Service Manual for

KR028
KR029 Chieftain de Luxe

& RR229 Rapier

FOOTSCRAY, SIDCUP, KENT
01-300 7733

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East Kilbride 25101

ITT KB

Service Manual for KR028 KR029 & RR229

		KR028	KR029 & RR229
Dimensions:	Height:	7″	7″
	Width:	12⅝″	12⅝″
	Depth:	2¾″	3¼″

Weight: 4 lb. 8½ oz. inc. battery

Power Output: 850 mW at 10% distortion

Power Supply: 9 volt battery type PP9 or VT9

Power Consumption:

Quiescent:	19 mA
50 mW:	55 mA
600 mW:	140 mA

Battery Life: 350 hrs. approx

Wavebands:

M.W.	540–1620 KHz.	555–185 Metres
B.S.	1150–1500 KHz.	200–260 Metres
L.W.	150– 250 KHz.	1200–2000 Metres

Loudspeaker: 7″ x 3⅝″ 8 Ω. 8000 Gauss

Transistor Complement:

TXml	AF117	Mixer Oscillator
TXk1	AF117	I.F. Amplifier
TXk2	OC70	Detector
TXa1	AC127	Pre-Driver
TXa2	AC128	Driver
TXa3	AC128—	Push Pull Output
TXa4	AC127—	

Diode Complement: Dk1 CG64H I.F. Overload Protection

Controls:

KR028

Push Buttons — Volume. Tuning. M.W. B.S. L.W. Tone. Car/Portable. On/Off.

KR029, RR229

Push Buttons — Volume–On/Off. Tuning. M.W. B/S. L.W.

ISSUED OCTOBER 1968

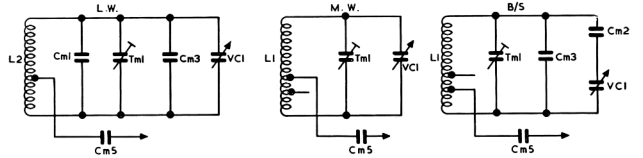
CIRCUIT DESCRIPTION

KR028

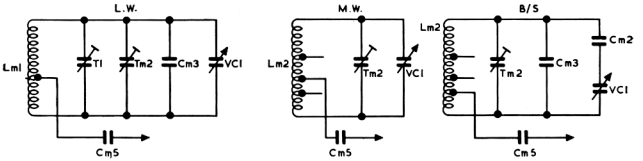
This receiver has two sets of aerial coils, one set for operation as a portable, the other set for operation as a car radio. When operated as a portable, signals developed in the ferrite rod aerial coils L1 and L2 are fed via Cm5 to the base of the mixer oscillator transistor TXm1. When the receiver is operated as a car radio the signals from the car aerial are fed via Lm3 to the tuned aerial circuit of which VC1, Lm1 and Lm2 form a part. The signal are again fed via Cm5 to TXm1. Trimmer T1 on the cabinet is adjusted by the customer to compensate for the detuning effect on Lm1 of the inherent capacity of the car aerial feeder cable.

KR029, RR229

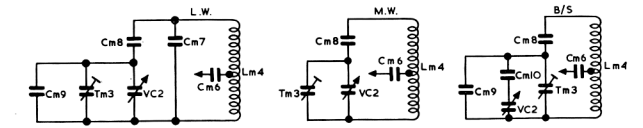
When operated as a portable signals developed in the ferrite rod aerial coils L1 and L2 are fed via Cm5 to the base of the mixer oscillator transistor TXm1. When operated as a car radio signals from the car aerial are fed direct to TXm1 via Rm1 and Cm5.



Aerial Circuits for Portable Operation



Aerial Circuits for Car Operation (KRO28 only)



Oscillator Circuits

In the collector of TXm1 is the primary of a double tune d.f. transformer Lk1 Lk2, protected against i.f. overloading by Dk1. The output from Lk2, which is capacitively coupled to Lk1 is fed to the base of TXk1 which is operated as an i.f. amplifier; the output being connected to the base of TXk2. TXk2 functions as a detector amplifier. When a signal is detected and amplified a d.c. component is produced, which causes the d.c. voltage on the collector to vary with signal strength. This variation in collector voltage is fed via Rk3 to TXk1 to provide a.g.c.

The audio signal developed across Rk13 is fed via the volume control R1 to a four transistor directly coupled audio amplifier. Automatic bias stabilization is provided by returning the emitter resistor Ra7 of TXa1 to the junction of Ra13, and the Ra14, conditions of bias being set by Ra4 and Ra11. Negative feedback is applied to TXa1 and TXa2, by Ra3 and Ca6 respectively.

ALIGNMENT INSTRUCTIONS

The following equipment will be required:—

1. A signal generator covering the range 150–1620 kHz. with 10 Ω output impedance.
2. Output power meter 8 Ω.
3. Shielded test coil (85 turns of enamel covered wire) on 2″ diameter former.
4. Oscilloscope.

AUDIO

1. Apply 1 kHz. audio signal from a generator via a 100K resistor to the volume control slider at maximum volume.
2. Adjust signal level to obtain 700 mW output, and together with the signal input, adjust Ra4 to produce an equally clipped response.

OR:

Ra4 may be adjusted by setting the d.c. voltage at the junction of the Ra13 and Ra14 to –5V (Avo model 8 on 10V. d.c. range).

3. Turn the volume control to minimum. Set Ra11 control fully anticlockwise. Connect milliammeter (to read quiescent current) in series with battery. Adjust Ra11 to increase the initial quiescent current by 4 mA. (Final quiescent current should be between 16 mA and 19 mA).

I.F. ALIGNMENT

1. Set the signal generator to 470 KHz. and inject the signal via a 0·1 μF. capacitor to the base of the mixer oscillator transistor TXm1 on the module RMM22 or RMM23. (A convenient means of connection is pin F5 on the LW push button.)
2. Set gang to minimum capacity.
3. Trim for maximum output by adjusting the i.f. coils in the following order:— Lk3, Lk2, Lk1 and then readjust if required. Maintain output at approximately 50 mW. by adjustment of signal generator.

R.F. ALIGNMENT

Connect the signal generator to the test coil. The test coil should then be positioned so that it is coaxially in line with, and its centre is 6½″ from, the m.w. end of the ferrite rod.

KR028

The following operations should be carried out in the order indicated (with the car button released), being repeated until maximum sensitivity is obtained.

	Frequency	*Gang Position*	*Wave Band Switch*	*Adjustments KR 028*
1	540 KHz.	Closed	M.W.	Set pointer to datum (the centre line of the pointer should be in line with the end of the scale window). Adjust oscillator coil Lm4 on RMM22 module for maximum output.
2	1620 KHz.	Open fully	M.W.	Adjust trimmer Tm3 for maximum output.
3	REPEAT OPERATIONS 1 AND 2 UNTIL BAND ENDS ARE SATISFACTORY			
4	600 KHz.	Max. signal	M.W.	Adjust M.W. aerial coil L1 on the ferrite rod for maximum output.
5	1450 KHz	Max. signal	B/S.	Adjust trimmer Tm1 for maximum output.
6	REPEAT OPERATIONS 4 AND 5 UNTIL MAXIMUM SENSITIVITY HAS BEEN OBTAINED			
7	225 KHz	Max. signal	L.W.	Adjust L.W. aerial coil L2 on the ferrite rod for maximum output.

Disconnect signal generator from test coil, then, with car button depressed:—

1.

a. Inject signal from generator via an 18 pF. capacitor to the car aerial socket.

b. Switch to L.W.

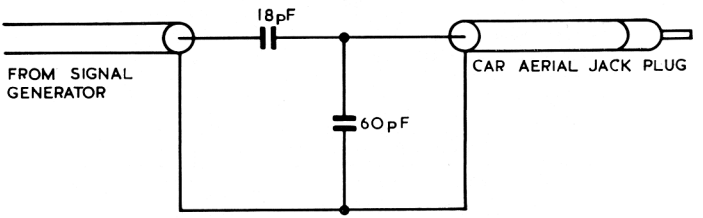
c. Screw trimmer T1 in tight but do not use excessive force.

d. Adjust screened aerial coil Lm1 for maximum sensitivity at 225 KHz.

2.

a. Inject signal from generator via a dummy aerial (as shown in Fig. 1) to the car aerial socket.

Fig 1.



b. Switch to M.W.

c. Set signal generator to 600 KHz.

d. Tune gang capacitor for maximum sensitivity.

e. Adjust screened aerial coil Lm2 for maximum sensitivity.

3.

a. Switch to B/S.

b. Set signal generator to 1450 KHz.

c. Tune gang capacitor for maximum sensitivity.

d. Adjust trimmer Tm2 for maximum sensitivity.

4. Repeat operations 2 and 3 until maximum sensitivity has been obtained.

Instructions for receiver alignment on a car aerial

Push the Car and LW buttons and tune to BBC Radio 2 on 1500 metres.

Collapse the car aerial until the output becomes small. Then tune T1 for maximum output.

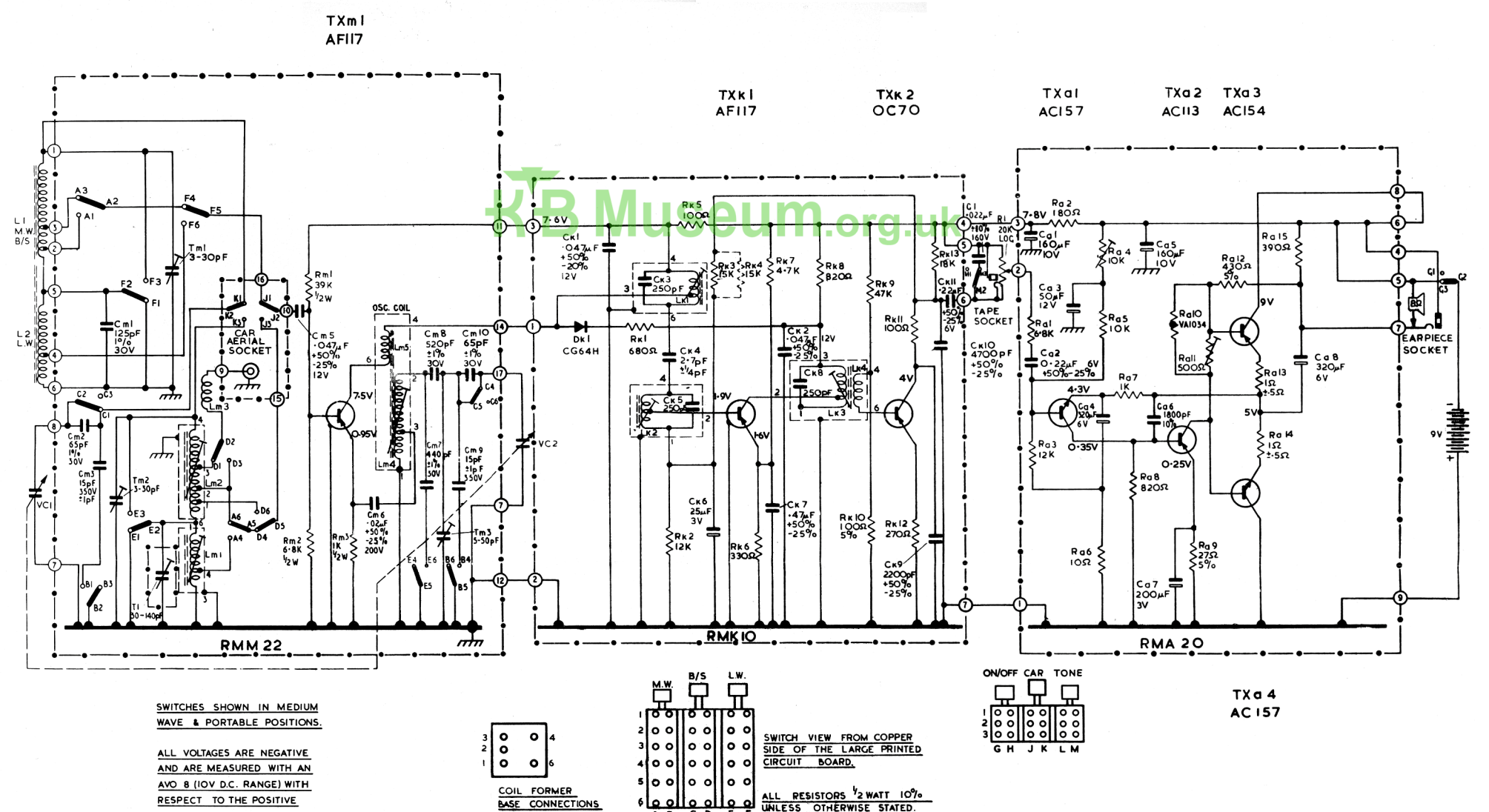
This alignment should be adequate for most cases, i.e. M.W. needs no re-aligning.

If an exceptionally long lead is used, say 10 feet and above, the M.W. can be re-aligned by tuning to a weak station around 200 metres and trimming Tm2 for maximum output.

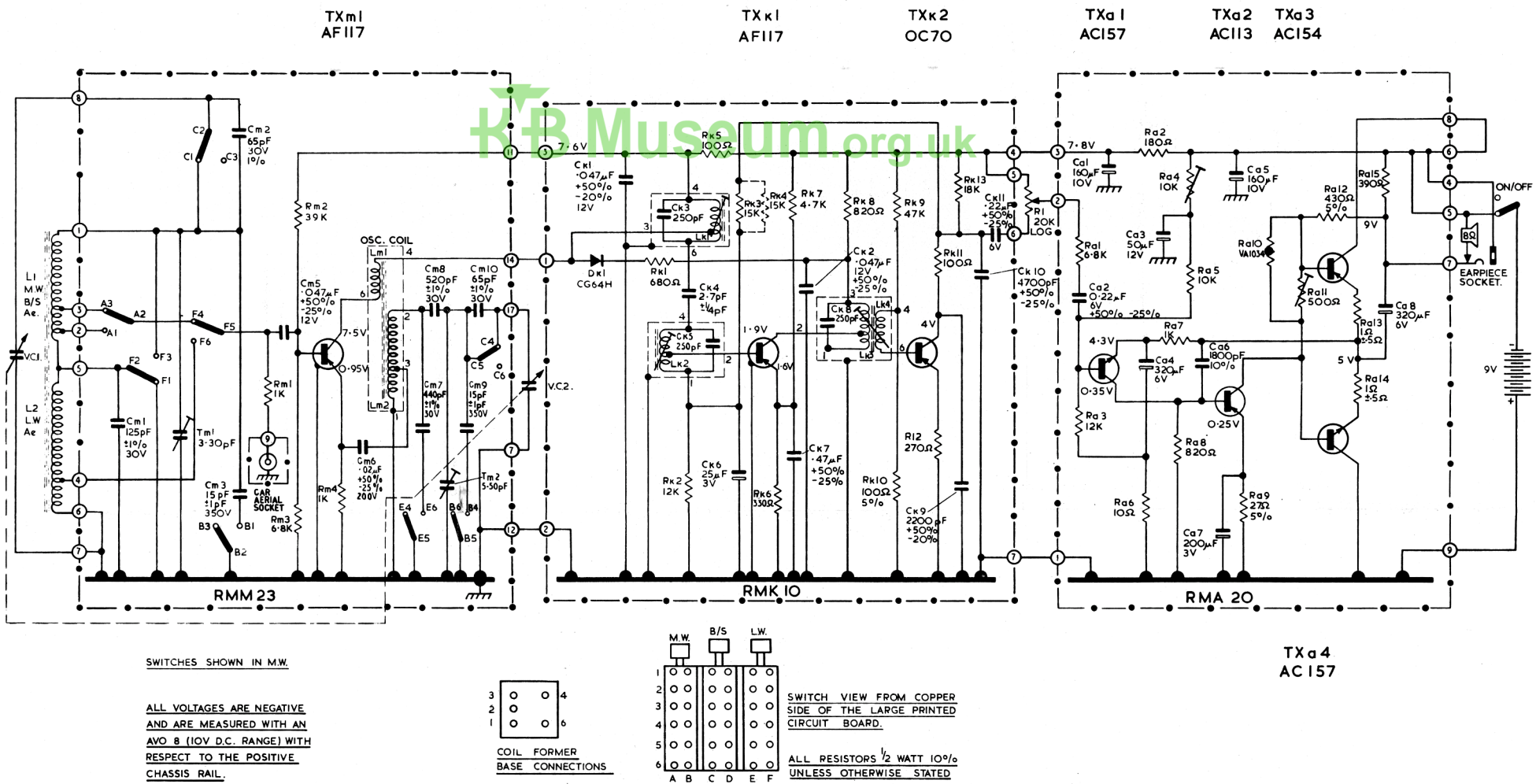
KR029 and RR229

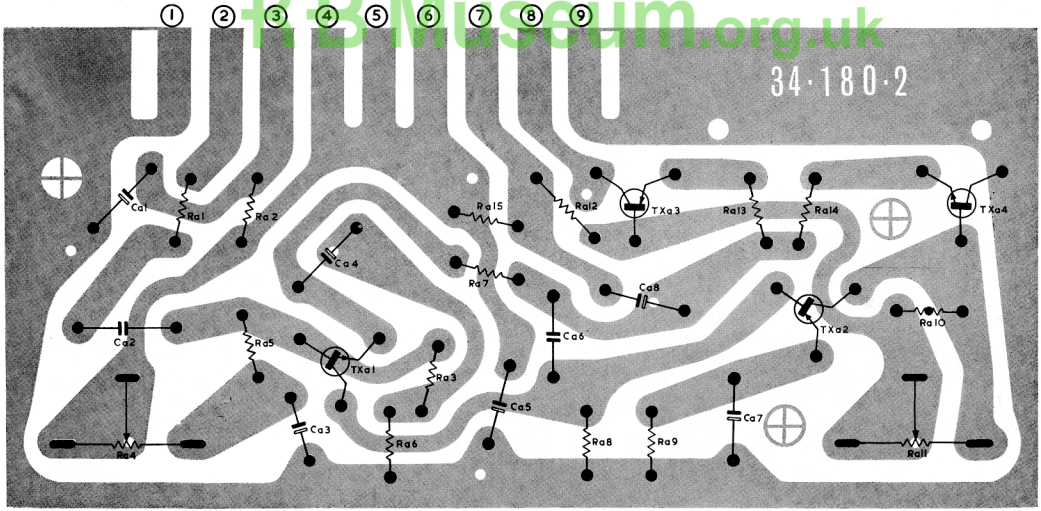
The following operations should be carried out in the order indicated, and can be repeated until maximum sensitivity is obtained.

	Frequency	*Gang Position*	*Wave Band Switch*	*Adjustments*
1	540 KHz.	Closed	M.W.	Set pointer to datum, (the centre line of the pointer should be in line with the end of the scale window). Adjust oscillator coil Lm2 on RMM23 module for maximum output.
2	1620 KHz.	Open fully	M.W.	Adjust trimmer Tm2 for maximum output.
3	REPEAT OPERATIONS 1 AND 2 UNTIL BAND ENDS ARE SATISFACTORY			
4	600 KHz.	Max. signal	M.W.	Adjust M.W. aerial coil L1 on ferrite rod.
5	1450 KHz.	Max. signal	B/S	Adjust trimmer Tm1 for maximum output.
6	REPEAT OPERATIONS 4 AND 5 UNTIL MAXIMUM SENSITIVITY HAS BEEN OBTAINED			
7	225 KHz.	Max. signal	L.W.	Adjust L.W. aerial coil L2 on the ferrite rod for maximum output.

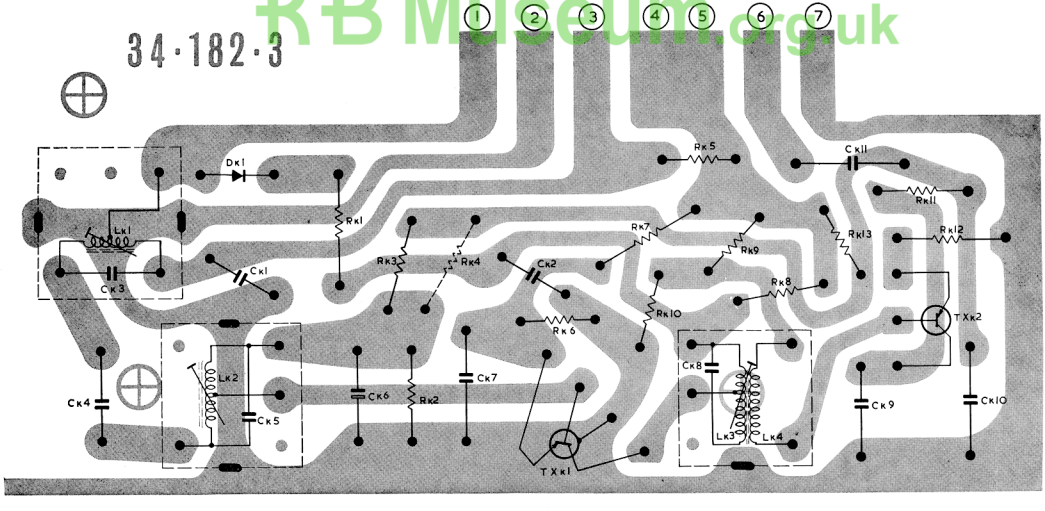


KR 028 CIRCUIT DIAGRAM

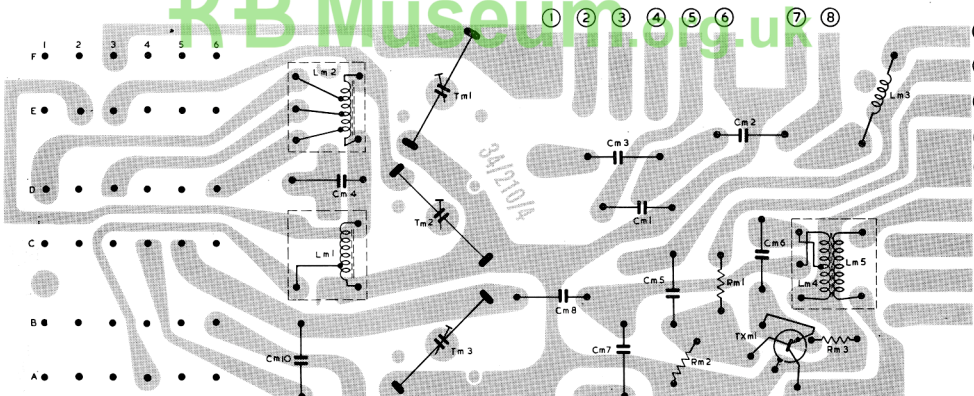

TXm1
AF117
TXk1
AF117
TXk2
OC70
TXa1
AC157
TXa2
AC113
TXa3
AC154
RMM 23
RMK 10
RMA 20
TXa4
AC157
SWITCHES SHOWN IN M.W.
ALL VOLTAGES ARE NEGATIVE AND ARE MEASURED WITH AN AVO 8 (10V D.C. RANGE) WITH RESPECT TO THE POSITIVE CHASSIS RAIL.
COIL FORMER BASE CONNECTIONS
M.W.
B/S
L.W.
SWITCH VIEW FROM COPPER SIDE OF THE LARGE PRINTED CIRCUIT BOARD.
ALL RESISTORS 1/2 WATT 10% UNLESS OTHERWISE STATED
KR 029 & RR 229 CIRCUIT DIAGRAM



A.F. Printed Circuit Schematic



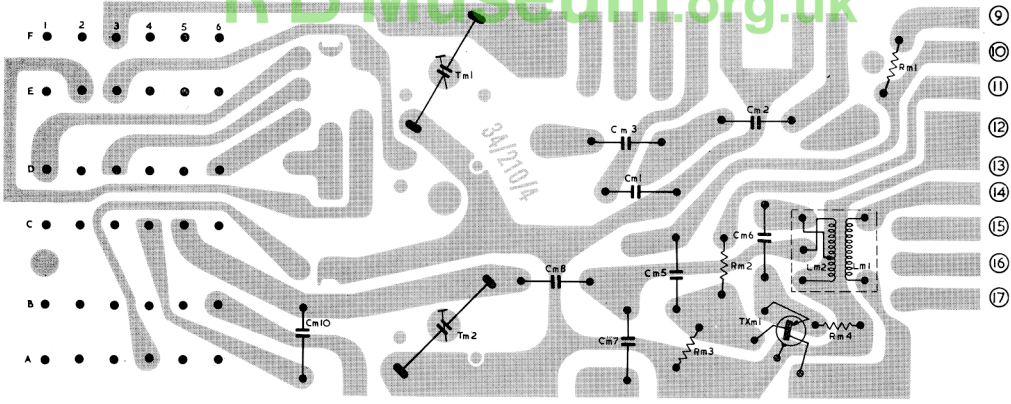
I.F. Printed Circuit Schematic



R.F. Printed Circuit Schematic

RMM22

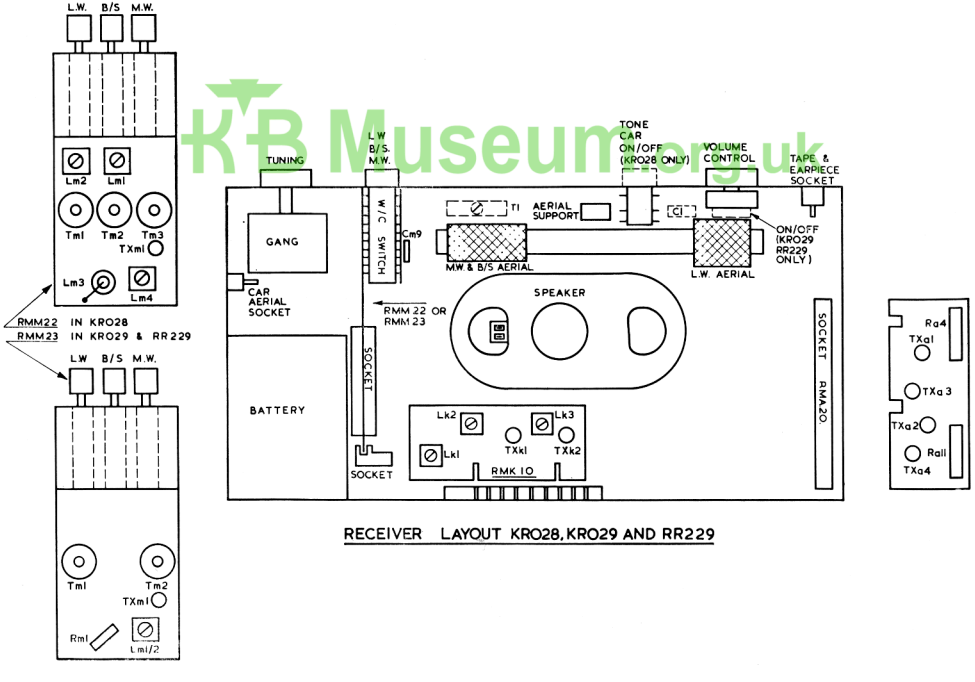
KRO28



R.F. Printed Circuit Schematic

RMM23

KRO29 RR229



RECEIVER LAYOUT KRO28, KRO29 AND RR229

COIL & TRANSFORMER DATA

Circuit KR028	*Ref:* KR029 RR229	*Description*	*Resistance in Ohms.*
Lm1		L.W. Aerial Coil (Car)	11.6 Ω
Lm2		M.W. Aerial Coil (Car)	2.8 Ω
L1	L1	M.W. Aerial Coil (Portable)	1.8 Ω
L2	L2	L.W. Aerial Coil (Portable)	7.8 Ω
Lm4	Lm2	Oscillator Coil	1.8 Ω
LK1	LK1	1st I.F. Transformer	5.5 Ω
LK2	LK2	2nd I.F. Transformer	5.5 Ω
LK3	LK3	3rd I.F. Primary (Pins 2 & 3)	3.7 Ω

ALL OTHERS LESS THAN 1 Ω

CORD DRIVE ASSEMBLY

1. Make up three cords as shown in Figure 2. The dimensions given are those when the cords are taut.

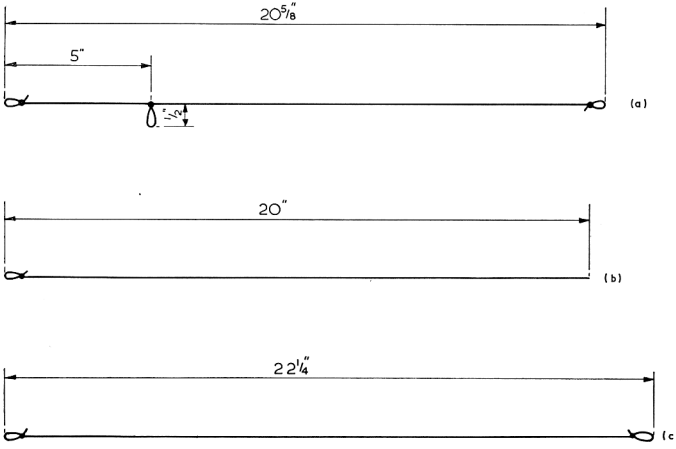


Fig. 2.

2. Close the tuning gang and adjust the drive drum to the position as shown in figure 3.

Note: In the following operations, care should be taken as to whether the drive cords pass round the pillars or the guides.

3. Fit cord (a) and then cord (b) as shown in Figure 3.

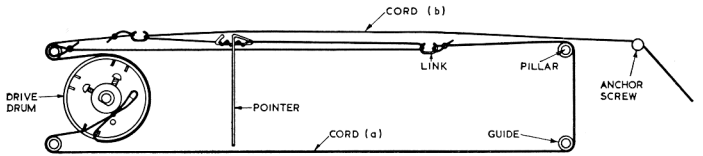


Fig. 3.

4. Fit the pointer as shown in Figure 3 so that it lines up with the low frequency end of the tuning scale, when the scale is temporarily placed in position.
5. Fit cord (c) in position, as shown in Figure 4, ensuring that the cord only passes over the pillars.

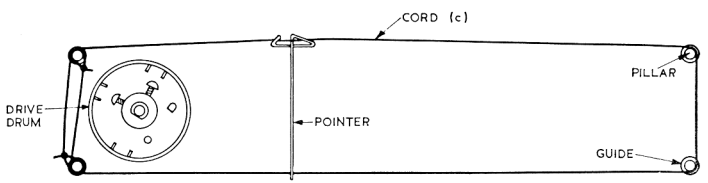
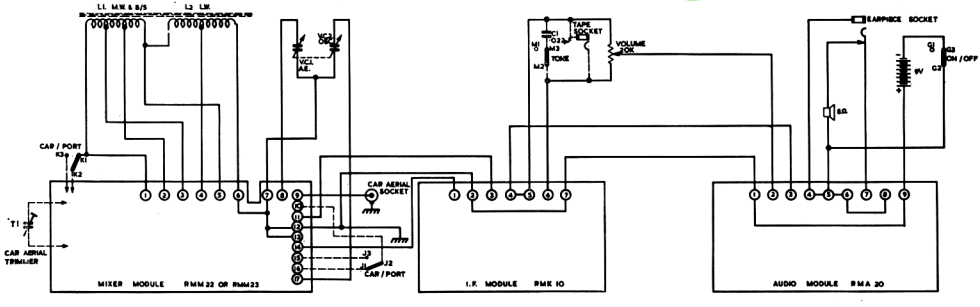


Fig. 4.

SPARE PARTS LIST

Description	KR028 Green	KR028 Grey	KR028 Red	KR028 Yellow	KR028 Blue	KR029 Black	RR229 Black
Cabinet Assembly	1493/3/21388	1493/3/A/21040	1493/3/B/21178	1493/3/C/21198	1493/3/D/21226	1494/3/21152	1347/3/21521
Handle	28/215/7/14005	28/215/14009	28/215/8/14028	28/215/8/14028	28/215/8/14028	28/215/8/14028	28/215/4/14017
Nameplate	21/185/13149	21/185/13149	21/185/13149	21/185/13149	21/185/13149	—	—
Trim (3 off 11½")	—	—	—	—	—	28/292/13013	28/292/13013
Front Grille	28/295/13147	28/295/13147	28/295/13147	28/295/13147	28/295/13147	28/297/13132	28/251/13313
Top Moulding Complete W/Scale	1493/13/21634	1493/13/21634	1493/13/21634	1493/13/21634	1493/13/21634	1494/13/21391	1550/13/21590



Interconnecting Wiring Diagram

SPARE PARTS LIST

DESCRIPTION	Part Number
COMMON CABINET ITEMS	
Handle Pivots	36/390/20433
Push-on Fix (Handle & LS)	4/227/20630
Knob Assembly (2 off)	1493/60/01222
Foot	28/12/0/21278
Back Retaining Screw	36/138/26207
Circlip for Back Retaining Screw	4/158/20007
Back-Fixing Spire Nut	4/8/20048
Car Aerial Socket	13/79/2/25200
Earpiece and Tape Socket (2 off)	13/435/1/25364
Push-on-Fix for Car Aerial, Earpiece and Tape Sockets	4/105/20986
Loudspeaker (7 x 3⅝" 8Ω)	11/184/03069
CHASSIS ITEMS	
Cord Pulleys, 4 off	42/28/18141
Shouldered Rivets, 4 off	25/82/20122
Scale Backing (White)	8/232/10/11038
Tuning Gang	38/109/18006
Gang Shield	34/225/4/25158
Drive Drum	42/29/18005
Volume Control (KR028)	9/367/3/02180
Volume Control with Switch (KR029, RR229)	9/341/02167
Pointer	33/552/11013
Link, 2 off (for Drive Cord)	33/482/23400
Drive Cord Eyelets	25/17/20392
Push Button Switch Assy. (Tone/Car/On-Off, KR028 only)	13/439/10037
Push on connector (for switches)	13/442/20488
Push Button Knobs, Black (KR028 5 off; KR029, RR229 3 off)	35/467/01043
Push Button Knob, Red (KR028 1 off)	35/467/1/01055
Ferrite Rod	43/61/06745
M.W. Aerial Coil	32/233/06022
L.W. Aerial Coil	32/234/06023
Rod Aerial Holder	35/441/15006
Trimmer, 30-140 pF.	38/112/18079
Duo Tyne Contacts	13/427/20497
Duo Tyne Housing, 2 way	13/430/2/25309
Duo Tyne Housing, 6 way	13/432/2/25264
Duo Tyne Housing, 9 way, 2 off	13/426/25189
Duo Tyne Housing, 9 way	13/426/1/25123

	Circuit Ref.	
R.F. MODULE RMM22 (KR028)		1495/1/16074
Push Button Switch (Waveband)		13/440/10039
Trimmers, 3–30 pF, 2 off	Tm1, Tm2	38/106/18009
Trimmer, 5–50 pF	Tm3	38/110/18014
L.W. Car Aerial Coil (Brown)	Lm1	32/237/06025
M.W. Car Aerial Coil (Green)	Lm2	32/236/06026
Oscillator Coil (Orange)	Lm4/5	32/235/06027
Choke, 50µH	Lm3	32/238/04019
Capacitors 15 pF±1 pF 350V	Cm3, Cm9	KST426/08300
65 pF±1% 30v	Cm2, Cm10	KST420/08470
125 pF±1% 30v	Cm1	KST409/08584
440 pF±1% 30v	Cm7	KST419/08302
520 pF±1% 30v	Cm8	KST411/08594

R.F. MODULE RMM23 (KR029 & RR229)		1496/1/16013
Push Button Switch (Waveband)		13/440/10039
Trimmer 3–30 pF	Tm1	38/106/18009
Trimmer, 5–50 pF	Tm2	38/110/18014
Oscillator Coil (Orange)	Lm1, Lm2	32/235/06027
Capacitors		
125 pF±1% 30v	Cm1	KST409/08584
65 pF±1% 30v	Cm2, Cm10	KST420/08470
15 pF±1 pF 350v	Cm3, Cm9	KST426/08300
440 pF±1% 30v	Cm7	KST419/08302
520 pF±1% 30v	Cm8	KST411/08594

DESCRIPTION	Circuit Ref.	Part/Loc. No.
I. F. MODULE RMK10		1302/1/16045
I. F. Transformer (Primary)	LK 1	32/227/05001
I. F. Transformer (Secondary)	LK 2	32/228/05002
I. F. Transformer	LK 3, LK 4	32/229/05004
25 mFd. 3v, Electrolytic Capacitor	CK 6	KEM245S/F/08390

AUDIO MODULE RMA20		1315/1/16046
Preset Control, 10K ohm	Ra 4	9/298/02019
Preset Control 500 ohm	Ra 11	9/305/02020
Thermistor VA 1034	Ra 10	12/70/07512
Capacitors, Electrolytic		
50 mFd 10v	Ca 3	KEM246/S/08335
200 mFd 3v	Ca 7	KEM249/S/08529
160 mFd 10v	Cal, Ca 5	KEM162/S/08638
320 mFd 6v	Ca 4, Ca 8	KEM248/S/08355
Heat Sink Clip (Double Transistor)		4/250/20008

To be inserted on Page 18 of the KR028/029 Service Manual

ALTERNATIVE TRANSISTORS FOR RMA20 AUDIO AMPLIFIER MODULE

	TELEFUNKEN	MULLARD
TXa1	AC186	AC127
TXa2	AC131	AC128
TXa3	AC131	AC128
TXa4	AC186	AC127

Errata KR029 RR229 Circuit Diagram LM2 should be marked to indicate adjustable core.