ELECTRICAL AND MECHANICAL ENGINEERING REGULATIONS
(By Command of the Army Council)

TELECOMMUNICATIONS
F 382
Part 2

WIRELESS SET, NO 31, MK 2

TECHNICAL HANDBOOK - FAULT-FINDING AND REPAIR DATA

Erratum

Note: This Page 0 will be filed immediately in front of Page 1001, Issue 1, dated 10 Sep 57.

1. The following amendment will be made to the Regulation:-

Page 1011 (Issue 1), Fig 2003 - Circuit diagram

Item: CONNECTOR, battery to PL1,
(located at co-ordinate reference L1, L2)

Delete: connection CONNECTOR lead 3 _____ 3
Add: connection from plug 3 to plug 6 of CONNECTOR at battery end.

Distribution - Class 870. Code No 3

WIRELESS SET, NO 31, MK 2

TECHNICAL HANDBOOK - FAULT FINDING AND REPAIR DATA

Table 2001 - Components

Circuit reference	Value	Tolerance and rating	Type	Location	
				Circuit Fig 2003	Layout Fig 2005
		RESISTORS - FIXED			
R1	220Ω	10% 1/4W	comp grade 2 ins	B1	L4
R2	1MΩ	10% 1/4W	comp grade 2 ins	B3	J3
R3	220kΩ	10% 1/4W	comp grade 2 ins	B3	JK4
R4	220Ω	10% 1/4W	comp grade 2 ins	BC1	J3
R5	220Ω	10% 1/4W	comp grade 2 ins	C12	JK34
R6	1MΩ	10% 1/4W	comp grade 2 ins	C3	G3
R7	220kΩ	10% 1/4W	comp grade 2 ins	C3	G34
R8	2.2kΩ	10% 1/4W	comp grade 2 ins	D1	FG3
R9	10kΩ	10% 1/4W	comp grade 2 ins	E1	J6
R10	68kΩ	10% 1/4W	comp grade 2 ins	E3	H56
R11	5.6kΩ	10% 1/4W	comp grade 2 ins	E1	J6
R12	2.7kΩ	10% 1/4W	comp grade 2 ins	EF1	FG6
R13	5.6kΩ	10% 1/4W	comp grade 2 ins	FG1	G6
R14	22kΩ	10% 1/4W	comp grade 2 ins	G3	G6
R15	15kΩ	10% 1/4W	comp grade 2 ins	G3	F6
R16	1MΩ	10% 1/4W	comp grade 2 ins	G3	H6
R17	2.2kΩ	10% 1/4W	comp grade 2 ins	H1	F6
R18	100kΩ	10% 1/4W	comp grade 2 ins	H2	E6
R19	470kΩ	10% 1/4W	comp grade 2 ins	H3	
R20	56kΩ	10% 1/4W	comp grade 2 ins	J3	E5
R21	330Ω	10% 1/4W	comp grade 2 ins	JK3	GH3
R22	1MΩ	10% 1/4W	comp grade 2 ins	A7	M67
R23	1MΩ	10% 1/4W	comp grade 2 ins	A6	M3
R24	680kΩ	10% 1/4W	comp grade 2 ins	A67	L3
R25	10kΩ	10% 1/4W	comp grade 2 ins	B5	L45
R26	100kΩ	10% 1/4W	comp grade 2 ins	BC5	LM4
R27	3.3MΩ	10% 1/4W	comp grade 2 ins	C67	K6
R28	22kΩ	10% 1/4W	comp grade 2 ins	C5	L7
R29	220kΩ	10% 1/4W	comp grade 2 ins	CD67	
R30	10kΩ	10% 1/4W	comp grade 2 ins	D5	L7
R31	120kΩ	10% 1/4W	comp grade 2 ins	DE5	L6
R32	220kΩ	10% 1/4W	comp grade 2 ins	E67	
R33	47kΩ	10% 1/4W	comp grade 2 ins	E5	K7
R34	220kΩ	10% 1/4W	comp grade 2 ins	F67	
R35	10kΩ	10% 1/4W	comp grade 2 ins	F5	H7
R36	1MΩ	10% 1/4W	comp grade 2 ins	G7	
R37	10kΩ	10% 1/4W	comp grade 2 ins	F7	K7
R38	100kΩ	10% 1/4W	comp grade 2 ins	F67	J7
R39	100kΩ	10% 1/4W	comp grade 2 ins	F5	H7

Table 2001 - (contd)

Circuit reference	Value	Tolerance and rating	Type	Location	
				Circuit Fig 2003	Layout Fig 2005
RESISTORS - FIXED - (contd)					
R40	100kΩ	10% 1/4W	comp grade 2 ins	G6	
R41	15kΩ	10% 1/4W	comp grade 2 ins	G5	F78
R42	1MΩ	10% 1/4W	comp grade 2 ins	H6	E8
R43	100kΩ	10% 1/4W	comp grade 2 ins	H6	
R44	22kΩ	10% 1/4W	comp grade 2 ins	H5	E7
R45	1MΩ	10% 1/4W	comp grade 2 ins	J6	C8
R46	100kΩ	10% 1/4W	comp grade 2 ins	J67	
R47	47kΩ	10% 1/4W	comp grade 2 ins	J5	C6
R48	68kΩ	10% 1/4W	comp grade 2 ins	K5	C6
R49	470kΩ	10% 1/4W	comp grade 2 ins	H3	
R50	220kΩ	10% 1/4W	comp grade 2 ins	L5	CD5
R51	1MΩ	10% 1/4W	comp grade 2 ins	K7	
R52	100kΩ	10% 1/4W	comp grade 2 ins	L6	D6
R53	220kΩ	10% 1/4W	comp grade 2 ins	K6	D67
R54	39kΩ	10% 1/4W	comp grade 2 ins	L7	B4
R67	1MΩ	10% 1/4W	comp grade 2 ins	L7	B5
R70	270Ω	10% 1/4W	comp grade 2 ins	M5	G7
R71	39Ω	5% 1.1/2W	wirewound	NO4	K3
R72	27Ω	5% 1.1/2W	wirewound	M4	
RESISTORS - VARIABLE					
RV1	500kΩ	20% 3/4W	composition	L6	
CAPACITORS					
C1	680pF	+100% -0% 500V	ceramic	A2	
C2	100pF	5% 750V	ceramic tub ins	A2	L3
C3	18pF	5% 750V	ceramic tub ins	B2	L4
C4	0.01μF	20% 200V	pap tub ins	B2	K4
C5	200pF	5% 500V	silvd cerm tub	B2	KL4
C6	0.01μF	20% 350V	pap tub ins	B3	JK3
C7	5-12pF		trimmer	B2	KL45
C8	7-36pF		gang	B2	
C9	680pF	+100% -0% 500V	ceramic	C4	K34
C10	100pF	5% 750V	ceramic tub ins	C2	J3
C11	16pF	±0.5pF 750V	cerm temp comp ins	C2	J4
C12	0.01μF	20% 200V	pap tub ins	C2	HJ45
C13	200pF	5% 500V	silvd cerm tub	C2	J4
C14	5-12pF		trimmer	C2	J45
C15	15pF	5% 750V	cerm tub ins	C2	
C16	0.01μF	20% 350V	pap tub ins	C4	F3
C17	7-36pF		gang	C2	
C18	680pF	+100% -0% 500V	ceramic	D4	F34
C19	680pF	+100% -0% 500V	ceramic	D4	F3
C20	18pF	5% 750V	cerm tub ins	D2	G3
C21	15pF	5% 750V	cerm tub ins	E2	J56
C22	0.01μF	20% 200V	pap tub ins	E2	J56

Table 2001 - (contd)

Circuit reference	Value	Tolerance and rating	Type	Location	
				Circuit Fig 2003	Layout Fig 2005
		CAPACITORS - (contd)			
C23	5-12pF		trimmer	E2	H45
C24	7-36pF		gang	E2	
C25	0.01µF	20% 200V	pap tub ins	E4	J6
C26	0.01µF	20% 350V	pap tub ins	EF4	FG6
C27	7-36pF		gang	F2	
C28	5-12pF		trimmer	F2	G45
C29	9pF	±0.5pF 750V	cerm tub non-ins	F2	GH5
C30	100pF	5% 750V	cerm tub ins	F2	GH6
C31	0.01µF	20% 200V	pap tub ins	F2	G56
C32	100pF	5% 750V	cerm tub ins	G4	G6
C33	27pF	5% 750V	cerm tub ins	G3	F67
C34	0.01µF	20% 350V	pap tub ins	G4	H6
C35	0.01µF	20% 350V	pap tub ins	H4	EF56
C36	0.01µF	20% 350V	pap tub ins	H4	EF7
C37	0.01µF	20% 350V	pap tub ins	J3	
C38	0.01µF	20% 350V	pap tub ins	A7	M3
C39	15pF	5% 750V	cerm tub ins	B5	L5
C40	200pF	5% 500V	silvd cerm tub	B5	L5
C41	5-12pF		trimmer	B5	LM45
C42	100pF	5% 750V	cerm tub ins	B6	K5
C43	7-36pF		gang	B5	
C44	0.01µF	20% 350V	pap tub ins	BC7	LM45
C45	25pF	5% 500V	silvd cerm tub	C5	
C46	0.01µF	20% 200V	pap tub ins	C5	
C47	100pF	5% 750V	cerm tub ins	C6	
C48	25pF	5% 500V	silvd cerm tub	D5	
C49	0.01µF	20% 200V	pap tub ins	D5	
C50	0.01µF	20% 200V	pap tub ins	DE7	M7
C51	100pF	5% 750V	cerm tub ins	E6	
C52	25pF	5% 500V	silvd cerm tub	E5	
C53	0.01µF	20% 200V	pap tub ins	E7	
C54	100pF	5% 750V	cerm tub	E6	
C55	25pF	5% 500V	silvd cer tub	F5	
C56	0.01µF	20% 200V	pap tub ins	F7	JK7
C57	68pF	2% 750V	cerm tub ins	F6	J78
C58	100pF	5% 750V	cerm tub ins	G6	
C59	0.01µF	20% 200V	pap tub ins	G4	
C60	0.01µF	20% 200V	pap tub ins	G5	
C61	25pF	5% 500V	silvd cerm tub	G5	
C62	0.01µF	20% 200V	pap tub ins	H7	
C63	100pF	5% 750V	cerm tub ins	H6	
C64	0.01µF	20% 200V	pap tub ins	H7	E78
C65	25pF	5% 500V	silvd cerm tub	H5	
C66	0.01µF	20% 200V	pap tub ins	J7	
C67	100pF	5% 750V	cerm tub ins	J6	
C68	0.01µF	20% 200V	pap tub ins	J7	C78

Table 2001 - (contd)

Circuit reference	Value	Tolerance and rating	Type	Location	
				Circuit Fig 2003	Layout Fig 2005
CAPACITORS - (contd)					
C69	25pF	5% 500V	silvd cerm tub ins	K5	
C70	0.01µF	20% 200V	pap tub ins	J5	
C71	0.01µF	20% 200V	pap tub ins	K7	BC67
C72	50pF	10% 750V	cerm tub ins	K6	
C73	100pF	5% 500V	silvd cerm tub	K5	
C74	100pF	5% 500V	silvd cerm tub	K6	
C75	10pF	10% 750V	cerm tub ins	L5	
C76	0.005µF	20% 500V	pap tub ins	L5	D4
C77	0.01µF	20% 350V	pap tub ins	K7	
C78	0.01µF	20% 350V	pap tub ins	L6	BC4
C79	100pF	5% 750V	cerm tub ins	K7	E6
C85	0.01µF	20% 350V	pap tub ins	L7	BC4
C90	0.01µF	20% 200V	pap tub ins	N7	M34
C91	0.01µF	20% 350V	pap tub ins	M7	D56
C92	0.01µF	20% 200V	pap tub ins	N6	B78
C93	0.01µF	20% 350V	pap tub ins	MN6	K6
C94	0.01µF	20% 350V	pap tub ins	O6	CD7
C95	0.05µF	25% 250V	pap tub ins	NO6	C6
C96	0.01µF	20% 350V	pap tub ins	N6	KL7
C97	0.01µF	20% 200V	pap tub ins	N6	LM78
C98	0.01µF	20% 200V	pap tub ins	M6	H8
C99	0.01µF	20% 200V	pap tub ins	N5	D6
C100	0.01µF	20% 200V	pap tub ins	N5	LM6
C101	0.01µF	20% 200V	pap tub ins	O5	F8
C102	0.01µF	20% 200V	pap tub ins	N5	G7
C103	0.01µF	20% 200V	pap tub ins	N5	H4
C104	0.01µF	20% 350V	pap tub ins	M4	H4
C105	0.01µF	20% 350V	pap tub ins	N4	J3
C106	22pF	5% 750V	cerm tub ins	F6	HJ7
INDUCTORS AND TRANSFORMERS					
L1			inductor	AB2	L4
L2			inductor	C2	J4
L3			inductor	C23	
L4			inductor	G2	G6
L5			inductor	G3	G6
L6			inductor	A5	L5
L7			inductor	C5	
L8			inductor	D5	
L9			inductor	E5	
L10			inductor	F5	
L11			inductor	G5	
L12			inductor	H5	
L13			inductor	J5	
L14			inductor	K6	
L17	25µH	10%	r.f. choke	M7	D6

Table 2001 - (contd)

Circuit reference	Value	Tolerance and rating	Type	Location	
				Circuit Fig 2003	Layout Fig 2005
INDUCTORS AND TRANSFORMERS - (contd)					
L18	25µH	10%	r.f. choke	N6	C78
L19	25µH	10%	r.f. choke	M6	K6
L20	25µH	10%	r.f. choke	M6	K7
L21	25µH	10%	r.f. choke	N6	L78
L22	25µH	10%	r.f. choke	N5	LM56
L23	25µH	10%	r.f. choke	M5	L6
L24	25µH	10%	r.f. choke	N5	G78
L25	25µH	10%	r.f. choke	M5	D78
L26			goalpost inductor	G2	EFG6
TR1			coupling trans	D2	J5
TR2			microphone trans	J3	E5
TR3			output trans	L5	E4
RELAYS AND SWITCHES					
RLA			relay, magnetic, min, sealed, HS, SM8-1	L34	C4
SWB1			calibration switch	N4	
SWB2			calibration switch	D1	
SW3-1			on/off, DPDT switch	K2	
SW3-2			on/off, DPDT switch	K1	
LAMPS					
LP1	3.5V	0.15A	dial calibration light	M4	
PLUGS AND SOCKETS					
PL1			plug, 7-pole, fxd, polarised	L12	KL8
PL2			plug, r.f. sealed	A1	JK2
SK1			socket, 6-pt, No 17	L23	D2
SK2/1			Valveholder, international octal	G34	M67
SK2/2				H7	M67
SK2/3				J7	M67
SK2/4				C3	M67
SK2/5				B3	M67
SK2/6				A6	M67
SK2/7				K7	M67
SK2/8				B3	M67
CRYSTALS					
XL1	4.3Mc/s	0.01%	Osc, quartz, 4.3 Mc/s, No 2	D3	
XL2	6.815Mc/s	0.01%	Osc, quartz, 6.815 Mc/s, No 1	G6	

Table 2001 - (contd)

Circuit reference	Value	Tolerance and rating	Type	Location	
				Circuit Fig 2003	Layout Fig 2005
VALVES					
V1			CV 807	B23	K3
V2			CV 807	C23	H3
V3			CV 785	DE23	HJ6
V4			CV 785	FG23	F6
V5			CV 1758	H23	E6
V6			CV 785	B6	M3
V7			CV 1758	C6	JK6
V8			CV 785	D6	M6
V9			CV 785	E6	L78
V10			CV 782	F6	J78
V11			CV 785	G6	FG78
V12			CV 1758	H6	DE78
V13			CV 1758	J6	BC78
V14			CV 753	KL6	CD67
V15			CV 784	L5	CD56

Table 2002 - Overall check of sender

Test conditions

(i) The set correctly loaded with either the 1/4 wave whip aerial or the Wattmeter, absorption, HF, No 2 via the 52Ω termination and the co-axial socket on the front panel of the set.
(ii) All measurements taken with a Voltmeter, valve, No 3 between the pin indicated and earth.
(iii) All measurements taken with the set transmitting at 44Mc/s.

Meter socket (SK2) voltages

Pin No	Voltage	Remarks
1	-2.5V min	M.O. grid
2	-8V min	1st limiter grid
3	-15V min	2nd limiter grid
4	-17V min	Oscillator grid
5	-10V min	P.A. grid
6	-20V min	R.F. grid
7	±0.4V max	Discriminator
8		Earth

Table 2003 - Schedule of test equipment for field and base repairs

Preferred instrument	Suitable alternative
Signal generator, No 12 (SSG 12)	Signal generator, No 1, Mk 3 (SSG 1)
Signal generator, No 13 (SSG 13)	
Wattmeter, absorption, AF, No 1 (Watt: AF 1)	Meters, output power, No 5 (Output meter)
Voltmeter, valve, No 3 (VV 3)	Voltmeter, valve, No 2 (VV 2) See Tels F 384, para 7, Ser Nos 1,5,6,7, para 8, Ser Nos 1 and 2, para 9, Ser No 2 and Tels F 382, table 2002 Test set, deviation, FM, No 1A Instrument, testing, electronic, multi-range, No 1 Balanced valve voltmeter (see Note) (See Tels F 384, para 7, Ser Nos 2,3,8 and para 8, Ser Nos 3 and 4)
Test set, deviation, FM, No 2 (Deviation meter)	Test set, deviation, FM, No 1A (Deviation meter)
Oscillator, beat frequency, No 8 (BFO)	Oscillator, beat frequency, No 5 or 7 (BFO)
Wattmeter, absorption, HF, No 2 (Watt: HF 2)	Valve voltmeter across dummy load (See Tels F 384, para 9, Ser No 2)
Frequency meter, SCR 211 (SCR 211)	
Instrument, testing, avometer, universal, 46-range, Mk 1 or 50-range (Avometer)	
Stabilised power unit (SPU) (See Tels F 364 para 58)	
Testers, valve, avo, CT 160 (Valve tester)	Tester, valve avo, No 1, Mk 1 and 2 Tester, valve, avo, No 3

Note: If a suitable alternative is not available, a centre-zero balanced valve voltmeter must be made up locally. (See Tels F 364 para 57)

Table 2004 - Valve testing data

Inter-Service type	Commercial equivalent	Tester	Selector switch setting	V_f	Neg. Grid Volts	Anode Volts	Screen Volts	gm mA/V	I_a mA
CV 807	3A4	a b	365426300 365426300	1.4 1.4	8.4	150 100	90 75	1.9 1.9	13.3
CV 785	1T4	a b	265024300 265024300	1.4 1.4	-	90 80	75 75	0.9 0.9	3.5
CV 1758	1L4	a b	265024300 265024300	1.4 1.4	-	90 80	75 75	0.925 0.9	2.9
CV 782	1R5	a b	266424300 266424300	1.4 1.4	4	75 80	-	1.2 1.4	4.5
CV 753	1A3	a b	2810*8300 281008300	1.4 1.4		 D			
CV 784	1S5	a b	208564300 208564300	1.4 1.4	-	75 80	75 75	0.625 0.625	1.6

Notes: 1. 'a' refers to Tester, valve, avo, CT 160 or Tester, valve, avo, No 3.
2. 'b' refers to Tester, valve, avo, No 1, Mk 1 or Mk 2.
3. '*' indicates that an unknown electrode may be connected to this pin internally. To obtain the complete selector switch coding, see 'Special procedure for valves having internally connected pins' on page 12 of the AVO valve data manual, Z4/ZD 00305.

Table 2005 - Specification tests

1. The conditions of test are as specified in Tels F 384.

Receiver

2. Quieting: The receiver input voltage should not exceed 5.5μV at any dial setting for 20dB noise quieting.

3. Bandwidth:

Input voltage (Control grid 1st mixer)	Pin 3 or SK2 (2nd limiter grid)	Frequency
Less than 30μV	-10V	F_0 (approx 4.3Mc/s)
+ 6dB	-10V	F_1
+ 6dB	-10V	F_2

Bandwidth = $(F_1 - F_0) + (F_0 - F_2)$ = More than 30kc/s

Table 2005 - Specification tests - (contd)

4. Automatic frequency control:

Signal frequency	Detune set by	Noise quieting
40.2Mc/s	-	20dB
40.2Mc/s	+ 35kc/s	Not less than 10dB
40.2Mc/s	- 35kc/s	Not less than 10dB

Receiver h.t. 78V

5. Audio characteristics :

Input voltage	Input frequency	Power output
3.0V	500c/s - 2,500c/s	Not less than 2mW
3.0V	2,500c/s - 8,000c/s	Should fall by a ratio of at least 6dB

Sender

6. The r.f. output must be not less than 0.3W for any dial setting.

7. Deviation:

Microphone input		Signal frequency	Deviation
Volts	Frequency		
0.2V	1,000c/s	44.0Mc/s	±10kc/s

Table 2006 - Incorrectly marked sub-assemblies and their correct circuit reference

Incorrectly marked sub-assembly and component	Correct circuit reference	Grid reference	
		Fig 2003	Fig 2005
L5 - 1	L7	C5	
L5 - 2	L8	D5	
L5 - 3	L9	E5	
L6 - 1	L10	F5	
L6 - 2	L11	G5	
L6 - 3	L12	H5	
L7	L13	J5	
L8	L14	K56	
T1	TR1	D2	J5
T2	L4/L5	G23	G6
T3A/T3B	TR2/TR3	J3/L45	E5/E4
L4	L6	AB5	L5

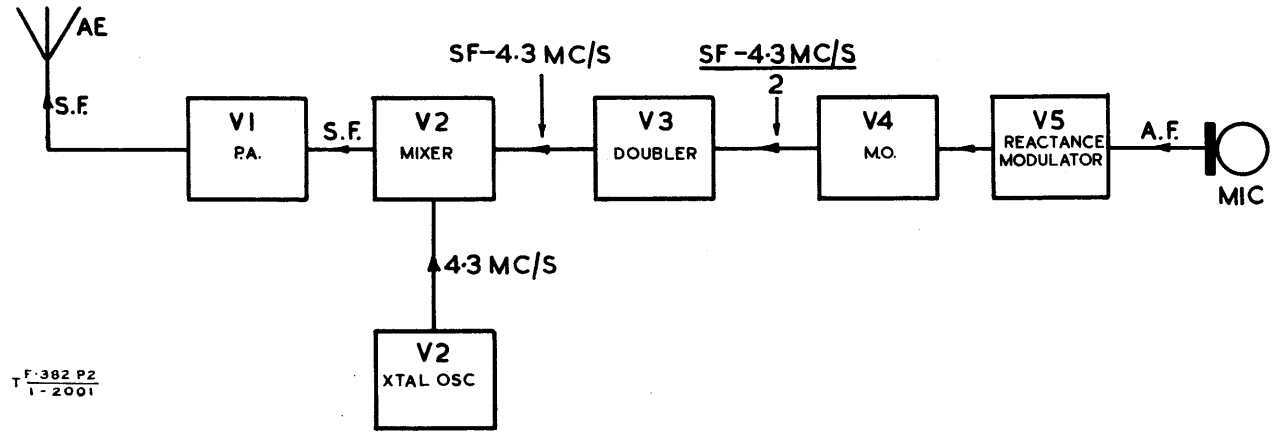


Fig 2001 - Sender block diagram

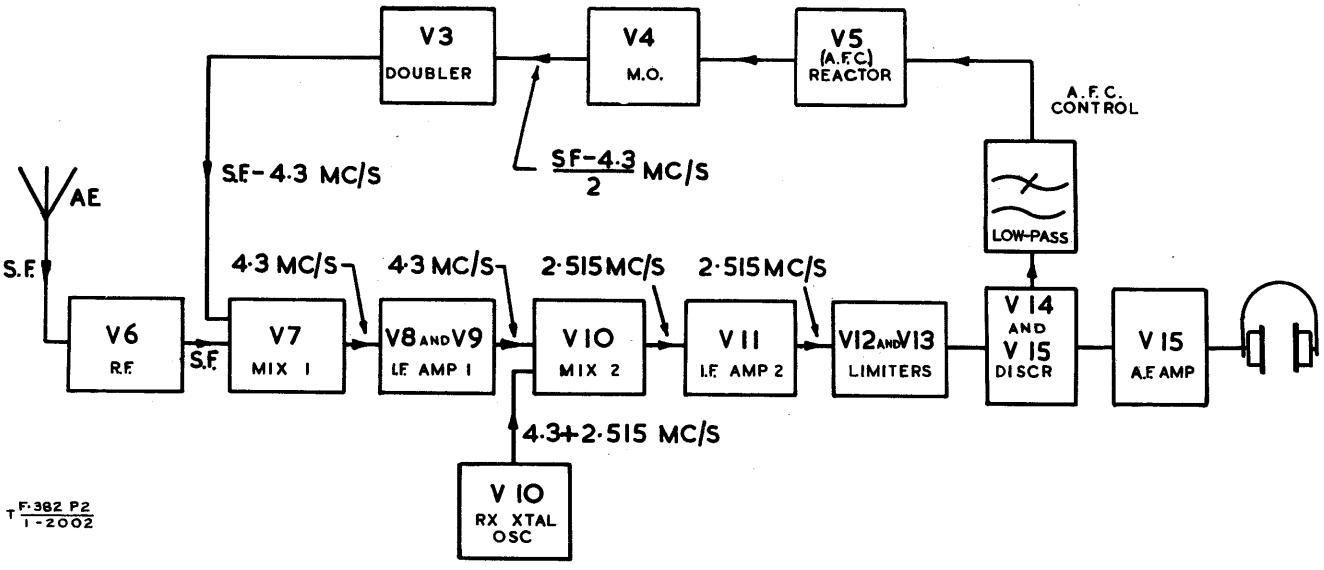


Fig 2002 - Receiver block diagram

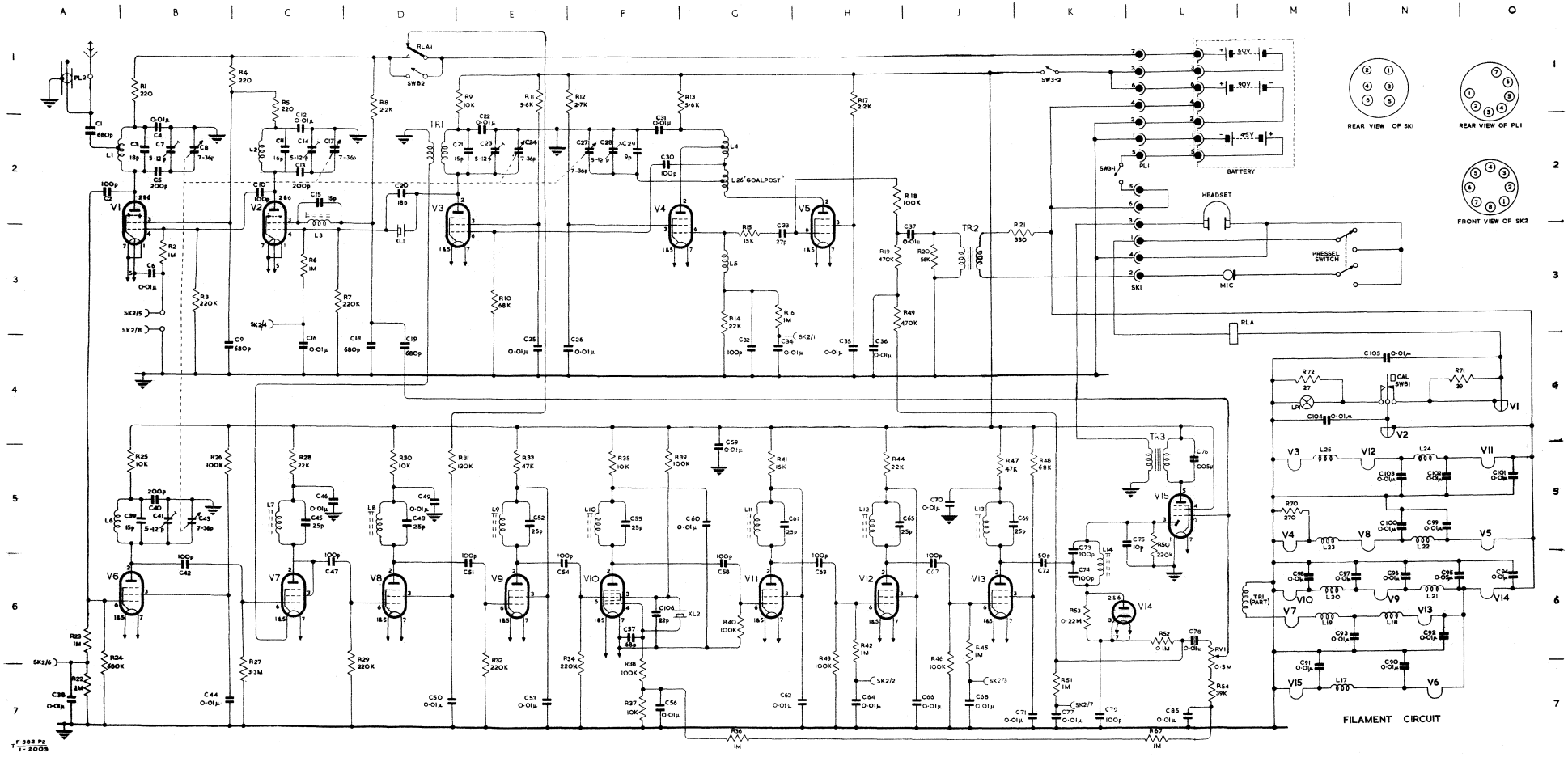


Fig 2003 - Circuit diagram

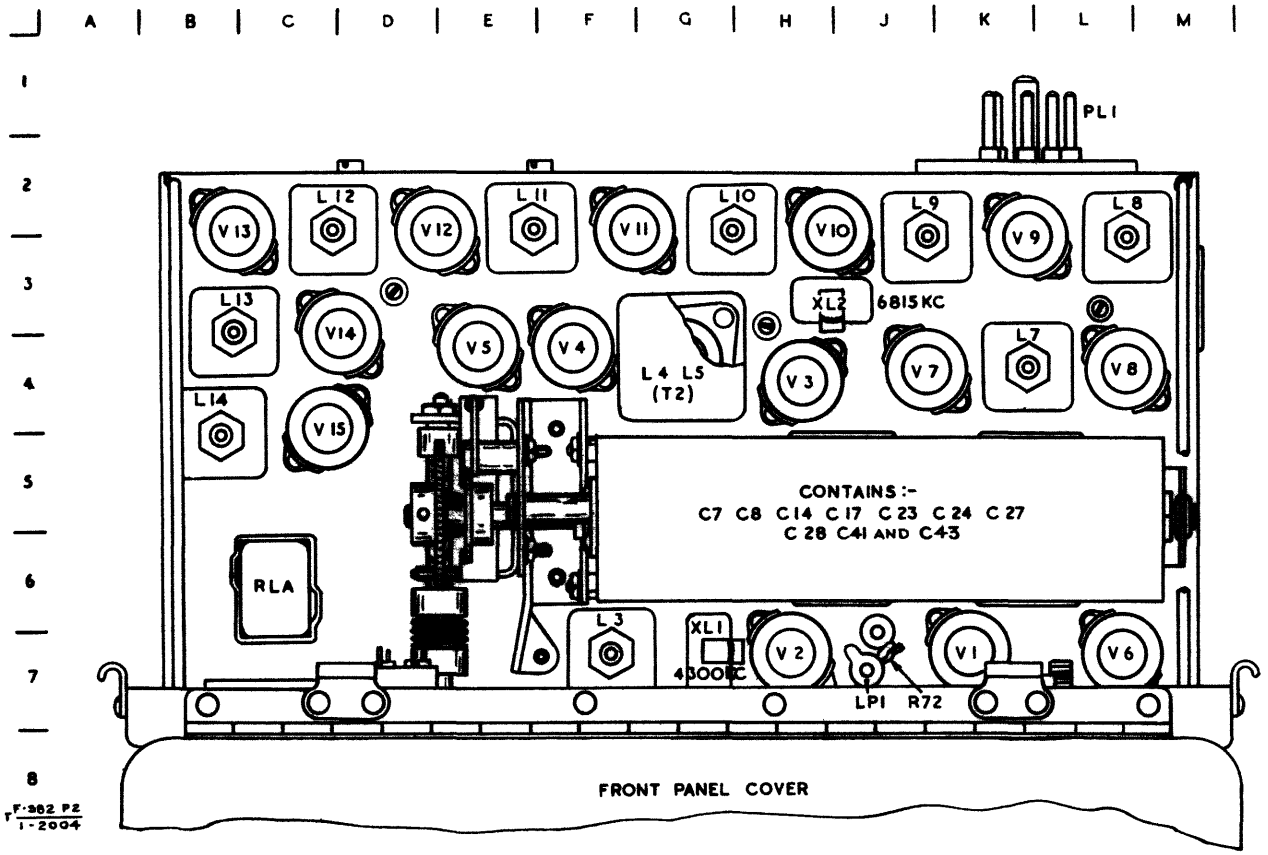
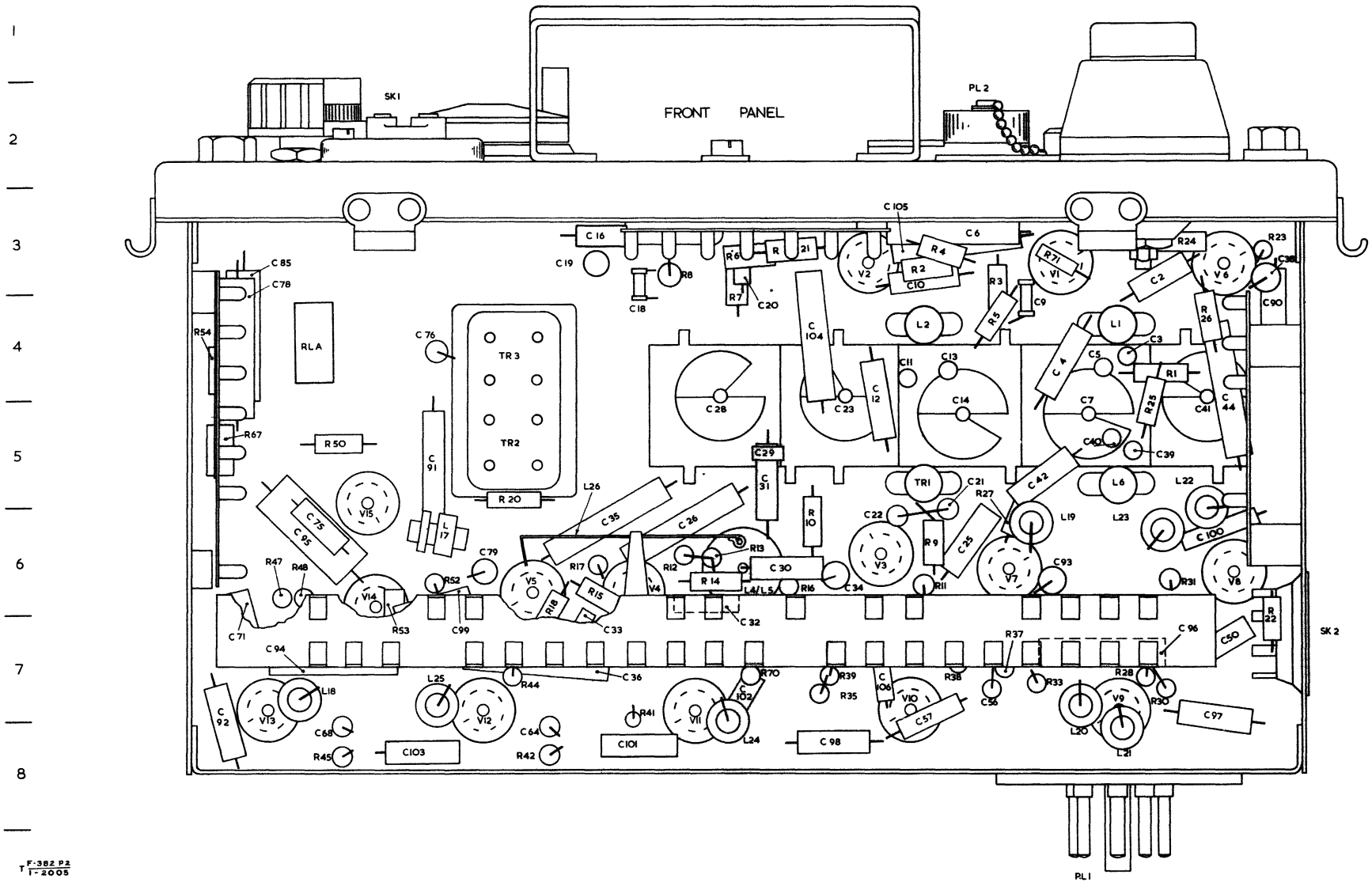


Fig 2004 - Chassis layout - top view



T F-382 P2 I-2005

Fig 2005 - Chassis layout - underside view

END