

FIG. 6.

M182/189 COMPONENT LAYOUT

SERVICE HINTS

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 possible damage to the transistor. To avoid this, remove the transistor from the circuit board before making continuity tests.

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.

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.

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.

3. Select required dial scale and snap off along score line. (When breaking scales off, bend the material in the direction which results in the "V" score OPENING not closing. This procedure will result in a clean break along the scale.
4. Fit new dial scale.

To Set Push-Buttons for any Desired Stations:

1. Tune receiver manually to first desired station by means of tuning knob, starting from left hand end of dial scale.
2. With pointer on station pull No. 1 button (from left) straight out. Button will move about $\frac{1}{2}$ ".
3. Now push this same button right in as far as it will go.
4. Repeat the above sequence with 2nd, 3rd, 4th and 5th stations. Readjust on any station if necessary by repeating (2) and (3) above.

N.B. Slight sideways movement of tuning knob ensures drag-free push-button action and accurate repeat tuning.

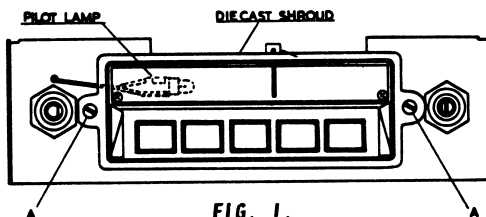
Dial Scale (M182):

The Model 182 is supplied with 6 dial scales (one for each state) including the one already fitted.

To change dial scales follow same procedure as for Model 189 shown above.

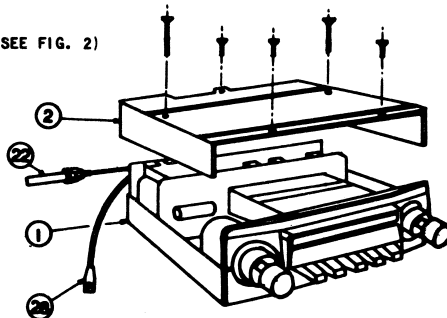
Dial Lamp:

1. Remove knobs and escutcheon.
2. Remove 2 screws marked "A" (FIG. 1).
3. Remove diecast shroud.
4. Replace dial lamp.



REMOVAL OF TOP LID:

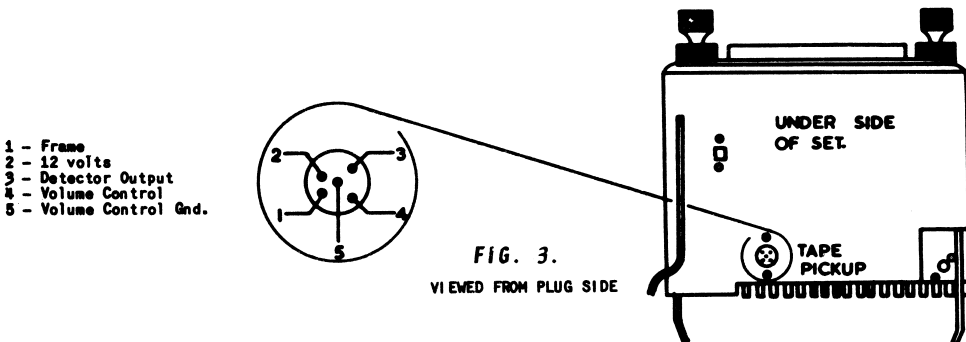
Take out 5 machine screws from top of set. Lift lid. (SEE FIG. 2)



CONNECTION FOR TAPE PLAYER:

Normally a small brass "U" link is used across the miniature 5 pin socket to complete the circuit between detector load and volume control. When a tape player is used in conjunction with the set the link is, of course, removed. Selective switching within the tape player supplants the "U" link.

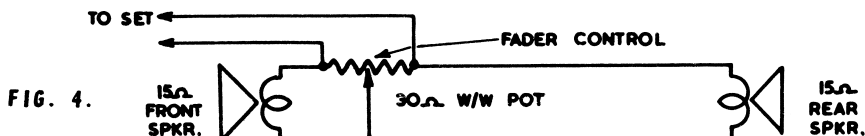
Note that the Pins 1 & 2 are marked "12 VOLTS" and "FRAME" respectively (FIG. 3). If the receiver is operated in NEG. GND. mode, then Pin 2 is positive with respect to grounded Pin 1. For POS. GND. mode, Pin 2 becomes negative with respect to grounded Pin 1. The voltage at Pins 1 & 2 is used to operate the tape player, so that correct polarity must be observed.



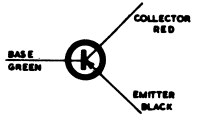
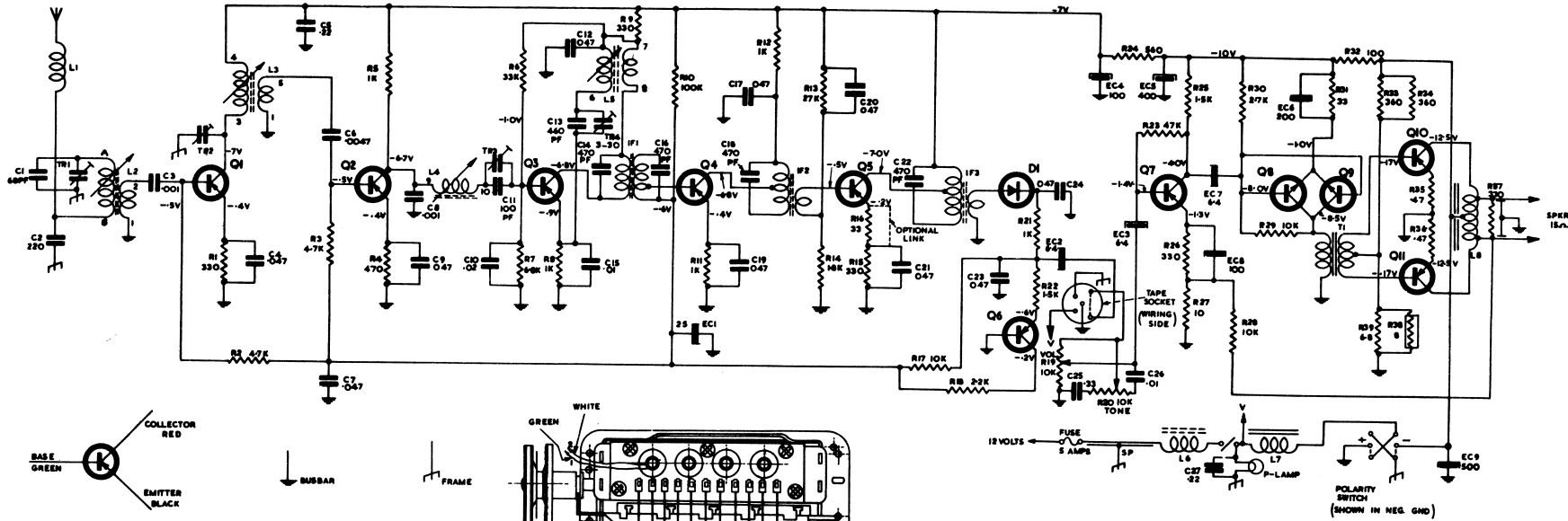
SPEAKER CONNECTION:

The optimum speaker load impedance for Models 182 & 189 is 15 ohms. More than one speaker may be operated simultaneously from the set, providing the lump impedance does not fall below 10 ohms.

A suitable front and rear speaker arrangement with fader control is shown in FIG. 4.

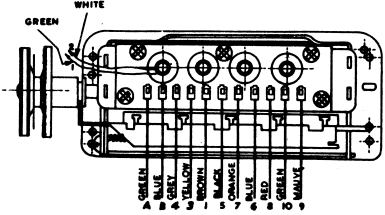


FERRIS - TRANSISTOR CAR RADIO - MODELS 182-189



↓ BUSBAR

↓ FRAME



R1 - 330	10% RESISTOR	R21 - 1K	10% RESISTOR	C1 - 68 pf	125V. POLYSTYRENE	C22 - 470 pf	125V. POLYSTYRENE	T1 - DRIVER TRANSFORMER 5120	O1 - 2N1637	DIAL LAMP 12V. - 2W.
R2 - 4.7K	10% RESISTOR	R22 - 1.5K	10% RESISTOR	C2 - 220 pf	125V. POLYSTYRENE	C23 - .047 uf	25V. CAPACITOR	O2 - 2N1637	O2 - 2N1637	BAND COVERAGE 525 - 1610 KHz
R3 - 4.7K	10% RESISTOR	R23 - 47K	10% RESISTOR	C3 - 1000 pf	125V. POLYSTYRENE	C24 - .047 uf	25V. CAPACITOR	I F1 - 455 KHz TRANSFORMER 9130	O3 - 2N1639 AF116	IF FREQUENCY 455 KHz
R4 - 470	10% RESISTOR	R24 - 560	10% RESISTOR	C4 - .047 uf	25V. CAPACITOR	C25 - .33 uf	50V. CAPACITOR	I F2 - 455 KHz TRANSFORMER 9131	O4 - 2N1638 AF117	TOTAL BATTERY CURRENT 330 ma for 12V. Input.
R5 - 1K	10% RESISTOR	R25 - 1.5K	10% RESISTOR	C5 - .22 uf	50V. CAPACITOR	C26 - .01 uf	50V. CAPACITOR	I F3 - 455 KHz TRANSFORMER 9132	O5 - 2N1638 AF117	COLLECTOR CURRENT of a/p Stage 140 ma at zero signal
R6 - 3.3K	10% RESISTOR	R26 - 350	10% RESISTOR	C6 - .0047 uf	125V. POLYSTYRENE	C27 - .22 uf	50V. CAPACITOR	L1 - AERIAL CHOKE 6100	O6 - 2N4066 AC125	ALL RESISTORS 1/2 watt unless otherwise stated
R7 - 6.8K	10% RESISTOR	R27 - 10	10% RESISTOR	C7 - .047 uf	25V. CAPACITOR	EC1 - .25 uf	6V. ELECTRO	L2 - PERMEABILITY	O7 - 2N4066 AC125	IF AV1113
R8 - 1K	10% RESISTOR	R28 - 10K	10% RESISTOR	C8 - 1000 pf	125V. POLYSTYRENE	EC2 - 6.4 uf	6V. ELECTRO	L3 - TUNER	O8 - AV1113	ALL VOLTAGES checked with 20,000 O.P.V. meter at zero signal input.
R9 - 330	10% RESISTOR	R29 - 10K	10% RESISTOR	C9 - .047 uf	25V. CAPACITOR	EC3 - 6.4 uf	6V. ELECTRO	L4 - Push-Button No. R2227	O9 - 2N3011 AT1138	
R10 - 100K	10% RESISTOR	R30 - 2.7K	10% RESISTOR	C10 - .02 uf	25V. CAPACITOR	EC4 - 100 uf	12V. ELECTRO	L5 - N.F. CHOKE 828	O10 - 2N3011 AT1138	
R11 - 1K	10% RESISTOR	R31 - 33	10% RESISTOR	C11 - 100 pf	125V. POLYSTYRENE	EC5 - 400 uf	18V. ELECTRO	L6 - L.F. CHOKE 0134	O11 - 2N3011 AT1138	
R12 - 1K	10% RESISTOR	R32 - 100	10% RESISTOR	C12 - .047 uf	25V. CAPACITOR	EC6 - 200 uf	6V. ELECTRO	L7 - O.P. CHOKE 4545	D1 - IN604 OADR	
R13 - 27K	10% RESISTOR	R33 - 360	10% RESISTOR 1 WATT	C13 - 460 pf	125V. POLYSTYRENE ± 2%	EC7 - 100 uf	6V. ELECTRO			
R14 - 1.4K	10% RESISTOR	R34 - 360	10% RESISTOR 1 WATT	C14 - 470 pf	125V. POLYSTYRENE	EC8 - 6.4 uf	6V. ELECTRO			
R15 - 330	10% RESISTOR	R35 - 0.47	10% RESISTOR	C15 - .01 uf	50V. POLYESTER	EC9 - 500 uf	10V. ELECTRO			
R16 - .53	10% RESISTOR	R36 - 0.47	10% RESISTOR	C16 - 470 pf	125V. POLYSTYRENE					
R17 - 10K	10% RESISTOR	R37 - 330	10% RESISTOR	C17 - .047 uf	25V. CAPACITOR					
R18 - 2.2K	10% RESISTOR	R38 - 0.0	THERMISTOR	C18 - 470 pf	125V. POLYSTYRENE					
R19 - 10K	POTENTIOMETER/	R39 - 0.0	10% RESISTOR	C19 - .047 uf	25V. CAPACITOR					
R20 - 40K	POTENTIOMETER/			C20 - .047 uf	25V. CAPACITOR					
				C21 - .047 uf	25V. CAPACITOR					

Concentric R2226

PRINTED BOARD:

For ease of servicing the vertical printed circuit board can be easily withdrawn clear of its mountings. When replacing the board ensure that lead dress to the tuner is correct, and that no wires are caught or pinched between the edge of it and the metal case. If the small harness of wires connecting the tuner and board is not arranged in accordance with FIG. 6, R.F. instability could result. Again, if it is necessary to disconnect leads which terminate on the board, check the wire colours against the code numbers on the copper side of board when re-terminating (see FIG. 5).

Model 182 is identical to Model 189 in every respect, except for the deletion of the push-button mechanism.

F11

Ferris 182 & 189

ALIGNMENT PROCEDURE

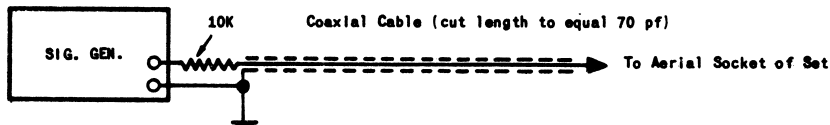
For all alignment operations, connect the earth side of the signal generator to the frame or case of receiver, and keep the generator output as low as possible to avoid A.V.C. action. Set volume control at maximum.

N.B. USE PROPER ALIGNMENT TOOL FOR MAKING ADJUSTMENTS. CORES ARE EASILY BROKEN BY IMPROPER HANDLING MAKING REPLACEMENT OF ENTIRE COIL OR TRANSFORMER NECESSARY

STEP	CONNECT SIG. GEN. TO:	TUNE SIG. GEN TO:	TUNE RECEIVER TO:	ADJ. FOR MAX. OUTPUT
1	Base of Q3 (2N1699) (mixer) via .1 uf capacitor	455 KHz	HF end of band	IF3 (one core)
2				IF2 (one core)
3				IF1 on outer peaks
4 REPEAT ABOVE ADJUSTMENTS UNTIL NO FURTHER INCREASE CAN BE OBTAINED				
5	Aerial socket via dummy aerial (see diagram)	525 KHz	Tune receiver to maximum. LF end of band.	Osc. Trimmer TR4
MAX. HF LIMIT SHOULD NOW BE 1610 KHz APPROX.				
6	Aerial socket via dummy aerial (see diagram)	1400 KHz	1400 KHz	2nd RF Trimmer TR3 1st RF Trimmer TR2 Ant. Trimmer TR1
CHECK SENSITIVITY AT 1400, 900 & 550 KHz.				

N.B. Cores of permeability tuner are accurately aligned and sealed at factory and should not require adjustment. If however, a core is replaced due to breakage, it should be peaked at 1200 KHz. Seal with paint or lacquer.

Dummy Aerial Arrangement for Alignment of Models 182/189:



D.C. Resistance of Windings in Ohms:

Aerial Filter Choke (L1)	2.5	
Ant. Coil Primary) (L2)	8.5	M189
Ant. Coil Secondary)	0.5	
1st R.F. Coil Primary) (L3)	8.5	Permeability Tuner No. 2227 push-button or
1st R.F. Coil Secondary)	0.25	
2nd R.F. Coil (L4)	8.5	M182 Permeability Tuner No. R2233 manual
Oscillator Coil Primary) (L5)	1.0	
Oscillator Coil Secondary)	4.0	
H.F. Choke (L6)	-	
L.F. Choke (L7)	0.5	
O.P. Choke (L8) total	1.8	
I.F. 1 Primary total	5.0	
I.F. 1 Secondary total	5.0	
I.F. 2 Primary total	5.0	
I.F. 2 Secondary total	0.5	
I.F. 3 Primary total	5.0	
I.F. 3 Secondary total	2.3	
T1 Driver Transformer Primary	36.0	
T1 Driver Transformer Secondary total	12.0	

FERRIS



F11

11 TRANSISTOR "VOLUMATIC" MODELS

182 MANUAL



189 - PUSH BUTTON



SPECIFICATIONS

INTERMEDIATE FREQUENCY: 455 KHz

TUNING RANGE: 525 - 1610 KHz

TUNING DRIVE RATIO:

TRANSISTOR COMPLEMENT:

- 1 x 2N1637 1st RF Amplifier
- 1 x 2N1637 2nd RF Amplifier
- 1 x 2N1639 Converter
- 1 x 2N1638 1st IF Amplifier
- 1 x 2N1638 2nd IF Amplifier
- 1 x 2N406 Audio A.V.C.
- 1 x 2N406 Audio Amplifier
- 2 x SE1113 Audio Drivers (Parallel Connected)
- 2 x 2N301 P.P. Power Output

DIODES:

- 1 x OA90 Detector & A.G.C.

CONSUMPTION:

330 ma including dial lamp
For 12 volts at zero signal.

POWER OUTPUT:

Undistorted 8 watts.
Maximum 10 watts.

DIMENSIONS:

7" x 5½" x 2"

LOUD SPEAKER:

Size and type to suit vehicle.
Voice Coil Impedance 15 Ohms.

WEIGHT: 5 lbs.

DESCRIPTION

The FERRIS MODELS 182 (MANUAL) and 189 (PUSH-BUTTON) are compact, rugged 11 TRANSISTOR CAR RADIOS designed to mount either in-dash or under-dash in a motor vehicle. An all diecast two piece case with integral heat sinking is used to house the electronic and mechanical components.

Removal of the lid permits excellent accessibility for ease of servicing, whilst the vertically mounted component board can be lifted out clear of the case for detailed inspection. Polarity adjustment is external and is appropriately marked on the under side of the receiver. A miniature 5 pin socket is provided for connection of a tape player.

CIRCUIT DESCRIPTION:

The 11 transistor circuit features two medium gain low noise R.F. amplifiers, placed ahead of a conventional autodyne mixer stage. Full A.G.C. is used to control both R.F. stages to promote good signal handling and excellent signal-to-noise performance. The mixer stage is followed by two stages of I.F. amplification. The 1st I.F. amplifier is subject to A.G.C. control which is derived from the signal diode circuit.

A transistor which forms part of the detector diode load acts as a variable impedance device, and presents a constant audio voltage at the volume control over widely varying input levels to the aerial circuit.

The audio amplifier consists of a pre-amplifier stage, followed by a large signal driver stage comprising two transistors parallel connected. Transformer coupling to the Class AB push-pull output stage is used for simplicity, and to provide good thermal stability at elevated temperatures. Choke output ensures maximum power transfer to a 15 ohm speaker load.

CONTROLS

- Tuning:** A diecast metal knob operates permeability tuner via anti-backlash gear system.
- Volume & On/Off Switch:** A diecast concentric knob controls receiver volume and on/off switch.
- Tone Control:** A continuously variable tone control is concentric with volume control.
- Push-Buttons (M189):** Push-buttons permit automatic selection of any 5 stations.
- External Connections:** Aerial and speaker connectors are at rear of set. Aerial compensating trimmer is adjacent to aerial lead and battery lead is adjacent to speaker outlet.
- Tape Player Connection:** A 5 pin miniature socket located on the under side of set is for connection of a suitable auto tape player.
- Polarity Selection:** By means of a small slide switch located on under-side of set. A small screw-driver is required to move the switch nib to the required setting.
- Dial Scale (M189):** The Model 189 is supplied with 6 dial scales (one for each state) including the one which is already fitted.

- To change dial scale:-
1. Remove the 2 screws which secure dial scale.
 2. Remove dial scale.

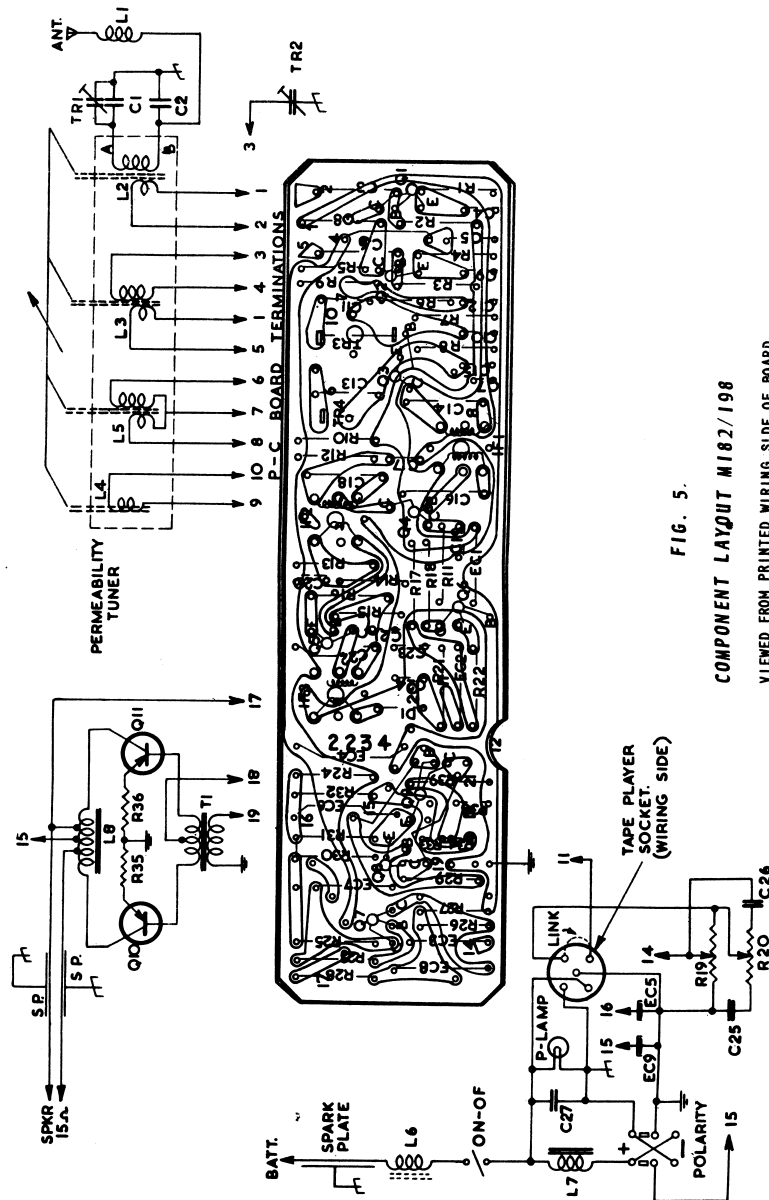


FIG. 5.

COMPONENT LAYOUT M182/198

VIEWED FROM PRINTED WIRING SIDE OF BOARD