UNCLASSIFIED

TECHNICAL MANUAL

for

GENERAL PURPOSE RADIO TRANSMITTER

MODEL SBT-1KPA2

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, ONTARIO

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THE TECHNICAL MATERIEL CORPORATION
COMMUNICATIONS ENGINEERS
700 FENIMORE ROAD MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes*furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

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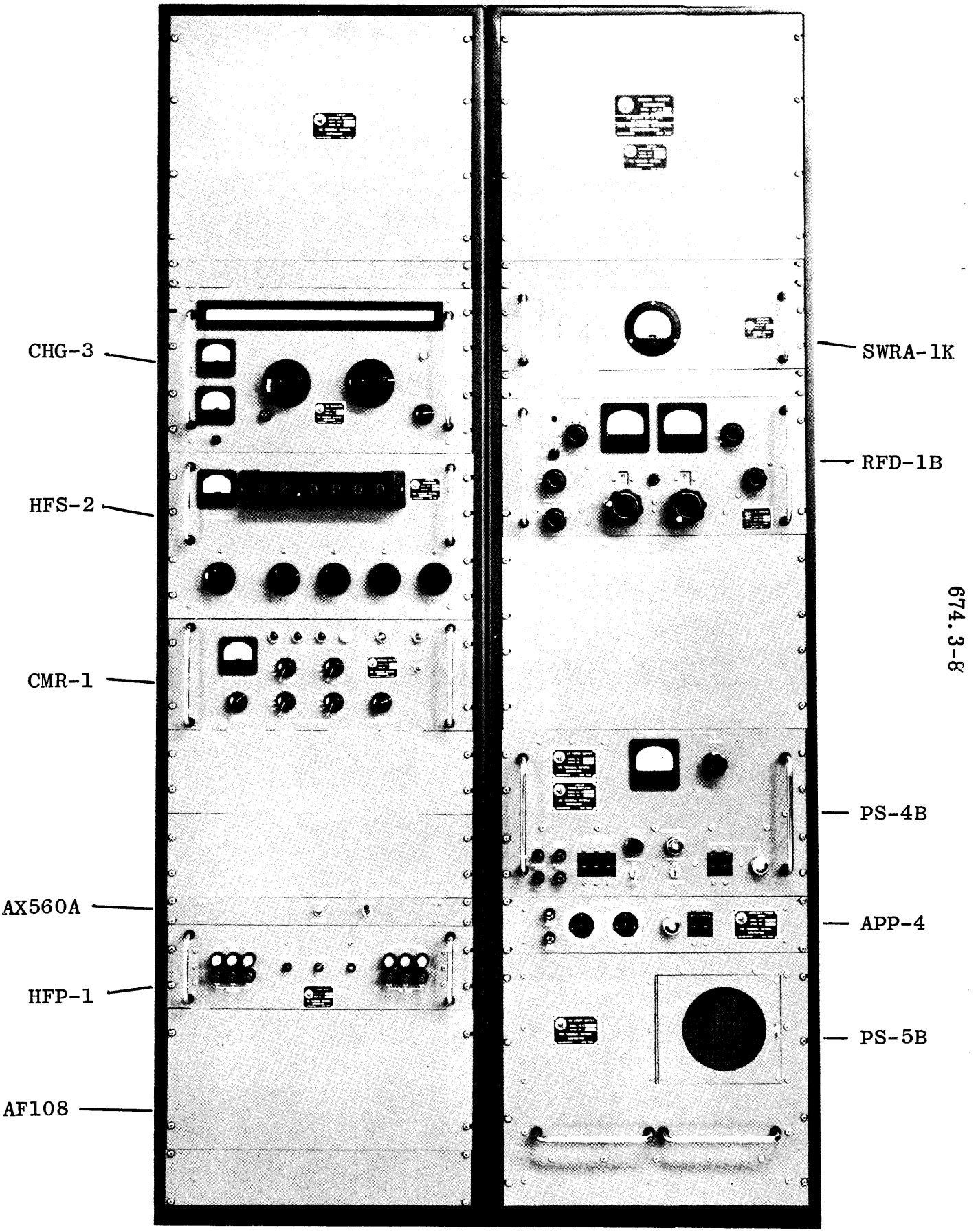


Figure 1-1. General Purpose Transmitter, Model SBT-1KPA2

SECTION 1
GENERAL INFORMATION

1-1. PURPOSE OF EQUIPMENT

General Purpose Radio Transmitter, Model SBT-1KPA2 (figure 1-1) is a general purpose transmitter system providing 1000 watts peak envelope power (PEP) throughout the 2 to 32 megacycle (MHz) frequency range.

The SBT contains two major sections; an exciter section and a linear amplifier section.

The exciter section accepts up to four 600-ohm audio input signals (channels A1, A2, B1 and B2), the outputs of which are combined to yield an independent sideband output centered at 1.75 mc. The 1.75 mc output is then heterodyned and stabilized at the desired output frequency.

The linear amplifier section is an r-f power amplifier configuration, boosting the selected output frequency from the exciter to 1000 watts peak envelope power (PEP). The resultant amplified signal is then made available to the antenna for transmission, a portion of which is sampled for front panel meter monitoring.

1-2. EQUIPMENT MAKE-UP

The major components comprising the SBT are listed in table 1-1. See figure 1-1 for physical equipment mounting locations and paragraph 1-3 for component descriptions.

1-3. DESCRIPTION OF EQUIPMENT

a. SIDEBAND EXCITER, CMR-1 - The CMR provides the primary stage of frequency conversion and frequency-division multiplexing in a 4-channel independent sideband transmitting system. The CMR accepts up to four 600-ohm audio input signals, each of these signals processed separately by independent amplification, modulation, filtering, and gain-control circuits (channels A1, A2, B1 and B2). The outputs of each of these channel circuits are then combined to yield an independent sideband output that is centered at a frequency of 1.75 mc.

The 1.75 mc carrier (used for channels A1 and B1) and the multiplexing subcarriers (1.74371 mc and 1.75629 mc used for channels A2 and B2) are synthesized within the unit from a 1 mc reference signal supplied from an associated control synthesizer (HFS).

b. RF TRANSLATOR, CHG-3 - The CHG receives a 1.75 mc input from the sideband exciter (CMR) and heterodynes this signal to the desired output frequency. A sample of the CHG high frequency oscillator output (3.75 to 33.75 mc) is applied to the control synthesizer (HFS). The control synthesizer in turn, supplies a d-c control voltage to the CHG to stabilize the high frequency oscillator. The CHG output is in the 2 to 32 mc frequency range, selectable in eight bands.

c. CONTROL SYNTHESIZER, HFS-2 - The HFS is a reference signal generator operating in the 2-32 mc frequency range. This unit contains a 1-mc frequency standard and is used as a comparator, with a correction loop, that provides a d-c correction voltage to stabilize the 3.75 to 33.75 mc high frequency oscillator in the associated r-f translator (CHG).

d. POWER SUPPLY, HFP-1 - The HFP is a dual-regulated power supply that provides regulated B+, regulated bias, and filament voltages to the associated system component units.

e. CONTROL PANEL, AX560A - The AX560A provides standby/operate power control and a test key function for the associated transmitter system.

The STANDBY/OPERATE toggle switch controls the power control relay in the exciter HFP-1.

The TEST KEY toggle switch permits test keying of the linear amplifier via AF108.

f. FILTER ASSEMBLY, LOW-PASS, AF108 - The AF108 is a combination audio input filter network and a system junction point. The unit terminal boards and connectors enable system testing and keying from one common point.

g. LINEAR AMPLIFIER, RFD-1B - The RFD is an r-f linear power amplifier, accepting a 100-milliwatt, 2-32 mc signal from an associated exciter, amplifying it up to a 1000 watts (PEP) level. Automatic load and drive control (ALDC) is also provided by the RFD for use by the associated exciter.

h. LOW VOLTAGE POWER SUPPLY, PS-4B - The PS-4B consists of a bias power supply, an a-c input section and a mid-voltage power supply. The bias and mid-voltage power supplies generate the operating voltages for the RFD-1B amplifier. The a-c input section distributes a-c voltage to the PS-5B power supply through time delay and control circuits.

j. HIGH VOLTAGE POWER SUPPLY, PS-5B - The PS-5B furnishes high voltage to the RFD-1B amplifier plates and sends sample voltages to the RFD-1B meters for measuring power amplifier plate voltage and plate current.

k. AUXILLARY POWER PANEL, APP-4 - The APP-4 functions as a line voltage distribution point, main power input point and a system component unit interconnection and termination point.

l. STANDING WAVE RATIO INDICATOR, SWRA-1K - The SWRA contains a directional coupler, coupling the transmitter r-f output to the antenna. A forward and reflected power indicating meter, with an associated toggle selector switch is also provided.

1-4. TECHNICAL SPECIFICATIONS

Frequency Range:	2-32 mc (MHz)
Output Power:	1000 watts PEP
Output Impedance:	50 ohms unbalanced.
Harmonic Suppression:	Second harmonic at least 40 db down and all others at least 50 db down from PEP output.
Signal/Distortion Ratio:	Better than 40 db down relative to PEP output.
Frequency Stability:	Synthesized, 1 part 10^8.
Input Power Requirements:	115/230 volts a-c 50/60 cps, single phase.

1-4. TECHNICAL SPECIFICATIONS (CONT)

Safely Features:	Interlocks, overload protective circuits and fuses.
Tuning:	All tuning and bandswitching controls on front panels (no plug-in components).
Metering:	Front panel meters indicate operation of all critical circuits.

TABLE 1-1. MAJOR COMPONENTS

TMC DESIGNATION	
EXCITER SECTION	
SIDEBAND EXCITER, MODEL CMR-1	
CONTROL SYNTHESIZER, MODEL HFS-2	
RF TRANSLATOR, MODEL CHG-3	
POWER SUPPLY, MODEL HFP-1	
CONTROL PANEL, AX560A	
FILTER ASSEMBLY, LOW-PASS, AF108	
LINEAR AMPLIFIER SECTION	
LINEAR AMPLIFIER, MODEL RFD-1B	PAL-1KB1 SUB-SYSTEM
LOW VOLTAGE POWER SUPPLY, MODEL PS-4B	
HIGH VOLTAGE POWER SUPPLY, MODEL PS-5B	
AUXILLARY POWER PANEL, MODEL APP-4	
STANDING WAVE RATIO INDICATOR, MODEL SWRA-1K	

SECTION 2
INSTALLATION

2-1. UNPACKING AND HANDLING

Each modular unit comprising the SBT system has been thoroughly inspected and tested at the factory before shipment. Upon arrival of the equipment, inspect each packing case and its contents immediately for possible damage. Unpack the equipment carefully. Inspect all packing material for parts which may have been shipped as loose items.

With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

2-2. INSTALLATION

All of the units used in the SBT system are equipped with standard width 19-inch front panels. These units are to be mounted in the equipment rack as shown in figure 1-1. Figures 2-3 and 2-4 illustrate electrical interconnections of the SBT modular units. Refer to the individual technical and sub-system manuals for detailed connection and installation procedures.

a. INSTALLATION OF MODULAR UNITS. - Refer to figure 1-1 for modular unit mounting locations. All major units are slide-mounted on pull-out, or tilt-lock drawer slides. To install any slide-mounted unit in its compartment, see figure 2-1 and proceed as follows:

1. Untape or unstrap cable assemblies and all other components fastened to the rack frame for shipment.

CAUTION

Start by installing bottom units first in order

to avoid rack tripping over from extended center of gravity.

2. Pull center section of associated compartment track out until it locks in an extended position.

3. Position slide mechanisms of modular unit in tracks and ease modular unit foward into rack until release buttons engage holes in track.

4. Make necessary cable and electrical connections as shown in figures 2-3 and 2-4. To prevent cables from snagging, utilize the cable retractors, located at the inside-rear of the rack.

5. Depress release buttons and slide modular unit completely into compartment.

6. Secure front panel of modulor unit to rack with screws and washers.

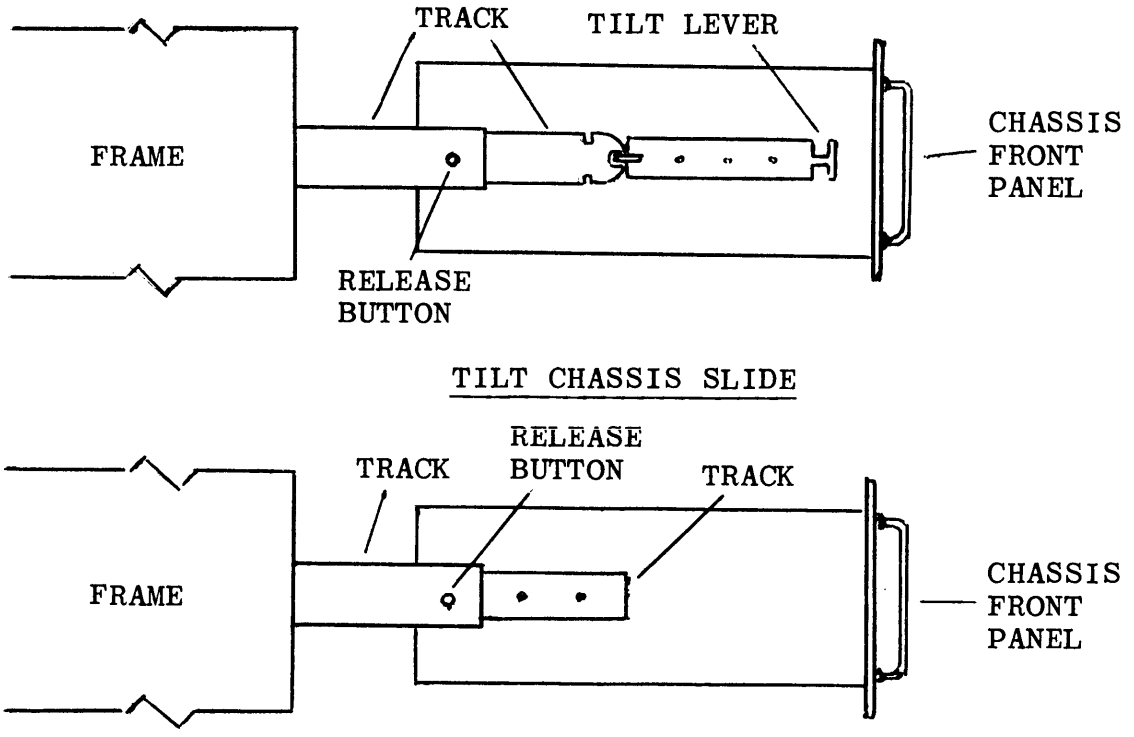
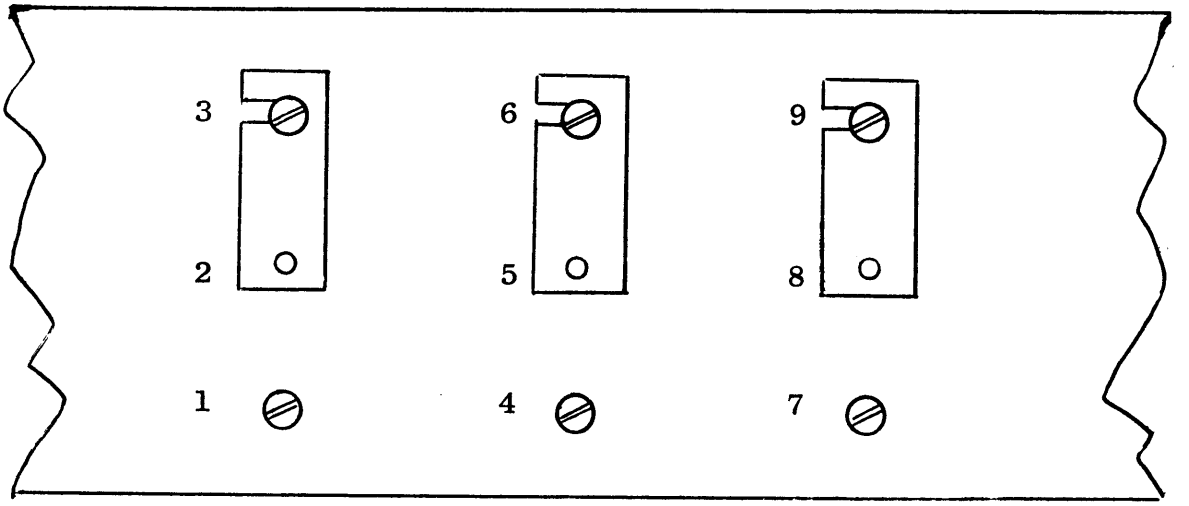


Figure 2-1. Slide Mounting Details

b. PRIMARY POWER INPUT CONNECTIONS - Primary input power to the SBT is applied to each rack, independent of one another. The a-c input cable (customer supplied) is to be connected to the exciter section via a-c strip AX660. Another a-c input cable (customer supplied) is to be connected to the linear amplifier section via Auxillary Power Panel, APP-4. Figure 2-2 illustrates the bus strap arrangements of the APP-4.

An auxilliary line voltage input cable may also be connected to the APP-4 auxilliary a-c terminals.

See figures 2-3 and 2-4 for complete wiring and cabling details.



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NOTES : Unit shown strapped for 230 volt operation.

For 115 volts operation, connect bus straps from terminal 2 to 1, 5 to 4, and 8 to 7.

Figure 2-2. Line Voltage Modification Diagram, APP-4

2-3. PRE-OPERATIONAL CHECKOUT

The following pre-operational checkout procedures are to be performed after final installation is completed; all interconnections and input power cables connected as per figures 2-3 and 2-4. Further checkout procedures for the individual modular units are presented in their associated technical manuals. Refer to table 2-1 for test equipment required.

a. PRELIMINARY SETUP, EXCITER SECTION

1. CHG- RF GAIN control set at mid-range

2. CMR- CHANNEL PRIORITY controls set at 100.
   METER FUNCTION switch set at A1.
   CARRIER SUPPRESSION control set at FULL
   POWER switch set at ON.

3. AX560A- STANDBY/OPERATE toggle switch set at STANDBY.
   TEST KEY toggle switch set at center or normal position.

4. AF108 - Place a jumper from terminals 4 to 5 on TB903. (CHG VOX).
   Place a jumper from terminals 9 to 7 on TB903.
   CHG KEY, TEST KEY).

5. Connect primary a-c input power to exciter section.

b. PRELIMINARY CHECKS

1. Set STANDBY/OPERATE switch of AX560A at OPERATE. This action applies power to the HFP. The delay circuit in the HFP will apply power to the HFS and CHG after a 90-second time delay. Ascertain that this 90-second time delay is functional.

2. Connect a d-c VTVM to test point TB8001 of the HFP. The voltage should measure +200 vdc; if not, adjust with voltage adjust control "A".

3. Connect a d-c VTVM to test point TB8002 of the HFP. The voltage should measure +200 vdc; if not, adjust with voltage adjust control "B".

4. Perform inter-modulation distortion carrier suppression, and spurious checks as outlined in Section 5 of this manual.

c. PRELIMINARY SETUP, LINEAR AMPLIFIER SECTION

With the exciter section operating controls set as outlined in the preceeding sub-paragraph a., make the following readjustments:

CHG- RF GAIN control set at minimum (CCW).

AF108- Place a jumper from terminals 9 to 11 on TB903. (TEST KEY, KEY TEST).

The linear amplifier control settings are as follows:

1. RFD- ALDC switch set at EXT., ALDC to minimum.

2. PS-4B- MAIN POWER switch set at OFF. TRANSMITTER VOLTAGES switch set at STANDBY. FINAL VOLTAGES switch set at OFF. PA OVERLOAD breakers set at ON. S100 (rear of PS-4B) set at NORMAL.

3. APP-4 - Place a jumper from terminals 5 to 6 and terminals 7 to 8 on E501. Remove jumper from terminals 21 to 22 on E502. MAIN POWER set at OFF.

4. Connect primary a-c input power to linear amplifier section.

5. Connect an r-f output cable from J102 of the SWRA to a 1KW dummy load . Connect dummy load monitor to PTE input.

d. PRILEMINARY CHECKS

1. Set STANDBY/OPERATE switch at OPERATE. Power should be applied to all units after a 90-second delay.

2. Set MAIN POWER switch on APP-4 at ON. The red MAIN POWER indicator should light.

3. Set MAIN POWER switch on PS-4B at ON. The green MAIN POWER indicator should light. The fans in the RFD and PS-5B should operate. Adjust LINE VOLTAGE control if necessary.

4. After a warm-up time of approximately 5-minutes, set TRANSMITTER VOLTAGES switch at ON. The red indicator should light.

5. Set FINAL VOLTAGES switch at ON. The red indicator should light and approximately 200 ma of plate current should appear on the PA PLATE CURRENT meter on the RFD.

6. Place a voltmeter across terminals 3 and 4 of E501 on the APP-4. Meter should read 115 volts a-c, $\pm$10%.

7. Set TRANSMITTER VOLTAGES switch at STANDBY. Meter should read zero volts. FINAL VOLTAGES and TRANSMITTER VOLTAGES indicators should extinguish. Remove meter.

8. Place a jumper across terminals 1 and 2 of E501 on the APP-4. TRANSMITTER VOLTAGES and FINAL VOLTAGES indicators should light.

9. Perform intermodulation distortion, push-to-talk, voltage-keying and ALDC checks as outlined in Section 5 of this manual.

TABLE 2-1. TEST EQUIPMENT REQUIRED

ITEM	MANUFACTURER
Voltohmeter	Simpson, Model 260 or equivalent.
VTVM	Hewlett-Packard, Model 410B or equivalent.
RF Spectrum Analyzer	TMC, Model PTE-4 or equivalent.
Square Wave Generator	Boonton, Model 71 or equivalent.
Dummy Load, 52-ohms, 1KW	Any manufacturer meeting the necessary requirements.

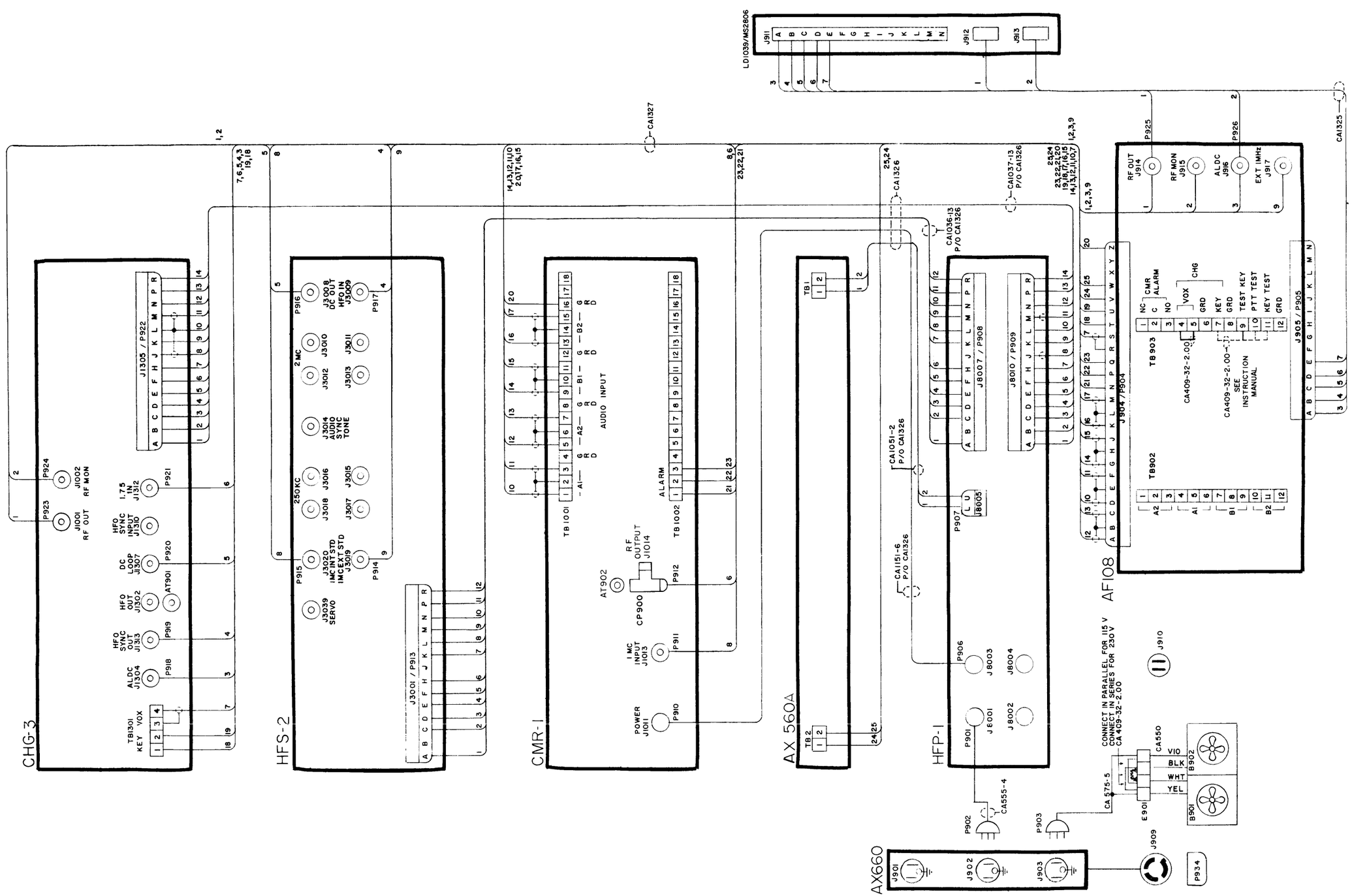


Figure 2-3. Interconnection Diagram, Exciter Section

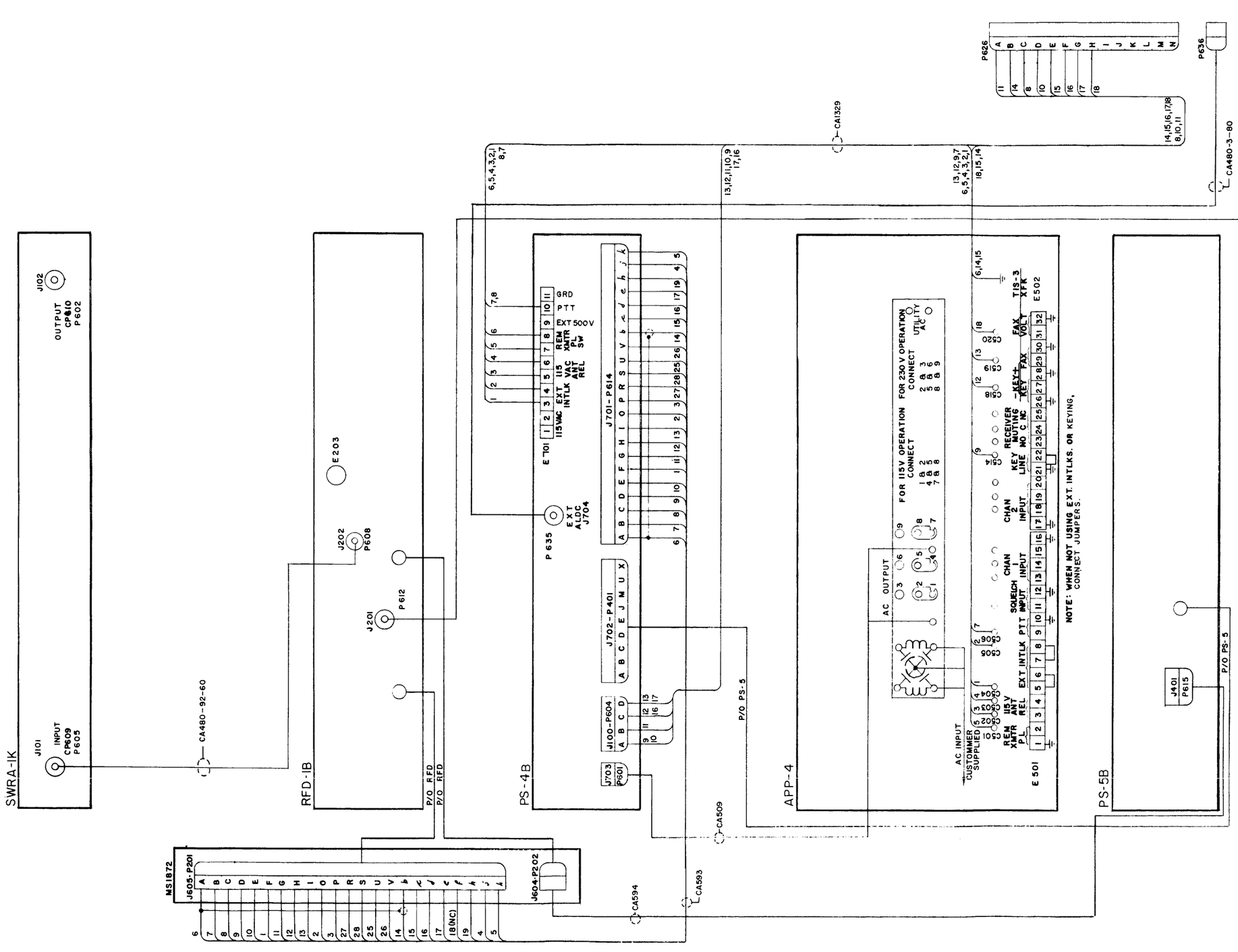


Figure 2-4. Interconnection Diagram, Linear Amplifier Section

SECTION 3
OPERATOR'S SECTION

3-1. GENERAL

The SBT comprises two sections, the exciter section and the linear amplifier section. Each section is comprised of modular units, each of which perform a particular function in the overall system. The tuning procedures for each unit may vary in accordance with the desired mode and frequency of transmission. Therefore, reference to the applicable modular unit technical manual will denote proper control and level settings for the desired mode of transmission.

3-2. OPERATOR'S INSTRUCTIONS

Table 3-1, used in conjunction with figure 3-1, provides control and indicator functions of the modular units comprising the SBT system.

Tables 3-2, 3-3 and 3-4 provide operating procedures and control settings, to be used in conjunction with the tuning charts supplied as part of the test data package (supplied with the equipment).

Refer to the individual modular unit technical manuals for detailed operating instructions.

NOTE

The operating procedures listed in table 3-4 are to be performed after the pre-operational checkout procedures (paragraph 2-3) have been completed.

TABLE 3-1. CONTROLS AND INDICATORS

ITEM NO. (See Figure 3-1)	CONTROL or INDICATOR	FUNCTION
EXCITER SECTION RF TRANSLATOR, CHG		
1	MEGACYCLES dial	Displays illuminated RF band dial, selected by operating BAND control knob, item 3.
2	TUNE control	Moves pointer to appropriate frequency along dial of selected band. (TUNE control is fitted with a lock, item 6.)
3	BAND switch	Rotates MEGACYCLES dial, item 1, and switches is desired RF band, as follows: BAND 1 = 2 - 3 mc BAND 2 = 3 - 4 mc BAND 3 = 4 - 6 mc BAND 4 = 6 - 8 mc BAND 5 = 8 - 12 mc BAND 6 = 12 - 16 mc BAND 7 = 16 - 24 mc BAND 8 = 24 - 32 mc
4	SYNC IND lamp	Lights to indicate system is synchronized (indicates only when CHG is in synthesized operation).
5	RF GAIN control	Controls amplitude of RF output signals.
6	LOCK knob	Locks TUNE control, item 2, to prevent accidental shift off selected frequency.
7	SYNCHRONIZE meter	Indicates amount and polarity of DC voltage. When system is out of synchronization, meter reads zero (meter functions only when CHG is in synthesized operation).
8	RF LEVEL meter	Indicates level of r-f output signal.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

ITEM No. (See fig. 3-1)	CONTROL or INDICATOR	FUNCTION
	CONTROL SYNTHESIZER, HFS	
9	.1KC switch S3101	Tunes the synthesizer in 100-cycle steps.
10	1 KC switch S3201	Tunes the synthesizer in 1000-cycle steps.
11	10 KC switch S3301	Tunes the synthesizer in 10-kc steps.
12	100 KC switch S3401	Tunes the synthesizer in 100-kc steps.
13	1 MC switch S3501	Tunes the synthesizer in 1-mc steps between 2 and 32-mc.
14	1 MC COMPARATOR meter M3001	Indicates frequency error in internal 1-mc standard.
15	Digital display indicators DS3001.	Indicates the frequency components set by controls.
	SIDEBAND EXCITER, CMR	
16	INPUT LEVEL (dbm)	Indicates power input level (to each channel) between -20 dbm and +3 dbm, as selected by METER FUNCTION switch, item 23.
17	CHANNEL ACTIVITY lamps (one for each channel)	Lights to indicate that corresponding channel is active (channel audio input level is -26dbm or higher)
18	STANDBY lamp	Lights when all channels are inactive (no audio input)
19	POWER lamp	Lights to indicate unit is in operation.
20	ON switch	When at ON position, energizes the unit.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

ITEM NO. (See fig. 3-1)	CONTROL or INDICATOR	FUNCTION
	SIDEBAND EXCITER, CMR (CONT)	
21	CARRIER SUPPRESSION (db) switch	Reinserts carrier at indicated levels below full power output.
22	CHANNEL PRIORITY controls (one for each channel)	Controls apportionment of output power for each channel (graduated in percentages).
23	METER FUNCTION switch	Selects channel input signal for monitoring by INPUT LEVEL meter, item 16.
	CONTROL PANEL, AX560A	
24	OPERATE/STANDBY toggle switch	Power control switch, controlling HFP power supply.
25	TEST KEY toggle switch	In up position, provides steady test keying to CHG. In center position, off. In down position, provides momentary keying.
	POWER SUPPLY, HFP	
26	STANDBY, lamp	Indicates HFP is in STANDBY condition (i. e., HFP is sending power to oscillator ovens and frequency standard in system units.)
27	TIME DELAY lamp	Indicates HFP is going through time delay stage between standby and operative conditions.
28	OPERATE lamp	Indicates HFP is in OPERATE condition, (sending power to all units in system).
	MAIN POWER switch, on rear of unit	STANDBY position applies power to frequency standard and oscillator ovens; OFF position disconnects main line voltage input to HFP.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

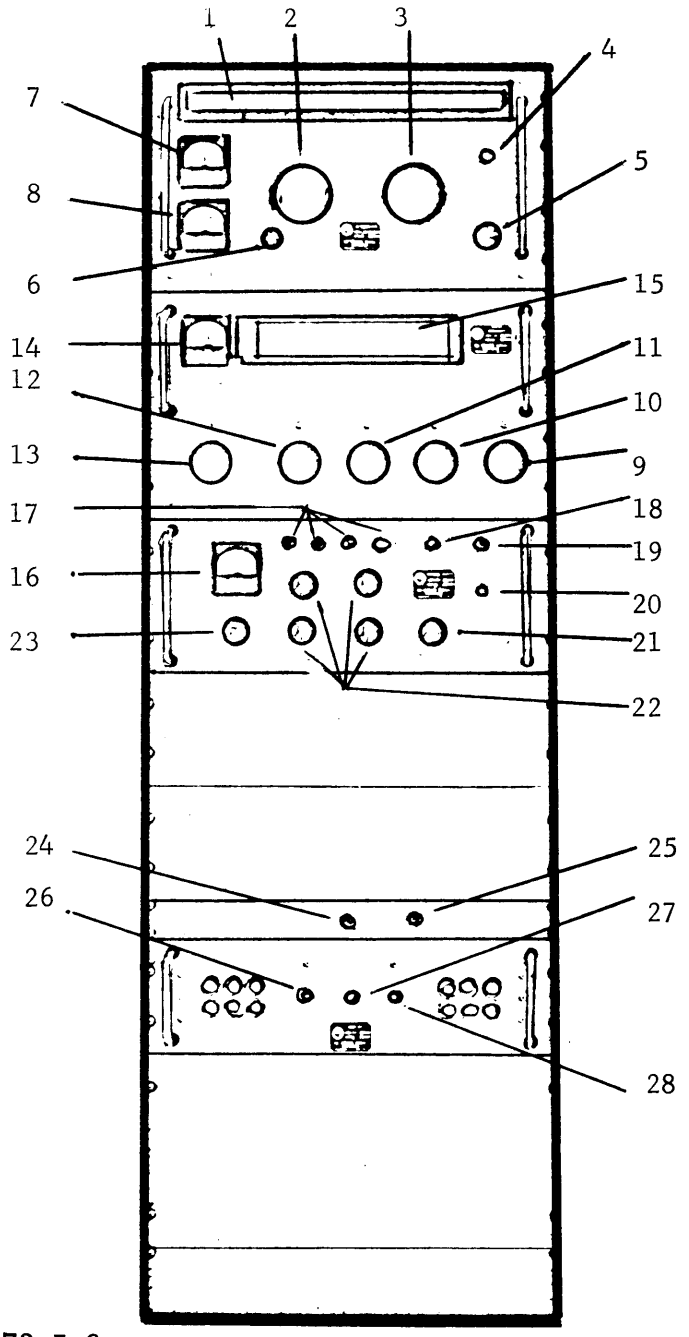
ITEM No. (See Fig. 3-1)	CONTROL, or INDICATOR	FUNCTION
LINEAR AMPLIFIER		
STANDING WAVE RATIO INDICATOR, SWRA		
29	RF OUTPUT meter	Monitors foward or reflected r-f power output of system.
30	FORWARD/REFLECTED toggle switch.	Determines monitoring function of RF OUTPUT meter.
RF LINEAR AMPLIFIER, RFD		
31	NEUT	Modifies spurious feedback from PA.
32	PA GRID TUNING	Fine-tunes PA stage input (or driver stage output)
33	MULTIMETER (switch)	Selects circuits for measurement by M202 multimeter.
34	MULTIMETER (meter)	Measures circuit selected by S204 switch.
35	PA PLATE CURRENT (meter)	Monitors PA plate d-c current.
36	PA BAND	Coarse-Tunes PA output.
37	1ST AMPL TUNING	Fine-Tunes 1ST amplifier stage output.
38	DRIVER BAND	Simultaneously coarse-tunes driver stage input and output.
39	PA TUNING (dial)	Provides calibrated position readings for C254 knob movement.
40	PA TUNING (knob)	Fine-tunes PA output to match antenna.
41	ALDC	Adjusts ALDC operating level.
42	PA LOADING (dial)	Provides calibrated position readings for C269 knob movement.
43	PA LOADING (knob)	Fine adjust for antenna impedance matching.
44	PA LOADING (switch)	Coarse-adjust for antenna impedance matching.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

ITEM No. (see Fig. 3-1)	CONTROL or INDICATOR	FUNCTION
	LOW VOLTAGE POWER SUPPLY, PS-4	
45	PA FIL PRI (meter)	Indicates voltage applied to primary of transformer supplying filament voltages to RFD unit.
46	PA FIL PRI/ ADJUST (knob)	7-position switch. Adjusts voltage across primary of transformer supplying filament voltages to RFD unit.
47	PA OVERLOAD/ PLATE	Circuit breaker for PA output current.
	PA OVERLOAD/ SCREEN GRID	Circuit breaker for PA screen grid current.
	PA OVERLOAD/ CONT GRID	Circuit breaker for PA control grid current.
48	FINAL VOLTAGES (light)	Light indicates PS-5 High Voltage Power Supply is receiving energizing power from PS-4 Low Voltage Power Supply.
49	FINAL VOLTAGES ON/OFF (switch)	ON position of switch supplies high PA plate and screen grid voltages to RFD.
50	TRANSMITTER VOLTAGES ON/ (light)	Light indicates that RFD Amplifier is receiving mid-voltage plate supply.
51	TRANSMITTER VOLTAGES ON/ STANDBY (switch)	ON position of switch feeds mid-voltage plate supply to RFD Amplifier; STANDBY position cuts off supply.
52	MAIN POWER (circuit breaker -left)	Dual circuit breaker for PAL-1K system main line current supply, companion trip type.
53	MAIN POWER (light)	Light indicates that PS-4 is receiving main line supply.
	Mode switch, S100 (Rear of Unit)	Provides for selection of CW, PTT, or NORMAL transmitter operation.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

ITEM No. (See Fig. 3-1)	CONTROL or INDICATOR	FUNCTION
	AUXILIARY POWER PANEL, APP	
54	UTILITY OUTLETS	Provide line voltage for utility purposes.
55	MAIN POWER (circuit breakers)	Controls main input power to all units.
56	MAIN POWER (light)	Indicates, when lit, main power is applied to all units.



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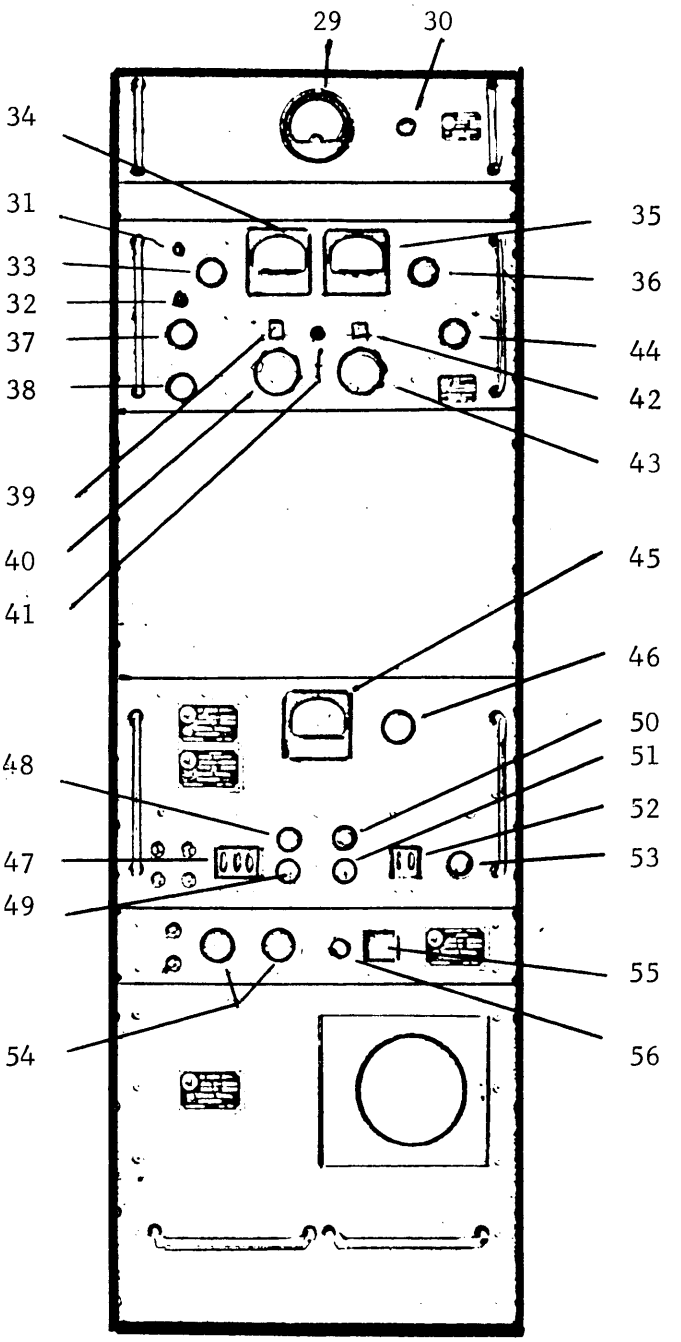
EXCITER



LINEAR AMPLIFIER

Figure 3-1. Control and Indicator Locations.

TABLE 3-2. CHANNEL PRIORITY CONTROL SETTING, CMR

MODE OF TRANSMISSION	CONTROL	SETTING
1 Channel SSB	A1 or B1	100
2 Channel ISB*	A1 and B1	50
4 Channel ISB*	A1, A2, B1, and B2	25
AME	A1 or B1	50
AM	A1 and B1	30
CW (Keyed Carrier)	A1, A2, B1, and B2	0
Tone CW, FSK, FAX*	A1	50
	A2, B1, and B2	0

* If one channel of an ISB transmission is to be used for FSK or FAX, set the priority control of the channel containing the single-tone modulation at 25 (for 2 channel ISB), or at 12.5 (for 4 channel ISB).

TABLE 3-3. CARRIER SUPPRESSION SWITCH SETTINGS, CMR

MODE OF TRANSMISSION	SETTING
CW (Keyed carrier telegraphy)	0 DB
AME	3 DB
AM	6 DB
SSB or two-channel ISB with reduced carrier	20 DB
Four channel ISB with reduced carrier	30 DB
SSB or ISB with suppressed carrier; tone CW, FSK, or FAX	FULL

TABLE 3-4. OPERATING PROCEDURES

STEP	UNIT CONTROL	OPERATION
1	CHG-TUNE and BAND controls	Set at proper operating band and frequency settings.
2	CHG - RF GAIN control	Set fully counterclockwise
3	HFS - MC and KC controls	Set at proper operating frequency settings.
4	CMR- CHANNEL PRIORITY control	Set to appropriate position as listed in table 3-2.
5	CMR - CARRIER SUPPRESSION control	Set to appropriate position as listed in table 3-3.
6	CMR- POWER switch	Set at ON.
7	AX560A - STANDBY/ OPERATE switch	Set at ON.
8	HFP - MAIN POWER switch (rear of unit)	Set at ON.
9	RFD-ALDC/INCR control	Set ALDC/INCR knob to extreme counterclockwise position.
10	RFD - MULTIMETER switch	Set MULTIMETER switch at PA DC BIAS V x 10 and observe MULTIMETER. Indication should be around 100 on red scale.
11	APP-4 - MAIN POWER circuit breaker	Set at ON.
	PS-4 - TRANSMITTER VOLTAGES switch	Set at ON; TRANSMITTER VOLTAGES lamp should light after an elapsed time of approx. 3 minutes.
12	PS-4- FINAL VOLTAGES switch	Set FINAL VOLTAGES switch at ON; FINAL VOLTAGES lamp should light.
13	RFD - MULTIMETER switch	Set MULTIMETER switch at SCREEN V x 10 and observe MULTIMETER. Indication should be 500 on green scale.

TABLE 3-4. OPERATING PROCEDURE (CONT)

STEP	UNIT CONTROL	OPERATION
14	RFD - MULTIMETER switch	Set MULTIMETER switch at PA DC PLATE V x 100 and observe MULTIMETER. Indication should be approx 3000 on black scale.
15	RFD - PA PLATE CURRENT meter	Observe PA PLATE CURRENT meter. Indication should be approx 220 milliamperes.
16	PS-4- FINAL VOLTAGES switch	Set FINAL VOLTAGES switch at OFF. FINAL VOLTAGES lamp should go out.
17	RFD - MULTIMETER switch	Set MULTIMETER switch at RF 1ST AMPL PLATE V x 1. Turn up output level on exciter to obtain 10 on MULTIMETER black scale. Adjust 1st AMPL TUNING for peak on MULTIMETER.
18	RFD-MULTIMETER switch	Set MULTIMETER switch to RF PA GRID V x 10. Adjust output level on exciter to obtain 7 on MULTIMETER red scale. Adjust PA GRID TUNING knob for peak on MULTIMETER.
19	RFD - PA TUNING control	Set PA TUNING knob to bring reading on PA TUNING dial as shown in the tuning chart supplied with system.
20	RFD - PA LOADING switch	Set PA LOADING switch to position shown in the tuning chart supplied with system.
21	RFD - PA LOADING control	Set PA LOADING knob to bring reading on PA LOADING dial as shown in the tuning chart supplied with system.

TABLE 3-4. OPERATING PROCEDURES (CONT)

STEP	UNIT CONTROL	OPERATION
22	PS-4 - FINAL VOLTAGES switch	Set FINAL VOLTAGES switch at ON. FINAL VOLTAGES lamp should light.
23	RFD - MULTIMETER switch	Set MULTIMETER switch to RF OUT V x 10
24	CHG - RF GAIN control	Slowly increase exciter output until PA PLATE CURRENT meter reads: Modulated Signal: 300 ma Unmodulated Signal: 220 ma Note reading on MULTIMETER.
25	RFD - PA TUNING control	Adjust PA TUNING knob until a pronounced dip is produced on PA PLATE CURRENT meter.
26	RFD - PA LOADING control	Adjust PA LOADING knob until the reading on PA PLATE CURRENT meter begins to rise.
27	CHG - RF GAIN control	Decrease setting on exciter output control until reading on PA PLATE CURRENT meter is the same as that in step 25. Reading on MULTIMETER should rise slightly from that in step 25.
28		Repeat steps 26 through 28, observing PA PLATE CURRENT meter and MULTIMETER. After each step 26 and 27, decrease exciter output to bring PA PLATE meter reading back to the reading in step 25 (as in step 28). Upon each step 28 adjustment, MULTIMETER reading will continue to increase. When point is reached where MULTIMETER reading starts to fall in step 28 adjustment) readjust controls back to previous step, as this is the step where ultimate tuning has been reached. ** ***
29	CHG - RF GAIN control	Slowly increase exciter output level control, until desired power output is reached. * ** ***

TABLE 3-4. OPERATING PROCEDURES

STEP	UNIT CONTROL	OPERATION
30	RFD - ALDC control	Turn ALDC knob slowly clockwise until MULTIMETER reading begins to drop off.
31	RFD - ALDC control	If transmitting voice, turn ALDC knob as far clockwise as possible without introducing obvious distortion. It is suggested that this adjustment be made with a remote station monitoring the quality of transmission.

*NOTE

Output power is increased as RF OUT reading is increased (as indicated on MULTIMETER). PA PLATE CURRENT meter reading will also increase; it will indicate around 400 to 450 milliamperes when 1 kilowatt of output power is reached. However, actual output power at the antenna, in a transmitting system, depends on antenna load and degree of impedance match between PAL-1K and antenna. A reading of the power output from the antenna can be obtained by multiplying the RF OUT reading on PAL-1K 's MULTIMETER by the ampere reading on an ammeter connected in series with the antenna. For more accuracy, an SWR (Standing Wave Ratio) indicator, such as model SWRA-1K, is usually employed to indicate the resistance presented by the antenna. This resistance, together with the RF OUT voltage read in PAL-1K's MULTIMETER can be used to calculate output watts.

**NOTE

In final adjustments, an occasional check should be made on PA screen grid current, by turning MULTIMETER switch to PA DC SCREEN MAX I position and observing MULTIMETER black scale. With a resistive load, it is usually under 35 to 40 ma. At no time should it exceed full scale.

***CAUTION

If PAL-1K turns off automatically as a result of a PA overload (indicated by circuit breakers and TRANSMITTER VOLTAGES and FINAL VOLTAGES lights on PS-4 unit), reduce exciter output level before re-setting the associated circuit breakers.

SECTION 4
PRINCIPLES OF OPERATION

4-1. GENERAL

The SBT transmitter system comprises two major sections; the exciter section and the linear amplifier section.

The exciter section accepts the input intelligence , translates and combines it to produce the input intellegence at a desired output frequency, within the 2 to 32 mc (MHz) frequency range.

The linear amplifier accepts the exciter output intelligence, at the desired frequency range, and amplifies it up to a 1000 watts (PEP) level. This power amplified output is then routed to a directional coupler for antenna use.

4-2. OVERALL FUNCTIONAL ANALYSIS

a. EXCITER SECTION (figure 4-1. a.) - The Sideband Exciter CMR provides the primary stage of frequency conversion and frequency division multiplexing for the SBT four-channel independent sideband transmitting system. The CMR accepts up to four 600-ohm audio input signals via the Filter Assembly, Low Pass AF108. The four signals are processed separately by independent amplification, modulation, filtering, and gain control circuits (channels A1, A2, B1 and B2). The outputs of each of these channel circuits are then combined to yield an independent sideband output that is centered at a frequency of 1.75 mc.

The 1.75 mc carrier (used for channels A1 and B1) and the multiplexing sub-carriers (1.74371 mc and 1.75629 mc used for channels A2 and B2) are synthesized within the CMR from a 1-mc reference signal. This 1-mc reference signal is supplied by the associed Control Synthesizer HFS.

The 1.75 mc CMR output is applied to the RF Translator CHG, heterodyning this signal to the desired output frequency. A sample of high frequency oscillator output (3.75 mc to 33.75 mc) of the CHG is routed to the Control Synthesizer HFS, which in turn supplies a d-c control voltage back to the CHG to stabilize the high frequency oscillator. The resulting output of the CHG is a stabilized r-f output, containing the input intelligence at a selected frequency within the 2 to 32 mc frequency range.

The CHG r-f output is routed to Filter Assembly, Low-Pass AF108 where it is made available for connection to the linear amplifier section. The AF108 also receives an r-f monitor output from the CHG. Automatic load and drive control (ALDC) from the linear amplifier is made available to the CHG via the AF108.

Control Panel AX560A provides front panel control of the exciter power and test keying. A standby/operate toggle switch on the AX560A operates the control relay in Power Supply HFP, thus controlling the application of operating voltages from the HFP to the exciter component units. A test-key toggle switch on the AX560A provides a means of test keying the exciter. The test-key toggle switch, in the ON position, supplies a key-down or steady-keying condition to the exciter for test purposes. Momentary or hand-keying is also possible by using the test-key toggle switch as a hand-key.

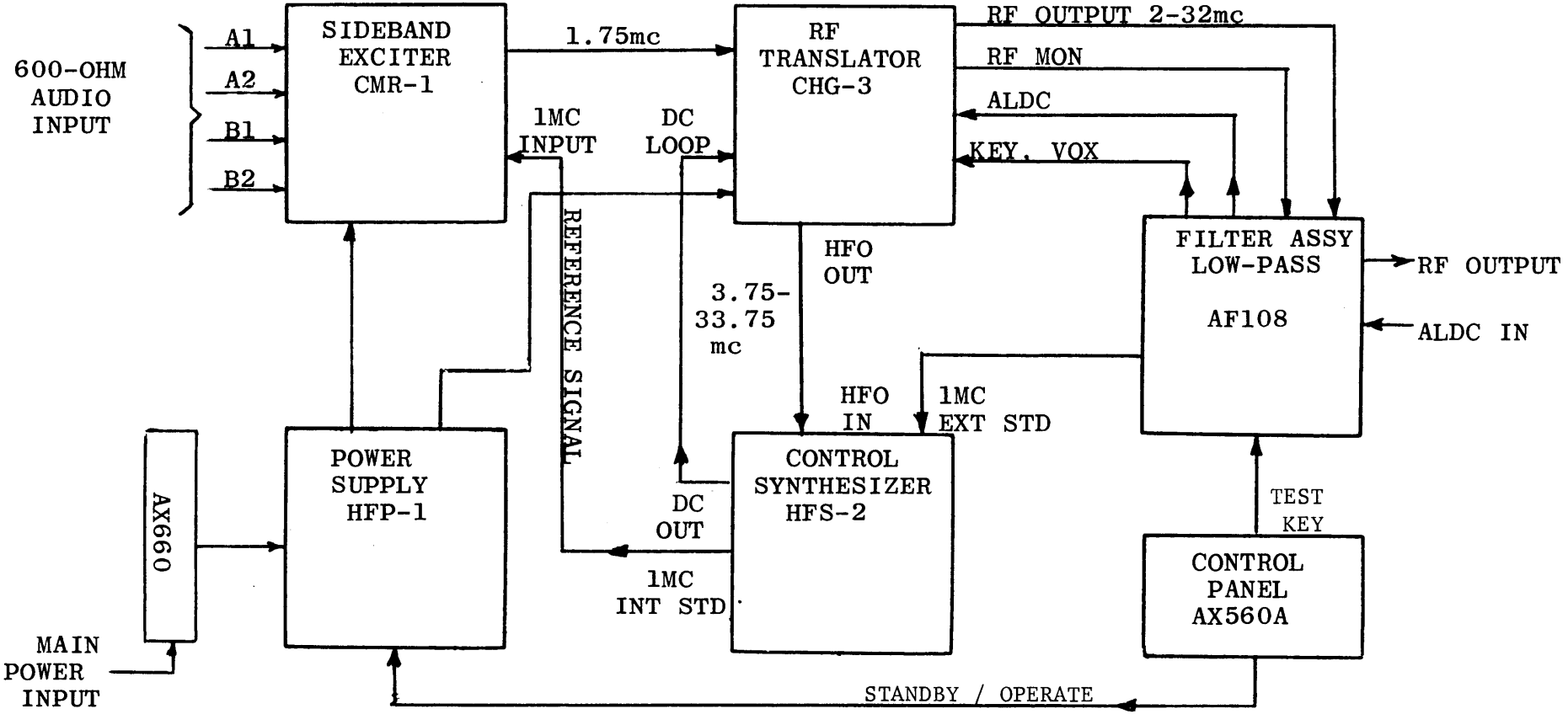


Figure 4-1.a. Block Diagram, Exciter

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b. LINEAR AMPLIFIER SECTION (figure 4-1. b) - The r-f output from the exciter section is applied tothe input of Linear Amplifier RFD. This input is amplified up to a 1000 watts (PEP) level, routed through tuned circuits and impedance matched with the antenna. The RFD also contains an ALDC network which may be switched for internal use or external use. This ALDC signal is routed back to the exciter section for automatic load and drive control. The r-f power amplified output is then routed to the Standing Wave Ratio Indicator SWRA. The SWRA incorporates a directional coupler, to couple the r-f output to the system antenna. A forward and reflected power meter on the SWRA provides front panel monitoring of the transmitted signal power level.

The RFD receives bias, filament and mid-voltage requirements from the Low Voltage Power Supply PS-4B. The PS-4B in turn, receives its primary a-c line voltage from Auxilliary Power Panel APP-4 and supplies line voltage to High Voltage Power Supply PS-5B. The PS-5B supplies plate voltages for use by the RFD.

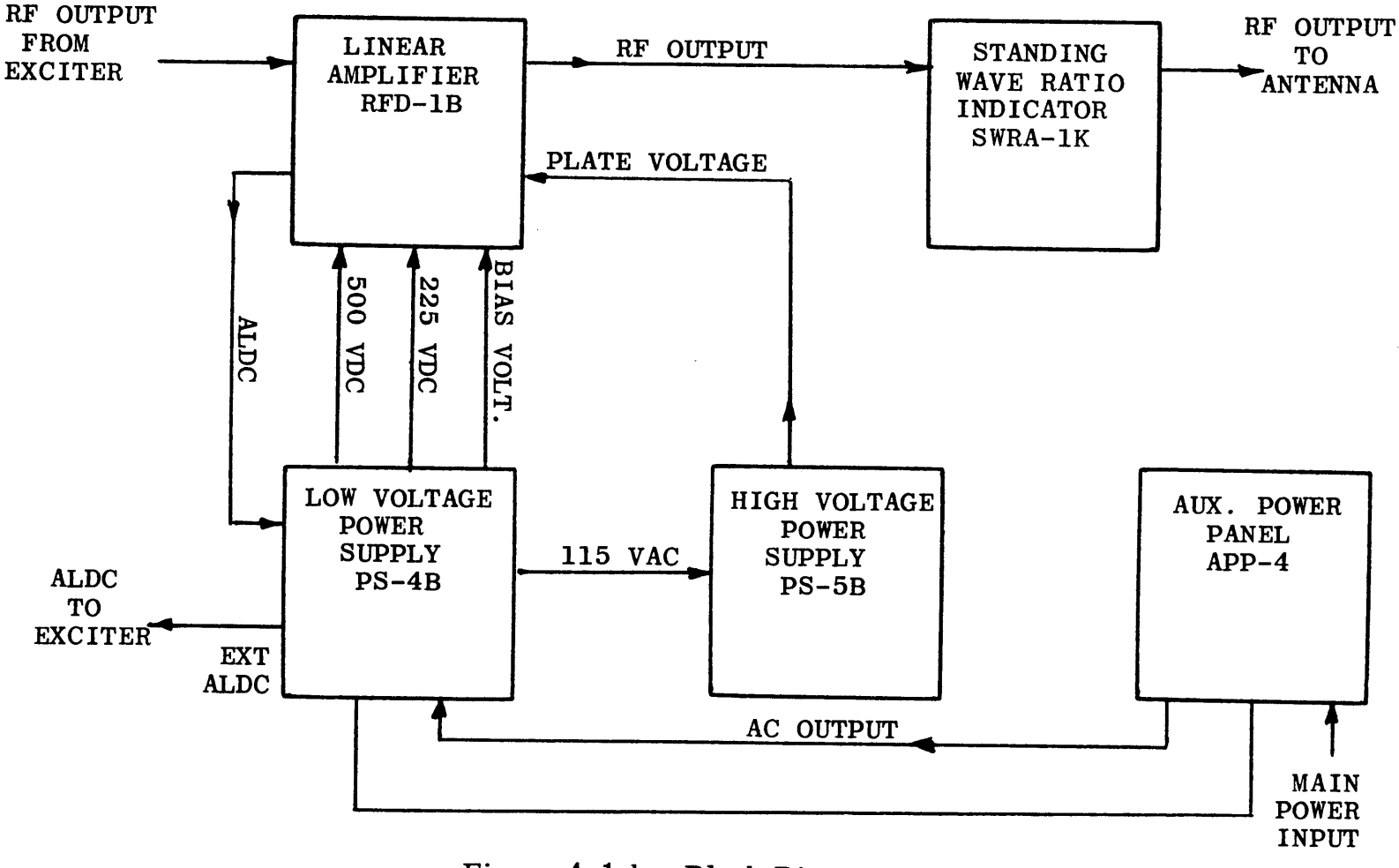

Figure 4-1.b. Block Diagram, Linear Amplifier

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SECTION 5
MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

In order to prevent equipment failure due to dust, dirt or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

At periodic intervals, the equipment should be removed from its mounting for cleaning and inspection. The wiring and all components should be inspected for dirt, dust, corrosion, grease or other harmful conditions. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or methyl chloroform may be used, providing the necessary precautions are observed.

WARNING

When using toxic solvents, make certain that adequate ventilation exists. Avoid prolonged or repeated breathing of the vapor. Avoid prolonged or repeated contact with skin. Flammable solvents shall not be used on energized equipment or near any equipment from which a spark may be received. Smoking, "hot work", etc. is prohibited in the immediate area.

CAUTION

When using trichlorethylene, avoid contact with painted surfaces, due to its paint removing effects.

5-2. TROUBLESHOOTING

When a piece of equipment has been operating satisfactorily and suddenly fails, the cause of failure may be due to symptoms of past failures or due to component aging.

The first step in troubleshooting is to ascertain that proper equipment voltages are present, interconnecting cables are secure, and that all fuses are in functional condition. Refer to table 5-2, used in conjunction with figure 5-1, for system fuse locations and functions.

NOTE

Never replace a fuse with one of a high rating unless brief continued operation is more important than probable equipment damage. If a fuse burns out immediately after replacement, do not replace it a second time until the cause has been located and corrected.

If the above mentioned checks fail to locate the fault, perform the pre-operational checkout procedure shown in paragraph 2-3. Use of this procedure will help localize the particular fault at hand.

Visual troubleshooting of the modular unit chassis components and tube conditions may also help localize the fault. Refer to the individual modular unit technical manuals for associated unit troubleshooting procedures.

The following troubleshooting aids are provided:

a. Interconnection diagram (Figures 2-3 and 2-4).

b. Pre-operational checkout procedures (Paragraph 2-3).

c. System block diagram (Figure 4-1).

d. System fuseing (Table 5-2 and Figure 5-1)

e. Cable/wire run list (Table 5-3)

5-3. REPAIR AND REPLACEMENT

Maintenance of the SBT will consist mainly of component replacement. It should be noted that when replacing components having many wires connected, such as switches, relays, etc., the wires should be tagged and marked for accurate identification when replacing.

When replacing components, the technician should observe for exact or equivalent replacements by referring to the parts list of the appropriate modular unit technical manual.

Polarity and positioning of certain components should be observed before removing so that the replacement component will fit and operate correctly.

5-4. OPERATIONAL CHECKS

The following checks are derived from factory test procedures, modified for field service use.

a. EXCITER SECTION.

1. Connect two AF tones from PTE to channel A1 on TB902 with a shielded pair. TB902 is located on the AF108 at the bottom of the Rack. TTG Power Switch to "ON". "AF TONE" Switch to "ON". "RF TONE" Switch to "OFF". Tone control switch to "TWO TONES". Connect a 50 ohm, 2W load to J912 through a "T" connector. Connect the analyzer RF Input to the Monitor Jack, J915. Connect a jumper from terminal 7 to 9 on TB903.

2. Place the meter function switch on the CMR to A1 and adjust audio output for a -10dbm which can be read on the input level meter on the CMR.

3. The first frequency to be tuned will be 2 MCS. Set RF Gain Control on CHG to mid range. On the HFS place the MC switch in position #2,

100KC at zero, 10KC zero, 1KC zero, .1KC also at zero. The HFS nixie lights will indicate 2 MCS. Activate the Test Key on the AX560A to the lock position. Turn the bandswitch on the CHG to band #1, and the CHG TUNE to 2 MCS. When it reaches 2 MCS the sync. light on the CHG will light and there should be some output indicated on the CHG RF level meter. Adjust RF gain control on the CHG for an output of 2.5 volts as indicated on the AC VTVM.

4. Tune the VOX on the PTE to a frequency 500 KC higher than the RF signal to be displayed.

EXAMPLE : Desired freq. 2,000.000
Intermediate freq. 500,000
V.F.O. 2,500,000

a. Set SWEEP selection to 14 KC.

b. MASTER OSCILLATOR Frequency to 2.5 MC.

c. Tuning switch to 2.5 MC.

5. PTE Analyzer Controls set as follows:

a. Set the VOX output for approximately .1 ma.

b. Set the analyzer scale switch to Log.

c. Set the analyzer IF attenuator switch to -20 db.

d. Set the analyzer input attenuator switch as required to place two tone signal peaks on the ZERO db reference line but maintaining the gain control at approximately full clockwise. Adjust the VOX freq. slightly to position the two tone signal presentation in the center of the analyzer secreen. The displayed signal in conjunction with the 2.5 volts across the 50 ohm load represents the rated PEP output on a scale from 0 to 40 db.

e. Place the IF attenuator switch to 0 db thus expanding the scale to 60 db (0 db line now becomes 20 db).

f. Read the 3rd order products from this presentation. The 3rd order products shall be not less than 45 db below either tone of the two tone signal at the rated output which is 2.5 volts RMS.

g. Repeat the above procedure for all frequencies. (See table 5-1).

h. Upon completion of the Channel A1 check, repeat the procedure at 2 MCS for Channels B1, B2 and A2. Audio connections for the channels can be made on TB902 for all channels.

CARRIER SUPPRESSION

1. Leaving the PTE set up as in Intermodulation check remove the A. F. tones from Channel A1 connection on the PTE.

2. Turn carrier suppression control on the CMR to "0".

3. Again adjust the output of the CHG to 2.5 volts RMS as indicated on the AC-VTVM with the RF gain control on the CHG and the CHG tuned to 2 Mcs.

4. Adjust the displayed signal on the analyzer screen with the IF Attenuator in the -20db position to the o db line and center the signal on the screen with the VOX.

5. Vary the carrier reinsertion on the CMR from its zero position to 3, 6, 20, 30 and FULL and back to the other extreme. Note the value of carrier suppression as indicated on PTE.

6. The carrier suppression and a maximum carrier suppression of not less than 55 db below the rated output on the PTE.

SPURIOUS CHECK

1. Set up the exciter to 2 MCS at its rated output, 2.5 volts RMS across a 50 ohm load with carrier drive only.

Set carrier suppression to 0 on CMR. Set up the analyzer presentation in previous test to the 0 db reference line with IF attenuator to -20 db position.

2. Set the analyzer sweep frequency to 14 KC. Position the displayed signal so that the carrier is centered on the screen.

3. Set the IF attenuator to 0 db and read the level of all the spurious signals.

4. Spurious signals shall be at least 45 db below rated output .250 W PEP or 2.5 volts RMS.

TABLE 5-1. EXCITER INTERMODULATION DISTORTION FREQUENCY TEST SETTINGS.

FREQ. IN MC/S	VOX SETTING	BAND SW
2.0000	2500	1
3.0000	3500	1
3.0000	3500	2
4.0000	2250	2
4.0000	2250	3
6.0000	3250	3
6.0000	3250	4
8.0000	2125	4
8.0000	2125	5
12.0000	3125	5
12.0000	3125	6
16.0000	2062.5	6
16.0000	2062.5	7
24.0000	3062.5	7
24.0000	3062.5	8
28.0000	3562	8
32.0000	3562	8
Channel A2		
2.0000	2500	1
Channel B1		
2.0000	2500	1
Channel B2		
2.0000	2500	1

b. LINEAR AMPLIFIER SECTION

1. Connect the output of the TTG (part of PTE spectrum analyzer) to Channel A1 on TB902 of the AF108 with a shielded pair. Connect a jumper from terminal 9 to 11 on TB903 (TEST KEY, KEY TEST).

2. Set the TEST KEY on the AX560A to the lock position and tune the system to 2 MC. On the PS-4B, set mode switch S100 at NORMAL.

3. Set TRANSMITTER VOLTAGES switch at ON and tune the amplifier to 1KW PEP output. (1KW is equal to 225 VRMS across a 52 ohm load.)

4. Set the PTE to check for third order distortion products. The distortion must be a minimum of 40 db down.

5. On the CMR, set the Channel A1 PRIORITY CONTROL at 0. Set the CARRIER SUPPRESSION at 0.

6. Tune the amplifier to 1 KW CW. (225 VRMS across 52 ohms).

7. Repeat steps 2, 3, 4, 5 and 6 for all test frequencies.

PUSH TO TALK TEST

1. Leave the transmitter set up for CW operation, 1 KW output. CARRIER SUPPRESSION at 0 and CHANNEL A1 PRIORITY at 0. Set the TRANSMITTER VOLTAGES at STANDBY and TEST KEY at normal (center) position.

2. On the APP-4, connect a jumper between TERM. 21 and 22.

3. On the PS-4B, set S100 at PTT.

4. On the AF108, connect a jumper between TERM. 9 and 10, TEST KEY; PTT TEST, on TB903.

5. Set the TRANSMITTER VOLTAGES switch at ON. There should be no PA PLATE CURRENT meter reading.

6. Activate the TEST KEY. There should be full power output.

Reduce the output by turning the CHG GAIN control counterclockwise. With no DRIVE to the amplifier there should be approximately 200 ma. PA PLATE CURRENT.

7. Release the TEST KEY. There should be no reading on the PA PLATE CURRENT meter. Activate the TEST KEY. Set the CHG GAIN control for 1 KW output. Activate the TEST KEY several times. The transmitter should go from full output to no current condition.

8. Leave the transmitter set for 1KW output. Set the TEST KEY to normal. Set the TRANSMITTER VOLTAGES switch at STANDBY.

VOLTAGE KEYING TEST.

1. Set S100 on the PS-4B to CW position.

2. Connect the output of the square wave generator to terminals 27 and 29 of the APP-4. Note the polarity.

3. Set the generator for 50 volts, 50 cycle operation.

4. Set the TRANSMITTER VOLTAGES switch at ON. With 50 volts applied to the KEY LINE, the transmitter should be operating at 1 KW output. Remove the 50 volt keying voltage. There should be no PA PLATE CURRENT. Repeat several times.

ALDC CHECK

1. With the transmiter set as above, keyed with 1 KW output, check the operation of the ALDC control. Rotation should vary the output.

TABLE 5-2. FUSE FUNCTIONS

ITEM No. (Figure 5-1)	PANEL DESIGNATION	FUNCTION
	SIDEBAND EXCITER, CMR	
1	B+, F3, 1 amp, 250 wvdc, quick-acting	Protects external +12 volt supply.
2	B-, F2, 1 amps, 250 wvdc, quick-acting	Protects external -12 volts supply.
3	AC, F1, 1 amp, time lag, slow-blow	Protects external power supply.
4	DC, F4, 1 amps, 250 wvdc, quick-acting	Protects internal components.
	POWER SUPPLY, HFP	
5	B- LINE .125 A	Section "B" B- output to J8010.
6	B- LINE .125 A	Section "B" B- output to J8008.
7	B+ LINE .250 A	Section "B" B+ output to J8005 and J8008.
8	B- LINE .125 A	Section "B" B- output to J8006.
9	B+ LINE .375 A	Section "A" B+ output to J8007.
10	B+ LINE .375 A	Section "A" B+ output to J8005.
11	FIL LINE 4 A	6.8 vac output to J8006.
12	FIL LINE 5 A	6.8 vac output to J8009.
13	FIL LINE 15 A	6.8 vac output to J8007.
14	FIL LINE	6.8 vac output to J8010.
15	FIL LINE 10 A	6.8 vac output to J8008.
16	FIL LINE 10 A	6.8 vac output to J8005.

TABLE 5-2. FUSE FUNCTIONS (CONT)

ITEM No. (Figure 5-1)	PANEL DESIGNATION	FUNCTION
	POWER SUPPLY, HFP (CONT)	
17	F8003 4A/115V 2A/230V	Line voltage supply to J8009 and J8010; 6.3 vac supply to J8005; time delay and circuit in HFP.
18	F8007 .750 A	Input to section "A" B+ regulator in HFP.
19	F8008 .750 A	Input to section "B" B+ regulator in HFP.
20	F8001 15A/115V 8A/230V	Main line voltage input and line voltage output to J8002.
21	F8004 4A/115V 2A/230V	Line voltage supply to J8009 and J8010; 6.3 vac supply to J8005; time delay and filament circuits in HFP.
22	F8005 2A/115V 1A/230V	Line voltage supply to J8004.
23	F8006 1/10A	Input to bias supply in HFP.
24	F8002 15A/115V 8A/230V	Main line voltage input and line voltage output to J8002.
	LOW VOLTAGE POWER SUPPLY, PS-4B	
25	LINE 5A, F701	Fuse for mid-voltage, filament and bias supply transformer primary.
26	L.V.B.-1/10A, F702	Fuse for bias supply to amplifier and interlock system.
27	BLOWER 2A, F703	Fuse for RFD blower 115 vac supply.
28	M.V.B.+ 1/4A, F704	Fuse for mid-voltage plate supply to RFD.

TABLE 5-2. FUSE FUNCTIONS (CONT)

ITEM No. (Figure 5-1)	PANEL DESIGNATION	FUNCTION
AUXILIARY POWER PANEL, APP-4		
27	UTILITY POWER, 15A, 250 V, F501	Utility a-c output receptacle protective fuse.
28	15A, 250V, F502	Utility a-c output receptacle protective fuse.

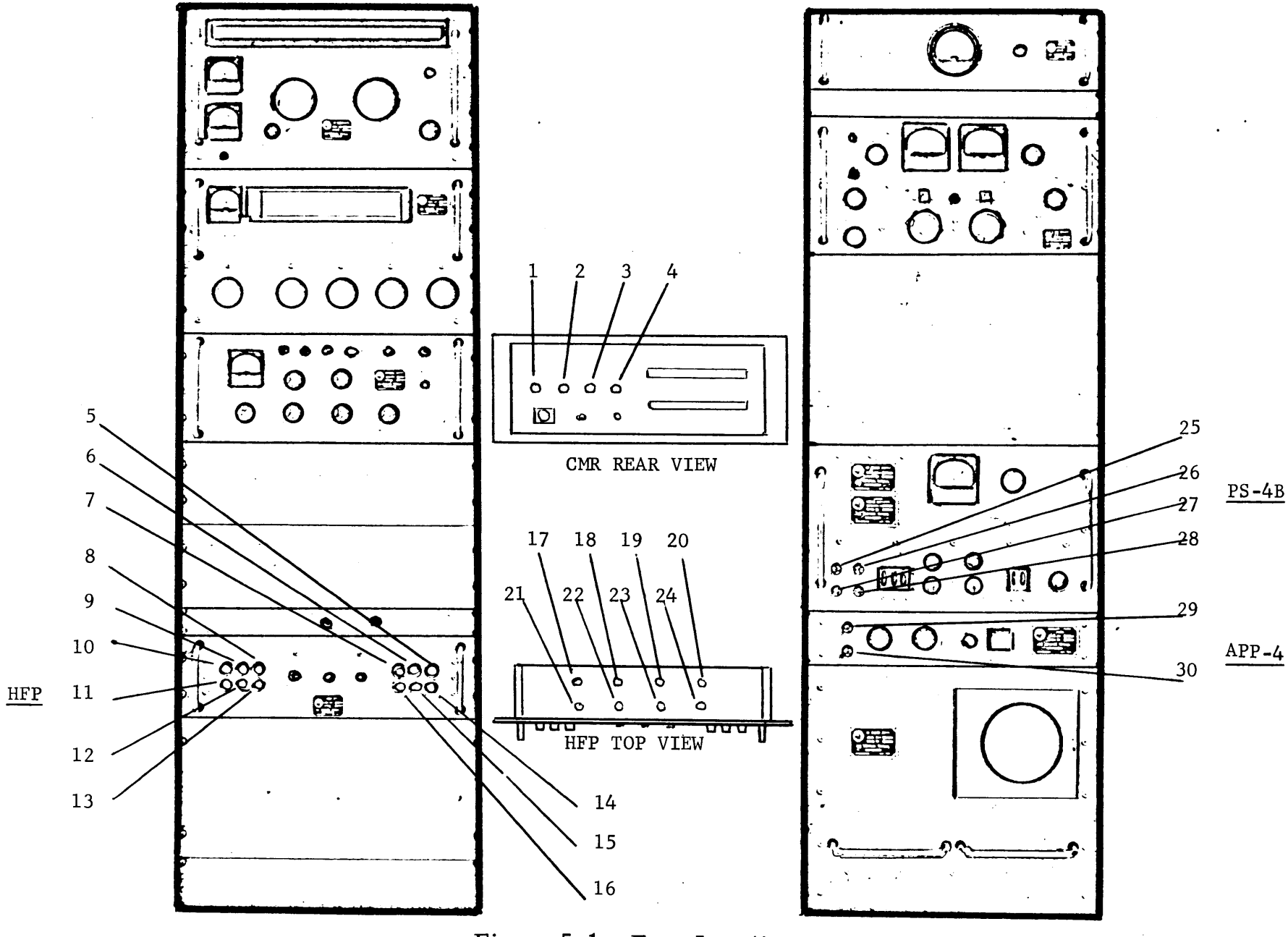

Figure 5-1. Fuse Locations

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Table 5-3. Cable/Wire Run List

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA593	PS-4B	P614	A	MS1872	J605	A
			B			B
			C			C
			D			D
			E			E
			F			F
			G			G
			H			H
			I			I
			O			O
			P			P
			R			R
			S			S
			U			U
			V			V
			b			b
			c			c
			d			d
			e			e
			h			h
			j			j
			k			k
CA1329		P604	A	APP-4	*E502	22
			C			27
			D			29

*Unit internal Connection.

Table 5-3. Cable/Wire Run List (Cont)

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA1329	PS-4B	P604	A	RAK	P626	D
			B			A
			C			F
			D			G
		E701	10			C
		E701	4	APP-4	*E 501	8
			5			3
			6			4
			7			2
			8		*Ground	
			10			9
			3			5
	RAK	P626	A	PS-4B	P604	B
			D			A
			F			C
			G			D
			C		E701	10
			B	APP-4	*Ground	
			E		*Ground	
			H		*E502	31
	APP-4	*E501	2	PS-4B	E701	7
			3			5
			4			6
			5			3
			8			4
			9			10

*Unit internal connection

Table 5-3. Cable/Wire Run List (Cont)

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA1329	APP-4	*E502	22	PS-4B	P604	A
			27			C
			29			D
			31	RAK	P626	H
CA480-3-80	PS-4B	P635		RAK	P636	
CA509		P601		APP-4	AC INPUT	
CA594	PS-5B	P615		MS1872	J604	
CA480-9-10F	RFD-1B	P612		RAK	P611	
CA480-92-60		J202		SWRA-1K	P605	

*Unit internal connection

Table 5-3. Cable/Wire Run List (Cont)

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA1327	AF108	P904	A	CMR-1	TB1001	5
			C			7
			D			1
			F			3
			G			9
			J			11
			K			13
			M			15
			Z			16
			N		TB1002	1
			P			2
			Q			3
			S	CHG-3	TB1301	4
			T			1
			U			2
			V	AX560A	TB2	1
			W			2
CA1325		P905	A	MS2906	J911	A
			B			B
			C			C
			D			D
			E			E
		P925			J912	
		P926			J913	

Table 5-3. Cable/Wire Run List (Cont)

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA1037-13 (P/O CA1326)	HFP-1	P909	A B C D E F H J K L M N P R	CHG-3	P922	A B C D E F H J K L M N P R
CA1036-13 (P/O CA1326)		P908	A C D E F H K L M N P R	HFS-2	P913	A C D E F H K L M N P R
CA1051-2 (P/O CA-1326)		P907	L U	AX560A	TB1	1 2

Table 5-3. Cable/Wire Run List (Cont)

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA1151-6 (P/O CA1326)	HFP-1	P906		CMR-1	P910	
CA1051-2 (P/O CA1226)	AX560A	TB1	1	HFP-1	P907	L
			2			U
CA1327		TB2	1	AF108	P904	V
			2			W
CA1151-6 (P/O CA1326)	CMR-1	P910		HFP-1	P906	
CA1327		P911		HFS-2	P915	
		P912		CHG-3	P921	
		TB1002	1	AF108	P904	N
			2			P
			3			Q
		TB1001	1			D
			3			F
			5			A
			7			C
			9			G
			11			J
			13			K
			15			M
			16			Z
CA1036-13 (P/O-CA1326)	HFS-2	P913	A	HFP-1	P908	A
			C			C
			D			D
			E			E

Table 5-3. Cable/Wire Run List (Cont)

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA1036-13 (P/O- CA1326)	HFS-2	P913	F H K L M N P R	HFP-1	P908	F H K L M N P R
CA1327		P914		AF108	J917	
		P915		CMR-1	P912	
		P916		CHG-3	P920	
		P917			P919	
	CHG-3	TB1301	1 2 4	AF108	P904	T U S
		P918			J916	
		P919		HFS-2	P917	
		P920			P916	
		P921		CMR-1	P912	
		P923		AF108	J914	
		P924			J915	
CA1037-13 (P/O CA1326)		P922	A B C D E F	HFP-1	P909	A B C D E F

Table 5-3. Cable/Wire Run List (Cont)

FROM				TO		
CABLE NO.	UNIT	TERMINATION	PIN	UNIT	TERMINATION	PIN
CA1037-13 (P/O CA1326)	CHG-3	P922	G H J K L M N P R	HFP-1	P909	G H J K L M N P R

SECTION 6
PARTS LIST

6-1. INTRODUCTION

The parts list presented in this section is a cross-reference list of parts identified by a reference designation and TMC part number. In most cases, parts appearing on schematic diagrams are assigned reference designations in accordance with MIL-STD-16. Wherever practicable, the reference designation is marked on the equipment, close to the part it identifies. In most cases, mechanical and electro-mechanical parts have TMC part numbers stamped on them.

To expedite delivery when ordering any part, specify the following:

a. Reference symbol.

b. Description as indicated in parts list.

c. TMC part number.

d. Model and serial numbers of the equipment containing the part being replaced; this can be obtained from the equipment nameplate.

For replacement parts not covered by warranty (refer to warranty sheet in front of manual), address all purchase orders to:

The Technical Materiel Corporation
Attention: Sales Department
700 Fenimore Road
Mamaroneck, New York

PARTS LISTS

for

RACK ELECTRICAL EQUIPMENT, SBT-1KPA2
LINEAR AMPLIFIER SECTION

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
E501-1	TERMINAL BOARD, FANNING: 16 terminals, angle type, left end feed. (Supplied as loose item)	TM105-16AL
E502-1	TERMINAL BOARD, FANNING: 16 terminals, angle type, right end feed. (Supplied as loose item)	TM105-16AR
J601 thru J603	NOT USED.	
J604	CONNECTOR, RECEPTACLE, ELECTRICAL: female. Part of W602.	MS3102A18-16S
J605	CONNECTOR, RECEPTACLE, ELECTRICAL: female. Part of W603.	MS3102A32-7S
P601	CONNECTOR, PLUG, ELECTRICAL: 3 wire female; current rating 20 amps at 250 VAC/DC, 10 amps at 600 VAC; polarized. Part of W604.	PL134NG
P602	NOT USED.	
P603	NOT USED.	
P604	CONNECTOR, PLUG, ELECTRICAL: male. Part of W605.	MS3106B14S-2P
P605	CONNECTOR, PLUG, ELECTRICAL: series N. Part of W601.	UG21*/U
P606	CONNECTOR, PLUG, ELECTRICAL: same as P605. (Supplied as loose item)	
P607	NOT USED.	
P608	CONNECTOR, PLUG, ELECTRICAL: series HN. Part of W601.	UG59*/U
P609	CONNECTOR, PLUG, ELECTRICAL: AC; 3 prong with removeable ground connection. (Supplied as loose item)	PL218
P610	NOT USED.	
P611	CONNECTOR, PLUG, ELECTRICAL: Series BNC. Part of W607.	UG260*/U

PARTS LIST

for

RACK ELECTRICAL EQUIPMENT, SBT-1KPA2
LINEAR AMPLIFIER SECTION

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
P612	CONNECTOR, PLUG, ELECTRICAL: RF; teflon insulation. Part of W607.	PL259A/TEF
P613	Same as P609. (Supplied as loose item)	
P614	CONNECTOR, PLUG, ELECTRICAL: male. Part of W603.	MS3106B32-7P
P615	CONNECTOR, PLUG, ELECTRICAL: male. Part of W602.	MS3106B18-16P
P616 thru P625	NOT USED.	
P626	CONNECTOR, PLUG, ELECTRICAL: male. Part of W605.	MS3106B20-27P
P627 thru P634	NOT USED.	
P635	CONNECTOR, PLUG, ELECTRICAL: RF; 1 male contact; voltage rating 500 V peak; polarized; series BNC. Part of W606.	PL244-1
P636	Same as P635. Part of W606.	
W601	CABLE ASSEMBLY, ELECTRICAL: RF; consists of 2 connectors, P605, P608.	CA480-92-60
W602	CABLE ASSEMBLY, ELECTRICAL: Hi-voltage; consists of 2 connectors, J604, P615.	CA594
W603	CABLE ASSEMBLY, ELECTRICAL: special purpose; consists of 2 connectors, J605, P614.	CA593
W604	CABLE ASSEMBLY, ELECTRICAL: power; consists of 1 connector, P601.	CA509
W605	WIRING HARNESS, BRANCHED: consists of 2 connectors, P604, P626.	CA1329
W606	CABLE ASSEMBLY, ELECTRICAL: RF; consists of 2 connectors, P635, P636.	CA480-3-80
W607	CABLE ASSEMBLY, ELECTRICAL: RF; consists of 2 connectors, P611, P612.	CA480-9-10F

PARTS LIST

for

EXCITER SECTION, SBT-1KPA2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J901	CONNECTOR, RECEPTACLE, ELECTRICAL: 3 wire; current rating 15 amps at 250 V; black plastic insulation.	JJ337
J902	Same as J901.	
J903	Same as J901.	
J904 thru J910	NOT USED.	
J911	CONNECTOR, PLUG, ELECTRICAL: female. Part of W905.	MS3106B20-27S
J912	CONNECTOR, PLUG, ELECTRICAL: 1 round female contact, straight type, series BNC. Part of W905.	JJ172
J913	Same as J912. Part of W905.	
J914 thru J917	Same as J912. Part of W903.	
P901	CONNECTOR, PLUG, ELECTRICAL: 2 female contacts, rated for 10 amps at 250 V; polarized; twist lock, midget size; brown bakelite. Part of W901.	PL176
P902	CONNECTOR, PLUG, ELECTRICAL: AC; 3 prong; polarized; with removeable ground connection. Part of W901.	PL218
P903	NOT USED.	
P904	CONNECTOR, PLUG, ELECTRICAL: female. Part of W903.	MS3106B24-28S
P905	CONNECTOR, PLUG, ELECTRICAL: female. Part of W905.	MS3106B20-27S
P906	CONNECTOR, PLUG, ELECTRICAL: 1 male connector, polarized; current rating 10 amps at 250 V or 15 amps at 125 V; twist lock, midget size; black bakelite. Part of W904.	PL177
P907	CONNECTOR, PLUG, ELECTRICAL: 24 round number 20 contacts; straight type. Part of W904	PL212-3
P908	CONNECTOR, PLUG, ELECTRICAL: 14 round number 16 male contacts; straight type. Part of W904.	PL212-1

PARTS LIST

for

EXCITER SECTION, SBT-1KPA2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
P909	Same as P908. Part of W904.	
P910	CONNECTOR, PLUG, ELECTRICAL: female. Part of W904.	MS3106A16S-5S
P911	CONNECTOR, PLUG, ELECTRICAL: 1 male contact; voltage rating 500 V peak; polarized; series BNC. Part of W903.	PL244-1
P912	Same as P911. Part of W903.	
P913	CONNECTOR, PLUG, ELECTRICAL: 14 number 16 female contacts; straight type. Part of W904.	PL212-2
P914 thru P921	Same as P911. Part of W903	
P922	Same as P913. Part of W904.	
P923	Same as P911. Part of W903.	
P924	Same as P911. Part of W903.	
P925	Same as P911. Part of W905.	
P926	Same as P911. Part of W905.	
P927 thru P934	NOT USED.	
P935	CONNECTOR, PLUG, ELECTRICAL: 31/32" long x 9/16" diameter; bayonet type, series BNC. (Supplied as loose item)	UG88*/U
P936	Same as P935. (Supplied as loose item)	
TB902-1	TERMINAL BOARD, FANNING: 12 terminals; angle type, right end feed. (Supplied as loose item)	TM105-12AR
TB903-1	Same as TB902-1. (Supplied as loose item)	
TB1001-1	TERMINAL BOARD, FANNING: 18 terminals; angle type, left end feed.	TM105-18AL
TB1002-1	TERMINAL BOARD, FANNING: 3 terminals; angle type, left end feed.	TM105-3AL

PARTS LIST

for

EXCITER SECTION, SBT-1KPA2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
TB1301-1	TERMINAL BOARD, FANNING: 4 terminals; angle type, right end feed.	TM105-4AR
W901	CABLE ASSEMBLY, ELECTRICAL: power; consists of 2 connectors, P901, P902.	CA555-4
W902	NOT USED.	
W903	WIRING HARNESS, BRANCHED: consists of 17 connectors, J914, J915, J916, J917, P904, P911, P912, P914, P915, P916, P917, P918, P919, P920, P921, P923, P924 and 3 terminal boards, TB1001-1, TB1002-1 and TB1301-1.	CA1327
W904	WIRING HARNESS, BRANCHED: consists of 7 connectors, P906, P907, P908, P909, P910, P913 and P922.	CA1326
W905	WIRING HARNESS, BRANCHED: consists of 6 connectors, J911, J912, J913, P905, P925 and P926.	CA1325