service sheet issue 2 1975

A Band (148-174 MHz)
B Band (132-156 MHz)
E Band (68-88 MHz)
M Band (Tx 105-108 MHz)

Linear Amplifier Unit Type A200

INTRODUCTION

This is a self contained linear amplifier designed to be used with an existing AM or FM radiotelephone as an 'add-on' unit.

Operating from r.f. inputs in the range 2¼ to 15W it delivers 8 to 50W according to input. Frequency bands currently available are 148–174MHz, 132–156MHz, 105–108MHz and 68–88MHz.

Automatic (r.f.) switching, a temperature cut-out and comprehensive polarity protection are incorporated in the circuitry. Due to the wideband characteristic of the amplifier, re-tuning entails only a few simple operations.

A separate 13,6V d.c. circuit, fused at 12A in the live lead is required to power the amplifier. The third core of the 3-core power cable together with the optional lead assembly is used only when the amplifier power supply has to be switched. If the radiotelephone to be used with the amplifier is one of the Pye Olympic VHF series, then the amplifier can be switched by the radiotelephone OFF/ON switch.

SUMMARY OF DATA

Switching Bandwidth	2% of mean frequency of associated radiotelephone	
Service	AM or FM	
Frequency Bands	148–174 MHz	A Band
	132–156 kHz	B Band
	105–108 MHz	M Band
	68–88 MHz	E Band
Power Supply	13,6V d.c. Polarity Protection	
Current Consumption		
1. Without switching lead	S/By	2–12 mA
	Transmit AM	6A typical
	FM	10A typical
2. With switching lead	Radiotelephone	
	OFF	2–12 mA
	ON (S/By)	200–800 mA
	Transmit	As above
Fusing	12A	
Output Power	AM 25W for 6W input	
	FM 50W for 15W input	
Option	OFF/ON switching (linked to radiotelephone)	
Dimensions (over major projections.)	207 mm wide x 52 mm high x 133 mm deep (8,15 in. x 2,05 in. x 5,25 in.)	
Weight	1,60 kg. (3 lbs. 9 oz.)	
Casing	Die-cast, finned, weatherproof	

Construction

The unit consists of a motherboard and a heavy duty, die-cast shell with cooling fins.

All the circuitry is accommodated on the motherboard, logically grouped in the three main functions of Switching, Amplifier, and Antenna Filter. Printed wire board matching sections are used in the Amplifier.

To ensure optimum heat dissipation, a heat sink is interposed between the amplifier transistors and the shell and secured to it by three M4 x 16 mm screws.

The shell is provided with an input socket, an output socket and a gland entry for the power cable all of which are weather-proof. The shell is sealed by the cover, fitted with an insert gasket, and secured by four M4 x 20 mm screws.

INSTALLATION

General

The amplifier is connected in the radiotelephone antenna feeder and the 12V power supply is taken from the vehicle battery by independent wiring fused at 12A. Power switching is required only if used in hazardous environments.

Notes

1. Instructions for installing the radiotelephone are shown in the appropriate Service Manual.
2. This unit is contained in a weatherproof diecasting. If possible, it should be mounted in a clean, dry location
3. Fixing screw dispositions and sizes are shown in the Set of Bagged Items (AT85737).
4. Permanent vehicle wiring consists of two 2,5 mm conductors, normally red and black. The lengths of these conductors (not supplied) depend upon the installation. All other lead lengths are shown on the installation diagrams.
5. Before finalising an installation, it is recommended that its feasibility proved by running the cables. If drilling is necessary, the holes should be grommetted.

Equipment Required — See 'Set of Bagged Items' in Parts List.

Note In this procedure the starred operations are necessary only when optional power switching is required.

Procedure

*(a) Remove top cover of radiotelephone (see Removal of Transceiver Cover). Replace blind grommet with open grommet attached to Lead Assy. (AT12739). Feed Berg sockets end of 3-core lead through the grommet and connect to the Mother Board as shown:—

Yellow Green	to	pin 18 AM	pin 27 FM
Brown	to	pin 19 AM	pin 4 FM
Blue	to	pin 20 AM	pin 5 FM

Replace top cover Refit radiotelephone to cradle.

(b) Fit Radiotelephone Installation (12V) as detailed in the appropriate instructions.

*(c) Locate 3-way Terminal Block A within 500 mm of cable outlet mentioned at (a) and connect 3-core cable to it.

(d) Site the amplifier on the route of the antenna feeder. Fix mounting plate and secure amplifier to it, SKB (N type socket) nearest to the antenna.

(e) Cut the antenna feeder to suit the amplifier location. Terminate the free end of the co-axial cable still attached to the antenna with the N type plug and terminate the free end of that attached to the radiotelephone with a TNC type plug. Connect plugs to the appropriate amplifier sockets.

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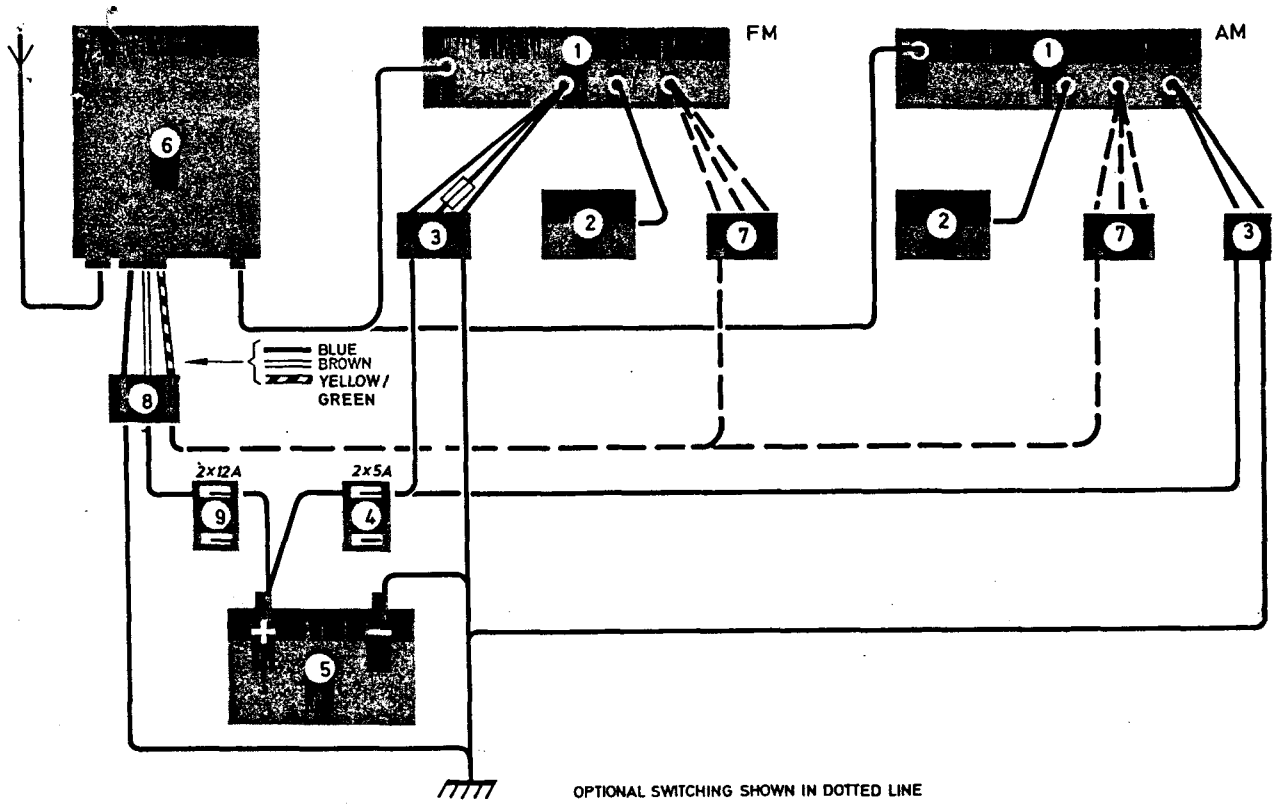


KEY

1. RADIOTELEPHONE (OLYMPIC M201 (AM) AND M202 (FM) SHOWN
2. LOUDSPEAKER
3. CONNECTOR BLOCK (M201 2-WAY M202 3-WAY)
4. FUSEHOLDER (1)
5. 12V BATTERY
6. AMPLIFIER A200
7. TERMINAL BLOCK (A) (PART OF AT12739)
8. TERMINAL BLOCK (B)
9. FUSEHOLDER (2)

Installation Diagram

(f) Fix 3-way Terminal Block B within 500 mm run of amplifier and connect the amplifier 3-core cable to it.

(g) Fix Fuseholder 2 close to the battery. Connect vehicle permanent wiring from battery to Terminal Block B routeing only the live lead through Fuseholder 2.

(h) Link the yellow green cores of Terminal Blocks A and B with a single wire to complete the switching circuit.

(j) Insert 12A fuses in Fuseholder 2. (One in circuit, one spare.)

(k) Carry out Change of Frequency Procedure.
(See Alignment and Test Procedure.)

Removal of Transceiver Cover

(a) Set OFF/ON switch to ON (upward) position.

(b) Remove the front panel cover by releasing the retaining pin through the access hole on the right hand edge of the cover. Swing front panel cover to the left and remove.

(c) At each end of the frame top edge, release 2 x M4 screws. Lift top cover to the rear to disengage the interlocking rear edges and remove.

PARTS LIST

R.F. Linear Amplifier Type A200	AT04697
consisting of:–	
Amplifier Assy.	AT27647/–
Amplifier Case	BT39002
Cover	BT15621
Socket (input) SKA	FS43852
Socket (output) SKB	FS43701
Pillar	BT04110
Gland	BT17678
Gland Nut	BT19206
Gland Washer (2 off)	BT29217
Washer Gasket	BT29218
Sealing Washer	BT29219
'O' Ring	FS15107
Unit Label	BT18466
Instruction Label	BT18937
3-core 2,5mm Cable (1m.)	FC07326
Screws:–	
S.T. No.4 x 3/16 in. 2/Label	QJ08239/A
Pozi. Pan M4 x 20mm 4/Cover	QJ11921/A
Pan Taptite M3 x 10mm 9/P.W.B.	QJ11552/A
Washer M4 4/Cover to case	QA15007/A
Set of Bagged Items	AT85737
consisting of:–	
Mounting Plate	AT12641
Terminal Block (A) 3-way	FT16450
*Lead Assy. (Includes Terminal Block (B) and Grommet)	AT12739
Fuseholder	FH02837
Fuse 12A (2 off)	FF00826
Screws:–	
Pozi Pan M5 x 30mm 2/Mtg. Plate-A200	QJ11937/A
Slot Pan ST No. 6 x ¾ in. 2/Fuseholder 4/Terminal Blocks	QW41212/A
Slot Pan ST No. 10 x ½ in. 4/Mtg. Plate	QQ41208/A
Washer M5 2/Mtg. Plate	QA15009/A
Plug (PLA)	FP13741
Plug (PLB)	FP13715

*Optional accessory required only for switching

AMPLIFIER ASSY. (AT27647/–)

CAPACITORS

C1	1p	±0p1			PN00023
C2	220n	±10%		100V	PQ99508
C3	4n7	±10%		100V	PN99604
C4	4n7	±10%		100V	PN99604
C5	4n7	±10%		100V	PN99604
C6	10u			25V	PS99513
C7	2–18p	Variable	132–174	250V	PV07670
	5–55p	Variable	105–108		PV07664
	5–55p	Variable	68–88		PV07664
C8	10–80p	Variable	132–174		PV05408
	30–140p	Variable	105–108		PV09359
	30–140p	Variable	68–88		PV09359
C9	4n7	±10%		100V	PN99604
C10	1n	±20%		350V	PP13051

Additional Checks and Tests

Linearity Tests

(a) FM Olympic – M202

Carry out Peak Deviation Test (See M202 Service Sheet – Transmitter Performance Checks).

(b) AM Olympic – M201

1. Connect equipment as shown in Fig.3. Switch off Amplifier.
2. Set Audio Oscillator to 1 kHz and adjust its output for minus 85% modulation.
3. Check that the waveform is free from kinks and irregularities (See Note under Amplifier Test).

Amplifier Test (Fig.3)

1. Switch on Amplifier
2. Check that the modulation is less than 90% downward and greater than 60% upward.
3. The waveform has a flattened top (compared with that of the Driver Setting para. 3.) but must be free from kinks and irregularities.

Note: Any content of kinks and/or irregularities would indicate the presence of a spurious signal(s) at that point(s) in the modulation cycle.

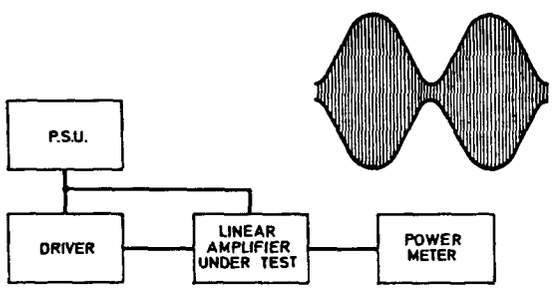


FIG. 1

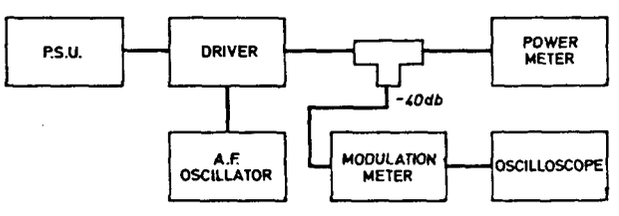


FIG. 2

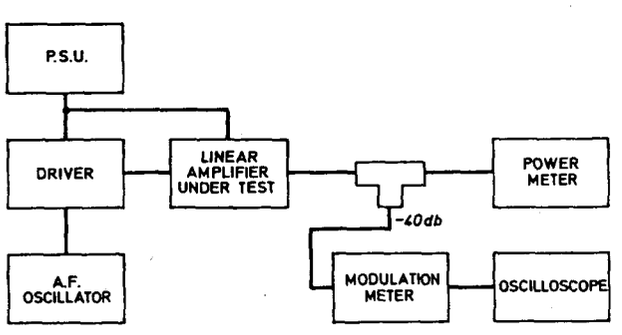


FIG. 3

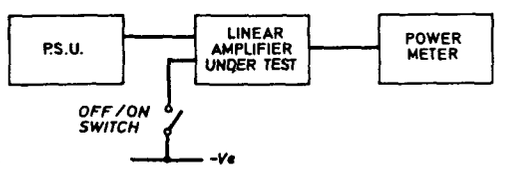


FIG. 4

WORKSHOP CHECKS

1. 'Off' Current Test

NOTE. The following tests require the arrangement shown in Fig. 4 which includes a single pole single throw switch for Off/On switching.

(a) Set OFF/ON switch to OFF.

(b) Set multimeter to 100 mA range and connect it in the A200 positive supply lead.

(c) Check that the reading is between 2 mA and 12 mA.

2. Voltage Tests

(a) Set the multimeter to 25V range and connect the negative to the Mother Board at pin 8.

(b) Connect the positive lead to the following points and check that the readings are as shown:–

Mother Board pin 6 (Input Voltage)	13,6V
TR5 collector	12,6V to 13,2V
C27 positive	6,0V to 13,2V
D5 positive (cathode)	9,4V to 10,6V

(c) Set the OFF/ON switch to ON.

(d) Connect the positive lead to the following points and check that the readings are as shown:–

Mother Board pin 6	13,6V
C27 positive	13,6V

3. Quiescent Current Check

(a) Connect as in Fig. 4, OFF/ON switch set to OFF.

(b) Connect Mother Board pin 6 (13V) to TR1 base via a 10k ohm resistor to operate the switching chain.

(c) With the multimeter set to 10V range, measure the voltage across R12. Check reading is approx. 0,9V at 25°C.

(d) Set multimeter to 1A range and connect it in the A200 positive supply lead. Check reading is between 200 mA and 800 mA.

4. Temperature Cut-out Check

(a) Tape thermometer so that the bulb is close to TH1.

(b) Using the hot air blower, gradually heat TH1 and check that relay RLB switches off at between 80°C and 100°C. Note switch-off temperature.

(c) Allow TH1 to cool and note that RLB switches on again at about 5°C below switch-off temperature.

CHANGE OF FREQUENCY PROCEDURE – AM and FM

WARNING

If this procedure is carried out in a vehicle, the engine should be run at fast idling speed.

(a) Remove A200 cover.

(b) Connect power meter between antenna and A200 output socket SKB.

(c) Adjust power supply for 13,6V.

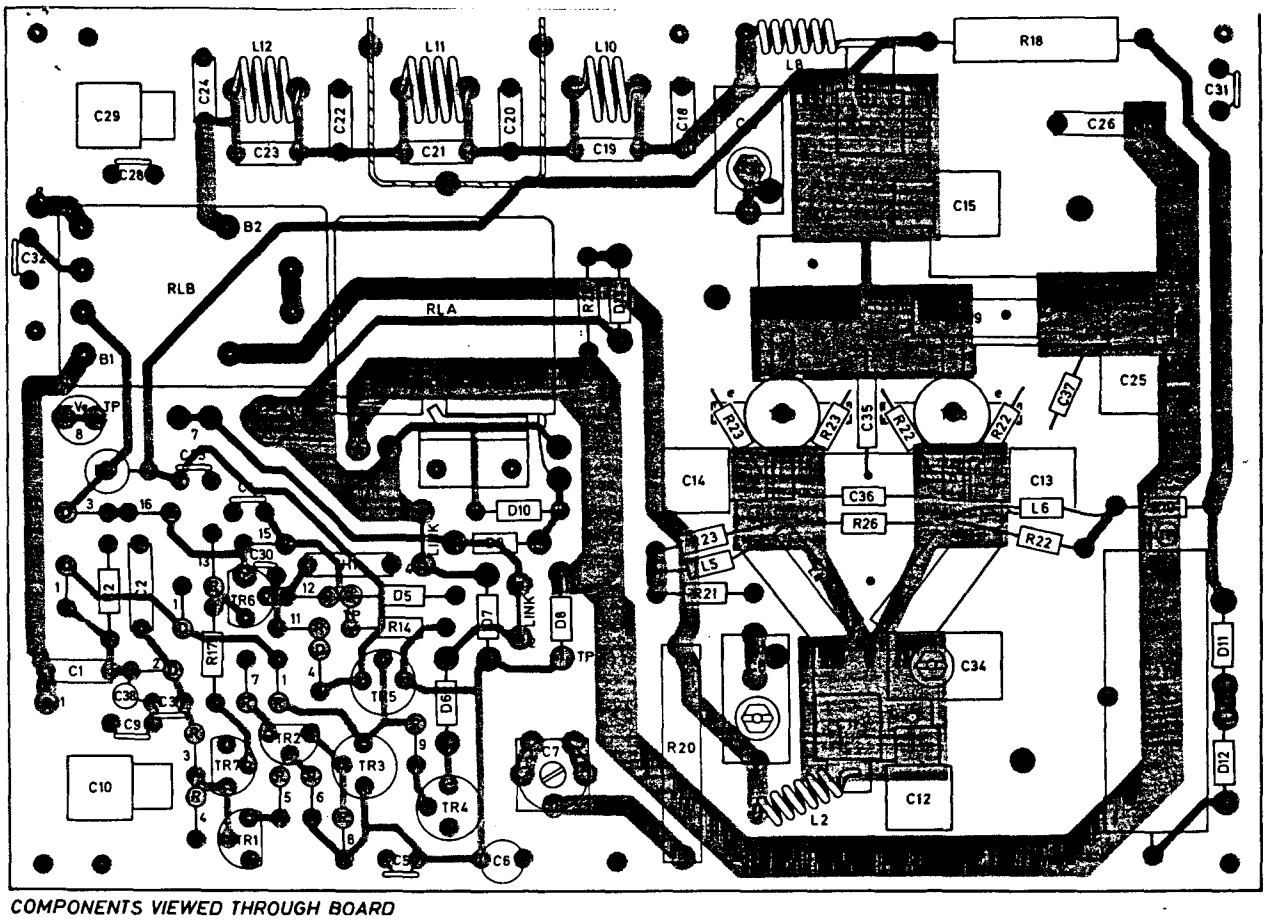
(d) A, B & M band – Tune C8 & C17 for maximum output
E Band – Tune C8 & C17 & C34 for maximum outp

(e) AM only – Set C7 for 25W output.
FM only – Check output is 50W.

(f) Disconnect power meter. Replace A200 cover.

NOTE If it is required to check the driver output with the A200 connected to it, disconnect the A200 power supply and carry out the above procedure. The power output should be:

AM 5,5 W FM 13 W



COMPONENTS VIEWED THROUGH BOARD

ALIGNMENT AND TEST PROCEDURE

Test Equipment Required.

Power Supply	P.S.U. 13,8V at 20A	
Radiotelephone	AM – Olympic M201 FM – Olympic M202	
Audio Oscillator	1 kHz	Marconi TF2102 and TF2162
Modulation Meter	Up to 90% 68 to 174 MHz	Marconi TF2303
Oscilloscope	General Purpose	Telequipment S43
R.F. Power Meter	50 ohms 100W	Bird Termaline 6154
T-attenuator	–40 db (–50 db at 25 MHz –24 db at 500 MHz)	Marconi Signal Sniffer 54452 – 011
Multimeter	20,000 ohms/volt	Pye TM1 or Avo Model 8.

Trimming Tools

Hot Air Blower (or other means of heating)

Thermometer $25^{o}C - 100^{o}C$

10k ohm Resistor

Notes

1. Ensure that the amplifier frequency coverage is compatible with that of the Radiotelephone.
2. The Radiotelephone should be keyed only for the time necessary to make an adjustment and observe the reading.
3. If the amplifier under test is to be used in an installation providing for OFF/ON switching, then the links between pins 2 and 3 and 4 and 5 of the P.W.B. must be removed and a switch wired between pins 7 and 8.

Preliminary Operations

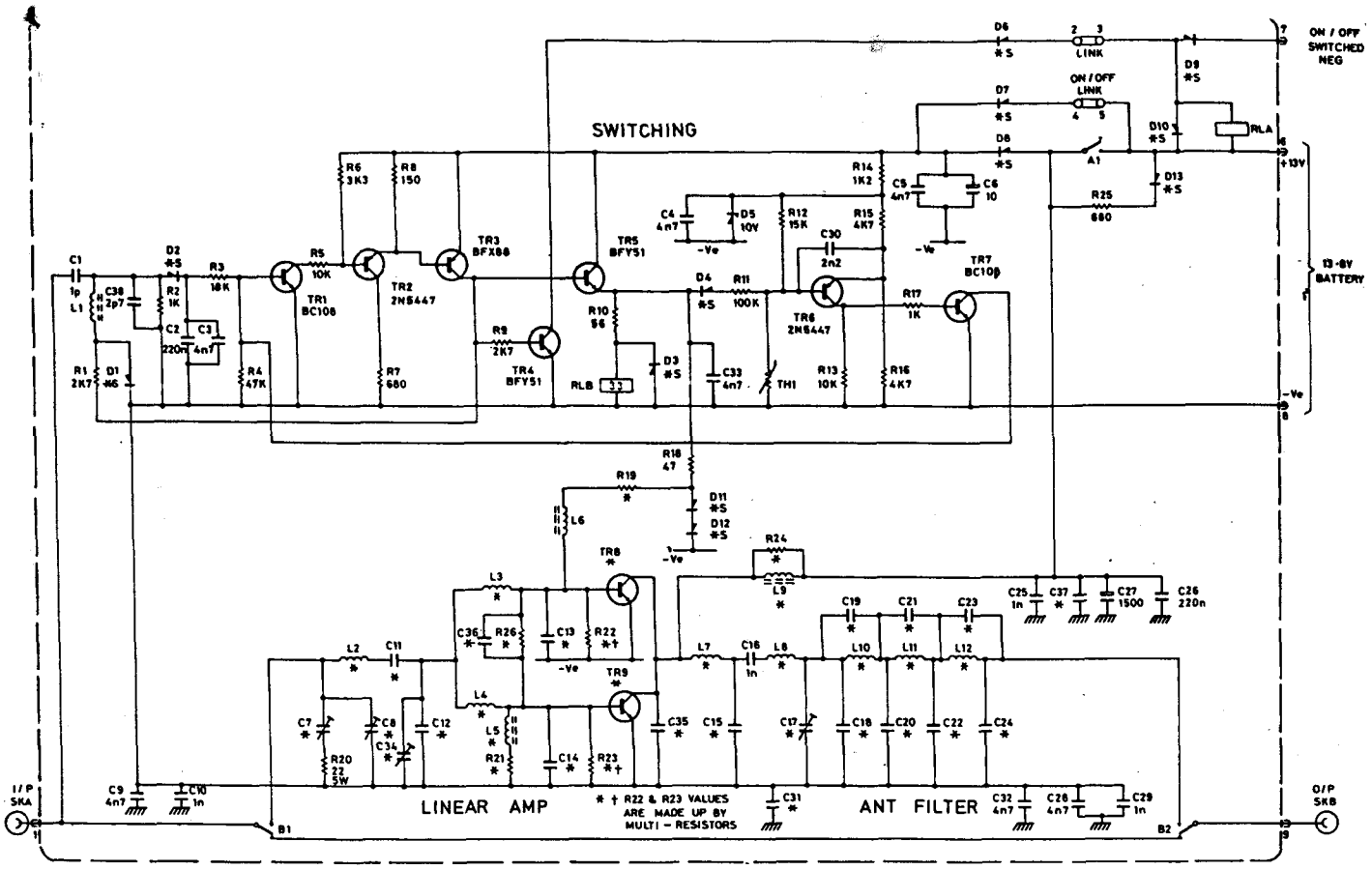
1. Remove the A200 cover and check that the resistance between the negative power lead and the chassis is greater than 1 megohm.
2. Check that the Radiotelephone output is correct according to its specification. Typically 5 to 6 watts for AM and 12 to 15W for FM.
3. Select the Radiotelephone channel tuned to the highest frequency.

Alignment

NOTE The power outputs quoted in this Alignment Procedure are typical for Radiotelephones delivering 6W (AM) and 15W (FM). The Amplifier will function on smaller inputs (minimum 2¼W AM or FM) but its output will be proportionately less.

1. Connect Radiotelephone and Amplifier as in Fig. 1. Set PSU to 13,6V.
2. Set C7 to minimum capacitance. (Maximum Gain).
3. Key the Radiotelephone and adjust C17, C8 (and C34 for E Band equipments) in sequence for maximum output

   AM 25W minimum
   FM 50W minimum
4. If the maximum output exceeds 25W on AM, adjust C7 to reduce it to 25W. On FM, C7 remains at minimum capacitance.
5. Check that the d.c. input current does not exceed 8A (AM) or 13A (FM) and that it falls to less than 20mA (AM and FM) when the Radiotelephone Key is lifted.
6. Reduce the output voltage of the PSU to 11V. Connect output meter directly to the Radiotelephone antenna socket and check its output. Increase PSU voltage output, if necessary to obtain meter reading of 2¼W.
7. Key the Radiotelephone and check that the A. plifier relay RLB operates and that the minimum power output is 8W.



CIRCUIT DESCRIPTION

General

Essentially, this unit consists of an r.f. wideband amplifier, TR8 and TR9 controlled by a switching chain, TR1 to TR5, and provided with a temperature sensing circuit TR6 and TR7. Operation of the switching chain is initiated by the r.f. input; the sensing circuit will inhibit the switching chain if the ambient temperature rises to between 80°C and 100°C.

The unit is connected to the 13,6V d.c. supply at all times and in the 'off' condition, a small standing current maintains C27 in a state of charge. This is necessary to avoid the overloading of the start relay (RLA) contacts (which would occur if C27 was charged from 0V) when that relay is energised as a result of the r.f. input.

OFF/ON Switching.

If it is required to use the amplifier where stringent safety precautions are required, the start relay RLA should be operated by the associated radiotelephone OFF/ON switch via the interconnecting lead provided. If this optional switching arrangement is to be used then the links connecting pins 2 and 3 and pins 4 and 5 of the printed wire board must be removed. For normal applications, these links must be in place.

Switching Circuit, TR1 to TR5.

(a) Without OFF/ON switching.

When an r.f. signal of suitable level is applied to the input at C1, a d.c. potential, derived from D2 C2 R2, is applied to the base of TR1 to switch on the chain TR1 to TR5. The start relay RLA/1 is energised by the fall at TR4 collector and contact pair A1 close to short out R25. Relay RLB/2 is energised by the rise at TR5 emitter and this potential is used to apply bias to the bases of TR8 and TR9. Contact pair B1 connects the applied r.f. from the associated radiotelephone and contact pair B3 connects the amplified and filtered output to the antenna. The d.c. feed back from TR3 collector ensures that the power level at which the amplifier switches off is lower than that required to switch on thus preventing relay chatter.

(b) With OFF/ON switching (in the ON position.)

As in (a) but start relay RLA will be energised so long as the associated radiotelephone OFF/ON switch is set to ON.

Temperature Sensing Circuit TR6 and TR7

At normal ambient temperatures, the base potential of TR6, as defined by the voltage divider network R14 R12 and TH1, holds off TR6 (p.n.p.). If the ambient temperature rises to between 80°C and 100°C, its effect on TH1 causes TR6 base potential to fall to cut-on point and TR7 collector to fall to ground. The base of TR1 is therefore grounded and the amplifier switching inhibited.

Amplifier Stages

The amplifier consists of two paralleled Class AB amplifier stages, TR8 and TR9. Standing bias to their bases is derived from TR5 emitter and limited by the diodes D11 and D12.

R.F. from the associated radiotelephone transmitter is fed via SKA and relay contact B1 to the impedance matching filter C8, L2, C12, L3, L4, C13, C14.

The amplified outputs appearing at the collectors of TR8 and TR9 are parallel fed to the impedance matching filter L7, C15, L8, C17. The final output is filtered by the elliptic function low pass filter C18 to C24, L10, L11, L12 and passed via the relay contact B2 and the output socket SKB to the antenna.

The gain of the amplifier is controlled by C7 in conjunction with R20.

PARTS LIST (cont.)

AMPLIFIER ASSY. (AT27647/-) (Cont.)

CAPACITORS (cont.)

C11	1n	±20%		350V	PP13051
C12	200p	±20%	132–174	350V	PP10024
	300p	±20%	105–108	350V	PP10516
	300p	±20%	68–88	350V	PP10516
C13	200p	±20%	148–174	350V	PP10024
	300p	±20%	132–156		PP10516
	500p	±20%	105–108	500V	PP11538
	750p	±10%	68–88	350V	PP12259
C14	200p	±20%	148–174	350V	PP10024
	300p	±20%	132–156		PP10516
	500p	±20%	105–108	500V	PP11538
	750p	±10%	68–88	350V	PP12259
C15	220p	±20%	148–174	350V	PP10117
	300p	±20%	105–156	350V	PP10516
	450p	±10%	68–86	350V	PP11213
C16	1n	±20%		350V	PP13051
C17	10–80p	Variable	132–174		PV05408
	30–140p	Variable	105–108		PV09359
	30–140p	Variable	68–88		PV09359
C18	6p8	±0p5	148–174		PN99540
	12p	±5%	132–156		PN99543
	18p	±5%	105–108		PN99545
	27p	±5%	68–88	750V	PN99526
C19	10p	±5%	148–174		PN99542
	3p9	±0p25	132–156		PN99537
	2p2	±0p1	105–108		PN99534
	18p	±5%	68–88		PN99545
C20	22p	±5%	132–174		PN99525
	33p	±5%	105–108		PN99527
	56p	±5%	68–88	750V	PN99530
C21	3p9	±5%	132–174		PN99537
	5p6	±0p25	105–108		PN99539
	8p2	±0p5	68–88		PN99541
C22	22p	±5%	132–174		PN99525
	33p	±5%	105–108		PN99527
	68p	±5%	68–88		PN99531
C23	1p7	±0p1	148–174		PN99533
	3p9	±0p25	132–156		PN99537
	10p	±5%	105–108		PN99542
	2p7	±0p1	68–88	750V	PN99535
C24	12p	±5%	132–174		PN99543
	15p	±5%	105–108		PN99544
	39p	±5%	68–88		PN99528
C25	1n	±20%		350V	PP13051
C26	220n	±10%		100V	PQ99508
C27	1500u			16V	PS99527
C28	4n7	±10%		100V	PN99604
C29	1n	±20%		350V	PP13051
C30	2n2	±10%		100V	PN99602
C31	4n7	±10%	105–174	100V	PN99604
	33p	±2%	68–88	63V	PN99574
C32	4n7	±10%		100V	PN99604
C33	4n7	±10%		100V	PN99604
C34		Not used	105–174		
	30–140p	Variable	68–88		PV09359
C35		Not used	105–174		
	100p	±10%	68–88	350V	PP08579
C36	150p	±2%	148–174	63V	PP99582
		Not used	68–148		
C37	4n7	±10%	105–174	100V	PN99604
		Not used	68–88		
C38	2p7	±0p25		63V	PN99719

RESISTORS

R1	2k7	±5%			PM01441
R2	1k	±5%			PM01436
R3	18k	±5%			PM01451
R4	47k	±5%			PM01456
R5	10k	±5%			PM01448
R6	3k3	±5%			PM01442
R7	680	±5%			PM01434
R8	150	±5%			PM01426
R9	2k7	±5%			PM01441
R10	56	±5%	2W W.W		PM01121
R11	100k	±5%			PM01460
R12	15k	±5%			PM01450
R13	10k	±5%			PM01448
R14	1k2	±5%			PM01437
R15	4k7	±5%			PM01444
R16	4k7	±5%			PM01444
R17	1k	±5%			PM01436
R18	47	±5%	6W W.W.		PM01220
R19	4 ohm 7	±5%	148–174		PM01408
	12	±5%	132–156		PM01413
	3 ohm 3	±10%	105–108		PM01406
	3 ohm 3	±10%	68–88		PM01406
R20	22	±10%			PL42351
R21	3 ohm 9	±10%	132–174		PM01407
		Not used	68–108		
R22		Not used	132–174		
	15	±5%(3off)	105–108		PM01414
	12	±5%(3off)	68–88		PM01413
R23		Not used	148–174		
	15	±5%(3off)	105–108		PM01414
R23	12	±5%(3off)	68–88		PM01413

RESISTORS (cont.)

R24		Not used		
R25	680	±5%		PM01434
R26	12	±5%	148–174	PM01413
		Not used	132–156	
	3 ohm 9		105–108	PM01407
		Not used	68–88	
TH1		Thermistor VA1067S		PL23080

SEMICONDUCTORS

TR1	BC108		FV05800
TR2	2N5447		FV05828
TR3	BFX88		FV05847
TR4	BFY51		FV05803
TR5	BFY51		FV05803
TR6	2N5447		FV05828
TR7	BC108		FV05800
TR8	Matched pair	132–174	AT12143
TR9			
TR8	BLW60	68–108	FV05436
TR9	BLW60	68–108	FV05436
D1	Diode G.P. (S)		FV05842
D2	Diode 1N914		FV07972
D3	Diode G.P. (S)		FV05842
D4	Diode G.P. (S)		FV05842
D5	Diode 10V Zener		FV05815
D6 to D9	Diode G.P. (S)		FV05840
D10	Diode G.P. (S)		FV05842
D11	Diode G.P. (S)		FV05840
D12	Diode G.P. (S)		FV05840
D13	Diode G.P. (S)		FV05842

INDUCTORS

L1	Choke 4uH7		FT99003
L2	Coil	132–174	AT31214/01
	Coil	105–108	AT31214/02
	Coil	68–88	AT31212/02
L3,L4	Part of ET18830	132–174	
	Part of ET18842	105–108	
	0 ohm 47 Resistor	68–88	FU03748
L5	Coil Assy	132–174	AT31986
	Not used	105–108	
	Not used	68–88	
L6	Coil Assy	132–174	AT31986
	Coil Assy	105–108	AT31986
	Coil Assy	68–88	AT31896
L7	Part of ET18831	132–174	
	Part of ET18843	105–108	
	Part of ET18900	68–88	
L8	Coil	132–174	AT31214/01
	Coil	105–108	AT31214/02
	Coil Assy	68–88	AT31212/02
L9	Coil Assy	132–174	AT32912
	Coil Assy	105–108	AT32912
	Inductor	68–88	AT31987
L10	Coil	148–174	AT31249/01
	Coil	132–156	AT31261/02
	Coil	105–108	AT31249/06
	Coil	68–88	AT31267/03
L11	Coil	148–174	AT31249/02
	Coil	132–156	AT31261/02
	Coil	105–108	AT31249/06
	Coil	68–88	AT31267/04
L12	Coil	148–174	AT31249/02
	Coil	132–156	AT31261/02
	Coil	105–108	AT31249/08
	Coil	68–88	AT31267/04
Matching Section P.W.B. No 1		132–174	ET18830
		105–108	ET18842
	Not used	68–88	
Matching Section P.W.B. No 2		132–174	ET18831
		105–108	ET18843
		68–88	ET18900

RELAYS

RLA	Relay (Board Mounted)	FR03972
RLB	Relay (Bracket Mounted)	FR03993

MECHANICAL ITEMS

Printed Wire Board Assy		AT12516
Sub Printed Wire Board (68–88 MHz only)		ET18899
Heatsink		BT36649
Relay Bracket		BT11130
Screen		BT26215
Screws, Pozi Pan Head:–		
M2,5 x 6 mm	2/Relay Bkt.	QJ11945/A
M4 x 16 mm	3/Mother Brd. to Case	QJ11920/A
Eyelet	3/Mother Board	QA09183
Full Nut M2,5	2/Relay Bkt.	QA11604/A
Washer, large M2,5	2/Relay Bkt.	QA15004/A
Insulating Bead	2/TH1	FJ00007
Medallion		203093/09

Complete Assy. Part No.

148–174 MHz	AT27647/01
132–156 MHz	AT27647/04
105–108 MHz	AT27647/02
68–88 MHz	AT27647/03