

K. W. ELECTRONICS SINGLE SIDEBAND TRANSMITTER

K. W. VESPA MKII

INSTRUCTION MANUAL

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P2260N

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K.W. VESPA MKII TRANSMITTER

SECTION 1

GENERAL DESCRIPTION AND SPECIFICATION

1 - 1

INTRODUCTION

The K.W. Vespa MKII transmitter is engineered for optimum performance on SINGLE SIDEBAND SUPPRESSED CARRIER upper or lower sideband, SINGLE SIDEBAND FULL CARRIER upper or lower sideband and C.W. It operates on all amateur bands between 1.8 mc/s and 30 mc/s. The power input is 220 watts P.E.P. on SSB, 60 watts on AM and 150 watts on C.W. * A Pi output stage provides a variable output impedance. A separate power supply operating off 200-250v A.C. is used.

1 - 2 (*Provision for reduced power on TOP BAND (160m))

SPECIFICATION

EMISSION:	Single sideband suppressed carrier (A3J) Single sideband full carrier (A3H) CW (A1)
BANDS COVERED:	1.8 - 2.0, 3.5 - 3.7, 3.7 - 3.9, 7.0 - 7.2, 14.0 - 14.2, 14.2 - 14.4, 21.0 - 21.2, 21.3 - 21.5, 28.0 - 28.2, 28.4 - 28.6, 28.6 - 28.8 mc/s.
AMBIENT TEMPERATURE RANGE:	-10°C - +40°C
VFO STABILITY:	With constant input voltage to PSU better than 200 c.p.s. after warm-up period of 30 minutes.
POWER REQUIREMENTS	110-115 volts 45-65 c.p.s. or 220 - 230 V ?
POWER CONSUMPTION:	250 watts on full modulation
CABINET DIMENSIONS:	
Transmitter:	6 5/16" Height 13 7/8" Width 11 1/2" Depth
Power Supply:	5 1/2" Height 7 1/2" Width 9 1/2" Depth.

CABINET DIMENSIONS:

WEIGHTS:

Transmitter: 18lbs approx
Power Supply: 18lbs approx (Packing extra)

TYPE OF SERVICE: SSB - continuous
A.M.- continuous
C.W.- 50% duty cycle

CARRIER SUPPRESSION: 50 db down relative to maximum output.

UNWANTED SIDEBAND: 45 db down relative to maximum output.

SECOND HARMONIC: 40 db down from output signal

THIRD ORDER DISTORTION: 30 db down from output signal

MIC INPUT: High impedance.

AUDIO RESPONSE: 300-2600 c/s \pm 6 db

OUTPUT IMPEDANCE: 50-300 ohms approximately on all bands

PLATE POWER INPUT: 220 watts P.E.P. on SSB
60 watts on A.M.
150 watts on C.W.

VALVE AND SEMI-CONDUCTOR COMPLEMENT

SYMBOL	FUNCTION	TYPE
V1	Mic Amp	12AX7 ✓
V2	Audio Cathode Follower	12AT7
V3	455 Kc Amp	EF183 ✓
V4	1st Mixer	12AT7 ✓
V5	2nd Mixer	12AT7
V6	Driver	6CH6 ✓
V7	Power Amplifier	6HF6 ✓
V8	Carrier Oscillator	12AT7
V9	Voltage Stabiliser	OA2 ✓
V10	V.F.O.	6U8
V11	H.F. Crystal Oscillator	6AL6
D1, D2	Balanced Modulator	OA79
A.C. POWER SUPPLY		
MR1-MR4	BHT Rectifiers	BY236
MR5-MR8	HT Rectifiers	BY235
MR9-MR12	Bias Rectifier	B250 C75
MR13-MR14	Negative D.C. Rectifier	40236
FS1	BHT Fuse,	1 amp
FS2	HT Fuse	500MA
FS3	Main Fuse	3 amp 240v 5 amp 115v

SECTION 2

CIRCUIT DESCRIPTION

2 - 1

TRANSMITTER CIRCUITS

1) A.F. STAGES

Microphone input is connected to the grid of the MIC AMP V1, amplified and coupled to the grid of the CATHODE FOLLOWER V2 across MIC GAIN control RV1. Output from the cathode follower is fed to the resistive balance point of the BALANCED MODULATOR.

2) BALANCED MODULATOR AND LOW FREQUENCY I.F. CIRCUIT

Audio output from the cathode of V2 and the CARRIER OSCILLATOR voltage are fed to the slider of the CARRIER BALANCE potentiometer RV3. Both upper and lower sideband output from the BALANCED MODULATOR are coupled through I.F. transformer IPT1 to the grid of the 455 kc I.F. AMPLIFIER V3. Output from the I.F. AMPLIFIER is fed to the MECHANICAL FILTER. The passband of the FILTER is centred at a nominal frequency of 455 kc/s. This passes either upper or lower sideband, depending upon which sideband is selected at the FUNCTION switch. This operates either CARRIER OSCILLATOR crystal X12 or X13. The SSB output of the FILTER is fed to the control grid of the FIRST MIXER.

3) A.M. & C.W.

For operation on A.M. or C.W. the BALANCED MODULATOR is unbalanced by the injection of a small D.C. voltage from the CARRIER control RV2 into D1, one of the balanced modulator diodes.

4) BALANCED MIXERS

The 455 kc signal is fed to the control grid of the FIRST BALANCED MIXER V4, and the VFO output voltage 2500 kc - 2700 kc is fed to the signal input cathode and to the grid of the second half of the twin triode. This arrangement cancels the high frequency injection signal within the mixer and converts the 455 kc signal to a 2.955 to 3.155 mc/s signal.

SECTION 2 -

BALANCED MIXERS - cont'd.

The coupling network between the plates of the FIRST MIXER and the SECOND BALANCED MIXER is made "broadband" to provide a uniform response to the band-pass-I.F. frequency. The transmit frequency is determined within the passband by the VFO frequency. The band-pass-I.F. signal is fed to the control grid of the SECOND BALANCED MIXER V5, and the HF injection signal voltage from the CRYSTAL OSCILLATOR V11 is fed to the signal input cathode and to the control grid of the second half of the twin triode. The HF injection voltage is cancelled within the mixer and the band-pass IF signal is converted to the desired band of operation.

5) R.F. CIRCUITS

The tuned circuits associated with the anode of V5 and the anode of V6 are ganged to the PRE-SELECTOR (DRIVE TUNE) tuning control. The signal is capacity coupled from the anode of V5 to the grid of the DRIVER V6 amplified and capacity coupled to the POWER AMPLIFIER V7 which operates in class AB1. Output from the P.A. is tuned by a PI NETWORK and fed to the ANTENNA through contacts of transmit-receive relay RL1.

2 - 2 OSCILLATORS

1) CARRIER OSCILLATOR

The CARRIER OSCILLATOR is crystal controlled at a frequency which puts the carrier approximately 20 db down the skirt of the MECHANICAL FILTER. UPPER X13 or LOWER X12 SIDEBAND crystals are selected by the FUNCTION switch.

2) VARIABLE FREQUENCY OSCILLATOR

The VFO operates in the range 2.5 - 2.7 mc/s. In addition to switching the UPPER or LOWER SIDEBAND crystal, the VFO must be moved in frequency, by an amount equal to the spacing of the carrier crystals. The VFO is moved by this amount when switching to LSB, and is accomplished by switching a one turn coil in circuit by operation of RL2.

3) HIGH-FREQUENCY CRYSTAL OSCILLATOR

The HF CRYSTAL OSCILLATOR V11 is crystal controlled by one of 11 crystals selected by BAND SWITCH S1 f & g. The output frequency of this oscillator is always 3.155 mc/s higher than the lower edge of the desired band.

SECTION 2

2 - 3 CONTROL CIRCUITS

1) NET

When the SEND-RECEIVE switch is held over to NET the NEGATIVE BIAS line is shorted to earth, removing the muting bias from V3, V4, V5 and V6. Turning the CARRIER CONTROL clockwise unbalances the balanced modulator by applying a small D.C. potential to diode D1. The P.A. Valve is quiescent when netting.

2) SEND

When the SEND-RECEIVE switch is put to send, RL1 closes, removes the muting bias from the controlled stages, changes the ANTENNA over to the receiver, operates the EXT OCT, and applies HT to the screen grid of the P.A.

3) EXT OCT

The EXT OCT socket is used to mute the station receiver and to operate the antenna change over relay in the KW 600 when used.

2 - 4 POWER SUPPLY

Transformer FM1059 has four secondary windings which supply the HT voltage, the negative bias, the 12.6 volt heater and negative 12.6 for the relay. The A.C. line is fused in the live side of the mains with FS3.

1) HT + 245 volts

The HT winding feeds a bridge rectifier circuit using four silicon rectifiers - 1R5-8, which delivers + 245v D.C. via the smoothing circuits. The H.T. Supply is fused by FS2 in the earth return of 1R7 and 1R8.

2) NEGATIVE BIAS

Two negative bias voltages are required, and one provided by rectifying the second secondary of FM1059 by a selenium rectifier 1R 9-12. This bias voltage is smoothed, and two potential dividers are used to produce - 35 volts, and -85 to -110. The former voltage is used to provide transmitter muting in the receiver condition and the latter provides P.A. stage bias adjustable by means of the potentiometer at the rear of the power supply.

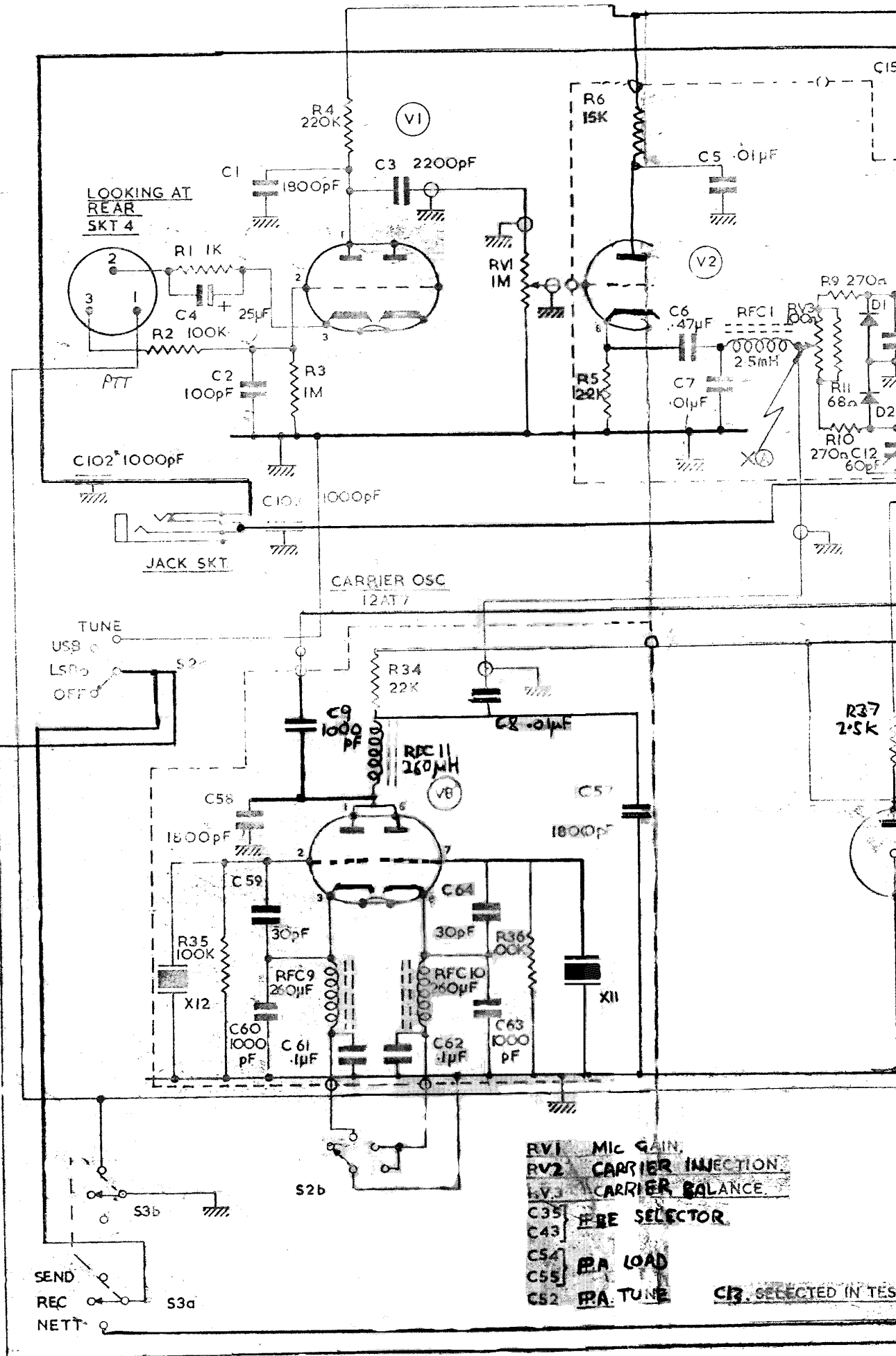
SECTION 2

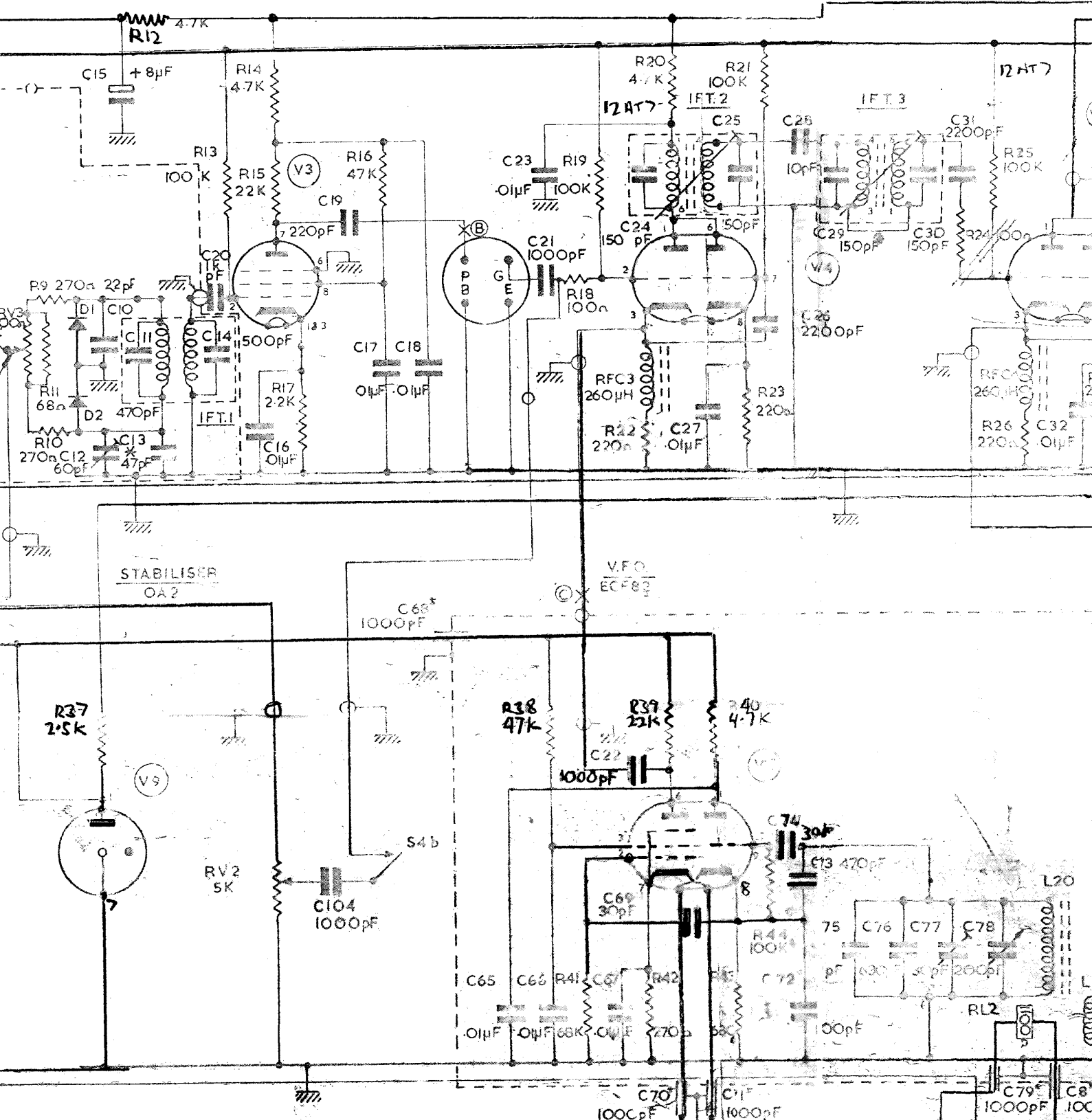
HEATERS & NEGATIVE 12 VOLTS

- 3) The third winding is for the 12.6v A.C. heater line. This supply is also rectified by 6R13-14 to provide the 12.6 D.C. necessary to operate the relays.

- 4) HT 750 VOLTS

The fourth windings is tapped to reduce power on the 160 meter band. A switch is provided on the rear of the power supply for this purpose. Voltage is applied to two semi-conductor rectifier strings connected in a full-wave voltage doubler configuration. The resulting DC is approximately + 750 volts with the HIGH-LOW power switch at high (switch up) and + 500 volts with it at low (switch down). This voltage is applied to the anode of the PA V7. The supply is fused by F51 lamp.





NOTE: ALL CAPACITORS SHOWN WITH * ARE
FEED THROUGH TYPE.

C13 SELECTED IN TEST.

S2 SHOWN IN OFF POSITION. FUNCTION SWITCH.

S1 SHOWN ON 1.8m BAND. BAND SWITCH.

S3 SHOWN IN RECEIVE POSITION. SEND-REC SWITCH.

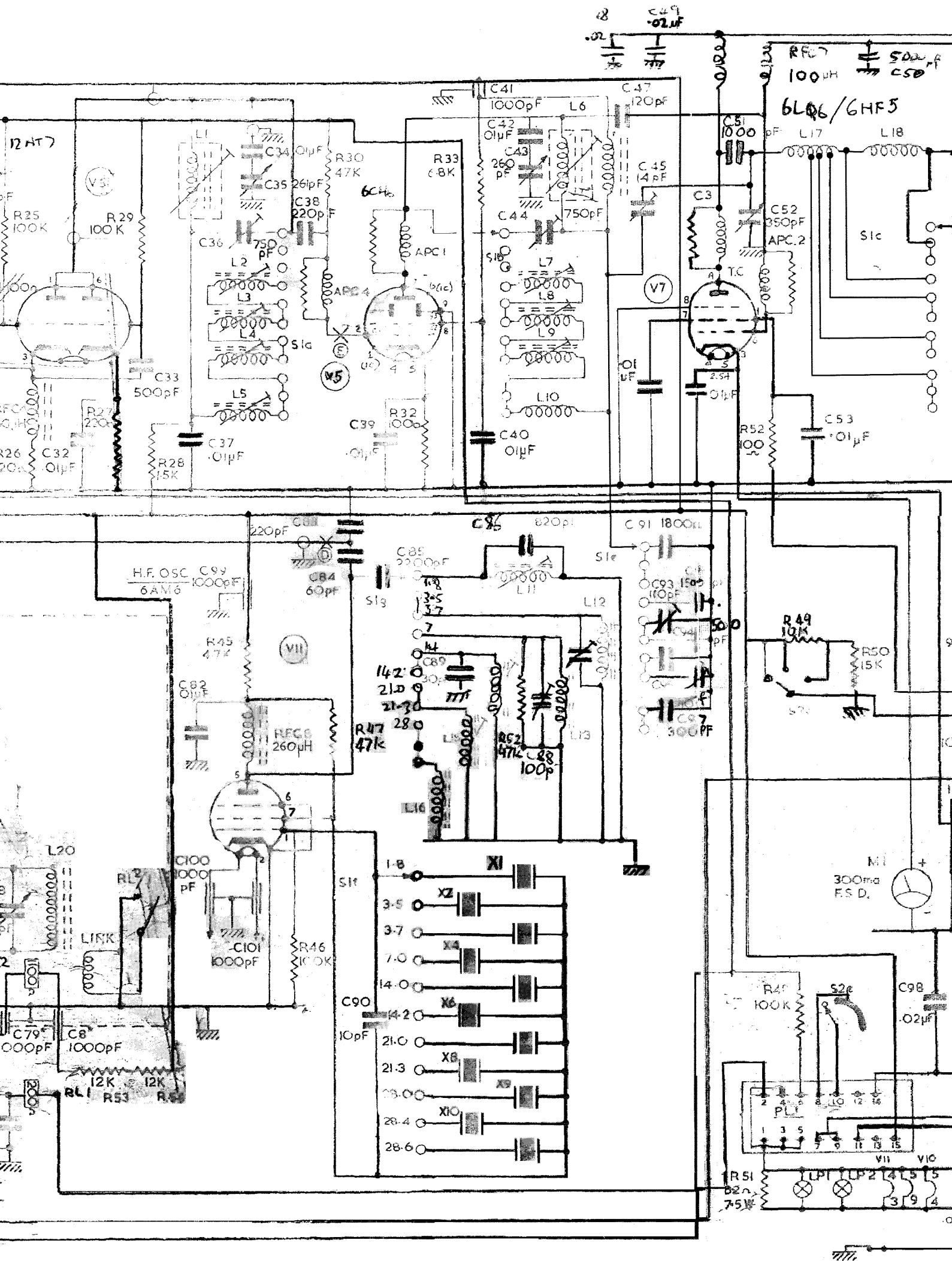
RL1 SHOWN IN RECEIVE POSITION.

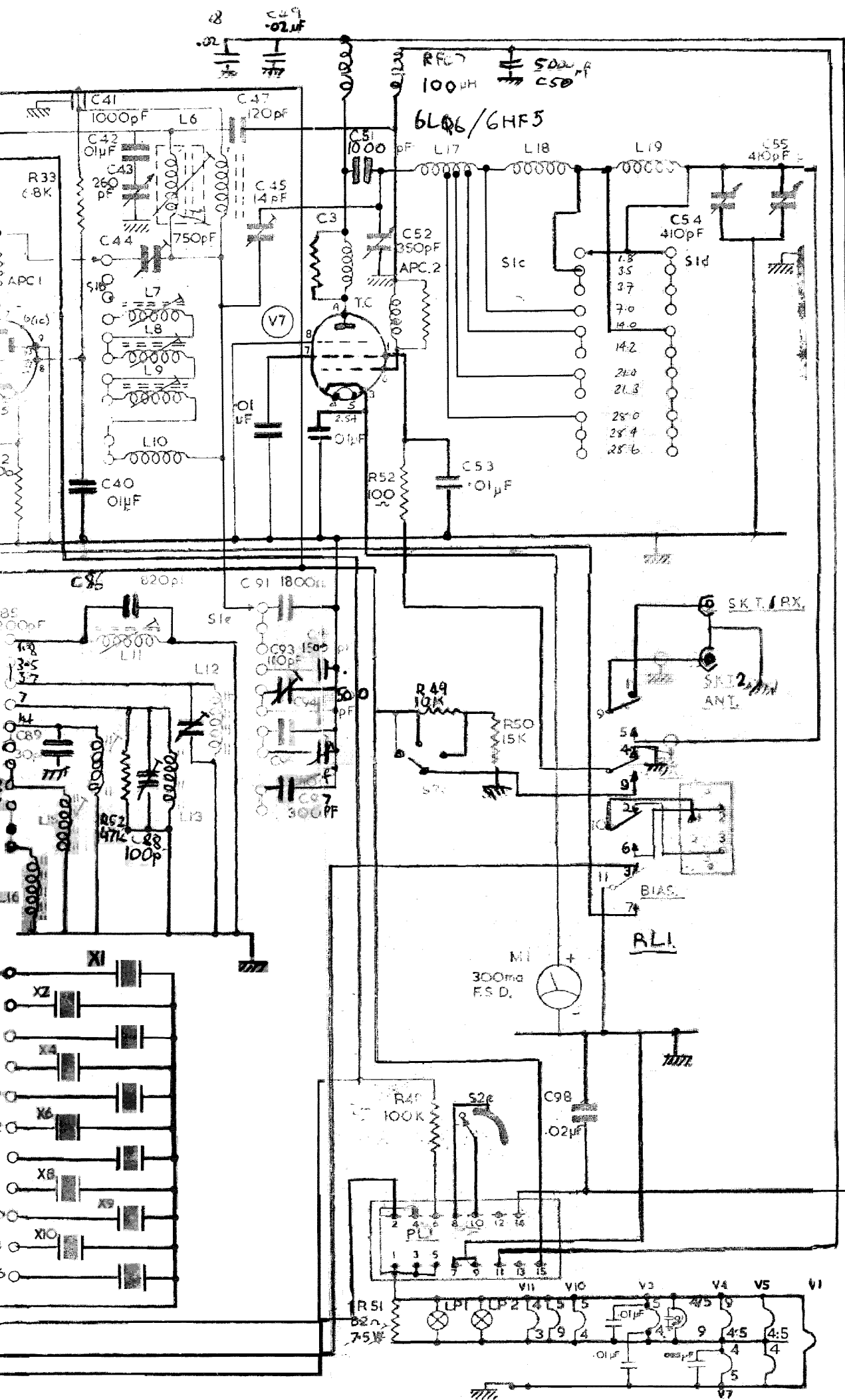
RL2 SHOWN IN U.S.B. POSITION.

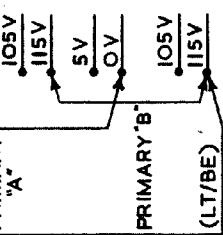
X INDICATES TEST POINTS.

O INDICATES P.T.E. FEED THROUGH TERMINALS.

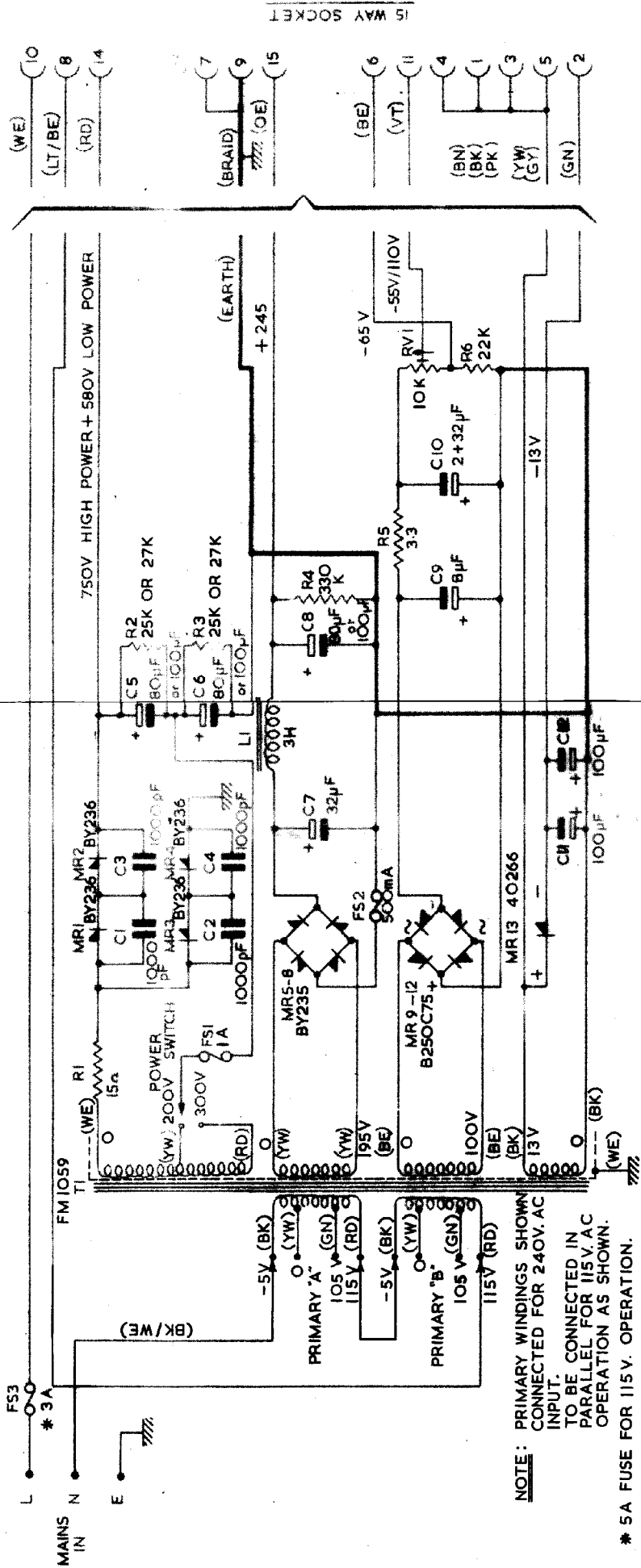
SELECTED IN TEST *







PRIMARY WINDING CONNECTIONS FOR 115V. A.C. OPERATION.



NOTE: PRIMARY WINDINGS SHOWN CONNECTED FOR 240V. AC INPUT. TO BE CONNECTED IN PARALLEL FOR 115V. A.C. OPERATION AS SHOWN.

* 5A FUSE FOR 115V. OPERATION.

K. W. ELECTRONICS DARTFORD KENT		ORG. N°	
CIRCUIT DIAGRAM		B.9024	
VESPA MK. II P.S.U.		TITLE	
CHECKED	MATERIAL	TOLERANCES	DIMENSIONS IN INCHES
DRAWN	FINISH		
ISSUE	SCALE		
DATE			
25-4-67	ORIGINAL	ISSUE	

SECTION 3

INSTALLATION

3 - 1

UNPACKING

Carefully unpack all items of the KW Vespa MKII and inspect for any damage which may have occurred during transit. Examine all packing material before discarding to ensure that no parts are inadvertently thrown away. Check all valves and crystals for obvious damage and ensure that they are firmly seated in their respective sockets.

3 - 2

STATION INSTALLATION

Connect the transmitter, power supply, receiver and antenna as shown in Fig. 3 - 1. Connect the transmitter to a good earth, such as a metal water pipe or a metal stake driven deep into moist soil. Connect microphone if SSB or A.M. required, or key if C.W. is required as shown in Fig. 3 - 1. Allow adequate ventilation for the equipment. Note: The key must be unplugged if SSB or A.M. operation is required.

3 - 3

INSTALLATION WITH THE KW 600 or KW 1000 LINEAR AMPLIFIER

Connect the transmitter, power supply, receiver, KW600 and antenna as shown in Fig. 3 - 2. Use twin screened lead for connection between the EKT CCT socket on the transmitter and the MOK socket on the KW 600.

3 - 4

ANTENNA The antenna should have a VSWR of 2-1 or better.

3 - 5

INITIAL CHECKS

a) The KW Vespa MKII is designed to operate from either 100/120v or 200/240v 50/60 cycle A.C. Power Supply. The unit has the power transformer set for 240 volt A.C. operation when it leaves the factory. For other voltages it is necessary to make internal changes to the transformer taps. This can be done with reference to the KW Vespa MKII A.C. PSU circuit diagram.

b) Put the HIGH LOW power switch to the required position. Set the MIC GAIN and CARRIER controls fully counterclockwise, FUNCTION switch to LSB, WAVECHANGE switch to 3.5, PRE-SELECTOR 30m segment. SEND RECEIVE switch to send, allow transmitter 60 seconds to warm up. Adjust RV located on rear of A.C. PSU, for a standing P.A. cathode current of 25 mA. Switch to receive and off.

CAUTION

Do not set standing cathode current too low: amplifier linearity will be degraded. Do not set too high; P.A. plate dissipation will be exceeded and valve damaged.

SECTION 4

OPERATION

4 - 1

SETTING UP

After making external connections as in Section 3 - 2 or 3 - 3 and doing initial checks as in Section 3 - 5, set controls to the following positions.

CARRIER	FULLY COUNTERCLOCKWISE
FUNCTION SWITCH	REQUIRED SIDE BAND
SEND RECEIVE SWITCH	RECEIVE
MIC GAIN	FULLY COUNTERCLOCKWISE
VFO	REQUIRED FREQUENCY
PA LOAD	FULLY CLOCKWISE
WAVE CHANGE SWITCH	REQUIRED BAND
PA TUNE	REQUIRED BAND
PRE-SELECTOR	REQUIRED BAND

4 - 2

NETTING

- a) To net onto a signal being received on the station receiver hold the Send/Receive switch over to NET, advance the CARRIER control a small amount, tune the VFO about the required frequency until ZERO BEAT is obtained with the incoming signal. The amount of netting signal can be varied by adjusting the carrier control.
- b) Turn the CARRIER control fully counterclockwise, release the SEND/Receive switch.

4 - 3

TUNE PROCEDURE

- a) To load the KW Vespa MKII into the antenna, put the FUNCTION switch to TUNE, this will put the transmitter in the transmit state with reduced voltage on the screen grid of the P.A., mute the station receiver and change the antenna over from the receiver to the transmitter.

TUNE PROCEDURE - cont'd

- b) Slowly advance the CARRIER control for an indication of P.A. cathode current on the meter. When 50mA is indicated check that the P.A. TUNE control is OFF RESONANCE, adjust the PRE-SELECTOR in the required band segment for a peak in cathode current, continue to advance the CARRIER control until an off resonance cathode current of 100mA flows.
- c) Adjust P.A. TUNE control for a DIP in cathode current, increase loading of P.A. by turning P.A. LOAD control counterclockwise, re-adjust P.A. TUNE for DIP in cathode current, continue adjustments until P.A. is loaded to 130mA with PA TUNE at DIP.
- d) Turn CARRIER control fully counterclockwise
- e) Turn FUNCTION switch to required sideband, it is normal practice to operate on LSB on 160, 80 and 40m and USB on 20, 15 and 10m.

4 - 4

SSB OPERATION

750 V at 80 mA = 56 W IN DC

- a) To put the transmitter in the transmit SSB mode, either press the press to talk button on the microphone, or put the SEND/RECEIVE switch to send.
- b) Note that when the transmitter is in the transmit position the standing cathode current is 25mA.
- c), Advance the MIC GAIN control while speaking into the microphone, until P.A. cathode current averages 80mA and peaks on the meter do not exceed 130mA.

4 - 5

A.M. OPERATION

- a) Load the transmitter up as in Section 4 - 3
- b) Switch to transmit by one of the methods described in 4 - 4(a)
- c) Advance the CARRIER control for a cathode current of 75mA.

A.M. OPERATION - cont'd

- d) Advance the MIC GAIN control while speaking into the microphone until a slight upward kick in cathode current is noted. To obtain the exact setting of the MIC GAIN control it is advisable to monitor the signal on the station receiver.
- e) When switching sidebands on A.M. it may be necessary to re-adjust the CARRIER control to maintain cathode current of 75 mA.

C.W. OPERATION

- a) Load the transmitter up as in Section 4 - 3
- b) Plug the key into the key jack.
- c) Switch to transmit by operating the SEND/RECEIVE switch, a slightly higher standing cathode current will be noted than when operating SSB or A.M.
- d) Make sure the MIC GAIN control is fully counterclockwise.
- e) Press the key and advance the CARRIER control until cathode current of 200mA flows, do not hold the key down for more than 1 second, otherwise damage to the P.A. valve may be done. Key in normal way.

Note:- Anode Voltage 750v @ 200mA= 150w input

160m SSB OPERATION 26²/3 WATTS P.E.P. OUTPUT

540, at 45mA = ~~24.3~~ 24.3 IN DC

- a) Put the HIGH LOW power switch to LOW power. Note: In the transmit condition the standing cathode current will now be slightly below 25 mA.
- b) Switch to TUNE, slowly advance the CARRIER control for an indication of cathode current, peak the PRE-SELECTOR, continue to advance the CARRIER Control until an off resonance P.A. cathode current of 150mA flows.
- c) Load the P.A. to 30 mA.
- d) Turn CARRIER control fully counterclockwise.
- e) Turn FUNCTION switch to required sideband.

160m SSB OPERATION - cont'd

- f) Switch to transmit and adjust MIC GAIN control.
- g) On speech average 45mA cathode current, and do not peak above 60mA.

SECTION 5

SERVICE INSTRUCTIONS

D A N G E R

EXTREME CARE MUST BE TAKEN WHEN SERVICING THIS EQUIPMENT ESPECIALLY IF ANY COVERS ARE REMOVED SINCE POTENTIALS AS HIGH AS 900 VOLTS ARE PRESENT.

5 - 1

KW VESPA MKII

GENERAL

This section covers maintenance and service of the K.W. VESPA transmitter. It includes information on trouble analysis, signal tracing procedures, voltage and resistance measurements and alignment procedures. The usefulness of signal level and alignment data given depends upon the accuracy of the test equipment used. If servicing requires that the cabinet be removed, proceed as follows:

- 1) Disconnect all power and external connections.
- 2) Remove the two rear feet. Take two plugs from the front feet to gain access to fixing screws and unscrew.
- 3) From the rear push the transmitter chassis forward until the front panel protrudes about an inch.
- 4) Slide chassis from cabinet.

NOTE

Valve filaments and pilot lamps are connected in a series parallel arrangement for 12v operation. When making valve or lamp replacements, be sure that rated filament currents are the same as the original units.

TROUBLE ANALYSIS

- 1) Most cases of trouble can be traced to defective valves. Many valve checkers cannot duplicate the conditions under which the valves work in the transmitter. Substitution of new valves will sometimes cure an obscure case of valve trouble. Intermittent trouble conditions in valves can usually be discovered by lightly tapping the envelope while listening to the signal. Occasionally valve pins will become dirty or corroded causing an intermittent condition. When this situation is suspected, remove the valve and apply a few drops of special contact cleaner to the pins. Replace the valve and work it up and down in the socket a few times. Shorted valves or capacitors will often cause associated resistors to overheat and crack, blister or discolour. Making the measurements listed in Tables 5 - 1 will help to isolate this type of trouble to a particular stage or component.
- 2) A logical process of elimination in conjunction with the main schematic and block diagram will aid in isolating trouble. For example -
 - a) No. R.F. signal passes through the transmitter section until the operator speaks into the microphone, presses the key or inserts carrier, all with the SEND-RECEIVE switch at SEND or NET. This means that no input signal and the SEND-RECEIVE switch at RECEIVE, all stages except the CARRIER OSCILLATOR, the VFO and the H.F. CRYSTAL OSCILLATOR are quiescent.
 - b) Should no output be obtained from the transmitter, then the fault can be isolated to the stages before or after the balanced modulator. When carrier is inserted the audio stages are not used, so if there is output with carrier inserted, but no output when speaking into the microphone, then the fault must be in the audio stages.

SIGNAL TRACING PROCEDURES

- 1) Table 5 - 3 lists significant test points and normal signal levels. Fig. 5 - 1 shows location of adjustments. Voltages given in the tables are nominal and may vary plus or minus 20 per cent. An audio generator with an accurately calibrated attenuator must be used to provide the signal source, and a valve voltmeter with an RF probe to measure the voltages.

SIGNAL TRACING PROCEDURES - cont'd

- 2) Connect a 52 ohm dummy load to the antenna socket, the audio generator to the mic socket, and the VVM to the test point. Set the controls as indicated in Table 5 - 3.

VOLTAGE AND RESISTANCE MEASUREMENTS

Table 5 - 1 lists voltage measurements with the transmitter on SEND. Table 5 - 2 lists resistance measurements. Voltages and resistances given in the tables are nominal and may vary plus or minus 20 per cent. Set the controls as indicated in Table 5 - 1. Resistance measurements are made with all external cables disconnected. It is recommended that a meter with a resistance of at least 20,000 ohm per volt be used for voltage measurements.

ALIGNMENT PROCEDURE

Complete alignment of the KW Vespa 1KII requires the use of the following equipment.

- a) Valve voltmeter with RF probe type used-airmec 314
- b) 52 ohm dummy load or wattmeter
- c) A receiver covering at least one of the band segments
- d) Swamping tool, consisting of a 0.01uf 400vw capacitor wired in series with a 1k ohm $\frac{1}{2}$ w resistor.
- e) Non metallic hexagonal trimming tool and screwdriver.

NOTE: Before attempting to align the KW Vespa 1KII please read instructions very carefully.

Dissolve affixative holding the coils in the pre-selector coils with acetone. Do not force the cores as they may become distorted.

ALIGNMENT PROCEDURE- cont'd

- 1) Set the transmitter up as follows:

CARRIER	FULLY COUNTERCLOCKWISE (FCC)
PA TUNE	80m
PRE-SELECTOR	80m LOWER EDGE OF SEGMENT
SEND RECEIVE SWITCH	RECEIVE
FUNCTION SWITCH	LSB
MIC GAIN	FULLY COUNTERCLOCKWISE (FCC)
VFO	000
PA LOAD	FULLY CLOCKWISE
BANDSWITCH	3.5
MICROPHONE	OUT
KEY	OUT

- 2) Plug the wattmeter into the antenna socket, allow ten minutes for warm up. Switch to TUNE, make sure CARRIER is fully counterclockwise.

3) CARRIER OSCILLATOR OUTPUT LEVEL

Check the output of the carrier oscillator with the VVM and RF probe, see Fig. 5 - 1 for test point "A". A voltage of 0.2v RF should be obtained on both sidebands.

4) VFO OUTPUT LEVEL

Check the output of the VFO with the VVM and the RF probe, see Fig. 5 - 1 for test point "C". A voltage of 0.3v should be obtained.

5) HF OSCILLATOR LEVEL

Connect the VVM with RF probe, to the junction of C83 220 pF and C84 60 pF, see Fig. 5 - 1 for test point "D" adjust condensers and inductances for equal reading on band segments as follows. It will first be necessary to loosen the cores in the inductances with acetone. See Fig. 5 - 1 for location of adjustments.

ALIGNMENT PROCEDURE - cont'd

BAND	XTAL FREQUENCY	C OR L	VVM READING
1.8	4955	L11	1.5v
3.5	6655	C87	1.5
3.7	6855	C87	1.5.
7.0	10155	C88	1.5
14.0	2 x 8577.5	L14	1.5
14.2	2 x 8677.5	L14	1.5
21.0	2 x 12077.5	L15	1.3
21.3	2 x 12227.5	L15	1.3
28.0	2 x 15577.5	L16	1.2
28.4	2 x 15777.5	L16	1.2
28.6	2 x 15877.5	L16	1.2

PRE-SELECTOR 3.5 mc/s BAND

- 1) Check that the PRE-SELECTOR pointer is at the lower edge of the 80m segment, and that the transmitter is on 3500 kc.
- 2) Adjust the PA BIAS potentiometer on the rear of the PSU for a standing cathode current of 25mA.
- 3) Turn the CARRIER control up until 50mA of cathode current flows.
- 4) Adjust L1 and L6 for a peak in cathode current, back off CARRIER control to keep cathode current about 50mA mark.
- 5) Change frequency to 3600 kc, 100 on VFO dial, adjust PRE-SELECTOR for peak in cathode current, re-adjust L1 and L6 for peak in cathode current. Turn CARRIER control F.C.C.

WIDEBAND COUPLERS IFT2 IFT3

- 1) Connect the swamping tool between Pin 4 IFT2 and earth, see Fig. 5 - 1 for location. Turn CARRIER control up until an increase of cathode current is noted, adjust bottom core of IFT2 for peak in cathode current, turn CARRIER control F.C.C.
- 2) Transfer swamping tool to Pin 6 IFT2, turn CARRIER control up until an increase of cathode current is noted, adjust top core of IFT2 for peak in cathode current, turn CARRIER control F.C.C.

NOTE: Pin 6 of IFT2 has HT on it, take care.

- 3) Transfer swamping tool to Pin 4 IFT3, turn CARRIER control up until an increase of cathode current is noted, adjust bottom core of IFT3 for a peak in cathode current, turn CARRIER control F.C.C.
- 4) Transfer swamping tool to Pin 6 IFT3, turn CARRIER control up until an increase of cathode current is noted, adjust top core of IFT3 for a peak in cathode current, turn CARRIER control F.C.C. and remove swamping tool.

CARRIER BALANCE

- 1) Connect VVM reading RF direct across dummy load.
- 2) Load transmitter to 75 mA, a VVM reading of 30-35 RF should be obtained. Switch to SEND and USB.
- 3) Check that MIC GAIN and CARRIER are F.C.C.
- 4) Adjust RV3 and C12 for minimum reading on VVM, it should be possible to balance down to 0.2v on both sidebands.
- 5) Switch to RECEIVE and USB.

VFO CALIBRATION AND ULSD SWITCHING

- 1) Tune the station receiver to 3700 kc/s.
- 2) Tune the transmitter to 3700 kc- 200 on VFO dial hold the SEND RECEIVE switch over to NET and insert enough CARRIER for the signal to be heard in the receiver.

VFO CALIBRATION AND ULSB SWITCHING - cont'd

- 3) Adjust the core of L20 (see Fig 5 - 1 for location) until signal is heard exactly on 3700 kc zero beat.
- 4) Check the tracking of the VFO at each 100 kc point. If it is over tracking at 3500 kc reduce capacity of C78 (see Fig. 5 - 2 for location) by inserting a probe through the hole in the top of the VFO and turning the Philips trimmer anticlockwise.
- 5) Reset the VFO at 3700 kc and adjust the core of L20 for zero beat. Repeat the above adjustments until the tracking is correct.
- 6) If the VFO is undertracking, follow the above procedure, but increase the capacity of C78 at 3500 kc.
- 7) Leave transmitter set of 3600 kc.

5 - 10

ULSB SWITCHING

- 1) Tune exactly to 3600 kc zero beat, make sure FUNCTION switch is at USB.
- 2) Switch to LSB, adjust L20 link (by inserting a probe through the lower hole in the VFO box cover) for zero beat.
- 3) Switch back to USB and check that zero beat is maintained repeat (2) until switching between USB and LSB zero beat is maintained.

5 - 11

PRE-SELECTOR GENERAL

It is only necessary to adjust the inductances of one segment of each band, as the PRE-SELECTOR tracking holds good for the whole of each band.

5 - 12

PRE-SELECTOR 28.4 mc/s BAND

- 1) Set the transmitter on 28500 kc
- 2) Adjust the PRE-SELECTOR so that the pointer is in the centre of the 10m segment.
- 3) Put the FUNCTION switch to TUNE and insert CARRIER until cathode current of 50 mA flows.

PRE-SELECTOR 23.4 mc/s BAND - cont'd

- 4) Adjust core of L5 and inductance of L10 for a peak in cathode current, back off CARRIER control to keep cathode current at 50 mA. Turn carrier control F.C.C.

NEUTRALISING 23.4 mc/s BAND

- 1) Connect VVM with RF probe across dummy load.
- 2) Adjust CARRIER control for an OFF RESONANCE cathode current of 190 mA.
- 3) Load the transmitter to 130 mA cathode current.
- 4) Check that MAXIMUM output occurs when PA cathode current is at DIP. i.e. move PA TUNE condenser either side of DIP and note that RF output drops, if it does not, note which side of dip output increases, if it is on the LF side then reduce value of C45 neutralising condenser, if it is on the HF side, increase value of C45, repeat until maximum output occurs when PA is at dip. Re-adjust L10 for peak in cathode current.
- 5) Turn FUNCTION switch to USB and CARRIER F.C.C.

PRE-SELECTOR 21.3 mc/s BAND

- 1) Set the transmitter up on 21400 kc
- 2) Adjust the PRE-SELECTOR so that the pointer is in the centre of the 15m segment.
- 3) Put the FUNCTION switch to TUNE and insert CARRIER until cathode current of 50mA flows.
- 4) Adjust cores of L4 and L9 for a peak in cathode current.
- 5) Load the transmitter up to 130mA. Check that maximum output occurs when PA is at dip. If maximum output occurs when PA TUNE condenser tuned LF of dip then increase value of C96, readjust L9 for resonance. If maximum output occurs on the HF side, decrease value of C96, readjust L9 for resonance. Repeat until maximum output occurs when PA is at dip.
- 6) Turn FUNCTION Switch to USB and CARRIER F.C.C.

PRE-SELECTOR 14.2 mc/s BAND

- 1) Set the transmitter up on 14300 kc
- 2) Adjust the PRE-SELECTOR so that the pointer is in the centre of the 20m segment.
- 3) Put the FUNCTION switch to TUNE and insert CARRIER until cathode current of 50 mA flows.
- 4) Adjust cores of L3 and L8 for a peak in cathode current.
- 5) Load the transmitter up to 130 mA. Check that maximum output occurs when PA is at dip. If maximum output occurs when PA TUNE condenser tuned LF of dip then increase value of C94, readjust L8 for resonance. If maximum output occurs on the HF side, decrease value of C94, readjust L8 for resonance. Repeat until maximum output occurs when PA is at dip.
- 6) Turn FUNCTION switch to USB and CARRIER F.C.C.

PRE-SELECTOR 40m BAND

- 1) Set the transmitter up on 7100 kc.
- 2) Adjust the PRE-SELECTOR so that the pointer is in the centre of the 40m segment.
- 3) Put the FUNCTION switch to TUNE and insert CARRIER until Cathode current of 50 mA flows.
- 4) Adjust cores of L2 and L7 for a peak in cathode current.
- 5) Neutralise as for other bands (Neut C is C46).
- 6) Turn FUNCTION switch to USB and CARRIER F.C.C.

PRE-SELECTOR 160m BAND

- 1) Set the transmitter up on 1900 kc
- 2) Adjust the PRE-SELECTOR so that the pointer is halfway in the 160m segment.
- 3) Put the FUNCTION switch to TUNE and insert CARRIER until cathode current of 50 mA flows.

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PRE-SELECTOR 160m BAND cont'd

- 4) Adjust C36 and C44 for a peak in cathode current
- 5) Turn FUNCTION switch to USB and CARRIER F.C.C.

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This completes the alignment of the KW Vespa. Re-seal the pre-selector coils with polystyrene cement.

TABLE 5 - 1
VOLTAGE MEASUREMENTS

BAND 3.5 Mc/s
MIC GAIN F. C. C.
FUNCTION L.S.D.
MIC CONNECTED
CONTROL SEND
CARRIER OFF

VALVE BASE CONNECTIONS

	1	2	3	4	5	6	7	8	9
V1 MIC AMP	95	0	.6	12.6AC	0	-	-	-	-
V2 CATH FOL	-	-	-	-	0	205	0	4	6.3AC
V3 IF AMP	10	0	10	6.3AC	12.6AC	0	140	165	0
V4 1st MIX	185	0	1.5	6.3AC	6.3AC	185	0	1.5	12.6AC
V5 2nd MIX	225	0	1.6	6.3AC	6.3AC	225	0	1.0	12.6AC
V6 DRIVER	-	0	4v	6.3AC	0)	-	245	220	0
V7 P.A.	0	6.3	250	0	-60	0	0	0	TC 770
V8 CAR OSC.	90	AC -.35	0	0	0	90	0	4.3	6.3AC
V9 OA2	150	-	-	-	-	-	0	-	-
V10 VFO	120	0	80	6.3AC	12.6AC	148.	1.4	3.5	0
V11 HI XTAL OSC	-2.3	0	6.3	12.6	220	0	170		
			AC	AC					

TABLE 5 - 2

RESISTANCE MEASUREMENTS (PSU DISCONNECTED)VALVE BASE CONNECTIONS

	1	2	3	4	5	6	7	8	9
V1 MIC AMP	200K	1 meg	Inf	0	0	-	-	-	-
V2 CATH FOL	-	-	-	-	0	35K	0	2.2k	0
V3 IF AMP	2.2k	Inf	2.2k	0	0	0	45k	65k	0
V4 1st MIX	19k	Inf	230	0	0	19k	Inf	220	0
V5 2nd MIX	15k	Inf	230	0	0	15k	Inf	220	0
V6 DRIVER	-	Inf	100	0	0	-	15k	20k	0
V7 P.A.	0	0	Inf	0	Inf	0	0	0	Top Cup Inf
V8 CAR. OSC.	40k	100k	Inf	0	0	40k	100k	Inf	0
V9 OA2	15k	-	-	-	-	-	-	-	0
V10 VFO	18k	70k	60k	0	0	40k	270	680	110k
V11 HF XTAL OSC	100k	0	0	0	18k	0	65k		

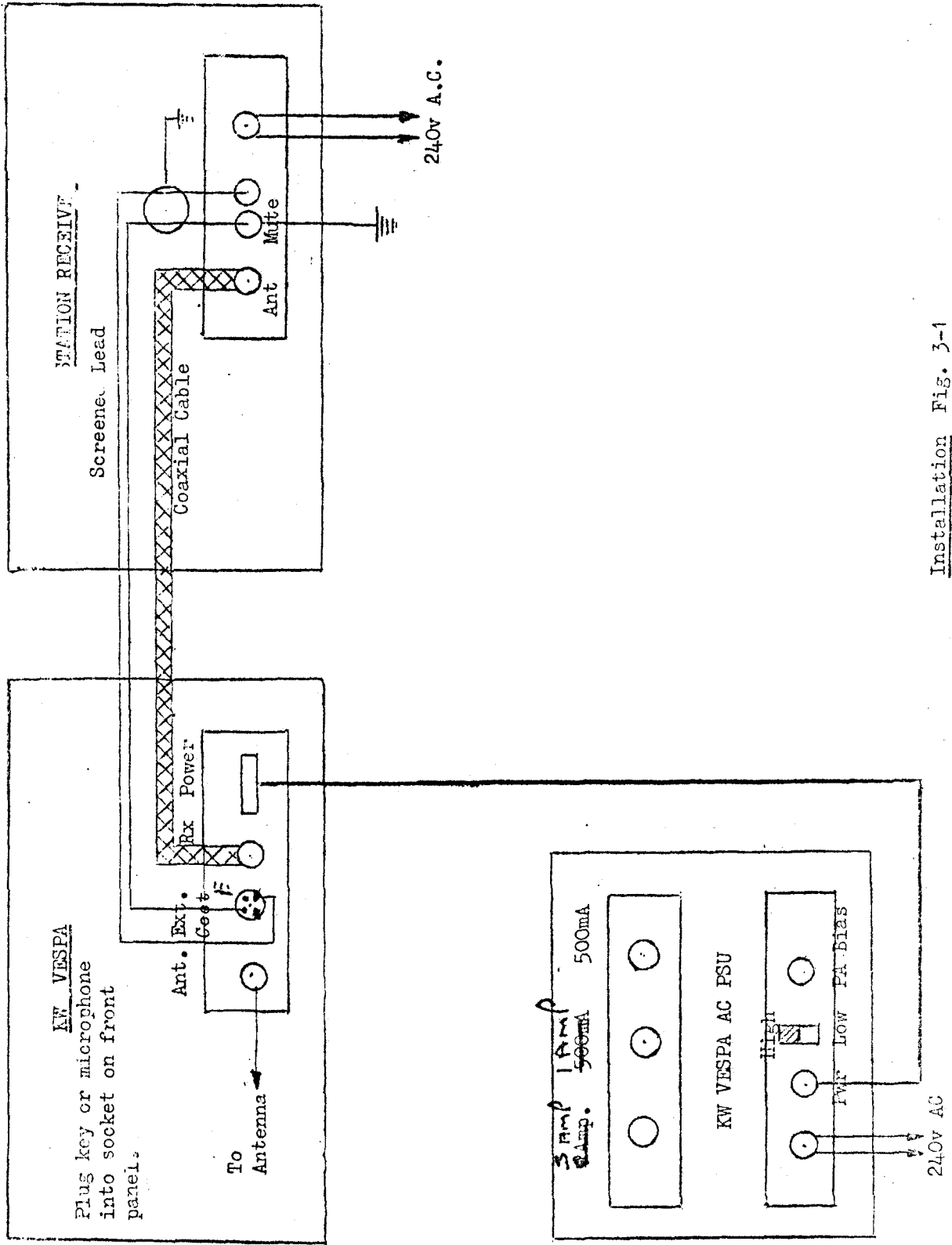
ALL MEASUREMENTS GIVEN IN OHMS UNLESS OTHERWISE SPECIFIED.

TABLE 5 - 3
SIGNAL LEVELS

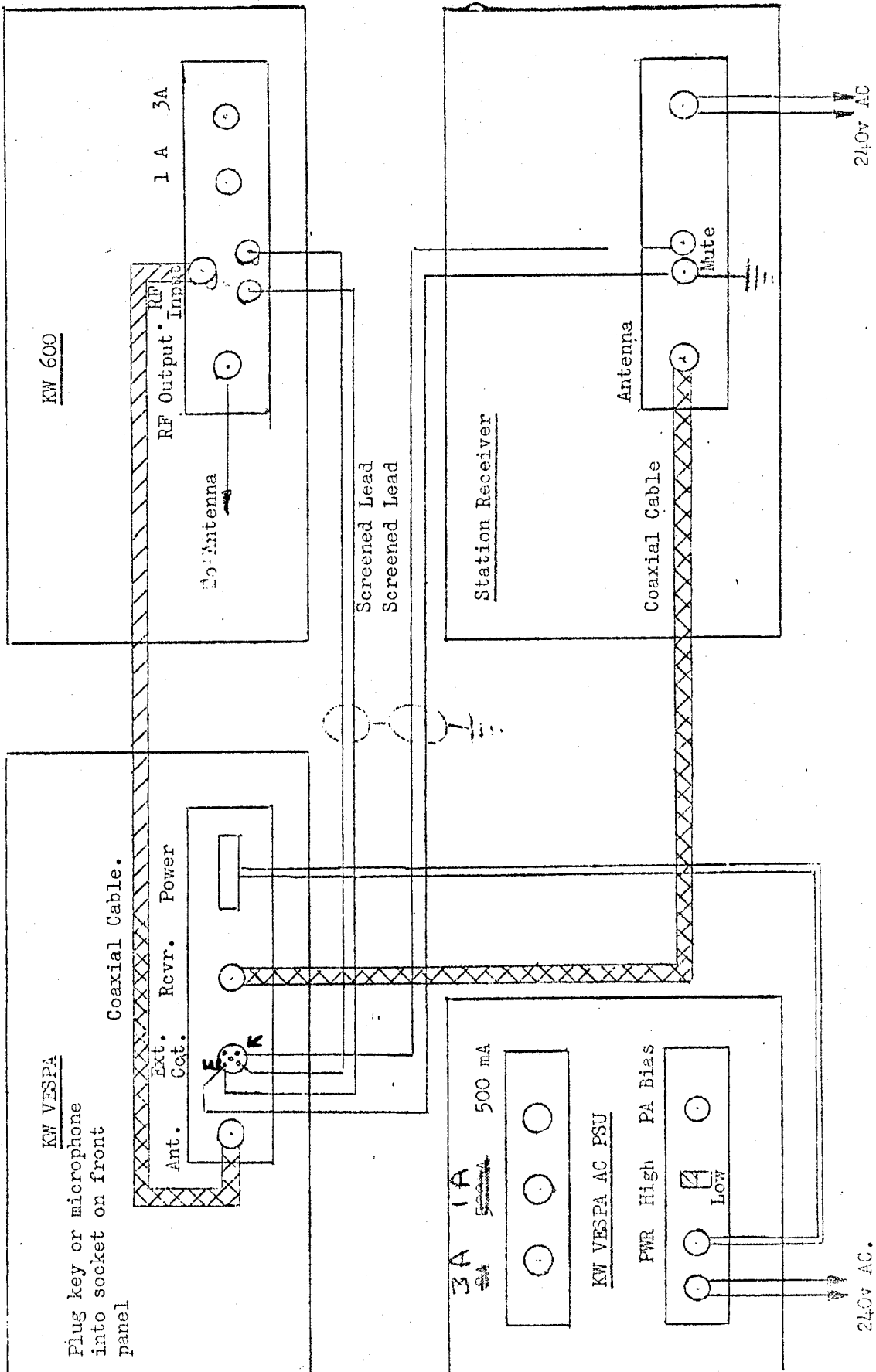
SET TRANSMITTER UP ON 3.6mc/s
CONTROL SWITCH SEND/RECEIVE
FUNCTION SWITCH USE
CONNECT AUDIO SIG. GEN TO MIC
SOCKET EXTERNAL LOAD
MIC GAIN FULLY CLOCKWISE

Test Point	AUDIO INPUT TO MIC SOCKET	VALVE & FUNCTION	RF VOLTS AF VOLTS	D.C VOLTS
	10mV	Pin 1 V1 Mic Amp	1v A.C.	95v
	25mV	Junction C6 C7 RFC1	0.5v A.C.	-
A		Car. Osc. Injection	0.2v R.F.	-
	60mV	Pri IFT1 (Bal Mod)	0.65vR.F.	-
	60mV	Sec IFT1	0.65vR.F.	-
B	60mV	P terminal H. Filter	3.5v R.F.	-
	60mV	G terminal H. Filter	0.75vR.F.	-
	20mV	Pin 1 V4 1st Mixer	1v	185v
C		VFO injection	0.3v R.F.	-
	20mV	Pin 6 IFT 3 WEC	1.4v R.F.	-
D		H.F. Xtal osc unjection	2v R.F.	
E	20mV	Pin 2 V6 Driver grid	6.5v R.F.	-
	20mV	Pin 7 V6 Driver anode	95v R.F.	245v

VTVM zeroed when connected to test point before signal injected.



Installation Fig. 3-1



Installation with KW 600 Fig 3 - 2

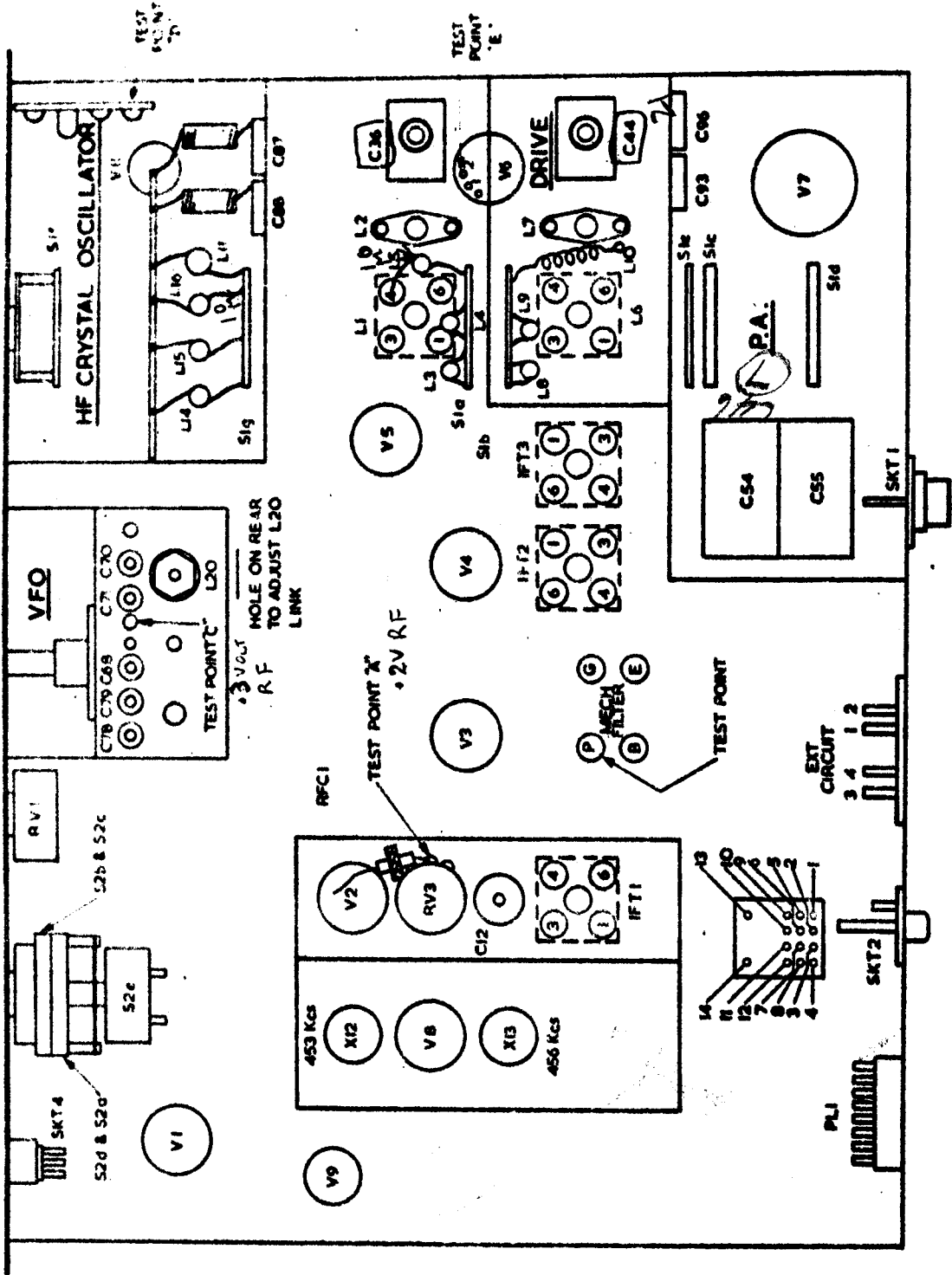
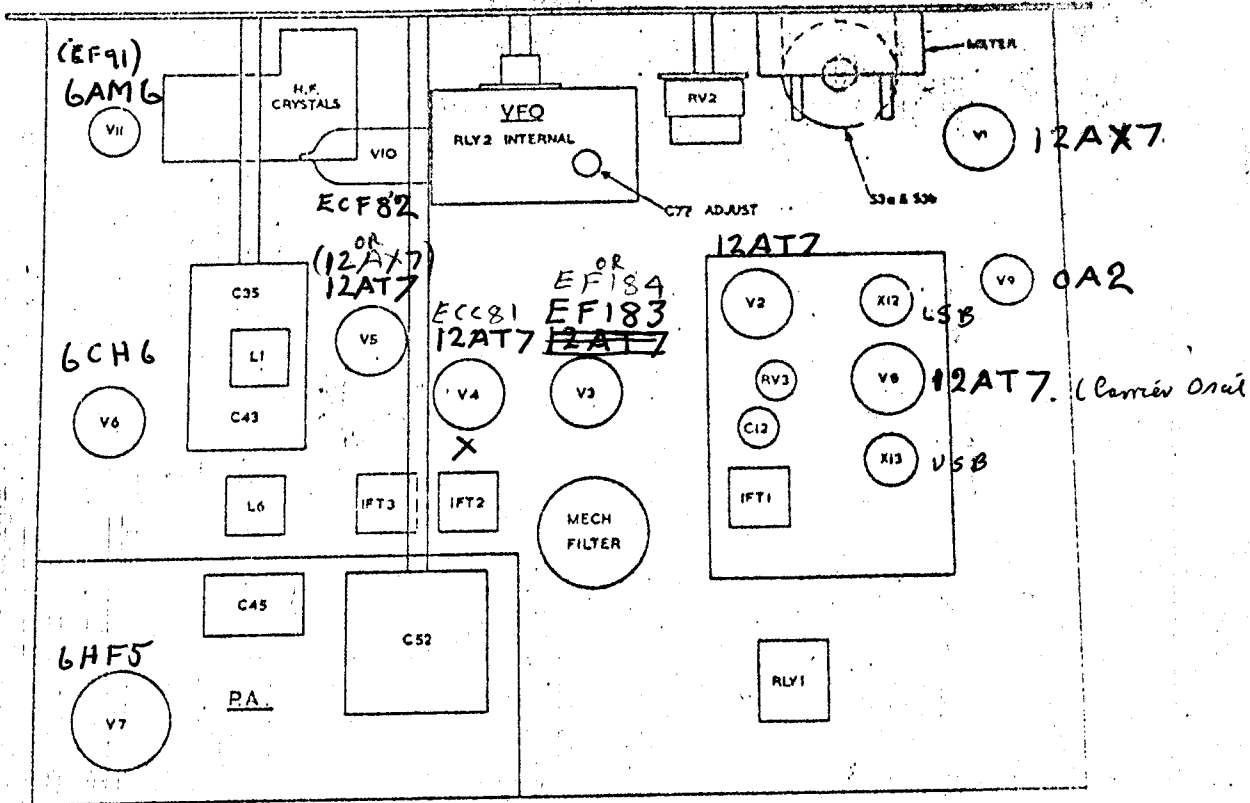
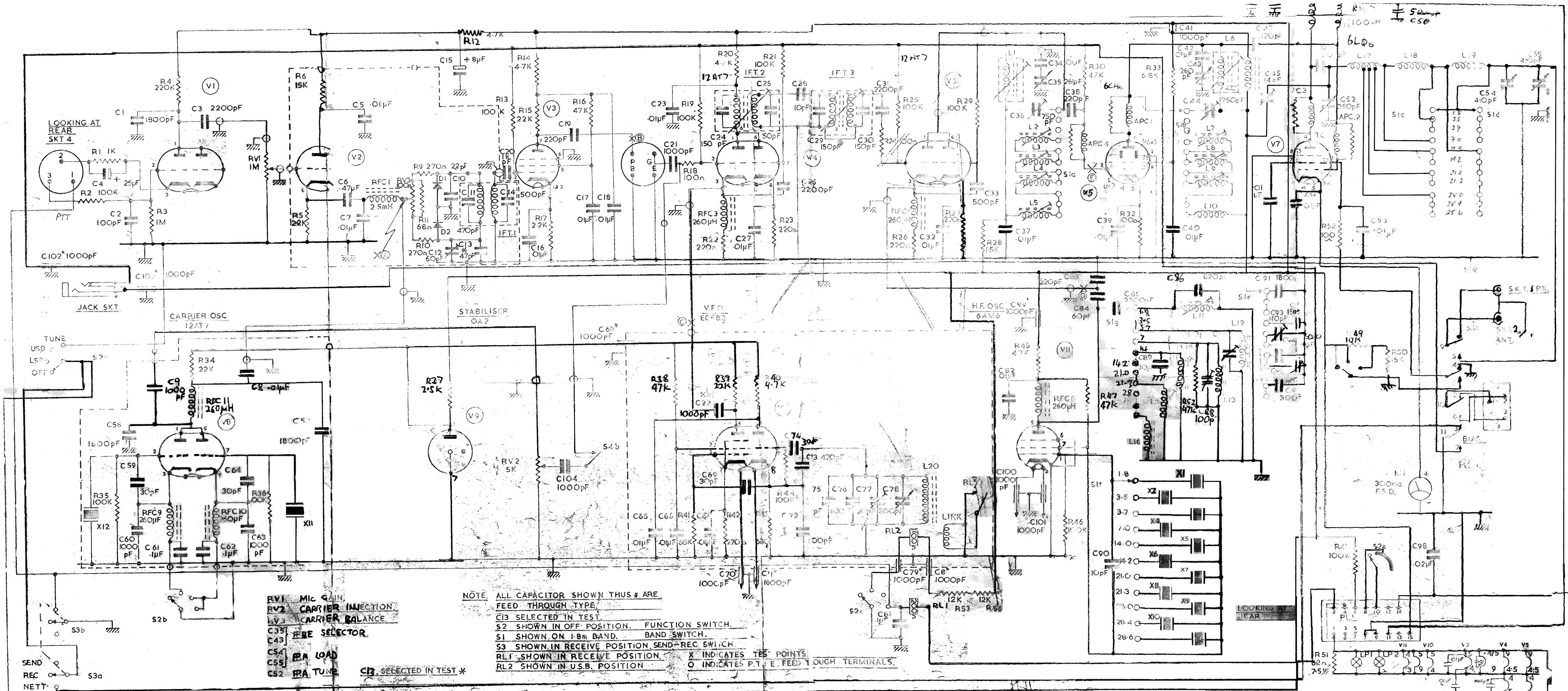


FIG 5-1 LOCATION OF ADJUSTMENTS.



		12077.5 21.0 Mcs	λ
		12227.5 21.3 Mcs	
15077.5 23.6 Mcs	15377.5 28.0 Mcs	15777.5 28.4 Mcs	
4055.0 1.8 Mcs	1055.0 7.0 Mcs	2677.5 14.2 Mcs	
6055.0 3.5 Mcs	1855.0 3.7 Mcs	8577.5 14.0 Mcs	

FIG. 3. LOCATION OF VALVES & CRYSTALS.



- RV1 MIC GAIN
- RV2 CARRIER INJECTION
- V3 CARRIER BALANCE
- C35 PRE SELECTOR
- C43
- C54 PA LOAD
- C55
- C52 PA TUNE
- C13 SELECTED IN TEST *

NOTE: ALL CAPACITOR SHOWN THUS * ARE FEED THROUGH TYPE.

C13 SELECTED IN TEST.

S2 SHOWN IN OFF POSITION. FUNCTION SWITCH.

S1 SHOWN ON 1.8m BAND. BAND SWITCH.

S3 SHOWN IN RECEIVE POSITION. SEND-REC SWITCH.

RL1 SHOWN IN RECEIVE POSITION. * INDICATES TEST POINTS.

RL2 SHOWN IN U.S. POSITION. O INDICATES P.T. E. FEED THROUGH TERMINALS.

SEND
REC
NETT

LOOKING AT REAR

