



TELECOMMUNICATION COMPANY OF AUSTRALIA PTY. LIMITED

TYPE FM1677

V.H.F. MOBILE

RADIOTELEPHONE EQUIPMENT

*Instruction
Manual*



A DIVISION OF PHILIPS ELECTRICAL INDUSTRIES PTY. LTD.

TYPE FM1677
V.H.F. MOBILE
RADIOTELEPHONE EQUIPMENT

TELECOMMUNICATION COMPANY OF AUSTRALIA PTY. LIMITED.

(Incorporated in N.S.W.)

(A Division of Philips Electrical Industries Pty. Limited.)

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RADIOTELEPHONE EQUIPMENT

ISSUE 2

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ACCESSORIES

AERIAL 1675/06 *
 MICROPHONE 1677/02.1
 MOUNTING TRAY 3502 130 00540
 MICROPHONE BRACKET 3502 130 00880
 BATTERY CABLE CR904.377

TYPE FM1677 MOBILE SERIES OF EQUIPMENT

FM 1677A (70-85 Mc/s)	FM 1677C (156 - 174 Mc/s)
/25 = 25 WATTS	/25 = 25 WATTS
/25I = 10 WATTS	/25I = 10 WATTS
/252 = 5 WATTS	/252 = 5 WATTS
/W = WIDE BAND	/W = WIDE BAND
/WM = WIDE BAND MARINE	/WM = WIDE BAND MARINE
/X = MULTI CHANNEL	/X = MULTI CHANNEL

INSTALLATION KIT
 3502 130 00250

TRANSMITTER

MODULATION AMPLIFIER ASSEMBLY 3502 150 00180
 OSCILLATOR/PHASE MOD.ASSEMBLY 3502 150 00171
 AUDIO FILTER 3502 150 00540
 HARMONIC FILTER (70-85 Mc/s) 3502 150 00590
 (156-174 Mc/s) 3502 150 00550
 POWER SUPPLY 1677/502A2

RECEIVER

RF ASSEMBLY (70-85 Mc/s) 3502 150 00120
 RF ASSEMBLY (156-174 Mc/s) 3502 150 00530
 FIRST IF ASSEMBLY 3502 150 00130
 SECOND IF ASSEMBLY 3502 150 00160
 AUDIO AMPLIFIER 3502 150 00150
 AUDIO OUTPUT 3502 150 00210
 VOLTAGE REG/SQUELCH DET. 3502 150 00110
 SQUELCH UNIT ASSEMBLY 3502 150 00100

TRANSMITTER CRYSTAL SWITCHING ASSY. 3502 150 00490

RECEIVER CRYSTAL SWITCHING ASSY. 3502 150 00480

CRYSTAL SWITCHING KIT 3502 150 00470

TYPE FM1677	
MOBILE RADIO TELEPHONE	
EQUIPMENT	
CA1026	3-5-65

* ALTERNATE AERIALS AVAILABLE
 KNOCK-DOWN WHIP AERIAL 1675/06.1A 70-85 Mc/s
 CHROMED FIXED BASE WHIP 1675/06.1C 156-174 Mc/s
 COAXIAL DIPOLE 1674/65

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT

T A B L E O F C O N T E N T S

					Page
SECTION 1	DESCRIPTION.....	.....	.....	.....	1
	1.1 General...	.....	.....	.....	1
	1.2 Mechanical	.....	.....	.....	2
	1.3 Hand Microphone...	.....	.....	.....	3
	1.4 Whip Antenna	.....	.....	.....	4
SECTION 2	INSTALLATION...	.....	.....	.....	5
	2.1 Location..	.....	.....	.....	5
	2.2 Mounting Tray	.....	.....	.....	5
	2.3 Microphone Bracket	.....	.....	.....	6
	2.4 Cabling...	.....	.....	.....	6
	2.5 Aerial....	.....	.....	.....	6
	2.6 Fixing Coaxial Plug	.....	.....	.....	8
	2.7 Security..	.....	.....	.....	8
	2.8 S.W.R. Check	.....	.....	.....	9
SECTION 3	NETTING	.....	.....	.....	10
	3.1 General...	.....	.....	.....	10
	3.2 Instruments Required	.....	.....	.....	10
	3.3 Procedure.	.....	.....	.....	10
	3.4 Notes	.....	.....	.....	11
SECTION 4	SPECIFICATION..	.....	.....	.....	12
	4.1 General...	.....	.....	.....	12
	4.2 Receiver..	.....	.....	.....	13
	4.3 Transmitter	.....	.....	.....	13
	4.4 Semi-Conductor and Valve Complement	.....	.....	.....	14
SECTION 5	TECHNICAL DESCRIPTION..	.....	.....	.....	16
	5.1 Receiver, General.	.....	.....	.....	16
	5.2 Transmitter	.....	.....	.....	21
	5.3 Power Supply	.....	.....	.....	24
SECTION 6	ALIGNMENT AND TEST	.....	.....	.....	26
	6.1 Receiver..	.....	.....	.....	26
	6.2 Transmitter	.....	.....	.....	31
SECTION 7	VOLTAGE ANALYSIS	.....	.....	.....	35
	7.1 Receiver..	.....	.....	.....	35
	7.2 Transmitter	.....	.....	.....	37

COMPONENTS PARTS LIST

APPENDICES

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT

L I S T O F I L L U S T R A T I O N S .

Type 1677 Mobile Radiotelephone Equipment Family Tree.

Mounting and Plug Fitting Instructions Type 1675/06
Whip Aerial.

Mobile Whip Aerial Type 1675/06 Adjustment Chart.

Installation of Mounting Tray and Microphone Bracket
for Type 1675/6/7 - Mobile Radiotelephone Equipment.

Type 1677 Component Card Layout.

Type FM1677/25 Mobile Transmitter/Receiver Metering
and Test Point Layout.

Mobile Transmitter/Receiver 1677A/25 with Power Supply
1677/502/12.

Mobile Transmitter/Receiver 1677A/25W with Power Supply
1677/502/12.

Mobile Transmitter/Receiver 1677C/25 with Power Supply
1677/502/12.

Mobile Transmitter/Receiver 1677C/25W with Power Supply
1677/502/12.

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT1 DESCRIPTION1.1 General

The Type 1677 Mobile Radiotelephone is a frequency modulated, self-contained, transmitter-receiver unit designed for vehicular operation. It covers the VHF bands allocated for the Land Mobile service in Australia, i.e. 70-85 Mc/s or 156-174 Mc/s.

A mobile unit is normally supplied pre-set to one frequency in one of the above bands. By the addition of a crystal switching kit, both the transmitter and receiver may be operated on two, three or four adjacent preset frequencies in one band.

The equipment is designated as follows:-

<u>Type of Equipment</u>		<u>Operates in</u>
1677A	-	70 - 85 Mc/s Band
1677C	-	156 - 174 Mc/s Band

It is designed for simplex operation, the receiver being automatically made inoperative when the transmitter is operative and vice-versa.

The fully transistorised receiver is a double superheterodyne type in which both heterodyne oscillators are separately crystal controlled. It employs an FM demodulator and automatic noise muting in the absence of signal. Additionally, it incorporates a special filter circuit to limit the band width of reception to 30 Kc/s. Three watts of audio output power are applied to a high efficiency 4 inch loudspeaker mounted behind the grille of the front panel of the unit.

The transmitter is a crystal controlled phase modulated type, using double wound transformer coupled, electron tubed, frequency multipliers with push pull output. All other stages, namely, the audio pre-amplifier, differentiator, deviation limiter, integrator amplifier, crystal oscillator, and phase modulator are transistorised.

The power supply is a high efficiency transistorised 12 volt DC/DC converter which is automatically protected against secondary circuit overloads. Connection may be made to either positive earthed or negative earthed systems, merely by observing correct polarity of the battery input leads to the equipment.

Metering points are provided in the transmitter and receiver for alignment and tuning. Indicator lamps are not provided. This is in order to reduce current consumption on receive in stationary vehicles or portables.

Four controls are provided on the front panel as follows:-

1.1.1 Function Switch

This is a three position switch marked O-R-T implying "Off", "Receive" and "Transmit". In the "Receive" (R) position, the receiver operating voltage is applied. In the "Transmit" (T) position, the heaters of the three tubes are connected to the supply and after 20 seconds the tubes are heated. It is then only necessary to depress the Press-to-Talk switch when H.T. is applied and transmission occurs.

1.1.2 Channel Selector Switch

On a single channel unit there is a dummy knob. When channel switching is supplied or added the knob is connected and used to select the desired channel.

1.1.3 Muting Control

This knob controls the range at which muting becomes effective. The muting system may be disabled by means of this control.

1.1.4 Volume Control

This is a full range variable potentiometer which controls the audio output from three watts down to zero.

1.2 Mechanical

The 1677 mobile units have been designed to satisfy the various requirements of operators of vehicular fleet communications systems. Particular attention has been paid to physical size, single unit construction and simplicity of installation, maintenance and operation.

The transmitter-receiver, together with its power supply, constitutes a compact self contained unit which mounts easily under the instrument panel or dash of a vehicle by means of four mounting screws.

The unit consists of:-

- 1.2.1. The chassis, upon which are mounted the conventional electron tubed stages of the transmitter, the separate transistorised DC/DC converter in its case, the printed wiring cards of the receiver sub-units, and the cast aluminium front panel. The front panel also supports the loudspeaker, the receiver audio power amplifier stage, the controls and the trim grille.
- 1.2.2 The cast aluminium case for housing the unit, and the mounting tray.

The cast aluminium unit case has two flanges each of which runs almost the whole length of the case along the upper edge of each side. The flanges are in effect support rails which slide into the unit mounting tray. The side edges of the mounting tray are folded down twice during manufacture to form a U section into which the case flanges slide.

The unit case is secured in position by means of two thumb screws at the front sides of the mounting tray and these thread into bosses, which have been formed in the case during manufacture.

The front panel and chassis is then held in the case by two set screws at the sides of the front panel. Thus the complete unit (in case) may be removed from the vehicle by removing two set screws. Alternatively the chassis and front panel are removable by taking out the side holding screws, loosening the cable clamp on the right side and removing the battery, aerial and mike cables.

The mounting tray, supplied with the mobile, may be fitted with either:-

- (a) standard U channels
 - (b) special U channels
 - (c) shock mounts to fit (b)
- (a), (b) and (c) are available to separate order.

1.3 Hand Microphone

The dynamic microphone is encased in a high impact plastic holder which fits comfortably in the hand when in use.

The "press-to-talk" button is positioned for easy use and has sufficient spring tension to prevent accidental switching.

The whole microphone assembly has proven rugged and reliable in service.

A small plated hang-up bracket is supplied for fitting in a convenient position near the operator to hold the microphone when not in use.

1.4 Whip Antenna

The mobile unit is normally supplied with a quarter wavelength whip antenna which has been designed for ease of fitting to a vehicle and to withstand the considerable shock encountered in striking overhanging objects. The whip is made of spring steel with a spiral spring base which allows maximum flexing and return to the normal vertical position. The whole is heavily cadmium plated for protection against weathering. This steel whip is screwed to a heavy brass boss which is insulated from the vehicle frame by a moulded bakelite lead through insulator. The whip assembly is held to the roof interior by a heavy steel clamp strap which also serves as the earth termination for the coaxial cable and the matching stub clamped to it.

The whip antenna is designed so that it may be mounted to the vehicle without direct access below the mounting point.

For 160 Mc/s operation, alternative stainless steel solid mounted whip antennae are available.

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT2 INSTALLATION2.1 Location

Adequate ventilation and heat dissipation are an important consideration when operating transistorised equipment. For this reason the manufacturer recommends that the FM1677 mobile be installed in a horizontal position and that a free flow of air be able to reach most of the surface area of the case. The exclusion of dust and debris, particularly from the speaker, must also be kept in mind. That is why the recommended arrangement is to mount the unit below the fascia panel. This ensures that the controls are readily accessible to the operator, that there is a free passage of air over the unit, and that it is up away from dust and dirt.

Detailed mounting instructions follow.

As an extra, a mounting tray installation kit is available, Code Number 3502.130.02050, this kit is suitable for use in most vehicles, although in some cases it may be necessary to adapt or modify it.

2.2 Mounting Tray

The mounting tray together with its associated hardware is supplied with the mobile. Instructions for mounting the tray by means of the kit follow. (Refer Drawing No: TP210.04).

2.2.1 Two mounting rails each having 3 groups of adjustment slots are provided. One end of each rail has a group of 8 slots while the other end has a group of 5 slots. The 5 slotted end will be referred to as the front and the 8 slotted end the rear.

The front end of the mounting rail is ALWAYS bolted to the dashboard flange.

2.2.2 Determine how far back the mobile is desired to be mounted beneath the dashboard and assemble the mounting tray and rails using the appropriate slots. (See assembly diagram.)

2.2.3 Turn the assembled tray and mounting rails around so that the rear end of the rails is towards the dash and butt the front end of the rails against the firewall of the vehicle. Now mark the rails where they protrude beyond the dash and cut off the excess.

- 2.2.4 Bolt the mounting brackets to the rear ends of the rails. Now place the assembly in its intended position under the dash and ensure that there are no obstructions which might prevent its final mounting.
- 2.2.5 Using the mounting washers (which are included to prevent the rails from splaying) secure the front ends of the rails to the dashboard flange. Be sure to keep the whole assembly square as you tighten the bolts.
- 2.2.6 Bolt the rear mounting brackets to the firewall. Be sure to place two 2" washers on the outer (motor) side of the firewall.

2.3 Microphone Bracket

Reference to drawing no: TP210.04 shows that the microphone bracket is quite simple to mount.

- 2.3.1 Place the bracket in the desired position and mark the hole positions.
- 2.3.2 Drill two 9/64" holes and using the hardware provided mount the bracket.

2.4 Cabling

The battery cable is fed from the unit through a grommetted hole in the firewall and, if possible, is connected directly to the battery. If direct connection is not possible it should at least be of very low impedance to the battery. It is most important that battery cables or straps to the engine block, or any part of the ignition wiring do not form part of the mobile supply.

Make sure that there is adequate slack left in the cable to enable the unit to be withdrawn from the tray for servicing. Cut off the excess cable and make a firm connection.

ALWAYS connect the RED wire to the battery POSITIVE

2.5 Aerial

The whip aerial gives best performance when mounted on the roof of the vehicle. If roof mounting is not practicable, the aerial may be mounted on the panel just in front of the wind-screen so that the mounting hardware and coaxial cable are fitted from inside the vehicle under the dash. However, if this mounting position is used the "aerial cutting chart" will no longer apply and the performance of the equipment will be reduced due to screening or directional effects and due to reduced height.

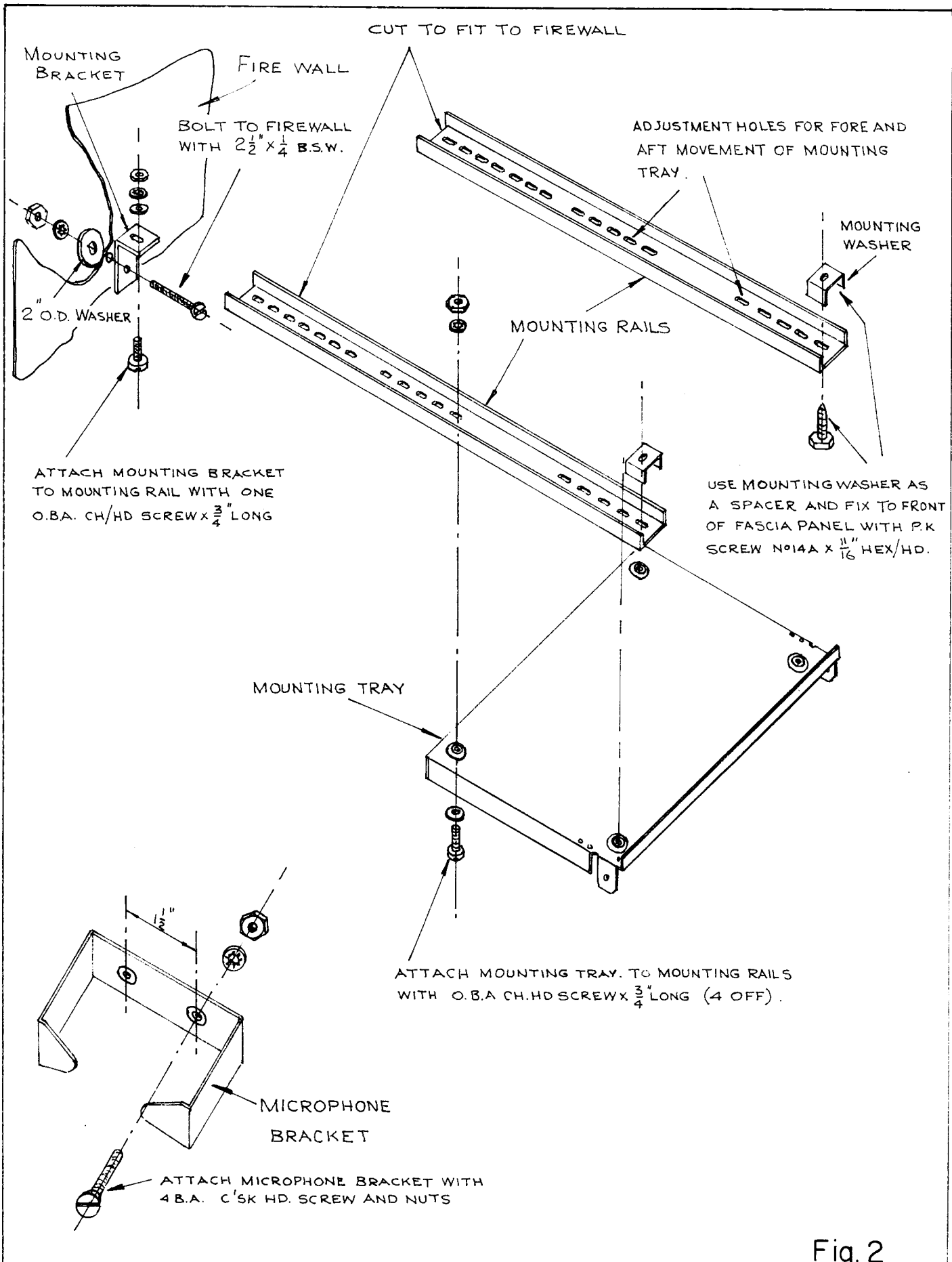


Fig. 2

INSTALLATION OF MOUNTING TRAY & MICROPHONE BRACKET FOR TYPE 1675/6/7 — MOBILE Radiotelephone Equipment

DRAWN: V.H.

DATE: 20.8.64

TP 210.04

TELECOMMUNICATION COMPANY OF AUSTRALIA PTY. LIMITED

Installation of Whip Aerials. Type 1675/06, 061A,
06.1C (see Illustration.)

NOTE: Illustration 1 and the following instructions - with the exception of paragraphs 9 and 10 - also apply to the knock-down and fixed base aerials. For these aerials it may be necessary to shorten the central mounting screw so that the aerial can be screwed tightly to the vehicle roof.

It will be necessary to remove the trim from above the near side or left hand front door of the vehicle. In some cases the adjacent sun-visor must also be removed. The box channeling should then be visible.

For an aerial impedance of 70 ohms use PT11 coaxial cable; alternatively, for an aerial impedance of 50 ohms use RG58AU coaxial cable.

- 2.5.1 Make up aerial stub following directions on the adjustment chart and Illustration 3 (b).
- 2.5.2 To fit main coaxial cable lead and aerial stub, solder the inner conductors to the main assembly and the outer conductors to the central solder lug provided. Clamp firmly. Do not fit coaxial plug until aerial and cable have been installed.
- 2.5.3 Select centre of roof, ensuring that there are no metal cross members welded immediately below by feeling lining.
- 2.5.4 On this centre, fly cut a hole 1" in diameter through metal and anti drum compound.
- 2.5.5 Feed free end of coaxial cable through hole from outside and guide between roof and lining towards installation of mobile unit (front or rear). For front installation, guide towards front window corner post and feed through to underneath of dash.
- 2.5.6 Pull cable through until aerial sub-assembly and stub are ready to enter. Tilt cable clamp end of plate downwards towards front or rear and insert through hole. Holding $\frac{1}{4}$ " B.S.F. screw, straighten assembly inside lining and pull upwards when screw is in centre of mounting hole. Place following items, in order, over screw:- neoprene washer, large insulator, aluminium washer and spring nut. Allow step on insulator to pass through holes in washer and roof. Screw nut down while maintaining pointed screw in contact with roof to prevent turning of assembly. This nut MUST NOT be over tightened otherwise distortion of roof will take place.

- 2.5.7 Fit coaxial plug - see paragraph 6 and illustration 2.
- 2.5.8 Check low resistance earth path between body of coaxial plug and car frame with ohm meter. This reading should be a short circuit; if not, remove aerial mount and clean anti-drum compound from under roof.
- 2.5.9 Pass flexible lead through aerial spring and assemble spring to nut.
- 2.5.10 Leaving approximately $\frac{1}{2}$ " free lead pushed back inside spring, bind to aerial at tinned area with fuse wire. Then solder. Cut off excess lead neatly above joint.
- 2.5.11 Cut whip aerial length using aerial adjustment chart and illustration 3(a).

2.6 Fitting Coaxial Plug

See illustration 2.

- 2.6.1 Trim feeder by removing 1" outer cover, $\frac{3}{4}$ " of braid and $\frac{7}{8}$ " of insulation.
- 2.6.2 Slide clamping nut and collet onto feeder and splay the braid.
- 2.6.3 Push centre conductor as far as possible, through plug pin and bend for soldering. Solder and trim.
- 2.6.4 Slide collet up to splayed ends of braid and trim braid flush with plug moulding, using knife against collet.
- 2.6.5 Push assembly home into plug so that collet enters it. Screw nut on firmly to grip feeder. The plug pin must be firm.
- 2.6.6 In the case of feeder larger than $\frac{1}{4}$ " diameter over cover, the collet clamp goes over the braid only.

2.7 Security

After the aerial, mounting tray and microphone bracket have been fitted, the tranceiver can be installed. Before inserting the unit into its mounting tray, check the chassis for a 'firm fit' in its case. A locking screw is located at the rear of the mobile chassis which bears upon a flange at the rear of the case. This screw should be adjusted for firmness so as to prevent any vibration of the chassis.

ILLUSTRATION 1

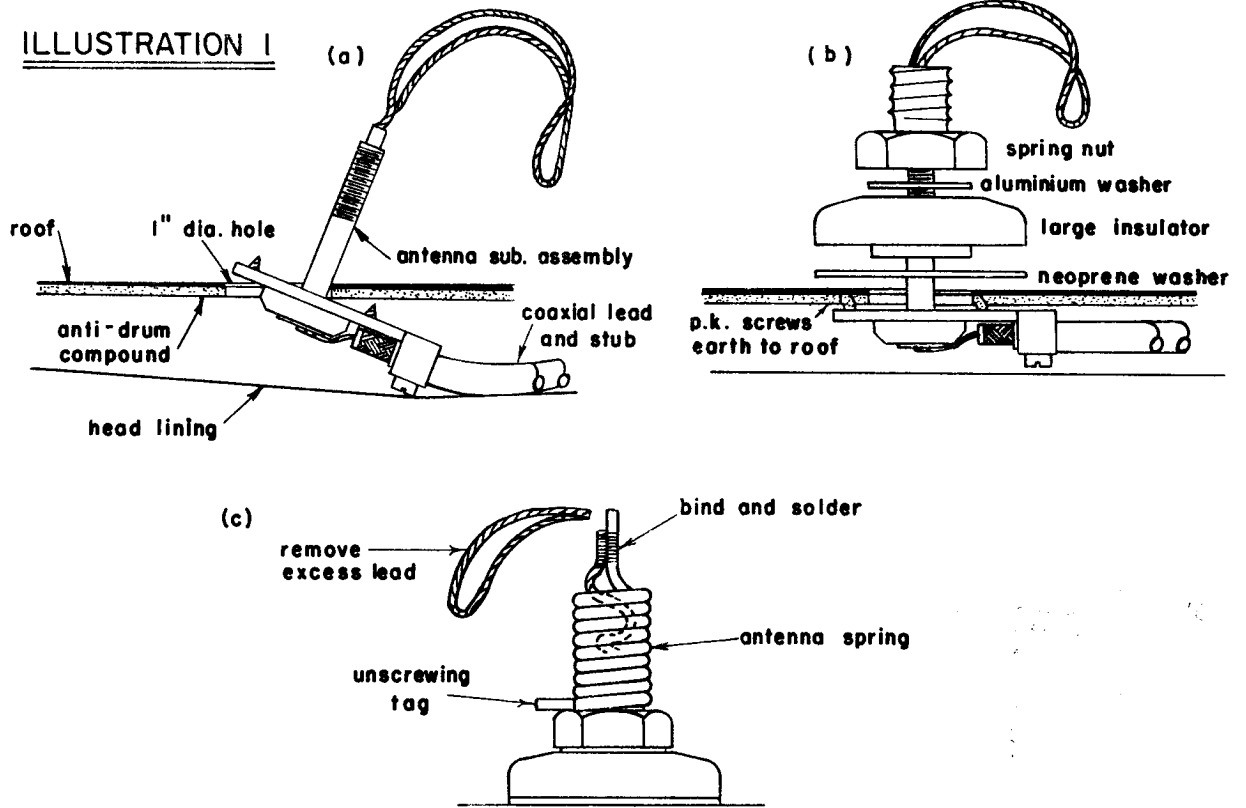


ILLUSTRATION 2

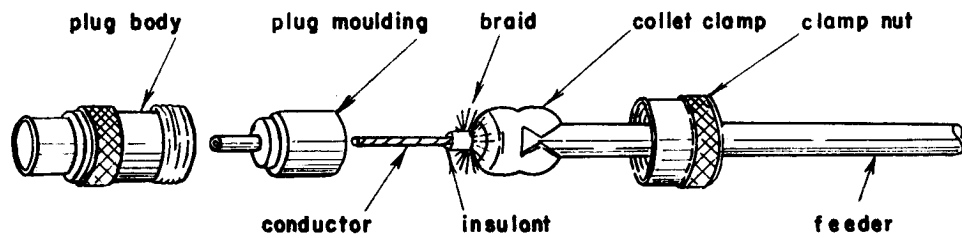
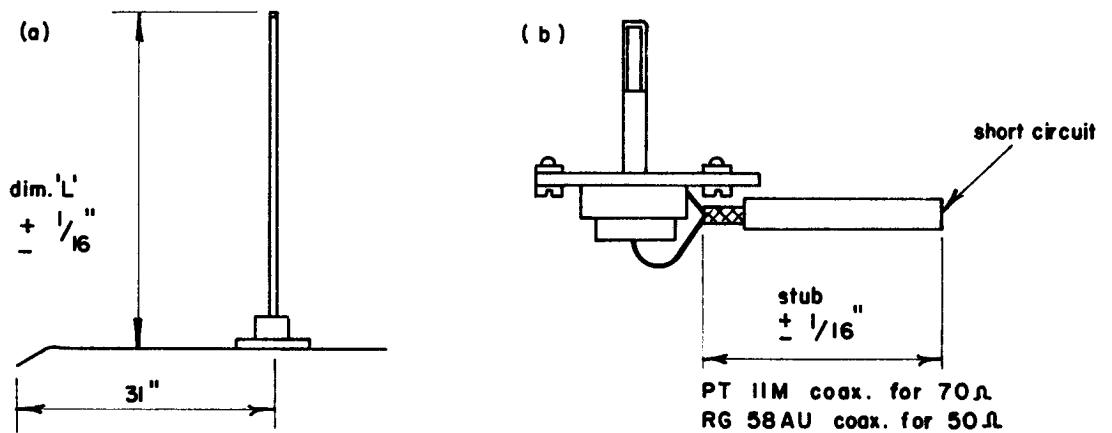
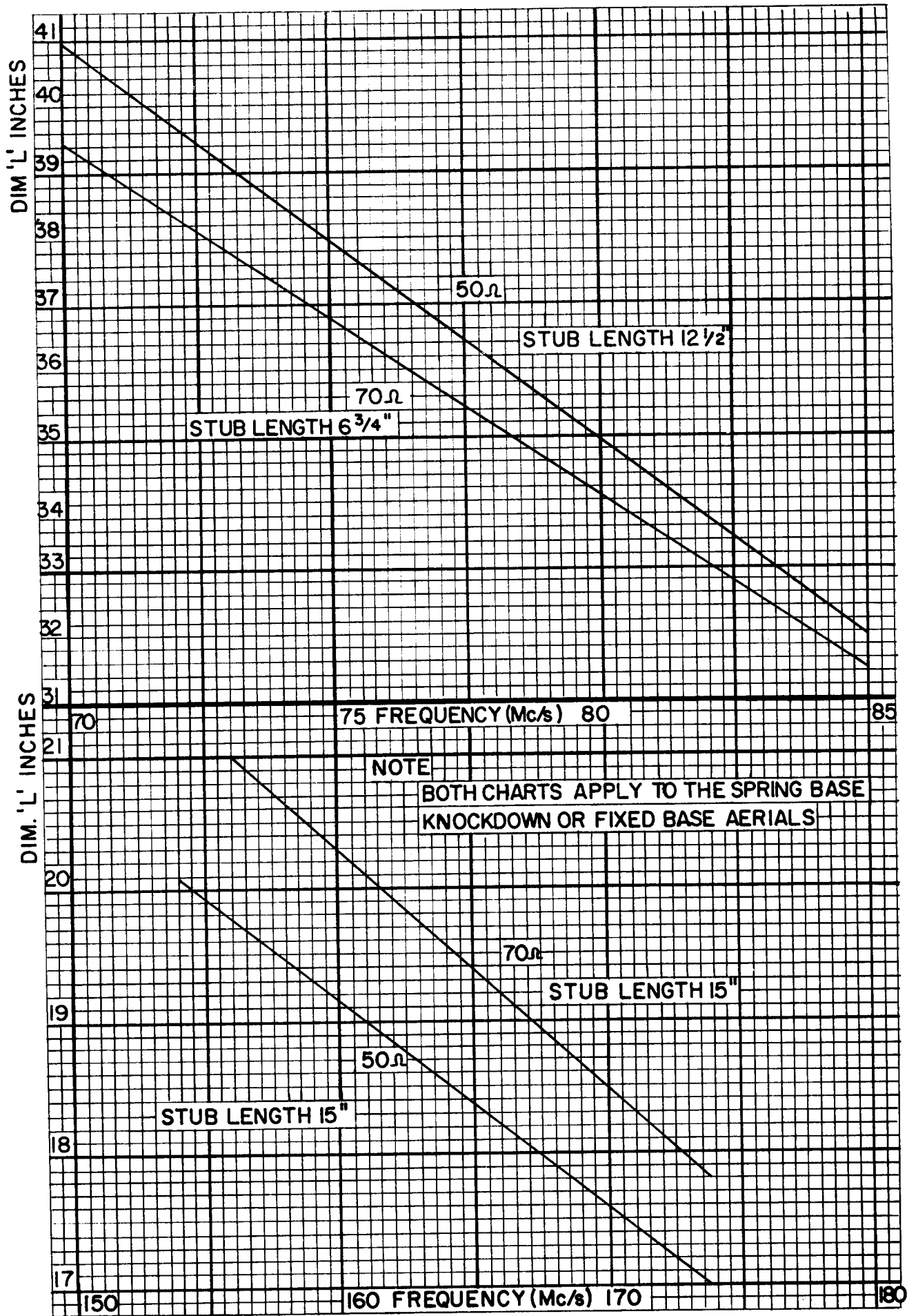


ILLUSTRATION 3



MOUNTING AND PLUG FITTING INSTRUCTIONS
TYPE 1675/06 WHIP AERIAL



MOBILE WHIP AERIAL TYPE 1675/06 ADJUSTMENT CHART

2.8 S.W.R. Check

With the transmitter/receiver installed and the power, aerial and microphone cables connected, the aerial standing wave ratio (S.W.R) should be checked. It should be approximately 1.2:1. If the ratio is higher, check the whip for correct length and the feeder cables for security and proper fitting.

If an S.W.R. meter is not available, check the P.A. cathode current with the mobile loaded into a wattmeter and note the reading. (A 0-100 uA meter with a 3000 ohm movement is used on metering point 4M7. Typical reading 40 uA).

Remove the wattmeter and load into the aerial and again note the P.A. current reading.

These two current readings should be within 2 uA of each other for the aerial matching to be satisfactory.

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT3 NETTING3.1 General

A small tunable inductor (IL2) which is in series with the receiver crystal, 1X1, is used for accurate netting. As the receiver first oscillator has a limited tuning range the inductor cannot be used to compensate for tuning errors elsewhere in the system.

If the tuning accuracy of the transmitter or test signal, the receiver second oscillator, or the discriminator, is in doubt the necessary checks and adjustments should be made before netting. The second oscillator has a tuning range of 800 - 900 c.p.s. and setting the air trimmer 7C12 to one third maximum capacity will normally bring the oscillator to within 50 c.p.s. of 17.210 Mc/s. The discriminator should be set to 455 Kc/s (within \pm 500 c.p.s.)

3.2 Instruments Required

- (1) A correctly aligned transmitter operating at the frequency in question (after P.M.G. check)
- (2) Hewlett Packard V.T.V.M. Model 410A or equivalent V.T.V.M. with a low capacity R.F. probe and 1 volt R.F. F.S.D. range. Alternatively (2) TCA CZ291.544 0-100 uA meter F.S.D. having an internal resistance of 1,000 to 3,000 ohms with 2.2K ohm resistor at probe end of the negative metering lead.
- (3) TCA CZ291.509.1 microammeter with centre zero sensitivity 50 uA F.S.D., or 0-100 uA reversible meter, or AV08, P817.00 multimeters on 2.5V or 3V DC range etc., for discriminator metering.

3.3 Procedure

An unmodulated signal of correct frequency at a level of more than 10 uV is applied to the receiver input. A microammeter with centre zero (or alternatives to (3) above) is then connected from the input of the receiver audio card to the positive point of this card.

With the slug of the tunable inductor (IL2) in approximately the centre position, trimmer 6C6 is adjusted for optimum drive level into the emitter of 6TS3 using a Hewlett Packard V.T.V.M. Model 410A or equivalent to measure the R.F. voltage on the emitter of 6TS3. This voltage should be about .4V.

Alternatively the 0-100 uA meter shown under alternative (2) may be used providing that the 2.2K ohm resistor is connected to the standoff supporting the emitter of 6TS3. Using this meter maximum drive will be shown as about 40 to 60 uA.

With the V.T.V.M. probe removed from the emitter of 6TS3 net the receiver to give discriminator zero by using the slug of IL2 for trimming.

In cases where the grinding accuracy of the crystal is close to its maximum permissible tolerance, it can happen that the discriminator zero cannot quite be obtained. This is due to the fact that 6C6 has some effect on the oscillator frequency while its setting to optimum drive level is fairly wide. It is therefore permissible to re-adjust 6C6 to obtain discriminator zero provided that the drive level on the emitter of 6TS3 does not drop by more than 10%.

3.4 Notes

Some crystals have been found to exhibit several resonance points and these crystals are capable of oscillating at any one of the spurious resonance frequencies. The spurious resonance points are often several kc/s away from the wanted resonance point and proper alignment of the receiver oscillator would not be possible, particularly as crystals exhibiting this fault are likely to jump from one resonance to another. Crystals suspected of this fault should be returned for further examination and possible replacement.

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT4. SPECIFICATION4.1 General

Frequency Ranges:	Band A 70-80 Mc/s for Model 1677A Band C 156-174 Mc/s for Model 1677C
Number of Channels:	Available from the factory equipped for operation on 1,2,3, or 4 channels.
Switching:	Crystal switching is employed in channel selection.
Channel Spacing:	25/30 Kc/s or 50/60 Kc/s
Frequency Stability of Carrier:	Better than 0.002%
Operation:	Simplex
Antenna Impedance:	50 - 70 ohms unbalanced, normal.
Antenna:	Normal - Standard whip 50 ohms Alternative - 70 ohms
Power Supply:	Interchangeable transistorised DC/DC converter with inbuilt silicon rectifiers and smoothing circuits.
Power Supply Voltage:	Available for nominal voltage of 12 volts DC.
Current Consumption: (Approximate)	Receiver - Quiescent * 70-80 mA Full Audio Power Output ** 300 mA Transmitter - Standby 1.17A Transmit 7.57A
* Receiver in standby condition ready to receive signal.	
** Average current consumption on speech information.	
Dimensions:	Diecast aluminium case (excluding projection)
	Width - $10\frac{1}{2}$ "
	Depth - $8\frac{7}{8}$ "
	Height - $4\frac{7}{8}$ "
Weight:	18 lbs.

4.2 Receiver

Circuit:	Fully transistorised double conversion super-heterodyne employing two crystals as heterodyne oscillators.
Crystal Tolerance:	0.002% (Optional extra 0.001%)
Crystal Frequency:	The crystal frequency is determined by the following formula:- Band A $f_x = \frac{f_s + 16.755}{2}$ Band C $f_x = \frac{f_s - 16.755}{3}$
	where: f_s = signal frequency in megacycles f_x = crystal frequency in megacycles
Input Impedance:	50 - 70 ohms unbalanced
Type of Signal:	Phase (FM)
Overall Distortion:	Not greater than 5%
Sensitivity for 20 db quieting:	Band A 70 - 80 Mc/s 0.6 uV Band C 156 - 174 Mc/s 0.8 uV
Signal to Noise Ratio at 1 uV signal input:	30 dB
Muting Level:	Adjustable from 0.5 uV
Selectivity: Receiver IF response relative to centre frequency:	\pm 25/30 Kc/s not less than -80dB \pm 50/60 Kc/s not less than -100dB
Audio Output:	3 watts

4.3 Transmitter

Crystal Tolerance:	0.002% (Optional extra 0.001%)
Crystal Frequency:	The crystal frequency is determined by the following formula:- $f_x = \frac{f_s}{36}$
Crystal Multiplication:	36 times (3 x 3 x 2 x 2)
Modulation:	Phase (FM) at crystal frequency
Deviation:	\pm 5 Kc/s controlled by instantaneous slope limiter (continuously variable).

Audio Response: \pm 3 db from pure phase 300-3000 c/s.

Audio Distortion: Less than 6% for 66% of maximum deviation at 1,000 c/s.

Noise Level: -40db Relative to full modulation with 1,000 c/s tone.

Spurious Radiation: -80db Relative to full carrier power.

Harmonic Radiation: 2.5 uW Relative to full carrier power.

Output Impedance: 50 - 70 ohms unbalanced.

Power Output: 25 watts

NOTE: Guaranteed performance of audio and RF outputs is based on battery terminal voltage of 13.8 volts DC.

4.4 Semi-Conductor and Valve Complement

4.4.1 Receiver

Diodes:	AAZ15	1 (A band only)
	OA79	2
	OA85	4
	OA202	3
	OAZ201	1
	OAZ202	1
Transistors:	AF114	3 (2 only, in C band)
	AF115	3
	AF116	5
	AFZ12	1 (2 in C band)
	ASZ16	2
	AC125	7
	AC126	1
	OC202	1

4.4.2 Transmitter

Diodes:	OA90	1
	OA202	3
Transistors:	AF115	2
	AC125	3
Valves:	12AT7	1
	QQE02/5	1
	QQE03/20	1

4.4.3 Power Supply

Diodes:	OA202	2
	OA210	1
	OA211	2
Transistors:	ASZ17	2

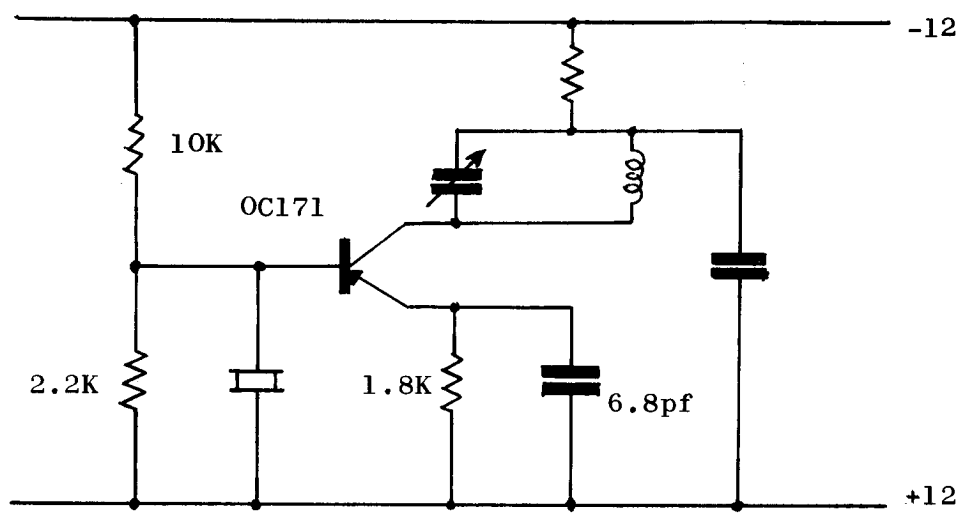
CRYSTAL SPECIFICATION TYPE FM1677

RECEIVER

<u>TYPE OF OPERATION</u>	Series Mode
<u>FREQUENCY RANGE</u>	40 - 66 Mc/s. Exact frequency specified on order.
<u>TYPE OF HOLDER</u>	Style D (HC6U)
<u>GRINDING ACCURACY</u>	20 ppm
<u>TEMPERATURE RANGE</u>	-20°C to +70°C
<u>TEMPERATURE CO-EFFICIENT</u>	20 ppm
<u>MAXIMUM SERIES RESISTANCE</u>	60 ohms for 5th overtone 40 ohms for 3rd overtone
<u>'A' BAND</u> Spec.No.3502.150.0096.1	$f_x = \frac{f_r + 16.755}{2}$
<u>'C' BAND</u> Spec.No.3502.150.0095.1	$f_x = \frac{f_r - 16.755}{3}$

where f_x = crystal frequency
 f_r = receiver frequency

Guarantee of one year against faulty design, material and workmanship.



CRYSTAL SPECIFICATION		
TYPE FM1677		
RECEIVER		
	CA1024	27.4.65.
TELECOMMUNICATION COMPANY OF AUSTRALIA PTY. LIMITED.		

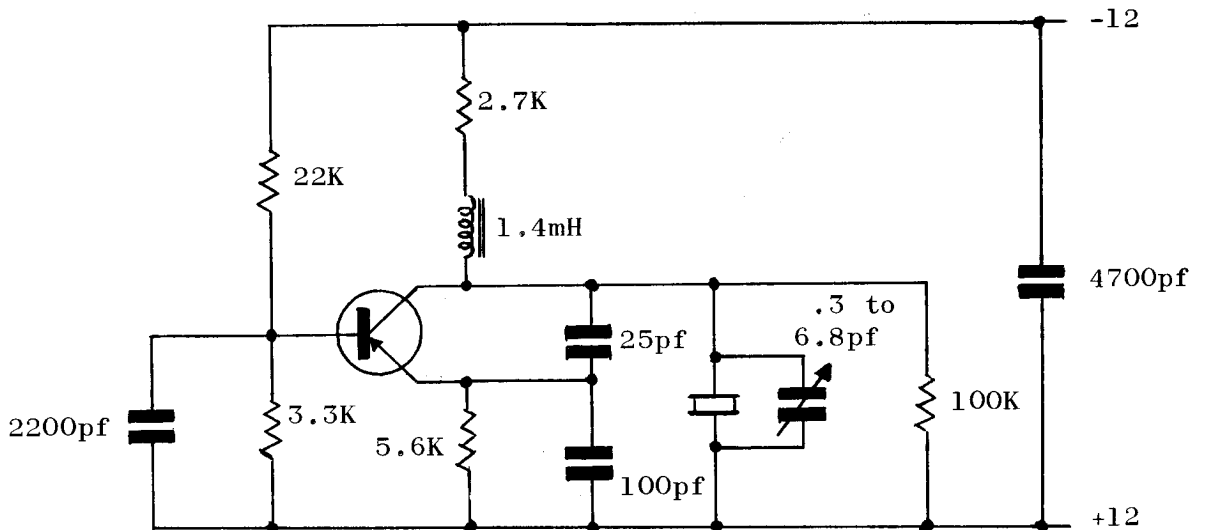
CRYSTAL SPECIFICATION TYPE FM1677

TRANSMITTER

FUNDAMENTAL OPERATION

<u>HOLDER</u>	Philips type K1, British type D
<u>GRINDING ACCURACY</u>	20 ppm
<u>TEMPERATURE RANGE</u>	-20°C to +70°C
<u>FREQUENCY RANGE 'A'</u>	1.9 - 2.4 Mc/s
<u>FREQUENCY RANGE 'C'</u>	4.3 - 4.85 Mc/s
<u>MINIMUM E.P.R.</u>	30K ohms to 18K ohms
<u>RESONANCE</u>	Parallel
<u>PARALLEL CAPACITY</u>	30 pf
<u>TEMPERATURE CO-EFFICIENT 'A'</u>	20 ppm
<u>TEMPERATURE CO-EFFICIENT 'C'</u>	10 ppm
<u>ALL BANDS</u>	$f_x = \frac{f_s}{36}$
Spec.No. 3502.150.0094.0	where f_x = crystal frequency f_s = transmitter frequency

Guarantee of one year against faulty design, material and workmanship.



CRYSTAL SPECIFICATION
TYPE FM1677
TRANSMITTER

CA1023

23.4.65.

TELECOMMUNICATION COMPANY OF AUSTRALIA PTY.LIMITED.

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT5. TECHNICAL DESCRIPTION5.1 Receiver, General

The fully transistorised VHF receiver Type FM1677 is a double superheterodyne type in which the two heterodyne frequencies are derived from separate crystal locked oscillators.

The first IF amplifier operates at a frequency of 16.755 Mc/s which is converted in the second mixer by the second heterodyne oscillator (frequency 17.21 Mc/s) to the second intermediate frequency of 455 Kc/s.

Two stages of limiting are followed by a discriminator, feeding the audio stages.

A.M. Noise at the second Intermediate Frequency is detected by 11MR3 and the resulting audio noise is amplified and rectified in the muting stages thereby developing a control current which mutes the audio stages of the receiver.

The receiver operates from 12 volts D.C. supply in all applications.

NOTE: The whole of the receiver circuit including the positive and negative bus lines for 12 Volt D.C. supply and common cold connections for R.F. etc. is ISOLATED from the main chassis for D.C. The antenna is coupled to the low impedance point of a coaxial tuned circuit formed by the coaxial stub and feed line from relay 1A1 to the RF Unit.

The receiver comprises a total of six interconnected printed wiring card assemblies, and I.F. filter assembly mounted in a sealed can, two 1st I.F. transformers, chassis mounted, and an audio power output amplifier assembly on a small sub-chassis.

5.1.1 R.F. Unit

The R.F. Unit is comprised of four stages. They are an RF amplifier, a channel determining crystal oscillator, a harmonic amplifier and a mixer.

This assembly is essentially a printed wiring card to which is attached a metal sub-chassis which is used for mechanical mounting and positioning of coil assemblies, screening and shielding of stages, and as common earthing and bonding of R.F. returns.

The 'A' band receiver incorporates a diode (6MR1) across the primary of the aerial transformer (6L1). This diode protects the R.F. amplifier (which is directly coupled to the secondary of the aerial transformer 6L2) from induced voltage peaks.

As the 'C' band aerial transformer primary consists of only one turn of wire, on 6T1 grounded by 6C1, the diode is unnecessary.

Reference to the circuit diagram will show that the R.F. stage is coupled to the first mixer through three tuned circuits.

These circuits are coupled via 6C10 and 6C12. 6C10 and 6C12 may not be immediately apparent on physical inspection of the R.F. unit as these comprise a single turn of wire on 6L3 and 6L5.

Output from the R.F. Unit at the first I.F. (16.755 Mc/s) is developed in the primary of 1T1 the first I.F. transformer. This is mounted on the main chassis in standard manner.

5.1.2 First I.F. Card Assembly

This card contains the first I.F. amplifier, the second mixer, and the second crystal locked heterodyne oscillator.

The first I.F. transformers 1T1 and 7T1 are mounted on the main chassis in standard manner and the necessary connections are brought out from the card to the transformers.

The output from the R.F. Unit is coupled through 1T1 to the 1st I.F. amplifier and thence to 7T1. The output from 7T1 is fed to the mixer where it combines with the output from the second oscillator.

The second heterodyne oscillator is a Colpitts type, crystal controlled at 17.21 Mc/s by crystal 7X1. This second crystal is factory fitted and soldered into the first I.F. card.

The mixer output leaves the 1st I.F. card at this stage and is applied to the special I.F. filter unit 1FL1 which selects the resulting 455 Kc/s second I.F.

5.1.3 I.F. Filter Unit 1FL1

The filter which is employed for 30 Kc/s channel spacing, 5 Kc/s deviation systems, provides the entire selectivity at the second Intermediate Frequency of 455 Kc/s as it is followed by untuned RC coupled amplifiers and limiters.

Each filter is factory aligned to full specification prior to release. It is most important that it is not adjusted in any way other than in the factory setup. A turnover repair service is available through TCA Service Departments at a reasonable flat rate.

An alternative filter is available for 30 Kc/s channel spacing, wide deviation.

5.1.4 Second I.F. Card Assembly

The filter unit is followed by the Second I.F. Card Assembly which contains the 2nd I.F. amplifiers, first and second limiting diodes and amplifiers and the discriminator.

Output from filter 1FL1 is applied to the first stage of the 2nd I.F. Card which is an impedance coupler. The signal is then amplified by the second stage which provides a portion of its output for metering. The third transistor amplifies the signal still further and feeds it to the first limiter diodes.

Limiter output from these diodes is amplified by the fourth stage and coupled to the second limiter diodes, amplified again by the 5th transistor and applied to the discriminator.

The resultant audio output is then fed to the Audio and Squelch cards.

5.1.5 Audio Card Assembly

This card contains an audio pre-amplifier, audio amplifier, and amplifier driver.

The audio output from the discriminator is fed via the pre-amplifier and volume potentiometer to the base of the audio amplifier. This is the first of the three audio stages and is controlled by 12TS4 for muting the audio output. Note that 9R8 in the emitter circuit of 9TS2 is not bonded to the cold audio bus but connected to the collector of 12TS4.

Output from the first audio amplifier is coupled to the base of the driver. The audio signal leaves the Audio Card at this point and is connected to the primary of the driver transformer 1T2 on the audio output stage sub-chassis.

5.1.6 Audio Output Stage Sub-Chassis

This stage comprises the driver transformer 1T2 and the push-pull audio output transistors 1TS1 and 1TS2.

The driver transformer couples the collector of the driver to the push-pull bases of the output transistors. The collectors of these transistors are directly coupled to the output transformer 1T3 which is mounted below on the main unit chassis and feeds audio power at voice coil impedance 3.5 ohms to the loudspeaker (Type 4 F Rola) on the front panel.

5.1.7 Voltage Regulator

This comprises transistor 11TS1 and Silicon Zener diodes 11MR1 and 11MR2.

The audio power amplifier D.C. supply is unregulated. The D.C. supply to all other assemblies or cards is provided via the zener controlled transistor 11TS1, and is thereby regulated.

5.1.8 Squelch Detector

In the absence of an input signal to the receiver, AM noise at I.F. is developed across the collector load of 8TS5, the second limiter, i.e. the primary of the discriminator transformer.

This is coupled to the noise detector 11MR3 and the D.C. resultant is demodulated then detected and coupled to the base of 11TS2.

The output of noise from the collector of 11TS2 is shaped and coupled to the muting control 1R6.

5.1.9 Squelch Card Assembly

The total noise is developed across the muting control. The variable arm of this potentiometer controls the amount of noise coupled to the Squelch Card. The components of this stage are chosen to produce a low gain at lower audio frequencies, a higher gain at higher audio frequencies and maximum gain at noise frequencies at the top end of the audio speech range.

The resultant output from the first muting amplifier is a response sloping upward as frequency rises, giving considerable amplification to noise frequencies above the speech range.

Similarly, the second muting amplifier with its associated collector load provides a further rising characteristic at higher audio frequencies so that the sum of the characteristics of both stages produces an overall rising response of many dB per octave, producing a high degree of sensitivity to high noise frequencies while retaining a low order of sensitivity to audio frequencies in the speech range.

The third transistor on this card is employed as an emitter follower to provide a relatively low impedance output of high frequency noise which is then rectified.

The noise applied to 12MR1 rectifier provides the control current for the base of the fourth stage which in turn controls 9TS2 and effectively mutes the audio stage in the presence of noise i.e. no signal condition of receiver.

When an R.F. signal is received, the reduction of noise output from 8TS5 limiter removes the rectified control current from 12MR1 causing the collector/emitter path of 12TS4 to close or function, bringing 9TS2 into action and allowing normal operation of the audio stages to amplify audio frequency signals received.

5.2 TRANSMITTER

5.2.1 Mod. Amp. Card.

The entire audio section of the transmitter is transistorised and the circuits are contained within one printed wiring card which consists of the audio pre-amplifier, differentiator, limiter and integrator amplifier sections. An audio filter is contained on a separate small card.

The microphone output is coupled to the base of the pre-amplifier which amplifies the microphone signal to an acceptable level and applies it to the differentiator. The differentiated signal is then limited by 2MR1, 2MR2. This is an instantaneous slope limiter which provides a deviation of ± 15 Kc/s.

The output from the limiter is then integrated by the integrator-amplifier circuit of 2TS3. The integrating capacitor is 2C8 connected between the base and collector of 2TS3.

The output from 2TS3 is developed across 1R1 the pre-set deviation control, and the controllable audio output is then coupled to the phase modulator through an audio filter which has a roll off at 3000 Kc/s.

5.2.2 Crystal Oscillator and Modulator Card

The crystal oscillator and phase modulator circuits are fully transistorised and both contained on one printed wiring card.

The crystal oscillator is a fairly conventional circuit based on a parallel mode of operation, the crystal being in the collector/emitter circuit of 3TS1.

Fine adjustment of crystal frequency for accurate netting of transmitters is obtained by means of 1C3, a variable trimmer capacitor in shunt with the crystal.

The output of the crystal oscillator is coupled to the phase modulator by a high value of resistance 3R5. This provides isolation of the crystal oscillator from effects of varying impedances of the phase modulator.

5.2.3 Phase Modulator

From the pre-set deviation control the audio signal is coupled through the audio filter to the phase modulator resonant circuit.

This creates a reactance modulation of the applied R.F. from the crystal oscillator in sympathy with the modulator input.

As the base impedance of 3TS2 circuit is relatively low, 3C8, 3C9 provide the low impedance connection from the phase modulator circuit to the base of 3TS2 which amplifies the voltage appearing across the phase modulator circuit.

5.2.4 Frequency Multiplier Stages

The maximum use of double tuned coupling circuits is made in these multiplier stages resulting in elimination of spurious output signals.

Coupling into the first three stages is by means of double permeability tuned transformers with coupling at or just below critical.

The output of the phase modulator/amplifier is coupled to the grid of the first multiplier valve 4V1A ($\frac{1}{2}$ 12AT7) through the double tuned transformer 4T1.

A total frequency multiplication of 36 is obtained by using the 12AT7 double triode up to 9f (both half sections triple) and a twin tetrode (QQE02/5) to 18f and 36f (both half sections double.)

Grid current metering for alignment of the phase modulator and 4T1 is provided by the metering point 4M1. Metering is effected by using a microammeter having 0 - 100 uA full scale deflection and an internal resistance of 3000 ohms.

The anode circuit of 4V1A ($\frac{1}{2}$ 12AT7) triples the input signal from 4T1 and applies it to the grid of 4V1B ($\frac{1}{2}$ 12AT7) through 4T2.

Grid metering of this stage is provided by metering point 4M2.

The anode circuit of 4V1B again triples the signal and applies it to 4V2A ($\frac{1}{2}$ QQE02/5) the third multiplier stage through the double tuned circuit transformer 4T3.

Grid metering of this stage is provided at metering point 4M3.

The anode of the first section 4V2A is coupled to the grid of the second section through the anode circuit 4L1, 4C19 which is tuned to the second harmonic of the grid input signal, and grid condenser 4C20.

Grid metering is available at metering point 4M4.

The output of the second section of 4V2B ($\frac{1}{2}$ QQE02/5) is applied to the capacitively tuned circuit 4L2, 4C23 which is also tuned to the second harmonic of its grid input signal and sufficient power is available at the operating signal frequency to drive the Final Power Amplifier.

Circuit 4L2, 4C23 is link coupled by inductive link 4L4, 4L5 to the grid tuning circuit of the power amplifier which comprises the centre tapped secondary 4L6 and split stator trimmer 4C29 providing balanced output to the push-pull P.A. grids.

The link is tuned by means of trimmer 4C25 in series with 4L4 to increase the transfer of power from the driver anode circuit to the P.A. grid circuit.

All stages in the R.F. exciter operate from either grid leak bias or a combination of grid leak bias and cathode bias, and in the event of R.F. drive failure, all tubes are held within rated dissipation.

5.2.5 Power Amplifier

The power amplifier 4V3 is the VHF double tetrode type QQE03/20 which requires no neutralising. The circuit design is such that the amplifier is completely stable showing no sign of oscillation at fundamental or parasitic frequencies.

Power from the driver is coupled into the amplifier balanced grid circuit by link coupling as mentioned above.

The P.A. anode tuning is by means of a self supporting centre tapped inductance 4L10 and a split stator condenser, 4C38.

The output power developed in the anode circuit is coupled to the antenna by a link 4L11 at the centre of the tank coil which is matched to the load. Transfer to the antenna connection is via the antenna change-over relay contacts 1A1.

Metering of the P.A. grid circuit between test points 4M5 and 4M6 enables driver anode tuning and P.A. grid tuning together with coupling link adjustment.

Metering of the P.A. anode tuning is provided by test point 4M7 in the cathode circuit of 4V3.

5.2.6 Metering

Using the standard 100 uA 3000 ohm test meter recommended for metering the 1677 equipment in conjunction with the various shunts in circuit the transmitter metering points give the following full scale meter readings. 4M5 is measured with respect to 4M6. All other points are with respect to chassis earth.

<u>Test Point</u>	<u>Quantity Measured</u>	<u>Full Scale Deflection</u>
4M1	4V1A grid current	120 uA or -26 volts at grid
4M2	4V1B grid current	540 uA or -54 volts at grid
4M3	4V2A grid current	750 uA or -75 volts at grid
4M4	4V2B grid current	2.1 mA or -172 volts at grid
4M5	4V3 grid current	4.5 mA or -45 volts at grid
4M6	(meter between these points)	
4M7	4V3 cathode current by cathode voltage.	250 mA/ + 2.5 volts

5.3 POWER SUPPLY

5.3.1 General

The Type 1677/502/12 Power Supply fitted within the mobile is a self-contained DC/DC converter. It is housed in a slim rectangular metal case which also acts as a heat sink for the ASZ 17 power transistors.

A turret lug terminal strip is mounted at each end of the narrow mounting face of the supply case so as to provide input and output connections.

5.3.2 Operation

The Power Supply operates from a 12 volt battery and the DC voltage is applied across transistors 10TS2, 10TS3. Each transistor receives forward bias and the initial pulse is sufficient to cause conduction in one of them. Normal asymmetries in the active elements dictate which of the two transistors conducts first.

Rising collector current in the conducting transistor induces a voltage in its associated feedback winding which causes increasing conduction in the transistor.

When the transformer core reaches saturation the induced voltage collapses and the reversing field switches on the second transistor which starts to conduct heavily.

As the second transistor conducts, the first one is cut off, and there is an instant change in polarity.

This cycle of events is repeated rapidly so that the secondary of the transformer produces an almost rectangular wave form.

The two outputs of the secondary are then rectified and smoothed to give DC outputs of minus 30V, plus 250V and 500V from a voltage doubler.

10TS1 is used as a switch to open the feedback path of the second transistor.

TYPE FM1677 VHF MOBILE RADIOTELEPHONE EQUIPMENT6 ALIGNMENT AND TEST6.1 Receiver6.1.1 Test Equipment

Suitable types of equipment are listed below, but any test apparatus having similar characteristics may be used.

Marconi Signal Generator TF995
Hewlett Packard V.T.V.M. or Model 8 AVO
A.W.A. D. and N. Meter 51932
Audio Oscillator
455 Kc/s Generator, GM2883, 1677/14 or PM5320,
(should be accurate within ± 100 c/s at 455 Kc/s).
Plastic Tuning Tool for R.F. Alignment.
(Do not use metal as an accidental short circuit
could damage transistors.)

6.1.2 Preliminary Alignment Procedure

Examine mechanically.

Measure resistance from positive and negative supply points on RF unit to main chassis. This should be about 1 meg. ohm.

Measure between power supply negative and chassis. This should be about 100 K ohms.

Connect 13.8V supply. OBSERVE CORRECT POLARITY i.e. red to positive, black to negative.

Switch on receiver and measure supply voltage at R.F. card. This should be 11.3 - 11.5 volts.

Switch off receiver and wire a bridge or short circuit between collector and emitter of the voltage regulator transistor, (OC80). This will protect the regulator transistor against an accidental short circuit between the positive and negative bus lines of the receiver supply during alignment.

This bridge MUST BE REMOVED upon completion of alignment.

Rotate the squelch control fully clockwise.

6.1.3 Discriminator Alignment

Check that discriminator centre is on 455 Kc/s \pm 200 c/s and if necessary adjust tuning.
 Check discriminator linearity at 460 Kc/s and 450 Kc/s and if necessary adjust tuning and check centre for shift. The above checks are carried out with 455 Kc/s fed to input of 2nd IF card via a 0.1 ufd on each lead of the generator, (hot and earth lead) at a level of 1.0 milli-volts.

6.1.4 Filter Alignment

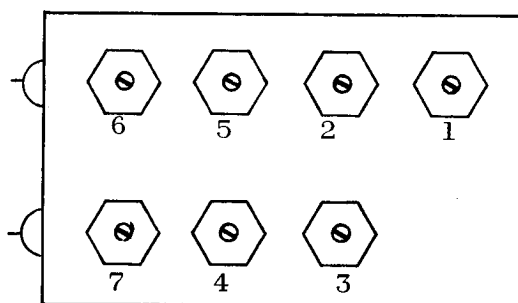
Check that filter is centred on 455 Kc/s.
 Centre of filter is the mean of the two 3db points, which are 455 Kc/s \pm 500 c/s.
 Check bandwidth at the 3db points. It should be 10 Kc/s \pm 1 Kc/s.

NOTE: UNLESS THE TECHNICIAN IS THOROUGHLY FAMILIAR WITH THE TECHNIQUES INVOLVED AND HAS THE NECESSARY INSTRUMENTS AND FACILITIES AVAILABLE THE FOLLOWING ADJUSTMENTS SHOULD NOT BE ATTEMPTED. IN THIS CASE RETURN TO TCA FOR REPLACEMENT.

If adjustment is necessary:-

Feed 455 Kc/s to the base of the 2nd Mixer (7TS2).
 Connect V.T.V.M. to metering point IM1 on 2nd IF card.

Adjust input level for 25mV reading on V.T.V.M.
 Carefully trim each coil (in order shown below) for maximum meter reading.



Repeat last step for absolute maximum tuning of coils.
 Re-check filter centre and bandpass requirements.
 Repeat alignment again if necessary.

6.1.5 2nd Oscillator Check

Check 2nd Oscillator frequency. This should be 17.210 Mc/s \pm 100 c/s. If out of adjustment a

crystal locked oscillator which has been checked for accuracy should be used to re-adjust. If a crystal locked oscillator is not available, setting the air trimmer 7C12 to one third of maximum capacity will normally set the frequency to within 50 c.p.s. of 17.210 Mc/s.

6.1.6 First IF Alignment

Adjust the output frequency of the Marconi TF995 signal generator to 16.755 Mc/s. Feed the output via a 3.3 pf capacitor to the input of the first IF Transformer (1T1, Pin 6) the connection to the first mixer collector should be removed.

Centre the signal generator frequency on the discriminator centre. Metering of the discriminator may be effected by connecting a VTVM or Model 8 AVO to the discriminator output, i.e. at the junction of 8R30, 9C1 which is the audio lead coupling the second IF card to the audio card.

Connect D and N meter if available or AVO 8 across the loud-speaker voice coil, range AC volts 0 - 2.5 or 3 volts.

Tune bottom slug of last IF transformer (7T1) for maximum quieting on output meter.

Next, tune the top slug of 7T1.

Proceed to the first IF transformer (1T1) and adjust slugs in similar manner.

Typical quieting at this point is 20 db for 12 - 20uV input measured with an AVO 8.

Replace the connection between the first mixer collector 6TS4 and the first IF transformer (1T1).

The correct tuning point in each case is the first rise indicated as the slug is screwed inwards from a position flush with the top of the coil former.

6.1.7 First Oscillator Alignment

Set volume to minimum and slug of inductor 1L2 to its approximate centre.

Adjust trimmer 6C6 for optimum drive to emitter of 6TS3, using an H.P.410A V.T.V.M. to measure RF voltage of approximately .4V across 6R7.

Alternatively use an 0 - 100uA meter F.S.D. with internal resistance of 1000 - 3000 ohms, with a 2.2K ohm resistor

inserted in the negative lead and attached to the standoff supporting the emitter of 6TS3. Using this meter maximum drive will indicate about 40 - 60uA across 6R7.

Switch receiver OFF and ON several times to ensure that oscillator starts each time.

For netting see "Netting", Section 3.

6.1.8 R.F. Alignment

Adjust the frequency of the Marconi TF995 to the signal frequency. The signal generator, terminating unit or a 6 db pad should be inserted between the generator output and receiver input during the test. Input to the receiver should be taken from the 75 ohm outlet of the pad. The R.F. output of the signal generator should be adjusted to provide only partial quieting of the receiver.

Tune the oscillator doubler 6C15 and the first mixer input 6C13 for maximum quieting.

Adjust the generator frequency to achieve discriminator balance or centre.

Adjust the output of the generator for quieting of about 10 - 15 db on the D and N meter.

Peak 1T1 for maximum quieting.

Tune 6C11, 6C7 and 6C4 for maximum quieting. Input to receiver for final alignment should be 0.5 uV.

6.1.9 Voltage Regulator

Remove short circuit or bridge previously wired across emitter to collector of 11TS1.

Measure the D.C. input voltage at the R.F. card (Do not short circuit the negative bus to chassis). Voltage should read 11.3 - 11.5 volts.

6.1.10 Quieting

Rotate the muting or squelch control fully clockwise.

Check quieting at input to receiver 0.6 uV for band A and 0.8 uV for band C. Quieting should be equal to or better than 20 db (10:1).

6.1.11 Signal to Noise Ratio.

Switch modulation switch to F.M. internal.

Adjust deviation to 5 Kc/s at 1,000 c.p.s.

Adjust generator to give 1uV input to receiver.

Advance volume control to give an output of 1.8V AC across the voice coil of the loudspeaker.

Check the signal/noise ratio on the D and N meter. This should be equal to or better than 30 db.

6.1.12 Audio Output and Distortion.

Advance the signal generator output to give an input of 5uV to the receiver. Leave the modulation as in para. 6.1.11.

Adjust the volume control for an audio output of 3.0W, across the speaker voice coil with signal generator deviated 5 Kc/s to 1000 c.p.s.

Check distortion which should not be greater than 5.0%.

6.1.13 Phase Correction Network.

Modulate signal generator using an external audio oscillator.

Set the audio frequency to 300 c.p.s. and adjust deviation to 5 Kc/s and input to receiver to 5uV.

Adjust receiver volume control to give 1.8 volts across the voice coil (1 watt).

Change audio frequency to 1,000 c.p.s. The output level should drop 10.5 db \pm 3 db.

Re-adjust volume control for 1.8 volts across voice coil.

Change audio frequency to 3000 c.p.s.

The output level should drop 9.5 db \pm 3 db.

6.1.14 Squelch or Muting

Re-adjust the signal generator input to the receiver to 0.5 uV.

Switch off the carrier.

Adjust the squelch control just past the point at which the receiver is muted.

Switch on the carrier, check deviation of 5 Kc/s at 1000 c.p.s. Receiver should open and 1000 c.p.s. note be audible.

Advance squelch control to full anti-clockwise position. Check input required to open receiver. This should not exceed 2.5 uV.

6.2 Transmitter

6.2.1 Test Equipment

Suitable types of test equipment are listed below but any test equipment having similar characteristics may be used.

- (1) Meter 100 uA F.S.D. 3000 ohms with suitable test clips for connecting to metering points or alternatively a 6 position switch may be used in association with the meter and a number of clip leads to select the various points.
- (2) Model 8 AVO meter.
- (3) R.F. Power Meter.
75 ohm Marconi TF1020A, Bird 50 ohm Termaline etc.
- (4) Modulation Monitor.
AWA Type IFA51931, Lampkin etc.
- (5) Audio Frequency Generator.
Philips Type GM2307.
- (6) Noise and Distortion Meter (if tests required)
AWA Type A51932 or Type 1A56068.
- (7) Audio Millivoltmeter.
Philips GM6005 or similar.
Alternatively, Resistance divider, calibrated, and less sensitive VTVM.

6.2.2 Alignment

- (1) Plug in correct crystal and connect R.F. power meter to the antenna socket with a short coaxial cable. Connect battery cable to the connector on the equipment and to the battery terminals, observing correct polarity. Connect microphone to socket. Switch the equipment on.

Connect a meter to the junction of 3C5, 3C7, 3MR2 and 3R6. Peak 3L2 for maximum (approx. 20uA)

- (2) Connect the meter to 4M1 and meter the grid current of the first tripler 4V1A. Tune the secondary of 4T1 (top core) until a deflection is noted on the meter. Tune for maximum grid current. Retrim the phase modulator coil 3L2 for maximum grid current. Return to the primary and secondary tuning adjustments and trim for maximum current.
- (3) Connect the meter to 4M2 and meter the grid current of the second tripler 4V1B. Tune the secondary of 4T2 (top core) until a deflection is noted on the meter. Tune for maximum and then tune the primary of 4T2 (bottom core) for maximum meter deflection. Retrim both primary and secondary to give maximum grid current.
- (4) Connect the meter to 4M3 and meter the grid current of the first doubler. Tune the secondary of 4T3 (top core) until a deflection is noted on the meter. Tune for maximum and then tune the primary of 4T3 (bottom core) for maximum meter deflection. Retrim both primary and secondary to give maximum grid current.
- (5) Connect the meter to 4M4 and meter the grid current of the second doubler. Tune the anode circuit of the first doubler 4L1 for maximum indication on the meter. This is a single tuned circuit and only one core has to be adjusted.
- (6) The anode circuit of the second doubler is adjusted roughly by leaving the meter connected to 4M4. The anode tuning capacitor 4C23, is rotated through resonance and the grid current meter will give a distinct kick downward. Tune carefully for minimum grid current.
- (7) Connect the meter to 4M5 and 4M6 (observing correct polarity) and meter the grid current of the final P.A. 4V3. Tune the grid condenser 4C29 for maximum grid current. (Make sure 4C25 is set at minimum capacity, i.e. completely unmeshed.) The grid current may not be the maximum obtainable, but immediately proceed with adjustment (8) to prevent overloading of the amplifier valve.
- (8) Connect the meter to 4M7 and tune the anode circuit capacitor 4C38 for maximum obtainable power output.

- (9) Reconnect the meter to 4M5 and 4M6 and adjust capacitor 4C25 and 4C29, alternately peaking with each one. After several adjustments of 4C25 - 4C29 recheck 4C23 and repeat. Tune 4C38 and adjust the coupling to 4L11 for maximum power output consistent with maximum grid drive.

The following table gives approximate figures for the various meter readings and may be taken as typical.

<u>Metering Position</u>	<u>Typical Readings</u>	
	<u>'A' Band</u>	<u>'C' Band</u>
4M1 Grid first tripler	30 uA	40 uA
4M2 Grid second tripler	70 uA	80 uA
4M3 Grid first doubler	55 uA	45 uA
4M4 Grid second doubler	45 uA	45 uA
4M5-4M6 Grid final P.A.	20 uA	55 uA
4M7 Cathode final P.A.	40 uA	40 uA
Power Output, Nominal	25 watts.	

6.2.3 Modulation Measurements

(1) Initial Setting Up

For these checks the output of an audio oscillator is connected to the appropriate pins of the microphone input socket. It is necessary to use a single shielded lead for this connection and to make the appropriate connections it is preferable to terminate the shielded lead with a 5 pin microphone plug. This will also enable the P.T.T. connections to be brought out for ease of switching the transmitter on and off. With an audio oscillator having a 600 ohm output, a voltage divider of 600 ohms plus 6 ohms will provide approximately the required output when the output of the oscillator is variable between .2 and 5 volts.

The modulation monitor should be provided with a coaxial input lead with a 1 or 2 turn pick up loop. The pick up loop may be coupled to the P.A. tank circuit, or, if the P.A. is not in operation, to the driver tank circuit 4L2/4C23. The output of the monitor should be displayed on a C.R.O. and if desired, connected also to a distortion and noise meter. If a distortion and noise meter is not used, an audio voltmeter should be connected across the output of the monitor for

use in noise measurements. All modulation checks listed below are carried out with the R.F. section operating.

With the transmitter on, tune the monitor to correct frequency. Adjust input level and set for phase modulation.

(2) Setting of Maximum Deviation.

With audio oscillator set to 1000 c.p.s. adjust input level to 50 mV and adjust deviation to 5 Kc/s by means of potentiometer 1R1.

(3) Sensitivity

Reduce 1000 c.p.s. input from audio oscillator from 50 mV to give 3 Kc/s deviation and check level which should be less than 10 mV.

(4) Distortion

Under the conditions of step (3) above, check that C.R.O. display is smooth and approximately of sine wave form, or that distortion and noise is less than 5%.

(5) Noise

Increase 1000 c.p.s. input from audio oscillator to give 5 Kc/s deviation. Feed audio output from the modulation monitor into the noise and distortion meter. Calibrate for 100% then remove deviation and check that the noise is at least 40 db down.

(6) Frequency Response

With 5.0 mV A.F. input the deviation at 3000 c.p.s. should not exceed 5 Kc/s. Also the deviation at 6000 c.p.s. should not exceed 1.5 Kc/s.

(7) Resetting of Maximum Deviation

With audio oscillator set to 1000 c.p.s. adjust input level to 50 mV and re-adjust deviation to 5 Kc/s by means of potentiometer 1R1.

TYPE FM1677 VHF RADIOTELEPHONE EQUIPMENT7 VOLTAGE ANALYSIS7.1 ReceiverINSTRUMENTS USEDFor the DC Voltage Analysis

Philips Multimeter Type P817.00 (40000 ohm/V is used on 3V and 12V ranges.

For the AC Voltage Analysis (Audio and Muting Card Levels etc.)

Philips Type GM6009 (or GM6000) V.T.V.M. is used for 2nd Oscillator and 2nd Mixer base and Philips Type GM6012 Millivoltmeter for audio and muting card levels.

7.1.1 DC VOLTAGE ANALYSIS (Input at Battery plug 13.8)

Voltages taken with respect to positive bus line (within approximately 10%).

<u>RF Unit</u>	<u>Emitter</u>	<u>Base</u>	<u>Collector</u>
6TS1 Osc.	2.0	2.1	11.1
6TS2 RF	5.7	6.0	11.3
6TS3 Harm. Amp.	0.2 Volts when aligned	0	10.9
6TS4 1 Mix	1.5	1.6	11.3
7TS1 1st IF	1.6	1.8	10.7
7TS2 2nd Mix.	1.8	2.0	10.9
7TS3 2nd Osc.	1.6	1.9	10.1
<u>2nd IF Card</u>			
8TS1	4.0	4.2	8.7
8TS2	2.6	2.8	6.5
8TS3	2.4	2.6	6.8
8TS4	2.7	2.9	7.7
8TS5	2.9	3.1	10.1
<u>Audio Card</u>			
9TS1	0.75	0.8	7.6
9TS2	2.15	2.1	7.7
9TS3	1.5	1.6	9.3
<u>Output Stage</u>			
1TS1		0.1	13.8
1TS2		0.1	13.8
<u>Muting Card</u>			
12TS1	2.55	2.6	8.5
12TS2	1.8	1.9	11.2

<u>Muting Card</u>	<u>Emitter</u>	<u>Base</u>	<u>Collector</u>
12TS3	1.2	1.2	11.3
	decreased to 0.95 - increases to 3.8 when mute control fully anti-clockwise.		
12TS4(OC202)	0	-0.6V	
	when mute control fully clockwise		
		+1.4V	
	when mute control fully anti-clockwise.		

* NOTE The above applies when mute feathering action is correct and sharply defined mute. Poorly defined muting point will be due to substantially reduced positive voltage, from reduced gain fault in earlier stages.

	<u>Emitter</u>	<u>Base</u>	<u>Collector</u>
11TS2	2.0	2.2	10.4
11TS1	11.3	10.8 - 11.0	12.1

Across 11MR1 OAZ201 5.1 Volts
Across 11MR2 OAZ202 5.8 - 6.0 Volts.

7.1.2. RF VOLTAGE

2nd Oscillator and Mixer base injection (measured with GM6009 with respect to positive bus line.)

At Collector of 7TS3	3.0V AC
At base of 7TS2	0.18V AC

7.1.3 AC VOLTAGE ANALYSIS

Input 1 uV at Signal Frequency, 15 Kc/s deviation at 1000 c/s for audio stage levels.

Audio Levels (measured with GM6012 Millivoltmeter)

	<u>1W</u>	<u>3W</u>
For Output from Discriminator to input of Audio Card.	40mV	70mV
At base of 9TS1	36mV	69mV
At collector of 9TS1	15mV	29mV
At base of 9TS2	15mV	29mV
At collector of 9TS2	16.5mV	36mV
At base of 9TS3	16.5mV	36mV
At collector of 9TS3	1.8mV	3.5mV
At collectors 1TS1, 1TS2	3.9V	7.4V

COMPONENTS PARTS LIST - TYPE FM1677A and C MOBILE - UI

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
C426AM/F25	1C1	25uf Electrolytic	1	Philips	25V +50% -10%
CZ097.022	1C2	200pf Ceramic Disc	1	Ducon	Style F Curve Y 'C' Band only
C004.AA/6E	1C3	6.8pf Variable Trimmer	1	Philips	Ceramic
CZ099.305	1C4	1uf Electrolytic	1	Ducon	Type E60 350VW
CZ097.507.AA	1C5	7500pf Ceramic Disc	1	Ducon	GMV CDS Style C Curve Z
B1.664.27	1C6	195pf Ceramic Tubular	1	Ducon	70V AC ± 2%
CZ097.507.AA	1C7	7500pf Ceramic Disc	1	Ducon	GMV CDS Style C Curve Z
B1.664.27	1C8	195pf Ceramic Tubular	1	Ducon	70V AC ± 2%
CZ097.907	1C9	0.1uf Ceramic Disc	1	Ducon	Style C Red Cap -20% +10%
CZ097.507.AA	1C10	7500pf Ceramic Disc	1	Ducon	GMV CDS Style C Curve Z
C296.AA/A150K	1C11	0.15uf Polyester	1	Philips	125V 10%
CZ097.507.AA	1C12	7500pf Ceramic Disc	1	Ducon	GMV CDS Style C Curve Z
C296.AA/A150K	1C13	0.15uf Polyester	1	Philips	125V 10%
C426AM/F6.4	1C14	6.4uf Electrolytic	1	Philips	25VW Insulated Type A
C426AM/F6.4	1C15	6.4uf Electrolytic	1	Philips	25VW Insulated Type A
C426AM/E100	1C16	100uf Electrolytic	1	Philips	16VW Insulated +50% -10%
CZ097.906	1C17	0.047pf Ceramic Disc	1	Ducon	25VW Red Cap +80% -20%
CZ097.102.AD	1C18	1000pf Ceramic Tubular	1	U.C.C.	Type HiK CTH 310 GMV
CZ097.910	1C19	0.27uf Ceramic Disc	1	Ducon	Type CDR Style E
CZ097.102.AD	1C20	1000pf Ceramic Tubular	1	U.C.C.	Type HiK CTH 310 GMV
C426AM/F25	1C21	25uf Electrolytic	1	Philips	25V +50% -10%
<u>INDUCTORS</u>					
3502.193.0001.0	1L1	Choke	1	TCA	
3502.150.0141.1	1L2	Coil Netting	1	TCA	SP2708
<u>RESISTORS</u>					
CZ029.088E	1R1	5K ohms Carbon Potentiometer	1	IRC	Type EC Tab mounted Linear ± 20%
B8.305.05B/120E	1R2	120 ohms $\frac{1}{4}$ watt Carbon	1	Philips	5%
B8.305.05B/470E	1R3	470 ohms $\frac{1}{4}$ watt Carbon	1	Philips	5%
B8.305.05B/100E	1R4	100 ohms $\frac{1}{4}$ watt Carbon	1	Philips	5%
CZ034.080	1R5	25K ohms Carbon Potentiometer	1	Ducon	P.S.U. Curve A Dims A = $\frac{3}{8}$, B = $\frac{3}{4}$, E = 5/16, F = 7/32.

CODE NO	POS.	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>RESISTORS cont.</u>					
CZ034.079	1R6	25K ohms Carbon Potentiometer	1	Ducon	P.S.U. Curve C. Dims A = $\frac{3}{8}$ B = $\frac{3}{4}$, E = 5/16, F = 7/32
B8.305.05B/470E	1R7	470 ohms $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.320.01A/4E	1R8	4 ohms 1 W N.T.C. Disc	1	Philips	10%
B8.305.05B/1K	1R9	1K ohms $\frac{1}{4}$ W Carbon	1	Philips	5%
CZ008.539	1R10	0.68 ohms 2W W.W.	1	Ducon	Type 2WL Vitreous Enamelled 10%
B8.305.05B/1K	1R11	1K ohms $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/680E	1R12	680 ohms $\frac{1}{4}$ W Carbon	1	Philips	5%
<u>SEMI-CONDUCTORS</u>					
	1TS1	ASZ16 Transistor	1	Philips	
	1TS2	ASZ16 Transistor	1	Philips	
<u>TRANSFORMERS</u>					
3502.183.00070	1T1	1st IF Transformer	1	TCA	Type JDR22.1 Lead lengths
CZ345.078	1T2	Driver Transformer	1	Rola	2". No Impregnation.
3502.175.00060	1T3	Output Transformer	1	TCA	
<u>MISCELLANEOUS</u>					
CZ281.223	1F1	Fuse 12A	1	Philips	$1\frac{1}{4}$ " x $\frac{1}{4}$ "
3502.100.00122	1FL1	I.F. Filter Assembly	1	Philips	30 Kc/s
	1FX1	Ferroxcube Bead GRD 3C1	1	Philips	Length 9mm, OD 4mm, 1D 2mm
	1FX2	Ferroxcube Bead GRD 3C1	1	Philips	Length 9mm, OD 4mm, 1D 2mm
	1FX3	Ferroxcube Bead GRD 3C1	1	Philips	Length 9mm, OD 4mm, 1D 2mm
CZ161.007	1LS1	Loudspeaker	1	Rola	4F Core F97
	1P1	Microphone Plug	1	Zephyr	Part of Microphone Assy. 1677/ M10620.1
CZ365.434	1P2	Battery Connector (Male)	1	Elco	
CZ365.017	1P3	Coaxial Connector	1	Belling Lee	
NE50962	1RL1	Transmit/Receive Relay	1	Haller	
CZ370.513	1S1	Microphone Socket	1	McMurdo	Type 5QMS/C
3502.130.00710	1S2	Battery Connector (Female)	1	TCA	Assy includes cables

COMPONENTS PARTS LIST - TYPE FM1677A and C MOBILE - U1

CODE NO	POS	DESCRIPTION	NO.OFF	SUPPLIER	REMARKS
<u>MISCELLANEOUS cont.</u>					
CZ369.909	1S3	Coaxial Socket	1	Belling Lee	Type L604S
3502.150.00200	1SW1	Switch assembly	1		SPL.SP.1080
	1X1	Crystal Transmitter		Pye	Order crystal for allocated frequency to specification 3502.15.00094.1 A Band or 3502.15.00125.0 C Band.

COMPONENTS PARTS LIST - U2 MODULATOR AMPLIFIER CARD

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
C426AM/F6.4	2C1	6.4uf Electrolytic	1	Philips	25VW Insulated
C426AM/B25	2C2	25uf Electrolytic	1	Philips	4VW Insulated
CZ090.010	2C3	0.0047uf Tubular Stryoseal	1	Ducon	Type DFB 50V 10%
CZ097.115.AA	2C4	1000pf Ceramic Disc	1	Philips	Type DS HiK GMV Style A
C426AS/G1	2C5	1.0uf Electrolytic	1	Philips	40VW Insulated Midget +100 -10%
C426AM/B25	2C6	25uf Electrolytic	1	Philips	4VW Insulated
C426AS/G1	2C7	1.0uf Electrolytic	1	Philips	40VW Insulated Midget +100 -10%
CZ074.400.EH	2C8	0.01uf Paper Tubular	1	AEE	Type W99, Size A 20% 200V
C426AM/B25	2C9	25uf Electrolytic	1	Philips	4VW Insulated
<u>RESISTORS</u>					
B8.305.05B/8K2	2R1	8.2K ohm	1	Philips	5%
B8.305.05B/1K	2R2	1K ohm	1	Philips	5%
B8.305.05B/2K2	2R3	2.2K ohm	1	Philips	5%
B8.305.05B/39E	2R4	39 ohm	1	Philips	5%
B8.305.05B/560E	2R5	560 ohm	1	Philips	5%
B8.305.05B/12K	2R6	12K ohm	1	Philips	5%
B8.305.05B/15K	2R6	15K ohm	1	Philips	5%
B8.305.05B/3K9	2R7	3.9K ohm	1	Philips	5%
B8.305.05B/4.7K	2R8	4.7K ohm	1	Philips	5%
B8.305.05B/56E	2R9	56 ohm	1	Philips	5%
B8.305.05B/2.2K	2R10	2.2K ohm	1	Philips	5%
B8.305.05B/18K	2R11	18K ohm	1	Philips	5%
B8.305.05B/10K	2R11	10K ohm	1	Philips	5%
B8.305.05B/27K	2R12	27K ohm	1	Philips	5%
B8.305.05B/15K	2R12	15K ohm	1	Philips	5%
B8.305.05B/15K	2R13	15K ohm	1	Philips	5%
B8.305.05B/2.7K	2R14	2.7K ohm	1	Philips	5%
B8.305.05B/1K5	2R15	1.5K ohm	1	Philips	5%

COMPONENTS PARTS LIST - U2 MODULATOR AMPLIFIER CARD

CODE NO	POS	DESCRIPTION	NO.OFF	SUPPLIER	REMARKS
<u>SEMI-CONDUCTORS</u>					
SP304.024	2MR1	0A202 Silicon Diode	1	Philips	
SP304.024	2MR2	0A202 Silicon Diode	1	Philips	
SP291.125.00	2TS1	AC125 Transistor	1	Philips	
SP291.125.00	2TS2	AC125 Transistor	1	Philips	
SP291.125.00	2TS3	AC125 Transistor	1	Philips	

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
CZ097.509	3C1	4300pf Ceramic Disc	1	Simplex	Type CDS HiK Style B GMV
CZ097.528.AA	3C2	2200pf Ceramic Disc	1	Simplex	Type CDS HiK Style A GMV
CZ096.559	3C3	25pf Ceramic Disc	1	Ducon	Type CDS NPO Size B \pm 1 pf
CZ096.500.AA	3C4	100pf Ceramic Disc	1	Simplex	DSNK N750 Style C \pm 5%
C426AM/F6.4	3C5	6.4uf Electrolytic	1	Philips	Insulated
CZ096.101.1AA	3C6	10pf Ceramic Disc	1	Simplex	NPO Style A 5%
CZ096.509	3C7	4300pf Ceramic Disc	1	Simplex	Type CDS HiK Style B GMV
CZ096.534.1AA	3C8	33pf Ceramic Disc	1	Simplex	NPO Style C 5%
CZ066.135.8AA	3C9	330pf Mica	1	Simplex	Type MS 5%
CZ097.509	3C10	4300pf Ceramic Disc	1	Simplex	Type CDS HiK Style B GMV
CZ097.025	3C11	0.001uf Ceramic Disc	1	Ducon	Style A Curve Y 10% 'C' Band only
<u>INDUCTORS</u>					
3502.183.00180	3L1	1.4mH RF Choke	1	TCA	
3502.183.00080	3L2	Phase Modulator Coil	1	TCA	'A' Band only
3502.183.00250	3L2	Phase Modulator Coil	1	TCA	'C' Band only
<u>RESISTORS</u>					
B8.305.05B/22K	3R1	22K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/3.3K	3R2	3.3K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/5K6	3R3	5.6K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/2K7	3R4	2.7K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/220K	3R5	220K ohm $\frac{1}{4}$ W Carbon	1	Philips	5% 'A' Band only
B8.305.05B/100K	3R5	100K ohm $\frac{1}{4}$ W Carbon	1	Philips	5% 'C' Band only
B8.305.05B/5K6	3R6	5.6K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/6K8	3R7	6.8K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/3K3	3R8	3.3K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
B8.305.05B/2K7	3R9	2.7K ohm $\frac{1}{4}$ W Carbon	1	Philips	5%
<u>SEMI-CONDUCTORS</u>					
SP304.024	3MR1	OA90 Germanium Diode	1	Philips	
	3MR2	OA202 Silicon Diode	1	Philips	
	3TS1	AF115 Transistor	1	Philips	
	3TS2	AF115 Transistor	1	Philips	

COMPONENTS PARTS LIST - U4 TRIPLER DOUBLER, P.A. STAGES

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
CZ096.542.AA	4C1	27pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'A' Band only.
CZ096.567	4C1	43pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'C' Band only.
CZ097.126.AA	4C2	330pf Ceramic Disc	1	Simplex	Type CDS HiK Style A + 20% CTH 310
CZ097.524.AD	4C3	2200pf Ceramic Tubular	1	UCC	Type DS NK NPO Style C 5% 'A' Band only.
CZ096.522.AA	4C4	22pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'A' Band only.
CZ096.533.AA	4C4	39pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'C' Band only.
CZ097.524.AD	4C5	2200pf Ceramic Tubular	1	UCC	CTH 310
CZ097.524.AD	4C6	2200pf Ceramic Tubular	1	UCC	CTH 310
CZ096.522.AA	4C7	22pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'A' Band only.
CZ096.101.1AA	4C7	10pf Ceramic Disc	1	Simplex	Type DS NK NPO Style A 5% 'C' Band only.
CZ096.726.AD	4C8	100pf Ceramic Bead	1	UCC	SPGI
CZ097.524.AD	4C9	2200pf Ceramic Tubular	1	UCC	CTH 310
CZ096.522.AA	4C10	22pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'A' Band only.
CZ096.101.1AA	4C10	10pf Ceramic Disc	1	Simplex	Type DS NK NPO Style A 5% 'C' Band only.
CZ097.524.AD	4C11	2200pf Ceramic Tubular	1	UCC	CTH 310
CZ096.522.AA	4C12	22pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'A' Band only.
CZ096.101.1AA	4C12	10pf Ceramic Disc	1	Simplex	Type DS NK NPO Style A 5% 'C' Band only.
CZ096.726.AD	4C13	100pf Ceramic Bead	1	UCC	SPGI
CZ097.102.AD	4C14	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ096.522.AA	4C15	22pf Ceramic Disc	1	Simplex	Type DS NK NPO Style C 5% 'A' Band only.
CZ096.101.1AA	4C15	10pf Ceramic Disc	1	Simplex	Type DS NK NPO Style A 5% 'C' Band only.

COMPONENTS PARTS LIST - U4 TRIPLER DOUBLER, P.A. STAGES

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS cont.</u>					
CZ097.524.AD	4C16	2200pf Ceramic Tubular	1	UCC	CTH 310
CZ097.102.AD	4C17	1000pf Ceramic Tubular	1	UCC	CTH 310 'A' Band only
CZ096.726.AD	4C17	100pf Ceramic Bead	1	UCC	CTH 310 'C' Band only
CZ097.102.AD	4C18	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ096.530.AA	4C19	12pf Ceramic Disc	1	Simplex	DS NK NPO Style B ± 1pf
CZ096.538.1AA	4C20	47pf Ceramic Disc	1	Simplex	DS NK N750 Style B 5%
CZ097.128.AD	4C21	220pf Ceramic Bead	1	UCC	SPGL 'A' Band only
CZ096.726.AD	4C21	100pf Ceramic Bead	1	UCC	SPGL 'C' Band only
CZ097.524.AD	4C22	2200pf Ceramic Tubular	1	UCC	CTH 310
XU.051.43	4C23	10pf Variable Trimmer	1	Philips	Locking
CZ097.102.AD	4C24	1000pf Ceramic Tubular	1	UCC	CTH 310 'A' Band only
CZ096.726.AD	4C24	100pf Ceramic Bead	1	UCC	SPGL 'C' Band only
XU.051.43	4C25	10pf Variable Trimmer	1	Philips	Locking
CZ097.102.AD	4C26	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ097.102.AD	4C27	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ097.102.AD	4C28	1000pf Ceramic Tubular	1	UCC	CTH 310
XU.051.56	4C29	6.4pf Variable Butterfly	1	Philips	Locking
CZ096.726.AD	4C30	100pf Ceramic Bead	1	UCC	SPGL
CZ097.128.AD	4C31	220pf Ceramic Bead	1	UCC	SPGL 'A' Band only
CZ096.726.AD	4C31	100pf Ceramic Bead	1	UCC	SPGL 'C' Band only
CZ097.102.AD	4C32	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ097.102.AD	4C33	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ097.102.AD	4C34	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ097.547	4C35	2200pf Ceramic Feed-thru	1	Simplex	Type CAC 100 HiK GMV
CZ097.102.AD	4C36	1000pf Ceramic Tubular	1	UCC	CTH 310
CZ097.102.AD	4C37	1000pf Ceramic Tubular	1	UCC	CTH 310
CR904.182	4C38	15 x 15pf Variable Butterfly	1	Eddystone	SPZ 3495 'A' Band only
CR904.181	4C38	8 x 8pf Variable Butterfly	1	Eddystone	SPZ 3495 'C' Band only
CZ097.128.AD	4C39	220pf Ceramic Bead	1	UCC	SPGL 'A' Band only
CZ096.726.AD	4C39	100pf Ceramic Bead	1	UCC	SPGL 'C' Band only
CZ096.726.AD	4C40	100pf Ceramic Bead	1	UCC	SPGL
CZ096.726.AD	4C41	100pf Ceramic Bead	1	UCC	SPGL
C302.AM/M12E	4C42	12pf Ceramic Tubular	1	Philips	NVW 12pf ± 1pf 'A' Band only

CODE NO	POS	DESCRIPTION	NO.OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u> cont.					
C005AA/25E	4C42	0-25pf Concentric Air Trimmer	1	Philips	Insulated
C302.AC/C47E	4C43	47pf Ceramic Tubular	1	Philips	± 2% 'A' Band only
C302.AB/M22E	4C43	22pf Ceramic Tubular	1	Philips	± 1pf 'C' Band only
CZ090.603.1	4C44	3300pf Styroseal Tubular	1	Ducon	1000VW DFB 1018 ± 20%
CZ096.725.AD	4C45	100pf Ceramic Disc	1	Ducon	Type CDS Style F Curve Y ± 20%
C302.AC/C47E	4C46	47pf Ceramic Tubular	1	Philips	± 2% 'A' Band only
C302.AB/M18E	4C46	18pf Ceramic Tubular	1	Philips	± 1pf 'C' Band only
C305.CB/M15E	4C47	15pf Ceramic Tubular	1	Philips	± 1pf 'A' Band only
<u>INDUCTORS</u>					
3502.183.0012.0	4L1	RF Coupling Coil	1	TCA	'A' Band only
3502.183.0022.0	4L1	RF Coupling Coil	1	TCA	'C' Band only
3502.180.0005.0	4L2	Plate Coil	1	TCA	'A' Band only
3502.180.0024.0	4L2	Plate Coil	1	TCA	'C' Band only
3502.183.0013.0	4L3	RF Choke	1	TCA	'A' Band only
3502.183.0006.0	4L3	RF Choke	1	TCA	'C' Band only
3502.180.0009.0	4L4	Coupling Link	1	TCA	'A' Band only
3502.180.0023.0	4L4	Coupling Link	1	TCA	'C' Band only
3502.180.0010.0	4L5	Coupling Link	1	TCA	'A' Band only
3502.180.0022.0	4L5	Coupling Link	1	TCA	'C' Band only
3502.180.0006.0	4L6	Grid Coil	1	TCA	'A' Band only
3502.180.0021.0	4L6	Grid Coil	1	TCA	'C' Band only
3502.183.0014.0	4L7	RF Choke	1	TCA	'A' Band only
3502.183.0006.0	4L7	RF Choke	1	TCA	'C' Band only
3502.183.0014.0	4L8	RF Choke	1	TCA	'A' Band only
3502.183.0008.0	4L8	RF Choke	1	TCA	'C' Band only
3502.183.0013.0	4L9	RF Choke	1	TCA	'A' Band only
3502.183.0006.0	4L9	RF Choke	1	TCA	'C' Band only
3502.180.0007.0	4L10	Plate Coil	1	TCA	'A' Band only
3502.180.0020.0	4L10	Plate Coil	1	TCA	'C' Band only
3502.180.0008.0	4L11	Loading Coil	1	TCA	'A' Band only
3502.180.0026.0	4L11	Loading Coil	1	TCA	'C' Band only
3502.180.0028.0	4L12	Coil	1	TCA	'A' Band only
3502.180.0027.0	4L12	Coil	1	TCA	'C' Band only

CODE NO	POS	DESCRIPTION	NO.OFF	SUPPLIER	REMARKS
<u>INDUCTORS cont.</u>					
3502.180.00280	4L13	Coil	1	TCA	'A' Band only
3502.180.00270	4L13	Coil	1	TCA	'C' Band only
<u>RESISTORS</u>					
B8.305.05B/220K	4R1	220K ohms	1	Philips	5%
B8.305.05B/15K	4R2	15K ohms	1	Philips	5%
B8.305.05B/220E	4R3	220 ohms	1	Philips	5%
B8.305.05B/1K	4R4	1K ohms	1	Philips	5%
B8.305.05B/100K	4R5	100K ohms	1	Philips	5% 'A' Band only
B8.305.05B/220K	4R5	220K ohms	1	Philips	5% 'C' Band only
B8.305.05B/680E	4R6	680 ohms	1	Philips	5% 'A' Band only
B8.305.05B/3K3	4R6	3.3K ohms	1	Philips	5% 'C' Band only
B8.305.05B/220E	4R7	220 ohms	1	Philips	5%
B8.305.05B/1K	4R8	1K ohms	1	Philips	5%
B8.305.05B/100K	4R9	100K ohms	1	Philips	5% 'A' Band only
B8.305.05B/220K	4R9	220K ohms	1	Philips	5% 'C' Band only
B8.305.05B/470E	4R10	470 ohms	1	Philips	5% 'A' Band only
B8.305.05B/2K2	4R10	2.2K ohms	1	Philips	5% 'C' Band only
B8.305.06B/100K	4R11	100K ohms	1	Philips	5% 'A' Band only
B8.305.06B/33K	4R11	33K ohms	1	Philips	5% 'C' Band only
B8.305.05B/82K	4R12	82K ohms	1	Philips	5% 'A' Band only
B8.305.05B/47K	4R12	47K ohms	1	Philips	5% 'C' Band only
B8.305.05B/150E	4R13	150 ohms	1	Philips	5%
B8.305.06B/4K7	4R14	4.7K ohms	1	Philips	5% 'A' Band only
B8.305.06B/1K8	4R14	1.8K ohms	1	Philips	5% 'C' Band only
B8.305.05B/470E	4R15	470 ohms	1	Philips	5%
B8.305.06B/4K7	4R16	4.7K ohms	1	Philips	5% 'A' Band only
B8.305.06B/1K8	4R16	1.8K ohms	1	Philips	5% 'C' Band only
B8.305.06B/10K	4R17	10K ohms	1	Philips	5%
B8.305.05B/68E	4R18	68 ohms	1	Philips	5%
B8.305.05B/22E	4R19	22 ohms	1	Philips	5% 'A' Band only
B8.305.05B/22E	4R20	22 ohms	1	Philips	5%

CODE NO	POS	DESCRIPTION	NO.OFF	SUPPLIER	REMARKS
<u>RESISTORS cont.</u>					
B8,305.05B/22E	4R21	22 ohms $\frac{1}{4}$ watt Carbon	1	Philips	5%
B8,305.05B/22K	4R22	22K ohms $\frac{1}{4}$ watt Carbon	1	Philips	5%
B8,305.06B/4K7	4R23	4.7K ohms $\frac{1}{2}$ watt Carbon	1	Philips	5%
<u>TRANSFORMERS</u>					
3502.183.00090	4T1	Coupling Transformer	1	TCA	'A' Band only
3502.183.00240	4T1	Coupling Transformer	1	TCA	'C' Band only
3502.183.00100	4T2	Coupling Transformer	1	TCA	'A' Band only
3502.183.00230	4T2	Coupling Transformer	1	TCA	'C' Band only
3502.183.00110	4T3	Coupling Transformer	1	TCA	'A' Band only
3502.183.00210	4T3	Coupling Transformer	1	TCA	'C' Band only
<u>VALVES</u>					
SP201.068	4V1	12AT7 Valve	1	Philips	
SP250.200	4V2	QQE02/5 Valve	1	Philips	
SP250.210	4V3	QQE03/20 Valve	1	Philips	

COMPONENTS PARTS LIST - U5 AUDIO FILTER

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
C426AM/E10	5C1	10uf Electrolytic	1	Philips	16VW Insulated
C297AA/C33K	5C2	33000pf Polystyrene	1	Philips	
C295AA/C6K8	5C3	6800pf Polystyrene	1	Philips	125 V.D.C.W.
C297AA/C33	5C4	33000pf Polystyrene	1	Philips	
<u>INDUCTORS</u>					
3502.193.00261	5L1	70 mH Choke	1	TCA	
<u>RESISTORS</u>					
B8.305.05B/1K2	5R1	1.2K ohms $\frac{1}{4}$ watt Carbon	1	Philips	5%
B8.305.05B/1K2	5R2	1.2K ohms $\frac{1}{4}$ watt Carbon	1	Philips	5%

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
CZ097.025	6C1	1000pf Ceramic Disc	1	Ducon	HiK Style A, Curve Y 'A' Band only.
CZ096.538	6C1	47pf Ceramic Disc	1	Ducon	CDS Style C 5% 'C' Band only
CZ097.546	6C2	4700pf Ceramic Disc	1	Ducon	GMV CDS Style B Curve Z
CZ096.206	6C3	6.8pf Ceramic Disc	1	Ducon	CDS Style A P33 ± 10%
C004AA/6E	6C4	7pf Ceramic Trimmer	1	Philips	
C309BB/R820E	6C5	820pf Ceramic Lead Through	1	Philips	
C004AA/6E	6C6	7pf Ceramic Trimmer	1	Philips	
C004AA/6E	6C7	7pf Ceramic Trimmer	1	Philips	
C309BB/R820E	6C8	820pf Ceramic Lead Through	1	Philips	
CZ096.218	6C9	4.7pf Ceramic Bead	1	Ducon	Type CBT NPO ± 5pf
C004AA/6E	6C10	Wire Condenser	1	TCA	
C004AA/6E	6C11	7pf Ceramic Trimmer	1	Philips	
C004AA/6E	6C12	Wire Condenser	1	TCA	
CZ097.135	6C13	7pf Ceramic Trimmer	1	Philips	
CZ097.509	6C14	1000pf Ceramic Lead Through	1	Ducon	Type CAC 100 'A' Band only
CZ097.509	6C14	4300pf Ceramic Disc	1	Ducon	GMV CDS Style B Curve Z
C004AA/6E	6C15	7pf Ceramic Trimmer	1	Philips	'C' Band only
CZ097.546	6C16	4700pf Ceramic Disc	1	Ducon	GMV CDS Style B Curve Z
CZ097.558	6C17	.01uf Ceramic Disc	1	Ducon	25V Red Cap Style A
CZ097.558	6C18	Wire Condenser	1	TCA	'A' Band only
<u>INDUCTORS</u>					
3502.183.0041.1	6L1/L2	Aerial Coil	1	TCA	'A' Band only
3502.180.0016.0	6L1	Oscillator Coil	1	TCA	'C' Band only
3502.183.0042.2	6L2	R.F. Coil	1	TCA	'C' Band only
3502.183.0042.2	6L3	R.F. Coil	1	TCA	'A' Band only
3502.180.0017.1	6L3	R.F. Coil	1	TCA	'C' Band only
3502.180.0016.0	6L4	Oscillator Coil	1	TCA	'A' Band only
3502.180.0013.2	6L4/L5	Mixer Doubler Coil	1	TCA	'C' Band only
3502.180.0017.1	6L5	R.F. Coil	1	TCA	'A' Band only
3502.180.0013.2	6L6/L7	Mixer Doubler Coil	1	TCA	'A' Band only

COMPONENTS PARTS LIST - U6 R.F. UNIT

CODE NO	POS	DESCRIPTION	NO.OFF	SUPPLIER	REMARKS
<u>RESISTORS</u>					
B8.305.05B/1K8	6R1	1.8K ohms	1	Philips	5%
B8.305.05B/10K	6R2	10K ohms	1	Philips	5%
B8.305.05B/2K2	6R3	2.2K ohms	1	Philips	5%
B8.305.05B/3K3	6R4	3.3K ohms	1	Philips	5%
B8.305.05B/1K	6R5	1K ohms	1	Philips	'A' Band only
B8.305.05B/820E	6R5	820 ohms	1	Philips	'C' Band only
B8.305.05B/1K	6R6	1K ohms	1	Philips	5%
B8.305.05B/220E	6R7	220 ohms	1	Philips	5%
B8.305.05B/1K2	6R8	1.2K ohms	1	Philips	5%
B8.305.05B/3K9	6R9	3.9K ohms	1	Philips	5%
B8.305.05B/22K	6R10	22K ohms	1	Philips	5%
B8.305.05B/220E	6R11	220 ohms	1	Philips	5%
B8.305.05B/100E	6R12	100 ohms	1	Philips	'C' Band only
<u>SEMI-CONDUCTORS</u>					
SP300.008	6MR1	AAZ15 Germanium Diode	1	Philips	'A' Band only
SP291.214	6TS1	AF114 Germanium Transistor	1	Philips	
SP305.021	6TS2	AFZ12 Germanium Transistor	1	Philips	
SP291.214	6TS3	AF114 Germanium Transistor	1	Philips	'A' Band only
SP291.214	6TS4	AF114 Germanium Transistor	1	Philips	'C' Band only
	6TS4	AFZ12 Germanium Transistor	1	Philips	
<u>TRANSFORMERS</u>					
CZ321.995.2	6T1	Aerial Transformer	1	TCA	'C' Band only
<u>CRYSTALS</u>					
	6X1	Receiver Oscillator Crystal		Pye	Order crystal for allocated frequency to specification 3502.150.0096.1 'A' Band 3502.150.0095.1 'C' Band

COMPONENTS PARTS LIST - U7 1st I.F. CARD

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
CZ097.507.AA	7C1	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z
CZ097.507.AA	7C2	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z
CZ097.507.AA	7C3	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z
B1.664.27	7C4	195pf Ceramic Tubular	1	Philips	70 V.A.C. ± 2%
B1.664.27	7C5	195pf Ceramic Tubular	1	Philips	70 V.A.C. ± 2%
CZ097.507.AA	7C6	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z
CZ097.507.AA	7C7	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z
CZ097.507.AA	7C8	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z
CZ097.507.AA	7C9	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z
CZ096.206.AA	7C10	6.8pf Ceramic Disc	1	Ducon	CDS Style A P33 10%
CZ097.019	7C11	220pf Ceramic Disc	1	Ducon	CDS Style C N1500 10%
CZ107.522	7C12	1.5 - 10pf Air Trimmer	1	Wingrove & Rogers	Type 32 - 10
<u>INDUCTORS</u>					
3502.183.0018.0	7L1	R.F. Choke	1	TCA	
<u>RESISTORS</u>					
B8.305.05B/2K2	7R1	1/4 watt Carbon	1	Philips	5%
B8.305.05B/22K	7R2	1/4 watt Carbon	1	Philips	5%
B8.305.05B/4K7	7R3	1/4 watt Carbon	1	Philips	5%
B8.305.05B/2K2	7R4	1/4 watt Carbon	1	Philips	5%
B8.305.05B/470E	7R5	1/4 watt Carbon	1	Philips	5%
B8.305.05B/2K2	7R6	1/4 watt Carbon	1	Philips	5%
B8.305.05B/4K7	7R7	1/4 watt Carbon	1	Philips	5%
B8.305.05B/22K	7R8	1/4 watt Carbon	1	Philips	5%
B8.305.05B/3K3	7R9	1/4 watt Carbon	1	Philips	5%
B8.305.05B/18K	7R10	1/4 watt Carbon	1	Philips	5%
B8.305.05B/1K5	7R11	1/4 watt Carbon	1	Philips	5%
<u>SEMI-CONDUCTORS</u>					
SP291.215	7TS1	AF115 Germanium Transistor	1	Philips	
SP291.215	7TS2	AF115 Germanium Transistor	1	Philips	
SP291.215	7TS3	AF115 Germanium Transistor	1	Philips	

COMPONENTS PARTS LIST - U7 1st I.F. CARD

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
		<u>TRANSFORMERS</u>			
3502.183.0007.0	7T1	1st I.F. Transformer	1	TCA	

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
CZ097.507.AA	8C1	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
C426AM/E100	8C2	100uf Electrolytic	1	Philips	16VW Insulated
CZ097.507.AA	8C3	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
C296AA/A47K	8C4	47000pf Polyester	1	Philips	125V
CZ097.507.AA	8C5	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
CZ097.507.AA	8C6	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
C296AA/A150K	8C7	0.15uf Polyester	1	Philips	125V
C296AA/A47K	8C8	47000pf Polyester	1	Philips	125V
CZ097.507.AA	8C9	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
CZ097.507.AA	8C10	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
C296AA/A47K	8C11	47000pf Polyester	1	Philips	125V
CZ097.507.AA	8C12	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
CZ097.909	8C13	0.22uf Ceramic Disc	1	Ducon	Red Cap CDR 25VW
CZ097.507.AA	8C14	7500pf Ceramic Disc	1	Ducon	GMV Style C Curve Z CDS
CZ096.533.AA	8C15	39pf Ceramic Disc	1	Ducon	Style A (N750)
CZ097.907	8C16	0.1uf Ceramic Disc	1	Ducon	Red Cap CDR 25VW
B1.514.99	8C17	500pf Styroflex	1	Siemens	125VW NK500/2.5/125 ± 2.5%
CZ097.115.AA	8C18	0.001uf Ceramic Disc	1	Ducon	Style A Curve Y 10%
C296AA/A47K	8C19	0.047uf Polyester	1	Philips	125V
B1.514.99	8C20	500pf Styroflex	1	Siemens	125VW KN500/2.5/125 ± 2.5%
CZ096.534.AA	8C21	33pf Ceramic Disc	1	Ducon	Style A N750
CZ088.003.1	8C22	270pf Styroflex	1	Ducon	125VW DFB110
CZ097.138	8C23	330pf Ceramic Disc	1	Ducon	CDS Style A Curve Y 20%
<u>RESISTORS</u>					
B8.305.05B/1K	8R1	1K ohms watt Carbon	1	Philips	5%
B8.305.05B/22K	8R2	22K ohms watt Carbon	1	Philips	5%
B8.305.05B/22K	8R3	22K ohms watt Carbon	1	Philips	5%
B8.305.05B/470E	8R4	470 ohms watt Carbon	1	Philips	5%
B8.305.05B/3K3	8R5	3.3K ohms watt Carbon	1	Philips	5%
B8.305.05B/22K	8R6	22K ohms watt Carbon	1	Philips	5%
B8.305.05B/10K	8R7	10K ohms watt Carbon	1	Philips	5%
B8.305.05B/3K3	8R8	3.3K ohms watt Carbon	1	Philips	5%
B8.305.05B/3K3	8R9	3.3K ohms watt Carbon	1	Philips	5%

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
RESISTORS cont.					
B8.305.05B/180E	8R10	180 ohms	1	Philips	5%
B8.305.05B/22K	8R11	22K ohms	1	Philips	5%
B8.305.05B/22K	8R12	22K ohms	1	Philips	5%
B8.305.05B/10K	8R13	10K ohms	1	Philips	5%
B8.305.05B/3K3	8R14	3.3K ohms	1	Philips	5%
B8.305.05B/3K3	8R15	3.3K ohms	1	Philips	5%
B8.305.05B/180E	8R16	180 ohms	1	Philips	5%
B8.305.05B/4K7	8R17	4.7K ohms	1	Philips	5%
B8.305.05B/22K	8R18	22K ohms	1	Philips	5%
B8.305.05B/10K	8R19	10K ohms	1	Philips	5%
B8.305.05B/3K3	8R20	3.3K ohms	1	Philips	5%
B8.305.05B/3K3	8R21	3.3K ohms	1	Philips	5%
B8.305.05B/4K7	8R22	4.7K ohms	1	Philips	5%
B8.305.05B/22K	8R23	22K ohms	1	Philips	5%
B8.305.05B/10K	8R24	10K ohms	1	Philips	5%
B8.305.05B/180E	8R25	180 ohms	1	Philips	5%
B8.305.05B/1K5	8R26	1.5K ohms	1	Philips	5%
B8.305.05B/180E	8R27	180 ohms	1	Philips	5%
B8.305.05B/100E	8R28	100 ohms	1	Philips	5%
B8.305.05B/2K2	8R29	2.2K ohms	1	Philips	5%
B8.305.05B/33K	8R30	33K ohms	1	Philips	5%
B8.305.05B/33K	8R31	33K ohms	1	Philips	5%
SEMI-CONDUCTORS					
SP290.082	8MR1	OA85 Diode	1	Philips	
SP290.082	8MR2	OA85 Diode	1	Philips	
SP290.082	8MR3	OA85 Diode	1	Philips	
SP304.024	8MR4	OA202 Diode	1	Philips	
SP305.025	8MR5	OA202 Diode	1	Philips	
SP290.076	8MR6	OA79 Diode	1	Philips	
SP290.076	8MR7	OA79 Diode	1	Philips	
SP291.216	8TS1	AFL16 Transistor	1	Philips	
SP291.216	8TS2	AFL16 Transistor	1	Philips	

COMPONENTS PARTS LIST - U8 2nd IF CARD

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>SEMI-CONDUCTORS cont.</u>					
SP291.216	8TS3	AF116 Transistor	1	Philips	
SP291.216	8TS4	AF116 Transistor	1	Philips	
SP291.216	8TS5	AF116 Transistor	1	Philips	
<u>TRANSFORMERS</u>					
3502.183.0020.0	8T1	Discriminator Transformer	1	TCA	

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
C426AM/F6.4	9C1	6.4uf Electrolytic	1	Philips	25VW Insulated
C426AM/F25	9C2	25uf Electrolytic	1	Philips	25VW Insulated
C426AM/F6.4	9C3	6.4uf Electrolytic	1	Philips	25VW Insulated
CZ076.003	9C4	0.04uf Paper Tubular	1	AEE	200V W99 Size A 10%
C426AM/F6.4	9C5	6.4uf Electrolytic	1	Philips	25VW Insulated
C426AM/F6.4	9C6	6.4uf Electrolytic	1	Philips	25VW Insulated
C415AR/B32	9C7	32uf Electrolytic	1	Philips	4VW Insulated
<u>RESISTORS</u>					
B8.305.05B/39K	9R1	39K ohms watt Carbon	1	Philips	5%
B8.305.05B/3K9	9R2	3.9K ohms watt Carbon	1	Philips	5%
B8.305.05B/5K6	9R3	5.6K ohms watt Carbon	1	Philips	5%
B8.305.05B/2K2	9R4	2.2K ohms watt Carbon	1	Philips	5%
B8.305.05B/33K	9R5	33K ohms watt Carbon	1	Philips	5%
B8.305.05B/10K	9R6	10K ohms watt Carbon	1	Philips	5%
B8.305.05B/3K3	9R7	3.3K ohms watt Carbon	1	Philips	5%
B8.305.05B/150E	9R8	150 ohms watt Carbon	1	Philips	5%
B8.305.05B/3K9	9R9	3.9K ohms watt Carbon	1	Philips	5%
B8.305.05B/68K	9R10	68K ohms watt Carbon	1	Philips	5%
B8.305.05B/1K	9R11	1K ohms watt Carbon	1	Philips	5%
B8.305.05B/22K	9R12	22K ohms watt Carbon	1	Philips	5%
B8.305.05B/4K7	9R13	4.7K ohms watt Carbon	1	Philips	5%
B8.305.05B/560E	9R14	560 ohms watt Carbon	1	Philips	5%
<u>SEMI-CONDUCTORS</u>					
SP291.125.00	9TS1	AC125 Transistor	1	Philips	
SP291.125.00	9TS2	AC125 Transistor	1	Philips	
SP291.125.00	9TS3	AC125 Transistor	1	Philips	

COMPONENTS PARTS LIST - U10 POWER SUPPLY

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>RESISTORS</u>					
B8.305.05B/1K	1OR1	1K ohms $\frac{1}{4}$ watt Carbon	1	Philips	SP2636
B8.305.05B/470E	1OR2	470 ohms $\frac{1}{4}$ watt Carbon	1	Philips	SP2636
B8.305.05B/330E	1OR3	330 ohms $\frac{1}{4}$ watt Carbon	1	Philips	SP2636
B8.305.05B/470E	1OR4	470 ohms $\frac{1}{4}$ watt Carbon	1	Philips	SP2636
B8.305.05B/330E	1OR5	330 ohms $\frac{1}{4}$ watt Carbon	1	Philips	SP2636
B8.305.06B/10E	1OR6	10 ohms $\frac{1}{2}$ watt Carbon	1	Philips	SP2594 SP2636
B8.305.06B/10E	1OR7	10 ohms $\frac{1}{2}$ watt Carbon	1	Philips	SP2594 SP2636
B8.305.06B/1K	1OR8	1K ohms $\frac{1}{2}$ watt Carbon	1	Philips	
B8.305.05B/220K	1OR9	220K ohms $\frac{1}{4}$ watt Carbon	1	Philips	
B8.305.05B/220K	1OR10	220K ohms $\frac{1}{4}$ watt Carbon	1	Philips	
<u>CAPACITORS</u>					
C436AM/E640	1OC1	640uf Electrolytic 16V	1	Philips	
C435AL/C40	1OC2	40uf Electrolytic 40V	1	Philips	
AC812/7/8	1OC3	8uf Electrolytic 300V	1	Philips	
AC812/7/8	1OC4	8uf Electrolytic 300V	1	Philips	
AC812/7/8	1OC5	8uf Electrolytic 300V	1	Philips	
AC812/7/8	1OC6	8uf Electrolytic 300V	1	Philips	
AC812/7/8	1OC7	8uf Electrolytic 300V	1	Philips	
C435AL/C40	1OC8	40uf Electrolytic 40V	1	Philips	
<u>INDUCTORS</u>					
3502.183.0016.0	1OL1	Choke Assembly	1	TCA	
3502.183.0016.0	1OL2	Choke Assembly	1	TCA	
3502.193.0030.06	1OL3	Choke Assembly	1	TCA	SP2510
3502.193.0030.06	1OL4	Choke Assembly	1	TCA	SP2510
3502.193.0031.0	1OL5	Filter Choke	1	TCA	
<u>TRANSFORMERS</u>					
3502.175.0013.1	1OT1	Transformer Assembly	1	TCA	SP2542

COMPONENTS PARTS LIST - UIO POWER SUPPLY

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>SEMI-CONDUCTORS</u>					
SP290.093	10MR1	OA210 Diode	1	Philips	
SP304.024	10MR2	OA202 Diode	1	Philips	
SP304.024	10MR3	OA202 Diode	1	Philips	
SP290.024	10MR4	BY100 Diode	1	Philips	
SP290.024	10MR5	BY100 Diode	1	Philips	
SP305.061	10TS1	OC202 Transistor	1	Philips	SP2636
SP301.012	10TS2	ASZ17 Transistor	1	Philips	
SP301.013	10TS3	ASZ17 Transistor	1	Philips	
<u>MISCELLANEOUS</u>					
56.200		Cooling Fin	1	Philips	SP2636
SP306.022		Mounting Insulation	1	Philips	Type 56201A for use with 10TS2, 10TS3 (2 plastic bushes and 1 mica insulation)

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
CZ096.118.21	11C1	3.3pf Ceramic Disc	1	Ducon	Type CDS ± 1pf N75 Style EF
CZ097.020	11C2	1000pf Ceramic Disc	1	Ducon	GMV Style A
C426AM/F6.4	11C3	6.4uf Electrolytic	1	Philips	25VW Insulated
C426AM/F6.4	11C4	6.4uf Electrolytic	1	Philips	25VW Insulated
CZ074.400.EH	11C5	0.01uf Paper Tubular	1	AEE	Type W99 Size A 20%
CZ074.400.EH	11C6	0.01uf Paper Tubular	1	AEE	Type W99 Size A 20%
<u>RESISTORS</u>					
B8.305.05B/100E	11R1	100 ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/47K	11R2	47K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/18K	11R3	18K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/10K	11R4	10K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/2K2	11R5	2.2K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/330E	11R6	330 ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/1K5	11R7	1.5K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/12E	11R8	12 ohms 1/4 watt Carbon	1	Philips	5%
<u>SEMI-CONDUCTORS</u>					
SP304.030	11MR1	OAZ201 Diode	1	Philips	
SP304.031	11MR2	OAZ202 Diode	1	Philips	
SP190.082	11MR3	OA85 Diode	1	Philips	
SP291.128.00	11TS1	AC128 Transistor	1	Philips	
SP291.125.00	11TS2	AC125 Transistor	1	Philips	

COMPONENTS PARTS LIST - U12 SQUELCH CARD

CODE NO	POS	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
<u>CAPACITORS</u>					
CZ074.400.EH	12C1	0.01uf Paper Tubular	1	A.E.E.	200V 20% Type W99
CZ074.400.EH	12C2	0.01uf Paper Tubular	1	A.E.E.	200V 20% Type W99
C296AA/A82K	12C3	0.082uf Polyester	1	Philips	125V
CZ074.400.EH	12C4	0.01uf Paper Tubular	1	A.E.E.	200V 20% Type W99
C426AM/F6.4	12C5	6.4uf Electrolytic	1	Philips	25VW Insulated
CZ097.558	12C6	0.01uf Ceramic Disc	1	Ducon	Type CDR Style A/2
C425AL/F25	12C7	25uf Electrolytic	1	Philips	25VW
<u>INDUCTORS</u>					
3502.193.0002.1	12L1	Choke Peaking	1	TCA	
<u>RESISTORS</u>					
B8.305.05B/22K	12R1	22K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/6K8	12R2	6.8K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/3K3	12R3	3.3K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/3K3	12R4	3.3K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/47K	12R5	47K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/10K	12R6	10K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/100E	12R7	100 ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/2K2	12R8	2.2K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/100K	12R9	100K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/15K	12R10	15K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/1K5	12R11	1.5K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/1K5	12R12	1.5K ohms 1/4 watt Carbon	1	Philips	5%
B8.305.05B/27K	12R13	27K ohms 1/4 watt Carbon	1	Philips	5%
<u>SEMI-CONDUCTORS</u>					
SP304.024	12MR1	0A202 Diode	1	Philips	
SP291.125.00	12TS1	AC125 Transistor	1	Philips	
SP291.125.00	12TS2	AC125 Transistor	1	Philips	
SP291.125.00	12TS3	AC125 Transistor	1	Philips	
SP305.061	12TS4	OC202 Transistor	1	Philips	

COMPONENTS PARTS LIST - GENERAL ASSEMBLY

CODE NO	DESCRIPTION	NO. OFF	SUPPLIER	REMARKS
CH525.042.0C	Hammer Drive Screw	2		No: 0 x $\frac{1}{8}$ " LG RD. HD
	Whip Antenna Assembly (1675/06)	1	TCA	
3502.130.0011.0	Knob Assembly	1	TCA	SPA6797, SPL.SP607
3502.130.0012.0	Knob Assembly	1	TCA	SPA6797, SPL.SP607
3502.130.0013.0	Knob Assembly	1	TCA	SPA6797, SPL.SP607
3502.130.0014.0	Knob Assembly	1	TCA	SPA6797, SPL.SP607
CR904.203.2	Transistor Mtg.Bracket Assy	1	TCA	SPA10163
CR904.204.5	Transistor Mtg.Bracket	1	TCA	SPA10164
3502.130.0054.0	Mounting Tray Assembly	1	TCA	
3502.130.0071.0	Battery Connector Assembly	1	TCA	SPA10263, SPL.SP1087 (CR904.382 - 24V operation)
	Microphone and Plug Assy (1677/02,1)	1	TCA	
3502.130.0088.0	Microphone Hang Up Bracket	1	TCA	
CS812.772.6	Case Casting	1	TCA	SPD1128
CS812.774.6	Front Panel	1	TCA	SPC1769
CS812.797	Locking Knob	1		SPC3398
CS812.798	Collet	1		SPC3399
CS812.799.1	Thumb Screw	4		SPZ3400
CS812.831.6	Moulding	1		SPC1807
CS812.997.2	Plug and Socket Mounting Brkt.	1		SPA10145
CS812.001	Insulation Strip	1		SPZ3500
CS813.049	Chassis	1		SPD1151
CS813.089	Knob Insert	1		SPA6789
CS813.095	Locking Screw	1		SPZ3538
CS813.113	Clamp	1		SPZ3551
CS813.125	Insulation Strip	1		SPZ3558
CS813.243.1	Clamp	1		
3502.130.0215.0	Coaxial Lead	1		
3502.150.0020.0	Switch Assembly	1		SPL.SP1080, SPB4631
CZ281.223	Fuse $1\frac{1}{4}$ " x $\frac{1}{4}$ "	1		12 amps working
CZ365.434	Battery Plug (Male)	1	ELCO	M10620-1

COMPONENTS PARTS LIST - GENERAL ASSEMBLY

CODE NO	DESCRIPTION	NO. OF	SUPPLIER	REMARKS
CZ369.909	Coaxial Socket	1	Belling Lee	Type I604S
CZ370.513	Microphone Socket	1	McMurdo	Type 5QMS/C
CZ371.119	Clip Type Fuse Holder	1	Zephyr	Cat. No: 107
B104AF/2.6X5	Metric Screw	2		Required to mount Haller Relay.
NE50962	Haller Relay	1		
3502.110.05021	Phillips Name Badge	1	Avala	
			Products	
56201	Transistor Mtg. Hardware	2	Phillips	JE10412
CS242.339	Shock Mount 8 1b	4		JE10412
CS242.325	Shock Mount 15 1b	4		For use with above
3702.11.00510.0	'U' Channel	2		shock mounts.

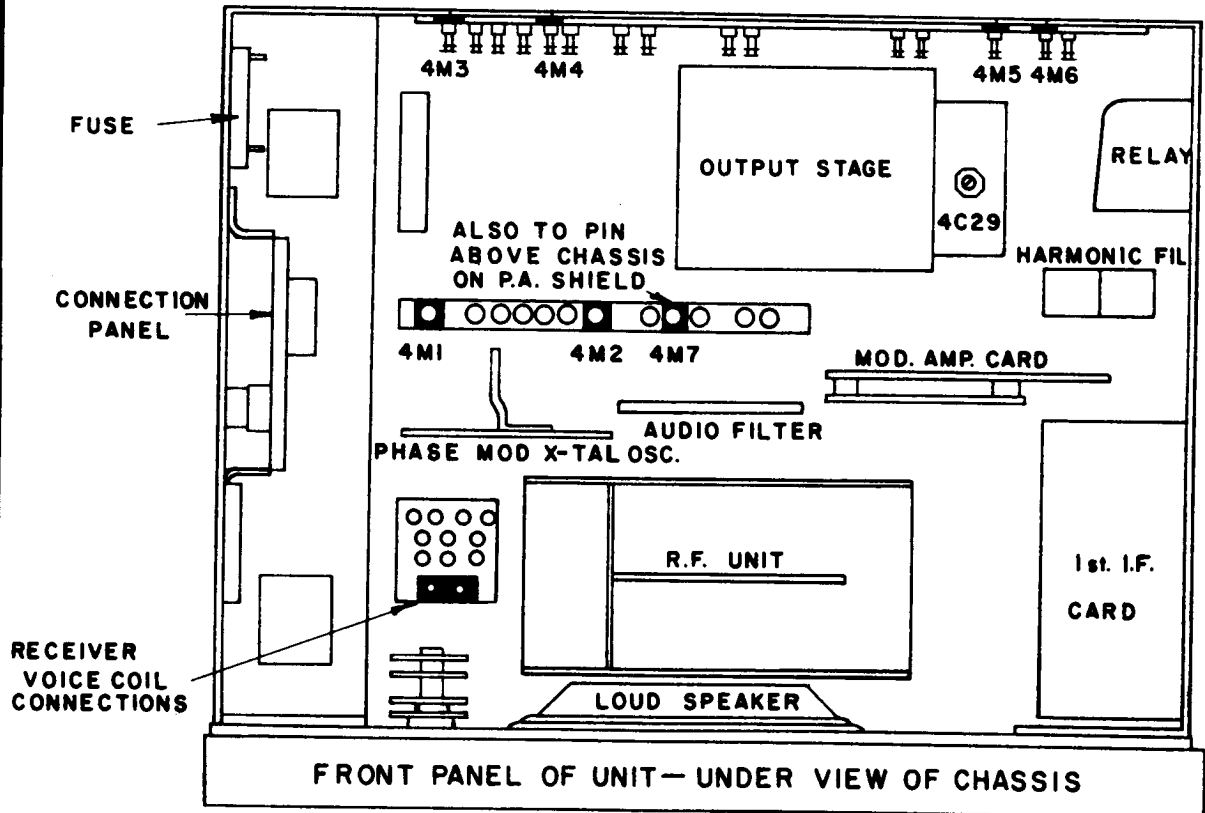
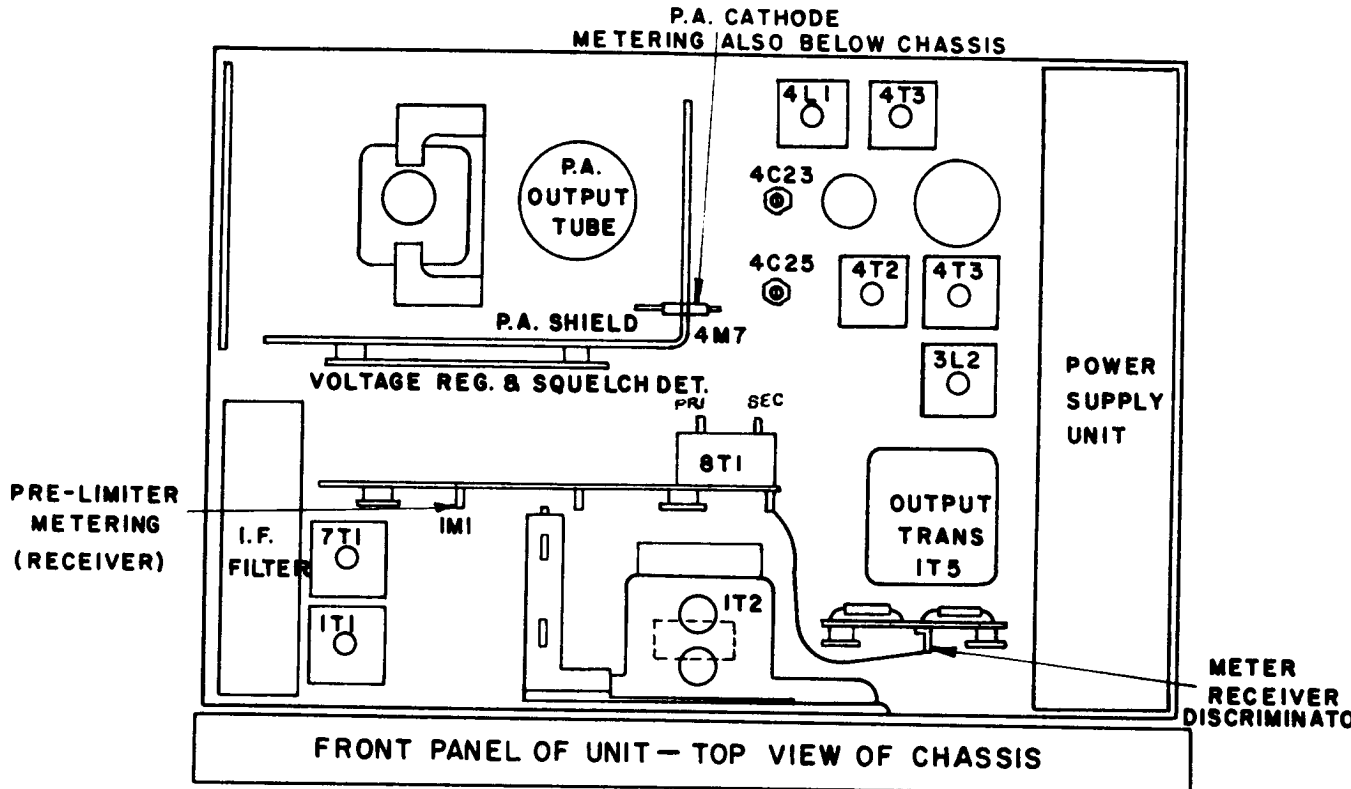
COMPONENTS PARTS LIST - COMPLETE UNITS

CODE NO	UNIT NO.	DESCRIPTION
3502.150.0018.1	U2	Modulator Amplifier Card.
3502.150.0017.2	U3	Crystal Oscillator and Modulator Card.
3502.150.0054.0	U5	Audio Filter
3502.150.0012.3	U6	R.F. Unit.
3502.150.0013.0	U7	1st I.F. Card
3502.150.0016.1	U8	2nd I.F. Card
3502.150.0015.1	U9	Audio Card
3502.100.0070.2	U10	Power Supply
3502.150.0011.1	U11	Voltage Regulator and Squelch Detector
3502.150.0010.0	U12	Squelch Card

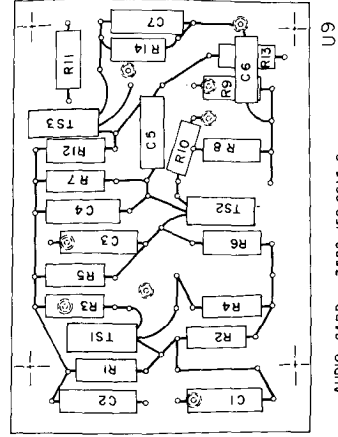
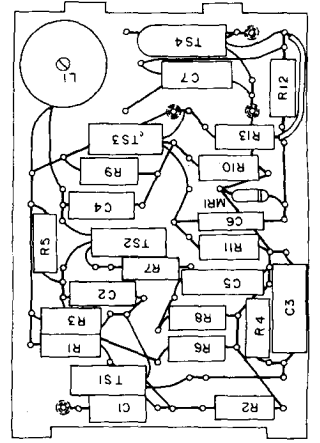
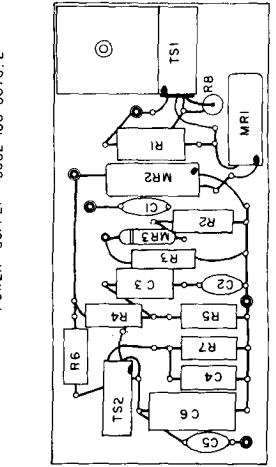
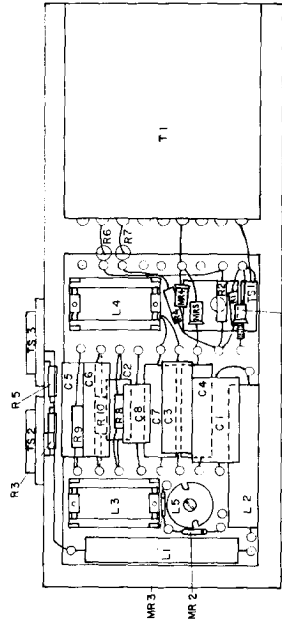
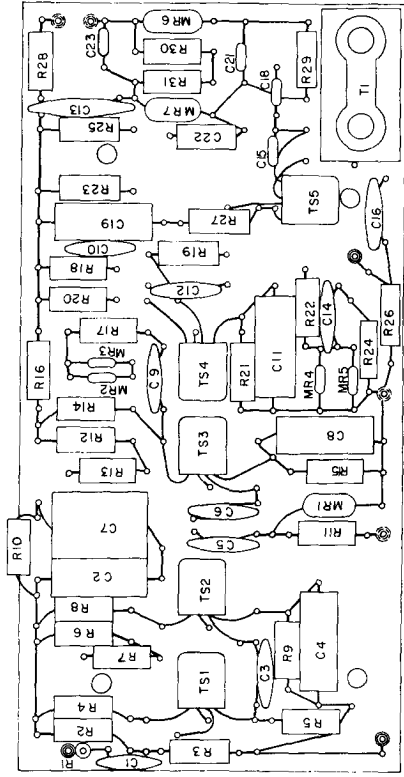
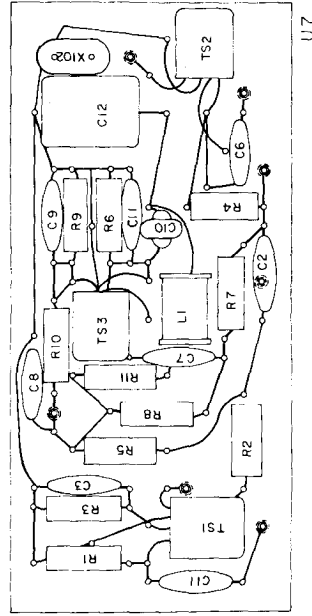
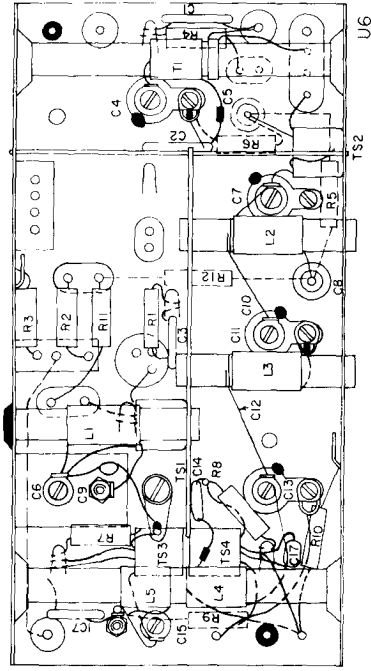
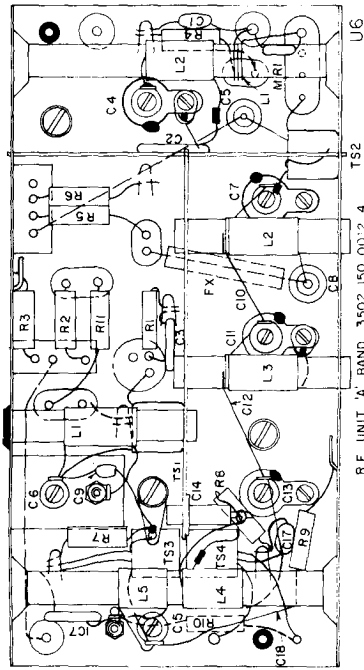
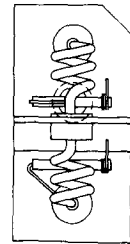
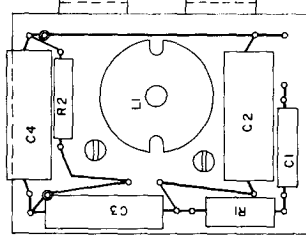
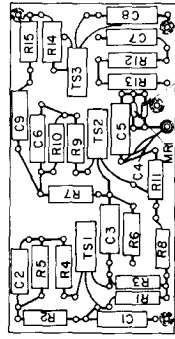
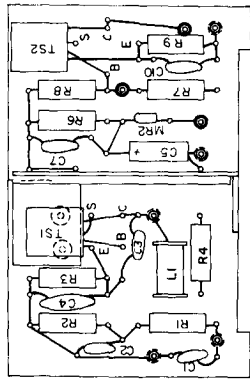
COMPONENTS PARTS LIST - ADDENDUM

The following component changes were made effective from 22nd April 1965 in accordance with change notes SP2874 and SP2875.

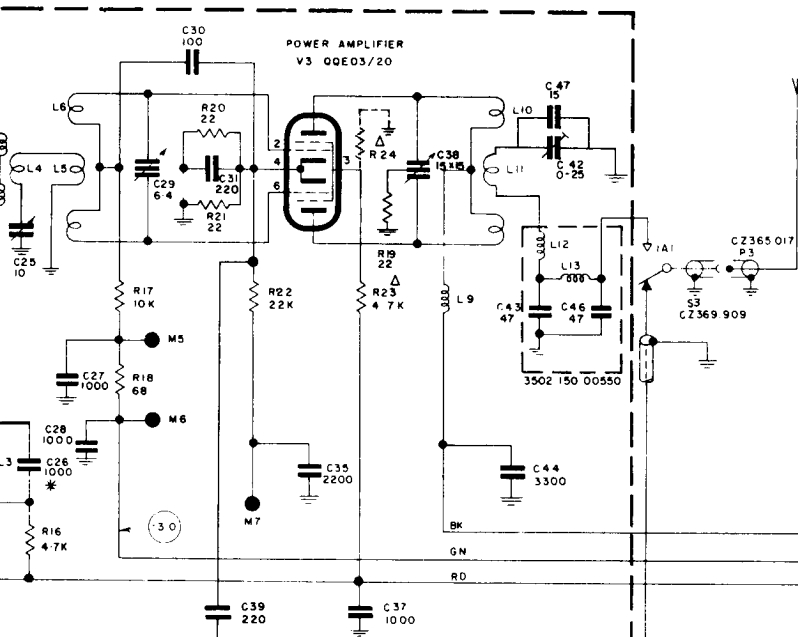
Existing Code	New Code	Pos	Description	No. Off	Supplier	Remarks
CZ096.726.AD	CZ096.741	4C8	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20%
CZ096.726.AD	CZ096.741	4C13	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20%
CZ096.726.AD	CZ096.741	4C40	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20%
CZ096.726.AD	CZ096.741	4C17	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20% 'C' Band only
CZ096.726.AD	CZ096.741	4C21	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20% 'C' Band only
CZ096.726.AD	CZ096.741	4C24	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20% 'C' Band only
CZ096.726.AD	CZ096.741	4C30	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20%
CZ096.725.AD	CZ096.741	4C31	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20% 'C' Band only
CZ096.725.AD	CZ096.741	4C45	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20%
CZ096.726.AD	CZ096.741	4C41	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20%
CZ096.726.AD	CZ096.741	4C39	100pf Ceramic Disc	1	Ducon	Type CDS, Style F, Curve Y \pm 20% 'C' Band only



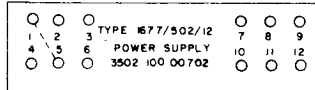
TYPE FM 1677A/25
MOBILE TRANSMITTER/RECEIVER
METERING & TEST POINT LAYOUT



TYPE FM 1677/25		CD 1022	21-4-1963
MOBILE RADIOTELEPHONE			
COMPONENT LAYOUT			
DRAWN: J.C.W. APPROVED: J.C.			
TELECOMMUNICATION COMPANY OF AUSTRALIA PTY. LIMITED			

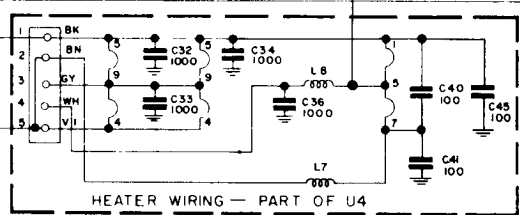
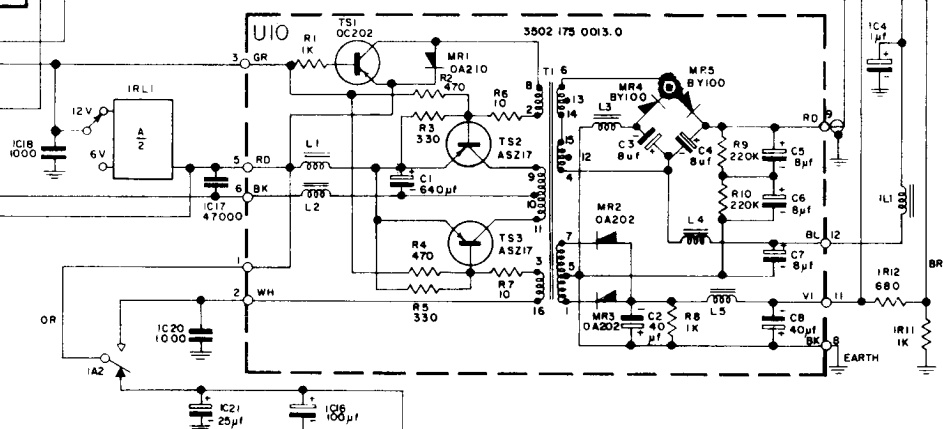


POWER SUPPLY
COVER SIDE

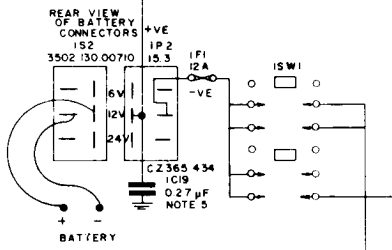
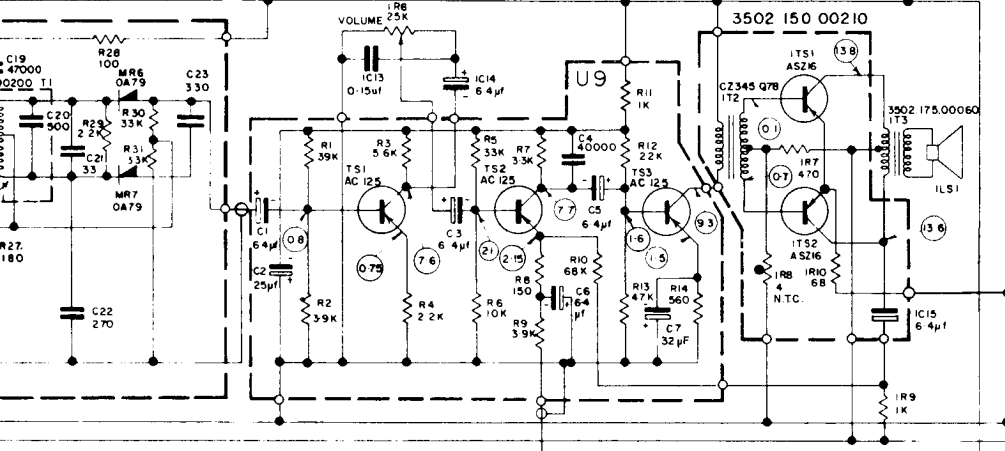


NOMINAL
+500V
-30V
+250V

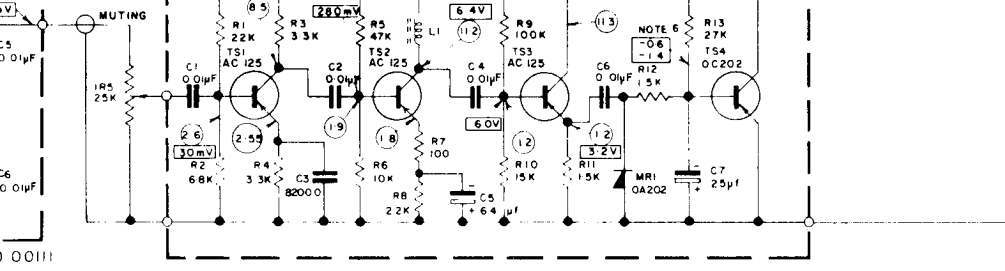
POWER SUPPLY 3502 100 00702



AUDIO CARD 3502 150 00151



SQUELCH CARD 3502 150 00100



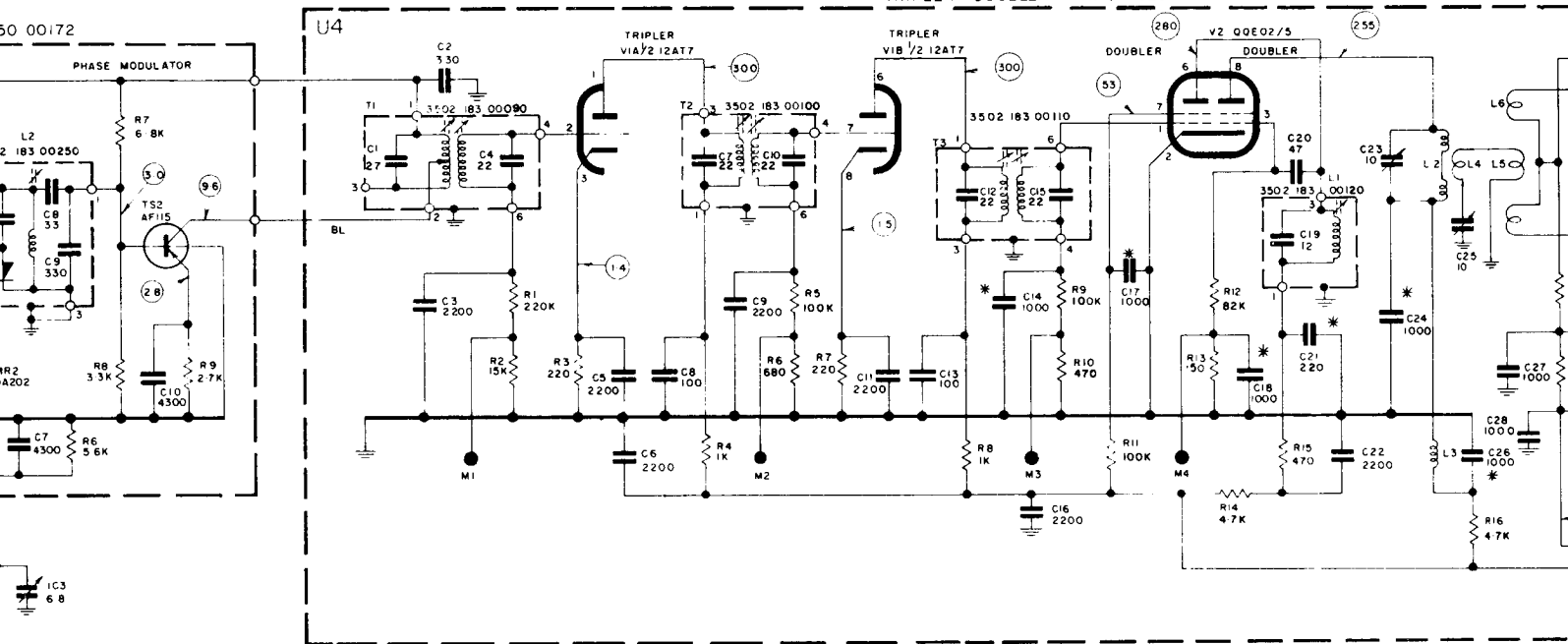
TYPE	OUTPUT WATTS	4 R 23	Δ	4 R 24	Δ	ANODE SUPPLY
1677/25	25	4.7K IW	-	-	-	AS PER CIRCUIT DIAGRAM
1677/251	10	4.7K IW	-	-	-	CHANGE WIRE FROM PIN 9 TO PIN 12 ON POWER SUPPLY U10
1677/252	5	22K IW	33K IW	-	-	CHANGE WIRE FROM PIN 9 TO PIN 12 ON POWER SUPPLY U10

TYPE 1677A/25
MOBILE TRANSMITTER/RECEIVER
WITH POWER SUPPLY
1677/502/12

DRAWN JEH APPROVED CD 1014 31-3-1965

TELECOMMUNICATION COMPANY OF AUSTRALIA PTY LIMITED

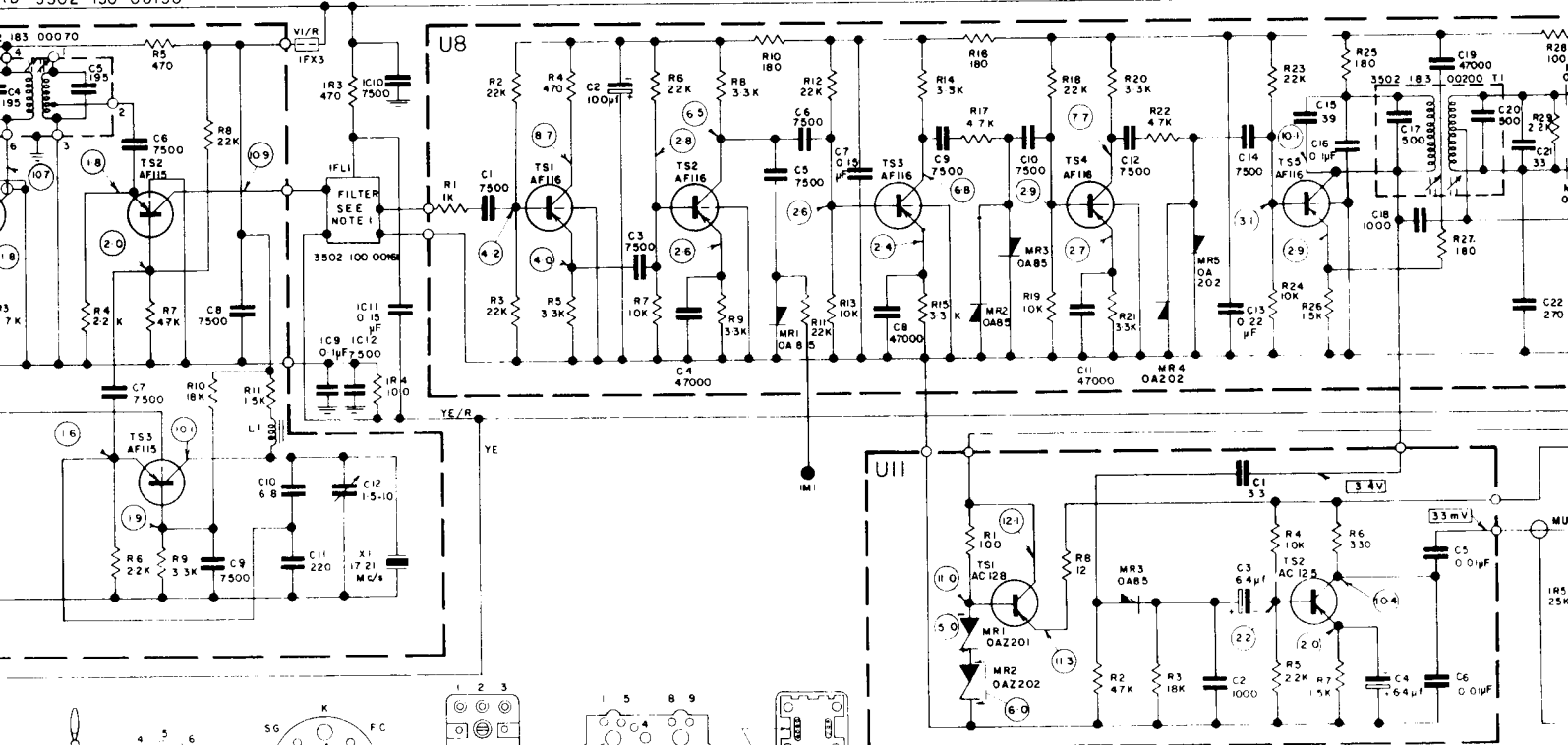
TRIPLER - DOUBLER - P.A. STAGES



1677 MOBILE NOTES

- 1 FOR 5Kc/s DEVIATION USE FILTER 3502 100 00160
- 2 D.C. VOLTAGE ANALYSIS SHOWN THUS - (5)
- 3 ALL COMPONENTS MARKED * ARE TO BE EARTHED TO A COMMON POINT
- 4 A.C. VOLTAGE ANALYSIS SHOWN THUS - (3.2V)
- 5 IC19 IS TO BE CONNECTED FROM UNEARTHED SIDE OF BATTERY TO CHASSIS
- 6 -0.6V WHEN MUTE CONTROL FULLY CLOCKWISE
+1.4V WHEN MUTE CONTROL FULLY ANTI-CLOCKWISE
- 7 11V AC WHEN NOT OSCILLATING
1.9V AC WHEN OSCILLATING

2nd. I.F. CARD 3502 150 00161



NOTES

- 1 PIN 1 COLOUR CODED TO IDENTIFY COIL TYPE
- 2 WHERE NOT USED PINS MAY BE OMITTED

COILS

- QOE 02/5
- QOE 03/12
- QOE 03/20
- QOE 06/40

BT1 (COLOUR SPOT TO IDENTIFY COIL ON PRIMARY SIDE)

- PRI. RED
- YELLOW C/T
- BLACK
- SEC. RED
- BLACK

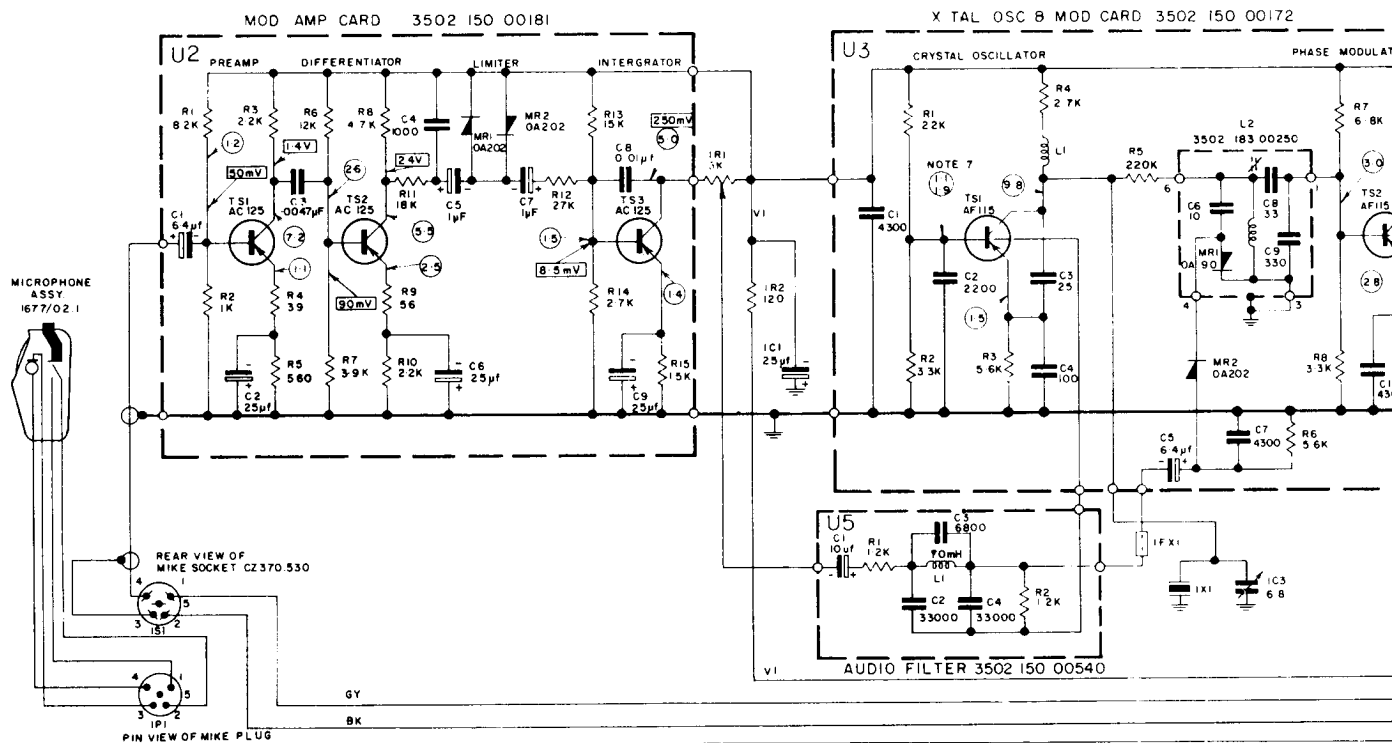
IT3 (FLYING LEADS)

- PRI. RED
- BLUE
- SEC. YELLOW
- BLACK C/T
- GREEN

VOLTAGE REGULATOR & SQUELCH DET 3502 150 00111

IC10TES CODE

- 1 CATHODE
- 2 END
- 3 (0A210)
- 4 (0A211)
- REPLACE WITH BY100

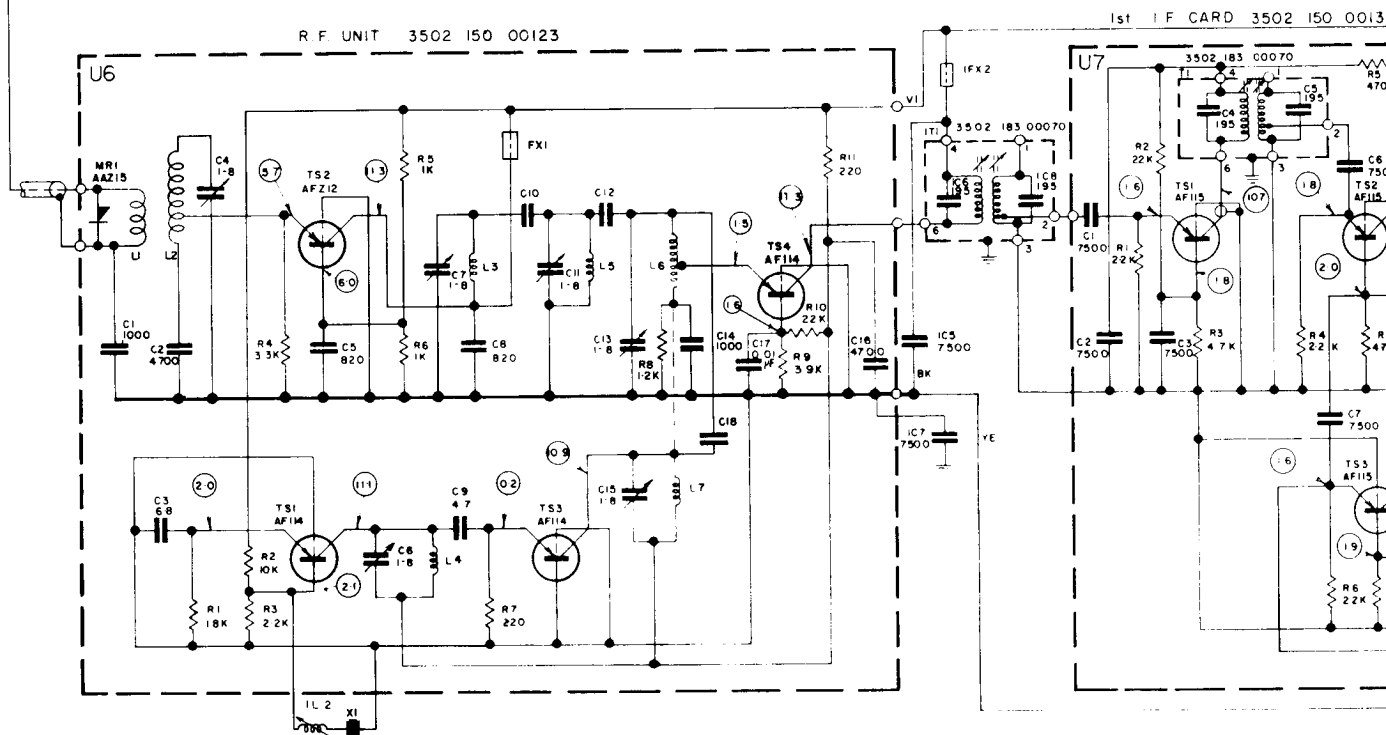


AUDIO CARD A.C. VOLTAGE ANALYSIS

FOR OUTPUT OF	1W	3W
INPUT TO AUDIO CARD	40 mV	70mV
BASE 9TS1	36mV	69mV
COLLECTOR 9TS1	15mV	29mV
BASE 9TS2	15mV	29mV
COLLECTOR 9TS2	16.5mV	36mV
BASE 9TS3	16.5mV	36mV
COLLECTOR 9TS3	18mV	3.5mV
COLLECTOR 1TS1, 1TS2	3.9V	7.4V

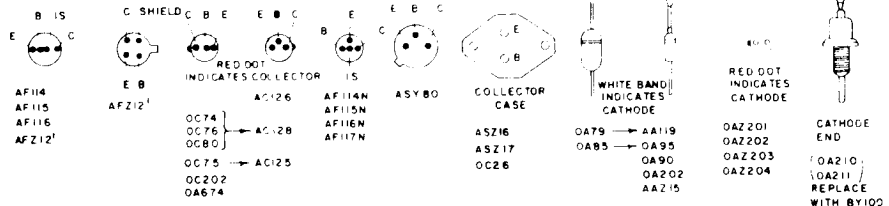
SUPPLY LEADS

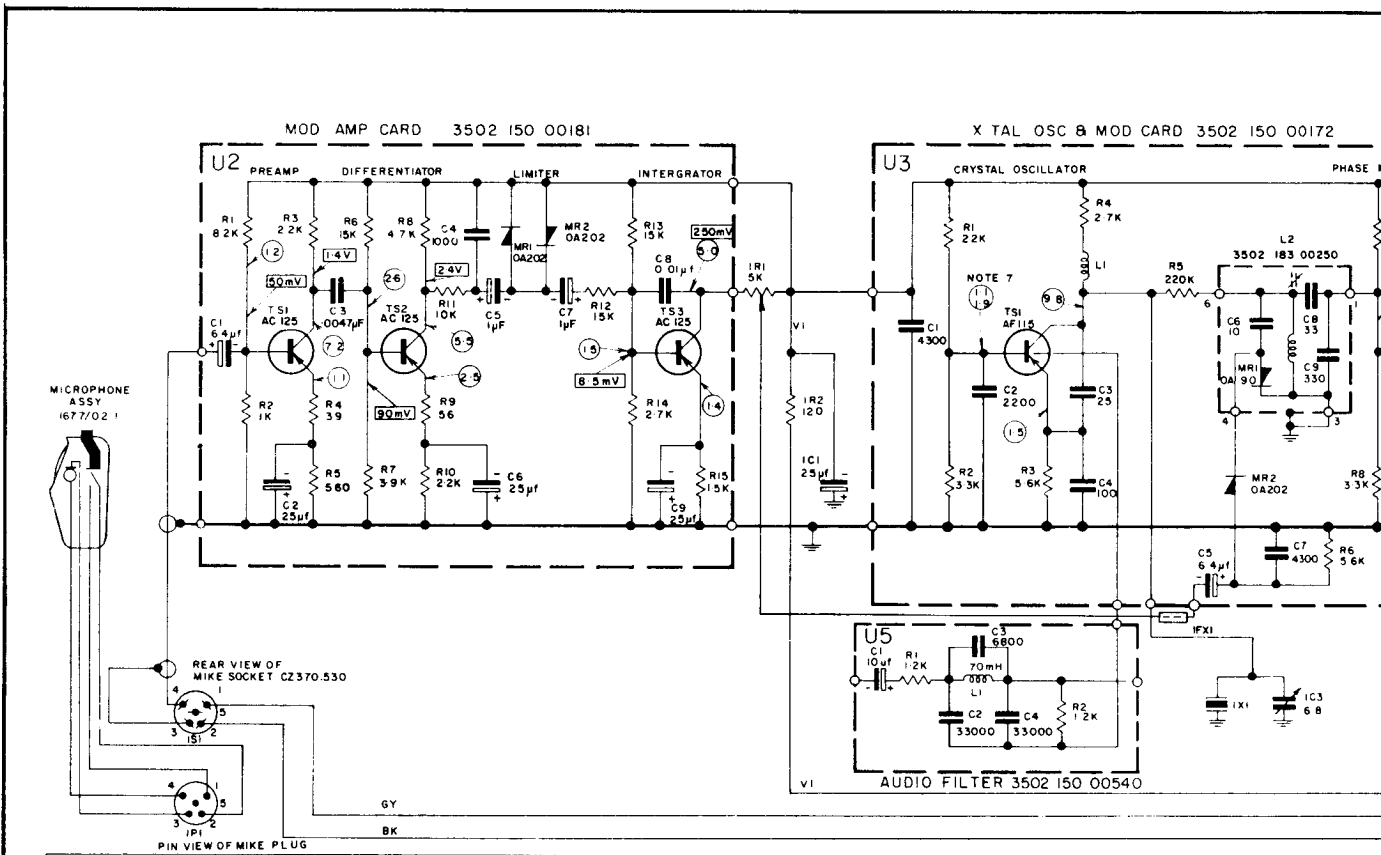
R.F. UNIT	PLAIN COLOURS
1st I.F. CARD	RED SLEEVE
2nd I.F. CARD	BLACK SLEEVE
AUDIO CARD	BLUE SLEEVE
SOULCH CARD	GREY SLEEVE
AUDIO OUTPUT	PINK SLEEVE
RX POS INPUT	ORANGE WIRE
RX NEG INPUT	GREY WIRE



NOTES

- AFZ12 MANUFACTURED IN BOTH ENVELOPE TYPES SHOWN
- INDICATES REPLACEMENTS
- 25HR10 IS IDENTICAL WITH 25H10 BUT OF REVERSE POLARITY



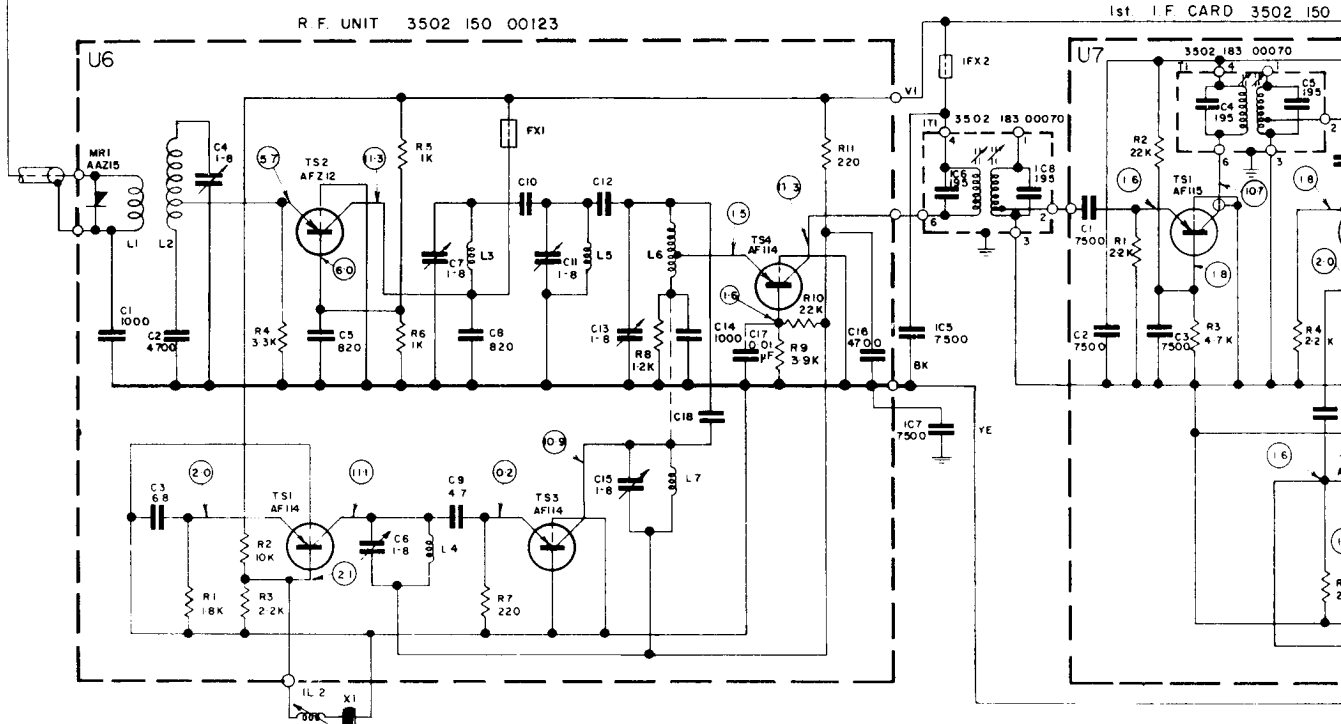


AUDIO CARD A C. VOLTAGE ANALYSIS

FOR OUTPUT OF	1W	3W
INPUT TO AUDIO CARD	40 mV	70 mV
BASE 9TS1	36 mV	69 mV
COLLECTOR 9TS1	15 mV	29 mV
BASE 9TS2	15 mV	29 mV
COLLECTOR 9TS2	16.5 mV	36 mV
BASE 9TS3	16.5 mV	36 mV
COLLECTOR 9TS3	1.8 mV	3.5 mV
COLLECTOR 1TS1, 1TS2	3.9 V	7.4 V

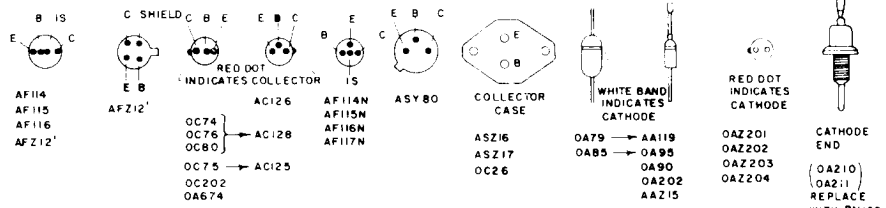
SUPPLY LEADS

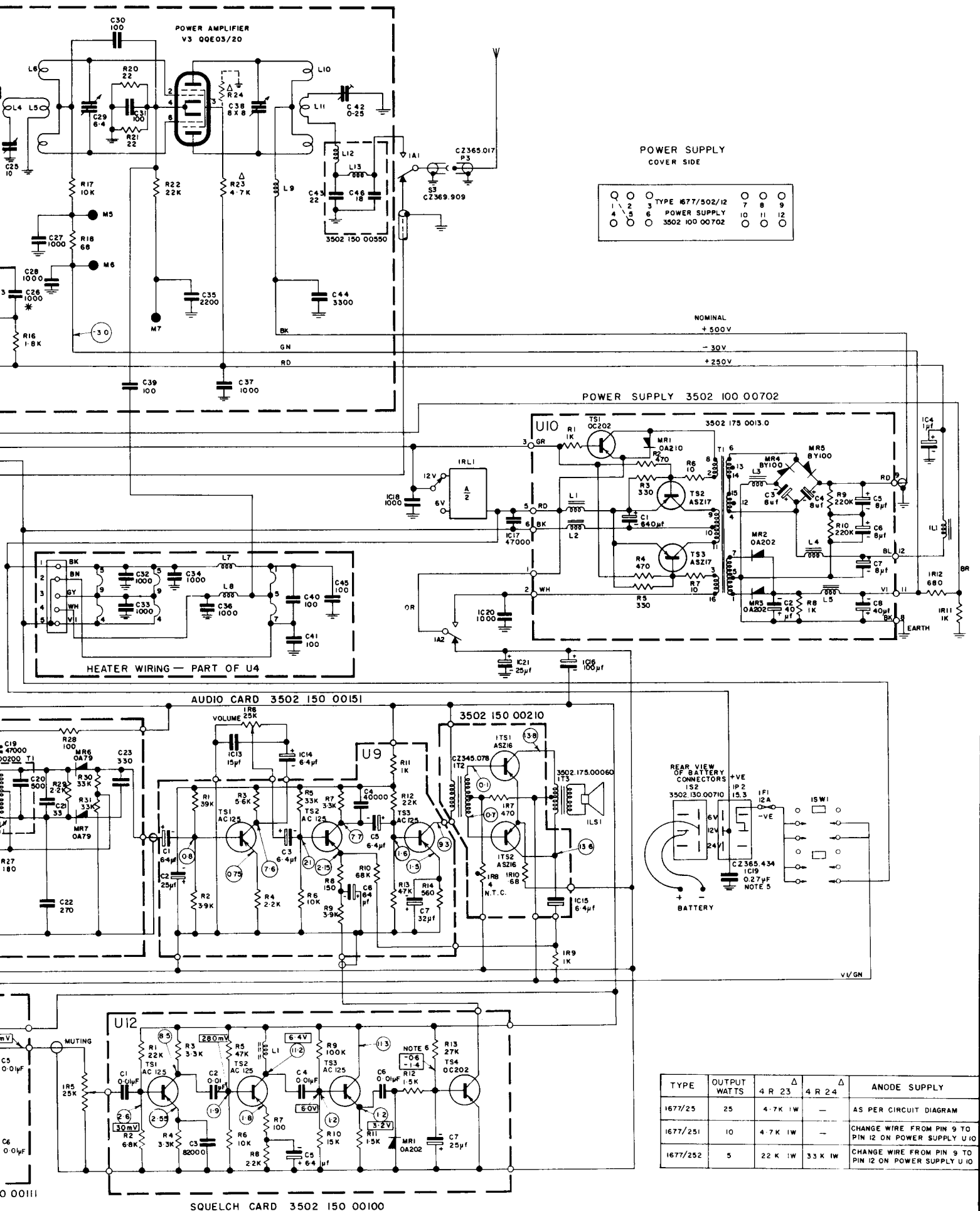
R.F. UNIT	PLAIN COLOURS
1st I.F. CARD	RED SLEEVE
2nd I.F. CARD	BLACK SLEEVE
AUDIO CARD	BLUE SLEEVE
SQUELCH CARD	GREY SLEEVE
AUDIO OUTPUT	PINK SLEEVE
RX POS. INPUT	ORANGE WIRE
RX NEG. INPUT	GREY WIRE



NOTES

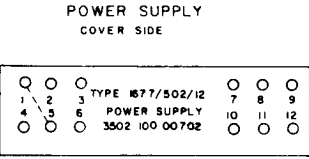
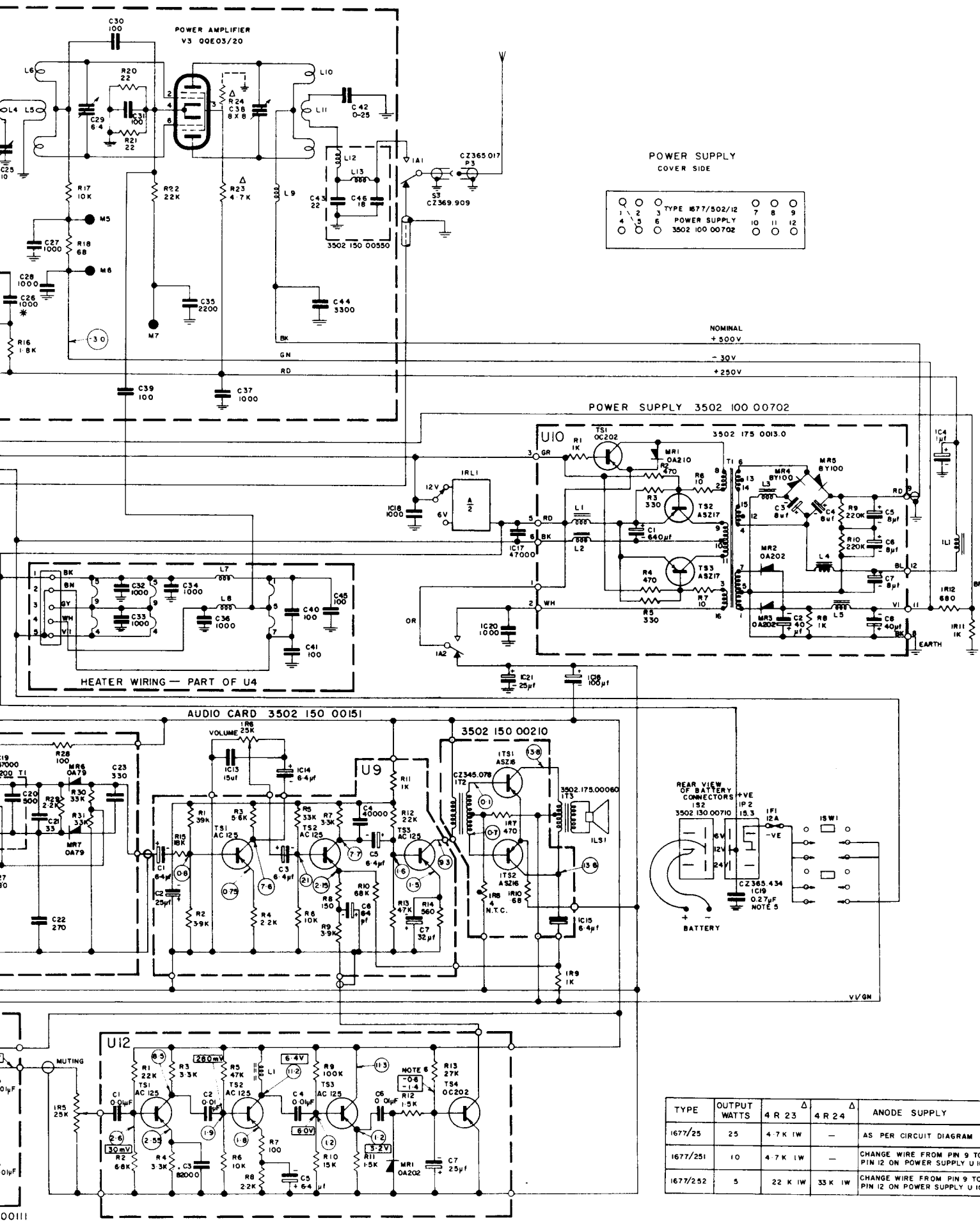
- 1 AFZ12 MANUFACTURED IN BOTH ENVELOPE TYPES SHOWN
- 2 → INDICATES REPLACEMENTS
- 3 25HR10 IS IDENTICAL WITH 25H10 BUT OF REVERSE POLARITY



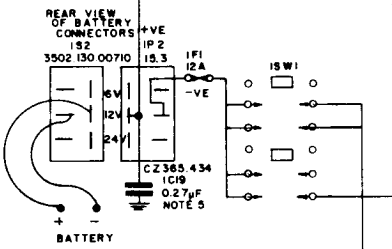


Q	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○

TYPE	OUTPUT WATTS	4 R 23	Δ	4 R 24	Δ	ANODE SUPPLY
1677/25	25	4.7K 1W	—	—	—	AS PER CIRCUIT DIAGRAM
1677/251	10	4.7K 1W	—	—	—	CHANGE WIRE FROM PIN 9 TO PIN 12 ON POWER SUPPLY U10
1677/252	5	22K 1W	33K 1W	—	—	CHANGE WIRE FROM PIN 9 TO PIN 12 ON POWER SUPPLY U10



NOMINAL
+ 500V
- 30V
+ 250V



TYPE	OUTPUT WATTS	4 R 23	4 R 24	ANODE SUPPLY
1677/25	25	4.7 K 1W	—	AS PER CIRCUIT DIAGRAM
1677/251	10	4.7 K 1W	—	CHANGE WIRE FROM PIN 9 TO PIN 12 ON POWER SUPPLY U10
1677/252	5	22 K 1W	33 K 1W	CHANGE WIRE FROM PIN 9 TO PIN 12 ON POWER SUPPLY U10

TYPE 1677C/25 W
MOBILE TRANSMITTER/RECEIVER
WITH POWER SUPPLY
1677/502/12

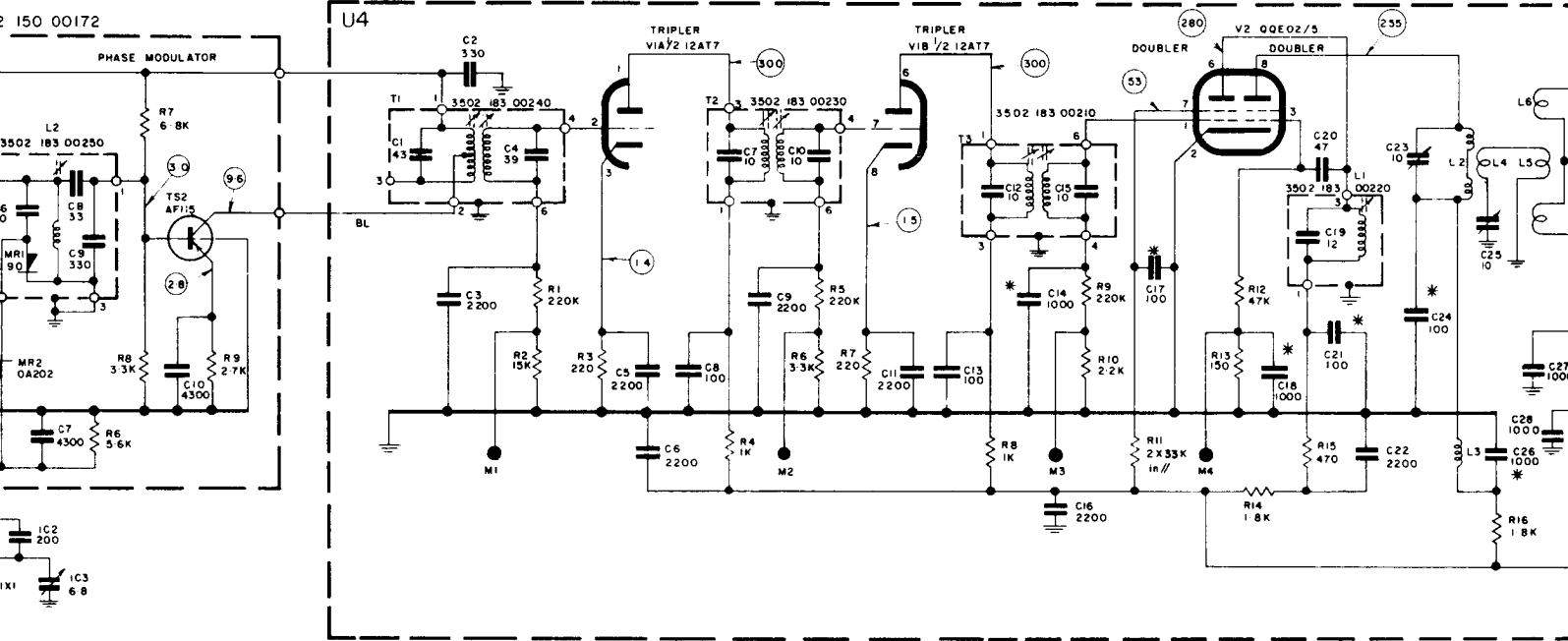
DRAWN: J.E.H. APPROVED: CD 1017

TELECOMMUNICATION COMPANY OF AUSTRALIA PTY. LIMITED

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TRIPLER - DOUBLER - P.A. STAGES

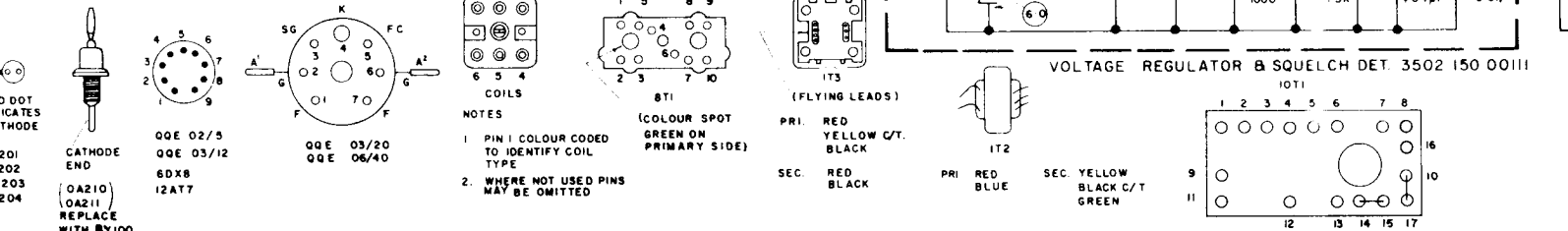
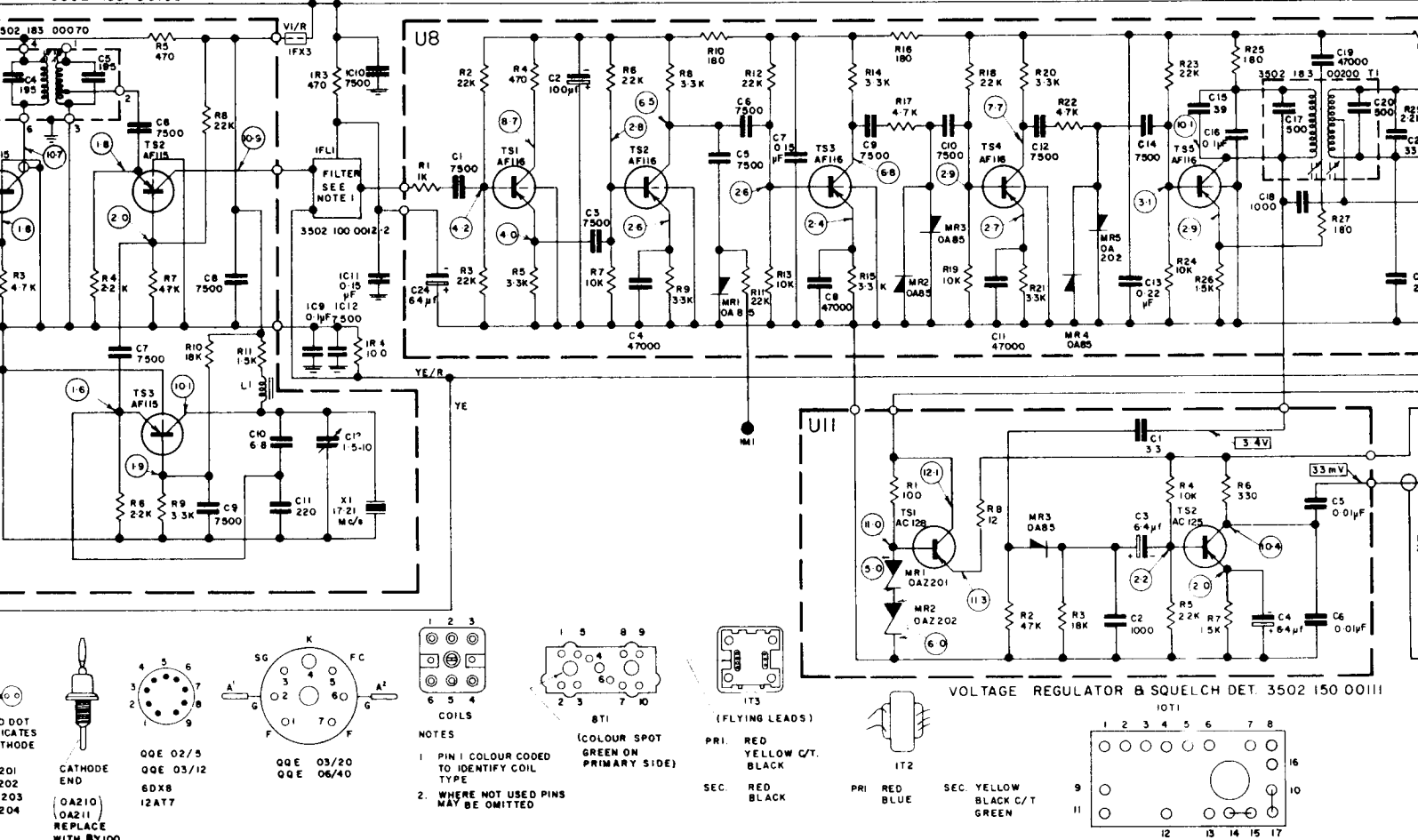


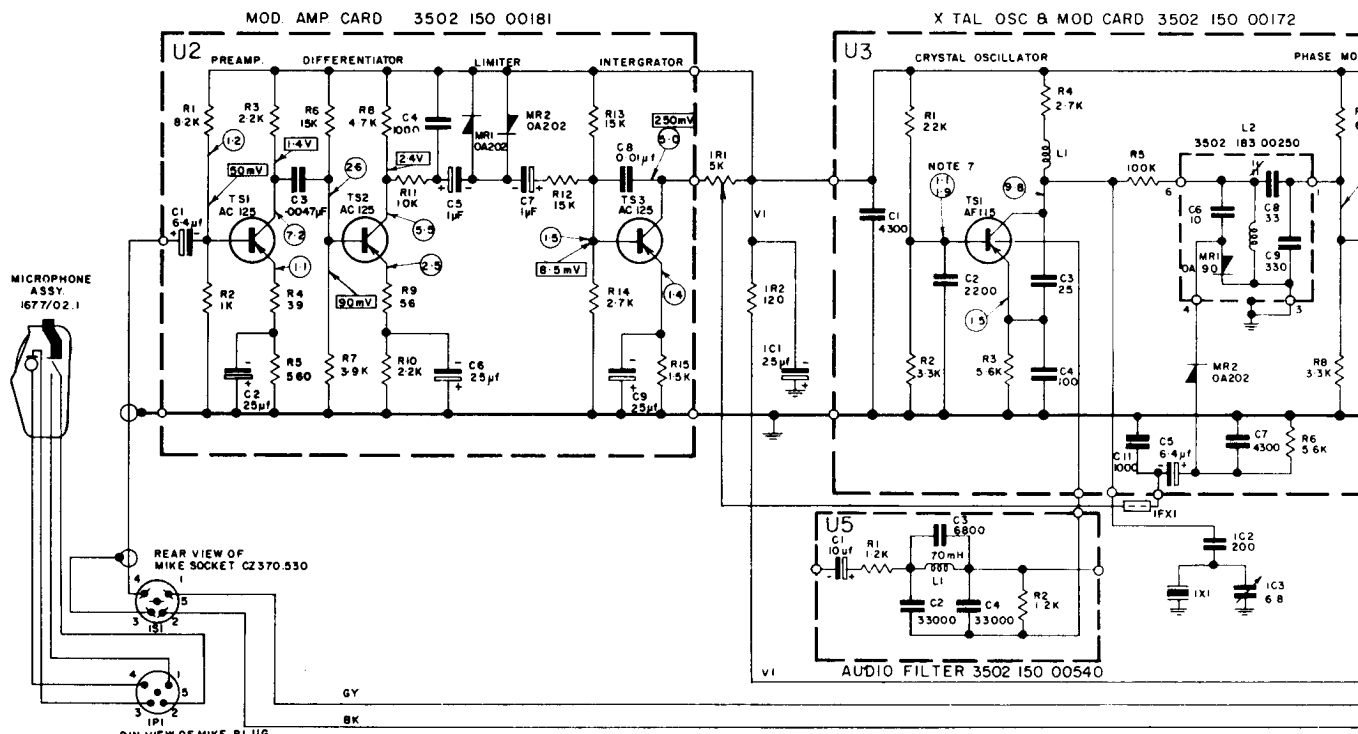
1677 MOBILE NOTES

- FOR 12.5kc/s DEVIATION USE FILTER 3502 100 0012-2
- D.C. VOLTAGE ANALYSIS SHOWN THUS: - (4)
- ALL COMPONENTS MARKED * ARE TO BE EARTHED TO A COMMON POINT
- A.C. VOLTAGE ANALYSIS SHOWN THUS: - (3.2V)
- IC19 TO BE CONNECTED FROM UNEARTHED SIDE OF BATTERY TO CHASSIS
- 0.6V WHEN MUTE CONTROL FULLY CLOCKWISE
+1.4V WHEN MUTE CONTROL FULLY ANTI-CLOCKWISE
- 11V AC WHEN NOT OSCILLATING
1.9V AC WHEN OSCILLATING

CARD 3502 150 00130

2nd. I.F. CARD 3502 150 00161



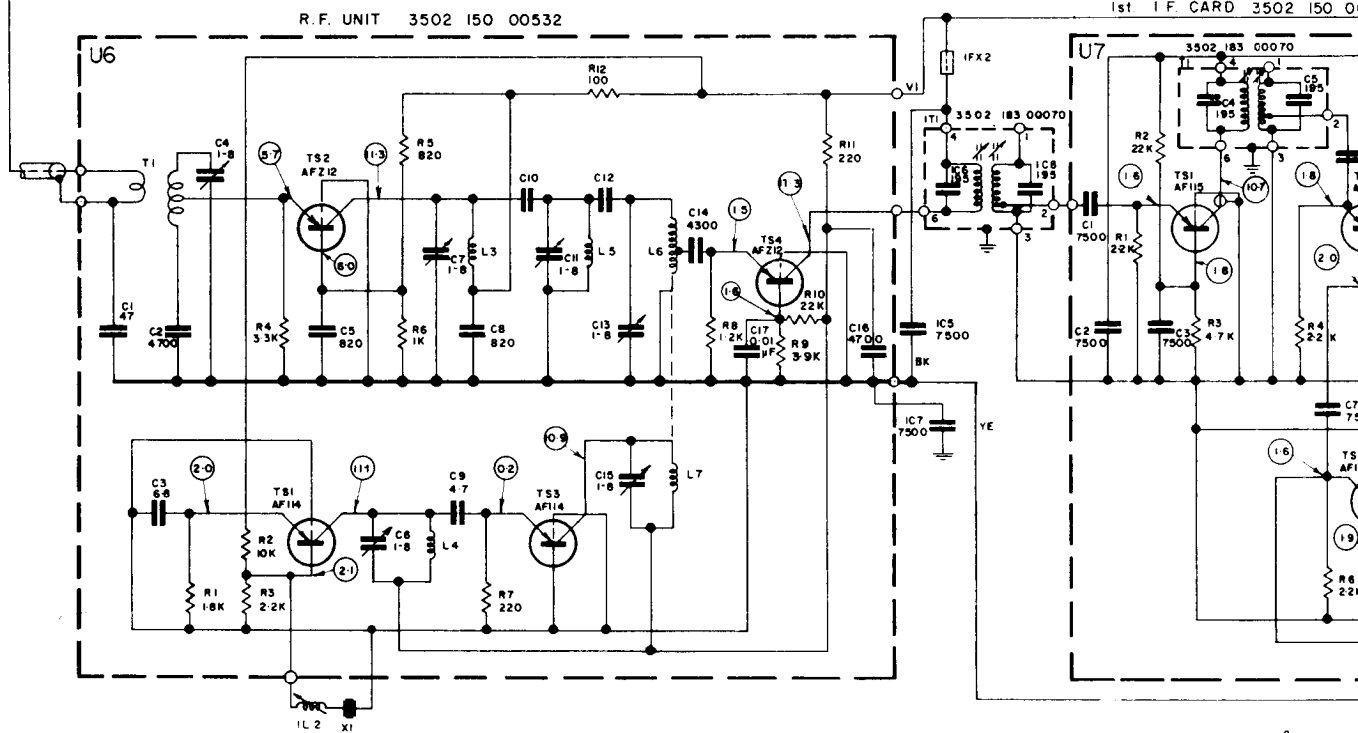


AUDIO CARD A.C. VOLTAGE ANALYSIS

FOR OUTPUT OF	1W	3W
INPUT TO AUDIO CARD	40 mV	70 mV
BASE 9TS1	36 mV	69 mV
COLLECTOR 9TS1	15 mV	29 mV
BASE 9TS2	15 mV	29 mV
COLLECTOR 9TS2	16.5 mV	36 mV
BASE 9TS3	16.5 mV	36 mV
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COLLECTOR 1TS1, 1TS2	3.9 V	7.4 V

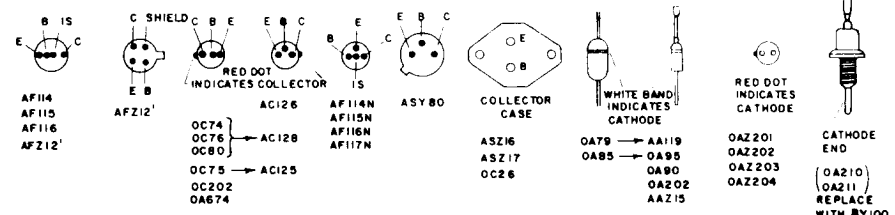
SUPPLY LEADS

R.F. UNIT	PLAIN COLOURS
1st. I.F. CARD	RED SLEEVE
2nd. I.F. CARD	BLACK SLEEVE
AUDIO CARD	BLUE SLEEVE
SQUELCH CARD	GREY SLEEVE
AUDIO OUTPUT	PINK SLEEVE
RX POS. INPUT	ORANGE WIRE
RX NEG. INPUT	GREY WIRE



NOTES

1. AFZ12 MANUFACTURED IN BOTH ENVELOPE TYPES SHOWN
2. → INDICATES REPLACEMENTS
3. 25HR10 IS IDENTICAL WITH 25H10 BUT OF REVERSE POLARITY



00
00
60
12
CATHODE
END
(0A210)
(0A211)
REPLACE
WITH 8Y100

A P P E N D I C E S

SUPPLEMENTARY INFORMATION FOR TYPE FM1677/25W

The FM1677/25W is adapted from the standard FM1677 for use with 12.5 Kc/s wide band deviation systems.

The changes from the standard circuitry are only minor and are detailed below.

RECEIVER

I.F. Filter 1FL1 is changed to one with wider band pass characteristics.
 Capacitor 1C11 is directly grounded to the chassis as shown in the 'W' circuits.
 Capacitor 8C24 is added between the positive bus of U8, 2nd IF card, and the top of filter 1FL1.
 Resistor 9R15 is added to U9, audio card. It is connected between 9C1 and the junction of 9R1, 9R2 and 9TS1 base.

3502.100.016 1FL1 changed to 1FL1 New Code 3502.100.0012.2
 C426.AM/F64 8C24 64 uf 25VW electrolytic added
 B8.305.05B/18K 9R15 18K $\frac{1}{4}$ W Carbon added.

TRANSMITTER

Audio filter card, U5 is included but not connected.
 The input lead from the movable arm of 1R1 is connected directly to the ferroxcube bead 1FX1.

Three resistor values are changed in the Mod.Amp.Card U2, to provide a higher order of audio drive so as to achieve greater deviation.

2R6 changed to 15K $\frac{1}{4}$ W Carbon New Code B8.305.05B/15K
 2R11 changed to 10K $\frac{1}{4}$ W Carbon New Code B8.305.05B/10K
 2R12 changed to 15K $\frac{1}{4}$ W Carbon New Code B8.305.05B/15K

SUPPLEMENTARY INFORMATION FOR TYPE FM1675/25

The FM1675 series of Mobile Radiotelephone Equipment is similar to the FM1677 described in the main body of this Handbook and is intended for use in systems using 15 Kc/s deviation.

The various models are:-

	<u>Frequency Range (Mc/s)</u>	<u>Channels</u>
Type FM1675A/25	70 - 85	1
Type FM1675A/25.4X	70 - 85	4
Type FM1675C/25	156 - 172	1
Type FM1675C/25.4X	156 - 172	4

The following changes in the Specification as stated herein should be noted.

3.1 General

Channel Spacing:	FM1675	60 Kc/s
	FM1675N	30 Kc/s
Power Supply Voltage:	Available for 6, 12 or 24 volts nominal.	

3.2 Receiver

Signal to Noise Ratio:	70 - 85 Mc/s	38 dB
	156 - 172 Mc/s	36 dB
Selectivity:	FM1675 (Filter CZ.320.484.4)	
	Response at ± 22.5 Kc/s - 3dB	
	Response at ± 60 Kc/s -100dB	
	FM1675N (Filter CZ.320.510 or 3502.100.00122)	
	Response at ± 14 Kc/s - 3dB	
	Response at ± 30 Kc/s - 100dB	

3.3 Transmitter

Deviation:	± 15 Kc/s
Audio Distortion:	Less than 5% for A Band and Less than 7.5% for C Band.
Harmonic Radiation:	-55 dB.

OPERATION OF TYPE FM1677 MOBILE ON REDUCED POWER

The Type FM1677/25 may be operated on a reduced power of either 5 watts or 10 watts. The necessary changes to the circuitry are detailed below.

5 Watts Output

- (i) 4R23 becomes 22K ohms 1 watt, Code: B8.305.07B/22K
- (ii) 4R24 added, 33K ohms 1 watt, Code: B8.305.07B/33K
Add from cathode (pin 3) of P.A. valve (4V3) to earth.
- (iii) Change wire from pin 9 to pin 12 on 1677/502/12 DC/DC converter.

10 Watts Output

Change wire from pin 9 to pin 12 on 1677/502/12 DC/DC converter.

K4XL's **BAMA**

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