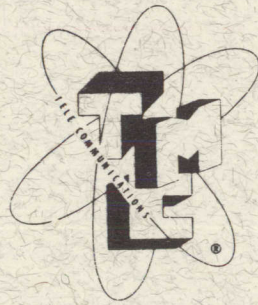


INSTRUCTION BOOK

**MASTER COPY**  
for  
**DO NOT DESTROY**

**COMMUNICATIONS  
RECEIVER**

**MODEL GPR-90-RX**



**THE TECHNICAL MATERIEL CORP.**

Mamaroneck, New York

Ottawa, Ontario

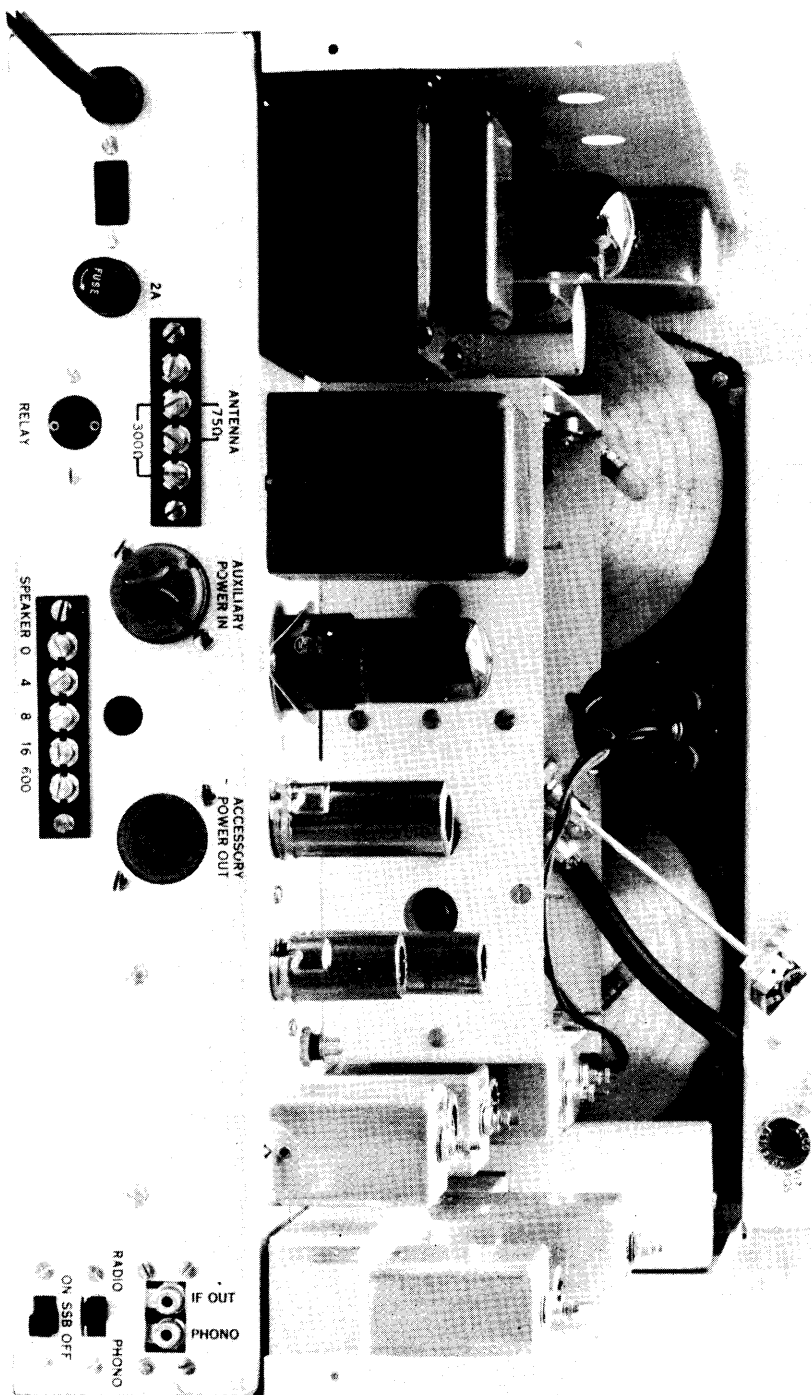
MF 102 2

MF 102 2



MF 102 2

MF 102 2



ANTENNA  
75Ω

AUXILIARY  
POWER IN

ACCESSORY  
POWER OUT

RADIO PHONO  
IF OUT  
PHONO

2A  
FUSE

RELAY

SPEAKER 0 4 8 16 6.00

ON SSB OFF

CHANGE #1

ERRATA

Make the following pen and ink corrections.

| <u>SYM.</u> | <u>PAGE</u> | <u>CHANGE</u>  |
|-------------|-------------|--|
| C13         | 5-5         | CM109D1601F to CM20D162F                                   |
| C27         | 5-6         | CM109D1800G to CM20D181G                                   |
| C28         | 5-6         | CM109D1001G to CM20D102G                                   |
| C33         | 5-6         | CM109D2200G to CM20D221G                                   |
| C34         | 5-6         | CM109D2000G to CM20D201G                                   |
| C35         | 5-6         | CM109D2000G to CM20D201G                                   |
| C39         | 5-7         | CM109D2200G to CM20D221G                                   |
| C41         | 5-7         | CM109D2401G to CM20D242G                                   |
| C44         | 5-7         | CM109D3000G to CM20D301G                                   |
| C49         | 5-7         | CM109D1001G to CM20D102G                                   |
| C51         | 5-7         | CM109D1001G to CM20D102G                                   |
| C55         | 5-7         | CM109D1001G to CM20D102G                                   |
| C58         | 5-8         | CM109D1001G to CM20D102G                                   |
| C62         | 5-8         | CM109D1001G to CM20D102G                                   |
| C64         | 5-8         | CM109D1001G to CM20D102G                                   |
| T9          | 5-23        | Change Sec. to read:<br>Sec. 600, 16, 8, 4 ohms, 5 w. max. |



## ADDENDUM

for

### MODEL GPR-90RX Crystal Selection

In order to better compensate for stray capacitances and make up frequency differences, the crystal formulas for the GPR-90RX have been revised as follows:

Paragraph 12. XTAL OPERATION should read as follows:

#### 12. XTAL OPERATION

No special connections are required for this mode of operation.

The frequency of the crystals required for use in this type of operation is determined as follows:

$F_o$  = Internal Oscillator Frequency

$F_x$  = Crystal Frequency

$F_s$  = Signal Frequency

A. Where the signal frequency lies between .54 and 5.6 mc

The oscillator frequency is

$$F_o = F_s + 0.455 \text{ mc}$$

The crystal frequency required is

$$F_x = 1.00005 \times F_o$$

Example: For a 1 mc signal the oscillator frequency would be:

$$F_o = 1.000 \text{ mc} + 0.455 \text{ mc}$$

$$F_o = 1.455 \text{ mc}$$

The crystal frequency then is

$$F_x = 1.00005 \times 1.45500 \text{ mc}$$

$$F_x = 1.45507 \text{ mc}$$

B. Where the signal frequency lies between 5.4 mc and 16.0 mc

The oscillator frequency is

$$F_o = F_x + 3.955 \text{ mc}$$

The crystal frequency required is

$$F_x = 1.00005 \times F_o$$

Example: For a 10 mc signal the oscillator frequency would be:

$$F_o = 10.000 \text{ mc} + 3.955 \text{ mc}$$

$$F_o = 13.955 \text{ mc}$$

The crystal frequency then is

$$F_x = 1.00005 \times 13.955 \text{ mc}$$

$$F_x = 13.95569 \text{ mc}$$

C. Where the signal frequency lies between 16.0 mc and 31.5 mc

The oscillator frequency is

$$F_o = F_s + 3.955 \text{ mc}$$

The crystal frequency required is

$$F_x = 1.00005 \times \frac{F_o}{2}$$

Example: For a 25 mc signal

The oscillator frequency would be

$$F_o = 25.000 \text{ mc} + 3.955 \text{ mc}$$

$$F_o = 28.955 \text{ mc}$$

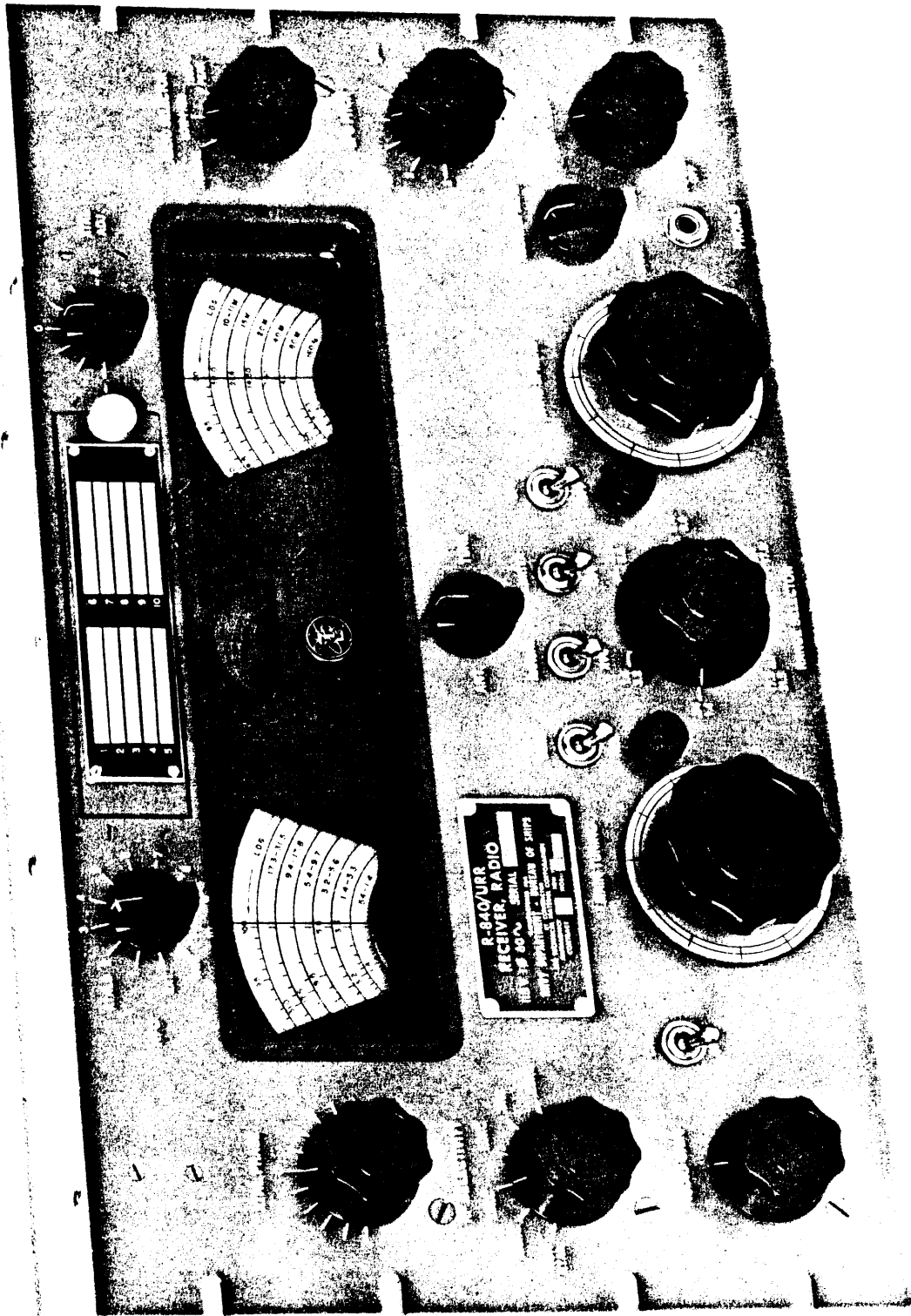
The crystal frequency then is

$$F_x = 1.00005 \times \frac{28.955 \text{ mc}}{2}$$

$$F_x = 1.00005 \times 14.4775 \text{ mc}$$

$$F_x = 14.47822 \text{ mc}$$

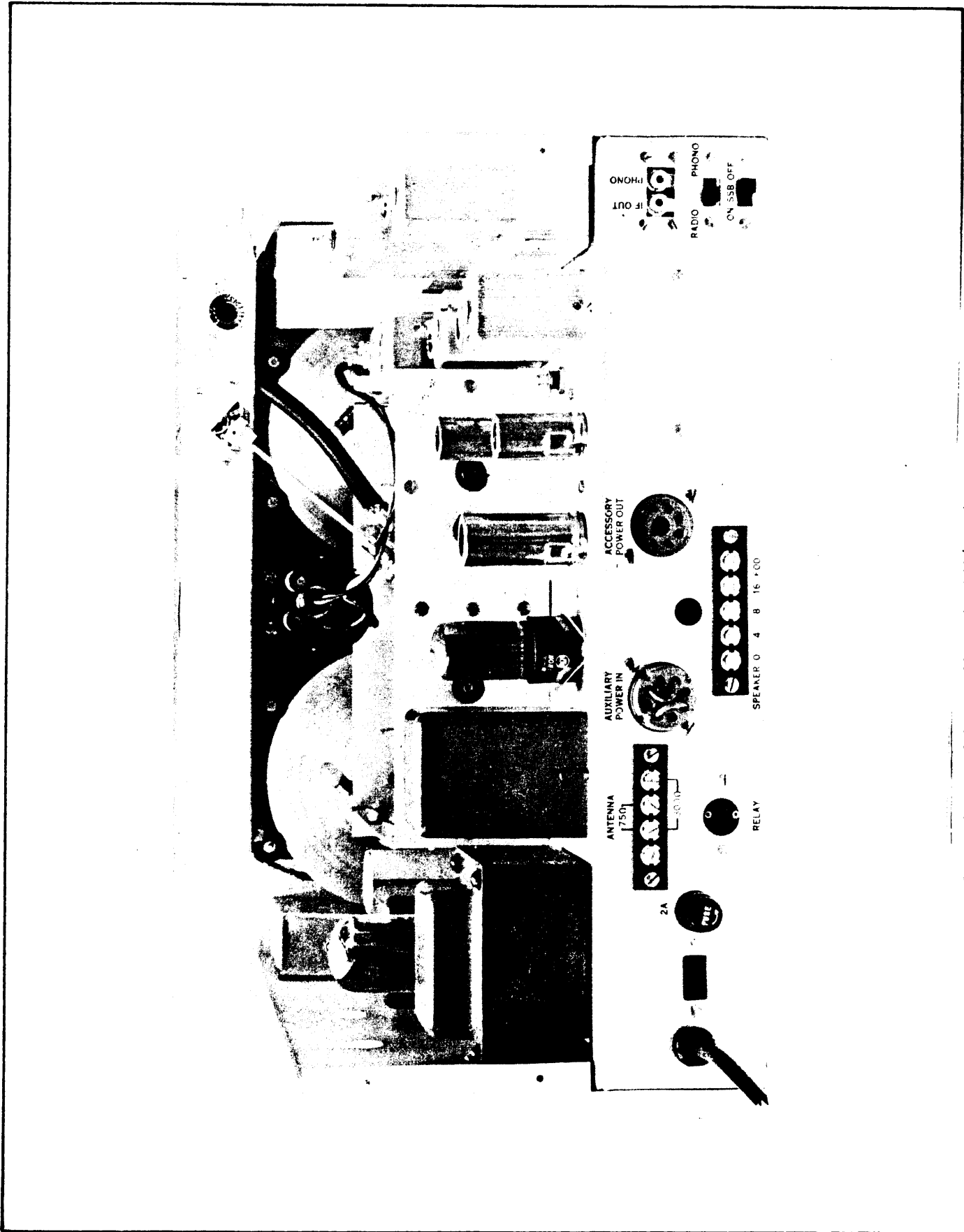
702



Front View Model GPR-90RX (R-840/URR)







Rear View Model GPR-90RX (R-840/URR)



**ADDENDUM**  
**for**  
**MODEL GPR-90(RX)**  
**(R-840/URR)**

The purpose of this addendum is to provide the necessary information required to operate the TMC Model GPR-90(RX).

In general the instruction book as written will apply to the GPR-90(RX) with the following

information to cover the added features of crystal and external oscillator operation.

The following information does not supercede but adds to the existing text of book.

**SECTION I**  
**GENERAL DESCRIPTION**

**I. DESCRIPTION**

The TMC Model GPR-90(RX), in addition to those features inherent in the GPR-90, provides 10 crystal positions for highly stable HFO and a connection for external oscillator. Additional controls are provided as follows:

**A. HFO switch**

(1) In the VAR position the receiver HFO is "ON" permitting variable (normal) operation.

(2) In the EXT position the receiver HFO is "OFF" permitting the use of an external os-

cillator, such as the TMC Models PMO (0-459/URT) or VOX (0-330/FR), as the HFO.

(3) In the XTAL positions, selection of any one of 10 predetermined fixed frequencies is possible.

**B. XTAL ADJ control**

(1) This control permits the "pulling" of the crystal frequency, to adjust for tolerance of the crystals and drift of the transmitter.

The GPR-90(RX) employs 17 tubes and is panel mounted measuring 19 in. wide x 10-1/2 in. high x 14 deep.

**SECTION II**  
**INSTALLATION**

**11. EXTERNAL OPERATION**

A stable external oscillator of 75 ohms output impedance with a minimum of 1 volt output is connected through a cable (consisting of RG-59/U with a UG-260/U connector) to J5, located adjacent to V17 on the amplifier crystal oscillator chassis.

The frequency of the external oscillator is determined as follows:

A. Where the signal frequency lies between .54 Mc and 5.6 Mc.

The external oscillator frequency is:

$$F_o = F_s + 0.455 \text{ Mc}$$

Example: For a 1 Mc signal the oscillator frequency would be;

$$F_o = 1.000 + 0.455 \text{ Mc} = 1.455 \text{ Mc}$$

B. Where the signal frequency lies between 5.6 Mc and 31.5 Mc.

The external oscillator frequency is:

$$F_o = F_s + 3.955 \text{ Mc}$$

Example: For a 25 Mc signal the oscillator frequency would be;

$$F_o = 25.000 + 3.955 = 28.955$$

where:  $F_o$  = Oscillator frequency

$F_s$  = Signal frequency

#### NOTE

THE EXTERNAL OSCILLATOR SHOULD BE TURNED "OFF" OR DISCONNECTED FROM THE RECEIVER WHEN NOT IN EXTERNAL OPERATION.

## 12. XTAL OPERATION

No special connections are required for this mode of operation.

The frequency of the crystals required for use in this operation is determined as follows:

$F_o$  = Internal oscillator frequency

$F_x$  = Crystal frequency

$F_s$  = Signal frequency

A. Where the signal frequency lies between .54 Mc and 5.6 Mc.

The oscillator frequency is:

$$F_o = F_s + 0.455 \text{ Mc}$$

The crystal frequency required is:

$$F_x = 1.00005 \times F_o$$

Example: For a 1 Mc signal the oscillator frequency would be;

$$F_o = 1.000 + 0.455 \text{ Mc} = 1.455 \text{ Mc}$$

The crystal frequency is:

$$F_x = 1.00005 \times 1.45500 \text{ Mc}$$

$$F_x = 1.45507 \text{ Mc}$$

B. Where the signal frequency lies between 5.4 Mc and 16.0 Mc.

The oscillator frequency is:

$$F_o = F_x + 3.955 \text{ Mc}$$

The crystal frequency required is:

$$F_x = 1.00005 \text{ Mc} \times F_o$$

Example: For a 10 Mc signal the oscillator frequency would be;

$$F_o = 10.000 \text{ Mc.} + 3.955 \text{ Mc.} = 13.955 \text{ Mc.}$$

The crystal frequency is:

$$F_x = 1.00005 \times 13.955 \text{ Mc.}$$

$$F_x = 13.95569 \text{ Mc.}$$

C. Where the signal frequency lies between 16.0 Mc and 31.5 Mc.

The oscillator frequency is:

$$F_o = F_s + 3.955 \text{ Mc}$$

The crystal frequency required is:

$$F_x = 1.00005 \times \frac{F_o}{2}$$

Example: For a 25 Mc signal the oscillator frequency would be;

$$F_o = 25.000 + 3.955 = 28.955 \text{ Mc}$$

The crystal frequency is:

$$F_x = 1.00005 \times \frac{28.955 \text{ Mc}}{2}$$

$$F_x = 1.00005 \times 14.4775 \text{ Mc}$$

$$F_x = 14.47822 \text{ Mc}$$

#### NOTE

TO MINIMIZE CONFUSION BETWEEN THE CRYSTAL FREQUENCY AND THE SIGNAL FREQUENCY IT IS SUGGESTED THAT THE SIGNAL FREQUENCY BE NOTED ON THE IDENTIFICATION PLATE ADJACENT TO THE NUMBER IDENTIFYING THE CRYSTAL POSITION.

## SECTION III OPERATION

### 4.a. SINGLE SIDEBAND OPERATION (XTAL AND EXT)

The equations used to determine the HFO frequency places the received signal in the center of the IF bandpass. When receiving SSB the sideband signal utilizes only a portion of the IF bandpass. The HFO should, therefore, be shifted approximately one half the IF bandwidth; plus for

upper sideband or minus for lower sideband signals, so as to place the sideband in the center of the IF bandpass.

### 6. VARIABLE (NORMAL) OPERATION

The receiver is operated as described for AM, CW and SSB when the HFO switch is in the VAR position.

## 7. EXTERNAL OPERATION

A. Tune the receiver to the desired frequency with the HFO switch in the VAR position.

B. Peak the ANTENNA TUNE control.

C. Place the HFO switch in EXT position.

D. A slight retuning of the receiver may be necessary.

## 8. XTAL OPERATION

A. Tune the receiver as in paragraph 7.A above.

B. Select desired crystal with HFO switch.

C. Trim the XTAL ADJ control, if necessary.

D. A slight retuning of the receiver may be necessary.

TABLE 5-1a VOLTAGE CHART

| TUBE     | VAR. POS. | SOCKET PIN NUMBERS |     |        |        |    |    |
|----------|-----------|--------------------|-----|--------|--------|----|----|
|          |           | 1                  | 2   | 3      | 4      | 5  | 6  |
| V17 6AG5 |           | 0                  | 0.8 | 3.2 AC | 3.2 AC | 70 | 90 |

TABLE 5-2a RESISTANCE CHART

| TUBE | VAR. POS. | 1        | 2 | 3   | 4   | 5  | 6  |
|------|-----------|----------|---|-----|-----|----|----|
|      |           | V17 6AG5 |   | 120 | 120 | 50 | 50 |

## 5.a. ELECTRICAL PARTS LIST

| SYM. | DESCRIPTION   | FUNCTION & LOCATION | TMC PART NO. |
|------|---|---------------------|--------------|
| C74  | CAPACITOR, fixed: ceramic; 30 mmfd., + 2%; 500 wvdc.  | Plate Coupling S13  | CC26CH300J   |
| C145 | CAPACITOR, fixed: ceramic; .01 mfd., +80-20%; 500 wvdc.   | Cathode Bias V17    | CC-100-16    |
| C146 | CAPACITOR, fixed: ceramic; 47 mmfd., ±10%; 500 wvdc.  | Screen Bypass V17   | CC21SL470K   |
| C147 | CAPACITOR, fixed: ceramic; .01 mfd., +80-20%; 500 wvdc.   | Screen Bypass V17   | CC-100-16    |
| C148 | CAPACITOR, fixed: ceramic; .01 mfd., +80-20%; 500 wvdc.   | B+ Decoupling V17   | CC-100-16    |
| C149 | CAPACITOR, variable: air dielectric; 1 section; 19 plates; 3.2 - 50 mmfd., 500 wvdc.                  | Xtal. Freq. Adj.    | CT-104-1     |
| J5   | CONNECTOR, receptacle: electrical; 1 female contact; 52 ohms; BNC type.                               | EXT HFO Input       | UG-625/U     |
| L36  | COIL, RF: 750 microhenries; ±20%; 100 ma. max. current; DC resistance approx. 17 ohms; bakelite body. | RF Choke V17        | CL-100-5     |

| SYM.              | DESCRIPTION   | FUNCTION & LOCATION    | TMC PART NO. |
|-------------------|---|------------------------|--------------|
| R98               | RESISTOR, fixed: composition; 120 ohms, ±10%; 1/2 watt.   | Cathode Bias V17       | RC20GF121K   |
| R99               | RESISTOR, fixed: composition; 47,000 ohms, ±10%; 1/2 watt.  | Grid Res. V17          | RC20GF473K   |
| R100              | RESISTOR, fixed: composition; 47 ohms, ±10%; 1/2 watt.  | Parasitic Supp. V17    | RC20GF470K   |
| R101              | RESISTOR, fixed: composition; 22,000 ohms, ±10%; 1 watt.  | Plate Load V17         | RC30GF223K   |
| R102              | RESISTOR, fixed: composition; 1,000 ohms, ±10%; 1/2 watt.   | B+ Decoupling V17      | RC20GF102K   |
| R103              | RESISTOR, fixed: composition; 22,000 ohms, ±10%; 1/2 watt.  | Screen Res. V17        | RC20GF223K   |
| R104              | RESISTOR, fixed: composition; 68 ohms, ±10%; 2 watts.   | EXT Input Res. J5      | RC42GF680K   |
| S12A,<br>B        | SWITCH, rotary: shorting; two sections; single pole; twelve positions; 30 deg angle of throw; Mycalex insulation; silver plated brass contacts and wipers; 1/4 in. diam shaft, 7/8 in. lg. from mtg. surface.           | HFO Switch             | SW-202       |
| S13               | SWITCH, rotary: non-shorting; one section; single pole; two positions; 30 deg. angle of throw; glass melamine insulation; silver alloy contacts and wipers; 1/8 in. diam shaft flated, 19/32 in. lg. from mtg. surface. | p/o HFO Switch         | SW-203       |
| V17               | TUBE, electron: sharp cutoff RF pentode; 7 pin miniature.   | Ampl. Xtal Osc.        | 6AG5         |
| XV17              | SOCKET, electron tube: 7 pin miniature.   | Socket for V17         | TS102P01     |
| XY4<br>thru<br>13 | SOCKET, crystal: .486'' spacing for .050'' pin diam.  | Socket for Y4 thru Y13 | TS-104-1     |
| Y4<br>thru<br>Y13 | CRYSTAL UNIT: quartz: ±.005%.<br>(Supplied only on customers request)   | HFO Xtal               | CR-18/U      |