Issue 1
3.11.77

DESIGNS DEPARTMENT MANUFACTURING INFORMATION

No. 6.305(77)

Voice Frequency Ringer UN10/42

J.W.H. O'Clarey
for Head of Designs Department

Written By: M.T. Ellen

D.D.M.I. No. 6.305(77)
Title Sheet

SCF

BBC

DS/SPA4

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C O N T E N T S

D R A W I N G S

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1. INTRODUCTION

This unit has been designed to interface two different types of telephone transmission circuit, one employing voice frequency ringing and the other employing 17Hz ringing. If 17Hz ringing current is applied to the "office" pins of the unit it will apply a voice frequency tone to the "line" pins of the unit for approximately 2 seconds. Conversely, if a tone of the correct frequency is applied to the "line" pins of the unit for a least 400mS it will apply 17Hz ringing current to the "office" pins of the unit.

The voice frequency generator and detector circuits may be independently set to any of the four standard signalling frequencies by means of internal links. The standard frequencies are 600, 700, 860 and 1900Hz but other frequencies could be selected by replacing a resistor and a capacitor.

The UN10/42 contains internal voice frequency and 17Hz oscillators mounted on a separate printed board and coded OS3/11. However, if external voice frequency and 17Hz oscillators are available the ringer can be supplied without the OS3/11 oscillator board and the external oscillators can be connected via the rear socket. The voice frequency ringer without internal oscillators is coded UN10/41 and the UN10/41 can be easily modified to a UN10/42 by adding an OS3/11.

2. SPECIFICATION

a) Voice frequency detector (UN10/41)

Input frequencies:	600, 700, 860 and 1900Hz selected by links on the PCB
Bandwidth:	25 to 30Hz
Sensitivity:	-35dBm.
Maximum input level:	0dBm.
Input impedance:	>10K
Signal to noise ratio required:	20dB at least. The detector will not operate if more than one tone is applied.
Response time:	400 ± 50mS.

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b) Voice Frequency oscillator (OS3/11)

Output frequencies:	600, 700, 860 and 1900Hz selected by links on the PCB.
Output level:	Adjustable up to 0dBm into 600
Frequency stability:	± 3Hz at 1900Hz from 0 to 40°C.
Output level stability:	±0.5dB from 0 to 40°C.

c) Ringing current detector (UN10/41)

Input frequency:	15 to 30Hz
Sensitivity:	40 volts peak to peak.
Maximum input voltage:	300 volts peak to peak for up to 5 seconds.
Input impedance:	>5.6KΩ in series with 2μF.

d) Ringing current generator (OS3/11)

Output frequency:	17 to 25Hz dependent on load.
Output voltage:	<200 volts peak to peak off load. >40 volts peak to peak with a load of 3 telephones in parallel.

Mechanical Data

Chassis:	CH1/65A
Weight:	0.6Kg.

Installation Data

Power requirements

Either PLA17 (+ve) and PLA2(-ve):	11.5 to 13 volts at 130 ± 20mA
or PLA13 (+ve) and PLA2(-ve):	13 to 35 volts at 130 ± 20mA (Current rises to 300 ±20mA when 3 bells are being driven).

Note 1: set link to connect X and Y when PLA17 is used.

Note 2: power supply may be floating, positive earth or negative earth.

Index pins:	1, 8 and 14
Chassis extender:	CH1A/45

Frequency setting

VF oscillator:	Fit link on PCB in one of four positions.
VF detector:	Fit links on PCB in one of four positions and adjust fine frequency control R11.
Output level setting:	Adjust R10 for required VF level.
"Office" telephone connection:	PLA6 and PLA14.
"Line" connection:	PLA8 and PLA10.
Input from external VF oscillator:	PLA3 and PLA12 (Set links LK5 and LK6)
Input from external ringing current generator:	PLA9 and PLA16.
Earth connection:	PLA1

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Voice Frequency Ringer UN10/42

PRODUCTION TEST SCHEDULE

1. Description

This unit has been designed to interface two different types of telephone transmission circuit, one employing voice frequency ringing and the other employing 17Hz ringing. If ringing current is applied to the "Office" pins of the unit RLC will operate and start the timer IC which energises RLB for about two seconds. When RLB is energised it connects a voice frequency oscillator to the "Line" pins of the unit. Conversely, if voice frequency tone of the correct frequency is applied to the "Line" pins the signal is amplified, detected and energises RLA after a delay of about 400mS. When RLA is energised it connects a ringing current generator to the "Office" pins of the unit. The voice frequency output duration is limited to 2 seconds to allow a higher level to be set to line and the 400mS detector delay is included to reduce the probability of false operation.

2. Information

a)	Design Section:	Transmission Section, D.D.
b)	Designer:	M.T. Ellen
c)	Engineer Responsible:	M.T. Ellen
d)	Handbook:	Not available 1.8.77
e)	Technical Instruction:	Not available 1.8.77
f)	Other Information:	This unit consists of voice frequency ringer UN10/41 and variable frequency oscillator OS3/11. They must be manufactured and tested in accordance with D.D.M.I. No.6.304(77) and 6.306(77) respectively.
g)	Pre-production Batch:	This P.T.S. has not been tested on a pre-production batch.

3. Manufacturing Performance Specification

a)	Input Requirements:	Speech or voice frequency tone on "line" pins. Speech or Ringing current on "Office" pins.

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b)	Output level:	Up to 0dBm on "line" pins when ringing current applied to "office" pins. 40 to 200 volts peak to peak on "office" pins when voice frequency tone is detected on the "line" pins.
	Output frequency:	600, 700, 860 or 1900Hz on "line" pins. 17 to 25Hz on "office" pins.
c)	Power requirements:	Either 11.5 to 13 volts PLA17(+ve) and PLA2(-ve), or 13 to 35 volts PLA13(+ve) and PLA2(-ve), at 190 ± 20mA off load and 300± 20mA when ringing three telephone bells.
d)	Performance:	
	Input sensitivity:	-35dBm (VF detector) 40 volts peak to peak (ringing detector).
	Bandwidth:	25Hz at 450Hz and 30Hz at 1900Hz.
	Response time:	400 ± 50mS (VF detector).
	Voice frequency oscillator stability:	±3Hz at 1900Hz from 0 to 40°C.

4. Warning

This unit contains a ringing current generator that can produce 200 volts peak to peak.

5. Test Apparatus Required

PSU variable from 0 to 35 volts, current limited to 350mA.

A.C. Test Set EP14/1.

Ringing Current Generator (e.g. OS3/11).

6. Inspection Checks

a) Check for overall mechanical defects. In particular, check that the OS3/11 (PCB only) has been correctly mounted in the UN10/41 chassis.

b) The UN10/42 does not contain any mains wiring but the OS3/11 produces over 30 volts r.m.s. Check that the OS3/11 has been correctly wired to the UN10/41 thus converting the unit to a UN10/42.

7. Test Procedure

7.1 To Check Current Consumption

a) Join pins Y and Z with LK1 (UN10/41) and connect a variable PSU (set to 0 volts and 350mA current limit) to PLA13 (+ve) and PLA2 (-ve). Gradually increase the voltage to 20 volts volts while monitoring the current.

b) Check that the current drawn is 130 ±20mA.

c) If this test is not passed check the wiring to the OS3/11 and if it is found to be correct remove the two power supply wires to the OS3/11 and note the current reading. If it drops to 22 ± 5mA re-test the OS3/11 (D.D.M.I. no. 6.306(77)) otherwise re-test the UN10/41 (D.D.M.I. No. 6.304(77)).

7.2 To Check the Voice Frequency Detector and Ringing Generator

a) Set LK2 and LK3 (OS3/11) to position D and set LK2 and LK5 (UN10/41) to position D. Connect a voltmeter set to 250 volts a.c. to PLA 6 and PLA14 (beware of high voltage) then connect an EP14/1 oscillator to PLA8 and PLA10 and set it to 1900Hz at 0dBm with 600Ω output impedance and internal termination. Note the voltmeter reading.

b) When the 1900Hz signal is applied the voltmeter reading should rise to 100±50 volts. The reading should be zero when the 1900Hz signal is removed.

c) If this test is not passed vary the frequency of the EP14/1 slightly. If it is still not passed check the wiring to the OS3/11.

7.3 To Check the Ringing Detector and Voice Frequency Oscillator

a) Connect the EP14/1 detector input to PLA8 and PLA10 then connect a 17Hz ringing current generator to PLA6 and PLA14. Note the EP14/1 reading.

b) When the ringing current is applied the reading should be 0dBm (or whatever the OS3/11 has been set to). The reading should drop to below -60dBm when the ringing current is removed.

c) If this test is not passed check the wiring to the OS3/11.

DS/A4

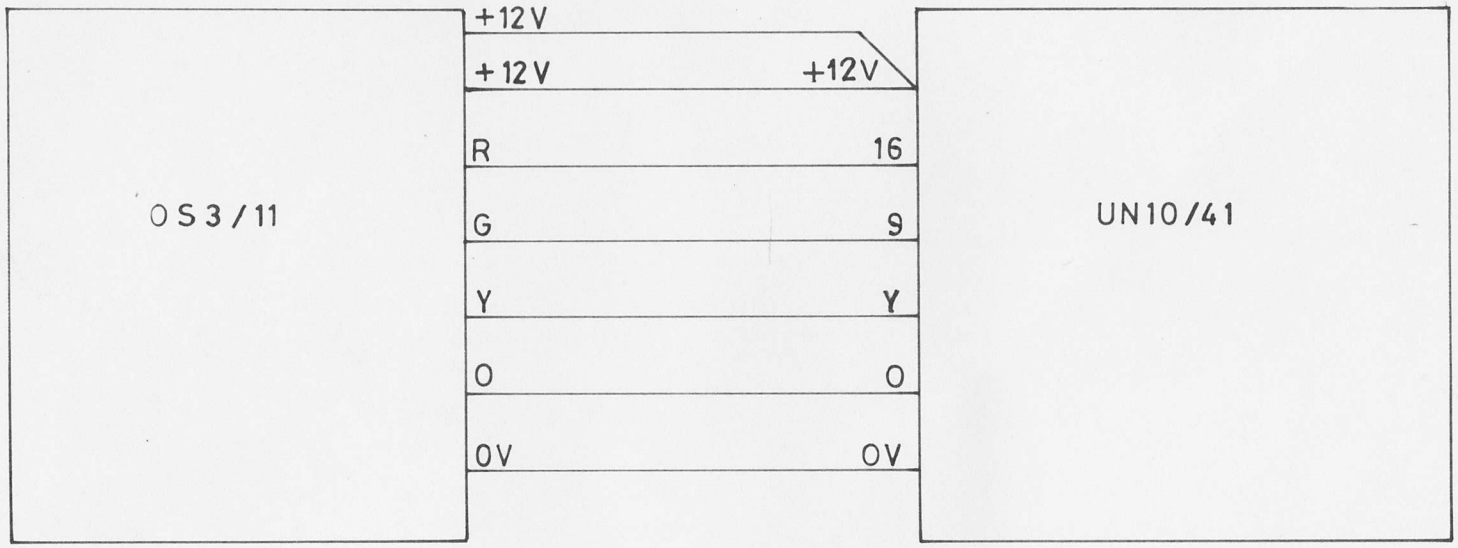
BBC

All dimensions in millimetres unless otherwise stated:
Normal tolerences:
no decimal place:– ±1 mm
one decimal place:– ±0.3mm
two decimal places:– ±0.1mm
unless otherwise stated

THIRD ANGLE PROJECTION

Original Frame Size
190mm × 277mm

CHANGE	ISS
5/1/78	1



PARTS LIST D42858A4

DRN
TCD.
CKD.
APPD.

DESIGNS DEPARTMENT

UN10/42
VOICE FREQUENCY
RINGER CIRCUIT

D42857 A4

S & H LTD L 3932

D42858A4

ISS.

CHANGE 5/1/78

ITEM No.	No. OFF	DESCRIPTION	C'C'T REF.	BBC REF. OR DRG. No.
		CIRCUIT		D42857A4
		PARTS LIST		D42858A4
		ASSEMBLY & WIRING		D42859A2
		DETAILS		D42860A2
		FURTHER INFORMATION REQUIRED FOR MANUFACTURE		
		ASSEMBLY EA10484		
		WIRING EA10137, EA10140		
1	1	OS3/11 OSCILLATOR,		
2	1	UN10/41 UNIT, VOICE FREQUENCY RINGER	⊣⊢	SEE NOTE
3	1	FRONT PANEL PART OF CH1/65A		D42860A2 DET.5
4	*	REAR PANEL PART OF CH1/65A		D42860A2 DET.2
5	*	CODING PLATE PART OF CH1/65A		D42860A2 DET.3
6	*	HANDLE PART OF CH1/65A		D42860A2 DET.4.
	⊣⊢	FOR ORIGINAL MANUFACTURE OF UN10/42 THE FRONT PANEL (OF UN10/41) D42860A2 DET.1. IS NOT REQUIRED	⊣⊢	
		* FOR ORIGINAL MANUFACTURE COMPLETE CH1/65A IS REQUIRED AND ITEMS 3-6 ARE MODIFIED PARTS OF THIS CHASSIS.		
		WHEN CONVERTING UN10/41 TO UN10/42 TO D42860 DET. 5. ONLY IS REQUIRED. ARE IDENTICAL TO UN10/41 EXCEPTING SERIAL NUMBER.		FRONT PANEL DETAILS 2-4

BBC

DS/PLA4

UN10/42
UNIT, VOICE FREQUENCY RINGER
PARTS LIST

DRN.	KK
TPD.	
CKD.	M.T.E
APPD.	

DESIGNS DEPARTMENT

D42858A4

SHEET 1 OF 2 SHEET

OPERATING CONDITIONS		Z SOURCE	Z LOAD	LOAD/SOURCE REFERRED TO SAME WDG	KLF	KHF	V MAX. (R.M.S.) ACROSS WINDING	B MAX. (PEAK) KILOGAUSS	TOTAL HARMONIC AT 50Hz & B MAX
	MATCHED								
	UNMATCHED								

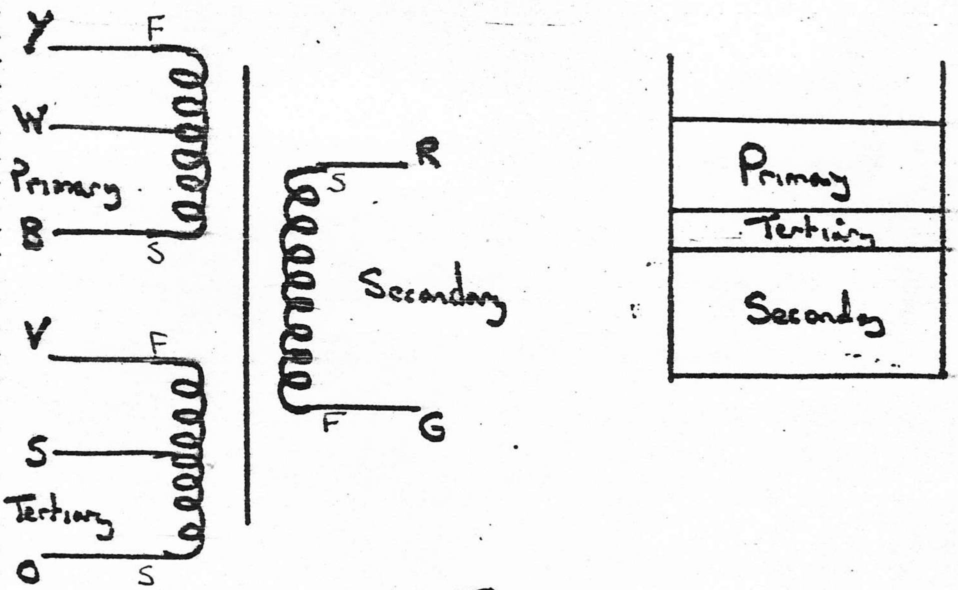
PERFORMANCE						
FREQUENCY RESPONSE	Hz	Hz	TURNS RATIO	P:S	P:T	
LOSS w.r.t. 1kHz			INDUCTANCE RATIO			

BBC SIZE	LAM No.	THICKNESS	STACK	MATERIAL	L/KT²	ASSEMBLY	AIR GAP SPACER
J	18	13 mils	15/16"	Unisil 51			Interleaved mils

WINDING DATA	PRIMARY	SECONDARY	TERTIARY	
No. OF SECTIONS	2	1	2	
TURNS/SECTIONS	325	2700	20	
WIRE (GRADE I METRIC)	0·2	0·08	0·08	
TOTAL TURNS	650	2700	40	

WINDING CONSTRN: SCREENING / WINDING

MANUFACTURING TEST DATA TO ED115	PRIMARY	SECONDARY	TERTIARY	
D.C. RESISTANCE IN OHMS				
MIN. INDUCTANCE IN HENRIES AT Hz MAX. A.C. LEVEL ACROSS BRIDGE -30 -50 dB				
MIN. INDUCT. IN HENRIES AT Hz WITH ADC				
MAX. LEAKAGE INDUCTANCE IN mH @ 10kHz				
TURNS RATIO				
MAX. SELF-CAPACITY AT kHz				
CAPACITY BALANCE MAX. 1kHz				
10kHz				



Tertiary winding in centre of bobbin.
3 layers scotch tape interwdg

DESIGNED BY	K. C.
DATE AS ISS. 1	
FOR	UN10/

CHANGES	SIG.	DATE	IS
13.5.77	KC		2

BBC YM3A/A4

DATA SHEET
B.B.C. L.F. TRANSFORMER / INDUCTOR

DESIGNS DEPARTMENT
TCD CKD APPD
DX611 J15

From: Senior Engineer Telecommunications, Communications Department

Room No. & Building: 1089 BH Tel. Ext.: 3189 date: 25th November, 1976

Subject: RE-DESIGN OF BBC VF RINGING EQUIPMENT

To: H.D.D. (Attention Mr. M. Ellen)

Following our telephone conversations, I attach a preliminary specification for a VF Ringer.

However, if an inband dialling detector (VF signalling receiver) could be designed this would suit our purposes so much better.

RAHM/LW.
Att.

(R.A.H. Metcalf)
for Senior Engineer Telecommunications

AS/20

VF RINGING RECEIVER

1. Sensitivity

The receiver should operate reliably over an input level range of -35dBm to -5dBm. It would be acceptable, if necessary, to have two ranges selected by soldered strap on miniature U links on the circuit board.
e.g. -35 to -20dBm and -20 to -5dBm, although some degree of overlap would be preferable. Say -35 to -7dBm and -23 to -5dBm.

2. Operating Frequencies

The frequency should be selected by soldered strap on miniature U links on the circuit board.

Four frequencies are required: 1900, 860, 700 and 600 Hz.

3. Selectivity

The receiver should not operate on speech or steady tones (other than signalling frequency) at any level up to -5dBm.

The receiver will be required to operate on receipt of one of the four signalling tones, the frequency of which may be subject to ±7 Hz variation. This variation is due to BPO line plant and signalling oscillator changes.

4. Operate Time

Not greater than 400mSecs.

5. Stability

The variation of operating characteristics due to normal temperature, supply voltage and component variations should be compatible with the foregoing requirements.

6. Insertion Loss

Less than 0.25dB at 1 KHz.
(Total insertion loss of VF Detector, 17 Hz Detector and 17 Hz stop filter, if used).

7. Supply Voltage

12 or 24 Volts D.C.

8. Operating Conditions

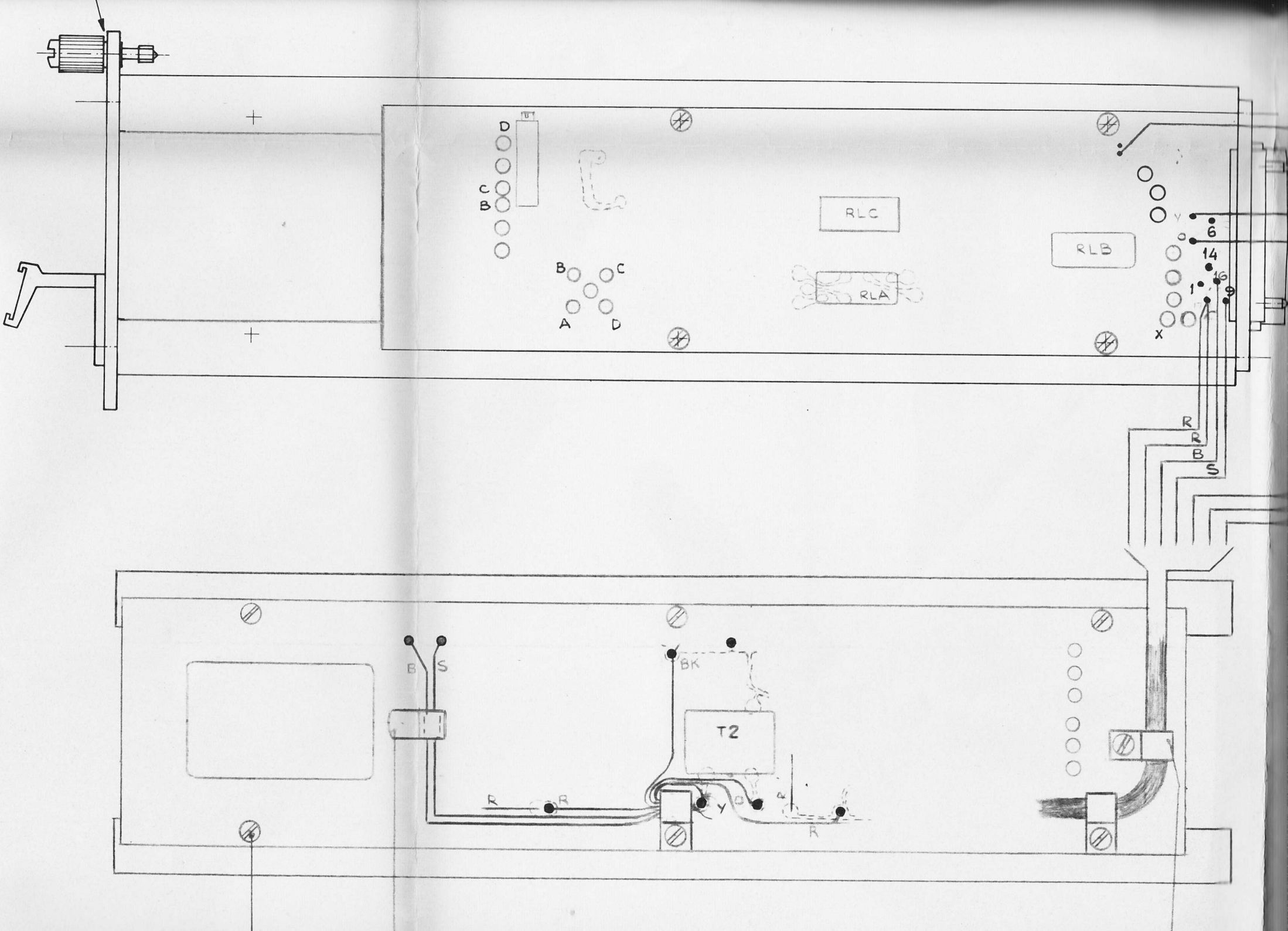
The receiver should be capable of working 'Tone on' or 'Tone off idle'.

9. Mechanical Construction

The standard construction for permanent telephone equipment installations in the BBC is the BPO 62 type. It will be necessary to make the 'Ringer' circuit board compatible with this construction.

Other uses are envisages (Telephone signalling from OB sites and various projects involving the use of inband frequencies for control purposes) and here the circuit board will best be mounted in standard BBC units.

RAHM/LW.
25.11.76


D
C
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RLA
RLB
Y
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6
14
16
1
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X
R
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B
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BK
T2
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