ACORN COMPUTER
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LABORATORY INTERFACE MANUAL

23-2-81 CDP.

LABORATORY INTERFACE

The Acorn laboratory interface provides 16 optically isolated connections each of which can function as input or output for the computer. The isolators and a peripheral interface IC are among the components carried on a standard Euro-Card which plugs on to the Acorn Computer bus. A remote circuit board with 16 power drivers and LED indicators is connected to the Euro-Card by up to 25 metres of flat 40 way ribbon cable.

The remote circuit board has 16 connection nodes each of which is set to be an input or an output by a switch. In its output mode each node can drive loads drawing current at up to 3 amps from the remote supply. A catching diode on each node allows inductive loads to be driven and the remote supply may be in the range 6 to 48 volts DC. When in input mode each node may be driven by a contact closure to theremote supply common. A LED indicates the state of each node in input or output mode.

The remote supply is optically isolated from the computer on the interface Euro-Card giving immunity to electrical noise generated by the load switching. Noise produced by other equipment at the remote station is also isolated and ground loop problems encountered inthe laboratory environment are eliminated. The remote supply common can be different to the computer 0 volt line by as much as 48 volts peak.

The 16 input-output bits of the peripheral interface IC must be programmed such that they match the modes set by the switches at the remote station. Inputs are then read and outputs are driven by the program. The program may be synchronised to real time using interrupts which are generated by circuitry on the Euro-Card with a periodic time of 10 milli-seconds.

PARTS LIST FOR EURO-CARD

P.C.B.	Acorn Computers 200,015
ICI-32	32 off TIL 112 Opto-Isolator
IC33-35	3 off 74C906
IC36	INS8154
IC37, 38	2 off 74LS138
IC39, 40	2 off CD4518B
IC41	CD4011B
D1	1N4148
D2-4	3 off 1N4002
R1-8	8 off 1K
R9-16	8 off 22K
R17-24	8 off 1K
R25-32	8 off 22K
R33-48	16 off 47K
R49, 50	2 off 150K
C1, 2	2 off 1nF
C3, 5 & 7	3 off 47nF
C4, 6	2 off 10-47uF

4 off 14 pin sockets
4 off 16 pin sockets
1 off 40 pin socket
1 off 64 way plug 17-3704L
1 off 40 way header 3432-1302
1 off punched front panel and brackets

PARTS LIST FOR CABLE

2 off 40 way socket 3417-6000
2 off strain relief 3448-3040
5 metres of 40 way ribbon cable 3302-40
NB Cable length may vary between 1 and 25 metres as required by customer.

PARTS LIST FOR REMOTE PANEL

PCB	Acorn Computers 200,017
Q1-16	16 off TIP31
D1-16	16 off 1N4002
L1-16	16 off TIL228
R1-4, 13-26, 25-28, 37-40	16 off 47K
R5-8, 17-20, 29-32, 41-44	Not required
R9-12, 21-24, 33-36, 45-48	16 off 1K @ 1 watt

2 off 20 way pin strips
16 off SPCO switches
16 off studs 201,007
4 off studs 201,008
20 off M3 nuts
4 off terry clips
1 off front panel 201,006

APPLICATIONS

The laboratory interface is normally set such that the INS8154 input-output ports are in the address range 0900 to 0977 with the 128 bytes of RAM in the 8154 at 0980 to 09FF. This is done so that the 8154 appears in the same address space as the one on the 6502 CPU card which should not be fitted as well. The advantage of this scheme is that ONLI BASIC can be used to drive the 8154 device on the 6502 CPU in the absence of the laboratory interface card. A second laboratory interface may be addressed at 1000 to 1077 for the I-O and at 1080 to 10FF for the RAM. The RAM in both devices is free to the user and if desired the INS8254 device with I-O only can be fitted to both cards.

For the card at 0900 to 09FF the 74LS138 in position IC38 is not necessary as the 'Not Block Zero' signal on pin 31 decodes this address space. To modify a card to occupy the 1000 to 10FF space IC38 must be present with a link fitted in position 1 on the block select and the track bringing in the NBZero signal must be cut. The page decode link at position 8, 9 must also be cut and replaced with a link at position 0,1. Finally the two upper page select links must be cut and remade in the lower positions.

A free running oscillator on the card produces pulses every 10 milli-seconds which are normally linked to the 'Not Interrupt Request' line on the system back-plane. These interrupts are used by ONLI BASIC to synchronise real time events. When two laboratory interface cards are fitted only one should drive the NIRQ line with the second having its NIRQ link cut. Thus ICs 39, 40 and 41 need not be fitted to the second card.

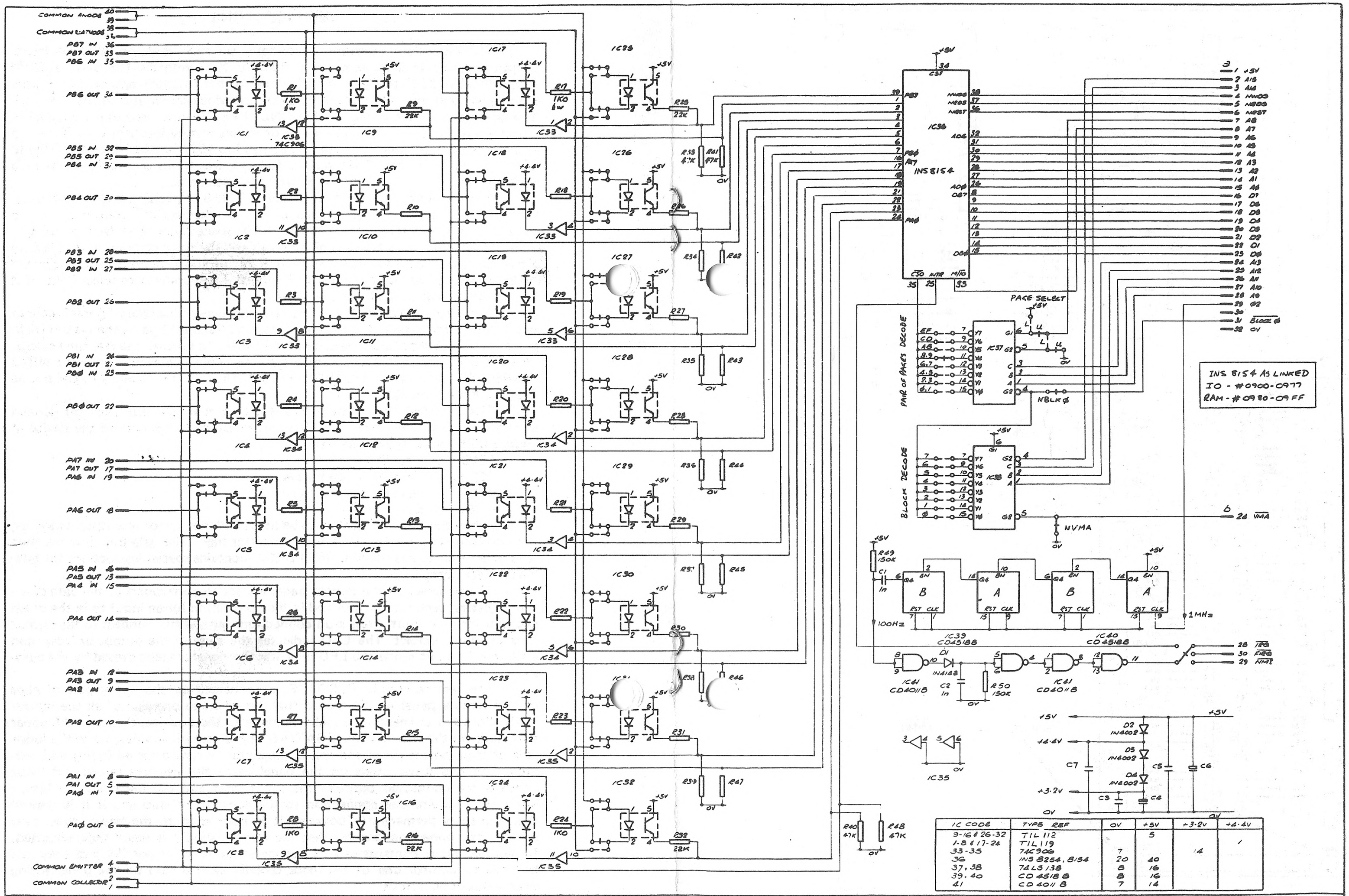
The INS8154 devices have two 8 bit ports which have each bit defined as input or output by two data direction registers. In the case of the device at address 0900 these registers are at:—

0923 . . . . Data Direction Port B
0922 . . . . Data Direction Port A
0921 . . . . Data Port B
0920 . . . . Data Port A

After system reset all bits are set to be input and may be set to output by setting the corresponding bit in the direction register high. The data port bits are then read or written to as required. ONLI BASIC contains special instructions for talking to these ports.

The switches on the remote panel are set to correspond to the data direction registers, each switch is placed in the up position for an input or in the down position for an output. Press stud connections are used to connect to the output load or input contact. The LED indicates the state of the output or input and note that in input mode the LED indicates the signal actually sensed by the euro-card.

The remote supply POSITIVE is connected to the upper pair of clips on the remote panel and it should then be wired to one side of all the output loads. No other connections should be made to the positive, that is to the upper two studs on the panel. The NEGATIVE of the remote supply goes to the lower pair of clips on the panel and this is the common return for all inputs and outputs. The two lower studs on the panel carry the negative return and input contacts are connected between the input stud and the lower studs. Output loads only require one connection to the appropriate stud and if it is desired that a load is permanently powered it is connected to the lower studs. This scheme of connection ensures that the remote supply is never short-circuited. If required input contacts can be connected in series or parallel and they can be used to control one of the loads directly with a stud on the panel acting as an input or an output.



ISSUE	A	1	2
DATE	12-7-80	16-8-80	1-8-80
"	"	CBT	CBT

DRN	GWDS
DATE	11-2-80

TITLE: CIRCUIT DIAGRAM FOR LABORATORY INTERFACE PCB

200,015/C

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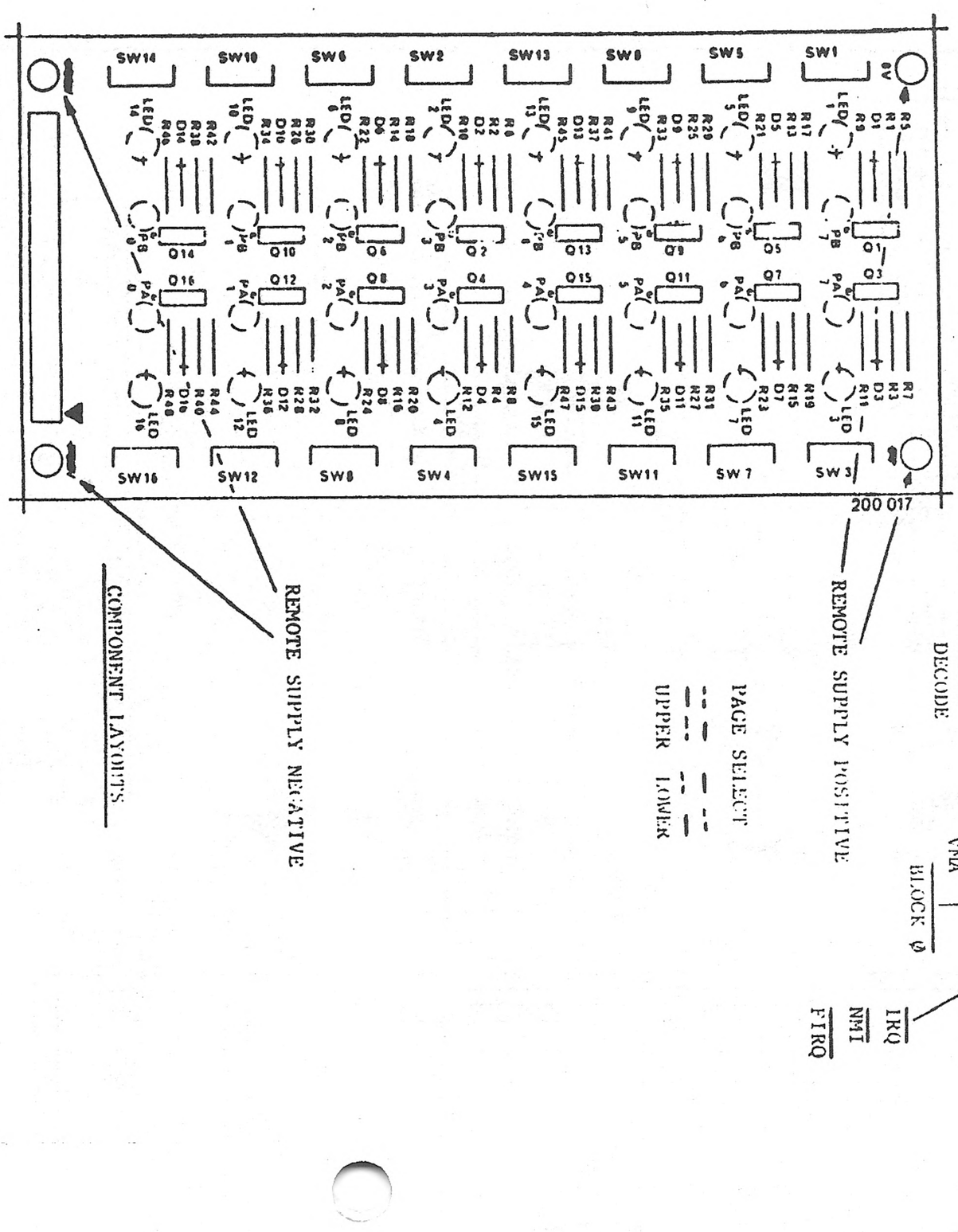

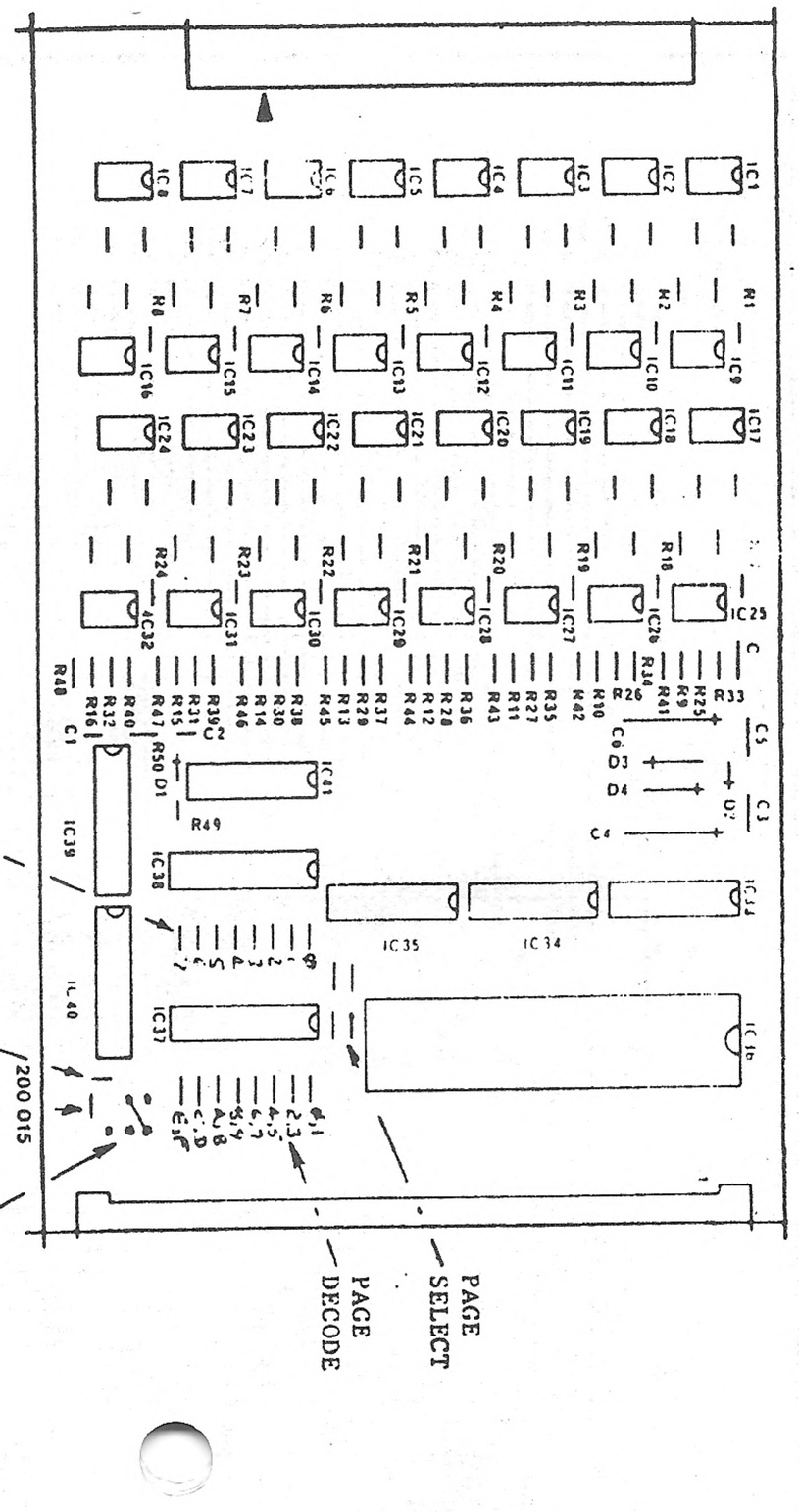

PAGE SELECT
UPPER
LOWER

COMPONENT LAYOUTS

ISSUE	A	1	2
DATE	6-3-80	16-4-80	1-8-80
		CBT	CBT

DRN	GWOS
DATE	29-2-80

TITLE: CIRCUIT DIAGRAM FOR INTERFACE PANEL PCB

200.017/C

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