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*Colin Hinson*

*In the village of Blunham, Bedfordshire, UK.*

# Service Manual



Pye Telecommunications Ltd

Beaver  
VHF FM Mobile  
Radiotelephone  
Types M254 & M256

### WARNING

Certain semiconductor devices used in this equipment contain Beryllium Oxide. If inhaled, dust from this oxide can be toxic.

No danger can arise from normal handling but no attempt should be made to tamper with these devices.

They should not be discarded with industrial or domestic waste.

This service manual is for the maintenance of Pye Telecommunications equipment. The performance figures quoted are typical and are subject to normal manufacturing and service tolerances.

The right is reserved to alter the equipment described in this manual in the light of future technical development.

## BEAVER VHF FM MOBILE RADIOTELEPHONE TYPES M254 AND M256

SERVICE MANUAL  
ISSUE 1 MARCH 1976

THE TELECOMMUNICATIONS LIMITED

CAMBRIDGE

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## AMENDMENT LIST

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Should it be necessary to raise the issue of a publication the amendment numbering will recommence with No. 1.

Amend't No.	Date	Initials	Remarks
1	October 1978		Incorporated on Reprint

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# SECTION 1

## GENERAL INFORMATION

### SUMMARY OF DATA

#### General

Operation	Single or two-frequency simplex
Modulation	Frequency (phase)
Frequency Bands	Band A 148—174 MHz Band B 132—156 MHz Band E 68—88 MHz
Channel Spacing	12,5 kHz — S 20 kHz — R 25 kHz — V
No. of Channels	Single Channel Up to 6 Channels Up to 12 Channels
Switching Bandwidth	±0,5% mean operating frequency
Equipment Operating Temperature Range	—30°C to + 60°C ambient
Frequency Stability	Stabilities are available to meet climatic and mandatory requirements up to ±0,0005% over the temperature range —30°C to +60°C
Power Supply	12V (nominal) DC supply, positive, negative or floating ground. 24V operation available by separate regulator unit.
Current Consumption	Receive (standby): M254 360mA approx. M256 440mA approx.  Transmit: 4,25A
Operator Controls	On-Off switch, Squelch Volume, Channel selector *Reset/Lock/Defeat Switch
Indicator Lamps	Power on (also illuminates channel selector and volume control) Transmit: *Call Lamp
Overall Dimensions	Main Unit: 198mm wide x 93mm high (includes mounting plate) x 241mm deep (7,8 x 3,6 x 9,5 in) Main Unit: 198mm wide x 93mm high (includes mounting plate) x 222mm deep (7,8 x 3,6 x 8,7 in) Speaker Unit: 1. Weatherproof flat circular 215mm x 178mm x 102mm (8,5 x 7 x 4 in) 2. Weatherproof Re-entrant Horn 127mm x 50mm x 76mm (5 x 2 x 3 in) Control Unit 201mm wide x 85mm high x 84mm deep (across projections) (7,9 x 3,3 x 3,3 in)  *Used only with Selective Call Module

## Summary of data (Contd.)

Finish	Main Unit and Control Unit:	die cast aluminium finished in yellow with black polycarbonate front panel
	Speaker Unit:	Yellow
Optional Extras	(i) 2–12 channels (ii) 24V regulator — VR200 (iii) RF power amplifier — A200 (12V DC supplies only) (iv) Choice of antennas (v) Selection of Selective Call modules (Details on application) (vi) Choice of frequency stabilities (vii) Telephone handset in place of fist microphone (viii) Adjustable Transmitter Power Module (ix) Choice of either circular bulkhead or re-entrant horn loudspeaker (both weatherproof)	

## Receiver

Input Impedance	50 $\Omega$
Sensitivity	20 db quieting for 0,35 $\mu$ V PD signal input
Signal/Noise	12 db SINAD for 0,25 $\mu$ V PD signal input
Audio Output	M254 3,0W with less than 5% distortion at 1 kHz M256 2,5W with less than 5% distortion at 1 kHz
Audio Response	+1 db to –3 db of a 6 db per octave de-emphasis characteristic from 300 Hz to 3 kHz
Intermodulation Attenuation	70 db
Spurious Response Attenuation	85 db
Squelch	6 db quieting at threshold. Sensitivity adjustable

## Transmitter

Output Impedance	50 $\Omega$
Power Output	15W minimum (at 13,8V DC input) (Adjustable down to 5W as required. 25–50W available with separate power amplifier)
Spurious Outputs	Harmonics 2,5 $\mu$ W at antenna socket. Other outputs 0,25 $\mu$ W at antenna socket.
Modulation	+1 db to –3 db of 6 db per octave pre-emphasis characteristic from 300 Hz to 3 kHz
Modulation Distortion	Less than 5% at 1 kHz with 60% deviation

Typical figures based on normal operating conditions. Pye policy is one of continuous improvement therefore the right is reserved to change specifications without notice.



## INTRODUCTION

1. The Beaver is a frequency modulated VHF mobile radiotelephone designed for two-way communication between mobiles and a base station.
2. Two versions of the equipment are available, type M254 (Front Mount) and type M256 (Remote Mount). Both types employ similar ruggedised transceivers (featuring plug-in modules) together with one of the two loudspeakers available and either a fist microphone or handset. All items of the installation are weatherproof. The only physical difference between the M254 and M256 is that the control panel of M254 is integral with the transceiver while that of the M256 is contained in a separate control unit and connected to the transceiver through a control cable.
3. It operates on fixed crystal controlled frequencies in the range 68 to 174 MHz using either single or two-frequency simplex working.
4. Single and multiple channel versions are available; in multiple channel equipments provision is made for up to 12 communication channels spaced at 12,5 kHz, 20 kHz or 25 kHz within  $\pm 0,5\%$  of the centre frequency. The channel spacing can be changed by replacing the IF Amplifier and Squelch Module.
5. The transmitter generates a modulated carrier of 15 watts into a  $50\Omega$  load; an add-on RF amplifier (Pye Type A200) is available which increases the output to 50 watts.
6. The receiver delivers 3 watts (M254) or 2,5 Watts (M256) audio with less than 5% distortion into a  $3\Omega$  load.
7. The power supply is normally 12V DC nominal but a 24/12V voltage regulator unit (Pye Type VR200) is available for use with 24V DC systems.
8. Space provision is made within the transceiver for any one of a range of Pye selective signalling facilities.



EQUIPMENT VARIATIONS

Equipment Label

The sub-assemblies fitted to a transceiver will vary according to the role in which it is used. The complement of sub-assemblies for any particular transceiver is indicated by a code number shown on the Equipment Label (together with the catalogue and serial numbers) attached to the transceiver frame assembly. A typical equipment number is given below:

M254	01	V	A0	A0	1
Catalogue Number	Market Code	Channel Spacing	TX Band	RX Band	No. of Channels
	01—Standard	S—12.5 kHz	A	148—174 MHz	0 No crystals fitted
	Production	R—20 kHz	B	132—156 MHz	1 to 9 No. of channels crystallised
		V—25 kHz	E	68—88 MHz	X—10 channels crystallised
					A—11 channels crystallised
					B—12 channels crystallised

Frequency Label

The transmit and receive frequencies for each channel, when known, are shown on the Frequency Label attached to the rear of the transceiver frame assembly.

Should the equipment be supplied less crystals, it should be checked on the recommended Test Frequencies as detailed under 'Test Frequency Crystal Information' in Section 2.

Installation Items

The equipment can be supplied (by agreement) as follows:—	CODE
Less Installation Items	0
With Installation Items including Bulkhead Loudspeaker	A
With Installation Items including Horn Loudspeaker	B
With Installation Items less loudspeaker.	9
With Installation Items for Motor Cycle Mounting	C

Functions

Standard Function — no internal facility socket fitted	1
Single Selective Call Facility — internal facility socket and Selective Call Module fitted*.	N

Primary Options

- Fist microphone assembly
- Telephone handset assembly

Power Output

'Add-on' 50W Amplifier Unit (A200). See A200 Service Sheet — TP200.

Power Output Control

An alternative PA Assembly can be provided to enable the transmitter output to be varied between 5W and 13W.

## **24V Input Power**

24V Regulator Module (VR200) (Publications Ref. No. TP201)

\*Details of the Selective Call Modules and their functions are available on application.

## **MODULE IDENTIFICATION**

For the purpose of easy identification, each module is allotted a prefix number which is shown on all circuit diagrams. A prefix number is also given to the Mother Board. It should be noted that these prefix numbers are applicable ONLY TO THE BEAVER TYPES M254 AND M256

### **Receiver Modules**

- (1) RF Front End
- (2) IF Amplifier and Squelch
- (4) Receiver Oscillator Multiplier

### **Transmitter Modules**

- (8) Transmitter Exciter
- (9) Power Amplifier

### **Common Modules**

- (3) Receiver/Transmitter Oscillator — Single and Multiple Channel
- (7) Transceiver Audio
- (6) 12,5V Restrictor and 10V Regulator
- (10) Antenna Filter and Changeover Relay
- (11) Mother Board
- (12) 30 Way Interconnection Board (Front Mount)
- (13) 30 Way Interconnection Board (Remote Mount)
- (14) Options Interconnection Board.

## SECTION 2

### INSTALLATION AND OPERATION

#### PRE-INSTALLATION CHECKS

##### CAUTION

Where 'Pozidriv' screws are used in this equipment, use only the appropriate size of 'Pozidriv' screwdrivers.

#### Unpacking Information

Unpack the container and check the items against Contents List. (See Contents List on page 2.2 or 2.10). Check that no obvious damage has occurred during transit

**NOTE:** *Pye Telecommunications Ltd, or our authorized agents, must be advised by letter of any shortage or damage within 10 days of receipt.*

#### Serviceability Check

**NOTE:** *Before checking remote mount equipments, interconnect Control unit and transceiver using the control cable.*

1. Connect the ignition switch lead (white) (fused at 500mA) to the positive lead (red). Ensure that the 500mA fuse is fitted. Do not connect microphone.
2. Fit 5A fuse into fuse box and connect power supply (see 'Test Equipment' on page 4.8) to the red & blue leads of equipment, ensuring that the fuse is in the live lead. Adjust the power supply for 13,8V output.
3. Using Signal Generator, AF Output Meter and RF Output Meter (see 'Test Equipment' on page 4.8 for suitable types) check equipment serviceability as follows:—
  - (a) Connect AF Output Meter (set to  $3\Omega$  impedance), as shown in fig. 4 5, across the brown and blue loudspeaker leads, connect Signal Generator to Antenna Socket

**NOTE:** *Crystals are normally fitted before shipment and the Frequency Label (on rear of transceiver) suitably inscribed with details of TX and RX frequencies for each channel. Should the equipment be shipped less crystals, it should be checked on recommended Test Frequencies shown.*

- (b) Adjust Signal Generator to the Receiver operating frequency and inject a 1mV PD signal modulated with a 1 kHz tone and 1,5 kHz deviation.
  - (c) Carry out Operating Instructions (see page 2.14) for RECEPTION and check that a reading is obtained on the AF Output Meter of 3W for M254 or 2,5W for M256.
  - (d) Disconnect Signal Generator and AF Output Meter. Connect the microphone.
  - (e) Connect RF Output Meter to the Antenna Socket and carry out Operating Instructions for TRANSMISSION. Check that the Power Meter reading is not less than 15W.

## NETTING PROCEDURES

**Receiver.** With carrier received from base station, hold marker oscillator near the 10,7 MHz Crystal Filter. Adjust appropriate crystal trimmer for zero audio beat note. Repeat for each channel if more than one fitted.

**Transmitter.** Transmit (carrier only) to base station. Check audio beat as above at base station receiver. Adjust mobile transmitter oscillator trimmer to give zero beat at base station. Repeat for each channel, if required.

**NOTE:** *Apart from the above procedures, adjust oscillator trimmers with reference to a frequency sub-standard only.*

## TEST FREQUENCY CRYSTAL INFORMATION (for equipment supplied 'Less crystals')

Band	Rx or Tx	Test Xtal Freq. MHz	Multiplication	Test Freq. MHz	Rx Injection Freq. MHz.
A	Tx	13,2175	X12	158,61	
	Rx	13,9583	X12 (−10,7 MHz)	156,8	167,50
B	Tx	12,250	X12	147,00	
	Rx	13,5708	X12 (−10,7 MHz)	152,15	162,85
E	Tx	6,500	X12	78,00	
	Rx	7,950	X12 (−10,7 MHz)	84,70	95,40

## CONTENTS LIST (INSTALLATION ITEMS) FOR FRONT AND REMOTE MOUNTS

PART Nos.	DESCRIPTION	Qty.	REMARKS
AT05225	Transceiver M254	1	Front Mount only
	or		
AT05226	Transceiver M256	1	Remote Mount only
AT04730/02	Control Unit	1	Remote Mount only
AT36384/05	Control Cable Assembly 5 metres	1	M256 to Control Unit
			Remote mount only
275590/03	Loudspeaker Bulkhead (Weatherproof)	1	
	or		
AT12742/02	Loudspeaker Re-entrant Horn (Weatherproof)	1	Clamp or surface mounting
AT29690	Fist Microphone & Lead Assembly	1	
	or		
AT29689	Handset (Weatherproof)	1	
FH00629	Microphone Rest	1	Handset
FH00642	Microphone Rest	1	Fist Mic.
AT12836	Cradle Assembly	1	Transceiver

AT12732/03	Power and Loudspeaker Lead Assy.	1	
BT30081	Terminal Block	1	Power & Ignition lead
FP13742	Elbow Plug Coaxial (series BNC)	1	Mating component to transceiver Antenna socket
FH02837	Fuseholder Block	1	
FF99006	Fuses (5A)	2	
QW41212/A	No. 6 x ¾ Pan. Hd. Self Tap Screw	2	Fuseholder block
QJ13032/A	Hex Bolt M5 x 30 mm	4	Loudspeaker
QJ13051/A	Hex Bolt M6 x 30 mm	4	Cradle assembly, 2 Control Unit
QW41212/A	No. 6 x ¾ Slot ST Screw	1	Terminal Block
QY41214/A	No. 8 x 7/8 Slot S/T Screw	3	Microphone Rest
QA11609/A	Full Nut Hex. M5	4	Loudspeaker
QA11610/A	Full Nut Hex. M6	4	Cradle, 2 Control Unit
QA15009/A	Washer M5	8	Loudspeaker
QA15010/A	Washer M6	8	Cradle, 4 Control Unit
BT17168	Module Extractor	1	PW Boards (Transceiver)
	Antenna & Lead Assembly	1	Optional Item
			Despatched separately when ordered

## INSTALLATION PROCEDURE

### Equipment Required

Circle Cutter, Holesaw or Socket Punch

Drills (see sizes below)

Electric drill for drilling mounting holes

'Pozidriv' and flat-blade screwdrivers for mounting screws

Soldering iron

Drill Sizes

Drill for No. 6 Self-Tapping Screws	—	2,35 mm (or No. 42)
Drill for No. 10A Self-Tapping Screws	—	3,40 mm (or No. 29)
Drill for No. 8 Self-Tapping Screws	—	2,9 mm (or No. 33)
Allen Key	—	M2,5 and M3

**NOTES:** *The item to be fitted can be used as a drilling template.*

*Detail of the screws required to secure the installation items is shown in the Contents List.*

*If possible, the cables should be routed away from the areas of extreme heat and possible battery acid leakage; to minimize noise pick-up, they should be kept clear of ignition circuits.*

*Wherever possible, existing holes in the bulkhead should be used. If metal work has to be drilled, ensure that the new holes are fitted with grommets.*

*Refer to Basic Installation Diagram Fig. 2.2 throughout this procedure.*

### Procedure

1. (Determine location of the following: Cradle Assembly, Control Unit (Remote Mount only), Loudspeaker and Microphone Rest.

When finalising the locations of the above items, the length of the following cables should be noted.

Power and LS Leads 1 metre (39,37 in.)

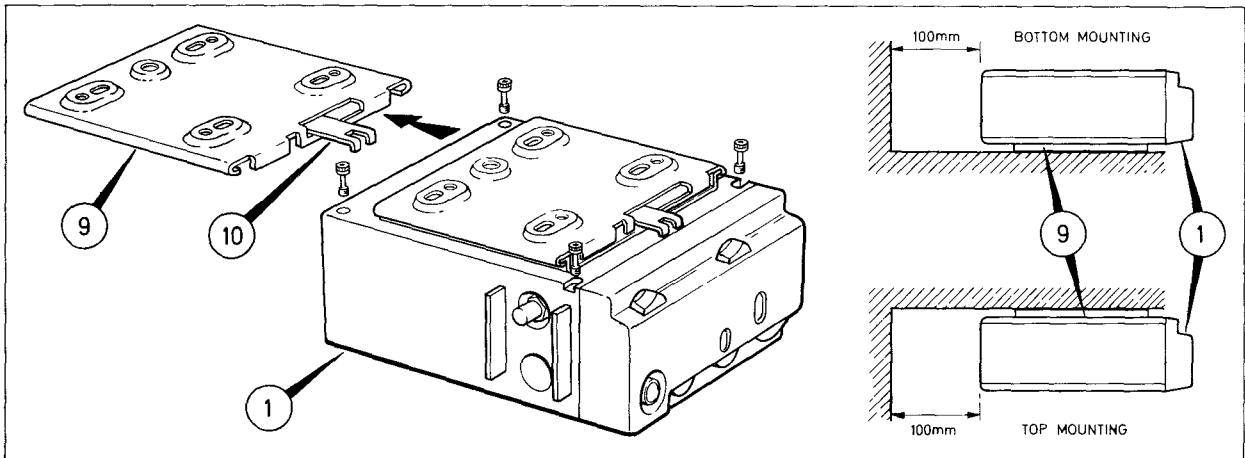
Bulkhead Loudspeaker lead 1,65 m (5ft 5 in.)

Horn Loudspeaker lead 1,22 m (4ft.)

Control Cable (remote mount only) 5 m (16ft 5 in.)

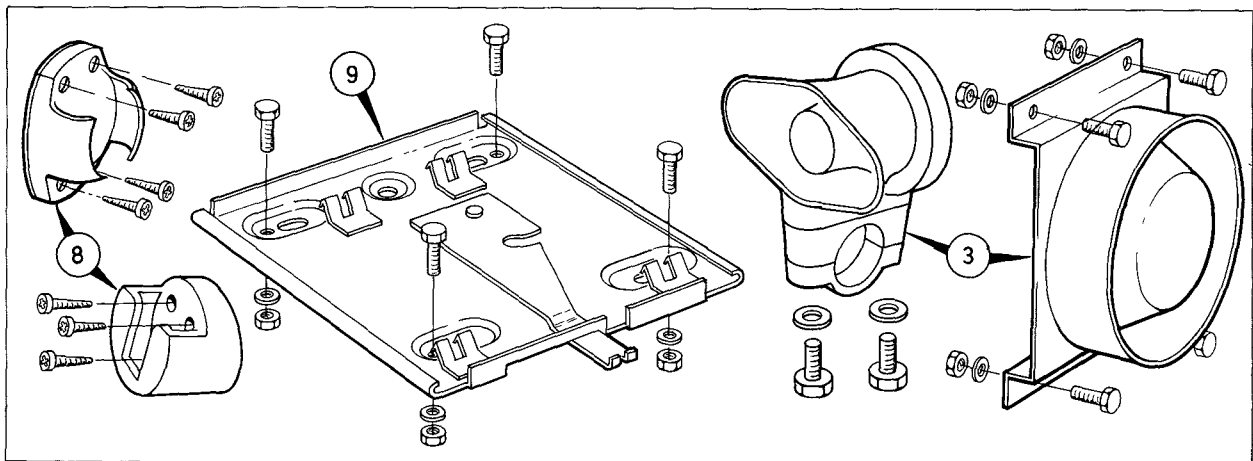
2. Remove cradle assembly by moving the release lever to the right and pushing the assembly to the rear

**NOTE 1** *The equipment is supplied with the Carrier Plate fitted to the top cover. To interchange covers remove the four screws with socket heads securing each cover and interchange top and bottom covers.*



**NOTE 2** *Before finalising the Cradle Assembly location, ensure that it allows adequate clearance at the rear (100 mm), at the left hand side (50 mm) for the power and the antenna plugs of the transceiver, and that the front panel projects beyond mounting surface to give access to controls.*

3. Install Cradle Assembly (release lever to front), Loudspeaker, Control Unit (Remote Mount only) and Microphone Rest. (See Contents List for Fixing Screws).



**NOTE:** *The control unit support bracket is drilled at its ends so that the control unit can be mounted at any one of three angles. Reversing the bracket provides three slightly different angles.*

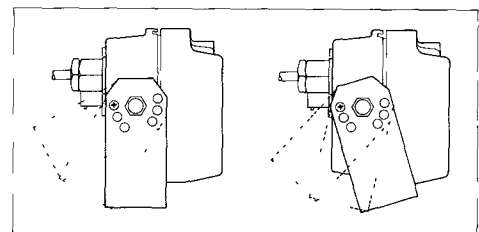
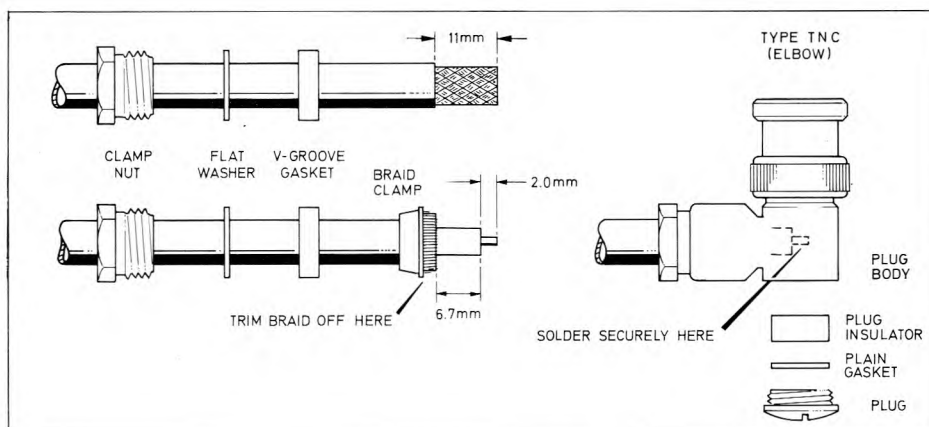




Fig. 2.1 Typical Installation (Front Mount)

4. Mount the Antenna. See Antenna Fixing Instructions for fitting details. Connect the Feeder Plug as shown.



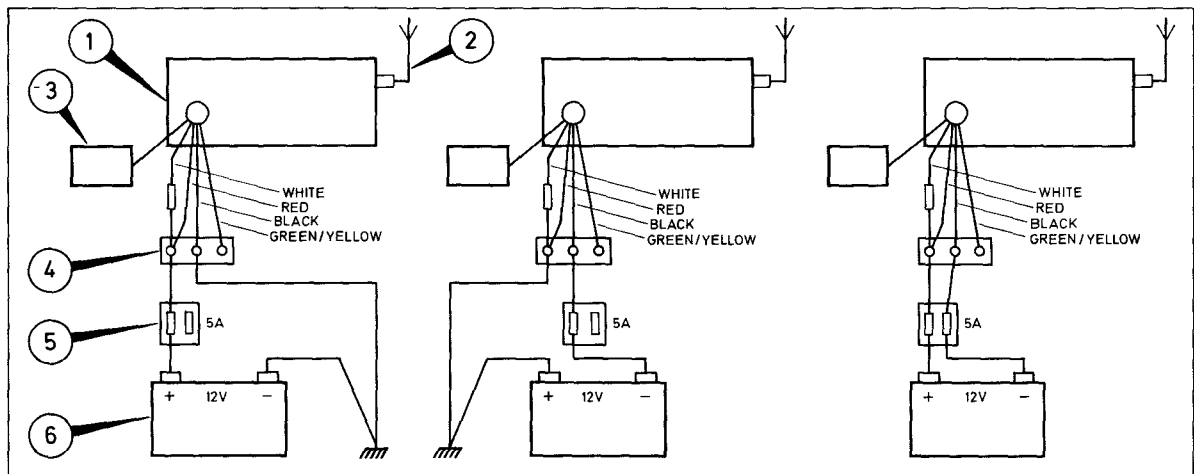
For best all-round performance of the radiotelephone, the antenna should be mounted on the centre of the vehicle roof.



5. Connect the installation supply to vehicle battery as follows:—

(a) 12v Supply

- NOTES:**
1. Cable (not supplied) used between battery and connector block should be 63/0,2 mm
  2. Ignition switching lead (fused at 500mA) must be linked to the positive power lead at the 3-way connector block if ignition switching is not used.
  3. The Power and Loudspeaker Lead Assembly is colour coded as follows:—  
Red = Positive. Black = Negative; Yellow/Green = Switching lead for A200 or VR200: White = Ignition switching; Brown = LS; Blue = LS

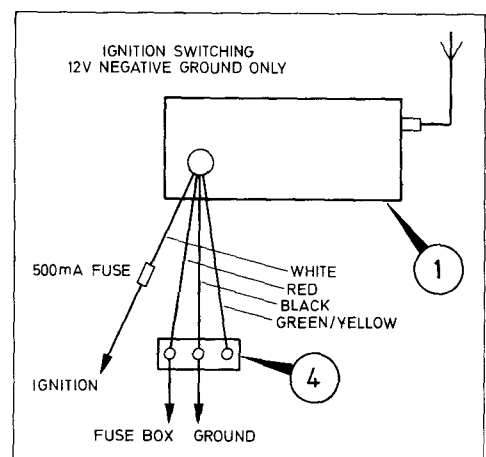


- Secure fuse box 5 close to battery 6
- Wire from battery 6 to connector block 4 (live lead via fuse box: if floating ground fuse both leads)
- Connect transceiver power leads to connector block 4. Ensure that red (positive) end and white (ignition) leads are connected to common terminal.
- Plug in fist mic (or handset) 7 and loudspeaker 3
- Remove protection cover on antenna socket & plug in antenna feeder 2.
- Slide mobile 1 into cradle assy 9 ensuring that retaining lever 'clicks' into locked position.

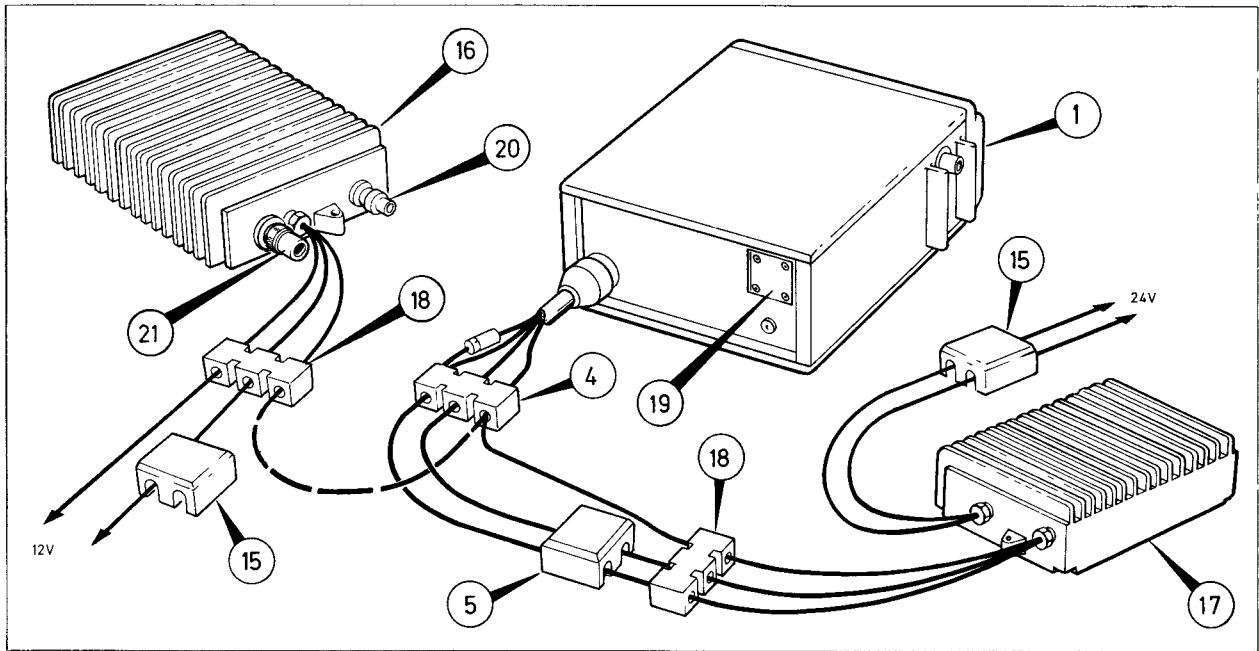
(b) Ignition Switching

This feature is available only to 12V negative ground vehicles.

- Connect red, black and yellow/green power leads to connector block 4 as shown
- Connect white (fused) lead to ignition switch



## 6. ANCILLARY ITEMS



### LEGEND

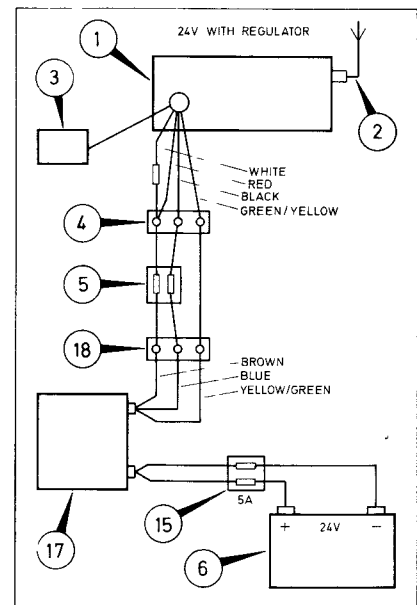
**NOTE:** THESE INDICATOR NUMBERS APPLY TO ALL DRAWINGS.

- |   |  |
|---|--|
| 1-14 As basic installation diagram legend | 18. 3-Way Connector Block                          |
| 15. Fuseholder                            | 19. Blanking Plate (M254) Control Connector (M256) |
| 16. Amplifier A200                        | 20. Input Connector                                |
| 17. Regulator VR200                       | 21. Output Connector                               |

#### (a) Regulator VR200 (for 24V DC Supply)

**NOTE:** The VR200 casing is weather proof but for optimum reliability it should be mounted in an area free from constant wetting or immersion.

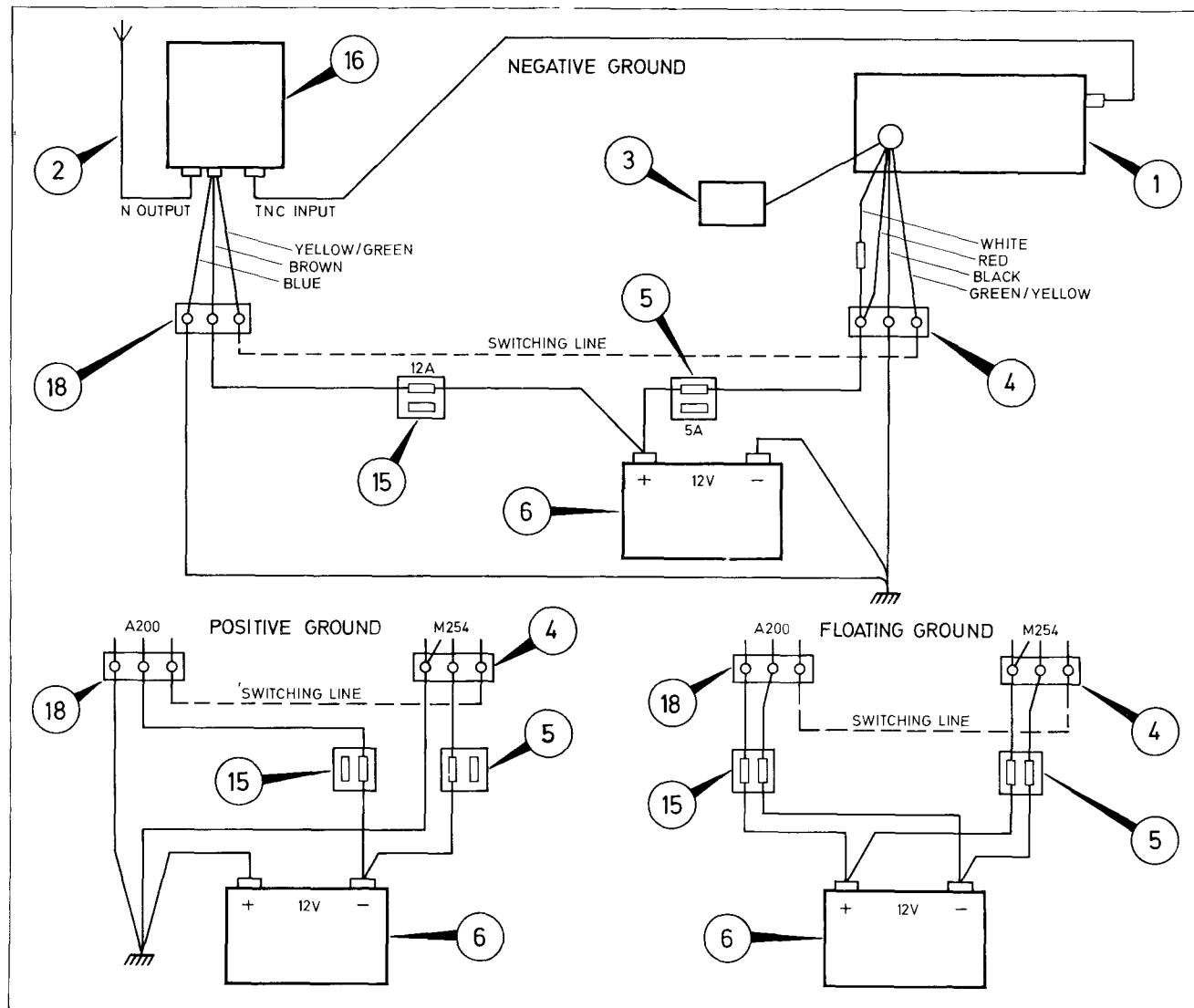
- (i) Secure fuse box 15 close to battery 6
- (ii) Wire from battery 6 to 24V input via fuse box 15 fusing both leads (5A).
- (iii) Connect VR200 12V (3-core) cable to 3-way connector block 18
- (iv) Link connector blocks 4 and 18 so that the yellow/green cores are connected.
- (v) Wire between connector blocks 4 and 18 via fuse box 5 so that both leads are fused (5A).



(b) Amplifier A200 (Not available for 24V Systems)

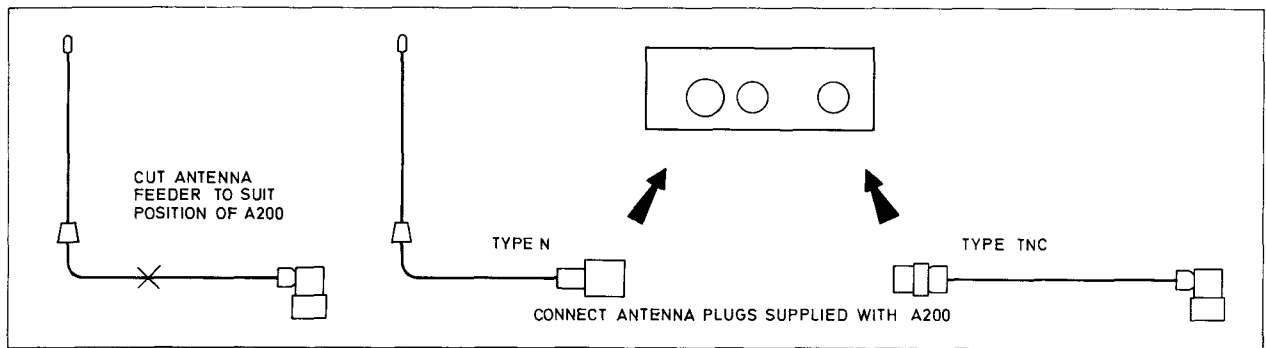
**NOTES:**

1. A separate circuit, fused at 12A is required to power the amplifier. A 3-core power cable is supplied, if required the third core can be connected into the radiotelephone OFF/ON switch to provide switching for the amplifier.
2. The A200 should be mounted in a clean dry location on the route of the antenna feeder.



**INSTALLATION**

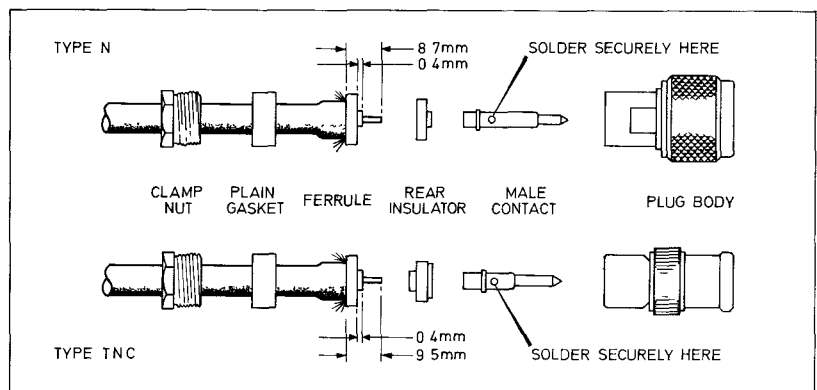
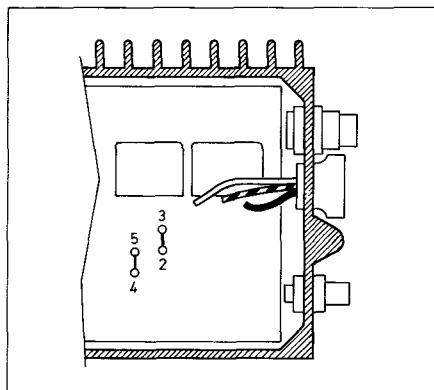
- Fit mounting plate
- Locate 12A fusebox 15 close to the battery and 3-way connector block (18) within 1 m of A200 front panel.
- Wire from battery to 3-way connector block (18) 2,5 mm or 70/.0070 cable) live lead via fusebox 15, fuse both leads if floating ground supply is used.
- Connect A200 power leads to 3-way connector block (18).
- Cut antenna feeder to suit location of A200.
- Fit free ends with appropriate plugs as shown.
- Secure A200 to mounting plate and connect plugs.



(h) Check tie-on label BT18937

If it carries a warning calling for the amplifier to be aligned before use, then carry out 'change of frequency procedure' below.

If not the installation can be put into use immediately.



## OPTIONAL SWITCHING

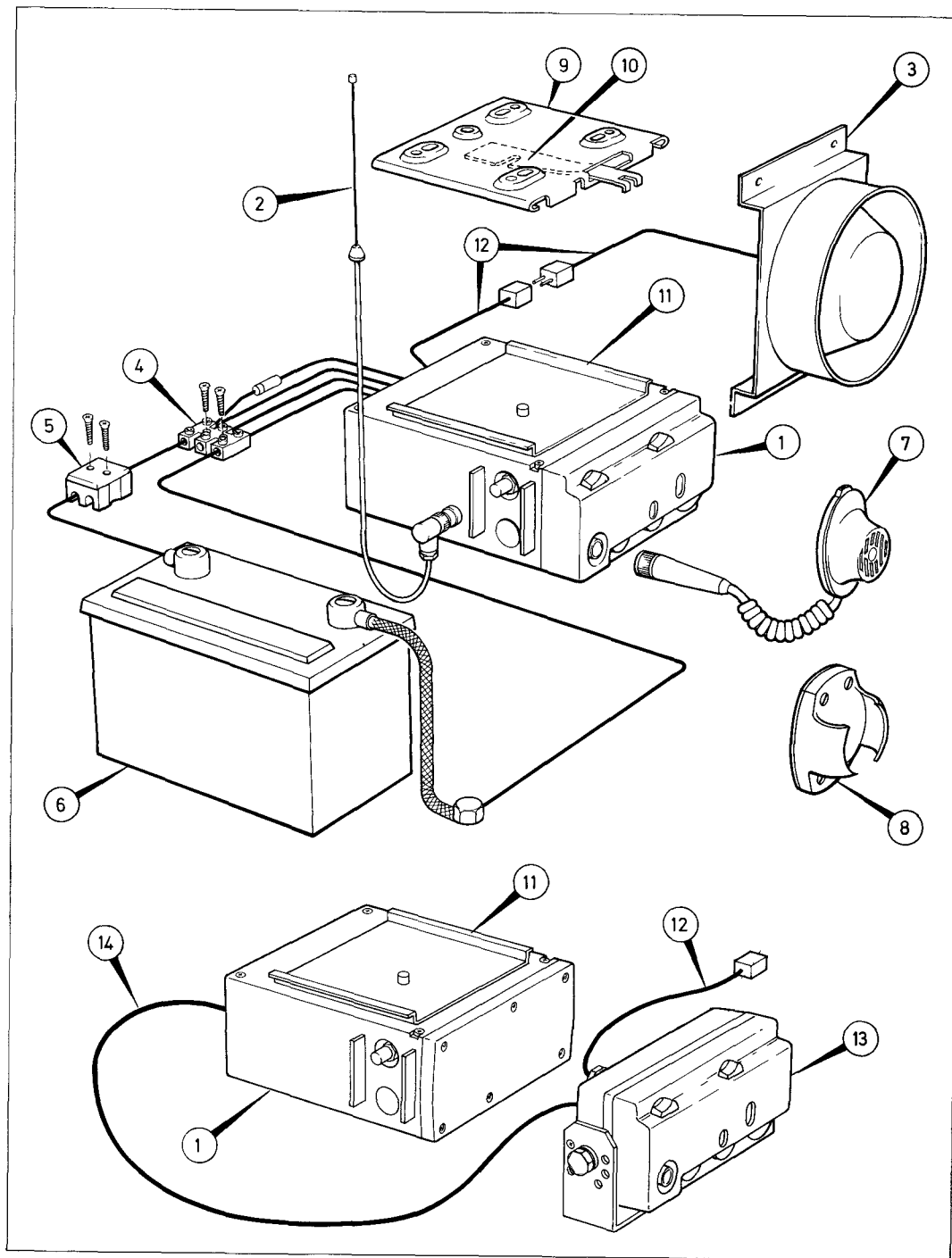
- Remove A200 top cover cut links from mother board pins 4 & 5 and 2 & 3.
- Connect the two connector blocks (13) and (14) so that the yellow/green cores are linked.

## CHANGE OF FREQUENCY PROCEDURE – FM ONLY

- Remove A200 cover
- Disconnect antenna from A200 output socket. Connect Power Output Meter in its place.
- Key radiotelephone and tune as follows:—
 

AB and M Band	—	Tune C8 and C17 for maximum output
E Band	—	Tune C8, C17 and C34 for maximum output
	—	Check output is 50W
- Disconnect power meter. Reconnect antenna to A200.

**NOTE:** If it is required to check the radiotelephone output with the A200 connected to it then disconnect the power supply to the A200 and carry out the above procedure. Check that the power output is 13W

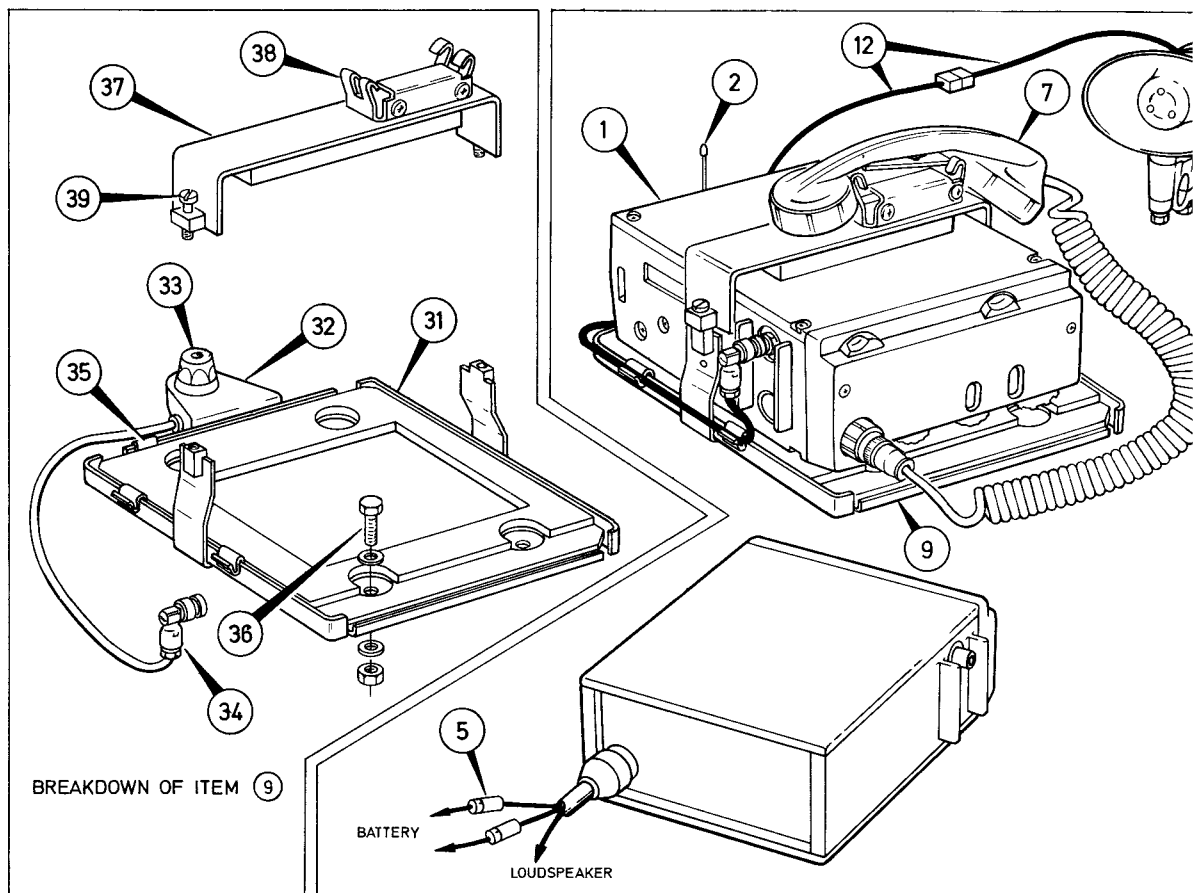


## LEGEND

**NOTE:** These indicator numbers apply to all drawings shown in this Installation Procedure

- |                           |                             |
|---------------------------|-----------------------------|
| 1. Transceiver            | 7. Microphone & Lead Assy.  |
| 2. Antenna & Feeder Cable | 8. Microphone rest.         |
| 3. Loudspeaker Assy.      | 9. Cradle Assy.             |
| 4. 3-Way Connector Block  | 10. Release Lever           |
| 5. Fuse Holder            | 11. Carrier Plate and Cover |
| 6. Vehicle Battery        | 12. Loudspeaker Lead        |
|                           | 13. Remote Control Unit     |
|                           | 14. Control Cable           |

**Fig. 2.2 Basic Installation Front & Remote Mount**



## LEGEND

*NOTE: These indicator numbers apply to all drawings shown in this Installation Procedure.*

- |                      |                            |
|----------------------|----------------------------|
| 1. Transceiver M254  | 7. Microphone & Lead Assy. |
| 2. Antenna           | 9. Cradle Assy.            |
| 3. Loudspeaker Assy. | 12. Loudspeaker Lead       |
| 5. Inline Fuses      |                            |

*NOTE: Numbers 4, 6, 8, 10 and 11 are not used.*

Fig. 2.3 Basic Installation Motorcycle

## MOTOR CYCLE INSTALLATION

### CONTENTS LIST

Part No.	Description	Qty.	Remarks
AT05225	Transceiver Type M254	1	
AT12742/02	Loudspeaker Re-entrant Horn (Weatherproof)	1	Clamp or surface mounting
AT29689	Handset (weatherproof)	1	
AT12740/01	Cradle Assembly	1	Includes Antenna Base and feeder with plug
AT12748/01	Power and Loudspeaker Lead Assy.	1	Includes 'in-line' fuse.
AT12741	Retainer Strap Assembly	1	Includes handset rest
AT36364	Earth Lead Assembly	1	
FA00822	Antenna	1	
AT26293/01	Bagged Items	1	
Consisting of:—			
QJ13053/A	Bolt Hex. Hd. St. Cad. M6 x 40	4	Cradle to M/Cycle
QA15010/A	Washer Large St. C. M6	8	
QA11610/A	Full Nut St. Cad. M6	4	
QJ11916/X	Screw Pozi Pan M4 x6	1	Earth Lead to transceiver

### Tools Required

Slot and Pozidriv Screwdrivers  
Allen Key M2,5  
Spanner Open-ended M6

### Package Check

Check package against Contents List for shortages and transit damage

**Note:** *Pye Telecommunications Ltd, or our authorised agents, must be advised by letter of any shortage or damage within 10 days of receipt.*

### Installation Procedure

- Note: 1 Connecting Lead lengths are as follows:—  
Power 1,728m (5ft, 8 in.)  
Loudspeaker (part of Power Lead Assy.) 0,75m (2 ft. 5,6 in.)  
(part of Loudspeaker Assy.) 1,2m (4 ft.)
- Note 2 The cradle may be mounted on the Motorcycle carrier with the antenna bracket either to the rear or on the offside.
- Note 3 Connecting leads should be routed away from the ignition system, antenna feeder and areas likely to cause chafing or pinching of the cables.
- Note 4 Refer to Basic Installation and Schematic Diagrams throughout the procedure.



## 1. Transceiver

- (a) Locate mounting cradle on the carrier and secure (See Note 2).
- (b) Place transceiver on the mounting cradle rubber pad so that carrier plate on the bottom cover locates in the recess in the pad. Controls to face either the saddle or the nearside. Fit and secure retaining bracket.

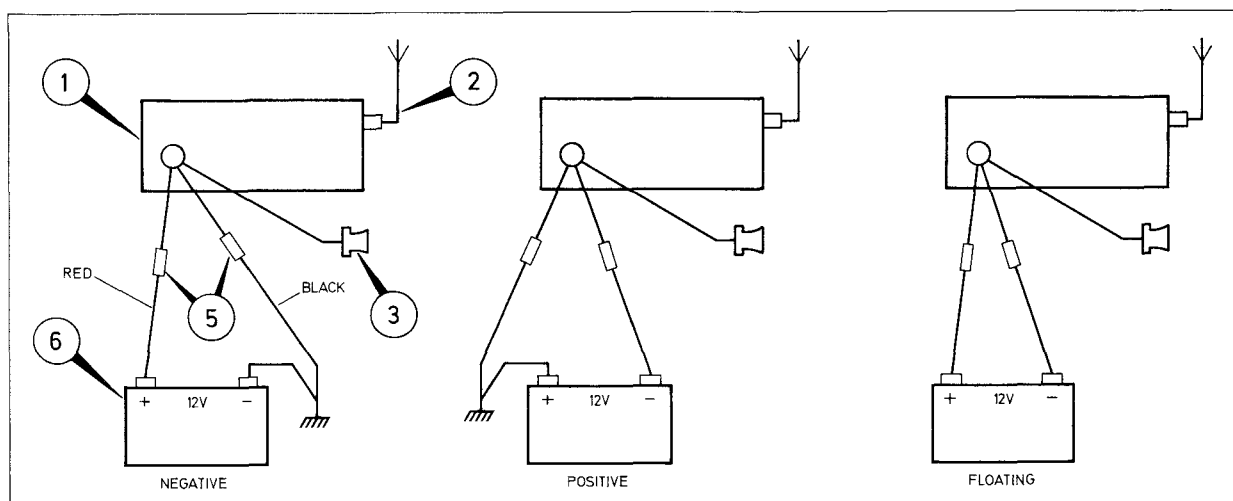
## 2. Loudspeaker

Clamp loudspeaker to handlebar.

**Note:** *A packing sleeve may be required to take up the difference between the diameter of the handlebar and the diameter of the clamp.*

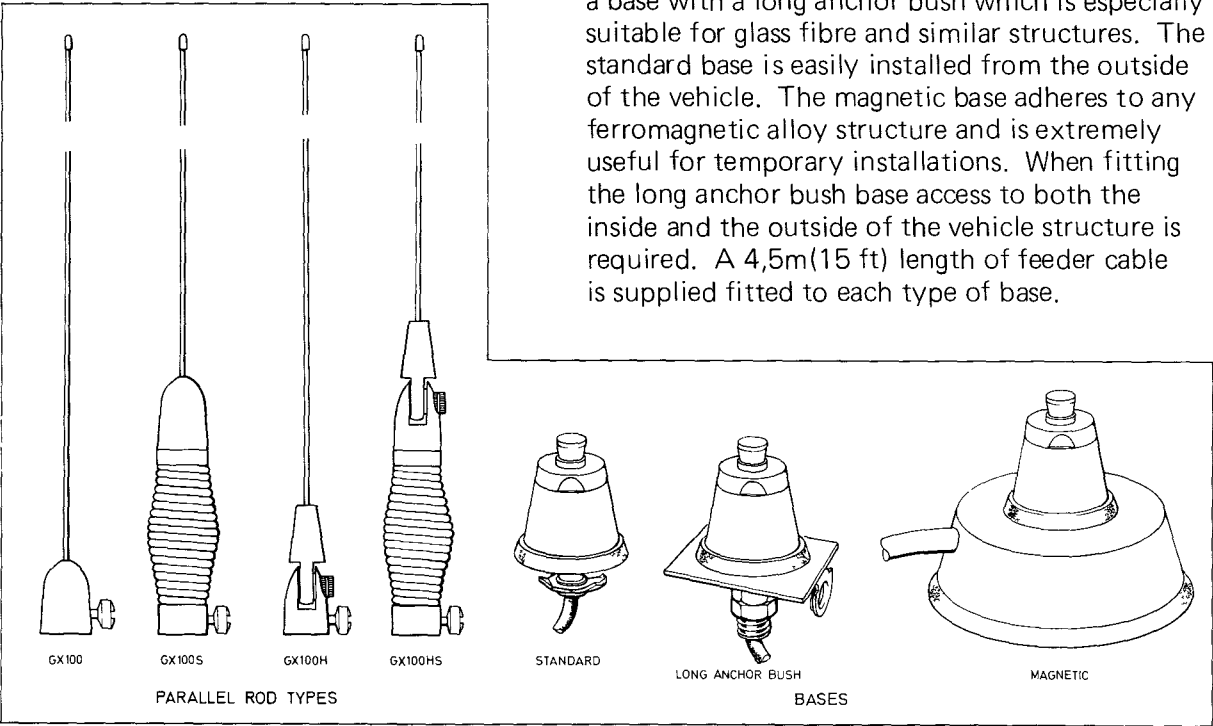
## 3. Interconnection

- (a) Mate Power and Loudspeaker lead with socket on the rear of Transceiver.
- (b) Connect antenna feeder to antenna socket. Secure feeder to edge of cradle with the 3 clips provided.
- (c) Route and connect power lead to the battery. (See Note 3 and Schematic Diagram below).
- (d) Route both sections of the loudspeaker lead and connect. (See Note 3).
- (e) Secure cable with rubber cleats.
- (f) Connect earth lead between earth point on rear of the transceiver and motorcycle frame. Ensure that both connecting points are thoroughly clean.
- (g) Screw antenna into antenna base.
- (h) Connect handset plug to socket on the front panel of transceiver.



# VHF QUARTER-WAVE VEHICLE ANTENNA (GX100 SERIES)

The GX100 series vehicle antennas can be supplied with a standard base, a magnetic base or a base with a long anchor bush which is especially suitable for glass fibre and similar structures. The standard base is easily installed from the outside of the vehicle. The magnetic base adheres to any ferromagnetic alloy structure and is extremely useful for temporary installations. When fitting the long anchor bush base access to both the inside and the outside of the vehicle structure is required. A 4,5m(15 ft) length of feeder cable is supplied fitted to each type of base.



The antenna rod assemblies are clamped to the base with a coin-slot screw, making removal for carwash etc. an easy operation. An Allen screw, which is also supplied, can be used as an alternative to discourage unauthorised removal.

## Identification

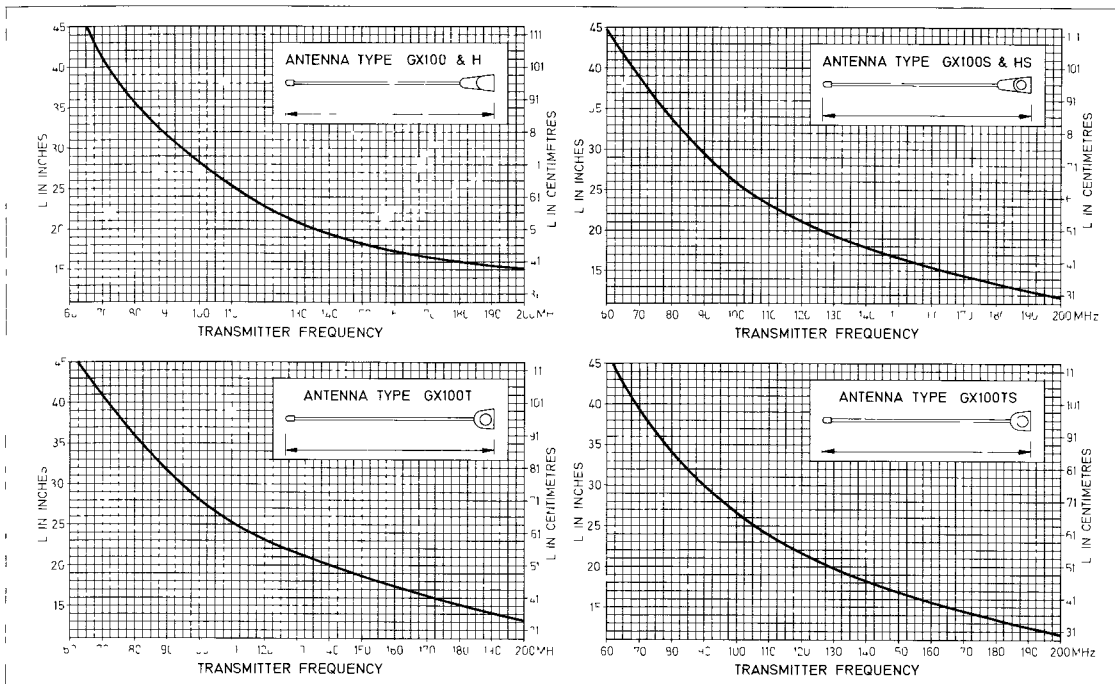
Except for the standard fixed parallel rod type GX100, suffix letters are used to identify the items included in the make-up of the antennas. The suffixes are read from the top of the antenna downwards e.g. GX100TS is a tapered rod with a spring. The following suffix letters are used S = spring; H = hinge; HS = hinge and spring, T = tapered; TS = tapered with spring. The various combinations available in the series are detailed in the table below.

Type	Rod	Rod Assembly Ref. No.	Base Assembly Ref. No.	Max. Height Inc. Base	
				Standard mm (in)	Magnetic mm (in)
GX100	Parallel	9638599	9638613 (standard) or 9638632 (Magnetic) or 9638633 (Long Anchor Bush)	1108 (43 <sup>5</sup> / <sub>8</sub> )	1140 (44 <sup>7</sup> / <sub>8</sub> )
GX100S		9638600		1168 (46)	1180 (47 <sup>1</sup> / <sub>4</sub> )
GX100H		9638601		1118 (44)	1150 (45 <sup>1</sup> / <sub>4</sub> )
GX100HS		9638602		1176 (46 <sup>3</sup> / <sub>8</sub> )	1208 (47 <sup>5</sup> / <sub>8</sub> )
GX100T	Tapered	9638603		1108 (43 <sup>5</sup> / <sub>8</sub> )	1140 (44 <sup>7</sup> / <sub>8</sub> )
GX100TS		9638604		1168 (46)	1200 (47 <sup>1</sup> / <sub>4</sub> )

## Cutting Length

The antenna rods can be supplied in standard length or cut to suit specific frequencies. If they are supplied uncut, the length required for an operational frequency can be determined from the charts shown below. The antenna must be cut to length for the transmitter frequency. If the antenna is to be used with multi-channel equipment cut the antenna for the lowest transmit frequency.

For Quarter-wave antennae not supplied with an antenna cutting chart, the antenna rod length from the top to the ground plane =  $\frac{7137 \text{ cm}}{\text{Freq (MHz)}}$



## Fitting GX100 Series

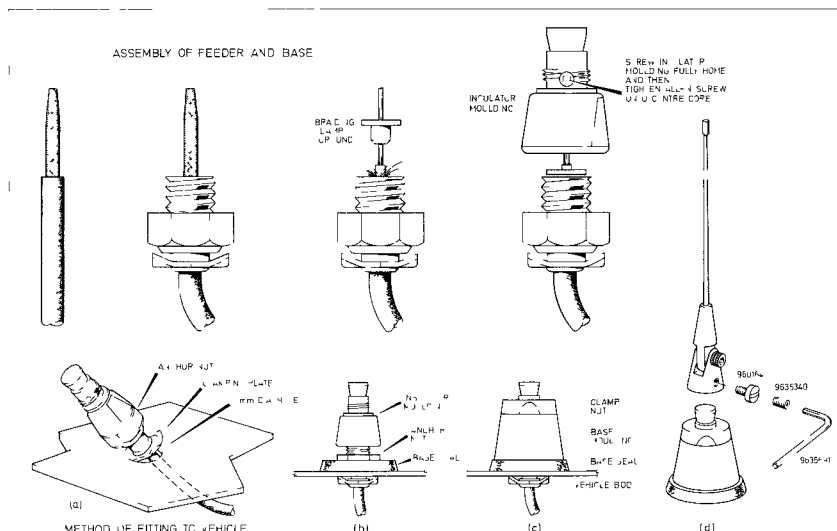
**Standard Base** — When using the standard base the antenna can be fitted from the outside of the vehicle. First select the optimum location on the vehicle and drill a 16 mm ( $\frac{5}{8}$  in) diameter hole. Pass the end of the feeder cable through the hole.

**NOTE:** *the feeder cable is fitted to the base at the factory. Should it prove necessary to change the cable at any time the method of assembly is depicted below.*

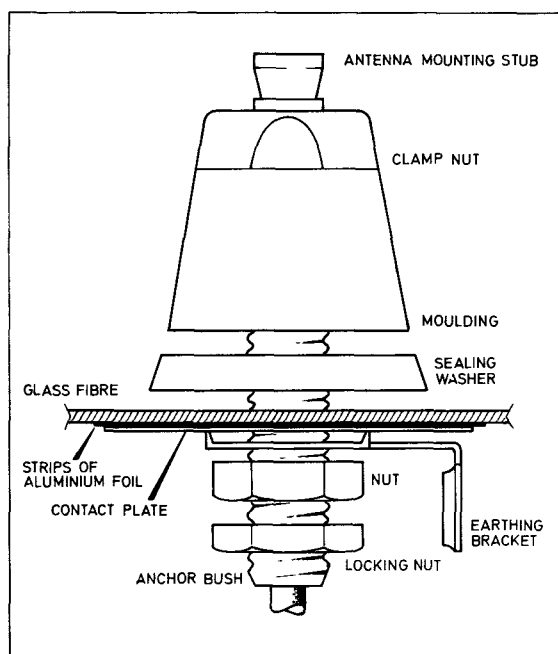
Remove the cover nut from the base and slacken the clamping nut back against the centre core connector insulating nut. Take care not to turn the insulating nut as the centre core is either crimped or soldered into the connector. Insert the clamping plate through the hole as shown in fig. (a) below. Pull the clamping plate against the vehicle body ensuring that the four upturned corners are resting evenly about the hole and tighten the clamping nut, fig (b) below). When clamped the corners bite through the paintwork to give a good connection to the metal of the vehicle body. Place the rubber washer over the base. Check that the spring clip is in position inside the brass stub of the cover nut to engage the centre core connector when assembled, see fig. (c) below. Screw the cover nut firmly against the rubber washer.

If necessary cut the rod to length and assemble with spring (if fitted) and secure the rod assembly to the base using either the coin slot screw or the Allen grub screw, see fig. (d) below.

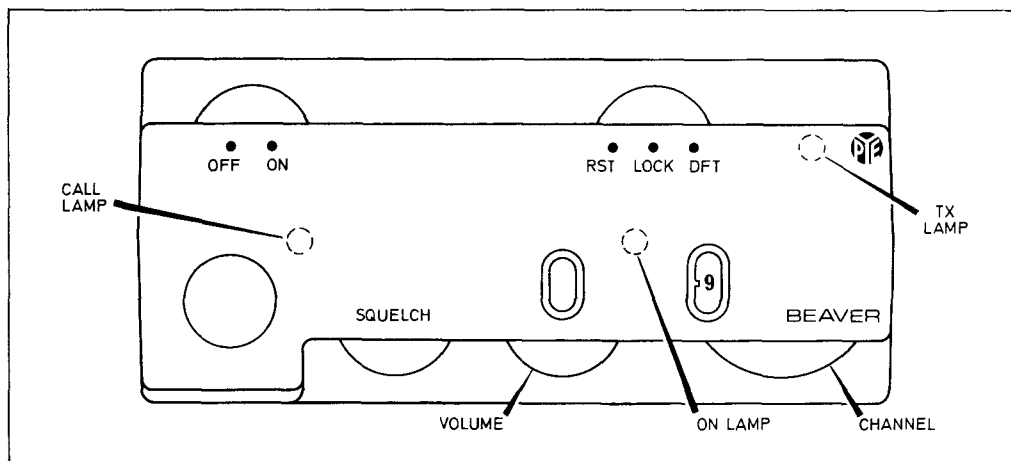
Check the insulation and continuity of the antenna from the mobile end of the feeder. Secure the feeder throughout its length and ensure it will not be damaged by sharp edges or moving parts.



**Long Anchor Bush Base** – When fitting the long anchor bush base clear access to both the inside and the outside of the vehicle bodywork is required. If a ground plane is required stick strips of aluminium alloy or similar conducting material to the inside surface at the selected antenna site. Drill a 12,7 mm (0.5 in.) hole through the structure. Remove the locking nut, earthing bracket and contact plate from the anchor bush and slide them off the feeder cable, remove the cover nut and rubber sealing washer. Pass the feeder cable through the hole in the structure, the contact plate, the earthing bracket, the nut and the lock nut, and feedthrough until the anchor bush enters the hole. Secure the assembly with the nut and lock nut. Place the sealing washer in position, screw on the cover nut and attach the antenna rod assembly using the coin slot or Allen grub screw. Run the cable over the best route to the radiotelephone avoiding sharp bends and jagged edges. Assemble rod and check insulation as described for *'Standard Base'*.



## OPERATION



## Controls

All controls, except the 'press-to-talk' switch on the first microphone, are located on the front panel of the transceiver or control unit as illustrated.

- Squelch Control.** This control eliminates receiver noise in the absence of a signal and also suppresses weak interfering signals.
- OFF/ON Switch** – makes or breaks the power supply to the radiotelephone.

- (c) Volume Control — adjusts the speech level at the loudspeaker
- (d) Channel Switch — selects required channel.
- \* (e) RST-LOCK-DFT — LOCK is the normal position when the facility is in use. Selection of DFT (defeat) cancels the facility To re-activate the address decoder, set to RST position (spring loaded).

### Indicator Lamps

**NOTE:** *Lamps are visible only when the equipment is switched on and in the case of TX and CALL lamps, when these functions are in use.*

The indicator lamps are:—

- (a) TRANSMIT: A red-lamp which lights when the 'press-to-talk' switch on the fist microphone is operated.
- (b) ON: Lights when the power supply is connected. This lamp illuminates a green lens and also the channel and Volume control windows.
- \* (c) CALL: When illuminated, indicates station is being called.

\*Used only if Selective Call facility is required.

### For Reception

- (a) Set the OFF/ON switch to ON. The ON lamp should light.
- (b) Select the required channel by rotating the channel switch until the appropriate number appears in the channel window.
- (c) Set Squelch control fully clockwise.
- (d) Adjust Volume control until receiver noise is heard.
- (e) Turn Squelch control anticlockwise until the receiver noise just disappears.

**NOTE:** This is the most sensitive setting of the Squelch control; turning it further anti-clockwise will suppress weak interfering signals.

### For Transmission

- (a) To avoid interfering with other users of the operating channel, listen first to ensure that no transmissions are being made
- (b) Holding the microphone one or two inches from the lips, press the 'press-to-talk' switch and, noting that the red (Transmit) lamp lights, speak clearly across its face in a normal conversational tone.
- (c) Use correct operating procedure and keep transmissions short. Release 'press-to-talk' switch as soon as the message is finished. Note that the red lamp is extinguished.

### Switching Off

To switch off the equipment set the OFF/ON switch to OFF and check that the green lamp is extinguished.

### Pyecall System Modules

Any one of the following Pyecall System Modules can be incorporated into the Beaver Radio-telephones Types M254 and M256:

- TL1 — Tone Lock Encoder Decoder
- MD1 — Address Decoder
- MD1A — Address Decoder with Group Call
- ME2 — Identity Encoder

With the exception of the ME2, all these facilities are modified for operation by the RST (Reset) — LOCK—DFT (Defeat) switch on the Beaver control panel.

### Tone Lock Encoder/Decoder Type TL1

With this unit fitted and activated, only calls made by stations in your group will be heard.

### **Operation**

Set RST—LOCK—DFT switch to LOCK.

Reply to any incoming calls with the switch still in the LOCK position.

When initiating an outgoing call, set RST—LOCK—DFT switch to DFT and listen out to ensure that the channel is not in use. Re-select LOCK and make the call using normal procedure.

### **Address Decoder Types MD1 and MD1A**

This unit ensures that you hear those messages which are intended for you.

The 'Call' lamp is operative for this facility.

### **Operation**

Set RST—LOCK—DFT switch to LOCK

Incoming call — On receipt of a correctly addressed call the 'Call' lamp lights. Reply using normal procedure and select the RST position at the end of your conversation.

Outgoing call — Select the DFT position and listen out to ensure that channel is not in use. Make your call using normal procedure and return the switch to LOCK at the end of your conversation.

### **Facility Cancellation and Re-activation**

Set RST LOCK DFT switch to DFT to cancel any facility

Set RST LOCK DFT switch to RST to re-activate MD1 or MD1A

### **Identity Encoder type ME2**

This module automatically transmits your identity code each time you operate your transmitter-receiver 'Press-to-Talk' switch.

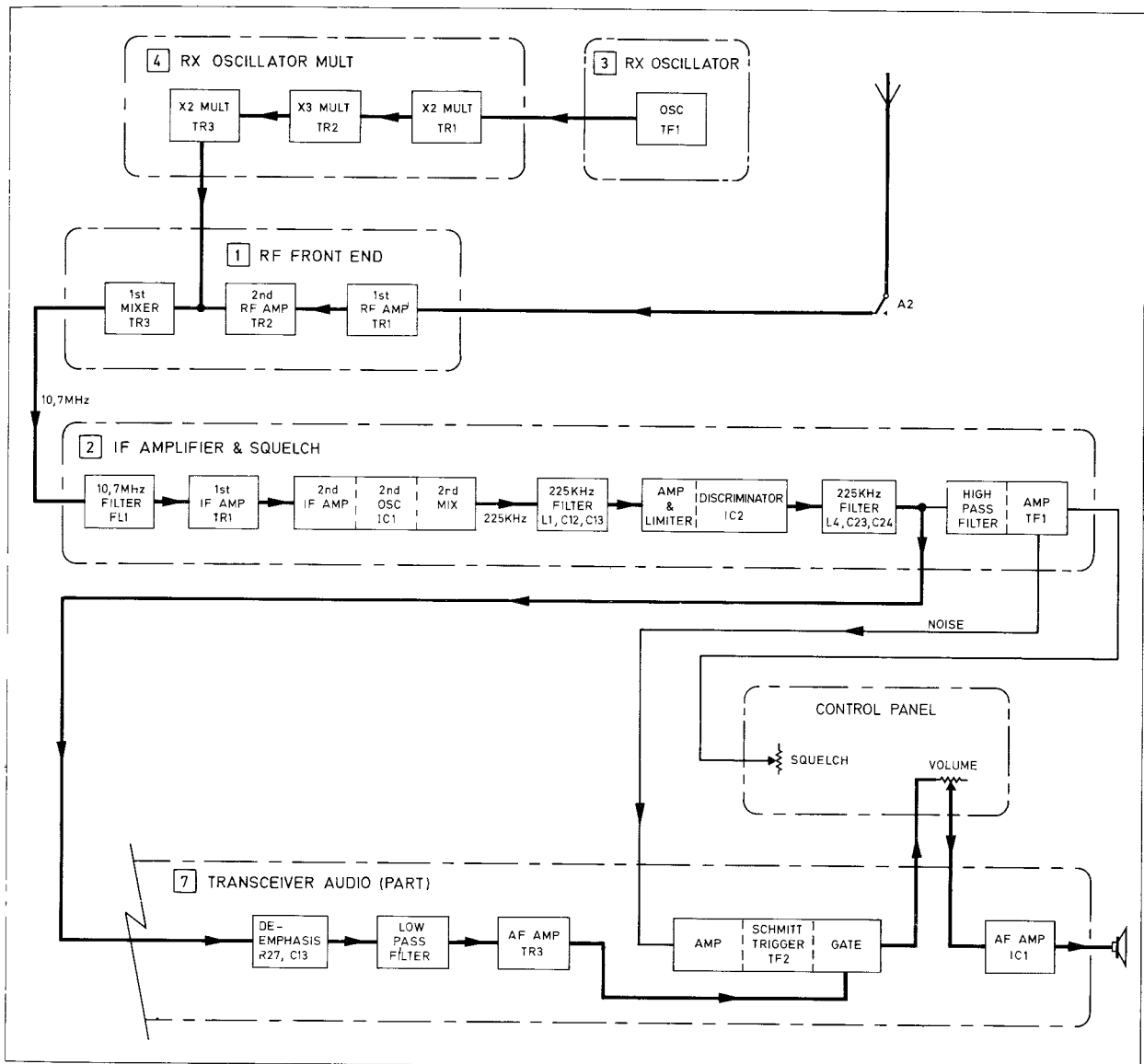
### **PROCEDURE**

Incoming call — not affected in any way by the Identity Encoder. Normal procedures should be followed.

Outgoing call — Operate the transmitter-receiver Press-to-Talk switch, allow one second for the transmission of your identity code, then pass your message in the normal way. Since your identity code is transmitted each time the Press-to-Talk switch is operated, ALWAYS wait for one second after pressing the switch before you begin speaking.

## SECTION 3 TECHNICAL DESCRIPTION

### RECEIVER CIRCUIT SUMMARY



**Fig. 3.1 Receiver Block Diagram**

'On frequency' signals at the antenna are routed via contact A2 of the un-energised Changeover Relay RLA/2, part of the antenna Filter Module (10), to the RF Front End Module (1) which consists of two RF amplifiers followed by a mixer.

The injection frequency is provided by the output from the Oscillator Module (3) which is frequency multiplied (x12) by the 3-stage Oscillator Multiplier Module (4) before application to the mixer gate in Module (1). Amplified RF is applied to the source of the mixer and the resultant 10.7 MHz IF signal is coupled to the IF Amplifier and Squelch Module (2) at pin 1. FL1, a 10.7 MHz Crystal Filter, determines the receiver selectivity. The filtered IF signal is amplified by TR1 and IC1, an integrated circuit which also includes the 2nd Oscillator, operating with an external crystal XL1, and the second Mixer Stage. Mixing action produces the 2nd IF of 225 kHz which is filtered before being passed to IC2, the 2nd IF amplifier limiter and discriminator. A discrete phase shift network L3, C18, C20 is provided for the quadrature detector. The audio output is fed from IC2 pin 16 and passed through a low-pass filter L4, C23, C24 and then routed to the Transceiver Audio Module (7) and also to the high pass filter sub-module which can be a thick film circuit (TF1, in AT27644), or a daughter board with discrete components (Module 2A, in AT27880).



The audio signal enters Module 7 where it is de-emphasised, filtered, amplified and then applied to either pin 2 of TF2, a thick film circuit incorporating a noise operated gate (in AT27780) or the gating transistor TR14 via C25 (in AT27882). The gated audio signal is fed to the Volume Control (part of Module 5 or 13) via either a shorting link, LK3, or a selective call unit and returned to Module 7 at pin 19 for application to the AF amplifier IC1. The final output of up to 3W is coupled to the loudspeaker.

In the absence of an acceptable signal, the high-pass filter sub-module in Module 2 selects a high frequency band of noise. After amplification, the noise output is connected to pin 8 of Module 7 where the signal is processed to provide the gating voltage which mutes the audio. The level at which this muting occurs is set by the Squelch Control.

## TRANSMITTER CIRCUIT SUMMARY

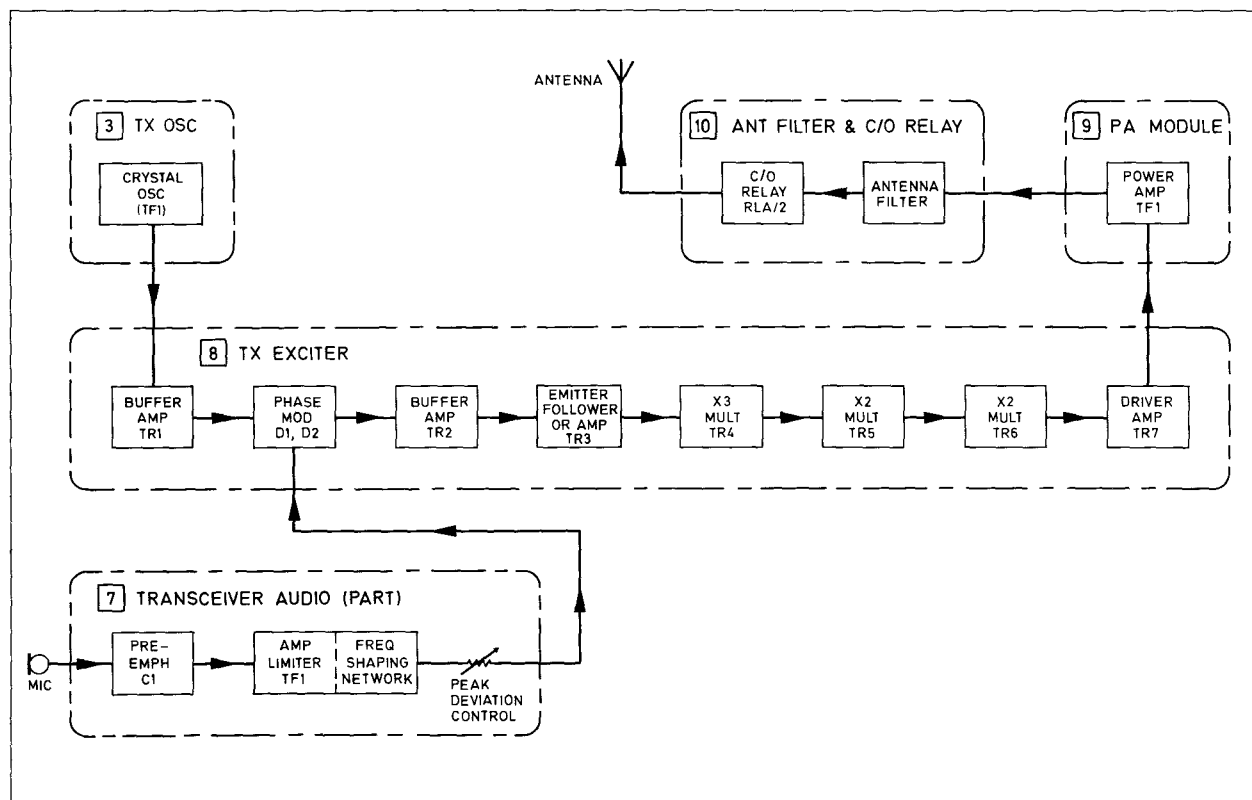


Fig. 3.2 Transmitter Block Diagram

Audio signals from the microphone are applied to the Transceiver Audio Module (7) at pin 2 and pre-emphasised by 7C1 before being amplified, limited, frequency shaped and passed via the Peak Deviation Control to the phase modulator stages D1 and D2 of the TX Exciter Module (8). RF output from the fundamental crystal oscillator is also applied to the phase modulator stages of Module 8 via the buffer amplifier 8TR1 and the phase modulated signal is further amplified and then multiplied in three stages to final frequency. A final amplifier stage brings the output of Module 8 to approximately 250 mW and this is passed to the PA Module (9) a wideband amplifier.

The RF output is filtered by the Antenna Filter (10), to minimise the harmonic content of the RF carrier signal, and connected to the antenna via contact A2 of the energised changeover relay RLA/2.

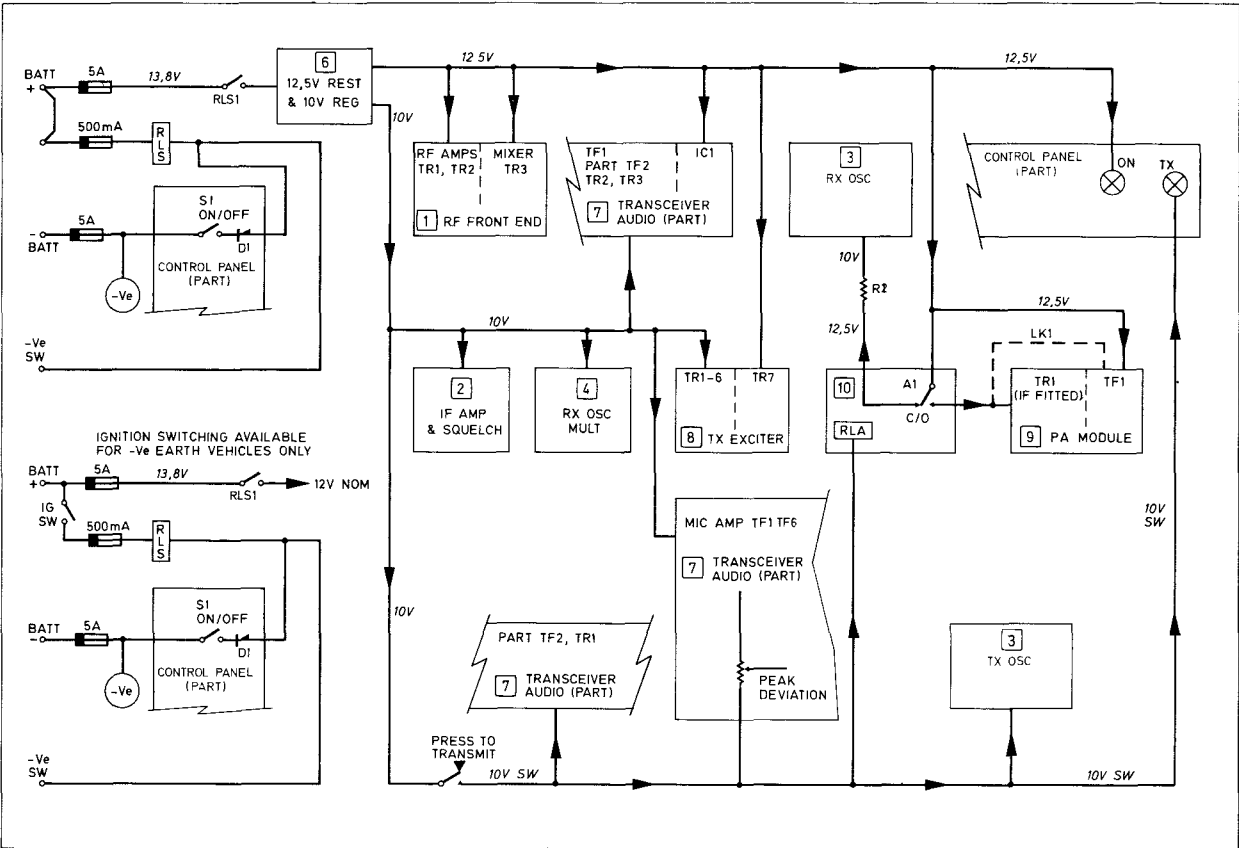


Fig. 3.3 Power Supply Block Diagram

Power Supplies

The input power supplies are derived from a 12V nominal (normally 13,8V) DC source. Both power leads are fused at 5A, the negative lead is switched by the ON/OFF switch. Protection against polarity reversal is provided by D1 of the 30-Way Interconnection Board.

A Restrictor and Regulator Module (6) provides 12,5V, 10V and via press-to-talk switch, the switched 10V (10V.sw) supplies to the appropriate modules as shown in fig. 3,3, the Power Distribution and Switching block schematic diagram.

**NOTE:** *Input power supply switching by the vehicle's ignition switch is normally only available to vehicles having negative earth.*

Receive Switching

Setting the OFF/ON switch (SA) to ON completes the negative line to energise the Start Relay RLS/1. Contact S1 closes and the 13,8V positive line is made to the 12,5V Restrictor Module (6). All modules in the equipment are supplied with either 12,5V or 10V according to their requirements. The ON lamp lights to illuminate the VOLUME Control and also the Channel Selector window (multiple channel equipments only). The equipment is in the receive condition.

## Transmit Switching

Operation of the microphone press-to-talk switch completes the 10V supply (10V SW) to:—

- (a) energise relay RLA/2 in Module (10). Contact A2 transfers the antenna from the input to Module (1) to the output of Module (10). Contact A1 transfers the 12,5V supply from the RX Oscillator (3) to the PA Module (9) transistor TR1, part of the output control circuit (if fitted), or link LK1.
- (b) part of squelch circuit and amplifier stage in the Transceiver Audio Module (7).
- (c) The TX Oscillator (3).
- (d) The TX Lamp in the Control Unit.

## Channel Switching

See description of Control Panel below.

## MODULE DESCRIPTIONS

### 12,5V RESTRICTOR & 10V REGULATOR (6) AT27637 or AT27883

This module consists of a 12,5V restrictor and a 10V regulator mounted on one board.

#### 12,5V Supply

The PNP transistor TR1 is a series regulator with a base control network.

Transistor TR4 samples the regulated voltage and compares it with the reference voltage (0v) on its emitter. The error signal is then amplified by TR3 and TR2 and fed to the base of TR1 to control that transistor and compensate for any error. In AT27883, further current stabilisation is provided by TR6 (connected across TR1) via two series diodes so that when the input voltage falls below 13V, bias is immediately applied to TR1 base via TR5 and TR3, to reduce the quiescent current. The regulated 12,5V output is bled off to various points around the equipment and to the 10V section of the Module.

#### 10V Supply

AT27637 — Transistor TR5 is a series regulator. The voltage regulation circuitry is contained in the thick film sub-module TF1 which generates the control voltage at TR5 base.

AT27883 — Transistor TR7 is a series regulator controlled by TR8 which samples the regulated 10V and compares it with the reference 10V on its base. The error signal is detected at the emitter of TR8 and applied to the base of TR7 to maintain the output at 10V.

## CONTROL PANEL (Front Mount)

This panel carries the ON/OFF switch (SA), volume, squelch and RST-LOCK-DFT controls and, the channel switch (SB) which in conjunction with the microphone press-to-talk switch, provide the means of controlling the equipment. The panel is fitted with the indicator lamps ON (green), TX (red), and CALL (amber).

The channel switch (SB) completes the negative line to the selected oscillator on both the receiver and the transmitter oscillator modules.

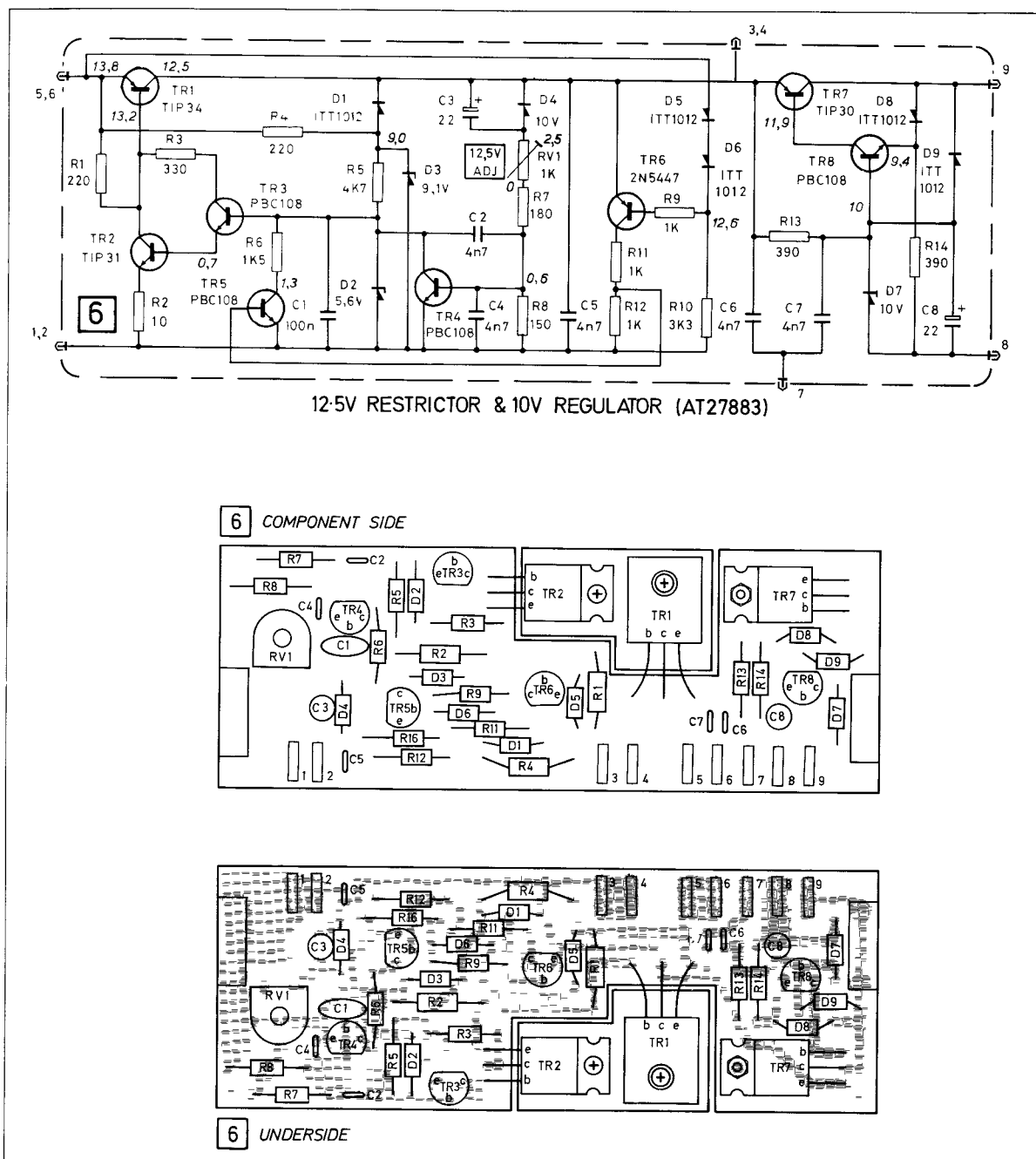
## CONTROL UNIT (Remote Mount)

This unit is provided with the same switches, controls and indicator lamps as the Control Panel (Front Mount). The cast box is fitted with a 19 way plug and the control unit is coupled to the transceiver by a 19-way control cable.

Switching of all 12 channels is achieved by a binary coded system which employs two integrated logic circuits incorporated in the transceiver Control Interface Module (12).

, .

A complex system of wafer contacts is arranged to select the required binary coding for any given channel switch position. Thus when Channel 1 is selected, the wiper engages four wafer contacts (connected to the Control Interface Module via the control cable) and the negative signal is applied to the required combination of pins at the logic circuits to produce a negative signal at IC.1 pin 1. This is fed in turn to the Channel 1 transmitter and receiver oscillators. The receiver oscillator is activated and the transmitter oscillator can be activated by operating the microphone press-to-talk switch.

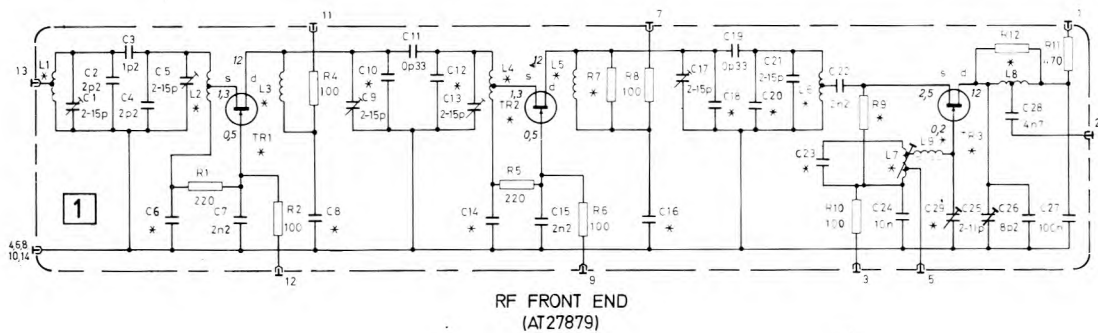


## RF FRONT END (1) AT27642 or AT27879

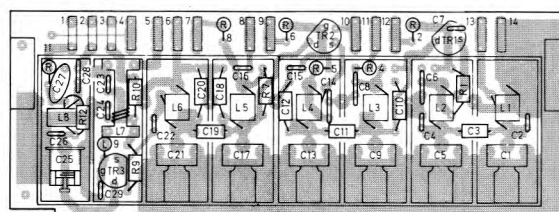
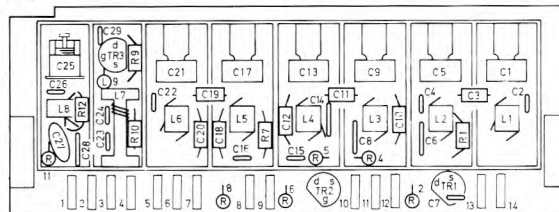
The RF signal at the antenna is fed via contact A2 of the un-energised changeover relay RLA/2 (mounted on the Antenna Filter and Changeover Relay Module (10) to the input stage of the RF Front Module (1). This module consists of two RF amplifier stages and a mixer stage, all using FET's in grounded gate configurations.

The input stage, a bandpass pair, matches the antenna impedance to the source of the first amplifier stage TR1. Bandpass pairs are also used to couple TR1 output to the second amplifier input (TR2) and TR2 output to the mixer transistor TR3.

The local oscillator injection frequency from the Oscillator Multiplier Module (4) is fed via the resonant circuit L7, C23 to the gate of TR3. The resultant mixer output of 10,7 MHz is developed across TR3 drain load, consisting of L8, C25, C26 and coupled by C28 to the IF Amplifier and Squelch Module (2) via pin 2 of module (1).



1 COMPONENT SIDE



1 UNDERSIDE

## OSCILLATOR MODULES (3)

This module is available in single, six and twelve channel versions; two separate identical modules are required per equipment (one for the receiver and one for the transmitter) regardless of the number of channels provided. Individual oscillators are provided for each channel fitted. Non-operational channels are not supplied with crystals.

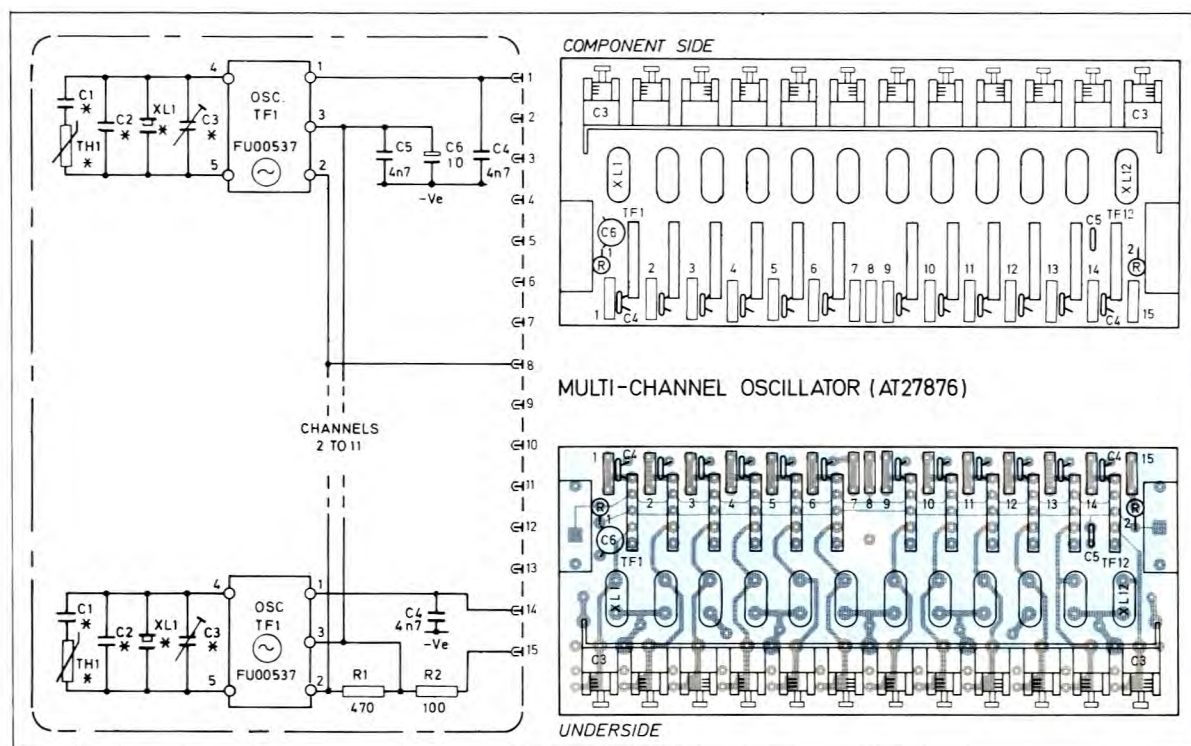
### 12-Channel Oscillator Module (3) AT27652/04 or AT27876/02

**Channel Selection.** The Channel switch, SB of the Control Panel (Front Mount) or Control Unit (Remote Mount), completes the negative line to the transistor emitter (contained in TF1), of the selected oscillator on both the receiver and the transmitter oscillator modules.

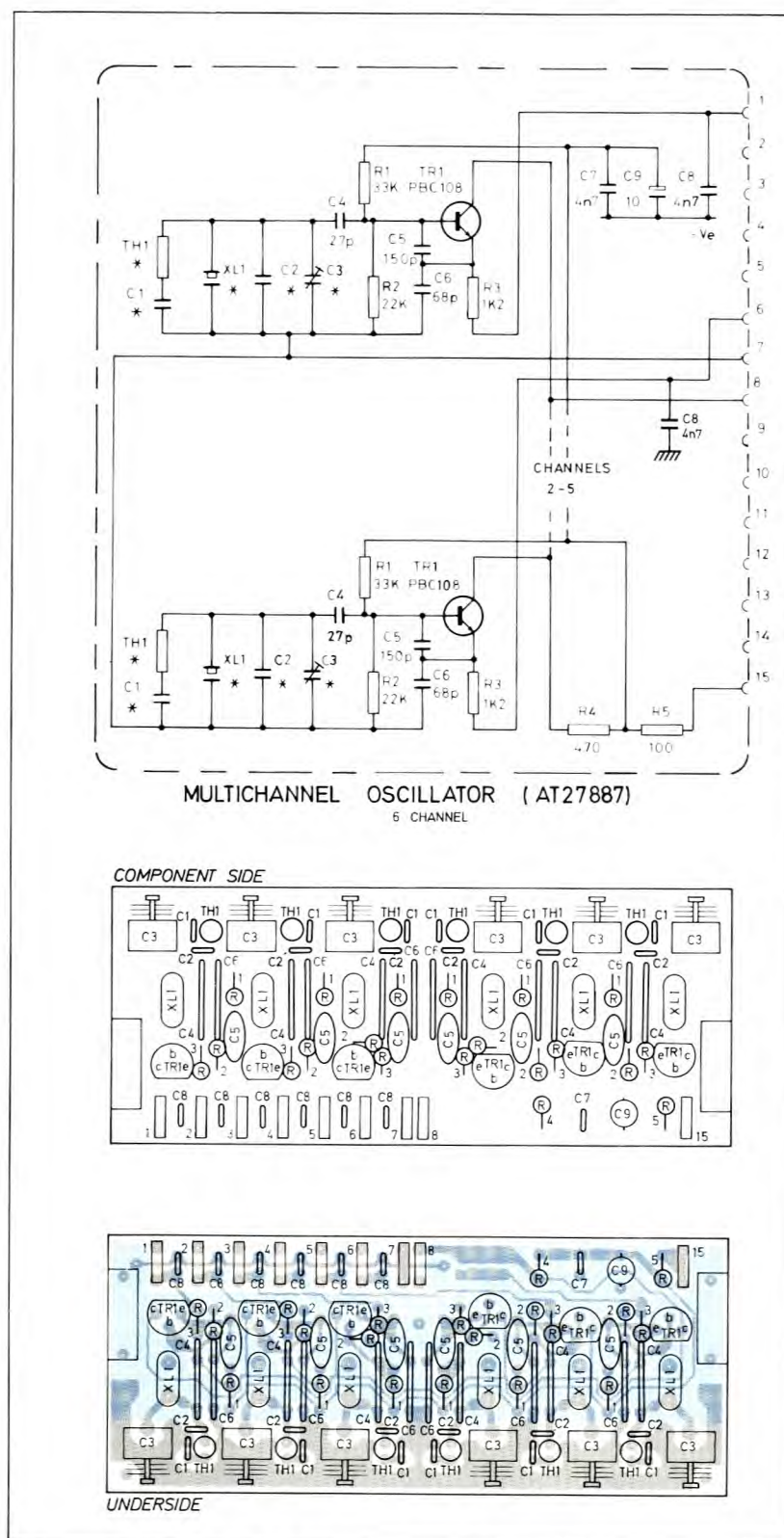
**Switching.** In the receive condition, the 12,5V supply is connected to the receive oscillator module at pin 15 via the un-energised relay contact A1, in the Antenna Filter and Changeover Module (10), and resistor R1 on the Mother board (11).

Operation of the press-to-transmit switch connects 10V to:—

- energise relay RLA/2. Contact A1 changes over to remove the 12,5V supply from the receiver oscillator module.
- pin 15 of the transmitter oscillator module to activate the selected transmitter oscillator.







### Single Channel Oscillator Module AT27652/07 or AT27887/01

When fitted, a link is required to override the channel switch.

AT27652 – A channel oscillator comprises a thick film sub-module TF1, a crystal XL1 operating in its fundamental mode, capacitor C2, a trimmer C3 for fine frequency adjustment and a decoupling capacitor C4. These components are repeated for each channel fitted. One set of loading components (C5, C6, R1 and R2) is fitted to each module.

AT27887 – A channel oscillator comprises a transistor TR1, a crystal XL1 operating in its fundamental mode, capacitor C2 and a trimmer C3 for fine frequency adjustment. One set of loading components (R4, R5, C8 and C9) is fitted to each module.

Switching. In the receive condition, the 12,5V supply is connected to the Receiver Oscillator Module at pin 15 via the un-energised relay contact A1, in the Antenna Filter and Changeover Relay Module (10), and resistor R1 on the Motherboard (11). The Channel switch, SB of the Control Panel (Front Mount) or Control Unit (Remote Mount), completes the negative line to the transistor emitter of the selected oscillator on both the receiver and the transmitter oscillator modules.

Operation of the press-to-talk transmit switch connects 10V to:

- (a) energise relay RLA/2 — Contact A1 changes over to remove the 12,5V supply from the receiver oscillator.
- (b) pin 15 of the Oscillator Module to activate the transmitter oscillator.

## **6—Channel Oscillator Module (3) AT27652/03 or AT27887/02**

Switching of this module is identical in all respects to the 12-channel version.

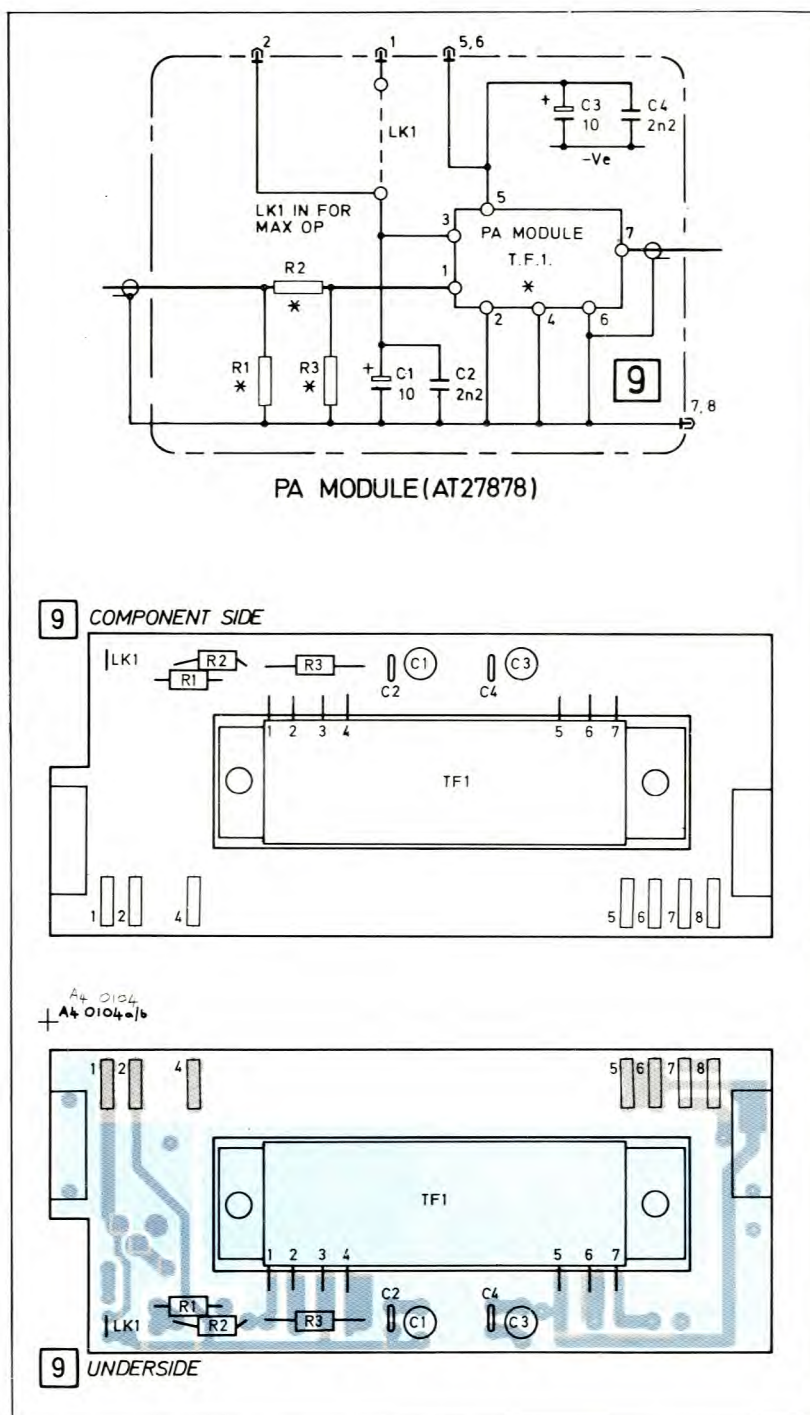
AT27652/-3 — Apart from the number of channels provided, this module is identical in all respects to the 12-channel version.

AT27887/02 — Individual oscillators are provided for each channel fitted but these work into a common load. Non-operational channels are not supplied with crystals. Each channel oscillator comprises a transistor TR1. A crystal XL1 operating in its fundamental mode, capacitor C2 and a trimmer C3 for fine frequency adjustment. These components are repeated for each channel fitted. One set of loading components (R4,R5,C8 and C9) is fitted to each module.



## PA MODULE (9) AT27638 or AT27878

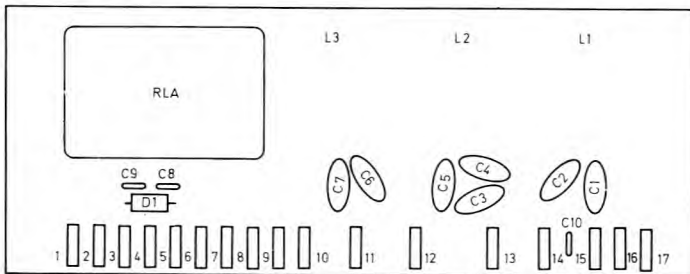
This module features a thick film sub-module TF1 (PA Sub-Module) and has provision for the optional power output control facility. When the standard module is fitted the output is fixed at maximum. The output from the Exciter Module (8) is passed via a co-axial feeder and a resistive matching network R1,R2,R3 to the input of the wideband power amplifier sub module TF1. The output of the PA Module (18W nominal) is fed to the Antenna Filter and Changeover Relay Module (10).



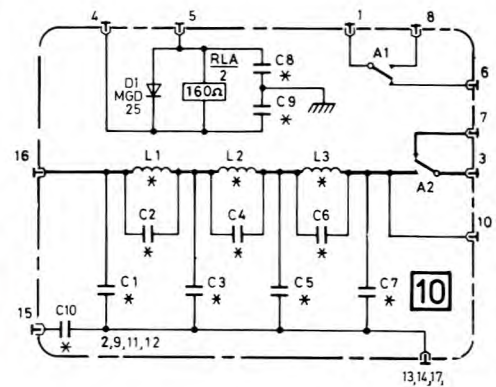
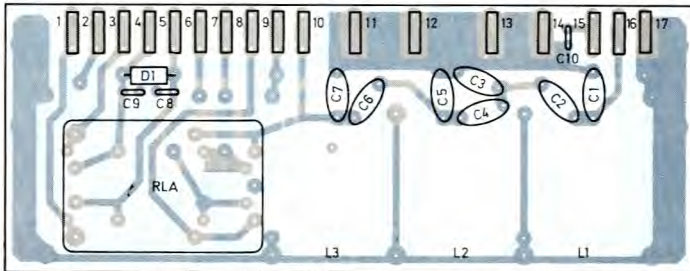
## ANTENNA FILTER AND CHANGEOVER RELAY (10)

The RF output from PA Module (9) is passed via co-axial feeder to a three section low-pass filter, which minimises the harmonic content of the RF carrier signal appearing at the output of the PA Module (9). The filtered output is connected to the antenna via contact A2 of the changeover relay RLA/2, energised by operation of the press-to-transmit switch. Contact A1 removes the 12,5V supply from the Receiver Oscillator Module and applies it to the first stage of PA Module (9).

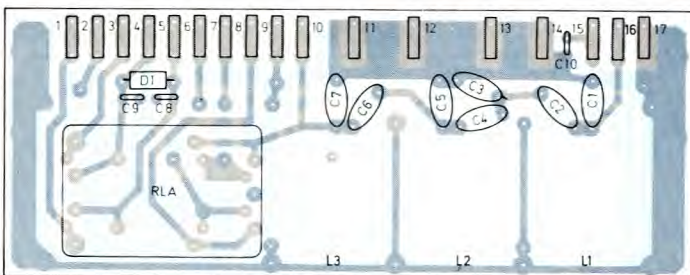
10 COMPONENT SIDE



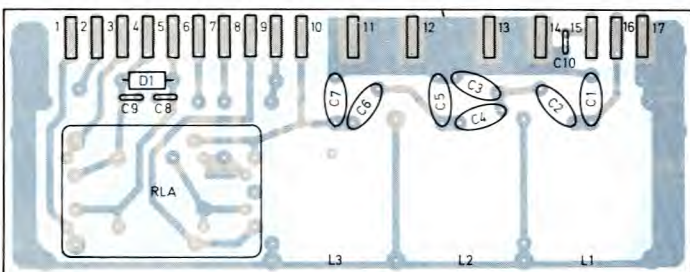
ANT FILTER & C/O RELAY



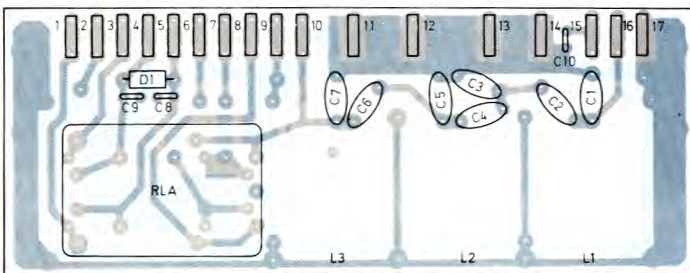
10 UNDERSIDE A BAND (AT27888)



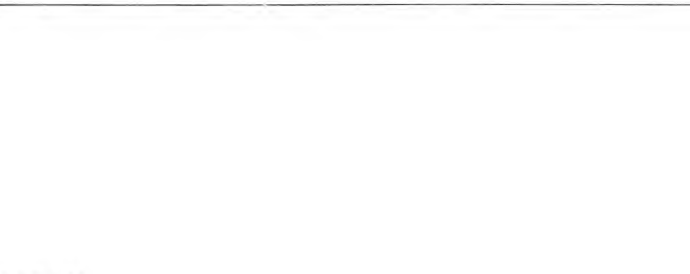
10 UNDERSIDE B BAND (AT27889)



10 UNDERSIDE D BAND (AT27890)



10 UNDERSIDE E BAND (AT27891)

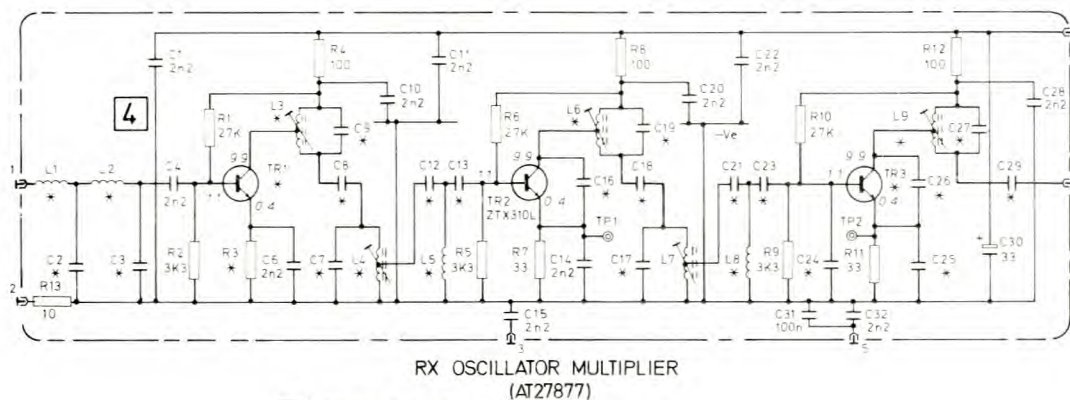




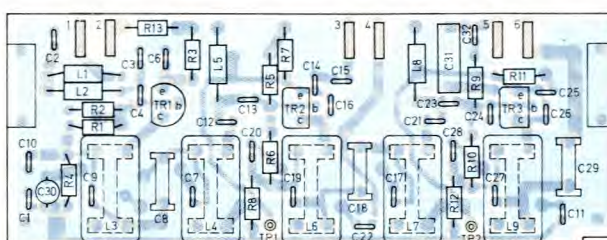
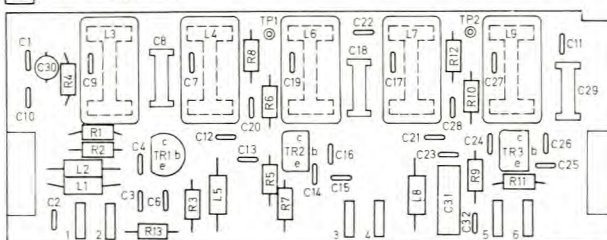
## RECEIVER OSCILLATOR MULTIPLIER (4) AT27651 or AT27877

The output from the receiver oscillator module (3) load is fed to the first (doubler) stage TR1; the second harmonic is selected by the resonant circuit L3, C9 and passed to the base of TR2, a tripler stage which selects the third harmonic. This is applied to the base of doubler stage TR3; the second harmonic is selected by the resonant circuit L9, C27 and the resultant injection frequency signal is coupled by C29 to pin 6 and thence to the mixer stage in the RF Front End Module (1).

Test points (TP1, TP2) are provided in the emitters of TR2 and TR3 for alignment purposes.



4 COMPONENT SIDE



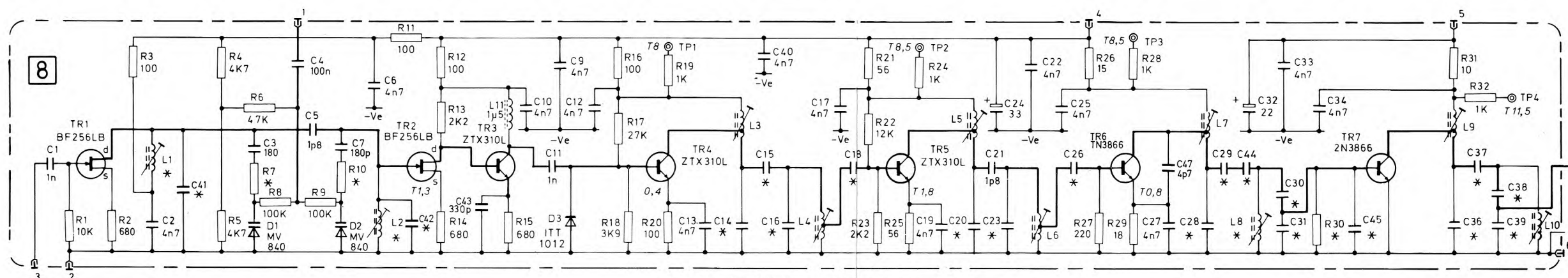
4 UNDERSIDE

## TRANSMITTER EXCITER (8) AT27639 or AT27881

The module contains discrete components to provide buffer amplifier, phase modulator, multiplier and driver amplifier stages.

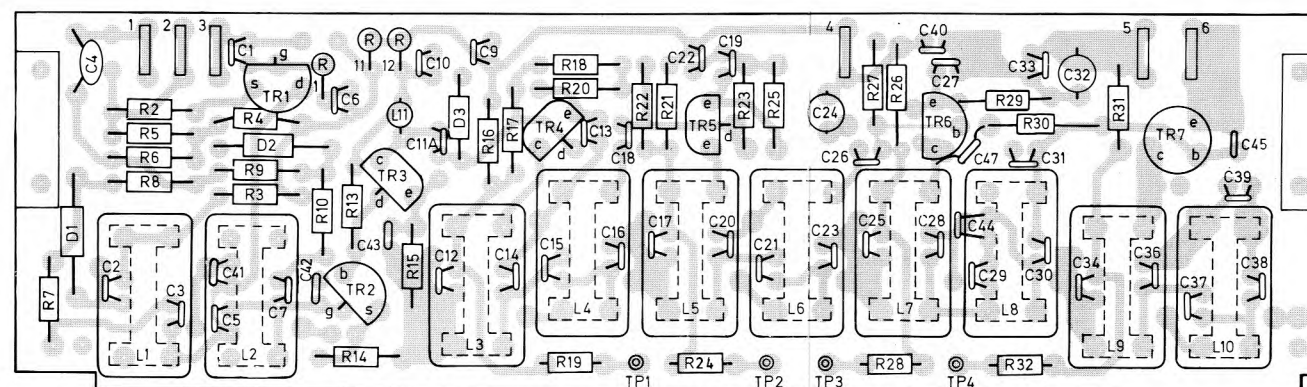
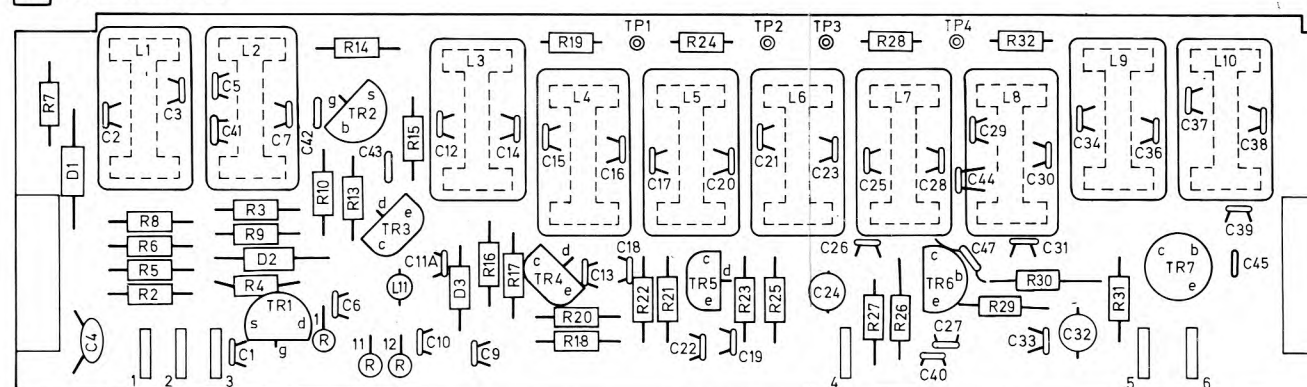
The RF output from the fundamental crystal oscillator Module (3) is applied via the FET buffer amplifier stage TR1 to the two cascaded phase modulator stages. Each stage consists of a circuit tuned to the crystal frequency, the variable capacity diodes D1 and D2 being part of the tuning capacity. The application of the audio signal from Microphone Amplifier (in Module 7), via pin 1, varies the diode capacities to phase modulate the RF carrier signal. The phase modulated signal is further amplified by the FET amplifier stage TR2 and multiplied to final frequency by TR4 (x3), TR5 (x2), TR6 (x2). TR3 is an emitter follower (E Band) or an amplifier (A and B Bands) which matches the RF modulated signal to the three multiplier stages. A final amplifier stage TR7 brings the output of Module 8 to approximately 250 mW and this is applied to the PA Module (9), a wideband amplifier.

Test points (TP1, TP2, TP3 and TP4) are provided for alignment purposes.



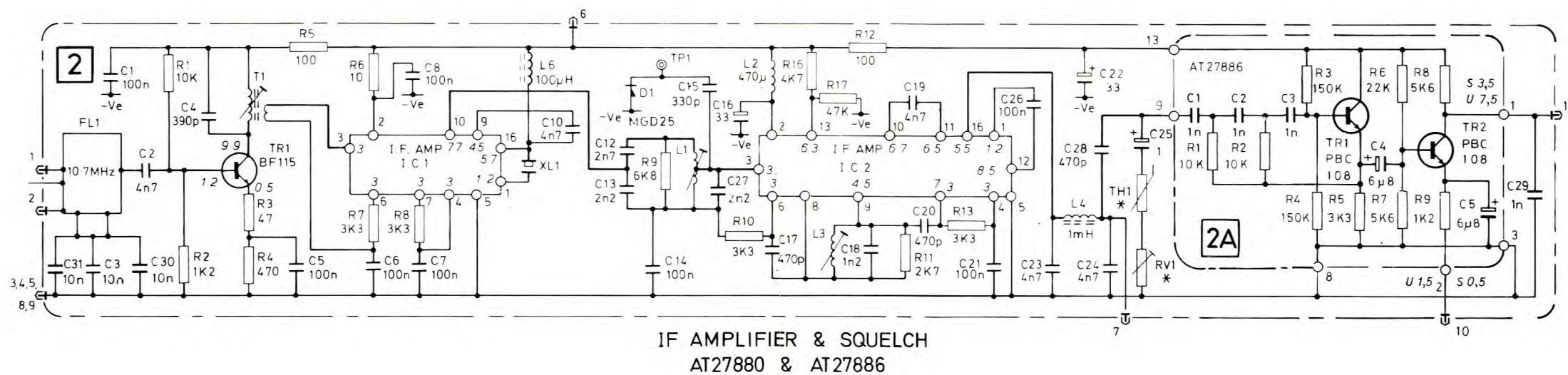
TX EXCITER  
A BAND AT27881/01  
B BAND AT27881/02

8 COMPONENT SIDE

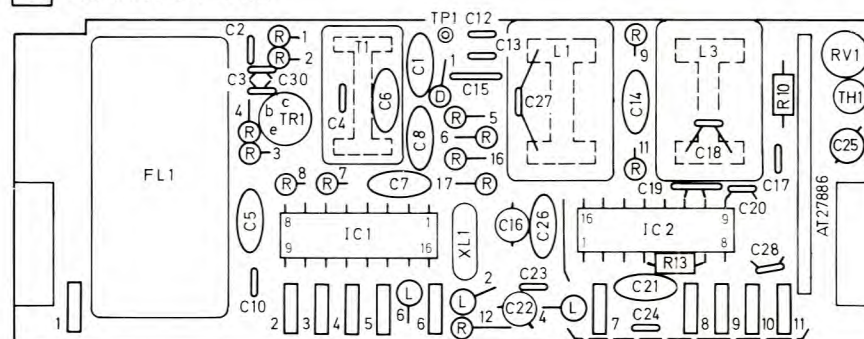


8 UNDERSIDE

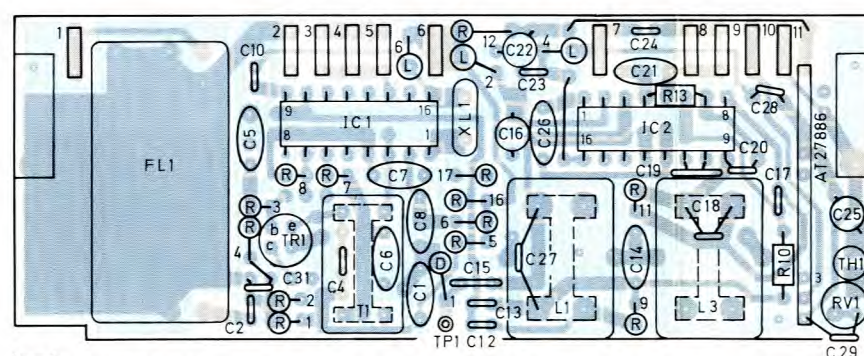
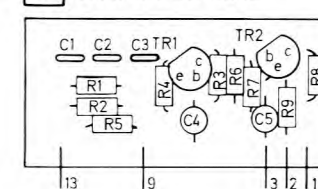




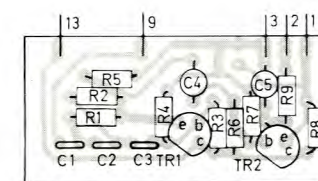
**2** COMPONENT SIDE



**2A** COMPONENT SIDE



**2** UNDERSIDE



**2A** UNDERSIDE

## IF AMPLIFIER AND SQUELCH (2) AT27644 or AT27880

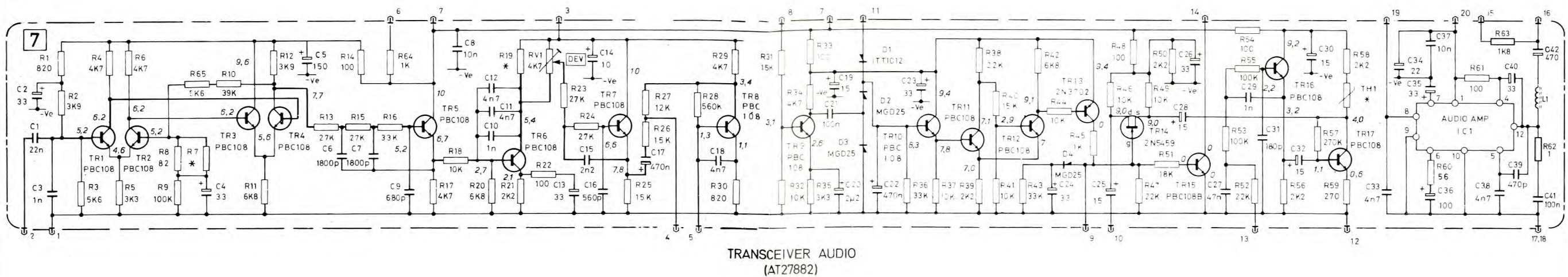
This module consists of a crystal filter, two integrated circuits IC1 and IC2 and a sub-module which can be a thick film circuit (TF1 in AT27644) or a daughter board with discrete components (Module 2A in AT27880). Both forms of the sub-module act in the same way.

The 10,7 MHz output from the mixer in Module (1) is coupled to the IF Amplifier and Squelch Module (2) at pin 1 and fed to the crystal filter FL1, which determines the receiver selectivity. The filtered IF signal (10,7 MHz) is amplified by TR1 the first IF amplifier, and IC1 an integrated circuit which also includes the second oscillator, operating with an external crystal XL1, and the second mixer stage. Mixing action produces the second IF of 225 kHz which is filtered by the tuned circuit C12,C13,L1 before being passed to IC2, the second IF amplifier, limiter and discriminator. External components L3,C18, C20 comprise the discrete phase shift network for the quadrature detector. Audio is fed out from IC2 pin 16 and any residual 225 kHz content is blocked by the filter L4,C23,C24.

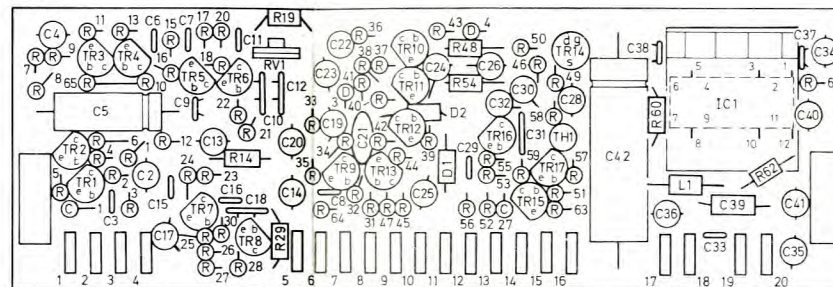
The filtered output is routed to the Transceiver Audio Module (7) and also to the input stage of the sub-module via C28.

In the absence of an acceptable signal, the input to the sub-module will be noise. In AT27644 – After amplification (in TF1), the noise output is fed via (2) pin 11 to the noise processing stages of the Transceiver Audio Module (7). Squelch control voltage is applied via the SQUELCH control (RV1), on the Control Panel (or Control Unit), to (2) pin 10 and then to pin 2 of 2TF1. In AT27880— Transistor TR1 with C1,R1, C2,R2 and C3 is an active high-pass filter and will select a high frequency band of noise to be amplified by TR2 and passed to the noise processing stages of the Transceiver audio module (7). The squelch control voltage is applied via the SQUELCH control (RV1), on the Control Panel (or Control Unit), to TR2 emitter.

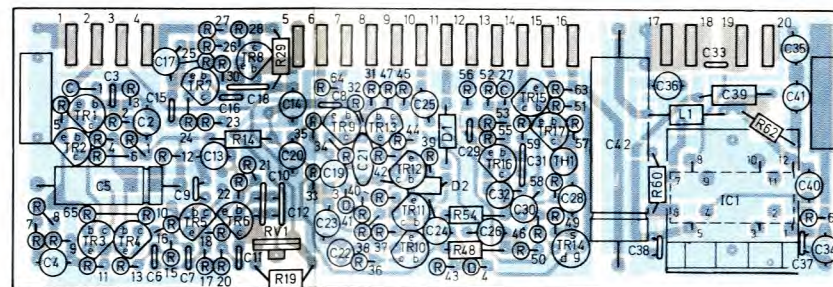




**7** COMPONENT SIDE



**7** UNDERSIDE



### TRANSCEIVER AUDIO (7) AT27882 (Receiver Part)

This module contains discrete components to provide the audio circuitry for both the receiver and the transmitter. The receiver circuitry only is described here.

The noise signal derived from the squelch high pass filter and noise amplifier in the IF Amplifier and Squelch Module (2) enters Module (7) at pin 8 to be applied to the base of TR9 a noise amplifier stage. Voltage doubling takes place (D2,D3) before application to the Schmitt trigger circuit (TR11,TR12) via transistor rectifier TR10. Activating the Schmitt trigger turns on the switching transistor TR13 which in turn causes the gating transistor TR14 to cut off, thus muting the receiver.

The audio signal from the IF Amplifier and Squelch Module (2) enters Module (7) at pin 13 to be de-emphasised (C27,R52), filtered by the low pass filter R53, C29,R55 and TR16, amplified by TR17 and coupled to the gating transistor TR14 via C28. The gated audio signal at pin 10 of Module (7) is routed via internal socket SKE pin 11(linked to pin 3) and 30-way interface connector pin 28 to Volume control RV2 on the Control Panel. The audio signal is returned to pin 19 of Module (7) for application to the AF amplifier IC1 via the 30-way interface connector pin 10. The final audio output of up to 3W is passed via pin 16 to the loudspeaker.

If an optional facility or selective call module is fitted, the audio path is modified as described under TRANSCEIVER AUDIO (7) AT27780 (part) below.

### **TRANSCEIVER AUDIO (7) AT27882 (Transmitter Part)**

Audio signals from the microphone are applied to this module at pin 2 and pre-emphasised by C1. The signals are then amplified and limited by TR1 to TR4, shaped by TR5 and TR6 and passed via the Peak Deviation Control (RV1) and emitter follower stage TR7 to the modulation stages of the Transmitter Exciter Module (8).

### **TRANSCEIVER AUDIO (7) AT27780 (Part)**

This module features two thick film sub-modules and an integrated circuit and contains the audio circuitry for both the transmitter and receiver. The receiver circuitry only is described here

The noise signal, derived from the squelch high-pass filter TF1 in Module 2, enters Module 7 at pin 8 and is processed by the thick film circuit TF2 (SQUELCH 'B'), a thick film circuit which incorporates a noise operated squelch gate.

The audio signal, derived in the IF Amplifier and Squelch Module (2), enters Module (7) at pin 13 and is de-emphasised by R27, C13 filtered by the low-pass active filter R14, C17, R15, TR2 and amplified by TR3. The amplified audio is applied to pin 2 of TF2 (SQUELCH 'B'). The gated audio signal is fed from pin 1 of TF2 via pin 10 of the Module (7), internal socket SKE pin 11 (linked to pin 3) and 30-way interface connector pin 28 to Volume control RV2 on the Control Panel. The audio signal is returned to pin 19 of Module 7 for application to the AF Amplifier IC.1 via the 30-way Interface connector pin 10. The final audio output of up to 3 watts is passed via pin 16 to the loudspeaker.

If the Options Interconnection Board (optional facility) SKF is fitted, the SKE pins 3 and 11 are not linked and the path is modified to route the signal via SKE pin 11 SKF pin 8 linked to SKF pin 12 to SKE pin 3 and then as above.

When a Selective Call Module is fitted, the link across pins 8 and 12 of the Options Interconnection Board is removed.

### **TRANSCEIVER AUDIO (7) AT27780 (Part)**

Audio signals from the microphone are applied to this Module at pin 2 and pre-emphasised by C1 before being processed by the thick film circuit TF1 (Microphone Amplifier) consisting of an amplifier, limiter and frequency shaping network. The output is passed via the Peak Deviation Control (RV1) to the Transmitter Exciter Module (8) via the low pass filter (if fitted), C7 and pin 4.



## SECTION 4

### SERVICING

#### PRECAUTIONARY NOTES AND GENERAL INFORMATION

##### Routine Frequency Adjustment

This equipment uses quartz crystal control of its channel frequency/ies whilst this is extremely accurate and reliable, it is important to realise that crystals "Age" slightly and require periodic re-adjustment. Therefore the Netting Procedure (see Section 2) needs to be carried out as a matter of routine at least twice a year. The need for this adjustment is not affected by whether or not the equipment is in use, it occurs even during careful storage and is greatest while the crystals are new.

##### 'Pozidriv' Screws

Where 'Pozidriv' screws are used in this equipment, only the correct size of 'Pozidriv' screwdriver should be used to release or tighten these screws. The use of any other screwdriver type can result in severe damage to the screwhead.

##### 'Griplets'

Some printed wire boards may be fitted with 'Griplets' to facilitate the mounting of components.

'Griplets' take the form of hollow rivets the tubular section of which is provided with teeth biased to tighten on the component wire end should any attempt be made to withdraw the wire from the insertion side.

##### Component Removal From PWBs Fitted with Griplets

Components are normally fitted so that the wire-ends protrude through the printed wire boards by 1,5–1,8 mm (daughter board) or 2,5 mm (mother board). Using a solder sucking device, extract the solder to expose the wire protrusion. Cut component free from its wire-end and remove wire with pliers.

Should the wire-end be too short to grasp with pliers, it can be tapped out from the component side with a very fine drift.

##### Servicing Compounds

Module pins are gold plated and are not subject to oxidation. Contamination from grease or dust should be removed by the application of contact cleaning fluid only (such as R.S. Components Ltd., Cat. No. 554/175). Under no circumstances should any abrasive or corrosive cleaning agent be used.

When active components mounted on heatsinks are replaced, a heatsink compound (such as R.S. Components Ltd., Cat No. 553/311) must be applied between the component, insulating washers and the heatsink surface to ensure a good thermal path.

##### Soldering

Soldering operations should be kept to a minimum. Ensure that the equipment is switched off before soldering. Printed circuit tracks should be clean before applying solder or soldering iron. The amount of solder applied and the dwell time of the soldering iron should be kept to the minimum required for practical purposes. Avoid excessive heat by using heat shunts. Always check that the hole in the printed circuit track is clear of solder before fitting a component. Wherever possible a low voltage DC soldering iron should be used, with an earthed bit. This type of soldering iron must be used when replacing a field effect transistor.

When soldering wire ends into printed wire boards, ensure that the solder flows through to emerge on the other side of the board.

Do not use a permanent magnet type soldering iron in the vicinity of coils with ferrite cores.

## Printed Circuits

Take particular care not to bend a printed circuit board when removing and replacing it or when working on it. Bending can cause hairline breaks in the printed circuit tracks, and such breaks are very difficult to locate. Do not connect test leads to a printed circuit track.

## Replacement of Plug-in Modules

When replacing plug-in modules, ensure that they are correctly orientated so that the module sockets engage with the Mother Board pins. Reversing the module will not cause damage as pins and sockets will not engage.

## Use of FM Beaver Test (Extension) Assemblies Kit (AT12658)

The complete kit consists of eight plug-in printed wire assemblies mounted on a plastic mould and contained in a carrying case. Each assembly is designed so that the required mother board connections are extended to a corresponding set of sockets on the top edge; these in turn mate with pins of the appropriate module. When the combination of extension assembly and module is plugged into the mother board, complete access to the module is available.

Test Extensions are provided for the following modules:—

Transmitter Exciter	Antenna Filter
Transceiver Audio	Receiver Oscillator Multiplier
IF Amp. and Squelch	Oscillators (TX and RX)
RF Front End	12,5V Restrictor and 10V Regulator
	Control Interface (M256)

It should be noted that Test Extensions are not required for the remaining modules as they can be analysed either in situ (PA Module) or when removed from the equipment (Control Panel).

- NOTE:**
- (a) *Before using the RF Front End or IF Amplifier and Squelch Module Test Extensions, remove the spring clips located on the sides of the module compartments of the equipment frame.*
  - (b) *Only one Test Extension should be used at a time.*
  - (c) *The DC and audio levels of modules on Test Extensions are similar to the levels obtained when the modules are in situ. RF levels may be slightly different.*
  - (d) *When using the Test Extension for the 12,5V Restrictor and 10V Regulator Module do not transmit for more than one minute as the module is no longer connected to its heatsink.*

## Fault-finding — Integrated Circuits (IC's) and Thick-film Circuits (TF.'s)

In the event of an apparent failure of an IC or a TF, all external associated components should be checked to prove the serviceability or otherwise of the IC or TF before replacing it.

It is essential that these checks should be carried out as otherwise the original cause of the failure could be still present and destroy the replacement item.

## Antenna Loading

The equipment will operate safely under a wide range of loading conditions. However, the transmitter should not be operated in the absence of a suitable load such as a 50 $\Omega$  wattmeter, otherwise the transmitter output transistor may be damaged.

Remote Mount Transceivers

It is necessary to provide a control unit and a control cable to carry out Performance Checks and Alignment Procedures on remote mount transceivers. In most installations, it will be found relatively easy to remove the control unit but removing the control cable from an installation may be difficult and inconvenient. In such instances, it is recommended that a spare control cable (Part No. AT36384/01) is held for servicing.

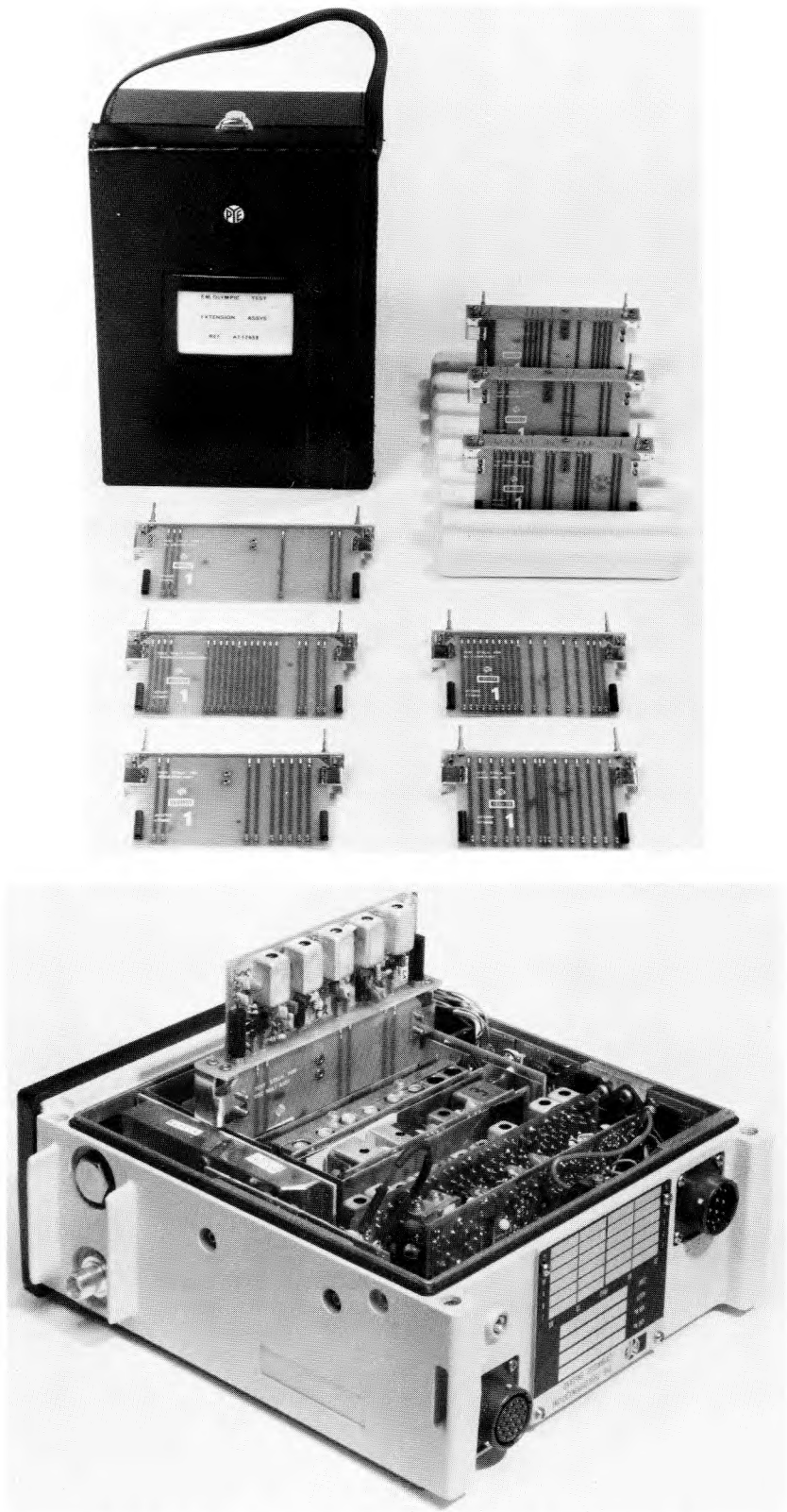


Fig. 4.1 FM Beaver Test (Extension) Assemblies Kit

## CONSTRUCTION

The equipment is contained in a die-cast frame (fitted with removable top and bottom covers) open at one end and divided into upper and lower compartments by an integral plate. The open end accepts either the detachable control panel of the M254 (Front Mount) or the blank front panel of the M256 (Remote Mount).

The upper compartment houses the optional selective call facility; the transmitter and receiver circuitry is accommodated in modular fashion in the lower compartment. To provide optimum thermal bonding the Power Amplifier and Regulator Modules are bolted to the frame walls. All other modules can be lifted out of the mother board using the extractor tool.

Mutual screening of the modules concerned with IF and RF is provided by a multi:— section screen which is soldered to the mother board.

It is possible to mount the equipment either on or suspended from any flat surface. One of the covers is fitted with a carrier plate which slides into the mating grooves of the cradle. As the two covers are interchangeable the carrier plate cover can be either the top or bottom cover according to the mounting requirements.

Each cover is secured with four socket head screws. In order to make the frame moisture proof, sealing gaskets are provided on the flanged surfaces which mate with the covers.

The controls and outlets of the control panel (Front Mount) are fitted with seals and the mating surfaces of panel and frame are sealed with a gasket. The front panel is secured to the frame with six screws and a polycarbonate cover, giving access to the controls is secured to the front panel by two socket head screws.

The control unit (Remote Mount) front panel is identical with the control panel described above. This is contained in a die cast shell and made moisture proof by a gasket interposed between the mating surfaces of shell and front panel and also by the use of glanded outlets for the control socket and loudspeaker leads at the rear of the shell. As with the main unit, the control unit can be mounted on or suspended from any flat surface. The design of the adjustable mounting bracket permits the control unit to be positioned and fixed at any one of three angles to suit the operator's requirements. Removal and reversal of the bracket provides three slightly different angles.

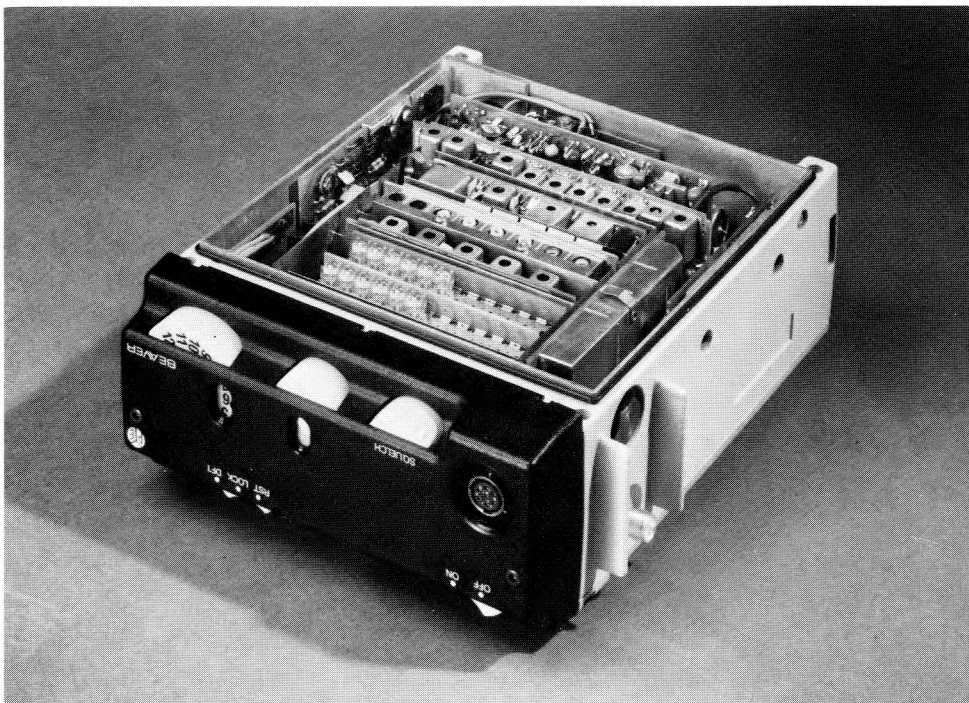


Fig. 4.2 Mechanical Construction

## EQUIPMENT ACCESS

### Tools Required

'Pozidriv' screwdrivers Nos. 1 and 2  
Allen Keys M2,5 and M4.

### Procedure

#### (a) Transceiver

Release the four socket head screws securing the bottom cover; lift off the cover.

All the modules are now exposed and, with the exception of the 12,5V Restrictor Module (6), and the PA Module (9), can be removed with the aid of the Extractor Tool. Modules 6 and 9 are thermally bonded to the frame, Module 6 is secured by 2 x M3 screws to the left hand wall; Module 9 is secured to the right hand wall by 2 x M2,5 socket head screws. (See also Removal of Power Amplifier Module).

### Removal of Transmitter Exciter and/or Power Amplifier Module

Exciter

Lift Exciter Module and carefully unsolder coaxial link connected to track side

Power Amplifier

Release two M2,5 x 15 mm socket head screws using M2,5 Allen Key

Remove screws, nuts and washers securing module to the frame. Lift module and carefully unsolder the co-axial on the component side.

Remove insulating wafer between frame and module.

#### CAUTION

The casing is proofed against the ingress of moisture as also are the controls. When removing or replacing covers or front panel, care should be taken not to damage the sealing gaskets or the proofed bolts securing them.

#### (b) Front Panel (Transceiver Type M254 and Remote Control Unit)

The detachable front panel carries all the controls and may be removed from the casing as follows:—

(a) Remove the two captive screws securing the polycarbonate cover.

(b) Release the six screws securing the front panel to the casing.

(c) On the underside of the chassis, remove the 30-way connector.

To re-fit the front panel, carry out the above detail in reverse order.

**NOTES:** 1. *The Volume control knob is secured by a recessed head grub screw. All other control knobs can be pulled off.*

2. *The indicator lamp bulbs are held in position by threaded lens caps.*

## Removal of Mother Board from Frame

### Tools Required

Pozidriv screwdriver  
M2,5 Allen key  
M2,5 spanner  
M3 spanner

Remove all plug-in modules except the Transmitter Exciter, Power Amplifier and 12,5V Restrictor modules.

Remove Power Amplifier module as detailed on page 4.5. Remove Exciter and PA (linked) together.

Release the two M3 x 8 mm screws and washers securing the 12,5V Restrictor module. Remove module.

Remove Interconnecting Control Interface 30-way PWB and Interconnecting (14 way) socket

Remove pin connectors from Mother Board pins 1,2,3,4,5 and 6 on Front Mount equipment or pins 1,2,3 and 4 only on Remote Mount equipments.

Unsolder leads between PLH/G and relay RLS and PLH/J and relay RLS at the relay ends.

Remove the two M3 x 6 mm screws securing Relay Bracket through the Mother Board to the frame. Remove Relay Bracket.

Remove the remaining eight screws securing the Mother Board to the frame and lift out Mother Board.

## Module Replacement

When replacing modules which are bolted to the main frame, ensure that the mating surfaces of the frame and the modules are thoroughly clean and are lightly coated with thermal grease (See Precautions on Page 4.1). Before securing a module to the frame, check that it is correctly seated.

The PA Module is insulated electrically from the frame by an insulating wafer. When replacing this module, ensure that the wafer, coated with thermal grease (DowCorning 340 heat sink compound), is correctly aligned between frame and module to accept the fixing screws.

## Receiver Audio Path Link

This link completes the receiver audio path as follows:

- (a) No Options Interconnecting Board fitted — link pins 3 and 11 of 14-way Interconnecting Board.
- (b) Options Interconnecting Board fitted but no Selective Call Module — link pins 8 and 12 of Options Interconnecting Board.
- (c) Selective Call Module fitted — no link required.

**NOTE:** When aligning an equipment which normally employs a Selective Call Unit, remove the Selective Call Unit and link pins 8 and 12 of Options Interconnecting Board. For equipments not provided with an Options Interconnecting Board, pins 3 and 11 of the 14 way Interconnecting Board must be linked at all times.

## Single Channel Oscillator Link

This link is provided to override the channel switch on single channel sets. It is fitted adjacent to pins 15 and 16 of the 30 way Interconnecting Board.

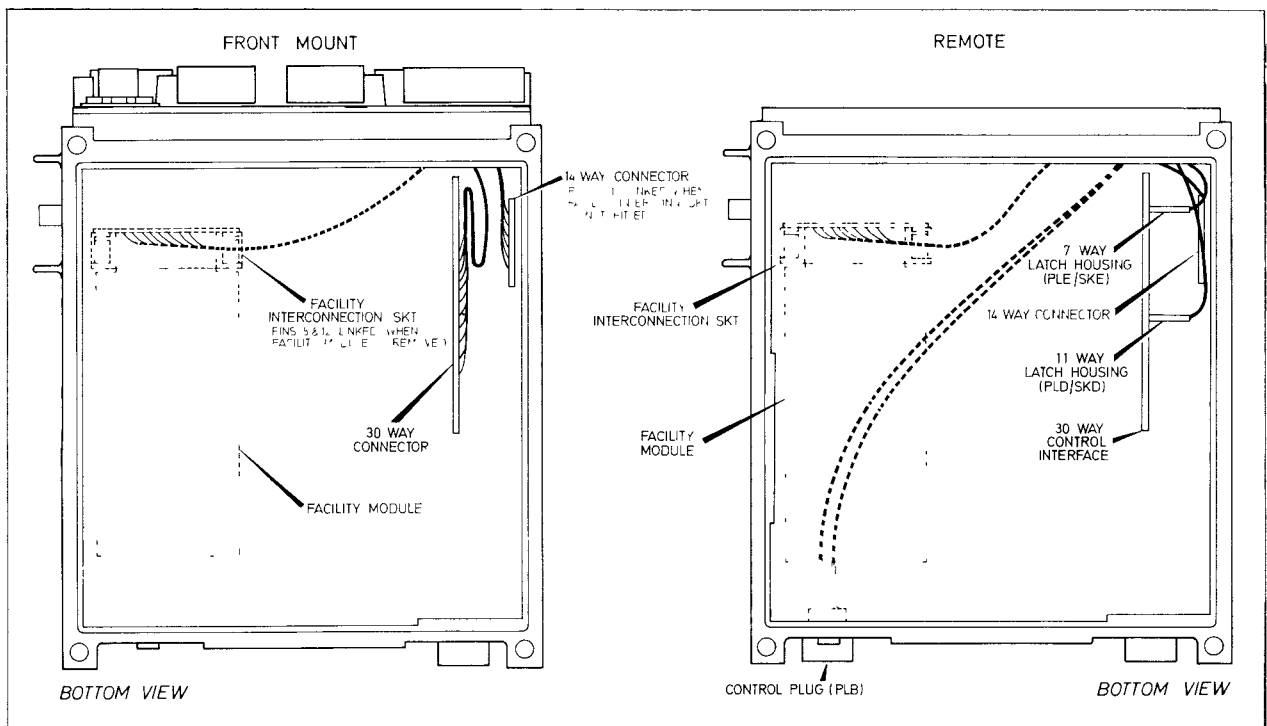


Fig. 4.3 Facility socket Interconnections

TEST EQUIPMENT

Unless otherwise suitably equipped with test equipment of the calibre required for alignment, fault location and repair of the M254–M256, the following list of test equipment is suitable.

Power Supply	Nominal 13,8V DC Adjustable 9 to 16V Preferred	Kingshill 18V 10
Signal Generator	50Ω 0,25μV to 50 mV PD at 68–174 MHz	Pye SG3V or Marconi 995B/5
*Multimeter	20,000Ω/volt	Pye TM1A or Avometer Model 8
Electronic Voltmeter (E.V.M.)	50mV to 10V at 200 MHz Input capacitance 1,5pF	Marconi TF2604
Audio Generator	300Hz – 20 kHz	Marconi TF2102M and TF2162
Oscilloscope	General Purpose	Telequipment S43
Marker Oscillator	10,7 MHz	Pye PT507
Modulation Meter	±5 kHz at 68–174 MHz	Marconi TF2303 or Pye MM1
RF Output Meter	50Ω, 50W 68–174 MHz	Bird Termaline 6154
AF Output Meter	3Ω 3W FSD	Marconi TF893
Diode Probe (Not required if TM1A is available)	10k	Local manufacture (Fig. 4.4)
Set of Trimming Tools		Pye Kit (AT00007)
Distortion Factor Meter		Marconi TF2331
Frequency Counter	68–174 MHz	Marconi TF1417/2 and TF2401A
Control Cable	Remote Equipments only	Pye AT36384/01
Kit of Module Test (Extension) Assemblies (FM)		Pye TSK2 (AT12658)

**\*NOTE:** *If an Avo 8 Multimeter is used it is recommended that a probe set such as those shown below be employed.*

*Meter Probes*  
*Meter Probes*

*Radio spares Type 1*  
*Radio spares*

*423–431 (Red & Black) or*  
*423–433 (Red) 423–649 (Black)*

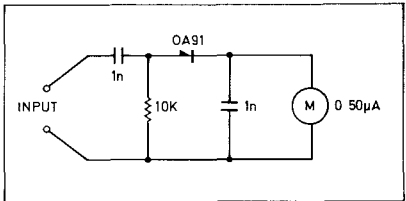


Fig. 4.4 Diode Probe Circuit Diagram

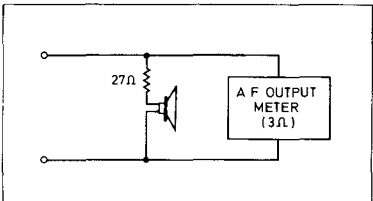


Fig. 4.5 Connection of AF Output Meter



CRYSTAL INFORMATION

Receiver (1st Osc.)

Band	Carrier Freq (fc)	Crystal Freq (fx)	Crystal Range	Crystal Spec.
A	148 to 174 MHz	$\frac{f_x = f_c + 10,7 \text{ MHz}}{12}$	13,22 to 15,39 MHz	T54J0
B	132 to 156 MHz	$\frac{f_x = f_c + 10,7 \text{ MHz}}{12}$	11,89 to 13,89 MHz	T54J0
E	68 to 88 MHz	$\frac{f_x = f_c + 10,7 \text{ MHz}}{12}$	6,56 to 8,22 MHz	T54J0

**Receiver (2nd Osc)**    Standard 10,925 MHz, Alternative 10,475 MHz  
The alternative is used only when the carrier frequency is within 100 kHz of a multiple of the standard frequency, e.g. 109,25 MHz.

This specification applicable to UK    only. Specification for other areas available on application.

Transmitter

Band	Carrier Freq (fc)	Crystal Freq (fx)	Crystal Range	Crystal Spec.
A	148 to 174 MHz	$f_x = \frac{f_c}{12}$	12,33 to 14,50 MHz	T54J0
B	132 to 156 MHz	$f_x = \frac{f_c}{12}$	11,00 to 13,00 MHz	T54J0
E	68 to 88 MHz	$f_x = \frac{f_c}{12}$	5,67 to 7,33 MHz	T54J0

This specification applicable to UK only. Specification for other areas available on application.

ALIGNMENT PROCEDURES AND PERFORMANCE CHECKS

Test Points (TP's)

Test points take the form of flat gold plated pins fitted to the top edge of the module concerned (See Equipment Layout Diagrams).

Measuring Points (MP's)

Measuring Points give an indication of the equipment performance at these points when specified levels of RF (or AF) are injected.

The Measuring Points are shown at their positions on the circuit and their physical locations are given on the layout diagrams of the relevant individual modules.

## Identification of Modules and Components

Modules are allotted a prefix number which is used to identify both the module and its coded components, e.g. Module (8) is the TX Exciter and 8TP1 is TP1 of that module.

## Signal Generator Levels

All signal generator levels are expressed in terms of PD.

## Intermediate Frequencies

First IF	10,7 MHz	Second IF	225 kHz
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## Multiple Channel Equipments

Multiple channel equipments should be aligned on the channel nearest to the mid-point of the band of frequencies covered by the channel fitted. Set CHANNEL switch to appropriate channel before adjusting an oscillator trimmer.

## Multimeter

Unless otherwise stated, the multimeter negative lead should be connected to IIC10 negative. Connect positive lead to the Test Point indicated in the alignment chart.

## GENERAL PRELIMINARY CHECKS AND ADJUSTMENTS

**NOTE:** *The Alignment Procedure should be undertaken only when either a frequency change is required or when replacing a module affecting the alignment procedure.*

- (a) With the OFF/ON switch in the ON position, check that the resistance between:
  - (i) negative input line and frame
  - (ii) positive input line and frameis greater than 1 megohm in each instance.  
Set OFF/ON switch to OFF
- (b) Connect AF Output Meter, set to  $3\Omega$  impedance and connect  $27\Omega$  in series with the loudspeaker (see Fig. 4.5).
- (c) Connect the Power Supply Unit to the power lead and adjust it for 13,8V output.
- (d) Switch on the equipment and check that the ON lamp lights. With the VOLUME control fully anti-clockwise use the multimeter to check that current consumption is between 350 and 450mA.
- (e) Connect meter (set to 25V) across 11C10. Adjust 6RV1 for reading of 12,5V.
- (f) Transfer positive lead of meter to 6TR5 collector and check that the reading is between 9,5V and 10,9V. Ensure that the meter lead probe does not short circuit the adjacent base and emitter ribbon leads.

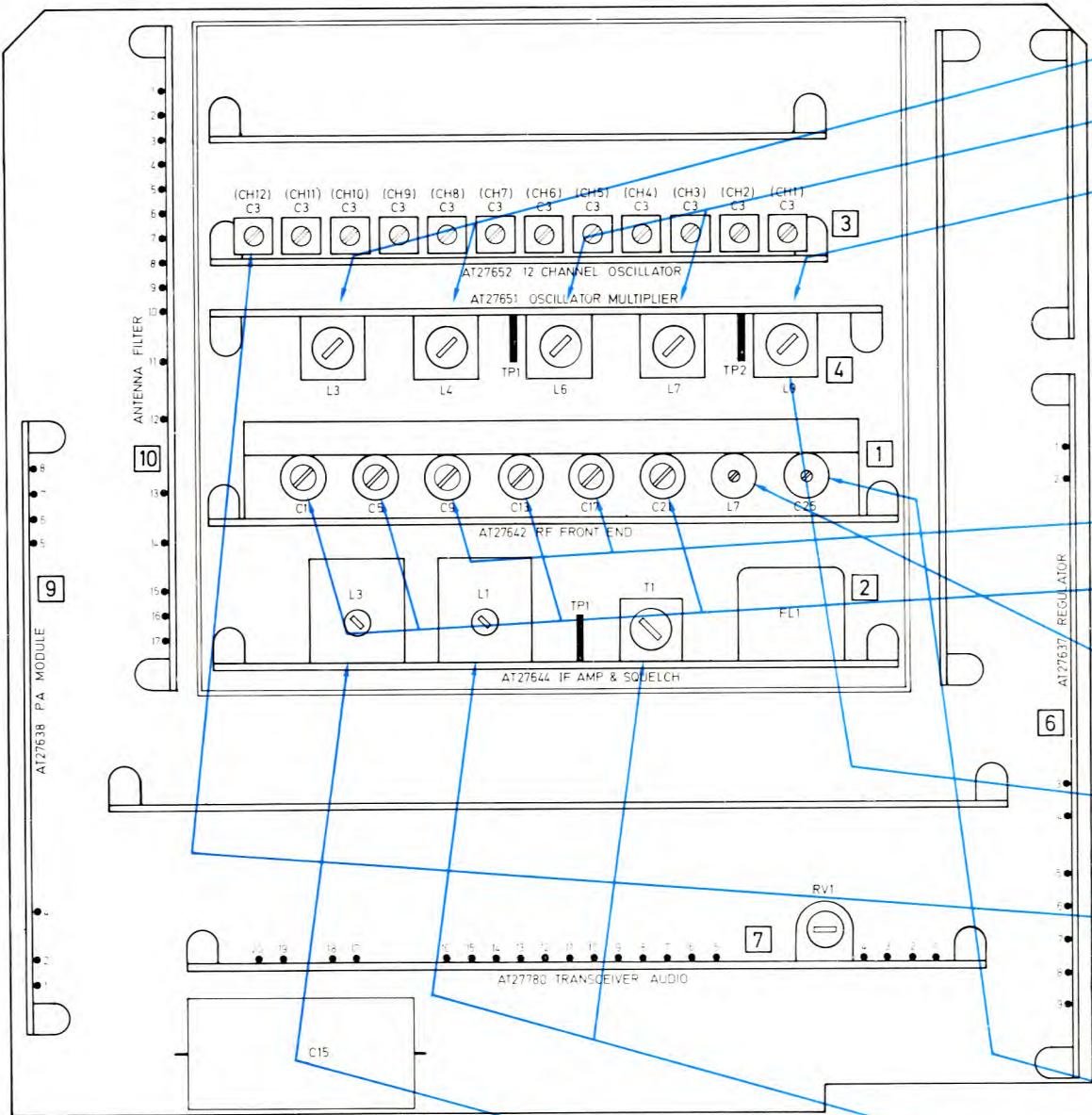
## RECEIVER ALIGNMENT

### Preparation

- (i) Connect signal generator to antenna socket.
- (ii) Set Squelch control fully clockwise (open).
- (iii) Adjust Volume Control for AF Output Meter reading of 100 mW (noise).
- (iv) Adjust Oscillator Multiplier Module (4) inductor cores so that they protrude 3 mm above their former tops.
- (v) Connect multimeter (set to appropriate voltage range) negative lead to 11C10 negative and connect positive lead to the test point indicated in the following procedure.

CAUTION 3

To prevent inadvertent keying of the transmitter resulting in damage to the signal generator, it is recommended that the microphone assembly is removed from the equipment during the alignment of the receiver.



	STEP	MODULE	TUNE	TEST POINT	ADJUSTMENT
(a)	4		L3 L4	4TP1	Tune downwards to 2nd tuning point for maximum reading (1,0V)
(b)	4		L6 L7	4TP2	Tune downwards to 2nd tuning point for max.
(c)	4		L3 L4	4TP2	Re-tune for max. reading (0,5V)
	4		L9	—	Set core so that it is flush with top of its former.
(d)	3		—	4TP2	Select all operational channels in turn. Check each reading is approx. 0,5V.
(e)					Switch on signal generator, tune to the selected channel carrier frequency and adjust the output level to give about 20 db quieting.
(f)					Hold 10,7 MHz marker close to Module 2 input and tune signal generator to zero beat.
					<b>NOTE:</b> During steps (g) to (l) the signal generator output level should be reduced as the tuning proceeds to maintain about 20 db quieting.
(g)	1		C9 C17	AF Output meter	Tune for maximum quieting
(h)	1		C1 C5 C13 C21	AF Output Meter	Tune in sequence for maximum quieting
(j)	1		C1 C5 C9 C13 C17 C21	AF Output Meter	Tune in sequence for maximum quieting
(k)	1		L7	AF Output Meter	Tune for maximum quieting
(l)	4		L9	AF Output Meter	Tune for maximum quieting
(m)					Set signal generator to precise frequency
(n)	3		*C3	—	Hold 10,7 MHz marker close to Module (2) input, tune for zero beat. Repeat for each operational channel setting signal generator to precise frequency of each channel.
	1		C25	AF Output Meter	Tune for maximum quieting
(o)	2		—	2TP1	Set multimeter to appropriate $\mu$ A range. Increase signal generator level until a reading of 5 $\mu$ A is obtained.
(p)	2		T1 L1	2TP1	Tune for maximum reducing the signal generator level to maintain reading of about 5 $\mu$ A.
(q)	2		L3	AF Output Meter	Modulate signal generator at 1 kHz to 50% of peak deviation; tune for maximum audio output.

\*C3 appropriate oscillator trimmercapacitor

## TRANSMITTER ALIGNMENT

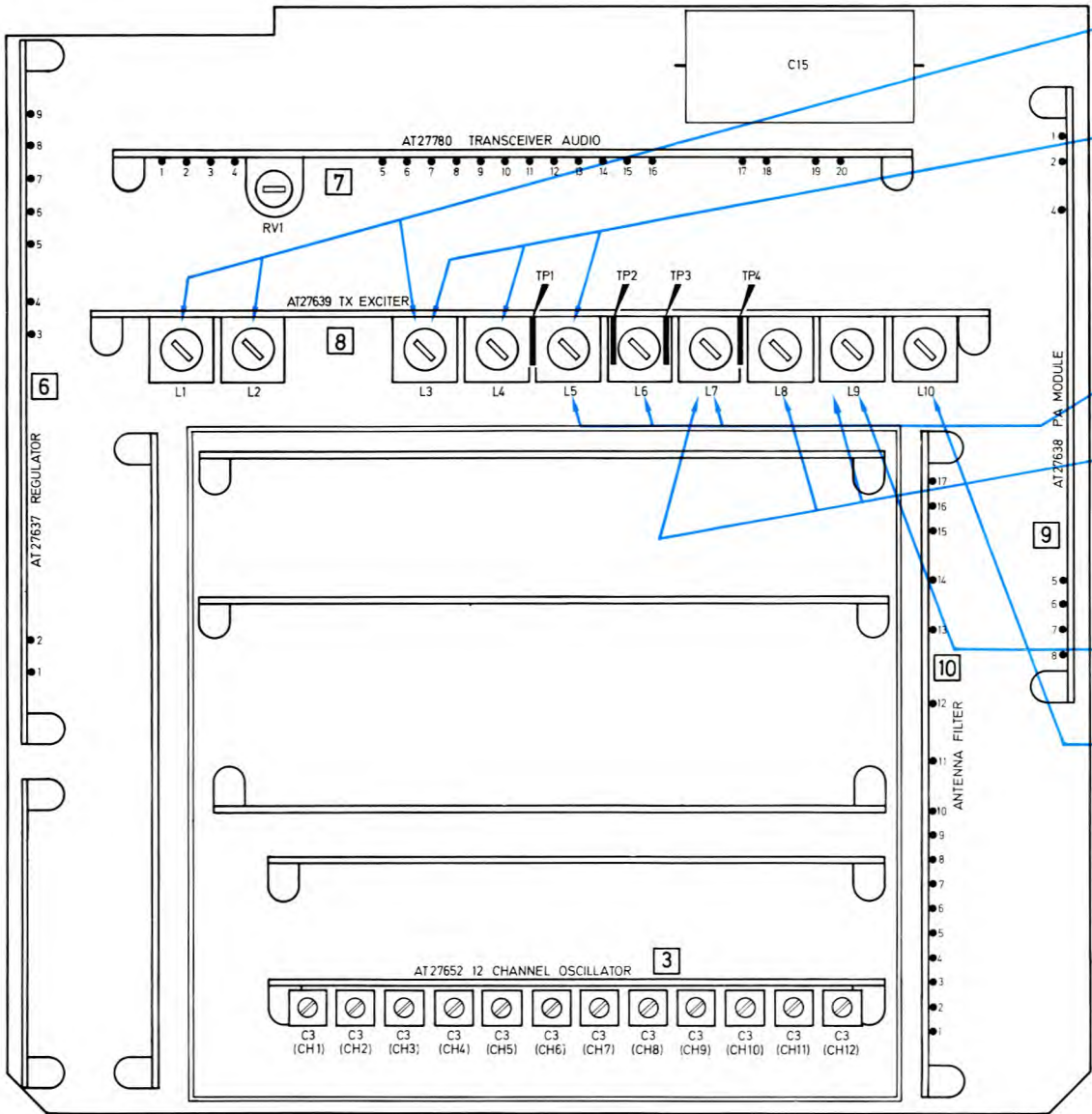
**NOTE:** *The transmitter should always be suitably loaded at the Antenna Socket and keyed only for the time required to make an adjustment and to observe the readings.*

### Preparation

- (i) Connect RF Output meter to Antenna Socket.
- (ii) Key the transmitter and check that the TX lamp (LP2) lights.
- (iii) On the underside of the Mother Board, locate the pin which mates with pin 3 on the socket of the TX Exciter Module (8). Connect diode probe (see Fig. 4.5) to it and check that all operational channels are oscillating.
- (iv) Connect multimeter, set to appropriate voltage range, negative lead to 11C10 negative and connect positive lead to test point indicated in the following procedure.



Transmitter Alignment Chart



STEP	MODULE	TUNE	TEST POINT	ADJUSTMENT
(a)	8	L1 L2 L3	8TP1	Tune for minimum Tune for maximum (8V)
(b)	8	L4 L3 L5	8TP2	Tune for minimum Re-tune for minimum Tune for maximum (9V)
(c)	8	L6 L5 L7	8TP3	Tune for minimum Re-tune for minimum Tune for maximum (8V)
(d)	8	L8 L7 L9	8TP4	Tune in sequence for minimum Tune for maximum (12V)
*(e)	—	—	—	Connect multimeter (10A range) in power supply live lead
(f)	8	L9	Multimeter	Re-tune for maximum supply current
(g)	8	L10	Multimeter	Tune for maximum supply current
(h)	—	—	RF Output Meter	Check output is: greater than 15W for standard equipments not greater than 8,4W for West Germany.

\*If the Power Supply Unit in use incorporates an ammeter (0-10A), this step (e) is omitted.

## CHANGE OF FREQUENCY PROCEDURE

Receiver — Carry out steps (a) to (m) in the Receiver Alignment Chart

Transmitter— Carry out all steps in the Transmitter Alignment Chart

## RECEIVER PERFORMANCE CHECKS

### R.F. Sensitivity

+(i) Carry out Receiver Alignment if necessary.

Check that the signal generator level is about  $0,5\mu\text{V}$  PD for 20 db quieting.

Check that 12 db Sinad is achieved with a signal generator output modulated at 1 kHz with 2/3 peak deviation at a level of about  $0,5\mu\text{V}$  PD.

### Audio Sensitivity

Set the signal generator level to 1 mV PD modulated at 1 kHz. With Volume control at maximum, adjust the deviation until, 1,5 watts audio output is obtained.

Deviation should be less than 1 kHz for all channel spacings.

### Audio Power Output

Set up as for Audio Sensitivity. Set deviation to 2/3 max and turn up volume control to give 3 watts audio output. (2,5W for M256).

Using the oscilloscope check that the waveform is free from distortion.

### Bandwidth

+(i) Select channel tuned to highest frequency.

\*(ii) Check 12 db Sinad is achieved with a signal generator output modulated at 1 kHz with 2/3 of peak deviation at a level of about  $0,5\mu\text{V}$  PD.

(iii) Select channel tuned to lowest frequency and repeat (ii).

### Squelch

(i) Sensitivity

Check the squelch control range from threshold to maximum setting with a unmodulated signal as follows:—

With no signal input, set the squelch control fully clockwise and set the audio output to 100mV. Set the Squelch control to threshold and increase the signal input until the squelch opens and note the reduction in audio level is about 6 db.

Note reading

Turn the Squelch control to maximum (fully anti-clockwise) and check that the squelch opens at a level of between about  $0,3\mu\text{V}$  PD and  $2\mu\text{V}$  PD.

\*See 12 db Sinad Measurement.

+As the accuracy of Bandwidth and RF Sensitivity Checks is dependent on the use of a precisely calibrated signal generator, sensitivity figures within + 2 db of the specified performance may be accepted.

(ii) Supply Voltage

With no signal applied check that the Squelch control can open and close the squelch through the power supply range of 11V to 16V.

(iii) Threshold

Inject a signal modulated at 1 kHz with 100% system deviation.

Note reading and check that it is about 1 db of unmodulated opening level.

(iv) Threshold Backlash

With no signal applied, adjust Squelch control to threshold. Apply an unmodulated signal so that the squelch just opens. Reduce signal level until squelch just closes. Check that the difference in signal levels is less than 6 db.

## Frequency Count

Using a frequency counter, set the signal generator to selected carrier frequency. Hold the 10,7 MHz marker oscillator close to Module 2 input and adjust the appropriate oscillator trimmer for zero beat. Repeat for all operational channels.

## Sinad Measurement

- (i) Tune signal generator to the operating frequency; set output to 1 mV PD modulated at 1 kHz to give 2/3 of system deviation.
- (ii) Connect Distortion Meter across the audio output. Notch out the fundamental of 1 kHz and reduce signal generator level until a distortion factor of 25% is measured. This represents a ratio of signal + noise + distortion to noise + distortion, i.e. SINAD of 12 db.
- (iii) The output of the signal generator should not exceed 0,5µV PD to obtain a SINAD figure of 12 db.

## TRANSMITTER PERFORMANCE CHECKS

**Note:** Key transmitter only for the time required to make an adjustment or to observe reading.

### Power Output

Check power output on all channels:— standard not less than 15W  
West Germany not greater than 8,4W.

### Supply Voltage

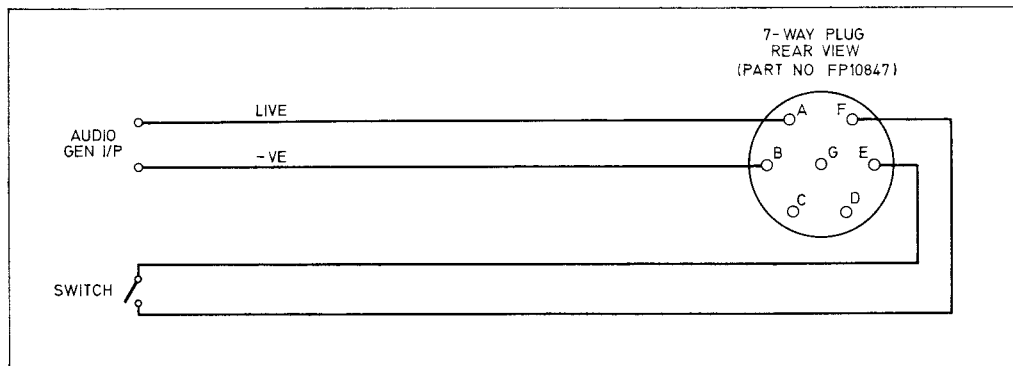
- (i) Reduce supply voltage to 11V. Check power output is not less than: 10 watts — standard, 4,3W — W. Germany
- (ii) Further reduce supply voltage to 9V. Check that relays RLA and RLS remain energised
- (iii) Increase supply voltage to 16V. Check power output is greater than minimum level specified above. Check voltage across 11C10 is 12,5V.

### Frequency Check

Using the frequency counter, check the carrier frequency of each channel in turn. Adjust the appropriate trimming capacitor on the Transmitter Oscillator Module (Module 3).

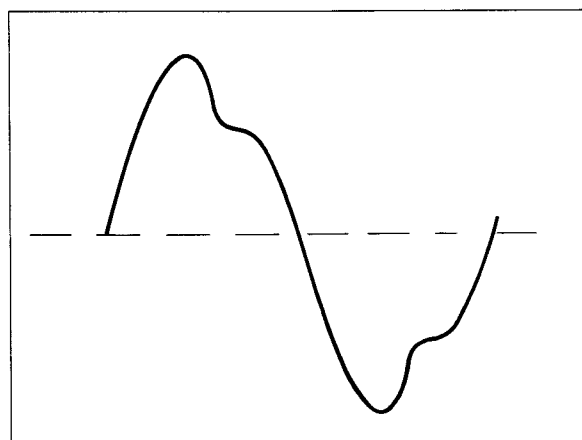
## Peak Deviation

It is recommended that a microphone test lead (as shown in the diagram) be used to carry out this check.



- (i) Ensure that the transmitter is suitably loaded with an output meter or antenna
- (ii) Loosely couple deviation meter to transmitter.
- (iii) Connect test lead to microphone socket and connect AF Oscillator to test lead input
- \* (iv) Adjust the AF Oscillator for an output of 7 mV RMS at 1 kHz.  
Note deviation is at least 50% peak.
- \* (v) Adjust the AF Oscillator level to obtain 50% of peak deviation. Increase level by 20 db and adjust RV1 of Transceiver Audio Module (7) for peak deviation.
- (vi) Using an oscilloscope, check the waveform at the audio terminals of the deviation meter. This should be a good sine wave.

The limited waveform should resemble the adjacent sketch:—



- (vii) Check that the peak deviation is not exceeded on any channel.

### \*Peak Deviation

12,5 kHz Channelling	$\pm 2,5$ kHz
20 kHz Channelling	$\pm 4$ kHz
25 kHz Channelling	$\pm 5$ kHz



## SINGLE TO MULTICHANNEL CONVERSION

Single channel equipments can readily be converted to multichannel as follows:—

Remove single channel Oscillator Modules (AT27652/07)

Locate and remove link which is fitted in the oscillator multiplier compartment.

Fit multichannel boards:—

- |     |                                     |              |   |
|-----|-------------------------------------|--------------|---|
| (a) | Receiver Oscillator<br>(AT27652/03) | — 6 channel  | — inboard position<br>(marked '2' on Mother Board)  |
|     | or                                  |              |   |
|     | AT27652/04                          | — 12 channel |   |
| (b) | Transmitter<br>(AT27652/03)         | — 6 channel  | — outboard position<br>(marked '1' on Mother Board) |
|     | AT27652/04                          | — 12 channel |   |

## SECTION 5

### PARTS LISTS

#### NOTATION

In the following Parts Lists component values are designated as follows:—

**Capacitors** Values given in microFarads unless otherwise stated

$22\mu = 22 \text{ microFarad} \quad (\text{F} \times 10^{-6})$   
 $22n = 22 \text{ nanoFarad} \quad (\text{F} \times 10^{-9})$   
 $22p = 22 \text{ picoFarad} \quad (\text{F} \times 10^{-12})$

Fractional values shown thus:

$2\mu 2 = 2,2 \text{ microFarad} = (22 \times 10^{-7}) \text{ F}$   
 $2n 2 = 2,2 \text{ nanoFarad} = (22 \times 10^{-10}) \text{ F}$   
 $2p 2 = 2,2 \text{ picoFarad} = (22 \times 10^{-13}) \text{ F}$

**Resistors** Values given in Ohms unless otherwise stated

$22 = 22 \text{ ohms}$   
 $22k = 22 \text{ kilohms} \quad (\text{Ohms} \times 10^3)$   
 $22M = 22 \text{ Megohms} \quad (\text{Ohms} \times 10^6)$

Fractional values are shown thus:

$2 \text{ ohms} \quad 2,2 \text{ ohms}$   
 $2k 2 = 2,2 \text{ kilohms} = (22 \times 10^2)$   
 $2M 2 = 2,2 \text{ Megohms} = (22 \times 10^5)$

#### ABBREVIATIONS

cadmium	cad	printed wire board	PWB
carbon	c.	polyester	poly
ceramic	cer.	steel	st.
composition	comp.	resin dipped	r.d.
countersunk	csk	tantalum	tant.
electrolytic	elec.	tubular	tub.
parts per million	ppm	wire wound	w.w.

#### ORDERING OF SPARE PARTS

When ordering spares, please quote the description and Part No. of the item and the part number of the sub-assembly on which it is used together with the equipment code number given on the identity plate fixed to the left hand side of the equipment.

The right is reserved to fit alternative types of semiconductors with equal or improved performance to those quoted in the Parts List.

# VHF FM BEAVER FRONT MOUNT MOBILE RADIOTELEPHONE TYPE M254 – AT00225

	Bands		Market Codes
A	148–174 MHz	01	= Standard Product
B	132–156 MHz	03	= Germany
E	68– 88 MHz	09	= Canada

## MISCELLANEOUS ITEMS

Description	Part No.	Remarks/Code/Band
Consisting of:—		
†Transceiver Type M254	AT05225	
†Fist microphone Assembly	AT29690	
†Handset Assembly	AT29689	
Cover Assembly	AT12502/01	Item 5
Cover Assembly	AT12502/02	Item 2 includes Carrier Bracket Item 3
Front Cover Printed	BJ30657	Item 14
Screw Socket Head M3 x 12 mm	BT08289	Secure Items 2,5,14 10 off
Dust Cap	FS40860	Power Plug
Dust Cap	FS40861	Microphone Socket
Screw Poz. Pan. st. M2,5 x 6 mm	QJ11945/B	2 Crystal Retainers
Crystal Retainer	AT13032	2 Oscillator Modules
Bung	BT36502	
Gasket	BT17410	Item 24 1 each items 2 & 5.
Operating Instructions	BT36928	TP940
Installation Instruction and Contents List (Front and Remote Mounts)	BT18988	TP807
Installation Instruction and Contents List (Motorcycle)	BT18989	TP811

## INSTALLATION ITEMS (STANDARD)

### AT26335

		/01	/02	/03	/04	/05	/06
†Power Lead Assembly	AT12732/03	1	1	1	1	1	1
Cradle Assy Item 4	AT12836	1	1	1	1	1	1
†Bagged Items	AT26336/01	1	—	1	—	1	—
†Bagged Items	AT26336/02	—	1	—	1	—	1
†Bulkhead L.S.	275590/03	—	—	1	1	—	—
†Horn Loudspeaker	AT12742/02	—	—	—	—	1	1

From the above table, it will be seen that the Installation Item Parts Lists are arranged to meet the possible combinations of microphones and loudspeakers which can be supplied with the transceiver.

## INSTALLATION ITEMS for Motorcycle (OPTIONAL) AT26337

†Power Lead Assy	AT12748/01
†Cradle Assy. Complete	AT12740/01
†Bagged Items	AT26293/01
†Horn Loudspeaker	AT12742/02
†Earth Lead Assy.	AT36364
†Retainer Strap Assy.	AT12741
Antenna	FA00822
Dust Cap	FS40861

†Breakdown under headed list

### Power Lead Assembly (Standard)

AT12732/03

### Power Lead Assembly for Motorcycle (Option)

AT12748/01

### Replacement Items

Housing 2-way	FT10535	L.S. Connector
Pins	FT10537	
Fuseholder Body	FH02763	
Fuseholder Cap	FH02765	
Fuseholder Eyelet	FH02767	
Fuseholder Spring	FH02768	
Fuse 500 mA	FF99002	FS3 AT12732/03 only
Fuses 5A	FS99006	FS1, FS2 AT12748/01 only

<b>Bagged Items (Standard)</b>	<b>AT26336/01 AT26336/02 Part No.</b>	<b>Remarks/Code/Band</b>
<b>Description</b>		
Socket Wrench, 3mm, AF	FT08070	
Extractor	BT17168	M254 Modules
Terminal Block 3-way	BT30081	
Fuse 5A	FF99006	FS1, FS2
Fuseholder	FH02837	
Plug, Type BNC	FP13742	Antenna Feeder
Screws:—		
Slot Pan Self Tap No. 6 x ¾ in.	QW41212/A	2 Terminal Block
Slot Pan Self Tap No. 8 x ¾ in.	QY41214/A	2 Fuseholder
Hex. Head st. cad. M5 x 30 mm	QJ13032/A	3 Mic. or Handset Rest
Hex. Head st. M6 x 30 mm	QJ13051/A	4 Loudspeaker (Bulkhead)
Hex. Full Nut st. 6H M5	QA11609/A	4 Cradle
Hex. Full Nut st. 6H M6	QA11610/A	4 Loudspeaker
Washer st. cad. M5 large	QA15009/A	4 Cradle
Washer st. cad. M6 large	QA15010/A	8 Loudspeaker
*Fist Microphone Rest (Black)	FH00642	8 Cradle
†Handset Rest	FH00629	
*AT26336/01 only		
†AT26336/02 only		
<b>Bagged Items for Motorcycle (Optional)</b>	<b>AT26293/01</b>	
Bolt Hex Hd. M6 x 40	AJ13053/A	Item 36 4 Cradle to M/Cycle
Washer Large M6	QA1510/A	
Full Nut Hex M6	QA11610/A	
Screw Pozi Pan M4 x 6	QJ11916/X	1 Earth lead to transceiver
<b>Cradle Assembly Complete for Motorcycle (Optional)</b>	<b>AT12740/01</b>	
Cradle Assembly	AT10848/01	Item 31
Bracket Assembly	AT10850	
Antenna Support	AT26584/02	Item 32
Antenna Base	FA00823	Item 33
Pad Moulded	BT24757	
Pad Plain	BT24758	
Grommet ¼ in.	FG02219	Antenna Support
Antenna Feeder Plug	FP13742	Item 34
Edge Clip	QA02150	Item 35 Co-axial cable
Black Button	QA07453	Blanking
Screw Slot st. 4BA x ¾ in.	RU41010	4 Antenna Support to cradle
Washer st. Cad. 4BA	QA13004/A	
Nylon Nut 4BA	QA12568	
Cable Co-axial 500 ohm	FC04530	400 mm
<b>Earth Lead Assembly</b>	<b>AT36364</b>	
Tag	FT10688	2 off
Wire 56/0.3 mm Black	FW05091/K	450 mm
<b>Retainer Strap Assembly</b>	<b>AT12741</b>	
Retainer Strap	BT25152	Item 37
Bracket	BT11172	
Handset Rest	BT25148	Item 38
Pad	BT24756	
Screw Special	238259	Item 39 2 Retainer strap to cradle
Screw Pozi Pan M5 x 10	QJ11932/A	2 Bracket to Handset Rest
Screw Pozi Pan M5 x 12	QJ11933/A	2 Retainer Strap to Handset Rest
Full Nut Hex. M5	QA11609/A	4 2 Retainer Strap to Handset Rest
Washer Large M5	QA15009/A	2 Bracket to Handset Rest
<b>Bulkhead Loudspeaker</b>	<b>275590/03</b>	
Bracket	406349/02	
Loudspeaker	FS11093	
Housing 2-way	FT10536	
Socket	FT10538	2 off
Identification Sleeve	FS22184/18	

**Horn Loudspeaker****AT12742/02****Description**

Loudspeaker  
Housing 2-way  
Socket  
Identification Sleeve

**Part No.**

ET13511/02  
FT10536  
FT10538  
FS22184/18

**Remarks/Code/Band**

Complete with fixings  
2 off

**Fist Microphone**

Plug 7-way  
Fist Microphone Assembly  
Which includes:—  
Microphone Insert  
Lead Assembly  
Identification Sleeve  
Resistor  $680\Omega \pm 5\%$  0,25W

**AT29690**

FP10847  
FH00638/02

FM99004  
240595/2  
FS20126/20  
PM01434

(S.G. BROWN Part No.)

**Telephone Handset**

Plug 7-way  
Handset and Lead  
Which includes:—  
Microphone Insert  
Earpiece Insert  
Identification Sleeve  
Resistor  $680\Omega \pm 5\%$  0,25W

**AT29689**

FP10847  
FH00643/01

FM99004  
FM03640  
FS20126/19  
PM01434

# VHF FM FRONT MOUNT TRANSCEIVER TYPE M254

## AT05225

Consisting of:—

Mother Board with plug in modules details of which are provided under headed parts lists

### MISCELLANEOUS

Link Assembly	AT14171	Used on Single Channel
Link Assembly	AT12514	Used on Non Facility Equipment — links pins 3 and 11 of SKF
Socket Assy	AT14131	Item 23 Antenna Socket
Nut Special	BT03295	Item 21 — Blanking
Screw Special	BT08295	Hole Blanking
Gasket Front Panel	BT17424	Item 19
Blanking Plate	BT20046/01	Item 18 Facility Skt. Cut-out
Screw Pan Taptite M2,5 x 6 mm	QJ11580/A	4 for Item 18
Contact Spring	BT26991	5 Modules to Screen
Contact Spring	BT26996	Ant. Filter Module
Gasket	FP10819	1 for Item 16 1 for Item 18
Hex. Full Nut st. 6H M3	QA11605/A	for Item 18
Washer Seloc Mk2 st. 4BA	QA13742	for Item 18
Washer Seloc M10	QA13330	for Item 21
Insulator	BT36937	1 Osc Board to Screen 1 IF Board to Screen

<b>START RELAY AND BRACKET ASSEMBLY</b>	<b>AT13056</b>	<b>Item 15</b>
Start Relay	FR03994	RLS/1
Bracket	BT11192	
Pad	BT24763	
Receptacle Mini Pv Strip	FC00830	

### CONTROL PANEL COMPLETE

#### Control Panel Assembly

Description	Part No.	Remarks/Code/Band
Panel Sub-Assembly	AT12505	Item 10
Knob Assembly	AT25830	OFF-ON 1 RST-LOCK-DFT
Knob Assembly	AT25831	Volume
Knob Assembly	AT25832	SQUELCH
Knob Assembly	AT25833	Channel
Lens Red	FL13801	Transmit LP3
Lens Green	FL13803	On LP1
Lens Amber	FL13802	Item 13 Call Lamp LP2
Protection Plug Black	FG02597	Panel Bung
Protection Plug Yellow	FG02598	Panel Bung 2 off
Switch 1 pole 12-way	FS07147	Channel S2
Switch 2 pole 3-way	FS07149	RST-LOCK-DFT S3 (a) & (b)
Switch 1 pole 1-way	FS07150	OFF-ON S1
Socket 7-way	FS40847	Item 20 Microphone Skt. SKA
Potentiometer 250 linear	FL09087	SQUELCH RV1
Potentiometer 5k log.	PL09086	Volume RV2
Lamp 14V 6 mm Tub	FL17818	Item 12 LP1, LP2, LP3
Screw Pan Taptite M3 x 12 mm	QJ11553/X1	Fixing screws 6 off for Item 10 (Not part of AT14126)
Lampholder Body, 3 off	FL13804	} For LP1, LP2, LP3
Small Washer, 3 off	FL13805	
Lampholder Nut, 3 off	FL13806	
Large Washer, 3 off	FL13807	

<b>Control Lead Assembly</b>	<b>AT36405</b>	
Single core screened cable	FC04527	1200 mm
7/0,2 mm Wire class 1		Various colours
48/0,5 mm Flex		Various colours
Clips	QA04424	11 off
<b>PWB 30-Way Interconnection Assembly</b>	<b>AT27822</b>	
consisting of:—		
Printed Wire Board Assembly	AT14127	
Stand-off Button	BT36480	
Guide	BT17558	
Diode 1N4001	FV05840	D1
47 Resistor ±5%	PM01420	R1
<b>POWER PLUG ASSEMBLY</b>	<b>AT13057</b>	
which includes:—		
Plug 12-way	FP10831	Item 16 Power
Receptacle Mini PV Strip	FC00833	4 off
7/0,2 mm Wire Class 1		Various colours
16/0,2 mm Wire Class 3		Various colours
Screw Pan Taptite M2,5 x 6 mm	QJ11580/X1	4 for Item 16 (Not included in AT1305
<b>OPTIONS INTERCONNECTION ASSEMBLY</b>	<b>AT14130</b>	<b>Required only when facility Module is fitted</b>
consisting of:—		
<b>14-Way Interconnection Assembly</b>	<b>AT13099</b>	
which includes:—		
Printed Wire Board	AT13161	
Guide	BT17588	
Stand-off Button	BT36480	
<b>PWB Interconnection Assembly</b>	<b>AT27824</b>	
which includes:—		
Printed Wire Board Assy.	AT13105	
Bracket	BT11178	
Bracket	BT11178/01	
Modular Connector	FS99074	SKF
Capacitor 1nF cer. plate	PN99600	C1—C9
Lead Assembly	AT36406	
Clip	QA04424	4 off
48/0,5 mm Flex	Various colours	
Cable single screened	FC04527	
<b>FRAME ASSEMBLY COMPLETE</b>	<b>AT12504/02</b>	
<b>Description</b>	<b>Part No.</b>	<b>Remarks/Code/Band</b>
Frame Assembly	AT13030/01	Item 1
Label Frequency	BT18983	
Screw Pan Taptite M2,5x6	QJ11580/A	4 for label

# VHF FM BEAVER REMOTE MOUNT MOBILE RADIOTELEPHONE TYPE M256 – AT00226

	Bands		Market Codes
A	148–174 MHz	01	= Standard Product
B	132–156 MHz	03	= Germany
E	68– 88 MHz	09	= Canada

## MISCELLANEOUS ITEMS

Consisting of:—

†Transceiver Type M256	AT05226	
†Control Unit	AT04730/02	
Cover Assembly	AT12502/01	Item 5
Cover Assembly	AT12502/02	Item 2 includes Carrier Bracket Item 3
†Handset and Lead	AT29689	
†Fist Microphone and Lead Assy	AT29690	
Screw Socket Head M3 x 12 mm	BT08289	Secure Items 2,5,14
Dust Cap	FS40860	Power Plug
Dust Cap	FS40861	Microphone Socket
Screw Poz. Pan. st. M2,5 x 6mm	QJ11945/B	2 Crystal Retainers
Crystal Retainer	AT13032	2 Oscillator Modules
Bung	BT36502	
Gasket	BT17410	Item 24 2 off
Operating Instructions	BT36928	TP940
Installation Instruction and Contents List	BT19989	TP807

## INSTALLATION ITEMS

	AT26335	/07	/08	/09	/10	/11	/12
†Power Lead Assy	AT12732/03	1	1	1	1	1	1
Cradle Assy Item 4	AT12836	1	1	1	1	1	1
†Bagged Items	AT26336/01	1	—	1	—	1	—
†Bagged Items	AT26336/02	—	1	—	1	—	1
†Bulkhead L.S.	275590/03	—	—	1	1	—	—
†Horn Loudspeaker	AT12742/02	—	—	—	—	1	1
†Control Cable Assembly 5 metres	AT36384/05	1	1	1	1	1	1

From the above table, it will be seen that the Installation Item Parts Lists are arranged to meet the possible combinations of microphones and loudspeakers which can be supplied with the transceiver.

†Breakdown under headed list

## Power Lead Assembly

## AT12732/03

Replaceable Items		
Housing 2-way	FT10535 }	L.S. Connector
Pins	FT10537 }	
Fuseholder Body	FH02763	
Fuseholder Cap	FH02765	
Fuseholder Eyelet	FH02767	
Fuseholder Spring	FH02768	
Fuse 500 mA	FF99002	FS3
Wire 16/0.2 mm	FW05060/W	White 900 mm



<b>Bagged Items</b>		<b>AT26336/01 &amp; /02</b>
<b>Description</b>	<b>Part No.</b>	<b>Remarks/Code/Band</b>
Socket Wrench, 3 mm AF	FT08070	
Extractor	BT17168	M256 Modules
Terminal Block 3-way	BT30081	
Fuse 5A	FF99006	FS1
Fuseholder	FH02837	
Plug, Type BNC	FP13742	Antenna Feeder
Screws:—		
Slot Pan Self Tap No. 6 x ¾ in.	QW41212/A	2 Terminal Block
Slot Pan Self Tap No. 8 x ⅞ in.	QY41214/A	2 Fuseholder
Hex. Head st. cad. M5 x 30 mm	QJ13032/A	3 Mic. or Handset Rest
Hex. Head st. M6 x 30 mm	QJ13051/A	4 Loudspeaker (Bulkhead)
Hex. Full Nut st. 6H M5	QA11609/A	4 Cradle
Hex. Full Nut st. 6H M6	QA11610/A	4 Loudspeaker
Washer st. cad. M5 large	QA15009/A	4 Cradle
Washer st. cad. M6 large	QA15010/A	8 loudspeaker
*Fist Microphone Rest (Black)	FH00642	8 Cradle
†Handset Rest	FH00629	
*AT26336/01 only		
†AT26336/02 only		
<b>Bulkhead Loudspeaker</b>		<b>275590/03</b>
Bracket	406349/02	
Loudspeaker	FS11093	
Housing 2-way	FT10536	
Socket	FT10538	2 off
Identification Sleeve	FS22184/18	
<b>Horn Loudspeaker</b>		<b>AT12742/02</b>
Loudspeaker	ET12511/02	Complete with fixings
Housing 2-way	FT10536	
Socket	FT10538	2 off
Identification Sleeve	FS22184/18	
<b>Control Cable Assembly</b>		<b>AT36384</b>
Plug 19-way	FP10845	
Socket 19-way	FS40857	
Cable 28-way	FC04182	5 m
Sleeve 1,5 mm x ¾ in. long	FS22515	4 off
Sleeve Identification	FS30488/01	
Sleeve Heat Shrink	FS23183	50 mm
<b>Fist Microphone</b>		<b>AT29690</b>
Plug 7-way	FP10847	
Fist Microphone Assembly	FH00638/02	
Which includes:—		
Microphone Insert	FM99004	
Lead Assembly	240595/2	(S.G. BROWN Part No.)
Identification Sleeve	FS20126/20	
Resistor 680 ±5% 0,25W	PM01434	
<b>Telephone Handset</b>		<b>AT29689</b>
Plug 7-way	FP10847	
Handset and Lead	FH00643/01	
Which includes:—		
Microphone Insert	FM99004	
Earpiece Insert	FS20126/19	
Resistor 680 ±5% 0,25W	PM01434	
<b>CONTROL UNIT</b>		<b>AT04730/02</b>
†Control Panel Assembly	AT13058/04	<b>Item 28</b>
†Loudspeaker Lead Assembly	AT36383	Item 10
†Cableform assembly	AT36424	
Front Cover Printed	BJ30657	Item 14
Screw socket hd. M3 x 12 mm	BT08289	6 off Secure Item 14
Bracket	BT11193	
Gasket	BT17424	Item 19 1 for Item 10 1 for Item 26
†Breakdown under headed list		

## Control Unit (Cont.)

Description	Part No.	Remarks/Code/Band
Unit label	BT18466	
Bung	BT36502	
Casting (rear cover)	BT39010	Item 27
Cable gland	FG02588	Loudspeaker lead
Lock nut	FG02589	Item 30 Loudspeaker lead
Screw Pan Pozi Taptite M2,5 x 6 mm	QJ11580/X1	2 off Unit location
Screw Pan Pozi Taptite M3 x 6 mm	QJ11550/X1	2 off label
Screw Pan Pozi Taptite M3 x 8 mm	QJ11551/X1	6 off Control Panel
Screw Hex. Hd. st. cad. M6 x 10 mm	QJ113327/A	2 off Bracket
Washer shakeproof M6	QA13331	2 off Bracket
Washer st. cad. M6 large	QA15010/A	2 off Bracket
<b>Control Panel Assembly</b>	<b>AT13058/04</b>	
Panel Sub-Assembly	AT12505	Item 10
Knob Assembly	AT25830	OFF-ON 1 RST-LOCK-OFT
Knob Assembly	AT25831	VOLUME
Knob Assembly	AT25832	SQUELCH
Knob Assembly	AT25833	Channel
Lens Red	FL13801	Transmit LP3
Lens Green	FL13803	On LP1
Lens Amber	FL13802	Item 13 Call Lamp LP2
Protection Plug Black	FG02597	Panel Bung
Protection Plug Yellow	FG02598	Panel Bungs 2 off
Switch 1 pole 12-way	FS07184	Channel S2
Switch 2 pole 3-way	FS027149	RST-LOCK-DFT S3 (a) & (b)
Switch 1 pole 1-way	FS07150	OFF-ON S1
Socket 7-way	FS40847	Item 20 Microphone Skt. SKA
Resistor 47 $\Omega$ $\pm$ 5% 0,25W c. film	PM01420	
Resistor 1k $\Omega$ $\pm$ 5% 0,25W c; flim	PM01436	
Potentiometer 250 linear	PL09087	SQUELCH RV1
Potentiometer 5k log	PL09086	VOLUME RV2
Lamp 14V 6 mm Tub	FL17818	Item 12 LP1, LP2, LP3
Screw Pan Taptite M3 x 6 mm	QJ11551/A	Fixing screws for Item 10 6 off
Lampholder Body, 3 off	FL13804	for LP1, LP2, LP3
Small Washer, 3 off	FL13805	
Lampholder Nut, 3 off	FL13806	
Large Washer, 3 off	FL13807	
<b>Loudspeaker Lead Assembly</b>	<b>AT36383</b>	
Housing 2-way	FT10535	
Pins tin plated	FT10537	2 off
Sleeve 5 mm x 1 in.	FS22529	
Twin core cable 16/0,2 mm	FC09656	1 in.
Twin core cable 16/0,2 mm	FC09656	1 in.
<b>Cableform Assembly</b>	<b>AT36424</b>	
Plug 19-way	FP10852	Item 29
Cable	FC04553	250 mm
Wire CLass 1 7/0,2 mm		various colours
Flex 48/0,5 mm		various colours
Cable clip	QA04424	10 off
Cable Single Screened	FC04527	475 mm

# VHF FM REMOTE MOUNT TRANSCEIVER TYPE M256

## PART No. AT05226

### Consisting of:

Mother Board and plug in modules details of which are shown under headed lists.

### MISCELLANEOUS ITEMS

Description	Part No.	Remarks/Code/Band
Link Assembly	AT14171	Used on Single channel
Link Assembly	AT12514	Used on Non-Facility Equipment — links pins 3 and 11 of SKF
Socket Assy	AT14131	Item 23 Antenna Socket
Front Panel Blank	BJ30656	Item 26
Frame Assy	AT12504/02	
Nut Special	BT03295	Item 21 — Blanking
Screw Special	BT08295	Hole Blanking
Gasket	BT17424	Item 19
Screw Pan Taptite M2,5 x 6 mm	QJ11580/X1	4 Control Interface Skt.
Contact Spring	BT26991	2 Modules to Screen
Contact Spring	BT26996	Ant. Filter Module
Insulating Washer	BT36783	Item 8
Gasket	FP10819	1 for Item 16, 1 Control Interface Skt.
Washer Seloc M10	QA13330	1 for Item 21
Insulator, 3 off	BT36937	1 Screen to OSC Module
		1 Screen to Mother Board
		1 Screen to IF Module
Screw Pozi Pan M3 x 12	QJ11553/X1	6 for Item 26
Insulator	BT36908	1 Screen to Mother Board
<b>Start Relay and Bracket Assy</b>	<b>AT13056</b>	<b>Item 15</b>
Start Relay	FR03994	RLS/1
Bracket	BT11192	
Pad	BT24763	
Receptacle Mini PV Strip	FC00830	
<b>Control Socket Assembly</b>	<b>AT14129</b>	
Socket 19-way	FS40581	Item 25
Mini-latch Housing 8-way	FC00820/08	Single row
Mini-latch Housing 12-way	FC00820/12	Single row
Polarizing Plug	FC00798	1 off per latch housing
Cable single screened	FC04527	850 mm
Flex 48/0,05 mm		Various colours and lengths
Wire Brown 16/0,2 mm	FW05063/B	170 mm
Wire Blue 16/0,2 mm	FW05063/U	170 mm
Screw Pozi Pan M2,5 x 6	QJ11580/X1	4 for Item 25 (Not included in AT14129)
<b>Power Plug Assembly</b>	<b>AT13057</b>	
Which includes:—		
Plug 12-way	FP10831	Item 16
Receptacle Mini, PV Strip	FC00833	4 off
7/0,2 mm Wire Class 1		Various colours
16/0,2 mm Wire		Various colours
Screw Pan Taptite M3,5 x 6 mm	QJ11580/X1	4 for Item 16 (Not included in AT13057)
<b>Frame Assembly Complete</b>	<b>AT12504/02</b>	
Frame Assembly	AT13030/01	Item 1
Label Frequency	BT18983	
Screw Pan Taptite	QJ11580/A	4 for label

<b>OPTIONS INTERCONNECTION ASSEMBLY</b>	<b>AT14130</b>	<b>Required only when facility Module is fitted</b>
<b>Description</b>	<b>Part No.</b>	<b>Remarks/Code/Band</b>
<b>14-Way Interconnection Assembly</b>	<b>AT13099</b>	
which includes:—		
Printed Wire Board	AT13161	
Guide	BT17588	
Stand-off Button	BT36480	
<b>PWB Interconnection Assembly (14)</b>	<b>AT27824</b>	
which includes:—		
Printed Wire Board Assy.	AT13105	
Bracket	BT11178	
Bracket	BT11178/01	
Modular Connector	FS99074	SKF
Capacitor 1nF $\pm 10\%$ 100V cer. plate	PN99600	C1—C9
Lead Assembly	AT36406	
Clip	QA04424	3 off
48/0,5 mm Flex		Various colours, 300 or 600 mm lengths
Cable single screened	FC04527	

### RF FRONT END MODULE (1) AT27642/— or AT27879/—

Complete Assembly Part No.

Band	Freq.	Part No.
A	148—174 MHz	AT27642/02 or AT27879/01
A *	148—174 MHz	AT27642/05 or AT27879/11
B	132—156 MHz	AT27642/03 or AT27879/02
E	68—88 MHz	AT27642/01 or AT27879/05

### CAPACITORS

Description	Part No.	Remarks/Code/Band
0p33 $\pm 10\%$	400V cer. tub PN00115	A * ABE C11,19
1p2 $\pm 10\%$	160V cer. tub PN00114	A * ABE C3
1p8 $\pm 0p25$	63V cer. plate PN99750	A * AB C23
2p2 $\pm 0p25$	400V cer. tub PN01049	A * AE C12,18,20
		B C12,20
		E C10
2p2 $\pm 0p25$	63V DC cer. plate PN99751	A * ABE C2,4
2p7 $\pm 0p25$	400V DC cer. tub PN01119	B C10,18
8p2 } $\pm 2\%$	63V DC cer. plate PN99758	A * ABE C26
15p }	PN99761	A * AB C29
18p }	PN99762	E C23,29
330p }	PN99777	A * AB C6,8,14,16
2n2 $\pm 10\%$	100V DC cer. plate PN99812	A * AB C7,15,22
		E C6,8,14,16
4n7 $\pm 10\%$	100V DC cer. plate PN99813	A * ABE C28
10n $-20\% +100\%$	40V DC cer. plate PN99823	A * ABE C24
100n $+20\% +80\%$	12V DC cer. plate PN62335	A * ABE C27
2-15p Variable	PV07264	A * ABE C1,5,9,13,17,21
2-18p Variable	PV07657	A * ABE C25

## RESISTORS (Ohms)

Description			Part No.	Remarks/Code/Band
100	±5%	0,125W	c. film	PL99757 A* ABE R2,4,6,8,10
220				PL99761 A* ABE R1,5
470				PL99765 A* ABE R11
3k3	±5%	0,25W	c. film	PM01422 A* R9
5k6				PM01445 ABE R9
10k				PM01448 E R7
18k	±5%	0,125	c. film	PL99783 A* R12
33k	±5%	0,25W	c. film	PM01454 A R7

## INDUCTORS

Coil Assembly	AT31243/01	E	L3,5
Coil Assembly	AT31244/01	E	L1
Coil Assembly	AT31244/02	E	L2
Coil Assembly	AT31244/03	E	L4
Coil Assembly	AT31244/04	E	L6
Coil Assembly	AT31249/03	A* A	L6
Coil Assembly	AT31249/05	A* A	L2,4
Coil Assembly	AT31249/06	A* A	L5
Coil Assembly	AT31249/09	A* A	L1
Coil Assembly	AT31249/10	A* A	L3
Coil Assembly	AT31264/05	B	L3,5
Coil Assembly	AT31297/01	B	L4
Coil Assembly	AT31297/02	B	L1,6
Coil Assembly	AT31297/03	B	L2
Coil Assembly	AT31874/01	A* ABE	L8
Coil Assembly	AT32402/03	A* A	L7
Coil Assembly	AT32402/06	B	L7
Coil Assembly	AT32408/01	E	L7
Loop	AT32924	A* ABE	L9
Bead Ferrite	FJ00111		
Bead Insulating	FJ00007		
Core	FC36120	ABE	Part of L7

## SEMICONDUCTORS

Transistor J310	FV40804	A* ABE	TR1
		A* AB	TR2
Transistor T1S88A	FV08241	E	TR2
		ABE	TR3
Transistors BF256LC	FV08235	A*	TR3

## MISCELLANEOUS

Printed Wire Board	AT12499	AT27642 only	
Screen Cover Assembly	BT15679		
Plate Mounting	BT20021	for trimmer	
Guide	BT17558	2 off	
Screen	BT26211	8 compartment	
Spring Strip	BT26960		
Screw Pozi Pan Self Tap No. 4 x 3/16 in.	QJ08244/X	4 off Screen Cover	
Sleeve 4 mm dia. x 10 mm	FS23179	6 off	
Label	BT18919		
Label Mod. Record	BT18917		
Printed Wire Board	AT13026	AT27879 only	
Cover	BT15678		

# IF AMPLIFIER AND SQUELCH MODULE (2) AT27644/— or AT27880/—

Complete Assembly Part No.

12,5 kHz	channel spacing	AT27644/03 or AT27880/01
20 kHz	channel spacing	AT27644/04 or AT27880/02
25 kHz	channel spacing	AT27644/02 or AT27880/03

## CAPACITORS

Description				Part No.	Remarks/Code/Band
100p	} ±20%	63V	cer. plate	PN99771	C9 Earlier Versions only
120p				PN99772	C11 Earlier Versions only
330p	±20%	63V	cer. plate	PN99777	C15
390p	±2,5%	30V	poly	PQ10927	C4
470p	} ±10%	100V	cer. plate	PN99810	C17,20,28
1n				PN99811	C29 Not used on earlier versions
1n2	±2,5%	30V	poly.	PQ14008	C18
2n2	} ±10%	100V	cer. plate	PN99812	C13,27
2n7				PN36300	C12
4n7				PN99813	C2,10,19,23,24
10n	−20 +80%	40V	cer. disc	PN99823	C3,30,31
100n	−20 + 80%	12V	cer. disc	PN62335	C1,5,6,7,8,14,21,26
1μ	±20%	35V	tant (r.d.)	PS99502	C25
33μ	±20%	10V	tant. (r.d.)	PS99508	C16,22

## RESISTORS

10	±5%	0,125W	c. film	PL99750	R6
47	±5%	0,25W	c. film	PM01420	R3
100	} ±5%	0,125W	c. film	PL99757	R5,12
470				PL99765	R4
1k2				PL99770	R2
2k7				PL99774	R11
3k3				PL99775	R7,8,10,13
4k7				PL99777	R16
6k8				PL99779	R9
10k				PL99780	R1
47k				PL99788	R17
4k7	±20%	Linear potentiometer		PL99688	RV1 Later versions only (See Note)
100		Thermistor		PL23128	TH1

**NOTE:** Potentiometer RV1 replaced a 'select on test' resistor, R15, of earlier versions.  
The range from which R15 was selected is shown below.

150	} ±5%	0,25W	c. film	PM01426	} R15
180				PM01427	
220				PM01428	
270				PM01429	
330				PM01430	
470				PM01432	
560				PM01433	
680				PM01434	
820				PM01435	
1k				PM01436	
1k2				PM01437	
2k2				PM01440	
3k3				PM01442	

**INDUCTORS**

Description		Part No.	Remarks/Code/Band
	Coil Assembly	AL03335/01	L3
	Coil Assembly	AL03335/02	L1
	Transformer	AT32418/01	T1
100μH	Choke	FT99006	L6
470μH	Choke	FT99007	L2
1000μH	Choke	FT99008	L4
	Core	FC36130	Pt. of L1, L3
Not used			L5

**SEMICONDUCTORS**

Diode HG1012	FV05818	D1
Transistor BF115	FV05823	TR1

**THICKFILM AND INTEGRATED CIRCUITS**

Squelch 'A' High Pass Filter	FU00553	TF1
or		
Squelch 'A' Assembly	AT27886	See headed list
IF Amplifier	FU07565	IC1, IC2

**FILTERS**

Crystal Filter 12,5 kHz	FC99001	FL1 AT27644/03 or AT27880/01 only
Crystal Filter 20 kHz	FC99003	FL1 AT27644/04 or AT27880/02 only
Crystal Filter 25 kHz	FC99002	FL1 AT27644/02 or AT27880/03 only

**CRYSTAL**

Second Oscillator 10,925 MHz	FC03174	Specification E52J0
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**MECHANICAL ITEMS**

Printed Wire Board Assy.	AT13207	AT27880 only
Printed Wire Board Assy.	AT12501	AT27644 only
Can Screening	FC00126	For L1,L3
Can Screening	BT15606	For T1
Guide	BT17558	2 off
Stand-off Button	BT36480	PWB

**SQUELCH 'A' SUB-MODULE (2A) AT27886****CAPACITORS**

1n	±10%	100V	cer. plate	PN99600	C1—3
6μ8	±20%	35V	tant.	PS99512	C4,5

**RESISTORS**

1k2	±5%	100V	0,25W	c. film	PL99770	R9
3k3	±5%	100V	0,25W	c. film	PL99775	R5
5k6	±5%	100V	0,25W	c. film	PL99778	R7,8
10k	±5%	100V	0,25W	c. film	PL99780	R1,2
22k	±5%	100V	0,25W	c. film	PL99784	R6
150k	±5%	100V	0,25W	c. film	PL99794	R3,4

**TRANSISTOR**

PBC108	FV05800	TR1,2
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**MISCELLANEOUS**

Printed Wire Board	ET20110	
Pin Connecting	BT24667	5 off

## RECEIVER AND TRANSMITTER OSCILLATOR MODULE (3) AT27652/–

Complete Assy. Part Nos.

Single Channel	AT27652/07	ABE Bands
Six Channel	AT27652/03	ABE Bands
Twelve Channel	AT27652/04	ABE Bands

### CAPACITORS

Description	Part No.	Remarks/Code/Band
2–18p	PV07657	C3 ABE
4n7 ±10% 100V cer. plate	PN99813	C4,5 ABE
10μ ±20% 15/16V tant	PS99505	C6 ABE

### RESISTORS

100 } ±5% 0,25W c. film	PM01424	R2 ABE
470 }	PM01432	R1 ABE

### THICKFILM CIRCUIT

Oscillator Sub-module	FU00537	TF1 ABE
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### CRYSTAL

To specification	XL1	ABE
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**NOTE:** Components TF1, C3 and C4 comprise a basic oscillator circuit. In multiple channel modules, these components are repeated according to the number of channels required.

### MECHANICAL ITEMS

Printed Wire Board	AT12530	
Guide	BT17558	
Support Plate	BT20029	Mounting for C3

## RECEIVER AND TRANSMITTER OSCILLATOR MODULE (3) AT27887/–

Single Channel	AT27887/01
6-Channel	AT27887/02 (See Note)

### CAPACITORS

27p ±1% 350V s. mica	PP99212	C4
27p ±2% 63V cer plate	PN99764	C10
68p ±1% 350V s. mica	PP99217	C6
150p ±2% 350V s. mica	PP99221	C5
4n7 ±10% 63V cer. plate	PN99813	C7
4n7 ±10% 63V cer. plate	PN99813	C8
10μ ±20% 15/16V tant.	PS99505	C9
*Details on application		C1*
†Details on application		C2†
2–18p Variable	PV05959	C3

### RESISTORS

100 ±5% 0,25W c. film	PM01424	R5
470 ±5% 0,25W c. film	PM01432	R4
1k2 ±5% 0,25W c. film	PM01437	R3
22k ±5% 0,25W c. film	PM01452	R1
33k ±5% 0,25W c. film	PM01454	R2
*Thermistor – Details on application		TH1

### TRANSISTOR

PBC108	FV05800	TR1
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**MISCELLANEOUS**

Crystal — To specification  
 Printed Wire Board  
 Guide

AT13214  
 AT17558

XL1

**NOTES:** *With the exception of C7,C9, R4 and R5 the above items are repeated in each oscillator according to the number of channels.*

*\*Components used with close tolerance crystals (C2 not used).*

*†Components used with standard crystals (C1, TH1 not used).*

**12 CHANNEL RECEIVER & TRANSMITTER OSCILLATOR MODULE (3) AT27876/02****CAPACITORS**

4n7	±10%	63V	cer. plate	PN99813	C5,C4 x 12
10μ	±20%	15/16V	tant.	PS99505	C6
2–18p	Variable			PV07657	C3 x 12

**RESISTORS**

100	±5%	0,25W	c. film	PM01424	R2
470	±5%	0,25W	c. film	PM01432	R1

**THICK FILM CIRCUIT**

Oscillator Sub-Module	FU00537	TF1 x 12
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**MISCELLANEOUS**

Crystal — To specification  
 Printed Wire Board Assy.  
 Guide  
 Plate Mounting  
 Label

AT13203  
 BT17558  
 BT20111  
 BT18919/17

XL1  
 2 off

**RECEIVER OSCILLATOR MULTIPLIER MODULE (4) AT27651/— or AT27877/—**

Complete Assembly Part No.

Band	Freq.	Part No.
A	148–174 MHz	AT27651/02 or AT27877/01
B	132–156 MHz	AT27651/03 or AT27877/02
E	68–88 MHz	AT27651/01 or AT27877/05

**CAPACITORS**

Description	Part No.	Remarks/Code/Band
1p	PN99532	AB C18
1p7	PN99533	ABE C29
2p2 ±0p1 750V DC cer. tub	PN99534	A C8
		E C18
2p7	PN99535	B C8
3p3 ±0p1 63V DC cer. plate	PN99753	B C26
4p7 ±0p25 750V DC cer. tub	PN99538	E C8
5p6 ±0p25 63V DC cer. plate	PN99756	A C21,27
6p8 ±0p25 63V DC cer. plate	PN99757	A C16
8p2 ±0p5 63V DC cer. plate	PN99758	AB C23
		B C27
12p } ±2% 63V DC cer. plate	PN99760	BE C21
15p }	PN99761	A C2
18p }	PN99762	A C3,26
		B C16
		E 26
22p }	PN99763	E C3,12,27
27p }	PN99764	A C17,19
		B C2,C17,19

## CAPACITORS (Contd.)

Description				Part No.	Remarks/Code/Band
39p	±2%	63V DC	cer. plate	PN99766	A C12
47p				PN99767	B C3,12,13
56p				PN99768	A C13
100p				PN17331	E C2,19,17
120p				PN17370	B C7,9
150p	±10%	63V DC	cer. plate	PN18395	A C7,9
470p				PN99810	E C7
1n				PN99811	E C9
2n2				PN99812	A C25
					ABE C13,23
100n	±10%	100V	Poly Film	PQ99501	BE C1,4,6,10,11,14,15,20,22,28,32
33μ	±20%	10V	Tant. (r.d.)	PS99508	ABE C25
					ABE C31
					ABE C30

## RESISTORS (Ohms)

10	±5%	0,25W	c. film	PM01412	ABE R13
33				PM01418	ABE R7,11
100				PM01424	B R3
120				PM01425	ABE R4,8,12
270				PM01429	A R3
3k3				PM01442	E R3
27k				PM01453	ABE R2,5,9
					ABE R1,6,10

## INDUCTORS

Description	Part No.	Remarks/Code/Band
Coil Assembly	AT32402/04	A L9
Coil Assembly	AT32402/05	B L9
Coil Assembly	AT32407/03	A L6
		E L9
Coil Assembly	AT32407/04	A L7
Coil Assembly	AT32408/02	B L6
Coil Assembly	AT32408/05	B L7
Coil Assembly	AT32410/02	A L3
		E L6
Coil Assembly	AT32410/06	A L4
Coil Assembly	AT32410/08	E L7
Coil Assembly	AT32417/01	B L4
Coil Assembly	AT32417/02	B L3
Coil Assembly	AT32428/01	E L3,4
Coil Assembly	AT32428/01	E L3,4
Choke 0μ47	FT99001	A L8
Choke 0μ68 (H)	FT05524	A L5
		E L8
Choke 1μH	FT05612	A L1
Choke 1μH	FT99009	AB L1 AT27877 only
		B L8 AT27877 only
		B L1,8
Choke 3μ3 (H)	FT05624	E L1,2
Choke 3μ3 (H)	FT99010	A L2
		B L5
Choke 2μ2 (H)	FT95274	E L5
Choke 4μ7 (H)	FT99003	B L2
Choke 22μ(H)	FT99011	E L1,L2 AT27877 only
Core	FC36120	ABE Part of L6,7,9
		ABE Part of L3,4

## SEMICONDUCTORS

Transistor PBC108	FV05800	E TR1
Transistor ZTX310L	FV07469	A TR1,2
		B TR1
		BE TR2,3
Transistor ZTX312	FV07476	A TR3

## MISCELLANEOUS

Printed Wire Board Assembly  
Can, Coil Cover  
Guide  
Stand-off Button  
Printed Wire Board Assembly

AT12533  
BT15606  
BT17558  
BT36480  
AT13204

AT27651 only  
ABE L3,4,6,7,9  
2 off  
PWB  
AT27877 only

## 12,5V RESTRICTOR AND 10VREGULATOR MODULE (6) PART No. AT27637/0'

Item 6 of Exploded diagram

### CAPACITORS

Description	Part No.	Remarks/Code/Band
4n7 ±10% 100V cer. plate	PN99813	C1,2,4,5,6,7
100n	PN62335	C9
22μ ±20% 15/16V tant. (r.d.)	PS99507	C3,8

### RESISTORS

10	±5%	0,25W	c. film	PM01112	R2
150				PM01426	R8
180				PM01427	R7
220				PM01428	R1
220				PM00032	R4
330				PM01430	R3
4k7	±20%	0,25W	c. film	PM01444	R5
10k				PM01448	R6
1k				PL03624	RV1
Linear potentiometer					

### SEMICONDUCTORS

Diode Zener 9,1 BZY88	FV05814	D2
Diode Zener 10V	FV05815	D5
Diode 1N4001	FV05840	D1
Diode 1TT1012	FV05842	D3,D4
Transistor PBC108A	FV05801	TR3,4
Transistor TIP30	FV08231	TR5
Transistor TIP31	FV08232	TR2
Transistor TIP34	FV05701	TR1

### THICK FILM CIRCUIT

10V Regulator	FU00536	TF1
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### MECHANICAL ITEMS

Printed Wire Board Assembly	AT12494	
Guide	BT17558	
Insulator Mica	BT29211	for Heatsink
Heatsink	BT36646 Item 7	For TR1,TR2
Stand-off Button	BT36480	PWB
Pozidriv Pan Screws st. M3 x 6 mm	QJ11901/A	1 ea. for TR1—TR5
Hex Full Nut st. M3	QA11605/A	1 for TR5
Fixings (Not part of AT27637/01)		
Screw Pozi Pan st. M3 x 8 mm	QJ11902/A	2 off
Seloc Washer Mk2. st. 4BA	QA13742	2 off

## 12,5V RESTRICTOR AND 10VREGULATOR MODULE (6) AT27883/01

Item 6 of Exploded diagram

### CAPACITORS

4n7 ±10% 63V cer. plate	PN99813	C2,4,5,6,7
100n -20 + 80% 12V cer. disc	PN62335	C1
22μ ±20% 15/16V tant (R.D.)	PS99507	C3,8

## RESISTORS

10	}	±5%	0,25W	c. film	PM01112	R2	
150					PM01426	R8	
180					PM01427	R7	
220	}	±5%	0,5W	250V	c. comp.	PM00032	R4
220						PM01428	R1
330						PM01430	R3
390						PM01431	R13,14
1k	}	±5%	0,25W	c. film	PM01436	R9,11,12	
1k5					PM01438	R6	
3k3					PM01442	R10	
4k7					PM01444	R5	
1k		±20%	Linear Potentiometer		PL03624	RV1	

## DIODES

Zener 5V6	FV05812	D2
Zener 9V1 (BZY88)	FV05814	D3
Zener 10V	FV05815	D4,7
ITT1012	FV05842	D1,5,6,8,9

## TRANSISTORS

Transistor PBC108	FV05800	TR3,4,5,8
Transistor 2N5447	FV05828	TR6
Transistor TIP30	FV05833	TR7
Transistor TIP31	FV05834	TR2
Transistor BD606	FV37812	TR1

## MISCELLANEOUS

Printed Wire Board Assembly	AT13210	
Guide	BT17558	
Insulator	BT29211	1/Heatsink
Stand-off Button	BT36480	1/PWB
Heat sink	BT36646	Item 7 1/TR1 TR2
Insulating Bead	FJ00007	2/Resistors
Hex Nut M3	QA11605/X	1/TR5
Screw Pozzi Pan M3 x 6 mm	QJ11901/X	1/TR1 1/TR2 1/TR5

## TRANSCEIVER AUDIO MODULE (7) AT27780/04

## CAPACITORS

Description				Part No.	Remarks/Code/Band	
39p	}	±2%	63V	cer. plate	PN99766	C35
180p					PN99774	C18
470p	}	±10%	500V	cer. tube	PN22129	C24
560p					PN23360	C34
1n	}	±10%	100V	cer. plate	PN99811	C2,17
2n2					PN99812	C33
4n7					PN99813	C9,23,30
10n		−20 + 80%	40V	cer. disc	PN99823	C4,21
22n		±10%	250V	cer. tub	PR16033	C1
47n		±20%	250V	cer. tub	PR18484	C13
100n		−20 +80%	12V	cer. disc	PN62335	C11
100n		±20%	35V	tant (r.d.)	PS99500	C26
470n		±20%	35V	tant (r.d.)	PS99501	C7
10μ		±20%	15/16V	tant (r.d.)	PS99505	C27
15μ		±20%	10V	tant (r.d.)	PS99506	C10,14,15,16,19
22μ		±20%	15/16V	tant (r.d.)	PS99507	C20
33μ		±20%	10V	tant (r.d.)	PS99508	C3,6,8,12,25,29,31
100μ		±20%	3V	tant (r.d.)	PS99510	C22
150μ			16V	elect.	PS99525	C5
470μ			10V	elect.	PS45774	C28

## RESISTORS

1	±10%	0,25W	c. film	PM01400	R22
56	±5%	0.25W	c. film	PM01421	R20
100				PM01424	R6,10,13,21
270				PM01429	R19
820				PM01435	R5
1k				PM01436	R1
1k8	±5%	0,125W	c. film	PL99772	R23
2k2	±5%	0,25W	c. film	PM01440	R16,18,35
4k7				PM01444	R4
10k				PM01448	R9,36*
12k				PM01449	R2
15k				PM01450	R8,33,34
18k				PM01451	R12
18k				PL99783	R36*
22k				PM01452	R11,27
22k				PL99784	R36*
27k				PM01453	R31,32
27k				PL99785	R36*
33k				PM01454	R29
100k				PM01460	R14,15
270k				PM01465	R17
560k				PM01469	R3
100	Thermistor			PL23128	TH1
4k7	Linear Potentiometer			PL03370	RV1

\*Select on Test

## SEMICONDUCTORS

Diode	HG1012	FV05818	D1,2,4
Diode	HSP1012	FV05842	D3
Transistor	PBC108	FV05800	TR1,2,3,6
Transistor	PBC108B	FV05802	TR4

## THICKFILM AND INTEGRATED CIRCUITS

Microphone Amplifier Sub-Module	FU00534	TF1
Squelch 'B' Sub-Module	FU00533	TF2
Audio Amplifier Sub-Module	FU99091	IC1
Choke Assembly	AT31681/03	L1

## MECHANICAL ITEMS

Description	Part No.	Remarks/Code/Band
Printed Wire Board Assy	AT13014	
Spacer	BT06513	1 off
Guide	BT17558	
Mod. Record Label	BT18917	
Spacer	BT27137	2 off
Stand-off Button	BT36480	PWB
Heatsink (1)	BT36647	PWB
Slot Pan Hd. Screw M2 x 10 mm	QJ11428/B	2 for IC1
*Heatsink (2)	BT36677	Bolted to Heatsink (1)
*Screw Pozi Pan st. M2,5 x 10 mm	QJ11947/B	2 for Heatsink (2)
*Washer Nickel large M2,5	QA15004/B	2 for Heatsink (2)

\*These items are not part of AT27780/—

# TRANSCEIVER AUDIO MODULE (7) AT27882/01

## CAPACITORS

Description	Part No.	Remarks/Code/Band
180p ±2% 63V cer tub	PN99774	C31
470p ±10% 500V cer plate	PN22129	C39
560p ±10% 100V cer. plate	PN23360	C16
680p ±10% 63V cer. plate	PN99814	C9
1n ±10% 63V cer. plate	PN99811	C3,29
1n8 ±10% 100V cer. plate	PN32309	C6,7
2n2 ±10% 100V cer. plate	PN99812	C11,15
3n3 ±10% 63V cer. plate	PN99815	C10
4n7 ±10% 63V cer. plate	PN99813	C12,18,33,38
10n -20 +80% 40V cer. plate	PN99823	C8,37
22n ±10% 250V tub	PR16033	C1
47n ±20% 250V tub	PR18484	C27
100n -20 +80% 12V cer. disc	PN62335	C21
100n ±20% 35V tant. (R.D.)	PS99500	C41
470 ±20% 35V tant. (R.D.)	PS99501	C17,22
2μ2 ±20% 35V tant. (R.D.)	PS99503	C20
10μ ±20% 15/16V tant. (R.D.)	PS99505	C14
15μ ±20% 10V tant. (R.D.)	PS99506	C19,25,28,30,32
22μ ±20% 15/16V tant. (R.D.)	PS99507	C34
33μ ±20% 10V tant. (R.D.)	PS99508	C2,4,13,23,24,26,35,40
100μ ±20% 3V tant. (R.D.)	PS99510	C36
150μ 16V elect.	PS99525	C5
470μ 10V elect.	PS45774	C42

## RESISTORS

4k7 Linear Potentiometer	PL03370	RV1
100 Thermistor	PL23128	TH1
1 ±10%	PM01400	R62
56 ±5%	PM01421	R60
82 ±5%	PM01423	R8
100 ±5%	PM01424	R14,22,33,48,54,61
270 ±5% 0,25W c. film	PM01429	R59
820 ±5%	PM01435	R30
820 ±2%	PL99153	R1
1k ±5%	PM01436	R45,64
1k8 ±5% 0,125W c. film	PL99772	R63
2k2 ±5%	PM01440	R21,39,50,56,58
3k3 ±5%	PM01442	R5,35
3k9 ±5%	PM01443	R12
3k9 ±2%	PL99161	R2
4k7 ±5% 0,25W c. film	PM01444	R4,6,17,29,34
5k6 ±5%	PM01445	R65
5k6 ±2%	PL99163	R3
6k8 ±5%	PM01446	R11,20,42
10k ±5%	PM01448	R18,32,37,41,44,46,49
12k	PM01449	R27
15k	PM01450	R25,26,31,40
18k	PM01451	R51
22k	PM01452	R38,47,52
27k	PM01453	R13,15
33k ±5% 0,25W c. film	PM01454	R16,36,43
39k	PL99173	R10
47k	PM01456	R23,24
100k	PM01460	R53,55
100k	PL99178	R9
270k	PM01465	R57
560k	PM01469	R28

## TRANSISTORS

PBC108	FV05800	TR1 to 12,16,17
PBC108B	FV05802	TR15
2N5447	FV05828	TR13
2N5459	FV37832	TR14

DIODES

MGD25	FV05818	D2,3,4
HSP1012	FV05842	D1

THICKFILM SUB-MODULE

Audio Amplifier	FU99091	IC1
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MISCELLANEOUS

Printed Wire Board Assy	AT13209	
Choke Assembly	AT31681/03	L1
Spacer	BT06513	2 off
Guide	BT17558	2 off
Modification Record Label	BT18917	
Spacer	BT27137	
PWB Stand-off Button	BT36480	PWB
Heatsink (1)	BT36647	PWB
Slot Pan Hd. Screw M2 x 10mm	QJ11428/B	2/IC1
*Heatsink (2)	BT36677	Bolted to Heatsink (1)
*Pozi Pan Hd. Screw M2,5 x 10mm	QJ11947/R	2/Heatsink (2)
*Washer large Nickel M2,5	QA15004/B	2/Heatsink (2)

\*These items are not part of AT27882/—

TRANSMITTER EXCITER MODULE (8) AT27639/— or AT27881/—

Complete Assy. Part No.		
Band	Freq. (MHz)	Part No.
A	148—174	AT27639/03 or AT27881/01
E	68—88	AT27639/02 or AT27881/05
B	132—156	AT27639/04 or AT27881/02

CAPACITORS

Description	Part No.	Remarks/Code/Band
1p8	PN99750	AB C5,21
2p2	±0p25 63V DC cer. plate	A C29,37,44
		B C15
		BE C29,37
		E C5,21
3p3		A C15
		B C44
		E C15
4p7	PN99755	AB C47
10p	PN99759	A C36
12p	PN99760	A C28,30
15p		B C36
		A C38
		B C28,30
18p	PN99762	B C38
22p	PN99763	A C45
27p		E C35,36
		A C20,23
		B C26,45
33p	PN99765	B C23
39p		E C28
		A C41,42
		A C26
		E C30,38
47p	±2% 63V DC cer. plate	B C18,20
		A C18,31,39
		B C31
56p	PN99768	B C39
68p	PN99769	A C14,16
		B C41,42
		E C20,23

## CAPACITORS (Contd.)

Description	Part No.	Remarks/Code/Band
82p	PN99770	B C14 E C14,16,26,31
100p	PN99771	B C16
120p ±0p25 63V DC cer. plate	PN99772	E C3,7,18
150p	PN99773	E C39
180p	PN99774	AB C3,7
330p	PN99777	AB C43
1n ±10% 100V DC cer. plate	PN99811	ABE C1,11
4n7	PN99813	ABE C2,6,9,10,12,13,17,19,22,25,27,33,34,40 A C8
100n -20+80% 12V cer. plate	PN62335	ABE C4
22μ ±20% 15/16V tant. (r.d.)	PS99507	ABE C32
33μ ±20% 10V tant (r.d.)	PS99508	ABE C24

## RESISTORS (Ohms)

6Ω8	PM01410	A R7,10
10	PM01412	B R7,10 ABE R31
15	PM01414	AB R26
18	PM01415	ABE R29
22	PM01416	E R7
33	PM01418	E R26
39	PM01419	E R10
47	PM01420	AB R30
56 ±5% 0,25W c. film	PM01421	AB R21,25 E R21
100	PM01424	AB R3,11,12,16,20 E R3,11,12,16,25
120	PM01425	E R30
150	PM01426	E R20
220	PM01428	ABE R27
470	PM01432	E R1,2
470	PL99765	E R33 AT27881 only
680	PM01434	AB R2,14,15 E R14,15
1k ±5% 0,125W c. film	PL99769	ABE R19,24,28,32
2k2	PM01440	AEB R13,23
3k9	PM01443	ABE R18
4k7	PM01444	ABE R4,5
10k ±5% 0,25W c. film	PM01448	AB R1
12k	PM01449	ABE R22
27k	PM01453	ABE R17
47k	PM01456	ABE R6
100k	PM01460	ABE R8,9

## INDUCTORS

Coil Assembly	AT31873/01	E L1,2
Coil Assembly	AT32402/02	AB L8,10
Coil Assembly	AT32402/02	AB L7,9
Coil Assembly	AT32407/01	E L7,9
Coil Assembly	AT32407/02	E L8,10
Coil Assembly	AT32407/05	AB L5,6
Coil Assembly	AT32410/01	E L5,6
Coil Assembly	AT3241/04	AB L3,4
Coil Assembly	AT32426/01	E L3,4
Coil Assembly	AT32432/01	AB L1,2
Choke 1μ5H	FT99002	AB L11
Coil Core	FC36120	AB L3,4 ABE L5 to 10
Coil Core	FC36150	AB L1,L2 E L1,3,4



## SEMICONDUCTORS

Transistor BF256LB	FV05724	ABE	TR1,2
Transistor 2N3866	FV05810	E	TR7
Transistor 2N4427	FV05846	AB	TR7
Transistor ZTX310L	FV07469	ABE	TR3,4,5
Transistor TN3866	FV08230	ABE	TR6
Diode HSP1012	FV05842	ABE	D3
Diode MV840	FV07742	ABE	D1,2

## MISCELLANEOUS

Printed Wire Board Assembly	AT13208	AT27881 only
Printed Wire Board Assembly	AT12496	AT27639 only
Coil Can	BT15606	L1 to 10
Guides	BT17558	2 off
Grounding Spring	BT26984	
Stand-off Button	BT36480	
Transipad	QA05804	T0-5

## TRANSMITTER POWER AMPLIFIER MODULE (9) AT27638/— or AT27878/—

Complete Assy. Part No.

Band	Freq. (MHz)	Part No.
E	68—88	AT27638/02 or AT27878/05
A	148—174	AT27638/03 or AT27878/01
E (W. Germany only)	68—88	AT27638/04 or AT27878/15
A (W. Germany only)	148—174	AT27638/05 or AT27878/11
B	132—156	AT27638/06 or AT27878/02

Item 9 of Exploded Diagram

## CAPACITORS

Description	Part No.	Remarks/Code/Band
2n2 ±10% 100V cer. plate	PN99812	ABE C2,4
10μ ±20% 15/16V elect.	PS99505	ABE C1,3

## RESISTORS (Ohms)

12			PM01413	AB	R2
15 ±5%	0,25W	c. film	PM01414	E	R2
330			PM01430	E	R1,3
470			PM01432	AB	R1,3
*4k7 ±20%	0,1W	carbon	PL03370	AE	RV1 Linear Potentiometer

## THICK FILM CIRCUITS

MS438BGY	PA	Sub-Module	FU00109	E TF1	} Item 17 Contains Beryllium Oxide see WARNING on title page.
MS438BGY	PA	Sub-Module	FU07518	A TF1	
MS437BGY/L	PA	Sub-Module	FU07524	B TF1	

## SEMICONDUCTORS

*HSP1012	Diode	FV05842	AE	D1
*TP131	Transistor	FV08232	AE	TR1

\*West Germany only

## MISCELLANEOUS

Printed Wire Board Assembly	AT13205	ABE	AT27878 only
Printed Wire Board Assembly	AT12495	ABE	AT27638 only
Cable coaxial 50 ohm	FC09437		
Guide	BT17558	ABE	2 off
Grounding Strap	BT27048	ABE	2 off
*Heat Sink	BT36645	AE	
Fixings (Not Part of AT27638/—)			
Screw Socket Head M2,5 x 12mm	QJ13700		2 off
Full Nut M2,5	QA11604		2 off
Seloc Washer M2,5	QA13800		2 off
Insulating Bush	BT00175		2 off
Insulating Washer	BT36783		
*West Germany only			

**ANTENNA FILTER AND RELAY MODULE (10) – E BAND**  
**PART No. AT27640/01 or AT27891/05**

**CAPACITORS**

Description			Part No.	Remarks/Code/Band
3p3	} ±5%	cer. tub	PN02074	C2
10p			PN09047	C6
22p			PN11158	C4
27p			PN11250	C1,7
39p			PN12180	C3,5
4n7	±10%	cer tub	PN99813	C8,9,10
	100V			

**MISCELLANEOUS**

Antenna Changeover Relay	FR21000	RLA
Diode HG1012	FV05818	D1

**MECHANICAL ITEMS**

Printed Wire Board Assembly	AT13218	AT27891 only
Printed Wire Board Assembly	AT12497	AT27640 only
Guide	BT17558	2 off
Screen	BT26212	Soldered to PWB
Spring Contact	BT26975	
Washer	BT29184	
Stand-off Button	BT36480	PWB

**ANTENNA FILTER AND RELAY MODULE (10) – B BAND**  
**PART No. AT27750/01 or AT27889/02**

**CAPACITORS**

2p2	} ±5%	cer tub	PN01074	C2
10p			PN09047	C4,6
18p			PN10137	C1,7
33p			PN12111	C3,5
2n2			PN99812	C8,9,10 AT27750 only
10n	±10%	cer tub	PN99612	C8,9,10 AT27889 only
	–20 +80%	cer disc		
	500V			

**MISCELLANEOUS**

Antenna Changeover Relay	FR21000	RLA
Diode HG1012	FV05818	D1

**MECHANICAL ITEMS**

Printed Wire Board Assembly	AT13216	AT27889 only
Printed Wire Board Assembly	AT12896	AT27750 only
Screen	BT26212	Soldered to PWB
Guide	BT17558	2 off
Washer	BT29184	
Stand-off Button	BT36480	PWB
Contact Spring	BT26975	AT27889 only

**ANTENNA FILTER AND RELAY MODULE (10) – A BAND**  
**PART No. AT27679/01 or AT27888/01**

**CAPACITORS**

2p2	±5%	cer. tub	PN01074	C2
5p6	±0p5	cer. tub	PN04142	C4,6
15p	} ±5%	cer. tub	PN10066	C7
18p			PN10137	C1
27p			PN11250	C3,5
4n7	±10%	cer tub	PN99813	C8,9,10
	100V			

**MISCELLANEOUS**

Antenna Changeover Relay	FR21000	RLA
Diode HG1012	FV05818	D1

**MECHANICAL ITEMS**

Description	Part No.	Remarks/Code/Band
Printed Wire Board Assy.	AT13215	AT27888 only
Printed Wire Board Assembly	AT12896	AT27679 only
Screen	BT26212	Soldered to PWB
Guide	BT17558	
Washer	BT29184	
Stand-off Button	BT36480	PWB
Contact Spring	BT26975	

**MOTHER BOARD ASSEMBLY (11) AT27796**

Item 11 of Exploded Diagram

**CAPACITORS**

2p2	±0p25	63V	cer. plate	PN99751	C7
8p2	±0p25	100V	cer. plate	PN99758	C2
1n	±10%	100V	cer. plate	PN99811	C12
10n	±10%	100V	cer. plate	PN50339	C18
4n7	±10%	100V	cer. plate	PN99813	C6,8,9,13,14,15,16,17
1μ	±10%	100V	poly.	PQ37573	C11
22μ	±20%	15/16V	tant. (r.d.)	PS99507	C1,5
1500μ		16V	elec.	PS99527	C10
Not used					C3,4

**RESISTORS**

100	±5%			PL99757	R4
330				PM01424	R1
330	±5%	0,25W	c. film	PM01442	R2
3k3				PM01442	R3

**INDUCTORS**

0μ22 Choke				FT99000	L3
1μ5 Choke				FT99002	L1,2

**MECHANICAL ITEMS**

Printed Wire Board Assembly	AT13055	
Screen	BT26254	
Spring Contact	BT26997	Screen
Screw Pan Taptite M3 x 8 mm	QJ11551/X1	10 Fixing screws (Not part of AT27796)

**CONTROL INTERFACE ASSEMBLY (13) AT27823 M256 only****CAPACITOR**

100n -20 +80% 12V cer. disc.	PN62335	C1
------------------------------	---------	----

**RESISTORS**

100 } ±5% 0,25W c. film	PM01424	R1
4k7 }	PM01444	R2

**DIODES**

Zener 4,7V	FV05811	D2
IN4001	FV05840	D1

**INTEGRATED CIRCUITS**

74145	FU99028	IC1
7412A	FU10334	IC2

**MECHANICAL ITEMS**

Printed Wire Board Assembly	AT14128	
Guide	BT17558	2 off
Stand-off Button	BT36480	

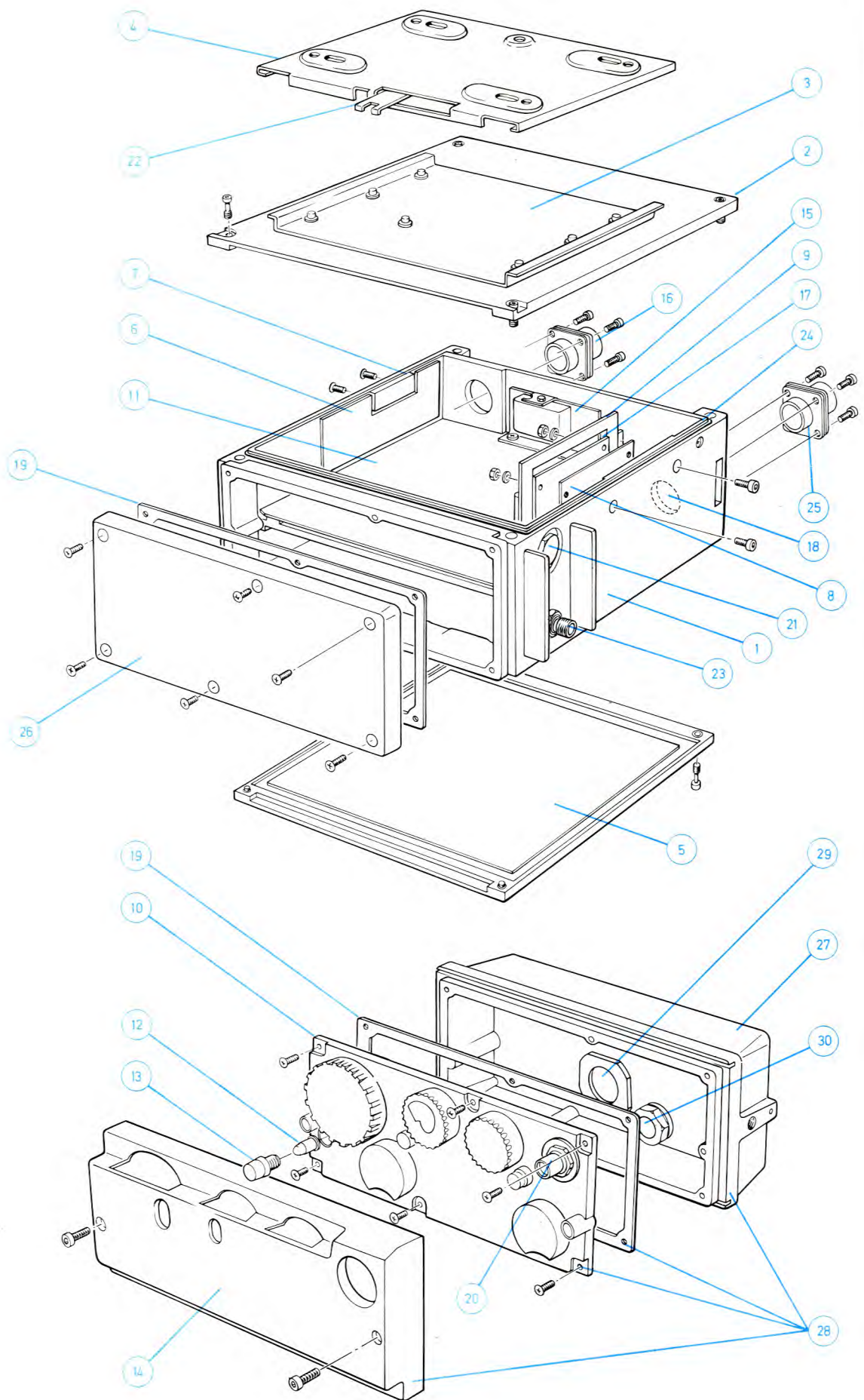


Fig. 5.1 Exploded Diagram



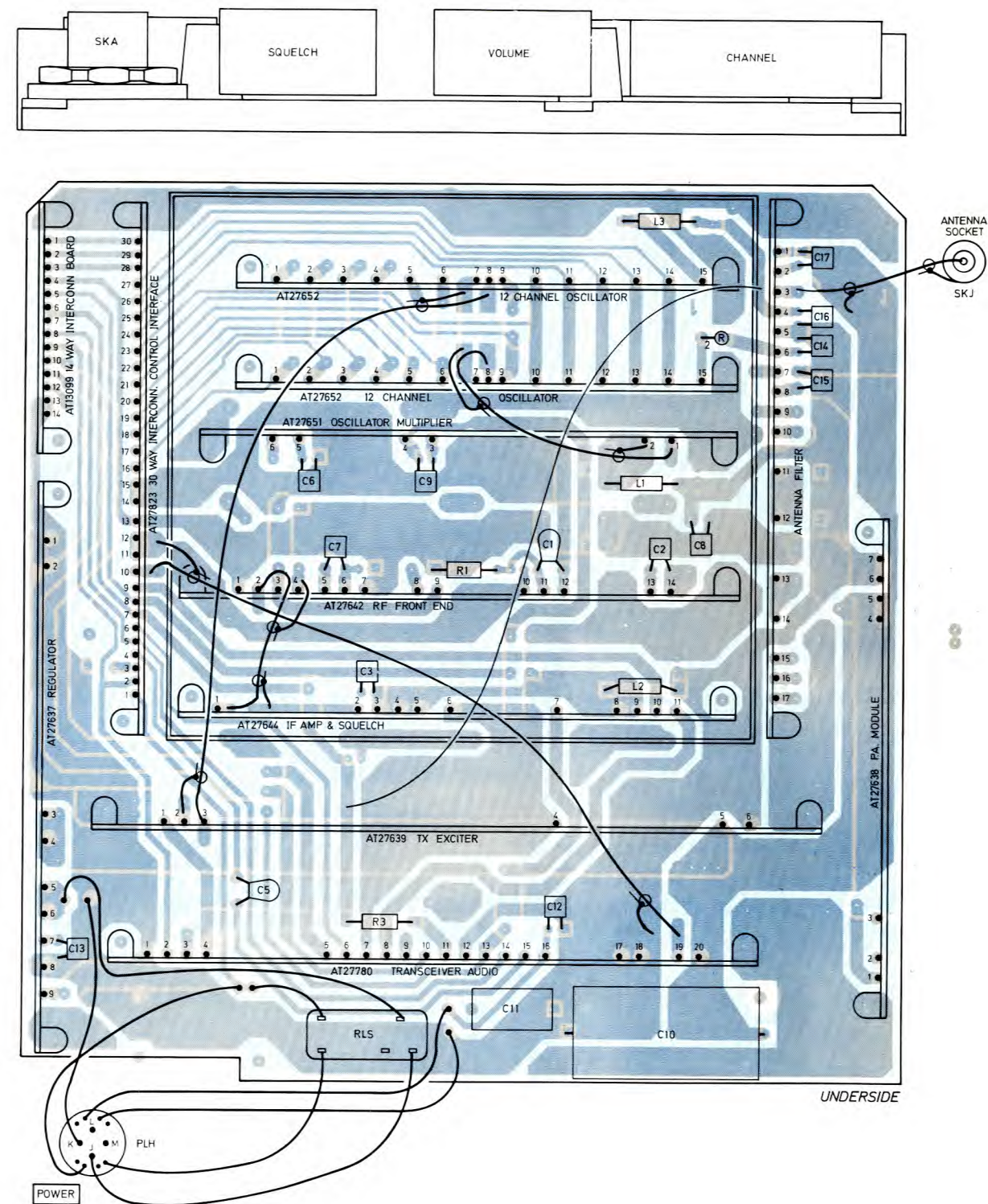
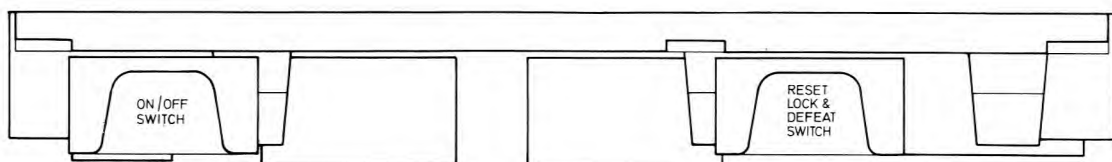
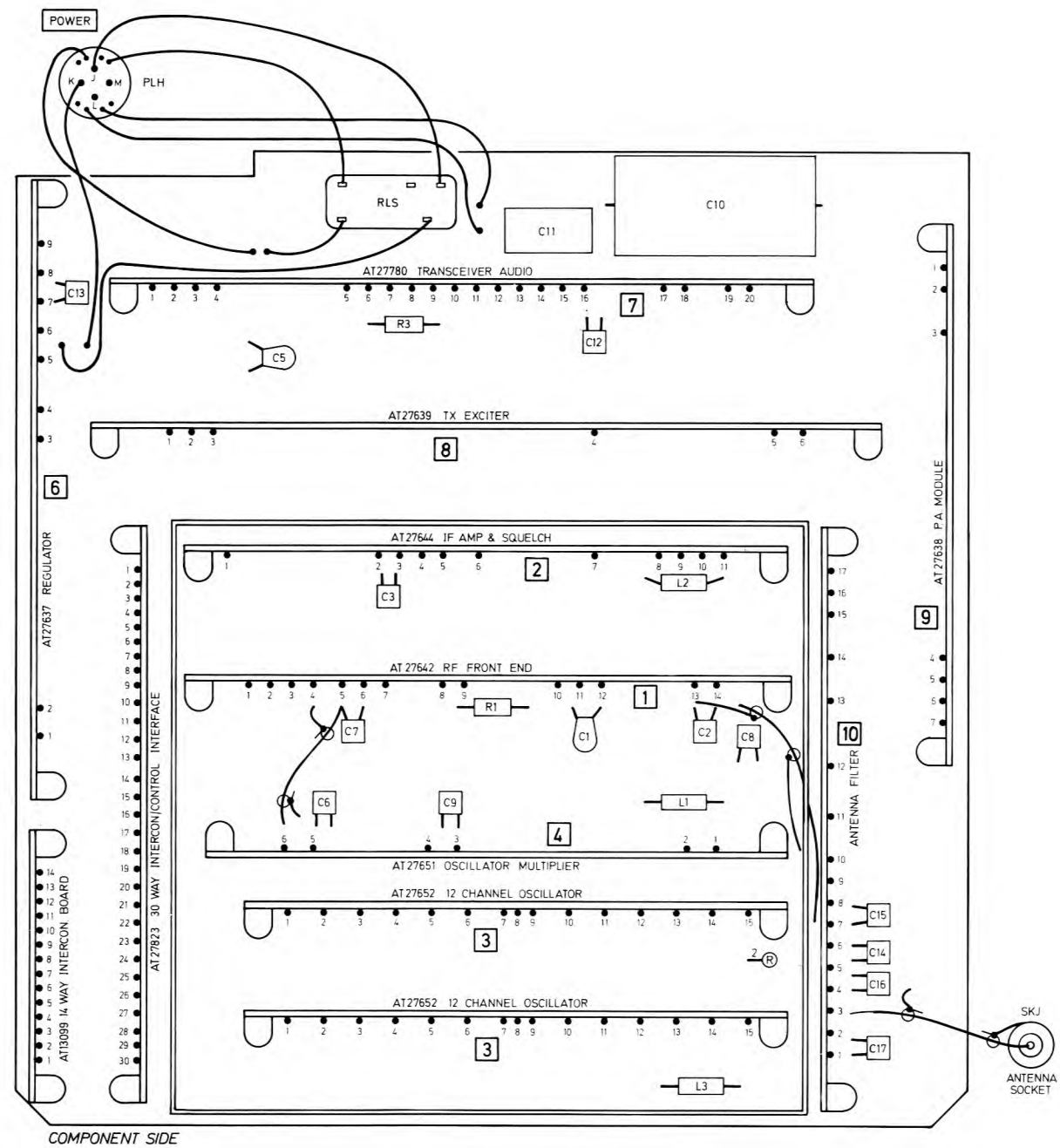


FIG. 6.1 COMPLETE MOTHER BOARD LAYOUT

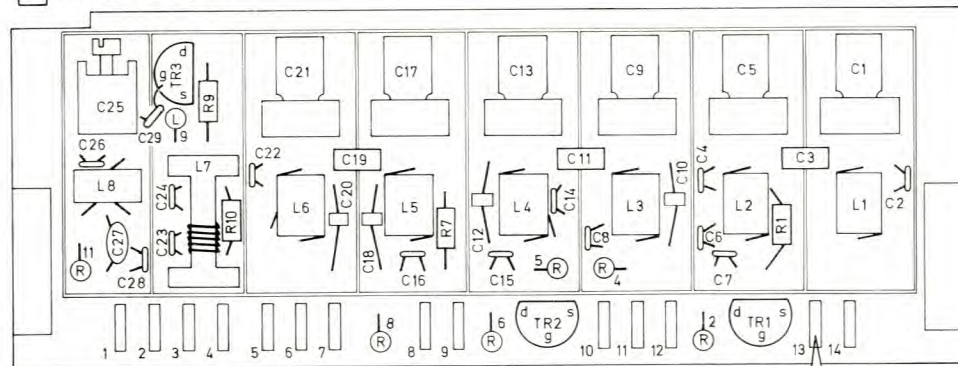




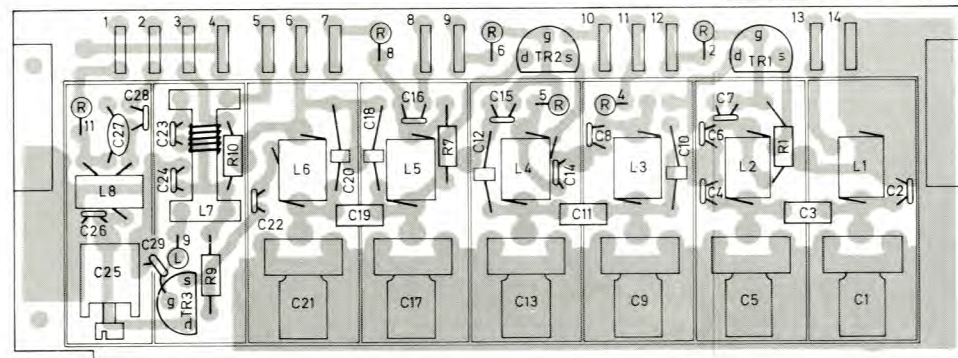




1 COMPONENT SIDE

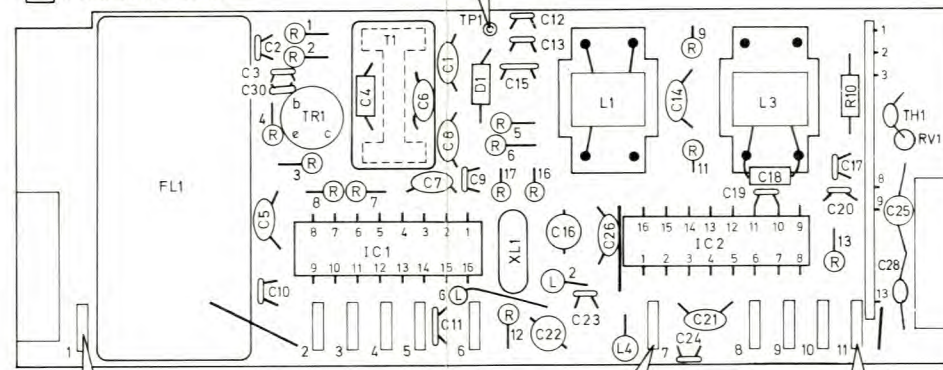


MP1  
INPUT AT ANTENNA SOCKET  
A=0V B=2 $\mu$ V p.d.  
C=10 $\mu$ V p.d.  
AT 1KHz MOD  
1.5KHz DEV



1 UNDERSIDE

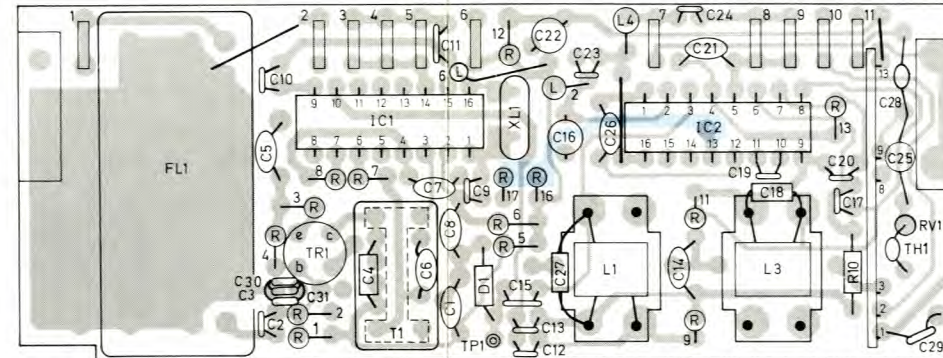
2 COMPONENT SIDE



MP2  
500 GENERATOR  
A=0V B=2 $\mu$ V p.d.  
C=100 $\mu$ V p.d.

MP3  
A=0  
B=0  
C=2-3 $\mu$ A

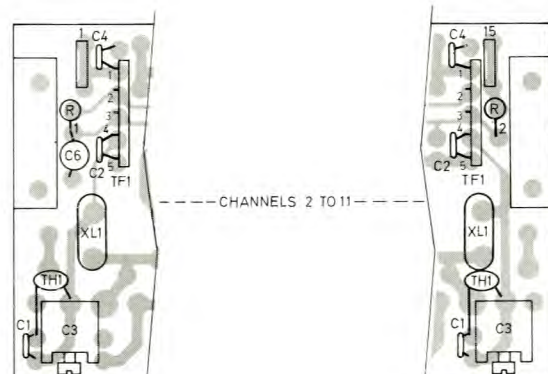
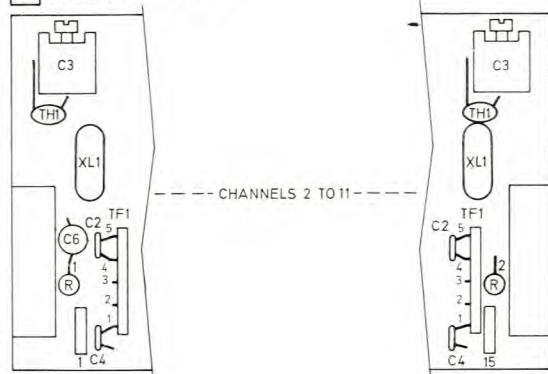
MP4  
100mV r.m.s. SQUELCH CONTROL  
FULLY C/WISE 1V r.m.s.  
CONTROL FULLY ANTI-C/WISE



2 UNDERSIDE

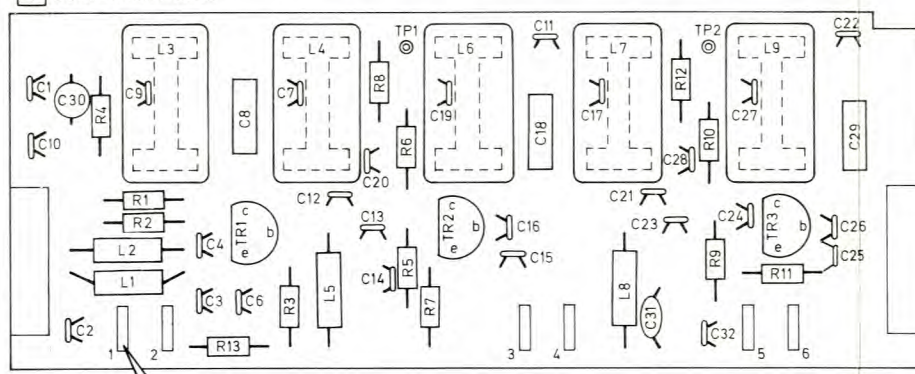
NOTE  
WHEN ONE CONDUCTOR-LAYER OF A DOUBLE-SIDED BOARD IS USED AS  
A GROUND OR SCREEN, IT IS OMITTED TO IMPROVE CLARITY.

3 COMPONENT SIDE

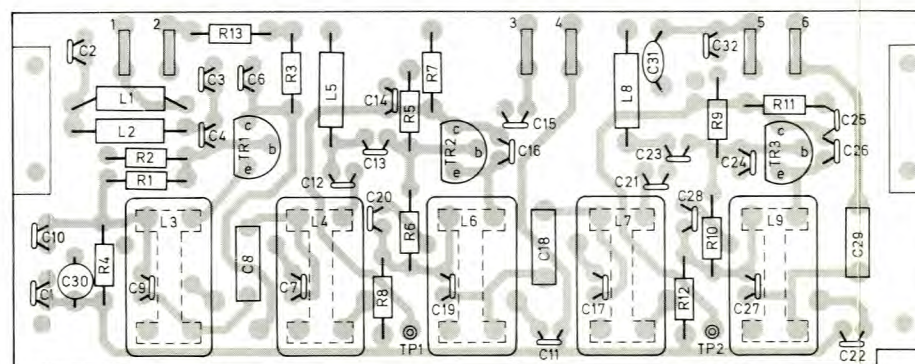


3 UNDERSIDE

4 COMPONENT SIDE

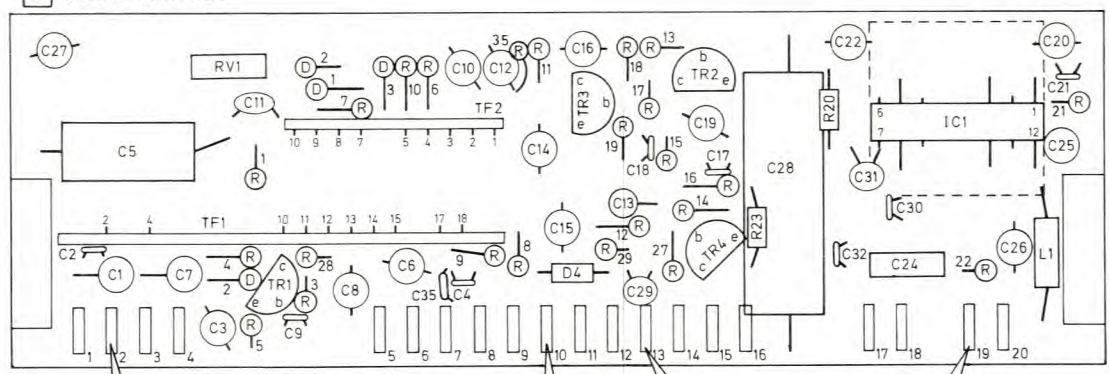


MP6  
1V r.m.s.



4 UNDERSIDE

7 COMPONENT SIDE

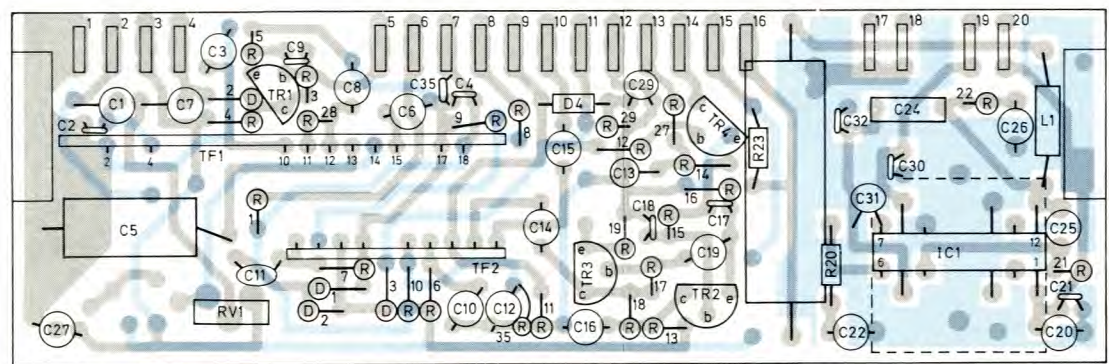


MP7  
7mV r.m.s. 1KHz  
MOD 1.5KHz DEV

MP8  
C=60mV r.m.s.

MP9  
C=150mV r.m.s.

MP10  
C=40mV r.m.s.



7 UNDERSIDE







1. MOTHER BOARD COMPONENTS TO BE PREFIXED **11**

2. NUMERALS SHOWN WITHIN THE SQUARES  
ARE CODING PREFIXES FOR THE PRINTED  
WIRING BOARDS FOR USE WITH THIS TRANCEIVER C

3. \* FOR UNSPECIFIED COMPONENTS SEE PARTS LIST

4. USE OF 5PPM XTALS. DELETE C2, ADD C1 AND TH1, ON OSC BOARD [3]

5. ALL VOLTAGES TAKEN ON 20,000 $\Omega$ /VOLT METER  
ALL RECEIVER VOLTAGES TAKEN WITH VOLUME CONTROL FULLY ANTICLOCKWISE AND NO SIGNAL AT ANTENNA WITH SQUELCH CONTROL AT MAX

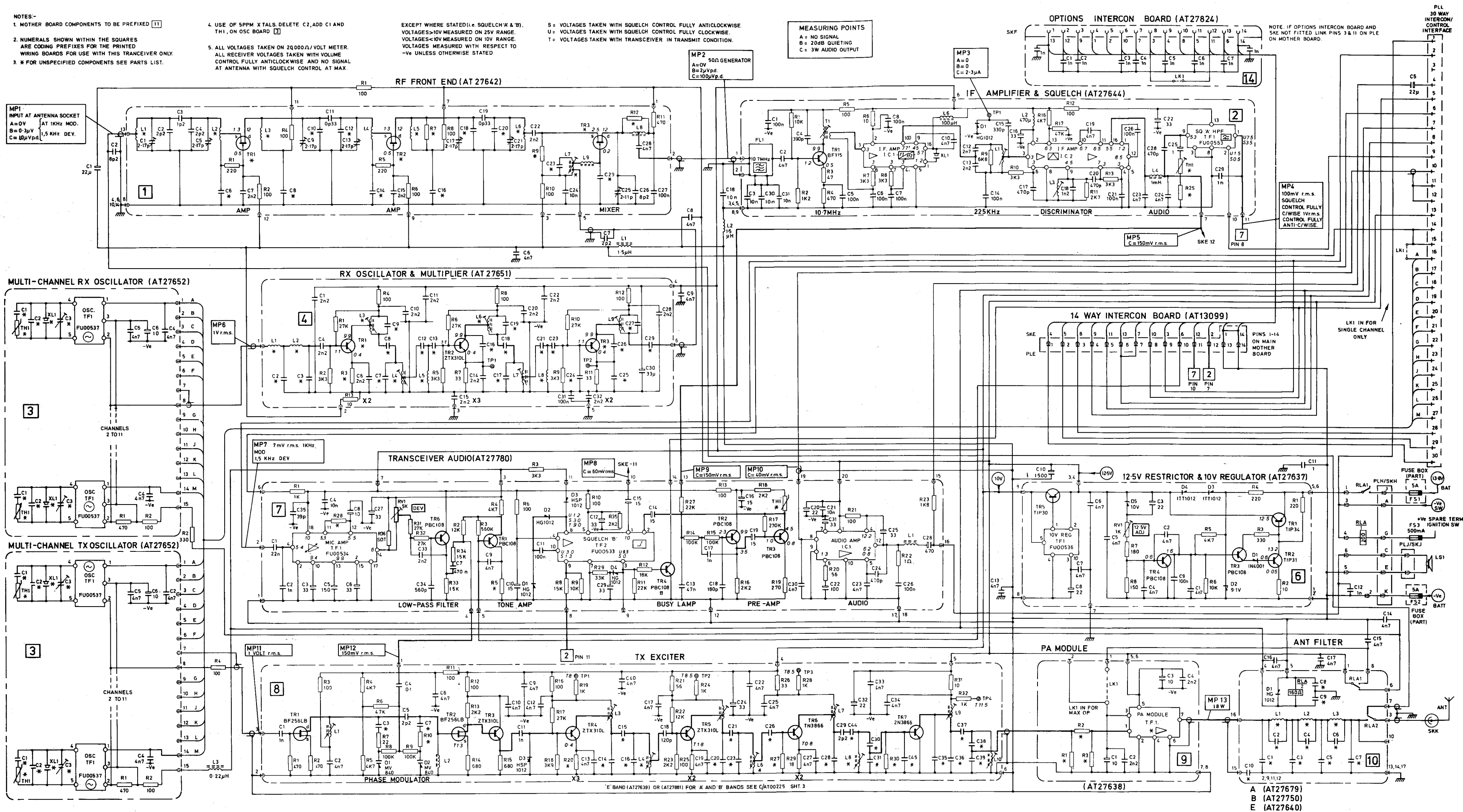
EXCEPT WHERE STATED (i.e. SQUELCH 'A' & 'B').  
VOLTAGES > 10V MEASURED ON 25V RANGE.  
VOLTAGES < 10V MEASURED ON 10V RANGE.  
VOLTAGES MEASURED WITH RESPECT TO  
-V<sub>e</sub> UNLESS OTHERWISE STATED.

S = VOLTAGES TAKEN WITH SQUELCH CONTROL FULLY ANTICLOCKWISE  
U = VOLTAGES TAKEN WITH SQUELCH CONTROL FULLY CLOCKWISE.  
T = VOLTAGES TAKEN WITH TRANSCEIVER IN TRANSMIT CONDITION.

**MEASURING POINTS**  
**A = NO SIGNAL**  
**B = 20dB QUIETING**  
**C = 3W AUDIO OUTPUT**

OPTIONS INTERCON BOARD (AT27824)

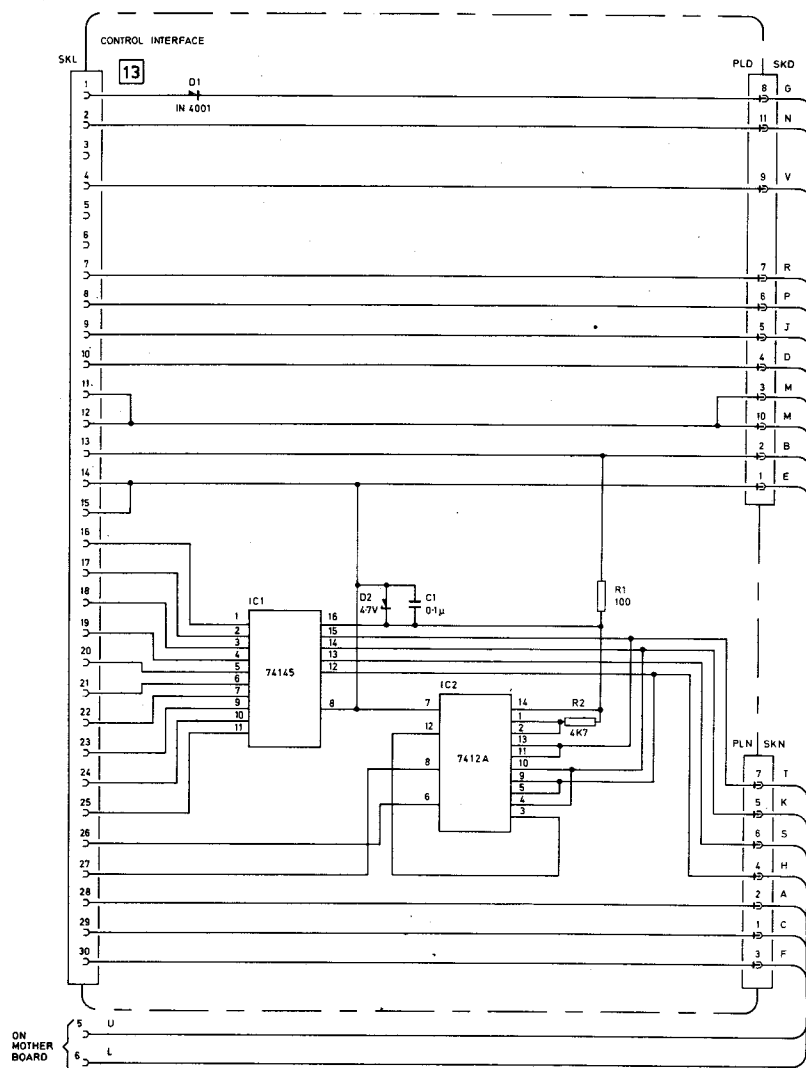
NOTE: IF OPTIONS INTERCON BOARD AND  
SKE NOT FITTED LINK PINS 3 & 11 ON PL  
ON MOTHER BOARD.



**FIG. 6.6 M254/M256 TRANSCEIVER  
OVERALL CIRCUIT DAIGRAM**

TP271/1

AT 27823



CONTROL BOX (AT 04730/1) (AT 04730/2 WITH DEFEAT SWITCH AND CALL LAMP)

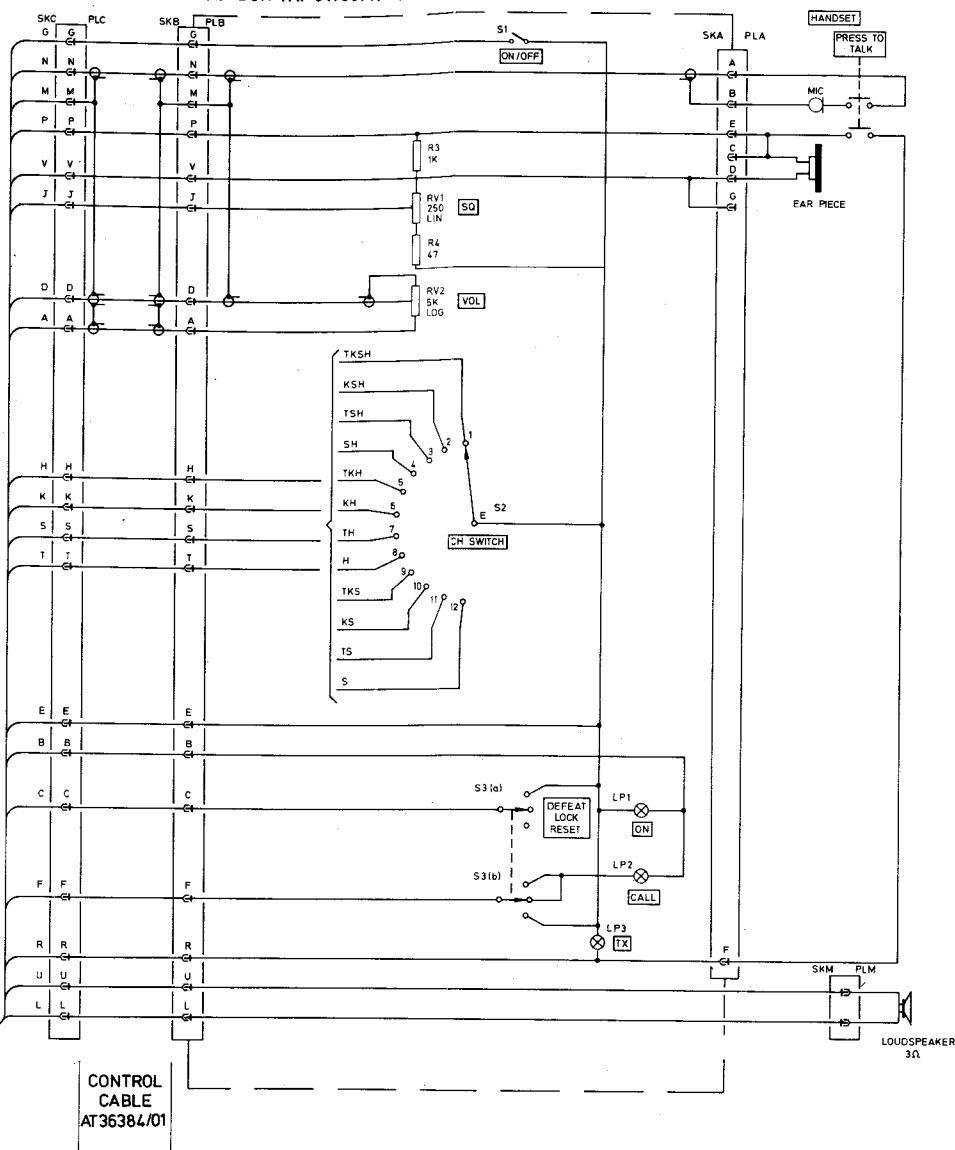


FIG. 6.7 M254/M256 REMOTE MOUNT INTERFACE & CONTROL UNITS

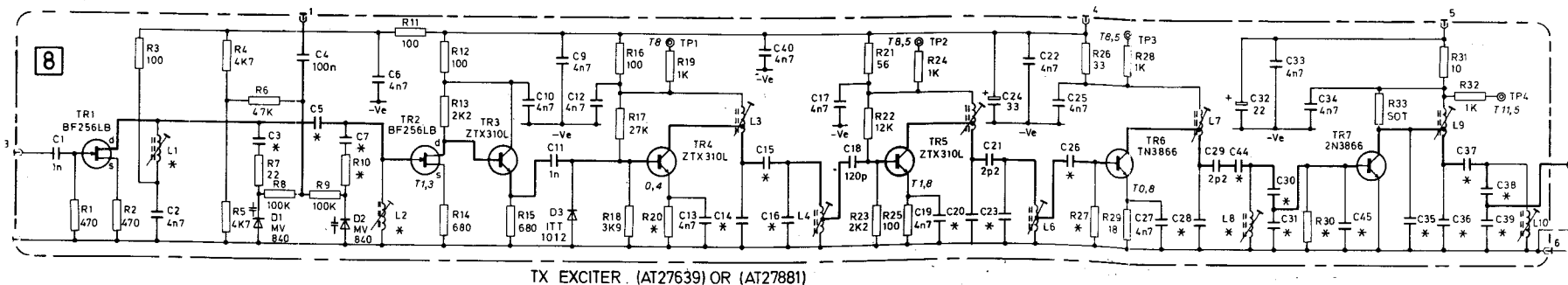


FIG. 6.8 M254/M256 TRANSMITTER EXCITER A & B BANDS