

PART 3
FAULT DIAGNOSIS

PART.
3

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(5) Set the OFF-ON-NB-CAL switch to ON and connect J16 (PTT) to ground to key the transmitter.

(6) Using a high impedance electronic multimeter, or calibrated oscilloscope, measure the signals appearing at the points listed in Table 1 for the BAND switch settings detailed. It will be necessary in the case of the measurements at V6 pin 3 to obtain peak meter reading by adjustment of the EXCITER TUNING control.

(7) Connect an r.f. signal generator to the points listed in Table 2 and at the frequencies and BAND switch settings detailed, determine the minimum signal generator output (as measured on a suitable high impedance electronic multimeter) necessary to obtain the grid current threshold condition, i.e. when the meter on the KWM-2A front panel just begins to indicate grid current. It will be necessary in each case to peak the grid current with the EXCITER TUNING control and then re-adjust the signal generator output for the threshold condition.

(8) Disconnect the signal generator and remove the ground connection to J16.

(9) Set the EMISSION switch to TUNE and with the BAND switch in any position adjust the MIC GAIN control for grid current threshold. Ensure that the EXCITER TUNING control has been adjusted correctly to peak the grid current.

(10) Using a high impedance electronic multimeter, or calibrated oscilloscope, measure the signal amplitude at the points listed in Table 3.

(11) Set the EMISSION switch to USB and connect an a.f. signal generator, set to a frequency of 1500 c/s, to J11 (PHONE PATCH) via a 40dB pad.

(12) Turn the MIC GAIN and VOX GAIN controls fully clockwise and with the BAND switch in any position, adjust the signal generator output for grid current threshold. As previously, ensure that the EXCITER TUNING control has been adjusted correctly to peak the grid current.

(13) Using a high impedance electronic multimeter, or calibrated oscilloscope, measure the signal at V1 pin 9. This should be $35\text{mV} \pm 20\%$.

TABLE 1
Transceiver KWM-2A: transmitter oscillator outputs

Monitoring point	BAND switch position	Voltage	
		Minimum	Maximum
V6 pin 3	3.6	1.0V	1.8V
	7.0	1.0V	1.4V
	14.0	1.0V	1.4V
	21.2	1.0V	1.4V
	28A	1.0V	1.4V
V5 pin 2	Any	1.0V	1.4V
V5 pin 7	Any	1.0V	1.4V
R15 wiper	Any	1.0V	1.4V

TABLE 2
Transceiver KWM-2A: transmitter signal levels

Signal generator connection point	BAND switch position	Signal generator frequency	Signal generator output voltage	Tolerance
V8 pin 2	3.8	3.9 Mc/s	500mV	$\pm 20\%$
	7.2	7.3 Mc/s	410mV	$\pm 20\%$
	14.2	14.3 Mc/s	500mV	$\pm 20\%$
	21.4	21.5 Mc/s	200mV	$\pm 20\%$
	28A	28.6 Mc/s	750mV	$\pm 20\%$
V7 pin 1	3.8	3.9 Mc/s	40mV	$\pm 20\%$
	7.2	7.3 Mc/s	22mV	$\pm 20\%$
	14.2	14.3 Mc/s	43mV	$\pm 20\%$
	21.4	21.5 Mc/s	30mV	$\pm 20\%$
	28A	28.6 Mc/s	32mV	$\pm 20\%$
V6 pin 2	14.2	3.055 Mc/s	32mV	$\pm 20\%$
V5 pin 2	14.2	3.055 Mc/s	62mV	$\pm 20\%$
V4 pin 6	14.2	455 kc/s	12mV	$\pm 20\%$

TABLE 3
Transceiver KWM-2A: microphone amplifier and tone oscillator signal levels

Monitoring point	Voltage	Tolerance
V3 pin 7	14mV	$\pm 20\%$
V3 pin 9	60mV	$\pm 20\%$
V11 pin 9	2.8V	$\pm 20\%$

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Receiver signal tracing

5. The method employed for signal tracing in the receiver channel is similar to that described in para. 4 in that the outputs of the three principal oscillators are first checked, then signals are injected at various points in the circuit and the minimum signal required to produce a change in the a.v.c. level is measured. The procedure is as follows:—

- (1) Ensure that the OFF-ON-NB-CAL switch is set to OFF.
- (2) Remove the KWM-2A from its cabinet (Part 2, Chap. 1). ▶
- (3) Set the BAND switch to 14·0, the tuning dial to 100, the EMISSION switch to USB, the R.F. GAIN control fully clockwise and the OFF-ON-NB-CAL switch to ON.
- (4) Using a high impedance electronic multimeter, or calibrated oscilloscope, measure the

signals appearing at the points listed in Table 4. (5) Connect the electronic multimeter between the a.v.c. line (negative) and ground. A small negative voltage, its amplitude adjustable by means of the R.F. GAIN control, should be obtained on this line.

(6) Connect an r.f. signal generator to the points listed in Table 5 and at the frequencies specified determine the minimum signal generator output (as measured on a suitable high impedance electronic multimeter) necessary to obtain the a.v.c. threshold condition, i.e. the point at which the a.v.c. signal just changes with increased signal level. In the case of the 14·1 Mc/s signal inputs it will be necessary to peak the a.v.c. signal with the EXCITER TUNING control and then re-adjust the signal generator output for the threshold condition.

TABLE 4
Transceiver KWM-2A: receiver oscillator outputs

Monitoring point	Voltage	Tolerance
V13 pin 8	2·4V	±25%
V17 pin 9	0·6V	±20%
V15 pin 9	1·4V	±20%

TABLE 5
Transceiver KWM-2A: receiver signal levels

Signal generator connection point	Signal generator frequency	Signal generator output voltage	Tolerance
V15 pin 8	455 kc/s	1·1V	±20%
V3 pin 6	455 kc/s	8mV	±20%
V1 pin 6	455 kc/s	220µV	±20%
V17 pin 8	3·055 Mc/s	180µV	±20%
V13 pin 9	14·1 Mc/s	55µV	±20%
V7 pin 1	14·1 Mc/s	6·5µV	±20%
J1 (RF OUT)	14·1 Mc/s	2·3µV	±20%

Voltage and resistance measurements

6. Table 6 lists voltage and resistance measurements for all valves in the KWM-2A except those on the sub-assembly noise blanker 136B-2 (para. 7) and V301 on the variable frequency oscillator 70K-2. It is inadvisable to attempt to open the screening can on the 70K-2 sub-assembly. Measurements were made under the following conditions unless otherwise stated.

(1) All voltage measurements were made with an electronic multimeter connected between the valve pin and ground with the valves in their sockets.

(2) All resistance measurements were made between the valve pin and ground with the a.c. power supply PM-2 disconnected from J13.

(3) EMISSION switch set to USB.

(4) BAND switch set to 14·2 and tuning dial to 100.

(5) R.F. GAIN turned fully clockwise.

(6) A.F. GAIN turned fully counter-clockwise.

(7) MIC GAIN turned fully counter-clockwise, but not so far as to open S10.

(8) OFF-ON-NB-CAL switch set to ON.

(9) All voltages on the transmitter valves were measured with J16 (PTT) connected to ground.

(10) Where two voltages are given for the same valve pin the first is for the receive function and the second for transmit.

(11) Resistance measurements of less than 1 ohm are listed as zero.

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TABLE 6

Transceiver KWM-2A: voltage and resistance measurements

Valve		Pin number									top cap
		1	2	3	4	5	6	7	8	9	
V1	d.c.V	270/1.5	200/1.4	4.2	0	0	-1.4/-18	0.45	43	-0.3	
	a.c.V				6.3	0					
	ohms	9K	34K	10-1K	0	0	3.5M	180	80K	1M	
V2	d.c.V	270/245	0..	130*	0	0	140*	4.2*	125/105	125/105	
	a.c.V		6.5*		6.3	0					
	ohms	9K	650K	110K	0	0	58K	inf/1K*	6.5K	52K	
V3	d.c.V	230/1.5	145/1.4	0.5/0	0	0	-1.4/-18	5.8/7.4	0/190	0	
	a.c.V				6.3	0					
	ohms	14K	45K	47	0	0	3.9M	1K	20K/27K**	0-250K	
V4	d.c.V	0/260	0/95	0.1/0.66	0	0	-1	18/0	270/90	-0.1	
	a.c.V				6.3	0					
	ohms	26K	23K	54-94	0	0	1.5M	2K	21K	inf	
V5	d.c.V	270/250	-64/0	0/2.1	0	0	270/250	-64/0	0/2.1	0	
	a.c.V				0	0				6.3	
	ohms	9K	480K	245	0	0	9K	480K	245	0	
V6	d.c.V	0.3/220	0	0/1.9	0	0	0.3/220	0	0/1.9	0	
	a.c.V				6.3	6.3				0	
	ohms	28K	100K	220	0	0	28K	100K	220	0	
V7	d.c.V	-1.5	0	0	0	230/215	95/90	0			
	a.c.V			6.3	0						
	ohms	2.5M	0	0	0	10K	27K	0			
V8	d.c.V	0/4	-64/0	0.3/155	0	0	270/260	0	0.3/155	-64/0	
	a.c.V				0	6.3					
	ohms	150	30K	50K	0	0	8.3K	0	50K	30K	
V9	d.c.V	0/0.1	0	0/240	0/0.1	-64	0/0.1	0	0	800/700	
	a.c.V		0					6.3			
	ohms	2	0	11K	2	40K	2	0	0	inf	
V10	d.c.V	0/0.1	0	0/240	0/0.1	-64	0/0.1	0	0	800/700	
	a.c.V		0					6.3			
	ohms	2	0	11K	2	40K	2	2	0	inf	
V11	d.c.V	96/86	-11	84	0	0	195/185	0	2	0	
	a.c.V				6.3	0					
	ohms	600K	1M	230K	0	0	17K	0	1K	470K	
V12	d.c.V	260/1.5	0	270/1.5	0	0	270/1.5	15/0.1	122/0.4	120/1.6	
	a.c.V				6.3	0					
	ohms	6K	1M	120K	0	0	240K	1M/inf**	6.8K	55K	
V13	d.c.V	155/1.5	-11	185	0	0	275/260	0	1.8/0	0	
	a.c.V				6.3	0					
	ohms	15K	1M	51K	0	0	7K	0	150	100K	
V14	d.c.V	-0.5	0	1.2	0	0	0	96/88	0	0.6	
	a.c.V				6.3	0					
	ohms	inf.	0-500K	inf.	0	0	270K	120K	0-250K	330	
V15	d.c.V	-1.8/-19	2.7	2.7	0	0	-1.8/-19	130/180	0/-64	1.5/0	
	a.c.V				6.3	0					
	ohms	2.2M	5.6K	5.6K	0	0	2.2M	43K	1M	820	

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Valve		Pin number									top cap
		1	2	3	4	5	6	7	8	9	
V16	d.c.V	3	1.7	78/82	0	0	2.1	0	130/120	182/196	
	a.c.V				6.3	0					
	ohms	5.6K	2.3M	270K	0	0	68	470	22K	8K	
V17	d.c.V	0	1.7/1.5	0	0	0	-1.3	275/1.5	0/-64	3.8/0.2	
	a.c.V				0	6.3					
	ohms	inf.	1.5K	inf.	0	0	2.3M	8.5K	100K	1K	

** Dependent on polarity of ohm-meter

* EMISSION switch in TUNE position

Note . . .

The measurements given in Table 6 are approximate only, a tolerance of $\pm 20\%$ can be assumed.

NOISE BLANKER 136B-2

Voltage and resistance measurements

7. Table 7 lists voltage and resistance measurements for the four valves in the noise blanker 136B-2. Measurements were made under the following conditions:—

(1) All voltage measurements were made with an electronic multimeter connected between the valve pin and ground with the valves in their sockets.

(2) P24 on the 136B-2 connected to J24 on the KWM-2A.

(3) All resistance measurements were made between the valve pin and ground with the a.c. power supply PM-2 disconnected from J13 on the KWM-2A.

(4) OFF-ON-NB-CAL switch set to NB.

(5) Resistance measurements of less than 1 ohm are listed as zero.

(6) Double values of resistance on certain valve pins are caused by semiconductor diodes in the circuit and the polarity of the ohm-meter used.

TABLE 7
Noise blanker 136B-2: voltage and resistance measurements

Valve		Pin number								
		1	2	3	4	5	6	7	8	9
V1	d.c.V	100	0	110	0	0	195	2.2	2.6	0
	a.c.V				0	6.3				
	ohms	50K	0	110K	0	0	30K	470	470	1M
V2	d.c.V	135	0	110-210*	0	0	205	2.2-15*	4.5	0
	a.c.V				6.3	0				
	ohms	45K/70K	4.7K	105K	0	0	25K	500-35K*	3K	5/250K
V3	d.c.V	40	0	115	0	0	220	2.6	0	0
	a.c.V				0	6.3				
	ohms	60K	10K	100K	0	0	25K	5/470	0	15K/11K
V4	d.c.V	135	0	130	0	0	225	3	14	11
	a.c.V				6.3	0				
	ohms	45K	0	90K	0	0	25K	470	3.3K	100K

* Dependent on the setting of the noise blanker gain control

Note . . .

The measurements given in the above table are approximate only; a tolerance of $\pm 20\%$ can be assumed.

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R.F. LINEAR AMPLIFIER 30L-1

8. Table 8 shows the normal and full scale meter readings for the front panel meter on the 30L-1.

TABLE 8
R.F. linear amplifier 30L-1 : meter readings

Meter switch position	Full scale indication	Normal indication
TUNE	—	Zero when 30L-1 is correctly tuned and loaded.
D.C. VOLTS	2000V	1800V - no modulation. 1600V - at rated load.
D.C. AMPS	1000mA	600mA - key down c.w. 300-350mA - s.s.b. voice peaks. 110mA - keyed, no excitation.

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