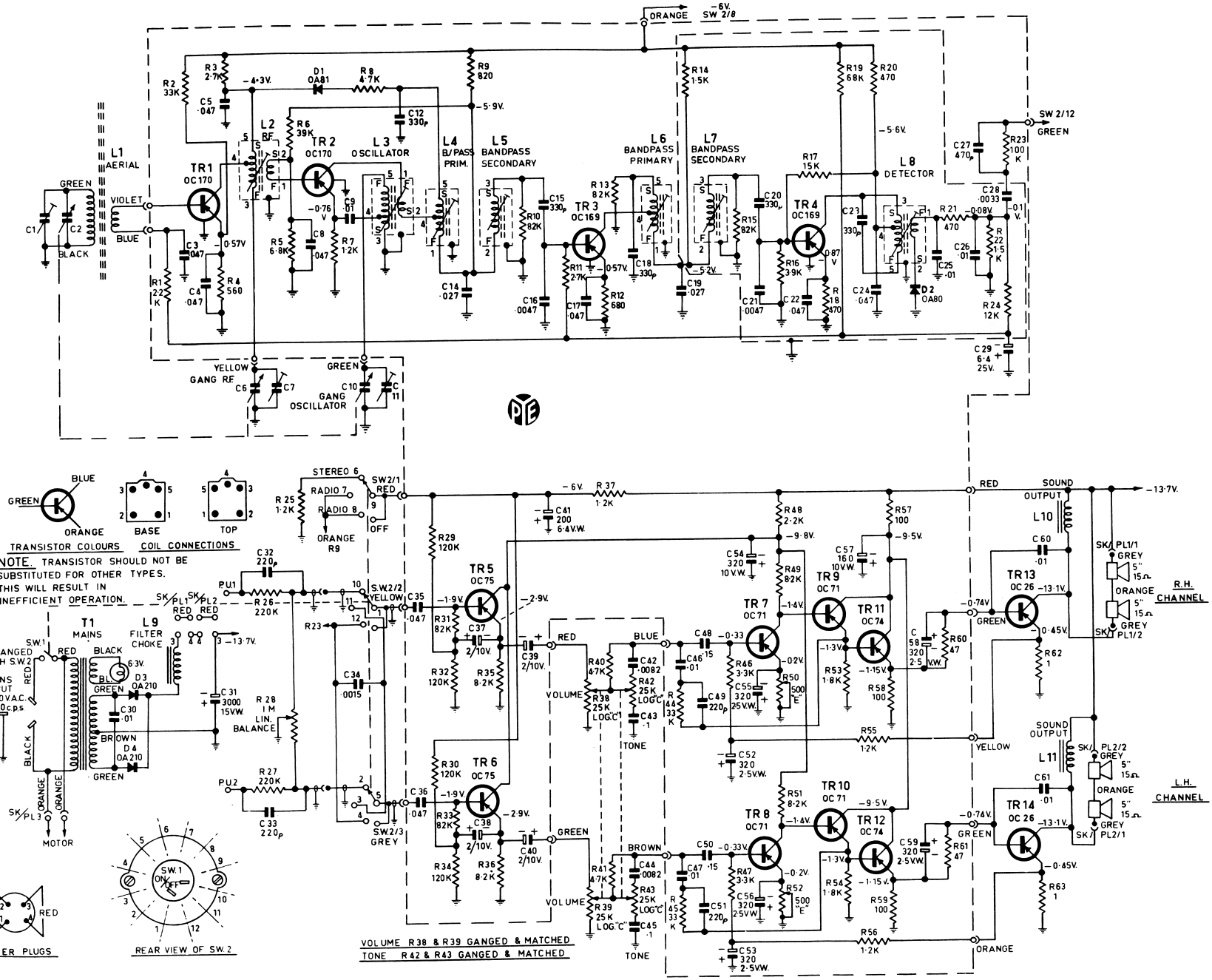
ORANGE -6V. SW 2/8
L1 AERIAL
L2 RF
L3 OSCILLATOR
L4 B/PASS PRIM.
L5 BANDPASS SECONDARY
L6 BANDPASS PRIMARY
L7 BANDPASS SECONDARY
L8 DETECTOR
TR1 OC170
TR2 OC170
TR3 OC169
TR4 OC169
TR5 OC75
TR6 OC75
TR7 OC71
TR8 OC71
TR9 OC71
TR10 OC71
TR11 OC74
TR12 OC74
TR13 OC26
TR14 OC26
D1 OA81
D2 OA80
D3 OA210
D4 OA210
SW 2/12 GREEN
YELLOW GANG RF
GREEN GANG OSCILLATOR
STEREO 6
RADIO 7
RADIO 8
OFF
SW2/1 RED
SW2/2 YELLOW
SW2/3 GREY
SW.1 GANGED WITH S.W.2
MAINS INPUT 240 V.A.C. 50 c.p.s.
T1 MAINS
L9 FILTER CHOKE
SOUND OUTPUT
L10
L11
R.H. CHANNEL
L.H. CHANNEL
VOLUME
TONE
R28 1M LIN. BALANCE
MOTOR
SPEAKER PLUGS
REAR VIEW OF SW.2
VOLUME R38 & R39 GANGED & MATCHED
TONE R42 & R43 GANGED & MATCHED
TRANSISTOR COLOURS
COIL CONNECTIONS
BASE
TOP
NOTE. TRANSISTOR SHOULD NOT BE SUBSTITUTED FOR OTHER TYPES. THIS WILL RESULT IN INEFFICIENT OPERATION.

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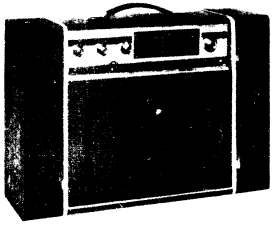
SERVICE DATA

ISSUE 1

ALL TRANSISTOR STEREOPHONE TS1



CHASSIS MODEL NO. R24-1A

R24-1-A TSI SPECIFICATIONS

TUNING RANGE	525-1640 Kc/s
INTERMEDIATE FREQUENCY	455 Kc/s
INPUT SIGNAL RANGE	10 uV/metre to 1 Volt/metre
AUDIO SENSITIVITY	150 mV for full output
MAXIMUM AUDIO OUTPUT	3 watts (2 watts at 2%)(Continuous sine wave)
FREQUENCY RANGE	60 c/s to 20,000 c/s
TONE CONTROL	± 10 dB at 10,000 c/s
BASS BOOST	8 dB at 100 cps
POWER SOURCE	230-254 V 50 cps
POWER CONSUMPTION	24 watts with P.F. = 0.85

TSI SUMMARY OF OPERATION

RADIO TUNER

The radio is a high sensitivity superheterodyne incorporating an RF stage for good signal to noise ratio and two bandpass coupled IF amplifiers for high selectivity. Alloy diffused junction transistors are used throughout for superior stability, gain and A.V.C. control.

A large diameter loopstick has been used for high signal pick-up and is matched to the RF amplifier for best signal to noise ratio. Both IF amplifiers are bottom capacitively coupled by C14 and C19 and the base circuits are matched by means of a capacitive tap to ensure high transfer efficiency.

A.V.C. control is applied to the RF and first IF amplifiers and also to the converter by means of the damping diode D1. The RF amplifier acts as a DC amplifier for the damping diode and enables the audio output to be held constant over widely varying inputs. At high input signals the effect of the damping diode diminishes, the RF amplifier gain then decreases rapidly, ensuring that the receiver will be free of cross modulation effects.

With the selector switch in the first radio position the radio output is fed to both audio channels in parallel and the bass boost in the audio amplifiers makes this position particularly suited to music listening. In radio position two the bass is attenuated by C34 to give an overall flat response for clearest diction on speech programmes. When switched to stereo the radio HT is disconnected and the stereo pickup is fed to each channel via the treble boost network R26 C32.

AUDIO AMPLIFIER

The two audio channels are identical and consist of a four stage DC amplifier preceded by a preamplifier. For High transfer efficiency the power amplifier is choke coupled to a pair of matched speakers which give increased acoustic efficiency and extended frequency range. All speakers are connected in phase to ensure true stereophonic sound and when a speaker is replaced this point must be carefully observed.

Due to the voltage drop across the output choke there is a small DC current flowing in each speaker. This can be used to quickly ascertain the phasing of the speakers by turning the receiver on and off watching cone movement. The correct phasing will result in all cones moving in the one direction.

Negative feedback is applied to the output stage independently by means of the unbypassed emitter resistor and this stage is driven by two cascaded emitter followers. This method gives low distortion and allows a low output impedance whilst only lightly loading the voltage amplifier TR7. All stages are DC coupled and the voltage amplifier TR7 is biased from the output stage, giving high overall DC feedback. This results in remarkable thermal stability and the receiver may be run at temperatures as high as 120° F. The operating current in the output stages is set to 0.45 amps by the emitter resistor R50, by measuring 0.45V at the emitter of the output stage.

Negative feedback is applied over the main amplifier and bass boost is obtained by means of the network consisting of R44, C46 and C48. This ensures low distortion and compensates the characteristics of the stereo pickup cartridge. Treble boost and cut is provided by the tone control which has 20 dB range.

The preamplifier is a high gain low noise transistor connected as a bootstrap emitter follower. This gives a high load impedance for the pickup and a low output impedance for the volume and tone control networks, hence minimising hum pickup.

POWER SUPPLY

The power supply delivers 14 volts at 1 amp and uses a choke input filter to give maximum protection to the silicon rectifiers, which are connected in full wave.

Each speaker plug incorporates a shorting link which removes the HT from the receiver when the plug is removed. This safety device should never be tampered with as it is possible to permanently damage the output transistors if they are run without a load.

ALIGNMENT PROCEDURE

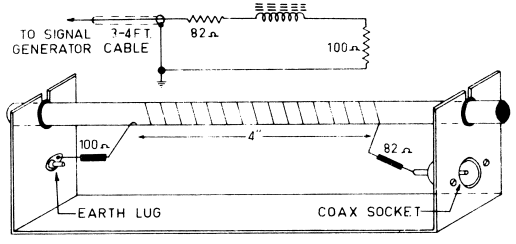
Alignment should not be necessary unless repairs have been made to a tuned circuit. When alignment is necessary the following procedure should be followed.

Switch to radio position one and turn the volume and tone controls to maximum. Connect a 30 ohm output meter to one channel, making sure that the shorting link is incorporated in the plug, and terminate the other channel either with its speakers or with a 30 ohm 5W resistor. During the alignment the output should be kept below 100 mW to make sure the AVC is inoperative.

To inject a signal into the loopstick it is necessary to radiate a signal from the signal generator. When measurements are not necessary a 2 ft. length of wire may be used, placed vertically and 2 ft from the receiver. If sensitivity measurements are to be taken the following radiator may be used with 1 dB accuracy throughout the band.

17 turns of 22 to 26 B & S wire are wound over an 8 inch x 3/8" dia loopstick spaced to cover 4 inches about the centre of the rod. The generator is fed to one end of the winding via 82 ohm and the other end is returned to earth by 100 ohm. Both resistors should be carbon types.

In use the radiating loop is placed parallel to the receiver loopstick and 24 inches from it, keeping the centres of both loops roughly in line. The equivalent field strength at the receiver is then found by dividing the generator reading by 20; i.e. 20 mV on the generator gives a field strength of 1 mV/metre at the receiver.



I.F. ALIGNMENT

Connect the signal generator to the base of the converter TR2 via an 0.047 uF capacitor and tune it to 455 Kc/s. Set the receiver dial to the extreme low frequency end and tune all IF coils for maximum output, keeping the output below 100 mW by adjusting the generator. For 100 mW output the input should be 12 uV ± 3 dB.

NOTE: To eliminate radio interference the oscillator gang may be shorted to stop the oscillator.

R.F. ALIGNMENT AND SCALE CALIBRATION

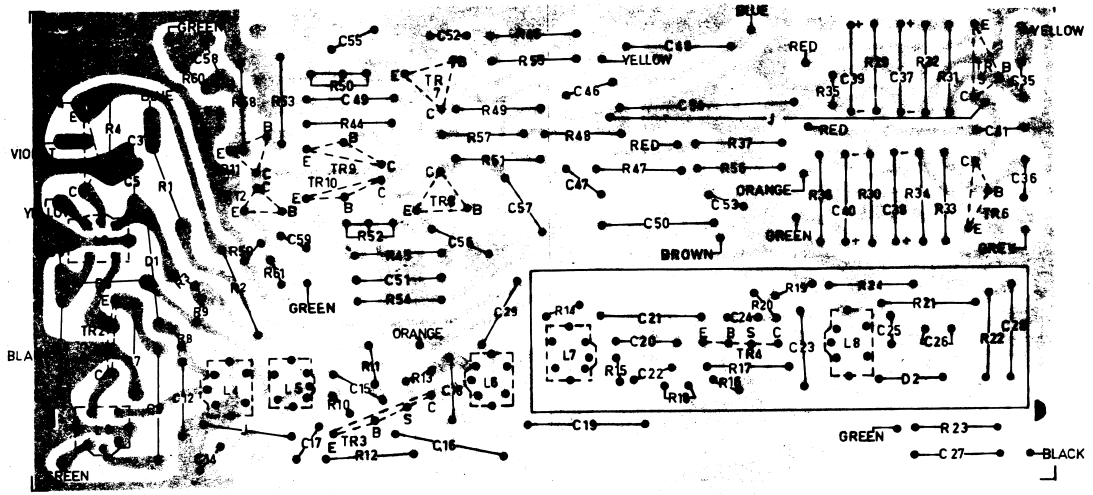
If the gang is replaced it may be necessary to re-calibrate the dial scale. To do this, first fully mesh the gang and adjust the pointer so that it lies over the band limit mark on the scale. This mark and the calibration marks are along the bottom of the dial scale and cannot easily be seen when the chassis is in the cabinet.

Connect the signal generator to the radiating loop and set the frequency to 640 Kc/s. Tune the receiver to the first calibration mark under 5 CK and adjust the oscillator coil L3 and the RF coil L2 for maximum output. The aerial coil is also tuned by sliding the coil over the rod.

Set the generator to 1470 Kc/s and tune the receiver to the third calibration mark under 3MA and adjust the oscillator, RF and aerial trimmers for maximum output. Repeat these adjustments until no further improvement can be achieved. The generator input should be kept at roughly 100 uV/metre during these adjustments.

Set the generator to 980 Kc/s and tune the receiver to the signal. Check that the pointer is within 1/16" of the second calibration mark under 2KM.

PRINTED CIRCUIT BOARD



PERFORMANCE FIGURES

These are taken at 980 Kc/s with 30% modulation on the generator.

1. R.F. SENSITIVITY

For 100mW output taken from the base of the RF amplifier V1 via an 0.047 uF capacitor. 1.4 uV ± 4 dB.

2. SIGNAL TO NOISE RATIO (using loopstick radiator)

For 100uV/metre input note the audio output then remove the modulation. The audio output should fall by at least 19 dB.

3. AUDIO OUTPUT

For full volume and 1 mV/metre input 1 watt ± 3 dB.

4. A.G.C. CHARACTERISTIC

Adjust the generator to give 1 mV/metre and adjust the volume control to give 100 mW output. At 50 uV/metre the output should not fall more than 10 dB and at 1 volt/metre the output should not rise more than 10 dB.

NOTE: 1. To achieve 1 volt/metre the radiating loop should be placed 10" from the receiver loopstick. The field strength is now found by reading the generator output direct with no division factor necessary. i.e. IV on the generator gives a field strength of 1 volt/metre.

2. When the chassis is replaced in the metal cabinet the aerial coil L1 may have to be slightly readjusted for optimum alignment. This may be carried out using a radio station near 1470 Kc/s, but it may be neglected since the detuning affect is only very slight.

PROCEDURE FOR DISMANTLING OF TS1 FOR SERVICE

CHASSIS REMOVAL

1. Remove knobs and retainer nuts from panel.
2. Remove speaker boxes from cabinet pivots.
3. Remove cover plates on both ends of cabinet held by 4 Phillip - head screws per side.
4. Remove flex clamps.
5. Remove back inspection cover.
6. Disconnect speaker plugs from sockets.
7. Disconnect tone-arm leads from tag strip. (Observe colour coding).
8. Disconnect mains plug to player motor.
9. Remove two chassis holding P.K. screws.
10. Withdraw chassis from cabinet, taking care that dial drum does not foul top of cabinet on removal.
11. Replace BOTH Speaker plugs to chassis before switching on for service diagnosis.
12. Reverse procedure for assembly.

REMOVAL OF RECORD PLAYER

1. Remove end cover plates on cabinet.
2. Remove back inspection cover.
3. Disconnect mains plug to player from chassis.
4. Disconnect pick-up leads from tag strip. (Observe colour coding).
5. Remove large pivot screws from both ends of cabinet.
6. Remove player platform complete with player.
7. Reverse procedure for assembly.

REPLACEMENT OF BALANCE CONTROL

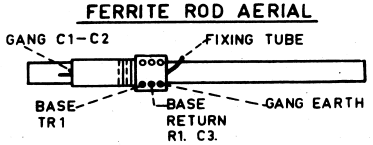
Remove two Phillips screws from stereo direction finder backplate, this will reveal balance control to be replaced. (Observe wiring).

Do not use an iron over 60W - excess solder - undue pressure. Replace components by withdrawing solder from the crimped leads while lifting the lead from the foil by the insertion of a knife edge. Cut off the crimped section and withdraw component, or cut out component, unsolder remaining terminations and push through. Repair foil breaks by flowing solder, or soldering tinned copper wire across. Replace damaged sections with a jumper of wire.

Base and emitter voltages to be within ± 15% those given when input voltage is 13.7 volts. Measurements taken with an avo-meter model 8-20,000 ohms per volt - no signal - input - gang fully meshed. All measurements taken to chassis.

Do not make continuity tests with transistors in circuit. Use a heat sink i.e., a pair of pliers between the transistor and iron when soldering a replacement. Transistors may be permanently damaged if the polarity of the batteries is reversed.
Do not interchange the transistor types. Do not use a transistor as a replacement unless it is identical, or has been specified as a direct equivalent to the original.

FERRITE ROD AERIAL



DIODE

CODE NO.	FUNCTION	TYPES	PART NO.
D1	A.V.C. Diode	OA81	OA81
D2	Detector Diode	OA80	OA80
D3	H.T. Rectifiers	OA210	OA210
D4	H.T. Rectifiers	OA210	OA210

TRANSISTORS

CODE NO.	FUNCTION	TYPES.
TR1	R.F. Amplifier	OC-170
TR2	Converter	OC-170
TR3	1st I.F. Amplifier	OC-169
TR4	2nd I.F. Amplifier	OC-169
TR5	Audio Preamplifier	OC-75
TR6	Audio Preamplifier	OC-75
TR7	Voltage Amplifier	OC-71
TR8	Voltage Amplifier	OC-71
TR9	Current Amplifier	OC-71
TR10	Current Amplifier	OC-71
TR11	Audio Driver	OC-74
TR12	Audio Driver	OC-74
TR13	Audio Output	OC-26
TR14	Audio Output	OC-26

INDUCTANCES

CODE NO.	SPECIFICATIONS	PART NO.
L1	Coil - Aerial Assembly	EAC-334
L2	R.F. - Coil Assembly	EAC-322
L3	Oscillator	EAC-323
L4	Bandpass primary	EAC-324
L5	Bandpass secondary	EAC-325
L6	Bandpass primary	EAC-324
L7	Bandpass secondary	EAC-325
L8	Detector	EAC-326
L9	Filter choke	EAC-015
L10	Sound output	EAC-015
L11	Sound output	EAC-015

TRANSFORMER

CODE NO.	SPECIFICATIONS	PART NO.
	Transformer - Mains	EAB-101