TRANSMITTER POWER AMPLIFIER MODULE

AT04874/- 30W VERSION BANDS A9,BO (VHF)
AT04879/- 50W VERSION BANDS A9,BO (VHF)
AT04882/- 25W VERSION BANDS UO,T1,WM (UHF)
AT04883/- 50W VERSION BANDS EO (VHF)

INTRODUCTION

The transmitter power amplifier comprises two boards - an RF power amplifier and a PA control board.

The power amplifier accepts the nominal 1,25W input from the transmitter driver on VHF frequencies, or nominal 2,5W on UHF bands, producing the specified output power at the antenna. The control board provides power output regulation and also VSWR and thermal monitoring.

RF POWER AMPLIFIER

The low power RF input from the transmitter driver module is applied to a two-stage power amplifier TR1 and TR2, each transistor operating in class C. Automatic level control is provided by the switching regulator controlling the voltage supply line to:-

(i) TR1 and TR2 on 25W and 30W versions
(ii) TR1 on 50W versions.

TR2 on 50W versions is supplied with unregulated +24V from the PA Control PCB.

The RF power output from TR2 is fed via a harmonic filter to the antenna. LK1 may be removed from circuit to allow alignment of the antenna filter under workshop conditions. A stripline inductor (circuit reference L17 on VHF equipments) and power coupler D1, D2 provide forward and reverse power monitoring to the control board.

PA CONTROL BOARD AT28991/01

Power Level Control

The switching regulator circuit IC1, TR3, D6, uses the unregulated +24V DC input to provide a suitable supply voltage to power amplifier [O]TR1 and, on 25W and 30W versions, [O]TR2 at a level determined by the forward power feedback circuit. On 50W versions an unregulated +24V supply, is provided for [O]TR2. L3 acts as a flywheel coil to store energy which is drawn off by the power amplifier.

The Tx key input is used as the enable input to IC1 thus ensuring that the PA is shut down in the non-transmit condition.

At power-up the switching regulator is set to produce a nominal +15V supply to the PA. R37 provides current limiting to protect the regulator from short circuits.

A power coupler on L17 in the PA taps off the forward and reverse power to provide regulation of the RF output level and give VSWR indication and protection.

The forward power is detected by D1 and applied to the variable gain amplifier IC3(c). Gain is set by RV1 (POWER SET). The DC output from IC3(c) is compared to +5V in IC3(d) producing a DC level which is applied to IC1 pin 1. The switching regulator compares the level on pin 1 with the +2,5V reference on pin 2 and adjusts the supply voltage to the PA accordingly. The DC output from IC3(d) also provides an open collector monitor of forward power through TR7.

Reverse power detected by D2 is applied to IC3(b) to produce a DC output which is compared to +5V in IC3(a). The resulting output is passed to comparator IC3(d) to control the voltage supply line and hence RF power output as previously described. The output from IC3(a) is also used to provide an open collector output for VSWR alarm, via TR8.

An external VSWR detector may be connected directly to the reverse power line on SKC pin 9 whilst the output on pin 21 provides a metering point for forward power.

External control of comparator IC3(d) enables remote adjustment of the power output; a value of resistance, selected in the control module, connected between PLC pin 7 and OV reducing the transmitter power output.

Over-temperature Protection

Over-temperature protection within the module is provided by thermistor TH1 and dual comparator IC2(a) and IC2(b). At "normal" operating temperatures the potential from TH1 on IC2 pin 2 is greater than the bias on pins 3 and 5. The output from both comparators is "low" and the module functions as normal.

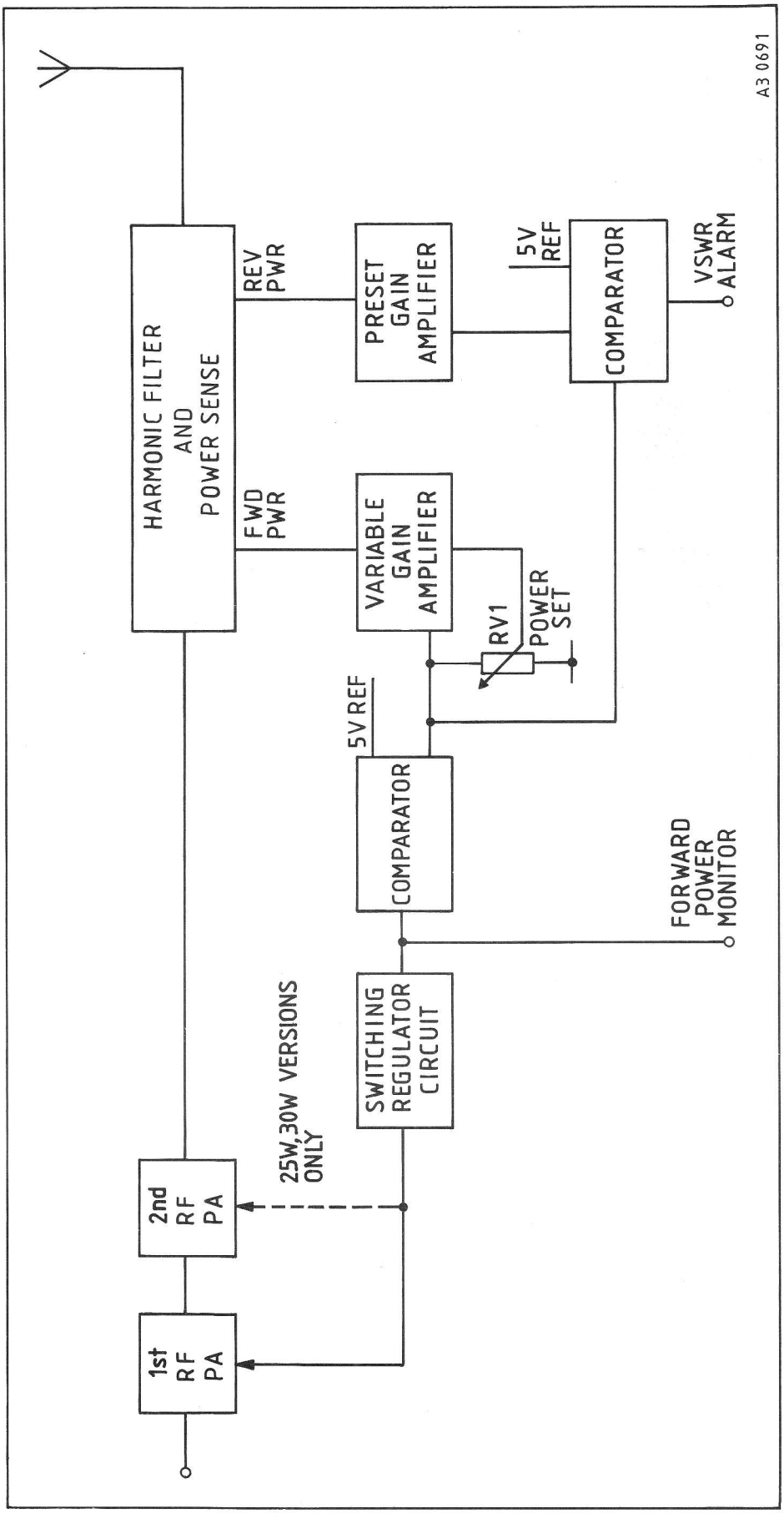
Should the temperature rise slightly above the nominal 80°C the potential from TH1 will fall as its resistance rises. The biasing arrangement is such that this potential will now be less than that on IC2 pin 3 but still greater than that at IC2 pin 5. The output from IC2(b) will remain "low" but the output from IC2(a) will go "high" causing TR5 and TR6 to conduct. TR5 provides an over-temperature alarm on SKC pin 17 and TR6 reduces the reference input on IC3(d) to a level such that the RF power output is reduced by 3dB (half-power), thus reducing the module dissipation.

A larger rise in heatsink temperature further decreases the potential from TH1, the bias level on IC2 pin 5 is now greater than the level on pin 6 and the output from IC2(b) goes "high". The enable line on IC1 pin 10 goes "high" and inhibits the switching regulator so providing total shutdown, and TR4 conducts providing a temperature shutdown alarm on SKC pin 4.

SPECIFICATION

Bands		
	AT04874/02	A9 146-174MHz
	AT04874/03	BO 132-156MHz
	AT04879/02	A9 146-174MHz
	AT04879/03	BO 132-156MHz
	AT04882/05	TO 405-440MHz
	AT04882/06	UO 440-470MHz
	AT04882/07	WM 470-520MHz
	AT04883/04	EO 66-88MHz
Output Impedance		50Ω nominal
Output Power		25W; adjustable down to 6W - 04882/-versions. 30W; adjustable down to 6W - AT04874/-versions 50W; AT04879/- and AT04883/- versions.

Output Power Stability	Less than ±1dB variation over full range of voltage, temperature, switching bandwidth, and input power
Duty Cycle	100%
Input Impedance	50Ω nominal, VSWR less than 2:1
Input Power	1,25W ±1dB; 2,5W maximum without damage (VHF Bands) 2,0W ±1dB; 3W maximum without damage (UHF Bands)
Temperature Protection	3dB power reduction if heatsink temperature exceeds 85°C, total shutdown above 87°C
Supply Input	24V +20% -10% ; 3A maximum at 30W; 5A maximum at 50W.
Alarm Outputs (Open collector)	1) Supply Alarm (normally pulled low) 2) VSWR Alarm (pull low on alarm) indicates proportional shutdown operative 3) Temp Alarm 1 (pull low on alarm) indicates 3dB power reduction operative 4) Temp Alarm 2 (pull low on alarm) indicates complete shut-off



TX POWER AMPLIFIER ATO4874/-, ATO4879/-, ATO4882/- and ATO4883/-
BLOCK DIAGRAM

TEST PROCEDURE

Test Equipment required

Note: Refer to Part I, Table 3.1 for list of suitable types.

10* RF Signal Generator
15 Thruline Wattmeter
16 Spectrum Analyser
17* Return Loss Bridge
18 50Ω Load (includes sniffer)
20 "Break-out" connector 25 way
21* Input Test Lead (local manufacture)
Termaline Wattmeter

* Required only for optional Antenna Filter Alignment check

Preliminaries

1. Remove the cover plate from the power amplifier module. Disconnect the ribbon cable from the control board and remove the cover plate from the power amplifier board.

2. Ensure that LK1 and LK2 (where fitted) on AT28991/01 are as follows:- LK1 Open Circuit, LK2 Short Circuit.

Antenna Filter Alignment

Note: This check ensures that the input match of the antenna filter is maintained over the entire bandwidth of the equipment. It is factory set and should not normally require adjustment but may be carried out if any of the filter coils have been replaced or adjusted.

3. With the test equipment connected as shown in Fig.1 measure the 'return loss' of the 50Ω termaline load. This should be greater than 25dB.

4. On VHF equipments remove link LK1 from the power amplifier board and connect the input test lead and plug from the return loss bridge. Ensure that the clip on the test lead is connected to the filter screen. Connect the 50Ω load to the antenna socket SKB.
On UHF equipments remove the solder blob from LK1 and solder in test resistors RT1 and RT2; connect the test lead from the return loss bridge to the antenna socket SKB.

5. Sweep the RF signal generator output over the frequency range of the amplifier (see SPECIFICATION), check the return loss is greater than 20dB. If part of the sweep between these limits on VHF equipments shows a return loss of less than 20dB slight adjustment to the filter coils L14, L15 and L16 is required. DO NOT adjust L18.
If part of the sweep between these limits on UHF equipments shows a return loss of less than 20dB adjustment to the trimmer capacitors C43, C45 and C47 is required.

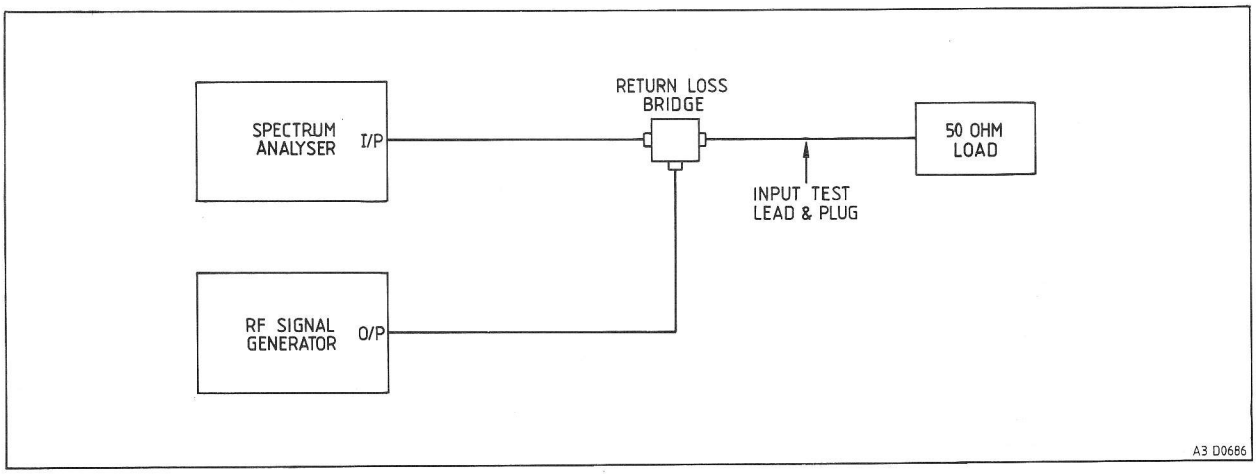


Fig.1 'Return Loss' Measurement

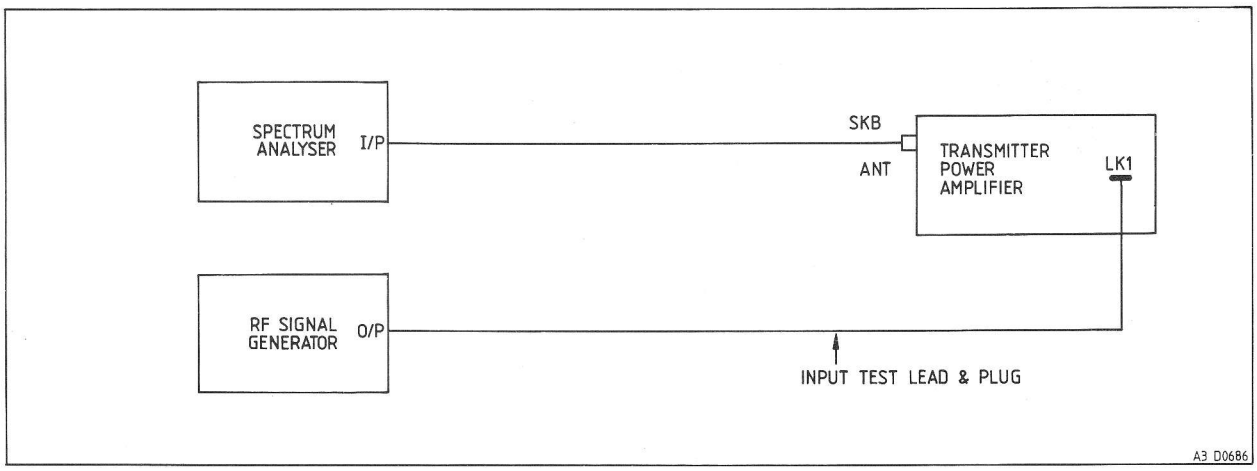


Fig.2 Antenna Filter Test Circuit - Direct Sweep

Note: *(i) Tuning is effected by either squeezing (to increase inductance) or parting (to reduce inductance) the turns of the coil. To assist coil tuning the use of a piece of ferrite or brass held near the coil will indicate whether more or less inductance, respectively, is required.*

(ii) It is normal for the return loss to deteriorate rapidly above the top frequency of the band covered by the equipment.

6. Connect the test equipment as shown in Fig.2 (for A,B and E Bands only) and sweep the filter directly. The attenuation at 136MHz (E Band), 246MHz (A and B Bands), should be greater than 55dB.

7. Remove the test equipment and refit LK1.

Amplifier Alignment

8. Connect the Termaline wattmeter to the antenna socket SKB and the spectrum analyser to the sniffer port (monitor output).

Note: *Connect the Thruline Wattmeter between the Signal Generator and the PA I/P SKA.*

9. Reconnect the ribbon cable to the control board (SKA/PLA) and connect the ribbon cable from the backplane to the module (SKC), via the "break-out" connector.

10. Check the following voltages on the control board:

+24V	on PLC pin 2	25V ±0,5V
+14V	on PLD pin 4	14V ±0,5V
+5V	on PLD pin 6	5V ±0,25V

11. Connect the engineer's handset to the control module front panel and set the manual function switch to TX ON. Select either the highest frequency customer channel, or the test channel corresponding to the highest frequency channel required.

12. Operate the EHS PTT switch, to key the transmitter.

13. Set the thruline wattmeter to 'reverse' and adjust the following capacitors on the PA board for minimum reverse power:-
C7 (on A and B Bands).
C4 and C48 (on T and U Bands);

14. Tune the following capacitors on the PA board for maximum power output:-
C14 and C24 on (A,B and E Bands)
C12, C25 and C26 (on T,U and W Bands)

15. Repeat steps 13 and 14. Check output power is greater than 30W (ATO4882/-); 35W (ATO4874/-); 60W (ATO4879/- and ATO4883/-)

16. Set RV1 (POWER SET) on the control board for an output of 25W (ATO4882/-); 30W (ATO4874/-); 50W (ATO4879/- and ATO4883/-)

17. Select the customer lowest frequency (or the test channel corresponding to the lowest frequency channel required) on the Tx driver. Check that the output power does not drop by more than 0,75dB below the level measured in step 16 above. Re-select the highest frequency channel.

18. Temporarily short circuit SKC pins 2 and 7 and check for a power output fall to 10-15W (ATO4882/-); 12-18W (ATO4874/-) or 20-30W (ATO4879/-) (ie Approximately 3dB down, half power)'.

19 Disconnect the RF load from the PA module output on SKB. Check the VSWR ALARM indicator LED3 on the Control Logic PCB is illuminated.

20. Disconnect and remove all items of test equipment and refit the covers to the module.

TX POWER AMPLIFIER

AT04874/02 A9 BAND 30W
AT04874/03 B0 BAND 30W
AT04879/02 A9 BAND 50W
AT04879/03 B0 BAND 50W

Cct. Ref	Description	Part No.	Remarks
	Feedthrough plate assembly	AT14803	
	PCB assy Tx PA control	AT28991/01	
	PCB assy Tx PA	AT28992/-	30W
	PCB assy Tx PA	AT29059/-	50W
	Housing & heatsink Tx PA	BT45146	30W
	Housing & heatsink Tx PA	BT45169	50W
	Lid assy Tx PA	AT29404	
SKA	Socket BNC str 50Ω	FS43808	RF I/P
SKB	Socket 50Ω N type	FS16081	RF O/P
	Lid unit	BT13802	
	Bushing shorty	FG02736	3/Tx PA lid
	Strap, earth	3513 904 40011	50W 1/TR2
	Label frequency align.	BT38238	
	Label, Beryllium oxide	CM01125	
	Label, unit	BT38209/01	Casting
	Nut st hex M3	QA11605/X	1/TR1,TR3,D6(PA control) 1/SKB, 2/f'thru assy - housing & heatsink
	Washer st M3	QA15005/X	1/TR1,TR3,D6(PA control), 1/SKB, 2/f'thru assy - housing & heatsink
	Bush insulating (TO-220)	QA99024	1/TR1,TR3,D6(PA control)
	Washer thermal	QA99111	50W 1/TR1,TR3,D6(PA control)
	Scr st tap pan M3 x 6mm	QJ11550/X1	2/front panel - housing & heatsink, 11/PA lid, 7/TX PA PCB - housing & heatsink, 4/TX PA Control PCB - housing & heatsink, 11/unit lid, 7/RF connectors
	Scr st tap pan M3 x 10mm	QJ11552/X1	1/Tx PA PCB - housing & heatsink
	Scr st tap pan M2,5 x 8mm	QJ11581/X1	50W 2/TR2
	Scr st pan pozi M3 x 16mm	QJ11905/X	1/TR1,TR3,D6(PA control), 1/SKB
	Scr st hex M3 x 12mm	QJ13255/X	2/f'thru assy - housing & heatsink

LID ASSEMBLY, TX PA AT29404

	Cable assy ribbon 26-way	AT70154	DC interconnecting
	Lid Tx PA	BT13808	
	Scr st pan pozi M2,5 x 8mm	QJ11946/B	2/SKC
	Nut st M2,5	QA11604/B	2/SKC

FRONT PANEL ASSEMBLY AT14820

	Panel, front	BT23741	
	Label, TX PA	BT38206/03	1/handle
	Label, Philips	BT38217/01	1/handle
	Fastener	BT17284	4/PA - shelf
	Handle	BT35950	
	Scr st tap pozi No4 x 8mm	QJ08241/X	3/handle

PCB ASSEMBLY TX PA CONTROL AT28991/01

Semiconductors & IC's

IC1	IC SG3524N	FU09729
IC2	IC Dual op amp 1458	FU99092
IC3	IC LM324	FU99115
TR1	Transistor BD947	FV99042
TR2	Transistor BSS64	FV99119/SM
TR3	Transistor RFP10N12	FV08879
TR4-9	Transistor BCW71	FV99100/SM
D1	Diode BAS16	3513 999 15003
D2	Diode BZX84C15	FV99018/SM
D3	Diode BZX84C8V2	FV99013/SM
D4,5	Diode BAS16	3513 999 15003
D6	Diode GP BYW29-150	FV99171
D7	Diode BAS16	3513 999 15003

Cct. Ref	Description				Part No.	Remarks
Resistors						
R1	39k	±5%	0,125W	SMD	3513 999 80055	
R2	1k8	±5%	0,125W	SMD	3513 999 80039	
R3	680	±5%	0,125W	SMD	3513 999 80034	
R4	390	±5%	0,125W	SMD	3513 999 80031	
R5	1k5	±5%	0,125W	SMD	3513 999 80038	
R6	100	±2%	0,5W	m oxide	PL99293	
R7	10k	±5%	0,125W	SMD	3513 999 80048	
R8-10	100k	±5%	0,125W	SMD	3513 999 80060	
R11	220	±5%	0,125W	SMD	3513 999 80028	
R12	4k7	±5%	0,125W	SMD	3513 999 80044	
R13	22k	±5%	0,125W	SMD	3513 999 80052	
R14	4k7	±5%	0,125W	SMD	3513 999 80044	
R15	1k8	±5%	0,125W	SMD	3513 999 80039	
R16	100k	±5%	0,125W	SMD	3513 999 80060	
R17	18k	±5%	0,125W	SMD	3513 999 80051	
R18	22k	±5%	0,125W	SMD	3513 999 80052	
R19-21	4k7	±5%	0,125W	SMD	3513 999 80044	
R22	3k9	±5%	0,125W	SMD	3513 999 80043	
R23	680	±5%	0,125W	SMD	3513 999 80034	
R24	1k8	±5%	0,125W	SMD	3513 999 80039	
R25	10k	±5%	0,125W	SMD	3513 999 80048	
R26	150	±5%	0,125W	SMD	3513 999 80026	
R27	1k	±5%	0,125W	SMD	3513 999 80036	
R28,29	27k	±5%	0,125W	SMD	3513 999 80053	
R30	47k	±5%	0,125W	SMD	3513 999 80056	
R31	4k7	±5%	0,125W	SMD	3513 999 80044	
R32	10	±5%	0,125W	SMD	3513 999 80012	
R33,34	18k	±5%	0,125W	SMD	3513 999 80051	
R35	22k	±5%	0,125W	SMD	3513 999 80052	
R36	27k	±5%	0,125W	SMD	3513 999 80053	
R37	30milli-ohm	±20%			PL41528	
R38,39	27k	±5%	0,125W	SMD	3513 999 80053	
R40,41	1k	±5%	0,125W	SMD	3513 999 80036	
R42	10k	±5%	0,125W	SMD	3513 999 80048	
R43,44	18k	±5%	0,125W	SMD	3513 999 80051	
R45,46	4k7	±5%	0,125W	SMD	3513 999 80044	
R47	27k	±5%	0,125W	SMD	3513 999 80053	
R48	10k	±5%	0,125W	SMD	3513 999 80048	
R49	1k	±5%	0,125W	SMD	3513 999 80036	
R50	100k	±5%	0,125W	SMD	3513 999 80060	
R51,52	10k	±5%	0,125W	SMD	3513 999 80048	
R53	100k	±5%	0,125W	SMD	3513 999 80060	
R54	10k	±5%	0,125W	SMD	3513 999 80048	
R55	47k	±5%	0,125W	SMD	3513 999 80056	
R56	4k7	±5%	0,125W	SMD	3513 999 80044	
R57	150	±5%	0,125W	SMD	3513 999 80026	
R58	220	±5%	0,125W	SMD	3513 999 80028	
RV1	10k	±20%	Pot,skel,lin		PL01478	
Capacitors						
C1	100n	±10%	50V	SMD	3513 999 55017	
C2-8	1n	±5%	50V	SMD	3513 999 55418	
C9	470	±20%	40V	elec	PS45812	
C10	1n	±5%	50V	SMD	3513 999 55418	
C11	100n	±10%	50V	SMD	3513 999 55017	
C12	470n	±5%		submin pes	PQ99538	
C13	1n	±5%	50V	SMD	3513 999 55418	
C14	100n	±10%	50V	SMD	3513 999 55017	
C15	100	±20%	63V	elec	PS38287	
C16	1n	±5%	50V	SMD	3513 999 55418	
C17	10n	±10%	50V	SMD	3513 999 55492	
C19	15n	±10%	50V	SMD	CN99116	
C20,21	1n	±5%	50V	SMD	3513 999 55418	
C22	100n	±10%	50V	SMD	3513 999 55017	
C23,24	1n	±5%	50V	SMD	3513 999 55418	
C25	10n	±10%	50V	SMD	3513 999 55492	
C26	100	±20%	63V	elec	PS38287	
C27	1n	±5%	50V	SMD	3513 999 55418	
C28	470	±20%	40V	elec	PS45812	
C29	100n	±10%	50V	SMD	3513 999 55017	
C30,31	1n	±5%	50V	SMD	3513 999 55418	
C32	270n	±10%	50V	SMD	3513 999 55022	
C33,34	100n	±10%	50V	SMD	3513 999 55017	
C35,36	470n	±5%		submin pes	PQ99538	
C37	470	±20%	40V	elect	PS45812	

Cct Ref	Description				Part No	Remarks
Capacitors (Cont'd)						
C38	10n	±5%		submin pes	PQ99532	
C39	100n	±10%	50V	SMD	3513 999 55017	
C40	1n	±5%	50V	SMD	3513 999 55418	
C41	470n	±5%		submin pes	PQ99538	
C42	470	±20%	40V	elect	PS45812	
C43	1n	±5%	50V	SMD	3513 999 55418	
C44,45	100n	±10%	50V	SMD	3513 999 55017	
C46	10n	±10%	50V	SMD	3513 999 55492	
C47	470n	±5%		submin pes	PQ99538	
C48	1n	±5%	50V	SMD	3513 999 55418	
C49	100n	±10%	50V	SMD	3513 999 55017	
C50	10n	±10%	50V	SMD	3513 999 55492	
C51	1n	±5%	50V	SMD	3513 999 55418	
C52	15n	±10%	50V	SMD	CN99116	
C53-61	1n	±5%	50V	SMD	3513 999 55418	
C62	270n	±10%	50V	SMD	3513 999 55022	
Inductors						
L1	Choke				AL21474	
L2	Choke assy				AT30092	
L3,4	Choke				AL21474	
Miscellaneous						
FS1	Fuse 5A quick acting				FF99018	
TH1	Thermistor PTC 70°C				PL23137	
	Fuseholder PCB mtg				FH99101	1/FS1
	Header, str, male 1 pos'n				3513 504 00121	1/TP -ve
PLB,C	Plug, PCB mtg, str 2 x 2				FP99172	
PLD	Plug, PCB mtg, str 2 x 3				FP99174	
PLA	Plug, PCB mtg, str 2 x 13				FP99186	

PCB ASSEMBLY TX PA
AT28992/02 A BAND 30W
AT28992/03 B BAND 30W

Semiconductors						
TR1	Transistor BLY87C 'BeO'				FV05647	
TR2	Transistor SD1274-3				FV42221	
D1,2	Diode schottky				FV09000	
Resistors						
R1	10	±5%	0,5W	carb	PM00001	
R2	100	±5%	0,5W	carb	PM00024	
R3	10	±5%	0,5W	carb	PM00001	/02
R3	3Ω3	±5%	0,25W	c film	PM01406	/03
R4	150	±5%	2,5W	m film	PL51219	
R5	68	±5%	0,25W	c film	PM01422	
R6	47k	±5%	0,25W	c film	PM01456	
Capacitors						
C1,2	1n	±5%		cer	PN99900	
C3	100n	±20%		cer	PN99927	
C4	18p	±5%	500V	NP0	PN10377	
C5	56p	±5%	500V	c disc	PN14335	
C6	100p	±5%	500V	SMD	3513 999 55663	
C7	16-90p			trimmer	PV06601	
C8	100	±20%	63V	elec	PS38287	
C9	100n	±5%		submin pes	PQ99535	
C10	56p	±5%	500V	c disc	PN14335	/02
C10	38p	±5%	500V	c disc	PN12307	/03
C11,12	1n	±5%		cer	PN99900	
C13	100n	±20%		cer	PN99927	
C14	16-90p			trimmer	PV06601	
C15	220p	±5%	200V	SMD	3513 999 55671	
C16	100	±20%	63V	elec	PS38287	
C17	10n	±5%		cer	PN99906	
C18	100n	±5%		submin pes	PQ99535	
C19,20	220p	±5%	200V	SMD	3513 999 55671	
C21	1n	±5%		cer	PN99900	
C22	100p	±5%	500V	SMD	3513 999 96053	
C23	1n	±5%		cer	PN99900	

Cct Ref	Description				Part No	Remarks
Capacitors (Cont'd)						
C24	16-90p			trimmer	PV06601	
C25	1n	±5%		cer	PN99900	
C26	100n	±20%		cer	PN99927	
C27-30	1n	±5%		cer	PN99900	
C31	12p	±5%	500V	cer	PN09382	
C32	4p	±0p25	500V	NP0	PN02410	
C33	470n	±5%		submin pes	PQ99538	
C34	10p	±0p5	500V	NP0	PN09344	
C35	12p	±5%	500V	cer	PN09382	
C36	5p	±0p25	500V	c disc	PN04306	
C37	12p	±5%	500V	cer	PN09382	
C38,39	15p	±5%	500V	c disc	PN10376	
C40-44	1n	±5%		cer	PN99900	
C45	12p	±5%	500V	cer	PN09382	
C46	1n	±5%		cer	PN99900	
C47	15p	±5%	500V	c disc	PN10376	
C48	5p	±0p25	500V	c disc	PN04306	
C49	100n	±5%		submin pes	PQ99535	
C51	470p	±5%	200V	SMD	3513 999 55679	
Inductors						
L1	Coil				AT30624/02	
L2	Loop(8mm)				AT31511/02	
L4	Coil				AT30624/01	
L5	Coil				AT30624/02	
L6	Choke assy				AT30092	
L7	Inductor				BT37703	
L8	Choke assy				AT31975/01	
L10	Coil				AT30624/01	
L11	Choke assy				AT30092	
L13	Loop(11mm)				AT31511/01	
L14	Coil				AT30624/02	
L15	Coil				AT31342/02	
L16	Coil				AT30624/03	
L18	Coil				AT30624/02	
Miscellaneous						
	Link connector				FC99060	
	Screen, TX PA filter				BT26410	
	Header, str, male, 4 pos'n				FC00837/04	

PCB ASSEMBLY PA
AT29059/02 A9 BAND 50W
AT29059/03 B0 BAND 50W

Semiconductors & IC's						
TR1	Transistor BLY87C "Be O"				FV05647	
TR2	Transistor SD1468-6 "Be O"				FV42231	
D1,2	Diode Schottky				FV09000	
Resistors						
R1	10	±5%	0,5W	Carb.	PM00001	
R2	100	±5%	0,5W	Carb.	PM00024	
R3	10	±5%	0,5W	Carb.	PM00001	
R5	68	±5%	0,25W	c film	PM01422	
R6	47k	±5%	0,25W	c film	PM01456	
Capacitors						
C1,2	1n	±5%		cer	PN99900	
C3	100n	±20%		cer	PN99927	
C4	18p	±5%	500V	C disc	PN10377	
C5	56p	±5%	500V	C disc	PN14335	
C6	150p	±5%	300V	SMD	3513 999 55667	
C7	16-90p			variable	PV06601	
C8	100	20%	63V	elec	PS38287	
C9	100n	±5%		pes	PQ99535	
C10	82p	±5%	500V	SMD	3513 999 55661	/02
C10	47p	±5%	500V	SMD	3513 999 55655	/03
C11,12	1n	±5%		cer	PN99900	

Cct Ref	Description				Part No	Remarks
Capacitors (Cont'd)						
C13	100n	±20%		cer	PN99927	
C14	16-90p			variable	PV06601	
C15	220p	±5%	200V	SMD	3513 999 55671	
C16	100	20%	63V	elec	PS38287	
C18	100n	±5%		pes	PQ99535	
C19,20	220p	±5%	200V	SMD	3513 999 55671	/02
C19,20	470p	±5%	200V	SMD	3513 999 55679	/03
C21	1n	±5%		cer	PN99900	
C22	82p	±5%	500V	SMD	3513 999 96065	/02
C22	100p	±5%	500V	SMD	3513 999 96053	/03
C23	1n	±5%		cer	PN99900	
C24	16-90p			variable	PV06601	
C25	1n	±5%		cer	PN99900	
C26	100n	±20%		cer	PN99927	
C27-30	1n	±5%		cer	PN99900	
C31	12p	±0p5	500V	cer	PN09382	
C32	4p	±0p25	500V		PN02410	
C33	470n	±5%		pes	PQ99538	
C34	10p	±0p5	500V	cer	PN09344	
C35	12p	±0p5	500V	cer	PN09382	
C36	5p	±0p25	500V	C disc	PN04306	
C37	12p	±0p5	500V	cer	PN09382	
C38,39	15p	±5%	500V	C disc	PN10376	
C40-44	1n	±5%		cer	PN99900	
C45	12p	±0p5	500V	cer	PN09382	
C46	1n	±5%		cer	PN99900	
C47	15p	±5%	500V	C disc	PN10376	
C48	5p	±0p25	500V	C disc	PN04306	
C49	100n	±5%		pes	PQ99535	
C50-52	470p	±5%	200V	SMD	3513 999 55679	
C53	22p	±5%	500V	SMD	3513 999 55647	
C54	100p	±5%	500V	SMD	3513 999 96053	/03
Inductors						
L1	Coil				AT30624/02	
L2	Loop (8mm high)				AT31511/02	
L4	Coil				AT30624/01	
L5	Coil				AT30624/02	
L6	Choke Assy				AT30092	
L7	Inductor				BT37703	
L8	Choke Assy				AT31975/01	
L10	Coil				AT30624/02	
L11	Choke Assy				AT30092	
L13	Loop (11mm high)				AT31511/01	
L14	Coil				AT30624/02	
L15	Coil				AT31342/02	
L16	Coil				AT30624/03	
L18	Coil				AT30624/02	
Miscellaneous						
	Screen Tx PA Filter				BT26410	
	Hder str male 4 pos'n				FC00837/04	
LK1	Link Connector				FC99060	
					TX POWER AMP MODULE	
					AT04882/05 T1 Band	
					AT04882/06 U0 Band	
					AT04882/07 WM Band	
	PCB Assembly Tx PA Control				AT28991/01	See Separate Headed List
	PCB Assembly Tx PA T1 Band				AT29078/05	/05 See Separate Headed List
	PCB Assembly Tx PA U0 Band				AT29078/06	/06 See Separate Headed List
	PCB Assembly Tx PA WM Band				AT29078/07	/07 See Separate Headed List
	Bush Insulating				QA99024	
	Bushing Shorty				FG02736	3/Tx PA Lid
	Feedthrough Plate Assembly				AT14803	
	Front Panel Assembly Tx PA				AT14820	
	Grommet				FG02736	2/Tx PA lid
	Housing & Heatsink Tx PA				BT45169	
L7	Inductor 15nh				3513 999 98078	/05,06
	Label Alignment Frequency				BT38238	1/Unit Lid
	Label Beryllium Oxide				CM01125	1/PA Lid
	Label Unit				BT38209/01	1/Casting
	Lid Assembly UHF Tx PA				AT29406	

Cct Ref	Description	Part No	Remarks
Miscellaneous (Cont'd)			
	Lid Unit	BT13802	
SKA	Socket BNC str 50Ω	FS43808	
SKB	Socket 50Ω N type	FS16081	
	Nut st hex M3	2522 401 64008	
	Scr st hex M3 x 12mm	QJ13255/X	
	Scr st pan pozi M3 x 16mm	QJ11905/X	
	Scr st tap pan M2,5 x 8mm	QJ11581/X1	2/TR2
	Scr st tap pan M3 x 10mm	QJ11552/X1	
	Scr st tap pan M3 x 6mm	QJ11550/X1	
	Wash st Form A M3	QA15005/X	
	Washer	3513 907 30031	2/TR1
	Washer Thermal TO-220	QA99111	
		PCB ASSEMBLY TX PA	
		AT29078/05 T1 Band	
		AT29078/06 U0 Band	
		AT29078/07 WM Band	
Semiconductors			
TR1	Transistor, SD1136	9337 447 50682	
TR2	Transistor, BLU30/12	9337 434 00112	
D1,2	Diode, BAT17	3513 999 15006	
D3	Diode, BYW54 GP	3513 990 10012	
Resistors			
R1,2	47 ±5% 0,125W SMD	3513 999 80020	
R3	10 ±5% 0,125W SMD	3513 999 80012	
R4,5	82 ±5% 0,125W SMD	3513 999 80023	
R6,7	22 ±2% 0,25W m film	3513 992 06207	/05,07
R6,7	10 ±2% 0,25W m film	PM99234	/06
R8	820 ±2% 0,25W m film	PM99280	
R9	1k ±2% 0,25W m film	PM99282	
R10	100k ±5% 0,125W SMD	3513 999 80060	
RT1,2	100 ±5% 0,125W SMD	3513 999 80024	
Capacitors			
C1	470p ±5% 200V Hi Q	3513 999 55679	
C2	100n ±10% 50V SMD	3513 999 55017	
C3	1n ±5% 50V SMD	3513 999 55418	
C4	2p-18p Var	PV99006	
C5	8p2 ±0p25 500V Hi Q	3513 999 55618	/05
C5	5p6 ±0p25 500V Hi Q	3513 999 55614	/06,07
C6	470p ±5% 200V Hi Q	3513 999 55679	
C7	39p ±5% 500V Hi Q	3513 999 55653	/05,06
C7	18p ±5% 500V Hi Q	3513 999 55645	/07
C9	39p ±5% 500V Hi Q	3513 999 55653	/07
C10	470p ±5% 200V Hi Q	3513 999 55679	
C11	18p ±5% 500V Hi Q	3513 999 55645	/05,06
C12	7p-50p Var	3513 999 70007	
C13	100n ±10% 50V SMD	3513 999 55017	
C14	100 ±20% 63V elec	PS38287	
C15	27p ±5% 500V Hi Q	3513 999 55649	/05
C15	33p ±5% 500V Hi Q	3513 999 55651	/06
C15	22p ±5% 500V Hi Q	3513 999 55647	/07
C16	27p ±5% 500V Hi Q	3513 999 55649	/05
C16	39p ±5% 500V Hi Q	3513 999 55653	/06
C16	27p ±5% 500V Hi Q	3513 999 55649	/07
C17	33p ±5% 500V Hi Q	3513 999 55651	/05,06
C17	22p ±5% 500V Hi Q	3513 999 55647	/07
C18	33p ±5% 500V Hi Q	3513 999 55651	/05,06
C18	27p ±5% 500V Hi Q	3513 999 55649	/07
C19	470p ±5% 200V Hi Q	3513 999 55679	/05,06,07
C20	22p ±5% 500V Hi Q	3513 999 55647	/05,06
C20	8p2 ±0p25 500V Hi Q	3513 999 55618	/07
C21	27p ±5% 500V Hi Q	3513 999 55649	/05
C21	22p ±5% 500V Hi Q	3513 999 55647	/06
C21	12p ±5% 500V Hi Q	3513 999 55641	/07
C22	100n ±10% 50V SMD	3513 999 55017	
C23	100 ±20% 63V elec	PS38287	
C24	8p2 ±0p25 500V Hi Q	3513 999 55618	/05
C24	5p6 ±0p25 500V Hi Q	3513 999 55614	/06,07
C25,26	2p-18p Var	PV99006	
C27,28	470p ±5% 200V Hi Q	3513 999 55679	

Cct Ref	Description		Part No	Remarks
Capacitors (Cont'd)				
C29,30	390p ±5% 50V	SMD	3513 999 55413	
C31	1n ±5% 50V	SMD	3513 999 55418	
C32	470p ±5% 200V	Hi Q	3513 999 55679	
C33	6p8 ±0p25 500V	Hi Q	3513 999 55616	/05,07
C33	8p2 ±0p25 500V	Hi Q	3513 999 55618	/06
C34	5p6 ±0p25 500V	Hi Q	3513 999 55614	/05,07
C34	6p8 ±0p25 500V	Hi Q	3513 999 55616	/06
C35-41	390p ±5% 50V	SMD	3513 999 55413	
C42	12p ±5% 500V	Hi Q	3513 999 55641	/05
C42	8p2 ±0p25 500V	Hi Q	3513 999 55618	/06,07
C43	1p4-5p5 Var		PV99004	
C44	27p ±5% 500V	Hi Q	3513 999 55649	/05
C44	22p ±5% 500V	Hi Q	3513 999 55647	/06
C44	18p ±5% 500V	Hi Q	3513 999 55645	/07
C45	1p4-5p5 Var		PV99004	
C46	12p ±5% 500V	Hi Q	3513 999 55641	/05
C46	8p2 ±0p25 500V	Hi Q	3513 999 55618	/06,07
C47	1p4-5p5 Var		PV99004	
C48	2p-18p Var		PV99006	
C49,50	100	elec	PS99449	
Inductors				
L1	Coil		3513 509 01301	
L2	Choke Assembly		3513 509 00221	
L3	Coil		3513 509 01301	
L4	Choke Assembly		3513 509 00221	
L5	Choke Assembly		AT30092	
L6	Coil		3513 509 01301	
L7	Choke Assembly		AT30092	
L8	Loop		3513 509 00661	/05
L8	Loop		3513 509 00671	/06
L8	Loop		3513 509 00681	/07
L9	Inductor 15nh		3513 999 98078	/05,06
L9	Inductor 8nh		3513 999 98050	/07
Miscellaneous				
	Pad Spacer		3513 905 10001	1/L2,4
	Screen Tx PA Filter		BT26410	

TX POWER AMPLIFIER
AT04883/04 EO BAND

Miscellaneous			
	PCB Assembly Tx PA Control	AT28991/01	See Separate Headed List
	PCB Assembly Tx PA E Band 50W	AT29083/04	See Separate Headed List
SKA	Socket BNC straight 50Ω	FS43808	RF input
SKB	Socket 50Ω N type	FS16081	RF output
	Bush Ins(TO-220)	3513 990 16014	
	Bushing shorty	FG02736	3/Tx PA lid
	Feedthrough plate assembly	AT14803	
	Front Panel Assembly Tx PA	AT14820	See Separate Headed List
	Housing & heatsink Tx PA	BT45169	
	Label alignment frequency	BT38238	1/Unit Lid
	Label Beryllium Oxide	CM01125	1/PA Lid
	Label unit	3513 903 71211	1/Casting
	Lid assembly Tx PA	AT29404	
	Lid Unit	BT13802	
	Screening RF	FG00018	410mm/PA
	Sleeving natural PTFE	4313 324 30011	350mm/Feedthrough plate assy
	Strap earth	3513 904 40011	1/TR2
	Nut st hex m3	2522 401 64008	1/TR1; 1/TR3; 1/D6 Tx PA Control; 1/SKB; 2/Feedthrough plate assy - housing & heatsink
	Scr st hex M3 x 12mm	QJ13255/X	2/Feedthrough plate assy - housing & heatsink
	Scr st pan pozi M3 x 16mm	2522 178 20064	1/TR1; 1/TR3; 1/D6 Tx PA Control; 1/SKB
	Scr st tapt pan M2,5 x 8mm	QJ11581/X1	2/TR2
	Scr st tapt pan M3 x 10mm	QJ11552/X1	1/Tx PA PCB - housing & heatsink

Cct Ref	Description	Part No	Remarks
Miscellaneous (Cont'd)			
	Scr st tapt pan M3 x 6mm	QJ11550/X1	2/Front panel - housing & heatsink; 7/Tx PA PCB - housing & heatsink; 4/Tx Control PCB - housing & heatsink; 11/Tx PA lid; 11/Unit lid; 7/RF connectors
	Washer Thermal TO-220	3513 990 16254	1/TR1; 1/TR3; 1/D6 Tx PA Control
	Washer st form a M3	2522 600 89017	1/TR1; 1/TR3; 1/D6 Tx PA Control; 1/SKB; 2/Feedthrough plate assy - housing & heatsink

PCB ASSEMBLY TX PA E BAND 50W
AT29083/04

Semiconductors					
TR1	Transistor, BLY87C 'BeO'				9333 262 90112
TR2	Transistor, PT9783 'BeO'				FV41823
D1,2	Diode, Schottky				FV09000
Resistors					
R1	10	±5%	0,5W	carb	3513 992 00001
R2	100	±5%	0,5W	carb	PM00024
R3	10	±5%	0,5W	carb	3513 992 00001
R5	68	±5%	0,25W	c flm	PM01422
R6	47k	±5%	0,25W	c flm	PM01456
Capacitors					
C1,2	1n	±5%			PN99900
C3	100n	±20%			3513 991 06095
C4	56p	±5%	500V	c disc	PN14335
C5	68p	±5%	500V	c disc	2020 557 90408
C6	470p	±5%	200V	hi q	3513 999 55679
C8	100	±20%	63V	elec	PS38287
C9	100n	±5%	63V	pes	3513 991 08013
C10	47p	±5%	500V	c disc	2020 557 90407
C11,12	1n	±5%			PN99900
C13	100n	±20%			3513 991 06095
C14	90p-350p		variable	mica	4313 326 10191
C16	100	±20%	63V	elec	PS38287
C18	100n	±5%	63V	pes	3513 991 08013
C15	390p	±5%	200V	hi q	3513 999 55677
C19,20	470p	±5%	200V	hi q	3513 999 55679
C21	1n	±5%			PN99900
C22	220p	±5%	200V	hi q	3513 999 55671
C23	1n	±5%			PN99900
C24	16p-90p		variable	mica	PV06601
C25	1n	±5%			PN99900
C26	100n	±20%			3513 991 06095
C27-30	1n	±5%			PN99900
C31	33p	±5%	500V	c disc	PN12307
C32	18p	±5%	500V		PN10377
C33	470n	±5%		pes	3513 991 08016
C35	56p	±5%	500V	c disc	PN14335
C36	22p	±5%	500V	c disc	2020 557 90405
C37	8p	±0p5		c disc	2020 557 90404
C38	56p	±5%	500V	c disc	PN14335
C39	33p	±5%	500V	c disc	PN12307
C40-44	1n	±5%			PN99900
C45	22p	±5%	500V	c disc	2020 557 90405
C46	1n	±5%			PN99900
C47	22p	±5%	500V	c disc	2020 557 90405
C48	6p	±0p5	500V	c disc	2020 557 90403
C49	100n	±5%	63V	pes	3513 991 08013
C50-52	470p	±5%	200V	hi q	3513 999 55679
C55	100p	±5%	500V	hi q	3513 999 55663
C56	120p	±5%	300V	hi q	3513 999 55665
Inductors					
L1	Coil				AT30624/03
L2	Loop				AT31511/03
L4	Coil				AT31434/01
L5	Coil				AT30624/04
L6	Choke assembly				AT30092