Issue 1
29.9.76

DESIGNS DEPARTMENT MANUFACTURING INFORMATION

No. 6.286(76)

Digital P.C.M. Generator GE7/1

+ OTHER JOB INFO.

(J.W.H. O'CLARKEY)
for Head of Designs Department

Written by: M.T. Ellen

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Digital P.C.M. Generator GE7/1

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DRAWINGS

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Digital P.C.M. Generator GE7/1

INTRODUCTION

This unit generates a bitstream which may be connected directly to the input of a 13 channel PCM decoder type BA1/5. The bitstream can be modulated to produce an identical waveform on each of the 13 channels simultaneously.

Several different internally generated waveforms may be selected by push buttons on the front panel and these waveforms may be used to line up most of the BA1/5 decoder. Parity errors at two different rates may be applied to channel 1 and the bitstream may be muted for exactly 786ms.

An output is available to trigger an oscilloscope at a suitable rate to display the waveforms selected.

The unit is mounted in an Imhof-Bedco 5 CDX plug-in module, which may be inserted in the spare position at the right-hand end of the frame containing the digital to analogue converters in the BA1/5. Its output should be wired to a musa plug mounted in the rear of the BA1/5 and this plug should be linked to the PCM decoder input musa when required. Power, and a 12.672MHz clock feed should be fed from the BA1/5 via the GE7/1 rear connector.

SPECIFICATION

Performance Data

Inputs

Clock	12.672MHz square wave with TTL logic levels.
Clock load	1 TTL gate.
Supply voltage	+9 ± 0.5 volts.
Current consumption	1.7 ± 0.2 amps.

Outputs

Bitstream amplitude	1 ± 0.1 or 0.4 ± 0.05 volts peak to peak into 75Ω load.
Bitstream polarity	Symmetrical about earth.
Bitrate	6.336Mbits/sec (accuracy determined by OS2/40).

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Oscilloscope trigger — TTL logic levels, waveforms as follows:

function selected	trigger waveform
DC	29 ± 2µs negative pulses at 125Hz.
Ramp	29 ± 2µs negative pulses at 125Hz.
500Hz	500Hz square wave.
1kHz	1kHz square wave.
5.3kHz	5.3kHz square wave.

Mechanical Data

Imhof-Bedco 5 CDX plug-in module, to be inserted in the spare position at the right-hand end of the frame containing the DAC's (CO9M/2).

Indexing positions 5, 11 and 17.

Weight 0.6kg.

Installation Data

Modify BA1/5 back wiring as follows:-

a) Connect a spare 12.672MHz feed from the OS2/40 socket to the GE7/1 socket.

b) Connect a musa plug (to be mounted at the back of the cabinet) to the GE7/1 socket.

c) Connect a feed of +9 volts to the GE7/1 socket from the adjacent socket.

Detailed installation information is given in change forms 12294 BA1/5(8) and 12295 CO9M/2(2).

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DESIGNS DEPARTMENT MANUFACTURING INFORMATION No. 6.286(76)

Digital P.C.M. Generator GE7/1

PRODUCTION TEST SCHEDULE

1. DESCRIPTION

This unit generates a bitstream which may be connected directly to the input of a 13 channel PCM decoder type BA1/5. The bitstream can be modulated to produce an identical waveform on each of the 13 channels simultaneously.

Several different internally generated waveforms may be selected by push buttons on the front panel, and these waveforms may be used to line up most of the BA1/5 decoder. Parity errors at two different rates may be applied to channel 1 and the bitstream may be muted for exactly 786mS.

An output is available to trigger an oscilloscope at a suitable rate to display the waveform selected.

The unit is mounted in an Imhof-Bedco 5CDX plug-in module, which may be inserted in the spare position at the right hand end of the frame containing the digital to analogue converters in the BA1/5. Its output should be wired to a musa plug mounted in the rear of the BA1/5 and this plug should be linked to the PCM decoder input musa when required. Power and a 12.672MHz clock feed should be fed from the BA1/5 via the GE7/1 rear connector.

2. INFORMATION

a) Design Section - Transmission Section.

b) Designer - M.T. Ellen.

c) Engineer Responsible - M.T. Ellen.

d) Handbook - No. 6.135(76).

e) Technical Instruction - not available 1.10.76.

f) Other information - Change Forms 12294 BA1/5(8) and 12295 C09M/2(2) show the required modifications to the BA1/5 in order to accommodate the GE7/1. Section 8 of this D.D.M.I. shows the words to be programmed into the two read only memories IC35 and IC36.

g) Pre-production batch - This Production Test Schedule has not been tested on a pre-production batch in Designs Department.

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3. MANUFACTURING PERFORMANCE SPECIFICATION

a) Input requirements:

12.672MHz TTL square wave.

b) Outputs:

i) 6.336M bits/sec Bitstream at 1 ± 0.1 volts pk-pk on PLA17 or 0.4 ± 0.05 volts pk-pk on PLA19.

ii) Oscilloscope trigger pulses with TTL logic levels as follows:

Function selected	Trigger waveform
DC	positive 31µs pulses every 8ms
Ramp	positive 31µs pulses every 8ms
500Hz	500Hz square wave
1kHz	1kHz square wave
5.3kHz	5.3kHz square wave

c) Power Supply:

+9 ± 0.5 volts at 1.7 ± 0.2 amps.

d) Performance

This unit is entirely digital and the only parameters that can be slightly outside the specification are current consumption and output level. Any other faults will result in one or more of the output waveforms being incorrect and appropriate action must be taken to correct the fault. Detailed fault finding information may be found in the equipment handbook.

4. WARNING

a) No voltages above 50V d.c. or 30V a.c. are connected to this unit.

b) Note that IC35 and IC36 are programmable read only memories which should be pre-programmed and fitted in IC sockets.

5. TEST APPARATUS REQUIRED

0-10 volt variable power supply up to 2 amps., fitted with ammeter.

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AVO 8

Isep 33-way socket (to fit PLA).

Oscilloscope, Bandwidth 20MHz, Sensitivity <100mV/div.

Pulse generator to generate 12.7MHz positive going square waves 5V peak to peak.

PCM 13 channel decoder BA1/5.

6. INSPECTION CHECKS

a) Check that the segments of the coding comb of PLA are cut away from positions 5, 11 and 17 as shown on D 41389 A1.

b) No mains voltages are connected to this unit.

Check all the connections from PCB1 to the front panel, and from PCB1 to PCB2.

c) Check that the following components are correctly inserted.

i) Integrated circuits IC1 - IC66.

Note: IC22 to IC30 are mounted in the opposite direction to the rest of the integrated circuits, and IC35 and IC36 should be mounted on sockets.

ii) Resistors R1 to R61.

iii) Capacitors C1 to C7.

Check for obvious soldering defects.

7. TEST PROCEDURE

7.1 D.C. Supply

a) To check that the current drawn from the d.c. supply is within limits, connect the AVO 8 (10 volt range) between earth (TPE) and TP1 (+ve lead), connect the power supply (set to 0 volts) to PLA1 and PLA8 (+ve) and slowly increase the voltage to 9 volts while monitoring the current.

b) When the power supply voltage is 5V the AVO should read 3.6 ± 0.2 volts and the current drawn should be 1.1 ± 0.2 amps.

c) If the power supply voltage and AVO 8 voltage are the same at 6 volts do not increase the voltage above 6 volts and check the voltage regulator IC66.

If the current drawn is much too high look for shorts from the supply rail to earth.

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7.2 D.C. Voltage Regulation

a) Connect the AVO 8 (10 volt range) between earth (TPE) and TP1 (+ve lead), connect the power supply to PLA1 and PLA8 (+ve) and vary its voltage from 8 to 10 volts. Monitor the AVO reading.

b) The AVO should read 5 ± 0.1 volts. If it does disconnect the AVO, set the power supply to 9 volts and leave the power supply connected.

c) If the voltage at TP1 is outside these limits check the regulator IC66.

7.3 To Check Operation of Function Selector Latches

a) Press and release the following push buttons in turn:

DC

Ramp

500Hz

1kHz

5k3Hz DE

5k3Hz FLAT

b) Check that the LED inside each button comes on and stays on when the associated button is pressed and that the other five LED's go out.

c) If there is a fault on one or two buttons only check the associated latch (IC13 or IC16) wiring, and also the push button and LED wiring. If there is a similar fault on all six buttons check that the voltage on IC19 pin 8 is >2.4 volts when any button is pressed and 0.8 volts when they are all released. Also check that there is a positive 1 ± 0.3µs pulse at IC21b pin 6 about 1.4ms after any of the buttons have been pressed. This pulse may be seen by triggering the oscilloscope from IC19 pin 8.

7.4 To Check Output Level at PLA17

a) Connect PLA17 and PLA20 (earth) to an oscilloscope using 75Ω coaxial cable and terminate the cable with a 75Ω load at the oscilloscope end. Connect a pulse generator to PLA25 and PLA24 (earth) and set it to generate 12.7 ± 0.2MHz positive going square waves 5 volts peak to peak. Trigger the oscilloscope from the "scope trig" socket on the front panel of the GE7/1 and select "5.3kHz DE".

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b) The peak to peak amplitude of the waveform should be 1 ± 0.1 volts.

c) If the output waveform is slightly outside the above limits adjust the value of R14. If there is no output some or all of the tests shown in the maintenance section of the handbook must be carried out.

7.5 To Check Output Level at PLA19

a) Set up the equipment as shown in 7.4 a) but connect the oscilloscope to PLA19 instead of PLA17.

b) The peak to peak amplitude of the waveform should be 0.4 ± 0.05 volts.

c) If the output waveform is slightly outside the above limits adjust the value of R15.

7.6 To Check the Overall Performance of the GE7/1 When Connected to A BA1/5

a) Modify the BA1/5 in accordance with Change Forms 12295 BA1/4(8) and 12295 C09M/2(2). Plug the GE7/1 in the spare position at the right hand end of the digital to analogue converter frame and connect its output to the input of the BA1/5.

Connect an oscilloscope to the output monitor point of the channel 1 digital to analogue converter (set to "flat") and trigger the oscilloscope from the GE7/1 trigger output.

Press the following buttons in turn (with the parity error switch set to its centre off position unless otherwise stated):

i)	Ramp
ii)	Up fast
iii)	Up slow
iv)	Ramp
v)	down fast
vi)	down slow
vii)	DC
viii)	up fast
ix)	up slow
x)	500Hz
xi)	1 kHz
xii)	5.3 kHz DE
xiii)	5.3 kHz FLAT
xiv)	1 kHz
xv)	Parity errors set to low (2000 errors/second)
xvi)	Parity errors set to high (2286 errors/second)
xvii)	Parity errors off
xviii)	Ramp
xix)	Parity errors set to high
xx)	1 kHz
xxi)	Break

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b) The effect of pressing the above buttons should be as follows:

i) A 125 Hz 0.3 ± 0.05 volt sawtooth (or ramp) with a fast negative slope should be displayed. Its most negative voltage should be -0.15 ± 0.05 volts relative to the output voltage when the bitstream is removed. The LED array should be as shown below:

Left Array		Right Array
off		on
on		on
on		on
on		on
on		on
off		on
on		off
off	NOT USED	off
off		off
off		off

ii) The DC level of the ramp should get more positive until it reaches the top of the dynamic range (about +5 volts relative to earth). The LED array should be as shown below when the ramp stops increasing in level:

Left Array		Right Array
on		off
on		off
on		off
on		off
on		off
off		off
off		off
off	NOT USED	off
off		off
off		off

iii) The DC level of the negative end of the ramp should get more positive (relatively slowly) and the positive end should fold round and appear (non-inverted) at the negative end of the dynamic range.

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iv) As i).

v) The DC level of the ramp should get more negative until it reaches the bottom of the dynamic range (about -5 volts relative to earth). All the LED's in the LED array should be out when the ramp stops decreasing in level.

vi) The DC level of the positive end of the ramp should get more negative (relatively slowly) and the negative end should fold round and appear (non-inverted) at the positive end of the dynamic range.

vii) A DC level -0.15 ± 0.05 volts relative to the output level when the bitstream is removed should be displayed. The LED array should be as shown in 7.6 b) i).

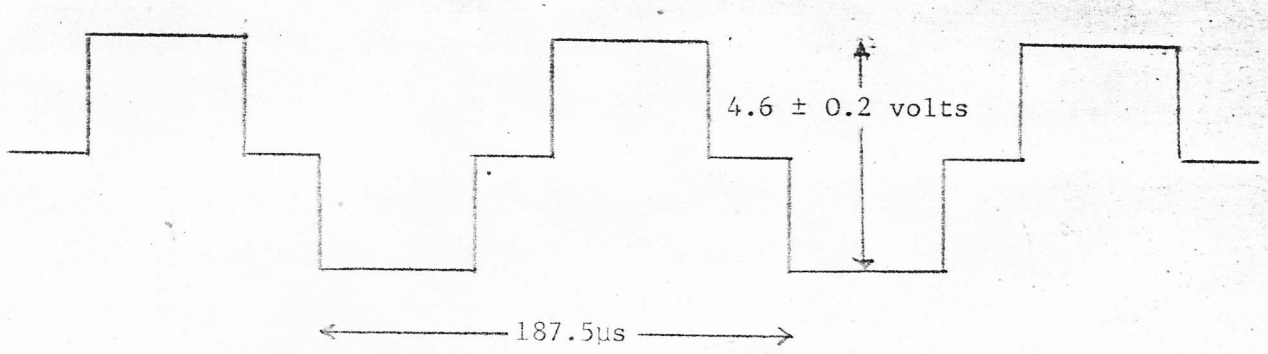
viii) The DC level should get more positive until it reaches the top of the dynamic range. It should then stop and 13 LED's in the LED arrays should be on.

ix) The DC level should immediately change to the bottom of the dynamic range and then get more positive (slowly).

x) A 500 Hz 2.75 ± 0.1 volt peak to peak sine wave should be displayed (each quantizing level should be easily distinguishable).

xi) A 1 kHz 9 ± 0.2 volt peak to peak sine wave should be displayed (each quantizing level should be easily distinguishable).

xii) A waveform similar to that shown below should be displayed.



xiii) A waveform similar to that shown in xii) but 2.4 ± 0.2 volts peak to peak should be displayed.

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xiv) As xi).

xv) Two quantizing levels in each cycle of 1 kHz should be repeated.

xvi) All the digital to analogue converters should mute.

xvii) The 1 kHz waveform should return.

xviii) As i).

xix) All the digital to analogue converters should mute.

xx) As xi).

xxi) All the digital to analogue converters should mute for about 0.8 seconds, and the decoder monitor bit-stream LED should not go out.

c) If the results of any of the above tests are negative, some or all of the tests shown in the Maintenance section of the Handbook must be carried out.

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8. PROGRAM FOR READ ONLY MEMORIES IN GE7/1

Word No.	Address					Parity MSB PROM-A								PROM-B						
	A0	A1	A2	A3	A4	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q1	Q2	Q3	Q4	Q5	Q6	level
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4096
1	1	0	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	4208
2	0	1	0	0	0	1	1	0	0	0	0	1	1	0	1	1	1	1	1	4319
3	1	1	0	0	0	0	1	0	0	0	1	0	1	0	0	1	1	0	0	4428
4	0	0	1	0	0	0	1	0	0	0	1	1	0	1	1	0	1	1	0	4534
5	1	0	1	0	0	0	1	0	0	1	0	0	0	0	1	1	1	0	0	4636
6	0	1	1	0	0	0	1	0	0	1	0	0	1	1	1	1	1	0	1	4733
7	1	1	1	0	0	0	1	0	0	1	0	1	1	0	1	0	1	1	1	4823
8	0	0	0	1	0	1	1	0	0	1	1	0	0	1	0	1	0	1	0	4906
9	1	0	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	4982
10	0	1	0	1	0	1	1	0	0	1	1	1	0	1	1	1	0	0	1	5049
11	1	1	0	1	0	1	1	0	0	1	1	1	1	1	1	0	0	1	1	5107
12	0	0	1	1	0	0	1	0	1	0	0	0	0	1	0	0	0	1	1	5155
13	1	0	1	1	0	0	1	0	1	0	0	0	1	0	0	1	0	0	1	5193
14	0	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	1	0	0	5220
15	1	1	1	1	0	0	1	0	1	0	0	0	1	1	1	0	1	0	1	5237
16	0	0	0	0	1	0	1	0	1	0	0	0	1	1	1	1	0	1	0	5242
17	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4096
18	0	1	0	0	1	0	1	0	0	1	0	1	1	0	1	1	1	0	0	4828
19	1	1	0	0	1	1	1	0	1	0	1	1	0	0	1	1	1	0	1	5533
20	0	0	1	0	1	0	1	1	0	0	0	0	0	1	0	0	1	1	0	6182
21	1	0	1	0	1	1	1	1	0	1	0	0	1	0	1	1	1	1	1	6751
22	0	1	1	0	1	1	1	1	1	0	0	0	0	1	1	0	0	1	0	7218

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Word No.	Address					Parity MSB	PROM-A						PROM-B						
	A0	A1	A2	A3	A4	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q1	Q2	Q3	Q4	Q5	Q6	level
23	1	1	1	0	1	0	1	1	1	0	1	1	0	0	0	1	1	0	1	7565
24	0	0	0	1	1	0	1	1	1	1	0	0	1	1	0	0	0	1	1	7779
25	1	0	0	1	1	0	1	1	1	1	0	1	0	1	0	1	0	1	1	7851
26	0	1	0	1	1	1	0	1	0	0	0	0	0	0	0	0	1	0	1	2053
27	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	3967
28	0	0	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	0	1	5881
29	1	0	1	1	1	1	0	1	0	1	1	1	0	1	0	1	0	1	0	2986
30	0	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	3967
31	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	0	1	0	0	4948

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CHANGE ISS.

UNAPPROVED

ITEM No.	No. OFF	DESCRIPTION	C'C'T REF.	BBC REF. OR DRG. No.
		DRAWING NUMBERS		
		Circuit D41387 A1		
		Parts List D41388 A4		
		Assembly & Wiring D41389 A1		
		Details D41390 A2		
		P. B. No. 1 Wiring, D41391 A1 Sht. 1		
		P. B. No. 1 Wiring (Roundel) D41391 A1 " 2		
		P. B. No. 1 Wiring (Comp. Side) D41392 A1s		
		P. B. No. 1 Comp. Location D41393 A3		
		P. B. No. 1 Drilling D41394 A3		
		P. B. No. 2 Wiring, D41395 A2 Sht. 1		
		P. B. No. 2 Wiring (Roundel), D41395 A2 " 2		
		P. B. No. 2 Wiring (Comp. Side) D41396 A2		
		P. B. No. 2 Comp. Location D41397 A3		
		P. B. No. 2 Drilling D41398 A3		
		P. B. No. 3 Wiring D41399 A4		
		P. B. No. 3 Drilling D41400 A4		
		F. P. Legend D41401 A2		
		FURTHER INFORMATION REQUIRED FOR MANUFACTURE		
		Unit Assembly Information EA10484		
		Unit Wiring Information EA10137, EA10140		
		Imhof-Bedco Panel Drilling DSK 14104 A3		
		Fixing Bars DSK 14105 A3 DET 5u		
1	1	Front Panel, Imhof-Bedco MCP/5CDX/12 (undrilled)		
		Drilled to		D41390A2 Det 1, DSK14104A3
		Finished to		D41401A3
2	1	Handle, made from:		
		ISEP Extrusion, Code No. 24-001-015		D41390 A2 Det 2
3	1	Fixing Bar,		DSK14105 A3 Det 5u
		modified to		D41390 A2 Det 3
4	1	Hinge Bar		" " 4
5	2	Hinge Bracket		" " 5
6	2	Spacer, Insulating		" " 6
7				
8				
9	1	Captive Screw, Imhof-Bedco MC407		
		complete with washers & Circlip		
10				
11	1	Spacer, ISEP Code 34-007-001		
12	2	Eyelet, ISEP Code 34-014-036		
13				
14	1	Printed Board No. 1 Wiring	D41391A1 SHTS 1&2, D41392A1s	
				D41393A3, D41394A3
15	1	Printed Board No. 2 Wiring	D41395A2 SHTS 1&2, D41396A2	
				D41397A3, D41398A3
16	1	Printed Board No. 3 Wiring		D41399A4, D41400A4
17				
18	1	Heatsink, Wakefield Engineering Inc. type		
		680 — .75 — A1 obtainable from Jermyn Ind.		
19				

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BBC

DS/PLA4

GE7/1

GENERATOR, DIGITAL, P.C.M. - PARTS LIST

DRN. MJ
TPD.
CKD.
APPD.

DESIGNS DEPARTMENT

D41388 A4

SHEET 1 OF 8 SHEETS

ISS.

CHANGE

UNAPPROVED

ITEM No.	No. OFF	DESCRIPTION	C'C'T REF.	BBC REF. OR DRG. No.
20				
21				
22				
23				
		Wire		
24	A/R	PUF1/3M, Colour Black		
25	A/R	" " Brown		
26	A/R	" " Red		
27	A/R	" " Orange		
28	A/R	" " Yellow		
29	A/R	" " Green		
30	A/R	" " Blue		
31	A/R	" " Slate		
32	A/R	" " Violet		
33				
34				
35				
36				
37	A/R	Lacing Cord		
38				
39				
40				
		Screws, Isometric, Coarse, Slotted For Fixing Items		
41	7	M2·5 x 6 Pan Hd M.S. Zn. P , 5, 6, 15, 105		
42	4	M2·5 x 10 " " " " 4, 5,		
43	7	M2·5 x 10 CSK Hd " " 1, 3, 14		
44	2	M3 x 6 Pan " - - 2		
45	6	M3 x 10 " " - " 18, 153		
46				
		Nuts, Isometric, Coarse, Hex., Ord.		
47	7	M2·5 M.S. Zn. P. 3, 4, 14, 105		
48	6	M3 " " 18, 153		
49				
50				
		Washers, Isometric (Form A), Normal, plain.		
51	11	M2·5 M.S. Zn. P. 3, 4, 5, 6, 14, 105		
52	6	M3 " " 18, 153		

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BBC

DS/PLA4

GE7/1

PARTS LIST

DRN.	RH
TPD.	
CKD.	
APPD.	

DESIGNS DEPARTMENT

D41388 A4

SHEET 2 OF 3 SHEETS

ITEM No.	Qty		DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
101	2		Display,Line Array,10 Bar,Red:ITT DD10R	
102	2	*	Socket,Miniature,P.C.B.	S27611-0236252
103	1	*	Socket,Fixed,1.27mm Dia,2.5mm Panel,Black	S27612-0336764
104	2	*	I.C. Socket,D.I.L.,Low Profile,Solder Tail,16 Pin	S27861-0342806
105	1	*	Clamp,Sling Type,for 6.4mm dia. cable	S51860-0052513
106	17	*	Test Point:William Hughes 100/101	0276372
107	112	*	Tag:Vero TP11034	0277818
108				
109				
110				
111				
112				
113				
114				
			CAPACITORS	
115	1	*	150pF,2%,125V dc,Capacitor,Polystyrene Foil C6	S21004-0009511
116	1	*	220nF,10%,100V dc,Capacitor,Metallised Polyester C1	S21034-0209112
117	2	*	330nF,10%,100V dc,Capacitor,Metallised Polyester C5, C7	S21034-0209120
118	1	*	10uF,20%,10V dc,Capacitor,Solid Tantalum C2	S21122-0205740
119	2	*	33uF,20%,10V dc,Capacitor,Solid Tantalum C3, C4	S21122-0205767
120				
121				
122				

UNAPPROVED

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ITEM No.	Qty		DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
			RESISTORS	
123	2	*	82 ohm,2%,Resistor,Metal Film,0.4W. R14, R15	S26877-0099303
124	15	*	150 ohm,2%,Resistor,Metal Film,0.4W. R13, R16, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57	S26877-0099468
125	14	*	240 ohm,2%,Resistor,Metal Film,0.4W. R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44	S26877-009932X
126	2	*	430 ohm,2%,Resistor,Metal Film,0.4W. R1, R60	S26877-0227937
127	26	*	1.0kohm,2%,Resistor,Metal Film,0.4W. R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R17, R18, R19, R20, R21, R22, R23, R24, R25, R28, R29, R30, R58, R59, R61	S26877-0099082
128	2	*	20kohm,2%,Resistor,Metal Film,0.4W. R26, R27	S26877-022806X
129				
130				
131				
			TRANSISTORS	
132	1	*	BCY71 TR1	0112798
133				
134				
			INTEGRATED CIRCUITS	
135	13	*	DIC7400N IC8, IC14, IC15, IC18, IC21, IC38, IC39, IC53, IC56, IC57, IC58, IC61, IC64	0136867
136	5	*	DIC7404N IC2, IC5, IC7, IC10, IC52	0136891

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ITEM No.	Qty		DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG. No.
137	4	*	DIC7410N IC12, IC41, IC54, IC62	013692X
138	1	*	DIC74123N IC20	0154427
139	1	*	DIC74128N IC34	0173792
140	3	*	DIC74150N IC31, IC32, IC33	0152911
141	6	*	DIC74161N IC45, IC46, IC47, IC48, IC50, IC55	0155589
142	2	*	DIC74163N IC51, IC63	0158781
143	1	*	DIC74180N IC30	0157969
144	8	*	DIC74193N IC22, IC23, IC24, IC25, IC26, IC27, IC28, IC29	0136501
145	3	*	DIC7420N IC9, IC11, IC17	013651X
146	5	*	DIC7430N IC1, IC3, IC4, IC6, IC19	0136528
147	1	*	DIC7453N IC59	0136607
148	1	*	DIC7470N IC49	0136631
149	5	*	DIC7474N IC37, IC42, IC43, IC60, IC65	0136666
150	2	*	DIC7475N IC13, IC16	0136674
151	1	*	DIC7486N IC40	0136729
152	2	*	IM5600CDE IC35, IC36	0170758
153	1	*	LM309K IC44	0183876
154				

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ITEM No.	Qty		DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
155				
156				
157				
158				
159				
			PLUGS	
160	1	*	Plug,ISEP,Fixed,33 Pole,Printed Wiring PL.A	S24993-0223481
161				
162				
			SWITCHES	
163	1	*	Switch,Toggle,1 Pole,3 Way,Centre Off:Arrow CTC.3 S.L	0370123
164	11		Switch,Push-To-Test,Illum.,Red:Diamond 3202/2/LED S.A, S.B, S.C, S.D, S.E, S.F, S.G, S.H, S.J, S.K, S.M	

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CIRCUIT REFERENCE INDEX

END OF CIRCUIT REFERENCE INDEX.

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SHT.	ISS.	DETAILS OF CHANGE	SHT.	ISS.	DETAILS OF CHANGE
	1	6·9·76			

ORIGINAL FRAME SIZE 190mm x 277 mm

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED

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UNAPPROVED

BBC

VM418/A4

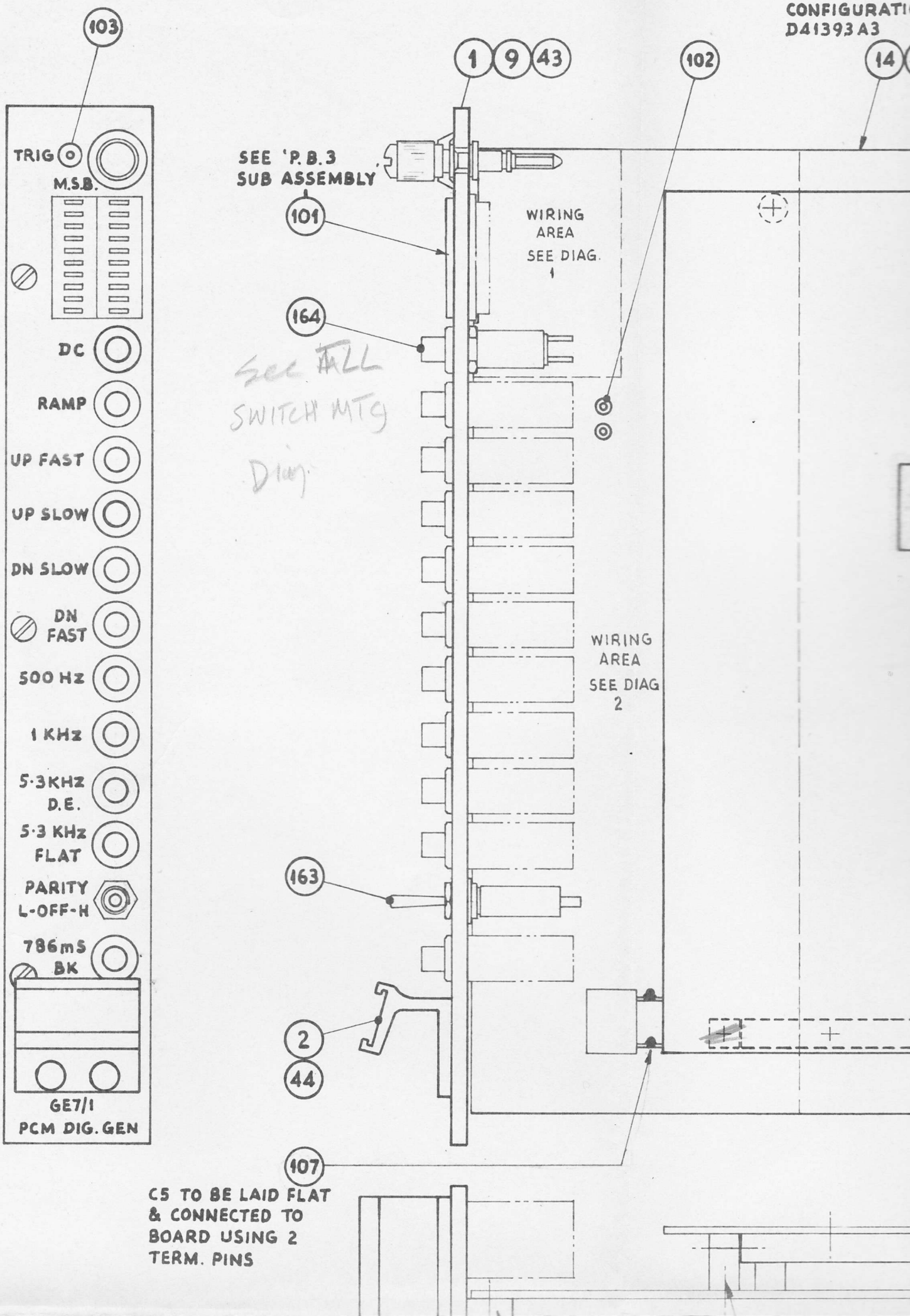
DESIGNS DEPARTMENT

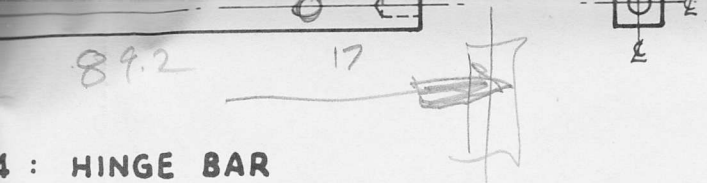
CODE:- GE7/1

PARTS LIST CHANGE RECORD, ISSUE:- 1

D41388 A4

SHEET 8


FOR P.B. No. 1
CONFIGURATI
D41393 A3
103
1
9
43
102
14
TRIG
M.S.B.
DC
RAMP
UP FAST
UP SLOW
DN SLOW
DN FAST
500 Hz
1 KHz
5·3KHz D.E.
5·3 KHz FLAT
PARITY L-OFF-H
786mS BK
GE7/1
PCM DIG. GEN
SEE 'P.B.3 SUB ASSEMBLY'
101
WIRING AREA SEE DIAG. 1
164
See TALL SWITCH MTG Diag.
WIRING AREA SEE DIAG 2
163
2
44
107
C5 TO BE LAID FLAT & CONNECTED TO BOARD USING 2 TERM. PINS



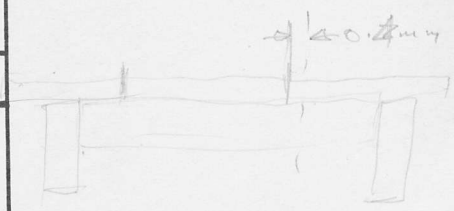
4 : HINGE BAR

L : 6 x 6 SQUARE BAR, AL. ALLOY
BS1474 HE15TF.

CLEAN

D41390A2

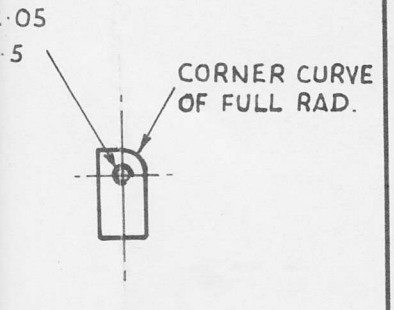
= 18.6
88.7
88.0 17 - 3.6
= 13.4



21.8
50
17

22.2
50
17
89.2

·05
·5

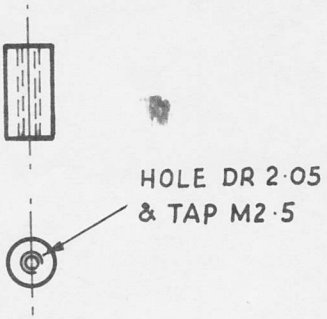


HOLE DR. 2·05
& TAP M2·5 x 5 DP.

INGE BRACKET

x6 SQARE BAR,
ALLOY BS1474 HE15TF

D41390A2



DETAIL 6 : SPACER, INSULATING

MATERIAL : TUFNOL VOLE ROD,
NAT. 6·3 (1/4") DIA
x 12 Lg.

FINISH : CLEAN

D41390A2

THIRD ANGLE PROJECTION

All dimensions in millimetres unless otherwise stated:

Normal tolerances	
no decimal place:–	±1 mm
one decimal place:–	±0.3mm
two decimal places:–	±0.1mm

unless otherwise stated

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UNAPPROVED

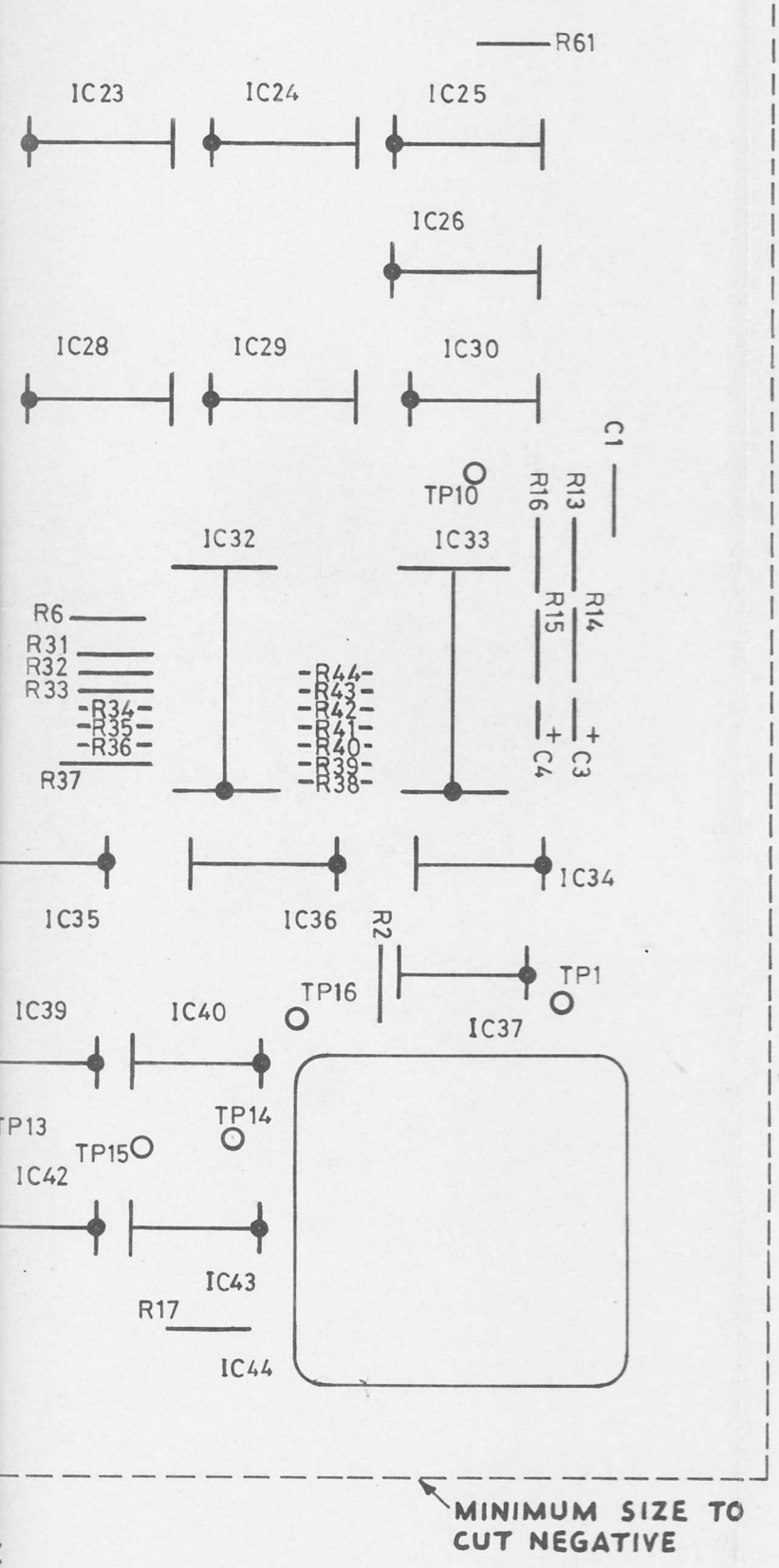
GE7/1
DETAILS

DRN.	TCD.	CKD.	APPD.
RB			

DESIGNS DEPARTMENT

D41390 A2

PARTS LIST : D41388 A4



MINIMUM SIZE TO CUT NEGATIVE

1391A1

41392A1S

Original Frame Size	BBC
277mm × 400mm	DS/A3

CHANGE	ISS
1·9·76	1

THIRD ANGLE PROJECTION

All dimensions in millimetres unless otherwise stated:

Normal tolerances

no decimal place:–	±1 mm
one decimal place:–	±0.3mm
two decimal places:–	±0.1mm

unless otherwise stated

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UNAPPROVED

GE7/1

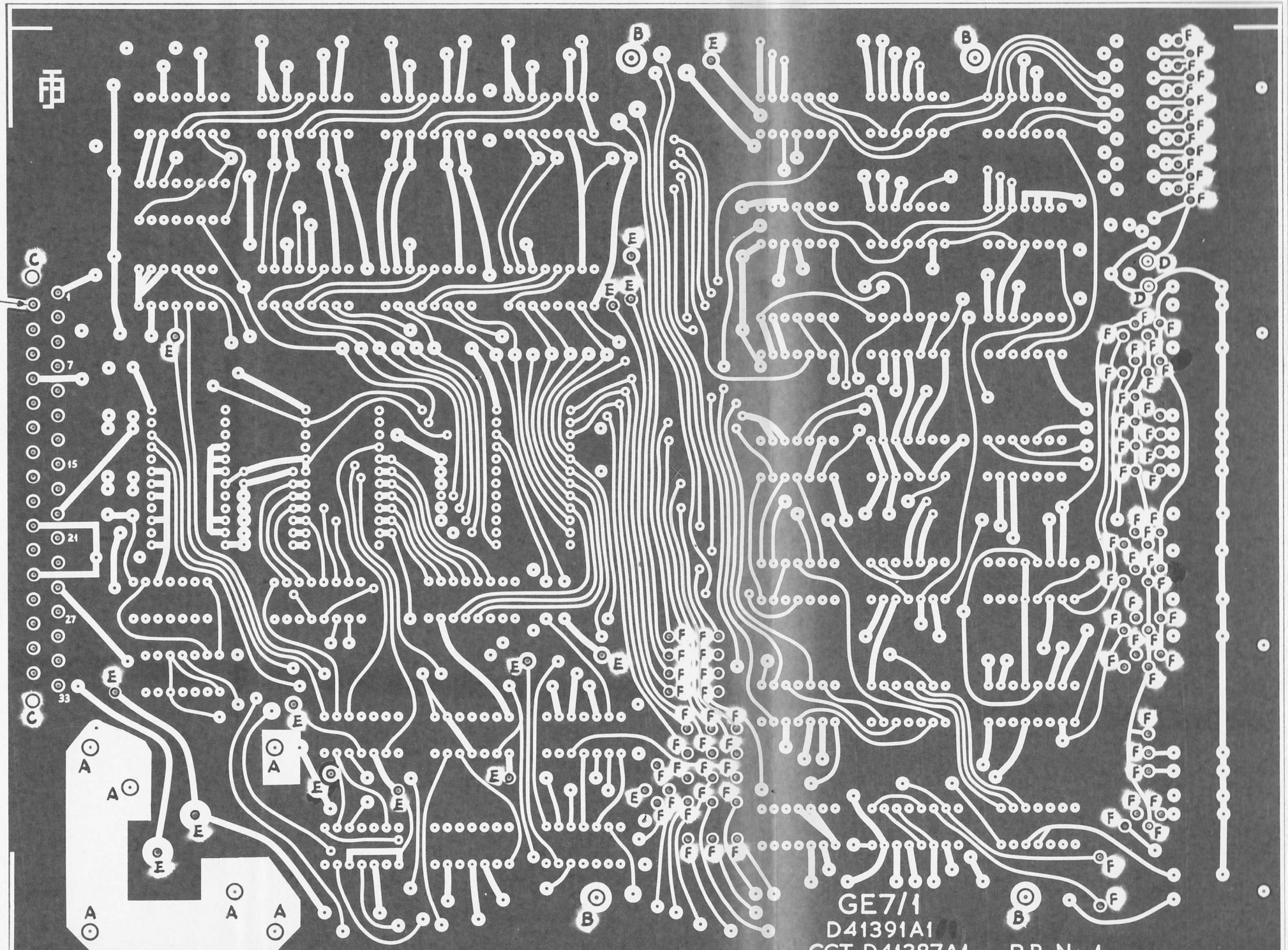
PRINTED BOARD No. 1

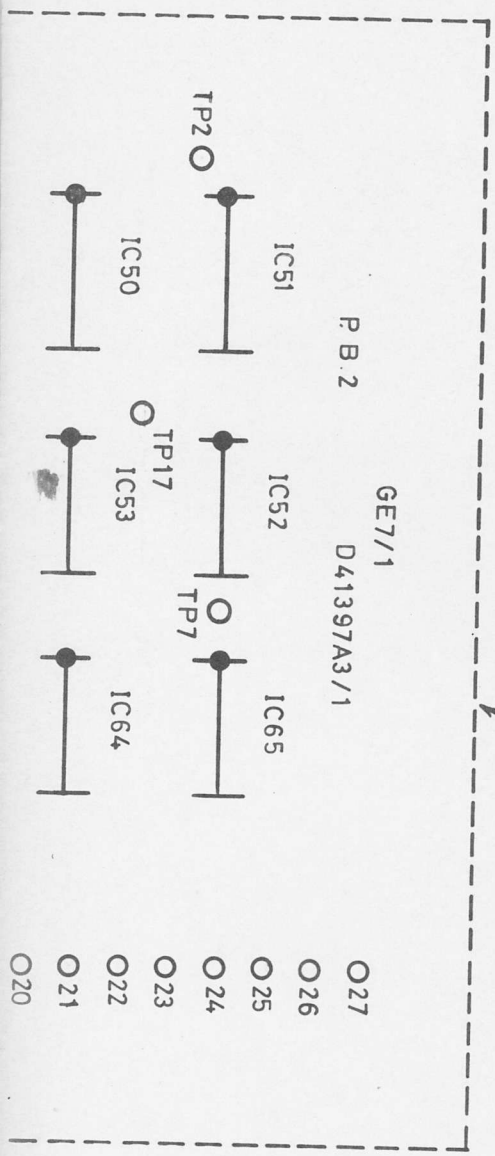
COMPONENT LOCATION

DRN.	TCD.	CKD.	APPD.
RJ			

DESIGNS DEPARTMENT

D41393 A3


33 - 'E' HOLES
IN 2 LINES)
GE7/1
D41391A1



CK
D41395 A2
S D41396 A2

Original Frame Size 277mm × 400mm	BBC DS/A3
CHANGE	ISS
DATE	

THIRD ANGLE PROJECTION

All dimensions in millimetres unless otherwise stated:

Normal tolerances

no decimal place:–	±1 mm
one decimal place:–	±0.3mm
two decimal places:–	±0.1mm

unless otherwise stated

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UNAPPROVED

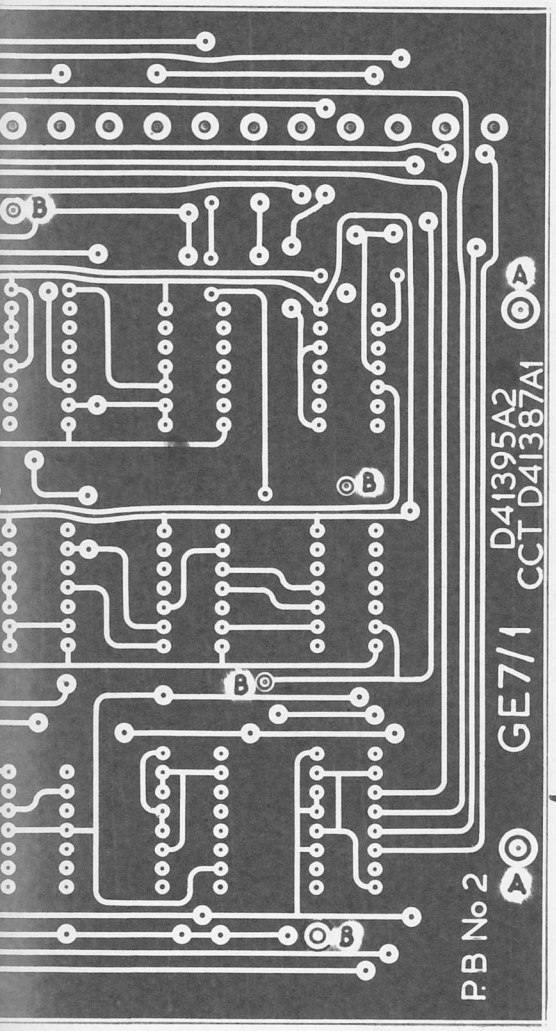
GE7/1

PRINTED BOARD No. 2
COMPONENT LOCATION

DRN.	TCD.	CKD.	APPD.
RH			

DESIGNS DEPARTMENT

D41397 A3



CUT BOARD TO OUTER EDGE OF COPPER.

TERIAL: 1·6 THK. TO BS4584, +CL5·2, EP-GC-Cu-3, 35/35, 1·6 ± 0·20. (EPOXIDE WOVEN GLASS FABRIC, CLAD ON [redacted]/BOTH SIDES WITH 35 µm COPPER.

NUFACTURED TO: D41395A2, D41396A2, D41397A3

ISH: ALL HOLES TO BE COPPER THROUGH-PLATED, MINIMUM WALL THICKNESS OF PLATING TO BE 20 MICRONS. ALL COPPER SURFACES TO BE TIN-LEAD PLATED.

Original Frame Size 277mm · 400mm	BBC DS/A3

CHANGE	ISS
1·9·76	A

THIRD ANGLE PROJECTION

All dimensions in millimetres unless otherwise stated

Normal tolerances

no decimal place	±1 mm
one decimal place	±0.3mm
two decimal places	±0.1mm

unless otherwise stated

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GE7/1

PRINTED BOARD No.2

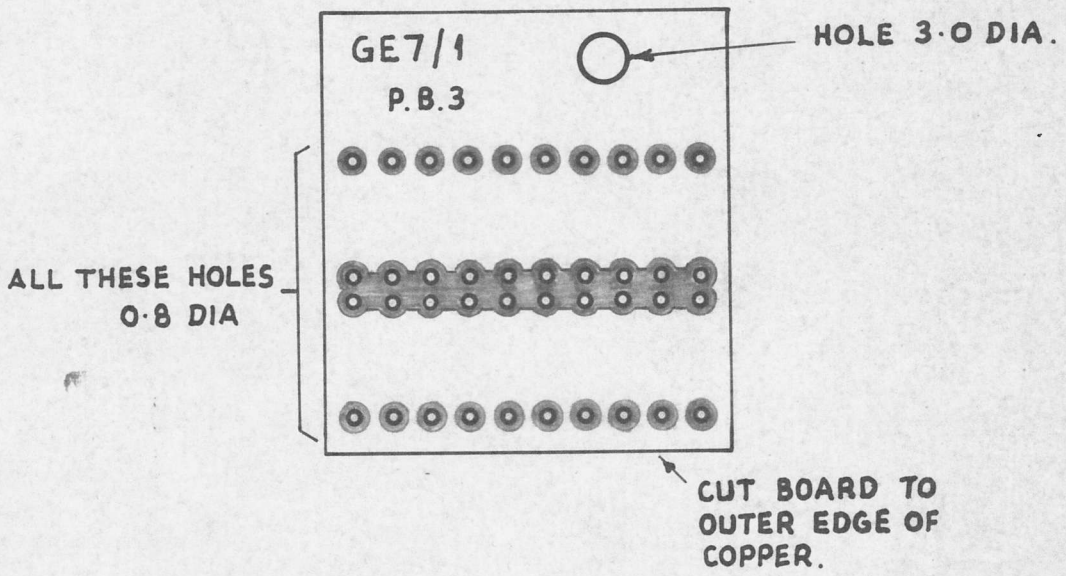
DRILLING

UNAPPROVED

DRN.	TCD.	CKD.	APPD.
RJS			

DESIGNS DEPARTMENT

D41398 A3



MATERIAL : 1·6 THK TO B.S.4584, + CL5·2, EP-GC-CU-3, 35/0, 1·6 ± 0·20 (EPOXIDE WOVEN GLASS FABRIC, CLAD ON ONE SIDE WITH 35µm COPPER.

MANUFACTURED TO : D41399 A4

FINISH : TINNED

UNAPPROVED

SCALE : 2/1

Original Frame Size 190mm × 277mm

THIRD ANGLE PROJECTION

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

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BBC

DS/A4

CHANGE	ISS
1.9.76	A

GE7/1
P. B. No. 3 DRILLING

DRN	RH	DESIGNS DEPARTMENT
TCD.		D41400A4
CKD.		
APPD.		

DC

RAMP

UP FAST

UP SLOW

DN SLOW

DN
FAST

500Hz

1KHz

5·3KHz
D.E.

5·3KHz
~~FLAT~~
B.Z.

PARITY
L- OFF-H

786mS
BK

GE7/1 D41401A2 ISSUE 1

MINIMUM SIZE
TO CUT NEGATIVE

THIS DRAWING IS TO BE USED IN CONJUCTION WITH
D41390 A2 DET 1

PROM DEFINITION FORM

Device type 74S188 First used on GE7/1

Description Contains coefficients of sine waves (six least significant bits)

Engineer/Section/Department M.T. Ellen / 6 / D.D. CEMAST No.

References, Remarks, Associated devices, etc. IC35 used with R1011 (IC36)

```
00 1F
L
00   00 03 3E 0C 1B 0E 2F 3A 15 1B 27 33 31 24 09 2B
10   17 00 0E 2E 19 3E 13 2C 31 35 28 3F 27 0A 3F 15
   /100D
```

BBC

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DATE | ISS

P1010

SHEET / | APP.

PROM DEFINITION FORM

Device type 74S188 First used on GE7/1

Description Contains coefficients of sine waves (six least significant bits)

Engineer/Section/Department M.T. Ellen / 6 / D.D. CEMAST No. 0182564

References, Remarks, Associated devices, etc. IC35 used with R1011 (IC36)

```
00 1F
L
00   00 03 3E 0C 1B 0E 2F 3A 15 1B 27 33 31 24 09 2B
10   17 00 0E 2E 19 3E 13 2C 31 35 28 3F 27 0A 3F 15
   /100D
```

BBC

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DATE	ISS	
		P1010
		SHEET / APP.

PROM DEFINITION FORM

Device type 74S188 First used on GE7/1

Description Contains coefficients of sine waves (seven most significant bits and parity bit.)

Engineer/Section/Department M.T. Ellen / 6 / D.D. CEMAST No.

References, Remarks, Associated devices, etc. IC36 used with P1010 (IC35).

```
00 1F
L
00   03 83 C3 A2 62 12 92 D2 33 B3 73 F3 0A 8A 8A 8A
10   8A 03 D2 6B 06 97 0F 6E 9E 5E 05 BC DB 89 BC 57
   /2672
```

BBC

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ISS DATE

P 1011

SHEET / APP.

PROM DEFINITION FORM

Device type 74S188 First used on GE7/1

Description Contains coefficients of sine waves (seven most significant bits and parity bit.)

Engineer/Section/Department M.T. Ellen / 6 / D.D. CEMAST No.

References, Remarks, Associated devices, etc. IC36 used with P1010 (IC35).

```
00 1F
L
00   03 83 C3 A2 62 12 92 D2 33 B3 73 F3 0A 8A 8A 8A
10   8A 03 D2 6B 06 97 0F 6E 9E 5E 05 BC DB 89 BC 57
   /2672
```

BBC

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ISS DATE

P 1011

SHEET / APP.