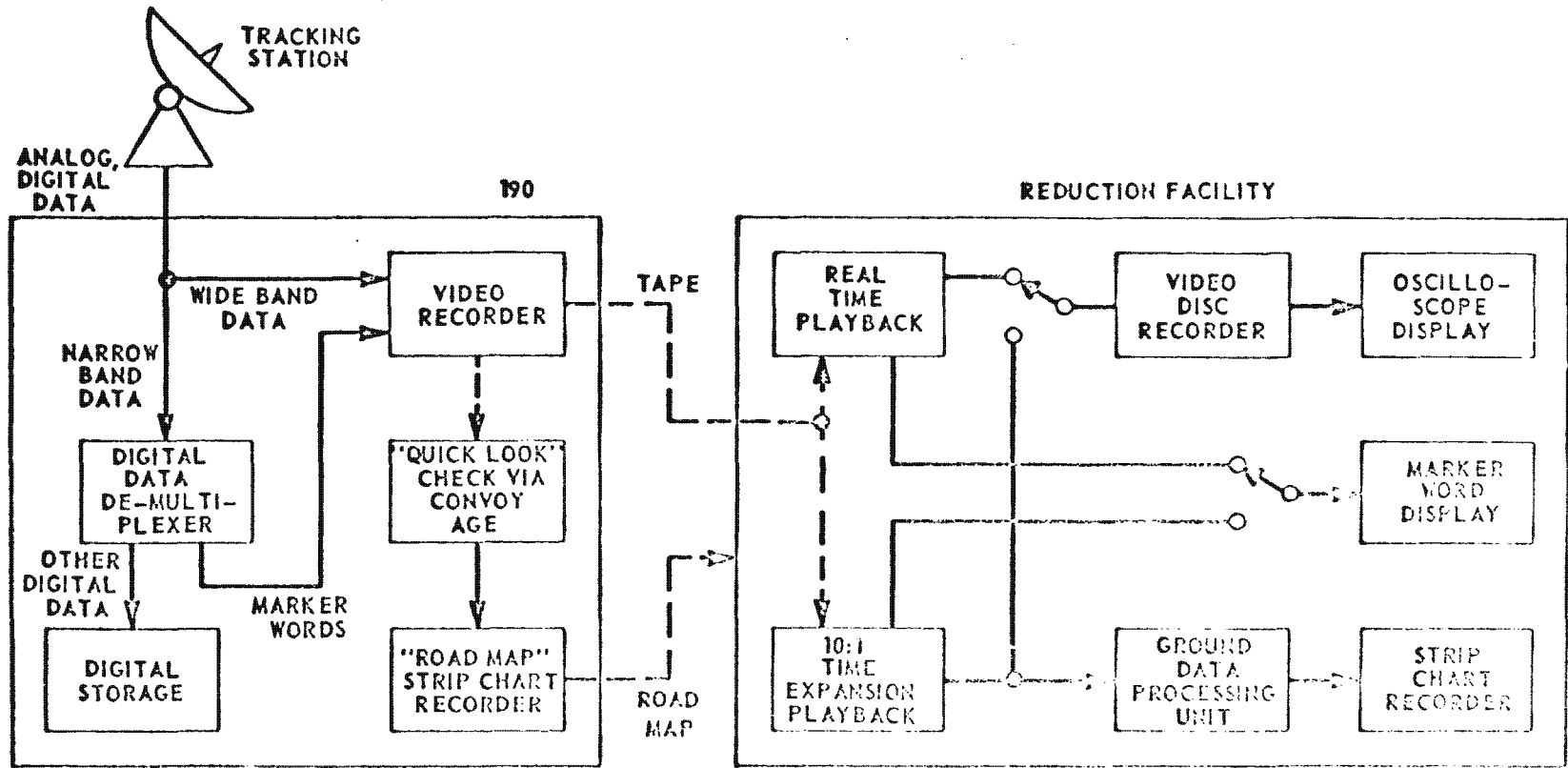
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ANALOG DATA FORMAT

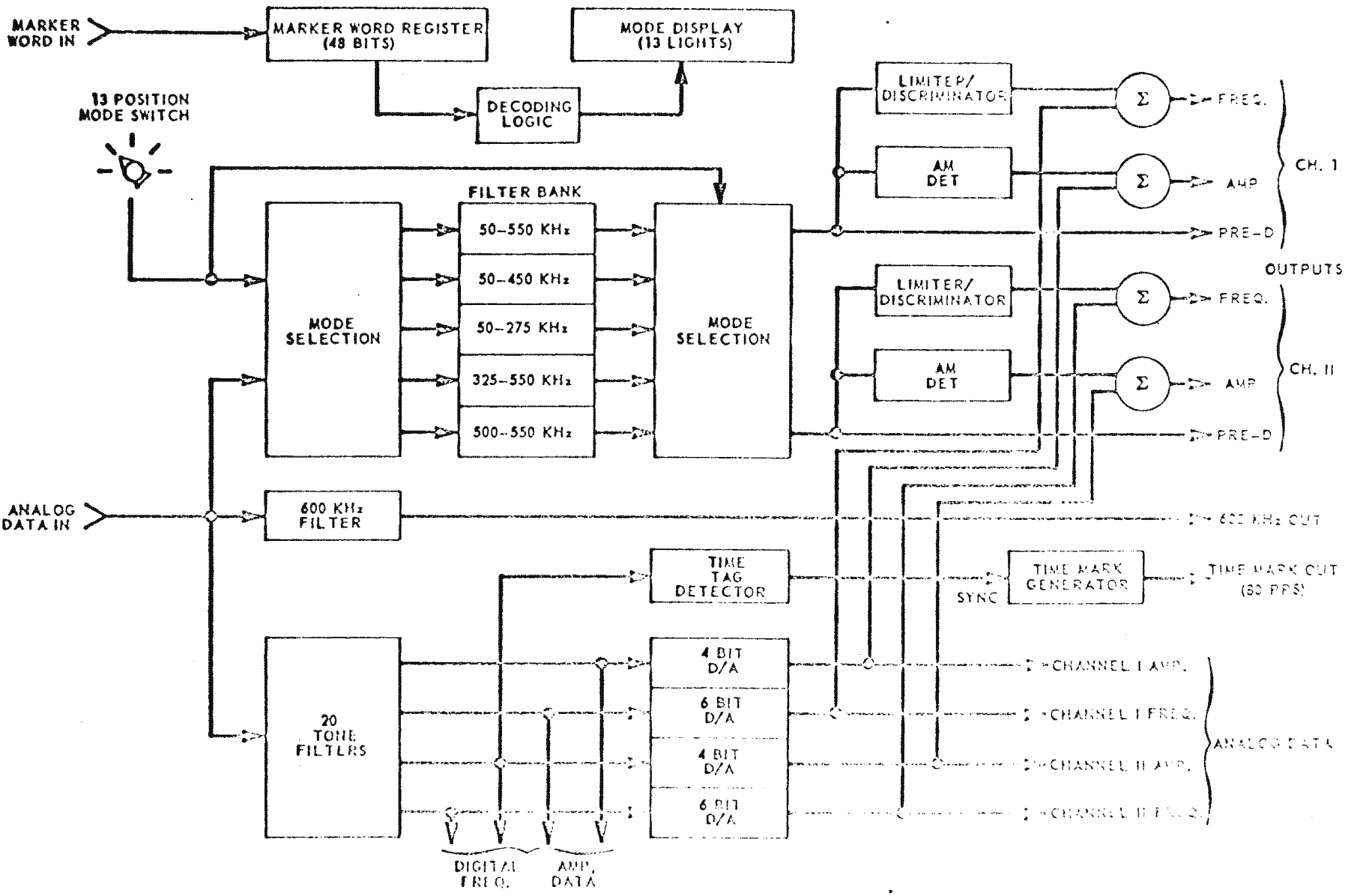
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CONVOY GROUND DATA PROCESSING DIAGRAM

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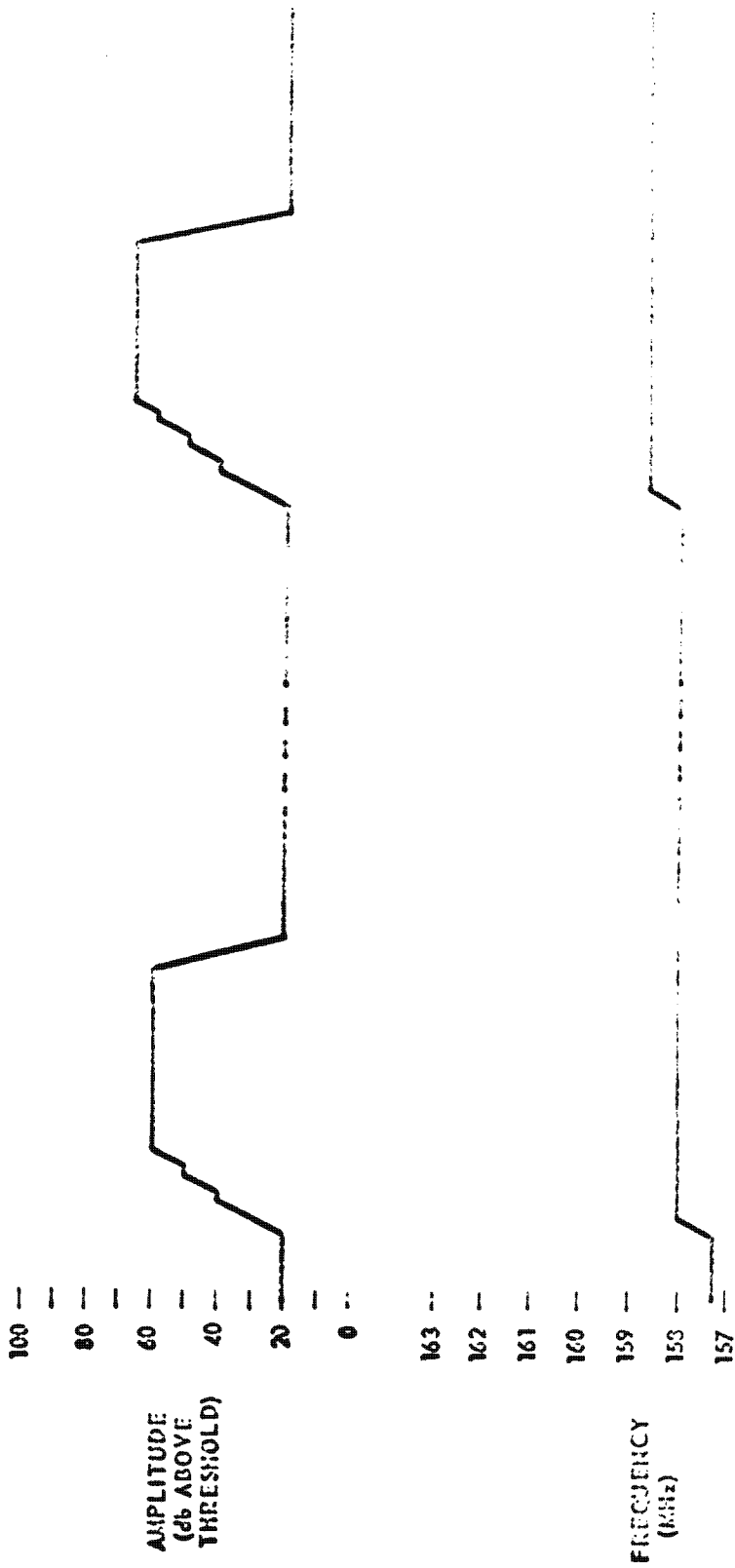
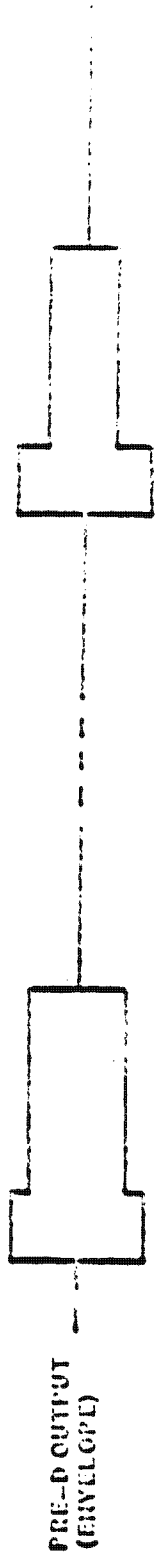
SIMPLIFIED BLOCK DIAGRAM - GROUND DATA PROCESSOR

Approved for Release: 2017/08/17 C05099703

Approved for Release: 2017/08/17 C05099703

REF 246 - R030-66

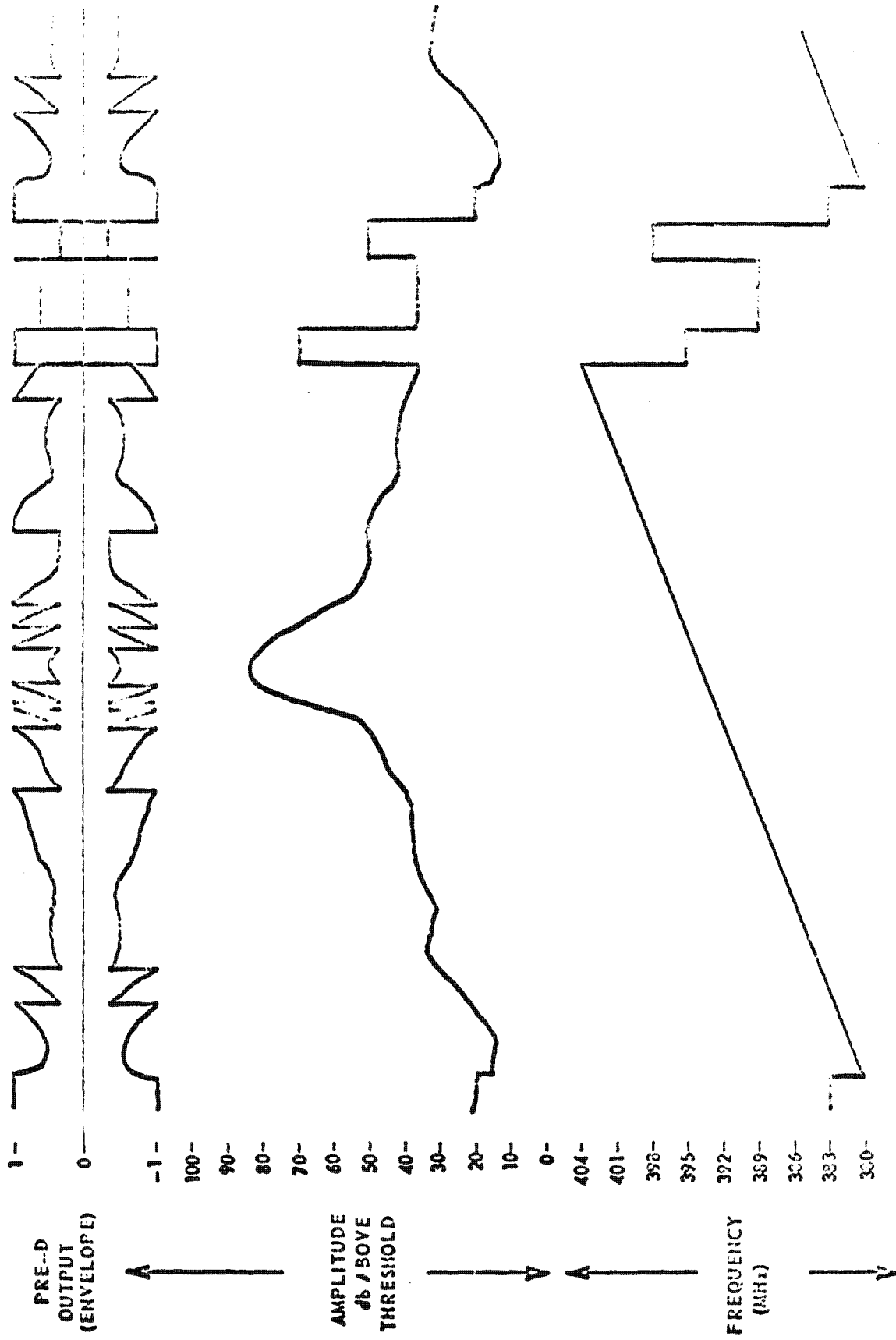
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PULSE #1 PULSE #2
 FREQ = 153.0 MHz FREQ = 157.0 MHz
 AMP = 59.0 (20-80.0) AMP = 60.0 (20-80.0)

SAMPLES PER CHANNEL - TWO CLASS OF PULSES
 (PULSE #1 AND PULSE #2)

~~SECRET/E~~



SAMPLE SIGNAL - LOGIC SIGNAL

~~SECRET/E~~