PNC3
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MAINTENANCE MANUAL
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PNC3 Maintenance Manual

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1/ a) Built in Diagnostics / Fault messages.

Each time the PNC3 stepper motor control unit is switched on the control unit carries out a self test procedure which checks the following:

1) System RAM (Random Access Memory)
2) System EPROM (Electrically Programmable Read Only Memory)
3) Keyboard is tested for short circuit Keys

1) The system RAM is checked in 2 stages

   a) Stage 1 checks if the 1st 256 bytes are operating correctly if not the test continues until the power is removed. If this RAM section is OK then
   b) Stage 2 checks the remaining 5.75K bytes. If an error is detected the faulty IC (integrated Circuit) number is displayed on the VDU (Visual Display Unit). If the RAM is OK testing proceeds.

2) The system ROM is checked to ensure that all ROMs are functioning correctly. If an error is detected the program version number together with a list of ROM numbers with their actual and correct checksums is displayed. If the ROM is OK testing proceeds.

3) program versions 3.14 onwards carry out a Keyboard test to ensure that there are no short circuit Keys. If a short circuit Key is found its number is shown on the VDU.

   Note The RAM, ROM and Key numbers are as labelled on the Processor/Keyboard printed circuit board issue 2 onwards which is located behind the front panel.

System Fault Diagnosis (Operator checks)

A number of system checks may be carried out by the operator to check that various parts of the complete machine are functioning. The following checks can only be made prior to the machine being ZEROed:-

1) System EPROM checks
2) Keyboard tests
3) Input signals test
4) RS232 Serial Link test (to be added)

NOTE - Each test is ended by pressing the 'RESET' Key.

1) System EPROM can be checked by pressing the 'S' Key. The display will then show the program version number together with a list of ROM numbers with their actual and correct checksums which should always agree.

2) If the PNC3 stepper motor control unit is switched on whilst a Key is depressed on the keyboard the control will do a Keyboard test where the number of each Key depressed is displayed. Only one Key should be depressed at once. A faulty Key will result in either no Key number being displayed if the Key is open circuited, or the faulty Key number will always be displayed if the Key is short circuited.

3) The PNC3 stepper motor control unit uses many input signals some of which come from the machine being controlled. These signals are arranged as 'ports' having in general 8 bits.

   The input ports used are:-

   a) PC - Datum markers, spindle speed sensors and spares
   b) PD - Machine input switch signals
   c) PE - Printer Status and control unit 'assign' switches
   d) P4A - Axis step and direction signals
   e) P4B - Axis drive fault and overtravel signals
   f) P6 - Optional additional Serial Link (not normally fitted)
   g) POR - Machine control switches and Cassette unit status

a)PC - Port C is used for the Datum Signals from each of the axes and for the spindle speed sensors (only used on programmable spindle speed systems)

bit assignments:-

	7	6	5	4	3	2	1	0
LATHES:	Spindle encoder 200/rev 1=HOLE	Spindle encoder 1/rev 1=HOLE	Z Datum 1=METAL	X Datum 1=METAL	SPARE	SPARE	SPARE	SPARE
MILL:	Spindle encoder 1/rev 1=metal	Z Datum 1=metal	Y Datum 1=metal	X Datum 1=metal	Spare	Spare	Spare	Spare

b)PD - Port D is used for the machine input switch signals

bit assignment:-

7	6	5	4	3	2	1	0
INPUT 7	INPUT 6	INPUT 5	INPUT 4	INPUT 3	INPUT 2	INPUT 1	INPUT 0
0=CLOSED	0=CLOSED	0=CLOSED	0=CLOSED	0=CLOSED	0=CLOSED	0=CLOSED	0=CLOSED

c)PE - Port E is used for the printer Status signals and for the unit 'assign' switches. IMPORTANT:- If the unit assign switches are changed they must be set back to their original settings at the end of the test or certain characteristics of the control unit will change.

bit assignment:-

7	6	5	4	3	2	1	0
PRINTER /ACK 0=ACK	PRINTER BUSY 1=BUSY	SWA 6 1=ON	SWA 5 1=ON	SWA 4 =ON	SWA 3 1=ON	SWA 2 1=ON	SWA 1 1=ON

d)P4A - Axis step and direction signals. These signals are used by the control unit to control the stepper motors.

bit assignments:-

7	6	5	4	3	2	1	0
4th axis DIR'N 1=+VE	3rd axis DIR'N 1=+VE	2nd axis DIR'N 1=+VE	1st axis DIR'N 1=+VE	4th axis STEP 1-STEP	3rd axis STEP 1=STEP	2nd axis STEP 1=STEP	1st axis STEP 1=STEP

e)P4B - Axis drive faults and overtravels. Note the axis drive fault signals are only active if the stepper motor drives are switched ON.

bit assignments:-

7	6	5	4	3	2	1	0
4th axis drive fault 1=OK	3rd axis drive fault 1=OK	2nd axis drive fault 1=OK	1st axis drive fault 1=OK	4th axis over/ travel 1=OK	3rd axis over/ travel 1=OK	2nd axis over/ travel 1=OK	1st axis over/ travel 1=OK

f)P6 Port 6 is used by the optional additional serial link.

g)POR - Port 0 Read is used for the Machine Control switches and for the digital cassette status signals.

7	6	5	4	3	2	1	0
Machine STOP	AUTO/ MANUAL	START	Cass clear leader	Cass Data	Cass present	Cass File protect	Machine Single step
1=stop	0=AUTO	0=START	1=CLR LDR	0=DATA	0=CASS pres	1=FILE Protect	0=SINGLE STEP

1/b) Preliminary Fault Finding

The following symptoms of basic problems with the control unit are included as a fault finding aid. Before attempting to resolve more complex problems the user should become familiar with information in the maintenance manual.

NOTE System power must always be removed from the control unit before removing/disconnecting or replacing any components/connectors etc. The control unit may be operated if necessary with the outer cover removed but great care must be taken as dangerous high voltages are then exposed.

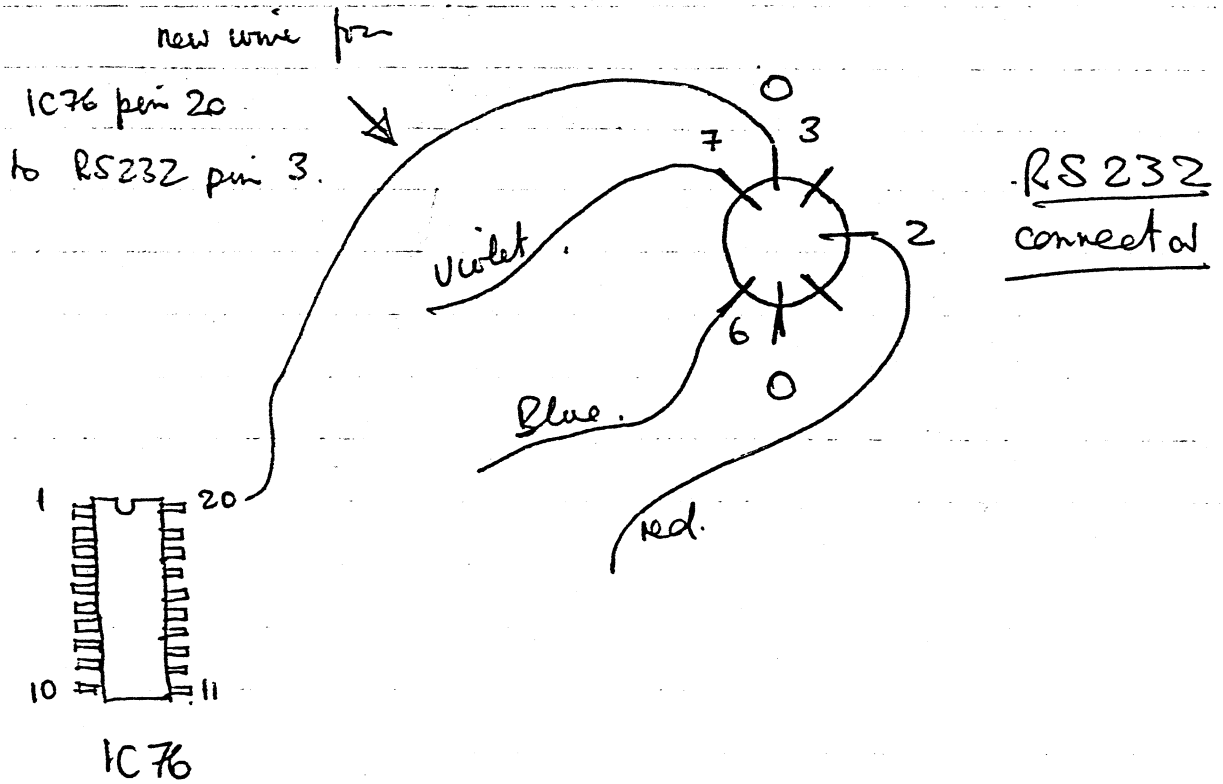
SYMPTOM	CHECK	NORMAL	ABNORMAL
1/Unit fails to function when switched ON	a) Main Power ON b)ON switch on unit rear is ON c)Fuse F1 on unit d)Power ON indicator on front panel	ON i.e. power is present If no display after 2 mins remove power, remove control unit cover and check internal connections	OFF Wait for 2 minutes a)if no display remove power, remove control unit cover and check all internal connections. b)If display comes on replace ON indicator
	e)Check 3 green DC power indicators on power distribution board.	all ON go to 1K)	one or more off. Check relevant fuses on power distribution board.
	f)Remove interface board and PLD on power distribution	all 3 green indicators ON	one or more off - Replace Power Distrib-ution board
	g)Replace PLD on power distribution board	all 3 green indicators ON	if +12v indicator off Replace VDU driver board at L.H.S. of unit.
	h)Replace Interface board and remove PLD on interface board	all 3 green indicators ON	if +5v OR 12VI indicator off. Replace interface board.

SYMPTOM	CHECK	NORMAL	ABNORMAL
	j)Replace PLD	all 3 green indicators ON	+5v indicator OFF- Replace Processor/ Keyboard
	k)Ensure PROGRAMME switch set to MANUAL. Depress Green On switch above STOP switch.	Stepper Motors should 'energise'	Stepper Motors do not energise goto m
	l)Press 'ZERO' Key	Machine moves towards Zero. Press PROG STOP Key. Check wiring to VDU. Replace VDU driver board at L.H.S of unit. Replace PNC3-VDU board.	go to H Nothing happens - replace processor board.
	m)Check green indicators at lower L.H.S. of unit	all On Remove power Check Motor connections X,Y,Z as applicable at rear of drive on PCB	one only off- Check relevant fuse on PCB on rear of drives. All off - proceed
	n)check 2 green supply indicators on PCB at rear of drives	both on	one or more off - check fuses on PCB. and supply
	p)check Red indicators on Drives	all OFF	one or more ON - consult Drive handbook Section 5
Unit Displays RAM ERROR when switched ON	Remove Outer cover and front panel and replace Processor/ Keyboard		

Pantec 3c/p mod 29/4/86

Andrew

assuming the software is OK for the purpose all that is needed is one extra wire as shown below



regards Ken

P.S. Denford PNC3 software produced after 6/12/84 is suitable for the purpose.

SYMPTOM	CHECK	NORMAL	ABNORMAL
Unit Displays XX Keypressed when switched ON	Remove Outer cover and front panel and replace respective Key on Processor/Keyboard OR replace Processor/Keyboard.		
Machine fails to Move when 'ZERO' pressed	Does display change when ZERO is first pressed to 'machine moving to datum'	YES Remove outer cover, check all connections, go to m.	Display does not change proceed, OR if error message displayed see error messages.
	Ensure display indicates Manual Mode	MDI shown at top Right of VDU. Carryout Keyboard test - see Built in diagnostics. If OK replace processor/keyboard.	MDI not shown - check setting of PROGRAMME switch should be set to MANUAL. Replace switch.
MACHINE moves when ZERO is pressed but runs into a machine limit before datum is reached	Press PROG.STOP. Carryout checks detailed in system diagnostics by operating respective overtravel switches (if fitted) and by placing a ferrous object over each datum detector in turn.	All relevant port signals should change as indicated in system diagnostics	Any abnormalities should be corrected by a)checking the system wiring b)Replacing the defective component
OTHER FAULTS	Please obtain as much relevant information about the faults as possible and obtain ROM checksums (see 1/ a)? before contacting the supplier.		
Unit Displays 'ROM ERROR' when switched ON	Remove Outer cover and front panel of unit ensure all integrated circuits are 'plugged in' correctly. If fault presists, replace EPROMS. If fault persists Replace Processor/Keyboard.		

1.d) Basic Operation of Control Unit

The PNC3 Control Unit consists of a number of elements housed in a purpose built cabinet. The elements are shown in the Block diagram of the control unit.

Main power either at 220/240vac 50/60hz or at 110/120vac 50/60hz single phase is fed to the power distribution board then via the rear panel mounted 'ON' switch and fuse to the power supply components wich generate DC power for the system.

If the rear panel switch is ON power is supplied via the logic transformer to the +5, +12, 12VI and -8 volt supplies which power the computer section and the VDU.

The +5 +12 and 12VI supplies each have an indicator and a fuse. The +5, 12VI and -8volt supplies supply the computer section. The 12volt supply supplies the VDU unit.

The computer section comprises the interface board, the processor/keyboard, the PNC3 VDU board, the cassette unit and the programme control switches.

The processor/keyboard consists of a 8 bit microprocessor, associated EPROM and RAM together with control logic, and a 61 character keyboard. The processor/keyboard controls all functions and characteristics of the control unit enabling programes defining the components to be produced to be loaded into its memory then edited/stored as desired and executed sequentially one instruction at a time as required. The processor/keyboard also provides all messages to be displayed on the integral VDU which is driven by the VDU drive board via the PNC3 VDU board. The PNC3 VDU board generates the display on the VDU and the display in updated/changed as required by the processor/keyboard.

The interface board contains all the PORTS, up to 4 axes of control electronics, up to 8 input switch monitoring, datum detector monitors, a single analogue output channel, an optional additional RS232 serial port,and a parallel printer port. Optical isolators are fitted to all machine input and output signals to minimize any adverse effects from electrical interferance.

Power to the stepper motor drive system is supplied via the front panel mounted STOP and ON switches, to the drive transformer. The drive transformer and associated components provides +24volts and +55volts DC to power the drive units which in turn power the stepper motors. The drives are high performance bopolar chopper types, CD20 models generally being fitted. The drives have internal protection and fault monitoring circuiting. (For more details consult the DIGIPLAN CD20 instruction manual).

The control system is connected to the machine by the system connections which are generally made through the centre of the machine arm upon which the control unit is mounted.

1/ e) Basic Operation of printed circuit boards.

Power Distribution Board.

The power distribution board contains the latching drives mains relay, the logic power mains filter, the +12volt, +5volt, +12volt isolated and -8volt supplies.

Single phase 110-120vac or 220-240vac 50/60hz is supplied to the PHC3 control unit via the switch and mains fuse F1 mounted on the rear panel. Main power is then taken to the front panel mounted STOP switch, ON switch and ON indicator and also to the mains filter which filters the mains supply to the logic transformer powers supplies.
The logic transformer supplies power for the following supplies:-
a) The +12volt 2 amp supply which powers the VDU drive board and CRT.
b) The +5volt 2.5amp supply which powers the interface, PHC3 VDU and Processor/keyboard printed circuit boards.
c) The 12 volts 1 amp isolated supply which powers optial isolators for the overtravel switches, the input switches, machine datum detectors and relays and also the relay drives.
d) The low current -8volt supply which is used as a negative supply for the RS232 serial link.
Note: Three green indicators on supplies a),b), and c) indicate if the supply is ON.

The latching mains relay latches the stepper motor drive system mains power after the ON switch on the front panel is pressed. The front panel power ON indicator is powered via a diode D1 and resistor R1 from a 110vac supply from the logic transformer.

Interface Board.

The interface board contains the axis movement control electronics, overtravel and stepper motor drive fault monitoring electronics, spindle speed control logic (consisting of an analogue voltage), an RS232 port, auxilliary relays, datum detector monitoring, input switch monitoring, printer control and assign switches.

The numerous facilities of the control unit are arranged as a series of ports. The ports used are:-

Port	Function
0	KH3701 Continuos Path Controller
2	Programmable timer 1
3	Programmable timer 2
4A	Axis step/direction monitoring signals
4B	Axis overtravel and drive fault signals
4C	Axis acknowledge signals and reset signals
4D	Axis boost and direction control signals
5	Enables the auxiliary and spindle speed control functions to operate
6	Optional RS232 link
7	Extension board 1 (option)
8	Auxiliary 1-8 control
9	Auxiliary 9-16 control
A	Spindle speed control (Analouge output)
B	Printer Data
C	Datum Detector and spare monitor signals
D	Input switch monitor signals
E	Unit ansign switch and printer status signals
F	Extension board 2 (option)

A complete list of the port signals is included at 1/ k).
All machine control and monitoring signals are fed via optical isolators thus breaking any direct electrical link between the machine and control unit.

Control of the XY axes is provided by the programmable timers (which control movement speed) and the KH3701 2 axes continuous path controller (which controls the XY axis movement direction).

The Z and 4th axis controller is provided using the programmable timers. Movement of any axis is inhibited if that axis has an overtravel condition in the direction in which movement is attempted or if that axis has a drive fault. Movement pulses produced by the KH3701 are "smoothed" by IC30 which is generally used as a divide by 4 element (dependant on board linking). IC's 15 and 17 are used to provide a movement pulse of approx 25 micro-secs to be compatible with the stepper motor drive unit.

VR1 and VR2 (if fitted) set the maximum speed of movements.

Axis movement is monitored by the control unit enabling the precise position of the machine to be found. Each movement step together with its direction is monitored by the processor via PORTS 4A and 4C. Port 4D is used to control the movement direction of the Z and 4th axis and also sets the axis 'boosts' which are generally used to increase the power fed by the stepper motor drive to the stepper motor during motor accelerations.

Axis overtravel signals provided by optional machine mounted switches are fed via optical isolators to the axis overtravel logic which monitors the overtravel switches dependant on the direction of machine movement required. The resultant signals are used to enable/disable the output step signals to the relevant axes and the signals are also taken to port 4D.

The stepper motor drives fitted provide a fault signal if a drive/motor fault is detected. The fault signals are fed via optical isolators to also enable/disable the output step signals to the reteuant axes and to PORT 4D enabling the processor to monitor the signals.

The data bus buffering/control and port decoding provide the necessary signals to enable the other components on the interface board to function correctly.

The spindle speed control is accomplished by PORT A, optical isolators IC59 to IC62, IC64 a low power digital to analouge convertor and IC's 63, 65 low power op-amps. IC's 59 to 65 are powered by the supply provided by the spindle speed control unit which is external to the PNC3 controller, a 10 to 12v DC supply of typically 2milliamps being required. VR3 enables the output signal on PLH pin 3 to be set. (This control is factory set to provide the required maximum speed when the control is demanding maximum speed.)

The optional additional RS232 Serial Link uses an 8251 Serial Controller.

Ports 8 and 9 are used to control relays via optical isolators and high current relay driver circuits. Relays 1 to 10 and 14 to 15 are conventional relays capable of switching 1amp. Relays 11 to 13 are Solid State Relays which can switching only AC current up to 1 amp and are ideally switched to switching power to inductive loads because these relays are zero voltage switches.

Both the spindle speed control and auxiliary control have the added protection of only functioning if the processor has accessed Port 5 after initial power up. At power up IC1 pt2 is reset removing the output enable from PORTS 8,9 and A thus disabling them. The outputs are enabled when the processor accesses PORT 5 and sets IC1 driving the o/p OE signal low.

Datum detector signals are derived from a proximity detector equivilant to the TURCK Bi 1 G08 YO. The proximity detectors are the inductive type. When no metal is detected the detector stops oscillating and acts as a high resistance. When metal is detected the detector acts as a low resistance. The detectors are powered by approx 8volts from the PNC3 control unit.

Signals from the detectors are fed via transistor amplifiers then via optical isolators to PORT D.

Printer data is fed via PORT B to the printer connector on the rear of the control unit. The printer strobe signal is produced by PORT 4D bit 4. Printer status is monitored by PORT E which is connected to the printer BUSY and ACK signals. PORT E is also used by the 6 control asign switches which are used to select certain facilities of the control unit.

processor / Keyboard.

The Processor/keyboard controls all PNC functions i.e. data input and display, machine status monitoring and display, machine positioning/control and cassette unit control.

At the heart of the processor board is an 8085 8 bit microprocessor. The microprocessor sequentially obeys instructions contained in the Electrically Programmable Read Only Memory (EPROM). These instructions which are put into the EPROM's during manufacture are stored in a coded form. The instructions characterize and control all of the operations which the control unit is capable of.

Random Access Memory (RAM) is read/write memory, this is used to store both data required by the EPROM programme and also positioning, spindle control, auxilliary and input section information.

The cassette control ports control the storage and retrieval of data to/from the integral digital cassette unit.

The programme control switch port enables the settings of the programme control switches to be monitored.

The processor/keyboard also includes a 61 character keyboard which is monitored by the 8085 microprocessor via the keyboard ports. The keyboard is multiplexed by the output port P2W and keypressed data is read by the input port P1R.

The 8085 microprocessor communicates with the PNC3 VDU board via connector C and with the INTERFACE board via connector D.

All control signals, address, data and restart signals are buffered.

Basic Operation of PNC3 VDU Board

The PNC3 VDU board generates the composite video signals to produce the VDU display.

The PNC3 VDU board consists of address, control and data bus buffers/decoders, a character generator/data interface, page memory, extended character generator memory and buffer decoders, a video interface and display clock, and a video driver.

Characters to be displayed together with their attributes e.g. reverse video, are stored in page memory which stores 25 rows of 40 characters. The memory is arranged to be 1K x 16 bits. The video display is generated by the display clock and video interface which accesses sequential locations of page memory to determine which character is to be displayed together with its attributes. Data determining the formation of each character is obtained by the video interface either from the character generator or from the extended character generator memory dependant upon a character definition attribute bit.

Characters to be displayed are stored in page memory into their correct display position by the Processor/Keyboard via the buffers/decoders and the data interface. These characters may be read by the processor/keyboard using the same components.

The video driver combines the full intensity and half intensity signals with the picture sync signals to produce 1v composite video on two output lines one of which is connected to the VDU driver board and the other to the extension video socket on the rear of the control unit.

1/ j) PNC3 Internal Connections

PROCESSOR BOARD CONNECTORS

PLA - PROGRAM CONTROL SWITCHES

PIN	SIGNAL
1	/SINGLE STEP
2	/START
3	MAN/AUTO
4	/STOP
5	0VOLTS

SKE - CASSETTE UNIT SIGNALS

PIN	SIGNAL
1	POLARISING
4	DATA TO CASSETTE
5	/CASS PRESS
6	WR/RD
7	/FILE PROTECT
8	+5V
9	0V
10	EARTH
11	RWD/FWD
12	SL/FST
13	DATA FROM CASSETTE
14	CL LDR
15	STOP/GO
16	+5V

PROCESSOR BOARD CONNECTORS

CONNECTOR C - PNC3 VDU BOARD CONNECTOR

PIN	SIGNALS		
	ROW A (RH)	ROW B	Row C (LH)
1	+5V	+5V	+5V
2	SPARE	SPARE	RDY
3	HOLD	SPARE	SPARE
4	RSTOUT	/WR	CLK
5	IO/M	/INTA	/RD
6	HOLDA	ALE	D7
7	D6	D5	D4
8	D3	D2	D1
9	D0	A15	A15
10	A14	A13	A13
11	A12	A11	A11
12	A10	A9	A9
13	A8	A0	A1
14	A2	A3	A4
15	A5	A6	A7
16	0V	0V	0V

NORTH EAST ELECTRONICS LIMITED 15th March, 1985

DENFORD MACHINE TOOLS LIMITED
PNC 3 Input and Auxiliary Connectors on Rear Panel

INPUTS

15 Way Socket

Pin 1	--------	input common
Pin 2	Not used	
Pin 3	--------	input ~~0~~ 1
Pin 4	--------	input ~~1~~ 2
Pin 5	--------	input ~~2~~ 3
Pin 6	--------	input ~~3~~ 4
Pin 7	--------	input ~~4~~ 5
Pin 8	--------	input ~~5~~ 6
Pin 9	--------	input ~~6~~ 7
Pin 10	--------	input ~~7~~ 8
Pin 11-15	Not used	

AUXILIARY

15 Way Plug

Pin 1	--------	A1 to 4 common
Pin 2	--------	A1 N/O
Pin 3	--------	A2 N/O
Pin 4	--------	A3 N/C
Pin 5	--------	A3 N/O
Pin 6	--------	A4 N/O
Pin 7-15	Not Used	

PROCESSOR BOARD CONNECTORS

CONNECTOR D

PIN	SIGNAL LHROW	PIN	SIGNAL RHROW
1	+5V	26	+5V
2	SER IN	27	SER OUT
3	RST 7.5	28	RST 6.5
4	RST 5.5	29	INTR
5	SPARE	30	SPARE
6	SPARE	31	SPARE
7	RDY	32	HOLD
8	SPARE	33	SPARE
9	RST OUT	34	/WR
10	CLK	35	IO/M
11	/INTA	36	/RD
12	HOLD A	37	ALE
13	D7	38	D6
14	D5	39	D4
15	D3	40	D2
16	D1	41	D0
17	A15	42	A14
18	A13	43	A12
19	A11	44	A10
20	A9	45	A8
21	A0	46	A1
22	A2	47	A3
23	A4	48	A5
24	A6	49	A7
25	0V	50	0V

INTERFACE BOARD CONNECTORS

SKA - EXTENSION BOARD 1

PIN	SIGNAL
1	+5V
2	DB7
3	DB6
4	DB5
5	DB4
6	DB3
7	DB2
8	DB1
9	DB0
10	/P7
11	/WR
12	/RD
13	A9
14	A8
15	SPARE
16	0V

SKB - AXIS OVERTRAVEL SIGNALS

PIN	SIGNAL
1	OVI
2	-XOT
3	+XOT
4	-YOT
5	+YOT
6	POLARISING
7	-ZOT
8	+ZOT
9	-WOT
10	+WOT

INTERFACE BOARD CONNECTORS

PLC - STEPPER MOTOR DRIVE SIGNALS

PIN	SIGNAL
1	OV DRIVE
2	+24V DRIVE
3	X DRIVE FAULT
4	X BOOST
5	X DIRN
6	X STEP
7	OV DRIVE
8	
9	Z DRIVE FAULT
10	Z BOOST
11	Z DIRN
12	
13	
14	OV DRIVES
15	+24V DRIVE
16	Y DRIVE FAULT
17	Y BOOST
18	Y DIRN
19	Y STEP
20	OV DRIVE
21	
22	T DRIVE FAULT
23	T BOOST
24	T DIRN
25	T STEP
26	

PLD - SEE PROCESSOR BOARD CONNECTORS - CONNECTOR D

INTERFACE BOARD CONNECTORS

SKE - DC POWER SUPPLIES

PIN	SIGNAL
1	12VI
2	12VI
3	OVI
4	OVI
5	-8V
6	
7	
8	
9	+5V
10	+5V
11	+5V
12	+5V
13	OV
14	OV
15	OV
16	OV

PLF - OPTIONAL ADDITIONAL (RS232 LINK)

PIN	SIGNAL
1	-
2	/TXD
3	/RXD
4	RTS
5	CTS
6	DSR
7	OV
20	DTR

INTERFACE BOARD CONNECTORS

PLG - AUXILLIARY FUNCTION CONNECTIONS

PIN	SIGNAL	
1	AUX 10 N/O	
2	AUX 9 N/O	
3	AUX 2 N/O	
4	AUX 1 N/O	
5	AUX 11-14 COMMON	*
6	AUX 9,10 COMMON	
7	AUX 1-4 COMMON	
8	AUX 3 N/C	
9	AUX 12 N/O	
10	AUX 11 N/C	
11	AUX 3 N/O	
12	AUX 4 N/O	
13	AUX 14 N/O	*
14	AUX 13 N/O	*
15	AUX 6 N/O	
16	AUX 5 N/O	
17	AUX 16 N/C	
18	AUX 15,16 COMMON	
19	AUX 5,6 COMMON	X
20	AUX 6 N/C	
21	AUX 16 N/O	X
22	AUX 15 N/O	
23	AUX 8 N/O	
24	AUX 7 N/O	

* These auxilliaries are SOLID STATE RELAYS suitable for 110-240vac only

X LINKS may be made a PCB changing the function of these pins

PLH - ANALOGUE OUTPUT (Normally Spindle Control)

PIN	SIGNAL
1(LH)	10 - 12V DC
2	-
3	ANALOGUE OUT
4	-
5(RH)	OV DC

KJ - Extension Board Connector
s SKA but pin 10 is /PF

SKK - INPUT SWITCH SIGNALS

PIN	SIGNAL
1	OVI
2	POLARISING
3	INPUT 0
4	INPUT 1
5	INPUT 2
6	INPUT 3
7	INPUT 4
8	INPUT 5
9	INPUT 6
10	INPUT 7

PLL - SPARE SIGNALS

PIN	SIGNAL
2	OVI
2	-
3	-
4	SPARE 0
5	SPARE 1
6	SPARE 2
7	SPARE 3
8	-

INTERFACE BOARD CONNECTORS

SK11 - RS232 LINK

PIN	SIGNAL
2	0VOLTS
6	SERIAL DATA FROM PNC3
7	SERIAL DATA TO PNC3

PL11 - DATUM DETECTOR SIGNALS

PIN	SIGNAL
1	8VI
2	SPARE INPUT
3	X AXIS DATUM
4	Y AXIS DATUM
5	Z AXIS DATUM
6	T AXIS DATUM

PLP - PRINTER SIGNALS

PIN	SIGNAL
1	DATA STROBE
2	DATA 0
3	DATA 1
4	DATA 2
5	DATA 3
6	DATA 4
7	DATA 5
8	DATA 6
9	DATA 7
10	/ACK
11	BUSY
14-25	0 VOLTS

1/ k) PNC3 PORT DETAILS

Processor/Keyboard Ports

PVDU	Addr C0 - C4	VDU Controller I/O
POR	Addr D8	I/P Cassette status, PROGRAMME switches

Bit Allocation:-

7	6	5	4	3	2	1	0
/STOP	/AUTO	/START	CLR.LDR	DATA IN (FROMCASS)	CASS. PRES.	FILE PROTECT	/S.STEP

POW	Addr D8	O/P Cass. Control

Bit Alloc:-

7	6	5	4	3	2	1	0
Spare	ExtMem ACC	Spare	DataOut (ToCass)	Slow Fast	Rewind Forward	WR RD	Stop Go

P1R	Addr D9	Keyboard Inputs (row signals)
P2W	Addr DA	Keyboard Output Digit Selects

Interface Board Ports

P01	Addr A0 - A7	KM3701 I/O (Note KMreset is on P4C bit 6)
P2	Addr A8 - AB	Range Timer (I/O)
P3	Addr AC - AF	Feed Timer (I/O)
P4A	Addr B0	Step and Dirn I/P's

Bit Allocation:-

7	6	5	4	3	2	1	0
$Tdir^n/n$	$Zdir^n/n$	$Ydir^n/n$	$Xdir^n/n$	Tstepin	Zstepin	Ystepin	Xstepin

P4B	Addr B1	Overtravels and Drivefaults

Bit Allocation:- -VE LOGIC

7	6	5	4	3	2	1	0
/Tdrive fault	/ZDF	/YDF	/XDF	/Tover travel	/ZOT	/YOT	/XOT

P4C	Addr B2	Axes ACK, KMRESET, CLK Select (O/P's)

Bit Allocation:-

7	6	5	4	3	2	1	0
CLKSEL	KMRES	Spare	Spare	TACK	ZACK	YACK	XACK

P4D	Addr B3	Axes BOOSTS, Z & T DIRNS, Printer Strobe (O/P's)

Bit Allocation:0

7	6	5	4	3	2	1	0
Tdirn	Zdirn		Printer Strobe	/Tboost	/Zboost	/Yboost	/Xboost

P5 Addr B4 Latch to initiallise Ports 8,9,A

P6 Addr B8 - B9 8251A Serial Port (I/O)

P7 Addr BC - BF 1st (Upper) Extension Board

P8 Adder 80 O/ Auxilliarys 0 - 7

Bit Allocation:- -VE LOGIC

7	6	5	4	3	2	1	0
AUX7	AUX6	AUX5	AUX4	AUX3	AUX2	AUX1	AUX0

P9 ADDR 84 O/P Auxilliarys 8 - 15

Bit Allocation:- -VE LOGIC

7	6	5	4	3	2	1	0
AUX15	AUX14	AUX13	AUX12	AUX11	AUX10	AUX9	AUX8

PA Addr 88 O/P Spindle Speed

Bit Allocation:- -VE LOGIC

7	6	5	4	3	2	1	0
LSB							LSB

PB Addr 8C O/P Data to printer

Bit Allocation:-

7	6	5	4	3	2	1	0
DATA7	DATA6	DATA5	DATA4	DATA3	DATA2	DATA1	DATA0

PC Addr 90 I/P Machine datums and spare inputs

Bit Allocation:-

7	6	5	4	3	2	1	0
THKR	ZMKR	YMKR	XMKR	SPARE	SPARE	SPARE	SPARE

PD Addr 94 I/P Switches

Bit Allocation:- -VE

7	6	5	4	3	2	1	0
I/P7	I/P6	I/P5	I/P4	I/P3	I/P2	I/P1	I/P0

PE Addr 98 I/P Printer Status, Assign Switches

7	6	5	4	3	2	1	0
PRINTER /ACK	PRINTER BUSY	SWA6	SWA5	SWA4	SWA3	SWA2	SWA1

PF Addr 9C - 9F 2nd (Lower) Extension Board

2/ a) Built in machine diagnostics.

The Control Unit has a built in machine diagnostic program which enables the maintenance engineer to test all machine mounted switches and detectors together with their associated wiring.

All signals to and from the control unit are organised into ports each of which is generally 8 bits wide.

Signals received by the control unit may be checked by:-

a) Removing power from the control unit
b) Switching the control unit ON
c) Setting the programme switch to MANUAL
d) Depressing the T (Test) Key
e) At this point all signals necessary for the correct operation of the control unit are displayed in a 'port map'. Each of the ports together with the function of each of the bits is detailed in section 1,a,3.

2/ d) PHC3 - Easimill 3 machine wiring loom (Programmable & 2 speed spindle systems)

Connector C01 - Mains power & Motor signals

24 way CH socket from MILL

Cable	Pin	Signal	Destination	Wire No.
Y/GN 24/.2	1	EARTH	Cont panel conn A1	---
BN 24/.2	2	LIVE IN	Cont panel conn A2	20
Be 24/.2	3	NEUTRAL IN	Cont panel conn A3	21
W/R	4	LIVE OUT	Cont panel conn A4	65
W/Bk	5	NEUTRAL OUT	Cont panel conn A5	66
W	6	CLNT/LUB Relay Com	Cont panel conn A6	17
	7	POLARISING	Cont panel conn A7	
	8	SPARE	Cont panel conn A8	
	9	SPARE	Cont panel conn A9	
P	10	CLNT RLY N/O(A8)	Cont panel conn A10	28
	11	LUB RLY N/O (OPTION)	Cont panel conn A11	
	12	SPARE		
Bn	13	X MOTOR ph 2A	X MOTOR Terminal block	41
R	14	X MOTOR ph 2B	X MOTOR Terminal block	42
O	15	X MOTOR ph 1B	X MOTOR Terminal block	43
Y	16	X MOTOR ph 1A	X MOTOR Terminal block	44
Gn	17	Y MOTOR ph 2A	Y MOTOR Terminal block	45
Be	18	Y MOTOR ph 2B	Y MOTOR Terminal block	46
V	19	Y MOTOR ph 1B	Y MOTOR Terminal block	47
Gy	20	Y MOTOR ph 1A	Y MOTOR Terminal block	48
R/Bk	21	Z MOTOR ph 2A	Z MOTOR Terminal block	49
R/Bn	22	Z MOTOR ph 2B	Z MOTOR Terminal block	50
O/Bk	23	Z MOTOR ph 1B	Z MOTOR Terminal block	51
O/Rd	24	Z MOTOR ph 1A	Z MOTOR Terminal block	52

All wires 16/0.2 unless stated.

Connector C02 - 2 Speed spindle control, overtravels, datum switches

24 way CH Plug from Mill

Cable	Pin	Signal	Destination	Wire No.
R/Bk	1	SPINDLE CONT COM	Cont panel	54
	2	---		
	3	---		
R/Bn	4	SPINDLE HI RELAY	Cont panel	22
R/Be	5	SPINDLE LO RELAY	Cont panel	25
	6	---		
	7	---		
	8	---		
	9	---		
Gn 12 CORE)				
Gn 6 CORE)	10	Overtravel switch comm	Terminal blocks	30
R 12 CORE	11	-X O/T N/C	Terminal block	32
O 12 CORE	12	+X O/T N/C	Terminal block	33
Y 12 CORE	13	-Y O/T N/C	Terminal block	35
Be 12 CORE	14	+Y O/T N/C	Terminal block	36
R 6 CORE	15	-Z O/T N/C	Terminal block	38
Be 6 CORE	16	+Z O/T N/C	Terminal block	39
	17			
	18			
Bk 12 CORE)				
Bk 6 CORE)	19	Datum Detectors +	Terminal blocks	31
	20			
V 12 CORE	21	X Datum Detector -	Terminal block	34
Gy 12 CORE	22	Y Datum Detector -	Terminal block	37
Y 6 CORE	23	Z Datum Detector -	Terminal block	40
	24			

All cables 16/.2

PHC3 - Easimill 3 machine wiring loom (Programmable spindle speed)

Connector C02 Programmable Spindle Control, overtravels, Datum switches

NOTE See below for combivert option.

24 way QM Plug from Hill

Cable	Pin	Signal	Destination	Wire No.
Bn & cable outer	1	Parajust common	Parajust TB1-1	
R	2	speed output	Parajust TB1-2	
O	3	+10v	Parajust TB1-3	
Y	4	START/STOP COMMON	Parajust TB1-5	
Gn	5	STOP	TB1-6	
	6			
	7			
Gy	8	SPINDLE REVERSE COMMON	Parajust TB12-1	
V	9	SPINDLE REVERSE N/O	Parajust TB12-2	
Gn16/.2(12core) (6core)	10	Overtravel switch common	overtravel switch commons	
R 16/.2(12core)	11	-X O/T N/C	-X overtravel switch N/C	
O 16/.2(12core)	12	+X O/T N/C	+X overtravel switch N/C	
Y 16/.2(12core)	13	-Y O/T N/C	-Y overtravel switch N/C	
Be16/.2(12core)	14	+Y O/T N/C	+Y overtravel switch N/C	
R 16/.2(6core)	15	-Z O/T N/C	-Z overtravel switch N/C	
Be16/.2(6core)	16	+Z O/T N/C	+Z overtravel switch N/C	
-	17	---		
-	18	---		
Bk 16/.2 (12core & (6core)	19	Datum detector +	Detector commons +	
-	20	---		
V 16/.2(12core)	21	X Datum detector -	X datum detector -	
Gy16/.2(12core)	22	Y Datum detector -	Y datum detector -	
Y 16/.2(6core)	23	Z Datum detector -	Z datum detector -	
V 16/.2(6core)	24	SPINDLE RPM detector -	Spindle RPM detector-	

Combivert Hill Option.

Gn (4core)	1	Combivert 0v
Rd (4core)	2	Speed Output
Y (4core)	3	+10v Combivert
Be (4core)	4	Reverse
	5 to 9	not used

2/ e) EASIMILL 3 Control unit (PNC3) Internal wiring -

Connector C01 Mains pwr & Motor signals (For 2 SPEED and Programmable SPEED systems.)

24 way CH socket from MILL, PLUG from PNC

Cable	Pin	Signal	Source	Destination
Y/Gn 24/.2	1	EARTH	PDB-A1	Cnt Pnl A1
Bn 24/.2	2	LIVE 220/240v Ac	PDB-A2	" A2
Be 24/.2	3	NEUTRAL	PDB-A3	" A3
W/R 16/.2	4	LIVE OUT	PDB-L	" A4
W/Bk 16/.2	5	NEUTRAL OUT	PDB-N	" A5
Bk 16/.2	6	LUB &CLNT RLY COM	IB-G21	" A6
	7	POLARISING		
	8	SPARE		
	9	SPARE		
P 16/.2	10	CLNT RLY N/O (AUX 6 N/O)	IB-G23	" A10
	11	LUB RLY N/O (OPTION)		" A11
	12	SPARE		
Bn 16/.2	13	X MOTOR ph 2A	X1 (DRIVE BOARD)	X MOTOR
R 16/.2	14	X MOTOR ph 2B	X2	X MOTOR
O 16/.2	15	X MOTOR ph 1B	X3	X MOTOR
Y 16/.2	16	X MOTOR ph 1A	X4	X MOTOR
Gn 16/.2	17	Y MOTOR ph 2A	Y1	Y MOTOR
Be 16/.2	18	Y MOTOR ph 2B	Y2	Y MOTOR
V 16/.2	19	Y MOTOR ph 1B	Y3	Y MOTOR
Gy 16/.2	20	Y MOTOR ph 1A	Y4	Y MOTOR
Rd/Bk 16/.2	21	Z MOTOR ph 2A	Z1	Z MOTOR
Rd/Bn 16/.2	22	Z MOTOR ph 2B	Z2	Z MOTOR
O/Bk 16/.2	23	Z MOTOR ph 1B	Z3	Z MOTOR
O/Rd 16/.2	24	Z MOTOR ph 1A	Z4	Z MOTOR

Connector C02 2 SPEED Spindle Control, overtravels, Datum switches

24 way CH plug from MILL, socket from PNC 3

Cable	Pin	Signal	Source	Destination
R/Bk 16/.2	1	SPINDLE CONT COM (24vac)	IB-G19	24vac Supply
	2	---		
	3	---		
R/Bn 16/.2	4	SPINDLE HI RLY	IB-G15	Spdl hi rly
R/be 16/.2	5	SPINDLE LO RLY	IB-G16	Spdl lo rly
	6	---		
	7	---		
	8	---		
	9	---		
Bn 16/.2	10	Overtravel switch common	IB-B1	overtravel switch commons
R 16/.2	11	-X O/T N/C	IB-B2	-X overtravel switch N/C
O 16/.2	12	+X O/T N/C	IB-B3	+X overtravel switch N/C
Y 16/.2	13	-Y O/T N/C	IB-B4	-Y overtravel switch N/C
Gn 16/.2	14	+Y O/T N/C	IB-B5	+Y overtravel switch N/C
V 16/.2	15	-Z O/T N/C	IB-B7	-Z overtravel switch N/C
Gy 16/.2	16	+Z O/T N/C	IB-B6	+Z overtravel switch N/C
-	17	---		
-	18	---		
R 16/.2	19	Datum detector +	IB-N1	Detector commons +
-	20	---		
Y 16/.2	21	X Datum detector -	IB-N3	X datum detector -
Gn 16/.2	22	Y Datum detector -	IB-N4	Y datum detector -
Be 16/.2	23	Z Datum detector -	IB-N5	Z datum detector -
-	24	---		

PHC 3 Internal wiring -- EASIMILL 3

Connector C02 Programmable Spindle Control, overtravels, Datum switches

NOTE See below for Combivert option

24 way CH plug from MILL, socket from PHC 3

Cable	Pin	Signal	Source	Destination
Bn & cable outer	1	Parajust common	IB-H5,IB-G16	Parajust TB1-1
R	2	speed output	IB-H3	Parajust TB1-2
O	3	+10v	IB-H1	Parajust TB1-3
Y	4	START/STOP COMMON	IB-G19	Parajust TB1-5
Gn	5	STOP	IB-G15	TB1-6
	6			
	7			
Gy	8	SPINDLE REVERSE COMMON	IB-G22	Parajust TB12-1
W	9	SPINDLE REVERSE N/O	IB-G24	Parajust TB12-2
Bn 16/.2	10	Overtravel switch common	IB-B1	overtravel switch common s
R 16/.2	11	-X O/T N/C	IB-B2	-X overtravel switch N/C
O 16/.2	12	+X O/T N/C	IB-B3	+X overtravel switch N/C
Y 16/.2	13	-Y O/T N/C	IB-B4	-Y overtravel switch N/C
Gn 16/.2	14	+Y O/T N/C	IB-B5	+Y overtravel switch N/C
V 16/.2	15	-Z O/T N/C	IB-B7	-Z overtravel switch N/C
Gy 16/.2	16	+Z O/T N/C	IB-B8	+Z overtravel switch N/C
—	17	---		
—	18	---		
R 16/.2	19	Datum detector +	IB-H1	Detector commons +
-	20	---		
Y 16/.2	21	X Datum detector -	IB-H3	X datum detector -
Gn 16/.2	22	Y Datum detector -	IB-H4	Y datum detector -
Be 16/.2	23	Z Datum detector -	IB-H5	Z datum detector -
W 16/.2	24	SPINDLE RPM detector -	IB-H6	Spindle RPM detector-

Combivert Option

Gn 16/.2	1	Combivert Ov	IB-H5,IB-G24
Rd 16/.2	2	Speed Output	IB-H3
Y 16/.2	3	+10v	IB-G19
Be 16/.2	4	Reverse	IB-G22
	5 to 9 not used		

NOTE IB-G15 linked to IB-H1

2/ h) Easiturn 3 machine wiring (Combivert option)

Connector C01 - Mains signals, Combivert signals + Z O/T and datum detector. 24 way QH socket.

Cable	Pin	Signal	Destination
Y/Gn 24/.2	1	Earth	Contactor Panel Conn A1
Bn 24/.2	2	LIVE IN	Cont Panel Conn A2
Be 24/.2	3	NEUTRAL IN	Cont Panel Conn A3
W/R 16/.2	4	LIVE OUT	Cont Panel Conn A4
W/Bn 16/.2	5	NEUTRAL OUT	Cont Panel Conn A5
W	6	CLNT RLY com	Cont Panel Conn A6
	7	SPARE	Cont Panel Conn A7
	8	Spare	Cont Panel Conn A8
	9	Spare	Cont Panel Conn A9
P	10	CLNT RLY N/O	Cont Panel Conn A10
	11	LUB RLY N/O (option)	Cont Panel Conn A11
	12	Polarizing	
	13		
	14		
Gn (4core A)	15	Combivert OV	Combivert L
R (4core A)	16	Speed Output	Combivert 0
Y (4core A)	17	10v	Combivert H
Be (4core A)	18	Combivert reverse	Combivert FR
R (4core B)	21	8VI(Z DATUM DET +)	Terminal Block
Y (4core B)	22	Z DATUM DET -	Terminal Block
Gn (4core B)	23	OVI (+ Z O/T COM)	Terminal Block
Be (4core B)	24	+Z O/T N/C	Terminal Block

te:- All unused overtravels must be linked to OVI !

rajust option
nnector C01 Mains signals, Parajust signals +Z O/T & datum detector.
way QH socket

Cable	Pin	Signal	Destination
Y/Gn 24/.2	1	Earth	Contactor Panel Conn A1
Bn 24/.2	2	Live IN	Cont Panel Conn A2
Be 24/.2	3	NEUTRAL IN	Cont Panel Conn A3
W/R 16/.2	4	LIVE OUT	Cont Panel Conn A4
W/Bk	5	NEUTRAL OUT	Cont Panel Conn A5
W	6	CLNT/LUB RLY COM	Cont Panel Conn A6
Bk	7	PolarisING	Cont Panel Conn A7
Gn/R	8	SPARE	Cont Panel Conn A8
R/Be	9	SPARE	Cont Panel Conn A9
P	10	CLNT RLY N/O	Cont Panel Conn A10
Gy/Be	11	LUB RLY N/O (option)	Cont Panel Conn A11
Bn & Outer (12 core)	12	Parajust common	Parajust TB1-1
R (12 core)	13	Speed Output	Parajust TB1-2
O (12 core)	14	+10v	Parajust TB1-3
Y (12 core)	15	START/STOP common	Parajust TB1-5
GN (12 core)	16	STOP	Parajust TB1-6
	17		
	18		
Gy (12 core)	19	SPINDLE REV COM	Parajust TB12-1
W (12 core)	20	SPINDLE REV N/O	Parajust TB12-2
R (4 core)	21	8VI(ZDATUM DET+)	Z DATUM DET +VE
Y (4 core)	22	Z DATUM DET -	Z DATUM DET -VE
Gn (4 core)	23	OVI (+Z O/T com)	+ Z overtravel com
Be (4 core)	24	+Z O/T N/C	+ Z overtravel N/C

2/ j)EASITURN 3 Control Unit (PNC3) Internal wiring:-

Combivert Drive
Connector C01 - Mains signals, Combivert signals, +Z O/T & Datum detector.

24way QM plug

Cable	Pin	Signal	Source	Destination
Y/Gn 24/.2	1	Earth	PDB-A1	Contactor Panel A1
Bn 24/.2	2	Live In	PDB-A2	Contactor Panel A2
Be 24/.2	3	Neutral In	PDB-A3	Contactor Panel A3
W/R	4	Live Out	PDB-A4	Contactor Panel A4
W/Bk	5	Neutral Out	PDB-A5	Contactor Panel A5
W	6	CLNT & LUB RLY COM	IB-G21	Contactor Panel A6
	7	Spare		
	8	Spare		
	9	Spare		
Pk	10	CLNT RLY N/O	IB-C23	Contactor Panel A10
	11	LUB RLY N/O (option)		
	12	Polarizing		
	13			
	14			
Gn	15	Combivert OV	IB-H5,IBG24	Combivert L
R	16	Speed output	IB-H3	Combivert O
Y	17	Combivert +10v	IB_G19	Combivert H
Be	18	Combivert reverse	IB-G22	Combivert FR
	19			
	20			
Rd/Bk	21	8VI(Z datum DET +)	IB-H1	Terminal block
Y	22	Z datum Det -	IB-H4	Terminal block
Rd/Bn	23	0VI(+ Z O/T com)	IB-B1	Terminal block
Gn	24	+Z O/T N/C	IB-B5	Terminal block

Note:
1) IBG15 linked to IB-H1
2) all cables 16/.2 unless stated

Parajust Drive
Connector C01 - Mains signals, Parajust signals, + Z overtravel and Z datum signals.

24 way QM plug

Cable	Pin	Signal	Source	Destination
Y/Gn 24/.2	1	Earth	PDB-A1	Contactor Panel A1
Bn 24/.2	2	Live In	PDB-A2	A2
Be 24/.2	3	Neutral In	PDB-A3	A3
W/R	4	Live Out	PDB-A4	A4
W/Bk	5	Neutral Out	PDB-A5	A5
W	6	CLNT & LUB RLY Com	IB-G21	A6
	7	Polarizing		
	8	Spare		
	9	Spare		
Pk	10	CLNT RLY N/O	IB-G23	A10
	11	LUB RLY N/O (option)		
Bn	12	Parajust common	IB-H5,IB-G16	Parajust TB1-1
R	13	Speed output	IB-H3	Parajust TB1-2
O	14	+10v	IB-H1	Parajust TB1-3
Y	15	START/STOP common	IB-G19	Parajust TB1-5
GN	16	STOP	IB-G15	Parajust TB1-6
	17	-		
	18	-		
Gy	19	Spindle REV com	IB-G24	Parajust TB12-1
Bk	20	Spindle REV N/O	IB-G22	Parajust TB12-2
Rd/Bk	21	8VI (Z datum DET +)	IB-N1	Z datum det +
Y	22	Z datum Det-	IB-H4	Z datum det -
Rd/Bn	23	0VI (+Z O/T com)		IB-B1 +Z overtravel com
Gn	24	+Z O/T N/C	IB-B5	+Z overtravel N/C

PNC3 Internal Wiring: Easiturn 3 system

Combivert and Parajust Drive

Connector C02 - X motor, datum and overtravel signals

12 way CH plug

Cable	Pin	Signal	Source	Destination
Bn	1	X motor 2A	X1 Drive	X motor
R	2	X motor 2B	X2 drive	X motor
O	3	X motor 1B	X3 drive	X motor
Y	4	X motor 1A	X4 drive	X motor
	5			
	6			
	7			
R/Bn	8	OVI	C01-23	C03-7
R	9	-X over-travel N/C	IB-B2	-X overtravel N/C
O	10	+X over-travel N/C	IB-B3	+X overtravel N/C
R/Bk	11	8VI(X datum detector +)	COL - 21	X datum det +
O/Bk	12	X datum detector -	IB-N3	X datum det -

Combivert and Parajust Drive

Connector C03 - Z motor, Spindle Encoder and Z overtravel

12 way CH socket

Cable	Pin	Signal	Source	Destination
Gn	1	Z motor 2A	Y1 drive board	Z motor
Be	2	Z motor 2B	Y2 drive board	Z motor
V	3	Z motor 1B	Y3 drive board	Z motor
Gy	4	Z motor 1A	Y4 drive board	Z motor
	6			
Rd/Bn	7	OVI (-Z over-travel com)	Link to C02-8	-Z overtravel com
Y	8	-Z over-travel N/C	IB-B4	-Z overtravel N/C
Rd/Bn	9	OVI	Link to 7 above	spindle encoder 4
Rd/Bk	10	8VI	Link to C02-11	Spindle encoder 1
R/Be	11	Spindle encoder	IB-N6	Spindle encoder 5
R/Gn	12	Spindle rpm encoder	IB-N5	Spindle encoder 3

2/ k) PNC3 Auxilliary Board Information.

The PNC3 Ancilliary board is a printed circuit board which may be mounted in single phase powered systems and contains compenents associated with the mains supply.

Connector Details:-

1) SKA connects to the mains connector CO1 from PNC3 pins 1 to 11.

2) 12 way connector block TB1 signals:-

pin 1,2,3 - Earth, live and neutral (220v-240v AC)
4 - Earth
5 - 0v (24vac supply)

6 - 24vac if PNC3 is on
7 - Earth
8 - LUBA
9 - LUBB
10 - Earth

11 - CLNTA
12 - CLNTB

Notes

LUBA and LUBB signals may be used in 2 ways

a) For single phase lubricantion system (if option is fitted) LUB relay R3 is fitted and this relay switches the live (via the LUB fuse) and the neutral to LUBA and LUBB terminals respectively. S1 and LUB FUSE are fitted.

b) For 3 phase lubrication systems (if option is fitted) LUB relay R3 is not fitted and links are fitted i.e. pin 3 is linked to 4 and pin 7 is linked to 8. LUB fuse is not fitted suppresor S1 is fitted (pins of relay base are counted clockwise from pin 1).

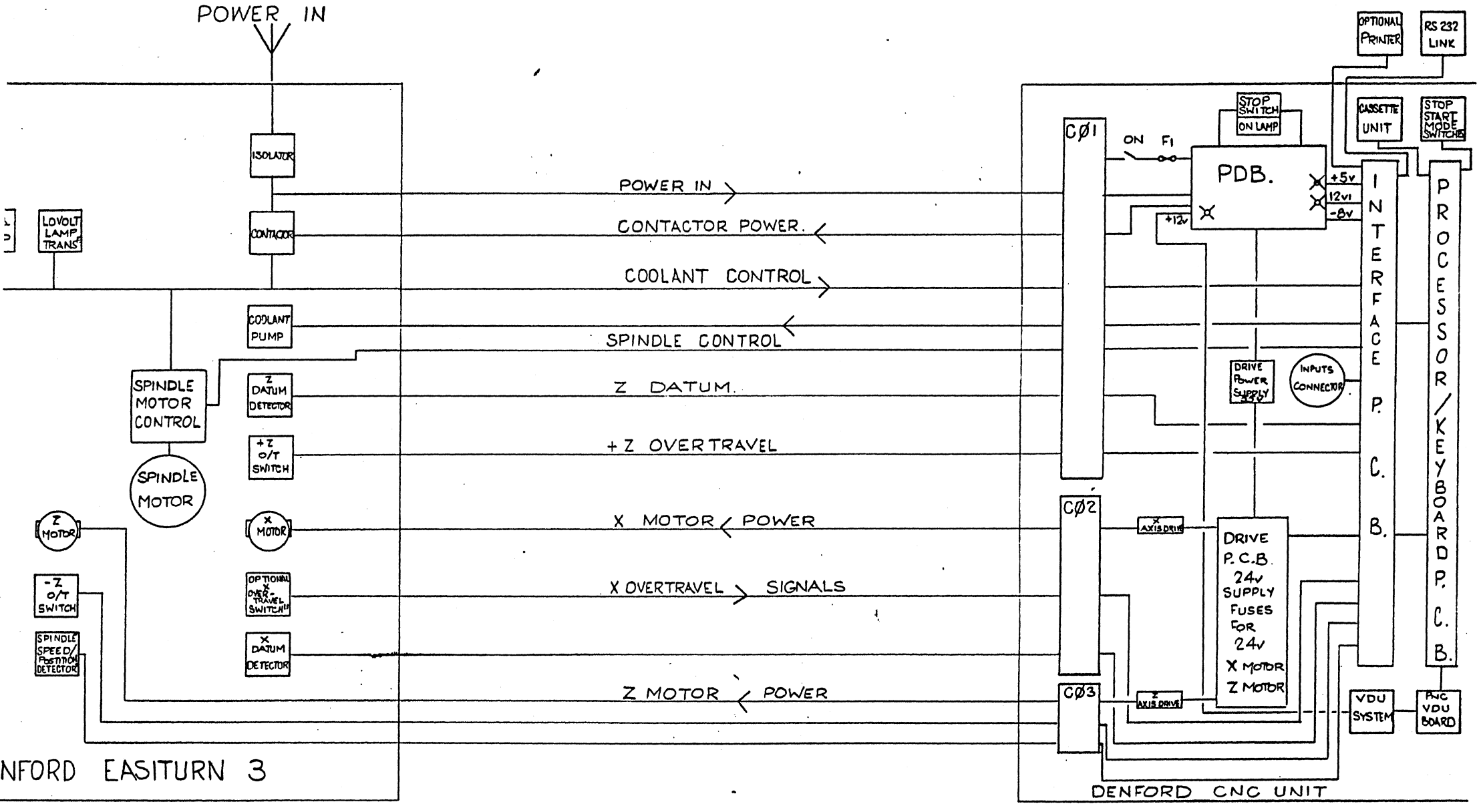
CLNT A are CLNT B signals:- above comments apply except that the coolant relay is R2, suppresor is S2 and fuse is labelled CLNT.

PLB This plug connects to the 24v transformer.

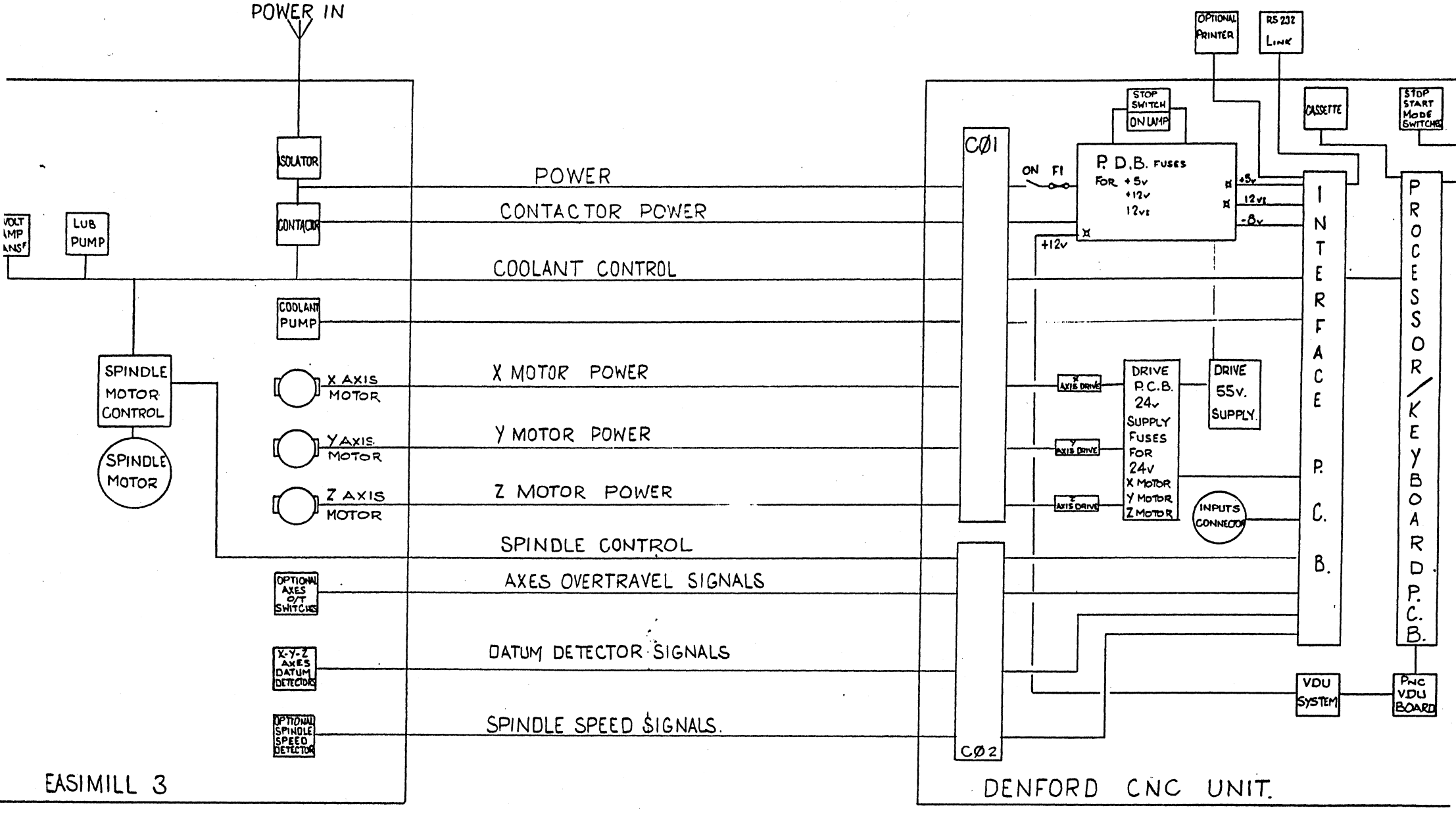
TB2 This terminal block provides signals for the low volt lamp.

L1 Indicates if 24vac is ON.

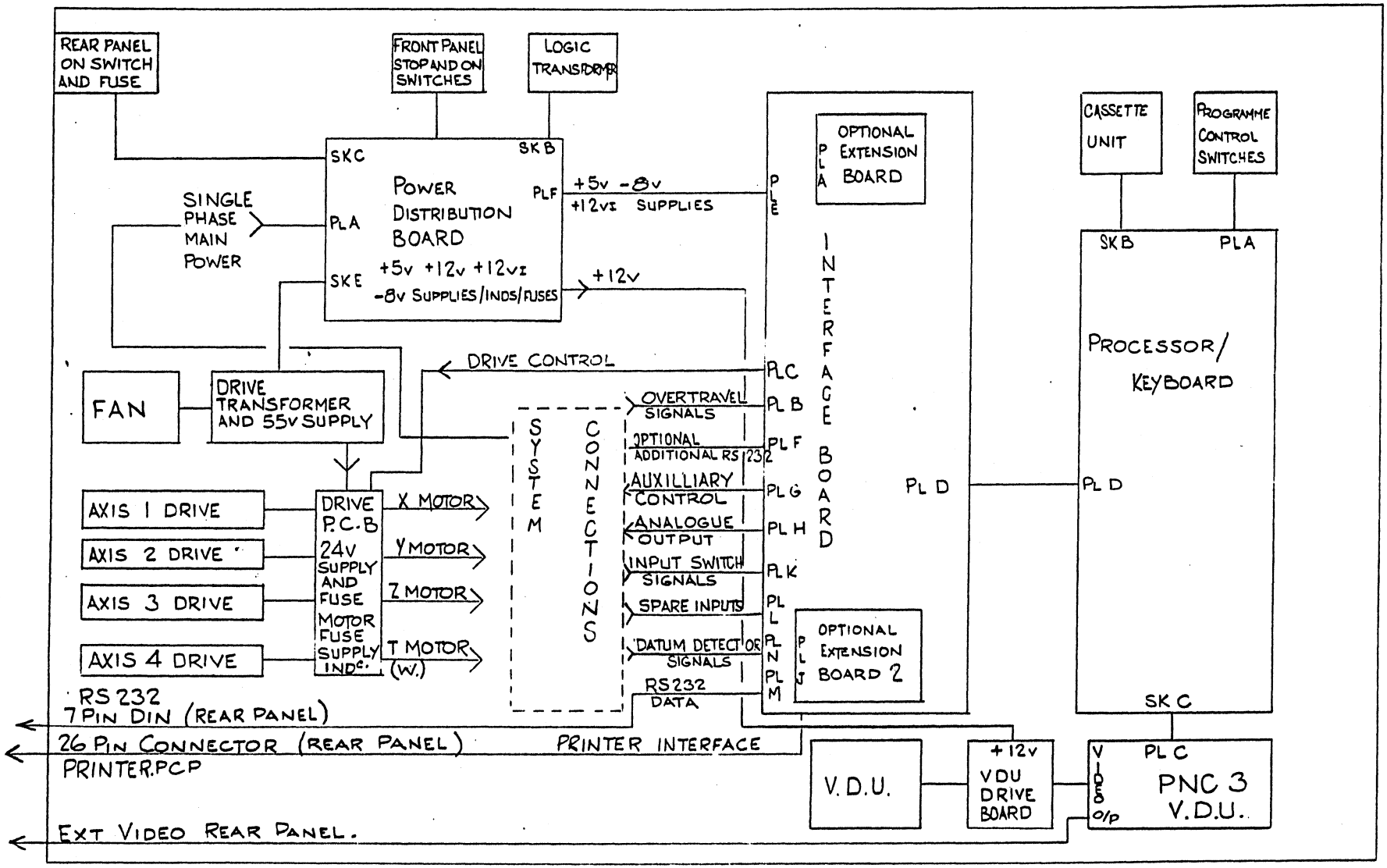
BLOCK DIAGRAM EASITURN. 3.



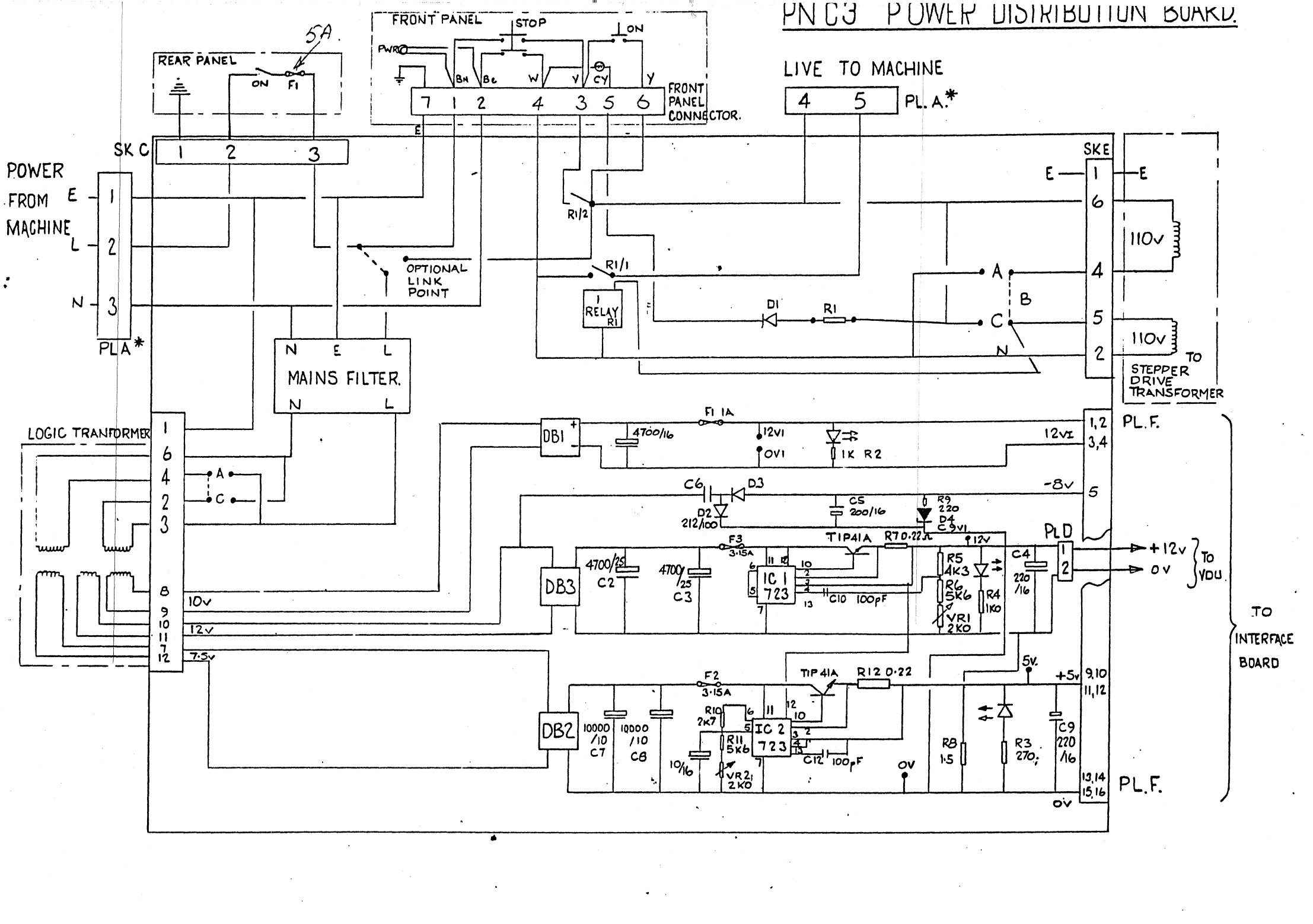
BLOCK DIAGRAM EASIMILL 3

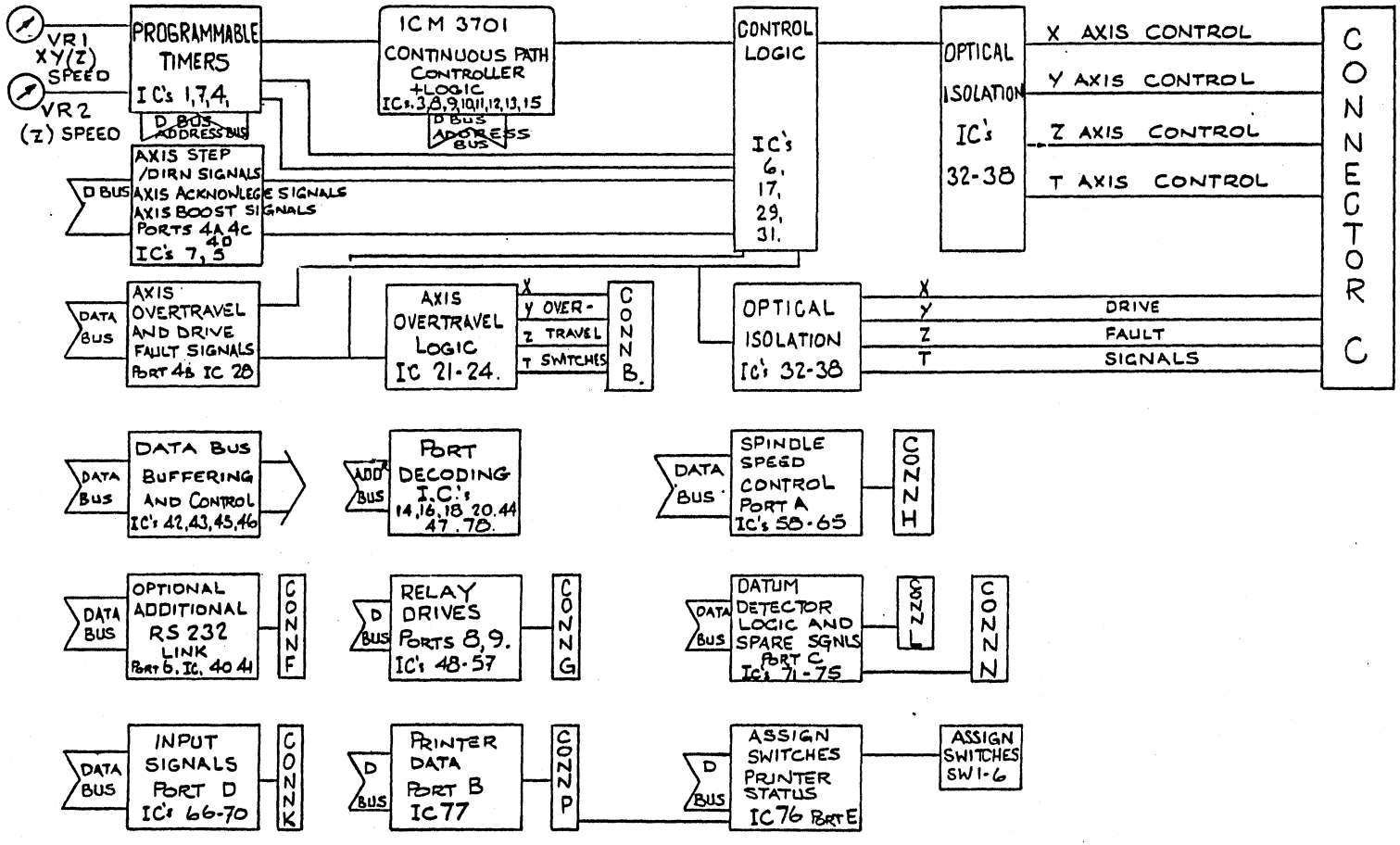


BLOCK DIAGRAM OF PNC 3 CONTROL UNIT.

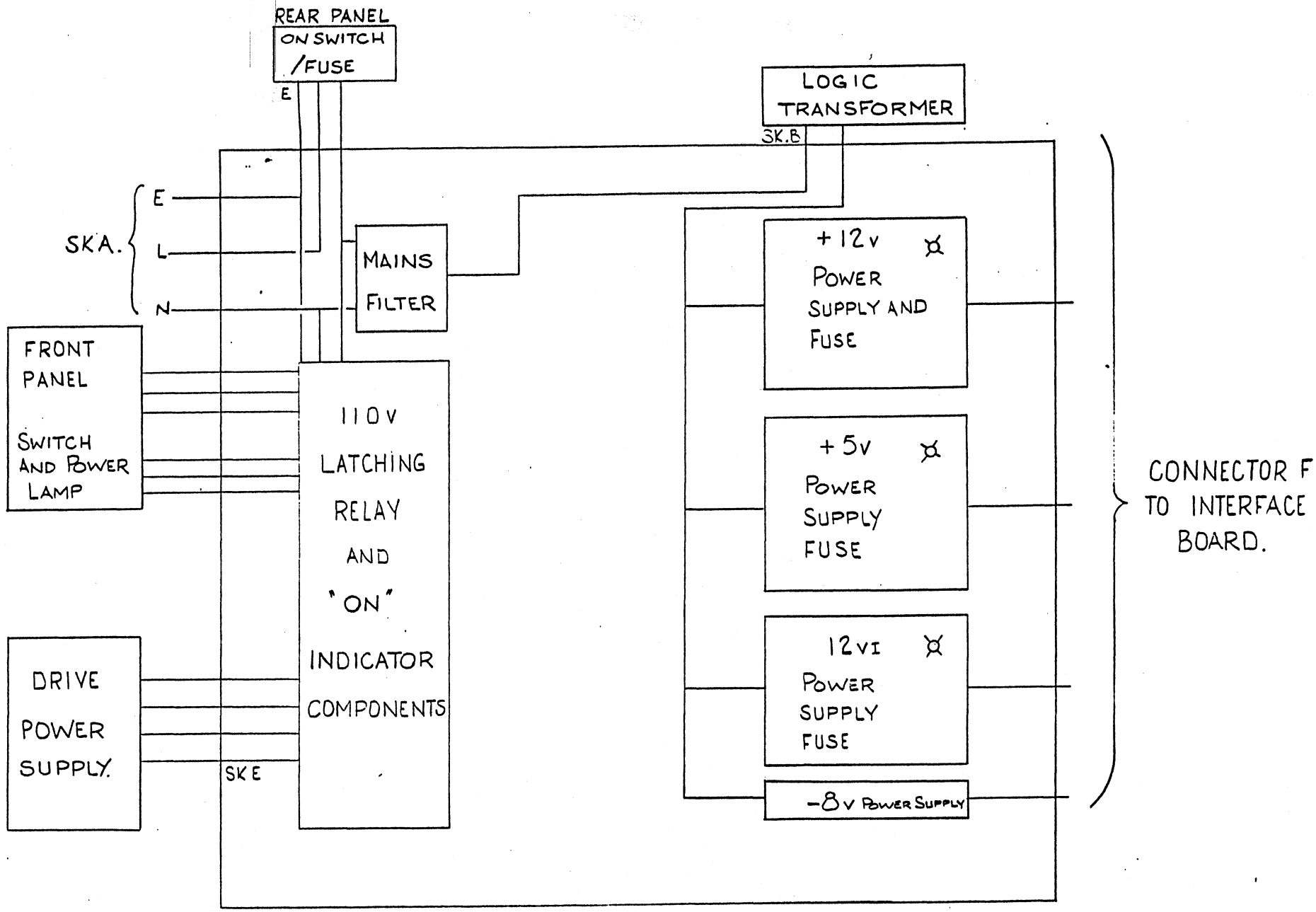


PN C3 POWER DISTRIBUTION BOARD.



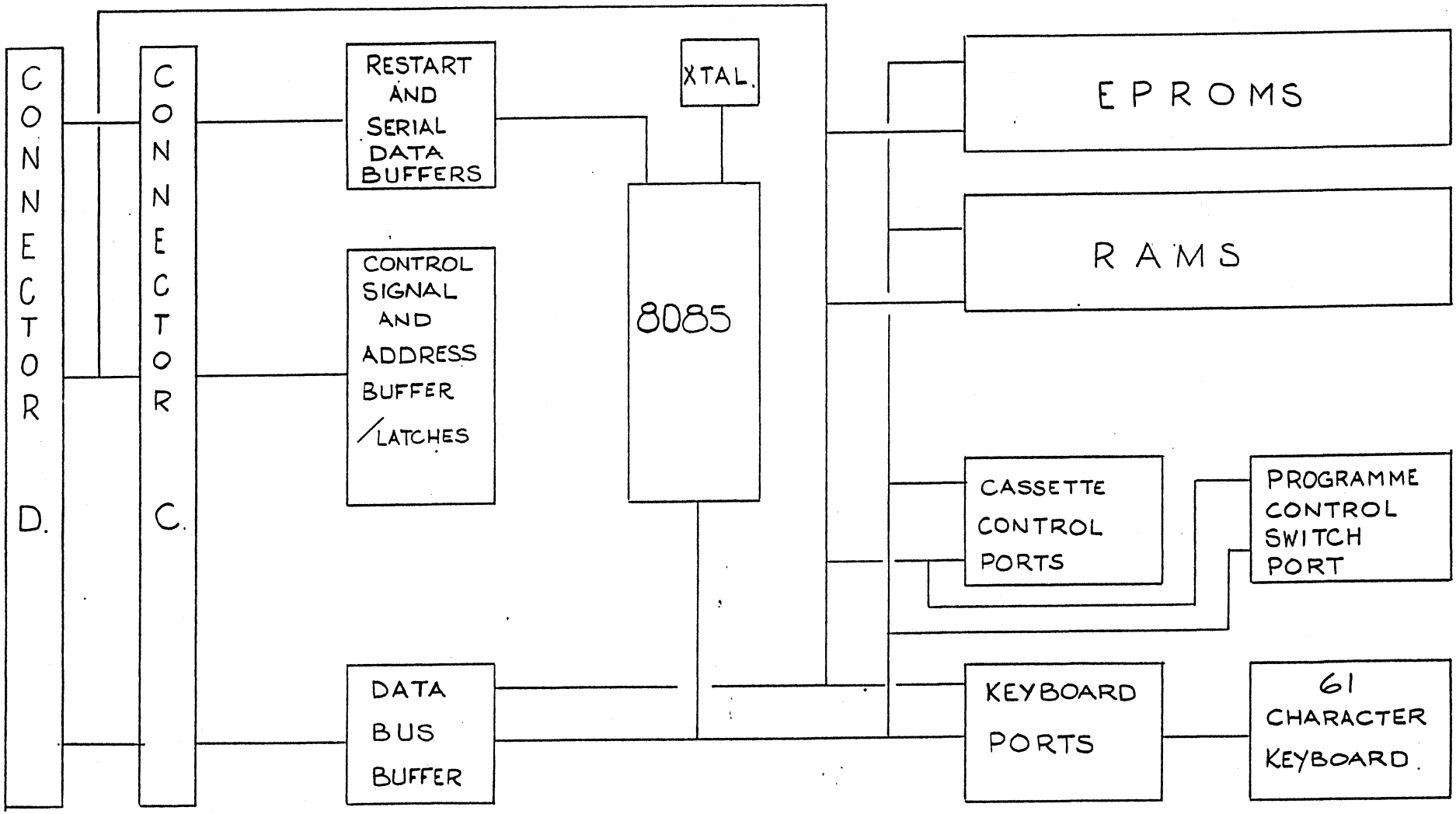


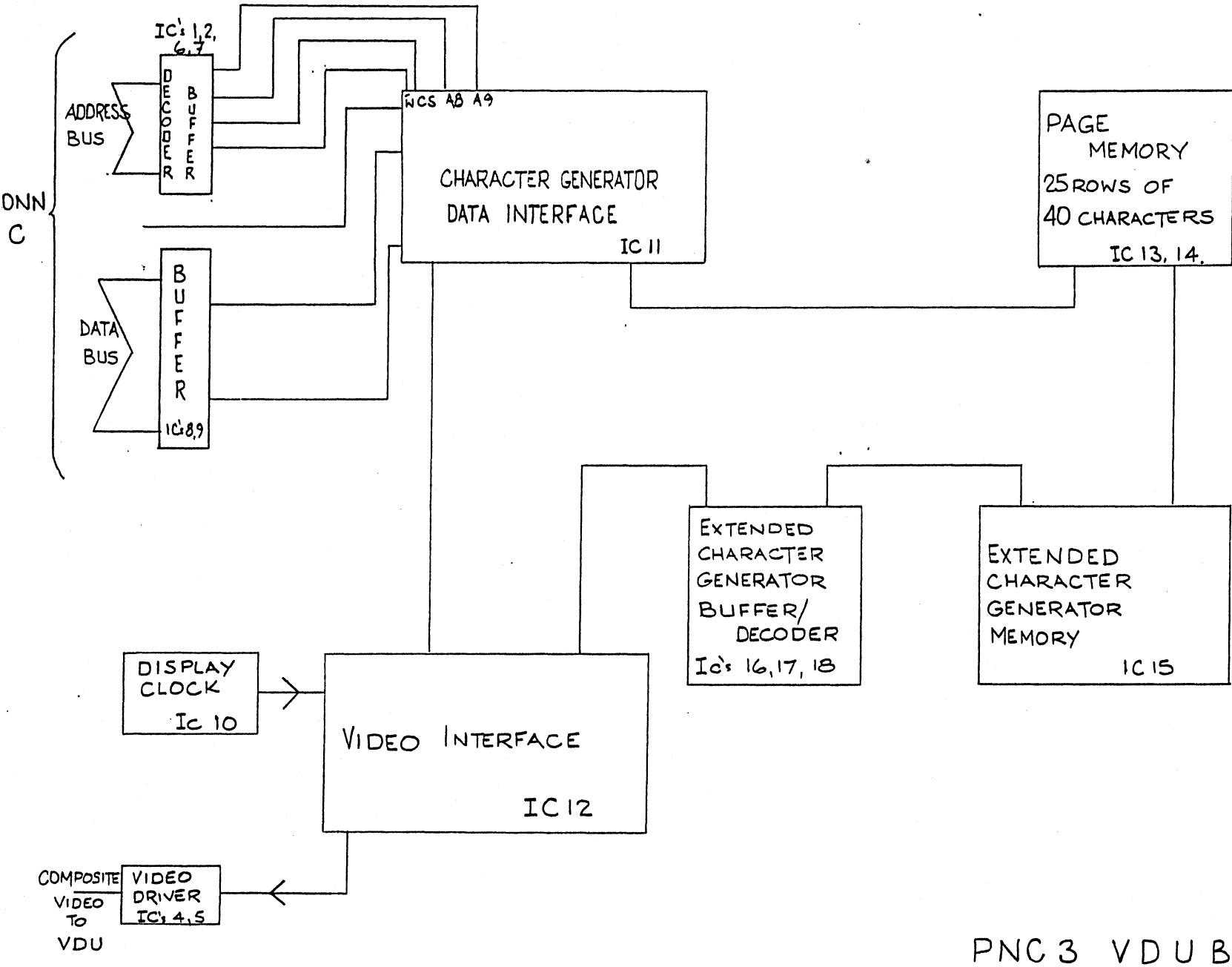
PNC 3 INTERFACE BOARD



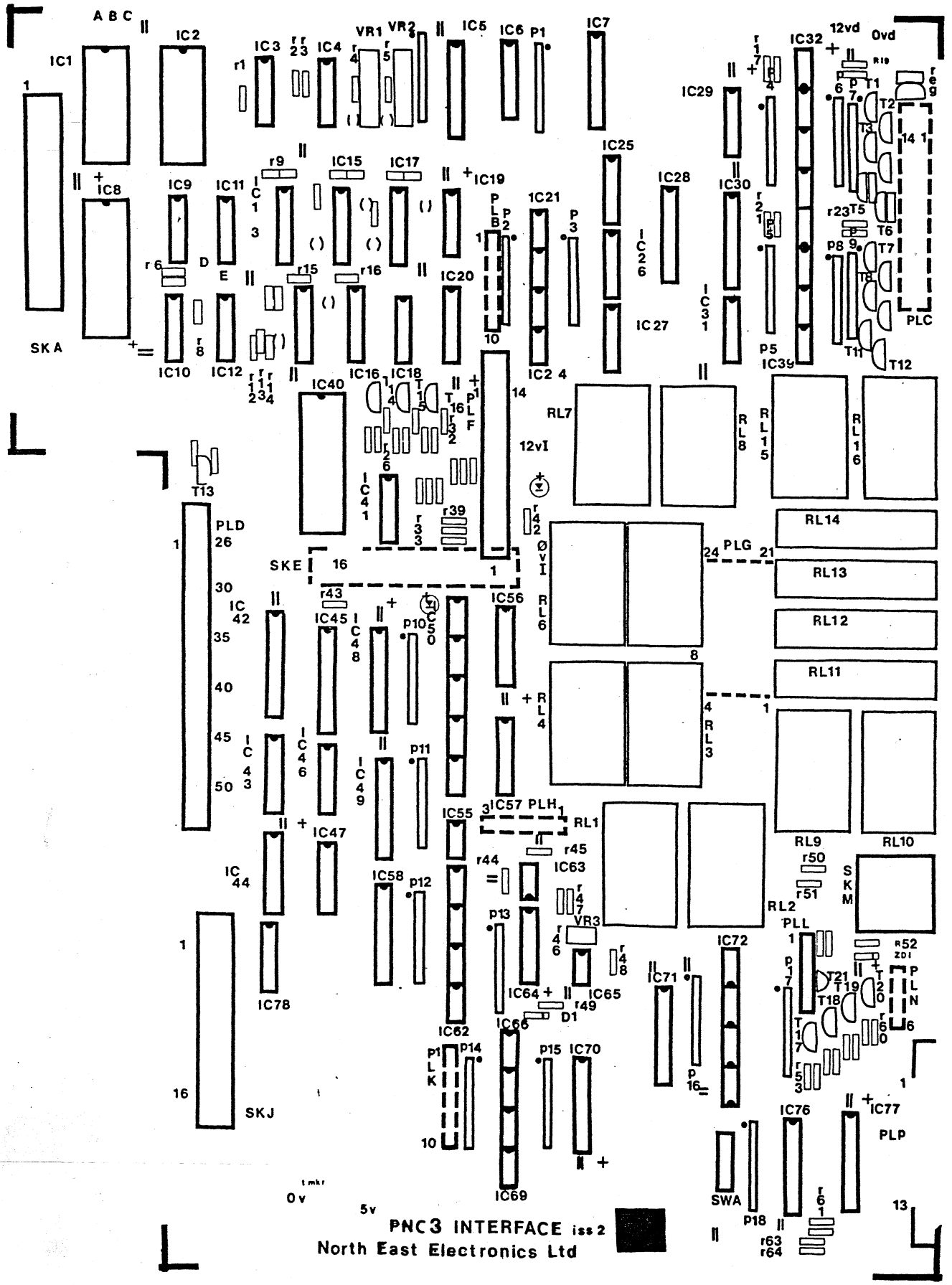
BLOCK DIAGRAM OF POWER DISTRIBUTION BOARD.

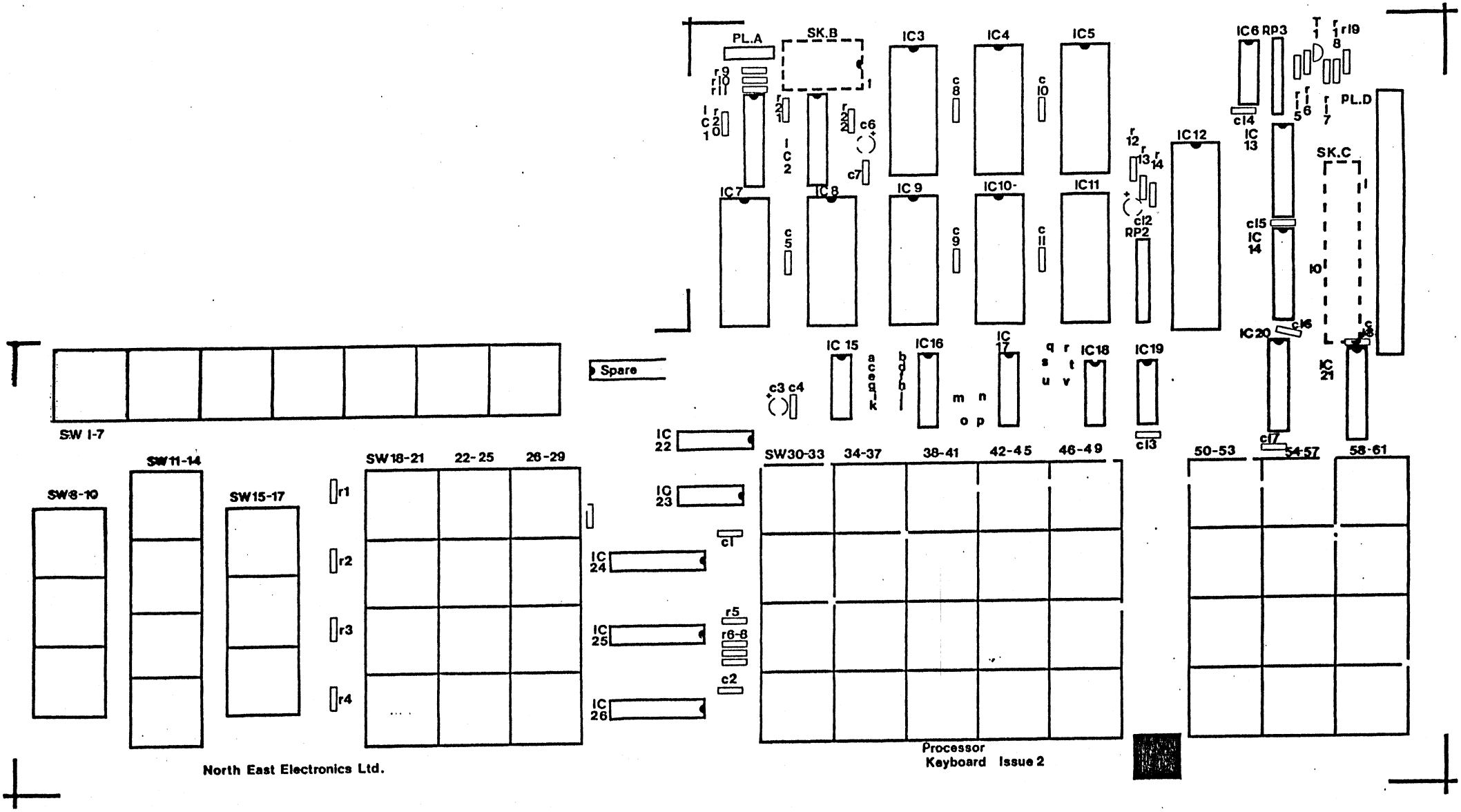
PNC PROCESSOR BOARD BLOCK DIAGRAM

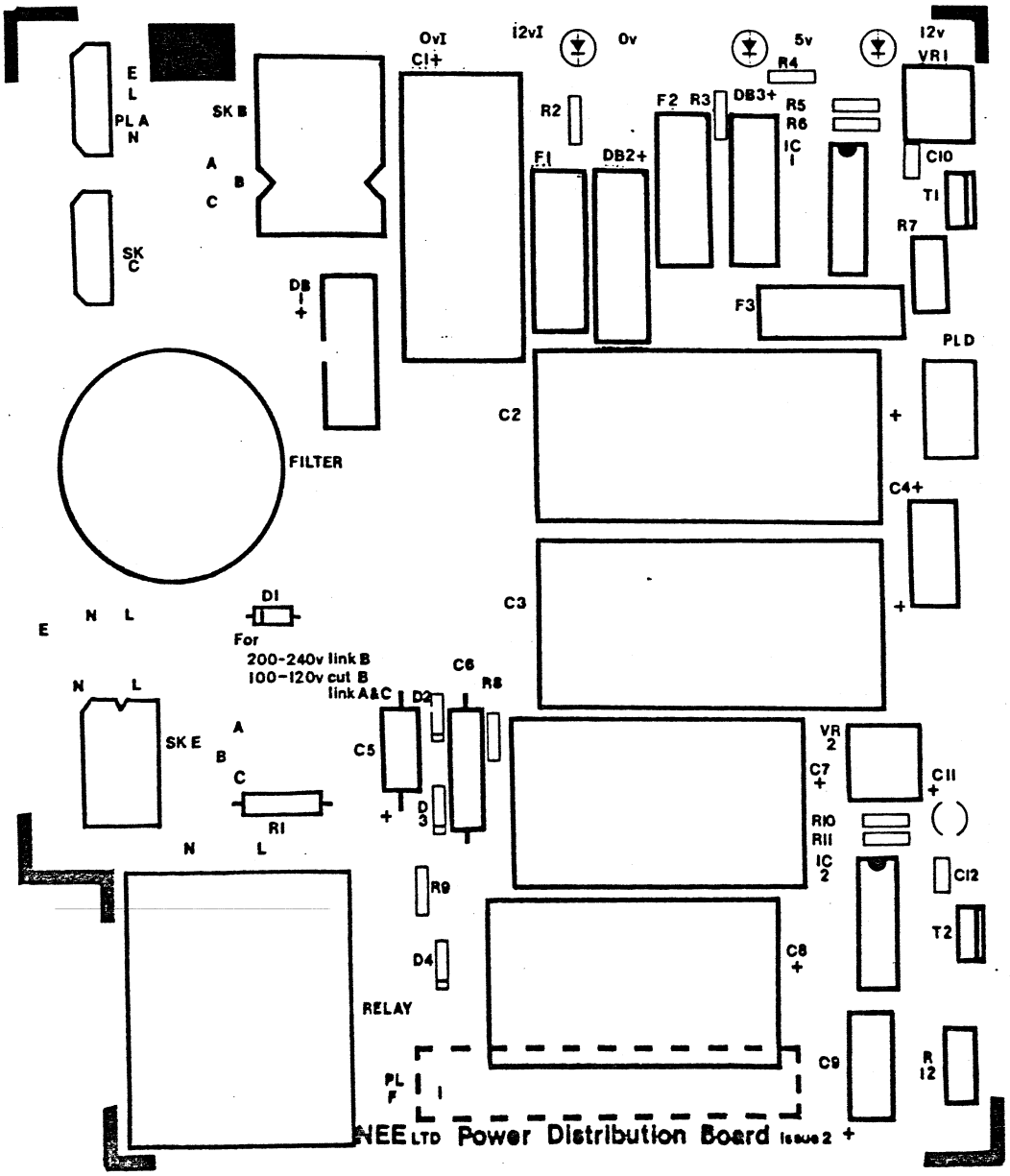




PNC 3 V D U BOARD BLOCK DIAGRAM.

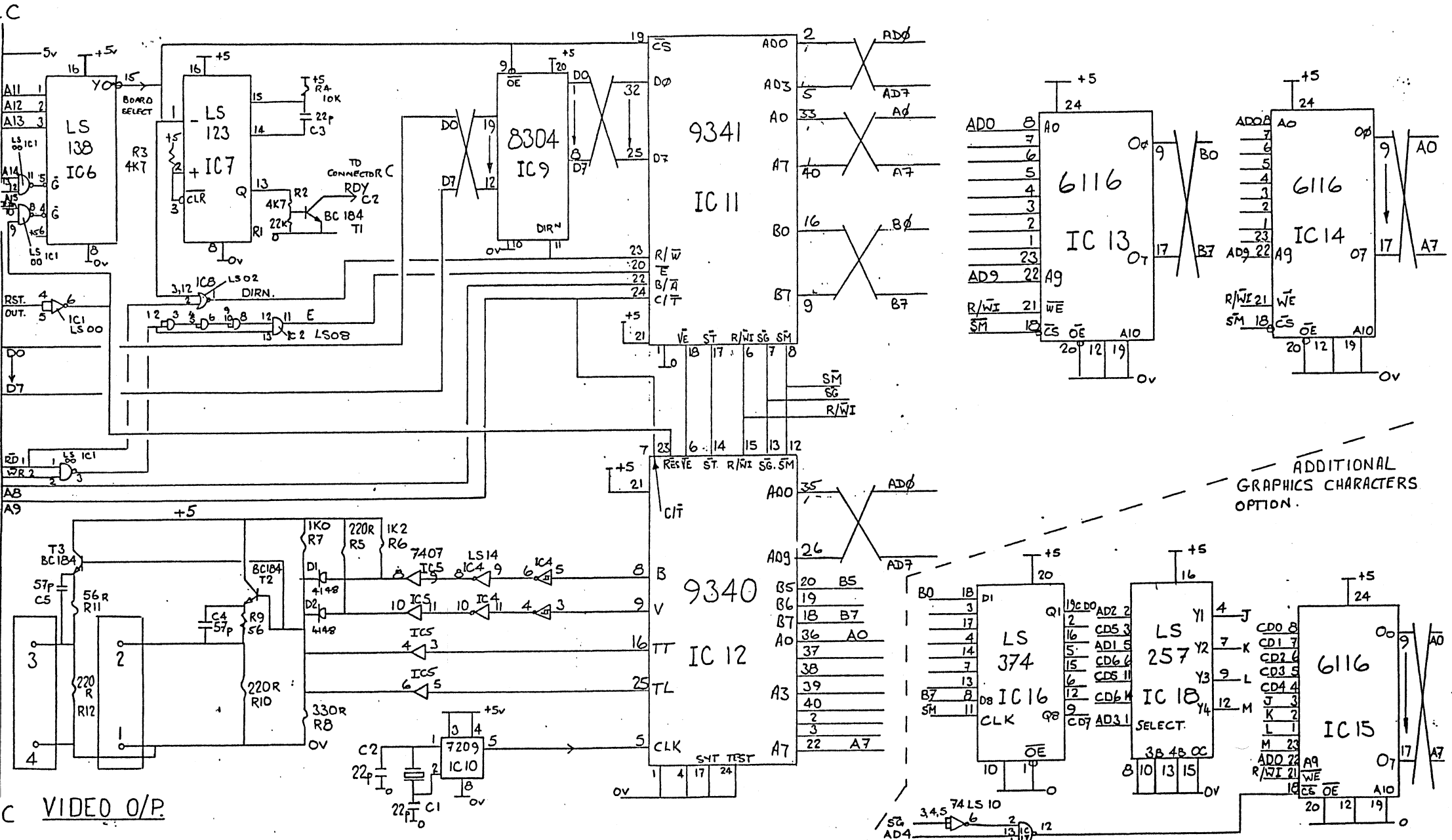

A B C
IC1
IC2
IC3
IC4
VR1
VR2
IC5
IC6
P1
IC7
12vd
0vd
IC32
IC29
IC8
IC9
IC11
IC15
IC17
IC19
IC25
IC28
IC30
IC21
P2
P3
IC26
IC27
IC31
SK A
IC10
IC12
IC16
IC18
IC20
IC24
P5
IC39
PLC
T1
T2
T5
T6
T7
T8
T11
T12
IC40
PLF
12vI
RL7
RL8
RL15
RL16
T13
PLD
IC41
SKE
IC42
IC48
IC50
IC56
ØvI
RL6
PLG
RL14
RL13
RL12
RL11
RL4
RL3
IC45
IC46
IC49
IC43
IC47
IC57
PLH
RL1
RL9
RL10
IC44
IC58
IC55
IC63
VR3
RL2
SKM
PLL
IC72
IC71
IC64
IC65
IC66
IC62
IC78
SKJ
PLK
IC70
IC76
IC77
PLP
SWA
IC69
0v
5v
PNC3 INTERFACE iss 2
North East Electronics Ltd

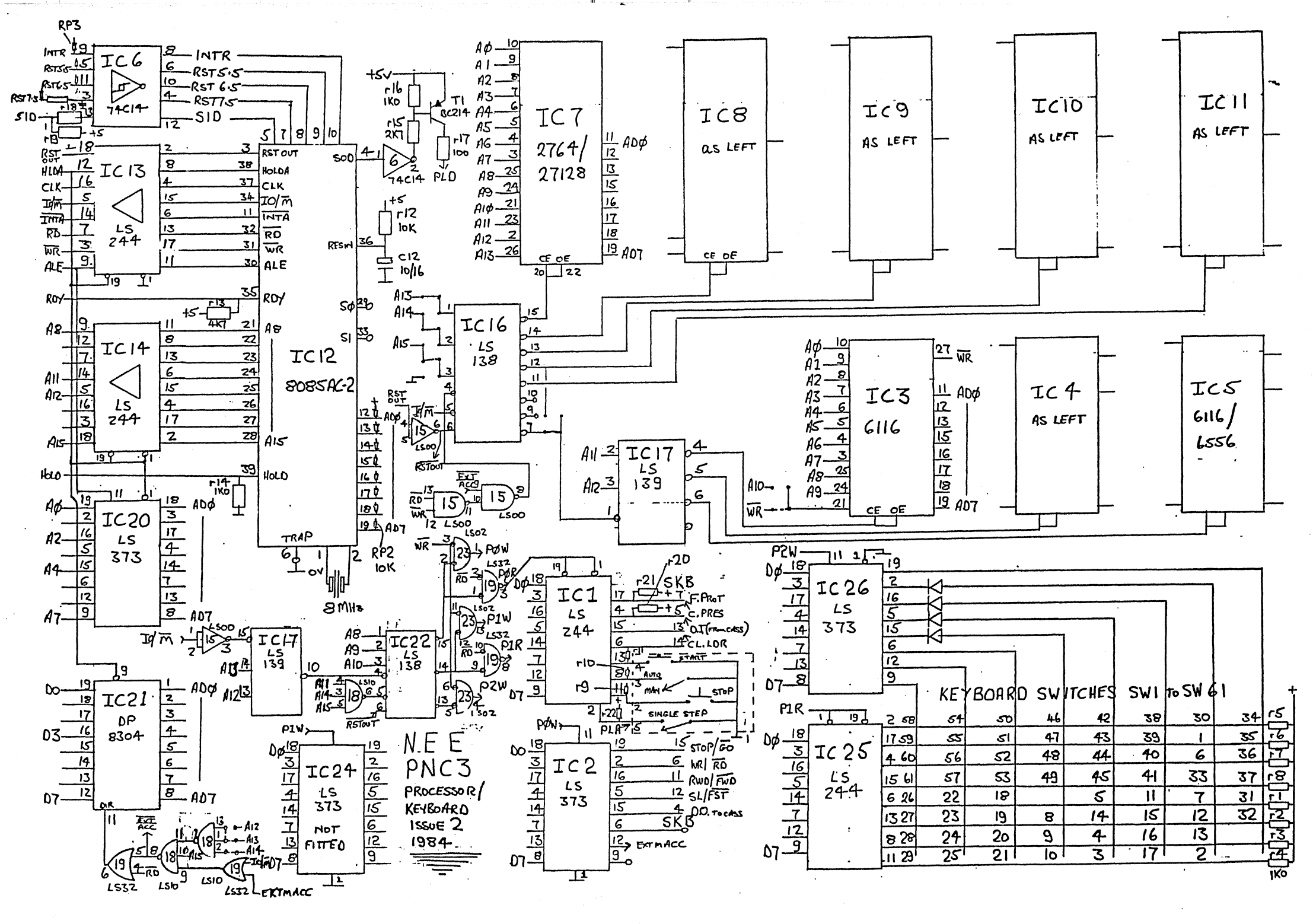

PL.A
SK.B
IC3
IC4
IC5
IC6
RP3
PL.D
SK.C
IC12
IC7
IC8
IC9
IC10
IC11
IC13
IC14
IC15
IC16
IC17
IC18
IC19
IC20
IC21
RP2
Spare
SW 1-7
SW8-10
SW11-14
SW15-17
SW18-21
22-25
26-29
IC 22
IC 23
IC 24
IC 25
IC 26
SW30-33
34-37
38-41
42-45
46-49
50-53
54-57
58-61
Processor
Keyboard Issue 2
North East Electronics Ltd.

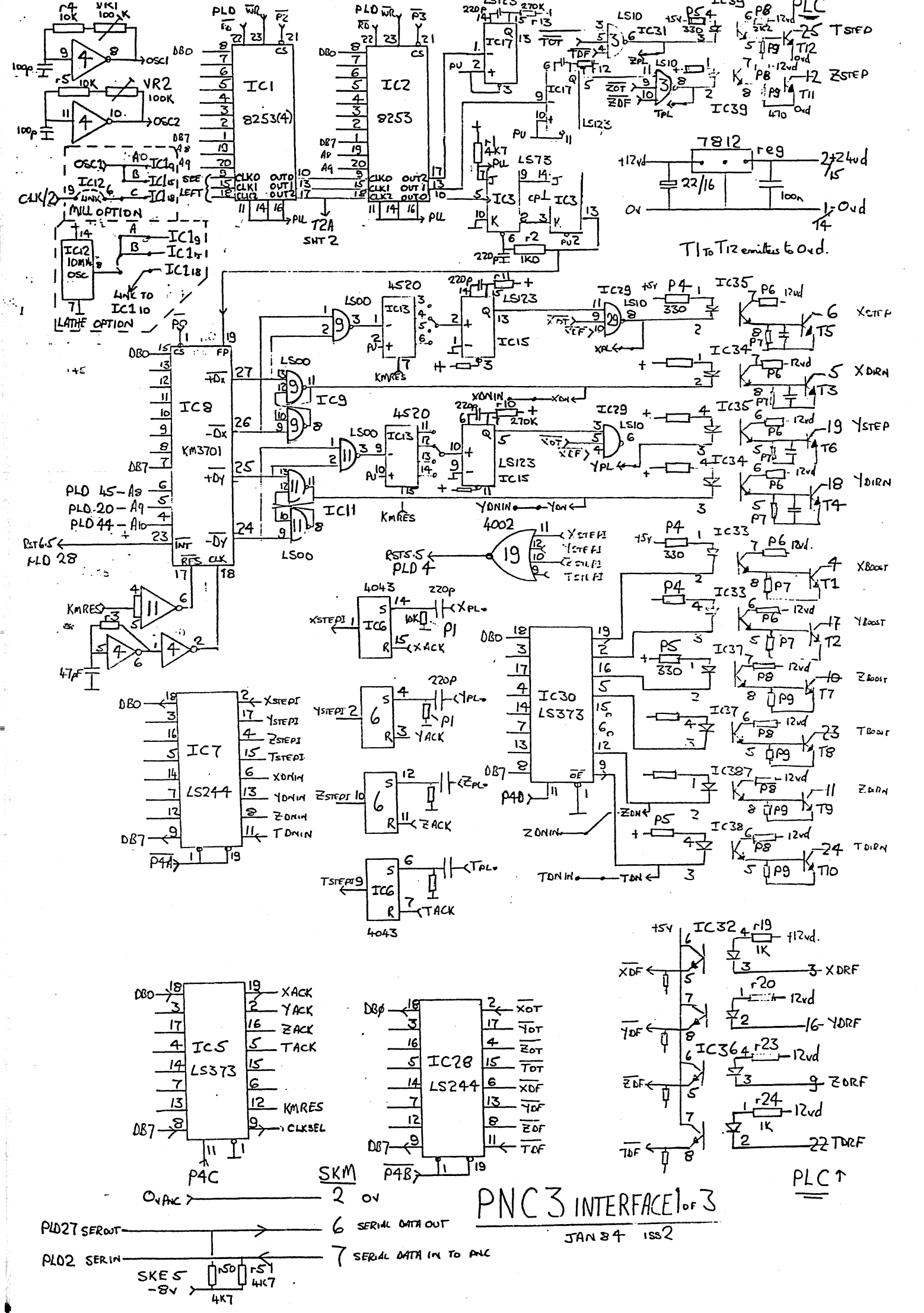

E
L
PL A
N
SK B
A
B
C
SK
C
OvI
C1+
i2vI
0v
5v
i2v
VR1
R2
F2
R3
DB3+
R5
R6
IC
1
F1
DB2+
C10
T1
R7
DB
+
F3
PLD
C2
+
FILTER
C4+
C3
+
E
N
L
D1
For
200-240v link B
100-120v cut B
link A&C
N
L
C6
R8
SK E
A
B
C
C5
D2
VR
2
C7
+
C11
+
R1
D
3
+
R10
R11
IC
2
C12
N
L
R9
T2
D4
C8
+
RELAY
C9
R
12
PL
F
NEE LTD Power Distribution Board Issue 2

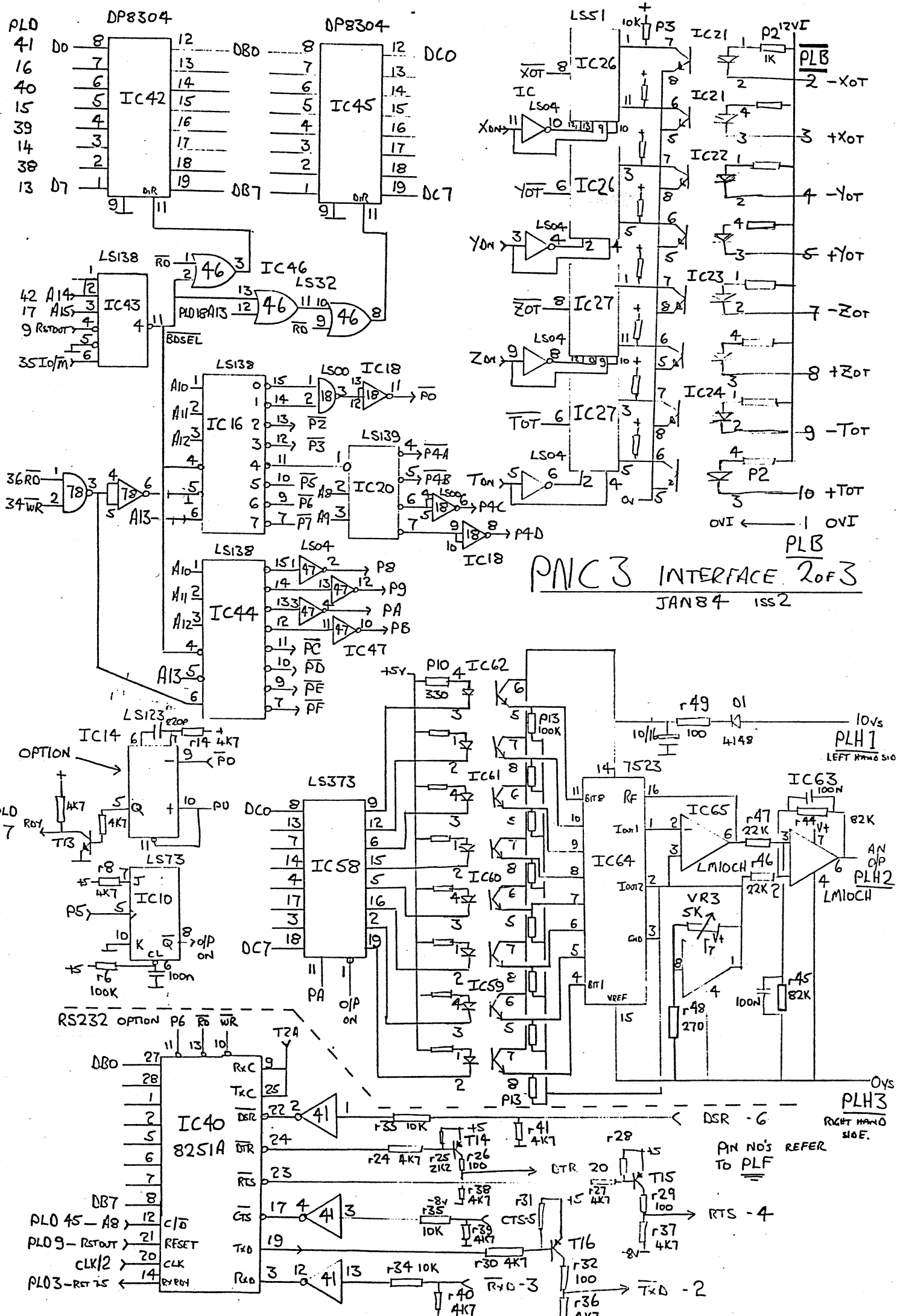
PNC 3 VDU

'SS1 JAN 84



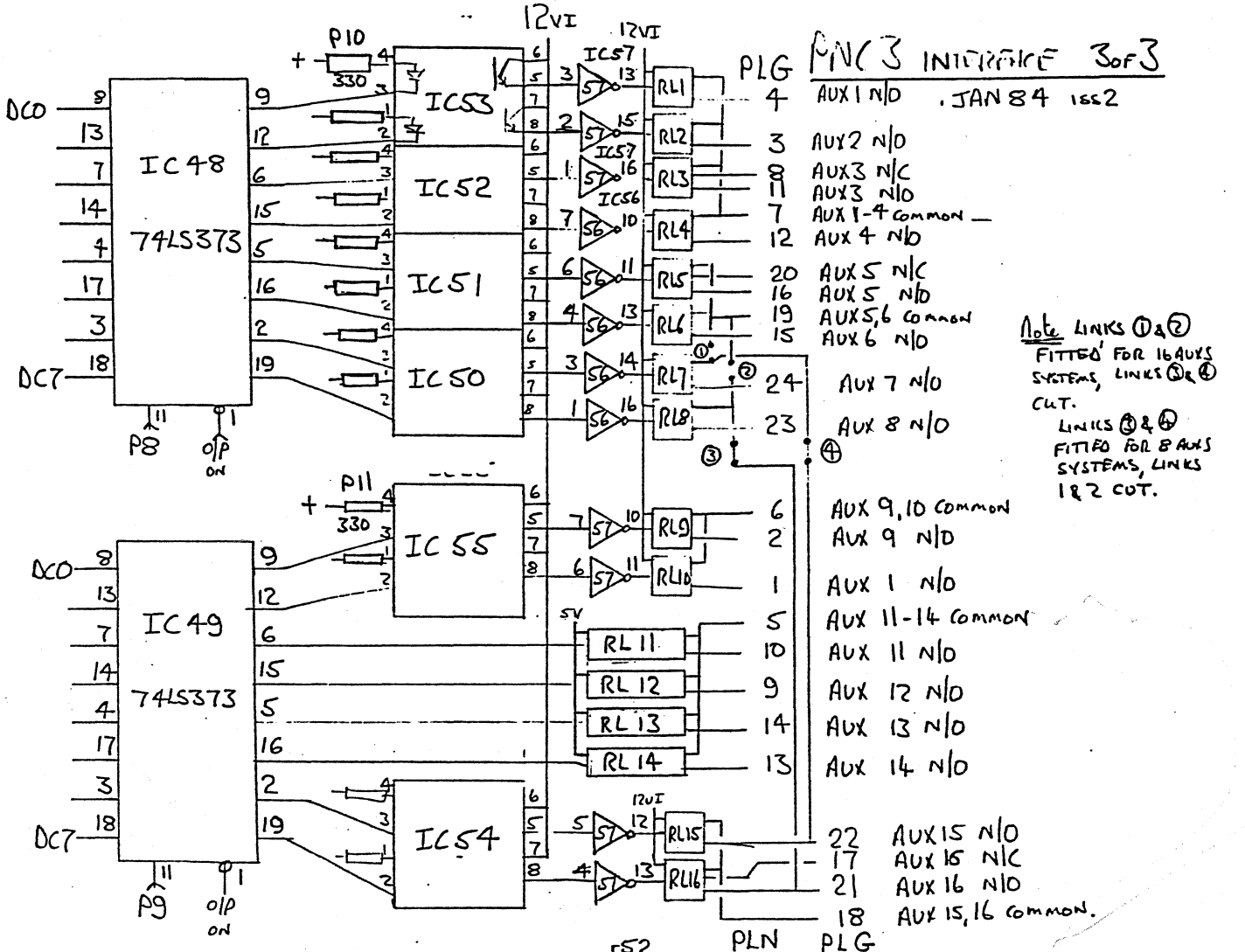

RP3
IC6
74C14
INTR
RST5·5
RST 6·5
RST7·5
SID
IC13
LS 244
IC14
LS 244
IC12
8085AC-2
IC16
LS 138
IC17
LS 139
IC7
2764/ 27128
IC8
AS LEFT
IC9
AS LEFT
IC10
AS LEFT
IC11
AS LEFT
IC3
6116
IC4
AS LEFT
IC5
6116/ 6556
IC20
LS 373
IC17
LS 139
IC22
LS 138
IC21
DP 8304
IC24
LS 373
NOT FITTED
IC1
LS 244
IC2
LS 373
IC26
LS 373
IC25
LS 244
T1
BC214
PLD
8MHz
N.E.E
PNC3
PROCESSOR/
KEYBOARD
ISSUE 2
1984
KEYBOARD SWITCHES SW1 TO SW 61
SKB
SKS
F.PROT
C.PRES
CL.LOR
START
STOP
SINGLE STEP
AUTO
MAN
STOP/GO
WR/RD
RWD/FWD
SL/FST
EXTMACC

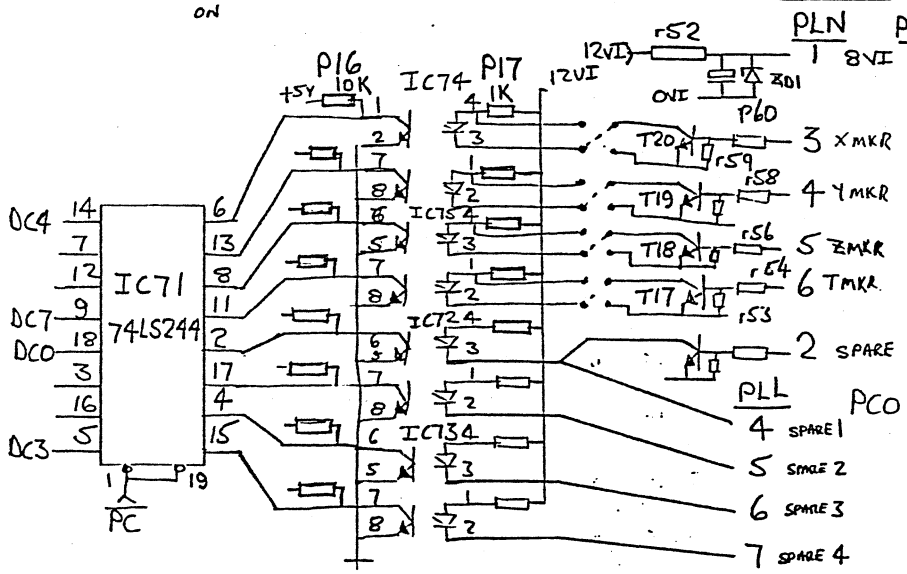

PNC3 INTERFACE 1 OF 3
JAN 84 ISS 2
IC1 8253(4)
IC2 8253
IC8 KM3701
IC9
IC11
IC5 LS373
IC7 LS244
IC28 LS244
IC30 LS373
IC32
IC33
IC34
IC35
IC36
IC37
IC38
IC39
IC29
IC31
IC13
IC15
IC17
IC3
IC6
IC12
7812 reg
T1 TO T12 emitters to 0vd.
MILL OPTION
LATHE OPTION
PLC
SKM
XSTEP
XDIRN
YSTEP
YDIRN
XBOOST
YBOOST
ZBOOST
TBOOST
ZDIRN
TDIRN
XDRF
YDRF
ZDRF
TDRF
PLD27 SEROUT
PLD2 SERIN
SERIAL DATA OUT
SERIAL DATA IN TO PNC


PLD
DP8304
IC42
DP8304
IC45
LS138
IC43
LS32
IC46
LS138
IC16
LS00
IC18
LS139
IC20
LS138
IC44
LS04
IC47
LS123
IC14
OPTION
LS373
IC58
IC62
IC61
IC60
IC59
7523
IC64
IC63
IC65
LM10CH
VR3
5K
LS73
IC10
RS232 OPTION P6 RD WR
IC40
8251A
T2A
DSR -6
DTR 20
RTS -4
CTS-5
TxD -2
RxD-3
PIN NO'S REFER TO PLF
LS51
IC21
IC22
IC23
IC24
IC26
IC27
P3
P2
12VI
PLB
-XOT
+XOT
-YOT
+YOT
-ZOT
+ZOT
-TOT
+TOT
OVI
PLB 2 OF 3
PNC3 INTERFACE
JAN84 ISS2
PLH1
LEFT HAND SIDE
PLH2
PLH3
RIGHT HAND SIDE

MNC3 INTERFACE 3 OF 3

AUX 1 N/O . JAN 84 1552





	MILL	LATHE
r52	220Ω ½W	560Ω ¼W
r53,55	1KΩ ¼W	220
r54,56	2K2	560
r57,59	220	220
r58,60	560	560