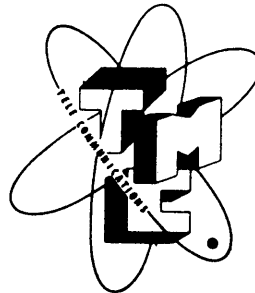


**TECHNICAL MANUAL**  
for  
**COMMUNICATION RECEIVER**  
**MODEL FFR**

**RECEIVER SET, RADIO**

**AN/FRR-49 (V)**

**AN/FRR-502**



**THE TECHNICAL MATERIEL CORPORATION**

**Mamaroneck, N. Y.**

**Ottawa, Ontario**

Approved 15 October 1956

## CHART OF NOMENCLATURE VS COMMERCIAL DESCRIPTION

NOMENCLATURE	NOUN	T.M.C. MODEL NUMBER
AN/FRR-49(V) AN/FRR-502 (see note)	Equipment, Receiver Set, Radio Consisting of: Receiver Subassembly R5007 and one or more of the TN's and if required CY5045A in any combination.	
R-5007/FRR-502	Receiver Subassembly	FFR-2
TN-5010/FRR-502	Tuner, R.F. (2-4 Mcs.)	FFRD-5
TN-5011/FRR-502	Tuner, R.F. (4-8 Mcs.)	FFRD-6
TN-5012/FRR-502	Tuner, R.F. (8-16 Mcs.)	FFRD-7
TN-5014/FRR-502	Tuner, R.F. (16-32 Mcs.)	FFRD-8
TN-274/FRR-502	Tuner, R.F. (50-100 Kcs.)	FFRD-1
TN-275/FRR-502	Tuner, R.F. (100-200 Kcs.)	FFRD-2
TN-276/FRR-502	Tuner, R.F. (200-400 Kcs.)	FFRD-3
TN-277/FRR-502	Tuner, R.F. (500 Kcs.)	FFRD-3M
CY-5045/FRR-502	Cabinet, Electrical Equipment	FFRDP
CY-5045A/FRR-502	Cabinet, Electrical Equipment	FFRDP-H

**NOTE:** Receiver Set, Radio AN/FRR-502 is a specific system consisting of the following:

1 each R5007/FRR-502  
 1 each TN5010/FRR-502  
 1 each TN5011/FRR-502  
 1 each TN5012/FRR-502  
 1 each CY5045/FRR-502

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Figure 1-1. Communication Receiver, Model FFR

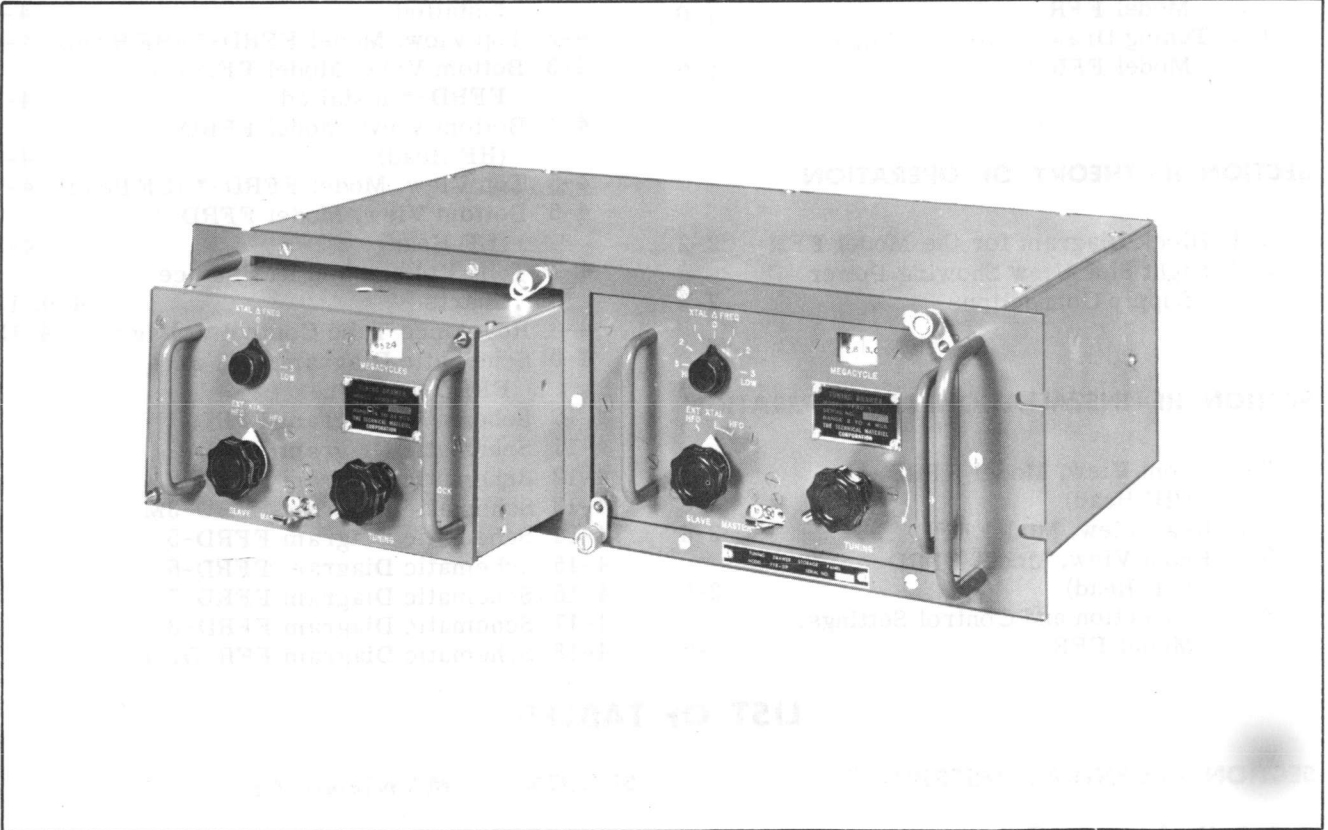


Figure 1-2. Tuning Drawer Storage Panel, Model FFR-DP

# SECTION I

## GENERAL DESCRIPTION

### 1. PURPOSE AND BASIC PRINCIPLES

The Model FFR Communication Receiver has been designed to fulfill the long existing need for a sturdy, easily tuneable, single frequency receiver, which will provide maximum flexibility and thoroughly dependable, unattended, continuous reception of AM radio telephone, CW telegraph or teletype, and MCW telegraph signals.

The design of this receiver is a departure from the conventional single channel receiver in that it provides for both crystal and VFO operation of the HFO and BFO. The front end is simply and accurately tuned by a single Frequency Tuning Dial with a vernier reduction ratio of 10 to 1, which permits maximum traverse speed and ease of operation. A specially designed input transformer provides an impedance matching circuit suitable for use with a straight wire antenna, a balanced doublet, and a 75 ohm unbalanced or 300 ohm balanced line.

The Model FFR is available in frequencies of 50 to 400 Kcs., 500 Kcs., and 2 to 32 Mcs. depending upon the tuning drawer used. These drawers are sturdily built and incorporate the 1st RF, 2nd RF, VFO, and Mixer circuits. This type of construction provides excellent shielding between stages and minimizes the difficulties usually encountered with this type of receiver.

When used in the TMC Model RCR Remote Control Receiver System, control of the HFO, BFO, and Sensitivity is accomplished on a tone basis; in addition, provision is made for ON/OFF control of the AVC and BFO. This feature is particularly useful when the receiver is to be used remotely for CW and phone operation. This remote control provides the following:

TUNING DRAWER	HFO SHIFT
FFRD-1,2,3	±2 Kcs.
FFRD-3M	±3 Kcs.
FFRD-5,6	±2 Kcs. per Mc.
FFRD-7	±1.5 Ksc. per Mc.
FFRD-8	32 Kcs. throughout the band.

The BFO shifts not less than ±2.5 Kcs. manually and remote control.

Output terminations are provided so that two receivers may be used in diversity for CW, FS

and Phone services, and either receiver may be used in the MASTER or SLAVE position by front panel switches in the BFO and HFO circuits. The AVC bus, HFO, BFO, IF, and Diode Load are all brought out to the rear of the receiver chassis for diversity inter-connection. When used in diversity, crystal control of the HFO and BFO is also possible, providing a very compact dual diversity system requiring only 10-1/2 inches of space.

### 2. DESCRIPTION OF UNIT

The Communication Receiver, Model FFR, is shown in Figure 1-1. The panel is 3/16 inches thick by 10 inches long and 5-1/4 inches high, and is finished in TMC grey enamel. The chassis extends 15 inches behind the panel and is supported to the panel on each side by brackets. The controls most often used are located on the front panel, while the terminal connections are located at the rear of the receiver chassis.

Facilities for remote control applications have been provided at the rear of the receiver. For short distance operations (within a one mile radius) a +4.5 volts D.C. applied separately to terminals 1 and 7 (on terminal strip E-102) and a -9.5 volts D.C. applied to terminal 8 of terminal strip E-101 will provide remote control of the HFO, BFO and RF GAIN respectively. Also, a toggle switch must be connected to the BFO ON/OFF terminals and turned to its ON position. For remote control by frequency shifted tones, the TMC Remote Control Receiver System, Model RCR is used to provide the necessary control functions. In addition, any remote control system, which provides the necessary D.C. voltages as mentioned above, may be used in conjunction with the Model FFR.

Vacuum tubes are readily accessible from the top of the Model FFR and are mounted in a vertical position. All components are so mounted that trouble-shooting and maintenance may be easily accomplished.

### 3. TECHNICAL SPECIFICATIONS

Frequency Range:

H.F. 2 to 32 megacycles in four bands.

L.F. 50 to 400 and 500 kilocycles in four bands.

Band Change:

By means of plug-in tuning drawers, each

covering the following frequencies:

FFRD-1 covers 50-100 Kcs.  
FFRD-2 covers 100-200 Kcs.  
FFRD-3 covers 200-400 Kcs.  
FFRD-3M covers 500 Kcs.  
FFRD-5 covers 2-4 Mcs.  
FFRD-6 covers 4-8 Mcs.  
FFRD-7 covers 8-16 Mcs.  
FFRD-8 covers 16-32 Mcs.

**Type of Reception:**

AM, CW, and MCW signals. FS when used with appropriate Audio of IF type Frequency Shift Converter.

**Tuning System:**

Single dial control.

**Antenna Input Circuit:**

75 ohms unbalanced, 300 ohms balanced.

**Oscillator Circuit:**

Variable Manual Tuning  
Fixed Frequency Crystal  
External Excitation from Master Osc.

**BFO Circuit:**

Variable Manual Tuning  
Fixed Frequency Crystal  
External Excitation from Master Osc.

**Sensitivity:**

1.0 micro volt for a 10 db Signal to Noise Power ratio.

**Image Ratio:**

Better than 60 db for 2-16 Mcs., not less than 40 db for 16-32 Mcs.  
Image Rejection Infinite on L.F. Heads.

**AVC Characteristics:**

With an 80 db change in the input signal, the output remains constant within 12 db.

**Hum Level:**

Across 600 ohm load, output hum not less than 34 db below 0 dbm or 66 db across 2 watts.

**Output Power:**

2 watts maximum.

**Input Power:**

110/220 volts, 50/60 cycles, approximately 85 watts.

**Noise Limiter:**

A Noise Limiter circuit is provided, which provides maximum effectiveness in combating impulse noise.

**Rear Panel Facilities:**

Antenna Connections.  
Fuse.  
BFO Connections.  
HFO Connections.  
IF Connections.

**Accessory Voltage Source:**

6.3 volts AC @ 1 amp  
150 volts DC @ 10 milliamps

**Front Panel Controls:**

Main Chassis

Noise Limiter Switch.  
Pilot Light.  
Audio Gain Control.  
Phone Jack.  
BFO Master-Slave Switch.  
AVC/MANUAL Switch.  
BFO ON/OFF Switch.  
RF Gain Control and Power ON/OFF Switch.  
BFO Pitch.

Tuning Drawers

Tuning Dial.  
HFO Master-Slave Switch.  
Crystal Trimmer.  
Tuning Dial Lock.  
Selectivity Switch on Band 1, 2 and 3

**Rear Panel Facilities**

terminals provided for:

HFO control	RFG control
HFO IN	AVC ON/OFF
HFO OUT	AVC Bus
BFO control	Diode Load
BFO IN	Loudspeaker
BFO OUT	ANTENNA
IFO OUT	

**Mounting:**

Standard WE rack mounting.

**Size and Weight:**

19" wide x 5 1/4" high x 15" deep,  
(w/coaxial), approximately 35 lbs.

**Tube Complement:**

FFR  
3 each 6BA6, IF Amplifier.  
1 each 6AL5, Detector and AVC.  
1 each 6T8, Noise-Limiter, Audio.  
1 each 6AQ5, Audio.  
1 each 6J6, BFO Reactance Tube.  
1 each 6AG5, BFO Oscillator.

1 each 5Y3GT, Rectifier.  
 1 each OA2, Voltage Regulator.

FFRD-1,2,3,3M,5,6, and 7:  
 4 each 6AG5, RF Amplifiers, HFO.  
 1 each 6AU6 Mixer.

FFRD-8:  
 3 each 6AK5 RF Amplifiers, HFO.  
 1 each 6AU6 Mixer.  
 1 each 6AG5 HFO Reactance Tube.

**Construction and Components:**

Equipment is manufactured in accordance with JAN specifications wherever practicable.

\* \* \*

We reserve the right to make changes in the design of our equipment, consistent with good engineering practice, in order to make improvements in design and to effect economies in manufacture.

**TABLE 1-1. PERFORMANCE DATA**

(Approximate Values - Taken from Production Receiver)

Head	Frequency Kc	Sensitivity in Microvolts for 1 volt across diode load (Approx. 2 watts output)	Antenna Input in Microvolts for 10 db Signal - Noise Ratio	I.F. Rejection db
FFRD-1	50	1.10	1.10	134
	75	1.20	1.20	120
	100	1.00	1.00	110
FFRD-2	100	1.10	1.10	114
	150	1.20	.85	106
	200	1.20	1.30	92
FFRD-3	200	1.30	1.30	100
	300	0.07	1.20	90
	400	0.55	0.65	60
FFRD-3M	485	0.60	0.80	50
	500	0.50	0.80	60
	515	0.40	0.80	68

	Frequency Mc			Image Ratio
FFRD-5	2.0	0.40	0.62	132000
	3.0	0.50	0.64	24000
	4.0	0.60	0.68	9600
FFRD-6	4.0	0.40	0.52	32000
	6.0	0.60	0.56	6500
	8.0	0.65	0.58	1600
FFRD-7	8.0	0.50	0.65	12000
	12.0	0.10	0.85	3000
	16.0	1.00	0.90	1000
FFRD-8	16.0	0.75	0.60	2400
	24.0	0.60	0.67	500
	31.0	0.40	0.72	290

**TABLE 1-2. NORMAL SELECTIVITY**

(Approximate Values - Taken from Production Receiver)

BAND	FREQUENCY	6 db POINTS	60 db POINTS
FFRD - 1	50 Kcs. 100	2 Kcs. 4	14 Kcs. 17
FFRD - 2	100 200	2.5 4.3	14 19
FFRD - 3	200 400	4.1 4.8	17 20
FFRD - 3M	500	3.8	12
FFRD - 5, 6, 7, 8	2 to 32 Mcs.	5	25

NOTE:- On the low frequency heads (FFRD 1, 2 and 3) the BANDWIDTH control provides four positions of selectivity - one normal as indicated above and three narrow positions providing bandwidths of 1.3 Kc, .5 Kc and .3Kc.



## SECTION II THEORY OF OPERATION

### 1. GENERAL DESCRIPTION OF CIRCUITS

The design of the Model FFR featuring versatility and steady performance assures continuous reception of phone and code signals over its entire frequency range. Two R.F. and three I.F. stages provide a high degree of sensitivity, selectivity, and image rejection to insure uninterrupted reception. A noise-limiter, effective on both code and phone reception, reduces pulse interferences. Other circuit refinements feature a minimum of frequency drift in the oscillators, a high gain audio stage, a manual gain control and a manual volume control.

The Model FFR utilizes 10 tubes, plus 5 more for each drawer, in a superheterodyne circuit, shown schematically in Figure 4-5. The circuitry employed consists of 2 stages of R.F. amplification, a mixer, HFO oscillator, HFO oscillator reactance control, 3 stages of I.F. amplification, detector and A.V.C., BFO oscillator, BFO oscillator reactance tube, noise limiter, A.F. amplifier, and an integral power supply system.

Contained in each of the drawers are 2 RF. amplifiers, a mixer, an H.F. Oscillator, and an HFO reactance tube. In the FFRD-1,2 and 3 drawers a bandwidth control provides four degrees of selectivity. At the rear of each drawer is a multiple connector plug by which the antenna circuit, the I.F. input, HFO output HFO input, external oscillator injection, R.F. gain control and the power supply voltages are connected to the receiver proper.

The main chassis deck consists of the I.F. strip, the audio amplifier, and the BFO assembly. The associated operating controls are mounted on the front panel of the receiver. The I.F. is centered at 455 Kcs.

### 2. CIRCUIT ANALYSIS

A block diagram, Figure 2-1, shows the arrangement and functions of the various circuit sections. Constant reference to both the schematic and block diagrams will facilitate a more thorough understanding of the unit and will serve to illustrate the basic composition of the Model FFR.

**INPUT COUPLING.-** The antenna input ter-

minals are provided at the rear of the receiver. An efficient coupling system between the antenna and the first RF tube provides sufficient gain to override the "shot effect" and thermal agitation originating in the first tube and its associated circuits. The antenna coupling is designed to provide optimum coupling from a 300 ohm balanced or a 75 ohms unbalanced line. A balanced doublet or straight wire antenna may also be used.

**RF AMPLIFIERS AND MIXER.-** Maximum sensitivity at high signal to noise ratio is assured by the design of the R.F. amplifiers. The coil assemblies of the amplifiers, together with those of the mixer and HFO oscillator, are placed directly adjacent to their respective sections of the four-gang tuning capacitor and their respective tubes. To insure stability and minimize oscillator radiation, the coils are enclosed in grounded shielded containers; input and output circuits are well isolated to prevent any possible regeneration. A 6AU6 triode-connected mixer is used for maximum conversion gain and low noise factor.

**HIGH FREQUENCY OSCILLATOR.-** The high frequency oscillator is aligned to track with the R.F. Amplifiers to produce a 455 Kc intermediate frequency in the Mixer output. A front panel switch controls the H.F.O. for Master-Slave or crystal-controlled operation. For remote control purposes, a d.c. voltage (such as obtained from the TMC Model RCR) of 0 to  $\pm 4.5$  volts is connected to the HFO external terminal at the rear of the receiver. This voltage controls the center frequency of the oscillator by varying the output impedance of the reactance modulator. The oscillator voltage is regulated by the OA2 regulator tube to provide maximum frequency stability under variable conditions of power supply voltage.

**I.F. AMPLIFIERS.-** Three separate I.F. stages of amplification are employed and provide adequate gain. Each I.F. transformer has its primary and secondary tuned by means of powdered iron cores. Eight tuned circuits in the I.F. system provide the necessary I.F. selectivity.

**DETECTOR AND AVC.-** The detector and AVC functions are performed by the dual-diode 6AL5. Both the detector and AVC load connections are brought out to the rear terminal strip for diversity reception. One plate of the diode section of the tube is used for signal detection and the other for

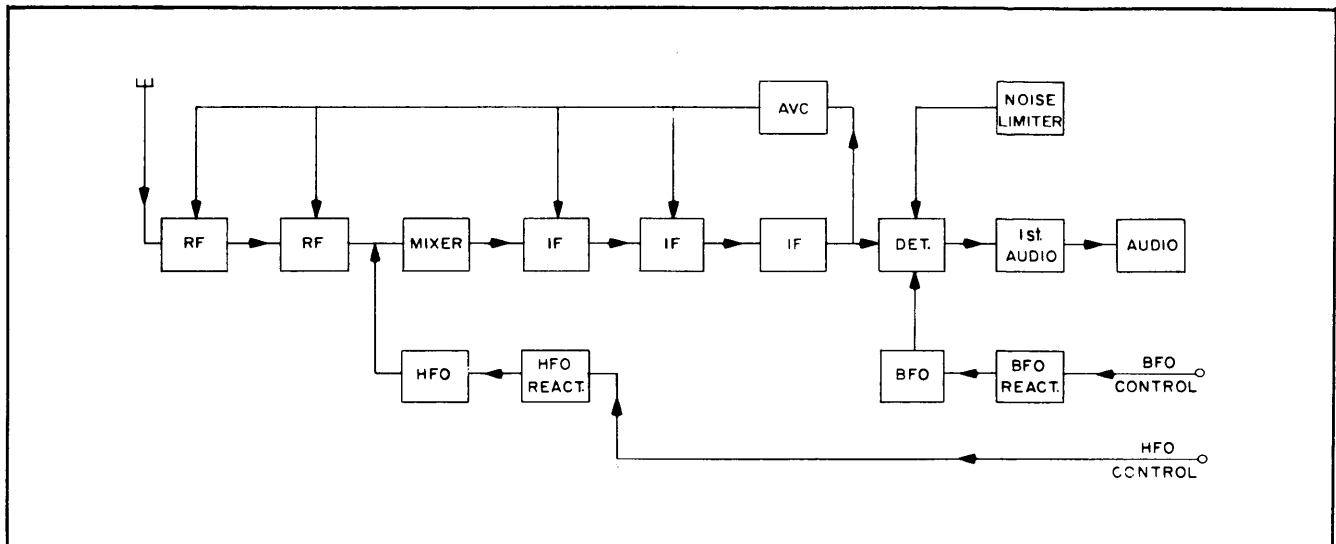


Figure 2-1. Block Diagram for the Model FFR.

AVC rectification. The AVC voltage is connected to the 1st and 2nd R.F. amplifiers and to the grids of the 1st and 2nd I.F. amplifiers. Thus good AVC characteristic is obtained. The time constant is approximately .01 second.

**BFO OSCILLATOR.**- The beat frequency oscillator employs a magnetic-coupling circuit, which provides stability and a minimum of oscillator harmonics. A front panel switch, similar to the one used in the HFO, controls the BFO for Master-Slave or crystal-controlled operation. Likewise, a BFO External Control terminal on the rear of the unit permits remote control operation of the BFO tuning, when a d.c. voltage of  $\pm 4.5$  volts is applied.

**NOISE LIMITER.**- A series-diode noise limi-

ting circuit effects noise reduction on CW or modulated reception when impulse noise is present. A front panel switch, S-100, permits the optional use of the noise limiter. The second part of the 6T8 is a resistance-coupled audio-amplifier triode, in whose grid is placed the conventional audio-volume control.

**AUDIO-OUTPUT.**- The 6AQ5 beam power amplifier, driven by the triode section of the 6T8 tube, delivers 2 watts into an 8 or 600 ohm load. A phone jack available on the front panel permits use of a headset of 600 ohms impedance or higher under normal conditions.

**IF OUTPUT.**- An IF output voltage at 455 Kcs. is available at the rear of the unit. This voltage is of sufficient amplitude to drive a wide variety

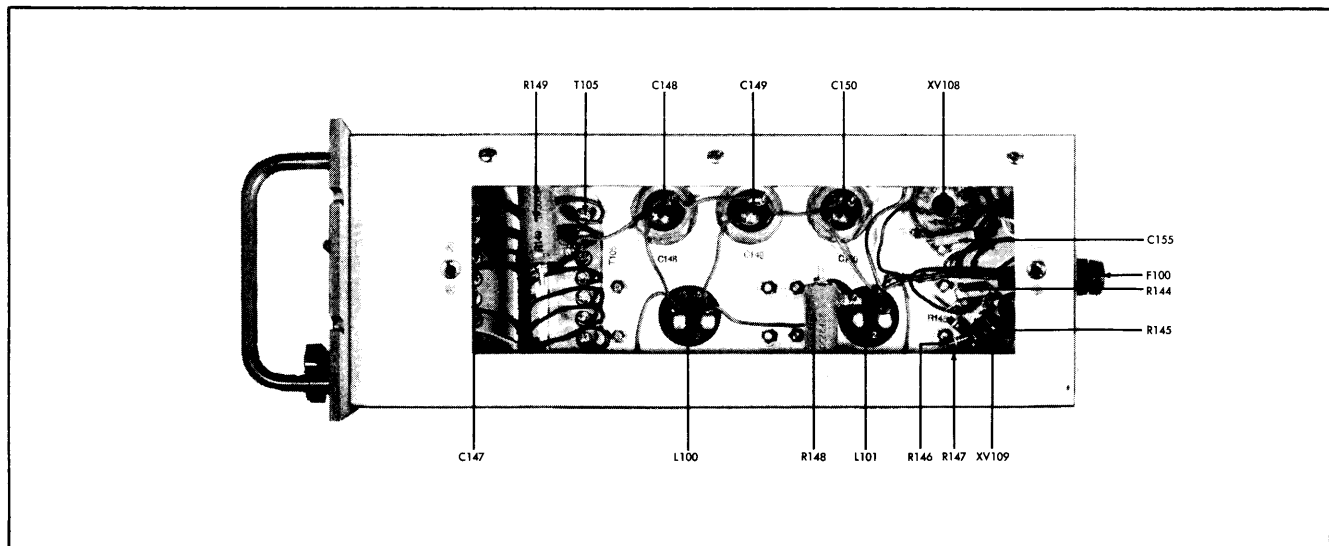


Figure 2-2. Right Side View Showing Power Supply Connections.

of equipment such as the TMC Diversity Combining Unit (Model DCU), the TMC Diversity Visual Monitor (Model DVM), and the TMC Mode Selector Receiving (Model MSR-1).

**RF GAIN CONTROL.-** The RF gain control is provided for the manual control of the sensitivity to prevent overloading in the presence of strong signals and operates on either position of the MANUAL or AVC switch. Rear panel terminals are provided for remote control of the RF Gain.

**POWER SUPPLY.-** The power supply is self-contained and consists of a power transformer, rectifier, voltage regulator, and filter. It is designed for 110/220 volts, 50/60 cycles, single phase operation, with a power consumption of approximately 85 watts. The power supply includes a voltage regulator system which compensates for changes of load and line voltage, holding the voltage more constant. Adequate filtering is provided to prevent line noise and stray voltages from entering the receiver by way of the power line.



## SECTION III INSTALLATION AND OPERATION

### 1. INSTALLATION

#### A. UNPACKING

The Communication Receiver, Model FFR has been designed for ease of installation and minimum effort in operation. The unit comes in its individual shipping container and should be carefully unpacked. A close visual inspection should be made to ascertain any physical damage due to rough handling during shipment.

#### B. POWER SUPPLY

The unit is designed for operation from a 110 volts A.C. 50/60 cycles source, unless it is specifically ordered for 220 volts A.C., 50/60 cycles. The receiver is shipped from the factory with the power transformer wired for 110 volts A.C. operation only. However, a simple wiring change in the tapped primary circuit of the power transformer is necessary to change the Model FFR for 220 volts A.C. operation. This change is made directly on the power transformer terminal lugs and is as follows:

Connect the power line to terminals "1" and "3" on the primary power transformer winding, as indicated on the schematic diagram.

#### C. ELECTRICAL CONNECTIONS

The antenna connections should be made at the proper terminals at the rear of the unit. The input impedance has been designed to match a balanced 300 ohm or an unbalanced 75 ohm transmission line. When using a balanced 300 ohm line, one side is to be connected to point "1" and the other side to point "2"; when using a 75 ohm unbalanced line, line connection may be made in one of two methods. (a) Connect the shield to the ground terminal, point "3", and the center conductor to point "1" (Refer to terminal E-100 on the schematic diagram.) or (b) Connect through a PL-259/A type connector to J 109. A jack is provided on the front panel for plugging in a pair of headphones. Both high and low impedance headphones may be used in the phone jack. Audio output terminals for connection of a loudspeaker are provided at the rear of the receiver (terminal E-101). The output transformer is designed to match a speaker having either 8 ohms or 600 ohms impedance.

After unpacking, install receiver as follows:

1. Seat the tubes firmly in their sockets.

2. Connect a loudspeaker to the 8 ohm or 600 ohm terminals on E-101 (on the rear chassis) or a headset to the phone jack (J-106) on the front panel.

3. Connect the antenna according to the instructions set forth in the above paragraph.

4. Connect the power cord to a 110 volts, 50/60 cycles source of supply.

5. Set the controls for operation as set forth in Section III-2B.

The unit may be placed on a table or mounted in a rack. The panel is equipped with standard slots for rack mounting. Before mounting the receiver in the rack, inspect the tubes to see that they are firmly seated in their respective sockets. Once the desired converter drawer has been selected, the operator must be certain to tighten the lock nuts on the front panel in order to secure the drawer to the main chassis.

### 2. OPERATION

#### A. DESCRIPTION OF CONTROLS.

All controls are identified by the front panel markings for ease of identification and are arranged for ease of operation. Figure 3-1 illustrates the dial and control knobs.

The MAIN TUNING DIAL is in the lower right corner of each converter drawer. The knob operates the four gang-tuned capacitors and turns the dial scale through a vernier gear-train reduction of 10 to 1. The dial is calibrated directly in megacycles. A lock on the shaft of the main tuning dial effects positive locking action without disturbing the frequency setting.

The XTAL  $\Delta$  FREQ. control in the upper left corner of the converter drawers operates a tuning capacitor, which is connected across the crystal in the HFO oscillator circuit. This control is used to adjust the crystal on frequency when crystal-control of the HFO is desired.

The HFO MASTER-SLAVE switch, on the lower left corner of each drawer, is a two pole, three position switch, and, starting from fully counterclockwise, permits optional External, Xtal, or HFO operation in the HFO circuit. The crystals for each frequency range are not supplied for the separate drawers.

The R. F. GAIN CONTROL is a continuously variable sensitivity control used with the AUDIO

GAIN control for all manual operation. Clockwise rotation increases the gain of the I.F. and R.F. stages. The A. C. POWER switch (S102) is associated with the R.F. GAIN control, and the A.C. power is tuned "On" as the R.F. GAIN control is as turned clockwise from its extreme counter-clockwise position.

The A.F. GAIN control adjusts the amount of audio voltage applied to the first audio tube. Clockwise rotation of this control increases the audio output power of the receiver.

The AVC-MANUAL toggle switch adjusts the receiver for either AUTOMATIC VOLUME CONTROL or MANUAL VOLUME CONTROL. The AVC can be used for both phone and code reception.

The NOISE-LIMITER toggle switch sets the unit for operation of noise limitation. Any noise peak voltages in excess of the set threshold are prevented from reaching the audio amplifiers. The limiter circuit is a series diode type and is equally effective for both phone or code reception.

The BFO CONTROL (S-104) turns on the BFO oscillator and is used for CW code reception. The CW code characters are made audible by the heterodyning action of the BFO with the IF signal frequency.

The BFO PITCH control operates a tuning capacitor (C137) across the tank circuit of the BFO oscillator. Turning of the knob in either direction of zero set changes the resonant frequency to give the desired pitch.

The BFO MASTER-SLAVE switch is similar to the HFO MASTER-SLAVE control and permits optional EXTERNAL, XTAL, or BFO operation in the BFO circuit.

Refer to Figure 4-3 for a complete description of switch control settings and terminal board wiring for various modes of operation.

## B. TUNING PROCEDURE

Initially, the operator must select the converter drawer covering the desired frequency range and plug the draw into the receiver proper. After the unit is mounted, he must adjust the receiver controls in the following manner:

1. Turn the R.F. GAIN control to the "On" position. The front panel light should be lighted.

2. Set the HFO MASTER-SLAVE switch on the front panel to the HFO position. If crystal-

controlled operation of the HFO is desired, set the switch to the XTAL position.

3. Set the RF GAIN control fully on and the A.F. GAIN volume control to the desired audio level.

4. Set the NOISE-LIMITER and AVC-MANUAL controls to the desired mode of operation.

5. In the FFRD -1, 2 and 3 set the BANDWIDTH switch to NORMAL. If antenna noise is excessive or interference is pronounced, increase the selectivity to improve reception.

6. Tune in to the desired station via the main tuning dial.

7. Once the desired frequency is attained, adjust the RF GAIN control, AVC-MANUAL control, and the A.F. GAIN volume control to the desired value.

The receiver is now adjusted for phone reception and will tune to the frequency shown on tuning dial. When the AVC is being used, the R.F. GAIN control should be advanced as far as receiving conditions permit. However, the R.F. GAIN control may be retarded to reduce any objectionable disturbances or noise background. The operation of the A.V.C. will be restricted unless the R.F. GAIN control is fully advanced. The operator should adjust the audio output volume entirely by use of the A.F. GAIN control.

For C.W. reception the receiver is tuned in the same manner as described above, except that the BFO CONTROL switch is turned to its "On" position and the BFO MASTER-SLAVE switch is set to its BFO position. If crystal-controlled operation of the BFO is desired, set the latter switch to its XTAL position, and insert a BFO XTAL whose frequency produces the desired pitch with the IF signal frequency. When the BFO MASTER-SLAVE switch is on the XTAL position, the BFO PITCH control is inoperative. In the presence of a strong CW signal, the BFO injection may not be sufficient to give good heterodyne action, in which case the RF GAIN should be reduced to a desirable level. The BFO injection has been optimized around weak and medium strength signals. A large BFO injection causes a higher AVC voltage to be developed and thereby decreasing the basic receiver sensitivity.

## C. DIVERSITY OPERATION

When properly spaced individual antennas are available, two Model FFR receivers may be used for diversity reception. Figure 3-3 illustrates the proper connections for diversity operation. The AVC terminals of the two receivers must be connected together with a patch cable; likewise, the DETECTOR terminals.

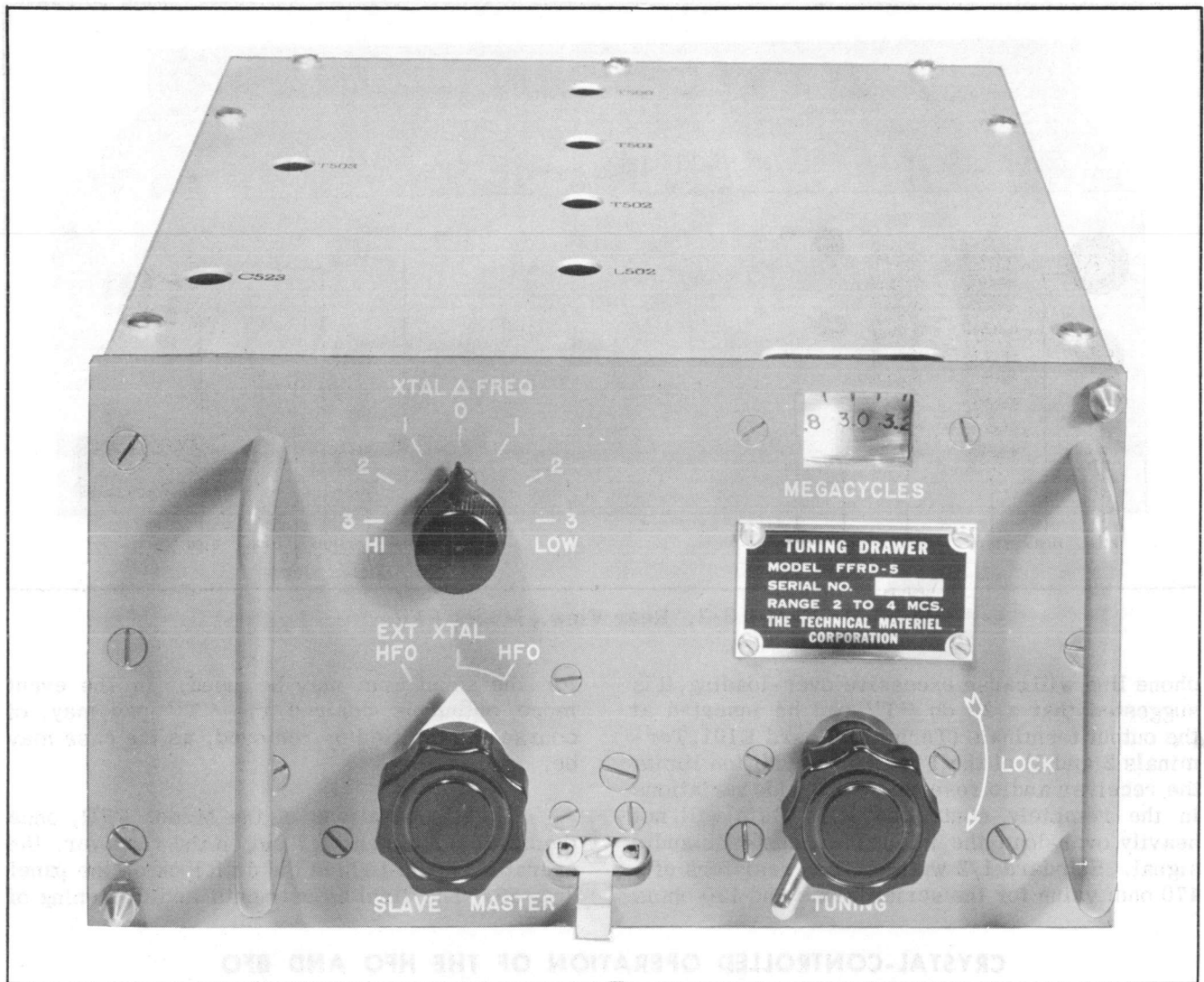


Figure 3-1. Front View, Model FFRD-\* ( H F Head)

Refer to Figure 4-3 for a complete description of switch control settings and terminal board wiring for various modes of operation.

Since the audio output of only one receiver is required, the operator should turn down the audio gain on one receiver and use only the gain of the other. Single oscillator control is obtained by connecting a shielded, low capacitance cable from the HFO OUTPUT connector (J-102) of one receiver to the HFO INPUT connector (J-101) of the other receiver, and setting the HFO MASTER-SLAVE switches of both receivers to the HFO and EXTERNAL-SLAVE positions, respectively. Or, if an external, precision oscillator is used, such as the TMC Variable Frequency Oscillator (Model VOX), both receivers should be set to the EXTERNAL-SLAVE position. The BFO may be set in exactly the same manner, in this instance, by using connectors J-104 and J-103. For crystal

controlled operation of either both the HFO and BFO, insert a crystal in the master receiver and set the MASTER-SLAVE switch to the "XTAL" position; do not insert a crystal in the slave receiver, but merely set the MASTER-SLAVE switch to the EXT position.

#### D. REMOTE CONTROL.

The terminal strips E101 and 102 at the rear of the receiver provides all connections for remote control operation.

Refer to Figure 4-3 for a complete description of switch control settings and terminal board wiring for various modes of operation.

The normal audio output at 600 ohms can be in the range of 20 to 30 volts. Since accidental imposing of such levels on a conventional tele-

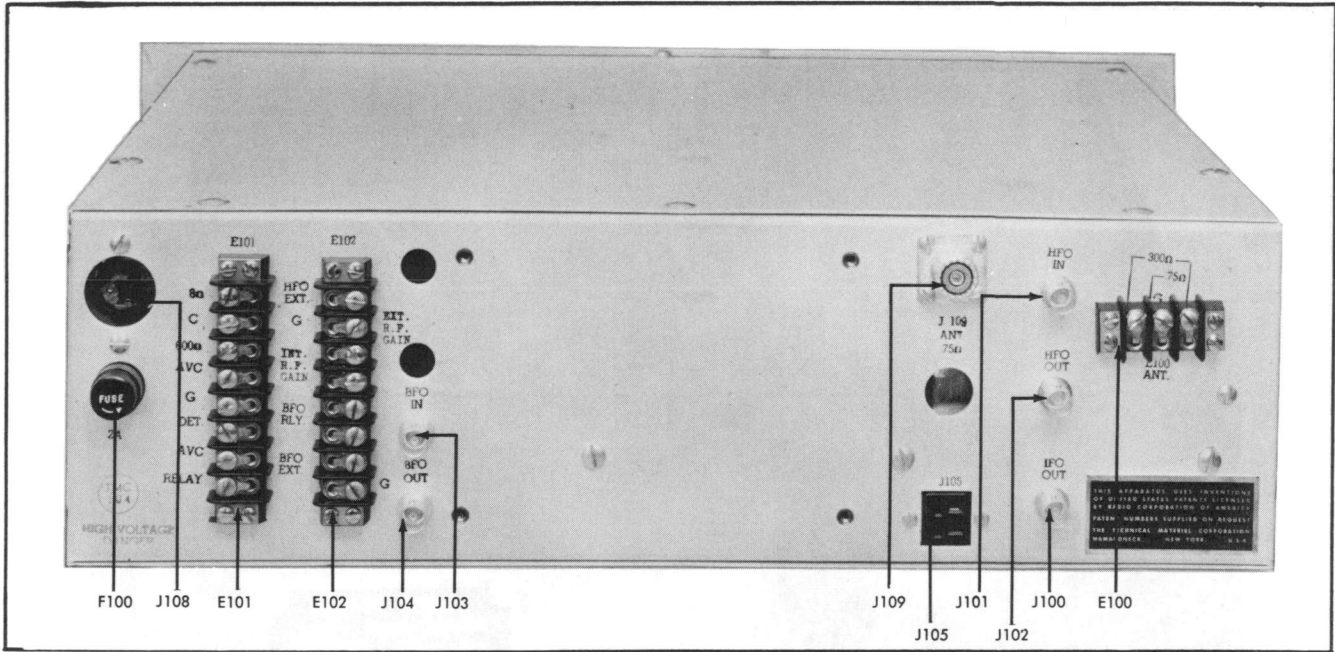


Figure 3-2. Rear View., Model FFR.

phone line will cause excessive over-loading, it is suggested that a 20 db "T" pad be inserted at the output terminals (Terminal Board E101, Terminals 2 and 3) of the FFR. This addition limits the receiver audio reserve so that wide variations in the remotely controlled R.F. Gain will not heavily over-load the telephone lines with audio signal. Standard 1/2 watt, carbon resistors of a 470 ohm value for the series arms and 120 ohms

for the shunt arm may be used. In the event more output is desired the "T" pad may, of course, be omitted or removed, as the case may be.

In all operations of the Model FFR, once the correct frequency is set on the receiver, the operator should tighten the dial lock on the panel drawer. The final adjustments and tightening of

### CRYSTAL-CONTROLLED OPERATION OF THE HFO AND BFO

The operating range of the crystal controlled HFO circuits are as follows:

TUNING DRAWER	SIGNAL FREQUENCY RANGE	OSCILLATOR FREQUENCY RANGE	CRYSTAL TYPE (Holder -HC -6/U)	CRYSTAL FREQUENCY MODE
FFRD-1	50-100 Kc	505-555 Kc	CR- 4/U	Parallel Resonance Fundamental
FFRD-2	100-200 Kc	555-655 Kc	CR- 4/U	Parallel Resonance Fundamental
FFRD-3	200-400 Kc	655-855 Kc	CR- 4/U	Parallel Resonance Fundamental
FFRD-3M	500 Kc	955 Kc	CR-18/U	Parallel Resonance Fundamental
FFRD-5	2-4 Mc	2.455-4.455 Mc	CR-18/U	Parallel Resonance Fundamental
FFRD-6	4-8 Mc	4.455-8.455 Mc	CR-18/U	Parallel Resonance Fundamental
FFRD-7	8-16 Mc	8.455-16.455 Mc	CR-18/U	Parallel Resonance Fundamental
FFRD-8	16-32 Mc	16.455-32.455 Mc	CR-18/U	Parallel Resonance 2nd Harmonic



the dial lock should be done only after the receiver has had adequate time to reach operating stability, i.e. two or three hours.

The crystal frequency is determined as follows:

- (1) When the signal frequency lies between 50 kcs.-16 mcs.

$$F(\text{osc}) = F(\text{sig}) + 0.455, \text{ where}$$

$$F(\text{osc}) = F(\text{xtal}) = \text{oscillator frequency in mcs.}$$

$$F(\text{sig}) = \text{signal frequency in mcs.}$$

- (2) When the signal frequency lies between 16-32 mcs,

$$F(\text{osc}) = F(\text{sig}) + 0.455 \text{ and}$$

$$F(\text{xtal}) = \frac{F(\text{osc})}{2}$$

When the front end of the receiver is crystal-controlled, crystal control of the BFO may also be desirable. A CR-46/U crystal unit is required for the BFO circuit. The BFO crystal frequency is determined by the pitch or tone desired, as follows:

$$(3) F(\text{BFO}) = 455 \text{ kc} \pm F(\text{tone}), \text{ where}$$

$$F(\text{BFO}) = \text{BFO crystal frequency in kcs.}$$

$$F(\text{tone}) = \text{desired beat note or pitch in kcs.}$$

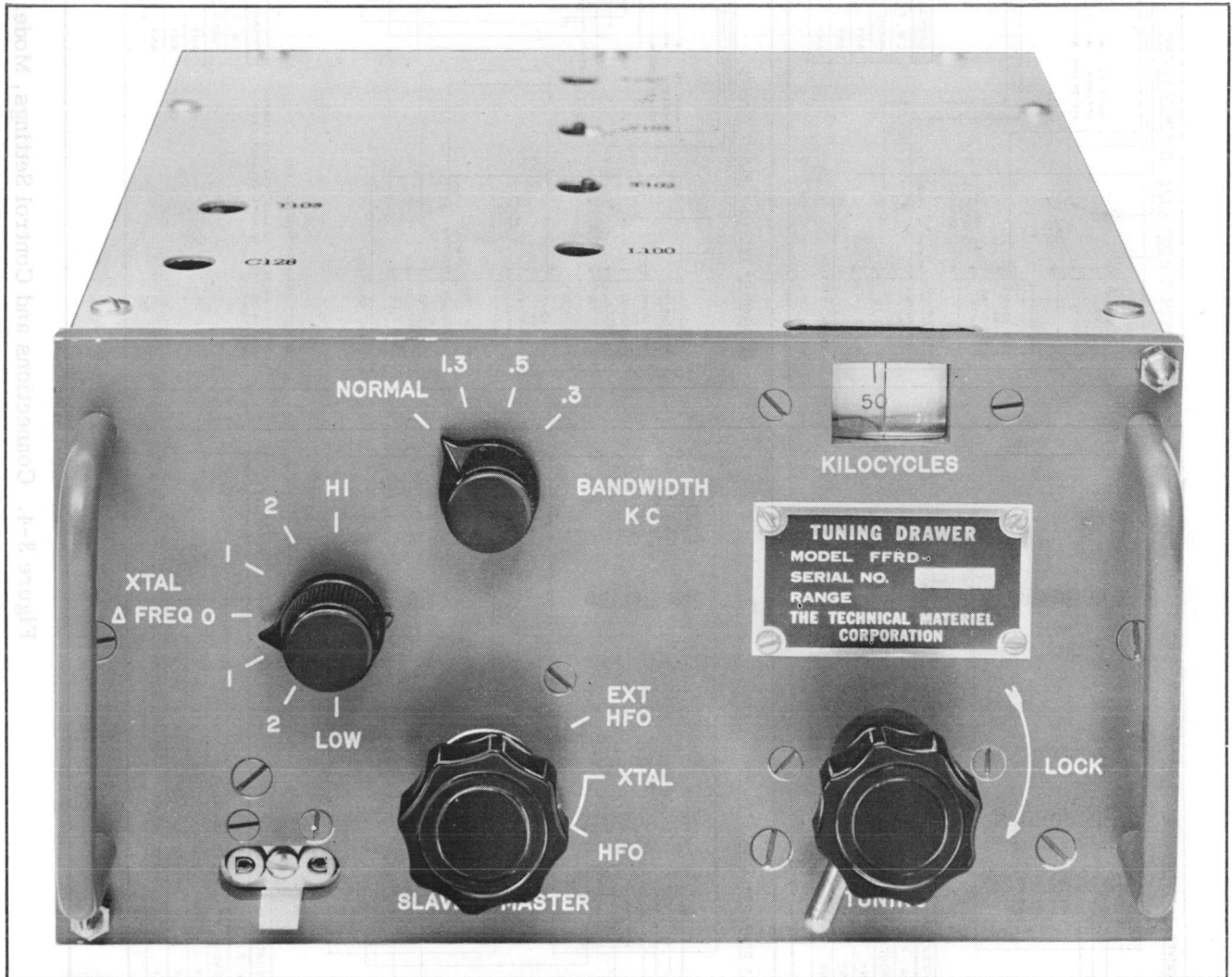
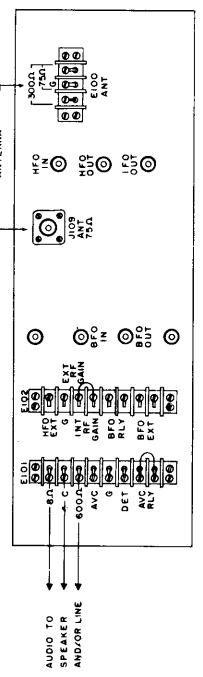


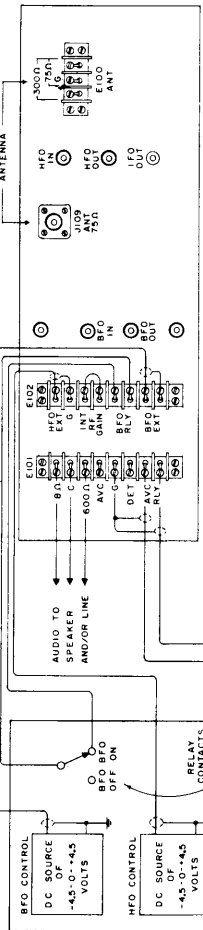
Figure 3-3. Front View, Model FFRD-\* (LF Head)

I - SINGLE RECEIVER OPERATION, LOCAL CONTROL



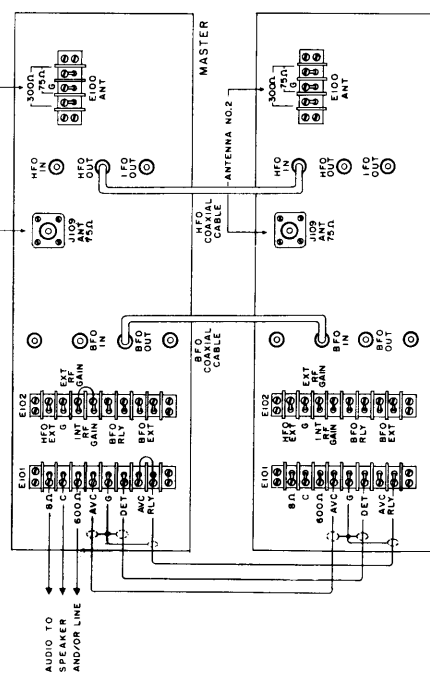
OPERATION	CONTROL	CONTROL SETTINGS
C.W. F.S	BFO SWITCH	BFO
PHONE OR MCW	BFO SWITCH	OFF
ANY	BFO MAS./SL. SW.	XTAL OR BFO
ANY	HFO MAS./SL. SW.	XTAL OR HFO
ANY	AVC SWITCH	AVC OR MANUAL

III - SINGLE RECEIVER OPERATION, REMOTE CONTROL



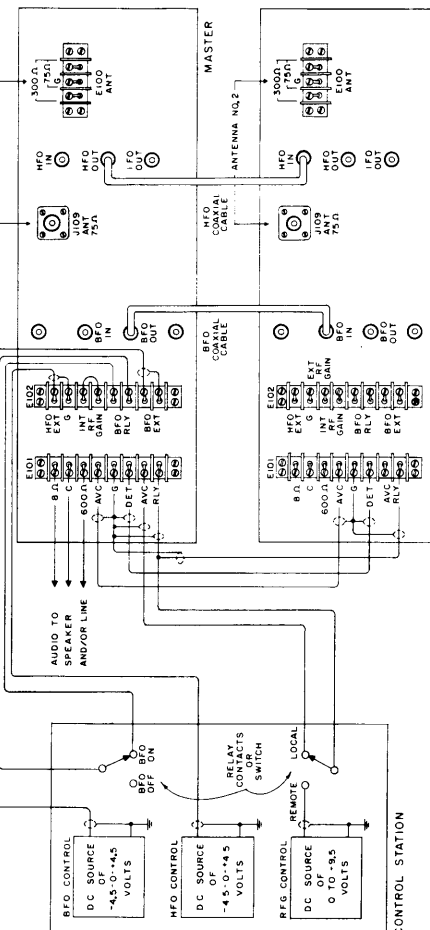
OPERATION	CONTROL	CONTROL SETTINGS
C.W. F.S	BFO SWITCH	OFF
PHONE OR MCW	BFO SWITCH	OFF
ANY	BFO MAS./SL. SW.	BFO
ANY	HFO MAS./SL. SW.	HFO
ANY	AVC SWITCH	AVC

II - DIVERSITY OPERATION, LOCAL CONTROL



OPERATION	CONTROL	MASTER RECEIVER	SLAVE RECEIVER
C.W. F.S	BFO SWITCH	OFF	OFF
PHONE OR MCW	BFO SWITCH	OFF	OFF
ANY	BFO MAS./SL. SW.	XTAL OR BFO	EXT BFO
ANY	HFO MAS./SL. SW.	XTAL OR HFO	EXT HFO
ANY	AVC SWITCH	AVC OR MANUAL	POS. UNIMPORTANT

IV - DIVERSITY OPERATION, REMOTE CONTROL



OPERATION	CONTROL	MASTER RECEIVER	SLAVE RECEIVER
C.W. F.S	BFO SWITCH	OFF	OFF
PHONE OR MCW	BFO SWITCH	OFF	OFF
ANY	BFO MAS./SL. SW.	BFO	EXT BFO
ANY	HFO MAS./SL. SW.	HFO	EXT HFO
ANY	AVC SWITCH	AVC	POS. UNIMPORTANT

INDICATES SHIELDED LEAD  
NOTE THAT WHERE NECESSARY, CHASSIS STOPPING SHOULD BE USED MORE CLEARLY SHOWING CONNECTIONS TO E102.

Figure 3-4. Connections and Control Settings, Model FFR.

## SECTION IV MAINTENANCE

### 1. SERVICE MAINTENANCE

#### A. GENERAL

The Model FFR has been designed for rugged, long term, trouble free duty. Familiarity with the receiver will permit quick frequency change, and once the receiver is properly adjusted, little attention beyond normal maintenance is required. It is recommended that any maintenance to the equipment be performed by a competent maintenance technician. The power supply system has been protected by a fuse easily accessible at the rear of the receiver. Power fuse failure in the receiver would normally be indicated by failure of the red pilot light to be on when the unit is turned on. If a fuse burns out immediately after replacement, do not replace it a second time until the cause has been corrected.

The location of all tubes and components in the Model FFR are shown in Figures 4-1 and 4-2. Normally, the tubes used in this unit have a long useful life, although occasionally a defective tube may be encountered and must be replaced. The tubes may be checked visually to see if they are lighted, or for warmth. When necessary, the tubes should be carefully removed and tested, and when replaced, care should be taken to install tube shields.

#### B. PREVENTIVE

All tubes and components in the Model FFR have been carefully selected to assure maximum efficiency in operation. If the receiver sensitivity is reduced and tube failure is suspected, test each tube one at a time in a reliable tube tester. Replace the tube in the same socket from which it was removed, if its measured characteristics are within the manufacturers tolerances (usually +20% from tube manual values). No special selection is necessary in the event of tube replacement, but the operator should remember that tubes of the same type will vary slightly in their individual characteristics.

Failure may occur due to the breakdown of a capacitor or resistor. Test all DC and AC voltages as indicated on the tube voltage and resistance data sheets, Figure 4-2, and investigate any serious discrepancies. A faulty bypass capacitor may cause overload of associated resistors, which should be checked for any change in

resistor value. A shorted resistor may be sighted by scorching or discoloration marks on the surface of the resistor. An open capacitor may cause unwanted oscillations and may be checked by connecting a good capacitor across it.

In order to prevent actual failure of the equipment due to corrosion, dust, and other destructive ambient conditions, it is recommended that the inside of the chassis be thoroughly inspected for signs of dirt, dampness, molding, charring, and corrosion, and to correct any defect found with a charring agent of proven quality. When placing the Model FFR in the rack, the operator should make certain that all terminal screw connections at the rear of the receiver are tight.

### 2. CIRCUIT ALIGNMENT

The circuits in the Model FFR have been carefully aligned with precision instruments at the factory, and realignment should be undertaken only when sub-par performance of the receiver against its normal operation is determined. A fiber screw-driver is recommended to make all the screw-type adjustments necessary for alignment. The TMC Tone Demodulator, Model AMD should be disconnected during alignment.

#### A. THE I.F.

It is recommended that the I.F. strip be aligned first. The receiver should be set up in the same manner as described in Section III-1C with no antenna lead-in and loudspeaker connected. The test instruments to be used are an accurate signal generator and a high-impedance A.C. voltmeter. The signal generator should be modulated 30 percent at 400 or 1000 cycles. Connect a 600 ohm load to the rear of the receiver and the A.C. voltmeter across the load; the signal-generator should be so adjusted as to give a 20-25 volt reading on the voltmeter. The I.F. is 455 kcs. In order to accurately calibrate a 455 kc test signal from the signal generator, a precision 455 kc crystal is placed in the BFO circuit (Y-100 on the schematic), and the BFO MASTER-SLAVE switch is set to the XTAL position. Then with the controls set as follows:

1. The BFO switch to ON position.
2. The AVC-MANUAL switch to the MANUAL position.
3. The A.F. GAIN turned on maximum.
4. The R.F. GAIN turned on maximum.

5. The NOISE-LIMITER switch to the OFF position.

Proceed as follows:

a. Set the HFO MASTER-SLAVE switch to the EXTERNAL position. The HFO is now acting as an amplifier.

b. Inject a 455 kc unmodulated signal from the signal generator to the HFO INPUT jack (J-101)

c. Vary the tuning dial of the signal generator until a "Zero Beat" is obtained. This beat will be evidenced by a sharp peaked response on the output meter; a headset or loud-speaker may also be used to hear the "Zero Beat".

This frequency is then that of the crystal and the I.F. alignment is made to this frequency, which is not to be disturbed for the remaining alignment. It may be necessary to adjust the signal generator output to prevent overload of the I.F. amplifiers.

Without changing the frequency setting of the signal generator, turn on the modulation of the signal generator and turn the BFO switch to the OFF position. The I.F. tuned, powdered-core transformers, T-101, T-102, T-103, and T-503 (T4, 603, 703, 803 for the 3M, 6, 7, and 8 bands, respectively) should be carefully adjusted to give a maximum output on the voltmeter.

For the low frequency heads a sweep generator and oscilloscope are desired for correct alignment. Connect the sweep generator to the HFO INPUT jack (J-101). Connect the scope across the detector terminals (5 & 6 of E101). Adjust the sweep generator input voltage so as not to overload the receiver and produce a distorted bandpass pattern.

Adjust T103 and L101 (T203, L201; T303, L301 for bands 2 & 3) for a maximum peak on the scope. Adjust the crystal phasing trimmer C123 (C223, 323) for a clear symmetrical wave form. Care must be used in adjusting L101 and C123 for symmetry, otherwise a rejection notch will appear on either skirt of the wave form. The other two positions of the BANDWIDTH switch do not require adjustment.

At this point, turn off the modulation; switch the BFO switch to the ON position; and set the BFO MASTER-SLAVE switch to BFO. Set the BFO PITCH control on the front panel to its "Zero" position. At this setting the BFO oscillator should produce a "Zero Beat" with the 455 kcs test signal. In the event that there is no "Zero Beat" at the "Zero" setting, tune the adjustable inductor (L-103) on the bottom of the

receiver until a "Zero Beat" occurs at the "Zero" setting.

## B. THE BFO REACTANCE TUBE.

Adjustment of the BFO Reactance Tube (V-106) requires a  $\pm 4.5$  D.C. voltage to be applied between point 7 and ground on terminal board E-102 at the rear of the receiver. A high impedance vacuum tube voltmeter whose scale is thrown off zero to obtain center scale reading, such as the RCA Volt-Ohmyst model, is connected across points 7 and 8 on E-102. The BFO switch is set to its ON position, and the BFO PITCH control is set to its Zero position. Then proceed as follows:

1. Set up an oscilloscope for external sweep. Connect the vertical input across the 600 ohm load on Terminal Board E-101.

2. Connect an audio oscillator to the horizontal input of the oscilloscope.

3. Following the same procedure as described in Section IV-2A, feed a test signal into the HFO INPUT jack (J-101) and tune to obtain a ZERO beat.

4. Vary the D.C. control voltage from +4.5 to -4.5 volts and determine the frequency shift at each extreme as follows; observe the lissajous pattern and vary the audio oscillator frequency until a circle or ellipse is obtained. The frequency read on the audio oscillator is then the frequency shift of the BFO. The resulting shift should not be less than  $\pm 2$  Kc.

5. If the frequency shift is asymmetrical about the zero voltage center, the reactance tube is unbalanced. Balancing of the reactance tube is accomplished by adjusting the variable resistor R-136, located on the main deck behind L-103.

6. Another method of measuring the frequency shift is to read the audio tone directly on an Audio Frequency Meter.

## C. THE R.F. HEAD

The following suggested procedure for alignment of the HFO oscillator, R.F. amplifiers, the first detector, and HFO Reactance tube requires an accurate signal generator, a vacuum tube voltmeter, and an LM18 meter. A typical alignment of Band 8 will serve as an example, which can be followed for all the bands included in the Model FFR.

1. After allowing the receiver to warm-up for at least two hours, connect the signal generator with a proper matching resistor to the antenna terminals. The proper matching is done as follows: If the impedance of the signal generator is less than 75 ohms, then the matching resistor required is the difference between 75 ohms and



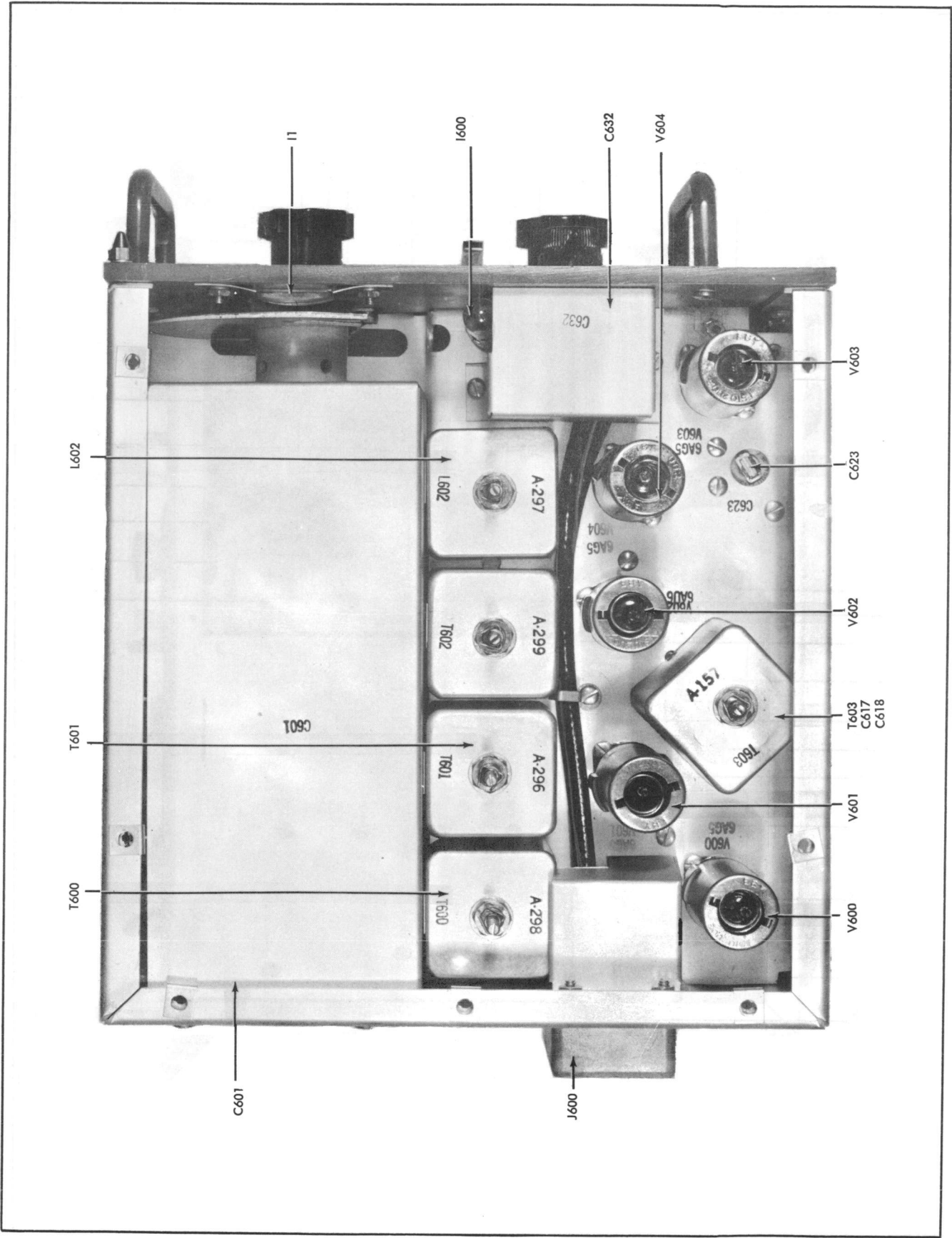


Figure 4-2. Top View, Model FFRD-\* (HF Head)

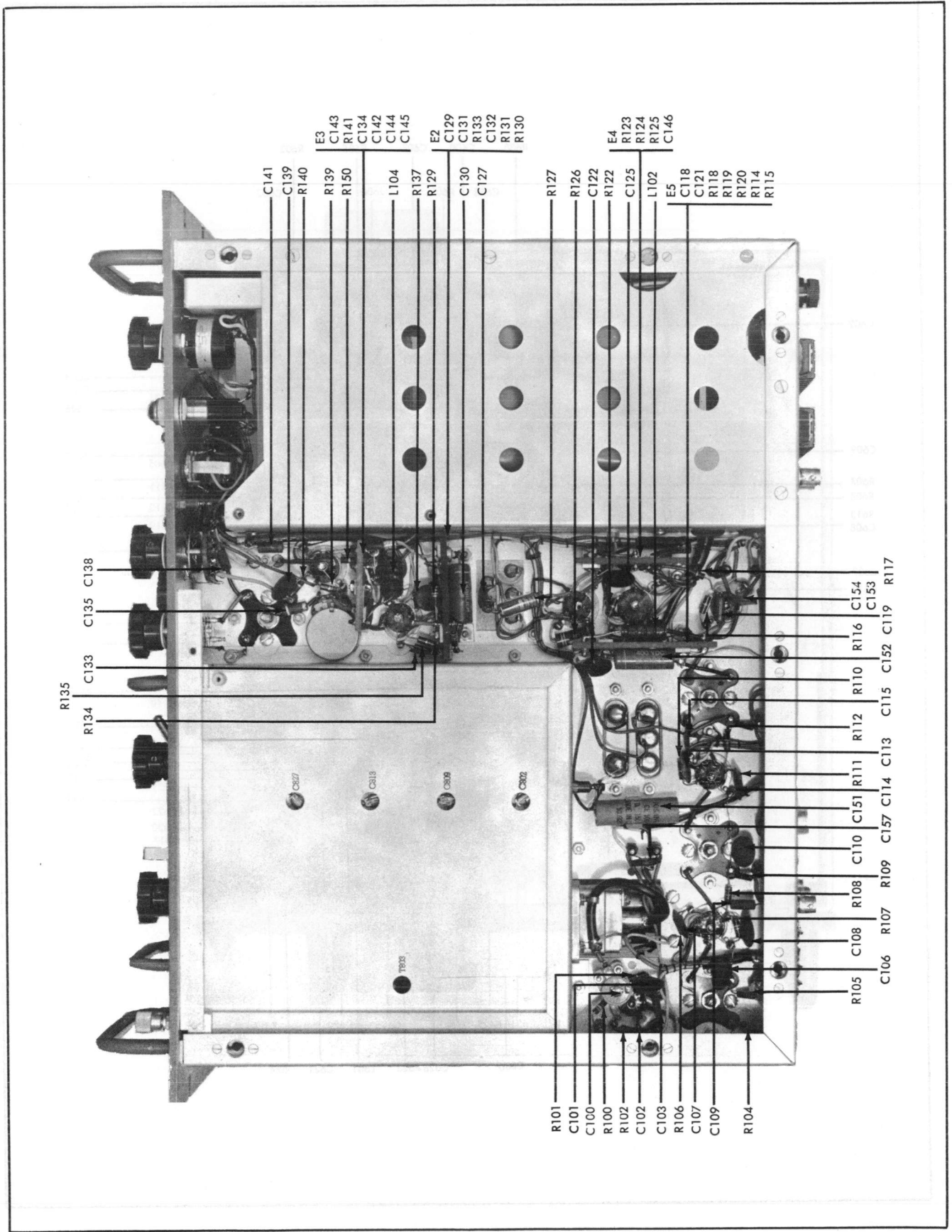


Figure 4-3. Bottom View, Model FFR with FFRD-\* Installed.

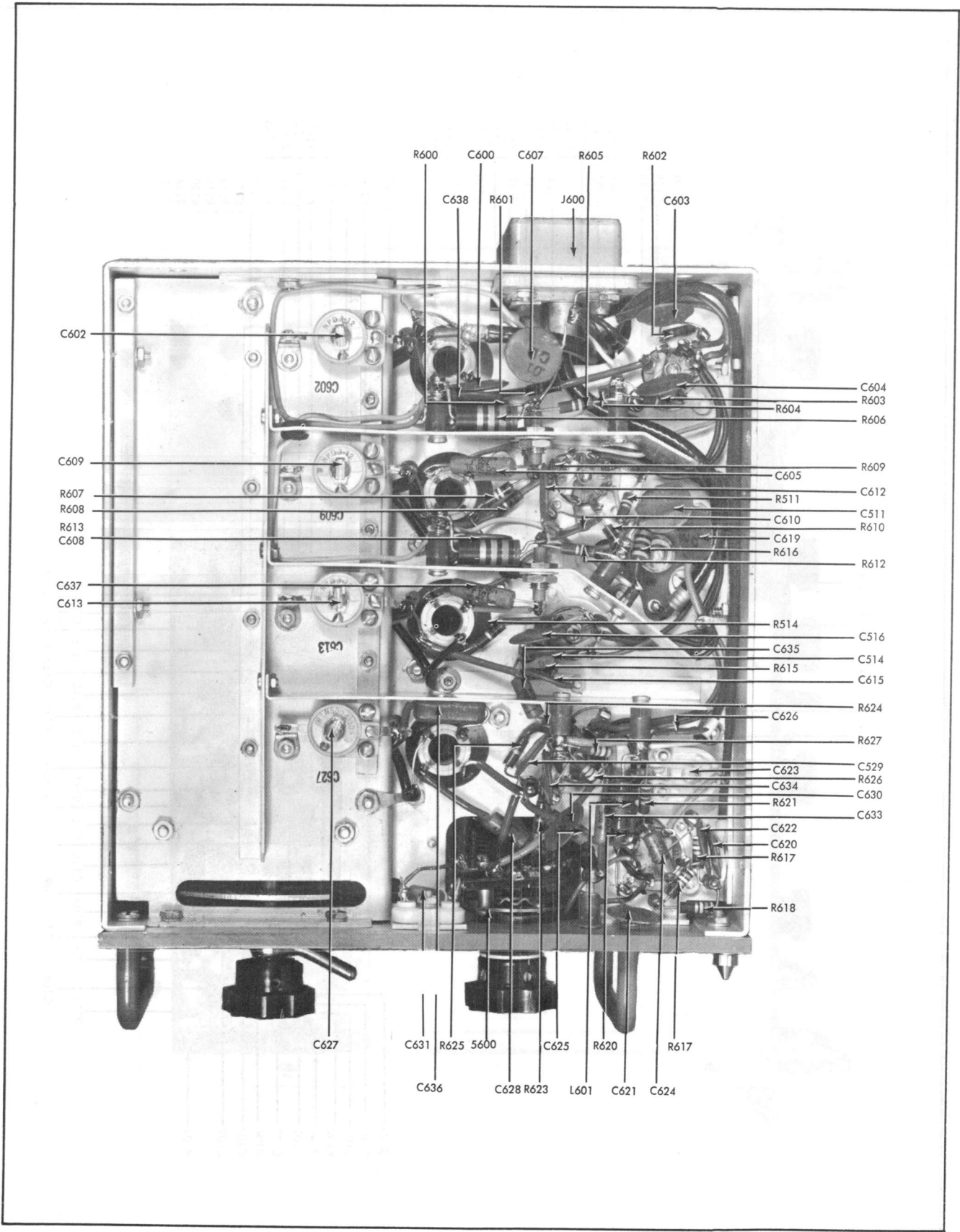


Figure 4-4. Bottom View, Model FFRD-\* (HF Head).



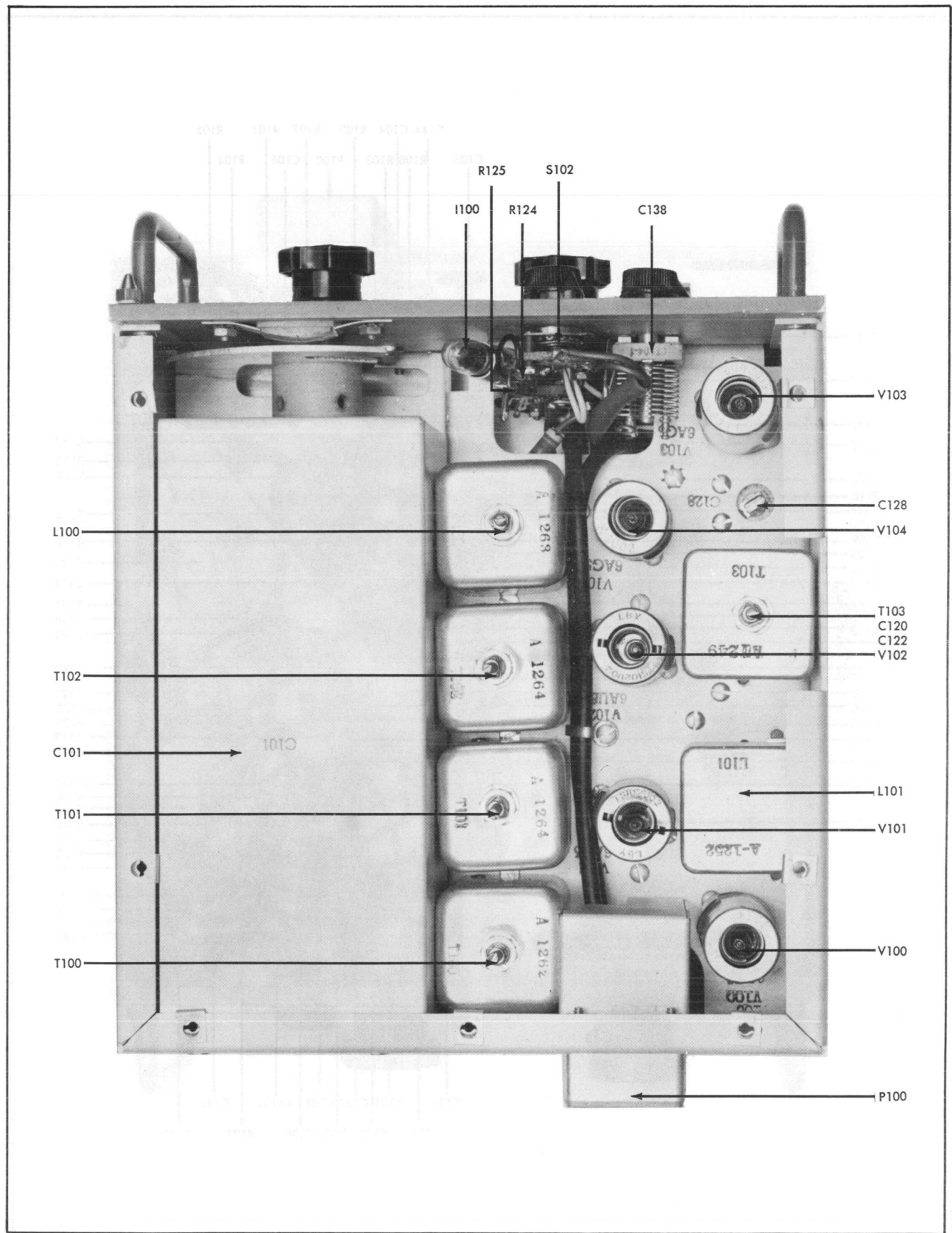


Figure 4-5. Top View Model FFRD-\* (LF Head)

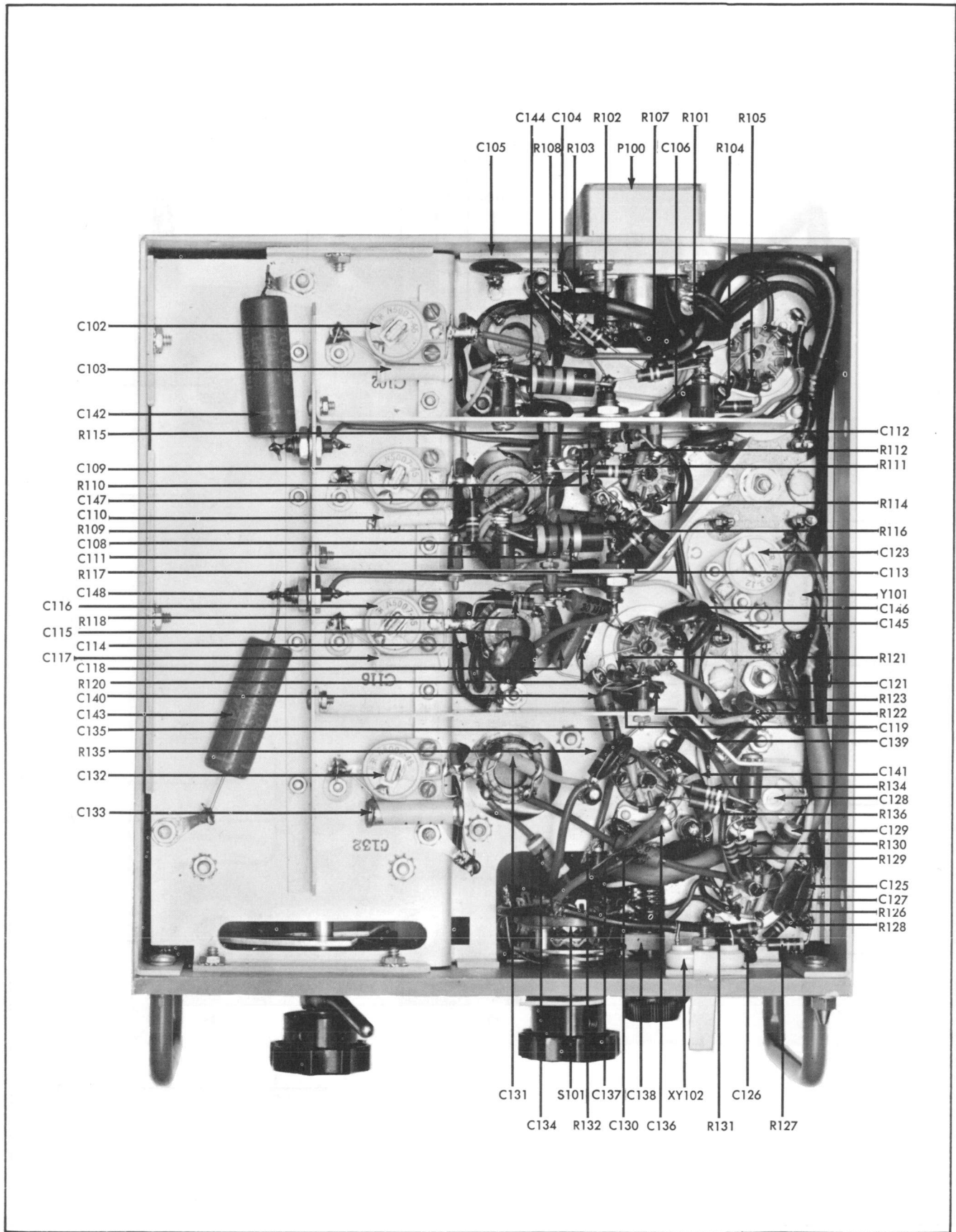


Figure 4-6. Bottom View, Model FFRD-\* (LF Head).

TUBE SOCKET VOLTAGES

ALL DC VOLTAGES MEASURED TO CHASSIS WITH AN ELECTRONIC VACUUM TUBE VOLTMETER (WITH TUNING DRAWER IN PLACE). AC VOLTAGES WERE TAKEN WITH SIMPSON MODEL 260 VOLTMETER. FILAMENT VOLTAGES MARKED WITH ASTERISK WERE MEASURED TO THE CORRESPONDING ASTERISK OF THE SAME TUBE SOCKET. HIGH VOLTAGE AC, MARKED WITH A DOUBLE ASTERISK, WAS MEASURED TO THE CHASSIS. LINE VOLTAGE ADJUSTED TO 110 VOLTS.

CONTROLS

OPERATING POSITION DURING MEASUREMENT

HFO (SLAVE-MASTER) SW ..... HFO  
 AUDIO GAIN ..... FULLY CLOCKWISE  
 AVC MANUAL SW ..... AVC  
 NOISE LIMITER SW ..... ON  
 BFO SW ..... ON  
 BFO (SLAVE-MASTER) SW ..... BFO  
 RF GAIN ..... FULLY CLOCK WISE

MODEL FFR-2 RECEIVER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS													
			1	2	3	4	5	6	7	8	9					
V100	6BA6	1 <sup>ST</sup> I.F. AMP.	-0.18	+1.30	—	+6.3	6.2*	+6.3	6.2*	+250	—	+70	+1.30	—	—	—
V101	6BA6	2 <sup>ND</sup> I.F. AMP.	-0.18	+1.25	—	+6.3	6.2*	+6.3	6.2*	+250	—	+65	+1.25	—	—	—
V102	6BA6	3 <sup>RD</sup> I.F. AMP.	0	+1.40	—	+6.3	6.2*	+6.3	6.2*	+250	—	+70	+1.40	—	—	—
V103	6AL5	2 <sup>ND</sup> DET. & AVC	0	-0.1	—	+6.3	6.2*	+6.3	6.2*	+3.6	—	0	-1.5	—	—	—
V104	6T8	NOISE LIMITER & 1 <sup>ST</sup> AUDIO	NC	-2.0	—	-1.3	—	+6.3	6.2*	+6.3	6.2*	NC	+1.5	0	—	+125
V105	6AQ5	AUDIO	0	+16.0	—	+6.3	6.2*	+6.3	6.2*	+250	—	+250	0	—	—	—
V106	6J6	BFO REACT. MOD.	+4.7	+4.9	—	+6.3	6.2*	+6.3	6.2*	0	—	0	+1.6	—	—	—
V107	6AG5	BFO OSC.	+3.0	+0.4	—	+6.3	6.2*	+6.3	6.2*	+150	—	+70	+0.4	—	—	—
V108	5Y3GT	RECT.	—	290	5.2*	—	—	—	—	380*	—	—	380*	—	290	5.2*
V109	0A2	VOLTAGE REG	+150	—	—	—	—	—	—	+150	—	—	—	—	—	—

CH-138-5

FFRD-5A TUNING DRAWER  
TUNING CONTROL AT 2 MCS

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS								
			1	2	3	4	5	6	7		
V500	6AG5	1 <sup>ST</sup> RF	-0.2	+0.83	+6.3	6.0*	+6.3	6.0*	+150	+60	+0.83
V501	6AG5	2 <sup>ND</sup> RF	-0.2	+0.76	+6.3	6.0*	+6.3	6.0*	+150	+60	+0.76
V502	6AU6	MIXER	0	—	+6.3	6.0*	+6.3	6.0*	+112	+112	+2.0
V503	6AG5	HFO REACT. MOD.	0	+4.6	+6.3	6.0*	+6.3	6.0*	+145	+145	+4.6
V504	6AG5	HFO OSC.	-2.5	+0.5	+6.3	6.0*	+6.3	6.0*	+53	+90	+0.5

CH-138-1

FFRD-7A TUNING DRAWER  
TUNING CONTROL AT 8 MCS.

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS								
			1	2	3	4	5	6	7		
V700	6AG5	1 <sup>ST</sup> RF	-0.2	+0.7	+6.3	6.0*	+6.3	6.0*	+150	+60	+0.7
V701	6AG5	2 <sup>ND</sup> RF	-0.2	+0.7	+6.3	6.0*	+6.3	6.0*	+150	+64	+0.7
V702	6AU6	MIXER	0	+2.6	+6.3	6.0*	+6.3	6.0*	+115	+115	+2.6
V703	6AG5	HFO REACT. MOD.	0	+4.6	+6.3	6.0*	+6.3	6.0*	+145	+135	+4.6
V704	6AG5	HFO OSC.	-3.6	+0.5	+6.3	6.0*	+6.3	6.0*	+68	+90	+0.5

CH-138-3

FFRD-6A TUNING DRAWER  
TUNING CONTROL AT 4 MCS

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS								
			1	2	3	4	5	6	7		
V600	6AG5	1 <sup>ST</sup> RF	-0.2	+0.70	+6.3	6.0*	+6.3	6.0*	+160	+60	+0.70
V601	6AG5	2 <sup>ND</sup> RF	-0.2	+0.80	+6.3	6.0*	+6.3	6.0*	+150	+60	+0.80
V602	6AU6	MIXER	0	—	+6.3	6.0*	+6.3	6.0*	+108	+108	+2.0
V603	6AG5	HFO REACT. MOD.	0	+3.8	+6.3	6.0*	+6.3	6.0*	+145	+135	+3.8
V604	6AG5	HFO OSC.	-1.8	+0.5	+6.3	6.0*	+6.3	6.0*	+47	+92	+0.5

CH-138-2

FFRD-8A TUNING DRAWER  
TUNING CONTROL AT 16 MCS

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS								
			1	2	3	4	5	6	7		
V800	6AK5	1 <sup>ST</sup> RF	-0.1	+0.7	+6.3	6.0*	+6.3	6.0*	+150	+58	+0.7
V801	6AK5	2 <sup>ND</sup> RF	-0.1	+0.8	+6.3	6.0*	+6.3	6.0*	+150	+58	+0.8
V802	6AU6	MIXER	0	+2.5	+6.3	6.0*	+6.3	6.0*	+110	+110	+2.5
V803	6AG5	HFO REACT. MOD.	0	+3.3	+6.3	6.0*	+6.3	6.0*	+150	+130	+3.3
V804	6AK5	HFO OSC.	-0.75	+1.1	+6.3	6.0*	+6.3	6.0*	+150	+112	+1.1

CH-138-4

CH-138

Figure 4-7a. Tube Socket Voltages, FFR Receiver., FFRD-5,6, 7 and 8

TUBE SOCKET RESISTANCES

RESISTANCE MEASURED FROM TUBE SOCKET PINS TO GROUND. LINE CORD  
DISCONNECTED FROM POWER SOURCE AND TUNING DRAWER PLUGGED INTO  
RECEIVER. OPERATING CONTROLS WERE SET AS FOLLOWS:

<u>CONTROL</u>	<u>POSITION</u>
HFO (SLAVE—MASTER) SW.....	HFO
AUDIO GAIN.....	FULLY CLOCKWISE
AVC—MANUAL SW.....	AVC
NOISE LIMITER SW.....	ON
BFO SW.....	ON
BFO (SLAVE—MASTER) SW.....	BFO
RF GAIN.....	FULLY CLOCKWISE

MODEL FFR-2 RECEIVER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS								
			1	2	3	4	5	6	7	8	9
V100	6BA6	1 <sup>ST</sup> IF AMP	1.7M	220Ω	6.8K	6.8K	32K	50K	220Ω	—	—
V101	6BA6	2 <sup>ND</sup> IF AMP	1.5M	220Ω	6.8K	6.8K	32K	50K	220Ω	—	—
V102	6BA6	3 <sup>RD</sup> IF AMP	5Ω	220Ω	6.8K	6.8K	32K	50K	220Ω	—	—
V103	6AL5	2 <sup>ND</sup> DET. & AVC	0	1.2M	6.8K	6.8K	6.8K	0	520K	—	—
V104	6T8	NOISE LIMITER & 1 <sup>ST</sup> AUDIO	—	1.0M	470K	6.8K	6.8K	—	2.7K	1.0M	225K
V105	6AQ5	AUDIO	470K	510Ω	6.8K	6.8K	32K	32K	—	—	—
V106	6J6	BFO REACT. MOD.	95K	95K	6.8K	6.8K	33K	590K	1.0K	—	—
V107	6AG5	BFO OSC.	47K	120Ω	6.8K	6.8K	37K	150K	120Ω	—	—
V108	5Y3GT	RECTIFIER	—	32K	—	730Ω	—	750Ω	—	32K	—
V109	0A2	VOLTAGE REG.	32K	—	—	—	32K	—	—	—	—

NOTE K=1000 Ω  
M=1 MEGOHM

CH-137-5

FFRD-5A TUNING DRAWER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS						
			1	2	3	4	5	6	7
V500	6AG5	1 <sup>ST</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	48K	90K	220Ω
V501	6AG5	2 <sup>ND</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	48K	90K	220Ω
V502	6AU6	MIXER	10Ω	0	6.8K	6.8K	78K	78K	820Ω
V503	6AG5	HFO REACT. MOD.	1.4M	2.7K	6.8K	6.8K	2.6K	73K	2.7K
V504	6AG5	HFO OSC.	22K	120Ω	6.8K	6.8K	68K	68K	120Ω

CH-137-1

FFRD-7A TUNING DRAWER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS						
			1	2	3	4	5	6	7
V700	6AG5	1 <sup>ST</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	45K	93K	220Ω
V701	6AG5	2 <sup>ND</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	45K	93K	220Ω
V702	6AU6	MIXER	0	950Ω	6.8K	6.8K	75K	75K	950Ω
V703	6AG5	HFO REACT. MOD.	1.4M	3.3K	6.8K	6.8K	52K	68K	3.3K
V704	6AG5	HFO OSC.	22K	120Ω	6.8K	6.8K	66K	66K	120Ω

CH-137-3

FFRD-6A TUNING DRAWER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS						
			1	2	3	4	5	6	7
V600	6AG5	1 <sup>ST</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	50K	95K	220Ω
V601	6AG5	2 <sup>ND</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	50K	95K	220Ω
V602	6AU6	MIXER	10Ω	0	6.8K	6.8K	80K	80K	820Ω
V603	6AG5	HFO REACT. MOD.	1.4M	3.3K	6.8K	6.8K	27K	75K	3.3K
V604	6AG5	HFO OSC.	22K	120Ω	6.8K	6.8K	70K	70K	120Ω

CH-137-2

FFRD-8A TUNING DRAWER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS						
			1	2	3	4	5	6	7
V800	6AK5	1 <sup>ST</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	50K	94K	220Ω
V801	6AK5	2 <sup>ND</sup> RF AMP	1.5M	220Ω	6.8K	6.8K	50K	94K	220Ω
V802	6AU6	MIXER	5Ω	950Ω	6.8K	6.8K	80K	80K	950Ω
V803	6AG5	HFO REACT. MOD.	1.5M	1.5K	6.8K	6.8K	50K	75K	1.5K
V804	6AK5	HFO OSC.	22K	120Ω	6.8K	6.8K	27K	50K	120Ω

CH-137-4

CH-137

Figure 4-7b. Tube Socket Resistances, FFR Receiver, FFRD-5, 6, 7 and 8.

TUNING DRAWER VOLTAGES

FFRD-1,2,3 TUNING DRAWERS  
TUNING CONTROL AT 75KCS, 150 KCS, 300 KCS

TUBE TYPE	FUNCTION	SOCKET PIN NUMBERS								
		1	2	3	4	5	6	7		
V100	6AG5 1ST RF AMP	-0.2	+0.6	+6.3	6.0*	+6.3	6.0*	+130	+50	+0.6
V101	6AG5 2ND RF AMP	-0.2	+0.6	+6.3	6.0*	+6.3	6.0*	+130	+50	+0.6
V102	6AU6 MIXER	0	0	+6.3	6.0*	+6.3	6.0*	+240	+240	+9.0
V103	6AG5 HFO REACT MOD	0	+3.5	+6.3	6.0*	+6.3	6.0*	+100	+130	+3.5
V104	6AG5 HFO OSC	-7.0	+0.5	+6.3	6.0*	+6.3	6.0*	+85	+75	+0.5

TUBE NUMBERS ARE KEYED TO BAND 1. ON-181-1

TUNING DRAWER INSTANCES

FFRD-1,2,3 TUNING DRAWERS

TUBE TYPE	FUNCTION	SOCKET PIN NUMBERS							
		1	2	3	4	5	6	7	
V100	6AG5 1ST RF AMP	2M	220Ω	6.8K	6.8K	6.8K	6.8K	100K	220Ω
V101	6AG5 2ND RF AMP	1.5M <sup>x</sup>	220Ω	6.8K	6.8K	6.8K	6.8K	100K	220Ω
V102	6AU6 MIXER	100K	0	6.8K	6.8K	70K	70K	24K	
V103	6AG5 HFO REACT MOD	1.5M	2.7K	6.8K	6.8K	70K	70K	2.7K	
V104	6AG5 HFO OSC	2.2K	120Ω	6.8K	6.8K	60K	60K	120Ω	

TUBE NUMBERS ARE KEYED TO BAND 1. ON-181-3

FFRD-3M TUNING DRAWER  
TUNING CONTROL AT 500 KCS

TUBE TYPE	FUNCTION	SOCKET PIN NUMBERS								
		1	2	3	4	5	6	7		
V1	6AG5 1ST RF AMP	-0.2	+1.2	+6.3	6.0*	+6.3	6.0*	+250	+100	+1.2
V2	6AG5 2ND RF AMP	-0.2	+1.2	+6.3	6.0*	+6.3	6.0*	+250	+100	+1.2
V3	6AU6 MIXER	0	0	+6.3	6.0*	+6.3	6.0*	+250	+250	+9.0
V4	6AG5 HFO REACT MOD	0	+5.3	+6.3	6.0*	+6.3	6.0*	+75	+130	+5.3
V5	6AG5 HFO OSC	-3.0	+0.5	+6.3	6.0*	+6.3	6.0*	+65	+80	+0.5

TUBE NUMBERS ARE KEYED TO BAND 1. ON-181-2

FFRD-3M TUNING DRAWER

TUBE TYPE	FUNCTION	SOCKET PIN NUMBERS							
		1	2	3	4	5	6	7	
V1	6AG5 1ST RF AMP	2M	220Ω	6.8K	6.8K	28K	28K	82K	220Ω
V2	6AG5 2ND RF AMP	2M	220Ω	6.8K	6.8K	28K	28K	82K	220Ω
V3	6AU6 MIXER	3Ω	0	6.8K	6.8K	68K	68K	24K	
V4	6AG5 HFO REACT MOD	1.4M	2.7K	6.8K	6.8K	65K	65K	78K	2.7K
V5	6AG5 HFO OSC	2.2K	120Ω	6.8K	6.8K	60K	60K	120Ω	

TUBE NUMBERS ARE KEYED TO BAND 1. ON-181-4

x ON THE FFRD-3 ONLY, THIS READING IS 2 M.

ALL NOTES ON PAGE 4-8 ARE APPLICABLE TO THE ABOVE CHARTS.

ALL NOTES ON PAGE 4-7 ARE APPLICABLE TO THE ABOVE CHARTS.

Figure 4-7c. Tube Socket Resistance and Voltages, FFRD-1, 2, 3 and 3M.

**TABLE 4-1. RF AND HFO ALIGNMENT CHART**

BAND		OSC.	MIXER	R.F.	ANT.
8	LOW END	16.0 Mc	16.0 Mc	16.0 Mc	16.0 Mc
	HIGH END	31.0 Mc	31.0 Mc	31.0 Mc	31.0 Mc
7	LOW END	8.0 Mc	8.5 Mc	8.5 Mc	8.5 Mc
	HIGH END	16.0 Mc	16.0 Mc	16.0 Mc	16.0 Mc
6	LOW END	4.0 Mc	4.25 Mc	4.25 Mc	4.25 Mc
	HIGH END	8.0 Mc	8.0 Mc	8.0 Mc	8.0 Mc
5	LOW END	2.0 Mc	2.1 Mc	2.1 Mc	2.1 Mc
	HIGH END	4.0 Mc	4.0 Mc	4.0 Mc	4.0 Mc
3M	LOW END	185 Kc	185 Kc	185 Kc	185 Kc
	HIGH END	215 Kc	215 Kc	215 Kc	215 Kc
3	LOW END	655 Kc	200 Kc	200 Kc	200 Kc
	HIGH END	855 Kc	400 Kc	400 Kc	400 Kc
2	LOW END	555 Kc	100 Kc	100 Kc	100 Kc
	HIGH END	655 Kc	200 Kc	200 Kc	200 Kc
1	LOW END	405 Kc	50 Kc	50 Kc	50 Kc
	HIGH END	555 Kc	100 Kc	100 Kc	100 Kc

**TABLE 4-2 HFO REACTANCE SHIFT CHART**

TUNING DRAWER				TUNING DRAWER			
No.	Total Freq. Shift/Mc	Freq.	Total Shift	No.	Total Freq. Shift/Mc	Freq.	Total Shift
5	4 Kc/Mc	2 Mc	8 Kc	7	3 Kc/Mc	8 Mc	24 Kc
		3 Mc	12 Kc			12 Mc	36 Kc
		4 Mc	16 Kc			16 Mc	48 Kc
6	4 Kc/Mc	4 Mc	16 Kc	8	Min. Shift of 32 Kc Throughout The Band	16 Mc	32 Kc
		6 Mc	24 Kc			24 Mc	32 Kc
		8 Mc	32 Kc			31 Mc	32 Kc
1	Min. Shift of 4 Kc Throughout The Band	50 Mc	4.0 Kc	3	Min. Shift of 4 Kc Throughout The Band	200 Kc	4.0 Kc
		75 Mc	4.0 Kc			300 Kc	4.0 Kc
		100 Mc	4.0 Kc			400 Kc	4.0 Kc
2	do	100 Kc	4.0 Kc	3M	do	500 Kc	6 Kc
		150 Kc	4.0 Kc				
		200 Kc	4.0 Kc				

the signal generator impedance. The generator should be modulated 30% at 1000 cycles.

2. Place a high impedance vacuum tube voltmeter across a 600 ohm load at the proper load terminals.

3. Plug a set of headphones into the PHONE jack, if desired.

4. Set the BFO to "Off", the LIMITER to "Off", the R.F. GAIN full, the HFO MASTER-SLAVE switch to HFO, and adjust the A.F. GAIN to an output of 20 volts on the meter.

5. Set the signal generator and the Model FFR dials to 32 Mcs.

The HFO is set to operate at a frequency above the first detector and R.F. amplifiers and not below. The fundamental-image relationship of this receiver is such that the signal image frequency always appears 910 kcs. higher on the dial of the signal generator (or 910 kcs. lower on the receiver dial). Referring to the oscillator trimmer C-827, starting from the maximum capacity setting in clockwise rotation, two distinct peaks will be obtained. After one of the peaks has been tuned in and assumed to be correct, the signal generator dial is tuned from 31 Mc. to 31.91 Mc. If a signal appears on this new setting, then the peak setting of the trimmer is correct. If the wrong peak was chosen, the operator should tune the trimmer to its adjacent peak and recheck the 31.91 Mc point on the signal generator. In all cases when checking the image frequency, the signal generator output should be increased because of pre-selector discrimination against image frequencies.

The next step is to set the signal generator and the FFR dial to 31 Mcs and peak the MIXER, RF, and ANTENNA trimmers C-813, C-809, C-802 in that order. When adjusting the MIXER trimmer, the signal generator should be reset slightly because of the pulling effect of the MIXER on the HFO oscillator. At the lower frequency heads, the MIXER trimmer may have two peak settings. One of these is due to the MIXER being tuned to the frequency of the HFO oscillator, resulting in great oscillator injection voltage, thus giving an apparent indication of correct alignment. However, this is the wrong setting. The correct setting is the one with maximum trimmer capacity.

Then, tune the signal generator and the FFR dial to 16 Mcs. Turn the trimmer "slug"

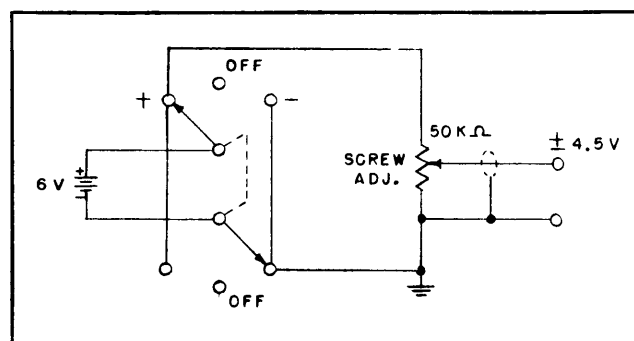


Figure 4-8. Reactance Tube Control Voltage.

of the HFO oscillator until an indication is noticed in the voltmeter. Check for its image at the 16.91 Mcs. setting on the signal generator, at the same time increasing the attenuating control on the signal generator. Once the correct peak setting of the slug is chosen, set the signal generator and the FFR dial to 16 Mcs. and peak the MIXER, RF, and ANTENNA "Slugs" in that order. Again, the operator must remember to retune slightly the dial of the signal generator because of the slight pulling effect of the MIXER on the HFO oscillator. Then, return the dial settings of the signal generator and the FFR to 31 Mcs. and repeat the procedure.

Table 4-1 gives a list of the frequency settings to be followed for the alignment of all the bands in the Model FFR. Using the frequencies shown in this table, align the bands in the same procedure as described above.

#### D. THE HFO REACTANCE TUBE

It is recommended that the HFO Reactance Tube be adjusted in the center band. Set a standard crystal in the BFO circuit, and "Zero-beat" an unmodulated 24 Mcs. signal from an LM18 or a BC-221 frequency meter connected into the antenna with a ±4.5 v.D.C. signal connected to the HFO EXTERNAL terminal on E-102. Note the amount of shift on the frequency meter when the "zero-beat" has been established. Then trim C-823 to give a maximum shift when the ±4.5 D.C. voltage has been applied to the reactance tube input. A suggested circuit for the varying and controlling of a ±6 v.D.C. source in the BFO and HFO Reactance Tube alignment is shown in Figure 4-6. Then repeat the procedure for aligning the R.F. Head.





### 3. ELECTRICAL PARTS LIST

R-5007/FRR-502

COMMUNICATION RECEIVER, MODEL FFR

THE BASIC RECEIVER CHASSIS IS SYMBOLIZED WITH SERIES 100 THROUGH 199 NUMBERS.

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C100	CAPACITOR, variable: ceramic, 4-30 mmfd, 500 wvdc.	IF Coupling	CV11C300
C101	CAPACITOR, fixed: ceramic; .01 mfd. (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C102	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C103	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate decoupling	CC-100-16
C104	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF tank	CM20D621G
C105	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF tank	CM20D621G
C106	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C107	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C108	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C109	CAPACITOR, fixed: ceramic; 15 mmfd, $\pm 5\%$ , 500 wvdc.	IF output	CC21SL150J
C110	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C111	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF tank	CM20D621G
C112	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF tank	CM20D621G
C113	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C114	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C115	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate decoupling	CC-100-16
C116	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF tank	CM20D621G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C117	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF tank	CM20D621G
C118	CAPACITOR, fixed: ceramic; 100 mmfd, $\pm 10\%$ , 500 wvdc.	IF Bypass	CC26SL101K
C119	CAPACITOR, fixed: ceramic; 51 mmfd, $\pm 5\%$ , 500 wvdc.	Det-AVC Coupling	CC21SL510J
C120A B	CAPACITOR, fixed: paper, dual unit, .5 mfd, $\pm 15\%$ , ea sect, 600 wvdc, oil filled and impregnated, hermetically sealed metal case.	Filter capacitor	CP69B4EF504L
C121	CAPACITOR, fixed: ceramic; 100 mmfd, $\pm 10\%$ , 500 wvdc.	IF Bypass	CC26SL101K
C122	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Audio Coupling	CC-100-16
C123	CAPACITOR, fixed: paper; .05 mfd, +40, -20%, 400 wvdc, plastic tubular case.	Noise Limiter time constant	CN-100-3
C124	Not used.		
C125	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Audio Coupling	CC-100-16
C126	Not Used.		
C127	CAPACITOR, fixed: ceramic; .005 mfd, (GMC), 500 wvdc, disc type.	Audio Bypass	CC-100-15
C128	CAPACITOR, fixed: paper; 1 mfd, $\pm 15\%$ , 600 wvdc, oil-filled and impregnated, hermetically sealed case.	Audio Filter	CP69B1EF105L
C129	CAPACITOR, fixed: paper; .05 mfd, +40, -20%, 400 wvdc, plastic tubular case.	Reactance tube Grid	CN-100-3
C130	CAPACITOR, fixed: paper; .05 mfd, +40, -20%, 400 wvdc, plastic tubular case.	Reactance tube Grid Filter	CN-100-3
C131	CAPACITOR, fixed: ceramic; 22 mmfd, $\pm 5\%$ , 500 wvdc.	Reactance tube Phase Network	CC21SL220J
C132	CAPACITOR, fixed: ceramic; 1,000 mmfd, $\pm 20\%$ , char. A, 500 wvdc, disc type.	Blocking	CC-100-9
C133	CAPACITOR, fixed: ceramic; .005 mfd, (GMC), 500 wvdc, disc type.	Reactance tube cathode bypass	CC-100-15
C134	CAPACITOR, fixed: ceramic; 220 mmfd, $\pm 10\%$ , 500 wvdc.	P/O Output Tank	CC-101-3

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C135	CAPACITOR, fixed: ceramic; 150 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance tube Coupling	CC-101-2
C136	CAPACITOR, fixed: mica; 510 mmfd, $\pm 2\%$ , char. C, 500 wvdc.	Part of BFO tank	CM20C511G
C137	CAPACITOR, variable: air 2.3 to 15 mmfd.	BFO Pitch	CT-104-2
C138	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	BFO Grid Coupling	CC21SL470K
C139	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	BFO Cathode Bypass	CC-100-16
C140	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	BFO Screen Bypass	CC-100-16
C141	CAPACITOR, fixed: ceramic; 30 mmfd, $\pm 5\%$ , 500 wvdc.	Xtal BFO Grid Bypass	CC21SL300J
C142	CAPACITOR, fixed: ceramic; 150 mmfd, $\pm 5\%$ , 500 wvdc.	RF Screen Bypass	CC-101-2
C143	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	RF Bypass	CC-100-16
C144	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm .5$ mmfd, 500 wvdc.	BFO Injection	CC21SL100D
C145	CAPACITOR, fixed: ceramic; 5mmfd, $\pm .5$ mmfd, 500 wvdc.	BFO Output	CC21SL050D
C146	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	AVC time constant	CC-100-16
C147 A & B	CAPACITOR, fixed: paper; dual unit, .1 mfd, $\pm 10\%$ ea. section, 600 wvdc, oil filled and impregnated, hermetically sealed metal case.	Line Bypass	CP53B4EF104K
C148	CAPACITOR, fixed: paper; 4.0 mfd, +20%, -10%, 600 wvdc, oil filled and impregnated, hermetically sealed metal case.	Power Supply Filter	CP41B1FF405V
C149	CAPACITOR, fixed: paper; 4.0 mfd, +20%, -10%, 600 wvdc, oil filled and impregnated, hermetically sealed metal case.	Power Supply Filter	CP41B1FF405V
C150	CAPACITOR, fixed: paper; 4.0 mfd, +20%, -10%, 600 wvdc, oil filled and impregnated, hermetically sealed metal case.	Power Supply Filter	CP41B1FF405V
C151	CAPACITOR, fixed: electrolytic; 25 mfd, $\pm 10\%$ , 150 wvdc.	Negative Supply Filter	CE-100

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C152	CAPACITOR, fixed: paper; .05 mfd, +40, -20%, plastic tubular case, 400 wvdc.	B+ Filter	CN-100-3
C153 A,B	CAPACITOR, fixed: ceramic; dual unit, .01 mfd, ea. sect., 500 wvdc, disc type.	Filament Bypass	CC-100-23
C154	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	RF Bypass	CC-100-16
C155	CAPACITOR, fixed: mica; 470 mmfd, ±10%, char. A, 500 wvdc.	RF Line Bypass	CM20A471K
C156	CAPACITOR, fixed: mica; 470 mmfd, ±10%, char. A, 500 wvdc.	RF Line Bypass	CM20A471K
C157 A,B	CAPACITOR, fixed: ceramic; dual unit, .01 mfd, each sect, 500 wvdc, disc type.	Filament Bypass	CC-100-23
C158 A,B	CAPACITOR, fixed: ceramic; dual unit, .01 mfd, each sect, 500 wvdc, disc type.	RF Bypass	CC-100-23
E100	BOARD, terminal: general purpose barrier type; three 6-32 binding head machine screws.	Antenna Input	TM-100-3
E101	BOARD, terminal: general purpose barrier type; eight 6-32 binding head machine screws.	Diversity & Audio Terminals	TM-100-8
E102	BOARD, terminal: general purpose barrier type ; eight 6-32 binding head machine screws.	Remote control Terminals	TM-100-8
F100	FUSE, cartridge: 2 amp.	Line Fuse	FU-100-2
I100	LAMP, incandescent: 6-8 volts, .250 amp. T-3-1/4 clear bulb.	Pilot Light	BI-101-44
J100	CONNECTOR, coaxial: female contact BNC type receptacle; 52 ohms impedance, single hole mounted.	IF Output	UG-625/U
J101	CONNECTOR, coaxial: female contact BNC type receptacle; 52 ohms impedance, single hole mounted.	HFO Input	UG-625/U
J102	CONNECTOR, coaxial: female contact BNC type receptacle; 52 ohms impedance, single hole mounted.	HFO Output	UG-625/U
J103	CONNECTOR, coaxial: female contact BNC type receptacle, 52 ohms impedance, single hole mounted.	BFO Input	UG-625/U
J104	CONNECTOR, coaxial: female contact BNC type receptacle; 52 ohms impedance, single hole mounted.	BFO Output	UG-625/U

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
J105	CONNECTOR, female contact: polarized; four contact bracket type.	Power Supply Jack	JJ-120-2
J106	JACK, open circuit: insulated.	Phone Jack	JJ034
J107	CONNECTOR, multiple contact: 4 coaxial female contacts; 8 non-coaxial male contacts.	RF Connector	JJ-104
J108	CONNECTOR, male contact: polarized; twist lock.	AC Input	JJ-115
J109	JACK, connector: 75 ohm, coaxial female receptacle, mica filled bakelite dielectric.	ANT. Input	SO-239
L100	INDUCTOR, 15 henries : 85 ma DC; 270 ohms DC res, 2,500 volts, RMS Test.	Power Supply Filter	TF5000
L101	INDUCTOR, 15 henries : 85 ma DC; 270 ohms DC res, 2,500 volts RMS Test.	Power Supply Filter	TF5000
L102	CHOKER, RF: 2.5 mh; 50 ma with axial leads.	BFO Filter	CL-101-3
L103	INDUCTOR, fixed: BFO coil.	Part of Oscillator tank	A-164
L104	CHOKER, RF: 2.5 mh, 50 ma, with axial leads.	BFO plate load	CL-101-3
R100	RESISTOR, fixed: composition; 270,000 ohms, $\pm 10\%$ , 1/2 watt.	IF Grid resistor	RC20GF274K
R101	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode bias	RC20GF221K
R102	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen voltage divider	RC20GF104K
R103	RESISTOR, fixed: composition; 68,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen voltage divider	RC20GF683K
R104	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ , 1/2 watt.	Plate decoupling	RC20GF222K
R105	RESISTOR, fixed: composition; 33,000 ohms, $\pm 5\%$ , 1/2 watt.	AVC Decoupling	RC20GF333J
R106	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode bias	RC20GF221K
R107	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen voltage divider	RC20GF104K
R108	RESISTOR, fixed: composition; 68,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen voltage divider	RC20GF683K
R109	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ , 1/2 watt.	Plate Decoupling	RC20GF222K
R110	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R111	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen voltage divider	RC20GF104K
R112	RESISTOR, fixed: composition; 68,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen voltage divider	RC20GF683K
R113	RESISTOR, fixed: composition; 2,200 ohms, $\pm 10\%$ , 1/2 watt.	Plate decoupling	RC20GF222K
R114	RESISTOR, fixed: composition; 6,800 ohms, $\pm 5\%$ , 1/2 watt.	Part of AVC Delay	RC20GF682J
R115	RESISTOR, fixed: composition; 270,000 ohms, $\pm 5\%$ , 1/2 watt.	Part of AVC Delay	RC20GF274J
R116	RESISTOR, fixed: composition, 1.2 megohm, $\pm 10\%$ , 1/2 watt.	AVC Load	RC20GF125K
R117	RESISTOR, fixed: composition; 1.2 megohm, $\pm 10\%$ , 1/2 watt.	Part of AVC Time Constant	RC20GF125K
R118	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	2nd Detector Load	RC20GF474K
R119	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of I.F. Filter	RC20GF473K
R120	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Noise Limiter	RC20GF474K
R121	RESISTOR, variable: composition; 1 megohm, $\pm 20\%$ , audio taper, 3/8-32 x 3/8 bushing, 1/4 in. diameter shaft 7/8 in. from mounting surface.	Audio Gain Control	RV4ATRD105D
R122	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ , 1/2 watt.	Cathode bias	RC20GF222K
R123	RESISTOR, fixed: composition; 120,000 ohms, $\pm 10\%$ , 1/2 watt.	Plate Filter	RC20GF124K
R124	RESISTOR, fixed: composition; 120,000 ohms, $\pm 10\%$ , 1/2 watt.	Plate Load	RC20GF124K
R125	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Grid Leak	RC20GF474K
R126	RESISTOR, fixed: composition; 510 ohms, $\pm 5\%$ , 1 watt.	Cathode bias	RC30GF511J
R127	RESISTOR, fixed: composition; 1500 ohms, $\pm 10\%$ , 2 watts.	Filter	RC42GF152K
R128	RESISTOR, fixed: 3900 ohms, $\pm 5\%$ , 1/2 watt.	Audio Level	RC20GF392J
R129	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Grid Filter	RC20GF474K

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R130	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Grid Filter	RC20GF474K
R131	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Grid Filter	RC20GF474K
R132	RESISTOR, fixed: composition; 120,000 ohms, $\pm 10\%$ , 1/2 watt.	Grid Leak	RC20GF124K
R133	RESISTOR, fixed: composition; 82000 ohms, $\pm 5\%$ , 1/2 watt.	Part of Reactance Tube Phase Circuit	RC20GF823J
R134	RESISTOR, fixed: composition; 180 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Degeneration	RC20GF181K
R135	RESISTOR, fixed: composition; 1000 ohms, $\pm 5\%$ , 1/2 watt.	Cathode bias	RC20GF102J
R136	RESISTOR, variable: composition; 2500 ohms, $\pm 10\%$ , 2 watts, 1/4 in. lg. x 1/4 in. diam, slotted shaft.	Reactance Tube Balance	RV4ATSA252A
R137	RESISTOR, fixed: composition; 33,000 ohms, $\pm 5\%$ , 1/2 watt.	Reactance Tube Grid Resistor	RC20GF333J
R138	RESISTOR, fixed: composition; 56,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Plate Resistor	RC20GF563K
R139	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Oscillator Grid Resistor	RC20GF473K
R140	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF121K
R141	RESISTOR, fixed: composition; 120,000 ohms, $\pm 10\%$ , 1/2 watt.	Oscillator Screen Resistor	RC20GF124K
R142	RESISTOR, fixed: composition; 3.3 megohms, $\pm 10\%$ , 1/2 watt.	AVC Decoupling	RC20GF335K
R143	RESISTOR, variable: composition; 50,000 ohms, $\pm 10\%$ , reverse log taper with SPST switch, 3/8-32 x 3/8 bushing 1/4 diam. shaft 7/8 in. from mounting surface.	RF Gain Control	RV4BTRD503E
R144	RESISTOR, fixed: composition; 6800 ohms, $\pm 5\%$ , 1/2 watt.	Voltage Divider	RC20GF682J
R145	RESISTOR, fixed: composition; 150,000 ohms, $\pm 5\%$ , 1/2 watt.	Voltage Divider	RC20GF154J
R146	RESISTOR, fixed: composition; 6800 ohms, $\pm 5\%$ , 1/2 watt.	Voltage Divider	RC20GF682J
R147	RESISTOR, fixed: composition; 150,000 ohms, $\pm 5\%$ , 1/2 watt.	Voltage Divider	RC20GF154J

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R148	RESISTOR, fixed: wire wound; 5000 ohms, $\pm 10\%$ , 20 watts.	Current Limiting	RW-110-30
R149	RESISTOR, fixed: wire wound; 600 ohms, $\pm 10\%$ , 25 watts.	Negative Bias	RW-102
R150	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor	RC20GF220K
S100	SWITCH, toggle: SPST; 3 amp, 250 V.	Noise Limiter On-Off	ST12A
S101	SWITCH, toggle: DPDT; 3 amp, 250 V. (one pole unused).	AVC - Manual	ST22N
S102	SWITCH, rotary: SPST; 3 amp, 250 V. (part of R143).	On - Off Power	
S103	SWITCH, rotary: single section; mycalex insulation.	Slave, Master Xtal Operational	SW-100
S104	SWITCH, toggle: SPST; 3 amp, 250 V.	BFO On - Off Switch	ST12A
T100	TRANSFORMER, RF: 300 ohms balanced to 75 ohms unbalanced, open construction, plastic molded case.	Antenna Matching Transformer	TR-021
T101	TRANSFORMER, IF: 455 Kcs.	IF Transformer	A-157
T102	TRANSFORMER, IF: 455 Kcs.	IF Transformer	A-157
T103	TRANSFORMER, IF: 455 kcs.	IF Transformer	A-157
T104	TRANSFORMER, audio: 5000 ohms primary, 600 ohms, 8 ohms secdy.	Output Transformer	TF-100
T105	TRANSFORMER, filament and power: input 110/220 volts, 50/60 cycle, single phase, four output windings.	Power Transformer	TF-101
V100	TUBE, electron: 6BA6, miniature 7 pin pentode.	1st IF	6BA6
V101	TUBE, electron: 6BA6, miniature 7 pin pentode.	2nd IF	6BA6
V102	TUBE, electron: 6BA6, miniature 7 pin pentode.	3rd IF	6BA6
V103	TUBE, electron: 6AL5, miniature 7 pin twin diode.	2nd det. & AVC	6AL5
V104	TUBE, electron: 6T8, miniature 9 pin triple diode.	Noise Limiter & 1st Audio	6T8
V105	TUBE, electron: 6AQ5, miniature 7 pin beam power amplifier.	Audio Output	6AQ5
V106	TUBE, electron: 6J6, miniature 7 pin UHF twin triode.	Balance Reactance Modulator	6J6



SYM	DESCRIPTION	FUNCTION	TMC PART NO.
V107	TUBE, electron: 6AG5, miniature 7 pin pentode.	BFO Oscillator	6AG5
V108	TUBE, electron: 5Y3GT, duo-diode rectifier, octal.	Rectifier	5Y3GT
V109	TUBE, electron: OA2, miniature 7 pin voltage regulator.	Voltage Regulator	OA2
W100	CABLE ASSEMBLY, power: female twist-lock type plug one end, non-polarized male plug opposite end.	AC Line Cord	CA-103
Y100	CRYSTAL UNIT, quartz: 455 Kcs, .01%, hermetically sealed can. (supplied only on customer request).	Freq. Determining Element.	CR-46/U
XF100	HOLDER, fuse: extractor post type; for single AGC fuse.		FH-100-2
XI100	LIGHT, indicator: with red frosted lens, for miniature bay base lamp.	Pilot Light	TS-106-1
XV100 101, 102, 103, 105, 106, 107, 109	SOCKET, tube: 7 pin miniature	Tube Sockets	TS102P01
XV104	SOCKET, tube: 9 pin miniature.	V104 Socket	TS103P01
XV108	SOCKET, tube: octal.	V106 Socket	TS101P01
XY100	SOCKET, crystal: ceramic, .487 in, spacing, for .050 in. pins.	Crystal holder	TS-104-1



TN-274/FRR-502  
TUNING DRAWER, MODEL FFRD-1 (50-100 Kcs.)

SYMBOLIZED WITH SERIES 100 THROUGH 199 NUMBERS

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C101	CAPACITOR, variable: air dielectric; four sections, 0-455 mmfd. each section.	Frequency Tuning Capacitor	CB-129
C102	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer V100	CV11C450
C103	CAPACITOR, fixed: ceramic; 68 mmfd., $\pm 5\%$ ; 500 wvdc.	P/O R.F. Tank, V100	CC35CH680J
C104	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Coupling Cap., V100	CC-100-16
C105	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	AVC Decoupling Cap., V100	CC-100-16
C106	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Screen Bypass Cap., V100	CC-100-16
C107	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V101	CC-100-16
C108	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%; 500 wvdc; disc type.	AVC Decoupling Cap., V101	CC-100-16
C109	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer V101	CV11C450
C110	CAPACITOR, fixed: ceramic; 68 mmfd., $\pm 5\%$ ; 500 wvdc.	P/O RF Tank, V101	CC35CH680J
C111	CAPACITOR, fixed: ceramic; 82 mmfd., $\pm 5\%$ ; 500 wvdc.	P/O RF Tank, V101	CC21SL820J
C112	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V101	CC-100-16
C113	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Screen Bypass Cap., V101	CC-100-16
C114	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V101	CC-100-16
C115	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V102	CC-100-16
C116	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer V102	CV11C450

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C117	CAPACITOR, fixed: ceramic; 68 mmfd, ±5%; 500 wvdc.	P/O RF Tank, V102	CC35CH680J
C118	CAPACITOR, fixed: ceramic; 82 mmfd, ±5%; 500 wvdc.	P/O RF Tank, V102	CC21SL820J
C119	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Cathode Bypass Cap., V102	CC-100-16
C120	CAPACITOR, fixed: mica; 160 mmfd; ±5%; char. D; 500 wvdc.	Part of IF Tank, V102	CM20D161J
C121	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Plate Decoupling Cap., V102	CC-100-16
C122	CAPACITOR, fixed: mica; 620 mmfd., ±5%; char. D; 500 wvdc.	Part of IF Tank, V102	CM20D621J
C123	CAPACITOR, variable: ceramic; 3-12 mmfd., 500 wvdc.	Phasing Cap., V102	CV11A120
C124	CAPACITOR, fixed: mica; 680 mmfd; ±5%; char. D; 500 wvdc.	P/O Output Tank V102	CM20D681J
C125	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V103	CC-100-16
C126	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V103	CC-100-16
C127	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V103	CC-100-16
C128	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	Balance Control Trimmer, V103	CV11C450
C129	CAPACITOR, fixed: ceramic; 47 mmfd, ±10%; 500 wvdc.	Screen Bypass Cap., V103	CC21SL470K
C130	CAPACITOR, fixed: ceramic; 10 mmfd., ±.5 mmfd., 500 wvdc.	Coupling Cap., V103	CC21SL100D
C131	CAPACITOR, fixed: ceramic; 100 mmfd, ±5%; 500 wvdc.	Osc. Padder Cap., V104	CC32CH101J
C132	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	Osc. Trimmer Cap., V104	CV11C450
C133	CAPACITOR, fixed: ceramic; 150 mmfd., ±5%; 500 wvdc.	P/O Osc. Tank V104	CC45CH151J
C134	CAPACITOR, fixed: ceramic; 47 mmfd., ±10%, 500 wvdc.	Osc. Grid Coupling Cap., V104	CC21SL470K
C135	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Cathode Bypass Cap., V104	CC-100-16

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C136	CAPACITOR, fixed: ceramic; 120 mmfd., ±10%, 500 wvdc.	Screen Bypass Cap., V104	CC-101-4
C137	CAPACITOR, fixed: ceramic; .01 mfd, +80%-20%, 500 wvdc; disc type.	Screen Coupling Cap., V104	CC-100-16
C138	CAPACITOR, variable: air dielectric; 3.2-50 mmfd.	Crystal Tuning Cap., V104	CT-104-1
C139	CAPACITOR, fixed: ceramic; .01 mfd, +80%-20%, 500 wvdc; disc type.	Plate Bypass Cap., V104	CC-100-16
C140	CAPACITOR, fixed: ceramic; 10 mmfd, ±.5 mmfd; 500 wvdc.	Osc. Injection Cap., V104	CC21SL100D
C141	CAPACITOR, fixed: ceramic; 10 mmfd, ±.5 mmfd., 500 wvdc.	HFO Output Cap., V104	CC21SL100D
C142	CAPACITOR, fixed: moulded plastic; .1 mfd., +40%-10%, 400 wvdc.	Plate Decoupling Cap., V100	CN-100-4
C143	CAPACITOR, fixed: moulded plastic; .1 mfd., +40%-10%, 400 wvdc.	Plate Decoupling Cap., V100	CN-100-4
C144	CAPACITOR, fixed: ceramic; .01 mfd, +80%-20%, 500 wvdc; disc type.	RF Bypass Cap., V100	CC-100-16
C145	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Filament Bypass Cap., V102	CC-100-16
C146	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Filament Bypass Cap., V102	CC-100-16
C147	CAPACITOR, fixed: ceramic; 30 mmfd., ±5%, 500 wvdc.	Grid Coupling Capacitor	CC21SL300J
C148	CAPACITOR, fixed: ceramic; 30 mmfd., ±5%, 500 wvdc.	Grid Coupling Capacitor	CC21SL300J
I101	LAMP, incandescent: 6-8 volts; 250 ma DC; bayonet base.	Pilot Light	BI-101-44
L200	TRANSFORMER, RF: tune: 770 microhenries, ±40 microhenries, Q=25; tapped at 420 microhenries, ±42 microhenries, Q=20; and 285 microhenries, ±30 microhenries, Q=15.	Osc. Tank	A-1263
L101	COIL, RF: tuned: 105 microhenries, ±6 microhenries; Q=80.	Xtal Filter Output Tank	A-1252
P101	CONNECTOR, multiple contact: 4 coaxial contacts and 8 non-coaxial contacts.	RF Head Connector	PL-109
R101	RESISTOR, fixed: composition; 22 ohms, ±10%; 1/2 watt.	Parasitic Suppressor V100	RC20GF220K

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
R102	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Bias Res., V100	RC20GF474K
R103	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	AVC Filter Res., V100	RC20GF104K
R104	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V100	RC20GF221K
R105	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V100	RC20GF100K
R106	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V100	RC20GF224K
R107	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V100	RC20GF104K
R108	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 2 watts.	Plate Decoupling Res., V100	RC42GF473K
R109	RESISTOR, fixed: composition; 270,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V101	RC20GF274K
R110	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V101	RC20GF220K
R111	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Bias Res., V101	RC20GF104K
R112	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	AVC Filter Res., V101	RC20GF104K
R113	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V101	RC20GF221K
R114	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V101	RC20GF100K
R115	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V101	RC20GF224K
R116	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V101	RC20GF104K
R117	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 2 watts.	Plate Decoupling Res., V101	RC42GF473K
R118	RESISTOR, fixed: composition; 270,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V102	RC20GF274K
R119	Not Used.		
R120	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Bias Res., V102	RC20GF104K
R121	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Res., V102	RC20GF222K

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
R122	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V102	RC20GF223K
R123	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1 watt.	Plate Decoupling Res., V102	RC30GF473K
R124	RESISTOR, fixed: composition; 10 ohms, $\pm 5\%$ ; 1/2 watt.	P/O Output Tank, S102	RC20GF100J
R125	RESISTOR, fixed: composition; 22 ohms, $\pm 5\%$ ; 1/2 watt.	P/O Output Tank, S102	RC20GF220J
R126	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V103	RC20GF474K
R127	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Grid Filter, V103	RC20GF474K
R128	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Grid Filter, V103	RC20GF474K
R129	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1/2 watt.	Plate Load Res., V103	RC20GF473K
R130	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1/2 watt.	Screen Res., V103	RC20GF473K
R131	RESISTOR, fixed: composition; 2700 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V103	RC20GF272K
R132	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V104	RC20GF220K
R133	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V104	RC20GF223K
R134	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ ; 1/2 watt.	Plate Res., V104	RC20GF393K
R135	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V104	RC20GF121K
R136	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ ; 1/2 watt.	Screen Res., V104	RC20GF393K
S101	SWITCH, rotary: non-shorting: 1 section, 3 positions; Mycalex insulation; contacts and wipers silver plated; 1/4" drive shaft, 7/8" lg.	Slave, Master Xtal Operational Switch	SW-100
S102	SWITCH, rotary: shorting: 1 section, 4 positions, double pole; glass melamine insulation; contacts and wipers silver alloy; 1/4" drive shaft; 11/32" lg., 1/4" flatted two sides.	Bandwidth Switch	SW-181

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
T100	TRANSFORMER, RF: tuned; 11 millihenries, $\pm 6$ millihenries, $Q=40$ ; tapped at 10.7 millihenries, $\pm 7$ millihenries, $Q=50$ .	Antenna Transformer	A-1262
T101	TRANSFORMER, RF: tuned; 11 millihenries, $\pm 6$ millihenries, $Q=40$ ; tapped at 9.2 millihenries, $\pm 9$ millihenries, $Q=40$ .	RF Transformer	A-1264
T102	TRANSFORMER, RF: tuned: 11 millihenries, $\pm 6$ millihenries, $Q=40$ ; tapped at 9.2 millihenries, $\pm 9$ millihenries, $Q=40$ .	Mixer Trans.	A-1264
T103	TRANSFORMER, RF: tuned; two windings; pri., 520 microhenries, $\pm 27$ microhenries, $Q=60$ ; sec., 152 microhenries, $\pm 8$ microhenries, $Q=80$ ; tapped at 50 microhenries, $\pm 5$ microhenries, $Q=20$ .	First IF Transformer	A-1249
V100	TUBE, electron: 6AG5; miniature 7 pin.	First RF	6AG5
V101	TUBE, electron: 6AG5; miniature 7 pin.	Second RF	6AG5
V102	TUBE, electron: 6AU6; miniature 7 pin.	Mixer	6AU6
V103	TUBE, electron: 6AG5; miniature 7 pin.	Reactance Tube	6AG5
V104	TUBE, electron: 6AG5; miniature 7 pin.	HF Oscillator	6AG5
XI101	SOCKET, lens: min. bayonet base, T-3-1/4 bulb; right angle, down turned; 5/32" mtg. hole.	Socket for I201	TS-107-2
XV100	SOCKET, tube: 7 pin miniature.	Socket, V100	TS102P01
XV101	SOCKET, tube: 7 pin miniature.	Socket, V101	TS102P01
XV102	SOCKET, tube: 7 pin miniature.	Socket, V102	TS102P01
XV103	SOCKET, tube: 7 pin miniature.	Socket, V103	TS102P01
XV104	SOCKET, tube: 7 pin miniature.	Socket, V104	TS102P01
XY101	SOCKET, CRYSTAL: ceramic; .487" spacing for .050" pins.	Socket, Y102	TS-104-1
Y101	CRYSTAL, UNIT, quartz: 455 Kc.	L.F. Xtal	CR-102
Y102	CRYSTAL UNIT, quartz: 500-1200 Kc (supplied at customer's request.)		CR-104



TN-275/FRR-502  
TUNING DRAWER, MODEL FFRD-2 (100-200 Kcs.)

SYMBOLIZED WITH SERIES 200 THROUGH 299 NUMBERS

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C201	CAPACITOR, variable: air dielectric; four sections, 0-455 mmfd. each section.	Freq. Tuning Cap.	CB-129
C202	CAPACITOR, variable: ceramic; 7-45 mmfd, 500 wvdc.	High Freq. Band Adj. Trimmer V200	CV11C450
C203	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R.F. Tank	CC35CH680J
C204	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Coupling Cap., V200	CC-100-16
C205	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	AVC Decoupling Cap., V200	CC-100-16
C206	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Screen Bypass Cap., V200	CC-100-16
C207	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V201	CC-100-16
C208	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	AVC Decoupling Cap., V201	CC-100-16
C209	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer, V201	CV11C450
C210	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R.F. Tank, V201	CC35CH680J
C211	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R.F. Tank, V201	CC26SL680J
C212	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V201	CC-100-16
C213	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Screen Bypass Cap., V201	CC-100-16
C214	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V201	CC-100-16
C215	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V202	CC-100-16
C216	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer, V202	CV11C450

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C217	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R. F. Tank, V202	CC35CH680J
C218	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R. F. Tank, V202	CC26CH680J
C219	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Cathode Bypass Cap., V202	CC-100-16
C220	CAPACITOR, fixed: mica; 160 mmfd.; ±5%; char. D; 500 wvdc.	Part of IF Tank, V202	CM20D161J
C221	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Plate Decoupling Cap., V202	CC-100-16
C222	CAPACITOR, fixed: mica; 620 mmfd., ±5%; char. D; 500 wvdc.	Part of IF Tank, V202	CM20D621J
C223	CAPACITOR, variable: ceramic; 3-12 mmfd., 500 wvdc.	Phasing Cap., V202	CV11A120
C224	CAPACITOR, fixed: mica; 680 mmfd; ±5%; char. D; 500 wvdc.	P/O Output Tank, V202	CM20D681J
C225	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V203	CC-100-16
C226	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V203	CC-100-16
C227	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V203	CC-100-16
C228	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	Balance Control Trimmer, V203	CV11C450
C229	CAPACITOR, fixed: ceramic; 47 mmfd., ±10%; 500 wvdc.	Screen Bypass Cap., V203	CC21SL470K
C230	CAPACITOR, fixed: ceramic; 10 mmfd., ±.5 mmfd., 500 wvdc.	Coupling Cap., V203	CC21SL100D
C231	CAPACITOR, fixed: ceramic; 150 mmfd, ±5%; 500 wvdc.	Osc. Padder Cap., V204	CC45CH151J
C232	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	Osc. Trimmer Cap., V204	CV11C450
C233	CAPACITOR, fixed: ceramic; 120 mmfd., ±5%; 500 wvdc.	P/O Osc. Tank, V204	CC35CH121J
C234	CAPACITOR, fixed: ceramic; 47 mmfd., ±10%, 500 wvdc.	Osc. Grid Coupling Cap., V204	CC21SL470K
C235	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Cathode Bypass Cap., V204	CC-100-16

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C236	CAPACITOR, fixed: ceramic; 120 mmfd., $\pm 10\%$ , 500 wvdc.	Screen Bypass Cap., V204	CC-101-4
C237	CAPACITOR, fixed: ceramic; .01 mfd., $+80\%$ - $20\%$ , 500 wvdc; disc type.	Screen Coupling Cap., V204	CC-100-16
C238	CAPACITOR, variable: air dielectric; 3.2-50 mmfd.	Crystal Tuning Cap., V204	CT-104-1
C239	CAPACITOR, fixed: ceramic; .01 mfd., $+80\%$ - $20\%$ , 500 wvdc; disc type.	Plate Bypass Cap., V204	CC-100-16
C240	CAPACITOR, fixed: ceramic; 10 mmfd; $\pm .5$ mmfd; 500 wvdc.	Osc. Injection Cap., V204	CC21SL100D
C241	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm .5$ mmfd., 500 wvdc.	HFO Output Cap., V204	CC21SL100D
C242	CAPACITOR, fixed: moulded plastic; .1 mfd., $+40\%$ - $10\%$ , 400 wvdc.	Plate Decoupling Cap., V200	CN-100-4
C243	CAPACITOR, fixed: moulded plastic; .1 mfd., $+40\%$ - $10\%$ , 400 wvdc.	Plate Decoupling Cap., V200	CN-100-4
C244	CAPACITOR, fixed: ceramic; .01 mfd., $+80\%$ - $20\%$ , 500 wvdc; disc type.	RF Bypass Cap., V200	CC-100-16
C245	CAPACITOR, fixed: ceramic; .01 mfd., $+80\%$ - $20\%$ , 500 wvdc; disc type.	Filament Bypass Cap., V202	CC-100-16
C246	CAPACITOR, fixed: ceramic; .01 mfd., $+80\%$ - $20\%$ , 500 wvdc; disc type.	Filament Bypass Cap., V202	CC-100-16
C247	CAPACITOR, fixed: ceramic; 30 mmfd., $\pm 5\%$ , 500 wvdc.	Grid Coupling Capacitor	CC21SL300J
C248	CAPACITOR, fixed: ceramic; 30 mmfd., $\pm 5\%$ , 500 wvdc.	Grid Coupling Capacitor	CC21SL300J
I201	LAMP, incandescent: 6-8 volts; 250 ma DC; bayonet base.	Pilot Light	BI-101-44
L200	TRANSFORMER, RF: tune; 360 microhenries, $\pm 35$ microhenries, $Q=100$ ; tapped at 194 microhenries, $\pm 19$ microhenries, $Q=65$ ; and 162 microhenries, 16 microhenries, $Q=75$ .	Osc. Tank	A-703
L201	COIL, RF: tuned; 105 microhenries, $\pm 6$ microhenries; $Q=80$ .	Xtal Filter Output Tank	A-1252
P201	CONNECTOR, multiple contact; 4 coaxial contacts and 8 non-coaxial contacts.	RF Head Connector	PL-109
R201	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V200	RC20GF220K

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
R202	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Bias Res., V200	RC20GF474K
R203	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	AVC Filter Res., V200	RC20GF104K
R204	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V200	RC20GF221K
R205	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V200	RC20GF100K
R206	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V200	RC20GF224K
R207	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V200	RC20GF104K
R208	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 2 watts.	Plate Decoupling Res., V200	RC42GF473K
R209	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V201	RC20GF224K
R210	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V201	RC20GF220K
R211	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Bias Res., V201	RC20GF104K
R212	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	AVC Filter Res., V201	RC20GF104K
R213	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V201	RC20GF221K
R214	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor V201	RC20GF100K
R215	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V201	RC20GF224K
R216	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V201	RC20GF104K
R217	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 2 watts.	Plate Decoupling Res., V201	RC42GF473K
R218	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V202	RC20GF224K
R219	Not Used.		
R220	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Bias Res., V202	RC20GF104K

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
R221	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Res., V202	RC20GF222K
R222	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V202	RC20GF223K
R223	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1 watt.	Plate Decoupling Res., V202	RC30GF473K
R224	RESISTOR, fixed: composition; 10 ohms, $\pm 5\%$ ; 1/2 watt.	P/O Output Tank, S202	RC20GF100J
R225	RESISTOR, fixed: composition; 22 ohms, $\pm 5\%$ ; 1/2 watt.	P/O Output Tank, S202	RC20GF220J
R226	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V203	RC20GF474K
R227	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Grid Filter, V203	RC20GF474K
R228	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Grid Filter, V203	RC20GF474K
R229	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1/2 watt.	Plate Load Res., V203	RC20GF473K
R230	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1/2 watt.	Screen Res., V203	RC20GF473K
R231	RESISTOR, fixed: composition; 2700 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V203	RC20GF272K
R232	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V204	RC20GF220K
R233	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V204	RC20GF223K
R234	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ ; 1/2 watt.	Plate Res., V204	RC20GF393K
R235	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V204	RC20GF121K
R236	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ ; 1/2 watt.	Screen Res., V204	RC20GF393K
S201	SWITCH, rotary: non-shorting; 1 section, 3 positions; Mycalex insulation; contacts and wipers silver plated; 1/4" drive shaft, 7/8" lg.	Slave, Master Xtal Operational Switch	SW-100
S202	SWITCH, rotary: shorting; 1 section, 4 positions, double pole, glass melamine insulation; contacts and wipers silver alloy; 1/4" shaft, 11/32" lg., 1/4" flatted two sides.	Bandwidth Switch	SW-181

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
T200	TRANSFORMER, RF: tuned; 2.85 millihenries, $\pm 0.15$ millihenries, $Q=50$ ; tapped at 2.76 millihenries, $\pm 0.26$ millihenries, $Q=50$ .	Antenna Transformer	A-705
T201	TRANSFORMER, RF: tuned; 2.85 millihenries, $\pm 0.15$ millihenries, $Q=50$ ; tapped at 1.8 millihenries, $\pm 0.18$ millihenries, $Q=45$ .	Interstage Trans.	A-707
T202	TRANSFORMER, RF: tuned; 2.85 millihenries, $Q=50$ ; tapped at 1.8 millihenries, $\pm 0.18$ millihenries, $Q=45$	Mixer Trans.	A-707
T203	TRANSFORMER, RF: tuned; two windings; pri., 520 microhenries, $\pm 27$ microhenries, $Q=60$ ; sec., 152 microhenries, $\pm 8$ microhenries, $Q=80$ ; tapped at 50 microhenries, $\pm 5$ microhenries, $Q=20$ .	First IF Transformer	A-1249
V200	TUBE, electron: 6AG5; miniature 7 pin.	First RF	6AG5
V201	TUBE, electron: 6AG5; miniature 7 pin.	Second RF	6AG5
V202	TUBE, electron: 6AU6; miniature 7 pin.	Mixer	6AU6
V203	TUBE, electron: 6AG5; miniature 7 pin.	Reactance Tube	6AG5
V204	TUBE, electron: 6AG5; miniature 7 pin.	HF Osc.	6AG5
XI201	SOCKET, lens: min. bayonet base, T-3-1/4 bulb; right angle, down turned; 5/32" mtg. hole.	Socket for I201	TS-107-2
XV200	SOCKET, tube: 7 pin miniature.	Socket, V200	TS102P01
XV201	SOCKET, tube: 7 pin miniature.	Socket, V201	TS102P01
XV202	SOCKET, tube: 7 pin miniature.	Socket, V202	TS102P01
XV203	SOCKET, tube: 7 pin miniature.	Socket, V203	TS102P01
XV204	SOCKET, tube: 7 pin miniature.	Socket, V204	TS102P01
XY201	SOCKET, CRYSTAL: ceramic; .487" spacing for .050" pins.	Socket, Y202	TS-104-1
Y201	CRYSTAL UNIT, quartz: 455 Kc.	L. F. Xtal	CR-102
Y202	CRYSTAL UNIT, quartz; 500-1200 Kc (supplied at customer's request.)		CR-104

TN-276/FRR-502  
TUNING DRAWER, MODEL FFRD-3 (200-400 Kcs.)

SYMBOLIZED WITH SERIES 300 THROUGH 399 NUMBERS

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C301	CAPACITOR, variable: air dielectric; four sections, 0-455 mmfd. each section.	Freq. Tuning Cap.	CB-129
C302	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer V300	CV11C450
C303	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R.F. Tank	CC35CH680J
C304	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc. disc type.	Coupling Cap., V300	CC-100-16
C305	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	AVC Decoupling Cap., V300	CC-100-16
C306	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Screen Bypass Cap., V300	CC-100-16
C307	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V301	CC-100-16
C308	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Plate Decoupling Cap., V301	CC-100-16
C309	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer, V301	CV11C450
C310	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R.F. Tank, V301	CC35CH680J
C311	CAPACITOR, fixed: ceramic; 30 mmfd., ±5%; 500 wvdc.	Grid Coupling Cap., V301	CC21SL300 J
C312	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	AVC Decoupling Cap., V301	CC-100-16
C313	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Screen Bypass Cap., V301	CC-100-16
C314	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	D.C. Blocking Cap., V301	CC-100-16
C315	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Plate Decoupling Cap., V302	CC-100-16
C316	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	High Freq. Band Adj. Trimmer, V302	CV11C450

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C317	CAPACITOR, fixed: ceramic; 68 mmfd., ±5%; 500 wvdc.	P/O R. F. Tank, V302	CC35CH680J
C318	CAPACITOR, fixed: ceramic; 30 mmfd., ±5%; 500 wvdc.	Grid Coupling Cap., V302	CC21SL300J
C319	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Cathode Bypass Cap., V302	CC-100-16
C320	CAPACITOR, fixed: mica; 160 mmfd; ±5%; char. D; 500 wvdc.	P/O IF Tank, V302	CM20D161J
C321	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Plate Decoupling Cap., V302	CC-100-16
C322	CAPACITOR, fixed: mica; 620 mmfd., ±5%; char. D; 500 wvdc.	P/O IF Tank, V302	CM20D621J
C323	CAPACITOR, variable: ceramic; 3-12 mmfd., 500 wvdc.	Phasing Cap., V302	CV11A120
C324	CAPACITOR, fixed: mica; 680 mmfd; ±5%; char. D; 500 wvdc.	P/O Output Tank, V302	CM20D681J
C325	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V303	CC-100-16
C326	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V303	CC-100-16
C327	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Grid Filter Cap., V303	CC-100-16
C328	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	Balance Control Trimmer, V303	CV11C450
C329	CAPACITOR, fixed: ceramic; 47 mmfd., ±10%; 500 wvdc.	Screen Bypass Cap., V303	CC21SL470K
C330	CAPACITOR, fixed: ceramic; 15 mmfd., ±.5 mmfd., 500 wvdc.	Coupling Cap., V303	CC21SL150D
C331	CAPACITOR, fixed: ceramic; 300 mmfd., ±5%; 500 wvdc.	Osc. Padder Cap., V304	CC45CH301J
C332	CAPACITOR, variable: ceramic; 7-45 mmfd., 500 wvdc.	Osc. Trimmer Cap., V304	CV11C450
C333	CAPACITOR, fixed: ceramic; 120 mmfd., ±5%; 500 wvdc.	P/O Osc. Tank, V304	CC35CH121J
C334	CAPACITOR, fixed: ceramic; 47 mmfd., ±10%; 500 wvdc.	Osc. Grid Coupling Cap., V304	CC21SL470K
C335	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Cathode Bypass Cap., V304	CC-100-16



SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C336	CAPACITOR, fixed: ceramic; 120 mmfd., +10%, 500 wvdc.	Screen Bypass Cap., V304	CC-101-4
C337	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Screen Coupling Cap., V304	CC-100-16
C338	CAPACITOR, variable: air dielectric; 3.2-50 mmfd.	Crystal Tuning Cap., V304	CT-104-1
C339	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Plate Bypass Cap., V304	CC-100-16
C340	CAPACITOR, fixed: ceramic; 10 mmfd., $\pm 5$ mmfd; 500 wvdc.	Osc. Injection Cap., V304	CC21SL100D
C341	CAPACITOR, fixed: ceramic; 10 mmfd., $\pm 5$ mmfd., 500 wvdc.	HFO Output Cap., V304	CC21SL100D
C342	CAPACITOR, fixed: moulded plastic; .1 mfd., +40%-10%, 400 wvdc.	Plate Decoupling Cap., V300	CN-100-4
C343	CAPACITOR, fixed: moulded plastic; .1 mfd., +40%-10%, 400 wvdc.	Plate Decoupling Cap., V300	CN-100-4
C344	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	R.F. Bypass Cap., V300	CC-100-16
C345	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Filament Bypass Cap., V302	CC-100-16
C346	CAPACITOR, fixed: ceramic; .01 mfd., +80%-20%, 500 wvdc; disc type.	Filament Bypass Cap., V302	CC-100-16
C347	CAPACITOR, fixed: mica; 1500 mmfd., $\pm 2\%$ , char. C; 500 wvdc.	P/O Ant. Filter Capacitor	CM20C152G
C348	CAPACITOR, fixed: mica; 560 mmfd., $\pm 5\%$ , char. C; 500 wvdc.	P/O Ant. Filter Capacitor	CM20C561J
C349	CAPACITOR, fixed: mica; 1100 mmfd., $\pm 5\%$ , char. C; 500 wvdc.	P/O Ant. Filter Capacitor	CM20C112J
C350	CAPACITOR, fixed: mica; 560 mmfd., $\pm 5\%$ , char. C; 500 wvdc.	P/O Ant. Filter Capacitor	CM20C561J
C351	CAPACITOR, fixed: mica; 1500 mmfd., $\pm 2\%$ , char. C; 500 wvdc.	P/O Ant. Filter Capacitor	CM20C152G
I301	LAMP, incandescent: 6-8 volts; 250 ma DC; bayonet base.	Pilot Light	BI-101-44
L300	TRANSFORMER, RF: tuned; 196 microhenries, $\pm 10$ microhenries, Q=30; tapped at 100 microhenries, $\pm 10$ microhenries, Q=20; and 110 microhenries, $\pm 10$ microhenries, Q=50.	Osc. Tank	A-1312

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
L301	COIL, RF: tuned; 105 microhenries, +6 microhenries; Q=80.	Xtal Filter Output	A-1252
L302	COIL, RF: fixed: 93 microhenries, +1 microhenry, Q=70.	P/O Ant. Filter	A-1317
L303	COIL, RF: fixed: 93 microhenries, +1 microhenry, Q=70.	P/O Ant. Filter	A-1317
P301	CONNECTOR, multiple contact; 4 coaxial contacts and 8 non-coaxial contacts.	RF Head Connector	PL-109
R301	RESISTOR, fixed: composition; 22 ohms, ±10%; 1/2 watt.	Parasitic Suppressor, V300	RC20GF220K
R302	RESISTOR, fixed: composition; 470,000 ohms, ±10%; 1/2 watt.	Grid Bias Res., V300	RC20GF474K
R303	RESISTOR, fixed: composition; 100,000 ohms, ±10%; 1/2 watt.	AVC Filter Res., V300	RC20GF104K
R304	RESISTOR, fixed: composition; 220 ohms, ±10%; 1/2 watt.	Cathode Bias Res., V300	RC20GF221K
C305	RESISTOR, fixed: composition; 10 ohms, ±10%; 1/2 watt.	Parasitic Suppressor, V300	RC20GF100K
R306	RESISTOR, fixed: composition; 220,000 ohms, ±10%; 1/2 watt.	P/O Screen Voltage Divider, V300	RC20GF224K
R307	RESISTOR, fixed: composition; 100,000 ohms, ±10%; 1/2 watt.	P/O Screen Voltage Divider, V300	RC20GF104K
R308	RESISTOR, fixed: composition; 47,000 ohms, ±10%; 2 watts.	Plate Decoupling Res., V300	RC42GF473K
R309	RESISTOR, fixed: composition; 100,000 ohms, ±10%; 1/2 watt.	Grid Res., V301	RC20GF104K
R310	RESISTOR, fixed: composition; 22 ohms, ±10%; 1/2 watt.	Parasitic Suppressor, V301	RC20GF220K
R311	RESISTOR, fixed: composition; 470,000 ohms, ±10%; 1/2 watt.	Grid Bias Res., V301	RC20GF474K
R312	RESISTOR, fixed: composition; 100,000 ohms, ±10%; 1/2 watt.	AVC Filter Res., V301	RC20GF104K
R313	RESISTOR, fixed: composition; 220 ohms, ±10%; 1/2 watt.	Cathode Bias Res., V301	RC20GF221K
R314	RESISTOR, fixed: composition; 10 ohms, ±10%; 1/2 watt.	Parasitic Suppressor	RC20GF100K
R315	RESISTOR, fixed: composition; 220,000 ohms, ±10%; 1/2 watt.	P/O Screen Voltage Divider, V301	RC20GF224K

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
R316	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Screen Voltage Divider, V301	RC20GF104K
R317	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 2 watts.	Plate Decoupling Res., V301	RC42GF473K
R318	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V302	RC20GF104K
R319	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Tank, V302	RC20GF104K
R320	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Bias Res., V302	RC20GF104K
R321	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Res., V302	RC20GF222K
R322	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V302	RC20GF223K
R323	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1 watt.	Plate Decoupling Res., V302	RC30GF473K
R324	RESISTOR, fixed: composition; 10 ohms, $\pm 5\%$ ; 1/2 watt.	P/O Output Tank, S302	RC20GF100J
R325	RESISTOR, fixed: composition; 22 ohms, $\pm 5\%$ ; 1/2 watt.	P/O Output Tank, S302	RC20GF220J
R326	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V303	RC20GF474K
R327	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Grid Filter, V303	RC20GF474K
R328	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Grid Filter, V303	RC20GF474K
R329	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1/2 watt.	Plate Load Res., V303	RC20GF473K
R330	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ ; 1/2 watt.	Screen Res., V303	RC20GF473K
R331	RESISTOR, fixed: composition; 2700 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V303	RC20GF272K
R332	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ ; 1/2 watt.	Parasitic Suppressor, V304	RC20GF220K
R333	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ ; 1/2 watt.	Grid Res., V304	RC20GF223K
R334	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ ; 1/2 watt.	Plate Res., V304	RC20GF393K

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
R335	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ ; 1/2 watt.	Cathode Bias Res., V304	RC20GF121K
R336	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ ; 1/2 watt.	Screen Res., V304	RC20GF393K
R337	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Tank, V300	RC20GF104K
R338	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ ; 1/2 watt.	P/O Tank, V301	RC20GF104K
S301	SWITCH, rotary: non-shorting; 1 section, 3 positions; Mycalex insulation; contacts and wipers silver plated; 1/4" drive shaft, 7/8" lg.	Slave, Master Xtal Operational Switch	SW-100
S302	SWITCH, rotary: shorting: 1 section, 4 positions, double pole; glass melamine insulation; contacts and wipers silver alloy; 1/4" drive shaft; 11/32" lg., 1/4" flatted two sides.	Bandwidth Switch	SW-181
T300	TRANSFORMER, RF: tuned; 650 microhenries, $\pm 35$ microhenries, $Q=100$ ; tapped at 590 microhenries, $\pm 30$ microhenries, $Q=90$ .	Antenna Transformer	A-1313
T301	TRANSFORMER, RF: tuned; 650 microhenries, $\pm 35$ microhenries, $Q=90$ ; tapped at 400 microhenries, $\pm 40$ microhenries, $Q=75$ .	RF Transformer	A-1314
T302	TRANSFORMER, RF: tuned; 650 microhenries, $\pm 35$ microhenries, $Q=90$ ; tapped at 400 microhenries, $\pm 40$ microhenries, $Q=75$ .	Mixer Trans.	A-1314
T303	TRANSFORMER, RF: tuned; two windings; pri., 520 microhenries, $\pm 27$ microhenries, $Q=60$ ; sec., 152 microhenries, $\pm 8$ microhenries, $Q=80$ ; tapped at 50 microhenries, $\pm 5$ microhenries, $Q=20$ .	First IF Transformer	A-1249
V300	TUBE, electron: 6AG5; miniature 7 pin.	First IF	6AG5
V301	TUBE, electron: 6AG5; miniature 7 pin.	Second IF	6AG5
V302	TUBE, electron: 6AU6; miniature 7 pin.	Mixer	6AU6
V303	TUBE, electron: 6AG5; miniature 7 pin.	Reactance Tube	6AG5
V304	TUBE, electron: 6AG5; miniature 7 pin.	HF Osc.	6AG5
XI301	SOCKET, lens: min. bayonet base, T-3-1/4 bulb; right angle, down turned; 5/32" mtg. hole.	Socket for I301	TS-107-2

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
XV300	SOCKET, tube: 7 pin miniature.	Socket, V300	TS102P01
XV301	SOCKET, tube: 7 pin miniature.	Socket, V301	TS102P01
XV302	SOCKET, tube: 7 pin miniature.	Socket, V302	TS102P01
XV303	SOCKET, tube: 7 pin miniature.	Socket, V303	TS102P01
XV304	SOCKET, tube: 7 pin miniature.	Socket, V304	TS102P01
XY301	SOCKET, CRYSTAL: ceramic; .487'' spacing for .050'' pins.	Socket, Y302	TS-104-1
Y301	CRYSTAL UNIT, quartz: 455 Kc.	L.F. Crystal	CR-102
Y302	CRYSTAL UNIT, quartz: 500-1200 Kc. (supplied at customer's request.)		CR-104



TN-277/FRR-502  
TUNING DRAWER, MODEL FFRD-3M

TUNING DRAWER MODEL FFRD-3M (500 Kcs,  $\pm 10$  Kcs,) IS SYMBOLIZED WITH  
SERIES 1 THROUGH 99 NUMBERS

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C1	CAPACITOR, fixed: mica; 1,000 mmfd, $\pm 2\%$ , Char E, 500 wvdc.	RF Tank, T1	CM20E102G
C2	CAPACITOR, variable; ceramic; 7-45 mmfd, 500 wvdc.	HF Band Adjust	CV11C450
C3	CAPACITOR, variable: air dielectric; four sect., 10 to 135 mmfd ea sect.	Frequency Tuning	CB-101
C4	CAPACITOR, fixed: ceramic; 1,000 mmfd, 500 wvdc, disc type.	Grid Coupling	CC-100-9
C5	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C6	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C7	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Screen Bypass	CC-100-16
C8	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C9	CAPACITOR, fixed: mica; 1,000 mmfd, $\pm 2\%$ , Char E, 500 wvdc.	RF Tank, T2	CM20E102G
C10	CAPACITOR, variable: ceramic; 7-45 mmfd, 500 wvdc.	HF Band Adjust	CV11C450
C11	CAPACITOR, fixed: ceramic; 1,000 mmfd, 500 wvdc, disc type.	Grid Coupling	CC-100-9
C12	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C13	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C14	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Screen Bypass	CC-100-16
C15	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C16	CAPACITOR, fixed: mica; 1,000 mmfd, $\pm 2\%$ , Char E, 500 wvdc.	RF Tank, T3	CM20E102G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C17	CAPACITOR, variable: ceramic; 7-45 mmfd, 500 wvdc.	HF Band Adjust	CV11C450
C18	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C19	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C20	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , Char D, 500 wvdc.	Part of IF Tank	CM20D621G
C21	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , Char D, 500 wvdc.	Part of IF Tank	CM20D621G
C22	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Filament Bypass	CC-100-16
C23	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Filament Bypass	CC-100-16
C24	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C25	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C26	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Filter	CC-100-16
C27	CAPACITOR, variable: ceramic; 7-45 mmfd, 500 wvdc.	Reactance Tube Bal Control	CV11C450
C28	CAPACITOR, fixed: ceramic; 30 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance Bal	CC21SL300K
C29	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C30	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance Tube Screen Bypass	CC21SL470K
C31	CAPACITOR, fixed: mica; 300 mmfd, $\pm 2\%$ , Char E, 500 wvdc.	Reactance Coupling	CM20E301G
C32	CAPACITOR, fixed: mica; 500 mmfd, $\pm 2\%$ , Char E, 500 wvdc.	Oscillator Tank	CM20E501G
C33	CAPACITOR, fixed: mica; 300 mmfd, $\pm 2\%$ , Char E, 500 wvdc.	Oscillator Pad	CM20E301G
C34	CAPACITOR, fixed: ceramic; 150 mmfd, $\pm 5\%$ , 500 wvdc.	Oscillator Tank	CM20C151J
C35	CAPACITOR, variable: ceramic; 7-45 mmfd, 500 wvdc.	Osc Trimmer	CV11C450



SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C36	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Oscillator Grid Coupling	CC21SL470K
C37	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C38	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Screen Bypass	CC-100-16
C39	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm 1$ mmfd, 500 wvdc.	Oscillator Injection	CC21SL100K
C40	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm 1$ mmfd, 500 wvdc.	HFO Output	CC21SL100K
C41	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C42	CAPACITOR, fixed: ceramic; 120 mmfd, $\pm 10\%$ , 500 wvdc.	RF Bypass	CC-101-4
C43	CAPACITOR, variable: air dielectric, 3.2 to 50 mmfd,	Crystal Tuning	CT-104-1
C44	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	RF Bypass	CC-100-16
I1	LAMP, incandescent: 6-8 volts, 250 ma DC, bayonet base.	Pilot Light	BI-101-44
L1	REACTOR, RF: two sect., 40 uh, Q of 60 at 2.5 Mcs, $\pm 1.5$ uhs.	Oscillator Coil	A-928
P1	CONNECTOR, multiple contact: 4 coaxial contacts and 8 noncoaxial female contacts.	RF Head Connector	PL-109
R1	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF220K
R2	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Grid Bias	RC20GF474K
R3	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R4	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R5	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R6	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R7	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R8	RESISTOR, fixed: composition; 2,700 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF272K

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R9	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF220K
R10	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Grid Bias	RC20GF474K
R11	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R12	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R13	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R14	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R15	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R16	RESISTOR, fixed: composition; 2,700 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF272K
R17	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF220K
R18	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$ , 1/2 watt.	Mixer Cathode Resistor	RC20GF222K
R19	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF223K
R20	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1 watt.	Plate Decoupling	RC30GF473K
R21	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Grid Resistor	RC20GF474K
R22	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R23	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R24	RESISTOR, fixed: composition; 2,700 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Cathode Bias	RC20GF272K
R25	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Plate Load	RC20GF473K
R26	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Screen Resistor	RC20GF473K
R27	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF220K

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R28	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Oscillator Grid Resistor	RC20GF223K
R29	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ , 1/2 watt.	Osc Cathode Bias	RC20GF121K
R30	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ , 1/2 watt.	Osc Plate Resistor	RC20GF393K
R31	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ , 1/2 watt.	Osc Screen Resistor	RC20GF393K
S1	SWITCH, rotary: non-shortening; mycalex.	Function Switch	SW-100
T1	TRANSFORMER, RF: 485-515 Kcs., pri 9.3 uh, scdy 68 uh, uncased, ceramic form.	Antenna Trans	A-931
T2	TRANSFORMER, RF: 485-515 Kcs., pri 103 uh, scdy 68 uh, uncased, ceramic form.	Interstage Trans	A-929
T3	TRANSFORMER, RF: 485-515 Kcs., pri 103 uh, scdy 68 uh, uncased, ceramic form.	Mixer Trans	A930
T4	TRANSFORMER, IF: 455 Kcs.	1st IF Trans	A-157
V1	TUBE, electron: 6AG5, min 7 pin.	1st RF	6AG5
V2	TUBE, electron: 6AG5, min 7 pin.	2nd RF	6AG5
V3	TUBE, electron: 6AU6, min 7 pin.	Mixer	6AU6
V4	TUBE, electron: 6AG5, min 7 pin.	Reactance Mod	6AG5
V5	TUBE, electron: 6AG5, min 7 pin.	Oscillator	6AG5
XI1	SOCKET, min bay base; for T3-1/4 bulb; right angle, downturned.	Dial Light Socket	TS-107-2
XV1, 2, 3, 4, 5.	SOCKET, tube: 7 pin min.	Socket, V1	TS102P01
XY1	SOCKET, crystal: ceramic; .050" spacing; .048" pins.	Socket, Y1	TS-104
Y1	CRYSTAL UNIT: quartz: 500 plus 455 Kcs., parallel resonant. (Supplied only on customer request.)	LF Crystal	CR-18/U



TN-5010/FRR-502  
TUNING DRAWER, MODEL FFRD-5  
TUNING DRAWER MODEL FFRD-5 (2-4 Mcs) IS SYMBOLIZED WITH SERIES  
500 THROUGH 599 NUMBERS.

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C500	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C501	CAPACITOR, variable: air dielectric; four sect. 10-135 mmfd each sect.	Frequency Tuning	CB-101
C502	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11A120
C503	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C504	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Screen Bypass	CC-100-16
C505	CAPACITOR, fixed: ceramic; 220 mmfd, $\pm 10\%$ , 500 wvdc.	Plate Tank	CC-101-3
C506	NOT USED		
C507	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C508	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C509	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11A120
C510	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C511	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	HF Screen Bypass	CC-100-16
C512	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C513	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11A120
C514	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Filament Bypass	CC-100-16
C515	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C516	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Filament Bypass	CC-100-16
C517	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF Tank	CM20D621G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C518	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF Tank	CM20D621G
C519	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C520	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C521	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid	CC-100-16
C522	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C523	CAPACITOR, variable: ceramic; 7-45 mmfd, 500 wvdc.	Reactance Tube Balance Control	CV11C450
C524	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ ; 500 wvdc.	Reactance Tube Screen Bypass	CC21SL470K
C525	CAPACITOR, fixed: ceramic; 100 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance Tube Coupling	CC26SL101K
C526	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C527	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	Oscillator Trimmer	CV11C300
C528	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Oscillator Grid	CC21SL470K
C529	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C530	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Screen Bypass	CC-100-16
C531	CAPACITOR, fixed: ceramic; 120 mmfd, $\pm 10\%$ , 500 wvdc.	RF Bypass	CC-101-4
C532	CAPACITOR, variable: air dielectric; 3.2-50 mmfd.	Crystal Tuning	CT-104-1
C533	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm .5$ , mmfd, 500 wvdc.	HFO Output	CC21SL100D
C534	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc.type.	Oscillator Plate Bypass	CC-100-16
C535	CAPACITOR, fixed: ceramic; 1.0 mmfd, $\pm 0.5$ mmfd, 500 wvdc.	Oscillator Injection	CC21SL010D
C536	CAPACITOR, fixed: mica; 1,000 mmfd, $\pm 2\%$ , char. E, 500 wvdc.	Oscillator Padder	CM30E102G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C537	CAPACITOR, fixed: ceramic; 220 mmfd, $\pm 10\%$ , 500 wvdc.	Plate Tank	CC-101-3
C538	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	RF Bypass	CC-100-16
I500	LAMP, incandescent: 6-8 volts, 250 ma DC, Bayonet Base.	Pilot Light	BI-101-44
L501	COIL, RF: fixed; 250 microhenries.	RF Choke	CL-108-2
L502	REACTOR, RF: 2 sect. 30 microhenries, Q of 40 at 2.5 Mcs, and 2.6 microhenries, Q of 30 at 7.9 Mcs.	Oscillator Tank	A-313
P500	CONNECTOR, multiple contact: 4 coaxial contacts and 8 non-coaxial contacts.	RF Head Connector	PL-109
R500	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R501	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R502	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R503	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R504	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R505	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R506	RESISTOR, fixed: composition; 27,000 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF273K
R507	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R508	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R509	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R510	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R511	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R512	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R513	RESISTOR, fixed: composition; 27,000 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF273K
R514	RESISTOR, NETWORK: fixed: composition; 5 ohms, $\pm 10\%$ , 1/2 watt (Consists of two 10 ohm resistors in parallel).	Parasitic Suppressor	
R514A*	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R514B*	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R515	RESISTOR, fixed: composition; 820 ohms, $\pm 10\%$ , 1/2 watt.	Mixer Cathode Bias	RC20GF821K
R516	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1 watt.	Plate Decoupling	RC30GF473K
R517	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Grid Resistor	RC20GF474K
R518	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R519	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R520	RESISTOR, fixed: composition; 4700 ohms, $\pm 10\%$ ; 1/2 watt.	Reactance Tube Cathode Bias	RC20GF472K
R521	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Screen Resistor	RC20GF473K
R522	NOT USED.		
R523	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF220K
R524	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Oscillator Grid Resistor	RC20GF223K
R525	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ , 1/2 watt.	Oscillator Cathode Bias	RC20GF121K
R526	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ , 1/2 watt.	Oscillator Screen Resistor	RC20GF393K
R527	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ , 1/2 watt.	Oscillator Plate Resistor	RC20GF393K
S500	SWITCH, rotary: non-shorting; mycalex insulation, two pole, three position.	Slave, Master Xtal Operational Switch	SW-100
T500	TRANSFORMER, RF: 2-4 Mcs, pri. 2.7 ohms, sec'dy 13.8 ohms, C.T.	Antenna Transformer	A-314

\* Listed for reference only.



SYM	DESCRIPTION	FUNCTION	TMC PART NO.
T501	TRANSFORMER, RF: 2-4 Mcs, pri. 24.8 ohms, secdy 18.8 ohms, C.T.	Interstage Transformer	A-312
T502	TRANSFORMER, RF: 2-4 Mcs, pri 24.8 ohms, secdy 18.8 ohms, C.T.	Mixer Transformer	A-315
T503	TRANSFORMER, IF: 455 Kcs.	IF Transformer	A-157
V500	TUBE, electron: 6AG5, miniature 7 pin.	First RF	6AG5
V501	TUBE, electron: 6AG5, miniature 7 pin.	Second RF	6AG5
V502	TUBE, electron: 6AU6, miniature 7 pin.	Mixer	6AU6
V503	TUBE, electron: 6AG5, miniature 7 pin.	Reactance Tube	6AG5
V504	TUBE, electron: 6AG5, miniature 7 pin.	HF Osc.	6AG5
XI500	SOCKET, min. bayonet base: T-3-1/4 bulb bulb; right angle, downturned, short, hole size 5/32 inches, 1-3/8 in. lg. x 7/16 in. wd. o/a.	Lamp Socket	TS-107-2
XV500	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV501	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV502	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV503	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV504	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XY500	SOCKET, ceramic.	Xtal Socket	TS-104-1
Y500	CRYSTAL UNIT, quartz: 2-4 Mcs (supplied only on customers request)		CR-16/U



TN-5011/FRR-502  
TUNING DRAWER, MODEL FFRD-6  
TUNING DRAWER, MODEL FFRD-6 (4-8 Mcs) IS SYMBOLIZED WITH SERIES  
600 THROUGH 699 NUMBERS.

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C600	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C601	CAPACITOR, variable: air dielectric, four sect. 10-135 mmfd each sect.	Frequency Tuning	CB-101
C602	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11A120
C603	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C604	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Screen Bypass	CC-100-16
C605	CAPACITOR, fixed: ceramic; 150 mmfd, $\pm 10\%$ , 500 wvdc.	Plate Tank	CC-101-2
C606	NOT USED		
C607	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C608	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C609	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11A120
C610	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C611	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	HF Screen Bypass	CC-100-16
C612	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C613	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11A120
C614	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Filament Bypass	CC-100-16
C615	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C616	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Filament Bypass	CC-100-16
C617	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF Tank	CM20D621G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C618	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF Tank	CM20D621G
C619	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C620	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C621	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C622	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C623	CAPACITOR, variable: ceramic; 7-45 mmfd, 500 wvdc.	Reactance Tube Balance Control	CV11C450
C624	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance Tube Screen Bypass	CC21SL470K
C625	CAPACITOR, fixed: ceramic; 200 mmfd, $\pm 20\%$ , 500 wvdc.	Reactance Tube Coupling	CC-101-7
C626	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C627	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	Osc. Trimmer	CV11C300
C628	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Osc. Grid Coupling	CC21SL470K
C629	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C630	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Screen Bypass	CC-100-16
C631	CAPACITOR, fixed: ceramic; 120 mmfd, $\pm 10\%$ , 500 wvdc.	RF Bypass	CC-101-4
C632	CAPACITOR, variable: air dielectric, 3.2-50 mmfd.	Crystal Tuning	CT-104-1
C633	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm .5$ mmfd, 500 wvdc.	HFO Output	CC21SL100D
C634	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	Osc. Plate Bypass	CC-100-16
C635	CAPACITOR, fixed: ceramic; 1.5 mmfd, $\pm .25$ mmfd, 500 wvdc.	Osc. Injection	CC21SL1R5C
C636	CAPACITOR, fixed: mica; 1500 mmfd, $\pm 2\%$ , char. E, 500 wvdc.	Osc. Padder	CM30E152G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C637	CAPACITOR, fixed: ceramic; 150 mmfd, $\pm 10\%$ , 500 wvdc.	Plate Tank	CC-101-2
C638	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	RF Bypass	CC-100-16
I600	LAMP, incandescent: 6-8 volts; 250 ma DC, Bayonet Base	Pilot Light	BI-101-44
L601	Coil, rf: fixed; 250 microhenries.	RF Choke	CL-108-8
L602	REACTOR, rf: 3 sect; sec. #1: L of 7.7 microhenries, Q of 78 at 7.9 Mcs, Sec. #2: L of 1.7 microhenries, Q of 44 at 7.9 Mcs, Sec. #3: L of 4.2 microhenries, Q of 57 at 7.9 Mcs.	Osc. Tank	A-297
P600	CONNECTOR, multiple contact: 4 coaxial contacts and 8 non-coaxial contacts.	RF Head Connector	PL-109
R600	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R601	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R602	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R603	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R604	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R605	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R606	RESISTOR, fixed: composition; 27,000 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF273K
R607	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R608	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R609	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R610	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R611	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R612	RESISTOR, fixed: composition; 1000,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R613	RESISTOR, fixed: composition; 27,000 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF273K
R614	RESISTOR, NETWORK: fixed: composition; 5 ohms, $\pm 10\%$ , 1/2 watt. (Consists of two 10 ohm resistors in parallel).	Parasitic Suppressor	RC20GF100K
R614A*	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R614B*	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R615	RESISTOR, fixed: composition; 820 ohms, $\pm 10\%$ , 1/2 watt.	Mixer Cathode Bias	RC20GF821K
R616	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1 watt.	Plate Decoupling	RC30GF473K
R617	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Grid Resistor	RC20GF474K
R618	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R619	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R620	RESISTOR, fixed: composition; 3900 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Cathode Bias	RC20GF392K
R621	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Screen Resistor	RC20GF473K
R622	NOT USED.		
R623	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF220K
R624	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$ , 1/2 watt.	Osc. Grid Resistor	RC20GF223K
R625	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$ , 1/2 watt.	Osc. Cathode Bias	RC20GF121K
R626	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ , 1/2 watt.	Osc. Screen Resistor	RC20GF393K
R627	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$ , 1/2 watt.	Osc. Plate Resistor	RC20GF393K

\*Listed for reference only.

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
S600	SWITCH, rotary: non-shorting; mycalex insulation, two pole, three position.	Slave, Master Xtal Operational Switch	SW-100
T600	TRANSFORMER, RF: 4-8 Mcs; pri L of 4 microhenries, Q of 75 at 7.9 Mcs, sec. L of 10.5 microhenries, Q of 58 at 7.9 Mcs.	Antenna Transformer	A-298
T601	TRANSFORMER, RF: 4-8 Mcs; pri L of 50 microhenries, Q of 40 at 2.5 Mc, sec L of 10.5 microhenries, Q of 58 at 7.9 Mc.	Interstage RF Transformer	A-296
T602	TRANSFORMER, RF: 4-8 Mcs; pri L of 50 microhenries, Q of 40 at 2.5 Mc, L of 10.5 microhenries, Q of 58 at 7.9 Mc.	Mixer Transformer	A-299
T603	TRANSFORMER, IF: 455 Kcs.	IF Transformer	A-157
V600	TUBE, electron: 6AG5, miniature 7 pin.	First RF	6AG5
V601	TUBE, electron: 6AG5, miniature 7 pin.	Second RF	6AG5
V602	TUBE, electron: 6AU6, miniature 7 pin.	Mixer	6AU6
V603	TUBE, electron: 6AG5, miniature 7 pin.	Reactance Tube	6AG5
V604	TUBE, electron: 6AG5, miniature 7 pin.	HF Osc.	6AG5
XI600	SOCKET, min. bayonet base: T-3-1/4 bulb; right angle, downturned, short, hole size 5/32 inches, 1-3/8 in. lg. x 7/16 in. wd. o/a.	Lamp Socket	TS-107-2
XV600	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV601	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV602	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV603	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XV604	SOCKET, tube: 7 pin miniature.	Tube Socket	TS102P01
XY600	SOCKET, ceramic.	Xtal Socket	TS-104-1
Y600	CRYSTAL UNIT, quartz: 4-8 Mcs. (supplied only on customers request).		CR-18/U





TN-5012/FRR-502  
TUNING DRAWER, MODEL FFRD-7  
TUNING DRAWER, MODEL FFRD-7 (8-16 Mcs) IS SYMBOLIZED WITH SERIES  
700 THROUGH 799 NUMBERS.

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C700	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C701	CAPACITOR, variable: air; 4 sect. 10-135 mmfd, each sect.	Frequency Tuning	CB-101
C702	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11C300
C703	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C704	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C705	CAPACITOR, fixed: ceramic; 22 mmfd, $\pm 10\%$ , 500 wvdc.	Plate Tank	CC21SL220K
C706	NOT USED		
C707	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C708	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C709	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11C300
C710	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C711	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C712	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C713	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11C300
C714	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Filament Bypass	CC-100-16
C715	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C716	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Filament Bypass	CC-100-16
C717	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , Char. D, 500 wvdc.	Part of IF Tank	CM20D621G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C718	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF Tank	CM20D621G
C719	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C720	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C721	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C722	CAPACITOR, fixed: ceramic; .01 mfd, $\pm 20\%$ , 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C723	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	Reactance Tube Balance Control	CV11A120
C724	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Screen Bypass	CC21SL470K
C725	CAPACITOR, fixed: ceramic; 68 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance Tube Coupling	CC-101-5
C726	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C727	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	Osc. Trimmer	CV11C300
C728	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Osc. Grid Coupling	CC21SL470K
C729	CAPACITOR, fixed: ceramic; .01 mfd, $\pm 20\%$ , 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C730	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C731	CAPACITOR, fixed: ceramic; 120 mmfd, $\pm 10\%$ , 500 wvdc.	HFO Output	CC-101-4
C732	CAPACITOR, variable: air dielectric; 3.2 - 50 mmfd, 500 wvdc.	Crystal Tuning	CT-104-1
C733	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm .5$ mmfd, 500 wvdc.	HFO Output	CC21SL100D
C734	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Osc. Plate Bypass	CC-100-16
C735	CAPACITOR, fixed: ceramic; 1 mmfd, $\pm .25$ mmfd, 500 wvdc.	Osc. Injection	CC21SL010C
C736	CAPACITOR, fixed: mica; 2200 mmfd, $\pm 2\%$ , char. E, 500 wvdc.	Osc. Padder	CM30E222G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C737	CAPACITOR, fixed: ceramic; 22 mmfd, $\pm 10\%$ , 500 wvdc.	Plate Tank	CC21SL220K
C738	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	RF Bypass	CC-100-16
I700	LAMP, incandescent: 6-8 volts; 250 ma. DC, Bayonet Base.	Pilot Light	BI-101-44
L701	COIL, RF: fixed; 250 microhenries.	Reactance Tube Plate Load	CL-108-2
L702	COIL, RF: 3 sections; sec #1: L of .352 microhenries, Q of 86 at 25 Mcs, sec. #2: L of 1.14 microhenries, Q of 114 at 25 Mcs, sec #3: L of 2.1 microhenries, Q of 114 at 7.9 Mcs.	Osc. Tank	A-305
P700	CONNECTOR, multiple contact: 4 coaxial & 8 non-coaxial contacts.	RF Head Connector	PL-109
R700	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R701	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R702	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R703	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R704	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R705	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R706	RESISTOR, fixed: composition; 27,000 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF273K
R707	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R708	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R709	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R710	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R711	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R712	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
R713	RESISTOR, fixed: composition; 27,000 ohms, ±10%, 2 watts.	Plate Decoupling	RC42GF273K
R714	Not Used.		
R715	RESISTOR, fixed: composition; 820 ohms, ±10%, 1/2 watt.	Mixer Cathode Bias	RC20GF821K
R716	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1 watt.	Plate Decoupling	RC30GF473K
R717	RESISTOR, fixed: composition; 470,000 ohms, ±10%, 1/2 watt.	Reactance Tube Grid Resistor	RC20GF474K
R718	RESISTOR, fixed: composition; 470,000 ohms, ±10%, 1/2 watt.	Reactance Tube Grid Filter	RC20GF474K
R719	RESISTOR, fixed: composition; 470,000 ohms, ±10%, 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R720	RESISTOR, fixed: composition; 3300 ohms, ±5%, 1/2 watt.	Reactance Tube Cathode Bias	RC20GF332J
R721	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1/2 watt.	Reactance Tube Screen Resistor	RC20GF473K
R722	Not Used.		
R723	RESISTOR, fixed: composition; 22 ohms, ±10%, 1/2 watt.	Parasitic Suppressor	RC20GF220K
R724	RESISTOR, fixed: composition; 22,000 ohms, ±10%, 1/2 watt.	Osc. Grid Leak	RC20GF223K
R725	RESISTOR, fixed: composition; 120 ohms, ±10%, 1/2 watt.	Osc. Cathode Bias	RC20GF121K
R726	RESISTOR, fixed: composition; 39,000 ohms, ±10%, 1/2 watt.	Osc. Screen Resistor	RC20GF393K
R727	RESISTOR, fixed: composition; 39,000 ohms, ±10%, 1/2 watt.	Osc. Plate Resistor	RC20GF393K
R728	RESISTOR, fixed: composition; 130 ohms, ±5%, 1/2 watt.	Mixer Cathode Res.	RC20GF131J
S700	SWITCH, rotary: non-shorting; mycalex insulation, two pole, three position.	Slave, Master Xtal Operational Switch	SW-100
T700	TRANSFORMER, RF: 8-16 Mcs; pri .59 ohms, sec .87 ohms.	Antenna Coil	A-306
T701	TRANSFORMER, RF: 8-16 Mcs; pri 20.6 ohms, sec 1.26 ohms.	Interstage RF Transformer	A-304

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
T702	TRANSFORMER, IF: 8-16 Mcs; pri 20.6 ohms, sec 1.26 ohms.	Mixer Transformer	A-307
T703	TRANSFORMER, IF: 455 Kcs.	IF Transformer	A-157
V700	TUBE, electron: 6AG5; miniature 7 pin.	First RF	6AG5
V701	TUBE, electron: 6AG5; miniature 7 pin.	Second RF	6AG5
V702	TUBE, electron: 6AU6; miniature 7 pin.	Mixer	6AU6
V703	TUBE, electron: 6AG5; miniature 7 pin.	Reactance Tube	6AG5
V704	TUBE, electron: 6AG5; miniature 7 pin.	HF Oscillator	6AG5
XI700	SOCKET, min. bayonet base: T-3-1/4 bulb; right angle, downturned, short, hole size 5/32 inches, 1-3/8 in. lg x 7/16 in. wd. o/a.	Lamp Socket	TS-107-2
XV700	SOCKET, tube: 7 pin miniature.	Electron Tube Socket	TS102P01
XV701	SOCKET, tube: 7 pin miniature.	Electron Tube Socket	TS102P01
XV702	SOCKET, tube: 7 pin miniature.	Electron Tube Socket	TS102P01
XV703	SOCKET, tube: 7 pin miniature.	Electron Tube Socket	TS102P01
XV704	SOCKET, tube: 7 pin miniature.	Electron Tube Socket	TS102P01
XY700	SOCKET, ceramic.	Xtal Socket	TS-104-1
Y700	CRYSTAL UNIT, quartz: 8-16 Mcs. (supplied only on customers request).	HFO Crystal	CR-18/U



TN-5014/FRR-502  
TUNING DRAWER, MODEL FFRD-8  
TUNING DRAWER, MODEL FFRD-8 (16-32 Mcs.) IS SYMBOLIZED WITH SERIES  
800 THROUGH 899 NUMBERS.

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C800	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C801	CAPACITOR, variable: air dielectric, four sect, 10-135 mmfd, each sect.	Frequency Tuning	CB-101
C802	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11C300
C803	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C804	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C805	CAPACITOR, fixed: ceramic; 12 mmfd, $\pm 10\%$ , 500 wvdc.	Plate Tank	CC21SL120K
C806	CAPACITOR, fixed: ceramic; 2.5 mmfd, $\pm .25$ mmfd, 500 wvdc.	RF Coupling	CC-101-1
C807	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C808	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	AVC Decoupling	CC-100-16
C809	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	High Frequency Band Adjustment	CV11C300
C810	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C811	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	HF Screen Bypass	CC-100-16
C812	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C813	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	High Frequency Band	CV11C300
C814	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Filament Bypass	CC-100-16
C815	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C816	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Filament Bypass	CC-100-16
C817	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , Char. D, 500 wvdc.	Part of IF Tank	CM20D621G

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
C818	CAPACITOR, fixed: mica; 620 mmfd, $\pm 2\%$ , char. D, 500 wvdc.	Part of IF Tank	CM20D621G
C819	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C820	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C821	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C822	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Reactance Tube Grid Filter	CC-100-16
C823	CAPACITOR, variable: ceramic; 3-12 mmfd, 500 wvdc.	Reactance Tube Balance Control	CV11A120
C824	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance Tube Screen Bypass	CC21SL470K
C825	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Reactance Tube Coupling	CC21SL470K
C826	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Plate Decoupling	CC-100-16
C827	CAPACITOR, variable: ceramic; 1.5-7 mmfd, 500 wvdc.	Oscillator Trimmer	CV11C070
C828	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$ , 500 wvdc.	Oscillator Grid Coupling	CC21SL470K
C829	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Cathode Bypass	CC-100-16
C830	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Screen Bypass	CC-100-16
C831	CAPACITOR, fixed: ceramic; 120 mmfd, $\pm 10\%$ , 500 wvdc.	RF Bypass	CC-101-4
C832	CAPACITOR, variable: air dielectric; 3.2-50 mmfd.	Crystal Tuning	CT104-1
C833	CAPACITOR, fixed: ceramic; 10 mmfd, $\pm .5$ mmfd, 500 wvdc.	HFO Output	CC21SL100D
C834	CAPACITOR, fixed: ceramic; .01 mfd, (GMC), 500 wvdc, disc type.	Oscplate Bypass	CC-100-16
C835	CAPACITOR, fixed: ceramic; 1.5 mmfd, $\pm .25$ mmfd, 500 wvdc.	Osc. Injection	CC21SL1R5C
C836	CAPACITOR, fixed: mica; 1300 mmfd, $\pm 2\%$ , char. E, 500 wvdc.	Osc. Padder	CM30E132G



SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C837	NOT USED		
C838	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	R.F. Bypass	CC-100-16
I800	LAMP, incandescent: 6-8 volts; 250 ma DC, Bayonet Base.	Pilot Light	BI-101-44
L800	INDUCTOR, fixed: 5.6 microhenries.	Osc. Plate Load	A-241
L801	COIL, RF: fixed; 200 microhenries.	Reactance tube Plate Load	CL-108-6
P800	CONNECTOR, multiple contact: 4 coaxial contacts and 8 non-coaxial contacts.	RF Head Connector	PL-109
R800	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R801	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R802	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R803	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic	RC20GF100K
R804	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R805	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R806	RESISTOR, fixed: composition; 27,000 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF273K
R807	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	AVC Filter	RC20GF104K
R808	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R809	RESISTOR, fixed: composition; 220 ohms, $\pm 10\%$ , 1/2 watt.	Cathode Bias	RC20GF221K
R810	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Screen Parasitic	RC20GF100K
R811	RESISTOR, fixed: composition; 220,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R812	RESISTOR, fixed: composition; 100,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R813	RESISTOR, fixed: composition; 27,000 ohms, $\pm 10\%$ , 2 watts.	Plate Decoupling	RC42GF273K

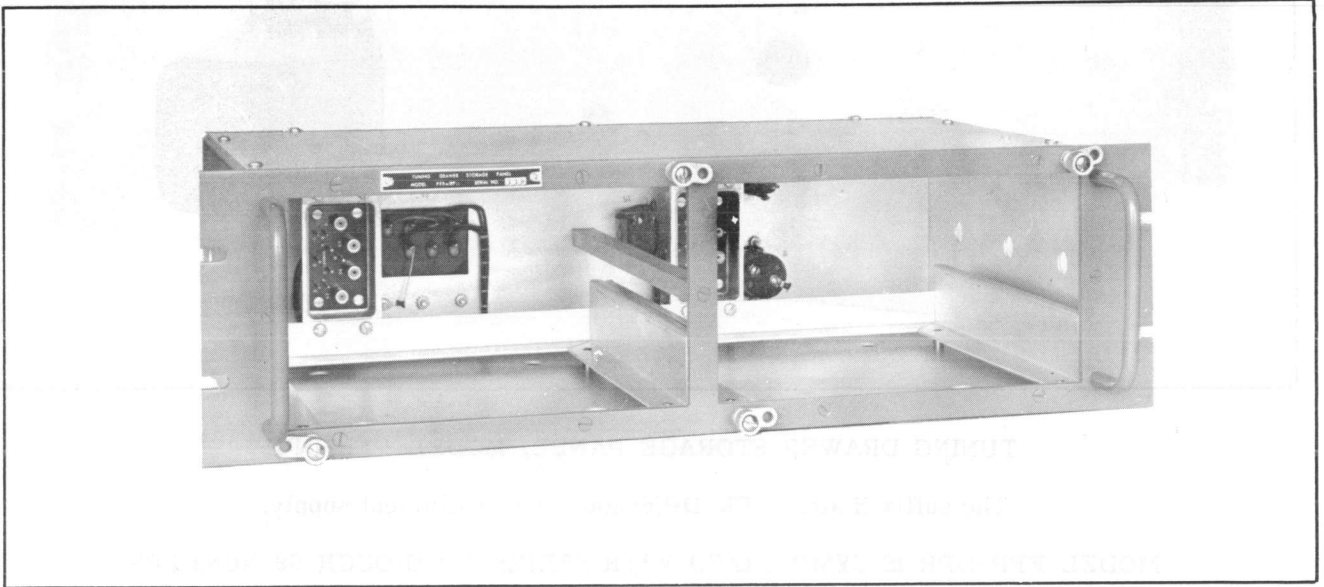
SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R814	RESISTOR, NETWORK: fixed; composition; 5 ohms, $\pm 10\%$ , 1/2 watt. (Consists of two 10 ohm resistors in parallel).	Parasitic Suppressor	RC20GF100K
R814A*	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R814B*	RESISTOR, fixed: composition; 10 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF100K
R815	RESISTOR, fixed: composition; 820 ohms, $\pm 10\%$ , 1/2 watt.	Mixer Cathode Bias	RC20GF821K
R816	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1 watt.	Plate Decoupling	RC30GF473K
R817	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Grid Resistor	RC20GF474K
R818	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R819	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$ , 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R820	RESISTOR, fixed: composition; 1500 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Cathode Bias	RC20GF152K
R821	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$ , 1/2 watt.	Reactance Tube Screen Resistor	RC20GF473K
R822	NOT USED.		
R823	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$ , 1/2 watt.	Parasitic Suppressor	RC20GF220K
R824	RESISTOR, fixed: composition; 22,000 ohms, $\pm 5\%$ , 1/2 watt.	Oscillator Grid Resistor	RC20GF223J
R825	RESISTOR, fixed: composition; 120 ohms, $\pm 5\%$ , 1/2 watt.	Oscillator Cathode Bias	RC20GF121J
R826	RESISTOR, fixed: composition; 22,000 ohms, $\pm 5\%$ , 1/2 watt.	Oscillator Screen Resistor	RC20GF223J
R827	RESISTOR, fixed: composition; 120 ohms, $\pm 5\%$ , 1/2 watt.	Oscillator Plate Resistor	RC20GF121J
R828	RESISTOR, fixed: composition; 130 ohms, $\pm 5\%$ , 1/2 watt.	Cathode Res.	RC20GF131J
S800	SWITCH, rotary: non-shorting; mycalex insulation two pole, three position.	Slave, Master Xtal Operational Switch	SW-100

\*Listed for reference only.

SYM.	DESCRIPTION	FUNCTION	TMC PART NO.
T800	TRANSFORMER, RF: 16-32 Mcs; pri 1.236 microhenries, secdy .58 microhenries.	Antenna Transformer	A-177
T801	TRANSFORMER, RF: 16-32 Mcs; pri 3.8 ohms, secdy 1.15 ohms, C.T.	Interstage RF Transformer	A-198
T802	TRANSFORMER, RF: 16-32 Mcs, pri 1.3 ohms, secdy .59 ohms.	Mixer Transformer	A-194
T803	TRANSFORMER, IF: 455 Kcs.	IF Transformer	A-157
T804	TRANSFORMER, RF: 16-32 Mcs; pri 1.57 ohms, secdy .63 ohms.	Osc. Transformer	A-175
V800	TUBE, electron: 6AK5; miniature 7 pin.	First RF	6AK5
V801	TUBE, electron: 6AK5; miniature 7 pin.	Second RF	6AK5
V802	TUBE, electron: 6AU6; miniature 7 pin.	Mixer	6AU6
V803	TUBE, electron: 6AG5; miniature 7 pin.	Reactance Tube	6AG5
V804	TUBE, electron: 6AK5; miniature 7 pin.	HF Oscillator	6AK5
VI800	SOCKET, min. bayonet base: bulb T-3-1/4; right angle, downturned, short, hole size 5/32 inches, 1-3/8" lg x 9/16" wd. o/a.	Lamp Socket	TS-107-2
XV800 XV801 XV802 XV803 XV804	SOCKET, tube: 7 pin miniature.	Electron Tube Sockets	TS102P01
XY800	SOCKET, ceramic.	Xtal Socket	TS-104-1
Y800	CRYSTAL UNIT, quartz: 16-32 Mcs. (Supplied only on customer request).		CR-18/U



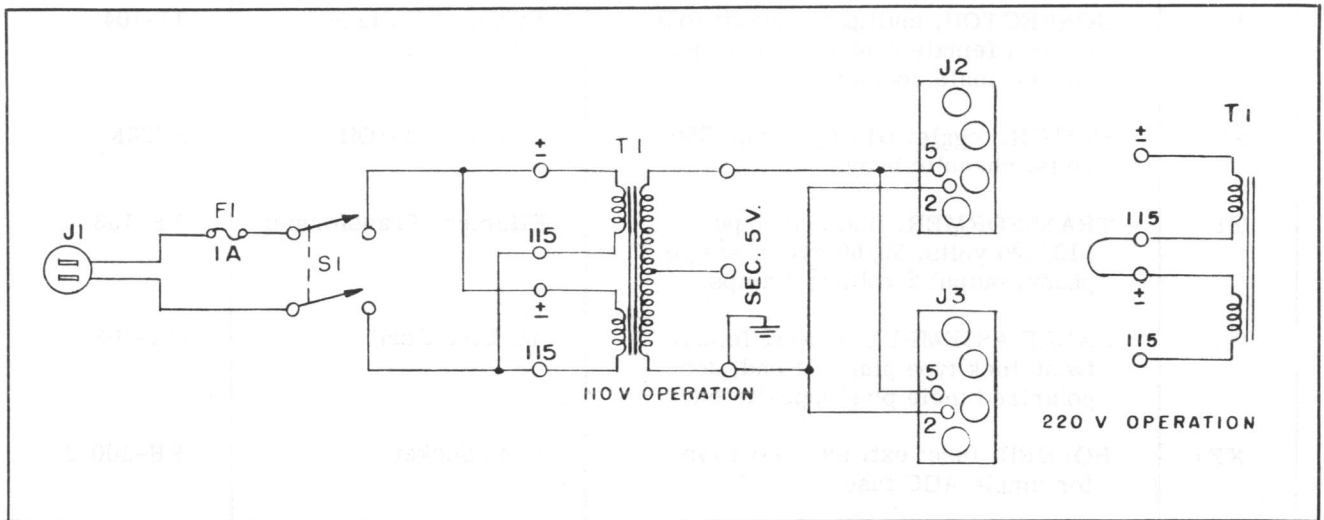
**INSTRUCTION SHEET**  
**TUNING DRAWER STORAGE PANEL**  
**MODEL FFR-DPH**  
**CY-5045A/FFR-502**

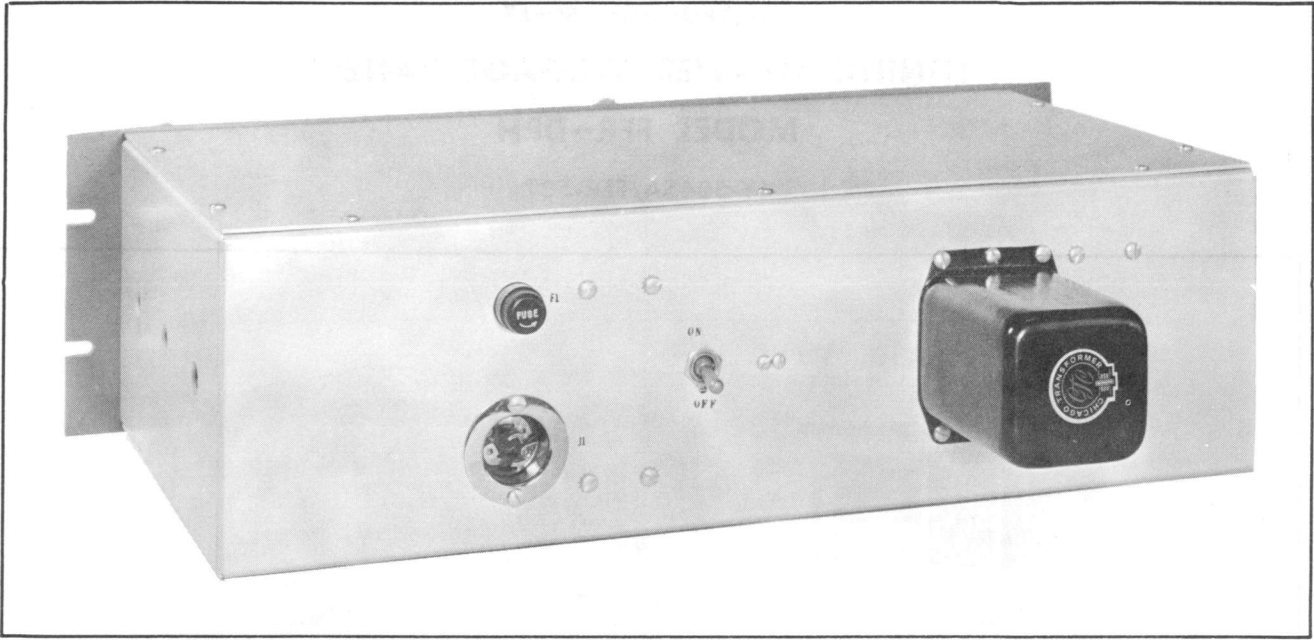


The TMC Model FFR-DPH, Tuning Drawer Storage Panel is designed to provide a safe and convenient method of storing and pre-heating the filaments of the TMC Model FFRD-\*, Tuning Drawers while not in operation.

The unit is designed to operate from a 110 volts A.C. 50/60 cycles source, unless it is specifically ordered for 220 volts 50/60 cycles. The unit is normally shipped from the factory wired for 110 volts A.C. operation. However, a simple wiring change in the tapped primary of the filament power transformer is necessary to change the Model FFR-DPH for 220 volts A.C. operation. This change is made directly on the transformer terminal lugs as described in the schematic diagram.

Once the tuning drawers have been installed in the panel, it is only necessary to turn the filament power switch (located on the rear chassis) "ON". The dial lights on the tuning drawers should light indicating power present in the unit.





TUNING DRAWER STORAGE PANEL, MODEL FFR-DPH

The suffix H after FFR-DP denotes use of filament supply.

MODEL FFR-DPH IS SYMBOLIZED WITH SERIES 1 THROUGH 99 NUMBERS.

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
F1	FUSE, cartridge: 1 amp.	Line Fuse	FU-100-1.0
J1	CONNECTOR, assembly: male contact; flush motor plug type.	AC Input	JJ-100
J2	CONNECTOR, multiple contact: four coaxial female contacts; eight non-coaxial male contacts.	Filament Voltage Connector	JJ-104
J3	CONNECTOR, multiple contact: four coaxial female contacts; eight non-coaxial male contacts.	Filament Voltage Connector	JJ-104
S1	SWITCH, toggle: DPST; 3 amp, 250 volts, phenolic body.	Filament On/Off	ST22K
T1	TRANSFORMER, filament: input 110/220 volts, 50/60 cycle, single phase, output 5 volts @ 4 amps.	Filament Transformer	TF-153
W1	CABLE ASSEMBLY, power: female twist-lock type plug one end, non-polarized male plug opposite end.	AC Line Cord	CA-103
XF1	HOLDER, fuse: extractor post type; for single AGC fuse.	Fuse Socket	FH-100-2

## STOCK NUMBER IDENTIFICATION

RECEIVER SUBASSEMBLY R-5007/FRR-502

REF. DESIG.	STOCK NUMBERS			USAF
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	
C100		N16-C064062-6985		3330-313-334-199
C101,102,103, 106,107,108, 110,113,114, 115,122,125, 139,140,143, 146,154		*N16-C019139-8871		3330-055-475-243
C104,105,111, 112,116,117		*N16-C030367-9395		3330-055-950-292
C109		*N16-C015980-8561		3330-055-350-320
C118,121		N16-C017085-7060		3330-313-889-919
C119		N16-C016596-2514		3330-313-584-175
C120		N16-C053683-4665		
C123,129,130, 152		*N16-C055872-1577		3330-052-251-095
C127,133		N16-C019010-8091		3330-055-425-267
C128		*N16-C048817-2795		
C131		*N16-C016140-8561		3330-055-350-214
C132		*N16-C018659-7522		3330-055-475-268
C134		N16-C017218-8281		3330-055-475-266
C135,142		N16-C017406-7214		3330-055-475-238
C136		N16-C030183-3521		
C137		N16-C058469-5910		3330-058-050-001
C138		N16-C016541-7014		3330-313-430-240
C141		N16-C016276-2514		3330-055-350-183
C144		N16-C015916-9005		3330-055-350-095
C145		N16-C015628-9005		3330-312-860-711
C147		N16-C053192-8190		3330-317-760-196
C148,149,150		*N16-C049958-5179		3330-317-643-027
C151		N16-C019788-8858		3330-055-725-159
C153,157,158		N16-C019238-9510		3330-055-475-378
C155,156		N16-C030144-4271		3330-326-034-200
E100		*N17-B077585-4501		8880-500-308-3255
E101,102		N17-B077840-1659		8880-500-808-3755
F100		G17-F016302-0100		
I100		*G17-L006305-0000		
J100,101,102, 103,104		N17-C073108-7477		
J105		N17-C073185-1208		8850-530-900
J106		N17-J039248-4418		8850-749-430
J107		N17-C073583-3424		8850-753-180
J108		*N17-C073428-3259		8850-508-172
J109		N17-C073108-5890		
L100,101		N16-R029318-5633		3340-062-454-170
L102,104		N16-C071597-2121		3340-060-709-470
L103		N17-T073847-5951		
R100		N16-R050741-0818		
R101,106,110		N16-R049661-0818		3350-103-000-1921
R102,107,111		N16-R050633-0785		
R103,108,112		N16-R050552-0818		3350-098-000-5291
R104,109,113, 122		N16-R050012-0816		3350-103-000-3516
R105,137		N16-R050416-0435		
R114,144,146		N16-R050200-0438		3350-103-000-4541

#Indicates: Low failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.

\*Indicates: "For replacement use SNSN-"

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
R115		N16-R050740-0380		
R116,117		N16-R050993-0818		3350-103-000-7786
R118,120,125, 129,130,131		N16-R050822-0761		3350-103-000-7416
R119,139		N16-R050479-0440		3350-103-000-5461
R121		N16-R088342-5572		3350-794-500-8947
R123,124,132, 141		N16-R050651-0818		3350-103-000-5928
R126		N16-R049786-0701		3350-133-000-1596
R127		N17-R049968-0525		
R128		N16-R050092-0438		3350-103-000-3856
R133		N16-R050587-0435		
R134		N16-R049643-0818		
R135		N16-R049921-0349		
R136		N16-R087419-4625		3350-067-025-200
R138		N16-R050516-0818		3350-103-000-5616
R140		N16-R049598-0818		3350-103-000-1571
R142		N16-R051110-0813		3350-098-000-6991
R143		N16-R087849-8209		
R145,147		N16-R050677-0380		3350-103-000-6141
R148		N16-R066255-3781		3350-501-000-5135
R149		N16-R065923-9616		3350-545-000-4955
R150		N16-R049319-0818		3350-103-000-1211
S100,104		N17-S070777-8626		3360-395-852-800
S101		N17-S074139-4844		3360-395-739-045
S103		N17-S061164-7830		
T100		N17-T081561-4387		
T101,102,103		N17-T067634-4626		
T104		N17-T064538-1652		3340-062-752-610
T105		N17-T073863-5546		3340-063-902-130
V100,101,102		*N16-T075749-0000		3370-286-000-6295
V103		*N16-T075726-0000		3370-259-000-6125
V104		N16-T056719-0000		3370-259-000-6158
V105		*N16-T076005-0000		3370-298-000-6155
V106		N16-T056365-0000		3370-316-000-6345
V107		N16-T056175-0000		3370-286-000-6165
V108		N16-T055735-0000		3370-304-000-5265
V109		N16-T052001-0003		3370-331-000-1615
W100		N17-C048215-1505		7700-087-196-52
XF100		N17-F074266-9392		8870-112-000-779
XI100		*N17-L076854-4141		548-615
XV100,101, 102,103, 105,106, 107,109,		N16-S062603-6702		8850-882-880
XV104		N16-S064063-6713		8850-896-590
XV108		N16-S063515-4151		8850-889-946
XY100		N16-S054287-5101		8850-867-340
Y100		G.F.M.		

#Indicates: Low failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.

\*Indicates: "For replacement use SNSN-"



TUNER, R.F. TN-274/FRR-502

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C101	N5910-508-0931			
C102,109, 116,128, 132	N5910-112-8248			
C103,110, 117	*N5910-270-9207			
C104,105, 106,107, 108,112, 113,114, 115,119, 121,125, 126,127, 135,137, 139,144, 145,146	*N5910-636-2339			
C111,118	*N5910-195-8752			
C120	*N5910-665-0201			
C122	*N5910-270-5390			
C123	*N5910-126-1611			
C124	*N5910-644-5957			
C129,134	N5910-112-8210			
C130,140, 141	*N5910-197-1562			
C131	*N5910-248-2217			
C133	*N5910-666-5811			
C136	*N5910-248-2230			
C138	N5910-643-7233			
C142,143	*N5910-644-3539			
C147,148	N5910-192-2162			
I101	*G6240-057-2887			
L100	N5950-563-3549			
L101	N5950-508-0103			
P101	N5935-259-7135			
R101,110, 132	*N5905-279-3519			
R102,126, 127,128	*N5905-279-2515			
R103,107, 111,112, 116,120	*N5905-195-6761			
R104,113	*N5905-279-3513			
R105,114	*N5905-190-8883			
R106,115	*N5905-192-0667			
R108,117	*N5905-195-6754			
R109,118	*N5905-190-8865			
R121	*N5905-279-1876			
R122,133	*N5905-171-2004			
R123	*N5905-299-2013			
R124	N5905-190-8883			
R125	N5905-279-3519			
R129,130	*N5909-254-9201			
R131	*N5905-279-1880			
R134,136	*N5905-279-3497			
R135	*N5905-252-5434			
S101	N5930-548-9990			

\* Indicates: "For replacement use SNSN-"

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
S102	N5930-508-0104			
T100	N5950-563-3550			
T101,102	N5950-563-7992			
T103	N5950-508-0099			
V100,101, 103,104	N5960-188-8566			
V102	*N5960-262-0152			
XI101	G6240-143-3084			
XV100,101, 102,103, 104	N5935-259-1944			
XY101	N5935-201-7119			
Y101	N5955-508-0294			
Y102	G. F. M.			

\* Indicates: "For replacement use SNSN-"

TUNER, R.F. TN-275/FRR-502

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C201	N5910-508-0931	N16-C063647-8118		3330-313420185
C202,209, 216,228, 232		N16-C064133-6581		
C203,210, 217		*N16-C016784-9289		
C204,205, 206,207, 208,212, 215,219, 221,225, 226,227, 235,237, 239,244, 245,246		*N16-C019139-8871		3330-055475243
C211,218		N16-C016788-2530		
C220		*N16-C029080-6829		
C222		*N16-C030367-9395		
C223		N16-C063934-8129		3330-313046248
C224		*N16-C030531-4153		
C229,234		N16-C016541-7014		3330-3134-30240
C230,240, 241		N16-C015916-9005		3330-055350095
C231		*N16-C017392-9926		
C233		*N16-C017195-8091		
C236		N16-C017214-6130		3330-055475239
C238		N16-C059671-6046		3330-058100089
C242,243		*N16-C045773-8071		3330-056200857
C247,248		N16-C016276-2514		3330-055350183
I201	*G6240-057-2887			8870-938000445
L200	N5950-508-0102	N17-T082436-2757		
L201	N5950-508-0103	N16-C072148-2839		
P201		N17-C073297-4370		8850-373600
R201,210, 232		*N16-R049318-0438		3350-1030001211
R202,226, 227,228		*N16-R050821-0276		3350-1030007416
R203,207, 211,212, 216,220		*N16-R050632-0416		3350-1030005866
R204,213		*N16-R049660-0438		3350-1030001921
R205,214		*N16-R049237-0443		3350-1030001151
R206,209, 215,218		*N16-R050713-0380		3350-0980005771
R208,217		*N16-R050480-0131		
R221		*N16-R050011-0438		3350-1030003516
R222,233		*N16-R050371-0433		3350-1030004941
R223		*N16-R050479-0713		3350-1330004256
R224		N16-R049237-0443		
R225		N16-R049318-0438		

\* Indicates: "For replacement use SNSN-"

# Indicates: Low Failure item - if required requisition from ESO referencing NavShips 900, 180A.

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
R229,230		*N16-R050479-0435		3350-1030005461
R231		*N16-R050038-0438		3350-1030003631
R234,236		*N16-R050443-0438		3350-1020005351
R235		*N16-R049597-0438		3350-1030001571
S201		N17-S061164-7830		3360-073113692
S202	N5930-508-0104	N17-S059441-7937		
T200	N5950-508-0100	N17-T082234-6219		
T201,202	N5950-508-0101	N17-T082436-6571		
T203	N5950-508-0099	N17-T082436-5463		
V200,201		N16-T056175-0000		3370-2860006165
203,204				
V202		N16-T056203-0050		3370-2860006285
XI201		#		7700-525510
XV200,201,		*N17-S062603-6700		8850-582880
202,203,				
204				
XY201		N16-S054287-5101		8850-867340
Y201	N5955-508-0294	N16-C096420-1298		
Y202		GFM		

\* Indicates: "For replacement use SNSN-"

# Indicates: Low Failure item - if required requisition from ESO referencing NavShips 900, 180A.

TUNER, R.F. TN-276/FRR-502

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C301	N5910-508-0931			
C302,309, 316,328, 332	N5910-112-8248			
C303,310, 317	*N5910-270-9207			
C304,305, 306,307, 308,312, 313,314, 315,319, 321,325, 326,327, 335,337, 344,345, 346	*N5910-636-2339			
C311,318	*N5910-192-2162			
C320	*N5910-665-0201			
C322	*N5910-270-5390			
C323	N5910-126-1611			
C324	*N5910-644-5957			
C329,334	N5910-112-8210			
C330	N5910-666-8139			
C331	*N5910-184-2337			
C333	*N5910-191-9840			
C336	*N5910-248-2230			
C338	N5910-643-7233			
C340,341	*N5910-197-1562			
C342,243	*N5910-644-3539			
C347,351	*N5910-264-9443			
C348,350	N5910-636-2101			
C349	*N5910-174-5113			
I301	*G6240-057-2887			
L300	N5950-563-3545			
L301	N5950-508-0103			
L302,303	N5950-563-3546			
P301	N5935-259-7135			
R301,310, 332	*N5905-279-3519			
R302,311, 326,327, 328	*N5905-279-2515			
R303,307, 309,312, 316,318, 319,320, 337,338	*N5905-195-6761			
R304,313	*N5905-279-3513			
R305,314	*N5905-190-8883			
R306,315	*N5905-192-0667			
R308,317	*N5905-195-6754			
R321	*N5905-279-1876			
R322,333	*N5905-171-2004			

\* Indicates: "For replacement use SNSN-".

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
R323	*N5905-299-2013			
R324	N5905-190-8883			
R325	N5905-279-3519			
R329,330	*N5905-254-9201			
R331	*N5905-279-1880			
R334,336	*N5905-279-3497			
R335	*N5905-252-5434			
S301	N5930-548-9990			
S302	N5930-508-0104			
T300	N5950-563-3547			
T301,302	N5950-563-3548			
T303	N5950-508-0099			
V300,301, 303,304	N5960-188-8566			
V302	*N5960-262-0152			
XI301	G6240-143-3084			
XV300,301, 302,303, 304	N5935-259-1944			
XY301	N5935-201-7119			
Y301	N5955-508-0294			
Y302	G.F.M.			

\* Indicates: "For replacement use SNSN-".

TUNER, R.F. TN-277/FRR-502

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C1,9, 16	N5910-648-7993			
C2,10, 17,27, 35	N5910-112-8248			
C3	N5910-667-3879			
C4,11	*N5910-665-0252			
C5,6 7,8, 12,13, 14,15, 18,19, 22,23, 24,25, 26,29, 37,38, 41,44	*N5910-636-2339			
C20,21	*N5910-270-5390			
C28	*N5910-197-1569			
C30,36	N5910-112-8210			
C31,33	N5910-648-7994			
C32	N5910-191-5941			
C34	N5910-101-5590			
C39,40	*N5910-197-1562			
C42	N5910-248-2230			
C43	N5910-643-7233			
I1	*G6240-057-2887			
L1	N5950-699-5188			
P1	N5935-259-7135			
R1,9, 17,27	*N5905-279-3519			
R2,10 21,22, 23	*N5905-279-2515			
R3,7, 11,15	*N5905-195-6761			
R4,12	*N5905-279-3513			
R5,13	*N5905-190-8883			
R6,14	*N5905-192-0667			
R8,16	*N5905-279-1920			
R18	*N5905-279-1876			
R19,28	*N5905-171-2004			
R20	*N5905-299-2013			
R24	*N5905-279-1880			
R25,26	*N5905-254-9201			
R29	*N5905-252-5434			
R30,31	*N5905-279-3497			
S1	N5930-548-9990			
T1	N5950-696-0486			
T2,3	N5950-699-5198			
T4	N5950-645-2438			
V1,2, 4,5	N5960-188-8566			

\* Indicates: "For replacement use FSN--"

# Indicates: "Low failure item. If required requisition from ESO referencing NAVSHIPS 900, 180A".

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
V3 XI-1 XV1,2, 3,4, 5 XY1 Y1	*N5960-262-0152 # *N5935-259-1944  N5935-201-7119 G.F.M.			

\* Indicates: "For replacement use FSN-"

# Indicates: "Low failure item. If required requisition form ESO referencing NAVSHIPS 900, 108A".



TUNER, R.F. TN-5010/FRR-502

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C500,503,504, 507,508,510, 511,512,514, 515,516,519, 520,521,522, 526,529,530, 534,538		*N16-C019139-8871		3330-055-475-243
C501		N16-C063470-1461		3330-058-100-088
C502,509,513		N16-C063934-8129		3330-313-046-248
C505,537		N16-C017218-8281		3330-055-475-266
C517,518		*N16-C030367-9395		3330-055-950-292
C523		N16-C064133-6581		3330-313-420-185
C524,528		N16-C016541-7014		3330-313-430-240
C525		N16-C017976-2501		3330-313-889-919
C527		N16-C064062-6985		3330-313-334-199
C531		N16-C017214-6130		3330-055-475-239
C532		N16-C059671-6046		3330-058-100-0089
C533		N16-C015916-9005		3330-055-350-095
C535		*N16-C015369-4394		3330-055-350-188
C536		N16-C031080-2219		3330-376-120-840
I500		*G17-L006305-0000		
L501		N16-S089794-3406		
L502		N17-T076495-5950		
P500		N17-C073297-4370		
R500,505,507, 512		N16-R050633-0785		
R501,503,508, 510,514 A,B		N16-R049238-0818		
R502,509		N16-R049661-0818		3350-103-000-1921
R504,511		N16-R050714-0818		3300-381-171-514
R506,513		N16-R050400-0511		3350-165-000-596
R515		N16-R049877-0818		3350-103-000-2646
R516		N16-R050481-0233		3350-133-000-4256
R517,518,519		N16-R050822-0761		3350-103-000-7416
R520		N16-R050129-0815		3350-103-000-3981
R521		N16-R050479-0440		3350-103-000-5461
R523		N16-R049319-0818		3350-103-000-1211
R524		N16-R050372-0833		3350-103-000-4941
R525		N16-R049598-0818		3350-103-000-1571
R526,527		N16-R050444-0233		
S500		N17-S061164-7830		
T500		N17-T081980-3117		
T501		N17-T081609-4202		
T502		N17-T081464-2652		
T503		N17-T067634-4626		
V500,501, 503,504		N16-T056175-0000		3370-286-000-6165
V502		N16-T056203-0050		3370-286-000-6285
XI500		#		7700-525-510
XV500,501, 502,503, 504		N16-S062603-6702		8850-882-880
XY500		N16-S054287-5101		8850-867-340
Y500		G.F.M.		2100-2X911-3500

#Indicates: Low failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.

\*Indicates: "For replacement use SNSN-"

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C600,603,604, 607,608,610, 611,612,614, 615,616,619, 620,621,622, 626,629,630, 634,638		*N16-C019139-8871		3330-055-475-243
C601		N16-C063470-1461		3330-058-100-088
C602,609,613		N16-C063934-8129		3330-313-046-248
C605,637		N16-C017406-7214		3330-055-475-238
C617,618		*N16-C030367-9395		3330-055-950-292
C623		N16-C064133-6581		3330-313-420-185
C624,628		N16-C016541-7014		3330-313-430-240
C625		N16-C017699-7215		
C627		N16-C064062-6985		3330-313-334-199
C631		N16-C017214-6130		3330-055-475-239
C632		N16-C059671-6046		3330-058-100-0089
C633		N16-C015916-9005		3330-055-350-095
C635		N16-C015401-4505		3330-055-350-318
C636		N16-C031502-2619		3330-376-125-230
I600		*G17-L006305-0000		
L601		N16-S089794-2711		
L602		N17-T082612-8849		
P600		N17-C073297-4370		8850-373-600
R600,605,607, 612		N16-R050633-0785		
R601,603,608, 610,614 A,B		N16-R049238-0818		
R602,609		N16-R049661-0818		3350-103-000-1921
R604,611		N16-R050714-0818		3300-381-171-514
R606,613		N16-R050400-0511		3350-165-000-596
R615		N16-R049877-0818		3350-103-000-2646
R616		N16-R050481-0233		3350-133-000-4256
R617,618,619		N16-R050822-0761		3350-103-000-7416
R620		N16-R050093-0816		
R621		N16-R050479-0440		3350-103-000-5461
R623		N16-R049319-0818		3350-103-000-1211
R624		N16-R050372-0833		3350-103-000-4941
R625		N16-R049598-0818		3350-103-000-1571
R626,627		N16-R050444-0233		
S600		N17-S061164-7830		
T600		N17-T082796-4184		
T601		N17-T081954-4101		
T602		N16-T081928-2255		
T603		N17-T067634-4626		
V600,601, 603,604		N16-T056175-0000		3370-286-000-6165
V602		N16-T056203-0050		3370-286-000-6285
XI600		#		7700-525-510
XV600,601, 602,603, 604		N16-S062603-6702		8850-882-880
XY600		N16-S054287-5101		8850-867-340
Y600		G.F.M.		

#Indicates: Low failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.

\*Indicates: "For replacement use SNSN-"

TUNER, R.F. TN-5012/FRR-502

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C700,703,704, 707,708,710, 711,712,714, 715,716,719, 720,721,722, 726,730,734, 738		*N16-C019139-8871		3330-055-475-243
C701		N16-C063470-1461		3330-058-100-088
C702,709,713, 727		N16-C064062-6985		3330-313-334-199
C705,737		N16-C016157-6400		
C717,718		*N16-C030367-9395		3330-055-950-292
C723		N16-C063934-8129		3330-313-046-248
C724,728		N16-C016541-7014		3330-313-430-240
C725		N16-C016799-4750		3330-055-475-355
C731		N16-C017214-6130		3330-055-475-239
C732		N16-C059671-6046		3330-058-100-0089
C733		N16-C015916-9005		3330-055-350-095
C735		N16-C015369-4505		3330-055-350-150
C736		N16-C031897-8619		3330-055-950-038
I700		*G17-L006305-0000		
L701		N16-S089794-3406		
L702		N17-T081896-3238		
P700		N17-C073297-4370		8850-373-600
R700,705,707, 712		N16-R050633-0785		
R701,703,708, 710		N16-R049238-0818		
R702,709		N16-R049661-0818		3350-103-000-1921
R704,711		N16-R050714-0818		3300-381-171-514
R706,713		N16-R050400-0511		3350-165-000-596
R715		N16-R049877-0818		3350-103-000-2646
R716		N16-R050481-0233		3350-133-000-4256
R717,718,719		N16-R050822-0761		3350-103-000-7416
R720		N16-R050065-0438		
R721		N16-R050479-0440		3350-103-000-5461
R723		N16-R049319-0818		3350-103-000-1211
R724		N16-R050372-0833		
R725		N16-R049598-0818		3350-103-000-1571
R726,727		N16-R050444-0233		
R728		N16-R049606-0438		3350-098-000-2391
S700		N17-S061164-7830		
T700		N17-T081781-9991		
T701		N17-T082361-8949		
T702		N17-T067988-9086		
T703		N17-T067634-4626		
V700,701,703, 704		N16-T056175-0000		3370-286-000-6165
V702		N16-T056203-0050		3370-286-000-6285
XI700		#		7700-525-510
XV700,701, 702,703, 704		N16-S062603-6702		8850-882-880

#Indicates: Low Failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.

\*Indicates: "For replacement use SNSN-"

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
XY700 Y700		N16-S054287-5101 G.F.M.		8850-867-340 2100-2X911-3500

#Indicates: Low failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.  
\*Indicates: "For replacement use SNSN-"

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
XV800,801, 802,803, 804 XY800 Y800		N16-S062603-6702  N16-S054287-5101 G.F.M.		8850-882-880  8850-867-340 2100-2X911-3500

**CABINET, ELECTRICAL EQUIPMENT CY-5045A/FRR-502**

F1		G17-F016302-0080		
J1		N17-C073428-3259		8850-491-260
J2,3		N17-C073583-3424		8850-753-180
S1		N17-S073082-9028		3360-395-853-000
T1		N17-T070669-1049		
W1		N17-C048215-1505		7700-087-196-52
XF1		N17-F074266-9392		8870-112-000-779

TUNER, R.F. TN-5014/FRR-502

REF. DESIG.	STOCK NUMBERS			
	FEDERAL	STANDARD NAVY	SIGNAL CORPS	USAF
C800,803,804, 807,808,810, 811,812,814, 815,816,819, 820,821,822, 826,829,830, 834,838		*N16-C019139-8871		3330-055-475-243
C801		N16-C063470-1461		3330-058-100-088
C802,809,813		N16-C064062-6985		3330-313-334-199
C805		*N16-C015749-2063		3330-055-350-230
C806		N16-C015514-3301		
C817,818		*N16-C030367-9395		3330-055-950-292
C823		N16-C063934-8129		
C824,825,828		N16-C016541-7014		3330-312-430-240
C827		N16-C063900-6761		3330-312-922-272
C831		N16-C017214-6130		3330-055-475-239
C832		N16-C059671-6046		3330-058-100-0089
C833		N16-C015916-9005		3330-055-350-095
C835		N16-C015401-4505		3330-055-350-318
C836		*N16-C031343-9216		3338-055-950-259
I800		*G17-L006305-0000		
L800		N16-S089739-6815		
L801		N16-S089793-9196		
P800		N17-C073297-4370		8850-373-600
R800,805, 807,812		N16-R050633-0785		
R801,803,808, 810,814 A,B		N16-R049238-0818		
R802,809		N16-R049661-0818		3350-103-000-1921
R804,811		N16-R050714-0818		3300-381-171-514
R806,813		N16-R050400-0511		3350-165-000-596
R815		N16-R049877-0818		3350-103-000-2646
R816		N16-R050481-0233		3350-133-000-4256
R817,818,819		N16-R050822-0761		3350-103-000-7416
R820		N16-R049967-0760		
R821		N16-R050479-0440		3350-103-000-5461
R823		N16-R049319-0818		3350-103-000-1211
R824,826		N16-R050371-0433		3350-103-000-4941
R825,827		N16-R049597-0438		3350-098-000-2351
R828		N16-R049606-0438		3350-098-000-2391
S800		N17-S061164-7830		
T800		N17-T082143-8005		
T801		N17-T081979-5014		
T802		N17-T082049-5270		
T803		N17-T067634-4626		
T804		N17-T082128-4346		
V800,801,804		*N16-T075654-0000		3370-286-000-6215
V802		N16-T056203-0050		3370-286-000-6285
V802		N16-T056175-0000		3370-286-000-6165
XI800		#		7700-525-510

#Indicates: Low failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.

\*Indicates: "For replacement use SNSN-"

## STOCK NUMBER CROSS REFERENCE

TUNER, R.F. TN-274/FRR-502

FEDERAL	REF. DESIG.	FEDERAL	REF. DESIG.	FEDERAL	REF. DESIG.
*G6240-057-2887	I101	*N5910-644-5957	C124	N5910-126-1611	C323
G6240-143-3084	XI101	*N5910-665-0201	C120	*N5910-174-5113	C349
*N5905-171-2004	R122,133	*N5910-666-5811	C133	*N5910-184-2337	C331
*N5905-190-8865	R109,118	N5930-508-0104	S102	*N5910-191-9840	C333
*N5905-190-8883	R105,114	N5930-548-9990	S101	*N5910-192-2162	C311,318
N5905-190-8883	R124	N5935-201-0294	XY101	*N5910-197-1562	C340,341
*N5905-192-0667	R106,115	N5935-259-1944	XV100,101, 102,103, 104	*N5910-248-2230	C336
*N5905-195-6754	R108,117			*N5910-264-9443	C347,351
*N5905-195-6761	R103,107, 111,112, 116,120	N5935-259-7135	P101	*N5910-270-5390	C322
	R135	N5950-508-0099	T103	*N5910-270-9207	C303,310, 307
*N5905-252-5435	R129,130	N5950-508-0103	L101	N5910-508-0931	C301
*N5905-254-9201	R121	N5950-563-3549	L100	N5910-636-2101	C348,350
*N5905-279-1876	R131	N5950-563-3550	T100	*N5910-636-2339	C304,305, 306,307, 308,312, 313,314, 315,319, 321,325, 326,327, 335,337, 344,345, 346
*N5905-279-1880	R102,126, 127,128	N5950-563-7992	T101,102		C338
*N5905-279-2515	R134,136	N5955-508-0294	Y101	N5910-643-7233	C342,343
	R104,113	N5960-188-8566	V100,101, 103,104	*N5910-644-3539	C324
*N5905-279-3497	R101,110, 132	*N5960-262-0152	V102	*N5910-644-5957	C320
*N5905-279-3513	R125	G.F.M.	Y102	N5910-666-8139	C330
*N5905-279-3519	R123	TUNER, R.F. TN-276/FRR-502		N5930-508-0104	S302
N5905-279-3519	R129,134	*G6240-057-2887	I301	N5930-548-9990	S301
*N5905-299-2013	C102,109, 116,128, 132	G6240-143-3084	XI301	N5935-201-7119	XY301
N5910-112-8210	C102,109, 116,128, 132	*N5905-171-2004	R322,333	N5935-259-1944	XV300, 301,302, 303,304
N5910-112-8248	C130,140, 141	*N5905-190-8883	R305,314		
*N5910-126-1611	C123	N5905-190-8883	R324	N5935-259-7135	P301
N5910-192-2162	C147,148	*N5905-192-0667	R306,315	N5950-508-0099	T303
*N5910-195-8752	C111,118	*N5905-195-6754	R308,317	N5950-508-0103	L301
*N5910-197-1562	C130,140, 141	*N5905-195-6761	R303,307, 309,316, 318,319, 320,337, 338	N5950-563-3545	L300
*N5910-248-2217	C131		320,337, 338	N5950-563-3546	L302,303
*N5910-248-2230	C136	*N5905-252-5434	R335	N5950-563-3547	T300
*N5910-270-5390	C122	*N5905-254-9201	R329,330	N5950-563-3548	T301,302
*N5910-270-9207	C103,110, 117	*N5905-279-1876	R321	N5955-508-0294	Y301
	C101	*N5905-279-1880	R331	N5960-188-8566	V300,301, 303,304
N5910-508-0931	C104,105, 106,107, 108,112, 113,114, 115,119, 121,125, 126,127, 135,137, 139,144, 145,146	*N5905-279-2515	R302,311, 326,327, 328	*N5960-262-0152	V302
*N5910-636-2339	C104,105, 106,107, 108,112, 113,114, 115,119, 121,125, 126,127, 135,137, 139,144, 145,146		R334,336	G.F.M.	Y302
	C138	*N5905-279-3497	R304,303		
	C142,143	*N5905-279-3513	R301,310, 332	TUNER, R.F. TN-277/FRR-502	
		*N5905-279-3519	R325	*G6240-057-2887	I1
		N5905-279-3519	R323	*N5905-171-2004	R19,28
		*N5905-299-2013	C329,334	*N5905-190-8883	R5,13
		N5910-112-8210	C302,309, 316,328, 332		
		N5910-112-8248			

\* Indicates: "For replacement use SNSN-"

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		STANDARD NAVY	REF. DESIG.		
*N5905-192-0667	R6,14			N16-R050200-0438	R114,144,146
*N5905-195-6761	R3,7,11,15			N16-R050416-0435	R105,137
*N5905-252-5434	R29	G17-F016302-0100	F100	N16-R050479-0440	R119,139
*N5905-254-9201	R25,26	*G17-L006305-0000	I100	N16-R050516-0818	R138
*N5905-279-1876	R18	N16-C015628-9005	C145	N16-R050552-0818	R103,108,112
*N5905-279-1880	R24	N16-C015916-9005	C144	N16-R050587-0435	R133
*N5905-279-1920	R8,16	*N16-C015980-8561	C109	N16-R050633-0785	R102,107,111
*N5905-279-2515	R2,10,21,22,23	*N16-C016140-8561	C131	N16-R050651-0818	R123,124,132,141
*N5905-279-3497	R30,31	N16-C016276-2514	C141	N16-R050677-0380	R145,147
*N5905-279-3513	R4,12	N16-C016541-7014	C138	N16-R050740-0380	R115
*N5905-279-3519	R1,9,17,27	N16-C016596-2514	C119	N16-R050741-0818	R100
*N5905-299-2013	R20	N16-C017085-7060	C118,121	N16-R050822-0761	R118,120,125,129,130,131
N5910-101-5590	C34	N16-C017218-8281	C134	N16-R050993-0818	R116,117
N5910-112-8210	C30,36	N16-C017406-7214	C135,142	N16-R051110-0813	R142
N4910-112-8248	C2,10,17,27,35	*N16-C018659-7522	C132	N16-R065923-9616	R149
N5910-191-5941	C32	N16-C019010-8091	C127,133	N16-R066255-3781	R148
*N5910-197-1562	C39,40	*N16-C019139-8871	C101,102,103,106,107,108,110,113,114,115,122,125,139,140,143,146,154	N16-R087419-4625	R136
*N5910-197-1569	C28		C153,157,158	N16-R087849-4759	R143
N5910-248-2230	C42	N16-C019238-9510	C151	N16-R088342-5572	R121
*N5910-270-5390	C20,21	N16-C019788-8858	C155,156	N16-S054287-5101	XY100
*N5910-636-2339	C5,6,7,8,12,13,14,15,18,19,22,23,24,25,26,29,37,38,41,44	N16-C030114-4271	C136	N16-S062603-6702	XV100,101,102,103,105,106,107,109
N5910-643-7233	C43	N16-C030183-3521	C104,105,111,112,116,117	N16-S063515-4151	XV108
N5910-648-7993	C1,9,16	*N16-C030367-9395	C128	N16-S064063-6713	XV104
N5910-648-7994	C31,33	*N16-C048817-2795	C148,149,150	N16-T052001-0003	V109
*N5910-665-0252	C4,11	*N16-C049958-5179	C147	N16-T055735-0000	V108
N5910-667-3879	C3	N16-C053192-8190	C120	N16-T056175-0000	V107
N5930-548-9990	S1	N16-C053683-4665	C123,129,130,152	N16-T056365-0000	V106
N5935-201-7119	XY1	*N16-C055872-1577	C137	N16-T056719-0000	V104
*N5935-259-1944	XV1,2,3,4,5	N16-C058469-5910	C100	N16-T056719-0000	V103
N5935-259-7135	P1	N16-C064062-6985	L102,104	*N16-T075726-0000	V100,101,102
N5950-645-2438	T4	N16-C071597-2121	L100,101	*N16-T076005-0000	V105
N5950-696-0486	T1	N16-R029318-5633	R150	*N17-B077585-4501	E100
N5950-699-5188	L1	N16-R049319-0818	R140	N17-B077840-1659	E101,102
N5950-699-5198	T2,3	N16-R049598-0818	R134	N17-C048215-1505	W100
N5960-188-8566	V1,2,4,5	N16-R049643-0818	R101,106,110	N17-C073108-5890	J109
*N5960-262-0152	V3	N16-R049661-0818	R126	N17-C073108-7477	J100,101,102,103,104
#	XI-1		R135	N17-C073185-1208	J105
G.F.M.	Y1		R127	*N17-C073428-3259	J108
			R104,109,113,122	N17-C073583-3424	J107
			R128	N17-F074266-9392	XF100
				N17-J039248-4418	J106
				*N17-L076854-4141	XI100
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N16-C065062-6985 N16-C064133-6581 N16-R049238-0818	C627 C623 R601,603, 608,610, 614A,B	*N16-C030367-9395 N16-C031897-8619 N16-C059671-6046 N16-C063470-1461 N16-C063934-8129 N16-C064062-6985	C717,718 C736 C732 C701 C723 C702,709, 713,727	N16-C017214-6130 *N16-C019139-8871	C800,803, 804,807, 808,810, 811,812, 814,815, 816,819, 820,821, 822,826, 829,830, 834,838
N16-R049319-0818 N16-R049598-0818 N16-R049661-0818 N16-R049877-0818 N16-R050093-0816 N16-R050372-0833 N16-R050400-0511 N16-R050444-0233 N16-R050479-0440 N16-R050481-0233 N16-R050633-0785	R623 R625 R602,609 R615 R620 R624 R606,613 R626,627 R621 R616 R600,605, 607,612	N16-R049238-0818  N16-R049319-0818 N16-R049598-0818 N16-R049606-0438 N16-R049661-0818 N16-R049877-0818 N16-R050065-0438 N16-R050372-0833 N16-R050400-0511 N16-R050444-0233 N16-R050479-0440 N16-R050481-0233 N16-R050633-0785	R701,703, 708,710 R723 R725 R728 R702,709 R715 R720 R724 R706,713 R726,727 R721 R716 R700,705, 707,712 R704,711 R717,718, 719	*N16-C030367-9395 *N16-C031343-9216 N16-C059671-6064 N16-C063470-1461 N16-C063900-6761 N16-C063934-8129 N16-C064062-6985	C817,818 C836 C832 C801 C827 C823 C802,809, 813
N16-R050714-0818 N16-R050822-0761	R604,611 R617,618, 619	N16-R050714-0818 N16-R050822-0761	R724 R706,713 R726,727 R721 R716 R700,705, 707,712 R704,711 R717,718, 719	N16-R049238-0818	R801,803, 808,810, 814A,B
N16-S054287-5101 N16-S062603-6702	XY600 XV600, 601,602, 603,604	N16-R050479-0440 N16-R050481-0233 N16-R050633-0785	R721 R716 R700,705, 707,712 R704,711 R717,718, 719	N16-R049319-0818 N16-R049597-0438 N16-R049606-0438 N16-R049661-0818 N16-R049877-0818 N16-R049967-0760 N16-R050371-0433 N16-R050400-0511 N16-R050479-0440 N16-R050481-0233 N16-R050633-0785	R823 R825,827 R828 R802,809 R815 R820 R824,826 R806,813 R821 R816 R800,805, 807,812
N16-S089794-2711 N16-T056175-0000	L601 V600,601, 603,604	N16-R050714-0818 N16-R050822-0761	R704,711 R717,718, 719 XY700 XV700, 701,702, 703,704	N16-R050714-0818 N16-R050822-0761	R802,809 R815 R820 R824,826 R806,813 R821 R816 R800,805, 807,812
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TN-5012/FFR-502	FFRD-7	N16-S089794-3406 N16-T056175-0000	L701 V700,701, 703,704 V702 P700 S700 T703 T702 T700 L702 T701 XI700 Y700	N16-S054287-5101 N16-S062603-6702	R800,805, 807,812 R804,811 R817,818, 819 XY800 XV800, 801,802, 803,804
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TN-5014/FRR-502	FFRD-8	N16-T056203-0050 N17-C073297-4370 N17-S061164-7830 N17-T067634-4626 N17-T081979-5014 N17-T082049-5270	I800 C835 C806	N17-C073297-4370 N17-S061164-7830 N17-T067634-4626 N17-T081979-5014 N17-T082049-5270	P800 S800 T803 T801 T802

#Indicates: Low failure item - if required requisition from ESO referencing NAVSHIPS 900,180A.

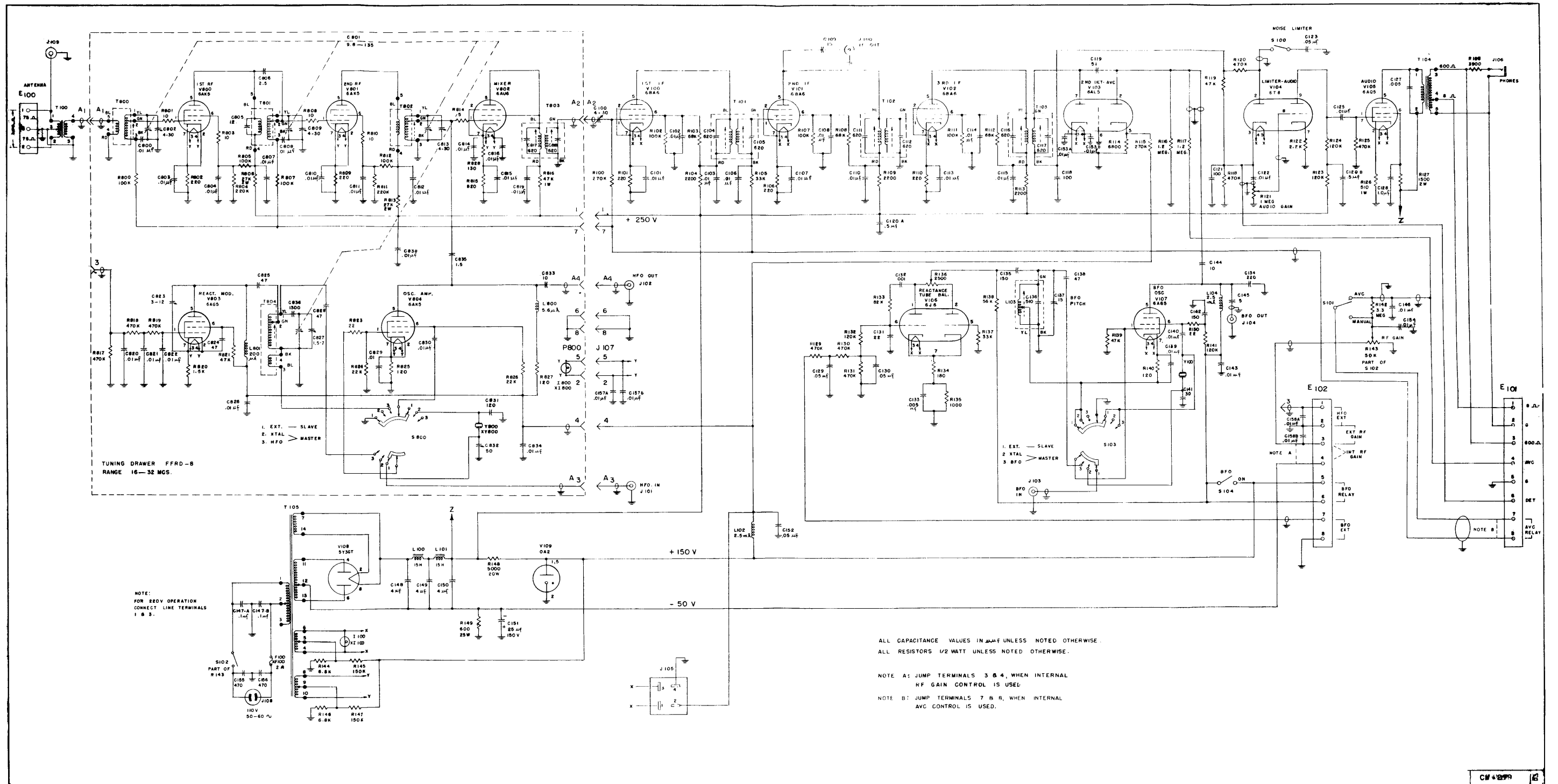
\*Indicates: "For replacement use SNSN-"

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CY-5045 A/FRR-502		FFRDPH			
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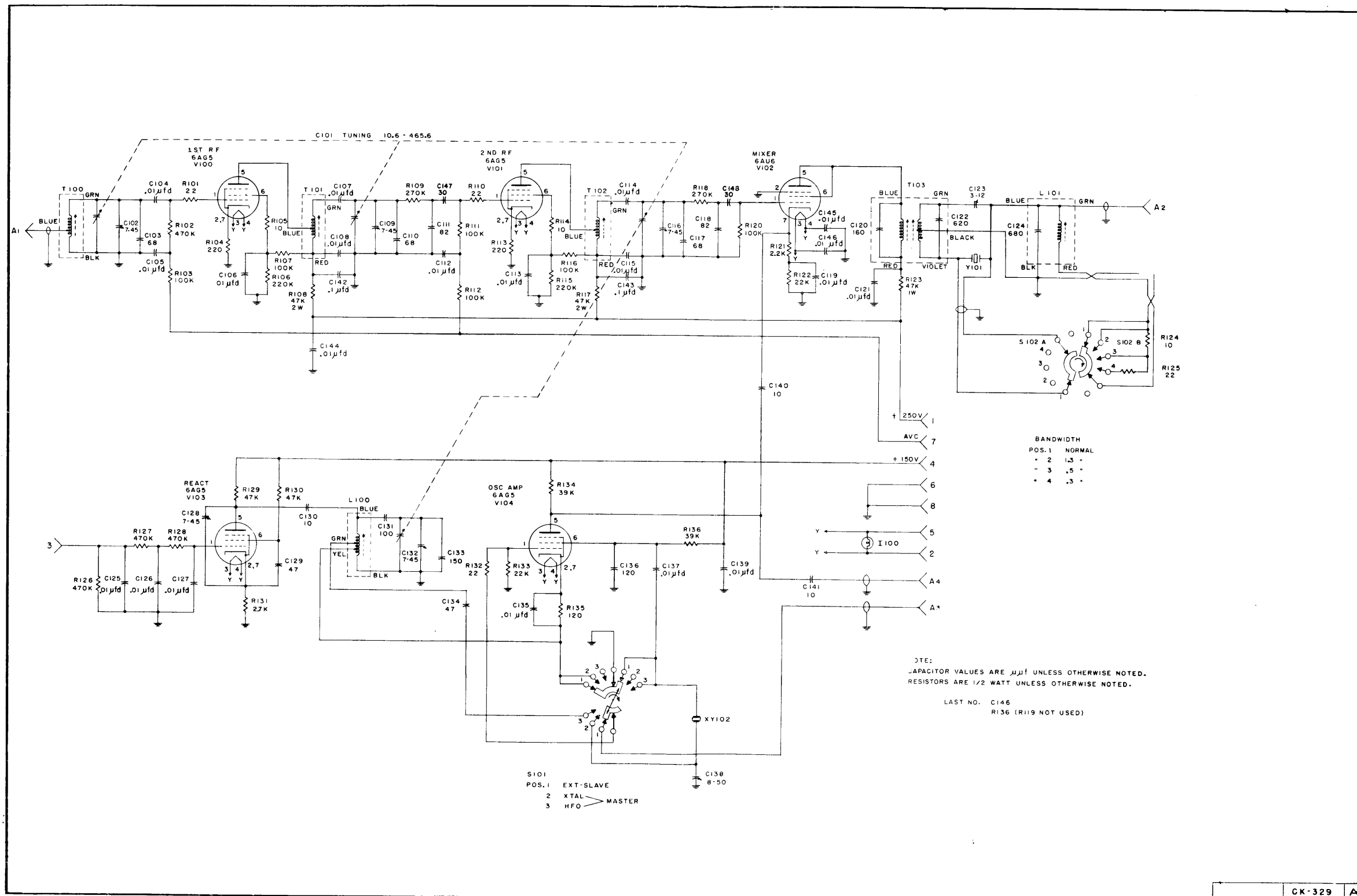
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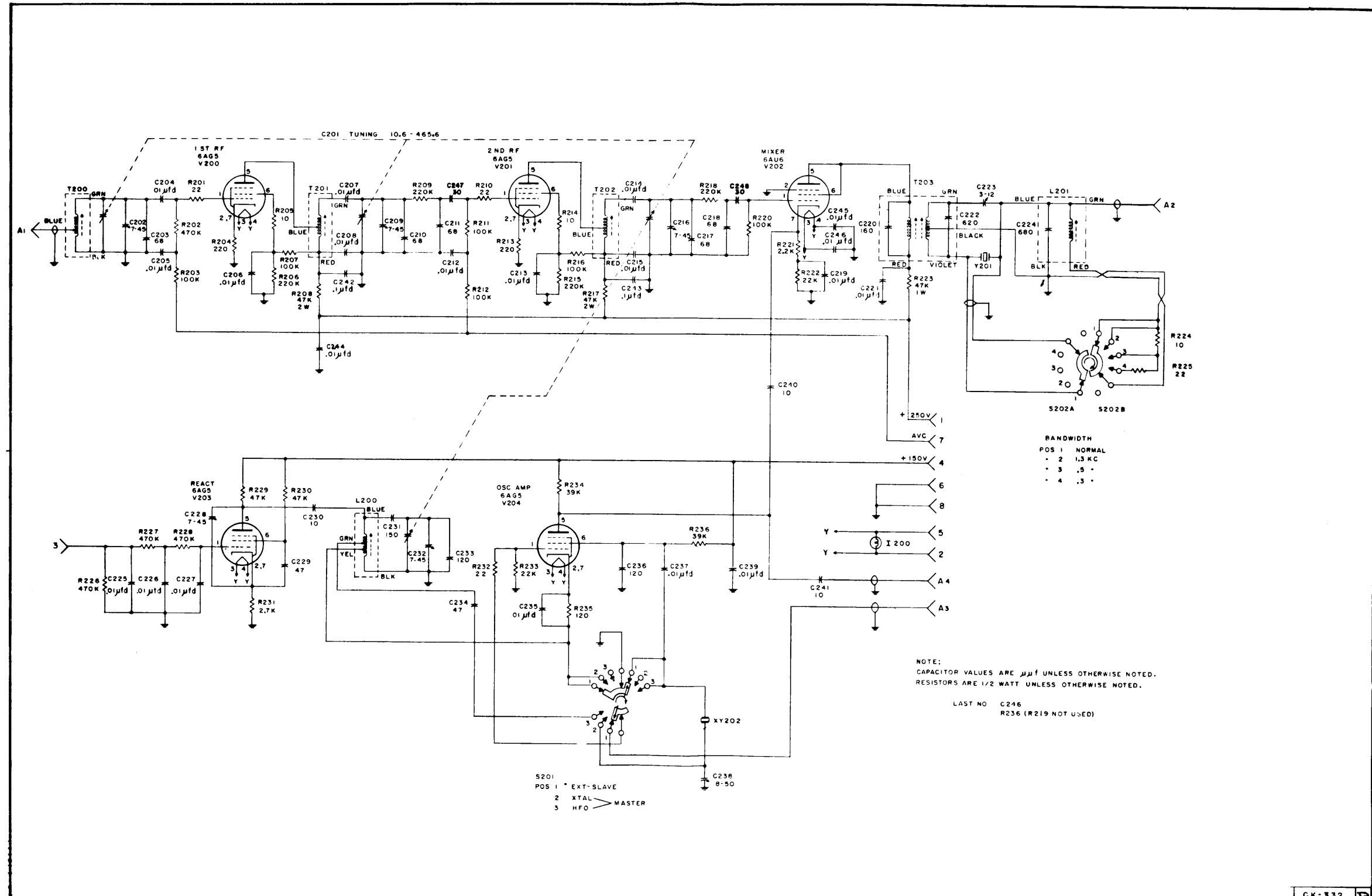
4. SCHEMATIC DIAGRAMS, MODEL FFR



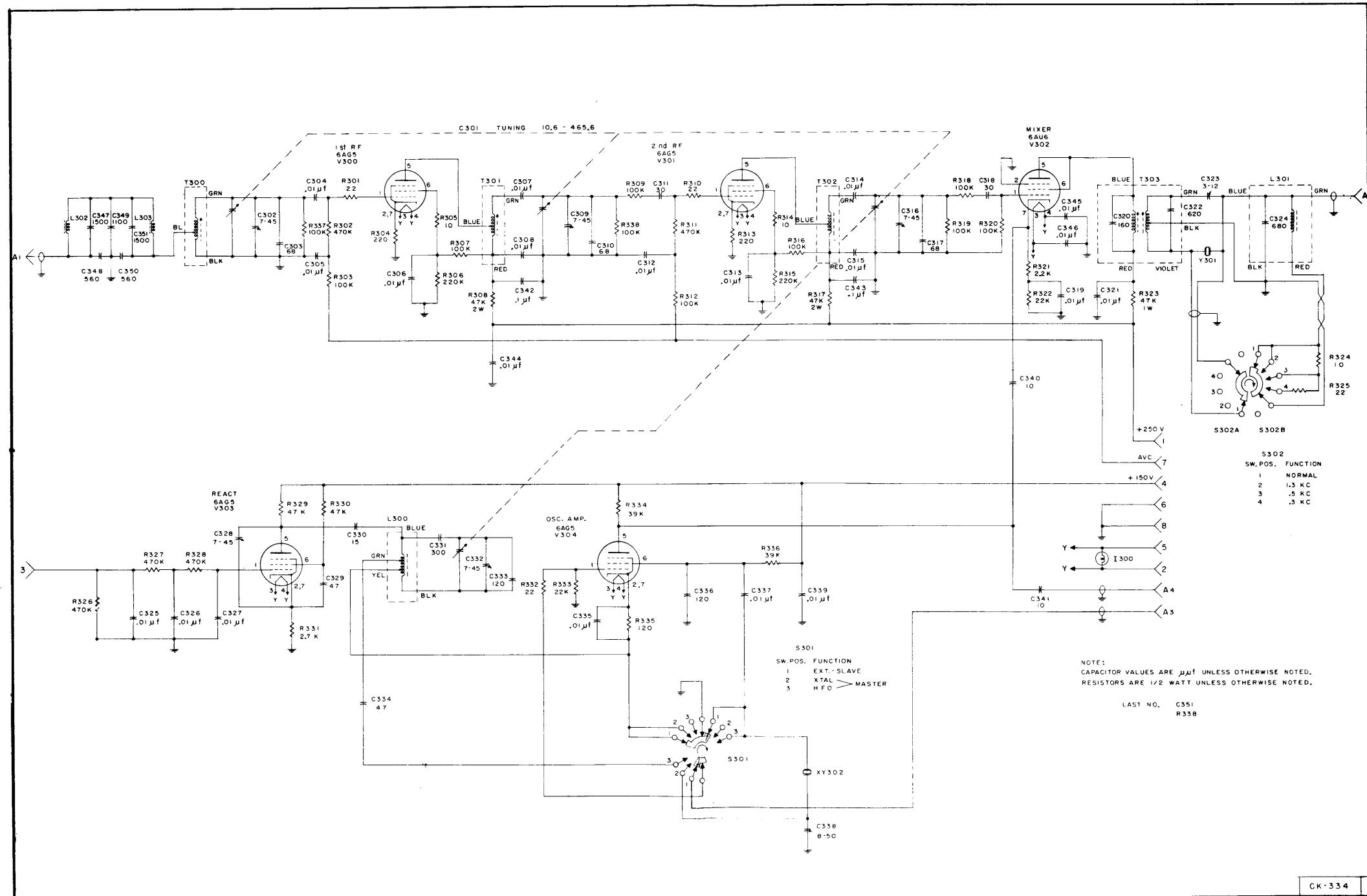
SCHEMATIC DIAGRAM, MODEL FFR-2 AND FFRD-8



Schematic Diagram, Model FFRD-1

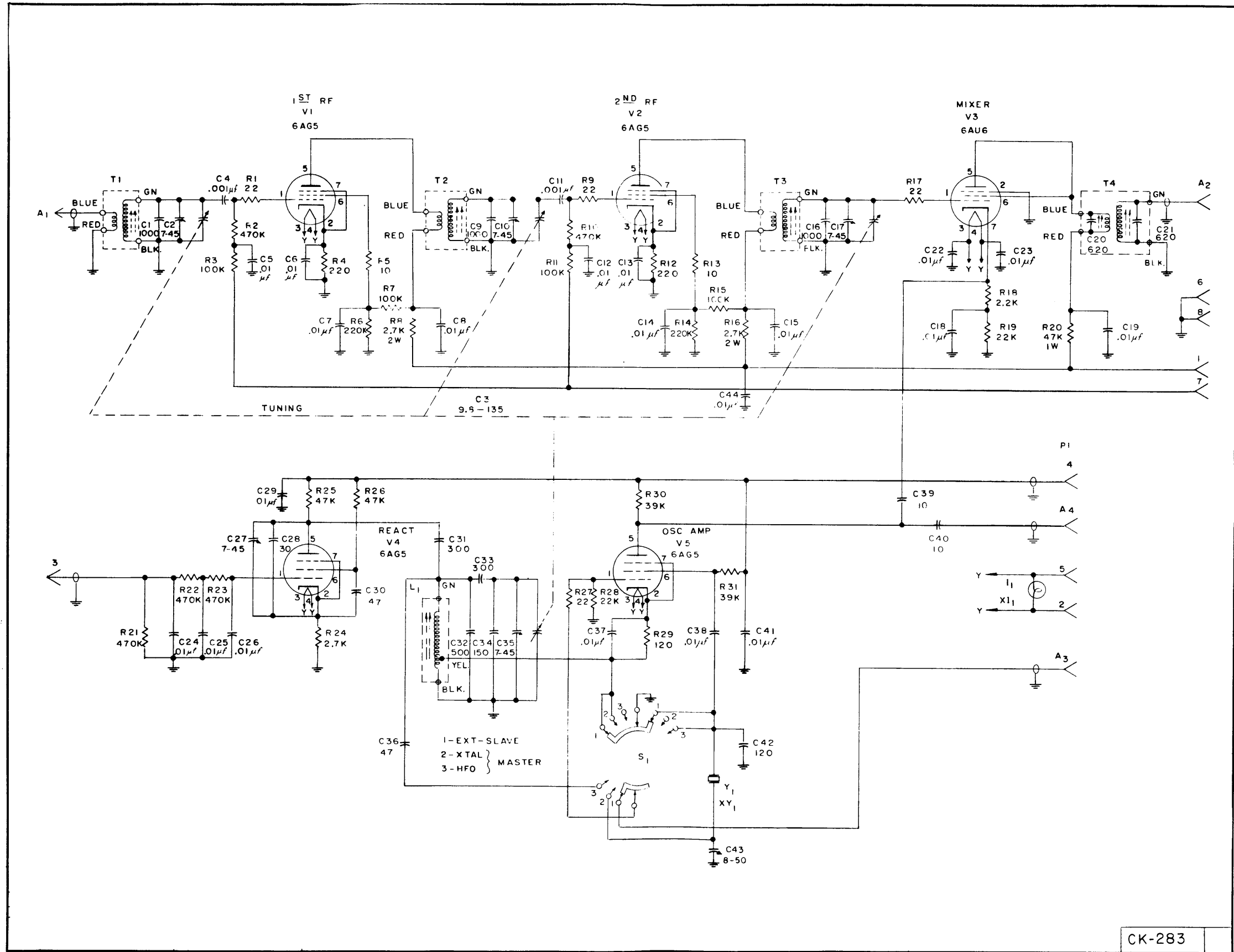


Schematic Diagram, Model FFRD-2

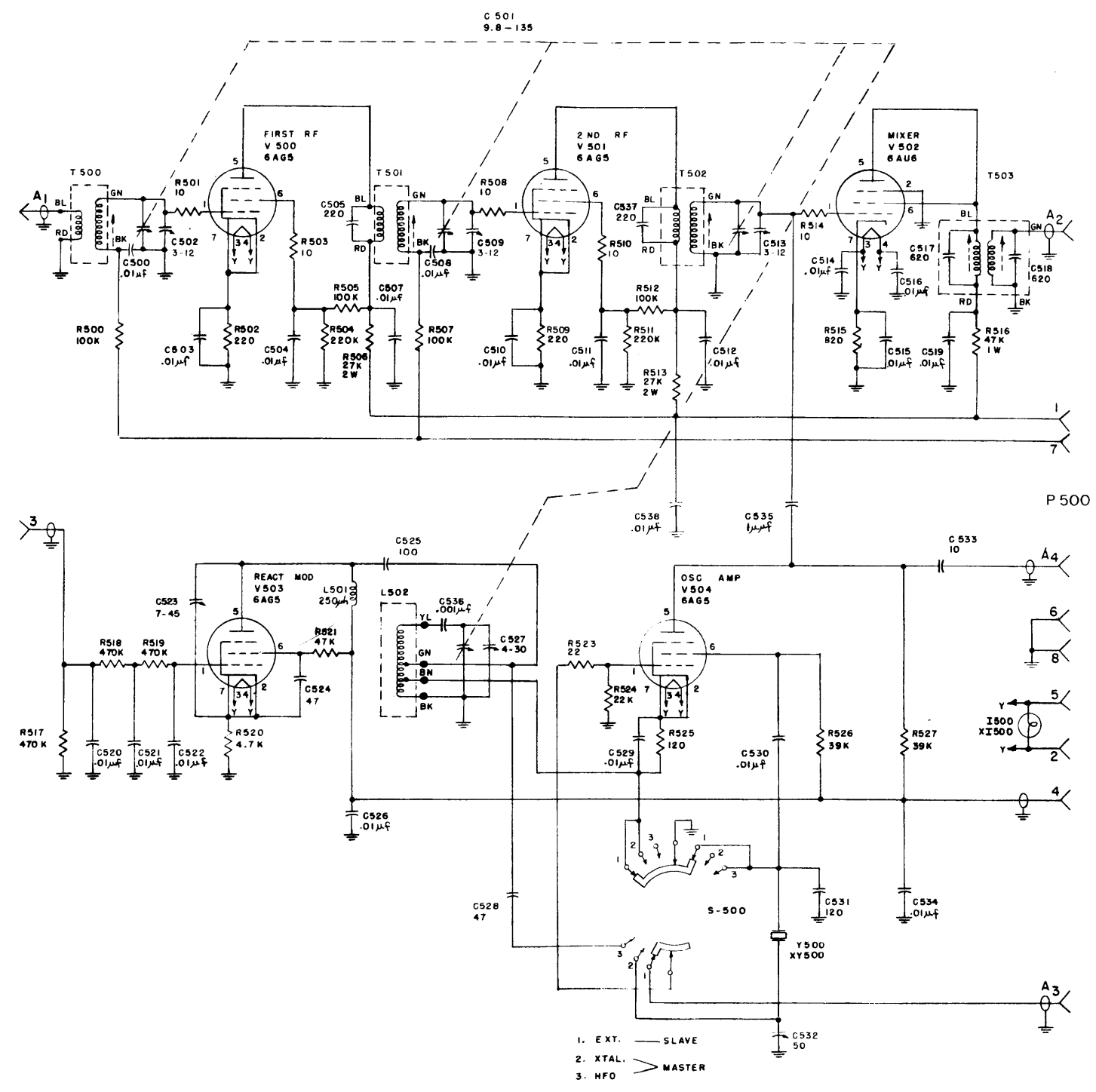


Schematic Diagram, Model FFRD-3

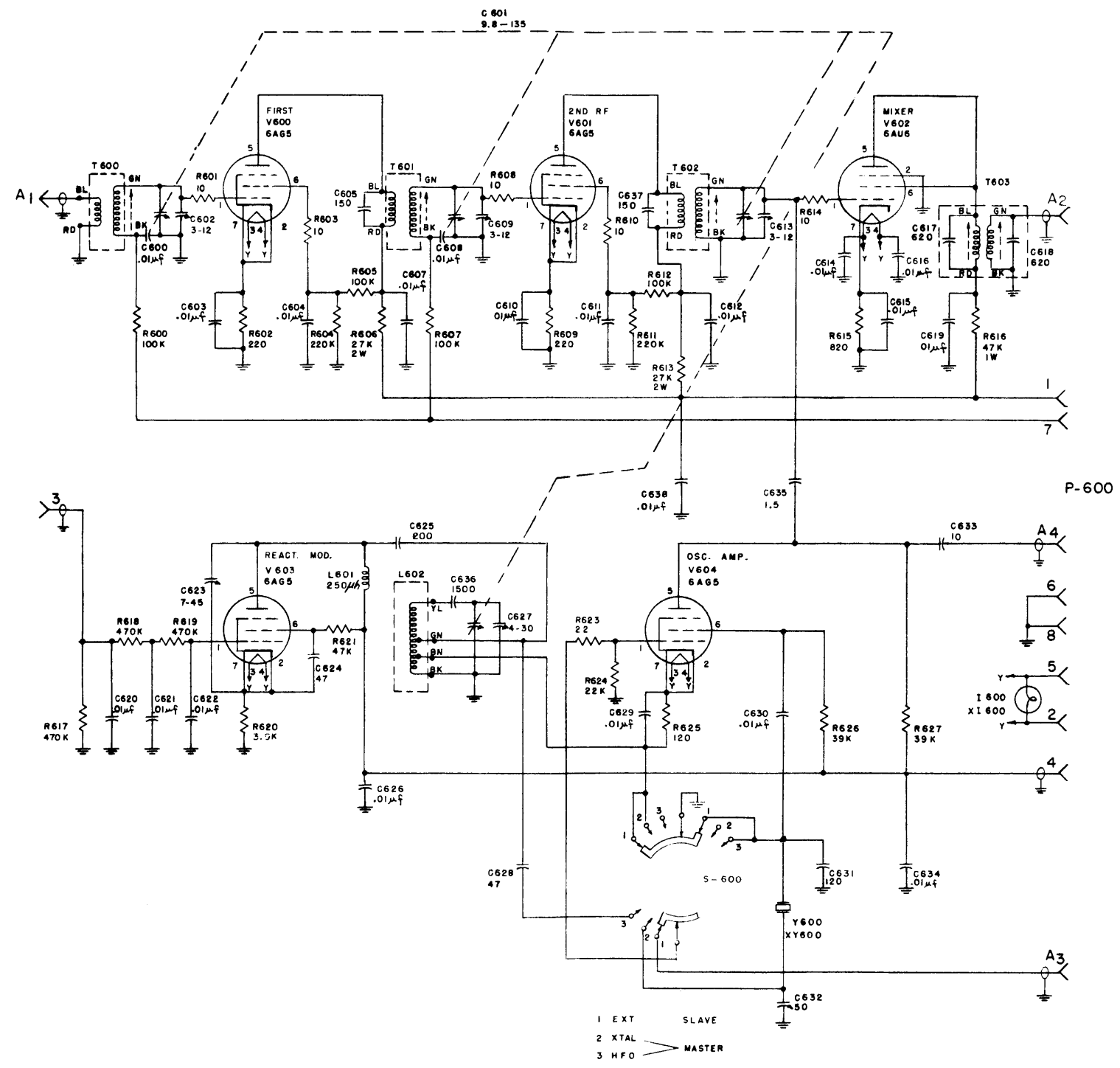




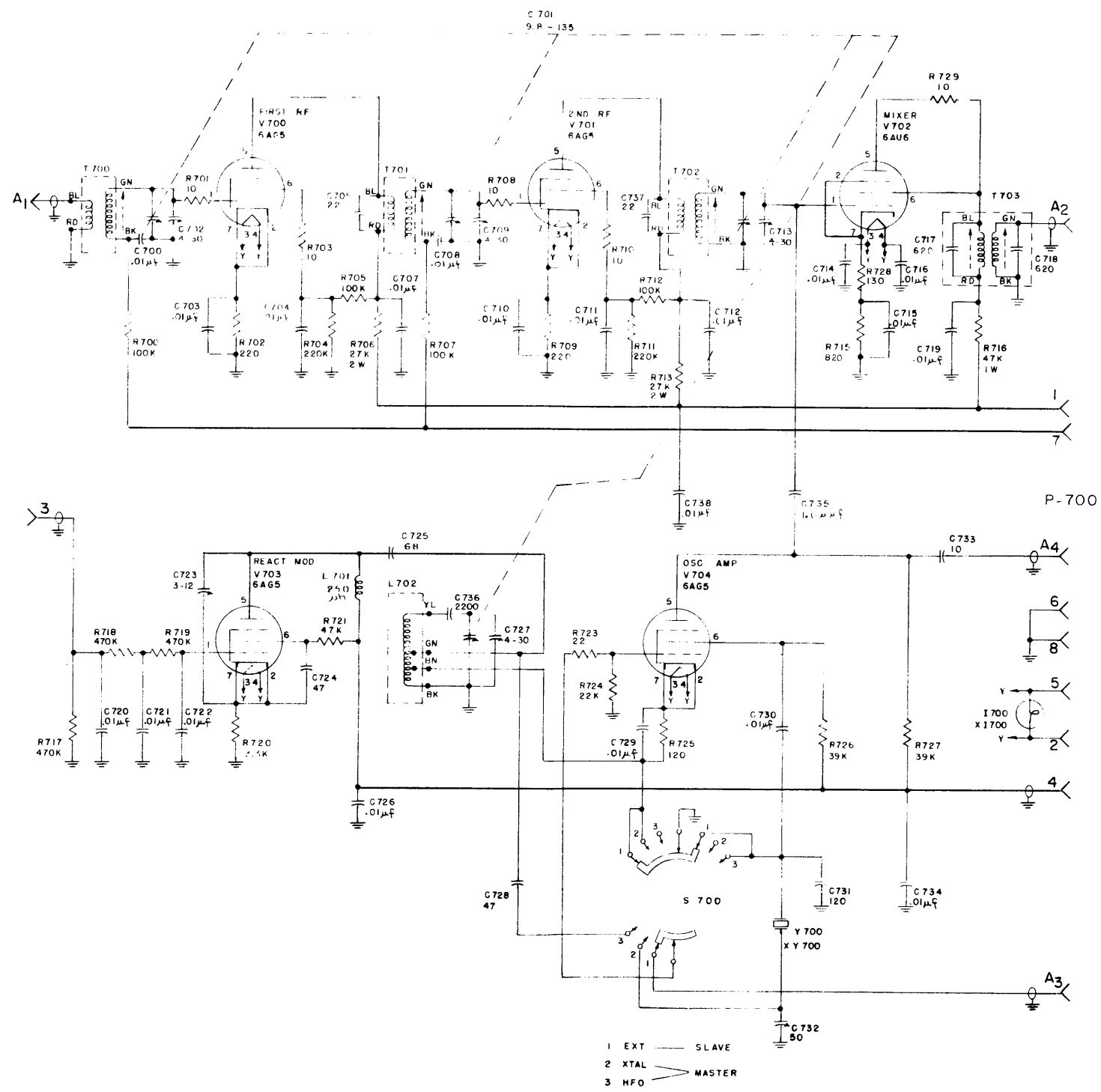
Schematic Diagram, Model FFRD-3M



Schematic Diagram for FFRD-5



Schematic Diagram for FFRD-6



1 EXT — SLAVE  
 2 XTAL — MASTER  
 3 HFO — MASTER

Schematic Diagram for FFRD-7