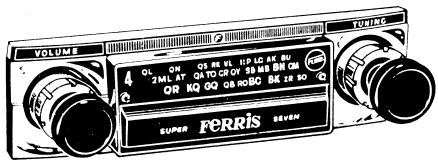
FERRIS "Super Seven

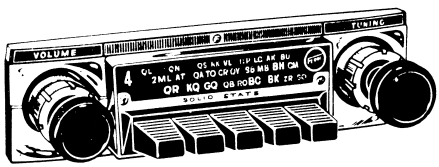
SOLID STATE CAR RADIOS

222 MANUAL

229 PUSH BUTTON

AUSTRALIAN MADE





SPECIFICATIONS

TUNING RANGE 520–1620 KHz

INTERMEDIATE FREQUENCY 455 KHz

TRANSISTOR COMPLEMENT

1 x 2N1637 RF Amplifier
1 x 2N1639 Converter
1 x 2N1638 1st IF Amplifier
1 x 2N1638 2nd IF Amplifier
1 x 2N406 Audio Amplifier
1 x AC128 Audio Driver
1 x 2N301 Power Output

DIODE

1 x 1N60A Detector & AGC

CONSUMPTION

900 ma incl. dial lamp for 12v at zero signal

LOUD SPEAKER

Size & Type to suit vehicle.
Voice Coil Impedance 15 Ohms.

TUNING RATIO

$4\frac{1}{2}$ turns of knob for full pointer traverse (229)

6 turns of knob for full pointer traverse (222)

POWER OUTPUT

Undistorted 3 watts
Maximum 5 watts

DIMENSIONS

7" x $5\frac{1}{2}$" x 2"

WEIGHT $4\frac{3}{4}$ lbs.

DESCRIPTION

FERRIS MODELS 222 (MANUAL) and 229 (PUSH-BUTTON) are compact 7 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 underside of the receiver. A miniature 5 pin socket is provided for connection of an auto tape player.

Circuit Description

The 7 transistor circuit features a tuned R.F. stage followed by a conventional autodyne mixer stage and thence a two stage I.F. amplifier. A.G.C. which is derived from the diode detector circuit is applied to the R.F. and 1st I.F. amplifier stages.

The audio section is comprised of a pre-amplifier A.C. coupled to an audio driver transistor. Direct coupling is used between driver and output stage. D.C. feed-back over the last stage of the audio amplifier provides excellent thermal stability over wide temperature ranges.

CONTROLS

Tuning (229): Knob operates push-button permeability tuner via anti-backlash gear system.

Tuning (222): Knob operates permeability tuner by means of smooth worm drive. Dial pointer is operated via cord and pulley system.

Volume: Concentric knob controls receiver volume and on off switch.

Tone Control: A continuously variable tone control is concentric with volume control.

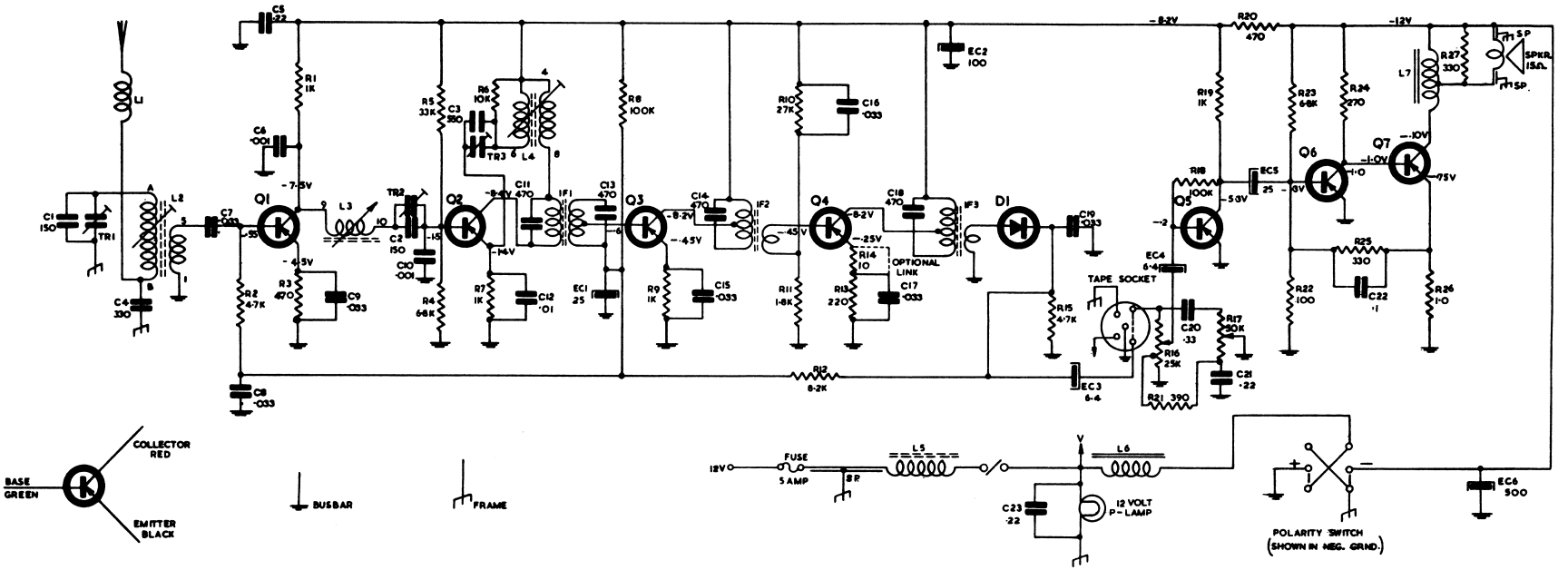
Push-Buttons: Push-buttons permit automatic selection of any 5 stations.

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 screwdriver is required to move the switch nib to the required setting.

FERRIS - TRANSISTOR CAR RADIO - MODELS 222-229



REAR VIEW OF TUNER.

R1 - 1K 10% RESISTOR
R2 - 4.7K 10% RESISTOR
R3 - 470 10% RESISTOR
R4 - 6.8K 10% RESISTOR
R5 - 33K 10% RESISTOR
R6 - 10K 10% RESISTOR
R7 - 1K 10% RESISTOR
R8 - 100K 10% RESISTOR
R9 - 1K 10% RESISTOR
R10 - 27K 10% RESISTOR
R11 - 1.8K 10% RESISTOR
R12 - 8.2K 10% RESISTOR
R13 - 330 10% RESISTOR
R14 - 10 10% RESISTOR
R15 - 4.7K 10% RESISTOR
R16 - 25K POTENTIOMETER TAPPED 8K) Concentric
R17 - 50K POTENTIOMETER) R2500
R18 - 100K 10% RESISTOR
R19 - 1K 10% RESISTOR
R20 - 470 10% RESISTOR
R21 - 390 10% RESISTOR
R22 - 100 10% RESISTOR
R23 - 6.8K 10% RESISTOR
R24 - 270 10% RESISTOR
R25 - 330 10% RESISTOR
R26 - 1.0 1 WATT RESISTOR
R27 - 330 10% RESISTOR

C1 - 150pf 125V POLYSTYRENE)
C2 - 150pf 125V POLYSTYRENE) -2%
C3 - 550pf 125V POLYSTYRENE)
C4 - 330pf 125V POLYSTYRENE)
C5 - .22uf 50V CAPACITOR
C6 - .001uf 63V CAPACITOR
C7 - .033uf 50V CAPACITOR
C8 - .033uf 50V CAPACITOR
C9 - .033uf 50V CAPACITOR
C10 - .001uf 63V CAPACITOR
C11 - 470pf 125V POLYSTYRENE
C12 - .01uf 50V POLYESTER
C13 - 470pf 125V POLYSTYRENE
C14 - 470pf 125V POLYSTYRENE
C15 - .033uf 50V CAPACITOR
C16 - .033uf 50V CAPACITOR
C17 - .033uf 50V CAPACITOR
C18 - 470pf 125V POLYSTYRENE
C19 - .033uf 50V CAPACITOR
C20 - .33uf 50V CAPACITOR
C21 - .22uf 50V CAPACITOR
C22 - .1uf 25V CAPACITOR
C23 - .22uf 50V CAPACITOR

EC1 - 25uf 6V ELECTRO
EC2 - 100uf 12V ELECTRO
EC3 - 6.4uf 6V ELECTRO
EC4 - 6.4uf 6V ELECTRO
EC5 - 25uf 6V ELECTRO
EC6 - 500uf 16V ELECTRO

TR1 - 3 PLATE TRIMMER Type 39375 MSP
TR2 - 3 PLATE TRIMMER Type CWA 12-120pf
TR3 - AIR TRIMMER 3-30pf

IF1 - 455 KHz TRANSFORMER 9129
IF2 - 455 KHz TRANSFORMER 9131
IF3 - 455 KHz TRANSFORMER 9132

L1 - AERIAL CHOKE 6108
L2 -)
L3 -) PERMEABILITY TUNER Manual Type ME3
L4 -) Push-Button Type R2227
L5 - HF CHOKE 828
L6 - LF CHOKE 8134
L7 - O.P. CHOKE 4345

Q1 - 2N1637
Q2 - 2N1639 AF116
Q3 - 2N1638 AF117
Q4 - 2N1638 AF117
Q5 - 2N406 AC125
Q6 - 2N408 AC128
Q7 - 2N301 AT1138

D1 - 1N60A OA90

DIAL LAMP 12V-1.2W
BAND COVERAGE 520 - 1620 KHz
IF FREQUENCY 455 KHz
TOTAL BATTERY CURRENT 900 ma for 12v input
COLLECTOR CURRENT OF O/P STAGE 750 ma
ALL RESISTORS ½ WATT unless otherwise stated
ALL RESISTOR VALUES IN OHMS
ALL VOLTAGES CHECKED with 20,000 O.P.V. meter at zero signal input.

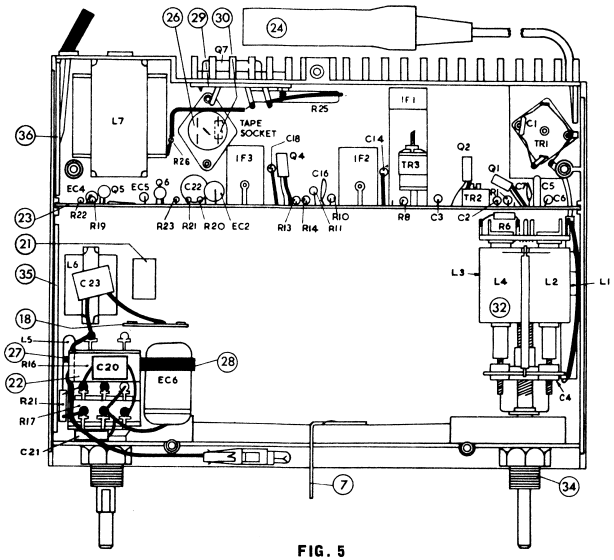


FIG. 5

M222 COMPONENT LAYOUT

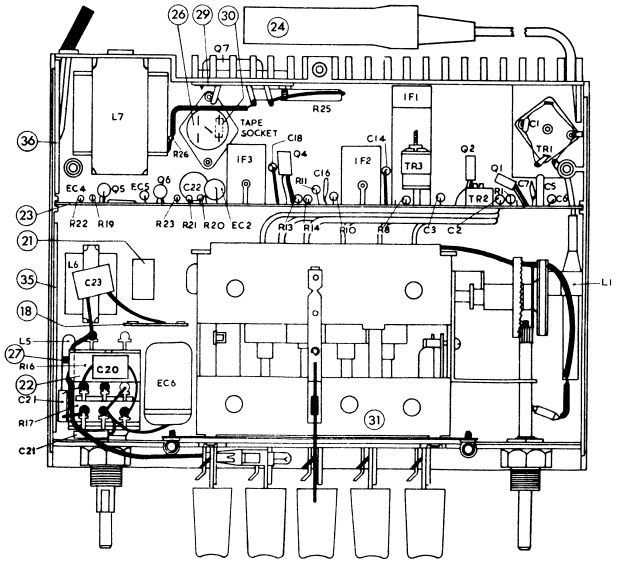


FIG. 6 M229 COMPONENT LAYOUT

Dial Scale (229):

The Model 229 is supplied with 6 dial scales (one for each state) including the one already fitted.

To change dial scale:–

1. Remove the 2 screws which secure dial scale.
2. Remove dial scale.
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 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 ½''.
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 station. . 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 (222):

The Model 222 is supplied with 6 dial scales (one for each state) including the one already fitted.

To change dial scales follow the same procedure as for Model 229 above.

Dial Lamp:

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

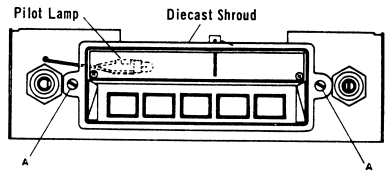


FIG. 1

REMOVAL OF TOP LID:

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

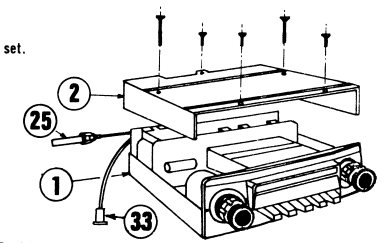
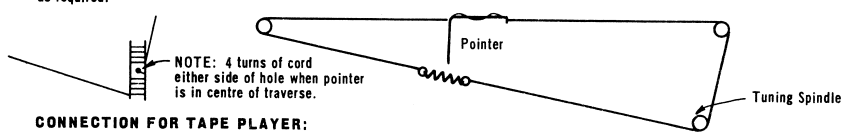


FIG. 2

REPLACEMENT OF DIAL CORD (222):

Re-string dial in accordance with diagram. When the tuning spindle is rotated 3 turns clockwise form 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.



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.

1. Frame.
2. 12 volts.
3. Detector output.
4. Volume control.
5. Volume control ground.

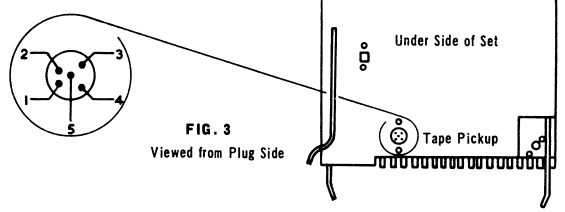


FIG. 3

Viewed from Plug Side

SPEAKER CONNECTION:

The optimum speaker load impedance for Models 222 and 229 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.

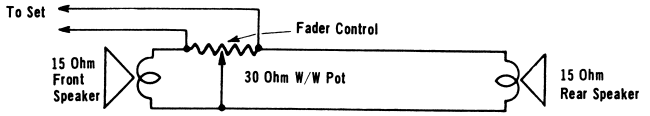


FIG. 4

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 (M229), 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. 7).

ALIGNMENT PROCEDURE:

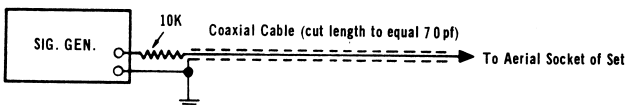
For all alignment operations, connect the earth side of the signal generator to the frame or case of receiver, and keep the generator output as low as possible to avoid A.V.C. action. Set volume control at maximum.

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. 2. 3.	Junction of C2 & L3 via .1 uf capacitor	455 KHz	HF end of Band	IF3 (one core) IF2 (one core) IF1 (on outer peaks)
4.	REPEAT ABOVE ADJUSTMENTS UNTIL NO FURTHER INCREASE CAN BE OBTAINED			
5.	Aerial Socket via dummy aerial (see diagram)	1620 KHz	Tune receiver to maximum. HF end of band.	Osc. Trimmer TR3
	MAX. LF LIMIT SHOULD NOW BE 520 KHz APPROX.			
6.	Aerial Socket via dummy aerial (see diagram)	1400 KHz	1400 KHz	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 222/229:



D.C. Resistance of Windings in Ohms:

Aerial Filter Choke	(L1)	2.5	
Ant. Coil Primary	(L2)	7.0	M222
Ant. Coil Secondary	(L2)	0.4	M222
R.F. Coil	(L3)	7.0	M222
Oscillator Coil Primary	(L4)	1.5	M222 Permeability Tuner
Oscillator Coil Secondary	(L4)	2.5	M222 Permeability Tuner
Ant. Coil Primary	(L2)	7.0	M229
Ant. Coil Secondary	(L2)	0.5	M229
R.F. Coil	(L3)	7.0	M229 Permeability Tuner
Oscillator Coil Primary	(L4)	1.5	M229 Permeability Tuner No. 64600/028 Push-Button
Oscillator Coil Secondary	(L4)	2.5	M229 Permeability Tuner No. 64600/028 Push-Button
H.F. Choke	(L5)		
L.F. Choke	(L6)	0.5	
O.P. Choke	(L7) total	2.2	
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		0.5	
I.F. 3 Primary Total		5.0	
I.F. 3 Secondary		2.3	

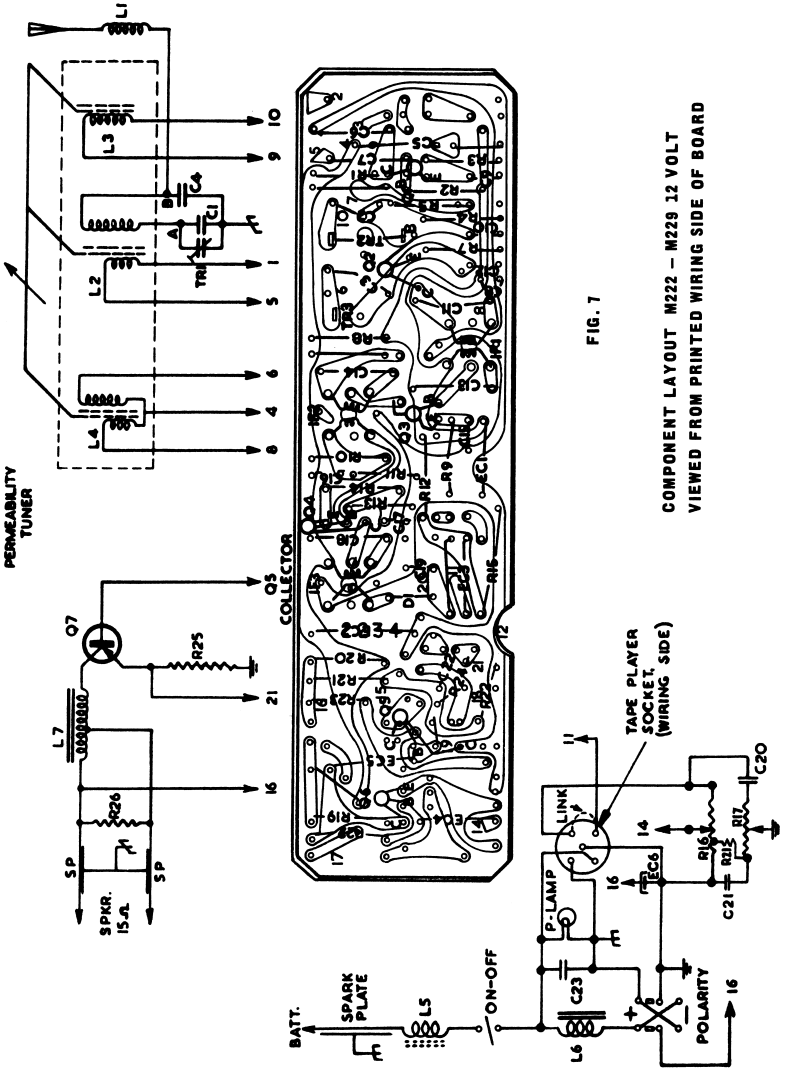


FIG. 7

COMPONENT LAYOUT M222 – M229 12 VOLT
VIEWED FROM PRINTED WIRING SIDE OF BOARD