Removal of Canopy & Dial Scale:

Move dial pointer to extreme high frequency end of dial. Remove tuning and volume knobs (knobs pull off). Remove screws marked "A" FIG. 4. Lift dial scale at tuning spindle end and remove as shown in FIG. 4A. Lift canopy clear of set.

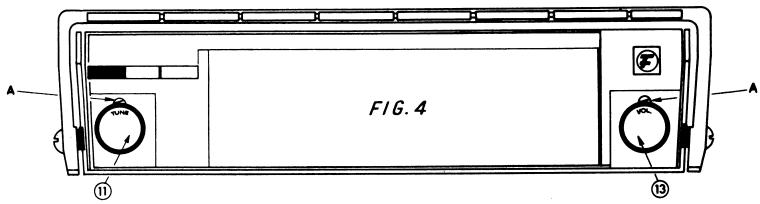


FIG. 4

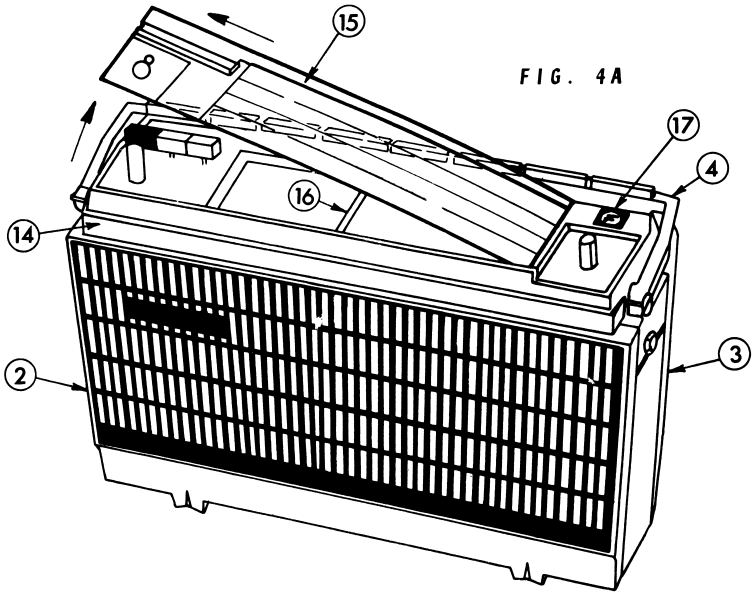


FIG. 4A

Dial Cord Replacement:

Remove canopy and dial scale as previously described. Re-string dial in accordance with FIG. 5A. When the tuning spindle is rotated 3½ turns from its full anti-clockwise position, the tension spring and pointer are then in their mid position of traverse. The 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.

Before replacing the canopy, set the pointer to the extreme high frequency end of the tuning range. Fit canopy, then with the aid of tweezers bring the pointer through the clearance slot so that it lodges on the face of the canopy backplate. Replace dial scale, screws and knobs.

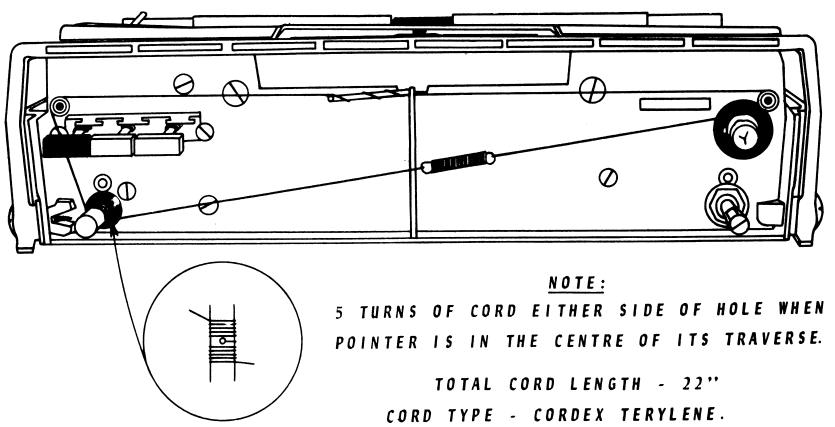


FIG. 5A

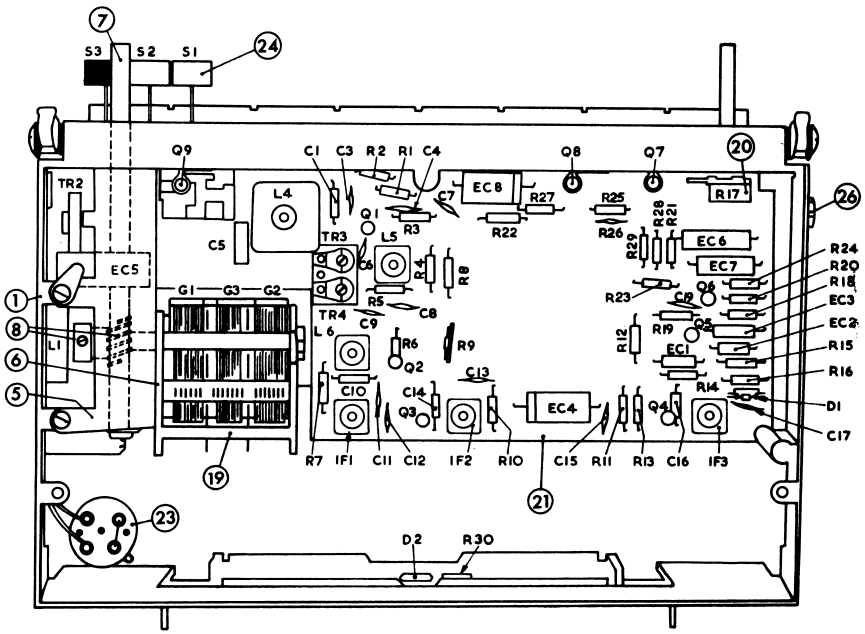
NOTE:

5 TURNS OF CORD EITHER SIDE OF HOLE WHEN POINTER IS IN THE CENTRE OF ITS TRAVERSE.

TOTAL CORD LENGTH - 22"

CORD TYPE - CORDEX TERYLENE.

12lb. BREAKING STRAIN.



Alignment Procedure:

For all alignment operations, connect the earth side of the signal generator to frame or case of set. Keep the generator output as low as possible to avoid A.V.C. action. Set volume control at maximum.

Use correct 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		Gang fully	IF3 all cores
2	via .1 uf capacitor	455 KHz	open	IF2 on top
3				IF1 peak
4	Repeat above adjustments until no further increase can be obtained.			
5	Aerial socket via dummy aerial	525 KHz	Gang fully closed.	Osc. Coil L6
6	"	1620 KHz	Gang fully open.	Osc. Trimmer TR4
7	Repeat steps 5 & 6 until band limits are 525-1620 KHz.			
8	Aerial socket via dummy aerial	600 KHz	600 KHz	* R.F. Coil L5 * Aer. Coil L4
9		1500 KHz	1500 KHz	TR3 & TR2
* Rock gang back and forth through signal. Repeat steps 8 & 9 until no further increase can be obtained. Check sensitivity at 1500, 1000 and 600 KHz.				

Ferritenna Alignment:

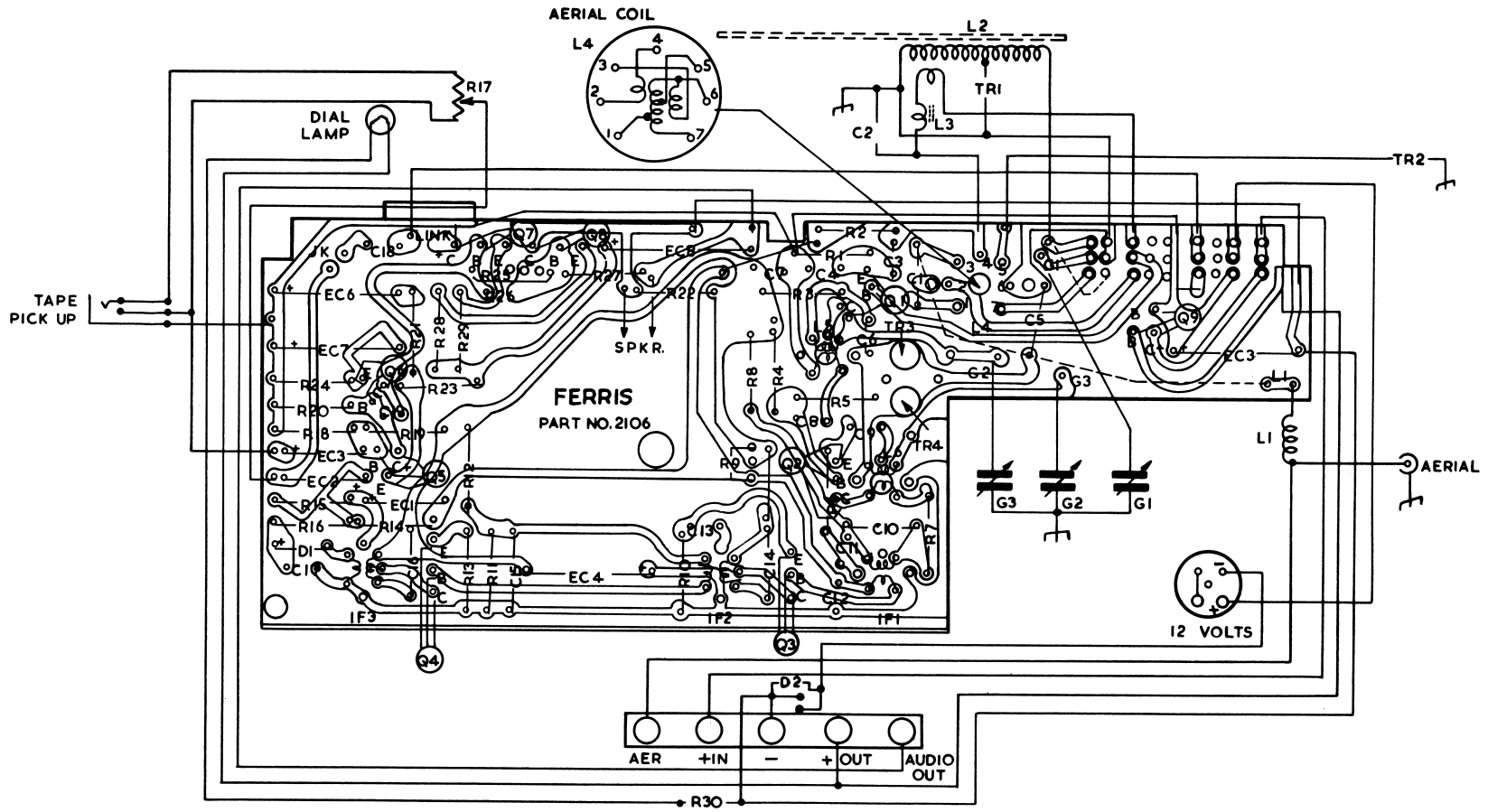
Set aerial button to "UP" position. If the Ferrite rod aerial has not been replaced due to breakage then it is only necessary to peak the Trimmer TR1 at approx. 1500 KHz. This can be done by peaking up on a distant B/C station operating near 1500 KHz. Note that the Ferritenna must be in the fully open position to gain access to trimmer. The diecast rear grille MUST be in place during Ferritenna alignment, otherwise set will be unstable.

Replacement of Ferrite Rod Aerial:

When a rod has to be replaced because of breakage, proceed as follows:

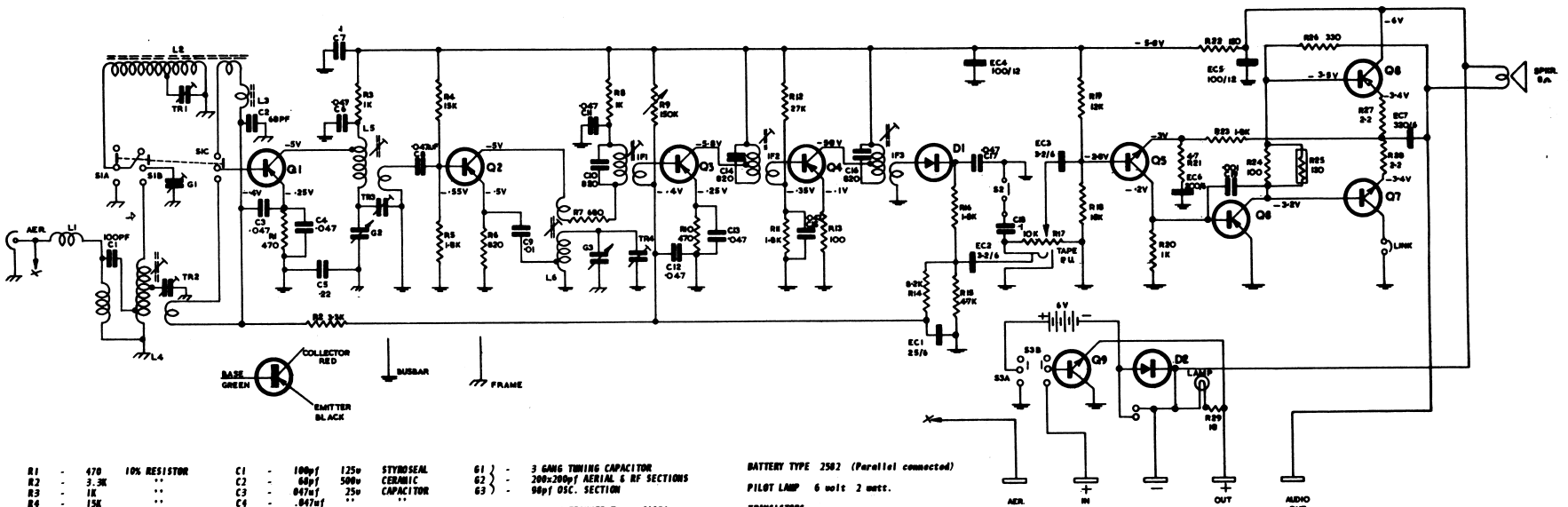
1) Remove canopy.
2) Remove rear grille.
3) Remove 7 screws from the under side of the Ferritenna plastic housing.
4) Slacken screws marked "C" FIG. 6.

The top half of the Ferritenna housing can now be removed to allow replacement of a broken Ferrite rod. If the winding has been damaged then this must, of course, be replaced. When installing a new coil observe correct terminating and, in particular, correct phasing of low impedance link winding.



COMPONENT LAYOUT VIEWED FROM PRINTED WIRING SIDE OF BOARD

FERRIS - TRANSISTOR CAR RADIO - MODEL 274 (6V)



R1	-	470	10% RESISTOR	C1	-	100pf	125v	STYROSEAL	G1 } - 3 GANG TUNING CAPACITOR
R2	-	3.3K	"	C2	-	68pf	500v	CERAMIC	G2 } - 200x200pf AERIAL & RF SECTIONS
R3	-	1K	"	C3	-	047uf	25v	CAPACITOR	G3 } - 98pf OSC. SECTION
R4	-	15K	"	C4	-	.047uf	"	"	
R5	-	1.8K	"	C5	-	.22uf	50v	"	TR1 - 5.5pf TRIMMER Type 31954
R6	-	820	"	C6	-	.047uf	25v	"	TR2 - 5.5pf " Type 31954
R7	-	680	"	C7	-	.1uf	"	"	TR3 } - 2.2pf
R8	-	1K	"	C8	-	.047uf	"	"	TR4 } - DUAL ROTARY TRIMMER Type AT2-12
R9	-	150K	VARIABLE	C9	-	.01uf	"	"	
R10	-	470	10% RESISTOR	C10	-	820pf	125v	STYROSEAL	S1A }
R11	-	1.8	"	C11	-	.047uf	25v	CAPACITOR	S1B } - 3 POLE - 2 POSITION SWITCH
R12	-	27K	"	C12	-	.047uf	"	"	S1C }
R13	-	100	"	C13	-	.047uf	"	"	
R14	-	8.2K	"	C14	-	820pf	125v	STYROSEAL	S2 - 1 POLE - 2 POSITION SWITCH
R15	-	4.7K	"	C15	-	.047uf	25v	CAPACITOR	
R16	-	1.8K	"	C16	-	820pf	125v	STYROSEAL	S3A } - 2 POLE - 2 POSITION SWITCH
R17	-	10K	POTENTIOMETER	C17	-	.047uf	25v	CAPACITOR	S3B }
R18	-	18K	10% RESISTOR	C18	-	.1uf	"	"	
R19	-	12K	"	C19	-	.001uf	500v	CERAMIC	L1 - AERIAL CHOKE Type 6108
R20	-	1K	"						L2 - ROD AERIAL COIL Type 7127
R21	-	4.7	"	EC1	-	25uf	6v	ELECTRO	L3 - FERRITE BEAD CHOKE Type 6109
R22	-	120	"	EC2	-	3uf	6v	"	L4 - AERIAL COIL Type 7128
R23	-	1.8K	"	EC3	-	3uf	6v	"	L5 - R.F. COIL Type 7206
R24	-	100	"	EC4	-	100uf	12v	"	L6 - OSC. COIL Type 7332
R25	-	130	THERMISTOR	EC5	-	100uf	12v	"	
R26	-	330	10% RESISTOR	EC6	-	200uf	6v	"	IF1 - 455 KHz TRANSFORMER Type 9141
R27	-	2.2	"	EC7	-	320uf	6v	"	IF2 - 455 KHz " " 9141
R28	-	2.2	"						IF3 - 455 KHz " " 9142
R29	-	18	"						

BATTERY TYPE 2S2 (Parallel connected)

PILOT LAMP 6 volt 2 watt.

TRANSISTORS

Q1	-	2N1637	
Q2	-	2N1639	- AF116
Q3	-	2N1638	- AF117
Q4	-	2N1638	- AF117
Q5	-	2N 649	- AC172
Q6	-	2N 406	- AC125
Q7	-	AC 187	- AC127
Q8	-	AC 188	- AC128
Q9	-	AC 187	

DIODES

D1	-	OA90
D2	-	OA91

BAND COVERAGE 525-1620 KHz
IF FREQUENCY 455 KHz

ZERO SIGNAL BATTERY CURRENT 16 MA FOR 6v SUPPLY
" " COLLECTOR CURRENT OF O/P STAGE 3 - 6 MA.

ALL RESISTORS ½ WATT RATING UNLESS OTHERWISE STATED
ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE STATED.

VOLTAGE CHECKED WITH 20,000 O.P.V. METER AT ZERO SIGNAL INPUT

DO NOT OPERATE SET WITHOUT SPEAKER CONNECTED.

D.C. RESISTANCE OF WINDINGS

WINDING		D C. RESISTANCE IN OHMS:
Aerial Choke (L1)		2.5
Rod Aerial (L2)		2.0
Aerial Coil Primary } (L4)		21.0
" " Secondary (total) }		2.5
R.F Coil Primary (total) (L5)		5.4
" " Secondary }		0.3
Osc. Coil Primary } (L6)		0.4
" " Secondary (total)		3.0
IF1 Primary (total)		2.1
IF1 Secondary		0.3
IF2 Primary (total)		2.1
IF2 Secondary		0.3
IF3 Primary (total)		2.1
IF3 Secondary		1.0

F19. g

FERRIS MODEL 274

MODIFICATION - M274 DIAL LAMP CIRCUIT (NOVEMBER 1967.)

Some reports from the field indicate malfunction of the discriminator circuit which is used for solid state switching of the dial lamp. In such cases the dial lamp remains on, when the set is being used as a portable, either as a dull glow or near full brilliance, depending on degree of leakage through the AC187.

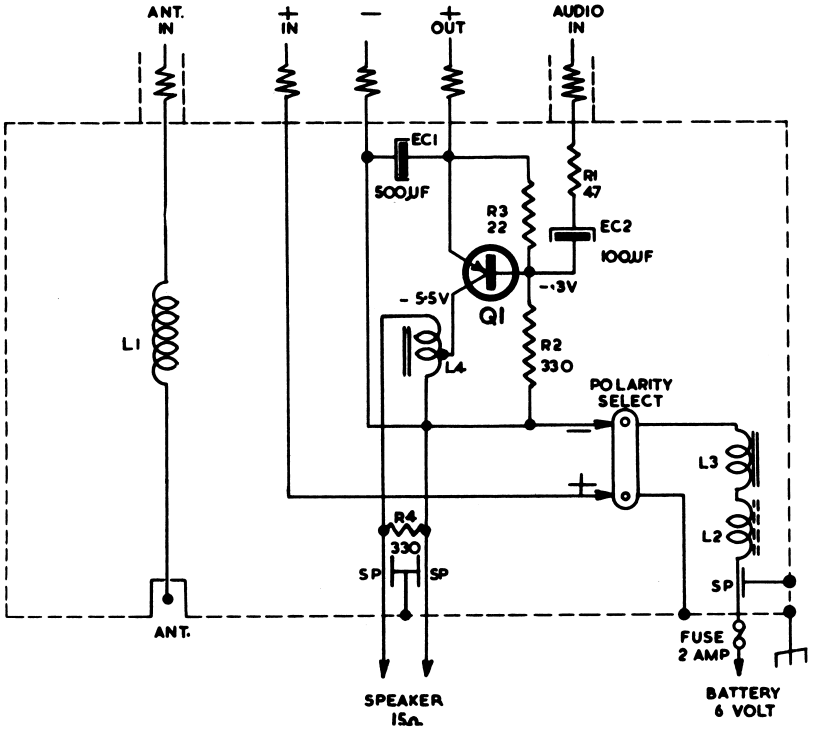
It is considered possible that some damage may occur to the AC187, by a voltage spike developed across the iron cored filter choke in cradle, if the set is removed from the cradle while still switched ON. Apparently this is done accidently by some owners, and quite deliberately by others, to retain continuity of a news item, etc., when leaving the car.

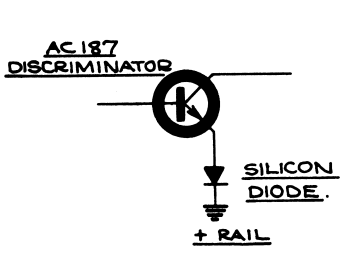
A faulty dry battery, i.e. with internal current flow to metal case, can cause leakage to develop across the AC187. Remember too, this transistor must be firmly mounted in its heat sink to avoid any possible damage.

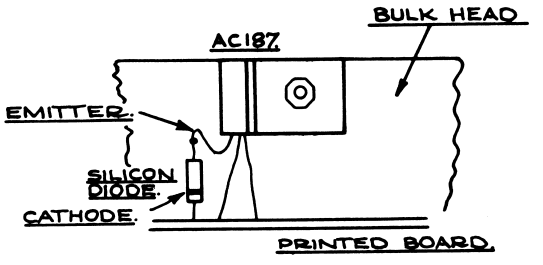
Rather than replace a leaking AC187, the recommended modification, as in current production, is as follows:-

The insertion of a 50 volt .75 Amp Silicon Diode (EM4005), or similar, between the emitter of the discriminator and positive rail of the set, will completely offset the leakage problem - thus ensuring normal life expectancy of the dry battery.

Note: Anode of diode connects to emitter, cathode connects to positive rail. (See diagram).







M274 Cradle 6 Volt

R1	47 OHM	10%	RESISTOR
R2	330 OHM	10%	RESISTOR
R3	22 OHM	10%	RESISTOR
R4	330 OHM	10%	RESISTOR
EC1	500 uf	16v	ELECTROLYTIC
EC2	100 uf	12v	ELECTROLYTIC
L1	AERIAL FILTER CHOKE		Type 6108
L2	R.F. CHOKE		Type 828
L3	FILTER CHOKE		Type 8136
L4	OUTPUT CHOKE		Type 4335

D.C. RESISTANCE OF WINDINGS

Winding:	D.C. Resistance in OHMS:
L1	2.5
L2	less than 0.2
L3	0.5
L4	0.85

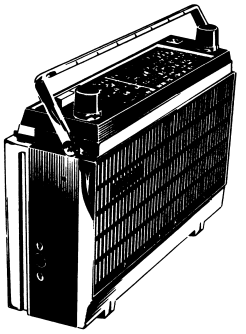
TOTAL CURRENT CONSUMPTION WITH SET IN CRADLE 600 MA APPROXIMATELY.

N.B.

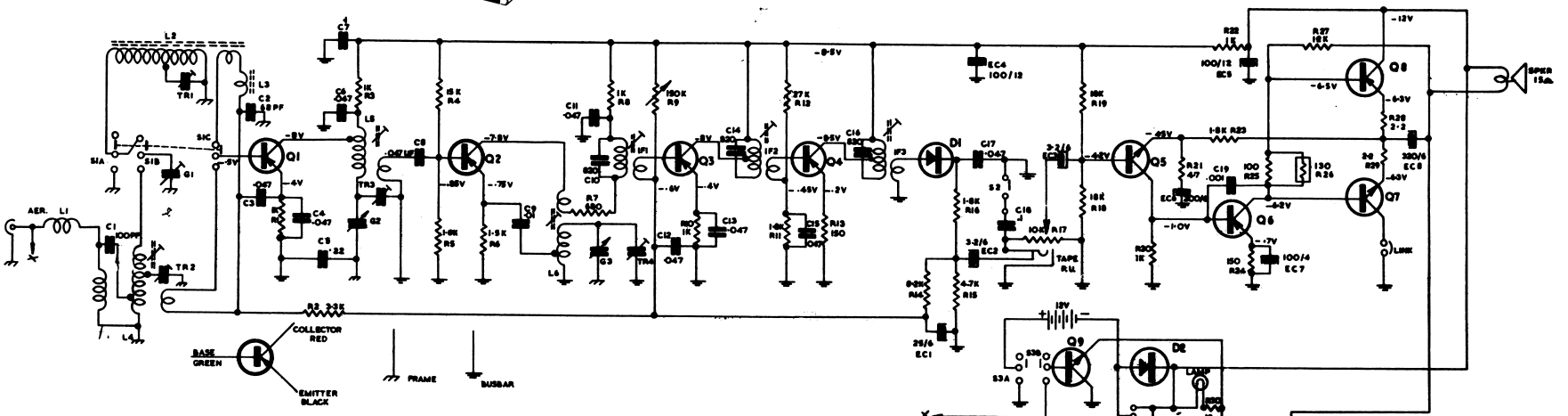
The AC187 functions as a discriminator with either the emitter or collector connected to positive rail. All sets are wired with the AC187 emitter connected to positive rail, (now via the diode), as illustrated in this modification, and not with collector to positive rail as shown in the M274 Service Manual, and on printed board screening.

F19. e

FERRIS MODEL 274



CAR RADIO - MODEL 274 (12 V)



R1	-	1K	10% RESISTOR		
R2	-	3.3K	"		
R3	-	1K	"		
R4	-	15K	"		
R5	-	1.8K	"		
R6	-	1.5K	"		
R7	-	680	"		
R8	-	1K	"		
R9	-	150K	VARIABLE		
R10	-	1K	10% RESISTOR		
R11	-	1.8K	"		
R12	-	27K	"		
R13	-	150	"		
R14	-	8.2K	"		
R15	-	4.7K	"		
R16	-	1.8K	"		
R17	-	10K	POTENTIOMETER		
R18	-	18K	10% RESISTOR		
R19	-	18K	"		
R20	-	1K	"		
R21	-	4.7	"		
R22	-	1K	"		
R23	-	1.8K	"		
R24	-	150	"		
R25	-	100	"		
R26	-	130	THERMISTOR		
R27	-	1.2K	10% RESISTOR		
R28	-	2.2	"		
R29	-	2.2	"		
R30	-	18	"		

C1	-	100pf	125v	STYROSEAL
C2	-	68pf	500v	CERAMIC
C3	-	047uf	25v	CAPACITOR
C4	-	047uf	"	"
C5	-	.22uf	50v	"
C6	-	.047uf	25v	"
C7	-	.1uf	"	"
C8	-	.047uf	"	"
C9	-	.01uf	"	"
C10	-	820pf	125v	STYROSEAL
C11	-	.047uf	25v	CAPACITOR
C12	-	.047uf	"	"
C13	-	.047uf	"	"
C14	-	820pf	125v	STYROSEAL
C15	-	.047uf	25v	CAPACITOR
C16	-	820pf	125v	STYROSEAL
C17	-	.047uf	25v	CAPACITOR
C18	-	.1uf	"	"
C19	-	.001uf	500v	CERAMIC
EC1	-	25uf	6v	ELECTRO
EC2	-	3uf	6v	"
EC3	-	3uf	6v	"
EC4	-	100uf	12v	"
EC5	-	100uf	12v	"
EC6	-	200uf	6v	"
EC7	-	100uf	4v	"
EC8	-	320uf	6v	"

G1 }	-	3 GANG TUNING CAPACITOR
G2 }	-	208x208pf AERIAL & RF SECTIONS
G3 }	-	98pf OSC. SECTION
TR1	-	5.55pf TRIMMER Type 31954
TR2	-	5.55pf " Type 31954
TR3 }	-	2.20pf
TR4 }	-	DUAL ROTARY TRIMMER Type AT2-12
S1A }		
S1B }	-	3 POLE - 2 POSITION SWITCH
S1C }		
S2	-	1 POLE - 2 POSITION SWITCH
S3A }	-	2 POLE - 2 POSITION SWITCH
S3B }		
L1	-	AERIAL CHOKE Type 6108
L2	-	ROD AERIAL COIL Type 7127
L3	-	FERRITE BEAD CHOKE Type 6109
L4	-	AERIAL COIL Type 7128
L5	-	R.F. COIL Type 7206
L6	-	OSC. COIL Type 7332
IF1	-	455 KHz TRANSFORMER Type 9141
IF2	-	455 KHz " " 9141
IF3	-	455 KHz " " 9142

BATTERY TYPE 2S82 (Series connected)

PILOT LAMP 12volt 2 watt.

TRANSISTORS

Q1	-	2N1637	
Q2	-	2N1639	- AF116
Q3	-	2N1638	- AF117
Q4	-	2N1638	- AF117
Q5	-	2N 649	- AC172
Q6	-	2N 496	- AC125
Q7	-	AC 187	- AC127
Q8	-	AC 188	- AC128
Q9	-	AC 187	

DIODES

D1	-	OA90
D2	-	OA91

BAND COVERAGE 525-1620 KHz
IF FREQUENCY 455 KHz

ZERO SIGNAL BATTERY CURRENT 12 MA FOR 12v SUPPLY
" " COLLECTOR CURRENT OF O/P STAGE 2.5 - 4 Ma.

ALL RESISTORS ½ WATT RATING UNLESS OTHERWISE STATED
ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE STATED.

VOLTAGE CHECKED WITH 20,000 O.P.V. METER AT ZERO SIGNAL INPUT

DO NOT OPERATE SET WITHOUT SPEAKER CONNECTED.

D.C. RESISTANCE OF WINDINGS

WINDING	D.C. RESISTANCE IN OHMS:
Aerial Choke (L1)	2.5
Rod Aerial (L2)	2.0
Aerial Coil Primary (L4)	21.0
" " Secondary (total) (L4)	2.5
R.F. Coil Primary (total) (L5)	5.4
" " Secondary (L5)	0.3
Osc. Coil Primary (L6)	0.4
" " Secondary (total) (L6)	3.8
IF1 Primary (total)	2.1
IF1 Secondary	0.3
IF2 Primary (total)	2.1
IF2 Secondary	0.3
IF3 Primary (total)	2.1
IF3 Secondary	1.0

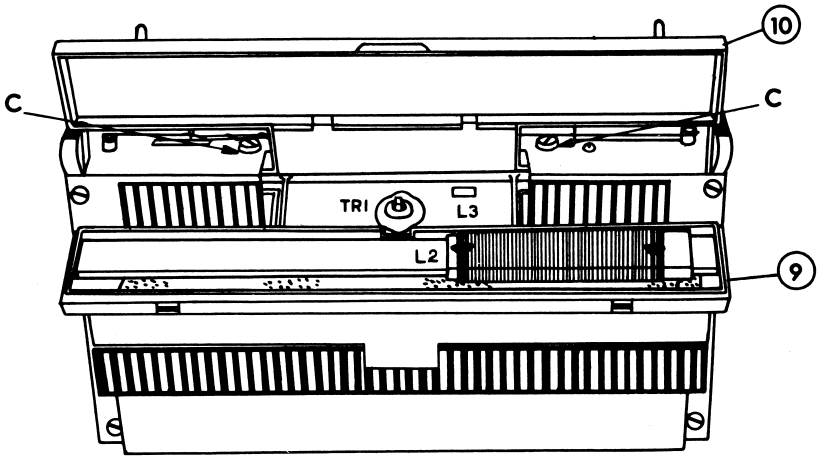


FIG. 6

Complete Ferritenna Alignment:

(1) Replace top half of Ferritenna housing, but do not insert the small screws.

(2) Tighten screws "C" just sufficiently to hold plastic halves together.

(3) Replace rear grille.

(4) Stand set in normal operating position and open Ferritenna as shown in FIG. 6. A small cardboard box or similar non-metallic object may be required to support the Ferritenna assembly during alignment.

(5) Connect signal generator to aerial socket at side of set. Adjust volume for maximum output.

(6) Set aerial button to UP position.

(7) Tune receiver and signal generator to 600 KHz.

(8) Slide winding along slab for maximum signal.

(9) Tune receiver and signal generator to 1500 KHz.

(10) Adjust TR1 for maximum output.

(11) Repeat Steps 6 to 9 until no further output can be obtained.

(12) Seal position of winding with electrical adhesive tape and replace estafoam packing strips.

(13) Close plastic halves and replace small fixing screws. Ensure that none of the terminating leads are strained or severed in so doing.

(14) Tighten screws "C" to give adequate friction loading of Ferritenna assembly.

(15) Finally, check TR1 setting whilst tuned to a distant station near 1500 KHz.

(16) Replace canopy.

NOTE - when aligning the Ferritenna as described, the output from the signal generator will need 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.

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.

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, replace if 6 volts or less on 12 volt set, or 3 volts on 6 volt set.

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 over all current measurement and supplementary voltage measurements should be made. A quick way to check battery current is to turn set off, set volume to minimum, then place a suitable milliammeter across the on/off switch contacts.

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.

ROUTINE SERVICE ADJUSTMENTS

Battery Test:

The condition of the battery can be quickly checked by switching the set on and connecting a voltmeter to the test points indicated in FIG. 3. Replace if reading is 6 volts or lower on 12 volt set, or 3 volts on 6 volt set.

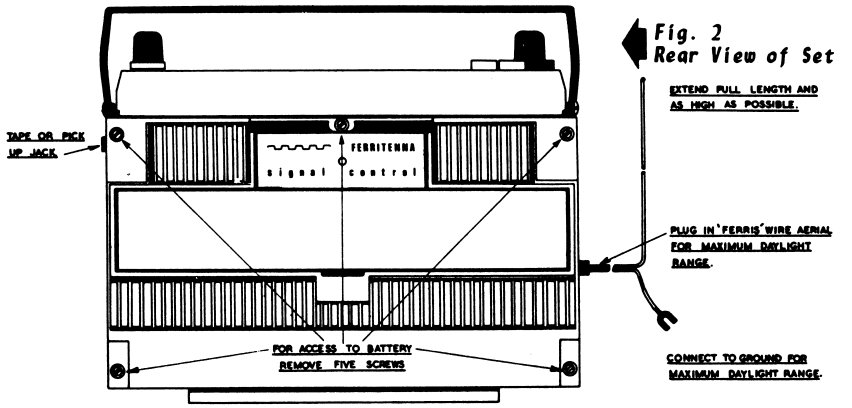


Fig. 2
Rear View of Set

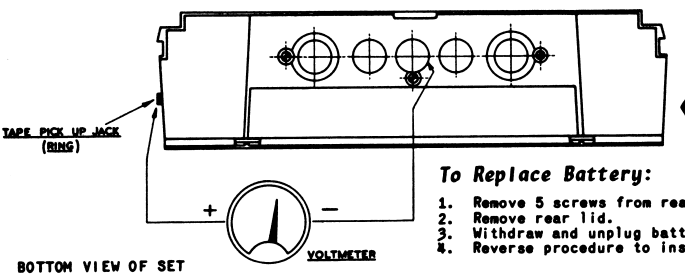


Fig. 3
Battery Test

To Replace Battery:

1. Remove 5 screws from rear lid.
2. Remove rear lid.
3. Withdraw and unplug battery.
4. Reverse procedure to install new battery.

Battery Replacement:

To replace battery, follow instructions as shown in FIGS. 2 & 3. After releasing screws, turn the set over and gently shake them free of rear grille. N.B. When replacing the rear grille, ensure that the screw threads are properly engaged before screwing down firmly.

Removal of Speaker Grille:

First remove rear lid as previously described. Remove 2 screws marked "B" in FIG. 5. Speaker grille can then be pressed outward from case, and the speaker disconnected by unfastening the voice coil leads. Connecting lugs pull off. Printed board is then accessable from both sides and any component can be replaced when the set is dismantled to this point.

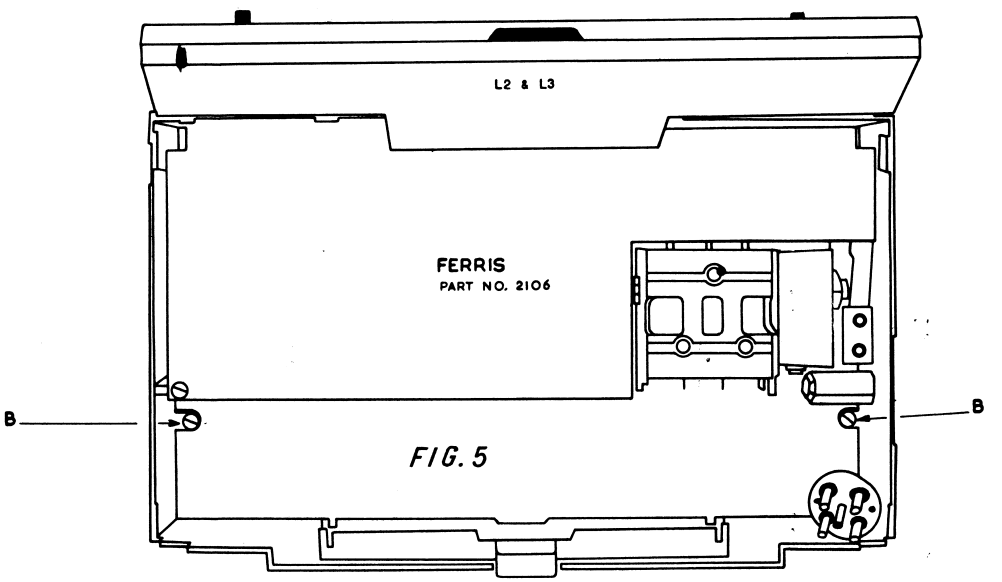


FIG. 5