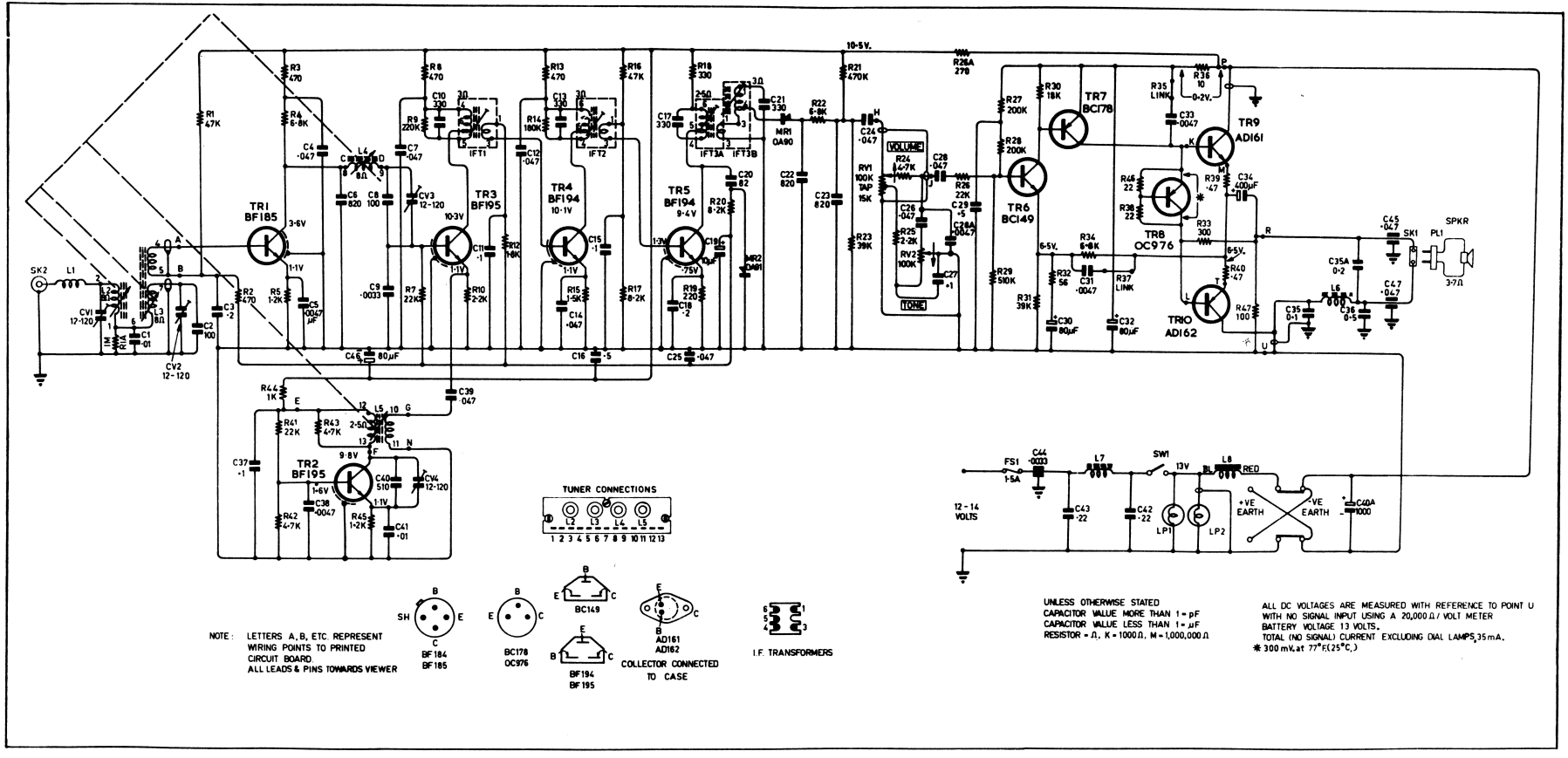
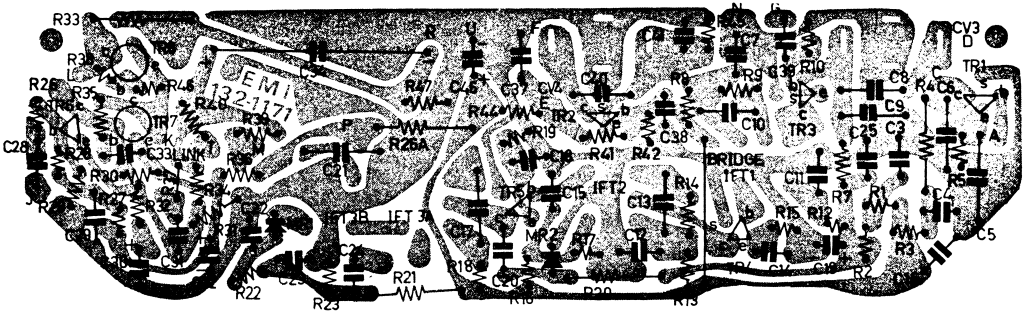


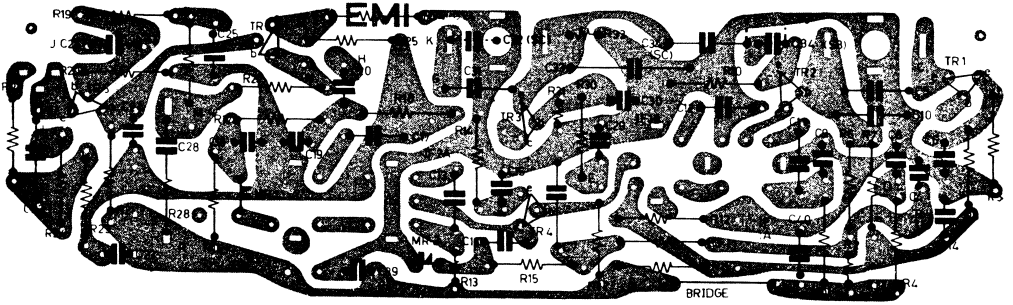
CIRCUIT DIAGRAM — MODEL SD

Note: R37 (link) and C31 (.0047uF) have been deleted.
C40a should read 1000uF.



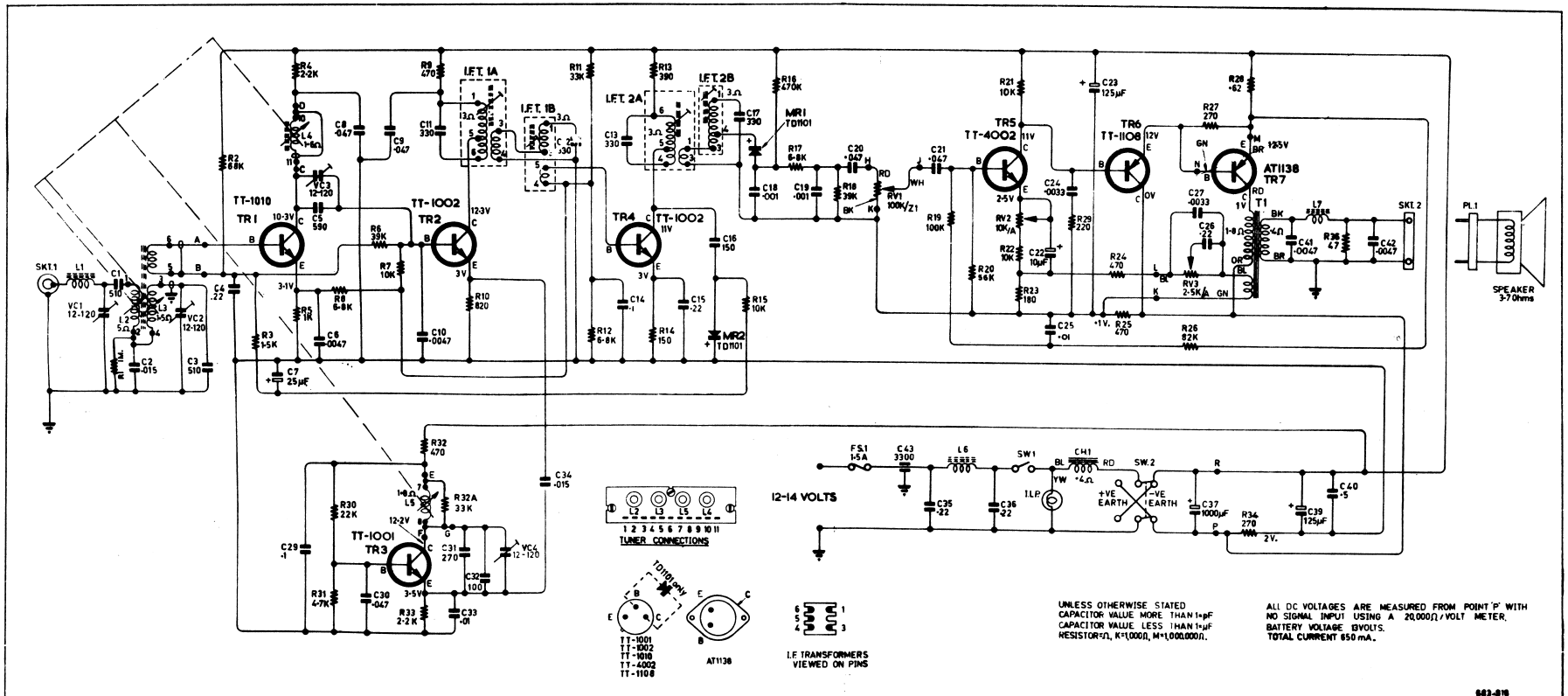
COMPONENT LAYOUT (viewed from copper side)

Model SD



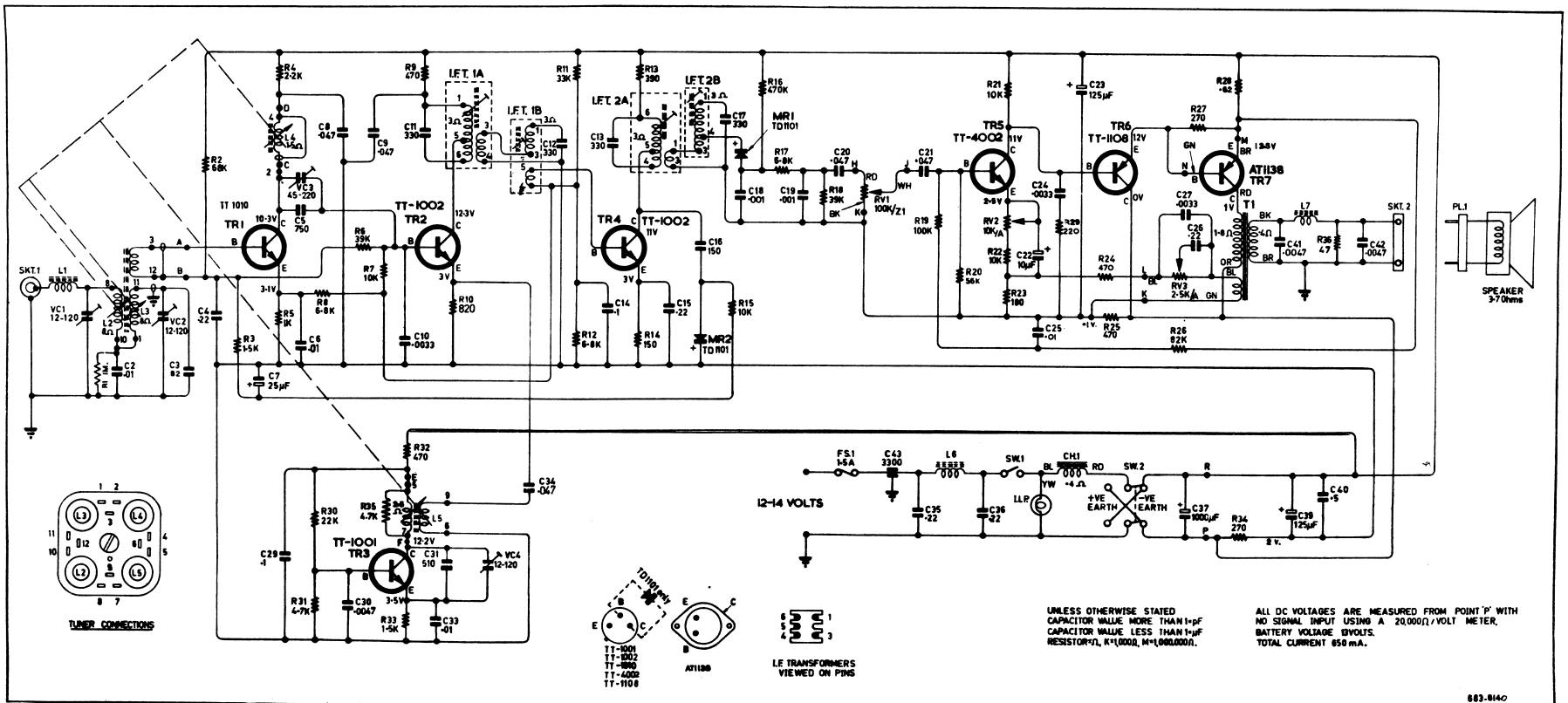
COMPONENT LAYOUT (viewed from copper side)

Models SB and SC



CIRCUIT DIAGRAM — MODEL SC

Note: On some tuners connection to pins 5 and 6 may be reversed for better stability.



CIRCUIT DIAGRAM — MODEL SB

ALIGNMENT

Use a signal generator modulated 30% at 400 Hz.

IF ALIGNMENT, MODELS SB AND SC

(1) Remove transistor shield (where applicable), top and heat sink section of receiver case.
(2) Connect a 47K resistor across the primary of IFT1A.
(3) Connect signal generator, via a .1 uF capacitor, to point C, adjacent to RF trimmer.
(4) Turn volume and tone controls fully clockwise.
(5) Tune to extreme LF end of the band (tuning carriage fully in).
(6) With signal generator tuned to 455 KHz., adjust the cores of IFT2B, IFT2A, IFT1B and IFT1A, in that order, for maximum reading on the output meter. Start alignment of each IF transformer by first screwing its core well out, and then screwing the core into the coil until resonance is obtained.
(7) Repeat sequence for optimum alignment.
(8) Disconnect 47K resistor.

IF Sensitivity:

Less than 100 uV (SB) and 200 uV (SC) for 50 mW output.

Note: These transformers are a very high-Q miniature type. It will be appreciated that the amount of travel for the core to cover its tuning range is much smaller than in normal IF transformers. Tuning the IF thus becomes more critical, and the following hints will prove useful:

(a) The tuning tool should be a small plastic screwdriver with a tip which fits cleanly into the tuning core.
(b) When tuning the core, do not use any downward pressure, as the threaded former has enough resilience to detune the circuit, after the pressure is released.

IF ALIGNMENT, MODEL SD

(1) Remove transistor shield, top and heat sink section of receiver case.
(2) Connect a 47K resistor across the primary of IFT3A.
(3) Connect signal generator, via a .1 uF capacitor, to point D, adjacent to RF trimmer.
(4) Turn volume and tone controls fully clockwise.
(5) Tune to extreme LF end of the band (tuning carriage fully in).
(6) With signal generator tuned to 455 KHz., adjust the cores of IFT3A, IFT3B, IFT2 and IFT1, in that order, for maximum reading on the output meter. Start alignment of each IF transformer by first screwing its core well out, and then screwing the core into the coil until resonance is obtained.
(7) Repeat sequence for optimum alignment.
(8) Disconnect 47K resistor.

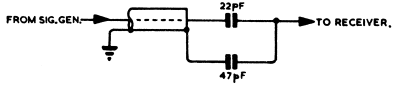
IF Sensitivity:

Less than 50 uV for 50 mW output.

See 'Note' under IF alignment, Models SB and SC.

RF ALIGNMENT, ALL MODELS

(1) Connect signal generator to aerial input socket via dummy aerial as shown below.



(2) Turn volume and tone controls fully clockwise.

RF ALIGNMENT TABLE

MODELS SB-SC-SD

Operation	Set Generator To	Set Receiver To	Adjust for Maximum Output
1	1620 KHz	Extreme HF end of Band	VC4 Oscillator Trimmer
2	1550 KHz	1550 KHz	VC1, VC3, VC2 Aerial and RF Trimmers
3	600 KHz	600 KHz	L2, L3, L4 Aerial and RF Tuning Cores*
4	Between limits: 510-525 KHz (SB-SD) 516-530 KHz (SC)	Extreme LF end of Band	L5 Oscillator Tuning Core*
5	1620 KHz	Extreme HF end of Band	VC4 Oscillator Trimmer
6	Repeat operations 2-5 for optimum alignment.		
7	1000 KHz	1000 KHz	Adjust Pointer: On SC by twisting the inner end of the pointer; on SD by twisting the inner end of the pointer, using a screwdriver in the slot provided.

* Cores of SB-SD tuned from the front; those of SC from the rear.

Minimum RF Sensitivities for 1W Output:

SB	SC	SD
1550 KHz 12 uV	1600 KHz 14 uV	1550 KHz 8 uV
1000 KHz 6 uV	1000 KHz 7 uV	1000 KHz 5 uV
600 KHz 6 uV	600 KHz 7 uV	600 KHz 5 uV

Note: Due to the fact that no padders are incorporated in the oscillator circuits of these receivers, tuning of the oscillator core L5 is critical, and should therefore only be attempted when absolutely necessary, e.g., when a new core is fitted. In this case, check that the pointer coincides with the LF and HF datum marks on the dial, and align the circuit at these points with L5 and VC4, respectively. Then proceed as per above table.

(4) The remaining push-buttons can now be set in the same manner to four different stations.

Transistors and Diodes:

BF115 (Silicon NPN)—RF Amplifier
BF195 (Silicon NPN)—Oscillator
BF195 (Silicon NPN)—Mixer
BF194 (Silicon NPN)—1st IF Amplifier
BF194 (Silicon NPN)—2nd IF Amplifier
BC149 (Silicon NPN)—Audio Pre-Amp.
BC178 (Silicon PNP)—Audio Driver
AD161} (German- {Output (Complemen-
AD162{ ium) } try matched pair)
OC976 (Germanium)—Compensating Transistor
OA90 (Germanium)—Detector Diode
OA91 (Germanium)—AGC Diode

Fuse: 1.5 amps.

Dial Lamps: 12V, 2W Philips BA7S.

AERIAL INPUT AND TRIMMER ADJUSTMENTS (ALL MODELS)

Aerial Input: The aerial input circuits have been designed to operate with up to 130 pF total aerial and lead capacity, i.e., with standard lead (10 pF per foot) up to a maximum of 8 feet. Lengths greater than 8 feet can be accommodated by adding a series 220 pF to the aerial input.

The Aerial Trimmer should be adjusted on weak signal at approximately 1300 Kc/s.

Where a fully retractable aerial is used, the bottom segment of the aerial should be fully extended before adjusting the aerial trimmer.

SERVICE NOTES

(1) **Dial Lamp Replacement:** Remove the receiver from the vehicle and take off transistor shield and the top of the receiver case. This will allow access to the dial lamps and sockets, which are mounted behind the dial scale.

(2) Regardless of the stated complaint, the following preliminary checks should be made:

(a) Current drain with no-signal input (13V Battery), dial lamps removed. Models SB and SC: 480 mA ± 50 mA. Model SD: 35 mA + 10 - 5 mA.
(b) Check for intermittent connections by gently probing components and soldered connections with an insulated tool.
(c) Check sensitivity by listening test.
(d) Check for distortion by listening test.
(e) Check for short-circuits by operating the receiver under both negative earth and positive earth conditions. In each case, ensure that the polarity switch is correctly set.
(f) Check car aerial for insulation resistance.

(3) Circuit checks with an ohm-meter will give misleading results and transistors may be damaged by excessive conduction caused by the ohm-meter battery.

Faulty components can usually be located by means of DC voltage checks in conjunction with standard signal tracing procedure.

Because of the difficulties associated with making operational tests, a suspect transistor should be checked by substitution, but only after all other possibilities have been eliminated.

Circuit tracing and component identification are simplified by reference to the wiring pattern printed on the component side of the circuit board.

Reference should also be made to the component location diagrams reproduced in this manual.

(4) **Printed Circuit Board Removal:** Remove transistor shield and top heat sink section of receiver case, and disconnect output transistor(s).

Remove the two PK screws from the top corners of the board, then pull the bottom edge of the circuit board out of the slots in the chassis. Note: Do not strain tuner leads.

To replace the board, reverse the above procedure.

(5) **Replacing Components On the Printed Circuit Boards:**

(a) When replacing transistors or diodes, use a small iron and work quickly, to prevent overheating these components.
(b) To unsolder multi-terminal components (IF transformers, etc.), it is best to apply heat simultaneously to all terminals, using a special iron tip. If a normal tip is used, apply the iron to each joint in turn and brush away the solder with a stiff brush. It may be found necessary to remelt and brush several times.

Caution: Before using a soldering iron, ensure that:

(a) The set is switched off.
(b) All testing and earthing leads are removed.
(c) The soldering iron gives adequate but not too much heat. A low voltage soldering iron is preferred, as leakage and capacitance effects of a 240-volt iron can destroy a transistor. Apply the iron for only a short period of time, bearing in mind that the copper on the board can easily be damaged; it may be repaired by bridging the gap with tinned copper wire.

(6) Ensure that all screws are replaced during servicing.

(7) Care of Transistors:

(a) If the voltage polarisation is reversed without regard to the setting of the polarity switch, the transistors or electrolytic capacitors may be damaged.
(b) Always switch the receiver OFF before connecting or disconnecting the leads of the output transistor(s).
(c) If continuity tests must be made, disconnect all transistors first.
(d) Never switch on the receiver while the loudspeaker is disconnected.

Important: An accumulator, 12-14 volts, should be used unless a well-regulated, ripple-free, mains-powered unit is available.

When servicing a silicon transistor set, always use negative earth connection. Afterwards, check that the receiver operates satisfactorily on positive earth connection before returning to customer.

(8) **Output Transistor Replacement:**

(a) Disconnect base and emitter leads, undo screws and remove suspect transistor from the heat sink.
(b) Check that heat sink is free of burrs which could pierce the mica insulator, as this will earth the collector and result in blowing the fuse in some instances.
(c) Apply a coating of silicone grease to each side of the mica insulator to ensure maximum heat transfer.
(d) Place mica insulator in position on heat sink. Place the transistor in position and firmly tighten the fixing screws to ensure maximum heat transfer. Ensure that the fixing screws are insulated from the heat sink by the sleeves provided.
(e) Check for short-circuits to heat sink with no leads connected to the transistor.
(f) Re-connect the leads to the transistor.

Model SD: Sequence of wires to output transistors (bottom to top) are:

(1) **Pins**—
Red (AD161 Base)
White (AD161 Emitter)
Yellow (AD162 Emitter)
Black (AD162 Base)

(2) **Collectors**—
Red (AD161). Black (AD162).

VOLTAGE MEASUREMENTS

Due to the fast time constant of the planar silicon transistors used in these receivers, extreme care should be exercised when taking voltage measurements at the transistor terminals. For this reason, it is not recommended that base voltage measurements are taken and, in consequence, these voltages have been omitted from the circuit diagrams.

IMPORTANT—Model SD:

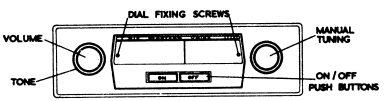
It is desirable that when any repairs are done to the audio amplifier, the supply rail be reduced to half the nominal voltage to enable a quick check on the performance to be made without the possibility of damage occurring due to faulty components, etc.

This is best done by inserting an external series resistor of 470 ohms between supply and receiver. The approximate receiver rail voltage under no-signal conditions then being 6.5 volts, and the centre voltage (junction R39, R40) will be 2.7V.

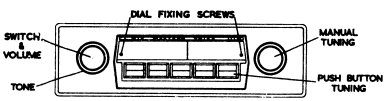
Under no-signal conditions, base bias for TR9 and TR10 will be 250 mV. The amplifier will continue to operate with considerably reduced power, cross over distortion and non-symmetrical clipping due to the shift in centre voltage. If the amplifier does not operate, do not restore full supply rail until the fault has been corrected.

Where TR6, TR7 and/or associate circuitry are suspect, unplug base and emitter connections to TR9 and TR10 to electrically isolate them, link K-M to maintain D.C. conditions, remembering that the centre voltage (junction R39, R40) is set by R27 + R28 and R29. Avoid prolonged shorts across the speaker under drive. Never short point R or the emitter or base of any audio transistor to +ve or —ve as this may cause failure in one or more of the transistors.

"HIS MASTER'S VOICE"



SB, SC



SD

GENERAL SPECIFICATION

SB and SC Car Radios are 7-transistor, high-sensitivity, permeability tuned, superheterodyne, medium-wave receivers with class A output stages, manually-tuned (SB) or tuned by pre-set push-buttons and/or manual control (SC).

Model SD is a 10-transistor de luxe version of SC with push-pull (class B) output stage.

OPERATING VOLTAGE:
12-14 volts, positive and negative earth.

CONSUMPTION:
SB and SC: 650 mA (no signal).
SD: 400 mA (no signal).

FREQUENCY RANGE:
520-1620 KHz.

INTERMEDIATE FREQUENCY:
455 KHz.

OUTPUT LOAD IMPEDANCE:
3.7 ohms.

UNDISTORTED POWER OUTPUT:
SB and SC: 1.8 watts.
SD: 3.6 watts.

EARTHING POLARITY:
Reversible. Earthing polarity is selected by setting the polarity switch to positive or negative earth as marked on the chassis.

Note: The correct vehicle polarity position is given in the kit installation instructions.

DIMENSIONS:

Height	2"
Width	6½"
Depth	5¾"

WEIGHT:

SB	3½ lbs.
SC	3¾ lbs.
SD	3¾ lbs.

MODEL SPECIFICATION

SB

Model SB is a manually-tuned, single unit receiver with separate loudspeaker, and is designed for universal fitting.

The circuitry contains the following elements:

A band-pass filter aerial stage, a tuned RF stage, an oscillator stage, a mixer stage, one IF amplifying stage, a detector diode, an audio preamplifying stage, an audio driver stage and a class A output stage.

AGC voltage is derived from a separate diode and is applied to the RF and IF stages.

A continuously variable feedback type tone control is provided to allow for individual preference.

A winding on the output transformer provides negative feedback, which is applied to the pre-amplifier stage in order to reduce distortion and improve the audio frequency response.

There is a pre-set potentiometer in the emitter circuit of the pre-amplifier stage to stabilise collector current in the output transistor.

RECEIVER CONTROLS

On/Off switch consists of two push-buttons below the dial scale. When the left-hand ON button is pushed in, the receiver will be switched on, and the button will remain in. When the right-hand OFF button is pushed in, the receiver will be switched off, and both buttons will return to the 'out' position.

Volume Control: Is the smaller of the concentric knobs to the left of the dial scale.

Tone Control: Is the larger knob concentric with the volume control. This provides continuously variable tone adjustment, from a flat frequency in the maximum clockwise position, with progressive treble-cut as the control is rotated anti-clockwise.

Tuning Control: Is the knob to the right of the dial scale, and provides variable station selection.

Transistors and Diodes: SB and SC

TT1010 (Silicon NPN)—RF Amplifier
TT1001 (Silicon NPN)—Oscillator
TT1002 (Silicon NPN)—Mixer
TT1002 (Silicon NPN)—IF Amplifier
TT4002 (Silicon NPN)—Audio Pre-Amplifier
TT1108 (Silicon PNP)—Audio Driver
AT1138 or 2N301 (Germanium PNP—Output
TD1101 (Silicon)—Detector Diode
TD1101 (Silicon)—AGC Diode
Fuse: 1.5 amps.
Dial Lamp: 12V, 2W Philips BA7S.

SC

Apart from the push-button/manual tuner and associated components, this model is functionally identical to model SB. For push-button operation, refer to model SD.

SD

Model SD is a push-button or manually-tuned, single unit receiver with separate loudspeaker, and is designed for universal fitting.

The circuitry contains the following elements:

A band-pass filter aerial stage, a tuned RF stage, an oscillator stage, a mixer stage, two IF amplifying stages, a detector diode, an audio pre-amplifying stage, an audio driver and a complementary push-pull output stage, the latter four transistors being directly coupled.

AGC voltage is derived from a separate diode and is applied to the RF and IF stages.

A continuously variable tone control is provided to allow for individual preference.

RECEIVER CONTROLS

Volume Control and On/Off Switch: Is the smaller of the concentric knobs to the left of the dial scale. Clockwise rotation switches the receiver ON, and further rotation increases the volume. At the same time a measure of bass compensation is incorporated.

Tone Control: Is the larger knob concentric with the Volume Control and On/Off Switch. The control provides continuously variable tone adjustment. Bass is minimum and treble maximum in the maximum clockwise position, anti-clockwise rotation maintains treble, but gradually adds the bass boost if volume is operated at or below tap, whilst treble is cut in the maximum anti-clockwise position.

Tuning Control: Manual tuning is carried out using the knob to the right of the dial scale.

Automatic tuning to five pre-set stations is provided for by the five push-buttons.

To Set Up the Tuning Push-Buttons:

(1) Tune-in the required station by means of the manual tuning control.

(2) With the station accurately tuned-in, pull out the push-button to its full extent (¼" movement) to release the locking mechanism, then push the button FULLY home, thus locking the mechanism in the required position.

(3) The push-button is now set to the required station and is independent of the manual tuning control.