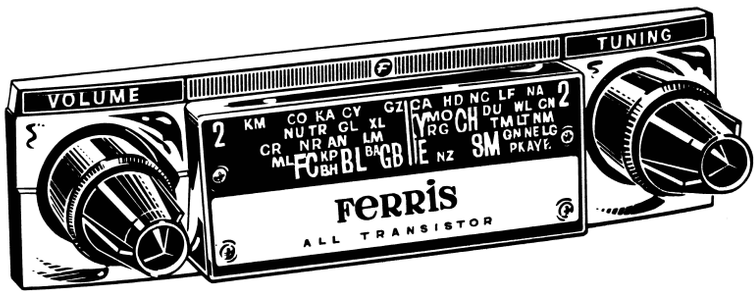
SERVICE MANUAL

FERRIS

MODEL 202 6 TRANSISTOR CAR RADIO



MANUAL TUNING

AUSTRALIAN MADE

SPECIFICATIONS

TUNING RANGE: 520–1650 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 2N301 Power Output

DIODE: 1 X 1N60A Detector & AGC

CONSUMPTION:

650 ma including dial lamp at 12 volts input.

LOUD SPEAKER:

Size & Type to suit Vehicle.
Voice Coil Impedance 15 ohms.

TUNING RATIO:

6 turns of knob to traverse dial.

POWER OUTPUT:

Undistorted 3 watts.
Maximum 5 watts.

DIMENSIONS:

7" x 5¾" x 2"

WEIGHT:

3 lbs.

DESCRIPTION

The FERRIS MODEL 202 is a compact, rugged 6 Transistor Manually Tuned Car Radio, designed to mount either in dash or under dash in a motor vehicle. Simplicity of construction combined with uncomplicated circuitry assures satisfactory performance in all 12 volt vehicles. Polarity adjustment serves either positive or negative ground battery systems.

CONTROLS

TUNING KNOB operates permeability tuner by means of a smooth worm drive. Dial pointer is operated via cord and pulley system.

VOLUME KNOB is combined with push-pull "on/off" switch.

EXTERNAL CONNECTIONS:

Aerial socket marked "A" is at rear right hand corner of set adjacent to aerial trimmer capacitor. Speaker and battery connections are at opposite rear corner of set.

POLARITY ADJUSTMENT:

To adjust polarity, remove top lid and follow instructions on indicator plate.

TO REMOVE TOP LID:

1. Remove one self-tapping screw in rear flange in addition to fixing screws at each side.
2. Slacken lid screws at front of set.
3. Slide lid off towards rear of set.

DIAL SCALE:

The M 202 is supplied with six dial scales (one for each state) including the one which is already fitted. TO CHANGE DIAL SCALE:-

1. Remove two 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 give a clean break along the scale.
4. Fit new dial scale.

DIAL LAMP REPLACEMENT:

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

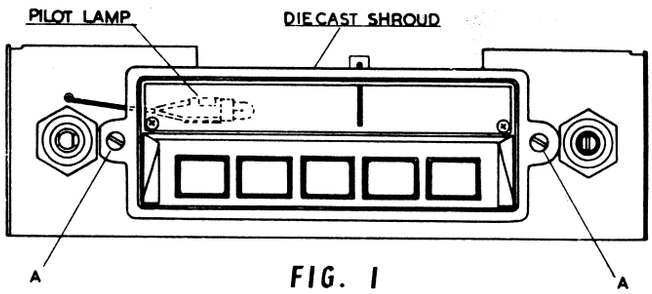


FIG. 1

REPLACEMENT OF DIAL CORD:

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

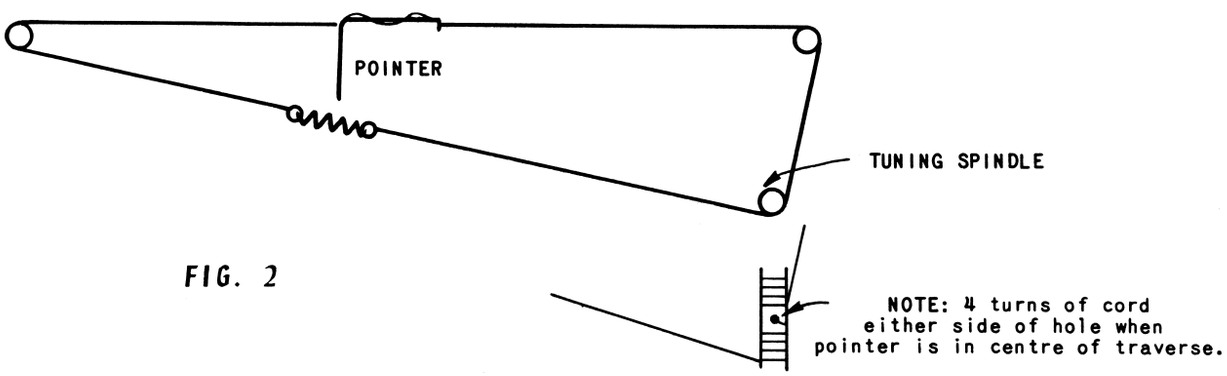


FIG. 2

PRINTED CIRCUIT BOARD:

For access to underside of printed board, remove the two screws marked "B" - FIG. 3.

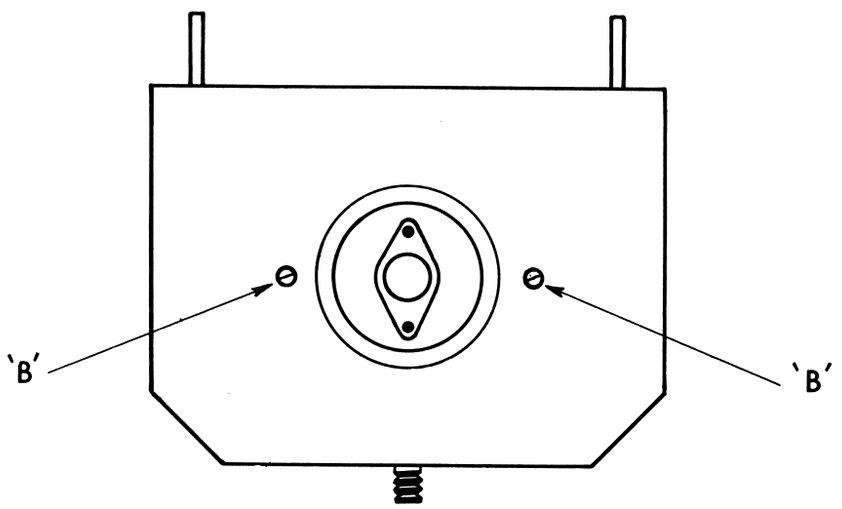


FIG. 3

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 AVC action. Set volume control at maximum.

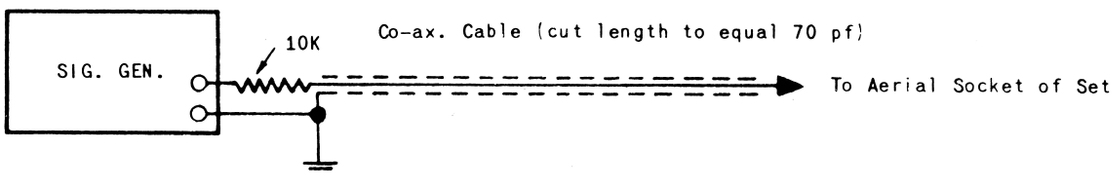
N.B. USE PROPER ALIGNMENT TOOL FOR MAKING ADJUSTMENTS. CORES ARE EASILY BROKEN BY IMPROPER HANDLING - MAKING REPLACEMENT OF ENTIRE COIL OR TRANSFORMER NECESSARY.

SET FRINGE SWITCH TO "OUT" POSITION.

STEP	CONNECT SIG. GEN. TO:	TUNE SIG. GEN. TO:	TUNE RECEIVER TO:	ADJ. FOR MAX. OUTPUT
1 2 3	Emitter of 2N1639 via .1 uf capacitor	455 KHz	HF end of band	IF3 IF2 IF1
4	REPEAT ABOVE ADJUSTMENTS UNTIL NO FURTHER INCREASE CAN BE OBTAINED			
5	Aerial socket via dummy aerial (see diagram).	520 KHz	Tune receiver to max. LF end of band	Osc. trimmer TR3
	MAX. HF LIMIT SHOULD NOW BE 1650 Kc/s APPROXIMATELY			
6	Aerial socket via dummy aerial (see diagram).	1500 KHz	1500 KHz	RF trimmer TR2 Ant. Trim. TR1
	CHECK SENSITIVITY AT 1500, 1000 AND 600 KHz DEPRESS FRINGE SWITCH AND NOTE IMPROVED PERFORMANCE.			

N.B. Cores of permeability tuner are accurately aligned and sealed at factory and should not require any 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 M202



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.

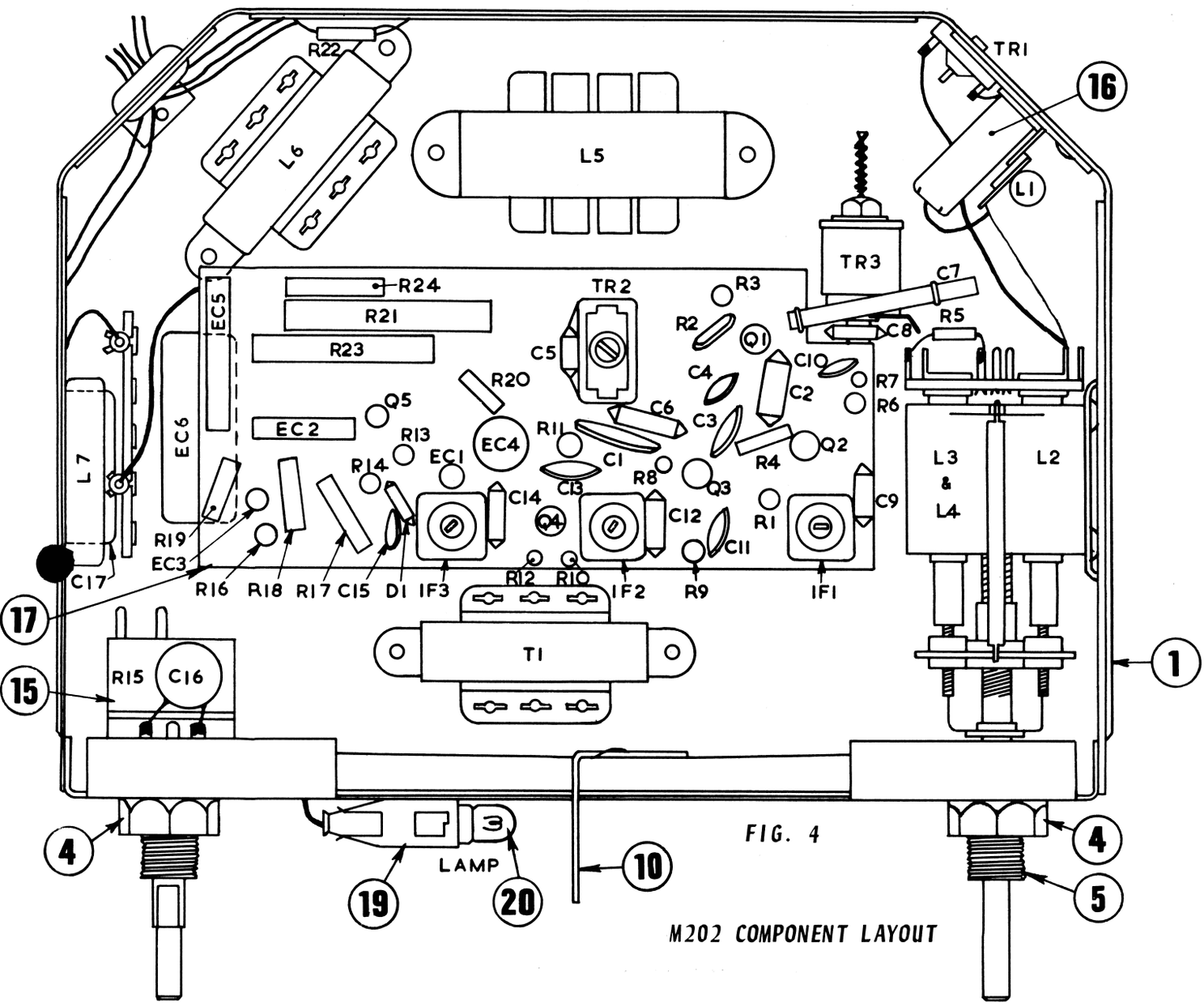


FIG. 4

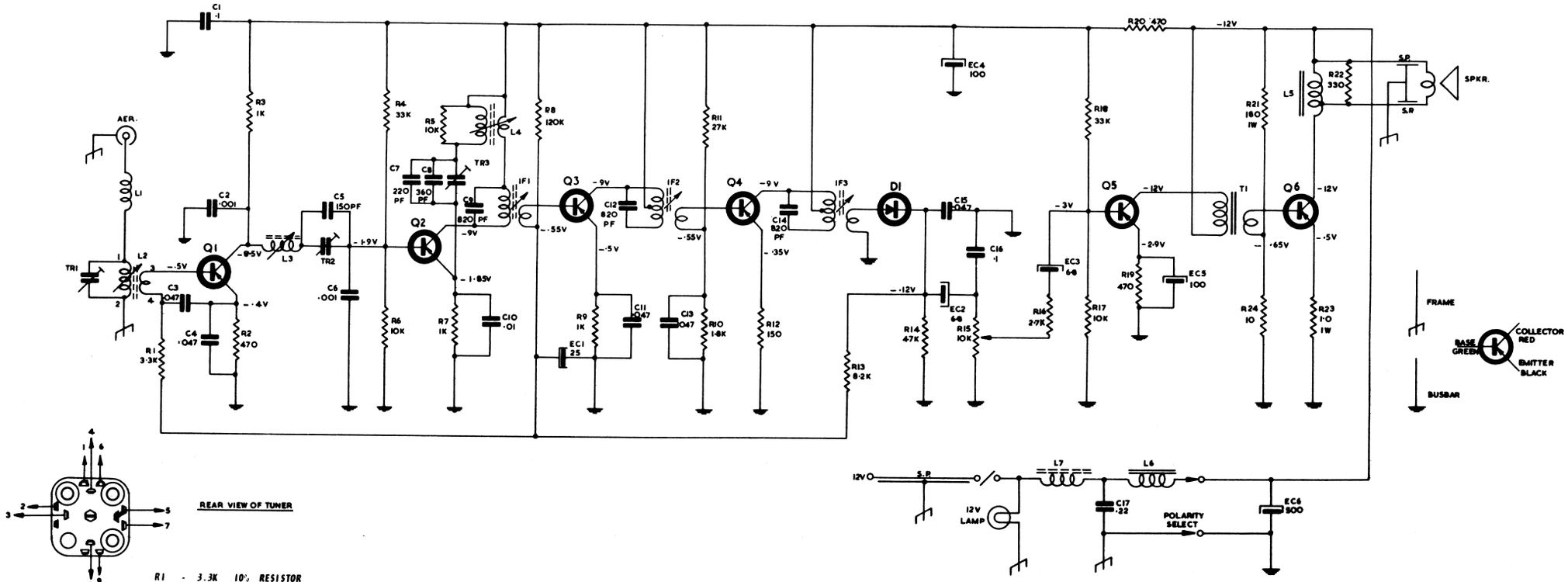
M202 COMPONENT LAYOUT

DC RESISTANCE OF WINDINGS:

	DC RESISTANCE IN OHMS
Aerial Filter Choke (L1)	2.5
Ant. Coil Primary (L2)	7.0
Ant. Coil Secondary (L2)	0.4
RF Coil (L3)	7.0
Oscillator Coil Primary (L4)	1.5
Oscillator Coil Secondary (L4)	2.5
HF Choke (L7)	Less than 0.1 ohm
LF Choke (L6)	0.3

	DC RESISTANCE IN OHMS
O/P Choke (total) (L5)	2.2
IF1 Primary (total)	2.0
IF1 Secondary	0.3
IF2 Primary (total)	2.0
IF2 Secondary	0.3
IF3 Primary (total)	2.0
IF3 Secondary	1.0
T1 Primary	75.0
T1 Secondary	4.0

FERRIS - TRANSISTOR CAR RADIO - MODEL 202



REAR VIEW OF TUNER

R1	3.3K	10%	RESISTOR
R2	470	"	"
R3	1K	"	"
R4	33K	"	"
R5	10K	"	"
R6	10K	"	"
R7	1K	"	"
R8	120K	"	"
R9	1K	"	"
R10	1.8K	"	"
R11	27K	"	"
R12	150	"	"
R13	8.2K	"	"
R14	4.7K	"	"
R15	10K	POTENTIOMETER	
R16	2.7K	10%	RESISTOR
R17	10K	"	"
R18	33K	"	"
R19	470	"	"
R20	470	"	"
R21	180	"	" 1 watt
R22	330	"	"
R23	1.0	"	" 1 watt
R24	10	"	"

TR1	3 PLATE TRIMMER	12-120 pf
TR2	2 PLATE TRIMMER	5-55 pf
TR3	AIR TRIMMER	4-60 pf

Q1	2N1637	2N374
Q2	2N1639	2N374
Q3	2N1638	2N373
Q4	2N1638	2N373
Q5	2N406	AC125
Q6	2N301	AT1138
D1	OA90	IN60A

C1	.1	uf 25V	CAPACITOR
C2	.001	uf 63V	STYROSEAL
C3	.047	uf 25V	CAPACITOR
C4	.047	uf 25V	CAPACITOR
C5	150	pf 125V	CAPACITOR
C6	.001	uf 63V	CAPACITOR
C7	220	pf NTC	CAPACITOR
C8	360	pf 125V	CAPACITOR
C9	820	pf 125V	CAPACITOR
C10	.01	uf 25V	CAPACITOR
C11	.047	uf 25V	CAPACITOR
C12	820	pf 125V	CAPACITOR
C13	.047	uf 25V	CAPACITOR
C14	820	pf 125V	CAPACITOR
C15	.047	uf 25V	CAPACITOR

L1	AERIAL CHOKE	TYPE 6108
L2	PERM TUNER	M3E E845
L3	PERM TUNER	M3E E845
L4	PERM TUNER	M3E E845
L5	O/P CHOKE	TYPE 4333
L6	FILTER CHOKE	TYPE 8138
L7	HF CHOKE	TYPE 828

EC1	25	uf 6V	ELECTRO.
EC2	6.8	uf 6V	ELECTRO.
EC3	6.8	uf 6V	ELECTRO
EC4	100	uf 12V	ELECTRO
EC5	100	uf 6V	ELECTRO
EC6	500	uf 16V	ELECTRO.

IF1	455 KHz	TRANS	9133
IF2	455 KHz	TRANS	9133
IF3	455 KHz	TRANS	9134

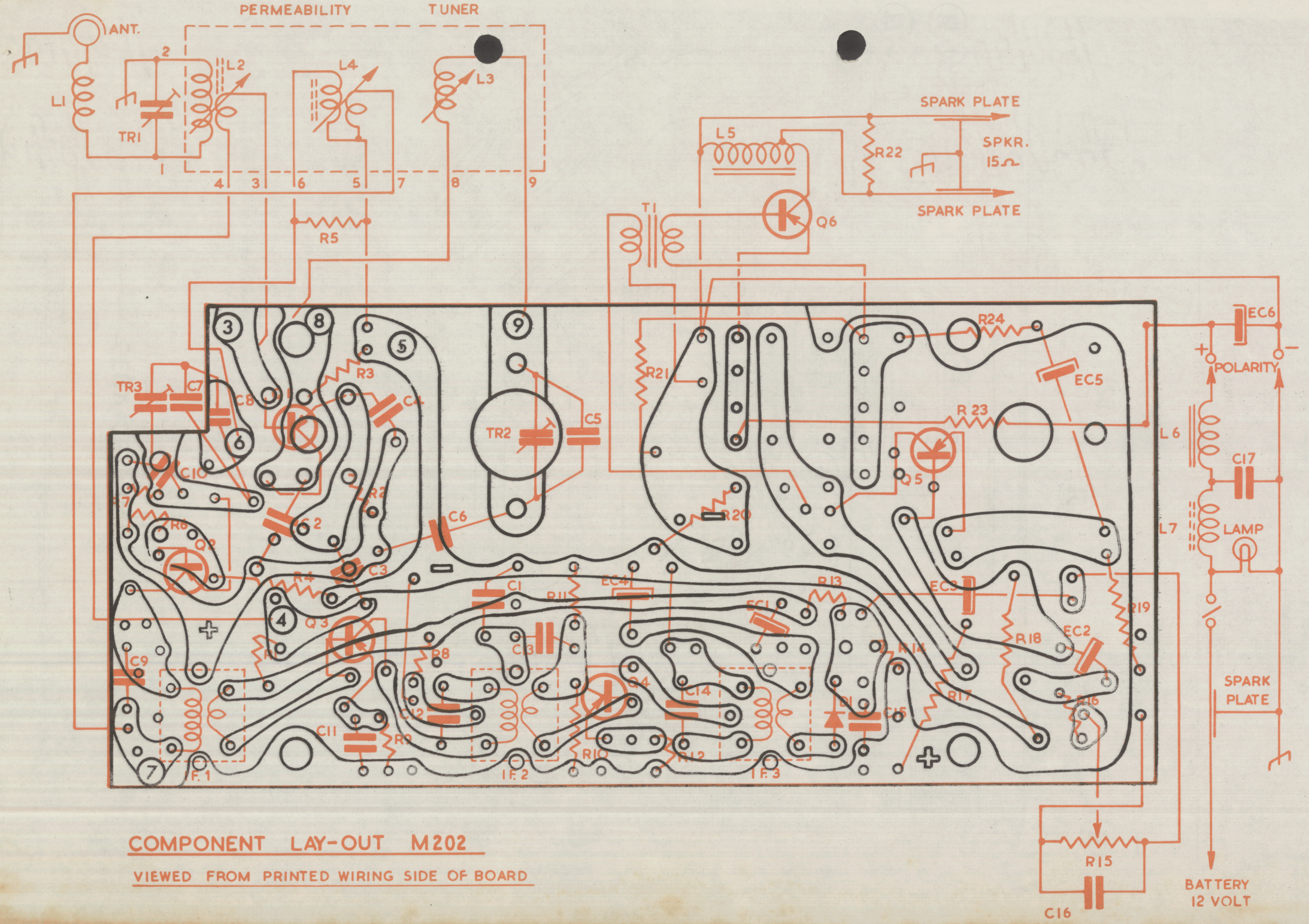
T1	DRIVER	TRANS	5222

BAND COVERAGE 520 - 1650 KHz
IF FREQUENCY 455 KHz

TOTAL BATTERY CURRENT
INCLUDING DIAL LAMP := 650 M.A.

COLLECTOR CURRENT OF op
STAGE 500 M.A.

NOTE:- ALL VOLTAGE CHECKED WITH
20.000 O.P.V. METER AT
ZERO SIGNAL INPUT



COMPONENT LAY-OUT M202

VIEWED FROM PRINTED WIRING SIDE OF BOARD

FERRIS MODEL 202 - SPARE PARTS LIST

Item Reference - Fig. 4 (P3), Component Layout, & Fig. 5 (below).

ITEM	DESCRIPTION	PART NO.	
1.	Case Assembly	R2023A	
2.	Shroud	R1808-2	
3.	Dial Back Plate	R1812	
4.	Counter Bored Nut	R1826	
5.	Tuning Bush	R2026	
6.	Knob Rear	R1177	Complete Knob
7.	Knob Front	R1178	
8.	Spigot Nut	R1878	
9.	Light Shield	R1920	
10.	Dial Pointer	R2038	
11.	Pointer Trim	R1829	
12.	Washer Knob Bearing	R1823	
13.	Knob Circlip	SCB	
14.	Connector Socket Assembly	R1870-1-2/R1871	
15.	Volume Control	R2254	
16.	Aerial Socket	733-23-9	
17.	Printed Board	R2030	
18.	Bracket Board Mounting	R1874	
19.	Dial Lamp Socket	7222-065-01	
20.	Miniature Dial Lamp	4068-003-06	
21.	Moulded Fuse Holder	36546	
22.	Dial Scale (1 set of 6)	R1811	
23.	Diecast Escutcheon	R2222	
24.	Spigot Washer	R987	

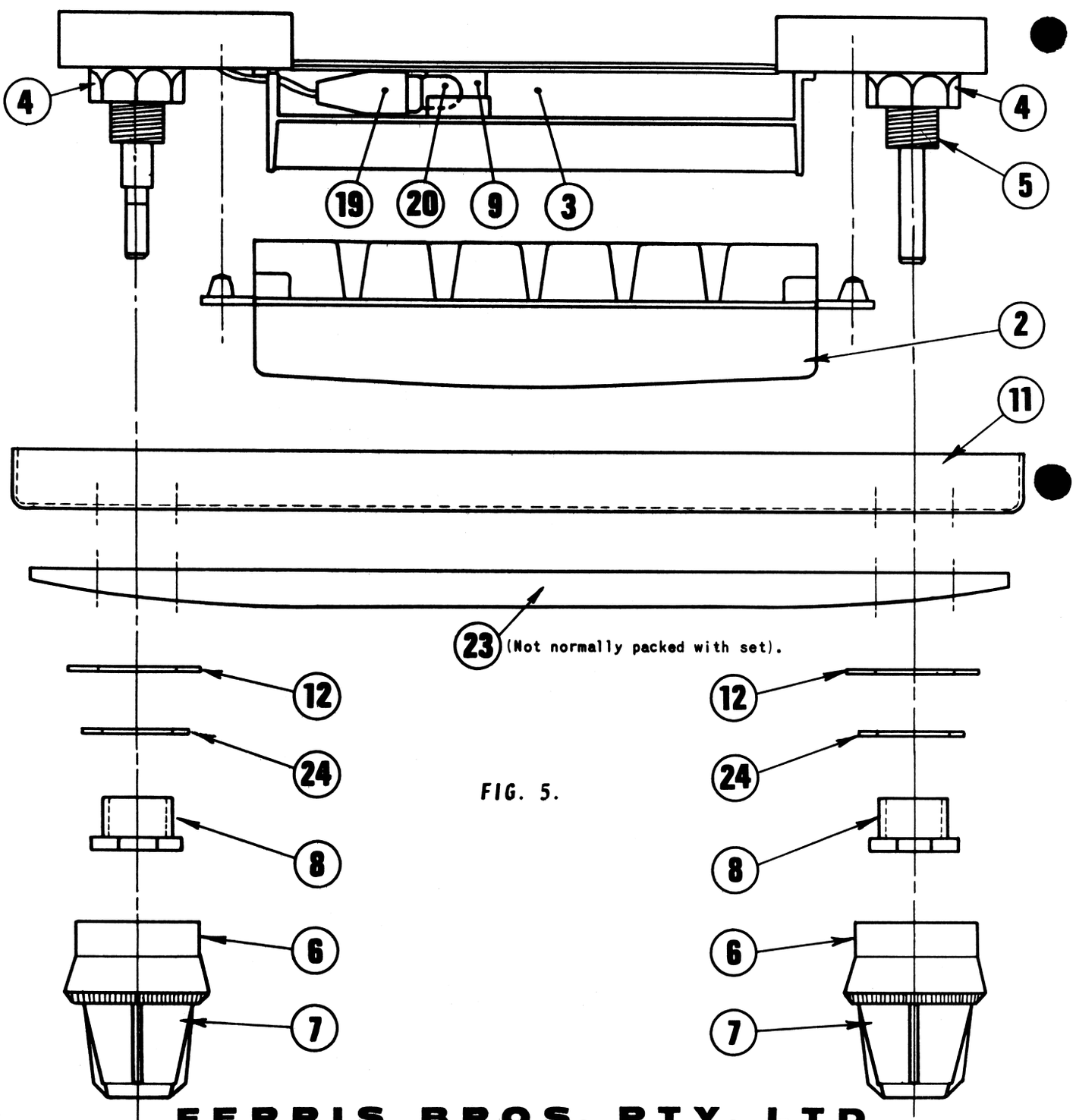


FIG. 5.