FAST TRACE

INTRODUCTION

The FAST TRACE provided the famliarity of a manual with power of a cnc.

The FAST TRACE is specifically designed for the first-time cnc user is entended to NARDINI the gap between the hand - wheel driven lathe and the full-featured CNC lathe ,with the easy of use of one , and the productivity of the other.

About this manual

This manual provides the necessary information to run the FAST TRACE . It provides information via illustrations , and through a complete step by step tutorial which actually produces a part.

For all the users ,It is recommended that this manual be read in the following order for maximum clarity.

Please , follow the security norms in it completely.

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1

HARDWARE

1.1 - Hardware

This section shows the hardware . See figure 1.1

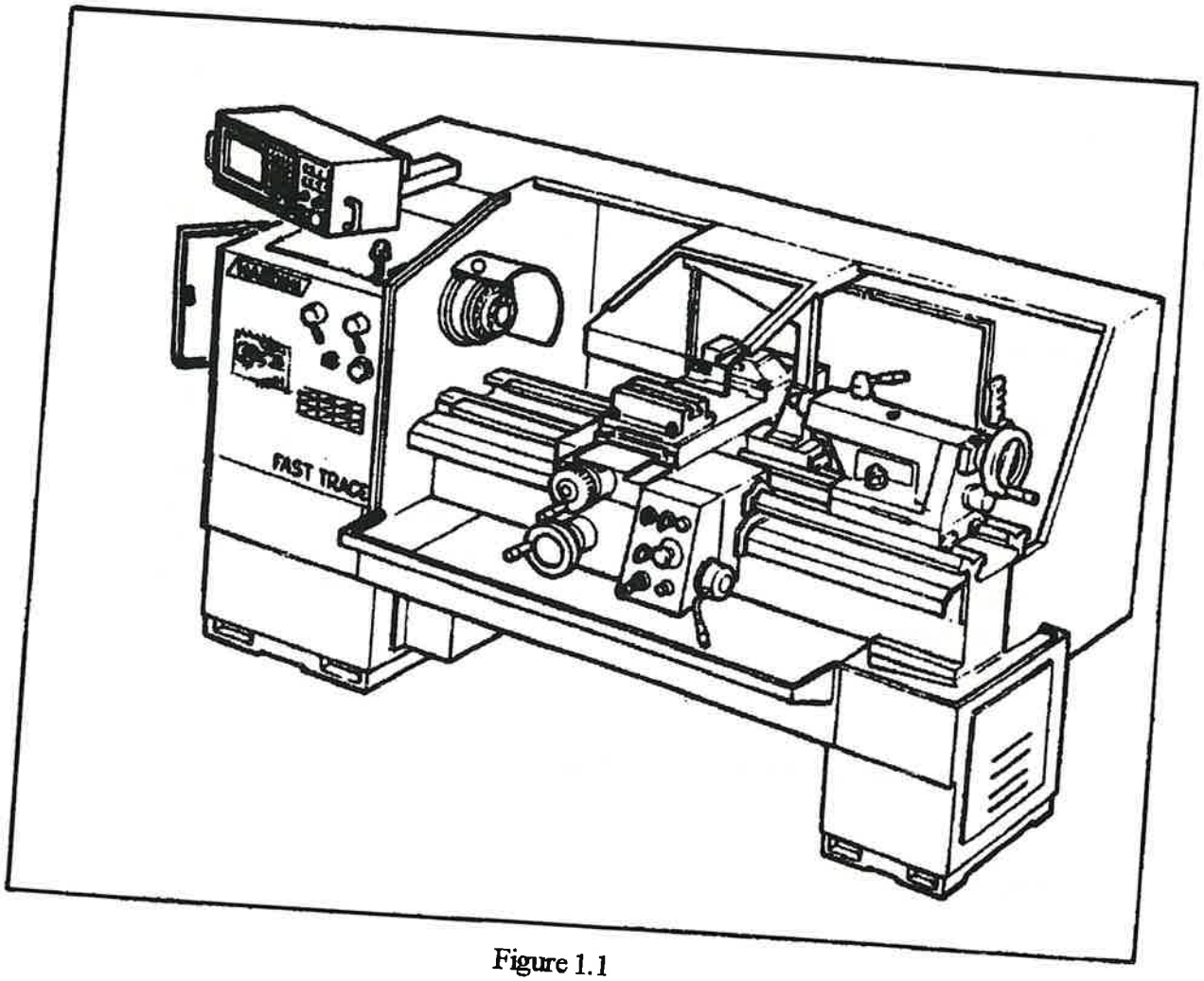


Figure 1.1

1.2 - Operator's Panel

The operator's panel is below and to the right side of the tool carriage .See figure 1.2.

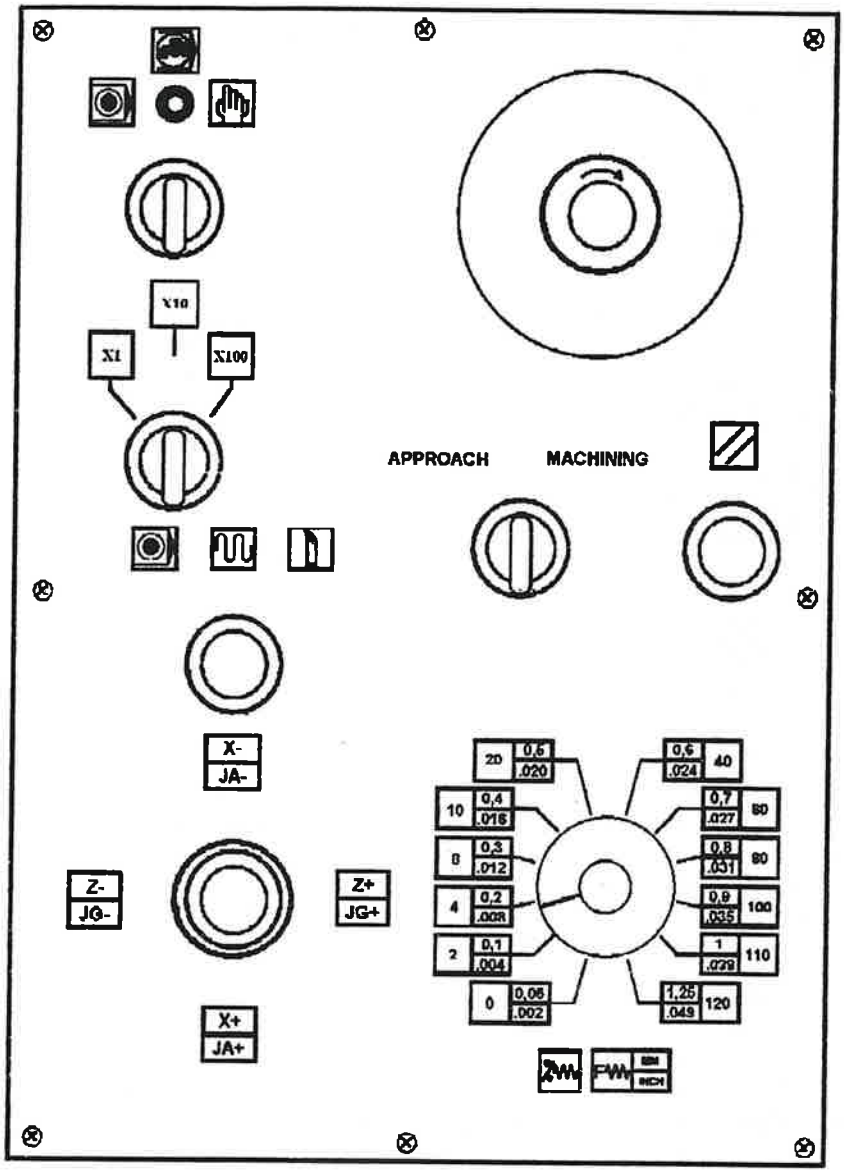
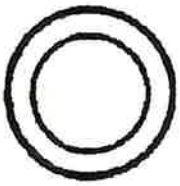
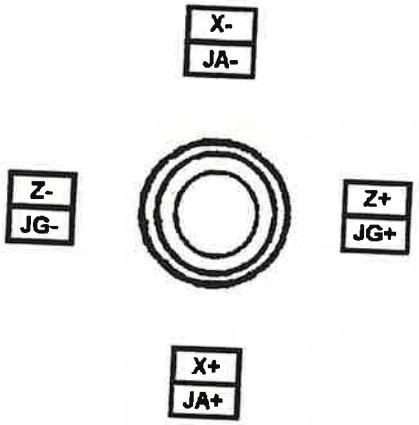


Figure -1.2

START pushbutton

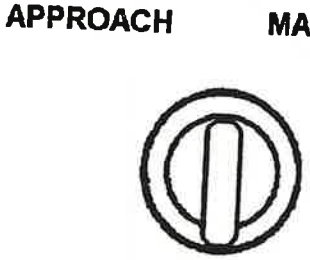
By selectingan an execution program the pressing this pushbutton automatic operation is started.





JOG handle

By pushing the jog handle , manual continuously feed is executed in the direction desired.

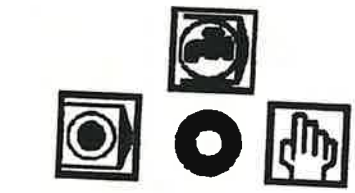


APROACH / MACHINING switch

Select the kind of the handwheel movement in machinning guidan ce mode , if the jog axis joystick on the central position (off).

RELEASE pushbutton

When the tool tries to move beyond the stroke in set by the machine tool limit switch , an over travel is displayed and the tool slows down and stops. In this case keeping the release pushbutton pressed , to press the reset key to reset the alarm. After moving the tool to the opposite direction of the over-travel alarm from the handwheel. After the tool get out limit switch , untie the release button.



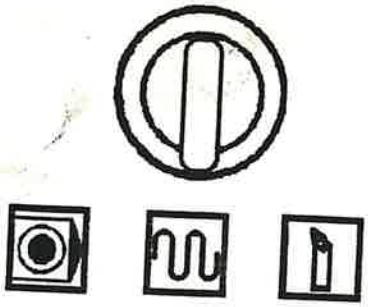
COOLANT switch

Moving the coolant switch to the right , the pump coolant turn on manually independent of the operating mode.

Moving the coolant switch to the left , to turn on the pump coolant is need programmed the auxiliary fucntion M08 in the part program.

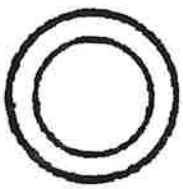
To turn off the coolant is need programmed the auxiliary function M09 in the part program or moving the coolant switch to the central position.

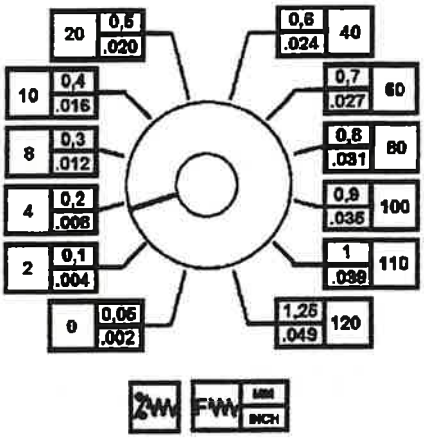
When the coolant switch is in the central position the pump coolant is turnnig off.



RAPID TRAVERSE pushbutton

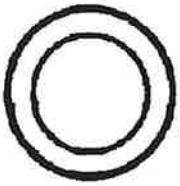
BY pressing this pushbutton the axis is feed rapidly.





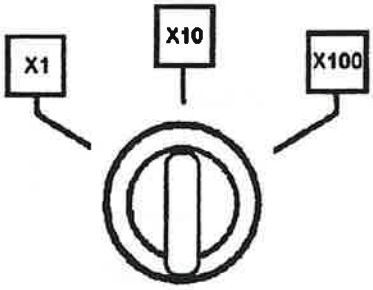
FEEDRATE OVERRIDE switch

With this dial , it is possible to override the feedrate designated by the program , or to override the feedrate when the axes are moving manually. An override of 0 to 120% can be applied.



TOOL CHANGE pushbutton

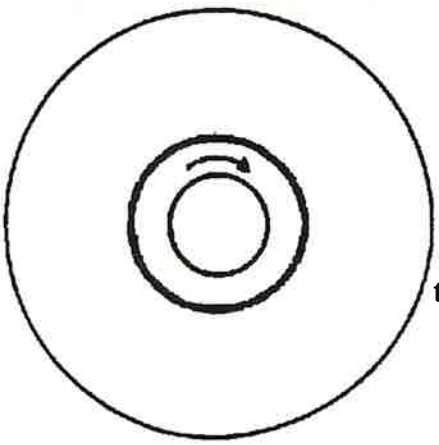
When there is tool change , the cnc stop the axes , a lamp in the pushbutton is flashing and change request will be displayed. After change the tool , press the tool change pushbutton to continue the program.



INCREMENTAL HANDWHELL switch

It is used to multiplie the movement of handwhells.

This switch multiplies the movement amount by x1 , x10 , x100.



EMERGENCY STOP button

By pressing this button , all movement is stopped.

The system comes to emergency stop. After the emergency stop the system must be put through the start - up procedure.

In normal operation the emergency stop is not used.

1.3 - Control Panel

The control panel is above from the door and to the right side of manual data input (MDI). See figure 1.3

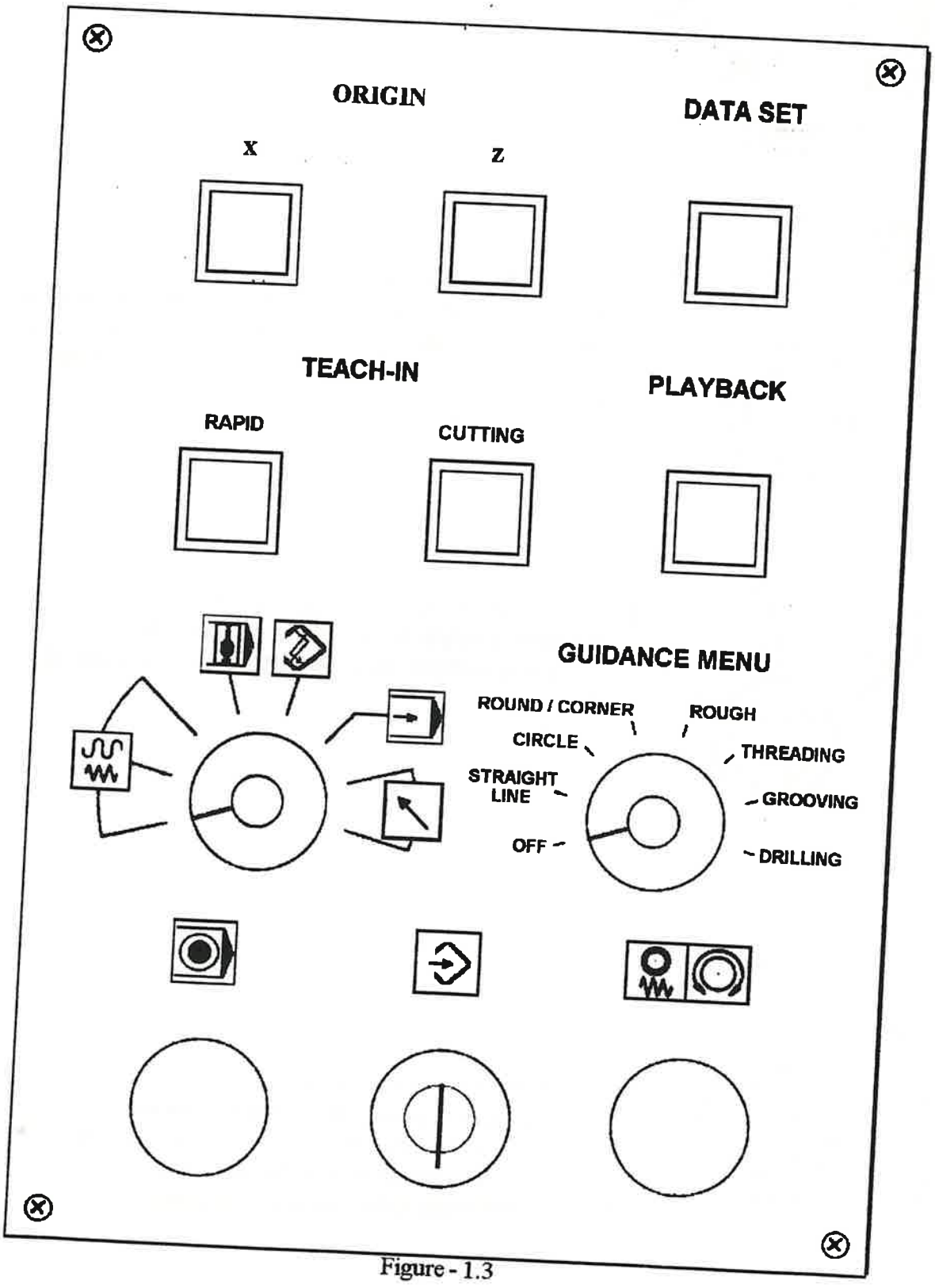
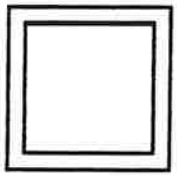


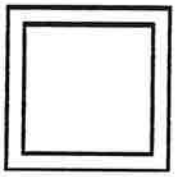
Figure - 1.3

PLAYBACK



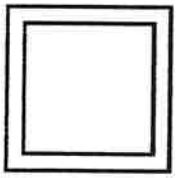
PLAYBACK pushbutton
Execute the program created by teach-in sequences (O7999).

DATA SET



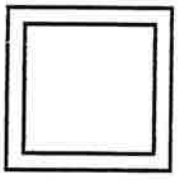
DATA SET pushbutton
Take the current position to the actual cursor position in each axis.

Z,X



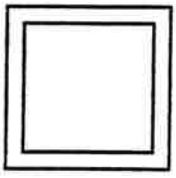
ORIGIN Z , X pushbutton
Set X or Z datum plane for machinning . Set to zero the actual position display (absolute position) for X or Z axis.

RAPID



TEACH - IN RAPID pushbutton
Tell to the cnc that the last motion or cycles is G0 (F0) when in teach - in state mode.

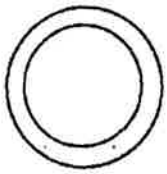
CUTTING

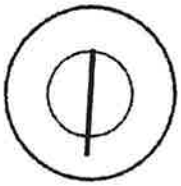


TEACH - IN CUTTING pushbutton
Tell to the cnc that the last motion or cycle is cutting feed . The cycles feed is determined into the cycles screens and the motions feed is determined by the cutting feed parameter on the machinning guidance parameter screen.

START pushbutton

By selecting an execution program the pressing this pushbutton automatic operation is started.

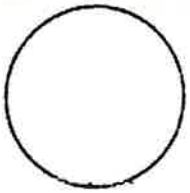




PROTECT key

By pushing this key is possible to creat or modific a program or change a parameter.

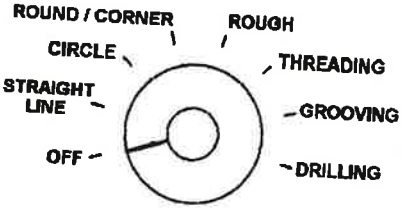
In this case do not push the protect key , a input data a flashing warnig message will be displayed on the data input line.



FEED HOLD pushbutton

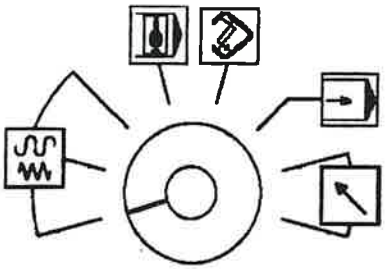
When this pushbutton is pressed during automatic operation , the axes decelerates then stops an they stay waiting to press the star pushbutton to continue the program.

GUIDANCE MENU



GUIDANCE MENU switch

Select whose machinning guidance cycle is used. These cycles will be described following in this manual , however consult Fanuc series 20-TA machinning guidance function operator's manual .



SELECT MODE switch
Change the operating modes.

1.4 - Handwheels

The LOGIC 220G has two handwheels at the front the machine, below the tool carriage . The handwheel to the left moves the tool carriage left and right along the Z axis, the upper handwheel to the right moves the tool in and out along the X axis.

These can be moved freely the tool only as no command is ative or when the program is running.

2

OPERATING SYSTEM

WARNING

Make sure that the door to the electrical cabinet is closed . If the door open , close the door , then will not create any problems.

Supply comppressed air when there is pneumatic chuck or pneumatic tailstock . After chuck the pressure of the compressed air , the pressure must be the value indicated in the table next steam gauge.

2.1 - Turnig on Power

On the door of the electrical cabinet , there is the main switch . It turn on power all the machine. Turn on the main switch to the ON position as show figure 2.1

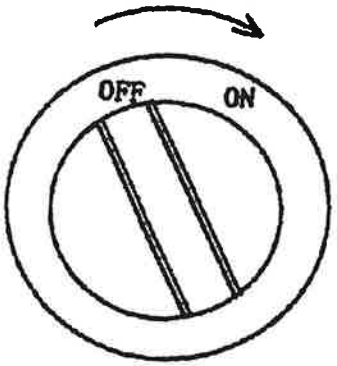


Figure -2.1

2.2 - Start - up

When the main switch is turned ON , turn the emergency stop button on the operato's panel and on the headstock to reset the emergency stop state. See figure 2.2 .

Press the reset key in the manual data input (MDI) . If there is no problem with it , the system is ready for operation.

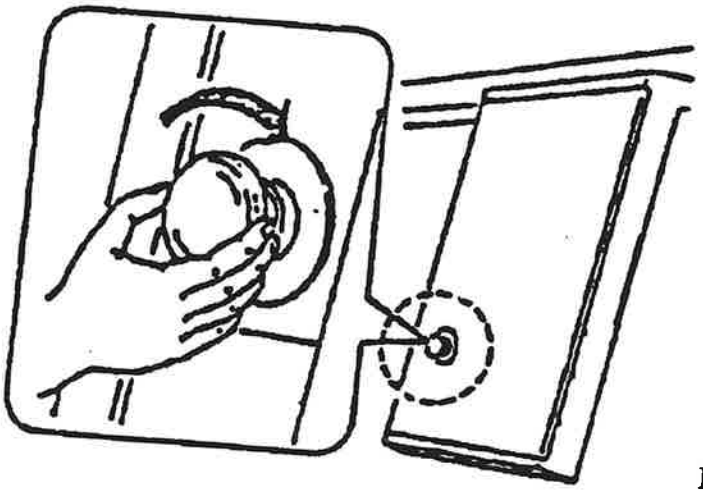


Figure 2.2

2.3 - Axes Movement

2.3.1- Manual Mode (Jog)

To move the axis in jog, select the direction pushing the axes handle and the axis will move the speed selected in the feedrate override to the side desired.See fgure 2.3.

Pressing the rapid travel pushbutton (see figure 2.3.1) the axis speed is increased.

To change the rate at which the carriage moves, select on the feedrate override switch the rate desired.See figure 2.3.2.

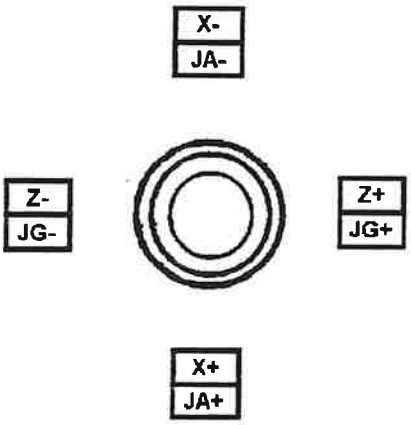


Figure -2.3

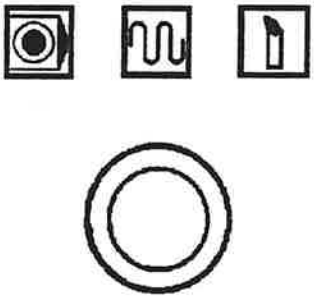


Figure - 2.3.1

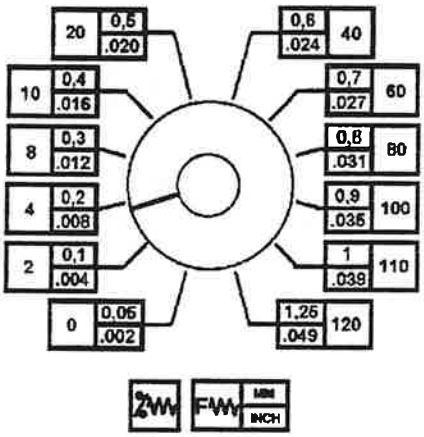


Figure - 2.3.2

2.3.2 - Handwheel

May move the axis with the handwheels easily, in jog mode turn the left handwheel clockwise or counter clockwise to move left and right along the Z axis.

To move X axis turn the upper handwhell clockwise or counter clockwise to move in and out along the X axis.

It is possible to change the increment of the handwheels selecting on the switch x1,x10,x100.See figure 2.3.4.

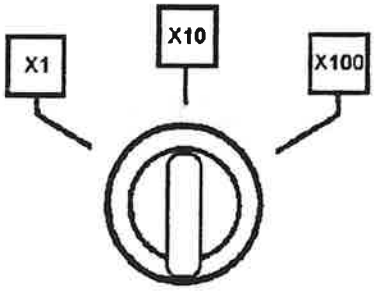


Figure - 2.3.4

2.3.3 - Reference Point Return (Home).

The machine needs to find a point reference to work. This process to find this point is called Home the axes.

To execute this process , in jog mode moving the carriage on the midle bed and move the tool support in the same direction of the center chuck , select in the operating mode switch on the control panel (see figure 2.3.3.1) the screen home is showed .

Pushing the axes handle (see figure 2.3.3.2) to direction of the headstock (Z-) and turn clockwise one step the feeedrate to enable the rate. After reached the Z axes , pushing the axes handle to direction X+.

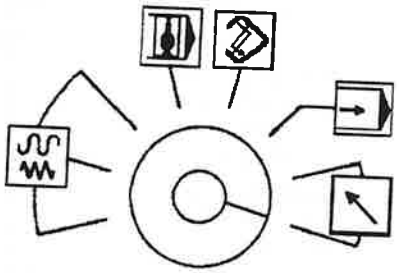


Figure 2.3.3.1

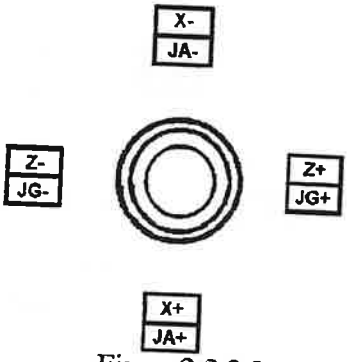


Figure 2.3.3.2

When the home process finish , the home screen changes to jog screen.

Note : During the home process do not stop the rate by feedrate override turning counter clockwise , because the home process may not get finish. If there is any problem and need to stop the rate , pressing the reset key and begin the process again.

2.3.4 - Automatic Mode

May to move the axis in automatic mode by MDI mode or Memory mode (MEM).

In MDI screen (see figure 2.3.4.1) selected by operating mode switch , insert the G codes necessary and the X or Z coordinate.

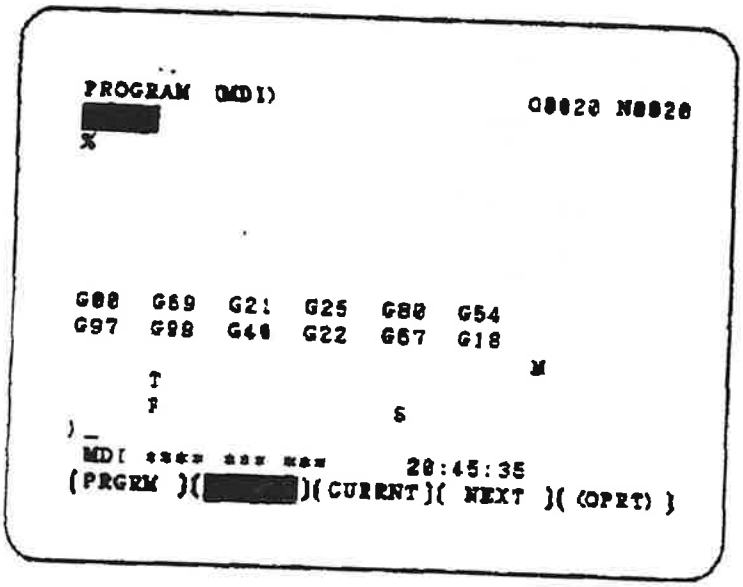


Figure - 2.3.4.1

Example :

- Type < G > < 9 > < 4 >key
- Type < G > < 0 > < 1 > key
- Type < Z > (the position desired)
- Type < F > (the feedrate desired)
- Type < EOB > key and type insert key .
- Pressing the start pushbutton on the control panel and the axis will move to position desired.

In Memory MEM mode is need to make the program in EDIT mode simililary in MDI mode . After made the program en EDIT mode , change to MEM mode and pressing the start pushbutton and the axis will move to position desired.

Note 1: G94 - per minute feed
G01 - linear interpolation
F - feedrate

Note 2 : After type the coordinate (whole number) , type the point key.
Example : Z 500.

* For more details see Fanuc series 20-TA operator's manual and Fanuc series 20-TA programming manual.

2.4 - Spindle Speed

2.4.1 - Manual Mode

To the right of the operator's panel is the spindle handle . See figure 2.4.1.1.

This handle is used to start , stop , and reverse the spindle. To start the spindle , move the handle to the left and up (the chuck will run clockwise).To stop the spindle , move the handle to the left and down.

The spindle is stopped immediately. To reverse the spindle (counter clockwise direction) move the handle to the left and downward.

There is a switch on the headstock that has two settings, Low and High speed. It changes the speed of the spindle according to the gearing and spindle speed handle on the tables shows on the front of the machine. See figure 2.4.1.2.

After change the gearing on the headstock repeat the second paragraf . If the speed is in low range turn the switch (see figure 2.4.1.3) on the headstock and the speed will double.

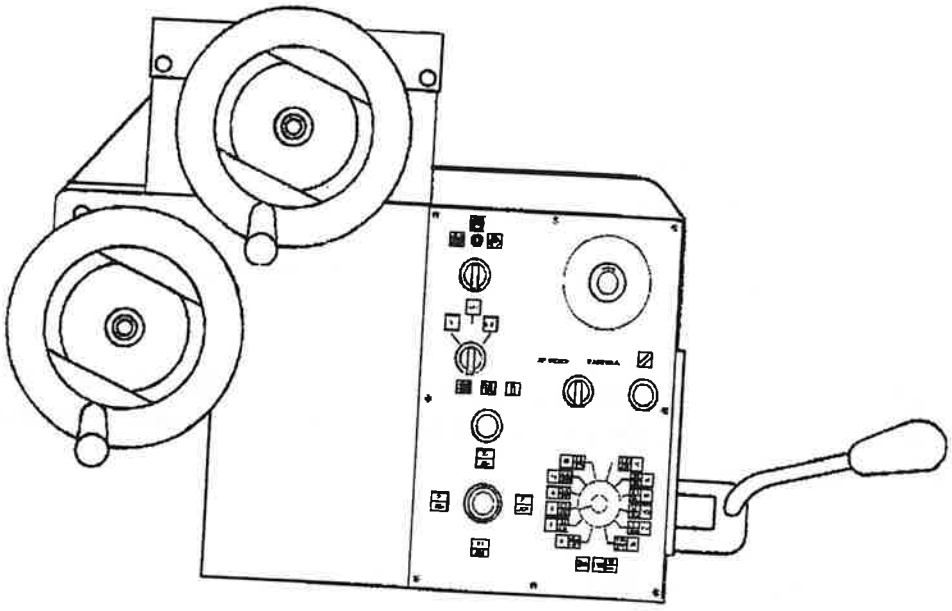


Figure - 2.4.1.1

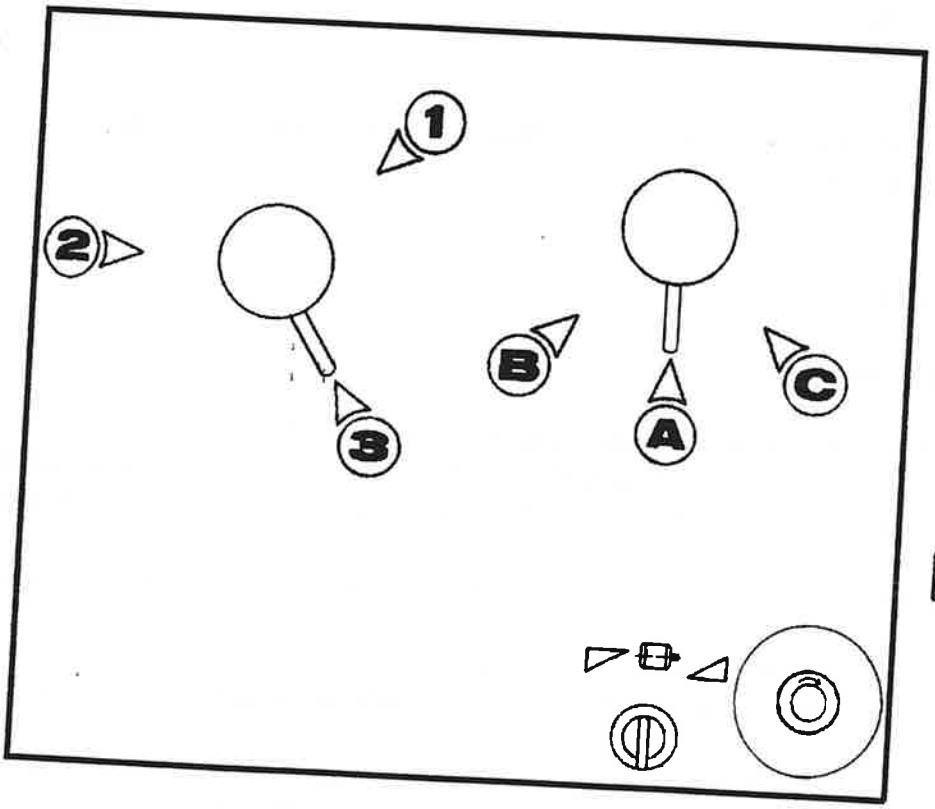


Figure - 2.4.1.2

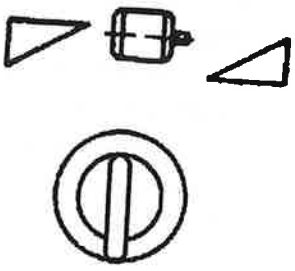


Figure - 2.4.1.3

2.4.2 - Automatic Mode

Can run the spindle in automatic mode by MDI mode or Memory mode (MEM).
In MDI screen selected by operating mode switch .
- First selected desired by spindle speed handle of the headstock .
- Insert speed selected in MDI screen or EDIT screen .

- Change to the speed desired by spindle speed handle on the headstock.
- Type < S > key and the selected on the table on the headstock.
- Type < M > < 3 > keys or type < M > < 4 >keys.
- Type < EOB >key .
- Type < INSERT > key
- By pressing the start pushbutton on the control panel , the spindle will run .

In memory mode MEM is need to make the program in EDIT mode similary mode in MDI mode. After made the program in EDIT mode , change to memory mode and pressing the start pushbutton the spindle will run in the direction selected.

* For more details , see Fanuc series 20-TA operator's manual and Fanuc series 20-TA programming manual.

2.5 - Operating Modes

2.5.1 - JOG

Using operator's panel switch , pushbutton or the manual handle , the tool can be moved along each axis or can be run the spindle clockwise or counter clockwise using the spindle handle.

The tool can be moved in the following ways:

— The tool moves continuously while jog handle remain pressed.

— Manual handle feed.

By rotating the manual handwheel , the tool moves by the distance corresponding to the degree of handle rotation.

2.5.2 - MDI

After the program is entered , as an command group , from the mdi keyboard, the machine can run according to the program .

This operation is called MDI operation as show figure 2.5.2.

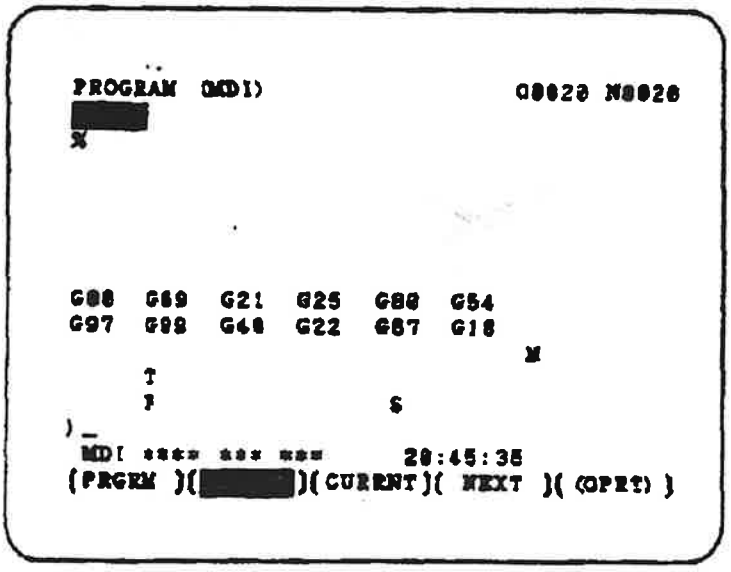


Figure 2.5.2

2.5.3 - EDIT

In EDIT mode(see figure 2.5.3) is created the program used for the workpiece desired from the CRT/MDI panel. Ordinarily , one program is prepared for one workpiece.

When there is other workpiece use the EDIT mode to creat the program .

After a created program is one registered in memory , it can be conected or modified from the CRT/MDI panel.

Example: Modified the word T15 to M15

— Search the word T15

— Type key <M> <1> <5>key

— Press the <ALTER>key

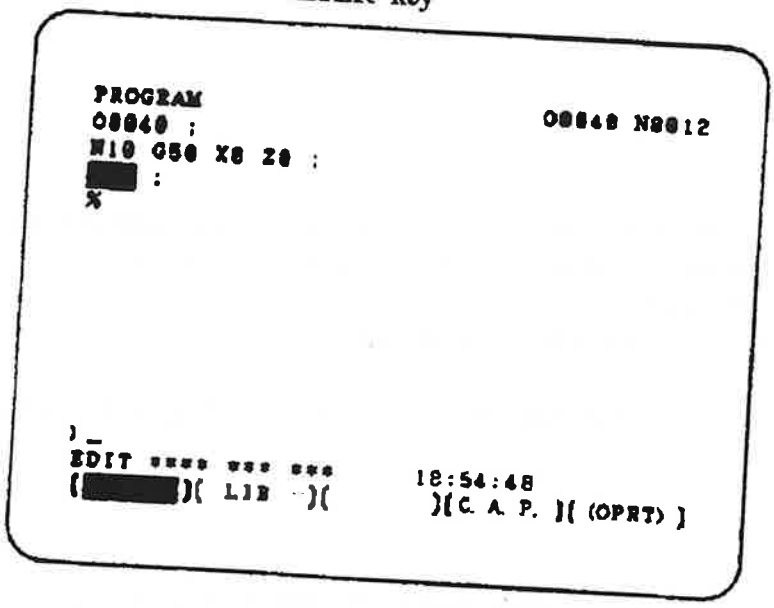


Figure 2.5.3

Note : To creat or modifie a program is need to push the protect key on the control panel. (See figure 2.5.3.1).

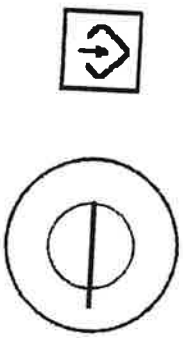


Figure 2.5.3.1

In the case do not push the protect key , incorret input data or the wrong operation a flashing warning message will be displayed on the data input line.

The warnig messages are showing below:

Warning message	Content
— FORMAT ERROR	The format is incorret
— WRITE PROTECT	Key input in invalid because of memory protect signal or the parameter is not write enabled.
— DATA IS OUT OF RANGE	The value searched exceeds the permitted range.
— TOO MANY DIGITS	The input value exceeds the pemitted number of digits.
— WRONG MODE	Parameter input is not possible in any mode other than MDI mode.
— EDIT REJECTED	It is not possible to edit in current CNC status.

2.5.4 - MEMORY (MEM)

After the program is once registered in memory of cnc , the machine can be run according to the program instructions.This operation is called memory operation .(See figure 2.5.4).

To run the instructions is need press the start pushbutton on the control panel.

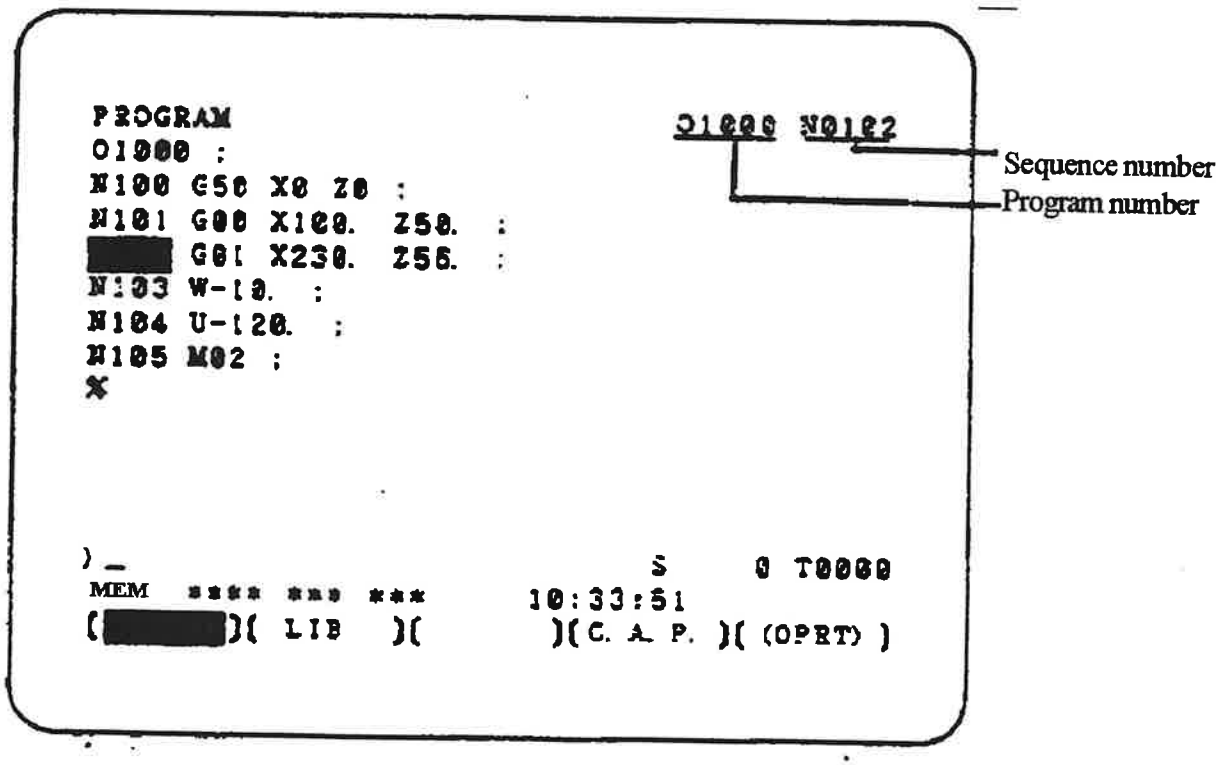


Figure 2.5.4

2.5.5 - HOME

The machine needs to find a point reference to work.This process to find this point is called HOME mode.

To execute this process,in jog mode move the carriage on the middle bed and move the move the tools support in the same direction of the center chuck. Select in the operating mode switch on the control panel the screen HOME and press the start pushbutton (see figure 2.5.5.1) and turn clockwise one step the feedrate override to enable the rate.See figure 2.5.5.2.

When the home process finish , the HOME screen changes to JOG screen.

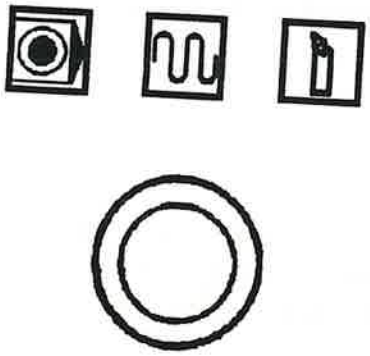


Figure 2.5.5.1

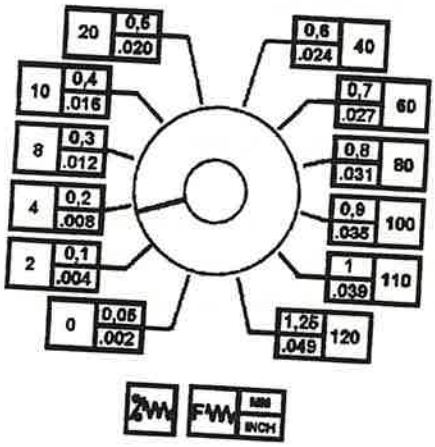


Figure 2.5.5.2

2.6.2 - Output

The following procedures to output data from cnc to the floppy cassete ,card or pc.

A program can be output from the cnc to the cassete or card by the follwing operation in the EDIT mode.

— Output of one program .
— Type <O>key .
— Type program number.
— Type <PUNCH>key.
— Type <EXEC>key.

— Output for all programs.
— Type <O> key.
— Type - 9999.
— Type <PUNCH>key.
— Type <EXEC>key.

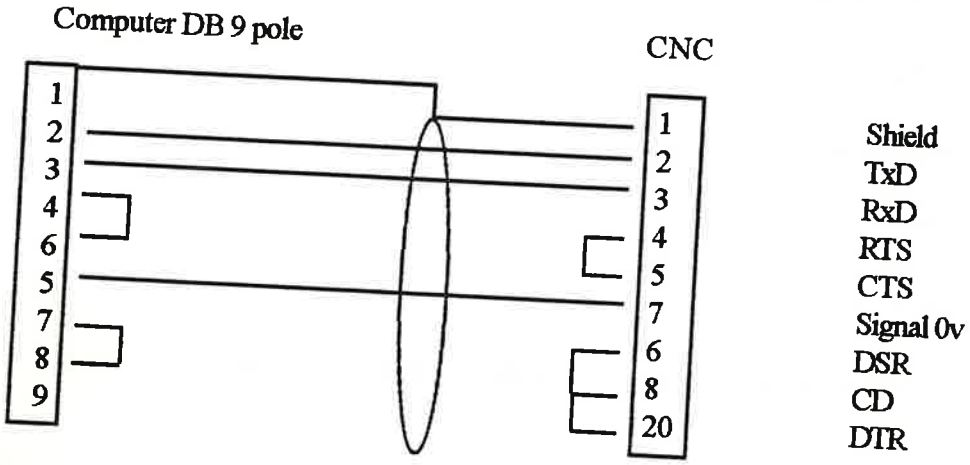
* For more details see Fanuc series 20 - TA operator's manual and Fanuc series 20-TA programming manual

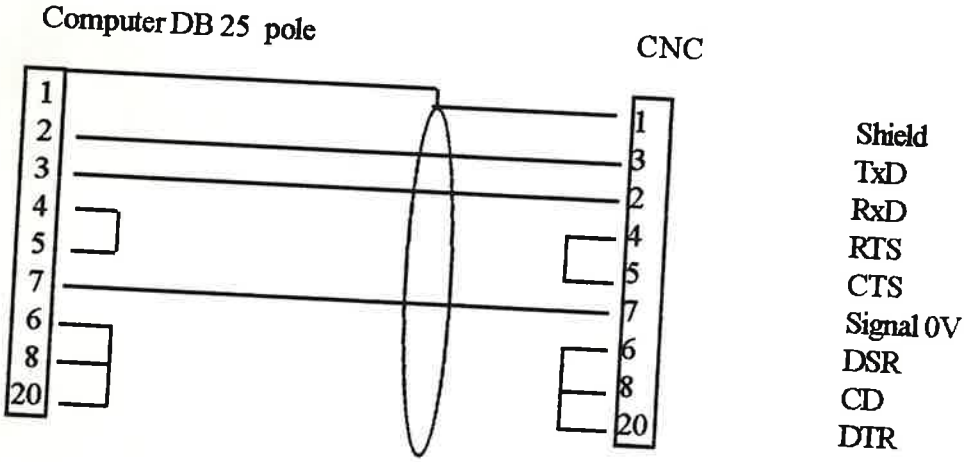
2.6 - Data Input / Out[ut

The unit of data , which is input /output between the pc ,floppy cassete or card and cnc by one input/output operation pressing the <READ> or <PUNCH> key is called a "file".

When inputting cnc programs from , or outputting them to the floppy cassete , card or pc , for example , one or all programs within the cnc memory are handled as on file.

Below is follwing the configuration of the cable to link.





2.6.1 -Input

The follwing procedure to input data from the cassete to the cnc.

The program can be input from the floppy cassete or pc to the cnc by operating as "cnc tape input" .After searching the file head in EDIT mode as described below:

- Search the head.
- Type one of N1 to N9999 , N-9999 or N-9998 and press <FSRH> key .
- Type O , the program number , press <READ> key .
- Type <EXEC>key.

* For more details , see Fanuc series 20-TA operator's manual and Fanuc series 20-TA proagramming manual.

2.7 - Automatic Chuck

In machines with this opition , there is a foot switch to open and close the chuck.(See figure 2.7).

To run a the program it is necessary to insert in the part program the auxiliary functions M68 , M69 , M46 , M47 (described in the active functions).

If an incorret functions is inserted , an error message (described messages list) will be displayed . The program will not run.

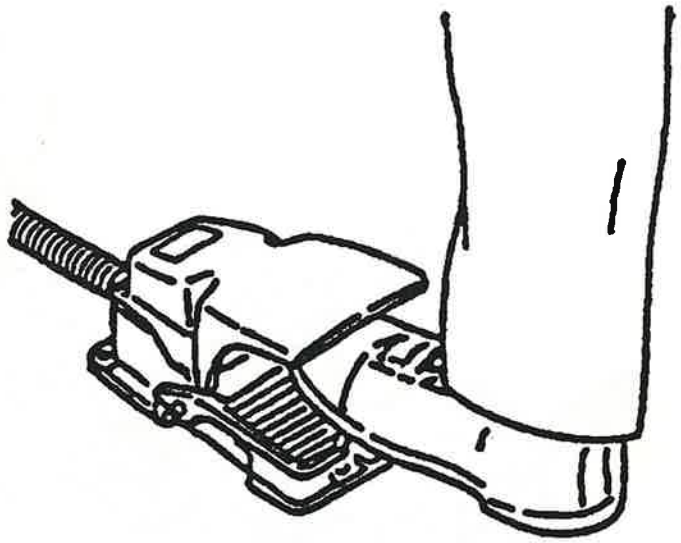


Figure - 2.7

NOTE : When this option , is not installed , you do not need insert the auxiliary functions described above.

2.7.1 - Pneumatic Chuck Without Actuation Cylinder or Hydraulic Chuck.

In machines with this option there is always a solenoid actuated (open chuck solenoid or closed chuck solenoid) and there are two sensors to monitor the pressure of system.

When any fault occurs , the system stops and the proper error message displayed.

2.7.2 - Pneumatic chuck with actuation cylinder

In machines with this option , there are no sensors to monitor pressure stages of chuck and the solenoid is not actuated with the spindle or program running.

There is only an general sensor to monitor the pressure , and when there is any pressure fault , the system stops and the proper error message displayed.

With this option , the solenoid stays actuated only during the time the foot switch or pushbutton is pressed or by the time the auxiliary functions M46 and M47 determined by.

Note : You do not need to insert in the program the auxiliary function M68 , M69 to run program or spindle.

2.8 - Automatic Tailstock

In machines with this option there are two foot switches to actutate it. See firure 2.8.
One foot switch actuate the quill out and the other actuates the quill in.
To program the quill it is necessary to insert in the part program the auxiliary functions M28 , M29 , M40 , M41 (described in the item active functions).
If an incorret function is inserted an error (described messages list) will be displayed , and the program will not run.

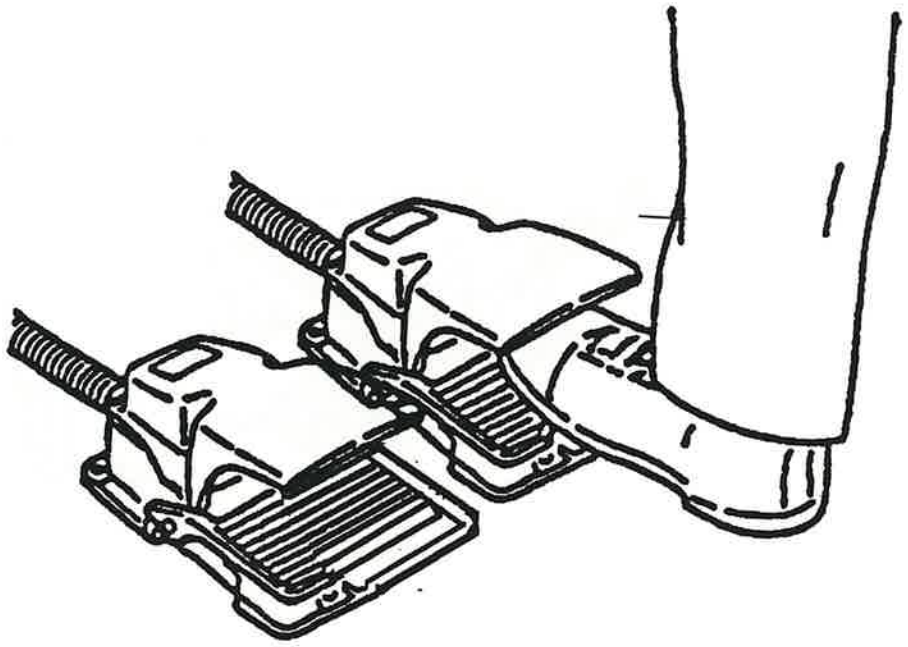


Figure - 2.8

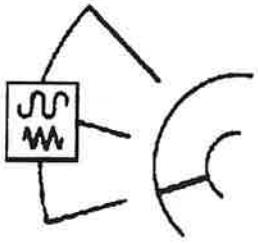
Note: When this option is not installed ,you do not need to insert the auxiliary functions described above.

3

TOOL

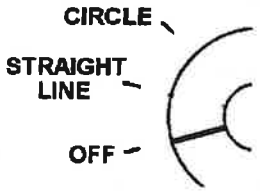
2.1 - Presetting tools

1 - Turn the mode select switch to JOG position.



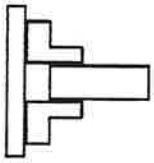
Mode select switch

2 - Turn the Machining guidance select switch to a position off.



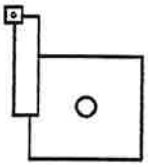
Machining guidance cycles select switch

3 - Put a part on chuck. Be sure that it is correctly locked.



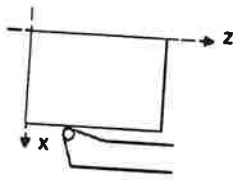
Part on chuck

4 - Put the tool which is to be preset on the tool post. Be sure that it is correctly locked.



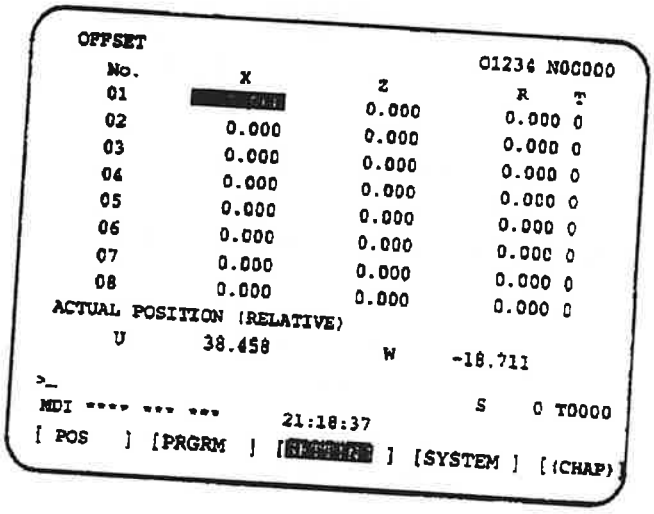
Tools on tool post

5 - Using the handwheels, touch the part with the tool tip on a known diameter. You can manually machine a little length and measure it.



Touching the diameter

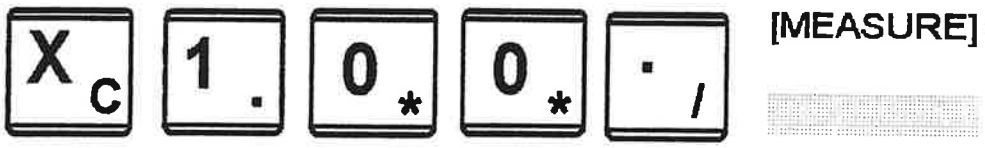
6 - Keep the X axis on this position and change the cnc screen to the tool offset screen. Push the OFFSET SETTING key as many time as necessary until the tool offset screen appears.



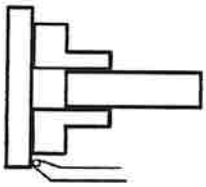
Tool offset screen

7 - Locate the cursor on the desired tool number no. 1 for example).

8 - Push X key on the cnc operator's panel and key in the value of the known diameter - don't forget the decimal point - and push the measure softkey. (X100. for example).

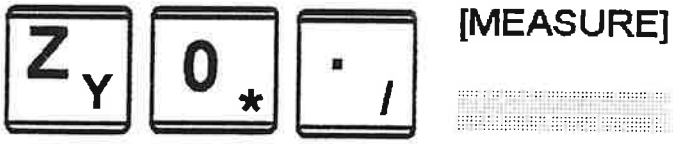


9 - Using the handwheels, touch the chuck on its length.



Touching the chuck length

10 - Keep the Z axis on this position.
11 - Push Z key and 0 key on the cnc operator's panel and push the softkey measure.



12 - Insert the tool tip geometry number and the tool tip radius.

*** Attention ***

Make sure that there is no T active - The T parameter on the machining guidance cycle actually displayed must be blank. Press the CAN key when the cursor is on the T parameter and put the cursor on the parameter (using arrows keys). Before presetting the tool, press reset key once.

Machining guidance screen T code blank and reset key.

All the workpieces will be referred to these points, the X axis value is always the diameter of the workpiece and the Z axis value is the length of the workpiece face to the chuck face.

4

M CODE LIST

4.1 - M Function Basic

M02 - End part program.
Turns off all active finctions during the program .

M30 - End part program.

4.2 - M Function Spindle

M03 - Spindle clockwise rotation.
M04 - Spindle counter clockwise rotation.
M05 - Spindle stop .
M13 - Operates like M03 and M08 together.
M14 - Operates like M04 and M08 together.
M37 - Select low spindle speed gear range.
M38 - Select medium spindle speed gear range.
M39 - Select high spindle speed gear range.

4.3 - M Function Coolant

M08 - Turn on coolant pump.
Operates together with the coolant select switch.

M09 - Turn off the coolant pump.
Operates together with the coolant select switch.

4.4 - M Function Chuck

M46 - Chuck open and verify.

M47 - Chuck close and verify.

M68 - Verify chuck is open.
Must be inserted in the part program when spindle is running.

M69 - Verify chuck is closed .
The auxiliary functions are actuated only when the spindle is not running.

4.5 - M Function Tailstock

M40 - Quill in and verify.

M41 - Quill out and verify.

M28 - Verify quill is in.
Must be inserted in the part program when spindle is running.

M29 - Verify quill is out.
The auxiliary functions are actuated only when the spindle is not running.

5 POWER SUPLY

5.1 - Input Voltage

The power supply input voltage must be 220/380/440VAC 3 phase +10% -5HZ+2%. (According with the purchase order).

5.2 - Power Supply Input Voltage Cable

The input cable cross section must be 10mm2 (6AWG) and directly connected to the main switch at the electrical cabinet.

Under the electrical cabinet has a input to the input cable as show figure 5.2.1 in the next page.

5.3 - Ground Cable

The ground cable must be 10mm2 (6AWG) and directly connected to the ground block next to the main switch.

The input ground cable is the same place of the power cable.

The ground system must be according to NFPA-79.

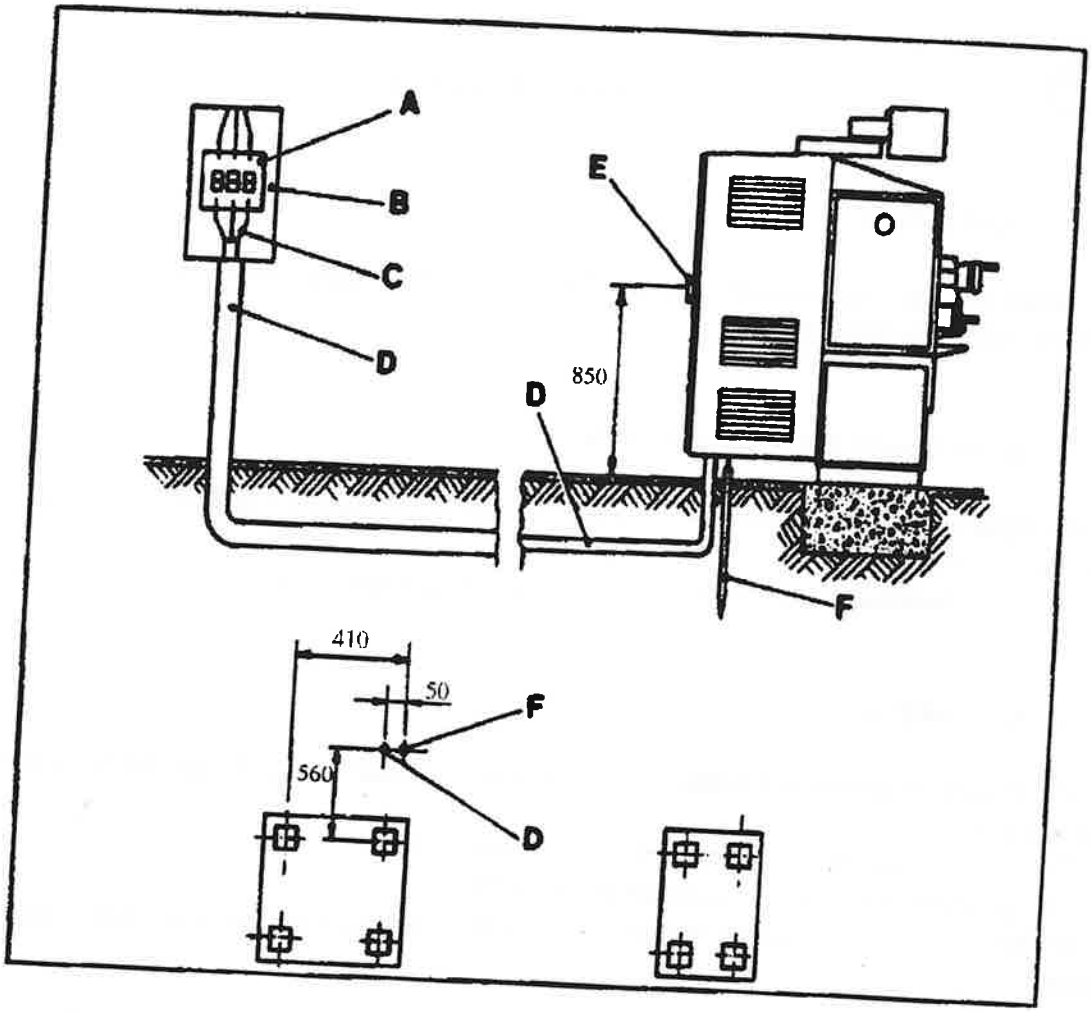
In figure 5.2.1 is suggested the configuration to make system ground and make power supply in the machine.

5.4 - Inverted Phase

After the power supply and ground cable are connected, verify the rotating direction of the coolant pump motor .If its rotation is inverted to the arrow on the motor , turn off the power supply and change the phase R to phase S.

5.5 - Rated Power

The rated power is 14 KW.



A	General protection of the machine	Fuse base	3NH3020	SIEMENS
		Fuse	3NA1018(220v) 3NA1016(380v) 3NA1016(440v)	
B	General feed box	Defined by user		
C	Feed cable	Vinil cable 0,6/1,0kv		SIEMENS
D	Conduit for cable	Sealtube	1"	
E	Main switch			
F	Earthing			

Figure - 5.2.1

6

ALARM MESSAGES

All messages and alarms are reset by key the reset

6.1.1 - Limit Switch and emergency

1002 Reference Point not Performed
Need find the reference point of the machine.
Diagnosis : make the item 2.3.3

2002 Front Door Opened
The program execution is stopped because of an open door.
Diagnosis: Close the door , check the switch conection.

1017 S Code Not Defined
The speed has not defined .
Diagnose : Define the speed in MDI mode .

5001 The X axis has reached the limit switch x+.
The axis X has moved past the limit of the machine.

5011 The X axis has reached the limit switch x-.
The axis X has moved past the limit of the machine.

5002 The Z axis has reached the limit switch z+
The axis Z has moved past the limit of the machine.

5012 The Z axis has reached the limit switch z-.
The axis Z has moved past the limit of the machine.

5002 The Z axis has reached the tailstock limit switch .
The axis Z has moved past the limit of the machine.

Emergency System

Diagnose : Check the emergency circuit input and output of the cnc.

NOTE : When a limit switch is reached , the emergency circuit is turned off. Move the axis by keeping the release button pressed on the operator's panel and select the axis direction to the opposite direction of the over-travel alarm.

6.1.2 - Servomotor and Drives

1006 Circuit Breaker / Thermal relay Off.
Failure of the thermal relay or circuit breakers.
Diagnosis : Check all thermal relays and circuit breakers.

1005 Spindle motor / Resistor Overheat
Diagnosis : Check the alarm activated in the drive and see apindle drive manual .Check connections and the working condition of the spindle.Check the temperature of the regenerative modul and connections.

6.1.3 - Lubrifications

1001 Slide Lube Failure.
The slide way sequence was not completed.
Diagnosis : Check lubrification system , slide lube.

2006 Lube Oil Low Level.
Diagnosis: Check if the level of oil in the reservoir is low . If not , check the condition and connections.

6.1.4 - Rotation of Gears.

2102 Gear Change Request
Diagnosis : Check the gear requested by program , change the gear requested and press the start pushbutton.

1000 Wrong Gear Stage
The gear engaged is not the same requested by program.
Diagnosis : Change the gear requested by program.

6.1.5 - Chuck

2003 Wrong Chuck Position
The state chuck is not the same requested by the program.
Diagnosis : Change the state chuck requested by the program.

1004 Chuck Pressure Fail
Diagnosis : Check the pressure of the system , check connections and adjustments of sensor the chuck .

1009 Chuck Position Not Defined
Diagnosis : Put in the part program the state chuck .

6.1.6 - Tailstock

1007 Tailstock Wrong State.

The tailstock position is not the same requested by the program
Diagnosis : Change the position tailstock requested by the program.

1008 Tailstock Position Failure

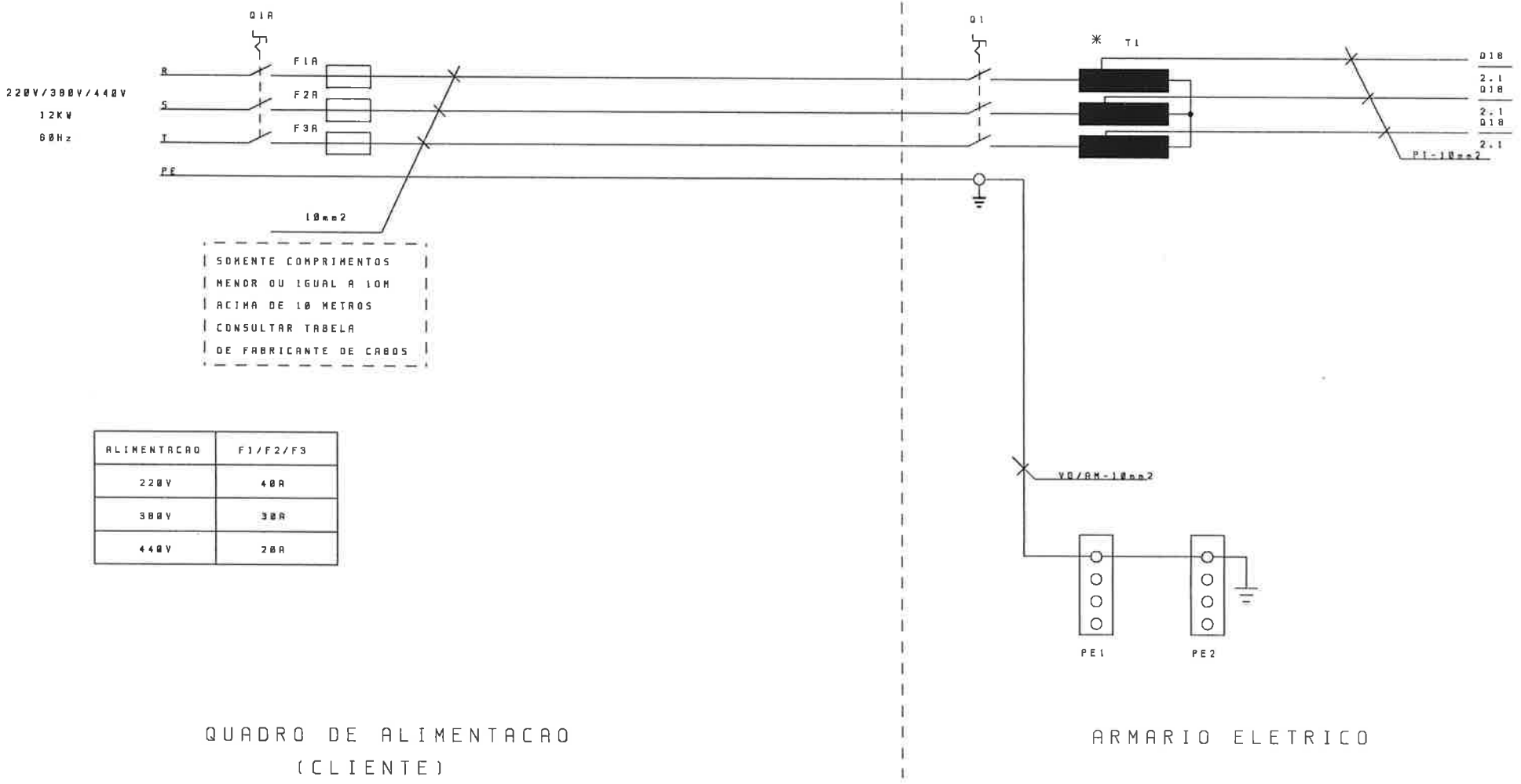
Diagnosis : Check the pressure system , connections and adjustments of the sensor tailstock.

6.1.7 - Turret

2101 Tool Change Request

Diagnosis : Change the tool requested by the program and press the start pushbutton.

7 ELECTRICAL DIAGRAM / LAYOUT



ALIMENTACAO	F1/F2/F3
220V	40A
380V	30A
440V	20A

QUADRO DE ALIMENTACAO
(CLIENTE)

ARMARIO ELETRICO

* USAR AUTOTRAFO T1 SOMENTE QUANDO ALIMENTACAO FOR 380/440V.

PROJ	14-03-95	BRANDAO
DES	14-03-95	BRANDAO
	DATA	NOME

OBS:
FANUC 20T

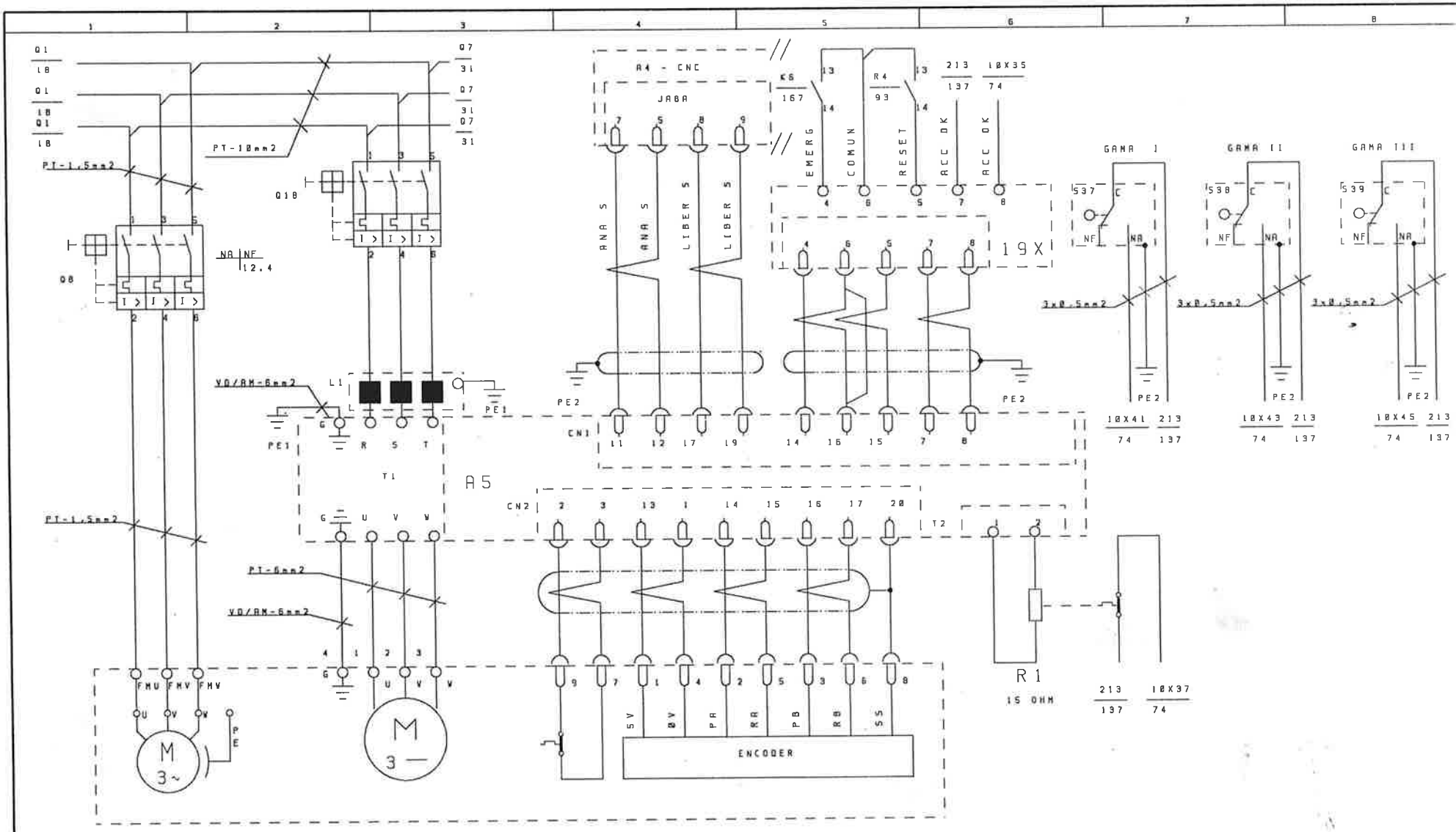
ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA
NARDINI

TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 01/22
SUBSTITUI | SUBSTITUIDO
NR. 044015003 DE

044.00



VENTILADOR DO MOTOR PRINCIPAL	M8 - M. PRINCIPAL 7,5KW\4500RPM FANUC	TERMICO	ENCODER

** USAR SOMENTE QUANDO VERSAO VS

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

OBS: FANUC 20I

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

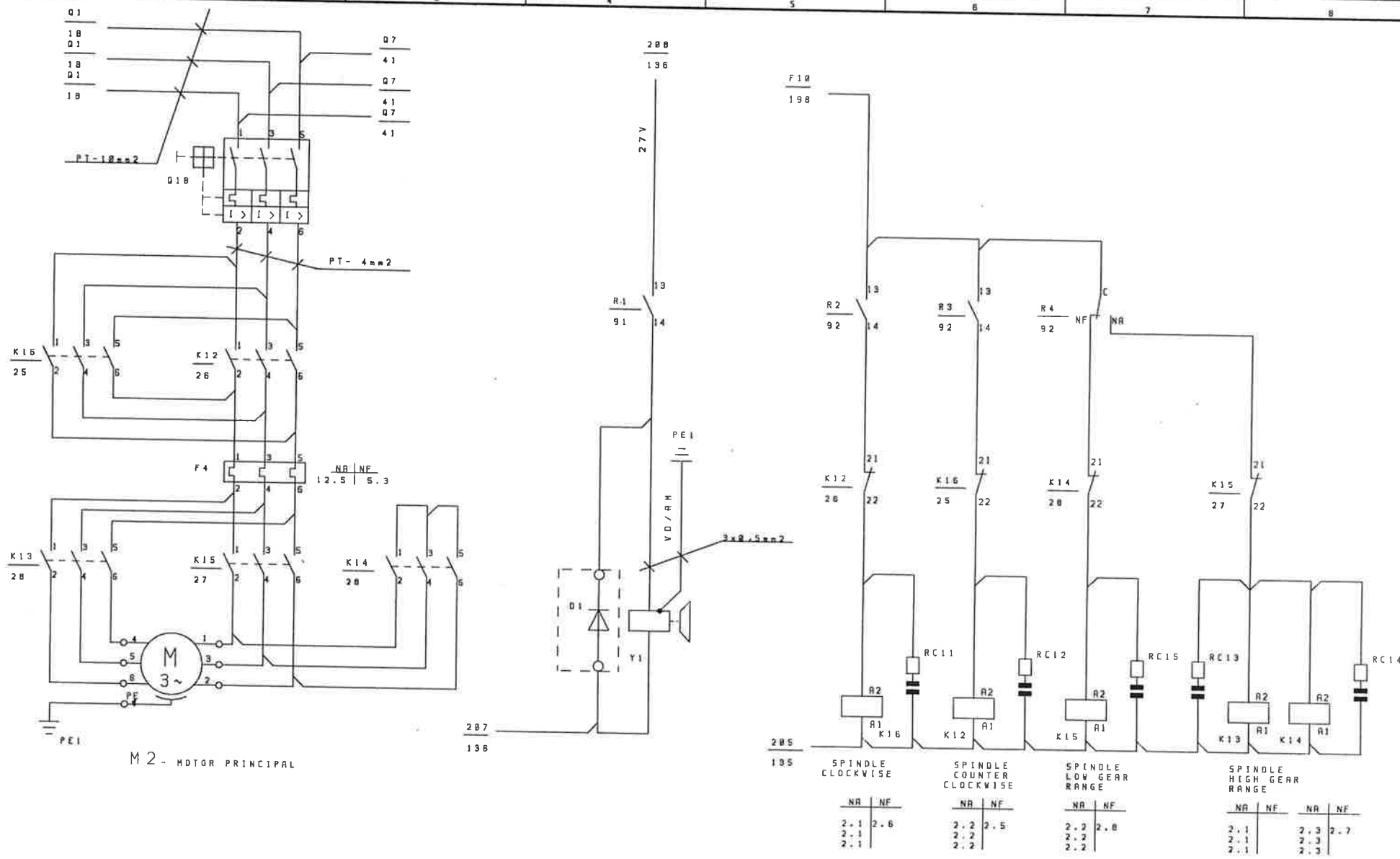
TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 02/22

SUBSTITUI | SUBSTITUIDO

NR. 844015003 DE

844.0



** USAR SOMENTE QUANDO VERSAO ENGRENADO

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

DBS:
FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

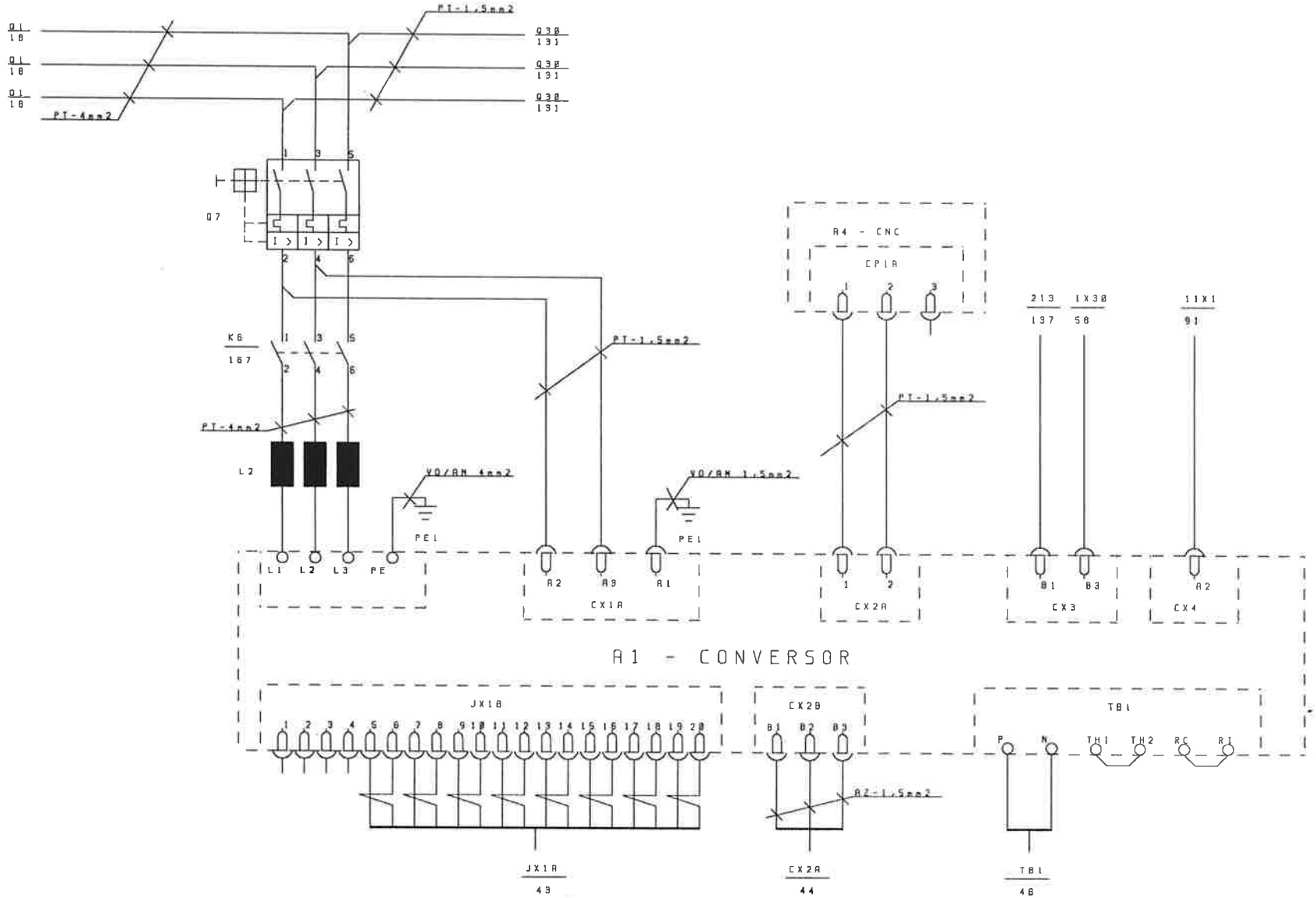
Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

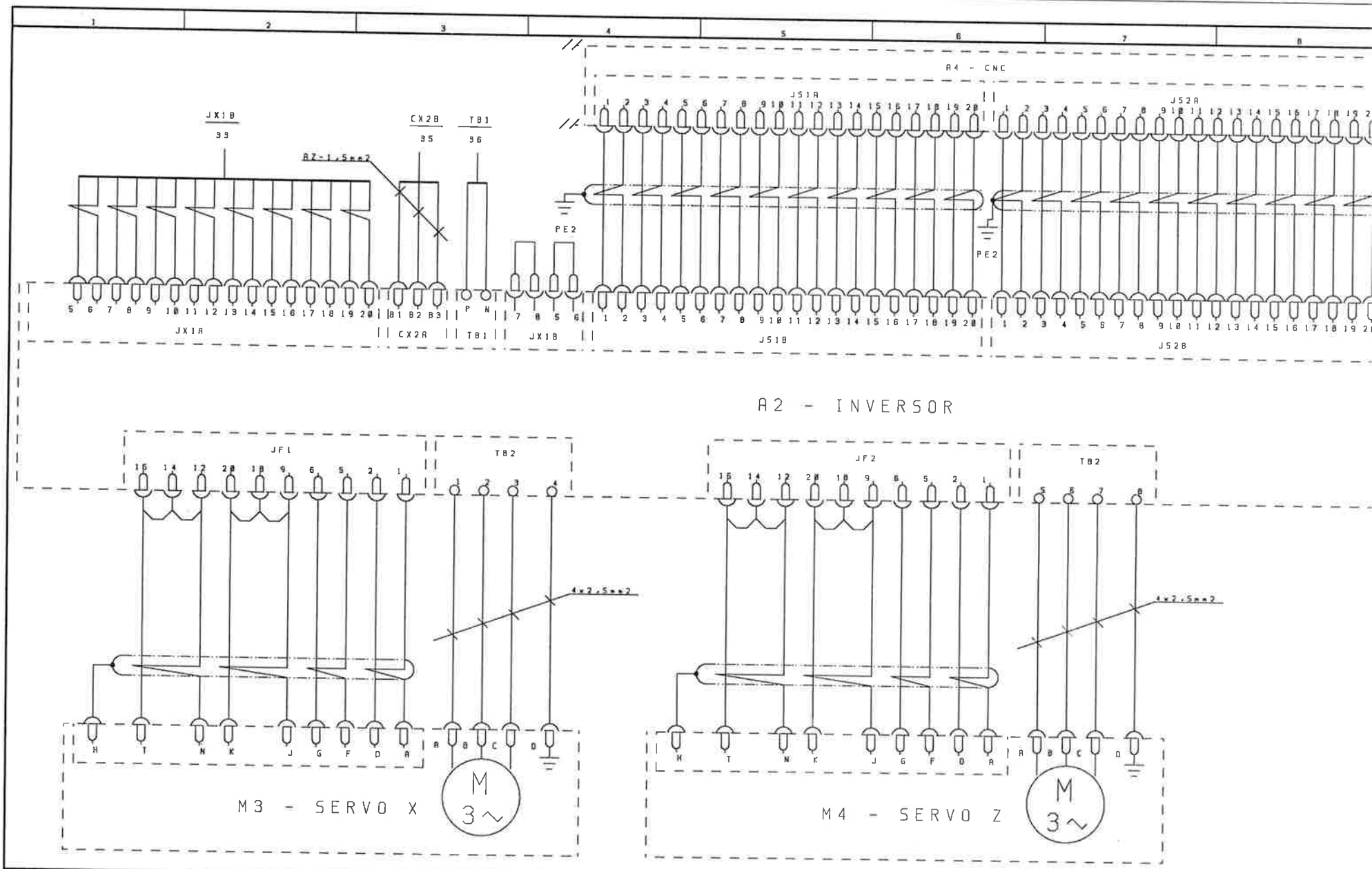
TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 02A/22
SUBSTITUI | SUBSTITUIDO
NR. 044015003 DE

044.02A

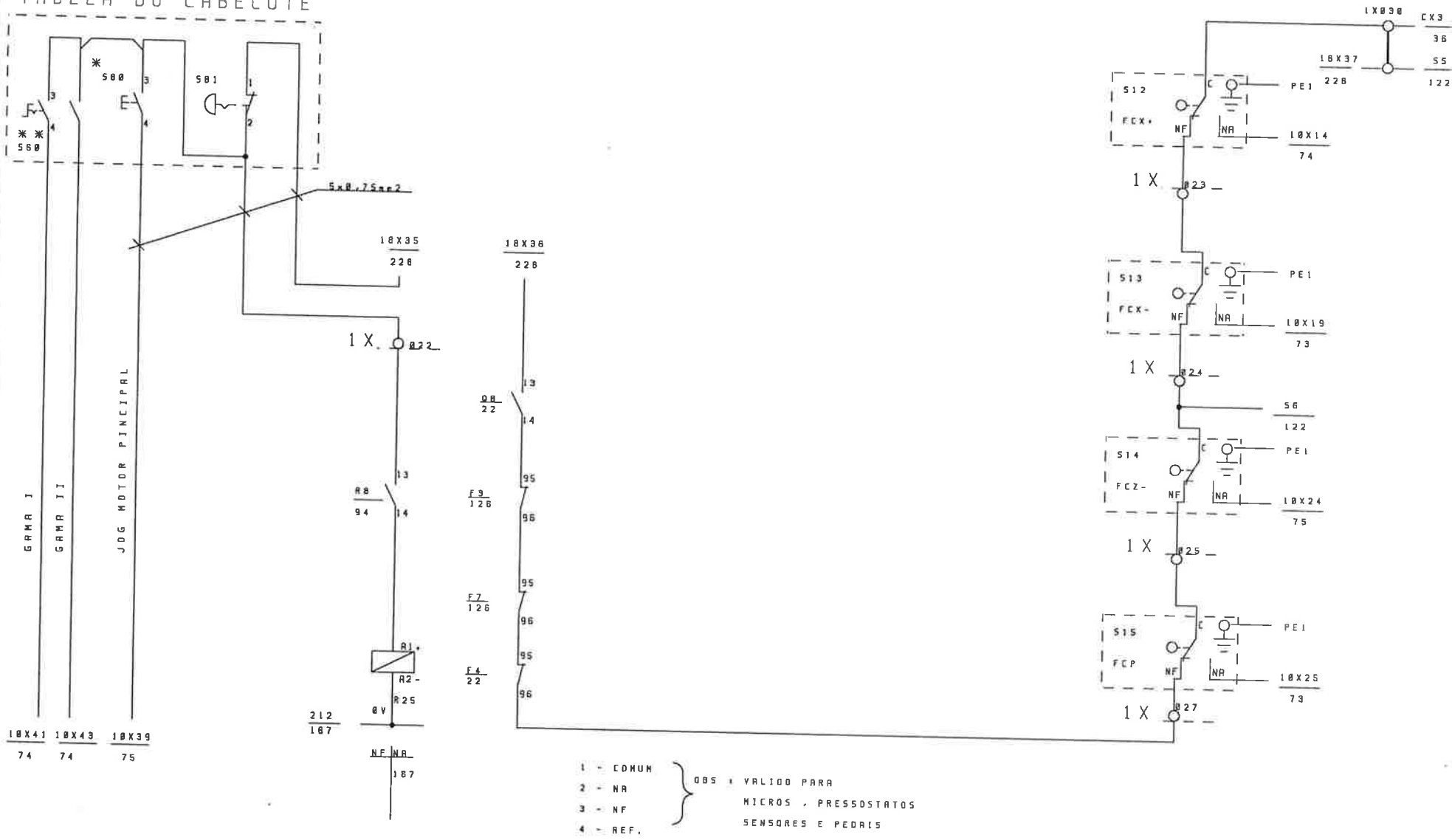


	PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 03/22
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 DE



PROJ	14-03-95	BRANDAO	DBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 04/22
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
	DATA	NOME				NR. 044015003 DE

TABELA DO CABECOTE



* SOMENTE QUANDO REQUERIDO

** SOMENTE QUANDO VERSAO ENGRENADO

PROJ	14-03-95	BRANDAO	OBS: FANUC 20T
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.
	DATA	NOME	

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO

FAST TRACE

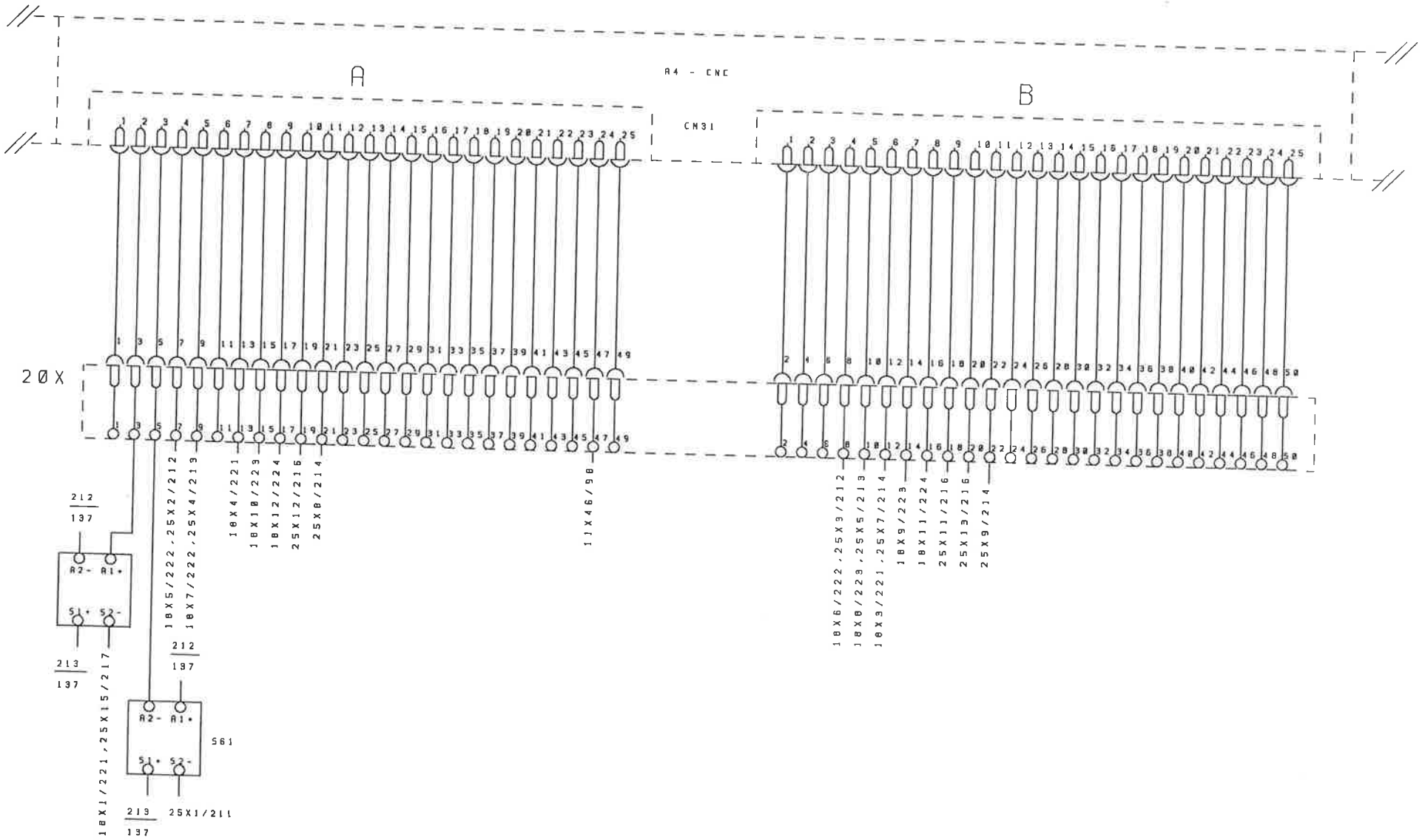
DIAGRAMA ELETRICO

FOLHA 05/22

SUBSTITUI | SUBSTITUIDO

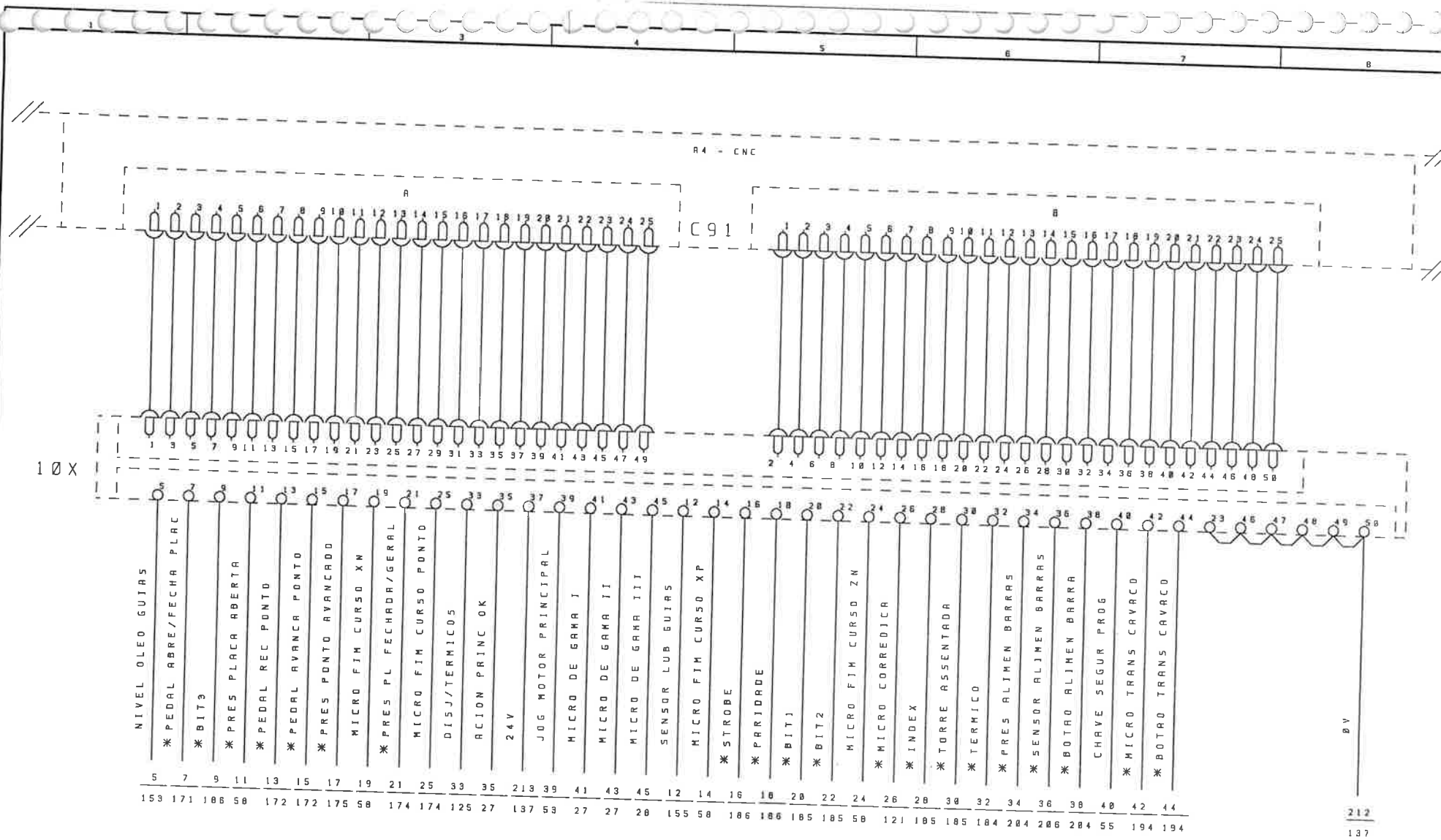
NR. 044015003 DE

044.005



PROJ	14-03-95	BRANDAO	DBSi FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 06/22
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
	DATA	NOME				NR. 044015003 DE

044.006



* USAR SOMENTE QUANDO REQUERIDO

PROJ	14-03-95	BRANDAO	OBS: FANUC 20T
DES	14-03-95	BRANDAO	
	DATA	NOME	

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO

FAST TRACE

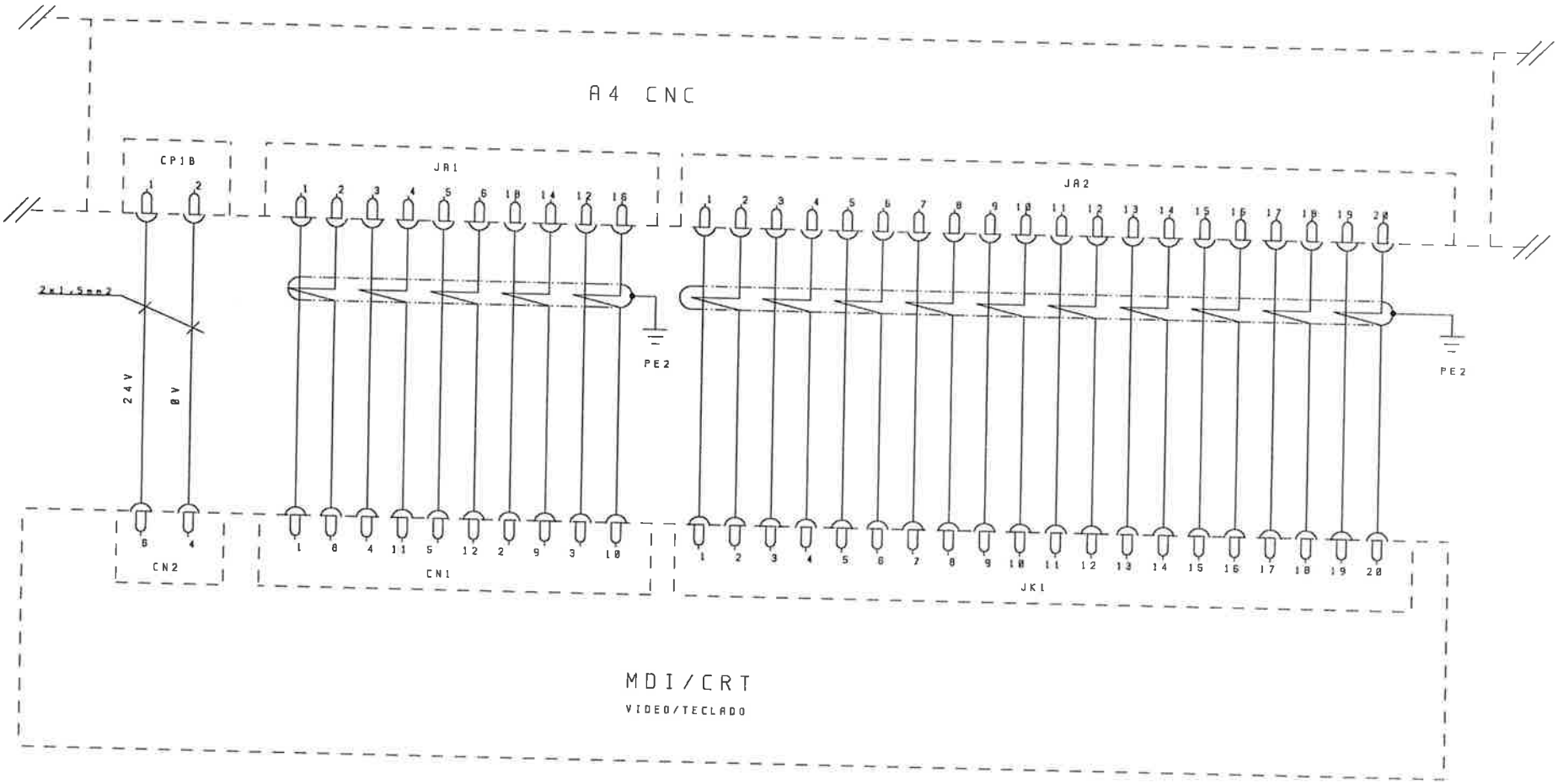
DIAGRAMA ELETRICO

FOLHA 07/22

SUBSTITUI | SUBSTITUIDO

NR. 044015003 DE

044.007



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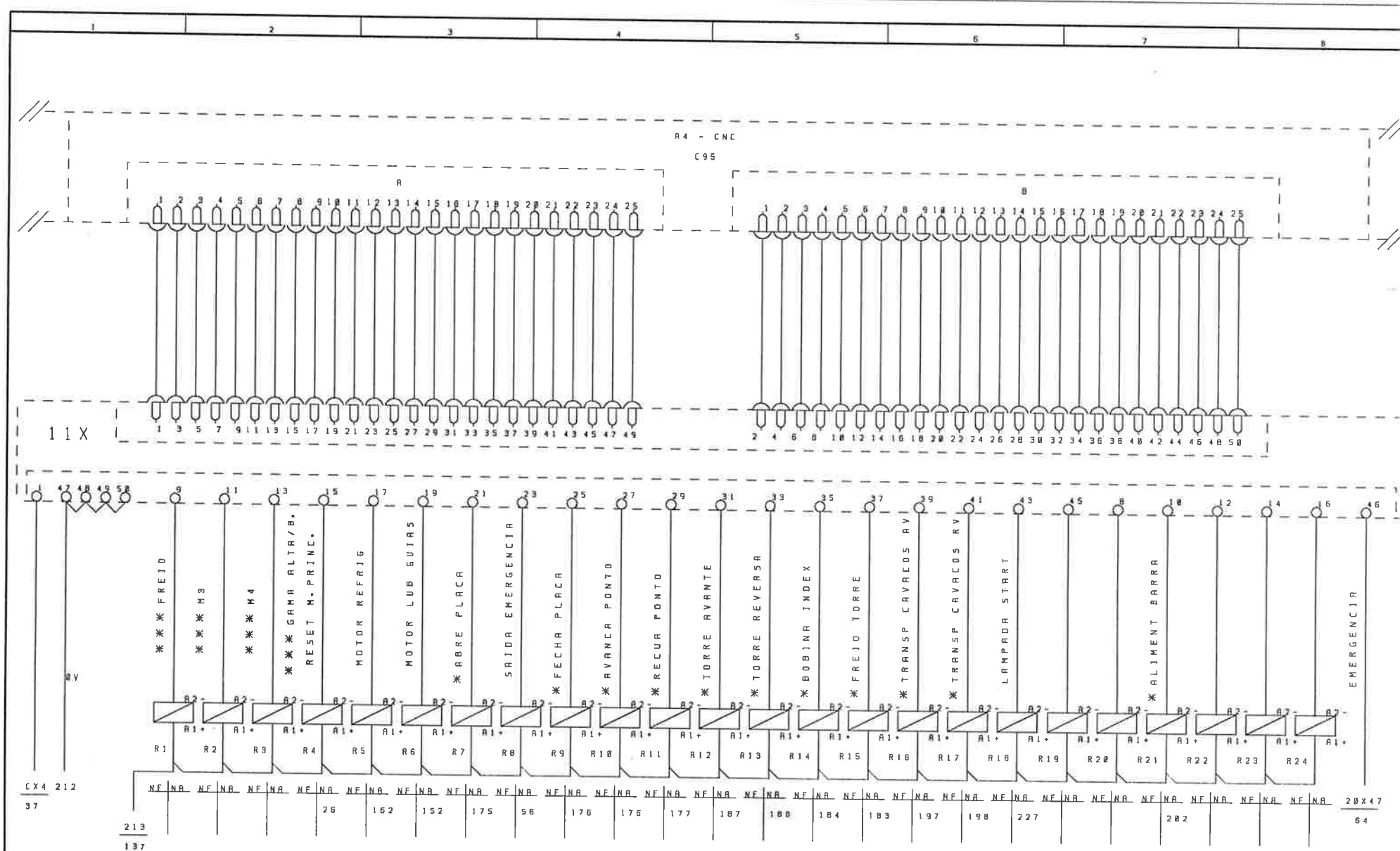
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 DE

044.000



* USAR SOMENTE QUANDO REQUER.

***USAR SOMENTE QUANDO VERSAO ENGRENADO

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

DES: FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO

FAST TRACE

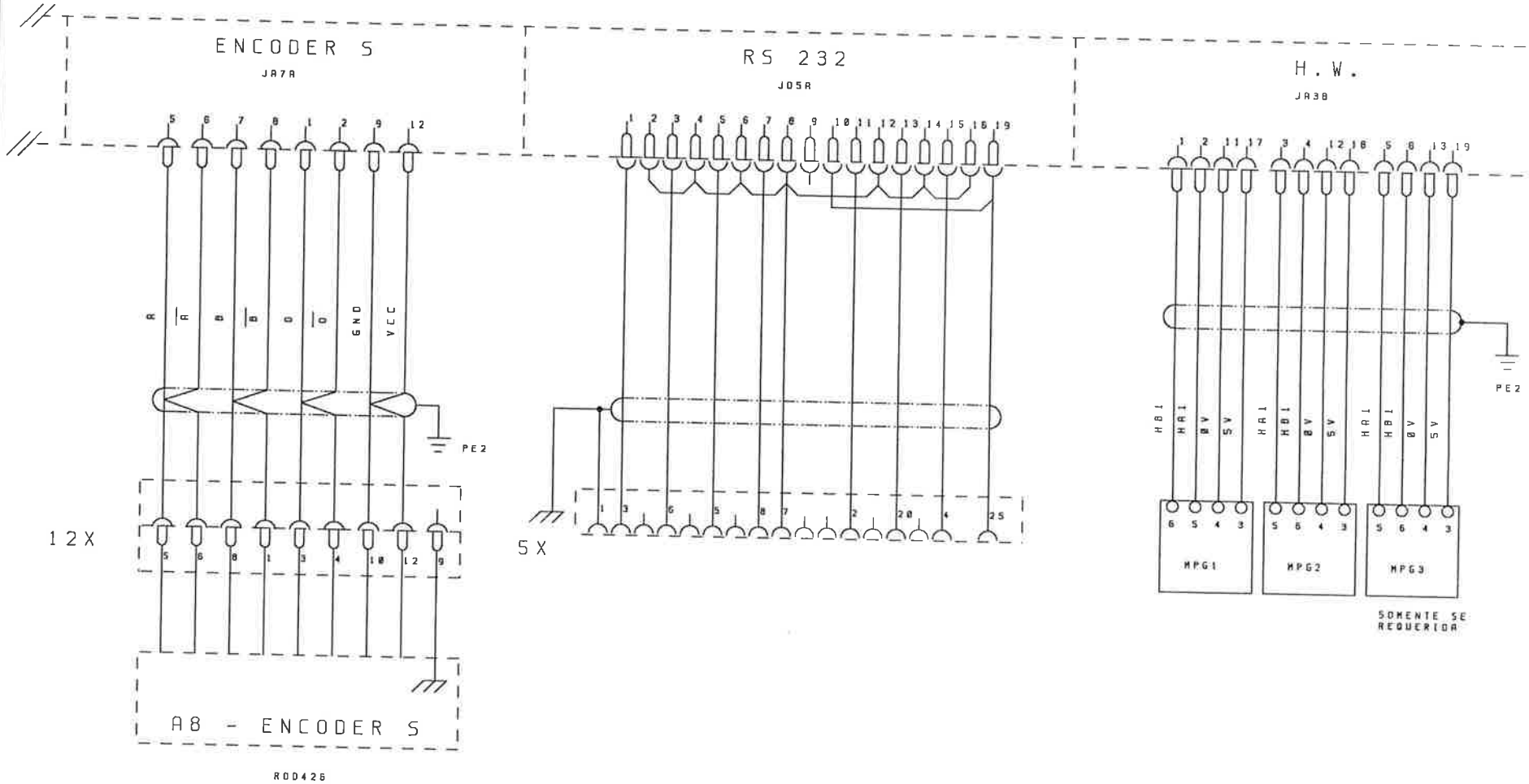
DIAGRAMA ELETRICO

FOLHA 09/22

SUBSTITUI | SUBSTITUIDO

NR. 044015003 DE

044.009



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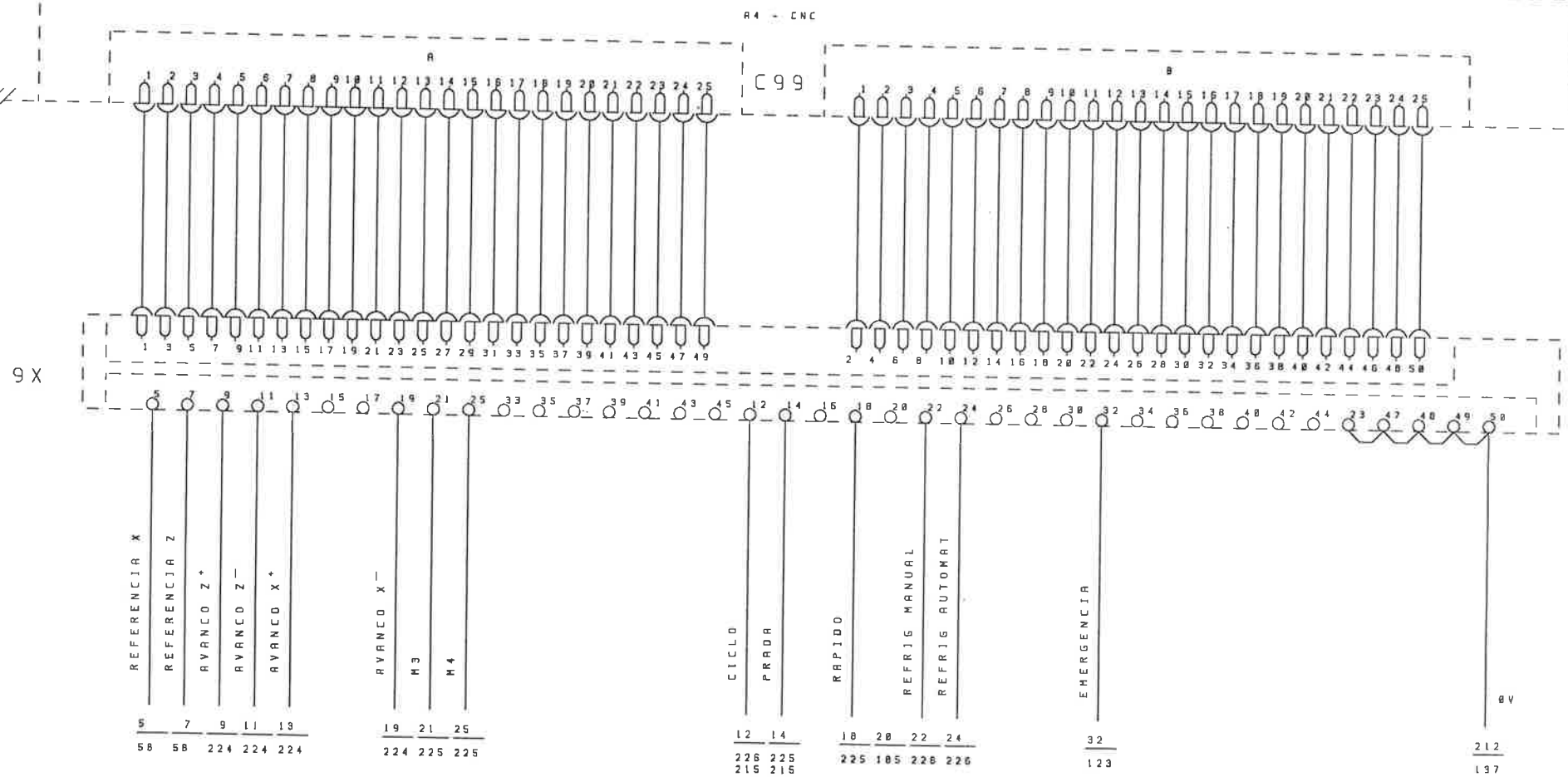
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 DE

044.010



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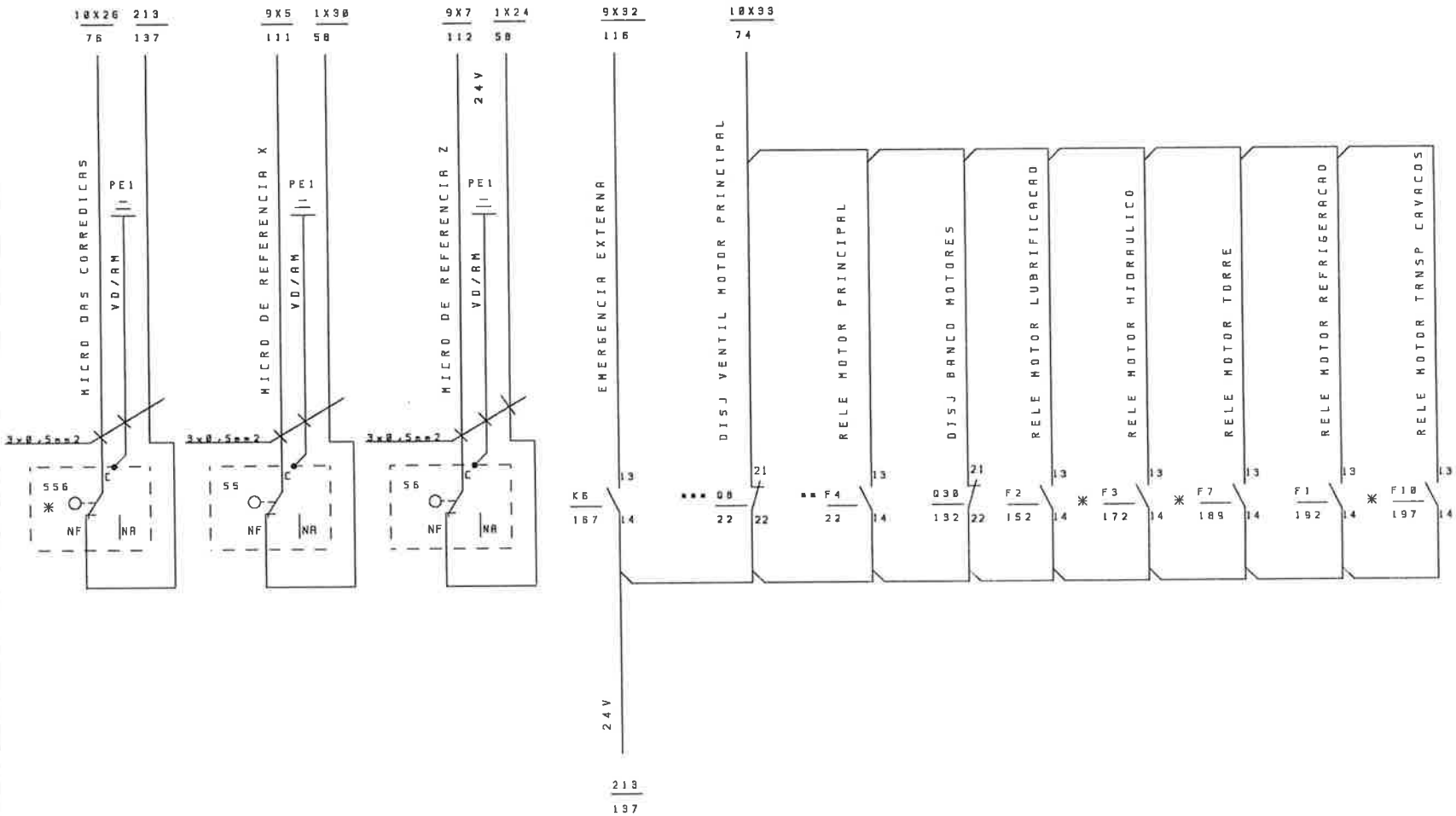
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 DE



* SOMENTE QD. REQUERIDO

** SOMENTE QD.VERSAO ENGREN

*** SOMENTE QD.VERSAO VS

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

OBS:

FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SEM USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO

FAST TRACE

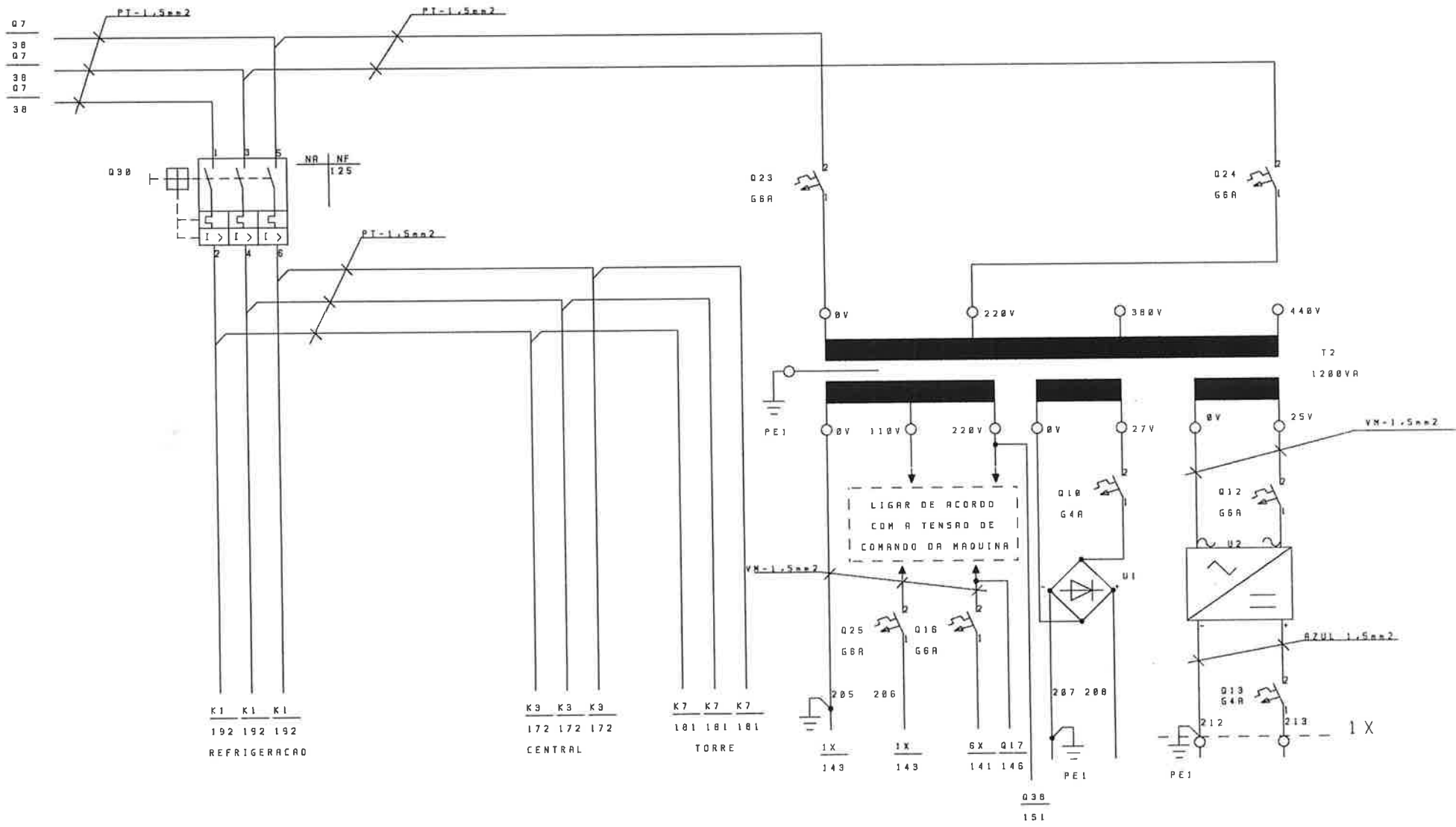
DIAGRAMA ELETRICO

FOLHA 12/22

SUBSTITUI | SUBSTITUIDO

NR. 044015003 DE

044.2



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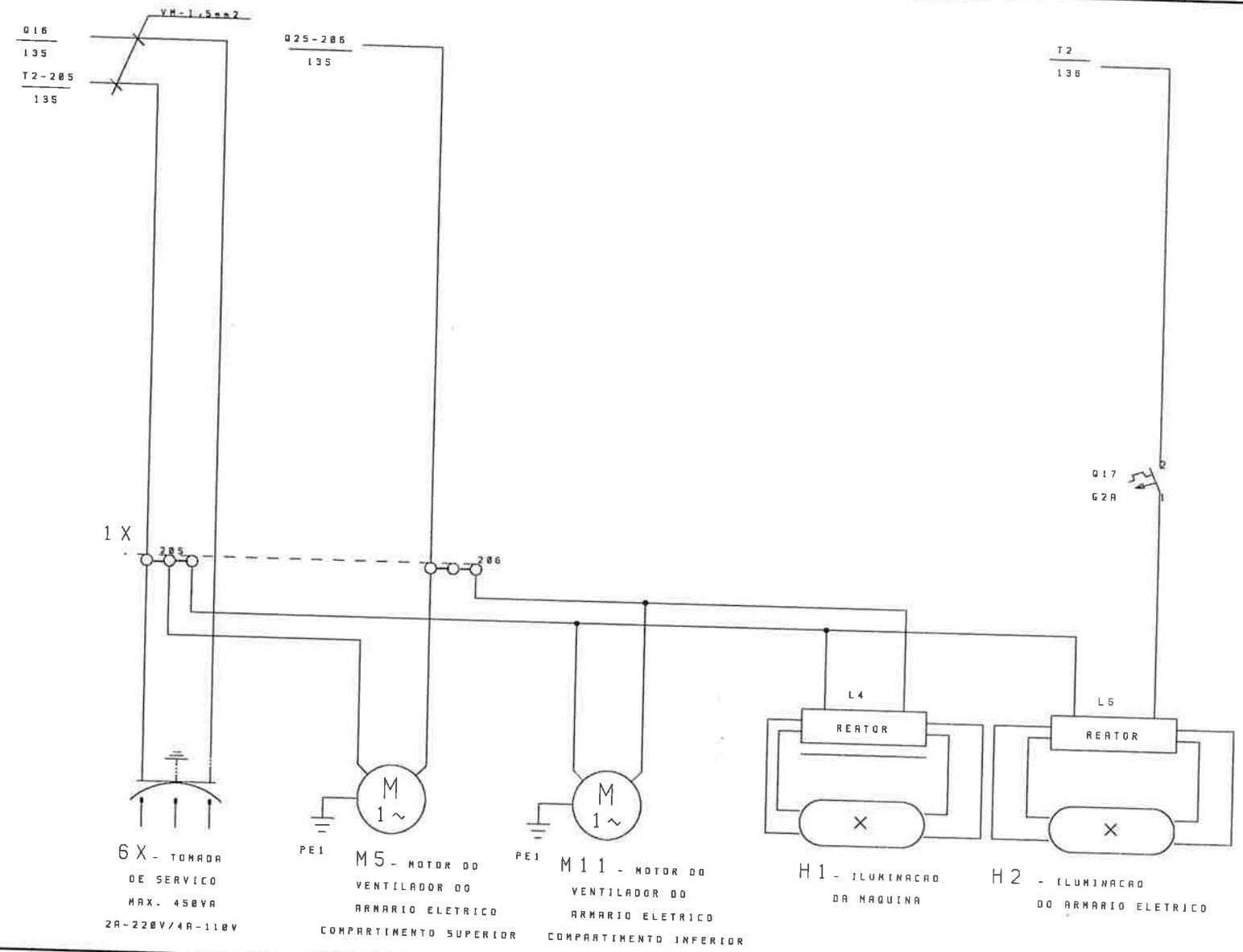
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 DE

044.0



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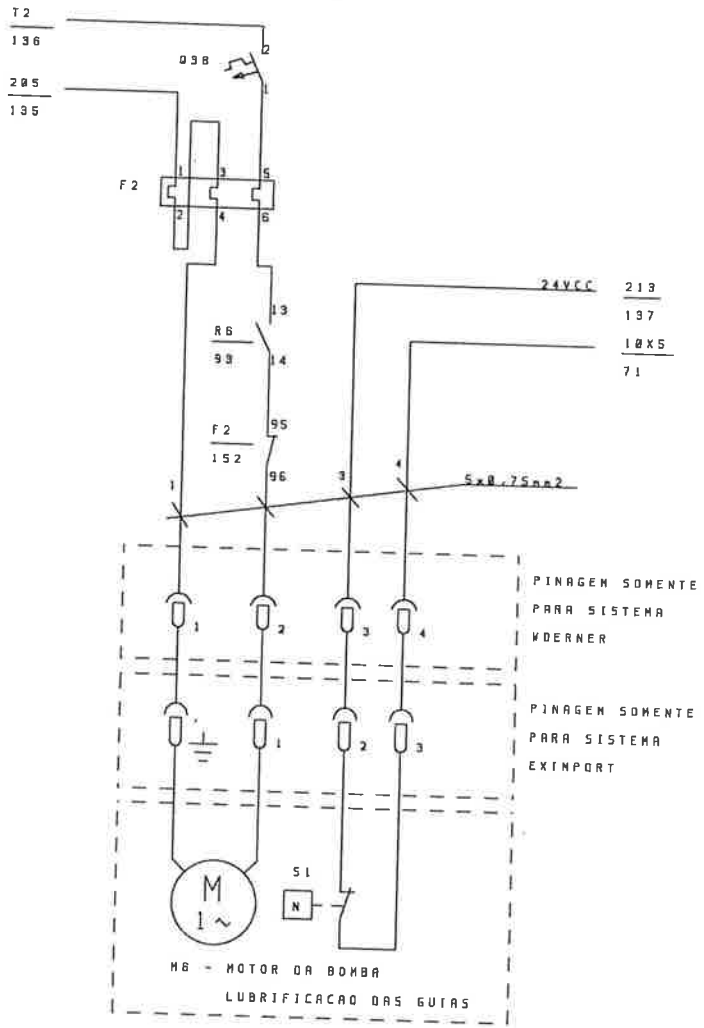
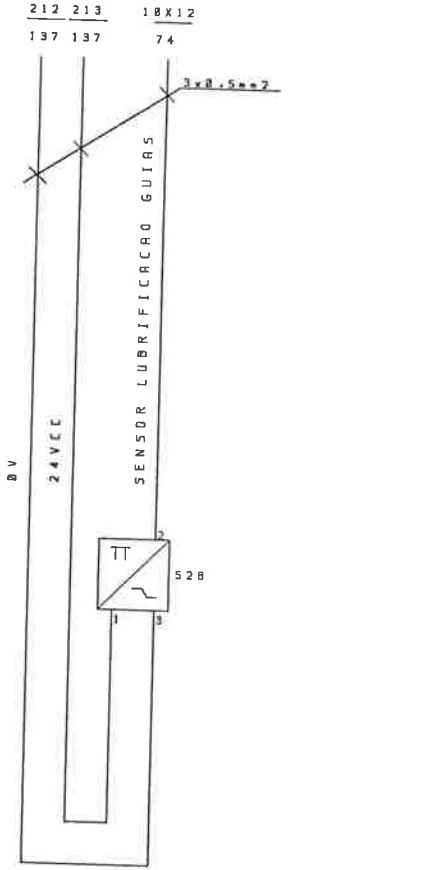
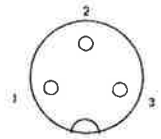
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 DE

044.014





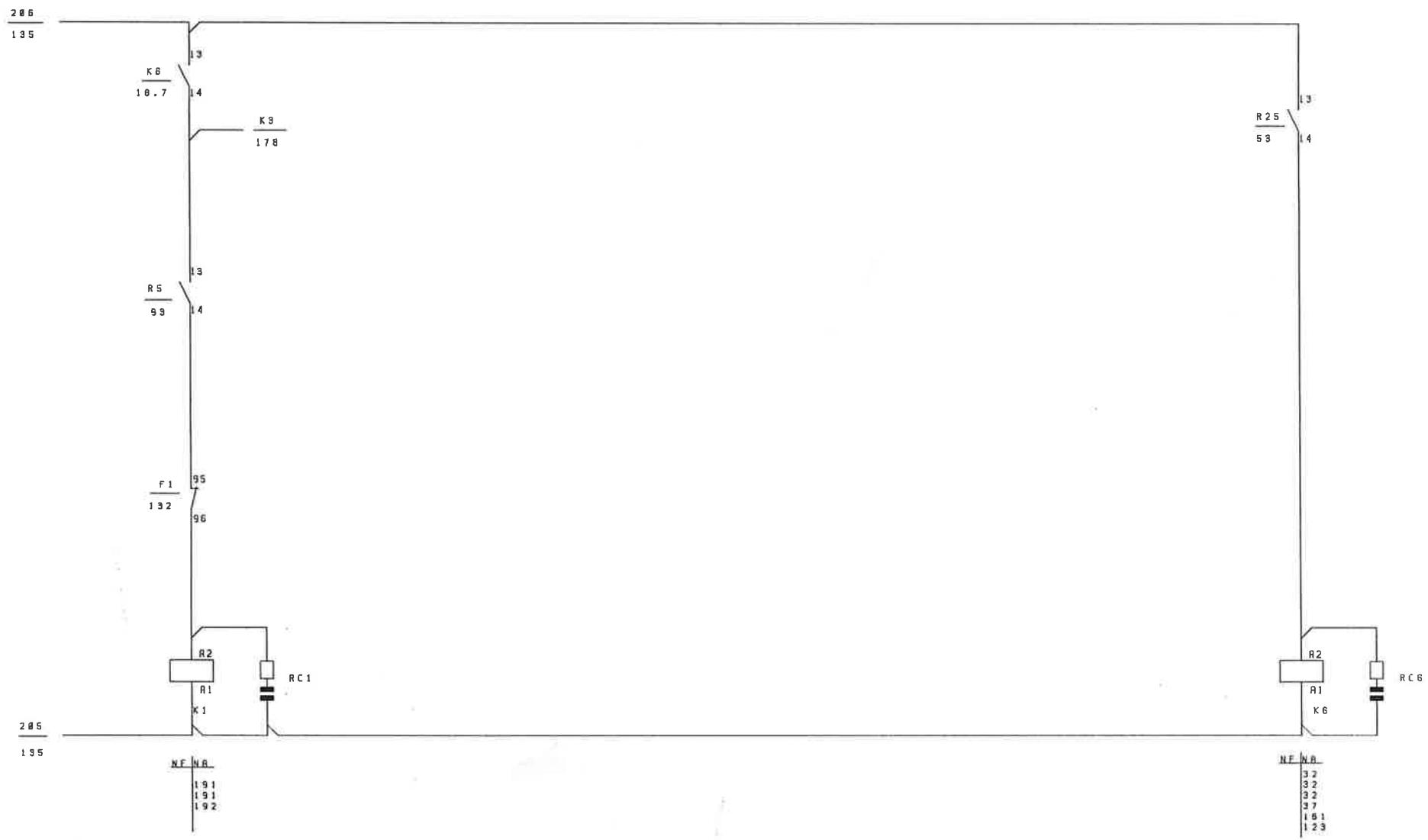
LIGACAO UTILIZADA
SOMENTE COM BOMBA
MULTIPLA GMT.8 WOERNER



1 - 24VCC ALIMENTACAO
2 - SINAL
3 - 0V

PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 15/22
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI - SUBSTITUIDO
	DATA	NOME				NR. 044015003 DE

044.015



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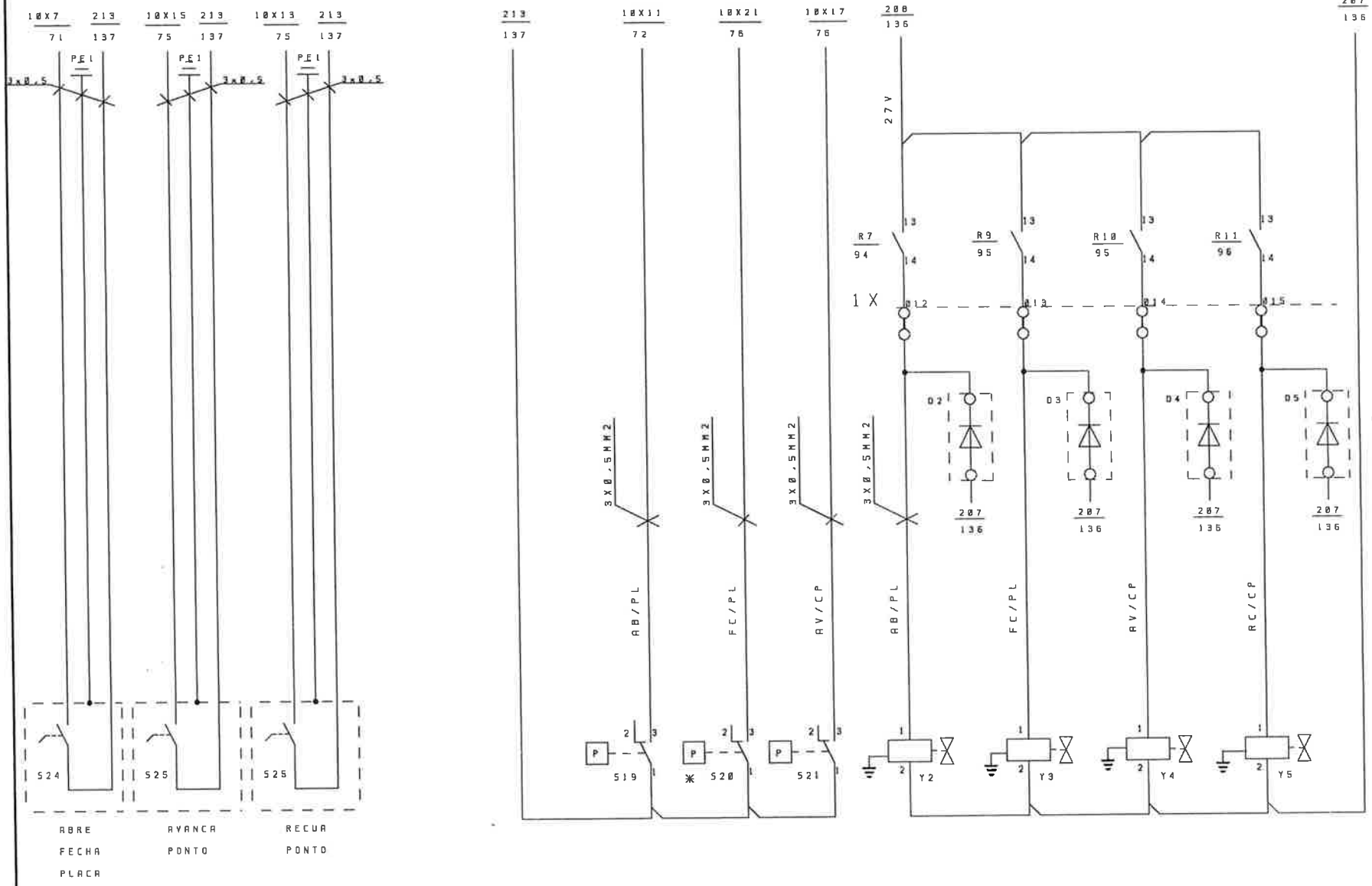
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 DE



** USAR ESTA FOLHA SOMENTE QUANDO SISTEMA PNEUMATICO

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

DBS:
FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

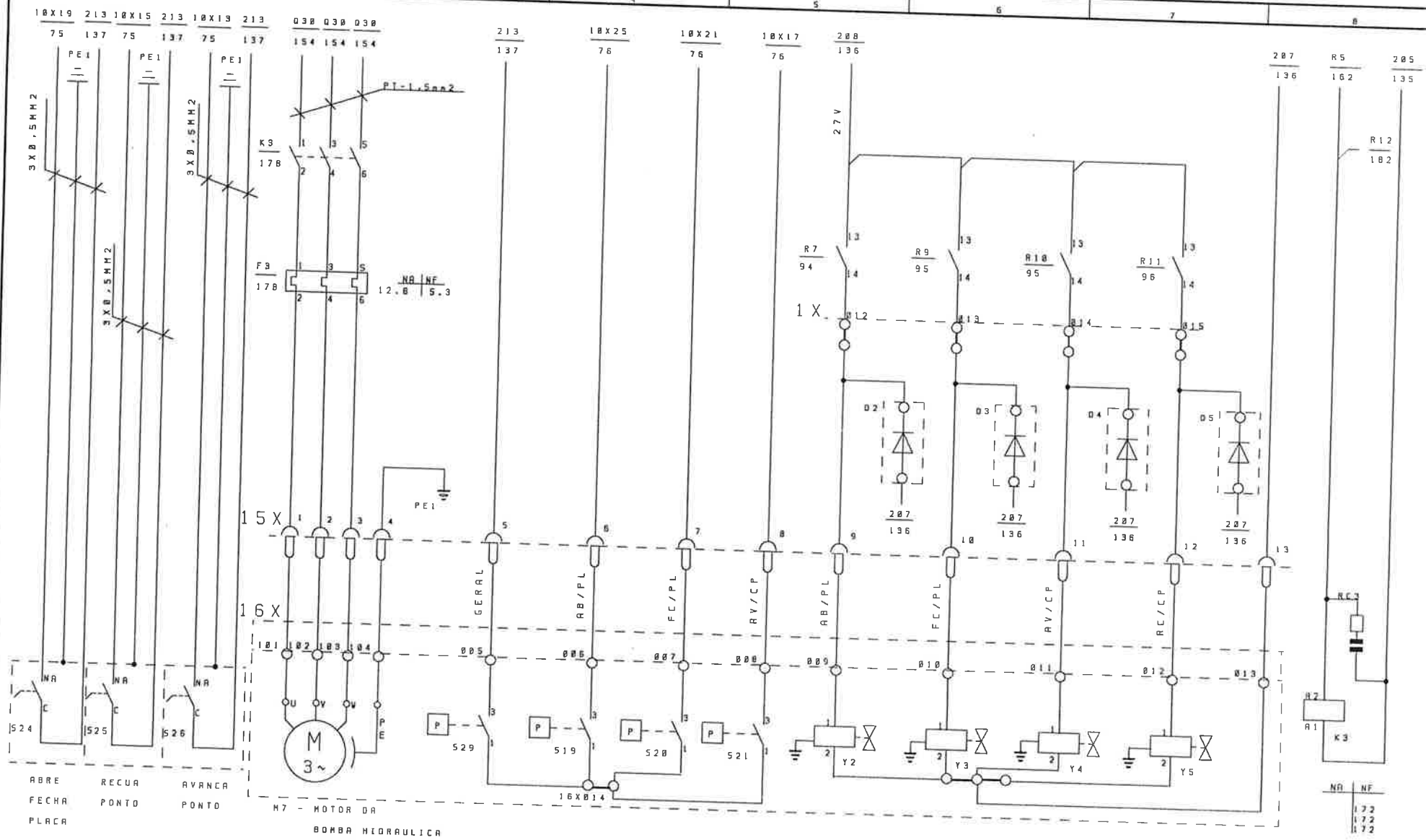
Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 17/2
SUBSTITUI
SUBSTITUIDO
NR. 044015003 DE

044.0



* USAR ESTA FOLHA ESTA FOLHA SOMENTE QUANDO REQUERIDO SISTEMA HIDRAULICO

PROJ	14-03-95	BRANDAO
DES	14-03-95	BRANDAO
	DATA	NOME

DBS:
FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 17A/22
SUBSTITUI | SUBSTITUIDO
NR. 044015003 DE

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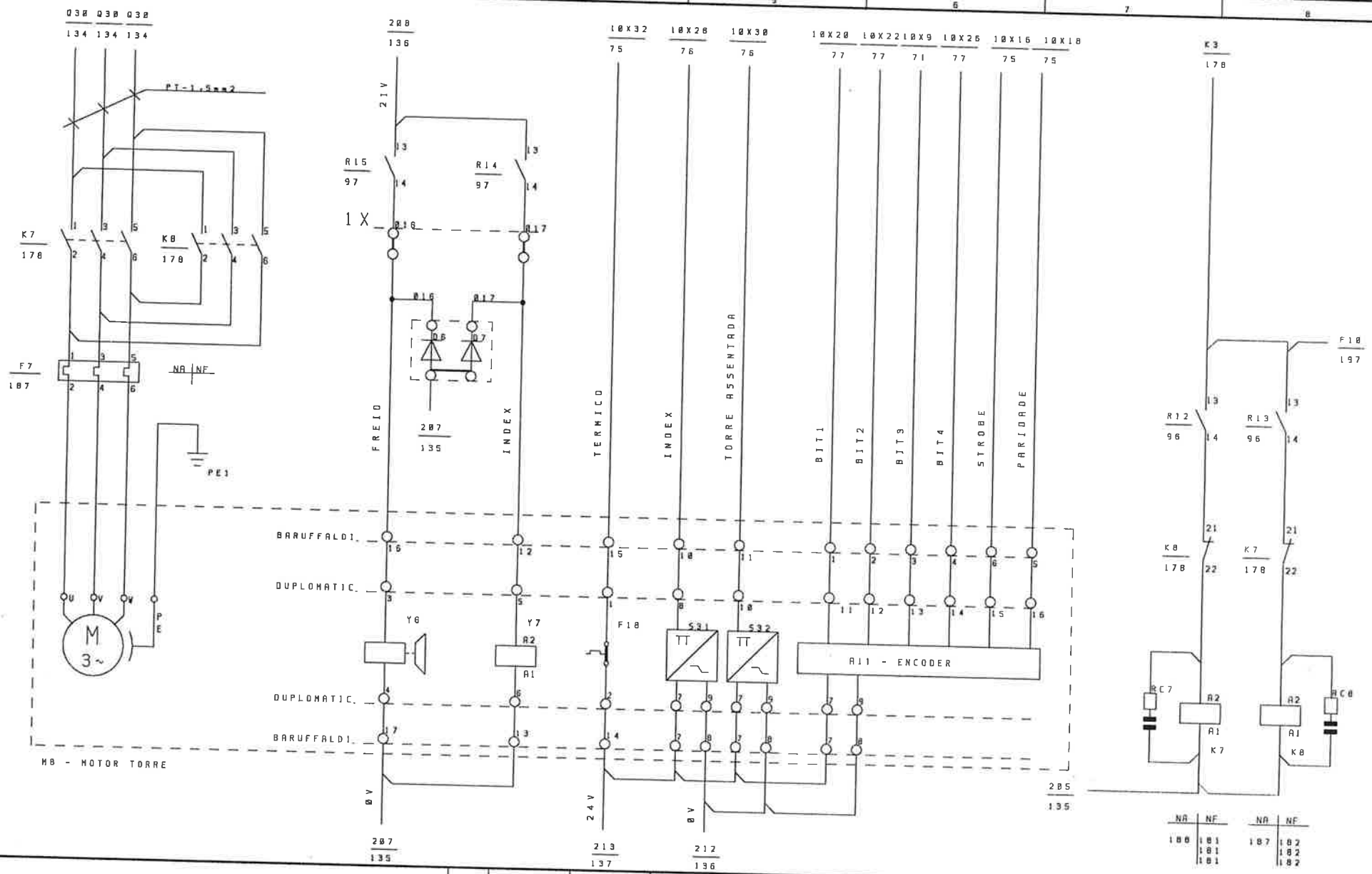


* USAR ESTA FOLHA SOMENTE QUANDO TORRE AUTOMATICA

PROJ	14-03-95	BRANDAO
DES	14-03-95	BRANDAO
	DATA	NOME

OBS: FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO

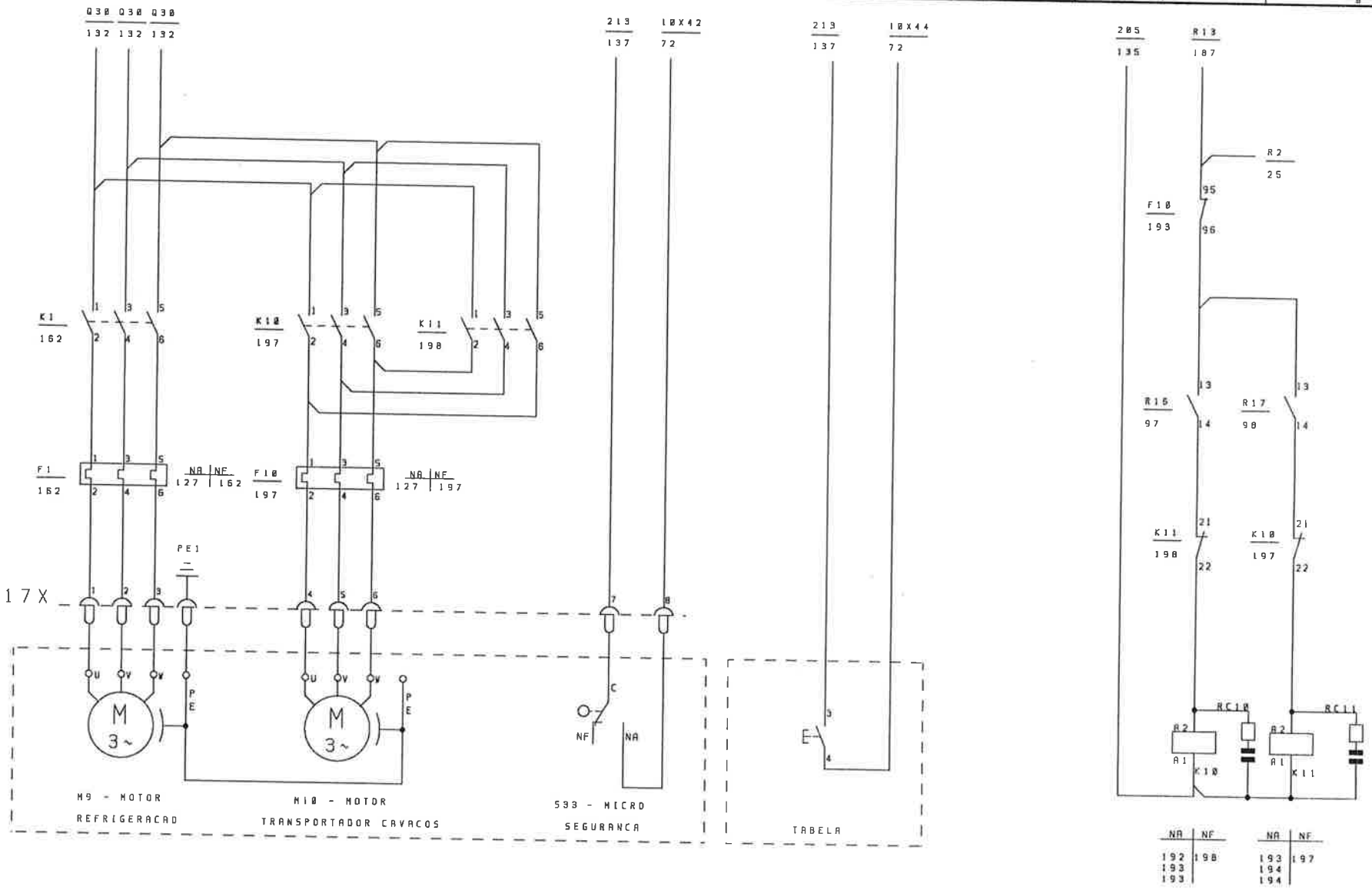
FAST TRACE

DIAGRAMA ELETRICO

FOLHA 18/22

SUBSTITUI	SUBSTITUIDO

NR. 044015003 DE



* USAR ESTA FOLHA SOMENTE QUANDO REQUERIDO TRANSPORTADOR DE CAVACOS

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

OBS: FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO

FAST TRACE

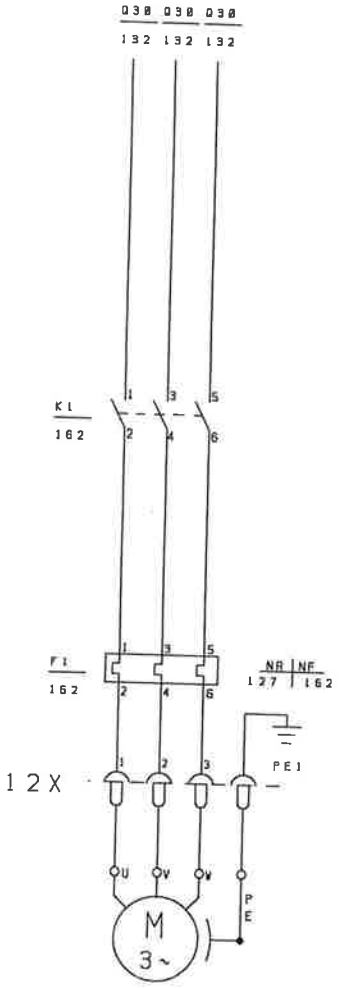
DIAGRAMA ELETRICO

FOLHA 19/22

SUBSTITUI | SUBSTITUIDO

NR. 844015003 DE

844.R19



M9 - MOTOR
REFRIGERACAO

* USAR ESTA FOLHA SOMENTE QUANDO REFRIGERACAO SEM TRANSPORTADOR DE CAVACOS

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

OBS:
FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGo. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 19A/22
SUBSTITUI | SUBSTITUIDO
NR. 044015003 DE

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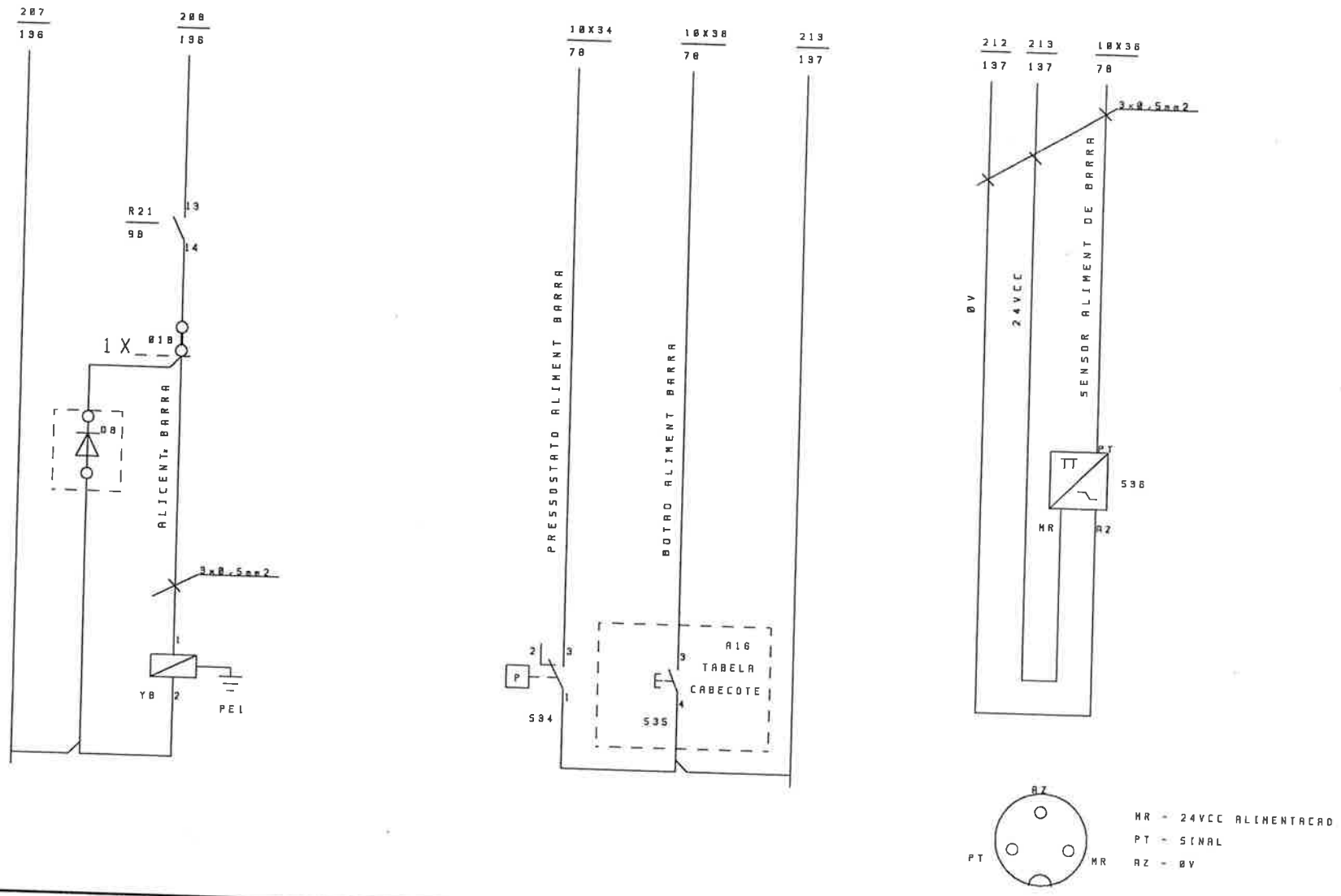


* USAR ESTA FOLHA SOMENTE QUANDO REQUERIDO ALIMENTADOR DE BARRAS

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

DBS:
FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

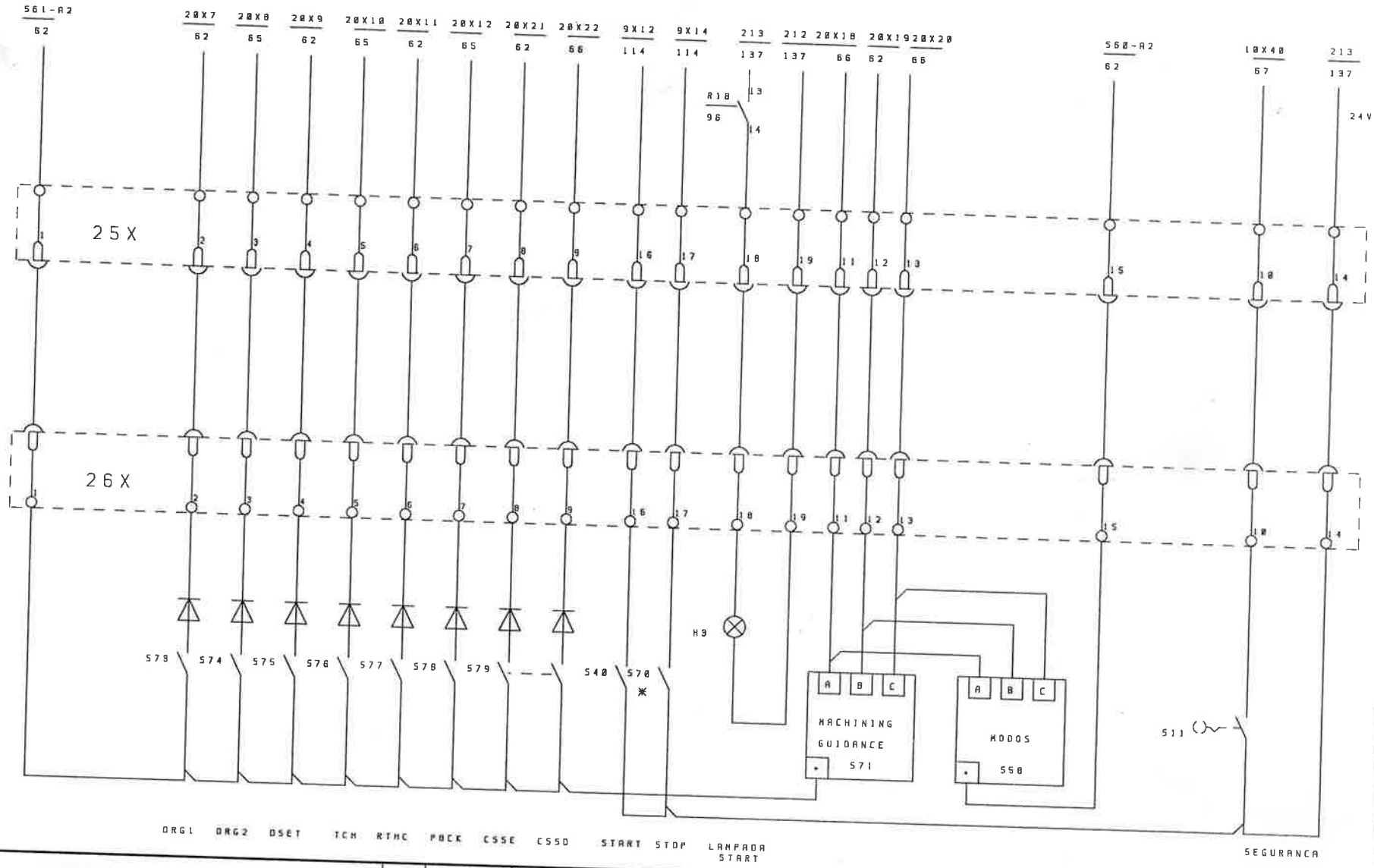
Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 20/22
SUBSTITUI | SUBSTITUIDO
NR. 044015003 DE

044.020



* SOMENTE QUANDO REQUERIDO

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

OBS:
FANUC 20T

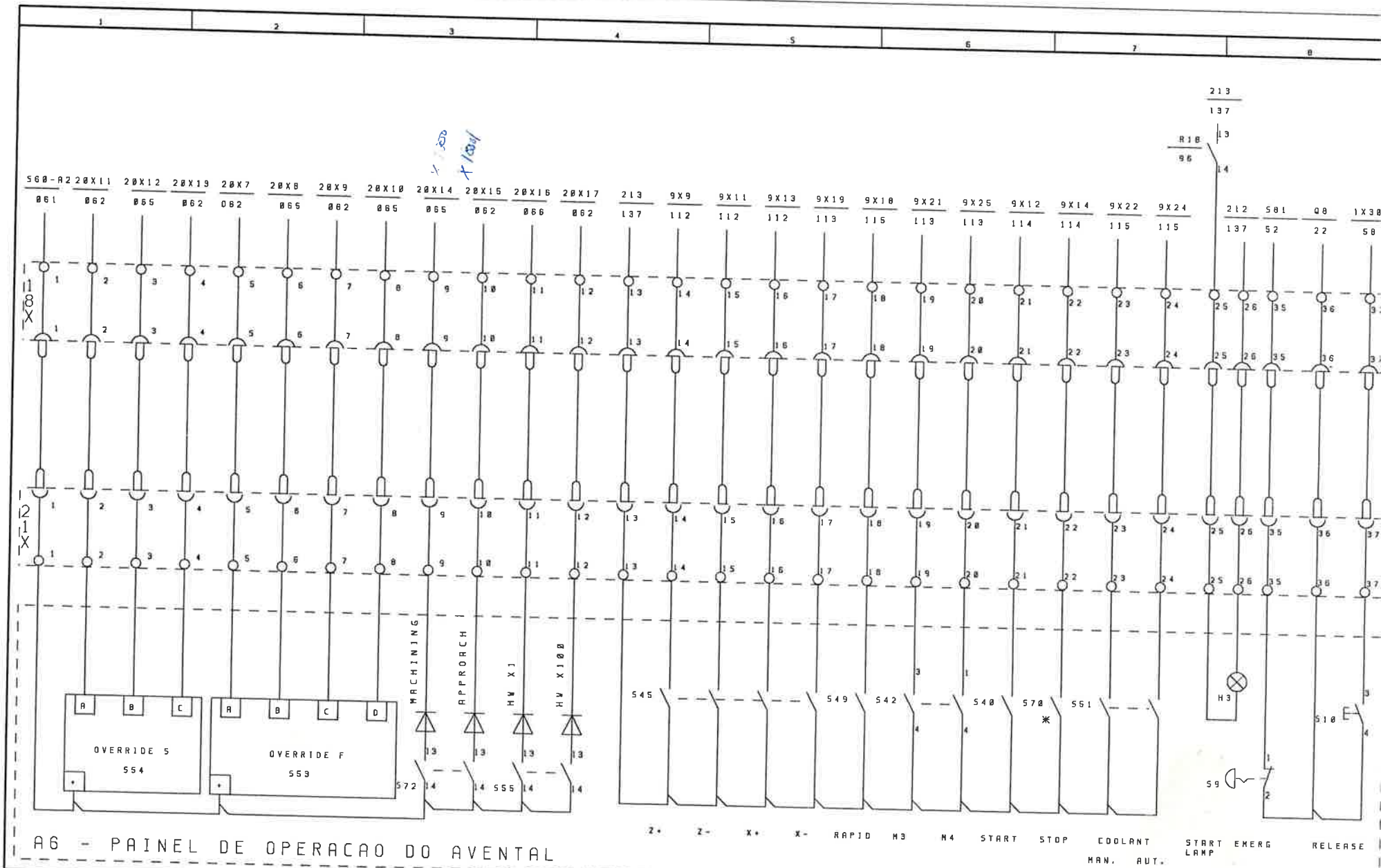
ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELET/ELETRONICA

NARDINI

TITULO
FAST TRACE
DIAGRAMA ELETRICO

FOLHA 21
SUBSTITUI
NR.



A6 - PAINEL DE OPERACAO DO AVENTAL

* SOMENTE QUANDO REQUERIDO

PROJ	14-03-95	BRANDAO	
DES	14-03-95	BRANDAO	
	DATA	NOME	

DBS: FANUC 20T

ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.

Depto. ENGa. PRODUTO
DIV. ELETÆLETRONICA

NARDINI

TITULO

FAST TRACE

DIAGRAMA ELETRICO

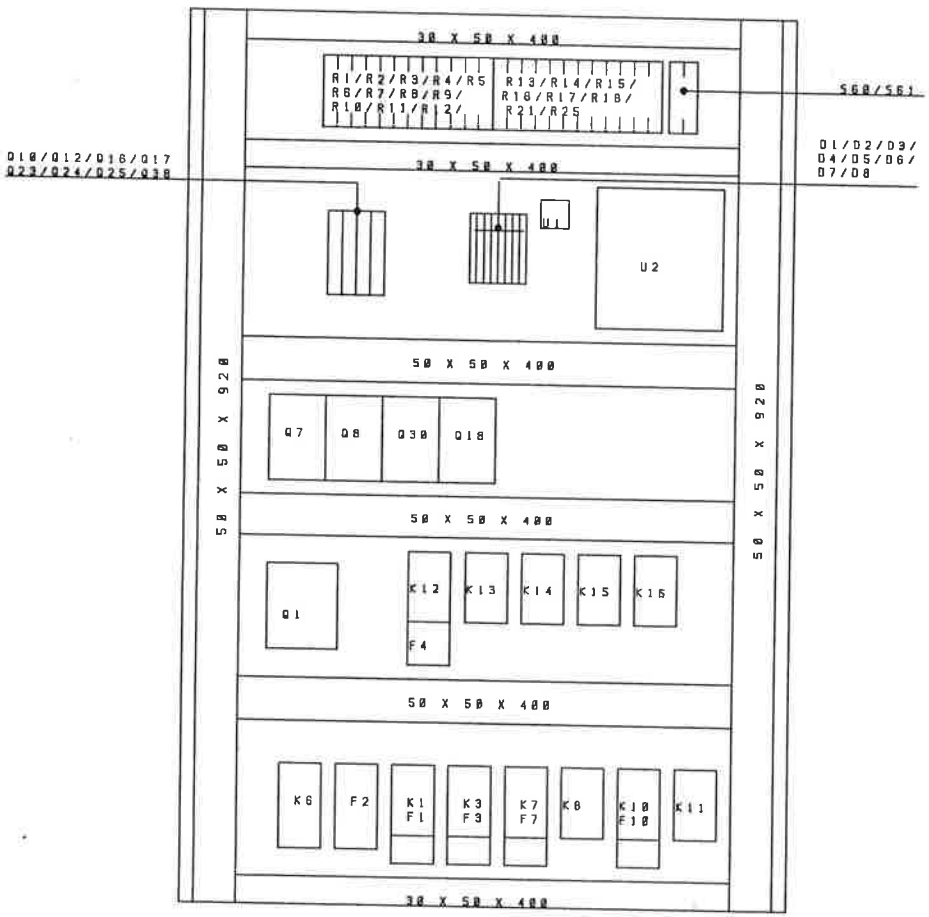
FOLHA 22/22

SUBSTITUT | SUBSTITUIDO

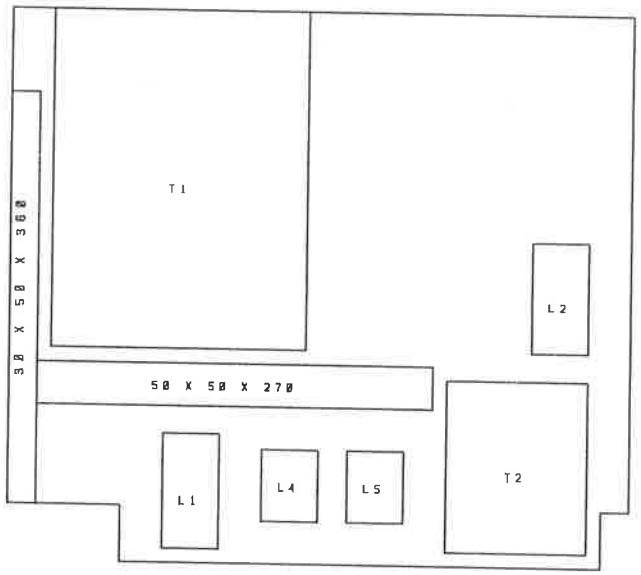
NR. 044015003 DE

044.022

PLACA BASCULANTE



PLACA COMPARTIMENTO INFERIOR



PROJ	14-03-95	BRANDAO	DBS: FANUC 20T	Depto. ENG. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 01/07
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE LAY OUT	SUBSTITUI / SUBSTITUIDO
	DATA	NOME				NR. 044015003 LAY

044LAY.001

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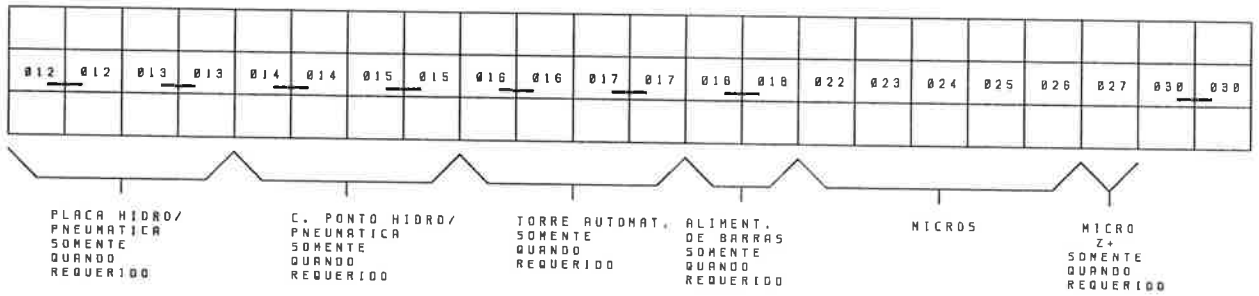
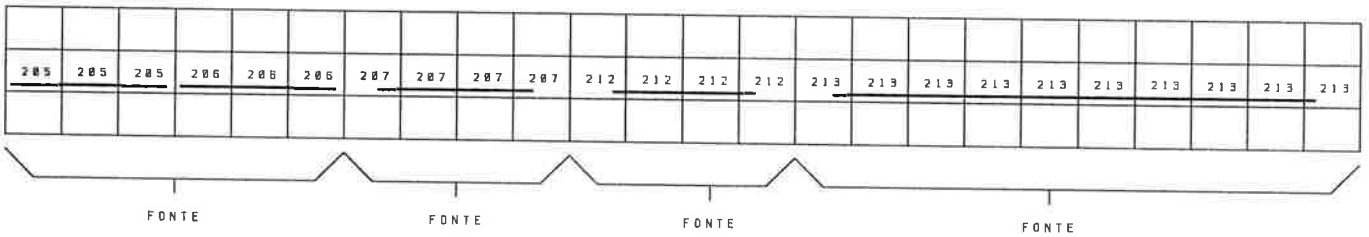




PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE
	DATA	NOME			LAY OUT ELETRICO

FOLHA 02/07

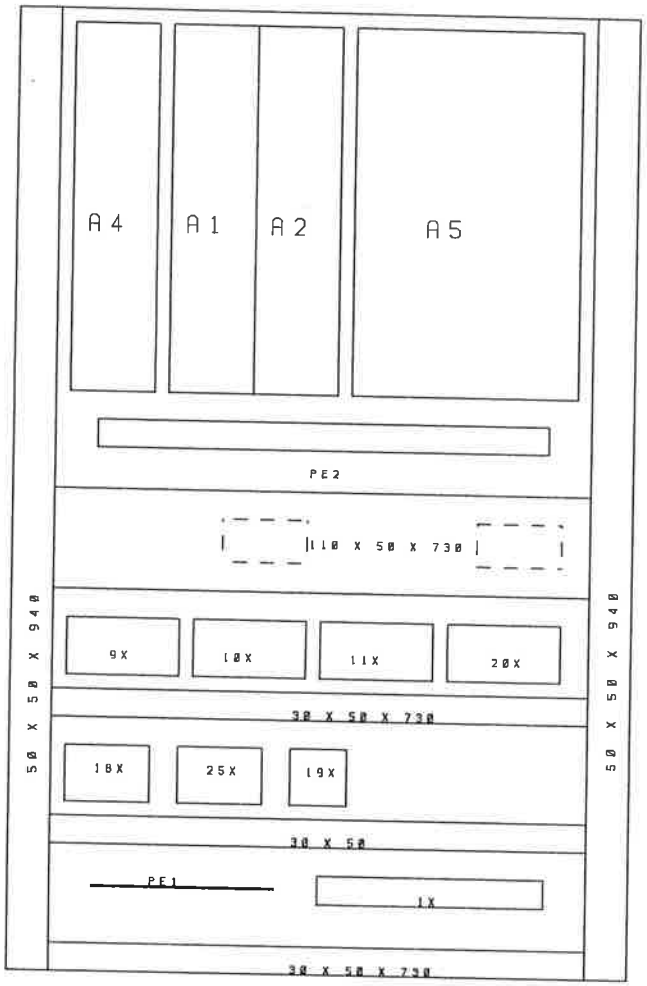
SUBSTITUI | SUBSTITUIDO

NR. 044015003 LAY

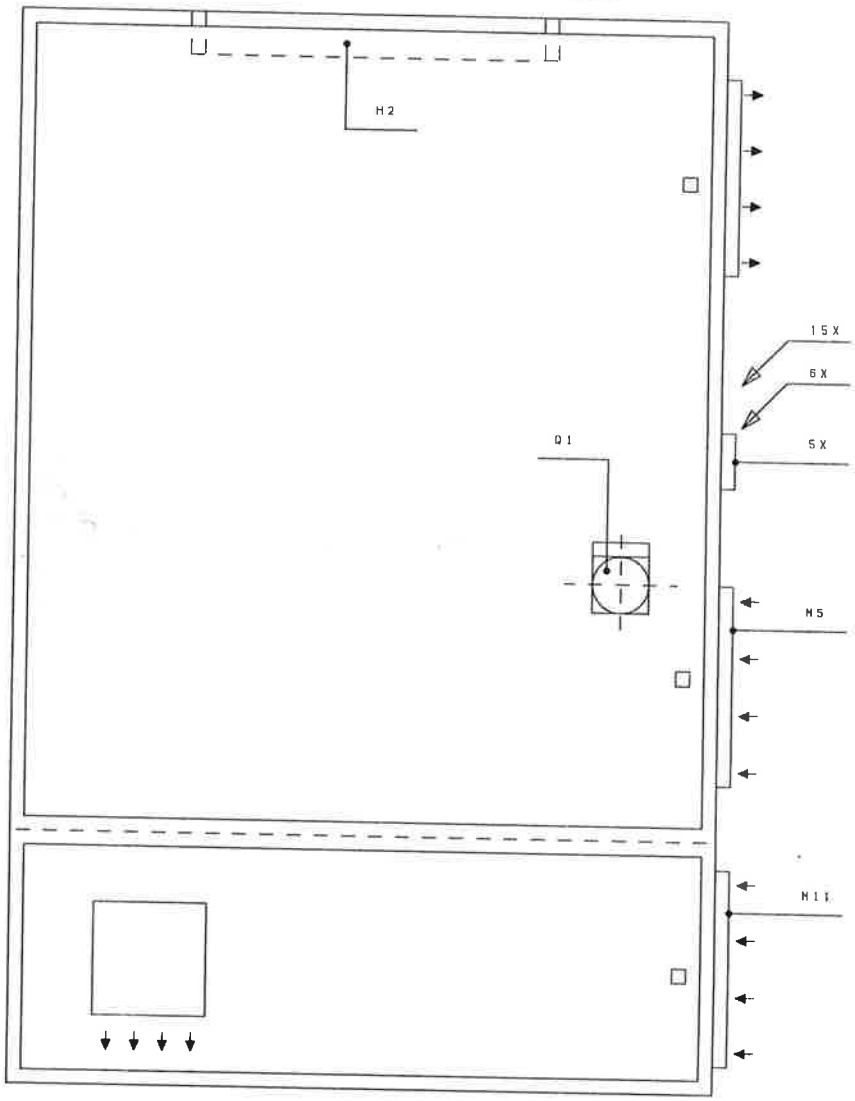
244LAY.DWG

1 2 3 4 5 6 7 8

PLACA DO FUNDO FIXA

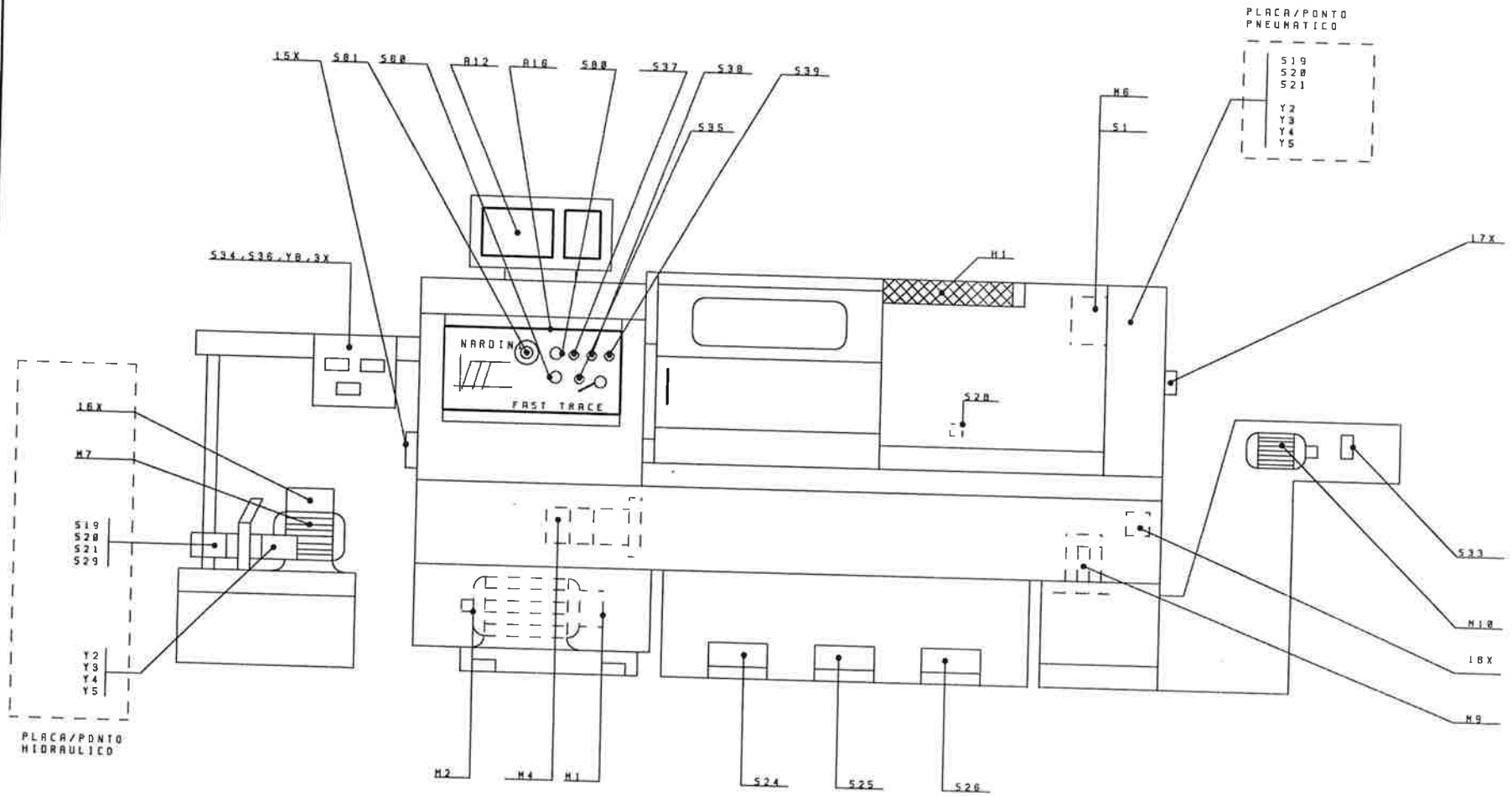


ARMARIO ELETRICO



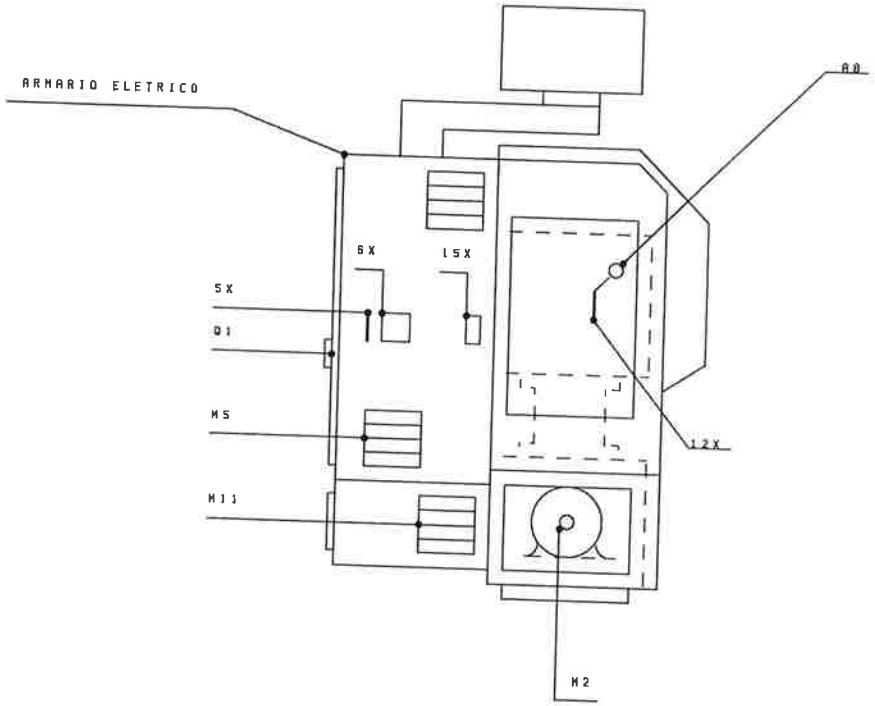
PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 03/07
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE LAY OUT ELETRICO	SUBSTITUI / SUBSTITUIDO
	DATA	NOME				NR. 044015003 LAY

044LAY.003



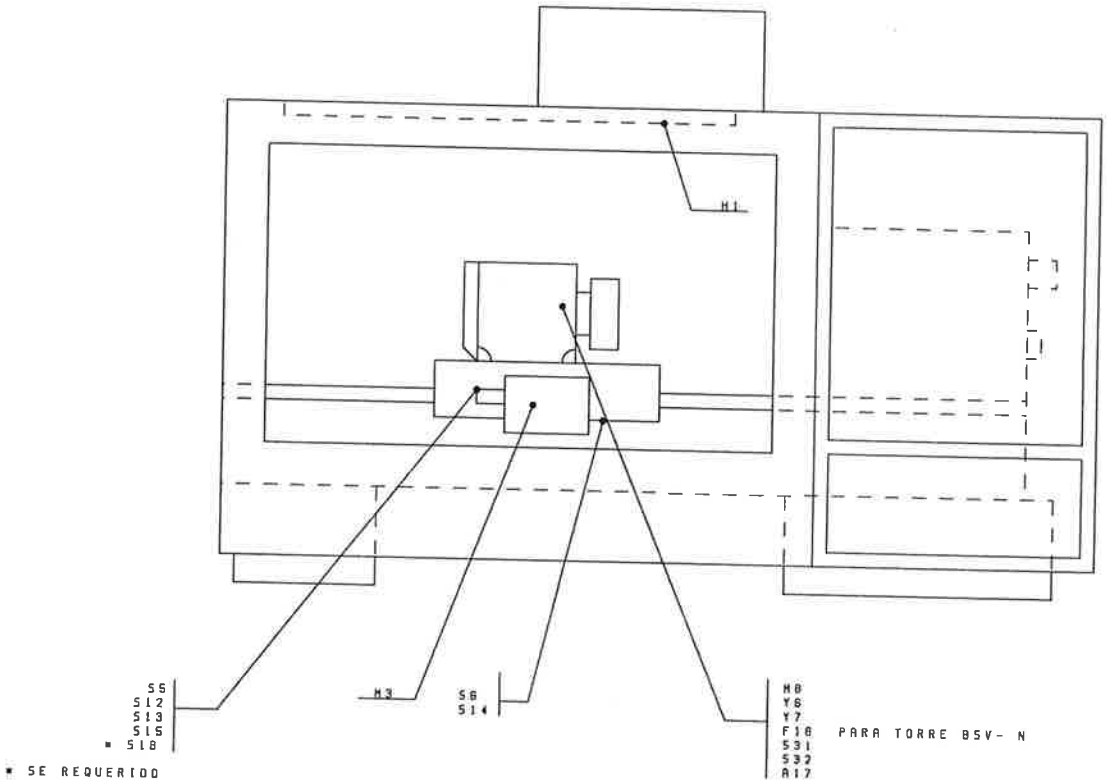
	PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 04/07
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE	SUBSTITUI / SUBSTITUIDO
		DATA	NOME			LAY OUT	NR. 044015003 LAY

044LAY.004



PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 05/05
DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE	SUBSTITUI / SUBSTITUIDO
	DATA	NOME			LAY OUT ELETRICO	NR. 044015003 LAY

044LAY.005



* SE REQUERIDO

	PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 06/07
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE	SUBSTITUI / SUBSTITUIDO
		DATA	NOME			LAY OUT ELETRICO	NR. 044015003 LAY

044LAY.005

1	2	3	4	5	6	7	8

SIMBOLO	CODIGO	FUNCAO	MODELO	FORNECEDOR
		COMPONENTES BASICOS		
A1		FONTE	SERVO CONVERTER A06B-6071-H201	FANUC
A2		DRIVE DOS EIXOS X,Z	SERVO INVERTER A06B-6074-H201	FANUC
A4	001522133	CONTROLE NUMERICO	COMANDO NUM. 20-TA	FANUC
A6		PAINEL DE OPERACAO	MANUAL MECANICO	
A8	001522051	ENCODER DO CABECOTE	ROD 420 1024 200.720.01	DIADUR
A12		CRT/MDI	9" CRT/MDI (SMALL)	FANUC
A16		TABELA DO CABECOTE	MANUAL MECANICO	
D10,D11, D12,D13, D14,D15, D16,D17	001521007	DIODO	DIODO IN 4148	QUALIFICADOS
F1	001512003	TERMICO - REFRIGERCAO 220V	REL. LRI-D09306 1/1.6A	TELEMECANIQUE
F2	001512008	TERMICO - BOMBA LUBRIF.DAS GUIAS	REL. LRI-D09303 0.25/0.4A	TELEMECANIQUE
H1	001525001	ILUMINACAO DA MAQUINA	LUMINARIA - 30V	QUALIFICADOS
H2	001525005	ILUMINACAO DO ARMARIO ELETRICO	LAMPADA FLUORESCENTE 15W	QUALIFICADOS
H3	001500000	LAMPADA DE CICLO	LAMPADA BA9S 24V 50MA 28MM	BLINDEX
K1	001511020 001511019	CONTATOR - REFRIGERACAO 60HZ	CONT.LCI-D0910-M6-220V/60HZ CONT.LCI-D0910-F6-110V/60HZ	TELEMECANIQUE
K1	001511057 001511084	CONTATOR - REFRIGERACAO 50HZ	CONT.LCI-D0910-M5-220V/50HZ CONT.LCI-D0910-F6-110V/60HZ	TELEMECANIQUE
K6	001511024 001511023	CONTATOR - LIBERACAO DOS EIXOS 60HZ	CONT.LCI-D1210-M6-220V/60HZ CONT.LCI-D1210-F6-110V/60HZ	TELEMECANIQUE
K6	001511066 001511065	CONTATOR - LIBERACAO DOS EIXOS 50HZ	CONT.LCI-D1210-M5-220V/50HZ CONT.LCI-D1210-M6-220V/60HZ	TELEMECANIQUE
L2		INDUTOR DOS SERVOS MOTORES	AC LINE FILT.A81L-0001-0083*3C	FANUC
L4	001516002	REATOR DA ILUMINACAO DA MAQUINA	40W/220V-50HZ/60HZ(ELETRONIC)	QUALIFICADOS
L5	001516001	REATOR DA ILUMINACAO DO ARM. ELETRICO	15W/110/220-50/60HZ(ELETRONIC)	QUALIFICADOS
MPG1		MANIVELA ELETRONICA	M.P.G. A860-0202-T001	FANUC
MPG2		MANIVELA ELETRONICA	M.P.G. A860-0202-T001	FANUC
M3		SERVO MOTOR DO EIXO X	A06B-123-B577*7000-(3N)	FANUC
M4		SERVO MOTOR DO EIXO Z	A06B-127-B577*7000-(6N)	FANUC
M5/M11	001524013 001524017	VENTILADOR DO ARMARIO ELETRICO	CONJ.VENTILACAO 220V 9631 CONJ.VENTILACAO 110V 9630	TASCO TASCO
M6		MOTOR - LUBRIF. GUIAS	MANUAL MECANICO	
M9		MOTOR - REFRIGERACAO	MANUAL MECANICO	
Q1	001507047	CHAVE GERAL	CH.GERAL KG648 E300 BRA 034E	KLAUS & NAIMER
Q7	001514028	DISJUNTOR DOS EIXOS 220V	5 SHD 315-3G-(15A)	SIEMENS
Q10-Q13	001514002	DISJUNTOR ALIMENTACAO DA FONTE 24VCC	5 SHD 104-3G-(4A)	SIEMENS
Q12	001514003	DISJUNTOR ALIMENTACAO DA FONTE 24VCC	5 SHD 106-3G-(6A)	SIEMENS
Q16	001514003	DISJUNTOR DA TOMADA DE MANUTENCAO	5 SHD 106-3G-(6A)	SIEMENS
Q17	001514005	DISJUNTOR DA LAMPADA DO ARM. ELETRICO	5 SHD 102-3G-(2A)	SIEMENS
Q23-Q24	001514003	DISJUNTOR DA ALIMENT. TRAFO COMANDO	5 SHD 106-3G-(6A)	SIEMENS
Q25	001514003	DISJ.DA ALIM.DA FONTE (110 OU 220VAC)	5 SHD 106-3G-(6A)	SIEMENS
Q30	001514053	DISJUNTOR DO BANCO DE MOTORES	PKZM1 - 16A	KLOCKNER-MOELLER
Q38	001514001	DISJUNTOR DA LUBRIF.DAS GUIAS	5 SHD 101-3G-(1A)	SIEMENS
PE1	038015001	BARRA DE ATERRAMENTO	BARRA DE ATERRAM. 240x10mm	CONEXEL
PE2		BARRA DE ATERRAMENTO	GROUNDING BAR	FANUC
R5	001513002	RELE - MOTOR DA REFRIGERACAO	RS3B-11016.2/1RV 24V-LNA	CONEXEL/ELETROHIDRO
R6	001513002	RELE - LUBRIFICACAO DAS GUIAS	RS3B-11016.2/1RV 24V-LNA	CONEXEL/ELETROHIDRO
R8	001513002	RELE - SAIDA DE EMERGENCIA	RS3B-11016.2/1RV 24V-LNA	CONEXEL/ELETROHIDRO
R25	001513002	RELE - EMERGENCIA	RS3B-11016.2/1RV 24V-LNA	CONEXEL/ELETROHIDRO
RC1	001519012	FILTRO - CONTATOR DE REFRIGERACAO	RC 47/100 / LCA-D25 22/100	TMV/ICOS
RC6	001519012	FILTRO - CONTATOR DOS EIXOS	RC 47/100 / LCA-D25 22/100	TMV/ICOS
S1		SENSOR NIVEL DE OLEO LUBRIF. DAS GUIAS	MANUAL MECANICO	
S5-S12, S14,S6	001510018	MICROS FIM DE CURSO X+/REF. X,Z-,REF.Z	BNS-519-B02-R8-40-11	BALLUFF
S13-S15	001510017	MICROS FIM DE CURSO X-/TAILSTOCK/Z-	BNS-519-100-R-11	BALLUFF
S9	001506009	BOTAO DE EMERGENCIA	2A-802G.10-VM/C2XEK+CA5B01	BLINDEX/KAP
S10	001506006	BOTAO DE RELEASE	2A-820.01-BC/C2X0NT+CSAB10	BLINDEX/KAP
S11	001506090	CHAVE LIBERACAO DE PROGRAMA	2A-828A.01	BLINDEX
S28		SENSOR DE LUBRIFICACAO DAS GUIAS	MANUAL MECANICO	

	PROJ	14-03-95	BRANDAO	085: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 01/04
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 LP

1	2	3	4	5	6	7	8

SIMBOLO	CODIGO	FUNCAO	MODELO	FORNECEDOR
S42	001506097	CHAVE M3/M4/M5	2A-826.3.1.11-PT C2XSN3PB+CSAB20	BLINDEX KAP
S40	001506091	BOTAO DE CICLO	2A-820.01-VD/C2X0NV+CSA010	BLINDEX/KAP
S45	001506028 001506115	CHAVE DE MOVIMENTO DOS EIXOS	MANIPUL.2A 2029.4TC C/ TRAVA	BLINDEX
S49	001506091	BOTAO DE AVANCO RAPIDO	MANIPUL.XD2-PA14 S/ TRAVA	TELEMECANIQUE
S51	001506097	CHAVE DE REFRIGERACAO	2A-820.01-VD/C2X0NV+CSAB10	BLINDEX/KAP
S53	001521011	MODULO DE OVERRIDE % F	COMUT. 2A-826.3.1.11 PT C2XSN3PB+CSAB20	BLINDEX KAP
S55	001506097	CHAVE DE INCREMENTO DAS MAN. ELETRON.	MODULO DE OVERRIDE 12 POS.	ELETROHIDRO
S58	001521010	CHAVE DE TRANSICAO DE MODOS	COMUT. 2A-826.3.1.11 PT C2XSN3PB+CSAB20	BLINDEX KAP
S60/S61	001513023	ACOPLADOR P/MULTIPLEXAR ENTRADAS	MODULO DE OVERRIDE 8 POS.	ELETROHIDRO
S70	001506149	BOTAO DE PARADA	RSO-24V.C.C.-903924.6	CONEXEL
S71	001521010	CHAVE DE MODOS MACHINING GUIDANCE	2A-802.11-AM/C2XE3A+CSAB11	BLINDEX/KAP
S72	001506104	CHAVE DE APPROACH/MACHINING	MODULO DE OVERRIDE 8 POS.	ELETROHIDRO
S73	001506078	BOTAO ORG1	COMUT. 2A-826.2.11 PT	BLINDEX
S74	001506078	BOTAO ORG2	BOT. LU 261/10 116010 IN	ACE
S75	001506078	BOTAO DATA SET	BOT. LU 261/10 116010 IN	ACE
S76	001506078	BOTAO TEACH IN	BOT. LU 261/10 116010 IN	ACE
S77	001506078	BOTAO RTHC	BOT. LU 261/10 116010 IN	ACE
S78	001506078	BOTAO PLAY BACK	BOT. LU 261/10 116010 IN	ACE
S79	001506088	CHAVE CSSE/CSSO	BOT. LU 261/10 116010 IN	ACE
S81	001506089	BOTAO DE EMERGENCIA	BOT. COMAN. LU 731 1.16.165	ACE
			2A-802G.10-VM/C2XEK+CSAB01	BLINDEX/KAP
U1	001521004	RETIFICADOR	SKB 7/08	SEMIKRON
U2	001521012	FONTE ESTABILIZADA	S24VA5AR	ELETROHIDRO
1X	001503008	REGUA DE BORNES	SAK 2,5 - PA 2796.6	CONEXEL
5X		TOMADA DE COMUNICACAO RS-232	PUNCH PANEL	FANUC
6X	001505019	TOMADA DE MANUTENCAO	S 2016 - 220V	STECK
9X	001522104	INTERFACE DE ENTRADA	INTER RS-F50 C022456.0	CONEXEL
10X	001522104	INTERFACE DE ENTRADA	INTER RS-F50 C022456.0	CONEXEL
11X	001522104	INTERFACE DE SAIDA	INTER RS-F50 C022456.0	CONEXEL
12X	001505099	TOMADA DO ENCODER 5	TOM.12P/F 20072101	DIADUR
18X	001522044	INTERFACE DE SAIDA	RS-5037B-C902108.6	CONEXEL
20X	001522104	INTERFACE DE ENTRADA	INTER RS-F50 C022456.0	CONEXEL
21X	001522044	INTERFACE DE SAIDA	RS-5037B-C902108.6	CONEXEL
25X	001522063	INTERFACE DE ENTRADA	INTER.RS-5025S C902102.6	CONEXEL
26X	001522063	INTERFACE DE ENTRADA	INTER.RS-5025S C902102.6	CONEXEL
T2	001516080	TRADO DE COMANDO	TRAFO-1200VA-220/380/415/440/ 575V-5-/60HZ	WALTEC
		COMPONENTES P/VERSAO ENGRENADO (OP. REQUERIDO)		
D1	001503052	DIODO DE FREIO	BORNE DIODO-IN 4004-EB 159.93 BORNE DIODO-IN4004	CONEXEL ENTRELEC
F4	001512011	TERMICO DO MOTOR PRINC.220V	REL. LR1-D,25322 10/25A	TELEMECANIQUE
K16,K12,K13, K14,K15	001511035 001511034	CONTATOR DO MOTOR PRINCIPAL 60HZ	CONT.LC1-D2501-M6-220V/60HZ CONT.LC1-D2501-F6-110V/60HZ	TELEMECANIQUE
K16,K12,K13, K14,K15	001511099 001511056	CONTATOR DO MOTOR PRINCIPAL 50HZ	CONT.LC1-D2501-M5-220V/50HZ CONT.LC1-D2501-F5-110V/50HZ	TELEMECANIQUE
M2	002132009	MOTOR PRINCIPAL 220V 60HZ	S 80D 5/8 220V 60HZ	WEG
M2	002132035	MOTOR PRINCIPAL 220V 50HZ	S 80D 5/8 220V 50HZ	WEG
Q10	001514032	DISJUNTOR DO MOTOR PRINCIPAL 220VAC	S 5MO 340-3G (40A)	SIEMENS
R1	001513002	RELE DE FREIO	RS30-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R2	001513002	RELE MOVIMENTO HORARIO	RS30-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R3	001513002	RELE MOVIMENTO ANTI-HORARIO	RS30-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R4	001513024	RELE GAMA ALTA/BAIXA	RS30-C900.16.2/1RV 24V 1RV	CONEXEL/ELETROHIDRO
RC12-RC13-RC14				
RC15-RC16	001519012	FILTRO DO MOTOR PRINCIPAL	RC LCA-025 22-100/RC 47-100	ICOS/THW
S60	001506104	CHAVE SELECAO DE GAMA	COMUT. 2A-826.2.11 PT	BLINDEX
Y1		SOLENOIDE DE FREIO	MECANIC MANUAL	

Parts list

	PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 02/04
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 LP

1	2	3	4	5	6	7	8

SIMBOLO	CODIGO	FUNCAO	MODELO	FORNECEDOR
		COMPONENTES PARA VERSAO VS (VELOCIDADE VARIAVEL)		
AS		DRIVE DO EIXO ARVORE	SPINDLE 6I A06B-6060-H007+H502	FANUC
M1		MOTOR - VENTILADOR DO MOTOR PRINCIPAL		FANUC
M2		MOTOR - EIXO PRINCIPAL	SPINDLE MOTOR 6I	FANUC
Q8	001514052	VENTILADOR DO MOTOR PRINCIPAL	PKZM 1 - 0,6 + NHI-11	KLOCNER - MOELLER
Q18	001514031	DISJUNTOR DO MOTOR PRINCIPAL	5 5HD 332-3G-(32A)	SIEMENS
R4	001513002	RELE - RESET DO EIXO ARVORE	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
S19	001505031	INTERFACE	INTERF.RS-50155 C9022181.6	CONEXEL
S37	001510017	MICRO DA GAMA DE VELOCIDADE II	BNS-519-100-R-11	BALLUFF
S38	001510017	MICRO DA GAMA DE VELOCIDADE I	BNS-519-100-R-11	BALLUFF
S39	001510017	MICRO DA GAMA DE VELOCIDADE III	BNS-519-100-R-11	BALLUFF
S54	001521010	CHAVE DE OVERRIDE 6 5	MODULO DE OVERRIDE 6 POS.	ELETROHIDRO
S88	001506091	BOTAO DE JOG	2A-B20,01-V0/C2X0NV+C5AB10	BLINDEX/KAP
LX		FILTRO DO DRIVE PRINCIPAL	AC LINE FILT.A61L-0001-0083#4C	FANUC
		COMPONENTES PARA TORRE AUTOMATICA		
A11		ENCODER DA TORRE	MANUAL MECANICO	
D6-D7	001503052	DIODO DO FREIO E INDEX DA TORRE	BORNE DIODO-IN 4004-EB 159.93 BORNE DIODO-IN 4004	CONEXEL ENTRELEC
F7	001512003	TERMICO - MOTOR DA TORRE 220V	REL. LR1-D09306 1/1,6A	TELEMECANIQUE
F18		TERMICO - TORRE	MANUAL MECANICO	
K7-K8	001511022 001511021	CONTATOR - MOTOR DA TORRE 60HZ	CONT.LC1-D0901-M6-220V/60HZ CONT.LC1-D0901-F6-110V/60HZ	TELEMECANIQUE
K7-K8	001511112 001511065	CONTATOR - MOTOR DA TORRE 50HZ	CONT.LC1-D0901-M5-220V/50HZ CONT.LC1-D0901-F5-110V/50HZ	TELEMECANIQUE
M8		MOTOR - TORRE	MANUAL MECANICO	
R12/R13	001513002	RELE - TORRE	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R14	001513002	RELE - SOLENOIDE DE INDEX	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R15	001513002	RELE - FREIO DA TORRE	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
RC7-RC8	001519012	FILTRO - CONTATOR DA TORRE	RC LCA-025 22-100/RC 47-100	ICOS/THW
S31		SENSOR DE INDEX DA TORRE	MANUAL MECANICO	
S32		SENSOR DE TORRE ASCENTADA	MANUAL MECANICO	
Y6		SOLENOIDE DE FREIO DA TORRE	MANUAL MECANICO	
Y7		SOLENOIDE DE INDEX DA TORRE	MANUAL MECANICO	
		COMPONENTES PARA PLACA\PONTO HIDRAULICO		
D2-D3	001503052	DIODO DA PLACA HIDRAULICA	BORNE DIODO-IN 4004-EB 159.93 BORNE DIODO-IN 4004	CONEXEL ENTRELEC
D4-D5	001503052	DIODO DA PONTO HIDRAULICO	BORNE DIODO-IN 4004-EB 159.93 BORNE DIODO-IN 4004	CONEXEL ENTRELEC
F3	001512006	TERMICO - MOTOR DA BOMBA HIDRAULICA	REL. LR1-D09310 4/6A	TELEMECANIQUE
K3	001511020 001511019	CONTATOR - HIDRAULICA 60HZ	CONT.LC1-D0910-M6-220V/60HZ CONT.LC1-D0910-F6-110V/60HZ	TELEMECANIQUE
K3	001511057 001511064	CONTATOR - HIDRAULICA 50HZ	CONT.LC1-D0910-M5-220V/50HZ CONT.LC1-D0910-F5-110V/50HZ	TELEMECANIQUE
M7		MOTOR - UNIDADE HIDRAULICA	MANUAL MECANICO	
R7	001513002	RELE - PLACA ABERTA	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R9	001513002	RELE - PLACA FECHADA	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R10	001513002	RELE - PONTO AVANCADO	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
R11	001513002	RELE - PONTO RECUADO	R530-11016.2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
RC3	001519012	FILTRO - CONTATOR HIDRAULICO	RC LCA-025 22-100/RC 47-100	ICOS/THW

	PROJ	14-03-95	BRANDAO	DESI FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 03/04
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 LP

1	2	3	4	5	6	7	8

SIMBOLO	CODIGO	FUNCAO	MODELO	FORNECEDOR
S19		SENSOR DE PLACA ABERTA	MANUAL MECANICO	
S20		SENSOR DE PLACA FECHADA	MANUAL MECANICO	
S21		SENSOR DE PONTO AVANCADO	MANUAL MECANICO	
S24	001506086	PEDAL - ABRE/FECHA PLACA	PEDAL ELETRICO	QUALIFICADOS
S25	001506086	PEDAL - PONTO AVANCADO	PEDAL ELETRICO	QUALIFICADOS
S26	001506086	PEDAL - PONTO RECUADO	PEDAL ELETRICO	QUALIFICADOS
S29		SENSOR GERAL DA UNIDADE HIDRAULICA	MANUAL MECANICO	
Y2		SOLENOIDE - PLACA ABERTA	MANUAL MECANICO	
Y3		SOLENOIDE - PLACA FECHADA	MANUAL MECANICO	
Y4		SOLENOIDE - PONTO AVANCADO	MANUAL MECANICO	
Y5		SOLENOIDE - PONTO RECUADO	MANUAL MECANICO	
15X	001505007	TOMADA - UNIDADE HIDRAULICA	CX 16PC 213 61	CONEXEL
16X	001503008	REGUA DE BORNES	SAK 2,5 - PA 2796.6	CONEXEL
		COMPONENTES PARA TRANSPORTADOR DE CAVACOS		
F10	001512003	TERMICO - MOTOR TRANSP. CAVACOS	REL. LR1-D09306 1/1,6A	TELEMECANIQUE
K10-K11	001511022	CONTATOR - TRANSPORT. DE CAVACOS 60HZ	CONT.LC1-D0901-M6-220V/60HZ	TELEMECANIQUE
	001511021		CONT.LC1-D0901-F6-110V/60HZ	
K10-K11	001511112	CONTATOR - TRANSPORT. DE CAVACOS 50HZ	CONT.LC1-D0901-M5-220V/50HZ	TELEMECANIQUE
	001511065		CONT.LC1-D0901-F5-110V/50HZ	
M10		MOTOR - TRANSP. DE CAVACOS	MANUAL MECANICO	
RC10-RC11	001519012	FILTRO - CONTATORES TRANSP. CAVACOS	RC LCR-025 22-100/RC 47-100	ICOS/TMW
R16-R17	001513002	RELE - TRANSPORTADOR DE CAVACOS	R530-11016,2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
S33		MICRO DO TRANSPORTADOR DE CAVACOS	MANUAL MECANICO	
S50	001506091	BOTAO DO TRANSPORTADOR DE CAVACOS	2A-820.01-VD/C2XBNV+C5AB10	BLINDEX/KAP
17X	001505004	TOMADA DE TRANSPORTADOR DE CAVACOS	CX 10PC 202 60	CONEXEL
		COMPONENTES PARA ALIMENTADOR DE BARRAS		
DB	001503052	D1000 - ALIMENTADOR DE BARRAS	BORNE C/D1000-IN 4004	CONEXEL
			BORNE C/D1000-IN 4004	ENTRELEC
R21	001513002	RELE - ALIMENTADOR DE BARRAS	R530-11016,2/1RV 24V-1NA	CONEXEL/ELETROHIDRO
S34		SENSOR DE ALIMENTADOR DE BARRAS	MANUAL MECANICO	
S35	001506091	BOTAO DE ALIMENTADOR DE BARRAS	2A-820.01-VD/C2XBNV+C5AB10	BLINDEX/KAP
S36		SENSOR DE ALIMENTADOR DE BARRAS	MANUAL MECANICO	
Y8		SOLENOIDE - ALIMENTADOR DE BARRAS	MANUAL MECANICO	
		COMPONENTES PARA CORREDICA		
S56		MICRO DA CORREDICA		
		COMPONENTES PARA ALIMENTACAO 380/440V		
T1	001516063	AUTOTRAFO 15KVA 220/380/440V	AUTOTRAFO 220/380/440V 15 KVA	WALTEC

	PROJ	14-03-95	BRANDAO	OBS: FANUC 20T	Depto. ENGa. PRODUTO DIV. ELET/ELETRONICA	TITULO	FOLHA 04/04
	DES	14-03-95	BRANDAO	ESTE DESENHO E PROPRIEDADE DAS INDUSTRIAS NARDINI S.A. NAO PODENDO SER USADO OU TRANSFERIDO SEM AUTORIZACAO POR ESCRITO.	NARDINI	FAST TRACE DIAGRAMA ELETRICO	SUBSTITUI / SUBSTITUIDO
		DATA	NOME				NR. 044015003 LP

8 MACHINING GUIDANCE

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PREFACE

This manual describes how machining guidance function operates on the NARDINI FAST TRACE lathe.

The reading of this manual is very important to operate this lathe. However the reading of the others manuals which are send with the machine is extremely recommended.

All contents of this manual may not be reproduced in any form without previous machine builder agreement.

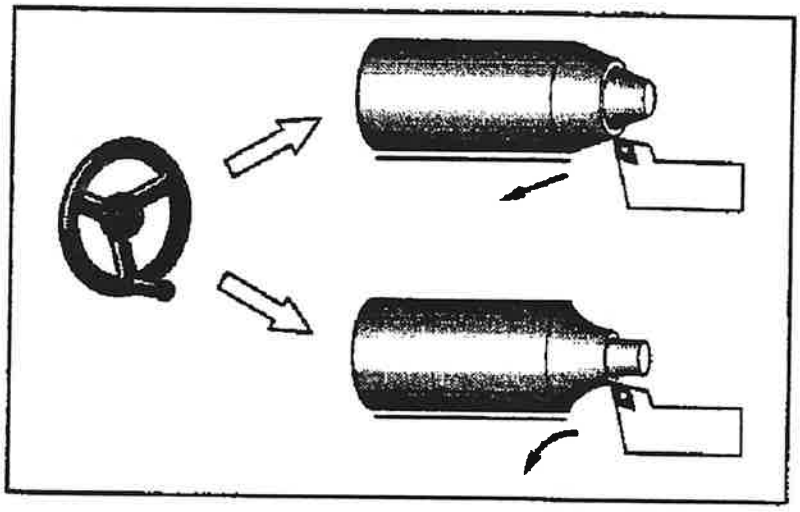
All contents, specifications, and designees described in this manual are subject to change without notice.

Have fun with Fast Trace machining guidance functions.

INTRODUCING

The machining guidance function was developed to control general-purpose lathes numerically. This function enables to carry out machining which is very difficult with a general-purpose easily.

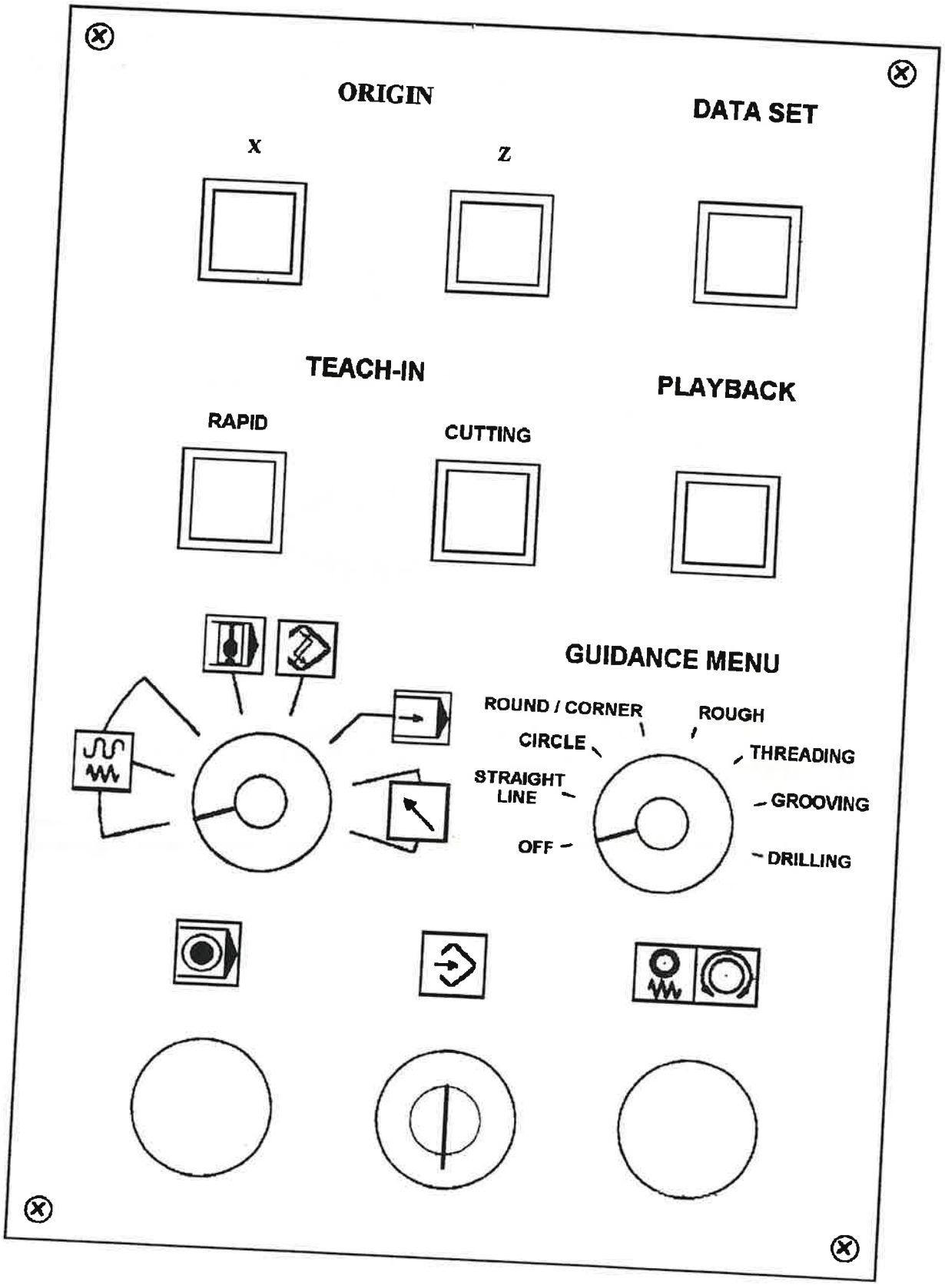
Examples :



To carry out machining along a oblique line or an arc the operator must rotate two handles simultaneously in synchronization. It is almost impossible to accurate machining with this method.

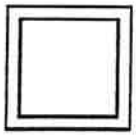
When machining guidance function is used, the synchronization is numerically controlled, then the operator just need to turn only one handle, which is called machining guidance handle in this manual.

1 OVERVIEW



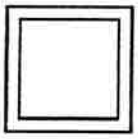
Machining guidance function switches. CNC table.

CUTTING

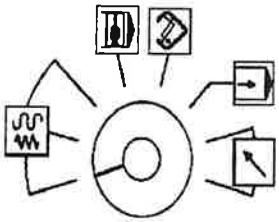


Teach-in cutting - Tell to the cnc that the last motion or cycle is cutting feed. The cycles feed is determined into the cycles screens and the motions feed is determined by the cutting feed parameter on the machining guidance parameter screen.

PLAYBACK

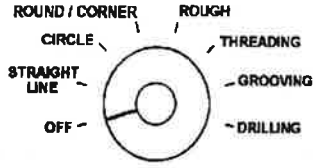


Playback - Execute the program created by teach-in sequences (O7999).

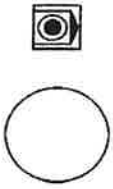


Mode select switch - Select the cnc operation modes. It has no effect when in machining guidance cycles are selected, so, put it in JOG mode for operation mistakes prevention. Obs: Since machine home position has been reached the home positions of the switch is valid like JOG mode.

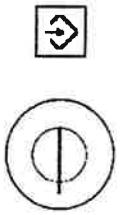
GUIDANCE MENU



Guidance menu select switch - Select whose machining guidance cycle is used. These cycles will be described following in this manual, however consult Series 20-TA Machining Guidance Function Operator's Manual from GE Fanuc Automation (GFZ-62204E-1/02)



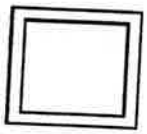
Start button - Start any program, since this program had been selected in automatic mode. It is used to confirm tool change.



Program protect key - Changes in part programs are only possible if this key is in on position (pressed). Keep this key ON when using machining guidance cycles in any way.

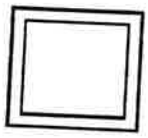
Description

X



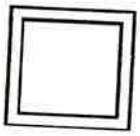
Origin X - Set X datum plane for machining. Set to zero the actual position display (absolute position) for X axis.

Z

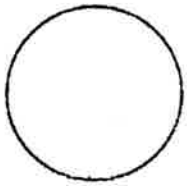


Origin Z - Set Z datum plane for machining. Set to zero the actual position display (absolute positions) for Z axis.

DATA SET

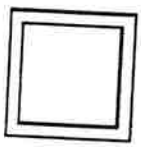


Data set - Take the current position to the actual cursor position in each axis.

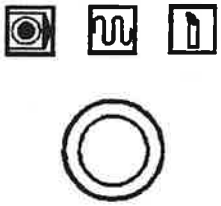


Feed Hold pushbutton - Stops the axis feed during automatic (mem) operation or MDI operation. To continue with normal feed after the feed hold pushbutton was pushed, press the start pushbutton once.
The reset key cancel this function too, but, remember that the reset key cancel the operation completely.

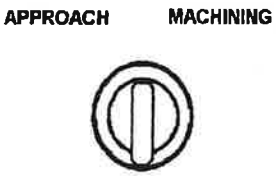
RAPID



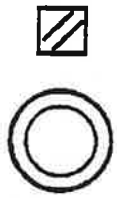
Teach-in rapid - Tell to the cnc that the last motion or cycle is G0 (F0) when in teach-in state mode.



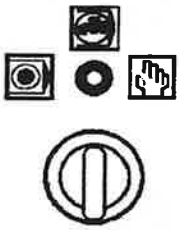
Start / Jog feed F0/ Tool change confirm button - Starts any program when in mem mode (automatic mode). Change the feedrate to F0 when in jog mode. Confirm (quit) the tool change request in mem mode or machining guidance mode. It is used to quit gear changes request too.



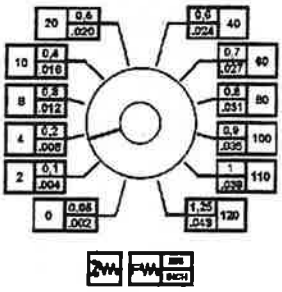
Approach / Machining select switch - Select the type of the handwheel movement in machining guidance mode if the jog axis joystick is on the central position (off).



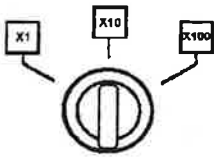
Axis release button - Use this button to move a hardware overtravelled axis away from the hardware overtravel switch. Press it and rotate the axis handwheel to the opposite side of the overtravel alarm.



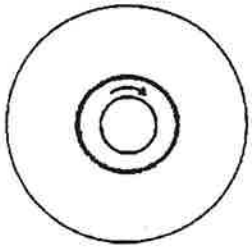
Coolant select switch - Turns the coolant on/off/auto. In the central position turns the coolant off in even if coolant was requested by the part program or machining guidance cycle. Turn it clockwise to turn coolant on in any mode. Turn it counterclockwise to turn coolant on only when requested by part program or machining guidance cycles.



Feedrate / Feedrate override select switch - Select feedrate (mm/rot or inch/rot) in jog mode. The feedrate is only active if axis jog joystick is selecting an axis and the spindle is rotating. The inside upper value is the mm/rot feedrate, inside down is inch/rot feedrate. Override the programed feedrate in mem mode and machining guidance cycles.

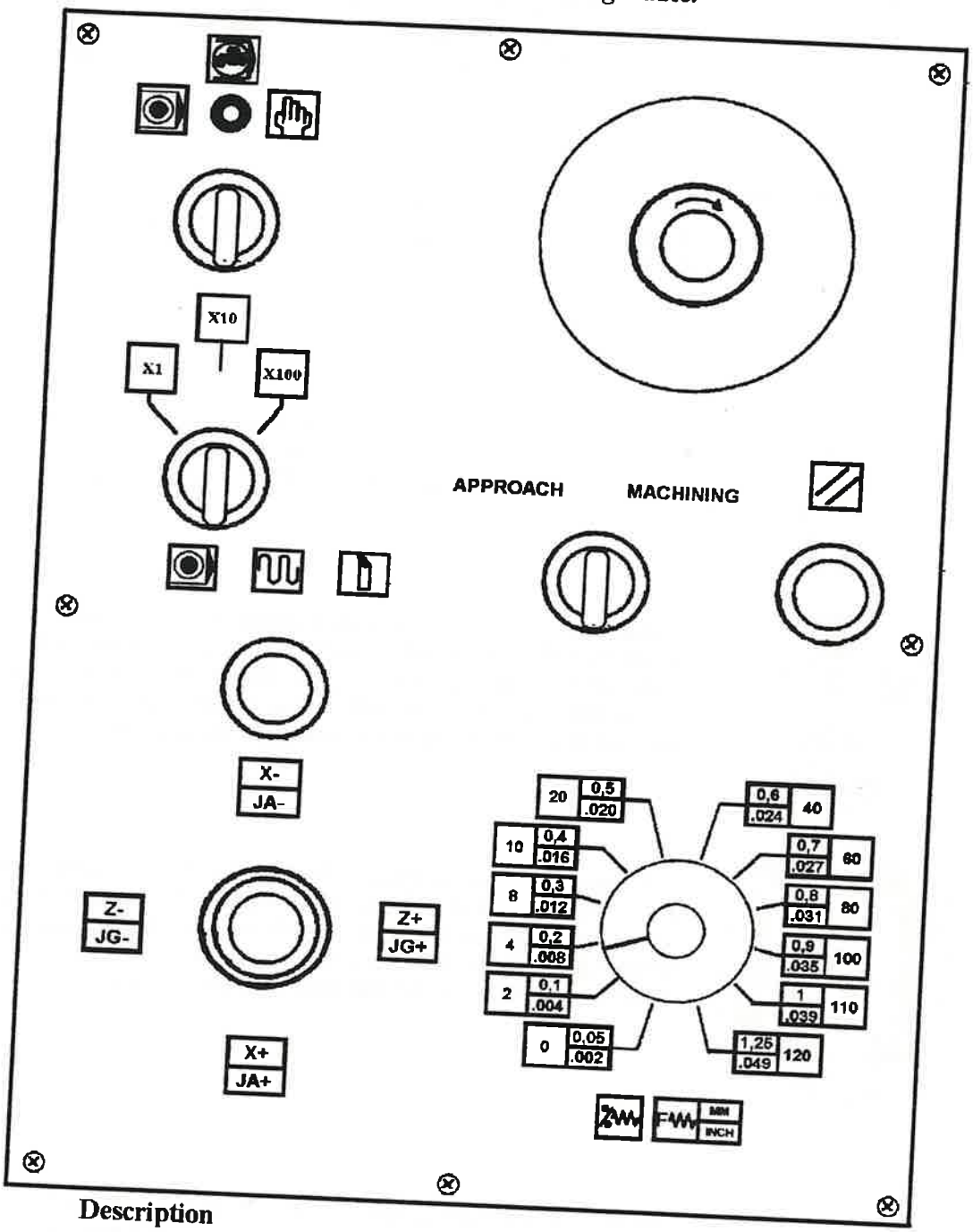


Handwheel's increment select switch - Select if each handwheel's dot is 1 or 10 or 100 times the cnc least increment (0,001 mm or 0.0001 inch).

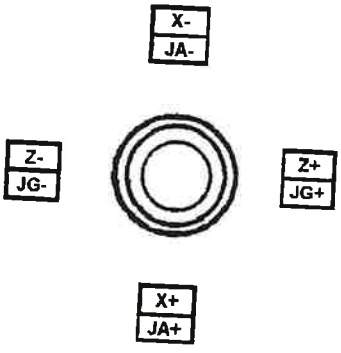


Emergency stop button - Keep it release to normal operation. Push it if an abnormal operation or mistakes occurs. All movement and speed is stopped as fast as possible and the cnc blinks emergency state, the program execution is aborted in anyway. Once pushed, turn it clockwise to release it and turn machine to ready state.

Machining guidance functions switches. Carriage table.

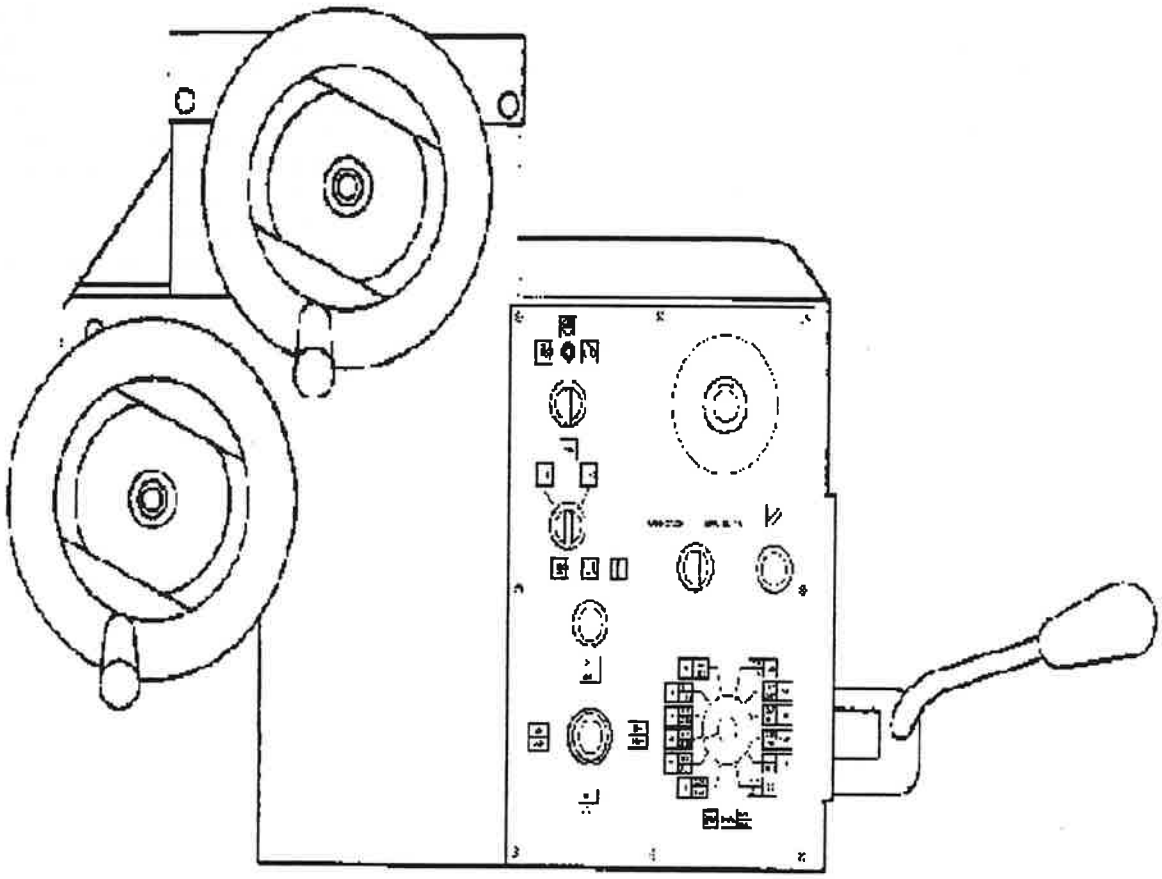


Description

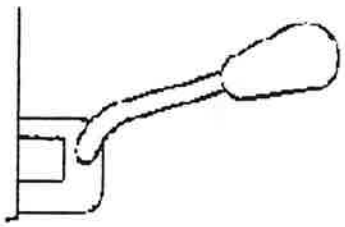


Jog axis Joystick - Select the axis directions movement. The axis movement only is enabled if spindle is rotating. Chose the desired with it and the desired feedrate on the feedrate/override select switch. It is used to enable machining cycles feed (machining path or approaching path) when in machining guidance mode.

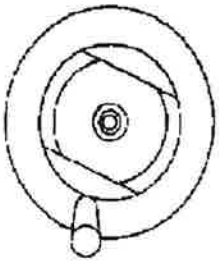
Machining Guidance functions switches. Handwheel's table.



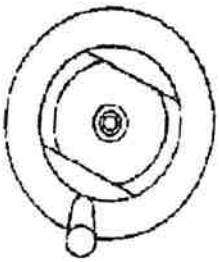
Description



Spindle handle - Turns spindle speed on (moving down turns on clockwise and moving up turns on counterclockwise) or off (moving to the center) when in jog mode or machining guidance cycles (when cycles are not being executed).



X axis handwheel - This is the upper right handwheel. It is used to move the X axis in jog mode like a general-purpose lathe, even the spindle speed is turned off. It is active since the jog axis joystick is on the central position (off). Select the dot increment value on the handwheel's increment select switch.

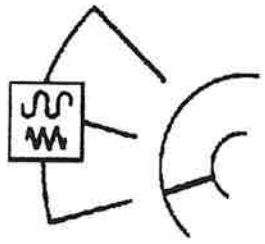


Z axis / machining-approach handwheel - This is the down left handwheel. It is used to move the Z axis in jog mode like a general-purpose lathe, even the spindle speed is turned off. When under machining guidance mode, it is used to move the two axis (if necessary) on the path described in the machining guidance cycles, or to approach to the same path. Select the desired movement - machining or approaching the described path - on the machining / approach select switch. It is active since the jog axis joystick is on the centra position (off). Select the dot increment value on the handwheel's increment select switch.

2 Machining guidance cycles description.

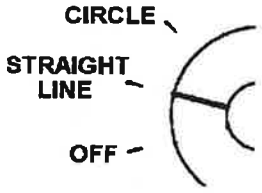
2.1 - Presetting tools

1 - Turn the mode select switch to JOG position.



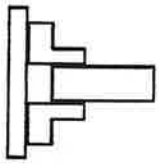
Mode select switch

2 - Turn the Machining guidance select switch to a position cycle position. Linear machining for example.



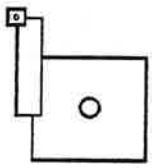
Machining guidance cycles select switch

3 - Put a part on chuck. Be sure that it is correctly locked.



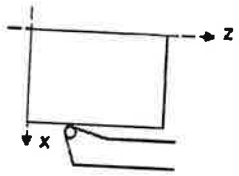
Part on chuck

4 - Put the tool which is to be preset on the tool post. Be sure that it is correctly locked.



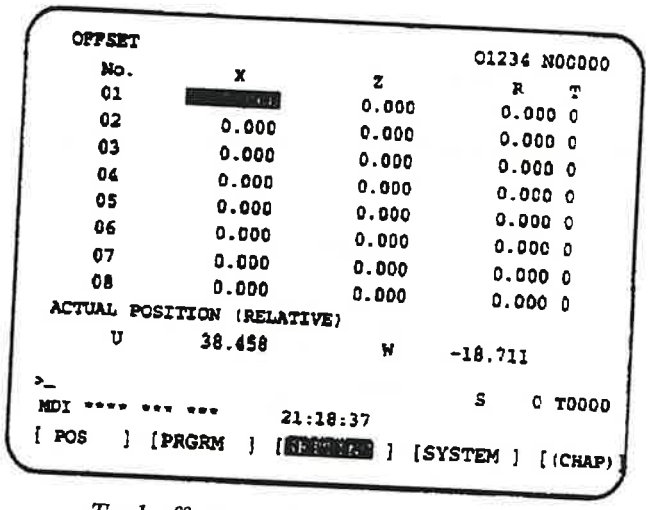
Tools on tool post

5 - Using the handwheels, touch the part with the tool tip on a known diameter. You can manually machine a little length and measure it.



Touching the diameter

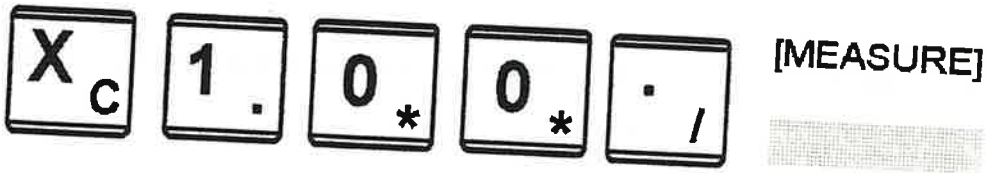
6 - Keep the X axis on this position and change the cnc screen to the tool offset screen. Push the OFFSET SETTING key as many time as necessary until the tool offset screen appears.



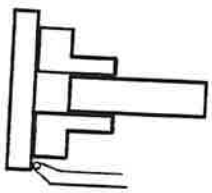
Tool offset screen

7 - Locate the cursor on the desired tool number no. 1 for example).

8 - Push X key on the cnc operator's panel and key in the value of the known diameter - don't forget the decimal point - and push the measure softkey. (X100. for example).

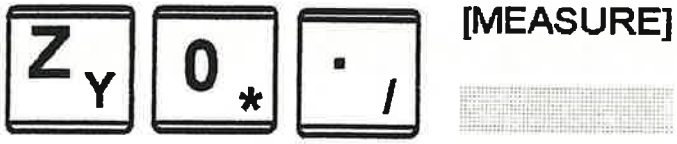


9 - Using the handwheels, touch the chuck on its length.



Touching the chuck length

10 - Keep the Z axis on this position.
11 - Push Z key and 0 key on the cnc operator's panel and push the softkey measure.



12 - Insert the tool tip geometry number and the tool tip radius.

*** Attention ***

Make sure that there is no T active - The T parameter on the machining guidance cycle actually displayed must be blank. Press the CAN key when the cursor is on the T parameter and put the cursor on the parameter (using arrows keys). Before presetting the tool, press reset key once.

Machining guidance screen T code blank and reset key.

All the workpieces will be referred to these points, the X axis value is always the diameter of the workpiece and the Z axis value is the length of the workpiece face to the chuck face.

2.2 - Z axis workpiece measurement

Put a preseted tool on the tool post, call the custom graphic screen on cnc (straight line, in the example).

Insert the tool number on T parameter.

Using handwheels, touch the workpiece face (Z axis).

The Z axis value displayed on the screen is the Z axis workpiece length (relative to he chuck).

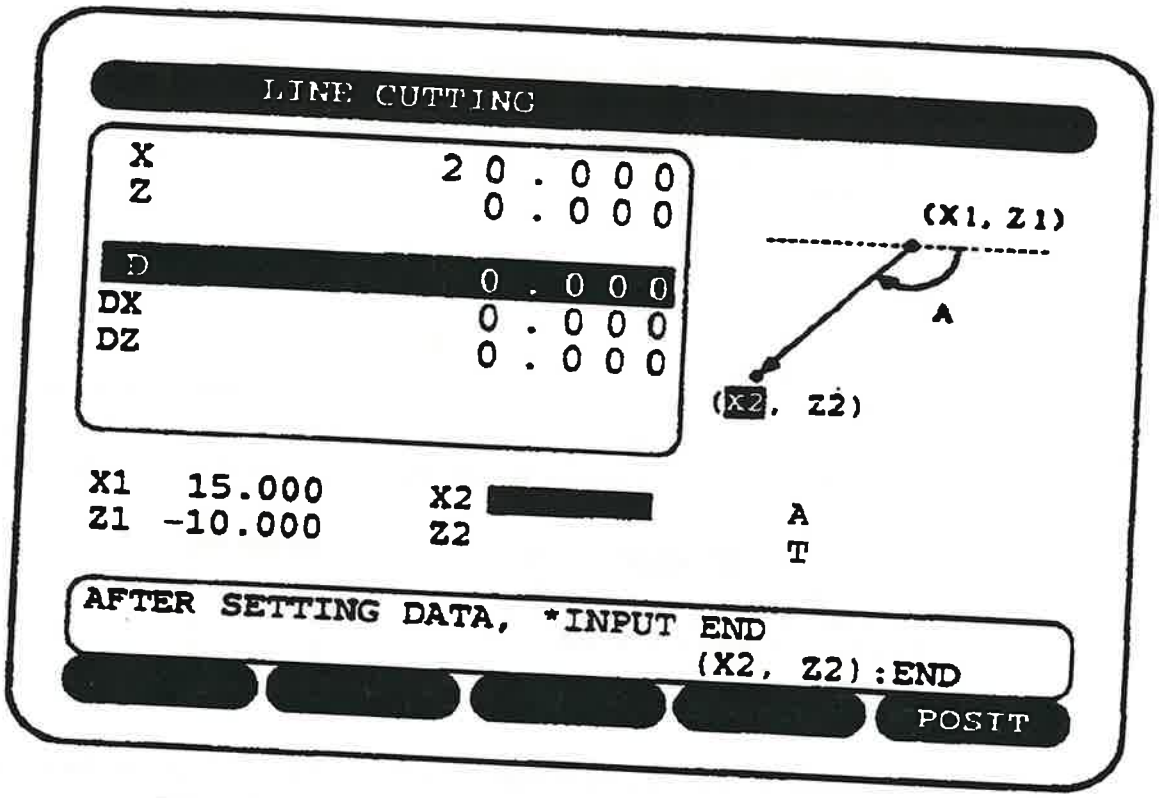
2.3 - Machining guidance T offset.

When T code preset is made, the offset values are automatically entered on the T offset screen of machining guidance. These values are the same of the normal offset screen, but there is another parameter, called GROOVE WN, this parameter is used to define the width of a groove tool, and the tool tip geometry, in this case, must be 0.

TOOL	COMPENSATION			TI	GROOVE
NO.	DX	DZ	RN	P	WN
01	123.45	123.45	123.45	0	3.3
02					
03					

Machining guidance T offset screen example

2.4 - Straight line cycle



Machining guidance straight line cycle screen

This cycle is used to machine along a line, defined by the data on screen. When the line angle is not known, you can define a start point (X1,Z1) and an end point (X2,Z2), or, if the line angle is known, you can define a start or an end point and the line angle (A). Defining the start point, the end point, and the angle an alarm will occurs. Note the sign and the value of the angle, it is clearly shown on the straight line cycle screen.

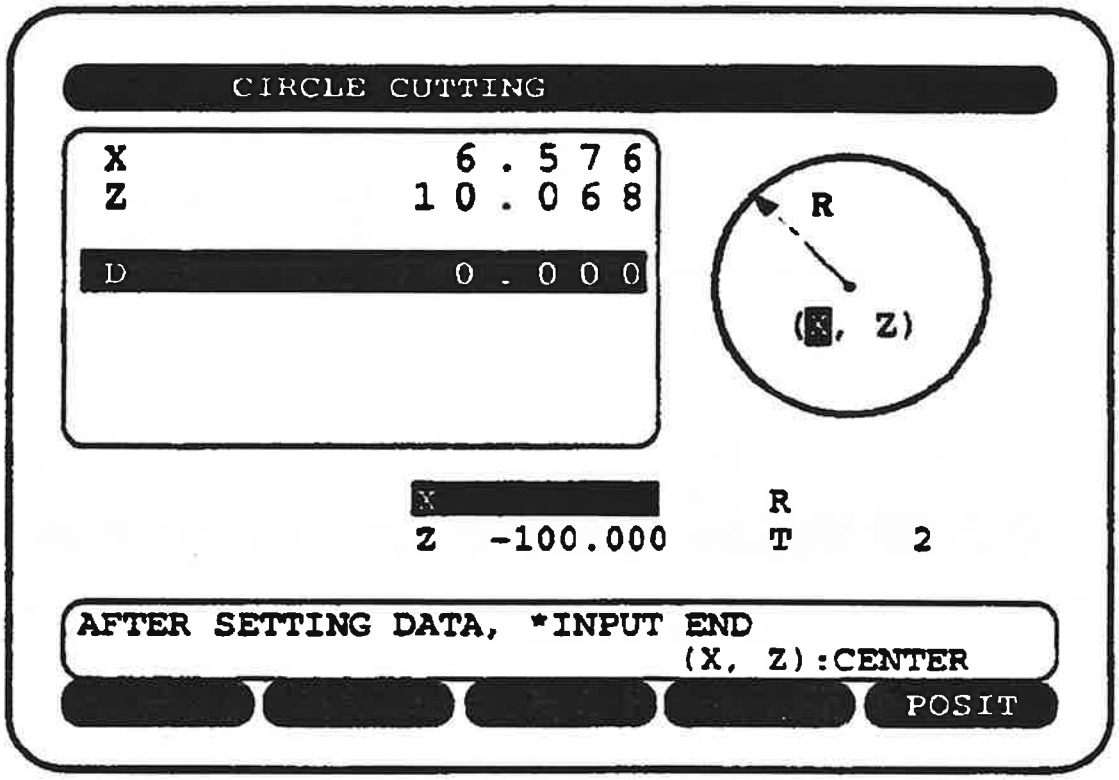
After entering required data press [INPUT END] key (insert key).

Use the axis jog joystick to machining along the defined line or to approach to the defined line. The approach movement is always 90º relative to defined line. The machining guidance handwheel can be use too, keep the axis jog joystick on the central position (off) an select the kind of the movement on the machining/approach select switch. The direction of the movement is displayed on the screen. When using the handwheel make sure to keep the feedrate/override feedrate select switch out of the first position.

Use the limit/release function to stop or no the approach movement when the tool reach the defined line. Using the limit function the approach movement is automatically stopped when the tools tip reach the defined line. Using the release function the axis has free movement, even the defined line is overcut.

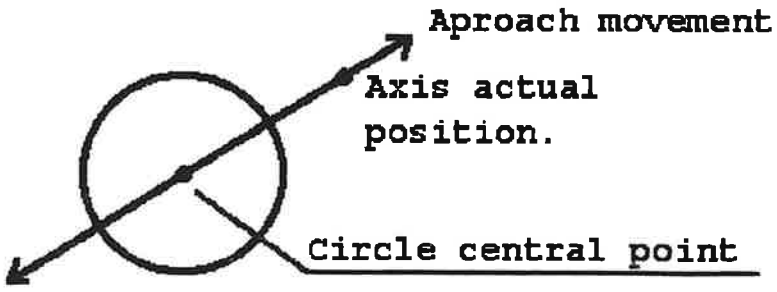
2.5 - Circle cutting cycle

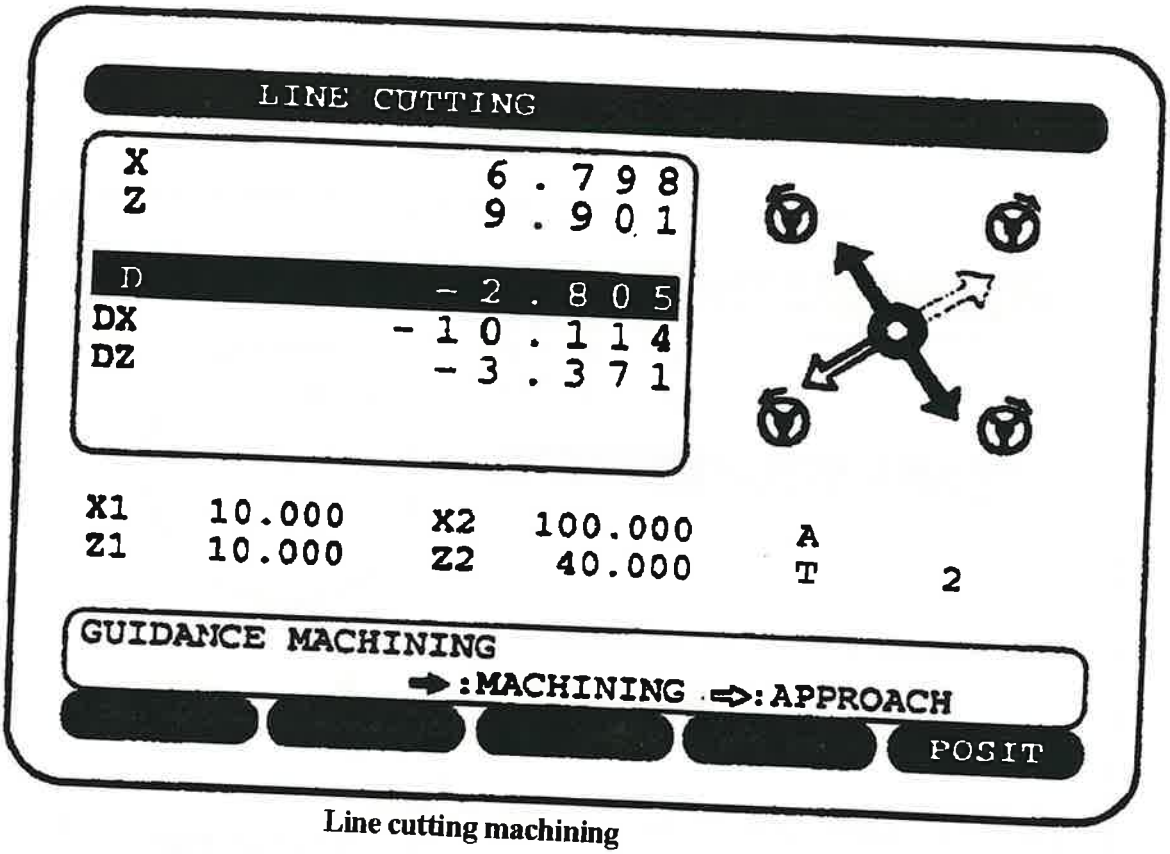
This cycle is used to circular and semicircular machining. Define the central point of the circle and the radius.



After entering the required data press [INPUT END] key (insert key).

Use the axis jog joystick to machining along the defined circle or to approach to the defined circle. The approach movement is always 90º relative to defined circle central point and the actual axis position. The machining guidance handwheel can be use too, keep the axis jog joystick on the central position (off) an select the kind of the movement on the machining/approach select switch. The approach movement is always forward to the defined circle, then the approach sign movement is relative to the defined circle. The direction of the movement is displayed on the screen. When using the handwheel make sure to keep the feedrate/override feedrate select switch out of the first position.





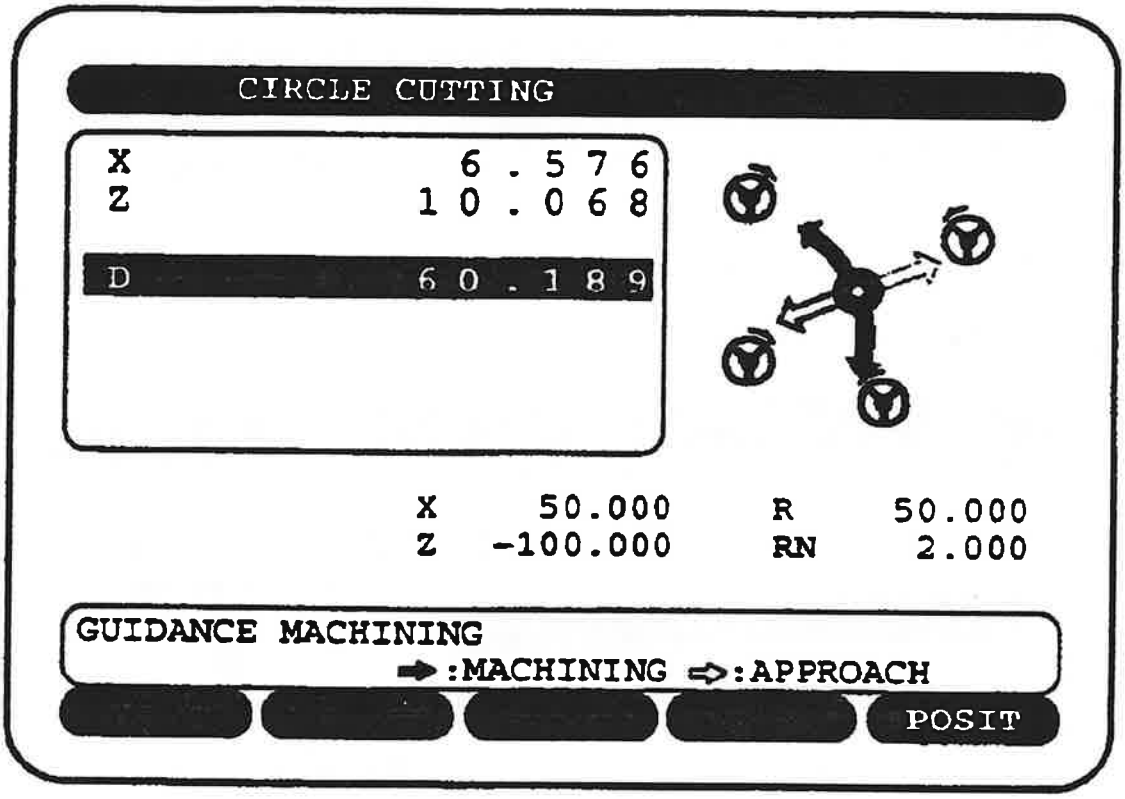
Line cutting machining

Push [INPUT RESUME] key (alter key) to cancel the cycle.

Required data:

X1,Z1 - Line point 1.
X2,Z2 - Line point 2 (Insert only if line angle is not specified).
A - Line angle (Insert only if line point 2 is not specified).
T - Tool number.
F - Feedrate.

Use the limit/release function to stop or no the approach movement when the tool reach the defined circle. Using the limit function the approach movement is automatically stopped when the tools tip reach the defined circle. The limit is always the defined circle, it means that if the tool is inside the defined circle it will not go out of the defined circle and if the tool is outside of the defined circle it will not go inside the defined circle. Using the release function the axis has free movement, even the defined circle is overcut.



Circle cutting cycle machining

Push [INPUT RESUME] key (alter key) to cancel the cycle.

Required data:

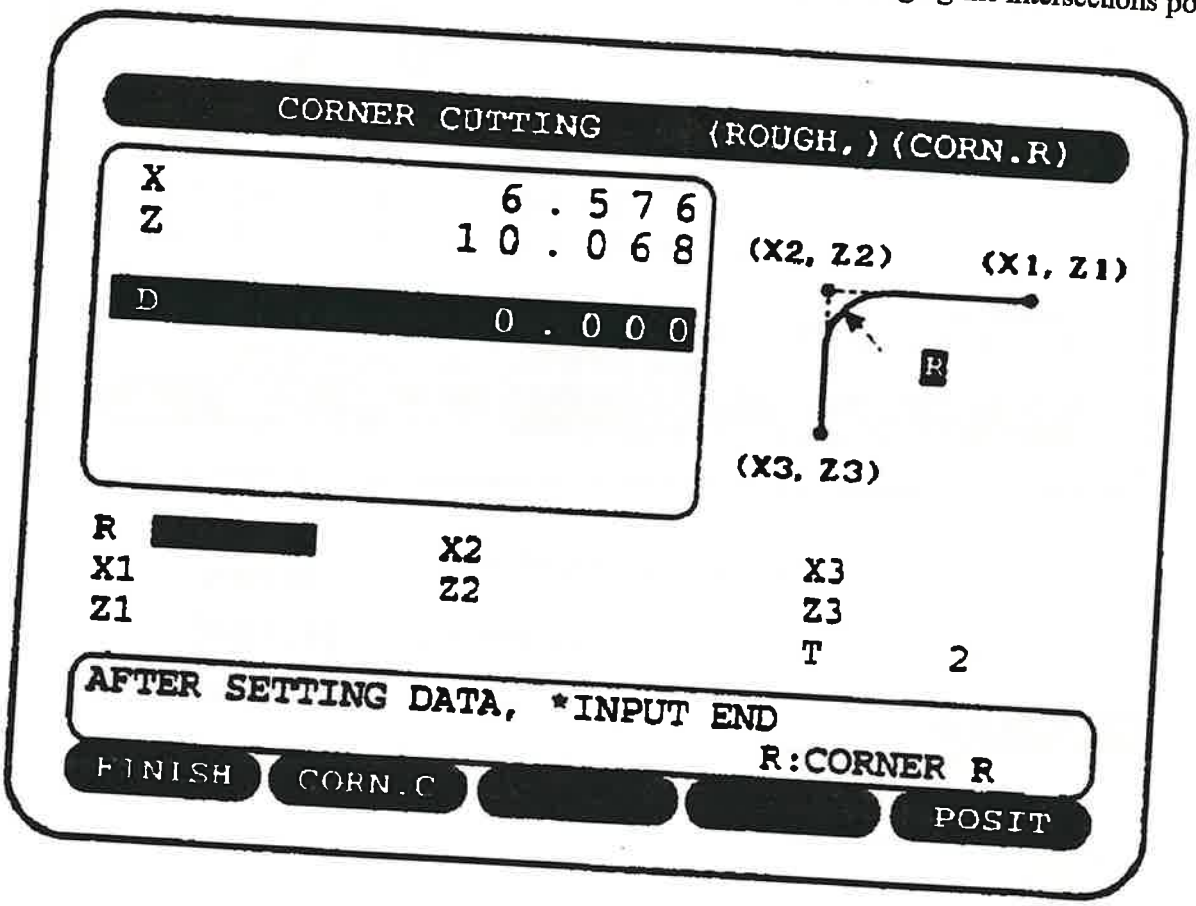
X - Circle center point X axis.
Z - Circle center point Z axis.
R - Circle radius.
T - Tool number.
F - Feedrate.

2.6 - Corner cutting cycle

This cycle is used to continuous machining of two straight lines and a corner (rounding or chamfering) on its intersection. Rough machining and finish machining are carried out in this mode, but rough machining can be skipped to carry out only finish machining. Even internal and external corner can be carried out.

Insert the start point (X1,Z1) the intersection point (X2,Z2) and the final point. Select the kind of the corner (chamfering or radius) - if corner radius is selected, the R parameter becomes the value of the radius, and if corner chamfering is selected the R parameter become the value of the 45º chamfering on each axis. Select even if the type of the movement will be roughing or finishing the described path.

Outer or inner corner can be machined, its can be obtained changing the intersections point.



After entering the required data press [INPUT END] key (insert key) once.

Approach to start point, then input end guidance machining message will appear in the guidance menu area.

Using the handwheels or the axis jog joystick, approach to the desired cutting point (remember the allowance to finish machining), then press [INPUT END] key again.

Use the machining guidance handwheel or the axis jog joystick to move the axis. The tool will move along the defined path.

2.7 - Roughing

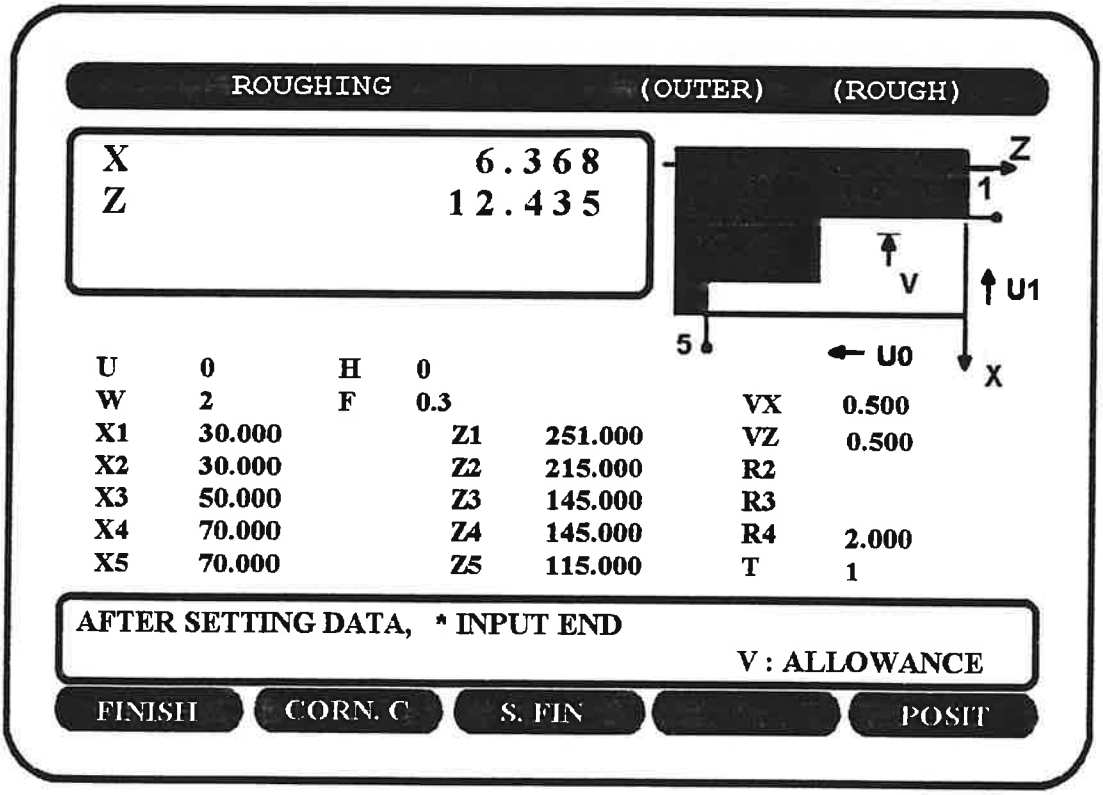
This cycle is used to carry out more complex workpieces. It can carry out workpieces with until five defined points with corner rounding or chamfering on three points intersection. The corner chamfering is always 45º and the corner rounding is always 90º.

Rough or finish path can be choose. Choosing rough path, the tool will move along the defined rough movement (parallel to the Z or to the X axis, defined by the U parameter), and approach the other axis the value defined by the cut width parameter automatically. In roughing sequence the allowance (V parameter) is not carried out.

Surface finish can be used too, in this case only the final figure path is carried out and the allowance (V) is not carried out, this is used when the workpiece is not a blank, but it is a preformed part.

When finish machining is used the axis are moved only on the final figure path, and the workpiece finish allowance (V) is carried out.

Using the handwheels, approach to a point next to the beginning of the cycle. Enter the required data (not all parameters are required, if the workpiece has less than five points, keep blank the parameters not used. Each data is explained on the screen in the guidance menu area. Example - V:ALLOWANCE



After entering the required data press [INPUT END] key (insert key).

Use the axis jog joystick or the machining guidance handwheel to move the axis according to the

Pressing the finish softkey the target corner figure is displayed and the end point is erased. Enter the

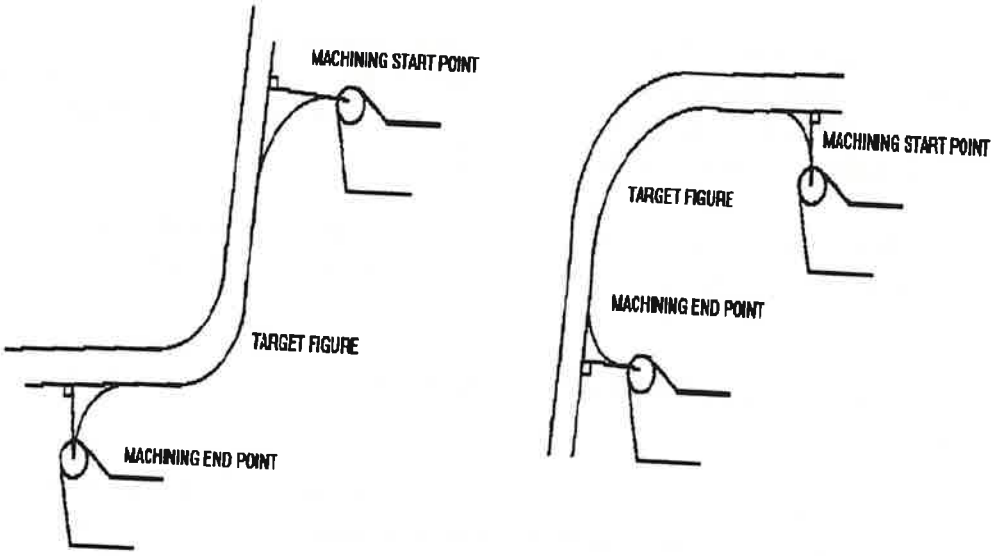


figure data and start finish machining from the beginning.
The cycle is automatically cancelled on its end.

Cancel cycle without ending it pushing the [INPUT RESUME] key (alter key).

defined cycle. Keep the machining / approach select switch on the machining position. Remember that the spindle speed must be turned on to execute the cycle using the axis jog joystick.

The machining guidance handwheel can be used too, to do this put the axis jog joystick on the central position (off). Remember that the feedrate is the one of the handwheel turning speed.

This cycle can be used as many time as necessary to machining parts with more than five points.

This cycle is automatically cancelled on its end.
Cancel cycle without end pushing [INPUT RESUME] key (alter key)

Required data :

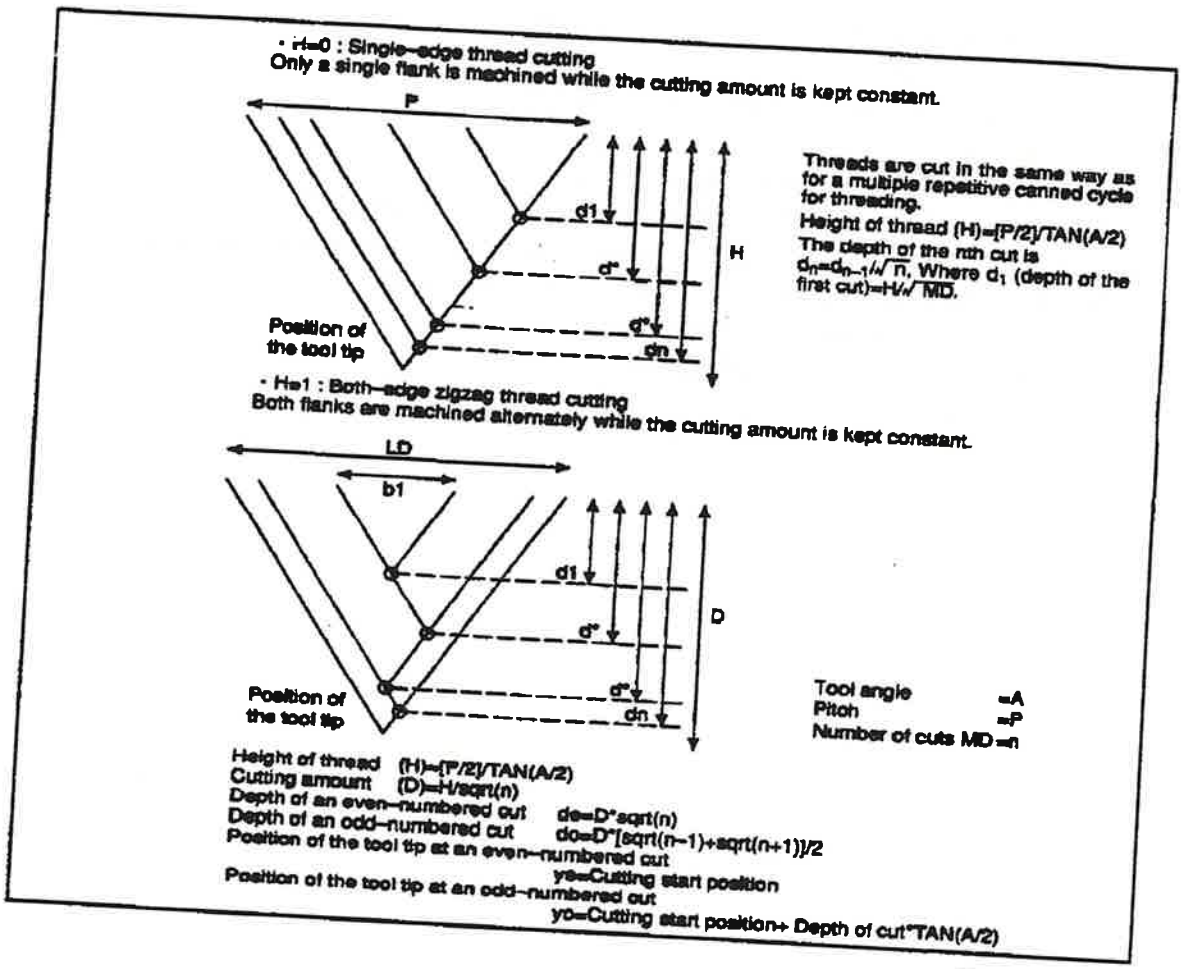
U - external or internal cycle (0:outer 1:inner)
W - Cutting width
H - Cutting path along Z axis (0) or X axis (1)
F - Feedrate
X,Z points - Specifies the workpiece path.
R/C points - To change from radius chamfering (R) and corner chamfering (C) use the COR NER C. or CORNER R. softkey when the cursor is on the required data
Specifies the chamfering value (45º for corner and 90º for radius).
VX - Allowance in X axis for finishing path.
VZ - Allowance in Z axis for finishing path.
T - Tool number.

2.8 - Threading

Use this cycle to carry out internal / external, male / female, mm or pitch/inch, parallel or nonparallel threads. All the parameters are explained on the screen, put the cursor on the desired parameter and the explain will appear on the guidance menu area. Example - V : ALLOWANCE

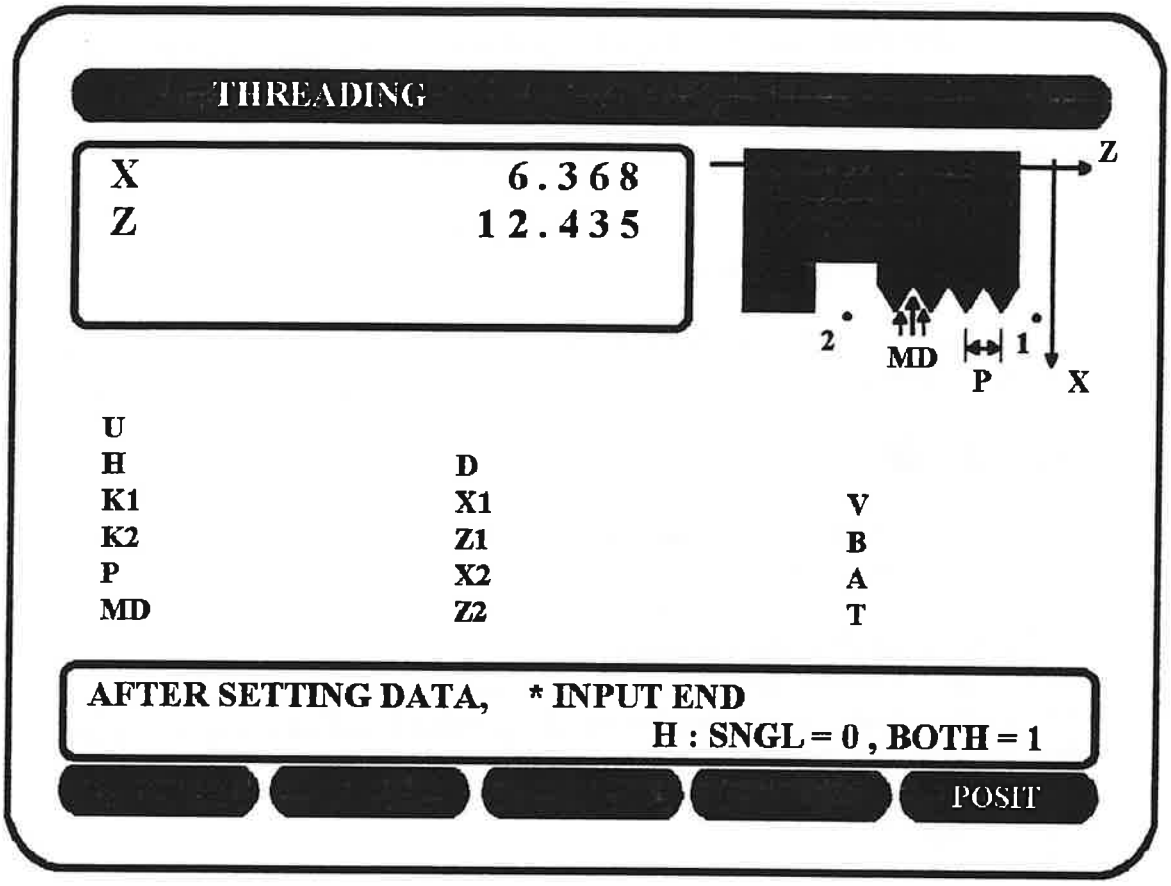
Insert the start point (X1,Z1) , the final point (X2,Z2) - nonparallel threads can be carried out when the X2 parameter differs from X1 parameter - the depth (D) of thread, choose male or female, inner or outer, the number of clean paths on the final depth and the insert the thread tool angle.

The thread cutting width value differs its means in accordance with the type of cutting (H parameter). The thread cutting amount is defined by the MD parameter. See the figure below to know how these parameters operate.



After entering the required data push [INPUT END] key (insert key).

Remember that a thread can only be executed if the spindle is turned on. Use the machining guidance handwheel ONLY when the axis is not on the thread path (return movements only), if it is used on the thread path the thread will be not carried out correctly. Use the axis jog joystick on the thread path, and even doing it, don't turn the joystick off on the thread path, if the axis jog joystick is turned off during the thread path, the thread will be not carried out correctly.



Incomplete thread can be carried out (the incomplete thread angle is always 45º), to do this insert the following data in the common parameter screen before the cycle operations.

Lenght of incomplete thread (CL) - Insert a two-digit numeral from 00 to 99. This parameter means the distance from the final thread point and the point where the tool will begin to move out of the thread path without loose the synchronism. This distance is : CL parameter * 0.1 * Pitch

Remember that the common parameters are not lost when the cycle terminate, the, if a normal thread will be executed, check these parameters.

Others thread related common parameters :

Distance to stable speed (TC) - Define the point where the cnc will start the thread. This value is add to the Z axis start point.

Clearance along the X axis for threading (TH) - Define the return amount of the X axis when the Z axis return to the thread start point.

Finishing thread:

See the following to know how to finish threads:

Finish thread type 1 - When the clearance for finish and the number of finishing cuts are 0 or not specified the finishing path is performed once.

Finish thread type 2 - When clearance for finish is 0 or not specified and the number of finishing cuts is other than 0 the finishing path is performed the specified number of times.

Finish thread type 3 - When clearance for finish is other than 0 and the number of finishing cuts is 0 or not specified the finishing path is performed once.

Finish thread type 4 - When clearance for finish and the number of finishing cuts are other than 0 the finishing path is performed the specified number of times.

This cycle is automatically cancelled on its end.
Cancel cycle without end pushing [INPUT RESUME] key (alter key)

Required data :

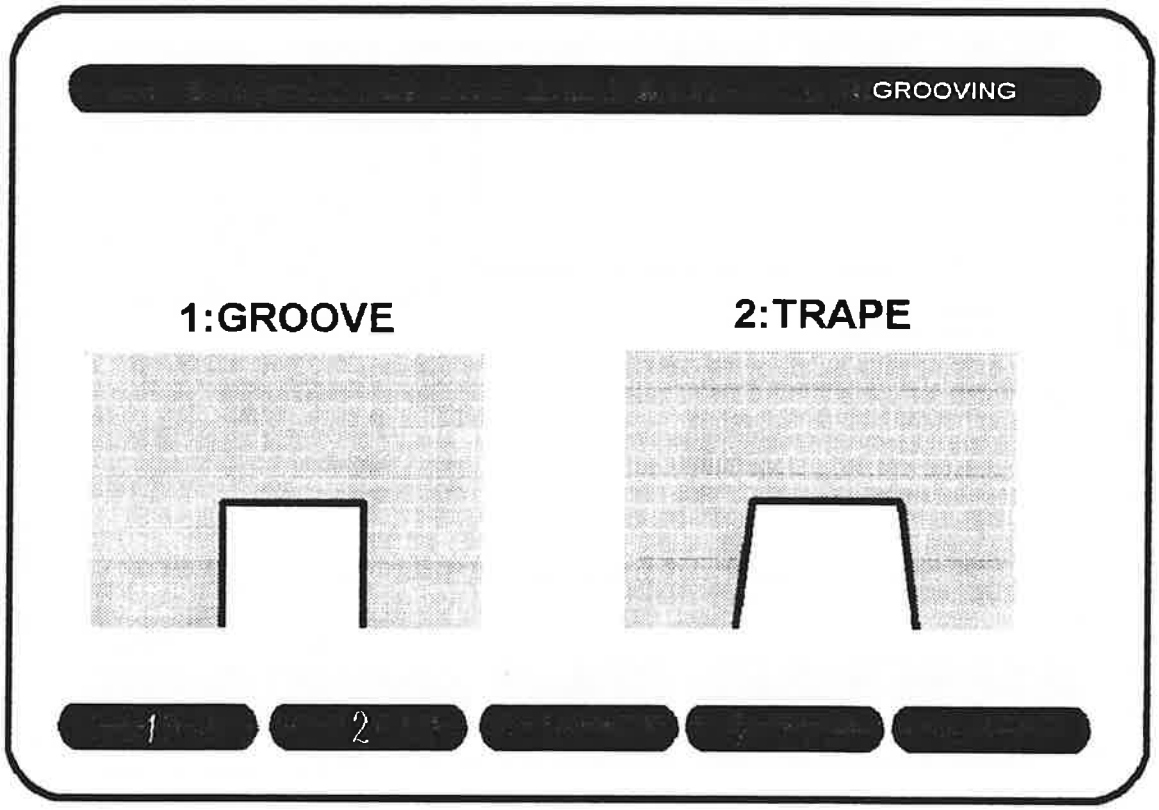
U - External or internal thread (0:outer 1:inner).
H - Single-edge thread cutting (0) or Both-edge - zigzag - (1).
K1 - Thread type (0:external 1:internal).
K2 - Metric thread (0) or unified thread (1).
P - Pitch - pitch for metric thread or number of threads per inch if unified.
MD - Number of cuts. An even number must be specified. If odd value is specified, one is added. See cut width description after entering this parameter.
X1,Z1 - Start point.
X2,Z2 - End point.
V - Thread allowance for finishing.
B - Finishing cut number.
A - Tool thread angle. Used to calculate the amount of single cut.

2.9 - Grooving

Even straight groove or trapezoidal grooves can be carried out using the groove cycle. However the groove cycle is divided in two subcycles, one for straight grooves and other one for trapezoidal groove. If straight groove or trapezoidal groove is selected it will be active until the machining guidance select switch is changed to another cycle.

Then it is not possible to change the groove type directly if the machining guidance screen is on one of the groove type, so change the machining guidance cycle select switch to another cycle and to the groove cycle again to get the groove type select screen (below) again.

The data on each groove screen is not lost.



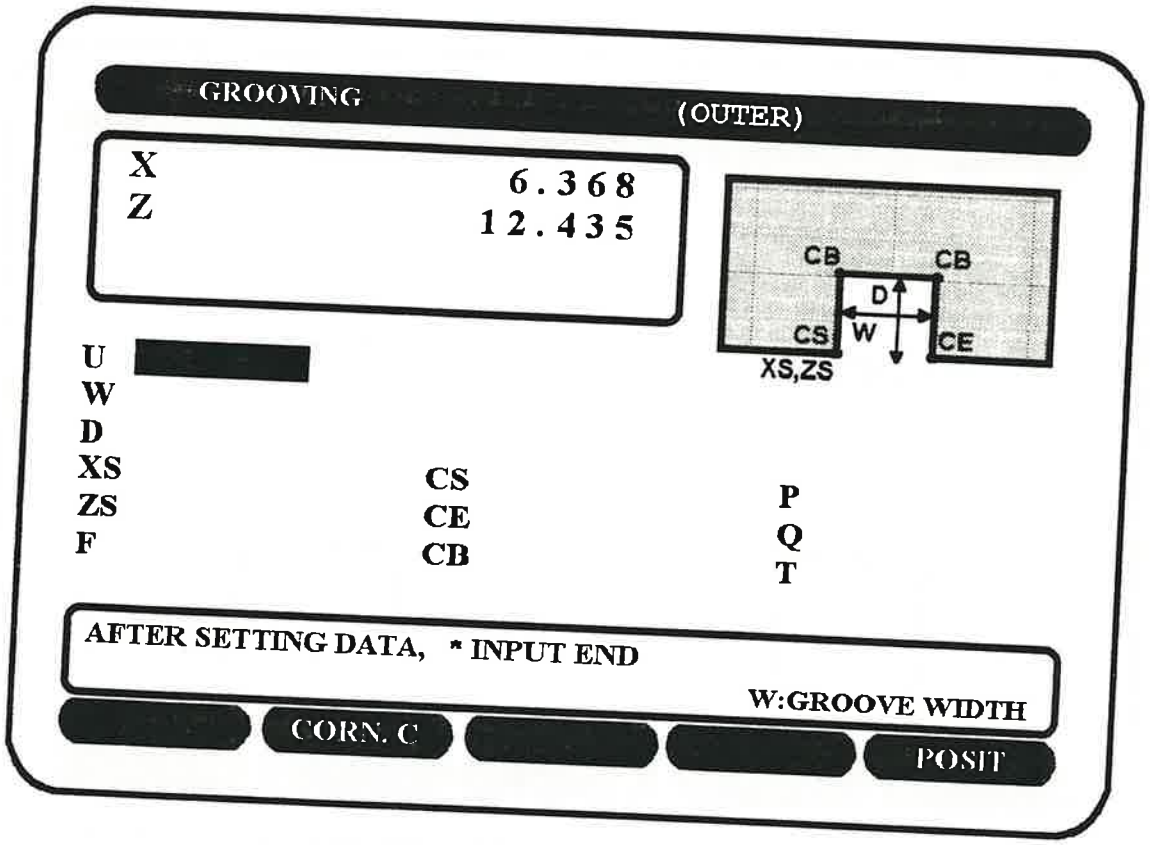
Select the type of groove is to be used :

Push softkey 1 for straight grooves or softkey 2 for trapezoidal grooves.

2.9.1 - Straight groove.

This type is used to carry out one or repetitive straight grooves.

Even internal or external grooves can be carried out. Corner radius or corner chamfering can be easily inserted using CS/RS, CE/RE and CB/RB data. Set the depth (D) and the width (W) of the groove, XS,ZS start points, the feedrate (F). If only one groove is required set 1 to Q and keep the pitch value (P) blank, if repetitive grooves are required, set the number of required grooves on Q and the distance between each one on P (pitch). Select the groove tool. See common parameters no. 11, 12, 13, 17 for more information about this cycle.



After entering the required data push [INPUT END] key (insert key).

Use the axis jog joystick or the machining guidance handwheel to move the axis according to the defined cycle. Keep the machining / approach select switch on the machining position. Remember that the spindle speed must be turned on to execute the cycle using the axis jog joystick.

The machining guidance handwheel can be used too, to do this put the axis jog joystick on the central position (off). Remember that the feedrate is the one of the handwheel turning speed.

This cycle is automatically cancelled on its end.

Cancel cycle without end pushing [INPUT RESUME] key (alter key).

Required data :

U - External or internal groove (0:outer 1:inner).
W - Groove width.
D - Groove depth.
XS,ZS - Groove start point.
F - Cutting feedrate.
CS/RS, CE/RE, CB/RB - 45º corner chamfering or 90º corner radius chamfering value.
P - Groove pitch. Distance between the start points of repetitive grooves. This value can be positive or negative.
Q - Number of repetitive grooves.
T - Groove tool number.

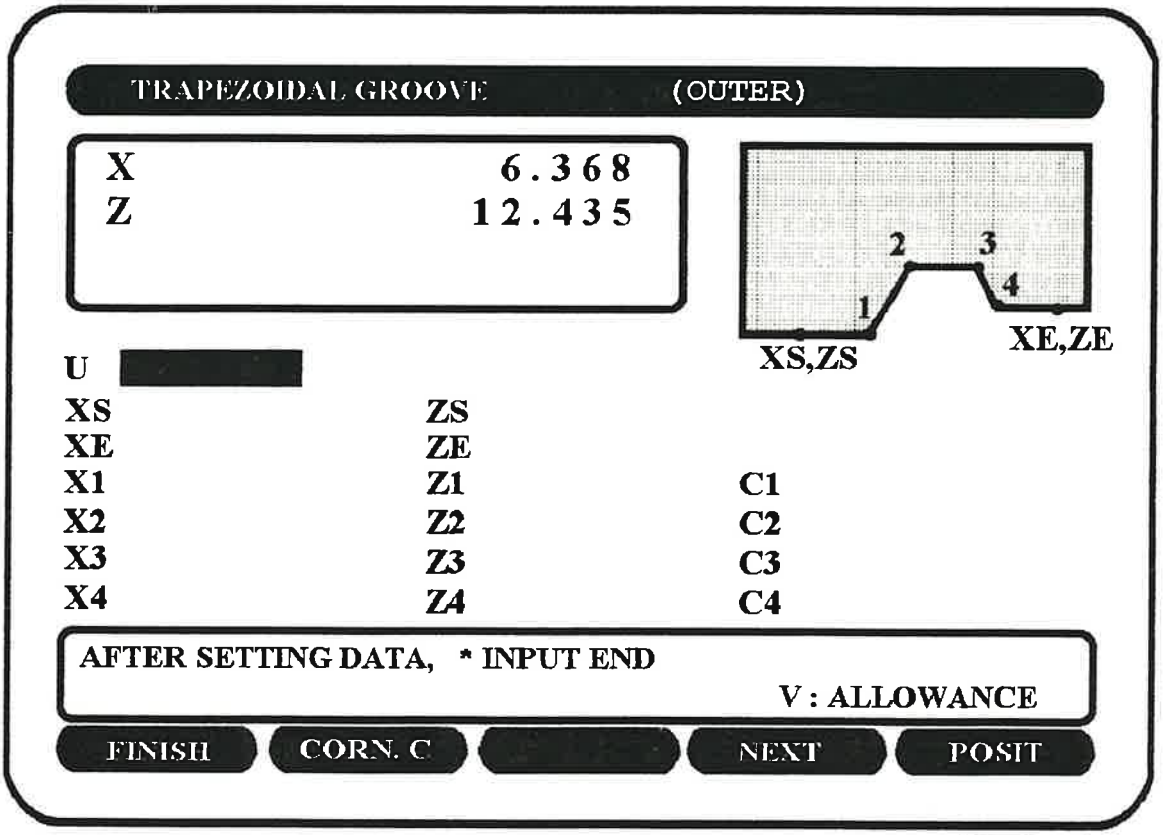
2.9.2 - Trapezoidal groove.

This type is used to carry out trapezoidal grooves.

Even internal or external grooves can be carried out. Corner radius or corner chamfering can be easily inserted using C1/R1, C2/R2, C3/R3 and C4/R4 data. Set XS,ZS start points, set X1,Z1, X2,Z2, X3,Z3, X4,Z4 points and XE,ZE end point, and tool number (T). Push the NEXT softkey to complete the required data.

Insert the allowance amount (V) and feedrate (F) If only one groove is required set 1 to Q and keep the pitch value (P) blank, if repetitive grooves are required, set the number of required grooves on Q and the distance between each one on P (pitch). Select the groove tool. See common parameters no. 11, 12, 13, 17 for more information about this cycle.

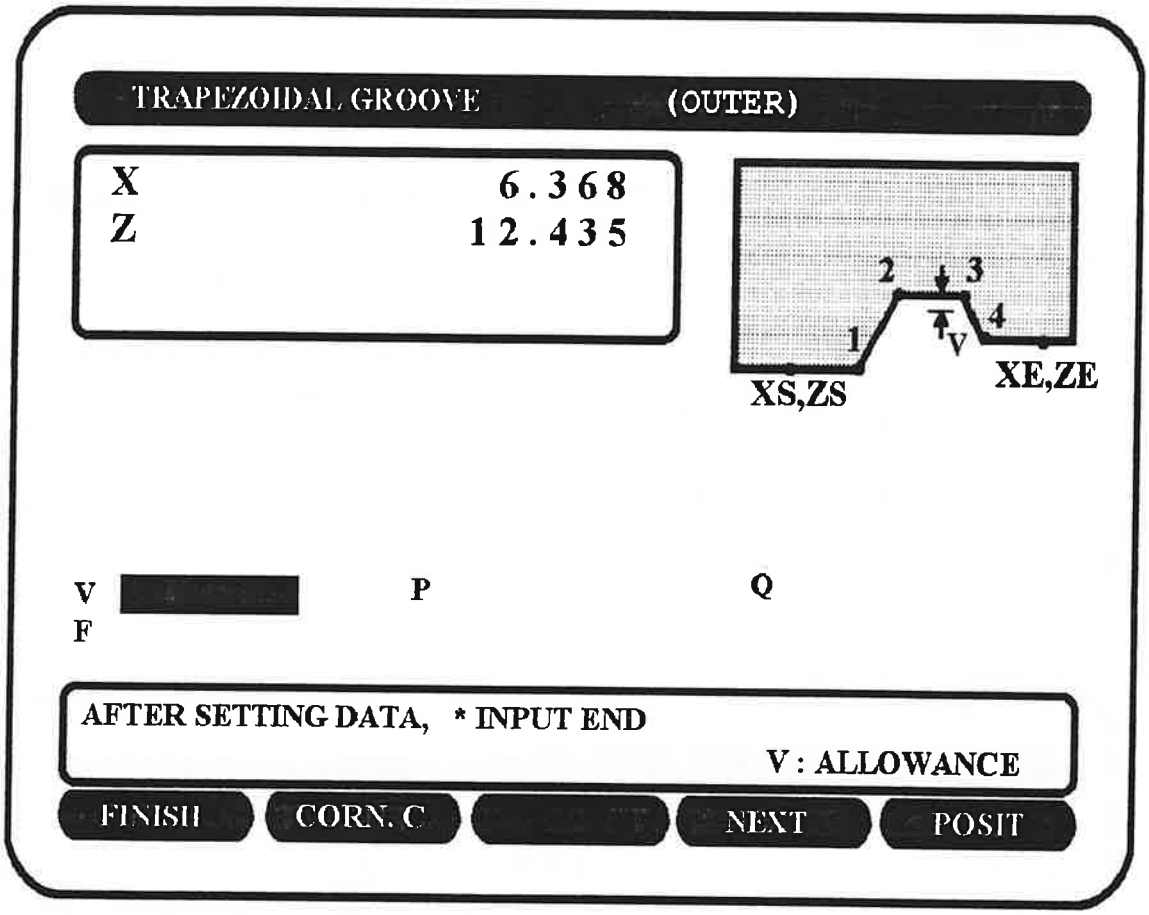
A finish path can be carried out too. To do this push the softkey FINISH. In this case the tool will only carry out the finish figure path.



After entering the required data push [INPUT END] key (insert key).

Use the axis jog joystick or the machining guidance handwheel to move the axis according to the defined cycle. Keep the machining / approach select switch on the machining position. Remember that the spindle speed must be turned on to execute the cycle using the axis jog joystick.

The machining guidance handwheel can be used too, to do this put the axis jog joystick on the central position (off). Remember that the feedrate is the one of the handwheel turning speed.



This cycle is automatically cancelled on its end.
Cancel cycle without end pushing [INPUT RESUME] key (alter key).

Required data :

U - External or internal groove (0:outer 1:inner).
T - Groove tool number.
XS,ZS - Path start point.
X1,Z1 - Groove start point.
X2,Z2 - Groove depth left point.
X3,Z3 - Groove depth right point.
X4,Z4 - Groove end point.
XE,ZE - Path end point.
C1/R1, C2/R2, C3/R3, C4/R4 - 45º corner chamfering or 90º corner radius on the intersect tion points.
V - Allowance for finishing path.
P - Pitch. Distance between the path start point of each groove.
Q - Number of repetitive grooves.
F - Groove cutting feedrate.

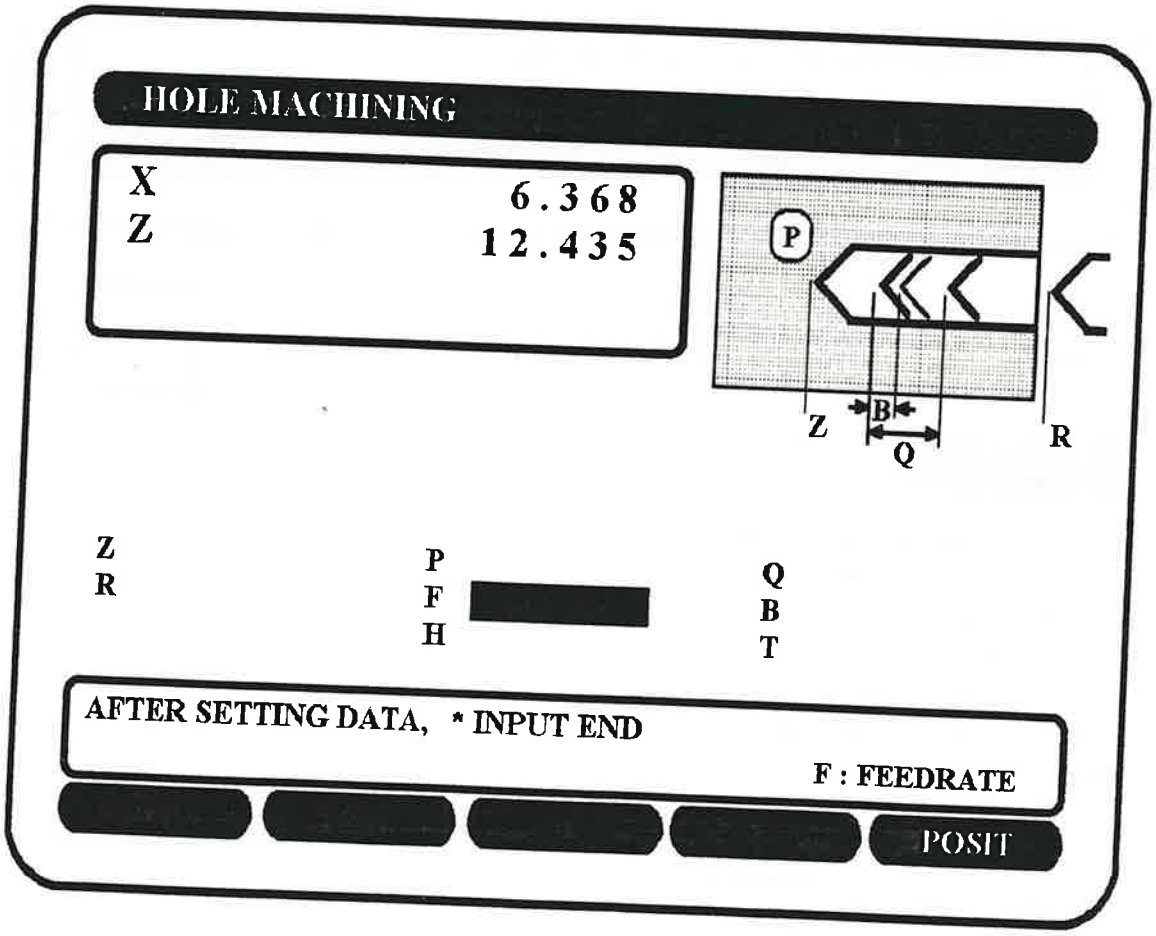
2.10 - Drilling

This cycle is used to drill holes on the center of the workpiece.

Insert the end point of the hole (depth Z), the tool return point (R) - it is used like the start point. Set dwell for drill the depth of the hole completely (P) the cut feedrate (F), the type of return (H), the cut amount (Q), the return amount / feedrate start point (B) and the drill tool number (T).

When H is 0 the rapid deep drill is nor performed, then the tool always return to the R point at rapid traverse after cut the specified cut amount (Q), The approach to the next point is in rapid traverse until the point b of this point is reached. At this point the tool moves in the specified traverse.

When H is 1 the rapid deep drill is performed. The tool return only the return amount specified (B) before the next cut amount (Q). The tool only returns to the start point at the end of the drill cycle.



After entering the required data push [INPUT END] key (insert key).

Use the axis jog joystick or the machining guidance handwheel to move the axis according to the defined cycle. Keep the machining / approach select switch on the machining position. Remember that the spindle speed must be turned on to execute the cycle using the axis jog joystick.

The machining guidance handwheel can be used too, to do this put the axis jog joystick on the central position (off). Remember that the feedrate is the one of the handwheel turning speed.

This cycle is automatically cancelled on its end.
Cancel cycle without end pushing [INPUT RESUME] key (alter key).

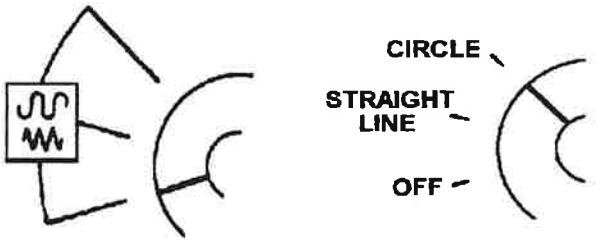
Required data:

Z - Hole depth coordinate.
R - Tool return point / tool start point.
P - End cut drill dwell.
F - Cut feedrate.
H - Rapid deep (0=N 1=Y).
Q - Cut depth.
B - Return amount / cut start point.
T - Drill tool number.

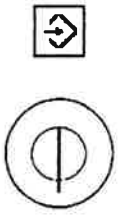
3 Teaching-in and Playback

3.1 - Putting the cnc on teach-in mode.

Select jog mode and a machining guidance cycle on the respective switches.



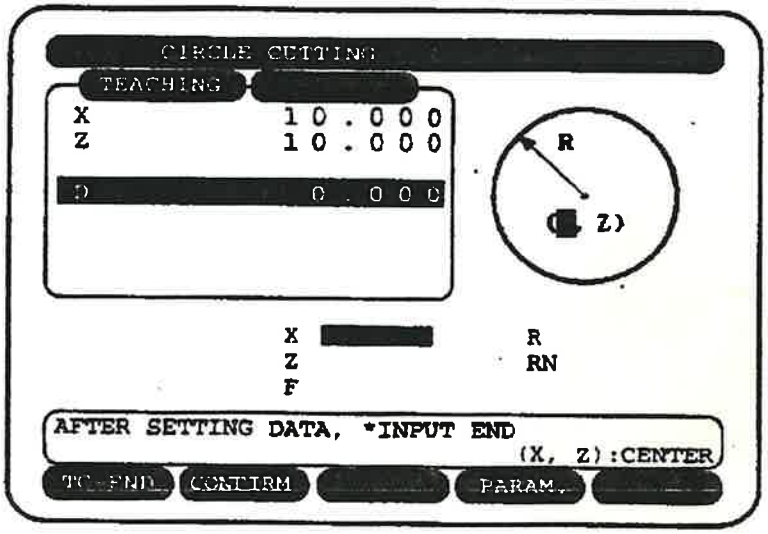
Turn on the program protect switch.



With the cnc screen displaying the selected machining guidance cycle, push the right arrow softkey, then push TEACH softkey.

The NEW and CONT. softkeys will appear. Push NEW to create a new program O7999 or push CONT. to continue the existing O7999 program (inserting the actual teached-in cycles, movements and auxiliary functions into the program end).

Teaching will appear on upper left side of the position area. A blank cursor will appear on the right side too.



Since this, all axis movements, machining guidance cycles, and auxiliary functions M03 (spindle speed clockwise), M04 (spindle speed counterclockwise), M05 (spindle stop), M06 (Toll change request), M08 (Automatic coolant on) , and M09 (Automatic coolant off) can be teached-in.

The spindle auxiliary functions M03, M04, are teached-in when the spindle handle switch is turned on and M05 when it is turned off.

Always when the M03 or M04 functions are teached-in the function M06 is inserted in the program following these functions. This function ask for a tool change.

The function M08 is inserted in the program if the coolant is on (coolant select switch is on the manual position). M09 is inserted if the coolant select switch is on off or automatic position. These functions are inserted always following the M06 function, it means that these functions are inserted when the spindle speed is turned on.

Axis movements can be teached-in with cutting or rapid feeds. Move the axis (single or both) and push the cutting or rapid buttons to select the kind of feed. Remember that cutting feed are in mm/rot (in/rot), then only select cutting feed when spindle speed is turned on. If cutting feed is selected when spindle is not turned on, NO FEEDRATE COMMANDED alarm will occurs when playback.

The machining guidance cycles can be teached-in only with cutting feed. Make sure to push only the cutting button. The roughing, threading, grooving and drilling cycles can be teached-in even the cycles are not executed. After push [INPUT END] key, just push the cutting button, wait the COMPLETE message, and push [ALTER]. Remember that the spindle speed must be turned on.

After teaching-in all required procedures, press TEACH END softkey to terminate the program.

Remember that if others procedures are required following the last teached-in, push TEACH softkey and CONT. softkey. The actual teached-in process will be storage at the end of the program O7999. After ending the procedures, push TEACH END softkey.

After push TEACH END softkey, the animation screen appears.
Push ANIMAT softkey to see a O7999 program simulation. Push BLOCK + softkey to block after block simulation. Push BLOCK - to go back one block simulation. Push CANCEL softkey to cancel the current to the end blocks which were teached-in.

3.2 - Altering the O7999 part program.

The O7999 can be altered. Since spindle speed values, and others functions which are not possible to be theached-in, edit the O7999 program to insert these functions.

When a spindle function like speed values (S1000 for ex.), and others functions related to the spindle speed is required, insert these functions before the M03 or M04 function in the program.

Some kind of normal functions could be necessary into the program before a cycle be executed.

To make the O7999 program more easy to understand, see the following cycles codes that are inserted in the program by the teach-in procedure. These codes operate like a canned cycle, then, when a roughing cycle is theached-in, for example, only a G640 is inserted in the program, followed by the cycle required parameters. Now it will be more easy to know where the functions is to be inserted.

G600 - Rapid traverse positioning and straight line rapid teach.
G601 - Feed traverse positioning and stright line cutting teach.
G602 - Clockwise circle.
G603 - Counterclockwise circle.
G610 - Corner / Radius chamfering.
G620 - Rough cycle.
G630 - Thread cycle.
G640 - Straight groove cycle.
G650 - Trapezoidal groove cycle.
G660 - Drill cycle.

ATTENTION

After altering the O7999 program, call another program to the execution screen. Never keep the O7999 part program to be executed. If it is not done, an alarm RETRY FORM SELECT MENU will occur when teach-in sequence is followed.

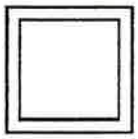
3.3 - Storing O7999 part program.

Since the teach-in generates only the O7999 program, it is necessary to change its number if another program will be theached in and the actual O7999 program is not to be lost.

In edit mode, put the cursor on the program number and attribute a new number to the program (O40 for exampie), the push alter key.

3.4 Playback

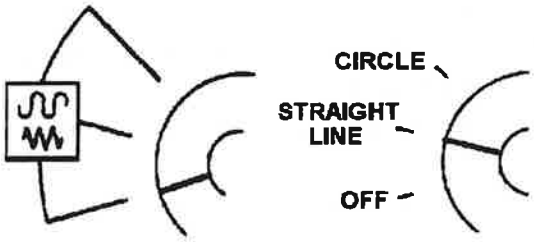
PLAYBACK



Only the O7999 part program is playback. Then if you need to playback a part program stored with other number, change the O7999 program number as described above and change the number of the program which is to be executed by playback to O7999. Only program generated by teach-in sequence can be playback. If another kind of program is numbered O7999, the playback function will fail.

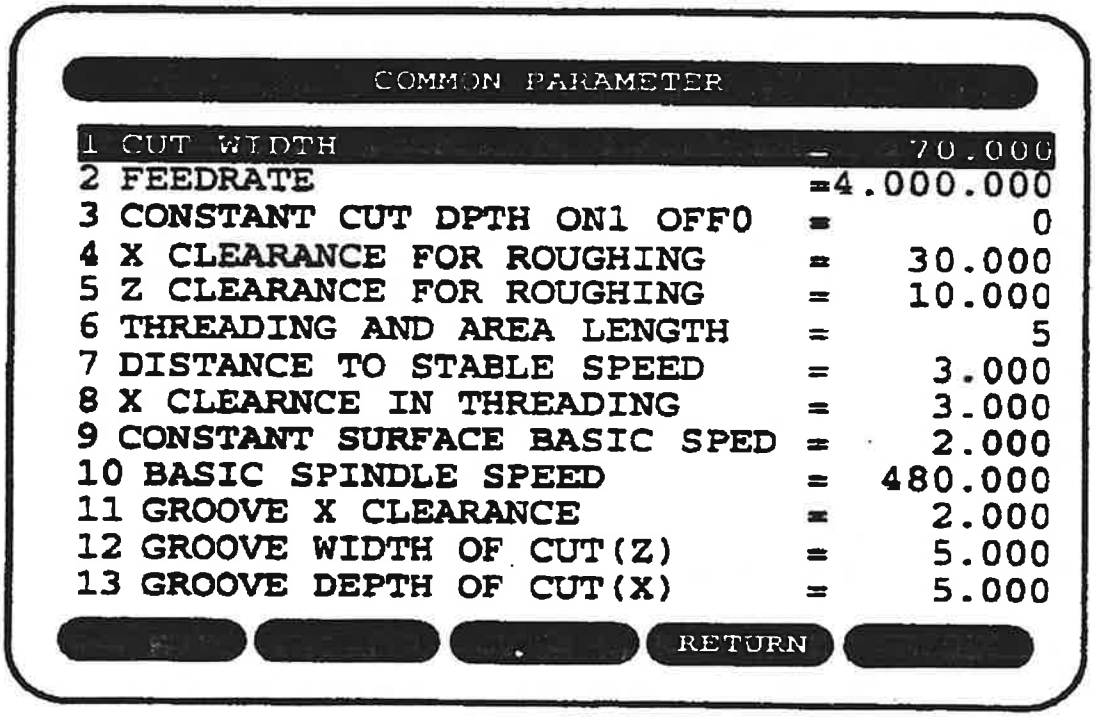
4 Machining guidance common parameters.

Put the cnc in machining guidance mode.
Mode switch in JOG mode and Machining guidance switch on straight line cycle.



Push the right arrow softkey, then push PARAM softkey.

The machining guidance common parameters page 1 will appear. Push 2/2 softkey to get the page 2. When in page 2 push 1/2 softkey to get the page 1.



Machining guidance common parameters screen 1/2

These parameter describe how the machining guidance cycles and machine will operate. Read the following explains to know how these parameter operate.

1 - Cut width - This is the cutting value when the cutting value is not specified in the cycle.

2 - Feedrate - This is the feedrate when feedrate is not specified in the cycle.

3 - Constant cut depth on 1 off 0 - When this parameter is 0 the cut depth is the specified on the cycle or on the parameter no. 1, even if the last cut path will be smaller than the specified. Ex. - if cut depth is 3 mm and the total amount to remove is 10 mm the 1st to 3rd cut path will be 3 mm and the last one will be 1 mm.

When this parameter is 1 the cut depth is constant and as close as possible from the cut depth specified. Ex. - if cut depth is 3 mm and the total amount to remove is 10 mm it will be necessary 4 cutting paths (3 with 3 mm and 1 with 1 mm), the cnc calculates the cut amount for 4 cutting depth to make the cutting depth constant. The total mount to remove is divided by the number of required paths. In this case we will have 4 cutting paths removing 2,5 mm each one.

4 - X clearance for roughing - Specifies how many mm (inch) the X axis will return when the cutting path is ended. It is used in roughing cycle.

5 - Z clearance for roughing - Specifies how many mm (inch) the Z axis will return when the cutting path is ended. It is used in roughing cycle.

6 - Threading area and lenght (CL) - Insert a two-digit numeral from 00 to 99. This parameter means the distance from the final thread point and the point where the tool will begin to move out of the thread path without loose the synchronism. This distance is : CL parameter * 0.1 * Pitch.

7 - Distance to stable speed - The distance in Z axis from the start of the thread to wait the spindle speed and axis speed be stable. If this is a few value the initials pitch of the thread can be damage.

8 - X clearance in threading - Specifies how many mm (inch) he X axis will return when the threading cut path is ended. It is used in thread cycle.

9 - Constant surface basic speed - Specifies the value of the surface speed. It is used when the constant surface speed switch is turned on. This parameter has no effect with the Fast Trace engaged headstock.

10 - Basic spindle speed - Specifies the spindle speed when it is constant. It is used when the constant surface speed switch is turned off. This parameter has no effect with the Fast Trace engaged headstock.

11 - Groove X clearance - Specifies haw many mm (inch) the X axis will return when the grooving path is ended. It is used in groove cycle.

12 - Groove width of cut (Z) - Specifies the cutting width in Z axis for grooving.
This value must be smaller than the grooving tool width. (Ex. if tool is 3,3 mm on its width set 3 in this parameter).

13 - Groove width of cut (X) - Specifies how many mm (inch) the X axis will cut in each path. This value is effected by the constant cut depth parameter.

14 - Cutting type (0:Sngl 1:Both) - Specifies the type of threading cut when it is not specified on the cycle.

15 - Minimum depth of cut - Specifies the least value of cut width.

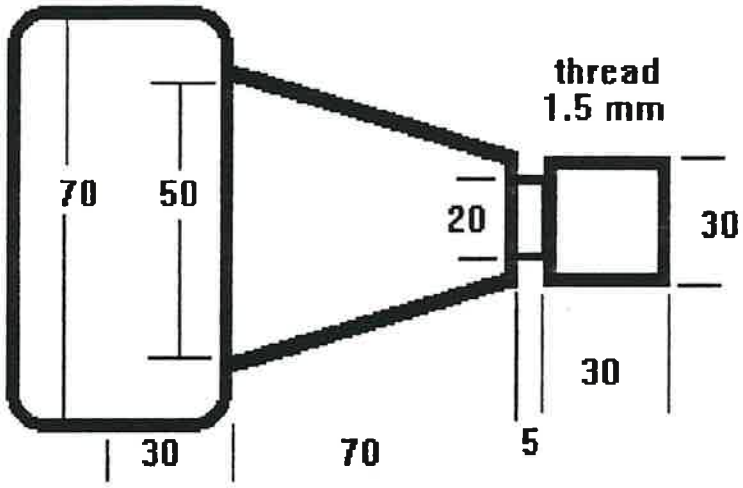
16 - CSS max rpm - Set the maximum spindle speed when constant surface speed is used. This parameter has no effect with Fast Trace engaged headstock.

17 - Groove dwell - This is the dwell when the cut depth in X axis is ended (each one). This is used to cut all groove surface in X axis.

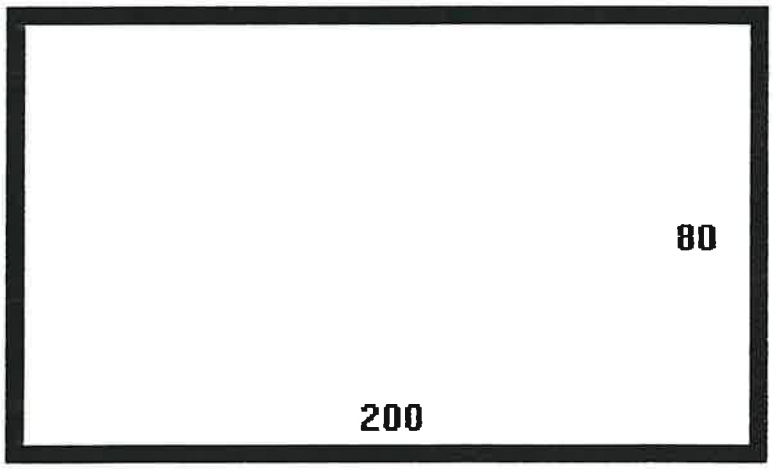
5 Teach-in and playback procedure example.

5.1 - Teach-in procedure.

The workpiece used in this example has no known application. It will be used only an example.



At first place a blank on the chuck. (Remember to lock it).



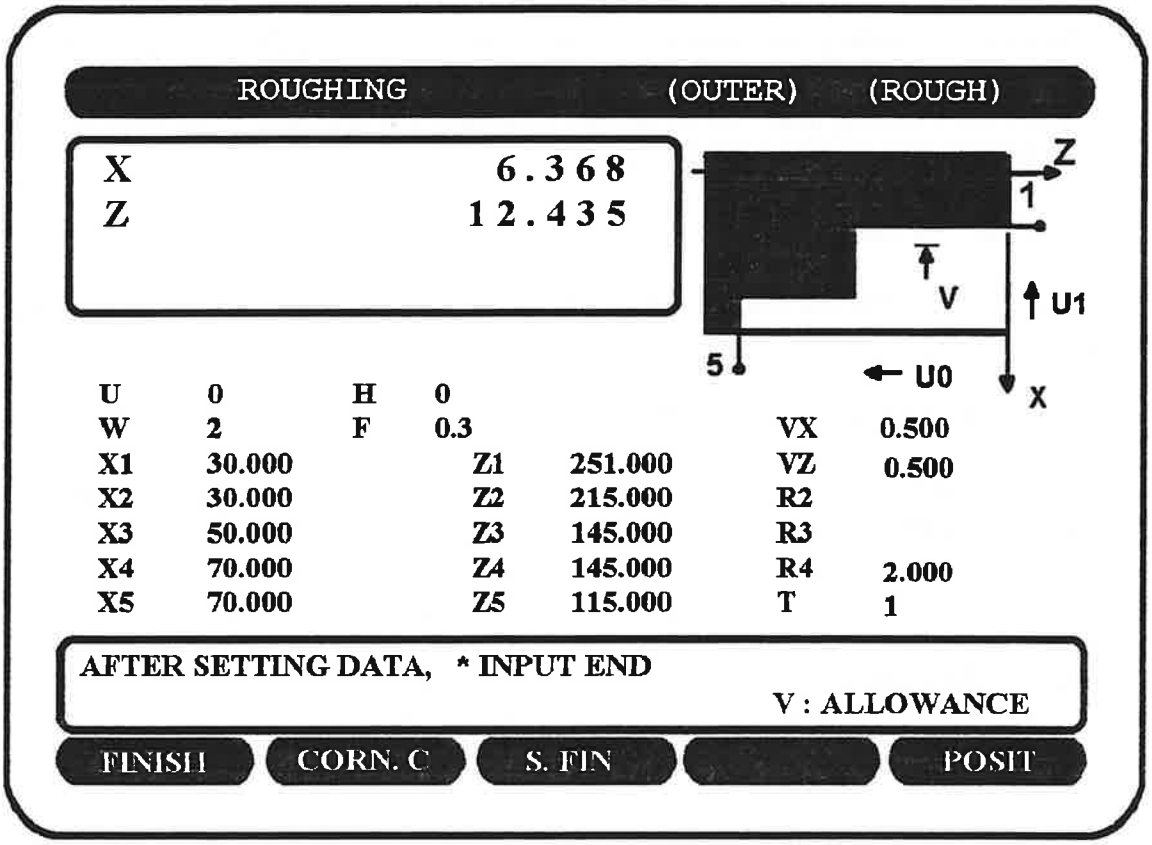
Select the required tools for machining the part completely.

Threading, grooving and turning tools.

Preset the tools as described in item 2.1. Preset the turning tool as no. 1, grooving tool as no. 2 and threading tool as no. 3.

Measure the workpiece lenght os described in item 2.2.
(Let's suppose that the lenght is 250 mm).

The first step of the machining is a roughing. Put the mode select switch on JOG MODE and machining guidance cycles select switch on ROUGHING cycle.



Insert common parameters (see chapter 4).

Complete the roughing required data:

Put the turning tool (presseted as no. 1) on the tool post (remember to lock it).

Turn the spindle speed on counterclockwise (assume front tool post).

Using the handwheels, approach to the workpiece. Push [INPUT END] key. See chapter 2.7 for more details.

Use the machining guidance handwheel or the axis jog joystick to carry out the roughing.

Terminating the rough cycle, turn off the spindle speed.
Measure the workpiece and inspect the rough. If everything is looking well the cycle is able to be teached-in, if not check the tool, the common parameters and roughing data.

Now teach-in the rough cycle.

Keep the mode select switch and machining guidance select switch on the JOG MODE and ROUGHING cycle, push RIGHT ARROW softkey, then push TEACH softkey and NEW softkey.

Wait for TEACHING message.

Using handwheels, approach the tool next to the rough start point. Push the TEACH-IN RAPID push-button. Wait for COMPLETE message.

Turn on the spindle speed counterclockwise. Wait for COMPLETE message FLASH.

Push [INPUT END] key - no movement is necessary at this point - then push TEACH-IN CUTTING push-button. Wait for COMPLETE message FLASH.

Push [INPUT RESUME] key.

Push RIGHT ARROW softkey and then TEACH END softkey. (The simulation screen will appear).

Turn off the spindle speed.

At this point the cycle animation can be done, but it is not necessary. Push RETURN softkey to go back to the rough screen.

The second step is finish the rough.

Push FINISH softkey.

Turn the spindle speed counterclockwise.

Using the handwheels, approach to the workpiece. Push [INPUT END] key. See chapter 2.7 for more details.

Use the machining guidance handwheel or the axis jog joystick to carry out the finish roughing.

Terminating the finish rough cycle, turn off the spindle speed.
Measure the workpiece and inspect the finish rough. If everything is looking well the cycle is able to be teached-in, if not check the tool, the common parameters and roughing data.

Now teach-in the finish rough cycle.

Keep the mode select switch and machining guidance select switch on the JOG MODE and ROUGHING cycle, push RIGHT ARROW softkey, then push TEACH softkey and CONT. softkey.

Wait for the TEACHING message.

Using handwheels, approach the tool next to the rough start point. Push the TEACH-IN RAPID push-button. Wait for COMPLETE message.

Turn on the spindle speed counterclockwise. Wait for COMPLETE message FLASH.

Be sure that the FINISH path is selected.

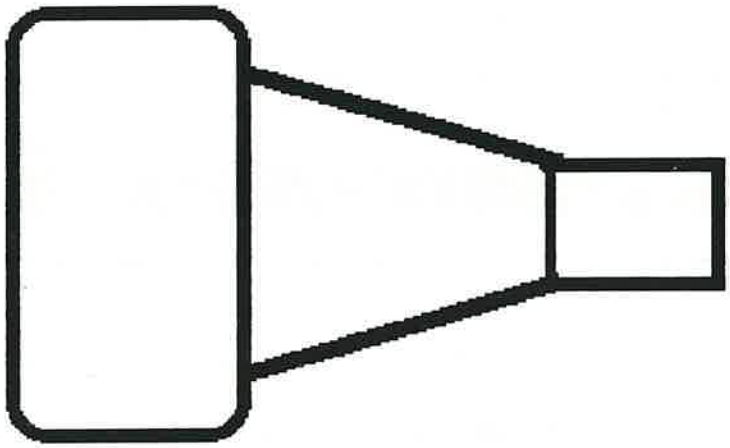
Push [INPUT END] key - no movement is necessary at this point - then push TEACH-IN CUTTING push-button. Wait for COMPLETE message FLASH.

Push [INPUT RESUME] key.

Push RIGHT ARROW softkey and then TEACH END softkey. (The simulation screen will appear).

Turn off the spindle speed.

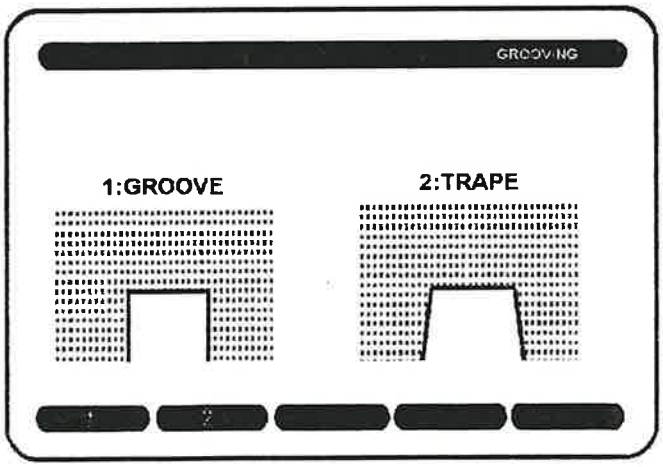
At this point the cycle animation can be done, but it is not necessary. Push RETURN softkey to go back to the rough screen.



The work piece will be as the figure above.

The next step is the groove (out of thread).

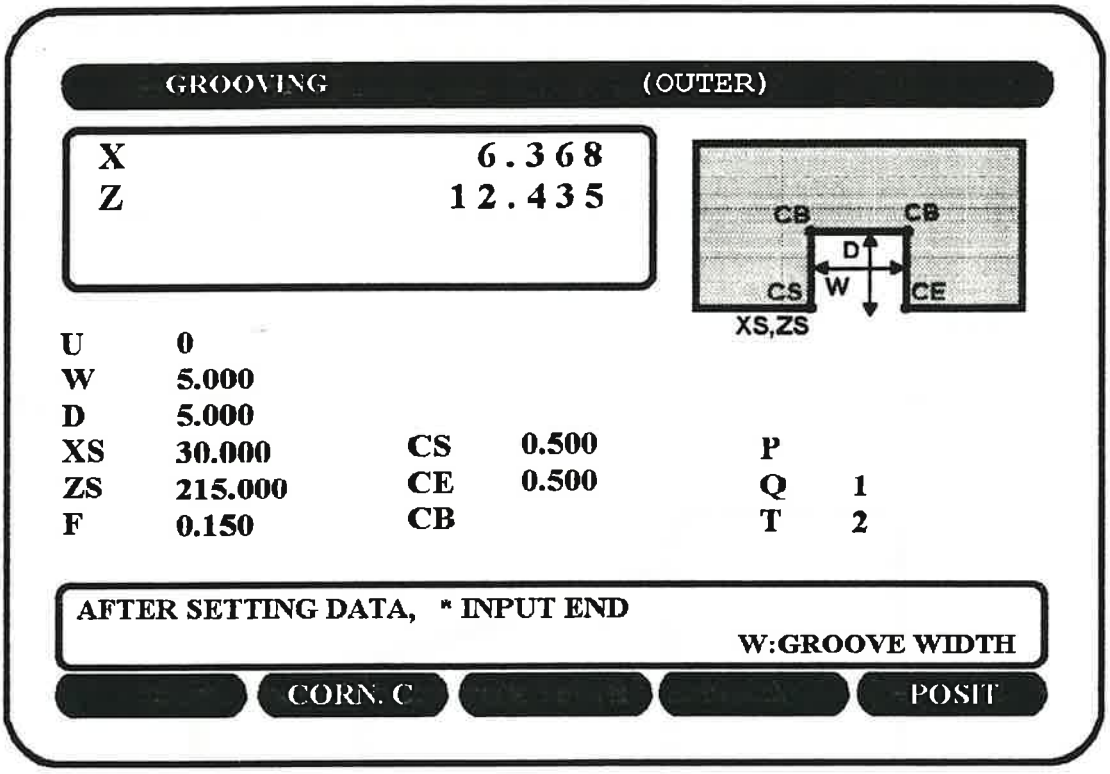
Keep the mode select switch on JOG mode. Put the machining guidance select switch on the GROOVING position.



Select groove type 1 (straight groove).

Check common parameters (see chapter 4).

Complete the grooving required data:



Put the grooving tool (presseted as no. 2) on the tool post (remember to lock it).

Turn the spindle speed on counterclockwise (assume front tool post).

Using the handwheels, approach to the workpiece. Push [INPUT END] key. See chapter 2.9.1 for more details.

Use the machining guidance handwheel or the axis jog joystick to carry out the grooving.

Terminating the groove cycle, turn off the spindle speed.
Measure the workpiece and inspect the groove. If everything is looking well the cycle is able to be teached-in, if not check the tool, the common parameters and grooving data.

Now teach-in the groove cycle.

Keep the mode select switch and machining guidance select switch on the JOG MODE and GROOVING cycle, push RIGHT ARROW softkey, then push TEACH softkey and CONT. softkey.

Wait for TEACHING message.

Using handwheels, approach the tool next to the groove start point. Push the TEACH-IN RAPID push-button. Wait for COMPLETE message.

Turn on the spindle speed counterclockwise. Wait for COMPLETE message FLASH.

Push [INPUT END] key - no movement is necessary at this point - then push TEACH-IN CUTTING push-button. Wait for COMPLETE message FLASH.

Push [INPUT RESUME] key.

Push RIGHT ARROW softkey and then TEACH END softkey. (The simulation screen will appear).

Turn off the spindle speed.

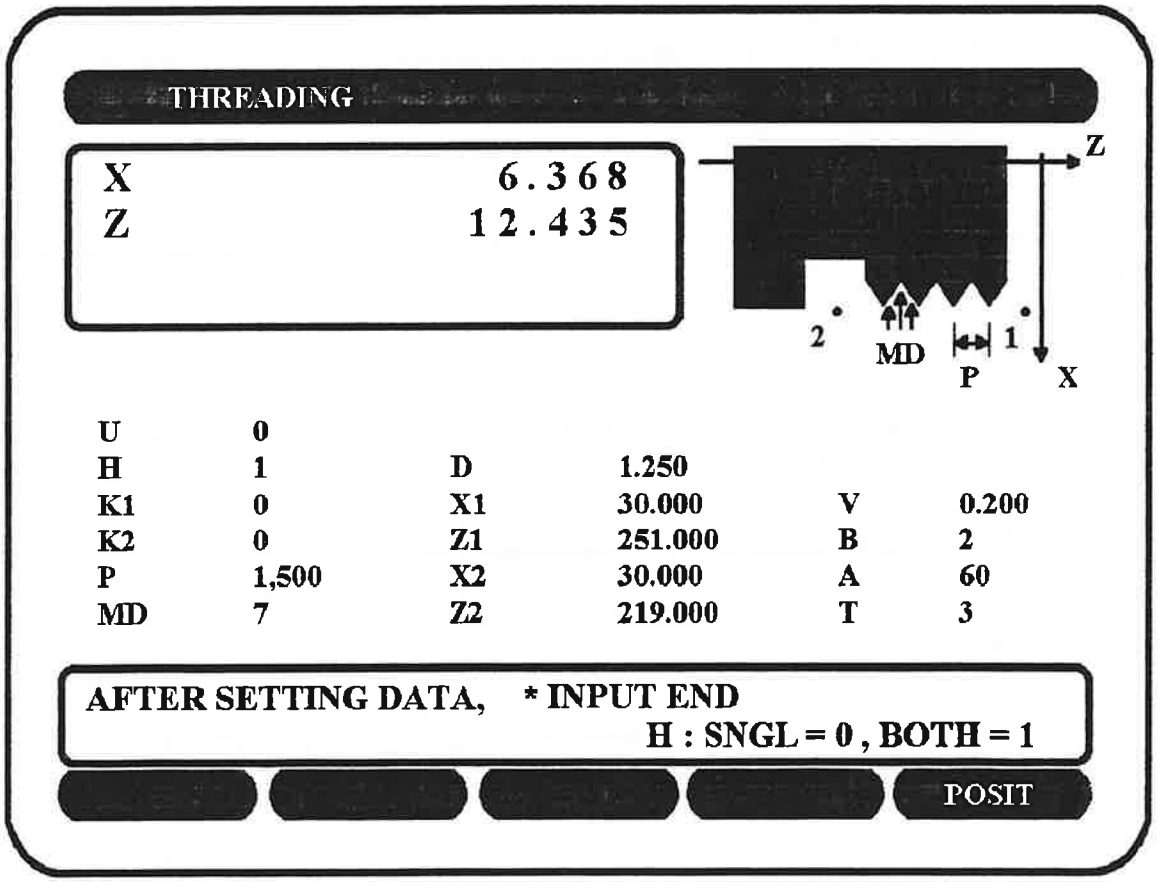
At this point the cycle animation can be done, but it is not necessary. Push RETURN softkey to go back to the groove screen.

The last step is making the thread.

Keep the mode select switch on JOG mode. Put the machining guidance select switch on the THREADING position.

Check common parameters (see chapter 4).

Complete the threading required data:



Put the threading tool (presseted as no. 3) on the tool post (remember to lock it).

Turn the spindle speed on counterclockwise (assume front tool post).

Using the handwheels, approach to the workpiece. Push [INPUT END] key. See chapter 2.8 for more details.

Use the machining guidance handwheel or the axis jog joystick to carry out the threading.

Terminating the thread cycle, turn off the spindle speed.
Measure the workpiece and inspect the thread. If everything is looking well the cycle is able to be teached-in, if not check the tool, the common parameters and grooving data.

Now teach-in the thread cycle.

Keep the mode select switch and machining guidance select switch on the JOG MODE and THREADING cycle, push RIGHT ARROW softkey, then push TEACH softkey and CONT. softkey.

Wait for TEACHING message.

Using handwheels, approach the tool next to the thread start point. Push the TEACH-IN RAPID push-button. Wait for COMPLETE message.

Turn on the spindle speed counterclockwise. Wait for COMPLETE message FLASH.

Push [INPUT END] key - no movement is necessary at this point - then push TEACH-IN CUTTING push-button. Wait for COMPLETE message FLASH.

Push [INPUT RESUME] key.

Push RIGHT ARROW softkey and then TEACH END softkey. (The simulation screen will appear).

Turn off the spindle speed.

At this point the cycle animation can be done, but it is not necessary. Push RETURN softkey to go back to the thread screen.

At this point the workpiece is completely carried out.

5.2 - Playback example

The playback function is now available for the part described on item 5.1. The playback procedure is very simple and closely similar with automatic execution.

Put mode select switch on JOG mode position and the machining guidance select switch on OFF position.

Press the PLAYBACK push-button.

At first, the cnc will ask for tool change confirmation blinking the start push-button. Put the turning tool on the tool post (remember to lock it) and push the start push-button to quit the ask.

The tool will approach to the beginning of the rough cycle. Use the machining guidance handwheel to execute the cycle manually or use the axis jog joystick to execute the cycle automatically.

Following this, the cnc will ask for a tool change confirmation blinking the start push-button. In this case it is not necessary, then keep the turning tool on the tool post and push the start push-button. Use the machining guidance handwheel to execute the cycle manually or use the axis jog joystick to execute the cycle automatically.

After the rough fininshing path the cnc will ask for a tool change confirmation blinking the start push-button. In this case it is necessary. Change the tool (put the groove tool no. 2 on the tool post - lock it). Push the start push-button to continue with the groove cycle. Use the machining guidance handwheel to execute the cycle manually or use the axis jog joystick to execute the cycle automatically.

At the end of the groove cycle the cnc will ask for a tool change confirmation blinking the start push-button again. Change the tool to the thread tool no. 3 and push the start push-button. USE THE AXIS JOG JOYSTICK ONLY TO CARRY OUT THREAD. The thread cycle must be done automatically.

Now, the workpiece is completely carried out. Follow these procedure to carry out other parts.

6 Using C.A.P. (CNC aided programing)

When using normal programing (via edit mode) you can use the C.A.P. feature.

C.A.P. is a kind of on line G codes operation description. All G codes available on the CNC are displayed on the screen. On the left side of the screen a coordinate plane appears to make easy the understanding of th G code operation. Refer to Fanuc Series 20-TA Operator's Manual for more details about G codes operation description.

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