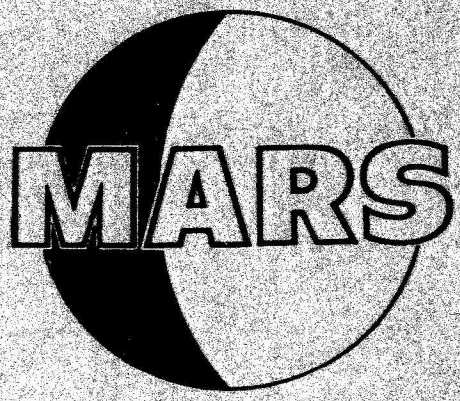
RCA # CRM-R3A

# SINGLE-SIDEBAND
# RECEIVER CONVERTER
## Model RC-288A




**MARS ELECTRONICS**

135 Eileen Way, Syosset, L.I., N.Y. • Telephone: Area Code 516 WAlnut 1-6234

# SINGLE-SIDEBAND

# RECEIVER CONVERTER

Model RC-288A

INSTRUCTION MANUAL

February 1963

MARS ELECTRONICS
135 Eileen Way
Syosset, L.I., N.Y.

# WARRANTY

MARS ELECTRONICS, warrants each instrument of its manufacture to be free from defects in material and workmanship. Our obligation under this Warranty is limited to servicing or adjusting any instrument returned to our factory for that purpose, and to making good at our factory any part or parts thereof except tubes, fuses or batteries which shall, within one year after making delivery to the original purchaser, be returned to us with transportation charges, prepaid, and which on our examination shall disclose to our satisfaction to have been thus defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at cost, plus a small service charge. In this case an estimate will be submitted before the work is started.

If any fault develops, the following steps should be taken:

1. Notify us, giving full details of the difficulty, and include the model number, type number and serial number. On receipt of this information, we will give you service instructions or shipping data.

2. On receipt of shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. If requested, an estimate of the charges will be made before the work begins provided the instrument or the repairs required are not covered by the warranty.

MARS ELECTRONICS, reserves the right to make changes in design at any time without incurring any obligation to install same on units previously purchased.

This Warranty is expressly in lieu of all other obligations or liabilities on the part of MARS ELECTRONICS and MARS ELECTRONICS neither assumes nor authorizes any other person to assume for them any other liability in connection with the sales of MARS ELECTRONICS instruments.

This Warranty applies regardless of conditions to the contrary that are included as a part of the buyer's purchase order.

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## ILLUSTRATIONS



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Figure 1. Single Sideband Receiver Converter, Model RC-288

# SINGLE SIDEBAND COMMUNICATIONS

# RECEIVER CONVERTER

# Model RC-288

## Section I

## GENERAL DESCRIPTION

### 1. General

This section provides a brief discussion of the virtues of single sideband communications including a general description of Receiver Converter, Model RC-288, its application and its use in the single sideband communications field. Also included in this section is a summary of the functional characteristics and features of the single sideband Receiver Converter, figure 1.

a. Introduction. The techniques of single sideband and exalted-carrier reception provide important new tools to help overcome the many difficulties encountered in short wave transmission. By exalted-carrier detection, the harmonic distortion and cross modulation resulting from carrier fading, is removed. Also, additional degrees of selectivity are provided that are not available with ordinary diode detection.

The use of single sideband reception is a valuable aid in the elimination of the very frequent interference which is encountered in H-F transmission. The long-ranges from which signals may be received bring about so many possible cases of interference that all such devices become a necessity to obtain the utmost out of an H-F communications system.

When the communications link is by a single sideband transmitter and a single sideband receiver, not only is the ultimate realized with respect to spectrum economy, but a power gain of 9 db is realized with respect to double sideband AM systems. The single sideband receiver converter unit is the result of a long period of research devoted to the simplification of single sideband receiving equipment. It provides performance better than that which is actually necessary for reception of single sideband transmissions of all types, together with the capability of reception of double sideband amplitude and phase modulation by exalted-carrier detection of a single sideband only.

The RC-288 Receiver Converter is capable of operation with any communications receiver in which the I-F frequency lies in the range of 440 kc to 510 kc. The I-F bandwidth between the minus 1 db points of the communications receiver should not be less than 12 kc. The converter unit separates the sidebands of the incoming signal and converts this sideband intelligence into audio signals for operation of terminal equipment. These audio signals may also be used for redistribution to other landlines or communications circuitry. The single sideband filters within the receiver converter provide a reception of audio frequencies between 250 cps and 6000 cps. However, the I-F bandwidth of the communications receiver may be altered, or 3500 cps filters may be used in the Receiver Converter to lower the audio frequency response if desired.

b. Types of Reception. The RC-288 single sideband Receiver Converter is intended for use in applications between fixed installations having a heavy flow of message traffic. The output signal of the Receiver Converter will be identical with the multiplexed signals delivered over the wires in voice-frequency landline carrier telephonic transmission. Thus, the converter unit, operating in conjunction with a communications receiver, may be used to feed carrier terminal equipment that operates several channels of teletypewriters, facsimile, or voice reproducing equipment.

The single sideband Receiver Converter is also capable of the following types of reception:

(1) EXALTED-CARRIER UPPER-SIDEBAND RECEPTION. This type of reception provides the optimum reception of double sideband signals for the case of interference on the lower sideband.

(2) EXALTED-CARRIER LOWER-SIDEBAND RECEPTION. This type of reception provides optimum performance for the case of interference on the upper sideband.

(3) SIMULTANEOUS RECEPTION OF THE UPPER AND LOWER SIDEBAND CHANNELS TRANSMITTED IN A SINGLE SIDEBAND TWIN-CHANNEL MULTIPLEX SYSTEM. Separate outputs are provided for each sideband on the converter. Thus, simultaneous reception of the separate programs on both sidebands may be obtained. For instance, a voice or program channel might be transmitted on the lower sideband and a multiplex tone teletypewriter system on the upper sideband.

(4) REDUCED-CARRIER OPERATION WITH CARRIER REDUCTIONS FROM ZERO TO TWENTY DB ON ANY OF THE ABOVE FORMS OF RECEPTION. The present standards of commercial single sideband transmission employ carrier reductions of ten and twenty db, depending upon the types of programs being applied to the transmitters. The degree of received carrier reduction is controllable by means of a CARRIER COMPENSATION control on the single sideband Receiver Converter. Zero db carrier reduction corresponds to ordinary double sideband A-M transmission.

c. Functional Characteristics. The following paragraphs describe the functional characteristics of the RC-288 single sideband communications Receiver Converter:

(1) AUTOMATIC FREQUENCY CONTROL. Automatic frequency control is provided to maintain the signal carrier exactly in tune with the local crystal oscillator. The maximum residual AFC error is less than 2 cps. The system holds-in over a range of ± 2000 cps with a pull-in range of 50 cps from the center frequency of the carrier filter. The mechanical servo system is capable of following an overall system frequency drift of up to 10 cps per second.

The automatic frequency control is operated from the output of the carrier filter. This "protects" the system from jamming signals since the jamming signals must be exactly in the range of the carrier filter to be effective. The same "protection" also eliminates the "sideband grabbing" of the AFC system when tone modulation is being received.

(2) AFC SQUELCH. An automatic squelch circuit stabilizes the servo AFC circuit when there is a decrease in the carrier signal below a pre-adjusted operating level. Operation of the AFC squelch is indicated by a visual alarm.

(3) LOCAL CARRIER OSCILLATOR. A local carrier oscillator, tuned to the incoming carrier by the use of a crystal oscillator which is tuned to the mid-frequency of the crystal carrier filter, is provided for single sideband reception. Operation with the local carrier oscillator provides complete protection against carrier fading effects and also serves as an aid in tuning weak signals and in tuning complex multiplex single sideband signals.

(4) RECONDITIONED CARRIER. The filtered and limited "reconditioned carrier" may be used as well as the local carrier oscillator. The reconditioned carrier is used for all double sideband reception or may be used with single sideband reception if it is desired to receive modulation material which is sensitive to the frequency error between the incoming carrier and the local carrier.

(5) DRIFT CORRECTION INDICATOR. A direct reading drift correction indicator is provided to indicate the amount of detuning in the receiver. The scale is calibrated in increments of 500 cps between minus 2000 cps and plus 2000 cps.

(6) CARRIER STRENGTH METER. This meter indicates the incoming signal level and provides an indication for determining when the signal is properly tuned.

(7) AUDIO OUTPUT METER. This meter indicates the audio output level in VU units. Switching is provided for monitoring either the upper or lower sideband. Two ranges, 0 VU and +10 VU, are provided as well as an OFF position, which may be utilized while retuning to another frequency.

(8) AGC SYSTEM. The automatic gain control may be controlled by a signal with a fast-attack/slow-decay time constant on either sideband for the reception of suppressed carrier single sideband voice or program modulation. The AGC system may also be regulated by the usual carrier-controlled AGC method or the total signal (DSB) AGC signal. Control by the total rectified signal is advantageous for tuning purposes. Control by the rectified filtered carrier or sidebands is advantageous for rejecting interference and jamming which might obtain control of the AGC system.

2. Specifications

All specifications for the single sideband Receiver Converter Model RC-288 are divided into two categories; electrical and physical.

a. Electrical. The electrical specifications of this unit include all electronic characteristics as well as the primary power requirements. These specifications are listed as follows:

(1) PRIMARY POWER REQUIREMENTS
115/230 volts ±10 percent 50/60 cps single phase, 200 watts.

(2) AUDIO OUTPUT
+10 dbm at 600 ohms, each channel, balanced.

(3) AUDIO FREQUENCY RESPONSE
Within ± 2 db from 250 cps to 6000 cps.

(4) TOTAL HARMONIC AND CROSS-MODULATION DISTORTION
Overall distortion is less than 2 percent at rated power output.

(5) HUM AND NOISE LEVEL
-60 db or better.

(6) METERING FACILITIES

a. Carrier meter is operated by diode rectifier in carrier channel of the single sideband adapter.

b. Drift correction indicator, mechanically connected to AFC servo system, displays tuning drift to maximum of ± 2000 cps.

c. Audio output meter monitors either upper or lower sideband output. Range 0 VU or + 10 VU.

(7) MONITOR OUTPUT

The monitor amplifier may be switched to either upper or lower sideband audio output.

(8) TERMINAL CONNECTIONS

a. Terminal for each audio output channel.

b. AGC Terminal.

c. UG - 625/U I-F INPUT.

b. Physical. The physical specifications of the RC-288 Receiver Converter are provided in the following list:

| | |
|---|---|
| WEIGHT | 58 pounds |
| MATERIAL | Chassis and Front Panels - Aluminum |
| FINISH | Medium Grey, Semi-Gloss White Lettering |
| MOUNTING OF EQUIPMENT | Chassis is in horizontal position; all tubes vertical. |
| DIMENSIONS | Width, 19 inches<br>Height, 8 3/4 inches<br>Depth, 17 1/2 inches |

Section II

# FUNCTIONAL DESCRIPTION

## 1. General

The following paragraphs provide a functional description of the RC-288 single sideband communications Receiver Converter. Referring to the block diagram, figure 2, and the schematic diagrams, figures 3 and 4, an illustrative signal will be traced through the converter and the functions of the circuits described.

## 2. Circuit Description

The intermediate frequency from the communications receiver is fed into the RC-288 Receiver Converter through a tuned I-F transformer to Mixer VI. The signal from the variable R-F oscillator, V25, is applied to the grid of VI where it is heterodyned with the receiver IF producing a new intermediate frequency of 100 kc. The 100 kc intermediate frequency is amplified in I-F Amplifier V2 and applied to Sideband Cathode Followers V3-A and V3-B and Carrier Amplifier V9. Sideband Cathode Follower V3-A applies the signal to the deflecting electrodes of Product Detector V4 through an upper sideband crystal filter, FL-1. This filter has a pass band from 100 kc to 106 kc. Likewise, Cathode Follower V3-B applies the signal to Product Detector V6 through a lower sideband crystal filter, FL-3, which has a pass band from 94 kc to 100 kc.

Incorporated with Carrier Amplifier V9 is the variable CARRIER COMPENSATION control which compensates for the suppressed carrier level from 0 to 20 db. The amplified carrier output of V9 is fed to a 100 kc crystal carrier filter, FL-5, which has a pass band of 50 cps, rejecting all sideband frequencies. The filtered carrier is then applied to the AGC SELECTOR and carrier amplifier V10-A. The output from this carrier amplifier is fed to Squelch Driver V10-B and to Limiter V12. The output from the two stages of limiting is applied to Frequency Multiplier V13 and also to one side of the local carrier-reconditioned carrier (LC-RC) CARRIER INSERTION switch. Connected to the other side of the CARRIER INSERTION switch is the crystal-controlled 100 kc local oscillator, V15. The output from

Local Oscillator V15 is also fed to a second frequency multiplier, V14, which is compared against the output of frequency multiplier V13 in a phase error detector network. This action will be discussed in later paragraphs.

The output of the CARRIER INSERTION switch is connected to the control grid of Product Detectors V4 and V6. With the application of the incoming local or reconditioned carrier, the product detectors demodulate the applied intermediate frequency. The output of each product detector is next passed through its respective 6 kc low pass filter, FL-2 or FL-4, to the SIDEBAND SELECTOR and the AGC SELECTOR. The function of the SIDEBAND SELECTOR is to provide a convenient method of switching the upper sideband and lower sideband between LINE A and LINE B. Each output from the SIDEBAND SELECTOR is applied to an associated audio amplifier. The audio amplifier provides the audio signal for the balanced 600 ohms output terminals on the back panel and the paralleled MONITOR SELECTOR. The MONITOR SELECTOR switch applies either line signal to the monitor amplifier, V8, which feeds the audio signal to the 600 ohms phone jack on the front panel. The output from the MONITOR SELECTOR is also applied to a VU meter circuit which provides visual aid for monitoring and setting the level of each line.

The AGC voltage can be obtained from the carrier (CAR), upper sideband (USB), lower sideband (LSB), or the total signal (DSB) with the AGC SELECTOR. The desired AGC voltage is amplified by AGC Amplifier V24 and detected by AGC Diode V23. The I-F gain is obtained by applying a positive "bucking" bias to the AGC voltage. In the USB and LSB position of the AGC SELECTOR, a fast-attack/slow-decay AGC is obtained.

The AFC circuit consists of the two frequency multipliers, a phase error detector network, the AFC motor and drive amplifiers and the AFC squelch circuit. The total output torque of the AFC motor is a function of the frequency of field expansion/decay due to winding current. Because of this fact, the fundamental of the 100 kc carrier and local carrier signals are fed into frequency multipliers which select and amplify the third harmonic as the operating frequency. Thus, the effective error frequency is triple the actual error, thereby tripling the motor sensitivity. The output of each frequency multiplier is then fed into a phase error detecting network.

The output signals of Frequency Multipliers V13 and V14, which appear across the secondary of transformer T6, produce voltage drops across the elements of a phase shifting network. Since the effective operating frequency lies within a narrow band about 300 kc ± 6 kc, the capacitance and resistance values have been chosen to produce an equal reactive voltage drop in across R116, C60, C61 and R117.. Although the reactive voltage drop in each leg is equal, the signals appearing across each of the capacitive legs produce a phase shift of 90 degrees with respect to each other. This signal, with the necessary phase relationship, is then used to drive the phase rectifiers. The instantaneous phase displacement of the two 300 kc signals (assuming there is some error in the carrier frequency relative to the frequency of Crystal Oscillator V15) is translated in each rectifier into an output voltage. This voltage will be varying in amplitude and polarity at the difference frequency existing between the two input signals. While the rms value of the output rectifiers is virtually equal, the instantaneous output across the load of one differs from that of the other by the 90 degree phase shift. A frequency error in which the carrier frequency is higher than the crystal oscillator will result in the output voltage of one rectifier leading that of the other by 90 degrees. Similarly, a frequency error in which the carrier frequency is lower than the crystal oscillator will result in the output voltage of the corresponding rectifier to be lagging that of the other by 90 degrees.

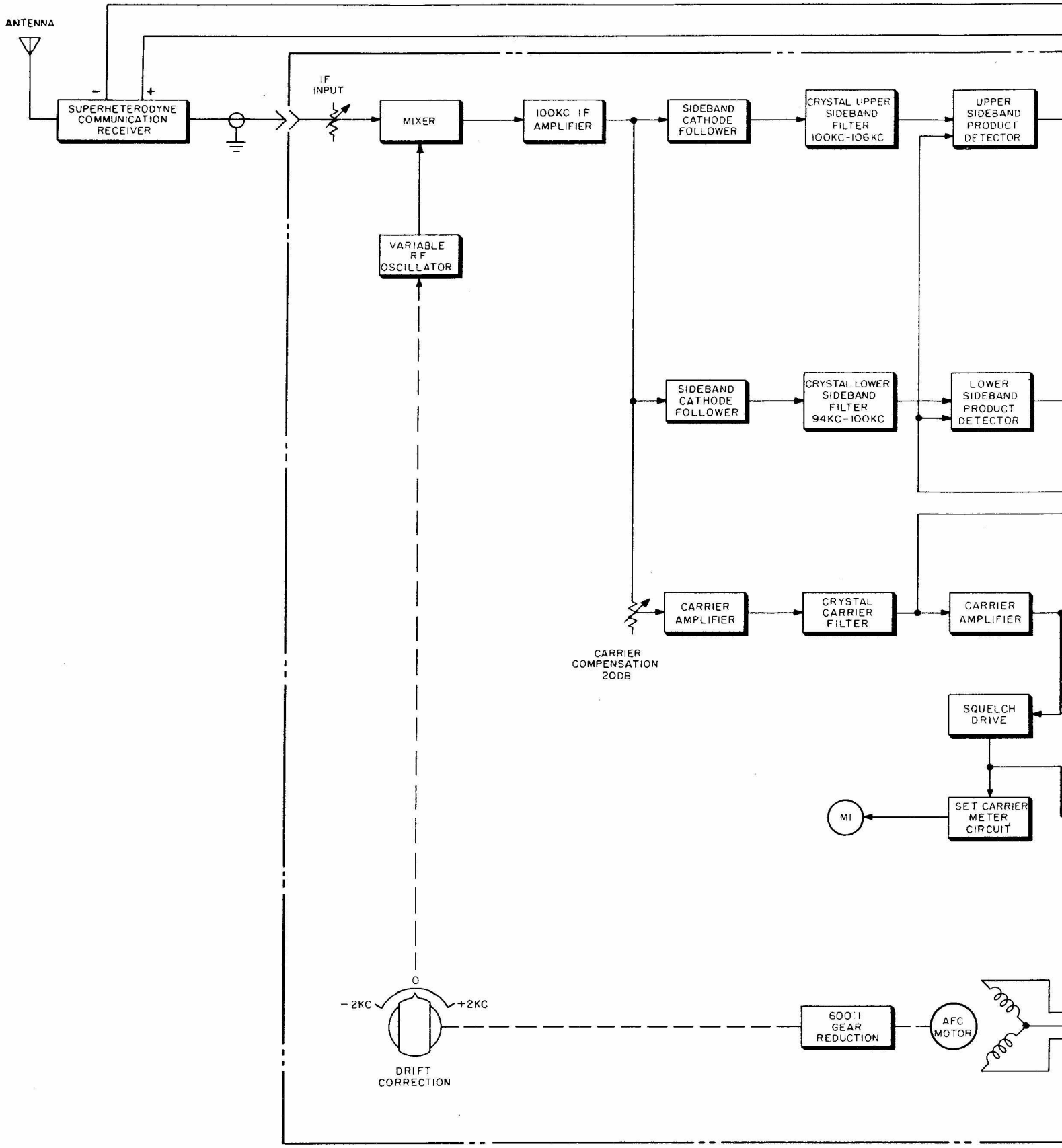
The voltage produced by each phase rectifier excites the associated grid of Amplifier V16. The partially clipped sinusoidal voltage at each plate of this amplifier drives a subsequent DC amplifier, V17 and V20, through the cut-off/conduct cycles thus generating a square wave signal. This square wave excitation is fed to the motor drive amplifiers, V19 and V22, and the inverter stage driving the ballast tubes, V18 and V21. Cathode current in one of the parallel-connected motor drive amplifiers produces the field in the second winding. The direction of rotation is determined by the lead-lag relationship between the current in one winding relative to that in the other winding.

The motor drive output is directly coupled, through a 600:1 gear reduction, to the shaft of the variable condenser associated with R-F Oscillator V25. When torque is applied to this condenser, the R-F oscillator will be readjusted to return the frequency to within 2 cps or less of that necessary to produce the converted I-F center frequency. A front panel scale, calibrated to range limits between minus 2000 cps and plus 2000 cps, provides a direct reading of the error of the carrier

frequency. A visual indication of the AFC motor action is provided by an indicator disc coupled to the gear drive assembly. This aid becomes particularly valuable to indicate drift and correction of a relatively slow rate which would not be perceptible in the motion of the DRIFT CORRECTION knob.

When the amplitude of the carrier drops below some predetermined value, as set by Squelch Threshold potentiometer R90, Squelch Amplifier V11 will operate Relay RY1. One set of contacts of RY1 will disable the AFC circuit by cutting off amplifier V16 (assuming AFC switch S-6 is in the ON position). The second set of contacts will illuminate the ALARM indicating lamp on the front panel warning the operator of the disabled condition of the AFC circuit.

The output from Squelch Driver V10-B is also used as the signal which is fed to the carrier meter diode. Rectification within diode CR3 provides an appropriate current sample for the SET CARRIER meter mounted on the front panel. The SET CARRIER meter indicates, on a linearly marked scale with a red reference at mid-scale, the level at which to maintain the carrier during operation.


ANTENNA
SUPERHETERODYNE COMMUNICATION RECEIVER
IF INPUT
MIXER
100KC IF AMPLIFIER
SIDEBAND CATHODE FOLLOWER
CRYSTAL UPPER SIDEBAND FILTER 100KC-106KC
UPPER SIDEBAND PRODUCT DETECTOR
VARIABLE RF OSCILLATOR
SIDEBAND CATHODE FOLLOWER
CRYSTAL LOWER SIDEBAND FILTER 94KC-100KC
LOWER SIDEBAND PRODUCT DETECTOR
CARRIER AMPLIFIER
CRYSTAL CARRIER FILTER
CARRIER AMPLIFIER
CARRIER COMPENSATION 20DB
SQUELCH DRIVE
MI
SET CARRIER METER CIRCUIT
0
-2KC
+2KC
DRIFT CORRECTION
600:1 GEAR REDUCTION
AFC MOTOR

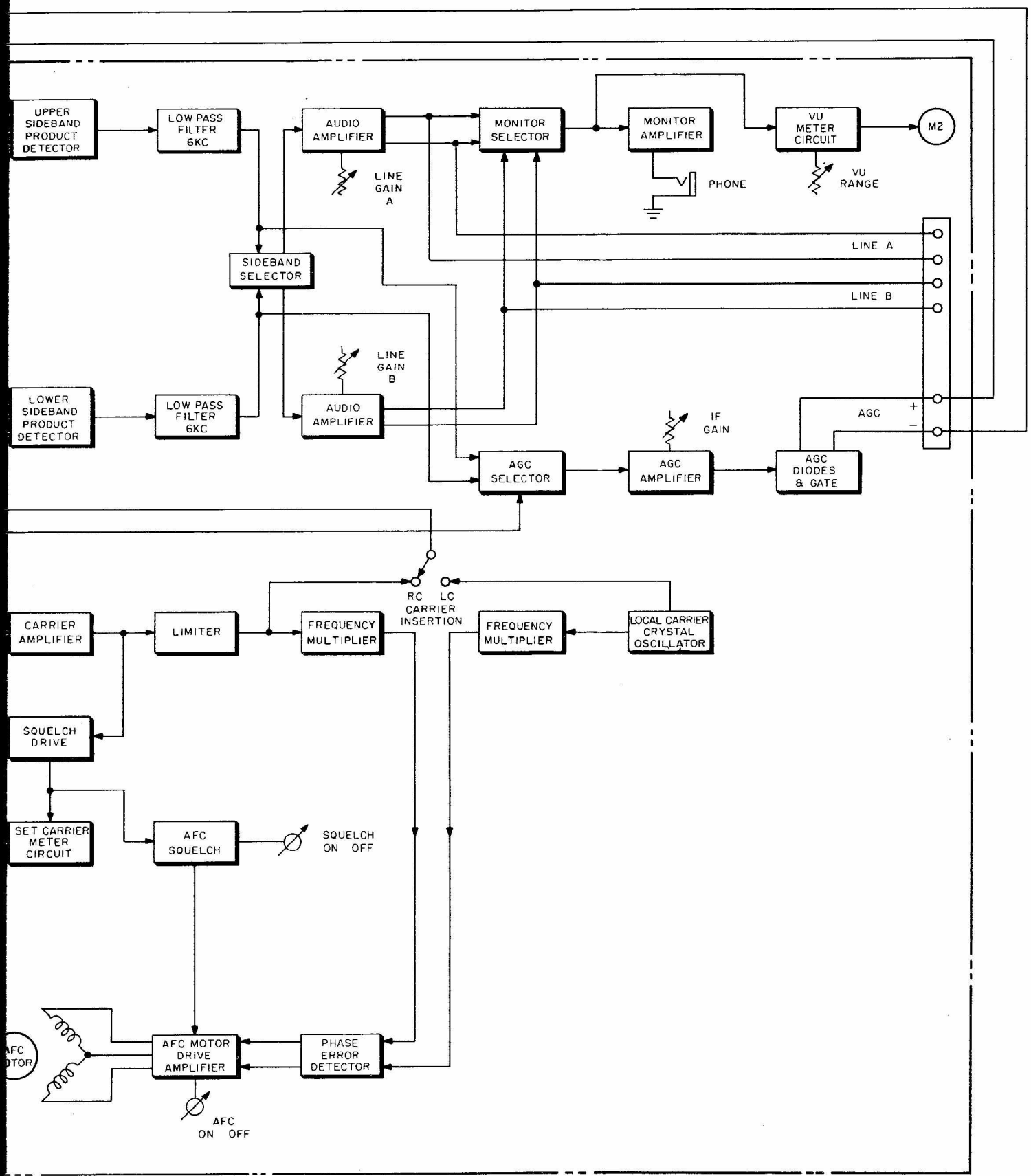
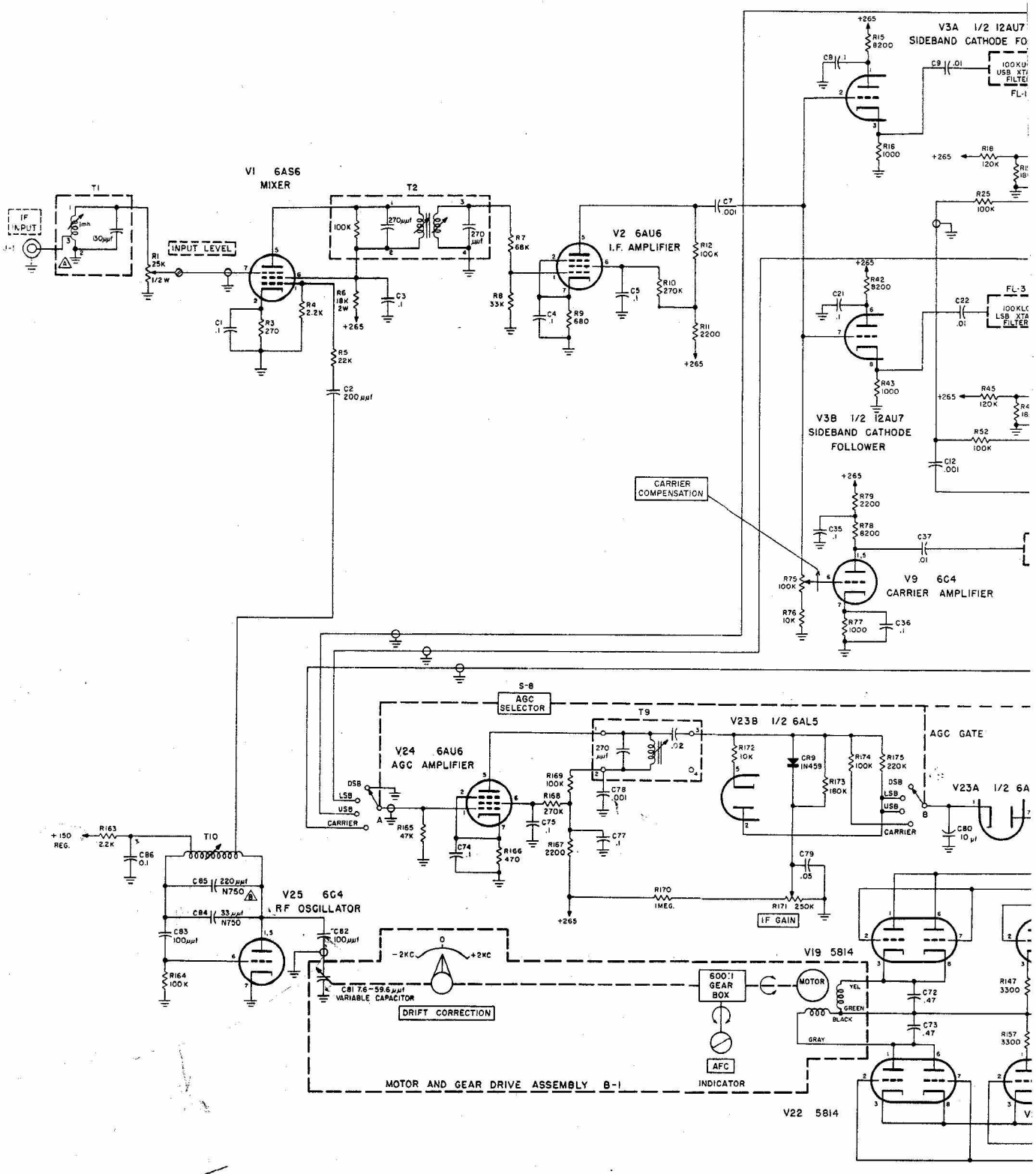
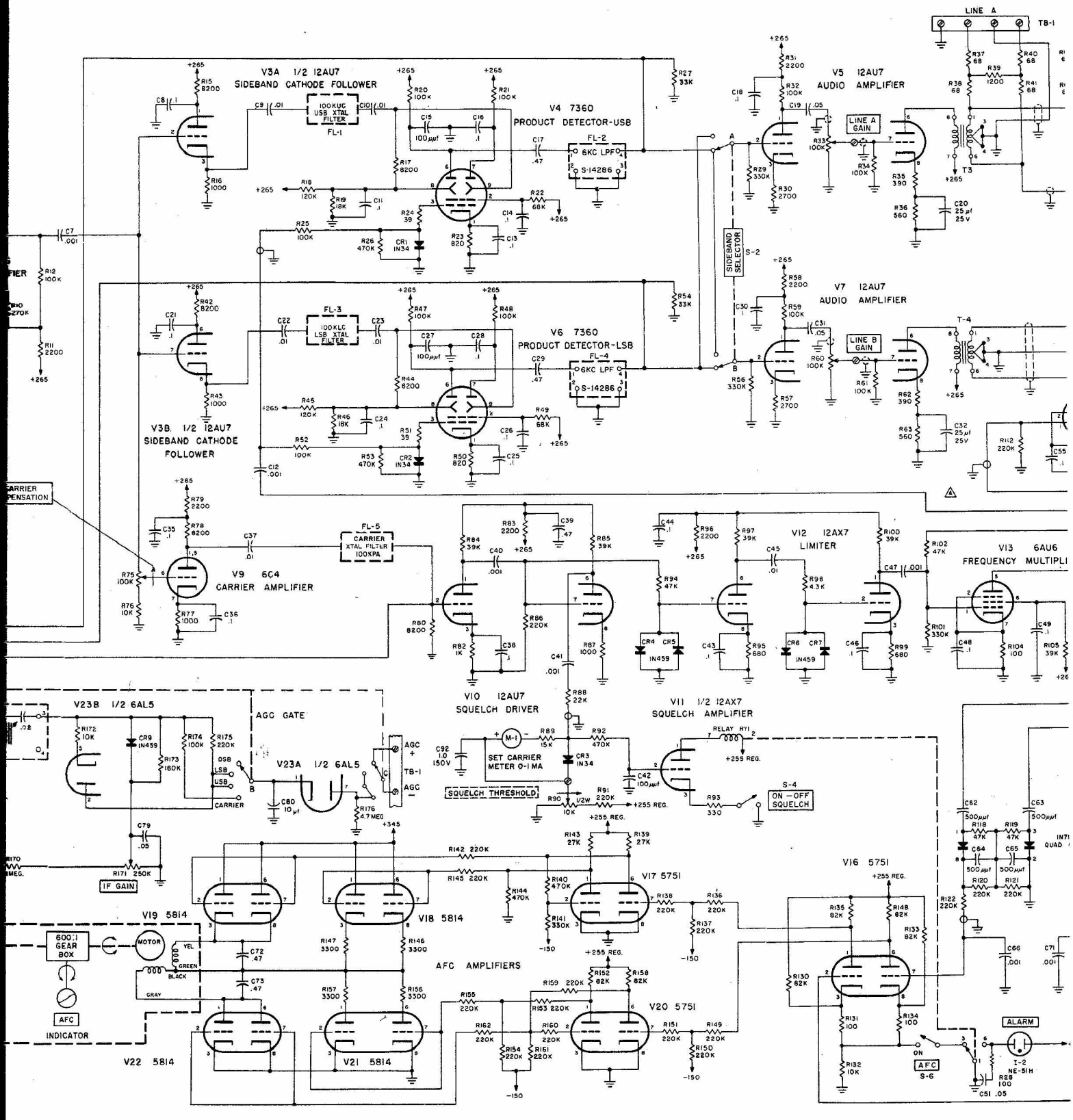



Figure 2. Receiver Converter RC-288, Block Diagram


V1 6AS6
MIXER
T1
T2
IF INPUT
INPUT LEVEL
V2 6AU6
I.F. AMPLIFIER
V3A 1/2 12AU7
SIDEBAND CATHODE FO
V3B 1/2 12AU7
SIDEBAND CATHODE
FOLLOWER
CARRIER COMPENSATION
V9 6C4
CARRIER AMPLIFIER
S-8
AGC SELECTOR
V24 6AU6
AGC AMPLIFIER
T9
V23B 1/2 6AL5
AGC GATE
V23A 1/2 6A
DSB
LSB
USB
CARRIER
+150 REG.
T10
V25 6C4
RF OSCILLATOR
IF GAIN
V19 5814
600:1 GEAR BOX
MOTOR
-2KC
0
+2KC
C81 7.6-59.6 µµf VARIABLE CAPACITOR
DRIFT CORRECTION
AFC INDICATOR
MOTOR AND GEAR DRIVE ASSEMBLY B-1
V22 5814
YEL
GREEN
BLACK
GRAY


V3A 1/2 12AU7
SIDEBAND CATHODE FOLLOWER
V4 7360
PRODUCT DETECTOR-USB
V5 12AU7
AUDIO AMPLIFIER
LINE A
T8-1
FL-1
100KUC
USB XTAL
FILTER
FL-2
6KC LPF
S-14286
LINE A
GAIN
T3
SIDEBAND
SELECTOR
S-2
V3B. 1/2 12AU7
SIDEBAND CATHODE
FOLLOWER
V6 7360
PRODUCT DETECTOR-LSB
V7 12AU7
AUDIO AMPLIFIER
FL-3
100KLC
LSB XTAL
FILTER
FL-4
6KC LPF
S-14286
LINE B
GAIN
T-4
V9 6C4
CARRIER AMPLIFIER
FL-5
CARRIER
XTAL FILTER
100KPA
V12 12AX7
LIMITER
V13 6AU6
FREQUENCY MULTIPLI
V10 12AU7
SQUELCH DRIVER
V11 1/2 12AX7
SQUELCH AMPLIFIER
V23B 1/2 6AL5
AGC GATE
V23A 1/2 6AL5
SET CARRIER
METER 0-1 MA
SQUELCH THRESHOLD
RELAY RY1
+255 REG.
S-4
ON — OFF
SQUELCH
AGC
TB-1
DSB
LSB
USB
CARRIER
IF GAIN
V17 5751
V16 5751
V19 5814
V18 5814
V20 5751
V22 5814
V21 5814
AFC AMPLIFIERS
600:1
GEAR
BOX
MOTOR
YEL
GREEN
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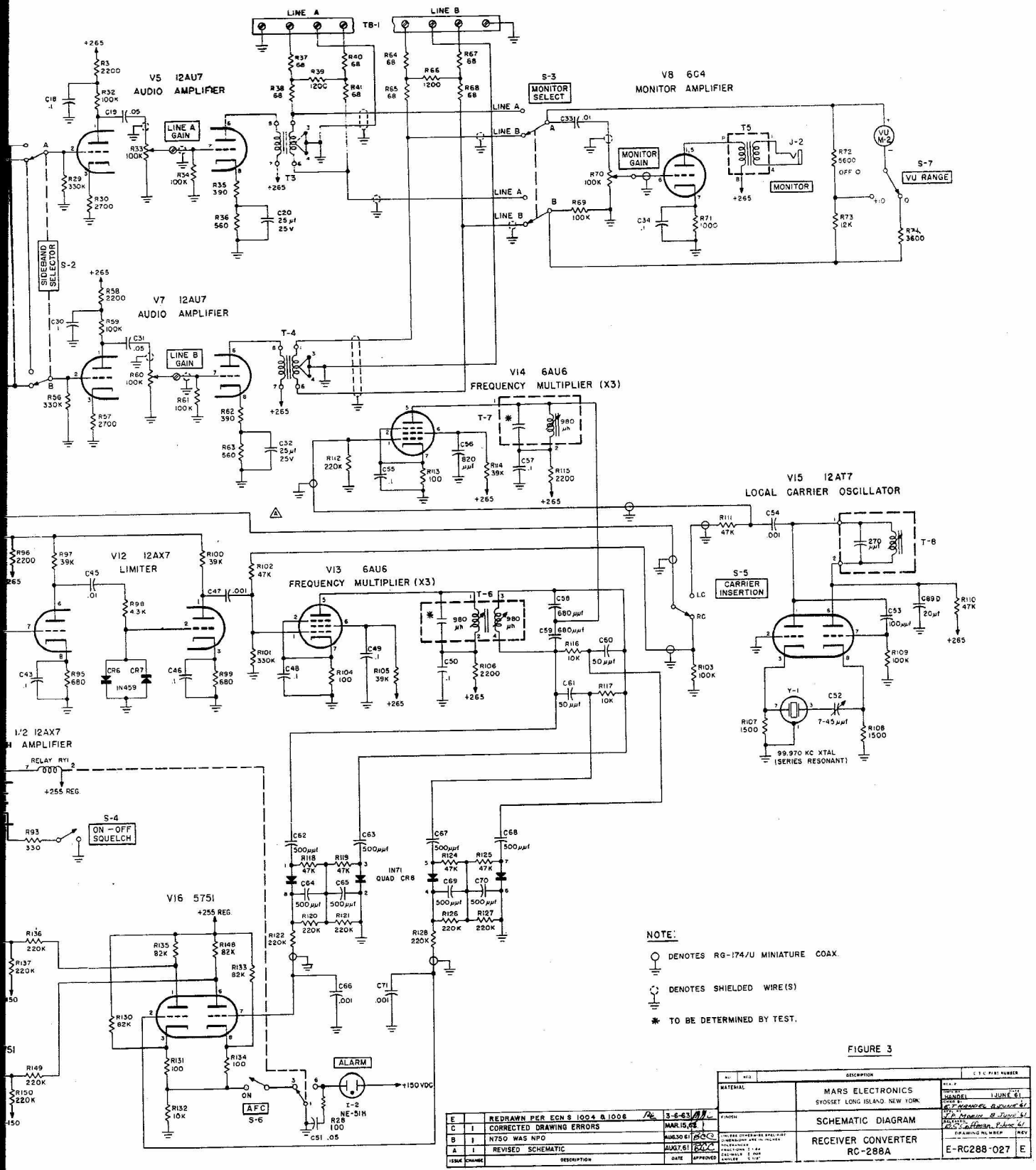
AFC
INDICATOR
ALARM
I-2
NE-51H
ON
AFC
S-6
CARRIER
COMPENSATION




NOTE:

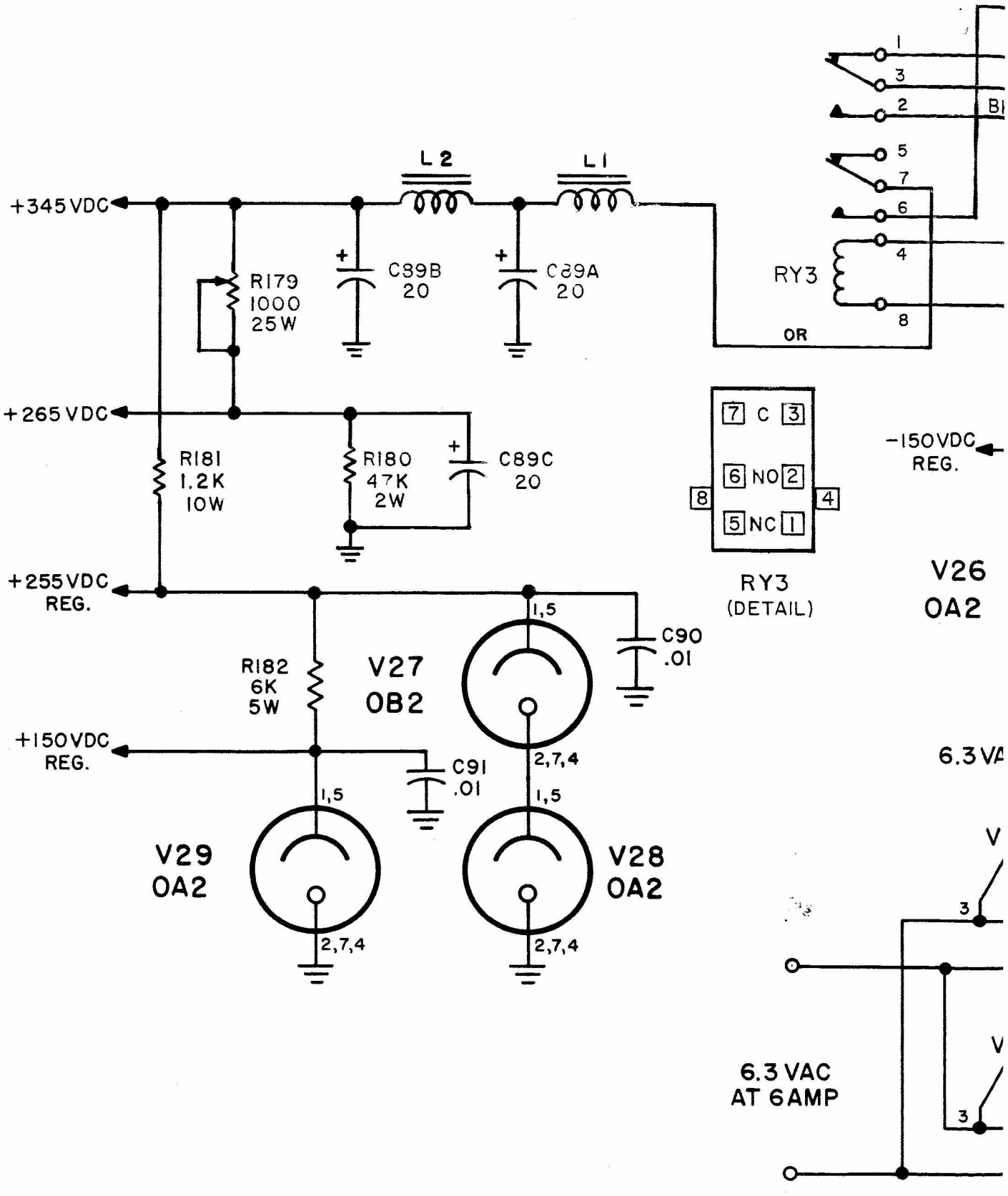
- ○ DENOTES RG-174/U MINIATURE COAX.
- ◌ DENOTES SHIELDED WIRE(S)
- ✱ TO BE DETERMINED BY TEST.

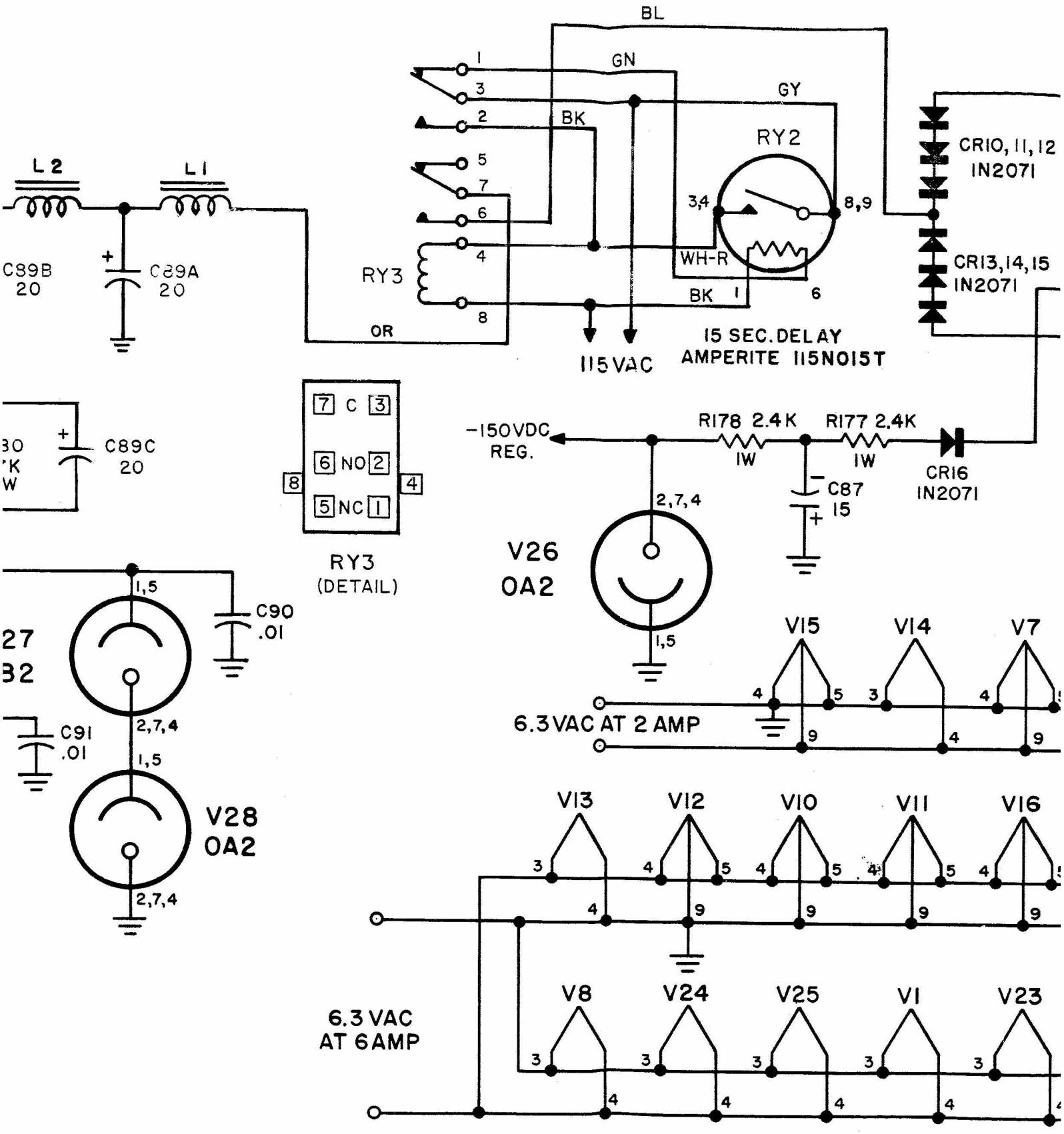
FIGURE 3

| ISSUE | CHANGE | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| E | | REDRAWN PER ECN S 1004 & 1006 | 3-6-63 | |
| C | 1 | CORRECTED DRAWING ERRORS | MAR.15,62 | |
| B | 1 | N750 WAS NPO | AUG.30 61 | |
| A | 1 | REVISED SCHEMATIC | AUG.7,61 | |

| | |
|---|---|
| MATERIAL | MARS ELECTRONICS, SYOSSET LONG ISLAND, NEW YORK |
| FINISH | SCHEMATIC DIAGRAM |
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES FRACTIONS ± DECIMALS ± ANGLES ± | RECEIVER CONVERTER RC-288A |
| | E-RC288-027 E |

DRAWN: HANDEL 1 JUNE 61
CHKD BY: E.T. KRAMER 6 JUNE 61
APP'D BY: J.P. MARIN 8 JUNE 61
RELEASED: E.T. KRAMER 9 JUNE 61


L2
L1
+345VDC
R179
1000
25W
C89B
20
C89A
20
RY3
OR
+265VDC
R181
1.2K
10W
R180
47K
2W
C89C
20
-150VDC
REG.
7 C 3
6 NO 2
5 NC 1
8
4
RY3
(DETAIL)
V26
0A2
+255VDC
REG.
R182
6K
5W
V27
0B2
C90
.01
+150VDC
REG.
C91
.01
V29
0A2
V28
0A2
6.3 VAC
AT 6AMP


BL
GN
GY
BK
RY2
RY3
L2
L1
C89B
20
C89A
20
C89C
20
CR10, 11, 12
IN2071
CR13, 14, 15
IN2071
CR16
IN2071
WH-R
OR
115 VAC
15 SEC. DELAY
AMPERITE 115N015T
-150VDC
REG.
R178 2.4K
1W
R177 2.4K
1W
C87
15
RY3
(DETAIL)
V26
0A2
V28
0A2
C90
.01
C91
.01
V15
V14
V7
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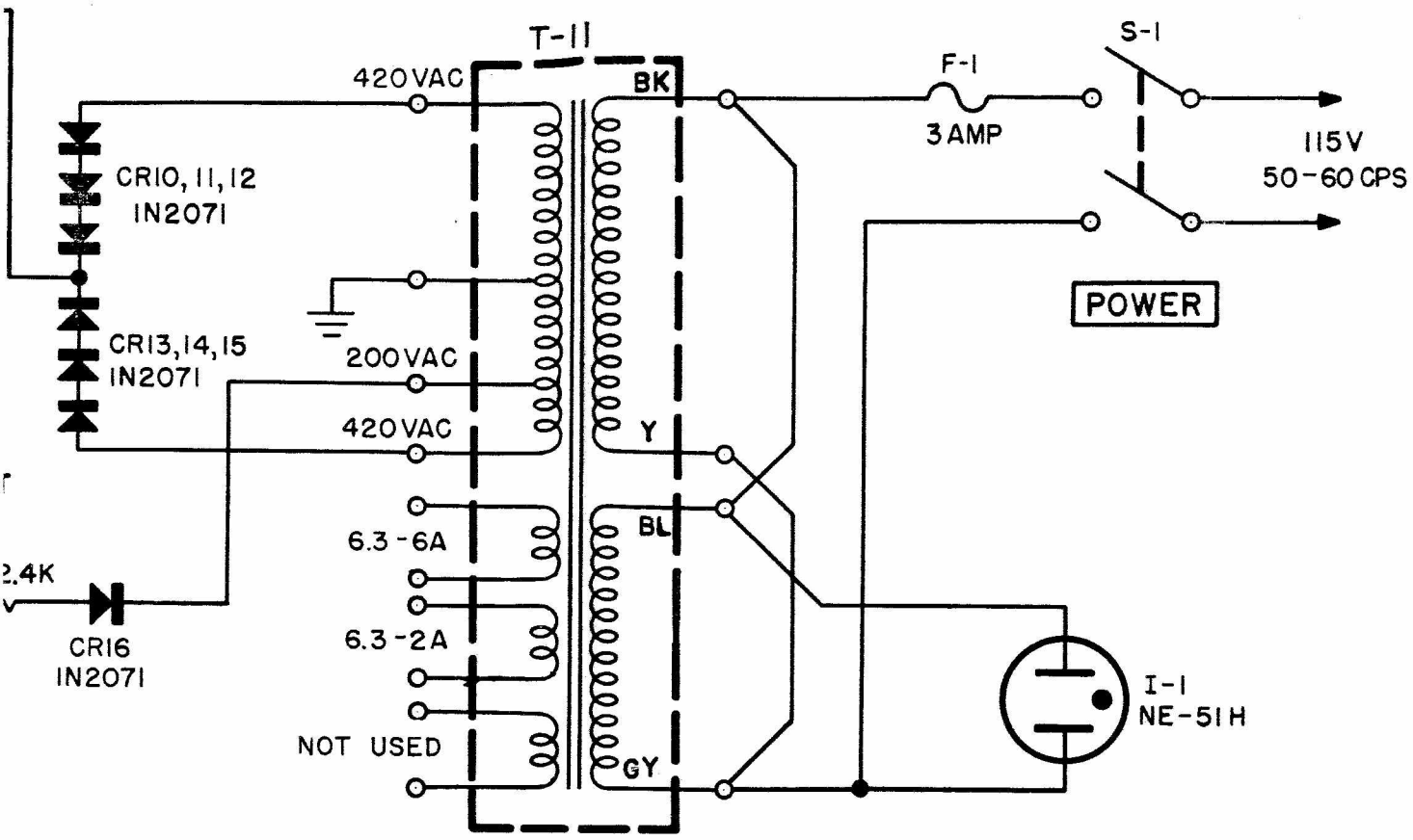
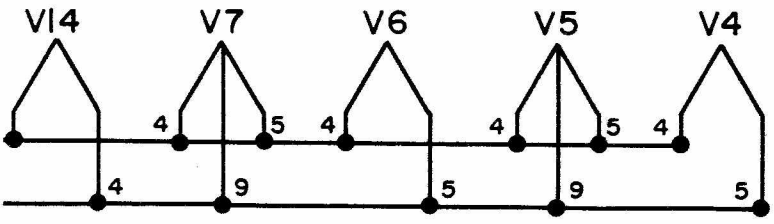
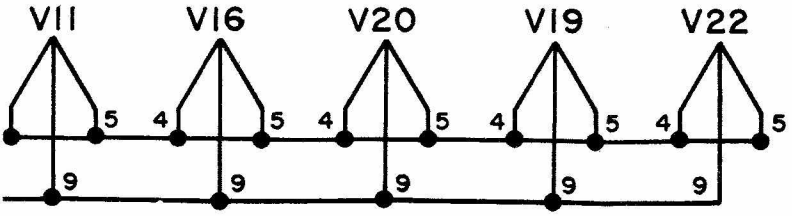
V1
V23
6.3 VAC
AT 6AMP



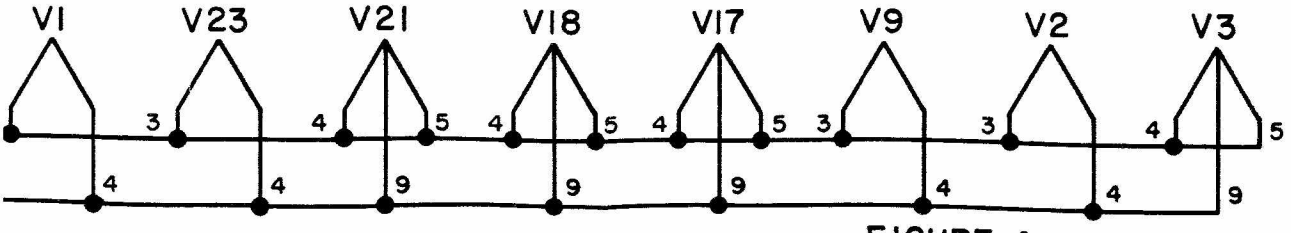




FIGURE 4

POWER SUPPLY SCHEMATIC DIAGRAM
RECEIVER CONVERTER RC-288

Section III

# INSTALLATION

## 1. Unpacking

Refer to the packing slip for a list of all equipment supplied on order. The equipment should be unpacked carefully to avoid damage. Search all packing material carefully for any small packages which may be contained therein.

## 2. Installation Instructions

All units are designed for rack mounting in standard 19 inch relay racks. Panel sizes and mounting slots are in accordance with current standards. Physical dimensions of the RC-288 Receiver Converter are as follows:

| | |
|---|---|
| Height (front panel) | 8 3/4 inches |
| Width (front panel) | 19 inches |
| Depth (from mounting surface) | 17 1/2 inches |
| Weight | 58 pounds |

Each unit is designed to operate from 115/230 volts, 50/60 cps power source. Unless otherwise specified units are properly connected to operate from a 115 volts, 50/60 cps power lines. Refer to Appendix I for the modification necessary for operating from a 230 volts power source.

Proceed as follows for installing and connecting the RC-288 Receiver Converter:

1. Position and secure the Receiver Converter in a location as near as possible to the communications receiver with which the converter is to be associated.

2. Connect the I-F output of the receiver to the I-F INPUT jack at the rear of the converter.

3. Remove the AGC jumper wire from the receiver. Connect the plus and minus AGC terminals of the receiver to the corresponding terminals at the terminal board on the back of the converter. Refer to Appendix II for recommended AGC modifications to the communications receiver should the unit be lacking the external AGC terminal output.

4. Connect a grounding wire to the converter using the ground lugs on the back terminal board.

5. Connect the communications equipment to be driven by the converter to the audio outputs at the rear terminal board, LINE A and LINE B. These are balanced outputs which appear as a 600 ohms source.

6. Connect the power line cord to a convenient 115 volts, 50/60 cps power source (or 230 volts, 50/60 cps power source if the converter has been modified in accordance with Appendix I).

## Section IV

## OPERATION AND ALIGNMENT

### 1. Controls and Indicators

A description of all controls and indicators incorporated into the RC-288 Receiver Converter is provided in Table I. Each item is listed in the order assigned by its respective designation on the schematic diagrams of figures 3 and 4. All controls are adjustable from the front panel unless otherwise specified.

Table I

Function of Controls and Indicators

| Sym. | Control or Indicator | Function |
|---|---|---|
| | AFC Indicator | Provides a visual indication of the AFC motor action. This becomes especially useful in detecting a slow drift and correction since this rate would not be perceptible in the movement of the DRIFT CORRECTION knob. |
| C-81 | DRIFT CORRECTION | Indicates positive or negative drift of the carrier. The drift correction scale has a range of ±2 kc with calibration marks in 500 cps intervals. |
| I-1 | POWER (red) | Indicates when line power is applied to the primary side of power transformer T-11. |
| I-2 | ALARM (white) | Indicates when the AFC squelch circuit has disabled the associated motor drive circuit. |

Table I (Cont'd)

Function of Controls and Indicators

| Sym. | Control or Indicator | Function |
|---|---|---|
| M-1 | SET CARRIER Meter | Indicates the filtered carrier signal level. The meter and the carrier meter diode circuit elements have been designed in a manner such that a reading of 1.0 (red indication at mid-scale) on the meter indicates normal carrier signal level for correct operation of the Receiver Converter. |
| M-2 | VU Meter | Volume indicator used in conjunction with MONITOR SELECT switch S-3 for measuring the audio level of either output line, A or B. |
| R-1 | Input Level Adj. (Chassis adjustment) | Sets the level of the I-F input from the communications receiver. |
| R-33 | LINE GAIN A | Controls the audio level of LINE A at the output terminals on the rear of the chassis. |
| R-60 | LINE GAIN B | Controls the audio level of LINE B at the output terminals on the rear of the chassis. |
| R-70 | MONITOR GAIN | Controls the audio level at the MONITOR jack of either line selected for monitoring by switch S-3. |
| R-75 | CARRIER COMPENSATION | Compensates for reduced carrier signals. This control is continuously variable from 0 db thru 20 db. The standard values of carrier reduction used in single sideband transmission are minus 10 db and minus 20 db. |
| R-90 | Squelch Threshold (mounted on TB-8 behind M-1) | Sets the minimum carrier level which will activate the squelch relay to disable the AFC circuit under conditions of loss of carrier. |

Table I (Cont'd)

Function of Controls and Indicators

| Sym. | Control or Indicator | Function |
|---|---|---|
| R-171 | I-F GAIN | Adjusts the gain of the receiver being fed to the Receiver Converter. |
| S-1 | POWER switch | Applies line power to the primary winding of power transformer T-11. |
| S-2 | SIDEBAND SELECTOR | Provides interchangeability of the signals appearing at the outputs of Lines A and B. In the counterclockwise position, the output of Line A is the USB signal and the output of Line B is the LSB signal. When switch S-2 is in the clockwise position, the output of Line A is the LSB signal while the output of Line B is the USB position. |
| S-3 | MONITOR SELECT | Selects either Line A or Line B for monitoring purposes. This control also feeds the selected audio signal to the VU meter circuitry for a visual aid in setting the levels of either line. |
| S-4 | SQUELCH ON-OFF | Controls the operation of the Squelch Amplifier V11. When the switch is in the ON position, the squelch circuit will operate under the conditions preset by Squelch Threshold R-90. The OFF position will cause the Squelch Amplifier to be inoperative. |
| S-5 | CARRIER INSERTION | Selects the 100 kc signal to be used by Product Detectors V4 and V6. In the Local Carrier (LC) position, the crystal controlled carrier from Local Oscillator V15 is fed to the detectors. When the switch is in the Reconditioned Carrier (RC) position, the filtered and limited carrier from the receiver is used for detection. |

Table I (Cont'd)

Function of Controls and Indicators

| Sym. | Control or Indicator | Function |
|---|---|---|
| S-6 | AFC ON-OFF | Used to disable the AFC circuit to permit tuning of the receiver. In the ON position, the AFC Motor Drive Circuit will be activated to compensate for any frequency shift within ±2 kc. |
| S-7 | VU RANGE | Selects 0 db or + db sensitivity of VU Meter M-2. The OFF position will ground the meter, preventing it from functioning. This is a protective device which is intended for use while tuning the receiver to a new frequency. |
| S-8 | AGC SELECTOR | Permits selection of source of AGC operating potential. This voltage can be obtained from the reconditioned carrier (CAR), upper sideband signal (USB), lower sideband signal (LSB), or the total signal (DSB). |

2. Operating Instructions

The operating instructions for the RC-288 Receiver Converter are as described in the following procedure:

1. Place the POWER switch in the ON position. The POWER indicating lamp will be energized. Time-delay Relay RY2 will become energized after a period of 15 seconds, supplying B+ voltage to the Converter. Allow at least 15 minutes for the Converter and any associated equipment to warm up.

2. Place the DRIFT CORRECTION knob in the zero position, AGC SELECTOR in the DSB position, AFC switch and AFC SQUELCH switch in the OFF position and the VU RANGE switch in the OFF position.

3. Position LINE GAIN A and LINE GAIN B approximately mid-position.

4. Place the CARRIER COMPENSATION control in a position corresponding to the carrier level of the signal to be received; ie, the zero position for double sideband reception, and the 10 or 20 position for single sideband reception, depending on the amount of carrier suppression.

5. Place the CARRIER INSERTION switch in the LC position.

6. Place the SIDEBAND SELECTOR in the desired position. In the counterclockwise position, the upper sideband is on the LINE A output and the lower sideband is fed to the LINE B output. The alternate position will interchange the outputs placing the upper sideband on the LINE B output and the lower sideband on the LINE A output.

7. Position the MONITOR GAIN control fully counterclockwise. Place the MONITOR SELECT control in the desired position for monitoring either line.

8. Plug headphones into the MONITOR jack (600 ohms impedance).

9. Tune the communications receiver for the desired signal. When the signal is properly tuned, the carrier will lie within the carrier filter and the SET CARRIER meter on the Receiver Converter will indicate accordingly. It may be desirable to monitor the receiver by increasing the MONITOR GAIN during tuning.

10. Once the receiver is properly tuned, place the Converter AFC switch in the ON position.

11. Select the desired AGC control voltage using the AGC SELECTOR.

NOTE

The I-F GAIN control will not adjust the receiver intermediate frequency when the AGC SELECTOR is in the DSB position. Refer to the Schematic Diagram of figure 3.

12. Adjust the I-F GAIN control until the SET CARRIER meter reads mid-scale. It may be necessary to adjust Input Level control R-1 on the chassis (refer to paragraph 3-i).

13. Place the MONITOR SELECT switch in the LINE A position. Place the VU RANGE control in the + 10 position and adjust LINE GAIN A for the desired audio output level.

14. Place the MONITOR SELECT switch in the LINE B position. Adjust LINE GAIN B to the same audio output level as obtained in step 13.

15. Place the AFC and the AFC SQUELCH switches in the ON positions.

16. Place the CARRIER INSERTION switch in the RC position if the reception is sensitive to frequency error. Otherwise, leave the CARRIER INSERTION switch in the LC position.

## 3. Alignment and Adjustment Procedures

The following instructions provide a step-by-step procedure for the overall alignment of the RC-288 Receiver Converter. This alignment procedure may be accomplished with the use of a VTVM similar to the Hewlett Packard model 400-C, a frequency generator capable of generating 600 kc and an oscilloscope which is to be used for monitoring purposes in conjunction with the VTVM.

a. I-F Transformer T-2. Transformer T-2 is a double-tuned I-F transformer which is to be tuned to an intermediate frequency of 100 kc. Proceed as follows for this alignment:

1. Remove R-F Oscillator tube V25.

2. Connect a signal generator, tuned to 100 kc, to the third grid, pin 7, of Mixer V1.

3. Connect a VTVM to the grid, pin 1, of I-F Amplifier V2.

4. Connect a damping network, consisting of a 22 k ohms resistor in series with a 0.01 mfd condenser, across secondary terminals 3 and 4 of transformer T-2.

5. Tune the primary slug of transformer T-2 for a maximum indication on the VTVM.

6. Remove the damping network from the secondary winding and connect it across primary terminals 1 and 2.

7. Tune the secondary slug of transformer T-2 for a maximum indication on the VTVM.

8. Remove the damping network from the primary of T-2 and the VTVM from the grid of V2.

9. Remove the signal generator from Mixer V1.

b. Local Carrier Oscillator V15. The local Carrier Oscillator is crystal controlled to generate a stable 100 kc signal. This oscillator is aligned and set as indicated in the following procedure:

1. Place the CARRIER INSERTION switch in the LC position.

2. Connect the VTVM to pin 1 of V14.

3. Adjust the tuning slug of coil T-8 to obtain a maximum reading on the VTVM. Back off the adjustment of T-8 slightly.

4. Connect a frequency generator to pin 7 of Mixer V-1. Adjust the generator for set carrier level and frequency as indicated on the SET CARRIER meter (100 kc).

5. Connect a set of headphones to the MONITOR jack and adjust the MONITOR GAIN.

6. Zero beat Local Carrier Oscillator V-15 to the 100 kc input carrier by adjusting Capacitor C52.

7. Remove the VTVM from V14-1, the frequency generator from V1-7 and the monitor headphones.

c. Frequency Multiplier V13. This circuit consists of a high-gain amplifier, V13, and transformer T-6 which is tuned to the third harmonic of the reconditioned carrier. Proceed as follows for tuning T-6:

1. Remove LC oscillator tube V15.

2. Connect a frequency generator to pin 7 of Mixer V1. Adjust the generator for set carrier level and frequency as indicated on the SET CARRIER meter (100 kc).

3. Connect the VTVM across output terminals 3 and 4 of transformer T-6. Connect the oscilloscope to the VTVM to provide a visual aid in tuning.

4. Tune the primary and secondary slugs for a maximum reading on the VTVM.

NOTE

Be sure transformer T-6 is tuned to the third harmonic by observing the signal pattern on the monitor scope.

5. Disconnect the VTVM from the transformer output and the frequency generator from V1-7.

6. Replace LC Oscillator tube V15.

d. Frequency Multiplier V14. Transformer T-7 and the associated circuitry are primarily identical with that described in the previous paragraph. Proceed as follows for the tuning process of T-7:

1. Connect the VTVM to output terminal 1 of transformer T-7. Connect the oscilloscope to the VTVM for monitoring purposes.

2. Adjust the tuning slug of T-7 to obtain a maximum indication on the VTVM.

NOTE

Be sure Transformer T-7 is tuned to the third harmonic by observing the signal pattern on the monitor scope.

3. Disconnect the VTVM from Transformer T-7.

e. AGC Bandpass Transformer T-9. Bandpass Transformer T-9 is a single tuned transformer which is to be tuned to an intermediate frequency of 100 kc. The tuning procedure for T-9 is as follows:

1. Connect a signal generator to pin 7 of Mixer V-1. Adjust the generator for set carrier level and frequency as indicated on the SET CARRIER meter (100 kc).

2. Place the AGC SELECTOR in the CAR position.

3. Connect the VTVM to terminal 3 of transformer T-9.

4. Adjust the tuning slug of T-9 to obtain a maximum indication on the VTVM.

5. Disconnect the VTVM from T-9 and the signal generator from V1-7.

f. R-F Oscillator Coil T-10. The R-F Oscillator is continuously tunable over the range of 540 kc through 610 kc by means of coil T-10. The setting of the R-F frequency is obtained in the following manner:

1. Replace R-F Oscillator tube V25. This tube was previously removed during the alignment procedure described in paragraph "a".

2. Place the AFC switch in the OFF position.

3. Position the DRIFT CORRECTION control at zero.

4. Connect a set of headphones to the MONITOR jack and adjust the MONITOR GAIN.

5. Connect a signal generator, tuned to the intermediate frequency of the receiver, to pin 7 of Mixer V-1.

6. Zero beat the R-F Oscillator against the signal generator by adjusting the tuning slug of coil T-10.

7. Remove the signal generator from V-17. Remove the monitor phones.

g. I-F Input Transformer T-1. Proceed as follows to align the input transformer to the intermediate frequency of the receiver.

1. Connect a signal generator, tuned to the receiver intermediate frequency, to I-F INPUT jack J-1 on the rear panel of the chassis.

2. Connect the VTVM to pin 7 of Sideband Cathode Follower V3.

3. Adjust the tuning slug of T-1 to obtain a maximum indication on the VTVM.

4. Remove the VTVM from V3-7. Remove the signal generator from jack J-1.

h. Input Level Adjust R1. This control will compensate for any gain differences in the various receivers with which the Receiver Converter may be connected. Adjust the setting of Input Level Adj. R1 in the following manner:

1. Connect an R-F signal generator to the antenna terminal of the associated receiver.

2. Connect the receiver to the Receiver Converter. Place the POWER switch in the ON position.

3. Place the AGC SELECTOR in the DSB position.

4. Place the CARRIER INSERTION switch in the RC position.

5. Place the AFC and the AFC SQUELCH switches in the OFF positions.

6. Set the CARRIER COMPENSATION control to zero.

7. Set the DRIFT CORRECTION control to zero.

8. Feed in a 1 millivolt R-F signal and tune in the receiver to this frequency.

9. Adjust Input Level Adj. R1 to obtain SET CARRIER as indicated on the meter of the Receiver Converter. Input Level Adj. R1 is a chassis adjustment located near the rear along the left-hand side.

10. Remove the R-F signal generator from the receiver antenna terminal and connect the communications antenna to the receiver.

(1) ALTERNATE METHOD OF ADJUSTING R1. If an R-F signal generator is not available for the adjustment described in paragraph "h", proceed as follows to adjust Input Level Adjust R1:

1. Connect the receiver and the Receiver Converter for normal operation and apply power.

2. Set all controls to the positions prescribed in the preceding description.

3. Tune in the receiver to the desired frequency observing the indication on the SET CARRIER meter.

4. Position the CARRIER COMPENSATION control in a position corresponding to the carrier level of the received signal.

5. Adjust Input Level Adj. R1 to obtain SET CARRIER as indicated on the meter of the Receiver Converter.

i. Squelch Threshold Adjust R90. Squelch Threshold potentiometer R90 is used to set the minimum carrier level which will activate the squelch relay to disable the AFC circuit. Adjust potentiometer R90 as follows:

1. Tune in the receiver and operate the Receiver Converter as described under the Operating Instructions.

2. With the AFC and the AFC SQUELCH switches in the ON positions, lower the receiver gain and note relative level on the SET CARRIER meter where the ALARM becomes illuminated. This will occur when the AFC circuit is disabled.

3. Adjust potentiometer R90, located on terminal board TB8 on the back of the SET CARRIER meter, to increase or lower the point of cutoff. Normal threshold cutoff (-20 db) lies between 0.1 and 0.2 as indicated on the SET CARRIER meter.

## Section V

## MAINTENANCE

### 1. Tube Socket Voltages and Terminal Resistance

All tube socket voltage and resistance measurements presented in Table II were recorded with the converter controls set in the following positions:

| | | |
|---|---|---|
| CARRIER COMPENSATION | - | Zero |
| I-F GAIN | - | Fully Counterclockwise |
| MONITOR GAIN | - | Fully Counterclockwise |
| AFC | - | ON |
| AFC SQUELCH | - | ON |
| LINE GAIN A | - | Fully Clockwise |
| SIDEBAND SELECTOR | - | Either Position |
| LINE GAIN B | - | Fully Clockwise |
| DRIFT INDICATOR | - | Zero |
| CARRIER INSERTION | - | LC |
| AGC SELECTOR | - | CAR |
| MONITOR SELECTOR | - | Either Position |
| VU RANGE | - | OFF |
| POWER | - | ON (Remove power for all resistance measurements) |
| Input Signal Level | - | Set Carrier (red indication on M-1) |
| Test Meter | - | RCA VoltOhmyst WV-97A |
| Test Meter | - | H.P. 400 C. |

Table II

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| VI MIXER | 1 | 2.2K | 0 | 3.0 |
| 6AS6 | 2 | 300 | 2.5 | - |
| | 3 | 0 | 6.3 VAC | - |
| | 4 | 0 | 0 | - |
| | 5 | 42 K | 112 | 4.1 |
| | 6 | 33 K | 112 | - |
| | 7 | 3 K | 0 | 0.05 |
| V2 | 1 | 25 K | 0 | 0.038 |
| I-F AMP. | 2 | 680 | 1.5 | - |
| 6AU6 | 3 | 0 | 6.3 VAC | - |
| | 4 | 0 | 0 | - |
| | 5 | 140 K | 88 | 2.0 |
| | 6 | 330 K | 78 | - |
| | 7 | 680 | 1.5 | - |
| V3 | 1 | 23 K | 210 | - |
| SIDEBAND | 2 | 360 K | 0 | 1.9 |
| C.F. | 3 | 1 K | 8 | 1.25 |
| 12AU7 | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 25 K | 205 | - |
| | 7 | 360 K | 0 | 1.9 |
| | 8 | 1 K | 7.5 | 1.25 |
| | 9 | 0 | 0 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V4 | 1 | 850 | 4.4 | - |
| PROD | 2 | 100 K | 180 | - |
| DETECTOR | 3 | 300 K | 0 | 2.25 |
| USB | 4 | 0 | 0 | - |
| 7360 | 5 | 0 | 6.3 VAC | - |
| | 6 | 120 K | 65 | 3.8 |
| | 7 | 120 K | 75 | - |
| | 8 | 17 K | 37 | - |
| | 9 | 25 K | 37 | - |
| V5 | 1 | 125 K | 104 | - |
| AUDIO | 2 | 32 K | 0 | - |
| AMP | 3 | 3 K | 4.8 | - |
| 12AU7 | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 17 K | 260 | - |
| | 7 | 53 K | 0 | - |
| | 8 | 1 K | 9.2 | - |
| | 9 | 0 | 0 | - |
| V6 | 1 | 820 | 4.4 | - |
| PROD | 2 | 100 K | 180 | - |
| DETECTOR | 3 | 300 K | 0 | 2.25 |
| LSB | 4 | 0 | 0 | - |
| 7360 | 5 | 0 | 6.3 VAC | - |
| | 6 | 120 K | 68 | 3.2 |
| | 7 | 120 K | 75 | - |
| | 8 | 17 K | 31 | - |
| | 9 | 25 K | 30 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V7 | 1 | 125 K | 102 | - |
| AUDIO | 2 | 32 K | 0 | - |
| AMP | 3 | 3 K | 4.8 | - |
| 12AU7 | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 17 K | 260 | - |
| | 7 | 53 K | 0 | - |
| | 8 | 1 K | 8.8 | - |
| | 9 | 0 | 0 | - |
| V8 | 1 | 17 K | 255 | - |
| MONITOR | 2 | NC | NC | NC |
| AMP | 3 | 0 | 6.3 VAC | - |
| 6C4 | 4 | 0 | 0 | - |
| | 5 | NC | NC | NC |
| | 6 | 0 | 0 | - |
| | 7 | 1 K | 9 | - |
| | 8 | | | |
| V9 | 1 | 25 K | 190 | 0.82 |
| CARRIER | 2 | NC | NC | NC |
| AMP | 3 | 0 | 6.3 VAC | - |
| 6C4 | 4 | 0 | 0 | - |
| | 5 | 25 K | 190 | 0.82 |
| | 6 | 10 K | 0 | 0.15 |
| | 7 | 1 K | 6.8 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V10 | 1 | 60 K | 110 | 6.5 |
| CARRIER | 2 | 8.2K | 0 | 0.59 |
| AMP & | 3 | 1 K | 3.7 | - |
| SQUELCH | 4 | 0 | 6.3 VAC | - |
| DRIVER | 5 | 0 | 6.3 VAC | - |
| 12AU7 | 6 | 60 K | 110 | 41.0 |
| | 7 | 90 K | -0.6 | 6.1 |
| | 8 | 1 K | 3.6 | 2.3 |
| | 9 | 0 | 0 | - |
| V11 | 1 | 17 K | 265 | - |
| SQUELCH | 2 | 480 K | -7.8 | - |
| AMP | 3 | 350 | 0 | - |
| 12AX7 | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | NC | NC | NC |
| | 7 | NC | NC | NC |
| | 8 | NC | NC | NC |
| | 9 | 0 | 0 | - |
| V12 | 1 | 60 K | 200 | 18.0 |
| LIMITER | 2 | 50 K | 0 | 0.64 |
| 12AX7 | 3 | 750 | 1.2 | - |
| | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 60 K | 200 | 5.2 |
| | 7 | 50 K | 0 | 0.54 |
| | 8 | 680 | 1.2 | - |
| | 9 | 0 | 0 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V13 | 1 | 101 K | -15 | 17.5 |
| I-F AMP. | 2 | 100 | 1.0 | - |
| (FREQUENCY | 3 | 0 | 6.3 VAC | - |
| MULTIPLIER) | 4 | 0 | 0 | - |
| 6AU6 | 5 | 17 K | 260 | 67.0 |
| | 6 | 57 K | 165 | - |
| | 7 | 100 | 1.0 | - |
| V14 | 1 | 220 K | -13.4 | 11.5 |
| I-F AMP. | 2 | 100 | 1.0 | - |
| (FREQUENCY | 3 | 0 | 6.3 VAC | - |
| MULTIPLIER) | 4 | 0 | 0 | - |
| 6AU6 | 5 | 18 K | 260 | 18.0 |
| | 6 | 58 K | 195 | - |
| | 7 | 100 | 1.0 | - |
| V15 | 1 | 66 K | 92 | 12.5 |
| LOCAL | 2 | 0 | 0 | - |
| OSCILLATOR | 3 | 1.5K | 1.75 | 0.75 |
| 12AT7 | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 70 K | 92 | - |
| | 7 | 100 K | -2.1 | 10.5 |
| | 8 | 1.5K | 4.2 | 4.1 |
| | 9 | 0 | 0 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V16 | 1 | 92 K | 170 | - |
| DC AMP | 2 | 600 K | -0.15 | - |
| 5751 | 3 | 100 | 0.45 | - |
| | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 92 K | 170 | - |
| | 7 | 600 K | -0.34 | - |
| | 8 | 100 | 0.4 | - |
| | 9 | 0 | 0 | - |
| V17 | 1 | 50 K | 190 | - |
| DC AMP | 2 | 210 K | -28 | - |
| 5751 | 3 | 0 | 0 | - |
| | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 50 K | 134 | - |
| | 7 | 450 K | -8 | - |
| | 8 | 0 | 0 | - |
| | 9 | 0 | 0 | - |
| V18 | 1 | 15 K | 345 | - |
| MOTOR | 2 | 300 K | 150 | - |
| DRIVE | 3 | Inf. | 185 | - |
| PHASE 1 | 4 | 0 | 6.3 VAC | - |
| 5814 | 5 | 0 | 6.3 VAC | - |
| | 6 | 15 K | 345 | - |
| | 7 | 300 K | 150 | - |
| | 8 | Inf. | 185 | - |
| | 9 | 0 | 0 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V19 | 1 | 15 K | 345 | - |
| MOTOR | 2 | 300 K | 124 | - |
| DRIVE | 3 | Inf. | 170 | - |
| PHASE 1 | 4 | 0 | 6.3 VAC | - |
| 5814 | 5 | 0 | 6.3 VAC | - |
| | 6 | 15 K | 345 | - |
| | 7 | 300 K | 124 | - |
| | 8 | Inf. | 170 | - |
| | 9 | 0 | 0 | - |
| V20 | 1 | 50 K | 170 | - |
| DC AMP | 2 | 400 K | -28 | - |
| 5751 | 3 | 0 | 0 | - |
| | 4 | 0 | 6.3 VAC | - |
| | 5 | 0 | 6.3 VAC | - |
| | 6 | 50 K | 145 | - |
| | 7 | 480 K | -8.8 | - |
| | 8 | 0 | 0 | - |
| | 9 | 0 | 0 | - |
| V21 | 1 | Inf. | 130 | - |
| MOTOR | 2 | 450 K | -26 | - |
| DRIVE | 3 | 0 | 0 | - |
| PHASE 2 | 4 | 0 | 6.3 VAC | - |
| 5814 | 5 | 0 | 6.3 VAC | - |
| | 6 | Inf. | 125 | - |
| | 7 | 450 K | -26 | - |
| | 8 | 0 | 0 | - |
| | 9 | 0 | 0 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V22 | 1 | Inf. | 133 | - |
| MOTOR | 2 | 450 K | -28 | - |
| DRIVE | 3 | 0 | 0 | - |
| PHASE 2 | 4 | 0 | 6.3 VAC | - |
| 5814 | 5 | 0 | 6.3 VAC | - |
| | 6 | Inf. | 133 | - |
| | 7 | 450 K | -28 | - |
| | 8 | 0 | 0 | - |
| | 9 | 0 | 0 | - |
| V23 | 1 | - | -5 | - |
| AGC | 2 | 420 K | -20 | 5.9 |
| GATE | 3 | 0 | 6.3 VAC | - |
| 6AL5 | 4 | 0 | 0 | - |
| | 5 | - | -12 | 11.5 |
| | 6 | NC | NC | NC |
| | 7 | 4.7 MEG | -5.7 | - |
| V24 | 1 | ~~300~~ K | 0 | 0.22 |
| AGC | 2 | 470 | 1.2 | - |
| AMP | 3 | 0 | 6.3 VAC | - |
| 6AU6 | 4 | 0 | 0 | - |
| | 5 | 150 K | 70 | 12.5 |
| | 6 | 300 K | 67 | - |
| | 7 | 470 | 1.2 | - |

Table II (Cont'd)

Voltage and Resistance Measurements

| Tube | Pin No. | Resistance Ohms | D. C. Volts | R. F. Volts |
|---|---|---|---|---|
| V25 | 1 | 26 K | 150 | 63.0 |
| RF | 2 | NC | NC | NC |
| OSCILLATOR | 3 | 0 | 6.3 VAC | - |
| | 4 | 0 | 0 | - |
| 6C4 | 5 | 25 | NC | NC |
| | 6 | 100 K | -70 | 59.0 |
| | 7 | 0 | 0 | - |

Section VI

# PARTS CATALOG

## 1. General

This section provides a complete list of the components used in the RC-288 Receiver Converter. Included in this parts catalog are datum referring to the reference item by part number, description, manufacturer's symbol and catalog number and the total number of part references. Equally rated components may be substituted.

Table III consists of a cross reference of manufacturer's symbols and the corresponding manufacturing company. All manufacturers are listed in the alphabetical of their associated symbols.

Table III

Manufacturers' Symbols

| Sym. | Manufacturer | Sym. | Manufacturer |
|---|---|---|---|
| A | San Fernando Electric | CMC | Clarostat Mfg. Co., Inc. |
| AB | Allen-Bradley Co. | CMG | Cinch Mfg. Co. |
| CAGK | Amperite Co. | CMI | Molded Insulation Co. |
| CAYZ | Dial Light Co. | CNA | National Co., Inc. |
| CBN | Centralab | COM | Ohmite Mfg. Co. |
| | | CRC | R.C.A. Mfg. Co. |
| CD | Cornell-Dubilies Electronics | CSF | Sprague Products Co. |
| CER | Erie Resistor Corp. | E | Grade Mfg. Corp. |
| CFA | Bussman Mfg. | J | Arco Electronics, Inc. |
| CFX | Freed Transformer Co. | K | Micamold Radio Corp. |
| CGO | Texas Instruments, Inc. | | |
| CHS | Sylvania Electric Co. | M | Mars Electronics |
| CIR | International Resistance Co. | N | Carling Electric, Inc. |
| CJA | Millen, James, Mfg. Co., Inc. | O | Caddell-Burns |
| CKU | Kurman Electric Co. | P | Reeves Hoffman Corp. |
| CMA | Mallory, P.R. | UTC | United Transformer Co. |

2. Parts List

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| B-1 | Motor and Gear Drive Assembly | M D-RC288-009 | | 1 |
| C-1 | Condenser-0.1 mfd, 400 V paper with lug terminals | A 25M4104-AG | C 1, 3, 4, 5, 6, 8, 11 13, 14, 16, 18, 21, 24, 25, 26, 28, 30, 34, 35, 36, 38, 43, 44, 46, 48, 49, 50, 55, 57, 74, 75, 76, 77, 86 | 34 |
| C-2 | Condenser, 200μμf silver mica | J CM-15-E-201-J | | 1 |
| C-3 | Same as C1 | | | |
| C-4 | Same as C1 | | | |
| C-5 | Same as C1 | | | |
| C-6 | Same as C1 | | | |
| C-7 | Condenser, .001μμf ceramic, 20% | CBN D6-102 | C 7, 12, 41, 47, 54, 66, 71, 78 | 9 |
| C-8 | Same as C1 | | | |
| C-9 | Condenser, 0.01 mfd, 400V molded tubular | K 473-27 | C 9, 10, 22, 23, 33, 37, 45, 90, 91 | 9 |
| C-10 | Same as C9 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| C-11 | Same as C1 | | | |
| C-12 | Same as C7 | | | |
| C-13 | Same as C1 | | | |
| C-14 | Same as C1 | | | |
| C-15 | Condenser, 100μμf silver mica | J CM-15-E-101-J | C 15, 27, 42, 53, 82 83 | 6 |
| C-16 | Same as C1 | | | |
| C-17 | Condenser, 0.47 mfd metalized paper with lug terminals | A 26M4474-EFG | C 17, 29, 39, 72, 73 | 5 |
| C-18 | Same as C1 | | | |
| C-19 | Condenser, 0.05 mfd, 400 V molded tubular | CSF 4TM-S5 | C 19, 31, 51, 79 | 4 |
| C-20 | Condenser, 25mfd, 25 V dry electrolytic "ATOM" | CSF TVA-1205 | C 20, 32 | 2 |
| C-21 | Same as C1 | | | |
| C-22 | Same as C9 | | | |
| C-23 | Same as C9 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| C-24 | Same as C1 | | | |
| C-25 | Same as C1 | | | |
| C-26 | Same as C1 | | | |
| C-27 | Same as C15 | | | |
| C-28 | Same as C1 | | | |
| C-29 | Same as C17 | | | |
| C-30 | Same as C1 | | | |
| C-31 | Same as C19 | | | |
| C-32 | Same as C20 | | | |
| C-33 | Same as C9 | | | |
| C-34 | Same as C1 | | | |
| C-35 | Same as C1 | | | |
| C-36 | Same as C1 | | | |
| C-37 | Same as C9 | | | |
| C-38 | Same as C1 | | | |
| C-39 | Same as C17 | | | |
| C-40 | Same as C7 | | | |
| C-41 | Same as C7 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| C-42 | Same as C15 | | | |
| C-43 | Same as C1 | | | |
| C-44 | Same as C1 | | | |
| C-45 | Same as C9 | | | |
| C-46 | Same as C1 | | | |
| C-47 | Same as C7 | | | |
| C-48 | Same as C1 | | | |
| C-49 | Same as C1 | | | |
| C-50 | Same as C1 | | | |
| C-51 | Same as C19 | | | |
| C-52 | Condenser, variable 7μμf to 45μμf, ceramic trimmer | CER Style TS2A No. TS-E | C 52 | 1 |
| C-53 | Same as C15 | | | |
| C-54 | Same as C7 | | | |
| C-55 | Same as C1 | | | |
| C-56 | Condenser, 820μμf Dur-mica | J DM-15-821-K | C 56 | 1 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| C-57 | Same as C1 | | | |
| C-58 | Condenser, 680μμf, Dur-mica | J DM-15-681-J | C 58, 59 | 2 |
| C-59 | Same as C58 | | | |
| C-60 | Condenser, 50μμf silver mica | J CM-15-E-500-J | C 60, 61 | 2 |
| C-61 | Same as C60 | | | |
| C-62 | Condenser, 500μμf silver mica | J CM-15-E-501-J | C 62, 63, 64, 65, 67, 68, 69, 70 | 8 |
| C-63 | Same as C62 | | | |
| C-64 | Same as C62 | | | |
| C-65 | Same as C62 | | | |
| C-66 | Same as C7 | | | |
| C-67 | Same as C62 | | | |
| C-68 | Same as C62 | | | |
| C-69 | Same as C62 | | | |
| C-70 | Same as C62 | | | |
| C-71 | Same as C7 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| C-72 | Same as C17 | | | |
| C-73 | Same as C17 | | | |
| C-74 | Same as C1 | | | |
| C-75 | Same as C1 | | | |
| C-76 | Same as C1 | | | |
| C-77 | Same as C1 | | | |
| C-78 | Same as C7 | | | |
| C-79 | Same as C19 | | | |
| C-80 | Condenser, 10μf 150 V, dry electrolytic | CSF TVA-1406 | C 80 | 1 |
| C-81 | Refer to B-1 Motor and Gear Drive Assembly | CNA SA-9507 | | |
| C-82 | Same as C15 | | | |
| C-83 | Same as C15 | | | |
| C-84 | Condenser, 33μμf N750 | CER TC7-33 | C 84 | 1 |
| C-85 | Condenser, 220μμf NPO | CER TCO-220 | C 85 | 1 |
| C-86 | Same as C1 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| C-87 | Condenser, Electrolytic Twist lock Single Unit 15μf at 450 VDC | CSF TVL-1709 | C 87 | 1 |
| C-88 | Condenser, 0.25μf 600 WVDC, Mylar Tubular | CD PM6P25 | C 88 | 1 |
| C-89 | Condenser, Electrolytic Twist lock Quad unit 4X20 μf at 475 V | CSF TVL-4834 | C 89 | 1 |
| C-90 | Same as C9 | | | |
| C-91 | Same as C9 | | | |
| | Closed-top insulating tube for C87 for 1" by 2" can | CSF HKT-1 | | 1 |
| C-92 | 1.0 μf 150 VDC | CD | C 92 | 1 |
| CR-1 | Diode, IN34 Germanium | | CR 1, CR2, CR3 | 3 |
| CR-2 | Same as CR1 | | | |
| CR-3 | Same as CR1 | | | |
| CR-4 | Diode, IN459 Crystal | CHS | CR 4, CR5, CR6, CR7, CR9 | 5 |
| CR-5 | Same as CR4 | | | |
| CR-6 | Same as CR4 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| CR-7 | Same as CR4 | | | |
| CR-8 | Diode, IN71 Crystal Variator Plug-in | CHS | CR 8 | 1 |
| CR-9 | Same as CR4 | | | |
| CR-10 | Rectifier, Silicon IN2071 | CGO | CR 10, CR 11, CR 12 CR 13, CR 14, CR 15 CR 16 | 7 |
| CR-11 | Same as CR10 | | | |
| CR-12 | Same as CR10 | | | |
| CR-13 | Same as CR10 | | | |
| CR-14 | Same as CR10 | | | |
| CR-15 | Same as CR10 | | | |
| CR-16 | Same as CR10 | | | |
| F-1 | Fuse, 3 amp AGC, 250V | CFA AGC-3 | F-1 Spare | 2 |
| | Fuse Holder | CFA HKP-H | Fuse Hold Spare | 2 |
| Spare F-1 | Same as F-1 | | | |
| FL-1 | Filter, 100KC USB XTAL | 100KUC | FL-1 | 1 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| FL-2 | Filter, sideband L.P., 0-6KC | | FL2, FL4 | 2 |
| FL-3 | Filter, 100KC LSB XTAL | | FL3 | 1 |
| FL-4 | Same as FL2 | | | |
| FL-5 | Filter, 100KC XTAL, Sym-metrical band-pass | 100KPA | | |
| I-1 | Pilot lamp, neon | NE 51-H | I1, I2 | 2 |
| | Pilot lamp, socket red lens multi-view bayonet | CAYZ 52408-991 | for I1 | 1 |
| I-2 | Same as I1 | | | |
| | Pilot lamp socket white translucent lens multi-view, bayonet | CAYZ 52408-995 | for I2 | 1 |
| J-1 | Connector, BNC | UG 625/U | J1 | 1 |
| J-2 | Phone Jack | CMA SC-1A | J2 | 1 |
| L-1 | Filter Reactor 10 henry, 250ma (DC) | CFX PGC 11 | L1, L2 | 2 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| L-2 | Same as L1 | | | |
| M-1 | Meter-Set Carrier, 0-1ma | M B-RC288-012 | M1 | 1 |
| M-2 | Meter-VU | M B-RC288-013 | M2 | 1 |
| R-1 | Potentiometer, 25K, 1/2 watt, scrdriv. adj. locking type bushing "A" Taper | CIR RQL11-120 | R1 | 1 |
| R-2 | Resistor, 100 ohms 1/2 watt | AB | R2, 28, 104, 113 131, 134 | 6 |
| R-3 | Resistor, 270 ohms 1/2 watt | AB | R3 | 1 |
| R-4 | Resistor, 22K ohms, 1/2 watt | AB | R4, 5, 88 | 3 |
| R-5 | Same as R4 | | | |
| R-6 | Same as R19 | | | |
| R-7 | Resistor, 68K ohms, 1/2 watt | AB | R7, 22, 49 | 3 |
| R-8 | Resistor, 33K ohms, 1/2 watt | AB | R8, 27, 54 | 3 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R-9 | Resistor, 680 ohms, 1/2 watt | AB | R9, 95, 99 | 3 |
| R-10 | Resistor, 270 K ohms, 1/2 watt | AB | R10, 168 | 2 |
| R-11 | Resistor, 2200 ohms, 1/2 watt | AB | R11, 31, 58, 79, 83, 96, 106, 115, 163, 167 | 10 |
| R-12 | Resistor, 100 K ohms, 1/2 watt | AB | R12, 13, 20, 21, 25, 32, 34, 47, 48, 52 59, 61, 69, 103, 109, 164, 169, 174 | 18 |
| R-13 | Same as R12 | | | |
| R-14 | Resistor, 330 K ohms, 1/2 watt | AB | R14, 29, 56, 101, R141 | 5 |
| R-15 | Resistor, 8200 ohms, 1/2 watt | AB | R15, 17, 42, 44, 78 | 5 |
| R-16 | Resistor, 1000 ohms, 1/2 watt | AB | R16, 43, 71, 77, 82 87 | 6 |
| R-17 | Same as R15 | | | |
| R-18 | Resistor, 120 K ohms, 1/2 watt | AB | R18, 45 | 2 |
| R-19 | Resistor, 18K ohms, 1/2 watt | AB | R6, 19, 46 | 3 |
| R-20 | Same as R12 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R-21 | Same as R12 | | | |
| R-22 | Same as R7 | | | |
| R-23 | Resistor, 820 ohms, 1/2 watt | AB | R23, 50 | 2 |
| R-24 | Resistor, 39 ohms, 1/2 watt | AB | R24, 51 | 2 |
| R-25 | Same as R12 | | | |
| R-26 | Resistor, 470K ohms, 1/2 watt | AB | R26, 53, 92, 144 R140 | 5 |
| R-27 | Same as R8 | | | |
| R-28 | Same as R2 | | | |
| R-29 | Same as R14 | | | |
| R-30 | Resistor, 2700 ohms, 1/2 watt | AB | R30, 57 | 2 |
| R-31 | Same as R11 | | | |
| R-32 | Same as R12 | | | |
| R-33 | Potentiometer, 100 K, 2 watts scrdriv. adj. locking type bushing | COM CLU 1041 | R33, 60 | 2 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R-34 | Same as R12 | | | |
| R-35 | Resistor, 390 ohms, 1/2 watt | AB | R35, 62 | 2 |
| R-36 | Resistor, 560 ohms, 1/2 watt | AB | R36, 63 | 2 |
| R-37 | Resistor, 68 ohms, 1/2 watt | AB | R37, 38, 40, 41 64, 65, 67, 68 | 8 |
| R-38 | Same as R37 | | | |
| R-39 | Resistor, 1200 ohms, 1/2 watt | AB | R39, 66 | 2 |
| R-40 | Same as R37 | | | |
| R-41 | Same as R37 | | | |
| R-42 | Same as R15 | | | |
| R-43 | Same as R16 | | | |
| R-44 | Same as R15 | | | |
| R-45 | Same as R18 | | | |
| R-46 | Same as R19 | | | |
| R-47 | Same as R12 | | | |
| R-48 | Same as R12 | | | |
| R-49 | Same as R7 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R-50 | Same as R23 | | | |
| R-51 | Same as R24 | | | |
| R-52 | Same as R12 | | | |
| R-53 | Same as R26 | | | |
| R-54 | Same as R8 | | | |
| R-56 | Same as R14 | | | |
| R-57 | Same as R30 | | | |
| R-58 | Same as R11 | | | |
| R-59 | Same as R12 | | | |
| R-60 | Same as R33 | | | |
| R-61 | Same as R12 | | | |
| R-62 | Same as R35 | | | |
| R-63 | Same as R36 | | | |
| R-64 | Same as R37 | | | |
| R-65 | Same as R37 | | | |
| R-66 | Same as R39 | | | |
| R-67 | Same as R37 | | | |
| R-68 | Same as R37 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R-69 | Same as R12 | | | |
| R-70 | Potentiometer, 100 K ohms, 2 watt | COM CU1041 | R70, 75 | 2 |
| R-71 | Same as R16 | | | |
| R-72 | Resistor, 5600 ohms, 1/2 watt | AB | R72 | 1 |
| R-73 | Resistor, 12 K ohms, 1/2 watt | AB | R73, | 1 |
| R-74 | Resistor, 3600 ohms, 1/2 watt | AB | R74 | 1 |
| R-75 | Same as R70 | | | |
| R-76 | Resistor, 10K ohms, 1/2 watt | AB | R76, 116, 117, 132, 172 | 5 |
| R-77 | Same as R16 | | | |
| R-78 | Same as R15 | | | |
| R-79 | Same as R11 | | | |
| R-80 | Same as R15 | | | |
| R-82 | Same as R16 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R-83 | Same as R11 | | | |
| R-84 | Resistor, 39K ohms, 1/2 watt | AB | R84, 85, 97, 100 105, 114 | 6 |
| R-85 | Same as R84 | | | |
| R-86 | Resistor, 220K ohms, 1/2 watt | AB | R86, 91, 112, 120, 121, 122, 126, 127, 128, 136, 137, 138, 142, 145, 159, 150, 151, 153, 154, 155, 159, 160, 161, 162, 175 | 25 |
| R-87 | Same as R16 | | | |
| R-88 | Same as R4 | | | |
| R-89 | Resistor, 15K ohms, 1/2 watt | AB | R89 | 1 |
| R-90 | Potentiometer, 10 K, ohms, 1/2 watt-scrdriv. adj., locking, "A" taper | CIR RQL 11-116 | R90 | 1 |
| R-91 | Same as R86 | | | |
| R-92 | Same as R26 | | | |
| R-93 | Resistor, 330 ohms, 1/2 watt | AB | R93 | 1 |
| R-94 | Resistor, 47K | AB | R94, 102, 110, 111, 118, 119, 124, 125, 165 | 9 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R-95 | Same as R9 | | | |
| R-96 | Same as R11 | | | |
| R-97 | Same as R84 | | | |
| R-98 | Resistor, 4300 ohms, 1/2 watt | AB | R98 | 1 |
| R-99 | Same as R9 | | | |
| R100 | Same as R84 | | | |
| R101 | Same as R14 | | | |
| R102 | Same as R94 | | | |
| R103 | Same as R12 | | | |
| R104 | Same as R2 | | | |
| R105 | Same as R84 | | | |
| R106 | Same as R11 | | | |
| R107 | Resistor, 1500 ohms, 1/2 watt | AB | R107,108 | 2 |
| R108 | Same as R107 | | | |
| R109 | Same as R12 | | | |
| R110 | Same as R94 | | | |
| R111 | Same as R94 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R112 | Same as R86 | | | |
| R113 | Same as R2 | | | |
| R114 | Same as R84 | | | |
| R115 | Same as R11 | | | |
| R116 | Same as R76 | | | |
| R117 | Same as R76 | | | |
| R118 | Same as R94 | | | |
| R119 | Same as R94 | | | |
| R120 | Same as R86 | | | |
| R121 | Same as R86 | | | |
| R122 | Same as R86 | | | |
| R124 | Same as R94 | | | |
| R125 | Same as R94 | | | |
| R126 | Same as R86 | | | |
| R127 | Same as R86 | | | |
| R128 | Same as R86 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R130 | Resistor, 82K ohms, 1/2 watt | AB | R130,133 | 2 |
| R131 | Same as R2 | | | |
| R132 | Same as R76 | | | |
| R133 | Same as R130 | | | |
| R134 | Same as R2 | | | |
| R135 | Resistor, 82K ohms, 1/2 watt | AB | R135, 148 | 2 |
| R136 | Same as R86 | | | |
| R137 | Same as R86 | | | |
| R138 | Same as R86 | | | |
| R139 | Resistor, 27K ohms, 1/2 watt | AB | R139, 143 | 2 |
| R140 | Same as R26 | | | |
| R141 | Same as R14 | | | |
| R142 | Same as R86 | | | |
| R143 | Same as R139 | | | |
| R144 | Same as R26 | | | |
| R145 | Same as R86 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R146 | Resistor, 3300 ohms, 1/2 watt | AB | R146, 147, R157, 157 | 4 |
| R147 | Same as R146 | | | |
| R148 | Same as R135 | | | |
| R149 | Same as R86 | | | |
| R150 | Same as R86 | | | |
| R151 | Same as R86 | | | |
| R152 | Same as R130 | | | |
| R153 | Same as R86 | | | |
| R154 | Same as R86 | | | |
| R155 | Same as R86 | | | |
| R156 | Same as R146 | | | |
| R157 | Same as R146 | | | |
| R158 | Same as R130 | | | |
| R1 59 | Same as R86 | | | |
| R160 | Same as R86 | | | |
| R161 | Resistor, 180K ohms, 1/2 watt | AB | R173 | 1 |
| R162 | Same as R86 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R163 | Same as R11 | | | |
| R164 | Same as R12 | | | |
| R165 | Same as R94 | | | |
| R166 | Resistor, 470 ohms, 1/2 watt | AB | R166 | 1 |
| R167 | Same as R11 | | | |
| R168 | Same as R10 | | | |
| R169 | Same as R12 | | | |
| R170 | Resistor, 1 megohm, 1/2 watt | AB | R170 | 1 |
| R171 | Potentiometer, 250K ohms, 2 watts | COM CU 2541 | R171 | 1 |
| R172 | Same as R76 | | | |
| R173 | Same as R161 | | | |
| R174 | Same as R12 | | | |
| R175 | Same as R86 | | | |
| R176 | Resistor, 4.7 megohms, 1/2 watt | AB | R176 | 1 |
| R177 | Resistor, 2400 ohms, 2 watts | AB | R177, 178 | 2 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| R178 | Same as R177 | | | |
| R179 | Resistor, 1000 ohms, 25 watts, adjustable, wire wound | CMC VP-25-KA | | |
| R180 | Resistor, 47K ohms, 2 watts | AB | R180 | 1 |
| R181 | Resistor, 1200 ohms, 10 watts | COM "Brown Devil" | | |
| R182 | Resistor, 6000 ohms, 5 watts | COM "Brown Devil" | | |
| RY-1 | Relay, 2000 ohms 2.3ma, SPDT Contact rating 2 amps | CKU 5D1CA40D Plug-in Unit | RY-1 | 1 |
| RY-2 | Time delay relay, 15 sec. delay-5V heater normally open contacts 9 pin miniature | CAGK 5NO15T | RY-2 | 1 |
| RY-3 | Relay 115V AC | | RY-3 | 1 |
| S-1 | Switch, toggle ON-OFF DPST solder lugs | N 2GK63-72 | S-1 | 1 |
| S-2 | Switch assembly<br>Index Assembly 30° indexing, 2" rear shaft | CBN PA-300 | | 1 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| | Steatite switch section 1 pole, 2-12 posit. 30° indexing, non-short | CBN PA-1 (2 req'd) | | 2 |
| S-3 | Switch, Miniature rotary 30° indexing-2 poles, 2 position, 1 section non-shorting ceramic | CBN PA-2003 | S 3 | 1 |
| S-4 | Switch, single pole 2 position, shorting contacts | CBN 1460 | S 4, S5, S6 | 3 |
| S-5 | Same as S-4 | | | |
| S-6 | Same as S-4 | | | |
| S-7 | Switch, single pole, 3 position, shorting contacts | CBN 1461 | S 7 | 1 |
| S-8 | Switch, 2 poles 4 position, shorting contacts, ceramic | CBN PA-2002 | S 8 | 1 |
| T-1 | IF Transformer 455KC 1 mh, single tuned | M B-RC288-016 | T 1 | 1 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| T-2 | IF Transformer 100KC, 13KC BW, Double Tuned | M B-RC288-017 | T-2 | 1 |
| T-3 | Audio Transformer | UTC | T-3, T-4 | 2 |
| T-4 | Same as T-3 | | | |
| T-5 | Audio Transformer, Triode pl't to line | UTC CG-140 | T-5 | 1 |
| T-6 | 300KC Transformer 980μh double tuned | M B-RC288-018 | T-6 | 1 |
| T-7 | 300KC Transformer 980μh, single tuned | M B-RC288-019 | T-7 | 1 |
| T-8 | IF Transformer 100KC, single tuned, osc coil | M B-RC288-020 | T-8 | 1 |
| T-9 | IF Transformer 100KC, single tuned | M B-RC288-021 | T-9 | 1 |
| T-10 | Oscillator coil tunable | M B-RC288-022 | T-10 | 1 |
| T-11 | Power Transformer (Special) | CFX No. 34272 | T-11 | 1 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| V-1 | Tube, 6AS6 | | V1 | 1 |
| V-2 | Tube, 6AU6 | | V2, V13, V14 V24 | 4 |
| V-3 | Tube, 12AU7 | | V3, V5, V7, V10 | 4 |
| V-4 | Tube, 7360 | CRC | V4, V6 | 2 |
| V-5 | Same as V3 | | | |
| V-6 | Same as V4 | | | |
| V-7 | Same as V3 | | | |
| V-8 | Tube, 6C4 | | V8, V9, V25 | 3 |
| V-9 | Same as V8 | | | |
| V-10 | Same as V3 | | | |
| V-11 | Tube, 12AX7 | | V11, V12 | 2 |
| V-12 | Same as V11 | | | |
| V-13 | Same as V2 | | | |
| V-14 | Same as V2 | | | |
| V-15 | Tube, 12AT7 | | V15 | 1 |
| V-16 | Tube, 5751 | | V16, V17, V20 | 3 |
| V-17 | Same as V16 | | | |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| V-18 | Tube 5814 | | V18,V19,V21,V22 | 4 |
| V-19 | Same as V18 | | | |
| V-20 | Same as V16 | | | |
| V-21 | Same as V18 | | | |
| V-22 | Same as V18 | | | |
| V-23 | Tube, 6AL5 | | V23 | 1 |
| V-24 | Same as V2 | | | |
| V-25 | Same as V8 | | | |
| V-26 | Tube, voltage regulating 0A2 | | V26, V28, V29 | 3 |
| V-27 | Tube, Voltage regulating OB2 | | V27 | 1 |
| V-28 | Same as V26 | | | |
| V-29 | Same as V26 | | | |
| Y-1 | Crystal 99.970 KC | P RH51H-79 | Y-1 | 1 |
| | Tube socket, JAN shield base type 9 pin min. | | | 17 |

Parts List (Cont'd)

| Part No. | Description | Mfgr. and Catalog No. | All Part Nos. | Qty. |
|---|---|---|---|---|
| | Tube socket, JAN shield base type 7 pin min. | | | 1 3 |
| | Tube socket, octal with ground lugs | | | 3 |
| | Tube shields | | | as req'd. |

# APPENDIX I

## Modification to RC-288 Receiver Converter for Operation from a 230 VAC Power Source

Since each receiver is initially wired for 115 VAC operation, the modification described below is necessary in order to operate the Converter from a 230 VAC power source. Originally, both halves of the split primary of power transformer T-11 were wired in parallel as shown in figure 4. Therefore, the only change required for 230 VAC operation is to rewire the primary windings in series. This is accomplished in the following manner:

1. Place the Converter on a suitable work area with the bottom side up. Remove the bottom cover.

2. Locate the four-lug terminal strip positioned vertically between condenser C88 (.25 mf/600 VDC) and terminal board TB-7 along the right hand side in the power supply compartment.

### CAUTION

Check that the power line cord is not connected to the power source.

3. Remove the existing jumpers between the first and third terminals and the second and fourth terminals.

4. Install a jumper wire between the second and third terminals on the terminal strip. Refer to the modified schematic in figure A1-1.

5. Remove Relay RY2 (located on top of chassis in forward right-hand corner).

6. Connect power line cord to 230 volts 50/60 cps power outlet. Place the POWER switch S-1 in the ON position. The red POWER indicating lamp, I-1, will illuminate.

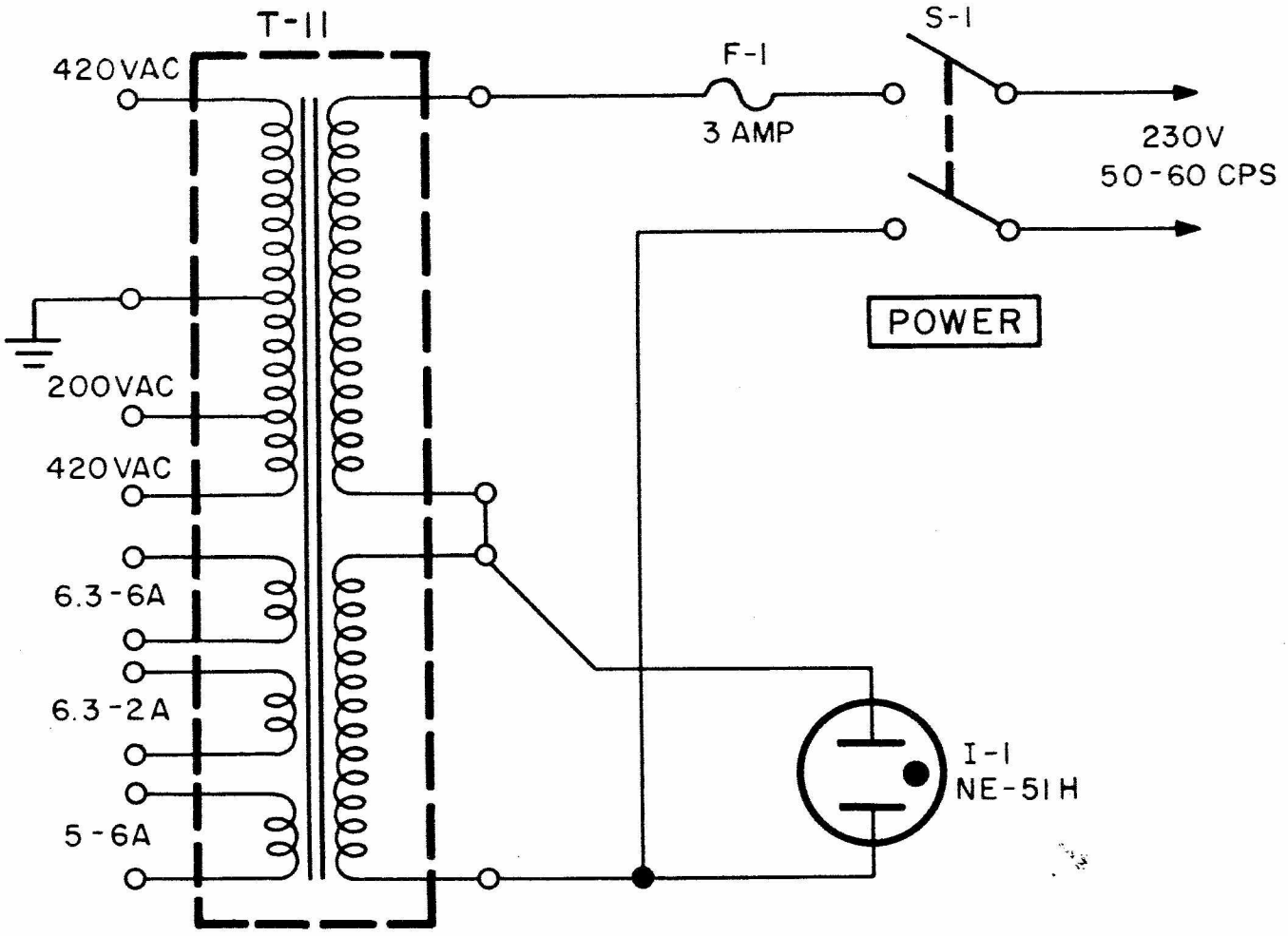



Figure A 1-1. Power Supply Modification for 230 Volts 50/60 cps Power Source Operation

7. Check all line voltages on the primary and secondary of transformer T-11 using a VTVM.

8. Cut off the power by placing switch S-1 in the OFF position and removing the power line cord from its source.

9. Replace the bottom cover using the 21 No. 6-32 by 1/4 inch binding-head screws which were previously removed.

10. Place the Converter top side up.

11. Replace Relay RY2 and its associated shield.

# APPENDIX II

## Communications Receiver AGC Modifications

### A. General AGC Modifications

Included in this Appendix are complete descriptions of specific modifications recommended for three commercial communications receivers. These modifications take into consideration the necessary AGC changes in addition to any I-F or R-F modifications which may be deemed necessary for the complete utilization of the RC-288 Receiver Converter.

In order to obtain proper operation of the combined units, the communications receiver and the Receiver Converter, the receiver AGC should be connected to the AGC terminals on the back of the converter. If the receiver does not have external AGC terminals, it will be necessary to modify the receiver AGC circuitry. In general, this is accomplished by breaking the circuit at the point from the AGC detector to the common feed for all controlled gain stages. Run two leads from this break point to terminal connections on the rear deck of the chassis and indicate which is positive and which is negative. Once this modification is complete, the receiver may be restored to normal operation by placing a jumper between these two AGC terminals.

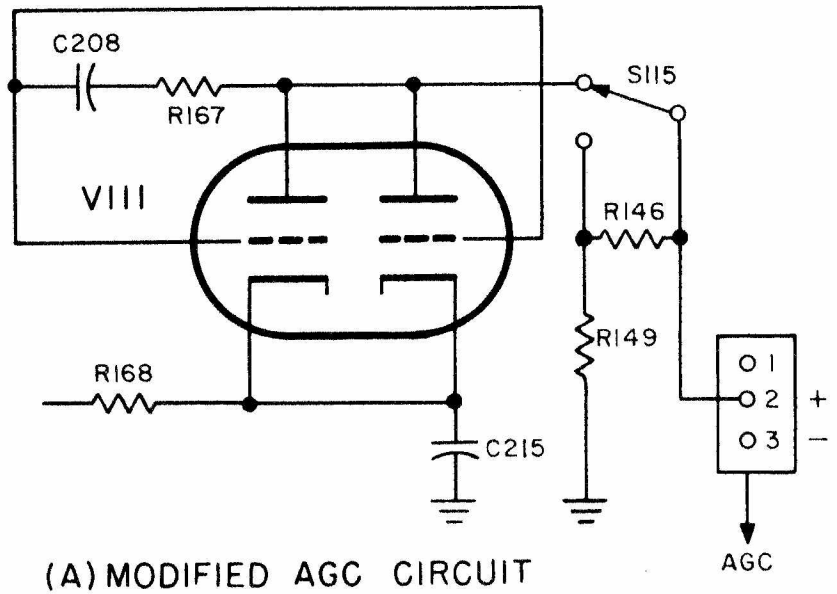
### B. Collins Receiver, Type 51J-1 through 4

1. Break the existing AGC circuit between the receiver AGC switch, S115, and the AGC buss.

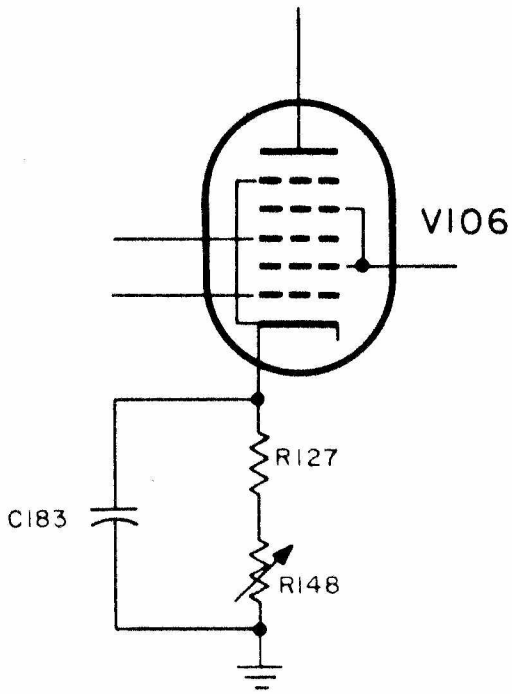
2. Remove and tape the coil connections of Relay K101 from terminals 2 and 3.

3. Connect a wire from AGC switch S115 to terminal 2, figure A2-1A.

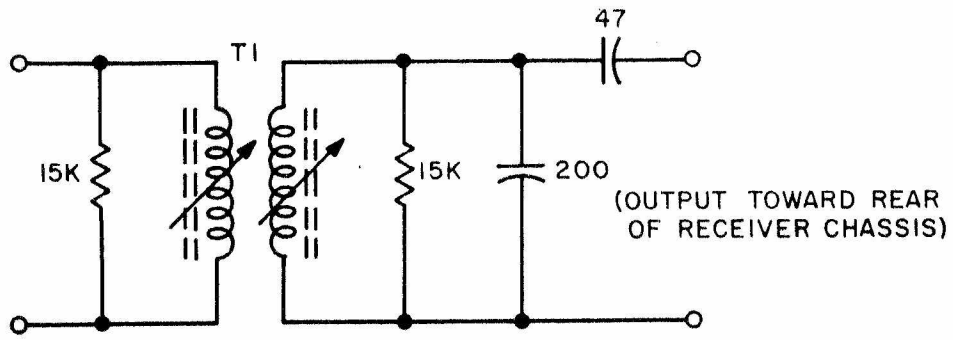
4. Connect a wire from the AGC buss to terminal 3.




(A) MODIFIED AGC CIRCUIT




(B) MODIFIED R.F. GAIN CONTROL CIRCUIT




(C) WIDEBAND TRANSFORMER

Figure A 2-1. Modifications, Collins Receiver, Model 51-J

NOTE

In order to restore the normal operation of the receiver AGC, place a jumper between terminals 2 and 3.

5. Remove the R-F gain control from the AGC circuit and reconnect in the cathode circuit of Mixer V-106. Refer to the associated schematic in figure A2-1B.

6. Replace the mechanical filter in the Collins 51J-4 receiver with the wideband transformer shown in figure A2-1C. This transformer is necessary in order to obtain the full 6 kc fidelity of the crystal filters within the RC-288 Receiver Converter.

NOTE

When the above modifications are complete, connect the AGC from terminals 2 and 3 of the receiver to the plus and minus AGC terminals, respectively, on the back of the converter as shown in Fig. 2.

C. Hammarlund Receiver, Model SP-600-JX

1. Add AGC chain connections in accordance with Fig. A 2-2.

2. Modify IF output in accordance with Fig. A 2-3.

NOTE

When the above modifications are complete, connect the AGC chain terminals of receiver to AGC terminal of RC-288 plus to plus and minus to minus as shown in Fig. 2.

D. RCA Receiver, Model AR-8516

1. Removes wires connected to TRANS relay terminals on TB102 and tape ends.

2. Remove connection from arm of AGC switch S111A and connect to end terminal of TB102 (TRANS Relay). This is the negative terminal of the AGC.

3. Make connection from removed wire on AGC switch S111A to second terminal on TB102. This is the positive terminal of the AGC.

4. Return the power supply B minus to ground by running a wire from the negative terminal of C324B to ground.

CAUTION

Use an isolation transformer without a ground connection as a power source for the modified receiver.

5. Connect the positive and negative terminals from TB102 of the receiver to the corresponding terminals on the receiver converter.

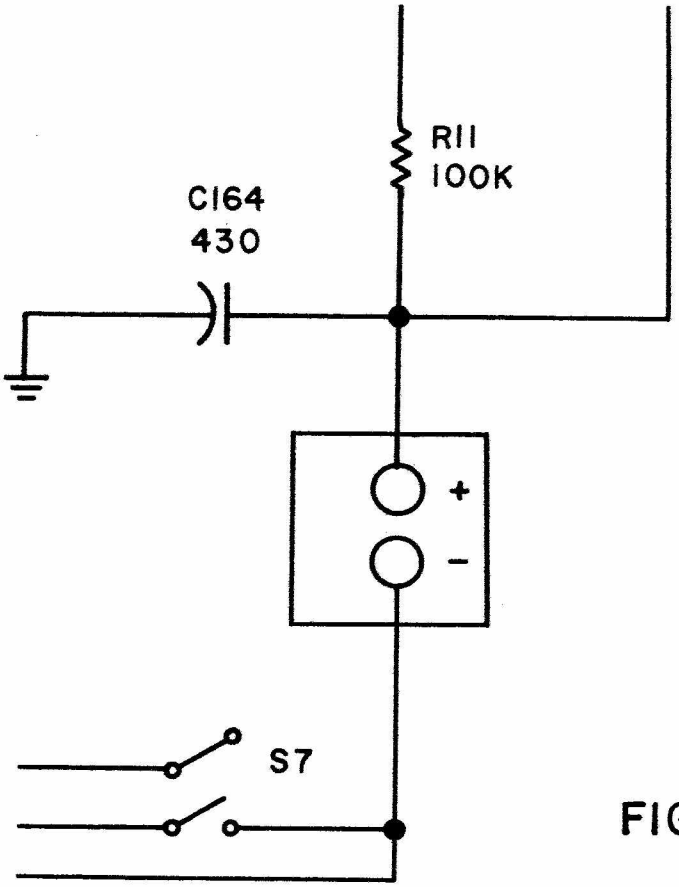



FIGURE A2-2

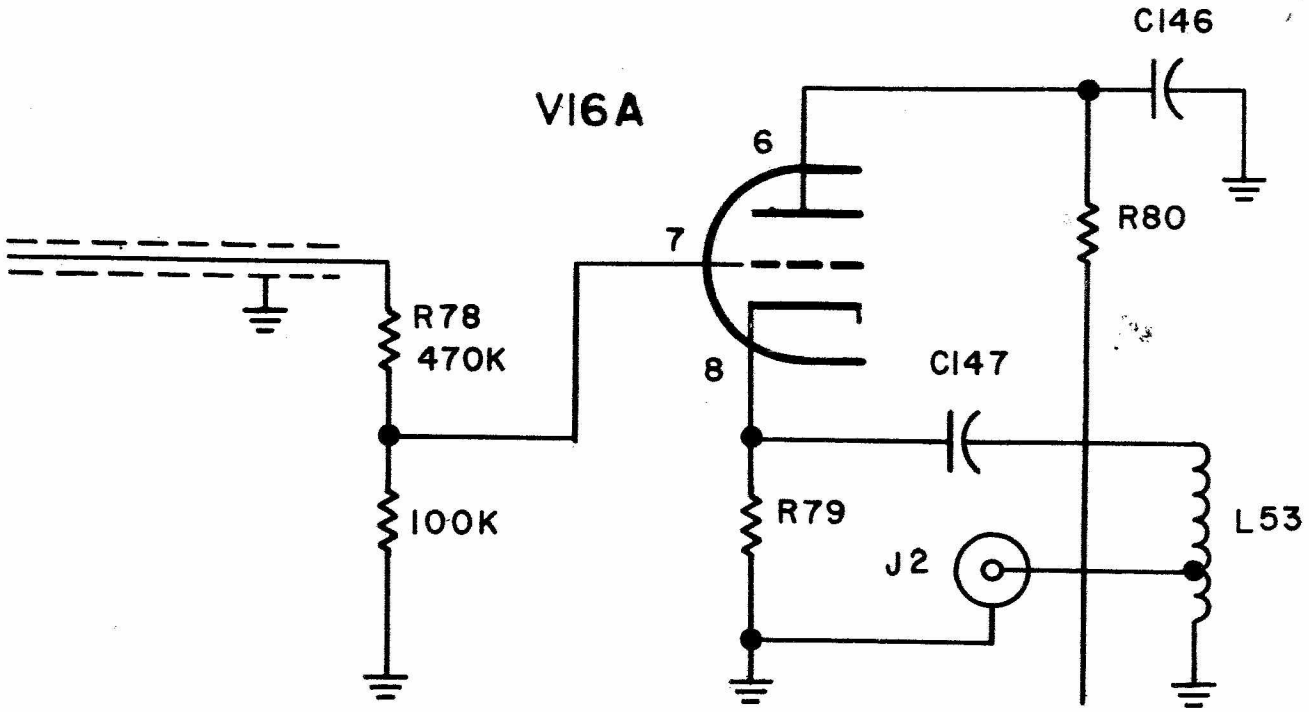



FIGURE A2-3

AGC AND IF MODIFICATIONS HAMMARLUND RECEIVER MODEL SP-600-JX