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TECHNICAL MANUAL

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for

COMMUNICATION RECEIVER MODEL FFR

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THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y.

OTTAWA, ONTARIO

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COMMUNICATION RECEIVER MODEL FFR



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MAMARONECK, N. Y.

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LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
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CH. OF NOMEN. T OF C	TC-1	4-1 thru 4-73	ORIG.
1-0 thru 1-4	ORIG.	STOCK NO. IDENT.	TC-1
2-1 thru 2-4	ORIG.	STOCK NO. X REF.	TC-1

GUARANTEE

Each unit of each item and each part thereof is guaranteed by the Contractor against all defects in material and/or workmanship. Each unit of each item and each part thereof is guaranteed by the Contractor against damage resulting from improper application by the Contractor of any component in the design or fabrication of the equipment. This guarantee extends for a period of one year from the date of installation or use, provided that this period shall not exceed 2 years from the date of delivery.

Upon notice in writing the Contractor shall promptly repair or replace all defective or damaged units or parts f.o.b. any point within the continental United States (this means the forty-eight contiguous states and the District of Columbia) as designated by the Government, at no expense to the Government.

The Contractor may elect to have any replaced unit or part returned to his plant at his expense. If, upon examination of the unit or part, it can be shown to the satisfaction of the Government that the unit or part is not defective or damaged within the meaning this guarantee, the Contractor may bill the Government for the cost of repair or replacement, including transportation costs.

This guarantee shall exclude electron tubes, batteries, natural rubber and material normally consumed in operation unless such excepted items fail as a result of improper application by the Contractor, in which case the guarantee shall be equally applicable to these items; provided that the Contractor shall guarantee such excepted items to the extent of the guarantee received by the Contractor from his supplier.

If 20% or more of the total quantity of any part or component to which the above guarantee applies, but not less than two of any such part or component furnished under the contract, fail in normal service, that fact shall be conclusive evidence that the particular part or component or the item or part design, is unsuitable for the purpose intended. The Contractor, upon notice of this fact, shall replace or correct the item or part design in a manner satisfactory to the Government in all items and parts, without any cost to the Government, unless the use of such part, component or design was required by the Government.

This guarantee period shall not include any period of time the unit or part fails to perform satisfactorily due to any such defect and any unit part or component repaired or replaced by the Contractor pursuant to this guarantee shall itself be guaranteed as specified in the first paragraph above.

MODIFICATION OF RECEIVER SUB-ASSEMBLY R5007/FFR-502
FOR SQUELCH OPERATION

PURPOSE:

1. This modification provides for automatic muting of the audio output until the receiver is tuned to a R.F. Signal of pre-determined amplitude.

THEORY OF OPERATION:

2. A control tube is introduced into the first audio frequency frequency amplifier grid circuit, to control the bias of this stage. The control tube is operated by the amplitude of the negative D.C. voltage developed across the second detector load resistance. With signals below a pre-determined and adjustable level, the first audio tube is maintained in a current "Cut off" condition, and in consequence, there is no audio output from the receiver. With signal levels in excess of the pre-determined level, the excess bias is removed from the first audio amplifier, which then operates in a normal manner.

CIRCUIT DESCRIPTION:

3. Reference should be made to figure 1 for schematic diagram. The Squelch control tube V110 introduced by this modification is controlled by the rectified voltage appearing across the second detector load resistance R118. This negative voltage is filtered by R157, C161 to remove the audio frequency components of the signal, and applied then to the grid of V110, a 6AB4 tube. With applied signal of amplitude less than threshold, V110 is in a conducting condition as the cathode voltage is negative with respect to the grid, and the plate current causes a voltage drop across the plate load resistor R153, this causes the grid of V104 to fall below its cathode voltage sufficiently to cut the tube off.

Addendum No. 1

CIRCUIT DESCRIPTION: (Cont)

As input signal level is increased, the negative voltage applied to the grid of the control tube increases, and the plate current decreases, allowing the grid of V104 to approach normal operating condition. With V110 in the "cut off" condition the plate voltage rises to its maximum at which point the diode section of V104 limits and prevents its grid from being driven positive. V104 operating bias voltage is developed in the grid circuit resistors R160, R158.

In operation the rate of change of bias of V104 is such that a 3 db change in signal level is sufficient to change the audio output level from -30 dbm to +30 dbm, its full rated power.

To maintain the overall fidelity of the audio frequency section of the receiver, after incorporation of this modification the following changes are made:

- (a) V104 plate load resistor, R124 is changed in value. (Not applicable to Serial No. 32866 and following).
- (b) C125 audio coupling capacitor is changed in value.
- (c) C126, V105 cathode resistor by pass capacitor is deleted. (Not applicable to Serial No. 32866 and following).
- (d) C127 high frequency by pass is deleted.
- (e) R123 plate decoupling resistor for V104 is deleted.

PARTS RENDERED REDUNDANT BY THIS MODIFICATION:

4. (a) R124, 33,000 ohms 1/2 watt (Not applicable to Serial No. 32866 and following).
- (b) C126 50 uf 150 V.D.C.W., electrolytic
- (c) C127 .005 500 V.D.C.W.
- (d) R123 120,000 ohms 1/2 watt

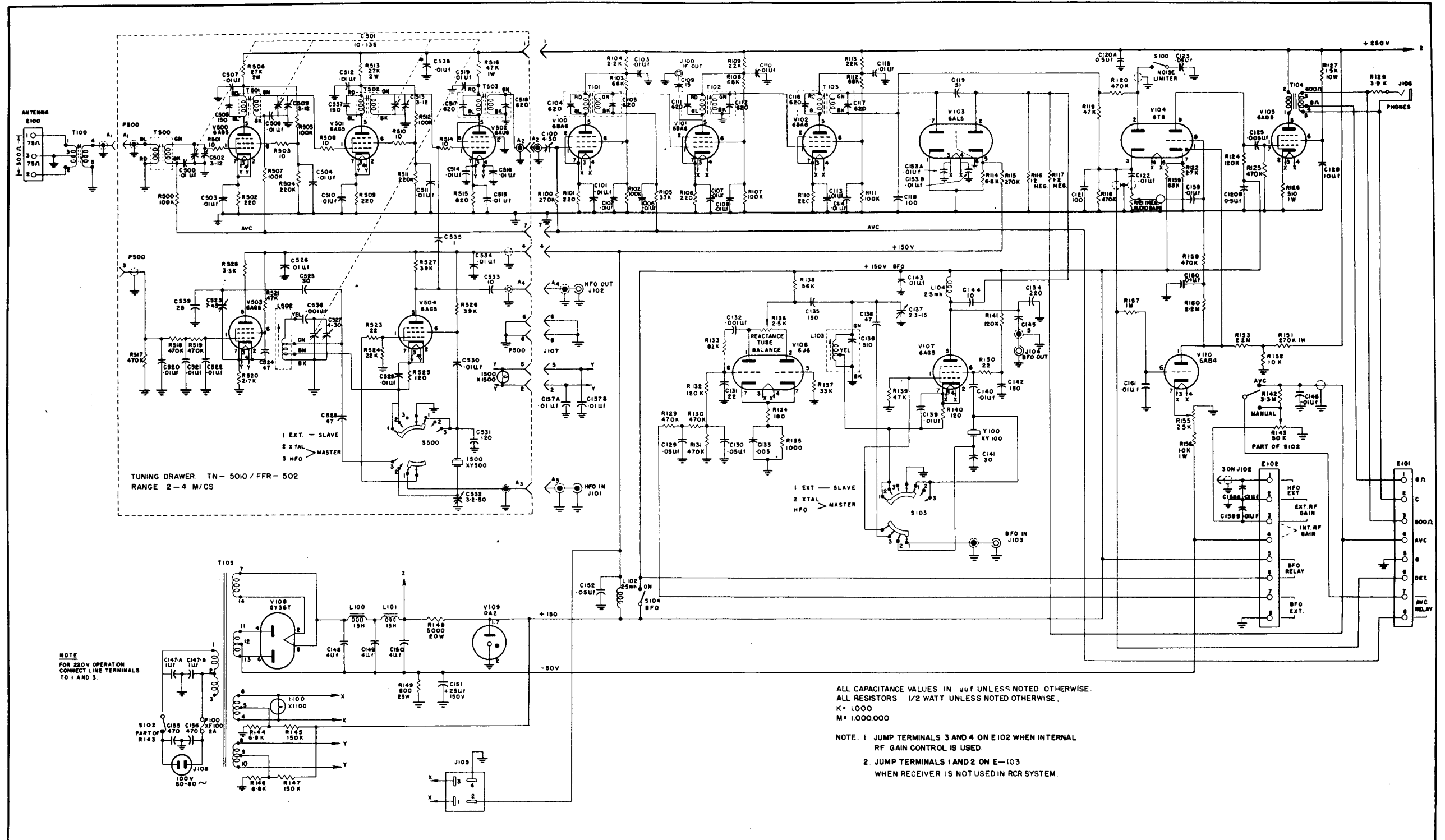


Figure 1 Schematic Diagram (with Squelch), R-5007/FRR-502 with TN-5010/FRR-502



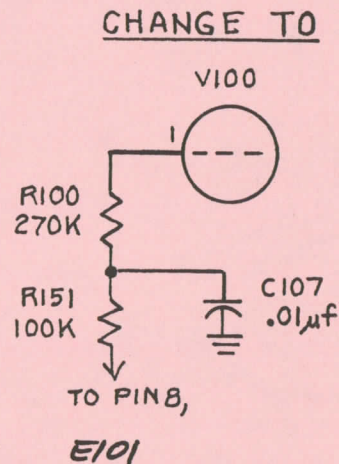
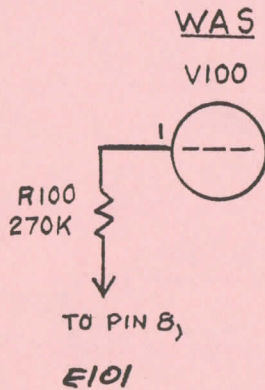
INSTRUCTION BOOK CHANGE NOTICE

Date 6-13-63

Manual affected: Communication Receiver Model FFR IN - 3004

1. Schematic Diagram Model FFR-3, CK 378

a. Change schematic as indicated.



b. Remove C107 the .01 mf cathode bypass capacitor from R106 the 220 ohm bias resistor for V101.

2. Page 4-22 Parts List

After item R150 add:

R151 Resistor; fixed composition

100 K ohms \pm 10% 1/2 watt Grid Decoupling RC20GF104K

3. Page 4-15 Parts List.

Item C107 under function column change

"Cathode Bypass" to read "Grid Decoupling"

CHANGE NO. 2



INSTRUCTION BOOK CHANGE NOTICE

Date October 4, 1963

Manual affected: Communication Receiver Model FFR IN -3004

page 4-55

Change Y500 part no. from "CR-16/U" to "CR-18/U"

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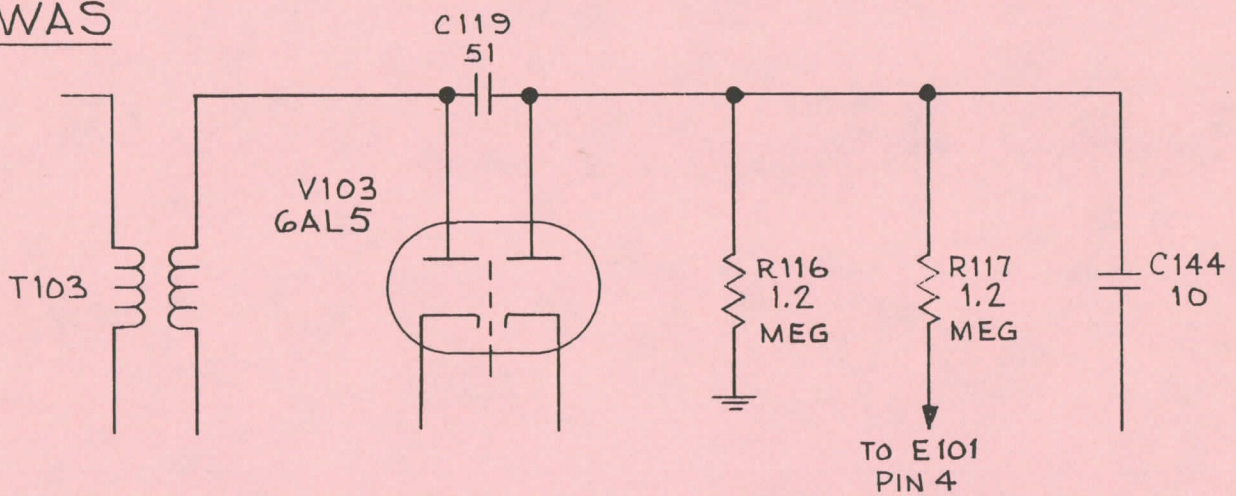
INSTRUCTION BOOK CHANGE NOTICE

Date 12/11/63

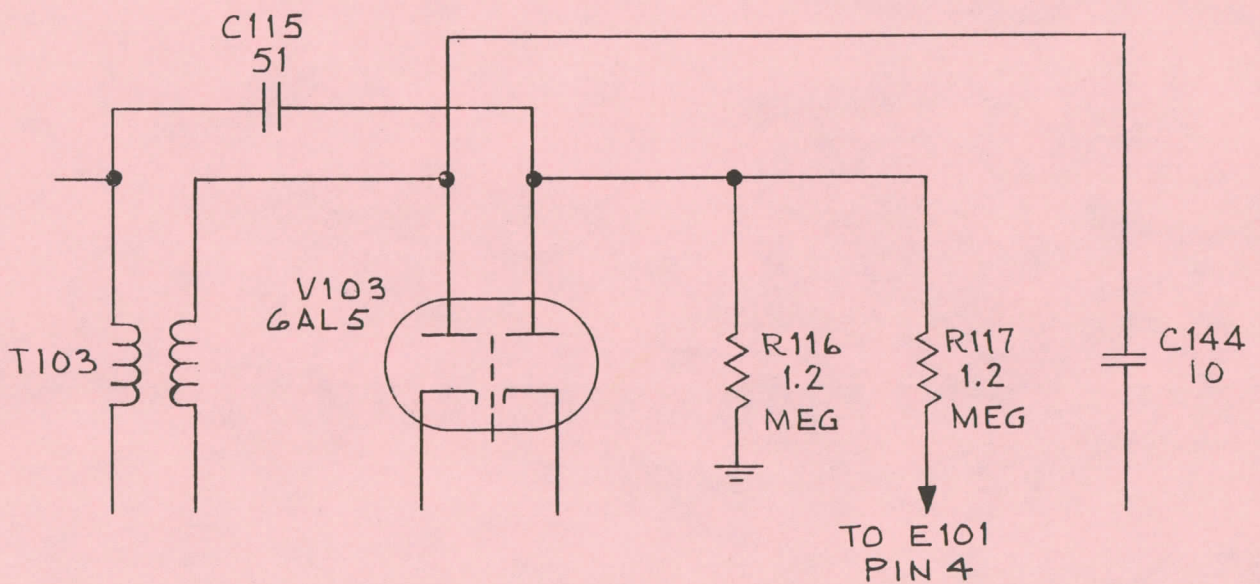
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Correct schematic diagram for Model FFR-3 as shown below.

WAS



CHANGE TO



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CHANGE NO. 4 FFR(Sh. 1 of 3)



INSTRUCTION BOOK CHANGE NOTICE

Date 4/21/64

Manual affected: Communication Receiver Model FFR IN -3004

Page 4-1, para 1(B), line 32.

Change "found with a charring agent of proven quality" to read, "found with a cleaning agent of proven quality."

Add, "Refer to E1B 516 for approved cleaner."

Page 4-2, para 2(A), step 5(c), line 3.

Change "will be evidenced by a sharp peaked response on the output meter," to read, "will be evidenced by a sharp dip on the output meter."

Page 4-2, para 2(A)5 eight paragraph.

Change first line to read "With BANDWIDTH switch in 1.3 KC position adjust T103 and L101....."

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INSTRUCTION BOOK CHANGE NOTICE

Date 4/21/64

Manual affected: Communication Receiver Model FFR IN -3004

Page 4-2 Para 2(B) change steps 1 through 6 to read:

1. Connect an AN/USM-26 (or equivalent) between pin 3 and pin 2 of E-101. Pin 2 is Common.
2. Using the procedure set forth in Section IV, paragraph 2(A), obtain a "Zero Beat".
3. Adjust the D.C. Control Voltage to obtain +4.5 Volts at pin 7 of E-102.
4. Record the frequency as measured by the AN/USM-26.
5. Adjust the D.C. Control Voltage to obtain -4.5 Volts at pin 7 of E-102.
6. Record the frequency as measured by the AN/USM-26.
7. Frequencies obtained in steps 4 and 6 above should be the same and the sum of which should be more than 4 KCS. If the frequencies in steps 4 and 6 are not the same, adjust the Reactance Tube Balance, R-136, until the shift is the same for steps 4 and 6.

Page 4-2, para 2(c), line 5.

Change "tube voltmeter, and LM-18" to read "tube voltmeter, and AN/USM-26 (or equivalent)."

Page 4-13 Para 2(c)line 26.

Change "If a signal appears on the new setting, then the peak setting of the trimmer is correct" to read "If a signal appears

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CHANGE NO. 4 FFR(Sh. 3 of 3)



INSTRUCTION BOOK CHANGE NOTICE

Date 4/21/64

Manual affected: Communication Receiver Model FFR IN -3004

on the new setting, the peak setting of the trimmer is incorrect and should be adjusted for the other peak.

Page 4-13, para 2(D), lines 4 and 5

Change "signal from an LM-18 or a BC-221 Frequency Meter," to read, "signal from an AN/URM-25 Signal Generator (or equivalent)"

Page 4-22

For SYM T105 under DESCRIPTION column add "SEC#4, 5.0 volts at 2 amps".

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Figure 1-1. Communication Receiver, Model FFR

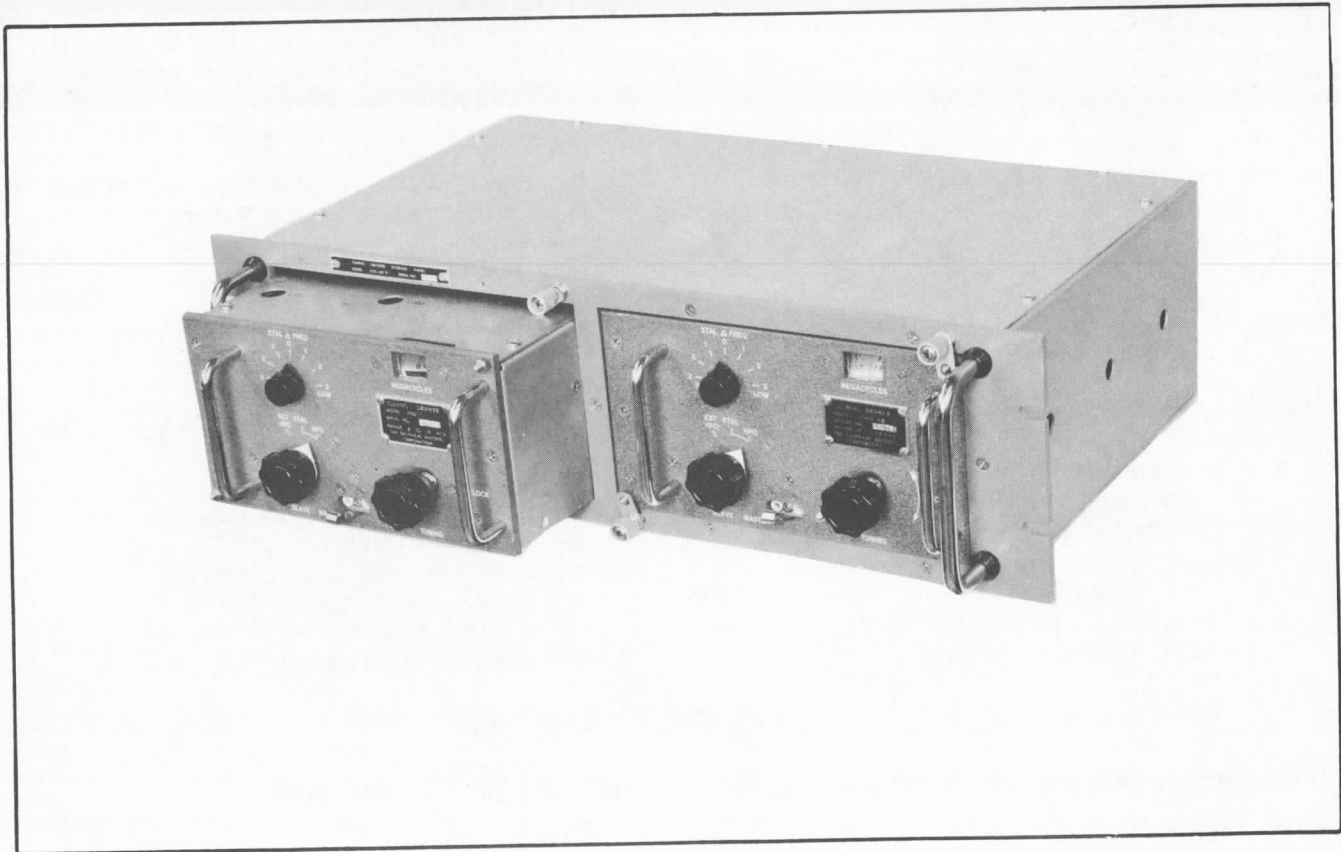


Figure 1-2. Tuning Drawer Storage Panel, Model FFR-DP

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 Kcs. 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.	2 Kcs.	14 Kcs.
	100	4	17
FFRD - 2	100	2.5	14
	200	4.3	19
FFRD - 3	200	4.1	17
	400	4.8	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 +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

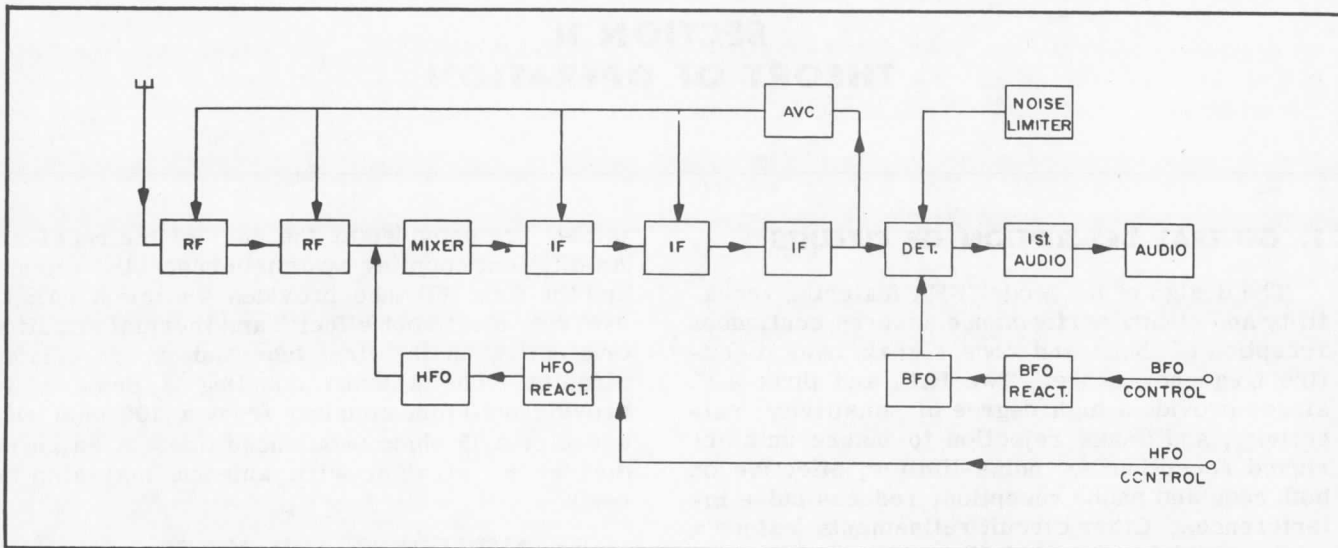


Figure 2-1. Block Diagram for the Model FFR.

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 ± 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

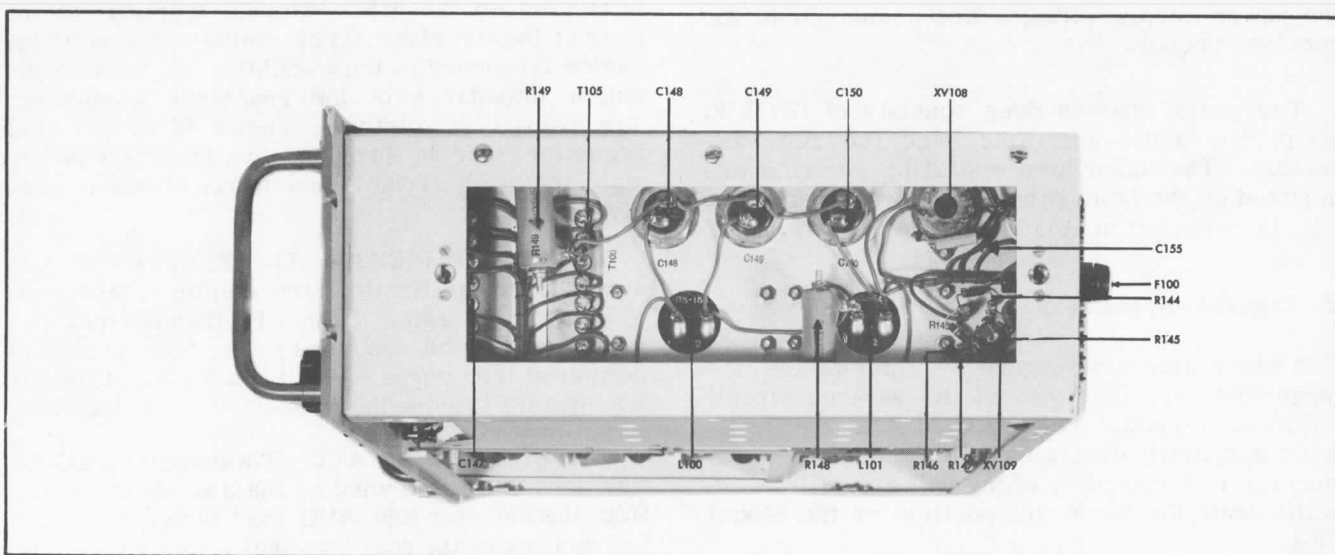
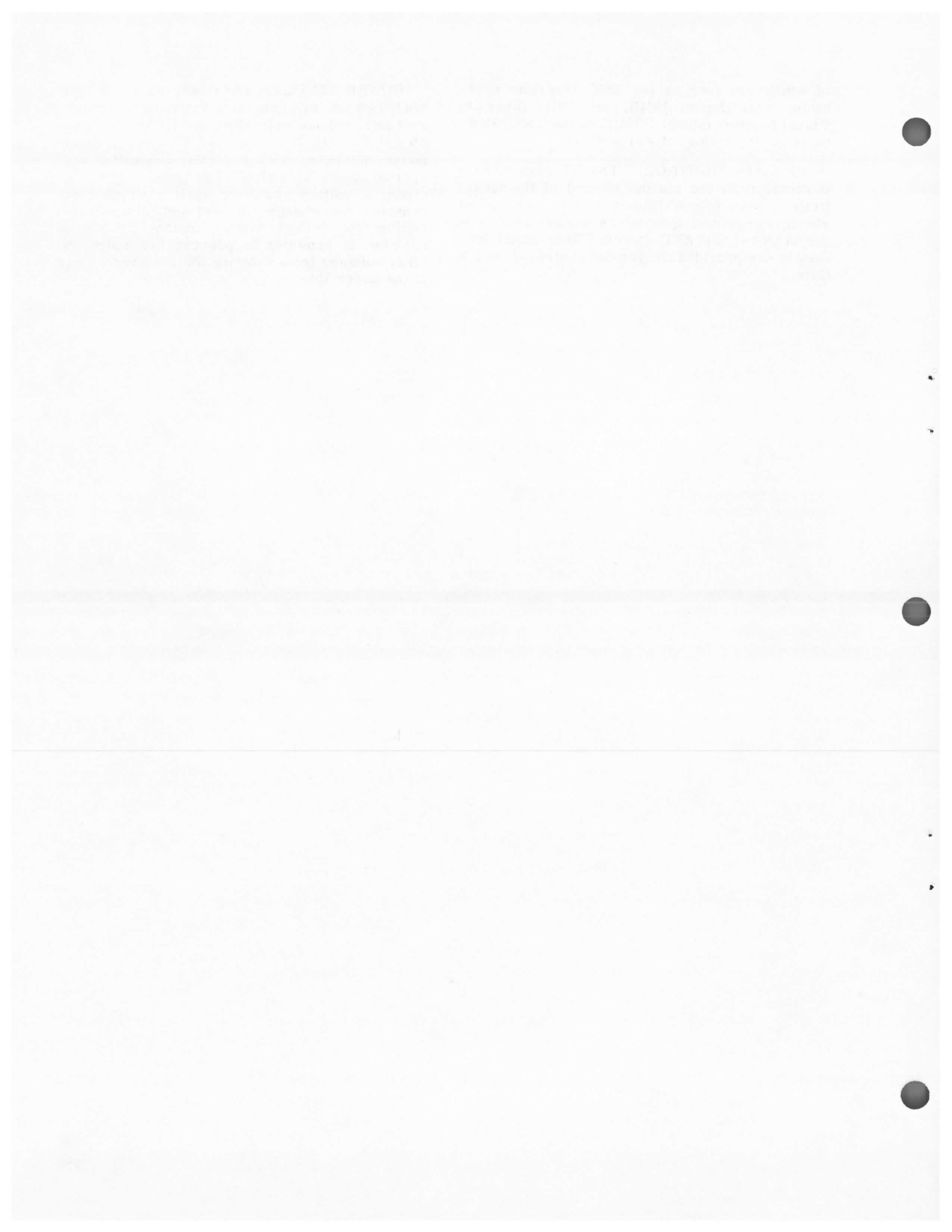


Figure 2-2. Right Side View Showing Power Supply Connections.

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 Δ 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.

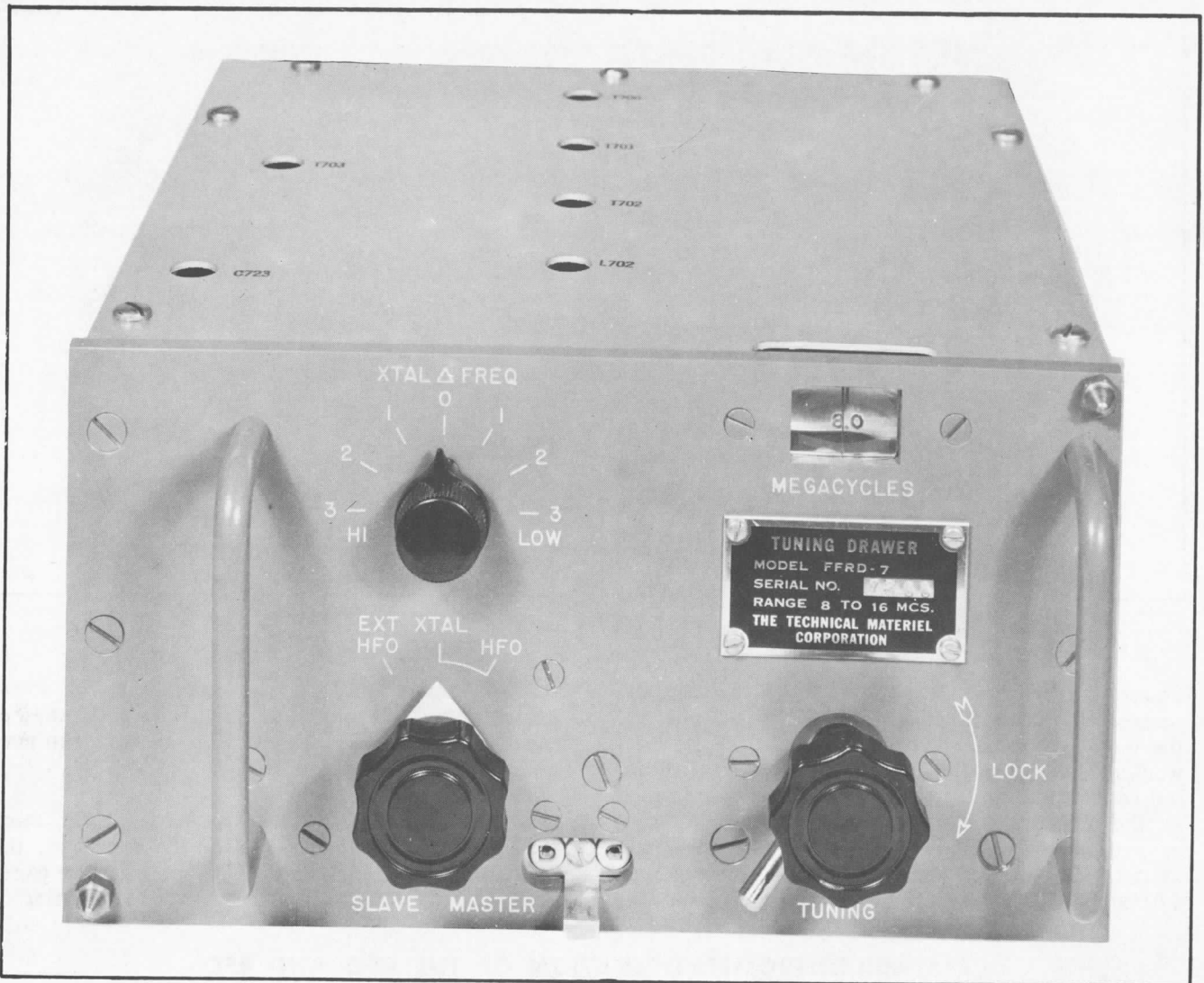


Figure 3-1. Front View, Model FFRD-* (H F Head)

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-

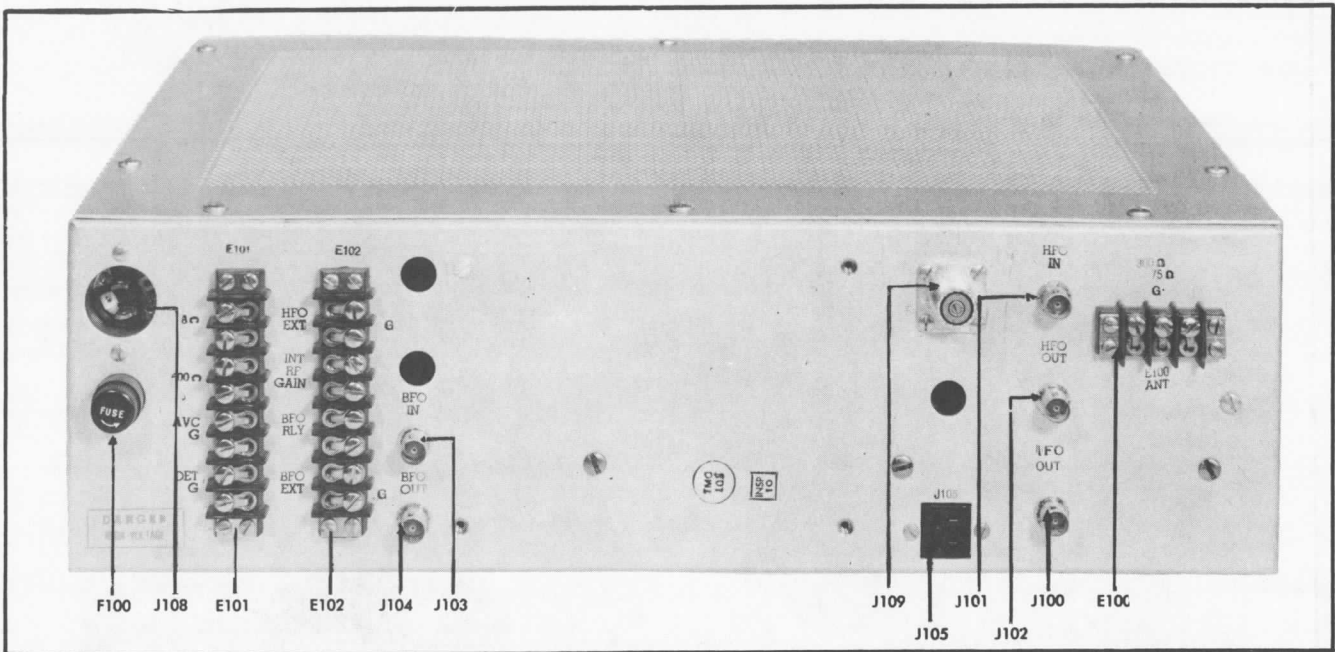


Figure 3-2. Rear View., Model FFR.

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.

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

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

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

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

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

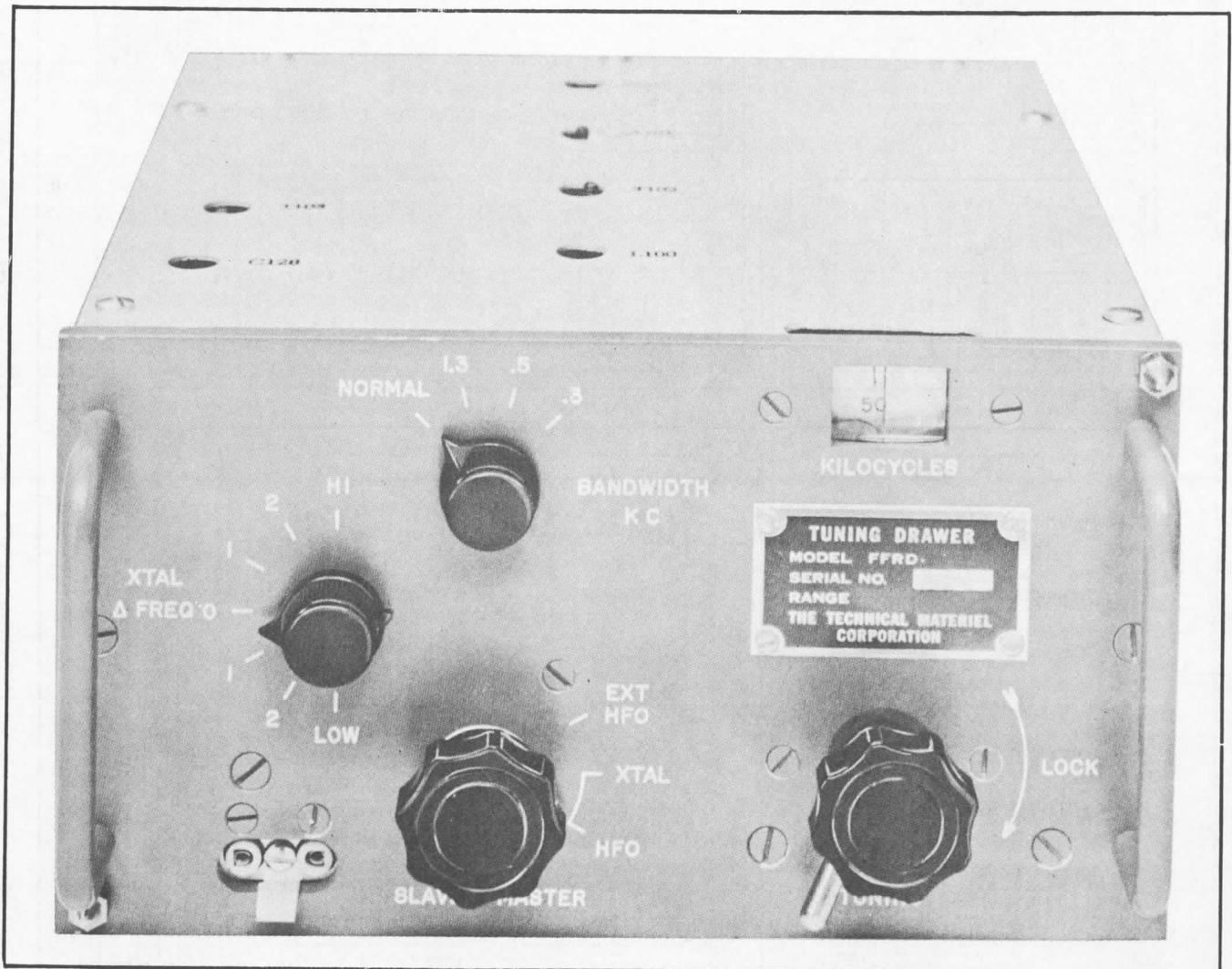
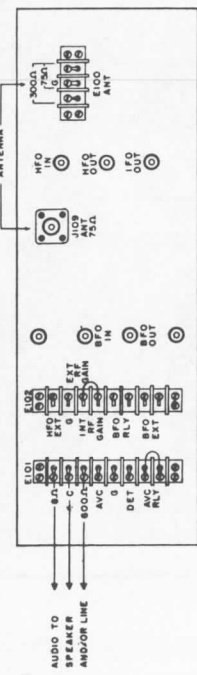


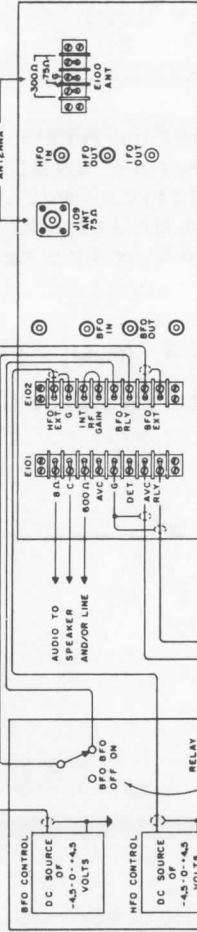
Figure 3-3. Front View, Model FFRD-* (LF Head)

I - SINGLE RECEIVER OPERATION, LOCAL CONTROL



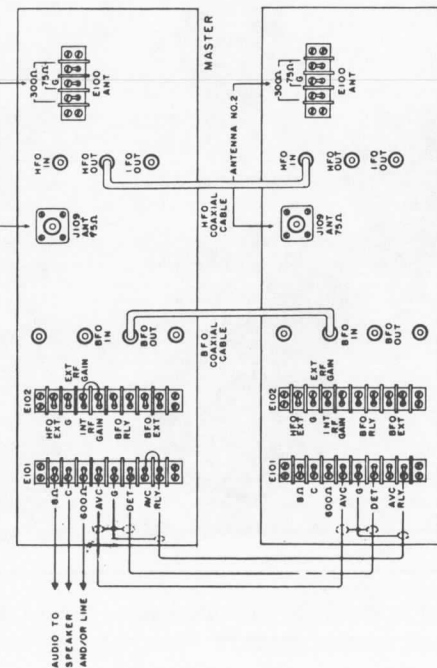
OPERATION	CONTROL	CONTROL SETTINGS
C.W., F.S	BFO SWITCH	BFO
PHONE OR MCW	BFO SWITCH	OFF
ANY	BFO MAS./SL. SW.	XTAL OR BFO
ANY	HFO MAS./SL. SW.	XTAL OR HFO
ANY	AVC SWITCH	AVC OR MANUAL

III - SINGLE RECEIVER OPERATION, REMOTE CONTROL



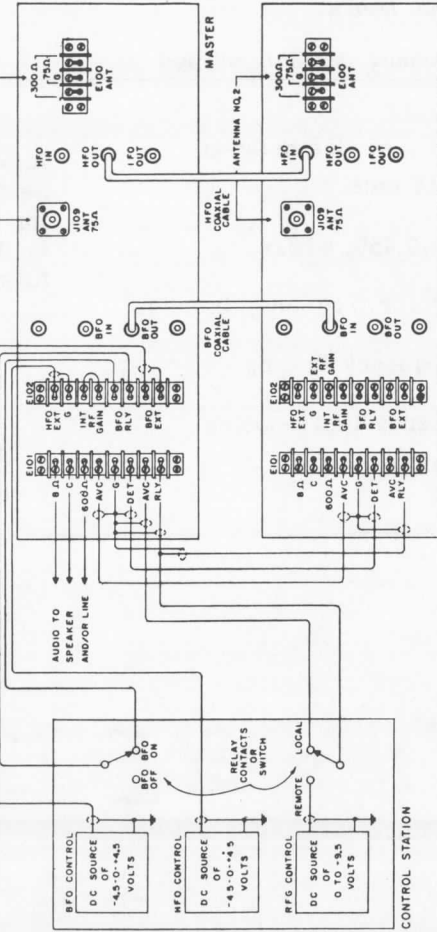
OPERATION	CONTROL	CONTROL SETTINGS
C.W., F.S	BFO SWITCH	OFF
PHONE OR MCW	BFO SWITCH	OFF
ANY	BFO MAS./SL. SW.	BFO
ANY	HFO MAS./SL. SW.	HFO
ANY	AVC SWITCH	AVC

II - DIVERSITY OPERATION, LOCAL CONTROL



OPERATION	CONTROL	MASTER RECEIVER	SLAVE RECEIVER
C.W., F.S	BFO SWITCH	BFO	BFO
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	BFO
PHONE OR MCW	BFO SWITCH	OFF	BFO
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 STAMPING HAS BEEN OMITTED TO MORE CLEARLY SHOW 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 +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 +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.

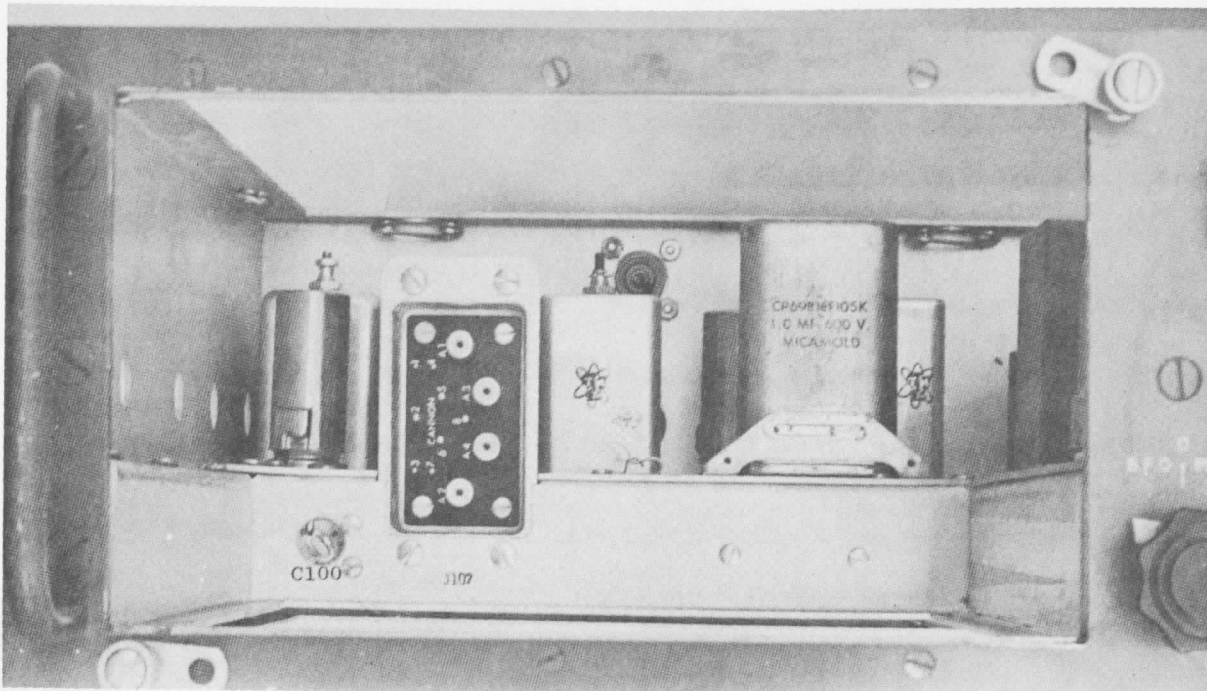
C. THE R.F. HEAD

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

ADDENDUM

Relocation of C100, I.F. coupling capacitor on R5007/FRR-502 Receiver Sub Assembly.



As illustrated, C 100 I.F. coupling capacitor has been placed on the rear of the R.F. Tuner wrap around. This makes adjustment possible from the front of the unit, and eliminates the necessity of removing the receiver from the rack. (See page 4-5 for former location.)

REASON: Due to ageing or replacement of vacuum tubes, slight readjustment of C 100 may be necessary to bring the sensitivity of a group of receivers to a uniform level.

- PROCEDURE:**
1. Remove RF Tuner from the receiver.
 2. Connect signal generator to pin A2 of J 107.
 3. Connect an AC VTVM to detector terminals 5 and 6 of Terminal Strip E 101 at the rear of the unit.
 4. Set receiver controls as follows:
 - a. RF GAIN fully clockwise.
 - b. AVC MANUAL switch to MANUAL position.
 - c. BFO switch to OFF position.
 - d. Other controls in any position.
 5. Set signal generator frequency to 455.0 kc, output to 115 microvolts, modulated 30 percent at 400 or 1000 cycles.
 6. Adjust C 100 with an insulated tuning tool to obtain 1.0 volts A.C. at the detector.
 7. If 1.0 volts is not available, the I.F. tubes must be checked for low emission.

PH-703



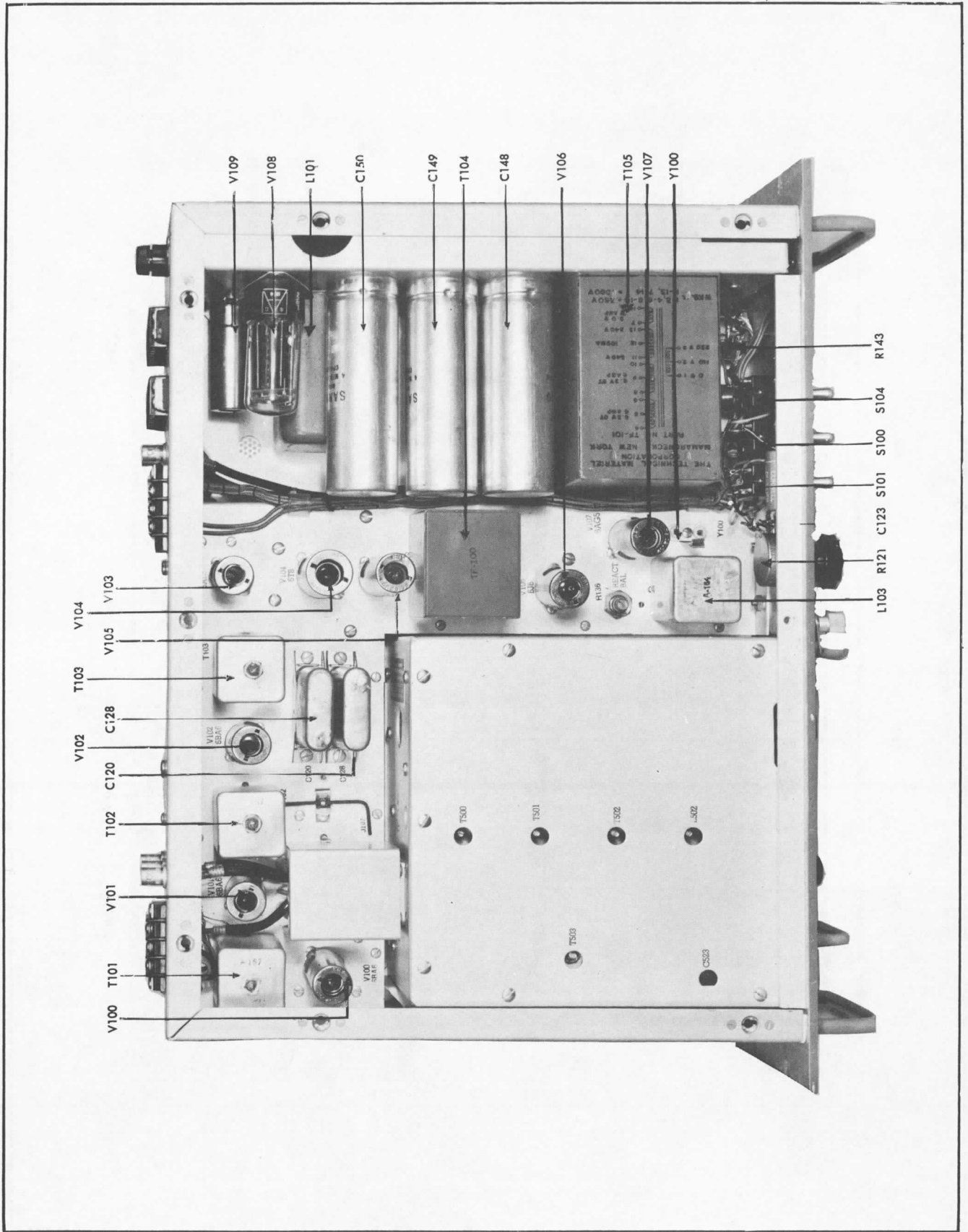


Figure 4-1. Top View, Model FFR with FFRD-* Installed.

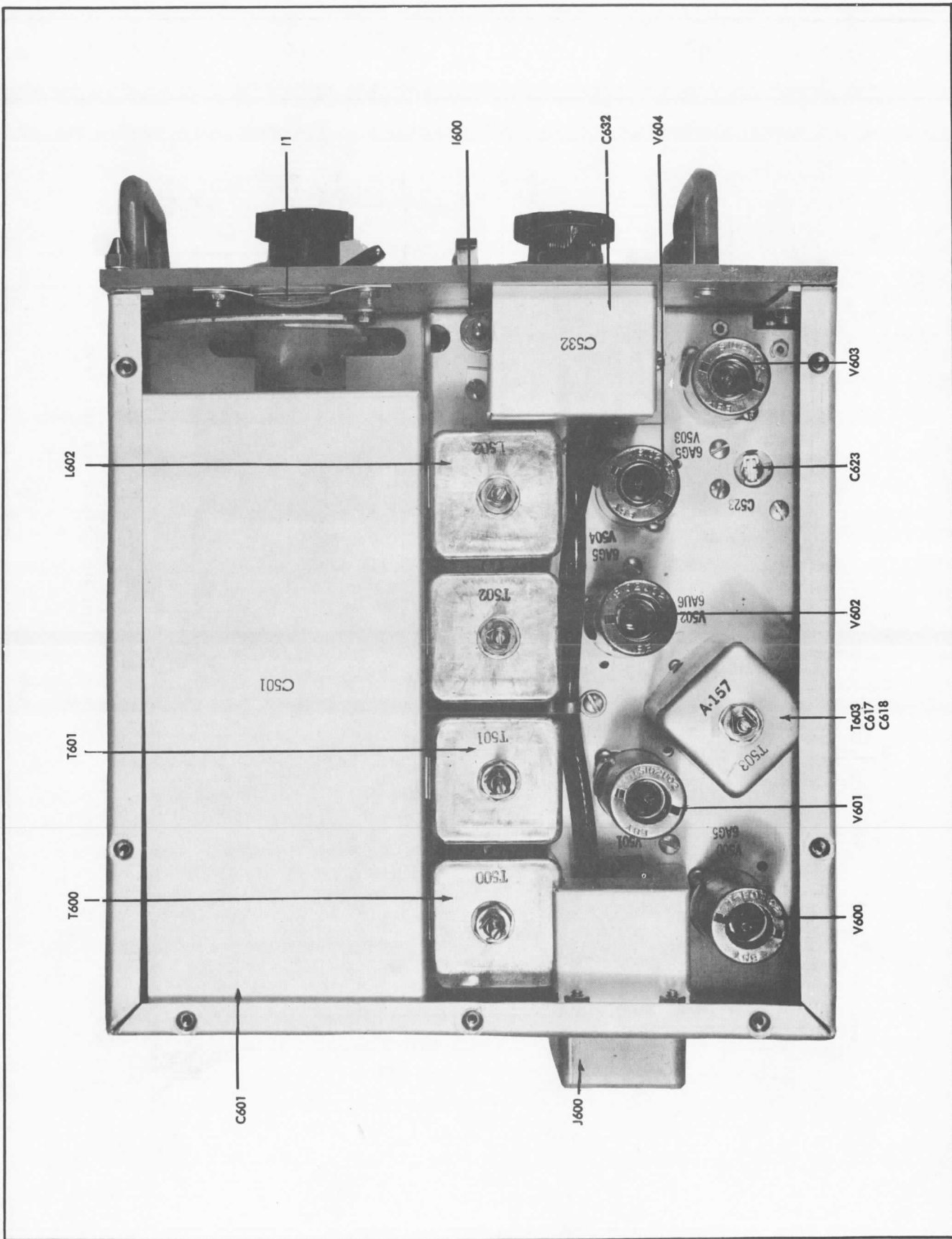


Figure 4-2. Top View, Model FFRD-* (HF Head)

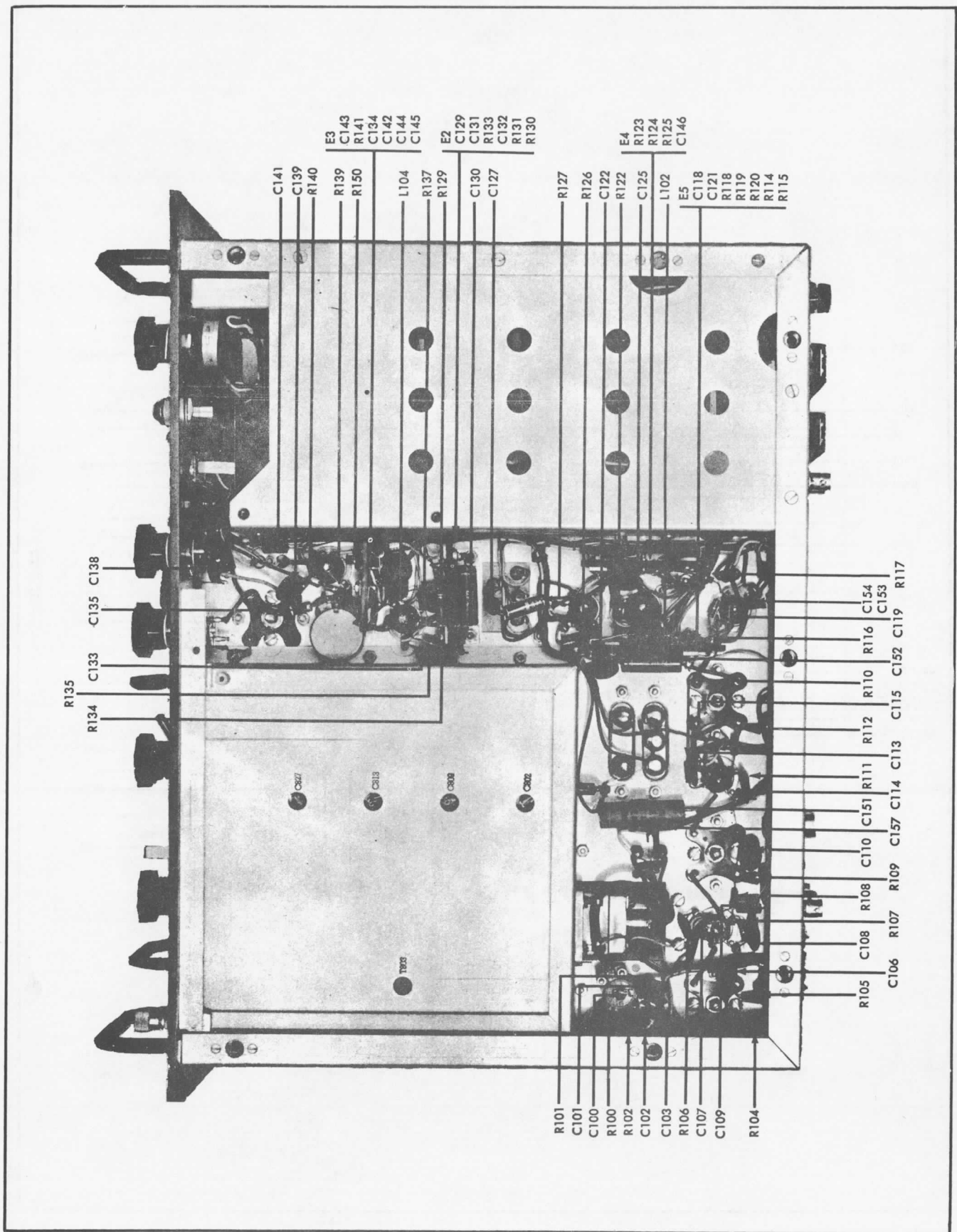


Figure 4-3. Bottom View, Model FFR with FFRD-* Installed.

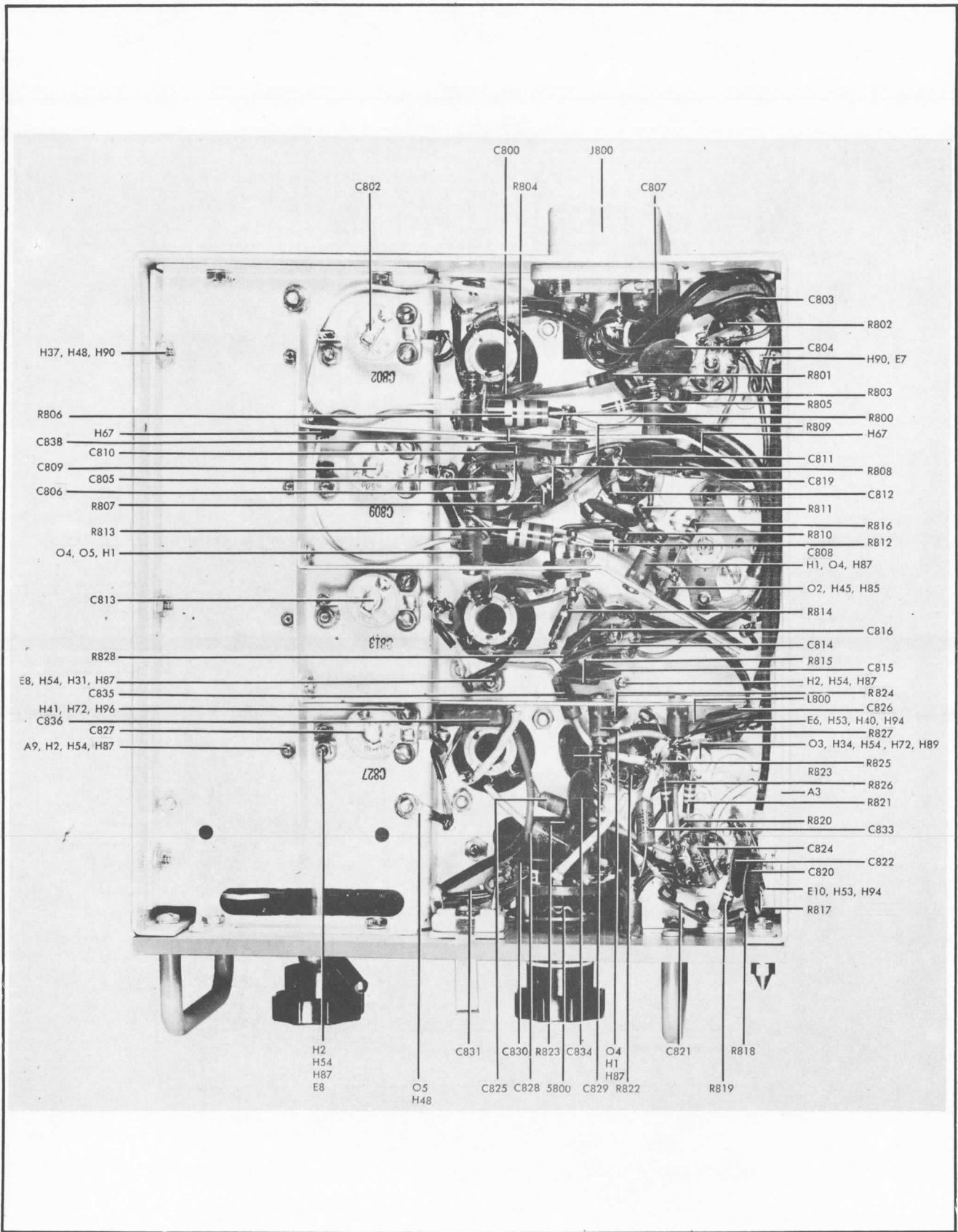


Figure 4-4. Bottom View, model FFRD-* (HF Head).

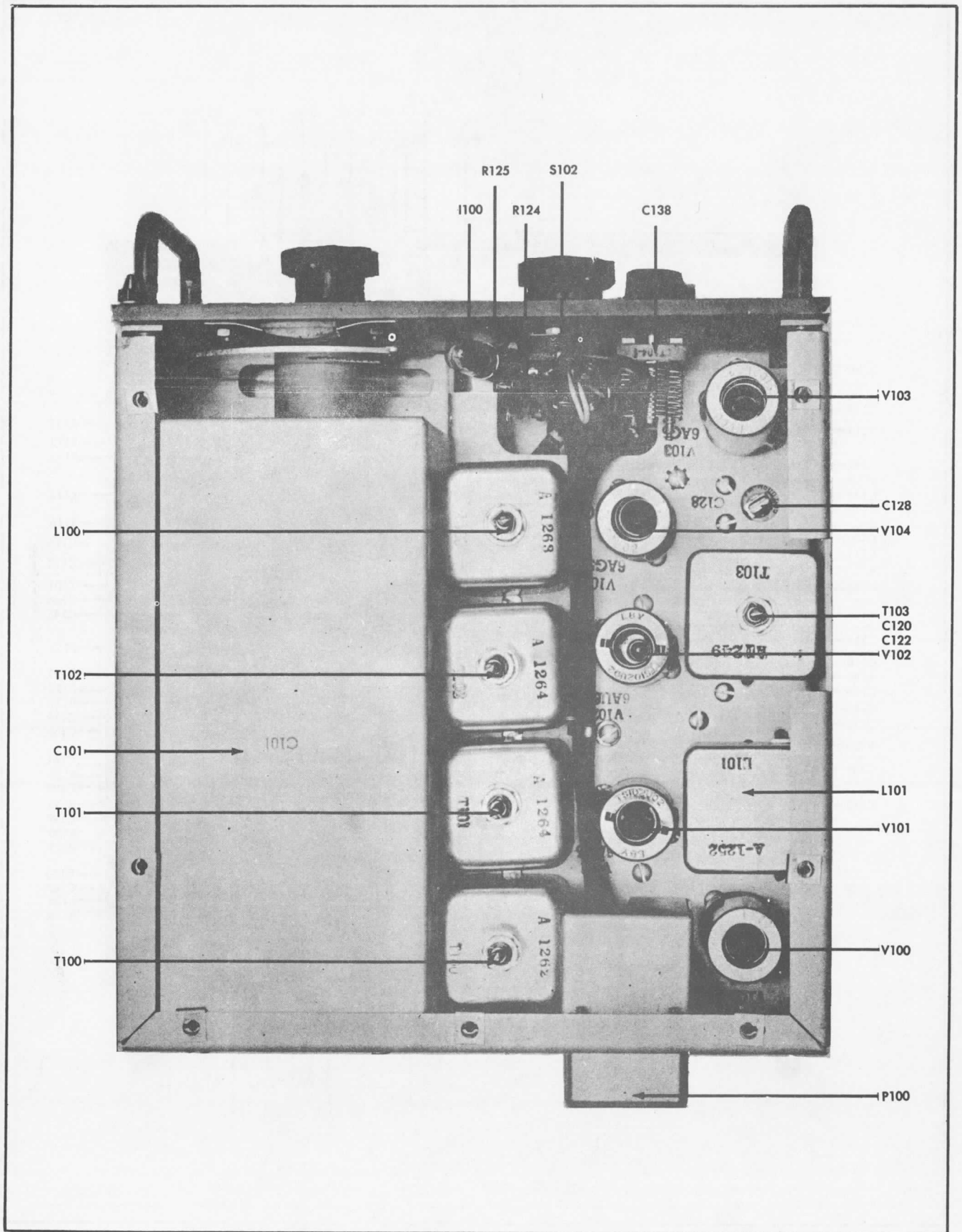


Figure 4-5. Top View Model FFRD-* (LF Head)

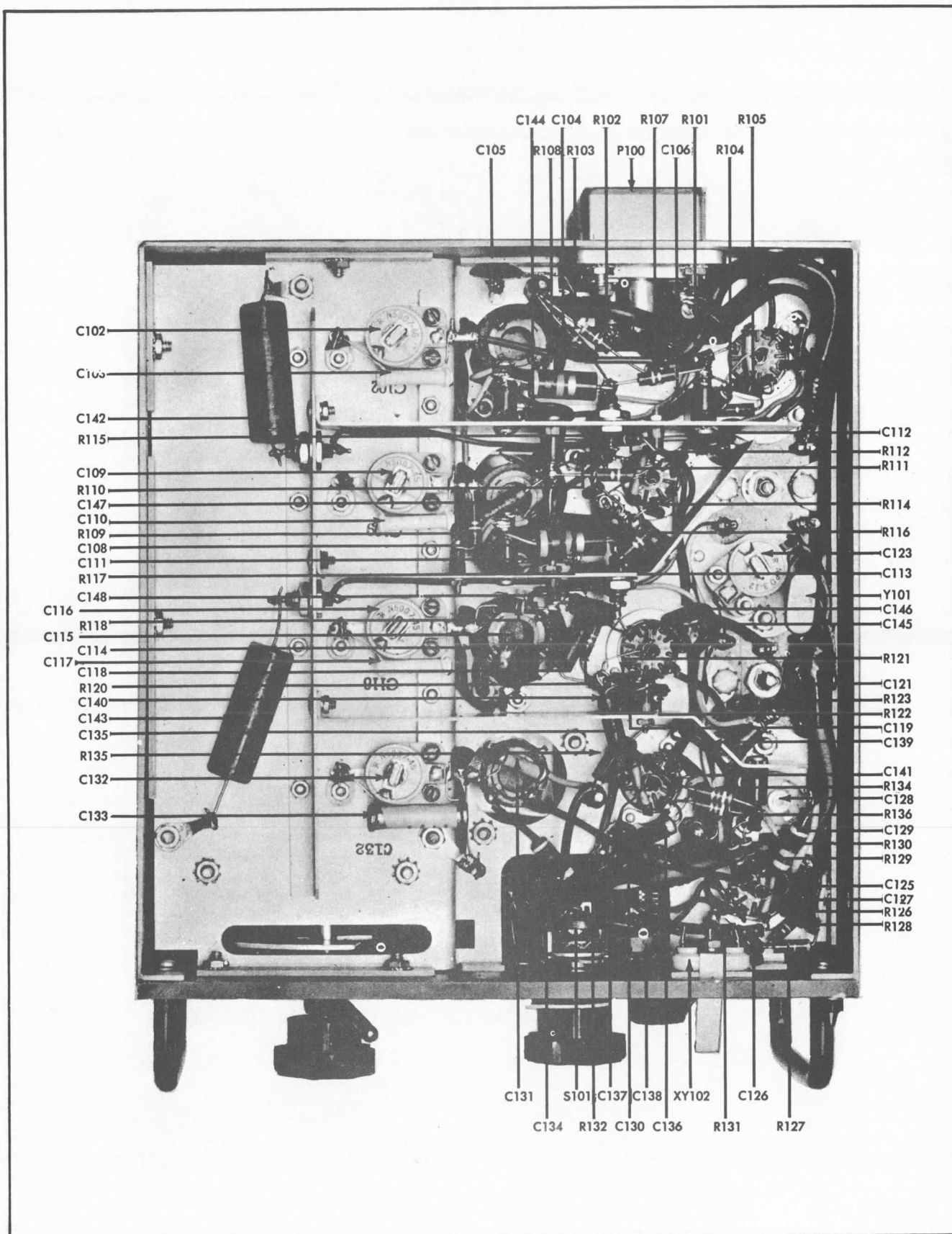


Figure 4-6. Bottom View, Model FFRD-* (LF Head).

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 CLOCKWISE

MODEL FFR-2 RECEIVER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS													
			1	2	3	4	5	6	7	8	9					
V100	6BA6	1 ST IF AMP	-0.18	+1.30	—	+6.3	6.2*	+6.3	6.2*	+250	—	+70	+1.30	—	—	—
V101	6BA6	2 ND IF AMP	-0.18	+1.25	—	+6.3	6.2*	+6.3	6.2*	+250	—	+65	+1.25	—	—	—
V102	6BA6	3 RD IF AMP	0	+1.40	—	+6.3	6.2*	+6.3	6.2*	+250	—	+70	+1.40	—	—	—
V103	6AL5	2 ND DET & AVC	0	-0.1	—	+6.3	6.2*	+6.3	6.2*	+3.6	—	0	-1.5	—	—	—
V104	6T8	NOISE LIMITER & 1 ST 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*	—	—	—	—	360**	—	—	360**	290	5.2*	—
V109	0A2	VOLTAGE REG	+150	—	—	—	—	—	—	+150	—	—	—	—	—	—

CH-138-8

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 ST RF	-0.2	+0.83	+6.3	6.0*	+6.3	6.0*	+150	+60	+0.83
V501	6AG5	2 ND 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 ST RF	-0.2	+0.7	+6.3	6.0*	+6.3	6.0*	+150	+60	+0.7
V701	6AG5	2 ND 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 ST RF	-0.2	+0.70	+6.3	6.0*	+6.3	6.0*	+160	+60	+0.70
V601	6AG5	2 ND 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	+5.8	+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 ST RF	-0.1	+0.7	+6.3	6.0*	+6.3	6.0*	+150	+58	+0.7
V801	6AK5	2 ND 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 ST IF AMP	1.7M	220Ω	6.8K	6.8K	32K	50K	220Ω	—	—
V101	6BA6	2 ND IF AMP	1.5M	220Ω	6.8K	6.8K	32K	50K	220Ω	—	—
V102	6BA6	3 RD IF AMP	5Ω	220Ω	6.8K	6.8K	32K	50K	220Ω	—	—
V103	6AL5	2 ND DET & AVC	0	1.2M	6.8K	6.8K	6.8K	0	520K	—	—
V104	6T8	NOISE LIMITER & 1 ST 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	10K	—	—
V107	6AG5	BFO OSC	47K	120Ω	6.8K	6.8K	37K	150K	120Ω	—	—
V108	5Y3GT	RECTIFIER	—	32K	—	750Ω	—	750Ω	—	32K	—
V109	0A2	VOLTAGE REG	32K	—	—	—	32K	—	—	—	—

NOTE K = 1000 Ω
M = 1 MEGOHM

CH-137-B

FFRD-5A TUNING DRAWER

TUBE	TYPE	FUNCTION	SOCKET PIN NUMBERS						
			1	2	3	4	5	6	7
V500	6AG5	1 ST RF AMP	1.5M	220Ω	6.8K	6.8K	48K	90K	220Ω
V501	6AG5	2 ND 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	26K	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 ST RF AMP	1.5M	220Ω	6.8K	6.8K	45K	93K	220Ω
V701	6AG5	2 ND 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 ST RF AMP	1.5M	220Ω	6.8K	6.8K	50K	95K	220Ω
V601	6AG5	2 ND 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 ST RF AMP	1.5M	220Ω	6.8K	6.8K	50K	94K	220Ω
V801	6AK5	2 ND 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 75 KCS, 150 KCS, 300 KCS

TUBE TYPE	FUNCTION	SOCKET PIN NUMBERS								
		1	2	3		4		5	6	7
				DC	AC	DC	AC			
V100 6AG5	1ST RF AMP	-0.2	+0.6	+6.3	6.0*	+6.3	6.0*	+150	+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

0N-181-1

TUBE NUMBERS ARE KEYS TO BAND 1

TUNING DRAWER 'STANCES

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	15M ^x	220Ω	6.8K	6.8K	6.8K	6.8K	100K	220Ω
V102 6AU6	MIXER	100K	0	6.8K	6.8K	6.8K	6.8K	70K	24K
V103 6AG5	HFO REACT MOD	1.5M	2.7K	6.8K	6.8K	6.8K	6.8K	70K	2.7K
V104 6AG5	HFO OSC	22K	120Ω	6.8K	6.8K	6.8K	6.8K	60K	120Ω

0N-181-3

TUBE NUMBERS ARE KEYS TO BAND 1.

FFRD-3M TUNING DRAWER
TUNING CONTROL AT 500 KCS

TUBE TYPE	FUNCTION	SOCKET PIN NUMBERS								
		1	2	3		4		5	6	7
				DC	AC	DC	AC			
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*	+85	+80	+0.5

0N-181-3

TUBE NUMBERS ARE KEYS TO BAND 1

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	6.8K	6.8K	28K	220Ω
V2 6AG5	2ND RF AMP	2M	220Ω	6.8K	6.8K	6.8K	6.8K	28K	220Ω
V3 6AU6	MIXER	3Ω	0	6.8K	6.8K	6.8K	6.8K	68K	24K
V4 6AG5	HFO REACT MOD	1.4M	2.7K	6.8K	6.8K	6.8K	6.8K	65K	75K
V5 6AG5	HFO OSC	22K	120Ω	6.8K	6.8K	6.8K	6.8K	60K	120Ω

0N-181-4

TUBE NUMBERS ARE KEYS TO BAND 1.

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

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

ALL NOTES ON PAGE 4-8 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"

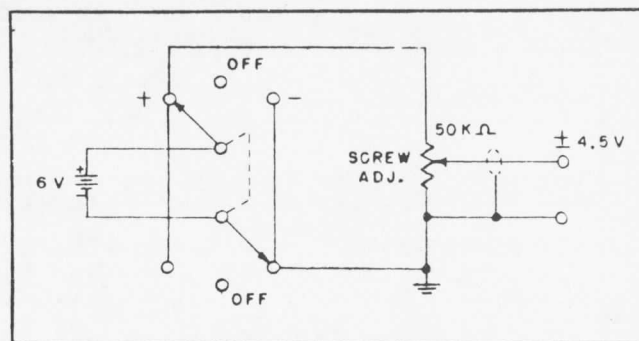


Figure 4-8. Reactance Tube Control Voltage.

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, $\pm 10\%$, 600 wvdc, oil-filled and impregnated, hermetically sealed case.	Audio Filter	CP69B1EF105K
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, $\pm 15\%$ ea. section, 600 wvdc, oil filled and impregnated, hermetically sealed metal case.	Line Bypass	CP53B4EF104L
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: dry electrolytic polarized; 35 mmfd each section 450 wvdc, char. F.	Power Supply Filter	CE52F350R
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	CHOKE, 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	CHOKE, 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 power: primary 105, 115, 125, 210.	Output Transformer	TF-100
T105	TRANSFORMER, 230 volts, 50/60 cycle, single phase. Sec #1, 6.3 volts at 5 amps CT; sec. #2, 6.3 volts at 2 amps CT; sec #3, 340-0-340 v RMS; 100 ma dc operating into 4 ufd capacity input filter. Hermetically sealed rectangular metal case.		TF-196
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., +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., +5%; 500 wvdc.	P/O RF Tank, V101	CC35CH680J
C111	CAPACITOR, fixed: ceramic; 82 mmfd., +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; 51 mmfd, ±5%, 500 wvdc.	Cathode Bypass Cap., V102	CC21SL510J
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		Osc. Grid Coupling Cap., V104	
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, +10%; 1/2 watt.	Grid Bias Res., V100	RC20GF474K
R103	RESISTOR, fixed: composition; 100,000 ohms, +10%; 1/2 watt.	AVC Filter Res., V100	RC20GF104K
R104	RESISTOR, fixed: composition; 220 ohms, +10%; 1/2 watt.	Cathode Bias Res., V100	RC20GF221K
R105	RESISTOR, fixed: composition; 10 ohms, +10%; 1/2 watt.	Parasitic Suppressor, V100	RC20GF100K
R106	RESISTOR, fixed: composition; 220,000 ohms, +10%; 1/2 watt.	P/O Screen Voltage Divider, V100	RC20GF224K
R107	RESISTOR, fixed: composition; 100,000 ohms, +10%; 1/2 watt.	P/O Screen Voltage Divider, V100	RC20GF104K
R108	RESISTOR, fixed: composition; 47,000 ohms, +10%; 2 watts.	Plate Decoupling Res., V100	RC42GF473K
R109	RESISTOR, fixed: composition; 270,000 ohms, +10%; 1/2 watt.	Grid Res., V101	RC20GF274K
R110	RESISTOR, fixed: composition; 22 ohms, +10%; 1/2 watt.	Parasitic Suppressor, V101	RC20GF220K
R111	RESISTOR, fixed: composition; 100,000 ohms, +10%; 1/2 watt.	Grid Bias Res., V101	RC20GF104K
R112	RESISTOR, fixed: composition; 100,000 ohms, +10%; 1/2 watt.	AVC Filter Res., V101	RC20GF104K
R113	RESISTOR, fixed: composition; 220 ohms, +10%; 1/2 watt.	Cathode Bias Res., V101	RC20GF221K
R114	RESISTOR, fixed: composition; 33,000 ohms, ±5%, 1/2 watt.	Parasitic Suppressor, V101	RC20GF333J
R115	RESISTOR, fixed: composition; 220,000 ohms, +10%; 1/2 watt.	P/O Screen Voltage Divider, V101	RC20GF224K
R116	RESISTOR, fixed: composition; 100,000 ohms, +10%; 1/2 watt.	P/O Screen Voltage Divider, V101	RC20GF104K
R117	RESISTOR, fixed: composition; 47,000 ohms, +10%; 2 watts.	Plate Decoupling Res., V101	RC42GF473K
R118	RESISTOR, fixed: composition; 270,000 ohms, +10%; 1/2 watt.	Grid Res., V102	RC20GF274K
R119	Not Used.		
R120	RESISTOR, fixed: composition; 100,000 ohms, +10%; 1/2 watt.	Grid Bias Res., V102	RC20GF104K
R121	RESISTOR, fixed: composition; 2200 ohms, +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, ± 6 millihenries, $Q=40$; tapped at 10.7 millihenries, ± 7 millihenries, $Q=50$.	Antenna Transformer	A-1262
T101	TRANSFORMER, RF: tuned; 11 millihenries, ± 6 millihenries, $Q=40$; tapped at 9.2 millihenries, ± 9 millihenries, $Q=40$.	RF Transformer	A-1264
T102	TRANSFORMER, RF: tuned: 11 millihenries, ± 6 millihenries, $Q=40$; tapped at 9.2 millihenries, ± 9 millihenries, $Q=40$.	Mixer Trans.	A-1264
T103	TRANSFORMER, RF: tuned; two windings; pri., 520 microhenries, ± 27 microhenries, $Q=60$; sec., 152 microhenries, ± 8 microhenries, $Q=80$; tapped at 50 microhenries, ± 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., $\pm 5\%$; 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., $\pm 5\%$; 500 wvdc.	P/O R.F. Tank, V201	CC35CH680J
C211	CAPACITOR, fixed: ceramic; 68 mmfd., $\pm 5\%$; 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, ± 35 microhenries, $Q=100$; tapped at 194 microhenries, ± 19 microhenries, $Q=65$; and 162 microhenries, 16 microhenries, $Q=75$.	Osc. Tank	A-703
L201	COIL, RF: tuned; 105 microhenries, ± 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, ± 0.15 millihenries, $Q=50$; tapped at 2.76 millihenries, ± 0.26 millihenries, $Q=50$.	Antenna Transformer	A-705
T201	TRANSFORMER, RF: tuned; 2.85 millihenries, ± 0.15 millihenries, $Q=50$; tapped at 1.8 millihenries, ± 0.18 millihenries, $Q=45$.	Interstage Trans.	A-707
T202	TRANSFORMER, RF: tuned; 2.85 millihenries, $Q=50$; tapped at 1.8 millihenries, ± 0.18 millihenries, $Q=45$	Mixer Trans.	A-707
T203	TRANSFORMER, RF: tuned; two windings; pri., 520 microhenries, ± 27 microhenries, $Q=60$; sec., 152 microhenries, ± 8 microhenries, $Q=80$; tapped at 50 microhenries, ± 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., +5%, char. C; 500 wvdc.	P/O Ant. Filter Capacitor	CM20C561J
C349	CAPACITOR, fixed: mica; 1100 mmfd., +5%, char. C; 500 wvdc.	P/O Ant. Filter Capacitor	CM20C112J
C350	CAPACITOR, fixed: mica; 560 mmfd., +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-shortening; 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, ± 35 microhenries, $Q=100$; tapped at 590 microhenries, ± 30 microhenries, $Q=90$.	Antenna Transformer	A-1313
T301	TRANSFORMER, RF: tuned; 650 microhenries, ± 35 microhenries, $Q=90$; tapped at 400 microhenries, ± 40 microhenries, $Q=75$.	RF Transformer	A-1314
T302	TRANSFORMER, RF: tuned; 650 microhenries, ± 35 microhenries, $Q=90$; tapped at 400 microhenries, ± 40 microhenries, $Q=75$.	Mixer Trans.	A-1314
T303	TRANSFORMER, RF: tuned; two windings; pri., 520 microhenries, ± 27 microhenries, $Q=60$; sec., 152 microhenries, ± 8 microhenries, $Q=80$; tapped at 50 microhenries, ± 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, ± 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, ± 1 mmfd, 500 wvdc.	Oscillator Injection	CC21SL100K
C40	CAPACITOR, fixed: ceramic; 10 mmfd, ± 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, ± 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	RC2 3F104K
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, ±10%, 1/2 watt.	Oscillator Grid Resistor	RC20GF223K
R29	RESISTOR, fixed: composition; 120 ohms, ±10%, 1/2 watt.	Osc Cathode Bias	RC20GF121K
R30	RESISTOR, fixed: composition; 39,000 ohms, ±10%, 1/2 watt.	Osc Plate Resistor	RC20GF393K
R31	RESISTOR, fixed: composition; 39,000 ohms, ±10%, 1/2 watt.	Osc Screen Resistor	RC20GF393K
S1	SWITCH, rotary: non-shorting; 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
X11	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, ± 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, +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, +10%, 500 wvdc.	Reactance Tube Screen Bypass	CC21SL470K
C625	CAPACITOR, fixed: ceramic; 200 mmfd, +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, +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, +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, ±.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, +.25 mmfd, 500 wvdc.	Osc. Injection	CC21SL1R5C
C636	CAPACITOR, fixed: mica; 1500 mmfd, +2%, char. E, 500 wvdc.	Osc. Padder	CM30E152G

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C637	CAPACITOR, fixed: ceramic; 150 mmfd, +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, +10%, 1/2 watt.	AVC Filter	RC20GF104K
R601	RESISTOR, fixed: composition; 10 ohms, +10%, 1/2 watt.	Parasitic Suppressor	RC20GF100K
R602	RESISTOR, fixed: composition; 220 ohms, +10%, 1/2 watt.	Cathode Bias	RC20GF221K
R603	RESISTOR, fixed: composition; 10 ohms, +10%, 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R604	RESISTOR, fixed: composition; 220,000 ohms, +10%, 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K
R605	RESISTOR, fixed: composition; 100,000 ohms, +10%, 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R606	RESISTOR, fixed: composition; 27,000 ohms, +10%, 2 watts.	Plate Decoupling	RC42GF273K
R607	RESISTOR, fixed: composition; 100,000 ohms, +10%, 1/2 watt.	AVC Filter	RC20GF104K
R608	RESISTOR, fixed: composition; 10 ohms, +10%, 1/2 watt.	Parasitic Suppressor	RC20GF100K
R609	RESISTOR, fixed: composition; 220 ohms, +10%, 1/2 watt.	Cathode Bias	RC20GF221K
R610	RESISTOR, fixed: composition; 10 ohms, +10%, 1/2 watt.	Screen Parasitic Suppressor	RC20GF100K
R611	RESISTOR, fixed: composition; 220,000 ohms, +10%, 1/2 watt.	Part of Screen Voltage Divider	RC20GF224K

SYM	DESCRIPTION	FUNCTION	TMC PART NO.
R612	RESISTOR, fixed: composition; 1000,000 ohms, ±10%, 1/2 watt.	Part of Screen Voltage Divider	RC20GF104K
R613	RESISTOR, fixed: composition; 27,000 ohms, ±10%, 2 watts.	Plate Decoupling	RC42GF273K
R614	RESISTOR, NETWORK: fixed: composition; 5 ohms, ±10%, 1/2 watt. (Consists of two 10 ohm resistors in parallel).	Parasitic Suppressor	RC20GF100K
R614A*	RESISTOR, fixed: composition; 10 ohms, ±10%, 1/2 watt.	Parasitic Suppressor	RC20GF100K
R614B*	RESISTOR, fixed: composition; 10 ohms, ±10%, 1/2 watt.	Parasitic Suppressor	RC20GF100K
R615	RESISTOR, fixed: composition; 820 ohms, ±10%, 1/2 watt.	Mixer Cathode Bias	RC20GF821K
R616	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1 watt.	Plate Decoupling	RC30GF473K
R617	RESISTOR, fixed: composition; 470,000 ohms, ±10%, 1/2 watt.	Reactance Tube Grid Resistor	RC20GF474K
R618	RESISTOR, fixed: composition; 470,000 ohms, ±10%, 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R619	RESISTOR, fixed: composition; 470,000 ohms, ±10%, 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R620	RESISTOR, fixed: composition; 3900 ohms, ±10%, 1/2 watt.	Reactance Tube Cathode Bias	RC20GF392K
R621	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1/2 watt.	Reactance Tube Screen Resistor	RC20GF473K
R622	NOT USED.		
R623	RESISTOR, fixed: composition; 22 ohms, ±10%, 1/2 watt.	Parasitic Suppressor	RC20GF220K
R624	RESISTOR, fixed: composition; 22,000 ohms, ±10%, 1/2 watt.	Osc. Grid Resistor	RC20GF223K
R625	RESISTOR, fixed: composition; 120 ohms, ±10%, 1/2 watt.	Osc. Cathode Bias	RC20GF121K
R626	RESISTOR, fixed: composition; 39,000 ohms, ±10%, 1/2 watt.	Osc. Screen Resistor	RC20GF393K
R627	RESISTOR, fixed: composition; 39,000 ohms, ±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; 8 mmfd, 500 wvdc, char. SL .05 mmfd,	Reactance Tube Coupling	CC21SL080D
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, $\pm 10\%$, 2 watts.	Plate Decoupling	RC42GF273K
R714	Not Used.		
R715	RESISTOR, fixed: composition; 820 ohms, $\pm 10\%$, 1/2 watt.	Mixer Cathode Bias	RC20GF821K
R716	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$, 1 watt.	Plate Decoupling	RC30GF473K
R717	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$, 1/2 watt.	Reactance Tube Grid Resistor	RC20GF474K
R718	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$, 1/2 watt.	Reactance Tube Grid Filter	RC20GF474K
R719	RESISTOR, fixed: composition; 470,000 ohms, $\pm 10\%$, 1/2 watt.	Part of Reactance Tube Grid Filter	RC20GF474K
R720	RESISTOR, fixed: composition; 2200 ohms, $\pm 10\%$, 1/2 watt.	Reactance Tube Cathode Bias	RC20GF222K
R721	RESISTOR, fixed: composition; 47,000 ohms, $\pm 10\%$, 1/2 watt.	Reactance Tube Screen Resistor	RC20GF473K
R722	Not Used.		
R723	RESISTOR, fixed: composition; 22 ohms, $\pm 10\%$, 1/2 watt.	Parasitic Suppressor	RC20GF220K
R724	RESISTOR, fixed: composition; 22,000 ohms, $\pm 10\%$, 1/2 watt.	Osc. Grid Leak	RC20GF223K
R725	RESISTOR, fixed: composition; 120 ohms, $\pm 10\%$, 1/2 watt.	Osc. Cathode Bias	RC20GF121K
R726	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$, 1/2 watt.	Osc. Screen Resistor	RC20GF393K
R727	RESISTOR, fixed: composition; 39,000 ohms, $\pm 10\%$, 1/2 watt.	Osc. Plate Resistor	RC20GF393K
R728	RESISTOR, fixed: composition; 130 ohms, $\pm 5\%$, 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/FFR-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
4-70	CAPACITOR, variable: ceramic; 4-30 mmfd, 500 wvdc.	Reactance Tube Balance Control	CV11C300
C824	CAPACITOR, fixed: ceramic; 47 mmfd, $\pm 10\%$, 500 wvdc.	Reactance Tube Screen Bypass	CC21SL470K
C825	CAPACITOR, fixed: ceramic; 10 mmfd, 500 wvdc, char. SL.	Reactance Tube Coupling	CC21SL100D
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

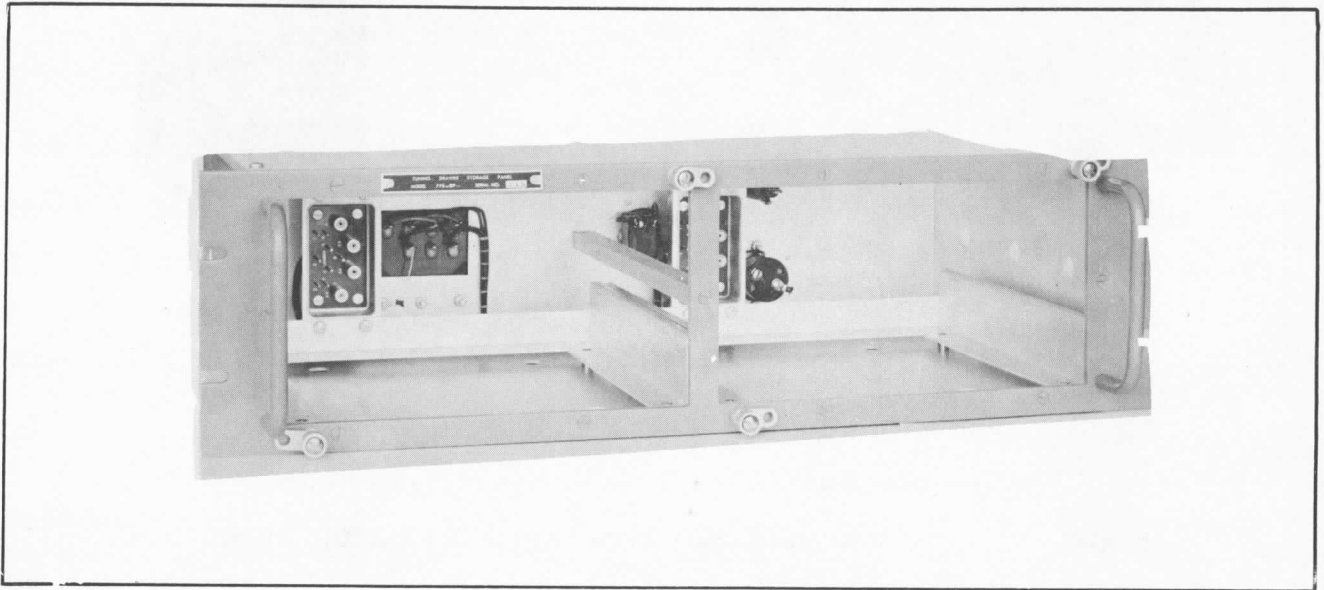
SYM	DESCRIPTION	FUNCTION	TMC PART NO.
C837	NOT USED		
C838	CAPACITOR, fixed: ceramic; .01 mfd, 500 wvdc, disc type.	R.F. Bypass	CC-100-16
I800	LAMP, incandescent: 6-8 volts; 250 ma DC, Bayonet Base.	Pilot Light	BI-101-44
L800	INDUCTOR, fixed: 5.6 microhenries.	Osc. Plate Load	A-241
L801	COIL, RF: fixed; 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; 1000 ohms, $\pm 10\%$, 1/2 watt.	Reactance Tube Cathode Bias	RC20GF102K
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

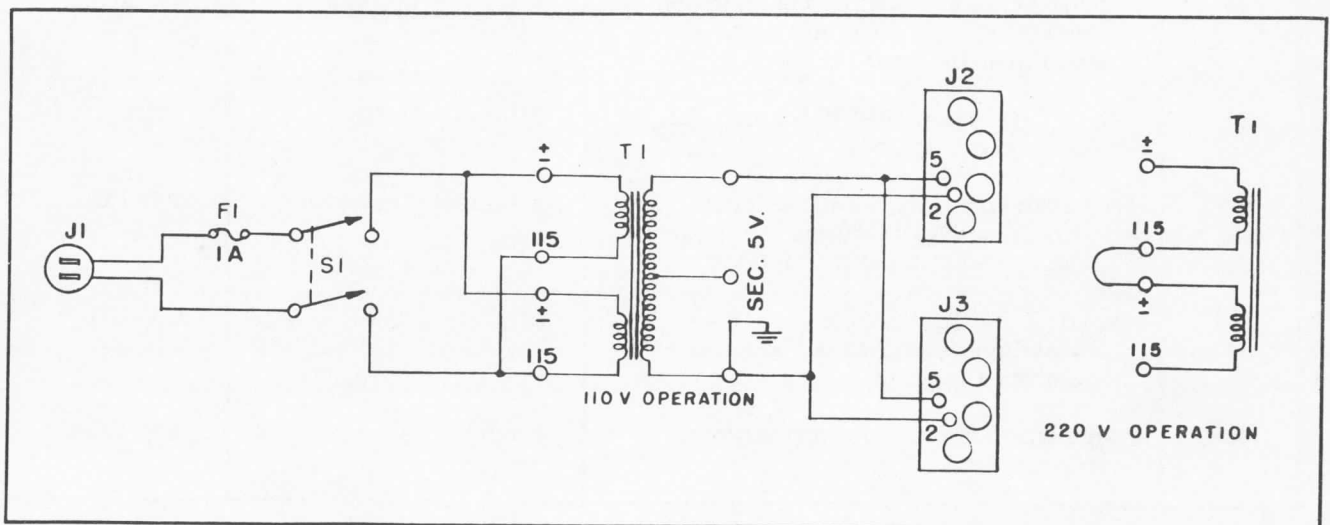
INSTRUCTION SHEET
TUNING DRAWER STORAGE PANEL
MODEL FFR-DPH
CY-5045A/FFR-502

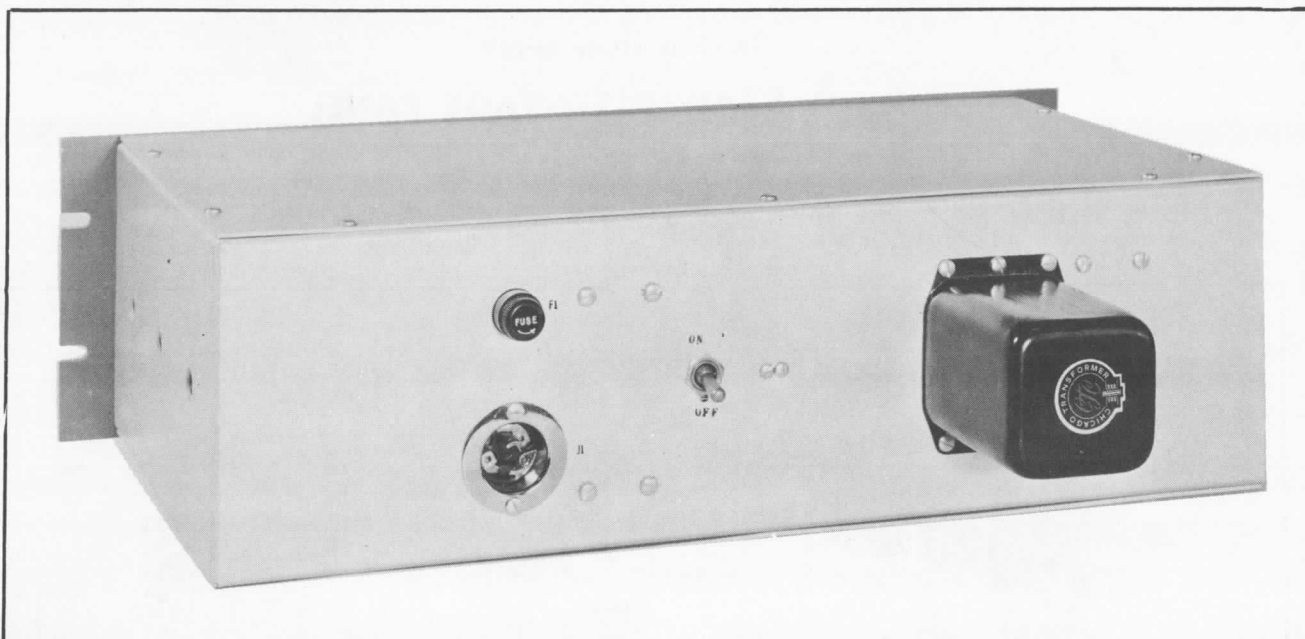


The TMC Model FFR-DPH, Tuning Drawer Storage Panel is designed to provide a safe and convenient method of storing and pre-heating the filaments of the TMC Model FFRD-*, Tuning Drawers while not in operation.

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.





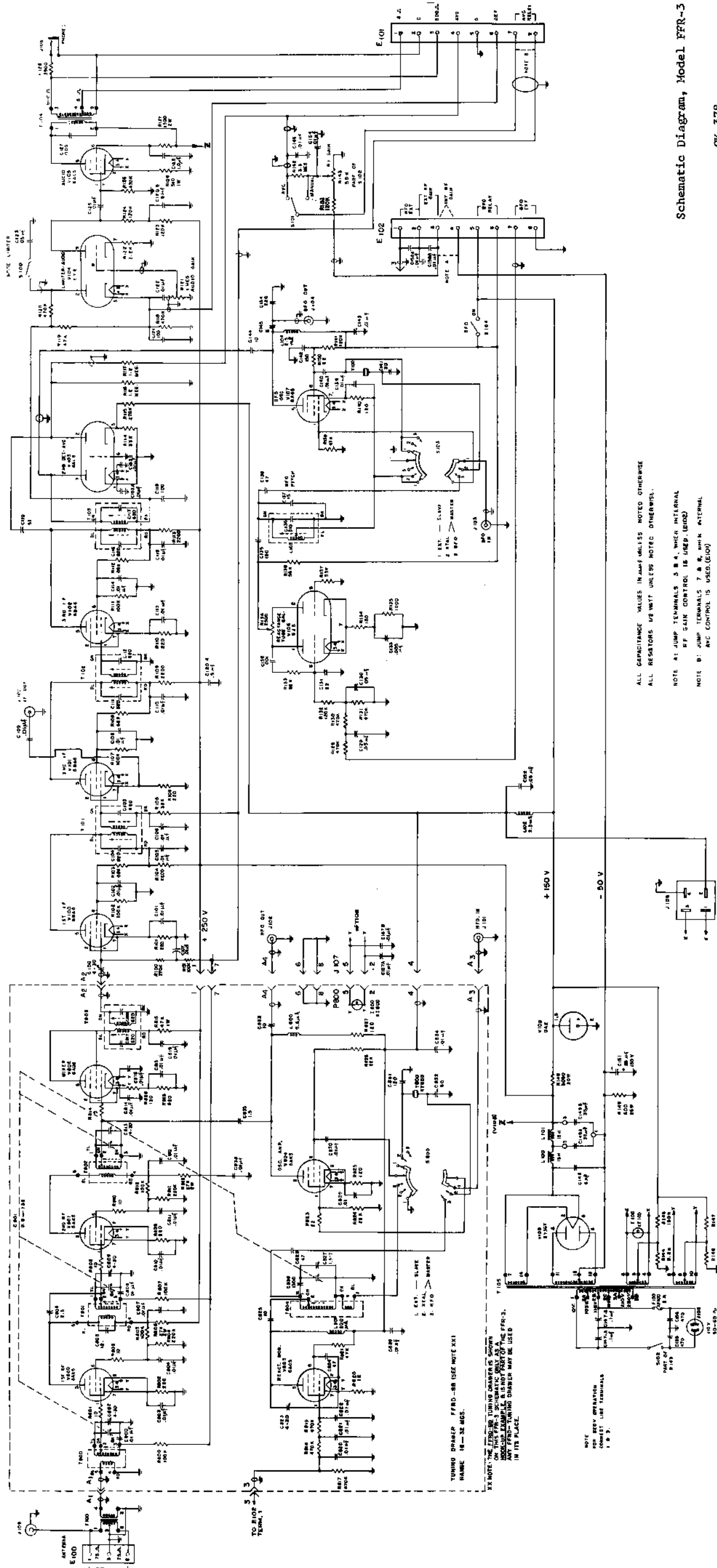
TUNING DRAWER STORAGE PANEL, MODEL FFR-DPH

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





ALL CAPACITANCE VALUES IN MICROFARADS UNLESS NOTED OTHERWISE.
 ALL RESISTORS IN OHMS UNLESS NOTED OTHERWISE.

NOTE A: JUMP TERMINALS 3 & 4, WHEN INTERNAL
 PF GAIN CONTROL IS USED (E102)

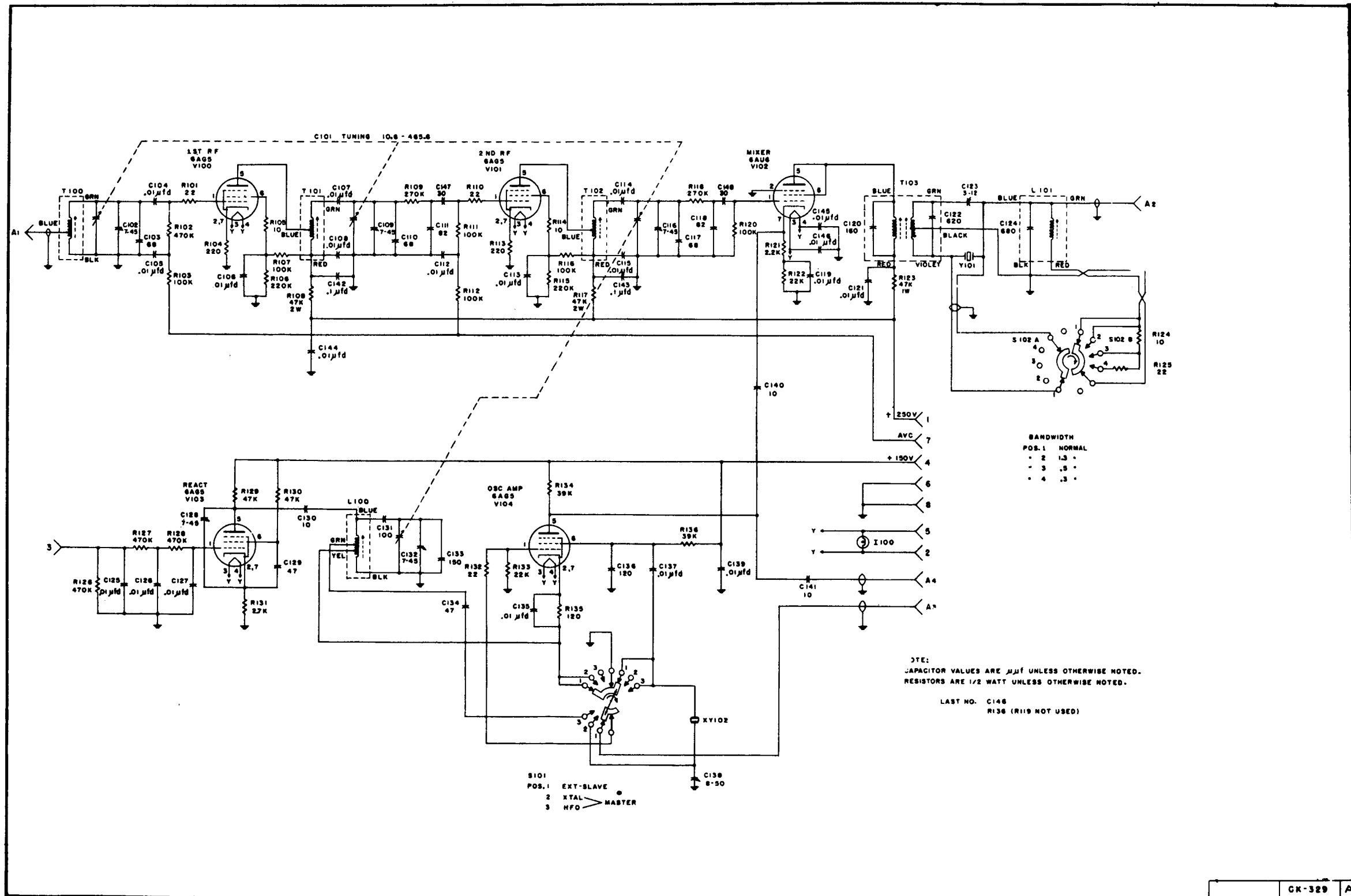
NOTE B: JUMP TERMINALS 7 & 8, WHEN INTERNAL
 AVC CONTROL IS USED (E103)

TUNING DRIFT/F FFRD-3B USE NOTE XXI
 RANGE 18-32 MCS.

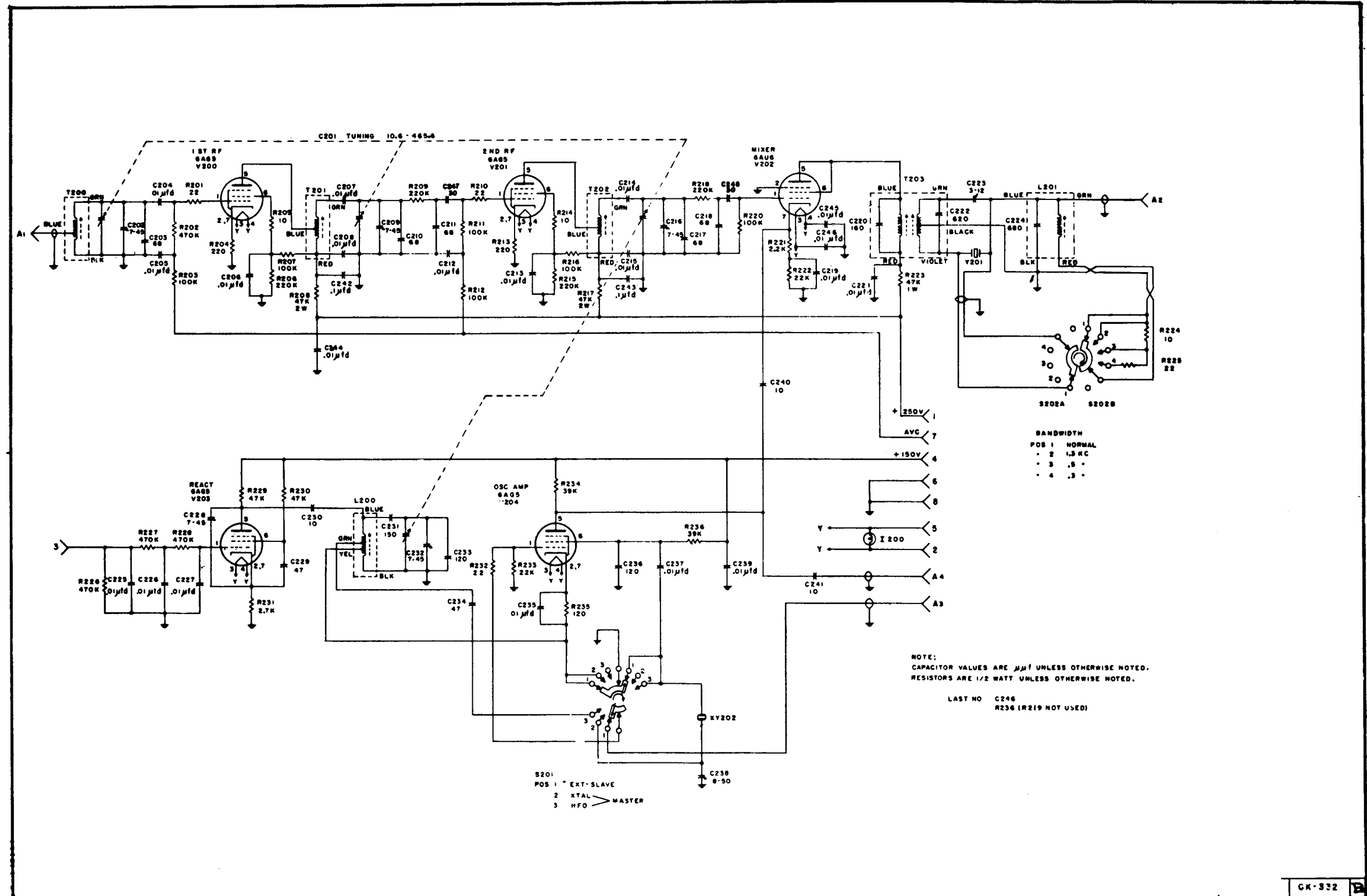
XX NOTE: THE FFRD-3B TUNING DRIFT IS SHOWN
 ON THIS PFR-3 SCHEMATIC ONLY AS A
 REFERENCE. THE TUNING DRIFT OF THE
 FFRD-3B TUNING DRIFT UNIT MAY BE USED
 IN ITS PLACE.

NOTE
 FOR REV. OPERATION
 PART OF
 1 8 9 3

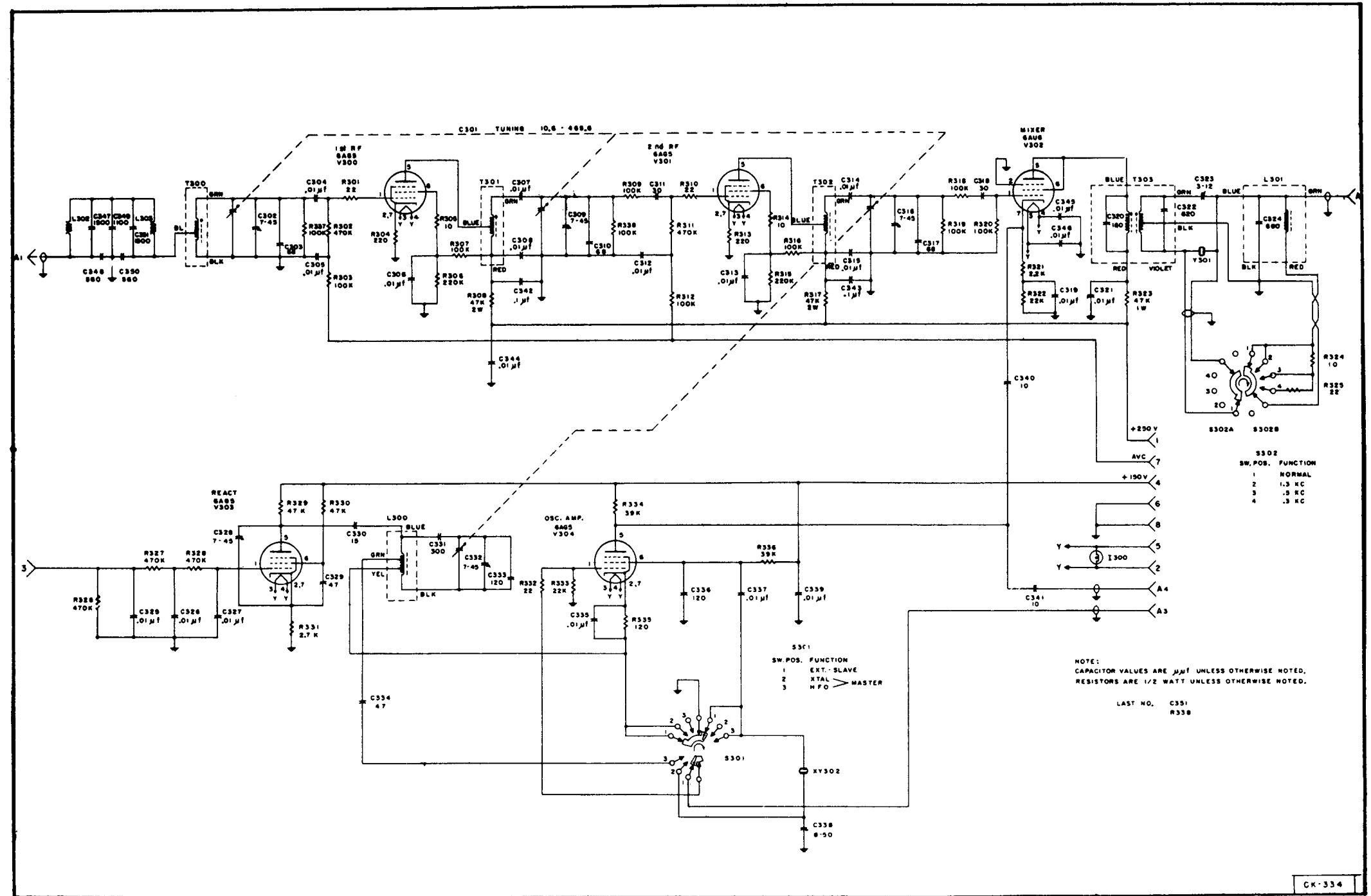
Schematic Diagram, Model FFR-3



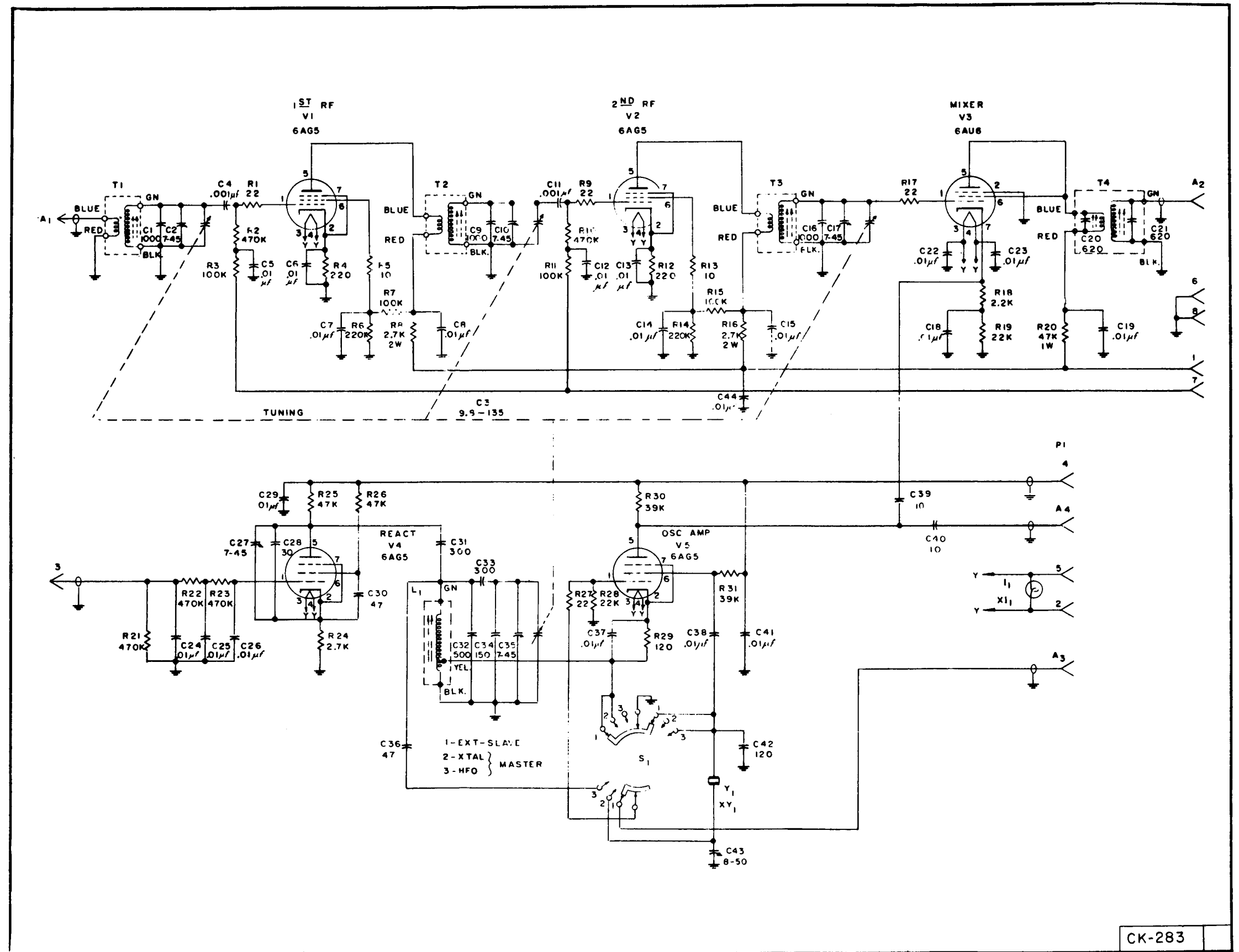
Schematic Diagram, Model FFRD-1



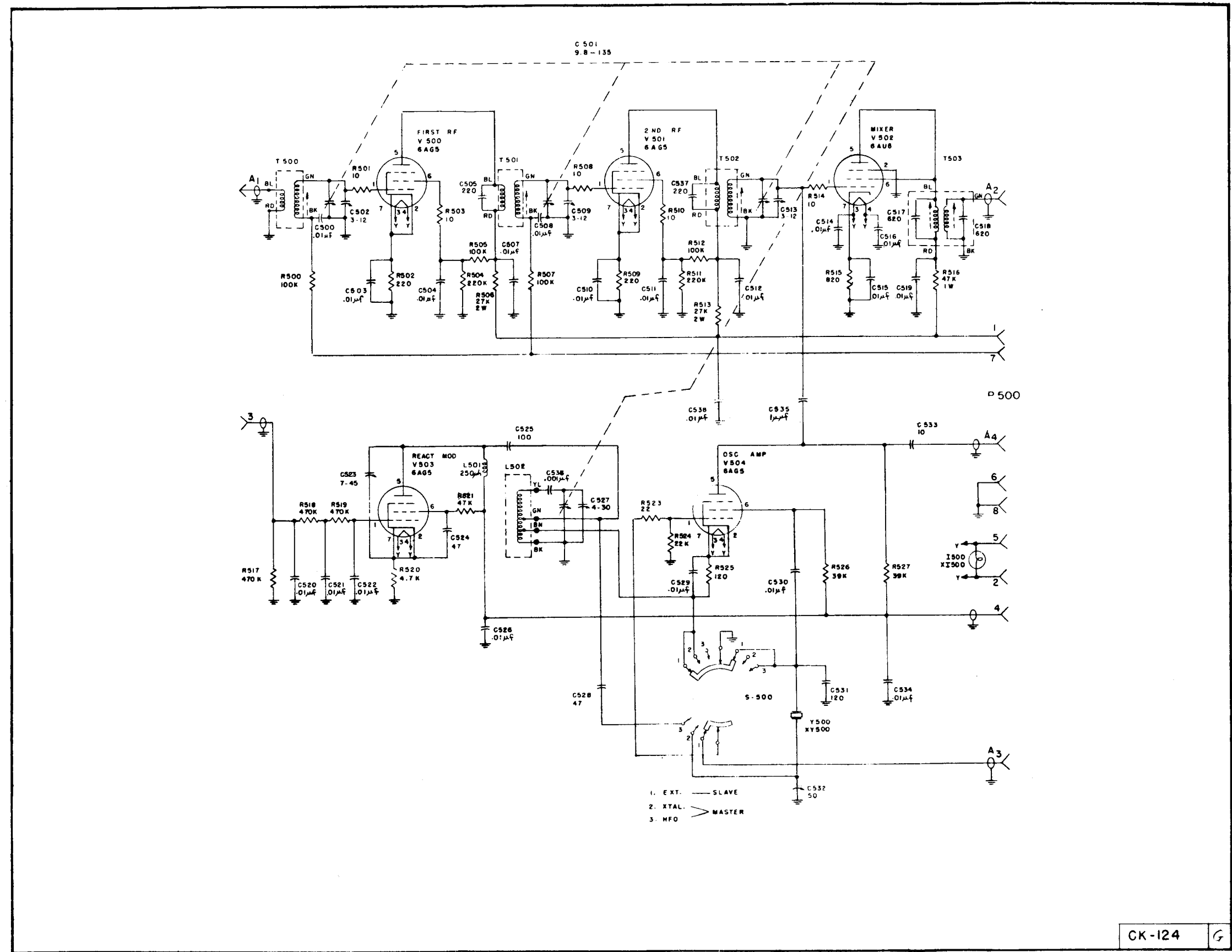
Schematic Diagram, Model FFRD-2



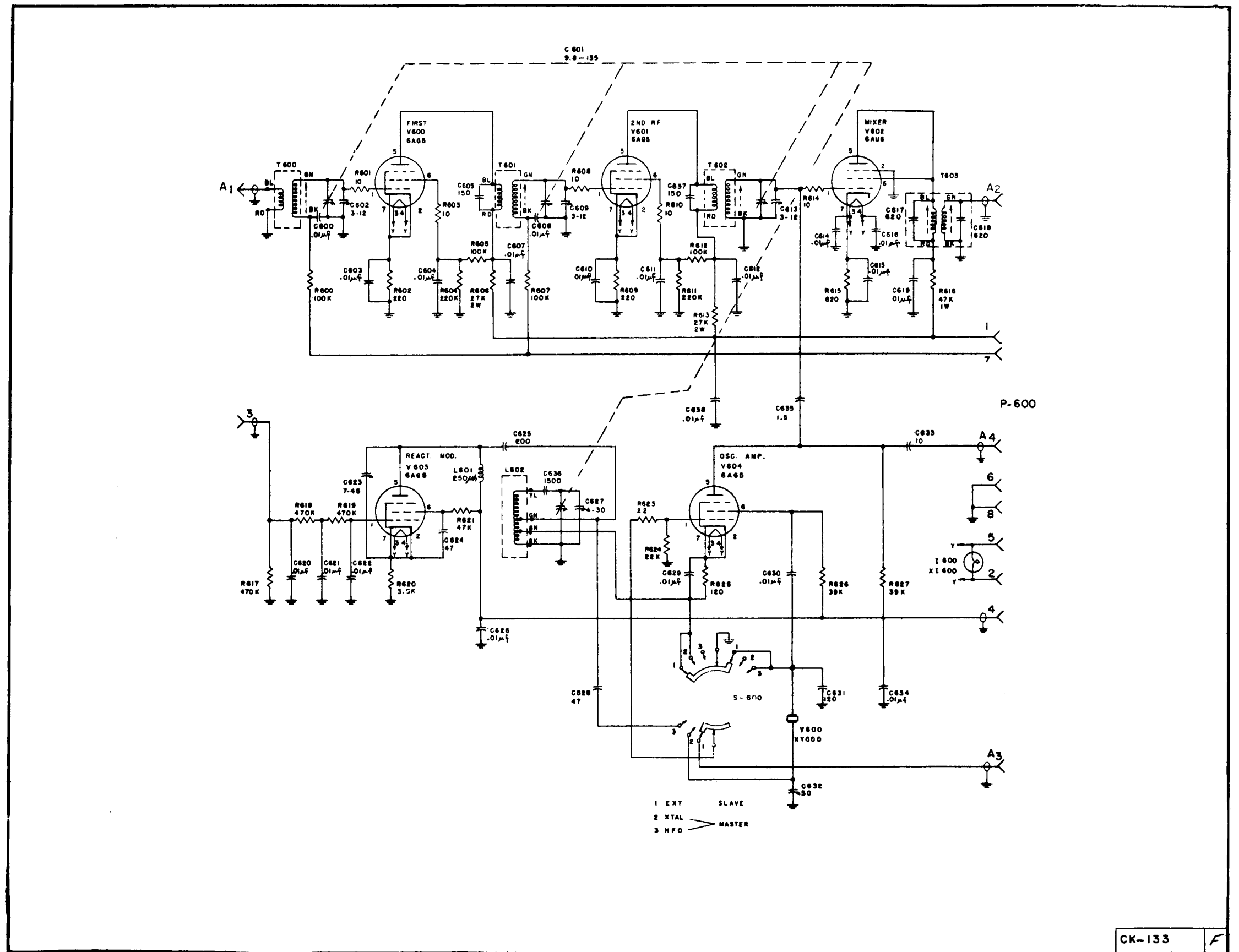
Schematic Diagram, Model FFRD-3



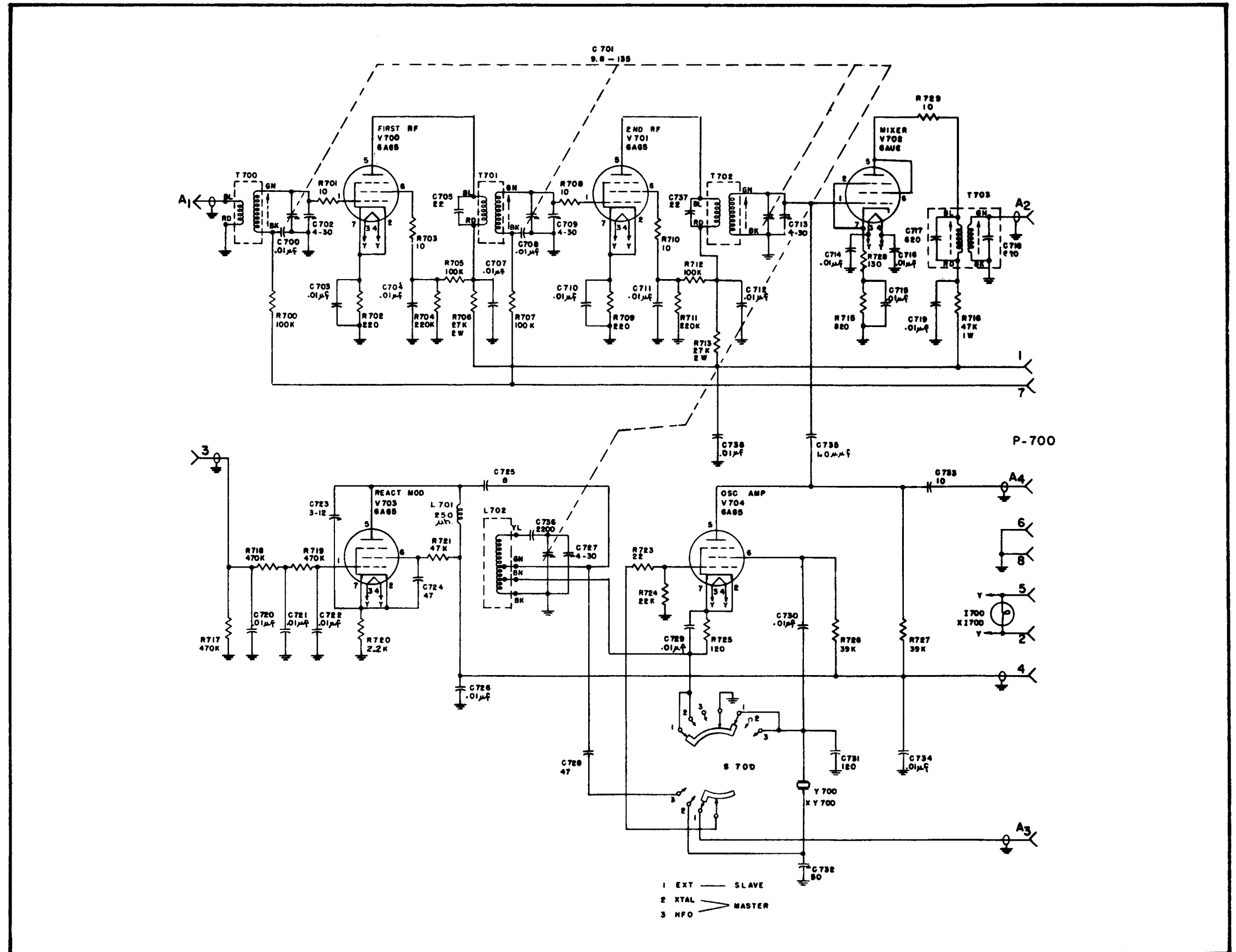
Schematic Diagram, Model FFRD-3M



Schematic Diagram for FFRD-5



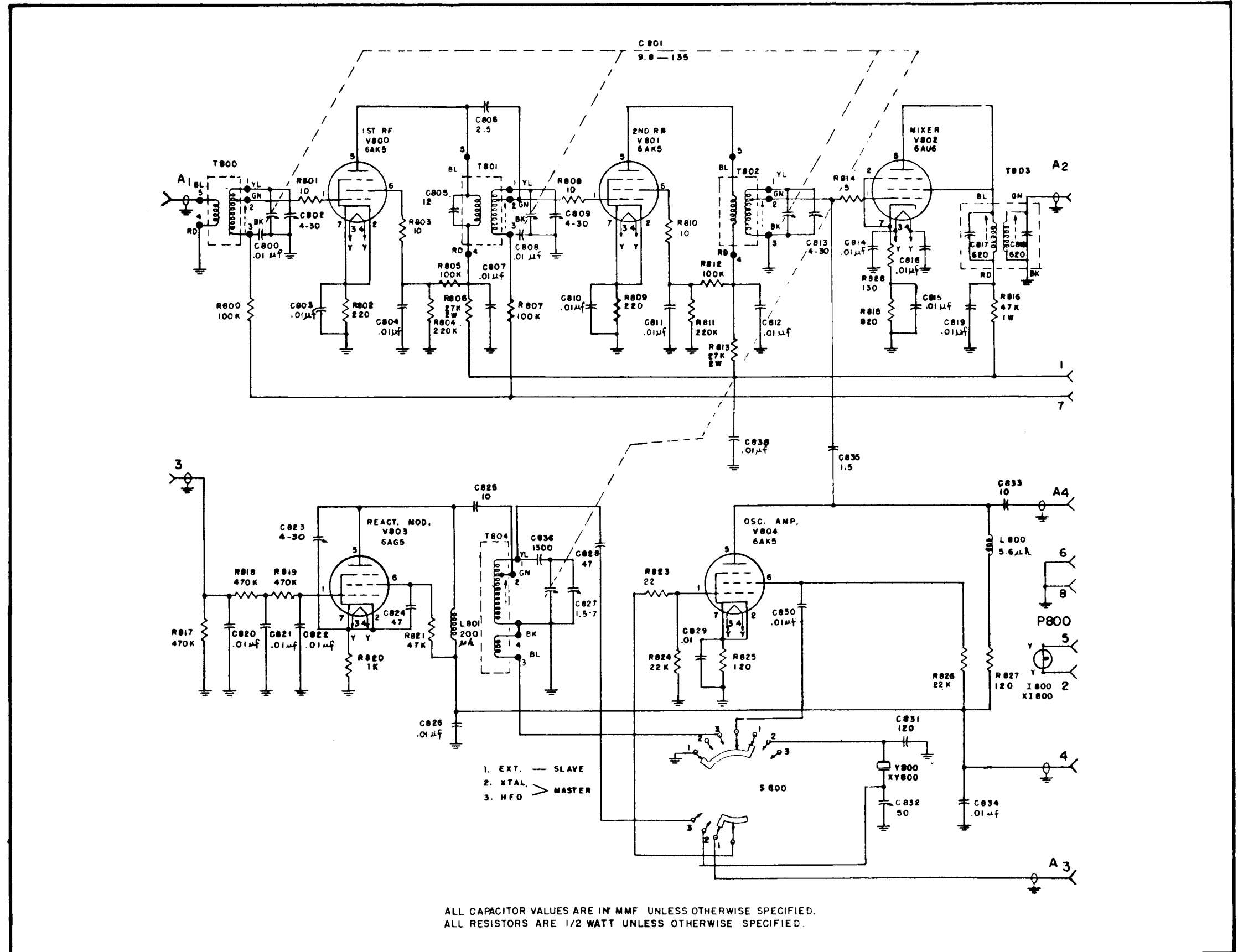
Schematic Diagram for FFRD-6



CK-376

Schematic Diagram, Model FFRD-7B

CHANGE 1



CK-377

Schematic Diagram, Model FFRD-8B

CHANGE 1