Murphy

RADIO RECEIVER
MR 152

OPERATING AND SERVICE BULLETIN

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RADIO RECEIVER

MODEL MR 152

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INTRODUCTION

This unit is an 8 valve radio receiver, designed to tune over the medium frequency waveband, covering 525 Kc/s to 1605 Kc/s, and designed for operation on 230 volts A.C. mains voltage at a frequency of 50 c/s.

In addition to radio reception, provision is made to amplify the output from a gramophone pick-up.

Further provision is made to use a microphone with the unit, either with or without, radio or gramophone music as a background.

Volume and tone controls are provided for all signals handled.

A monitor speaker supplied with up to 1 watt output and provided with a switch and volume control enables monitoring of the output circuits to take place.

Extension speaker circuits are provided, each at 500 ohms impedance. Either 2.5 watts output into each of 1 up to 4 extension speakers, or 10 watts output into one extension speaker, can be taken from the amplifier unit.

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OPERATING INSTRUCTIONS

n.b. Receiver to be set up according to installation instructions before using the following.

(1) CONTROLS :-

All controls are clearly marked and should be studied to familiarize operator with their function and position.

(2) RADIO :-

(a) Turn left hand control marked "OFF-ON TONE" to a fully clockwise position.

(b) Press down the top left hand toggle switch (MONITOR).

(c) Turn "MONITOR VOLUME" a half turn in clockwise direction.

(d) Turn "MICROPHONE VOLUME" fully anticlockwise.

(e) Turn "RADIO-GRAM VOLUME" a quarter turn clockwise.

(f) Turn "RADIO-GRAM SWITCH" to anti-clockwise position.

(g) Turn "TUNING CONTROL" to select required radio station as indicated on dial scale. Station should be tuned till minimum "swish" is heard in monitor loudspeaker.

(h) Adjust "RADIO-GRAM" volume or "MONITOR VOLUME" to suit. Adjust "TONE" to suit.

(i) Refer to "EXTENSION SPEAKER OPERATION."

(3) GRAMOPHONE:-

(a) Follow operations 2 (A), (B), (C), (D) and (E) above.

(b) Turn "RADIO-GRAM SWITCH" to clockwise position.

(c) Adjust "RADIO-GRAM" volume or "MONITOR VOLUME" to suit. Adjust "TONE" to suit.

(d) Refer to "EXTENSION SPEAKER OPERATION".

(4) MICROPHONE :-

(a) Follow operation 2 (a) above.

(b) Turn "RADIO-GRAM VOLUME" to extreme anti-clockwise.

(c) Lift top left hand toggle switch (MONITOR) to upper most position.

(d) Turn "MICROPHONE VOLUME" a quarter turn clockwise.

(e) Refer to "EXTENSION SPEAKER OPERATION".

(f) Return "MICROPHONE VOLUME" to fully anti-clockwise position, after using microphone.

n.b. Microphone may be used in conjunction with gramophone or radio, by merely leaving the "RADIO-GRAM VOLUME" control set at normal volume (or turned slightly anti-clockwise to suit requirements), and using the procedure under 4 (d), (e) and (f) above.

(5) MONITOR SPEAKER :-

(a) To monitor programme, press down top left hand toggle switch (MONITOR), and adjust "MONITOR VOLUME" to required loudness. It is suggested that the "MONITOR VOLUME", once it is set, should be left, and the "MONITOR" toggle switch used to stop monitor.

(b) The "MONITOR" toggle switch must be switched off (up) to avoid feedback (howling) when microphone is used. This can only be avoided if the microphone is placed well away from the monitor speaker and receiver unit, and away from extension speakers, or with the monitor volume low, and/or with microphone close to mouth.

(6) EXTENSION SPEAKER LINES 1 TO 4 :-

(a) The top right hand toggle switch marked "EXTENSION 1-4" and "EXTENSION 5" must be left in the upper position (EXTENSION 1-4).

(b) The extension speaker line required can be selected by pushing down the respective toggle switch. (Lower four toggle switches).

(c) The "RADIO-GRAM" or "MICROPHONE" volume controls must now be adjusted to give the required volume at the extension speakers being used, the setting of the controls being noted in relation to a clock, e.g. 10 o'clock meaning the position the hour hand of the clock assumes then.

(d) Readjust the "MONITOR VOLUME" control to suit individual requirement, also noting the position of this control if required.

(7) EXTENSION SPEAKER LINE 5 :-

(a) The top right hand toggle is pressed down to the "EXTENSION 5" position. This automatically switches off Lines 1-4 completely, but leaves the monitor speaker available.

(b) Make the adjustments listed in 6 (c) and (d) above.

(8) FUSE REPLACEMENT :-

(a) With-draw chassis from cabinet (Refer Service Information) and insert replacement fuse in fuseholder next to mains input socket.

(b) It is suggested that one or two fuses be kept handy, as voltage surges and aging may cause the fuse to blow. Replace with one of the following or an equivalent 750 m.a. "slow-blow" fuse cartridge $1\frac{1}{4}$" x $\frac{1}{4}$".

Recommended fuses

Bulgin PAK.3. 750 Ma. Delay fuse.
Belling-Lee "Mag. Nickel" 750 ma. Anti-surge fuse.

(c) If fuse blows immediately it is replaced, the receiver unit will require attention from a qualified radio or television serviceman.

MINOR FAULT CORRECTION CHART

(If none of these suggestions restore required function, call registered radio serviceman)

SYMPTOM	OPERATING CONDITIONS	SUGGESTED ACTION
NO SOUND (at all)	(1) Dial not lighting	a. Check switch "OFF-ON TONE". b. Check power lead plugged into unit and power point. c. Check and replace fuse if necessary. d. (See note on fuse in OPERATING INSTRUCTION.Par.8 e. Check power on at power point. f. Have power lead connections checked.
	(2) Dial is lighting	a. Check monitor switch "on". b. Check top right hand toggle switch is switched to correct extension lines. c. Check that wanted speaker lines are connected at rear of unit. d. Check "RADIO-GRAM SWITCH" position. e. Check "RADIO-GRAM" or "MICROPHONE" volume controls. f. Check that "AERIAL", "GRAMOPHONE" or "MICROPHONE" are connected at rear.
NO SOUND (in wanted speakers)	Sound in monitor speaker.	a. Check top right hand toggle switch position. b. Check wanted toggle switch positions. c. Check that wanted speaker lines are connected at rear of unit. d. Check that extension speaker cables have not been damaged or disconnected from extension speakers.
NO SOUND (on radio)	Sound on gramophone	a. Check aerial connection at rear of unit. b. Check "RADIO-GRAM" switch position. c. Check station is tuned in.
NO SOUND (on gramophone)	Sound on radio	a. Check gramophone connections at rear of unit and at gramophone. b. Check gramophone stylus has not been damaged or removed. Replace if necessary. c. Check "RADIO-GRAM" switch position.

NO SOUND (on microphone)	Sound on radio and gramophone.	a. Check microphone connections at rear of unit and at microphone, also switch at microphone if fitted. b. Check "MICROPHONE" Volume control position.
HOWLING SOUND	(1) When microphone used	a. Extension speakers too close to microphone. b. Monitor speaker should be switched off.
	(2) When microphone not connected.	a. "MICROPHONE" volume should be turned to full anti-clockwise position.
DISTORTED	(1) On "RADIO" only	a. Tune into station correctly. b. "RADIO-GRAM VOLUME" at too high a level. c. If interference from electric motors or adjacent radio signals, the use of the "TONE" control will help to make reception more acceptable.
	(2) On "GRAMOPHONE" only.	a. Have stylus checked and replaced if necessary. b. Have "pick-up" arm weight checked for correct operation. c. "RADIO-GRAM" volume at too high a level.
	(3) On "MICROPHONE" only	a. "MICROPHONE" volume at too high a level. b. Operator's mouth too close to microphone.
	(4) "RADIO", "GRAMOPHONE and "MICROPHONE"	a. "RADIO-GRAM" and "MICROPHONE" volumes at too high a setting. b. If on one ext. speaker only, replace it.
BACKGROUND NOISE	(1) On "RADIO" only	a. Check "AERIAL" connection at rear of unit, and complete aerial installation. b. If continuous at a high level, this is probably due to electric motors such as projectors, sewing machines, vacuum cleaners etc. Temporary relief can sometimes be obtained with use of the "TONE" control in anti-clockwise position. Permanent relief by having faulty motors found and interference suppressors fitted. The radio inspector of the Post Office may be called in to locate offending appliances if necessary.

SYMPTOM	OPERATING CONDITIONS	SUGGESTED ACTION
BACKGROUND NOISE (Contd)	(2) On "GRAMOPHONE" only	a. Worn and dusty records. All records should be kept clean and handled carefully. Use "TONE" control on worn records. b. Chipped stylus through bad handling. Usually accompanied by tiny shavings off record surface. Check and replace stylus.
	(3) On "MICROPHONE" only.	a. "MICROPHONE" connection at rear of unit not tightened properly. b. Faulty microphone lead. Have repaired.
CRACKLING AND INTERMITTENT NOISE AND VOLUME.	On "RADIO", "GRAMOPHONE" or "MICROPHONE"	a. Check all connections at rear of unit are firm and secure. b. Check connections on individual extension speakers and gramophone and microphone units. Clean and tighten.

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INSTALLATION PROCEDURE

MAINS SUPPLY :-

The Model MR 152 is designed for operation from the mains supply voltage of 230 volts + 10% at a frequency of 50 c/s. The unit must be plugged into a 3 pin wall socket. Any extension lead used must be of 3 core power flex with 3 pin plug and socket.

FUSE :-

A mains supply fuse is incorporated to safeguard major components should a fault develop. Withdrawal of the chassis (refer Service Information) allows the cartridge to be replaced.

It is recommended that on installation, spare fuses be kept in case a fuse blows through aging or voltage surge. Use fuses of the following "Slow-blow" type, with $1\frac{1}{4}$" x $\frac{1}{4}$" cartridge dimensions.

Bulgin PAK.3. 750 m.a. Delay fuse.
Belling-Lee "Mag. Nickel" 750 m.a. Anti-surge fuse.

AERIAL AND EARTH :-

A good aerial of approx. 100 ft. long, and 20 or 30 feet high is particularly recommended for use in country districts where the main stations required, are more than 50 miles away. In good locations 50 ft. of aerial would be sufficient, which may be located in the ceiling of a tiled roof building.

A good earth for reception purposes is advisable. The water supply pipe (if metal) of a town supply system, or 3 or 4 ft. of 1" water pipe driven into the ground in a damp situation, would be satisfactory.

LOCATION OF UNIT :-

This must be chosen with regard to where it is desired to operate the unit from. Gramophone and microphone should be used in the same room as the unit, but not in the same room as an extension speaker.

Unit should be placed close to a 3 pin mains outlet, stood on a flat surface and spaced at least $1\frac{1}{2}$ inches from any wall at the rear to allow adequate ventilation.

EXTENSION SPEAKER LINES :-

Extension lines 1 to 4 inclusive, are designed to supply up to $2\frac{1}{2}$ watts each. Lines are connected to the plugs supplied and inserted into sockets as marked on rear of cabinet.

As outputs are designed to match 500 ohms impedance, the wiring used for the lines may be quite light, unless run for long distances (50 yds) or exposed to hard wear. The wire used can be single conductor type, but at the extension speaker end, and at the unit end, or anywhere that bending will occur, flexible wire should be used. (e.g. 7/.0076" or 14/.0076"). The wire chosen for extension line No. 5, should normally be of a heavy flexible type (14/.0076" or 23/.0076") particularly if No. 5 speaker is used as a temporary speaker in various locations.

EXTENSION SPEAKERS :-

For INDOOR use, extension speakers may be of the normal type (as used in radio receivers) mounted in wood or metal cabinets, and wired in conjunction with 500 ohm to voice coil matching transformers of 5 watt size. If used on extension No. 5, the speaker and transformer should be of large size and capable of handling 10 watts output. If extension No. 5 is required to operate in a very large hall, a special horn type loudspeaker (as normally used outdoors) should be used. All speakers should be kept as far as possible from any microphone being used.

For OUTDOOR use, the extension speaker should be connected to No. 5 extension line, and the speaker used should be of the horn type designed for outdoor use, and with 500 ohm line matching transformer, capable of handling 10 watts output.

As the amplifier frequency response covers the range from 50 c/s to 10,000 c/s, the extension speakers used should also reproduce the frequencies from 50 c/s to 10,000 c/s with little loss, for good reproduction of music.

If the volume from a particular extension unit is too great when other extensions are at the correct volume required, then a preset or variable volume control may be fitted to the "loud" extension unit.

Individual switches may be fitted at the extension speaker units, but these should place a dummy load across the transformer or line when the speaker is switched off.

GRAMOPHONE UNIT :-

A four speed gramophone unit, which can be any of the following, should be used.

a. Transcription turntable unit.
b. A record changer unit.
c. A single record player unit.

Of the above, type (a) can be the most expensive, but the best, and will need a transcription type pick-up arm, and suitable pick-up.

Type (b) is normally self-contained, and enables a continuous programme of records with very little attention. This type will normally play single records also if desired.

Type (c) is also normally self-contained, but must have constant attention for a continuous programme. This type of unit can still give satisfactory operation.

For playing portions of records, particularly near the centre of the record, type (b) may give trouble due to the auto trip mechanism coming into action. Type (a) would be the best for this type of work, and type (c) fairly satisfactory although some types may also trip and stop in this type of work.

The gramophone signal leads should not be earthed at the gram unit, to avoid mains hum.

GRAMOPHONE PICK-UP

A modern lightweight ceramic turn-over cartridge for monaural recordings, with an output of at least 100 millvolts when recorded groove velocity is 1 cm. per sec. is recommended.

A Rochelle salt type crystal pick-up may be used, but a ceramic type is recommended where the unit is stored in a damp or relatively cold situation.

The stylus used should preferably be diamond tipped for long life. Sapphire tipped stylii must be limited to about 30 hours playing on a long playing record.

MICROPHONE :-

This should be of the crystal low level sound cell, or moving coil (dynamic) high impedance type. The output from the microphone should be at least -65dbv for a sound pressure of 1 dyne per cm.

A switch incorporated at the stem of the microphone stand of the "shorted input on stand by" type, has advantages in operation, but is not absolutely necessary.

For connections to the amplifier, refer to the circuit diagram in this manual.

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SERVICE INFORMATION

CHASSIS REMOVAL :-

Remove 11 mounting screws from perimeter of front panel. Carefully place instrument face downward on bench. Remove 2 mounting screws situated at each end of rear terminals. Lift cabinet off chassis and front panel with care.

GENERAL:-

Circuit connections and voltages are shown in the circuit diagram at the rear of this bulletin. The dial cord replacement diagram, and valve location chart are also shown at the rear of the bulletin. Circuit components and parts are listed further on.

The valves used and their functions are listed below :-

6F18/EF89	Radio freq. amplifier
6C12/ECH81	Converter
6FD12/EBF89	I.F. amplifier and detector and A.G.C.
6L13/ECC83	Microphone pre-amplifier and 1st. audio voltage amplifier.
6L13/ECC83	2nd audio voltage amplifier and phase inverter.
6P15/EL84) 6P15/EL84)	Push-pull output amplifier.
EZ81	Rectifier.

FUSE :-

The fuse used is a 750 m.a. "slow-blow" type, and may be one of the following, or equivalent.

Bulgin PAK.3. 750 m.a. Delay fuse.
Belling-Lee "Mag-Nickel" 750 m.a. Anti-surge fuse.

This fuse may blow on aging, or through voltage surge, and not necessarily through a circuit fault. Replace by withdrawing the chassis as described above.

If the fuse has blown through a circuit fault the limiting resistors in the plate circuit of the rectifier, and the "B" voltage filtering resistors should be checked for correctness of resistance value if they have been overheated.

SERVICE WITH EXTENSION SPEAKERS DISCONNECTED :-

Switch all toggle switches except the monitor to the upper position. This loads the output transformer with the internal load resistors, situated below the monitor speaker. Turn the monitor volume up to maximum, and a power of a least 1 watt should be obtained, (3.87 volts across monitor voice coil connection), when 8 watts are fed into the extension speaker loads.

CIRCUIT ALIGNMENT :-

The intermediate frequency used is 455 Kc/s.

1. I.F. ALIGNMENT should be made by stages.

   a. Connect sig.gen. via. 01 mfd isolating capacitor to the grid of I.F. amplifier 6FD12/EBF89.

   b. Detune the bottom core of the 2nd I.F. transformer (Part No. DW 4394).

   c. Peak upper core of 2nd I.F. transformer for maximum response.

   d. Peak lower core of 2nd I.F. transformer for maximum response. Do not readjust upper core.

   e. Connect sig.gen. to grid of 6C12/ECH81.

   f. Detune the bottom core of the 1st I.F. transformer (DW 4393).

   g. Peak upper core of 1st I.F. transformer for maximum response.

   h. Peak lower core of 1st I.F. transformer for maximum response. Do not readjust upper core.

2. RADIO FREQUENCY ALIGNMENT should be made by feeding a signal through a standard dummy atenna (200 pfd) into the "Aerial" and "Earth" terminals. Adjustments for maximum response should be made at 600 K.C. and 1400 K.C. (Pointer should be set to the marker at the left hand of the scale when the tuning capacitor is closed). The aerial secondary core is the lower one on the Aerial bandpass coil (EW 5231). The grid winding trimmer is the rear trimmer on the tuning capacitor, the aerial secondary trimmer is the centre trimmer of the tuning capacitor. (Adjust cores at 600 Kc/s, trimmers at 1400 Kc/s.)

The oscillator coil adjustment should be made at 600 Kc/s and is situated alongside the tuning capacitor. The oscillator trimmer is the front trimmer of the tuning capacitor.

It is recommended that when aligning the bandpass aerial coils, symmetry of the response curve be maintained by using a damping unit consisting of a 10K ohm resistor connected between the chassis and the tuning capacitor section which is not being aligned. For align-

ing the other tuned R.F. circuit, connect the damping unit to the capacitor section which has been aligned. This applies at both 600 K.C. and at 1400 K.C. (Use an output meter for accuracy).

An input of 5 microvolts into the dummy antenna should readily produce 100 milliwatts out on the monitor speaker, or 1 watt out at extension line No.5 when terminated with a 500 ohm load.

3. AUDIO OUTPUT :-

With an input of 100 millivolts into the gramophone input socket at 400 c/s, an output of 10 watts should be obtained at ext. line No.5.

With an input of .5millivolts into the microphone terminals at 400 c/s, an output of 10 watts (into 500 ohms load), should be obtained at ext. line No.5.

Maximum output power at 400 c/s on extension lines 1 to 4 should be $2\frac{1}{2}$ watts per line, when terminated with a 500 ohm load.

EXTENSION SPEAKERS :-

Service of extension speakers will consist mainly of checking lines for broken leads and loose connections, using an ohm meter if necessary.

Rattling speakers may develop, and checks should be made to see if dust or foreign matter has entered the front of the loudspeaker unit, and is causing the rattling. Check for loose screws and washers etc., also. If the fault is due to distorted frame or cone, then the speaker unit should be replaced, or returned to the manufacturer for repair.

Where reduced volume is required on any extension speaker, a volume control of approximately 10 ohms may be connected across the line, the speaker being supplied from the variable arm.

Switches may be connected to individual speakers, but should be wired to load the line at 500 ohms when the extension speaker involved is switched off.

When the installation uses a large horn mounted outdoors, it may be necessary to overhaul, check seals, and replace diaphragms when required, after a few years operation.

CHASSIS REPLACEMENT :-

Lay cabinet on its back on bench. Lower chassis carefully into cabinet, the correct way up. Enter 11 mounting screws surrounding front panel, but do not tighten. Place cabinet face down on bench and insert 2 rear mounting screws and tighten. Lay cabinet on back and finally tighten front mounting screws.

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REFERENCE LIST FOR CIRCUIT DIAGRAM

Abbreviations

cer.	ceramic	elect.	electrolytic
pl.f.	plastic film	w.v.	d.c. voltage rating
pol.	polyester	w.	wattage rating
		lin.	linear law
		log.	logarithmic law.

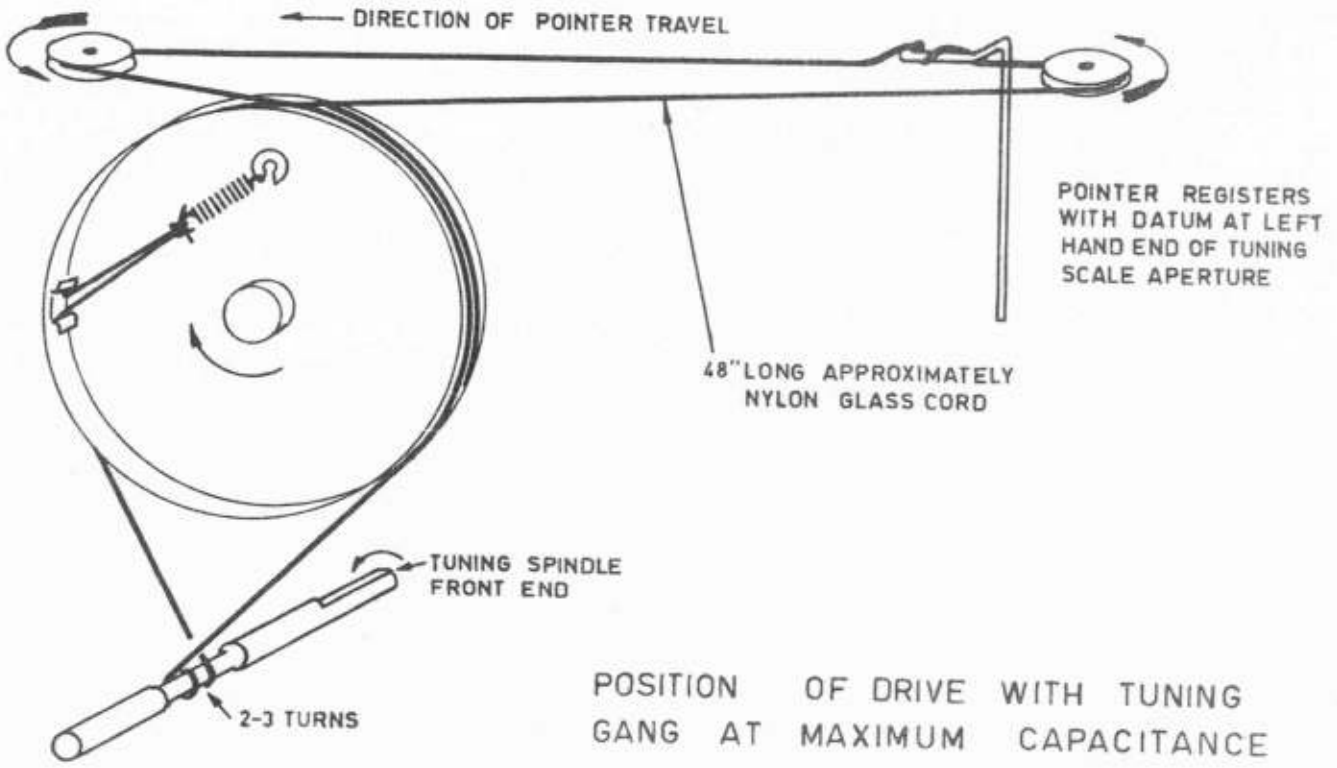
CIRCUIT NO.	PART No.	DESCRIPTION		
C 1	K221771	56 pf	500w.v.	Cer. 5%
C 2	M52149	4.7 pf	500w.v.	Cer. ± 0.5 pf.
C 3		4-40 pf	Trimmer (on tuning gang)	
C 4	K226775	.039 mf	160w.v.	pol.
C 5		4-40 pf	Trimmer (on tuning gang)	
C 6	K221972	470 pf	750w.v.	Cer. 20%
C 7	K226365	.01 mf	400w.v.	pol.
C 8	K226378	.01 mf	160w.v.	pol.
C 9	K229552	40 mf	16w.v.	elect.
C10	K226307	.01 mf	400w.v.	Cer.
C11	K221972	470 pf	750w.v.	Cer. 20%
C12	K22636	.022 mf	400w.v.	pol.
C13	M66292	220 pf	350w.v.	pl.f. ± 5%
C14	K226365	.01 mf	400w.v.	pol.
C15	K226775	.039 mf	160w.v.	pol.
C16	M66292	220 pf	350w.v.	pl.f. 5%
C17	K221963	68 pf	500w.v.	Cer. 10%
C18	XP10099	530 pf	350w.v.	pl.f. + 2½%
C19	XP10001	100 pf	750w.v.	Cer. 20%

CIRCUIT No.	PART No.	DESCRIPTION
C20		4-40 pf Trimmer (on tuning gang)
C21	K229552	40 mf 16w.v. elect.
C22	K226835	.047 600w.v. pol.
C23	K226365	.01 mf 400w.v. pol.
C24	K226307	.01 mf 400w.v. Cer.
C25	K226365	.01 mf 400w.v. pol.
C26	M66292	220 pf 350w.v. pl.f. 5%
C27	K229552	40 mf 16w.v. elect.
C28	K229552	40 mf 16w.v. elect.
C29	XP10001	100 pf 500w.v. Cer. 20%
C30	M66298	390 pf 350w.v. pl.f. 5%
C31	K226378	.01 mf 160w.v. pol.
C32	K221073	27 pf 750w.v. Cer. 20%
C33	XP10122	20 mf 350w.v. elect.
C34)	M46532	(32 mf 350w.v. elect.
C35)		(32 mf 350w.v. elect.
C36	XP10121	30 mf 450w.v. elect.
C37	K220550	12 pf 500w.v. Cer. 10%
C38	K220550	12 pf 500w.v. Cer. 10%
C39	K220550	12 pf 500w.v. Cer. 10%
R 1	XP21073	1 M ohm ¼ watt Resistor ± 10%
R 2	XP21073	1 M ohm ¼ " " ± 10%
R 3	XP21085	10 M ohm ¼ " " ± 10%
R 4	XP21065	220 K ohm ¼ " " ± 10%
R 5	XP21073	1 M ohm ¼ " " ± 10%
R 6	XP21065	220 K ohm ¼ " " ± 10%
R 7	XP21047	6.8 K ohm ½ " " ± 10%
R 8	XP5846	56 K ohm 1 " " ± 10%
R 9	XP21053	22 K ohm ¼ " " ± 10%
R10	XP21065	220 K ohm ¼ " " ± 10%
R11	XP21045	4.7 K ohm ¼ " " ± 10%
R12	XP21065	220 K ohm ½ " " ± 10%
R13	XP21616	33 K ohm 2 " " ± 10%
R14	XP21062	120 K ohm ¼ " " ± 10%
R15	XP21073	1 M ohm ¼ " " ± 10%
R16	XP21061	100 K ohm ¼ " " ± 10%
R17	XP21057	47 K ohm ½ " " ± 10%
R18	XP21073	1 M ohm ¼ " " ± 10%
R19	XP 21056	39 K ohm ¼ " " ± 10%
R20	XP21015	15 ohm ½ " " ± 10%
R21	XP21618	18 K ohm 2 " " ± 10%
R22	XP21065	220 K ohm ½ " " ± 10%
R23	XP21041	2.2 K ohm ¼ " " ± 10%
R24	XP21065	220 K ohm ½ " " ± 10%
R25	XP5846	56 K ohm 1 " " ± 10%
R 26	XP21691	1 M ohm ¼ " " ± 5%
R27	XP21691	1 M ohm ¼ " " ± 5%
R28	XP21071	680 K ohm ¼ " " ± 10%
R29	XP21071	680 K ohm ¼ " " ± 10%
R30	XP21049	10 K ohm ½ " " ± 10%
R31	XP21075	1.5 M ohm ½ " " ± 10%
R32	XP5818	270 ohm 1 " " ± 10%
R33	XP5818	270 ohm 1 " " ± 10%
R34	XP21057	47 K ohm ½ " " ± 10%

CIRCUIT No.	PART No.	DESCRIPTION
R35	XP21065	220 K ohm ½ " " ± 10%
R36	XP21053	22 K ohm ½ " " ± 10%
R37	XP21073	1 M ohm ½ " " ± 10%
R38	XP21049	10 K ohm ½ " " ± 10%
R39	XP5736	3.9 K ohm 5 " " ± 10%
R40	XP5736	3.9 K ohm 5 " " ± 10%
R41	XP5751	470 ohm 5 " " ± 10%
R42	XP5751	470 ohm 5 " " ± 10%
R43	XP5751	470 ohm 5 " " ± 10%
R44	XP5751	470 ohm 5 " " ± 10%
R45	M24571	100 ohm 2 " " ± 10%
R46	M24571	100 ohm 2 " " ± 10%
R47	XP21049	10 K ohm ½ " " ± 10%
VC1)	(	3 gang variable capacitor
VC2)	(	
VC3)	M75670 (	
VR1	DP22098	1 M ohm log. variable resistor
VR2	DP22096	250 K ohm log. w/s variable resistor
VR3	DP22097	250 K ohm log. " "
VR4	CP5555	50 ohm lin. " "
L4)	EW1017	Oscillator Coil (Pri. = .7 ohms)
L5)	EW1017	(sec. =1.7 ohms)
T1	EW5231	Ae. Bandpass Transformer (pri.L.= 13 ohms) (sec.L.=4.3 ohms) (sec.L.=5.3 ohms)
T2	DW4393	1st. I.F. Transformer (Pri. = 5.8 ohms) (Sec. = 5.8 ohms)
T3	DW4394	2nd. I.F. Transformer (Pri. = 5.8 ohms) (Sec. = 4.1 ohms)
T4	EA15716	Output Transformer (Pri. = 210 ohms) (Pri. = 270 ohms) (tot. Res. Sec. 15 ohm out = 1.98 ohms) (tot. Res. Sec.125 ohm out = 12 ohms) (tot. Res. Sec.500 ohm out = 23 ohms)
T5	EA15715	Mains Transformer (Pri. = 25 ohms) (H.T. Sec. = 48 ohms) (H.T. Sec. = 53 ohms) (6.3v Sec. = less than 1 ohm).
S1	EP3161	2 pole, 2 way, Rotary Switch
S2	XP3928	S/P change/over toggle switch (Ext.Line 5)
S3	XP3927	S/P on/off toggle switch (Monitor speaker)
S4	XP3928	S/P change/over toggle switch (Ext.line 1-4)
S5	XP3928	" " " " " (" " ")
S6	XP3928	" " " " " (" " ")
S7	XP3928	" " " " " (" " ")

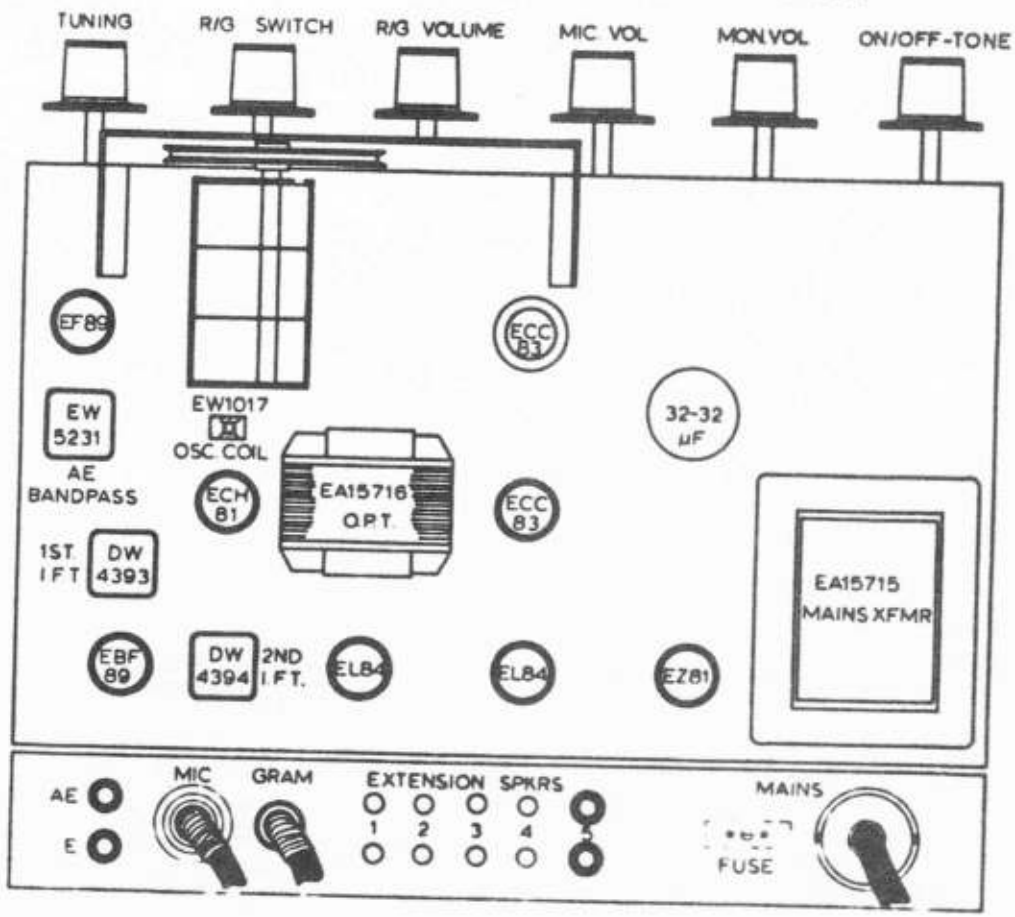
PART No.	DESCRIPTION
CP14156	Cabinet, (without feet)
XP10772	Clips, Dial (Spirefix)
XP1209	Cord, Nylon, glass dial
XP4014	Connector 3 pin plug (Amphenol 91-MC3M)
XP4015	" 3 " socket (" 91-PC3F)
XP4012	" 1 " plug (" 80-M)
XP4013	" 1 " socket (" 80-C)
EP17817	Dial Scale
EP14148	Dial Reflector
K12953	Feet, Rubber
XA14530	Front Plate, Printed
XP1606	Fuse, cartridge, Bulgin PAK.3. 750 m.a. or, Belling Lee Mag. Nickel 750 m.a.
K400094	Fuse, holder
EP14158	Knob, Indicating, Black
XA12515	Loudspeaker, monitor 6" x 4" 15ohm
EA15255	Mains Lead, Assembly
EP2532	Panel, ext. spkr. w/out sockets
M16882	Panel, lamps 6.5 volt.3 amp
XP3141	Plug, Red, Ediswan Clix M.P.2.
XP3142	Plug, Black " " "
EP14152	Pointer, dial
XP3136	Sockets, Clix S312 (for ext. spkr. panel)
EP1680	Spring, dial
XP1985	Screw, 2BA x $\frac{1}{2}$" P.R.H. Chrome PL.
XP17443	Technical Bulletin
K891002	Terminal, Black, "Aerial"
K891002	Terminal, Black, "Earth"
K891002	Terminal, Black (Ext. line No.5)
M16645	Washer, Shakeproof, 2BA.

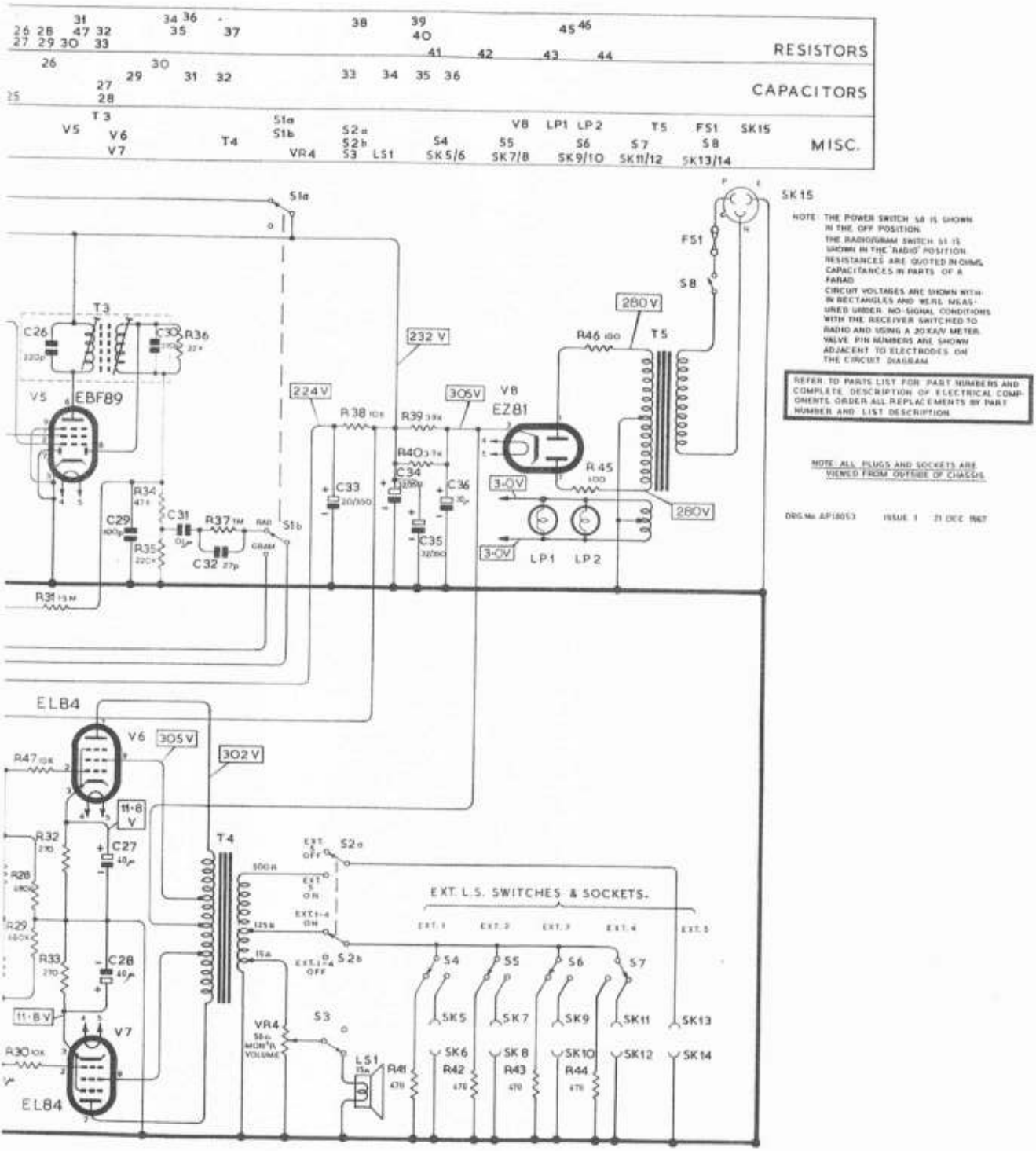
CORD DRIVE ARRANGEMENT DIAGRAM



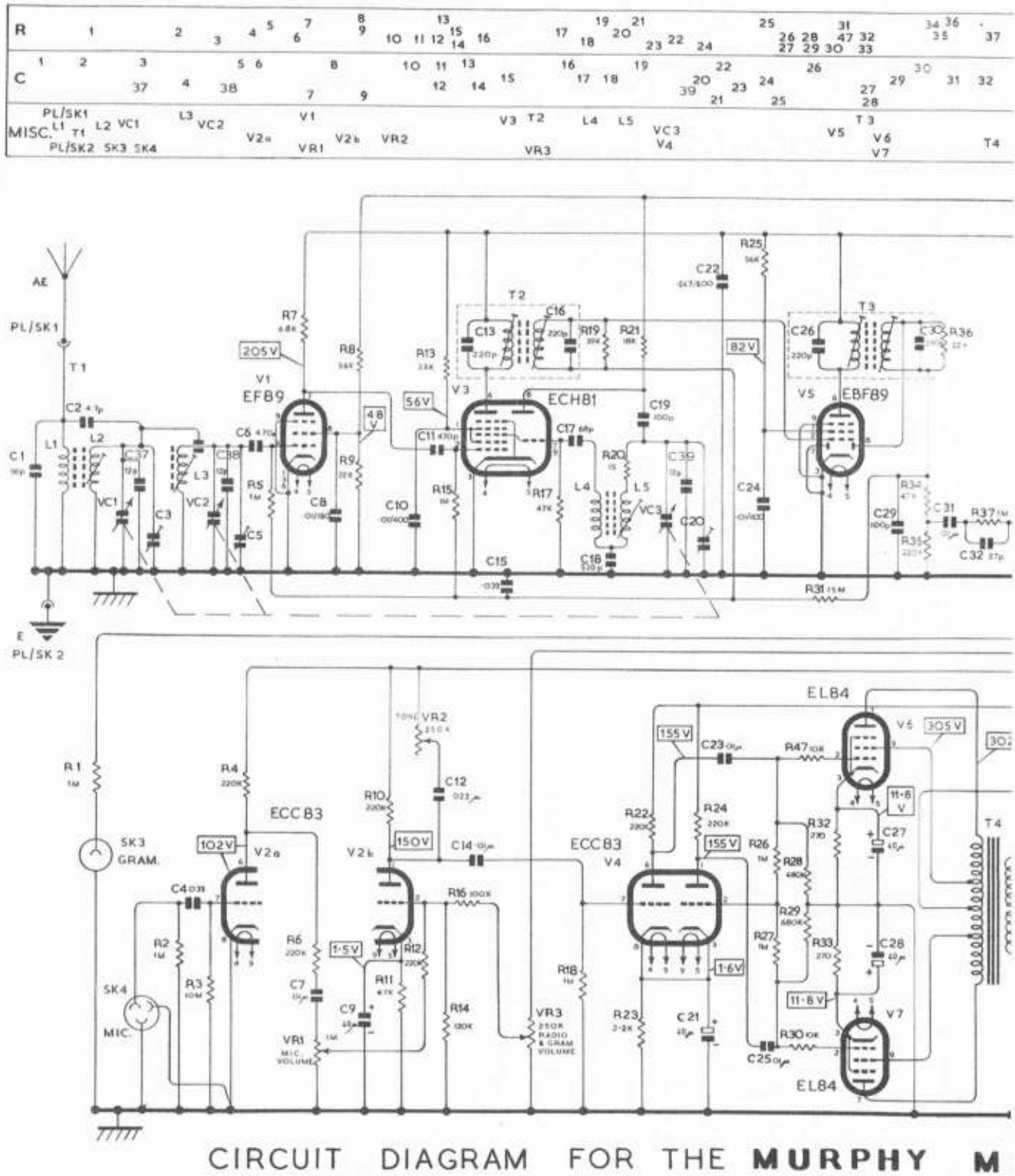
POSITION OF DRIVE WITH TUNING GANG AT MAXIMUM CAPACITANCE

VALVE LOCATION CHART





URPHY MR 152 RECEIVER.



CIRCUIT DIAGRAM FOR THE **MURPHY** M