

NOTICE

THE CONTENTS AND INFORMATION CONTAINED IN THIS INSTRUCTION MANUAL IS PROPRIETARY TO THE TECHNICAL MATERIEL CORPORATION TO BE USED AS A GUIDE TO THE OPERATION AND MAINTENANCE OF THE EQUIPMENT FOR WHICH THE MANUAL IS ISSUED AND MAY NOT BE DUPLICATED EITHER IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER WITHOUT THE WRITTEN CONSENT OF THE TECHNICAL MATERIEL CORPORATION.

TABLE OF CONTENTS

<u>Paragraph</u>		<u>Page</u>
	<u>SECTION 1 - GENERAL INFORMATION</u>	
1-1	Functional Description	1-1
1-2	Technical Specifications	1-2
1-3	Physical Description	1-4
	<u>SECTION 2 - INSTALLATION</u>	
2-1	General	2-1
2-2	Uncrating and Unpacking Instructions	2-1
2-3	Inspection	2-4
2-4	Power Requirement	2-4
2-5	Installation	2-4
2-6	Pre-Operational Checkout	2-14
	<u>SECTION 3 - OPERATION</u>	
3-1	General	3-1
3-2	Controls and Indicators	3-1
3-3	Operating Procedure	3-7
3-4	Operator's Maintenance	3-15

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1-1	Reference Data	1-2
2-1	Loose Items	2-8
2-2	Rear Panel Input and Output Connectors.	2-9
2-3	Wire Run List for Remote Cable	2-17
3-1	Operator Controls and Indicators	3-2

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1-1	General Purpose Receiver, Model GPR-110	1-0
2-1	Typical Equipment Packaging	2-3
2-2A	Wiring for 115 vac Operation	2-5
2-2B	Wiring for 230 vac Operation	2-6
2-2C	Wiring for 12 vdc Operation	2-7
2-3	Rear Panel, GPR-110	2-16
2-4	Interconnect Wiring Diagram, GPR-110	2-20
3-1	Controls and Indicators, GPR-110	3-8

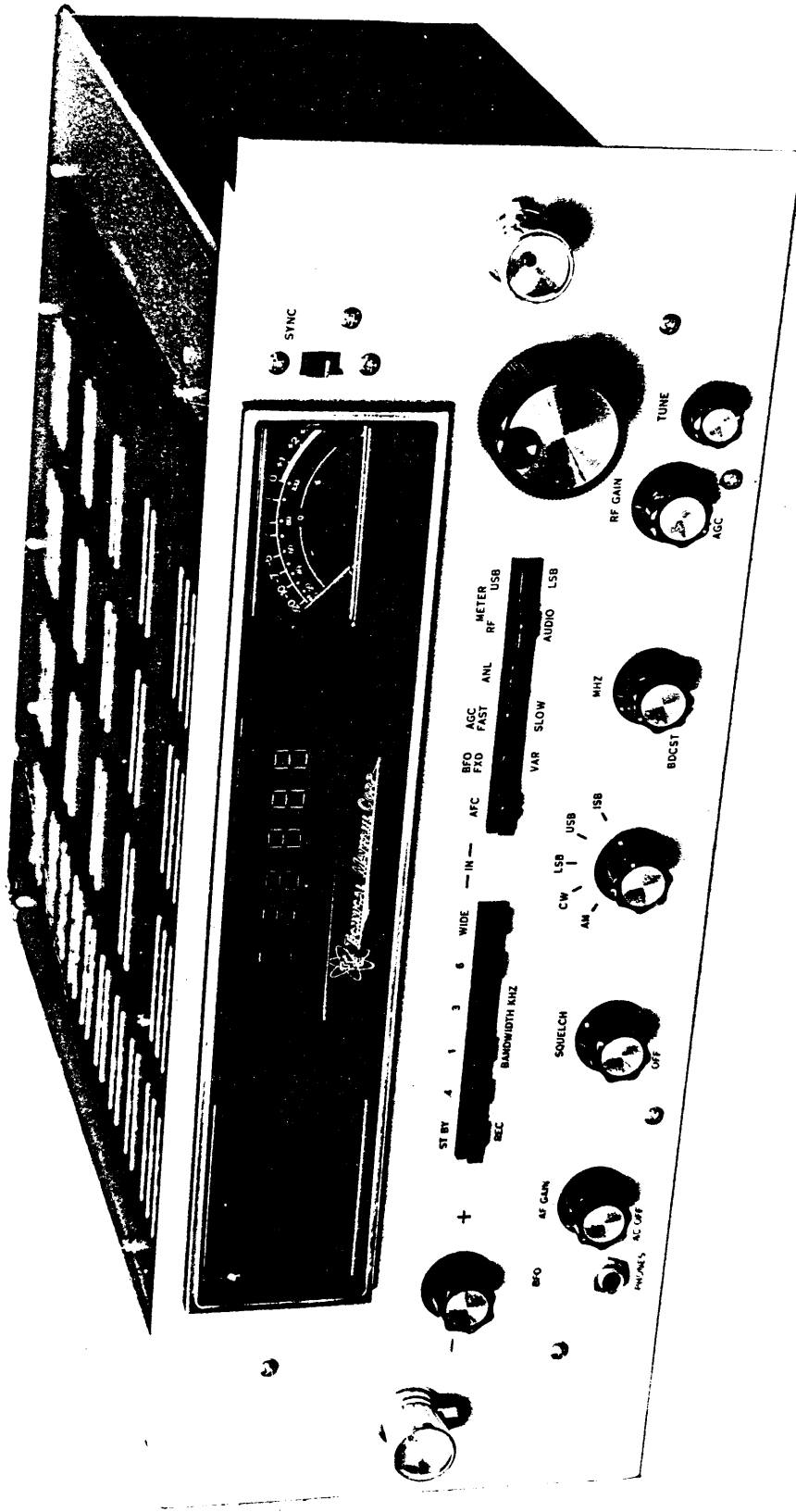


Figure 1-1. General Purpose Receiver,
Model GPR-110

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION

General Purpose Receiver GPR-110 (figure 1-1) is a solid state, triple conversion superheterodyne communications receiver that provides high-stability multimode operation over a frequency range of 100 KHz to 30 MHz. It can be utilized alone as a communications receiver for CW and voice reception, or as part of a communications system, such as a teletype system. The receiver is operable in five modes: the three standard modes (continuous wave, amplitude modulation, upper sideband), and two optional modes (lower sideband and independent sideband). Symmetrical filters are included for use in the AM and CW modes, providing .4 KHz, 1 KHz, 3 KHz, 6 KHz or wide i-f bandwidths. Sideband filters are available for use in the USB, LSB and ISB modes, providing 3 KHz or 6 KHz bandwidths. Selection of the proper filters provides optimum selectivity for the specific mode in use.

Receiver stability is determined by a digital frequency synthesizer and a phase detector/AFC system. The frequency synthesizer is controlled by a high-stability, oven-controlled one MHz crystal oscillator, which provides a stability factor of one part in 10^8 after warmup.

The receiver operating frequency is continuously displayed, in MHz, on a segmented-filament digital readout located on the front panel. The first two digits indicate the tens and units of the frequency in MHz, and the last four digits indicate the remaining .9999 MHz to the nearest 100 Hz increment.

Three front panel knobs are used to tune the receiver through its operating range. The MHz switch is used to select the coarse operating frequency in one MHz discrete steps, a frequency selector/TUNE control is used to tune the remaining four digits to the nearest 100 Hz increment, and the fine TUNE control is used in conjunction with the front panel meter to tune the receiver to sync.

Complete local operation is implemented by using the controls located on the front panel of the receiver. Remote control options are also available.

The receiver has an internal speaker and audio outputs for an external speaker and 600 ohm audio lines for each sideband. Terminations are provided on the rear panel for applicable input and output connections.

1-2. TECHNICAL SPECIFICATIONS

Performance specifications and other reference data for the GPR-110 are given in Table 1-1.

TABLE 1-1. REFERENCE DATA

<u>CHARACTERISTIC</u>	<u>SPECIFICATION</u>
Operating Modes	AM, CW, and USB (LSB and ISB optional)
Tuning System	Manual, with 1 MHz increment selector switch and frequency selector/tune control, tuning the receiver to nearest 100 Hz increment. A fine-tuning control tunes the receiver to a sync condition.
Frequency Range	100 KHz to 30 MHz, continuous.
Display Presentation	6-digit, 7-segment numeric readout on front panel.
Stability	One part in 10^8 per day, after warmup.
Sensitivity	SSB, with 3 KHz passband: 0.5 uv from 400 KHz to 30 MHz for 10 db (S+N)/N. AM, with 6 KHz passband: 4.0 uv from 400 KHz to 30 MHz for 10 db (S+N)/N. CW, with 1 KHz passband: 5.0 uv from 400 KHz to 30 MHz for 10 db (S+N)/N.
Image Rejection	First image: 100 db Second image: 70 db
IF Rejection	100 db
Intermodulation	35 db minimum (meets CCIR recommendations).
Opposite Sideband Rejection	Greater than 50 db at 300 Hz.
IF Selectivity	SSB: 300 - 3000 Hz at 3 db points. AM: Nominal 12 KHz, symmetrical at 3 db points in wideband. Optional selection of 6, 3, 1, and .4 KHz passbands.

TABLE 1-1. REFERENCE DATA (cont)

<u>CHARACTERISTIC</u>	<u>SPECIFICATION</u>
IF Ripple Response	SSB: Within 3 db absolute.
Independent IF AGC	In ISB mode only: Each sideband IF section has a partially independent AGC system to minimize cross-channel AGC capture problems.
Automatic Gain Control (AGC)	Switchable: FAST Attack 20mS Decay 100mS
	SLOW Attack 40mS Decay 2 Sec
	Threshold: Nominal 1 uv input signal; 3 KHz passband.
	Loop Error: Less than 6 db change in audio output for 1 uv to 500 mv variation in input signal.
Squelch	Threshold voltage is variable according to lowest incoming signal level.
Beat Frequency Oscillator (BFO)	Selection of variable or fixed frequency.
	Variable: 250 KHz \pm 1000 Hz
	Fixed: 250 KHz
Metering	Front panel RF/Audio/Sync meter with three scales.
Input Impedance	50 ohms nominal, unbalanced. Additional impedance values with RF matching units available for LF/MF antennas.
Outputs:	
Internal Monitor Speaker	Switchable: LSB, USB, or AM.
External Monitor Speaker Output	3 watts; less than 1% distortion at one watt.

TABLE 1-1. REFERENCE DATA (cont)

<u>CHARACTERISTIC</u>	<u>SPECIFICATION</u>
600 ohm Balanced Outputs	Adjustable to +10 dbm.
Phone Jack	Mutes internal monitor speaker when headphone connected.
Primary Power	
AC Input	115/230 vac, 50/60 Hz, single phase.
DC Input	12 vdc, negative ground. Provided with reverse polarity protection.
Input Power	Synthesized ISB Model: AC operation: 60 watts Battery operation: 40 watts

1-3. PHYSICAL DESCRIPTION

a. EXTERNAL DESCRIPTION. The GPR-110 is packaged for rack-mounting in a standard 19-inch rack unit or a table-top cabinet. The rack-mounted model is 19 inches wide, by 7 inches high, by 19-1/4 inches deep; the dimensions of the cabinet model are 16-3/4 inches wide, by 7 inches high, by 19-1/4 deep.

The front panel contains the controls and indicators used to operate the unit. The rear panel has input and output connectors for routing of various signals; a lamp test pushbutton; two fuse-holders for the power fuses; and line gain controls for USB and LSB audio line outputs.

b. INTERNAL DESCRIPTION. The main chassis contains two printed circuit mother boards, mounted back-to-back and hard-wired to the receiver. These two boards contain the printed circuit assemblies for the Digital Logic and Control Section, and the Audio Section. Each printed circuit assembly slides in a guide track, and plugs into one of the mother boards to form a positive connection. The chassis also contains the Preselector Section, Front End Section, Front Panel Assembly, and the Power Supply Section.

REPLACEABLE ASSEMBLIES

<u>Reference Symbol</u>	<u>TMC Part Number</u>	<u>Description</u>
Z101	A4959	Readout Display Assembly
Z102	A4955	Digital Counter Assembly
Z103	A4958	MHz Display/Divider Assembly
Z104	A4956	Comparator Assembly
Z105	A4951	Memory Assembly
Z106	A4952	3-12 MHz Generator Assembly
Z107	A4953	Sample Divide/Phase Detector Assembly
Z108	A4954	Mixer/Divider Assembly
Z109	A4957	Mixer/Oscillator Control Assembly
Z110	A4950	100 Hz Synthesizer Assembly
Z111	A4960	Digital Logic Mother Board
Z112	A4961-1	Symmetrical Filter (.4 kHz, 1 kHz) Assembly
Z113	A4961-2	Symmetrical Filter (3 kHz, 6 kHz, WB) Assembly
Z114	A4962	Audio Assembly
Z115	A4963-1	USB Filter Assembly
Z116	A4963-2	LSB Filter Assembly
Z117	A4964	Sync/AFC Assembly
Z118	A4965	BFO Assembly
Z119	A4966	Audio/Filter Mother Board
Z120	A4978	Preselector Assembly
Z201	A4970	Power Supply Assembly
Z202	A4972	1 MHz Standard Assembly
Z301	A4977	Tunable IF Assembly
Z302	A4971	160.5 MHz Oscillator Assembly
Z303	A4979	Sample Mixer Assembly
Z304	A4976	163.5 - 192.5 MHz Oscillator Assembly
Z305	A4973	IF Output Mixer Assembly
Z306	A4975	Difference Amplifier Assembly
Z307	A4974	RF Input Mixer Assembly

SECTION 2

INSTALLATION

2-1. GENERAL

The GPR-110 receiver is shipped from the factory in a crated box, as shown in figure 2-1 (typical equipment packaging) to insure maximum protection against damage in transit. This section outlines the unpacking, installation, inspection and pre-operation instructions, as well as power requirements and information which will aid the operator in the fabrication of external cables for use with the receiver.

Paragraph 2-2 details the uncrating and unpacking instructions; paragraph 2-3 contains guidelines for an initial visual inspection of the receiver; paragraph 2-4 lists the power requirements of the receiver; paragraph 2-5 gives detailed installation instructions, fabrication of external cables, and an overall wiring diagram showing interconnections of all the circuits of the receiver; and paragraph 2-6 contains a brief operating procedure to be used in determining if the receiver is operational and therefore undamaged internally during shipment.

2-2. UNCRATING AND UNPACKING INSTRUCTIONS

The following procedural steps outline general unpacking methods. These instructions should be adhered to when uncrating and unpacking the GPR-110 receiver to insure prevention of injury to personnel or damage to equipment. Before beginning the uncrating procedure, inspect the outside of the crate and note any damage which may show evidence of possible damage to the equipment during transit. With respect to damage for which the carrier is liable, the Technical Materiel Corporation will assist in describing methods of repair and furnishing of replacement parts.

- a. Cut wire straps or steel bands from around the crate with a pair of tin snips.

WARNING

Insure that all personnel are in proper position to avoid injury from backlash of the straps or hands when they are cut.

- b. Carefully remove the nails from three sides of the crate.

NOTE

Anticipating the possibility of reshipment of the receiver to a new location, it is suggested that the crate and packaging materials be retained and stored for future use.

- c. Open the outer carton and remove the inner carton. Check for loose items before storing the outer carton. Remove the moisture-proof paper from the inner carton.

- d. Carefully open the inner carton.

CAUTION

Exercise extreme care not to damage or mar the equipment while opening the inner carton.

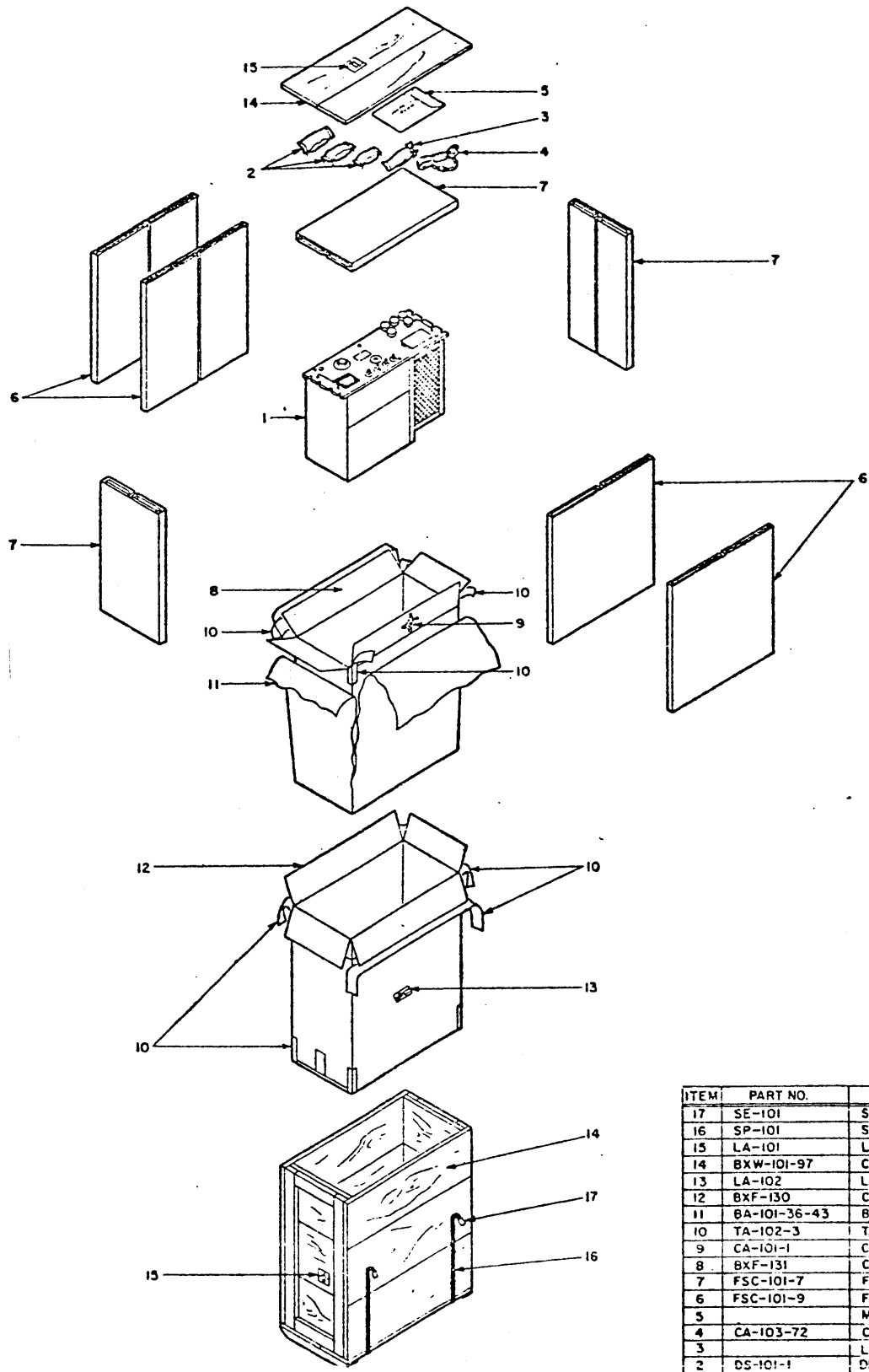
- e. Carefully remove the equipment from the inner carton. Check for loose items before storing the inner carton. Table 2-1 lists all loose items which are included with the receiver.

NOTE

Where applicable, remove the following:

1. Corrugated cardboard inserts
2. Barrier bags
3. Tape
4. Molded cushioning
5. Cellulose wadding
6. Tissue paper

- f. Check off items which have been unpacked on the packing list, or equipment supplied list.



ITEM	PART NO.	DESCRIPTION
17	SE-101	SEALS, STRAPPING
16	SP-101	STRAPPING, STEEL
15	LA-101	LABEL, FRAGILE
14	BXW-101-97	CONTAINER, SHIPPING
13	LA-102	LA-, METHOD II
12	BXF-130	CONTAINER, OUTER
11	BA-101-36-43	BAG, BARRIER
10	TA-102-3	TAPE, PRESSURE SENSITIVE
9	CA-101-1	CARD, HUMIDITY INDICATOR
8	BXF-131	CONTAINER
7	FSC-101-7	FIBERBOARD SHEET, CREASED
6	FSC-101-9	FIBERBOARD SHEET, CREASED
5		MANUALS, INSTRUCTION
4	CA-103-72	CORD, LINE
3		LOOSE ITEMS
2	DS-101-1	DESICCANT, 16 UNIT
1		MODULAR UNIT

2-3. INSPECTION

As soon as the receiver has been unpacked, it should be visually inspected for damage which may have occurred in shipping. Use the following procedural steps as a guide to determine the condition of the GPR-110, as well as the pre-operational checkout described in paragraph 2-6.

a. Visually inspect the receiver externally for dents, broken controls, scratches, etc.

2-4. POWER REQUIREMENT

The receiver is designed to operate from an ac power source of 115 vac + 10%, or 230 vac + 10% single phase, with a line frequency of 50 - 60 Hz, or a 12 volt dc source with a negative ground. The receiver requires 60 watts of continuous power when used on ac, and 40 watts continuous for dc operation.

The receiver is normally wired for operation on 115 vac power (see figure 2-2A) before being shipped from the factory, unless otherwise specified by the user. If the receiver is to be operated from a 230 vac source, the transformer primary windings must be re-wired as shown in figure 2-2B. Wiring for dc operation is shown in figure 2-2C. Terminal strip TB201 referred to in figure 2-2 is located at the front panel end of the underside of the Power Supply Section. (The cover plate must be removed to gain access.) The dc power input jack J201 is located on the rear panel of the receiver.

CAUTION

When operating the receiver on 230 vac, the ac fuse F201 must be changed from the 1.5 ampere rating to .75 ampere.

2-5. INSTALLATION

a. SITE SELECTION. In order to achieve optimum performance and ease of maintenance of the receiver, consideration must be given, before installing the receiver in its ultimate location, to the following factors:

(1) Accessibility. The receiver must be located so that an operator can comfortably reach all operating controls, and see all indicators, on the front panel. Sufficient clearance must be allowed around the unit so that the rear panel is accessible and the receiver can be removed for servicing.

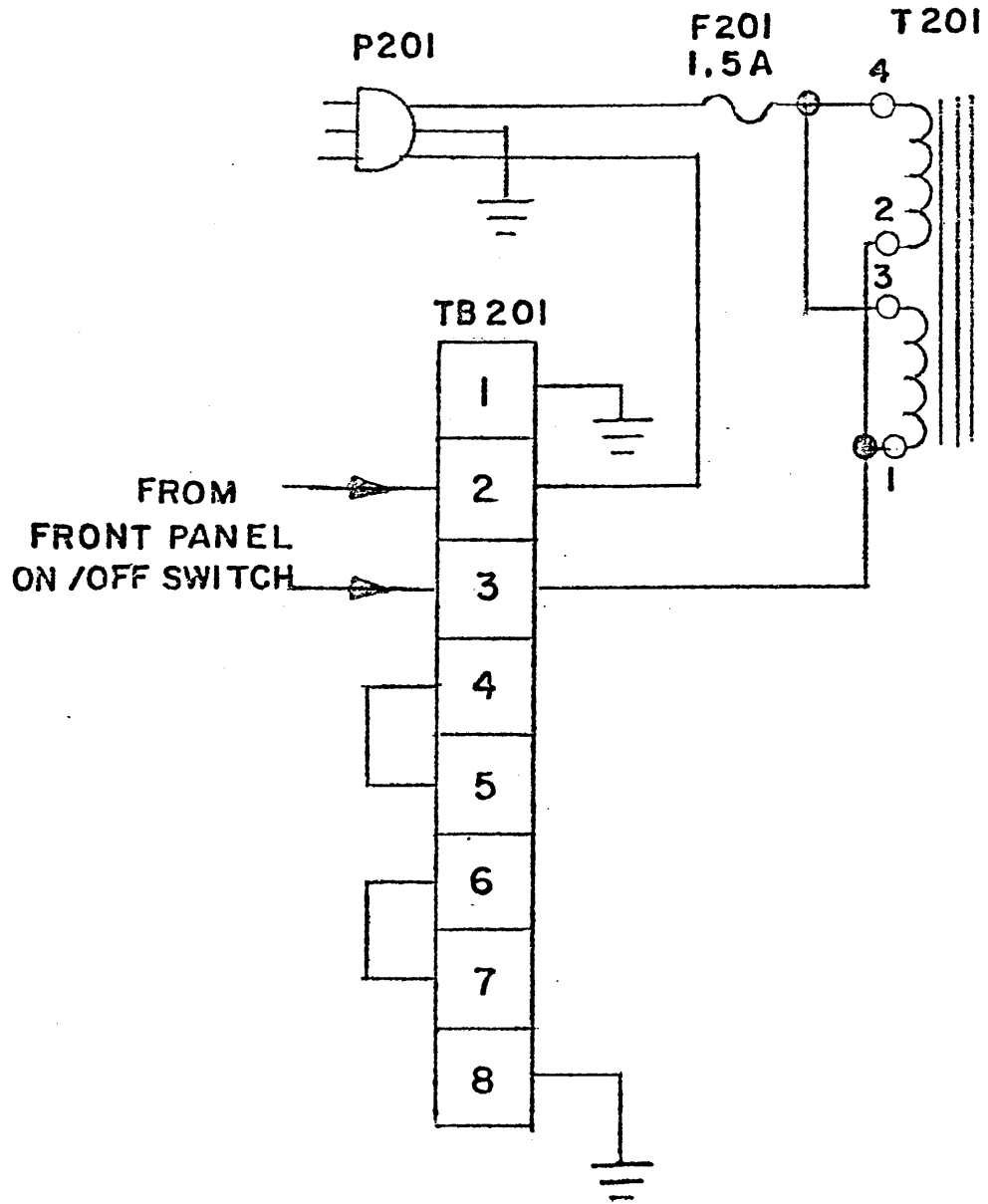


Figure 2-2A. Wiring for 115 vac Operation

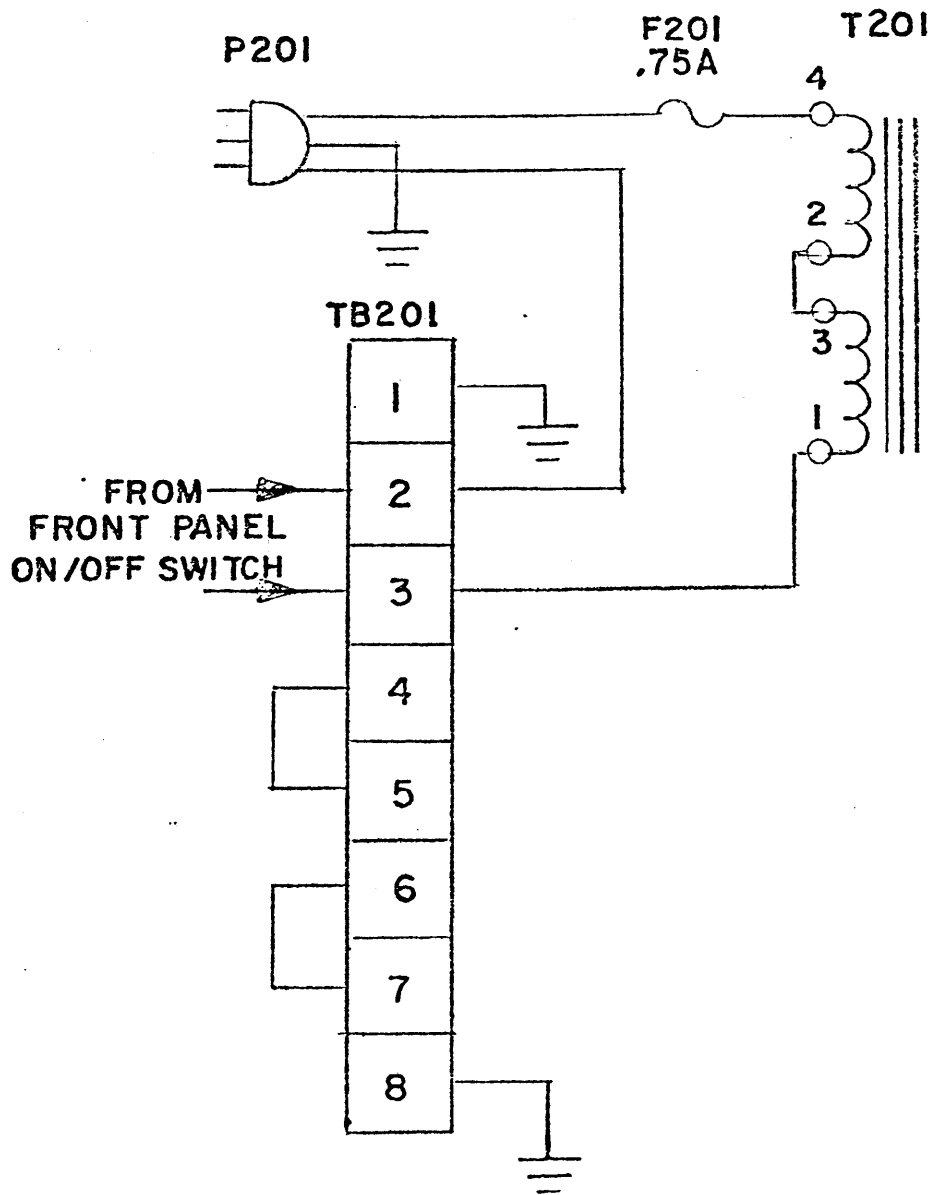


Figure 2-2B. Wiring for 230 vac operation

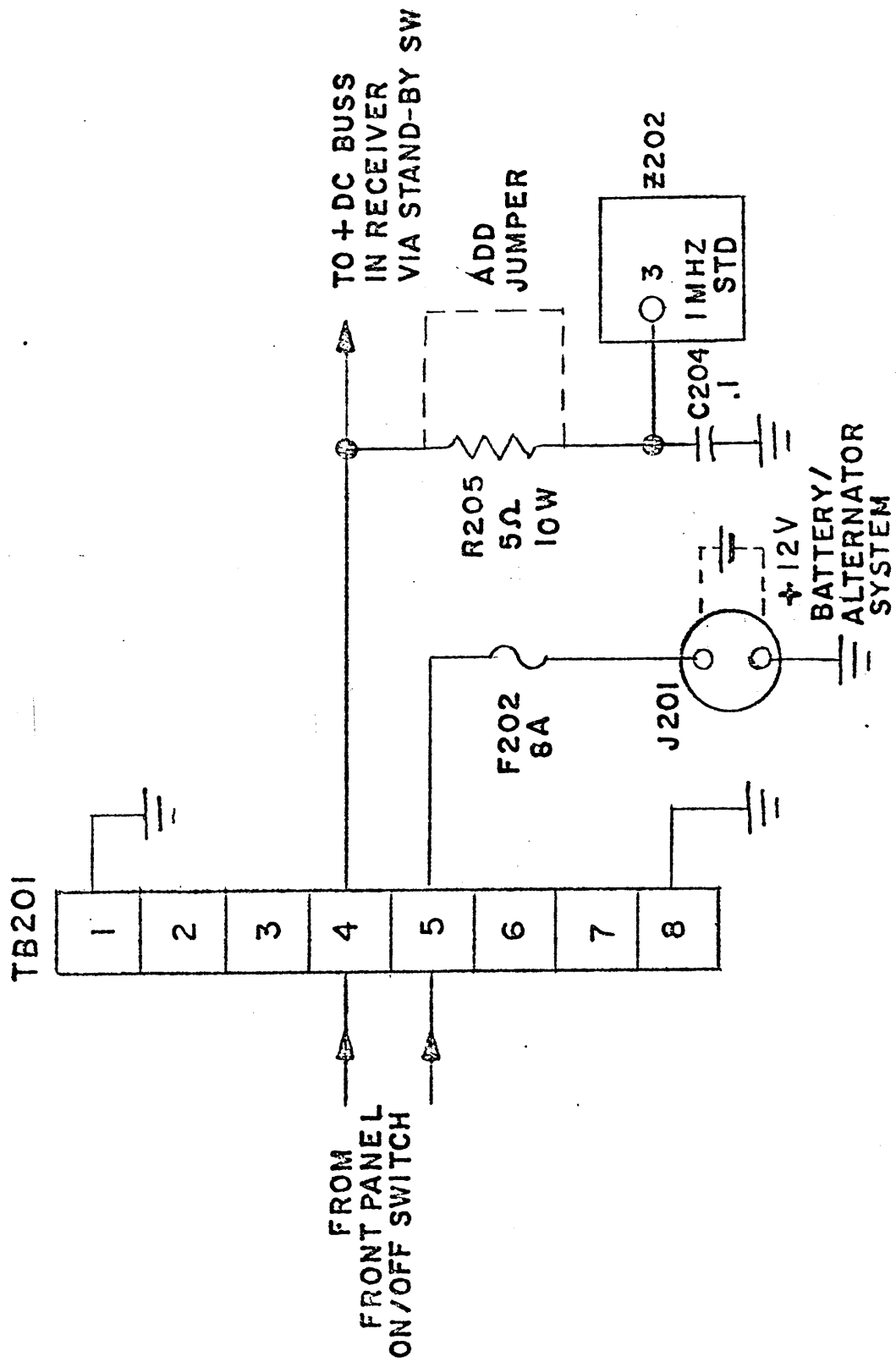


Figure 2-2C. Wiring for 12 vdc Operation

TABLE 2-1. LOOSE ITEMS SUPPLIED

<u>Quantity</u>	<u>TMC Part Number</u>	<u>Purpose</u>
1 each	PJ055	phone plug connection
6 each	UG88/U	coaxial BNC plugs for connection to the following connectors: ANTenna jack VFO INput jack 250 KC INput jack 250 KC OUTput jack 1 MC INput jack 1 MC OUTput jack

(2) Ventilation. To prevent heat build-up from the power transformer and various power transistors, sufficient clearance must be allowed to insure proper air circulation.

(3) Interference. To achieve optimum performance and ease of tuning, the GPR-110 should be located so that rf interference from other high-frequency equipment, and strong magnetic fields such as those generated by high power transformers, power lines, and motor-generator sets are kept to a minimum. Check that the third pin of the ac power line is grounded to eliminate power line conducted interference and static.

(4) Antenna. The type of antenna used with the GPR-110 receiver is dependent upon the location and the application for which the receiver is being used. In the selection and installation of an antenna, the user should refer to table 1-1, Reference Data, and take particular note of the sensitivity and input impedance characteristics of the receiver, in addition to the frequency range of the signals to be received. Selection of the antenna and its installation location, as well as supervision of the installation of the antenna and its transmission lines, should be made by an expert. This will insure that the input level to the receiver, even on the weakest signals, will meet the .5 microvolt sensitivity characteristic of the receiver. A coaxial antenna plug is provided as a loose item (see table 2-1), so that it can be assembled and connected to the end of the coaxial line from the antenna and plugged into ANT jack J104 on the rear panel of the receiver.

TABLE 2-2. REAR PANEL INPUT AND OUTPUT CONNECTORS

<u>ITEM</u>	<u>INDEX</u>	<u>FUNCTION</u>
ANTenna jack J104	1	Coaxial receptacle for connection of 50 ohm antenna to input of preselector assembly Z120.
Digital Mother Board Connector J102	2	Multi-pin connector for remote frequency control inputs and indicator outputs from the digital logic section of the receiver.
Audio Mother Board Connector J103	3	Multi-pin connector for remote bandwidth control inputs to the receiver, and line audio outputs to external equipment.

TABLE 2-2. REAR PANEL INPUT AND OUTPUT CONNECTORS (cont.)

<u>ITEM</u>	<u>INDEX</u>	<u>FUNCTION</u>
EXT SPKR jack J105	4	2-pin polarized receptacle; connects audio output signal from the receiver to an external speaker via wired cable.
VFO IN jack J106	5	BNC coaxial receptacle for connection of external variable frequency oscillator to input of the Tunable IF Assembly, when required.
250 KC IN jack J107	6	BNC coaxial receptacle for connection of external source of 250 KHz signal into the USB, LSB, and Symmetrical Filter Assemblies, when required. During normal operation, the 250 KHz signal from the receiver's Tunable IF Assembly is routed to this jack from the 250 KC OUT jack J108 via a coaxial jumper.
250 KC OUT jack J108	7	BNC coaxial receptacle for connection of 250 KHz IF signal output from the receiver's Tunable IF Assembly. During normal operation, this 250 KHz output signal is routed to the 250 KC IN jack J107 via a coaxial jumper.
1 MC IN jack J109	8	BNC coaxial receptacle for connection of external 1 MHz standard in place of the receiver's internal 1 MHz standard.
1 MC OUT jack J110	9	BNC coaxial receptacle for connection of coaxial jumper to 1 MC IN jack J109, routing the 1 MHz signal from the internal standard to various circuits in the receiver.

TABLE 2-2. REAR PANEL INPUT AND OUTPUT CONNECTORS (cont)

<u>ITEM</u>	<u>INDEX</u>	<u>FUNCTION</u>
BATTERY jack J201	10	2-pin receptacle for connection of 12 vdc battery.
P201	11	AC power plug for connection to AC power line (115 vac or 230 vac).

b. MECHANICAL INSTALLATION. The GPR-110 table model receiver is installed on a workbench, with sufficient workspace around the receiver for ventilation, and any accessories which may be required for use with the receiver. The rack-mount unit is installed in a system equipment rack by performing the following procedural steps:

(1) Mount the slide tracks, when supplied as a loose item, on the inside walls of the rack at the height prescribed by the system installation drawing, using the hardware (machine screws and star washers) provided as loose items.

(2) Pull out to its full length the extendable section of each slide track.

WARNING

BEFORE ATTEMPTING TO INSTALL THE RECEIVER IN THE SYSTEM RACK, INSURE THAT THE RACK WILL NOT TIP FORWARD AND INJURE PERSONNEL OR DAMAGE THE EQUIPMENT, BY BOLTING THE RACK TO THE FLOOR OR ASCERTAINING THAT THE RACK IS SUFFICIENTLY WEIGHTED AT THE BOTTOM BY PREVIOUSLY INSTALLED UNITS OF THE SYSTEM TO OFFSET THE SHIFT IN CENTER OF GRAVITY WHEN THE RECEIVER IS PLACED ON THE EXTENDED SLIDE TRACKS.

(3) Position the unit-mounted sections of the slides in the tracks of the rack-mounted sections, and slide the receiver into the rack until the release buttons of the slides engage the holes in the tracks.

(4) Insure that one end of the coaxial jumper (located on rear panel) is connected to the 250 KC OUT jack J108, and the other end to the 250 KC IN jack J107.

(5) Insure that one end of the coaxial jumper (located on rear panel) is connected to the 1 MC OUT jack J110, and the other end to the 1 MC IN jack J109.

c. ELECTRICAL INSTALLATION. For electrical installation of the GPR-110 receiver refer to figure 2-3, which locates the input and output connectors on the rear panel, and to table 2-2, which lists the function of each connector shown in figure 2-3. Reference should also be made to figure 2-4, the interconnect wiring diagram for the receiver, and to paragraph 2-5 d for fabrication of cables required for specific installations. Electrically install the receiver by performing the following procedural steps.

(1) Connect the antenna cable to the ANT input jack J104. (Refer to paragraph 2-5 d (1) for cable fabrication.)

(2) If an external speaker is to be used, connect the external speaker cable to EXT SPKR output jack J105. (Refer to paragraph 2-5 d (2) for cable fabrication.)

(3) If remote control inputs, remote readback outputs, and/or audio line outputs are to be used, connect the remote cable(s) to J102 and J103. (Refer to paragraph 2-5 d (3) for cable fabrication.)

(4) If the receiver is to be operated on ac power, connect the ac line cord plug P201 to the power source receptacle. (Refer to paragraph 2-4 for receiver power requirements and ac wiring details.)

(5) If the receiver is to be operated on dc/battery power, connect the dc power cable to BATTERY input jack J201. (Refer to paragraph 2-5 d (4) for cable fabrication. Refer to paragraph 2-4 for receiver power requirements and dc wiring details.)

(6) Pass the ac line cord of the receiver through the rear opening of the rack. Turn the knobs of the panel locks on the receiver panel counterclockwise to their extreme CCW position. Depress the release buttons on the slides, and push the receiver all the way into the rack until the receiver panel is flush with the rack panel. Turn the panel lock tabs clockwise, and turn the panel lock knobs clockwise until they are tight.

d. CABLE FABRICATION. The connectors which are required for the fabrication of external connection cables for the GPR-110 are either supplied in the loose items package (reference table 2-1), or supplied already connected on the rear panel to their mating jacks. When the receiver is shipped as a modular part of system, the external connection cables made directly to the receiver are a part of the system interconnect wiring. The technical manual for the system itself should be used in lieu of this paragraph for fabrication of external connection cables for the system.

(1) Remove the BNC coaxial plug (UG88/U) from loose items package and assemble the plug to a length of RG58/U coaxial cable long enough to reach the receiving antenna location. Connect the coaxial plug to ANT, jack J104.

NOTE

Use one continuous length of cable from the receiver to the antenna; splices in coaxial cable may change the impedance, standing wave ratio, or other characteristics of the cable.

(2) External Speaker Cable. Using a screwdriver or flat blade of a knife, carefully separate the polarized 2-pin plug from EXT SPKR jack J105. Solder the 2-pin plug to a length of 2-conductor speaker wire long enough to reach from the receiver to the location of the external speaker.

NOTE

Do not use low impedance cable, such as RG-58/U, to connect the receiver to the external speaker, as it will change the reflected impedance into the audio output transformer of the receiver, resulting in degradation of the frequency response.

(3) Remote Operation Cable. Using the two 22-pin connectors (located on rear panel) and multicolored insulated wires as required, construct a cable (or cables) long enough to reach from the GPR-110 receiver to the remote control/readback equipment and/or to the associated TTY terminal equipment. Refer to table 2-3 for wire run list of connections to J102 and J103.

NOTE

When wiring the connectors, be sure to connect the wires listed for J102 to the upper connector, and the wires for J103 to the lower connector.

The binary coded decimal (BCD) signal inputs required to tune the receiver must be generated by external bandswitches and binary level switches, and applied to the pins of connector J102. The signals from the remote readback portion of J102 must be applied to a digital readout assembly and display with six display tubes, such as the one used in the GPR-110 receiver or an equivalent NIXIE indicator with a BCD translator.

(4) DC Power Cable. Using a screwdriver or the flat blade of a knife, separate the polarized 2-pin plug from BATTERY jack J201 (refer to figure 2-3). Observe polarity and solder the plug on the end of two No. 14 wires long enough to reach the 12-volt battery or dc power source for the receiver.

2-6. PRE-OPERATIONAL CHECKOUT

Before installing the receiver in its permanent location, check that it is operative by performing the procedure outlined below:

a. After connecting an antenna to receiver jack J104 on the rear panel, plug the line cord into an appropriate power receptacle having the line voltage specified for the receiver (see paragraph 2-4, Power Requirement).

b. Release the STBY/REC pushbutton on the front panel of the receiver to the REC position by depressing one of the BANDWIDTH push-buttons.

c. Apply power to the receiver by turning the AF GAIN control clockwise. The numeric indicators on the front panel display light immediately; if they do not, press the TEST LAMP pushbutton S105 on the rear panel of the receiver. Each of the six display an "8", indicating that all filament segments are in proper operating condition.

CAUTION

If the lamps do not light when TEST LAMP push-button is pressed, turn power off and check fuses on rear panel.

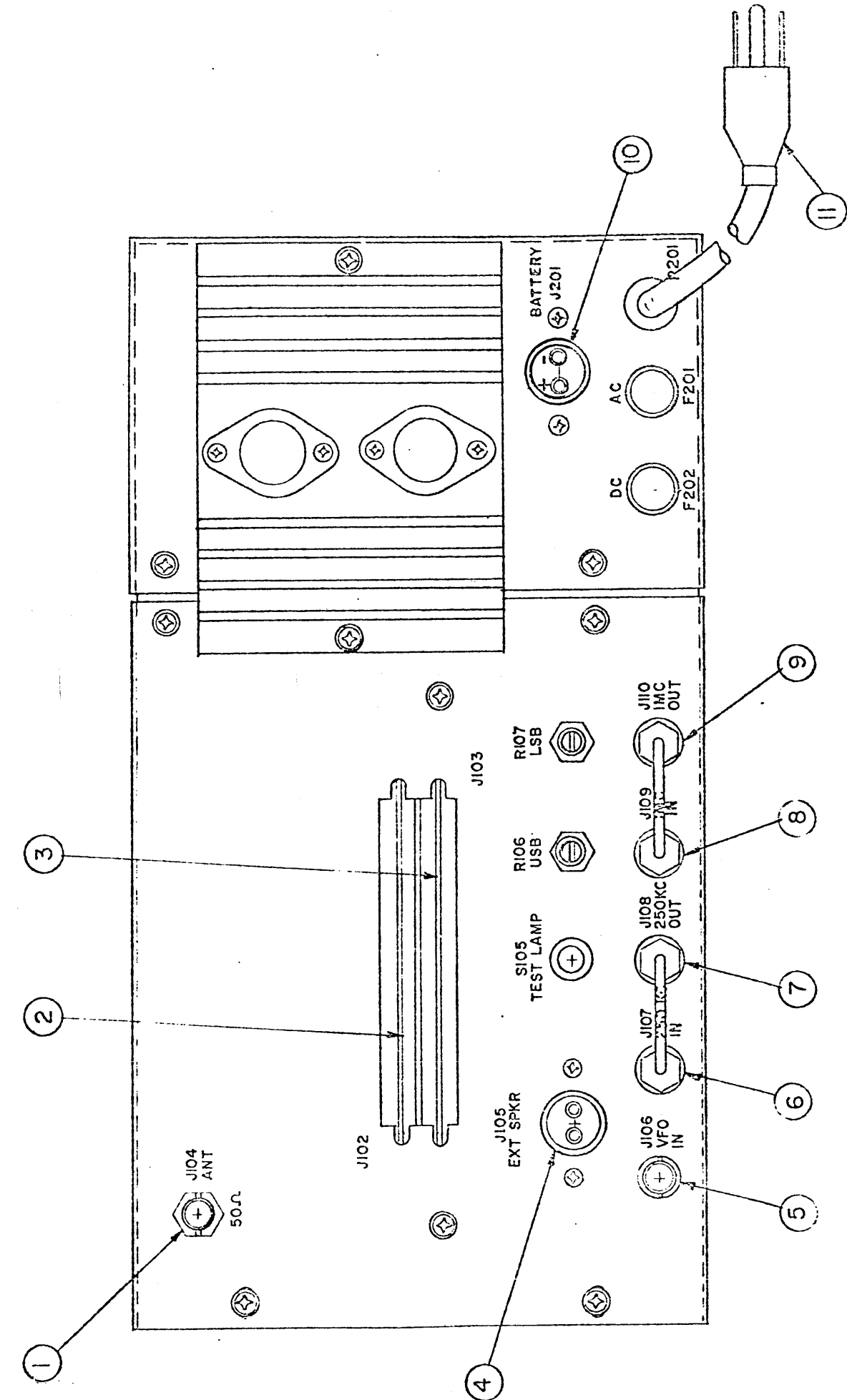
d. Follow the procedure in paragraph 3-3, AM Operation, and AM Tuning Procedure, of the same paragraph. Tune the receiver to any available local AM station, if there is no station in the area transmitting on the frequency given as an example in paragraph 3-3.

e. Turn the MHZ switch to each of its 32 positions while observing the first 2 digits of the numeric display. The numbers change from "00" through "29".

f. Depress and turn the frequency selector/TUNE control through all of its positions while observing the numeric display. The first number after the decimal, changes from "0" through "9". Release the frequency selector/TUNE control and turn it through its range while observing the numeric display. The last 3 digits each change from "0" to "9".

g. Set the MODE switch to CW, and the BFO pushbutton to the VAR position. Tune the MHZ switch and frequency selector/TUNE control to any CW station of known frequency in the area. Vary the BFO control to produce a tone in the speaker.

h. Shut the power off by turning the AF GAIN control to fully CCW position.



010743011

Figure 2-3. GPR-110 Receiver, Rear Panel

TABLE 2-3. WIRE RUN LIST FOR REMOTE CABLE

<u>Receiver Connection</u>	<u>Type of Signal</u>	<u>External Connection</u>
J102-1	8 line BCD, 1 khz readback	To a decoder/driver IC for a 1 khz display tube.
J102-2	1 line BCD, 1 khz readback	
J102-3	4 line BCD, 1 khz readback	
J102-4	2 line BCD, 1 khz readback	
J102-5	8 line BCD, 10 khz readback	To a decoder/driver IC for a 10 khz display tube.
J102-6	1 line BCD, 10 khz readback	
J102-7	4 line BCD, 10 khz readback	
J102-8	2 line BCD, 10 khz readback	
J102-9	8 line BCD, 100 khz readback	To a decoder/driver IC for a 100 khz display tube.
J102-10	1 line BCD, 100 khz readback	
J102-11	4 line BCD, 100 khz readback	
J102-12	2 line BCD, 100 khz readback	
J102-13	8 line BCD, 1 mhz readback	To a decoder/driver IC for a 1 mhz display tube.
J102-14	1 line BCD, 1 mhz readback	
J102-15	4 line BCD, 1 mhz readback	
J102-16	2 line BCD, 1 mhz readback	
J102-17	2 line BCD, 10 mhz readback	To a decoder/driver IC for a 10 mhz display tube.
J102-18	1 line BCD, 10 mhz readback	
J102-19	2 line BCD, .1 khz readback	To a decoder/driver IC for a .1 khz display tube.
J102-20	4 line BCD, .1 khz readback	
J102-21	1 line BCD, .1 khz readback	
J102-22	8 line BCD, .1 khz readback	
J102-A	2 line BCD, mhz control	From remote mhz control, six bit input control lines.
J102-B	4 line BCD, mhz control	
J102-C	8 line BCD, mhz control	
J102-D	16 line BCD, mhz control	
J102-E	32 line BCD, mhz control	
J102-F	+5 vdc supply output	To remote equipment, if required.
J102-H	Remote preset signal line (momentary ground)	From remote preset switch for mhz control.
J102-J	+9 vdc supply output	To remote equipment, if required.

TABLE 2-3. WIRE RUN LIST FOR REMOTE CABLE (cont.)

<u>Receiver Connection</u>	<u>Type of Signal</u>	<u>External Connection</u>
J102-K	_____	
J102-L	_____	
J102-M	_____	
J102-N	_____	
J102-P	_____	
J102-R	_____	
J102-S	* tune high input signal (ground)	From remote tune control.
J102-T	_____	
J102-U	* tune low input signal (ground)	From remote tune control.
J102-V	_____	
J102-W	_____	
J102-X	1 line BCD, mhz control	From remote mhz control, six bit input control lines.
J102-Y	mhz switch common input (ground)	From remote local/remote switch or receiver chas- sis ground.
J102-Z	_____	
J103-1	_____	
J103-2	AM mode selection input (ground)	From remote mode control.
J103-3	_____	
J103-4	_____	
J103-5	_____	
J103-6	_____	
J103-7	+20 vdc unregulated supply output	To remote equipment if required.
J103-8	Receiver disable input (ground)	From remote receiver disable switch.
J103-9	_____	
J103-10	_____	
J103-11	_____	
J103-12	_____	
J103-13	USB line audio output	To TTY terminal equip-
J103-14	(600 ohm)	ment.
J103-15		

TABLE 2-3. WIRE RUN LIST FOR REMOTE CABLE (cont.)

<u>Receiver Connection</u>	<u>Type of Signal</u>	<u>External Connection</u>
J103-16	LSB/ISB mode selection input (ground)	From remote mode control.
J103-17	LSB line audio input (600 ohm)	To TTY terminal equipment.
J103-18		
J103-19		
J103-20	=====	
J103-21	=====	
J103-22	=====	
J103-A	.4 KHz bandwidth selection input (ground)	From remote bandwidth control.
J103-B	1 KHz bandwidth selection input (ground)	
J103-C	3 KHz bandwidth selection input (ground)	
J103-D	6 KHz bandwidth selection input (ground)	
J103-E	wideband selection input (ground)	
J103-F	mode switch common input (ground)	From remote local/remote switch or chassis ground.
J103-H	chassis ground	
J103-J	chassis ground	
J103-K	chassis ground	
J103-L	=====	
J103-M	=====	
J103-N	=====	
J103-P	=====	
J103-R	=====	
J103-S	USB/ISB mode selection input (ground)	From remote mode control.
J103-T	=====	
J103-U	=====	
J103-V	=====	
J103-W	=====	
J103-X	=====	
J103-Y	=====	
J103-Z		

SECTION 3

OPERATION

3-1. GENERAL

The procedures for operating the GPR-110 receiver are discussed in detail in this section. In addition, two sub-sections cover both operator's maintenance procedures and the functions of all controls and indicators.

The GPR-110 operating frequencies are selected by controls on the front panel. The knob marked MHz controls the megahertz (MHz) increment of the desired frequency. By rotating this control and noting the indication on the digital readout, the correct MHz frequency is obtained. The large knob marked TUNE controls the remaining increments of the desired frequency below 1 MHz. By depressing this control and rotating it, the 100 KHz frequency position is incremented. Releasing the control and rotating it enables tuning to the nearest 100 Hz increment. A red "sync" light on the digital readout display turns on when the receiver is tuned to within 40 Hz of the incoming transmitter signal. The tuning control below the large tuning control is used with the front panel meter to fine tune the receiver to an "IN SYNC" condition. The same front panel meter is used to monitor the relative strength of both audio or RF signals.

Additional functions controlled at the front panel include:

- POWER ON/OFF
- AF GAIN WITH METERING
- STANDBY/RECEIVE
- IF BANDWIDTH SELECTION
- AUDIO SQUELCH
- OPERATING MODE SELECTION WITH METERING
- AUTOMATIC FREQUENCY CONTROL (AFC)
- BEAT FREQUENCY OSCILLATOR SELECTION AND TUNING
- AUTOMATIC GAIN CONTROL (AGC)
- AUTOMATIC NOISE LIMITING (ANL)
- METER FUNCTION SELECTION

3-2. CONTROLS AND INDICATORS.

All of the controls and indicators used in the operation of the receiver are mounted on the front panel. The operator should be familiar with them before attempting to operate the receiver. (Refer to Table 3-1 and descriptions.) The index numbers used in Table 3-1 correspond to the features indicated in Figure 3-1. Special attention should be given to the two rows of pushbuttons below the digital display. When

any pushbutton is pressed to the IN position, it activates the function which is marked above it. When it is released to the "OUT" position, it activates the function marked below it. If no function name is shown below the pushbutton, the function is considered to be "OFF".

The display lamp test button and all output adjustment controls are mounted on the rear panel of the receiver. (See Table 3-1 and corresponding locations in Figure 3-1.) The TEST LAMP pushbutton (S105) is used only when it is necessary to test the filament segments of the display tubes. The USB control (R106) or LSB control (R107) is used only when adjustment of each 600-ohm speaker line for remote control operation is required. The LSB control can be used only when the LSB option is included in the receiver.

TABLE 3-1. OPERATOR CONTROLS AND INDICATORS

<u>Control or Indicator</u>	<u>Index No.</u>	<u>Function</u>
Digital Readout Display	1	Indicates operating frequency in MHz to 4 decimal places.
AFC Indicator (LED IN DISPLAY)	2	Indicates when the receiver is tuned to within ± 40 Hz of the transmitted signal. Used in AFC to indicate "capture" range of the incoming carriers.
RF/Audio Level/Sync Meter	3	Monitors relative RF level of receiver by measuring AGC voltage when METER RF/AUDIO pushbutton is set to RF, and AFC pushbutton is set to "off". Monitors relative audio output level when METER RF/AUDIO pushbutton is set to "off". Monitors "In Sync" condition when SYNC switch is set to on.
SYNC switch	4	Connects the front panel meter to the meter amplifier in the SYNC/AFC circuit while the receiver frequency is being fine-tuned.
BFO control	5	Varies the pitch of the audio signal at the speaker or phones by adjusting the frequency of the beat frequency oscillator ± 1 KHz from IF center frequency.

TABLE 3-1. OPERATOR CONTROLS AND INDICATORS (cont.)

<u>Control or Indicator</u>	<u>Index No.</u>	<u>Function</u>
STBY/REC switch	6	When set to STBY, disables the digital display and the 12 Vdc line in the power supply (crystal oven in 1 MHz standard oscillator is not affected). When set to REC, activates all receiver circuits.
.4 KHz, 1 KHz, 3 KHz, and 6 KHz BANDWIDTH push-buttons	7 thru 10 respectively	With any one pushbutton set "IN" (pressed in), changes the if bandwidth via the upper and lower sideband circuits. Pressing any of the pushbuttons causes all other pushbuttons in this row, including the STBY/REC pushbutton, to release.
WIDE BANDWIDTH pushbutton	11	With this pushbutton set to WIDE (pressed in), provides wide if bandwidth via the upper and lower sideband cards.
AFC pushbutton switch	12	With this pushbutton set to AFC, the AFC circuit locks the receiver frequency to that of the incoming carrier and continuously compensates for any drift in the transmitter frequency. (Used only with a signal which has a carrier.)
BFO pushbutton switch	13	With this pushbutton set to FXD, the frequency of the BFO is fixed at 250 KHz. When it is set to VAR, the pitch of the audio can be varied ± 1000 Hz.

TABLE 3-1. OPERATOR CONTROLS AND INDICATORS (cont.)

<u>Control or Indicator</u>	<u>Index No.</u>	<u>Function</u>
AGC pushbutton switch	14	With this pushbutton set to FAST, the response to variations in signal level is relatively rapid (used especially when receiving CW signals). When set to SLOW, the slow compensating response provides more constant audio levels on voice reception.
ANL switch	15	With this pushbutton set to ANL position, the automatic noise limiting circuit provides a quieting effect to background noise and pulse-type transmission noise during low level reception.
METER RF/AUDIO switch	16	With this pushbutton set to METER RF, the meter on the front panel provides continuous monitoring of the relative rf level of the incoming signal. With the pushbutton set to AUDIO, the meter indicates the relative audio level. NOTE: The AFC and SYNC must be in the "OFF" positions to provide monitoring of either level.
METER USB/LSB switch	17	With this pushbutton set to METER USB, the operator can monitor the USB AUDIO level. When the switch is set to METER LSB, the audio signal from the lower sideband circuit can be monitored.
Frequency Selector/ TUNE control	18	By pressing knob in and rotating the third digit of frequency (100 KHz) is selected. By releasing knob and rotating the last 3 digits of the frequency are tuned.

TABLE 3-1. OPERATOR CONTROLS AND INDICATORS (cont.)

<u>Control or Indicator</u>	<u>Index No.</u>	<u>Function</u>
Frequency Selector/ TUNE control (cont.)	18	<p><u>NOTE</u></p> <p>The selector switch detent hits a mechanical stop at the last position. Turn the selector switch in the opposite direction to tune back through the band, or switch to the next higher/lower MHz frequency by rotating the MHz control.</p>
PHONES jack	19	Used to disconnect the speaker and monitor the audio output signal of the receiver by plugging in pair of low-impedance headphones.
AF GAIN control, AC OFF	20	Used to vary the volume of the audio signal to the internal/external speakers by attenuating it before it enters the Audio Assembly. Turning the control fully counterclockwise to the AC OFF position shuts off all line power to the receiver.
SQUELCH control	21	Adjusts the threshold voltage for the squelch circuit. If the rf voltage drops below the threshold level, the audio is disabled to avoid amplification of the resulting noise. Turning control clockwise, squelchs signals.
MODE selector switch	22	Selects the appropriate circuits for the type of signal being received. When set to AM, activates the amplifier and detector circuits in the USB card and applies a ground to the BANDWIDTH pushbuttons for selection of the appropriate symmetrical filter.

TABLE 3-1. OPERATOR CONTROLS AND INDICATORS (cont.)

<u>Control or Indicator</u>	<u>Index No.</u>	<u>Function</u>
MODE selector switch (cont.)	22	<p>When set to CW, a ground is connected to the BANDWIDTH pushbuttons to enable selection of the desired filter.</p> <p>When set to LSB, activates the 250 KHz amplifiers for lower sideband reception.</p> <p>When set to USB, activates the 250 KHz amplifiers for Upper sideband reception.</p> <p>When set to LSB, activates the 250 KHz amplifiers for upper and lower sideband reception.</p>
MHZ switch	23	<p>Used to select the operating frequency band in 1 MHz steps. Turning clockwise, the first switch position (00 band) in the shaded area is for broadcast frequencies in the range of 00.0000 to 00.9999 MHz; the 2nd band in the shaded area (01 band) is for broadcast frequencies from 01.0000 to 01.9999 MHz; the remaining switch positions cover SSB (or LSB) frequencies from 02.0000 to 29.9999 MHz, except for the last position before the shaded area, which covers SSB frequencies in the range from 00.0000 to 00.9999 (00 band). In all switch positions except the 2 broadcast positions, a broadcast filter in the preselector assembly is switched into the circuit.</p>
RF GAIN control	24	<p>Used to manually control the gain of the amplifiers in the IF, Tunable IF, and Audio assemblies.</p> <p>When the control is turned to the extreme CCW position (AGC), the switch disconnects the gain control and connects the AGC line to the AGC inputs of these assemblies instead.</p>

TABLE 3-1. OPERATORS CONTROLS AND INDICATORS (cont.)

<u>Control or Indicator</u>	<u>Index No.</u>	<u>Function</u>
Fine TUNE control	25	Used to fine-tune the receiver frequency by varying the frequency of the oscillator assembly on the SYNC/AFC.
<u>Rear Panel</u>		
TEST LAMP (S105)	26	Lights all segments of the display lamps simultaneously (all 8's).
USB control (R106)	27	Adjusts feedback loop to provide correct audio power level to 600-ohm speaker distribution line for USB channel.
LSB control (R107)	28	Adjusts feedback loop to provide correct audio power level to 600-ohm speaker distribution line for LSB channel.

3-3. OPERATING PROCEDURE

a. GENERAL. To turn on and operate the GPR-110 receiver, perform the following procedures. For best results and to prevent damage to the receiver, perform the steps within each procedure in the order given. For example, paragraph 3-3 d the rf and af gain should be turned down first, in order to avoid damage from an exceptionally strong signal to the front panel meter in case the AFC pushbutton is already in released position (meter connected).

The two major visual indicators of receiver performance are the Digital Readout Display and the RF/Audio/Sync Meter, both located on the front panel of the receiver. A general description of each is given in this paragraph, and a detailed description and function of each is included in table 3-1.

(1) Digital Readout Display- The operating frequency of the receiver is continuously displayed on a direct-reading 6-digit, 7-segment filament display. The display tubes are mounted behind a dark red plastic faceplate causing each incandescent filament segment to appear bright red. A light emitting diode (LED) tuning indicator is also mounted behind the red faceplate at the extreme right hand of the digital display. The digital readout displays frequency in Megahertz, to the nearest 100 Hz i.e., 00.0000 to 29.9999 MHz.

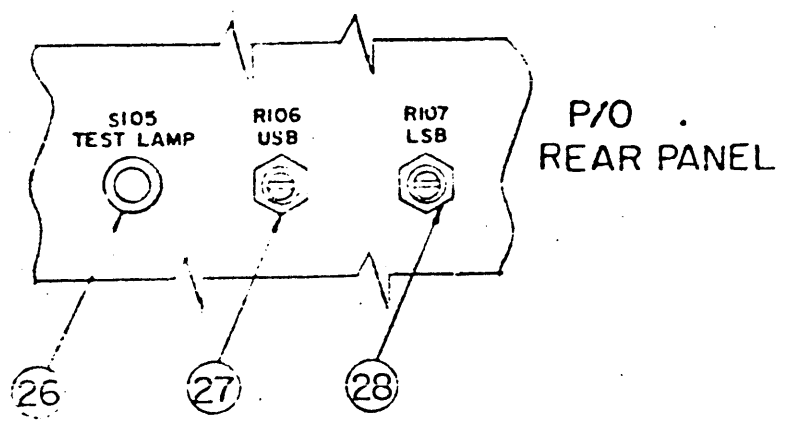
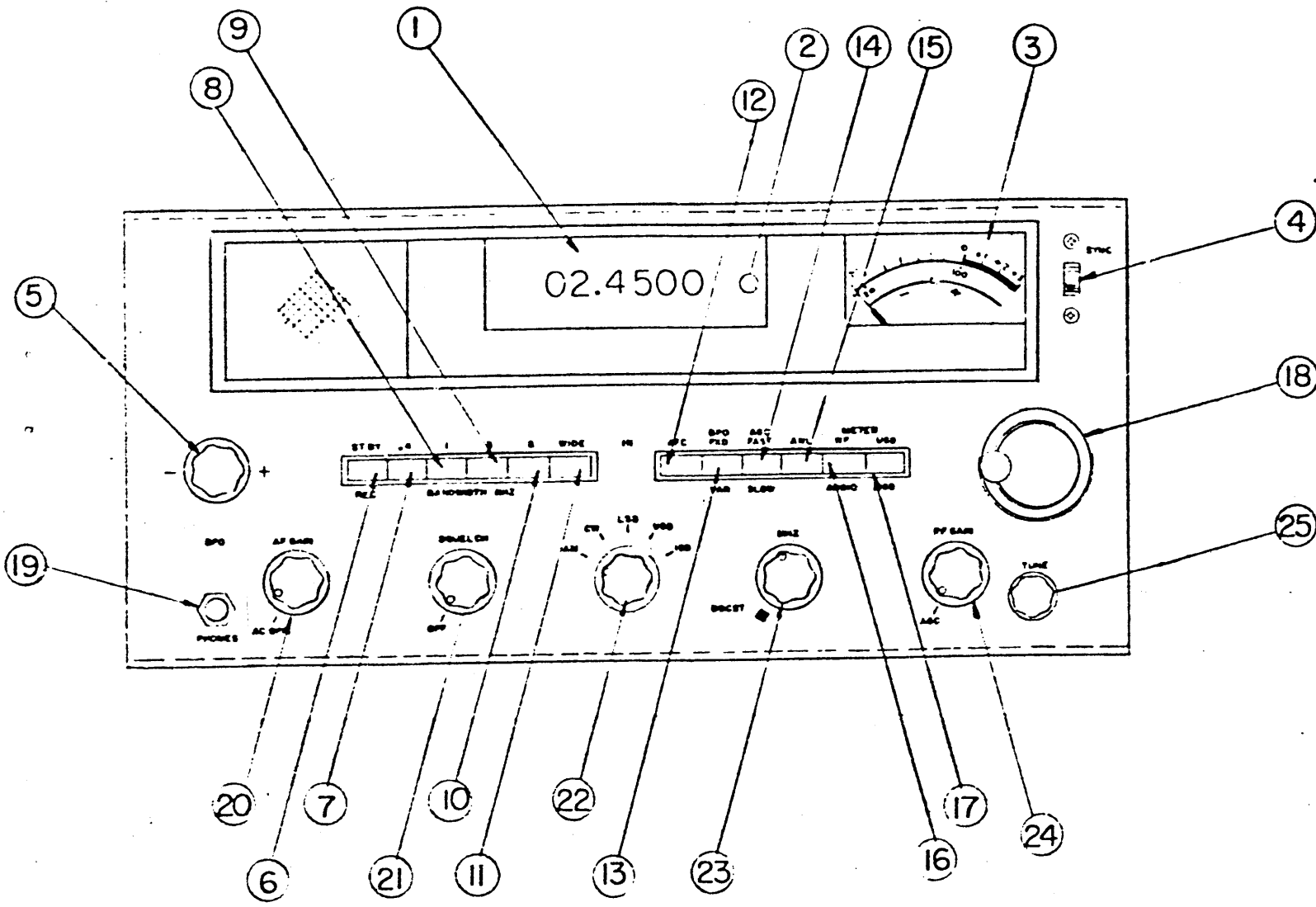


Figure 3-1. Controls and Indicators

(2) RF/Audio/Sync Meter - The front panel meter is utilized to monitor three separate circuit functions using three separate scales.

Top scale - indicates relative audio signal level. When METER pushbutton is set to AUDIO, it monitors the rectified output of the audio output amplifier circuit.

Middle scale - indicates relative rf signal strength. When METER pushbutton is set to RF, the meter is connected to the AGC amplifier in the Audio Assembly.

Lower scale - Indicates dc null from phase detector circuit in AFC assembly. When zero is obtained on the meter, it indicates that the receiver is tuned to the carrier frequency of the incoming signal.

b. START-UP PROCEDURE

(1) Turn AF GAIN control (20) clockwise until the receiver power comes on.

(2) Release STBY/REC pushbutton (6) to REC position by pressing in one of the BANDWIDTH KHz pushbuttons.

c. FREQUENCY SELECTION PROCEDURE

IMPORTANT

Each type of operation requires a different tuning procedure. Refer to the appropriate section before starting this procedure.

<u>Paragraph</u>	<u>Type Operation</u>	<u>Page</u>
3-3 d.	AM	3-10
e.	CW	3-11
f.	USB, LSB, LSB	3-13
g.	AFC	3-14

(1A) For AM reception only- Rotate the MHZ switch (23) clockwise to the first BDCST position if the frequency of the incoming carrier is between 00.0001 and 00.9999. Rotate the switch to the second BDCST position if the frequency is between 01.0000 and 01.9999.

(1B) For CW, USB, LSB and LSB reception - Rotate the MHZ switch (23) clockwise from the broadcast position until the first two digits of the signal frequency are displayed on the first two (left-hand) display positions to the left of the decimal.

(2) Depress and hold the knob of the frequency selector/TUNE control (18) to engage the 100 KHZ frequency selector switch. Turn the knob while observing the digital display (1) on the front panel of the receiver until the first digit to the right of the decimal agrees with that of the signal frequency. Release the knob and turn the TUNE control until all digits of the digital readout agree with those of the signal frequency.

NOTE

If no signal is present at the antenna, the receiver may still be tuned to the appropriate frequency. Once a signal is received steps (3) and (4) are performed to complete the tuning sequence.

During tuning, the RF Gain Control may be set to the AGC position. If greater sensitivity is required, adjust the RF GAIN control to obtain maximum signal strength on the RF meter (3) while maintaining minimum background noise. Adjust the AF GAIN control to a comfortable level in the speaker or headphones.

(3) Turn the TUNE control for maximum reading on the middle scale (rf) of the front panel meter.(3). Note this maximum reading, and the approximate setting of the RF GAIN control for later comparison during performance tests of the receiver.

(4) Set the SYNC switch (4) to SYNC. While observing the front panel meter, turn the fine TUNE control (25) to obtain zero on the bottom scale. The receiver is now tuned to the desired signal frequency.

d. AM OPERATION

(1) Set MODE switch (22) to AM.

(2) Turn AF GAIN control to midrange.

(3) Turn RF GAIN control (24) to AGC position or midrange. Release AFC pushbutton (12) to "off" position.

CAUTION

When tuning the receiver with AFC pushbutton set to "off", the RF GAIN or AF GAIN control must be adjusted as low as necessary to avoid "pegging" the meter needle.

- (4) Set the SYNC switch to "off".
- (5) Set the following pushbuttons to the positions indicated:

<u>Pushbutton</u>	<u>Position</u>
METER USB/LSB (17)	USB
METER RF/AUDIO (16)	RF
BFO (5)	FXD
ANL (15)	off
AGC (14)	SLOW
6 KHZ BANDWIDTH (10)	6 KHZ

- (6) Turn SQUELCH control fully counterclockwise to OFF.

- (7) Tuning Procedure-AM Reception.

- (a) Follow the procedure for FREQUENCY SELECTION described in paragraph 3-3c.

- (b) Turn the RF GAIN control fully CCW to the AGC position.

- (c) If the noise level between signals is too high, turn the SQUELCH control CW until the audio is disabled, then CCW to the point that enables the audio but not the noise between signals. If the noise level is still too high, or causes interference with the incoming signal, depress the ANL pushbutton (15) to the ANL position.

- (d) Set the SYNC switch to "off". Release the METER RF/AUDIO pushbutton to the AUDIO position. Note the relative strength of the audio level shown on the top scale of the front panel meter and the approximate settings of the AF GAIN and RF GAIN controls.

e. CW OPERATION

- (1) Set the MODE switch to CW.

(2) Turn the AF GAIN control to midrange.

(3) Turn RF GAIN control (24) to AGC position or midrange.
Release AFC pushbutton (12) to "off" position.

CAUTION

When tuning the receiver with AFC pushbutton set "off", RF GAIN or AF GAIN must be adjusted as low as necessary to avoid "pegging" the meter needle.

(4) Set the SYNC switch to "off".

(5) Set the following pushbuttons to the positions indicated:

<u>Pushbutton</u>	<u>Position</u>
METER USB/LSB (17)	USB (LSB if optional mode is in use)
METER RF/AUDIO (16)	RF
BFO (5)	FXD
ANL (15)	off
AGC (14)	FAST
6 KHz BANDWIDTH (10)	6 KHz

(6) Turn the SQUELCH control fully CCW to OFF.

(7) Tuning Procedure - CW Reception.

(a) Follow the procedure for FREQUENCY SELECTION described in paragraph 3-3c.

(b) Release BFO pushbutton to VAR. Adjust BFO control (5) to obtain a comfortable audio tone in the headphones or speaker.

(c) Depress the lowest frequency BANDWIDTH pushbutton which will obtain maximum noise attenuation with minimum audio frequency distortion.

(d) Set RF GAIN control fully CCW to AGC position.

(e) Follow the procedure in paragraphs (c) and (d) of the Tuning Procedure - AM Reception page 3-11 (Squelch and ANL).

f. SIDEBAND OPERATION-USB, LSB OR ISB (OPTIONAL)

- (1) Set MODE switch (22) to USB, LSB or ISB as desired.
- (2) Turn AF GAIN control (20) to midrange.
- (3) Turn RF GAIN control (24) to AGC position or midrange.
Release AFC pushbutton (12) to "off" position.

CAUTION

When tuning the receiver with AFC pushbutton set to "off" (front panel meter is connected to RF, audio, or sync circuit), RF GAIN or AF GAIN control must be adjusted as low as necessary to avoid "pegging" the meter needle.

- (4) Set the SYNC switch to "off".
- (5) Set the following pushbuttons to the positions indicated:

<u>Pushbutton</u>	<u>Position</u>
METER USB/LSB (17)	USB or LSB (alternate for ISB)
METER RF/AUDIO (16)	RF
BFO (5)	FXD
ANL (15)	off
AGC (14)	FAST
3 KHz BANDWIDTH (9)	3 KHz

- (6) Turn SQUELCH control fully counterclockwise to OFF.
- (7) Tuning Procedure - USB, LSB or ISB Reception.
 - (a) Follow the procedure for FREQUENCY SELECTION described in paragraph 3-3c.

(b) Turn the RF GAIN control fully CCW to the AGC position.

(c) If the noise level between signals is too high, turn the SQUELCH control CW until the audio is disabled, then CCW to the point that enables the audio but not the noise between signals. If the noise level is still too high, or causes interference with the incoming signal, depress the ANL pushbutton (15) to the ANL position.

(d) Set the SYNC switch to "off". Release the METER RF/AUDIO pushbutton to the AUDIO position. Note the relative strength of the audio level shown on the top scale of the front panel meter and the approximate settings of the AF GAIN and RF GAIN controls.

(8) 600 ohm Line Output Adjustment (Remote Operation Only).

(a) Determine the power requirement, in dbm, of the auxiliary equipment (teletype, etc.) to be connected to the 600 ohm line output terminals.

(b) Connect the auxiliary equipment (or 600 ohm dummy load) and test equipment to the 600 ohm line output terminals.

(c) Obtain the required power level determined in step (a) above by adjusting the following rear panel controls:

- (27) for USB operation
- (28) for LSB operation
- (27) and (28) for ISB operation

g. AFC OPERATION

When a synthesized receiver is utilized to receive a transmission with a stable carrier and/or sidebands, an AFC circuit is not required. However, such an AFC circuit has been included in the design of the GPR-110 for the reception of a carrier with appreciable frequency drift. Under this latter condition use the following procedure:

(1) Depress the AFC pushbutton (12, figure 3-1) to the AFC position.

(2) Rotate the TUNE control back and forth until the light emitting diode (2) in the digital readout faceplate lights steadily. (The receiver is now tuned to the nearest 100 Hz increment of the incoming signal.)

(3) Set the SYNC switch to SYNC position. Turn the fine TUNE control back and forth until a zero reading on the sync meter is obtained. The receiver is now tuned to the frequency of the incoming signal, and the AFC system will track the drifting transmitted carrier.

NOTE

If the incoming carrier drifts more than 40 Hz away from the receiver setting, repeat steps (2) and (3) to sync the receiver with the carrier again.

h. SHUTDOWN PROCEDURE

Shut the receiver off by performing the following procedure:

- (1) Depress the STBY/REC pushbutton to the STBY position.
- (2) Turn the AF GAIN control to AC OFF (extreme CCW position).

NOTE

If the receiver is to be used within 24 hours, and the AC power is not required to be shut off for maintenance or repair of the receiver, leave the receiver turned on and set to standby so as to maintain heater power in the crystal oven of the 1 MHz Standard.

3-4. OPERATOR'S MAINTENANCE

The GPR-110 receiver should be periodically inspected for degraded performance, electrical, or mechanical malfunctions. If the equipment is operated on a fairly constant basis, this inspection should be performed during idle periods or shutdown.

The operator should visually inspect the front and rear panels of the receiver and ascertain that none of the knobs, controls, pushbuttons, switches, indicators, meters, connectors, or fuses are cracked or broken. If any component of the receiver shows signs of cracks, breaks, wear, aging, or overheating, it should be repaired or replaced as soon as possible. Perform the pre-operational procedure described in paragraph 2-6 to make certain that all controls and indicators are operating properly.

The operator should periodically run a performance check to ascertain whether the receiver meets the sensitivity and noise specifications listed in table 1-1.

Receivers mounted on system racks with equipment slides should be checked for snagging or pulling of cables, (cables should be rerouted if this occurs). Cable connections should be checked for intermittents, and repaired when necessary.