

Bridgeport

VMC 560 22

MAINTENANCE MANUAL

HEIDENHAIN TNC 2500C CONTROL

SIEMENS DRIVES



PART No. 1801235
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IMPORTANT SAFETY NOTICE WARNING

It is the users responsibility to be acquainted with the legal obligations and requirements in the use and application of the machine particularly under the Health and Safety at Work Act 1974 and those under the British Standard Code of Practice for Safety of Machinery BS5304 1988.

The Bridgeport Machining Centre.

SAFE INSTALLATION

It is the customers responsibility to ensure the machine is installed in a safe operating position, with all service pipes and cables clear of the operation area so as not to cause a hazard. Access must be allowed for safe maintenance, swarf and oil disposal including safe stacking of machined and unmachined components.

MACHINE GUARDING

The Bridgeport Machining Centre is fitted with completely enclosed guards as standard. In certain cases and tooling applications additional guarding may have to be provided by the user.

The standard machine guarding has special safety interlocks on the guard doors that comply with the British Standard Code of practice for Safety of Machinery. Guards and interlock shall be kept fully maintained and tested by the customer and shall not be removed.

The guards are made with clear observation windows having high impact resistance to provide operator safety and a clear unobstructed view of the operations in progress. The opening of any guard door provides access to potential hazard areas. Opening the working area guard doors will automatically stop the spindle, but it is still possible, by means of the operator controls, to manually initiate all other machine functions. Extreme care must therefore be used at all times.

SOFTWARE

Unauthorised changing of machine software or control parameters is hazardous and is not permitted. Bridgeport Machines Limited will not accept any liability whatsoever for unauthorised changes in this area.

AUTHORISED PERSONNEL AND TRAINING

Operating, service and maintenance engineers shall be authorised by the 'User Company' and properly trained in the use of the machine.

SAFE WORKING PRACTICES

Workholding devices, lifting equipment, tooling and their use shall be the responsibility of the user. It is the users responsibility to protect against the hazards caused by swarf, leaking oil or coolant and their use.

Use of proprietary oil or coolant is the responsibility of the user. Special instructions from the suppliers concerning their use should be carefully read and understood before use.

To prevent bodily injury safe working practices should be employed when operating or servicing the machine.

IMPORTANT

SAFETY INFORMATION

U.S.A. ONLY

To prevent serious bodily injury, you should observe the following basic safety precautions when installing, operating or servicing your Bridgeport milling machine or machining centre.

1. Follow all instructions in the machine manual.
2. Wear approved Industrial safety glasses and safety shoes.
3. Do not wear gloves, long sleeves, long hair, rings, watches, jewelry or other loose items that could become caught in moving parts.
4. Keep all parts of your body away from moving parts (belts, cutters, gears, etc.).
5. Use proper point of operation safeguarding.

These and other safety precautions are discussed in the American National Standards Institute Standard entitled Safety Requirements for the Construction, Care and Use of Drilling, Milling and Boring Machines (ANSI B11.8-1974).

This publication is available from: The American National Standards Institute
1430 Broadway
New York, New York 10018

Safeguarding for protection at the point of operation can only be designed and constructed when the parameters of the particular operation have been determined. As a result, ANSI B11.80-1974, Section 5.1, states that "It shall be the responsibility of the employer to provide, and ensure the use of a guard, guarding device, awareness barrier, awareness device, or shield...".

To assist machine users in designing point of operation safeguarding for their specific machine applications, the Occupational Safety and Health Administration has published a booklet entitled Concepts and Techniques of Machine Safeguarding (O.S.H.A. Publication Number 3067).

This publication is available from: The Publication Office - O.S.H.A.
U.S. Department of Labor
200 Constitution Avenue, NW
Washington, D.C. 20210

The general purpose point of operation shield provided with this machine and shown in certain illustrations throughout this manual may not be appropriate and cannot be utilized for all possible applications of the machine. Use additional or alternate safeguarding where this shield is not appropriate or cannot be utilized. Note that for purpose of display the shield has been removed in certain other illustrations in this manual.

BRIDGEPORT SAFETY LIST ALL COUNTRIES

1. DON'T run your machine until you have read and understood the Bridgeport Operator and Maintenance manuals.
2. DON'T run your machine until you have read and understood all machine and control key signs.
3. DON'T run your machine for the first time without a qualified instructor. ASK your supervisor for help when you need it.
4. PROTECT your eyes. Wear safety glasses with side shields at all times.
5. DON'T get caught in moving parts. Remove watches, rings, jewelry, neck-ties, and loose-fitting clothes.
6. PROTECT your head. Wear a safety helmet when working near overhead hazards.
7. KEEP your hair away from moving parts.
8. PROTECT your feet. Always wear safety shoes with steel toes and oil-resistance soles.
9. Gloves are easily caught in moving parts. TAKE THEM OFF before you turn on the machine.
10. Loose objects can become flying projectiles. REMOVE all loose items (wrenches, chuck keys, rags, etc.) from machine before starting.
11. NEVER operate a machine tool after taking strong medication, using non-prescription drugs or perscribed drugs which may impair concentration or consuming alcoholic beverages.
12. SAFEGUARD the cutting zone ("point of operation"). Use standard, general purpose safeguard where possible. Use special safeguards when required.
13. Protect your hands. STOP the spindle completely BEFORE changing tools.
14. Protect your hands. STOP the spindle completely BEFORE you load or unload a workpiece.
15. Protect your hands. STOP the spindle completely BEFORE you clear away chips or oil. Use brush or chip scraper. NEVER use your hands.
16. Protect your hands. STOP the spindle completely BEFORE you adjust the workpiece, fixture or coolant nozzle.
17. Protect your hands. STOP the spindle completely BEFORE you take measurements.
18. Protect your hands. STOP the spindle completely BEFORE you open safeguard or covers. Never reach around a safeguard.
19. Protect your hands. STOP the machine BEFORE you change or adjust belts, pulleys or gears.
20. PROTECT your hands. Keep hands and arms clear of spindle start switch when changing tools.
21. PROTECT your eyes and the machine. Never use a compressed air hose to remove chips.

22. KEEP work area well lighted. Ask for additional light if needed.
23. DON'T slip. Keep your work area clean and dry. Remove chips, oil and obstacles.
24. NEVER lean on your machine. Stand away when the machine is running.
25. DON'T get trapped. Avoid pinch points caused by motion of table and head.
26. PREVENT objects from flying loose. Securely clamp and locate workpiece. Use stop blocks where necessary. KEEP clamps clear of cutter path.
27. PREVENT cutter breakage. Use correct table feed and spindle speed for the job. Reduce feed and speed if you notice unusual noise or vibration.
28. PREVENT cutter breakage. Rotate spindle in clockwise direction for right-hand tools., counterclockwise for left-hand tools. Use the correct tool for the job.
29. PREVENT workpiece and cutter damage. Never start the machine when the cutter is in contact with the workpiece.
30. Dull and damaged tools break easily. Inspect tools and tool holders. Keep tools sharp. Keep tool overhang short.
31. Keep rotating cranks and handwheels well-lubricated and maintained. Do not remove safety springs.
32. Certain materials, such as magnesium, are highly flammable in dust and chip form. See your supervisor before working with these materials.
33. PREVENT fire. Keep flammable liquids and materials away from work area and hot chips.
34. PREVENT machine from moving unexpectedly. Disengage power feed when not being used (manual machines only).
35. PREVENT machine from moving unexpectedly. Always start machine in manual mode.

This manual provides information which is proprietary to Bridgeport Machines and its suppliers and is made available for the use and maintenance of its products.

Any use reproduction or dissemination of this information for any other purpose without written permission is prohibited.

The information in this document is subject to change without notice and does not constitute a commitment by Bridgeport Machines.

E&OE.

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NOTES

1. MACHINE INSTALLATION

1.1 INTRODUCTION

Correct installation of the machine is the first essential to ensure that it will operate at a high level of efficiency over long periods with the minimum of attention. Each machine will be despatched with foundation, installation and capacity drawings.

These drawings show the design layout for the various units of the complete installation. As the cables and the trunking have been supplied to the dimensions shown on the drawings, variations from the layout should not be attempted without prior consultation with the manufacturers.

1.2 UNCRATING (WHERE NECESSARY)

Carefully remove the outside casing, internal braces and skids so that the machine is not damaged in any way. If any damage has been caused in transit please inform:

- i) the haulage contractors
- ii) the railways and/or shippers
- iii) or local agent and state the full extent of damage. Retain all the packing materials until the Insurance Company's assessors have inspected the machine.

1.3 SHORTAGES PROCEDURE

Check all the equipment with the Packing Sheet or Delivery Note. If any shortages are evident or suspected, please inform Bridgeport Machines or your local agent.

1.4 LIFTING



WARNING

WARNING: ENSURE THAT THE CHAINS USED TO LIFT THE MACHINE ARE UNDAMAGED AND OF THE SPECIAL RATING FOR THE EQUIPMENT
IE: 6000 kgs S.W.L

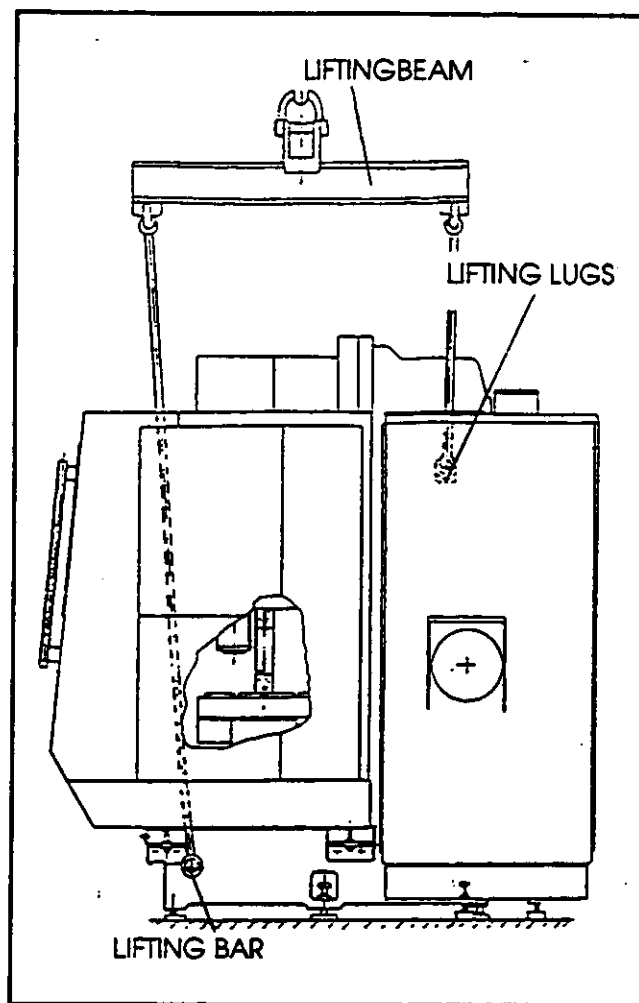


Figure 1.1 Slings

1.4.1 Weight

Base machine approximately 2,850 kgs or (6,300 lbs). To lift the machine you will require a steel bar approximately 50mm (2in.) diameter and 1,524 mm (5ft.) long and a lifting beam. Follow the procedure below and use the recommended method of slinging the machine as shown above (figure 1.1).

- i) Place the bar through lifting holes provided in the front of the base. Then affix the lifting chain to either side of the bar as shown and onto the lifting lugs on the side of the column.

1. MACHINE INSTALLATION (cont.)

- i) Before raising the machine off the ground test for balance. Figure 1.1 clearly depicts the method of slinging. If the machine cannot be lifted in the conventional manner, it should be jacked-up onto rollers and then drawn into position. The machine together with its ancillary equipment should now be positioned on the selected site and levelled.

1.5 PREPARATION OF THE MACHINE LOCATION

1.5.1 FOUNDATION & CLEARANCES

When setting the machine on a prepared foundation of concrete (optional) or on the shop floor. Carefully lower the machine onto the prepared foundation, having first extended the levelling screws until they protrude at least (20mm) through the base flange. If a swarf management system is an option, then the screw position should be 55mm.

- i) Ensure that the levelling screws are centralised over the bearing plates and that the weight of the machine is being taken by all six screws.
- ii) Position the table and saddle in the central position, then using a precision level on the machine table take readings in the 'X' and 'Y' axes. Level the machine by means of the six levelling screws to within 0.03mm in 300mm.

When machine is correctly levelled lock the levelling screws.

NOTE: Ensure the distance between the base and the floor is 40mm (1.57in.) see figure 1.3 (or 55mm for swarf management system machines).

Although foundation bolts are not always required ideally all milling machines should be bolted to a concrete foundation.

Figure 1.4 shows the necessary clearances around the machine for access door opening for maintenance and to continue the remainder of the installation.

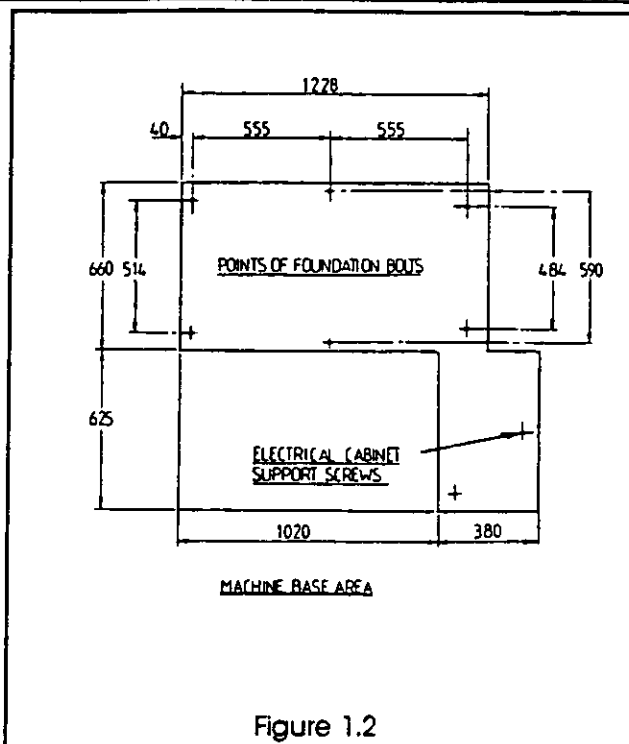


Figure 1.2

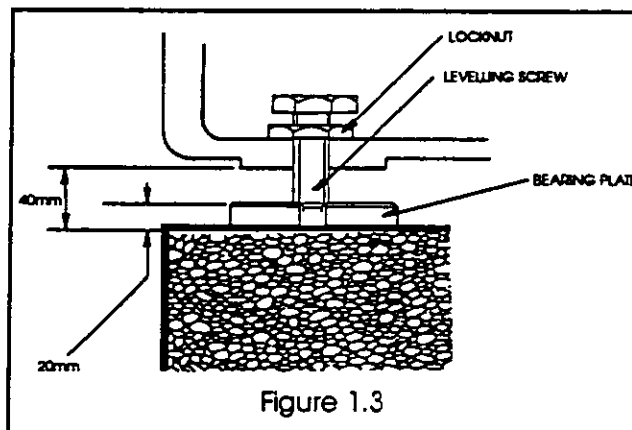


Figure 1.3

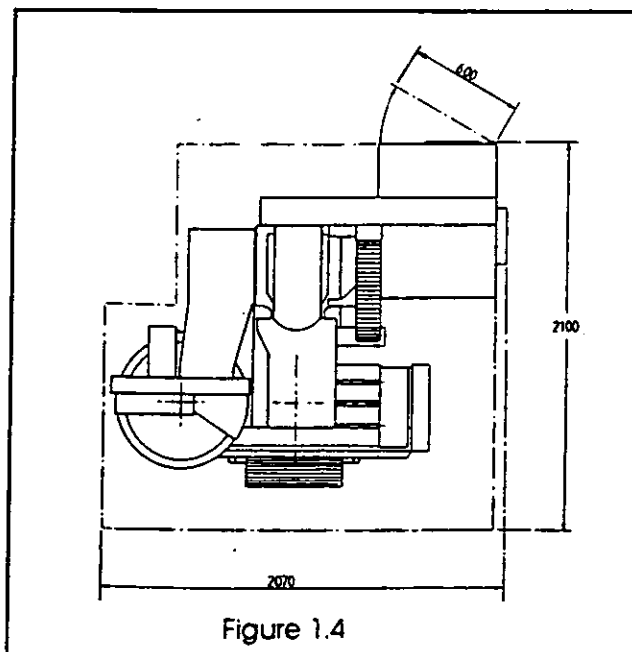


Figure 1.4

1. MACHINE INSTALLATION (cont.)


1.6 ELECTRICAL SERVICE

1.6.1 REFERENCE INFORMATION

There are two electrical cabinets on the machine supplied. Check the label on the door of the main magnetics cabinet to determine the exact figures for your installation.

1.6.2 MAIN MAGNETICS CABINET

This cabinet is wired for 230, 380, 420, and 460v. The mains circuit breaker (CB1) is 50 amps. The cabinet contains the magnetics, Drives, Transformer and Panels.

	Bridgeport	BRIDGEPORT MACHINES
	VOLTAGE	<input type="text"/>
	PHASE	<input type="text"/>
	FREQUENCY	<input type="text"/>
	FULL LOAD CURRENT	<input type="text"/>
	SPINDLE MOTOR RATING	<input type="text"/>
SHORT CIRCUIT INTERRUPT CAPACITY OF MAINS PROTECTION DEVICE <input type="text"/>		
<div>Bridgeport Machines Limited P.O. Box 22, Foster Road, Leicester, England Telephone: 0533 531122</div>		



Isolator in OFF position.



DANGER

DO NOT CONNECT ELECTRICAL SUPPLY AT
THIS STAGE

NOTE: Customer power requirement. The peak power requirement of the machine is **15 KVA**

NOTE: NON STANDARD SUPPLY VOLTAGES:
A machine ordered with option **4678190** will operate on; **200, 208, 220, 230 VOLTS 3 PHASE, 50 or 60 CYCLES.**

NOTES

2. PREPARATION FOR OPERATION

2.1 CLEANING THE MACHINE



WARNING

DO NOT USE GASOLINE, CHLORINATED HYDROCARBONS OR ANY OTHER INFLAMMABLE OR TOXIC CLEANING AGENT.

Clean all rust preventative from the machine with a non-volatile cleaning fluid such as kerosene/white spirit and lubricate all exposed sections of the table, saddle and column ways. This includes the underside of all ways.

SLIDEWAY OIL FILLING POINT

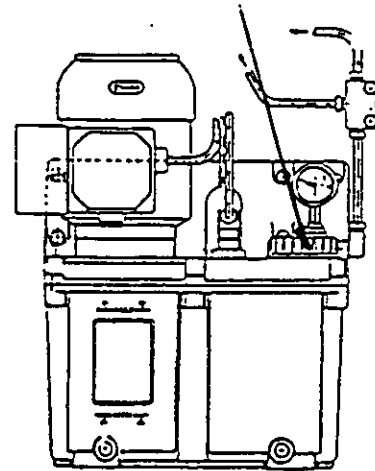


Figure 2.1

2.2 LUBRICATION



WARNING

FOR ALL LUBRICANTS THE MANUFACTURERS HEALTH AND SAFETY RECOMMENDATIONS SHOULD BE OBSERVED

The machine is provided with a lubrication system which automatically lubricates the ballscrews, linear guides and Z axis ways. Seventeen metering units are fed by a pump which operates once every 30 minutes generating 40 - 50 bar pressure.

Check oil level in air lubricator bottle.

RECOMMENDED LUBRICANT. (AIR LUBRICATOR.)

Mobil Oil	Velocite No. 6
Shell Oil	Tellus R10
Castrol	Hyspin AWS 10
Duckhams Oil	Zircon 1
Texaco	Spintex 60
BP	Energol HLP 10
Esso	Nuto H10
Century	P79A/P/198A

RECOMMENDED LUBRICANT. (SLIDEWAYS.)

Mobil Oil	Vactra Oil No. 2
Shell Oil	Tonna TX 68
Castrol	Magna BTD 68
Duckhams Oil	Adglide 68
Texaco	Way Lubricant 68
BP Trading	Maccurate 68D
Esso	Febis K-68
Kluber	Labora D68
Fina	Hydran G68
Arac	Deggamit BW 68
Avia	Avilub ESL 68 SU

2.3 COOLANT



WARNING

FOR ALL COOLANTS THE MANUFACTURERS HEALTH AND SAFETY RECOMMENDATIONS SHOULD BE OBSERVED

The coolant system consists of a separate tank which fits round the base of the machine beneath the perimeter guards. Coolant is pumped from the tank to the cutting area by a pump situated at the rear of the machine. Used coolant returns to the tank through a close mesh screen in the base of the guards. The coolant reservoir has a capacity of approximately 90 litres (20 gallons). Pour in the required type of coolant to the base of the machine.

NOTES

3. MACHINE COMMISSIONING

3.1 GENERAL

Initial machine commissioning must be carried out by Bridgeport Field Service or their trained Dealer Service.



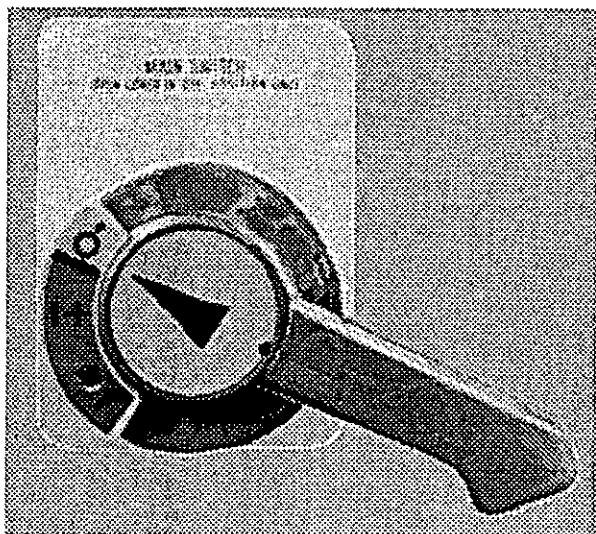
WARNING

ELECTRICAL POWER MUST NOT BE APPLIED TO THE MACHINE UNTIL REQUESTED BY THE ENGINEER CARRYING OUT THE COMMISSIONING

3.2 CUSTOMER INSTALLATION REQUIREMENTS

3.2.1 PRELIMINARY INSPECTION

The following checks are to be carried out with the machine isolator switched OFF.



Isolator in OFF position

- 3.2.1.1 Visual Inspection
- Check the machine for any transit damage and check that all hardware fixings are secure.
 - Check that all circuit breakers are installed and are secure.
 - Check that the lubrication reservoir has been filled with the correct grade of oil.

3.2.2 MAINS SUPPLY CHECKS

- Check 3 phase mains supply conforms with machine operating voltage.

- Inform Bridgeport Machines of any known regular variations of supply voltage which are widely different from the nominal values in (i) above.
- Connect the incoming 3 phase supply (L1/L2/L3) to the main isolator as shown in figure 3.1.
- Machine earth must be directly connected to the proper main earth system of the factory supply.
- Check that supplied with the machine is the special adaptor key for the guard.

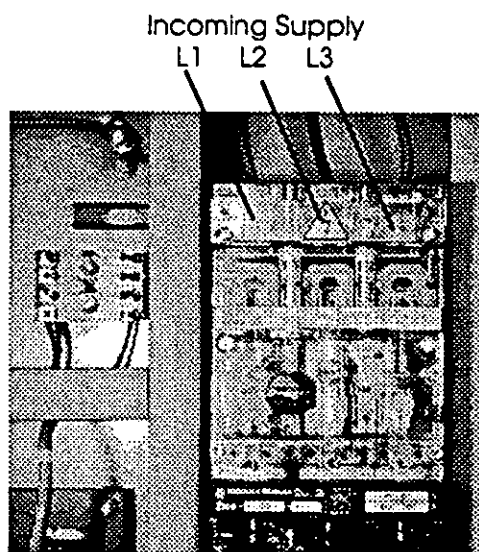


Figure 3.1

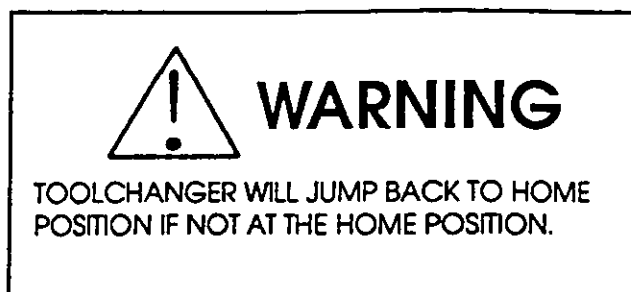
3.2.3. TRANSIT STRAPS

Remove transit straps (painted red) from the following areas:

- Bracket between toolchange casting and slide. This can be found by standing beside the pneumatic cabinet at the rear of the machine.
- Bracket between saddle and base - this can be reached through the perimeter guard opening.
- Bracket between table and saddle. The middle table tray must be removed (to gain access).
- The console must be unwrapped, removed from its transit bracket & the bracket removed.

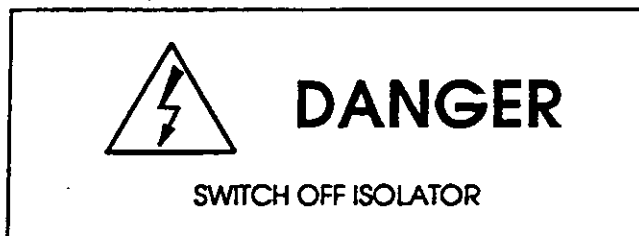
3. MACHINE COMMISSIONING (cont.)

3.2.4 PNEUMATICS



Connect air supply to air service panel. Set the pressure regulator to provide a nominal pressure of 80 p.s.i

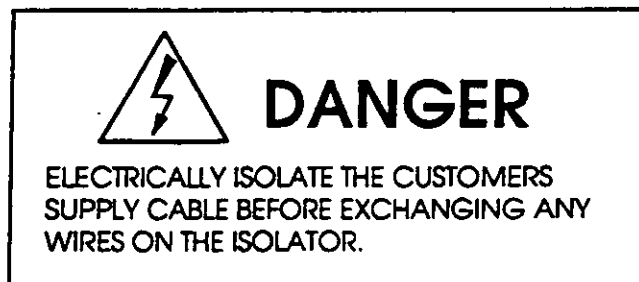
3.3 COMMISSIONING PROCEDURE FOR EXPORT MACHINES



Level machine as per section 1.5.

De-grease the slideways and apply oil as per section 2.1.

PHASE ROTATION CHECK



- a) Check that air is blowing OUT of the spindle motor fan. If the fan is not rotating in the correct direction exchange wires L1 & L2 on the isolator.)
- b) Check rotation of coolant pump (clockwise as viewed from the motor fan end). If necessary reverse the rotation by exchanging wire No.s 7 & 8 in the terminal box mounted onto the motor

4. SPECIFICATION

4.1 THE XYZ SERVO MOTOR DRIVE

4.1.1 SERVO MOTORS

The feed motors are of the permanent magnet type driven by 3 single axis drive unit situated in the electrical cabinet. Each motor has an encoder built in (X & Y - 500 linear/revolution, Z - 500 linear/revolution) to provide velocity feedback to the drive.

4.1.2 TRANSMISSION

The X and Y motions of the table are accomplished by means of hardened and preloaded 8mm pitch ballscrews with recirculating ball nuts. On the Y axis the ball nut is fixed to the saddle; X axis ballnut bracket is fixed to the table and the Z axis ballnut is fixed to the head casting. The a.c. motors drive the screw by timing belt and pulleys. The Z motion is accomplished by a hardened preloaded 5mm pitch ballscrew with recirculating ball nuts.

Automatic tool changer

Machine capacity 22 tools
Tool selection random select-bit-directional shortest path

Tool diameter adjacent pockets (max.) 75 mm

Tool weight (max) 6 kgs

Tool change time: adjacent pockets 5 secs.

adjacent pockets, chip to chip 12 secs.

Space and Weight

Floor area 2100mm x 2100mm

Height 2500mm 98"

Weight 2850 kg

Power

Input power 380/420 VOLTS

3 PHASE

50/60 CYCLES

Total power required 15 kVA

Air supply 5.5 bar

4.2 SPECIFICATION

Range

Table travel (X axis) 580 mm

Saddle travel (Y axis) 416 mm

Spindle travel (Z axis) 480 mm

Table

Working surface 840x 420mm

T slots 3 on 112 mm centres

T slot size 18 mm

Positioning speed 32m/min.

max table load. 500kg.

Machine Spindle

Motor 9.0kW (cont)
11 kW (30 min)

Spindle taper No. 40 BT

Tooling BT 40

Speed range 40 - 6000 r.p.m.

Positioning speed 16 m/min.

4. SPECIFICATION

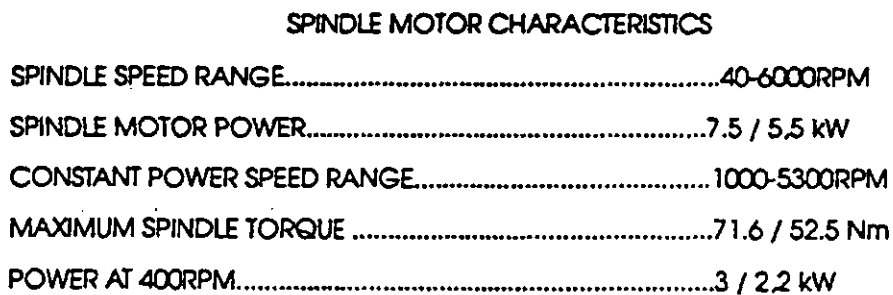
SPECIFICATION (CONT).

Control

Spindle motor	Siemens a.c. variable frequency
Axis drives	Siemens a.c.
Control	Heidenhain TNC 2500C
Input range	
XYZ	0.001 to ± 9999.999 mm
Programme Storage	3000 blocks
Tool definitions	254
Serial line input/output	
Interface	RS232
Input/Output code for tap reader/punch	ISO

Full MDI and mode select
Keyboard CRT display.
Programme/block search, display
and edit
Automatic operation-single block,
dry run
Electronic handwheel
Compensation-backlash and
leadscrew pitch error
Alarms and self diagnosis

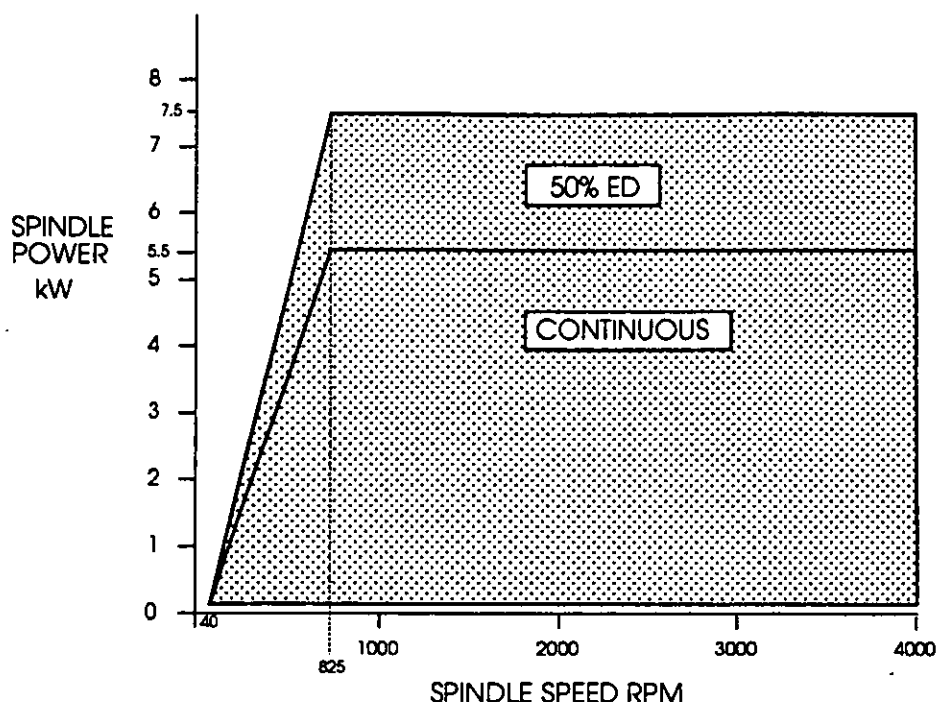
Figure 4.1 SPINDLE POWER 40-6,000 RPM



RAPID TRAVERSE(X,Y,Z).....	32 m/16m PER MIN
FEED RANGE.....	2-32000 mm PER MIN
MOTOR TORQUE.....X AXIS.....	4.5 Nm
.....Y AXIS.....	4.5 Nm
.....Z AXIS.....	4.5 Nm
AXIS THRUST.....X AXIS.....	360Kg f
.....Y AXIS.....	360 Kg f
.....Z AXIS.....	524 Kg f

4. SPECIFICATION (cont.)

Figure 4.2 SPINDLE POWER 40-4,000 RPM



SPINDLE MOTOR CHARACTERISTICS

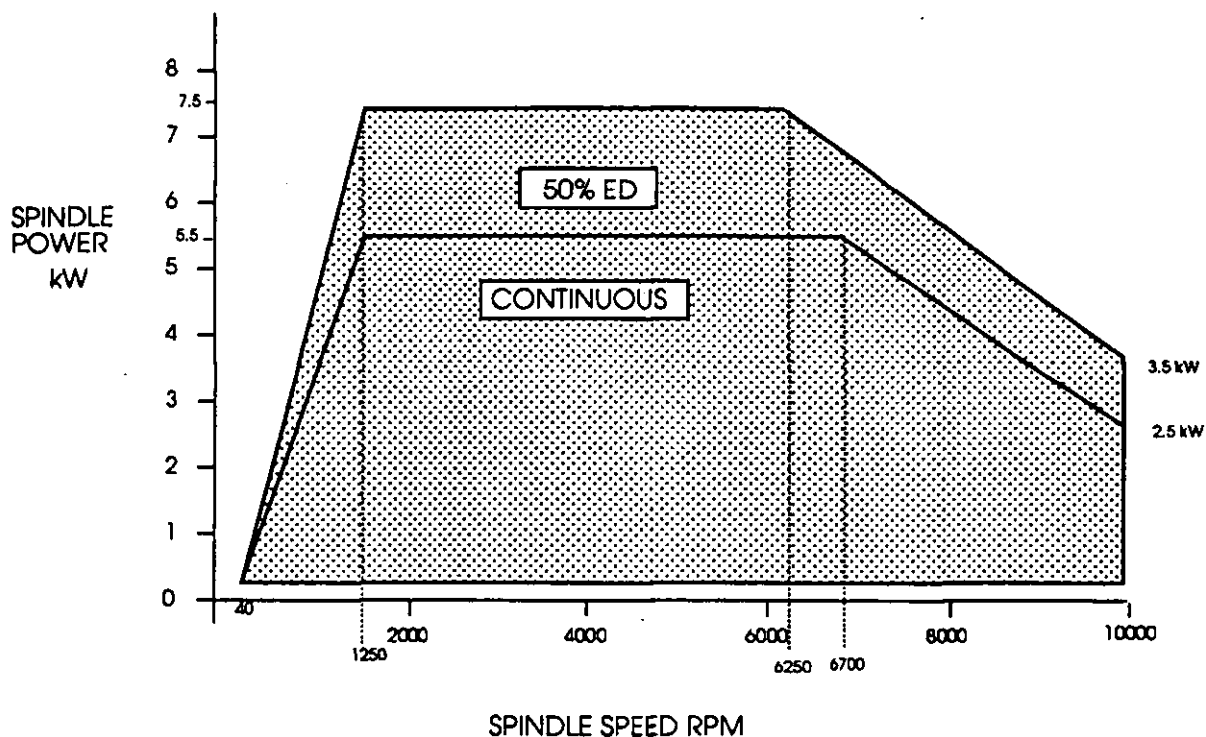
SPINDLE SPEED RANGE.....	40-4000RPM
SPINDLE MOTOR POWER.....	7.5 / 5.5 kW
CONSTANT POWER SPEED RANGE.....	825-4000RPM
MAX SPINDLE TORQUE.....	86Nm/63.3 Nm
POWER AT 400RPM.....	3.63/2.67 kW

AXIS DRIVE CHARACTERISTICS

RAPID TRAVERSE(X,Y/Z).....	32/16 m PER MIN
FEED RANGE.....	2-32,000 mm PER MIN
MOTOR TORQUE.....X AXIS.....	4,5 Nm
..... Y AXIS.....	4,5 Nm
.....Z AXIS.....	4,5 Nm
AXIS THRUST.....X AXIS.....	360 Kg f
..... Y AXIS.....	360 Kg f
.....Z AXIS.....	524 Kg f

4. SPECIFICATION (cont.)

Figure 4.3 SPINDLE POWER 40-10,000 RPM



SPINDLE MOTOR CHARACTERISTICS

SPINDLE SPEED RANGE.....	40-10000RPM
SPINDLE MOTOR POWER.....	7.5 / 5.5 kW
CONSTANT POWER SPEED RANGE.....	1250-6700 RPM
MAX SPINDLE TORQUE.....	57.3 Nm/42 Nm
POWER AT 400RPM.....	2.4 / 1.76 kW

AXIS DRIVE CHARACTERISTICS

RAPID TRAVERSE(X,Y/Z).....	32/16 m PER MIN
FEED RANGE.....	2-32,000 mm PER MIN
MOTOR TORQUE.....X AXIS.....	4,5 Nm
.....Y AXIS.....	4,5 Nm
.....Z AXIS.....	4.5 Nm
AXIS THRUST.....X AXIS.....	360 Kg f
.....Y AXIS.....	360 Kg f
.....Z AXIS.....	524 Kg f

NOTES

5. POWER DISTRIBUTION

5.1 INPUT SUPPLY

Prime power to the system is 3 phase, 50/60 Hz. The a.c. input voltage is selected by the customer when ordering the machine. Minor voltage adjustment can be made in the field to cope with local differences from the specified voltage. Available input voltages are 230, 380, 420, 460v.

Main (CB1) circuit braker.

- i) Magnetic trip.
Set to 400 amps for all supply voltages.
- ii) Thermal trip.
For 380-460 supply: setting 40 amps.
For 230 volts supply: setting 55 amps.

5.1.1 THREE PHASE POWER

Three phase power enters the system through the main isolator/circuit breaker (CB1) located on the electrical cabinet and feeds the 3 phase distribution wiring - Items connected to the 3 phase distribution wiring are:-

5.1.2 THREE PHASE POWER, 380 VOLTS

- i) The a.c. spindle and axes drive units.
- ii) The coolant pump motor.
- iii) The spindle fan motor.

5.1.3 SINGLE PHASE POWER, 200 VOLTS

This supplies the:-

- i) Lubrication pump motor.
- ii) Tool magazine motor.
- iii) Tool magazine motor, Forward and Back.

5.1.4 SINGLE PHASE POWER, 100 VOLTS

This is supplied by TX3 through (CB5)

- i) Tape cassette socket.
- ii) Mains fail contactor.
- iii) Coolant motor contactor.
- iv) Spindle fan contactor.
- v) Toolchanger solenoids and tool air blast solenoid
- vi) The fan motor is in the electrical cabinet

5.1.5 24V D.C UNREGULATED

- i) Idexer option (if fitted).
- ii) 'Z' Axis motor brake.
- iii) Guard door shotbolt.
- iv) 'B' Axis brake solenoid (if fitted).

5.1.6 24V D.C. REGULATED PSU2.

- i) T.N.C. control X31.
- #### 24V D.C. REGULATED PSU1.
- i) T.N.C. Control X24.
 - ii) T.N.C. Control inputs and outputs.

5. SPARE PARTS ELECTRICAL (cont.)

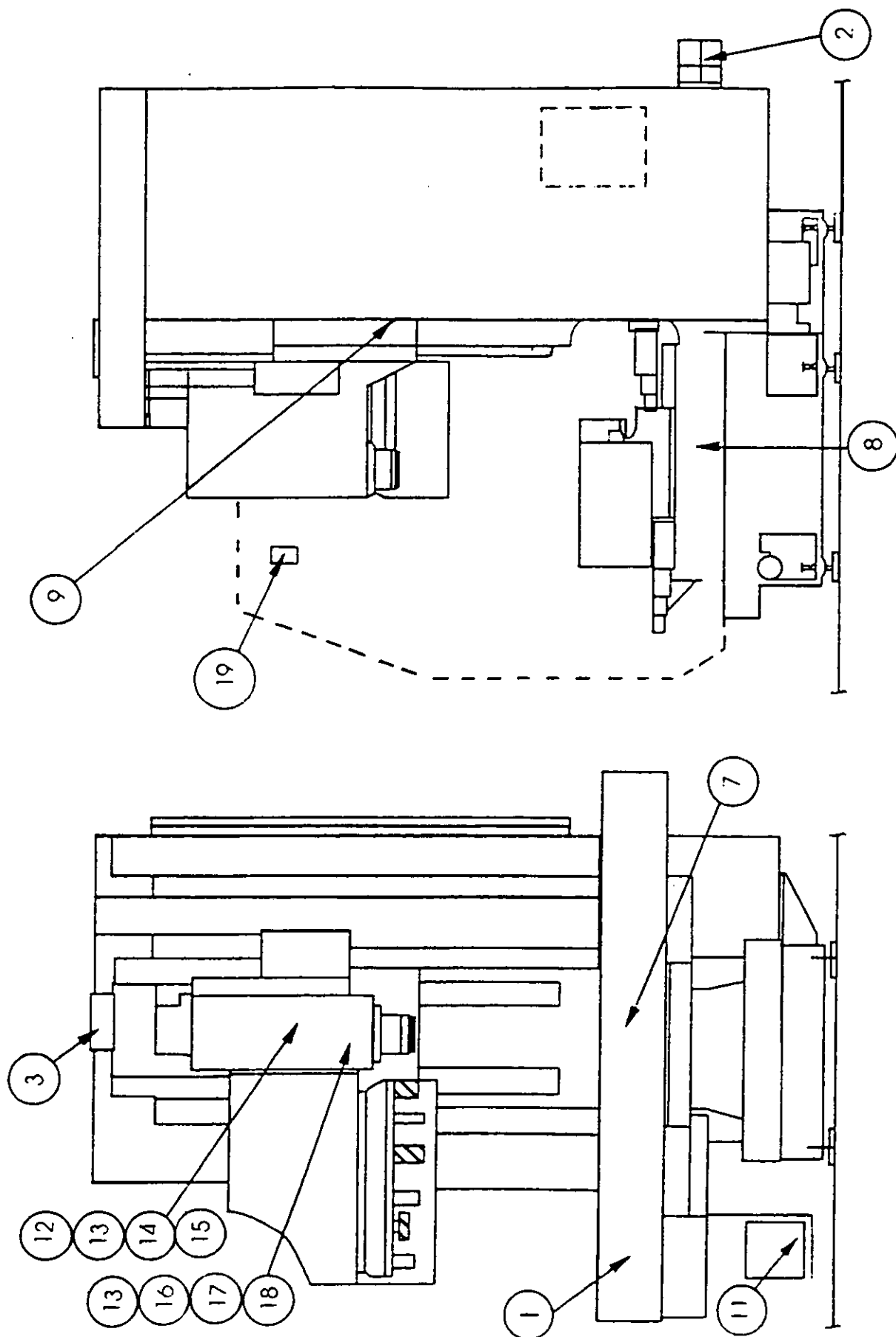
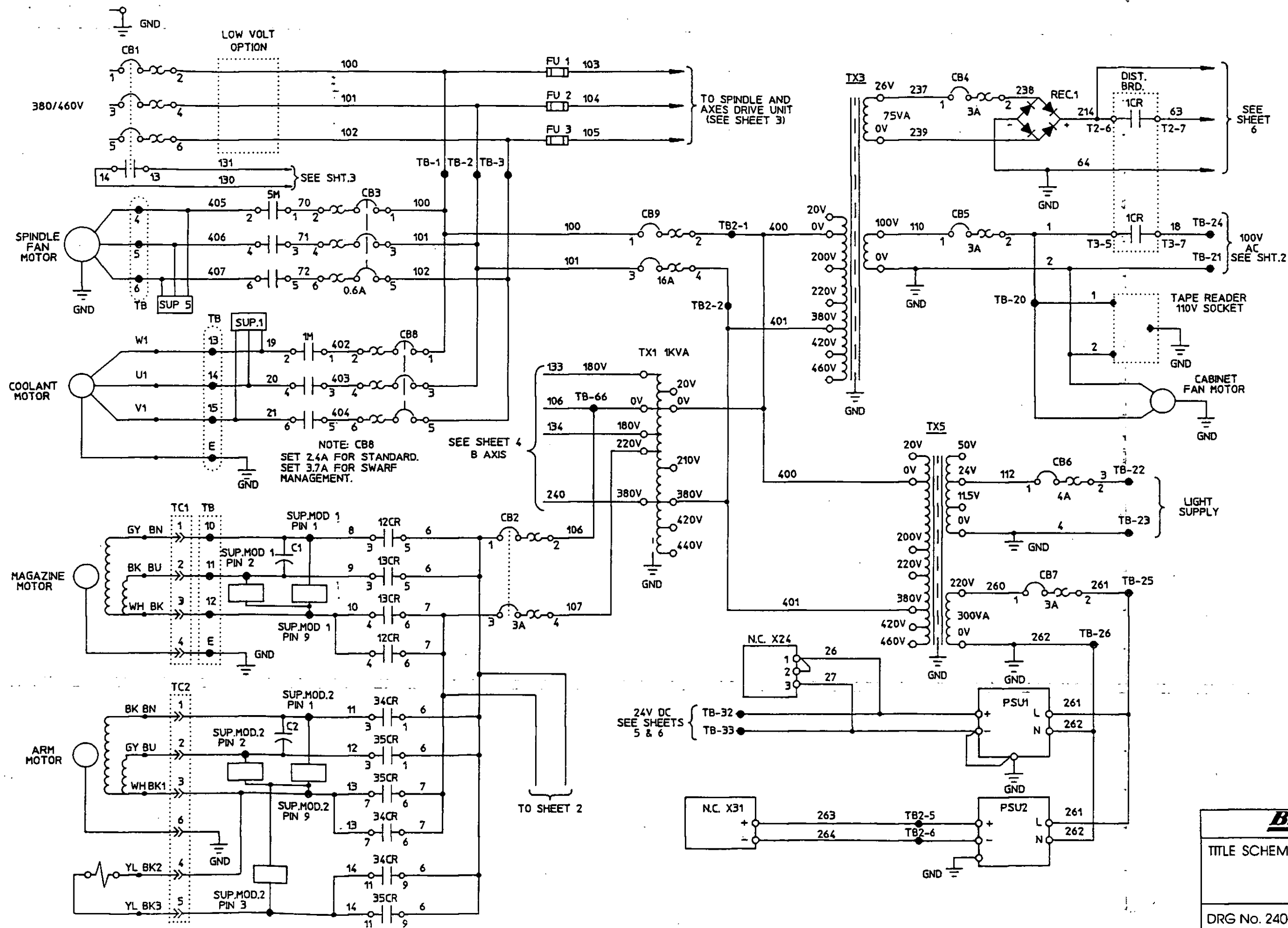


Figure 5.1 GENERAL ARRANGEMENT ELECTRICAL

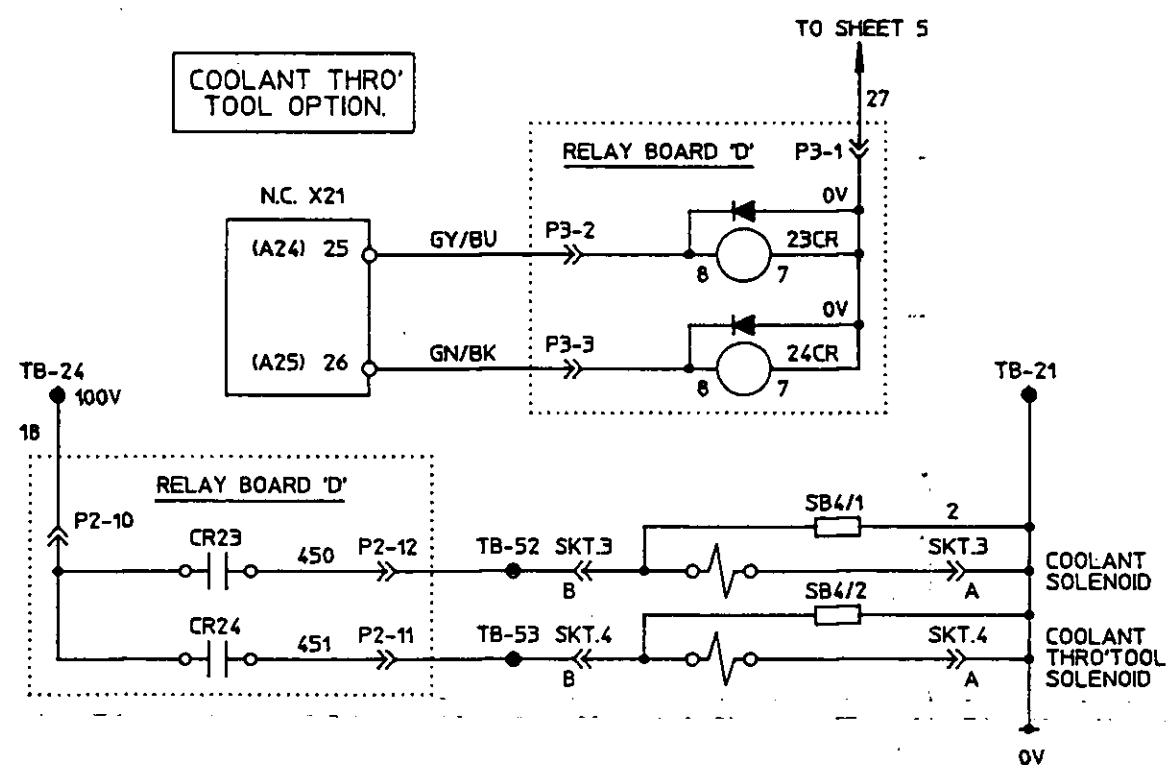
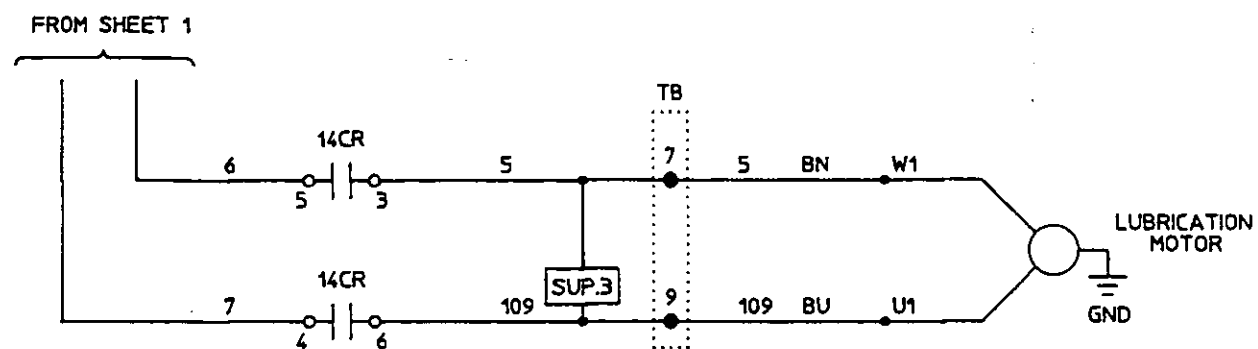
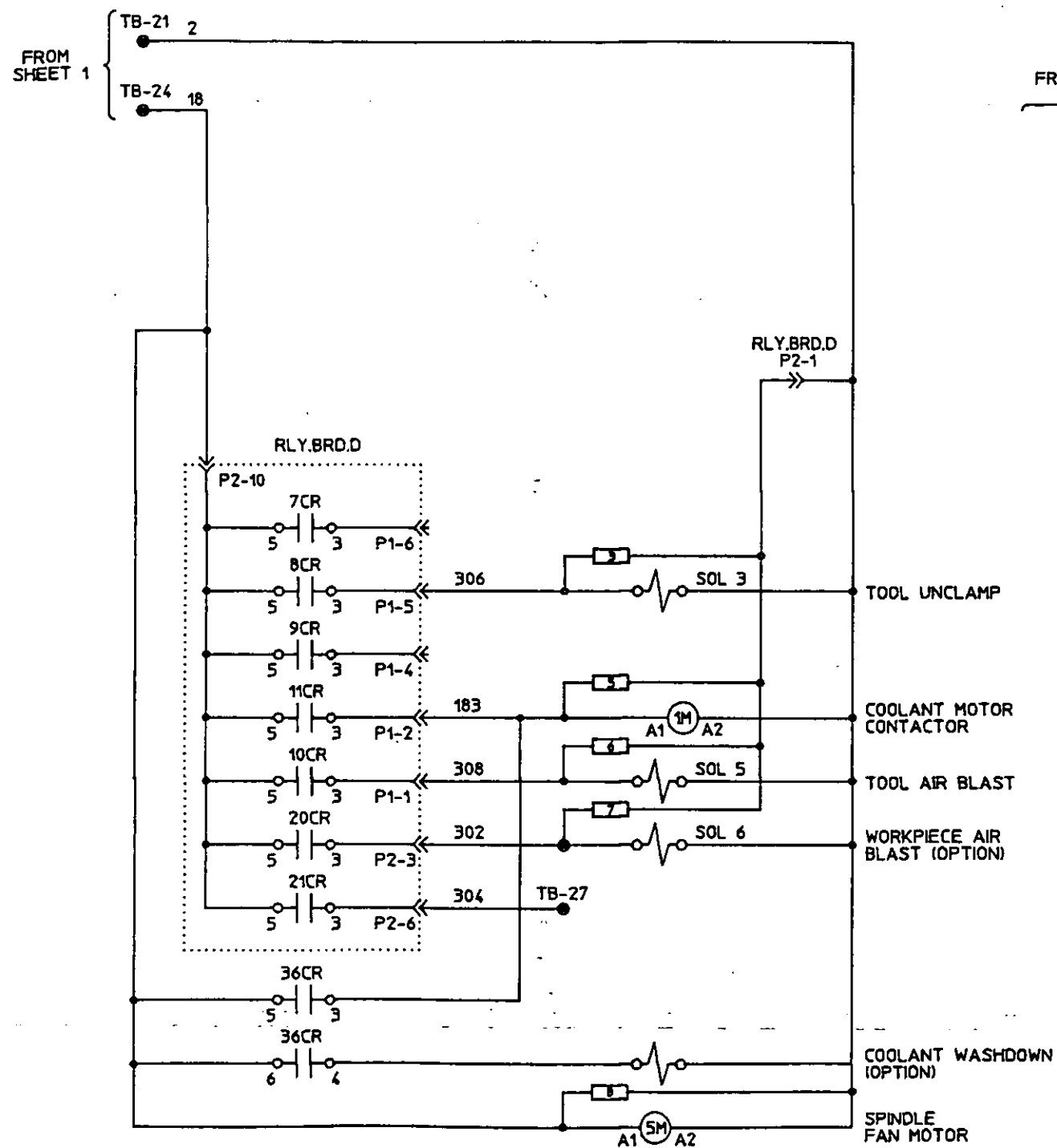
5. SPARE PARTS ELECTRICAL (cont.)

ITEM	DESCRIPTION	BRIDGEPORT No.	QTY.
1	X-AXIS SERVO MOTOR SIEMENS 1FT5 066-OAC 71-1-Z	1556453	1
2	Y-AXIS SERVO MOTOR SIEMENS 1FT5 066-OAC 71-1-Z	1556453	1
3	Z-AXIS SERVO MOTOR SIEMENS 1FT5 074- OAC 71-1-2	1556452	1
7	X- AXIS LIMIT SWITCH	1553679	1
8	Y- AXIS LIMIT SWITCH	1553673	1
9	Z- AXIS LIMIT SWITCH	1553672	1
11	COOLANT PUMP (MSP)	1552725	1
12	TOOL UNCLAMP BUTTON (GREEN)	1550517	1
13	CONTACT HOLDER	1550514	2
14	BULB HOLDER	1550516	1
15	BULB	1550440	1
16	MAG INDEX SWITCH	1550524	1
17	CONTACT BLOCK	1550515	1
18	BLACK DISC	1550521	1
19	GUARD INTERLOCK (SHOT BOLT SWITCH)	1553505	1

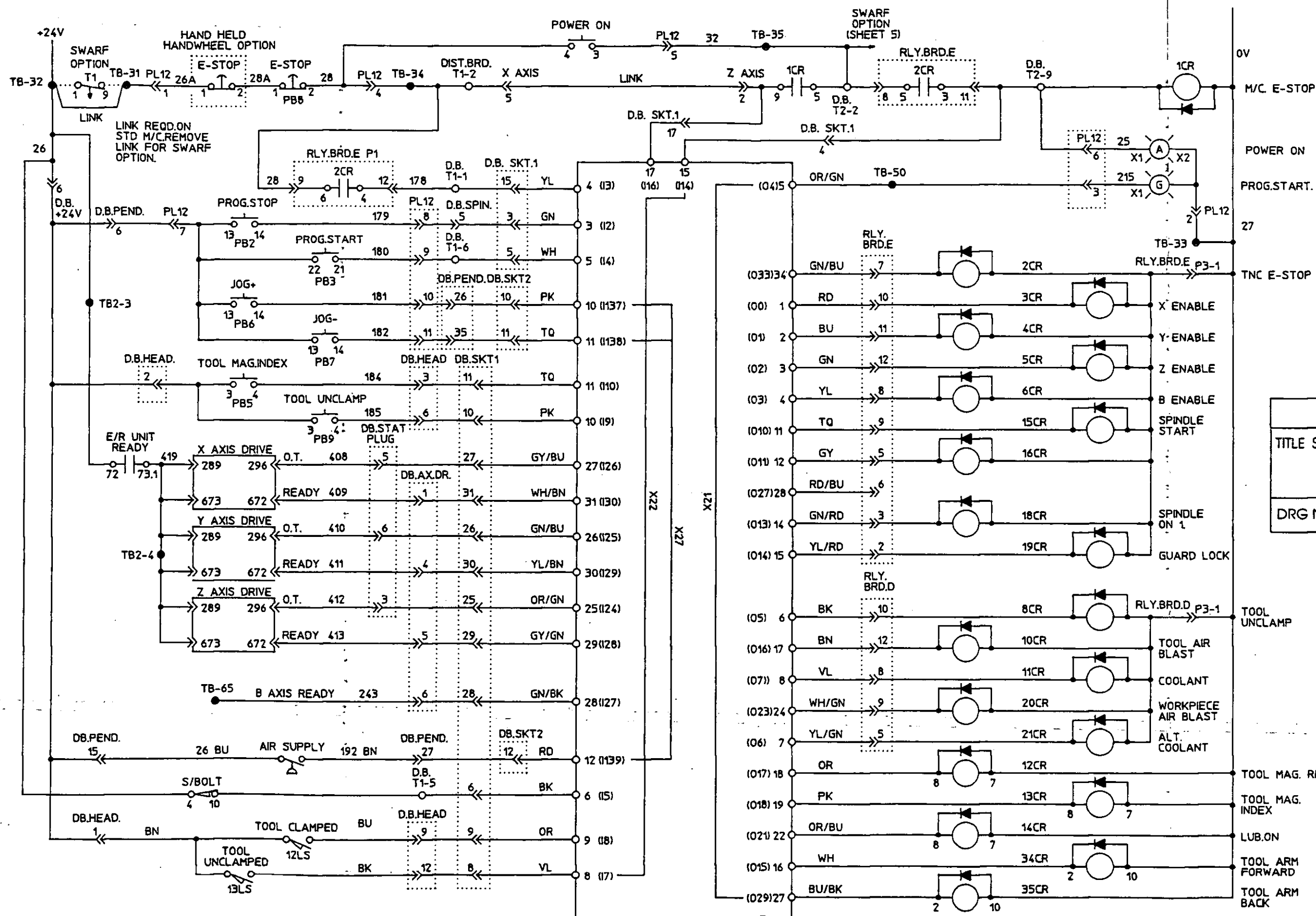
NOTES



Bridgeport	
TITLE SCHEMATIC DIAGRAM	
DRG No. 240-146	ISSUE No. 1

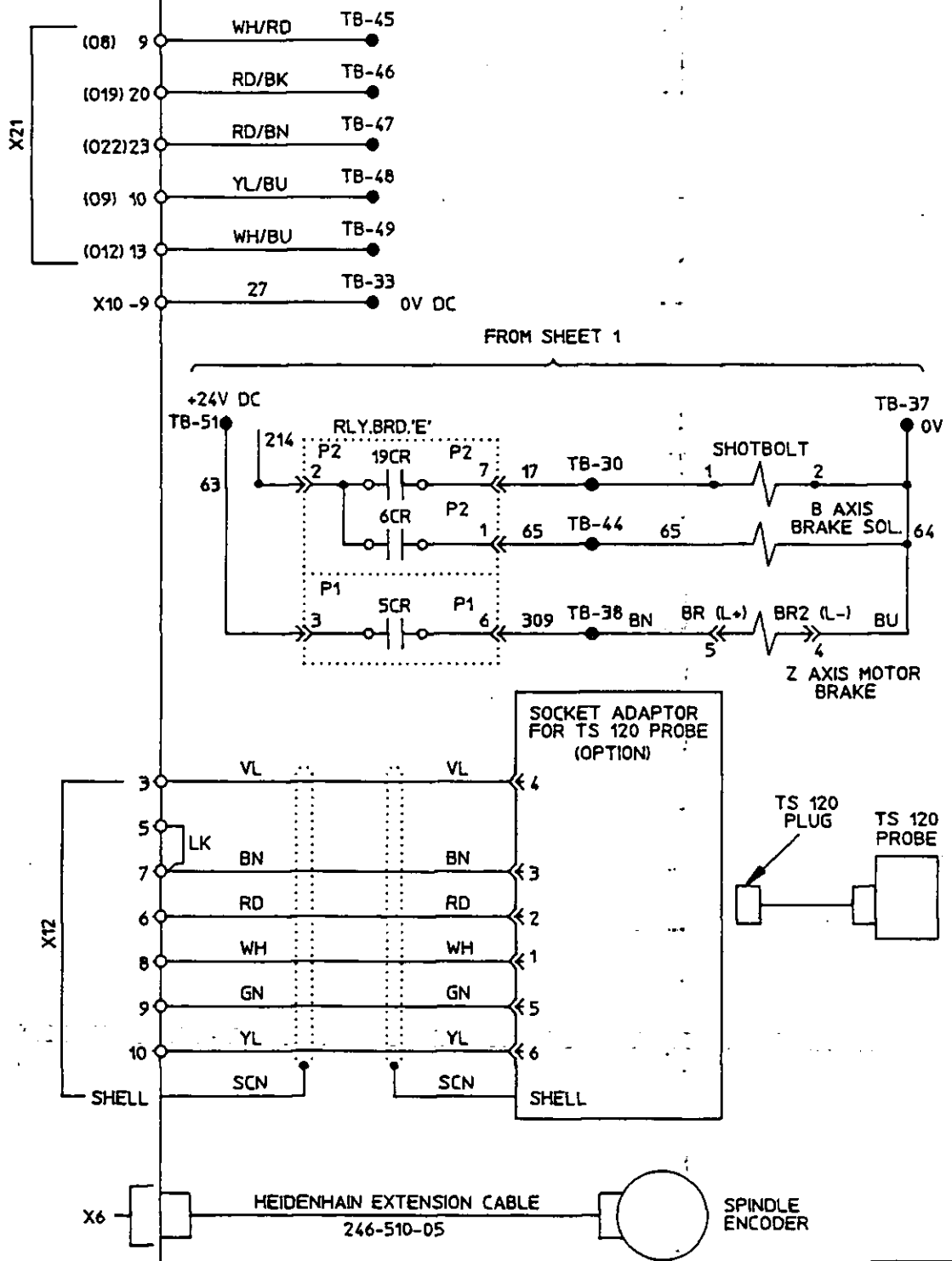
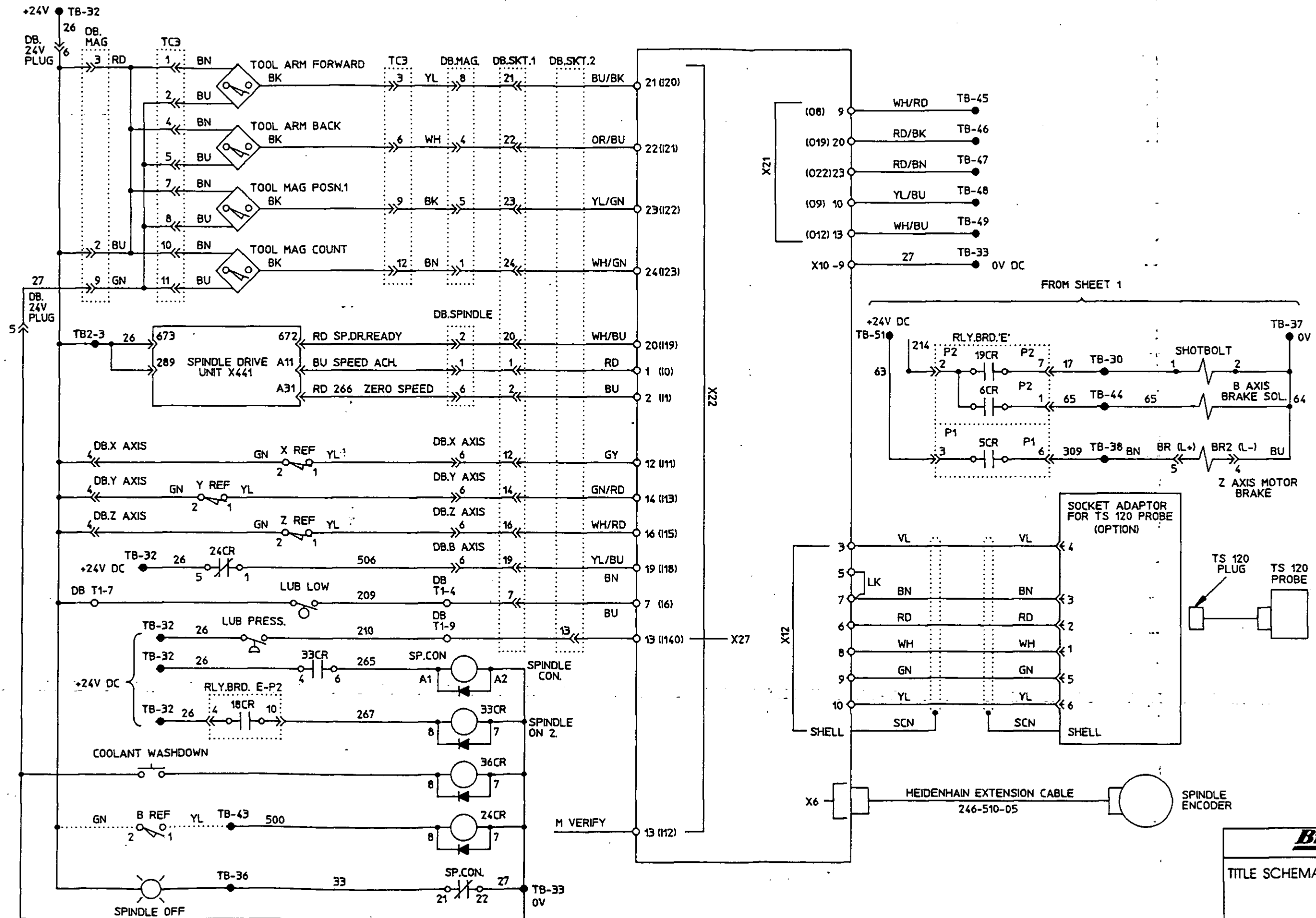


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TITLE SCHEMATIC DIAGRAM	
DRG No. 240-146	ISSUE No. 1

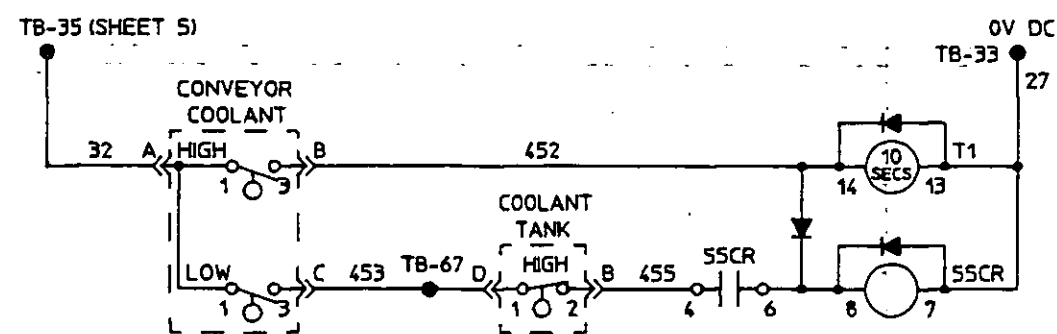
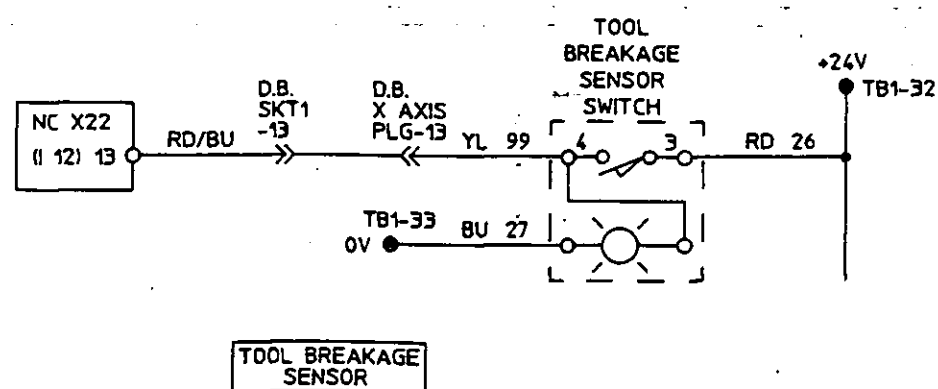
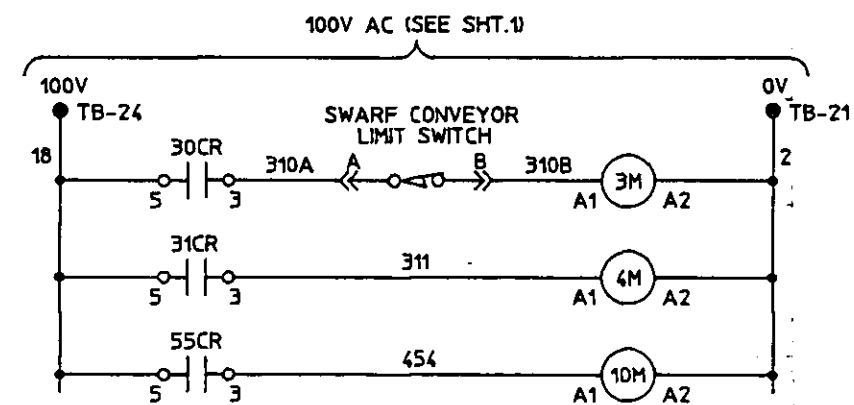
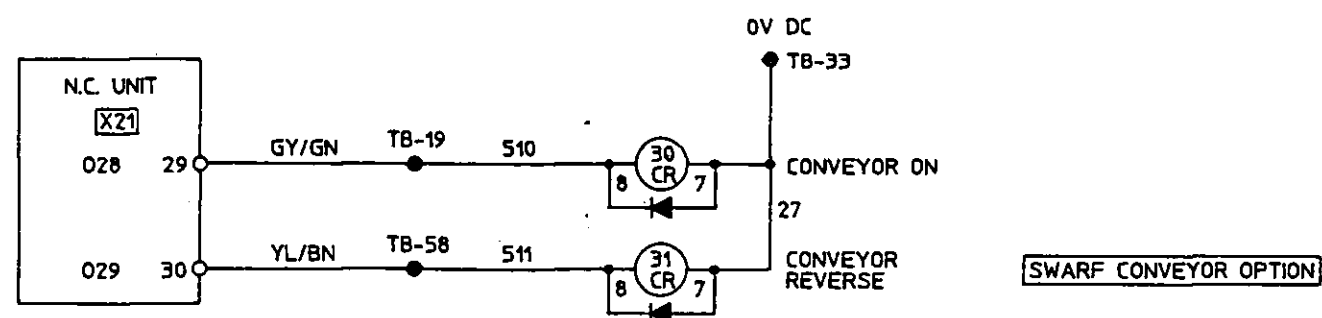
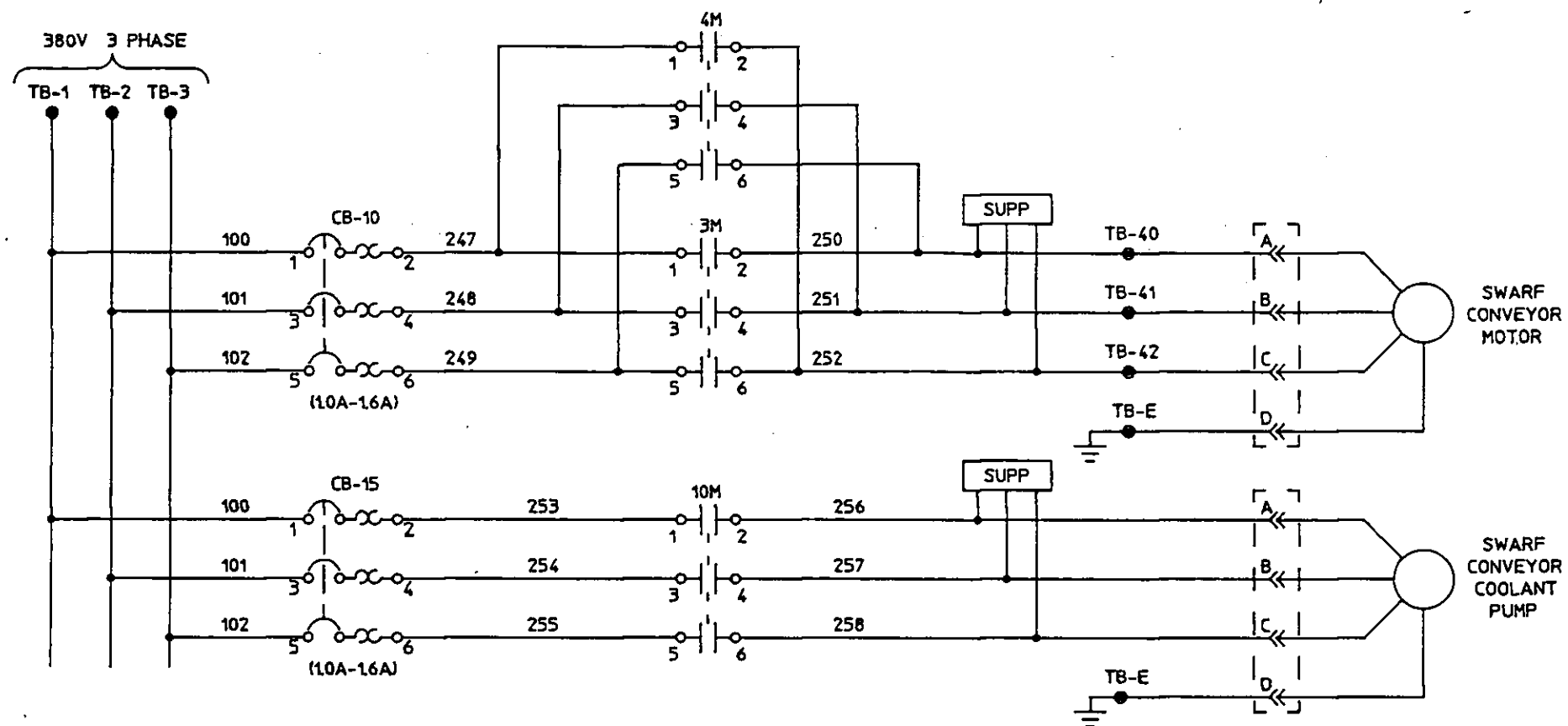


<i>Bridgeport</i>	
TITLE SCHEMATIC DIAGRAM	
DRG No. 240-146	ISSUE No. 1

E-5



Bridgeport	
TITLE SCHEMATIC DIAGRAM	
DRG No. 240-146	ISSUE No. 1



Bridgeport	
TITLE SCHEMATIC DIAGRAM	
DRG No. 240-146	ISSUE No. 1

Bridgeport		PARTS LIST				ISSUED BY: A.MASON DATE: 28-2-94		Sheet 2 of 3					
ASSEMBLY No. 4677694		DESCRIPTION				MAGNETIC PANEL ASSEMBLY				ISSUE 2			
ITEM	PART No.	QUANTITY	UNIT QTY	DESCRIPTION				COMMENT	MOD.	ITEM			
25													
26	1554300	1	OFF	RECTIFIER RBHOZ/KPBC 1002				REC1					
27	1555055	2	OFF	SUPPRESSOR HRC3/022-400 MURRELEKTRONIK				1MSUP,5MSUP.					
28	SUPPLIED WITH MOTOR	1	OFF	CAPACITOR PANASONIC 3uF				C1					
29	SUPPLIED WITH MOTOR	1	OFF	CAPACITOR PANASONIC 5uF				C2					
30	1710029	2	OFF	S.H.C.S. M4 X 12									
31	1710030	2	OFF	S.H.C.S. M4 X 16									
32	1710028	10	OFF	S.H.C.S. M4 X 10									
33	1712164	3	OFF	M16 BRASS HEXAGON NUT.									
34	1711188	1	OFF	M6 X 20 BRASS EARTH STUD									
35	1710036	2	OFF	S.H.C.S. M4 X 45									
36													
37													
38	1555054	1	OFF	SUPPRESSOR-RIFA PMR 202MD 6250M220				SUP.3					
39	1712101	14	OFF	M4 L/P WASHER.									
40	1710027	6	OFF	S.H.C.S. M4 X 8									
41													
42	8500732	2.60	MTRS	TEHALIT TRUNKING BA6 80025									
43	1553878	1.1	MTRS	DIN RAIL TS 35									
44	4678249	1	OFF	TERMINAL RAIL ASSEMBLY.									
45	1557101	14	OFF	4mm PILLAR AND NUT.									
46	1525143	2.2	MTRS	TEHALIT TRUNKING BA6 80040									
47	1707400	30	OFF	ADVEL GROVIT 11030410									
48													
MOD No.		DESCRIPTION		AUTHORISED BY		DATE	MOD NO.		DESCRIPTION		AUTHORISED BY		DATE
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2							7						
3							8						
4							9						
5							10						

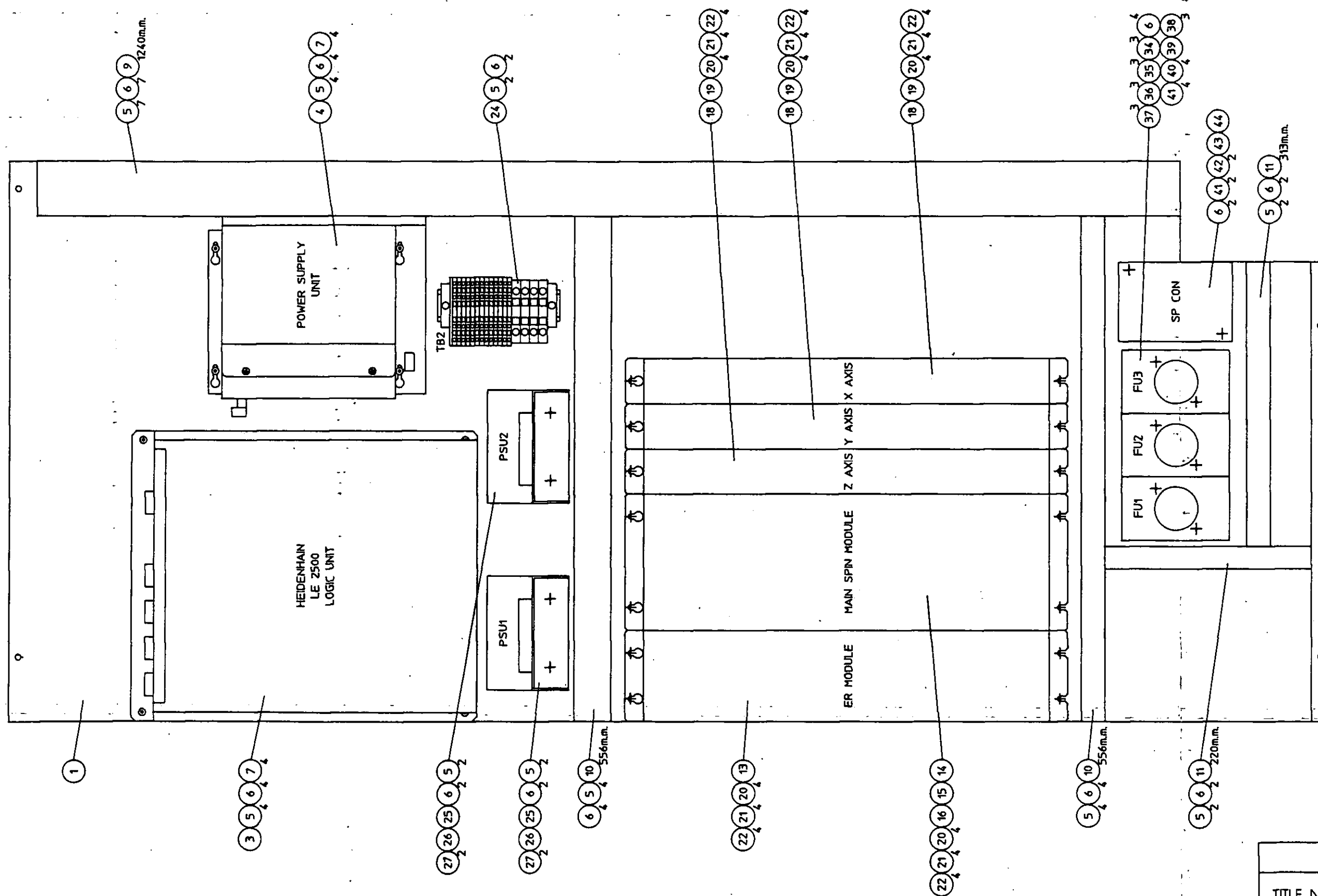
Bridgeport		PARTS LIST				ISSUED BY: A.MASON DATE: 28-2-94		Sheet 1 of 3					
ASSEMBLY No. 4677694		DESCRIPTION		MAGNETIC PANEL ASSEMBLY					ISSUE 2				
ITEM	PART No.	QUANTITY	UNIT QTY	DESCRIPTION				COMMENT	MOD.	ITEM			
1	2384400	1	OFF	PANEL DRILLING.									
2	4689770	1	OFF	DISTRIBUTION BOARD ASSEMBLY.									
3	4679106	1	OFF	RELAY BOARD TYPE D									
4	4679107	1	OFF	RELAY BOARD TYPE E									
5	1552946	4	OFF	RELAY - OMRON-LYZN 24V DC				12CR,13CR,14CR,33CR					
6	1552933	8	OFF	MOUNTING CLIP OMRON-PYC-A1									
7	1554809	1	OFF	CIRCUIT BREAKER FAZG16-2				CB9					
8	1552928	9	OFF	RELAY BASE OMRON-PTF-08A				12CR,13CR,14CR,24CR 30CR,31CR,33CR,R1,R2					
9	1554874	3	OFF	CIRCUIT BREAKER FAZG3 KM				CB4,CB5,CB7					
10	1554970	1	OFF	CIRCUIT BREAKER FAZG3-2 KM				CB2					
11	1554867	1	OFF	CIRCUIT BREAKER PKZM1-0.6				CB3					
12	1554812	1	OFF	CIRCUIT BREAKER FAZG 6 KM				CB6					
13	1554886	1	OFF	CIRCUIT BREAKER PKZM1-4				CB8					
14	1711502	2	OFF	H.S.B.H. M3 X 10									
15	1712100	2	OFF	PLAIN WASHER. M3									
16													
17	1555005	11	OFF	DIODE 1N 4002				12CR,13CR,14CR,24CR,30CR, 34CR,35CR,31CR,33CR,R1,R2					
18	1712091	2	OFF	LOCKWASHER M3									
19	1554969	1	OFF	CIRCUIT BREAKER NZM4-63+H6+VHI-NZM(H)4 sond f				CB1					
20	1555060	2	OFF	SUPPRESSOR MURRELEKTRONIK MCR8/022-22205				SUPP.MOD 1 & 2					
21													
22	1554971	1	OFF	ISOLATOR EXTENSION a-NZM6 KLOCKNER MOELLER									
23	1554821	1	OFF	RH6 RED HANDLE.									
24	1551085	2	OFF	CONTACTOR DIL-EM-10 110V 50Hz KM				1M-5M					
MOD No.		DESCRIPTION		AUTHORISED BY		DATE	MOD NO.		DESCRIPTION		AUTHORISED BY		DATE
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2							7						
3							8						
4							9						
5							10						

<i>Bridgeport</i>		PARTS LIST				ISSUED BY: A.MASON DATE: 28-2-94		Sheet 3 of 3	
ASSEMBLY No. 4677694		DESCRIPTION MAGNETIC PANEL ASSEMBLY				ISSUE 2			
ITEM	PART No.	QUANTITY	UNIT QTY	DESCRIPTION			COMMENT	MOD.	ITEM
49	1705601	32	OFF	1/8th DIAMETER WASHER.					
50									
51	1552963	2	OFF	11 PIN 24V 8 AMP RELAY R1510/3C 3 P.C.O. NORSLO					
52	1552958	2	OFF	11 PIN RELAY BASE					
53									
54	4677683	1	OFF	MAGNETIC PANEL LABEL KIT					
55	1554558	1	OFF	55212 BZS 1 METRE TRACK					
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
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72									

MOD No.	DESCRIPTION	AUTHORISED BY	DATE	MOD NO.	DESCRIPTION	AUTHORISED BY	DATE
1	10179 ITEM 51 CHANGED	A.MASON	3-94	6			
2				7			
3				8			
4				9			
5				10			

Bridgeport		PARTS LIST				ISSUED BY: A.MASON DATE: 24-JUNE-93		Sheet 2 of 2				
ASSEMBLY No. 4677454		DESCRIPTION VMC 560/16 TNC 2500 NC/DRIVE PANEL				ISSUE 1						
ITEM	PART No.	QUANTITY	UNIT QTY	DESCRIPTION			COMMENT	MOD.	ITEM			
25	1550036	2	OFF	POWER SUPPLY COUTANT CSH60-13								
26	2384476	2	OFF	POWER SUPPLY MOUNTING BRACKET								
27	1710000	4	OFF	M3 x 5 CAP HEAD SCREW								
28												
29												
30												
31												
32												
33												
34	1550120	3	OFF	5SD520 100A FUSE LINKS								
35	1550122	3	OFF	5SH322 D-TYPE ADAPTOR SLEEVES								
36	1550125	3	OFF	5SF140 FUSE BASES								
37	1550126	3	OFF	5SF140 FUSE CAPS								
38	1550128	3	OFF	5SH240 MOULDED PLASTIC CAPS								
39	2384402	1	OFF	FIBREGLASS INSULATOR								
40	1710032	6	OFF	M4 x 25 CAP HEAD SCREW								
41	1712051	8	OFF	M4 STAR WASHER								
42	1710033	2	OFF	M4 x 30 CAP HEAD SCREW								
43	1551015	1	OFF	3TB4617 0BB4 24VDC COIL CONTACTOR								
44	1551017	1	OFF	3TX5 486-3B TERMINAL COVERS								
45												
46	4688151	1	OFF	DRIVE PANEL LABEL KIT								
47	1554558	1	OFF	55212 BZS 1 METRE TRACK								
48												
MOD No.		DESCRIPTION		AUTHORISED BY		DATE	MOD NO.		DESCRIPTION	AUTHORISED BY		DATE
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2							7					
3							8					
4							9					
5							10					

Bridgeport		PARTS LIST				ISSUED BY: AMASON DATE: 24-JUNE-93		Sheet 1 of 2				
ASSEMBLY No.		4677454		DESCRIPTION		VMC 560/16 TNC 2500 NC/DRIVE PANEL		ISSUE 1				
ITEM	PART No.	QUANTITY	UNIT QTY	DESCRIPTION			COMMENT	MOD.	ITEM			
1	2384475	1	OFF	NC/DRIVE PANEL								
2												
3	1557760	1	OFF	HEIDENHAIN LE 2500B LOGIC UNIT 26409001								
4	1557719	1	OFF	HEIDENHAIN SUPPLY UNIT REF:- 23648405								
5	1710028	30	OFF	M4 x 10 CAP HEAD SCREW								
6	1712101	32	OFF	M4 WASHER								
7	1712092	8	OFF	M4 SPRING WASHER								
8												
9	1525129	1.3	MTRS	TEHALIT TRUNKING BA6 80060								
10	1525143	0.6	MTRS	TEHALIT TRUNKING BA6 80040								
11	8700732	1.1	MTRS	TEHALIT TRUNKING BA6 80025								
12												
13	1557623	1	OFF	16KW INFEED/REGENERATIVE FEEDBACK MODULE 6SN1145-1BA00-0BA0								
14	1557615	1	OFF	24A MAIN SPINDLE MODULE 6SC6112-4HA00								
15	1557616	1	OFF	ACTUAL VALUE BOARD 6SC6110-0HF00								
16	1557617	1	OFF	SOFTWARE BOARD 6SC6110-0EH00								
17												
18	1557622	3	OFF	7.5A FEED MODULE 6SN1130-1AA11-0AA0								
19	1557626	3	OFF	PARAMETER BOARD 6SN1114-0AA01-0AA0								
20	1710051	20	OFF	M5 x 10 CAP HEAD SCREW								
21	1712102	20	OFF	M5 WASHER								
22	1712085	20	OFF	M5 SPRING WASHER								
23												
24	4677357	1	OFF	TB2 ASSEMBLY								
MOD No.		DESCRIPTION		AUTHORISED BY		DATE	MOD NO.		DESCRIPTION	AUTHORISED BY		DATE
1							6					
2							7					
3							8					
4							9					
5							10					



Bridgeport	
TITLE N.C. DRIVE PANEL ASSEMBLY	
DRG No. 4677454	ISSUE No. 1

6. PREVENTATIVE MAINTENANCE

6.1 PREVENTATIVE MAINTENANCE

6.1.1 WARRANTY

As quoted in Bridgeport's terms and conditions. "Bridgeport warrants to the original purchaser only that all products manufactured by it will be free from defects in materials or workmanship, from date of shipment to such purchaser, such warranty to remain in effect if and only if such products are used in accordance with all instructions as to maintenance and operations set forth in manuals and instruction sheets furnished by Bridgeport".

6.1.2 SINGLE SHIFT OPERATION USING COOLANT ON ALL OPERATIONS

MAINTENANCE LEVEL 1

6.1.2.1 Daily Maintenance

- i) Check the automatic lubrication system oil level and fill as necessary.

CAUTION: Use only Mobil Vactra No. 2 or equivalent to ensure maximum effectiveness of lubrication system.

- ii) Check coolant level and fill as necessary.
- iii) Check that there is sufficient oil in the air lubricator.
- iv) Check that the air supply is regulated to 80 p.s.i.
- v) Clean dirt and chips from the ways; and empty swarf tray.

6.1.2.2 Weekly Maintenance In addition to daily maintenance

- i) Clean chips and dirt from the entire machine and wipe down.
- ii) Check that oil is reaching all the slideways.
- iii) Clean and apply light coat of oil to the steel guards between the cross-slide and the column.
- iv) Check the air filter at the rear of the electrical cabinet. Replace the filter element if it is contaminated.

MAINTENANCE LEVEL 2

6.1.2.3 Yearly Maintenance In addition to weekly maintenance.

- i) Remove the filter from the filler bottle for the air supply and clean.
- ii) Check spindle drive belt condition and tension.
- iii) Check the slideway gib settings and adjust if necessary.
- iv) Check lost motion.
- v) Check the condition of the slideway wipers and replace if necessary.
- vi) Check the integrity of the electrical connections and inspect the condition of the insulation.
- vii) Check condition of coolant filter and replace if necessary.

MAINTENANCE LEVEL 3

6.1.3 Periodic replacement (2 yearly).

The power drawbar disc spring stack and the spindle drive belt should be replaced.

NOTE: IT IS STRONGLY RECOMMENDED THAT ALL WORK ON THE SPINDLE CARTRIDGE, INCLUDING REPLACEMENT OF THE DISC SPRING STACK, IS CARRIED OUT BY BRIDGEPORT TRAINED DEALER SERVICE STAFF.

6. PREVENTATIVE MAINTENANCE (cont.)

6.1.4 MULTIPLE SHIFT OPERATIONS AND PUNITIVE ENVIRONMENTS

6.1.4.1 Definitions

Bridgeport is defining 3 shift operations, 5 or more days per week, as a multiple shift operation. Punitive environments are considered to be those in which the workpiece is cut dry or when cutting Magnesium or Carbon. If the workpiece is cut dry (Cast Iron, Carbon or Magnesium) extraordinary precautions should be taken by the customer. The following recommendations are made as a guide:-

- i) Special designed vacuum systems at the cutting tool are recommended.
- ii) Air hoses must not be used to clean the machine, use industrial vacuum cleaners.
- iii) Check coolant pump filter
- iv) Check air filter in electrical cabinet, replacement filter part number 1553006.
- v) Check oil level in air lubricator.

7. FAULT FINDING

This section is a brief guide to enable simple electrical faults to be readily identified and to localise any problem area due to the more obscure faults that cannot be dealt with individually in this chapter.



DANGER

PARTS OF THIS PROCEDURE INVOLVE WORKING WITH **ELECTRICALLY LIVE CIRCUITS** AND MUST ONLY BE PERFORMED BY PERSONNEL QUALIFIED TO DO SO.

7.1 PRELIMINARY CHECKS

If error message occurs see section 7.2

7.2 ERROR MESSAGES

This is a list of error messages that may be displayed by the TNC2500C control on the V.D.U.

7.3 SIEMENS DRIVES

7.4 FAULT INDICATIONS AND RESETING

7.1 PRELIMINARY CHECKS

7.1 PRELIMINARY CHECKS

The following preliminary checks are advised:-

1. Check that the three phase of the incoming electrical mains supply are present and of the correct voltage.
2. Check that none of the circuit breakers CB2 - CB9 are in their OFF or TRIPPED positions.
3. Check that 24 v.dc is present at the output of PSU1 (wires 26 and 27) and PSU2 (wires 263 and 264).
4. If a machine fault message is displayed on the screen refer to section. 7.2

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

7.2 ERROR MESSAGES

7.2 FAULT MESSAGES

- | | | |
|--|---|---|
| LUBRICATION OIL
LEVEL LOW | - | Early warning that oil level in lubrication unit is getting low. This message will not stop the machine and may be temporarily cancelled by pressing CE button. However the lubrication unit should be topped up with the correct slideway oil at the first opportunity. |
|
 | | |
| LUBRICATION OIL
PRESSURE LOW | - | Lubrication oil level has been allowed to fall too low.

Leak in lubrication system which prevents the pressure reaching 15 bar.

Faulty lubrication unit.

Faulty relay 14 CR or wiring. |
|
 | | |
| <p>(N.B. the above two messages are only displayed when the fault is detected during a lubrication cycle. The lubrication cycle occurs every 30 minutes, or when pressing the power on button after switching the machine ON, and lasts for about 30 seconds).</p> | | |
|
 | | |
| MACHINE GUARD
NOT CLOSED | - | If it is attempted to run the spindle or a programme with the guard doors open, this message will be displayed. The message will be cancelled on closing the guard door.

If the message fails to cancel when the guard is closed, check for faulty guard door safety switch or wiring. |
|
 | | |
| EMERGENCY STOP
or
EXTERNAL 24
VOLTS MISSING | - | Check that Emergency Stop push-button is fully released.

Check for 24 v.dc present at output of PSU1 (wires 26 and 27).

Check for faulty relay 2CR or wiring. |
|
 | | |
| EXTREME AXIS LIMIT | - | Check operation of axis reference switches if this occurs during initial machine referencing procedure.

Software limit parameters incorrect (MP910 and 920).

Swarf on limit switch causing premature operation.

Faulty limit switch or wiring. |
|
 | | |
| AXIS DRIVE FAULT | - | Check for Alarm number displayed on the axes drive units and refer to the Siemens Manual. |

7.2 ERROR MESSAGES

7.2 FAULT MESSAGES Continued

- X (Y or Z) DRIVE OVERLOAD OR TX2 OVERHEAT** - Thermostat on cooling fins of axis drive operated.
Thermostat on servo transformer TX2 operated.
Thermostat in axis motor operated.
- AIR PRESSURE LOW** - Low air pressure (nominally 80 p.s.i.)
Faulty pressure switch, setting or wiring.
- (N.B. This message is only displayed when air is used i.e. during a toolchange or power drawbar operation).
- SPINDLE DRIVE FAULT** - Check for alarm number displayed on spindle drive unit. (AL-XX) and refer to Siemens Manual.
- SPINDLE DRIVE OFF** - After disabling the spindle drive with an M25 command, it is necessary to press the programme start push-button to re-enable the drive before the spindle can be started. If this is not done (e.g. a programme with an M25 command followed by an M03, M04 and M19) this message will be displayed.
- SPINDLE NOT ORIENTATED** - Faulty relay 17CR or wiring.
Incorrect set up of spindle drive orientation card or faulty unit.
Faulty spindle encoder or encoder cable.
Incorrect adjustment of spindle encoder timing belt.
- Z AXIS NOT AT TOOL CHANGE POSITION** - Check that feedrate override control is not turned down.
Check that displayed Z axis position (in REF mode) agrees with the value in parameter 4110.0.
- TOOL NOT CLAMPED or TOOL NOT UNCLAMPED** - Faulty relay 8CR or wiring.
Faulty solenoid or wiring.
Faulty drawbar piston.
Faulty or incorrectly set, clamp and unclamp, limit switches (mounted on top of the drawbar piston).

7.2 ERROR MESSAGES

7.2 FAULT MESSAGES Continued

TOOL CHANGER NOT BACK.	-	Low air pressure.
TOOL CHANGER NOT OUT.		Faulty command relay (7 CR) or wiring.
TOOL CHANGER NOT UP.		
TOOL CHANGER NOT DOWN.		Faulty air cylinders.
		Faulty or incorrectly set end-of-stroke switches (mounted on the air cylinders).
TOOL CHANGER NOT AT POCKET	-	Faulty or incorrectly set tool magazine count proximity switch or wiring.
		Toolchanger mechanism overrun due to weakened springs or worn friction pads on the damping brake mounted in the end of the toolchanger motor.
N.B. If the tool carousel is out of position due to an aborted tool change (e.g. mains loss or E-stop operated) it may be realigned to the next pocket by pressing the tool change manual index push-button provided that the toolchanger is in its back position and that the TNC is in its manual mode. It will then be necessary to turn the machine isolator off and then on again, so that the tool carousel will re-reference at the next toolchange.		
TOOL CHANGER REFERENCE NOT FOUND	-	Faulty or incorrectly set tool magazine position 1 proximity switch or wiring.
TOOL CHANGER NOT COUNTING	-	If the tool carousel rotates:-
		Check for faulty or incorrectly set tool magazine count proximity switch or wiring.
		If the tool carousel does not rotate:-
		Faulty command relays (12 or 13CR) or wiring.
		Faulty tool magazine motor or wiring.
		Loose or jammed toolchanger mechanism.
WRONG TOOL NUMBER CALLED.	-	M06 has been commanded with a tool outside the range of the toolchanger i.e. T1 to T16.

FAULT FINDING (cont)

7.3 SIEMENS SIMO DRIVE 611 A.C. ANALOGUE AXIS SERVO DRIVE.

Test sockets, display elements

Display elements on monitoring and infeed/regenerative feedback modules

1		2	1 = red	Disturbance in ± 15 V electronics power supply
3		4	2 = red	Disturbance on 5 V voltage level
5		6	3 = green	Inverter not ready for operation (external enabling signals not present)
			4 = yellow	Inverter ready (internal enabling signals present)
			5 = red	Line fault
			6 = red	DC-link overvoltage

3.4.2 Test sockets and display elements on feed modules

• Test sockets

X		R	X Actual speed value
W		T	R Speed setpoint (output)
M		n ₂	W Actual current value
			T Current setpoint (output)
			M Chassis earth
			n ₂ Additional speed setpoint (input)

All outputs have an output resistance of 1 k Ω

• Operating-status display

Adjustment: PCB inserted	no	yes	yes	yes	yes
Pulse enable at Term. 663	-	no	no	yes	yes
n-contr. enable, Term. 65	-	no	yes	no	yes

• Fault display



No fault

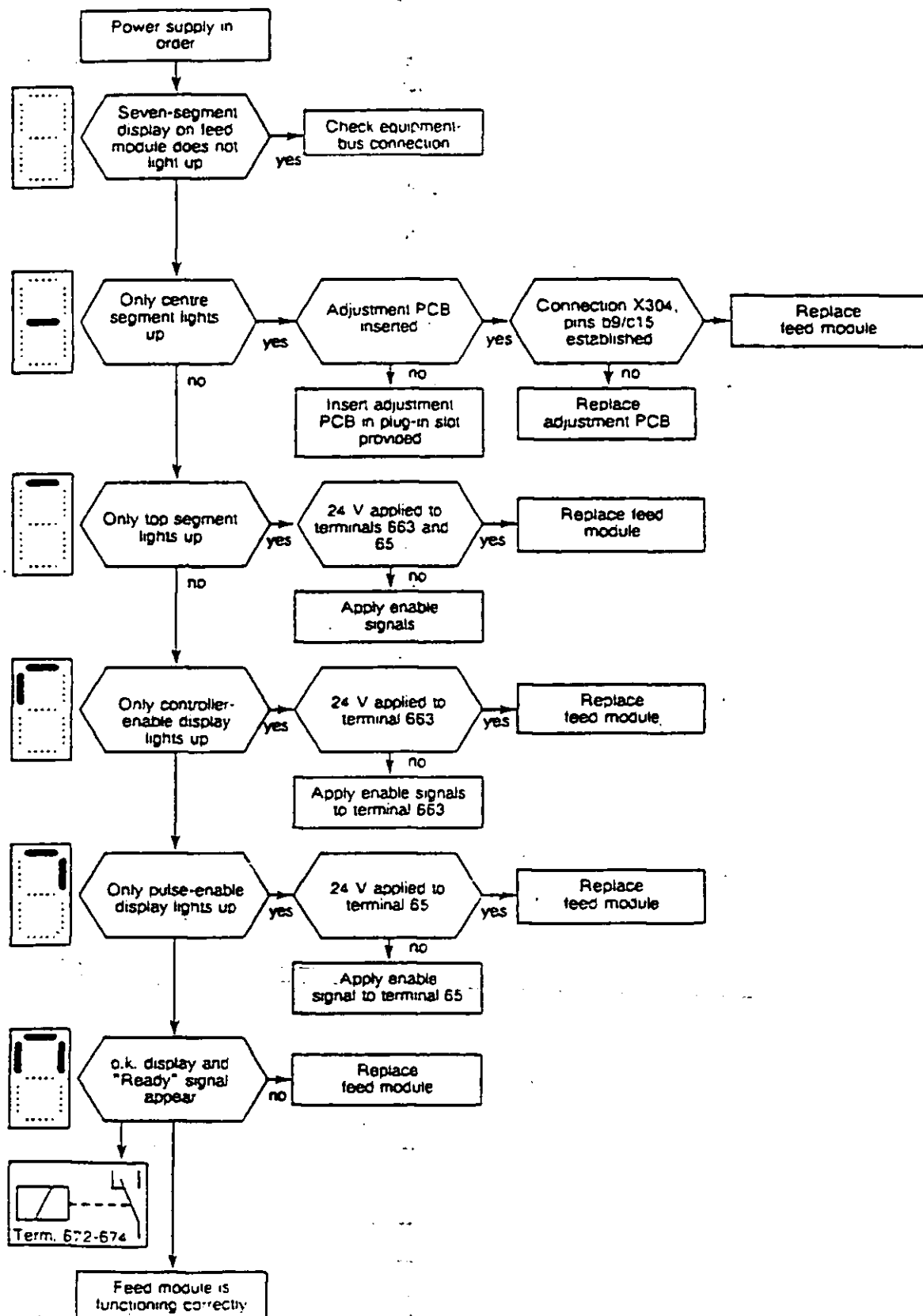
Fault							
I _{2t} alarm							
Shaft encoder							
Speed controller at limit							
Tachogenerator monitoring							
I _{act} = 0							
Motor overtemperature							
Effect	Alarm	Pulse suppression	Alarm	Pulse suppression	Pulse suppression	Pulse suppression	Pulse suppression

FAULT FINDING (cont)

Faults

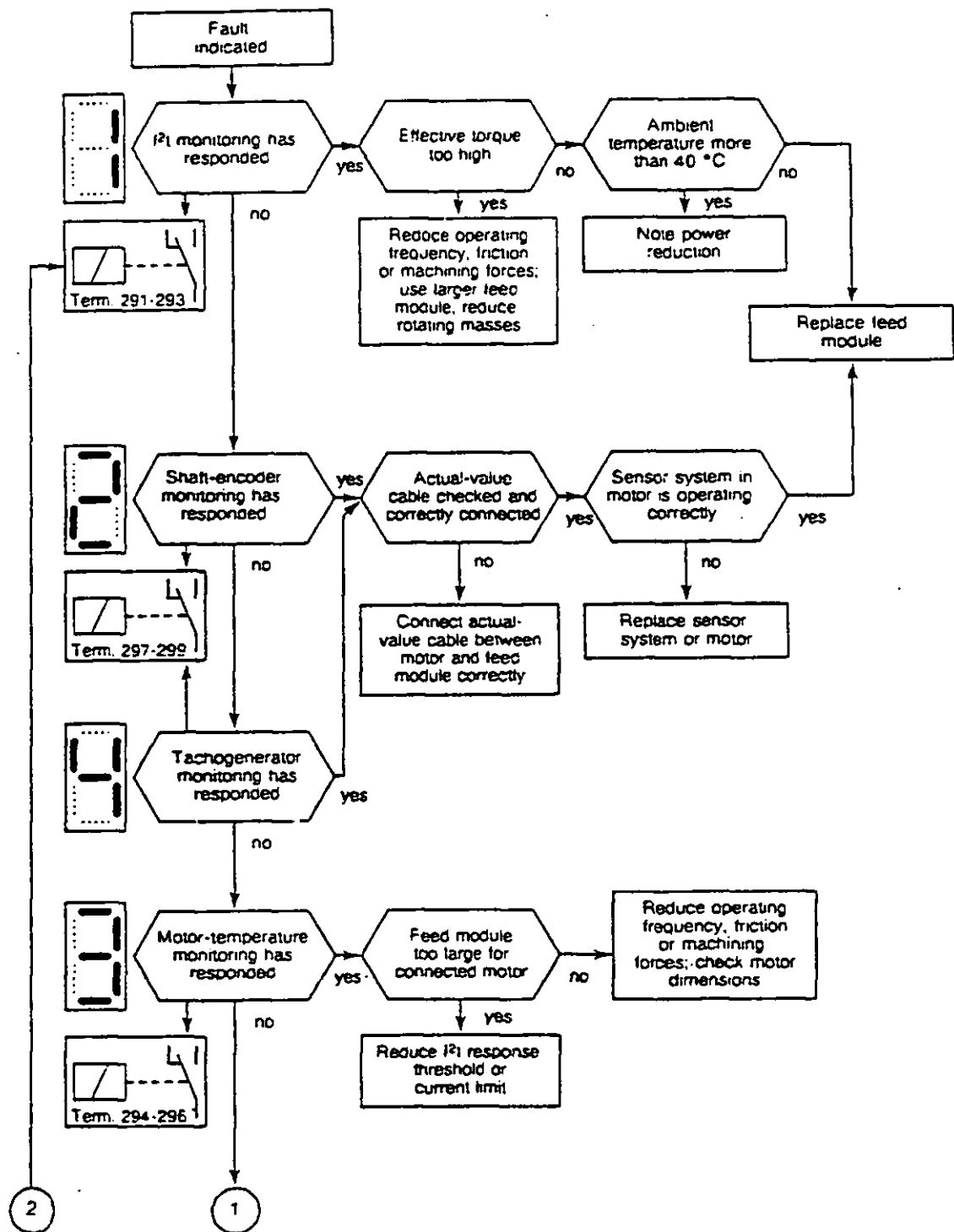
Axis-specific faults

• Axis-specific status displays

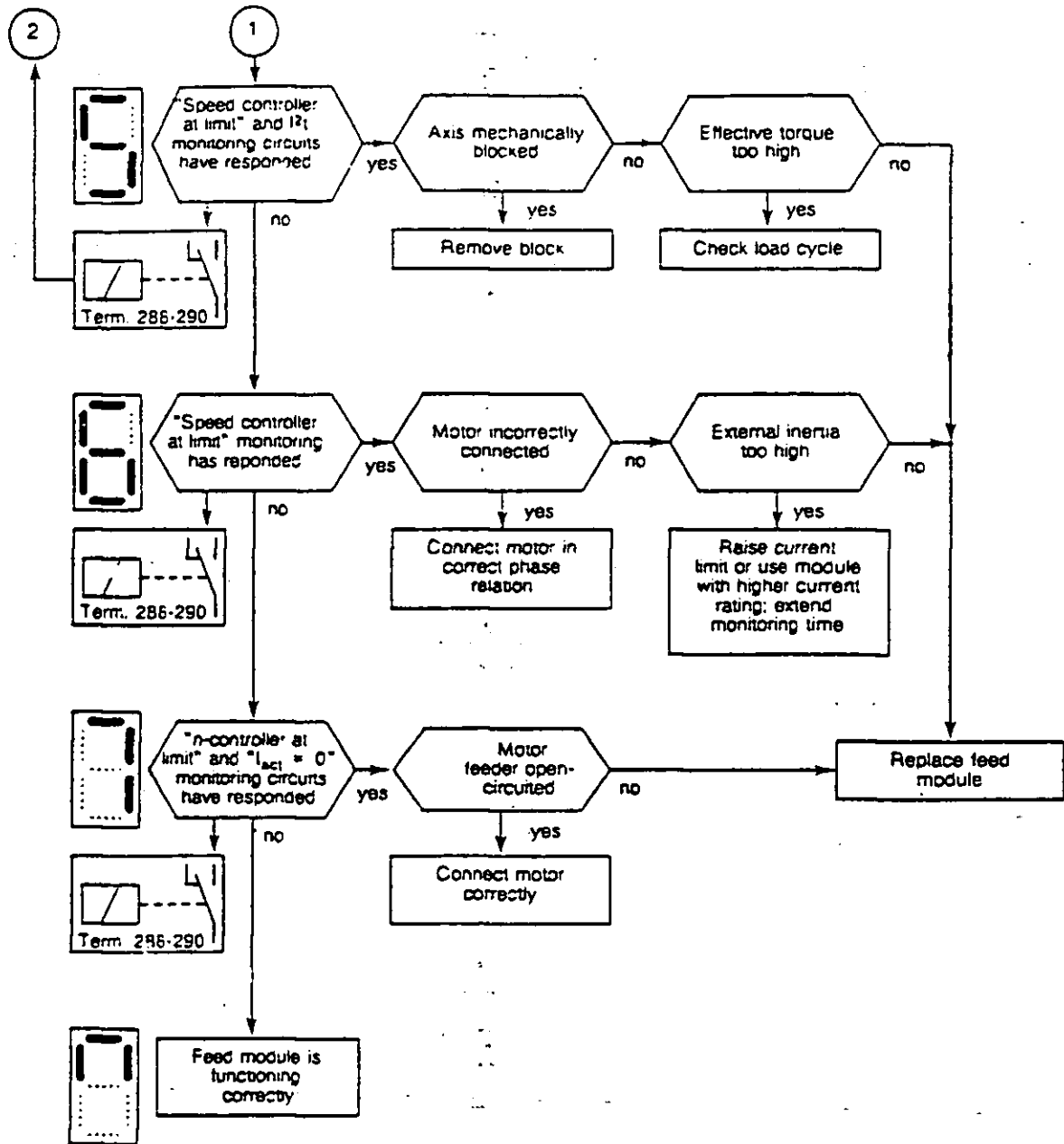


FAULT FINDING (cont)

• Axis-specific faults



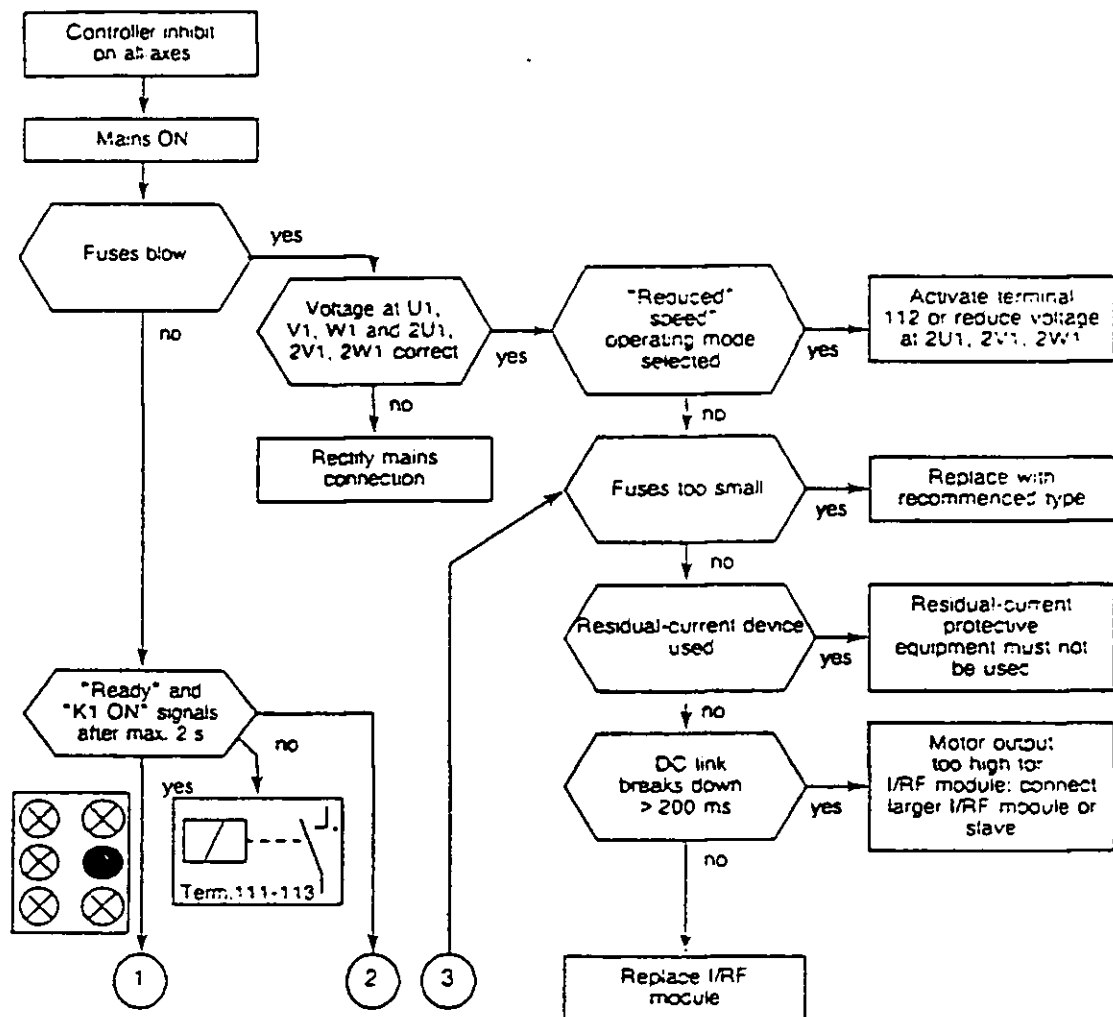
FAULT FINDING (cont)



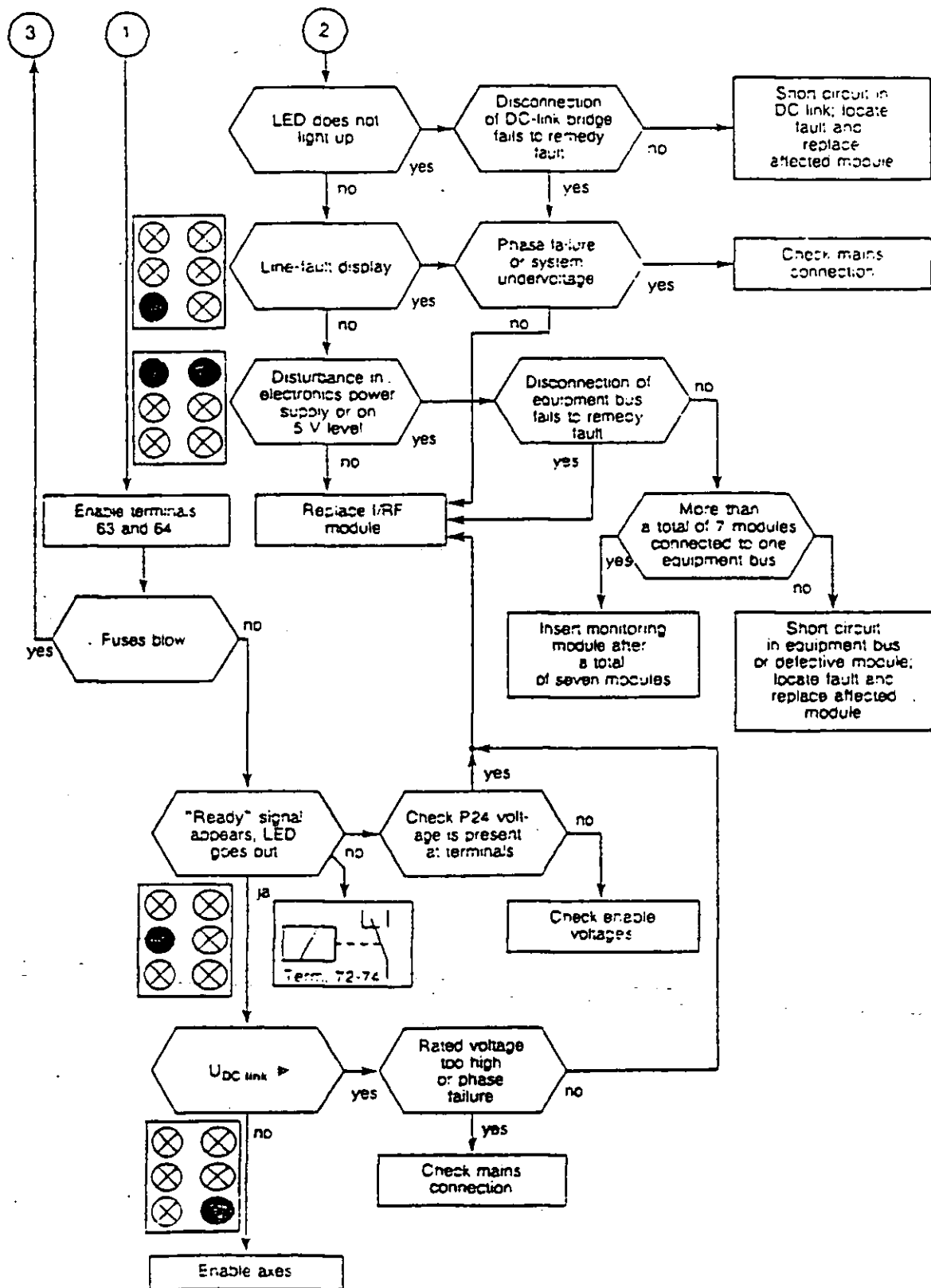
FAULT FINDING (cont)

Central faults

• Central faults with inhibited feed axes

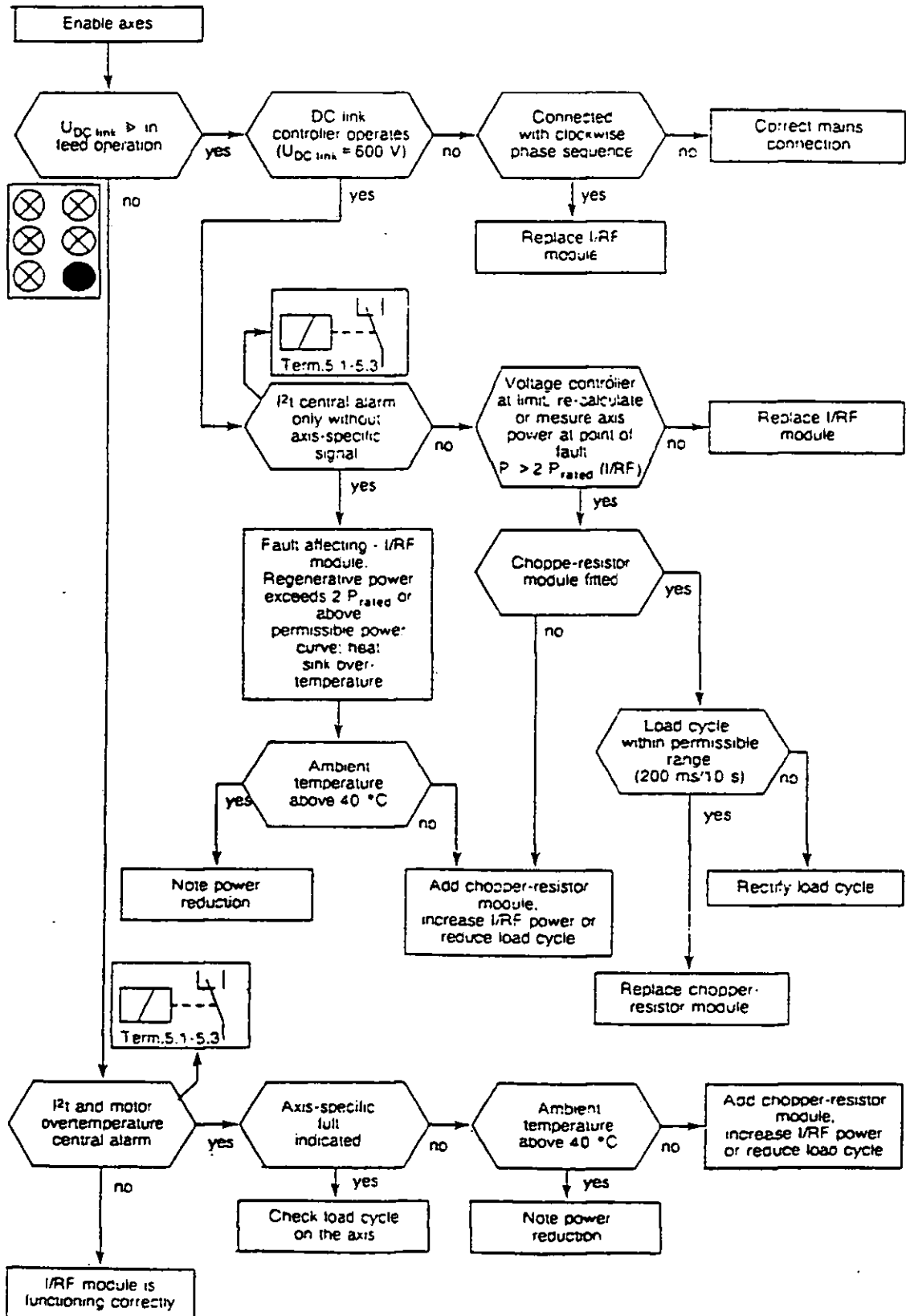


FAULT FINDING (cont)



FAULT FINDING (cont)

- Central faults with enabled feed axes



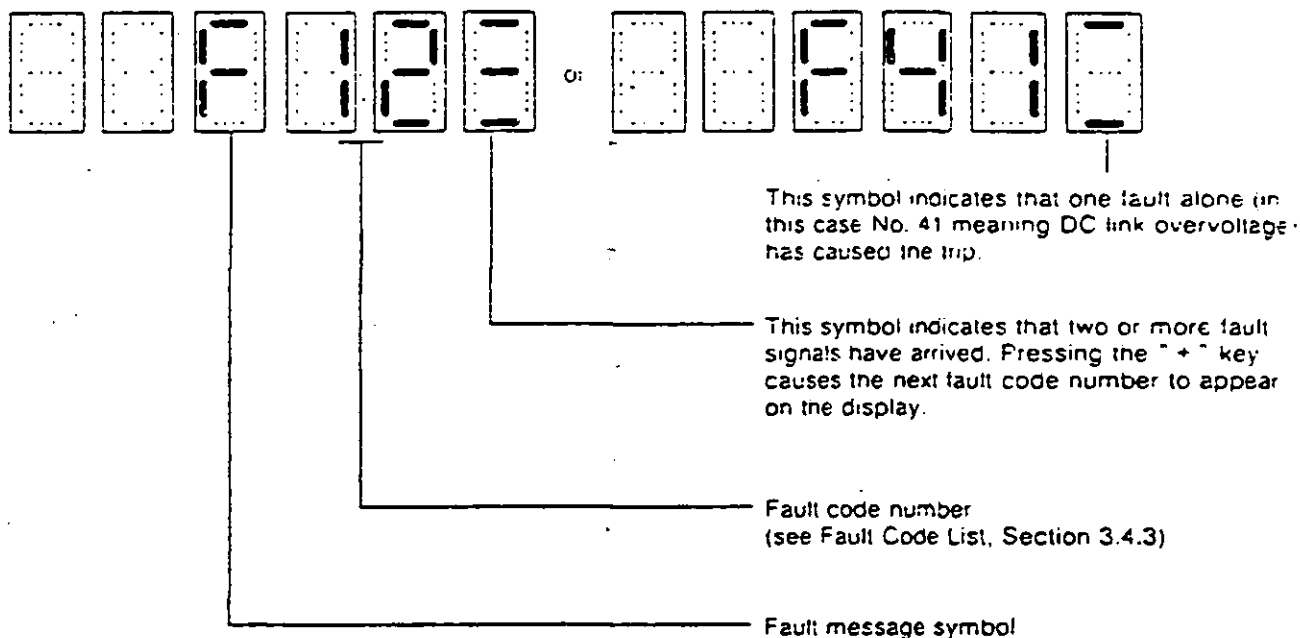
FAULT FINDING (cont)

7.4 Fault indications and fault resetting

Fault indications and fault resetting

Fault indications

If a fault arises, it causes automatic changeover from the operator communication program to the fault program and a flashing indication with the following symbols:



3.4.2 Faults

If all LEDs of the display remain dark after power-up, any one of the following fault conditions may be responsible:

- circuit-breaker not closed
- at least two phases dead
- at least two input fuses blown
- blown power supply fuses on firing circuit module A0 in the input/energy feedback section *)
- faulty connection between operator communication module H1 and controller module N1
- 5 V power supply faulted
- controller module N1 defective

If all LEDs on the display light up after power-up (8.8.8.8.8.), the following fault may have occurred:

- Defect on controller module N1
- EPROM on controller module N1 defective or incorrectly inserted
- No initializing pulse on the I/O module

*) applies only to 6SC6502 and 6SC6503

FAULT FINDING (cont)

Fault code list

For fault correction, check the components/equipment items in the sequence listed.

Fault code	Fault	Cause
F-01	Power supply disturbance	<ul style="list-style-type: none"> Pulse cable (G-X117 - G02-X117) not connected *) Phase loss Fuses F1, F2 or F3 blown Fuses F4, F5 or F6 or AG blown *) AO defective * U1 defective
F-02	Wrong rotating field	<ul style="list-style-type: none"> Interphase sequence incorrect (Mains connection)
F-11	Speed controller fully open; no actual speed value	<ul style="list-style-type: none"> Motor sensor cable not connected Encoder line interrupted Shaft encoder defective Motor not connected to inverter or one phase dead Motor mechanically blocked U1 defective Firing circuit EPROMs defective Power supply for driving stage or driving circuit module defective
F-12	Inverter overcurrent	<ul style="list-style-type: none"> Motor/inverter incorrectly matched Short-circuit/earth fault at inverter Current sensor U12, U13 defective U1 defective N1 defective Torque limit setting too high (e.g. P-39)
F-14	Motor overtemperature	<ul style="list-style-type: none"> Motor overloaded Excessive motor current, e.g. due to wrong motor data in P-96 NTC thermistor defective (motor) Motor fan defective U1 defective Interturn fault in motor
F-15	Converter overtemperature	<ul style="list-style-type: none"> Converter overloaded (motor/inverter incorrectly matched) High ambient temperature Fan failure PTC thermistor defective
F-19	Temperature sensor malfunction	<ul style="list-style-type: none"> NTC thermistor defective (motor) Sensor connection open-circuited Temperature below - 20 °C U1 defective

*) applies only to 6SC5502 and 6SC6503

FAULT FINDING (cont)

Fault code	Fault	Cause
F-40	Internal power supply disturbance	<ul style="list-style-type: none"> - P15 - P10 not available - N10REF or faulty - P5 - P24 - G01 defective - G02 defective - U1 defective
F-41	DC link overvoltage	<ul style="list-style-type: none"> - Temporary mains overvoltage - Voltage measuring system defective on A0 *) or G01, or U1 - V1 or V5 in step-up converter defective - Motor/inverter incorrectly matched - Mains failure during regenerative braking - Sporadic fault caused by shaft encoder or encoder line - Diode V9 or V10 defective**) or chopper module V1, V5
F-42	DC link overcurrent	<ul style="list-style-type: none"> - Converter overloaded - A0 defective *) - Current transformer U11 defective - Chopper transistors V1, V5 defective - Thyristor defective - Short-circuit in DC link - U1 defective - N1 defective
F-48 ***)		
F-51	DC link overvoltage	<ul style="list-style-type: none"> - U1 defective - N1 defective
F-52	DC link undervoltage	<ul style="list-style-type: none"> - Mains voltage dip - A0 defective *) - G01 (G02) defective - U1 defective
F-53	DC link charging disturbance	<ul style="list-style-type: none"> - Thyristor gate pulse leads disconnected from A0-X13, -X14 *) - A0 defective *) - G02 defective *) - G01 defective - U1 defective - N1 defective

*) applies only to 6SC6502 and 6SC6503

**) applies only to 6SC6512

***) fault code is not used from software version 09 onwards

FAULT FINDING (cont)

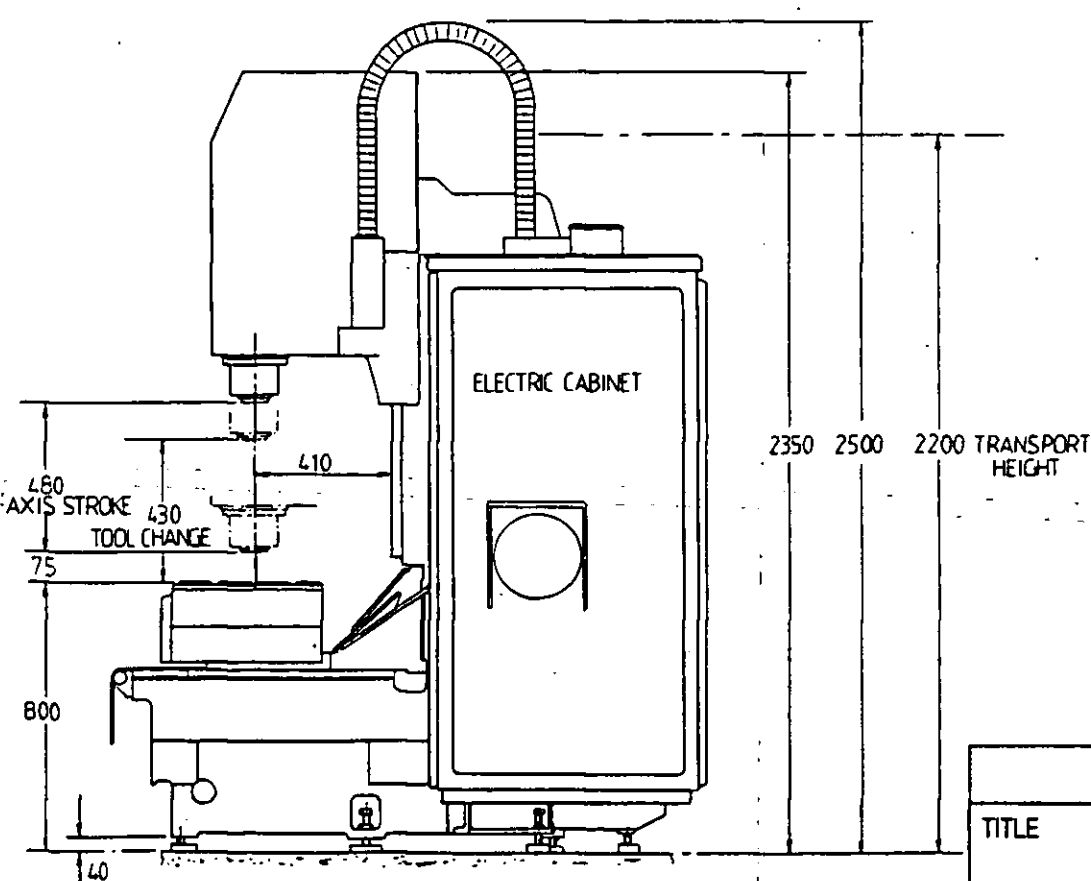
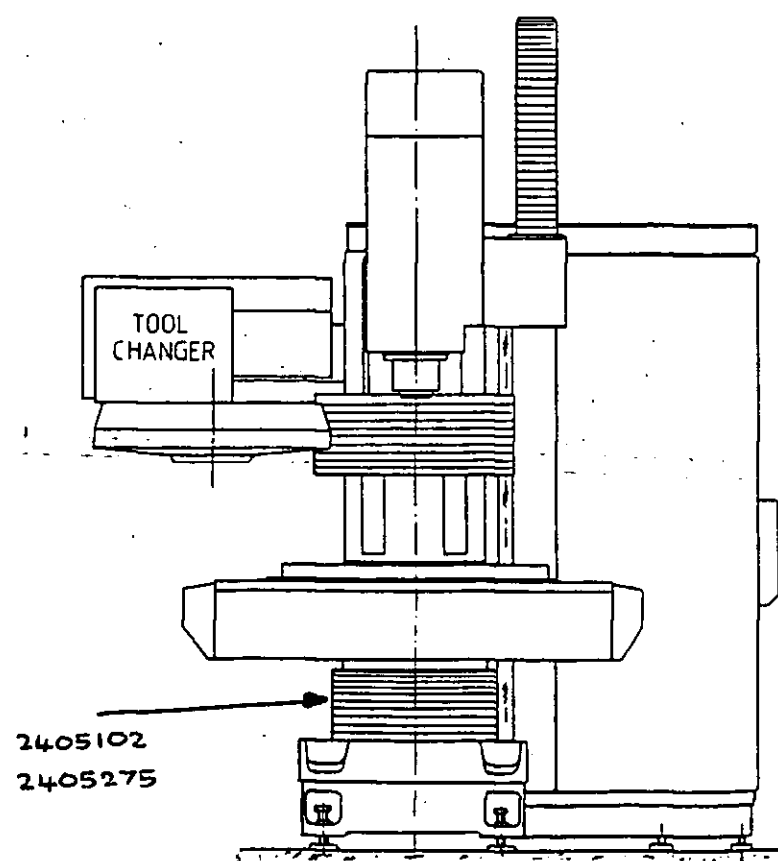
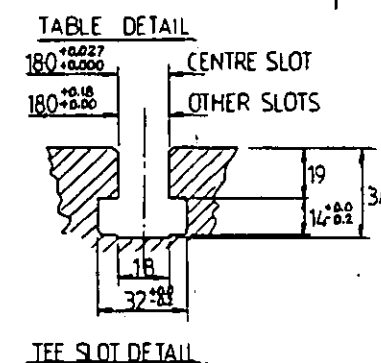
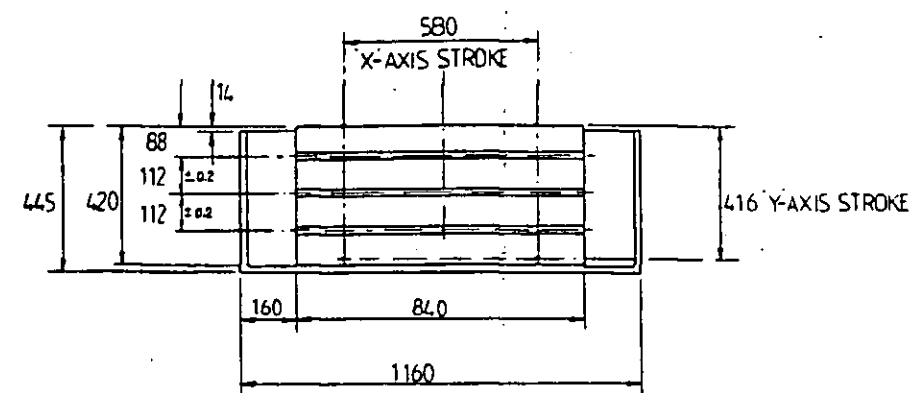
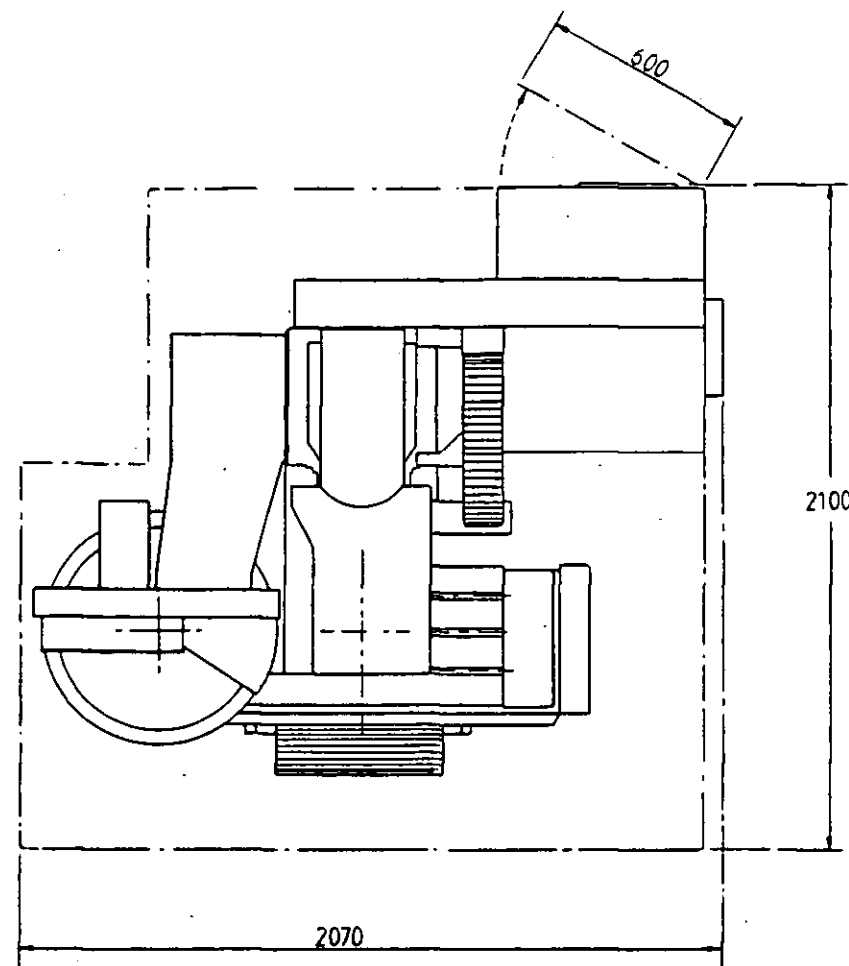
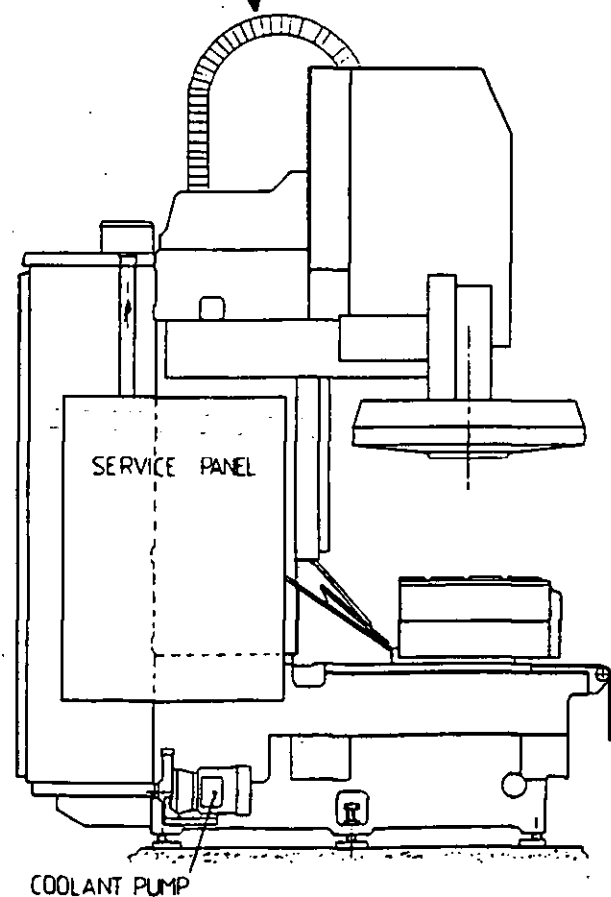
Fault message	Fault	Cause
F-54	Mains disturbance	<ul style="list-style-type: none"> 45 Hz > Mains frequency > 65 Hz Severe frequency fluctuations Mains synchronizing voltage missing A0 defective *) U1 defective N1 defective
F-55	Faulty setpoint value calculation	<ul style="list-style-type: none"> Values written into EEPROM exceed limit values (Bootstrapping necessary)
F-61	Maximum motor frequency exceeded	<ul style="list-style-type: none"> Excessive motor frequency output from control processor Wrong motor speed limit entered in parameter P-29
F-71	EPROM sum check error L byte, control processor	<ul style="list-style-type: none"> EPROM D82 on N1 defective
F-72	EPROM sum check error H byte, control processor	<ul style="list-style-type: none"> EPROM D80 on N1 defective
F-73	EPROM sum check error L byte, firing circuit processor	<ul style="list-style-type: none"> EPROM D78 on N1 defective
F-74	EPROM sum check error H byte, firing circuit processor	<ul style="list-style-type: none"> EPROM D76 on N1 defective
F-75	EEPROM sum check error	<ul style="list-style-type: none"> Memory error in EEPROM (Bootstrapping required) EEPROM D74 defective
F-77	No initializing pulse	<ul style="list-style-type: none"> N1 wrongly inserted U1 wrongly inserted U1 defective
F-78	I/O program execution time exceeded	<ul style="list-style-type: none"> Fault in EEPROM D74 (Bootstrapping or changing of EEPROM required)
F-81	High DC link voltage	<ul style="list-style-type: none"> G02 defective A0 defective *) U1 defective

*) applies only to 6SC6502 and 6SC6503

GENERAL ARRANGEMENT AND PARTS LIST

Specification (2409403)	GA-1
Base - Y Axis Screw (2409404)	GA-2
Saddle Assembly (2409399)	GA-3
Column Assembly (2409405)	GA-4
Table Assembly (2409400)	GA-5
Head (Encoder) (2409320)	GA-6
Triple Action Drawbar Arrangement (2409218)	GA-7
22 Tools Toolchanger (2409410)	GA-8
Lubrication Assembly (2409401)	GA-9
Pneumatic Layout (2389996)	GA-10
Service Panel (2409406)	GA-11
Coolant Assembly (2409364)	GA-12
Transit - Foundation Assembly (2409407)	GA-13
Perimeter Guard Sub Assembly (Heid.) (2409379)	GA-14
Rear Cladding (2409408)	GA-15
Rear Perimeter Guards (2409409)	GA-16

if Metal 1525341
if plastic 1525326



Bridgeport	
TITLE	
SPECIFICATION	
DRG No. 2409403	ISSUE No. 1

BASE - Y AXIS SCREW (cont.)

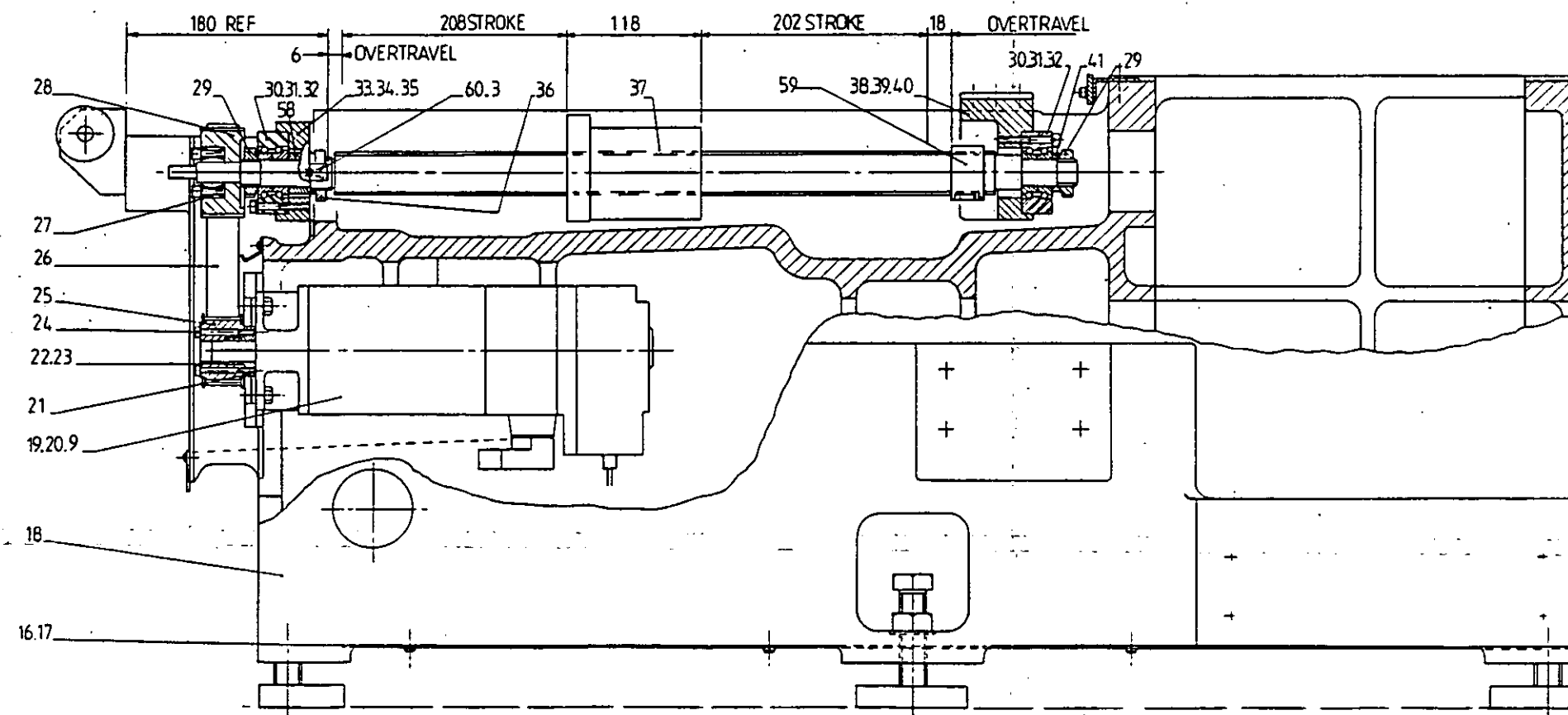
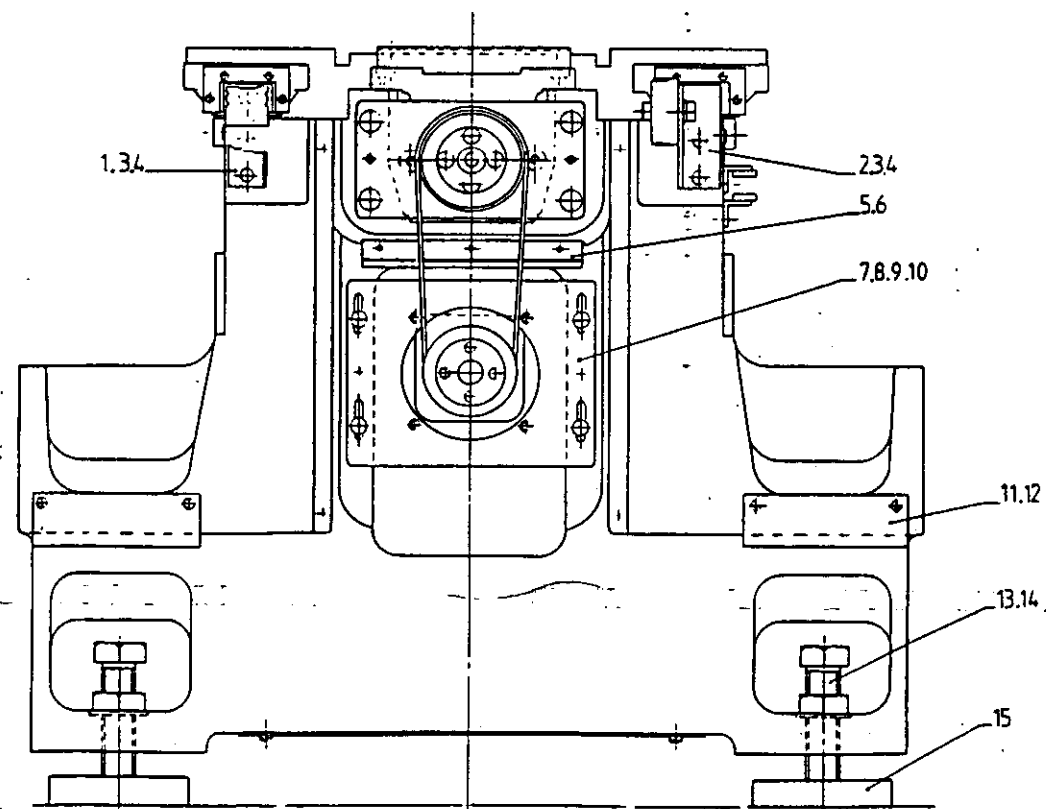
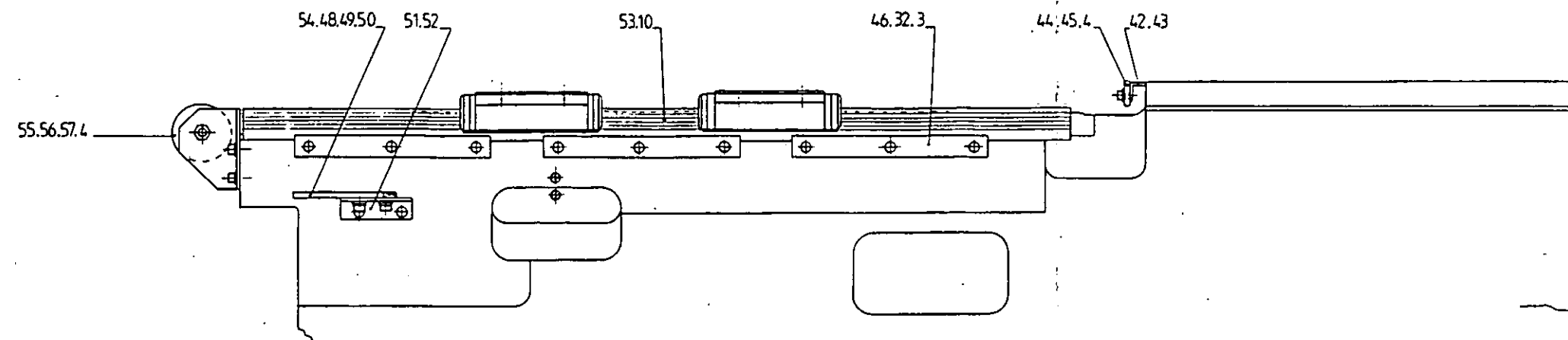
DRAWING NO. 2409404

ITEM	PART NO.	DESCRIPTION	QTY
53	2405010	Linear Guide Y Axis	2
54	2380468	Reference Stop	1
55	1734800	Roller (Nylon)	2
56	1711698	M6 x 20 Shoulder Screw	2
57	1712153	M6 Hex Nut	2
58	2405231	Spacer	1
59	2385420	Dead Stop	1
60	2405232	Bump Stop	2

BASE - Y AXIS SCREW

DRAWING NO. 2409404

ITEM	PART NO.	DESCRIPTION	QTY
1	2405038	Roller Bracket	1
2	2405037	Roller Bracket	1
3	1710078	M6 x 16 S.H.C.S.	24
4	1712103	M6 Washer	8
5	2403469	Coolant Shield	1
6	1711511	M4 x 10 Button Head Screw	3
7	2403840	Y Axis Motor Plate	1
8	1712104	M8 Washer	4
9	1712094	M8 Spring Washer	8
10	1710106	M8 x 35 S.H.C.S.	20
11	2403493	Drip Lip	2
12	1711520	M5 x 10 Button Head Screw	4
13	2400014	Foundation Bolt	6
14	1712159	M24 Hex. Nut	6
15	2400016	Foundation Plate	6
16	2405040	Base Cover Plate	1
17	1711530	M6 x 10 Button Head Screw	8
18	2405000	Base 560	1
19	1556461	Motor LFTS 064-OAF 71-1-Z	1
20	1711052	M8 x 20 Hex. Head Bolt	4
21	2403833	Clamp Plate	1
22	2403811	Spacer	1
23	1572807	Ring Feeder RFN 8006 19 x 24	1
24	1710060	M5 x 50 S.H.C.S.	4
25	2403835	Motor Pulley	1
26	1577914	Timing Belt 560-8M-30	1
27	1573071	Ring feeder RFN 7012 47 x 20	1
28	2405032	Pulley 33T	1
29	1765051	M25 x 1.5 Precision Lock Nut	2
30	1720594	Bearing ZKLF 2575-2RS	2
31	1710084	M6 x 45 S.H.C.S.	8
32	1712093	6mm Spring Washer	26
33	2400052	Y Axis Bearing Housing	1
34	1710131	M10 x 40 S.H.C.S.	4
35	1714126	6mm x 40mm Plain Dowel	2
36	1765052	M30 Locknut	1
37	2405225	Y Axis Ballscrew	1
38	2405029	Bearing Bracket	1
39	1710104	M8 x 25 S.H.C.S.	4
40	1714128	8mm x 25mm Plain Dowel	2
41	2383510	Spacer 'C'	1
42	2405042	Support Bracket	1
43	1710327	M6 x 12 C'sk Screw	2
44	2405043	Nylon Runner	1
45	1710077	M6 x 12 S.H.C.S.	2
46	2400058	Rail Push Plate	6
47			
48	1710052	M5 x 12 S.H.C.S.	2
49	1712102	M5 Washer	2
50	1712085	M5 Lock Washer	2
51	2380455	Stock Bracket	1
52	1711520	M5 x 10 Button Head Screw	2



Bridgeport	
TITLE	
BASE - Y AXIS SCREW	
DRG No. 2409404	ISSUE No. 1

SADDLE ASSEMBLY (cont.)

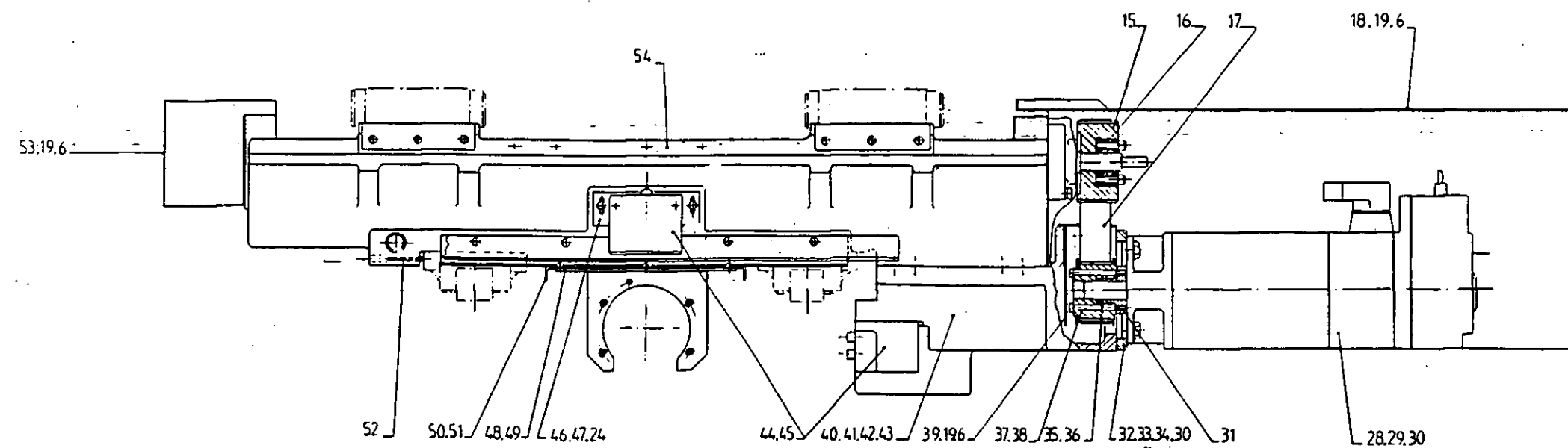
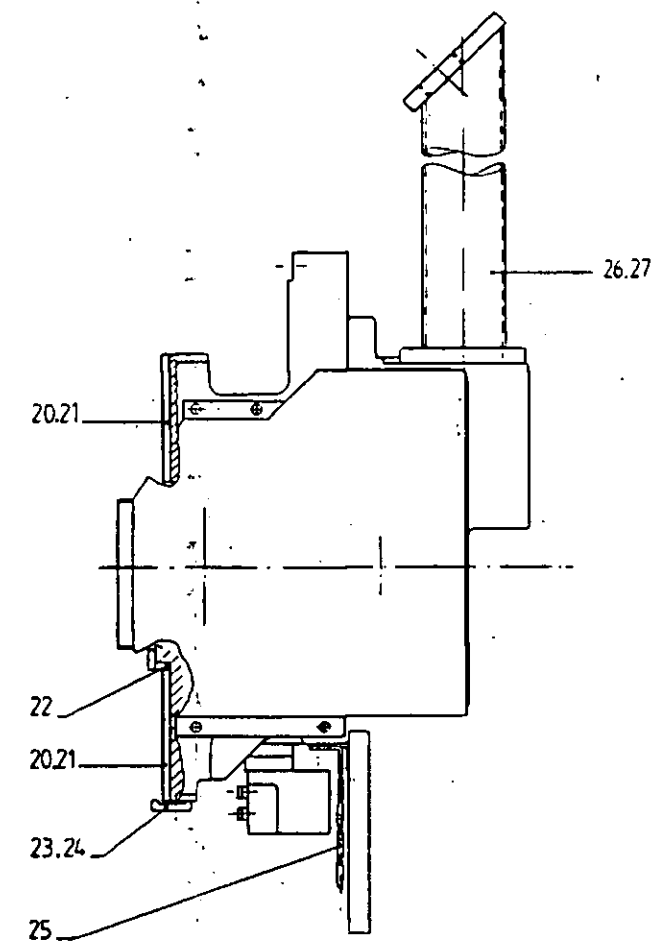
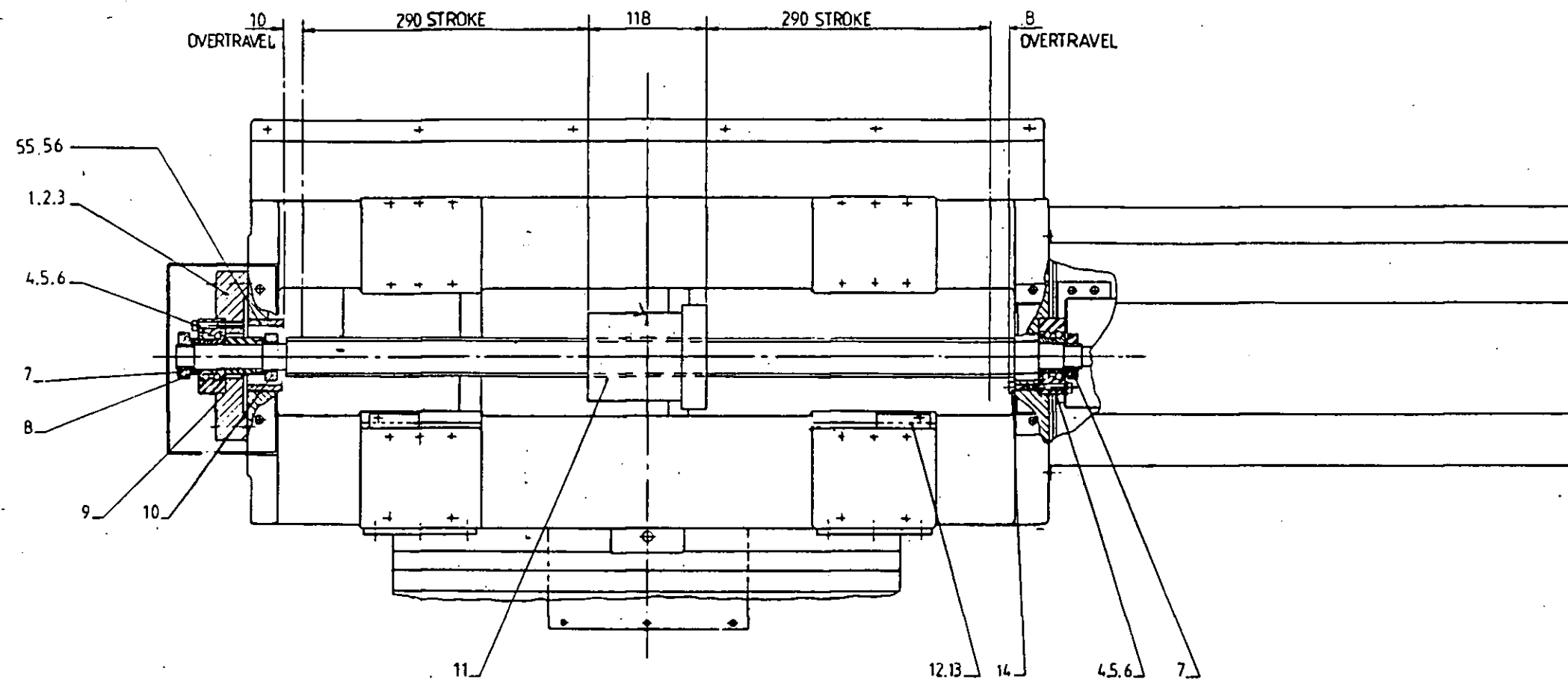
DRAWING NO. 2409399

ITEM	PART NO.	DESCRIPTION	QTY
53	2405026	Saddle Cover	1
54	2405229	Saddle	1
55	2405233	Bump Stop	1
56	1710550	Socket Set Screw M6 x 12	1

SADDLE ASSEMBLY

DRAWING NO. 2409399

ITEM	PART NO.	DESCRIPTION	QTY
1	2400052	Y Axis Bearing Housing	1
2	1710131	M10 x 40 S.H.C.S.	4
3	1714126	Ø6 x 40 Dowel	2
4	1720594	Bearing ZKLF 2575-2RS	2
5	1710084	M6 x 45 S.H.C.S.	8
6	1712093	Ø6 Spring Washer	16
7	1765051	M25 x 1,5 Precision Lock Nut	2
8	2383510	Spacer 'C'	1
9	2405034	Spacer	1
10	1765052	M30 Lock Nut	1
11	2405224	X Axis Ballscrew	1
12	2400453	Clamp	2
13	1710051	M5 x 10 S.H.C.S.	2
14	1713010	M6 x 5 Screw Pan 002 0194	4
15	2405032	Pulley 33T	1
16	1573071	Ring Feeder RFN 7012 47 x 20	1
17	1577927	Timing Belt 480-8M-30	1
18	2405063	X Axis Motor Cover	1
19	1711531	M6 x 12 B.H.S.S.	10
20	2400451	Bearing Plate	4
21	1710105	M8 x 30 S.H.C.S.	16
22	2400452	Bearing Shim	2
23	2400466	Slide Bearing Clamp	2
24	1710078	M6 x 16 S.H.C.S.	8
25	2405102	Wiper Apron Cover	1
26	2405025	Saddle Cable Tube	1
27	1710080	M6 x 25 S.H.C.S.	4
28	1556461	Motor LFTS 064-OAF71-1-Z	1
29	1711052	M8 x 20 Hex. Head Bolt	4
30	1712094	Ø8 Spring Washer	8
31	2403833	Clamp Plate	1
32	2405033	Motor Plate	1
33	1710106	M8 x 35 S.H.C.S.	4
34	1712104	Ø8 Washer	4
35	2403811	Spacer	1
36	1572807	Ring Feeder RFN 8006 19 x 24	1
37	2403855	Motor Pulley	1
38	1710060	M5 x 50 S.H.C.S.	4
39	2405062	Cable Shield	1
40	2405024	X Axis Drive Box	1
41	1710133	M10 x 50 S.H.C.S.	2
42	1710129	M10 x 30 S.H.C.S.	2
43	1713129	Ø8 x 28 Dowel	2
44	1553679	Euchner Limit Switch	2
45	1710079	M6 x 20 S.H.C.S.	4
46	2400454	Switch Plate	1
47	1712103	Ø6 Washer	2
48	2400432	Slide	1
49	1710005	M3 x 16 S.H.C.S.	3
50	2405091	Slide Cover Bracket	1
51	1711520	M5 x 10 Button Screw	4
52	1710556	M6 x 40 Socket Set Screw	6



Bridgeport	
TITLE SADDLE ASSEMBLY	
DRG No. 2409399	ISSUE No. 1

GA-3

COLUMN ASSEMBLY (cont.)

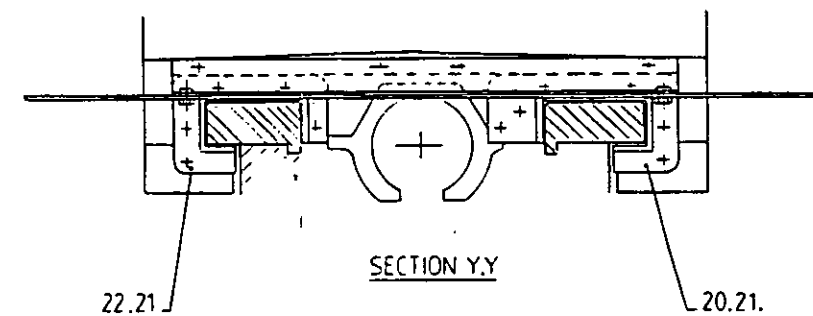
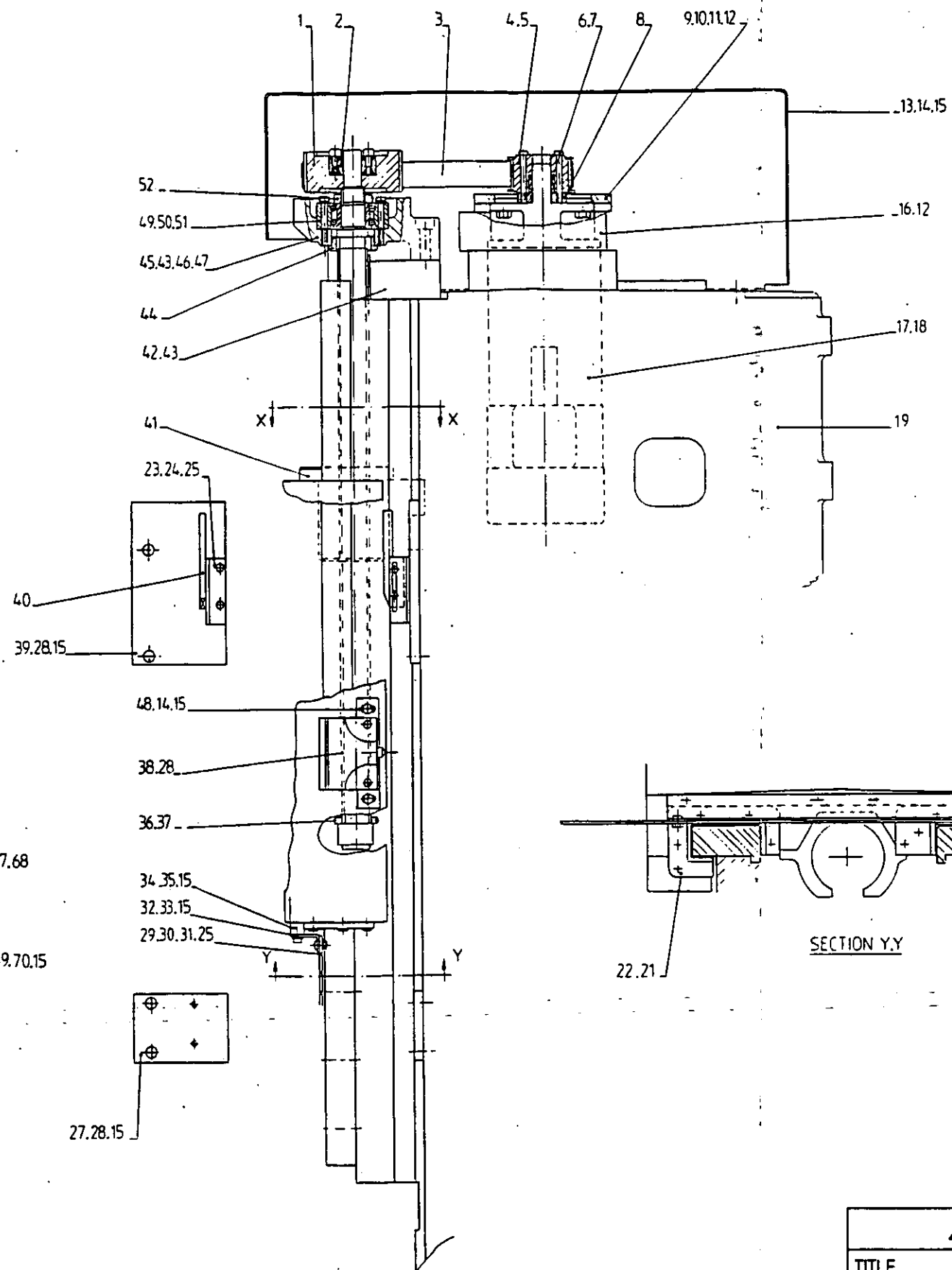
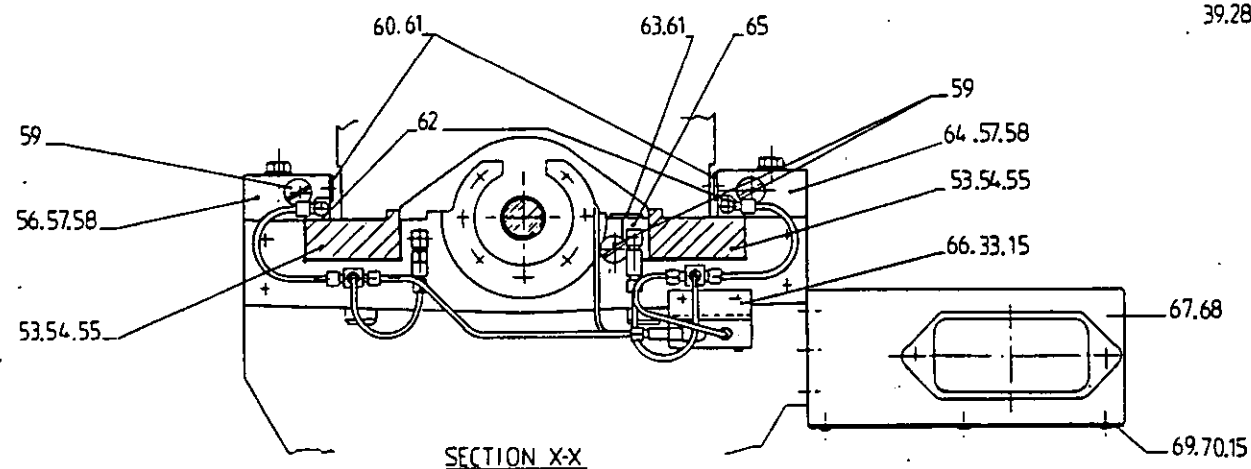
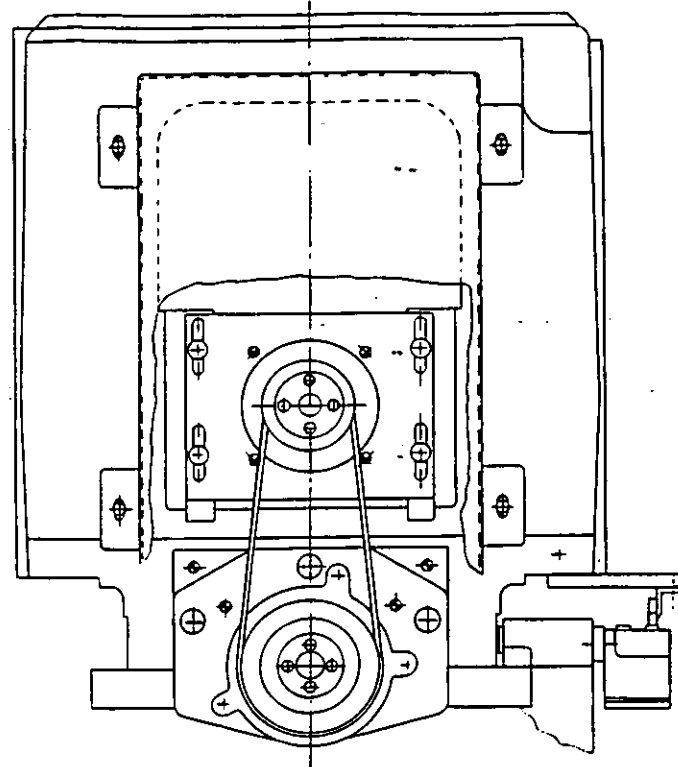
DRAWING NO. 2409405

ITEM	PART NO.	DESCRIPTION	QTY
53	2383433	Ø20 Plug	26
54	2400224	Slideway (Column)	2
55	1710153	M12 x 35 S.H.C.S.	26
56	2380801	Keep Plate L.H.	1
57	1711329	M10 x 55 Hex. Head Bolt	10
58	1712105	M10 Washer	10
59	2343529	Strip Adjusting Screw	6
60	2380843	Strip Retaining Plate	2
61	1710302	M5 x 12 Socket C'sk Screw	8
62	2380886	Taper Strip	2
63	2402859	Strip Retaining Plate	2
64	2380802	Keep Plate (R.H.)	1
65	2380880	Taper Strip Z Axis	1
66	2405126	Manifold Bracket	1
67	2405023	Cable Box Head	1
68	1710102	M8 x 16 S.H.C.S.	3
69	2405022	Cable Box Cover	1
70	1711531	M6 x 12 Button Head Screw	6

COLUMN ASSEMBLY

DRAWING NO. 2409405

ITEM	PART NO.	DESCRIPTION	QTY
1	2405058	Pulley 40T	1
2	1573071	Ring Feeder RFN 7012 47 x 20	1
3	1577915	Timing Belt 640-8M-30	1
4	2403835	Motor Pulley	1
5	1710060	M5 x 50 S.H.C.S.	4
6	2403811	Spacer	1
7	1572807	Ring Feeder RFN 8006 19 x 24	1
8	2403833	Clamp Plate	1
9	2403839	Z Axis Motor Plate	1
10	1712104	Ø8 Washer	4
11	1712094	Ø8 Spring Washer	4
12	1710108	M8 x 45 S.H.C.S.	8
13	2405027	Cover for Z Axis Drive	1
14	1710078	M6 x 16 S.H.C.S.	6
15	1712103	Ø6 Washer	18
16	2405016	Packing Block	2
17	1556464	Motor 1FT5 064-OAF71-1-Z Brake	1
18	1711052	M8 x 20 Hex. Head Bolt	4
19	2405001	Column	1
20	2400806	Moulded Wiper	1
21	1711532	M6 x 16 Button Head Screw	10
22	2400805	Moulded Wiper	1
23	2380455	Stop Bracket	1
24	1711520	M5 x 10 Button Head Screw	4
25	1712102	Ø5 Washer	4
26			
27	2400206	Plate for Trip Dogs	1
28	1710079	M6 x 20 S.H.C.S.	9
29	2400843	Link Apron Cover	1
30	1712152	M5 Hex. Nut	2
31	1711521	M5 x 12 Button Head Screw	2
32	2405051	Link Cover Bracket	1
33	1710077	M6 x 12 S.H.C.S.	4
34	2405050	Link Cover Block	1
35	1710080	M6 x 25 S.H.C.S.	2
36	2405065	Bump Stop	1
37	1763245	Circlip Seeger SW45	1
38	1553672	Limit Switch	1
39	2405017	Plate for Trip Dogs	1
40	2380468	Reference Stop	1
41	2405007	Z Axis Ballscrew	1
42	2405015	Packing Block	1
43	1714213	Ø8 x 40 Taper Dowel	4
44	2400208	Bump Stop	1
45	2400244	Ballscrew Bracket	1
46	1710140	M10 x 90 S.H.C.S.	3
47	1712084	Ø10 Lockwasher	3
48	2380845	Switch Plate	1
49	1720594	Bearing ZKLF 2575-2RS	1
50	1712093	Ø6 Lockwasher	4
51	1710083	M6 x 40 S.H.C.S.	4
52	1765051	M25 x 1.5 Precision Locknut	1



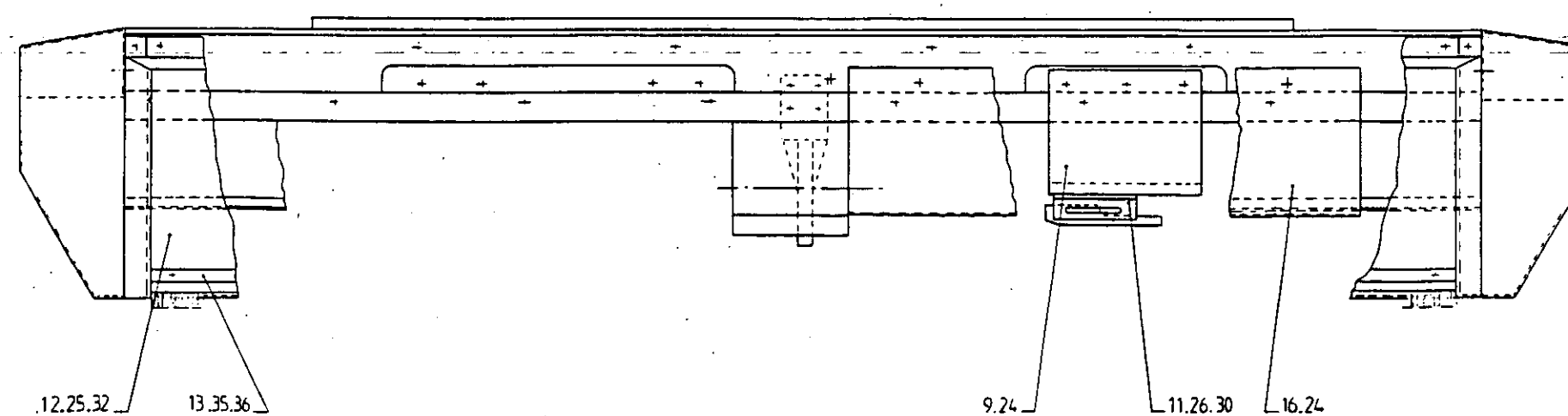
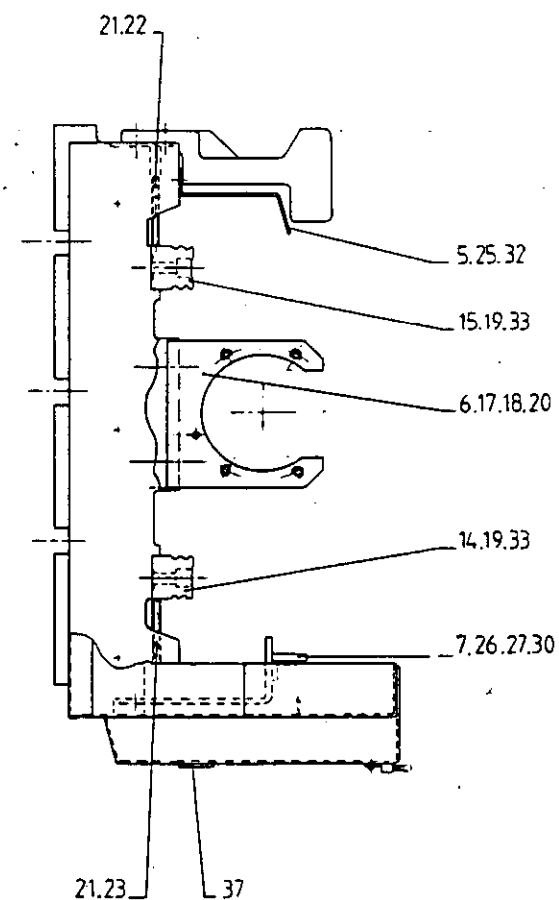
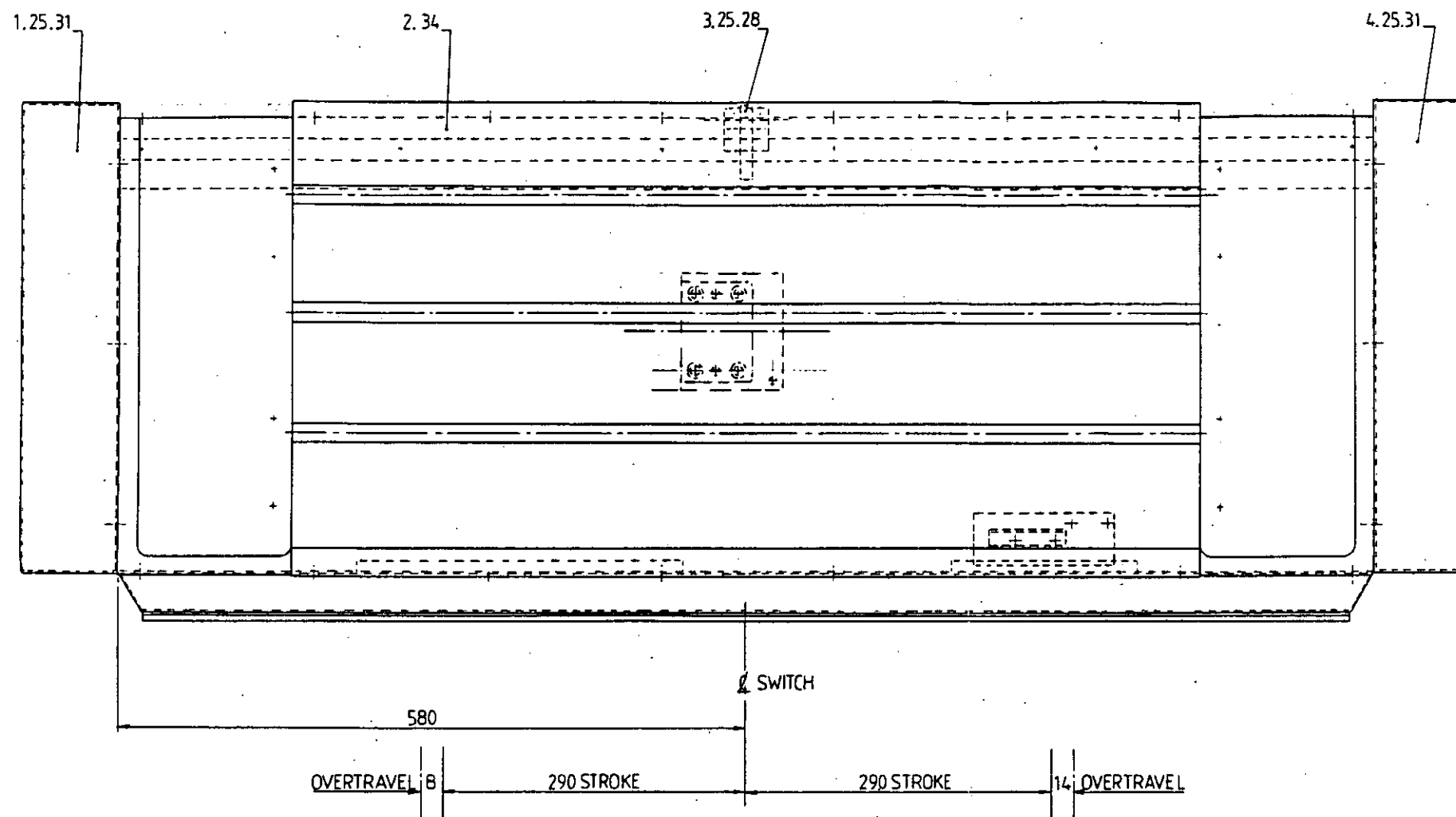
<i>Bridgeport</i>	
TITLE	
COLUMN ASSEMBLY	
DRG No. 2409405	ISSUE No. 1

GA-4

TABLE ASSEMBLY

DRAWING NO. 2409400

ITEM	PART NO.	DESCRIPTION	QTY
1	2405054	L.H. Table Cover	1
2	2405228	Table	1
3	2400664	Centre Paddle	1
4	2405053	R.H. Table Cover	1
5	2405057	Swarf Baffle Plate	1
6	2405230	Nut Bracket X Axis	1
7	2380468	Reference Stop	1
8			
9	2400692	Feed Stop Bracket	1
10			
11	2400658	Stop Bracket	1
12	2405052	Front Table Cover	1
13	2405047	Front Table Brush	1
14	2405008	Linear Guide X Axis	1
15	2405009	Linear Guide X Axis	1
16	2405104	Pipe Baffle Plate	1
17	1714132	8mm x 50mm Plain Dowel	1
18	1714213	8mm x 40mm Taper Dowel	1
19	1710105	M8 x 30 S.H.C.S.	30
20	1710132	M10 x 45 S.H.C.S.	4
21	1710547	M6 x 6 Skt Set Screw	30
22	1710554	M6 x 30 Socket Set Screw Cup Point	15
23	1710555	M6 x 35 Set Screw	15
24	1711532	M6 x 16 Button Head Screw	6
25	1712093	Ø6 Spring Washer	20
26	1712085	Ø5 Spring Washer	4
27	1712102	Ø5 Washer	2
28	1710079	M6 x 20 S.H.C.S.	2
29			
30	1710051	M5 x 10 S.H.C.S.	4
31	1710078	M6 x 16 S.H.C.S.	10
32	1711530	M6 x 10 Pan Head Screw	16
33	1572628	Plug	30
34	2403542	Blanking Plug	8
35	1712092	Ø4 Lockwasher	5
36	1711509	M4 x 6 Button Head Screw	5
37	2381870	Label	1



Bridgeport	
TITLE	
TABLE ASSEMBLY	
DRG No. 2409400	ISSUE No. 1

GA-5

HEAD (ENCODER) (cont.)

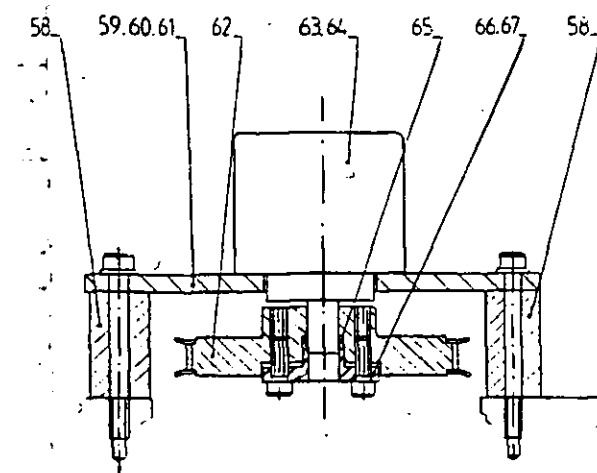
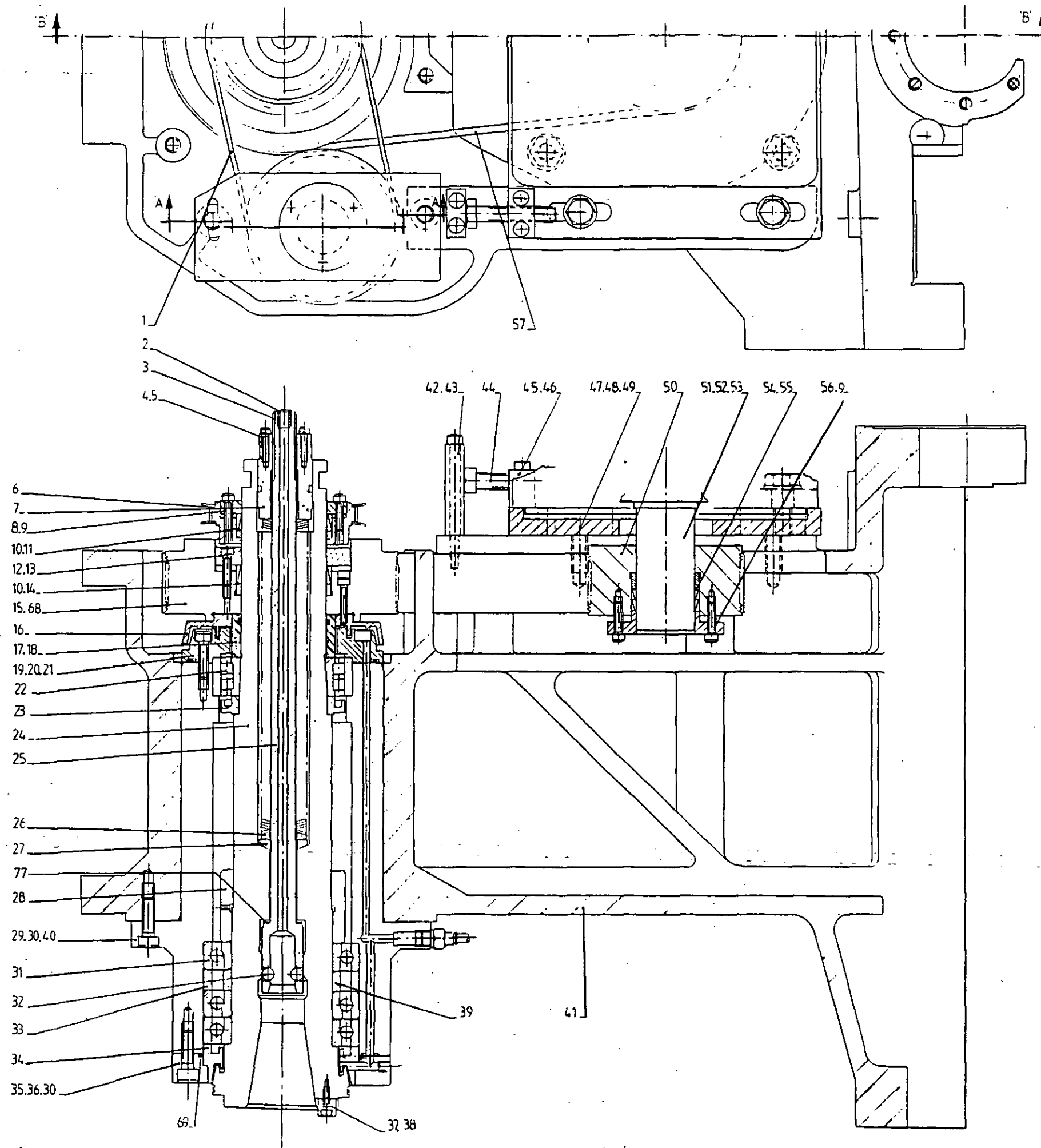
DRAWING NO. 2409320

ITEM	PART NO.	DESCRIPTION	QTY
53	1711103	Hex. Head Screw M12 x 35	4
54	1573065	Locking Element	2
55	1573066	Spacing Sleeve	1
56	2384576	Locking Plate	1
57	1578097	Belt	1
58	2384572	Collar	2
59	2405019	Encoder Plate	1
60	1710087	S.H.C.S. M6 x 60	2
61	1712103	Washer Ø6	2
62	2380898	Encoder Pulley	1
63	1557766	Encoder	1
64	1710005	S.H.C.S. M3 x 16	3
65	1572733	Locking Element	1
66	2402852	Lock Plate	1
67	1710053	S.H.C.S. M5 x 16	6
68	1710032	S.H.C.S. M4 x 25	3
69	1730430	'O' Ring	1
70			
71			
72			
73			
74			
75			
76			
77	2385704	Drawbar Spacer	1

HEAD (ENCODER)

DRAWING NO. 2409320

ITEM	PART NO.	DESCRIPTION	QTY
0	2409320	Arrangement Drawing	1
1	1577940	Timing Belt	1
2	1730302	'O' Ring	1
3	1741111	Bush	1
4	2380885	Lock Plate	1
5	1710030	S.H.C.S. M4 x 16	2
6	2380991	Encoder Drive Pulley	1
7	2380883	Drawbar Guide (BT40)	1
8	2380993	Locking Plate	1
9	1710054	S.H.C.S. M5 x 20	14
10	1572744	Locking Element	2
11	2380992	Spacer	1
12	2380814	Locking Plate	1
13	1710055	S.H.C.S. M5 x 25	6
14	2380815	Spacer	1
15	2380960	Spindle Pulley	1
16	2380987	Pulley Labyrinth	1
17	2380809	Lock Ring	1
18	1730222	'O' Ring	1
19	2380968	Bearing Cap	1
20	1730383	'O' Ring	1
21	1710080	S.H.C.S. M6 x 25	4
22	1572618	Roller Bearing	1
23	2380808	Spacer	1
24	2380950	Spindle (BT40)	1
25	2380953	Drawbar (BT40)	1
26	Now 1571758	Disc Stack (100 Springs) (was 132 1571700)	1
27	2380891	Thrust Washer	1
28	2361318	Stop Collar	1
29	2380806	Spindle Housing	1
30	1710104	S.H.C.S. M8 x 25	14
31	1572682	Angular Contact Bearing	1 set
32	1706606	Steel Ball	4
33	2361307	Outer Bearing Spacer	1
34	2380807	Labyrinth	1
35	2380811	Spindle Nose Cap	1
36	1730121	1/8 B.S.P. Press Plug	4
37	2361328	Key	1
38	1710029	S.H.C.S. M4 x 12	1
39	2361308	Inner Bearing Spacer	1
40	1730122	1/4 B.S.P. Plug	1
41	2405004	Head	1
42	2384567	Stop Block	2
43	1710086	S.H.C.S. M6 x 55	4
44	1711083	Hex. Head Screw M10 x 60	2
45	2384566	Motor Plate Adjusting Block	2
46	1710082	S.H.C.S. M6 x 35	4
47	2405013	Motor Plate	1
48	1711325	S.H.C.S. M10 x 35	4
49	1712105	Washer Ø10	4
50	2384574	Motor Pulley	1
51	1556459	Motor	1
52	1712106	Washer Ø12	4



SECTION A-A

Bridgeport	
TITLE	
HEAD (ENCODER)	
DRG No. 2409320	ISSUE No. 4

GA-6

TRIPLE ACTION DRAWBAR ARRANGEMENT

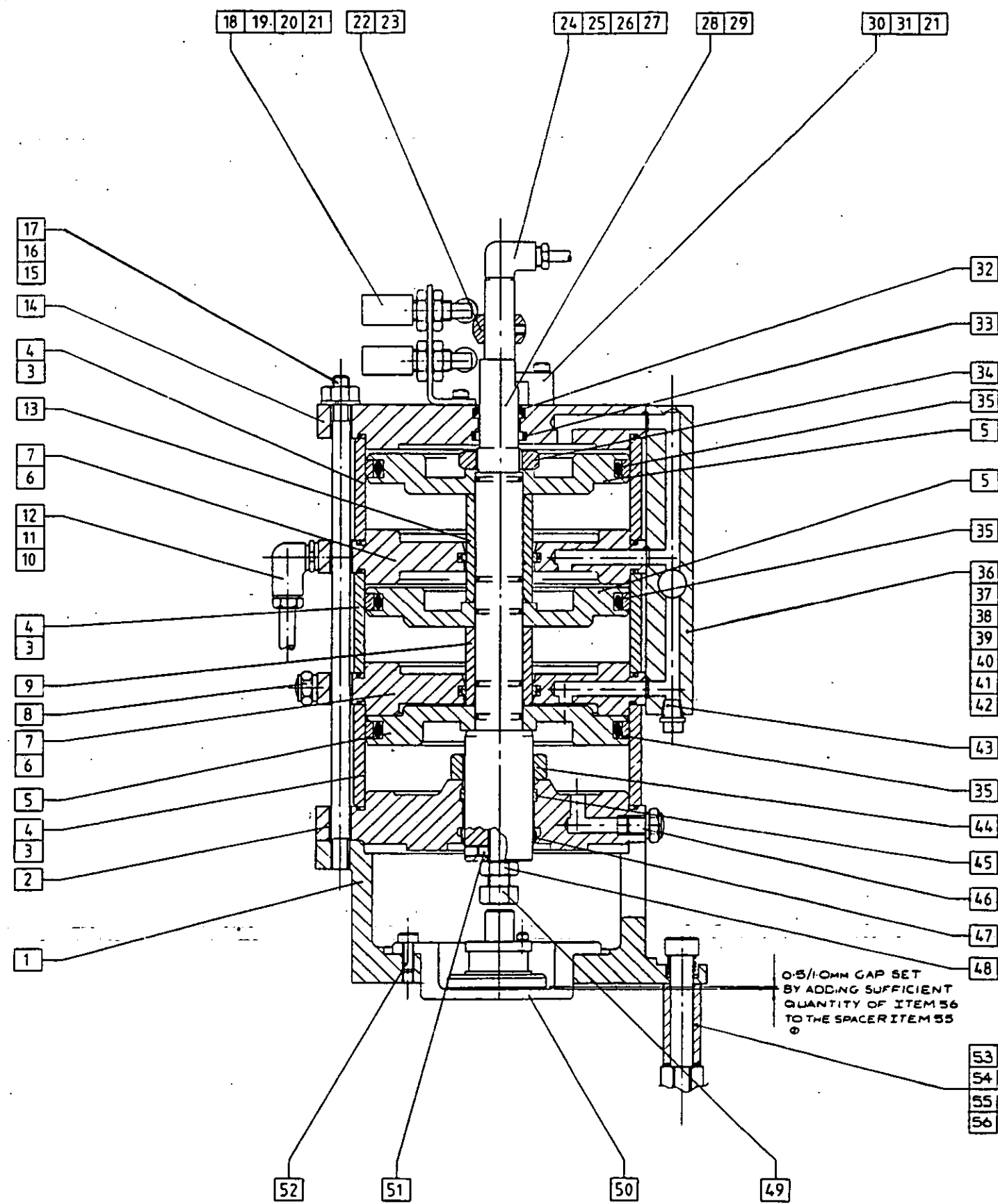
DRAWING NO. 2409218

ITEM	PART NO.	DESCRIPTION	QTY
53	1713009	Shoulder Screw Ø12 x 60	3
54	1760205	Entex Spring	3
55	2380957	Spacer	3
56	2403544	Spacer	

TRIPLE ACTION DRAWBAR ARRANGEMENT

DRAWING NO. 2409218

ITEM	PART NO.	DESCRIPTION	QTY
1	2380825	Cylinder Mounting	1
2	2400849	Cylinder End Cap	1
3	1730395	'O' Ring RM1395-30	6
4	2159324	Cylinder	3
5	2380835	Piston	3
6	1730186	Composite Seal No. 3035	2
7	2380827	Cylinder Middle Plate	2
8	1579042	Breather AVS 2901 1/8 B.S.P.	1
9	2159326	Bottom Spacer	1
10	1734277	Elbow 1/8 B.S.P. - Ø8	1
11	1734213	Tubing Nut Ø8	1
12	1734202	Tubing Sleeve	1
13	2159325	Top Spacer	1
14	2380828	Cylinder Top Plate	1
15	1712084	Spring Washer Ø10	4
16	1712155	Nut M10	4
17	2159327	Stud	4
18	1553453	Switch Z15GQ21-B	2
19	2380836	Limit Switch Bracket	1
20	1710051	S.H.C.S. M5 x 10	2
21	1712085	Spring Washer M5	2
22	2381016	Dog (Adjustable)	1
23	1710536	S.H.S.S. M5 x 5	1
24	1734276	Elbow 1/8 B.S.P. - Ø6	1
25	1734212	Tubing Nut Ø6	1
26	1734201	Tubing Sleeve	1
27	1705825	Sealing Washer	1
28	2400846	Piston Rod	1
29	1730318	'O' Ring RM0221-16	5
30	2400847	Thrust Block	1
31	1710055	S.H.C.S. M5 x 25	2
32	1730194	Scraper	1
33	1730185	Composite Seal No. 3020	1
34	1765010	Lock Nut M24 x 1.5	1
35	1730187	Composite Seal No. 4140	3
36	2159322	Manifold	1
37	1730306	'O' Ring RM0018-16	3
38	1712093	Spring Washer M6	6
39	1710082	S.H.C.S. M6 x 35	6
40	1734252	Adaptor 3/8 - Ø12	1
41	1734204	Tubing Sleeve	1
42	1734215	Tubing Nut	1
43	1730121	Pressure Plug 1/8 B.S.P.T.	1
44	2400848	Drawbar Spacer	1
45	1731032	Slydring S-55856-360-10-A	1
46	1579042	Breather AVS 2901 1/8" BSP	1
47	1731031	Shamban Da Excluder DA-17-0360-N90	1
48	1712127	Lock Nut M12	1
49	2380831	Pressure Screw	1
50	2380830	Thrust Plate	1
51	1710547	S.H.S.S. M6 x 6	1
52	1710078	S.H.C.S. M6 x 16	3



<i>Bridgeport</i>	
TITLE TRIPLE ACTION DRAWBAR ARRANGEMENT	
DRG No. 2409218	ISSUE No. 3

GA-7

22 TOOLS TOOLCHANGER (cont.)

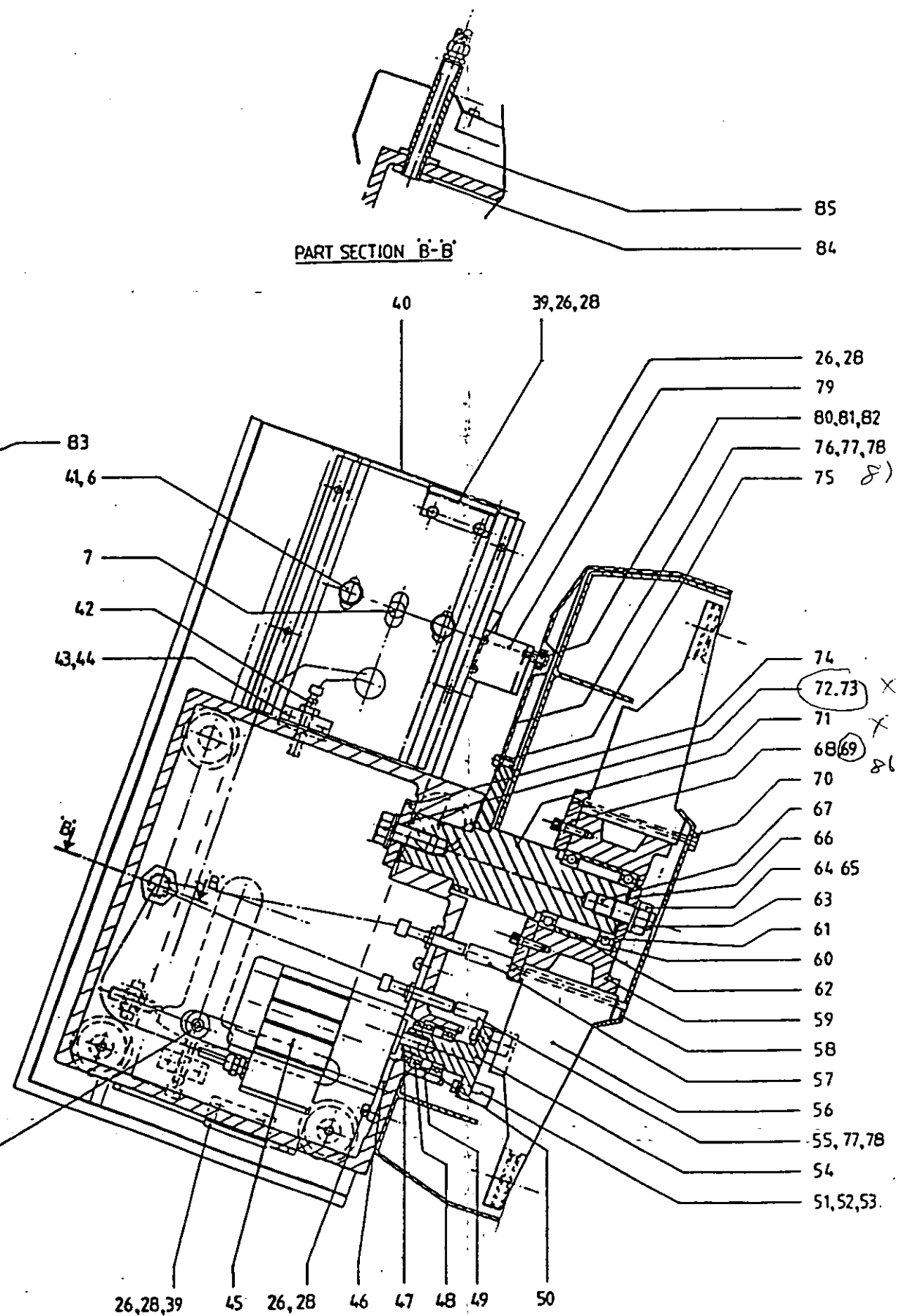
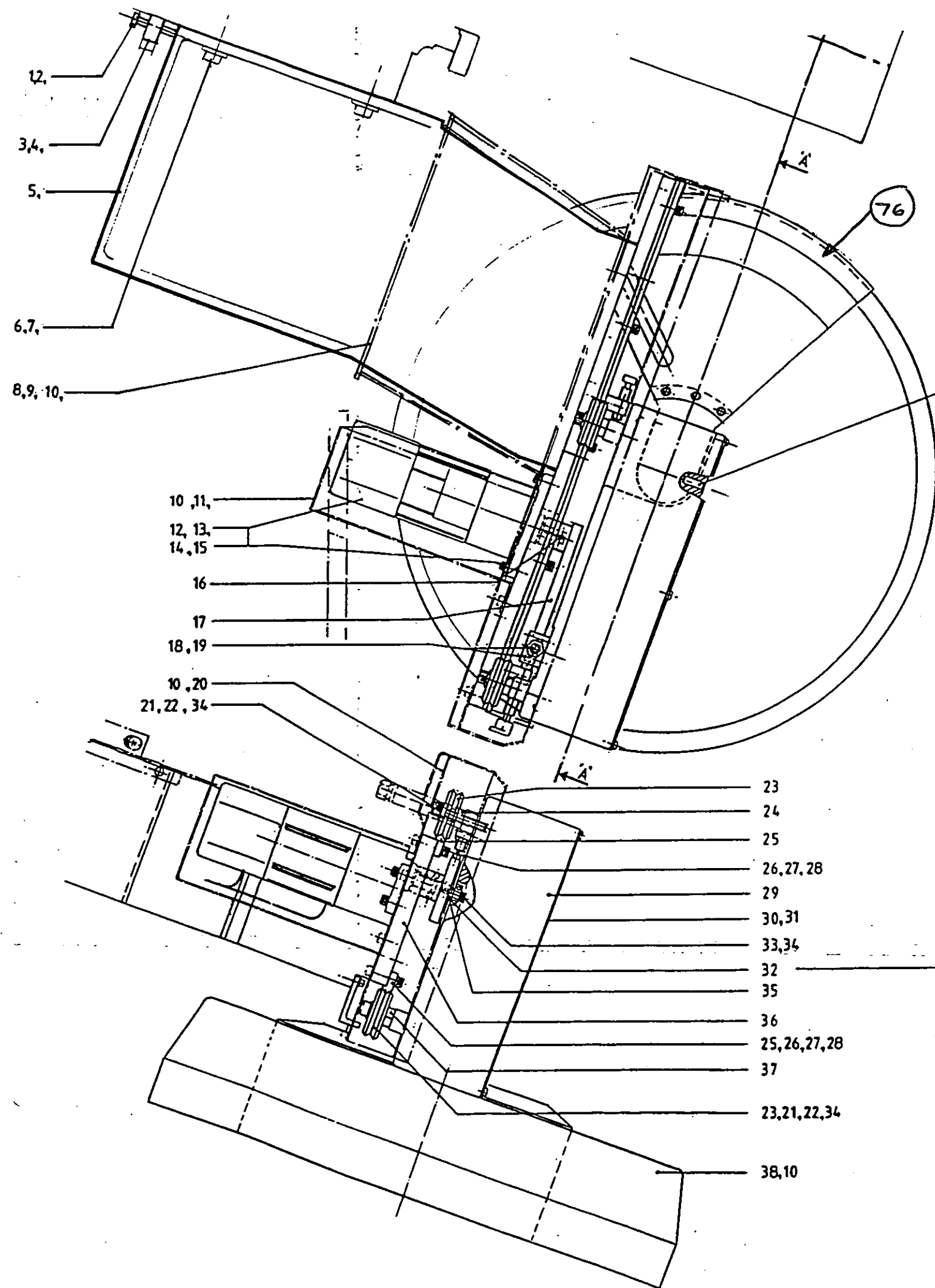
DRAWING No. 2409410

ITEM	PART NO.	DESCRIPTION	QTY
53	1712101	M4 Washer	2
54	2385637	Geneva Drive Shaft	1
55	2385669	Switch Target Segment	2
56	2385630	Carousel Segment	22
57	2385609	Switch Pin	1
58	2385656	Clamp Ring - Etched	1
59	2385639	Hub	1
60	1579505	Disc Spring 79.5 x 55.5 x .8	1
61	1720090	Ball Bearing 6010-2RS	2
62	2385624	Bearing Spacer - Outer	1
63	1710608	M20 x 45 Hex. Socket Set Screw	1
64	1712129	M20 Hex. Locknut	1
65	1712108	M20 Washer	1
66	2385642	Bearing Lockwasher	1
67	1710606	M20 x 20 Socket Set Screw	1
68	2385640	Hub Plate	1
69	1710104	M8 x 25 Socket Head Cap Screw	6
70	1710121	M8 x 130 Socket Cap Head Screw	5
71	2385638	Carousel Shaft	1
72	1711150	M20 x 40 Hex. Head Screw	1
73	1712097	M20 Spring Washer	1
74	2385643	Shaft Clamp Washer	1
75	2385652	Bearing Bush	1
76	2385646	Swing Door	1
77	1711521	M5 x 12 Socket Button Head Screw	3
78	1712085	M5 Lockwasher	3
79	2385654	Bracket	1
80	2385655	Bearing Spacer	1
81	1720391	Bearing 626ZZ	1
82	1711533	M6 x 20 Button Head Screw	1
83	1714128	Ø8 Parallel Dowel Pin 25 Long	1
84	1525815	M20 Locknut LNB/M20	2
85	2385617	Tube	1

22 TOOLS TOOLCHANGER

DRAWING No. 2409410

ITEM	PART NO.	DESCRIPTION	QTY
1	1711106	M12 x 50 Hex. Head Screw	1
2	1712127	M12 Hex. Locknut	1
3	2380259	Carriage Setting Block	1
4	1710132	M10 x 45 Socket Cap Head Screw	2
5	2405235	Fixed Slide	1
6	1710154	M12 x 40 Socket Cap Head Screw	4
7	1714145	16mm x 35mm Plain Dowel	2
8	2405284	Fixed Slide Cover	1
9	1712103	M6 Washer	2
10	1710077	M6 x 12 Socket Cap Head Screw	15
11	2385667	Motor Cover	1
12	1552776	Motor Gearbox with Elec. Brake	1
13	1710104	M8 x 25 Socket Cap Head Screw	4
14	1712094	M8 Spring Washer	4
15	1712104	M8 Washer	4
16	1710550	M6 x 12 Hex. Socket Set Screw	1
17	2385650	Carriage Drive Arm	1
18	1577693	Shock Absorber	1
19	1710033	M4 x 30 Socket Cap Head Screw	2
20	2385668	Toolchanger Cover	1
21	1710133	M10 x 50 Socket Head Cap Screw	4
22	1712105	M10 Washer	4
23	1721035	Guide Wheel	4
24	1721038	Fixed Bushing	2
25	2385648	Track	2
26	1710078	M6 x 16 Socket Cap Head Screw	20
27	1712093	6mm Spring Washer	10
28	1712103	6mm Washer	20
29	2385635	Toolchanger Carriage	1
30	2385647	Carriage Cover	1
31	1711520	M5 x 10 Socket Button Head Screw	8
32	1720080	Ball Bearing 6000-2RS	1
33	1711691	M8 x 16 Ø10 Shoulder Screw	1
34	1712084	Ø10mm Spring Washer	5
35	2385623	Bearing Spacer	1
36	2385633	Fixed Slide Plate	1
37	1721037	Adjustable Bushing	2
38	2385641	Carousel Cover	1
39	2385657	Bracket	2
40	2385673	Cover - Fixed Plate	1
41	1712106	M12 Washer	4
42	1550004	Proximity Switch	4
43	2385653	Mounting Block Switch	2
44	1710081	M6 x 40 Socket Head Cap Screw	4
45	1552770	Gear/Gearbox Index	1
46	2385636	Motor Mounting Plate	1
47	1765044	Self Locknut M25	1
48	1720085	Bearing 6005-2RS	2
49	2385644	Outer Bearing Spacer	1
50	8300548	Int. Circlip 7000-47	1
51	2385645	Geneva Drive Pin	2
52	1710029	M4 x 12 Socket Cap Head Screw	2



SECTION A-A

PART SECTION B-B

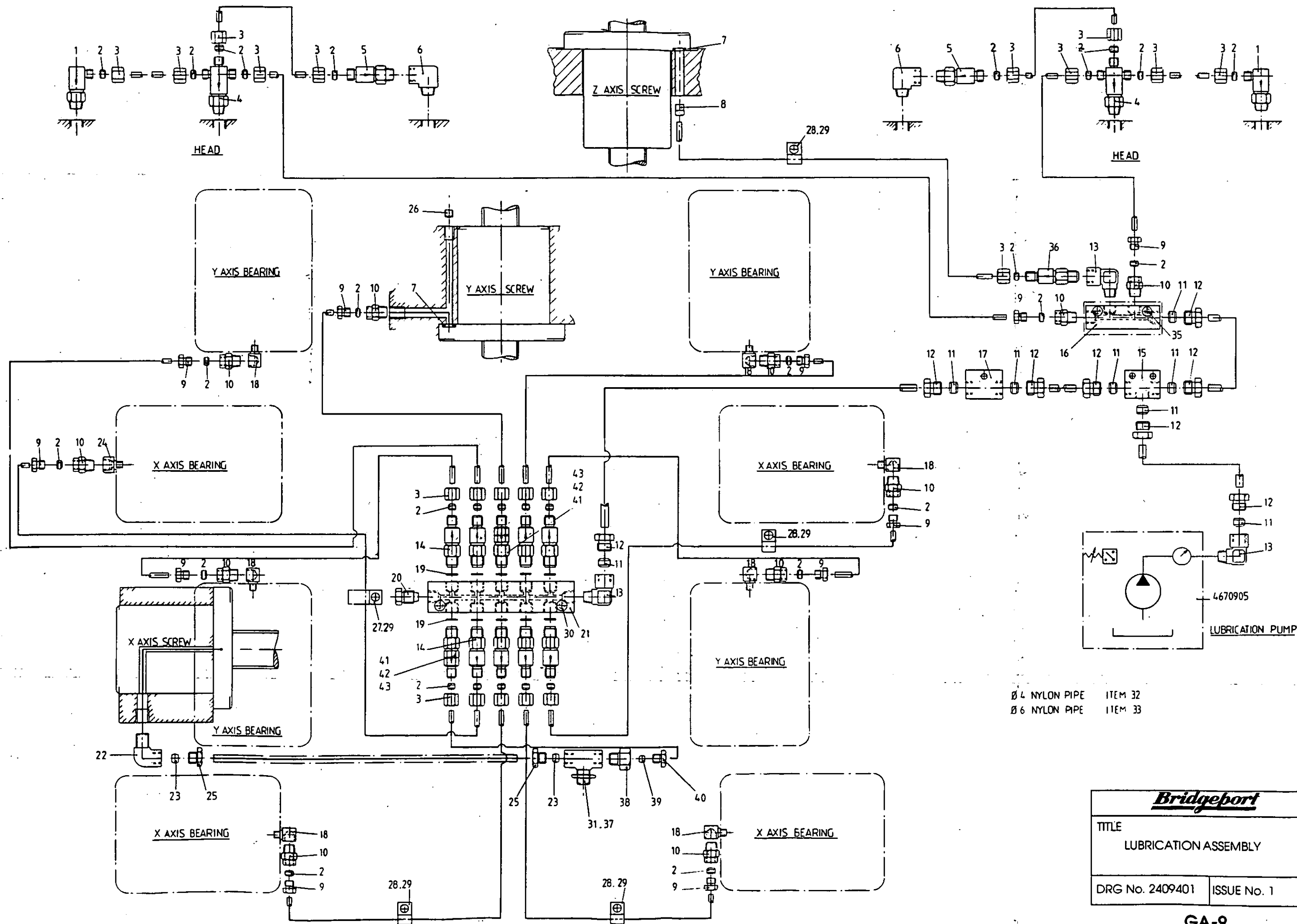
Bridgeport	
TITLE	
22 TOOLS TOOLCHANGER	
DRG No. 2409410	ISSUE No. 1

GA-8

LUBRICATION ASSEMBLY

DRAWING NO. 2409401

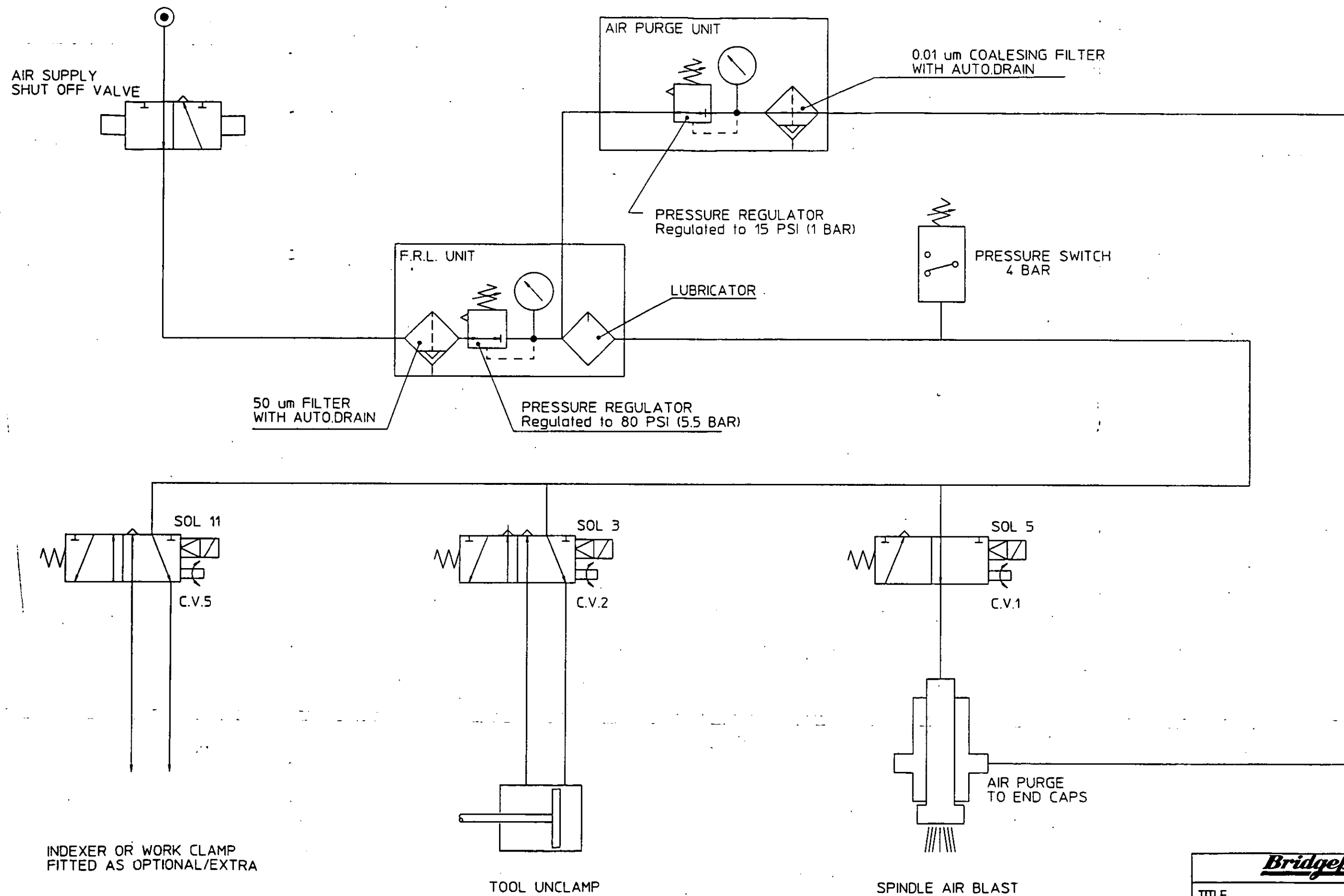
ITEM	PART NO.	DESCRIPTION	QTY
1	1734610	Dropsa 0006422 Valve	2
2	1734615	Dropsa 0093004 Cone	26
3	1734619	Dropsa 0091354 Nut	19
4	1734611	Dropsa 0201541 Valve	2
5	1734609	Dropsa 0006382 Valve	2
6	1575230	Elbow	2
7	1730306	'O' Ring	2
8	1575625	Insert 300-2580	1
9	1734643	Dropsa 0092004 Bush	10
10	1734634	Dropsa 0910005 St. Connector	10
11	1734616	Dropsa 0093006 Cone	8
12	1734641	Dropsa 0092052 Dip Fitting	8
13	1734629	Dropsa 0911051 Elbow	3
14	1734612	Dropsa 0006363 Valve	8
15	1734639	Dropsa 0118205 3-way Block	1
16	1734601	Dropsa 0006266 Junction	1
17	1734638	Dropsa 0118067 St. Block	1
18	1572649	St. Fitting	7
19	1734624	Dropsa 0125030 Gasket	8
20	1734623	Dropsa 0091002 Plug	1
21	1734605	Dropsa 0006189 Junction	1
22	1734474	Hobbs Elbow	1
23	1734206	Tubing Sleeve Ø6	2
24	1572656	Angle Fitting	1
25	1734212	Tubing Nut Ø6	2
26	1710547	M6 x 6 Socket Set Screw	1
27	1734322	Pipe Clip	1
28	1734317	Pipe Clip	5
29	1711520	M5 x 10 Button Head Screw	6
30	1710055	M5 x 25 S.H.C.S.	2
31	1734476	Tee Connector	1
32	1734645	Ø4 Nylon Pipe	-
33	1734646	Ø6 Nylon Pipe	-
34	1552131	Spiro Band Ø6	-
35	1710030	M4 x 16 S.H.C.S.	2
36	1734608	Dropsa 0006362 Valve	1
37	1734376	Lock Nut 1/8" BSP	1
38	1734240	Adaptor	1
39	1734201	Tubing Sleeve Ø4	1
40	1734211	Tubing Nut Ø4	1
41	1734614	Meter 6481 (0.5)	2
42	1734635	Adaptor 141695	2
43	1734627	Seal 97013	2



Ø 4 NYLON PIPE ITEM 32
 Ø 6 NYLON PIPE ITEM 33

Bridgeport	
TITLE LUBRICATION ASSEMBLY	
DRG No. 2409401	ISSUE No. 1

GA-9

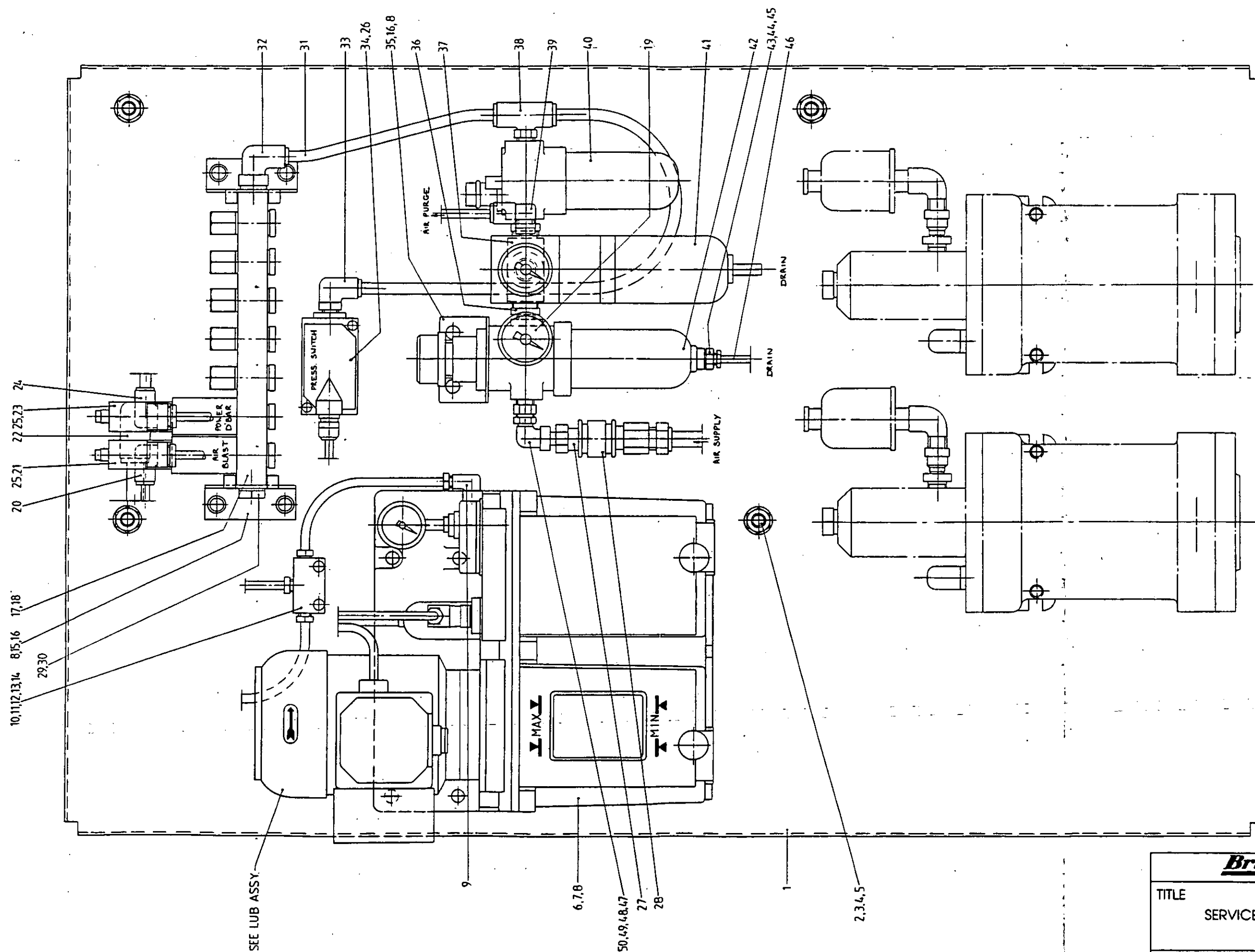


<i>Bridgeport</i>	
TITLE PNEUMATIC LAYOUT	
DRG No. 2389996	ISSUE No. 1

SERVICE PANEL

DRAWING NO. 2409406

ITEM	PART NO.	DESCRIPTION	QTY
1	2405011	Service Panel	1
2	1711761	Stud M10 x 110	4
3	1712105	Washer M10	4
4	1712155	Hex. Nut M10	4
5	2405049	Collar for Service Panel	4
6	4670904	Lubrication Pump	1
7	1710081	M6 x 30 S.H.C.S.	4
8	1712103	Washer Ø6	10
9	1734629	Elbow (Dropsa 0911051)	1
10	1734616	Cone (Dropsa 0093006)	4
11	1710055	M5 x 25 S.H.C.S.	2
12	1734646	Nylon Tube Ø6	1m
13	1734639	Anchor Tee (Dropsa 0118205)	1
14	1734641	Nut (Dropsa 0092052)	4
15	2400216	Bracket	2
16	1710077	M6 x 12 S.H.C.S.	6
17	1570071	Manifold Rail	1
18	1570077	Plug	5
19	1571574	Gauge	1
20	1571477	Elbow	1
21	1570065	Solenoid Valve	1
22	1571433	Elbow	1
23	1570066	Solenoid Valve (5-way)	1
24	1571428	Elbow	1
25	1570063	Solenoid Coil	2
26	1710034	M4 x 35 S.H.C.S.	2
27	1734381	Adaptor	1
28	8303879	Shut-off Valve	1
29	1730142	Plug	2
30	1705845	Seal	1
31	1510554	Nylon Tube Ø8	3m
32	1571430	Elbow	1
33	1571473	Elbow	1
34	1734391	Pressure Switch	1
35	1575269	Mounting Bracket	1
36	1571590	Adaptor	2
37	1571589	Tee	1
38	1571447	Swivel Tee	1
39	1571472	Swivel Elbow	1
40	1561771	Lubricator	1
41	4670929	Numatics Air Purge	1
42	1561774	Filter Regulator	1
43	1734211	Tube Nut Ø4	1
44	1734240	Adaptor 1/4" B.S.P. - Ø4	1
45	1575191	Sleeve Ø4	1
46	1510550	Nylon Tube Ø4	2m
47	1734246	Adaptor 1/4" B.S.P. x Ø8	1
48	1734272	Stem Elbow	1
49	1734213	Tube Nut Ø8	2
50	1734202	Sleeve Ø8	2



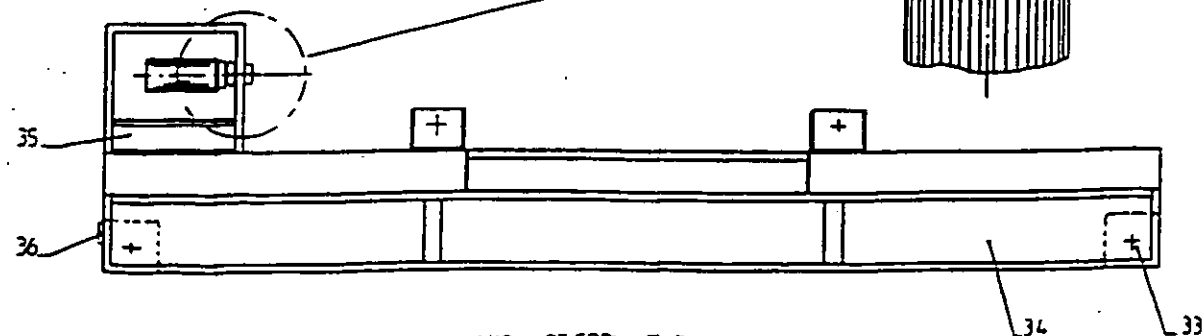
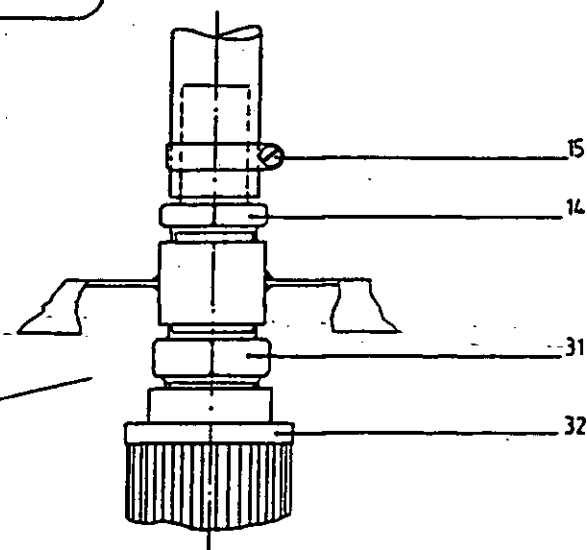
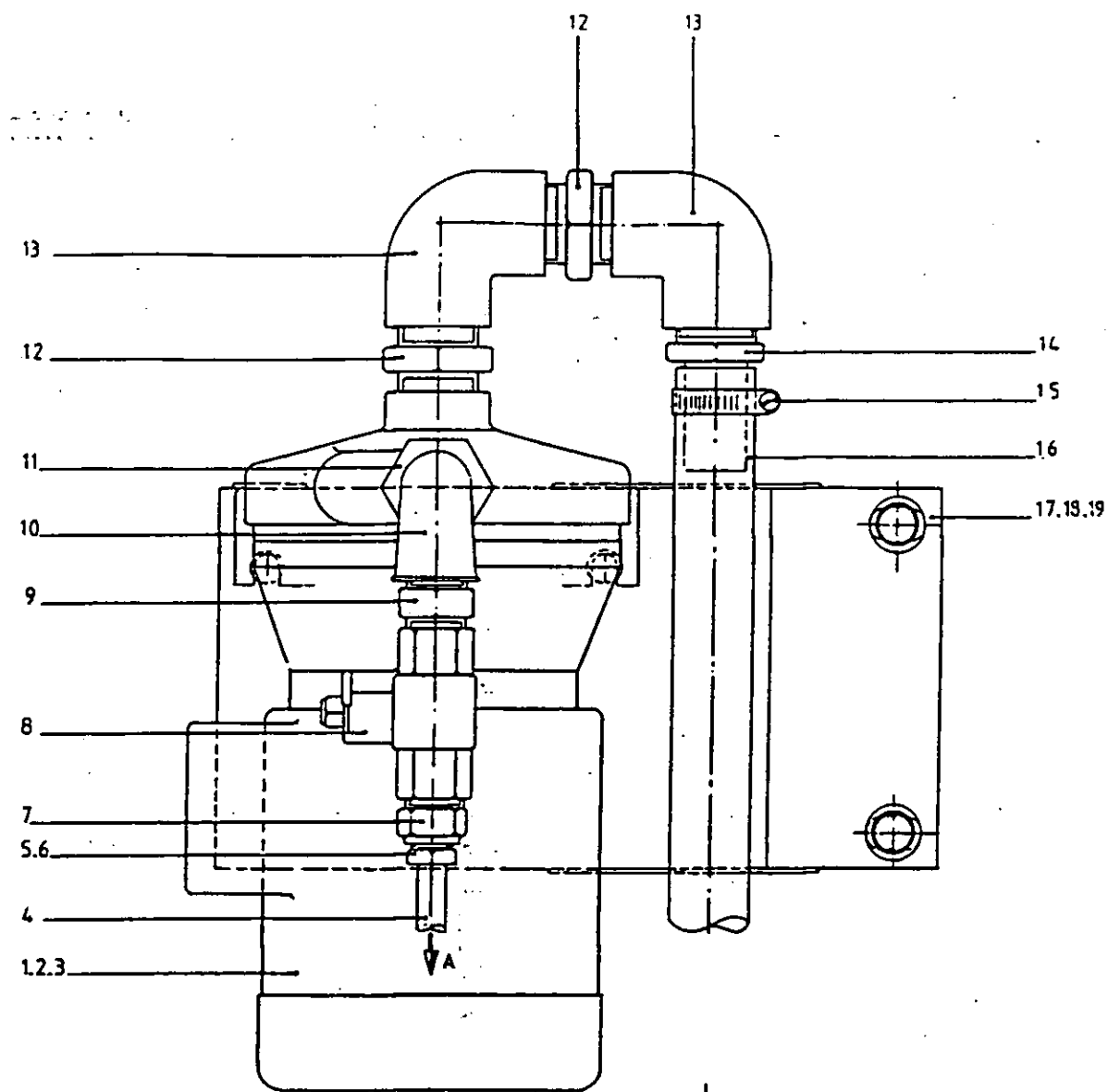
Bridgeport	
TITLE SERVICE PANEL	
DRG No. 2409406	ISSUE No. 1

GA-11

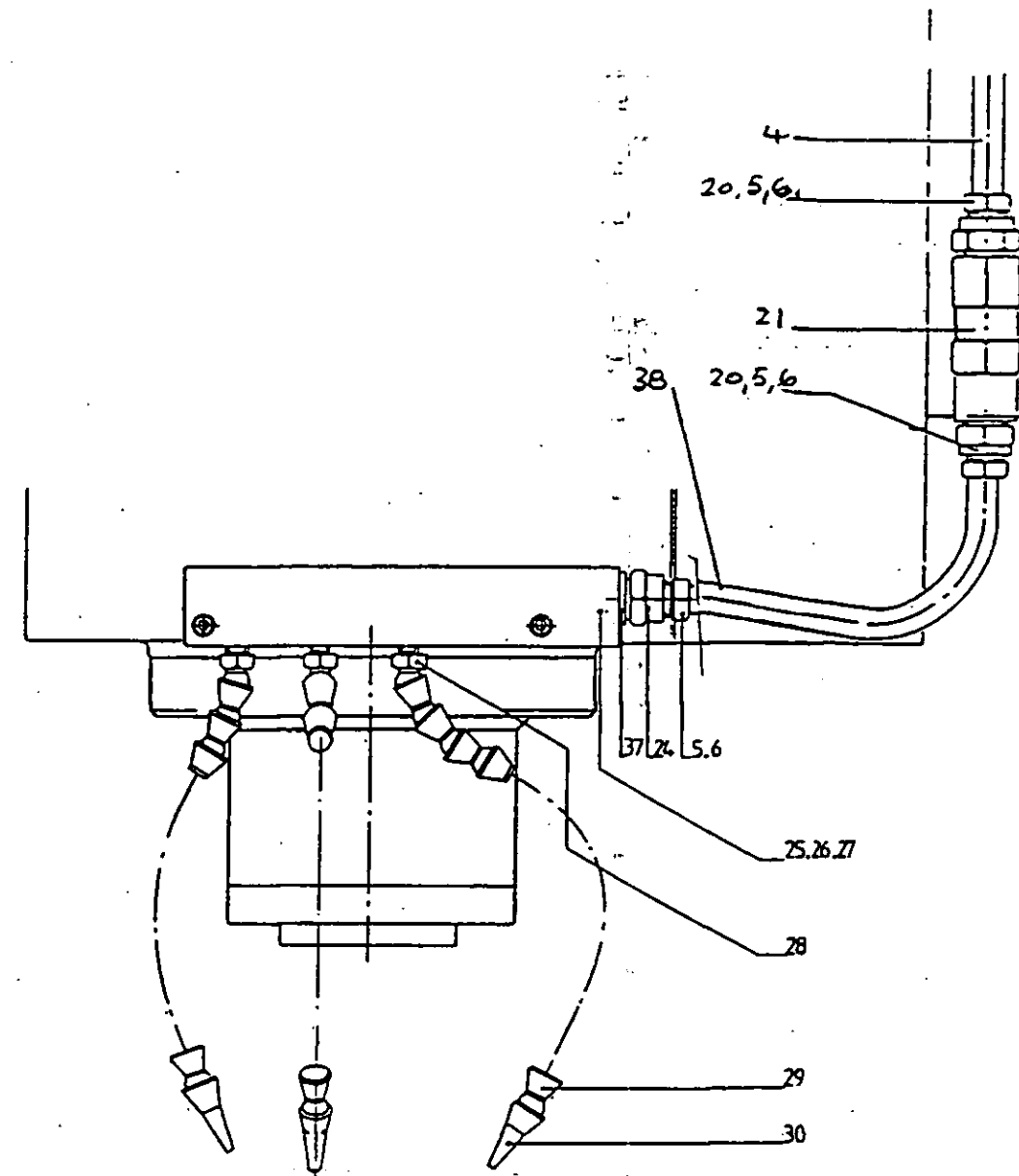
COOLANT ASSEMBLY

DRAWING NO. 2409364

ITEM	PART NO.	DESCRIPTION	QTY
1	1552728	MSP Coolant Pump	1
2	1710103	M8 x 20 S.H.C.S.	2
3	1712104	Ø8 Washer	2
4	1510556	Ø12 Nylon Tube	4m
5	1734204	Ø12 Tubing Sleeve	4
6	1734215	Ø12 Tubing Nut	4
7	1734411	Ø12 - 3/4 Straight Adaptor	1
8	1579886	3/4 Check Valve	1
9	1575359	3/4 - 3/4 Nipple	1
10	1575306	90° Elbow 3/4	1
11	1579950	1- 3/4 Reducer	1
12			
13	1575478	Elbow 1" B.S.P. Male/Female	1
14	1575817	Hose Adaptor MH 16-16	2
15	1579123	Jubilee Clip No. 1	2
16	1575816	CTR 25 Tube	1 length
17	2405077	Coolant Pump Bracket	1
18	1710151	M12 x 25 S.H.C.S.	2
19	1712078	Ø12 Washer	2
20	1734252	Ø12 - 3/8 Straight Adaptor	1
21	1570133	3/8 Non Return Valve	1
22			
23	2383660	Caution Label	1
24	1734261	Ø12 - 1/4 Straight Adaptor	1
25	2380949	Coolant Manifold	1
26	1710057	M5 x 35 S.H.C.S.	2
27	1712102	Ø5 Washer	2
28	1510207	1/8 Loc Line Connector	3
29	1510203	Loc Line 7" Hose	3
30	1510210	1/4 Loc Line Nozzle	3
31	1575479	1" - 1" Hex. Nipple	1
32	1579049	Suction Filter	1
33	1577144	Castor - Ross 9-61NY	4
34	2405100	Coolant Tank	1
35	2403832	Oil Boom	1
36	1579032	Sight Glass	1
37	1730101	1/4 Seal	1
38	2400852	Coolant Pipe	1



VIEW OF COOLANT TANK (1:5)

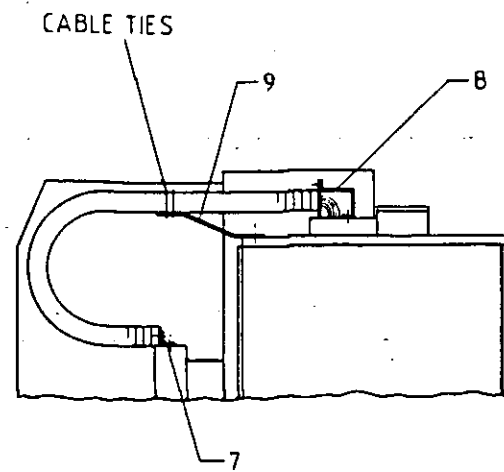
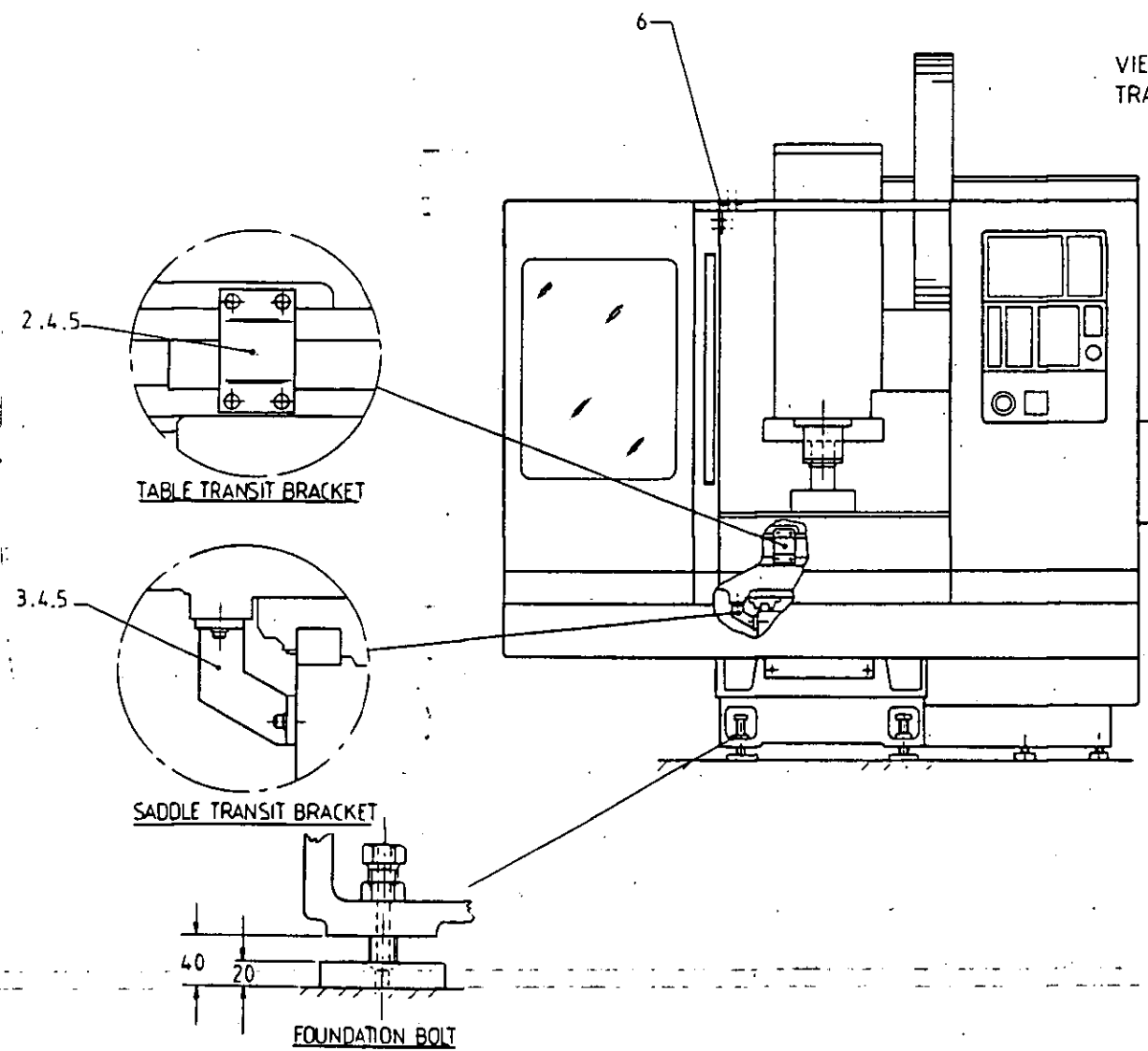


<i>Bridgeport</i>	
TITLE	
COOLANT ASSEMBLY	
DRG No. 2409364	ISSUE No. 1

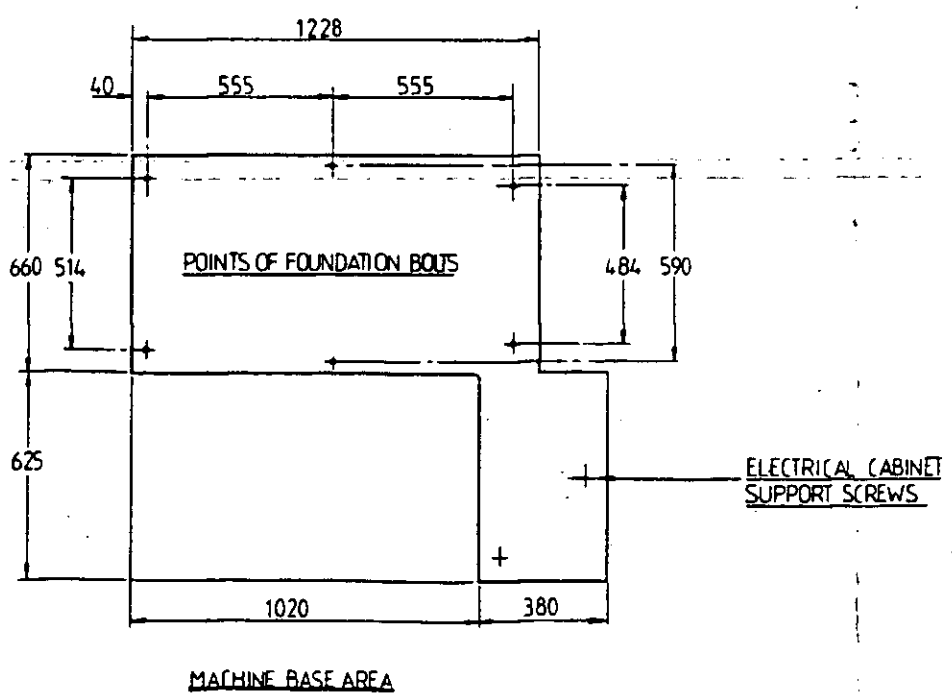
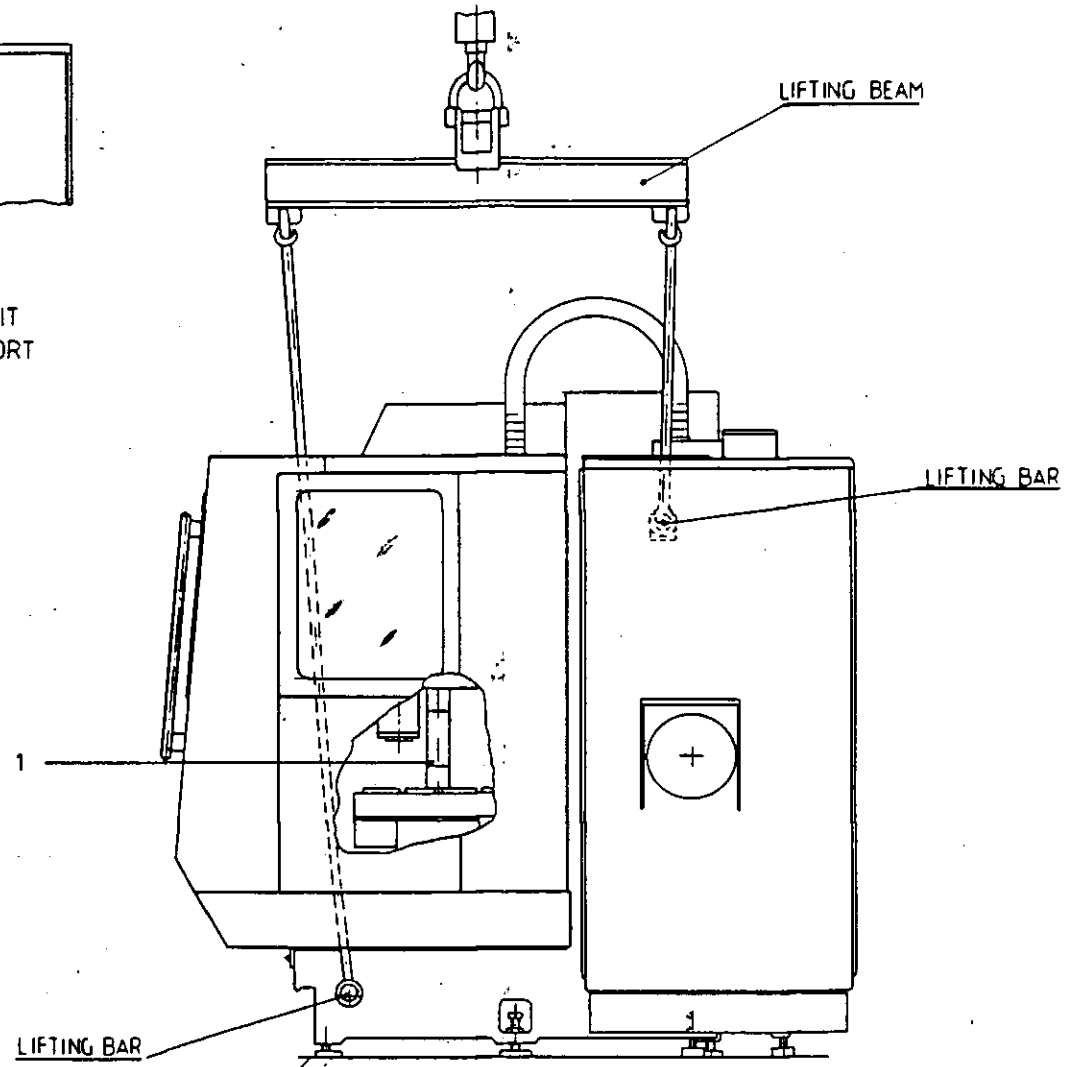
TRANSIT - FOUNDATION ASSEMBLY

DRAWING NO. 2409407

ITEM	PART NO.	DESCRIPTION	QTY
1	2400611	Wooden Support	1
2	2400659	Transit Bracket	1
3	2400065	Transit Bracket	1
4	1710078	M6 x 16 S.H.C.S.	12
5	1712103	M6 Plain Washer	14
6	2405110	Transit Bracket	1
7	2400106	Transit Bracket	2
8	2400107	Transit Bracket	1
9	2400108	Support Bracket	1



VIEW SHOWING FLEXIBLE CONDUIT
TRANSIT ARRANGEMENT FOR EXPORT
M/CS ONLY

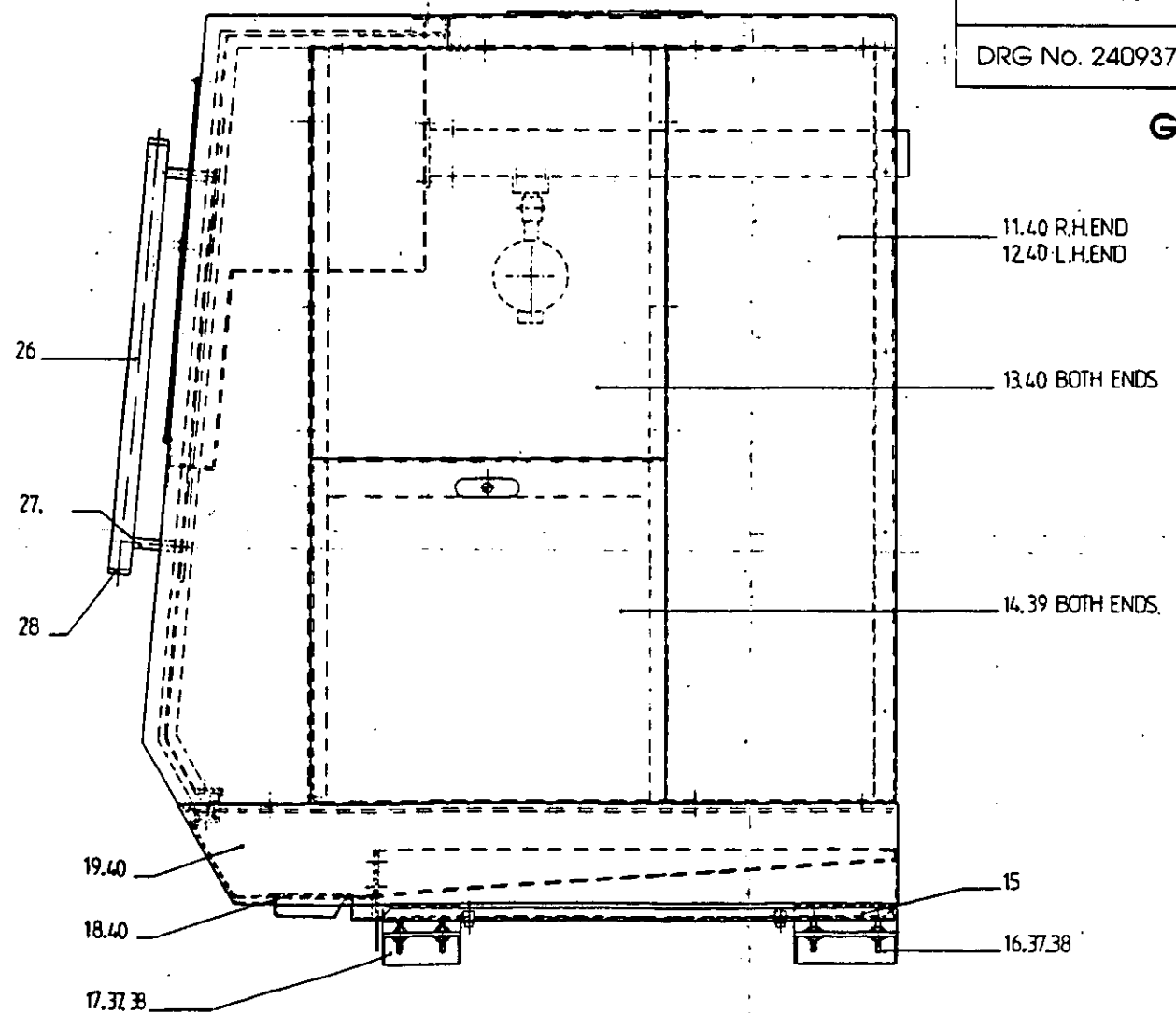
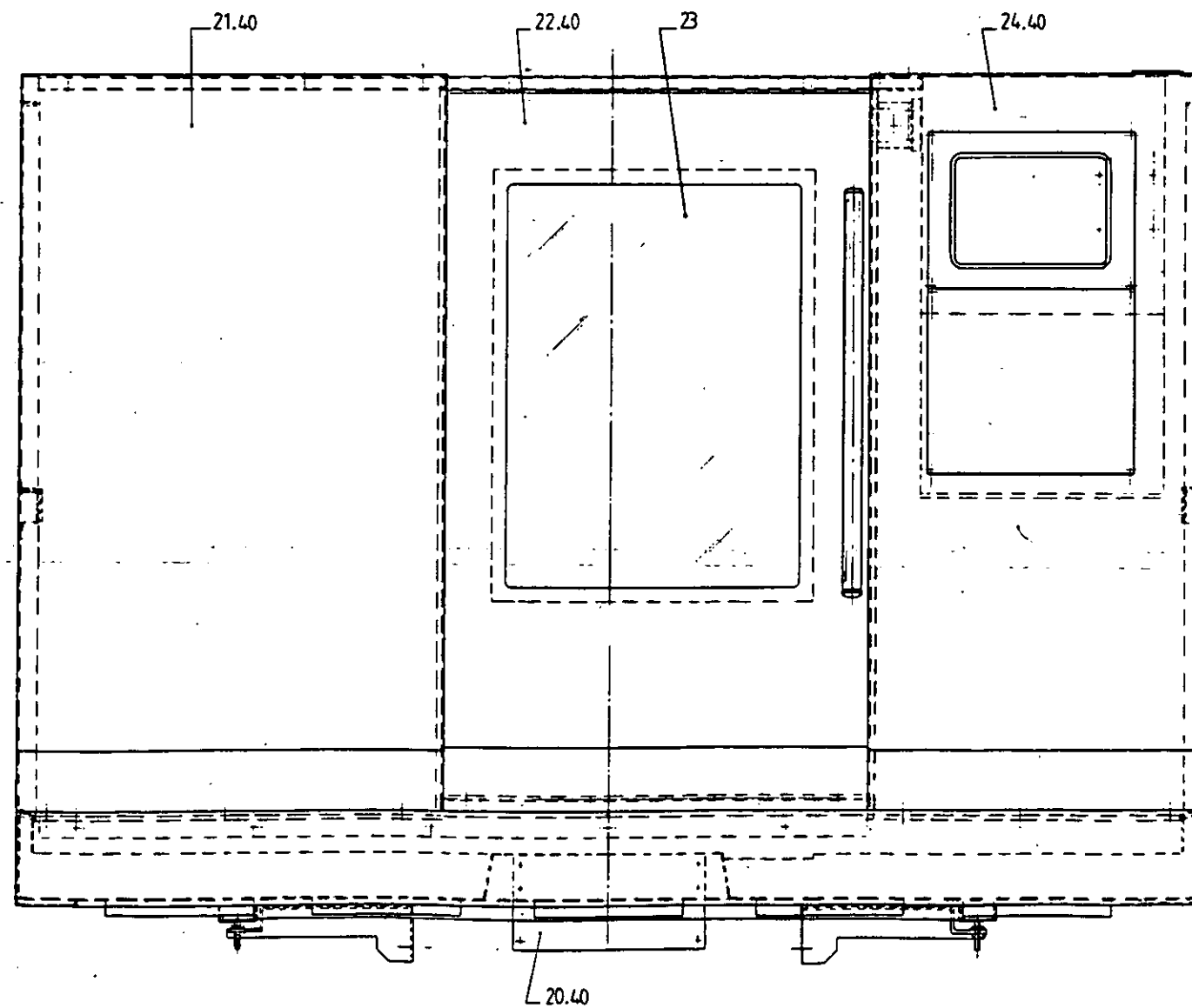
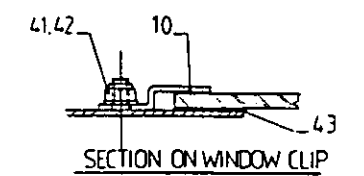
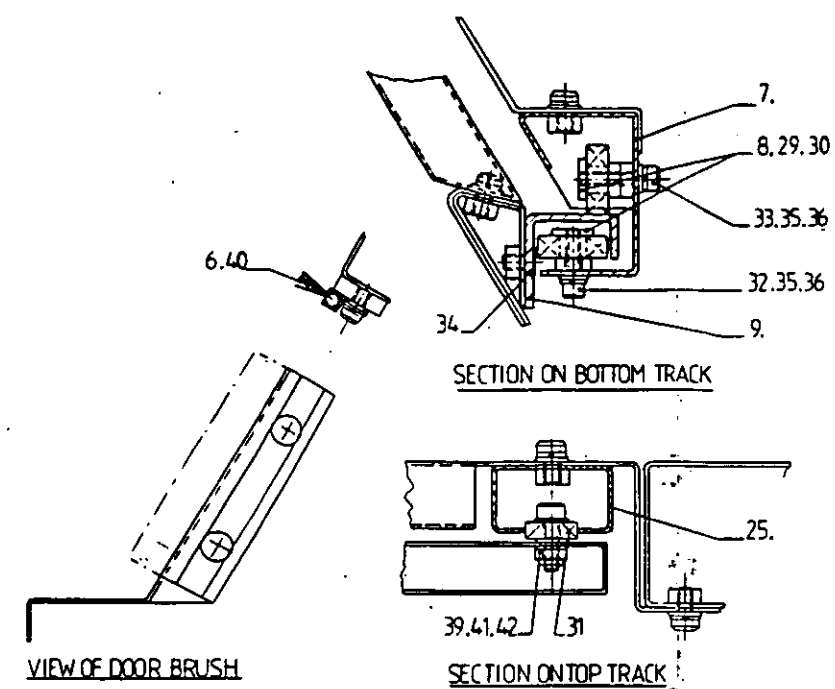
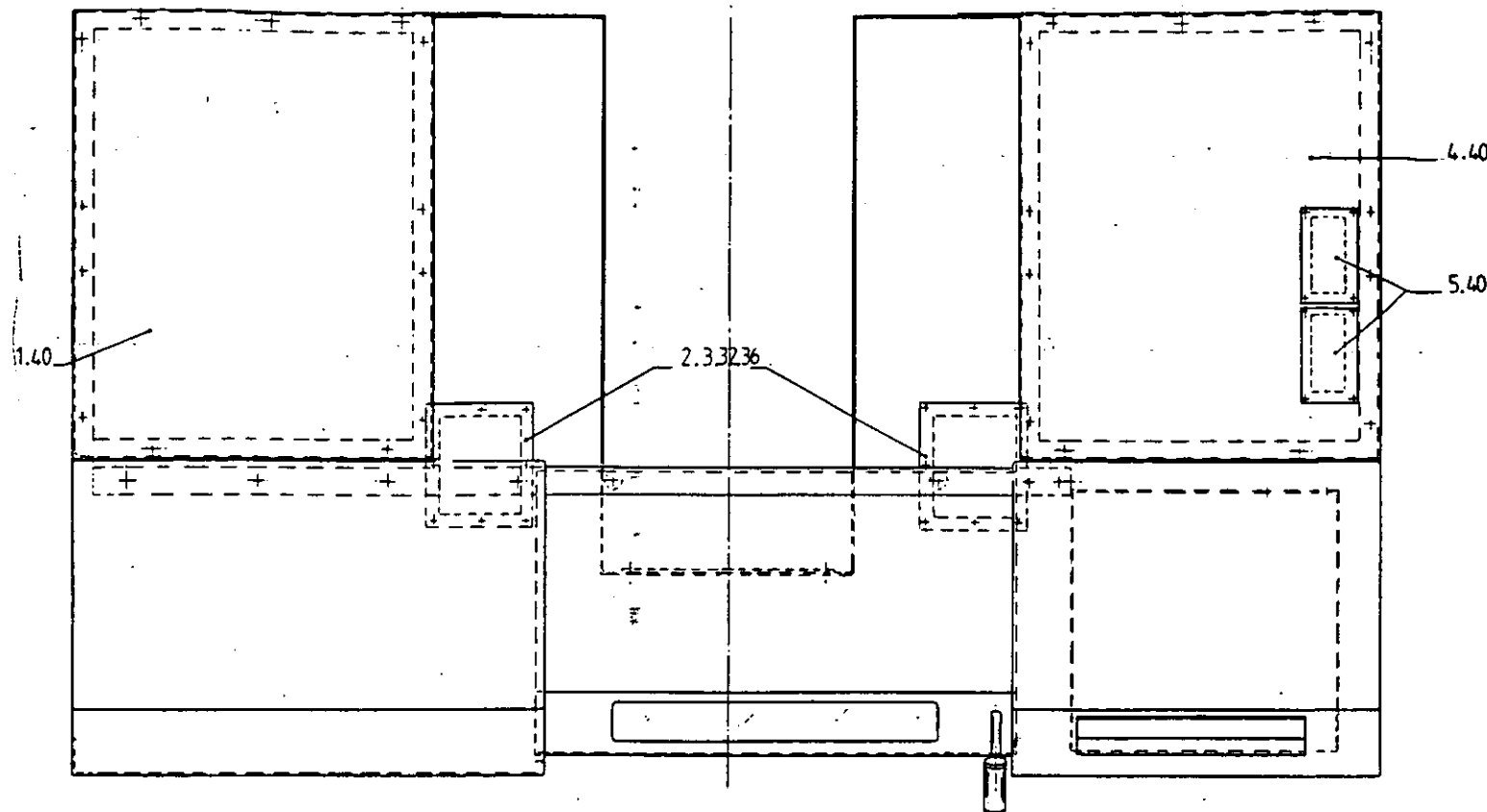


Bridgeport	
TITLE	
TRANSIT FOUNDATION ASSEMBLY	
DRG No. 2409407	ISSUE No. 1

PERIMETER GUARD SUB ASSEMBLY (HEID.)

DRAWING NO. 2409379

ITEM	PART NO.	DESCRIPTION	QTY
1	2405115	L.H. Top Cover	1
2	2405107	Cover (Base Tray Lifting Holes)	2
3	2403822	Gasket (Cover Plate)	2
4	2405117	R.H. Top Cover	1
5	2401478	Blanking Plate	2
6	2405109	Brush	1
7	2403889	Bottom Door Bracket	1
8	2401471	Locknut	4
9	2403890	Bottom Door Guide	1
10	2403897	Window Clip	16
11	2405119	R.H. Side End Panel	1
12	2405118	L.H. Side End Panel	1
13	2405114	Top Side Panel	2
14	2405116	Side Service Panel	2
15	2405124	Support Channel	2
16	2405123	Rear Base Bracket	2
17	2405111	Front Base Bracket	2
18	2405106	Drain Plate	1
19	2403879	Guard Base Tray	1
20	2405121	Clamp Plate	1
21	2403885	L.H. Front Panel	1
22	2403884	Door	1
23	2403871	Door Window	1
24	2403883	R.H. Front Panel	1
25	2405120	Top Door Track	1
26	2405188	Door Handle Bar	1
27	2405189	Handle Spacers	2
28	1575559	Hole Plug	2
29	1713011	Spacer	6
30	1720080	Bearing 6000 2RS	4
31	1720097	Bearing 606ZZ	2
32	1710054	M5 x 20 S.H.C.S.	18
33	1710055	M5 x 25 S.H.C.S.	2
34	1710327	M6 x 12 C'sk Socket Screw	5
35	1712085	M5 Lockwasher	6
36	1712102	M5 Washer	26
37	1712105	M10 Washer	32
38	1712155	M10 Hex. Nut	16
39	1710079	M6 x 20 S.C.H.	2
40	1712687	M6 x 12 Screw Posi Drive	70
41	1712103	M6 Washers	18
42	1712203	M6 Nut - Aero	18
43	1510053	Tape (Acrylic Foam)	2,6 m



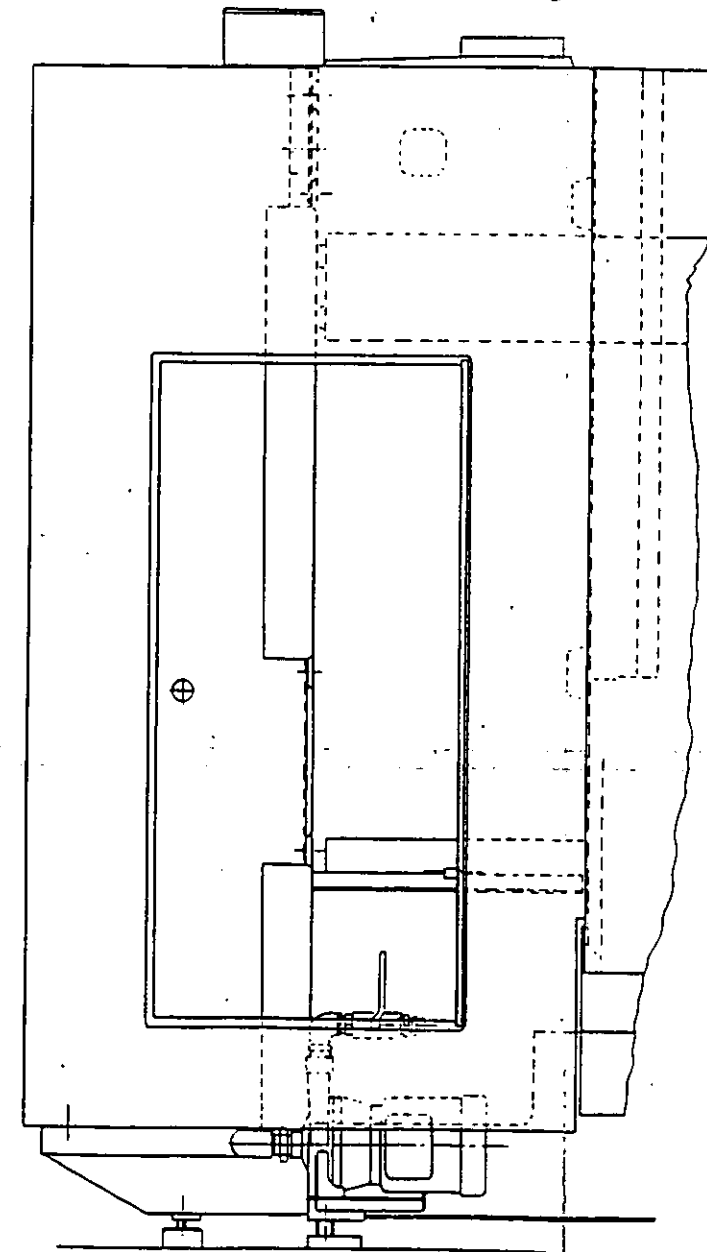
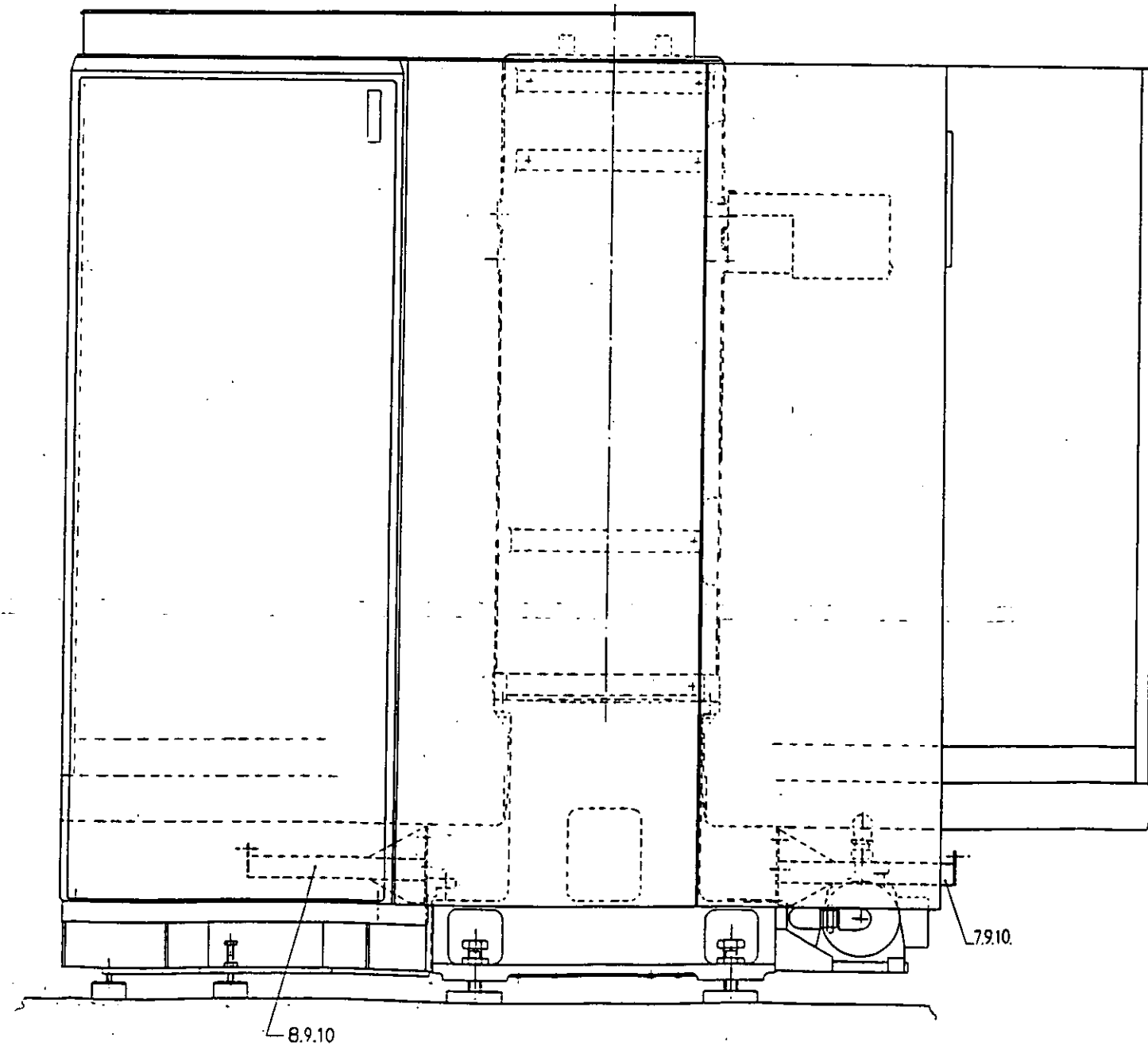
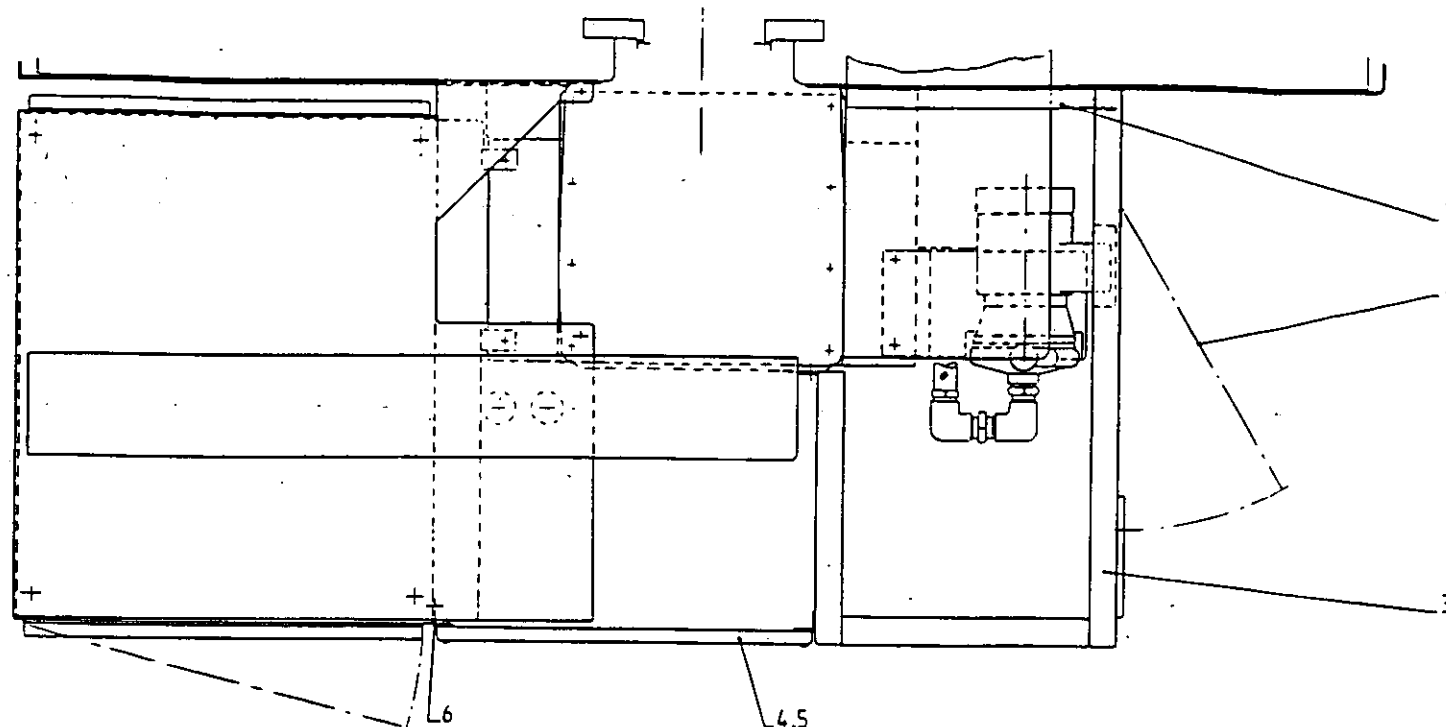
<i>Bridgeport</i>	
TITLE	
PERIMETER GUARD SUB ASSEMBLY (HEID.)	
DRG No. 2409379	ISSUE No. 1

GA-14

REAR CLADDING

DRAWING NO. 2409408

ITEM	PART NO.	DESCRIPTION	QTY
1	2405070	Front Panel	1
2	2400215	Service Door	1
3	2405069	Rear Cladding	1
4	2405068	Rear Panel	1
5	1575541	Plug	6
6	2384911	Bracket Rear Panel	1
7	2405206	L/H Base Bracket	1
8	2405207	R/H Base Bracket	1
9	1710127	M10 x 20 S.H.C.S.	16
10	1712084	Ø10 Lockwasher	16



<i>Bridgeport</i>	
TITLE	
REAR CLADDING	
DRG No. 2409408	ISSUE No. 1

GA-15

REAR PERIMETER GUARDS

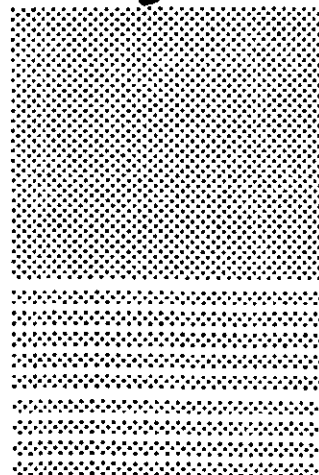
DRAWING NO. 2409409

ITEM	PART NO.	DESCRIPTION	QTY
1	2405236	L.H. Rear Column Panel	1
2	2403888	L.H. Rear Bottom Panel	1
3	2401334	Panel Brush	4
4	2400209	Wiper Brush - Screw Tube	1
5	2403891	Brush Holder	1
6	2403887	R.H. Rear Bottom Panel	1
7	2403886	R.H. Rear Column Panel	1
8	2403892	Plate (Rear Panel)	1
9	2403893	Gasket	1
10	2403823	Trunking Gasket	1
11	2405122	Trunking	1
12	1712092	M4 Spring Washer	8
13	1712151	M4 Hex. Nut	8
14	1711511	M4 x 10 S.H.B.S.	6
15	1710276	M4 x 10 S/K Screw C'sk	2
16	1712687	M6 x 12 Prest Pozl Screw	12
17	1711531	M6 x 12 S.H.B.S.	18
18	1712093	M6 Spring Washer	25
19	1712103	M6 Washer	25
20	1711532	M6 x 16 S.H.B.S.	4

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Bridgeport



Bridgeport reserve the right to amend the specification without notice.
Designed and produced by **Bridgeport** Product Dept, Leicester.