TECHNICAL MANUAL

for

GENERAL PURPOSE TRANSMITTER

MODEL GPTA-2.5JD

SYSTEM

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, CANADA

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IN-1029

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NOTICE

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

FOREWORD

TMC's General Purpose Transmitter, Model GPTA-2.5JD, consists of four major components as follows:

MMXA-2 Multi-Mode Exciter

PALA-2.5K Linear Amplifier

TMXI-2 Multiplexer

TFP-2.5K Harmonic Filter

These four basic units are also included in various TMC transmitter systems as well as in the GPTA-2.5JD. To satisfy this condition most practically, individual manuals on each unit are written, then combined, as required, to cover any of the GPTA-2.5's multi-mode transmitters. The GPTA-2.5JD manual is made up of individual manuals as described in Table Of Contents of General Purpose Transmitter, Model GPTA-2.5JD.

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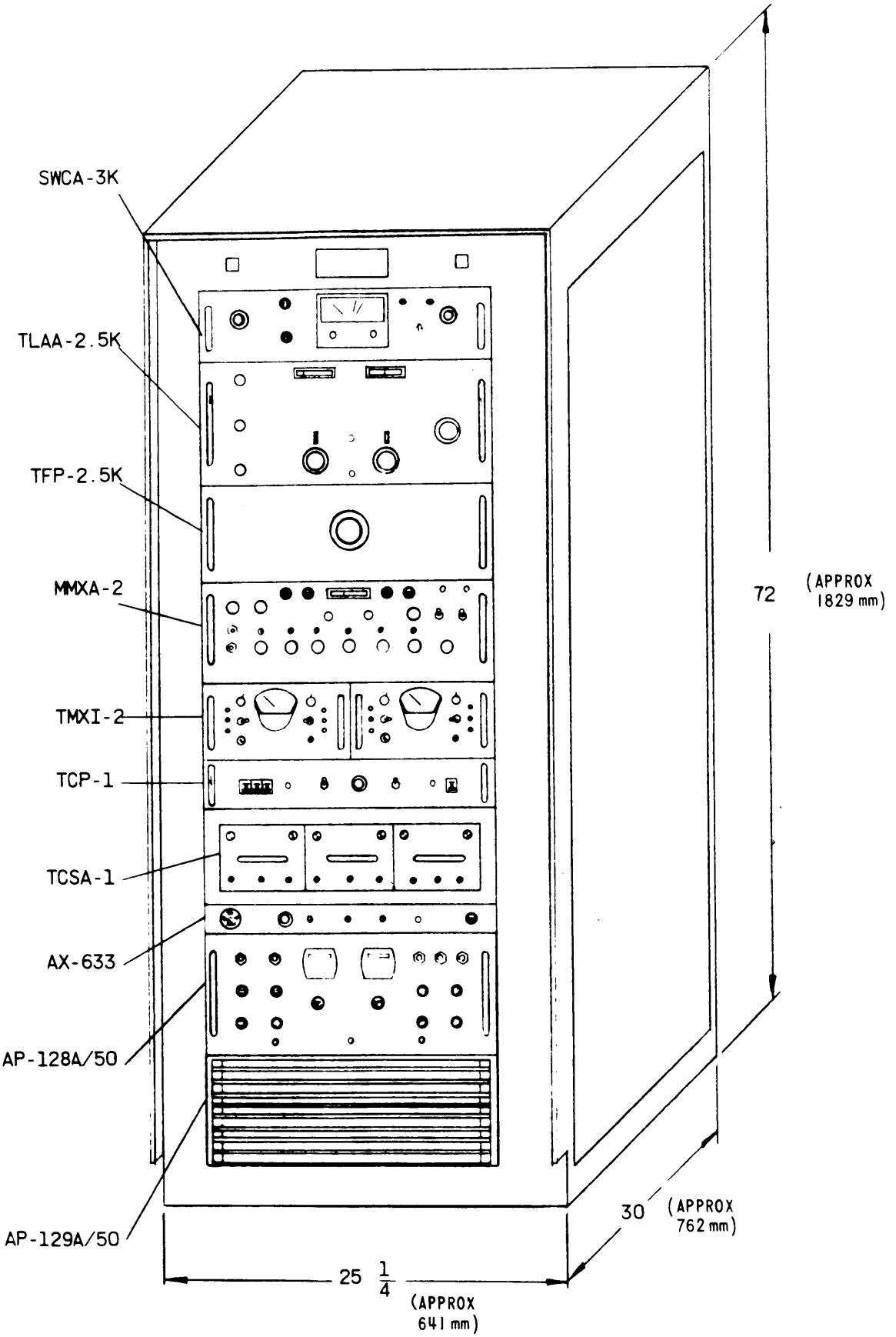

Figure 1-1. Front View Model GPTA-2.5JD, General Purpose Transmitter

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

Radio Transmitter, Model GPTA-2.5JD/50 (figure 1-1) is a general purpose, self-tunable transmitter system providing 2500 watts peak envelope power (PEP) throughout the 2 to 29.9999 megacycle (MHz) frequency range.

Operating modes include two channel single-sideband (SSB), 4 channel Independent sideband (ISB), amplitude modulation (AM), continuouous wave (CW), facsimile (FAX) and frequency-shift keying (FSK). The 4 channel independent sideband transmission is accomplished via Multiplexer Model TMXI-2. The frequency division multiplexing divides radio bandwidth from 300 to 6000 cps into independent channels each with a bandwidth of 375 to 3025 cps.

Front-panel meter monitoring of all critical circuits and operational safety features are also provided. Safety features include mechanical/electrical interlocks, overload protective circuits for bias, plate current, screen current and transmission SWR.

1-2. EQUIPMENT MAKE-UP.

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

1-3. DESCRIPTION OF EQUIPMENT.

a. RF CONTROL AND INDICATOR, SWC( ) 3K. - The SWCA contains the d-c controlled rotary solenoids for bandswitching. The unit also contains a power output meter that is calibrated in kilowatts; this meter also contains a second scale for measuring the transmission line SWR. An SWR switch is associated with the dual purpose output meter. The transmission line SWR is continuously monitored by a sensitive d-c relay that will de-energize the transmitter should the SWR exceed 2:1 or 3:1 (depended on SWR Switch Setting).

b. LINEAR AMPLIFIER, TLA( )2.5K. - The linear amplifier serves as a 40 db

power amplifier between the exciter and the antenna. The TLA( )2.5K contains the tune, loading and bandswitching circuits and all r-f amplifier parts. The final tube (2.5Kw amplifier) of the 3-stage amplifier is convection air-cooled in the r-f section.

c. LOW VOLTAGE POWER SUPPLY, AP-128A. - (The low voltage power supply, supplies operating voltages to the linear amplifier.) (This unit also contains the overload protection circuit controls to adjust the overload relay sensitivity settings.) The AP-128 provides bias, screen and filament voltages to the linear amplifier plus voltages in the interlock and control circuits. The front panel contains filament and plate time meters and overload indicator lamps. All amplifier overload adjustments and bias controls are also front panel mounted.

d. HIGH VOLTAGE POWER SUPPLY, AP-129. - The 5 kv high voltage power supply, mounted at the bottom of the equipment cabinet, contains the high voltage solid state rectifier stacks, filtering network and main power transformer.

This unit generates 5000 volts d-c for the plate of the 2.5 kw power amplifier tube. An automatic 60-second time delay circuit is integrally mounted inside the unit to delay the application of screen and plate voltages to the linear amplifier. This, in effect, prevents a sudden heavy conduction of the linear amplifier.

e. MULTI-MODE EXCITER, MMX( )2. - The MMX is a completely transistorized 2-channel superheterodyne communications exciter that operates on any crystal controlled frequency in the range of 2 to 29.9999 megacycles.

The exciter provides an adjustable 0 to 250MW excitation for SSB,ISB, AM, AME, and 0 to 1 watt for CW, FSK, and FAX modes of operation.

NOTE

Additional equipment is required to provide FSK and FAX input signals.

f. LOCAL CONTROL PANEL, TCP-1( ). - The TCP controls the application of plate voltages to the 2.5 kw power amplifier section and monitors all inter-

lock circuits contained in the cabinet. The TCP also controls the primary AC power input to the cabinet. Other front panel controls include a reset push-button associated with the overload and bias relays in the low voltage power supply AP-128A.

g. ALARM PANEL, AX633. - The AX633 is an alarm and monitor unit, providing connector receptacles for monitoring the PA output. An audio input jack, front panel mounted, provides for insertion of a two-tone test signal for testing the exciter unit. An audio alarm device, with its associated on/off toggle switch, and a line fuse are also front panel mounted. The alarm is activated only when the transmitter's high voltage is removed. This action is controlled by the high voltage power supply circuit breaker.

h. HARMONIC FILTER, MODEL TFP-2.5K. - The TFP-2.5K is a selectable hamonic filter unit, designed to operate in conjunction with a transmitter operating in the 2 to 30 megacycle (MHz) frequency range.

The TFP is functionally an in/out filter configuration. The transmitter operating frequency is routed through a frequency corresponding harmonic filter network, the output of which is harmonically suppressed to meet FCC harmonic suppression requirements.

Harmonic filtering in the 2 to 30 MHz range is accomplished by six harmonic filter networks in the TFP.

i. CABINET, ELECTRICAL EQUIPMENT, RAK-110-2JD. - The RAK houses all the components comprising the transmitter, measuring 72-inches high by 25 1/4-inches wide by 30-inches deep. Rear and side access doors permit ease in maintenance and accessability to hard-to reach components. The r-f output is fed to the directional coupler mounted on the upper rear portion of the cabinet. Heavy power supply components are bolted at the bottom, where the primary power connections are also made. A harmonic filter AF107 (used to reject all frequencies above the 32-megacycle range) is mounted at the rear right-hand portion of the cabinet.

1-4. TECHNICAL CHARACTERISTICS.

Frequency Range:	2 to 29.9999 megacycles (MHz), bandswitched.
Output Power:	2500 watts PEP
Operating Modes:	CW, AM, AME, SSB, FSK, FAX, ISB.
Tuning:	All tuning, loading bandswitching controls on front panel.
Relative Humidity:	Up to 90%.
Ambient Temp. Range:	0° to 50°C.
Metering:	Front panel meters monitor operation of all critical circuits.
ALDC:	ALDC (automatic load and drive control) circuit provide to improve linearity, limit distortion, and deliver a relatively constant output during high modulation peaks or load changes. Front panel control allows adjustment of ALDC attach point or circuit disabling.
Output Impedance:	50 ohms, unbalanced.
Harmonic Suppression:	Second harmonics at least 50 db below full PEP when measured with standard two-tone test; all other harmonics down at least 55 db.
Signal/Distortion Ratio:	Distortion products are at least 35 db below either tone of a standard two-tone test at full PEP output.
Hum and Noise Level:	Hum at least 50 db below full PEP; all other noise down at least 70 db.
Cooling:	Forced air.
Operating Temperature:	Designed to operate in a 0° to 50°C ambient with relative humidity of up to 90%.
Power Input:	195/208/220/230/380/440 volts a-c, 50/60 cps, 3-phase.
Heat Dissipation:	5000 watts.
Air Intake:	500 CFM.
Weight:	1000 lbs. (approx.).

TABLE 1-1. MAJOR COMPONENTS

TMC DESIGNATION
Cabinet, Electrical Equipment, RAK-110-2JD
Multi Mode Exciter, Model MMXA-2
Linear Amplifier, Model TLAA-2.5K
Servo Amplifier, Model TCSA-1
RF Control and Indicator, Model SWCA-3K
Linear Amplifier Control Panel, Model TCP-1A
Low Voltage Power Supply, AP-128A/50
High Voltage Power Supply, AP-129/50
Alarm Panel, AX633
Multiplex-unit, TMX1-2
Harmonic Filter Model TFP-2.5K

SECTION 2

INSTALLATION

2-1. GENERAL

The GPTA is tested at the factory and is carefully packaged to prevent damage during shipment. When it is delivered at the operating site, inspect the packing case and its content for damage that might have occured during transit. Unpack the equipment carefully and inspect all packaging material for parts that 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 furnishing of replacement parts.

2-2. ASSEMBLY

a. Refer to figure 2-1, outlined dimentional drawing for transmitter location.

b. Install the transmitter components into the rack as shown in figure 1-1.

c. Intracomponent cabling is shipped pre-installed in the transmitter rack, refer to figure 2-2, 2-3 and 2-4 for cable connections; follow outlined installation procedure in PALA-2.5K instruction manual (paragraphs 2-3 and 2-4).

NOTE

After the GPTA has been installed as per the installation sections of the PALA-2.5K Technical Manual, it is recommended a pre-operational exciter and system check be performed to ascertain transmitter operation prior to actual "on the air" transmissions.

2-3. GPTA CONTROL SETTINGS (Refer to GPTA control and indicator diagram figure 3-1 and table 3-1).

a. Place GPTA main power breaker to ON. (86)

b. Place AUTO/Manual switch to Manual. (82)

c. Place SERVO ON/OFF switch to OFF. (81)

2-4. EXCITER PRE-OPERATIONAL CHECK.

Set the exciter controls in the following manner and observe NORMAL indications. (Should indications be abnormal refer to modular unit Technical Manual).

STEP	OPERATION	NORMAL INDICATION
1	Place ON/STANDBY switch (40) to ON position.	Power indicator and monitor meter will light.
2	Place Exciter/PTT switch (41) to EXCITER position.	NO INDICATION
3	Rotate meter knob thru Q1, Q2, and Q3 positions and observe monitor meter.	Meter needle should reflect to the engraved markings on the meter face. Q1, Q2, and Q3 respectively.
4	Select a frequency with the frequency select knobs between 2 MHz and 29.9999 MHz.	Digital readout will indicate selected output frequency.
5	Place the MODE switch to the LSB position.	NO INDICATION.
6	Place meter knob to the "CARRIER" position and adjust carrier knob (37) to the full mark on the monitor meter.	When meter switch has been placed in the CARRIER position, meter should deflect to the FULL mark on meterface.
7	Adjust RF Output control (26) for and output reading of mid-scale on the monitor meter.	Monitor meter will deflect to mid-scale indicating exciter RF output at the selected frequency.
8	Reduce exciter output to zero.	

NOTE

The preceeding paragraph 2-5 indicates normal exciter operation for CARRIER mode of operation. Should any abnormalities occur, refer to the exciter manual supplied.

2-5. SYSTEM PRE-OPERATIONAL CHECK (MANUAL TUNING).

a. Place Main power breaker and Low Voltage breaker to ON.

b. Select desired output frequency with exciter controls (42-53).

c. Place AUTO/MANUAL switch to MANUAL (82).

d. Place SERVO ON/OFF switch to OFF (82).

e. Adjust Band knob on SWC( )3K and TFP-2.5K to a position that coincides with the output frequency selected.

f. Preset PA Tune (20) and PA Load (21) controls as per tuning chart provided Table 3-2.

g. Adjust exciter output control for approx. 2 on monitor meter (exciter should be set up as per para. 2-4).

h. Place meter switch (20) to the 2nd Ampl Ep position. Adjust RF GAIN (control located on SWC( )3K) for an indication on TLA( )2.5K's multimeter. (14).

i. Rotate the 2nd Ampl Tuning control (22) and observe a peak on multimeter (14).

j. Adjust RF Gain control (13) to maximum counter-clockwise position.

k. Place High Voltage breaker to the ON position. (85)

l. Advance the RF GAIN control (13 for an increase in PA PLATE CURRENT (15) and adjust TUNE control (20) for a dip in plate current indication. Adjust the LOAD control (21) until output is obtained. Retune plate to resonance after adjusting the LOAD control (21).

NOTE

When adjusting the PA TUNE control a dip in PA Plate current should be observed on the PA Plate current meter. Once a dip has been observed adjust the PA LOAD capacitor for maximum PA output as indicated on OUTPUT METER (7).

m. Adjust RF Gain control (13) for the desired amount of PA output. (Set lower limit switch for desired PA output). When preset output level has been reached the Ready indicator will light indicating the GPTA has been initally tuned to the desired Carrier Frequency and ready for intelligence.

CAUTION

Never exceed transmitters rated output.

n. Depress the KW/REFL switch and determine the value of SWR. (Should the SWR be excessive check the transmission line or the antenna, this must be performed with H.V. OFF). Reduce the PA output to zero and place the High Voltage breaker to the OFF position.

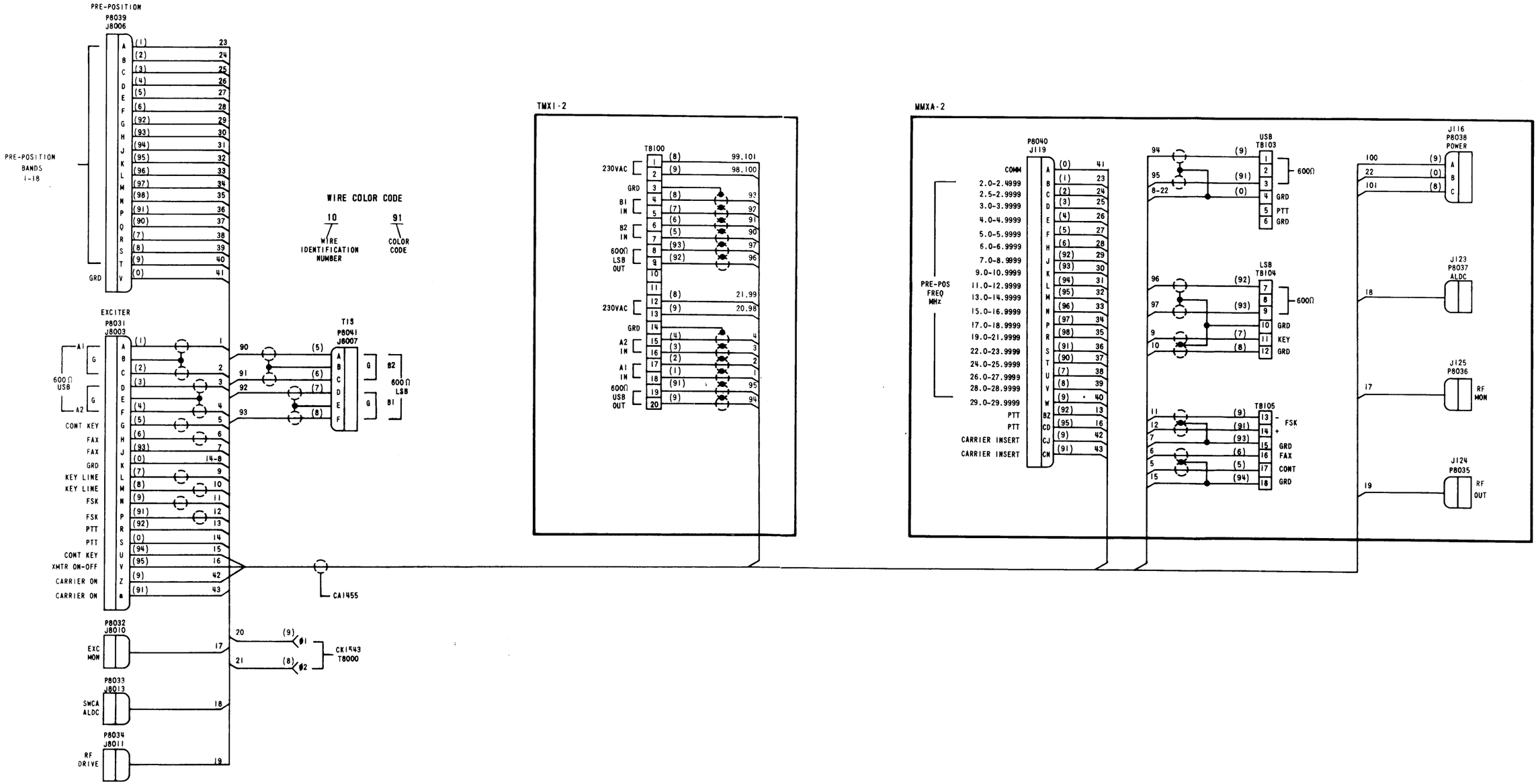

Figure 2-1. Exciter Interconnect Diagram

(CK-1547A)

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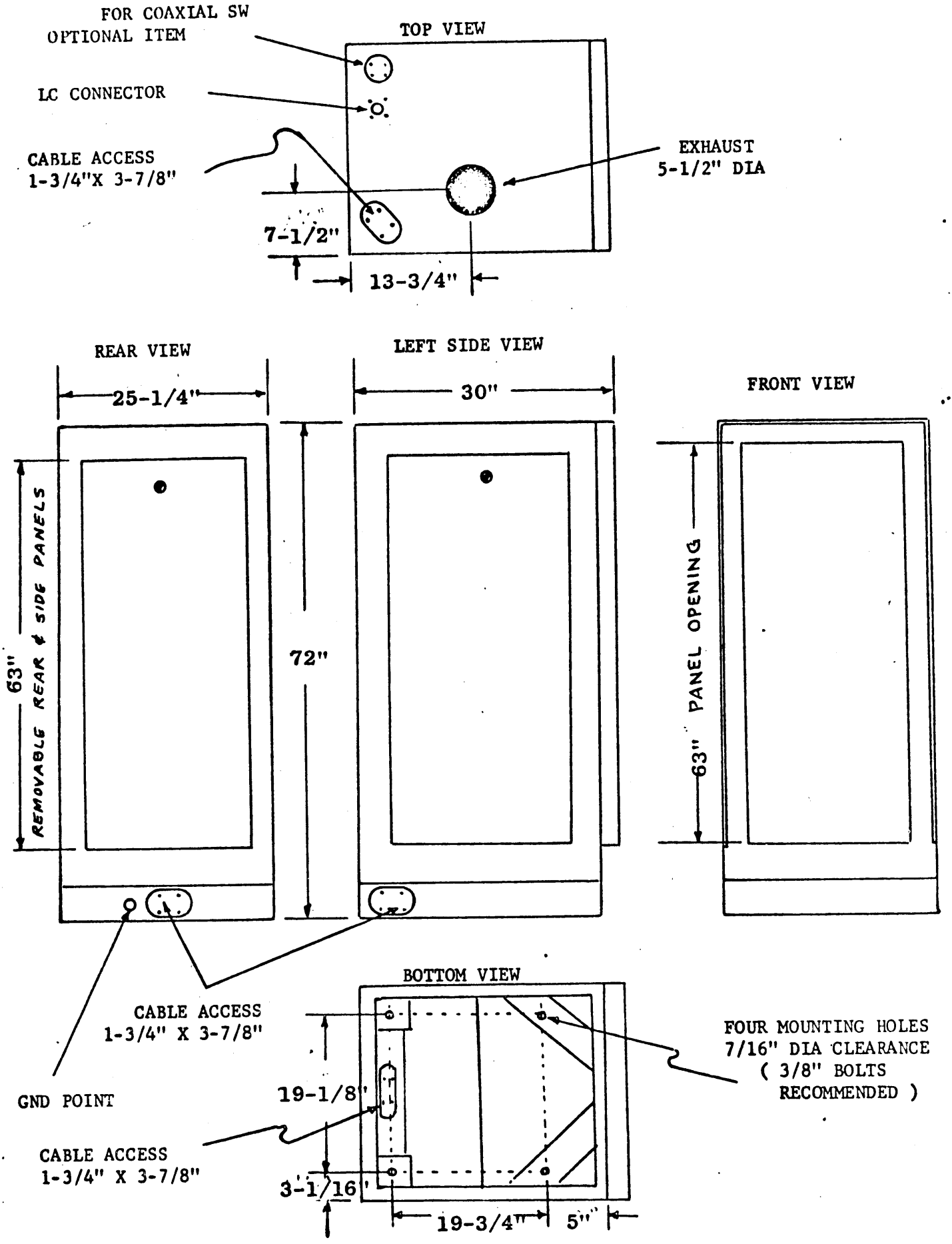

Figure 2-3. Outline Dimensional Diagram

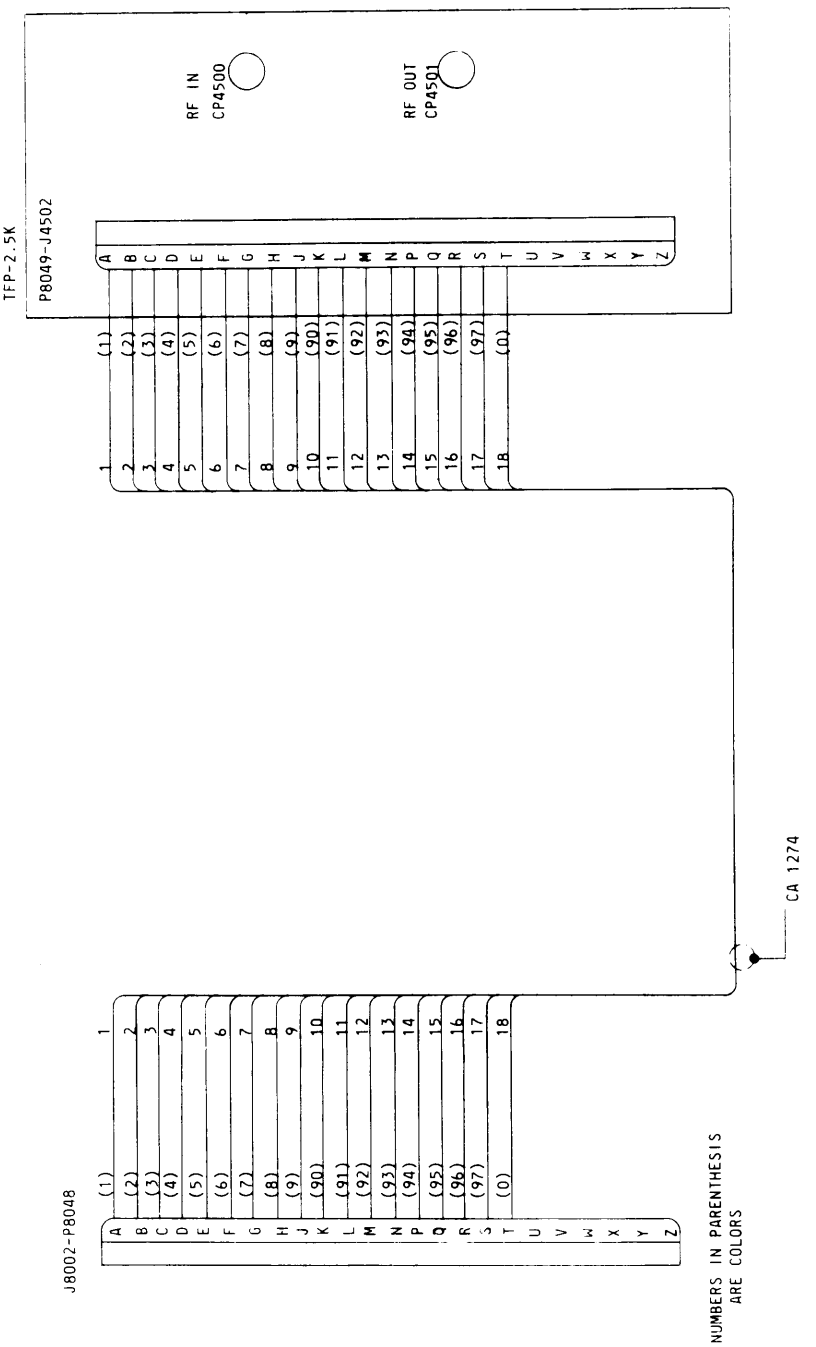

Figure 2-4. Wiring Diagram Filter Interconnect

SECTION 3

OPERATOR'S SECTION

3-1. GENERAL.

This section has been prepared for technicians having experience on similar or related equipment. Before operating the transmitter, the operator should familiarize himself with the controls and indicators illustrated in figure 3-1 and described in table 3-1. Refer to Section 1 of this manual for detailed technical information regarding the transmitter modular units. Table 3-2 provides typical tuning information. Insure that the necessary interface connections have been made to the rear panel of the GPTA.

3-2. TUNEUP PROCEDURE FOR GPTA-2.5( ) (MANUAL OPERATION)

STEP	OPERATION	NORMAL INDICATIONS
1	Set main power circuit breaker (86) to the ON position.	The Technimatic light (1) must come on, PA blower and top fan must start running.
2	Set Auto/Manual switch (82) to Manual and Servo ON/OFF switch to OFF (81).	NO INDICATIONS.
3	Place exciter/PTT at Power ON/Standby switches to ON (40) (41).	Monitor meter must light on exciter, power lamp and exciter lamp must be lit.
4	Select the desired exciter operating frequency (53). Place RF output control (26) to its' extreme counter-clockwise position.	NO INDICATIONS.
5	Determine operating frequency, select proper band position by rotating bandswitch knob on SWC( )-3K (Top unit) and band knob on TFP (25). (Manual band-switch selection can only be accomplished with transmitter in manual tuning mode and servo's OFF).	Proper band position on TLAA and TFP is selected.
6	Place the Low Voltage breaker (located on the AP-128 Low Voltage Power Supply) to the ON position.	NO INDICATIONS
7	Place SSB/CW-FSK Switch (131) to SSB position.	

NOTE

At this time it is advisable to check the plate currents of the 1st and 2nd RF amplifier tubes. They should be checked in the following manner:

(1) Place the multimeter switch (24) to the 1st Amp Ip position and observe a reading of "10" on multimeter (14). Should the meter reading indicate some other value, adjust the 1st Amp bias adjust (115) located on the Low Voltage Power Supply, for "10" on multimeterter.

(2) Place the multimeter switch (24) to the 2nd Amp Ip position and observe a reading of "12" on the multimeter (14). Should the meter reading indicate some other value, adjust the 2nd Amp bias adjust located on the Low Voltage Power Supply, for "12" on the multimeter.

STEP	OPERATION	NORMAL INDICATIONS
8	Set Exciter controls as follows Carrier-control (37)- Adjust for full carrier. Mode switch (54) - USB Meter switch (29) - RF USB and LSB (32) (33) - "0" RF output control (26) adjust to 100 milliwatts.	Meter on Exciter will read "FULL" when meter switch is in carrier position. When in "RF" position meter will read between 1 and 2.
9	On TLA( ), place multimeter switch (24) to the 2nd Amp Ep position.	No indications at this time. (However when excitation from exciter is applied to RF input of P.A. multimeter will indicate RF drive).
10	Advance RF Gain control on SWC( )-3K clockwise for a slight indication on the multimeter (14).	Indication will be noted on multimeter as RF Gain control (13) has been advanced.
11	Adjust 2nd Ampl. tuning control (22) for a peak indication on multimeter (14).	Peak indication will be noted on multimeter (14).
12	Reduce RF output (rotate RF Gain Control on SWC (13) to its extreme counterclockwise position).	Indication on multimeter should indicate zero.
13	Place High Voltage breaker (85) to ON position.	High Voltage Lamp (3) must light, PA Plate current meter (15) should indicate 450 ma. (Should some other value be noted, adjust the PA bias adjust (117) located on the Low Voltage Power Supply for a reading of 450 ma on the PA Plate Current meter (15).

STEP	OPERATION	NORMAL INDICATIONS
14	Advance the RF Gain Control on the SWC( )3K to a point where the PA plate current increases.	PA plate current meter indication increases from original reading.
15	Adjust the PA tuning control (20) until a resonant dip is obtained on the PA Plate current meter (15).	Observe resonant dip in PA Plate current.
16	Adjust the PA load control (21) until PA is properly loaded. After each change in loading the PA Tune control (20) must be returned to resonance.	Proper loading will occur when maximum output is obtained on Output meter (7). At a power level of 2.5 kilowatt the PA Plate current should be between .6 and .85 Amps depending on the frequency.
17	Advance RF Gain control on SWC( )-3K (13) until output meter reaches pre-determined power level.	PA Output meter will indicate desired power output level.
18	Reduce Power output by turning the RF Gain control on the SWC( )-3K (13) to its extreme counterclockwise position.	Power output indicates zero.
19	Place H.V. breaker to the OFF position (85).	High Voltage lamps will go out PA Plate current meter will indicate zero.

The transmitter at this time has been initailly tuned up on a carrier frequency. The desired mode of operation will be determined by control settings of the exciter.

3-3. SERVO TUNING PROCEDURE

STEP	OPERATION	NORMAL INDICATIONS
1	Set Main power circuit breaker (86) to the ON position.	The technimatic light (1) must come on. PA blower and top fan must start running.
2	Set Auto/Manual switch (82) to Auto and Servo ON/OFF switch to ON.	Prepares transmitter circuits for servo tuning.
3	Place MMX Exciter/PTT and power ON/ Standby switches to ON, (40) (41).	Monitor meter and power lamp must light on MMX.

STEP	OPERATION	NORMAL INDICATIONS
4	Select desired MMX operating frequency (42 thru 53) and place RF output control (26) to its extreme counterclockwise position.	Sets pre-positioning information for automatic bandswitching and Automatic tune and load controls presetting.
5	Place Power level indicator on SWC-3K to the desired power level.	No indications (power level control operates to control transmitter RF output in the servo-tune mode of operation).
6	Press Tune button (83).	Activates servo circuitry to cause automatic bandswitching, tune and load pre-positioning to take place.
7	Set MMX controls as follows: Meter Switch (29) - RF Mode Switch (54) - USB Carrier Control (37) USB and LSB Gain Controls (32) (33) - "0" RF Output control (26) - 100 mw (approximately "2" on Monitor meter).	With the controls set in this manner, the RF output will be monitored at the end of transmitters tuning cycle.
8	Place High Voltage breaker and Low Voltage breaker (130) ON (85). Press Tune button (83).	High Voltage indicator lamp will light. Transmitter will servo tune automatically. The tuning sequence is as follows: a. 2nd Amplifier tuning control will rotate and stop. (Indications are green search and operate lamps come on). b. PA Tune capacitor will rotate and stop (indications are green search and operate lamps will come on). c. PA load capacitor will rotate stop. (Indications are green search and operate lamps will come on). d. Transmitter will then automatically drive-up to preset output level and decrease its output to zero. The "Ready" lamp will then come on. This indicates the transmitter has been initially tuned on a pilot carrier, at the desired frequency, to a preset power output level. Mode of operation at this point be determined by the exciter controls.

NOTE

(1) Automatic Transmitter Operation

All inital exciter control adjustments should be performed with High Voltage OFF. Once the desired mode of emission has been determined and exciter controls adjusted accordingly, place the High Voltage breaker to ON and press the TUNE BUTTON, transmitter will automatically tune to the desired frequency; mode of operation and output level.

(2) Manual Operation

The transmitter must first be tuned manually to the desired frequency and output level as per paragraph 3-2. Exciter controls must be adjusted for the desired mode of emission (paragraph 3-4 thru 3-11). The RF Gain Control (located on SWC-3K) must be adjusted for desired output level.

3-4. INDEPENDENT SIDEBAND WITH ANY DEGREE OF CARRIER.

a. Set Direct Switches ON (63) (74). Set Translated Switches OFF (64) (71).

b. Set OUTPUT Switches (62) (70) to ON (LINE).

c. Set ON/STANDBY Switch (40) to ON position.

d. Set EXCITER Switch (41) to ON position when using either the USB or LSB 600-ohm line inputs. Set EXCITER Switch (41) to PTT position when using MIKE input (27).

e. Set USB (32) and LSB (33) controls to zero.

f. Select ISB position on MODE switch (54).

g. Select desired operating frequency with frequency selection controls (42 thru 53).

h. Turn METER switch (29) to LSB position. Adjust the LSB GAIN control (32) for a MONITOR meter (34) indication of up to but not to exceed the red region.

i. Turn METER switch (29) to USB position. Adjust USB GAIN control (38) for a MONITOR METER (34) indication of up to but not to exceed the red region.

j. Turn METER switch (29) to the CARR position. Adjust CARRIER control (37) to full or the desired level as indicated on MONITOR meter (34).

k. Turn METER switch (29) to the RF position and adjust RF OUTPUT control (26) for 100 milliwatts indicated by approximately 2 on meter.

3-5. CONVENTIONAL AM OPERATION

a. Set Direct Switches (63) (74) to ON.

b. Set Translated Switches (64) (71) to OFF.

c. Set OUTPUT Switches (62) (70) to ON (LINE).

d. Set ON/STANDBY switch (40) to ON position.

e. Set EXCITER switch (41) to ON position when using either the USB or LSB 600-ohm line (external signal source) input. Set EXCITER switch to PTT position when using MIKE input (27).

f. Set MODE switch (54) to AM position.

g. Connect a MIKE to the front panel MIKE jack (27) if used.

h. Adjust the MIKE/LINE controls (32) (33) of sideband used to appropriate level as indicated on MONITOR meter (34).

NOTE

DO NOT ENTER RED REGION. When mike input is used, adjust level so as not to exceed red region with highest input from microphone.

i. Turn METER switch (29) to RF position and adjust RF OUTPUT control (26) for 100 milliwatts indicated by approximately "2" on monitor meter.

3-6. FREQUENCY SHIFT TELEGRAPH OPERATION

a. Set Direct Switches (63) (74) to ON.

b. Set Translated Switches (64) (71) to OFF.

c. Set OUTPUT Switches (62) (70) to OFF.

d. Set ON/STANDBY switch (40) to ON position.

e. Set EXCITER switch (41) to ON position.

f. Turn MODE switch (54) to FSK position.

g. Select appropriate FSK operation by setting switches S110 and S111 (Refer to figure 2-2 in technical manual for MMX.)

h. Place SENSE switch S109 (refer to figure 2-2) to desired sense (+) or (-).

i. Place METER switch (29) to the RF position. Adjust RF OUTPUT control for 100 milliwatts.

3-7. FACSIMILE (FAX) OPERATION

a. Set ON/STANDBY switch (40) to ON position.

b. Set EXCITER switch (41) to ON position.

c. Turn MODE switch (54) to FAX position.

d. Place METER switch (29) to the RF position. Adjust RF OUTPUT control for 100 milliwatts.

3-8. CW TELEGRAPH OPERATION

a. Set ON/STANDBY switch (40) to ON position.

b. Set EXCITER/PTT switch (41) to ON position.

c. Set MODE switch (54) to CW position.

d. Connect key to KEY input (located on front panel of MMX exciter) or connect to GPTA junction box (located in rear of GPTA).

e. Place METER switch (29) to the RF position. Close key and adjust RF output control for 100 milliwatts.

3-9. SINGLE SIDEBAND WITH ANY DEGREE OF CARRIER INSERTION (INCLUDING AME FULL CARRIER).

a. Set Direct Switches (63) (74) to ON.

b. Set Translated Switches (71) (64) to OFF.

c. Set OUTPUT Switch of active channel to ON (LINE). (62 or 70)

d. Set OUTPUT Switch of inactive channel to OFF (600 ohms) (62 or 70).

e. Set ON/STANDBY switch (40) to ON.

f. Set EXCITER Switch (41) to ON position when using either USB or LSB 600-ohm line (external signal source) inputs. Set EXCITER switch to PTT position when using MIKE input (27).

g. Select desired sideband with MODE switch (54).

h. Turn METER switch (29) at the desired sideband.

i. Connect a Mike to the front panel MIKE jack (27) if used.

j. Adjust the MIKE/LINE control of sideband used to appropriate level as indicated on MONITOR (34).

NOTE

DO NOT ENTER RED REGION. When mike input is used, adjust level so as not to exceed red region with highest input from microphone.

k. Turn METER switch (29) to CARR position. Adjust CARRIER control (37) to the desired level as indicated on MONITOR meter (34).

l. Turn METER switch (29) to RF position. Adjust RF OUTPUT control (26) for RF output level as indicated on MONITOR meter (34) of 100 milliwatts.

NOTE

Turn RF OUTPUT control (26) fully CCW before selecting different modes of operation.

3-10. TWO CHANNEL MULTIPLEX TRANSMISSION

NOTE

There are two frequency multiplexing units housed in the GPTA, each having the capabilities of two channel multiplex operation. Therefore, when two channel operation is desired, one multiplex unit must have its controls set for direct operation. To accomplish this, set controls on channel A or B multiplex unit in the following manner.

1- Direct Switch to ON
2- Translated Switch to OFF
3- Output Switch to OFF (600 ohm)
4- Output level max counterclockwise.

a. Single Sideband With Any Degree of Carrier Insertion (Including AME FULL CARR.)

1. Set Direct Switch to OFF

2. Set Translated Switch to ON

3. Set OUTPUT Switch to ON (LINE)

4. Adjust OUTPUT LEVEL control for 0 db (top scale on VU Meter)

5. Set ON/STANDBY switch (40) to ON.

6. Set EXCITER Switch (41) to ON position when using either USB or LSB 600-ohm line (external signal source) inputs. Set EXCITER switch to PTT position when using MIKE input (27).

7. Select desired sideband with MODE switch (54).

8. Turn METER switch (29) at the desired sideband.

9. Connect a Mike to the front panel MIKE jack (27) if used.

10. Adjust the MIKE/LINE control of sideband used to appropriate level as indicated on MONITOR (34).

NOTE

DO NOT ENTER RED REGION. When mike input is used, adjust level so as not to exceed red region with highest input from microphone.

11. Turn METER switch (29) to CARR position. Adjust CARRIER control (37) to the desired level as indicated on MONITOR meter (34).

12. Turn METER switch (29) to RF position. Adjust RF OUTPUT control (26) for RF output level as indicated on MONITOR meter (34) of 100 milliwatts.

NOTE

Turn RF OUTPUT control (26) fully CCW before selecting different modes of operation.

b. Independent Sideband With Any Degree of Carrier.

1. Set Direct Switch on each multiplex unit to ON (60) (72).

2. Set Translated Switch on each multiplex unit to OFF (64) (71).

3. Set OUTPUT Switch on each multiplex unit to ON (LINE) (62) (70).

4. Set EXCITER Switch (41) to ON position when using either the USB or LSB 600-ohm line inputs. Set EXCITER Switch (41) to PTT position when using MIKE input (27).

5. Set USB (32) and LSB (33) controls to zero.

6. Select ISB position on MODE switch (54).

7. Select desired operating frequency with frequency selection controls (42 thru 53).

8. Turn METER switch (29) to LSB position. Adjust the LSB GAIN control (32) for a MONITOR meter (34) indication of up to but not to exceed the red region.

9. Turn METER switch (29) to USB position. Adjust USB GAIN control (38) for a MONITOR METER (34) indication of up to but not to exceed the red region.

10. Turn METER switch (29) to the CARR position. Adjust CARRIER control (37) to full or the desired level as indicated on MONITOR meter (34).

11. Turn METER switch (29) to the RF position and adjust RF OUTPUT control (26) for 100 milliwatts indicated by approximately 2 on meter.

3-11. FOUR CHANNEL MULTIPLEX TRANSMISSIONS

NOTE

Make the following control and switch setting on both multiplex units.

a. Set Direct Switches (63) (74) to OFF.

b. Set Translated Switches (64) (71) to ON.

c. Set Output Switches (62) (70) to ON (LINE).

d. Adjust OUTPUT LEVEL control for a zero reading on the VU METER (top scale).

e. Set EXCITER Switch (41) to ON position when using either the USB or LSB 600-ohm line inputs. See EXCITER Switch (41) to PTT position when using MIKE input (27).

f. Set USB (32) and LSB (33) controls to zero.

g. Select ISB position on MODE switch (54).

h. Select desired operating frequency with frequency selection controls (42 thru 53).

i. Turn METER switch (29) to LSB position. Adjust the LSB GAIN control (32) for a MONITOR meter (34) indication of up to but not to exceed the red region.

j. Turn METER switch (29) to USB position. Adjust USB GAIN control (38) for a MONITOR METER (34) indication of up to but not to exceed the red region.

k. Turn METER switch (29) to the CARR position. Adjust CARRIER control (37) to full or the desired level as indicated on MONITOR meter (34).

l. Turn METER switch (29) to the RF position and adjust RF OUTPUT control (26) for 100 milliwatts indicated by approximately 2 on meter.

TABLE 3-1. CONTROLS AND INDICATORS

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
RAK	1	TECHNIMATIC lamp	Indicates when primary circuit breaker (86) is set at ON position.
	2	READY lamp	Indicates transmitter is ready for operation.
	3	HIGH VOLTAGE lamp	Indicates when high voltage circuit breaker (85) is set at ON position.
Standing Wave Ratio Indicator SWCA	4	Frequency Selector switch (no panel designation)	Selects frequencies in the 2- to 30-mc range.
	5	230V AC fuse	Protective fuse for power output meter circuits; lights to indicate fuse has blown.
	6	24V DC fuse	Protective fuse for control circuits; lights to indicate fuse has blown.
	7	Power Meter (no panel designation)	Indicates forward and reflected power (KW).
	8	Power Limit Control (no panel designation)	Used for setting minimum r-f power output of transmitter.
	9	Power Limit Control (no panel designation)	Used for setting maximum r-f power output of transmitter.
	10	SWR OVLD lamp	Lights when standing wave ratio is excessive.
	11	KW/REFL switch	Activates meter (7) for forward or reflected power indication.
	12	FAULT lamp	Lights to indicate transmitter failed to tune in specified time.
	13	RF GAIN control	Adjusts excitation level to the TLAA (higher level in INCR arrow direction).

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
Linear Amplifier TLAA	14	MULTIMETER	Indicates 1st amplifier plate current, 2nd amplifier plate current, 2nd amplifier r-f plate voltage, and power amplifier r-f plate voltage.
	15	PA PLATE CURRENT indicator	Indicates power amplifier plate current.
	16	Indicator (no panel designation)	Veeder indicator for TUNE control (20).
	17	Indicator (no panel designation)	Veeder indicator for LOAD control (21).
	18	2ND AMPL BANDSWITCH switch	Selects 2- to 30-mc range in 9 increments.
	19	ALDC ADJ control	Adjusts level of negative feedback applied to the exciter.
	20	TUNE control	Adjusts resonance of the final PA.
	21	LOAD control	Adjusts the loading of the final PA.
	22	2ND AMPL TUNING control	Adjusts resonance of the 2nd amplifier.
	23	PA BANDSWITCH switch	Selects 2- to 30-mc range in 9 increments.
	24	MULTIMETER switch	Selects circuit for MULTIMETER (14).
TFP-2.5K	25	BAND	Selects harmonic filter bands.
MMX	26	RF OUTPUT control	Adjust level of RF OUTPUT.
	27	Mike	Accepts a 47,000 ohm impedance Microphone.
	28	Key	Input for a dry contact keyer used for CW mode of operation.
	29	METER switch	7-position selector switch. Selects circuits in system to be measured.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
	30 & 31	SPARES	Spare line voltage fuses.
	32	LSB MIKE/LINE gain control.	Adjusts level of LSB input.
	33	USB MIKE/LINE gain control	Adjusts level of USB input.
	34	MONITOR Meter	Monitors circuits selected by the Meter Switch.
	35 & 36	Line Fuses	Protective fuses for Line voltage input to unit.
	37	Carrier control	Adjusts amount of carrier to be used.
	38	STANDBY Lamp	Indicator lamp lights when unit is in STANDBY condition.
	39	POWER lamp	Indicator lamp for power ON condition.
	40	ON/STANDBY Switch	When set at ON applies operate 12- and 24-vdc to all modules and when set at STANDBY opens operate 12- and 24-vdc to modules.
	41	EXCITER Switch	Set at ON for all modes of operation using inputs other than a microphone. Set at PTT, when using the microphone input.
	42 - 53	10MHz, 1MHz, 100- , 10- , 1KHz, 100Hz Switches.	Used to select the desired operating frequency in the 1.6 to 29.9999 (MHz) in 100 cycle increments. Each switch has a window displaying the numerical value of the frequency.
	54	MODE Switch	Selects the various mode capabilities of the unit.
TMX1-2	55	3	Test jack, provided to monitor power supply voltage.
	56	6	Test jack, convenient ground for use with external equipment.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
	57	5	Test jack, convenient monitor for binary divider output.
TMXI-2	58	2	Test jack, test point for external test DB meter.
	59	4	Test jack, test point to monitor crystal oscillator output.
	60	1	Same as item 59 (test meter connected across TP-1 & TP-2).
	61	OUTPUT LEVEL	Controls output level of either direct or translated channels.
	62	OUTPUT OFF/ON	Output ON/OFF determines whether output signal is applied to output terminal P1 (LINE) or terminated by 600 ohm resistor (600 ohm). The latter condition is used when testing the performance of the unit.
	63	Direct ON/OFF Switch	Determines whether Direct channel is either ON or OFF.
	64	TRANSLATED ON/OFF Switch	Determines whether Translated channel is either ON or OFF.
	65	1/2 AMP FUSE	Protects unit from overload.
	66	VU METER	Monitors output of unit.
	67	VU METER	Monitors output of unit.
	68	POWER	Lamp lights when AC voltage is applied to unit.
	69	OUTPUT LEVEL	Controls output level of either direct of translated channels.
	70	OUTPUT OFF/ON	Output ON/OFF determines whether output signal is applied to output terminal P1 (LINE) or terminated by 600 ohm resistor The latter condition is used when testing the performance of the unit.

TABLE 3-1. CONTROLS AND INDICATORS

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
	71	TRANSLATED ON/OFF Switch	Determines whether Translated channel is either ON or OFF.
TMXI-2	72	1	Same as item 59 (test meter connected across TP-1 & TP-2).
	73	4	Test jack, test point to monitor crystal oscillator output.
	74	Direct ON/OFF Switch	Determines whether Direct channel is either ON or OFF.
	75	5	Test jack, convenient monitor for binary divider output.
	76	2	Test jack, test point for external test DB meter.
	77	6	Test jack, convenient ground for use with external test equipment.
	78	3	Test jack, provided to monitor power supply voltage.
	79	POWER	Lamp lights when AC voltage is applied to unit.
	80	1/2 AMP FUSE	Protects unit from overload.
Linear Amplifier Control Panel TCP	81	SERVO ON/OFF Switch	When set at ON, enables activation of automatic band switching and tuning circuits.
	82	TRANSMITTER TUNING AUTO/MANUAL switch	When set at AUTO, allows automatic operation of transmitter; when set at MANUAL, allows the transmitter to be tuned manually.
	83	TUNE Button	When depressed, initiates automatic tuning and loading.
	84	OVLD RESET Switch	Resets the overload relays.
	85	HIGH VOLTAGE Breaker	Control application of power to high voltage power supply AP-129.
	86	MAIN POWER circuit Breaker	Controls application of power to all units of the transmitter.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
	87	Interlock switch (no panel designation)	Used to locate open interlock switches (indicated by indicator lamp).
	87A	Interlock Indicator lamp (no panel designation)	When lit, indicates interlock switch is closed.
Servo Amplifier TCSA (Used only when transmitter is automated.)	88	AC fuse	Same as item 92
	89	DC fuse	Same as item 90
	90	DC fuse	Protects output circuit of supply.
	91	DC fuse	Same as item 90
	92	AC fuse	Protects output circuit of supply.
	93	AC fuse	Same as item 92
	94	SEARCH lamp	Lights when final amplifier is tuning.
	95	OPERATE lamp	Lights when PA stage has completed loading.
	96	AC ON lamp	Same as item 99.
	97	SEARCH lamp	Lights when PA stage is being loaded.
	98	AC ON lamp	Same as item 99.
	99	AC ON lamp	Lights when servo amplifiers are tuning.
	100	SEARCH lamp	Lights when 2nd amplifier is tuning.
	101	OPERATE lamp	Lights when PA has completed tuning.
	102	OPERATE lamp	Lights when 2nd amplifier completes tuning.
Alarm Panel AX633	103	DC fuse	Protective fuse for alarm device circuit.
	104	Alarm Device (no panel designation)	Alarm sounds if primary power to high voltage power supply is interrupted.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
	104a	ALARM ON/OFF Switch	Activates alarm device circuit when set at ON position.
	105	AUDIO IN jack	Provides for audio test signal to be applied (during maintenance procedures).
	106	SENSE Switch	Provides for the selection of circuits (as marked) for test purposes.
	107	PA MON jack	Provides PA monitoring outlet for test procedures.
	108	SENSE jack	Provides monitoring outlet for the sensing position of SENSE switch
	109	EXCITER MON jack	Provides exciter monitoring outlet (for test purposes).
Low Voltage Power Supply AP128	110	PA PLATE OVLD ADJ potentiometer	Used to set plate overload.
	111	PA BANDSWITCH fuse	Protective fuse.
	112	PA SCREEN OVLD ADJ potentiometer.	Used to set screen overload.
	113	FILAMENT TIME meter	Registers filament operation time.
	114	PLATE TIME meter	Registers final PA plate operation time.
	115	1ST AMPL BIAS ADJ potentiometer	Adjust 1st amplifier grid bias.
	116	2ND AMPL BIAS ADJ potentiometer	Adjust 2nd amplifier grid bias.
	117	PA BIAS ADJ potentiometer.	Adjust PA grid bias.
	118	FILAMENT fuse	Protective fuse.
	119	IPA BANDSWITCH fuse	Protective fuse.
	120	INTERLOCK fuse	Protective fuse.

TABLE 3-1. CONTROLS AND INDICATORS (CONT)

MODULAR UNIT	ITEM NO. (Fig. 3-1)	DESIGNATION	FUNCTION
	121	INTERLOCK fuse	Protective fuse.
	122	PA BIAS OVLD lamp	Overload indicator light.
	123	IPA SCREEN fuse	Protective fuse.
	124	PA PLATE OVLD lamp	Overload indicator light.
	125	PA SCREEN fuse	Protective fuse.
	126	BIAS fuse	Protective fuse.
	127	PA SCREEN OVLD lamp	Overload indicator light.
	128	BLOWER fuse	Protective fuse.
	129	LOW VOLTAGE fuse	Protective fuse
	130	Low Voltage Breaker	Provides protection to low voltage circuits.
	131	Single Sideband CW Switch	Increases bias voltage in CW mode.

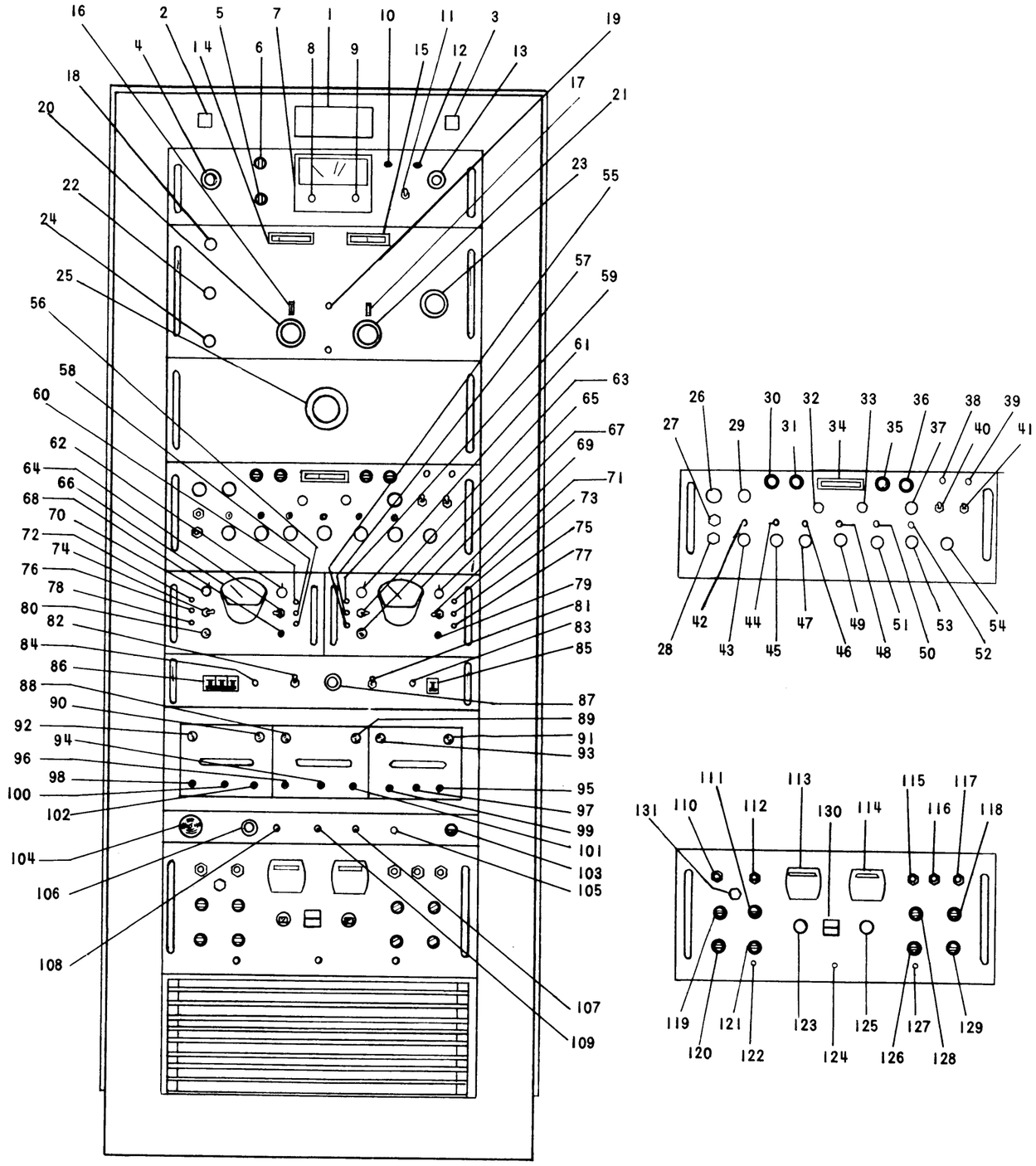

Figure 3-1. Controls and Indicators

TABLE 3-2. SAMPLE TUNING CHART

FREQ. OUT mc	PA BAND	PA TUNE	PA LOAD	PA IP ma	P out KW PEP	DIST. dB
2.0	2--2.5	142	168	700	2.5	43
2.5	2--2.5	109	072	780	2.5	42
2.5	2.5--3.0	118	138	750	2.5	41
3.0	2.5--3.0	101	077	840	2.5	43
3.0	3.0--5.0	110	137	720	2.5	39
5.0	3.0--5.0	084	046	780	2.5	40
5.0	5.0--7.0	091	075	750	2.5	45
7.0	5.0--7.0	077	043	750	2.5	37
7.0	7.0--11.0	091	074	750	2.5	37
11.0	11.0--15.0	084	065	720	2.5	36
15.0	11.0--15.0	075	039	750	2.5	35
15.0	15.0--19.0	078	061	750	2.5	35
19.0	15.0--19.0	069	045	630	2.5	43
19.0	10.0--24.0	075	050	660	2.5	43
24.0	19.0--24.0	039	043	660	2.5	46
24.0	24.0--30.0	075	056	660	2.5	43
30.0	24.0--30.0	061	039	720	2.5	41

TABLE 3-2. SAMPLE TUNING CHART

FREQ. OUT mc	PA BAND	PA TUNE	PA LOAD	PA IP ma	P out KW PEP	DIST. dB
2.0	2-2.5	142	168	700	2.5	43
2.5	2-2.5	109	072	780	2.5	42
2.5	2.5-3.0	118	138	750	2.5	41
3.0	2.5-3.0	101	077	840	2.5	43
3.0	3.0-5.0	110	137	720	2.5	39
5.0	3.0-5.0	084	046	780	2.5	40
5.0	5.0-7.0	091	075	750	2.5	45
7.0	5.0-7.0	077	043	750	2.5	37
7.0	7.0-11.0	091	074	750	2.5	37
11.0	11.0-15.0	084	065	720	2.5	36
15.0	11.0-15.0	075	039	750	2.5	35
15.0	15.0-19.0	078	061	750	2.5	35
19.0	15.0-19.0	069	045	630	2.5	45
19.0	10.0-24.0	075	050	660	2.5	43
24.0	19.0-24.0	039	043	660	2.5	46
24.0	24.0-30.0	075	056	660	2.5	43
30.0	24.0-30.0	061	039	720	2.5	41

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL.

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

The exciter section accepts up to four separate audio input intelligences, translates and combines them to produce the input intelligence (to the linear power amplifier section) at the desired output frequency, within the 2 to 29.9999 mc (MHz) frequency range.

The linear amplifier accepts the exciter output intelligence, at the desired frequency range, and amplifies it up to a 2500 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 - The Sideband Multiplexers, Model TMXI-2 provides the primary stage of channel conversion and frequency division multiplexing for the GPTA four-channel independent sideband transmitting system. The TMXI-2 accepts up to four 600-ohm audio input signals. The four signals are processed separately 2 channels by each TMXI-1 and the output of each of these TMXI-1 channel circuits are applied to the independent sideband inputs to the automated Sideband Exciter Model MMX(A)-2. (For detailed circuit analysis, refer to modular manuals.)

The four channel 600 ohm audio inputs converted (by the TMXI-2) to two 600 ohm inputs for connection to the MMXA-2 are combined and heterodyned to the desired output frequency only when the MMXA-2 is set to the ISB mode of operation. The resulting output of the MMX is a stabilized r-f output, containing the input intelligence at a selected frequency within the 2 to 29,9999 mc frequency range. The Exciter r-f output is then routed to the linear amplifier section.

b. LINEAR AMPLIFIER SECTION - The RF output of the associate exciter is extended via the RF GAIN control of the SWCA to the linear power amplifier.

The linear power amplifier section is used to accept the Exciter's output from the associated exciter section, amplify it (up to 2.5 kilowatts), and apply it to the associated antenna for transmission.

The SWC( )-3K accepts the exciter r-f output, routes it through an RF GAIN potentiometer, for excitation level control, and applies it to the input of the linear amplifier TLA( )-2.5K. Low level r-f signals applied to the TLA( ) are routed through a broadband amplifier, a tuned second amplifier and a tuned final amplifier to the r-f output jack at the rear of the TLA( ). The second and final amplifier bandswitches are automatically pre-positioned by a switch located on the SWC( ). Front panel meters provide the required indications for tuning and loading the amplifier stages. Operating power for the linear amplifier is furnished by power supplies AP-128A and AP-129. The linear amplifier output is coupled to the antenna via Harmonic Filter/Directional Coupler, Model AF-107 assembly.

When the MANUAL/AUTO switch on the TCP control panel is set at AUTO contacts of a relay in the AP-128A supply voltage required to activate the stepping switches attached to the TLA( ) second and final PA bandswitches.

The SWC( ) pre-position switch routes the pre-position reference signal to the linear amplifier TLA( ) bandswitch control circuitry.

The LOW VOLTAGE POWER SUPPLY AP-128A provides filament voltage and bias for all amplifier stages in the transmitter, plate and screen voltages for the first two amplifier stages, screen voltages for the PA stage, and 24 vac for the interlock circuits. The AP-128A contains overload relays that open interlocks, cutting off all voltages to the PA stage when preset overload levels are exceeded. The protective circuits sample the PA plate and screen currents and bias supply voltages and activate the overload relay of the SWCA when any of these currents are excessive.

The HIGH VOLTAGE POWER SUPPLY AP-129 supplies the 5000 vdc for the operation of the final power amplifier of the TLA( ). The AP-129 receives its operating power from a high voltage contractor that is energized by phase-two voltage supplied by

the interlock relay, and phase-three voltage that is supplied by the HIGH VOLTAGE switch in the TCP.

The TLA( ) linear amplifier r-f output, at the selected operating frequency and power level, is filtered by the TFP-2.5K and then routed to Harmonic/ Directional Coppler, Model AF-107. From the AF-107 assembly output is connected to the ANTENNA connector on top of the Equipment Rack.

4-3. TECHNIMATIC CIRCUIT ANALYSIS (Applicable to auto-tuned transmitters only)

Refer to PALA-2.5K Technical Manual for detailed techmatic circuit analysis.

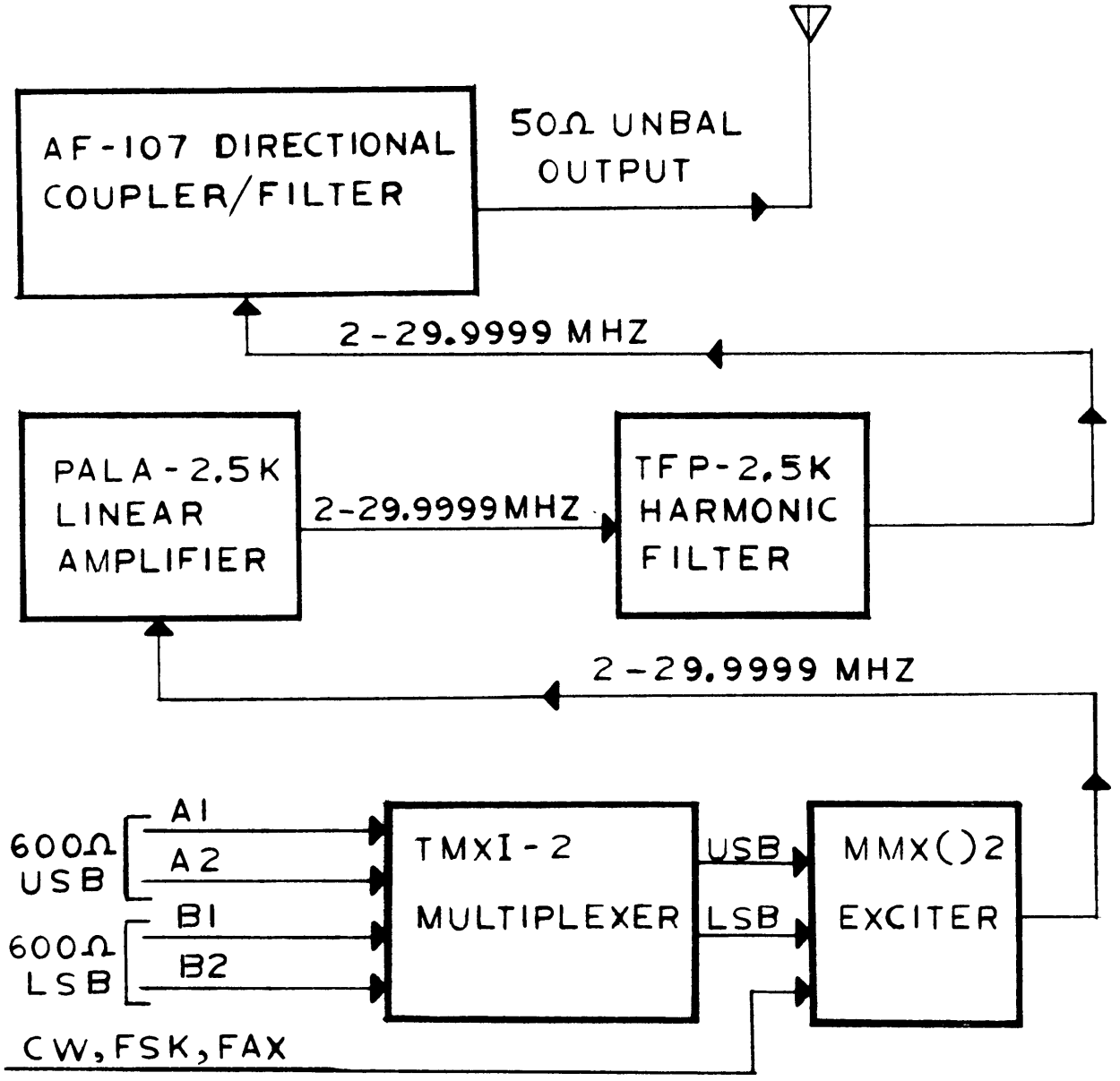

Figure 4-1. Functional Block Diagram

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 methylchloroform 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.

NOTE

Once a fault has been isolated, refer to manual covering the specific module for detailed maintenance procedures.

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 LIST

for

RACK, ELECTRICAL EQUIPMENT, RAK-110-2JD

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B8000	FAN, VANEAXIAL: AC motor, 230 V, ±10%; single phase, 50/60 cps (Hz); one 4uf capacitor, 400 VAC; 2800/3300 RPM; current rating 0.85/0.6 amps.	BL117
C8000	CAPACITOR, FIXED, PAPER DIELECTRIC: 4 uuf, ±10%; 600 WVDC.	CP41BIEF405K
C8001	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 1,000 uuf, ±20%; 5,000 WVDC.	CC109-38
C8002 thru C8006	Same as C8001.	
DS8000	LAMP, INCANDESCENT: 28 VAC/DC; 0.04 amps; single contact, T-1-3/4 bulb.	BI110-7
DS8001	LAMP, INCANDESCENT: 230 V, 10 watts; S-6 type bulb; screw type base.	BI105-1
DS8002	Same as DS8001.	
DS8003	Same as DS8000.	
E8000	Part of Tuning Control System, Model TCSA-1.	
E8001	Part of Tuning Control System, Model TCSA-1.	
E8002	NOT USED	
E8003	TERMINAL BOARD, BARRIER: two 6-32 thd. x 1/4" long binding head machine screws; black phenolic body.	TM102-2
E8004	TERMINAL BOARD, BARRIER: three 6-32 thd. x 1/4" long binding head machine screws; black phenolic body.	TM102-3
E8005	TERMINAL BOARD, BARRIER: twenty-two 6-32 thd. x 1/4" long binding head machine screws; black phenolic body.	TM100-22
E8006	Same as E8005.	
E8007	TERMINAL BOARD, BARRIER: ten 6-32 thd. x 1/4" long binding head machine screws; black phenolic body.	TM102-10
E8008	TERMINAL BOARD, BARRIER: fourteen 6-32 thd. x 1/4" long binding head machine screws; black phenolic body.	TM102-14

PARTS LIST

for

RACK, ELECTRICAL EQUIPMENT, RAK-110-2JD

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J8000	CONNECTOR, RECEPTACLE, ELECTRICAL: 4 female contacts.	MS3102A14S2S
L8000	COIL, RADIO FREQUENCY: fixed; 15 uh; operating frequency 10 Kcs.	CL410
L8001	Same as L8000.	
L8002	Same as L8000.	
R8000	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±5%; 2 watts.	RC42GF680J
S8000	SWITCH, ROLLER LEVER: SPDT; current rating 15 amps at 125 VAC.	SW260
S8001	SWITCH, INTERLOCK: push-pull; current rating 15 amps at 120/250 VAC or 0.2 amps resistive at 250 VAC.	SW230
S8002 thru S8006	Same as S8001.	
S8007	SWITCH, MICRO: low torque; SPDT; current rating 5 amps at 125/250 VAC; CCW rotation.	SW252
S8008	SWITCH, THERMOSTATIC	SS104-2
T8000	TRANSFORMER	TF342
XDS8000	LAMPHOLDER: used with indicator lens, TMC Part No. LI114G2.	TS184
XDS8001	LAMPHOLDER: accommodates candelabra screw type base lamps.	TS186
XDS8002	Same as XDS8001.	
XDS8003	Same as XDS8000. Used with indicator lens, TMC Part No. LI114R1.	

PARTS LIST

for

LOW PASS FILTER, MODEL AF107

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C8301	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100 uuf, ±10%; 5,000 WVDC.	CC109-28
C8302	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 25 uuf, ±10%; 7,500 WVDC.	CC109-13
C8303	Same as C8301.	
C8304	Same as C8302.	
C8305	Same as C8301.	
C8306	Same as C8301.	
C8307	Same as C8302.	
C8308	Same as C8301.	
C8309	Same as C8301.	
C8310	Same as C8302.	
CR8301	DETECTING ELEMENT: RF; average power rating 5 KW; average line power 2.5 KWCW, calibrated at 10 MC, ±5%; used with directional coupler DC106.	DD119-3
CR8302	DETECTING ELEMENT: RF; average power rating 1 KW; average line power 500 KWCW, calibrated at 10 MC, ±5%; used with directional coupler DC106.	DD119-4
DC8301	DIRECTIONAL COUPLER: operating frequency range 2-30 MC; impedance 50 ohms; power rating 8 KW average, 20 KW peak; used with detecting element DD119-3, DD119-4.	DC106
J8301	CONNECTOR, RECEPTACLE, ELECTRICAL: teflon dielectric; series HN.	UG560*/U
L8301	COIL, RADIO FREQUENCY	CL404-1
L8302	COIL, RADIO FREQUENCY	CL404-2
L8303	Same as L8301.	