TRIAC -ATC

SERVICE MANUAL

INTRODUCTION

THIS SERVICE MANUAL IS TO BE USED AS AN AID TO ANY MAINTENANCE WORK CARRIED OUT ON THE TRIAC CNC MILLER.

THE MANUAL IS SPLIT INTO FOUR SECTIONS:

1) ROUTINE MAINTENANCE

THIS COVERS THE SCHEDULE OF MAINTENANCE THAT SHOULD BE ADHERED TO FOR TROUBLE FREE USE OF THE TRIAC CNC MILLER.

2) ELECTRICAL DRAWINGS

COVERING ELECTRICAL DRAWINGS.

3) TROUBLE SHOOTING

SOME OF THE SMALL PROBLEMS THAT MAY OCCUR OVER THE MACHINES LIFETIME.

4) SPARE PARTS AND ASSEMBLY DRAWINGS

AN AID IN THE LOCATING AND ORDERING OF SPARE PARTS.

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CONTENTS

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SECTION 1

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1.1 INTRODUCTION

This section covers the schedule of maintenance that should be adhered to for trouble free use of TRIAC . The procedures for adjusting the lubrication flow rate are also contained within this section.

There is also a guide to the necessary lubrication requriements of TRIAC.

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1.2 PLANNING PROCEDURE FOR MAINTENANCE WORK

When carrying out maintenance work, pay special attention to the following items to ensure safe and correct procedures.

- 1) Before starting the maintenance work, understand its contents and obtain preparatory knowledge required for the maintenance work.
- 2) Based on the circumstantial judgement of the maintenance work, secure a work range, tools, workers at a work period, spare parts, and all necessary information to carry out the work.
- 3) Be sure to record and store results of preventive maintenance and productive maintenance.
- 4) During a maintenance work period, put up a notice at a place where it can be easily seen to inform other personnel that the machine is under maintenance work.
- 5) Use instruments and tools suitable for the maintenance work.
- 6) Use a work bench and proper lighting in accordance with a work place. Do not carry out the maintenance work under hazerdous conditions.
- 7) When carrying out the maintenance work, removing a safety cover or releasing various interlocks, pay special attention to safety. After finishing the maintenance work, be sure to mount the safety cover and reset the interlocks.
- 8) For electrical maintenance, it should be carried out by a qualified electrician with reference to Sections 2 and 3.
- 9) When carrying out the maintenance work with the power turned off, put up a notice "DO NOT TURN ON POWER" on the isolator.
- 10) Do not touch electric wiring or switches with a wet hands.
- 11) Do not change any set value of the machine unless absolutlynecessary, and then log any changes.
- 12) When replacing a fuse, electric wire, electric bulb, or switch, be sure to use the one specified.
- 13) After finishing the maintenance work, re-check serviced part so that the machine can be properly operated.

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1.3 MAINTENANCE SCHEDULE

Routine inspection and maintenance of the machine should be carried out to the following schedule:-

DAILY

- Check oil level in reservoir (See diagram Section 1.5 and lubrication chart).
- Clean out Swarf

WEEKLY

- Clean machine thoroughly.

For machines with an ATC.

- Check pull stud in tool shank to ensure that it is fully screwed in.
- Lubricate the slide ways to prevent sticking.

SIX MONTHLY

- Check adjustment of head, cross slide and table strips (See Trouble Shooting Procedure 1, Section 3.2)

ANNUALLY

- Grease Axis Bearings (See lubrication chart Section 1.5)
- Check machine alignments and accuracy.
- Check spindle bearing adjustment.
- Check spindle drive belt.
- Check Axis Drive Belt for Wear.

IF IN DOUBT ABOUT ANY OF ABOVE, CONTACT DENFORD'S FOR ASSISTANCE.

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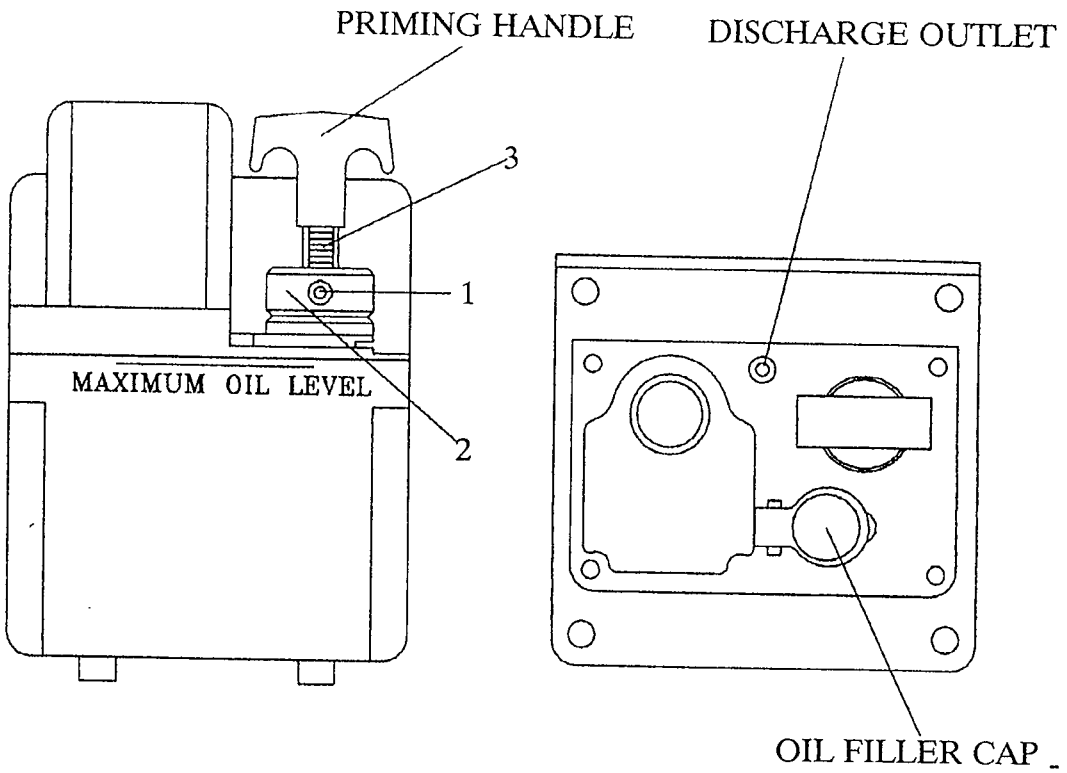
1.4 LUBRICATION PUMP



The lubrication reservoir and pump are found inside the access door on the left hand side of the machine. (See diagram on previous page).

ADJUSTING THE PUMP OUTPUT

To adjust the output of the pump, first release the screw(1) until the adjusting nut turns freely. Adjust the nut(2) for the required output, the shaft (3) is graduated in 0.5 ml stops to assist in this setting. After adjustment,the screw (1) must be carefully re-tightened.

DO NOT overtighten

NOTE:

Before tightening the screw (1) ensure that the adjuster(2) is positioned so that the screw (1) is always tightened towards the flat graduated section of the shaft(3).

Your system is now ready for trouble-free operation. To maintain continuity of lubrication do not allow the lubricant level in the reservoir to drop below 18mm (3/4").

LUBRICATION CHART

LUBRICATION POINT	LUBRICATING SYSTEM	FREQUENCY	RECOMMENDED OIL / GREASE	QTY
SLIDE WAYS AND BALLSCREWS	AUTO PUMP UNIT	ALARM MESSAGE ON CONTROL V.D.U.	BP : CS 68 SHELL : VITREA 68 CASTROL : PERFECTO NN	0,5 litre
MILLING HEAD	GREASE SEAL	ON MAINTENANCE OF MILLING HEAD	KLUBER ISOFLEX NBU 15	4 cc/BEARING
AXIS BEARINGS	GREASE SEAL	ONCE A YEAR	BP : LS 3 SHELL : ALVANIA No.3	2cc/BEARING
COOLANT	ELECTRIC PUMP	AS REQUIRED	CINCINNATI MILLACRON SIMCOOL C60	14.75 litre

SECTION 2

ELECTRICAL SERVICING

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TRIAC MAINTENANCE MANUAL

Contents:-

1)

BASIC OPERATION OF TRIAC CONTROL UNIT

Contents:-

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 7" 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/OT'S
f) GRAPHICS
g) DATUMS/INPUTS/PRINTER
h) 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 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 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 1v 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 cotinuous 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 KM3701 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 D0 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.

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 Reed Only Memory)
3) Keyboard (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 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 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.

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 SWITCH
CASSETTE
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-I/P 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
	0=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 CLEAR LEADER 1=CLR	CASS DATA (ALWAYS 0 ON TEST) 0=DATA	CASS PRESENT 0=CASS PRESENT	CASS FILE PROTECT 1=FILE PROTECT

M/C SWITCHES
Three of the front panel mounted keyboard switches are machine switches.

BIT	3	2	1
	0=CYCLE STOP	0=STOP	0=DRIVE 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 1=METAL SEEN	Z DATUM 1=METAL SEEN	Y DATUM 1=METAL SEEN	X DATUM 1=METAL SEEN

STEP & DIRN (USED BY TRIAC MANUFACTURERS).
These signals show the status of the step and direction input signals, these signals are utilized by the manufacturers.

BIT	7	6	5	4	3	2	1	0
	-	Z DIRN 1=+VE	Y DIRN 1=+VE	X DIRN 1=+VE	-	Z STEP 1=STEP	Y STEP 1=STEP	X 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 1 = OK	Y AXIS DRIVE 1 = OK	X AXIS DRIVE 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 check 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/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.

WARNING If the main PCB is removed it is imperative that when fitting a new PCB the power 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
1/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 1d)	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 Depress DRIVE ON	DRIVE ON indicator should light and stay on. If not do "T" test and check DRIVE ON key (see section 7)	All stepper motor should energise, if not do "T" test and check drives (see section 2) Faulty stepper drives may readily be replaced (Note the axis drives are not ineterchangable) If all drives appear faulty check indicator L1 on TRIAC DRIVE PCB whilst should be on 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 steps.
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 dont 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. MONitor Connector

EXT VID 1

Pin	Signal	Destination
Inner	Composite Video	to 12ins monitor
Outer	Ov	

EXT VID 2

Pin	Signal	Destination
Inner	Composite Video	to user monitor
Outer	Ov	

PRINTER

Pin	Signal	Destination
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).

Pin	Signal	Destination
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 3	
14	I/P 4	

RS232

Pin	Signal	Destination
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 1v 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 3 & 4) which operate when programmed to do so and remain ON until programmed OFF.

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 0VI 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 15mAdc.

RS232 Connector - Serial Link

pin 2

0v - TRIAC System 0volts. NOTE it is important that electrical interferance is not present on this connection as it could impair the performance of the TRIAC system.

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 Power)
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 ON 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
PL.O	External Video 2
*PL.P	Spindle Control Signals
PL.R	Overtravels (wired direct to C02)
PL.S	RS232 Link
PLG.T	Audio Cassette Input
PLG.U	Stepper Drive Control Signals
PL.V	VDU Signals
PL.W	Keyboard Connection 1
PL.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.P	Spindle Control Signals

CONNECTOR C01 - (24 way QM SKT) STEPPER MOTOR POWER,MISC POWER.
Mounted on bracket at rear of main pcb (left)

CABLE	PIN	SIGNAL	SOURCE TRIAC DRIVE PCB	DESTINATION
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. BOX-3
O/Bk	4	Zph 1B	SK.A. 4	Z MOTOR PH1B VIA C03-4
O/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 MOTOR 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
Be	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 Pump via C03-24

CONNECTOR C02 - (24 WAY QM SKT) OVERTRAVELS & DATUMS
Mounted on bracket at rear of main pcb (right)

CABLE	PIN	SIGNAL	SOURCE Main PCB	DESTINATION
R	1	9VI	C02-3	X DATUM DET + VIA TERM. BLK-1
Bk	2	XDATUM -	PL.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 C03-9
Be	9	0VI	PL.M-1	
Y/Gn	10	EARTH	SPADE TERM EARTH	CABLE SCREEN
Gn/R	11	0VI	PL.R-1	X O/TRAVEL SW COMM VIA TERM.BLK-3
Gy	12	+X O.T.	PL.R-2	+X O/TRAVEL SW N/C VIA TERM.BLK-4
W	13	-X O.T.	PL.R-3	-X O/TRAVEL SW N/C VIA TERM.BLK-5
Gn/R	14	0VI	C02-11	Y O/TRAVEL SW COMM
V	15	+Y O.T.	PL.R-4	+Y O/TRAVEL SW N/C
Pk	16	-Y O.T.	PL.R-5	-Y O/TRAVEL SW N/C
Gn/R	17	0VI	C02-11	Z O/TRAVEL SW COMM VIA C03-13
Gn	18	+Z O.T.	PL.R-7	+Z O/TRAVEL SW N/C VIA C03-14
R/Y	19	-Z O.T.	PL.R-8	-Z O/TRAVEL SW N/C VIA C03-15
	20			
Y/Gn	21	EARTH	MAIN EARTH POINT	
	22			
	23			
	24	POLARISING		

CONNECTOR CO3 - (24W QM SKT) HEAD SIGNALS
MOUNTED IN COLUMN

PIN	SIGNAL	SOURCE	COLOUR	DESTINATION	COLOUR
1	Z MOTOR PH2A	CO1-1	R/Bk	Z MOTOR	Bk
2	Z MOTOR PH2B	CO1-2	R/Bn	Z MOTOR	Bk/W
3	DATUM CON. 9VI	CO2-5	R	Z DATUM/SPDL SPD DET +	
4	ZMOTOR PH1B	CO1-4	O/Bk	Z MOTOR	R
5	ZMOTOR PH1A	CO1-5	O/R	Z MOTOR	R/W
6	SPDL. SPEED	CO2-8	Y	SPDL SPEED DET -	
7	YMOTOR PH2A	CO1-7	Gn	Y MOTOR	Bk/W
8	YMOTOR PH2B	CO1-8	Be	Y MOTOR	Bk
9	ZDATUM	CO2-6	B	Z DATUM DET +	
10	YMOTOR PH1B	CO1-10	V	Z MOTOR	R
11	YMOTOR PH1A	CO1-11	Gy	Z MOTOR	R/W
12	EARTH	CO2-10	SCREEN		
13	OVI	CO2-17	Gn/R	Z O/T CON	R
14	+Z O/T	CO2-18	W/Bk	+Z OTRAVEL	Y
15	-Z O/T	CO2-19	W/R	-Z OTRAVEL	Y
16	COOLANT SPRAY L	CO1-13		COOLANT UNIT	Bn
17	COOLANT SPARY N	CO1-14		COOLANT UNIT	Be
18	LOW LUBE IND OV	CO1-18	Y/R	LOW LUBE IND	
19	LOW LUBE IND +	CO1-17	O	LOW LUBE IND	
20	LOW VOLT LAMP	CO1-19	Pk	LOW VOLT LAMP	Pk
21	LOW VOLT LAMP	CO1-20	Pk	LOW VOLT LAMP	Pk
22	LUBE PUMP	CO1-22	R/Gn	LUBE PUMP	R/Gn
23	LUBE PUMP	CO1-23	R/Be	LUBE PUMP	R/Be
24	EARTH	CO1-24	Gn/Y	LUBE PUMP	Gn/Y

CONNECTOR CO4 -(6 way QM PLUG) STEREO CASSETTE HARNESS
SPEAKERS & JACK SOCKET LEAD

PIN	SIGNAL
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

CABLE	PIN	SIGNAL	SOURCE	DESTINATION
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.B-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 TRANSFORMER	C01-19
R/Gn	11	LO LUBE IND OV	DRIVE PCB	C01-18
R/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)

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
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 2B	C01-6
Gn	7	Yph 2A	C01-7
Be	8	Yph 2B	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

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
OPTION 1 PARAJUST CONTROL			
Gn/Yl	G	EARTH	TB3/SPINDLE MOTOR
Rd	1	PH1	TB3/SPINDLE MOTOR
W	2	PH2	TB3/SPINDLE MOTOR
B	3	PH3	TB3/SPINDLE MOTOR
OPTION 2 BROWN & PRESTEL CONTROL			
Gn/Yl	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

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
Y/Gn	1	EARTH	BACK PANEL MAINS PLUG
Bn	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

			FRONT PANEL
	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
	10		
	11		
	12		

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

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
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	110/240VAC L	REAR PANEL SW.
Be	3	110/240VAC N	REAR PANEL SW.
V	4	110/240VAC L	REAR PANEL SW.
W	5	110/240VAC N	REAR PANEL SW.
	6	Polarizing	

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

Bn	1	EMITTER T4	BD943 TRANSISTOR (12V REG)
Rd	2	COLLECTOR T4	BD943 TRANSISTOR (12V REG)
O	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	0V	STEREO UNIT
	3		

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

CABLE	PIN	SIGNAL	SOURCE/DESTINATION LOGIC Transformer
Y/Gn	1	EARTH	
Bn	2	110VAC	PRIMARY A Hi
O	3	110/240VAC N	PRIMARY A Lo
O	4	110VAC	PRIMARY B Lo
	5	Polarizing	
Bn	6	110/240VAC 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
W	9	AUX4 N/C	Pin 9
	10	Polarizing	

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)

CABLE 24w RIBBON	PIN	SIGNAL	SOURCE/DESTINATION 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 7	Pin 9
	10	/ACK	Pin 10
	11	BUSY	Pin 11
	14-22	0V	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	Polarizing	

PL.M (Solder Leads) - DATUMS, SPINDLE SPEED DET. (Wired direct to CO2)

Be	1	OVI	CO2-9
Bk	2	X DATUM	CO2-2
Bn	3	Y DATUM	CO2-4
R	4	9VI DATUM/SPDL.SPD DET +	CO2-1,3,5,7
O	5	Z DATUM	CO2-6
Y	6	SPINDLE SPD	CO2-8

PL.N (3w 0.1MOLEX) - 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.O (3w 0.1MOLEX) - 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 0.1MOLEX) - 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 (Colder 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

CABLE	PIN	SIGNAL	SOURCE/DESTINATION (See External Signals) REAR PANEL RS232 Connector
Y/Gn	1	0V	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	SPK HI	R/H SPEAKER HI
	3	Polarizing	
	4		

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

16w RIBBON			TRIAC DRIVE PCB IDC CONN.
	1	0V	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	0V	Pin 9
	10	Y DRIVE FAULT	Pin 10
	11	Z DRIVE FAULT	Pin 11
	12	Z BOOST	Pin 12
	13	Y BOOST	Pin 13
	14	Y DIRN	Pin 14
	15	Y STEP	Pin 15
	16	Z STEP	Pin 16

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

			KME VDU DRIVER PCB
Bk	1	0V	Pin 10
Gn/R	2	1V COMP. VIDEO	Pin 8
R	3	+12V	Pin 7
Gn	4	0V	Pin 1

PL.W (10w 0.1 BERG) - JAYCO FRONT PANEL/KEYBOARD

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
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

PL.X (10w 0.1 BERG) - JAYCO FRONT PANEL KEYBOARD

10w RIBBON			KEYBOARD CONN. 2
	1	Ov	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

PL.Y (6w 0.1MOLEX) - FRONT PANEL SECRET INDICATORS

			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

PL2 (16w DIL SKT) - DIGITAL CASSETTE UNIT

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
16w RIBBON			CASSETTE UNIT
RIBBON	1	Polarizing	
	2		
	3		
	4	DATA TO CASSETTE	Pin 4
	5	CASSETTE PRESENT	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

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
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

CABLE	PIN	SIGNAL	SOURCE/DESTINATION
	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)

	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	CO1-17

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 AND 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

Auxiliarys Block Diagram

Datum and Printer Block Diagram

Spindle Control and Overtravel Block Diagram

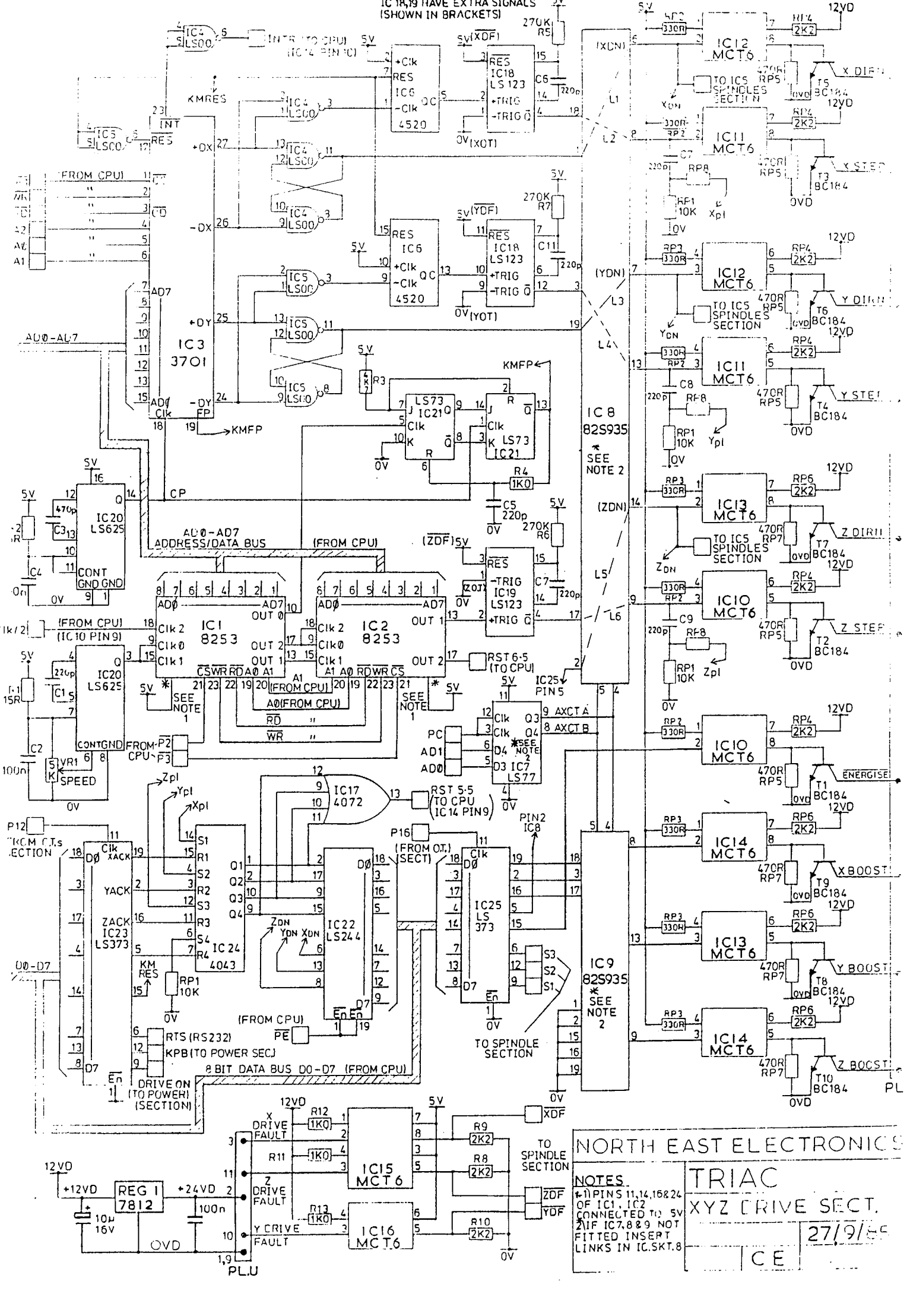
Auxiliary, Datum, Printer Control, Spindle Control, Overtravel Circuits

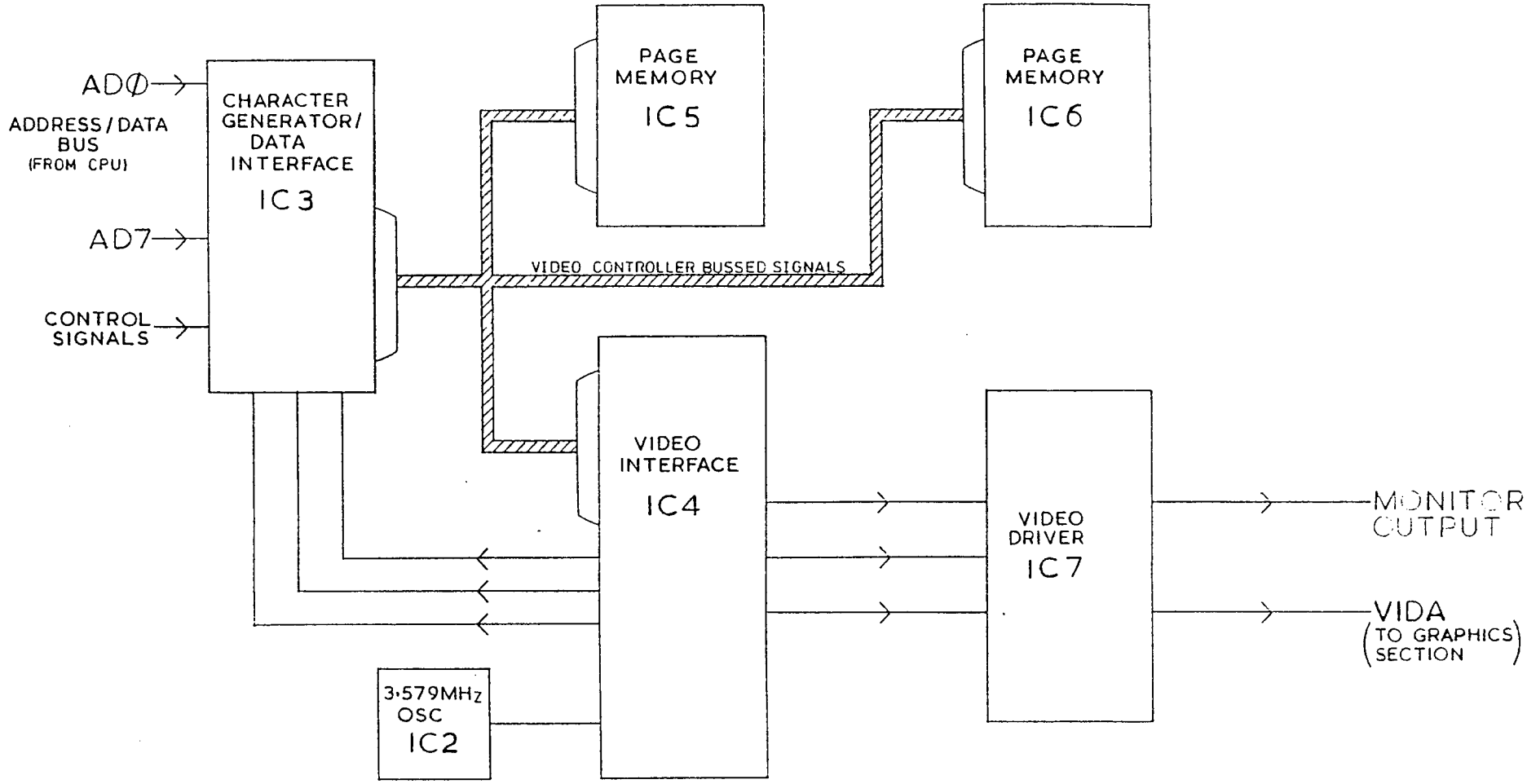
Graphics Block Diagram

Graphics Circuit Diagram

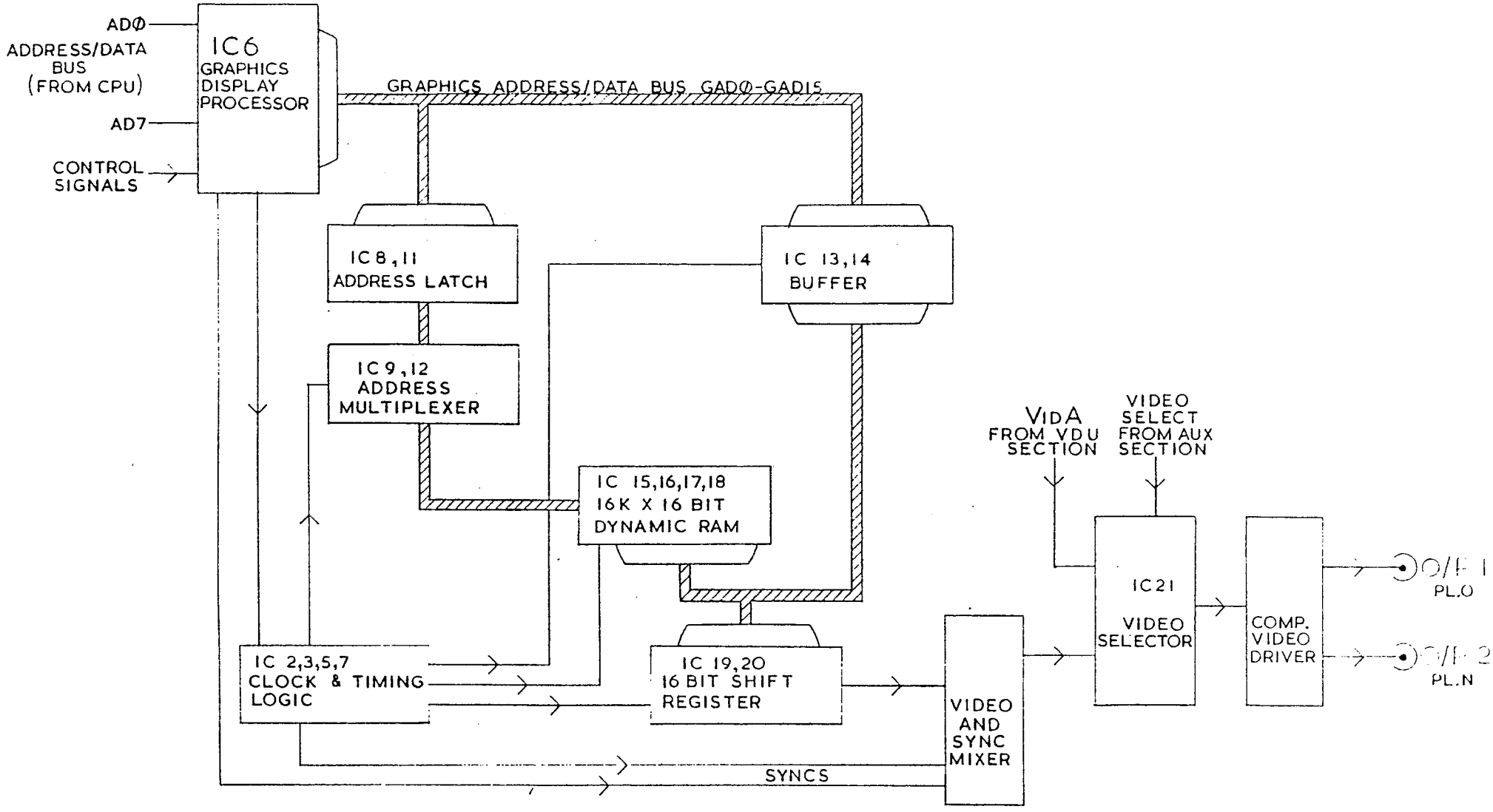
Power Supply Block Diagram

Mains Wiring and Power Supply Circuit Diagrams

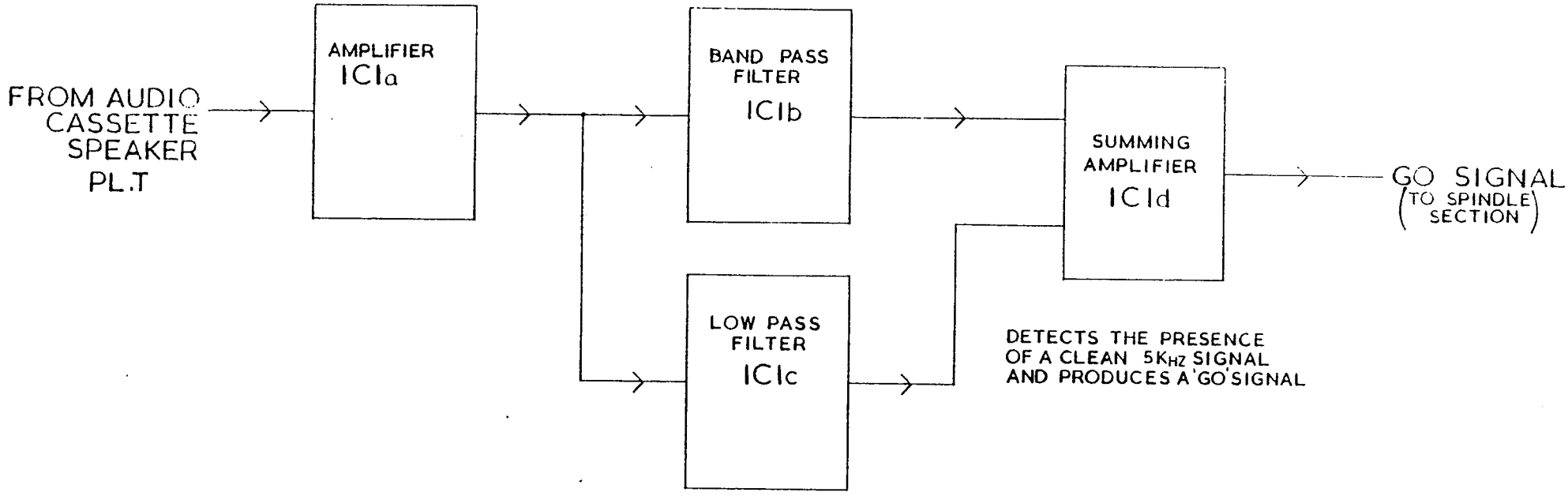

IC 18,19 HAVE EXTRA SIGNALS (SHOWN IN BRACKETS)
IC1 8253
IC2 8253
IC3 3701
IC4 LS00
IC5 LS00
IC6 4520
IC8 82S935
SEE NOTE 2
IC9 82S935
SEE NOTE 2
IC10 MCT6
IC11 MCT6
IC12 MCT6
IC13 MCT6
IC14 MCT6
IC15 MCT6
IC16 MCT6
IC17 4072
IC18 LS123
IC19 LS123
IC20 LS625
IC21 LS73
IC22 LS244
IC23 LS373
IC24 4043
IC25 LS 373
REG 1 7812
AD0-AD7 ADDRESS/DATA BUS
8 BIT DATA BUS D0-D7 (FROM CPU)
TO SPINDLE SECTION
TO IC5 SPINDLES SECTION
SPEED
ENERGISE
X DIRN
X STEP
Y DIRN
Y STEP
Z DIRN
Z STEP
X BOOST
Y BOOST
Z BOOST
DRIVE ON (TO POWER) (SECTION)
X DRIVE FAULT
Y DRIVE FAULT
Z DRIVE FAULT
RST 6-5 (TO CPU)
RST 5-5 (TO CPU IC14 PIN9)
NORTH EAST ELECTRONICS
TRIAC
XYZ DRIVE SECT.
27/9/
CE
NOTES
1) PINS 11,14,16&24 OF IC1, IC2 CONNECTED TO 5V
2) IF IC7,8&9 NOT FITTED INSERT LINKS IN IC.SKT.8

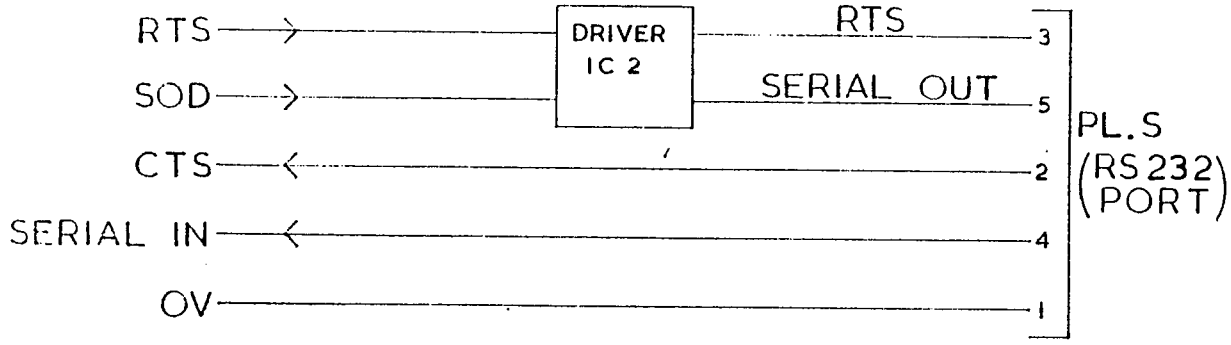


NORTH EAST ELECTRONICS	
NOTES:	TRIAC
	V.D.U. BLOCK DIAGRAM
	2/10/85
	CE

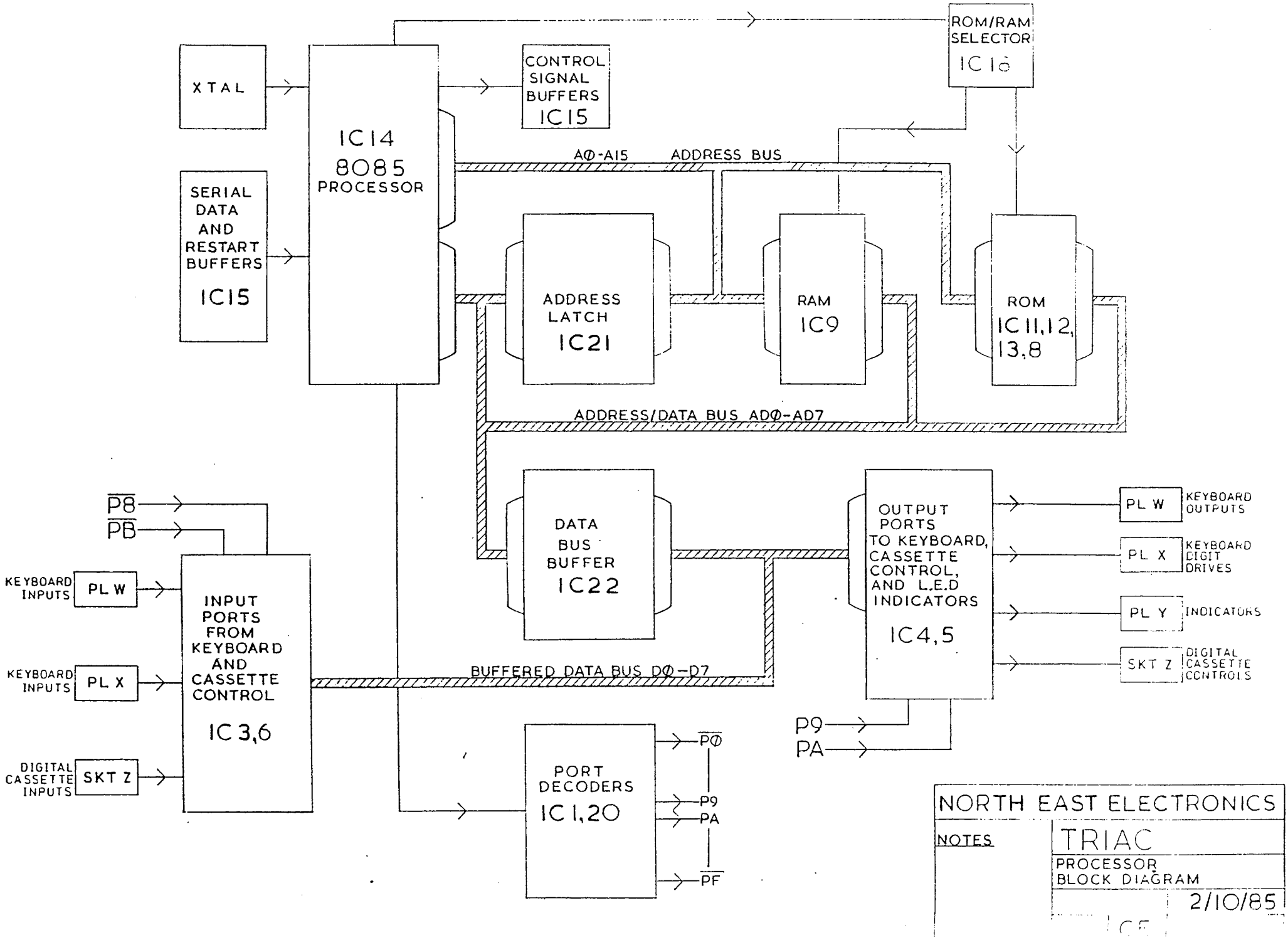


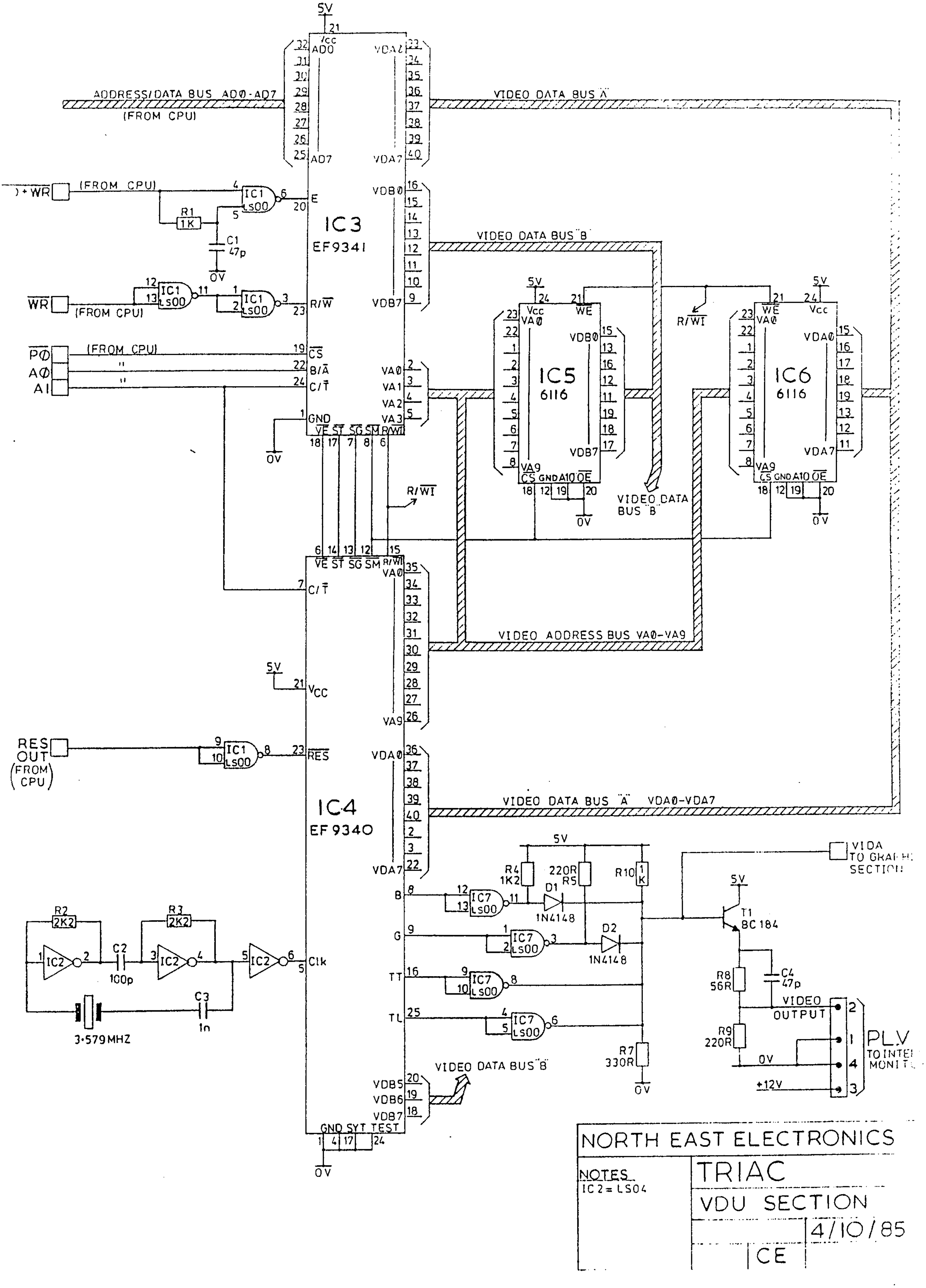
NORTH EAST ELECTRONICS	
NOTES	TRIAC
	GRAPHICS SECTION BLOCK DIAGRAM
	30/57-
	TE



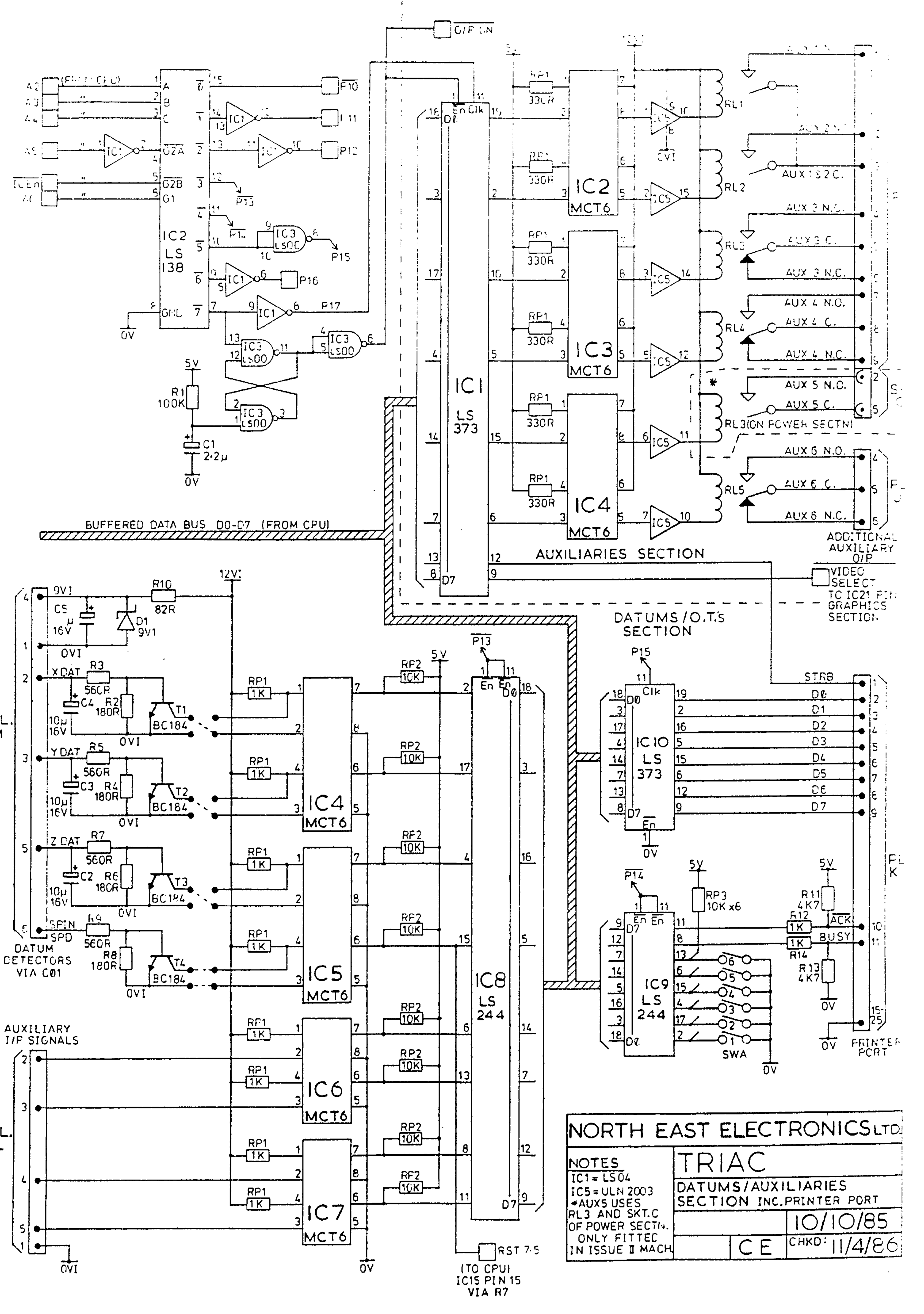


NORTH EAST ELECTRONICS	
NOTES:	TRIAC
	FILTER AND RS 232 LINK BLOCK DIAGRAM
	30/9/85
	CE

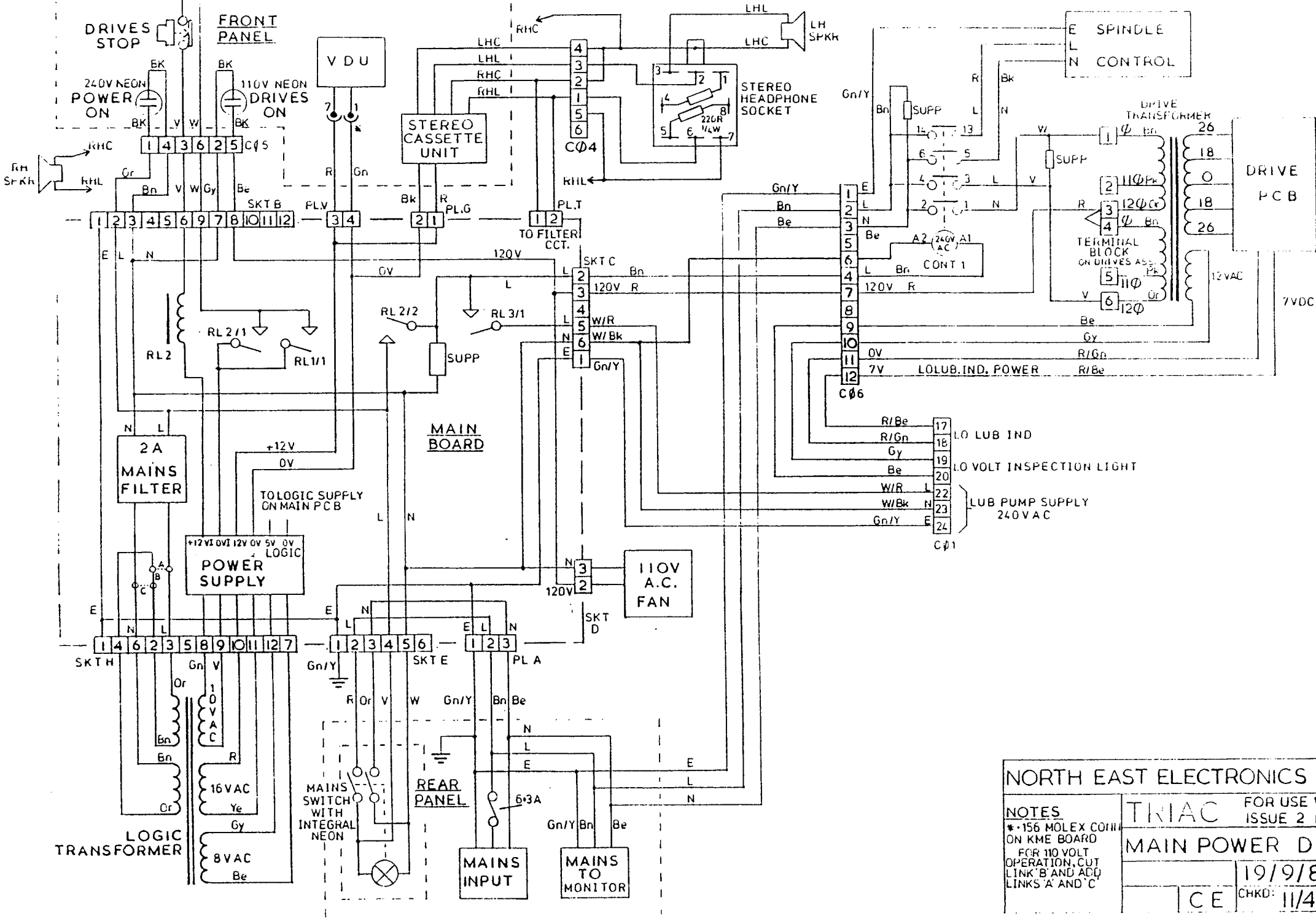

XTAL
IC14
8085
PROCESSOR
CONTROL
SIGNAL
BUFFERS
IC15
ROM/RAM
SELECTOR
IC16
SERIAL
DATA
AND
RESTART
BUFFERS
IC15
A0-A15 ADDRESS BUS
ADDRESS
LATCH
IC21
RAM
IC9
ROM
IC11,12,
13,8
ADDRESS/DATA BUS AD0-AD7
DATA
BUS
BUFFER
IC22
OUTPUT
PORTS
TO KEYBOARD,
CASSETTE
CONTROL,
AND L.E.D
INDICATORS
IC4,5
PL W
KEYBOARD
OUTPUTS
PL X
KEYBOARD
DIGIT
DRIVES
PL Y
INDICATORS
SKT Z
DIGITAL
CASSETTE
CONTROLS
P8
PB
KEYBOARD
INPUTS
PL W
KEYBOARD
INPUTS
PL X
DIGITAL
CASSETTE
INPUTS
SKT Z
INPUT
PORTS
FROM
KEYBOARD
AND
CASSETTE
CONTROL
IC 3,6
BUFFERED DATA BUS D0-D7
P9
PA
PORT
DECODERS
IC 1,20
P0
P9
PA
PF
NORTH EAST ELECTRONICS
NOTES
TRIAC
PROCESSOR
BLOCK DIAGRAM
2/10/85
CE



5V
ADDRESS/DATA BUS AD0-AD7
(FROM CPU)
VIDEO DATA BUS "A"
(FROM CPU)
IC1 LS00
R1 1K
C1 47p
0V
IC3
EF9341
VIDEO DATA BUS "B"
WR
(FROM CPU)
R/WI
IC5 6116
IC6 6116
VIDEO DATA BUS "B"
VIDEO ADDRESS BUS VA0-VA9
IC4
EF9340
RES OUT (FROM CPU)
VIDEO DATA BUS "A" VDA0-VDA7
R2 2K2
R3 2K2
C2 100p
C3 1n
3·579MHZ
IC2
IC7 LS00
R4 1K2
220R R5
D1 1N4148
D2 1N4148
R10 1K
R7 330R
T1 BC 184
R8 56R
C4 47p
R9 220R
VIDEO OUTPUT
+12V
VIDA TO GRAPHIC SECTION
PLV TO INTERNAL MONITOR
VIDEO DATA BUS "B"
NORTH EAST ELECTRONICS
NOTES
IC 2 = LS04
TRIAC
VDU SECTION
4/10/85
CE



O/P ON
IC2 LS 138
IC1 LS 373
AUXILIARIES SECTION
BUFFERED DATA BUS D0-D7 (FROM CPU)
IC2 MCT6
IC3 MCT6
IC4 MCT6
RL1
RL2
RL3
RL4
RL5
RL3(ON POWER SECTN)
AUX 1 & 2 C.
AUX 3 N.O.
AUX 3 C.
AUX 3 N.C.
AUX 4 N.O.
AUX 4 C.
AUX 4 N.C.
AUX 5 N.O.
AUX 5 C.
AUX 6 N.O.
AUX 6 C.
AUX 6 N.C.
ADDITIONAL AUXILIARY O/P
VIDEO SELECT TO IC21 PIN GRAPHICS SECTION
DATUMS / O.T.'s SECTION
IC10 LS 373
IC9 LS 244
IC8 LS 244
IC4 MCT6
IC5 MCT6
IC6 MCT6
IC7 MCT6
X DAT
Y DAT
Z DAT
SPIN SPD
DATUM DETECTORS VIA C01
AUXILIARY I/F SIGNALS
STRB
ACK
BUSY
SWA
PRINTER PORT
RST 7.5 (TO CPU) IC15 PIN 15 VIA R7
NORTH EAST ELECTRONICS LTD
NOTES
IC1 = LS04
IC5 = ULN 2003
*AUX5 USES RL3 AND SKT.C OF POWER SECTN. ONLY FITTED IN ISSUE II MACH.
TRIAC
DATUMS / AUXILIARIES SECTION INC. PRINTER PORT
10/10/85
CE
CHKD: 11/4/86



NORTH EAST ELECTRONICS

NOTES

*·156 MOLEX CONN ON KME BOARD

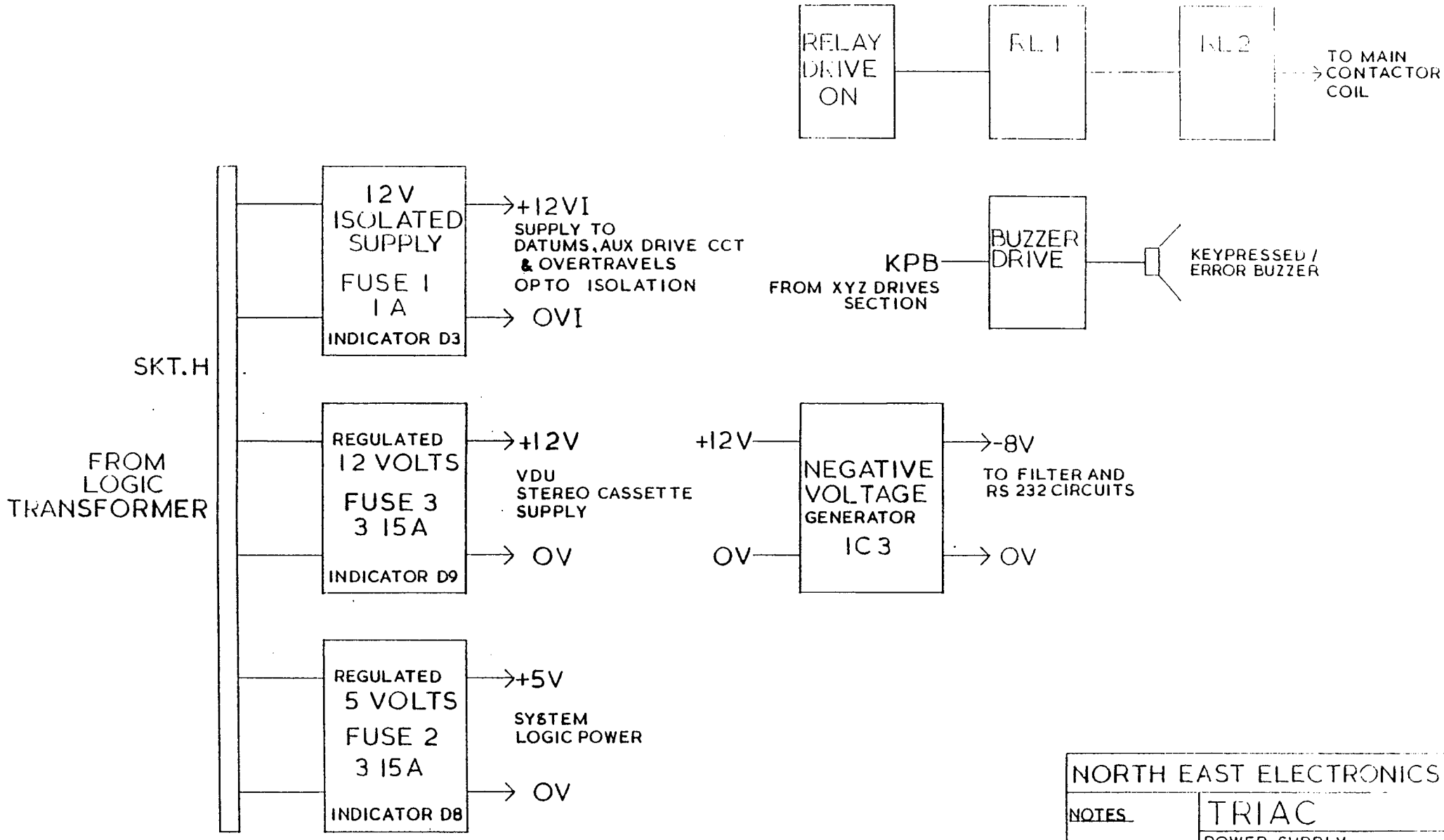
FOR 110 VOLT OPERATION, CUT LINK 'B' AND ADD LINKS 'A' AND 'C'

TRIAC FOR USE ISSUE 2

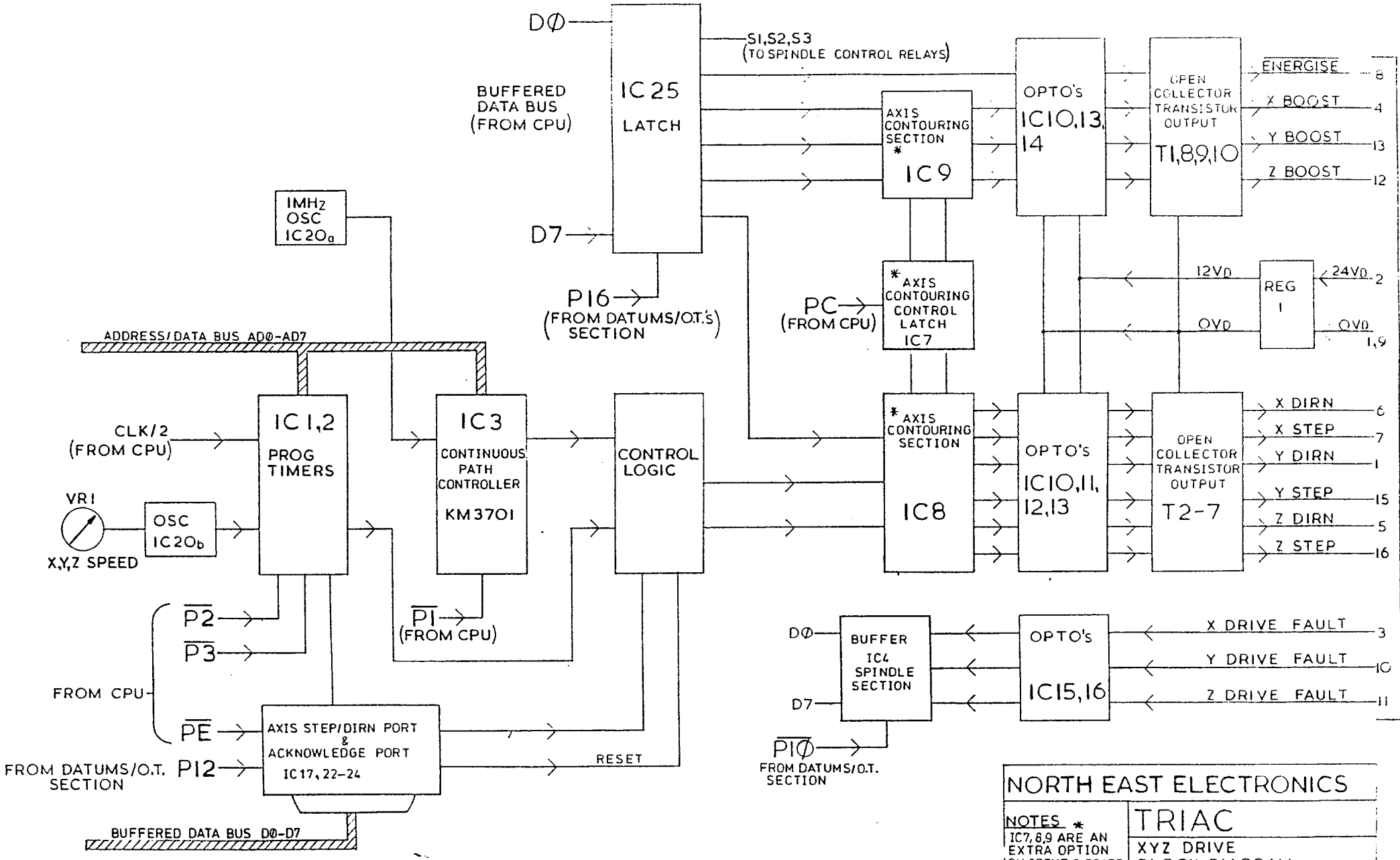
MAIN POWER D

19/9/8

CE CHKD: 11/4



NORTH EAST ELECTRONICS		
NOTES	TRIAC	
	POWER SUPPLY BLOCK DIAGRAM	
		30/9/85
	CE	



NORTH EAST ELECTRONICS

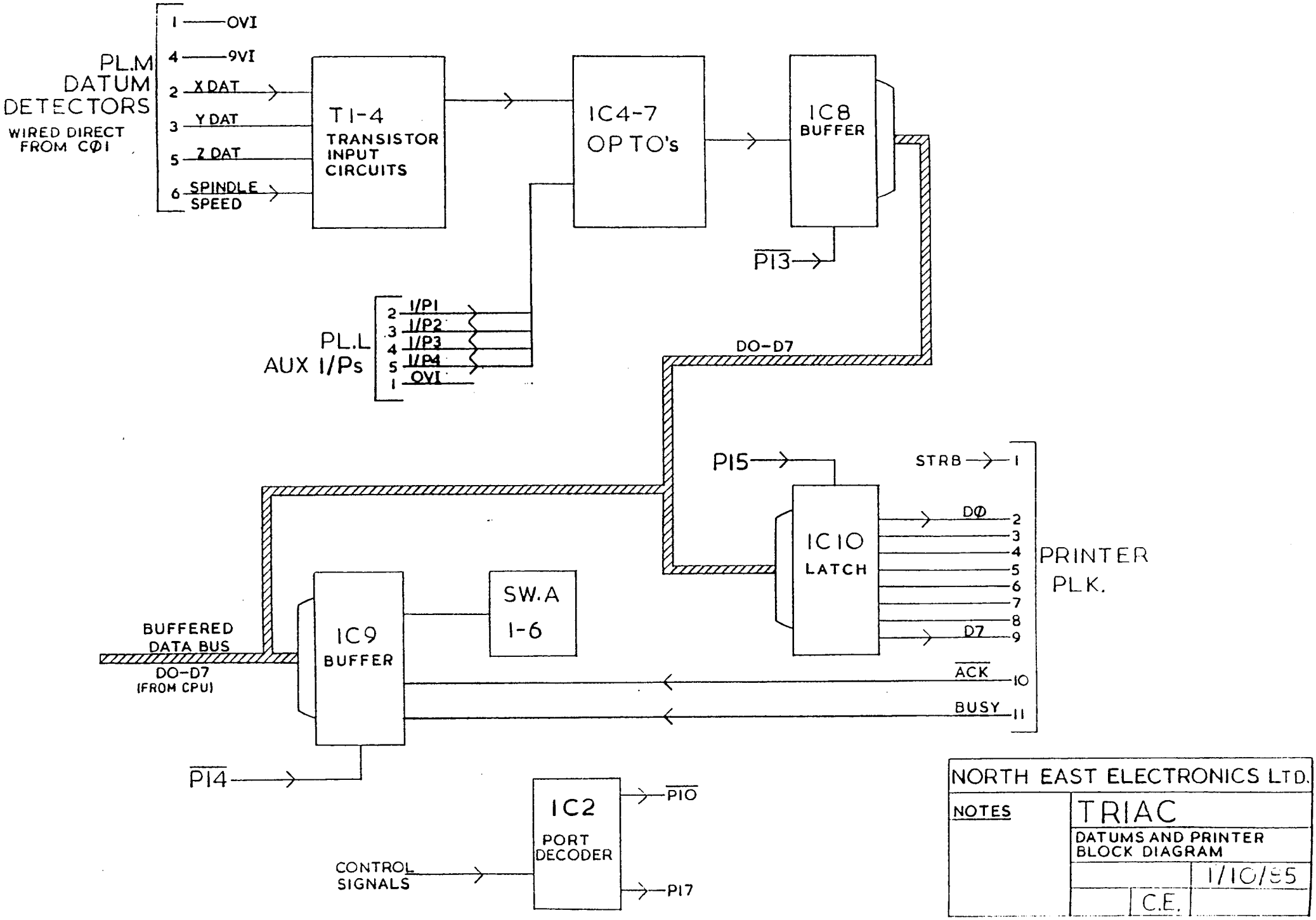
NOTES *
IC7, 8, 9 ARE AN EXTRA OPTION ON ISSUE 2 BOARD NOT PRESENT ON ISSUE 1 BOARDS

TRIAC

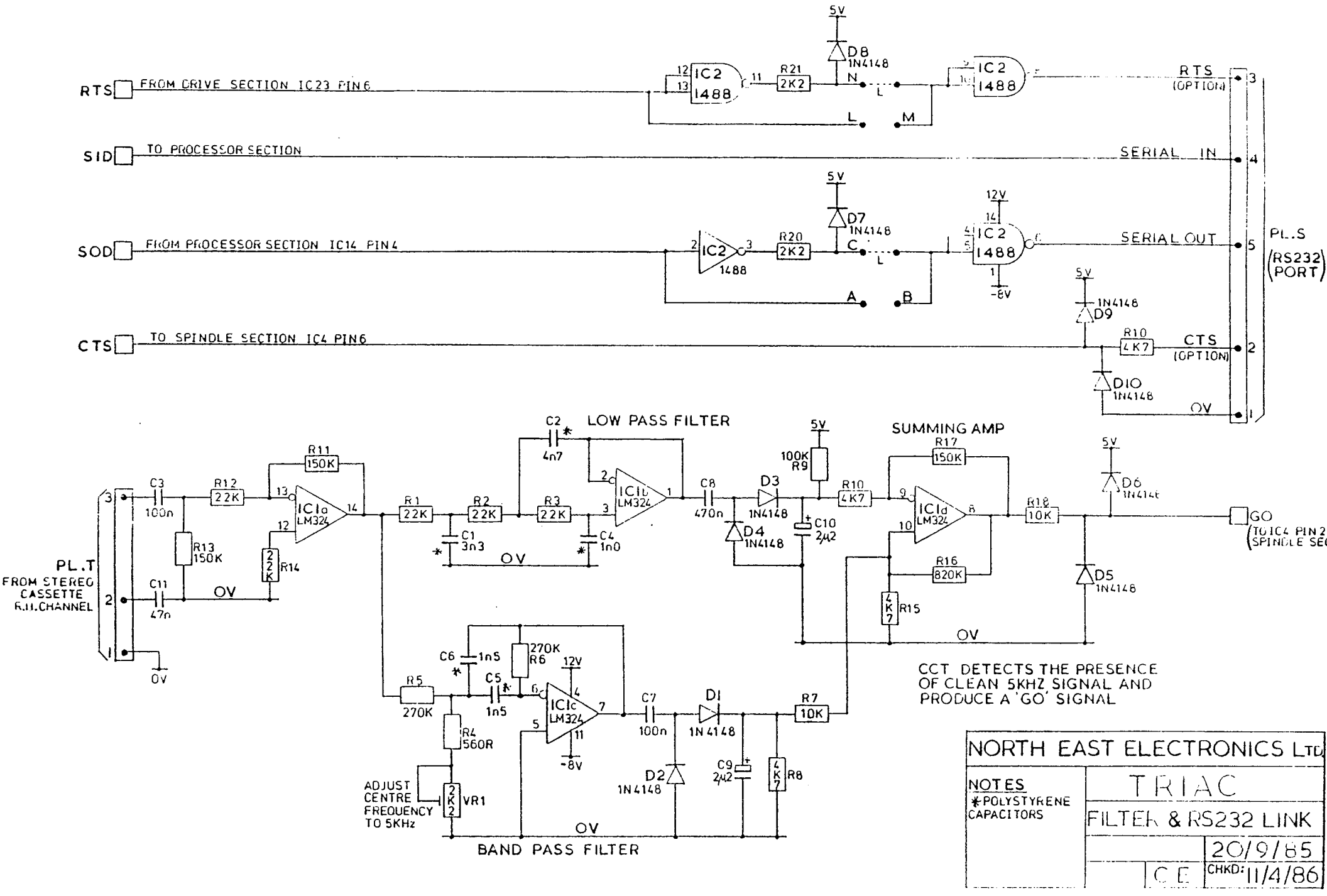
XYZ DRIVE BLOCK DIAGRAM

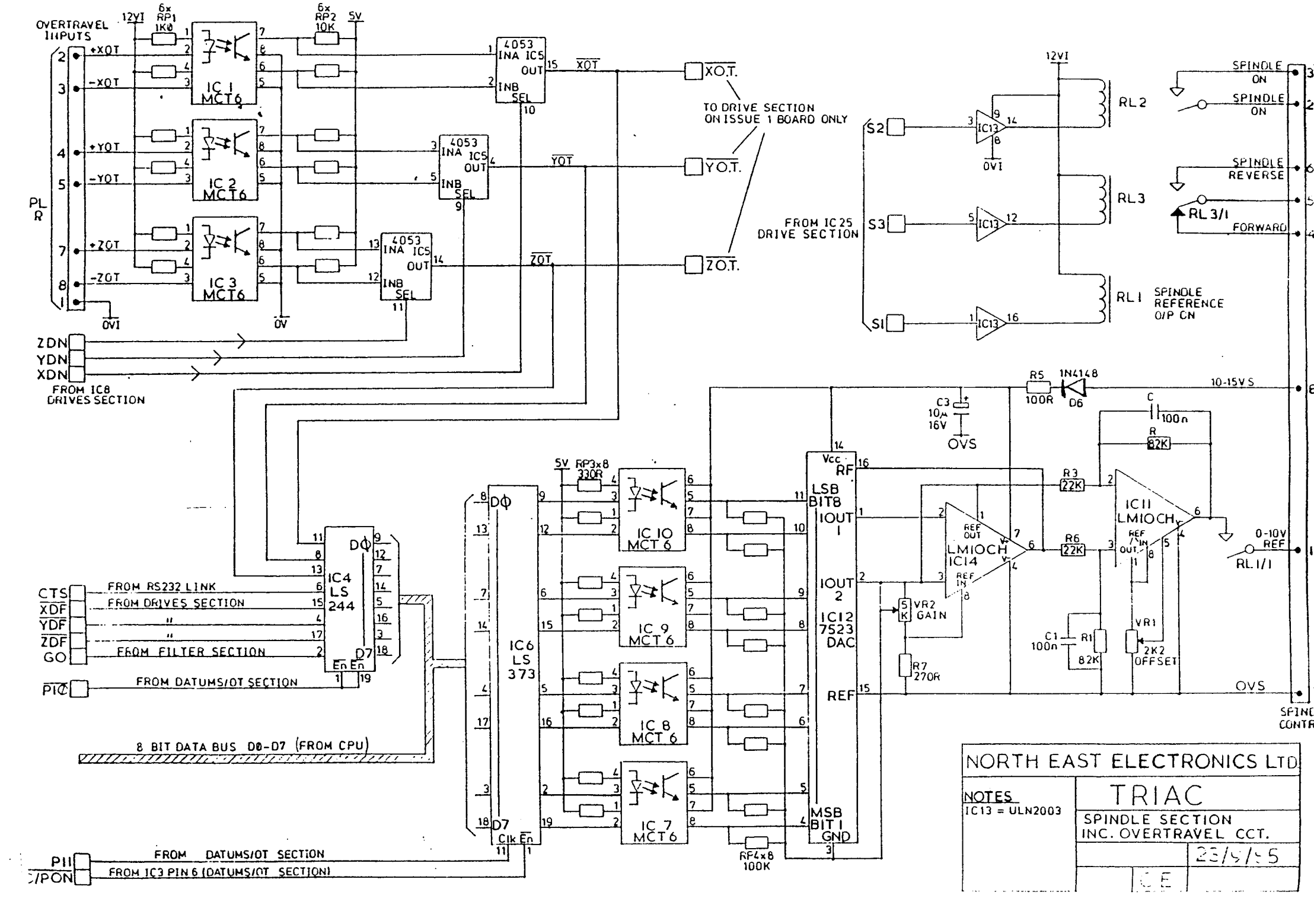
3/10/85

CE



NORTH EAST ELECTRONICS LTD.	
NOTES	TRIAC
	DATUMS AND PRINTER BLOCK DIAGRAM
	1/10/85
	C.E.


RTS
FROM DRIVE SECTION IC23 PIN6
SID
TO PROCESSOR SECTION
SOD
FROM PROCESSOR SECTION IC14 PIN4
CTS
TO SPINDLE SECTION IC4 PIN6
5V
D8 1N4148
D7 1N4148
D9 1N4148
D10 1N4148
IC2 1488
R21 2K2
R20 2K2
R10 4K7
12V
-8V
RTS (OPTION)
SERIAL IN
SERIAL OUT
CTS (OPTION)
OV
PL.S (RS232 PORT)
LOW PASS FILTER
C2 4n7
C1 3n3
C4 1n0
R1 22K
R2 22K
R3 22K
IC1b LM324
C8 470n
D3 1N4148
D4 1N4148
C10 2µ2
100K R9
SUMMING AMP
R17 150K
IC1d LM324
R16 820K
R15 4K7
R18 10K
D6 1N4148
D5 1N4148
GO
(TO IC4 PIN 2 SPINDLE SEC)
PL.T
FROM STEREO CASSETTE R.H. CHANNEL
C3 100n
C11 47n
R12 22K
R13 150K
R14 22K
R11 150K
IC1a LM324
BAND PASS FILTER
C6 1n5
C5 1n5
R6 270K
R5 270K
R4 560R
IC1c LM324
C7 100n
D1 1N4148
D2 1N4148
C9 2µ2
R8 4K7
R7 10K
ADJUST CENTRE FREQUENCY TO 5KHz
VR1 2K2
CCT DETECTS THE PRESENCE OF CLEAN 5KHZ SIGNAL AND PRODUCE A 'GO' SIGNAL
NORTH EAST ELECTRONICS LTD
NOTES
*POLYSTYRENE CAPACITORS
TRIAC
FILTER & RS232 LINK
20/9/85
CE
CHKD: 11/4/86



NORTH EAST ELECTRONICS LTD

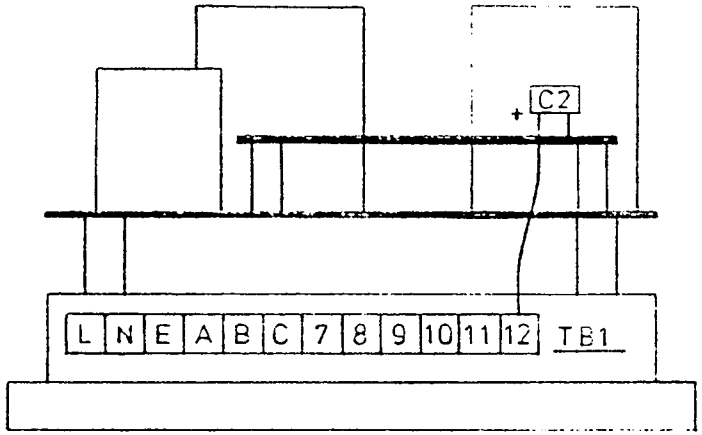
NOTES
IC13 = ULN2003

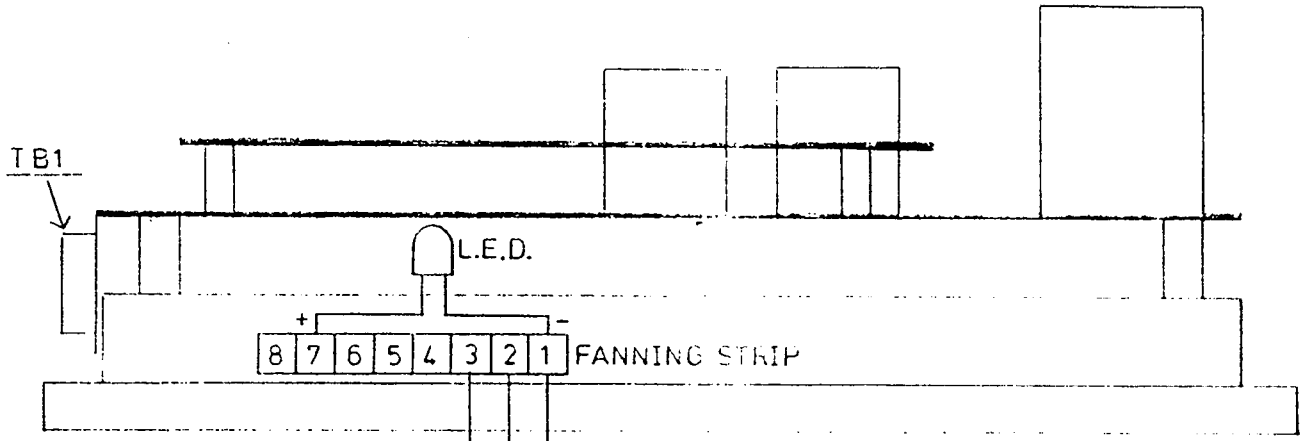
TRIAC

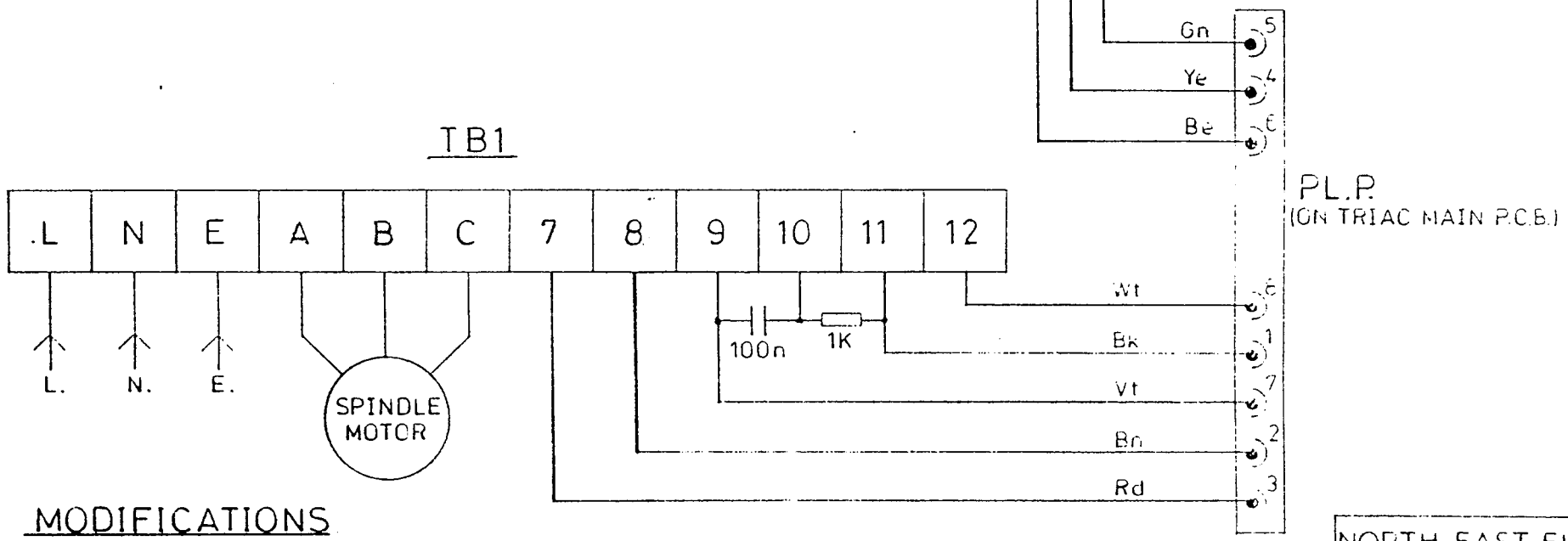
SPINDLE SECTION
INC. OVERTRAVEL CCT.

23/5/85

C E







MODIFICATIONS

1 REMOVE SHORTING LINK FROM PINS 1 AND 2 OF FANNING STRIP

2 LINK +VE END OF C2 ON TOP BOARD TO PIN 12 OF TB1

3 A 100n CAPACITOR AND 1K 1/8W RESISTOR SUPPRESSION NETWORK MUST BE FITTED TO TB1 PINS 9,10,11

NORTH EAST ELECTRONICS

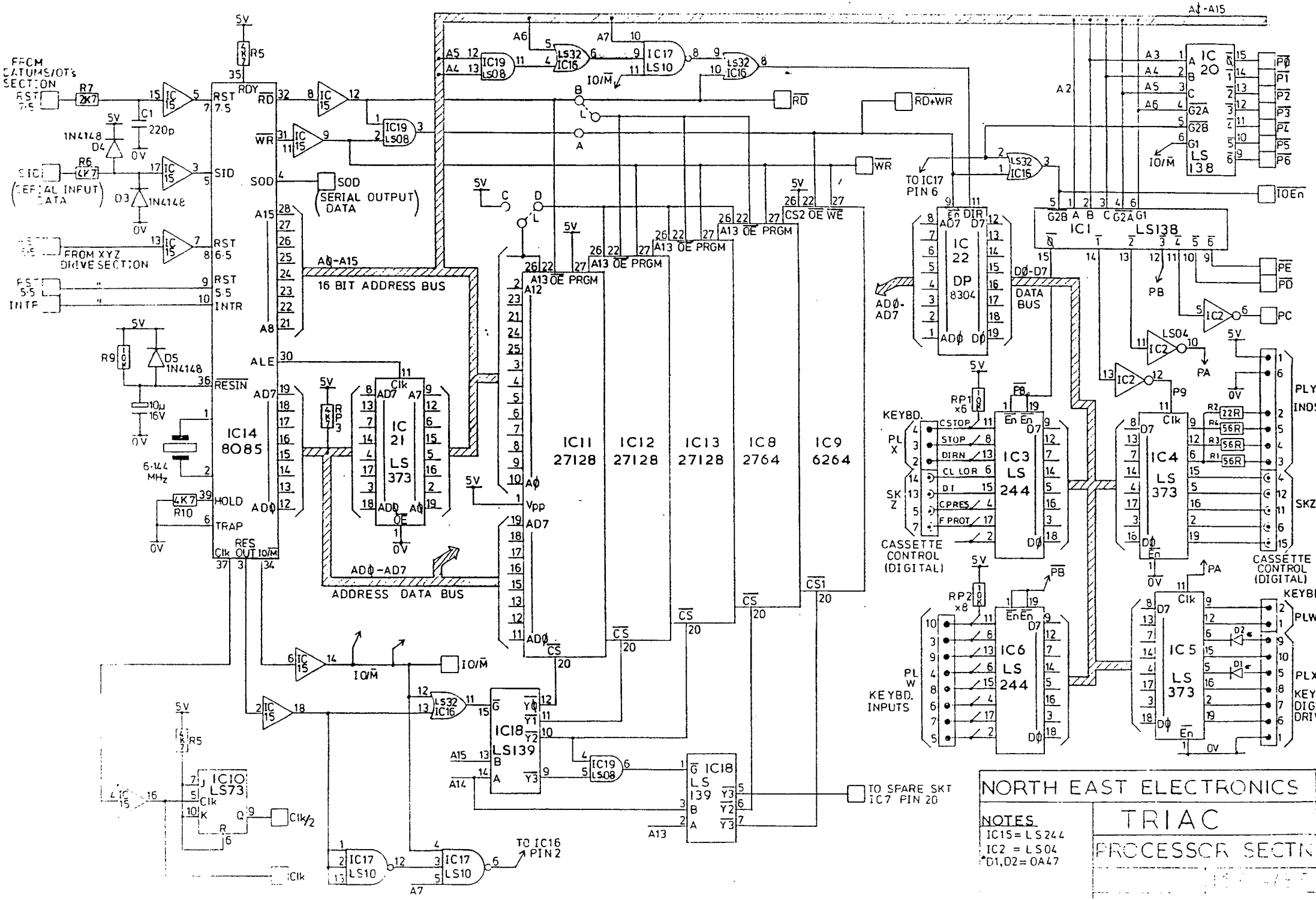
NOTES:

TRIAC

SPINDLE DRIVE CONNECTIONS

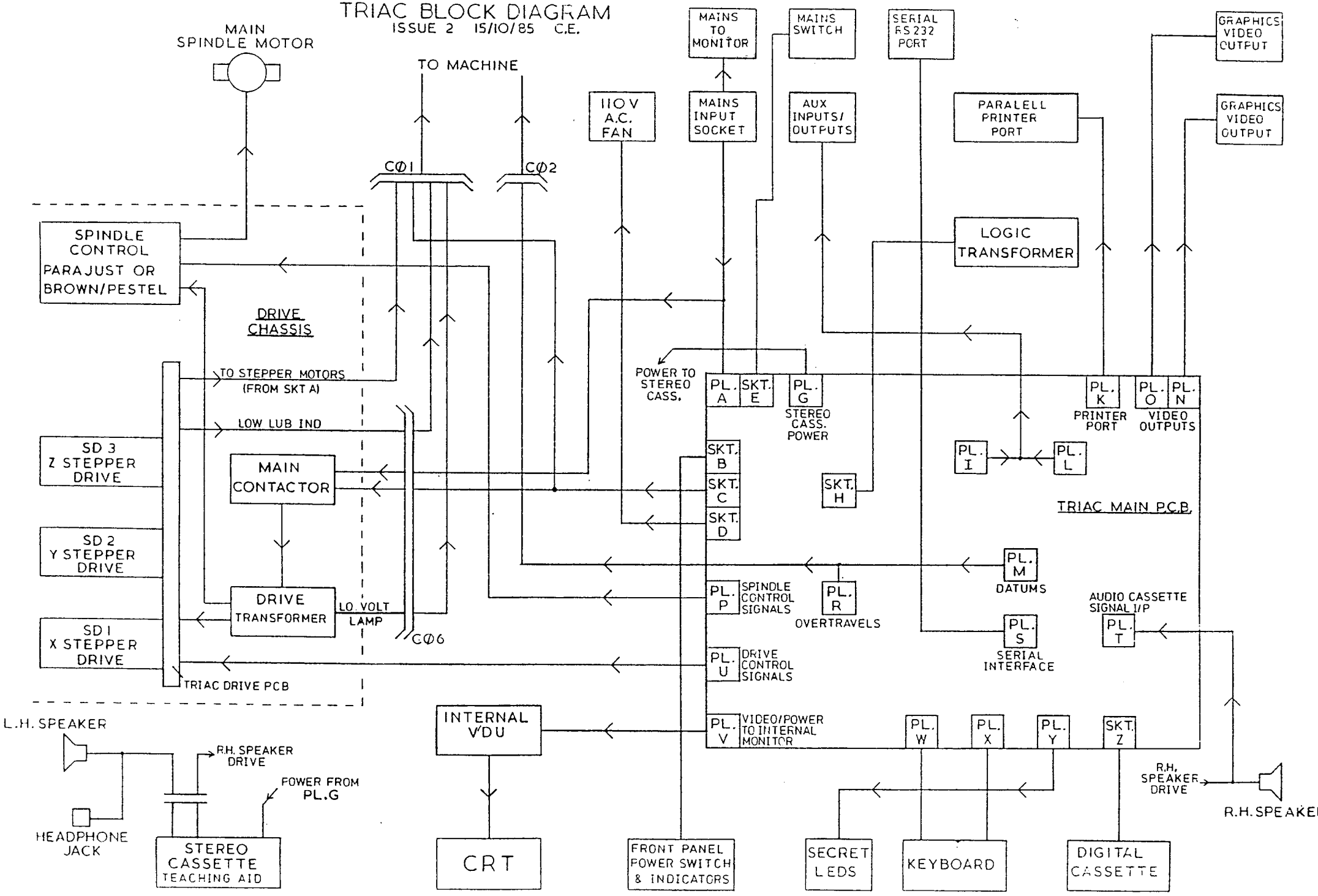
21/2/8

C.E


NORTH EAST ELECTRONICS
TRIAC
PROCESSOR SECTN
NOTES
IC15 = LS244
IC2 = LS04
D1,D2 = OA47
IC14 8085
IC11 27128
IC12 27128
IC13 27128
IC8 2764
IC9 6264
IC21 LS 373
IC22 DP 8304
IC20
IC1 LS138
IC3 LS 244
IC4 LS 373
IC6 LS 244
IC5 LS 373
IC10 LS73
IC18 LS139
16 BIT ADDRESS BUS
ADDRESS DATA BUS
DATA BUS
SERIAL INPUT DATA
SERIAL OUTPUT DATA
FROM CATUMS/OT's SECTION
FROM XYZ DRIVE SECTION
CASSETTE CONTROL (DIGITAL)
KEYBD. INPUTS
TO SPARE SKT IC7 PIN 20
TO IC16 PIN 2
TO IC17 PIN 6
6·144 MHz
220p
10µ 16V

TRIAC BLOCK DIAGRAM

ISSUE 2 15/10/85 C.E.



ELECTRICAL DRAWINGS

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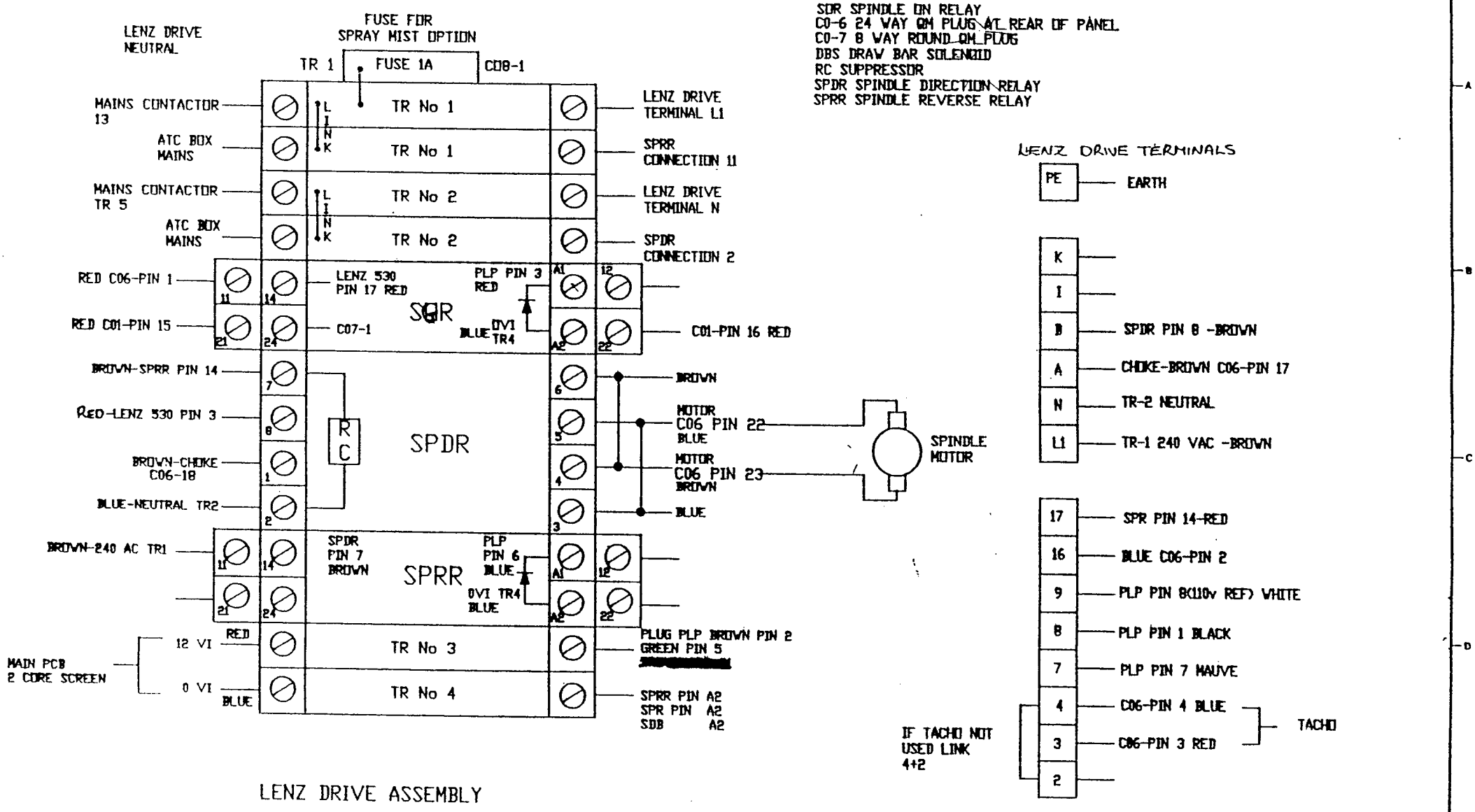
SDR SPINDLE ON RELAY
CO-6 24 WAY QM PLUG AT REAR OF PANEL
CO-7 8 WAY ROUND QM PLUG
DBS DRAW BAR SOLENOID
RC SUPPRESSOR
SPDR SPINDLE DIRECTION RELAY
SPRR SPINDLE REVERSE RELAY



LENZ DRIVE ASSEMBLY

FOR MORE INFORMATION SEE SHEET 9

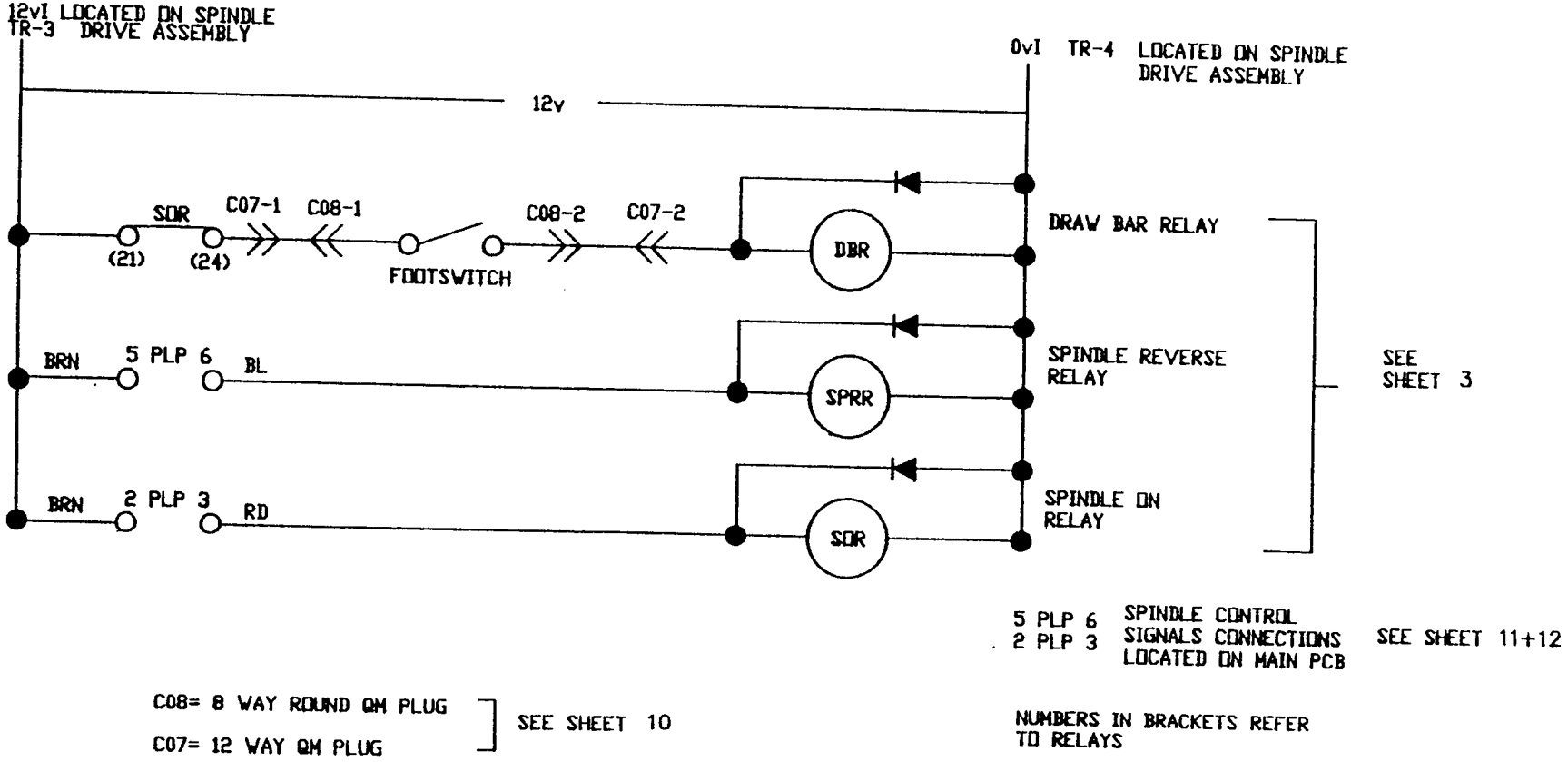
DENFORD	CHINE TOOLS LTD	BRIGHOUSE	WEST YORKSHIRE	DRN. BY: A. NEWSOME	DATE: 22-11-90	TRCD. BY:	DATE:

TRIAC ATC WITH GENEVA CAM

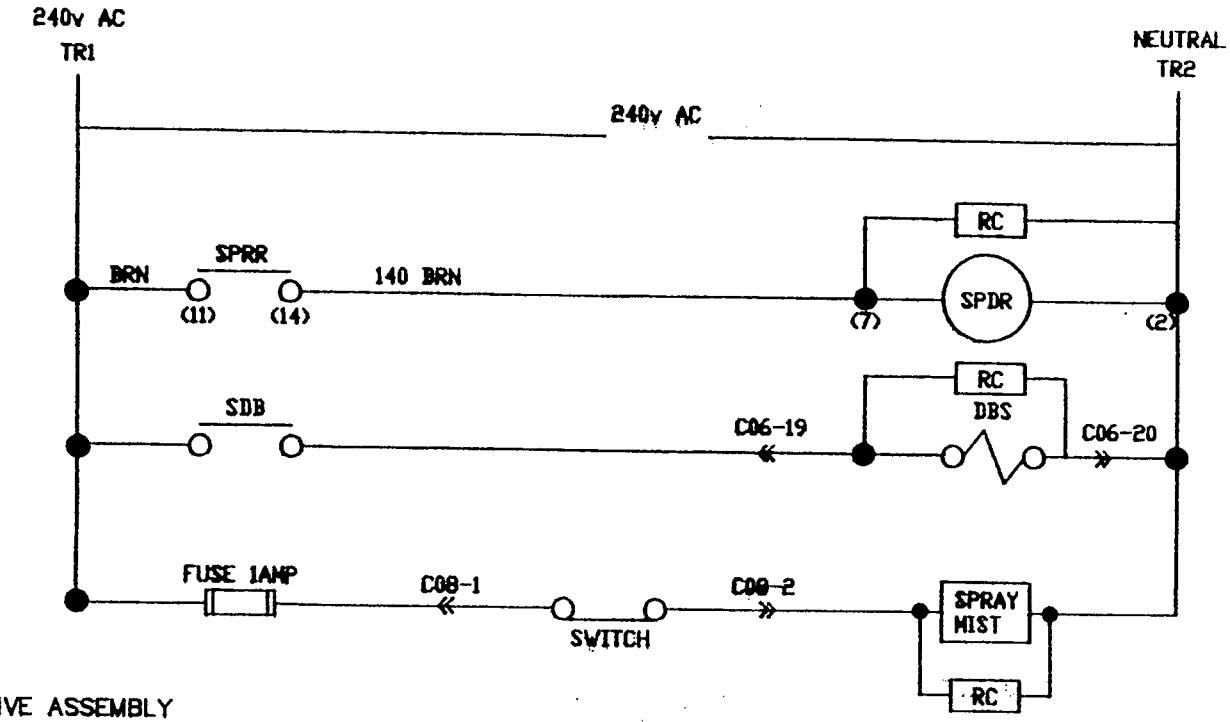
SHEET No. 3 OF 12 CONT. ON SHEET No.

A3-40 163

12V CIRCUIT



DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE	DRN BY A. NEWSOME	DATE 25-9-89	A3- 400164	12v CIRCUIT DIAGRAM	SHEET No 4 OF 12

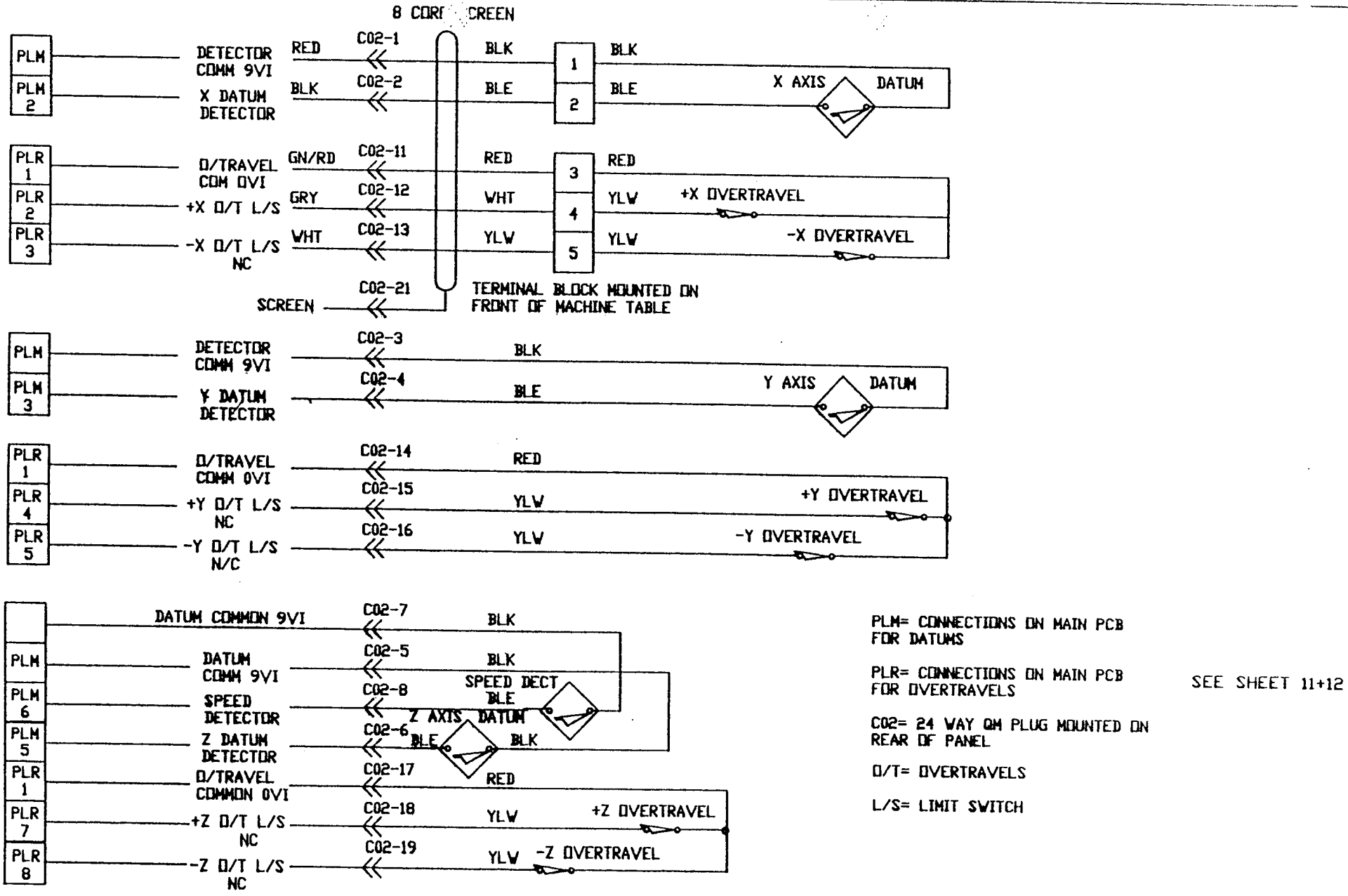


FUSE ON SPINDLE DRIVE ASSEMBLY

TR1 TERMINAL 1 ON LENZ DRIVE ASSEMBLY SHEET 1
TR2 TERMINAL 2 ON LENZ DRIVE ASSEMBLY SHEET 1
SPRR SPINDLE REVERSE RELAY
SPDR SPINDLE DIRECTION RELAY SEE SHEET 10
DBS DRAW BAR SOLENOID
RC SUPPRESSOR
C06 24 WAY QM PLUG LOCATED AT REAR OF PANEL
C0-8 8 WAY ROUND QM PLUG SEE SHEET 3

	SHEET No 5
240v CIRCUIT DIAGRAM	OF 12

DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE | DRN BY A. NEWSOME | DATE 25-9-89 | A3- 400165



PLM= CONNECTIONS ON MAIN PCB FOR DATUMS

PLR= CONNECTIONS ON MAIN PCB FOR OVERTRAVELS

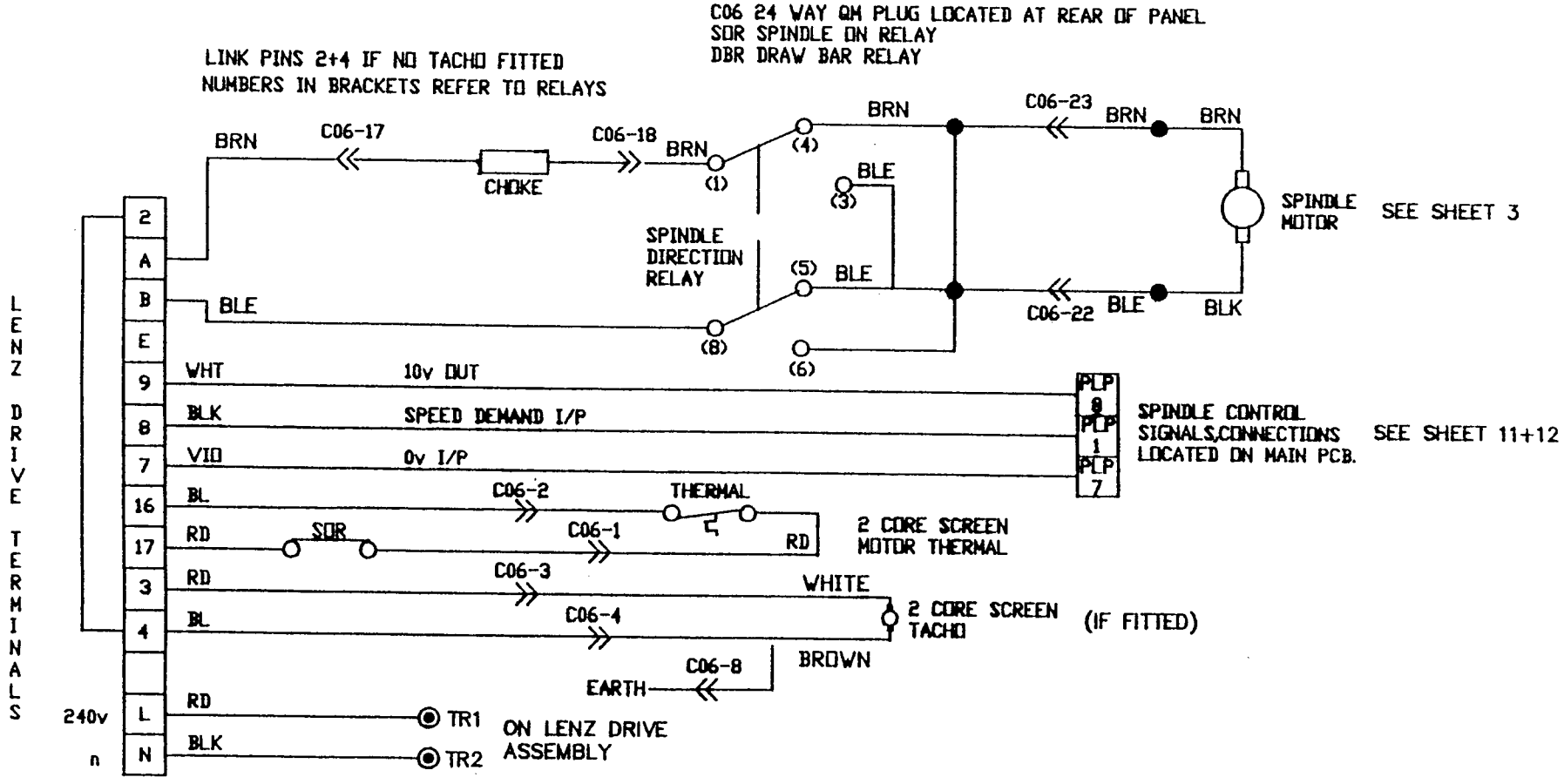
SEE SHEET 11+12

C02= 24 WAY QM PLUG MOUNTED ON REAR OF PANEL

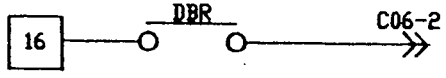
O/T= OVERTRAVELS

L/S= LIMIT SWITCH

				SHEET No 2
			OVERTRAVEL AND DATUM CONNECTIONS	OF 12
DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE	DRN BY A. NEWSOME	DATE 5-9-90	A3– 400162	



LENZ DRIVE CONNECTIONS



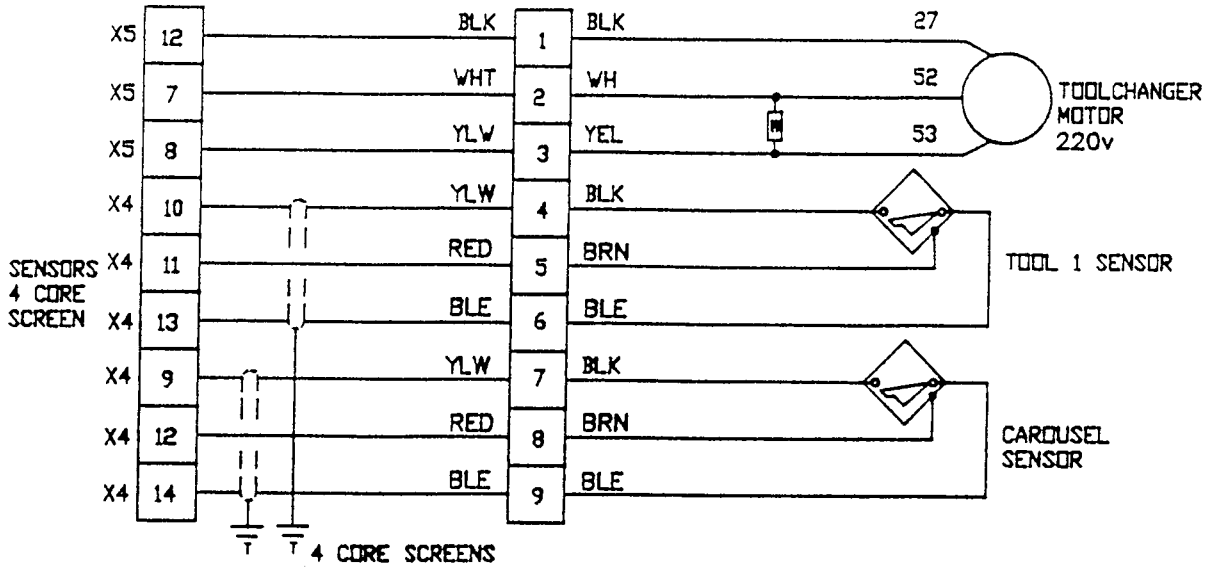
IF DRAWBAR OPTION IS FITTED
WITHOUT AN ATC BEING PRESENT
THEN WIRE AS ABOVE

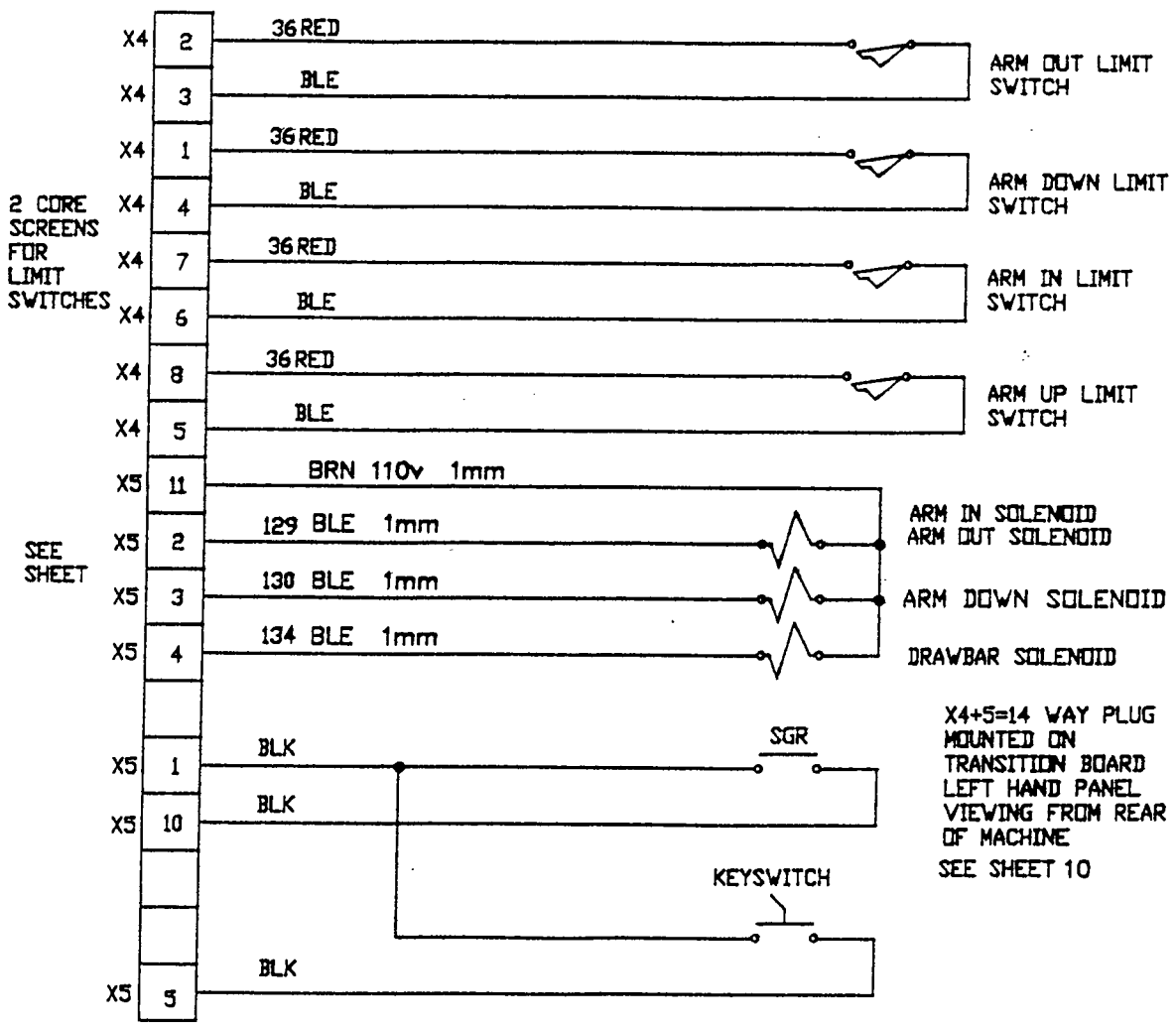
	SHEET No 9
LENZ DRIVE CONNECTIONS	OF 12

DENFORD MACHINE TOOLS LTD	BRIGHOUSE	WEST YORKSHIRE	DRN BY A. NEWSOME	DATE 25-9-89	A3 — 400169

NEE ATC PCB
MOUNTED INSIDE
LEFT HAND BOX
LOOKING AT REAR OF MACHINE

9 WAY TERMINAL BLOCK
MOUNTED ON CAROUSEL





DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE | DRN BY A. NEWSOME | DATE 25-9-89 | A3-40168

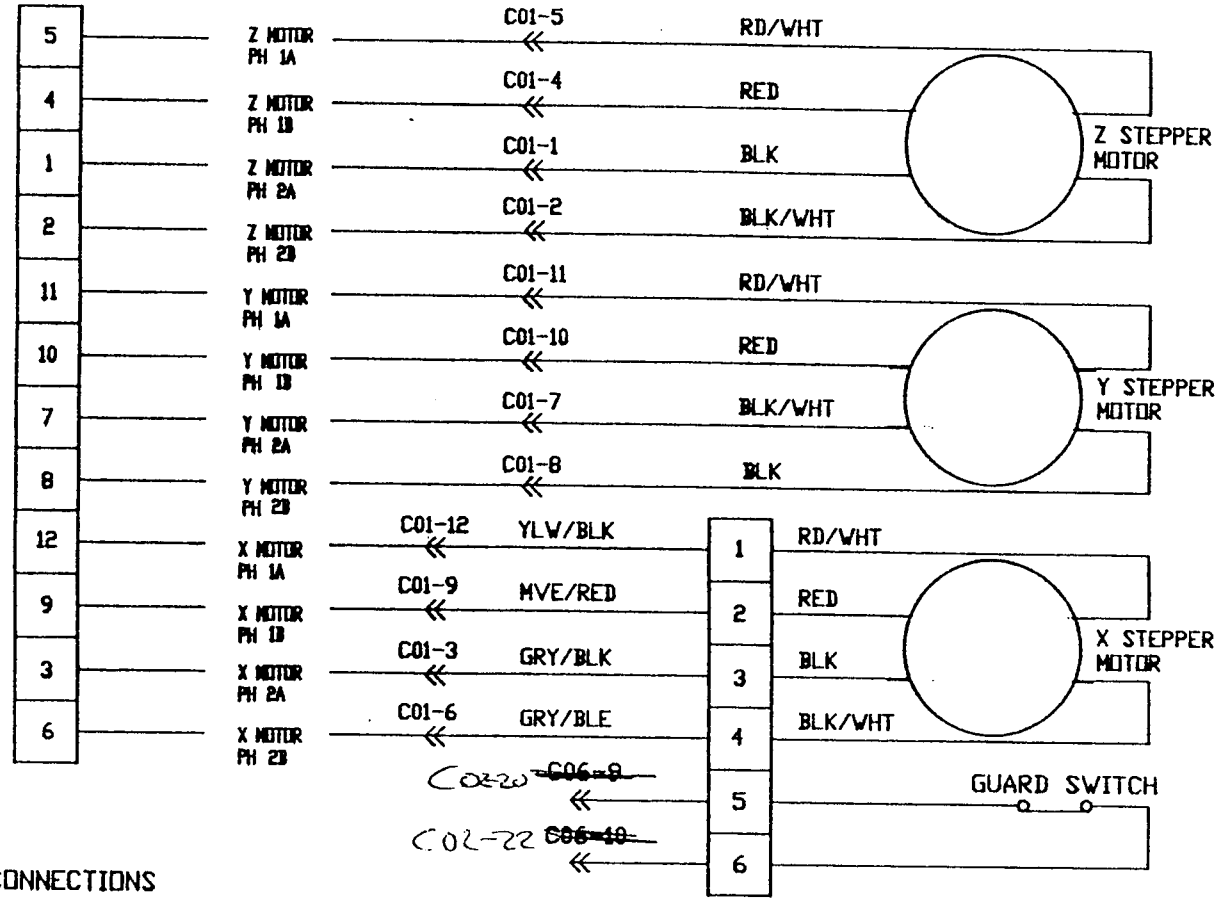
ATC SCHEMATIC
GENEVA CAM

SHEET No 8 OF 12

SEE SHEET 11+12

SK A ON DRIVE BOARD MOTORS

C01-1 24 WAY QM PLUG MOUNTED AT REAR OF CHASSIS



AXIS MOTOR CONNECTIONS

CONNECTION BOX MOUNTED ON X AXIS

DENFORD MACHINE TOOLS LTD	BRIGHOUSE	WEST YORKSHIRE	DRN BY A. NEWSOME	DATE 5-9-90	A3-400161	SHEET No 1 OF 12

AXIS MOTOR CONNECTIONS

24 WAY QM PLUG AT
REAR OF CHASSIS

C01-1 BLACK Z AXIS STEPPER MOTOR
C01-2 BLK/WH Z AXIS STEPPER MOTOR
C01-3 GRY/BK X AXIS STEPPER MOTOR
C01-4 RED Z AXIS STEPPER MOTOR
C01-5 RD/WH Z AXIS STEPPER MOTOR
C01-6 GRY/BL X AXIS STEPPER MOTOR
C01-7 BK/WH Y AXIS STEPPER MOTOR
C01-8 BK Y AXIS STEPPER MOTOR
C01-9 WE/RD X AXIS STEPPER MOTOR
C01-10 RED Y AXIS STEPPER MOTOR
C01-11 RD/WH Y AXIS STEPPER MOTOR
C01-12 YLW/BK X AXIS STEPPER MOTOR
C01-13
C01-14
C01-15 BLK SPR TO ATC BOX
C01-16 FROM SPR TO ATC BOX
C01-17 LUBE WARNING ORANGE
C01-18 YEL/RED LOW LUBE WARNING LIGHT
C01-19 PINK WORKLIGHT
C01-20 PINK WORKLIGHT
C01-21
C01-22 RD/GREEN LUBE PUMP
C01-23 RD/BL LUBE PUMP
C01-24 LUBE EARTH (SPRAYMIST IF USED)

24 WAY QM PLUG AT
REAR OF CHASSIS

C02-1 BK X AXIS DATUM 9V *
C02-2 BL X AXIS DATUM *
C02-3 BK Y AXIS DATUM 9V
C02-4 BL Y AXIS DATUM
C02-5 BK Z AXIS DATUM 9V
C02-6 BL Z AXIS DATUM
C02-7 BK SPEED DETACTOR
C02-8 BL SPEED DETECTOR
C02-9
C02-10
C02-11 RD X+OVERTRAVEL COMMON *
C02-12 WH X+ OVERTRAVEL *
C02-13 YLW X- OVERTRAVEL *
C02-14 RD Y+ OVERTRAVEL
C02-15 YLW Y+ OVERTRAVEL
C02-16 YLW Y-OVERTRAVEL
C02-17 RD Z+ OVERTRAVEL
C02-18 YLW Z+ OVERTRAVEL
C02-19 YLW Z- OVERTRAVEL
C02-20
C02-21 SCREEN *
C02-22
C02-23
C02-24

*= 8 CORE SCREEN

6 WAY QM PLUG
INSIDE CHASSIS

C07-1 FOOTSWITCH
C07-2 FOOTSWITCH
C07-3 SPRAYMIST
C07-4 SPRAYMIST
C07-5
C07-6
C07-7

24 WAY QM PLUG AT
REAR OF CHASSIS

C06-1 RD THERMAL O/L TO SDR
C06-2 BL THERMAL TO LENZ DRIVE 16
C06-3 RD TACHO
C06-4 BL TACHO
C06-5 EARTH FROM PNEUMATIC BOX
C06-6 NEUTRAL FROM PNEUMATIC BOX
C06-7 LIVE TO ATC CONNECTION BOX
C06-8 SCREEN FROM TACHO
C06-9 GUARD SWITCH
C06-10 GUARD SWITCH
C06-11
C06-12
C06-13
C06-14
C06-15
C06-16
C06-17 CHOKE TO LENZ DRIVE
C06-18 CHOKE TO SDR
C06-19 FROM DBR TO DBS
C06-20 NEUTRAL TO DBS
C06-21 SPINDLE MOTOR EARTH
C06-22 SPINDLE MOTOR
C06-23 SPINDLE MOTOR
C06-24

8 WAY ROUND QM PLUG

C08-1 FOOTSWITCH
C08-2 FOOTSWITCH

GENEVA CAM PLUGS

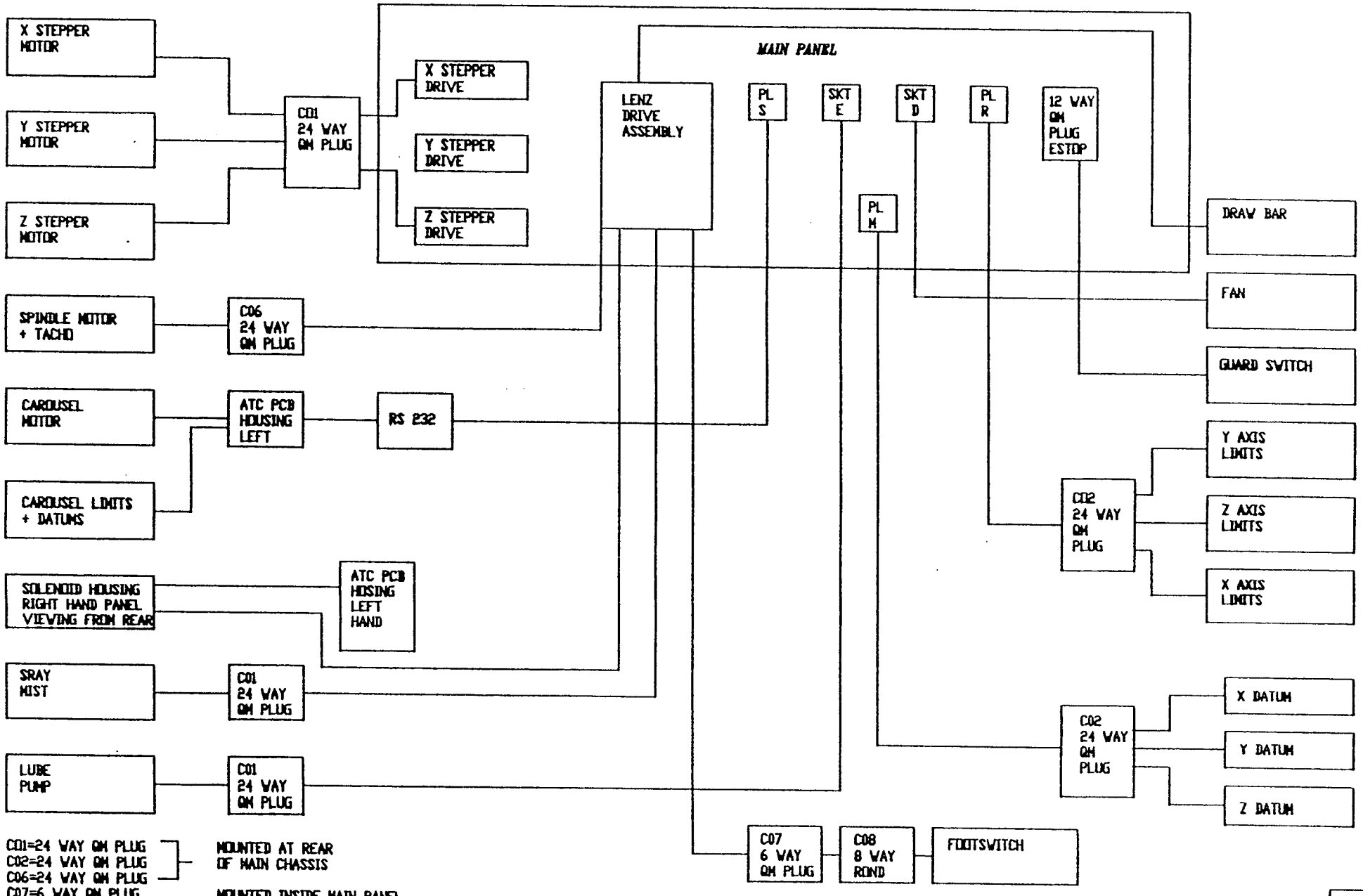
X4 1= 36 RED TO ARM DOWN LIMIT SWITCH
X4 2= 36 RED TO ARM OUT LIMIT SWITCH
X4 3= BLUE ARM OUT LIMIT SWITCH
X4 4=BLUE ARM DOWN LIMIT SWITCH
X4 5=BLUE ARM UP LIMIT SWITCH
X4 6=BLUE ARM IN LIMIT SWITCH
X4 7= 36 RED ARM IN LIMIT SWITCH
X4 8= 36 RED ARM UP LIMIT SWITCH
X4 9=BLACK CAROUSEL SENSOR
X4 10=RED TOOL 1 SENSOR
X4 11=BLUE TOOL 1 SENSOR
X4 12=BLUE CAROUSEL SENSOR
X4 13=YLW TOOL 1 SENSOR
X4 14=YLW CAROUSEL SENSOR

X5 1=SOR AND KEYSWITCH
X5 2=129 ARM OUT SOLENOID
X5 3=130 ARM IN SOLENOID
X5 4=134 DRAWBAR SOLENOID
X5 5=KEYSWITCH
X5 6=
X5 7=WHITE TOOLCHANGER MOTOR
X5 8=YLW TOOLCHANGER MOTOR
X5 9=
X5 10=SOR
X5 11=SOLENOID COMMON
X5 12=BLK TOOLCHANGER MOTOR

SHEET No 10
OF 12

PLUG AND SOCKET CONNECTIONS GENEVA CAM

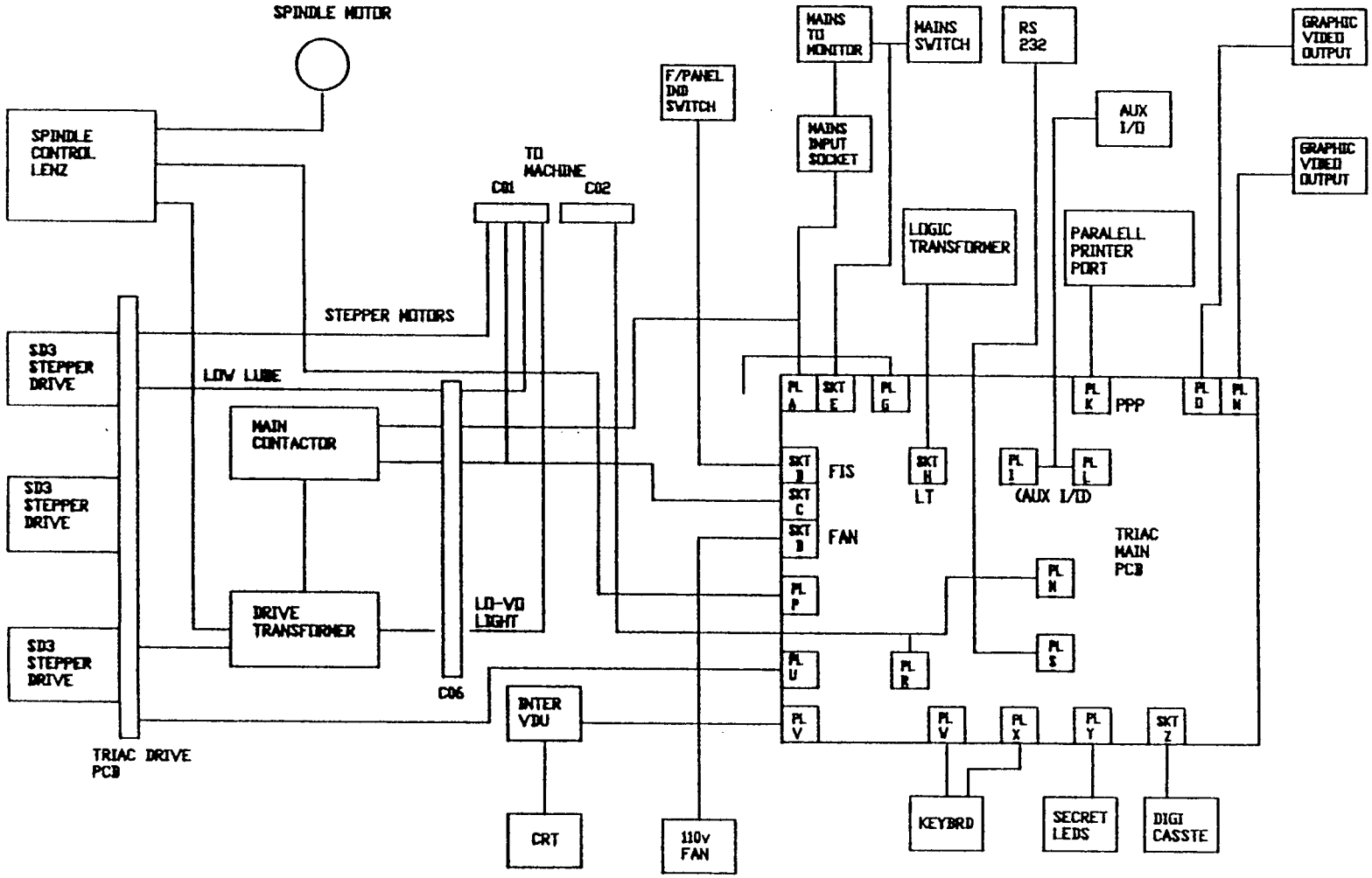
DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE | DRN BY A. NEWSOME | DATE 25-9-89 | A3- 400170



SHEET No 11
OF 12

TRIAC BLOCK DIAGRAM MACHINE SIDE

DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE | DRN BY A. NEWSOME | DATE 25-9-89 | A3 400171



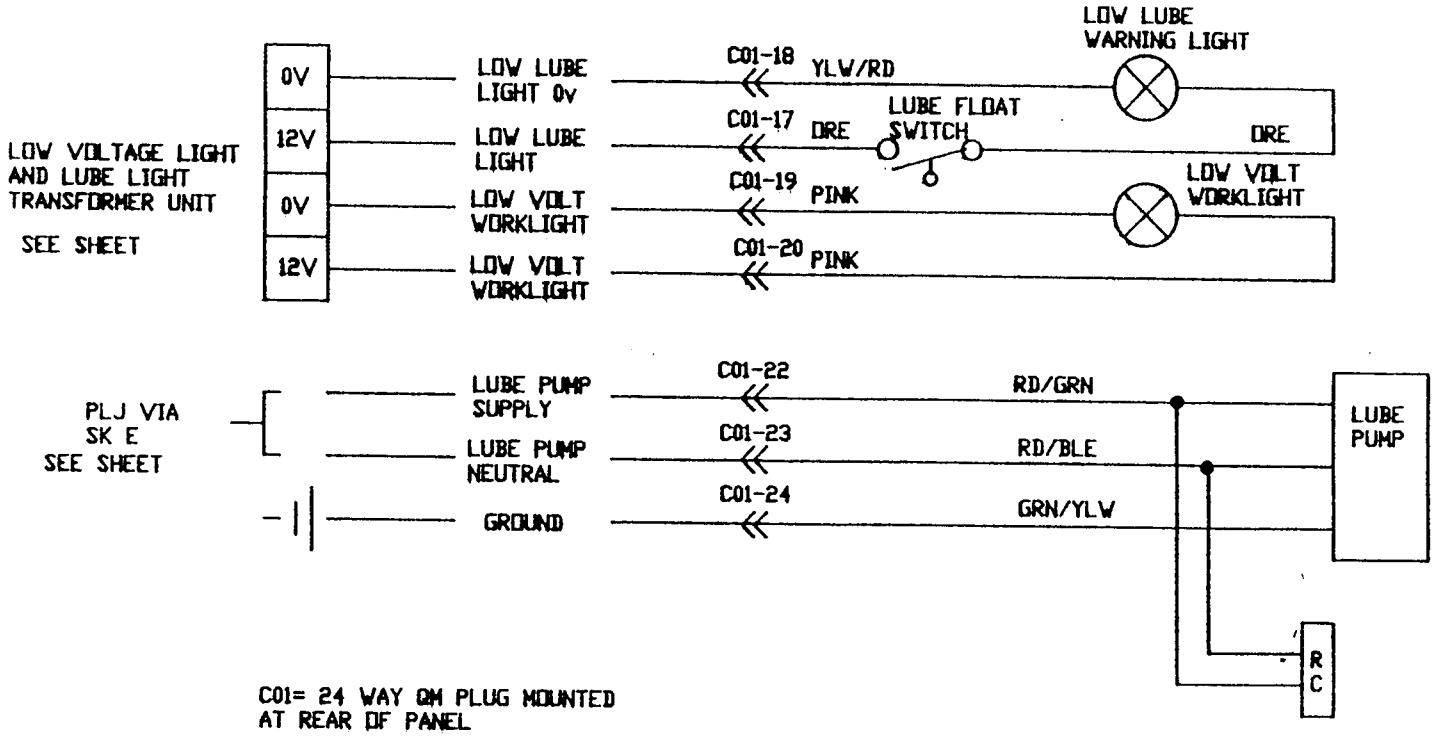
PLG STEREO CASSETTE POWER
PLK= PRINTER PORT
PLO+PLN= VIDEO OUTPUTS
PLP= SPINDLE CONTROL SIGNALS
PLR= OVERTRAVELS
PLU= DRIVE CONTROL SIGNALS
PLV= VIDEO/POWER TO INTERNAL MONITOR

PLM= DATUMS
PLS= SERIAL INTERFACE
PLT= AUDIO CASSETTE SIGNAL I/P

	SHEET No 12
BLOCK DIAGRAM TRIAC NEE.	OF 12

DENFORD MACHINE TOOLS LTD	BRIGHOUSE	WEST YORKSHIRE	DRN BY A. NEWSOME	DATE	25-9-89	A3- 400172

LUBE PUMP + WORKLIGHT



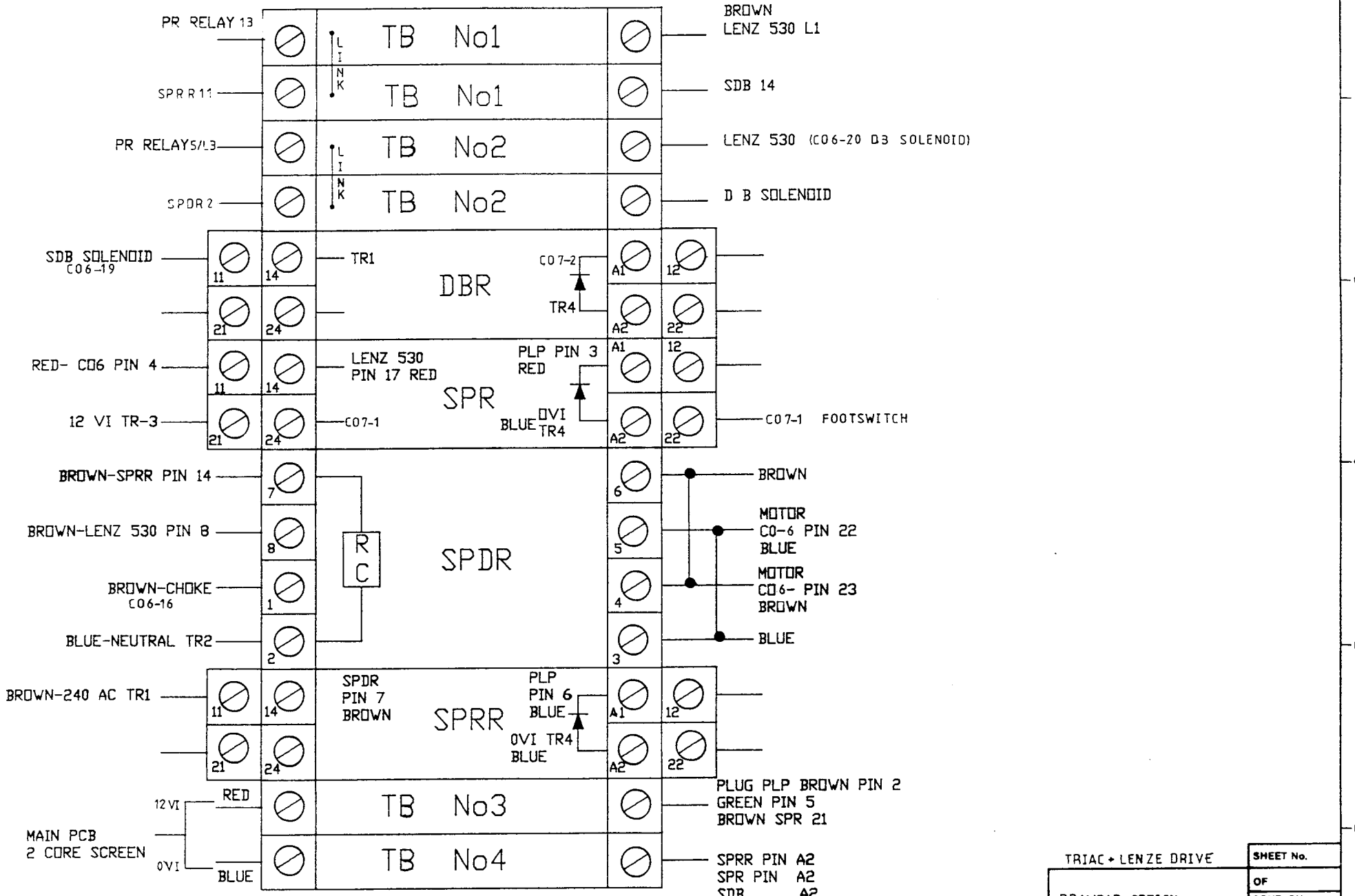
C01= 24 WAY QM PLUG MOUNTED AT REAR OF PANEL

PLJ= CONNECTION ON MAIN PCB

SKE= CONNECTION ON MAIN PANEL

	SHEET No 7
LUBE AND WORKLIGHT CONNECTIONS	OF 12

DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE | DRN BY A. NEWSOME | DATE 25-9-89 | A3- 400167



TRIAC + LENZE DRIVE

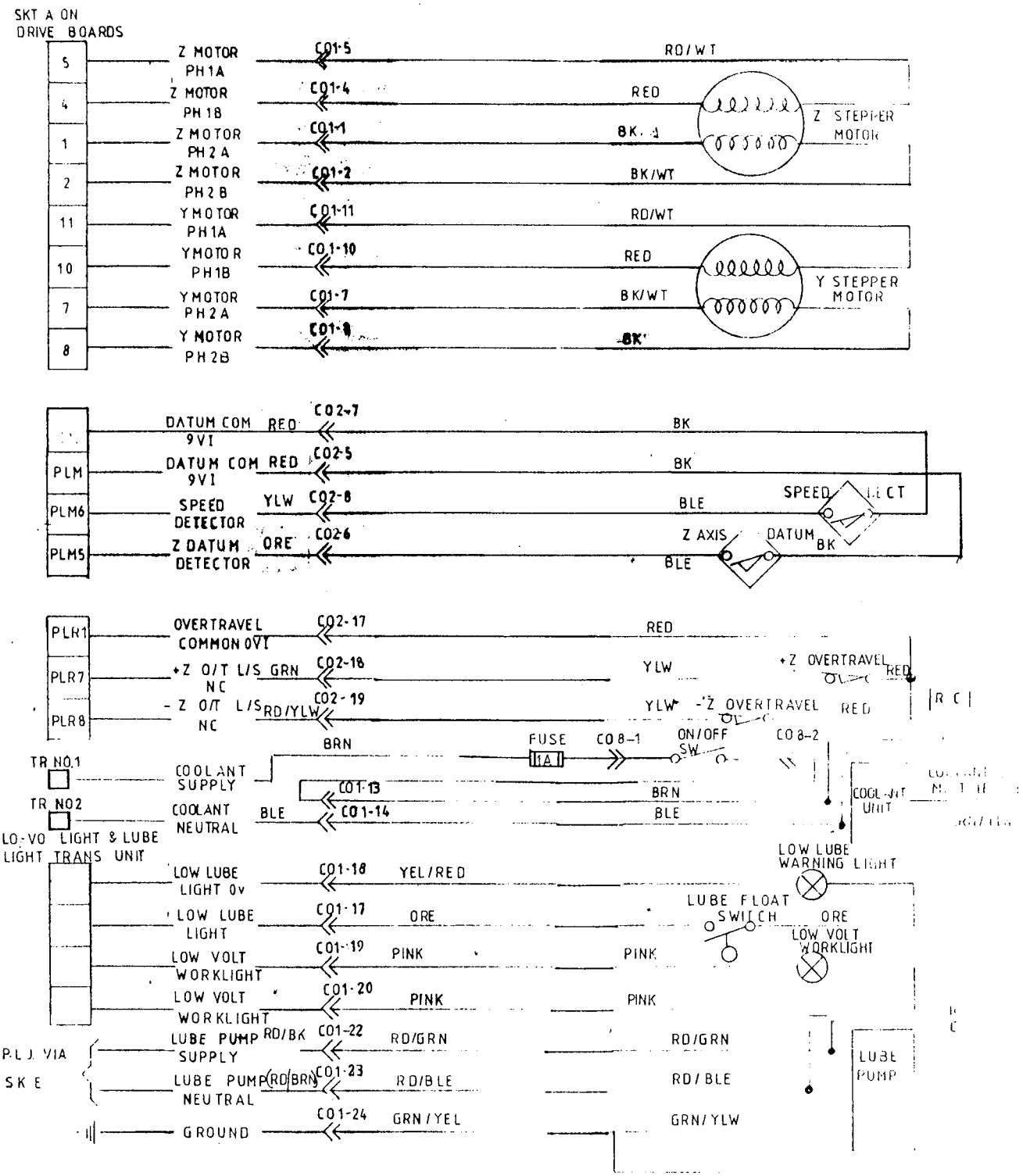
DRAWBAR OPTION

SHEET No.

OF

CONT. ON SHEET No.

DENFORD MACHINE TOOLS LTD	BRIGHOUSE	WEST YORKSHIRE	DRN. BY: A. NEWSOME	DATE: 11/7/89	TRCD. BY:	DATE:	A3-400153



WIRE - COLOURS

RD = RED
ORE = ORANGE
BK BLACK
WT = WHITE
BRN = BROWN
MVE = MAUVE
GRN = GREEN
BLE = BLUE
YLW = YELLOW

24 WAY QM PLUGS & SOCKETS

C01 = QM SOCKET MOUNTED ON THE CHASSIS BRACKET (LEFT)
C02 = QM SOCKET MOUNTED ON THE CHASSIS BRACKET (RIGHT)
C08 = 3 WAY CONNECTOR FOR SPRAY MIST PUSH BUTTON

DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE

DRN. BY: K STANTON DATE 22/11/89

TRCD. BY:

DATE:

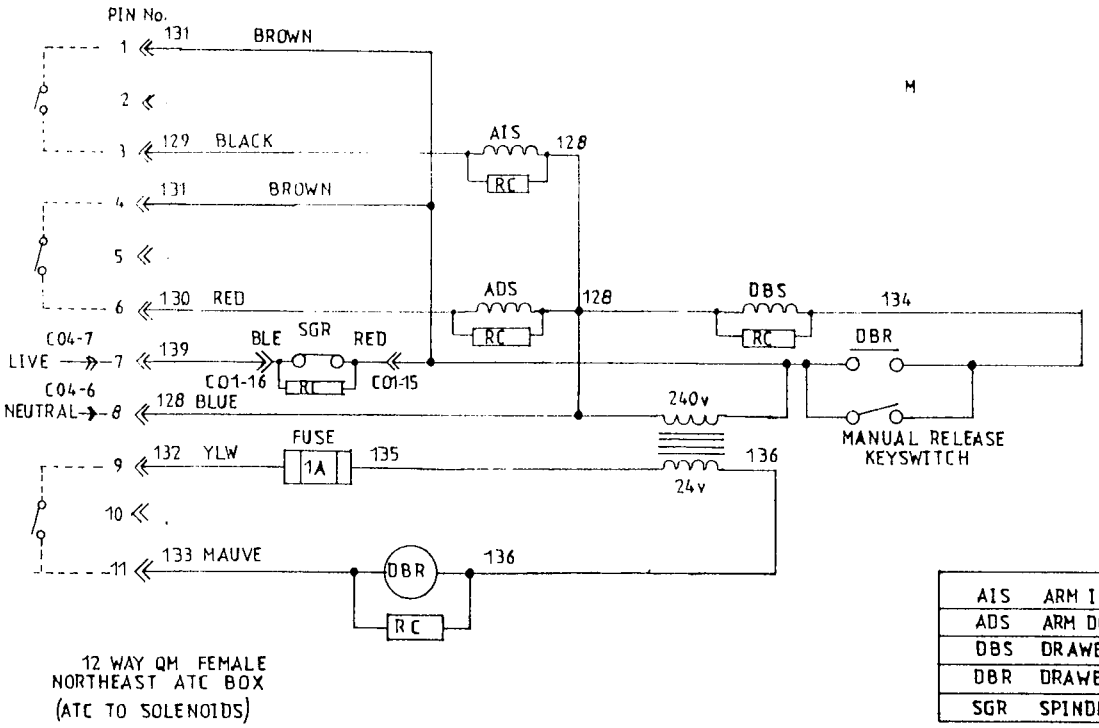
TRIAC WIRING DIAGRAM Nº1 MARK II

A3-40223-C

SHEET No.

OF

CONT. ON SHEET No.

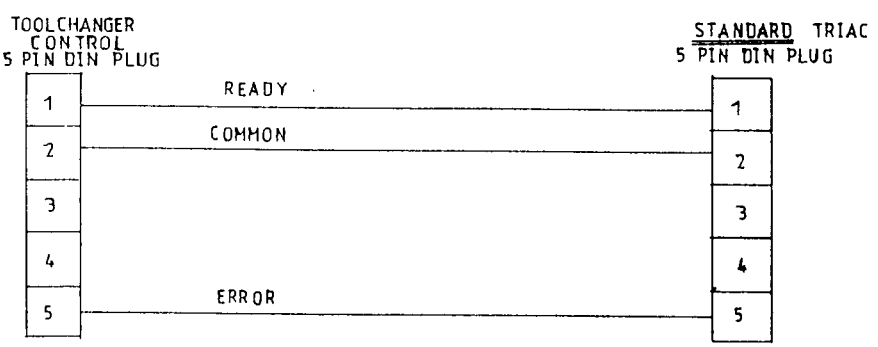


12 WAY QM FEMALE
NORTHEAST ATC BOX
(ATC TO SOLENOIDS)

AIS	ARM IN SOLENOID
ADS	ARM DOWN SOLENOID
DBS	DRAWBAR SOLENOID
DBR	DRAWBAR RELAY
SGR	SPINDLE GO RELAY

MOD

C04 24 WAY QM PLUG 17-6-89



DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE

DRN. BY: A McHENRY DATE: 30-11-87

TRCD. BY:

DATE:

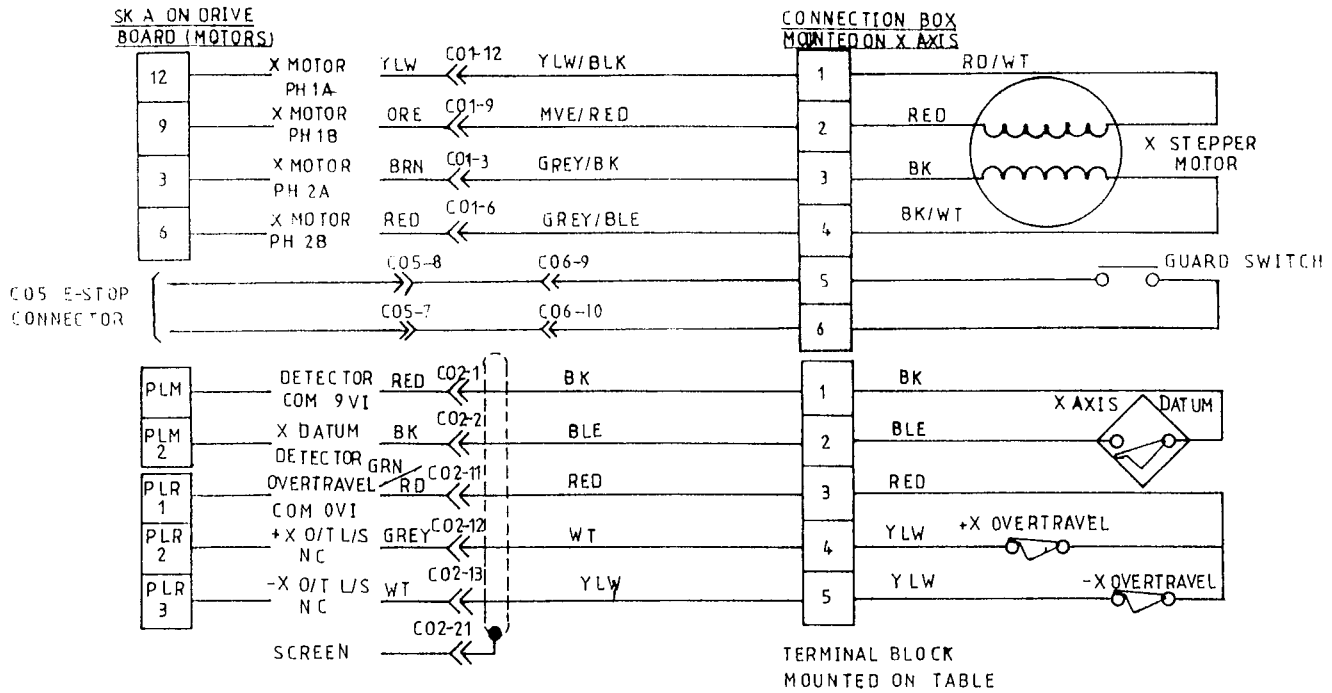
TRIAC ATC WIRING DIAGRAM SCHEMATIC No 3

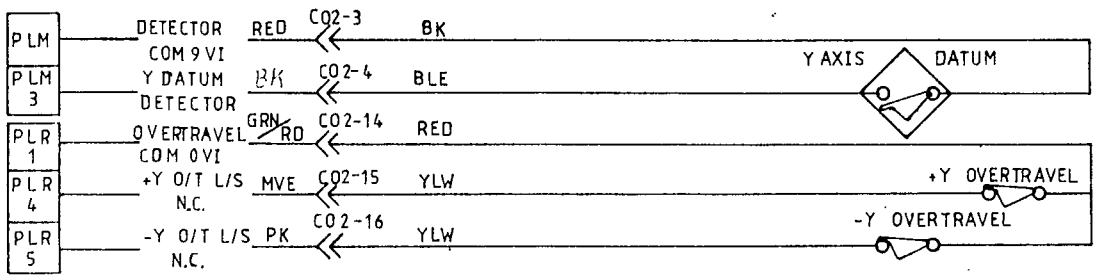
A3- 400 115/A

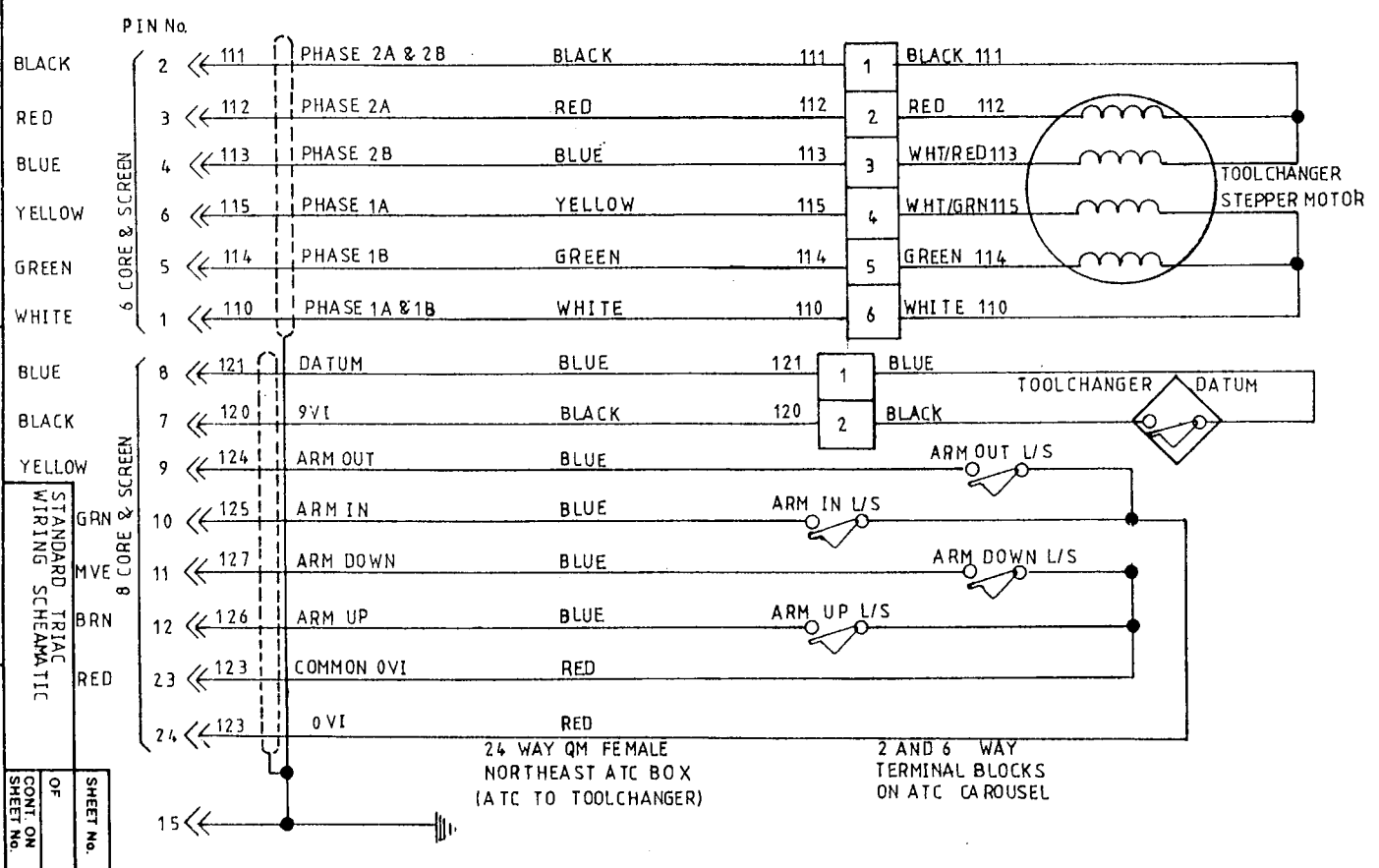
SHEET No.

OF

CONT. ON SHEET No.





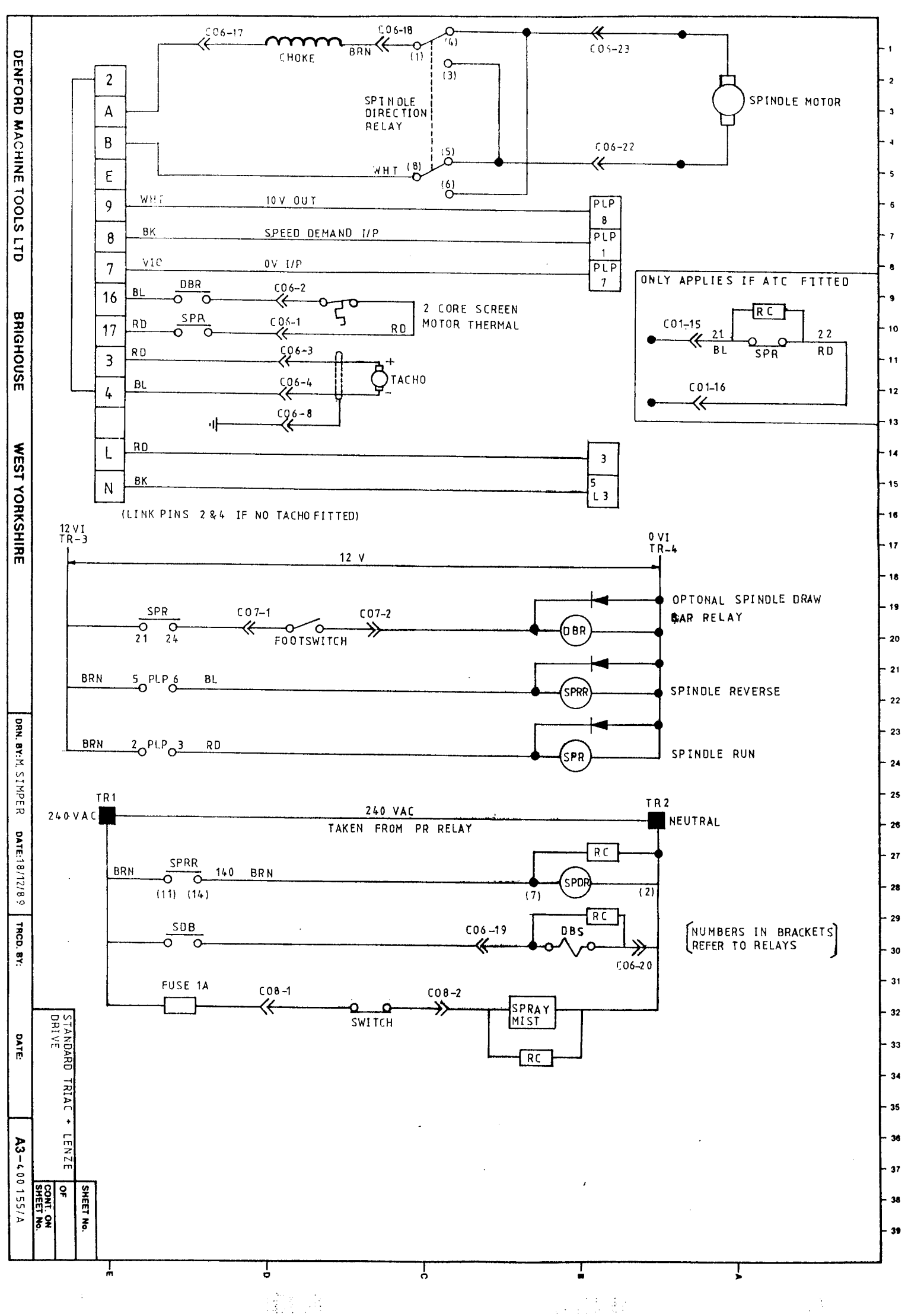


DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE

DRN. BY: M.SIMPER DATE: 19/10/89 TRCD. BY: DATE:

A3 - 400154

CONT. ON SHEET No. OF SHEET No.



DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE

DRN. BY: M. SIMPER DATE: 18/12/89

TRCD. BY:

DATE:

STANDARD TRIAC + LENZE DRIVE

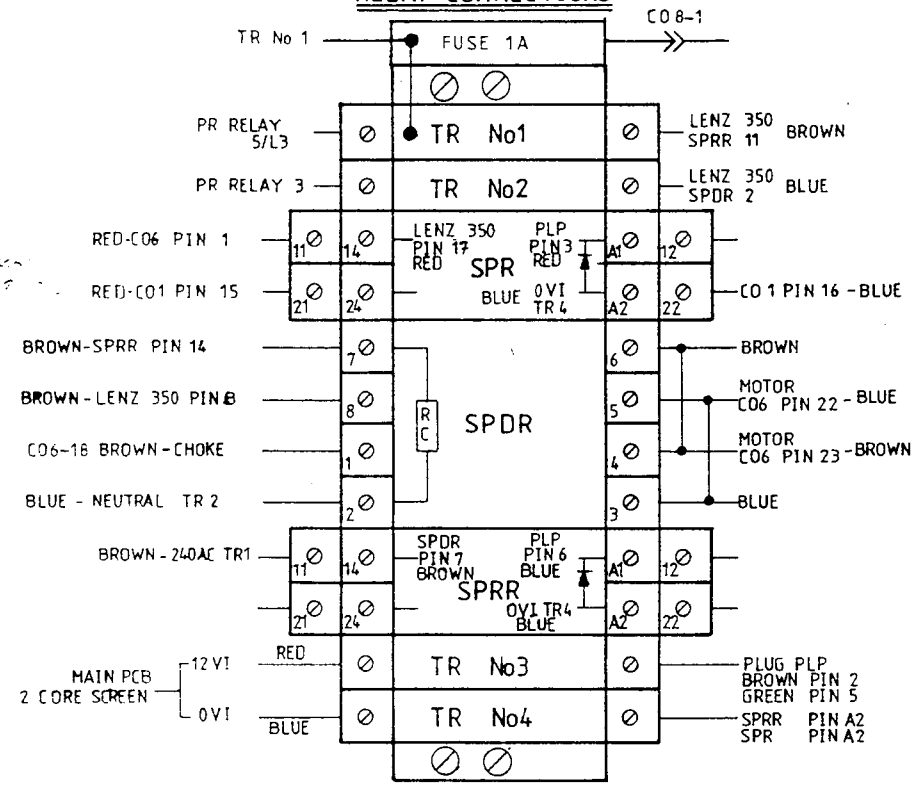
A3-400155/A

CONT. ON SHEET No.

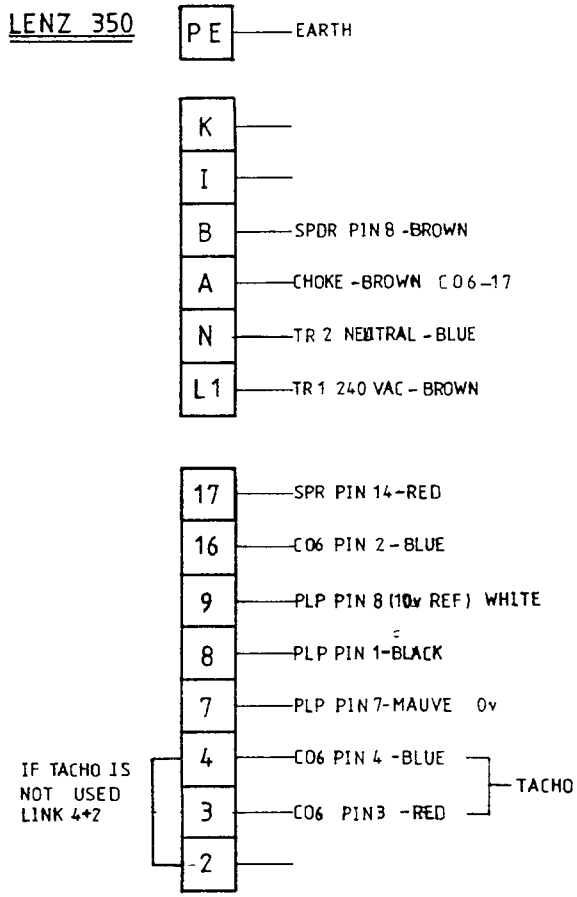
OF

SHEET No.

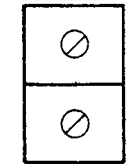
RELAY CONNECTIONS



LENZ 350

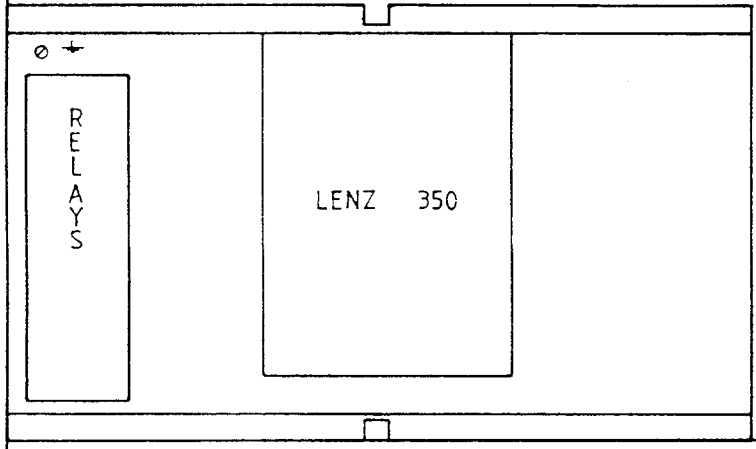


CHOKE



MOUNTED INSIDE MACHINE COLUME

PANEL LAYOUT



SPR SPINDLE RUN RELAY

SPDR SPINDLE DIRECTION RELAY

SPRR SPINDLE REVERSE RELAY

CO 1 24 WAY DM

CO 6 24 WAY DM

TRIAC ATC WITH LENZ DRIVE	SHEET No.
	OF
	CONT. ON SHEET No.

DENFORD MACHINE TOOLS LTD BRIGHOUSE WEST YORKSHIRE | DRN. BY: A. NEWSOME DATE: 10/7/89 | TRCD. BY: | DATE: | A3 – 400152

SECTION 3

TROUBLE SHOOTING

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3.1 INTRODUCTION

This section is concerned with small problems which may occur on the machine due to normal wear and tear over an extensive period of time. The problems listed are those which can easily be rectified and do not require a service engineer to carry them out. Should any other problem arise or difficulty found in working through the following procedures, then contact Denford's Service Department for further assistance.

The first part of this section covers problems of a mechanical nature and is backed up with corrective action procedures where required.

ALWAYS TURN OFF POWER AT ISOLATOR BEFORE ANY MAINTENANCE WORK IS STARTED.

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3.2 MECHANICAL TROUBLE SHOOTING

PROBLEM: Poor Surface Finish is Obtained

- First ensure that the correct feeds and speeds are being used for the material that is being cut, and the H.P. available. If a poor finish is still obtained then the following corrective action is required.

Corrective Action:-

- Ensure axis gib strips are correctly adjusted (see procedure 1).

PROBLEM : System fault.

Corrective action :-

- See PNC INSTRUCTIONS -Section 2.0 page 6, for machine built in diagnostics.
- Contact Denford Machine Tools service department for futher assistance.

ISOLATE MACHINE BEFORE WORKING ON IT.

PROCEDURE 1. ADJUSTMENT OF GIB STRIPS

- **Tools required:-** Flat Blade Screw driver, 2.5mm A/F Allen Key, 5mm A/F Allen key.
- Refer to drawing numbers: TR 1/400 & TR 2/400 Section 4
- **X Axis**
- Gib strip screw can be found under the right hand side of table
- Turn gib strip screw clockwise to tighten gib strip. Do not overtighten
- Move table in + and - X directions to ensure smooth continuous movement.

- **Y Axis**
- Remove bellows unit at front of table using 2.5 mm allen key.
- Gib strip screw, TR 1/409, can be found to the right of the bed.
- Turn gib strip screw clockwise to tighten gib strip. Do not overtighten
- Replace bellows unit.
- Move table in + and - Y directions to ensure smooth continuous movement.

- **Z Axis**
- Remove head cover TR 3/108 using 2.5 mm allen key.
- Release the gib strip lock screw TR 1/110 at the base of head.
- Adjust gib strip by turning lock screw TR 1/107 which is accessible from the top of the head.
- Turn screw clockwise to tighten strip. Do not over tighten.
- Lock strip with lock screw at base of head.
- Replace head cover
- Move head up and down column to ensure smooth continuous movement.

PROCEDURE 2. CHECKING LIMIT SWITCH

- Tools Required:- 2.5 mm A/F Allen Key, Thin strip of metal.
- Refer to drawing numbers: TR 1/400 & TR 2/400 Section 4
- X axis limit switches are accessible by sliding a thin strip of metal in beside the slide way to trip the switches.
- Y axis limit switches are accessible by removing the bellows units.
- Z axis limit switches are found to the right of the column.
- Ensure limit switches are clean and dry.
- DO NOT ATTEMPT TO ADJUST THE A.T.C , CONTACT DENFORD SERVICE DEPARTMENT FOR ASSISTANCE.

ATC CORRECTIVE ACTION

PROBLEM - "TOOL CHANGER ERROR"

This message means that the triac has waited for more than two minutes for the ready message from the tool changer and has not recieved the message.

This error is usually due to the level of the air pressure being too low a faulty micro switch (Part no. BI 00401A Drawing no. TR3/700.), or lack of lubrication on the slide way.

CORRECTIVE ACTION

First check the air pressure . If the air pressure is below 80 to 100 PSI the adjust to correct.

If error is due to a faulty micro switch then the replacement will require a service engineer.

PROBLEM - TOOL IS NOT SITTING CORRECTLY IN THE SPINDLE TAPER

CORRECTIVE ACTION

Check that the pull stud is screwed tightly into the shank of the tool holder.

Check that the collet has not moved down the drawbar.

SECTION 4

SPARE PARTS LIST AND ASSEMBLY DRAWING

4.0 INTRODUCTION AND ORDERING

The parts list are arranged in numerical order. The area of the machine covered by a certain number is given by looking at the parts illustration list on the next page.

When ordering any part state the part number, it's description and the quantity required.

i.e.

55500102A BEARING SKF: 7201 BEP 2 OFF

AC 2/310 GIB STRIP 1 OFF

SECTION 4

PARTS ILLUSTRATIONS

MILLING HEAD ASSEMBLY	TR3/100
MILLING HEAD KNOCK OFF	TR.1/100A
BASE & CROSS SLIDE DRIVE	TR.1/200
COLUMN & HEAD DRIVE	TR.1/300
TABLE & CROSS SLIDE	TR.1/400
X AXIS LIMIT SWITCH & SENSOR BRACKET ASSEMBLY	TR.1/400A
TABLE GUARD ASSEMBLY	TR.1/400B
CABINET	TR.1/500
LUBRICATION SYSTEM	SK.817.B
TOOL CHANGER ASSEMBLY	TR3./700A
PULL STUD	(BT 35 - TYPE U2)

ORDERING OF REPLACEMENT/ SPARE PARTS

This section of the TRIAC (ATC) maintenance manual contains the main assembly and parts drawings for the TRiAC and Automatic Tool Changer.

The parts list contains both drawing numbers and description.

Parts not manufactured by Denfords have a manufacturer's name and reference numbers and a Denfords order / drawing number.

When ordering spare parts or replacements be sure to quote both description and relevant drawing numbers.

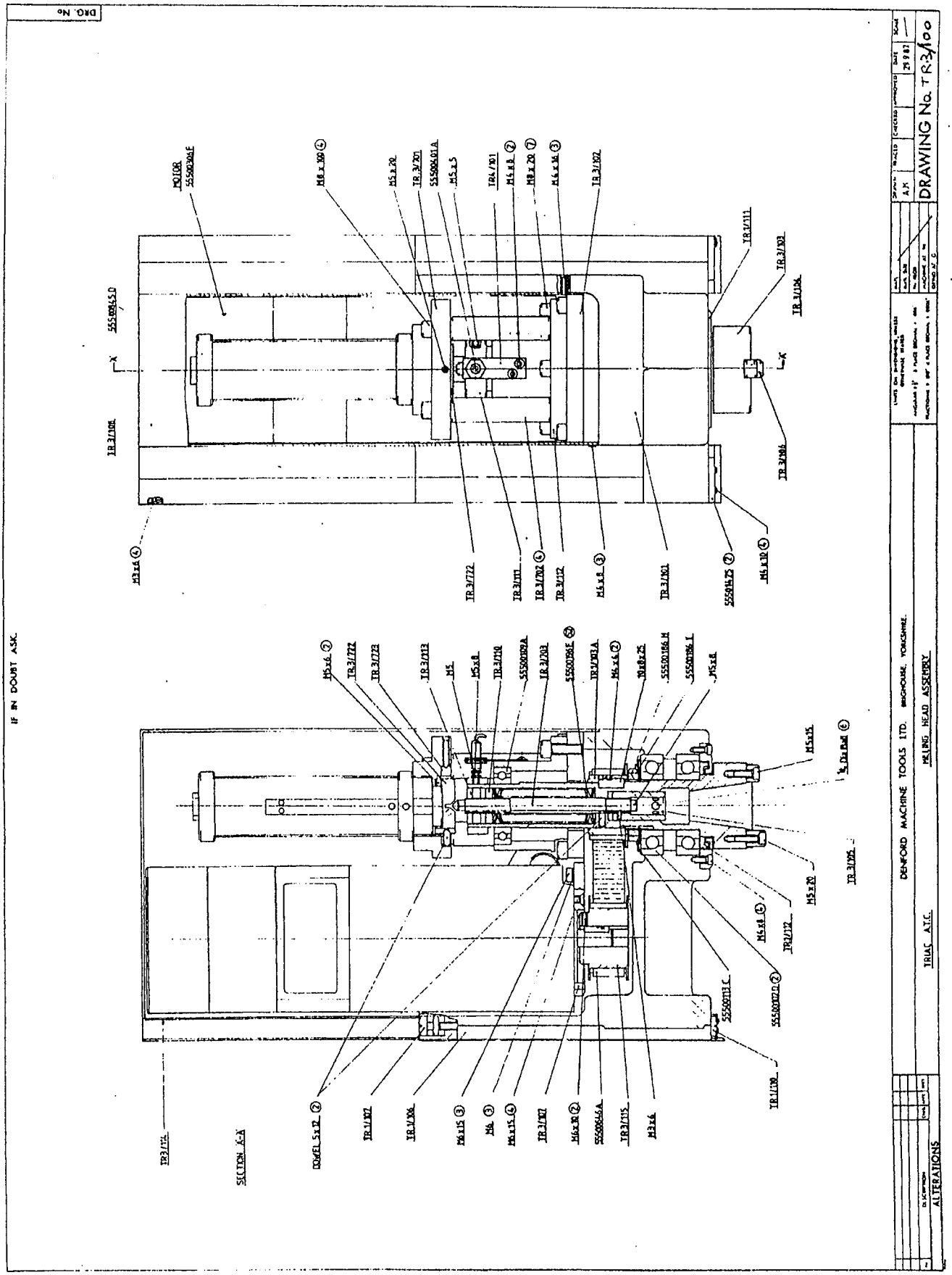
TRIAC 3 ATC TRIAC MILLING HEAD TR.3/100

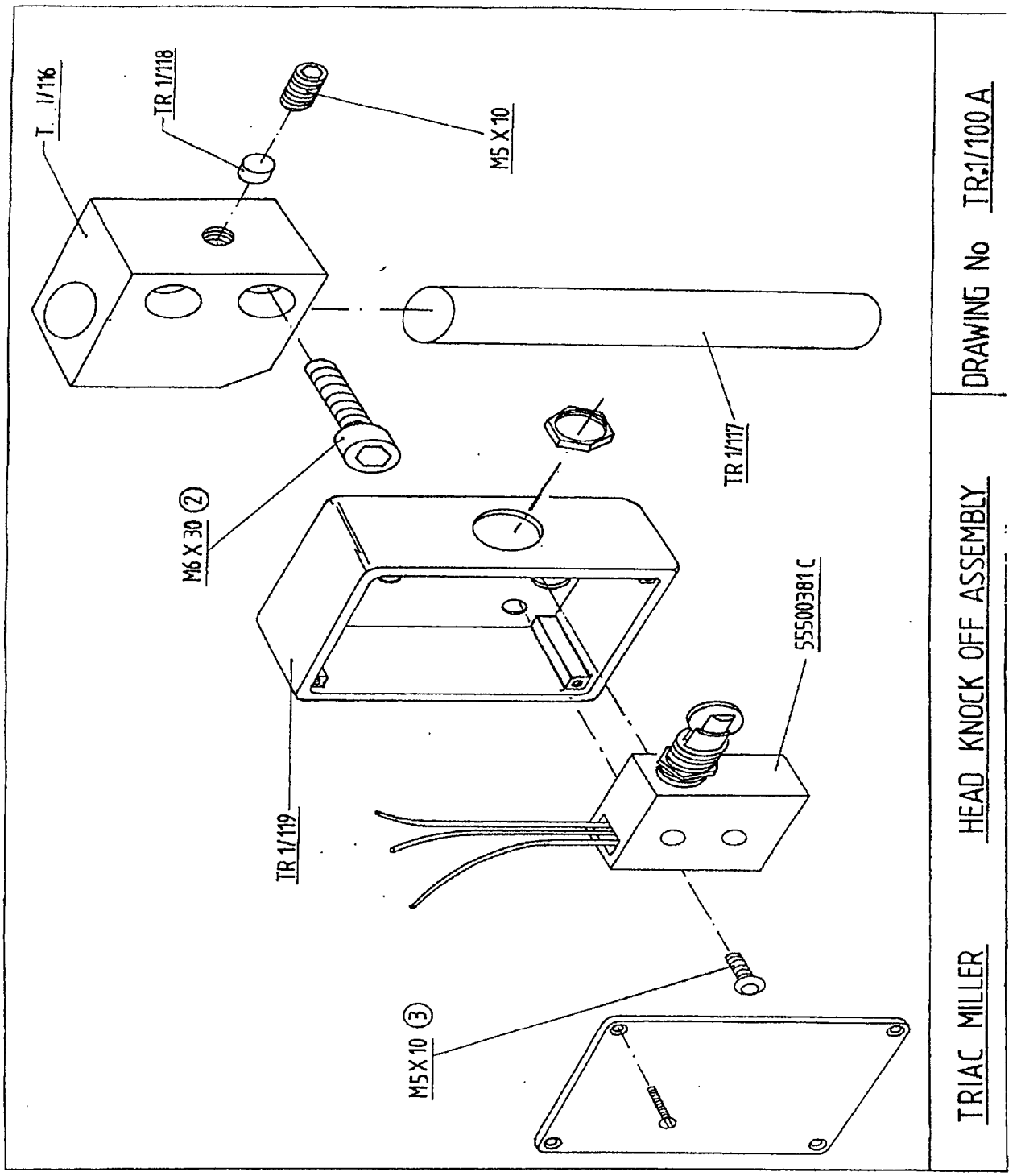
PART No.	DESCRIPTION	QTY
TR 3 /101	MILLING HEAD	1
102	BASE PLATE	1
103	SPINDLE No. 35 INT	1
104	SPINDLE TENON (SHORT)	1
105	DRAW BAR COLLET	1
106	SPINDLE TENON (LONG)	1
107	SPINDLE MOTOR PLATE	1
108	HEAD COVER	1
109	SENSOR BRACKET	1
110	PRE LOAD NUT	1
111	SPINDLE END CAP	1
112	SPINDLE SUPPORT BUSH	1
113	LIMIT NUT	1
114	HEAD COVER PLATE	1
115	MOTOR PULLEY	1
TR2/ 101	PULLEY	1
TR.1/103A	SPINDLE PULLEY	1
106	VERTICAL HEAD JIB STRIP	1
107	JIB STRIP SCREW	1
110	JIB STRIP LOCK	1

111	SPINDLE NOSE CAP	1
112	SPINDLE GREASE COLLAR	1
114	PULLEY 14L100	1
116	HEAD KNOCK OFF BLOCK	1
117	HEAD KNOCK OFF ROD	1
118	HEAD KNOCK OFF PAD	1
119	HEAD K/O M/STCH BOX	1
120	HEAD KNOCK OFF BUSH	1
121A	MOTOR TERMINAL BRK	1

TRIAC MILLING HEAD TR.3/100

DESCRIPTION	MANUF & REF	COMP No	QTY
DRIVE MOTOR	SEM FDPM 30 x 2		
	(4000 RPM)	BI 00306G	1
BEARING	FAG 7208 B	BI 00102D	2
BEARING	FAG 6007 2RS	BI 00109A	1
BEARING SEAL	NYLOS RINGS: 6208 AV	BI 00113C	1
LOCKNUT	FAG : KM 8 5	BI 00186H	1
TAB WASHER	FAG : MB 8	BI 00186I	1
MICRO SWITCH	BERGESS 4CRQR	BI 00381C	1
SENSOR	BALLUFF : NJ 58 GN	BI 00401A	1
TIMING BELT	FENNER 150L100	BI 00646A	1
WIPER	A2 x 50mm long	BI 01425	1
DIE CAST BOX	R.S. 509 939 (TR.1/119)	BI 09939	1
DISC SPRING	ANDERTON 28.0 x 14.2		
	x 1.25	BI 00196E	52


DRAWING No. TR3/100
DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE.
TRIAC A.T.C.
MILLING HEAD ASSEMBLY
ALTERATIONS
SECTION A-A
IF IN DOUBT ASK.

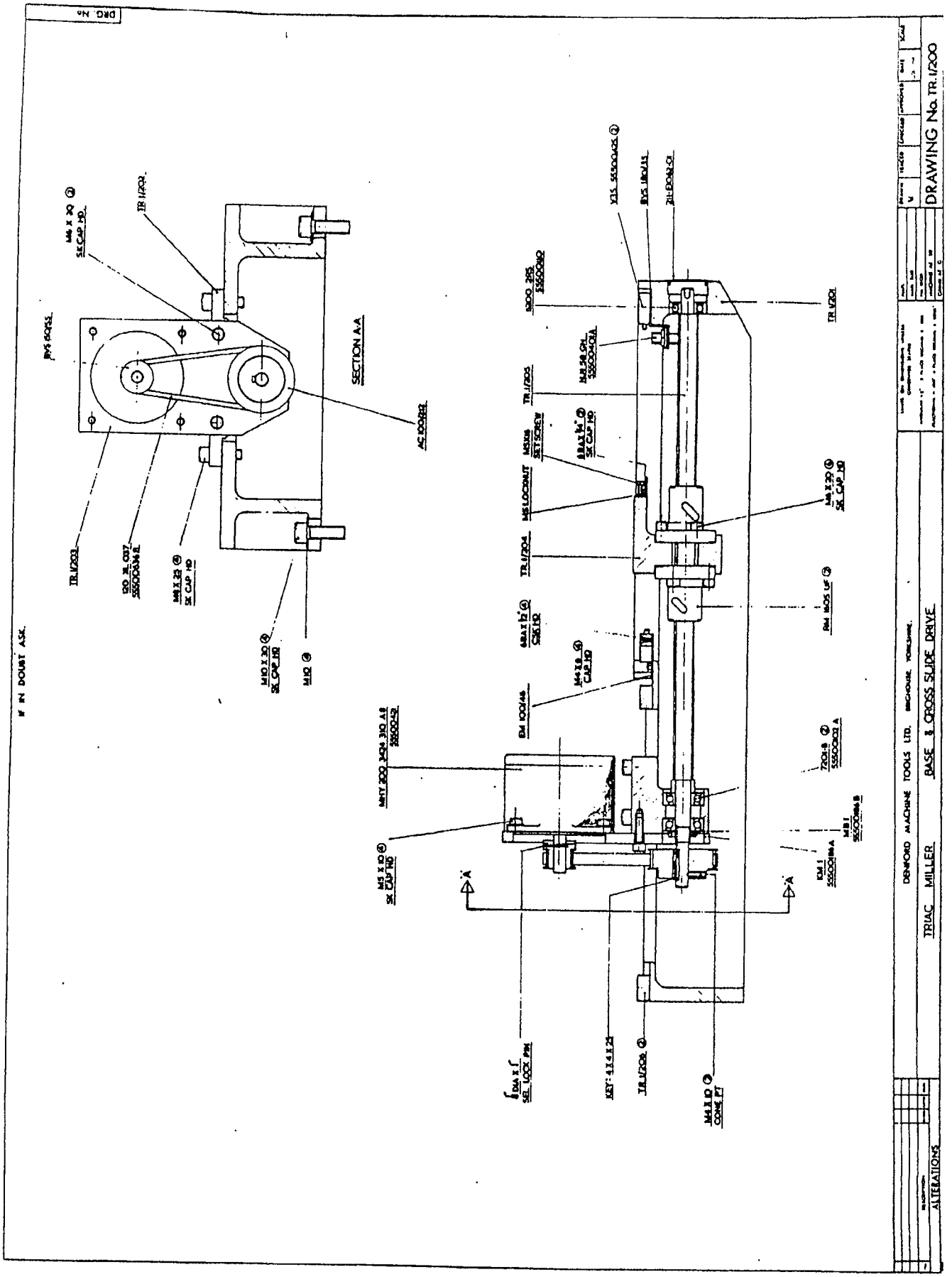

T. 1/116
TR 1/118
M5 X 10
M6 X 30 ②
TR 1/117
TR 1/119
55500381 C
M5 X 10 ③
TRIAC MILLER
HEAD KNOCK OFF ASSEMBLY
DRAWING No TR1/100 A

TRIAC BASE & CROSS SLIDE DRIVE TR.1/200

PART No.	DESCRIPTION	QTY
TR.1/201	BASE	1
202	CROSS SLIDE DRIVE HOUSING	1
203	MOTOR PLATE	1
204	CROSS SLIDE BALLNUT BRACKET	1
205	CROSS SLIDE BALLSCREW 1	
206	TENON	2
207B	FRONT BELLOW SUPPORT PLATE	1
208	BASE WASHER	4
209	BASE FILLER PLATE	1
210	FRONT BELLOWS HNG PLATE	2
211	Y DATUM TRIP	1
EM.100/46	MICRO-SWITCH MOUNTING PLATE	1
BVS.180/35	SENSOR & SWITCH BRACKET	1
CH.338Y	AXIS DIRECTION PLATE	1
BVS.150/55	12 T PULLEY	1
AC.100/212	30 T PULLEY	1

TRIAC BASE & CROSS SLIDE DRIVE TR.1/200

DESCRIPTION	MANUF & REF	COMPUTER No.	QTY
STEPPING MOTOR	ELECTRICAL DYNAMICS MHY200 3424 310 A8	BI 00421	1
TIMING PULLEY	FENNER12XL037 (BVS150/55)	BVS 159/55	1
PULLEY	(AC100/212	1	
TIMING BELT	FENNER120XL037	BI 00636B	1
BEARING	AG 7201 B	BI 00102A	2
BEARING	FAG 6200 2RS	BI 00110	1
LOCKNUT	FAG KM 1	BI 00186A	1
TABWASHER	FAG MB 1	BI 00186B	1
SENSOR	BALLUFF NJ1 58 GN	BI 00401A	1
MICRO SWITCH	BERGESS B3S	BI 00425	2
HOLE PLUG	HARMSWORTH TOWNSLEY 211-E1062-01		1


DRAWING No. TR.1/200
TRIAC MILLER
BASE & CROSS SLIDE DRIVE
DENFORD MACHINE TOOLS LTD.
ALTERATIONS
SECTION A-A
IF IN DOUBT ASK.

TRIAC COLUMN & HEAD DRIVE TR.1/300

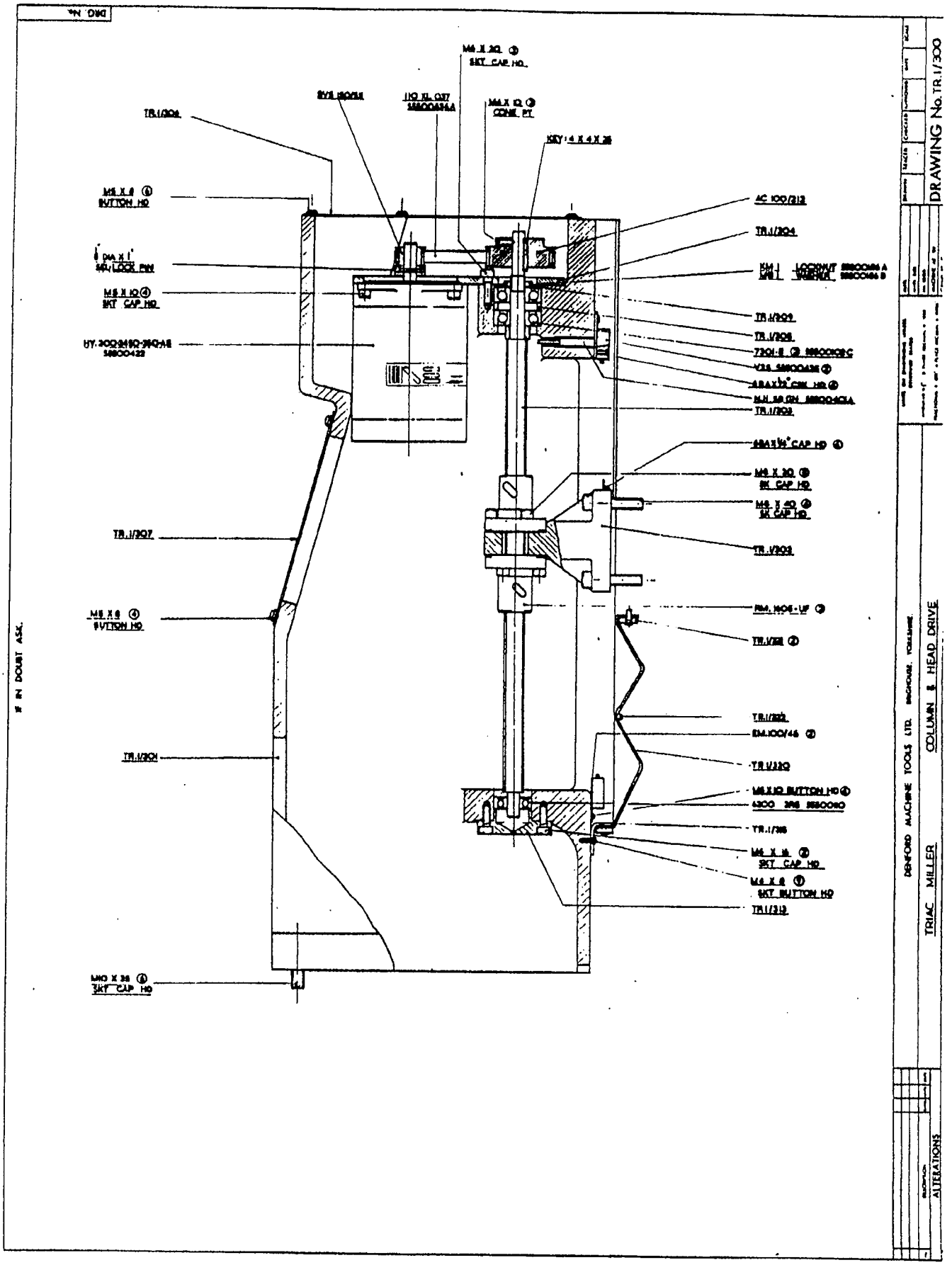
PART No.	DESCRIPTION	QTY
TR.1/ 301	COLUMN	1
302	HEAD BALLNUT BRACKET	1
303	HEAD BALLSCREW	1
304	MOTOR PLATE	1
306	COLUMN TOP COVER	1
307	REAR COVER PLATE	1
308	BEARING SPACER	1
309	PRE LOAD RING	1
313	BEARING CAP	1
314	24 WAY CONECTOR BRACKET	1
315	COLUMN BELLOW BRACKET	1
317	MONITOR SCREW	2
318	LO VO LIGHT MOUNTING BOX	1
*319	VERTICAL BELLOW TOP SUPPORT	1
320	SLIDE COVER	1
321	SLIDE COVER CLAMP	2
322	SLIDE COVER GUIDE	1
*323	BELLOW SUPPORT BACKPLATE	1
325	MOTOR PUL COUNTER WT	1
327	MONITOR FIXING BLOCK	2
329	CHOKE BRACKET	1
AC 100/212	30T PULLEY	1
BVS.150/55	12T PULLEY	1

BVS.160/80	LIFTING BRACKET	2
EM.100/46	MICRO SWITCH MOUNTING PLATE	1
CH.359	LOW LUB PLATE	1

* OPTIONAL EXTRA

TRIAC COLUMN & HEAD DRIVE TR.1/300

DESCRIPTION	MANUF & REF	COMP No.	QTY
STEPPING MOTOR	ELECTRONIC DYNAMIC HY.200-3450-350-A8	BI 00422	1
BEARING	FAG 7301-B	BI 00102C	2
BEARING	FAG 6200 2RS	BI 00110	1
TIMING BELT	FENNER 110XL037	BI 00636A	1
LOCK NUT	FAG KM1	BI 00186A	1
TAB WASHER	FAG MB1	BI 00186B	1
SENSOR	BALLUFF NJ1 58GN	BI 00401A	1
MICRO SWITCH	BERGESS V3S	BI 00425	1
BELLOW	SEVEN VALLEY 9816.C	BI 01427C	1
MONITOR BRACKET	AUDIO VISION FURNITURE	BI 01449	1
LO -VO LIGHT	MMSSK / 3122	BI 00415H	1
LOW-LUBE LIGHT	R.S. 570-080	RS 570 - 80	1


DRAWING No. TR.1/300
DENFORD MACHINE TOOLS LTD.
TRIAC MILLER
COLUMN & HEAD DRIVE
ALTERATIONS
IF IN DOUBT ASK.

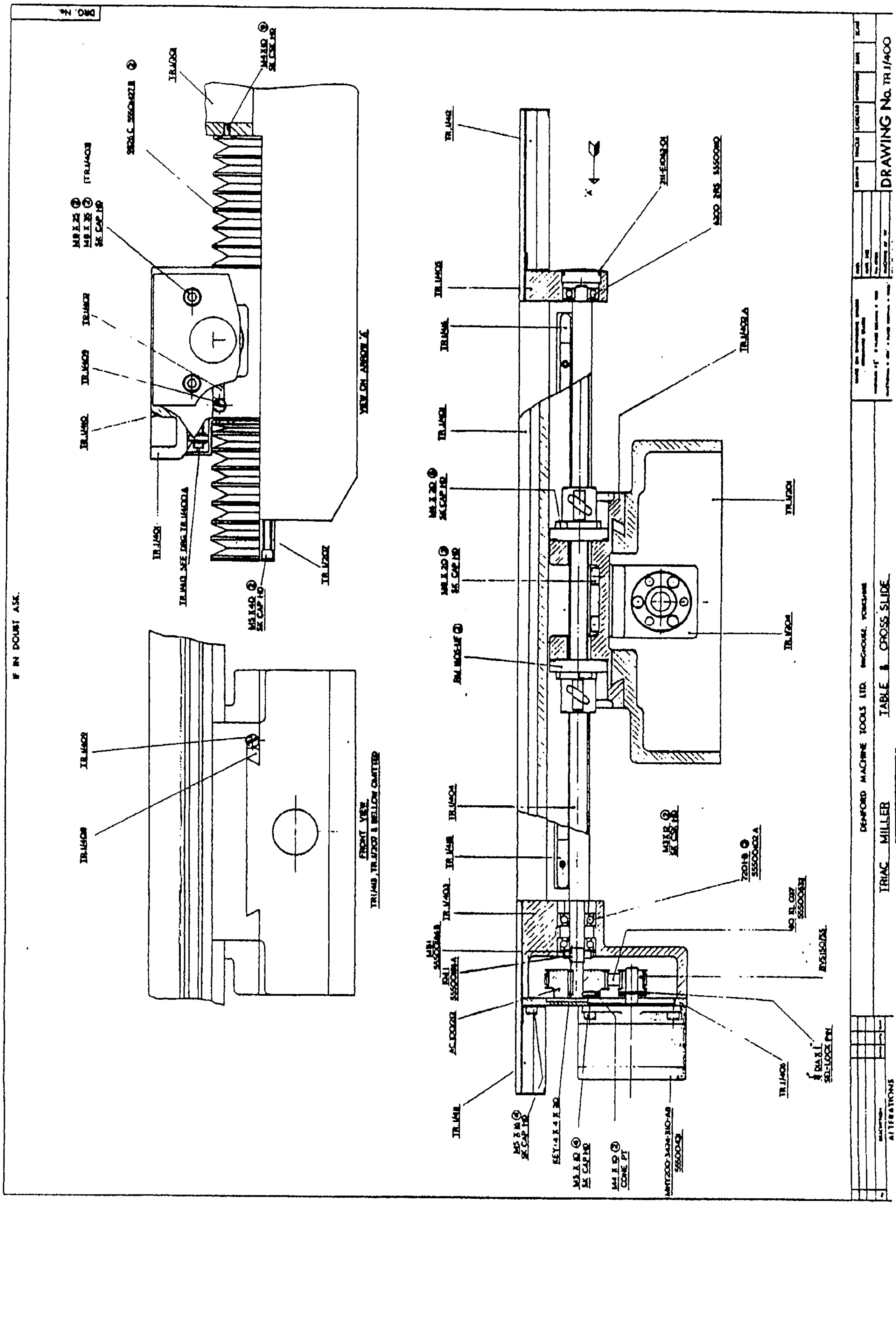
TRIAC TABLE & CROSS SLIDE TR.1/400

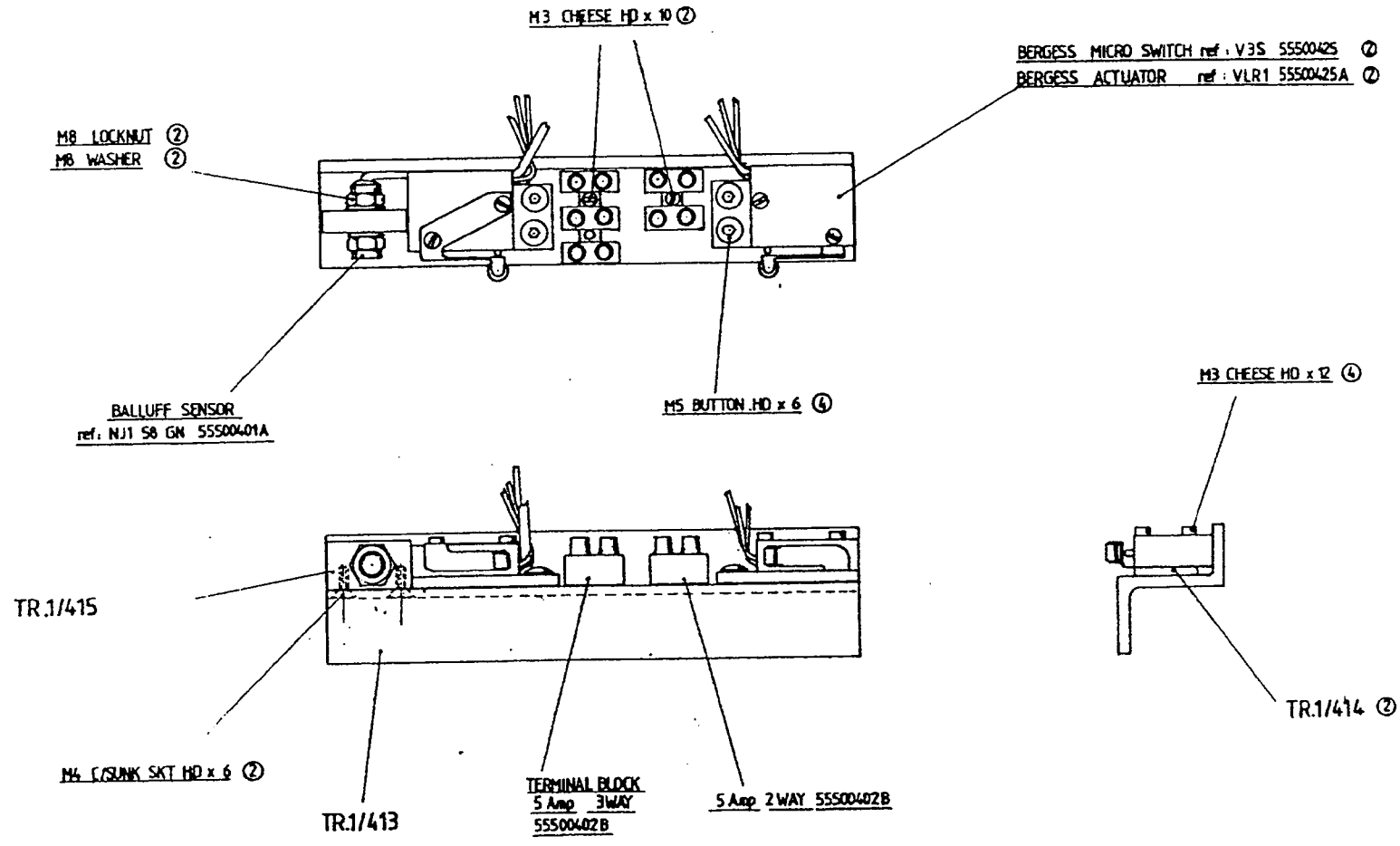
PART No.	DESCRIPTION	QTY
TR.1/ 401	TABLE	1
402A	CROSS SLIDE	1
403	TABLE DRIVE HOUSING	1
404	TABLE BALLSCREW	1
405	TABLE BEARING HOUSING	1
406	MOTOR PLATE	1
407	TABLE JIB STRIP	1
408	CROSS SLIDE/BASE JIB STRIP	1
409	JIB STRIP SCREW	2
411	TABLE END COVER LH	1
412	TABLE END COVER RH	1
413	SENSOR BRACKET	1
414	SWITCH PLATE	2
415	SENSOR SUPPORT	1
416	DATUM & LIMIT TRIP	1
417A	'X' MOTOR CONNECTION BOX	1
418	LIMIT TRIP	1
419	GUARD KNOCK OFF BRACKRT	1
420	T NUT M8	1
421	GUARD KNOCK OFF CAM	1
422	JIB STRIP LOCK	2
SP 192A	SUPPORT CHANNEL	1
193A	FRONT PLATE	1
194A	SIDE PLATE	1

CE.338X	AXIS DIRECTION PLATE	1
BVX.150/55	12 T PULLEY	1
AC.100/212	30 T PULLEY	1

TRIAC TABLE & CROSS SLIDE TR.1/400

DESCRIPTION	MANUF & REF	COMP No.	QTY
STEPPING MOTOR	ELECTRONIC DYNAMICS LTD MHY200-3424 310 A8	BI 00421	1
TIMING PULLEY	FENNER12XL037	BI 00640 (BVS150/55)	1
TIMING BELT	FENNER 80XL037	BI 00632	1
TIMING PULLEY	FENNER 30XL037	BI 00639 (AC100/212)	1
LOCKNUT	F AG : KM 1	BI 00186A	1
TABWASHER	FAG : MB 1	BI 00186B	1
BEARING	FAG : 7201 B	BI00102A	2
BEARING	FAG : 6200 2RS	BI 00110	1
SENSOR	BALLUFF : NJ1 58 GN	BI 00401A	1
MICRO SWITCH	BERGESS : V3S	BI 00425	2
ACTUATOR	BERGESS : VIR 1	BI 00425A	2
BELLOWS	SEVENVALLEY : 9826.C	BI 01427B	2
HOLE PLUG	HARMSWORTH TOWNSLEY 211-E1062-01		1
BALL CATCH	HOMEPAK 78	BI 01228A	2
HINGE	SOUTHCO E6-10-501-20	BI 01229	2


DRAWING No. TR 1/400
TRIAC MILLER
TABLE & CROSS SLIDE
DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE
IF IN DOUBT ASK.
FRONT VIEW
VIEW ON ARROW 'X'
ALTERATIONS



DRG. No.

No	DESCRIPTION	CHK'D	APP'D	DATE

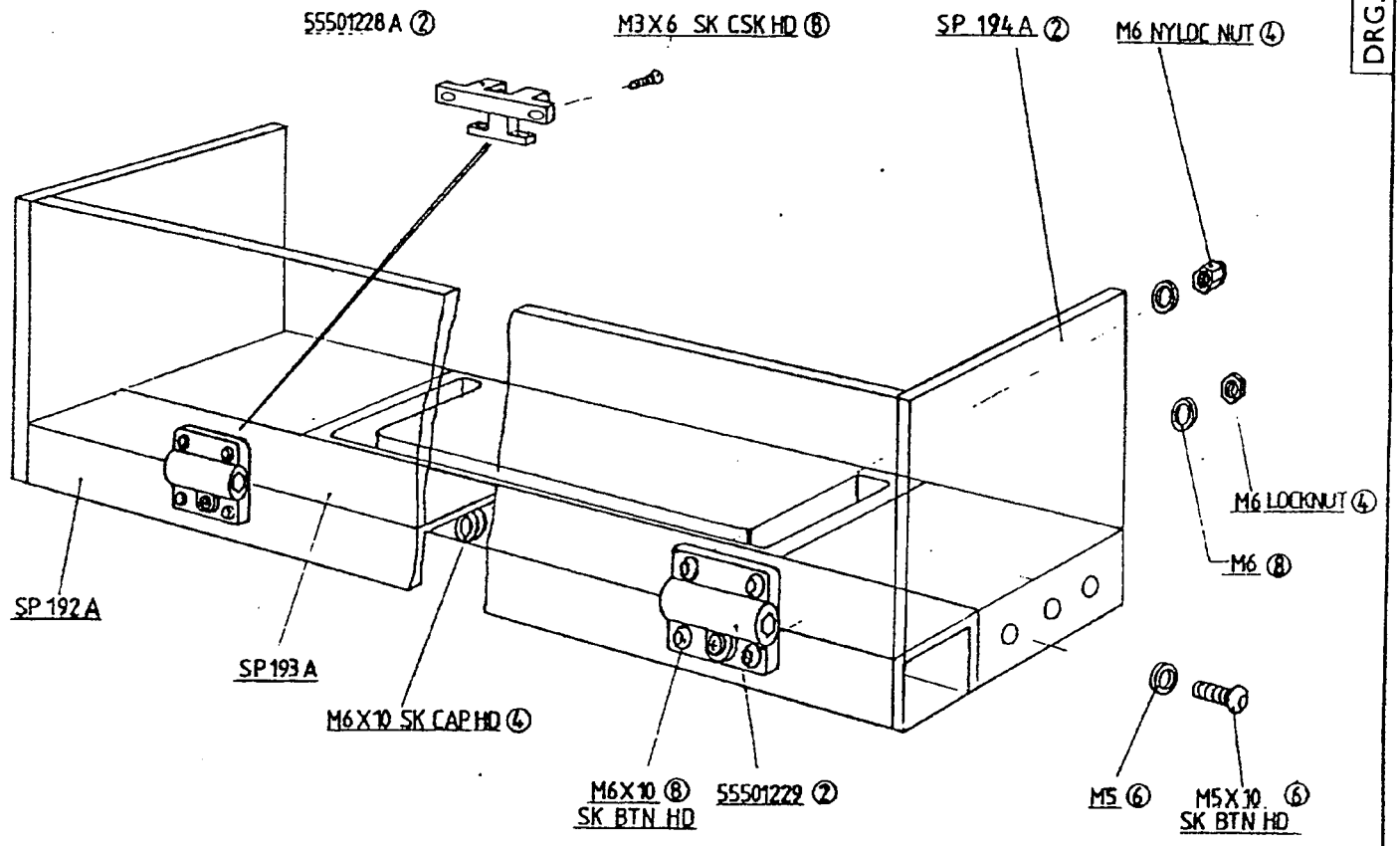
ALTERATIONS

TRIAC CNC MILLER

'X' AXIS LIMIT SWITCH & SENSOR BRACKET ASSEMBLY.

DRAWN	TRACED	CHECKED	APPROVED	DATE	SCALE
I.V.				16·1·85	1:1

DRAWING No. TR.1/400 A



DRG. No.

No	DESCRIPTION	CHK'D	APP'D	DATE
	ALTERATIONS			

TRIAC CNC MILLER
TABLE GUARD ASSEMBLY

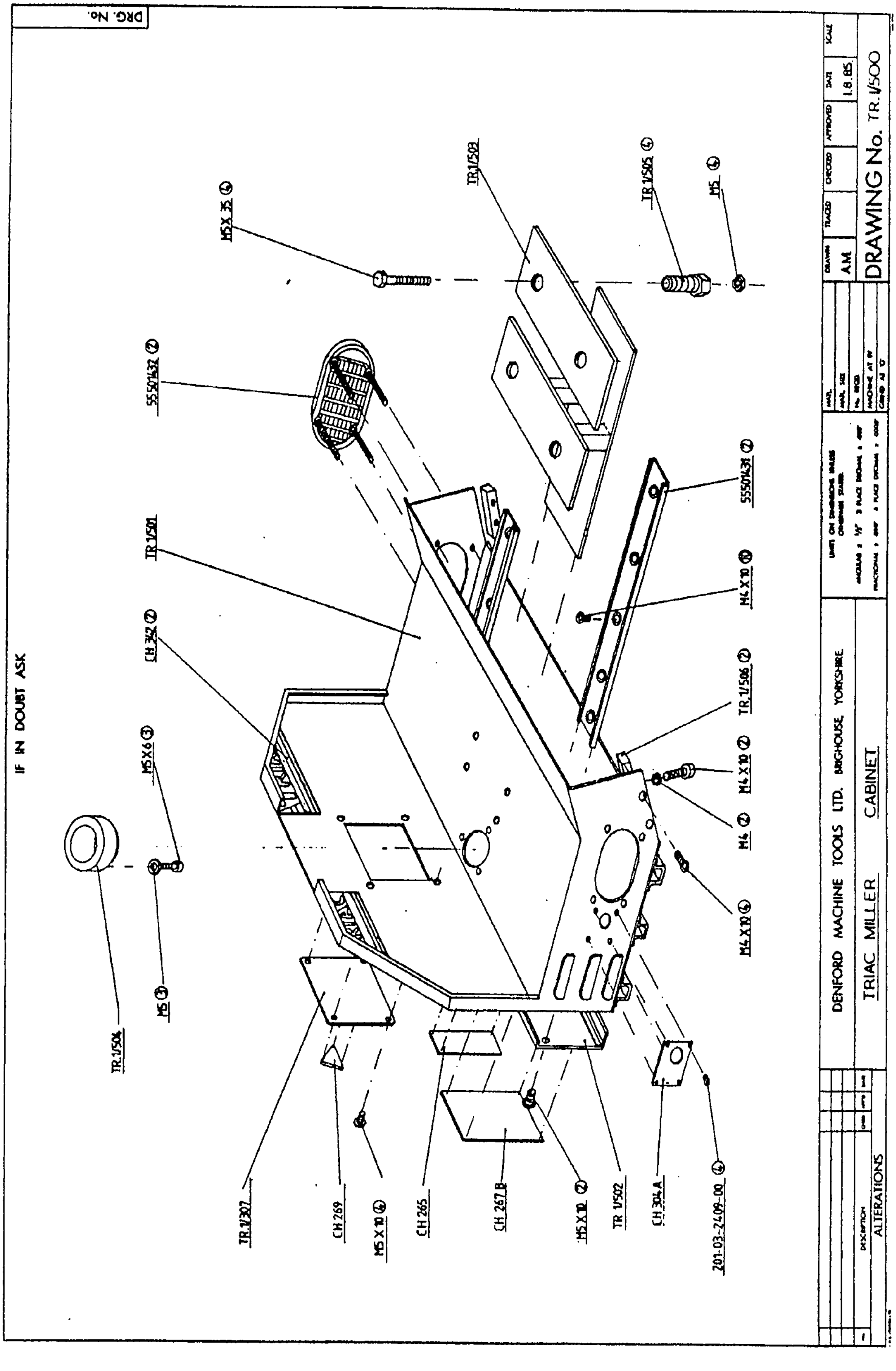
DRAWN	TRACED	CHECKED	APPROVED	DATE	SCALE
A.M.				29.7.85.	-

DRAWING No. TR.1/400 B

'TRIAC' CABINET TR.1/500

PART No.	DESCRIPTION	QTY
TR.1/501	CABINET	1
502	REAR DOOR	1
503B	INTERNAL SUPPORT	1
504	50mm GROMMET	1
505	LEVELLING SCREW	4
506	CHASSIS SUPPORT BLOCK	2
TR.1/307	REAR COVER PLATE	1
CH.304A.	EARPHONE PLATE	1
CH.342	TRIAC GUARD EMBLEM	2
CH.357	LUBRICATION PLATE	1
CH.265	ELECTRIC SYMBOL	1
CH.267B	SPECIFICATION PLATE	1
CH.269	ELECTRIC WARNING LABEL	1

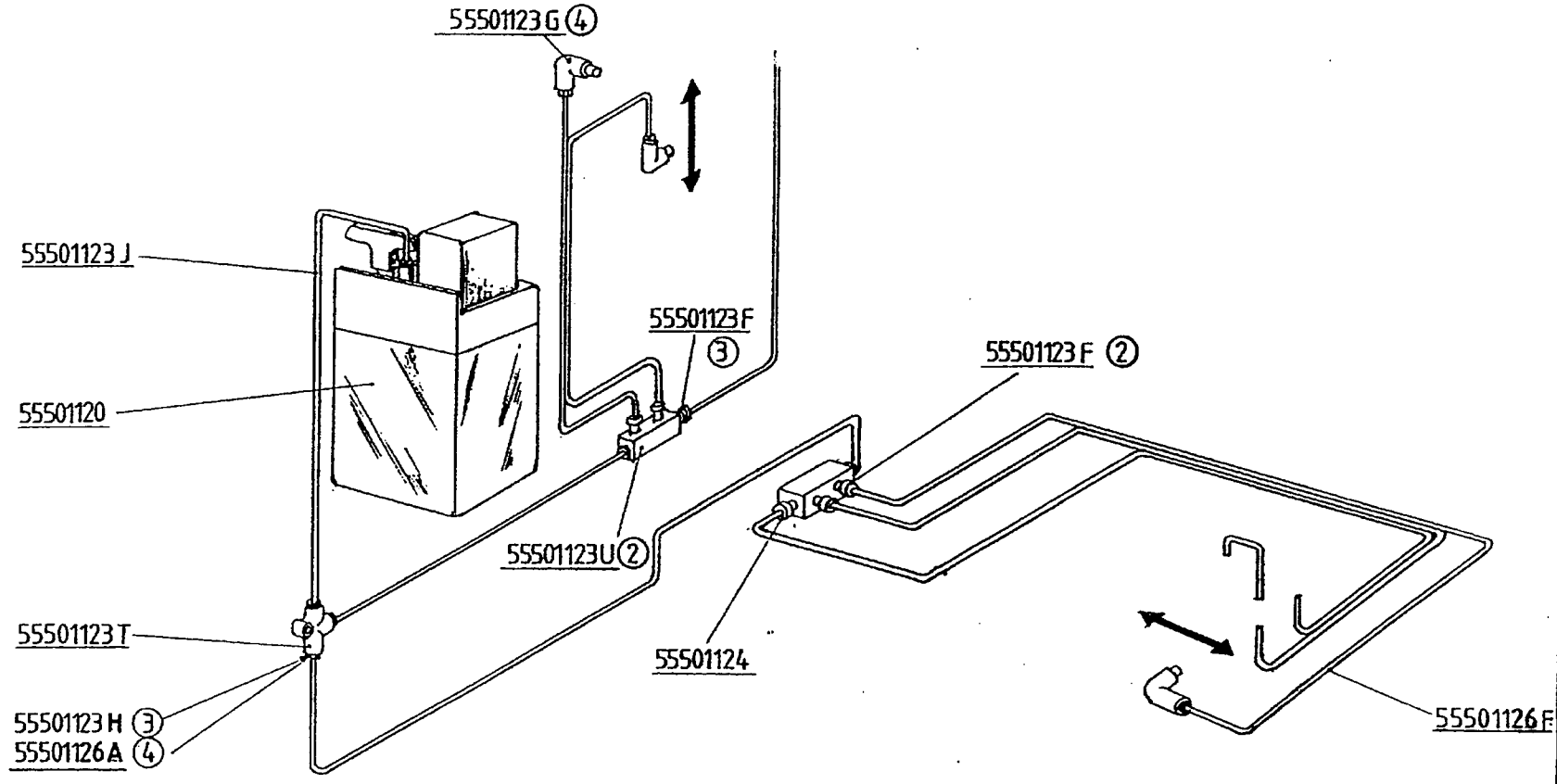
DESCRIPTION	MANUF& REF	COMPUTER No.	QTY
SPEAKER GRILLES	UNICARS 1-05.071	BI 01432	2
TRACK	WIDNEY 2012 FN	BI 01431	2
PLASTIC RIVETS	HARMWORTH TOWNLEY		
	201-03-2409-00		4


DRG. No.
IF IN DOUBT ASK
TR.1/504
M5 (3)
M5X6 (3)
CH 362 (2)
TR 1/501
55501432 (2)
M5X35 (4)
TR.1/503
TR 1/505 (4)
M5 (4)
55501431 (2)
M4X10 (10)
TR 1/506 (2)
M4X10 (2)
M6 (2)
M4X10 (4)
TR.1/307
CH 269
M5X10 (4)
CH 265
CH 267 B
M5X10 (2)
TR 1/502
CH 304 A
201-03-2409-00 (4)
DENFORD MACHINE TOOLS LTD. BRIGHOUSE, YORKSHIRE
TRIAC MILLER
CABINET
A.M.
1.8.85
DRAWING No. TR.1/500
ALTERATIONS

TRIAC PARTS LIST TR.1/600 LUBRICATION SYSTEM

DESCRIPTION	MANU & REF	COMPUTER No.	QTY
OIL PUMP	BIJUR C-2894	BI01120	1
METER UNIT	BIJUR FJB 3/0 B-6548	BI 01123F	5
4 WAY JUNCTION	BIJUR B-3262	BI 01123U	2
METER UNIT	BIJUR FJB O B-2495	BI01124	1
COMPRESSION CAP	105570	BI 01124A	4
ELBOW	ENOTS 36-05-02	BI 01123G	4
CONNECTOR			
TEE BRACKETED	ENOTS 36-0549-02	BI 01123T	1
PIPE CLIP	ENOTS 34-0220-02	BI 01125	8
COPPER PIPE	YORKSHIRE IMPERIAL	BI 01123J	1M
	4mm O/D X 0.6mm WALL		
NYLON PIPE	ENOTS 5N25	BI 01126F	5M
CLIP	RC34 COPP		4
CLIP	RC54 COPP		6
CONES	36-0501-02	BI 01123I	5
SLEEVE NUT	36050002	BI 01123R	5

See Drg SK.817B Lubrication system



'TRIAC' CNC MILLER — LUBRICATION SYSTEM — SK,817, B

TRIAC A.T.C. TOOL CHANGER TR.4/700A

PART No.	DESCRIPTION	QTY.
TR.3/701	PISTON FLANGE	1
702	MOUNTING PILLARS	4
703	DRAWBAR	1
704A	SUPPORT BRACKET	1
705	HORIZONTAL SLIDE	1
707	MICRO SWITCH PLATE	4
708A	STOP ROD	1
709A	TURRET BEARING HOUSING	1
710A	VERTICAL SUPPORT	1
712	VERTICAL SLIDE	1
714A	TURRET	1
725	TOOL HOLDER	6
717A	TURRET SPINDLE	1
719	TRIAC A.T.C. COVER	1
721A	SENSOR BRACKET	1
722A	PISTON VEE BLOCK	1
723	GUIDE COLLAR	1
724A	COLUMN FILLER PLATE	1
725A	COLUMN WIPER PLATE	1
726A	CYLINDER BRACKET	1
728	TOOL HOLDER SPRING	6
729	TOOL HOLDER ROLLER	12
730	TOOL HOLDER TENON	6
731	A.T.C. COVER BACKPLATE	1
732	MICRO SWITCH BLOCK	2

TR4. /700A CONTINUES

PART No.	DESCRIPTION	QTY.
737	PERSPEX GUARD	1
742	STOP ROD BUSH	1
743	STOP ROD PLATE	1
744A	SHOCK ABSORBER BRACKET	1
745	TOP TRIP	1
746	BOTTOM TRIP	1
747	LOCKNUT	1
748	PULL STUD (BT 35-TYPE U2)	6
750	INDEX PLATE	1
751	INDEX DISC	1
752	INDEX ROLLER	1
754	DRIVE COVER	1
755	FILLING PLATE	1
756	24 WAY CONNECTOR BRACKET	1
757	A.T.C. COVER SUPPORT	1

DESCRIPTION	MANUF & REF	COMP No	QTY
OILITE BUSH	MANG. BRONZE 6 x 10 x 10	55500195G	1
OILITE BUSH	MANG. BRONZE 12 x 16 x 20	55500195D	1
OILITE BUSH	MANG. BRONZE 7/8" x 1" x 1"	0192J	1

TR4. /700A CONTINUES

DESCRIPTION	MANUFACTURER & REF	COMPUTER No	QTY
BEARING	FAG 6002 2RS	55500106A	1
BEARING	FAG 7201B	55500102A	1
LOCKNUT	FAG KM 1	55500186A	1
TABWASHER	FAG MB 1	55500186B	1
SENSOR	R.S. 633 442	633 442	2
MICROSWITCH	BURGESS V3S	55500425	4
ACTUATOR	BURGESS VLR 1	55500425A	4
THRUST BEARING	TORRINGTON NTA 815	55500145	1
THRUST PLATE	TORRINGTON NRA 815	55500146	2
SLIDE WHEEL	HEPCO W2X	55501461	4
SLIDE TRACK	HEPCO T2 260 mm	55501461A	2
ADJUSTABLE	HEPCO BMX 2	55501461B	2
STATIONARY BUSH	HEPCO BM2	55501461C	2
MOTOR	ORIENTAL 2RK5GK	55500306J	1
GEAR BOX	ORIENTAL CE/2GK25K	55500306K	1
EDGING STRIP	BAINS; TITANFAST CODE 102	55501435A	

A.T.C. PNEUMATICS TR4/700A

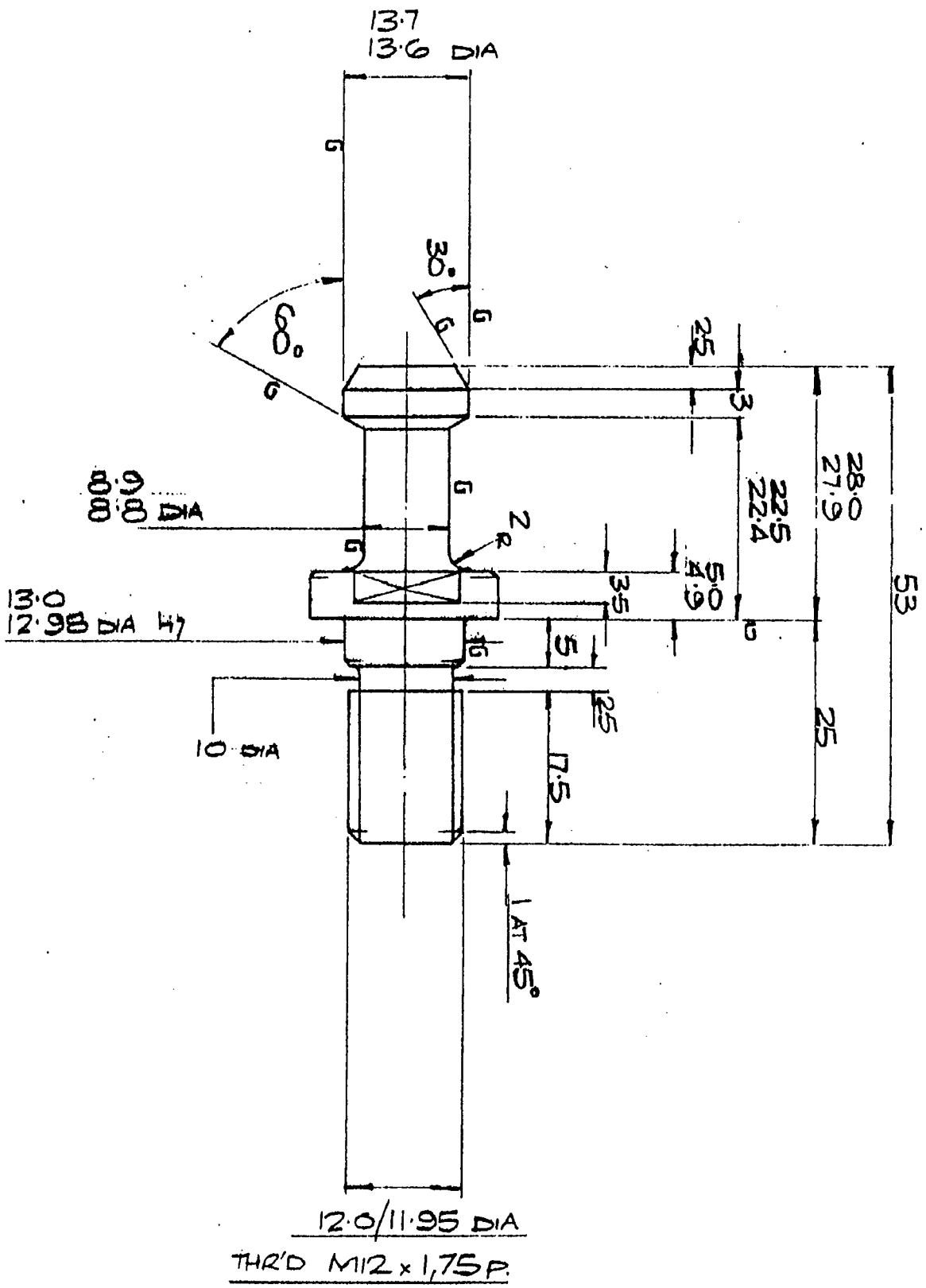
DESCRIPTION	MANUFACTURER & REF.	COMPUTER No	QTY.
CLAMP CYLINDER	BRAUER 489	BI 00845D	1
TUBING	6 DIA NYLON	BI 01110C	
TUBING SLEEVE			
4 DIA	ENOTS 36-0500-02	BI 01123I	4
TUBING NUT			
4DIA	ENOTS 36-0501-02	BI 01123R 4	
TUBING	6 DIA NYLON	BI 01126F	
LUBRICATOR	ENOTS L07-100-MPQD	BI 01127A	1
SOLENOID VALVE	ENOTS 14-1135-50-240	BI 01130Y	1
CYLINDER 25 DIA	ENOTS 60-202-00-160	BI 01128I	1
CYLINDER 25 DIA	ENOTS 60-202-00-100	BI 01128J	1
CYLINDER NUT	ENOTS 48-0127-06	BI 01128K	2
PUSH IN ADAPTOR	ENOTS 971505-02	BI 01128N	5
PLASTIC SILENCER	1/8" BSP S/S 1 x 10	BI 01128T	6
1/8 " BSP NIPPLED CON		ENOTS 36-0633-0155501128U	
SOLENOID VALVE	ENOTS 14-1135-50-240	BI 01128V	2
NON RETURN VALVE	ENOTS 04-0355-00-000	BI 01128W	2
FLOW VALUE 1/8 BSP	ENOTS 04-0315-00-000	BI 01128X	4
COMPRESSION TEE	ENOTS 36-0514-04	BI 01128Y	1
NIPPLED ADAPTOR	ENOTS 36-0556-04	BI 01128Z	1

(CONTINUES)

A.T.C. PNEUMATICS TR4/700A

DESCRIPTION	MANUF & REF.	COMP No	QTY
STRAIGHT MALE ADPT			
6 DIA	ENOTS 36-0530-04	BI 01129D	2
STRAIGHT MALE ADPT			
4 DIA	ENOTS 36-0530-02	BI 01129G	4
PUSH IN ELBOW	ENOTS 97-1114-04	BI 01129H	3
FILTER REGULATOR	ENOTS B06-101-AZKS	BI 01451	1
PRESSURE GAUGE	ENOTS 07-0131-16	BI 01451A	2
BRACKET	ENOTS 18-001-053	BI 01451B	2
PUSH IN ADAPTOR	ENOTS 97-1505-04	BI 01451C	9
PUSH IN TEECON	ENOTS 97-1514-04	BI 01451L	4
TUBING NUT	ENOTS 36-0500-04	BI 01451P	4
TUBING SLEEVE	ENOTS 36-0501-04	BI 01451Q	4
HOSE ADAPTOR	1/8 BSP SCHRADER 8051-11	BI 01451S	1
SHOCK ABSORBERS	MARTONAIR M/59614/AX	BI 01129F	4
ENCLOSURES	SAREL 8002	B I 00420	1
ENCLOSURE PLATE	SAREL 5202	BI 00420A	1
AIR VALVE	ENOTS 03-0401-00	BI 01129L	1
AIR VALVE	ENOTS 03-0413-00	BI 01129M	1
REGULATOR	ENOTS R06-100-RNKD	BI 01451U	1
PUSH IN TEE CON	ENOTS 97-1514-02	BI 01128D	1

PULL STUD


13·7
13·6 DIA
30°
60°
25
3
28·0
27·9
22·5
22·4
8·9
8·8 DIA
2 R
5·0
4·9
35
53
13·0
12·98 DIA H7
16
5
25
10 DIA
17·5
25
1 AT 45°
12·0/11·95 DIA
THR'D M12 x 1,75 P.