

DESIGNS DEPARTMENT
MANUFACTURING INFORMATION

No. 6.336(78)

ANALOGUE TO DIGITAL CONVERTER COB/5

J. M. H. O'Clarey
.....
(J.M.H. O'Clarey)
for Head of Designs Department

Written by: * M. T. Ellen

D.D.M.I. No. 6.336 (78)
Title Page

DT

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

BBC

DS/SPA4

ANALOGUE TO DIGITAL CONVERTER C08/5

C O N T E N T S

1. Introduction
2. Specification
3. Production Test Schedule

D R A W I N G S

Circuit	D44780 A1
Parts List	D44780 A4
Assembly and Wiring	D44782 A2
Details	D44783 A2
Printed Board wiring	D44784 A2
Printed Board wiring component side	D44785 A2
Printed Board Component Location	D44786 A3
Printed Board Drilling	D44787 A3

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

BBC

DS/SPA4

ANALOGUE TO DIGITAL CONVERTER C08/51. Introduction

This unit enables both analogue and digital information, generated by external equipment, to be inserted in the message sequence of the Fault Reporter TMLM/1. The unit has been designed to fit in the space provided in the TMLM/1 and it may be connected via a multicore cable to the TV Automatic Monitor MN2M/513. The C08/5 has 16 analogue inputs which may be connected to the MN2M/513 and they are suitably processed to give 8 bit digital words that may be easily converted to meaningful readings (% and volts) of each TV parameter. An 8 bit parallel data input is also provided and this may be used to convey readings from the Digital Ceefax decoding margin meter ME15M/502, or other equipment with a digital output.

A programmable read only memory (PROM) is used to preset the order in which the inputs are selected and to determine how many readings (up to 30) are added to each fault code cycle. The extra readings are limited to the range 0 to 224 inclusive and they are bracketed by 237 to distinguish them from fault code numbers.

The PROM address may be controlled externally and an 8 bit input/output port is available. This enables the unit to be controlled externally so that the numbers may be stored and/or processed before transmission.

2. Specification

Performance Data

Analogue inputs (front panel):-

Input	Input voltage range	Output number range	Conversion Instructions	Input Pin No. (PLA)
Bar Amp	2 to 8	028 to 112	+100, answer in volts	9
Sync Amp	0 to 8	000 to 048	+100, answer in volts	26
K' pulse	0 to 8	000 to 040	answer in %	10
Diff. Gain	0 to 8	000 to 080	answer in%	27
C-L Delay	0 to 8	000 to 080	-50, X10 answer in nS	28
C-L Intermod	0 to 8	000 to 080	answer in %	12
K' bar	0 to 8	000 to 080	-50, answer in %	29
P/B ratio	0 to 8	000 to 160 if Bar Amp =5v	answer in %	15
C-L gain	0 to 8	000 to 160 if Bar Amp =5v	answer in %	33
S/N ratio	0 to 8	000 to 046 if Bar Amp =5v	-60 + 20log ₁₀ of Reading	31
LF distortion	0 to 8	000 to 160 if Bar Amp =5v	answer in dB	32
Lum. Non. Linearity	Max riser 2 to 8 Min riser 0 to 8	<u>Min rise</u> Max rise x100	100-Reading answer in %	16 14
Spare 1	0 to 22.4 or	000 to 224		11
Spare 2	User defined			13
Spare 3				30

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

Digital inputs:-

<u>Name</u>	<u>Description</u>
External data input	An 8 bit binary number between 0 and 224 may be applied to this input for insertion in the message sequence.
Input/output port	This is an un buffered version of the data supplied to the TMLM/l. It may be used as an output at any time and it may be used as an input to the TMLM/l if logic 1 is applied to the Data Selection Inhibit Input.
Data Selection inhibit input	See description of input/output port.
PROM address input	A 5 bit binary word may be applied to this input if logic 1 is applied to the PROM Address Inhibit Input.
PROM address inhibit input	See description of PROM address input.
Fault code input	This 8 bit input is connected to the output of the fault code scanner in the TMLM/l.
Clock input	This input is connected to the 2.5Hz clock generated in the TMLM/l.

Digital outputs:-

Input/output port	See description under "Digital Inputs"
Data output	This 8 bit output is connected to the sequencer in the TMLM/l. It conveys the extra data to be inserted in the fault code message.
Select analogue output (<u>SELAN</u>)	This output is connected to the reset input of a flip flop, that controls a multiplexer, which selects either fault codes or analogue codes.

Power Consumption

5 ± 0.2 volts at 160 ± 60 mA

Mechanical Data

Chassis	CH1/63
Weight	0.3Kg
Indexing	Pins 2, 4 and 8

Installation Data

6. Program the PROM by following the instructions given in the Handbook 6.164 (78).

If the C08/5 is to be used with aTV Automatic Monitor MN2M/513 a connecting lead should be wired as shown below:-

Parameter	50 way Cannon socket for connection to the C08/5 Pin number	23 way Painton plug for connection to the MN2M/513 Pin number
Bar amplitude	9	1
Sync amplitude	26	7
K' pulse	10	5
Diff.gain	27	15
C-L delay	28	11
C-L Crosstalk	12	12
K' bar	29	14
Pulse amplitude	15	2
Chroma, amplitude	33	8
Noise	31	6
LF Noise	32	13
Min riser	14	4
Max riser	16	3
Earth	50	23

Modify the back wiring of the TMLM/1 as follows:-

- 1) Remove the printed tracks joining C08/5 pins W10 and C10 to the other units, but leave W10 connected to C10.
- 2) Join the two tracks that used to go to C08/5 pins W10 and C10.
- 3) Connect C08/5 pins W10 and C10 to GE2/6 pin W15 (2.5Hz clock)
- 4) Fit a slave scanner card SCL/2 and connect its output to SCL/1 pin W19 (faults 224 to 239). If this card has already been fitted ignore the next instruction.

D.D.M.I. 6.336 (78)
Sheet 4 of 13 sheets

- 5) Short the following pins on a plug to be inserted in the slave scanner socket:- 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, and 16 (not 14). This will apply fault 237 only.
- 6) Set pin 14 on the slave scanner socket to logic 1 (open current) to insert analogue data in the fault code sequence, otherwise set it to logic 0 (earth, pin 1). This could be done remotely by using the reset relays in the TMLM/1.

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

D.D.M.I. 6.336 (78)
Sheet 5 of 13 sheets

BBC

DS/SPA4

ANALOGUE TO DIGITAL CONVERTER C08/5

PRODUCTION TEST SCHEDULE

1. Description

This unit enables both analogue and digital information, generated by external equipment, to be inserted in the message sequence of the Fault Reporter TMLM/1. The unit has been designed to fit in the space provided in the TMLM/1 and it may be connected via a multicore cable to the TV Automatic monitor MN2M/513. The C08/5 has 16 analogue inputs which may be connected to the MN2M/513 and they are suitably processed to give 8 bit digital words that may be easily converted to meaningful readings (% and volts) of each TV parameter. An 8 bit parallel data input is also provided and this may be used to convey readings from the Digital Ceefax decoding margin meter ME15M/502, or other equipment with a digital output.

A programmable read only memory (PROM) is used to preset the order in which the inputs are selected and to determine how many readings (up to 30) are added to each fault code cycle. The extra readings are limited to the range 0 to 224 inclusive and they are bracketed by 237 to distinguish them from fault code numbers.

The PROM address may be controlled externally and an 8 bit input/output port is available. This enables the unit to be controlled externally so that the numbers may be stored and/or processed before transmission.

Briefly the operation is as follows: When the scanner in the TMLM/1 reaches 237, IC27 sets to logic 0 which clears the counter (IC15) and sets the SELAN (select analogue) output to logic 0. The counter is clocked at 2.5Hz and is used to address the PROM (IC17), which is programmed to select the required inputs by controlling the addresss of two multiplexers. The digital multiplex can output "237", "000" an externally applied digital word or the output of an analogue to digital converter (ADC). The analogue multiplexer connects one of 16 analogue inputs to the ADC. Not all of the analogue inputs are directly connected to the multiplexer, some are connected via a ratio measuring circuit. This means that, for instance, although a voltage proportional to pulse amplitude is applied to the unit, the voltage fed to the ADC is proportional to pulse/bar ratio.

For a more detailed circuit description see Handbook No 6.164 (78)

2. Information

- | | | |
|----|-----------------------|--|
| a) | Design Section | Transmission Section |
| b) | Designer | M.T. Ellen |
| c) | Engineer Responsible | M.T. Ellen |
| d) | Handbook | 6.164 (78) |
| e) | Technical Information | Not available on the 1/8/78 |
| f) | Other information | None |
| g) | Preproduction batch | This production test schedule has been tested on a pre-production batch in Designs Department. |

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

3. Manufacturing Performance Specification

A Designs Department Test Jig is available for testing this unit so only general information is given below.

a) Input requirements

- i) 2.5Hz TTL clock
- ii) 22 TTL logic inputs that may be switched from 0 to 1 (to control the various functions of the C08/5).
- iii) A d.c potential variable from 0 to 8 volts (for application to the analogue inputs).

b) Outputs

13 outputs have TTL logic levels and their condition may be observed using LED's (with suitable interfaces).

The SELAN output has TTL logic levels but an oscilloscope is required to observe a pulse on this output.

c) Power Supply

5 \pm 0.2 volts at 160 \pm 60mA
or 5 \pm 0.2 volts at 300 \pm 60mA including the test jig.

d) Performance

Accuracy of ADC= \pm least significant bit.
Accuracy of analogue circuits= \pm 2 % of readings.

4. Warning

- a) No voltages above 30 volts a.c or 50 volts d.c are present in this unit.
- b) This unit contains MOS devices. Ensure that they are not subjected to electrostatic discharges.

5. Test Apparatus Required

- 2 off Power supply, variable from 0 to 10 volts and fitted with a current limit control.
- 1 off Dual trace oscilloscope (B/W > 10MHz).
- 2 off Oscilloscope probes.
- 1 off DVM accuracy 0.05%.
- 1 off Designs Department test jig for C08/5

6. Inspection

- a) Check that the coding peg positions are correct (see D44783 A2)
- b) Check that the front panel plug and the interconnecting wires on the PCB have been assembled correctly.

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

- c) Check that the following components have been correctly inserted:-

Resistors R1 to R90
Capacitors C1 to C31
Integrated circuits IC1 to IC16 and IC18 to IC28

7. Test Procedure

7.1 To check power consumption

- a) Connect the orange (+ve) and black wires from the C08/5 test jig to a variable power supply set to 0 volts. Plug the C08/5 into the test jig (PLA and PLB). Increase the power supply voltage gradually to 5 volts while monitoring the current.
- b) The current drawn when the voltage is 5 volts should be 300 + 60mA. The exact current will depend on the number of LED's on the test jig which are on at any given time.
- c) If the current is not within this range, remove the C08/5 and check that the test jig current is 210 + 10mA. If it is within this range check the power connections on the C08/5.

7.2 To check PROM address input

- a) Set the multiplex control switches to 1 and the inhibit switch to 0. Observe the multiplexer control LED's.
- b) The state of the LED's should change every 400mS and they should count down from all ones to all zeros (an illuminated LED represents logic 1)
- c) If this test is not passed check the circuit associated with the 5 bit counter.

7.3 To check the frame code detector and counter reset

- a) Set the fault code input switches as follows:

<u>switch</u>	<u>position</u>
A	1
B	0
C	1
D	1
E	0
F	1
G	1
H	0

Reset switch H to 1 while observing the multiplexer control LED's.

- b) When switch H is set to 1 (thus applying the correct frame code) the LED's should all set to 1 and then proceed to count down from that point.
- c) If this test is not passed check that IC27 pin 13 is only at 0 when the correct frame code is applied. Also check the differentiator circuit R88 and C24.

7.4 To check 2.5Hz clock delay

- a) Set the dual trace oscilloscope to chop, 5mS/div, positive normal trigger and 0.2V/div (both inputs). Connect the A input to pin W10 and trigger on this input. Connect the B input to IC19 pin 4 and observe the waveform.
- b) The B trace should be a single positive edge $20 \pm 7\text{mS}$ after the trigger point.
- c) If this test is not passed check IC14, R49 and C20.

7.5 To check the 500kHz Oscillator

- a) Observe the waveform on IC13 pin 13.
- b) The waveform should be a squarewave with a period of $2 \pm 0.5\mu\text{S}$.
- c) If this test is not passed check IC14, R49, and C20.

7.6 To check the ADC start pulse generator

- a) Set the dual trace oscilloscope to chop, 5mS/div, ^{-ve}positive/normal trigger and 0.2V/div (both inputs). Connect the A input to W10 and trigger from this input but switch off the A channel display. Connect the B input to IC 13 pin 12 and then to IC13 pin 14. Observe the waveforms.
- b) The waveform on pin 12 should be a ^{-ve}positive going edge $20 \pm 7\text{mS}$ after the trigger point and the waveform on pin 14 should be a negative pulse (2.4S) in the same position.

7.7 To check the SELAN (select analogue) output

Fit the test PROM (IC17) supplied by Designs Department.

- a) Set the fault code input switches to:-

<u>switch</u>	<u>position</u>
A	1
B	0
C	1
D	1
E	0
F	1
G	1
H	1

Set the multiplexer external control input switches:-

<u>switch</u>	<u>position</u>
A	1
B	0
C	1
D	1
E	1
Inhibit	1

Connect an oscilloscope to pin W12 and observe the waveform.

- b) The waveform should be a single 2µS positive pulse every 400mS (TTL logic levels).
- c) If this test is not passed check IC18b and IC26F.

7.9 To check the analogue multiplexer

- a) Connect +5 volts to the test jig "Bar Amp" input (PLA 9), set the multiplexer external control input switches as shown in the first line of the table below and set the inhibit switch to 1. Use a DVM to measure the voltage on pins 8 and 1 of the multiplexer IC8 (relative to 0 volts). Repeat the test for the other nine direct inputs as shown in the table.
- b)

Multiplexer external control input switches E D C B A	+ 5 volts applied to	Voltage on Pin and Pin of IC8		
1 1 1 0 1	Bar Amp (PLA9)	0.7 + 2%	8	1
1 1 1 0 0	Sync Amp (PLA26)	0.3 + 2%	7	1
1 1 0 1 1	K' pulse (PLA10)	0.25 + 2%	6	1
1 1 0 1 0	Diff gain(PLA27)	0.5 + 2%	5	1
1 1 0 0 1	Spare	0.5 + 2%	4	1
1 1 0 0 0	C-L delay (PLA28)	0.5 + 2%	3	1
1 0 1 1 1	C-L intermod (PLA 12)	0.5 + 2%	2	1
1 0 1 1 0	K' bar (PLA29)	0.5 + 2%	23	1

- c) If the input voltages are not as shown in the table, check the potential dividers. If the output from the multiplexer (pin 1) is not the same as its selected input within ± 0.005 volts check the wiring to pin 1.

7.10 To set the voltage reference

- a) Connect a DVM to IC10 pin ~~5~~⁶ and adjust R57.
- b) Set the voltage to 1000 ± 1 mV.
- c) If the voltage cannot be set to this value check IC10, IC11, R56, R57 and R60. The voltage on IC11 pin 6 should be 2.5 volts approximately.

7.11 To check the bar amplitude normalising circuit

- a) Connect the variable PSU set to 0 volts to the bar amplitude input. Connect a DVM to IC 5 pin 2, gradually increase the PSU voltage until the DVM indicates 1000 ± 10mV then measure the PSU voltage. Increase the PSU voltage to 8 volts and check that the voltage on IC5 pin 2 remains at 1000 ± 10mV.
- b) The PSU voltage should be less than 1.7 volts.
- c) If this test is not passed refer to the handbook 6. 164 (78) for full information on the operation of this circuit.

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

7.12 To check the digital voltage-divider circuits

- a) Apply +5 volts to the following inputs simultaneously

Bar Amplitude
Pulse Amplitude
Chrominance Amplitude
Noise Amplitude
L.F. Distortion

Measure the voltage on IC8 pins 20,19,17, and 18.

- b) The voltage should be $1000 \pm 10\text{mV}$ on pins 20,19, and 17. The voltage should be $290 \pm 10\text{mV}$ on pin 18.
c) If this test is not passed check IC1, IC2 and the components connected to IC8 pins 20, 19, 17 and 18.

7.13 To check the luminance non-linearity ratio circuit

- a) Connect a variable PSU (set to 0 volts) to the max and min riser inputs. Connect a DVM to IC6 pin 2 and gradually increase the PSU voltage until the DVM indicates $1000 \pm 10\text{mV}$, then measure the PSU voltage.

Increase the PSU voltage to 8 volts and check that the voltage on IC6 pin 2 and IC8 pin 16 remains at $1000 \pm 10\text{mV}$.

- b) The PSU voltage should be less than 1.7 volts.
c) If this test is not passed refer to the handbook 6. 164 (78) for full information on the operation of this circuit.

7.14 To check the data selector

- a) Set the multiplexer external control inputs as shown below and observe the data output LED's.

b)

Multiplexer external control inputs						LED state
E	D	C	B	A	Inhibit	H G F E D C B A
0	1	1	0	1	1	output controlled by external data input switches - test each switch.
0	1	0	1	1	1	1 1 1 0 1 1 0 1
0	1	1	1	0	1	0 0 0 0 0 0 0 0

- c) If there is a fault check the data selectors and buffers (IC22, IC23, IC 24, IC25, IC19, IC26)

7.15 To set ADC zero control

- a) Remove all the analogue inputs and set the multiplexer control input switches to:-

<u>Switch</u>	<u>Position</u>
A	1
B	0
C	1
D	1
E	1
Inhibit	1

- b) Adjust R53 to set all the data output LED's to zero (off).
c) If the adjustment is out of range check that the voltage at IC9 pin 6 is $0 \pm 10\text{mV}$.

7.16 To set the ADC gain control

- a) Set the multiplexer control input switches to:-

<u>Switch</u>	<u>Position</u>
A	0
B	1
C	1
D	1
E	1
Inhibit	1

(This connects the 1 volt reference to the ADC via IC8 and IC9)
Adjust R54 to set the data output LED's as shown in b). Repeat 7.15 and 7.16 until no further adjustment is required to pass both tests.

b)

<u>LED</u>	<u>Condition</u>
A	0
B	0
C	1
D	0
E	0
F	1
G	1
H	0

- c) If the adjustment is out of range check that the voltage at IC9 pin 6 is $1000 \pm 10\text{mV}$.

7.17 To check the full range of the ADC and the "232" limit circuit

- A) Short R19 and set the multiplexer control input switches to:-

Switch	Position
A	1
B	0
C	1
D	0
E	1
Inhibit	1

Connect a variable PSU (set to 0 volts) to the "spare 3" input, then adjust its voltage as shown in the table below and check that the data output LED's give the correct indication. (The PSU voltage must not exceed 5 volts).

b)

Voltage mV	Data output LED's H G F E D C B A	Tolerance	Decimal equivalent
0	0 0 0 0 0 0 0 0	+ LSB	0
500 + 1	0 0 1 1 0 0 1 0	+ LSB	50
2000 + 1	1 1 0 0 1 0 0 0	+ LSB	200
2450 + 50	1 1 1 0 0 0 0 0	none	224
4500 + 50	1 1 1 0 1 0 0 0	none	232

- c) If the first three voltages give the wrong indication repeat sections 7.15 and 7.16. If the last two voltages give the wrong indications check IC20 and IC21.

D 44781A4

COB/5 A.D.C. FAULT REPORTER PARTS LIST.

ISS. 1
CHANGE 13-10-78

ITEM No.	No. OFF	DESCRIPTION	C'T REF.	BBC REF. OR DRG. No.
<u>LIST OF DRAWINGS</u>				
		CIRCUIT	D44780A1	
		PARTS LIST	D44781A4	
		ASSEMBLY	D44782A2	
		DETAILS	D44783A2	
		P.B. WIRING	D44784A2 (2 SHTS)	
		" " COMPONENT SIDE	D44785A2	
		" " COMPONENT LOCATION	D44786A3	
		" " DRILLING	D44787A3	
<u>FURTHER INFORMATION REQUIRED FOR MANUFACTURE:-</u>				
UNIT WIRING INFORMATION P.B. WIRING EA10140				
UNIT WIRING INFORMATION A.F. EQUIPMENT EA10138				
UNIT ASSEMBLY INFORMATION EA10484				
1	1	CHASSIS CH1/63 MODIFIED AS FOLLOWS:-		
		BSCUTCHEDN		D44783A2 DET. 1.
		FRONT BRACKET		" " 2.
		INDEXING BAR		" " 3.
		CODING BRACKET		" " 4.
2				
3	1	PRINTED BOARD		D44784A2
				D44785A2
				D44786A3
				D44787A3
4				
		SCREWS		FOR FIXING ITEMS:-
5	2	BB.A. x 5/16" C'SUNK HD. ZINC PLATED		
6	8	BB.A. x 1/4" CH. HD. ZINC PLATED		3
		WASHERS		
7	8	6 B.A. PLAIN		3
8	2	BB.A. PLAIN		
		NUTS		
9	2	BB.A. HEX. ORDINARY.		
10				
		WIRE		
11	A/R	PUNI/1M BLUE		
12	A/R	" GREEN		
13	A/R	" SLATE		
14	A/R	" VIOLET		
15	A/R	" WHITE		
16	A/R	" BLACK		

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

BBC

DS/PLA4

COB/5 A.D.C. FAULT REPORTER PARTS LIST

DRN.	M.G.B.	DESIGNS DEPARTMENT
TPD.		
CKD.	M.T.E	D 44781A4
APPD.	M.T.E	SHEET 1 OF 8 SHEETS

ITEM No.	Qty	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
101			
102	1	8 Pin, I.C. Socket:Cambion 703-3771-01-03-16	
103	1	24 Pin, I.C. Socket:Cambion 703-3783-01-04-16	
104			
105			
106			
107			
108			
		CAPACITORS	
109	2 *	100nF, -25+50%, 30V dc, Capacitor, Ceramic, Disc C23, C28	S20614-0085109
110	10 *	1.0nF, 20%, 500V dc, Capacitor, Ceramic, Disc C1, C2, C3, C4, C5, C6, C7, C8, C9, C26	S20615-0010119
111	1	100uF, 10V, Capacitor, Electrolytic, C428AR/D100 C29	S20733
112	1 *	20pF, +-2p, 125V dc, Capacitor, Polystyrene Foil C20	S21004-020827X
113	1 *	100pF, +-2p, 125V dc, Capacitor, Polystyrene Foil C24	S21004-000937X
114	3 *	10uF, 20%, 10V dc, Capacitor, Solid Tantalum C12, C30, C31	S21122-0205740
115	2 *	15uF, 20%, 10V dc, Capacitor, Solid Tantalum C18, C19	S21122-0205759
116	2 *	33uF, 20%, 10V dc, Capacitor, Solid Tantalum C25, C27	S21122-0205767
117	7 *	2.2uF, 20%, 20V dc, Capacitor, Solid Tantalum C10, C11, C13, C14, C15, C16, C17	S21124-0209356
118	2 *	1.0uF, 20%, 35V dc, Capacitor, Solid Tantalum. C21, C22	S21125-0085220
119			
120			

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

ITEM No.	Qty		BBC REF. or DRG.No.
121			
122			
RESISTORS			
123	2	* 10 ohm, 2%, Resistor, Metal Film, 0.4W. R89, R90	S26877-0099433
124	2	* 20 ohm, 2%, Resistor, Metal Film, 0.4W. R41, R48	S26877-0227795
125	1	* 1.1kohm, 2%, Resistor, Metal Film, 0.4W. R60	S26877-0099090
126	1	* 1.2kohm, 2%, Resistor, Metal Film, 0.4W. R58	S26877-0099102
127	1	* 1.6kohm, 2%, Resistor, Metal Film, 0.4W. R56	S26877-0099129
128	2	* 2.4kohm, 2%, Resistor, Metal Film, 0.4W. R51, R52	S26877-0099153
129	7	* 3.0kohm, 2%, Resistor, Metal Film, 0.4W. R1, R23, R27, R29, R34, R36, R43	S26877-0099362
130	2	* 4.3kohm, 2%, Resistor, Metal Film, 0.4W. R8, R55	S26877-0099188
131	15	* 5.1kohm, 2%, Resistor, Metal Film, 0.4W. R25, R28, R30, R35, R37, R44, R59, R78, R79, R80, R81, R82, R83, R84, R85	S26877-0228000
132	1	* 5.6kohm, 2%, Resistor, Metal Film, 0.4W. R2	S26877-0228019
133	11	* 10kohm, 2%, Resistor, Metal Film, 0.4W. R50, R61, R64, R65, R68, R69, R72, R73, R76, R77, R87	S26877-0099224
134	1	* 16kohm, 2%, Resistor, Metal Film, 0.4W. R4	S26877-0099232
135	7	* 20kohm, 2%, Resistor, Metal Film, 0.4W. R10, R12, R14, R16, R18, R20, R22	S26877-022806X
136	1	* 22kohm, 2%, Resistor, Metal Film, 0.4W. R49	S26877-0228078
137	1	* 30kohm, 2%, Resistor, Metal Film, 0.4W. R6	S26877-0228094

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

ITEM No.	Qty	*	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
138	1	*	56kohm,2%,Resistor,Metal Film,0.4W. R3	S26877-0228130
139	1	*	82kohm,2%,Resistor,Metal Film,0.4W. R7	S26877-0228165
140	17	*	100kohm,2%,Resistor,Metal Film,0.4W. R24, R26, R33, R38, R39, R42, R45, R46, R62, R63, R66, R67, R70, R71, R74, R75, R88	S26877-0228181
141	1	*	120kohm,2%,Resistor,Metal Film,0.5W R32	S26877-0228201
142	2	*	160kohm,2%,Resistor,Metal Film,0.5W R40, R47	S26877-0228236
143	7	*	180kohm,2%,Resistor,Metal Film,0.5W R9, R11, R13, R15, R17, R19, R21	S26877-0099409
144	2	*	300kohm,2%,Resistor,Metal Film,0.5W R31, R86	S26877-0228279
145	1	*	470kohm,2%,Resistor,Metal Film,0.5W R5	S26877-0228315
146	2	*	200 ohm,10%,Var.Resistor,Cermet,Multiturn,0.33W R53, R57	S27241-0211407
147	1	*	500 ohm,10%,Var.Resistor,Cermet,Multiturn,0.33W R54	S27241-0211415
148				
149				
150				
151				
152				
153				
154				

This drawing/specification is the property of
 the British Broadcasting Corporation and may
 not be reproduced or disclosed to a third party
 in any form without the written permission of
 the Corporation.

ITEM No.	Qty	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
INDUCTORS			
155	1	Inductor :Toko CH18 L1	
156	1	Inductor :Toko CH17 L2	
157			
158			
159			
INTEGRATED CIRCUITS			
160	1	CD4054BE IC12	
161	1	MC14502BCP IC16	
162	2	LIC310CS IC9, IC10	
163	2	* LIC748CS IC5, IC6	0153742
164	1	SN74188AN To be programmed by customer. IC17	
165	1	ZN432CE IC11	
166	1	* MOS/DIC4011AN IC21	0163424
167	1	MOS/DIC4023AN IC18	
168	1	MOS/DIC4024BN IC15	
169	1	MOS/DIC4027AN IC13	
170	1	MOS/DIC4047AN IC14	

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

ITEM No.	Qty	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
171	2	MOS/DIC4049AN IC7, IC20	
172	2	MOS/DIC4050AN IC19, IC26	
173	4	MOS/DIC4052BN IC22, IC23, IC24, IC25	
174	4	* MOS/DIC4066AN IC1, IC2, IC3, IC4	0178571
175	1	MOS/DIC4067BN IC8	
176	1	MOS/DIC4068BN IC27	
177	1	5N02F1-A IC2B	
178			
179			
180			
181			
182			
		PLUGS	
183	1	Plug, :ITT Cannon Electric 50 Way PL.A	

This drawing/specification is the property of the British Broadcasting Corporation and may not be reproduced or disclosed to a third party in any form without the written permission of the Corporation.

CIRCUIT REFERENCE INDEX

C1 110		R31 144	R62 140	L2 156
C2 110	R1 129	R32 141	R63 140	
C3 110	R2 132	R33 140	R64 133	IC1 174
C4 110	R3 138	R34 129	R65 133	IC2 174
C5 110	R4 134	R35 131	R66 140	IC3 174
C6 110	R5 145	R36 129	R67 140	IC4 174
C7 110	R6 137	R37 131	R68 133	IC5 163
C8 110	R7 139	R38 140	R69 133	IC6 163
C9 110	R8 130	R39 140	R70 140	IC7 171
C10 117	R9 143	R40 142	R71 140	IC8 175
C11 117	R10 135	R41 124	R72 133	IC9 162
C12 114	R11 143	R42 140	R73 133	IC10 162
C13 117	R12 135	R43 129	R74 140	IC11 165
C14 117	R13 143	R44 131	R75 140	IC12 160
C15 117	R14 135	R45 140	R76 133	IC13 169
C16 117	R15 143	R46 140	R77 133	IC14 170
C17 117	R16 135	R47 142	R78 131	IC15 168
C18 115	R17 143	R48 124	R79 131	IC16 161
C19 115	R18 135	R49 136	R80 131	IC17 164
C20 112	R19 143	R50 133	R81 131	IC18 167
C21 118	R20 135	R51 128	R82 131	IC19 172
C22 118	R21 143	R52 128	R83 131	IC20 171
C23 109	R22 135	R53 146	R84 131	IC21 166
C24 113	R23 129	R54 147	R85 131	IC22 173
C25 116	R24 140	R55 130	R86 144	IC23 173
C26 110	R25 131	R56 127	R87 133	IC24 173
C27 116	R26 140	R57 146	R88 140	IC25 173
C28 109	R27 129	R58 126	R89 123	IC26 172
C29 111	R28 131	R59 131	R90 123	IC27 176
C30 114	R29 129	R60 125		IC28 177
C31 114	R30 131	R61 133	L1 155	PL.A 183

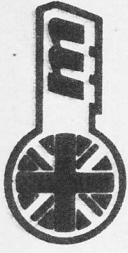
END OF CIRCUIT REFERENCE INDEX.

This drawing/specification is the property of
 the British Broadcasting Corporation and may
 not be reproduced or disclosed to a third party
 in any form without the written permission of
 the Corporation.

BBC
 VM424A4

A.D.C. FAULT REPORTER C08/5
 BBC: DESIGNS DEPARTMENT.

DD Ref: U454E-ME7/MGB
 SHEET 7 OF PARTS LIST D44781 A4



ORIGINAL
FRAME SIZE
190mm x 277mm

ALL DIMENSIONS IN MILLIMETRES UNLESS
OTHERWISE STATED

This drawing/specification is the property of the British
Broadcasting Corporation and may not be reproduced or
disclosed to a third party in any form without the written
permission of the corporation.

BBC

VM418/A4

SHT.	ISS.	DETAILS OF CHANGE	SHT.	ISS.	DETAILS OF CHANGE
2	2	"CONVERTOR TOKO SNO2FI-A ITEM 101" DELETED			
6	2	"SNO2FI-A IC28 ITEM 177" ADDED			
7	2	"IC28 177" ADDED TO CIRCUIT REFERENCE INDEX.			

DESIGNS DEPARTMENT

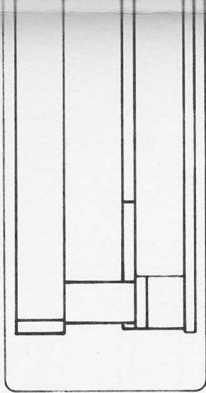
CODE:- C08/5

PARTS LIST CHANGE RECORD, ISSUE:-2

D44781

SHEET 8

A4



- INDEXING BAR
(NOTE POSITION OF CHAMFER)

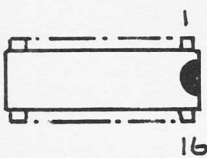
CAUTION
CMOS IC DEVICES FITTED,
HANDLE WITH CARE.
SEE EA10140 NOTE 14.

THROUGH HOLE PLATED BOARD,
ALL LEADS PASSING THROUGH
BOARD NOT TO BE BENT
AFTER ASSEMBLY

NOTES :-

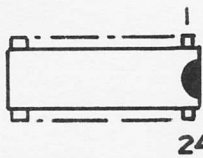
1. ASSEMBLY TO BE IN ACCORDANCE WITH DRAWING EA10484 NOTES. 1. 4. 6. 7. 12
2. WIRING TO BE IN ACCORDANCE WITH DRAWING EA10138 NOTES. 2.
3. COMPONENTS TO BE WIRED TO PRINTED BOARD IN ACCORDANCE WITH DRAWING EA10140 NOTES. 1, 9, 11, 13 & 14

IC TERMINATIONS
(VIEW ON TOP)



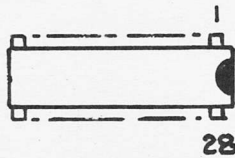
16

- MOS/DIC 4027AN
- MOS/DIC 4049AN
- MOS/DIC 4050AN
- MOS/DIC 4052AN
- MOS/DIC 4054AN
- CD 4502BE
- DIC 714BBN



24

MOS/DIC 4067BE



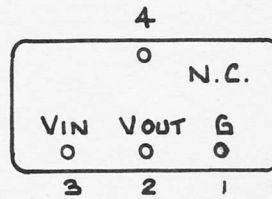
28

ZN432CE



8

- LIC 748CS
- LIC 310



SNOZFI-A

(VIEW ON LEADS)

D 44781A4

DIMENSIONS

4
32
6

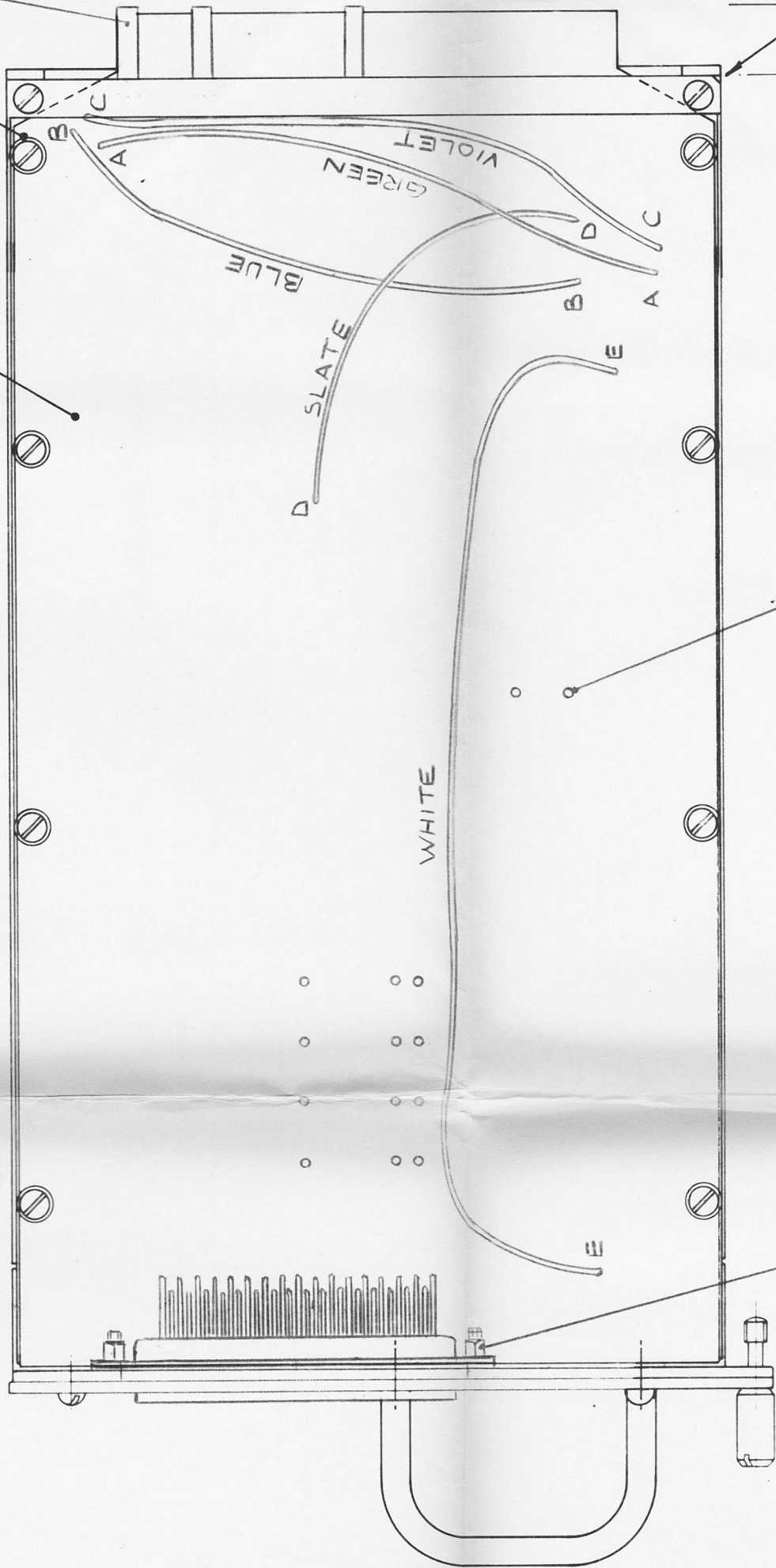
SCALE - 1:1

DRN	MGB	DESIGNS DEPARTMENT
TCD		
CKD	M.T.E	D 44782A2
APPD	M.T.E	

THIRD ANGLE PROJECTION

FOR COMPONENT
CONFIGURATION
SEE D 4-4786A2

6 7



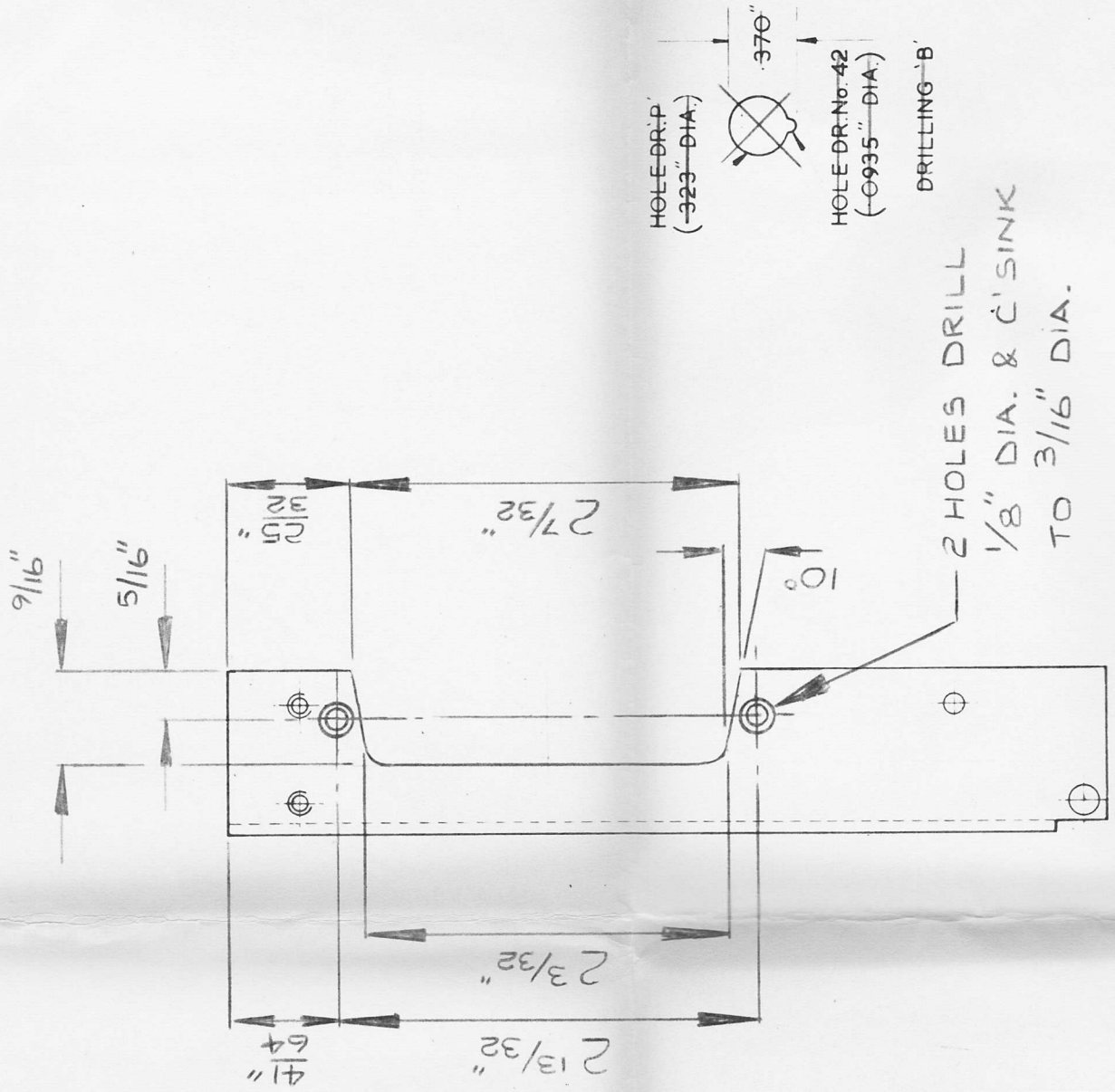
5 8

16

15"
32

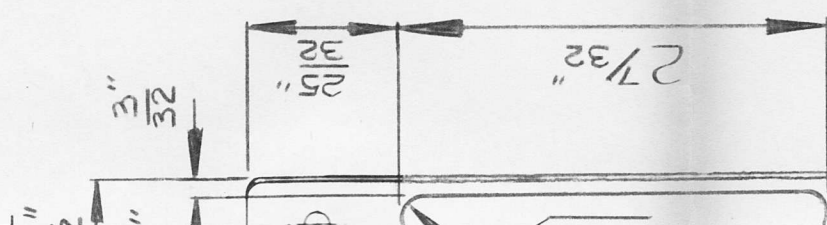
PLUGS ITEM 16 TO BE
FITTED FROM COMPONENT

THIRD ANGLE PROJECTION



HIGH

HERE

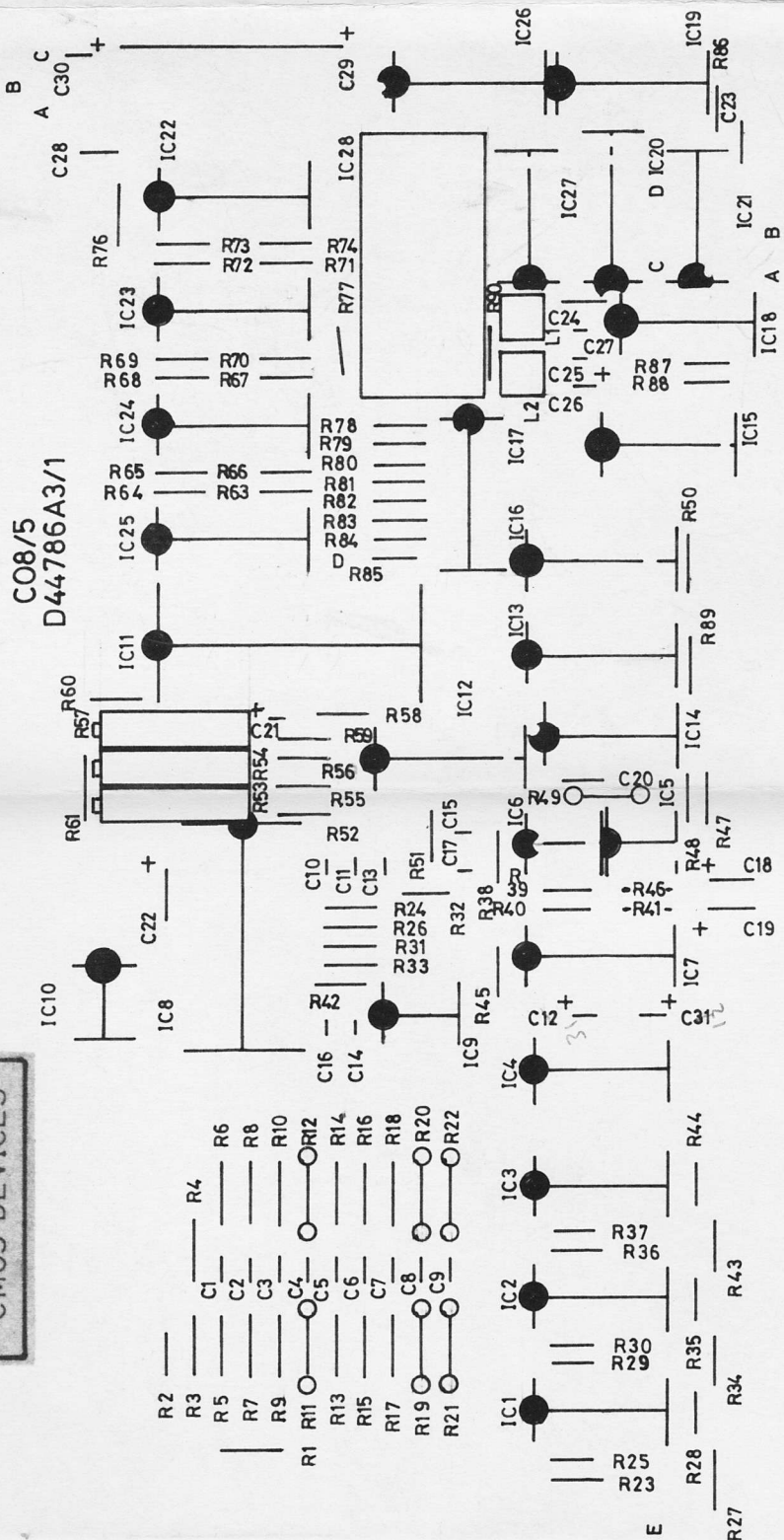


MINIMUM SIZE TO CUT NEGATIVE

TOP

CAUTION
CMOS DEVICES

C08/5
D44786A3/1



226.5

23.3

116.8

83.34

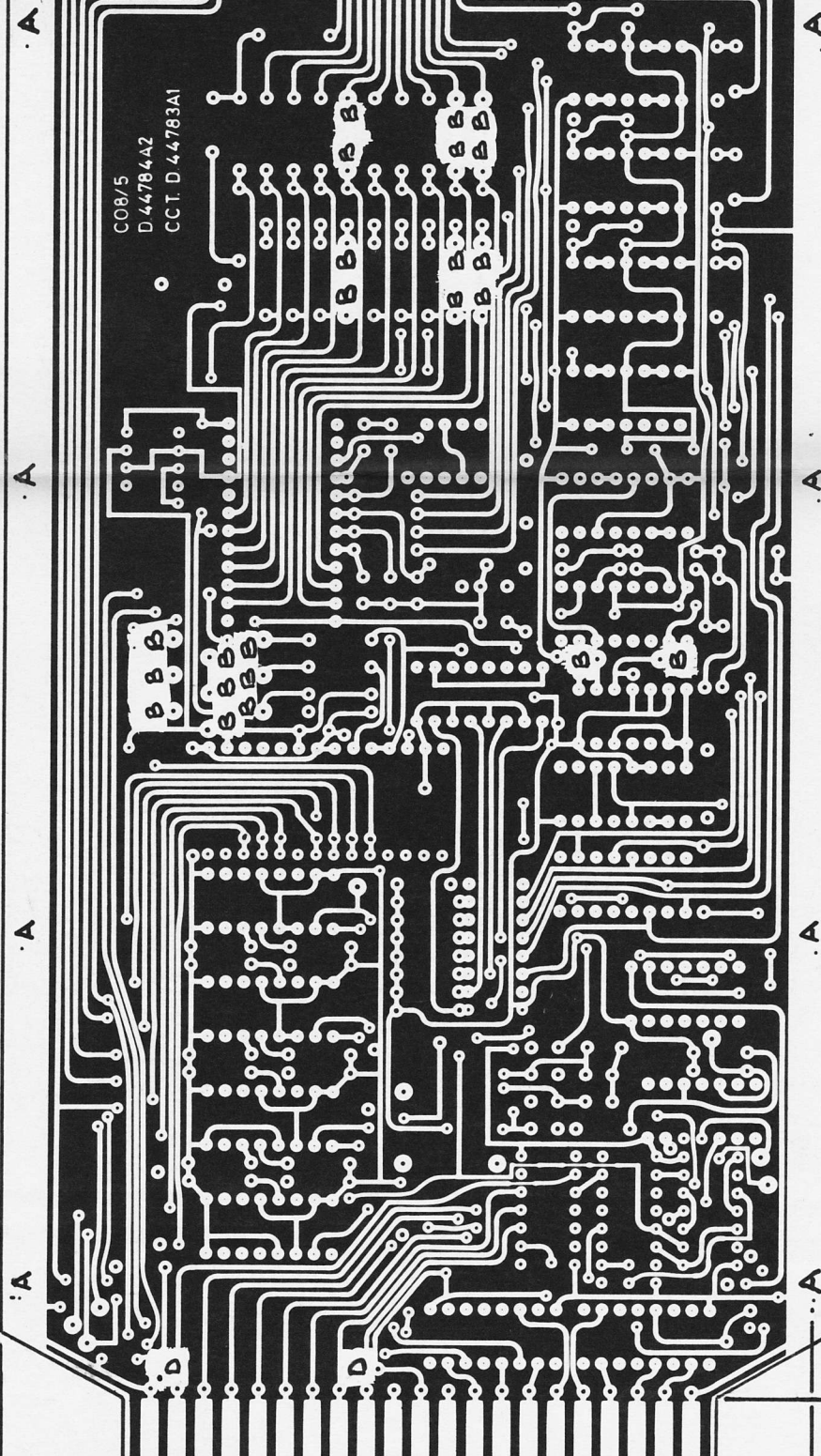
16.13

2.54

B*

50 HOLES 'C'

COB/5
D 44784A2
CCT. D 44783A1



* COPPER CONDUCTORS ONLY