COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF CIVIL AVIATION

HANDBOOK

FOR

V.H.F. TRANSCEIVERS PORTABLE & MOBILE

D.C.A. TYPE NOS. RT 12 & RT 13

VINTEN COMMUNICATION PRODUCTS PTY. LTD.
MELBOURNE AUSTRALIA

HB679

HANDBOOK INDENT NOS. Y5/~~679~~
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1.0 BRIEF SPECIFICATION.

1.1 Classification.

The portable type RT12 and mobile type RT13 transceivers are designed to operate in the frequency band 118 to 132 Mc./S. Type RT12 operates from 230V 50 c/s A.C. and is intended for use where portability is required. Type RT13 operates from 12/24V D.C. and is designed primarily for operation in vehicles.

1.2 Composition and Type Numbers:

RT12 Y5/672
RT13 Y5/673

DCA type RT12 corresponds to Vinten Type AMBTR8.

DCA type RT13 corresponds to Vinten Type AMMTR13.

Transceivers type RT12 and RT13 are executed in mono-unit construction with transmitter, receiver and power supply incorporated on a single chassis, designed to clip into ventilated snugly fitting cases, in a drawer type of construction.

Type RT12 is arranged to be fitted into a shock-mounted transit box with carrying handle for easy portability. In the case of type RT13, intended for vehicular service, the mounting case is intended to remain fixed in the vehicle, permitting rapid withdrawal of the complete unit for servicing or interchanging. Type RT13 is supplied with a combined plug-in power outlet fuse-board and a spring-mounted whip antenna.

1.3 Brief Description.

1.3.1 Transmitter.

The Transmitter is identical in both units. It is crystal controlled, Amplitude Modulated, mounted on the same chassis as the receiver, and is capable of being modulated 100% with an R.F. input to the antenna of 5 watts. The crystal frequency is multiplied twelve times to obtain the output frequency and all R.F. stages are transformer coupled to minimise spurious radiation. The modulator includes an efficient limiter and uses a low input variable reluctance microphone. Transmitter heaters are controlled by a microswitch mounted on the microphone cradle.

1.3.2 Receiver.

The Receiver is identical in both units also. It is a double conversion superheterodyne, utilising one crystal for control. An efficient A.V.C. circuit, muting circuit and noise limiter are incorporated in the Receiver. Audio output, capable of a maximum 2½ watts, is applied to a 4" speaker mounted on the front panel. The mute and volume controls and on-off switch are also mounted on the front panel.

1.3.3 Power Supply.

The RT12 power supply is mounted on the same chassis as the transceiver and located across the rear section. It operates from 190-270 volts 50 c/s A.C. and is controlled by an on-off switch mounted on the front panel.

The RT13 power supply is also mounted on the same chassis as the transmitter and receiver and located across the rear section. It is a balanced transistorised converter and can be connected for 12V or 24V operation. The transistors are mounted on an extruded aluminium heat sink which is bolted to the rear of the chassis and protudes through the rear of the case, ensuring adequate cooling.

N.B. THE TRANSISTOR POWER SUPPLY IS POLARITY SENSITIVE. INCORRECT POLARITY WILL RESULT IN DESTRUCTION OF THE TRANSISTORS.

1.3.4 Antenna.

A stub matched quarter wave whip antenna is supplied for mounting on metal-roofed vehicles. Construction is of all non-ferrous materials, chrome plated where necessary. A stainless steel compression spring with internal copper braid tail supports the whip section and provides a shock resistant assembly. A rubber gasket ring effectively precludes any chance of moisture leakage.

1.4 Power Requirements. (Typical Figures)

1.4.1 RT12.

Phases	One
Voltage	190 - 270
Frequency	50 C.P.S.
Power Consumed	Receive 72 watts Standby 100 watts Transmit 124 watts
Power Factor	0.92 approx.

1.4.2 RT13.

Voltage 12V D.C. or 24V D.C.

Polarity POSITIVE OR NEGATIVE

AS SPECIFIED

(see 1.3.3)

Battery Amps.

	12V	24V
Receive	4	2.2
Standby	7	3.5
Transmit	8	4

1.5 Performance Specification:

1.5.1 Transmitter.

Radio Frequency Section: 5 stage crystal controlled.
Total multiplication twelve times.

Crystal Frequency: 9.83 - 11 Mc./S.

Crystal Tolerance: .0035%

Output Frequency: Single frequency in the band 118 - 132 Mc./S.

Power Output: 5 watts carrier to 70 ohm load from push pull Class C output stage.

Modulation: Plate and screen modulation of the final amplifier. Less than 5% distortion for 90% modulation with limiter operating.

Carrier Noise: Greater than 46 db below level corresponding to 100% modulation.

Frequency Response: ± 3 db 300-3000 c.p.s.

Spurious Radiations: All greater than 70 db below rated output.

1.5.2 Receiver.

Tuning Range: 118 - 132 Mc./S. crystal controlled.

Signal Frequency Section: 1 stage at above frequencies.

First Intermediate Frequency Section:
16.44 - 14.88 Mc./S.

Second Intermediate Frequency Section: 2 Mc./S.

Crystal Frequency: 12.888 - 14.44 Mc./S.

Crystal Tolerance: .0035%

Sensitivity: Audio output greater than 1 watt for 2 μV input, modulated 30% at 1000 c.p.s.

Signal/Noise Ratio: Better than 12 db for 1 μV input, modulated 30% at 1000 c.p.s.

Audio Response:

300	- 3db
1000	0db
2000	- 3db

1.5.2 (cont)

A.V.C. Output level does not vary by more than 5 db with an input variation of 5 μV to 0.1 V.

Mute Control: May be set to operate at any R.F. input voltage between 0.25μV and 10μV. When the mute control is rotated fully anti-clock wise, the mute circuit is inoperative.

Selectivity: 2nd IF Channel

Bandwidth	Attenuation
± 25 Kc./S	4.5 dB
± 70 Kc./S	63 dB
± 100 Kc./S	120 dB

Distortion: Not greater than 5% at an RF input of 100 μV and an audio output of 1 watt.

1.6 Electron Tube and Crystal Complement.

1.6.1 Electron Tube Complement.

Receiver.

Type	Circuit Ref.	Function
6AK5	V1	R.F. Amplifier
6AK5	V2	1st Mixer
6BA6	V5	2nd Mixer
6BA6	V6	I.F. Amplifier
6BA6	V7	I.F. Amplifier
6AU6	V8	I.F. Amplifier
6AV6	V9	Audio and A.V.C. Detector Audio Voltage Amplifier
6BW6	V10	Audio Power Output
6U8	V4	Crystal Oscillator Crystal Frequency Multip.
6AM6	V3	Frequency Multiplier
12AT7	V11	Mute Relay Control Tube
OA202	W1	Noise Limiter
OA202	W2	Noise Limiter
OA202	W3	Mute Circuit Noise Detector

1.6.1 (cont)

Transmitter:

Type	Circuit Ref.	Function
6U8	V12	Crystal Oscillator and Tripler
QQE03/12	V13	Doubler-Doubler
QQE03/12	V14	Class C Power Amplifier
12AT7	V15	Microphone Amplif.
6BA6	V16	Limiter Control Tube
12AT7	V17	Audio driver
QQE03/12	V18	Push-pull Modulator
OA202	W4	Limiter Diode

D.C. Power Supply:

2N1099 (DT80)	Q1	Balanced Push-pull DC-DC Convertors
2N1099 (DT80)	Q2	Balanced Push-pull DC-DC Convertors
1N1442	W5 W6 W7 W8	HT Rectifiers
1N1442	W9	Bias Rectifier

A.C. Power Supply:

1N2088	W10,11 12,13	H.T. Rectifiers
1N1442	W14	Bias Rectifier
1N1442	W15 W16	Relay Supply Rectif.

1.6.1 (cont)

Total quantity of Each Type

Transmitter & Receiver

Type	Total Number
6AK5	2
6AU6	1
6BA6	4
6AV6	1
6BW6	1
6U8	2
6AM6	1
12AT7	3
QQE03/12	3
0A202	4

D.C. Power Supply

2N1099 (DT80)	2
1N1442	5

A.C. Power Supply

1N1442	3
1N2080	4

1.6.2 Crystal Complement:

1 Receiver Crystal AT Cut in HC6U Holder adjusted to 0.001% with a parallel capacity of 20 PF.

1 Transmitter Crystal AT Cut in HC6U Holder adjusted to 0.001% with a parallel capacity of 20 PF.

1.7 Special Tools:

Two special tuning tools and one Allen Key are supplied with each transceiver, located in stowage clips on the chassis.

1. A nylon tool for capacitor adjustment.

2. A combination tool for use with I.F. transformers consisting of a slug tuning tool and a slug locking ring tool.

3. An Allen key for 5/32" grub screws in knobs.

1.8 Mechanical Construction and Dimensions.

Cases and chassis are constructed in 18 s.w.g. M.S. sheet. Perforated sheet is utilised for sides and bottom of the cases to provide adequate ventilation. The front panel and case, which is fabricated by spot welding, are secured together by two simple clips to form a flush fitting unit. The transistor heat sink is an aluminium extrusion.

Finish to surfaces are as follows :-

(a) Chassis - Cadmium plated and passivated prior to screen printing.

(b) Cases & Panels - Painted to standard D.C.A. Specifications.

(c) Heat Sink - Heavily anodised black.

(d) Fittings, Hardware, etc. - Chrome, Nickel or Cadmium, according to the end use.

The outside dimensions of the RT12 is 15" width x 13" depth x 8" height.

The outside dimensions of the RT13 is 14½" width x 11½" depth x 5¼" height.

Total weight, including all accessories, of the RT12 is 43 lbs.

Total weight, including all accessories, of the RT13 is 26 lbs.

2.0 TECHNICAL DESCRIPTION.

2.1 Receiver.

To facilitate a circuit description, the major circuit components are tabulated below.

Section	Component	Function
Signal Frequency	L1	Aerial Coil
	V1	6AK5 RF Amplifier
	T1	RF Transformer to V2
	V2	6AK5 RF mixer
	RL1	Change over relay
16-14 Mc./S.	T3	I.F. transformer to V5
	V5	Second mixer
2 Mc./S.	T6 T7	I.F. Transformer to V6
	V6	6BA6 I.F. Amplifier
	T8	I.F. Transformer to V7
	V7	6BA6 I.F. Amplifier
	T9	I.F. Transformer to V8
	V8	6AU6 I.F. Amplifier
	T10	I.F. Transformer to V9
	V9	Double diode detector & Audio Amplifier
Audio	V10	6BW6 Output Pentode
	W1 W2	Noise Limiter
Mute	V11	Mute Relay Control Tube
	W3	Mute Noise Diode
RF Oscillator	V4	6U8 Oscillator & Doubler
	T5	Tuned Oscillator Load for V4 Pentode
	T4	Doubling Transformer to V3
	V3	6AM6 Quadrupler
	T2	Tuned Quadrupling Load for V3.

2.1 (cont.)

Crystal Oscillator.

The Receiver is a double conversion type using one crystal as the source for deriving both converter frequencies. The second mixer utilises the crystal frequency while the first mixer utilises eight times the crystal frequency.

The crystal oscillator is a Colpitts type, using the screen grid of the pentode section of the 6U8 as an anode for the oscillator section and the plate of the pentode section as a point from which amplified oscillator voltage is obtained for the second mixer. T5 is a tuned load for the pentode. The grid anode connection prevents the crystal frequency changing due to detuning of any tuned circuit, normally present in other types of oscillator circuits. The crystal frequency is applied to the second mixer via C25. It is also applied via C21 to the grid of the triode section of the 6U8 which with T4 in the anode circuit doubles the crystal frequency. T4 also couples the doubled frequency to the grid of the 6AM6 quadrupler. T2 is the anode load of the 6AM6 and is tuned to eight times the crystal frequency. From the secondary of T2 this frequency is applied to the grid of the first mixer via C14.

T.P.2 is a test point for tuning T5, and T.P.3 permits the tuning of T4, using grid current in both cases as an indication.

R.F. and I.F. Stages.

The aerial feeder is connected, via changeover relay $\frac{P.T.T}{3}$ to the tapped coil L1. The R.F. input is then transferred to the grid of V1 via C2 where it is amplified before being applied to the first mixer via T1 and C13. In V2 the frequency is changed to that of the first I.F. (14.88 - 16.44 Mc./S.) and then applied to the second mixer via T3. In V5 the frequency is changed to that of the second I.F. (2 Mc./S.) The signal is then amplified in conventional manner in V6 V7 and V8 and applied to the double diode detector in V9.

The I.F. transformers T6, T7, T8, T9 and T10 are all identical and overcoupled to obtain a bandwidth of 25 Kc./S. at an attenuation of 4db.

2.1 (cont)

Detection and Audio Stages.

The I.F. frequency is applied to both diodes as in a conventional receiver. The A.V.C. diode (pin 6) does not conduct immediately but is delayed until the diode is at a potential more positive than the cathode of the triode which has cathode bias. The A.V.C. is filtered via R35, C54 and applied to V7, V6 and V1.

Audio detection takes place at diode 2 of V9, the diode load being R30 and R31. At the junction of R30 and R31 the audio is taken off and applied to the diode limiter W1, W2 and associated components R34, R33 and C59.

The junction of W2 and R34 is held at a negative voltage with respect to the cathode of V9 corresponding to the carrier level. Due to the time constant of R33, C59, this voltage cannot follow the audio impulse type noise.

When noise or any audio in excess of 100% modulation is received, the junction R30, R31, becomes more negative than the cathodes of the diodes W1, W2. The diodes cease to conduct under these conditions, thereby stopping the noise from reaching the audio amplifier.

The audio is fed from the junction of W2 and R34 via C61, R42 and R43 to the grid of V9. There it is amplified and fed to the audio output tube V10 for further amplification before being applied to the speaker.

Mute Circuit.

V11 is the mute relay control tube and the circuit is a simple form of codan. Audio signal, noise and a D.C. voltage proportional to the strength of the received signal is fed from terminal 4 of T10 via R32 to a network in the grid circuit of one triode of V11. C62 and R39 is a high pass filter which filters out both the D.C. voltage and the audio signal but lets the noise pass, Via C63, to the diode W3. R40 and C64 is a low pass filter which filters out the audio signal and noise and permits the negative D.C. voltage to be applied to the grid. Meanwhile the noise voltage is rectified by diode W3 so that a positive voltage is formed tending to buck the negative voltage

2.1 (cont)

already applied to the grid and this causes more plate current to flow.

An adjustable trigger level is provided by R50 in the cathode of the 1st section of V11. R49 is a HT bleed resistor which assists in stabilizing this voltage. The adjustment of R50 determines the level of the applied signal which will open the mute relay. In the anode circuit of the same triode is a resistor of high value (R48) to produce a large voltage difference for grid voltage changes. This anode voltage is applied directly to the grid of the second triode. Cathode resistor R51 and HT bleed resistor R52 provide bias which is substantially independent of plate current until the grid voltage rises to the appropriate value, when plate current rises sharply and the relay operates, opening the mute contacts.

In the no signal condition, the second triode is nearly cut off while the first triode is conducting. An R.F. signal produces the negative D.C. voltage which tends to cut off the first triode and the subsequent rise in plate voltage causes the second triode to conduct and operate the mute relay.

In the absence of a signal, noise pulses cause the positive voltage mentioned above. This causes the first triode plate current to increase which cuts off the second triode. Hence noise will not unmute the receiver but rather tends to hold it muted. The application of a weak noisy signal combines both these operations and it is not until a readable signal to noise ratio is obtained that the mute opens.

The method of muting used is to bias the output tube V10 to cut off, in the muted condition the grid of V10 is biased to approximately -45 volts with respect to cathode, in the unmuted condition M1 contacts are closed, the bias then being reduced to -12.5 volts by the divider formed by R46 and R47.

2.2 Transmitter.

Radio Frequency Section.

Tube	Function	Remarks
V12 6U8 Pentode Triode	Oscillator Amplifier Tripler	Screen is utilised as plate of oscillator circuit and is electron coupled to plate circuit of V12A, giving an amplified voltage of frequency "f" which is transferred to V12B by T12. Output at 3f is transferred by T13 to V13A.
V13 QQE03/12	Doubler	Output at 6f is coupled via C99 to V13B.
Double Tetrode	Doubler	Output at 12f is coupled by T14 to V14. Output is balanced with respect to earth.
V14 QQE03/12 Double Tetrode	Push-pull Power Amplifier	Modulated output at 12f is coupled into load by T15.

Circuit Details.

The crystal oscillator is a Colpitts type which is identical to that used in the receiver. T12 couples the output of the oscillator-amplifier to V12B which with its transformer load (T13) triples the frequency. T13 also couples the signal to V13A which doubles the frequency in its load L2, C98. The output of V13A at 6f is coupled by C99 to V13B which also acts as a doubler. T14 selects the output of V13B at 12f and feeds it to V14 as a balanced signal to drive the push-pull power amplifier.

Screen and Anode modulation is used on V14 and the output is transferred to the feeder by T15. T15 is a double tuned transformer with the output tapped off the secondary. The R.F. passes to the aerial change over relay and via a high pass filter to the aerial socket. The low pass filter reduces harmonic radiations to a level less than -70db with respect to the carrier level.

2.2 (cont)

All the stages except the power amplifier have resistance capacity decoupling networks in the HT line.

Metering at TP5, TP6, TP7, TP8 and TP9 is provided for easy and direct tuning of each stage.

Fixed grid bias of approximately 25 volts is used on the final power amplifier to prevent the ratings of V14 being exceeded in the event of failure of grid drive.

2.3 Modulator:

Tube		
V15A ½ 12AT7	Microphone Amplifier	Low level input
V15B ½ 12AT7	Microphone Amplifier	Control voltage audio Amplifier
V16 6BA6	Limiter Amplifier	Constant output stage, controlled by bias volts via diode W4.
V17 12AT7	Driver	Phase splitter.
V18 QQE03/12	Push-pull Modulator	Class AB1 Output to modulation transformer T16.

Circuit Details:

The input stage V15A amplifies speech signal from a low level rocking-armature microphone. Cathode feedback is used in this stage. The output is coupled via C122 to V15B. A proportion of the output of V15A is not used for modulation purposes but is amplified by V15B and rectified by W4. A negative voltage is developed at the junction of R88, R89, R90 and C126. This negative voltage reduces the gain of V16 and as the voltage is proportioned at the audio level, limiting takes place. By adjusting R83 it is possible to maintain a high average level of modulation without overmodulating. The output from V16 is fed via C130 to V17 which is operating as a phase splitter and driver. Balanced output from V17 is fed to V18 via C132 and C133 to the modulator tube V18. Fixed bias is used on V18 and it operates in Class AB1. The output is fed to the modulation

2.3 (cont)

transformer, the secondary of which is in series with the HT supply to the power amplifier. A resistance network applies approximately 85% of the modulating voltage to the screen of the power amplifier. TP10 provides method of metering the modulator plate current.

Decoupling networks are provided in the HT line supplying V15 and V16 in order to reduce carrier noise.

2.4 Power Supply - RT12:

The RT12 power supply consists of a normal A.C. to D.C. supply. S3 is used in the primary of power transformer T18 for switching the receiver on and off. F2 protects the transformer against abnormally high currents and voltages.

The secondaries of T18 consist of the following winding and functions :-

(a) A 6.3 volt winding for the receiver heaters.

(b) A 6.3 volt winding for the transmitter heaters.

(c) A 13 volt winding for relay operation which is applied to a full wave silicon rectifier, W15, W16, from which 12V D.C. is obtained to operate the aerial changeover relay. Both the 12V D.C. supply and transmitter heaters are controlled by S4 so that high tension cannot be applied to the transmitter in the absence of heater voltage.

(d) A 50 volt winding for bias supply which is applied to a half wave rectifier circuit from which -50 volts D.C. bias for the power amplifier and modulator is obtained, each with its own resistance capacitance filter.

(e) A 170/190 volt H.T. winding which supplies a bridge connected rectifier circuit of silicon diodes. 200 volts D.C. output is fed via a capacitance input filter to a springset on relay PTT so that high tension can be applied to either receiver or transmitter as required. A springset is also provided on the relay to change taps on the H.T. winding to maintain 200V D.C. under the differing load conditions of the receiver and transmitter.

2.5 Power Supply - RT13.

The Power Supply for RT13 is of recent design and employs transistors in place of vibrators. It is a balanced push-pull converter using Delco Transistors, type 2N1099 (DT80). Conversion from 12 volt operation to 24 volt operation is simply a matter of changing transformer connections and terminal connections on the terminal boards.

The principle of operation of the supply is that only one transistor is conducting at one time. A study of the circuit reveals that in switching off one transistor and switching on the other results in a reversal of flux in the transformer. This reversal of flux induces a voltage in the secondaries which can be rectified at a much higher voltage due to a step up turns ratio.

R113, R114 and R115 is a bias or starting arrangement so that the circuit will commence oscillation automatically upon removal of a short circuit, should one occur. The bias produced by the resistance network causes both transistors to conduct to a small degree. Owing to dissimilarity of characteristics of transistors or resistance values, one transistor will conduct more than the other (say Q1). This difference will create a resultant flux which includes a voltage in the feedback winding whose polarity is negative at the base of Q1 and positive at Q2. This tends to cause Q1 to pass more collector current and Q2 to tend to be cut off. This increases the voltage in the feedback winding and Q1 is switched on and Q2 is cut off. The current through Q1 and the associated winding rises till saturation is reached. At this point, due to the decrease in rate of change of current, the feedback voltage disappears and this tends to reduce the current already flowing through Q1. This discrease in current produces a feedback voltage which is negative at the base of Q2 and positive at the base of Q1. This results in a switching waveform as the current in Q1 drops to zero and Q2 is switched on. The cycle is then repeated at a frequency dependent on circuit constants etc; in this case approximately 600 c.p.s.

It will be noted that the positive lead is connected to the emitter and so we have a small positive bias on the emitter with respect to the base and a large negative bias on the collector with respect to the base.

2.5 (cont)

Reversing the polarity of the supply leads will result in a large positive bias on the collector and the resulting current will cause the instantaneous destruction of the transistors. Also earthing the base of the transistors will result in a large positive bias on the emitter. This will again result in destructive values of current in the transistor.

The secondary circuit is the same type as used in the RT12 with a bridge rectifier feeding a capacitor input filter. The excellent regulation of the transistor supply eliminates the need to change taps on the secondary in the transmit condition. Short circuits to earth in the high tension line will stop the converter oscillating but the heatsink and circuit values in the supply have been chosen so that a short circuit may be left on indefinitely without damaging any components.

3.0 INSTALLATION AND OPERATING INSTRUCTIONS.

3.1 Packaging:

The RT12 is packed as a single package 18" high x 15" wide x 9" deep. Gross weight 44 lbs.

The RT13 is also packed as a single package and is 19" high x 12⅜" wide x 6" deep. Gross weight 27 lbs.

It contains the transceiver, a DC outlet and fuse board and antenna with 12 ft. of co-axial cable and a connector.

3.2 Installation:

Transceiver.

When the transceiver is first unpacked it should be examined for any damage.

Unclip the case retaining catches and remove the unit from the case. Check that crystals and tubes are seated correctly in their sockets.

Select a mounting position in the vehicle so that it is convenient for the operator to reach the controls and microphone, and also to hear the speaker. Mount the case, using three or four ¼" bolts, spring washers and nuts and any spacers, brackets, etc., as required for the particular vehicle and location of the set. Holes have to be drilled in the case to suit the conditions. Ensure that the case is now firm and free from distortion and is not likely to vibrate when the vehicle is passing over rough or corrugated roads. Drill one hole and mount the D.C. outlet and fuse board in a position close to the set so that the battery lead plug from the set can be plugged in. From the outlet board connect battery cables of size at least 162/.0076 to the battery terminals or between the starter solenoid and frame, using split type washers to ensure continued good connection. Insert a 10 amp. fuse for 12V sets and 5 amp. fuse for 24V sets.

Before replacing the chassis in the case, check that the unit is wired for the correct battery voltage and polarity. This information is contained on a

3.2 (cont)

warning plate on the battery leads. Should the polarity be incorrect this can be rectified by changing the connections on TS3 and TS2. The emitters of the transistors must be connected to the positive lead.

FAILURE TO OBSERVE CORRECT POLARITY WILL RESULT IN INSTANT DESTRUCTION OF THE TRANSISTORS.

Whenever the battery is removed after the transceiver is installed, every care should be taken to ensure that it is replaced with the same polarity.

Antenna.

The Antenna is supplied with a telescoping section to provide length adjustment and a stub which is to be cut to the correct length for the particular application. A chart is supplied at the rear of this handbook giving approximate lengths for stub and whip for various frequencies when the antenna is mounted centrally in the roof of a Holden Model F.C. Utility and is intended purely as a guide for this particular vehicle. It is essential that every installation be checked and adjustments to stub and whip lengths be made till a satisfactory standing wave ratio is obtained. This must be done with doors closed, bonnet down and no personnel within ten feet of the antenna using the transceiver as a signal source and the aerial mounted as stated below.

Select a central position for mounting the antenna. Drill a hole 1½" diameter in the roof taking care not to damage the lining. Using the split ring as a template, mark out and drill 4 holes each 5/32" diameter and two holes ⅛" diameter. Countersink the two ⅛" holes for the two 6BA screws which secure the split ring inside the roof of the vehicle. Scrape clean the under side of the roof which will make contact with the split ring. Insert the ring through the 1½" hole and fasten it to the underside using the two countersunk screws supplied. The braid of the co-axial cable feeder and stub must be tinned where it is held by the clamp at the aerial base. Feed the co-axial cable in the direction of the transceiver between the hood and the lining and bring it out at a point convenient for the particular vehicle.

3.2 (cont)

Insert the rubber "O" ring between the bottom of the antenna and the roof. Fasten the antenna to the roof using the four 4BA screws supplied. Screw the whip into the base. Pull the co-axial cable through ensuring that there are no sharp bends and after leaving ample spare cable, fix the connector to the cable. Screw the connector into the aerial socket.

The unit is now ready for putting into operation.

Checking Operating Conditions.

With the antenna connected to the transceiver, switch on the "on-off" switch and remove the microphone from the cradle on the front panel. Allow 20 seconds for the valves to warm up and then operate the press-to-talk button on the microphone and check the battery voltage appearing between the switch S1 and earth.

For 12V operation - minimum volts 11.8

For 24V operation - minimum volts 23.6

If the voltages measured are below those listed it is advisable to check that the battery is not discharged, and also check connections and cabling for excessive resistance.

Transmitter:

The output stage of the transmitter must be tuned to the antenna on the vehicle for maximum output. Connect a 0-100 mA meter to TP9. Using the special tuning tool provided, screw C107 anti-clockwise till its capacity is at a minimum. Tune C105 for a minimum plate current reading on the meter. Screw C107 in and tune it for a maximum of plate current. This maximum value should be 60 mA. If it is different from these values, adjust the coupling of T15 and retune C107 till the plate current is in the range 60 mA. The tuning of C107 must be the last adjustment, not the variation of T15 coupling. When this has been accomplished the transmitter is tuned to the aerial for 5 watts output.

3.2 (cont)

Receiver.

Rotate the mute control anti-clockwise and noise should be heard in the speaker. Check that the action of the volume control is normal. Rotate the mute control clockwise till the set is muted. There should still be ¼ of one turn left between the position of the control when the set mutes and the fully clockwise position. Check that the set unmutes on a signal. With no signal into the receiver, set the mute control so that the receiver is just muted. Advance the control approximately 20° clockwise. The receiver should then unmute on signals of less than 1μV strength.

3.3 Operation:

3.3.1 To Receive - RT12 RT13.

(a) Switch the "On-Off" switch to "On" and the muting control to maximum anti-clock wise.

(b) After approximately 20 seconds noise should be heard from the speaker.

(c) Reset muting control till the noise disappears.

The receiver is now ready to receive messages. The receiver volume may be adjusted by the VOLUME control.

3.3.2 To Transmit:

RT13 - Remove the microphone from the cradle on the front panel. This switches on the trans mitter heaters. After 30 seconds press the button on the microphone case and speak.

When speaking into the microphone, use a normal speaking voice and hold the microphone approximately three inches away from the lips.

Note: No transmission can take place until approx. 30 seconds after the microphone is lifted from the cradle. This arrangement reduces the battery drain and lowers the operating temperature of the equipment.

RT12 - The method of transmitting with the RT12 is basically the same as for the RT13. A separate TRANSMITTER FILS. ON switch is provided which must be manually operated 30 seconds before commencing to transmit.

4.0 MAINTENANCE

4.1 Tables of Voltages and Currents:

4.1.1 Power Supply Voltages:

Operating Voltage	Heater Volt-ages	H.T. Volts		Bias Volts at TP8		Bias Volts at Jctn. R100 R101	
		Rec-eive	Tran-smit	Rec-eive	Tran-smit	Rec-eive	Tran-smit
12.6 DC.	6.3	220	215	25	34	20	21
25.2 DC.	6.3	220	215	25	34	20	21
230 AC.	6.3	220	210	25	34	20	21

4.1.2 Power Supply Currents:

Operating Voltage	Battery Current A		High Tension Current mA	
	Transmit	Receive	Transmit	Receive
12.6 DC	8	4	160	130
25.2 DC	4	2	160	130
230AC.	-	-	160	130

4.1.3 Receiver Voltage Table:

Volume Control	Fully anti-clockwise
Mute Control	Fully anti-clockwise
R.F. Input	Zero
H.T. Supply	220 volts
Heater Volts	6.3 volts

Meter. Measurements marked V.V read with valve voltmeter. All others on instrument with 1000 Ω/v sensitivity.

4.1.3 Receiver (cont)

Valve No.	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
1	-	-	-	6.3	60	60	-	-	-
2	1.5VV	-	12.6	6.3	90	90	-	-	-
3	50VV	-	-	6.3	210	-	160	-	-
4	150	6VV	85	6.3	-	50	-	-	15VV
5	.5VV	4	6.3	12.6	120	120	4	-	-
6	.5VV	-	6.3	12.6	175	75	.5	-	-
7	.5VV	-	6.3	12.6	200	75	.5	-	-
8	-	4	0	6.3	220	160	4	-	-
9	9VV	10	0	6.3	7VV	-.3	150	-	-
10	0	9	0	6.3	12.6	[illegible]	210	[illegible]	-
11	150	40	85	0	0	40	4.5VV	8VV	6.3

4.1.4 Transmitter Voltage Table.

Unmodulated output 5W HT 220V

Valve	Plate		Screen		Grid		Cathode	
	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts
V12A 6U8	6	100*	3	75*	2	6VV	7	0
V12B 6U8	1	150*	-	-	9	34*	8	2.5
V13A QQE03/12	8	160*	7	85	3	40*	2	0
V13B QQE03/12	6	160*	7	85	1	30W	2	0
V14 QQE03/12	6 8	220*	7	160	1 3	60*	2	0

* These readings were measured between decoupled points and earth.

4.1.5 Modulator Voltage Table.

Valve	Plate		Screen		Grid		Cathode	
	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts
V15A 12AT7	6	70	-	-	7	0	8	1
V15B 12AT7	1	65	-	-	2	0	3	1
V16 6BA6	5	35	6	30	1	0	7	0
V17 12AT7	1 6	110 110	- -	- -	2 7	20VV 20VV	3 8	23 23
V18 QQE03/12	6 8	220 220	7	220	1	21VV 21VV	2	0

4.1.6 Receiver Test Point Readings.

Position		Current
TP1		+ 16μA
TP2	1 mA	0.7 mA
TP3	1 mA	0.4 mA
TP4	10 mA	6.5 mA

4.1.7 Transmitter Test Point Readings.

HT 220V Output 5W unmodulated.

Position		Current
TP5	10 mA	1.0 mA
TP6	1 mA	0.7 mA
TP7	10 mA	1.1 mA
TP8	10 mA	2.5 mA
TP9	100 mA	60 mA
TP10	100 mA	30 mA *

* rises to 60 mA at 100% mod.

4.2 Maintenance Adjustments and Alignments:

4.2.1 Receiver Alignment.

Test Equipment required -

(a) 50μA Amp centre zero meter.

(b) Signal Generator covering 2 Mc./S.

(c) Signal Generator covering the range 118 - 132 Mc./S.

(d) Resistor 15K ohms. with clips.

(e) 0-100μA meter.

2 Mc./S. I.F. Alignment.

Plug the 50μ Amp. meter into T.P.1 so that the meter deflects to the positive side of the scale with no signal. Connect the generator between Pin 1 of V8 and ground at 2 Mc./S. and full output. Using the special aligning tool provided, unlock the top and bottom slugs of T10 and tune for a maximum deflection on the meter. Ensure that the slugs are tuned to the first maximum when starting with the slugs at the outer position. Reduce the output of the generator till the deflection is -10μA. Amps. Retune each slug and lock, only very slight pressure on the locking ring is necessary to satisfactorily lock the slug.

Connect the generator to Pin 1 of V7 and earth. Connect the 15K loading resistor across terminals 1 and 2 of T9.

Using the same tuning technique as described above, tune both slugs of T9 for maximum deflection, reducing the output of the generator to give -10μA before giving the slugs a final tune and lock.

Connect the generator between Pin 1 of V6 and earth. Connect the 15K loading resistor between terminals 1 and 2 of T8. Tune both slugs of T8. Connect the generator between Pin 1 of V5 and earth. Connect the loading resistor between terminals 1 and 2 of T7. Tune both slugs of T7 as for T9. Disconnect the generator and resistor.(*)The I.F. Alignment is now complete.

4.2.1 (cont)

R.F. Alignment on Change of Frequency.

Select the crystal for the desired carrier frequency.

Crystal Frequency = $\frac{\text{Carrier Freq. Mc./S} - 2 \text{ Mc./S}}{9}$

Plug in the crystal. Plug in the 0-1mA meter into TP2. Tune both slugs of T5. Tune the top slug first for a maximum on the meter. Then tune the bottom slug for a minimum. Look both slugs after tuning. The meter reading should be approximately [redacted] A. Shift the meter into TP3 and tune both slugs of T4 for a maximum, approximately [redacted].

Connect the V.H.F. Signal Generator to the aerial socket and apply full output voltage (0.5 volts if available). Set the Signal Generator by the calibration to the approximate carrier frequency. Vary the frequency till a tuning indication is given on the 50μ Amp. meter in TP1. Tune the Signal Generator for maximum deflection.

Using the special tool provided, tune C1, C5, C6, C8 and C9 from the minimum capacity position for maximum meter deflection, taking care that the generator output is reduced at each tuning for a maximum meter deflection of + 10μA.

Having tuned the capacitors, check that the generator is exactly on the carrier frequency by tuning it for maximum deflection of the test meter. Retune C1, C5, C6, C8 and C9 if necessary again limiting the meter deflection to 10μA by reducing generator output. Now tune both slugs of T3 for maximum deflection, reducing the output of the generator to keep the maximum meter deflection down to +10μA.

The Receiver is now aligned and the generator output should be about 0.5μV. Give a final touch to the generator frequency, the slugs of T3, capacitors C1, C5, C6, C8 and C9 in that order. C5 and C6 can tune to spurious responses when the generator is set to outputs greater than 10μV and the original instruction to tune all condensers from the minimum capacity position should be adhered to.

4.2.2 Transmitter Alignment.

$$\text{Crystal Frequency} = \frac{\text{Carrier Frequency}}{12} \text{ Mc./S.}$$

Plug in the crystal. Connect RF Power Output Meter or matched antenna to antenna socket. Plug in the 0 mA meter into T.P.5. Press P.T.T. button on the microphone.
Tune the bottom slug of T12 for maximum deflection.
Tune the top slug of T12 for maximum deflection. The meter reading should be approximately. Reduce this reading by 100 µA by screwing top slug of T12 in.
Plug the meter into TP6.
Tune both slugs of T for maximum deflection, approximately
Plug the meter into TP7.
Tune C98 for maximum approximately
Tune C102 for a minimum.
Plug a 100 µA meter into TP8.
Tune C102 and C103 for maximum approx.
Plug a 0-100 µA meter into TP9.
Screw C107 out to minimum capacity.
Tune C105 for a minimum approx. 20 to 30
Tune C107 for a maximum. Reading should be 60
If this reading is not obtained, adjust the coupling of T15 and retune C107. Repeat until the reading is 60 The power output should be 5 watts. The power output stage must be tuned to the antenna when the set is returned to operation. (See Installation Instructions).

4.2.3 Checking Transmitter Audio Limiter.

Connect an audio generator with an output impedance of 600 ohms to an unbalanced attenuator using screened and insulated cable, then from the attenuator to terminal 1 and 2 on TS1 on the transceiver using screened and insulated cable. Earth the screen of the cable at terminal 2 on TS1 only. With an input to the transceiver of -35dBm at 1,000 cycles, adjust the modulation to approximately 50% by rotating the mod. set control R83.
Reduce the input to -45dBm then increase the input to - 25dBm, between these limits the modulation percentage should not change by more than 2 db., if a greater variation results the limited amplifier valve V16, (6BA6) should be replaced and the test repeated.
Readjust the modulation to 100% with an input of 35 dBm.

5. COMPONENT SCHEDULE.

5.1 Receiver.

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Resistors:			
R1	100KΩ ± 10% ¼W	V1 Grid	Y8/5492	IRC BTS
R2	27KΩ ±10% 1W	HT Decoupling	Y8/6493	IRC BTB
R3	3.3KΩ ±10% ¼W	HT Decoupling	Y8/5474	IRC BTS
R4	47KΩ ±10% ¼W	V3 Screen	Y8/5488	IRC BTS
R5	1000Ω ±10% ¼W	TP3 Shunt	Y8/5468	IRC BTS
R6	1MΩ ±10% ¼W	V2 Grid	Y8/5504	IRC BTS
R7	100KΩ ±10% ¼W	V3 Grid Return	Y8/5492	IRC BTS
R8	10KΩ ±10% ½W	HT Decoupling	Y8/167	IRC BTA
R9	4.7KΩ ±10% ¼W	HT Decoupling	Y8/5476	IRC BTS
R10	27KΩ ±10% ¼W	V4 Triode Grid	Y8/5485	IRC BTS
R11	1000Ω ±10% ¼W	TP2 Shunt	Y8/5468	IRC BTS
R12	1000Ω ±10% ¼W	V5 Cathode Bias	Y8/5468	IRC BTS
R13	47KΩ ±10% ½W	HT Decoupling	Y8/168	IRC BTA
R14	100KΩ ±10% ¼W	V4 Pentode Grid	Y8/5492	IRC BTS
R15	47KΩ ±10% ½W	V4 Screen Load	Y8/168	IRC BTA
R16	4.7KΩ ±10% ½W	HT Decoupling	Y8/160	IRC BTA
R17	100KΩ ±10% ¼W	AVC Decoupling	Y8/5492	IRC BTS
R18	100KΩ ±10% ¼W	V6 AVC Grid return	Y8/5492	IRC BTS
R19	47Ω ±10% ¼W	V6 Cathode	Y8/5452	IRC BTS
R20	39KΩ ±10% ¼W	V6 Screen	Y8/5487	IRC BTS
R21	100KΩ ±10% ¼W	V7 AVC Grid return	Y8/5492	IRC BTS
R22	1000Ω ±10% ½W	HT Decoupling	Y8/159	IRC BTA
R23	47Ω ±10% ¼W	V7 Cathode	Y8/5452	IRC BTS

Circuit Code	Component Description	Function	DCL Ident No.	Manufacturer & Designation
	Resistors			
R24	39KΩ ±10% ¼W	V7 Screen	Y8/5487	IRC BTS
R25	1000Ω ±10% 1.5W	HT Decoupling	Y8/889	Ducon RWV3J
R26	1000Ω ±10% ¼W	V8 Cathode	Y8/5468	IRC BTS
R27	39KΩ ±10% ¼W	V8 Screen	Y8/5487	IRC BTS
R28	1000Ω ±10% ¼W	HT Decoupling	Y8/889	IRC BTS
R29	470KΩ ±10% ¼W	TP2 Feed	Y8/5500	IRC BTS
R30	47KΩ ±10% ¼W	Det. Diode Load	Y8/5488	IRC BTS
R31	27K ~~39~~KΩ ±10% ¼W	Det. Diode Load	Y8/~~5487~~ 7487	IRC BTS
R32	47KΩ ±10% ¼W	Mute Decoupling	Y8/5488	IRC BTS
R33	330KΩ ±10% ¼W	Noise Filter	Y8/5498	IRC BTS
R34	330KΩ ±10% ¼W	Noise Filter	Y8/5498	IRC BTS
R35	470KΩ ±10% ¼W	A.V.C. Filter	Y8/5500	IRC BTS
R36	470KΩ ±10% ¼W	A.V.C. Load	Y8/5500	IRC BTS
R37	1.5KΩ ±10% ¼W	V9 Cathode Bias	Y8/5470	IRC BTS
R38	10KΩ ±10% ¼W	V9 Cathode A.V.C.Delay	Y8/5480	IRC BTS
R39	150KΩ ±10% ¼W	Mute Filter	Y8/5494	IRC BTS
R40	1MΩ ±10% ¼W	Mute Filter	Y8/5504	IRC BTS
R41	10KΩ ±10% ¼W	Minimum Volume	Y8/5480	IRC BTS
R42	220KΩ ±10% ¼W	Audio HF Filter	Y8/5496	IRC BTS
R43	250KΩ ±10% ¼W	Volume Control	Y8/5526	Morganite RVE
R44	1MΩ ±10% ¼W	V11 Grid	Y8/5504	IRC BTS
R45	47KΩ ±10% ¼W	V9 Anode	Y8/5488	IRC BTS
R46	470KΩ ±10% ¼W	V10 Bias	Y8/5500	IRC BTS
R47	150KΩ ±10% ¼W	V10 Bias	Y8/5494	IRC BTS
R48	1MΩ ±10% ¼W	V11 Anode	Y8/5504	IRC BTS
R49	220KΩ ±10% ¼W	Voltage Divider Cathode 1 of V11	Y8/5496	IRC BTS
R50	10KΩ ±10% ¼W	Mute Control	Y8/60	Morganite RVE

Circuit Code	Component Description	Function	DCA Ident. No.	Manufacturer & Designation
	Resistors.			
R51	47KΩ ±10% ½W	Voltage Divider	Y8/168	IRC BTA
R52	10K ± 10% ½W	Cathode 2 of V11	Y8/167	IRC BTA
R53	270Ω ± 10% ¼W	TP4 Shunt	Y8/5461	IRC BTS
R54	1MΩ ± 10% ¼W	V11 Grid	Y8/5504	IRC BTS
R55	47KΩ ± 10% ¼W	Mute HF Compensation	Y8/5452	IRC BTS
R56	470KΩ ± 10% ¼W	Mute HF Compensation	Y8/5500	IRC BTS
R57	1KΩ ± 10% ¼W	V2 Screen	Y8/5468	IRC BTS

5.1 Receiver. (cont.)

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Capacitors.			
C1	Variable 2-10pf	Aerial Tuning	Y1/2227	Philips C005BA/10E
C2	25pf ±10% 500VW	Aerial Coupling	Y1/922	Ducon CTR N750
C3	330pf ±20% 500VW	AVC Bypass	*Y1/83	Ducon CDS HiK
C4	330pf ±20% 500VW	HT Decoupling	*Y1/83	Ducon CDS HiK
C5	Variable 2-10pf	RF Tuning	Y1/2226	Philips C005AA/10E
C6	Variable 2-10pf	RF Tuning	Y1/2227	Philips C005BA/10E
C7	2200pf GMV 500VW	V3 Screen Bypass	Y1/2236	Ducon CDS HiK
C8	Variable 2-10pf	Quadrupler Tuning	Y1/2226	Philips C005AA/10E
C9	Variable 2-10pf	Quadrupler Tuning	Y1/2227	Philips C005BA/10E
C10	2200pf GMV 500VW	RF Bypass	Y1/2236	Ducon CDS HiK
C11	2200pf GMV 500VW	TP3 Dypass	Y1/2236	Ducon CDS HiK
C12	10pf ±2.5% 500VW	T4 Tuning	Y1/2215	Ducon IF
C13	5pf ±1pf 500VW	RF Coupling	*Y1/847	Ducon CTR N750
C14	3pf ±.25pf 500VW	Quadrupler Inject.	Y1/2221	Ducon CBT NPO
C15	10pf ±1pf 500VW	T4 Tuning	Y1/2215	Ducon IF
C16	2200pf GMV 500VW	HT Decoupling	Y1/2236	Ducon CDS HiK
C17	2200pf GMV 500VW	HT Decoupling	Y1/2236	Ducon CDS HiK
C18	22pf ±1pf 500VW	T3 Tuning	*Y1/2213	Ducon IF
C19	22pf ±1pf 500VW	T3 Tuning	*Y1/2213	Ducon IF
C20	2200pf GMV 500VW	TP2 Bypass	Y1/2236	Ducon CDS HiK
C21	200pf ±10% 500VW	Interstage Coupling	Y1/753	Ducon CTR N750
C22	5pf ±1pf 500VW	T5 Tuning	*Y1/915	Ducon CTR N750
C23	22pf ±1pf 500VW	T5 Tuning	*Y1/2213	Ducon IF
C24	22pf ±1pf 500VW	T5 Tuning	*Y1/2213	Ducon IF
C25	.25pf ±.1pf 500VW	Oscillator Inject.	*Y1/2225	Ducon CBT NPO
C26	2200pf GMV 500VW	HT Decoupling	Y1/2236	Ducon CDS HiK

* DCA Replacement Item.

Circuit Code	Component Description	Function	DCA Ident. No.	Manufacturer & Designation
	Capacitors.			
C27	2200pf GMV 500VW	V5 Cathode Bypass	Y1/2236	Ducon CDS HiK
C28	1000pf ±20% 500VW	Crystal Coupling	*Y1/[redacted]	Ducon CDS HiK
C29	100pf ±5% 500VW	Crystal Coupling	Y1/753	Ducon CTR N750
C30	10pf ±10% 500VW	Crystal Circuit Condenser	Y1/917	Ducon CTR N750
C31	.01µF GMV 500VW	HT Decoupling	Y1/2216	Ducon CDS HiK
C32	Variable 3-25pf	Crystal Circuit Capacitance Adj.	Y1/2228	Philips C005BA/10E
C33	68pf ±2½% 500VW	Crystal Circuit Capacitance	Y1/2217	Ducon CTR N150
C34	150pf ±2½% 500VW	T6 Tuning	Y1/2214	Ducon IF
C35	150pf ±2½% 500VW	T6 Tuning	Y1/2214	Ducon IF
C36	1pf ±.25pf 500VW	T6 to T7 Coupling	Y1/2229	Ducon CBT
C37	150pf ±2½% 500VW	T7 Tuning	Y1/2214	Ducon IF
C38	2200pf GMV 500VW	AVC Line Bypass	Y1/2236	Ducon CDS HiK
C39	150pf ±2½% 500VW	T7 Tuning	Y1/2214	Ducon IF
C40	0.01µF GMV 500VW	AVC Line Bypass	Y1/2216	Ducon CDS HiK
C41	0.01µF GMV 500VW	V6 Screen Bypass	Y1/2216	Ducon CDS HiK
C42	0.01µF GMV 500VW	HT Decoupling	Y1/2216	Ducon CDS HiK
C43	150pf ±2½% 500VW	T8 Tuning	Y1/2214	Ducon IF
C44	150pf ±2½% 500VW	T8 Tuning	Y1/2214	Ducon IF
C45	0.01µF GMV 500VW	AVC Line Bypass	Y1/2216	Ducon CDS HiK
C46	0.01µF GMV 500VW	V7 Screen Bypass	Y1/2216	Ducon CDS HiK
C47	0.01µF GMV 500VW	HT Decoupling	Y1/2216	Ducon CDS HiK
C48	150pf ±2½% 500VW	T9 Tuning	Y1/2214	Ducon IF
C49	150pf ±2½% 500VW	T9 Tuning	Y1/2214	Ducon IF
C50	0.01µF GMV 500VW	V8 Cathode Bypass	Y1/2216	Ducon CDS HiK

* DCA Replacement Item

5.1 Receiver (cont.)

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation.
	Capacitors.			
C51	0.01μF GMV 500VW	V8 Screen Bypass	Y1/2216	Ducon CDS HiK
C52	0.01μF GMV 500VW	HT Decoupling	Y1/2216	Ducon CDS HiK
C53	150pf ±2½% 500VW	T10 Tuning	Y1/2214	Ducon IF
C54	0.05μF GMV 100VW	AVC Line Bypass	Y1/2223	Ducon CDT HiK
C55	100pf ±10% 500VW	R.F. Bypass	Y1/753	Ducon CTR N750
C56	150pf ±2½% 500VW	T10 Tuning	Y1/2214	Ducon IF
C57	20pf ±5% 500VW	AVC Diode Feed	Y1/920	Ducon CTR N750
C58	330pf ±20% 500VW	Noise Limiter	*Y1/83	Ducon CDS HiK
C59	0.1μF GMV 150VW	Noise Limiter	Y1/2224	Ducon DCT HiK
C60	25μF 25VW	V9 Cathode Bypass	Y1/2231	Ducon ET 1BT
C61	2200pf GMV 500VW	Noise Limiter	Y1/2236	Ducon CDS HiK
C62	1000pf ±20% 500VW	Mute Circuit	Y1/2220	Ducon CDS HiK
C63	1000pf ±20% 500VW	Mute Circuit	Y1/2220	Ducon CDS HiK
C64	0.1μF GMV 150VW	Mute Circuit	Y1/2224	Ducon CDT HiK
C65	1000pf ±10% 500VW	V9 Plate Bypass	Y1/[illegible]	Ducon [illegible]
C66	2200pf ±20% 500VW	Noise Limiter	Y1/2236	Ducon CDS HiK
C67	2200pf GMV 500VW	Audio Coupling V10	Y1/2236	Ducon CDS HiK
C68	2200pf GMV 500VW	V2 Screen Bypass	Y1/2236	Ducon CDS HiK
C69	2200pf GMV 500VW	V10 Plate Bypass	Y1/2236	Ducon CDS HiK
C70	330pf ±20% 500VW	HT Decoupling	Y1/83	Ducon CDS HiK

* DCA Replacement Item.

5.1 Receiver (cont.)

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Valves, Diodes and Crystals.			
V1	Valve 6AK5	R.F. Amp.	Y11/374	
V2	Valve 6AK5	Mixer 1	Y11/374	
V3	Valve 6AM6	Quadrupler	Y11/81	
V4	Valve 6U8	Osc. Doubler	Y11/698	
V5	Valve 6BA6	Mixer 2	Y11/382	
V6	Valve 6BA6	I.F. Amp.	Y11/382	
V7	Valve 6BA6	I.F. Amp.	Y11/382	
V8	Valve 6AU6	I.F. Amp.	Y11/376	
V9	Valve 6AV6	Det. AVC Audio	Y11/377	
V10	Valve 6BW6	Audio Output	Y11/164	
V11	Valve 12AT7	Mute	Y11/64	
W1	Diode OA202	Noise Lim.	Y11/884	Philips
W2	Diode OA202	Noise Lim.	Y11/884	Philips
W3	Diode OA202	Mute	Y11/884	Philips
XL1	Crystal Quartz HC6 Holder	Frequency Control	Y2/6 Frequency	D.C.A.
	Coils and Transformers.			
L1	Aerial Coil - Air Core	Aerial	Y3/NIV	Vinten 155
T1	Transformer	R.F.	Y9/NIV	Vinten 156
T2	Transformer	Quadrupler	Y9/NIV	Vinten 157
T3	Transformer	Mixer 1	Y9/1332	Vinten 151
T4	Transformer	Doubler	Y9/1334	Vinten 142X
T5	Transformer	Oscillator	Y9/1333	Vinten 133X
T6	Transformer	I.F.	Y9/1331	Vinten 135
T7	Transformer	I.F.	Y9/1331	Vinten 135

5.1 Receiver (cont.)

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Coils and Transformers.			
T8	Transformer	I.F.	Y9/1331	Vinten 135
T9	Transformer	I.F.	Y9/1331	Vinten 135
T10	Transformer	I.F.	Y9/1331	Vinten 135
T11	Transformer Iron core	Audio Output	Y9/1330	Vinten G9S
	Miscellaneous.			
	Crystal Socket	Crystal Socket	V8/511	Teletron SC22GP
TP1	Metering Socket	Detector Diode	V8/302	Teletron SC12LB
TP2	Metering Socket	Doub. Grid	V8/302	Teletron SC12LB
TP3	Metering Socket	Quad. Grid	V8/302	Teletron SC12LB
TP4	Metering Socket	Relay		Teletron SC12LB
	Loudspeaker 4"d.		Y12/977	Rola 4C01
M/2	10,000 ohm 600 type relay	Muting	V13/1337	G.E.C.
	Whip Antenna		Y4/207	Vinten
	Co-axial cable		V5/1388	Telcon PT.11
	Plug co-axial		V8/19	Telcon 5B50868

5.2 Transmitter.

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Resistors.			
R60	100KΩ ±10% ¼W	V12A Grid	Y8/5492	IRC BTS
R61	47KΩ ± 10% ¼W	V12A Screen	Y8/5488	IRC BTS
R62	47KΩ ± 10% ½W	HT Decoup.	Y8/168	IRC BTA
R63	39KΩ ±10% ¼W	V12B Grid return	Y8/5487	IRC BTS
R64	1000 Ω ±10% ¼W	TP5 Shunt	Y8/5504	IRC BTS
R65	270Ω ±10% ¼W	V12B Cathode	Y8/5461	IRC BTS
R66	10KΩ ±10% ½W	HT Decoupl.	Y8/167	IRC BTA
R67	68KΩ ±10% ¼W	V13A Grid return	Y8/5490	IRC BTS
R68	1000 Ω ±10% ¼W	TP6 Shunt	Y8/5504	IRC BTS
R69	47KΩ ±10% ¼W	V13 Screen	Y8/5488	IRC BTS
R70	4700 Ω ±10% ½W	HT Decoupl.	Y8/399	IRC BTA
R71	1000 Ω ±10% ¼W	TP7 Shunt	Y8/5504	IRC BTS
R72	68KΩ ±10% ¼W	V13B Grid	Y8/5490	IRC BTS
R73	4.7KΩ ±10% 3W	HT Decoupl.	Y8/942	Ducon RWV4J
R74	10KΩ ±10% ¼W	V14 Grid return	Y8/5480	IRC BTS
R75	1000 Ω ±10% ¼W	TP8 Shunt	Y8/5504	IRC BTS
R76	39KΩ ±10% ½W	V14 Screen Divider	Y8/305	IRC BTA
R77	6.8KΩ ±10% ½W	V14 Screen Divider	Y8/271	IRC BTA
R78	47Ω ±10% ¼W	TP9 Shunt	Y8/5452	IRC BTS
R79	47KΩ ±10% ¼W	V12A HT Bleed	Y8/5488	IRC BTS

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Capacitors.			
C75	Not used			
C76	" "			
C77	" "			
C78	" "			
C79	" "			
C80	68pf ±2½% 500VW	Crystal Circ.	Y1/2217	Ducon CTR N150
C81	Variable 2-10pf	Freq. adjust.	Y1/2227	Philips C005BA/10E
C82	10pf ±10% 500VW	Crystal Circ.	Y1/917	Ducon CTR N750
C83	1000pf ±20% 500VW	Crystal Circ.	Y1/2220	Ducon CDS HiK
C84	100pf ±10% 500VW	Crystal Circ.	Y1/753	Ducon CTR N750
C85	2200pf GMV 500VW	HT Decoupl.	Y1/2236	Ducon CDS HiK
C86	22pf ±5% 500VW	T12 Tuning	Y1/2213	Ducon IF
C87	22pf ±5% 500VW	T12 Tuning	Y1/2213	Ducon IF
C88	2200pf GMV 500VW	V12B Metering Circ. shunt	Y1/2236	Ducon CDS HiK
C89	2200pf GMV 500VW	TP5 Shunt	Y1/2236	Ducon CDS HiK
C90	2200pf GMV 500VW	V12B Cathode Bypass	Y1/2236	Ducon CDS HiK
C91	2200pf GMV 500VW	HT Decoupling	Y1/2236	Ducon CDS HiK
C92	10pf ±10% 500VW	T13 Tuning	Y1/2215	Ducon IF
C93	10pf ±10% 500VW	T13 Tuning	Y1/2215	Ducon IF
C94	2200pf GMV 500VW	TP6 Shunt	Y1/2236	Ducon CDS HiK
C95	2200pf GMV 500VW	TP6 Metering Cir. Shunt	Y1/2236	Ducon CDS HiK
C96	1000pf ±20% 500VW	V13 Screen Bypass	Y1/2220	Ducon CDS HiK
C97	1000pf ±20% 500VW	HT Decoupl.	Y1/2220	Ducon CDS HiK
C98	Variable 2-10pf 500VW	1st DoublerTuning	Y1/2226	Philips C005AA/10E
C99	47pf ±5% 500VW	V13B Grid Coupling	Y1/868	Ducon CTR N750

5.2 Transmitter (cont.)

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Capacitors.			
C100	2200pf GMV 500VW	TP7 Shunt	Y1/2236	Ducon CDS HiK
C101	2200pf ± 20% 500VW	HT Decoupl.	*Y1/83	Ducon CDS HiK
C102	Variable 2-10pf 500VW	T14 Tuning	Y1/2226	Philips C005AA/10E
C103	Variable 2-10pf 500VW	T14 Tuning	Y1/2226	Philips C005AA/10E
C104	2200pf GMV 500VW	TP8 Shunt	Y1/2236	Ducon CDS HiK
C105	Variable 2-15pf 1000VW	Final Tank Primary Tuning	Y1/2230	Jackson C711
C106	330pf ±20% 500VW	TP9 Shunt	*Y1/83	Ducon CDS HiK
C107	Variable 3-25pf 500VW	Final Tank Secondary Tuning	Y1/2228	Philips C005BA/25E
C108	15pf ±1pf 500VW	Aerial Filter	*Y1/853	Ducon CTR N750
C109	15pf ±1pf 500VW	Aerial Filter	*Y1/853	Ducon CTR N750
		* DCA Replacement Item		
	Valves and Crystals.			
V12	Valve 6U8	Oscillator Tripler	Y11/698	
V13	Valve QQE03/12	Doubler Doubler	Y11/605	
V14	Valve QQE03/12	Power Amplifier	Y11/605	
XL2	Crystal Quartz HC6 Holder		Y2/6 Freq.	D.C.A.

5.2 Transmitter. (cont.)

Circuit Code	Component Description	Function	DCA Ident. No.	Manufacturer & Designation
	Coils and Transformers.			
T12	Transformer	Oscillator	Y9/1335	Vinten 143X
T13	Transformer	Tripler	Y9/1336	Vinten 144
T14	Transformer	Doubler	Y9/NIV	Vinten 160
T15	Transformer	Final Tank	Y9/NIV	Vinten 161
L2	Coil	Doubler	Y3/NIV	Vinten 158
L3	Coil	Aerial Filter	Y3/NIV	Vinten 159
L4	RF Choke	Modulated H.T.	Y3/NIV	Vinten 154
	Miscellaneous.			
TP5	Metering socket	Tripler Grid	V8/302	Teletron SC12GP
TP6	Metering socket	1st Doub. Grid	V8/302	Teletron SC12GP
TP7	Metering socket	2nd Doub. Grid	V8/302	Teletron SC12GP
TP8	Metering socket	Final Grid	V8/302	Teletron SC12GP
TP9	Metering socket	Final Plate	V8/302	Teletron SC12GP
TP10	Metering socket	Mod. Plate	V8/302	Teletron SC12GP
XL2	Crystal socket		V8/511	Teletron SC22LB
B9A	Valve Sockets		Y11/650	Clix VH499/902
B9A	Valve Shield		Y11/947	Clix SC9/6501/SBM
B9A	Valve Retainer		Y11/946	Clix SC9/8202/BO
SK1	Co-axial socket		V8/27	Cannon (Rep. Eng.) R125/1R

5.3 Modulator.

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Resistors.			
R80	1.5KΩ ±10% ¼W	V15A Grid	Y8/5470	IRC BTS
R81	1.5KΩ ±5% ½W	V15A Cathode	*Y8/6192	Philips B830506B
R82	100KΩ ±10% ¼W	V15A Plate Load	Y8/5492	IRC BTS
R83	500KΩ ±10% ¼W	Set Modulation depth	Y8/1874	Morganite RVE
R84	1.5KΩ ±10% ¼W	V15B Cathode	Y8/5470	IRC BTS
R85	100KΩ ±10% ¼W	V15B Plate Load	Y8/5492	IRC BTS
R86	47KΩ ±10% ¼W	HT Decoupling	Y8/5488	IRC BTS
R87	100KΩ ±10% ¼W	W4 return	Y8/5492	IRC BTS
R88	1 MegΩ ±10% ¼W	W4 Load	Y8/5504	IRC BTS
R89	4.7MΩ ±10% ¼W	W4 Load	Y8/5512	IRC BTS
R90	1MΩ ±10% ¼W	V16 Grid return	Y8/5504	IRC BTS
R91	270KΩ ±10% ¼W	V16 Screen	Y8/5497	IRC BTS
R92	100KΩ ±10% ¼W	V16 Plate	Y8/5492	IRC BTS
R93	27KΩ ±10% ¼W	HT Decoupling	Y8/5485	IRC BTS
R94	470KΩ ±10% ¼W	V17 Grid 1	Y8/5500	IRC BTS
R95	8.2KΩ ±10% ¼W	V17 Grid Cathode return	Y8/5479	IRC BTS
R96	470KΩ ±10% ¼W	V17 Grid 2	Y8/5500	IRC BTS
R97	560Ω ±10% ¼W	V17 Cathode	Y8/5465	IRC BTS
R98	75KΩ ±10% ½W	V17 Plate 2 Load	*Y8/6233	IRC BTS
R99	68KΩ ±10% ¼W	V17 Plate 1 Load	Y8/5490	IRC BTS
R100	470KΩ ±10% ¼W	V18 Grid 2	Y8/5500	IRC BTS
R101	470KΩ ±10% ¼W	V18 Grid 2	Y8/5500	IRC BTS
R102	10Ω ±10% ½W	TP10 Shunt	Y8/4550	IRC BW½

5.5 Modulator (cont.)

Circuit Code	Component Description	Function	DCA Ident. No.	Manufacturer & Designation
	Capacitors.			
C113	Not used			
C114	"			
C115	"			
C116	"			
C117	"			
C118	"			
C119	"			
C120	2200pf GMV 500VW	Mic. Shunt	Y1/2236	Ducon CDS HiK
C121	100pf ±10% 500VW	V15A Plate Shunt	Y1/753	Ducon CTR N750
C122	2200pf GMV 500VW	V15B Grid Coupling	Y1/2236	Ducon CDS HiK
C123	25μF 25VW	V15B Cathode Bypass	Y1/2231	Ducon ET 1BT
C124	8μF 300VW	HT. Decoup.	Y1/2234	Ducon ET2DT
C125	.01μF GMV 500VW	Limiter Coupling	Y1/2216	Ducon CDS HiK
C126	.05μF GMV 100VW	Lim. Time Constant	Y1/2223	Ducon CDT HiK
C127	2200pf GMV 500VW	V16 Grid Coupling	Y1/2236	Ducon CDS HiK
C128	.05μF GMV 100VW	V16 Screen Bypass	Y1/2223	Ducon CDT HiK
C129	8μF 200VW	HT Decoup.	*Y1/2234	Ducon ET2DT
C130	2200pf GMV 500VW	V17 Grid Coupling	Y1/2236	Ducon CDS HiK
C131	0.05μF GMV 100VW	V17 Grid Bypass	Y1/2223	Ducon CDT HiK
C132	0.01μF GMV 500VW	V18 Grid Coupling	Y1/2216	Ducon CDS HiK
C133	0.01μF GMV 500VW	V18 Grid Coupling	Y1/2216	Ducon CDS HiK
C134	2 x 4000pf GMV 500VW	V18 Plate Bypass	Y1/1905	Ducon CDS HiK
C135	1000pf ±20% 500VW	V16 Plate Bypass	Y1/2220	Ducon CDS HiK

* DCA Replacement Item

5.3 Modulator (cont.)

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Valves.			
V15	12AT7	Microphone Amplif.	Y11/64	
V16	6BA6	Limiter Amplifier	Y11/382	
V17	12AT7	Driver	Y11/64	
V18	QQE03/12	Modulator	Y11/605	
	Transformers.			
T16	Modulation	Modulator	Y9/1332	A & R Type MT22
	Miscellaneous.			
	Microphone - complete with cord		Y12/986	Vinten VM1
	Metering Socket TP10		V8/302	Teletron SC12GP
	B9A Valve Socket		Y11/650	Clix VH499/902
	B7G Valve Socket		Y11/646	Clix VH337/702
	B9A Valve Shield		Y11/947	Clix SC9/6501/SBM
	B7G Valve Shield		Y11/663	Clix SCT/6301/SBM
	B9A Valve Retainer		Y11/946	Clix SC9/8202/BO
	Inset, Microphone, Rocking Armature		Y12/987	STC LJ842
	Cord, Microphone, Retractible, 4 conductor		Y12/988	ET IRO 3156/4A/135B
	Assembly, Air Blower 24V D.C.		W25/61	Pullin
	Knobs, Metal		Y12/989	Vinten
	Element, Antenna, Lower		Y4/208	Vinten
	Element, Antenna, Upper		Y4/209	Vinten
	Gasket, Rubber for Antenna Base		Y14/382	Rubbertex 6230/5
	Insulator, Bushing, Polythene, 2 section for Antenna Base		V6/810	Vinten

5.4 D.C. Power Supply RT13

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Resistors.			
R109	10Ω ± 5% 1½W	Q1 Base	Y8/877	Ducon RWV3J
R110	10Ω ± 5% ½W	Q2 Base	Y8/877	Ducon RWV3J
R111	23Ω ± 5% 3W	Heater Balance	*Y8/900	Ducon RWV4J
R112	9.4Ω ± 5% 10W	Heater Balance	Y8/6581	Ducon RWV5J
R113	3Ω ± 10% 1.5W	Q1 and Q2 Bias	Y8/6580	Ducon RWV3J
R114	400Ω ± 10% 1.5W	Q1 and Q2 Bias	Y8/6579	Ducon RWV3J
R115	200Ω ± 10% 1.5W	Q1 and Q2 Bias	Y8/5867	Ducon RWV3J
R116	100Ω ± 10% 1.5W	Relay Dropper	Y8/883	Ducon RWV3J
R117	4.7KΩ ± 10% ¼W	V14 Bias Filter	Y8/5476	IRC BTS
R118	10KΩ ± 10% ¼W	V18 Bias Filter	Y8/5480	IRC BTS
R119	10KΩ ± 10% ¼W	V18 Bias Bleed	Y8/5480	IRC BTS
R120	6.8KΩ ± 10% ¼W	V14 Bias Bleed	Y8/5478	IRC BTS
	Capacitors.			
C135	330pf ± 20% 500VW	V14 RF Bypass	*Y1/83	Ducon CDS HiK
C136	2200pf GMV 500VW	V15 RF Bypass	Y1/2236	Ducon CDS HiK
C137	2200pf GMV 500VW	PTT Relay Bypass	Y1/2236	Ducon CDS HiK
C138	25μF 50VW	Suppressor	Y1/2232	Ducon ET2CT
C139	16μF 450VW	HT Filter	Y1/2235	Ducon ET5CT
C140	16μF 450VW	HT Filter	Y1/2235	Ducon ET5CT
C141	25μF 50VW	V18 Bias Filter	Y1/2232	Ducon ET2CT
C142	25μF 50VW	V14 Bias Filter	Y1/2232	Ducon ET2CT
C143	50μF 125VW	V10 Bias Filter	Y1/2212	Ducon ET4DT
C144	2200pf GMV 500VW	PTT Relay Bypass	Y1/2236	Ducon CDS HiK
C145	2200pf GMV 500VW	V13 Filament Bypass	Y1/2236	Ducon CDS HiK
C146	.02μF 750VW	Buffer	Y1/457	Ducon TF712

* DCA Replacement Item. 447.

5.4 L.T. Power Supply PT13 (cont.)

Circuit Code	Component Description	Function	DCA IDENT NO.	Manufacturer & Designation
Diodes & Transistors.				
Q1	Transistor	D.C. Converter	Y11/893	Delco 2N1099
Q2	Transistor	D.C. Converter	Y11/893	Delco 2N1099
W5	Silicon Diode P.I.V.400	HT Rectifier	Y11/867	Sarkes Tarzian 1N1442
W6	Silicon Diode P.I.V. 400	HT Rectifier	Y11/867	Sarkes Tarzian 1N1442
W7	Silicon Diode P.I.V. 400	HT Rectifier	Y11/867	Sarkes Tarzian 1N1442
W8	Silicon Diode P.I.V. 400	HT Rectifier	Y11/867	Sarkes Tarzian 1N1442
W9	Silicon Diode P.I.V.400	Bias Rectifier	Y11/867	Sarkes Tarzian 1N1442
Coils, Chokes and Transformers.				
L5	RF Choke - filament	V15 Heater	Y3/NIV	Vinten 154
L6	RF Choke - LT	Converter supply	Y3/NIV	Vinten 153
L7	Not used			
L8	Choke 2H, 200mA	HT Filter	Y3/1519	A & R Type 3021
T17	Transformer DC Converter	DC Converter	Y9/1337	A & R Type 1914

5.4 D.C. Power Supply RT13 (cont.)

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
Miscellaneous.				
S1	2 pole switch	LT Power	V14/621	Cutler Hammer 7320K3
S2	Micro switch	Tx Heaters	V14/925	Belloo V3
PTT 3	Relay 100Ω 3CO Contacts	HT & Aerial Changeover	V13/1336	7R/3 (12V) Relays P/L.
F1	Fuse (for value see install. instructions)	DC Converter	V12/3	3AG
PL1	Pilot Lamp 10-28V	Receive Pilot	V1/298	Philips 10-28V Type 12006N
PL2	Pilot Lamp 10-28V	S/B Pilot	V1/298	Philips 10-28V Type 12006N
	D.C. Outlet & Fuse Board		V15/342	Vinten
	Switch Parts, Cradle. Part of Micro Switch Assy.		V14/1269	Vinten
	Tools, Aligning for I.F. Transformers		DIH/106	Vinten
	Tools, Aligning for Trimmer Conds.		DIH/105	Vinten

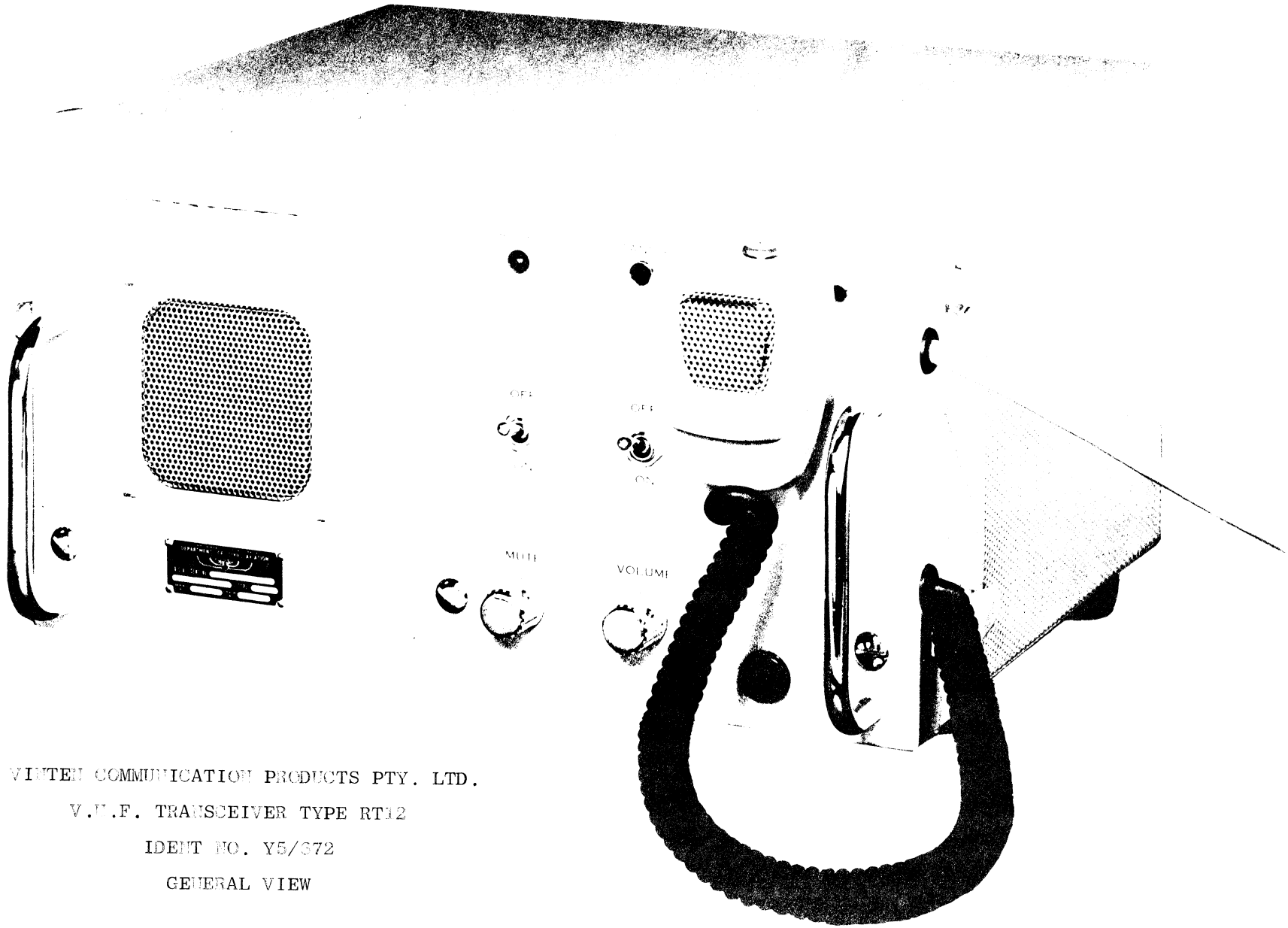
5.5 A.C. Power Supply RT12.

Circuit Code	Component Description	Function	DCA Ident No.	Manufacturer & Designation
	Resistors.			
R121	4.7KΩ ±10% ¼W	V14 Bias Filter	Y8/5476	IRC BTS
R122	10KΩ ±10% ¼W	V18 Bias Filter	Y8/5480	IRC BTS
R123	10KΩ ±10% ¼W	V18 Bias Bleed	Y8/5480	IRC BTS
R124	6.8KΩ ±10% ¼W	V14 Bias Bleed	Y8/5478	IRC BTS
R125	20KΩ ±10% ¼W	V10 Bias Feeder	Y8/5484	IRC BTS
	Condensers.			
C147	16µf 450VW	HT Filter	Y1/2235	Ducon ET6CT
C148	16µf 450VW	HT Filter	Y1/2235	Ducon ET6CT
C149	25µf 50VW	V18 Bias Filter	Y1/2232	Ducon ET2CT
C150	25µf 50VW	V14 Bias Filter	Y1/2232	Ducon ET2CT
C151	100µf 25VW	PTT Supply Filter	Y1/2233	Ducon ET4DT
C152	330pf ±20% 500VW	V14 RF Bypass	*Y1/83	Ducon CDS HiK
C153	2200pf GMV 500VW	V15 RF Bypass	Y1/2236	Ducon CDS HiK
C154	50µf 125VW	V10 Bias Filter	Y1/2212	Ducon ET4DT
C155	2200pf GMV 500VW	V13 Heater Bypass	Y1/2236	Ducon CDS HiK

* DCA Replacement Item.

5.5 A.C. Power Supply RT12 (cont.)

Circuit Code	Component Description	Function	DCA Ident. No.	Manufacturer & Designation
	Diodes.			
W10	Silicon Diode PIV600	HT Rectifier	*Y11/899	Sarkes Tarzian 60K
W11	Silicon Diode PIV600	HT Rectifier	*Y11/899	Sarkes Tarzian 60K
W12	Silicon Diode PIV600	HT Rectifier	*Y11/899	Sarkes Tarzian 60K
W13	Silicon Diode PIV600	HT Rectifier	*Y11/899	Sarkes Tarzian 60K
W14	Silicon Diode PIV400	Relay Rectifier	Y11/867	Sarkes Tarzian 1N1442
W15	Silicon Diode PIV400	Relay Rectifier	Y11/867	Sarkes Tarzian 1N1442
W16	Silicon Diode PIV400	Relay Rectifier	Y11/867	Sarkes Tarzian 1N1442
		* DCA Replacement Item.		
	Coils, Chokes, Transformers.			
L9	Choke 10H, 200mA	HT Filter	Y3/1520	A & R Type 3023
L10	RF Choke Filament	V15 Heater	Y3/NIV	Vinten 154
T18	Transformer 190-270VAC	Power Supply	Y9/1338	A & R Type 1960
	Miscellaneous.			
S3	2 pole switch	AC Power	V14/621	Cutler Hammer 7320K3
S4	2 pole switch	Tx Heaters	V14/621	Cutler Hammer 7320K3
PTT 3	Relay 100Ω 3C0 Contacts	HT. Aerial Changeover	V13/1336	Relays Pty.Ltd. Type 7R/3 (12V)
F2	Fuse 3AG	AC Mains	V12/3	2A Type 3AG
PL3	Pilot Lamp	Receive Pilot	V1/33	Philips 6V MBC
PL4	Pilot Lamp	S/B Pilot	V1/33	Philips 6V MBC
	Motor electric induction shaded pole 35 watt, 220-230V A.C. 0.18A, 50 C.P.S., with fan blade	Cooling	V4/527	Warner Drayton Product 15



VINTEN COMMUNICATION PRODUCTS PTY. LTD.

V.H.F. TRANSCEIVER TYPE RT12

IDENT NO. Y5/672

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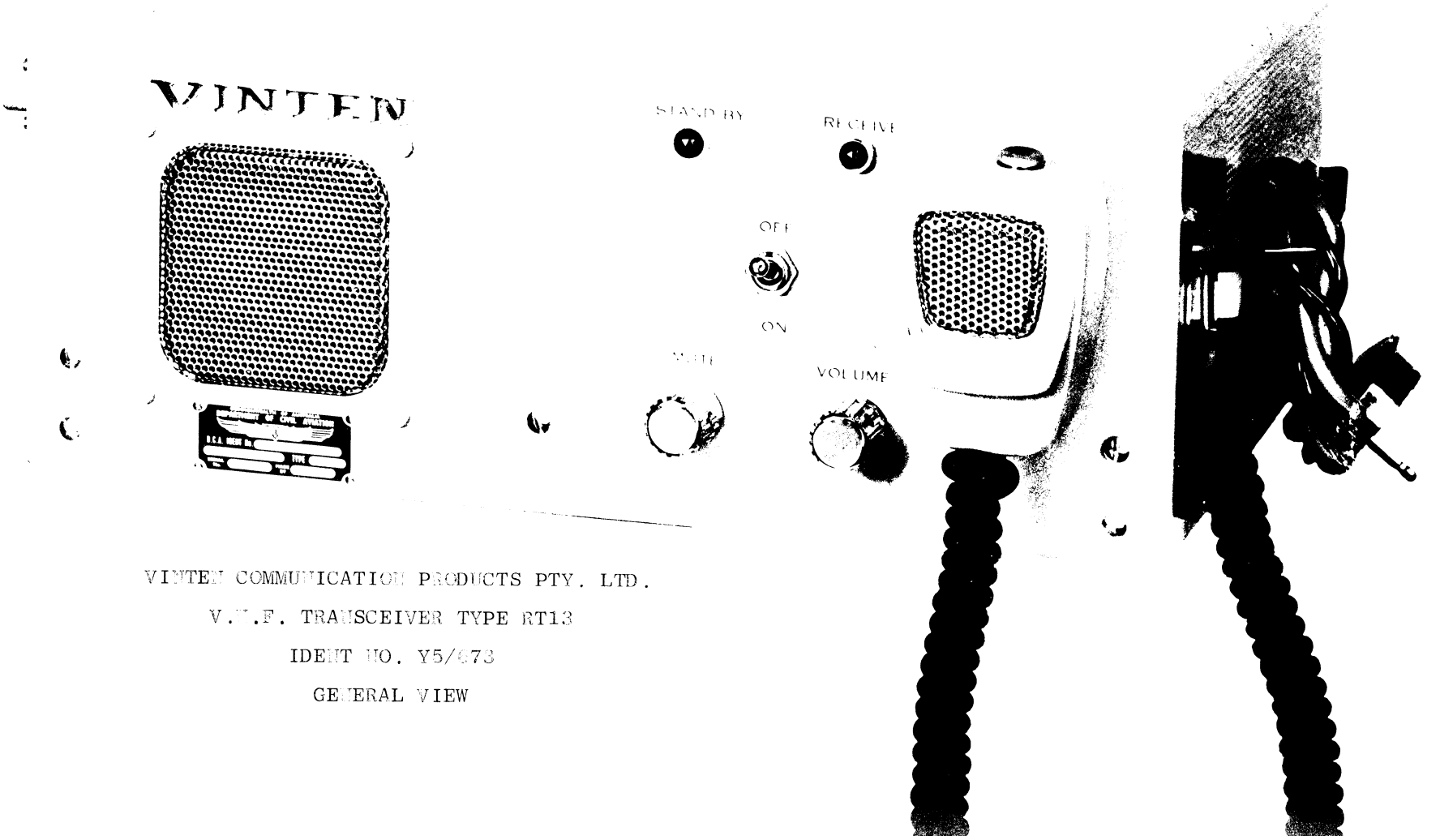
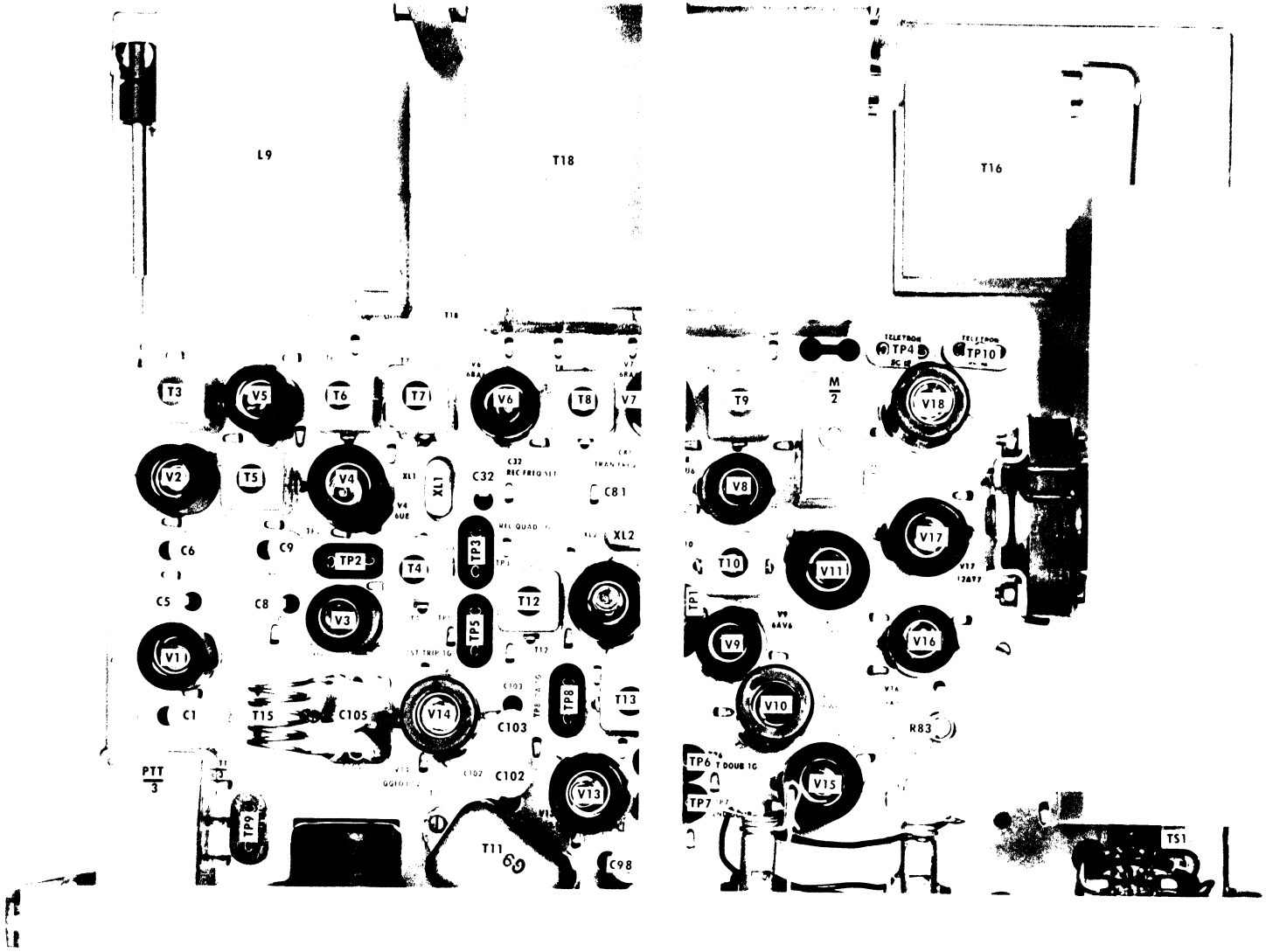


VINTEN COMMUNICATION PRODUCTS PTY. LTD.

V.H.F. TRANSCEIVER TYPE RT13

IDENT NO. Y5/673

GENERAL VIEW



VINTEN COMMUNICATION PRODUCTS PTY. LTD.

V.H.F. TRANSCEIVER TYPE RT12

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INTERCOMMUNICATION PRODUCTS PTY LTD
MELBOURNE

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IDENT NO. YS/672

COMPONENT LAYOUT BOTTOM VIEW

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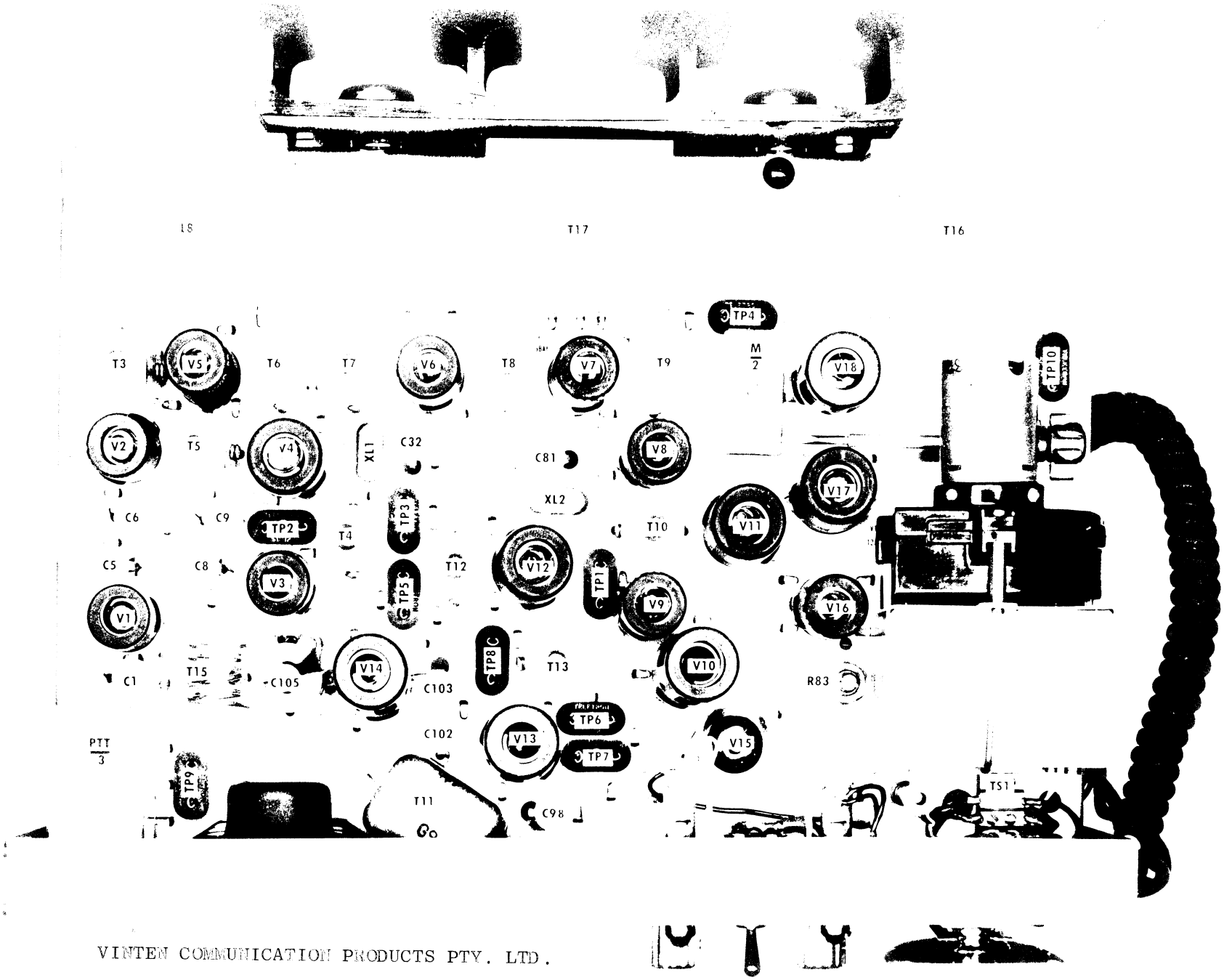

VINTEN COMMUNICATION PRODUCTS PTY. LTD.

V.H.F. TRANSCEIVER TYPE RT13

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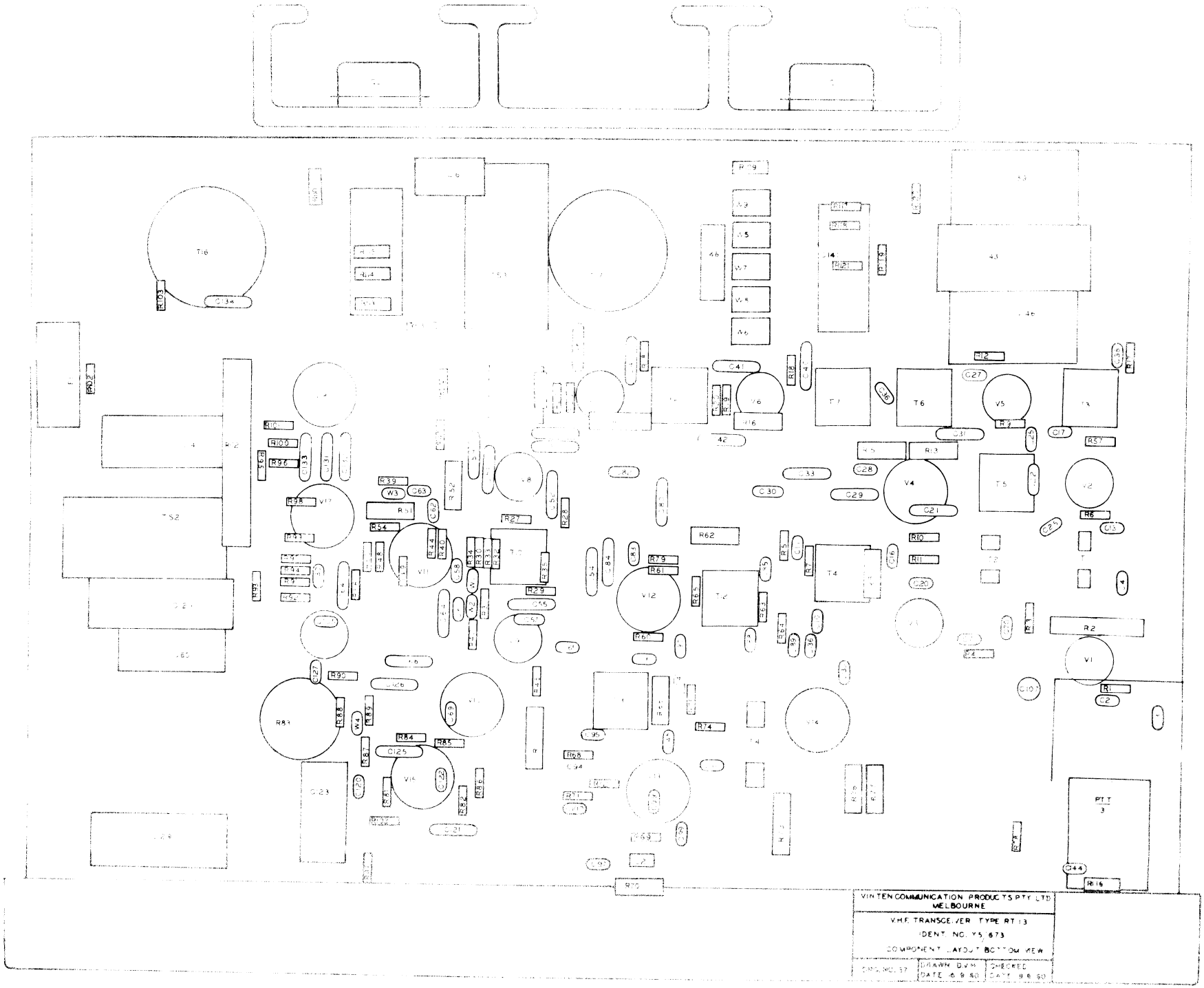
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MELBOURNE
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