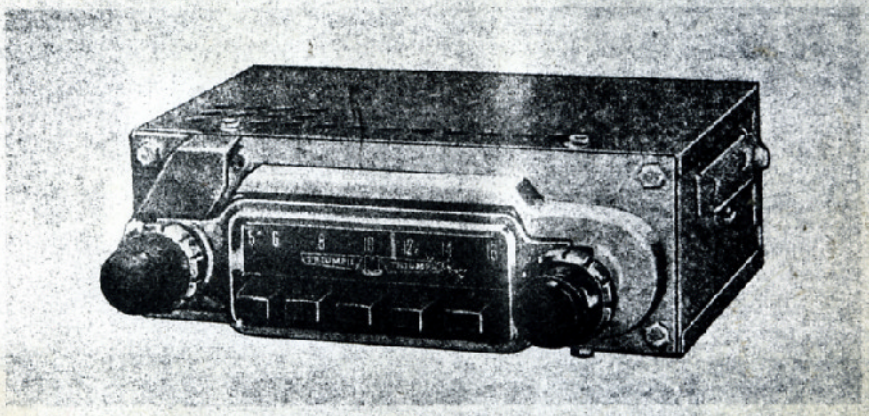
AUTO RADIO SERVICE MANUAL

1965 TRIUMPH ALL TRANSISTOR RADIO

Bendix Model	Serial Number Prefix	Triumph Part Number
5BTR	5BTR	V-350
5BTRP	5BTRP	V-350 DP



WARRANTY SERVICE PROCEDURE

Warranty service for the Bendix-Triumph radio and accessories will be handled by the Bendix Radio Division through its authorized service dealers.

GENERAL INFORMATION

This manual contains trouble-shooting procedures, schematic, layout diagrams, and alignment instructions for servicing the Bendix-Triumph AM Radio Model 5BTRP. Information on the positive ground Bendix-Triumph Radio Model 5BTR is supplied on the last page of this service manual.

TYPE:--The 1965 Bendix-Triumph Radio, Model 5BTRP, is a fully transistorized superheterodyne receiver. This model radio may be used with either a positive or a negative battery ground electrical system by correctly positioning the double pole double throw ground polarity switch (S2).

CAUTION-THE GROUND POLARITY SWITCH LOCATED AT THE REAR OF THE RADIO MUST BE IN THE CORRECT GROUND POSITION BEFORE APPLYING VOLTAGE. INCORRECT POSITIONING WILL DAMAGE RADIO.

TUNING RANGE:--540-1600 kc/s, IF 262.5 kc/s.

POWER INPUT:--12-volt storage battery. Rating 14.0 VDC at 1 amp.

AUDIO OUTPUT:--2 watts.

EXTERNAL CONNECTIONS

IMPORTANT:--Before attempting to service the radio, note the position of the polarity switch S2 and return the switch to this position upon completion of service. This should minimize the danger of the customer's radio being installed with the polarity switch S2 in the incorrect position.

Also, make sure that before the radio is connected for service on the test bench that the polarity switch S2 is in the correct position before applying power.

DO NOT USE UNGROUNDED AC INSTRUMENTS OF ANY KIND FOR SERVICING THE RADIO.

TO SET PUSHBUTTONS

The Bendix-Triumph radio has five pushbuttons for automatic station selection. To set the pushbuttons for automatic tuning, proceed as follows:

1. Using the manual tuning knob, tune in a desired station, being careful to tune exactly on the station.
2. Pull out the pushbutton to be set to unlock the mechanism, and then push button in firmly to set and lock.
3. Repeat the procedure for each remaining pushbutton.

THE BENDIX CORPORATION • BENDIX RADIO DIVISION • BALTIMORE, MARYLAND, 21204

AUTOMOTIVE PRODUCTS DEPARTMENT

Part No. 2093399-10 Price 35 cents Printed in U.S.A. 4-65

SERVICE SUGGESTIONS

GENERAL:--The 1965 Bendix-Triumph all transistor radio is an advanced designed superheterodyne receiver utilizing six transistors and two diodes. New features include a radically different audio section (exclusive with Bendix) and an improved AGC circuit.

TROUBLE SHOOTING:--The basic character of a transistor is such that the base, emitter, and collector current are dependent on each other. This suggests that the fastest and probably the most satisfactory method of trouble shooting the transistor radio is to measure the DC voltage drop across either a collector load resistor or an emitter resistor and calculate the transistor current. In general, a RF or IF transistor operates best in the range of 0.5 ma to 3.0 ma. Currents considerably above or below this range would indicate trouble in that stage. Of course, measurements must be made without a received signal to prevent misleading results due to AGC action. DC voltages at the collector and emitter of each transistor are shown on the schematic diagram. When these voltages are within 20% of that shown, it is a reasonably good indication that the stage under test is operating correctly.

When making voltage or resistance measurements, use a battery-operated VTVM or multimeter—DO NOT USE UNGROUNDED AC-POWERED INSTRUMENTS OF ANY TYPE. Be careful not to "short across" leads or components. Always be sure receiver power is off before removing or replacing any component—make certain of correct polarity before applying power to the receiver.

If signal tracing methods are used, be sure to use a DC blocking capacitor (0.1 mfd) in series with the generator lead.

Audio Section:--The audio amplifier utilizes direct coupling between stages along with DC feedback to obtain a high degree of bias current stability. The base voltage of Q4 is fixed (relative to the supply voltage) by the voltage divider network consisting of resistors R27 and R28. But its emitter voltage is dependent on the output transistor current, since it is derived from the IR drop across R26. Thus, any tendency of the output current to increase is offset by a decrease of the bias applied to Q4. Capacitors C17A and B are necessary to prevent AC feedback from shocking the amplifier.

If the voltage measured at the collector of output transistor Q6 is within 20% of that shown, it can usually be assumed that the amplifier is operating properly. No voltage at this point and normal voltages at Q4 and Q5 would suggest that Q6 collector might be shorted to the chassis (improper mounting or bad insulator).

When component replacement is necessary, be certain that identical parts are used—DO NOT USE SUBSTITUTE PARTS.

AGC Circuit:--The AGC circuit controls the bias of the RF and IF transistors to keep the receiver's gain at a value appropriate for the strength of the signal being received. Trouble shooting this circuit is reduced to simple voltage measurements once the operation and direction of current flow is understood.

In the absence of an input signal, base voltages for Q1 and Q3 are obtained through the voltage divider networks R3, R1, R12, R13, D1, and R8, R9, R10, respectively. Since D1 is part of the first network, it is biased with a small forward current. In the presence of a strong signal, this current will be exceeded in value by IF current coupled to D1 by C9 which will cause the diode to function so as to give AGC action. Rectified IF current will then charge filter capacitor C16B, increasing the voltage applied to the base biasing networks. This in turn decreases the forward bias of Q1 and Q3 and consequently their gain.

A good indication of whether the AGC circuit is functioning properly may be obtained by observing the voltage at Q1 collector as a 262.5 kc signal is applied at Q2 collector. As the signal level of the generator is progressively increased, the voltage should steadily diminish, reading less than 1 volt at maximum generator output.

TRANSISTOR TEST:--The transistors, except for Q6, are soldered into the printed circuit and no attempt should be made to remove them except for replacement. Normally, a careful check of voltages as shown on the schematic diagram will suffice in determining condition of the transistors.

TRANSISTOR REPLACEMENT:--When it becomes necessary to replace a transistor on the printed circuit board, use extreme caution to prevent damage to the board. Hold the new transistor with metal pliers to dissipate heat while soldering. When replacing the power transistor, apply a coating of silicone grease to both sides of the insulating disc. Be careful with the insulators so that no short circuit will occur between the transistor case and the heat radiator. If improperly mounted, the transistor can be damaged by insufficient heat conduction.

NOTE:--When transistor replacement is necessary, be certain that identical units are used—DO NOT USE SUBSTITUTES.

PRINTED CIRCUIT BOARD:--When it becomes necessary to replace a part connected to the printed circuit board, the defective part should be clipped out, leaving the leads connected when possible. This will permit connecting the new part to the old leads without soldering directly to the printed conductors. Use a light soldering iron of 40 watts or less and apply heat no longer than necessary. Too much heat will cause the conductor to blister. Small blisters can be repaired with Duco cement or equivalent. Large blisters must be cut out and replaced with wire jumpers.

SPEAKER:--The speaker used with the radio is a special unit having an impedance of 20 ohms. DO NOT USE A STANDARD 3.2 OHMS VOICE COIL SPEAKER.