

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT,

AND GENERAL SUPPORT MAINTENANCE MANUAL

TEST SET, RADIO

AN/ARM-156

(FSN 6625-086-6304)

HEADQUARTERS, DEPARTMENT OF THE ARMY

DECEMBER 1973

WARNING

DEATH OR SERIOUS INJURY may result from electric  hazards unless proper safety measures are observed when operating and maintaining this equipment. Up to 126.5 volts are present when the equipment is energized.

Change
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 22 September 1976

**Operator's, Organizational, Direct Support, and General Support
Maintenance Manual
TEST SET, RADIO AN/ARN-138 (FSN 6625-606-6304)**

TM 11-6625-2606-14, 28 December 1973, is changed as follows:

1. A vertical bar appears opposite changed material.
2. Remove and insert pages as indicated in the page list below:

Remove

i and ii
1-7
2-3 and 2-4
4-5 through 4-38
A - 1
B-2 through B-9
Glossary 1 through Glossary 4
Figure FO-3 ① ② ③ ④ ⑤
Figure FO-4
Figure FO-5
Figure FO-9 ① ②
Figure FO-10
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2-3 and 2-4
4-5 through 4-38
A-1(A-2 blank)
B-2 through B-9
Glossary 1 through Glossary 2
Figure FO-3 ① ② ③ ④ ⑤
Figure FO-4
Figure FO-5
Figure FO-9 ① ②
Figure FO-10
Figure FO-11 ①
Figure FO-12 ②
Figure FO-13 ③

3. File this change sheet in front of the publication for reference purposes.

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TECHNICAL MANUAL

No. 11-6625-2606-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 December 1973OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT,
AND GENERAL SUPPORT MAINTENANCE MANUAL
TEST SET, RADIO AN/ARM-136
(FON 6625-006-0204)

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CHAPTER 1

INTRODUCTION

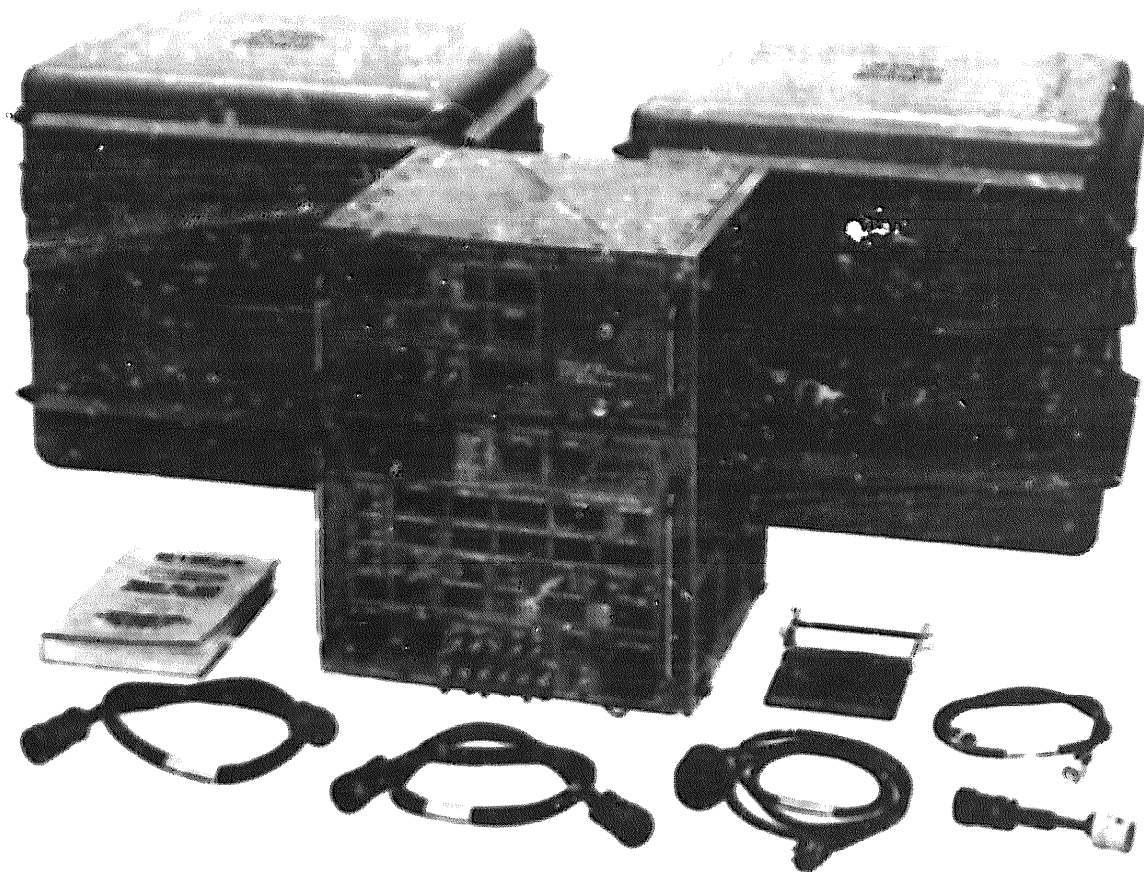
Section I. GENERAL

1-1. Scope

a. This manual describes Test Set, Radio AN / ARM-154 (Fig. 1-1) and includes installation, operation, organizational, direct, and general support maintenance instructions. The manual also

includes instructions for cleaning, inspecting, and replacement of defective components.

b. Refer to TM 11-6625-2606 24F for repair parts and special tools list.



TM 11-6625-2606-14 1W-1

Figure 1-1. Test Set Radio AN/ARM-154, major units.

1-2. Forms and Records

a. *Reports of Maintenance and Unsatisfactory Equipment.* Maintenance forms, records, and reports which are to be used by maintenance

personnel at all maintenance levels, prescribed by TM 38-750.

b. *Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6

(report of Packaging and Handling Deficiencies) as prescribed in AR 706-56 (Army) / NAVSUP Pub 378 (Navy) / AFR 71-4 (Air Force) / and MCO P4030.29 (Marine Corps).

c. *Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-36 (Army) / NAVSUP Pub 459 (Navy) / AFM 75-34 (Air Force) / and MCO P4410.10 (Marine Corps).

1-3. Destruction of Army Materiel to Prevent Enemy Use

Demolition of the equipment will be accomplished only upon the order of the Commander. Refer to TM 750-244-2 for procedures to prevent enemy from using or salvaging equipment.

1-4. Administrative Storage

For procedures, forms, records, and inspections required during administrative storage of this equipment refer to TM 740-90-1.

1-5. Calibration

Refer to paragraph 6-9 for calibration procedures.

1-6. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded directly to the Commander, U.S. Army Electronics Command, ATTN: AMSEL-MA-AN, Ft. Monmouth, NJ 07703.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use

a. *Purpose.* Test Set, Radio AN / ARM-156 simulates the signals from a TACAN beacon. The AN / ARM-156 also displays its own or a TACAN's output.

b. *Use.* Test Set, Radio AN / ARM-156 is used with Test Set, Navigational Set, TACAN TS-3134 / ARN-103 to perform general support maintenance on Navigational Set, TACAN AN / ARN-103(V).

1-8. Description of Test Set, Radio AN / ARM-156

a. Test Set, Radio AN / ARM-156 (fig. 1-1), hereinafter referred to as the radio test set, is enclosed in two transit cases which house the two major units and accessories which comprise the AN / ARM-156. Side covers can be removed from the major units to permit mounting in standard 19-inch equipment racks.

b. The radio test set simulates the signals from a TACAN beacon and verifies TACAN signal parameters required for X and Y channel testing in ground-to-air (G / A), air-to-air range (A / A), or air-to-air range and bearing (A / AB) modes with

data link capability. The simulated parameters can be programmed externally, internally, manually, or by an interruptive self-test. The radio test set can also support any TACAN equipments having standard TACAN technical characteristics.

1-9. Description of Major Components

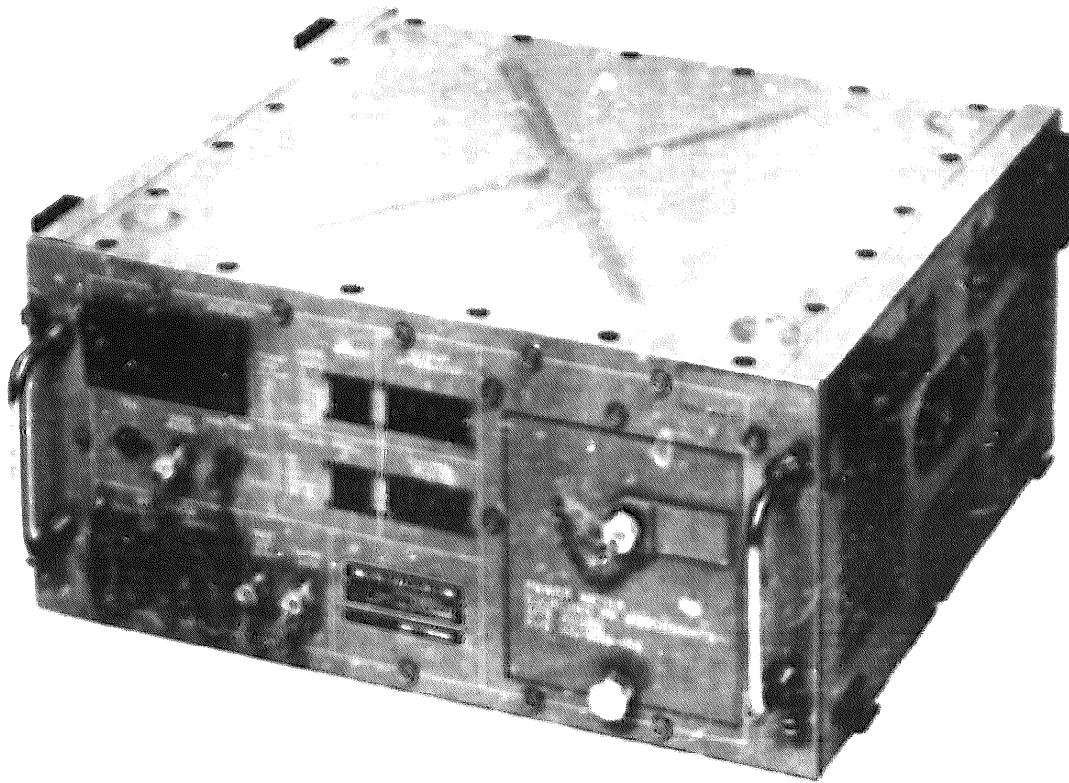
The radio test set is comprised of:

Signal Generator-Power Meter SG-980 / ARM-156

Power Supply-Video Pulse PP-6730 / ARM-156

Accessories

a. *Signal Generator—Power Meter SG-980 / ARM-156.* Signal Generator—Power Meter SG-980 / ARM-156 (fig. 1-2), hereinafter referred to as the rf unit, develops an rf output that is programmed for channel frequency by an external program or rf unit manual or program control, modulated by video unit output or external modulation, and programmed for power level by video unit or rf unit manual control. In addition, the rf unit measures TACAN or radio test set power output level, radio test set percent modulation, and critical dc voltages.

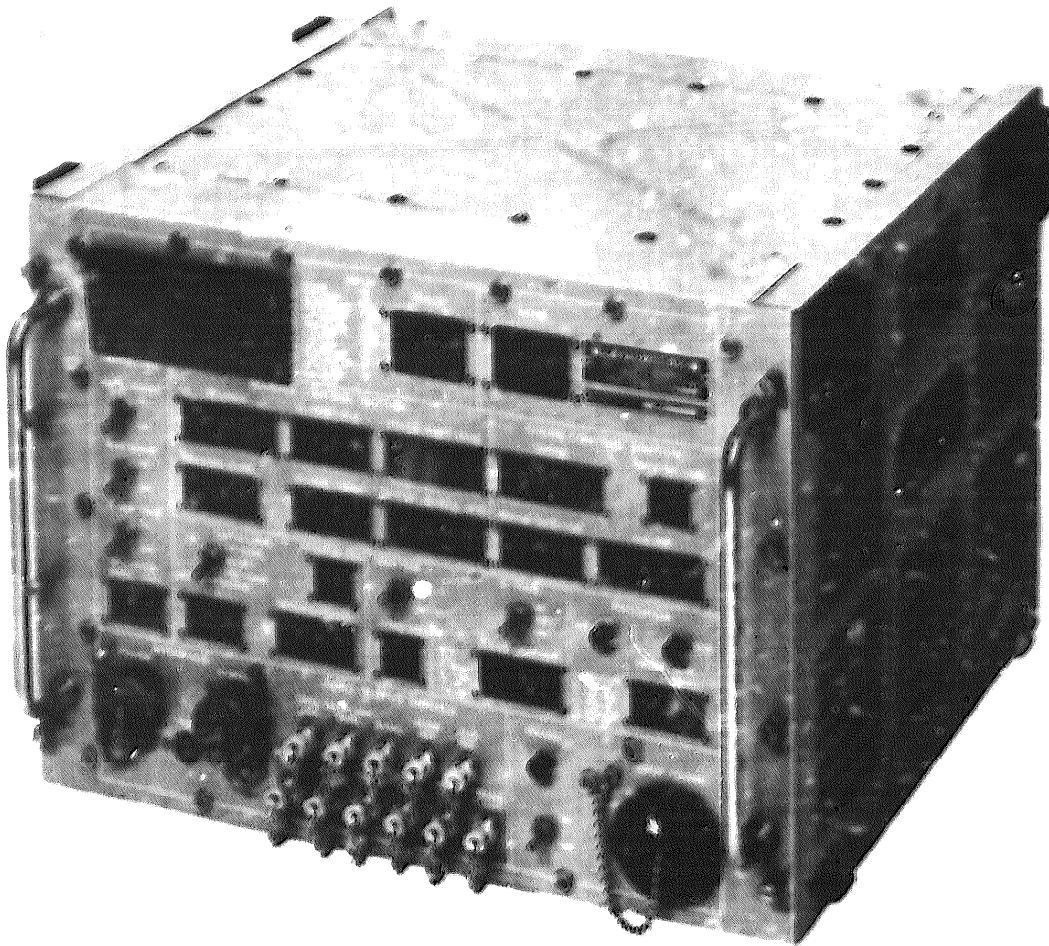


RL 6625-2606-14 TM-2

Figure 1-2. Signal Converter-Power Meter SC-989/ARM-156.

b. *Power Supply—Video Pulse PP-6730 // ARM-156.* Power Supply—Video Pulse PP-6730 // ARM-156 (Fig. 1-3), hereinafter referred to as the video unit, simulates and measures TACAN video parameters used to modulate rf developed by the rf unit, including bearing, antenna spread, and

reference, associated with amplitude modulation, and range, squitter, prf, and coding, associated with pulse modulation. In addition, the video unit programs radio test set operation, initiates self-test, and controls ac and dc power for both major units.



RL 6625-2606-14 PW-3

Figure 1-3. Power Supply-Video Pulse PP-6730/ARM-136.

c. *Accessories.* Accessories (RL 1-4) supplied with the radio test set include:

Input power cable (W-1)

Interface power cable (W-2)

Rf unit transit case (not shown)

Video unit transit case (not shown)

Interface signal cable (W-3)

Rf cable (W-4)
Extender card

Ac adapter

Rf adapters (three)

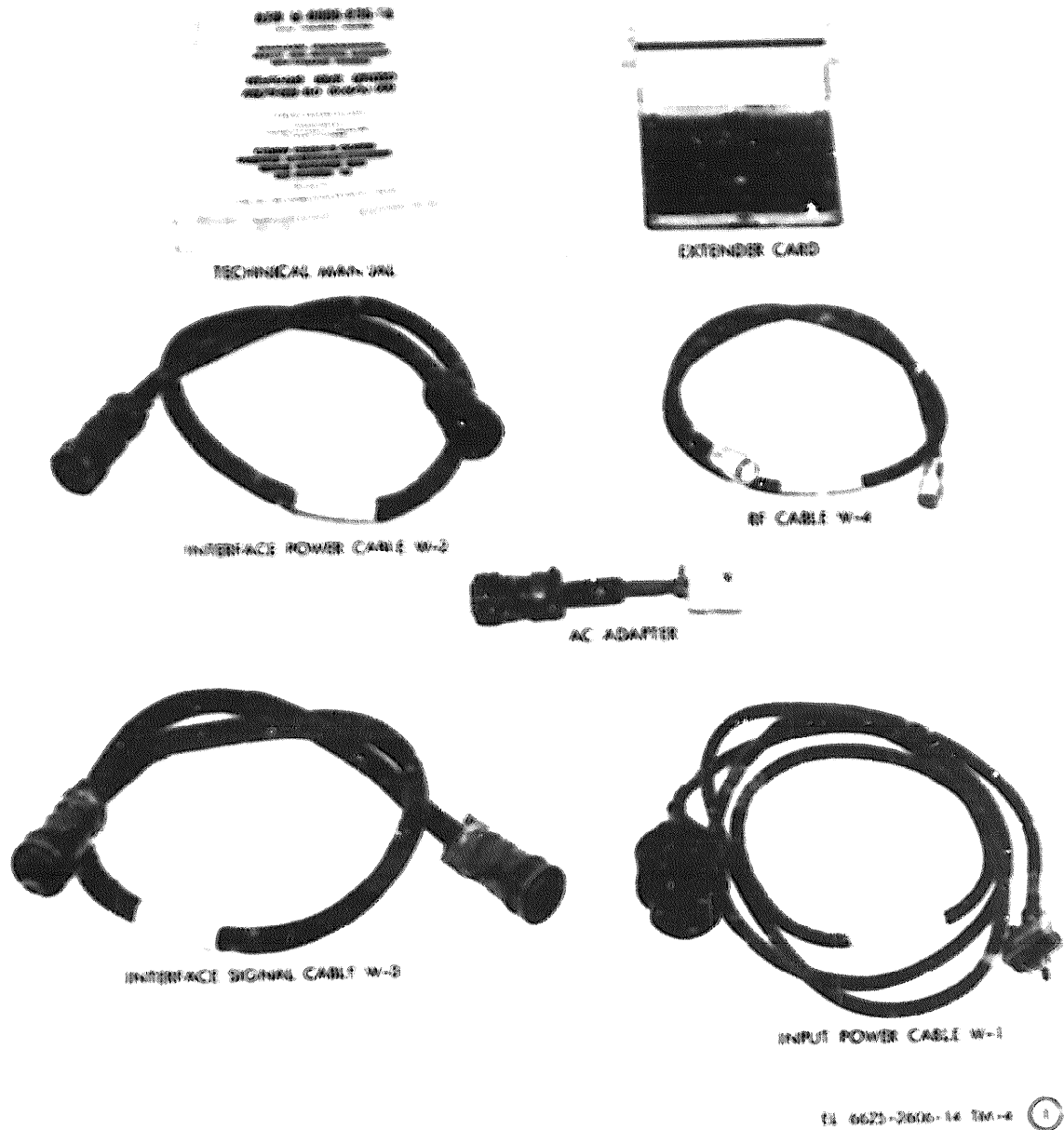
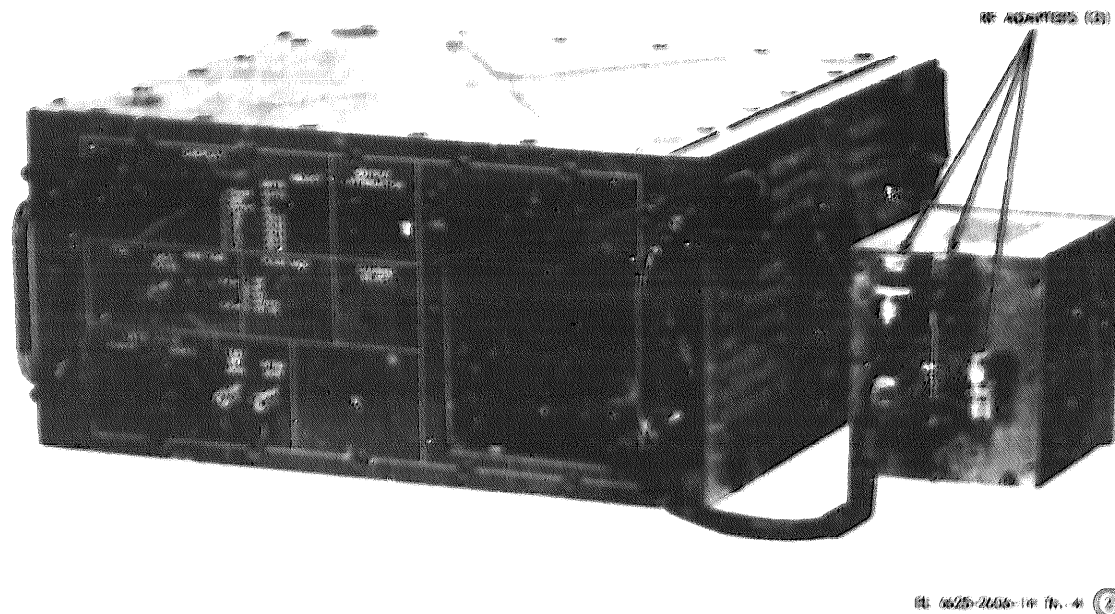


Figure 1-4. Accessories (sheet 1 of 2)



TM 11-6625-2606-14 (Rev. 4) (2)

Figure 1-4 Accessories (sheet 2 of 2).

(1) *Input Power Cable (W-1).* Input power cable (W-1) is used for connecting a 115 vac, 60 Hz source, or with an ac adapter for connecting a 115 vac, 400 Hz source, to the video unit.

(2) *Interface Power Cable (W-2).* Interface power cable (W-2) is used for interconnecting power between the video unit and the rf unit.

(3) *Interface Signal Cable (W-3).* Interface signal cable (W-3) is used for interconnecting signals between the video unit and the rf unit.

(4) *RF Cable (W-4).* Rf cable (W-4) is used with or without rf adapters 2CP1, 2CP2, or 2CP3 (mounted on rear of power meter module), for connecting rf output of the rf unit to the TACAN under test.

(5) *Extender Card.* Extender card is used for testing and troubleshooting circuit cards in the radio test set.

(6) *RF Unit Transit Case.* Rf unit transit case is used for shipment and storage of the rf unit and accessories.

(7) *Video Unit Transit Case.* Video unit transit case is used for shipment and storage of the video unit.

(8) *AC Adapter.* Ac adapter is used with the input power cable (W-1) to connect the radio test set to a 400 Hz source.

(9) *RF Adapters.* Rf adapters are used with the rf cable (W-4) to connect the rf output of the radio test set to a TACAN under test.

1-10. Tabulated Data

a. Performance Characteristics for RF Unit.

Service Temperature	-20 to +54 °C
AC Power Input	103.5 to 126.5 vac, 50 to 620 Hz
DC Power Input	+4 vdc ±1% at 2.5 amps +5 vdc ±1% at 21 amps -5 vdc ±1% at 1 amp +15 vdc ±1% at 1 amp -15 vdc ±1% at 1 amp +20 vdc ±1% at 1.5 amps +30 vdc ±1%
EC Modulation	Amplitude, Duration, or, Square-Pulse
RF Output Frequency (F ₀)	962 to 1213 MHz, accurate to ±0.005%
RF Output Level	0 to -11 dbm, accurate to ±0.5 dbm at 0 dbm.
RF Spurious Output	-70 db max below pk from 0 to -50 dbm or -120 db max below pk at less than -50 dbm
RF Peak Power Measurement	0.6 to 5.0 kw, accurate to ±0.5 db
RF Pulse Rise Time (Subnanosec)	2.5 ±0.1 μ sec or 2.0 ±0.25 μ sec
RF Pulse Fall Time	2.5 ±0.5 μ sec
RF Pulse Width	5.5 ±0.3 μ sec
RF Pulse Spectrum	-60 db at ±0.5 MHz from F ₀ ; or -65 db at ±2.0 MHz from F ₀

b. Performance Characteristics for Video Unit

Service Temperature	-20 to +54 °C
AC Power Input	103.5 to 126.5 vac, 50 to 620 Hz
DC Power Output	+4 vdc ±1% at 2.5 amps +5 vdc ±1% at 21 amps -5 vdc ±1% at 1 amp +15 vdc ±1% at 1 amp -15 vdc ±1% at 1 amp +20 vdc ±1% at 1.5 amps +30 vdc ±1%
AC/DC Mode Switching	0 / A, Normal or Inverse, X or Y A / A, Normal or Inverse, X or Y A / AB, Normal or Inverse, X or Y
Program Selection	Manual Reactive-Transmit Inverse-Reactive A / A-Range A / A-Range and Beam Self Test
Level Selection	0 dbm -10 dbm -15 dbm -40 dbm -45 dbm -90 dbm
Integration Rate Simulation	0 to 1999 gpc in 1-gpc steps
Version Speed Simulation	+2.99 to -2.99% deviation from 900 rpm (15 Hz)
Time Simulation	On, off, or timed (keyed)

Fixed Beam Simulation	0.0 to 359.9 deg in 0.1-deg steps, accurate to ±0.25 deg
Steering Rate Simulation	+39 to -39 deg/sec in 1.0 deg/sec steps
15 Hz / 135 Hz Distortion	2% max
15 Hz / 135 Hz Harmonic Content	10% max
15 Hz Phase Shift	+29.5 to -29.5 deg in 0.5-deg steps
Fixed Range Simulation	0 to 399.9 and in 0.1-and steps, accurate to ±0.1 and
Range Rate Simulation	0 to 6990 km/s in 100-km/s steps
Range Rate Accuracy	Accurate to ±0.1 μ sec
Reply Efficiency	0 to 100% of maximum efficiency in 10% steps
Mode Pulse Spacing	±0.4 μ sec from nominal in 0.5 μ sec steps, or 6 to 39.5 μ sec in 0.5 μ sec steps, accurate to ±0.1 μ sec
Squitter Rate Simulation	0 to 2700 gpc in 100-gpc steps

1-11. Major Units of Radio Test Set

The following lists the major units of the radio test set and their associated dimensions, weights, and figure references:

Qty	Item	Height (in.)	Depth (in.)	Width (in.)	Weight (lb.)	Fig. No.
1	RF Unit	24	17 1/2	19	54	1-2
1	Video Unit	14	17 1/2	19	79	1-3

1-12. Common Names

The following lists the major components of the radio test set and their associated common names used throughout this manual:

Designator	Common Name
Signal Generator-Power Meter 90-990 / ARM-156	RF Unit
Power Supply-Video Pulse PT-6730 / ARM-156	Video Unit

CHAPTER 2

I N S T R U C T I O N S

Section I. SERVICE UPON RECEIPT AND INSTALLATION

2-1. Unpacking

The radio test set is shipped in two separate packing boxes. The rf unit and accessories are packed in one box; the video unit is packed in the other box. The method of unpacking each box of

the radio test set is shown in figure 2-1. No special instructions are required for unpacking, except that care should be taken not to damage the equipment. Reinsert the packing materials in the packing boxes for reuse.

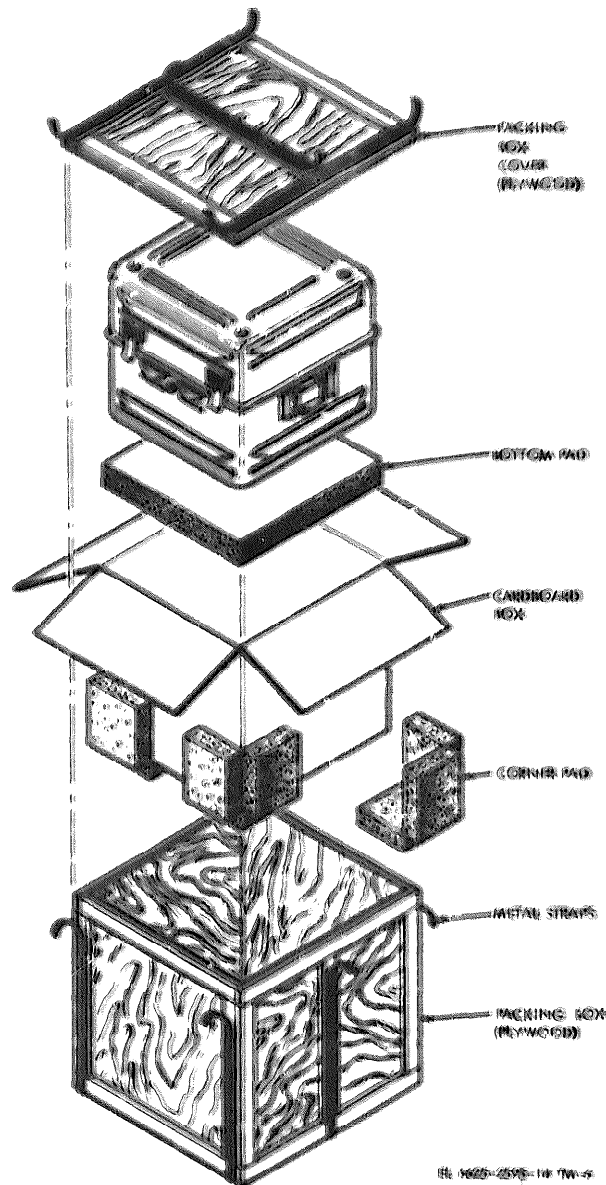


Figure 2-1. Typical packaging of radio test set.

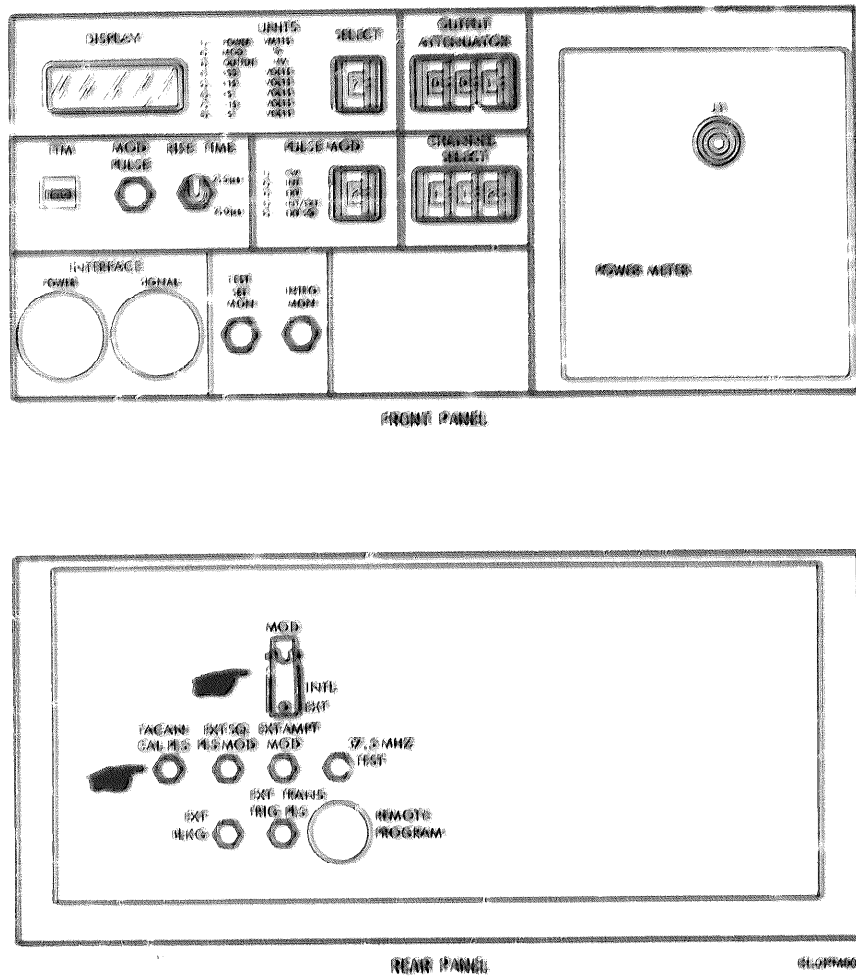


Figure 2-2. RF unit controls, indicators, switches, and connectors.

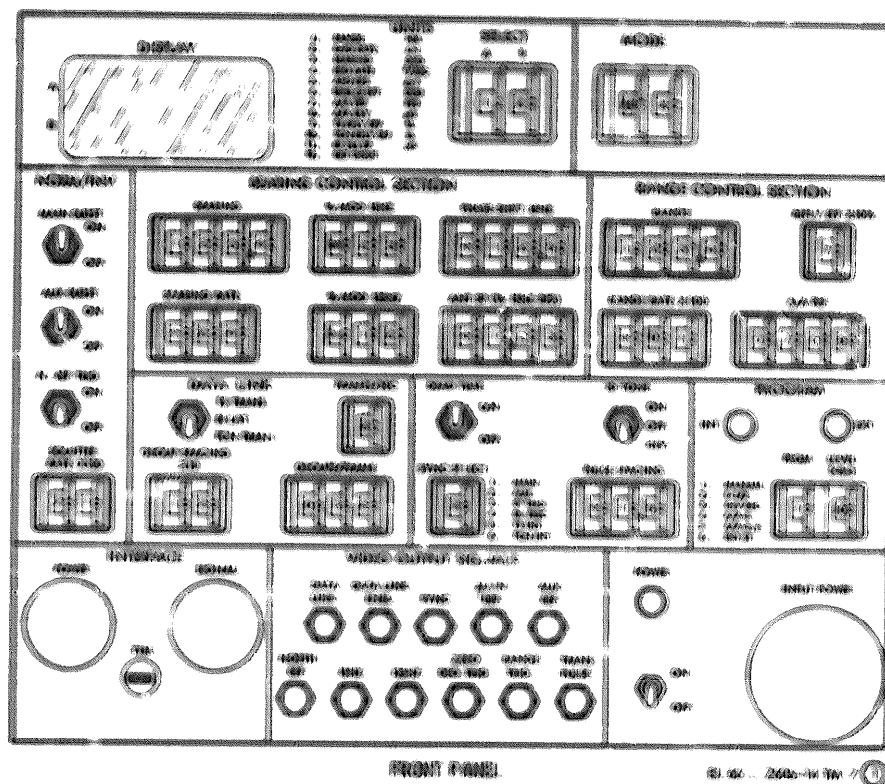


Figure 2-3. Video unit controls, indicators, switches, and converters (sheet 1 of 2).

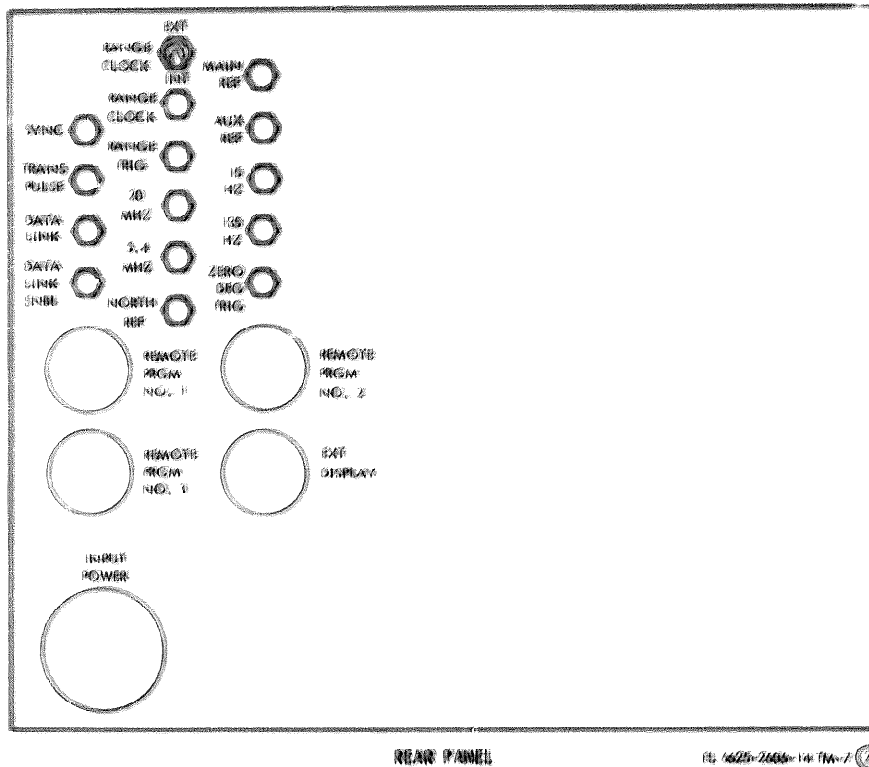


Figure 2-3  Radio unit controls, indicators, switches and connectors (sheet 2 of 2).

Table 2-1. RF Unit operators controls and indicators.

Control, indicator, switch, or connector	Function
DISPLAY indicator	Decimal readout device that displays parameters selected by SELECT control
SELECT control:	One-section thumbwheel switch that selects parameters for DISPLAY indicators:
1. POWER , WATTS	TACAN output power in watts
2. MOD%	Percent of modulation
3. OUTPUT mv	Modulator leveling loop output when PULSE MOD control is in CW position
4. +30 VOLTS	+30 output from video unit in volts
5. +15 VOLTS	+15 output from video unit in volts
6. +5 VOLTS	+5 output from video unit in volts
7. -15 VOLTS	-15 output from video unit in volts
8. -5 VOLTS	-5 output from video unit in volts
OUTPUT ATTENUATOR control	Three-section thumbwheel switch that programs output of power level
TM indicator	Time remaining meter that displays operating time
MOD PULSE connector	Monitor connection for Gaussian pulse
RISE TIME switch	Toggle switch that selects 2.5 μ s or 2.0 μ s rise time for interrogation and reply pulses
PULSE MOD control:	One-section thumbwheel switch that selects modulation source:
1. CW	No modulation
2. INT	Modulation from video unit
3. EXT	Modulation from external unit

Table 2-1. RF Unit Operators Controls and Indicators (Continued)

Control, indicator, switch, or connector	Function
4. INT / EXT	Modulation from external unit if present; otherwise, modulation from video unit
5. EXT SQ CHANNEL SELECT control	External squarewave from EXT SQ PLS MOD connector Three-action thumbwheel switch that programs 1 of 126 TACAN channel frequencies
INTERFACE POWER connector	Power connection between video unit and rf unit
INTERFACE SIGNAL connector	Signal connection between video unit and rf unit
TEST SET MON connector	Monitor connection for radio test set interrogations and replies
INTRG MON connector	Monitor connection for TACAN interrogations and replies
POWER METER connector	Test connection to TACAN
MOD INT / EXT switch	Toggle switch that selects internal or external amplitude modulation
EXT SQ PLS MOD connector	Input connection for square pulse modulation from external unit
EXT AMP MOD connector	Input connection for amplitude modulation from external unit
37.5 MILE TEST connector	Monitor connection for radio test set reference oscillator
EXT BLK connector	Input connection for blanking pulse from external unit
EXT TRANS TRIG. PLS connector	Input connection for transmit trigger from external unit
REMOTE PROGRAM connector	Input connection for program word from external unit

Table 2-2. Video Unit Operators Controls and Indicators

Control, indicator, switch, or connector	Function
DISPLAY Section	
DISPLAY A or DISPLAY B indicator	Decimal readout device that displays parameters selected by SELECT A or B control
SELECT A or SELECT B control:	Two-action thumbwheel switch that selects parameters for DISPLAY A or B indicator:
1. RANGE NM	Range in nautical miles
2. RNC RATE KN	Range rate in knots
3. BEARING DEG	Bearing in degrees
4. DRG RAT %/SEC	Bearing rate in degrees per second
5. ANT RPS ΔF	Antenna speed deviation from 15 rpm in percent
6. 15 HZ @ SFT DEG	15 Hz phase shift in degrees
7. A/A PRF PPS	Air-to-air prf in pulse pairs per second
8. A/A DLY MS	Air-to-air delay in microseconds
9. TS RPLY EFF. %	Test set reply efficiency in percent
10. TON RPLY EFF. %	TACAN reply efficiency in percent
11. RF 15 SP MS	TACAN RF pulse spacing in microseconds
12. EXT W/L F	Input word from EXT DISPLAY connector
MODE Section	
MODE control:	Two-action thumbwheel switch that programs mode when PRGM control is in position 1 (MANUAL):
Coast A/A X (arrow)	Coast-to-air, X mode internal condition
G/A X	Ground-to-air, X mode internal condition
G/A Y	Ground-to-air, Y mode internal condition
A/A X	Air-to-air, X mode internal condition
A/A Y	Air-to-air, Y mode internal condition
A/AB X	Air-to-air beacon, X mode internal condition
A/AB Y	Air-to-air beacon, Y mode internal condition
NORM / INV Section	
MAIN BURST ON-OFF switch	Toggle switch that enables main reference burst in ON position when PRGM control is in position 1 (MANUAL)
AUX BURST ON-OFF switch	Toggle switch that enables auxiliary reference burst in ON position when PRGM control is in position 1 (MANUAL)
N. REF TRIG ON-OFF switch	Toggle switch that enables north reference trigger in ON position when PRGM control is in position 1 (MANUAL)
SQUITTER RATE X100 control	Two-action thumbwheel switch that programs squitter rate when Program-PRGM control is in position 1 (MANUAL)

Table 2-2 Video Unit Operators Controls and Indicators (Continued)

Control, indicator, switch, or connector	Function
BEARING CONTROL Section	
BEARING control	Four-section thumbwheel switch that programs fixed bearing when PRGM control is in position 1 (MANUAL). Disabled when BEARING RATE control is set to + or - position.
BEARING RATE control	Three-section thumbwheel switch that programs bearing rate when PRGM control is in position 1 (MANUAL). Disables BEARING control when + or - bearing rate is selected.
%MOD 15 HZ control	Three-section thumbwheel switch that enables and programs 15 Hz percent modulation when PRGM control is in position 1 (MANUAL).
%MOD 135 HZ control	Three-section thumbwheel switch that enables and programs 135 Hz percent modulation when PRGM control is in position 1 (MANUAL).
PHASE SHIFT 15 HZ control	Four-section thumbwheel switch that programs phase shift of 15 Hz modulation when PRGM control is in position 1 (MANUAL).
ANT SP (+ % 15 HZ RPS) control	Four-section thumbwheel switch that programs percent of antenna speed deviation from 15 Hz (15 rpm) when PRGM control is in position 1 (MANUAL).
RANGE CONTROL Section	
RANGE control	Four-section thumbwheel switch that programs range when PRGM control is in position 1 (MANUAL). Disabled when RANGE RATE control is set to + or - position.
RANGE RATE X100 control	Three-section thumbwheel switch that programs range rate when PRGM control is in position 1 (MANUAL). Disables RANGE control when + or - range rate is selected.
REPLY EFF X10% control	One-section thumbwheel switch that programs percent of system maximum reply efficiency when PRGM control is in position 1 (MANUAL).
A/A PRF control	Four-section thumbwheel switch that programs air-to-air interrogation prf when PRGM control is in position 1 (MANUAL).
DATA LINK Section	
DATA LINK mode switch:	Three-position toggle switch that programs data link transmission / reception mode:
TS TRANS	Test set Transmission
BI LAT	Two-way test set and TACAN transmission / reception
TCN TRANS	TACAN transmission
GROUP SPACING X10 control	Two-section thumbwheel switch that programs spacing between data link pulse groups.
FRAMES / SEC control	One-section thumbwheel switch that programs data link frames per second.
GROUPS / FRAME control	Three-section thumbwheel switch that programs data link pulse groups per frame.
DEAD TIME and ID TONE Section	
DEAD TIME switch	Toggle switch that defeats dead time after TACAN interrogation when in OFF position.
SYNC SELECT control:	One-section thumbwheel switch that programs sync output as SYNC (Shore) connector and SYNC (rear) connector when PRGM control is in position 1 (MANUAL):
1. MAIN	Main reference pulse group
2. AUX	Auxiliary reference pulse group
3. 0° TRIG	Zero degree trigger
4. DL PREC	Data link precedence pulse
5. TS INT	Test set interrogation
6. TCN INT	TACAN interrogation
ID TONE switch:	Toggle switch that programs ID tone operation when PRGM control is in position 1 (MANUAL):
ON	Enables continuous ID tone
OFF	Disables ID tone
KEY	Keys coded ID tone
PULSE SPACING control	Three-section thumbwheel switch that programs spacing between pulses in an interrogation pulse pair when PRGM control is in position 1 (MANUAL).

Table 2-2. Video Units Controls and Indicators (Continued)

Control, indicator, switch, or connector	Function
PROGRAM Section	
INT indicator	Lamp that lights when radio test set is under internal control by PRGM control positions 2 through 6.
EXT indicator	Lamp that lights when radio test set is under external control.
PRGM control:	Thumbwheel switch section that selects control conditions:
1. MANUAL	Manual control
2. R-T/R	Receiver or transmit/receive internal conditions
3. INV REC	Inverse receive internal conditions
4. A/A-R	Air-to-air, range internal conditions
5. A/A-EB	Air-to-air, range and bearing internal conditions
6. INT ST	Internal still on
LEVEL (—dim) control: (10 position throw)	Thumbwheel switch section that programs rf unit output level when PRGM control is in positions 2 through 6:
0	0 dbm level
10	—10 dbm level
17	—17 dbm level
40	—40 dbm level
47	—47 dbm level
90	—90 dbm level
INTER FACE Section	
INTERFACE POWER connector	Power connection between video unit and rf unit
INTERFACE SIGNAL connector	Signal connection between video unit and rf unit
TM indicator	Time measuring meter that displays operating time
VIDEO OUTPUT SIGNALS Section	
DATA LINK connector	Monitor connections for data link pulse groups
DATA LINK ENBL connector	Monitor connections for data link enable pulses
SYNC connector	Monitor connections for pulse selected by SYNC SELECT control
MAIN REF connector	Monitor connections to main reference burst pulses
AUX REF connector	Monitor connections for auxiliary reference burst pulses
NORTH REF connector	Monitor connections for north reference pulses
15 HZ connector	Monitor connections for 15 Hz coarse bearing modulation
135 HZ connector	Monitor connections for 135 Hz fine bearing modulation
ZERO DEG TRIG connector	Monitor connections for zero degree trigger that occurs for each positive inflection of 15 Hz coarse bearing modulation
RANGE TRIG connector	Monitor connections for range trigger that occurs for each reply-pulse pair
TRANS PULSE connector	Monitor connections for transmit trigger pulse
POWER Section	
POWER indicator	Lamp that lights when power is applied to radio test set by POWER control
POWER ON/OFF switch	Toggle switch that connects or powers radio test set in ON position
INPUT POWER connector	Input connections for primary power to radio test set. An interlock switch accepts power only from rear connector if both are connected
Rear Panel	
RANGE CLOCK switch	Toggle switch that selects internal clock or external range clock at RANGE CLOCK connector.
RANGE CLOCK connector	Input connection for external range clock when RANGE CLOCK control is in EXT position. Output connection for internal range clock (16.1825 MHz) when RANGE CLOCK control is in INT position.
SYNC, TRANS PULSE, DATA LINK, DATA LINK ENBL, RANGE TRIG, NORTH REF, MAIN REF, AUX REF, 15 HZ, 135 HZ, and ZERO DEG TRIG connectors	Same as on VIDEO OUTPUT SIGNALS section on front panel.
20 MHz connector	Monitor connection for 20 MHz clock
3.4 MHz connector	Monitor connection for 3.4 MHz clock
REMOTE PRGM NO. 1, NO. 2, NO. 3 connectors	Input connections for program words from external unit.
EXT DISPLAY connector	Input connection for data from external unit which is displayed on DISPLAY A or B indicator when DISPLAY SELECT A or B control is in position 12 (EXT INPUT).

Section III. OPERATION UNDER USUAL CONDITIONS

2-5. Preliminary Operational Checks

The following procedures describe the preliminary operational checks of the radio test set. Personnel should become familiar with the following operating procedures and the various controls, switches, and indicators (para 2-4) before putting the equipment into operation in order to avoid improper sequence of operation.

- a. (Bench mounting) Set rf unit on top of video unit.
- b. Connect interface power cable W-2 to INTERFACE POWER connectors on rf unit and video unit.
- c. Connect interface signal cable W-3 to INTERFACE SIGNAL connectors on rf unit and video unit.
- d. Connect input power cable W-1 to INPUT POWER connector on video unit and to a 115 vac, 60 or 400 Hz source.
- e. Set controls to initial settings per table 2-3.
- f. Verify that video unit POWER lamp is illuminated.
- g. Verify that rf unit and video unit blowers operate.
- h. Set rf unit SELECT control to following voltages and verify voltages indicated on digital DISPLAY:

Position	Voltage
4	+30 vdc $\pm 1\%$
5	+15 vdc $\pm 1\%$
6	+5 vdc $\pm 1\%$
7	-15 vdc $\pm 1\%$
8	-5 vdc $\pm 1\%$

Table 2-3. Initial Control Settings for Self Test

Control	Setting
RF UNIT	
SELECT	2
OUTPUT ATTENUATOR	010
RISE TIME	2.0 μ s
PULSE MOD	2
CHANNEL SELECT	063
VIDEO UNIT	
SELECT A	1
SELECT B	1
MODE	C/A X
MAIN BURST	ON
AUX BURST	ON
N. REF TRIG	OFF
SQUITTER RATE X100	27
BEARING	000.0
BEARING RATE	OFF 00
%MOD 15 HZ	ON 10
%MOD 135 HZ	ON 10
PHASE SHIFT 15 HZ	OFF 00.0
ANT SP 1 % 15 HZ RPS	OFF 0.00
RANGE	025.0
RANGE RATE X100	OFF 00
REPLAY EFF X10%	7
A/A PRF	0000
DEADTIME	ON
SYNC SELECT	1
ID TONE	KEY
PULSE SPACING	NOM 0.0
PRGM	1
LEVEL (-40m)	10
POWER	ON

- i. Verify that rf unit and video unit TTM meters operate.
- j. Set video unit PRGM control to 6 (INT ST).
- k. Verify that rf unit digital DISPLAY indicates 1900 to 2100 watts.
- l. Verify that video unit digital DISPLAY A indicates 13.8 to 13.9 degrees.
- m. Verify that video unit digital DISPLAY B indicates 61.9 to 62.1 nautical miles.

Section IV. PREPARATION FOR MOVEMENT

2-6. Disassembly for Travel

- a. Disconnect all cables and store them in rf unit transit case cover.
- b. If rf unit and video unit are rack mounted, remove them from the rack and reinstall the chassis support panels per paragraphs 6-6b. and 6-11b.
- c. Place rf unit and video unit in their transit cases.
- d. Replace and secure covers to transit cases.

2-7. Repacking.

Repacking of the equipment for shipment or limited storage normally will be performed at a packaging facility or by a repackaging team. Should emergency packaging be required, select materials from those listed in SB 38-100, Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army. Package the equipment in accordance with the original packaging, in so far as possible, with the available materials.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DA Form 6 (para 1-21).

b. Check the equipment against the components listing in paragraph 1-11 and the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38-756. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether the equipment has been modified. (Equipment which has been modified will have the MWO number on the front panel, near the nameplate's plate.) Check also to see whether all currently applicable MWO's have been applied. (Current MWO's applicable to the equipment are listed in DA Form 310-7.)

2-3. Installation Instructions

The following procedures describe the methods of installing each major unit of the radio test set in a standard 19-inch rack or on a bench. The operator should take care that there is room to work on the equipment under test and that the position or location of the radio test set does not exceed the length of the test cable and input power cable. A

115 vac. 60 or 400 Hz single phase power source is required.

CAUTION

The rf unit without its transit case weighs 54 pounds; the video unit without its transit case weighs 74 pounds. Two men are required to lift the equipment.

a. Bench Mounting.

- (1) Press relief valves.
- (2) Remove covers from transit cases.
- (3) (RF unit only) Remove accessories from cover.

(4) Remove radio test set units from transit cases and place on test bench.

b. Rack Mounting.

- (1) Press relief valves.
- (2) Remove covers from transit cases.
- (3) Remove radio test set units from transit cases.
- (4) (RF unit only) Remove accessories from transit case cover.

(5) Refer to chapter 6, subparagraphs 6-7-4 and 6-10-6 and remove chassis support panels from radio test set units.

(6) Insert radio test set units into a 19-inch rack using two handlers on front panel. Secure test panel with captive screws.

Section II. CONTROLS AND INDICATORS

2-4. Operator's Controls

This paragraph describes, locates, and provides the functions of controls, switches, indicators, and connectors on the rf unit and the video unit. Operators and maintenance personnel should be

familiar with the controls shown in figures 2-2 and 2-3 and listed in tables 2-1 and 2-2 before attempting operation or maintenance of the radio test set.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. TOOLS AND EQUIPMENT

3-1. Tools, Test Equipment, and Materials Required

The tools, test equipment, and materials required for organizational maintenance are listed below. Repair parts, special tools, special test equipment, and accessories issued with or prescribed for use with the radio test set at organizational level of maintenance are listed in TM 11-6625-2606-25P.

a. Tools. Tool Kit, Electronic Equipment TK-101 / G.

b. Test Equipment. None.

c. Materials.

(1) Trichloroethane (Federal Spec O-T-620, Type II).

(2) Lint-free cloth (FSN 8305-170-5062 or equivalent).

(3) Detergent.

(4) Soap.

(5) Paint, gray semigloss, color No. 26037 per Type I Federal Standard No. 595.

(6) Small paint brush.

(7) Sandpaper, No. 000.

Section II. REPAINTING AND REFINISHING INSTRUCTIONS

3-2. Painting and Refinishing Instructions

Refer to the applicable cleaning and refinishing practices specified in TB 746-10, Field Instructions for Painting and Preserving Electronic Command Equipment. Remove rust or corrosion from metal surfaces by lightly sanding them with No. 000 sandpaper. Brush two thin coats of paint, gray

semi-gloss color No. 26037, on exposed metal areas to prevent further corrosion. Apply paint to only those areas which have been previously painted. Refer to SB 11-573 Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment and AR 746-1, Color and Marking of Army Materiel.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-3. General

To insure that the radio test set is always ready for operation, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed in tables 3-1 and 3-2. The item numbers indicate the sequence of and minimum inspection required. Defects discovered during operation of the unit will be noted for future correction to be made as soon as the operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment. Record all deficiencies together with the corrective action taken on the applicable forms.

Instructions for performing the required checks are identified as periodic checks at general support level of maintenance.

3-4. Instructions for the Performance of Preventive Maintenance Checks and Services.

The items listed in the tables should be checked on a monthly, quarterly, or semiannual basis, during periods of use and nonuse. The tables indicate when to inspect, how to inspect, and the Reference column lists the paragraphs or publications containing additional information. If the defect cannot be remedied the equipment will be referred to general support level of maintenance.

Table 3-1. Monthly Preventive Maintenance Checks and Services

Sequence number	Item to be inspected	Procedure	Reference
1	Front and Back Panels	a. Inspect for cleanliness b. Inspect all connectors for cleanliness c. Inspect for scratches, chipped paint, or corrosion d. Perform preliminary operational checks per paragraph 2-5.	Paragraph 3-7a. Paragraph 3-7b. Paragraph 3-2 Paragraph 3-8
2	Transit Cases	a. Inspect for cleanliness b. Inspect for chipped paint, scratches, or corrosion	Paragraph 3-7a. Paragraph 3-2
3	Cables	Inspect connectors for cleanliness	Paragraph 3-7c.

Table 3-2. Quarterly Preventive Maintenance Checks and Services

Sequence number	Item to be inspected	Procedure	Reference
1	Completeness	See that equipment is complete.	Paragraph 1-14
2	Installation	See that equipment is properly installed and connected.	Paragraph 2-3
3	Cleanliness	See that equipment is clean.	Paragraph 3-2
4	Preservation	Check all surfaces for evidence of fungus. Remove rust and corrosion, and spot-paint bare spots.	Paragraph 3-2
5	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310-4
6	Spare Parts	Check all spare parts for general condition and method of storage. There should be no evidence of overstock, and all shortages must be entered on valid requisitions.	TM 11-6625-2606-20P
7	Equipment Modification	Check DA PAM 310-7 to determine if new applicable MWO's (Modification Work Orders) have been published. All URGENT MWO's must be incorporated immediately. Schedule incorporation of NORMAL MWO's for next semiannual maintenance service.	DA Pam 310-7 and TM 36-750

3-5. Quarterly Preventive Maintenance Checks and Services

Quarterly preventive maintenance checks and services on the test set are required as part of organizational maintenance procedures and in some cases, are repetitive to the monthly checks and services. Periodic monthly checks and services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently.

3-6. Semiannual Preventive Maintenance Checks and Services.

Semiannual preventive maintenance checks and services apply to the adapter and test cables. At 6 month intervals, the adapter and test cables will be referred to general support maintenance category for continuity checks.

3-7. Cleaning.

Inspect each component of the test set for cleanliness. The equipment shall be free of dust, dirt, grease, and fungus. Clean the test set components as follows:

WARNING

The fumes of trichloroethane are toxic. Provide through ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to open flames converts the fumes to highly toxic, dangerous gases.

a. **Combination Case.** Clean the combination case with a soft clean lint-free cloth, using soap or mild detergent and water, then dry.

b. **Transit Cases.** Clean the transit cases with a soft clean lint-free cloth, using soap or mild detergent and water, then dry.

c. **Front and Back Panels.** The following procedures are provided for cleaning the panels.

(1) Remove dirt and dust with a lint-free cloth, using solvent if necessary.

(2) Clean meter face gently with lint-free cloth.

(3) Remove grease, fungus, and ground-in dirt from the appropriate case; use a cloth dampened (not wet) with trichloroethane (Federal Spec O-T-620, Type I).

(4) Use a small brush to clean dirt from connectors.

d. **Cables.** Remove dirt and dust from cable connectors using a small brush. If necessary use a lint-free cloth dampened with water; then dry. Do not immerse connectors.

Section IV. TROUBLESHOOTING**3-8. Troubleshooting Charts**

Troubleshooting of the radio test set at organizational level of maintenance is based on the results observed during operational checks, paragraph 2-5. Troubleshooting table 3-3 provides a list of the most frequent malfunctions and the corrective actions to be taken. The repair

procedures for those items authorized by the Maintenance Allocation Chart, Appendix B, are described in section V. Any malfunction beyond the scope of organizational level of maintenance will be referred to general support level of maintenance (chapter 6).

Table 3-3. Troubleshooting

Malfunction	Possible trouble	Corrective action
Para 2-5 f. POWER lamp not illuminated.	1. Input power cable W-1 defective. 2. POWER lamp burned out.	1. Check connection of input power cable or replace cable. 2. Replace POWER lamp per para. 3-10.
Para 2-5 g. RF or video unit blowers not operating.	Blower defective	Send radio test set to general support maintenance.
Para 2-5 h. Power supply voltages incorrect.	Power supply defective.	Send radio test set to general support maintenance.
Para 2-5 i. TTM meters not operating.	TTM meter defective.	Send radio test set to general support maintenance.
Para 2-5 k. RF power output incorrect.	RF unit defective.	Send radio test set to general support maintenance.
Para 2-5 l. Bearing indication incorrect.	Video unit defective.	Send radio test set to general support maintenance.
Para 2-5 m. Range indication incorrect.	Video unit defective.	Send radio test set to general support maintenance.

Section V. MAINTENANCE OF RADIO TEST SET

3-9. General.

This section describes the repairs performed at organization level of maintenance. The repairs consist of repair or replacement of items authorized by the Maintenance Allocation Chart, appendix B.

3-10. Repairs

Repair of the radio test set at organizational level of maintenance consists of replacement of lamps on the front panels.

- (1) Unscrew lens covering lamp.
- (2) Remove lamp.
- (3) Replace new lamp and install lens.

CHAPTER 4

FUNCTIONING OF EQUIPMENT

Section I. RADIO TEST SET FUNCTIONAL DESCRIPTION

4-1. General

a. Section I is a description of the overall functioning of the radio test set.

b. Section II is a functional description of the power distribution, rf unit, and video unit.

c. Abbreviations of the signal terms in this chapter are defined in the Glossary.

4-2. Overall Functioning of the Radio Test Set.

The major units of the radio test are the rf unit and the video unit (fig. 4-1). The rf unit consists of the rf, video detector, power measurement and display section. The video unit consists of the internal condition, video, display, and power sections. The internal condition section places the radio test set under internal or external control upon command from an external unit. Under external control, operating conditions and frequency channel are programmed by the external control, operating

conditions are programmed by the video unit and rf output level is programmed by the rf unit. When transmit functions are programmed, video generated by the video section is displayed by the display section and sent to the rf unit to modulate the rf section output. The rf section output is then transmitted to the TACAN under test via the power measurement section. When receive functions are programmed, TACAN rf is measured for display by the power measurement section, and detected by the video detector section to provide a sync pulse for the video unit. The sync pulse is coupled via the internal condition section to the video section where it is used to measure pulse spacing and reply efficiency for display. The power section provides operating voltages for both the video and rf units. Critical voltages are displayed in the rf unit display section.

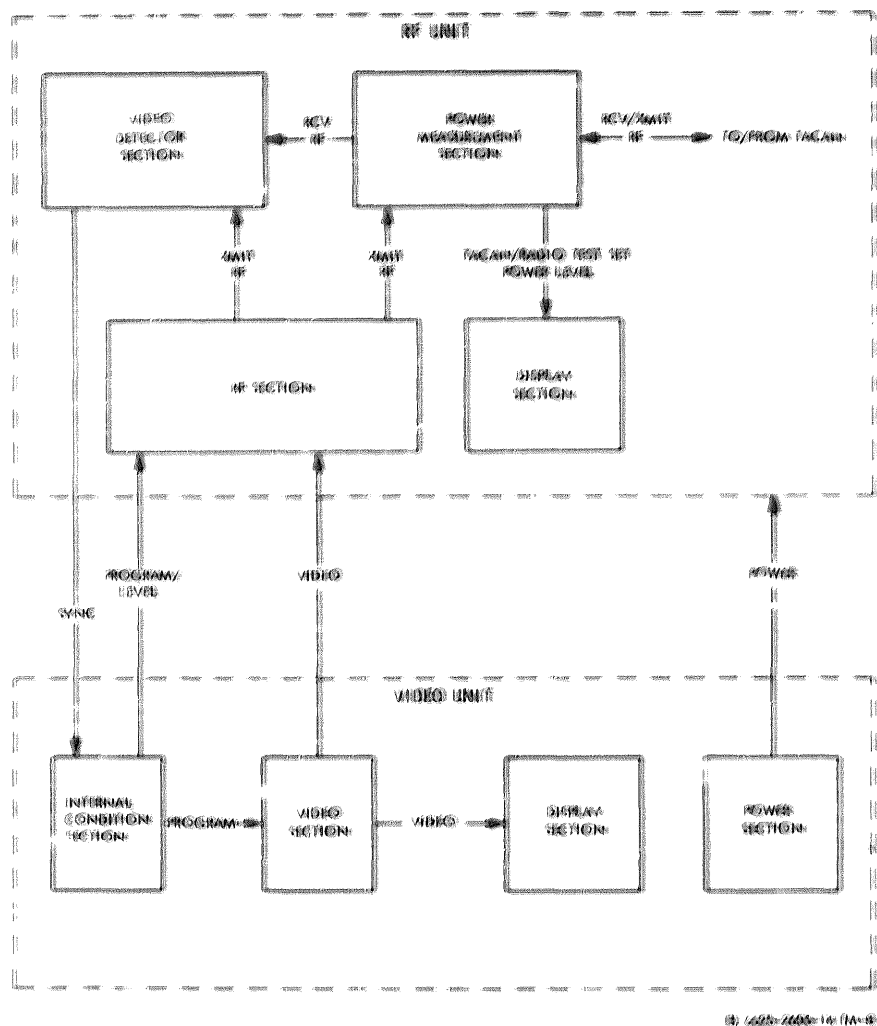


Figure 4-1. Radio test set amplifier block diagram.

Section II. FUNCTIONAL THEORY OF OPERATION

4-3. Primary Electrical Power

Primary electrical power is applied to the radio test set from a 113 vac, 60 or 400 Hz, single phase external source (fig. 4-2). The external source is connected through one of two connectors (J1 or J2) on the video unit. Connector J1 is located on the front panel and connector J2 is located on the rear panel. When the external source is connected to J2, power interlock switch S28 is activated, disconnecting the power from J1. Also when the external

source is connected to J1, the interlock switch is deactivated removing power from J2. When POWER switch S26 is set to ON, the input power is coupled through noise filter FL1 and POWER switch S26 to terminal board TB2. The output of TB2 is applied to blower B1, POWER lamp DS1, INTERFACE POWER connector J3, and POWER supply PS1. Overload protection is provided by the 8 ampere circuit breaker action of S26.

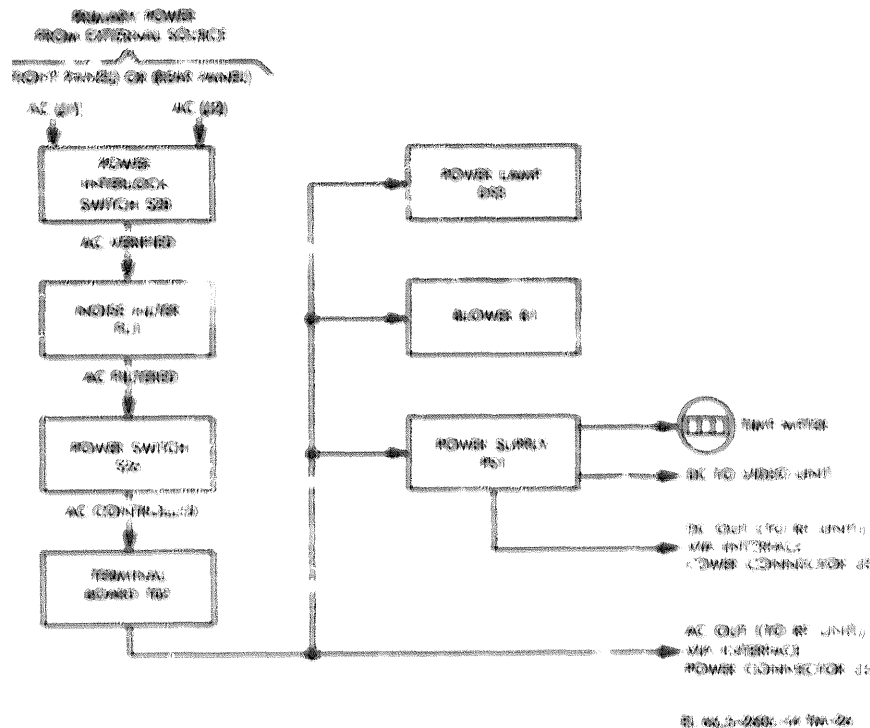


Figure 4-2 Power Distribution diagram.

4-4 Power Supply IF51

The power supply in the video unit supplies operational dc power used throughout the radio test set. Primary electrical power is supplied from a 115 vac, 60 or 400 Hz, single phase source and applied to transformer T1 in power supply IF51 (fig 4-3). The operational voltages are supplied by seven series type dc voltage regulators. Each supply is short-circuit, over-voltage, and transient-voltage protected. The power supply generates the following voltages:

- +5 vdc $\pm 1\%$, 21 amps (15 mv ripple at 50 Hz) used primarily for digital processing.
- +15 vdc $\pm 1\%$, 1 amp (10 mv ripple at 50 Hz)

used for analog, digital-to-analog, and analog-to-digital processing.

- 15 vdc $\pm 1\%$, 1 amp (10 mv ripple at 50 Hz) used for analog, digital-to-analog, and analog-to-digital processing.

- +30 vdc $\pm 1\%$, 300 ma (15 mv ripple at 50 Hz) used for analog and rf circuits in the rf unit.

- 5 vdc $\pm 1\%$, 1 amp (10 mv ripple at 50 Hz) used for digital and analog processing.

- +24 vdc $\pm 5\%$, 1.5 amps (100 mv ripple at 50 Hz) used for relays and TTM meters.

- +4 vdc $\pm 1\%$, 3.5 amps (100 mv ripple at 50 Hz) used for light emitting diode (LED) displays.

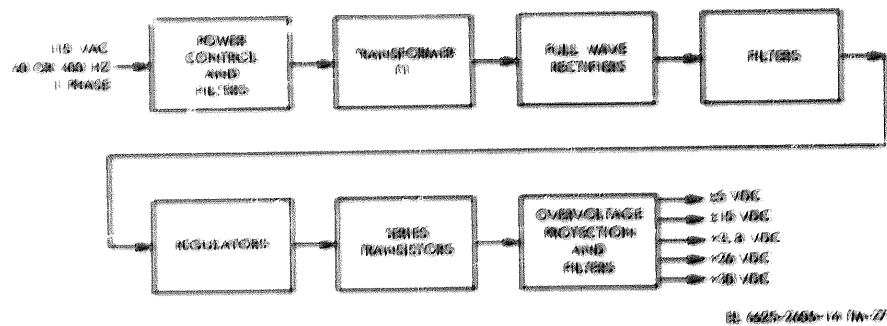


Figure 4-3. Power supply, 1PS1, simplified block diagram.

a. Unregulated voltages are generated by five separate windings on transformer T1. Supply returns are separate for the output of each regulator to eliminate ground loops and noise currents.

b. A single power transformer provides the various supply voltages and series regulators maintain the voltage levels and smooth out the dc ripple. The power transformer has multiple secondary windings to provide the required voltages and operates from an input frequency of 60 or 400 Hz.

c. Series regulators provide a noise-free supply for the digital processing circuits and reduce RFI and EMI. The efficiency of the power supply is approximately 30%. The input power required for the radio test set is 400 watts.

d. All the dc supplies contain a series pass transistor in conjunction with the hybrid regulator to supply the required current. The +5 vdc supply

has four parallel pass transistors for sufficient current capability.

e. Each supply is short circuit protected. As a supply load current is increased beyond its normal operating range the supply reduces its output voltage at a rate determined by a series current limiting resistor. This is accomplished without affecting any other supply. When the overload condition is removed, the output voltage returns to normal.

4-5. RF Unit Functional Description

The rf unit generates and modulates an L-band carrier with video signals from the video unit to simulate navigational signals for testing TACAN equipment. The rf unit consists of the rf, power measurement, video detector, and display sections (fig. 4-4).

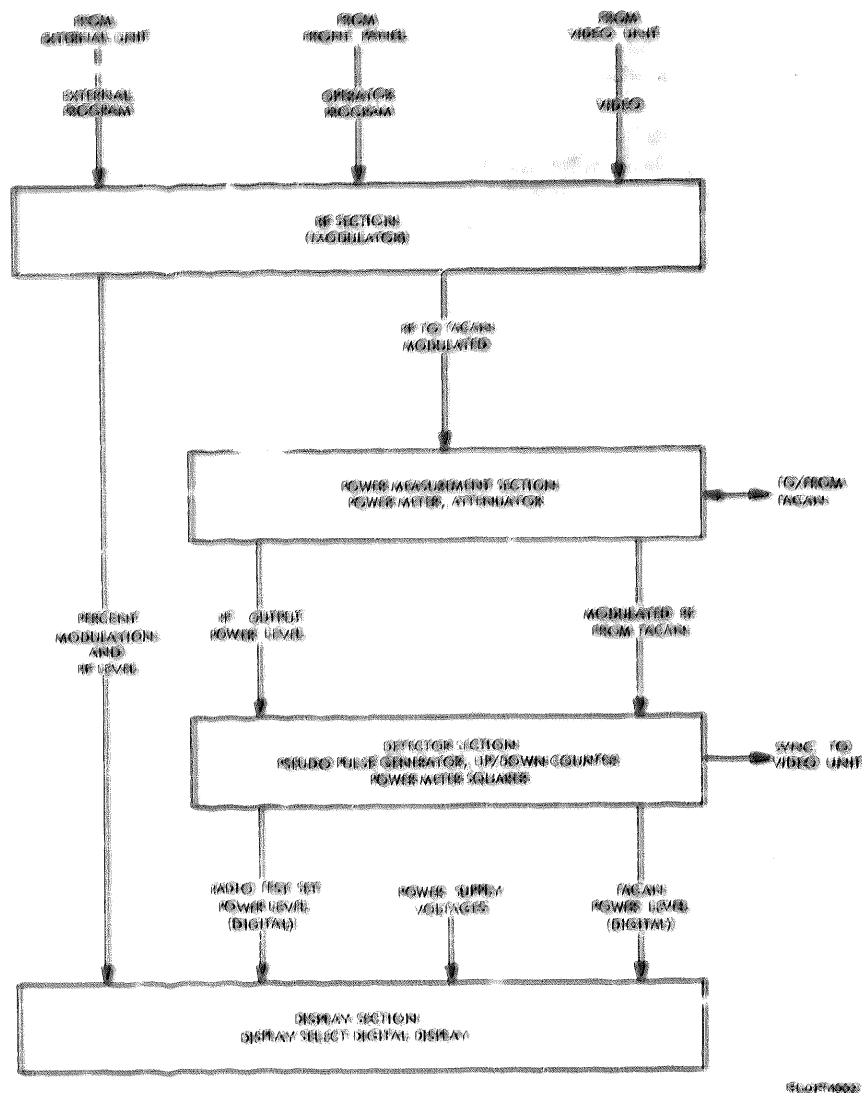


Figure 4-4. Rf unit, simplified block diagram.

a. The rf section, controlled by external program or manual settings, generates an rf carrier simulating the selected TACAN channel, modulates the carrier with video simulating TACAN interrogation or reply parameters from the video unit, and controls the modulated rf output level.

b. The power measurement section provides bidirectional coupling of modulated rf between the radio test set and the TACAN under test, and measurement of rf output power levels. A plug-in power meter module, containing coupling and detection circuits, is connected directly to the TACAN under test. Processing of measurement parameters is shared by the video detector and display sections.

c. The video detector section receives the radio test set output power level and the modulated TACAN

from the power measurement section. The video detector couples power level to the display section and processes modulated rf to develop a digital sync pulse (pseudo pulse) that represents the 50 percent point of the detected video pulse. The pseudo pulse is used by the video unit to develop interrogation and reply video parameters.

d. The display section selects percent modulation, test set power level, TACAN power level, or power supply parameters as determined by the rf unit SELECT control. The display section processes and stores the selected parameter for periodic updating of the rf unit DISPLAY readout.

4-6. RF Unit Block Diagram Analysis

Operating parameters of the rf unit are established by

front panel switches or external commands, depending on the type of operation. These parameters are decoded in the programming No. 1 circuit (fig. FO-11). The channel data is applied to the modulator.

a. During transmit mode operation, a crystal-controlled oscillator generates a 32.5 MHz reference frequency that is sent to the frequency synthesizer. In the frequency synthesizer, the carrier frequency is generated as a function of the channel select data. The carrier is sent to the modulator where it is amplitude and pulse modulated with composite sine wave signals and trigger pulses from the video unit or externally, depending on the operating mode data from programming No. 1. The modulated rf (MEF) signal is then sent to programmable attenuator A2 which controls the output power level. This attenuator can be controlled from a front panel switch or externally via programming No. 2. The decoded output attenuation data is sent to attenuator logic and driver A15 which controls the attenuator. After attenuation, the modulated and coupled rf (CRF) is sent to power meter A1. The output from the power meter (TRF) is applied to the TACAN under test.

b. During receive mode operation, the TACAN rf (TRF) signal is attenuated by power meter A1 and attenuator A2 and is sent to the pseudo pulse generator as PPC. The pseudo pulse generator is basically a low gain receiver that performs the functions of signal normalization, envelope detection, and video processing. The pseudo pulse generator rf and detector A3 output goes to pseudo pulse generator video and logic A8. This output is a combination of the TACAN rf signal and

the calibrate pulse. The video and logic separates the calibrate pulse from the rf and creates a pseudo rf pulse (DFFT) that is sent to the video unit as a TACAN reply or interrogation. Coupled radio frequency (CRF) is generated by power meter A1 and is sent to attenuator A2 and then to up/down counter A13 as FMDRF. The up/down counter is controlled by power meter programmer A14. The pulse train (TPP) from the pseudo pulse generator video and logic A8, causes the up/down counter to increment or decrement a counter until the D/A output (FMDAC) equals the peak rf voltage. The digital signal is sent to power meter squarer A12 where it is squared and sent to display select A9. It is then displayed in digital display A7 when POWER WATTS is selected on the front panel DISPLAY SELECT switch.

c. The following paragraphs provide a detailed description of the individual blocks shown in figure FO-11.

4-7. Channel and Operating Mode Selection

The channel and operating mode select logic can be controlled either internally or externally. Internally, the select logic of programming No. 1 is controlled by front panel switches. Externally, programming No. 1 is controlled by external signals and an internal/external command (fig. 4-4). The internal signals (from front panel switches) and external signals are sent to programming No. 1 along with the internal/external command level. Table 4-1 lists input signals and the internal/external command that are decoded and sent to the frequency synthesizer to determine the operating frequency and operating mode of signal generator.

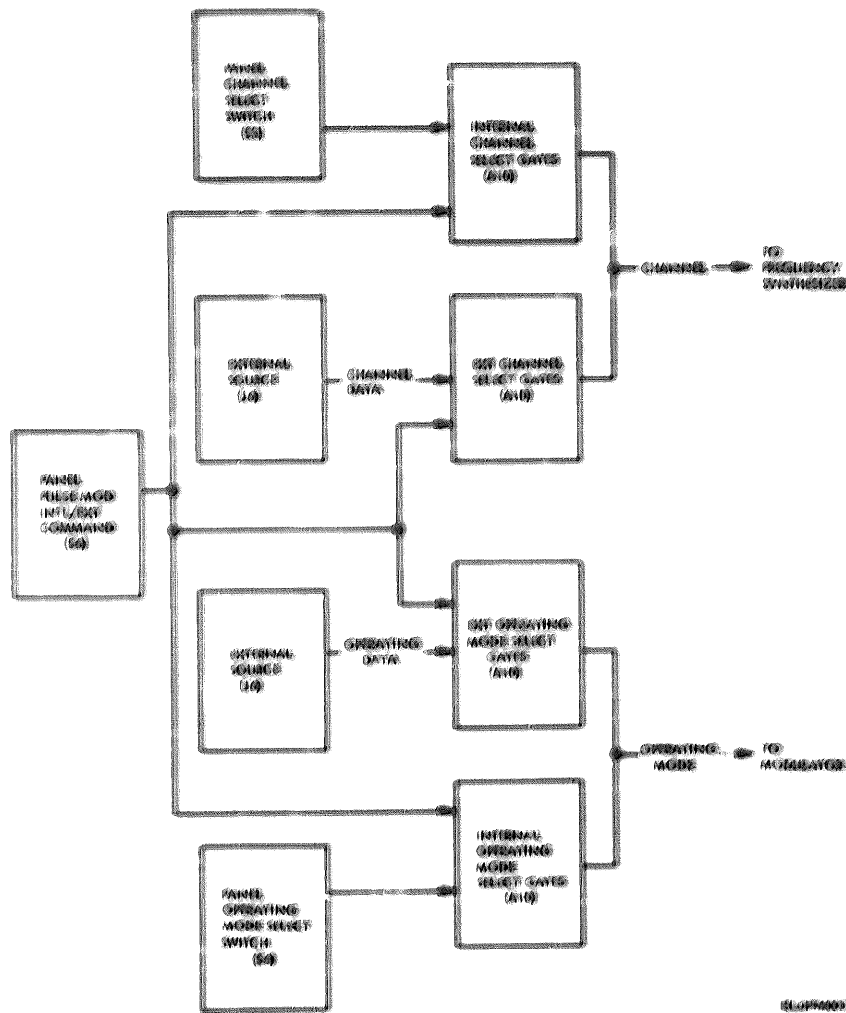


Figure 4-7. Channel and operating mode selection.

4-8. Frequency Synthesizer

A constant 37.5-MHz sine wave is generated by the temperature compensated crystal oscillator. This sine wave is applied to the frequency synthesizer (fig. FD-12). The other inputs to the frequency synthesizer are channel and operating mode selection data from the video unit. This data is sent to the control divider where it establishes the output frequency and operating mode. The 37.5-MHz sine wave is applied to a divide-by-300 counter, resulting in a 41.66-KHz reference frequency that is applied to the frequency discriminator and the phase discriminator. Discriminator outputs are applied to two similar voltage controlled

oscillators (vco), one for the lower frequencies (220.05 MHz to 362.50 MHz) and one for the higher frequencies (362.60 MHz to 404.50 MHz). Vco output is divided by eight and returned to a mixer via an rf switch, where the 37.5 MHz component is subtracted from the vco output and the difference is sent to the control divider. The control divider output is also applied to the frequency and phase discriminators. When a large difference exists between the reference frequency and control divider output, the frequency discriminator outputs a sawtooth waveform to the loop filter and summing amplifier. Sawtooth amplitude and polarity are determined by the magnitude and direction of

Table 4-1. Programming the I Signals.

Bit position	Int. input	Ext. input	Output signal	Description
1	SCNOR	ECNOR	PCNOR	Channel No. 100
2	SCNET	ECNET	PCNET	Channel No. 80
3	SCNFT	ECNFT	PCNFT	Channel No. 60
4	SCNTT	ECNTT	PCNTT	Channel No. 20
5	SCNOT	ECNOT	PCNOT	Channel No. 10
6	SCNDU	ECNDU	PCNDU	Channel No. 8
7	SCNFU	ECNFU	PCNFU	Channel No. 4
8	SCNTU	ECNTU	PCNTU	Channel No. 2
9	SCNOU	ECNOU	PCNOU	Channel No. 1
10	SPMCW	EPMCW	PPMCW	Pulse Modulation CW = 1
11	SPMIT	EPMIT	PPMIT	Pulse Modulation INT = 1
12	SPMEX	EPMEX	PPMEX	Pulse Modulation EXT = 1
13	SPMIE	EPMIE	PPMIE	Pulse Modulation INT/EXT = 1
14	SPMES	EPMES	PPMES	Pulse Modulation EXT SQ = 1
15	SRTTY	ERTTY	PRTTY	Rise Time, $t_r = 2.0 \mu\text{sec}$ $t_f = 2.5 \mu\text{sec}$
16	SAWET	EAWET	PAWET	Amplitude Modulation INT = 1

the error, respectively. The summing amplifier output causes the vco to vary, attempting to correct the error that exists between the reference frequency and control divider output. As the control divider output approaches the reference frequency, the frequency discriminator is switched off and the phase discriminator is switched on. The phase discriminator output is a pulse with a constant time duration and a variable duty cycle. The duty cycle is determined by the magnitude and direction of error. When the control divider output equals the reference frequency, the phase

discriminator output is a square wave. When the frequency discriminator output is at zero and the phase discriminator output is a square wave, the summing amplifier output is stable and the vco ceases to change frequency. The vco output is applied to a times-three multiplier. The appropriate vco and multiplier are selected by the control divider select output. The selected times-three output is then applied to a stripline L-band amplifier. The L-band output signal is sent to the modulator.

1. Modulator

Amplitude and pulse modulation of the frequency synthesizer output (SCS) and composite sine wave (CSW) is accomplished by three positive-intrinsic-negative (PIN) diode modulators (fig. F9-13). The carrier (SCS) from the frequency synthesizer is modulated in attenuator 2 and in the first PIN modulator, Gaussian pulse shaper A1, with the Gaussian pulse from Gaussian pulse shaper modulator A4. There is a closed loop modulator circuit with feedback from the linear detector A1 to regulate the carrier level at a constant amplitude. The video level Gaussian pulse is formed in Gaussian pulse shaper modulator A4 in a shaping circuit that is triggered by delay control A5. Gaussian pulse shaper A4 switches the rf level to bracket the Gaussian pulses to provide a continuous level of control current for the hearing modulator A2 between pulses. Following the Gaussian pulse modulator is the second PIN modulator, hearing modulator A2. A feedback controlled circuit with the third PIN modulator, hearing detector A7, provides Gaussian pulse amplitude level control for hearing modulator driver A6. Following the hearing modulator is rectangular/ square pulse modulator/rf switch S2. This modulator is a variable attenuator which provides additional CW rejection and accepts rectangular pulses in the external square pulse mode. Directional coupler DC2 and temperature stabilized detector A3 follow this modulator and provide a measure of rf level for use in the display section. The modulated rf output (MRFP) goes directly from amplifier DC 2 to programmable attenuator A2.

a. The Gaussian pulse shaper modulator can be triggered from two sources, either from the video unit (DTTP) or from external sources (ETTP). In either instance, it is necessary to accurately control the delay of the rf pulse from the trigger pulse. This is accomplished in the delay control (A5) circuit by generating timing pulses with a crystal oscillator and digital counter. The timing pulses (GDCP) are compared to pseudo pulses (GDRP) generated by the transmitted rf

pulse in the internal mode or by the video pulse that drives the Gaussian shaper modulator in the external mode. The timing error between GDCP and GDRP pulses is used to control a variable delay trigger. The initial operation in forming the Gaussian pulse is the generation of a triangular pulse that is applied to a shaping network which produces a linear segmented approximation of the Gaussian pulse. This is applied to an active filter which produces a smooth waveform that closely approximates a true Gaussian pulse. Since the hearing modulator follows this Gaussian pulse modulator, it is necessary to provide a dc level in the time intervals between Gaussian pulses so that the hearing modulator feedback loop maintains a control current (BMDC). This is accomplished in the Gaussian pulse shaper modulator in the time interval between Gaussian pulses by multiplexing the Gaussian pulse signal with a dc level equal to the Gaussian peak amplitude. This composite waveform (CMD0) is applied to the feedback circuit and the rf is modulated so that the rf voltage follows the composite waveform (fig. 4-4).

b. The hearing modulator (A2) includes a set of six series PIN diodes which control the Gaussian pulse amplitude. To provide the required attenuation, the hearing modulator is implemented as a two-section, L-pad attenuator with PIN diodes as the pad elements. Minimum attenuation is produced when the series diodes are on and the shunt diodes are off. Maximum attenuation is available when the series diodes are off and the shunt diodes are on. The diodes and driving circuit provide a risetime and falltime of less than 100 nanoseconds for the rectangular pulse modulation. The hearing modulator feedback circuit (BMDE and BMDO) is similar to the Gaussian pulse modulator feedback circuit. There are two sine wave sources into hearing modulator driver (A6): the 15/135 Hz signal (CSW) from the video unit, or the 15 Hz to 10 kHz input (EAM) from an external source (J9 EXT AMPT MOD). The selected sine wave is summed with a dc voltage to provide a normal rf level with a dc bias voltage for the



Figure 4-6. Composite Generation sine wave.

PIN diodes in bearing modulator A2. The amplitude of this signal (BMDS) is controlled by the level of inputs (EAM or CSW) and by the level control circuit in bearing modulator driver A4. This level control circuit includes a set of six resistors that are switched to ground in various combinations to provide 64 steps of attenuation. The output of the level control circuit is compared with the output of the linear detector A7 (BMDO) in a summing amplifier to provide the drive signal (BMDS) for controlling the rf output from bearing modulator A2 at a desired modulation index and constant carrier level. In the bearing modulator drive (A6), the percent modulation detector circuitry produces a linear dc voltage output (MPCT) which is linear with the input modulation. This data is sent to the display section.

A rectangular/square pulse modulator/rf switch S2 follows bearing modulator A2 and detector A7. When turned on, this variable attenuator provides minimum attenuation and a window sufficiently wide to pass the Gaussian pulse without distortion. When turned off, it provides sufficient attenuation, in addition to that of the Gaussian pulse modulator, to provide a minimum of 70 dB attenuation. When trans-

mission inhibit, or blanking, is required, this circuit also functions as an rf switch. The rf switch is actuated by drive gate signal RMDG which originates in delay control A5 in response to internal/external commands PPMXX in combination with ESPM, GSTT, and DTIP.

4-18. Programmable Variable Attenuator

The programmable variable attenuator (fig. 4-7) comprises two printed circuits, one module, and associated connector and switch inputs. Output attenuation is controlled by either commands from OUTPUT ATTENUATOR switch or externally from connector J6. The mode of operation is determined by the internal/external command level from connector J2. Both internal and external attenuation data is sent to programming No. 2 along with the internal/external command level. The data gates then determine which data to use. This gated data is sent to the attenuator and driver card, formatted as shown in table 4-2. In the attenuator logic and driver circuits, the input data is compared to the attenuator position feedback data from the programmable attenuator. When the input data does not compare with the feedback data, the programmable attenuator must be positioned until input and feedback are equal. The programmable attenuator is a digitally variable electromechanical device that can vary from 0 dbm to 119 dbm in 1.0 dbm increments. It has an insertion loss of less than 1 db and a maximum VSWR of 1.3 to 1.0. As the programmable attenuator is repositioned, the positional data is returned to the attenuator logic and compared with the input data. When they are equal, the programmable attenuator is latched and positioning stops. The attenuated rf signal is then coupled through the power measurement section to the input/output terminal. Also located in the attenuator and detector module is a low temperature sensing switch and heater that heats the compartment when the ambient temperature is less than 25°F.

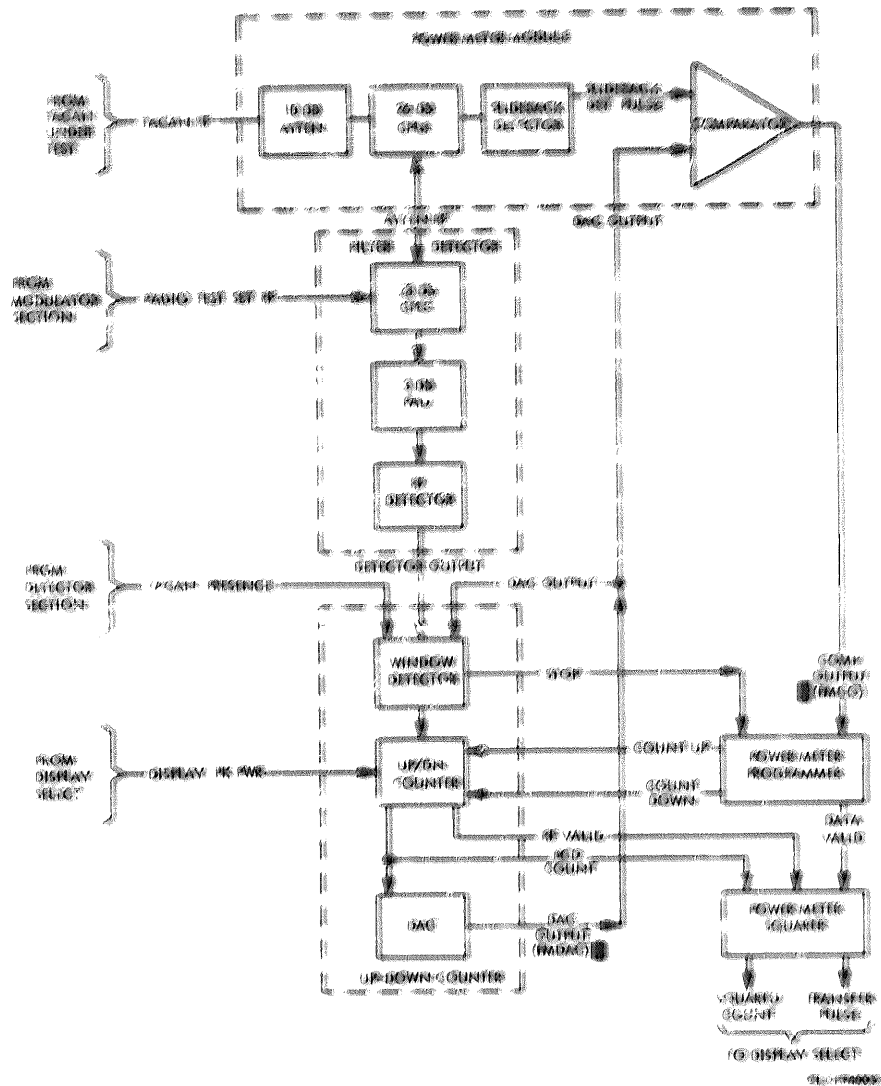


Figure 4-8. Power measurement section, simplified block diagram

4-12. Video Detective Section

Table 4-2. Programming No. 2 Signals

Bit position	Int. input	Ext. input	Output signal	Description
1	<u>SOLEU</u>	<u>EOLTU</u>	POLTU	RF Output Level 2 dbm
2	<u>SOLOU</u>	<u>EOLOU</u>	POLOU	RF Output Level 1 dbm
3	<u>SOLOH</u>	<u>EOLOH</u>	POLOH	RF Output Level 100 dbm
4	<u>SOLEY</u>	<u>EOLEY</u>	POLEY	RF Output Level 80 dbm
5	<u>SOLEY</u>	<u>EOLEY</u>	POLEY	RF Output Level 40 dbm
6	<u>SOLEY</u>	<u>EOLEY</u>	POLEY	RF Output Level 20 dbm
7	<u>SOLEY</u>	<u>EOLEY</u>	POLEY	RF Output Level 10 dbm
8	<u>SOLEU</u>	<u>EOLEU</u>	POLEU	RF Output Level 8 dbm
9	<u>SOLEU</u>	<u>EOLEU</u>	POLEU	RF Output Level 4 dbm

4-11. Power Measurement Section

The power measurement section (fig 4-11) contains coarse and fine measurement loops. For coarse measurement, rf is coupled to a slideback detector in the power meter module and an rf detector in the filter-detector module. The filter-detector output is applied to a window detector in the up-down counter module of the display section. When TACAN presence is sensed, the counter counts up until the digital-to-analog (D/A) converter output is within 1 volt of the peak value of the filter-detector output pulse. At this time, the window detector inhibits further up-counting and

the power meter programmer then starts the fine measurement cycle. During fine measurement, the up/down counter is ordered by the programmer to count down when the D/A converter output exceeds the peak value of the slideback detector pulse (high comparator output); and up when it does not (low comparator output). When the count stabilizes to plus or minus one count, the programmer issues a data valid signal to the squarer, and the squared binary-coded decimal (BCD) count (peak power) is sent along with a transfer pulse to the display select module for entry and display.

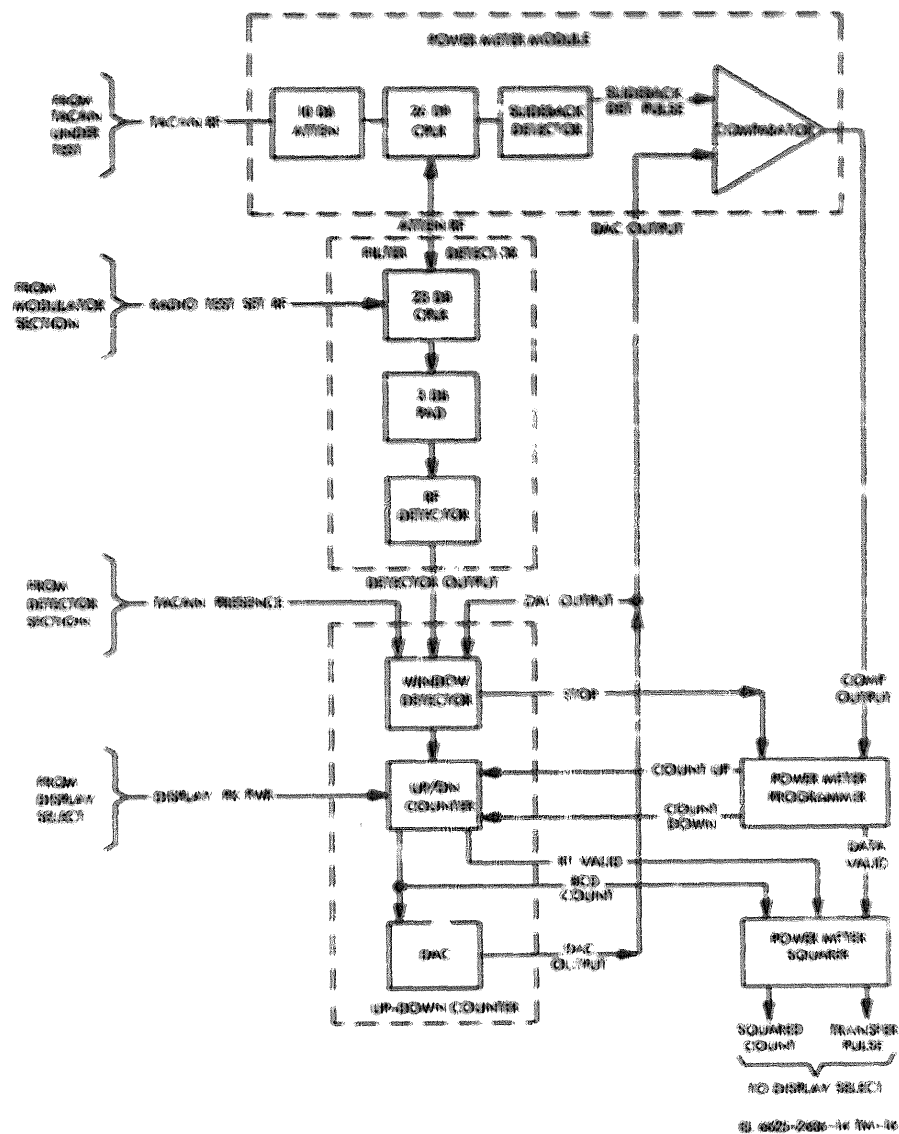


Figure 4-9. Power measurement section, simplified block diagram.

4-12. Video Detector Section

The video detector (fig. 4-12) section consists of the

pseudo pulse generator and the video and logic circuits.

Table 4-2. Programming the I Signal

Bit position	On input	Off input	Output signal	Description
1	RF LVL	RF LVL	RF LVL	RF Output Level 2 dbm
2	RF LVL	RF LVL	RF LVL	RF Output Level 1 dbm
3	RF LVL	RF LVL	RF LVL	RF Output Level 100 dbm
4	RF LVL	RF LVL	RF LVL	RF Output Level 80 dbm
5	RF LVL	RF LVL	RF LVL	RF Output Level 60 dbm
6	RF LVL	RF LVL	RF LVL	RF Output Level 20 dbm
7	RF LVL	RF LVL	RF LVL	RF Output Level 10 dbm
8	RF LVL	RF LVL	RF LVL	RF Output Level 5 dbm
9	RF LVL	RF LVL	RF LVL	RF Output Level 4 dbm

4-11. Power Measurement Sections

The power measurement section (Fig. 4-8) contains coarse and fine measurement loops. For coarse measurement, it is coupled to a diodeback detector in the power meter module and an rf detector in the filter-detector module. The filter-detector output is applied to a window detector in the up-down counter module of the display section. When TACAN presence is sensed, the counter counts up until the digital-to-analog (D/A) converter output is within 1 volt of the peak value of the filter-detector output pulse. At this time, the window detector inhibits further up-counting and

the power meter programmer then starts the fine measurement cycle. During fine measurement, the up/down counter is ordered by the programmer to count down when the D/A converter output exceeds the peak value of the diodeback detector pulse (high comparator output); and up when it does not (low comparator output). When the count stabilizes to plus or minus one count, the programmer issues a data valid signal to the squarer, and the squared binary-coded decimal (BCD) count (peak power) is sent along with a transfer pulse to the display error module for entry and display.

a. *Pseudo Pulse Generator.* The pseudo pulse generator is basically a low gain receiver. Receiver input is derived from the TACAN rf input signal and corresponds to a peak signal of +13 dbm to +30 dbm. The receiver input signal is scaled high enough to eliminate the need for an amplifier. A variable attenuator controls the rf level. The attenuator output is sent to a 3-db hybrid coupler. The other input to the coupler is the calib rf pulse from the modulator coupler output. The sum of the two signals is applied to the linear detector.

b. *Video and Logic Circuits.* The composite signal from the linear detector is applied to a 2-microsecond delay and then applied to a comparator. The other input to the comparator is from the sample and hold No. 1 circuit, which measures the pulse peak. The comparator is switched at the 50 percent point of each pulse and generates composite pulses. These composite pulses are sent

to logic gate No. 1 which removes the calibrate pulses and allows pseudo pulses to occur only during the TACAN pulses. The function of the remainder of the circuits is to provide gating and dump signals. This permits attenuation control in response solely to TACAN pulse amplitudes because the calibrate pulses are dumped prior to opening the attenuation control gate in sample and hold No. 2. A delay is used in the processing of received signals to determine their 50 percent voltage amplitude.

4-13. Display Selection Section

The display section (Fig. 4-10) provides manual selection of one of eight input parameters for measurement and display on a decimal readout. Seven of the eight input parameters are analog voltages; and one is a BCD word indicative of peak rf voltage from the power measurement section.

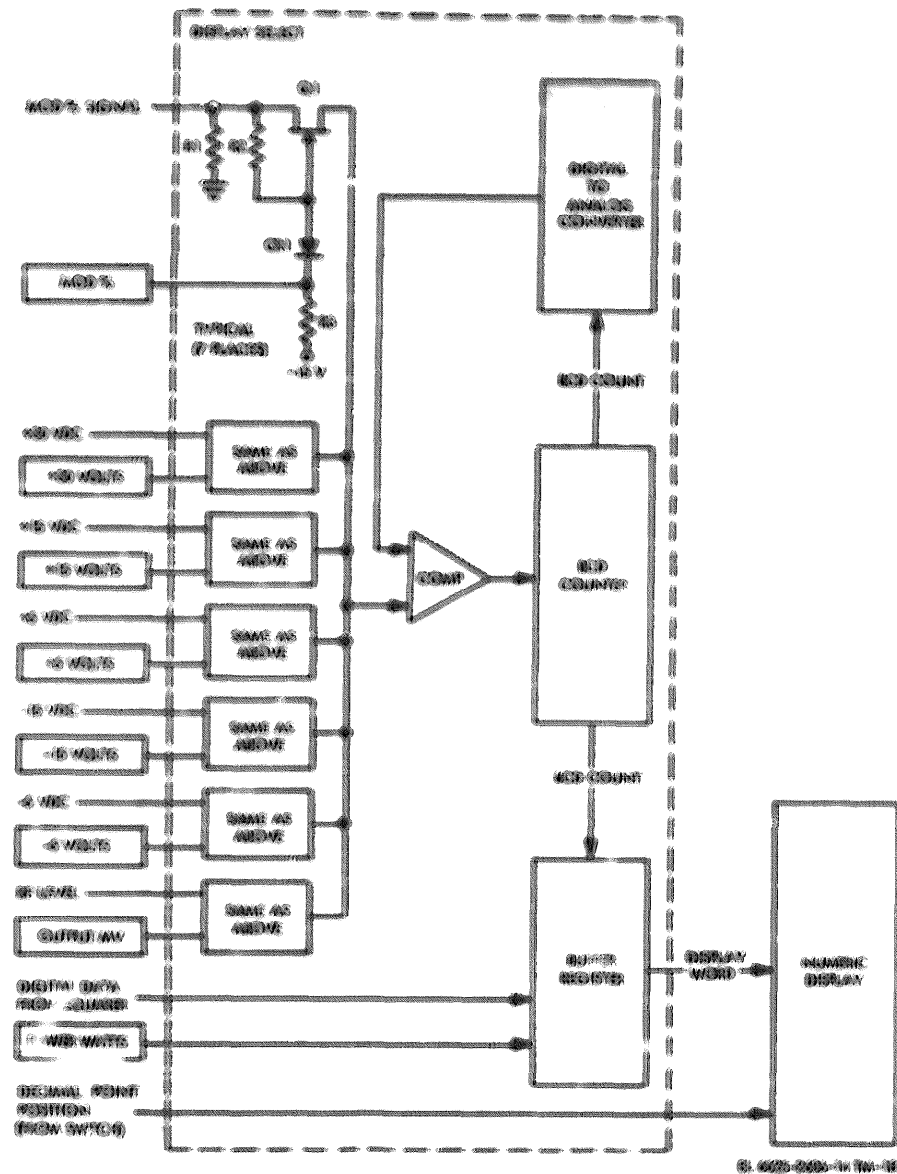


Figure 4-10. Display section, simplified block diagram.

3. Since voltage measurement is identical for the seven analog inputs, only the processing for percent modulation is described. When the SELECT switch is in the MOD % position, field-effect-transistor (FET) switch transistor Q1 of the display output module is turned on, connecting the MOD % signal voltage to one input of a comparator. The other input of the comparator is connected to the output of a D / A converter driven by a three-decade BCD counter. This counter, reset to zero at the beginning of the measurement cycle, counts up until the analog output of the D / A

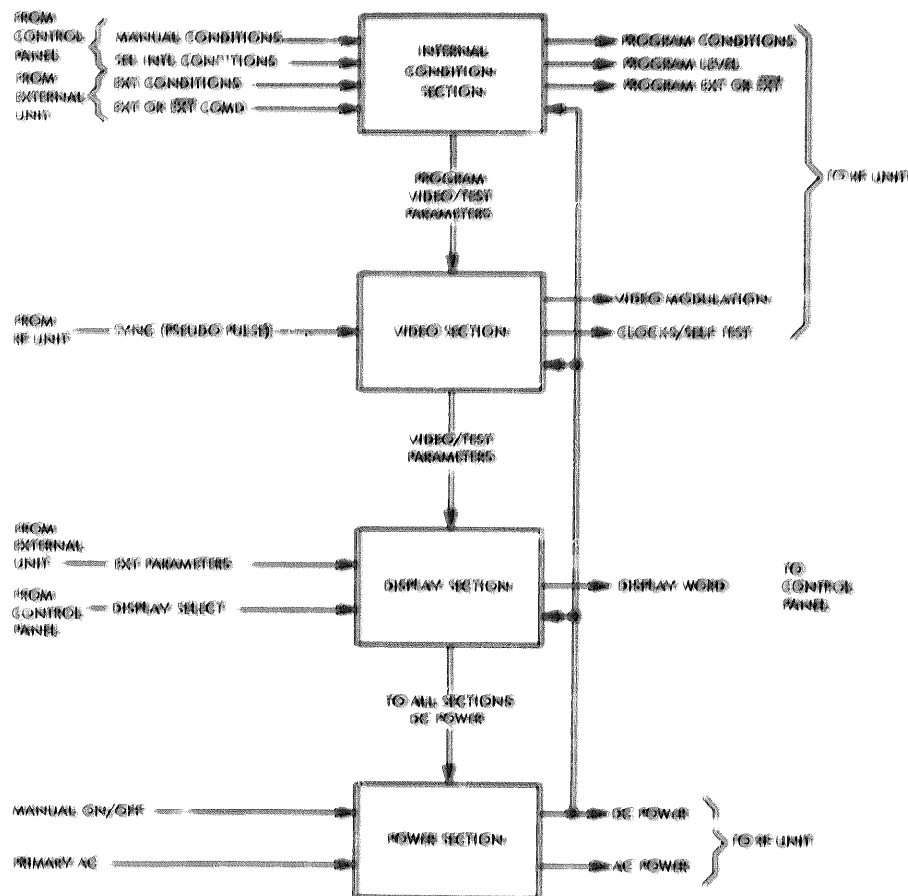
converter equals the analog voltage input to the comparator. The count is then stopped by the comparator output and the counter BCD output representing the analog value updates a storage register whose contents are displayed on the decimal readout.

4. Peak power is processed by the power meter programmer, up-down counter, and squarer as described in paragraph 4.9. A BCD word indicating peak power is transferred directly into the storage register when POWER WATTS is selected with the SELECT switch.

4-14. Video Units Functional Description

The video unit generates video signals whose parameters simulate TACAN navigational signal characteristics. This video is used in the rf unit to modulate the rf carrier that is applied to TACAN

equipment under test. The video unit consists of four functional sections (fig. 4-11). An internal condition section programs video unit operation, a video section develops programmed video modulation, a display section displays selected video parameters, and a power section provides power for both units of the radio test set.



11-6625-2606-14 FIG. 19

Figure 4-11. Video unit, simplified block diagram.

4-15. Video Unit Block Diagram Analysis

a. The internal condition section programs radio test set operation on the basis of external control, manual control, internal condition programs, or a self test program.

b. The video section develops interrogation video signals whose parameters are programmed by the internal condition section and detects reply video parameters. The video section outputs are applied to the display section for measurement and display, and to the rf unit for modulating the rf carrier.

c. The display section processes parameters selected by front panel controls for display on numeric readouts on the front panel. The display section can also be used to process and display external data inputs.

d. The power section converts input ac power into the low dc voltages required for video unit and rf unit operation. This section also provides power protection and equipment cooling.

e. The following paragraphs provide a detailed description of the individual blocks shown in figure 4-11, except for the power section which is described in paragraphs 4-3 and 4-4.

4-16. Internal Condition Section

The internal condition section (fig. 4-12) consists of a remote program control and a control matrix for each major function of the video unit. The remote program control determines whether an external word, manual switch settings, or preset internal conditions are selected by the control matrices for programming video unit operation.

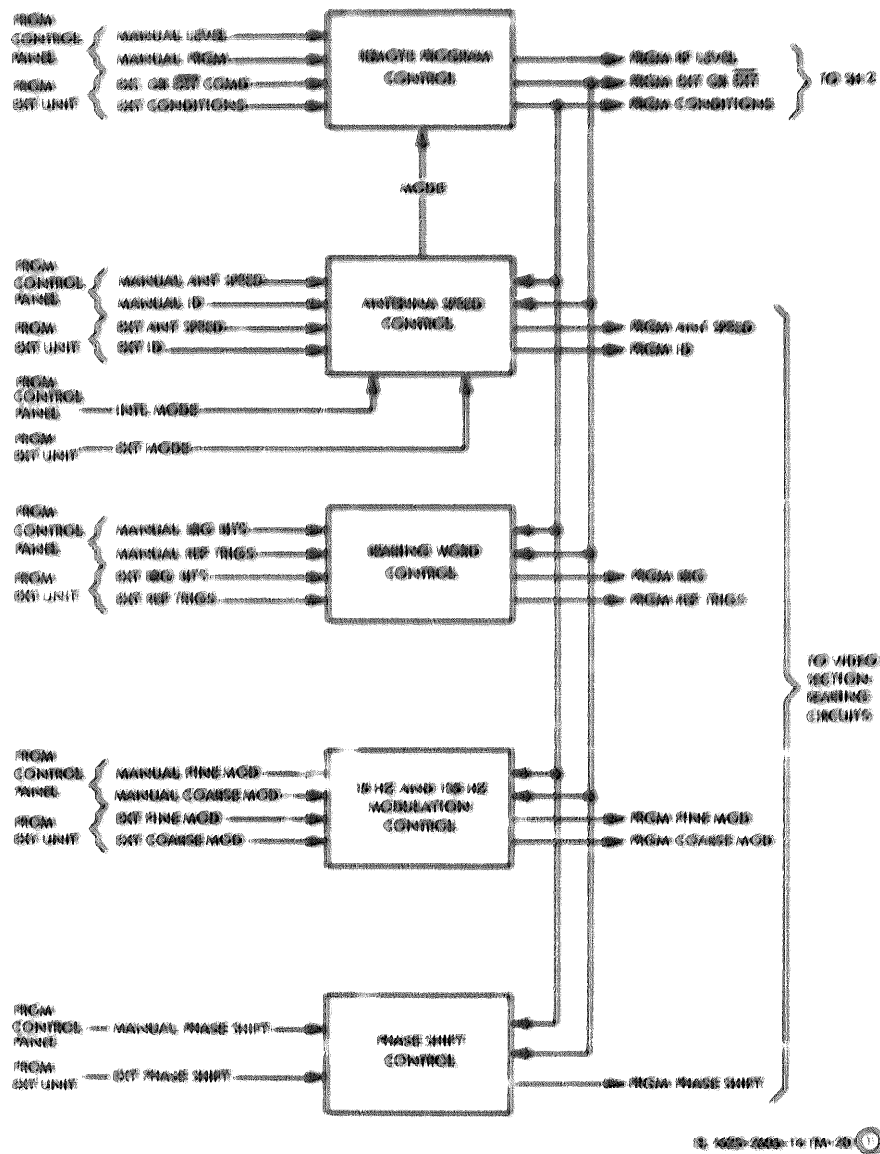


Figure 4-12 Internal condition section, simplified block diagram.
(sheet 1 of 2).

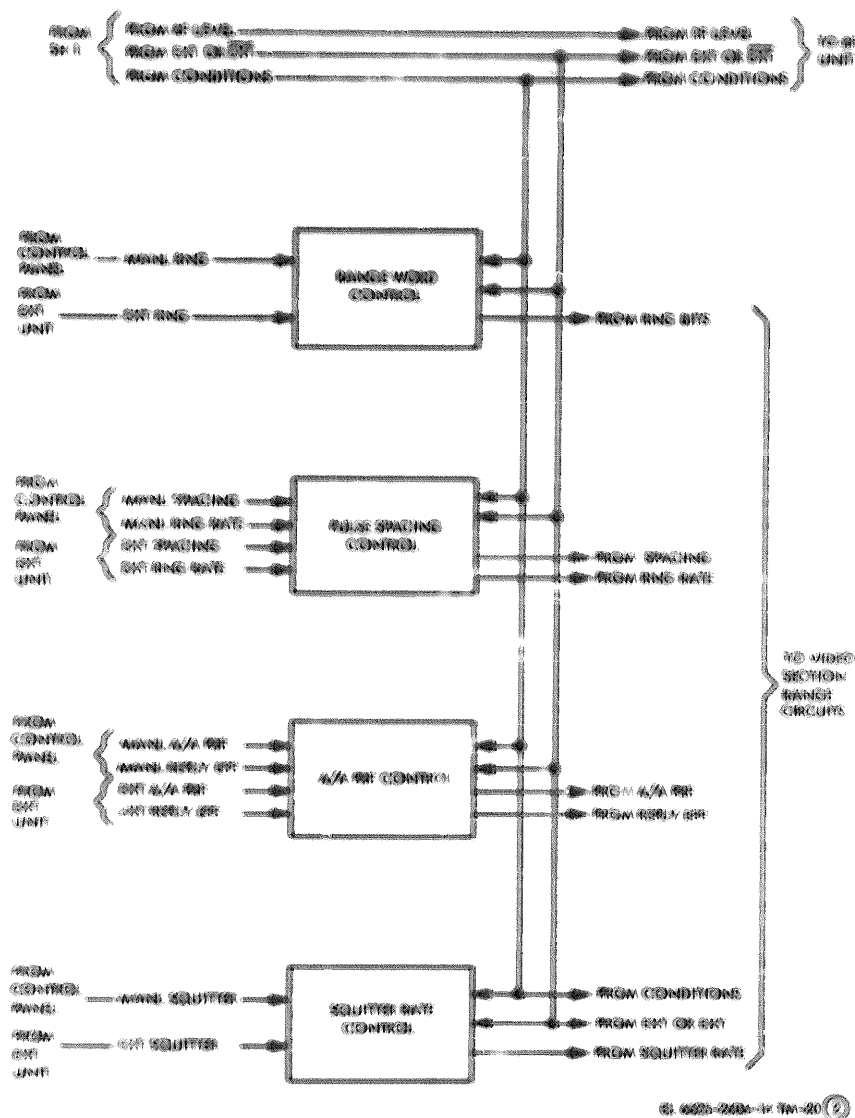


Figure 4-12. ② Internal condition section, simplified block diagram (sheet 2 of 2).

a. *Remote Program Control.* This logic sets up the control matrices for external control upon receipt of an external computer command (ECCM) from an external unit. When an ECCM is received, the program control issues a program external command (PEXC) to each control matrix to enable acceptance of external program words to program video unit operation. Conversely, if ECCM is received, PEXC is issued to enable acceptance of manual switch settings or internal conditions. If the PRGM switch is in the MANUAL position, the parameters set by the manual switches associated with each control matrix are used to control video

unit operation. If the PRGM switch is not in any other position, a signal indicating the selected condition is issued to the control matrices, and internal parameters present in the control matrices are used to control video unit operation. The remote program control also contains the selection matrices for phase shift loading sync selection.

b. *Control Matrices.* Since the circuits all operate in a similar manner, only typical operation is described. Each control matrix may operate in one of three selection modes: external, manual, or internal. External selection is enabled by PEXC from the remote program control to permit an

external word to program video unit operation. Manual selection is enabled by **FEXC** and the **MANUAL** position of the **PRGM** switch to permit manual switch settings to control video unit operation. Internal selection is enabled by **FEXC** and any remaining position of the **PRGM** switch selects sets of internal condition or self test parameters to program video unit operation.

4-17. Video Section

The video section (fig. 4-13) contains bearing video circuits and range video circuits. Controlled by the internal condition section, these circuits develop video outputs with the parameters required to provide amplitude and pulse modulation required by the rf unit for simulating TACAN navigational signals.

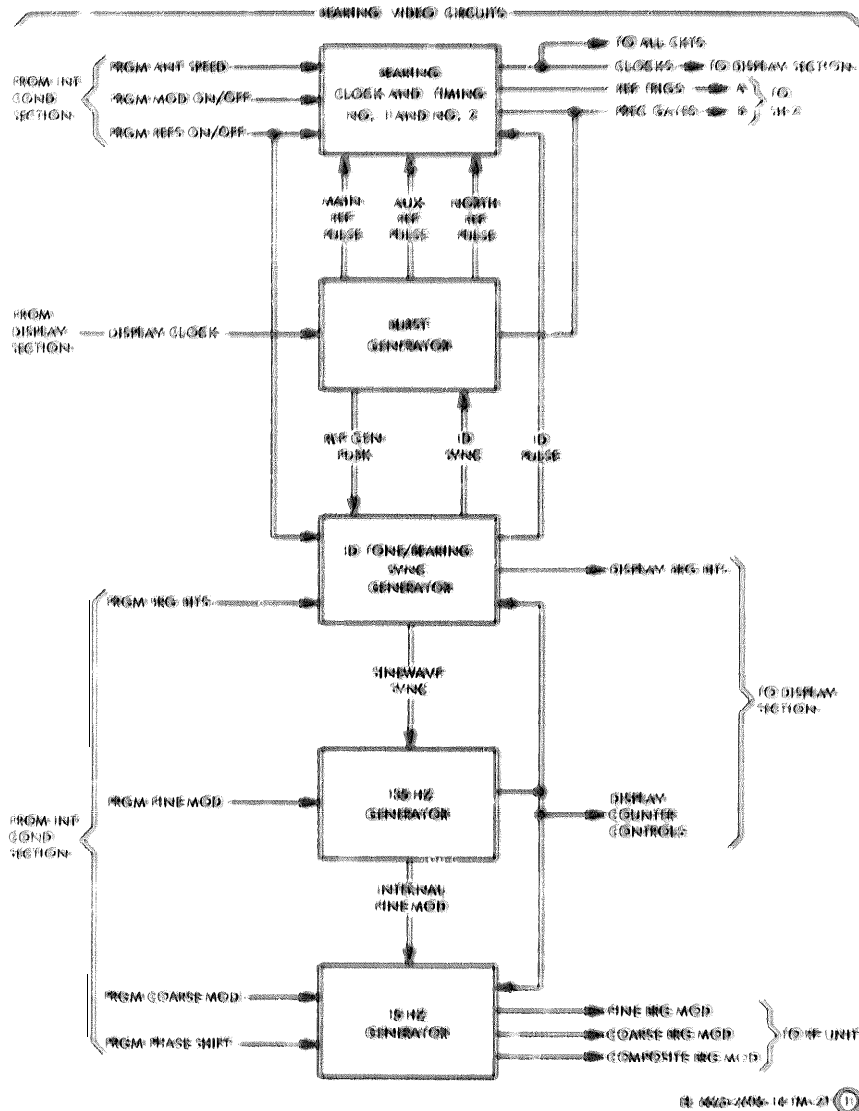


Figure 4-13. (1) Video section, simplified block diagram (sheet 1 of 2)

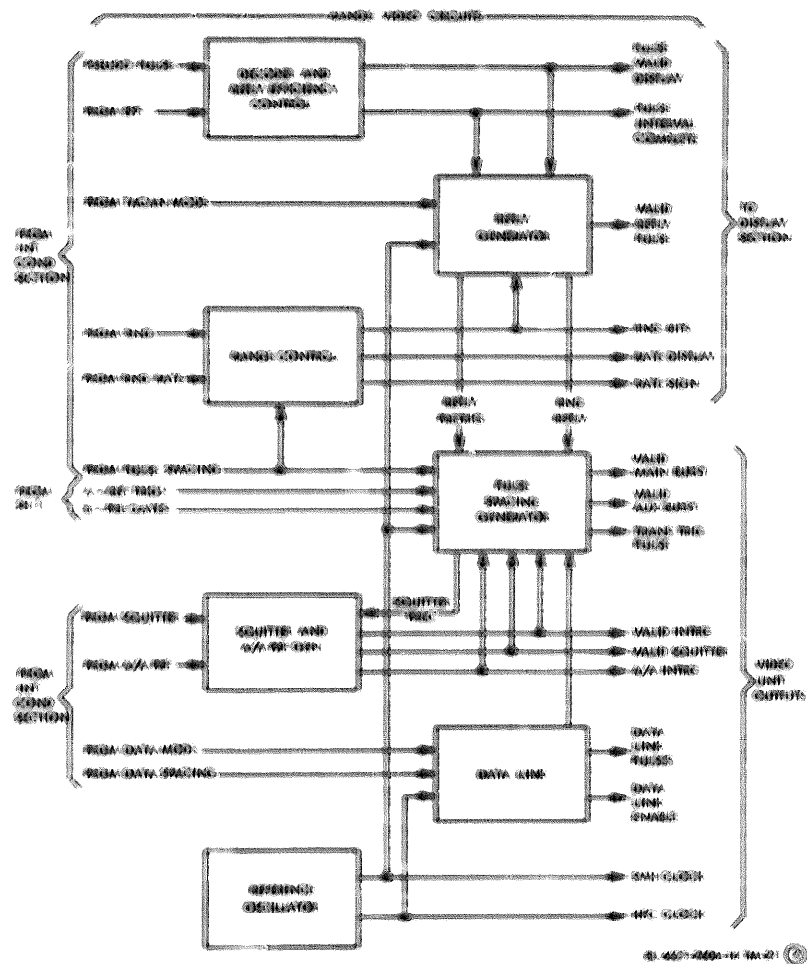


Figure 4-13. Video section, simplified block diagram (sheet 2 of 2).

a. **Beating Clock and Timing.** This logic generates all clocks required by the video section beating circuits. The beating clock and timing logic consists of a frequency synthesizer referenced by a 5.4 MHz temperature controlled crystal oscillator (TCXO). Beating rate (部数(文字)) and antenna

speed (ASXX1) inputs from the internal condition monitor programs frequency variations around the TCXO output. These variations allow 100-Hz increments in a 108 kHz clock to determine bearing rate and estimate speed. The primary outputs of this logic are as follows:

Signal	Function
SVC	Sine wave clock is used to generate cosine (115 Hz) and sine (115 Hz) sine waves. SVC is fixed by the TCXO at 100 kHz for zero bearing rate and zero antenna speed. The SVC frequency is a linear function of variable bearing rate or antenna speed deviation.
BCL	Bearing clock low is used to generate reference signals, including main reference burst, auxiliary reference burst, ID tone, and north reference pulse. It is fixed at 14 kHz for all conditions except variable antenna speed, in which case it is 14 kHz plus or minus a linear function of antenna speed deviation.
BCH	Bearing clock high is used in the same areas as BCL, and varies identically with regard to variable antenna speed. Its nominal frequency is 214 Hz.
BRC	Bearing rate clock issued in the display section for measurement and display of bearing rate. The BRC frequency is a linear function of bearing rate.
ASC	Antenna speed clock is used in the display section for measurement and display of antenna speed deviation. The ASC frequency is a linear function of antenna speed deviation.

b. Burst Generator. This logic generates reference pulses and corresponding precedence gates. The 10-MHz clock (DCOTM) from the display section and BCL from the bearing clock and timing section are used together with internal condition section mode commands to determine reference pulse spacing and pulse-per-burst count. Corresponding precedence gates are developed from the bearing clock and mode command. The burst pulses generated are as follows:

Signal	Function
MBP	Main burst pulse and its corresponding precedence gate is enabled in all except A/A mode, and is controlled in the clock and timing logic by a programmed main reference on/off signal from the internal condition section to provide the main burst trigger (MBT).
ABP	Auxiliary burst pulse and its corresponding precedence gate is enabled only in G/A mode, and is controlled in the clock and timing logic by a programmed auxiliary reference on/off signal from the internal condition section to provide the auxiliary burst trigger (ABT).
NRP	North reference pulse is enabled in all modes and is controlled in the clock and timing logic by a programmed north reference on/off signal from the ISC section to provide the north reference trigger (NRT).
IDP	ID pulse is enabled only in G/A mode, and is controlled in the clock and timing logic by a programmed ID on/off signal from the internal condition section to provide the ID tone (IDT) and ID precedence gate (IPG).

The ID pulse is generated in the ID tone/bearing generator.

c. ID Tone/Bearing Sync Generator. This logic consists of an ID tone generator and a bearing sync generator.

(1) The **L₁** tone generator continuously produces ID pulses and an ID code. In the clock and timing logic, internal condition section ID on/off/coded selects an ID (off), ID pulse (on), or the ID code (coded) for transmission as ID triggers to the range video circuit. The basic ID pulses are based on the auxiliary reference burst (ARB) as reflected in reference generator feedback (RGF) from the burst generator, so that ID sync occurs 740.741 microseconds after the first pulse of the ARB and thereafter at 740.741 microsecond intervals. The simulated ID code is a Morse code pattern prewired into an encoder. A divide-by-16 counter establishes a primary code interval of 118.52 microseconds. A divide-by-40 counter establishes 40 intervals per message. A divide-by-320 counter establishes message repetition of 37.93 seconds. In the message, dots are one interval, dashes are three intervals, spaces between dots and dashes are one interval, and spaces between characters are five intervals. The ID trigger output occurs continuously when programmed ID is on, but is gated by the ID code when coded ID is selected. The ID precedence gate generated by the clock and timing logic is high for ID on; and goes high in the coded sequence for ID coded.

(2) The bearing sync generator generates sine wave sync to determine the 135 Hz sine wave phase inflection (zero crossing) points relative to a main reference point established by the bearing burst generator on the basis of programmed bearing data from the internal condition section. The bearing sync generator also develops a self test trigger related to the inflection point and measures the programmed bearing data for display. The programmed bearing word promotes a programmed divider. This divider then counts down bearing clock low (BCL) from the time of the main reference point established by reference generator feedback (RGF) from the burst generator. Simultaneously, a display counter counts up BCL. When the divider count equals zero, the display count equals 10 times the preset bearing data in 0.1-degree increments. This point in time, representing the required inflection point for the sine waves, is used to develop SWS and STT. The display count is latched by display strobe latch (DSL) from the 135 Hz sine wave generator, and thus stabilized for use in the display section. The display counter is reset by display counter reset (DCR) also from the 135-Hz sine wave generator.

d. Bearing 135-Hz and 15-Hz Generators
These generators generate the 15-Hz cosine and 135-Hz sine bearing modulation sine waves. These sine waves are combined to provide the composite sine wave used for bearing modulation in the rf unit. For programmed fixed bearing, the sine waves are forced to a specific phase with respect to the main reference burst by sine wave sync (SWS) from the ID tone / bearing generator. For programmed variable bearing rate, the sine wave phases are permitted to change with respect to the main reference burst. For programmed antenna speed deviation, the sine wave phases remain fixed but their frequencies vary as a function of programmed antenna speed.

(1) In the 135-Hz sine wave generator, a triangle generator clocked by the sine wave clock (SWC) from the clock and timing logic, produces a sequence of binary states proceeding from zero to a peak of 200 and then back to zero. This output is converted by the synchronous inverter into a

bipolar 135-Hz sine wave. For variable bearing rate or antenna speed deviation, the sine wave sync (SWS) from the ID tone / bearing generator establishes the inflection point (zero crossover point) of the 135-Hz sine wave. A display strobe latch (DSL) signal is generated by the 135-Hz sine wave generator. DSL is used to sync the 15-Hz sine wave generator and to latch the count of the bearing and ID tone/bearing sync generator display counter. A display counter reset (DCR) is derived by ANDing DSL with BCL, and is used to reset the ID tone/bearing sync display counter.

(2) The 15-Hz sine wave generator is similar to the 135-Hz sine wave generator, except that the DSL signal replaces SWS as sync for the sine wave, and that a phase shift can be programmed into the 15-Hz sine wave by the internal condition section as shown in figure 4-14.

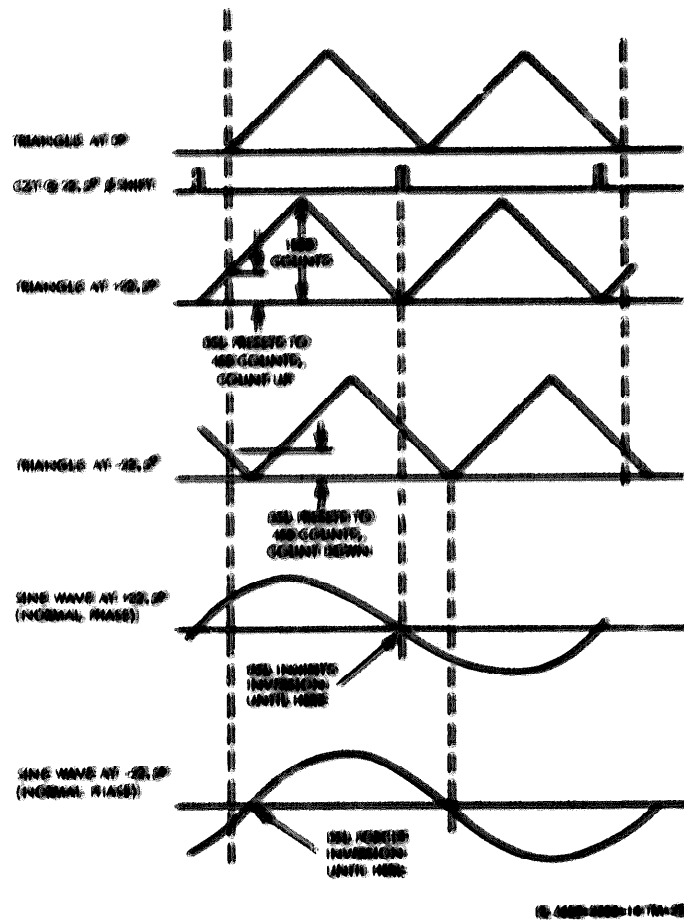


Figure 4-14. Fifteen Hz sine wave timing.

4. Decoder/Reply Efficiency Control. This logic contains a pulse spacing decoder and a reply efficiency control (Fig. 4-13).

(1) The pulse spacing decoder detects pulse pair spacing related to the TACAN modes to validate pseudo pulse pairs from the rf unit. Pulse spacing is validated by determining whether the second pulse of a pair falls within an 8-microsecond window that is delayed 12, 24, or 36 microseconds from the first pulse. The programmed delay is a function of mode. Pulse interval complete (PIC) is generated at the trailing edge of the window for resetting various video and display section circuits. Pulse pair valid (PPV) and pulse valid display

(PVD) are generated if the pulse pair spacing is valid. PPV is used by the reply efficiency control and PVD is used in the display section.

(2) The reply efficiency control simulates the percentage of replies to interrogations from 0 to 100 percent of system maximum in 10-percent steps. Pulse pair valid (PPV) pulse trains from the pulse spacing decoder are gated into 10 segments. Each segment is proportional to 10 percent of maximum efficiency. Program efficiency bits from the internal condition section select from 0 to 10 individual segments for simulating percent efficiency.

f. Range Control. This logic contains encoder No. 2 (associated with the range trigger control, subparagraph j) and a range bit control. For fixed range (0 to 399.9 nominal miles) program range bits from the internal condition section preset an up-down counter in the range bit control. This preset count is transmitted directly to the reply generator. For variable range (0 to 6000 nominal) program range bits control the counting rate and the counting polarity (up or down) from the preset range value. The changing count is then transmitted periodically to the reply generator. Range bits, range rate bits, and range polarity bits are used in the display section.

g. Squitter and A/A Generator. This logic contains a squitter generator and an A/A generator.

(1) The squitter generator simulates random squitter as a programmed rate. A noise generator circuit produces pulses of random amplitude and frequency. Program squitter rate (SQR) from the internal condition section controls the random pulse rate from the noise generator for squitter frequency. The resulting squitter pulses (SQP) are selectively blanked by precedence logic in the trigger control, subparagraph j. Resulting valid squitter pulses (VSQ) are fed back along with valid reply pulses (VRP) or valid interrogation pulses (VIP) to form an automatic gain control (AGC) loop for the squitter generator, thus maintaining the required duty cycle for the AT unit modulation section.

(2) The A/A generator is a frequency synthesizer controlled by the program A/A prf from the internal condition section. The output of the A/A generator provides the A/A interrogation pulses (AAP) to the range trigger control.

h. Reference Oscillator. This logic generates the following reference clocks:

SMC-46.0425 MHz Clock
 SWM-46 MHz Clock
 TTM-25 MHz Clock
 DCM Display Clock Monitor

SMC and SWM are used to clock the reply generator and the trigger control. TTM and DCM provide display and external sync.

i. Reply Counter. This logic contains a range delay counter. The counter is enabled by pulse pair valid (PPV) from the decoder and reply efficiency control, and preset to a value proportional to system zero mile delay. The counter is clocked at a 16.1425 MHz rate by SWM from the reference oscillator to the count determined by the range bits from the range control. Then a range reply pulse (RRP) is generated. The counter may be inhibited

by pulse interval complete (PIC) unless PPV is present, by a precedence inhibit range (PIR) from the trigger control, or by range reply count (RRCT) from the decoder and reply efficiency control. The range reply output is applied to the trigger control and the valid reply—the output is sent to the display section.

j. Range Trigger Control. This logic contains a precedence control, a pulse spacing control, and encoder No. 1. Encoder No. 2 of the range control is described here since it is an associated function.

(1) The precedence logic establishes the order of precedence for pulses as follows:

Main Burst Trigger
 Aux. Burst Trigger
 ID Tone Trigger
 Interrogation pretrigger
 Reply retrigger
 Squitter

The precedence logic also maintains a minimum dead time between pulses. A pretrigger and a 60-microsecond timing cycle inhibit all pulses at least 60 microseconds before and 60 microseconds after a transmitted pulse. The output trigger pulses from the precedence logic provide pulse spacing modulation to the AT unit.

(2) The pulse spacing control selects the appropriate pulse spacing encoder in the range trigger control. Encoder No. 1 is selected for nominal ± 4 microseconds spacing (table 4-3) and encoder No. 2 is selected for 6.0 to 39.5 microseconds spacing.

(3) Encoder No. 1 is a 10-bit up-counter that is preset for ± 4 microseconds variation from nominal pulse spacing by program pulse spacing from the internal condition section. The counter is enabled by the + NOM. and - positions of the PULSE SPACING switch and triggered by encoder trigger pulse (ETP) from the pulse spacing control.

(4) Encoder No. 2 of the range control is a down-counter that is preset by the internal condition section. The counter is enabled by the pulse spacing selector switch, and triggered by encoder trigger pulses (ETP) from the pulse spacing control. The encoder No. 2 output provides 6.0 to 39.5 microsecond pulse spacing in selectable 0.5 microsecond steps.

k. Data Link. This logic simulates a data link to a TACAN. Data link modes, spacing, and pulse parameters (fig. 4-13) are controlled by video unit front panel switches. The TS TRANS/Bi LAT/TCN TRANS toggle switch selects data link Test Set Transm., Bi-lateral, or TACAN transmit modes.

Table 4-3. Nominal Pulse Spacing vs TACAN Mode

Trigger	T / R (A)	T / R (B)	A / A (B)	A / A (B)
Main Burst	12.5 μs	—	—	—
Aux Burst	12.5 μs	—	—	—
ID Tone	12.5 μs	30 μs	12.5 μs	20 μs
Squitter	12.5 μs	30 μs	—	—
Range Reply	12.5 μs	30 μs	—	—

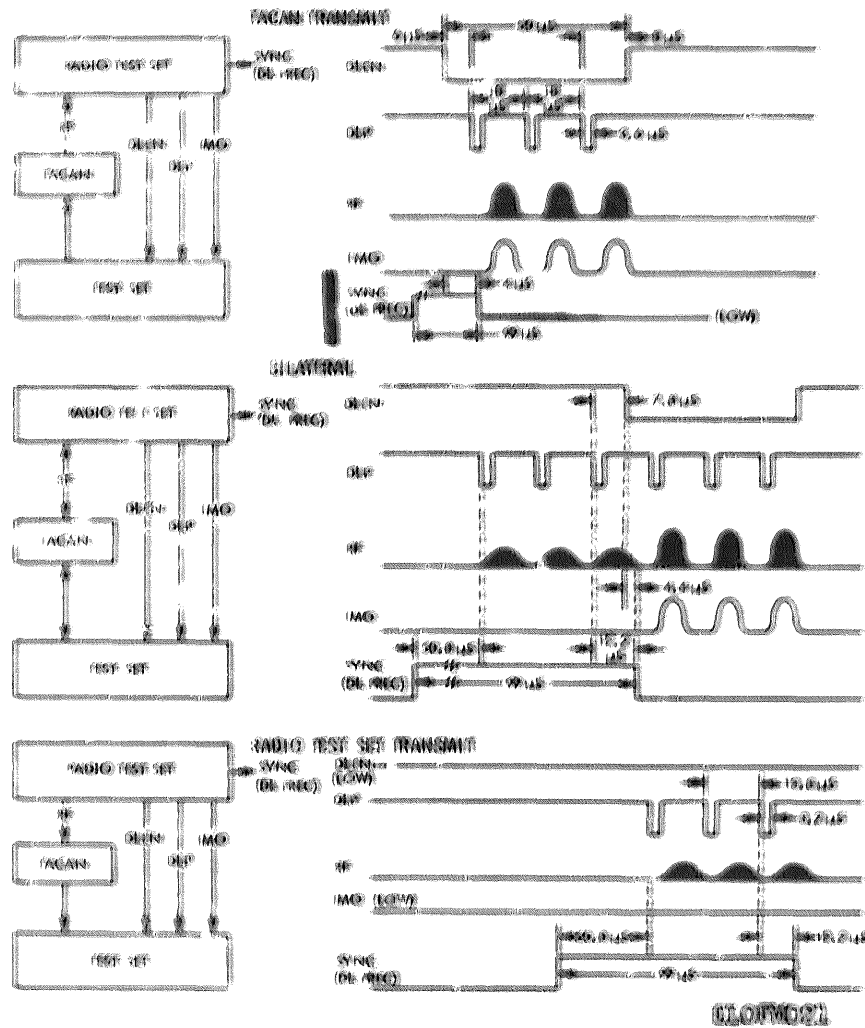


Figure 4-15. Data link timing.

respectively. GROUP SPACING switches control spacing between groups from 00 to 490 microseconds in 10-microsecond steps. GROUPS/FRAME switch controls the number of pulse groups per frame in 1-group steps. The FRAMES/SEC switch controls pulse group generation rate from 1 to 5 times per second. Data link pulses (DLP) are three pulse groups, within which pulses are 10 microseconds apart. Data link enable (DLEN) is a two level signal that enables TACAN, bilateral, or radio test set transmission.

(1) In the TACAN transmit mode, DLEN steps to low 6 microseconds prior to the first of the three DLP and steps to high after 50 microseconds. In this mode, the radio test set can test the TACAN transmitter by comparing the received pseudo pulse

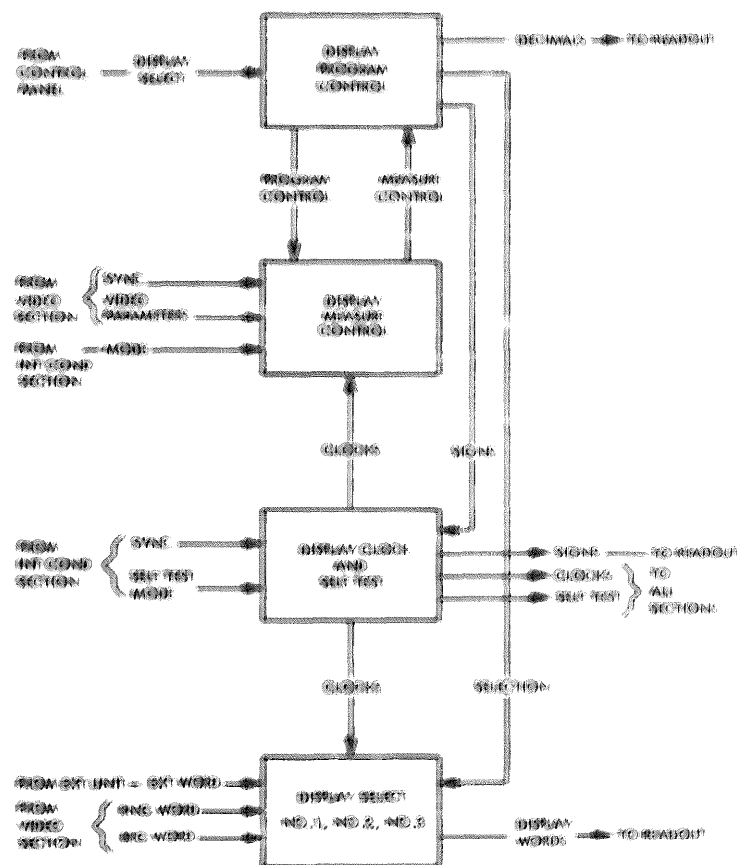
detector (RPFT) output with DLP when DLEN is low.

(2) In the bilateral mode, DLEN steps alternately high for test set transmit and low for TACAN transmit. In this mode, the TACAN receiver and transmitter can be tested simultaneously.

(3) In the radio test set transmit mode, DLEN is always high. In this mode, the TACAN receiver output can be tested by comparing the buffered receiver video (BEV) with the DLP.

4-18. Display Section

The display section (fig. 4-16) processes and displays simulated bearing, range/pulse, or external video parameters selected by SELECT A or SELECT B switch settings on DISPLAY A or DISPLAY B readouts. This section consists of the program control, measure control, display select, and clock / self test logic.



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Figure 4-16. Display section, simplified block diagram.

a. **Display Program Control.** This logic decodes SELECT A and SELECT B switch settings to control the display section mode and to determine the parameters to be displayed on the DISPLAY A and DISPLAY B readouts. The control data from the SELECT A and SELECT B switches are two four-line BCD numbers, one for A (SDA(XX)) and one for B (SDB(XX)). The program control decodes the BCD numbers and provides the necessary gating signals to present the correct parameter measurements on the appropriate readout. The program control also derives the correct decimal point (DAD(XX) or DDB(XX)) and polarity sign (NCSA or NCSE) for each display mode selected.

b. **Display Measure Control.** This logic converts frequency and time-interval parameters into a parallel BCD word for selection and display by the display select logic. Any two parameters can be selected for simultaneous display. The measure control updates the BCD word for the display at 2-second intervals. The various parameters are processed as follows:

(1) The range rate parameter is applied to the measure control as a pulse train with a frequency between 0 and 16.66 kHz. This pulse train is scaled by gating it during a 0.36-second time-base generated in the clock and self test logic.

(2) The bearing rate parameter is applied to the measure control as a pulse train with a frequency between 0 to 300 Hz. This pulse train is scaled by gating it during a 1-second time-base generated in the clock and self test. The decimal point is placed to the left of the least significant digit by the action of the SELECT switches.

(3) The antenna speed parameter is applied to the measure control as a pulse train with a frequency between 0 and 21.6 kHz corresponding to a displayed deviation frequency from 0.0 to ± 0.3 Hz, respectively. This pulse train is scaled by counting it during a 1.3889-second time-base generated in the clock and self test.

(4) The A/A interrogation frequency parameter is generated in the range squitter and A/A PRF generator of the video section and

consists of digital pulses with a frequency adjustable between 5 and 1999 pulses per second. These pulses are scaled by counting them during a 1-second time-base generated by the clock and self test, and the count is stored in the measurement control register.

(5) The 15-Hz phase shift parameter is applied to the measure control as two digital pulses. Coarse zero trigger (CZT) is the 15-Hz positive sloped zero crossing. The bearing generator also provides the measure control with a 108 kHz clock waveform which is synchronized to the CZT and DCR signals. The 108 kHz bearing clock provides one pulse for every 0.05 degree of the 15 Hz phase shift. A 15-Hz phase shift sign bit is provided by the internal condition section to determine whether the phase shift is positive or negative. If positive, the cycle is started with CZT and stopped with DCR; if negative, the cycle is started with DCR and stopped with CZT. During the measurement cycle, the 108-kHz clock is counted to determine the number of 0.05-degree increments of phase shift. This count is divided by two and the count stored in the display select cache. The program control logic places a decimal point to the left of the least significant digit in the display when the SELECT switches select the phase shift parameter for display.

(6) The TACAN A/A delay parameter measurement cycle (fig. 4-17) starts with a valid interrogation pulse (VIP) which indicates that the radio test set is going to interrogate the TACAN. A delay trigger pulse (DTP), delayed from the leading edge of the VIP by an amount of time equal to the sum of the rf section time delays, starts a 20 MHz count in the measure control. If the leading edge of a pseudo pulse occurs during this window, measurement is stopped and the number in the measure control is the turn-around time of the TACAN. The cycle starts over upon the arrival of each VIP. The program control places a decimal point to the left of the least significant digit in the readout so that the turn-around time is shown in 0.1-microsecond increments.

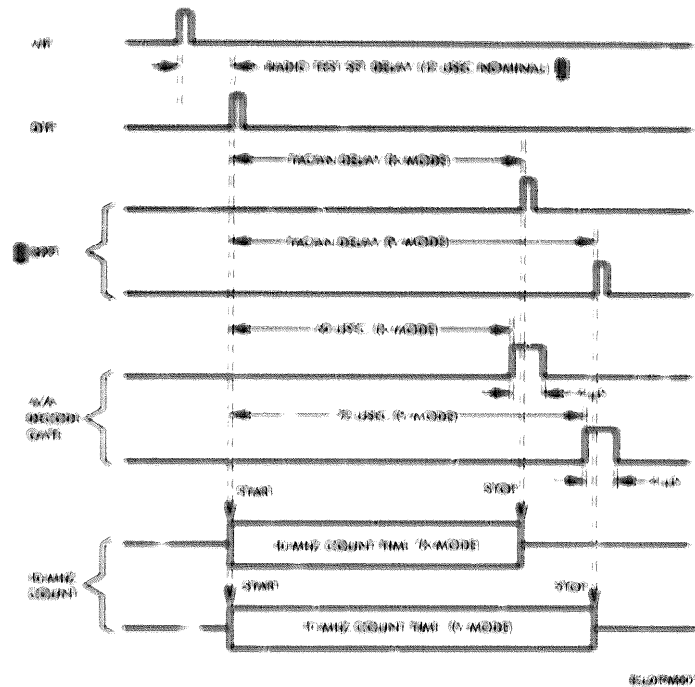


Figure 4-17. TACAN delay line measurement timing.

(7) The test set reply efficiency parameter is measured as follows: The video section decoder/reply efficiency control issues a pulse pair valid (PPV) pulse every time the radio test set is interrogated. The video section precedence logic puts out a range reply pulse (RRP) each time the radio test set is going to reply to a TACAN interrogation. The test set reply efficiency is defined as the ratio of RRP to PPV. The measurement cycle is enabled after a reset pulse from the program control and started by the next PPV. The PPV are then counted in a divide-by-100 counter in the measure control and the RRP's are counted in the BCD counter. After 100 PPV's are counted, the cycle will stop. The number of RRP's thus accumulated in the BCD counter is the test set reply efficiency. The display is then updated, and the cycle starts over.

(8) The TACAN reply efficiency parameter is the ratio of valid reply pulses (VRP) from the TACAN, to radio test set valid interrogation pulses (VIP). The measurement sequence starts after the program control card resets the start/stop circuitry. The next valid interrogation pulse will enable start. Then, the VIP's are counted in a divide-by-100 counter in the measurement control and the VRP's are counted in the BCD counter. After 100 VIP's are counted, the cycle will stop. The number of VRP's accumulated in the BCD counter is the TACAN reply efficiency. The display is then updated and the cycle repeats.

(9) The TACAN rf pulse spacing parameter is the time delay from the 50 percent amplitude point on the leading edge of the first pulse of a TACAN pulse pair, to the 50 percent amplitude point on the leading edge of the second pulse. The measurement cycle starts when the arrival of the pseudo pulse starts the start/stop logic which allows the 20-MHz clock signal to be gated by the measure control. With the arrival of the second pulse, the video section range circuits determine if the two pulses were validly spaced for the operating mode. With the arrival of pulse pair valid (PPV) the start/stop logic is stopped and the number in the measure control is the rf pulse spacing. After the maximum allowable pulse spacing time for the mode selected, the video section range circuits generate a pulse interval complete (PIC) pulse which allows the program control to update the display readouts. If the PPV and PIC does not follow the second rf pulse, or if the PPV and/or PIC pulse comes before the second pulse, the measurement cycle is reset and starts over with the arrival of the next rf pulse. The cycle continues until a valid pulse spacing measurement is completed and the display is updated.

c. Clock and Self Test. This function includes clock logic and self test logic.

(1) The clock logic provides all required clock frequencies and accurate time bases used in the measurement of displayed parameters. The master clock fre-

quency is obtained from a temperature compensated crystal oscillator (TCXO) running at 20 MHz ± 0.001 percent. The 20-MHz clock is divided by two to provide a 10-MHz clock. The 10-MHz clock is divided by ten to provide the 1-MHz clock. The 1-MHz clock signal is then divided by a series of divide-by-ten counters to provide 100-kHz, 10-kHz, 100-Hz, 10-Hz and 1-Hz clocks. All of the clocks from the divider chain have the same ± 0.001 percent accuracy as the 20-MHz clock (TCXO). In addition, the time base circuit produces a 1.0 second time-base, a 0.36 second time-base derived from the 100 Hz clock, and a 1.36889 sec gate derived from the 100 kHz clock.

(2) The self test logic is activated when the video unit PROGRAM control is in the INT ST position. When self test is activated, zero degree bearing delay and zero range delay are measured and displayed on DISPLAY A and DISPLAY B respectively, and override the SELECT A and SELECT B switches.

(a) The zero degree bearing measurement cycle is started when the self test trigger (STT) from the video section allows the A display select logic counters to count 10-MHz clock pulses until stopped by the zero degree trigger (ZDT) from the video section. The resulting count indicates radio test set turn-around delay of the 15 Hz zero crossing inflection point from zero degree bearing. Further counting is inhibited until DISPLAY A has been updated, after which the next STT may restart the measurement cycle.

(b) The zero degree range measurement cycle is started by the range self test trigger (RSTT). The RSTT triggers the video section to produce a self test

interrogation pulse pair which is sent to the rf unit. The pseudo pulse pair output of the rf unit is fed back to the video unit. In the video section, the pseudo pulse pair is accepted as a valid interrogation pulse (VIP) and a second pulse pair is regenerated by the video unit and subsequently fed back to the pseudo pulse generator. The first pulse simultaneously starts a divide-by-three counter and starts a 10-MHz clock count in the B display select logic counter. The divide-by-three counter counts three pulses and then outputs a pulse coincident with the first pulse of the second pulse pair to stop the 10-MHz count. The resulting count indicates the radio test set zero range turn-around delay. Further counting is inhibited until DISPLAY B has been updated, after which the next RSTT may restart the measurement cycle.

d. *Display Select Logic.* The display select logic selects, decodes, and displays any one of three parallel BCD inputs, or the output of the measurement section. Either the range word, bearing word, or external word, or the output of the measurement circuit can be selected by enabling all of the bits for that word and applying a logic zero to the other word gates. These select inputs are provided by the internal condition section and the select switches.

e. *Display Readout.* The video display uses light emitting diode (LED) readouts to display the data selected by the display select logic. The integrated circuits are mounted in a heat sink assembly on the front panel and each individual digit contains a BCD decoder and current drivers to drive the LED matrix.

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

NOTE

Direct support maintenance is not authorized.

CHAPTER 6

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. EQUIPMENT, TOOLS AND TEST

6-1. Scope

This chapter contains instructions for troubleshooting, calibration, inspection, and testing of the radio test set. Removal and replacement of assemblies, plug-in circuit cards, and specific component parts are also included. Maintenance functions beyond the scope of general support level maintenance are referred to depot level maintenance.

a. Voltage and Resistance Measurements.

(1) *Voltage Measurements.* This equipment is transistorized. When measuring voltages, use tape or sleeving (spaghetti) to insulate the entire test probe except for the extreme tip. A momentary short circuit can damage one or more transistors. Use the same or equivalent test equipment specified in the test procedure.

(2) *Resistance Measurements.* Make resistance measurements in this equipment as directed in the troubleshooting procedures. Use the ohmmeter range specified; otherwise the reading will be inaccurate.

CAUTION

Before using any ohmmeter to test transistors or transistor circuits, check the open-circuit voltage across the ohmmeter test leads. Do not use the ohmmeter if the open-circuit voltage exceeds 1.5 volts. Also since the R_{x1} range normally connects the ohmmeter internal battery across the test leads, the comparatively high current (50 ma or more) may damage the transistor under test. As a general rule, it is not recommended that the R_{x1} range of any ohmmeter be used when testing low power transistors. Make resistance measurements in this equipment only as directed, otherwise indications obtained may be inaccurate.

b. *Waveform Analysis.* Many of the circuits in the radio test set use signals that are difficult or impossible to analyze with a voltmeter. For these circuits, the use of an oscilloscope or frequency counter is specified. The oscilloscope is used as the indication of circuit operation. Resistance measurements may be required to support the waveform observed.

c. *Test Points.* Test points used on this

equipment consist mainly of terminal boards inside the equipment. Other test points are connector pins on the circuit cards and are identified on the wiring diagrams.

d. *Intermittent Troubles.* In all of the tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the equipment. Make a visual inspection of the wiring and cable connections. Minute cracks in printed circuit boards can cause intermittent operation. A magnifying glass is often helpful in locating defects in printed boards. Continuity measurements of printed conductors may be made using the same technique ordinarily used on hidden conventional wiring; observe ohmmeter precautions discussed in a. above.

e. *Resistor and Capacitor Color Code Diagram.* The resistor and capacitor color code diagram (fig. FO-1) aids maintenance personnel to determine the value, voltage rating, and tolerance of resistors and capacitors.

6-2. Tools and Test Equipment Required

All the equipment required for general support maintenance of the radio test set as authorized by the Maintenance Allocation Chart, Appendix B, are listed below:

a. *Tools.* Tool Kit, Electronic Equipment TK-100 / G.

<i>b. Test Equipment.</i>		<i>Common Name</i>
Multimeter ME-26D / U		Multimeter
Oscilloscope AN / USM-281A		Oscilloscope
Counter, Electronic Digital Readout AN / USM-207A with 882 Plug-in		Counter
Comparator, Frequency CM- 77A / USM		Comparator
Test Set, RF Power AN / USM-260		Power meter
Thermistor Mount HP-478A		Mount

Section II. TROUBLESHOOTING

6-3. General

The general support troubleshooting procedures in this section supplements those procedures listed for organizational level maintenance in Chapter 3. Systematic troubleshooting begins with the sectionalization checks where the fault is traced to a major unit of the radio test set or test cable. Troubleshooting at the general support level uses those procedures which localize and isolate the malfunction to an assembly, plug-in circuit card, or a specific component.

a. *Sectionalization.* The operational tests and associated preventive maintenance tables in Chapter 3 provide tests for sectionalizing a fault to a major unit of the radio test set.

b. *Localization.* After the trouble has been sectionalized, the malfunction is then localized through visual inspection, continuity checks, or through the electrical tests provided in Section VI.

c. *Isolation.* The isolation of a malfunction in the test cable consists of tracing the trouble to a faulty connector or a broken wire. Isolation of a malfunction in the radio test set consists of checking input and output voltages and signals and isolating the problem to an assembly or plug-in circuit card.

6-4. Test Set Cables Troubleshooting

The troubleshooting of the test cable assemblies consists of visual inspections and continuity checks. The following procedures are also performed as part of the semiannual periodic check referred to general support maintenance from organizational maintenance.

a. *Visual Inspection.* Visually inspect the cables for broken connectors, pins, frayed wiring, or worn insulation. If any defects are found, refer the faulty cable to depot level maintenance.

b. *Continuity Checks.* Refer to table 6-1 and perform continuity checks as follows:

- (1) Set ohmmeter to Rx1 range.
- (2) Verify a reading of less than 2 ohms at each check.
- (3) If any readings are not obtained, refer cable to depot level maintenance.

Table 6-1. Cable Continuity

POWER INTERFACE CABLE W-3

From Pin	To Pin	From Pin	To Pin
P1-A	P2-A	P1-Bright pin	P2-Y
P1-B	P2-B	P1-Gnd pin	PX-W
P1-C	P2-C	P1-Brass pin	PZ-X
P1-D	P2-D		
P1-E	P2-E		
P1-F	P2-F		

Table 6-1. Cable Continuity (continued)

POWER INTERFACE CABLE W-3

From Pin	To Pin
P1-G	P2-G
P1-H	P2-H
P1-J	P2-J
P1-K	P2-K
P1-L	P2-L
P1-M	P2-M
P1-N	P2-N
P1-P	P2-P
P1-R	P2-R
P1-S	P2-S
P1-T	P2-T
P1-U	P2-U
P1-V	P2-V
P1-W	P2-W
P1-X	P2-X

SIGNAL INTERFACE CABLE W-3

From Pin	To Pin	From Pin	To Pin
P1-A	P2-A	P1-E	P2-E
P1-B	P2-B	P1-F	P2-F
P1-C	P2-C	P1-G	P2-G
P1-D	P2-D	P1-H	P2-H
P1-E	P2-E	P1-I	P2-I
P1-F	P2-F	P1-J	P2-J
P1-G	P2-G	P1-K	P2-K
P1-H	P2-H	P1-L	P2-L
P1-I	P2-I	P1-M	P2-M
P1-K	P2-K	P1-N	P2-N
P1-L	P2-L	P1-P	P2-P
P1-M	P2-M	P1-Q	P2-Q
P1-N	P2-N	P1-R	P2-R
P1-P	P2-P	P1-S	P2-S
P1-R	P2-R	P1-T	P2-T
P1-S	P2-S	P1-U	P2-U
P1-T	P2-T	P1-V	P2-V
P1-U	P2-U	P1-W	P2-W
P1-V	P2-V	P1-X	P2-X
P1-W	P2-W	P1-Y	P2-Y
P1-X	P2-X	P1-Z	P2-Z
P1-Y	P2-Y	P1-AA	P2-AA
P1-Z	P2-Z	P1-BB	P2-BB
P1-A	P2-A	P1-CC	P2-CC
P1-B	P2-B	P1-DD	P2-DD
P1-C	P2-C	P1-EE	P2-EE
P1-D	P2-D	P1-FF	P2-FF
		P1-GG	P2-GG
		P1-HH	P2-HH

INPUT POWER CABLE W-1

From Pin	To Pin	From Pin	To Pin
P1-A	P2-A	P1-Bright pin	P2-Y
P1-B	P2-B	P1-Gnd pin	PX-W
P1-C	P2-C	P1-Brass pin	PZ-X
P1-D	P2-D		
P1-E	P2-E		
P1-F	P2-F		

RFCABLE W-4

From - Pin	To - Pin
P1-Center pin	P2-Center pin
P1-Shield	P2-Shield

6-5. Troubleshooting

The troubleshooting procedures are based on the results of the electrical tests performed in Section VI. When an electrical test fails, note the failed test step. Then refer to table 6-2 to locate the troubleshooting table by paragraph designation and step entrance. The troubleshooting procedures provide step-by-step troubleshooting of each functional test not meeting minimum performance

standards. Where more than one test is necessary, the items are subdivided into substeps to isolate a malfunction to an assembly or circuit card. Removal and replacement instructions are provided in Section IV. If the trouble cannot be located using the troubleshooting procedures, refer the test set to depot level maintenance.

a. *Bench Test Setup.* The bench test setup is the same as described for electrical tests in Section VI.

b. *Initial Control Settings.* The initial control settings are the same as described for electrical tests in Section VI.

CAUTION

Never disconnect circuit cards with power on. Damage to equipment can occur.

Table 6-2. Troubleshooting Problems for Electrical Test Failures

Electrical Test Step No.	Troubleshooting Entrance Item No.	Electrical Test Step No.	Troubleshooting Entrance Item No.	Electrical Test Step No.	Troubleshooting Entrance Item No.
e1	e1	e1	e1	f1	e1
e2	e2	e2	e2	f2	e1
e3	e3	e3	e3	e4	e2
e4	e4	e4	e4	e5	e2
e5	e5	e5	e5	e6	e3
e6	e6	e6	e6	e7	e3
		e7		e8	e3
d1	d1			a1	e3
d2	d2			a2	e3
d3	d3			a3	e3c
		a1		a4	e3y
e1	e1	a2			
e2	e2	a3		e1	e4
e3	e3	a4		e2	e4
e4	e4			e3	
e5	e5			e4	
e6	e6			e5	e5
e7	e7			e6	e5
e8	e8			e7	e6
				e8	e6
f1	e1			e1	e7
f2	e2			e2	e7
f3	e3				
f4	e4			e1	e8
f5	e5			e2	e8
f6	e6			e3	e8
f7	e7			e4	e8
f8	e8			e5	e8

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Correction action
1	Video Unit POWER lamp	Verify blower 1B1 operates.	N / A	Blower 1B1 operates.	If blower 1B1 operates, replace POWER lamp. If blower 1B1 does not operate, proceed to Item 1a.
1a	Video Unit power interlock switch 1S2B	Set POWER switch to OFF, disconnect power cable W-1 from INPUT POWER connector on front panel, connect W-1 to INPUT POWER connector on rear panel, set POWER switch to ON, and verify:	N / A	POWER lamp illuminates.	If POWER lamp illuminates, replace power interlock switch 1S2B (para 6-11j and 6-12j). If POWER lamp does not illuminate, proceed to Item 1b.
1b	Power cable W-1	Check power cable W-1.	N / A	Power cable W-1 has continuity.	Replace power cable W-1 if faulty. If power cable W-1 is good, proceed to Item 1c.
1c	Video unit POWER switch 1S2B	Remove top cover and lift out card rack (para 6-11c), and verify:	1FL1 pins 2 and 4 (17 fig. 6-5)	115 ± 11 vac	If correct voltage is present, replace POWER switch 1S2B (para 6-11j and 6-12j). If correct voltage is not present, proceed to Item 1d.
1d	Video unit filter 1FL1 and power interlock switch 1S2B	Remove top cover (para 6-11a), remove right-hand side chassis support panel and chassis access cover (para 6-11i), and verify:	1FL1 pins 1 and 3 (23 fig. 6-6)	115 ± 11 vac	If correct voltage is present, replace filter 1FL1 (para 6-11e and 6-12e). If correct voltage is not present, replace power interlock switch 1S2B (para 6-11e and 6-12e).
2	Video unit blower 1B1	Verify:	N / A	Blower 1B1 operates.	If blower 1B1 does not operate, replace blower 1B1 (para 6-11e and 6-12e).
3	Power interconnect cable W-2.	Disconnect cable W-2 from *INTERFACE POWER connector on rf unit and verify:	W-2 pins K and L	115 ± 11 vac	If correct voltage is present, proceed to Item 3a. If correct voltage is not present, replace cable W-2.
3a	Rf unit blower 2B1	Remove top cover of rf unit (para 6-7a), disconnect connector 2XA2P1 from module 2A2 (fig. 6-2), and verify:	2XA2P1 pins D and C	115 ± 11 vac	If correct voltage is present, replace blower 2B1 (para 6-7k and 6-8k). If correct voltage is not present, refer rf unit to depot.
4	Video unit dc voltages	Disconnect cable W-2 from video unit INTERFACE POWER connector 1J3 and verify:	1J3-A 1J3-B 1J3-E 1J3-F 1J3-G 1J3-H	+4 ± 0.1 vdc +5 ± 0.1 vdc -5 ± 0.1 vdc +15 ± 0.3 vdc -15 ± 0.3 vdc +30 ± 0.5 vdc	If correct dc voltages are present, proceed to Item 4a. If correct dc voltages are not present, proceed to Item 4B.
4a	Power interconnect cable W-2	Connect cable W-2 to video unit INTERFACE POWER connector 1J3, disconnect cable W-2 from rf unit INTERFACE POWER connector, and verify:	W-2 P2-A W-2 P2-B W-2 P2-E W-2 P2-F W-2 P2-G W-2 P2-H	Same as Item 4	If correct dc voltages are present, proceed to Item 4c. If correct dc voltages are not present, replace cable W-2.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action															
4b	Video unit voltage regulator IPS1A2 and power supply IPS1	Swing out power supply IPS1 from bottom (para 6-11d), and verify with oscilloscope:	1YB1-12 1YB1-13 1YB1-15 1YB1-16 1YB1-17 1YB1-18	+30 vdc* -5 vdc* -15 vdc* +15 vdc* +3.8 vdc* *(Ripple $\leq$ 200 mv) +5 vdc* *(Ripple $\leq$ 100 mv)	If correct dc voltages are present, refer video unit to depot. If correct dc voltages are not present, replace voltage regulator IPS1A2 (para 6-11d and 6-12d). Recheck dc voltages at 1YB1. If correct dc voltages are still not present, replace power supply IPS1 (para 6-11d and 6-12d).															
4c	RF unit dc voltages	Remove top cover (para 6-7a) and verify:	2YB4-6B 2YB4-7A 2YB4-7B 2YB4-8A 2YB4-8B 2YB4-9B 2YB4-10B	+4 $\pm$ 0.1 vdc +5 $\pm$ 0.1 vdc -5 $\pm$ 0.1 vdc +15 $\pm$ 0.3 vdc -15 $\pm$ 0.3 vdc +26 $\pm$ 0.6 vdc +30 $\pm$ 0.6 vdc	If correct dc voltages are present, proceed to item 4d. If correct dc voltages are not present, refer rf unit to depot.															
4d	RF unit circuit card 2A9 and display 2A7	Set SELECT switch to position (4, 5, 6, 7, or 8) that has wrong indication on DISPLAY, remove top cover (para 6-7a), place card 2A9 on extender card, and verify:	Measure logic voltage inputs to DISPLAY LED's A, B, and C, convert logic readings to binary code, and convert binary code to decimal values as follows: Logic 0 voltage= binary code value Logic 1 voltage= zero value <u>Example:</u> SELECT -4	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.3 $\pm$ 1.5 vdc	If correct logic voltage is present, replace display 2A7 (para 6-7f and 6-811). If correct logic voltage is not present, replace card 2A9.															
			<table><tr><th>LED A</th><th>Logic</th><th>Binary Code</th></tr><tr><td>2XA9P2-4</td><td>1</td><td>8</td></tr><tr><td>2XA9P2-10</td><td>0</td><td>4</td></tr><tr><td>2XA9P2-13</td><td>1</td><td>2</td></tr><tr><td>2XA9P2-16</td><td>0</td><td>1</td></tr></table> LED C-1101 (decimal 2) LED B-0110 (decimal 6) LED A-1011 (decimal 5) DISPLAY should read 295.	LED A	Logic	Binary Code	2XA9P2-4	1	8	2XA9P2-10	0	4	2XA9P2-13	1	2	2XA9P2-16	0	1		
LED A	Logic	Binary Code																		
2XA9P2-4	1	8																		
2XA9P2-10	0	4																		
2XA9P2-13	1	2																		
2XA9P2-16	0	1																		

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action			
			SELECT Position		DISPLAY LED's	Tolerance		
			D	C	B	A		
			4	•	3	0	.0	±0.3
			5	•	1	5	.0	±0.3
			6	•	5	.0	0	±0.1
			7	•	1	5	.0	±0.3
			8	•	5	.0	0	±0.1
			DISPLAY Point of Measurement LED's					
			D	2XA9P2-14 2XA9P2-15 2XA9P2-40 2XA9P2-22	0 0 DISPLAY 0 LED ! blanking ! code			
			C	2XA9P2-12 2XA9P2-7 2XA9P1-29 2XA9P1-30	Binary Code 8 4 2 1			
B	2XA9P2-6 2XA9P2-5 2XA9P2-25 2XA9P2-26	8 4 2 1						
A	2XA9P2-4 2XA9P2-10 2XA9P2-13 2XA9P2-16	8 4 2 1						
5	Video unit TTM motor IM1	Set PRGM switch to 2 and verify:	N / A	PROGRAM EXT lamp illuminated	If lamp is illuminated, replace TTM motor IM1 (para 6-11k and 6-12d).			
5a	Video unit voltage regulator IPS1A2 and power supply IPS1	Swing out power supply IPS1 from bottom (para 6-11d), and verify with oscilloscope:	• ITM1-14	+20 vdc ripple ≤200 mV	If lamp is not illuminated, proceed to Item 5a. If correct voltage is present, refer video unit to depot. If correct voltage is not present, replace voltage regulator IPS1A2 (para 6-11d and 6-12d). Rercheck voltage at ITM1-14. If correct voltage still not present, replace power supply IPS1 (para 6-11d and 6-12d).			

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
6	Rf unit TFM meter 2M1	Remove top cover (para 6-7a) and verify:	2TB49B	+26±0.5 vdc	If correct voltage is present, replace TFM meter 2M1 (para 6-7a and 6-8a). If correct voltage is not present, proceed to Item 4a.
6a	Power interconnect cable W-2	Disconnect cable W-2 from INTERFACE POWER connector on d unit and verify:	W-2 P2-B	+26±0.5 vdc	If correct voltage is present, refer of unit to depot. If correct voltage is not present, replace cable W-2.

d. Self Test Program Troubleshooting.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
1	Video unit PROM switch 1S17 and SIST signal	Remove top cover (para 6-11a), place card 1A5 on extender card, and verify:	1XA4P1-40	0.0±0.3 vdc	If correct voltage is present, proceed to Item 1a. If correct voltage is not present, remove and replace switch 1S17 (para 6-7a and 6-8a).
1a	Video unit SIST signal	Place card 1A7 on extender card and verify with oscilloscope:	1XA7P1-15	9.25±0.2 μ sec positive pulse	If correct waveform is present, proceed to Item 1b. If correct waveform is not present, proceed to Item 1c.
1b	Video unit ZLT signal	Place card 1A9 on extender card and verify with oscilloscope:	1XA9P1-26	1.5±0.1 μ sec positive pulse	If correct waveform is present, proceed to Item 1d. If correct waveform is not present, proceed to Item 1c.
1c	Video unit card 1A7 and BCH, BCL, SCL, and DSL signals	Verify with oscilloscope:	Refer to Fig. 6-7 waveform A.	Pulses per Fig. 6-7 waveform A.	If correct waveforms are present, replace card 1A7. If correct waveforms are not present, proceed to Item 1f.
1d	Video unit card 1A14 and PPRGF signal	Place card 1A5 on extender card and verify:	1XA5P2-20	+3.5±1.5 vdc	If correct voltage is present, proceed to Item 1g. If correct voltage is not present, replace card 1A14.
1e	Video unit card 1A7 and SWS signal	Verify with oscilloscope:	1XA9P1-30	1.0±0.1 μ sec negative pulse	If correct waveform is present, proceed to Item 1h. If correct waveform is not present, replace card 1A7.
1f	Video unit cards 1A27 and 1A32, and HFC signal	Place card 1A27 on extender card and verify with oscilloscope:	1XA27P1-4	0.105±0.01 μ sec degraded square wave	If correct waveform is present, replace card 1A27.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action																																							
1g	Video unit card 1A3 and DAC1 signal	View oscilloscope on input signal and verify:	1XA3P2-25	12.8 or 12.9 μ sec positive burst every 2 seconds (ignore all other indications)	If correct waveform is not present, replace card 1A32 (para 6-11k and 6-12k).																																							
1h	Video unit cards 1A9 and 1A27, and SWC signal	Verify with oscilloscope:	1XA9P1-13	9.26 $\pm$ 0.1 μ sec square wave	If correct waveform is present, proceed to item 1i. If correct waveform is not present, replace card 1A3. If correct waveform is present, replace card 1A9. If correct waveform is not present, replace card 1A27.																																							
1i	Video unit card 1A1	Place card 1A1 on extender card and verify:	<table><tr><td></td><td>Logic</td><td></td></tr><tr><td></td><td>①</td><td>②</td></tr><tr><td>1XA1P1-19</td><td>1</td><td>1</td></tr><tr><td>1XA1P1-16</td><td>1</td><td>1</td></tr><tr><td>1XA1P1-15</td><td>0</td><td>0</td></tr><tr><td>1XA1P2-11</td><td>0</td><td>0</td></tr><tr><td>1XA1P2-42</td><td>0</td><td>0</td></tr><tr><td>1XA1P2-43</td><td>1</td><td>1</td></tr><tr><td>1XA1P2-16</td><td>1</td><td>1</td></tr><tr><td>1XA1P2-15</td><td>1</td><td>0</td></tr></table>		Logic			①	②	1XA1P1-19	1	1	1XA1P1-16	1	1	1XA1P1-15	0	0	1XA1P2-11	0	0	1XA1P2-42	0	0	1XA1P2-43	1	1	1XA1P2-16	1	1	1XA1P2-15	1	0	Logic 0=0 $\pm$ 0.3 vdc Logic 1=+3.5 $\pm$ 1.5 vdc	If correct voltages are present, proceed to item 1j. If correct voltages are not present, replace card 1A1.									
	Logic																																											
	①	②																																										
1XA1P1-19	1	1																																										
1XA1P1-16	1	1																																										
1XA1P1-15	0	0																																										
1XA1P2-11	0	0																																										
1XA1P2-42	0	0																																										
1XA1P2-43	1	1																																										
1XA1P2-16	1	1																																										
1XA1P2-15	1	0																																										
1j	Video unit card 1A1 and DAC 2 signal	Place card 1A1 on extender card and verify with oscilloscope:	<table><tr><td>1XA1P1-38</td><td>①</td><td>②</td></tr><tr><td></td><td>12.8 or 12.9 μsec</td><td>or</td></tr><tr><td></td><td>2 μsec</td><td>or</td></tr><tr><td></td><td>3.9</td><td></td></tr></table>	1XA1P1-38	①	②		12.8 or 12.9 μ sec	or		2 μ sec	or		3.9		2 μ sec positive pulse every 2 seconds	If correct waveform is present, proceed to item 1k. If correct waveform is not present, replace card 1A1.																											
1XA1P1-38	①	②																																										
	12.8 or 12.9 μ sec	or																																										
	2 μ sec	or																																										
	3.9																																											
1k	Video unit cards 1A2 and display 1A31	Place card 1A2 on extender card and verify:	<table><tr><td></td><td>Logic</td><td></td></tr><tr><td>1XA2P1-4</td><td>0</td><td></td></tr><tr><td>1XA2P1-14</td><td>0</td><td></td></tr><tr><td>1XA2P1-2</td><td>1</td><td></td></tr><tr><td>1XA2P1-25</td><td>1</td><td></td></tr><tr><td>1XA2P1-7</td><td>0</td><td></td></tr><tr><td>1XA2P1-6</td><td>0</td><td></td></tr><tr><td>1XA2P2-44</td><td>1</td><td></td></tr><tr><td>1XA2P2-21</td><td>1</td><td></td></tr><tr><td>1XA2P1-39</td><td>1</td><td></td></tr><tr><td>1XA2P1-40</td><td>1</td><td></td></tr><tr><td>1XA2P2-14</td><td>1</td><td></td></tr><tr><td>1XA2P2-16</td><td>0</td><td></td></tr></table>		Logic		1XA2P1-4	0		1XA2P1-14	0		1XA2P1-2	1		1XA2P1-25	1		1XA2P1-7	0		1XA2P1-6	0		1XA2P2-44	1		1XA2P2-21	1		1XA2P1-39	1		1XA2P1-40	1		1XA2P2-14	1		1XA2P2-16	0		Logic 0=0 $\pm$ 0.3 vdc Logic 1=+3.5 $\pm$ 1.5 vdc	If correct voltages are present, replace display 1A31 (para 6-11j and 6-12j). If correct voltages are not present, replace card 1A2.
	Logic																																											
1XA2P1-4	0																																											
1XA2P1-14	0																																											
1XA2P1-2	1																																											
1XA2P1-25	1																																											
1XA2P1-7	0																																											
1XA2P1-6	0																																											
1XA2P2-44	1																																											
1XA2P2-21	1																																											
1XA2P1-39	1																																											
1XA2P1-40	1																																											
1XA2P2-14	1																																											
1XA2P2-16	0																																											

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
2	Rf unit output power	N / A	Rf unit DISPLAY	1900 to 2100 watts	If correct indication is present, proceed to Item 2a. If correct indication is not present, proceed to Item 2b.
2a	Video unit BTTP signal	Verify with oscilloscope:	TRANS PULSE jack	Pulse pair per fig. 6-7, H.	If pulse pair is present, proceed to Item 2c. If pulse pair is not present, proceed to Item 2d.
2b	Video unit BTTP signal	Verify with oscilloscope:	TRANS PULSE jack	Presence of pulses	If pulses are present, proceed to Item 2c. If pulses are not present, proceed to Item 2f.
2c	Video unit BTTP signal	Verify with oscilloscope:	TRANS PULSE jack	Reply pulse per fig. 6-7, H.	If reply pulse is present, proceed to Item 2g. If reply pulse is not present, proceed to Item 2h.
2d	Video unit SEP signal	Remove top cover (para 6-11a), place card 1A22 on extender card, and verify:	1XA22P1-5	+3.5±1.5 vdc	If correct voltage is present, replace card 1A22. If correct voltage is not present, proceed to Item 2i.
2e	Rf unit card 2A8 and IMO signal	Verify with oscilloscope:	INTRG MON jack	Presence of pulses per fig. 6-7, H.	If pulses are present, replace card 2A8. If pulses are not present, proceed to Item 2j.
2f	Video unit BTTP signal	Remove top cover (para 6-11a), place card 1A22 on extender card, and verify with oscilloscope:	1XA22P1-20	Pulse per fig. 6-7, H.	If correct pulse is present, proceed to Item 2k. If correct pulse is not present, proceed to Item 2l.
2g	Rf unit module 2A4 and TSM signal	Sync oscilloscope on video unit TRANS PULSE jack and verify:	TEST SET MON jack	8 μ sec delay per fig. 6-7, H.	If correct delay is present, proceed to Item 2m. If correct delay is not present, replace module 2A4, (para 6-7 d and 6-8 d).
2h	Rf unit card 2A8 and video unit DPPT signals	Remove top cover (para 6-11a), place card 1A14 on extender card, and verify with oscilloscope:	1XA14P2-25 1XA14P2-24	Pulses per fig. 6-7, H.	If correct pulses are present, proceed to Item 2n. If correct pulses are not present, replace card 2A8.
2i	Video unit cards 1A16 and 1A22, and ETP signal	Verify with oscilloscope:	1XA22P1-2	1.5±0.05 μ sec positive pulse	If correct pulse is present, replace card 1A16. If correct pulse is not present, replace card 1A22.
2j	Rf unit TSM signal	Verify with oscilloscope:	TEST SET MON jack	Presence of pulses per fig. 6-7, H.	If pulses are present, proceed to Item 2o. If pulses are not present, proceed to Item 2p.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
2k	Video unit cards 1A22 and 1A22, and SMH signal	Verify with oscilloscope:	1XA22P1-17	0.0617±0.001 μ sec degraded square wave	If correct waveform is present, replace card 1A22. If correct waveform is not present, replace card 1A22 (para 6-114 and 6-124).
2l	Video unit card 1A23 and RSTT signal	Place card 1A5 on extender card and verify with oscilloscope:	1XA5P2-26	Pulse per fig. 6-7, 11.	If correct pulse is present, replace card 1A23. If correct pulse is not present, proceed to item 2q.
2m	Rf unit card 2A8 and video unit RPPT signal	Sync oscilloscope on video unit TRANS PULSE jack and verify:	SYNC jack	10 μ sec delay per fig. 6-7, 11.	If correct delay is present, proceed to item 2r. If correct delay is not present, replace card 2A8.
2n	Video unit RRP and RPT signals	Place card 1A18 on extender card and verify:	1XA18P1-30 1XA18P2-26	+3.5±1.5 vdc 0±0.3 vdc	If correct voltages are present, proceed to item 2a. If correct voltages are not present, proceed to item 2a.
2o	Rf unit card 2A8 and DGP signal	Remove top cover (para 6-7a), place card 2A8 on extender card, and verify with oscilloscope:	2XA8P1-18	Pulse per fig. 6-7, 11.	If correct pulses are present, replace card 2A8. If correct pulses are not present, proceed to item 2a.
2p	Rf unit PADTT signal	Remove top cover (para 6-7a) and verify:	2TB4-A2	+1.25±0.25 vdc	If correct voltage is present, proceed to item 2v. If correct voltage is not present, proceed to item 2w.
2q	Video unit card 1A5 and PPRGF signal	Verify:	1XA5P2-20	+3.5±1.5 vdc	If correct voltage is present, replace card 1A5. If correct voltage is not present, proceed to item 2a.
2r	Video unit card 1A5 and DBC1 signal	Set FROM switch to 6, remove top cover (para 6-11a), place card 1A1 on extender card, sync oscilloscope on input signal, and verify:	1XA1P2-3	01.9 to 02.1 μ sec positive burst every 2 seconds (ignore all other indications)	If correct waveform is present, proceed to item 2y. If correct waveform is not present, replace card 1A5.
2s	Video unit card 1A22 and AAM signal	Verify:	1XA18P1-24	+3.5±1.5 vdc	If correct voltage is present, replace card 1A22. If correct voltage is not present, proceed to item 2a.
2t	Video unit card 1A14 and RPPT signal	Verify with oscilloscope:	1XA18P1-39	Pulse per fig. 6-7, 11.	If correct pulses are present, proceed to item 2aa. If correct pulses are not present, replace card 1A14.
2u	Rf unit modules 2A3 and 2A4, and TRFS signal	Disconnect cable 2W2 from 2A3-J2 and 2A4-J1, and verify with oscilloscope:	2A4-J1	25±1 μ sec negative pulse	If rf pulses are present, replace module 2A3 (para 6-7c and 6-8c). If rf pulses are not present, replace module 2A4 (para 6-7d and 6-8d).

Item No.	Item checked	Test procedures	Point of measurement	Normal reading	Corrective action																		
2v	Rf unit module 2A4 and DTTP signals	Disconnect cable W-3 from rf unit and verify with oscilloscope:	W-3-V W-3-W	Presence of pulses per Fig. 6-7, H.	If pulses are present, replace module 2A4 (para 6-7d and 6-8d). If pulses are not present, proceed to Item 2ah.																		
2w	Rf unit modules 2A5 and 2A6, and SRT signal	Verify with oscilloscope:	37.5 MHZ TEST jack on back panel	$0.0267 \pm 0.001 \mu\text{sec}$ CW	If output is present, replace module 2A6 (para 6-7e and 6-8e). If output is not present, replace module 2A5 (para 6-7h and 6-8h). If correct voltage is present, replace card 1A14.																		
2x	Video unit card 1A14 and PRGM switch 1S17, and SIST signal	Place card 1A14 on extender card and verify:	1XA14P1-7	$0 \pm 0.3 \text{ vdc}$	If correct voltage is not present, check switch 1S17. Replace switch 1S17 (para 6-7a and 6-8a) if faulty. If switch 1S17 is not faulty, refer video unit to depot.																		
2y	Video unit card 1A1	Remove top cover (para 6-11a), place card 1A1 on extender card, and verify:	Measure logic voltages per chart, convert logic readings to binary code, and convert binary code to decimal value as follows: Logic 0 voltage= binary code value Logic 1 voltage= decimal value <table><thead><tr><th></th><th>Binary Code</th></tr></thead><tbody><tr><td>1XA1P2-5</td><td>3</td></tr><tr><td>1XA1P2-4</td><td>4</td></tr><tr><td>1XA1P1-23</td><td>2</td></tr><tr><td>1XA1P2-25</td><td>1</td></tr></tbody></table> <table><tbody><tr><td>1XA1P2-44</td><td>0.3</td></tr><tr><td>1XA1P2-22</td><td>0.4</td></tr><tr><td>1XA1P1-12</td><td>0.2</td></tr><tr><td>1XA1P2-8</td><td>0.1</td></tr></tbody></table>		Binary Code	1XA1P2-5	3	1XA1P2-4	4	1XA1P1-23	2	1XA1P2-25	1	1XA1P2-44	0.3	1XA1P2-22	0.4	1XA1P1-12	0.2	1XA1P2-8	0.1	Logic 0= $0 \pm 0.3 \text{ vdc}$ Logic 1= $+2.5 \pm 1.5 \text{ vdc}$ Decimal value=1.9 to 2.1	If correct decimal value is present, proceed to Item 2ac. If correct decimal value is not present, replace card 1A1.
	Binary Code																						
1XA1P2-5	3																						
1XA1P2-4	4																						
1XA1P1-23	2																						
1XA1P2-25	1																						
1XA1P2-44	0.3																						
1XA1P2-22	0.4																						
1XA1P1-12	0.2																						
1XA1P2-8	0.1																						
2z	Video unit card 1A23 and PCAAC signal	Place card 1A14 on extender card and verify:	1XA14P2-32	$+3.5 \pm 1.5 \text{ vdc}$	If correct voltage is present, replace card 1A23. If correct voltage is not present, proceed to Item 2ad.																		
2aa	Video unit card 1A18 and PPV and PIC signals	Verify with oscilloscope:	1XA18P1-9	$2.6 \pm 0.1 \mu\text{sec}$ negative pulse	If correct pulses are present, replace card 1A18.																		

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
2ab	Interconnect signal cable W-3, video unit card IA14, and DTFP signals	Disconnect cable W-3 from video unit INTERCONNECT SIGNAL connector 1J4 and verify with oscilloscope:	1XA14P1-29 1J4-Y 1J4-W	0.6 ± 0.05 pulse per sec Pulse per fig. 6-7, H.	If correct pulses are not present, proceed to item 2ac. If correct pulses are present, replace cable W-3. If correct pulses are not present, replace card IA14.
2ac	Video unit card IA1 and DBCY signal	Verify with oscilloscope:	1XA1P2-2	6 positive pulses every 2 seconds	If correct waveform is present, proceed to item 2ad. If correct waveform is not present, replace card IA1.
2ad	Video unit cards IA14 and IA26, and ICAAC signal	Verify:	1XA14P2-9	$+3.5 \pm 1.5$ vdc	If correct voltage is present, replace card IA14. If correct voltage is not present, replace card IA26.
2ae	Video unit cards IA21 and IA23, and PREET and PRETT signals	Place card IA21 on extender card and verify:	1XA21P2-35 1XA21P2-42	$+3.5 \pm 1.5$ vdc $+3.5 \pm 1.5$ vdc	If correct voltages are present, replace card IA23. If correct voltages are not present, replace card IA21.
2af	Video unit card IA3 and display IA31	Place card IA3 on extender card and verify:	Logic 1XA3P1-8 1XA3P1-14 1XA3P1-2 1XA3P1-25 1XA3P1-7 1XA3P1-6 1XA3P2-44 1XA3P2-25 1XA3P1-39 1XA3P1-40 1XA3P2-14 1XA3P2-16	Logic 0 = 0 ± 0.3 vdc Logic 1 = $+3.5 \pm 1.5$ vdc 0 0 1 1 0 0 1 1 1 0 0 1	If correct voltages are present, replace display IA31 (para 6-11j and 6-12j). If correct voltages are not present, replace card IA3.
3	Rf unit PMDAT signal	Remove top cover (para 6-7a) and verify:	2TB4-100	$+7 \pm 0.5$ vdc	If correct voltage is present, proceed to item 3a. If correct voltage is not present, proceed to item 3b.
3a	Rf unit display 2A7	Remove top cover (para 6-7a), place card 2A9 on extender card, and verify:	Determine logic state for each point of measurement in Chart 3A (logic 0 = 0 ± 0.3 vdc; logic 1 = $+3.5$	2000 ± 100	If sum of decimal values equals normal reading, replace display 2A7 (para 6-7i and 6-8d).

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action																													
			± 1.5 vdc) and add decimal values of all logic 0 states. Chart 2a		If sum of decimal values does not equal normal reading, proceed to Item 3C.																													
			<table><tr><th>Point of Measurement</th><th>Decimal Value</th></tr><tr><td>2XA9P2-14</td><td>8000</td></tr><tr><td>2XA9P2-15</td><td>4000</td></tr><tr><td>2XA9P2-40</td><td>2000</td></tr><tr><td>2XA9P2-22</td><td>1000</td></tr><tr><td>2XA9P2-12</td><td>800</td></tr><tr><td>2XA9P2-7</td><td>400</td></tr><tr><td>2XA9P1-39</td><td>200</td></tr><tr><td>2XA9P1-30</td><td>100</td></tr><tr><td>2XA9P2-6</td><td>80</td></tr><tr><td>2XA9P2-5</td><td>40</td></tr><tr><td>2XA9P2-25</td><td>20</td></tr><tr><td>2XA9P2-36</td><td>10</td></tr><tr><td>2XA9P2-9</td><td>8</td></tr><tr><td>2XA9P2-10</td><td>4</td></tr><tr><td>2XA9P2-13</td><td>2</td></tr><tr><td>2XA9P2-16</td><td>1</td></tr></table>			Point of Measurement	Decimal Value	2XA9P2-14	8000	2XA9P2-15	4000	2XA9P2-40	2000	2XA9P2-22	1000	2XA9P2-12	800	2XA9P2-7	400	2XA9P1-39	200	2XA9P1-30	100	2XA9P2-6	80	2XA9P2-5	40	2XA9P2-25	20	2XA9P2-36	10	2XA9P2-9	8	2XA9P2-10
Point of Measurement	Decimal Value																																	
2XA9P2-14	8000																																	
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2XA9P2-36	10																																	
2XA9P2-9	8																																	
2XA9P2-10	4																																	
2XA9P2-13	2																																	
2XA9P2-16	1																																	
3b	Rf unit card 2A13 and PM-DAT signal	Verify:	2TB4-10D	$+7 \pm 0.5$ vdc	If correct voltage is present, proceed to Item 3d. If correct voltage is not present, replace card 2A13.																													
3c	Rf unit card 2A9 and XFRT signal	a. Verify with oscilloscope:	a. 2TB4-9D b. Determine logic state for each point of measurement in chart JC2 (logic 0= 0 ± 0.3 vdc; logic 1= $+3.5 \pm 1.5$ vdc) and add decimal values of all logic 1 states.	a. Pulse per fig. 6-7, C. b. 2000 ± 100	If correct pulse is present and sum of decimal values is correct, replace card 2A9. If correct pulse is not present or sum of decimal values is not correct, proceed to Item 3e.																													

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action																																		
			Chart 2C2 <table><thead><tr><th>Point of Measurement</th><th>Desired Value</th></tr></thead><tbody><tr><td>2XA9P2-43</td><td>8000</td></tr><tr><td>2XA9P2-44</td><td>4000</td></tr><tr><td>2XA9P2-42</td><td>2000</td></tr><tr><td>2XA9P2-41</td><td>1000</td></tr><tr><td>2XA9P1-42</td><td>800</td></tr><tr><td>2XA9P1-40</td><td>400</td></tr><tr><td>2XA9P1-38</td><td>200</td></tr><tr><td>2XA9P1-39</td><td>100</td></tr><tr><td>2XA9P2-8</td><td>80</td></tr><tr><td>2XA9P2-11</td><td>40</td></tr><tr><td>2XA9P2-18</td><td>20</td></tr><tr><td>2XA9P2-19</td><td>10</td></tr><tr><td>2XA9P2-4</td><td>8</td></tr><tr><td>2XA9P2-24</td><td>4</td></tr><tr><td>2XA9P2-2</td><td>2</td></tr><tr><td>2XA9P2-3</td><td>1</td></tr></tbody></table>	Point of Measurement	Desired Value	2XA9P2-43	8000	2XA9P2-44	4000	2XA9P2-42	2000	2XA9P2-41	1000	2XA9P1-42	800	2XA9P1-40	400	2XA9P1-38	200	2XA9P1-39	100	2XA9P2-8	80	2XA9P2-11	40	2XA9P2-18	20	2XA9P2-19	10	2XA9P2-4	8	2XA9P2-24	4	2XA9P2-2	2	2XA9P2-3	1		
Point of Measurement	Desired Value																																						
2XA9P2-43	8000																																						
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2XA9P2-42	2000																																						
2XA9P2-41	1000																																						
2XA9P1-42	800																																						
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2XA9P1-38	200																																						
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2XA9P2-8	80																																						
2XA9P2-11	40																																						
2XA9P2-18	20																																						
2XA9P2-19	10																																						
2XA9P2-4	8																																						
2XA9P2-24	4																																						
2XA9P2-2	2																																						
2XA9P2-3	1																																						
3d	RI unit card 2A13 and PMUPT and PMDNT signals	Verify with oscilloscope:	2TB4-12C 2TB4-12D	Pulses per fig. 6-7, C.	If pulses are present, replace card 2A13. If pulses are not present, proceed to Item 3f.																																		
3e	RI unit card 2A13 and PMRFV signal	a. Place card 2A12 on extender card and verify:	a. 2XA12P1-12	a. $+3.5 \pm 1.5$ vdc	If correct voltage and sum of decimal values are present, proceed to Item 3g.																																		
		b. Determine logic state for each point of measurement in chart 3E (logic 0= 0 ± 0.3 vdc; logic 1= $+3.5 \pm 1.5$ vdc) and add decimal values of all logic 1 states.		b. 44.7 ± 1.1	If correct voltage and sum of decimal values are not present, replace card 2A13.																																		

Item No.	Items checked	Test procedure	Point of measurement	Normal reading	Corrective action
			Chart 3a		
			Point of Measurement	Desired Value	
			2XA13P1-9	40	
			2XA13P1-4	40	
			2XA13P1-32	20	
			2XA13P1-5	10	
			2XA13P1-11	4	
			2XA13P1-14	4	
			2XA13P1-34	2	
			2XA13P1-33	1	
			2XA13P1-35	0.4	
			2XA13P1-29	0.4	
			2XA13P1-27	0.2	
			2XA13P1-28	0.1	
3f	RF unit module 2A1 and PVECO signal	Place card 2A14 on extender card and verify with oscilloscope.	2XA14P1-17	Pulses per fig. 6-7, C.	If pulses are present, proceed to item 3h. If pulses are not present, replace module 2A1 (para 6-7d and 6-8d).
3g	RF unit cards 2A12 and 2A14, and PVEDV signal	Verify with oscilloscope.	2XA12P1-14	Pulses per fig. 6-7, C.	If pulses are present, replace card 2A12. If pulses are not present, replace card 2A14.
3h	RF unit card 2A14 and PVEPP signal	Verify with oscilloscope.	2XA14P1-18	Pulses per fig. 6-7, C.	If correct pulses are present, replace card 2A14. If correct pulses are not present, proceed to item 3i.
3i	RF unit cards 2A9 and 2A13, and TFP signal	Verify with oscilloscope.	2XA13P1-13	Pulses per fig. 6-7, C.	If correct pulses are present, replace card 2A13. If correct pulses are not present, replace card 2A9.

c. Internal Program Troubleshooting.

Item No.	Item checked	Test procedures	Point of measurement	Normal reading	Corrective action																																																																																
1	Video unit manual program range	See FROM to 1 and verify:	DISPLAY A	25.0 (e 1, f 1) 105.0 (g 1, h 1) 200.0 (f 1) 172.7 (f 2)	If correct indication is present, proceed to Item 1a. If correct indication is not present, proceed to Item 1b.																																																																																
1a	Video unit manual program range	Verify:	DISPLAY A	Right two digits on DISPLAY A are 5.0 (e 1, f 1) 5.0 (g 1, h 1) 8.8 (f 1) 7.7 (f 2)	If correct indication is present, proceed to Item 1c. If correct indication is not present, proceed to Item 1d.																																																																																
1b	Video unit card 1A16	Remove top cover (para 6-11a), place card 1A17 on extender card, and verify:	<table><tr><td>RANGE</td><td>25</td><td>105</td><td>200</td><td>172.7</td></tr><tr><td></td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1XA17P1-100</td><td>0</td><td>1</td><td>0</td><td></td></tr><tr><td>1XA17P1-200</td><td>0</td><td>0</td><td>1</td><td></td></tr><tr><td>1XA17P1-300</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>1XA17P1-400</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>1XA17P1-500</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>1XA17P1-600</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>1XA17P2-220</td><td>0</td><td>1</td><td>0</td><td></td></tr><tr><td>1XA17P2-120</td><td>0</td><td>0</td><td>1</td><td></td></tr><tr><td>1XA17P2-240</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>1XA17P2-360</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>1XA17P2-480</td><td>0</td><td>1</td><td>0</td><td></td></tr><tr><td>1XA17P2-200</td><td>0</td><td>0</td><td>1</td><td></td></tr><tr><td>1XA17P2-210</td><td>0</td><td>0</td><td>0</td><td></td></tr><tr><td>1XA17P2-300</td><td>0</td><td>1</td><td>0</td><td></td></tr></table>	RANGE	25	105	200	172.7		0	0	0	0	1XA17P1-100	0	1	0		1XA17P1-200	0	0	1		1XA17P1-300	0	0	0		1XA17P1-400	0	0	0		1XA17P1-500	0	0	0		1XA17P1-600	0	0	0		1XA17P2-220	0	1	0		1XA17P2-120	0	0	1		1XA17P2-240	0	0	0		1XA17P2-360	0	0	0		1XA17P2-480	0	1	0		1XA17P2-200	0	0	1		1XA17P2-210	0	0	0		1XA17P2-300	0	1	0		Logic 0=0±0.3 vdc Logic 1=+3.5±1.5 vdc	If correct voltages are present, replace card 1A16. If correct voltages are not present, proceed to Item 1c.
RANGE	25	105	200	172.7																																																																																	
	0	0	0	0																																																																																	
1XA17P1-100	0	1	0																																																																																		
1XA17P1-200	0	0	1																																																																																		
1XA17P1-300	0	0	0																																																																																		
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1XA17P2-120	0	0	1																																																																																		
1XA17P2-240	0	0	0																																																																																		
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1XA17P2-210	0	0	0																																																																																		
1XA17P2-300	0	1	0																																																																																		
1c	Video unit manual program range	Verify:	DISPLAY A	Left digits on DISPLAY A are 2 (e 1, f 1) 19 (g 1, h 1) 20 (f 1) 17 (f 2)	If correct indication is present, proceed to Item 1f. If correct indication is not present, proceed to Item 1g.																																																																																
1d	Video unit manual program range	Verify:	DISPLAY A	Left digits on DISPLAY A are same as Item 1c	If correct indication is present, proceed to Item 1h. If correct indication is not present, proceed to Item 1i.																																																																																

Item No.	Item description	Test procedure	Point of measurement	Normal reading	Corrective action
1c	Video unit card 1A17 and RANGE switch 1S4	Set RANGE switch to failed value in test procedure, FROM switch to 1, and verify:	RANGE EXA17P1-10 EXA17P1-20 EXA17P1-11 EXA17P1-31 EXA17P1-12 EXA17P1-30 EXA17P2-10 EXA17P2-20 EXA17P2-6 EXA17P2-10 EXA17P2-10 EXA17P2-20 EXA17P2-17 EXA17P2-6	Logic 0 = 0 ± 0.5 vdc Logic 1 = + 3.5 ± 1.5 vdc	If correct voltages are present, replace card 1A17. If correct voltages are not present, check switch 1S4. Replace switch 1S4 (para 6-11g and 6-12g) if faulty. If switch 1S4 is not faulty, refer video unit to depot.
1i	Video unit manual program range	Set SELECT B to 1 and verify:	DISPLAY B	Right two digits on DISPLAY B are same as Item 1c	If correct indication is present, proceed to Item 1j. If correct indication is not present, proceed to Item 1k.
1g	Video unit card 1A2 and display 1A31	Set BEARING to 025.0 and SELECT A to 3, and verify:	DISPLAY A	Left digit on DISPLAY A are same as Item 1c	If correct indication is present, replace card 1A2. If correct indication is not present, replace display 1A31 (para 6-11j and 6-12j).
1h	Video unit card 1A1 and display 1A31	Set BEARING to 025.0 and SELECT A to 3, and verify:	DISPLAY A	Right two digits on DISPLAY A are same as Item 1c	If correct indication is present, replace card 1A1. If correct indication is not present, replace display 1A31 (para 6-11j and 6-12j).
1i	Video unit card 1A4 and display 1A31, and MMA and MMTA signals	Remove top cover (para 6-11a), place card 1A4 on extender card, and verify with oscilloscope:	EXA4P1-4 EXA4P1-19	0 ± 0.3 vdc + 3.5 ± 1.5 vdc level with 10 ± 0.1 millivolt negative pulse	If correct voltage and waveform are present, replace display 1A31 (para 6-11j and 6-12j).
1j	Video unit manual program range	Verify:	DISPLAY B	Left digit on DISPLAY B are same as Item 1c	If correct voltage and waveform are not present, replace card 1A4.
1k	Video unit manual program range	Verify:	DISPLAY B	Left digit on DISPLAY B are same as Item 1c	If correct indication is not present, proceed to Item 1m. If correct indication is present, proceed to Item 1n.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action																																										
1j	Video unit card 1A3 and display 1A31	Set BEARING to 025.0 and SELECT B to 3, and verify.	DISPLAY B	Left digit on DISPLAY B are same as Item 1i	If correct indication is present, replace card 1A3. If correct indication is not present, replace display 1A31 (para 6-11j and 6-12j).																																										
1k	Video unit card 1A1 and display 1A31	Set BEARING to 025.0 and SELECT B to 3, and verify.	DISPLAY B	Right two digits on DISPLAY B are same as Item 1i	If correct indication is present, replace card 1A1. If correct indication is not present, replace display 1A31 (para 6-11j and 6-12j).																																										
1n	Video unit card 1A4 and display 1A31, and MMB and MRYB signals	Remove top cover (para 6-11a), place card 1A4 on extender card, and verify with oscilloscope.	1XA4P2-60 1XA4P1-20	0±0.3 vdc +3.5±1.5 vdc level with 10±0.1 millisecond negative pulse	If correct voltage and waveform are present, replace display 1A31 (para 6-11j and 6-12j). If correct voltage and waveform are not present, replace card 1A4.																																										
2	Video unit manual program range rate	Set FROM to 1, SELECT A to 1, SELECT B to 2, RANGE RATE to +20, and verify.	DISPLAY A	Range indication is correct	If correct indications are present, proceed to Item 2a. If correct indications are not present, proceed to Item 2b.																																										
2a	Video unit manual program range rate	Set RANGE RATE to failed value, SELECT A to 2, and verify.	DISPLAY A	+40 (+2, / 2, g 2, h 2) +5000 (m 1) -1100 (m 2)	If correct indication is present, proceed to Item 2c. If correct indication is not present, proceed to Item 2d.																																										
2b	Video unit card 1A16	Set RANGE RATE to failed value, remove top cover (para 6-11a), place card 1A16 on extender card, and verify.	RANGE RATE <table><tr><td>0</td><td>25</td><td>—</td></tr><tr><td>+</td><td>+</td><td>1</td></tr></table> <table><tr><td>1XA16P2-24</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1XA16P2-42</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1XA16P2-21</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1XA16P2-14</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1XA16P2-22</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1XA16P2-12</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1XA16P2-26</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1XA16P2-35</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1XA16P2-33</td><td>0</td><td>1</td><td>1</td></tr></table>	0	25	—	+	+	1	1XA16P2-24	0	0	0	1XA16P2-42	0	0	1	1XA16P2-21	0	1	0	1XA16P2-14	0	0	0	1XA16P2-22	0	1	1	1XA16P2-12	0	1	0	1XA16P2-26	0	0	0	1XA16P2-35	0	0	0	1XA16P2-33	0	1	1	Logic 0=0±0.3 vdc Logic 3=+3.5±1.5 vdc	If correct voltages are present, replace card 1A16. If correct voltages are not present, proceed to Item 2c.
0	25	—																																													
+	+	1																																													
1XA16P2-24	0	0	0																																												
1XA16P2-42	0	0	1																																												
1XA16P2-21	0	1	0																																												
1XA16P2-14	0	0	0																																												
1XA16P2-22	0	1	1																																												
1XA16P2-12	0	1	0																																												
1XA16P2-26	0	0	0																																												
1XA16P2-35	0	0	0																																												
1XA16P2-33	0	1	1																																												
2c	Video unit card 1A19 and manual program range rate	Set SELECT B to 2 and verify.	DISPLAY B	Same as Item 2a	If correct indication is present, replace card 1A19. If correct indication is not present, proceed to Item 2d.																																										
2d	Video unit manual program range rate	Set SELECT B to 2 and verify.	DISPLAY B	Same as Item 2a	If correct indication is present, proceed to Item 2g. If correct indication is not present, proceed to Item 2h.																																										

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
2a	Video unit card IAB and RANGE RATE switch 156	Verify:	RANGE RATE		
				Logic 0 = 0 ± 0.3 vdc	If correct voltages are present, replace card IAB. If correct voltages are not present, check switch 156. Replace switch 156, (pins 6-11g and 6-12g) if faulty. If switch 156 is not faulty, refer video unit to depot.
			EXAMP2-5	Logic 1 = + 2.5 ± 1.5 vdc	
			EXAMP2-2		
			EXAMP2-17		
			EXAMP2-4		
			EXAMP2-18		
			EXAMP2-9		
2f	Video unit cards IAB and IAC, and PRB signal	Remove top cover (pins 6-11a), place card IAB on extender card, and verify:	EXAMP2-14	+ 2.5 ± 1.5 vdc	If correct voltage is present, replace card IAB. If correct voltage is not present, replace card IAB. If correct voltage is present, replace card IAB. If correct voltage is not present, replace card IAB.
			EXAMP2-2	+ 2.5 ± 1.5 vdc	
2g	Video unit cards IAB and IAC, and RRA signal	Remove top cover (pins 6-11a), place card IAB on extender card, and verify:	EXAMP2-9	0.50 ± 0.05 second positive pulse	If correct waveform is present, replace card IAB. If correct waveform is not present, replace card IAB.
3	Video unit ZDT signal	Set BEARING to 100.0 SYNC SELECT to 1, PRGM to 1, eye oscilloscope on SYNC jack, and verify:	ZERO DEL TIME jack	18.5 ± 0.1 millisecond delay	If correct delay is present, proceed to Item 3a. If correct delay is not present, proceed to Item 3b.
3a	Video unit manual program bearing	Set BEARING to failed value and verify:	DISPLAY A	000.0 (a.3, f.3, s.3) 200.0 (a.0) 177.7 (a.2)	If correct indication is present, proceed to Item 3c. If correct indication is not present, proceed to Item 3d.
3b	Video unit manual program bearing	Set BEARING to failed value and verify:	DISPLAY A	Same as Item 3a	If correct indication is present, proceed to Item 3c. If correct indication is not present, proceed to Item 3d.
3c	Video unit card IAB	Set SELECT 8 to 3 and verify:	DISPLAY B	Same as Item 3a	If correct indication is present, replace card IAB. If correct indication is not present, proceed to Item 3g.
3d	Video unit card IAB	Set SELECT 8 to 3 and verify:	DISPLAY B	Same as Item 3a	If correct indication is present, proceed to Item 3h. If correct indication is not present, replace card IAB.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
3c	Video unit STTP signal	Set REPLAY EFF X100 to 0, SQUITTER RATE X100 to 00, and verify with oscilloscope:	TRANS PULSE jack	Presence of main and sub burst pulses per fig. 6-7, G; set MAIN BURST and AUX BURST switches, ON and OFF to verify.	If pulses are present, proceed to item 3d. If pulses are not present, proceed to item 3j.
3d	Video unit SWS signal	Remove top cover (para 6-11 a), place card 1A7 on extender card, and verify with oscilloscope:	1XA7P1-41	Pulse per fig. 6-7, I.	If correct waveform is present, proceed to item 3d. If correct waveform is not present, proceed to item 3d.
3g	Video unit card 1A3 and display 1A31	Set RANGE to failed value, SELECT A to 1, and verify:	DISPLAY A	Left 1 or 2 digits of DISPLAY A indicate 9 (a3, f3, h3) 20 (a3) 17 (a2)	If correct indication is present, replace card 1A3. If correct indication is not present, replace display 1A31 (para 6-11/ and 6-12).
3h	Video unit card 1A2 and display 1A31	Set RANGE to failed value, SELECT A to 1, and verify:	DISPLAY A	Same as item 3g	If correct indication is present, replace card 1A2. If correct indication is not present, replace display 1A31 (para 6-11/ and 6-12).
3i	RF unit module 2A4 and CSW signal	Disconnect cable W-3 from RF unit INTERFACE SIGNAL connector 2F2 and verify with oscilloscope:	W-3-f	Composite sine wave per fig. 6-7, B.	If correct waveform is present, replace module 2A4 (para 6-7 d and 6-8 d). If correct waveform is not present, proceed to item 3m.
3j	Video unit MBT and ABT signals	Remove top cover (para 6-11 a), place card 1A22 on extender card, and verify with oscilloscope:	1XA22P1-3 1XA22P1-12	Pulses per fig. 6-7, G.	If correct waveforms are present, proceed to item 3n. If correct waveforms are not present, proceed to item 3n.
3k	Video unit DSL and DCN signals	Verify with oscilloscope:	1XA7P1-7 1XA7P2-9	Pulse per fig. 6-7, I.	If correct waveforms are present, proceed to item 3p. If correct waveforms are not present, proceed to item 3p.
3l	Video unit card 1A27 and BCH signal	Verify with oscilloscope:	1XA7P1-14	4.62MHz pulse square wave	If correct waveform is present, proceed to item 3n. If correct waveform is not present, replace card 1A27.
3m	Interface signal cable W-3 and CSW signal	Disconnect cable W-3 from video unit INTERFACE SIGNAL connector 1J4 and verify with oscilloscope:	1J4-f	Composite sine wave per fig. 6-7, B.	If correct waveform is present, replace cable W-3. If correct waveform is not present, proceed to item 3n.
3n	Video unit card 1A22 and MPQ and APQ signals	Verify with oscilloscope:	1XA22P1-25 1XA22P2-4	Pulses per fig. 6-7, G.	If correct waveforms are present, replace card 1A22. If correct waveforms are not present, proceed to item 3n.
3o	Video unit card 1A27 and MBT and ABT signals	Place card 1A13 on extender card and verify with oscilloscope:	1XA13P1-12 1XA13P1-11	Pulses per fig. 6-7, G.	If correct waveforms are present, replace card 1A27.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
2g	Video unit cards 1A7 and 1A13, and RCR signal	Verify with oscilloscope	1X.A7P1-40	140±5 μ sec negative pulses	If correct waveform is not present, proceed to Item 3a. If correct waveform is not present, replace card 1A13. Repeat Item 2g. If Item 2g fails, replace card 1A7.
3g	Video unit cards 1A9 and 1A27, and SWC signal	Place card 1A27 on extender card and verify with oscilloscope	1X.A27P1-16	Pulses per Fig. 6-7, 1.	If correct waveform is present, replace card 1A9. If correct waveform is not present, replace card 1A27.
3e	Video unit card 1A7	Place card 1A8 on extender card and verify:	SEE TABLE	Logic 0=0±0.3 vdc Logic 1=+3.5±1.5 vdc	If correct voltages are present, replace card 1A7. If correct voltages are not present, proceed to Item 3a.
			1X.A8P1-19 1X.A8P1-20	0 1 0 0 0 1	
			1X.A8P1-19 1X.A8P1-20 1X.A8P1-21 1X.A8P1-22	1 1 0 0 0 1 0 0 1 1 0 1	
			1X.A8P2-22 1X.A8P2-23 1X.A8P2-24 1X.A8P2-25	0 1 0 0 0 1 0 0 1 0 0 1	
			1X.A8P2-26 1X.A8P2-27 1X.A8P2-28 1X.A8P2-29	0 0 1 0 0 1 0 0 1 0 0 1	
3a	Video unit CSW signal	Remove top cover (para 6-11a), place card 1A11 on extender card, and verify with oscilloscope	1X.A11P1-34	Composite sine wave per Fig. 6-7, 2.	If correct waveform is present, refer video unit to depot. If correct waveform is not present, proceed to Item 3a.
3e	Video unit card 1A13 and MRC and ARC signals	Place card 1A13 on extender card and verify:	1X.A13P1-14 1X.A13P1-20	+3.5±1.5 vdc +3.5±1.5 vdc	If correct voltages are present, replace card 1A13. If correct voltages are not present, proceed to Item 3a.
3a	Video unit card 1A8 and SEARING switch 159	Verify:	SEE TABLE	Logic 0=0±0.3 vdc Logic 1=+3.5±1.5 vdc	If correct voltages are present, replace card 1A8. If correct voltages are not present, check switch 159. Replace switch 159 (para 6-11g and 6-12g) if faulty. If switch 159 is not faulty, refer video unit to depot.
			1X.A8P1-19 1X.A8P1-20	1 0 1 1 1 0	
			1X.A8P1-21 1X.A8P1-22	0 0 1 1 1 0	

Item No	Item description	Test procedure	Point of measurement	Normal reading	Corrective action
			EXA8P1-12 EXA8P1-30 EXA8P2-15 EXA8P2-9 EXA8P2-6 EXA8P2-10 EXA8P2-16 EXA8P1-29 EXA8P2-17 EXA8P2-8		
3v	Video unit card IAS1 and CVM and FVM signals	Verify with oscilloscope.	EXA11P1-27 EXA11P1-31	15 Hz sine wave 15 Hz sine wave	If correct waveforms are present, replace card IAS1. If correct waveforms are not present, proceed to Item 4.
3w	Video unit card IAS2 and PVR1 and PVR2 signals	Place card IAS2 on extender card and verify.	EXA27P2-3 EXA27P2-5	+3.5±0.5 vdc +3.5±0.5 vdc	If correct voltages are present, replace card IAS2. If correct voltages are not present, proceed to Item 3a.
3x	Video unit card IAS, MAIN BURST switch 1513, AUX BURST switch 1514, and STEREO and STEREO signals	Place card IAS on extender card and verify.	EXA4P2-7 EXA4P2-2	0.00±0.3 vdc 0.00±0.2 vdc	If correct voltages are present, replace card IAS. If correct voltages are not present, check switches 1513 and 1514. Replace switch 1513 or 1514 (pins 6-8) and 6-12 (if faulty). If switch 1513 or 1514 is not faulty, replace unit to depot.
3y	Video unit cards IAS22 and IAS20, and SOT signals	Place card IAS20 on extender card and verify with oscilloscope.	EXA22P2-20	1.40±0.1 vdc pulse	If correct waveform is present, replace card IAS22. If correct waveform is not present, replace card IAS20.
4	Video unit manual program loading rate	Set PROGRAM to 1 and DEACTIVATE RATE to failed value and verify.	DISPLAY 4	+ 0.0 (a 1, / 4, 2, 4, 8) + 20 (10 0, 1) + 6 (10 (a 2)	If correct indication is present, proceed to Item 4a. If correct indication is not present, proceed to Item 4b.
4a	Video unit manual program loading rate	Set SELECT 1 to 1 and verify.	DISPLAY 1	Same as Item 4	If correct indication is not present, proceed to Item 4a.
4b	Video unit manual program loading rate	Set SELECT 1 to 1 and verify.	DISPLAY 1	Same as Item 4	If correct indication is present, proceed to Item 4d. If correct indication is not present, proceed to Item 4a.
4c	Video unit cards IAS, IAS, and IAS, and SOT signal	Remove top cover (page 6-11) and place card IAS on extender card and verify.	EXA6P2-1	+ 3.5±0.5 vdc	If correct voltage is present, replace card IAS. Report Item 4a. If Item 4a fails, replace card IAS. If correct voltage is not present, replace unit.

Item No.	Item checked	Test status	Point of measurement	Normal reading	Corrective action
4d	Video unit card I/A4 and B/A signal	Remove top cover (page 6-11a), place card I/A4 on extender card, and verify.	IXA4P2-1	+3.5±1.5 vdc	If correct voltage is present, replace card I/A4. Repeat Item 4. If Item 4 fails, replace card I/A5. If correct voltage is not present, replace card I/A4.
4e	Video unit bearing marking	See SELECT A to I, SELECT B to K and verify.	DISPLAY A	Bearing indication markings visible for a 1, f 4, g 3, 4, . bearing indication increases for a 1; bearing indication decreases for a 2.	If correct indications are present, proceed to Item 4f. If correct indicat. are not present, proceed to Item 4g.
4f	Video unit card I/A27 and B/C signal	See BEARING RATE to failed value, remove top cover (page 6-11a), place card I/A6 on extender card, and verify with oscilloscope.	IXA6P2-20	0±0.3 vdc for a 4, f 4, g 3, 4 4, 2.9 KHz (256.4 cycles) square wave for a 1; 400 Hz (1.6K) millivolt square wave for a 2.	If correct voltage or waveform is present, proceed to Item 4h. If correct voltage or waveform is not present, replace card I/A27.
4g	Video unit card I/A27 and B/C2 signal	See BEARING RATE to failed value, remove top cover (page 6-11a), place card I/A25 on extender card, and verify.	IXA25P1-26	+3.5±1.5 vdc for a 4, f 4, g 3, 4 4; 0±0.3 vdc for a 1 and a 2.	If correct voltage is present, replace card I/A27. If correct voltage is not present, proceed to Item 4i.
4h	Video unit, cards I/A4 and I/A6, and B/C2 signal	Verify with oscilloscope.	IXA6P2-14	1±0.05 second positive pulse	If correct waveform is present, replace card I/A6. If correct waveform is not present, replace card I/A4.
4i	Video unit card I/A25	Place card I/A12 on extender card and verify.	BEARING RATE IXA12P2-19 IXA12P2-22 IXA12P2-21 IXA12P2-14 IXA12P2-22 IXA12P2-12 IXA12P2-26 IXA12P2-35	Logic 0=0±0.3 vdc Logic 1=+3.5±1.5 vdc	If correct voltages are present, replace card I/A25. If correct voltages are not present, proceed to Item 4j.
4j	Video unit card I/A12 and BEARING RATE switch IS12	Verify.	BEARING RATE IXA12P2-7 IXA12P2-2	Logic 0=0±0.3 vdc Logic 1=+3.5±1.5 vdc	If correct voltages are present, replace card I/A12. If correct voltages are not present, check switch IS12. Replace switch IS12 (page 6-11g and 6-12g) if faulty. If switch IS12 is not faulty, refer video unit to depot.

Item No.	Item checked	Test procedures	Point of measurement	Normal reading	Corrective action
			UXA12P2-17 UXA12P2-18 UXA12P2-19 UXA12P2-20 UXA12P2-21		
5	Video unit manual program antenna RPS	Set PROGRAM to 1, ANT SW (% 15 REC RPS) to failed value and verify.	DISPLAY A	+ .00000 (a), f3, g4, A 5) + .00200 ± .00001 (p 1) - .20550 ± .00001 (p 2)	If correct indication is present, proceed to item 5a. If correct indication is not present, proceed to item 5b.
5a	Video unit manual program antenna RPS	Set SELECT 8 to 5 and verify.	DISPLAY B	+ .00000	If correct indication is not present, proceed to item 5c.
5b	Video unit manual program antenna RPS	Set SELECT 8 to 5 and verify.	DISPLAY 1A	+ .00000	If correct indication is present, proceed to item 5d. If correct indication is not present, proceed to item 5c.
5c	Video unit cards U44 and U46, and ANSA signal	Remove top cover (para 6-114), place card U44 on extender card, and verify.	UXA12P2-19	+ 3.5 ± 1.5 vdc	If correct voltage is present, replace card U46. If correct voltage is not present, replace card U44.
5d	Video unit cards U44 and U46, and ANSA signal	Remove top cover (para 6-114), place card U46 on extender card, and verify.	UXA12P2-20	+ 3.5 ± 1.5 vdc	If correct voltage is present, replace card U46. If correct voltage is not present, replace card U44.
5e	Video unit ANS _c signal	a. Remove top cover (para 6-114), place card U427 on extender card, set ANT SW (% 15 REC RPS) switch to + 00 and verify with oscilloscope. b. Restore ANT SW (% 15 REC RPS) switch	UXA12P2-12	a. 0 ± 0.5 vdc level b. Square wave; frequency measure as switch setting is in around	If correct waveform are present, proceed to item 5f. If correct waveform are not present, proceed to item 5g.
5f	Video unit card U46 and ANS _c signal	Place card U45 on extender card and verify with oscilloscope.	UXA12P2-13	0.6 ± 0.01 second negative pulse	If correct waveform is present, replace card U46. If correct waveform is not present, proceed to item 5h.
5g	Video unit card U427 and bearing case	Set SELECT A to 4 and verify.	DISPLAY 4	+ .00	If correct indication is present, proceed to item 5i. If correct indication is not present, replace card U427.
5h	Video unit cards U44 and U45, and ANS _c signal	Place card U44 on extender card and verify.	UXA12P2-21	+ 3.5 ± 1.5 vdc	If correct voltage is present, replace card U45.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
5k	Video unit card I/A27 and ASZ signal	a. Verify : b. Set A/N/T SP (± % 1.5 Hz (SPS)) switch to +00 and verify :	I/A27P2-17 I/A27P2-17	a. + 3.5 ± 1.5 vdc b. 0 ± 0.5 vdc	If correct voltage is not present, replace card I/A27. If correct voltages are present, replace card I/A27.
5l	M / A	Set A/N/T SP (± % 1.5 Hz (SPS)) switch to failed value and verify :	A/N/T/SPS SPEED X/A26P1-30 X/A26P1-11 X/A26P1-6 X/A26P1-15 X/A26P1-5 X/A26P2-61 X/A26P1-20 X/A26P2-21 X/A26P2-14 X/A26P2-22 X/A26P2-12	Logic 0 = 0 ± 0.2 vdc Logic 1 = + 3.5 ± 1.5 vdc	If correct voltages are not present, proceed to Item 5j. If correct voltages are present, proceed to Item 5l. If correct voltages are not present, proceed to Item 5l.
5k	Video unit card I/A25 and ASZ signal	Verify :	I/A27P2-16	+ 3.5 ± 1.5 vdc	If correct voltage is present, replace card I/A25. If correct voltage is not present, proceed to Item 5m.
5j	Video unit card I/A26 and A/N/T SPEED (± % 1.5 Hz (SPS)) switch (510)	Verify :	A/N/T/SPS SPEED I/A26P1-10 I/A26P1-20 I/A26P1-11 I/A26P1-91 I/A26P1-12 I/A26P1-30 I/A26P2-16 I/A26P1-20 I/A26P2-17 I/A26P2-6 I/A26P2-10 I/A26P2-10	Logic 0 = 0 ± 0.2 vdc Logic 1 = + 3.5 ± 1.5 vdc	If correct voltages are present, replace card I/A26. If correct voltages are not present, check switch 5500 (replace switch 5500 type 6-01g and 6-02g) if faulty. If switch 5500 is not faulty, refer video unit to depot.
5m	Video unit cards I/A26 and I/A27, and PASOF signal	Verify :	I/A27P1-20	0 ± 0.2 vdc	If correct voltage is present, replace card I/A27.

Item No.	Item checked	Test procedures	Item of measurement	Normal reading	Corrective action
6	Video unit manual program phase shift	Set PROGRAM to 1, PHASE SHIFT to 15 Hz to failed value, and verify:	DISPLAY A	+ 0.1 (± 0.1, f 4, g 5, h 6) + 27.5 (q 1) - 27.5 (q 2)	If correct voltage is not present, replace and R.A.26. If correct indication is present, proceed to item 6a.
6a	Video unit manual program phase shift	Set SELECT B to 6 and verify:	DISPLAY B	+ 0.1	If correct indication is not present, proceed to item 6b.
6b	Video unit manual program phase shift	Set SELECT B to 6 and verify:	DISPLAY B	+ 0.1	If correct indication is not present, proceed to item 6c.
6c	Video unit cards I.A.1 and I.A.6, and C.B.V. signal	Remove top cover (para 6-114), place card I.A.1 on extender card, and verify:	I% A 1 P 1-17	+ 3.5 ± 0.5 vdc	If correct voltage is present, replace and I.A.6.
6d	Video unit cards I.A.1 and I.A.6, and C.B.V. signal	Remove top cover (para 6-114), place card I.A.1 on extender card, and verify:	I% A 1 P 1-5	+ 3.5 ± 0.5 vdc	If correct voltage is not present, replace and I.A.1.
6e	Video unit card I.A.2 and P.P.S. signal	Remove top cover (para 6-114), place card I.A.1 on extender card, and verify:	I% A 1 P 1-19	0 ± 0.2 vdc (f 4, g 5, h 6, q 7) + 3.5 ± 0.5 vdc (q 2)	If correct voltage is present, proceed to item 6f.
6f	Video unit C.B.T. signal	Verify with oscilloscope	I% A 1 P 1-25	7.0 ± 0 millivolt square wave	If correct waveform is present, proceed to item 6g.
6g	Video unit cards I.A.6 and I.A.2, and D.S.W.C. signal	Place card I.A.2 on extender card and verify with oscilloscope:	I% A 2 P 1-13	0.2 ± 0.1 zero square wave	If correct waveform is not present, replace and I.A.6.
6h	Video unit card I.A.11	Verify:	I% A 1 P 1-26 I% A 1 P 1-27 I% A 1 P 1-28 I% A 1 P 1-29 I% A 1 P 1-30 I% A 1 P 1-31 I% A 1 P 1-32 I% A 1 P 1-33 I% A 1 P 1-34 I% A 1 P 1-35 I% A 1 P 1-36 I% A 1 P 1-37 I% A 1 P 1-38 I% A 1 P 1-39 I% A 1 P 1-40 I% A 1 P 1-41 I% A 1 P 1-42 I% A 1 P 1-43 I% A 1 P 1-44 I% A 1 P 1-45 I% A 1 P 1-46 I% A 1 P 1-47 I% A 1 P 1-48 I% A 1 P 1-49 I% A 1 P 1-50 I% A 1 P 1-51 I% A 1 P 1-52 I% A 1 P 1-53 I% A 1 P 1-54 I% A 1 P 1-55 I% A 1 P 1-56 I% A 1 P 1-57 I% A 1 P 1-58 I% A 1 P 1-59 I% A 1 P 1-60 I% A 1 P 1-61 I% A 1 P 1-62 I% A 1 P 1-63 I% A 1 P 1-64 I% A 1 P 1-65 I% A 1 P 1-66 I% A 1 P 1-67 I% A 1 P 1-68 I% A 1 P 1-69 I% A 1 P 1-70 I% A 1 P 1-71 I% A 1 P 1-72 I% A 1 P 1-73 I% A 1 P 1-74 I% A 1 P 1-75 I% A 1 P 1-76 I% A 1 P 1-77 I% A 1 P 1-78 I% A 1 P 1-79 I% A 1 P 1-80 I% A 1 P 1-81 I% A 1 P 1-82 I% A 1 P 1-83 I% A 1 P 1-84 I% A 1 P 1-85 I% A 1 P 1-86 I% A 1 P 1-87 I% A 1 P 1-88 I% A 1 P 1-89 I% A 1 P 1-90 I% A 1 P 1-91 I% A 1 P 1-92 I% A 1 P 1-93 I% A 1 P 1-94 I% A 1 P 1-95 I% A 1 P 1-96 I% A 1 P 1-97 I% A 1 P 1-98 I% A 1 P 1-99 I% A 1 P 1-100	Logic 0 = 0 ± 0.2 vdc Logic 1 = + 3.5 ± 0.5 vdc	If correct voltages are present, replace and I.A.11. If correct voltages are not present, proceed to item 6i.

Item No.	Item checked	Test procedures	Point of measurement	Normal reading	Corrective action
6i	Video unit card I&14	Place card I&12 on extender card and verify:	1500c PHASE SHIFT	Logic 0 = 0 ± 0.5 vdc Logic 1 = + 2.5 ± 1.5 vdc	If correct voltages are present, replace card I&14. If correct voltages are not present, proceed to Item 6j.
			1X.A12P2-24	0 0 0	
			1X.A12P1-44	0 1 1	
			1X.A12P1-44	0 0 0	
			1X.A12P1-4	0 0 0	
			1X.A12P1-15	0 1 1	
			1X.A12P1-5	0 1 1	
6j	Video unit card I&12 and PHASE SHIFT 15 HZ switch 157	Verify:	1500c PHASE SHIFT	Logic 0 = 0 ± 0.5 vdc Logic 1 = + 2.5 ± 1.5 vdc	If correct voltages are present, replace card I&12. If correct voltages are not present, check switch 157. Replace switch 157 (pins 6-11g and 6-12g) if faulty. If switch 157 is not faulty after video unit is checked.
			1X.A12P1-10	1 1 1	
			1X.A12P2-5	1 1 1	
			1X.A12P1-20	1 0 0	
			1X.A12P1-11	1 1 1	
			1X.A12P1-41	1 1 1	
			1X.A12P1-12	1 0 0	
			1X.A12P1-30	1 0 0	
			1X.A12P2-16	1 0 0	
			1X.A12P1-29	1 0 0	
7	Video unit manual program A / A PREF	Set PROGRAM to 1, A / A PREF to failed value, and verify:	DISPLAY A	00 to 01 (0 ± 1) 1000 to 1000 (0 ± 0) 1000 to 2005 (0 ± 0) 5000 ± 1 (0 ± 1) 1000 ± 1 (0 ± 1) Same as Item 7	If correct indication is present, proceed to Item 7a. If correct indication is not present, proceed to Item 7b.
7a	Video unit card I&21 and manual program A / A PREF	Set SELECT B to 7 and verify:	DISPLAY B	Same as Item 7	If correct indication is present, replace card I&21. If correct indication is not present, proceed to Item 7a.
7b	Video unit manual program A / A PREF	Set SELECT B to 7 and verify:	DISPLAY B	Same as Item 7	If correct indication is present, proceed to Item 7d. If correct indication is not present, proceed to Item 7a.

Item No.	Item checked	Test procedures	Points measurement	Normal reading	Corrective action
7a	Video unit cards I/A4 and I/A6, and A/AP5 signal	Remove top cover (para 6-11a), place card I/A4 on extension card, and verify.	I/A4 AP2-13	+ 2.5 $\pm$ 0.5 vdc	If correct voltage is present, replace card I/A4. If correct voltage is not present, replace card I/A4.
7d	Video unit cards I/A4 and I/A6, and A/AP5 signal	Remove top cover (para 6-11a), place card I/A4 on extension card, and verify.	I/A4 AP2-25	+ 2.5 $\pm$ 0.5 vdc	If correct voltage is present, replace card I/A4. If correct voltage is not present, replace card I/A4.
7e	Video unit card I/A4 and OAC signal	Remove top cover (para 6-11a), place card I/A4 on extension card, and verify with oscilloscope.	I/A4 AP2-25	2 $\pm$ 0.05 second square wave	If correct waveform is present, proceed to item 7f. If correct waveform is not present, replace card I/A4.
7f	Video unit card I/A6 and VBP signal	a. Verify with oscilloscope. b. Verify with counter.	I/A6 22P1-9 I/A6 22P1-9	a. 3.2 $\pm$ 0.1 <i>ppm</i> positive pulse b. Same as item 7	If correct waveform and count is present, replace card I/A6. If correct waveform and count is not present, proceed to item 7g.
7g	Video unit card I/A22 and A/AP7 signal	a. Set A / A PPRF to failed value, place card I/A20 on extension card, and verify with oscilloscope. b. Verify with counter.	I/A20 AP1-27 I/A20 AP1-27	a. 3.2 $\pm$ 0.1 <i>ppm</i> positive pulse b. Number of pps is same as item 7 normal reading	If correct waveform and pulse count are present, replace card I/A22. If correct waveform and pulse count are not present, proceed to item 7h.
7h	Video unit card I/A20	Place card I/A20 on extension card and verify.	A / A PPRF I/A20 P1-14 I/A20 P1-15 I/A20 P1-16 I/A20 P1-17 I/A20 P1-18 I/A20 P1-19 I/A20 P1-20 I/A20 P1-21 I/A20 P1-22 I/A20 P1-23 I/A20 P1-24 I/A20 P1-25 I/A20 P1-26 I/A20 P1-27 I/A20 P1-28 I/A20 P1-29 I/A20 P1-30 I/A20 P1-31 I/A20 P1-32 I/A20 P1-33 I/A20 P1-34 I/A20 P1-35 I/A20 P1-36 I/A20 P1-37 I/A20 P1-38 I/A20 P1-39 I/A20 P1-40 I/A20 P1-41 I/A20 P1-42 I/A20 P1-43 I/A20 P1-44 I/A20 P1-45 I/A20 P1-46 I/A20 P1-47 I/A20 P1-48 I/A20 P1-49 I/A20 P1-50 I/A20 P1-51 I/A20 P1-52 I/A20 P1-53 I/A20 P1-54 I/A20 P1-55 I/A20 P1-56 I/A20 P1-57 I/A20 P1-58 I/A20 P1-59 I/A20 P1-60 I/A20 P1-61 I/A20 P1-62 I/A20 P1-63 I/A20 P1-64 I/A20 P1-65 I/A20 P1-66 I/A20 P1-67 I/A20 P1-68 I/A20 P1-69 I/A20 P1-70 I/A20 P1-71 I/A20 P1-72 I/A20 P1-73 I/A20 P1-74 I/A20 P1-75 I/A20 P1-76 I/A20 P1-77 I/A20 P1-78 I/A20 P1-79 I/A20 P1-80 I/A20 P1-81 I/A20 P1-82 I/A20 P1-83 I/A20 P1-84 I/A20 P1-85 I/A20 P1-86 I/A20 P1-87 I/A20 P1-88 I/A20 P1-89 I/A20 P1-90 I/A20 P1-91 I/A20 P1-92 I/A20 P1-93 I/A20 P1-94 I/A20 P1-95 I/A20 P1-96 I/A20 P1-97 I/A20 P1-98 I/A20 P1-99 I/A20 P1-100	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = + 3.5 $\pm$ 0.5 vdc	If correct voltages are present, replace card I/A20. If correct voltages are not present, proceed to item 7i.

Item No.	Item checked	Test procedure	Panel measurement	Normal reading	Corrective action
7a	Video unit and LA21 and A/A PREP switch 155	Verify:	A/A PREP 1XA21P1-10 1 0 1 1 0 1XA21P1-20 1 1 1 1 0 1XA21P1-11 1 1 1 0 1 1XA21P1-30 1 1 0 0 1 1XA21P1-32 1 1 1 0 0 1XA21P1-30 1 1 1 0 1 1XA21P2-00 1 0 1 1 0 1XA21P1-29 1 1 1 0 0 1XA21P2-17 1 0 1 0 0 1XA21P2-8 1 1 1 1 0 1XA21P2-13 1 0 1 1 0 1XA21P2-9 1 1 1 1 0 1XA21P2-6 1 0 1 0 0	Logic 0-+0.3 vdc Logic 1-+3.5 ± 1.5 vdc	If correct voltages are present, replace and LA21. If correct voltages are not present, check switch 155. Replace switch 155 (pins 6-11g and 6-12g) if faulty. If switch 155 is not faulty, refer video unit to depot.
8	RF unit and all program channels modulation	Set video unit PROGRAM to 1 and %MOD 15 HZ and %MOD 135 HZ as follows for a, b, f, g, i, and h k, and to failed value for ab, e 2, e 3, and e 4. Verify: 15 HZ 135 HZ a b 07N 10 07N 10 f g 07N 00 07N 10 e 2 07N 00 07N 06 h k 07N 10 07N 00	RF unit DISPLAY 135 HZ jack	20.0 ± 1.0 (a b) 10.0 ± 0.5 (f g, h k) 10.0 ± 0.5 (g 7) 20.0 ± 1.0 (a 1, e 3) 10.0 ± 1.0 (a 2, e 4)	If correct indication is not present, proceed to Item 6a.
8a	Video unit F.V.M. signal	Set %MOD 15 HZ to OFF 00 and %MOD 135 HZ to 07N 10, and verify with oscilloscope.	135 HZ jack	135 Hz sine wave with nominal amplitude 6 volts peak-to-peak	If correct waveform is present, proceed to Item 8b. If correct waveform is not present, proceed to Item 8c.
8b	Video unit C.V.M. signal	Set %MOD 15 HZ to 07N 10 and %MOD 135 HZ to OFF 00, and verify with oscilloscope.	15 HZ jack	15 Hz sine wave with nominal amplitude 6 volts peak-to-peak	If correct waveform is present, proceed to Item 8d. If correct waveform is not present, proceed to Item 8c.
8c	Video unit and LA11 and RFV signal	Set %MOD 135 HZ to failed value, remove top cover (pins 6-11a), place and LA9 on extender card, and verify with oscilloscope.	1XA0P1-27	135 Hz sine wave	If correct waveform is present, replace and LA11. If correct waveform is not present, proceed to Item 8f.
8d	RF unit M.P.C. signal	Remove top cover (pins 6-7a), place and 2A9 on extender card, set video unit %MOD 15 HZ and %MOD 135 HZ switches to	2XA0P1-12		If correct voltages are present, proceed to Item 8g. If correct voltages are not present, proceed to Item 8h.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
		following positions, and verify at each position: 15 002 OFF 00 ON 20 ON 30 ON 40 OFF 00 OFF 00 OFF 00 OFF 00		1 ± 0.25 vdc 2 ± 0.25 vdc 3 ± 0.25 vdc 4 ± 0.25 vdc 1 ± 0.25 vdc 2 ± 0.25 vdc 3 ± 0.25 vdc 4 ± 0.25 vdc	
8c	Video unit card 1A27 and CMC signal	Set %MOD 15 002 to failed value, remove top cover (para 6-11a), place card 1A27 on extender card, and verify.	1XA27P2-10	+3.5 ± 1.5 vdc	If correct voltage is present, proceed to item 8f. If correct voltage is not present, replace card 1A27.
8d	Video unit card 1A27 and RMC signal	Verify.	1XA9P1-9	+3.5 ± 1.5 vdc	If correct voltage is present, proceed to item 8f. If correct voltage is not present, replace card 1A27.
8e	RF unit SELECT switch 252 and VIDEO signal	Remove top cover (para 6-7a), place card 2A9 on extender card, and verify.	2XA9P1-5	+1.5 ± 1.5 vdc	If correct voltage is present, proceed to item 8f. If correct voltage is not present, check switch 252. Replace switch 252 (para 6-7a and 6-8a) if faulty. If switch 252 is not faulty, refer of unit to depot.
8f	RF unit module 2A4 and CSW signal	Disconnect cable W-3 from EN-TERFACE SIGNAL connector and verify with oscilloscope.	W-3-1	Composite sine wave per chart 38	If correct waveform is present, replace module 2A4 (para 6-7d and 6-8d). If correct waveform is not present, proceed to item 8h.
8g	Video unit card 1A11	Place card 1A10 on extender card and verify.	15 002 % Modulation 1XA00P2-22 0 0 0 0 1XA00P2-14 0 0 0 0 1XA00P2-12 0 0 0 1 1XA00P2-26 0 0 1 0 1XA00P2-35 0 1 1 0 1XA00P2-33 0 0 1 0 1XA00P2-42 0 0 0 0 1XA00P2-24 0 0 0 0 1XA00P1-6 0 0 1 0	Logic 0 → 0 ± 0.3 vdc Logic 1 → +3.5 ± 1.5 vdc Logic 1 → +1.7 ± 0.2 vdc	If correct voltages are present, replace card 1A11. If correct voltages are not present, proceed to item 8m.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action																																		
8j	Video unit card 1A9	Place card 1A10 on extender card and verify:	125 MHz Modulation 1X A10P1-20 1 0 0 0 1X A10P1-18 0 1 1 1 1X A10P1-14 0 0 0 0 1X A10P1-8 0 0 1 0 1X A10P1-15 0 1 1 0 1X A10P1-5 0 0 1 0 1X A10P2-40 0 0 0 0 1X A10P1-20 0 0 0 0 1X A10P2-21 0 0 0 0	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct voltages are present, replace card 1A9. If correct voltages are not present, proceed to item 8k.																																		
8k	RF unit card 2A9 and display 2A7	Verify:	Determine logic state for each point of measurement in chart 8K. (Logic 0 = 0 $\pm$ 0.3 vdc; Logic 1 = +3.5 $\pm$ 1.5 vdc) and add decimal values of all logic 0 states except as noted below: Chart 8K <table><tr><th>Point of Measurement</th><th>Decimal Value</th></tr><tr><td>2X A10P2-14</td><td>400</td></tr><tr><td>2X A10P2-15</td><td>400</td></tr><tr><td>2X A10P2-40</td><td>200</td></tr><tr><td>2X A10P2-22</td><td>100</td></tr><tr><td>2X A10P2-12</td><td>40</td></tr><tr><td>2X A10P2-7</td><td>40</td></tr><tr><td>2X A10P1-29</td><td>20</td></tr><tr><td>2X A10P1-30</td><td>1</td></tr><tr><td>2X A10P2-6</td><td>8</td></tr><tr><td>2X A10P2-5</td><td>4</td></tr><tr><td>2X A10P2-25</td><td>2</td></tr><tr><td>2X A10P2-26</td><td>1</td></tr><tr><td>2X A10P2-9</td><td>0.8</td></tr><tr><td>2X A10P2-10</td><td>0.4</td></tr><tr><td>2X A10P2-13</td><td>0.2</td></tr><tr><td>2X A10P2-16</td><td>0.1</td></tr></table>	Point of Measurement	Decimal Value	2X A10P2-14	400	2X A10P2-15	400	2X A10P2-40	200	2X A10P2-22	100	2X A10P2-12	40	2X A10P2-7	40	2X A10P1-29	20	2X A10P1-30	1	2X A10P2-6	8	2X A10P2-5	4	2X A10P2-25	2	2X A10P2-26	1	2X A10P2-9	0.8	2X A10P2-10	0.4	2X A10P2-13	0.2	2X A10P2-16	0.1	20.0 $\pm$ 1 (e 8) 10.0 $\pm$ 1 (f 4) 4.0 $\pm$ 1 (g 7) 10.0 $\pm$ 1 (h 8) 20.0 $\pm$ 1 (i 3) 40.0 $\pm$ 1 (j 2)	If correct decimal value is present, replace display 2A7 (para 6-7.1 and 6-8.2). If correct decimal value is not present, replace card 2A9.
Point of Measurement	Decimal Value																																						
2X A10P2-14	400																																						
2X A10P2-15	400																																						
2X A10P2-40	200																																						
2X A10P2-22	100																																						
2X A10P2-12	40																																						
2X A10P2-7	40																																						
2X A10P1-29	20																																						
2X A10P1-30	1																																						
2X A10P2-6	8																																						
2X A10P2-5	4																																						
2X A10P2-25	2																																						
2X A10P2-26	1																																						
2X A10P2-9	0.8																																						
2X A10P2-10	0.4																																						
2X A10P2-13	0.2																																						
2X A10P2-16	0.1																																						

Item No.	Item checked	Test procedure	Percent measurement	Normal reading	Corrective action
8f	Signal interface cable W-3 and video unit CSW signal	Disconnect cable W-3 from video unit INTERFACE SIGNAL connector 1J4 and verify:	1J4-1	Composite sine wave per fig. 6-7, B.	If correct waveform is present, replace cable W-3. If correct waveform is not present, proceed to item 8g.
8g	Video unit card 1A10 and %MOD 15 HZ switch 158	Verify:	15 HZ % Modulation 1X.A10P2-18 1X.A10P2-8 1X.A10P2-9 1X.A10P2-6 1X.A10P2-10 1X.A10P2-7 1X.A10P2-2 1X.A10P2-1 1X.A10P2-3	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct waveforms are present, replace card 1A10. If correct waveforms are not present, check switch 158. Replace switch 158 (pins 6-11g and 6-12g) if faulty. If switch 158 is not faulty, refer video unit to depot.
8h	Video unit card 1A10 and %MOD 135 HZ switch 1511	Verify:	135 HZ % Modulation 1X.A10P1-20 1X.A10P1-10 1X.A10P1-41 1X.A10P1-31 1X.A10P1-12 1X.A10P1-30 1X.A10P2-16 1X.A10P1-29 1X.A10P2-17	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct waveforms are present, replace card 1A10. If correct waveforms are not present, check switch 1511. Replace switch 1511 (pins 6-11g and 6-12g) if faulty. If switch 1511 is not faulty, refer video unit to depot.
8i	Video unit card 1A11 and CSW signal	Set %MOD 15 HZ and %MOD 135 HZ to ON, remove top cover (pins 6-11g, 1, 2) on card 1A11 on extender card, and verify with oscilloscope:	1X.A11P1-34	Composite sine wave per fig. 6-7, B.	If correct waveform is present, refer video unit to depot. If correct waveform is not present, replace card 1A11.

f. Channel and Mode Troubleshooting					
Item No.	Item checked	Test procedure	Point measurement	Normal reading	Corrective action
1	RF unit channel signals	Remove top cover (para 6-7a), place card 2A10 on extender card, and verify:	Channel 61 63 124 2XA10P1-13 0 0 1 2XA10P1-30 0 1 0 2XA10P1-14 1 0 0 2XA10P1-4 0 0 1 2XA10P1-15 0 1 0 2XA10P1-5 0 1 0 2XA10P2-41 0 0 1 2XA10P1-20 1 0 0 2XA10P2-21 1 0 0	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct voltages are present, proceed to Item 1a. If correct voltages are not present, proceed to Item 1b.
1a	Video unit PCOAC signal	Remove top cover (para 6-11a), place card 1A14 on extender card, and verify:	Mode A / A / A / A 1XA10P2-31 0 1 1	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct voltages are present, proceed to Item 1c. If correct voltages are not present, proceed to Item 1d.
	RF unit card 2A10 and CHANNEL SELECT switch 253	Verify:	Channel 43 94 124 2XA10P1-00 1 1 0 2XA10P1-20 1 0 1 2XA10P1-11 0 1 1 2XA10P1-31 1 1 0 2XA10P1-12 1 0 1 2XA10P1-34 1 0 0 2XA10P2-16 1 1 0 2XA10P1-29 0 1 1 2XA10P2-17 0 1 1	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct voltages are present, replace card 2A10. If correct voltages are not present, check switch 253. Replace switch 253 (para 6-7c and 6-8a) if faulty. If switch 253 is not faulty, refer unit to depot.
1c	Video unit PCXYC signal	Verify:	Mode X Y 1XA10P2-31 0 1 1	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct voltages are present, proceed to Item 1c. If correct voltages are not present, proceed to Item 1f.
1d	Video unit card 1A14 and PCOAC signal	Verify:	Mode A / A / A / A 1XA10P2-5 0 1 1	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct voltages are present, replace card 1A14. If correct voltages are not present, proceed to Item 1g.
1e	RF unit module 2A6, interface signal cable W-3, and video unit PCOAC and PCXYC signals	Disconnect cable W-3 from RF unit INTERFACE SIGNAL connector 212 and verify as cable:	Mode X Y W-3-D 0 1 1	Logic 0 = 0 $\pm$ 0.3 vdc Logic 1 = +3.5 $\pm$ 1.5 vdc	If correct voltages are present, replace module 2A6 (para 6-7c and 6-8a). If correct voltages are not present, replace cable W-3.

Item No.	Item checked	Test procedures	Point measurement	Normal reading	Corrective action
2a	RF unit card 2A11 and OUTPUT ATTENUATOR switch 251	Verify:	010101010	Logic 0 = 0 ± 0.3 vdc Logic 1 = + 3.5 ± 1.5 vdc	If correct voltages are present, replace card 2A11. If correct voltages are not present, check switch 251. Replace switch 251 (para 6-7.4 and 6-8.4) if faulty. If switch 251 is not faulty, refer all unit to depot.
			Antenna 010101122		
			2% A11P1-11 1 1 1 1 1 1		
			2% A11P1-31 1 1 1 1 1 1		
			2% A11P1-12 1 1 1 1 1 1		
			2% A11P1-30 1 1 1 1 1 1		
			2% A11P2-16 1 1 1 1 1 1		
			2% A11P1-29 1 1 1 1 1 1		
			2% A11P2-17 1 1 1 1 1 1		
			2% A11P1-10 1 1 1 1 1 1		
			2% A11P1-20 0 1 1 1 1 1		

h. ID Tone Manual Test Troubleshooting.

Item No.	Item checked	Test procedures	Point measurement	Normal reading	Corrective action
1	Video unit IDP signal	Remove top cover (para 6-11.4), place card 1A27 on extender card and verify with oscilloscope.	1% A27P1-7	ID pulses not observed and procedures, para 6-8.4, Step 1.	If correct waveform is present, proceed to Item 1a. If correct waveform is not present, proceed to Item 1b.
1a	Video unit card 1A22 and IFG signal	a. Set ID TONE switch to ON and verify. b. Set ID TONE switch to KEYED and verify.	1% A27P2-13 1% A27P2-13	+ 3.5 ± 1.5 vdc 0 ± 0.3 vdc	If correct voltages are present, replace card 1A22. If correct voltages are not present, proceed to Item 1c.
1b	Video unit card 1A27 and IDP signal	a. Set ID TONE switch to KEYED and verify with oscilloscope. b. Set ID TONE switch to ON and verify with oscilloscope.	1% A27P1-13 1% A27P1-13	a. Keyed negative pulses per para 6-8.4, Step 1. b. Pulser per fig. 6-7, f.	If correct waveforms are present, replace card 1A27. If correct waveforms are not present, proceed to Item 1d.
1c	Video unit cards 1A7 and 1A27, and EXT signal	Verify with oscilloscope.	1% A27P2-26	Keyed pulses per described test procedures, para 6-8.4, Step 1.	If correct waveform is present, replace card 1A27. If correct waveform is not present, replace card 1A7.
1d	Video unit card 1A7, and P1D0 and P1D6 signals	a. Set ID TONE switch to ON and verify. b. Set ID TONE switch to KEY and verify.	1% A27P2-11 1% A27P2-16 1% A27P2-11 1% A27P2-16	a. + 3.5 ± 1.5 vdc 0 ± 0.3 vdc b. 0 ± 0.3 vdc + 3.5 ± 1.5 vdc	If correct voltages are present, replace card 1A7. If correct voltages are not present, proceed to Item 1e.
1e	Video unit card 1A26, ID TONE switch 1S18, and S1D0 and S1D6 signals	a. Place card 1A26 on extender card, set ID TONE switch to ON, and verify.	1% A26P2-10 1% A26P2-16	a. 0 ± 0.3 vdc + 3.5 ± 1.5 vdc	If correct voltages are present, replace card 1A26.

Item No.	Item checked	Test procedure	Point of measurement	Normal reading	Corrective action
	1	6. Set RD TIGHT switch to KEY and verify:	EXA26P2-10 EXA26P2-6	b. $+2.5 \pm 1.5$ vdc 0 ± 0.3 vdc	If correct voltages are not present, check switch 1514. Replace switch 1514 (para 6-11f and 6-12g) if faulty. If switch 1514 is not faulty, refer video unit to depot.

Section III. MAINTENANCE OF RF UNIT

6-6. General

This section covers the repair procedures of the rf unit at general support level maintenance. The repairs consist of removal and replacement of modules and circuit cards, and calibration, authorized by the Maintenance Allocation Chart, Appendix B.

6-7. RF Unit Removal Procedures

WARNING

Remove all power to the rf unit and disconnect rf unit from video unit. Voltages capable of causing injury or death are used in this equipment.

Before any circuit cards or modules are removed, the rf unit must be electrically disconnected from

the video unit and, if rack-mounted, removed from the rack. If the rf unit and video unit are stacked for bench mounting, the rf unit must be separated from the video unit by releasing the four clamps, two on each side.

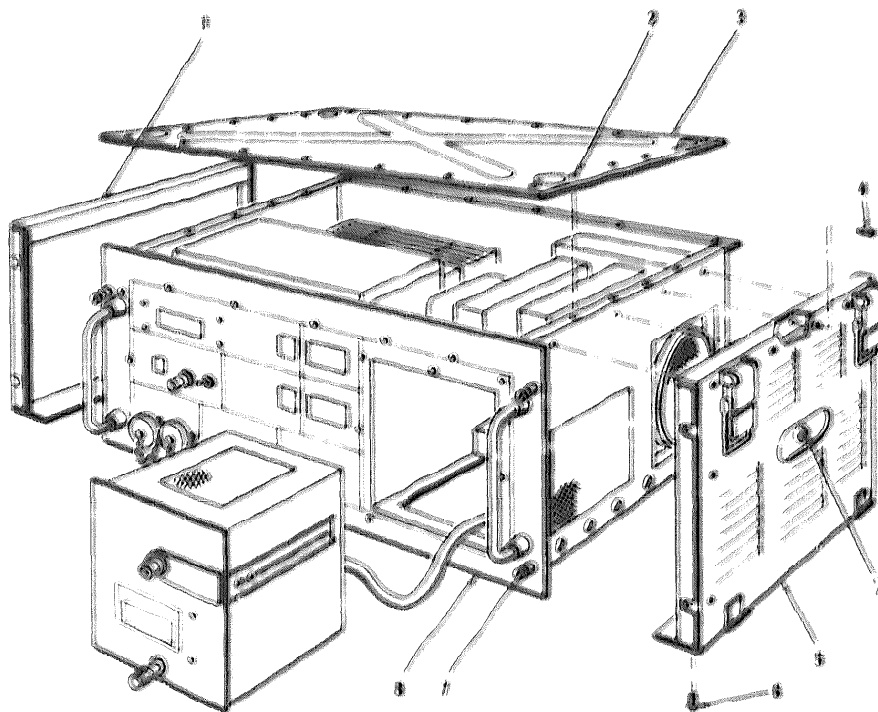
Caution

To prevent damage when disconnecting rigid coaxial cables W1 through W7 and A2W1 through A2W3 (fig. 6-2), always disconnect both ends and do not bend cables.

a. Removal of Top Cover.

(1) Loosen 20 turn-lock fasteners (2, fig. 6-1) that secure top cover (3, fig. 6-1) to chassis.

(2) Lift top cover from chassis.



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- 1 Left-hand chassis support panel
- 2 Turn-lock fasteners (20)
- 3 Top cover
- 4 Screws (14)
- 5 Right-hand chassis support panel
- 6 Screws (16)
- 7 Captive mounting screws (4)
- 8 Front panel

Figure 6-1. RF unit case removal

b. Removal of Chassis Support Panels.

NOTE

The following procedures are for the right-hand chassis support panel removal. The panel is removed when replacing the blower and/or radio interference filter. The left-hand panel is removed in a similar manner.

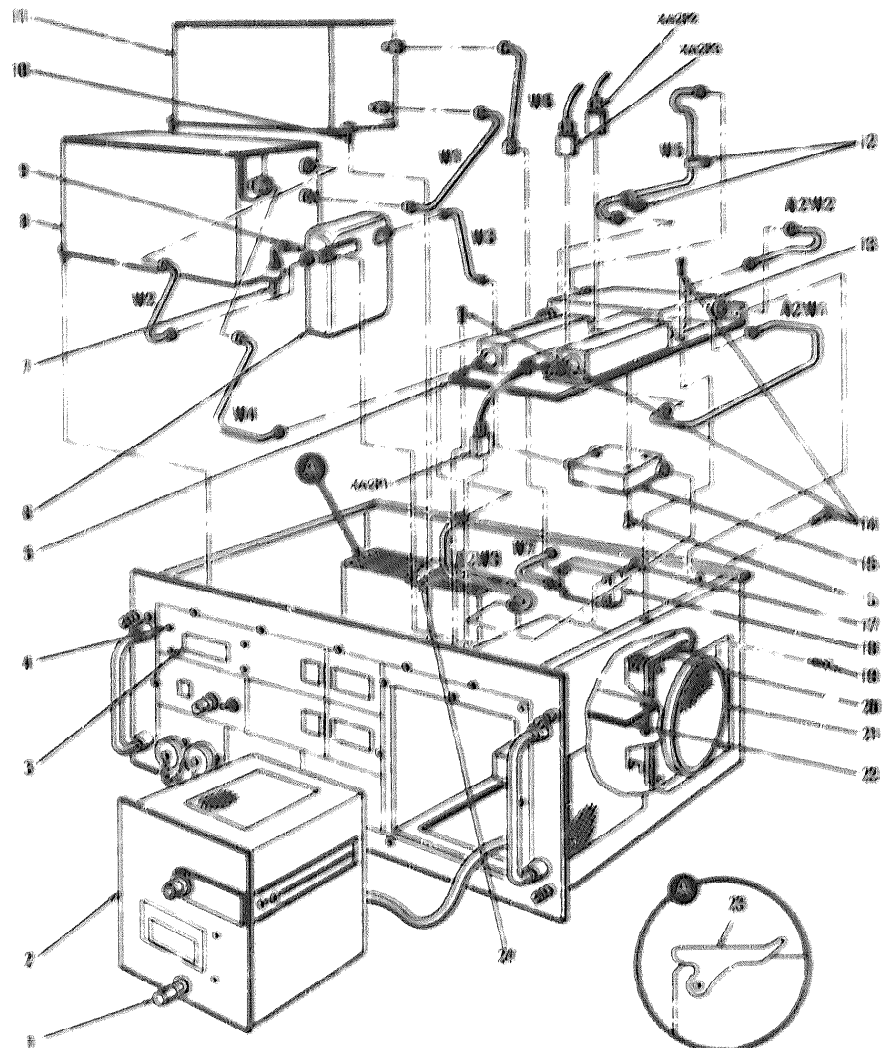
- (1) Turn rf unit on its left side as viewed from front.
- (2) Remove four screws (6, Fig. 6-1) securing bottom flange of right-hand chassis support panel (5) to chassis.
- (3) Loosen two front panel captive mounting

screws (7) which secure front flange of right-hand chassis support panel (5) to front panel (8).

(4) Loosen seven screws (4) which secure right-side chassis support panel (5) to chassis and carefully remove support panel.

c. Removal of Frequency Synthesizer 2A6.

- (1) Remove top cover per subparagraph *a*.
- (2) Loosen four mounting screws (10, Fig. 6-2) which secure frequency synthesizer 2A6 (11) to chassis.
- (3) Disconnect coaxial cables W6 and W1 from frequency synthesizer 2A6 (11).
- (4) Carefully lift module straight up to disengage two connectors on bottom of module.



11-6625-2606-14 (1A) (6)

- | | |
|--|--------------------------------------|
| 1 Knurled thumb screw | 13 Directional coupler |
| 2 Power meter 2A1 | 14 Mounting screws (6) |
| 3 Display assembly 2A7 | 15 Coupler-detector |
| 4 Screws (4) | 16 Mounting screw |
| 5 Attenuator and detector assembly 2A2 | 17 Mounting screws (4) |
| 6 Pseudo pulse generator 2A3 | 18 37.5 MHz reference oscillator 2A5 |
| 7 Captive mounting screws (4) | 19 Screws (6) |
| 8 Modulator 2A4 | 20 Blower 2B1 |
| 9 Screws (2) | 21 Radio interference filter |
| 10 Mounting screws (4) | 22 Capacitor mounting bracket |
| 11 Frequency synchronizer 2A6 | 23 Gasket levers (2 for each card) |
| 12 Cable clamps | 24 Retainer clip |

Figure 6-2. Rf with parts location.

d. Removal of Modulator 2A4.

- (1) Remove top cover per subparagraph a.
- (2) Loosen four captive mounting screws (7, fig. 6-2) which secure modulator 2A4 (8) to chassis.
- (3) Disconnect coaxial cables W1, W2, and W4.
- (4) Carefully lift module straight up to disengage two connectors on bottom of module.

e. Removal of Pseudo Pulse Generator 2A3.

- (1) Remove top cover per subparagraph a.
- (2) Disconnect coaxial cables W2 and W3 (fig. 6-2) from pseudo pulse generator 2A3 (6).
- (3) Remove and retain two screws (9) which secure top end of module to chassis brackets.
- (4) Carefully lift module straight up to disengage connector on bottom of module.

f. Removal of Attenuator and Detector Assembly 2A2.

- (1) Remove top cover per subparagraph a.
- (2) Remove and retain six mounting screws (14, fig. 6-2) securing attenuator and detector assembly 2A2 (5) base plate to chassis.
- (3) Disconnect connectors XA2P1, XA2P2, and XA2P3.
- (4) Remove mounting hardware securing cable clamps (12) and coaxial cable W5 to chassis.
- (5) Disconnect coaxial cables W5 and W4 from attenuator and detector assembly 2A2.

NOTE

Coupler-detector (15), mounting screw (16), and coaxial cable W3 are shown removed for clarity.

- (6) Disconnect coaxial cable W3 and flexible coaxial cable assembly connector (not shown) from coupler-detector (15).

- (7) Carefully lift attenuator and detector assembly 2A2 (5) from chassis.

g. Removal of Coupler-Detector Assembly. The coupler-detector assembly (15, fig. 6-2) is removed as part of the attenuator and detector assembly 2A2 (5).

h. Removal of 37.5 MHz Reference Oscillator 2A5.

- (1) Remove top cover per subparagraph a.
- (2) Remove attenuator and detector assembly 2A2 per subparagraph f.

- (3) Disconnect coaxial cables W6 and W7 (fig. 6-2) from 37.5 MHz reference oscillator 2A5 (18), which is mounted on rear of power meter cavity.

- (4) Tag and unsolder wiring to FL1 and FL2 on reference oscillator.

- (5) Remove and retain four mounting screws (17) and ground lug (not shown) from lower inside mounting screw.

- (6) Lift reference oscillator (18) out of chassis.

i. Removal of Power Meter 2A1.

- (1) Remove top cover per subparagraph a.
- (2) Loosen knurled thumb screw (1, fig. 6-3) on front of power meter 2A1 (2) and carefully pull module forward and out from rf unit chassis cavity.
- (3) Set power meter 2A1 to one side of cavity opening and reach inside and disconnect connector J12 (12).

- (4) Remove retaining nuts which secure coaxial connectors J13 (7), J14 (6), and J15 (8) to wall of module cavity. After removing coaxial connector from cavity wall, replace retaining nuts on their respective connectors.

- (5) Remove and retain mounting hardware which secures cable clamp (10) behind J12 mounting bracket.

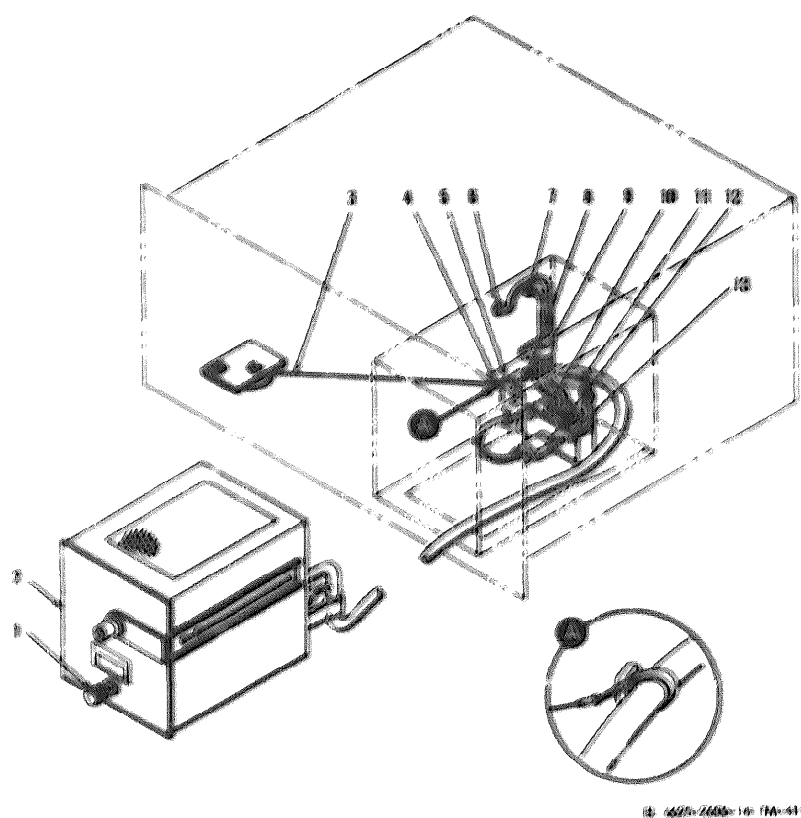
- (6) Remove and retain mounting hardware which secures cable clamp (9) at left, rear, center of module cavity.

- (7) Slip two coaxial cable leads out from cable clamp (9) and reinstall clamp to chassis.

- (8) Reach into module cavity with one hand and grasp cable at point where cable clamp (10) is located. While slowly feeding other end of cable back into cavity, pull lower end out far enough to engage holder ring (5) which is attached to loop (4) in end of spring wound line.

- (9) Thread and attach a length (approximately 5 feet) of hookup wire, or equivalent, through loop (4) in end of spring wound line as a means of retrieving looped end of line when installing replacement module.

- (10) Cut plastic holder ring (5) from cable and allow spring loaded reel to reel in line (3). Carefully remove power meter 2A1 and attached cables from rf unit chassis.



- 1 Knurled thumb screw
- 2 Power motor 2A1
- 3 Line
- 4 Loop
- 5 Holder ring
- 6 Coaxial connector J14
- 7 Coaxial connector J13
- 8 Coaxial connector J15
- 9 Cable clamp
- 10 Cable clamp
- 11 Cable guide bracket
- 12 Connector J12
- 13 Connector bracket

Figure 6-3. RF unit power motor 2A1 removal

g. Removal of Circuit Cards 2A8 through 2A13.

- (1) Remove top cover per subparagraph a.
- (2) Remove retainer clip (24, fig. 6-2) by inserting a flat blade screwdriver at end of clip next to modulator 2A4 (8) and pressing in to disengage studs from holes in card nest.
- (3) Grasp circuit card ejector levers (23) on each end of circuit card, turn upward and out to disconnect circuit card from its mating connector at

bottom of card nest, and slide circuit card out of its associated mounting slots in card nest.

h. Removal of Blower 2B1 and/or Radio Interference Filter.

- (1) Remove top cover per subparagraph a.
- (2) Remove right-hand chassis support panel per subparagraph b.
- (3) Remove attenuator and detector assembly 2A2 per subparagraph f.

(4) Remove and retain eight screws (13, fig. 6-2) which secure radio interference filter (21) to chassis.

(5) Remove radio interference filter and set to one side.

(6) Remove and retain two pushrod screws (not shown) which secure capacitor mounting bracket (22) to chassis posts.

(7) Turn capacitor mounting bracket over to gain access to blower 2B1 (20) wire connections.

(8) Tag and unsolder blower wires connected to capacitor bracket assembly.

(9) Remove and retain four mounting screws (not shown) which secure blower to chassis.

(10) Carefully lift blower out of rf unit chassis.

l. Removal of Display Assembly 2A7

(1) Remove modulator 2A4 per subparagraph *d*.

(2) Disconnect connectors XA7P1 (not shown) from rear of display assembly 2A7 (3, fig. 6-2).

(3) Remove and retain four screws (4) which secure display assembly 2A7 to front panel of rf unit chassis.

(4) Carefully remove display assembly 2A7 from front panel.

m. Removal of Toggle Switches 256 and 258

(1) Remove top cover per subparagraph *a*.

(2) Tag and unsolder wires from switch terminals.

(3) Remove mounting nut and washer from front side of switch and remove switch from panel. (Where a wire lug exists as part of switch mounting hardware, leave lug hanging free on attached wire and retighten it during subsequent installation of new switch.)

n. Removal of Thumbwheel Switches 251 through 254

(1) Remove top cover per subparagraph *a*.

(2) Tag and unsolder wires from printed circuit tabs at rear of switch.

(3) Remove four mounting screws, nuts, and associated washers which secure switch to front panel and remove switch.

o. Removal of TTM Meter 2M1

(1) Remove modulator 2A4 per subparagraph *d*.

(2) Tag and unsolder wires from meter 2M1 terminals.

(3) Remove and retain two mounting screws, nuts, and associated washers which secure meter 2M1 to front panel and remove 2M1.

6-8. RF Unit Replacement Procedure

The following procedures apply to the replacement of modules and circuit cards removed from the rf unit.

CAUTION

To prevent damage when installing rigid coaxial cables W1 through W7 and 42W1 through 42W3 (fig. 6-2), always check for dirt and foreign matter in teflon connectors and do not bend cables.

a. Replacement of Top Cover

(1) Install top cover (3, fig. 6-1) in position.

(2) Secure top cover to chassis with 20 turn-lock fasteners (2).

b. Replacement of Chassis Support Panels

NOTE

The following procedures are for the replacement of the right-hand chassis support panel. The left-hand panel is replaced in a similar manner.

(1) Set rf unit on its left side as viewed from front.

(2) Place right-hand chassis support panel (3, fig. 6-1) in position and secure flange with four screws (6) to bottom of chassis.

(3) Secure side of panel to chassis with seven screws (4).

(4) Set rf unit upright and secure panel with two front panel captive mounting screws (7).

c. Replacement of Frequency Synthesizer 2A6

(1) Place frequency synthesizer 2A6 (11, fig. 6-2) in position so that coaxial connectors are on right as viewed from front of rf unit.

(2) Lower module in place and carefully exert pressure until connectors on bottom are correctly seated.

(3) Connect coaxial cables W6 and W1 to their associated connectors on module.

(4) Secure module with four mounting screws (10) and recheck coaxial cable connections.

(5) Replace top cover per subparagraph *a*.

d. Replacement of Modulator 2A4

(1) Place modulator 2A4 (8, fig. 6-2) in position so that coaxial connectors are on right as viewed from front of rf unit.

(2) Lower module in place and carefully exert pressure until connectors on bottom are correctly seated.

(3) Connect coaxial cables W1, W2, and W4 to their associated connectors on module.

(4) Secure module with four captive mounting screws (7) and recheck coaxial cable connections.

(5) Adjust module per paragraph 6-9 *a*.

(6) Replace top cover per paragraph *a*.

e. Replacement of Pseudo Pulse Generator 2A3

(1) Set pseudo pulse generator 2A3 (6, fig. 6-2) in position so that flat side is to left as viewed from front of rf unit.

(2) Place module adjacent to power meter

cavity and carefully exert a downward pressure until connector on bottom is correctly seated.

(3) Install two screws (9) through module mounting flange into chassis brackets located at top corner of power meter cavity.

(4) Connect coaxial cables W2 and W3 to their associated connectors.

(5) Replace top cover per subparagraph a.

f. Replacement of Attenuator and Detector Assembly 2A2.

(1) Place attenuator and detector assembly 2A2 (3, fig. 6-2) so that directional coupler (13) is in rear.

(2) Carefully set attenuator and detector assembly 2A2 in position, insuring that coaxial cable A2W1 is not damaged.

(3) Secure the assembly with six mounting screws (14).

(4) Connect coaxial cable W3 and flexible coaxial cable (not shown) to coupler-detector (13).

(5) Connect coaxial cables W5 and W4 to assembly and secure cable clamps (12) to rf unit chassis.

(6) Connect connectors XA2P1, XA2P2, and XA2P3.

(7) Replace top cover per subparagraph a.

g. Replacement of Coupler-Detector Assembly. Coupler-detector assembly (13, fig. 6-2) is replaced as a part of attenuator and detector assembly 2A2 (subparagraph f.)

h. Replacement of 37.3 MHz Reference Oscillator 2A5.

(1) Place 37.3 MHz reference oscillator 2A5 (13, fig. 6-2) so that coaxial connectors are to left as viewed from front of rf unit and terminal FL1 is toward top of rf unit.

(2) Resolder wiring to terminals of FL1 and FL2.

(3) Secure module to rear of power meter cavity with four mounting screws (17) and replace ground lug (not shown).

(4) Connect coaxial cables W6 and W7 to their associated connectors.

(5) Replace attenuator and detector assembly 2A2 per subparagraph f.

(6) Replace top cover per subparagraph a.

i. Replacement of Power Meter 2A1.

(1) Retrieve loop (4, fig. 6-3) at end of spring wound line (3).

(2) Replace holder ring (5) through loop (4) and secure approximately 13 inches from bend in module end of cable.

(3) Dress power meter cable around cable guide bracket (11) and place cable clamp (10) in position at point where cable insulation ends.

(4) Secure cable clamp (10) with mounting hardware to connector bracket (13).

(5) Install coaxial connectors J13 (7), J14 (6), and J15 (8) in their respective mounting holes in wall of power meter cavity.

(6) Connect connector at end of module cable to connector J12 (12).

(7) Install power meter 2A1 (2) in chassis cavity insuring that cable does not block module.

(8) Secure module with knurled thumb screw (11).

(9) Refer to paragraph 6-9 for calibration requirements.

(10) Replace top cover per subparagraph a.

j. Replacement of Circuit Cards 2A8 Through 2A15.

(1) Grasp circuit card ejector levers (23, fig. 6-2) and insert circuit card to be installed into correct guide slots in card seat.

(2) Exert a steady pressure down on card ejector levers until circuit card is properly seated and press ejector levers inward.

(3) Install retainer clip (24) by engaging ends in holes in card seat.

(4) Replace top cover per subparagraph a.

(5) If circuit card 2A13 is replaced, refer to paragraph 6-9 for calibration requirements.

k. Replacement of Blower 2B1 and/or Radio Interference Filter.

(1) Place blower 2B1 (20, fig. 6-2) in position and secure with four mounting screws (not shown).

(2) Resolder blower wiring to connections on capacitor mounting bracket (22).

(3) Position capacitor mounting bracket in place and secure with two panhead screws (not shown).

(4) Place radio interference filter (21) in position and secure with eight screws (19).

(5) Replace attenuator and detector assembly 2A2 per subparagraph f.

(6) Replace right-hand chassis support panel per subparagraph b.

(7) Replace top cover per subparagraph a.

l. Replacement of Display Assembly 2A7.

(1) Install display assembly 2A7 (3, fig. 6-2) in position in front panel.

(2) Secure display assembly 2A7 with four screws (4).

(3) Connect connector XA7P1 (not shown) to rear of display assembly 2A7.

(4) Replace modulator 2A4 per subparagraph d.

(5) Replace top cover per subparagraph a.

m. Replacement of Toggle Switches 255 and 256.

(1) Place switch in mounting hole from rear of front panel and install mounting nut and washer (install wire tag, if applicable).

(2) Solder wires, as previously identified, to switch.

(3) Replace top cover per subparagraph *a*.

a. Replacement of Thumbwheel Switches 251 through 254.

(1) Place switch in mounting position at rear of front panel and install four mounting screws, nuts, and associated washers.

(2) Solder wires, as previously identified, to printed circuit tab at rear of switch.

(3) Replace top cover per subparagraph *a*.

a. Replacement of TTM Meter 2M1.

(1) Place meter 2M1 in mounting position on front panel and install two mounting screws, nuts, and associated washers.

(2) Solder previously tagged wires to terminals at rear of meter 2M1.

(3) Replace modulator 2A4 per subparagraph *d*.

6-9. Rf Unit Adjustment Procedures

Modulator 2A4 rf output should be checked every 6 months and when replaced. Power measurement action should be calibrated a depot level maintenance every 6 months and when power meter 2A1 or circuit card 2A13 is replaced.

a. Modulator 2A4 RF Output Check and Adjustment. Connect test equipment per figure 6-4, set initial control settings per table 6-3, and perform the following steps:

(1) Wait 10 minutes for equipment to warm up.

(2) Verify rf output of 0 ± 0.5 dbm on power meter. If rf output is not in tolerance, proceed as follows to adjust modulator 2A4:

(a) Remove top cover from rf unit (para 6-7 *a*) and cover from modulator 2A4 (8, fig. 6-2) to gain access to adjustments R70, R79, and R100.

(b) Adjust R70 to obtain an rf output of 0 dbm on power meter. 0 dbm equals an indication of

-5 dbm on the power meter with the RANGE switch in the MW 3 / DBM + 5 position.

(c) If necessary, adjust R79 for a stable output level (no hunting).

(d) Adjust R100 for 224 mc on rf unit DISPLAY.

(e) Measure and record rf output in dbm on power meter for following X and Y mode channels:

X Mode Channels		Y Mode Channels	
1	75	15	80
20	98	35	100
40	115	55	120
60	126		

(f) Insure that all readings taken in step (e) are within 0 ± 0.5 dbm. If not, repeat steps (b) through (e) to achieve nearest 0 ± 0.5 dbm level.

Table 6-3. Installed and Settings for Modulator

2A4 Adjustments	
Control	Setting
RADIO TEST SET	
SELECT	5
OUTPUT ATTENUATOR	0, 0
CHANNEL SELECT	ch. 2
PULSE MOD	1
RISE TIME	2.5 μ s
% MOD 15 KHZ	OFF 00
% MOD 155 KHZ	OFF 00
ID TONE	OFF
POWER	ON
OSCILLOSCOPE	
TIME BASE	10 μ s
VOLTS / CM	1
POWER METER	
POWER	ON
RANGE	MW 3 / DBM + 5
MOUNT RESISTANCE	200
FINE ZERO	ZERO
CAL FACTOR	100%

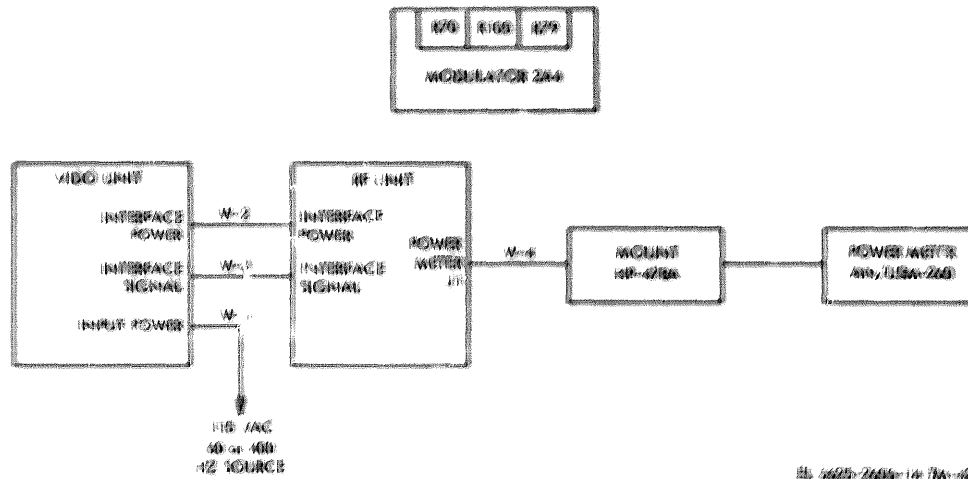


Figure 6-4. Test setup for modulator 2A4 adjustment.

b. Power Measurements Section Calibration. Refer radio test set to depot level maintenance when calibration is required by unit (6-9).

Section IV. MAINTENANCE OF VIDEO UNIT

6-10. General

This section covers the repair procedures of the video unit at general support level maintenance. The repairs consists of removal and replacement of modules and circuit cards authorized by the Maintenance Allocation Chart, appendix B.

6-11. Video Unit Removal Procedures

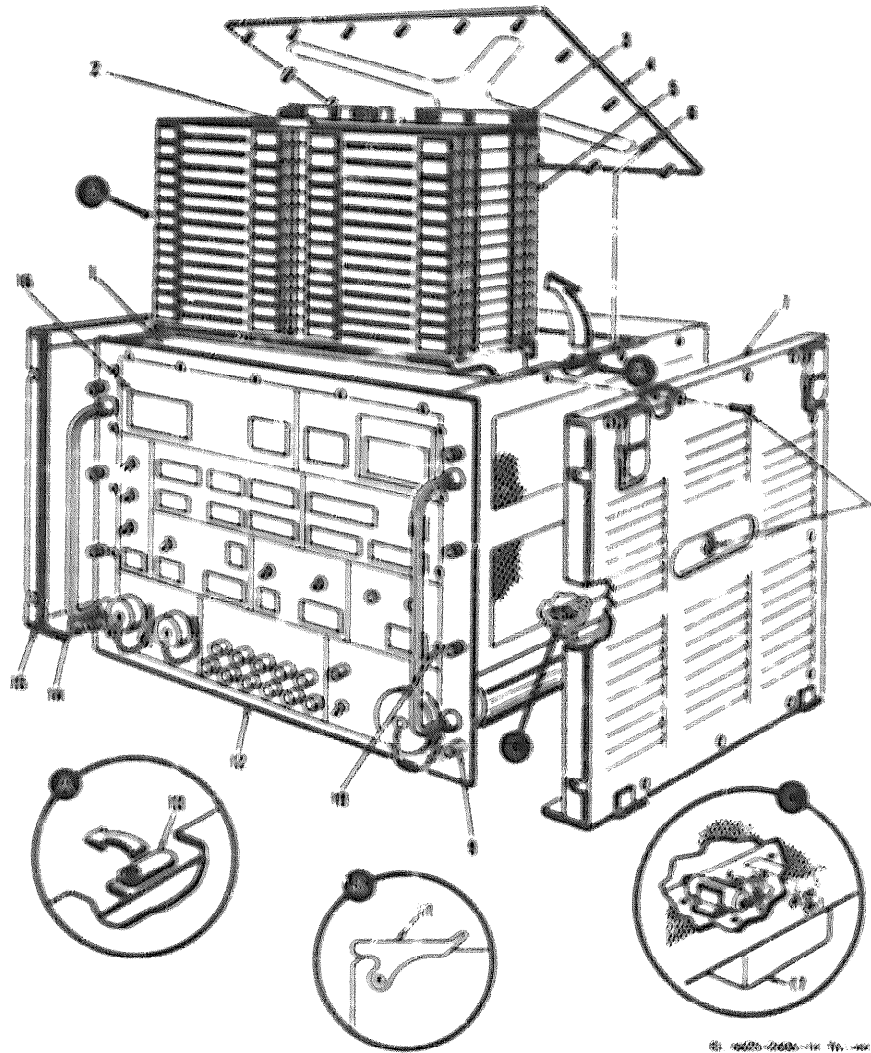
WARNING

Remove all power to video unit and disconnect rf unit from video unit. Voltages capable of causing death or injury are used in this equipment.

Before any circuit card or modules are removed, the video unit must be electrically disconnected from the rf unit and, if rack-mounted, removed from the rack. If the video unit and rf unit are stacked for bench mounting, the rf unit must be separated from the video unit by releasing the four clamps, two on each side.

a. Removal of Top Cover.

- (1) Loosen 18 turn-lock fasteners (6, fig. 6-5) securing top cover (4) to video unit chassis (1).
- (2) Remove top cover from video unit.



- 1 Chassis
- 2 Flange
- 3 Captive mounting screws (4)
- 4 Top cover
- 5 Control card rack
- 6 Turn-lock fastener (11)
- 7 Right-hand chassis support panel
- 8 Screws (11)
- 9 Captive mounting screws (4)

- 10 Captive screws (20)
- 11 Captive levers (2 for each card)
- 12 Front panel
- 13 Back support (2)
- 14 Handles (2)
- 15 Left-hand chassis support panel
- 16 Display assembly (A3)
- 17 RF filter (FL1 type)

Figure 6-5. Video unit parts location.

b. Removal of Chassis Support Panels.

NOTE

The following procedures are for the removal of the right-hand chassis support

panel. The left-hand panel is removed in a similar manner.

(1) Remove 11 screws (8, fig. 6-5) securing

right-hand chassis support panel (7) to video unit chassis (11).

(2) Loosen four captive mounting screws (9) on front panel.

(3) Remove chassis support panel from video unit.

c. Removal of Circuit Cards LA1 through LA14, LA16 through LA27, and LA29.

(1) Remove the circuit card support rack.

CAUTION

To prevent damage when pulling circuit cards out of card rack, avoid putting pressure on circuit card components.

(2) Grasp ejector levers (11, fig. 6-5) of circuit card to be removed and turn outward until card is disconnected from its mating connector in bottom of circuit card rack (5). Continue pulling card out of mounting slots using levers until card is free.

NOTE

If desired, the card rack can be swung up out of the chassis by performing the following steps:

(3) Loosen eight captive mounting screws (3) at bottom flanges of circuit card rack (5).

(4) Grasp flange (2) at top rear of circuit card rack and pull upward and towards front of chassis.

(5) While holding circuit card rack up out of chassis, turn rack supports (13) inward toward center of chassis and then allow circuit card rack to rest on rack supports.

d. Removal of Power Supply 1P51.

(1) Disengage eight captive mounting screws (9, fig. 6-5).

(2) Disengage 20 captive screws (19) and pull top of front panel (12) away from video unit until panel is resting on handles (14).

(3) Remove two center pins (4, fig. 6-6) and two hinge pins (5).

(4) Install front panel (12, fig. 6-5) on video unit and secure temporarily with approximately half of captive screws (19).

(5) Place video unit on handles (14) and remove 20 screws (2, fig. 6-6).

(6) Swing power supply 1P51 (3) out and down to gain access to terminal boards.

(7) Remove two screws (14) and insulator (9).

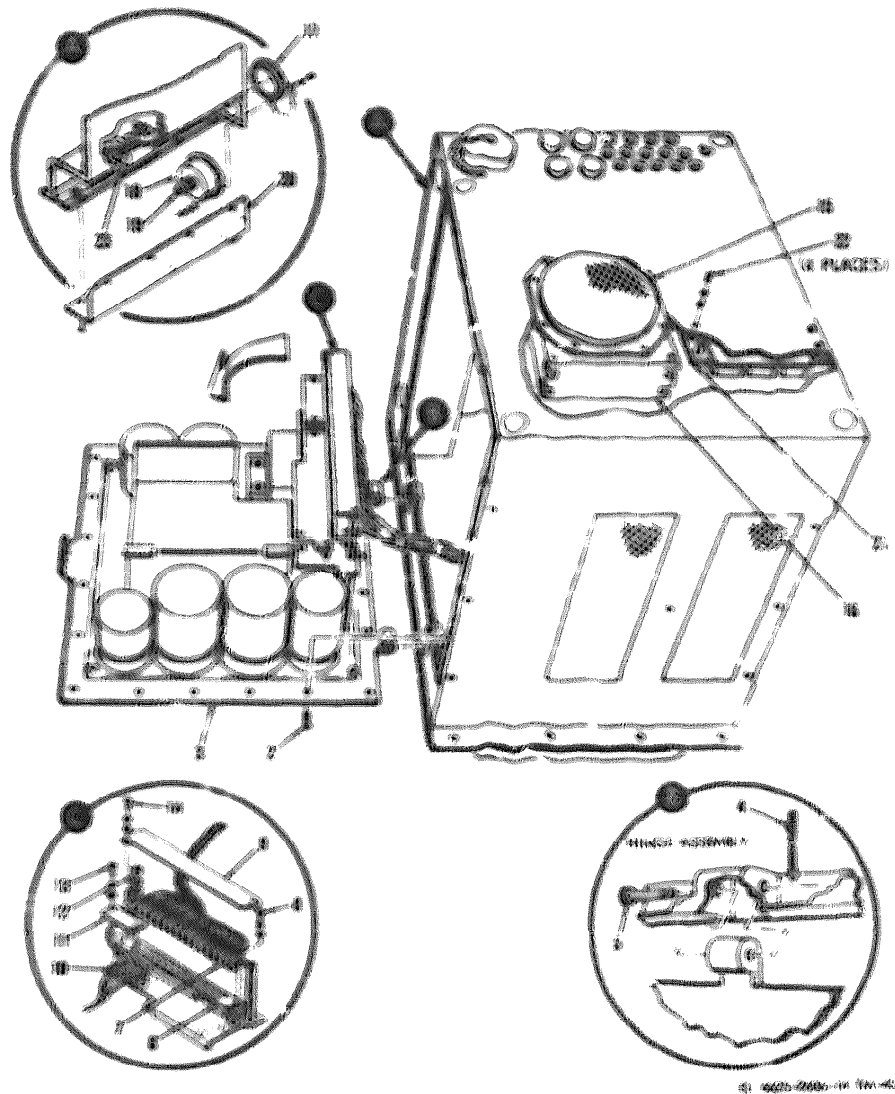
(8) Remove two screws (8).

(9) Loosen 20 slotted nuts (12) and slide top half of TB1 (7) off of bottom half (6).

(10) Remove two screws (13) and insulator (11) from TB2 (10).

(11) Remove those wires from TB2 (10) which are part of cable harness and tag those wires for identification.

(12) Remove power supply 1P51 (3) from video unit.



- | | |
|------------------------------------|-------------------------------|
| 1 Chassis | 13 Screws (2) |
| 2 Screws (20) | 14 Screws (2) |
| 3 Power supply (PS) | 15 Radio interference filter |
| 4 Center pin (2) | 16 Blower (1) |
| 5 Ring pin (2) | 17 Capacitor cover |
| 6 Terminal board TB1 (bottom half) | 18 Capacitor 112 |
| 7 Terminal board TB1 (top half) | 19 Interlock switch (12) |
| 8 Screws (2) | 20 Chassis access cover |
| 9 Insulator | 21 Resonator oscillator 1A.37 |
| 10 Terminal board TB2 | 22 Screws (4) |
| 11 Insulator | 23 RFI filter 1FL1 (bottom) |
| 12 Shield plate (20) | |

Figure 6-6. Video unit power supply (PS) removal.

c. Removal of Blower 1B1 and/or Radio Interference Filter.

- (1) Remove and retain eight screws (not shown) securing radio interference filter (15, fig. 6-6) to video unit chassis (11).
- (2) Unsolder and tag wiring from blower 1B1 (16) terminals (not shown).
- (3) Remove four screws (not shown) securing blower 1B1 (16) to chassis (11).
- (4) Remove blower 1B1 from video unit.

f. Removal of Toggle Switches 1S13 through 1S15, 1S18, 1S19, 1S22, 1S26 (Front) and 1S27 (Rear).

- (1) Remove top cover per subparagraph a.
- (2) Disengage front panel per subparagraph d, steps (1) and (2).
- (3) Tag and unsolder wires from switch terminals. (Power switch 1S26 terminals are coated with silicone rubber compound. Remove compound before unsoldering wires.)
- (4) Remove mounting nut and washer from front side of switch and remove switch from panel. (Where a wire lug exists as part of switch mounting hardware, leave lug hanging free on attached wire and reinstall it during subsequent installation of new switch.)

g. Removal of Thumbwheel Switches 1S1 through 1S12, 1S16, 1S17, 1S20 through 1S22, 1S24, and 1S25.

- (1) Remove top cover per subparagraph a.
- (2) Disengage front panel per subparagraph d, steps (1) and (2).
- (3) Tag and unsolder wires from printed circuit tab at rear of switch.
- (4) Remove four mounting screws, nuts, and associated washers which secure switch to front panel and remove switch.

h. Removal of FTM Meter 1M1.

- (1) Loosen eight captive mounting screws (9, fig. 6-5) on front panel (12).
- (2) Loosen 20 front panel captive screws (10).
- (3) Carefully displace front panel (12) away from chassis (11) by swinging top edge forward and down.
- (4) Tag and unsolder wires from meter 1M1 terminals.
- (5) Remove and retain two mounting screws, nuts, and associated washers which secure meter 1M1 to front panel and remove 1M1.

i. Removal of Power Input Connector 1J2 and Interlock Switch 1S28.

- (1) Remove right-hand chassis support panel per subparagraph b.
- (2) Remove and retain eight screws which secure chassis access cover (29, fig. 6-6) and set access cover aside.

(3) Tag and unsolder wires from interlock switch 1S28 (19). (Interlock switch 1S28 terminals are coated with silicone rubber compound. Remove compound before unsoldering wires.)

(4) Remove and retain four mounting screws, nuts, and associated washers (including connector cover (17) chain retaining lug) and remove connector 1J2 (18) and attached switch 1S28.

j. Removal of Display Assembly 1A31.

- (1) Disengage 20 captive screws (9) and pull top of front panel (12) away from video unit to gain access to rear of display assembly 1A31 (16).
- (2) Disconnect connector XA31P1 (not shown) from rear of display assembly 1A31 (16).
- (3) Remove and retain four screws which secure display assembly 1A31 (16) to front panel (12) and carefully remove display assembly from panel.

k. Removal of Reference Oscillator 1A32.

- (1) Remove top cover per subparagraph a.
- (2) Lift circuit card rack out of chassis per subparagraph c, steps (3), (4), and (5).
- (3) Reach inside chassis and disconnect connector XA32P1 (not shown) from reference oscillator 1A32 (21, fig. 6-6).
- (4) Remove and retain four screws (22) and associated washers which secure reference oscillator 1A32 to rear wall of chassis and remove 1A32 from chassis.

6-12. Video Unit Replacement Procedures

The following procedures apply to the replacement of modules and circuit cards removed from the video unit.

a. Replacement of Top Cover.

- (1) Set top cover (4, fig. 6-5) in position on top of video unit chassis (11).
- (2) Tighten 18 turn-lock fasteners (6).

b. Replacement of Chassis Support Panels.

NOTE.

The following procedures are for the replacement of the right-hand chassis support panel. The left-hand panel is replaced in a similar manner.

- (1) Place right-hand chassis support panel (7, fig. 6-5) in position.
- (2) Secure panel to chassis (11) with 11 screws (8).
- (3) Tighten four captive mounting screws (9) on front panel (12) of video unit.

c. Replacement of Circuit Cards 1A1 through 1A14, 1A16 through 1A27, and 1A29.

- (1) Grasp circuit card ejector levers (11, fig. 6-5) and insert circuit card to be installed into correct guide slots in circuit card rack (5).

(2) Exert a steady pressure on card levers until circuit card is properly seated in its mating connector at bottom of card rack. Then turn ejector levers inward to lock card into position.

NOTE

If the card rack is secured in vertical position, perform the following steps.

(3) Gump flange (2) at top rear of card rack and pull rack slightly forward. With card rack held in this position, turn card rack supports (13) back to their normal position under lip of chassis side panel.

(4) Carefully lower circuit card rack down into video unit chassis to its normal position.

(5) Tighten eight card rack captive mounting screws (3).

(6) Replace top cover per subparagraph *e.*
d. Replacement of Power Supply IPS1.

(1) Place video unit on handles (14, fig. 6-5).

(2) Install power supply (3, fig. 6-6) in place and mate hinges with video unit, but do not install hinge pins (5).

(3) Install tagged cable harness wires on TB2 (10).

(4) Install insulator (11) and secure with two screws (13).

(5) Install upper half of TB1 (7) on lower half (6) using two screws (8), and secure 20 shield wires (12).

(6) Install insulator (9) and secure with two screws (14).

(7) Install power supply IPS1 (3) on video unit and secure with 20 screws (2).

(8) Place video unit upright. Disengage captive screws (10, fig. 6-5) and pull top of panel (12) away from video unit until panel is resting on handles (14).

(9) Install two hinge pins (5, fig. 6-6) and two corner pins (4). If hinges do not align properly, loosen power supply screws (2) until hinge pins (5) are installed, then verify that screws (2) are secure.

(10) Install front panel (12, fig. 6-5) on video unit and secure with 20 screws (10).

(11) Secure panel to chassis support panels with eight screws (9).

e. Replacement of Blower 1B1 and/or Radio Interference Filter.

(1) Place blower 1B1 (16, fig. 6-6) in position and secure with four mounting screws (not shown).

(2) Resolder wiring to blower 1B1 terminals.

(3) Install radio interference filter (15) in position and secure with eight screws (not shown).

f. Replacement of Toggle Switches 1S13 through 1S15, 1S18, 1S19, 1S22, 1S26 (Front) and 1S27 (Rear).

(1) Place switch in mounting hole from rear of

panel and install mounting nut and washer (install wire lug, if applicable).

(2) Solder wires, as previously identified, to switch. (Coat terminals of 1S26 with silicon rubber compound).

(3) Replace front panel per subparagraph *d.* steps (10) and (11).

(4) Replace top cover per subparagraph *e.*

g. Replacement of Thumbwheel Switches 1S1 through 1S12, 1S16, 1S17, 1S20 through 1S22, 1S24, and 1S25.

(1) Place switch in mounting position at rear of panel and install four mounting screws, nuts, and associated washers.

(2) Solder wires, as previously identified, to printed circuit tab at rear of switch.

(3) Replace front panel per subparagraph *d.* steps (10) and (11).

(4) Replace top cover per subparagraph *e.*

h. Replacement of TTM Meter 1M1.

(1) Place meter 1M1 in mounting position on front panel (12, fig. 6-5) and install two mounting screws, nuts, and associated washers.

(2) Solder previously tagged wires to terminals at rear of meter 1M1.

(3) Carefully lift front panel (12) into mounting position adjacent to chassis and fasten front panel to chassis with 20 captive screws (10).

(4) Tighten eight captive mounting screws at edge of front panel (12).

i. Replacement of Power Input Connector 1J2 and Interlock Switch 1S28.

(1) Place connector and switch combination (18 and 19, fig. 6-6) in mounting position and install four mounting screws, nuts, and associated washers (including connector cover (17) chain retaining lug).

(2) Connect and solder previously tagged wires to interlock switch 1S28 (19). After soldering, coat all switch 1S28 terminals with silicon rubber compound.

(3) Place chassis access cover (20) in position and secure with eight mounting screws.

(4) Replace right-hand chassis support panel per subparagraph *b.*

j. Replacement of Display Assembly 1A31.

(1) Install display assembly 1A31 (16, fig. 6-5) in position in front panel (12).

(2) Secure display assembly 1A31 (16) with four screws.

(3) Connect connector XA31P1 (not shown) to rear of display assembly 1A31.

(4) Install front panel (12) on video unit and secure with 20 captive screws (10) and eight captive mounting screws (9).

k. Replacement of Reference Oscillator 1A32.

(1) Place reference oscillator 1A12 (21, fig. 6-6) in mounting position and install four screws (22) and associated washers.

(2) Connect connector XA32P1 (not shown) to reference oscillator 1A12.

(3) Secure circuit card rack down into chassis per subparagraph c, steps (3), (4), and (5).

(4) Replace top cover per subparagraph a.

Section V. GENERAL SUPPORT TEST PROCEDURES

6-13. General

a. Testing procedures are prepared for use by Signal Field Maintenance Shops and Signal Service Organizations responsible for general support maintenance of electronic equipment to determine acceptability of the repaired equipment. These procedures establish specific requirements that repaired equipment must meet before it is returned to the using organization.

b. Comply with the instructions preceding each chart before proceeding to the chart. Perform each step in sequence. Do not vary the sequence. For each step, perform all the actions required in the control settings column; then perform each specific test procedure and verify it against its performance standard.

c. If any defects are noted during physical inspections, repairs will be made within the capabilities of general support level maintenance. Any defects beyond the scope of general support maintenance will be referred to depot level maintenance.

d. If any of the electrical tests fail to meet performance standard requirements, note the failed test step. Then refer to table 6-2 in section III to locate the troubleshooting step entrance.

e. Test equipment required is listed preceding the tests.

f. The performance standards listed in the tests are based on the assumption that the modification work orders listed in DA Pam 310-7 have been performed.

6-14. Physical Tests and Inspection

a. *Test Equipment Required.* None.

b. *Test Connections and Conditions.* None.

6-15. Electrical Tests

a. *Test Equipment and Materials Required.*
Multimeter

Oscilloscope

Counter

Frequency Comparator

Power Meter

b. *Test Connections and Conditions.* None.

c. Power Electrical Test Procedures.

Step No.	Test Equipment	Control Settings	Test Procedure	Performance Standard
		Equipment Under Test		
1	N / A	Perform steps b, c, and d, of paragraph 2-5 and set controls to initial settings per Table 2-3.	Observe video unit POWER lamp.	POWER lamp illuminates.
2	N / A	Same as Step 1.	Verify operation of video unit blower 1B1.	Video unit blower 1B1 operates.
3	N / A	Same as Step 1.	Verify operation of rf unit blower 2B1.	Rf unit blower 2B1 operates.
4	N / A	RF Unit: Sequentially set SELECT switch to positions 4 thru 8.	Observe rf unit DISPLAY indications for each SELECT switch position.	4: +30 ± 0.5 vdc 5: +15 ± 0.2 vdc 6: +5 ± 0.1 vdc 7: -15 ± 0.2 vdc 8: -5 ± 0.1 vdc
6	N / A	Same as Step 1.	Observe operation of video unit TTM indicator per fig. 6-7, D.	TTM indicator operates.
	N / A	Same as Step 1.	Observe operation of rf unit TTM indicator per fig. 6-7, D.	TTM indicator operates.

d. Internal Self-Test Program Electrical Test Procedures.

Step No.	Test Equipment	Control Settings	Test Procedure	Performance Standard
		Equipment Under Test		
1	N / A	Video Unit: PRGM 6	Observe video unit DISPLAY A.	12.6 to 12.9
2	N / A	Same as Step 1.	Observe video unit DISPLAY B.	61.9 to 62.1
3	N / A	RF Unit: SELECT 1	Observe rf unit DISPLAY.	1700 to 2100

e. Receive / Transmit-Receive Internal Program Electrical Test Procedures.

Step No.	Control Settings		Test Procedure	Performance Standard
	Test Equipment	Equipment Under Test		
1		Video Unit: PRGM 2 SELECT A 1	Observe video unit DISPLAY A.	25.0 ± 0.1
2	N/A	Video Unit: SELECT A 2	Observe DISPLAY A.	+00 to +01
3	N/A	Video Unit: SELECT A 3	Observe DISPLAY A.	90 ± 0.1
4	N/A	Video Unit: SELECT A 4	Observe DISPLAY A.	+00 to +.01
5	N/A	Video Unit: SELECT A 5	Observe DISPLAY A.	+ .00000 to +.00001
6	N/A	Video Unit: SELECT A 6	Observe DISPLAY A.	+0.0 to +0.1
7	N/A	Video Unit: SELECT A 7	Observe DISPLAY A.	00 to 01
8	N/A	RF Unit: SELECT 2	Observe rf unit DISPLAY.	20.0 ± 1.0

f. Receive-Receive Program Electrical Test Procedures.

Step No.	Control Settings		Test Procedure	Performance Standard
	Test Equipment	Equipment Under Test		
1	N/A	Video Unit: PRGM 3 SELECT A 1	Observe video unit DISPLAY A.	25.0 ± 0.1
2	N/A	Video Unit: SELECT A 2	Observe DISPLAY A.	+00 to +01
3	N/A	Video Unit: SELECT A 3	Observe DISPLAY A.	90 ± 0.1
4	N/A	Video Unit: SELECT A 4	Observe DISPLAY A.	+00 to +.01
5	N/A	Video Unit: SELECT A 5	Observe DISPLAY A.	+ .00000 to +.00001
6	N/A	Video Unit: SELECT A 6	Observe DISPLAY A.	+0.0 to +0.1
7	N/A	Video Unit: SELECT A 7	Observe DISPLAY A.	00 to 01
8	N/A	RF Unit: SELECT 2	Observe rf unit DISPLAY	20.0 ± 1.0

g. Air-To-Air Range Internal Program Electrical Test Procedures.

Step No.	Test Equipment	Control Settings		Test Procedure	Performance Standard
		Equipment Under Test			
1	N / A	Video Unit:	Observe video unit DISPLAY A.	145.0 $\pm$ 0.1	
		PRGM 4			
		SELECT A 1			
2	N / A	Video Unit:	Observe DISPLAY A.	+00 to +01	
		SELECT A 2			
3	N / A	Video Unit:	Observe DISPLAY A.	+00 to +.01	
		SELECT A 4			
4	N / A	Video Unit:	Observe DISPLAY A.	+ .00000 to + .00001	
		SELECT A 5			
5	N / A	Video Unit:	Observe DISPLAY A.	+0.0 to +0.1	
		SELECT A 6			
6	N / A	Video Unit:	Observe DISPLAY A.	1040 to 1060	
		SELECT A 7			
7	N / A	RF Unit:	Observe of unit DISPLAY.	0.0 $\pm$ 1.0	
		SELECT 2			

h. Air-to-Air range and Braking Internal Program Electrical Test Procedures.

Step No.	Test Equipment	Control Settings		Test Procedure	Performance Standard
		Equipment Under Test			
1	N / A	Video Unit: PRGM 5 SELECT A 1		Observe video unit DISPLAY A.	145.0 ± 0.1
2	N / A	Video Unit: SELECT A 2		Observe DISPLAY A.	+ 00 to + 00
3	N / A	Video Unit: SELECT A 3		Observe DISPLAY A.	00 ± 0.1
4	N / A	Video Unit: SELECT A 4		Observe DISPLAY A.	+ 00 to + 00
5	N / A	Video Unit: SELECT A 5		Observe DISPLAY A.	+ .00000 to + .00000
6	N / A	Video Unit: SELECT A 6		Observe DISPLAY A.	+ 0.0 to + 0.1
7	N / A	Video Unit: SELECT A 7		Observe DISPLAY A.	40 to 200
8	N / A	RF Unit: SELECT 2		Observe d unit DISPLAY.	00.0 ± 1.0

4. Channel and Mode Electrical Test Procedures.

Step No.	Control Settings		Test Procedures	Performance Standard
	Test Equipment	Equipment Under Test		
1	Counter: FUNCTION: FREQUENCY TIME BASE: 1 μ s SENSITIVITY: PLUG IN Plug-In (932) MIXING FREQ 1000 VIDEO/RET RET	RF Unit: PULSE MOD 1 OUTPUT ATTENUATOR 000 Video Unit: SELECT A 3 SELECT B 3 BEARING 270.0 A/A PRF 0200 FROM 1	Remove counter plug-in, and insert Mod-A 12 plug-in. Connect 0.5V SW MAX connector of counter plug-in to rf unit POWER METER connector J1, set of unit CHANNEL SELECT switch and video unit MODE switch as follows, and observe frequency indications on counter. NOTE: Tune counter to leading edge (low end of dial) of Gaussian pulse. CHANNEL SELECT MODE 043 G/A X 4.0 $\pm$ 0.5 MHz 043 G/A Y 120.0 $\pm$ 0.5 MHz 124 G/A X 111.0 $\pm$ 0.5 MHz 124 G/A Y 85.0 $\pm$ 0.5 MHz 043 A/A X 67.0 $\pm$ 0.5 MHz 043 A/A Y 67.0 $\pm$ 0.5 MHz 000 A/AB X 122.0 $\pm$ 0.5 MHz 000 A/AB Y 122.0 $\pm$ 0.5 MHz	
2	Oscilloscope: TRIGGERING INTERNAL TIME / DIVISION 10 μ s VOLTS / DIVISION 2	RF Unit: PULSE MOD 2 Video Unit: MAIN BURST OFF AUX BURST OFF A/A PRF 1200 ID TONE OFF	a. Connect oscilloscope to video unit TRANS PULSE jack, set of unit CHANNEL SELECT switch and video unit MODE switch as follows, and observe pulse spacing indications on oscilloscope: CHANNEL SELECT MODE 043 G/A X 12 $\pm$ 0.1 μ s 043 G/A Y 30 $\pm$ 0.1 μ s 124 G/A X 12 $\pm$ 0.1 μ s 124 G/A Y 30 $\pm$ 0.1 μ s 043 A/A X 12 $\pm$ 0.1 μ s 043 A/A Y 24 $\pm$ 0.1 μ s b. Set SQUITTER RATE X100 switch to 00 and observe pulse spacing indications on oscilloscope: CHANNEL SELECT MODE 000 A/AB X 12 $\pm$ 0.1 μ s 000 A/AB Y 24 $\pm$ 0.1 μ s	

h. RF Power Output Manual Electrical Test Procedures.

Step No.	Control Settings		Test Procedure	Performance Standard
	Test Equipment	Equipment Under Test		
1	N / A	RF Unit: SELECT 3 OUTPUT ATTENUATOR 000 PULSE MOD 1 CHANNEL SELECT 124	Observe d unit DISPLAY.	19T to 25d
2	Power Meter: POWER ON CALIBRATION FACTOR 100% MOUNT RESISTANCE 200 ohms RANGE 0 DBM COARSE ZERO As required FINE ZERO As required	RF Unit: OUTPUT ATTENUATOR 001 Video Unit: MODE G / A X SCUTTER RATE X100 27 GROUP SPACING X10 00 GROUPS / FRAME 000	Connect power meter to d unit POWER METER connector J1, as OUTPUT ATTENUATOR switch as follows, and observe indications on power meter: OUTPUT ATTENUATOR 002 003 004 006 010 020	Signal amplitude decreases as output attenuation is increased.

i. ID Tone Manual Electrical Test Procedures

Step No.	Control Settings		Test Procedure	Performance Standard
	Test Equipment	Equipment Under Test		
1	Oscilloscope: TRIGGERING EXTERNAL TIME / DIVISION 100 μ sec VOLTS / DIVISION 2	RF Unit: SELECT 2 PULSE MOD 2 CHANNEL SELECT 063 Video Unit: AUX BURST ON SCUTTER RATE X100 00 A / A PRF 0000 SYNC SELECT 2 ID TONE ON	Connect oscilloscope to video unit TRANS PULSE jack and also common TRIGGER input to SYNC jack, as ID TONE switch to ON, and observe indications on oscilloscope, see fig. 6-7, E.	
2	Oscilloscope: TIME / DIVISION 500 msec	Video Unit: AUX BURST OFF	Set ID TONE switch to OFF and observe indications on oscilloscope.	Trace sweeps across at 0 volts and then drops at time 0.
3	N / A	N / A	Set ID TONE switch to KEY and observe modified trace on oscilloscope. Repeat Steps 2 and 3 several times to insure proper indications, see fig. 6-7, F.	

l. Range Manual Electrical Test Procedures.

Step No.	Initial Setup		Test Procedure	Performance Standard
	Test Equipment	Equipment Under Test		
1	N / A	Video Unit: SELECT A 1 SELECT B 1 RANGE 200.0 ID TONE OFF	Observe DISPLAY A and B.	200.0
2	N / A	Video Unit: RANGE 177.7	Observe DISPLAY A and B.	177.7

m. Range Rate Manual Electrical Test Procedures.

Step No.	Initial Setup		Test Procedure	Performance Standard
	Test Equipment	Equipment Under Test		
1	N / A	Video Unit: SELECT A 2 RANGE RATE X100 OFF 50 RANGE - 000.0	Set RANGE RATE X100 switch to +10 and observe: DISPLAY A DISPLAY B	+1000 Range indication increases.
2	N / A	Video Unit: RANGE RATE X100 OFF 11 RANGE 000.0	Set RANGE RATE X100 switch to -11 and observe: DISPLAY A DISPLAY B	-1000 Range indication decreases.

n. Sighting Manual Electrical Test Procedures.

Step No.	Initial Setup		Test Procedure	Performance Standard
	Test Equipment	Equipment Under Test		
1	N / A	Video Unit: SELECT A 3 SELECT B 3 MODE - G / A Y N. REF TRIG ON BEARING 200.0 RANGE RATE X100 OFF 00	Observe DISPLAY A and B.	200.0
2	N / A	Video Unit: BEARING 177.7	Observe DISPLAY A and B.	177.7
3	Oscilloscope: TIME / DIVISION 5 msec	Video Unit: SQUITTER RATE X100 00 ID TONE ON	a. Connect oscilloscope to TRANS PULSE jack, set AUX BURST switch to OFF and then ON, and observe oscilloscope. b. Set MAIN BURST switch to OFF and then ON, and observe oscilloscope.	a. Aux burst pulses are not present when switch is OFF and are present when switch is ON. b. Main burst pulses are not present when switch is OFF and are present when switch is ON.
4	Oscilloscope: 0.5 msec	Video Unit: AUX BURST OFF ID TONE OFF	Vary setting of SQUITTER RATE X100 switch and observe oscilloscope.	Squitter pulses are present and number of pulses change as switch is varied.

n. Bearing Rate Manual Electrical Test Procedures.				
Step No.	Test Equipment	Control Settings Equipment Under Test	Test Procedure	Performance Standard
1	N / A	Video Unit: SELECT A 4 ALX BURST ON SCUTTER RATE X100 27 BEARING 000.0	Set BEARING RATE switch to + 29 and observe: DISPLAY A DISPLAY B	+ 2900 Bearing indication increases.
2	N / A	Video Unit: BEARING RATE OFF 00	Set BEARING RATE switch to - 11 and observe: DISPLAY A DISPLAY B	- 1100 Bearing indication decreases.

p. Antenna Speed Manual Electrical Test Procedures.				
Step No.	Test Equipment	Control Settings Equipment Under Test	Test Procedure	Performance Standard
1	N / A	Video Unit: SELECT A 5 SELECT B 5 MODE G / A X N. REF TRIG OFF SCUTTER RATE X100 00 BEARING RATE OFF 00 % MOD 15 HZ ON 20 % MOD 135 HZ ON 20 ANT SP (% 15 HZ RPS) + 2.88	Observe DISPLAY A and B	+ .00200 ± .00001
2	N / A	Video Unit: ANT SP (% 15 HZ RPS) - 1.75	Observe DISPLAY A and B.	- .26550 ± .00001

q. 15 Hz Phase Shift Manual Electrical Test Procedures.				
Step No.	Test Equipment	Control Settings Equipment Under Test	Test Procedure	Performance Standard
1	N / A	Video Unit: SELECT A 6 SELECT B 6 MODE A / AB X ALX BURST OFF N. REF TRIG ON SCUTTER RATE X100 27 % MOD 135 HZ OFF 00 PHASE SHIFT 15 HZ + 27.5 ANT SP (% 15 HZ RPS) OFF 0.00	Observe DISPLAY A and B.	+ 27.5
2	N / A	Video Unit: PHASE SHIFT 15 HZ - 27.5	Observe DISPLAY A and B.	- 27.5

c. A / A PRF Manual Electrical Test Procedures.				
Step No.	Test Equipment	Control Settings		Performance Standard
		Equipment Under Test		
1	N / A	Video Unit: SELECT A 1 SELECT B 1 MODE A / A Y SQUITTER RATE X100 00 PHASE SHIFT 15 HZ OFF 00 A / A PRF 0799		799 $\pm$ 1
2	N / A	Video Unit: A / A PRF 1977		1977 $\pm$ 1

e. Modulation Manual Electrical Test Procedures.				
Step No.	Test Equipment	Control Settings		Performance Standard
		Equipment Under Test		
1	N / A	RF Unit: PULSE MOD 1 Video Unit: MODE G / A Y AUX BURST ON SQUITTER RATE X100 27 % MOD 15 HZ ON 39 A / A PRF 0200		39 $\pm$ 1
2	N / A	Video Unit: % MOD 15 HZ ON 40		40 $\pm$ 1
3	N / A	Video Unit: % MOD 15 HZ OFF 00 % MOD 135 HZ ON 39		39 $\pm$ 1
4	N / A	Video Unit: % MOD 135 HZ ON 40		40 $\pm$ 1
5	N / A	Video Unit: POWER OFF		N / A

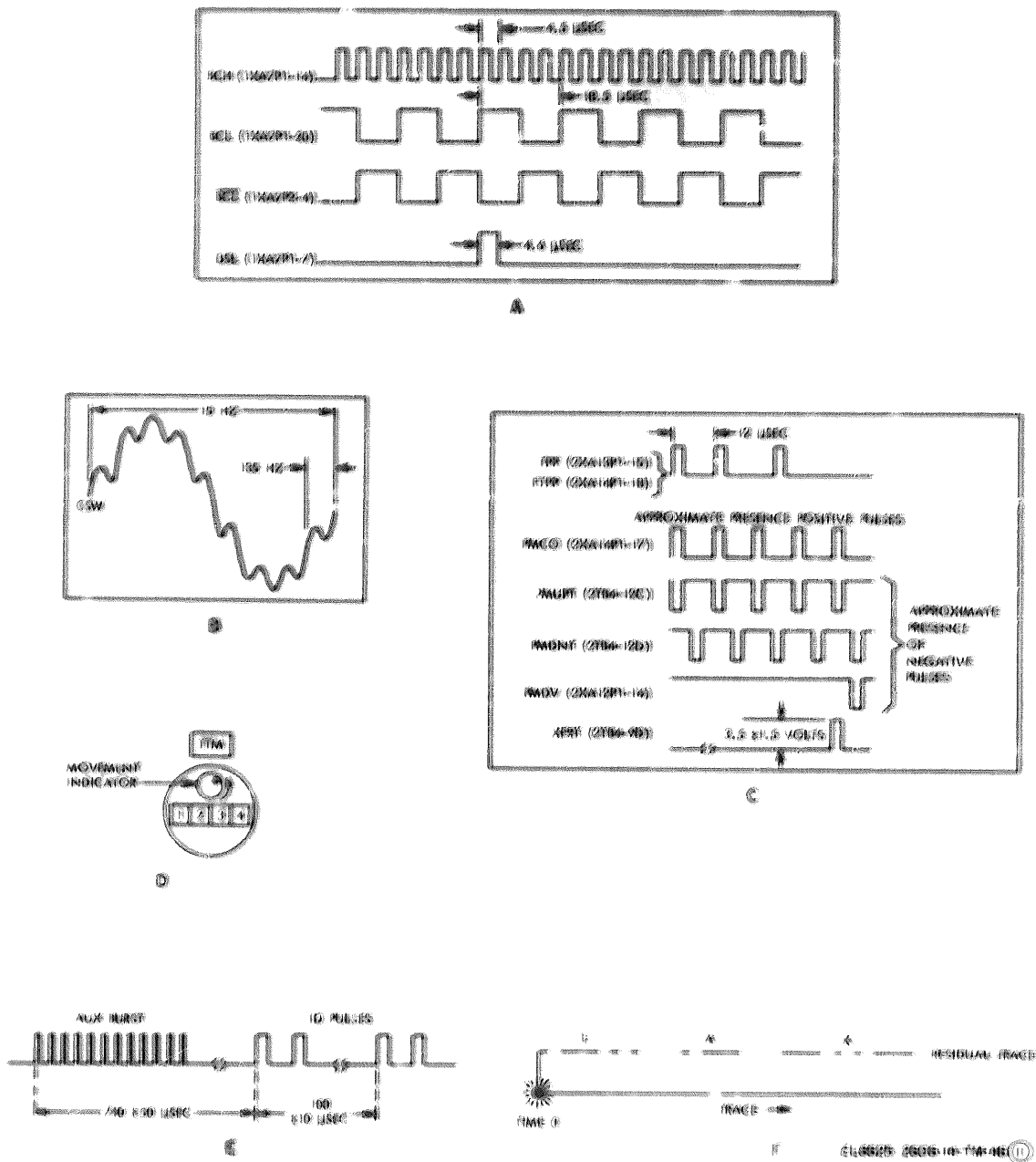


Figure 6-7. RF and video unit waveforms Sheet 1.

APPENDIX A

REFERENCES

Following is a list of references available to the user of Test Set, Radio AN/ARM-316.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
SB 35-100	Preservation, Packaging, Packing and Marking Materials, Supplies and Equipment Used by the Army.
TS 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 11-6625-2606-24P	Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools): Test Set, Radio AN/ARM-316. (FSM 6625-086-6304)
TM 35-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Material to Prevent Enemy Use (Electronics Command).

APPENDIX B

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature. It establishes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and / or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure of measuring the mechanical or electrical characteristics of an item and comparing these characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel / lubricants / hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used to precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of employing, setting, or fitting into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment / system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or

assembly) in a manner to allow the proper functioning of an equipment / system.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module / component / assembly, and item or system.

j. Overhaul. That maintenance effort (service / action) necessary to restore an item to a completely serviceable / operational condition as prescribed by maintenance standards (e.g., DMWR) in pertinent technical manuals. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services / actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment / components.

l. Symbols. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

B-3. Explanation of Format

a. Group Number. Column 1 lists group numbers, the purpose of which is to match components, assemblies, subassemblies and modules with the next higher assembly.

b. Functional Group. Column 2 lists the next higher assembly group and the item names of components, assemblies, subassemblies and modules within the group for which maintenance is authorized.

c. Maintenance Functions. Column 3 lists the twelve maintenance functions defined in B-2 above. Each maintenance function required for an item is specified by the symbol among those listed in d

below which indicates the level responsible for the required maintenance. Under this symbol is listed an appropriate work measurement time value determined as indicated in *c* below.

d. Use of Symbols. The following symbols are used to prescribe work function responsibility:

- C — Operator / Crew
- O — Organization
- F — Direct Support
- B — General Support
- D — Depot

e. Work Measurement Time. The active repair time required to perform the maintenance function is included below the symbol identifying the category of maintenance. The skill levels used to obtain the measurement times approximate those found in typical TOE units. Active repair time is the average aggregate time required to restore an item (subassembly, assembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, fault isolation / diagnostic time, and QA / QC time in addition to the time required to perform specific maintenance functions identified for the tasks authorized in the

maintenance allocation chart. This time is presented in man-hours and carried to one decimal place (tenths of hours).

f. Tools and Test Equipment. This column used to specify, by code, those tools and equipment required to perform the design function.

g. Remarks. Self-explanatory.

B-4. Explanation of Format of Table I and Equipment Requirements

The columns in table I follows:

a. Tools and Equipment. The numbers in column coincide with the numbers used in the tool and equipment column of the maintenance allocation chart. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in column indicate the maintenance category actually allocated the facility.

c. Nomenclature. This column lists tools, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists Federal stock number of the specific tool or equipment.

e. Tool Number. Not used.

MAINTENANCE ALLOCATION CHART														
(1) GROUP NUMBER	(2) FUNCTIONAL GROUP COMPONENT ASSEMBLY NOMENCLATURE	(3) MAINTENANCE FUNCTIONS										(4) TOOLS AND EQUIPMENT	(5) REMARKS	
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL			REBUILD
1AR	TEST SET, RADIO 4R/4B-126 6625-005-4006 000000000-1 4001	0 0.1	0 0.1	0 0.1 0 0.1						0 0.1 0.1		1 2 class 4	Calibr., inspec., adjustment, etc. Self-test & displays. Clean all surfaces. By replacing front panel lamps, lenses, tubes. By replacing faulty assembly.	
	POWER SUPPLY, VIDEO PULSE 29-4730/400-136 0010000225-1 4002		0 0.1 0.6							0 0.1		2 class 4 2 class 4	Class 40-000/400-136 using self-test. By replacing faulty components & pins/lead out cards & sockets.	
1AR 4E 400	FLATRON, RADIO (REPAIRABLE) 0010000000-1 0000		0 0.1					0 0.1		0 0.1		2 2	Operation Replace filament	
1AR 4E 40	CIRCUIT CARD 0026400100-1		0 0.6					0 0.1		0 2.0		2 class 4	as part of 29-4730. 1, 2, 4, 12, 17, 18	
1AR 4E 42640	CIRCUIT CARD 0026400100-1		0 0.6					0 0.1		0 2.0		2 class 4	as part of 29-4730. 1, 2, 4, 12, 17, 18	
1AR 4E 45	CIRCUIT CARD 0026400100-1		0 0.6					0 0.1		0 2.0		2 class 4	as part of 29-4730. 1, 2, 4, 12, 17, 18	
1AR 4E 45	CIRCUIT CARD 0026400100-1		0 0.6					0 0.1		0 2.0		2 class 4	as part of 29-4730. 1, 2, 4, 12, 17, 18	

MAINTENANCE ALLOCATION CHART													
(1) GROUP NUMBER	(2) FUNCTIONAL GROUP COMPONENT ASSEMBLY NOMENCLATURE	(3) MAINTENANCE FUNCTIONS										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	
LABAR A6	GENERATOR (AND 8000001361-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A7	GENERATOR (AND 8000001362-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A8	GENERATOR (AND 8000001363-1)		1 0.6						1 0.2	1 4.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A9	GENERATOR (AND 8000001364-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A10	GENERATOR (AND 8000001365-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A11	GENERATOR (AND 8000001366-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A12	GENERATOR (AND 8000001367-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A13	GENERATOR (AND 8000001368-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710
LABAR A14	GENERATOR (AND 8000001406-1)		1 0.6						1 0.2	1 2.0		2 class 6 1, 2, 4, 12, 17, 18	see parts of 80-4710

MAINTENANCE ALLOCATION CHART														
(1) GROUP NUMBER	(2) FUNCTIONAL GROUP COMPONENT ASSEMBLY NOMENCLATURE	(3) MAINTENANCE FUNCTIONS										(4) TOOLS AND EQUIPMENT	(5) REMARKS	
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL			REBUILD
LABAR A10	CHROMIUM CARD 8030001292-1		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A17	CHROMIUM CARD 8030001343 -2		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A18	CHROMIUM CARD 8030001290 -4		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A19	CHROMIUM CARD 8030001366-1		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A20	CHROMIUM CARD 8030001293		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A25	CHROMIUM CARD 8030001365-1		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A22	CHROMIUM CARD 8030001295-1		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A23	CHROMIUM CARD 8030001289-1		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	
LABAR A26	CHROMIUM CARD 8030001366-1		H 0.4						H 0.2	0 2.0		2 CHROM 6 2, 3, 6, 12, 17, 28	40 parts of 88-6720	

MAINTENANCE ALLOCATION CHART													
(1) GROUP NUMBER	(2) FUNCTIONAL GROUP COMPONENT ASSEMBLY NOMENCLATURE	(3) MAINTENANCE FUNCTIONS										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	
26A46 A2	ATTENUATION-DEFLECTION ASSEMBLY, RF 6030001420-1		1 0.2						1 0.2	1 0.2 0 2.0			2 Shop 6 2 Shop 6 2,3,4 As part of 20-988 By replacing attenuator or, programmable 6030001420-1
26A46 A3	RF AND DEFLECTION ASSEMBLY, CS/DDS MULTI GENERATION 6030001420-1		1 0.2						1 0.2	1 0 2.0			2 Shop 6 As part of 20-988
26A46 A4	MODULATOR MODULE 6026000575-1		1 0.2		1 0.4				1 0.2	0 0 2.0			2 Shop 6 As part of 20-988 When repairs or errors are corrected.
26A46 A5	REFERENCE GENERATOR 3030000750-1		1 0.2						1 0.2	0 0 2.0			2 Shop 6 As part of 20-988 2,3,4,7,8,9,10
26A46 A6	PRECISION STRETCHER 6030001420-2		1 0.2						1 0.2	0 0 2.0			2 Shop 6 As part of 20-988 2,3,4,7,10
26A46 A7	DISPLAY ASSEMBLY 6030001360-1		1 0.2						1 0.2	0 0 2.0			2 By unit test
26A46 A8	CIRCUIT CARD 6030001326-1		1 0.6						1 0.2	0 0 2.0			2 Shop 6 As part of 20-988
26A46 A9	CIRCUIT CARD 6030001300-1		1 0.6						1 0.2	0 0 2.0			2 Shop 6 As part of 20-988
26A46 A10	CIRCUIT CARD 6030001326-1		1 0.6						1 0.2	0 0 2.0			2 Shop 6 As part of 20-988

MAINTENANCE ALLOCATION CHART													
(1) GROUP NUMBER	(2) FUNCTIONAL GROUP COMPONENT ASSEMBLY NOMENCLATURE	(3) MAINTENANCE FUNCTIONS										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	
LABEL 16	GENERATOR CARD 803000134-1		H 0.4						H 0.2				2 Ohm 6 as part of 80-6738 2, 3, 4, 5, 6, 7, 18
LABEL A26	GENERATOR CARD 8030001350-1		H 0.4						H 0.2				2 Ohm 6 as part of 80-6738 2, 3, 4, 5, 6, 7, 18
LABEL A27	GENERATOR CARD 8030001296-1		H 0.4						H 0.2				2 Ohm 6 as part of 80-6738 2, 3, 4, 5, 6, 7, 18
LABEL A29	GENERATOR CARD 8030001374-1		H 0.4						H 0.2				2 Ohm 6 as part of 80-6738 2, 3, 4, 5, 6, 7, 18
LABEL A31	DISPLAY ASSEMBLY 8030001359-1		H 0.2						H 0.2				2 By adjusting potentiometer By applying indicator light.
LABEL A32	GENERATOR CARD 8030001327-1		H 0.4						H 0.2				4 Ohm 6 as part of 80-6738
LABEL 891	POWER SUPPLY, ANALOG 8020000467-1		H 0.2						H 0.2				2 Ohm 6 as part of 80-6738 4, 5, 13
LABEL 901	SIGNAL GENERATOR, POWER MEASUR 8010000219-1 SG-980/AM-136		H 0.2 H 0.4							H 0.2			2 Ohm 6 With 80-6738 using sub- unit Replacing faulty assembly
LABEL A1	POWER MEASUR MODULE 8020000476-2		H 0.2				H 0.0		H 0.2				2 Ohm 6 as part of 80-6738 2, 3, 4, 5, 6, 7, after repair or assembly errors.

GLOSSARY

NOTE: Alpha characters may be used in the last two places of a signal term to represent values as follows:

MNE (XX)	
VALUE	MULTIPLIER
() = 1	C = Hundreds
T = 2	O = Tenth
F = 1	U = Units
R = 3	T = Tens
	H = Hundreds
	M = Thousands

Additionally, the last two places may be used to represent a control signal:

IN: I = (---)	OF: I = OFF	SF = Shift
(+ = (+ +))	(- = ON)	

AADA	A/A Delay A	ASCO	Antenna Speed Gate Out
AADB	A/A Delay B	ASI	Antenna Speed Inhibit
AAEA	A/A Efficiency A	ASZ	Antenna Speed Equals Zero
AAEB	A/A Efficiency B	BBK	B Blanking
AAEV	A/A Efficiency Valid	BS(XX)	Bearing Bits
AAIP	A/A Interrogate Pulse	BCM	Bearing Clock High (100 KHz)
AAM	A/A Mode	BCL	Bearing Clock Low (54 KHz)
AAPA	A/A PRF A	BCM	Bearing Clock Monitor
AAPB	A/A PRF B	BDRFO	Bearing Detector of Output
AAVH	A/A Valid Hold	BDT	"B" Divide by Two
AAVHC	A/A Valid Hold Clock	BEFA	Beacon Efficiency A
ABK	A Blanking	BEFB	Beacon Efficiency B
ABP	AUX Burst Pulse	BER	Bearing Efficiency Reset
ABT	AUX Burst Trigger	BEV	Beacon Efficiency Valid
ACCB	AC Controlled Blower Start	BCTP	Bearing Gaussian Trigger Pulse
ACCI	AC Controlled Input	BMDI	Bearing Modulator Detector Input
ACCR	AC Controlled Return	BMDO	Bearing Modulator Detector Output
ACFI	AC Filtered Input		
ACRF	AC Filtered Return	BMDS	Bearing Modulator Driver Signal
ACVI	AC Verified Input	BMRFI	Bearing Modulator of Input
ACVR	AC Verified Return	BMRFO	Bearing Modulator of Output
ADT	Display A Divide by 2	BRA	Bearing Rate A
ANSA	Antenna Speed A	BRB	Bearing Rate B
ANSB	Antenna Speed B	BRC	Bearing Rate Clock
ANSCS	Antenna Speed Gate Start	BRL	Bearing Rate Logic
APC	Auxiliary Precedence Gate	BRLZ	Bearing Rate Low and Zero
ARC	Auxiliary Reference Clock	BRZ	Bearing Rate Equals Zero
ASC	Antenna Speed Clock	BTTP	Buffered Transmit Trigger Pulse

BTTR	Buffered Transmit Trigger Pulse Rear Panel	DBNG	Display B Negative Sign
BVVP	Buffered Valid Reply Pulse	DBPOP	Display B Positive Sign
BZDT	Buffered Zero Degree Trigger	DC*	Display C Code
BZDTR	Buffered Zero Degree Trigger Rear Panel		*Where A=1st Led *And: O=Bit 1
			B=2nd Led T=Bit 2
			C=3rd Led F=Bit 4
			D=4th Led E=Bit 8
CMB	Coarse Bearing Modulation	DCDPA	Display C Decimal Point A
CMBA	Coarse Bearing Modulation, Phase A	DCDPB	Display C Decimal Point B
CBMB	Coarse Bearing Modulation, Phase B	DCDPC	Display C Decimal Point C
	Coarse Modulation Clock	DCDPD	Display C Decimal Point D
	Counter Output A	DCM	Display Clock Monitor
C	Counter Output B	DCONH	Display Clock, 100 Hz
CRF	Coupled Radio Frequency	DCONK	Display Clock, 100 KHz
CSR	Composite Sine Wave Return	DCOTH	Display Clock, 10 Hz
CSW	Composite Sine Wave	DCOTE	Display Clock, 10 KHz
CTT	Coarse Timing Test	DCOTM	Display Clock, 10 MHz
CZT	Coarse Zero Trigger	DCOUB	Display Clock, 1 Hz
DA**	Display A Bits	DCOEK	Display Clock, 1 KHz
	*Where: A=1st Led *And: O=Bit 1	DCOUM	Display Clock, 1 MHz
	B=2nd Led T=Bit 2	DCF	Delay Calibrate Pulse
	C=3rd Led F=Bit 4	DCH	Display Counter Reset
	D=4th Led E=Bit 8	DCTTM	Display Clock, 20 MHz
	E=5th Led	DGP	Detect Gaussian Pulse
DACI	Display A Count Input	DLEN	Data Link Enable
DACY	Display A Carry	DLF(XX)	Data Link Frames
DADP*	Display A Decimal Point	DLG(XX)	Data Link Groups
	*Where: A = 1st Led Point	DLP	Data Link Pattern
	B = 2nd Led Point	DLX(XX)	Data Link Spacing
	C = 3rd Led Point	DLTCT	Data Link TACAN Transmit
	D = 4th Led Point	DLTST	Data Link Test Set Transmit
	E = 5th Led Point	DPP	Display Peak Power
DANG	Display A Negative Sign	DPPT	Drive Ps-udo Pulse TACAN
DAPOP	Display A Positive Sign	DSL	Display Srobe Latch
DACY	Display A Carry	DSWC	Display Sine Wave Clock
DB**	Display B Bits	DTP	Delay Trigger Pulse
	*Where: A=1st Led *And: O=Bit 1	DTTP	Drive Transmitter Trigger Pulse
	B=2nd Led T=Bit 2	EAM	External Amplitude Modulation
	C=3rd Led F=Bit 4	EAMIT	External Amplitude Modulation (EXT=0, UNT=1)
	D=4th Led E=Bit 8	EAP	External A/A PRF
DBCI	Display B Count Input	EARB	External Auxiliary Reference Burst
DBCY	Display B Carry	EAS(XX)	External Antenna Speed
DBDP*	Display B Decimal Point	ETB(XX)	External Bearing Word
	*Where: A=1st Led Point	EBI	External Blanking Input
	B=2nd Led Point	EBR(XX)	External Bearing Rate
	C=3rd Led Point	ECAAB	External Condition A/A Beacon
	D=4th Led Point		
	E=5th Led Point		

ECAAC	External Condition A/A Command	FACVI	Front Panel 115 Vac Input
ECCM	External Computer Command	FACVR	Front Panel 115 Vac Return
ECGAC	External Condition G/A Command	FBM	Fine Bearing Modulation
ECM(XX)	External Coarse Modulation	FGND	Front Panel Ground
ECN(XX)	External Channel Number	FMC	Fine Modulation Clock
ECXYC	External Condition X/Y Command	FSHLS	Frequency Synthesizer High Low Switch
ED**	External Display Bits *Where: A=1st Led *And: 0=Bit 1 B=2nd Led T=5th 2 C=3rd Led F=6th 4 D=4th Led E=5th 8 E=5th Led	FSHMS	Frequency Synthesizer High Mode Switch
EDCP	Enabled Delay Calibrate Pulse	FSMOS	Frequency Synthesizer Mixer Output Signal
EFM(XX)	External Fine Modulation	FSPDI	Phase Detector Input
EFN	Efficiency Reset	FSWLS	Frequency Synthesizer Filtered Reference Signal
ECTP	Enabled Gaussian Trigger Pulse	FTPP	Filtered TACAN Presence Pulse
EIDK	External ID Keyed	FTT	Fine Timing Test
EIDO	External ID ON	FZT	Fine Zero Trigger
EMRB	External Main Reference Burst	GAD	Gaussian Amplifier Diode
ENETE	Enable Transmitt Enable	GDCP	Gated Delay Calibrate Pulse
ENRT	External North Reference Trigger	GDRFO	Gaussian Detector rf Output
EOUL(XX)	External Output Level DBM	GDRP	Gated Delay Reference Pulse
EPL	External Program Lamp	GMDI	Gaussian Modulator Detector Input
EPMCW	External Pulse Modulation CW	GMDO	Gaussian Modulator Detector Output
EPMES	External Pulse Modulation EXT SQ	GMDS	Gaussian Modulator Drive Signal
EPMEX	External Pulse Modulation EXT	GMRFI	Gaussian Modulator rf Input
EPME	External Pulse Modulation INT/EXT	GMRFO	Gaussian Modulator rf Output
EPMIT	External Pulse Modulation INT	GND	Chassis Ground
EPP(XX)	External Pulse Spacing	GPS	Gaussian Pulse Sample
EPS(XX)	External Phase Shift	GSTT	Gaussian Shaper Triangle Trigger
ERB(XX)	External Range Bits	HFC	High Frequency Clock (5.4 MHz)
ERC	External Range Clock	HFDSE	High Frequency Divide-by-Eight
ERE(XX)	External Reply Efficiency	HFHLO	High Frequency High Level Output
ERR(XX)	External Range Rate	HFVCO	High Frequency VCO Input
ERTT F	External Rise Time (0-2.0 sec, 1-2.5 sec)	HNFVA	High -5 VDC
ESPM	External Square Pulse Modulation	HPTVR	High +12 VDC Regulated
ESR(XX)	External Squitter Rate	ICAAB	Internal Condition A/A Beacon
ETP	Encoder Trigger Pulses	ICAAC	Internal Condition A/A Command
ETT	Enable Transmitt Trigger	ICGAC	Internal Condition G/A Command
ETTP	External Transmitt Trigger Pulse	ICXYC	Internal Condition X/Y Command
		IDC	ID Clock
		IDP	ID Pulse
		IDS	ID Sync
		IDT	ID Tone
		IFM	Internal Fine Modulation (135 Hz)

AKT	ID Key Trigger	PAFDB	Program Attenuation: 4 Decibels
IMO	Interval Output	PAHLS	Power Amplifier High-Low Signal
IPG	ID F Gate	PAMIT	Program Amplitude Modulation (EXT = 0, INT = 1)
IPL	Int. Lamp	PAOBL	Program Attenuation: 1 Bel
IPT	Int. Trigger	PAODB	Program Attenuation: 1 Decibel
IRCC	Int. Lock Control	PAP(XX)	Program A/A PRF
LCRFS	13 DB Computer Input	PARB	Program Auxiliary Reference Burst
LFDBE	Low Frequency Divide-by-Eight	PAS(XX)	Program Antenna Speed
LFHLO	Low Frequency High Level Output	PATBL	Program Attenuation: 2 Bels
LFVCO	Low Frequency VCO Output	PATDB	Program Attenuation: 2 Decibels
LNTVA	Low -5 VDC	PBB(XX)	Program Bearing Rate
LPTVB	Low +12 VDC Regulated	PBR(XX)	Program Bearing Rate
MBGA	Bearing Mode A	PCAAB	Program Condition A/A Beacon
MBGB	Bearing Mode B	PCAAC	Program Condition A/A Command
MBP	Main Burst Pulse	POGAC	Program Condition G/A Command
MBT	Main Burst Trigger	PCME	Program Condition Manual or External
MDTP	Modulation Delay Trigger Pulse	PCM(XX)	Program Coarse Modulation Channel Number
MIA	Measure External A	PCN(XX)	Program Condition X/Y Command
MIB	Measure External B	PEPG	Program External Program
MFRFI	Modulator Frequency Bypass Filter Input	PEXC	Program External Command Level
MFRFO	Modulator Frequency Bypass Filter Output	PRM(XX)	Program Fine Modulation
MFTV	-15 Vdc	PPOV	+4 Vdc
MFVV	-5 Vdc	PFTV	+15 Vdc
MLDO	Bearing Driver Output	PFVV	+5 Vdc
MMA	Measure Memory A	PIC	Pulse Interval Complete
MMB	Measure Memory B	PCIR	Pulse Interval Complete Reset
MPCT	Modulation Percent	PIDK	Program ID Key ad
MPG	Main Precedence Gate	PIDO	Program ID ON
MRC	Main Reference Clock	PIB	Precedence Inhibit Range
MRP	Modulated RF	PLES	Program Level 87
MRGA	Measure Range Gate A	PLET	Program Level 89
MRGB	Measure Range Gate B	PLNT	Program Level 99
MRY	Memory	PLOT	Program Level 10
MRYA	Memory A	PLSS	Program Level 77
MRYB	Memory B	PLZE	Program Level Zero
MTWV	-12 Vdc	PMCLT	Power Meter Compare Test Point
NRP	North Reference Pulse	PMCO	Power Meter Compare Output
NRT	North Reference Trigger		
NGSA	Negative Sign A		
NGSB	Negative Sign B		
ONG	One Second Gate		
PAEBL	Program Attenuation: 8 Bels		
PAEDB	Program Attenuation: 8 Decibels		
PAFBL	Program Attenuation: 4 Bels		

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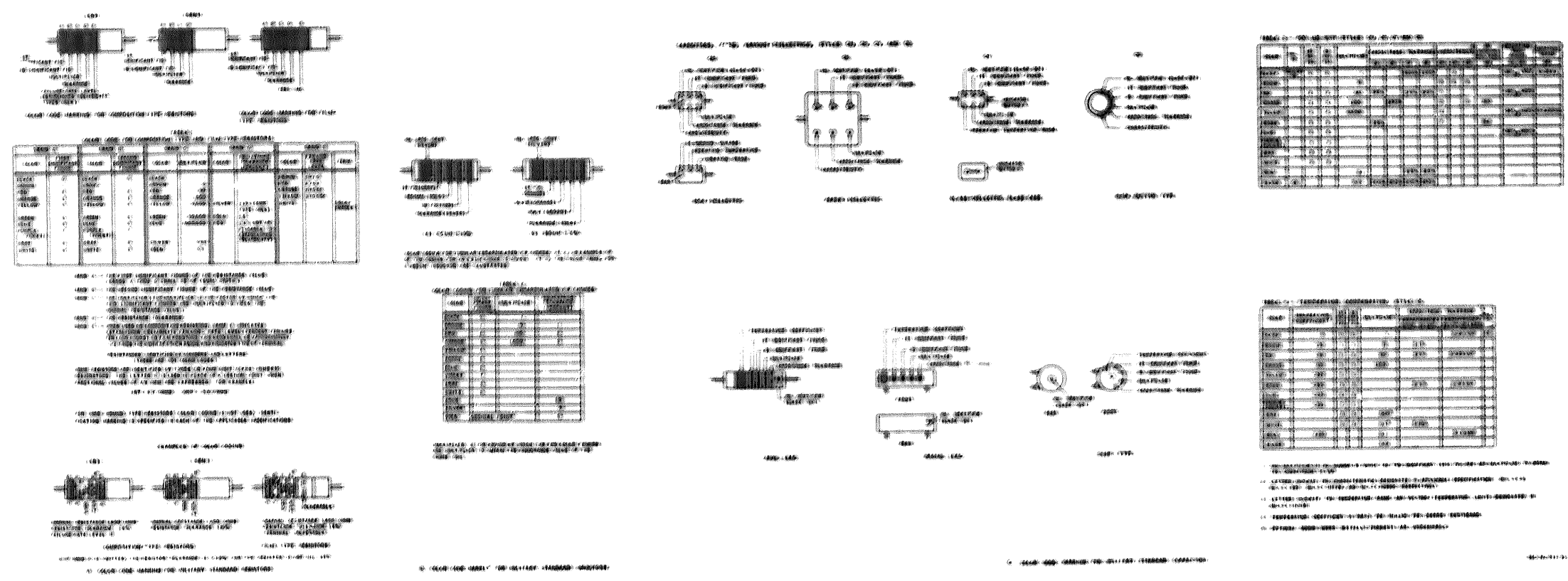


Figure FO-1 MIL-STD resistor, inductor, capacitor color codes.

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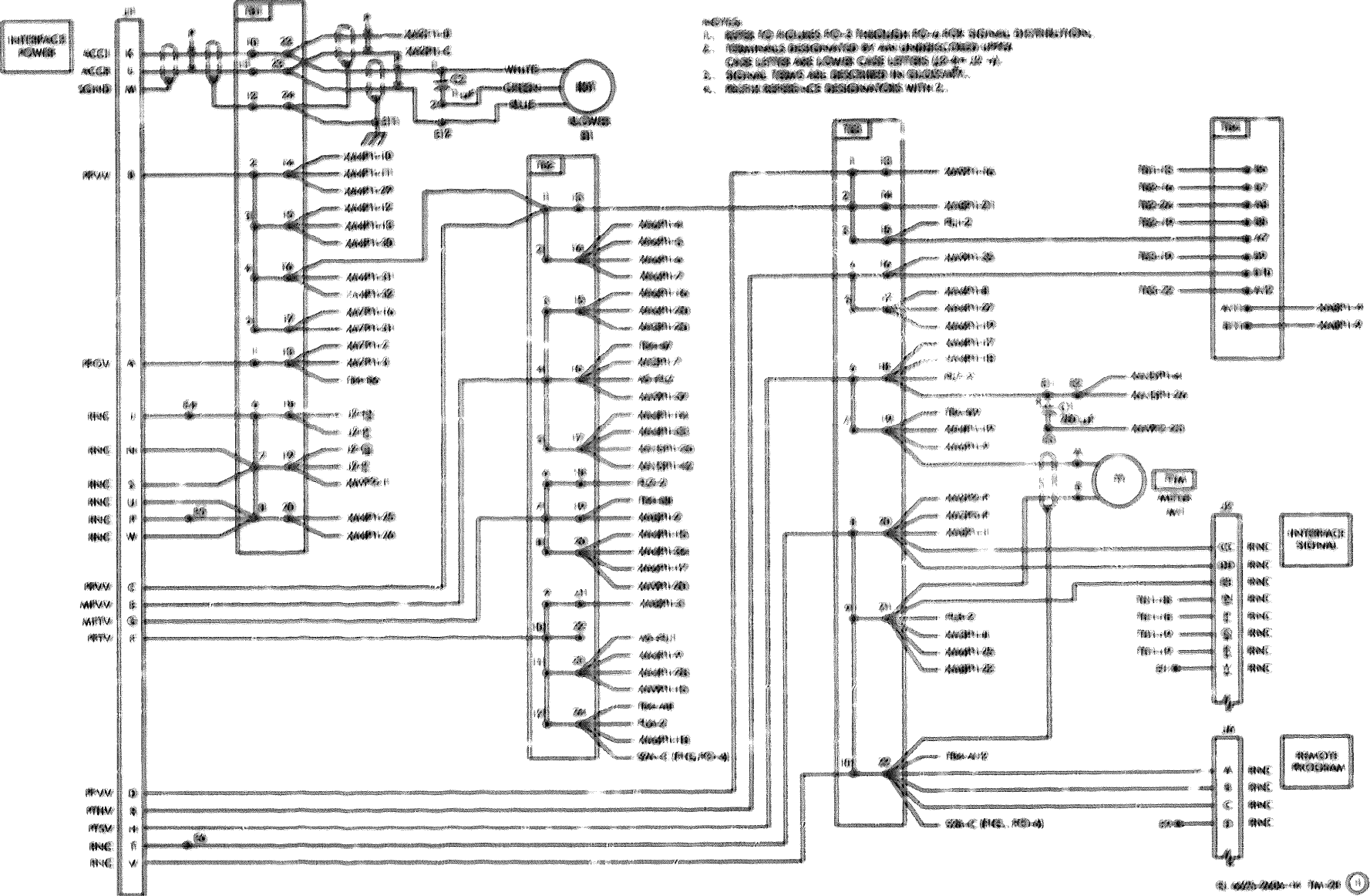


Figure FO-2  Rf with power wiring diagram (Sheet 1 of 2).

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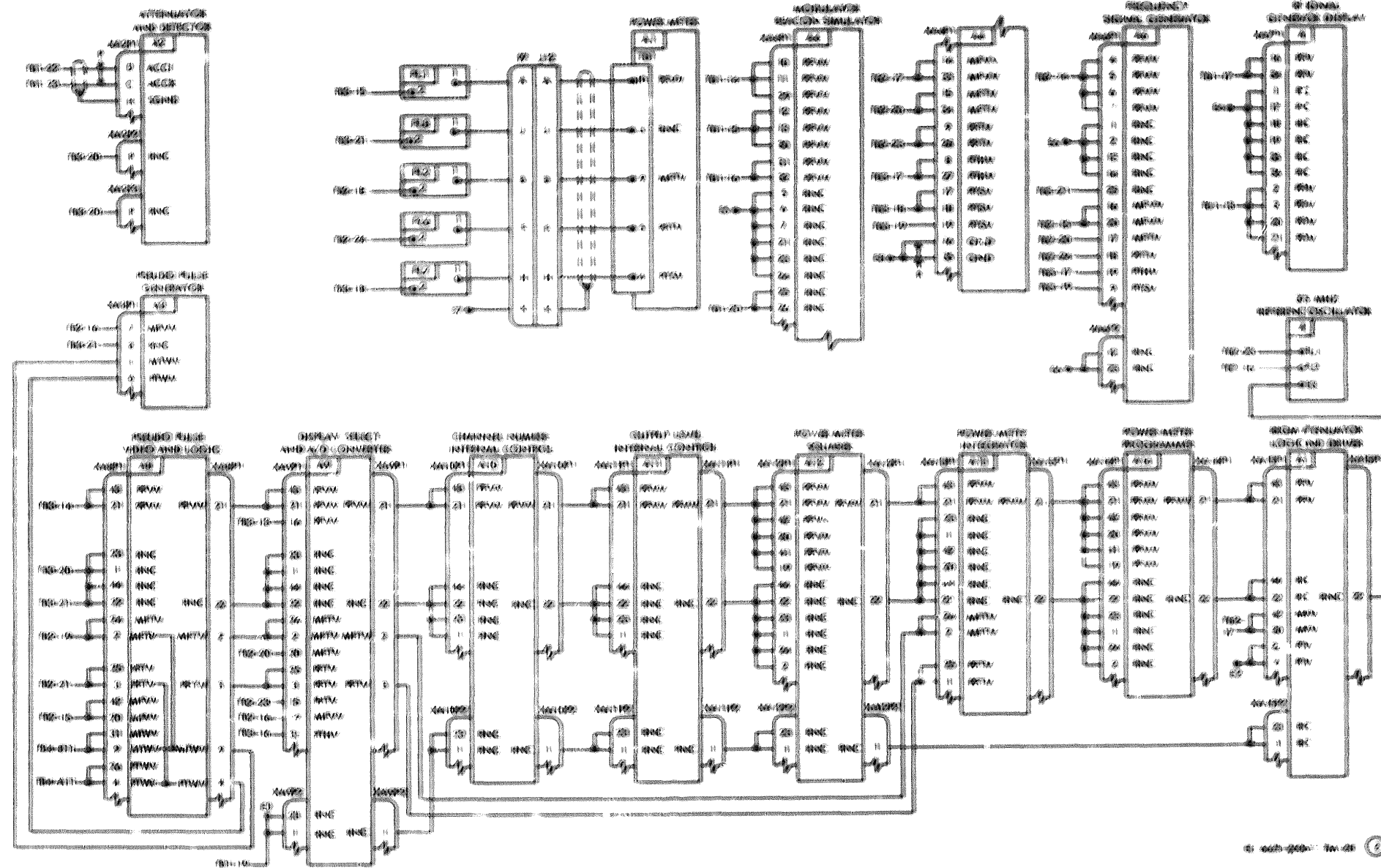


Figure 10-11. RF unit power wiring diagram (Sheet 2 of 2).

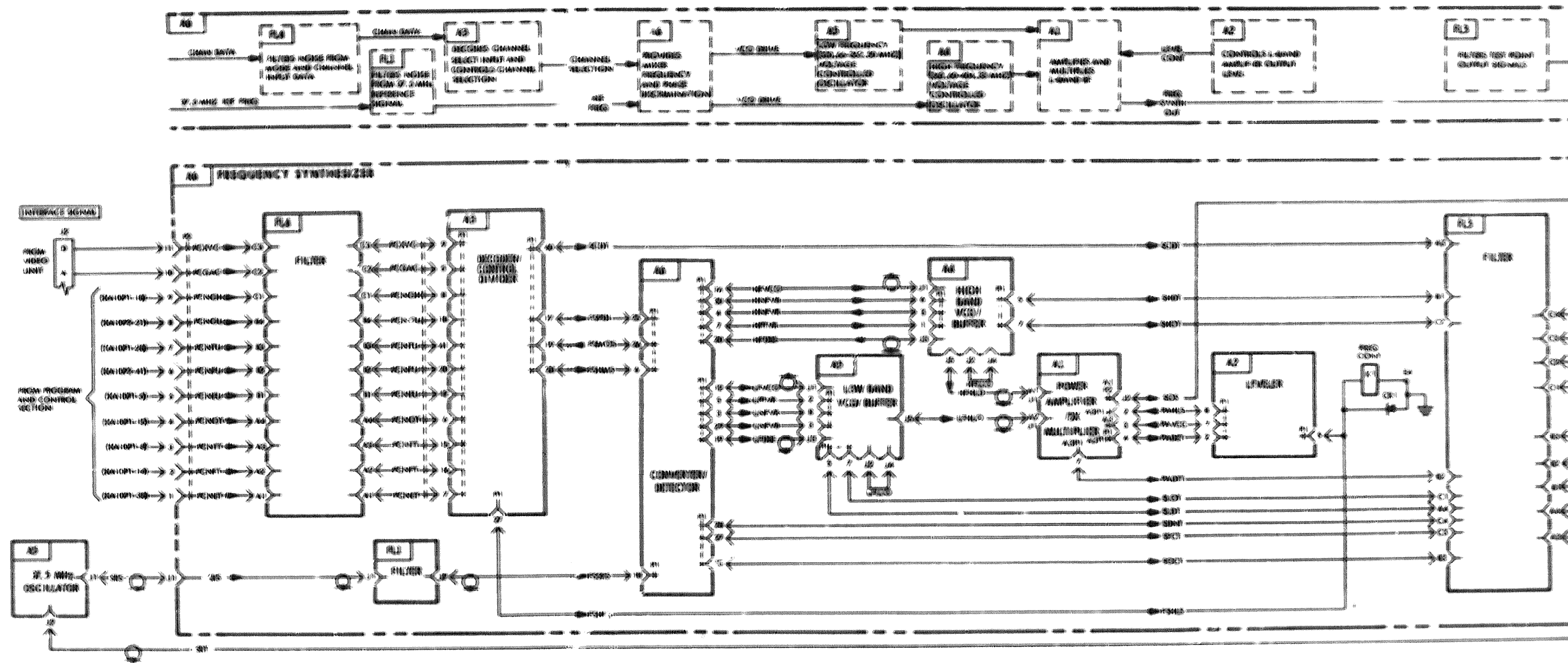


Figure FO-3 RF unit of section signal flow diagram (sheet 1 of 2)

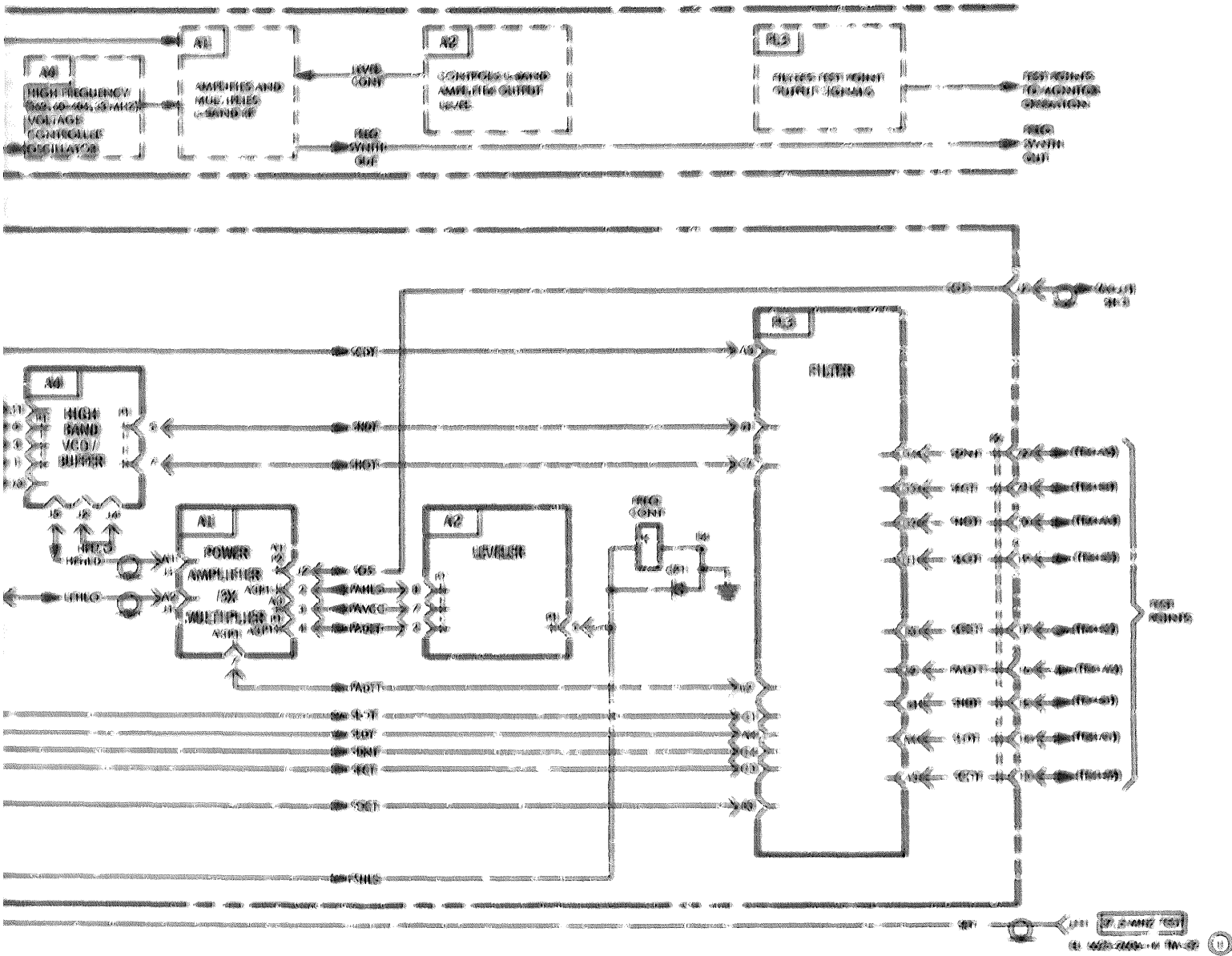


Figure FO-4 RF unit of section signal flow diagram (sheet 3 of 3).

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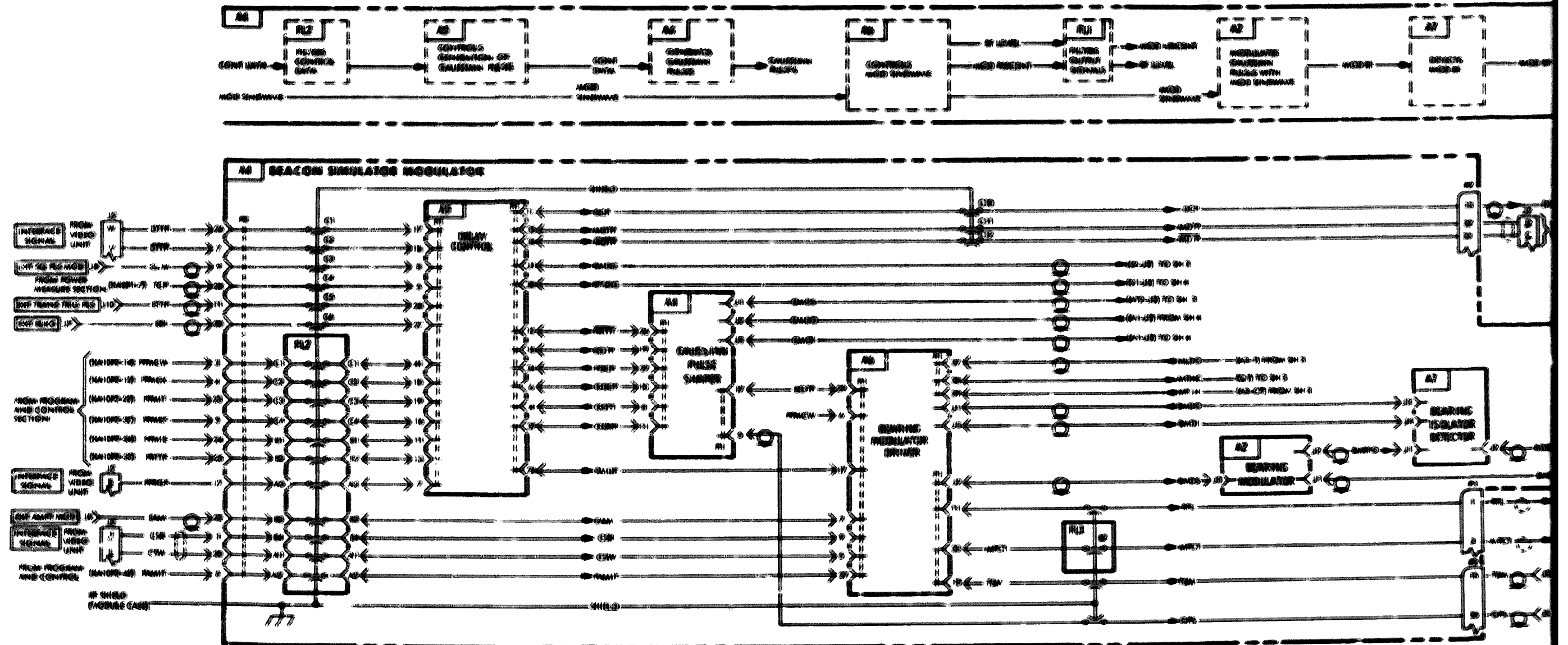


Figure FO-4 2. *Signal flow diagram of*

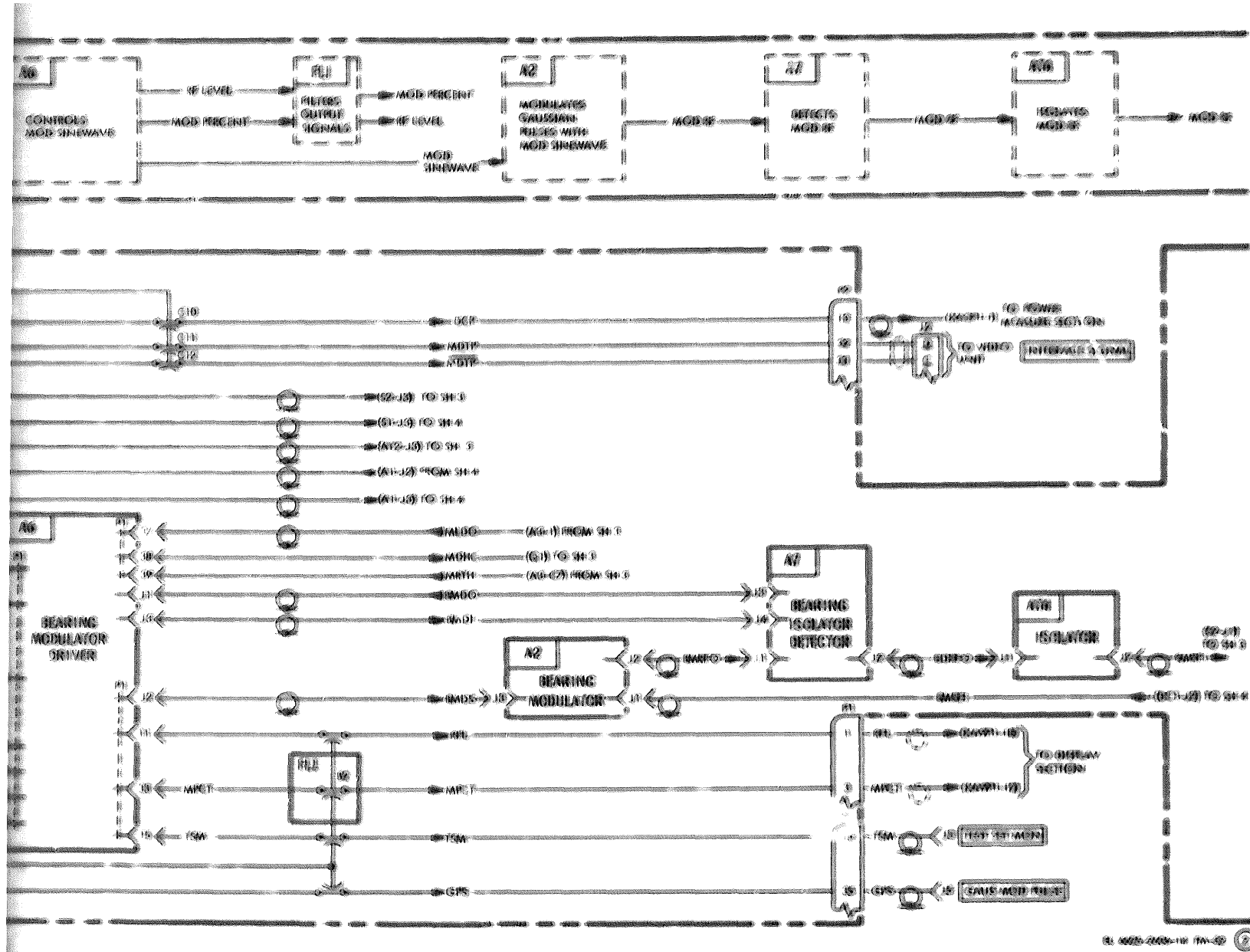


Figure FO-3-2 RF unit of section signal flow diagram (sheet 2 of 3).

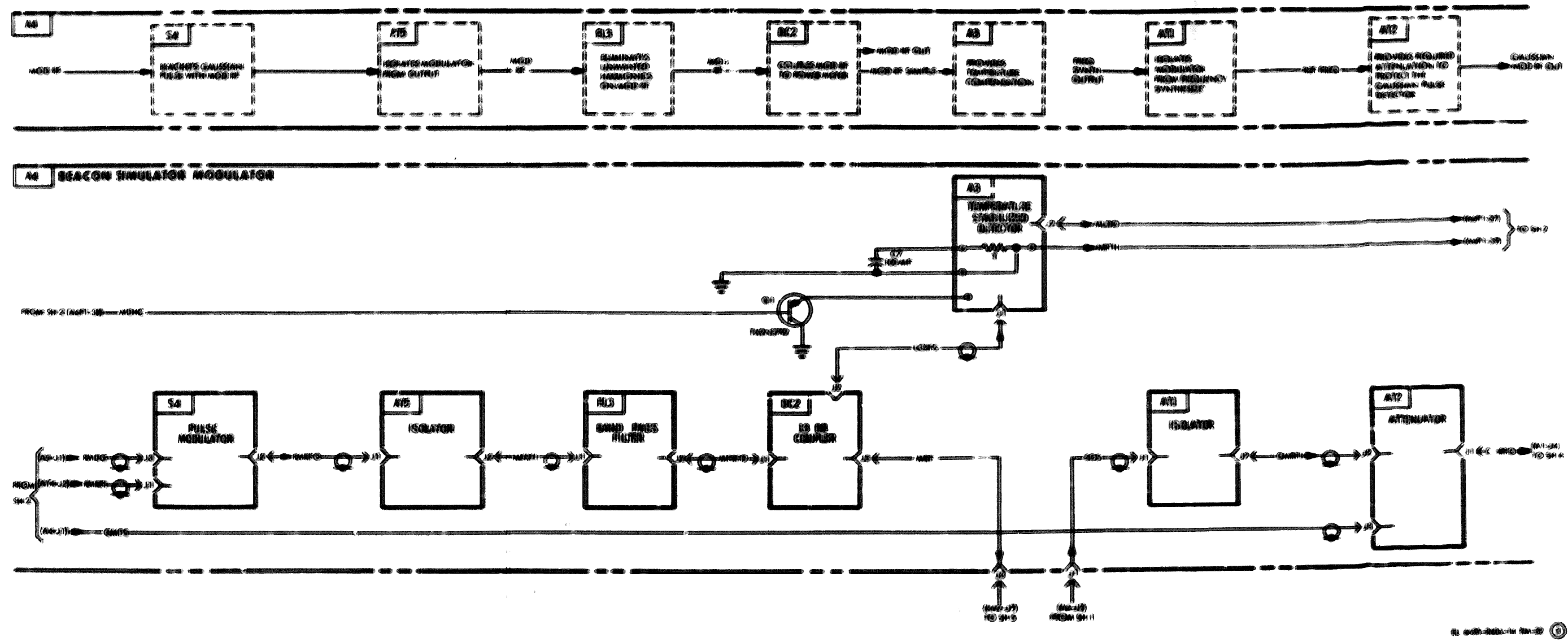


Figure FO-3 RF unit of section signal flow diagram (sheet 3 of 3).

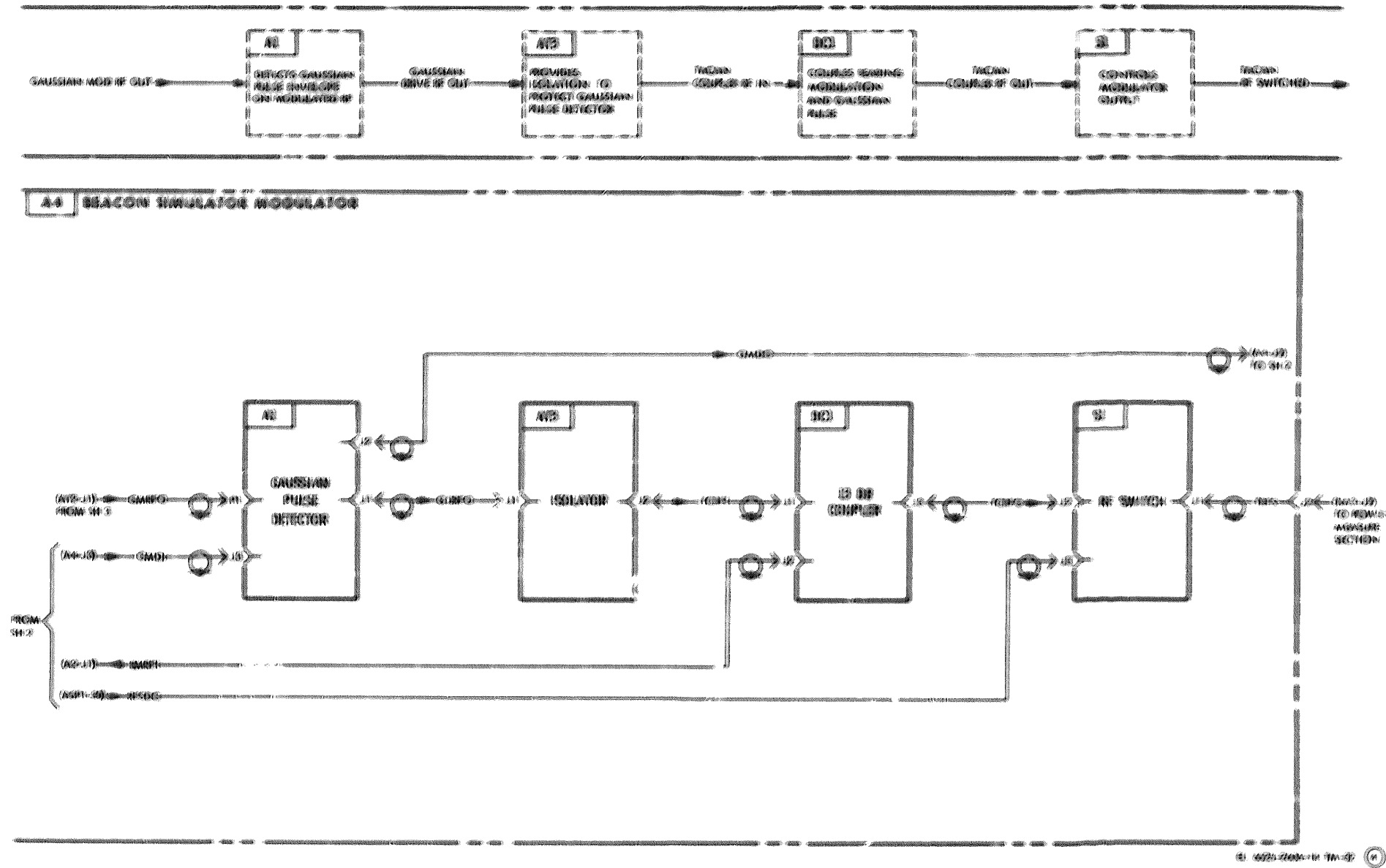


Figure FO-1. *Ref. unit. of section, signed flow diagram (Volume 2 of 5).*

Figure FO-1 RF Unit, off station, signal flow diagram (sheet 5 of 5).

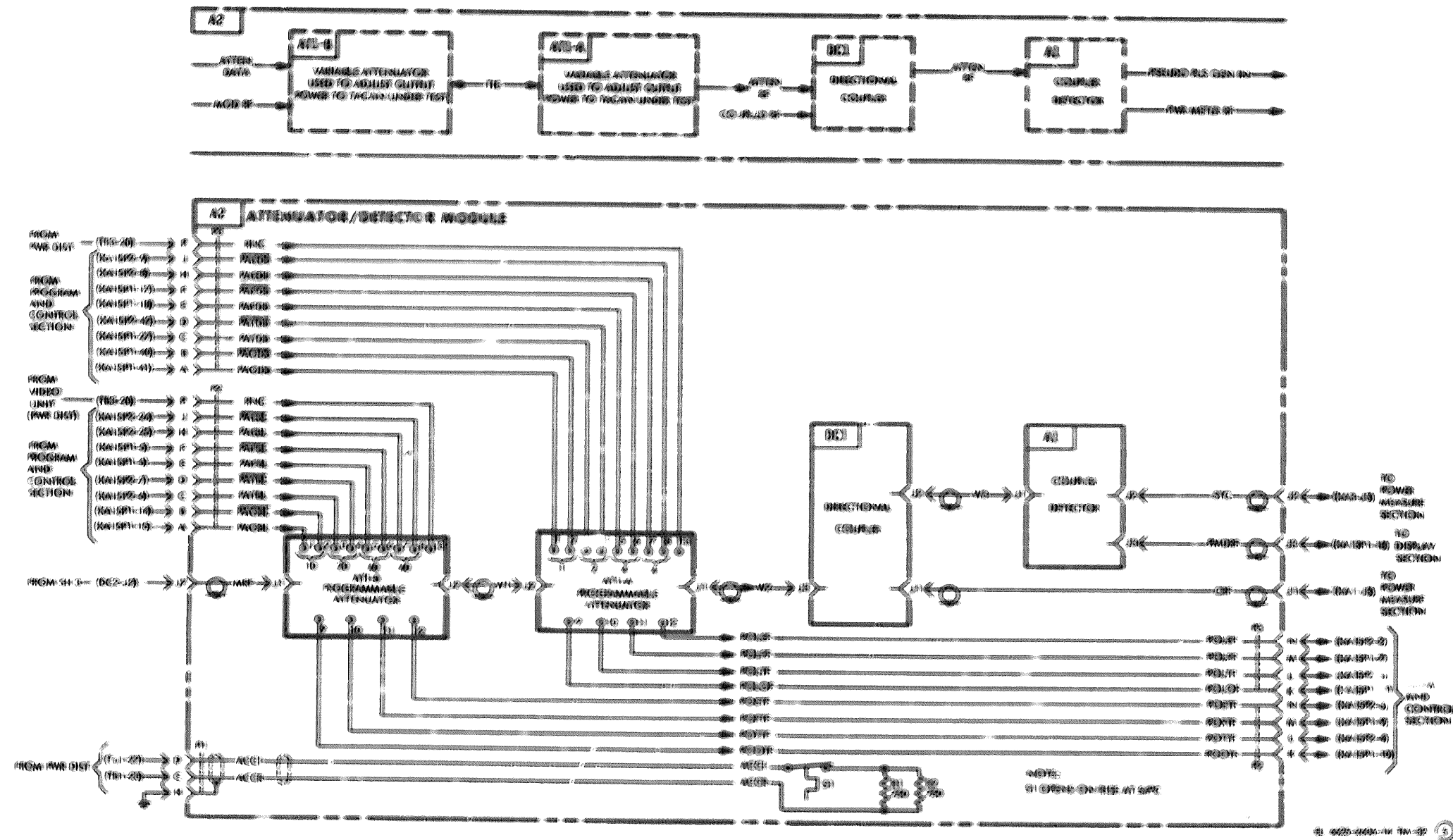
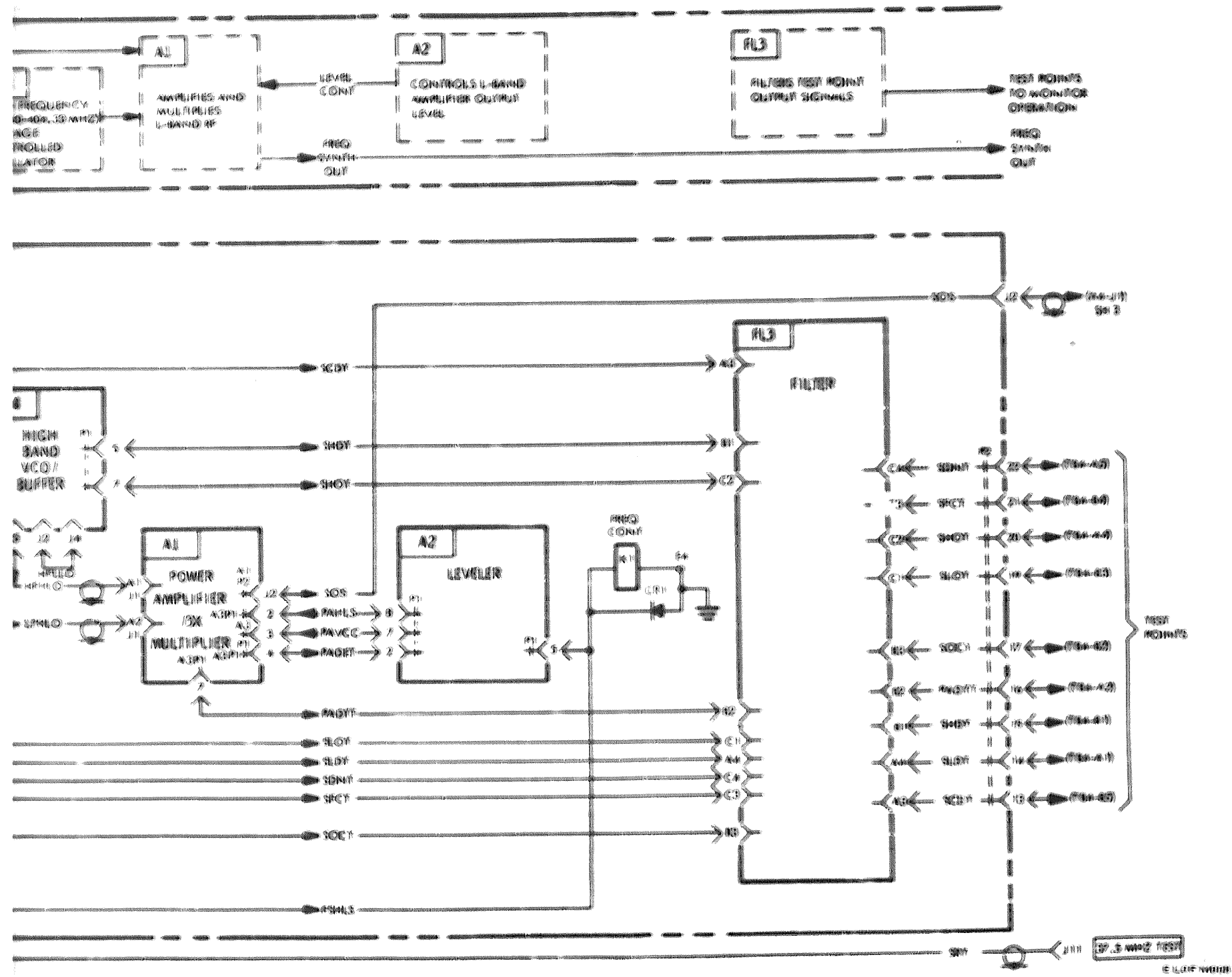




Figure FO-2. Rf with programming and control section, signal flow diagram.



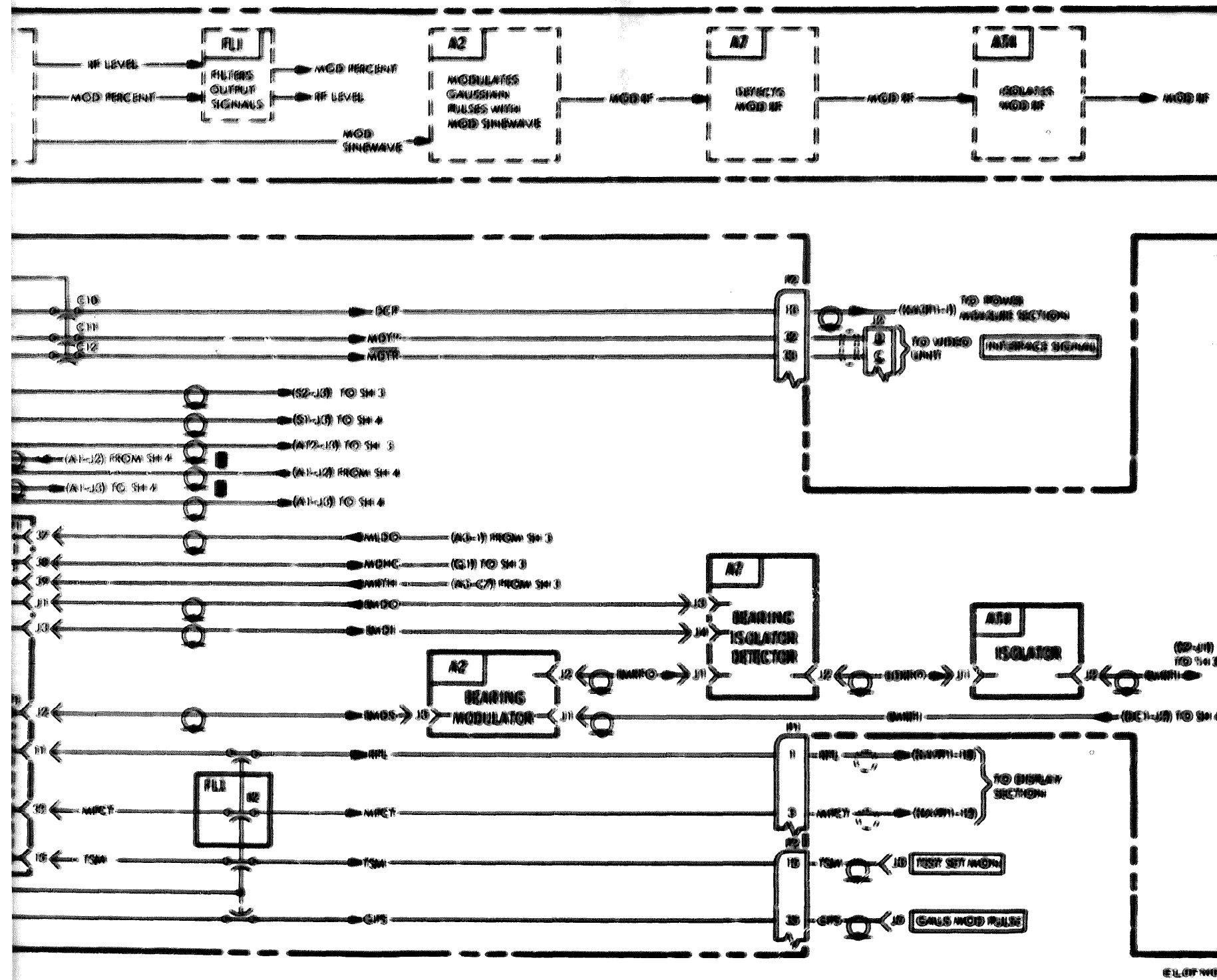


Figure FO-4.  RF unit, rf section, signal flow diagram (sheet 2 of 5)

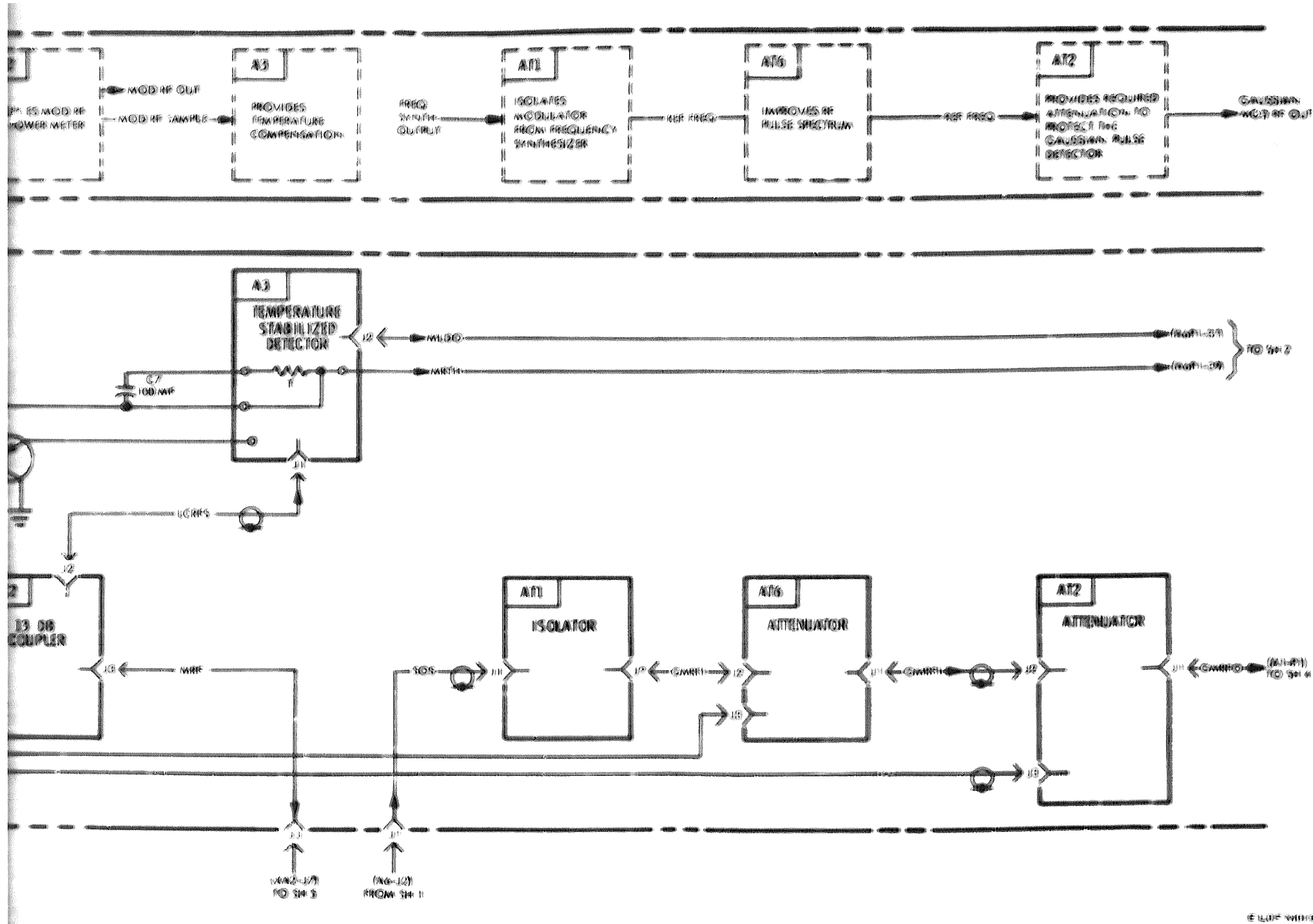


Figure FO-5 (3) Rf unit, rf section, signal flow diagram (sheet 3 of 5).

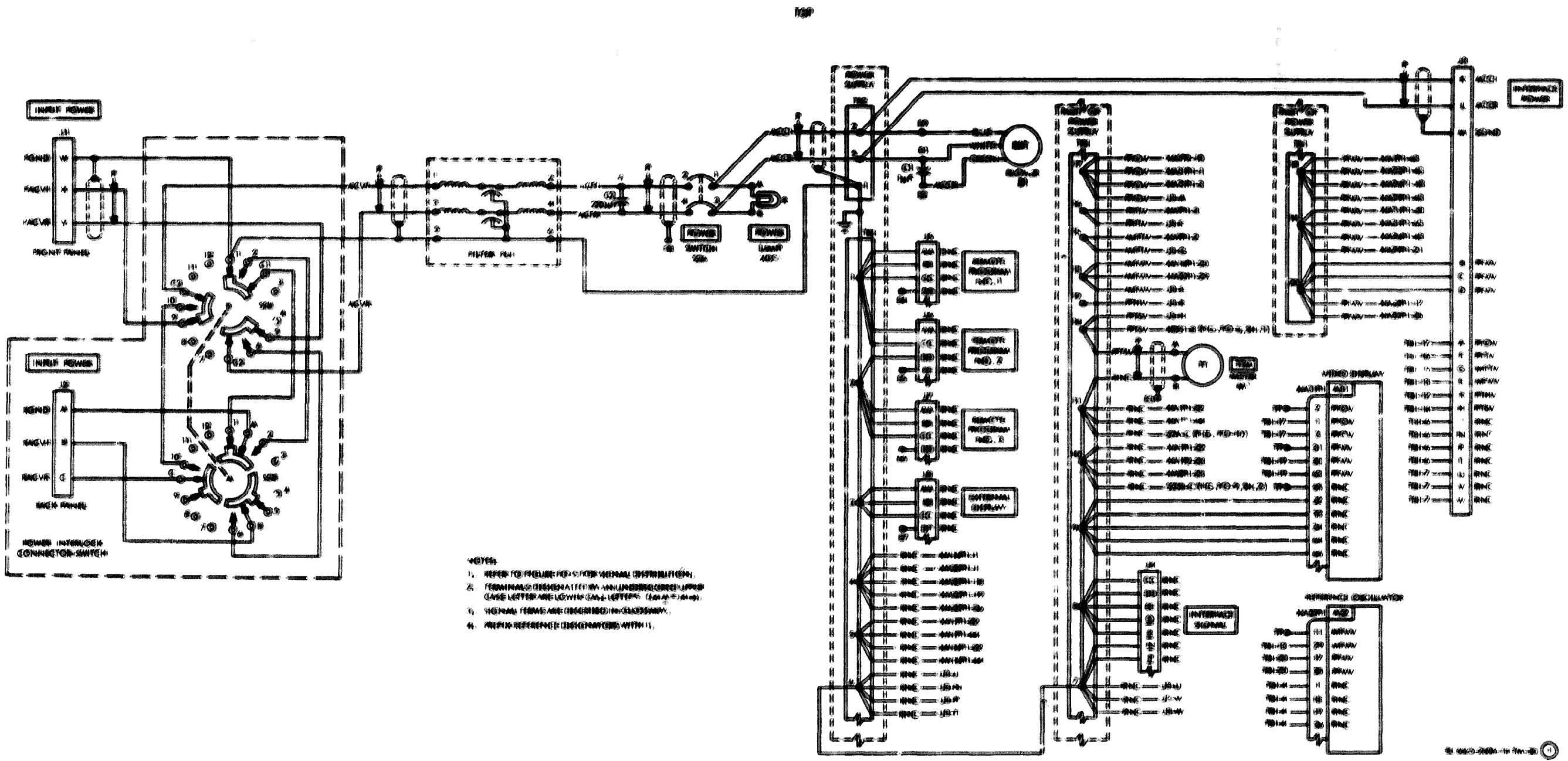
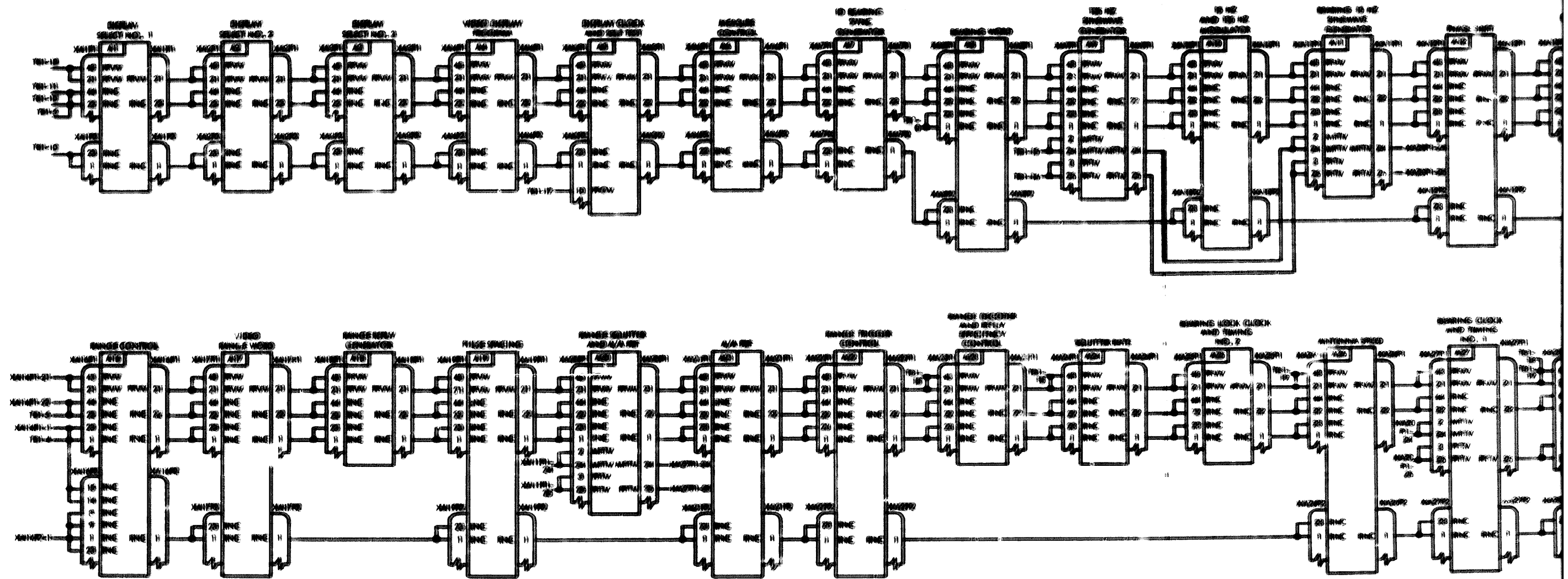


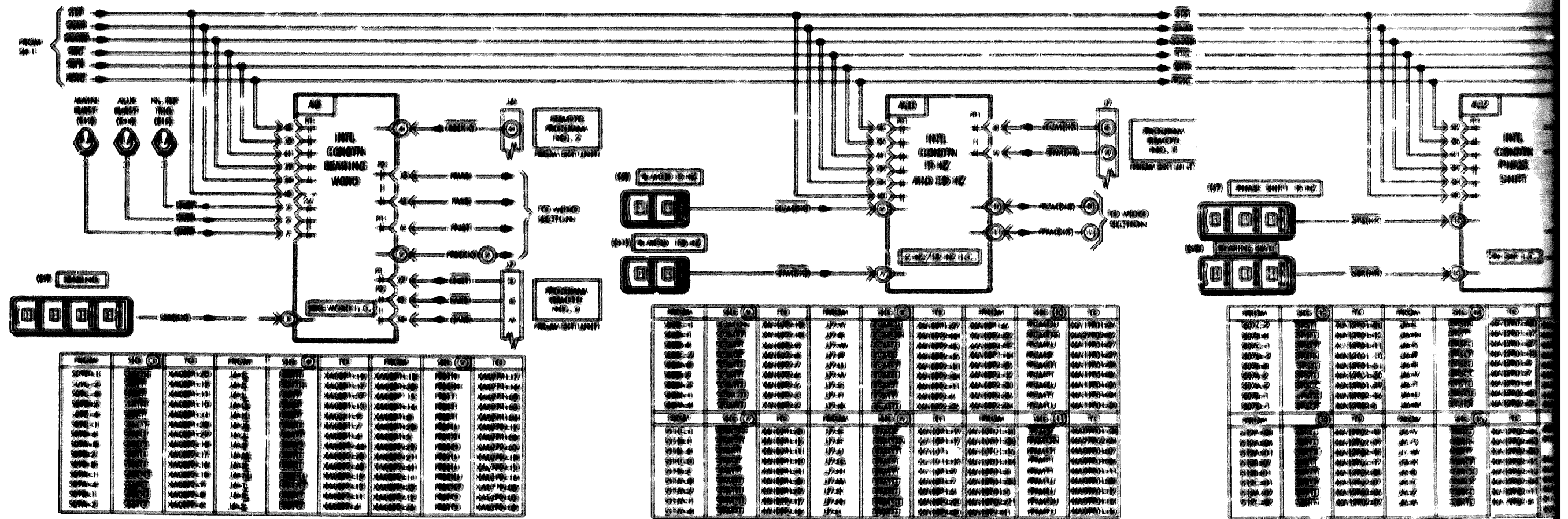
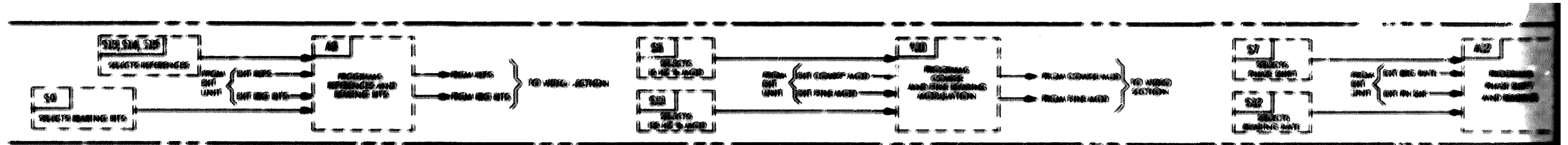
Figure FO-6.10

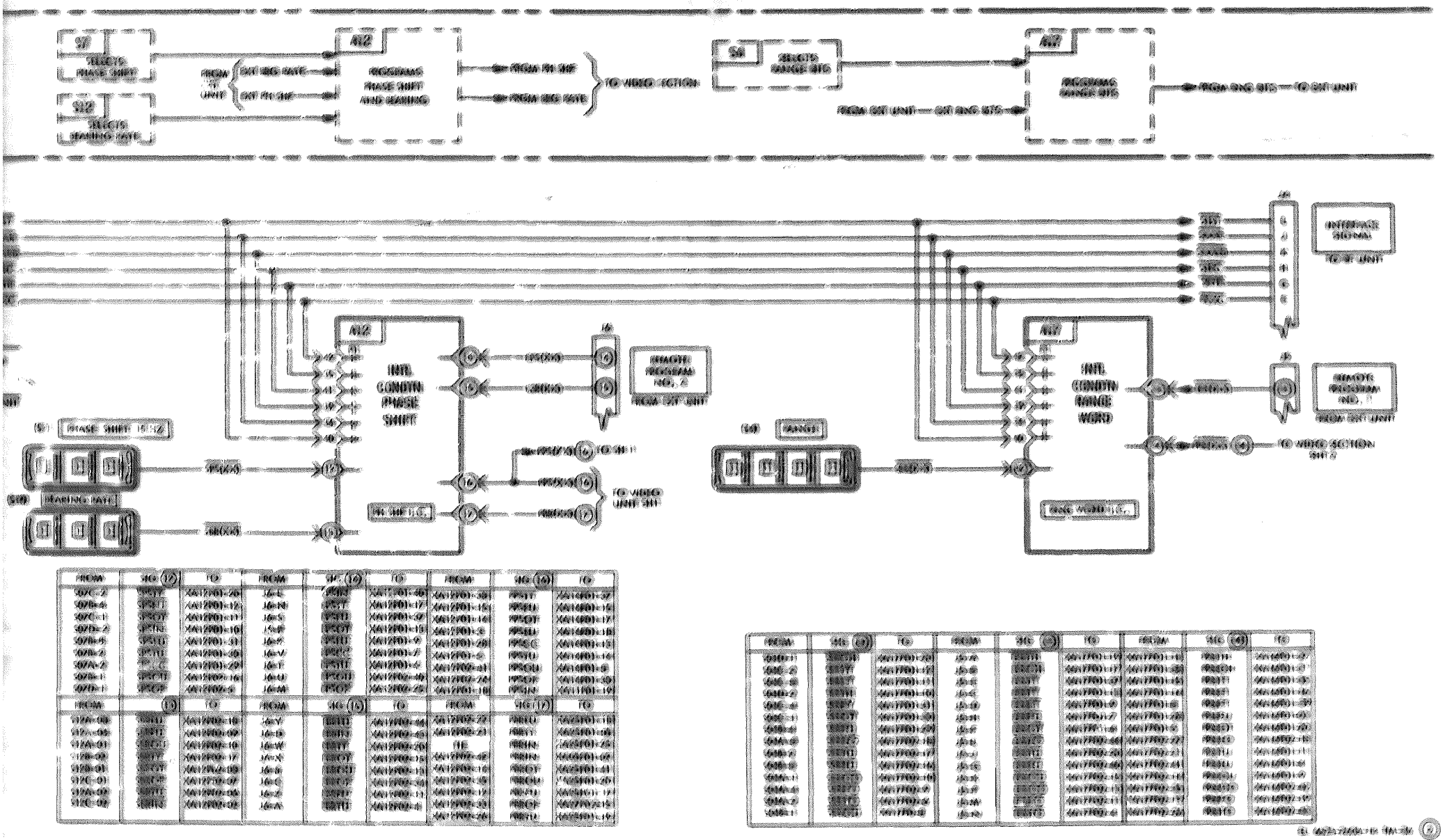
Video unit power wiring diagram (sheet 1 of 2).











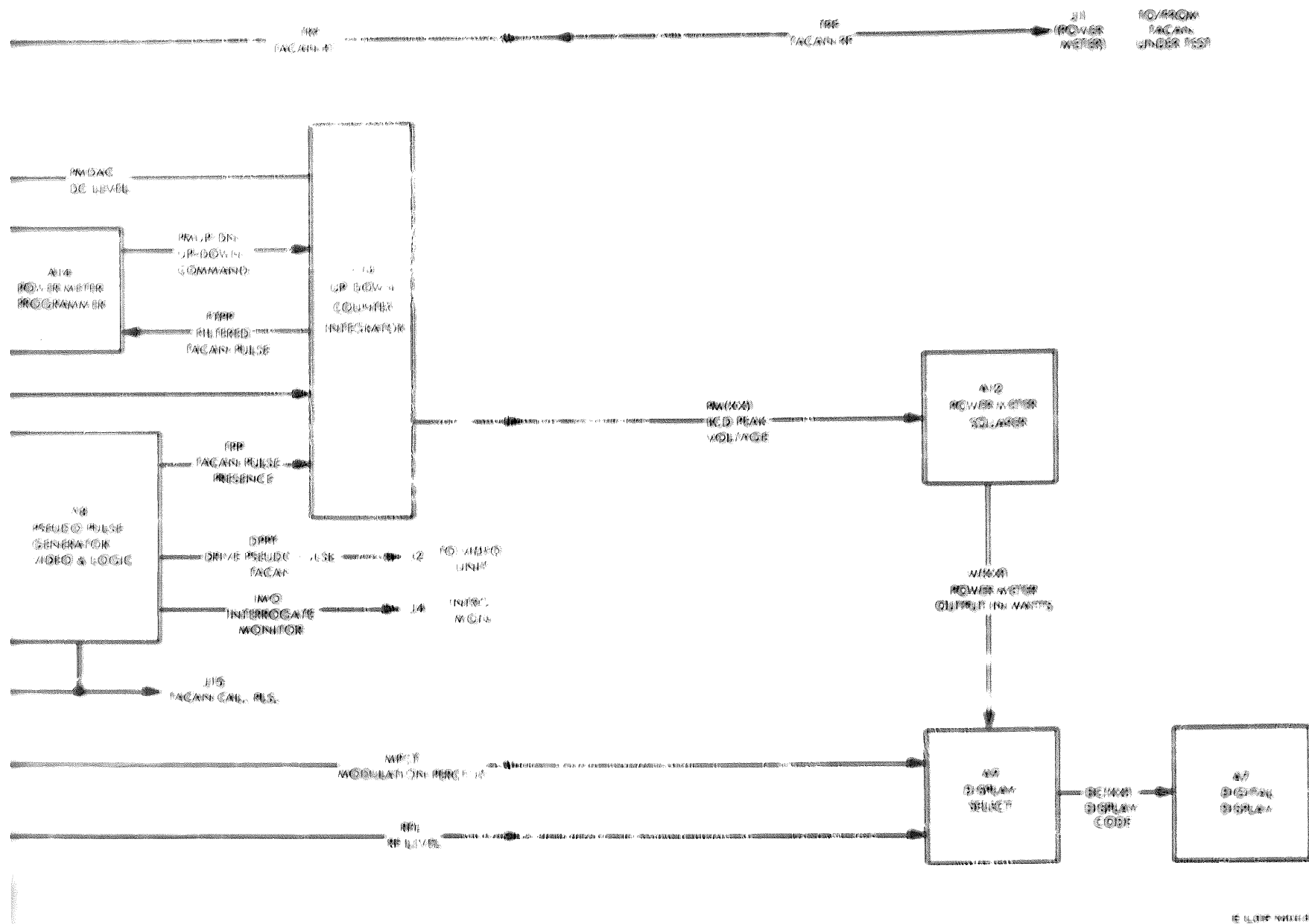


Figure FO-11. Rf Unit, Functional Block Diagram.

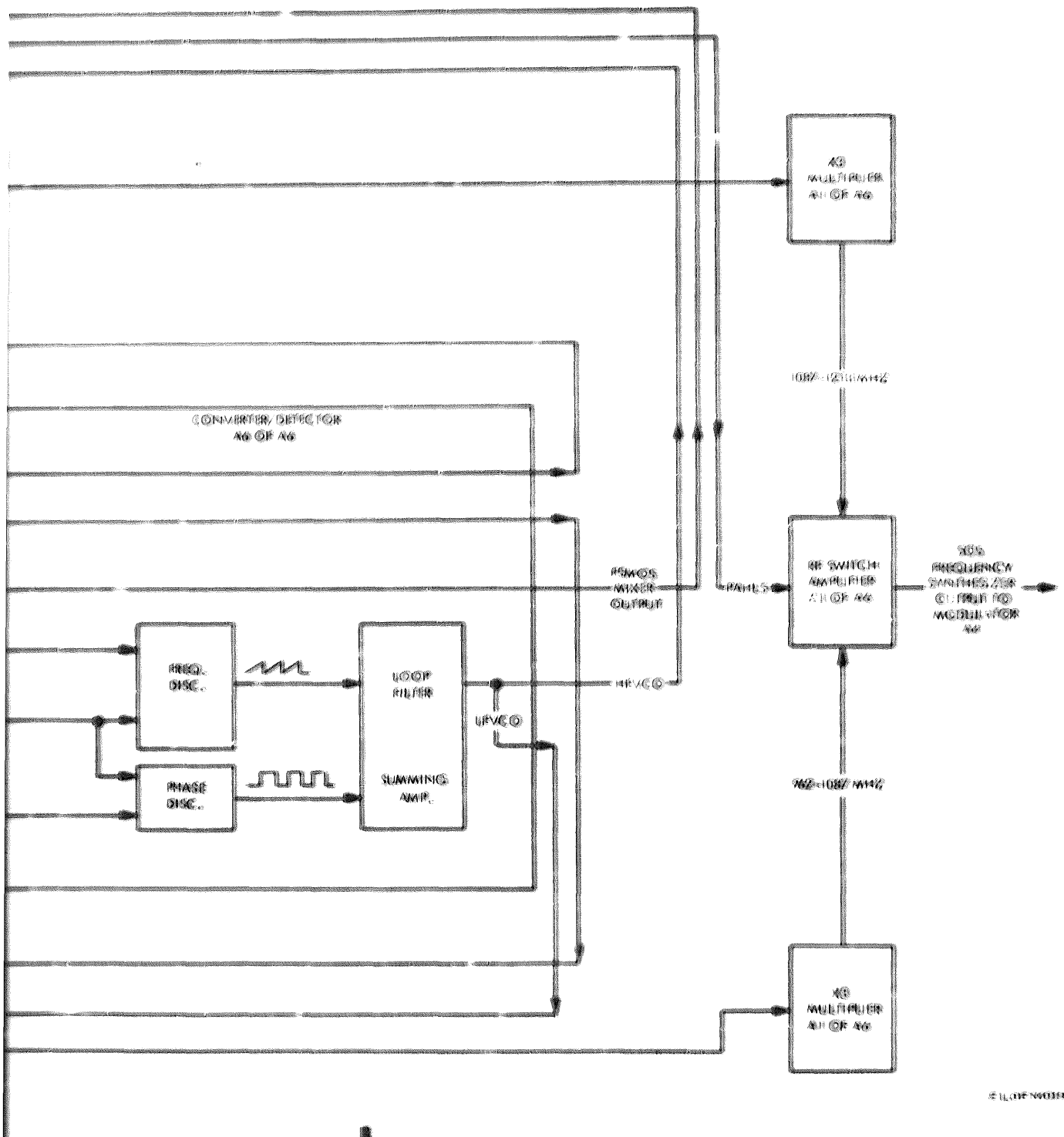


Figure FO-12. Frequency synthesizer, simplified block diagram.

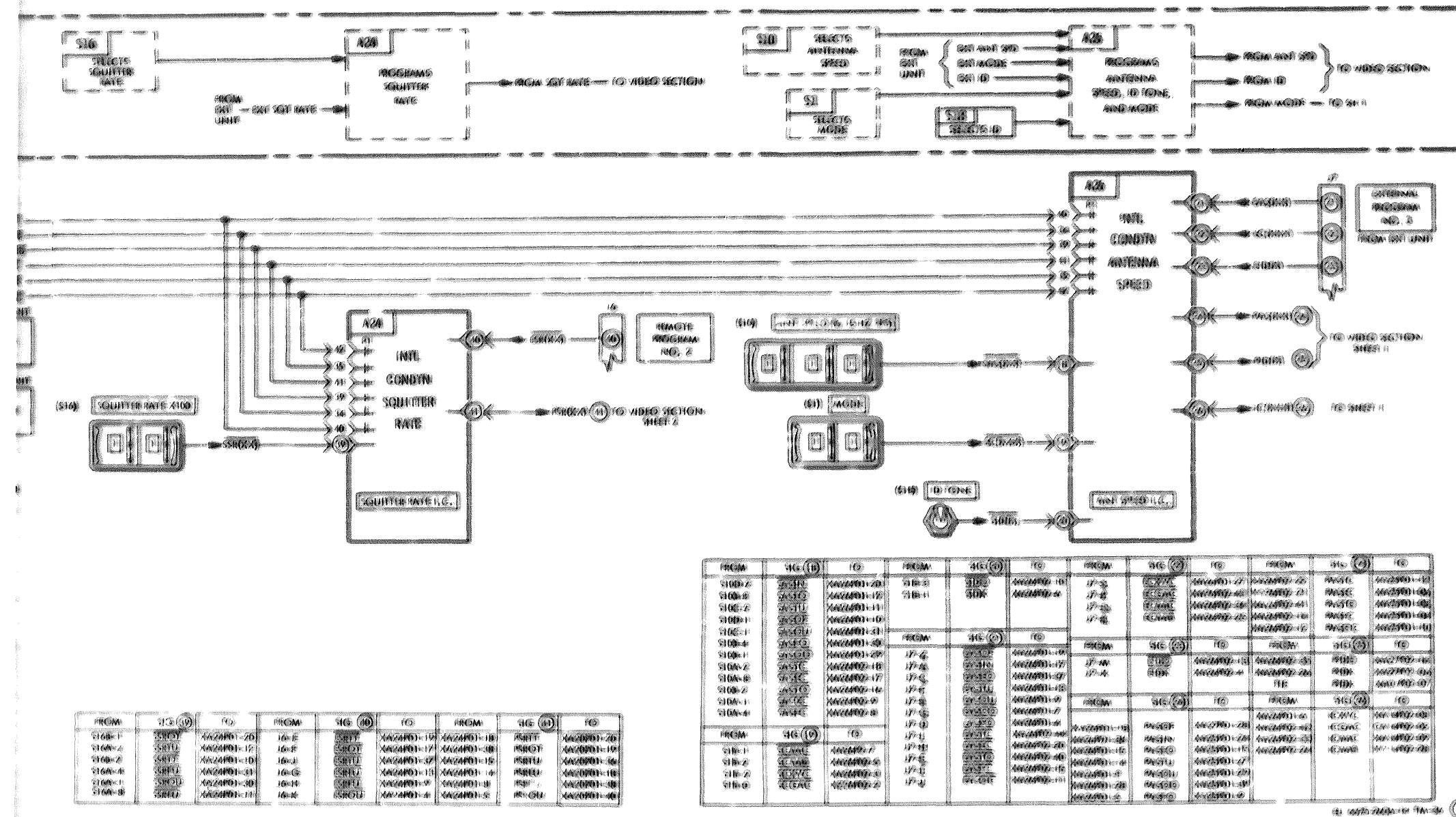
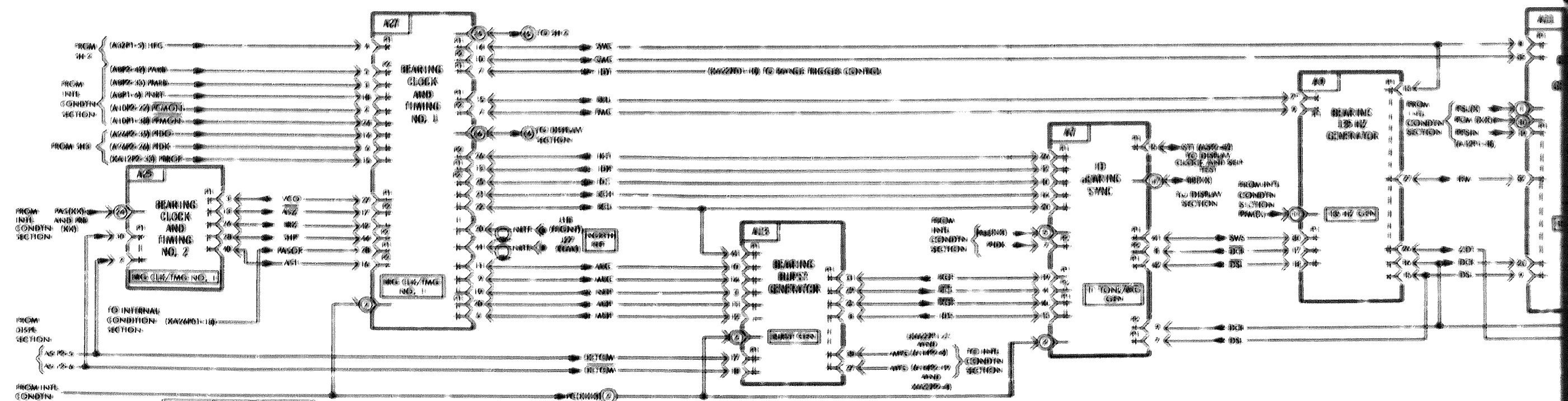
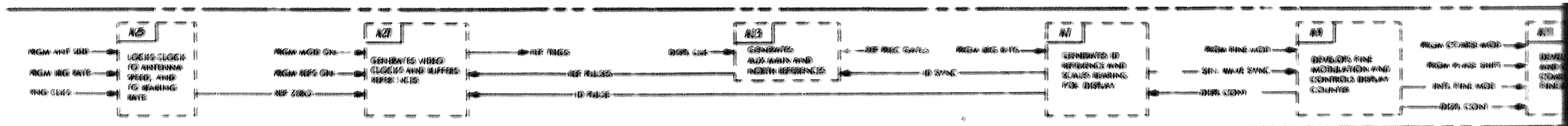


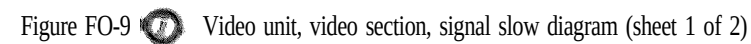
Figure FO-10 Video unit internal condition section flow diagram (sheet 3 of 3)

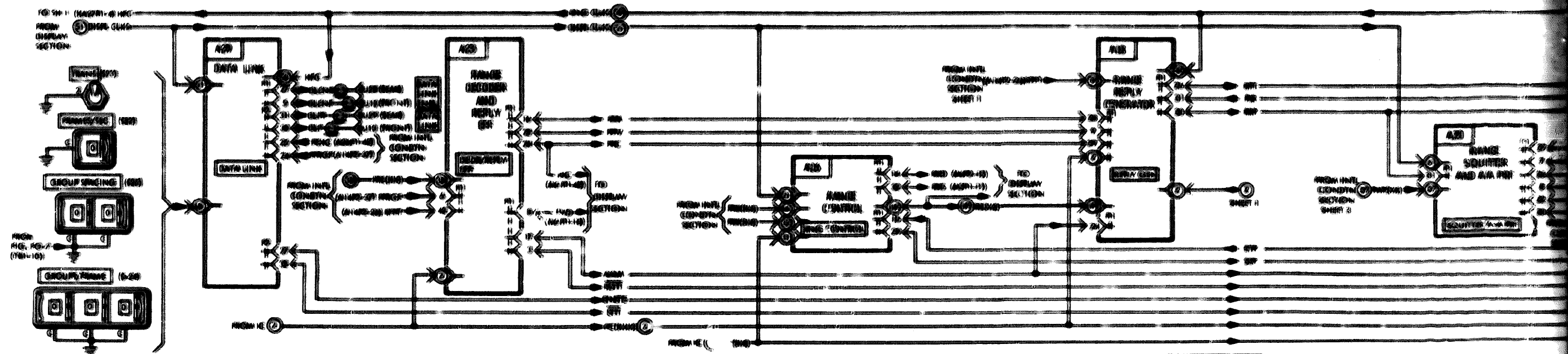


FROM	SIG (24)	TO	FROM	SIG (24)	TO
A26P1-1B	PASOE	A26P1-2B	A26P1-1B	PASOE	A26P1-2B
A26P1-3B	PASIN	A26P1-2B	A26P1-3B	PASIN	A26P1-2B
A26P1-12	PASOE	A26P1-1B	A26P1-12	PASOE	A26P1-1B
A26P1-22	PASOE	A26P1-1B	A26P1-22	PASOE	A26P1-1B
A26P1-14	PASOE	A26P1-1B	A26P1-14	PASOE	A26P1-1B
A26P1-21	PASOE	A26P1-1B	A26P1-21	PASOE	A26P1-1B
A26P1-2B	PASOE	A26P1-1B	A26P1-2B	PASOE	A26P1-1B
A26P1-41	PASOE	A26P1-1B	A26P1-41	PASOE	A26P1-1B
A26P1-5	PASOE	A26P1-1B	A26P1-5	PASOE	A26P1-1B

FROM	SIG (5)	TO	FROM	SIG (5)	TO
A26P1-1B	PASOE	A26P1-2B	A26P1-1B	PASOE	A26P1-2B
A26P1-3B	PASIN	A26P1-2B	A26P1-3B	PASIN	A26P1-2B
A26P1-12	PASOE	A26P1-1B	A26P1-12	PASOE	A26P1-1B
A26P1-22	PASOE	A26P1-1B	A26P1-22	PASOE	A26P1-1B
A26P1-14	PASOE	A26P1-1B	A26P1-14	PASOE	A26P1-1B
A26P1-21	PASOE	A26P1-1B	A26P1-21	PASOE	A26P1-1B
A26P1-2B	PASOE	A26P1-1B	A26P1-2B	PASOE	A26P1-1B
A26P1-41	PASOE	A26P1-1B	A26P1-41	PASOE	A26P1-1B
A26P1-5	PASOE	A26P1-1B	A26P1-5	PASOE	A26P1-1B

FROM	SIG (11)	TO	FROM	SIG (11)	TO
A26P1-21	PASOE	A26P1-2B	A26P1-21	PASOE	A26P1-2B
A26P1-2B	PASOE	A26P1-1B	A26P1-2B	PASOE	A26P1-1B
A26P1-12	PASOE	A26P1-1B	A26P1-12	PASOE	A26P1-1B
A26P1-22	PASOE	A26P1-1B	A26P1-22	PASOE	A26P1-1B
A26P1-14	PASOE	A26P1-1B	A26P1-14	PASOE	A26P1-1B
A26P1-21	PASOE	A26P1-1B	A26P1-21	PASOE	A26P1-1B
A26P1-2B	PASOE	A26P1-1B	A26P1-2B	PASOE	A26P1-1B
A26P1-41	PASOE	A26P1-1B	A26P1-41	PASOE	A26P1-1B
A26P1-5	PASOE	A26P1-1B	A26P1-5	PASOE	A26P1-1B





NRDM	SIC (7)	IND	NRDM	SIC (7)
42199-0	440000	42199-0	42199-0	440000
42199-1	440000	42199-1	42199-1	440000
42199-2	440000	42199-2	42199-2	440000
42199-3	440000	42199-3	42199-3	440000
42199-4	440000	42199-4	42199-4	440000
42199-5	440000	42199-5	42199-5	440000
42199-6	440000	42199-6	42199-6	440000
42199-7	440000	42199-7	42199-7	440000
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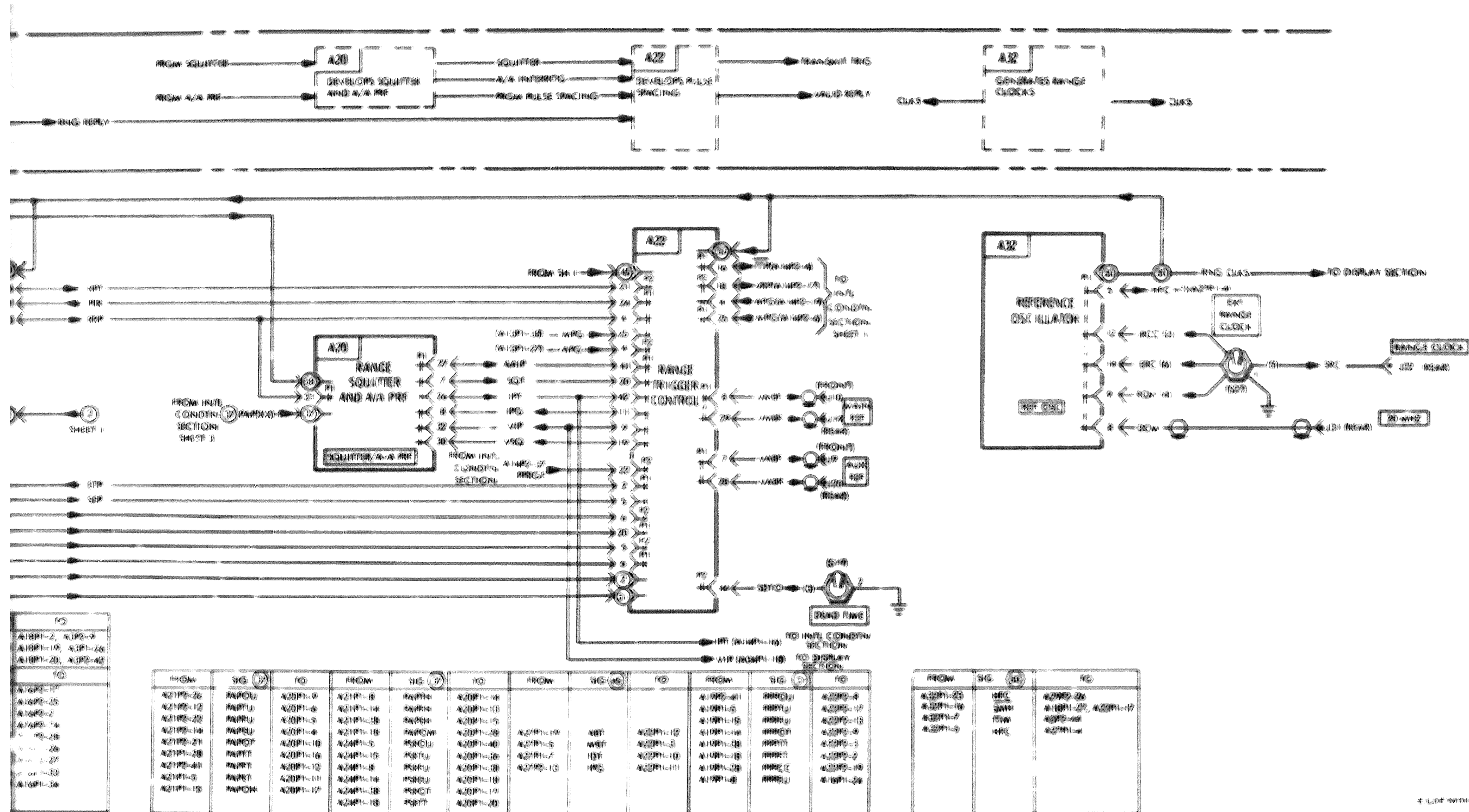
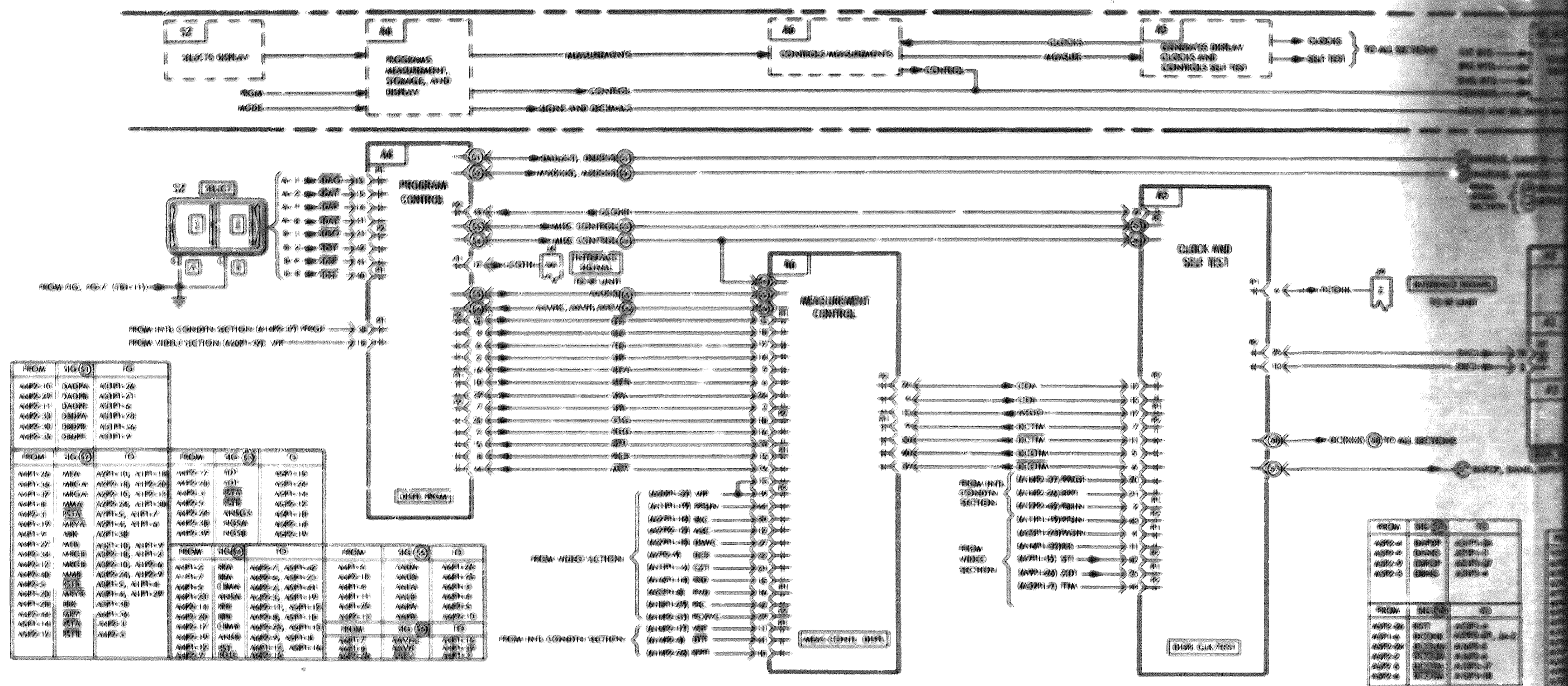
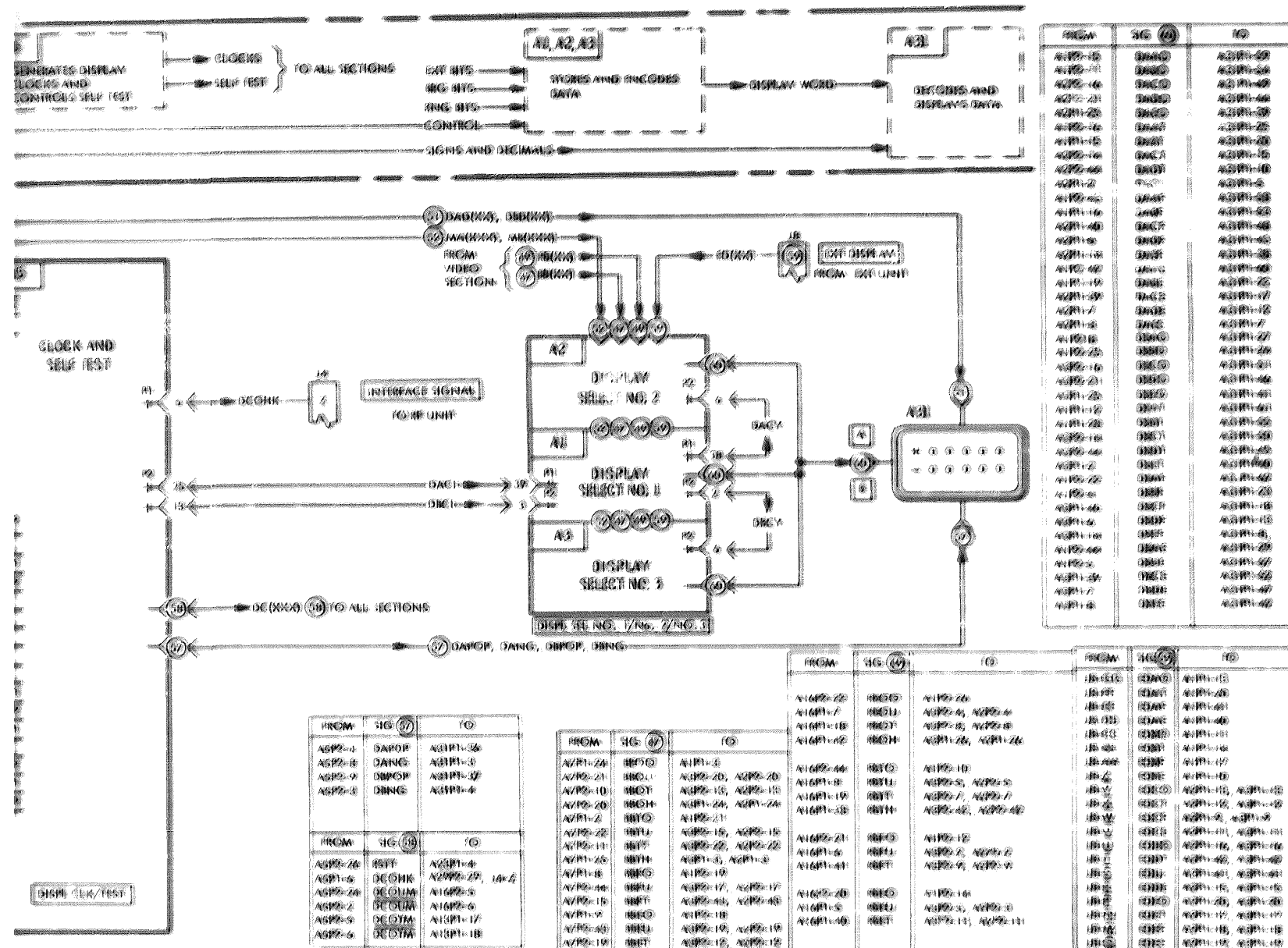


Figure FO-9(2). Video unit, video section flow diagram (sheet 2 of 2)

Change 1



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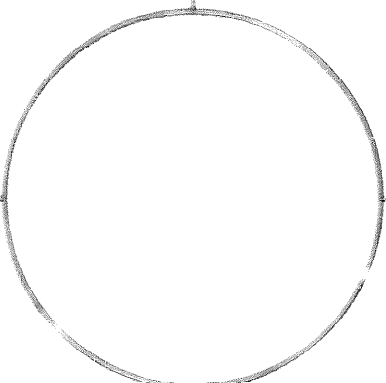




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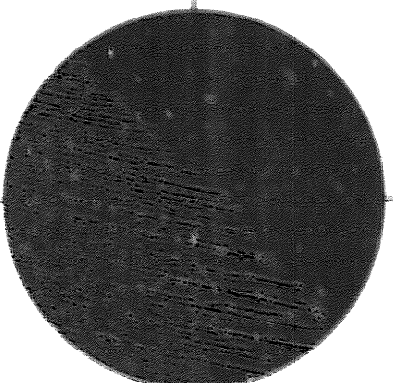
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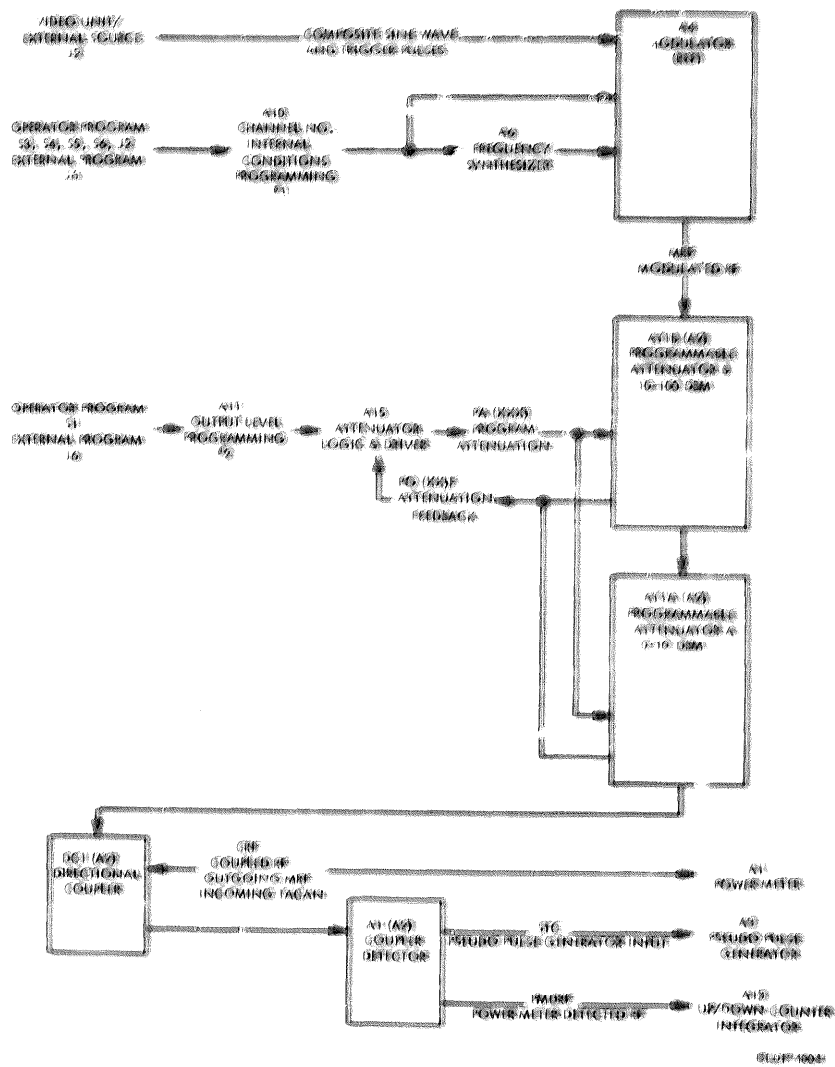


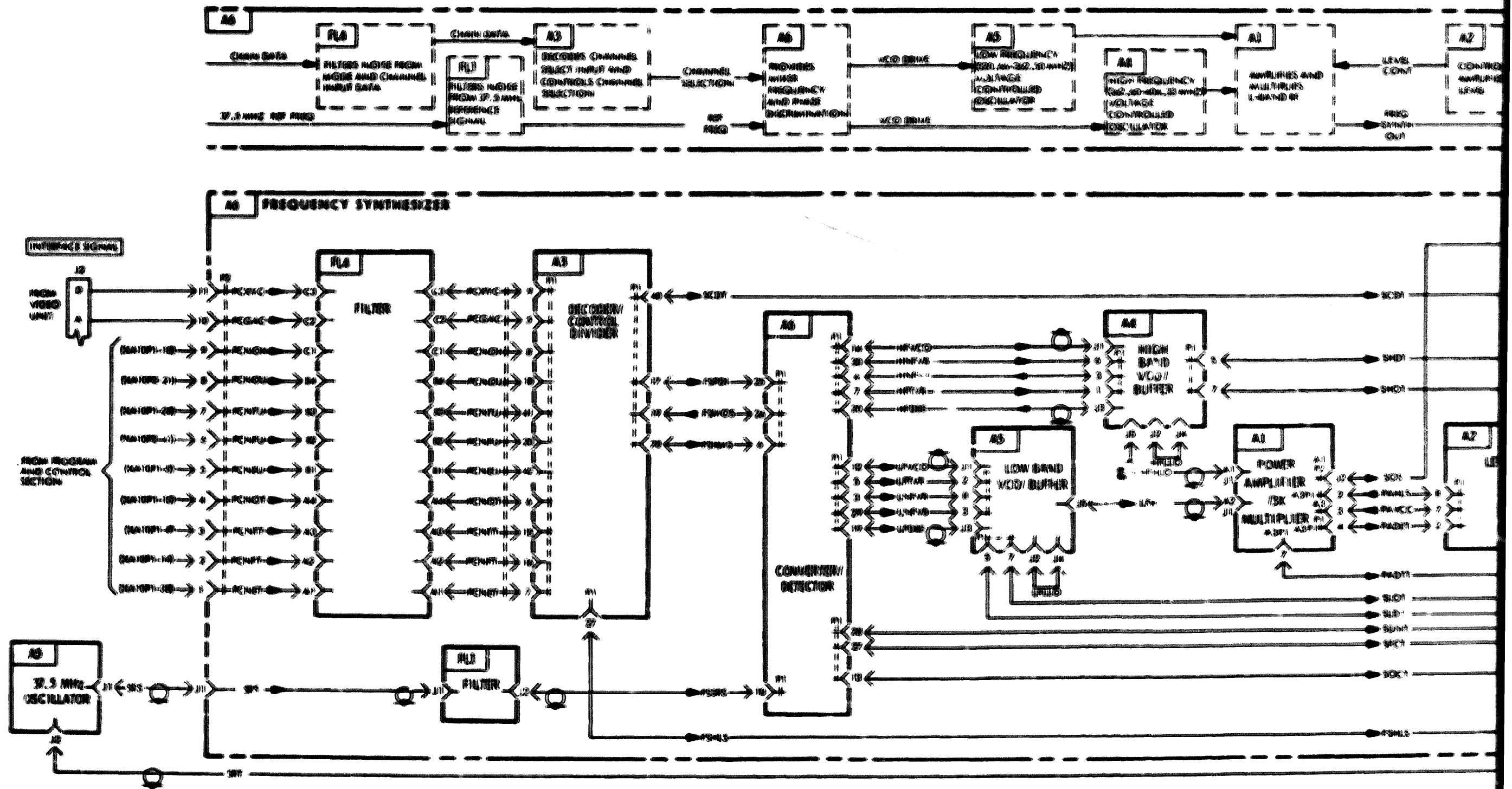
Figure 4-2. Programmable variable attenuator, amplified block diagram.

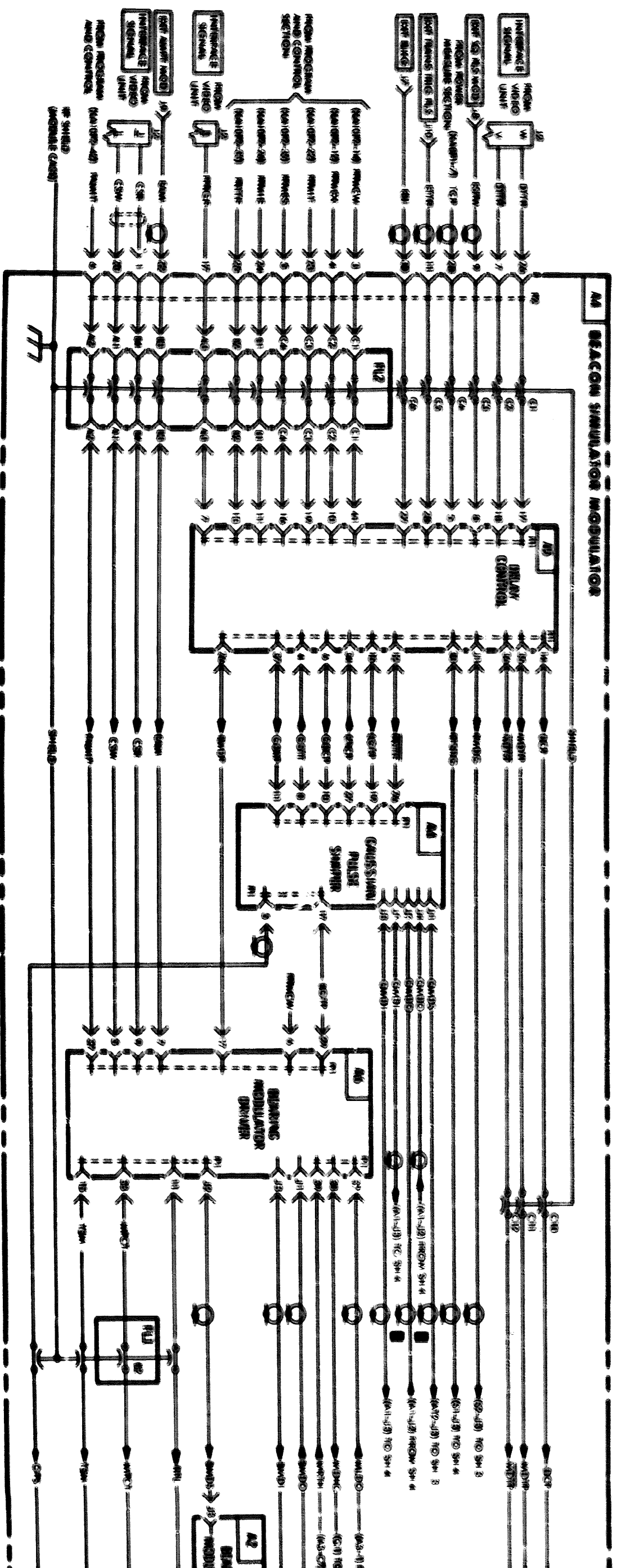
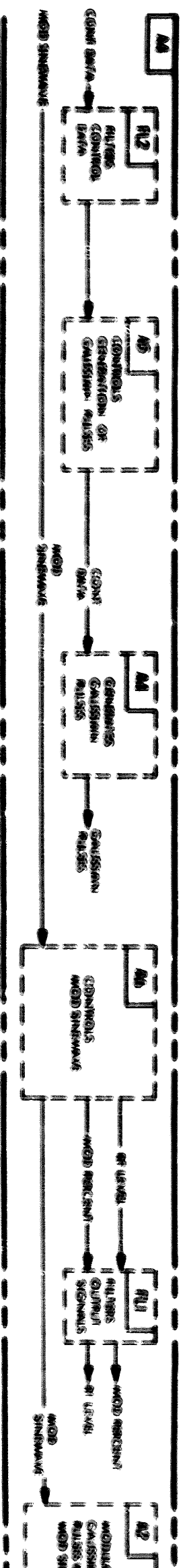
B - 8

PMDAC	Power Meter DAC Output	PSLD	Phase Shift Load D (3. 2)
PMDAT	Power Meter DAC Test Point	PSLE	Phase Shift Load E (1. 6)
PMDN	Power Meter Down Count	PSLF	Phase Shift Load F (0. 4)
PMDNT	Power Meter Down Count Test Point	PSLG	Phase Shift Load G (0. 4)
PMDRF	Power Meter Detect RF	PSLM	Phase Shift Load H (0. 2)
PMDV	Power Meter Data Valid	PSLJ	Phase Shift Load J (0. 1)
PMDVT	Power Meter Data Valid Test Point	PSM(XX)	Program Squitter Rate
PM(XX)	Power Meter Data	PTHV	+30 Vdc
PMRB	Program Main Reference Burst	PTSV	+26 Vdc
PMRFV	Power Meter rf Valid	PTWV	+12 Vdc
PMSC	Power Meter Stop Count	PVD	Pulse Valid Display
PMSTC	Program Manual or Self Test Complement	RACVI	Rear Panel AC Verified Input
PMUP	Power Meter Up Count	RACVR	Rear Panel AC Verified Return
PMUPT	Power Meter Up Count Test Point	RB(XX)	Range Bits
PNRT	Program North Reference Trigger	RCM	Range Clock Monitor
POETF	Program Output Level 80 Feedback	RFL	RF Level
POFTF	Program Output Level 40 Feedback	RFSDG	RF Switch Data Gate
POL(XX)	Program Output Level DBM	RGF	Reference Generator Feedback
POL(XX)F	Program Output Level DBM Feedback	RGG	Range Gate
POOTF	Program Output Level 10 Feedback	RGR	Reference Generator Reset
POTTF	Program Output Level 20 Feedback	RGND	Rear Panel Ground
PPMCW	Pulse Modulation CW	RMDG	Rectangular Modulator Drive Gate
PPMES	Pulse Modulation EXT 3Q	RMDP	Rectangular Modulator Drive Pulse
PPMEX	Pulse Modulation EXT	RMRFI	Rectangular Modulator rf Input
PPMIE	Pulse Modulation INT/EXT	RMRFO	Rectangular Modulator rf Output
PPMIT	Pulse Modulation INT	RNC	Return Common
PPP(XX)	Program Pulse Pair Spacing	RPPT	Received Pseudo Pulse TACAN
PPRGF	Program Self Test	RPT	Reply Pretrigger
PPS(XX)	Program Phase Shift	RRA	Range Rate A
PPV	Pulse Pair Valid	RRB	Range Rate B
PSB(XX)	Program Range Bits	RRD	Range Rate Display
PRE(XX)	Program Reply Efficiency	RRP	Range Replay Pulse
PRR(XX)	Program Range Rate	RRR	Range Reply Reset
PRTTF	Pulse Rise Time (0 = 2. 0 sec, 1 = 2. 5 sec)	RRS	Range Rate Sign
PSLA	Phase Shift Load A (25. 6)	RST	Reset
PSLB	Phase Shift Load B (12. 9)	RSTA	Reset A
PSLC	Phase Shift Load C (6. 4)	RSTB	Reset B
		RSTT	Range Self Test Trigger
		SAAR	Select A/A Range
		SAARB	Select A/A Range Bearing
		SAMIT	Select Amplitude Modulation Internal
		SAP(XX)	Select A/A PRF
		SARB	Select Auxiliary Reference Burst
		SARP	Select Auxiliary Reference Pulse

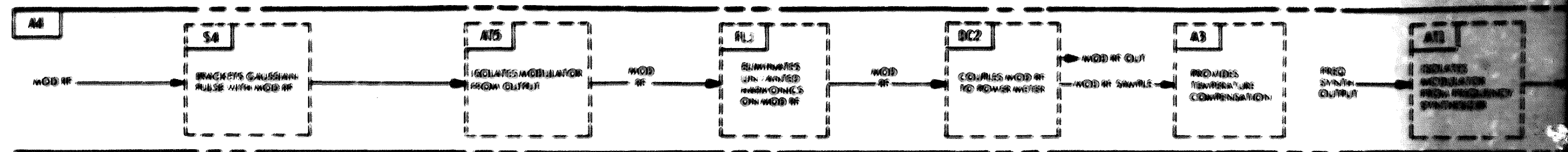
SAS(XX)	Select Antenna Speed	SLOT	Synthesizer Low Oscillator Test Point
SBB(XX)	Select Bearing Bits	SMAC	Select Manual Attenuator Complement
SBR(XX)	Select Bearing Rate	SMAN	Select Manual
SCAAB	Select Condition A/AB Command	SMH	16 MHz
SCAAC	Select Condition A/A Command	SMRB	Select Main Reference Burst
SCDT	Synthesizer Low & Test Point	SMRP	Select Main Reference Pulse
SCGAC	Select Condition G/A Command	SNRT	Select North Reference Trigger
SCM(XX)	Select Coarse Modulation	SOCT	Synthesizer Oscillator Control Test Point
SCN(XX)	Select Channel Number	SOL	Select Output Level DBM
SCXYZ	Select Condition X/Y Command	SOS	Synthesizer Output Signal
SDA *	Select Display A *Where: 0-Bit 1 T-Bit 2 F-Bit 4 E-Bit 8	SPA	Spacing Pulse Display A
SDB *	Select Display B *Where: 0-Bit 1 T-Bit 2 F-Bit 4 E-Bit 8	SPB	Spacing Pulse Display B
SDLPR	Select Data Link Precedence Sync	SPDT	Synthesizer Phase Detector Test Point
SDNT	Synthesizer Divide by 900	SPMCW	Select Pulse Modulation CW
SDPA	Select Display Decimal Point A	SPMES	Select Pulse Modulation EXT SQ
SDPB	Select Display Decimal Point B	SPMEX	Select Pulse Modulation EXT
SDPO	Select Display Power Output	SPMIE	Select Pulse Modulation INT/EXT
SDTO	Select Dead Time Override	SPMIT	Select Pulse Modulation INT
SD(XX)	Select Display	SPP(XX)	Select Pulse Pair Spacing
SEP	Second Encoder Pair	SPR	Spacing Pulse Reset
SFCT	Synthesizer Frequency Converter Test Point	SPS(XX)	Select Phase Shift
SFDT	Synthesizer Frequency Discriminator Test Point	SPV	Sample Pulse Valid
SFM(XX)	Select Fine Modulation	SQT	Squitter
SGND	Shield Ground	SRB(XX)	Select Range Bits
SHDT	Synthesizer High & Test Point	SRC	Select Range Clock
SHOT	Synthesizer High Oscillator Test Point	SRE(XX)	Select Reply Efficiency
SIP	Sample and Hold Pulse	SRPPT	Select Received Pseudo Pulse TACAN
SIDK	Select ID Keyed	SR(XX)	Select Range Rate
SIDO	Select ID ON	SRS	Synthesizer Reference Pulse
SIPT	Switch ID Tone Presence Trigger	SRT	Synthesizer Reference Test
SIRC	Select INV-REC	SRTR	Select Receive/Transmit
SIST	Select internal Self Test	SRTTF	Select Pulse Rise Time = (0 - 2.0 sec, 1 - 2.5 sec)
SLDT	Synthesizer Control Divider Test Point	SSR(XX)	Select Squitter Rate
		STC	Pseudo Pulse Generator Input
		STT	Self Test Trigger
		SWC	Sine Wave Clock (105 KHz)
		SWs	Sine Wave Sync
		SYNC	Sync
		SZDT	Select Zero Degree Trigger
		TCP	TACAN Calibrate Pulse
		TCRPI	13 DB Coupler Input

TCRFO	13 DB Coupler Output	VMB	Valid Main Burst
TCT	TACAN Calibration Test	VIP	Valid Interrogation Pulse
TER	TACAN Efficiency Reset	VRP	Valid Reply Pulse
TPP	TACAN Pulse Present	VSQ	Valid Squitter
TRF	TACAN RF	W*	*Where: 0=Bit 1 *And: U=Units
TRFS	Transfer RF Sample		T=Bit 2 T=Tens
TSM	Test Set Monitor		F=Bit 4 H=Hundreds
TTM	20 MHz		E=Bit 6 M=Thousands
TTP	Transmit Trigger Pulse		
VAB	Valid Auxiliary Burst	XFR	Transfer Control
VAC	Vary Attenuator Command	XFRT	Transfer Control Test Point
VBS	+5 Vdc	ZDT	Zero Degree Trigger
VCO	Voltage Controlled Oscillator (1.08 MHz)		

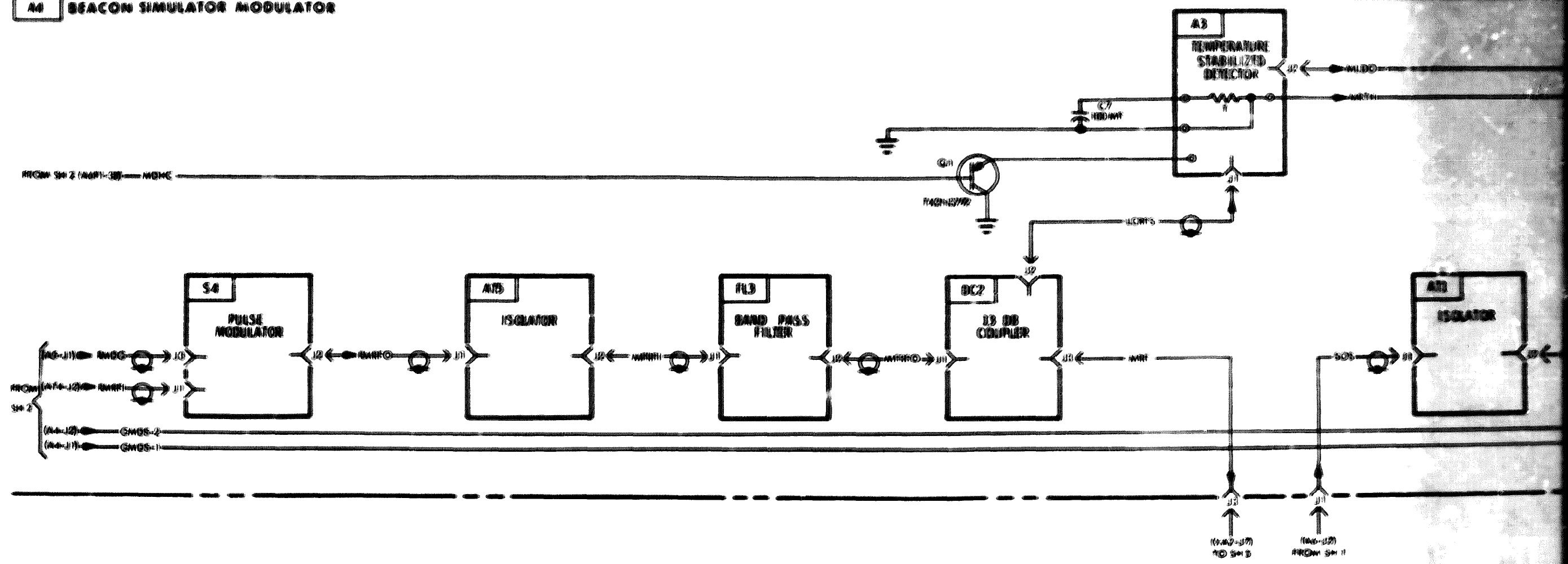




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A4 SEACON SIMULATOR MODULATOR



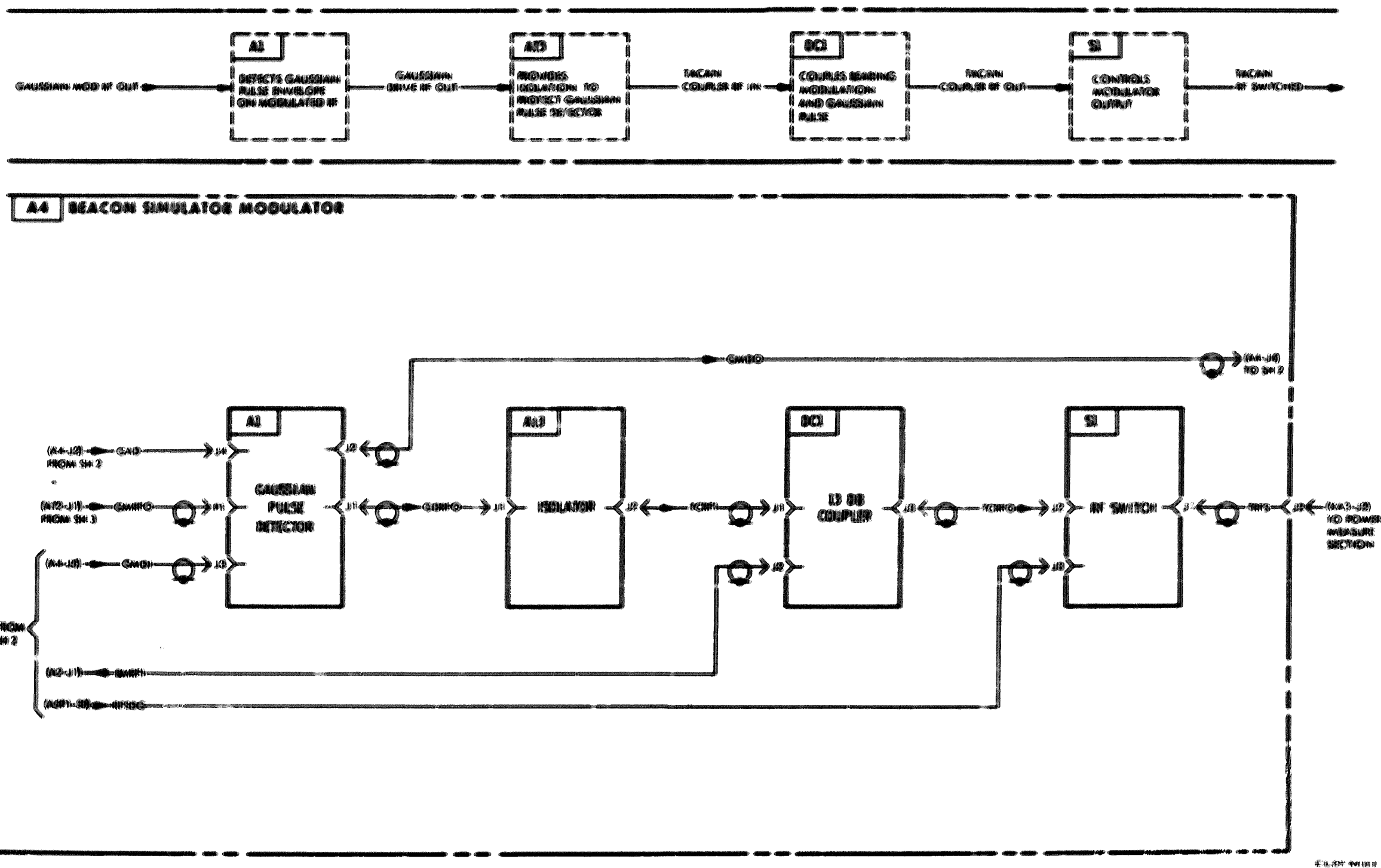


Figure FO-3 ④ RF unit, rf section, signal flow diagram (sheet 4 of 5).

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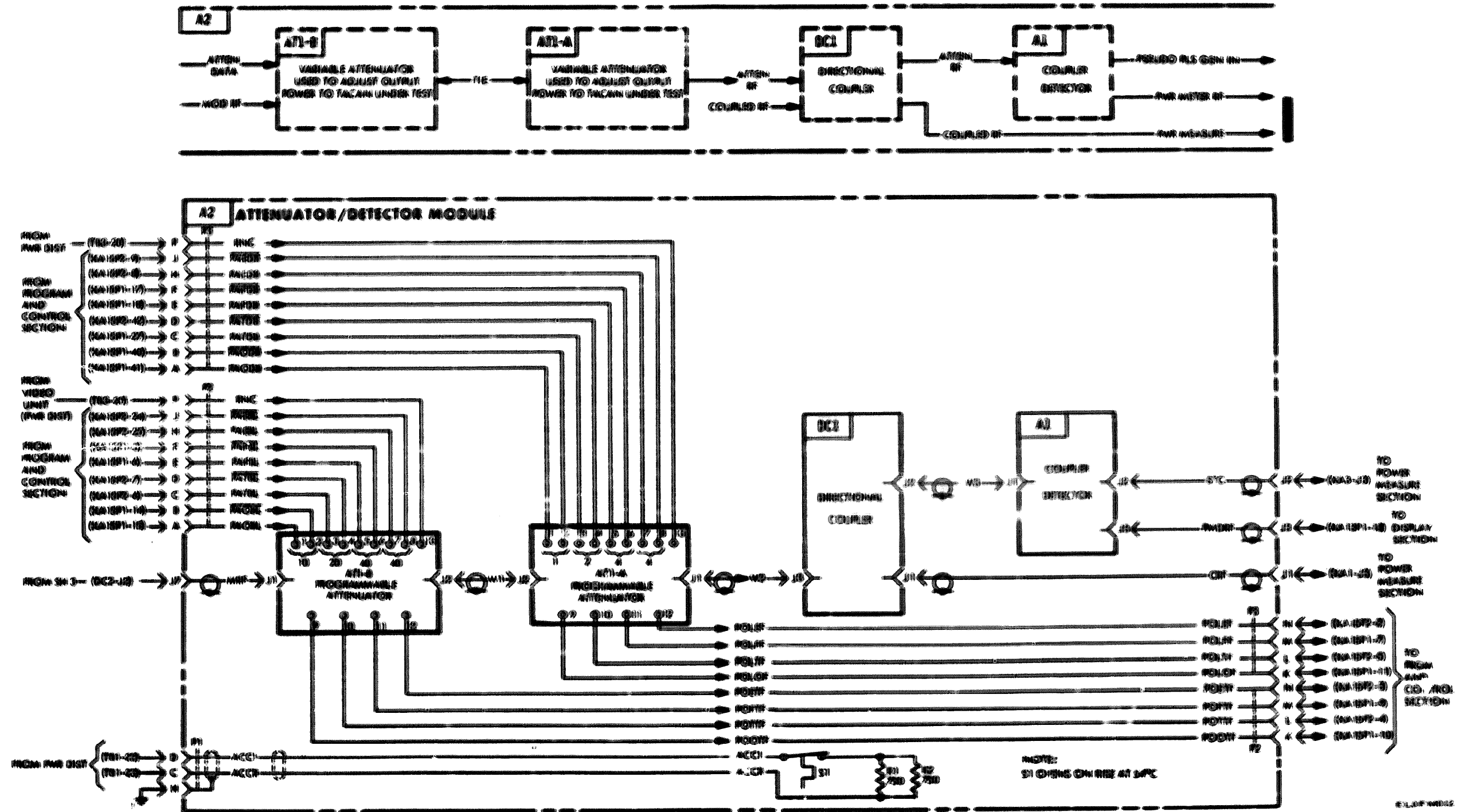


Figure FO-3 ⑤. Rf unit, rf section, signal flow diagram (sheet 5 of 5).

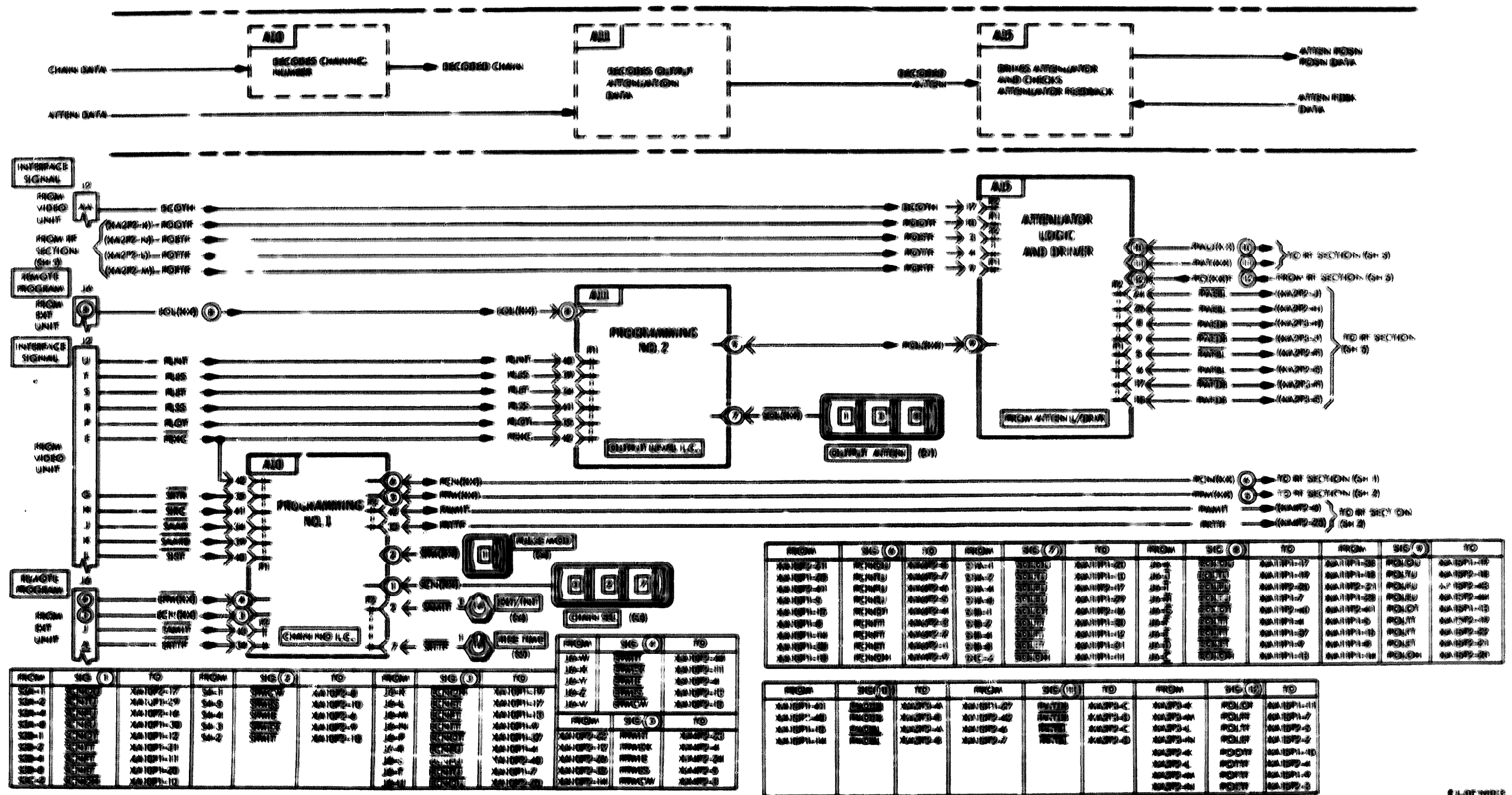
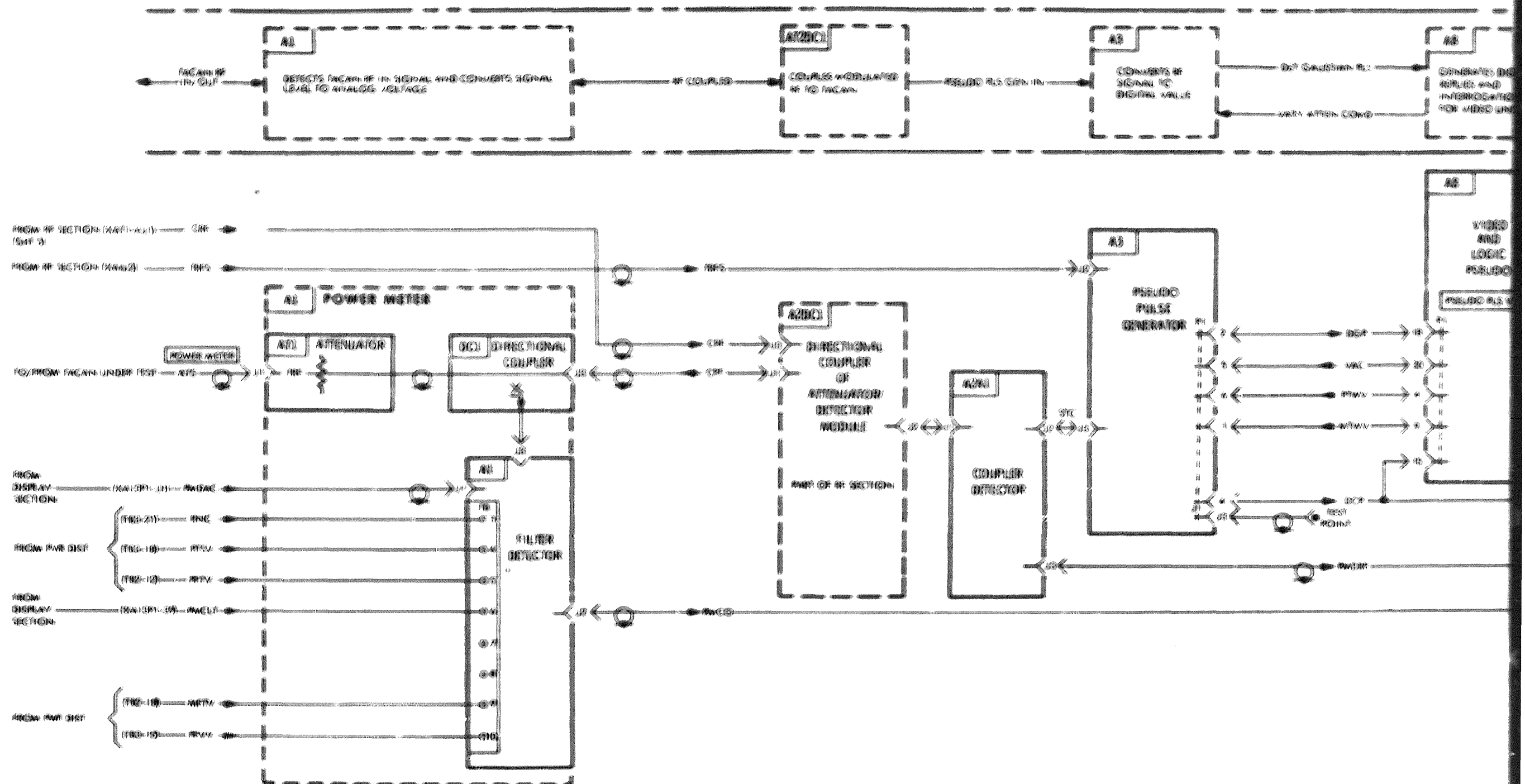


Figure FO-4 RF unit, programming and control-section signal-flow diagram.

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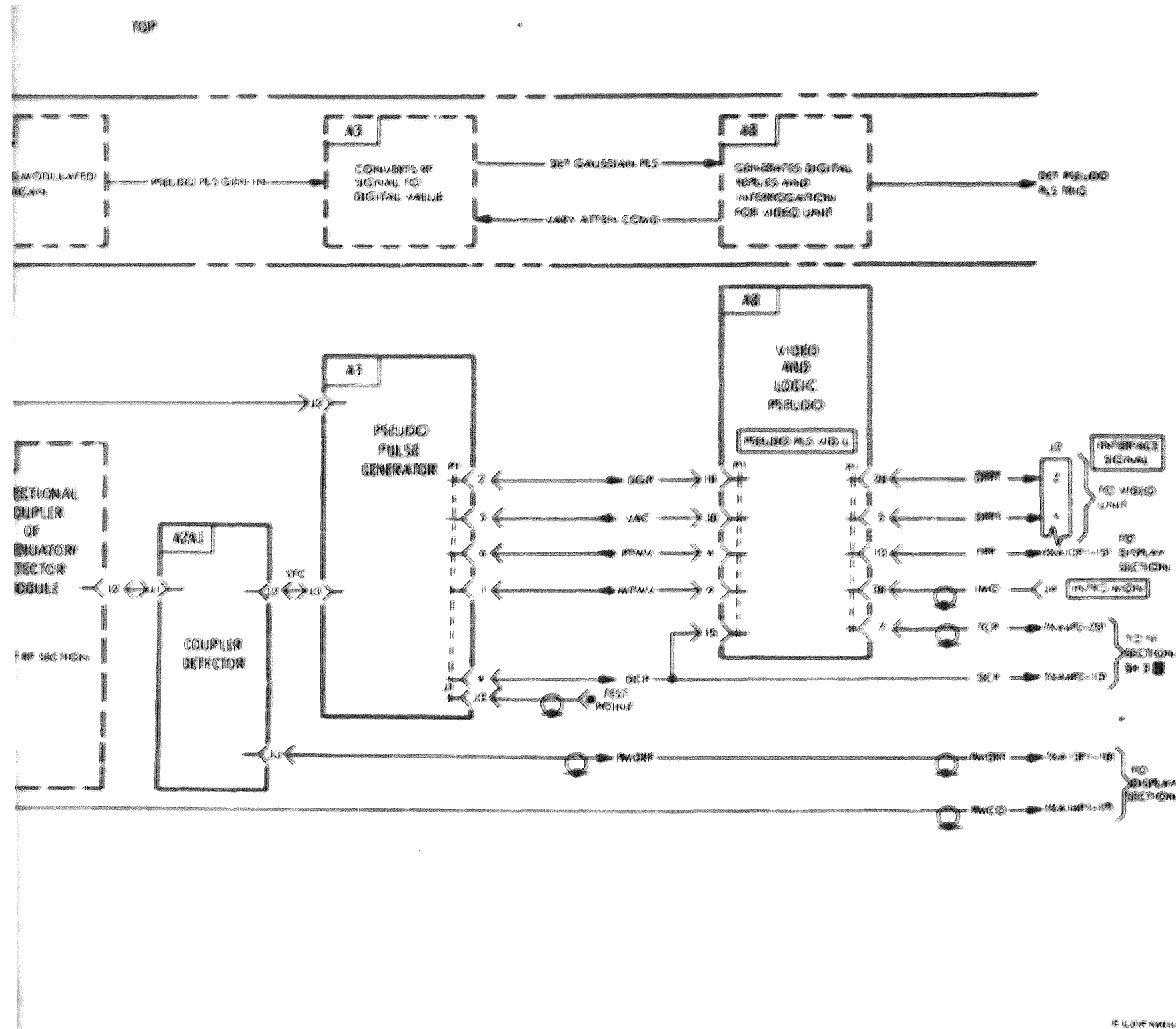
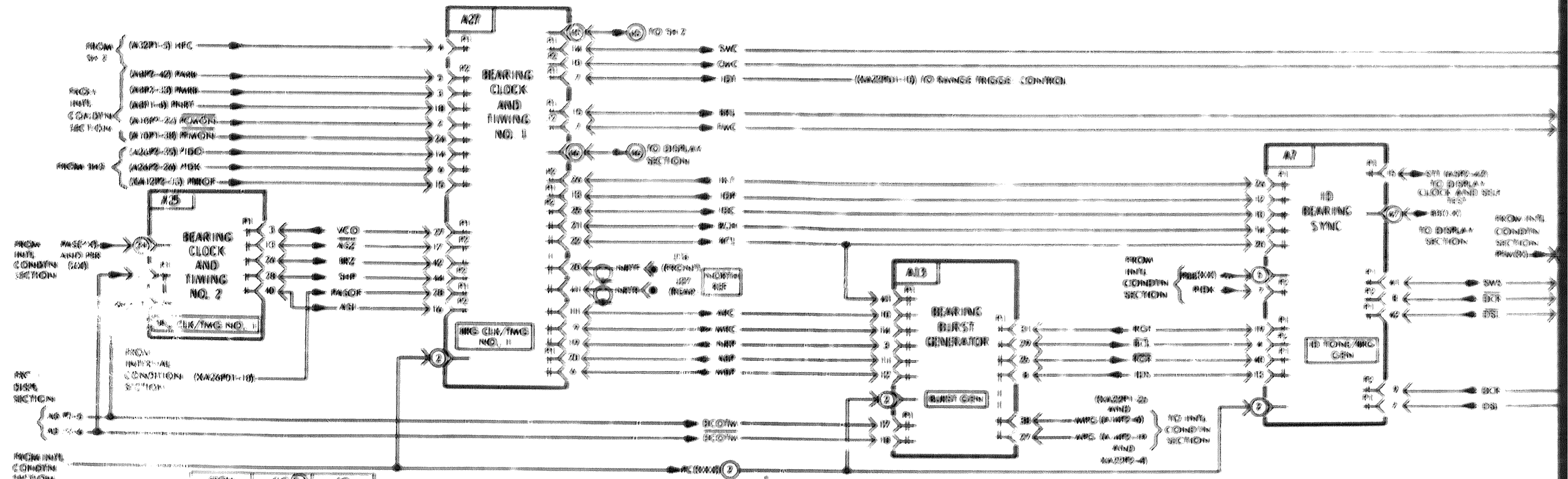
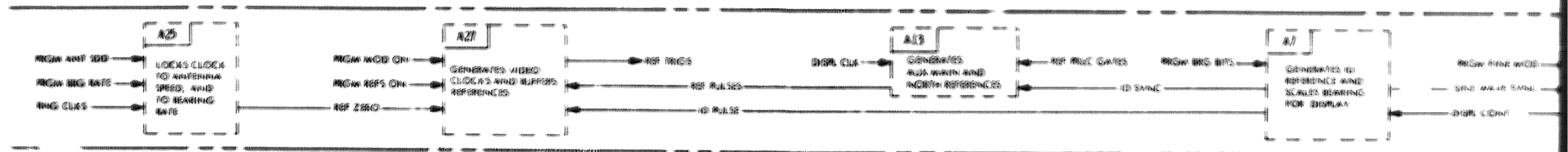


Figure FO-5. RF unit, power measure and detector section, signal flow diagram.



FROM	SIG (24)	TO	FROM	SIG (2)	TO
A25P1-15	PASSED	A25P1-15	A25P1-15	PASSED	A25P1-15
A25P1-16	PASSED	A25P1-16	A25P1-16	PASSED	A25P1-16
A25P1-17	PASSED	A25P1-17	A25P1-17	PASSED	A25P1-17
A25P1-18	PASSED	A25P1-18	A25P1-18	PASSED	A25P1-18
A25P1-19	PASSED	A25P1-19	A25P1-19	PASSED	A25P1-19
A25P1-20	PASSED	A25P1-20	A25P1-20	PASSED	A25P1-20
A25P1-21	PASSED	A25P1-21	A25P1-21	PASSED	A25P1-21
A25P1-22	PASSED	A25P1-22	A25P1-22	PASSED	A25P1-22
A25P1-23	PASSED	A25P1-23	A25P1-23	PASSED	A25P1-23
A25P1-24	PASSED	A25P1-24	A25P1-24	PASSED	A25P1-24
A25P1-25	PASSED	A25P1-25	A25P1-25	PASSED	A25P1-25

FROM	SIG (5)	TO	FROM	SIG (5)	TO
A25P1-15	PASSED	A25P1-15	A25P1-15	PASSED	A25P1-15
A25P1-16	PASSED	A25P1-16	A25P1-16	PASSED	A25P1-16
A25P1-17	PASSED	A25P1-17	A25P1-17	PASSED	A25P1-17
A25P1-18	PASSED	A25P1-18	A25P1-18	PASSED	A25P1-18
A25P1-19	PASSED	A25P1-19	A25P1-19	PASSED	A25P1-19
A25P1-20	PASSED	A25P1-20	A25P1-20	PASSED	A25P1-20
A25P1-21	PASSED	A25P1-21	A25P1-21	PASSED	A25P1-21
A25P1-22	PASSED	A25P1-22	A25P1-22	PASSED	A25P1-22
A25P1-23	PASSED	A25P1-23	A25P1-23	PASSED	A25P1-23
A25P1-24	PASSED	A25P1-24	A25P1-24	PASSED	A25P1-24
A25P1-25	PASSED	A25P1-25	A25P1-25	PASSED	A25P1-25

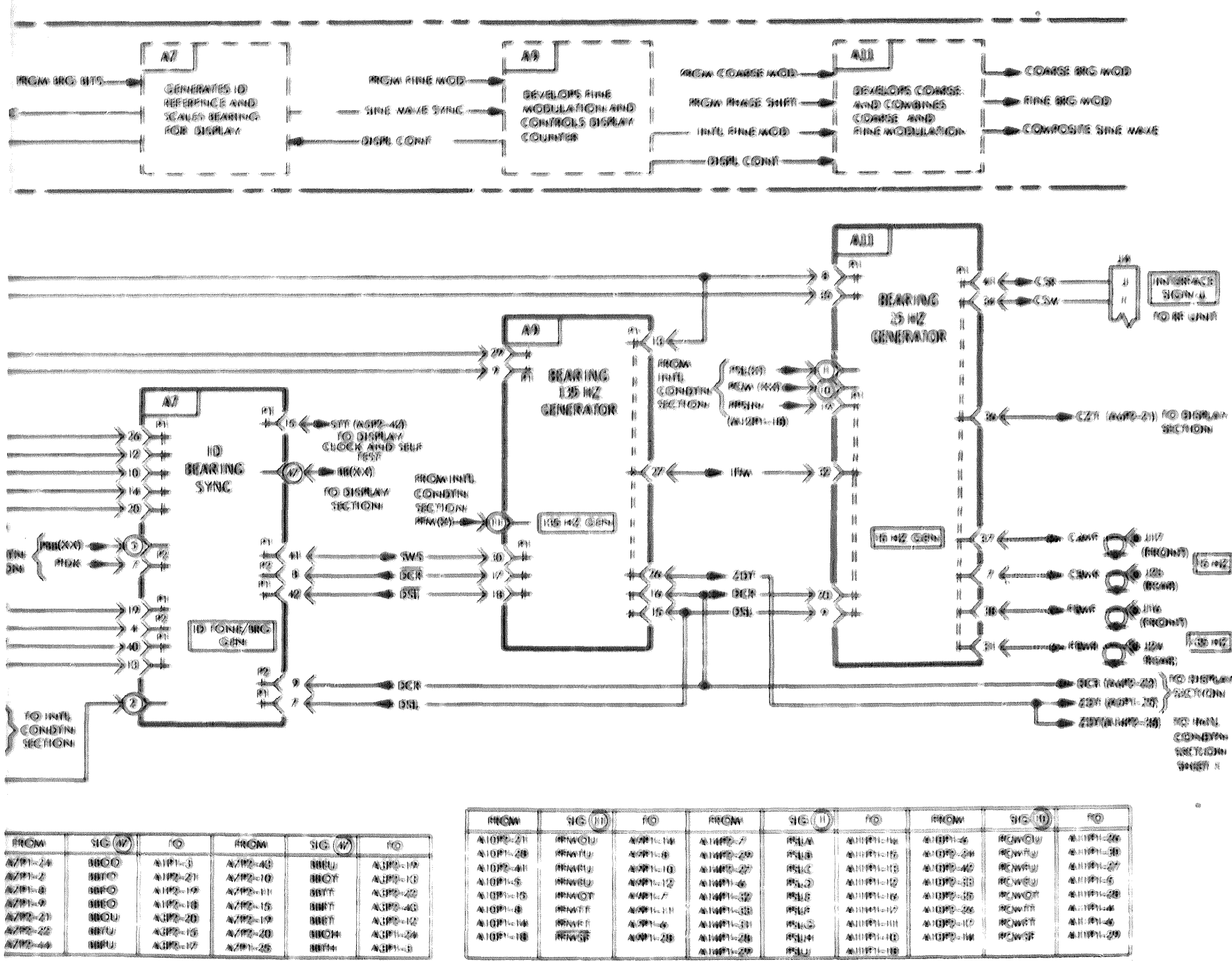
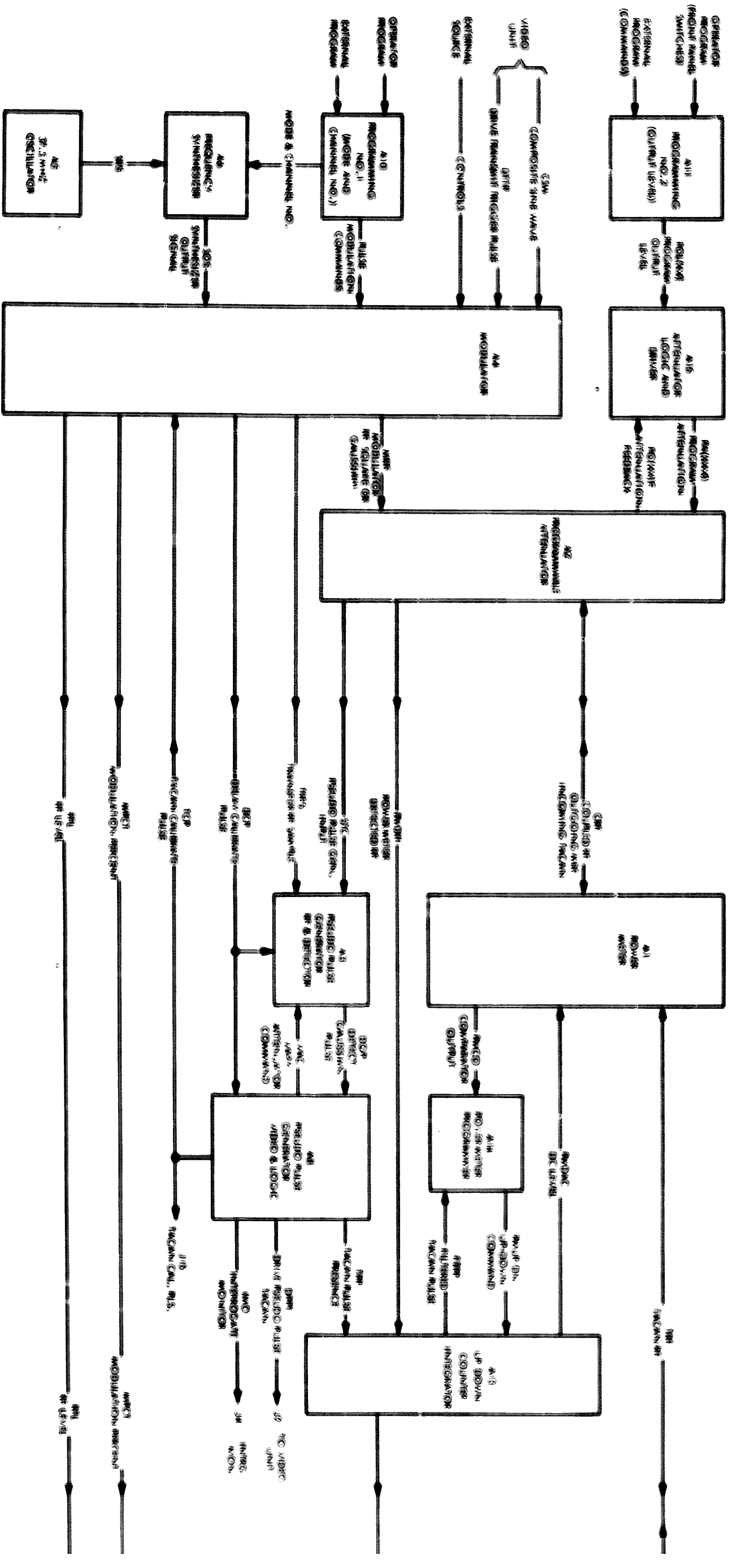


Figure FO-9 ① Video unit, video section signal flow diagram (sheet 1 of 2)



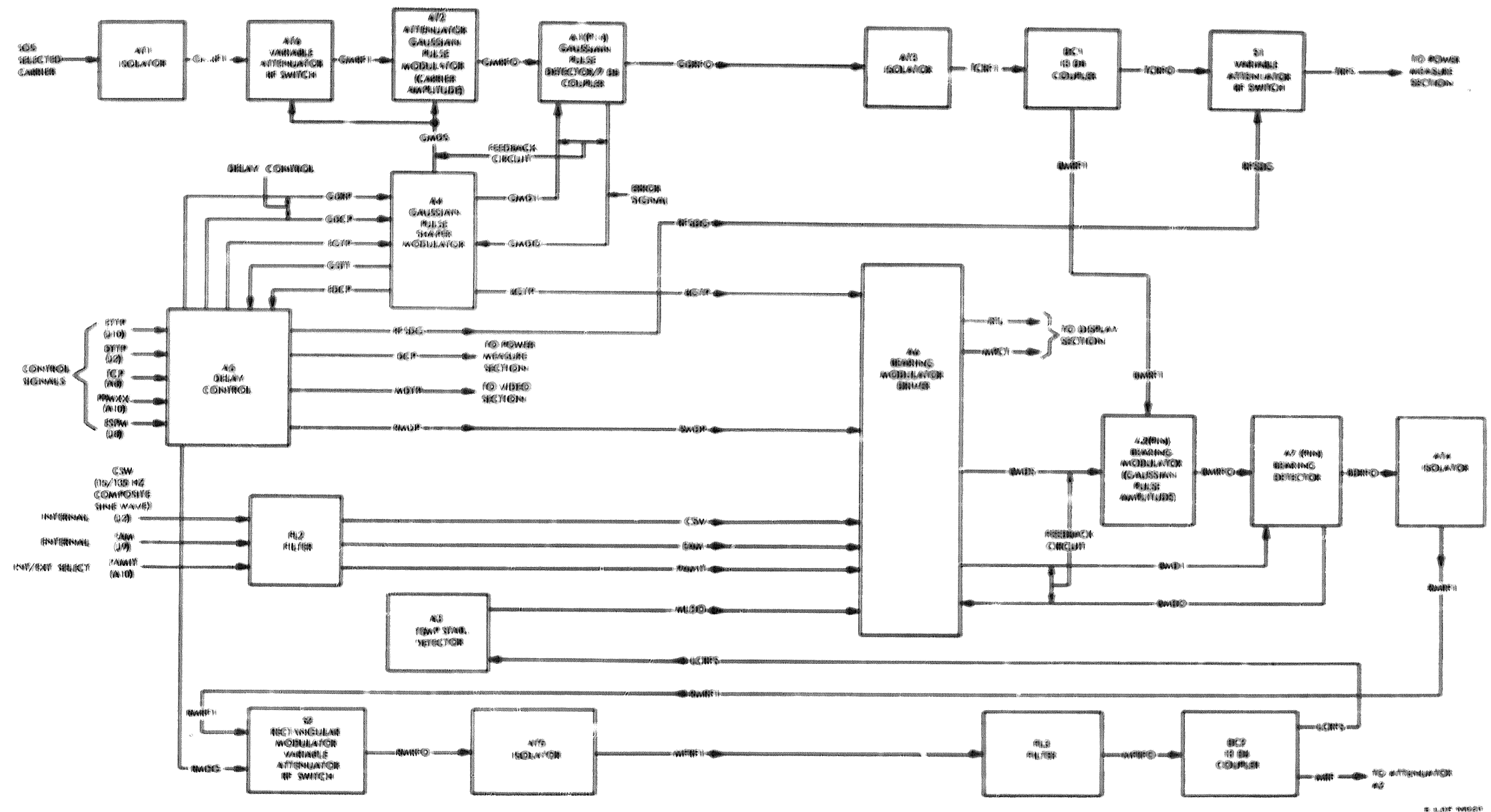


Figure FO-13. Modulator, Simplified Block Diagram.

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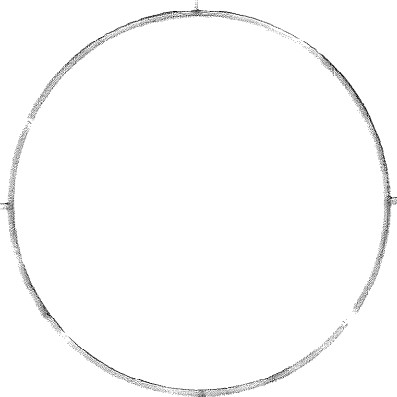




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abcdefghijklmnopqrstuvwxyz
123456789012345678901234567890

1.5 mm (per 1.00 mm)

ABCD EFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
123456789012345678901234567890

2.0 mm (per 1.37 mm)

ABCD EFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
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2.5 mm (per 1.77 mm)

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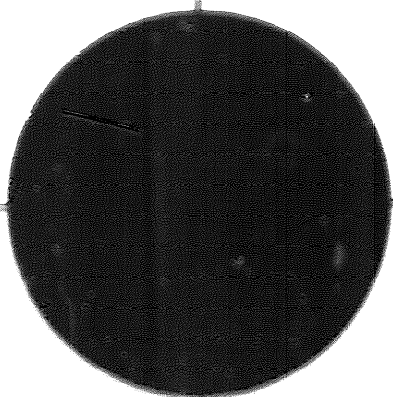
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ABCD EFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
123456789012345678901234567890

2.5 mm (per 1.77 mm)

ABCD EFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
123456789012345678901234567890



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