

THE
RME
HF 10-20
RADIO FREQUENCY CONVERTER

OPERATING and SERVICE
MANUAL

•
RADIO MFG. ENGINEERS, INC.
PEORIA 6, ILLINOIS

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SECTION II

Installation

2.1 Inspection

The HF 10-20 Converter should be carefully checked on receipt for any mechanical damage that may have resulted in transit. If any such damage is found, a claim should be filed with the carrier. No claim can be filed at the shipping point and Radio Mfg. Engineers, Inc. cannot be responsible for any damage incurred while in the hands of the carrier.

2.2 External Connections

To place the HF 10-20 in operation the line cord should be plugged into a suitable power source. The standard model is designed for operation on 110-120 volt 50-60 cycle AC line only. Use of the HF 10-20 on any other voltage or frequency may result in damage.

The output cable (Fig. 2) should be connected to the antenna terminal of the receiver. The cable has two shielded leads and a ground lead each ending in a terminal lug. On receivers which have provision for doublet operation, such as the RME-45 and the RME-84, the blue coded lead must be connected to the antenna terminal farthest from the ground terminal. This is the hot side of the converter output. The red lead, or low side, must be connected to the antenna terminal nearest to the ground terminal. The ground braid should be connected to the receiver ground. On receivers not equipped for doublet operation, the blue lead should be connected to the antenna terminal and the red and ground (shield) leads should be connected to the receiver ground. This lead is coded white. Unless the above instructions are followed, the changeover switch (Par. 3.3) will not operate properly.

If an RME-DB-22A Preselector is used ahead of the receiver, the connections will be made as above except that the converter output cable connects in the same manner to the DB-22A antenna terminals instead of to the receiver.

2.3 Precautions

IMPORTANT - Attempted operation of the HF 10-20 on any voltage or frequency other than that for which it is designed will result in damage to the unit. The operator must be sure that the supply is correct before plugging in the converter.

2.4 Antennas

Most radio Amateurs use resonate antennas for receiving on 20, 15 and 10 meters. For this reason the HF 10-20 is provided with separate antenna.

connection for each frequency band. On the terminal strip on the rear apron (Fig. 2) are four sets of two terminals each. These terminals are marked "20" for the 14.0 - 14.4 mc band; "15" for the 21.0 - 21.5 mc band, and "10" for the 27-29.7 mc band. The input impedance for each band has been designed to be 300 ohms so that the owner may make use of the 300 ohm twin lead line now available. The remaining set of two terminals marked "LF" are for connecting the low frequency antenna used with the receiver. This pair of terminals is connected through to the receiver when the antenna changeover switch (Par. 3.3) is turned to "OUT". For information regarding antenna design and dimensions reference should be made to the ARRL Amateur Handbook, available at all Radio Supply Stores.

SECTION III

Operation and Circuit Details

3.1 Introduction

The HF 10-20 operates in conjunction with a communication type receiver tuned to approximately 7 mc. The accuracy of setting the receiver will effect the accuracy of calibration of the HF 10-20 by the same amount. That is to say if the low frequency receiver is off 100 kilocycles, the calibration of the HF 10-20 will also be off by 100 kilocycles. It should be noted that the operator is not bound to use the output frequency of exactly 7.0 mc. If interference is encountered he may move the receiver tuning slightly to a clear channel, realizing that the HF 10-20 calibration will change by the same amount the low frequency receiver was moved. If it is necessary to move the receiver frequency so far that the calibration is affected, he may recalibrate by following instructions in Section IV. It is not recommended that the output frequency be moved more than 50 kc higher or lower than 7.0 mc because of tracking troubles that may be encountered. In the factory the I.F. is left aligned at 6950 kc.

3.2 Line Switch

The equipment is turned on by means of the line switch on the right hand side of the control panel (Fig. 1).

3.3 Changeover Switch

On the left side of the control panel (Fig. 1) is the changeover switch. When this switch is turned to "IN", the output of the HF 10-20 is fed to the receiver input terminals. At the same time the low frequency antenna terminals are grounded to prevent 7 mc signals from feeding through the HF 10-20 to the receiver. When the changeover switch is turned to "OUT" the output of the HF 10-20 is grounded and the low frequency "LF" (Fig. 2) antenna terminals are connected through to the receiver. Thus by turning the changeover switch to "OUT" the receiver functions normally.

3.4 Band Switch

In the center of the control panel (Fig. 1) is the band change switch. This switch has three positions marked: 14.0 - 14.4, 21.0 - 21.5, and 27-29.7, and is used to switch the HF 10-20 to the desired range.

3.5 RF Stage Peaking

When the HF 10-20 leaves the factory, the stages are peaked to maximum sensitivity. It may be found that some antennas may reflect a reactance into the RF stage that will detune it slightly. With the antenna for a certain band connected the RF padder for the band may be peaked up by listening to a signal. Figure IV shows the location of the RF padders for each band. To get at the padders it is necessary to remove the bottom cover plate.

3.6 IF Stage Peaking

The IF transformer on the HF 10-20 (Fig. 3) is peaked at the factory at 6.95 mc. Different receivers connected to the output may change this tuning slightly. The owner should check the peaking of this transformer with the receiver connected. Peaking is accomplished by turning the screw on the top of the can. The screw should be adjusted for maximum gain as indicated by a received signal or maximum background noise if a signal is not available.

SECTION IV

Maintenance and Service

4.1 Introduction

No Maintenance of importance is required on the HF 10-20. It is suggested that dust that may accumulate in the cabinet be blown out periodically.

The owner may, if he has an accurate signal source available, recalibrate his converter as discussed in succeeding paragraphs. It should be born in mind that the calibration of the converter is affected by the setting of the companion receiver (Par. 3.1). Therefore, before attempting to recalibrate the converter, the calibration of the receiver should be checked.

The HF 10-20 will drift somewhat during the first three minutes after being turned on and to a much less extent during the next ten or twenty minutes. It is recommended that no attempt be made to recalibrate or align the equipment until it has reached a stable temperature.

All calibrating and alignment should be done with the receiver connected and the changeover switch (Par. 3.3) in the "IN" position.

If the receiver has a carrier level meter such as is on the RME-45, this meter is used as a tuning indicator when peaking the circuits. If the receiver is not equipped with a meter, it will be necessary to connect an audio output meter to the receiver for a tuning indicator. When using an audio output meter, it is necessary to remove the AVC from the receiver.

4.2 IF Coil Alignment

As pointed out in Paragraph 3.1, the HF 10-20 is calibrated and aligned for an output frequency of 6.95 mc. The output tuning is controlled by the screw on the top of the aluminum can on the top of the chassis (Fig. 3). The transformer may be peaked with a 6.95 mc signal fed into the mixer grid or with a signal tuned in on the converter. Connection to the mixer grid is most easily made on the stator of the center section of the tuning condenser. In either case, the transformer is adjusted to maximum sensitivity as indicated by the meter on the receiver.

4.3 Calibration

Calibration of the HF 10-20 should not be attempted unless it is definitely established that the calibration is off.

Calibration is controlled by the oscillator padders (Fig. 4). These Padders are made accessible by removal of the cabinet bottom plate. Beneath this plate is a second plate in which are padder access holes. All calibrating and aligning should be done with this cover on, the proper padder for each band may be determined by referring to Figure IV.

High beat is used on all bands. That is to say, the oscillator is always 7 mc (approximately) above the received signal. As in the case of all super heterodyne receivers, if sufficient input is used each signal may be received at two points differing by twice the IF frequency. With a signal being received, the padder setting that gives the highest oscillator frequency is the proper setting.

The three oscillator coils have iron cores, The screws for adjusting the inductance of these coils is accessible on the top of the chassis. Unless the screws have been disturbed, and adjustment should never be necessary. Small adjustments in calibration may be made by means of these screws.

4.4 RF Alignment

When the calibration is correct, the RF circuits should be aligned. Figure 4 shows the location of the RF amplifier and mixer grid padders for each band. Each of these padders should be adjusted for maximum sensitivity as indicated by the meter on the receiver.

When using a signal generator in aligning the HF 10-20 a 300 ohm resistor should be inserted between the signal generator and the antenna terminals in order that the low impedance of the signal generator will not swamp the RF circuit and cause a misalignment of this circuit. Best results will be obtained when the RF circuit is aligned with the antenna connected. See paragraph 3.5.

4.5 Voltage Charts

As an aid in trouble shooting on the HF 10-20 the following chart of voltages at various points in the circuit is tabulated below. Voltage readings should be made with a voltmeter of at least 2000 ohms per volt resistance. Variation of $\pm 15\%$ may be expected. All voltages are measured from the point indicated to ground unless otherwise indicated.

<u>Circuit</u>	<u>Volts</u>
RF Plate	165
RF Screen	100
RF Cathode	2.9
Mixer Plate	150
Osc. Mixer Cathode	5.4
Osc. Plate	55 (From cold side of choke)
Osc. Grid*	6.9 (20 Meters) - 10.0 (15 Meters) - 4.2 (10 Meters)

*NOTE: Measured between Osc. grid and cathode with a 2.5 mh choke in series with voltmeter lead to grid.

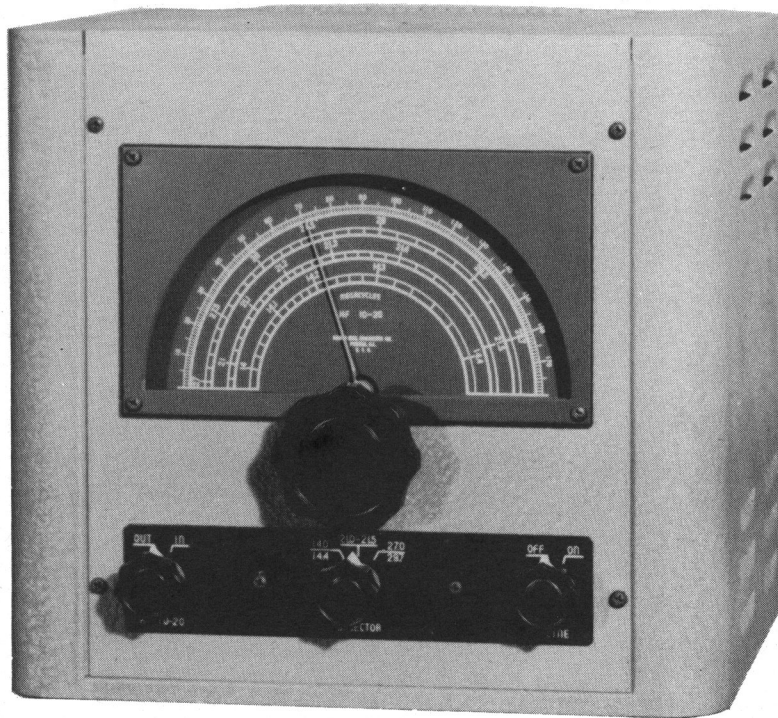


FIGURE 1

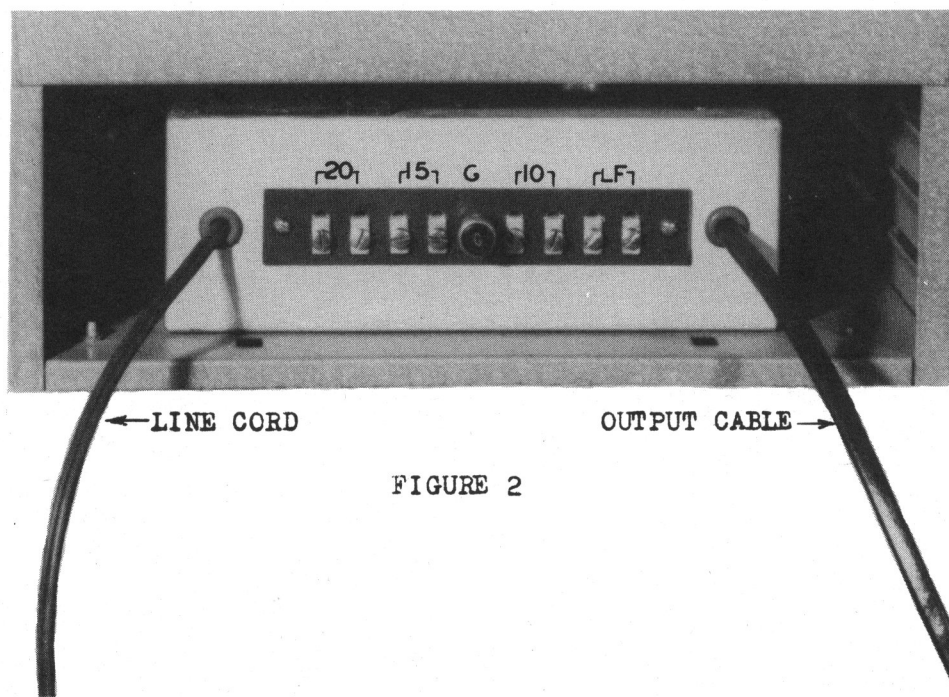


FIGURE 2

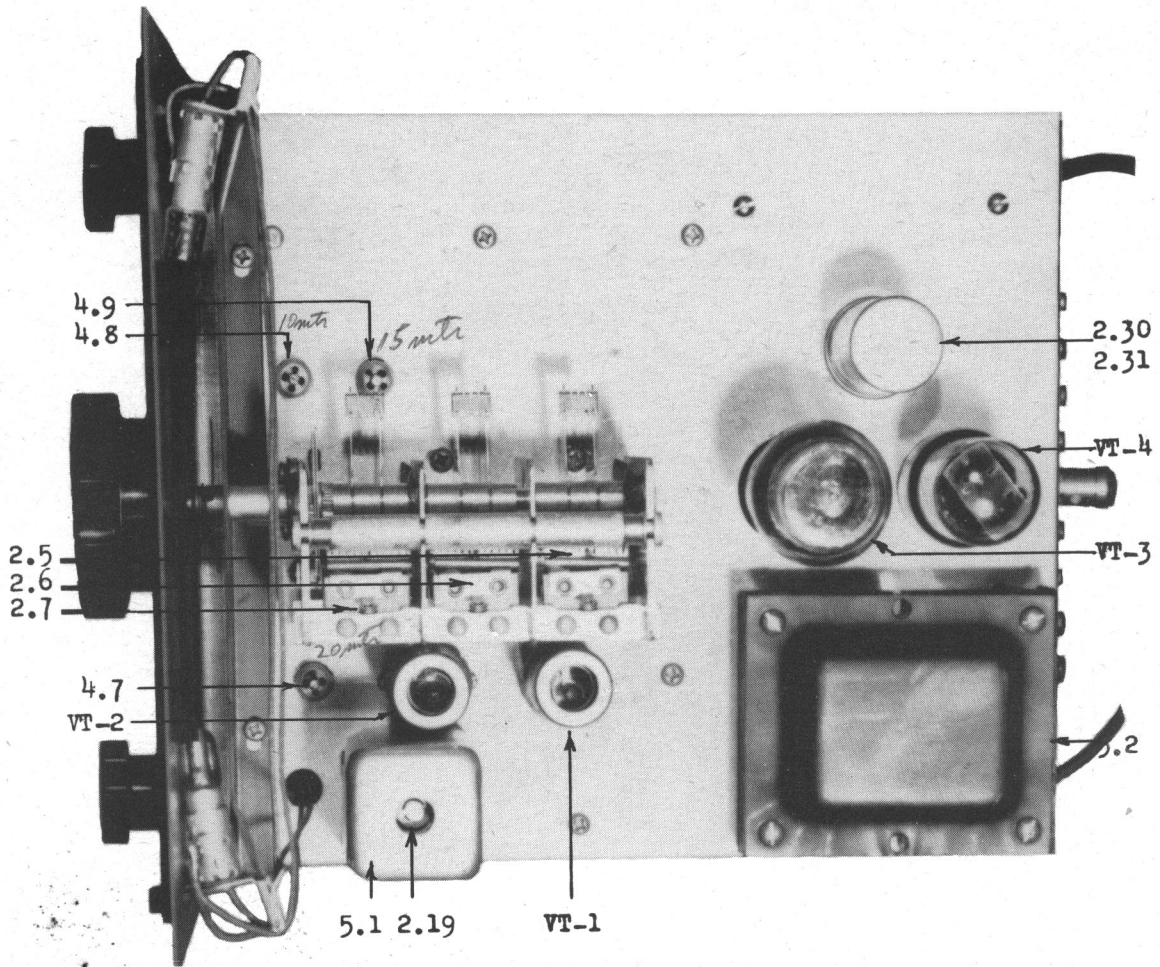


FIGURE 3

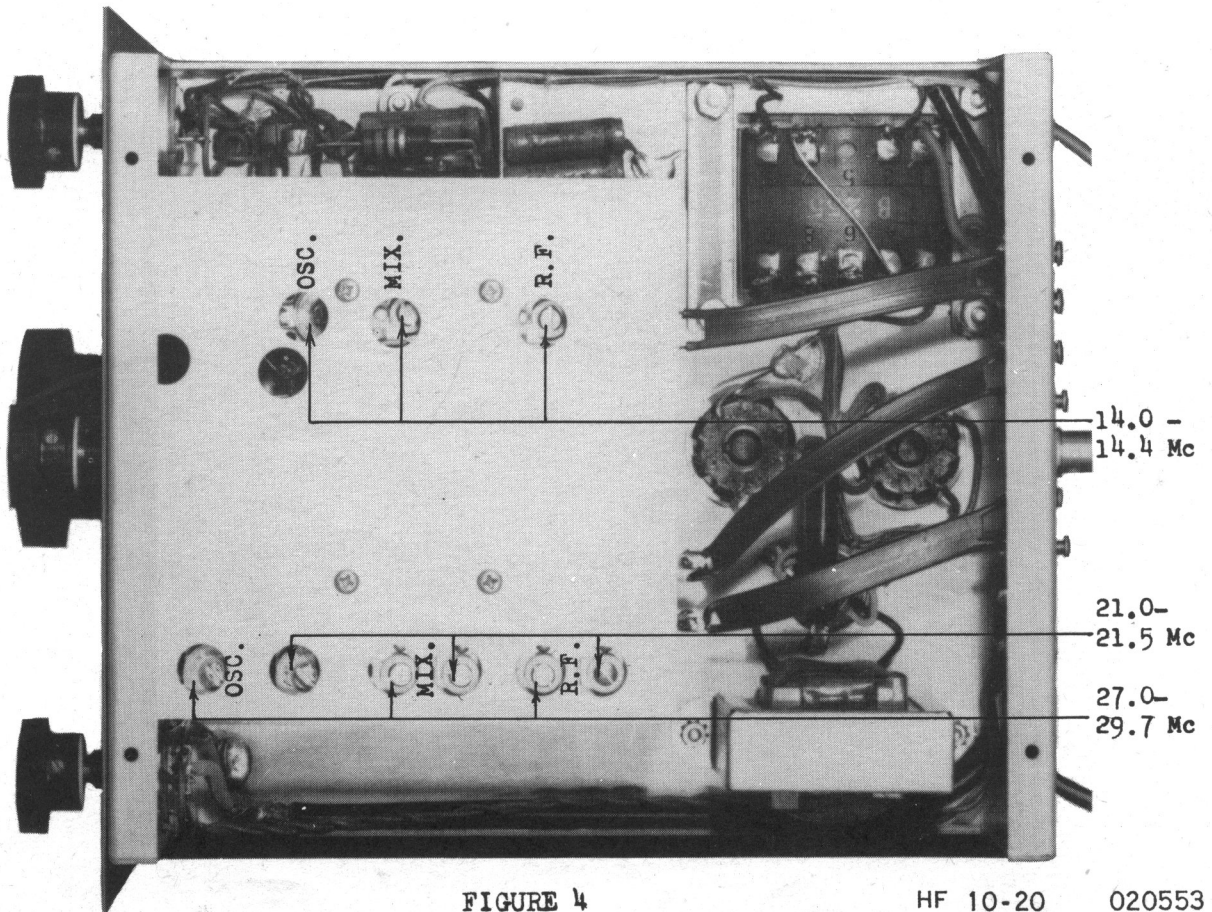
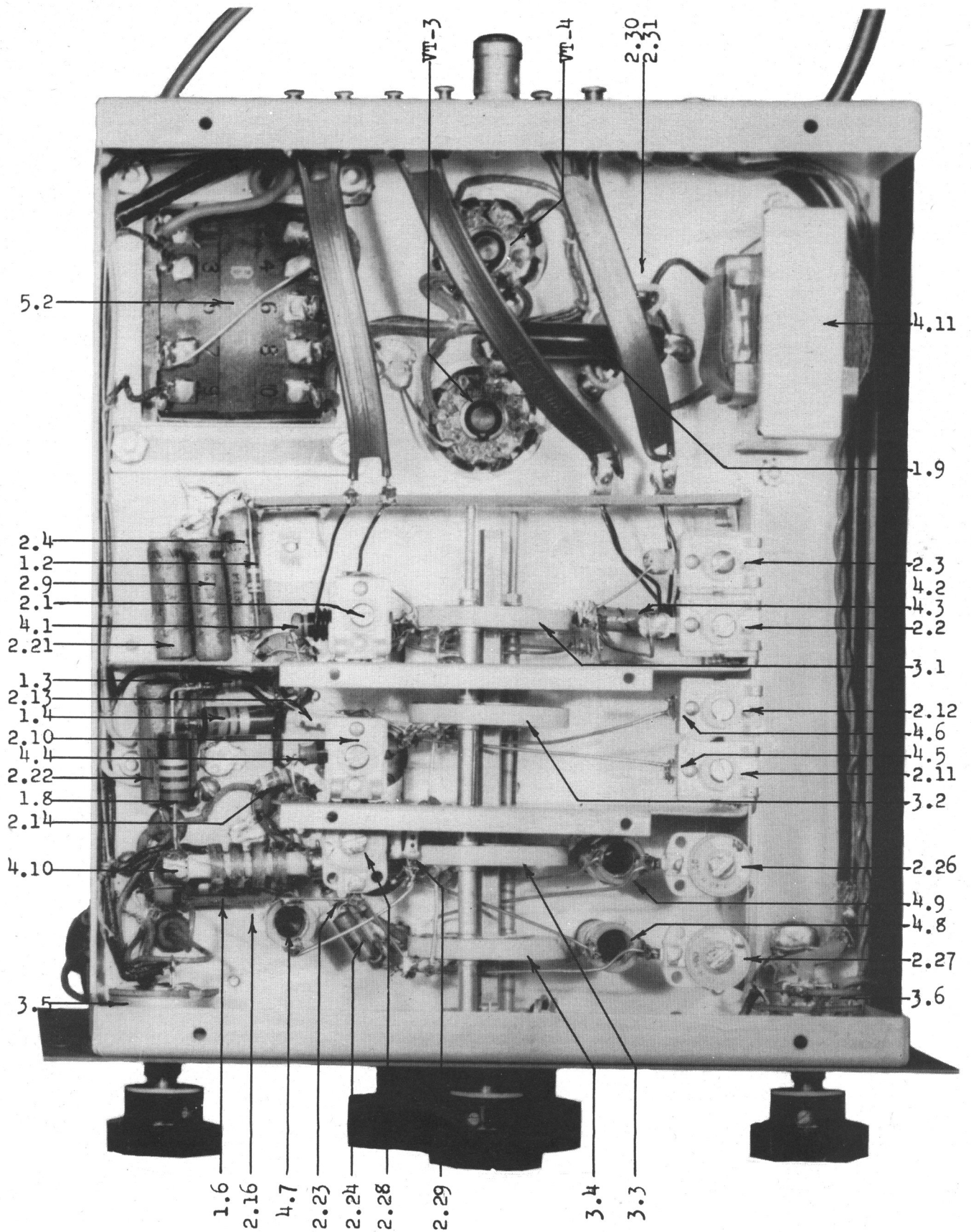


FIGURE 4



HF 10-20 PARTS LIST

Dwg. B-296
092447

No. Component

No. Component

RESISTORS

- 1.1 18 ohm 1/2 watt ±20% carbon
- 1.2 330 ohm 1/2 watt ±10% carbon
- 1.3 15 K ohm 1/2 watt ±10% carbon
- 1.4 18 K ohm 1 watt ±10% carbon
- 1.5 47 K ohm 1/2 watt ±10% carbon
- 1.6 1 K ohm 1/2 watt ±5% carbon
- 1.7 4.7 K ohm 1/2 watt ±10% carbon
- 1.8 18 K ohm 1 watt ±10% carbon
- 1.9 3500 ohm 10 watt-wire wound

COILS

- 4.1 20 Meter R.F. Coil
- 4.2 10 Meter R.F. Coil
- 4.3 15 Meter R.F. Coil
- 4.4 20 Meter Mixer Coil
- 4.5 10 Meter Mixer Coil
- 4.6 15 Meter Mixer Coil
- 4.7 20 Meter Osc. Coil
- 4.8 10 Meter Osc. Coil
- 4.9 15 Meter Osc. Coil
- 4.10 2.5 mh. R.F. Choke
- 4.11 30 Henry Filter Choke

CONDENSERS

- 2.1 40 μ f. Mica Padder
- 2.2 10 μ f. Mica Padder
- 2.3 40 μ f. Mica Padder
- 2.4 .01 μ f. 600 volt paper
- 2.5 R.F. Section Tuning
- 2.6 Mixer Section Tuning
- 2.7 Osc. Section Tuning
- 2.9 .01 μ f. 600 volt paper
- 2.10 40 μ f. Mica Padder
- 2.11 10 μ f. Mica Padder
- 2.12 40 μ f. Mica Padder
- 2.13 100 μ f. Ceramic ±10%
- 2.14 1.5 μ f. ±5% Ceramic
- 2.15 20 μ f. ±5% Ceramic Neg. Temp. Coeff.
- 2.16 1000 μ f. ±20% Mica
- 2.17 25 μ f. ±5% Ceramic Neg. Temp. Coeff.
- 2.19 70 μ f. Mica Padder
- 2.20 1000 μ f. ±20% Mica
- 2.21 .01 μ f. 600 volt paper
- 2.22 .01 μ f. 600 volt paper
- 2.23 25 μ f. ±5% Ceramic Neg. Coeff.
- 2.24 10 μ f. ±5% Ceramic Neg. Coeff.
- 2.25 30 μ f. ±5% Ceramic Neg. Coeff.
- 2.26 7-45 μ f. Ceramic Padder
- 2.27 7-45 μ f. Ceramic Padder
- 2.28 7-45 μ f. Ceramic Padder
- 2.29 40 μ f. ±5% Ceramic Neg. Temp. Coeff.
- 2.30 10 μ f. Electrolytic 450 volt
- 2.31 10 μ f. Electrolytic 450 volt

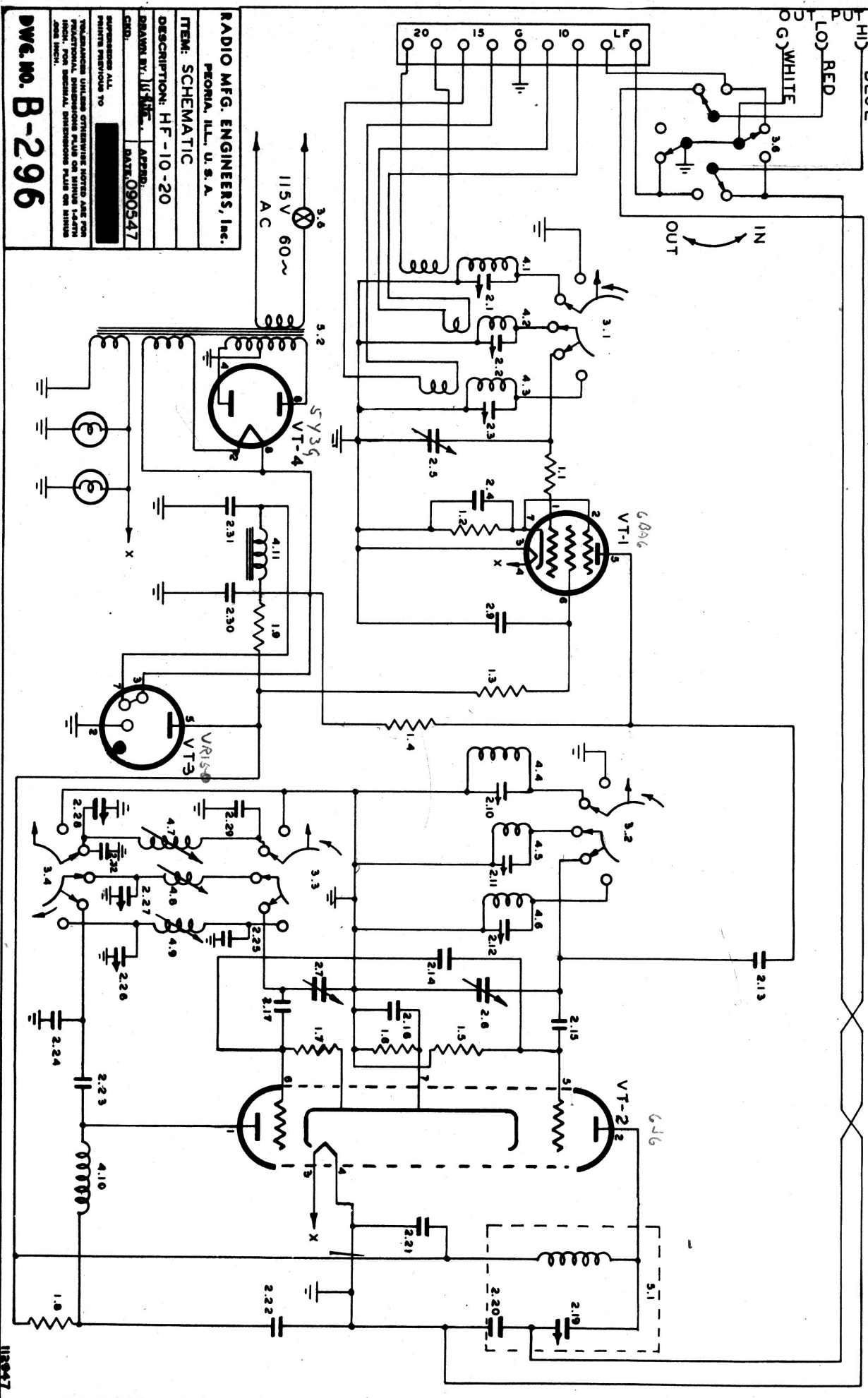
TRANSFORMERS

- 5.1 7 M.C. I.F. Transformer
- 5.2 Power Transformer

SWITCHES

- 3.1 Bandswitch R.F. Section
- 3.2 Bandswitch Mixer Section
- 3.3 Bandswitch Osc. Section, Grid Side
- 3.4 Bandswitch Osc. Section, Plate Side
- 3.5 A.C. Switch S.P.S.T.
- 3.6 Stand-By Switch 4PDT

B-296



RADIO MFG. ENGINEERS, Inc.
PEORIA, ILL., U. S. A.

ITEM: SCHEMATIC
DESCRIPTION: HF-10-20

DRAWN BY: J. S. W. APPROV.:
DATE: 090547

CRD: [REDACTED] DATE: 090547

SUPERSEDES ALL
PREVIOUS EDITIONS TO
THIS SCHEMATIC

TRADEMARKS UNLESS OTHERWISE NOTED ARE FOR
PROTECTIVE PURPOSES ONLY AND ARE NOT
PART OF THIS SCHEMATIC. TRADEMARKS ARE
NOTED FOR SPECIAL DIRECTIONS PLUS ON KITTED
AND REPAIR.

DWG. NO. B-296

118947

RME WARRANTY

Radio Mfg. Engineers, Inc. warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to us or to our authorized radio dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us; nor extend to units which have been repaired or altered outside of our factory; nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

RADIO MFG. ENGINEERS, INC. 300-306 First Avenue Peoria, Illinois