

**N**INE transistor portable radio with FM/VHF band, released at £30 2s. 5d., later reduced to 28gns.

**Batteries.** Ever Ready PP9 or equivalent.  
**Consumption.** VHF, 25mA; AM, 20mA; both under quiescent conditions.

**Wavebands.** LW, 1070-1900m; MW, 182-570m; VHF, 87.5-100mc/s.

**Transistors.** AF114, AF115, AF116 (3), OC71, OC81D, OC81 (2).

**Diodes.** OA90, OA79 (2).

**IFs.** AM, 470kc/s; FM, 10.7mc/s.

**Output.** 200mW.

**Speaker.** 5in. round, 3ohms.

**Aerial.** Internal ferrite rod for AM; telescopic rod aerial for FM. Socket for external aerial on all bands.

**Manufacturer.** Bush Radio, Ltd.

**Service Department.** Kew Works, Mortlake Road, Kew, Richmond, Surrey.

### DISMANTLING

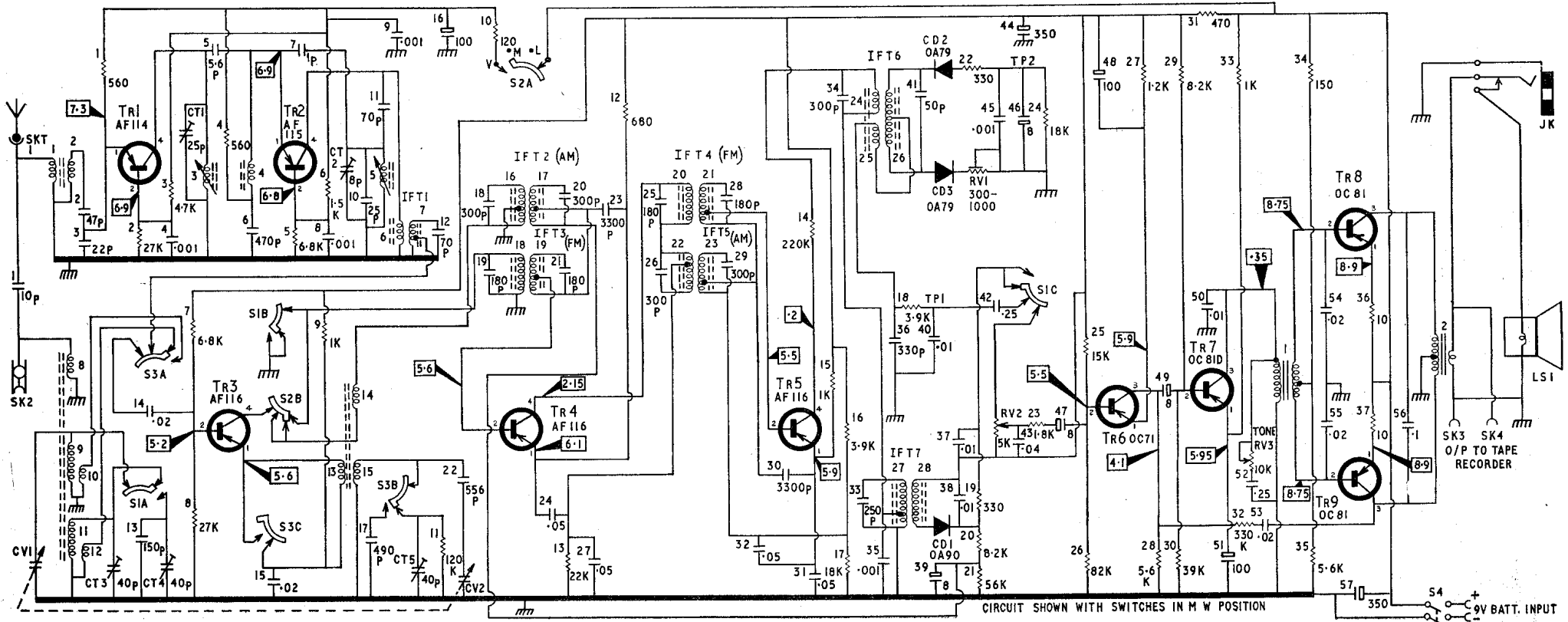
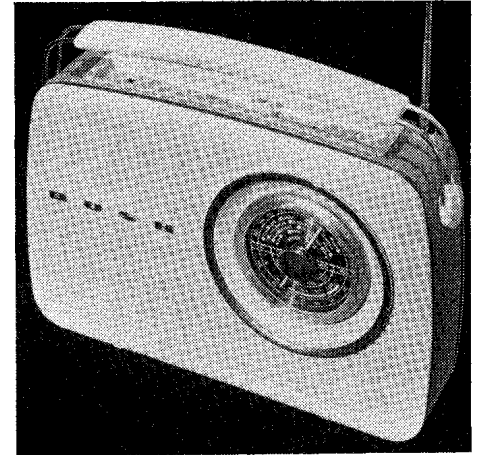
**Chassis removal.** Set tuning capacitor to maximum and remove knob and pointer from front of cabinet. Loosen large screw in centre of cabinet back and remove back, then disconnect and remove battery. Extend telescopic aerial sufficiently to facilitate chassis removal and disconnect aerial clip, then loosen and remove four chassis-fixing screws and lift chassis out of cabinet from bottom, allowing control knobs and tuning spindle to clear their holes.

**VHF box.** Unsolder connections to box, set tuning capacitor to maximum and slacken locking nut fixing collar to tuning capacitor spindle. Lift collar clear of spindle together with VHF drive cord. Remove four Phillips screws securing VHF box to its mounting bracket, noting position of earthing tag beneath one screw. Lift box clear of chassis and withdraw drive cord through aerial socket aperture in chassis.

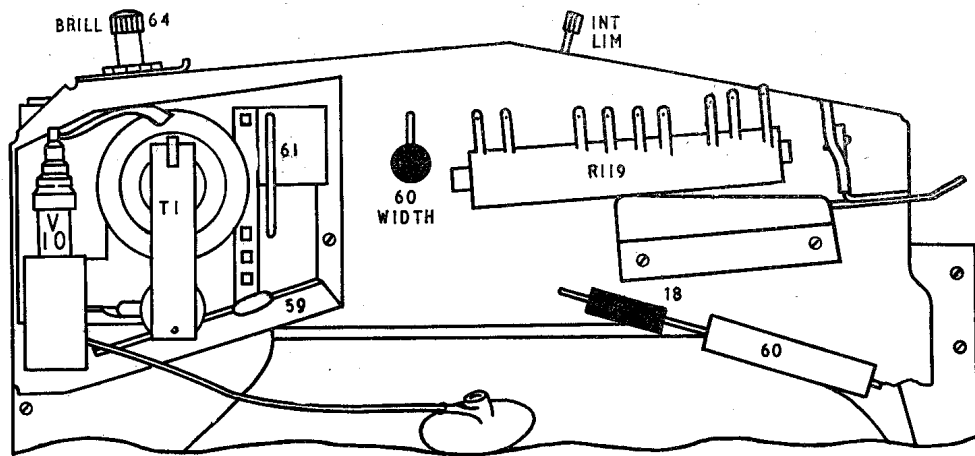
### MAINTENANCE

**Replacement of FM Tuning Cord Drive.** If a breakage occurs in either the cord or the cores the complete assembly should be replaced. To replace, proceed as follows: Remove the chassis from the cabinet and the car aerial socket from the chassis. Remove the VHF box cover, slacken the screw securing the VHF box pulley bracket and move the bracket away from the core aperture. Unhook the drive cord from the return spring and withdraw drive cord and cores. When re-fitting the new drive cord, ensure that the core stop is correctly located between the faces of the core plunger. After reassembly set the tuning capacitor for maximum. Ensure that the tuning spindle collar is reset so that the core of L5 just touches the core stop with no slack in the cord drive and with the pivoted core adjuster set to approximately the midway position.

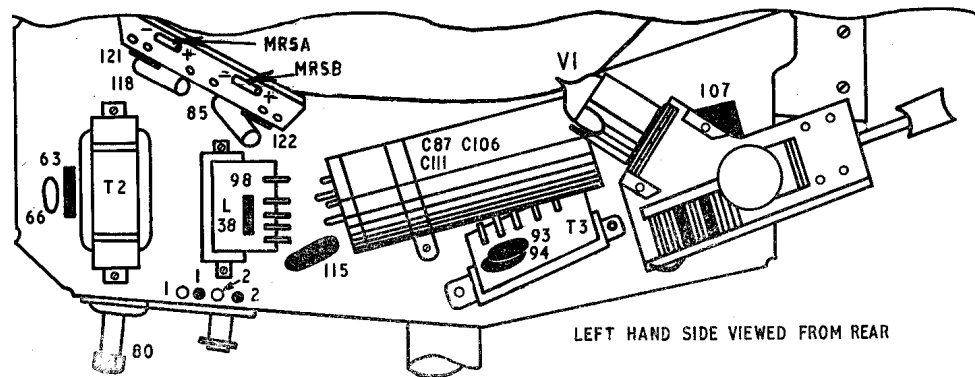
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CIRCUIT SHOWN WITH SWITCHES IN M W POSITION



RIGHT HAND SIDE VIEWED FROM REAR



LEFT HAND SIDE VIEWED FROM REAR

Switch off modulation, change input to 36.75mc/s, connect a 1K shunt from pin 8 of V5 to chassis and adjust L22 (bot) for maximum vision. Change input to 36.4mc/s, connect *normal* shunt from pin 7 of V4 to chassis and adjust L23 (top) for maximum vision. Change input to 36.75mc/s, connect shunt from pin 7 of V3 to chassis and adjust L20 (bot) for maximum vision. Change input to 37.25mc/s, connect shunt from pin 2 of V4 to chassis and adjust L37 (top) for maximum vision. Repeat operations in this paragraph.

Apply 36.4mc/s unmodulated, connect shunt from pin 2 of V3 to chassis and adjust L10 (on

tuner) for maximum vision. Change input to 34.8mc/s and adjust L16 (bot) for maximum vision. Finally, apply 33.15mc/s and adjust L15 (top) for minimum vision.

**Procedure, RF.** Connect generator to aerial socket (via an attenuator if necessary), switch tuner to required channel and inject relevant sound carrier frequency with modulation. Adjust C16 (fine tuner) for maximum sound. If V2 is changed it may be necessary to adjust fine tuner for each channel in use.

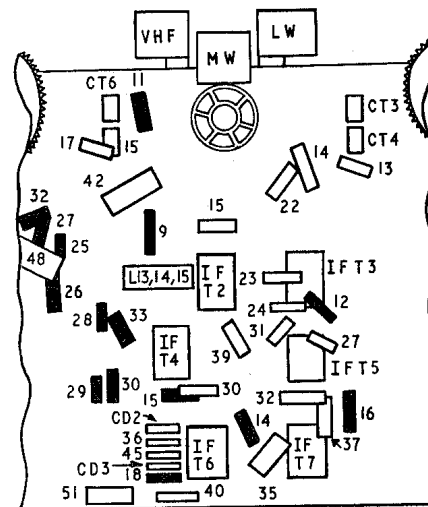
If tuner requires alignment other than to L10 or C16 it should be returned to the manufacturer's service department.

## BUSH VTR103 - Continued from page 1

**Voltages.** Readings given on circuit are positive with respect to chassis and are measured with an Avo 8 on 10V range under no-signal conditions on VHF with volume control set to zero.

**Circuit differences.** In some early models C7 was 3.3pF. Various IF transformers have been used with differing DC resistances.

**Circuit notes.** The transistors in this circuit are used in a slightly non-standard way to provide a negative earth line. Emitter circuits are returned to the positive line with decoupling to chassis, while collectors are connected to chassis via transformers, etc. Circuit is shown with switches in MW position.



### ALIGNMENT

**Equipment required.** AM signal generator covering 200-1500kc/s, 10.7mc/s and 87.5-100mc/s, with 30 per cent modulation. Sound output meter with range covering 200mW. Avo 8. Matched pair of 220K resistors, 0.1mf and 10pf capacitors. Suitable non-metallic trimming tool.

**Setting up.** Remove receiver from cabinet and replace pointer for calibration purposes. Connect output meter across speaker, or in place of speaker via phone socket if of 30hms impedance. If a low impedance meter is connected at the same time as speaker the power output must be restricted to 70mW to avoid damage to the transistors.

Set volume control to maximum and tone control for maximum treble and allow generator about 15 minutes to warm up before commencing alignment.

During alignment adjust the input to maintain an output level of 50mW (0.4V in 30hms), or 20mW (0.25V) if internal speaker is left connected. During FM, IF alignment input should be adjusted to produce a voltage output of 0.5-1V on DC meter.

The outer peak is the correct tuning point on all IF transformers.

**Procedure IF, AM.** Switch to MW and set tuning pointer to 1000kc/s. Inject a modulated 470kc/s signal via 0.1mf to base of Tr3 and adjust IFT7, 5 and 2 in that order for maximum on output meter. Align each transformer once only.

**Procedure, IF, FM.** Connect two 220K resistors in series from TP2 (negative end of C46) to chassis and connect Avo on 10V DC range as output meter across the two resistors. Set RV1 to mid-position.

Switch to VHF and set tuning pointer to 94mc/s. Apply a 10.7mc/s modulated signal via 0.1mf to base of Tr3 and adjust IFT6 prim. (bot) for maximum on DC meter. Transfer Avo (switched to 50mA range) to between junction of two 220K resistors and TP1 (R18/C36) and adjust IFT6 sec. (top) for zero reading on meter between positive and negative maxima. Reconnect Avo as previously.

Adjust both cores of IFT4 and IFT3 for maximum on DC meter, then adjust RV1 for minimum audio output with volume control at maximum. Re-adjust primary (bot) of IFT6 for maximum on DC meter, then re-adjust secondary for zero on microammeter connected between TP1 and junction of two 220Ks.

Switch off modulation and transfer IF signal to car aerial socket. Adjust cores of IFT1 (in VHF box) for maximum on DC meter. Disconnect meters and resistors.

**Procedure RF, AM.** Set tuning capacitor to maximum and check that tuning pointer is in line with horizontal datum line on auxiliary tuning scale. Connect signal generator output to car aerial socket via a 10pF capacitor and switch to MW. Inject a 600kc/s modulated signal, set tuning pointer to the same frequency and adjust L13/14/15 for maximum output. Coils on ferrite rod are unlikely to need adjustment, but if necessary the former of L11/12 may be adjusted for maximum output. Change input and pointer to 1500kc/s and adjust CT6 for maximum output. Repeat the operations in this paragraph.

Switch to LW, change input and pointer to 214kc/s and adjust CT5 for maximum output. Do not move L9/10.

Switch back to MW, apply 1500kc/s, set pointer to same frequency and adjust CT3 for maximum output. Change input and pointer to 600kc/s and adjust L11 on former if necessary. Repeat the operations in this paragraph.

Switch to LW, change input and pointer to 214kc/s and adjust CT4 for maximum output.

**Procedure RF, FM.** Switch to VHF and ensure that VHF box screening cover is securely in position. Connect signal generator output to car aerial socket and connect DC meter between TP2 and chassis.

Set scale pointer to 94mc/s on the auxiliary tuning scale and inject an unmodulated signal of the same frequency. Slacken the hexagonal headed locking screw securing the pivoted lever core adjuster and set the adjuster for maximum on the DC output meter; retighten the locking screw. This operation adjusts the cores of L3 and L5.

Without touching controls or generator, adjust the core of L1 and L2 for maximum on DC meter. Check calibration at 87.5 and 100mc/s. RF trimmer CT1 and oscillator CT2 are preset at 94mc/s during production and are unlikely to need further adjustment.