

## TRIAC MAINTENANCE MANUAL

### Contents:-

- 1) Basic Operation of TRIAC Control Unit
- 2) Built in Diagnostic Facilities
- 3) Preliminary Fault Finding
- 4) External Connections
- 5) External Connections Description
- 6) Internal Connections
- 7) TRIAC Wiring Diagram
- 8) Block and Circuit Diagrams

## 1) BASIC OPERATION OF TRIAC CONTROL UNIT

Contents:-

Introduction	
Detailed	Operation of Again PCB
a)	Processor
b)	VDU
c)	Drives
d)	Filter/RS232
e)	Spindle/Overtravels
f)	Graphics
g)	Datums/Inputs/Printer
h)	Auxiliaries
j)	Power

### INTRODUCTION

The TRIAC control unit consists of a number of elements contained in a removable drawer unit housed beneath the TRIAC Milling head. The block diagram of the control input shows the elements.

Main power either at 220/240Vac 50/60Hz or at 110/120Vac 50/60Hz single phase is fed to the power input connector on the unit rear, this connector houses an integral fuse and spare fuse. A second shuttered power connector is provided for the Graphics Monitor unit. Power from the rear panel is fed to the main PCB PLG A. From here power is fed via the rear panel mounted ON switch and power indicator via Skt.F, to provide system power to the power supply section on the main PCB.

The main PCB contains most of the electronic sections, which comprise the control unit. Each section is identified on the PCB. Diagrams at the end of this manual show block, circuit, and component layouts.

The spindle drive consists of a frequency convertor unit which converts single phase input power at 50/60Hz to 3 phase power from 6 to 120Hz to drive the main spindle motor. The frequency of the output power is controlled by a DC voltage of from 0 to 10V which is produced by the SPINDLE section on the MAIN PCB, power is also fed to the main contactor which closes when the drives are on.

The X, Y and Z stepper motor drives provide power to drive the X, Y and Z axis stepper motors. The X and Y axis drives are SD2 types. The X and Y drives are not interchangeable, as the link settings are different. The Z axis drive is an SD3, which is more powerful than the SD2, this drive, should not be fitted in the X or Y drive position. The drives are powered by the Drive Transformer the high voltage outputs of which are fed via fuses F1 and F2 mounted on the TRIAC DRIVE PCB mounted on the rear of the drives. Additional information on the SD2 and SD3 drives is, contained in the drive manual.

The 711 VDU is powered by a KME MB12 VDU drive board the video input of which is produced on the main PCB by the VDU section.

### DETAILED OPERATION OF MAIN PCB

The main PCB is sectioned, the sections are:-

- a) PROCESSOR
- b) VDU
- c) DRIVES
- d) FILTER/RS232
- e) SPINDLE/OTIS
- f) GRAPHICS
- g) DATUMS/INPUTS/PRINTER AUXILIARIES
- j) POWER

Both Block and Circuit diagrams for each of the MAIN PCB sections are included at the end of this manual.

#### a) PROCESSOR

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

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 characterise 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, auxiliary and input section information.

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

The control switch port enables the settings of the 3 control switches mounted on the keyboard to be monitored, these switches are the DRIVE ON switch and the CONTROL STOP and CYCLE STOP switches.

The keyboard ports enable the microprocessor to scan and read the keyboard. The 8085 microprocessor communicates with the other sections on the MAIN PCB via the address, data and control buses.

#### b) VDU

The VDU section generates the composite video signals to produce the VDU display.

The VDU section comprises a character generator/data interface, page memory, 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 from the character generator.

Characters to be displayed are stored in page memory in their correct display position by the Processor via the data and address buses 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 a lv composite video output which is fed to the KME MB12 VDU driver and also to the Graphics section.

#### c) DRIVES

The drives section produces signals which control the movement and speed of the stepper motor drives.

Control of the 2 contouring axes (generally X and Y) is provided by a 16 bit programmable timer, a KM3701 2 axis continuous path controller and associated logic.

IC20 and VR1 form an oscillator the output of which is fed to the programmable timer, which controls movement speed. The timer output is fed to the KM3701 as a feed pulse. The KI.13701 produces output pulses, which are fed via a divide by 8 circuit then via a monostable, which produces pulses of approximately 25 microseconds. The monostable output signals together with the direction signals are fed to on later units a PROM. The output from IC20 is also fed via a second 16 bit programmable timer to produce pulses to control a third axis (generally Z) of -movement. These pulses are also fed via a divide by 8 circuit then via a monostable to on later units a PROM. The PROM if fitted enables contouring movement to be selected on either the X Y or X Z or Y Z plane.

The PROM output is fed via optical isolators then open collector stages before being fed to the drive units via Plg. U.

NOTE: VR1 is factory set to give the correct programmed feed.

Axis movement is monitored by the control unit -enabling the precise machine position to be known at all times. Step and direction signals are fed via IC22 to the data bus DO to D7 thence to the processor.

The stepper motor drive unit provide a fault signal if a drive/motor fault is detected. The fault signal is fed via optical isolators then via IC18 to the data bus and thence to the processor.

#### d) FILTER/RS232

The Filter section permits the TRIAC to be automatically controlled by the stereo cassette unit. The filter circuit detects a pure note from the cassette in the range 4.5 to 5.5 KHz and demodulates this to produce a GO signal to the Processor which upon receipt of this signal executes the next block in memory.

The RS232 section buffers output data and converts it to + and - 7 volt levels. Input data is passed to the processor section.

#### e) SPINDLE/OTs

The Spindle section input data is fed to an 8 bit latch IC6. The latch output is fed via optical isolators IC7 to 10 to an 8 bit low power Digital to Analogue convertor IC12. IC12's output is fed via amplifier/level convertor IC14. IC14 has 2 associated adjustment potentiometers, VR1 is the output 'offset' adjustment, VR2 is the output 'gain' adjustment, these controls are factory set to provide a 0 to 10v analogue signal at the output. The analogue output is fed via RL1 to PLP. RL2/RL3- are provided to control the spindle and it's direction.

The overtravel circuit is fed via PLR from the machine mounted overtravel switches. If these switches are closed signals are fed via optical isolators IC12 to 14 to logic elements IC11 which selects one signal/axis dependant upon the axis movement direction. The resultant signals are fed via IC10 together with the drive fault signals (see DRIVE section) and the GO signal - to the processor section.

#### f) GRAPHICS

The Graphics section consists of a Graphics display processor (GDP) IC6, a 16K x 16 bit RAM, a 16 bit shift register, video sync and driver logic and clock timing logic.

The GDP receives commands from the processor section and executes these commands by writing or reading data to/from the RAM. The GDP' also refreshes the dynamic RAM and produces the video output signal.

The graphics display consists of 245,760 individually settable pixels. If all pixels are on the display shown in a green square, if all pixels are off the display in black. If only some of the pixels are on, patterns are displayed. The display area consists of 480(across) x 512(down) pixels, each pixel is a single bit in the dynamic RAM.

Data is written into the RAM by the GDP, which can write the data so that straight lines or arcs are formed on the display. Data is written by the GDP by first sending the required address to the 16 bit address latch IC8 & 11 then sending the data to the RAM via IC13, 14. IC's9 and 12 multiplex the address lines to the RAM.

Data may also be read from the RAM by the GDP which first sets the address latch then reads the data via IC13,14.

The graphics picture is formed by the GDP sequentially transferring the contents of each address in RAM to the 16 bit shift register IC19 and 20. Data is fed out of the shift register by a clock signal one pixel at a time via the video and sync coder where the video signal is combined with the sync pulses produced by the GDP. The composite video produced is fed to a video selector. The video selector selects either GDP video or video A (The video as supplied to the integral 7 inch monitor) then feeds it via the composite video drives to the two output connectors.

#### g) DATUMS, INPUTS and PRINTER

Datum, detector signals are derived from inductive proximity detectors. When no metal is detected the detector oscillates and acts as a low resistance. When metal is detected the detector acts as a high resistance. Signals from each of the 3 axes detectors together with a signal from the spindle speed detector are fed via transistor input circuits then via optical isolators IC4-7 together with signals from the four inputs to IC8 which in turn feeds the signals to the processor section.

The printer section consists of an 8 bit port which passes parallel data to the printer in Centronics format. Printer status is monitored via IC9. SWA a 6 pole switch is used to select TRIAC operating modes.

#### h) AUXILIARIES

Auxiliary outputs are set by the processor using IC1 an 8 bit latch. The latch outputs are fed via optical couplers then a relay driver to operate the relays.

#### j) POWER Section

The power section distributes main system power and also produces the low DC voltages required by the system.

## TRIAC MAINTENANCE MANUAL

2)

### Built in Diagnostics

The TRIAC controller has a number of in built diagnostic facilities some of which are automatically performed each time the system is powered up and some of which may be selected by the operator before the system is datumed.

The automatically performed diagnostics test the following:-

- 1) System RAM (Random Access Memory)
  - 2) System EPROM (Electrically Programmable Read Only Memory)
  - 3) Keyboard (tested for short circuit keys)
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- 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 7.75K 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) A keyboard test is then performed to ensure that there are no short circuit keys. If a short circuit key is found its number is shown on the VDU.

If the above tests are successful the control 'signs on'.

Note The RAM, and ROM numbers are as labelled on the MAIN PCB (printed circuit board). The keyboard keys are labelled systematically from top to bottom and from left to right.

### Operator Selected Tests

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) Keyboard test (CCLW Key)
- 2) VDU test (X key)
- 3) EPROM and Program version test (S key)
- 4) Graphics electronics tests (G key)
- 5) System Input signals test (T key)

NOTE:- Each test is ended by pressing the "RESET" Key, with the exception of the keyboard test which is executed by the CYCLE STOP key.

- 1) The keyboard test enables the operation of all keys to be tested. Only one key should be depressed at once. A faulty key will result in either no number being displayed if the key is open circuited, or the faulty key number will always be displayed if the key is short circuited.
- 2) The system VDU operation and adjustment settings can be checked using the X test, which is selected by pressing the X key. Pressing any other key exits the test. The KME MB12 VDU board has preset adjustments for height, contrast, brill, H.amp and H.hold.
- 3) 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.

- 4) The graphics test tests the graphics electronics and graphics monitor. The test is selected by pressing the “G” key. This test checks the display RAM and associated electronics by:-

- a) Alternately filling then emptying the graphics RAM, which should result in an alternately changing green/black filled rectangle on the graphics monitor.
- b) Generating a picture of a square divided by 4 lines with a inner circle, which is encoded by a sequence. Test b) is selected by first pressing the "G" key then pressing the "RESET" key once.

The graphics test is exited by pressing the "RESET" key twice.

- 5) For correct system operation the TRIAC controller uses a number of signals produced by machine and peripheral equipment mounted switches/sensors. These signals may each be checked/tested by the "T" test. This test should always be used if a system fault is experienced, as it will locate the faulty element.

The system input signals can be displayed by pressing the "T" key. Signals relating to the following input ports are displayed:-

- INPUTS
- PRINTER
- DIL SWITCHES
- M/C SWITCHES
- DATUMS
- STEP & DIRN
- DRIVE FAULT
- O/T's
- SERIAL LINK

For additional technical details see the section "External Signals Description".

#### INPUTS

TRIAC has facilities for 4 input signals on AUX-IIP connector (unit rear) which can be connected to external switches. The status of each of these switches is displayed.

BIT	4	3	2	1
SIGNALS	INPUT 4	INPUT 3	INPUT 2	INPUT 1

A 1 signifies input is open circuit 0 signifies input is short circuit to OVI.

#### PRINTER

TRIAC has a parallel printer facility which uses 1 or 2 printer status bits

BIT	2	1
SIGNAL	/ACK	BUSY
	O=ACK	1=BUSY

If the printer is not connected bit 2 is a "1" and bit 1 is a "0".

#### DIL SWITCH

A 6 position Dual In Line switch SWA is mounted on the main PCB board at the rear. This switch is used to select presetable facilities (see operating manual) The settings of the switch are displayed:-

BIT	6	5	4	3	2	1
	SWA6	SWA5	SWA4	SWA3	SWA2	SWA1

A "1" indicates switch OFF

A "0" indicates switch ON

## CASSETTE

The status of the input signals to the TRIAC controller from the integral digital cassette unit on the right hand side of the keyboard is shown next to the cassette label.

BIT - 4	3	2	1
CASS	CASS	CASS	CASS
CLEAR	DATA	PRESENT	FILE
LEADER	(ALWAYS 0 ON TEST)		PROTECT
1=CLR	O=DATA	O=CASS	1=FILE
		PRESENT	PROTECT

## M/C SWITCHES

Three of the front panel mounted keyboard switches are machine switches.

BIT	3	2	1
	O=CYCLE	O=STOP	O=DRIVE
	STOP		ON

## DATUMS

Each milling machine axis has an associated datum detector. The signal produced by the datum detector is dependant upon whether metal is above it.

BIT	4	3	2	1
	SPINDLE RPM SENSOR	Z DATUM	Y DATUM	X DATUM
	1=METAL SEEN	1=METAL SEEN	1=METAL SEEN	1=METAL SEEN

## STEP & DIRN (USED BY TRIAC MANUFACTURERS).

These signals show the status of the step and direction input signals, these signals are utilised by the manufacturers.

BIT	7	6	5	4	3	2	1	0
	-	Z DIRN	Y DIRli	X DIRN	-	Z STEP	Y STEP	X STEP
		1=+VE	1=+VE	1=+VE		1=STEP	1=STEP	1=STEP

## DRIVE FAULT

Each of the milling machine axes has an associated electronic DRIVE the status of the drive module is displayed.

BIT	3	2	1
	Z AXIS DRIVE	Y AXIS DRIVE	X AXIS DRIVE
	1 = OK	1 = OK	1 = OK

The drive should be switched on to get the OK signals.

## OVER TRAVELS

Each of the milling machine axes has associated overtravel switches. These switches are "closed" for normal operation. If any of the switches appear "open" to the controller due to a faulty switch or associated cabling, the fault is displayed. Each overtravel switch can be operated if desired to cheek system operation.

## SERIAL LINK

The TRIAC controller is fitted with a SERIAL LINK. During the "T" test a signal is transmitted on the serial out pin (Pin 6 on -the 7 pin DIN connector). This signal can be linked to the serial in pin (Pin 7 on the 7 pin DIN connector). and the display will then change from O/C (open circuit) to S/C (short circuit) if the controller is functioning correctly. Whilst the "T" test is being performed the signal on pin 6 of the 7 pin din is at a frequency of 50Hz- with levels of >+6v and <-6v.

### 3) 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/connect6rs 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.

WARNING If the main PCD is removed it is imperative that when fitting a new PCB the \_\_\_\_\_ transistors T3 and T4 be correctly fitted with mica washers beneath them and plastic insulating top hats above them. These transistors must be insulated from the metal heat sink area and must be securely fastened to Permit heat to be dissipated.

SYMPTOM	CHECK	NORMAL	ABNORMAL
I/Unit fails to function when switched ON	a) Main Power b) ON switch on unit rear is ON c)Fuse F1 on unit rear (integral with mains connector) d)Power ON indicator on front panel	ON i.e. power is present If no VDU display after 2 mins remove power, remove control unit cover and check internal connections.	OFF wait for 2 minutes a) if VDU no display remove power remove control unit and check all internal connections. b)If VDU display comes on replace ON indicator
	e)Check 3 green DC power indicators on power in rear LH corner of main PCB.	all ON go to ld)	one or more off. check relevant fuses F1 (1A) F2 (3.15a) F3(5A)

#### NOTES

D3 is 12VI supply indicator  
D8 is +5v supply indicator  
D9 is +12v supply indicator

If D8 and D9 are off switch off power then remove connection to PLG,G. Switch on power, if system functions fault is in stereo cassette recorder or wiring. For further information refer to circuit diagrams/descriptions.

d) Ensure TRIAC is in MAN MDI mode. Ensure KEY STOP SWITCH is released	DRIVE ON indicator should light and stay on. If not do "T" test and	All stepper motor should energise if not do "T" test check drive (see section 2) Faulty
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Depress DRIVE ON	check DRIVE ON key (see section 7)	stepper drives may readily be replaced (Note the axis drives a r e interchangeable) If all drives appear faulty check indicator L1 on TRIAC DRIVE PCB whilst should be when DRIVES are on, if not check fuses F1, F2 (5A)
e) Depress DATUM Key	Machine datums Z axis, then Y axis then x axis	If one of the axes moves continually do “T” test and check datums (see section 2) by placing a ferrous object on each datum detector in turn. If one of the axes does not move do step d.
TRIAC display limit exceeded in - axis when ABS datum is pressed	Use “T” test (see section Z) and check/operate overtravels if OK use “T” test and check datum detectors (see e above)	Otravels and datums function normally in T test.  If all otravels set check connectors/ wiring, see section 6 Connectors C01, C02 PLR. If datums don’t function check connectors/wiring C01, C02, PLR
TRIAC displays RAM ERROR when switched ON	Remove unit main PCB and replace	
Unit displays XX keypressed when switched ON	Remove unit and replace front panel	
TRIAC displays ROM error when switched ON	Ensure ROMS fitted correctly to main PCB if so obtain replacement ROM’s stating version number (on bottom of ROM’S)	
OTHER FAULTS	Please obtain as much relevant information about the faults as possible and obtain ROM checksums (see section 2) before contacting the supplier.	

4) EXTERNAL CONNECTIONS

Contents:-

- EXTErnal VIDEo 1 Connector
- EXTErnal VIDEo 2 Connector
- PRINTER Connector
- AUXiliary, INPUT Connector
- RS232 Connector
- EXT. 1,10Nitor Connector

EXT VID 1

<u>Pin</u>	<u>Signal</u>	<u>Destination</u>
Inner	Composite Video	to 12ins monitor
Outer	Ov	

EXT YID 2

<u>Pin</u>	<u>Signal</u>	<u>Destination</u>
Inner	Composite Video	to user monitor
Outer	OV	

PRINTER

<u>Pin</u>	<u>Signal</u>	<u>Destination</u>
1	Printer Strobe	Centronics Compatible Printer
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	
12		
13		
14	OV	
15	OV	
16	OV	
17	OV	
18	OV	
19	OV	
20	OV	
21	OV	
22		
23		
24		
25		
26		

AUX - I/P (AUXILIARY AND INPUT SIGNAL CONNECTOR.)

<u>Pin</u>	<u>Signal</u>	<u>Destination</u>
1	AUX 1 N/O	User Connected
2	AUX 2 N/O	
3	AUX 1, 2 COMMON	
4	AUX 3 N/O	
5	AUX 3 COMMON	
6	AUX 3 N/C	
7	AUX 4 N/O	
8	AUX 4 COMMON	
9	AUX 4 N/O	
10	OVI (Input Common)	
11	I/P 1	
12	I/P 2	
13	I/P	
14	I/P	

RS232

<u>Pin</u>	<u>Signal</u>	<u>Destination</u>
1	-	User supplied host computer
2	0v	
3	-	
4	CTS (OPTION)	
5	RTS (OPTION)	
6	SERIAL DATA INPUT	
7	SERIAL DATA OUTPUT	

EXT.MONITOR

Main Power at 220/240v (or optionally 110-120v) to external monitor.

220 - 240VAC - Input power at 5 amps.

NOTE: POWER ON current surges can exceed 50 amps for a few milliseconds.

5) EXTERNAL CONNECTIONS DESCRIPTION Contents:-

- EXTernal VIDEo 1 Connector
- EXTernal VIDEo 2 Connector
- PRINTER Connector
- AUXiliary, INPUT Connector
- RS232 Connector
- EXT. MONitor Connector

EXTernal VIDEo 1 & 2 Connectors (Co-ax types)

Standard lv composite video for external displays is provided on these connectors output impedance is 75ohms.

PRINTER Connector (26 pin IDC ribbon type)

Printer data produced is in CENTRONICS 8 bit parallel format.

AUXiliary - InPut Connector (15 way 'D' plug)

Auxiliary functions permit external processes to be controlled by the TRIAC. The auxiliary function outputs are via conventional relays.

Three types of auxiliary functions are supplied: a pulse auxiliary (AUX 1) which (if programmed on) provides a pulse of approx 50 milli seconds each time the machine arrives at a programmed position, a momentary auxiliary (AUX 2) which is 'ON' (if programmed on) when the machine is at a programmed position and is always OFF whilst the TRIAC is 'IN PROGRESS' and ON/OFF auxiliaries (AUX 1 & 4) which operate when programmed to do so

Connector Contact rating is 240VAC at 1A max. Inductive loads must be suppressed

Input signals permit user program execution to be 'held' until the input signals are as programmed. This facility enables events external to the control unit to control the sequence. Input signals are provided by microswitches which are connected between OV1 and the respective input-. If the input is programmed to be 'ON' then user program execution will wait until the respective input switch closes. If the input is programmed to be 'OFF' then user program execution will wait until the respective input switch opens.

Max o/c voltage 12 vdc, max s/c current 15mA dc

RS232 Connector - Serial Link

pin 2	Ov - TRIAC System Ovvolts. <u>NOTE it is important that electrical interference is not present on this connection as it could impair the performance of the TRIAC system.</u>
Pin 4	C.T.S. (Clear To Send) (Non standard Option) A High (>+3v) on this input indicates that the external device connected to the RS232 interface can accept RS232 data from the TRIAC via the serial data output (pin 7).
Pin 5	R. T. S. (Ready To Send) (Non standard option) If the TRIAC is ready to receive RS232 data on it's serial data input (pin 6) this pin is held high at > +6v.
pin 6	SDI - Serial Data Input - Serial data to the TRIAC should be provided at RS232 levels and at the Baud rate selected, by SWA on the main internal p.c.b. (See switch setting section in operating manual). The Format of the data must be as specified in the RS232 serial interface description in the operating manual.
pin 7	SDO - Serial Data Out - Serial data from the PNC is provided at RS232 levels. Baud rate is the same as that selected for Serial data input. The format of the data is as specified in the operating manual

## 6) TRIAC - INTERNAL CONNECTIONS.

### IMPORTANT

Since the manufacture of the first TRIAC Mill a number of system enhancements have been made to cater for different options. Systems with serial numbers 1 to 76 were fitted with Issue I main PCB'S. Systems with serial numbers 77 onwards were fitted with issue II main PCB'S. TRIAC's can be manufactured with either a Parajust of a Brown and Prestel spindle motor controller.

For pre serial number 77 systems this wiring information should be used as a guide only and reference should be made to the system circuit diagram supplied by Denford Senior Ltd. However the main connector differences between issue I and issue II main PCB's are on SKT.C, SKT.E, SKT.F, and PLG.J, and PLG.P, these issue I system connectors are detailed at the end of the main PCB connectors section.

### SYSTEM CONNECTIONS

Connector	C01	(Stepper Motor Power, Misc. Power Signals)
Connector	C02	(Datums and Overtravels)
Connector	C03	(Head Signals)
Connector	C04	(Stereo Cassette Harness)
Connector	C05	(Front Panel Stop & Power Indicators)
Connector	C06	(Drive Assembly offer)
Stepper Motor	Power PLA	
Spindle Speed	Controller	
Spindle Drive	Tag Block (Spindle Motor Power)	

### Main PCB-Connectors:- (Issue I & Issue II systems)

PLG.A	Mains Power In
SKT.B	Front Panel Signals
*SKT.C	Main Contactor/Lube supply connector
*SKT.D	Fan Power
*SKT.E	Rear Panel 0N switch
SKT.F	Power Regulator Transistors
PLG.G	Stereo Cassette Power
SKT.H,	Logic Transformer
PL.I	Auxiliaries
*PL.J	Additional Auxiliaries (option not fitted)
PL.K	Printer
PL.L	Inputs
PL.M	Datum Detector Signals (wired direct to C02)
PL.N	External Video 1
PT,O	External Video 2
*PL.P	Spindle Control Signals
PL.R	Overtravels (wired direct to C02)
P L.S	RS232 Link
PLG.T	Audio Cassette Input
PLG.U	Stepper Drive Control Signals
PL.V	VDU Signals
P L.W	Keyboard Connection 1
P L.X	Keyboard Connection 2
PL.Y	Front Panel Secret Indicators
SK.Z	Digital Cassette Signals

\*Issue I Connectors

SKT.C	Drive System Power - Early Systems
SKT.C	Drive Contactor Power/Fan-Power
SKT.E	Lube Pump Power Option
SKT. F	Wired as Issue II SKT.E
PLG.J	Lube Pump Power Option
PLG.I.P	Spindle Control Signals

CONNECTOR C01 - (24 way QM SKT) STEPPER MOTOR POWER, MISC POWER.

Mounted on bracket at rear of main pcb (left)

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE</u>	<u>DESTINATION</u>
			TRIAC DRIVE PCB	
R/Bk	1	Zph 2A	SK.A.1	Z MOTOR PH2A VIA C03-1
R/Bn	2	Zph 2B	SK.A.2	Z MOTOR PH2B VIA C03-2
Bn	3	Xph 2A	SK.A.3	X MOTOR VIA CONN.BOX3
0/BK	4	Zph 1B	SK.A.4	Z MOTOR PH1B VIA C03-4
0/Bn	5	Zph 1A	SK.A.5	Z MOTOR PH1A VIA C03-5
R	6	Xph 2B	SK.A.6	X MOTOR VIA CONN. BOX-4
GN	7	Yph 2A	SK.A.7	Y MOTOR VIA C03-7
Be	8	Yph 2B	SK.A.8	Y MOTOR VIA C03-8
O	9	Xph 1B	SK.A.9	X MOTOR VIA CONN. BOX-2
Y	10	Yph 1B	SK.A.10	Y MOTOR VIA C03-10
Gy	11	Yph 1A	SK.A.11	Y MOTOP VIA C03-11
Y	12	Xph 1A	SK.A.12	X MOTOR VIA CONN. BOX-1
	13	Coolant Spray L	Main Contactor via C07	Coolant Unit
Be	14	Coolant Spray N	Main Contactor	Coolant Unit
	15	Spare		
	16	Spare		
R/Be	17	Lo Lube Ind +	TRIACdrive PCB	Lube Float Sw via C03-19
Gn/R	18	Lo Lube Ind Ov	TRIACdrive PCB	Lo Lube Ind via C03-18
Gy	19	Lo Volt Lamp	Drive Transf.	Lo Volt Lamp via C03-20
	20	Lo Volt Lamp	Drive Transf.	Lo Volt Lamp via C03-21
	21	POLARISING		
W/R	22	Lube Pump Supply	Sk.C -5	Lube Pump via C03-22
W/Bk	23	Lube Pump Neutral	Sk.C -6	Lube Pump via C03-23
Gn/Y	24	Lube Pump Earth	Sk.C -1	Lube Purup via C03-24

CONNECTOR C02 - (24 WAY QM SKT) OVERTRAVELS & DATUMS

Mounted on bracket at rear of main pcb (right)

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE</u>	<u>DESTINATION</u>
R	1	9VI	Main PCD C02-3	X DATUM DET + VIA TERM. BLK-1
Bk	2	XDATUM -	PL. 1.M-2	X DATUM DET - VIA TERM BLK-2
R	3	9VI	C02-5	Y DATUM DET +
Bn	4	YDATUM -	PL. M-3	Y DATUM DET -
R	5	9VI	C02-7	Z & SPDL. SPD DET + VIA C03-3
O	6	ZDATUM -	PL.M-5	Z DATUM DET - VIA C03-6
R	7	9VI	PL.M-4	
Y	8	SPDL SPD DET -	PL.M-6	SPDL.SPD DET - VIA CO3-9
Be	9	OVI	PL.M-1	
Y/Gn	10	EARTH	SPADE TERM EARTH	CABLE SCREEN
Gn/R	11	OVI	PL.R-1	X 0/TRAVEL SW COMM VIA TERM. BLK -3
GY	12	+X O.T.	PL.R~2	+X 0/TRAVEL SW N/C VIA TERM.BLK-4
	13	-X O.T.	PL.R-3	-X 0/TRAVEL SW N/C VIA TERM.BLK-5
Gn/R	14	OVI	C02-11	Y 0/TRAVEL SW COMM
Y	15	+Y 0. T.	PL. R-4	+Y 0/TRAVEL SW N/C
Pk	16	-Y O.T.	PL.R-5	-Y 0/TRAVEL SW N/C
Gn/R	17	OVI	C.0 2 -.1 1	Z 0/TRAVEL SW COMM VIA C03-13
Gn	18	+Z O.T.	PL. R-7	+Z 0/TRAVEL SW N/C VIA C03-14
R/Y	19	-Z.O.T.	PL.R-8	-Z 0/TRAVEL SW N/C VIA C03-15
	20			
Y/Gn	21	EARTH	MAIN EARTH POINT	
	22			
	23			
	24	POLARISIIIIG		

CONNECTOR C03 - (24W QM SKT) HEAD SIGNALS  
MOUNTED IN COLUMN

<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE</u>	<u>COLOUR</u>	<u>DESTINATION COLOUR</u>
1	Z MOTOR PH2A	C01-1_	R/ Bk	Z MOTOR Bk
2	Z MOTOR PH2B	C01-2	R/Bn	Z MOTOR Bk/W
3	DATUM COM. 9VI	C02-5	R	Z DATUM/SPDL SPD DET +
4	ZMOTOR PH1 B	C01-4	O/ k	Z MOTOR R
5	ZMOTOR PH1A	C01-5	O/R	Z MOTOR R/W
6	SPDL. SPEED	C02-8	Y	SPDL SPEED DET
7	YMOTOP PH2A	C01-7	Gn	Y MOTOR Bk/W
8	YMOTOR PH2B	C01-8	Be	Y MOTOR Bk
9	ZDATUM	C02-6	B	Z DATUM DET +
10	YMOTOR PH1 B	C01-10	V	Z MOTOR R
11	YMOTOR PH1A	C01-11	GY	Z MOTOR R/W
12	EARTH	C02-10	SCREEN	
13	OVI	C02-17	Gn/R	Z 0/T COM R
14	+Z 0/T	C02-18	W/Bk	+Z OTRAVEL Y
15	-Z 0/T	C02-19	W/R	-Z OTRAVEL Y
16	COOLANT SPRAY L	C01-13		COOLANT UNIT Bn
17	COOLANT SPRAY N	C01-14		COOLANT UNIT Be
18	LOW LUBE IND CV	C01-18	Y/R	LOW LUBE IND
19	LOW LUBE IND +	C01-17	0	LOW LUBE IND
20	LOW VOLT LAMP	C01-19	Pk	LOW VOLT LAMP, Pk
21	LOW VOLT LAMP	C01-20	Pk	LOW VOLT LAMP Pk
22	LUBE PUMP	C01-22	R/Gn	LUBE PUMP R/Gn
23	LUBE PUMP	C01-23	R/ Be	LUDE PUMP R/Be
24	EARTH	C01-24	Gn/Y	LUBE PUMP Gn/Y

CONNECTOR C04 - (6way QM PLUG) STEREO CASSETTE HARNESS  
SPEAKERS & JACK SOCKET LEAD

<u>PIN</u>	<u>SIGNAL</u>
1	L/H CH SIGNAL
2	L/H COMMON
3	R/H CH SIGNAL
4	R/H COMMON
5	SPEAKERS COMMON
6	

CONNECTOR C05 - (6 way QM Skt.) FRONT PANEL STOP SWITCH/POWER INDICATORS

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE</u>	<u>DESTINATION</u>
O	1	240V NEON	SKT.B-2	240V PWR ON NEON
Gy	2	110V NEON	SKT.B-7	110V DRIVE ON NEON
V	3	STOP SW-A	SKT.D-6	STOP SWITCH
Bn	4	240V NEON	SKT.B-3	240V PWR ON NEON
Be	5	110V NEON	SKT.B-8	110V DRIVE ON NEON
W	6	STOP SW-B	SKT.B-9	STOP SWITCH

CONNECTOR, C06 - (12 way QM Skt.) DRIVE ASSEMBLY POWER

Gn/Yl	1	EARTH	MAIN EARTH	SPINDLE CONTROL
Bn	2	110/240v LIVE	MAIN POWER	MAIN CONTACTOR
Be	3	110/240 NEUT.	MAIN POWER	MAIN CONTACTOR
Bn	4	CONT.COIL SUPPLY	SKT.C-2	MAIN CONTACTOR
	5			
	6			
R	7	110V FAN POWER	DRIVE TRANSFORMER	SKT.C-3
	8			
Be	9	LO VOLT LAMP	DRIVE TRANSFORMER,	C01-20
Gy	10	LO VOLT LAMP	DRIVE TRANSFORMIER	C01-19
R/Gn	11	LO LUBE IND OV	DRIVE PCB	C01-18
P./Be	12	LO LUBE IND	DRIVE PCB	C01-17

STEPPER MOTOR POWER (12 QM Skt.A)

(Mounted on rear of drive units on TRIAC DRIVE PCB)

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
R/Bk	1	Zph 2A	C01-1
R/B	2	Zph 2B	C01-2
Bn	3	Xph 2A	C01-3
O/Bk	4	Zph 1B	C01-4
O/Bn	5	Zph 1A	C01-5
R	6	Xph 2E	C01-6
Gn	7	Yph 2A	C01-7
Be	8	Yph 2E	C01-8
O	9	Xph 1B	C01-9
Y	10	Yph 1B	C01-10
Gy	11	Yph 1A	C01-11
Y	12	Xph 1A	C01-12

### SPINDLE SPEED CONTROLLERS

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
<u>OPTION 1 PARAJUST CONTROL</u>			
Gn/Y1	G	EARTH	TB3/SPINDLE MOTOR
Rd	1	PH1	TB3/SPINDLE MOTOR
W	2	PH2	TB3/SPINDLE MOTOR
B	3	P113	TB3/SPINDLE MOTOR

### OPTION 2 BROWN & PRESTEL CONTROL

Gn/Y1	E	EARTH	TB1/SPINDLE MOTOR
Rd	A	PH1	TB1/SPINDLE MOTOR
W	B	PH2	TB1/SPINDLE MOTOR
Be	C	PH3	TB1/SPINDLE MOTOR

### MAIN PCB CONNECTIONS

#### PLG.A (3w QM PLG.) - MAINS POWER IN

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
Y/Gn	1	EARTH	BACK PANEL MAINS PLUG
B/n	2	110/240VAC L	BACK PANEL MAINS PLUG
Be	3	110/240VAC N	BACK PANEL MAINS PLUG

#### SKT, B (12w QM SKT.) FRONT PANEL SWITCHES

<u>FRONT PANEL</u>			
	1	Earth	
O	2	240v NEON	PWR IND. VIA C05-1
Bn	3	240V NEON	PWR IND. VIA C05-4
	4		
	5		
V	6	STOP SW-A	STOP SWITCH VIA C05-3
Gy	7	DRIVE ON NEON	DRIVE IND. VIA C05-2
Be	8	DRIVE ON NEON	DRIVE IND. VIA C05-5
W	9	STOP SW-B	STOP SWITCH VIA C05-6
	11		
	12		

SKT.C (6w QM SKT) - MAIN CONTACTOR/LUBE SUPPLY

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
Gn/Y	1	EARTH	LUBE PUMP via C01 -24
Bn	2	CONTACTOR COIL	MAIN CONTACTOR VIA C06-4
Rd	3	110V FAN POWER	DRIVE TRANSFORMER VIA C06-7
N. C.	4		
W/Rd	5	LUB PUMP L	LUBE PUMP VIA C01-22
W/Bk	6	LUB PUMP N	LUBE PUMP via C01-23

SKT.D (3w QM SKT) - FAN POWER (110/120vac)

Y/Gn	1	EARTH	FAN
Bn	2	110/120V LIVE	FAN
Be	3	110/120V NEUT	FAN

SKT.E (6w QM SKT) - REAR PANEL MAIN SWITCH

Y/Gn	1	EARTH	EARTH STUD
Bn	2	110/24OVAC L	REAR PANEL SW.
Be	3	110/24OVAC N	REAR PANEL SW.
V	4	110/24OVAC L	REAR PANEL SW.
W	5	110/24OVAC N	REAR PANEL SW.
	6	Polarising	

PLG.F (6w .156 MOLEX) - REGULATOR TRANSISTOR CONNECTOR

Bn	1	EMITTER T4	BD943 TRANSISTOR (12V REG)
Rd	2	COLLECTOR T4	BD943 TRANSISTOR (12V REG)
0	3	BASE T4	BD943 TRANSISTOR (12V REG)
Y	4	BASE T3	BD943 TRANSISTOR (5V REG)
Gn	5	COLLECTOR T3	BD943 TRANSISTOR (5V REG)
Be	6	EMITTER T3	BD943 TRANSISTOR (5V REG)

PLG.G (6w .156 MOLEX.) - STEREO CASSETTE UNIT POWER

R	1	+12V	STEREO UNIT
Bk	2	OV	STEREO UNIT
	3		

SKT.H (12w QM SKT) - LOGIC Transf.

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
			LOGIC Transformer
Y/Gn	1	EARTH	
Bn	2	110VAC	PRIMARY A Hi
O	3	110/24OVAC N	PRIMARY A Lo
O	4	110VAC	PRIMARY B Lo
		Polarising	
Bn	6	110/24OVAC L	PRIMARY B Hi
Be	7	7.5VAC	SEC 1
Gn	8	10VAC	SEC 2
V	9	10VAC	SEC 2
R	10	15VAC	SEC 3
Y	11	15VAC	SEC 3
Gy	12	7.5VAC	SEC 1

PL.I (10w 1 MOLEX) AUXILIARIES (See External Connections)

				REAR PANEL AUX-I/P Connector	
Bn	1	AUX1 N/O	Pin	1	
R	2	AUX2 N/O	Pin	2	
O	3	AUX1, 2 COMMON	Pin	3	
Y	4	AUX3 N/O	Pin	4	
Gn	5	AUX3 COMMON	Pin	5	
Be	6	AUX3 N/C	Pin	6	
V	7	AUX4 N/O	Pin	7	
Gy	8	AUX4 COMMON	Pin	8	
	9	AUX4 N/C	Pin	9	
	10	Polarising			

PL.J (6w 0,1 MOLEX) - ADDITIONAL AUXILLIARIES OPTION (NOT FITTED)

1	DO NOT USE
2	DO NOT USE
3	
4	AUX6 N/O
5	AUX6 COMMON
6	AUX6 N/C

PL.K (26w IDC) PRINTER INTERFACE (CENTRONICS PARALLEL) (See External Connections)

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
24w RIBBON			REAR PANEL PRINTER Connector
	1	PRINTER STROBE	Pin 1
	2	DATA 0	Pin 2
	3	DATA 1	Pin 3
	4	DATA 2	Pin 4
	5	DATA 3	Pin 5
	6	DATA 4	Pin 6
	7	DATA 5	Pin 7
	8	DATA 6	Pin 8
	9	DATA	Pin 9
	10	/ACK	Pin 10
	11	BUSY	Pin 11
	14-22	OV	Pins 14-22

PL.L (6w 0.1MOLEX) - I/P SIGNALS (See External Connections)

				REAR PANEL AUX-I/P Connector	
Bn	1	OVI	Pin	11	
R	2	I/P 1	Pin	12	
O	3	I/P 2	Pin	13	
Y	4	I/P 3	Pin	14	
Gn	5	I/P 4	Pin	15	
	6	Polarising			

PL.M (Solder Leads) - DATUMS, SPINDLE SPEED DET. (Wired direct to C02)

Be	1	OVI	C02-9
Bk	11	X DATUM	C02-2
Bn	3	Y DATUM	C02-4
R	4	9VI DATUM/SPDL.SPD DET +	C02-1,3,5,7
O	5	Z DATUM	C02-6
Y	6	SPINDLE SPD	C02-8

PL.N (3w 0.1 M0LEX) - EXTERNAL VIDEO 1 (See External Connections)

			REAR PANEL Connector
W/Bk	1	VIDEO COMMON	CONN. OUTER
O/R	2	1V COMP.VIDEO	CONN INNER
	3		

PL.0 (3w 0.1M0LEX) - EXTERNAL VIDEO 2 (See External Connections)

			REAR PANEL Connector
W/Bk	1	VIDEO COMMON	CONN OUTER
O/Bk	2	1V COMP VIDEO	CONN. INNER
	3		

PL.P (8w 0.1M0LEX) - SPINDLE CONTROL SIGNALS

OPTION 1 PARAJUST CONTROLLER (Very Early Systems ONLY)

Bn	1	SPEED REF SIG	PARAJUST TB1-2
	2		
	3		
	4		
Gn	5	SPINDLE COMMON	PARAJUST TB1-4
Be	6	SPINDLE ON N/O	PARAJUST TB1-6
V	7	OV D.C.	PARAJUST TB1-1
Gy	8	SPINDLE +12v SUPPLY	PARAJUST TB1-3

OPTION 2 - Brown Prestel Controller

(Screened cable colours in brackets)

Bn (Bk)	1	SPEED REF SIG	TB1-11
O ( Bn)	2	SPINDLE ON	TB1-8
Y ( R)	3	SPINDLE ON COMM	TB1-7
R (Y)	4	SPINDLE FWD	FANNING STRIP PIN 2
Gn (Gn)	5	SPINDLE DIRN COM	FANNING STRIP PIN 1
Be (Be)	6	SPINDLE REV	FANNING STRIP PIN 3
V (V)	7	SPINDLE OV	TB1-9
GY (W)	8	SPINDLE +12V SUPPLY	TB1-12

PL.R (Solder Connections) - Overtravel Signals. (wired direct to C02)

Gn/R	1	OVI	C02-11
Gy	2	+X O/T	C02-12
W	3	-X O/T	C02-13
V	4	+Y O/T	C02-15
Pk	5	-Y O/T	C02-16
	6		
Gn	7	+Z O/T	C02-18
R/Y	8	-Z O/T	C02-19

PL.S (5W 0.1MOLEX) - RS232 SERIAL INTERFACE

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u> (See External Signals)
			REAR PANEL RS232 Connector
Y/Gn	1	OV	Pin 2
W	2	CTS I/P	Pin 4 (non std.option)
Bk	3	RTS O/P	Pin 5 (non std. option)
R	4	DATA TO TRIAC	PIN 7
Be	5	DATA FROM TRIAC	PIN 6

PLG.T (4w 0.1MOLEX) - AUDIO CASSETTE I/P

Be	1	SPK LO	R/H	SPEAKER LO
Bk	2	SPKS. HI	R/H	SPEAKER HI
	3	Polarising		
	4			

PLG.U (16w IDC SK) - STEPPER MOTOR DRIVE CONTROL SIGNALS

<u>16w RIBBON</u>			<u>TRIAC DRIVE PCB IDC CONN.</u>	
	1	OV	Pin	1
	2	+24V	Pin	2
	3	X DRIVE FAULT	Pin	3
	4	X BOOST	Pin	4
	5	Z DIRN	Pin	5
	6	X DIRN	Pin	6
	7	X STEP	Pin	7
	8	/ENERGISE	Pin	8
	9	OV	Pin	9
	10	DRIVE FAULT	Pin	10
	11	DRIVE FAULT	Pin	11
	12	BOOST	Pin	12
	13	BOOST	Pin	13
	14	DIRN	Pin	14
	15	STEP	Pin	15
	16	STEP	Pin	16

PL.V (4w 0.156MOLEX) - POWER/VIDEO TO INTERNAL MONITOR

			<u>KME VDU DRIVER PCD</u>	
Bk	1	OV	Pin	10
Gn/R	2	1V COMP. VIDEO	Pin	8
R	3	+12V	Pin	7
Gn	4	OV	Pin	1

PL.W (10w 0,1 BERG) - JAYCO FRONT PANEL/KEYBOARD

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
10w RIBBON			KEYBOARD CONN. 1
	1	DIGIT 6	Pin 1
	2	DIGIT 7	Pin 2
	3	KEY 6	Pin 3
	4	KEY 4	Pin 4
	5	KEY 0	Pin 5
	6	KEY 2	Pin 6
	7	KEY 1	Pin 7
	8	KEY 3	Pin 8
	9	KEY 5	Pin 9
	10	KEY 7	Pin 10

<u>PL.X (10w 0,1 BERG)</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
10w RIBBON			KEYBOARD CONN. 2
	1	CV	Pin 1
	2	DRIVE ON KEY	Pin 2
	3	STOP KEY	Pin 3
	4	CYCLE STOP KEY	Pin 4
	5	DIGIT 3	Pin 5
	6	DIGIT 0	Pin 6
	7	DIGIT 1	Pin 7
	8	DIGIT 2	Pin 8
	9	DIGIT 5	Pin 9
	10	DIGIT 4	Pin 10

<u>PL.Y (6W 0.1MOLEX) - FRONT PANEL SECRET INDICATORS</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
			SECRET IND PCB,s
Bn	1	+5V	LED BD.1,2
W	2	MAN	LED BD.1
V	3	AUTO	LED BD.1
O	4	SPINDLE	LED BD.2
Bk	5	CASSETTE	LED BD.2
Gn	6	OV	LED BD.1

PLZ (16w DIL SKT) - DIGITAL CASSETTE UNIT

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
16w RIBBON			CASSETTE UNIT
RIBBON	1	Polarising	
	2		
	3		
	4	DATA TO CASSETTE	Pin 4
	5	CASSETTE PRESEIIT	Pin 5
	6	WR/RD	Pin 6
	7	FILE PROTECT	Pin 7
	8	+5v	Pin 8
	9	0v	Pin 9
	10	EARTH	Pin 10
	11	RWD/FWD	Pin 11
	12	SLOW/FAST	Pin 12
	13	DATA FROM CASS	Pin 13
	14	CLEAR LEADER	Pin 14
	15	STOP/GO	Pin 15
	16	+5v	Pin 16

ISSUE I System connectors

SKT.C (6w QM SKT) - DRIVE SYSTEM POWER - EARLY SYSTEMS

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
Y/Gn	1	EARTH	EARTH STUD
O	2	110/240 PRIMARY A Lo	Drive Transformer
O		110/240 PRIMARY B Lo	Drive Transformer
	4	Polarising	
Bn	5	110/240 PRIMARY B Hi	Drive Transformer
Bn	6	110/240 PRIMARY A Hi	Drive Transformer

SKT. C (6w QM SKT) Contactor Coil/Fan Power Supply

<u>CABLE</u>	<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
	1		
	2		
Bk	3	110vac. Fan Supply	C06
	4		
	5		
Rd	6	Contactor Coil Supply	Main Contactor

SKT.E (3w QM PLG) Lube Pump Power (Option)

<u>PIN</u>	<u>SIGNAL</u>	<u>SOURCE/DESTINATION</u>
1	EARTH	C01-19
2	110/240V LIVE	MAIN PCB PLG.J-1
3	110/240V NEUTRAL	C01-18

PLG.J (6w 0.1 MOLEX) Lube Pump Power (Option)

	1	110/240V LIVE	SKT. E-2
	2	110/240V LUBE ON	C01-17

PLG.P (8w 0.1MOLEX) SPINDLE CONTROL SIGNALS

OPTION 1 PARAJUST CONTROLLER

Bn	1	SPEED REF SIG	PARAJUST TB1-2
	2		
	3		
	4		
Gn	5	SPINDLE COMMON	PARAJUST TB1-4
Be	6	SPINDLE ON N/O	PARAJUST TB1-6
V	7	OV D. C.	PARAJUST TB1-1
GY	8	SPINDLE +12V SULPPLY	PARAJUST TB1-3

8) BLOCK AID CIRCUIT DIAGRAMS.

Processor Block Diagram

TRIAC Block Diagram

Processor Circuit Diagram

VDU Block Diagram

VDU Circuit Diagram

XYZ Drive Block Diagram

XYZ Drive Circuit Diagram

Filter and RS232 Link Block Diagram

Auxiliaries Block Diagram

Datum and Printer Block Diagram

Spindle Control and Overtravel Block Diagram

Auxiliary, Datum, Printer Control, Spindle Control, Overtravel Circuits

Graphics Block Diagram

Graphics Circuit Diagram

Power Supply Block Diagram

Mains Wiring and Power Supply Circuit Diagrams