

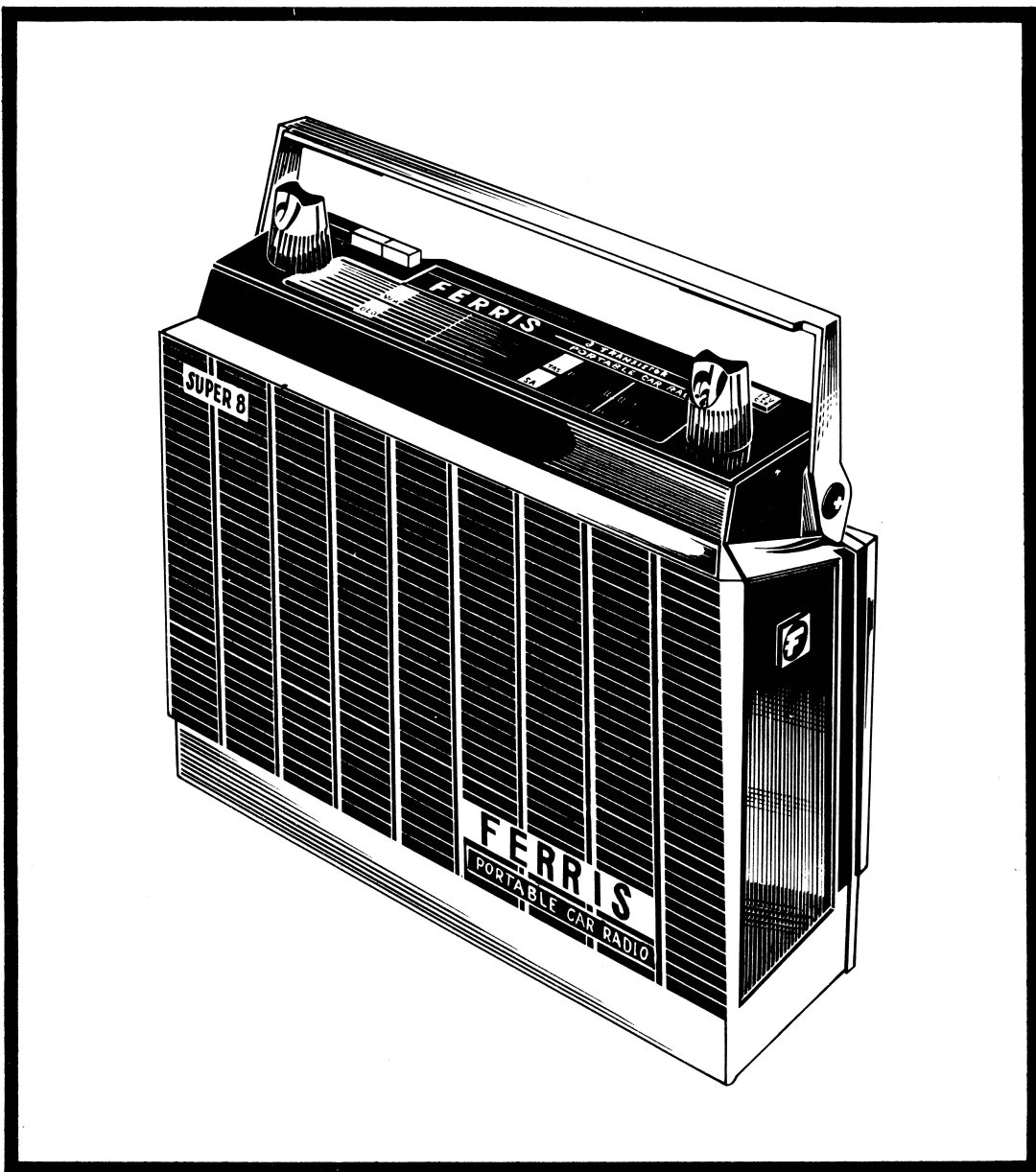
SERVICE MANUAL



MODEL 214

8 TRANSISTOR

PORTABLE CAR RADIO



another quality product of
FERRIS BROS. PTY. LTD.

(A Division of Ferris Industries Ltd.)

*SYDNEY *MELBOURNE *BRISBANE *ADELAIDE *CANBERRA *WOLLONGONG *NEWCASTLE *ORANGE *WAGGA *MT. GAMBIER

*ROCKHAMPTON *TOWNSVILLE

SPECIFICATIONS

TUNING RANGE 525-1620 KC

INTERMEDIATE FREQUENCY 455 KC

TRANSISTOR COMPLEMENT:

1 x 2N 1637 RF Amplifier
1 x 2N 1639 Converter
1 x 2N 1638 1st IF Amplifier
1 x 2N 1638 2nd IF Amplifier
1 x AC 125 Audio Amplifier
1 x AC 126 Audio Driver
2 x AC 128 P.P. Power Output

DIODES:

1 x OA 90 Overload Diode
1 x OA 90 AVC Diode
1 x OA 90 Detector Diode

BATTERY:

1 x Eveready Type No. 2761 - 12v set
1 x Eveready Type No. 2582 - 6v set
Current consumption (no signal):
approx. 13 m.a. (12v set)
approx. 12 m.a. (6v set)

LOUDSPEAKER:

Size and type - 5½" x 4 p.m.
Voice Coil Impedance - 15 ohms.

TUNING DRIVE RATIO:

6 : 1 approx.
3 turns of knob.

DIMENSIONS:

9" x 7" x 2½"

POWER OUTPUT (12 VOLT SET):

Max. Undistorted 420 mw
Max. Undistorted in Cradle 1.5 w

POWER OUTPUT (6 VOLT SET):

Max. Undistorted 330 mw
Max. Undistorted in Cradle 800 mw

DIAL LAMP:

12 VOLT .15 amp or
6 VOLT .3 amp

WEIGHT:

Approx. 7 lbs. inc. Battery

DESCRIPTION

The Ferris 8 Transistor Model 214 is designed to operate as a portable, cordless mantle and car radio. Complete shielding and rugged construction is assured by the use of a most attractively styled diecast metal case and speaker grille.

CONTROLS:

A diecast metal knob operates tuning capacitor and dial pointer via cord and pulley system.

VOLUME:

A diecast metal knob controls receiver volume.

ON-OFF SWITCH:

Set is switched on by depressing red "ON-OFF" button.

TONE CONTROL:

Press-button marked "TONE" selects either bass or treble response.

AERIAL SWITCH:

When button marked "AERIAL" is in down position it selects car aerial by switching into circuit a high gain aerial coil and, at the same time, effectively shorts out the Ferrite rod aerial so that random noise pulses, i.e. ignition interference, are not fed into the set when it is being used as a car radio. Up position of button switches out aerial coil and brings Ferrite rod aerial into circuit. Re-press buttons to return them to the up position.

AERIAL SOCKET:

The aerial socket at side of set is for connection of a Ferris car radio or wire aerial.

EXTERNAL CONNECTIONS:

The 5 contacts at the base of the set are for connection to external speaker, car aerial and car battery when the set is used in the M214 power cradle.

A 3 ohm external speaker MUST be used.

Damage to the receiver due to wrong battery connection is eliminated by the use of two safety diodes which are built into the cradle. The dial lamp and set will only receive power from the car battery providing the cradle polarity is matched to that of the car.

ROUTINE SERVICE ADJUSTMENTS

BATTERY TEST:

The condition of the battery can be quickly checked by switching the set on and connecting a voltmeter across the contacts marked + - at the bottom of the case (See FIG. 1).

BATTERY REPLACEMENT:

For access to the battery first place the set face down on a bench or table on a surface where the speaker grille will not be scratched. Remove the 5 screws which secure the rear grille (See Fig. 2). After removing rear grille withdraw and unplug battery.

N.B. When replacing rear grille ensure that screw threads are properly engaged before screwing down firmly.

REMOVAL OF CANOPY:

Remove tuning and volume knobs (knobs pull off). Remove screws marked "B" (FIG. 3) and lift off canopy. Dial scale and backplate can now be removed. Ensure that buttons are in "UP" position as this will assist in removing the dial scale. When replacing the canopy it is most important that it locates accurately into the top of the set before replacing the fixing screws "B."

REMOVAL OF SPEAKER GRILLE:

First remove rear grille and canopy as previously described, then remove 4 screws marked "A" (FIG. 4). Speaker grille can now be pressed outward from case and the speaker disconnected by unfastening the voice coil leads. Connecting lugs pull off. Printed board is now accessible from BOTH sides and any component can be replaced when the set is dismantled to this point.

BATTERY TEST

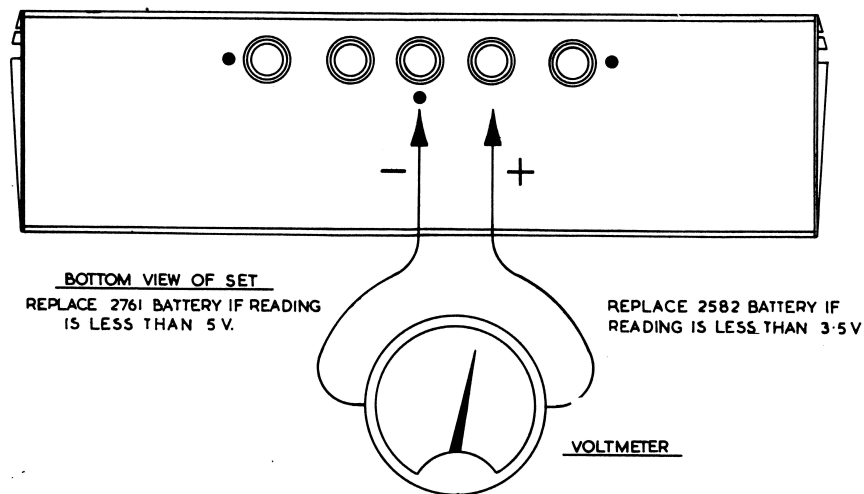


FIG.1

TOP VIEW OF SET

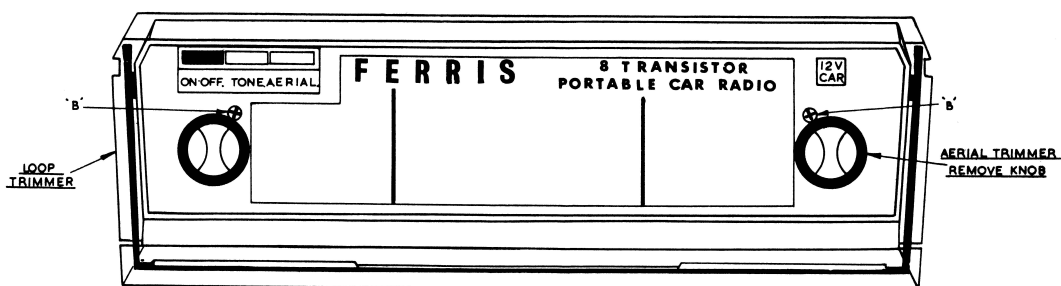


FIG. 3

REAR VIEW OF SET

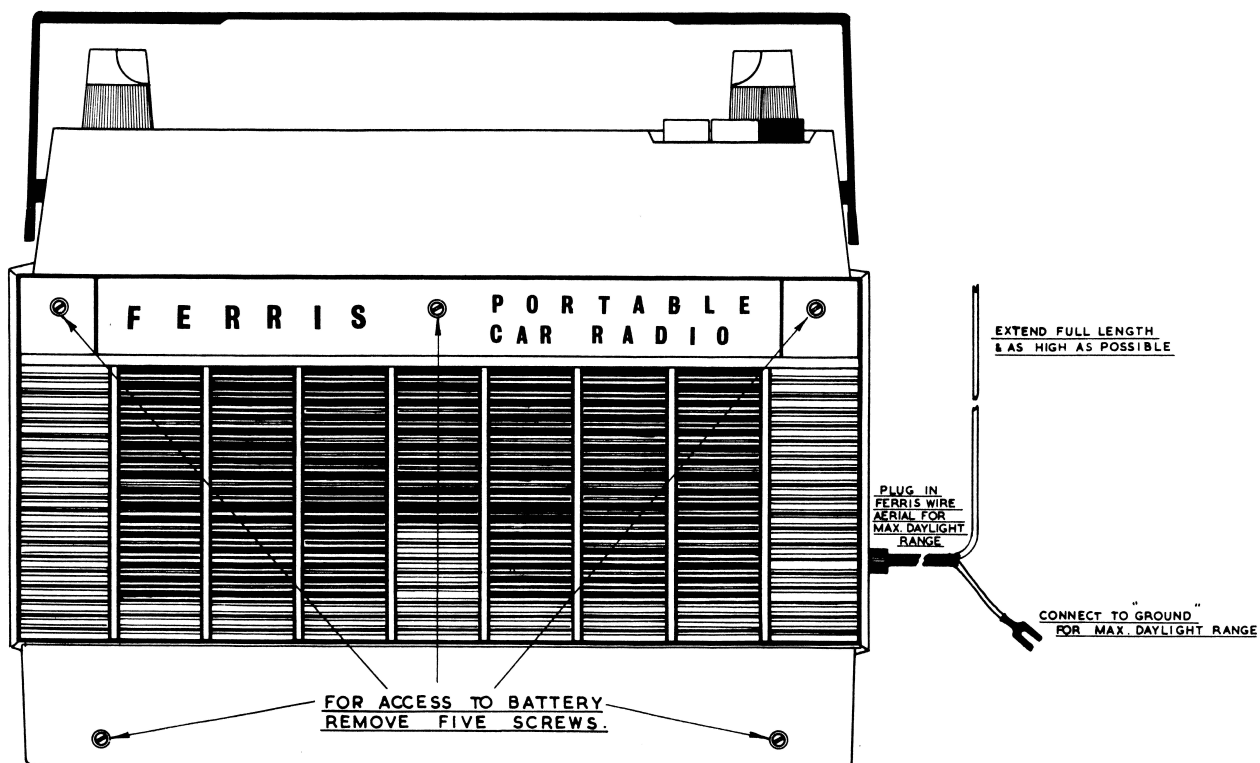


FIG.2

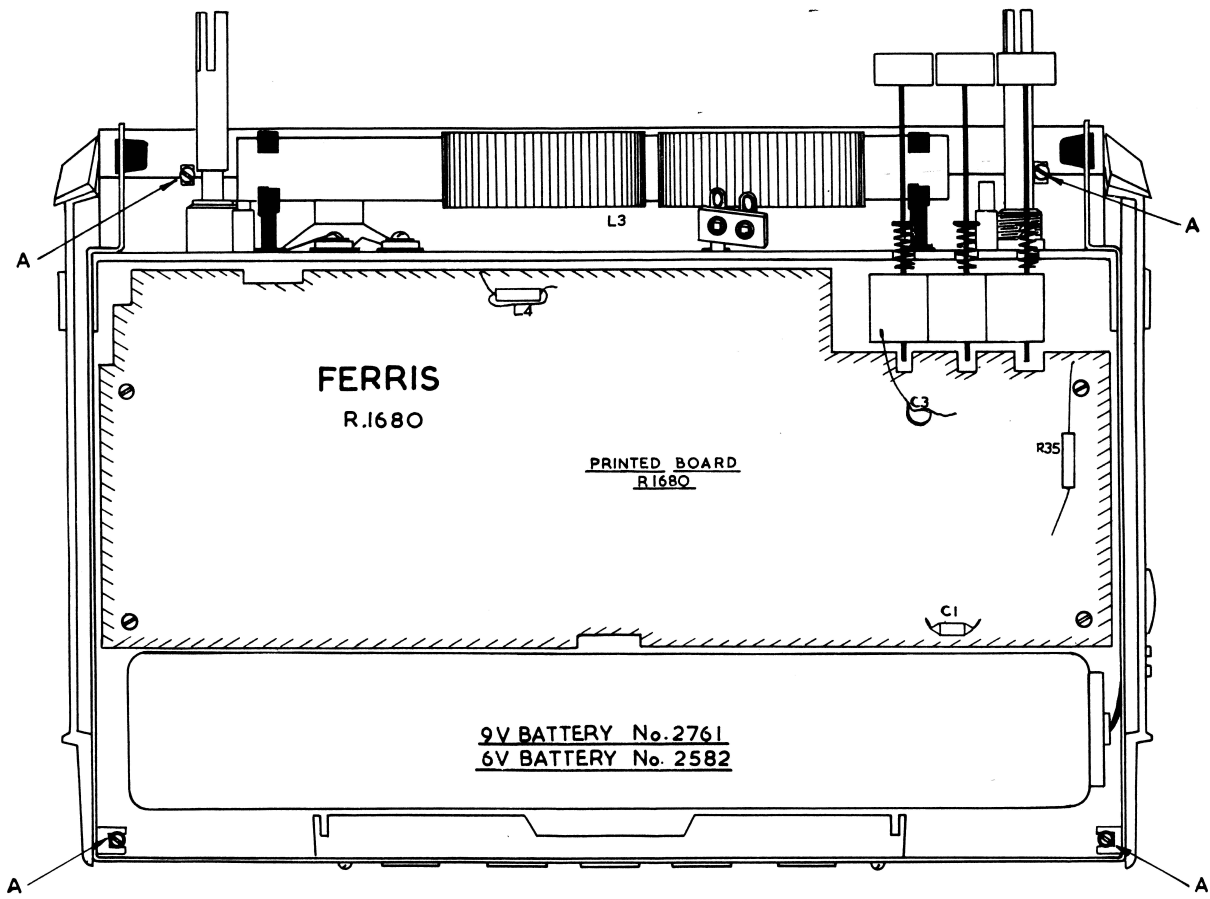
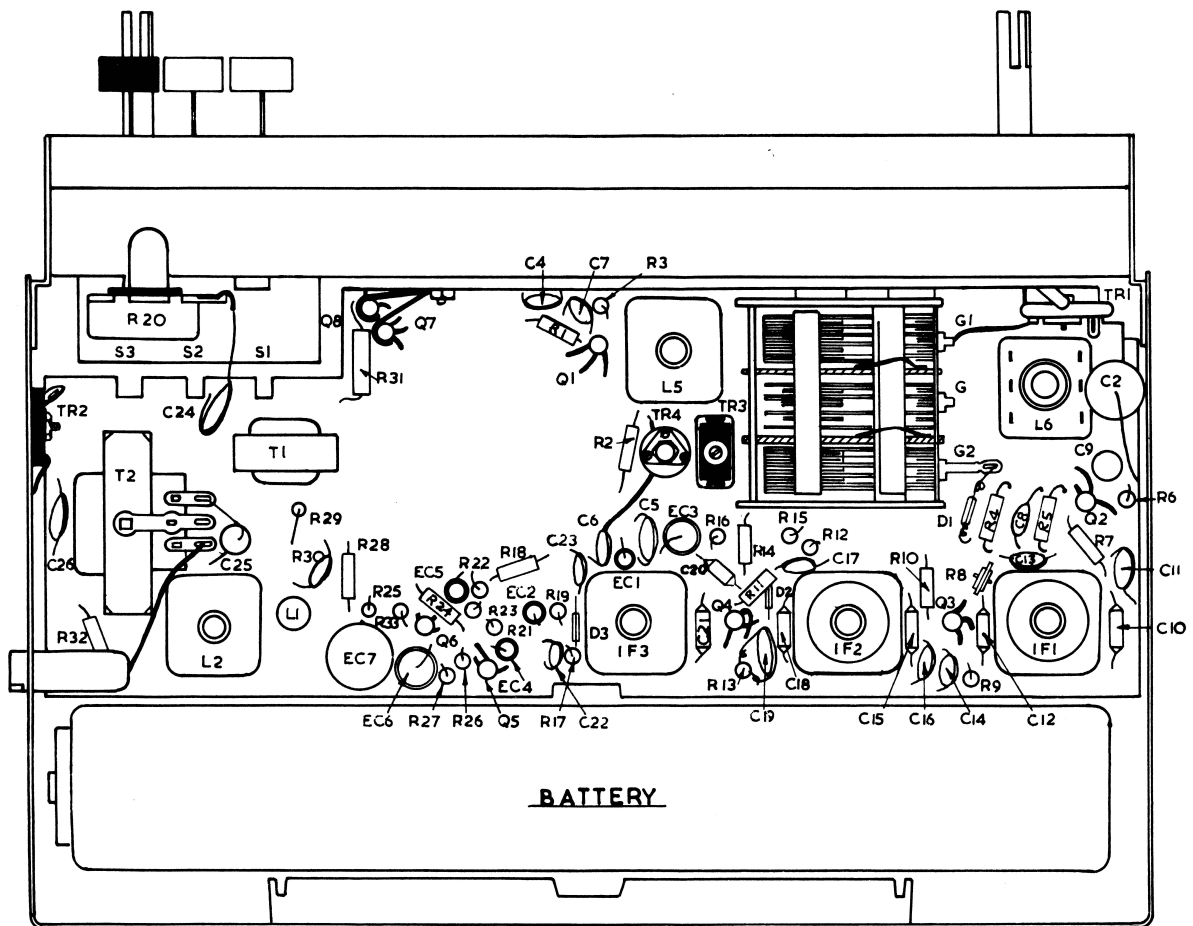


FIG. 4.

**FIG. 4
REAR VIEW OF SET**

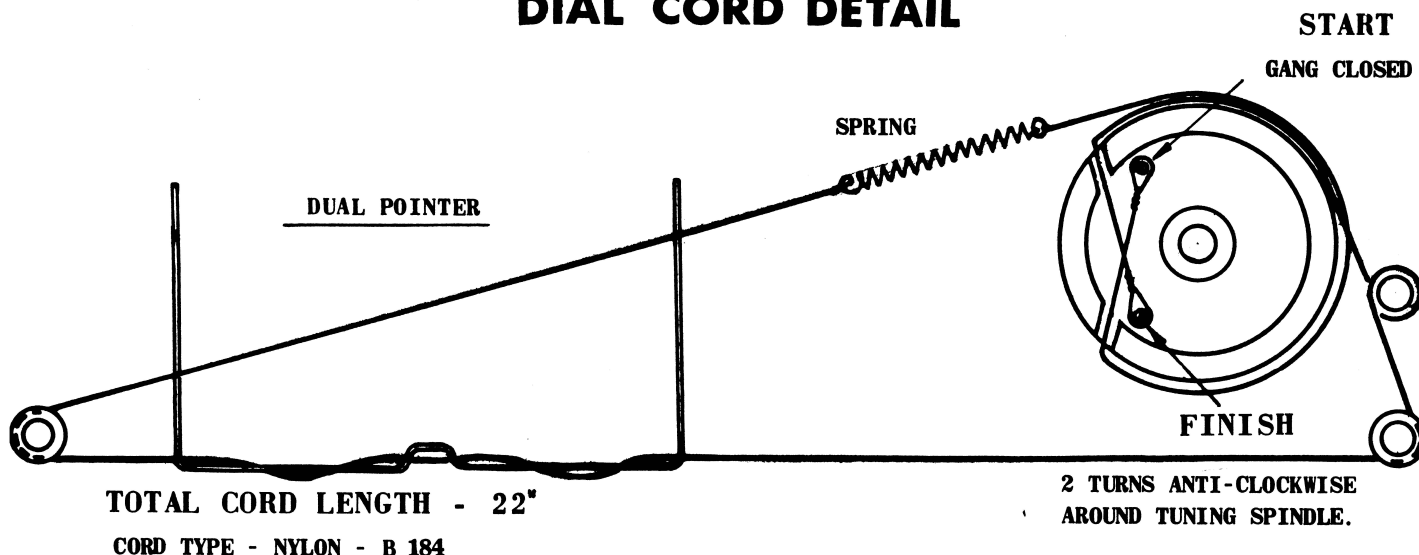


**FRONT VIEW OF SET
SHOWING COMPONENT LAYOUT**

DIAL CORD REPLACEMENT

Remove canopy and dial scale as previously described. Re-string dial in accordance with diagram. The dual pointer is attached by wrapping the dial cord around the crank formation along its carriage section. Calibration is achieved by sliding the pointer along the cord as required. The pointer can be lifted to vertical position to allow easy assembly of the dial backplate and scale. Ensure that the felt friction wads are correctly positioned against the edge of the dial scale before replacing the canopy.

DIAL CORD DETAIL



ALIGNMENT PROCEDURE

For all alignment operations, connect the low side of the signal generator to the frame or case and keep the generator output as low as possible to avoid AVC action. Set volume control at maximum.

NB - Use proper alignment tool for making adjustments. Cores are easily broken by improper handling, making replacement of entire coil or transformer necessary. Set aerial switch to "DOWN" position.

STEP	Connect Sig. Gen. to	Tune Sig. Gen. to	Tune Receiver to	Adj. for Max. Output
1	Base of 2N1639 via .1 uf capacitor	455 KC/S	Gang fully open " " "	IF3 (one slug)
2				IF2 (all slugs on
3				IF 1 outer peaks.)
4	Repeat above adjustments until no further increase can be obtained.			
5	Aerial socket via dummy aerial	525 KC/S	Gang fully closed	Osc. coil slug (L6)
6		1620 KC/S	Gang fully open	Osc. Trimmer TR4
7	Repeat steps 5 and 6 until band limits are 525 - 1620 KC/S			
8	Aerial socket via dummy aerial	550 KC/fl	550 KC/S	* RF Coil slug (L5)
9		1400 KC/fl	1400 KC/S	* Aer. coil slug (L2) TR1 and TR3

* Rock gang back and forth through signal.
Repeat steps 8 and 9 till no further increase can be obtained.
Check sensitivity at 1400, 900 and 550 KC/fl.

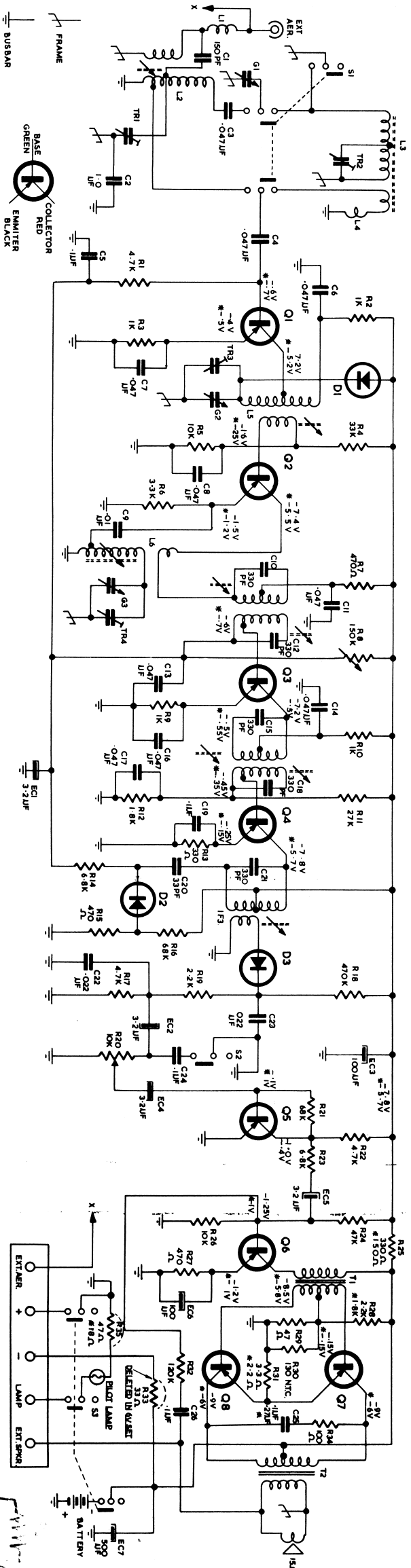
Ferrite Rod Alignment: Place set in normal operating position with canopy removed.
Set aerial switch to "UP" position.

STEP	Connect Sig. Gen. to	Tune Sig. Gen. to	Tune Receiver to	Adj. for Max. Output
1	To aerial socket via dummy aerial (see note)	1400 KC/S	1400 KC/S	TR2
2	"	550 KC/S	550 KC/S	Slide windings (L3) along Ferrite slab.

Repeat 1 and 2 until no further increase can be obtained.

NOTE - When aligning the rod aerial as described, the output from the signal generator needs to be in the order of 0.3 - 1 mv, as it is only loosely coupled to the set via the capacity of the aerial switch.

FERRIS ALL TRANSISTOR PORTABLE CAR RADIO MODEL 214



R1	4.7K	10%	RESISTOR
R2	1K	10%	RESISTOR
R3	10K	10%	RESISTOR
R4	2.2K	10%	RESISTOR
R5	10K	10%	RESISTOR
R6	470Ω	10%	RESISTOR
R7	3.3K	10%	RESISTOR
R8	470Ω	10%	RESISTOR
R9	150K	10%	VARIABLE RESISTOR
R10	1K	10%	RESISTOR
R11	27K	10%	RESISTOR
R12	1.8K	10%	RESISTOR
R13	390Ω	10%	RESISTOR
R14	6.8K	10%	RESISTOR
R15	470Ω	10%	RESISTOR
R16	68K	10%	RESISTOR
R17	4.7K	10%	RESISTOR
R18	470K	10%	RESISTOR
R19	2.2K	10%	RESISTOR
R20	10K	10%	POTENTIOMETER
R21	68K	10%	RESISTOR
R22	4.7K	10%	RESISTOR
R23	6.8K	10%	RESISTOR
R24	47K	10%	RESISTOR

R25	390Ω	10%	RESISTOR
R26	10K	10%	RESISTOR
R27	470Ω	10%	RESISTOR
R28	2.2K	10%	RESISTOR
R29	47Ω	10%	RESISTOR
R30	130Ω	NTC	RESISTOR
R31	3.3K	10%	RESISTOR
R32	120K	10%	RESISTOR
R33	33Ω	10%	RESISTOR
R34	100Ω	10%	RESISTOR
R35	47Ω	10%	RESISTOR
R36	150PF	125V	STYROSEAL CAP.
R37	10UUF	25V	PAPER CAPACITOR
R38	.047UF	25V	CAPACITOR
R39	.047UF	25V	CAPACITOR
R40	.047UF	25V	CAPACITOR
R41	.047UF	25V	CAPACITOR
R42	.047UF	25V	CAPACITOR
R43	.047UF	25V	CAPACITOR
R44	.047UF	25V	CAPACITOR
R45	.047UF	25V	CAPACITOR
R46	.047UF	25V	CAPACITOR
R47	.047UF	25V	CAPACITOR
R48	.047UF	25V	CAPACITOR
R49	.047UF	25V	CAPACITOR
R50	.047UF	25V	CAPACITOR
R51	.047UF	25V	CAPACITOR
R52	.047UF	25V	CAPACITOR
R53	.047UF	25V	CAPACITOR
R54	.047UF	25V	CAPACITOR
R55	.047UF	25V	CAPACITOR
R56	.047UF	25V	CAPACITOR
R57	.047UF	25V	CAPACITOR
R58	.047UF	25V	CAPACITOR
R59	.047UF	25V	CAPACITOR
R60	.047UF	25V	CAPACITOR
R61	.047UF	25V	CAPACITOR
R62	.047UF	25V	CAPACITOR
R63	.047UF	25V	CAPACITOR
R64	.047UF	25V	CAPACITOR
R65	.047UF	25V	CAPACITOR
R66	.047UF	25V	CAPACITOR
R67	.047UF	25V	CAPACITOR
R68	.047UF	25V	CAPACITOR
R69	.047UF	25V	CAPACITOR
R70	.047UF	25V	CAPACITOR
R71	.047UF	25V	CAPACITOR
R72	.047UF	25V	CAPACITOR
R73	.047UF	25V	CAPACITOR
R74	.047UF	25V	CAPACITOR
R75	.047UF	25V	CAPACITOR
R76	.047UF	25V	CAPACITOR
R77	.047UF	25V	CAPACITOR
R78	.047UF	25V	CAPACITOR
R79	.047UF	25V	CAPACITOR
R80	.047UF	25V	CAPACITOR
R81	.047UF	25V	CAPACITOR
R82	.047UF	25V	CAPACITOR
R83	.047UF	25V	CAPACITOR
R84	.047UF	25V	CAPACITOR
R85	.047UF	25V	CAPACITOR
R86	.047UF	25V	CAPACITOR
R87	.047UF	25V	CAPACITOR
R88	.047UF	25V	CAPACITOR
R89	.047UF	25V	CAPACITOR
R90	.047UF	25V	CAPACITOR
R91	.047UF	25V	CAPACITOR
R92	.047UF	25V	CAPACITOR
R93	.047UF	25V	CAPACITOR
R94	.047UF	25V	CAPACITOR
R95	.047UF	25V	CAPACITOR
R96	.047UF	25V	CAPACITOR
R97	.047UF	25V	CAPACITOR
R98	.047UF	25V	CAPACITOR
R99	.047UF	25V	CAPACITOR
R100	.047UF	25V	CAPACITOR

C1	10UUF	25V	POLYESTER CAP.
C2	10UUF	25V	POLYESTER CAP.
C3	10UUF	25V	POLYESTER CAP.
C4	10UUF	25V	POLYESTER CAP.
C5	10UUF	25V	POLYESTER CAP.
C6	10UUF	25V	POLYESTER CAP.
C7	10UUF	25V	POLYESTER CAP.
C8	10UUF	25V	POLYESTER CAP.
C9	10UUF	25V	POLYESTER CAP.
C10	10UUF	25V	POLYESTER CAP.
C11	10UUF	25V	POLYESTER CAP.
C12	10UUF	25V	POLYESTER CAP.
C13	10UUF	25V	POLYESTER CAP.
C14	10UUF	25V	POLYESTER CAP.
C15	10UUF	25V	POLYESTER CAP.
C16	10UUF	25V	POLYESTER CAP.
C17	10UUF	25V	POLYESTER CAP.
C18	10UUF	25V	POLYESTER CAP.
C19	10UUF	25V	POLYESTER CAP.
C20	10UUF	25V	POLYESTER CAP.
C21	10UUF	25V	POLYESTER CAP.
C22	10UUF	25V	POLYESTER CAP.
C23	10UUF	25V	POLYESTER CAP.
C24	10UUF	25V	POLYESTER CAP.
C25	10UUF	25V	POLYESTER CAP.
C26	10UUF	25V	POLYESTER CAP.
C27	10UUF	25V	POLYESTER CAP.
C28	10UUF	25V	POLYESTER CAP.
C29	10UUF	25V	POLYESTER CAP.
C30	10UUF	25V	POLYESTER CAP.
C31	10UUF	25V	POLYESTER CAP.
C32	10UUF	25V	POLYESTER CAP.
C33	10UUF	25V	POLYESTER CAP.
C34	10UUF	25V	POLYESTER CAP.
C35	10UUF	25V	POLYESTER CAP.
C36	10UUF	25V	POLYESTER CAP.
C37	10UUF	25V	POLYESTER CAP.
C38	10UUF	25V	POLYESTER CAP.
C39	10UUF	25V	POLYESTER CAP.
C40	10UUF	25V	POLYESTER CAP.
C41	10UUF	25V	POLYESTER CAP.
C42	10UUF	25V	POLYESTER CAP.
C43	10UUF	25V	POLYESTER CAP.
C44	10UUF	25V	POLYESTER CAP.
C45	10UUF	25V	POLYESTER CAP.
C46	10UUF	25V	POLYESTER CAP.
C47	10UUF	25V	POLYESTER CAP.
C48	10UUF	25V	POLYESTER CAP.
C49	10UUF	25V	POLYESTER CAP.
C50	10UUF	25V	POLYESTER CAP.

G1	3 GANG TUNING CAPACITOR
G2	300 X 200PF X 98 PF
G3	OSCILLATOR SECTION
T1	DRIVER TRANSFORMER JDR72
T2	OUTPUT TRANSFORMER TYPE 4323
T3	455 KC TRANSFORMER TYPE 923
T4	455 KC TRANSFORMER TYPE 923
T5	455 KC TRANSFORMER TYPE 923
T6	455 KC TRANSFORMER TYPE 923
T7	455 KC TRANSFORMER TYPE 923
T8	455 KC TRANSFORMER TYPE 923
T9	455 KC TRANSFORMER TYPE 923
T10	455 KC TRANSFORMER TYPE 923
T11	455 KC TRANSFORMER TYPE 923
T12	455 KC TRANSFORMER TYPE 923
T13	455 KC TRANSFORMER TYPE 923
T14	455 KC TRANSFORMER TYPE 923
T15	455 KC TRANSFORMER TYPE 923
T16	455 KC TRANSFORMER TYPE 923
T17	455 KC TRANSFORMER TYPE 923
T18	455 KC TRANSFORMER TYPE 923
T19	455 KC TRANSFORMER TYPE 923
T20	455 KC TRANSFORMER TYPE 923
T21	455 KC TRANSFORMER TYPE 923
T22	455 KC TRANSFORMER TYPE 923
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T27	455 KC TRANSFORMER TYPE 923
T28	455 KC TRANSFORMER TYPE 923
T29	455 KC TRANSFORMER TYPE 923
T30	455 KC TRANSFORMER TYPE 923
T31	455 KC TRANSFORMER TYPE 923
T32	455 KC TRANSFORMER TYPE 923
T33	455 KC TRANSFORMER TYPE 923
T34	455 KC TRANSFORMER TYPE 923
T35	455 KC TRANSFORMER TYPE 923
T36	455 KC TRANSFORMER TYPE 923
T37	455 KC TRANSFORMER TYPE 923
T38	455 KC TRANSFORMER TYPE 923
T39	455 KC TRANSFORMER TYPE 923
T40	455 KC TRANSFORMER TYPE 923
T41	455 KC TRANSFORMER TYPE 923
T42	455 KC TRANSFORMER TYPE 923
T43	455 KC TRANSFORMER TYPE 923
T44	455 KC TRANSFORMER TYPE 923
T45	455 KC TRANSFORMER TYPE 923
T46	455 KC TRANSFORMER TYPE 923
T47	455 KC TRANSFORMER TYPE 923
T48	455 KC TRANSFORMER TYPE 923
T49	455 KC TRANSFORMER TYPE 923
T50	455 KC TRANSFORMER TYPE 923

NOTE: ALL VOLTAGES CHECKED WITH 40000 Ω V. METER AT ZERO SIGNAL INPUT
DO NOT OPERATE SET WITHOUT SPEAKER CONNECTED.
 BAND COVERAGE 535 - 1630 KC/S
 IF FREQUENCY 455 KC/S
 TOTAL BATTERY CURRENT 13 MA FOR 9V BATTERY
 COLLECTOR CURRENT OF O/P STAGE FOR ZERO SING = 4MA
 TOTAL BATTERY CURRENT 13 MA FOR 6V BATTERY
 COLLECTOR CURRENT OF O/P STAGE = 4.5 MA
 ALL RESISTORS 1/2 WATT UNLESS OTHERWISE STATED

SERVICE HINTS

Extreme care should be taken to avoid accidental shorting of transistor elements to circuit ground. This is especially true of the output transistors. If a terminal of the driver transformer secondary should accidentally be grounded for a few seconds the output transistors would be permanently damaged.

Since a transistor needs only low voltage applied to its terminals for conduction, testing continuity of a circuit which includes a transistor can result in misleading indications and damage to the transistor. To avoid this remove the transistor from the circuit board before making continuity tests.

The first thing to check when the receiver is inoperative is the battery. With the receiver switched on a new battery should measure 9 volts - although the set will still operate at 5 volts.

Voltmeters used for test purposes must have a sensitivity of at least 20,000 ohms per volt. The use of low impedance meters will give misleading results as serious shunting effects will occur. When checking for a circuit fault causing excessive battery drain, an overall current measurement and supplementary voltage measurements should be made.

Signal tracing by signal injection from a signal generator is carried out on transistor radios in exactly the same manner as has been done for many years with conventional valve radios. The signal generator should be connected in series with a capacitor (.1 uf) to avoid shorting out bias voltages.

The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output, the battery current increases with increase in power output.

Transistors and printed circuit board can be damaged by excessive heat. Whenever soldering is necessary on the printed circuit board use a soldering iron which is both HOT and CLEAN. Do not hold the soldering iron on a soldering point any longer than is absolutely necessary. This minimises the amount of heat which will be radiated from the point of soldering. When soldering or unsoldering a transistor grasp the transistor lead with a pair of long-nose pliers to provide a heat sink. Excessive heat can damage a transistor.

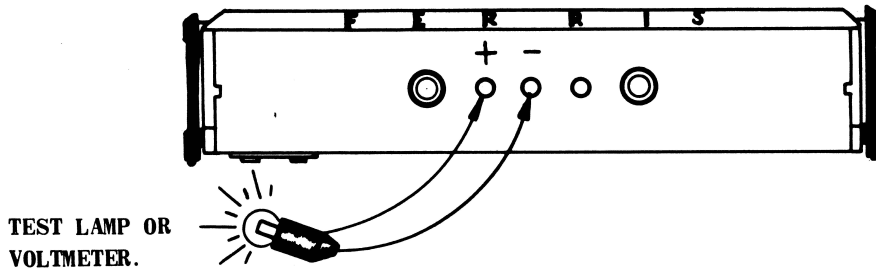
D. C. RESISTANCE OF WINDINGS

WINDING	DC RESISTANCE IN OHMS
Aerial filter choke (L1)	2.5
Aerial coil primary)	16
Aerial coil secondary total) (L2)	2.2
Ferrite bead choke (L3)	Less than 1 ohm
Ferrite rod aerial (L4)	1.4
RF coil primary total)	2.5
RF coil secondary) (L5)	Less than 1 ohm
Oscillator coil primary)	Less than 1 ohm
Oscillator coil secondary total) (L6)	5.5
IF1 primary total	8.5
IF1 secondary total	8.5
IF2 primary total	8.5
IF2 secondary total	8.5
IF3 primary total	7.5
IF3 secondary total	3.0
Driver transformer primary)	250
Driver transformer secondary total) (T1)	100
Speaker transformer primary total)	1.5
Speaker transformer secondary) (T2)	0.5

POWER CRADLE MODEL M 214

FOR USE WITH FERRIS MODEL 214 - 6 OR 12 VOLT PORTABLE CAR RADIO

The cradle is designed to mount under the dash of a motor vehicle. When the Ferris Model 214 - 6 or 12 volt Portable Car Radio is inserted into the cradle, automatic connection is made to the external car aerial, car battery and extension speaker. A 3 ohm external speaker MUST be used. The available power output from the set is increased approximately 3 times when it is in the cradle. Filters are incorporated in aerial, speaker and battery circuits of the cradle, thus ensuring effective suppression from electrical interference. For cradle polarity adjustment see instruction adjacent to bayonet connectors.



FRONT VIEW OF CRADLE

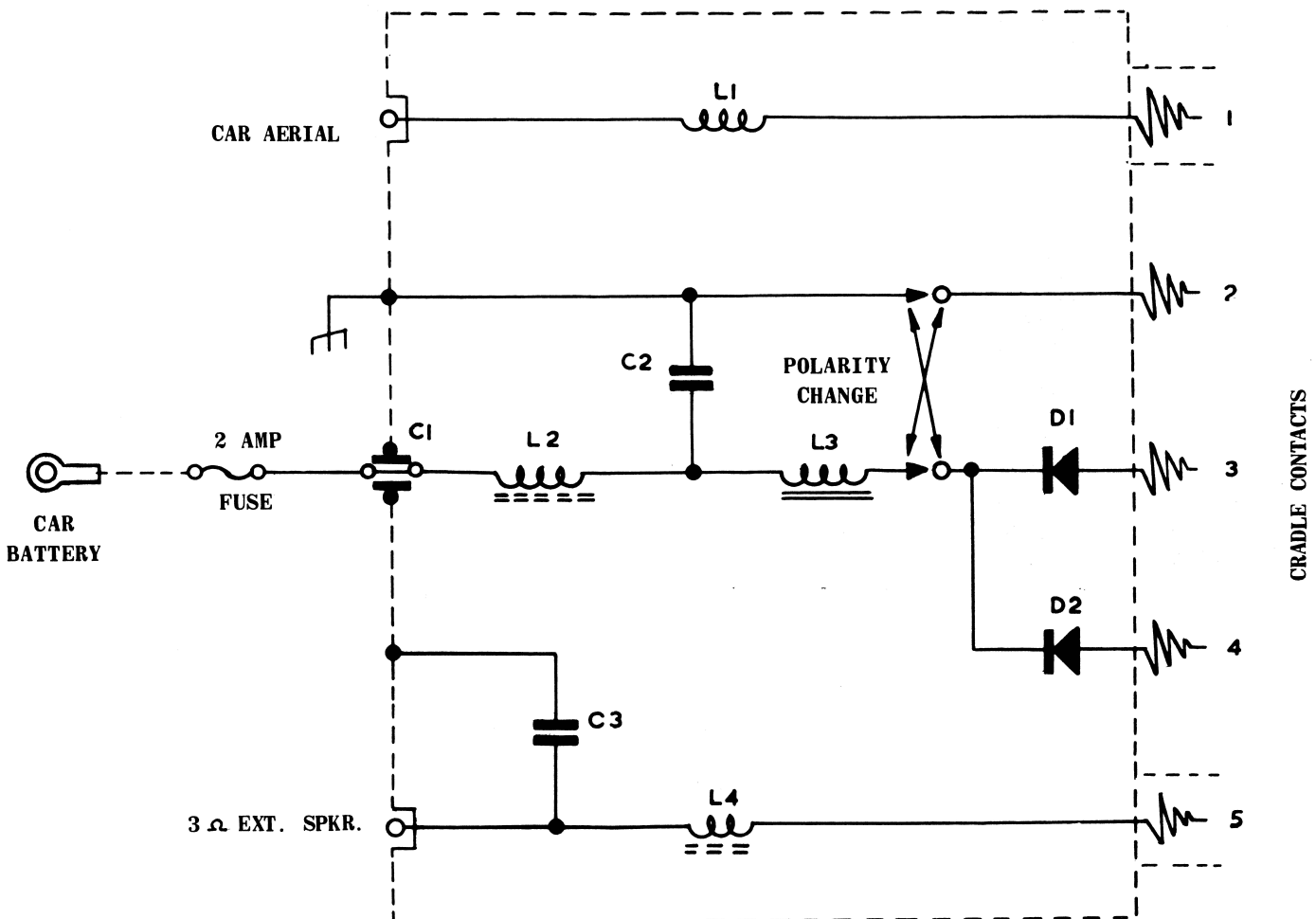
TO TEST CRADLE:

Connect either a voltmeter or 12 volt test lamp to the contacts as shown. No indication by test lamp or voltmeter means:

- (a) Wrong polarity adjustment on cradle (see instruction label).
- (b) Blown fuse.
- (c) Faulty battery connection.
- (d) Faulty cradle.

The above test is important as any of the suggested faults would result in no power reaching the set, hence reduced life of dry battery, i.e. set's own battery.

N.B. Do not operate set from car battery without internal dry battery fitted.

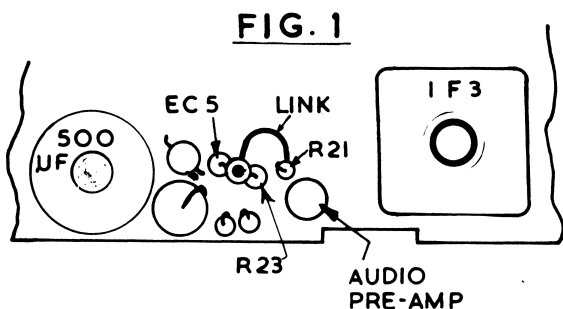
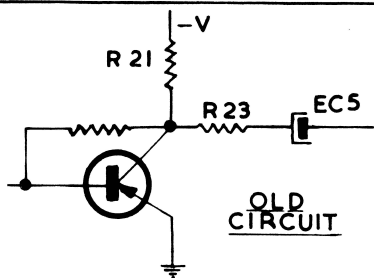


- C1 - .005 UF BUTTON CERAMIC CAPACITOR
- C2 - .1 UF 125V POLYESTER CAPACITOR
- C3 - .047 UF 25V CAPACITOR
- L1 - AERIAL FILTER CHOKE TYPE 6108
- L2 - RF CHOKE TYPE R859
- L3 - LF FILTER CHOKE TYPE 8117
- L4 - FERRITE BEAD CHOKE TYPE 6109
- D1, D2- SILICON DIODE TYPE BS1 OR HR10

MODIFICATION — MODEL 214 PORTABLE CAR RADIO.

AUDIO PRE-AMP MODIFICATIONS TO OBTAIN DISTORTION FREE OPERATION
AT VERY HIGH TEMPERATURES.

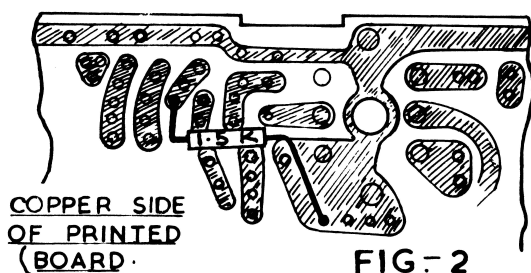
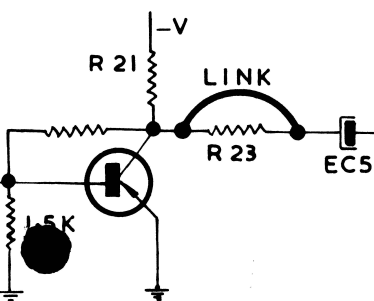
MODIFICATION FOR SETS MANUFACTURED PRIOR TO No. 8200



— NOTE —

(1) CONNECT A LINK FROM JUNCTION OF R23 & EC5 TO R21. — FIG. 1.

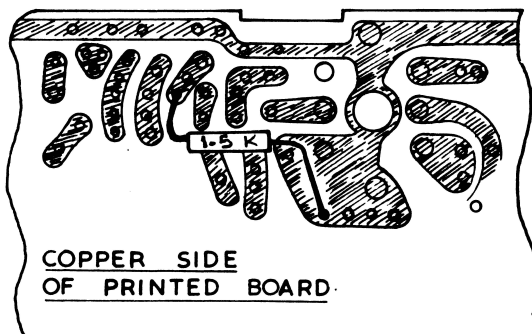
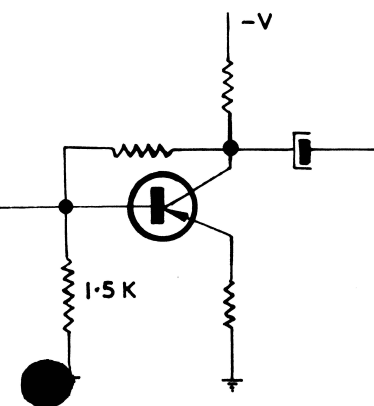
(2) CONNECT A 1.5 K RESISTOR FROM BASE OF AUDIO PRE-AMP TRANSISTOR TO POSITIVE RAIL — FIG. 2.



COPPER SIDE OF PRINTED BOARD.

FIG. 2

MODIFICATION FOR SETS MANUFACTURED FROM No 8201 TO 10600



COPPER SIDE OF PRINTED BOARD.

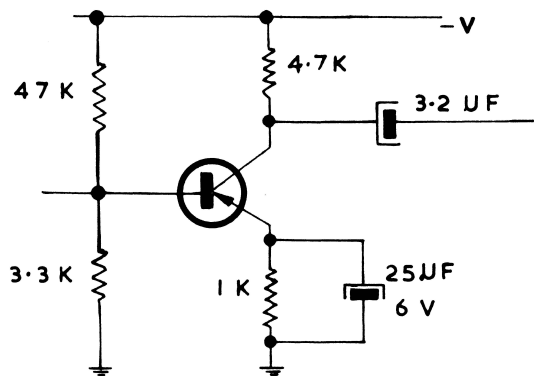
FIG. 3

— NOTE —

(1) CONNECT A 1.5 K RESISTOR FROM BASE OF AUDIO PRE-AMP TRANSISTOR TO POSITIVE RAIL — FIG. 3.

TO CARRY OUT THIS MODIFICATION, REMOVE REAR LID ONLY.

ALL SETS MANUFACTURED FROM No 10,601 DO NOT REQUIRE MODIFICATION.



PRE-AMP CIRCUIT FROM — No. 10,601

ADD THIS SHEET TO YOUR M.214 SERVICE MANUAL.

TELEPHONE
93-0221
(10 Lines)
CABLES & TELEGRAMS
"CARADIO." BROOKVALE

Ferris Bros. Pty. Limited

MANUFACTURERS OF CAR RADIO RECEIVERS

752 PITTWATER ROAD, BROOKVALE. N.S.W.



DEAR FERRIS RETAILER,

Since the onset of summer heat a minor problem has arisen under certain conditions with some of our Model 214 Portable Car Radios (up to Serial No. 10,600).

The trouble is evident only after the set has been shut up for some time in a closed car in hot sunshine. Symptom is distortion, from mild to severe, during the cooling down period after the car windows are lowered. The distortion vanishes and full volume is restored once the temperature around the set returns to normal.

The cure is simple - merely a matter of bridging out one resistor and fitting another as detailed on the attached modification sheet. This problem is not one of thermal runaway, in fact the exact reverse, so absolutely no damage to the radio or its components including transistors can occur.

Attached to this letter is a resistor of the correct value to carry out this modification. Your request will bring by return post as many more resistors as you require. The job is simple but if you prefer we will be pleased to carry it out for you upon receipt of any sets exhibiting the symptoms described. Any such sets should be despatched freight paid to your nearest Ferris branch or distributor.

Please accept our apologies,
FERRIS BROS. PTY. LIMITED.

P.S. If your Service Department has not received a Service Manual for the Model 214 please advise us so we can forward a copy by return mail.