

# REGENTONE

TRANSISTOR PORTABLE

MODEL

BT12

## DESCRIPTION

1.1 The BT12 Transistor Portable Radio receiver employs six Transistors and a crystal diode. Printed circuit technique is employed for Transistors and components, together with a Ferrite rod aerial mounted inside the cabinet.

1.2 **Voltage.**—Two 6-volt batteries connected in series Type Ever Ready PP1.

1.3 **I.F. Frequency.**—475 Kc/s.

1.4 **Waveband Coverage.**—M.W. 525-1,630 Kc/s.  
L.W. 165-295 Kc/s.

1.5 **Controls.**

Left Hand On/Off Volume.

Right Hand Tuning.

Centre Button Switch M.W./L.W.

1.6 **Consumption.**—No signal. 8 M/A.  
Normal Operating Conditions 17 M/A at 50 mW output.

1.7 **Speaker.**—5" Round 40 ohms Impedance.

## CIRCUIT DESCRIPTION

L.W. coils L1, and M.W. coils L2 are mounted at opposite ends of a Ferrite rod to form the internal aerial. Tuning on M.W. is provided by C21, and on L.W. by the fixed condensers C1, C27.

Signals are applied from the low impedance secondary windings on the Ferrite aerial to the Transistor TR1 which works as a mixer oscillator. The emitter of TR1 is connected to a low impedance winding on the oscillator transformer L3 which is tuned by C23 on M.W., and by C4 and C25 for L.W.

TR2 operates as an earthed emitter I.F. amplifier working into the second I.F. transformer L6, L7 which has a tuned primary and a low impedance secondary. Signals are passed from this winding to TR3 which operates as the second I.F. amplifier, the signal being tuned by L8, and coupled by L9 to the crystal diode detector CD1.

Neutralising is by C9, R9, for TR2, and by C13, R13 for TR3.

The driver stage TR4 has a primary winding of a step-down transformer connected to its collector, while the secondary windings are connected to TR5 and TR6 which operate as a common emitter Class B output stage. Resistors R22 and R27 are the base biasing resistors for this stage.

No output transformer is used as the high impedance speech coil is connected directly between the supply and the circuit.

The conditions necessary for efficient and undistorted operation are that R21 and R22 and TR5 shall be perfectly matched to R25 and R27 and TR6.

Under these conditions and with no signal input the junction of R26 R24 will be at the same potential as the centre of the battery, and no current will flow in the speech coil. On applying the signal from the driver stage, TR5 and TR6 will alternately be driven to pass a high current. This current will vary at an audible rate and will flow directly through the speech coil of the loudspeaker.

Provision is made for the connection of an external aerial via the co-axial socket on the cabinet back.

## ALIGNMENT

- (1) Remove the chassis from the cabinet, leaving the battery and aerial leads connected.
- (2) Connect the output of a signal generator to a loop of wire, which should be placed a few inches from the end of the Ferrite rod aerial.
- (3) Connect a high resistance voltmeter across the volume control, the negative lead going to the chassis. (A slight negative reading will be obtained until the input voltage is great enough to produce rectified current and a positive AGC voltage.)
- (4) Switch receiver to M.W. and turn gang to minimum capacity, shorting the oscillator section.
- (5) Feed in a 475 Kc/s signal and adjust the cores of L8, L6, L4 for maximum deflection.
- (6) Remove the short from the oscillator section.
- (7) Tune the receiver to 500 metres. Set the generator to 600 Kc/s and adjust the core of L3 for maximum deflection.
- (8) Tune receiver to 200 metres. Set the generator to 1,500 Kc/s and adjust C24 for correct calibration. Repeat with step (7) until calibration is correct. Then adjust the trimmer C22 for maximum deflection at 1,500 Kc/s.
- (9) Switch the receiver to L.W. and tune accurately to 1,500 metres. Feed in a 200 Kc/s signal and adjust C25 and the L.W. aerial coil L1 for maximum deflection.

## CHASSIS REMOVAL

To remove the printed circuit board from the cabinet, first remove the batteries and unsolder the loudspeaker connections.

Pull off the two front control knobs, care being taken not to damage the tuning scale (see note).

Remove the Ferrite rod aerial by sliding the bracket out of the retaining slot.

Remove the nut holding the volume control and the screw securing the tuning capacitor, which then allows the chassis to be removed from the cabinet together with the Ferrite rod aerial.

Note: It is recommended that the tuning scale is removed by fully meshing the tuning gang and pushing the scale with a screwdriver from the inside of the cabinet, or by levering the scale off from the front, by means of a cloth covered flat metal strip.

## NOTES ON PRINTED CIRCUITS USING CRYSTALS AND TRANSISTORS

(1)

When removing or inserting a component on the printed circuit wiring, care must be taken to avoid excessive pressure, as the copper may separate from the base material.

(2)

To prevent corrosion, the wiring has been protected by a thin coat of wax. For soldering therefore, an iron with a small diameter bit and not exceeding 30 watts should be used. The iron should be applied to the joint long enough to cause the solder to flow, and then be quickly removed.

(3)

Alternatively, for quick replacements of components they may be clipped out of circuit, when the remaining wire stubs can be easily removed.

Where free replacement of components under Guarantee is required, they must not be mutilated in any way.

(4)

When the need arises for testing on the printed circuit chassis plate the protective wax or varnish must first be scraped away from the test points.

(5)

Open or damaged sections of the printed circuit can be repaired by soldering a jumper of ordinary connecting wire across the connection points.

(6)

When removing a suspected crystal or transistor it is essential that the soldering iron should not be brought closer than  $\frac{1}{2}$ -inch from the body of the component. A suitable heat sink made with a pair of pliers will help to avoid damage to the semi-conductor properties of these components.

(7)

Continuity of components should NOT be made with the Transistors connected in circuit.

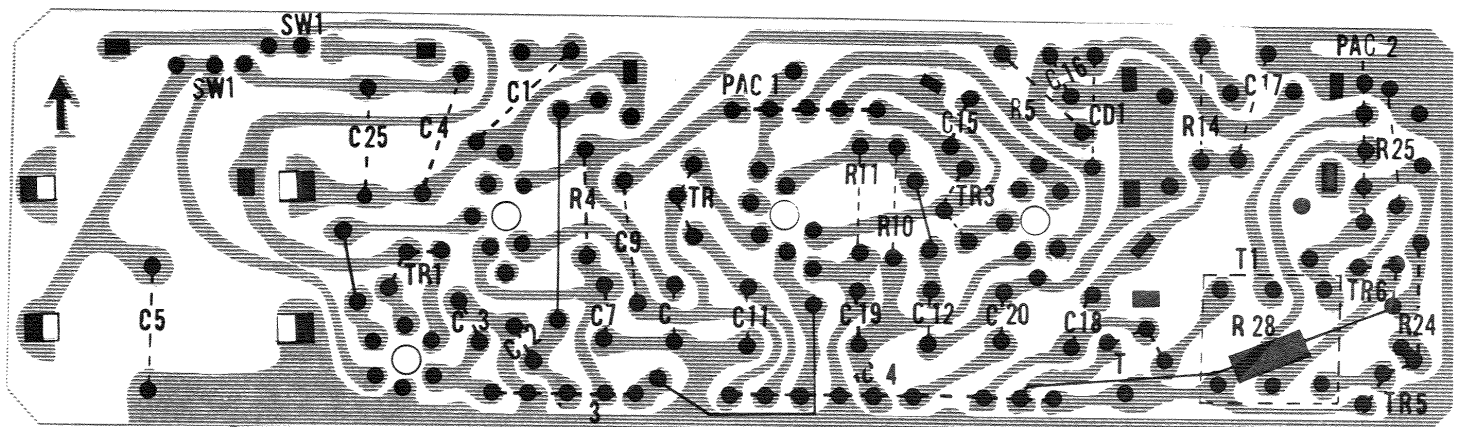
(8)

The measurement of emitter and base currents is not recommended as the introduction of a meter in the leads would upset the working voltages on these electrodes. The voltage existing between emitter and base should not be greater than 250 mV.

If the bias resistors are shorted out in any way, this value will be exceeded, and damage to the Transistor will result.

(9)

The Transistors will be permanently damaged if the full negative voltage is applied to their base, and this could happen if R1, R4, R10, etc., were shorted out. This could also happen if a voltmeter with a low internal resistance were used, or a high grade instrument switched to the current range in error.



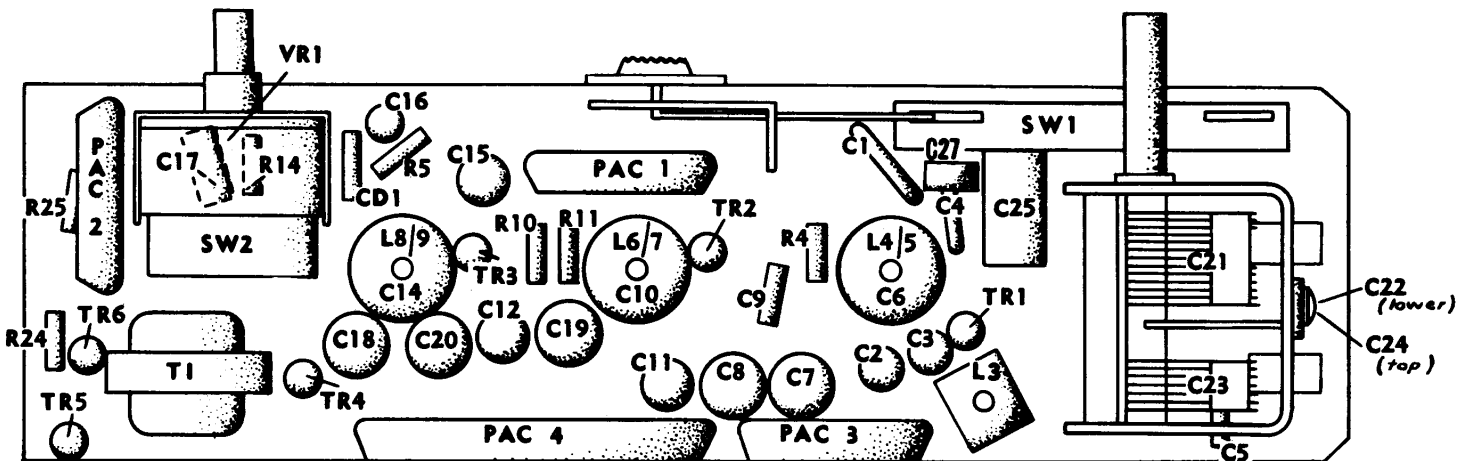
**UNDER CHASSIS LAYOUT**

## TRANSISTORS

TR1	Transistor	Mullard OC44	930/0008
TR2, 3	Transistor	Mullard OC45	930/0007
TR4	Transistor	Mullard OC78D	930/0012
TR5	Transistor	Mullard OC78	
TR6	Transistor	(matched pair)	930/0011
CD1	Germanium Diode	Mullard OA70	715/0011

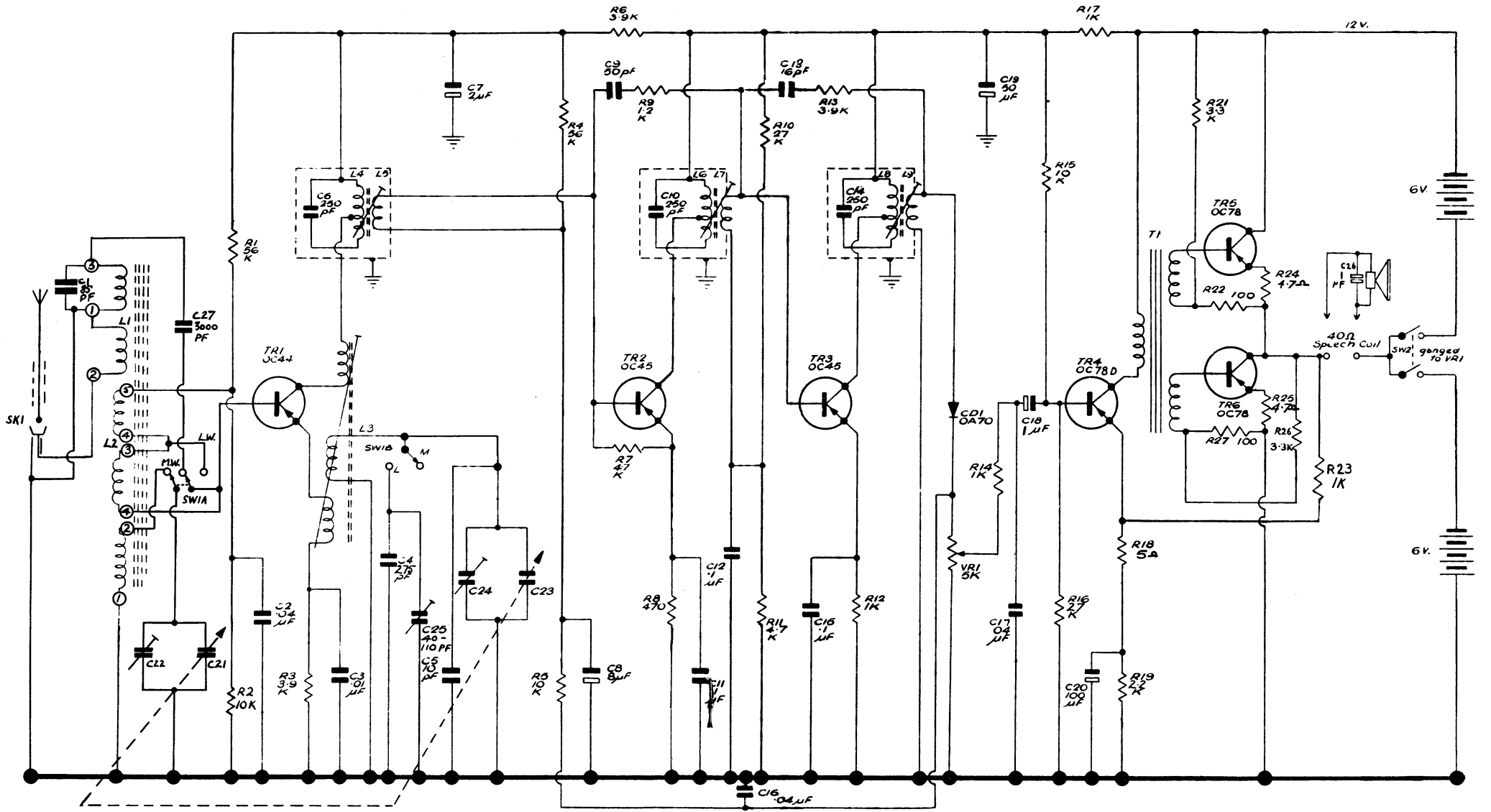
## INDUCTANCES

Cct. Ref.	Function	Part No.
L1	Aerial Coil, L.W.	204/0600
L2	Aerial Coil, M.W.	204/0566
L3	Oscillator Coil	203/0058
L4, 5	1st I.F. Transformer	206/0031
L6, 7	2nd I.F. Transformer	206/0031
L8, 9	3rd I.F. Transformer	206/0032
T1	Driver Transformer	907/0060

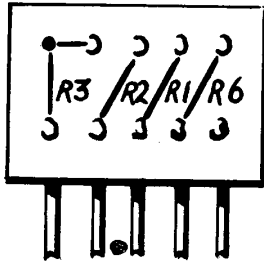


**TOP CHASSIS LAYOUT**

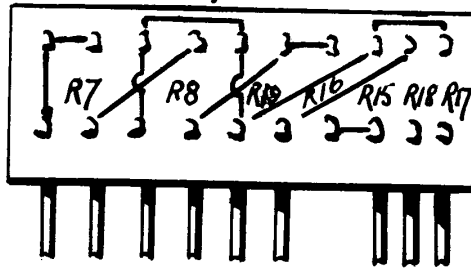
C	22	27	21	2	6	3	4	25	8	7	24	23	8	9	10	11	12	16	18	15	14	19	17	18	20							
R		1		3					4	5			6	7	9	8		10	13	12		14	15	16	17	18	21	22	27	25	26	23
M	L1			TR1		L4	L3						TR2	L6	L7				TR3	L8	L9	CD1			TR4		TR5	TR6				



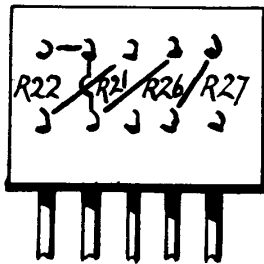
PAC 3  
617/0007



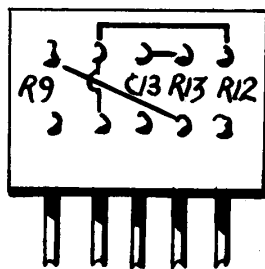
PAC 4  
617/0011



PAC 2  
617/0010



PAC 1  
617/0005



VIEWED FROM FLAT  
SIDE OF PACKS.

### CAPACITORS

Cct. Ref.	Value	Tol.	Voltage	Type	Part No.
C1	85pf	2	350	Suflex HS15/1	224/0705
C2, 16	.04uf	20	150	Hunts W99 B858	219/4529
C3	.01uf	20	400	Hunts W99 B810	219/4504
C4	275pf	2	350	Suflex H515/1	224/0706
C5	10pf	20	750	SRC P100/38	222/0164
C6	250pf			See IFT.1	
C7	2uf		12	BEC CE 268/12	213/0072
C8	8uf		6	BEC CE 243/12	213/0073
C9	50pf	2	750	SRC N750/38	222/0163
C10	250pf			See IFT.2	
C11, 12, 15	.1uf	20	150	Hunts MP A8005	219/5504
C13	16pf	5		See PAC1	
C14	250pf			See IFT.3	
C17	.04uf	20	150	Hunts W99 B858	219/4528
C18	1uf		6	BEC. CE242	213/0094
C19	50uf		12	BEC CE 201/13	213/0071
C20	100uf		6	BEC CE 202/12	213/0070
C21, C23	343pf + 177pf			Plessey V Type S488	217/0018
C22, C24	Trimmer			Part of 217/0018	
C25	40-110pf Padder			Wingrove and Rogers	220/0021
C26	1uf		25 Rev.	CCL x 208	213/0098
C27	3000pf	2	125	SUFLEX HS	224/3003

## SPARE PARTS

Description	Part No.
Cabinet (Cream)	159/0029/3
(Blue and White)	159/0029/5
(Pink and White)	159/0029/6
Clip for Knob 522/0021	197/0006
Clip, Back	199/0053
Ferrite Rod Aerial, Complete	204/0571
Ferrite Rod, Core only	230/0001
Knob, Tuning	522/0021
Knob, Volume On/Off	522/0021
Scale Dial	757/0076
Switch, Button	081/0024
Switch, Link	542/0004
Switch, Slider	818/0012
Speaker, 5" Round	787/0032
Socket, Co-axial	779/0013

## RESISTORS

Cct. Ref.	Value	Tol.	Rating	Type	Part No.
R1	56K	10			See PAC3
R2	10K	10			See PAC3
R3	3.9K	10			See PAC3
R4	56K	10	$\frac{1}{4}$	Erie 16F	730/0394/1
R5	10K	10	$\frac{1}{4}$	Erie 16F	730/0362/1
R6	3.9K	10			See PAC3
R7	4.7K	10			See PAC4
R8	470	10			See PAC4
R9	1.2K	10			See PAC1
R10	27K	10	$\frac{1}{4}$	Erie 16F	730/0380/1
R11	4.7K	10	$\frac{1}{4}$	Dub. BTSF	730/0114/1
R12	1K	10			See PAC1
R13	3.9K	10			See PAC1
R14	1K	10	$\frac{1}{4}$	Erie 16F	730/0320/1
R15	10K	10			See PAC4
R16	27K	10			See PAC4
R17	1K	10			See PAC4
R18	5	10			See PAC4
R19	2.2K	10			See PAC4
R21	3.3K	5			See PAC2
R22	100	5			See PAC2
R24, 25	4.7K	10	$\frac{1}{4}$	Morg. Type S	730/9008/1
R26	3.3K	5			See PAC2
R27	100	5			See PAC2
R28	1.5K	10	$\frac{1}{4}$	Erie 16	730/0327
PAC1	Contains R9, 12, 13, C13				617/0005
PAC2	,, R21, 22, 26, 27				617/0010
PAC3	,, R1, 2, 3, 6				617/0007
PAC4	,, R7, 8, 15, 16, 17, 18, 19				617/0011
VR1	5K Log DPST				649/0019

SPARE PART DIFFERENCES  
BETWEEN BT.14 AND BT.12 MANUAL

DESCRIPTION	BT.14	PART NO.
CABINET	Cream and Grey	157/0146
CABINET	Flame	157/0146/1
CLIP	Knob Retaining	197/0046
KNOB	Tuning, Volume On/Off	E522/0021/1
TRANSFORMER	T.1	908/0036/C
SCALE	Tuning	757/0080

CAPACITORS AND RESISTORS

CAPACITOR C4 WAS 275pF NOW 265pF 224/0707  
DELETE R28 1.5K ADD R23 1K.  $\frac{1}{4}$  W. (RESISTOR TABLE ONLY) 730/0320  
R24.R25 SHOULD READ 4.7 $\Omega$  NOT 4.7K $\Omega$

D.C. RESISTANCE OF SPEECH COIL WAS 40 $\Omega$  NOW 35 $\Omega$

077/0153