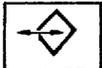
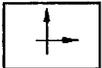


15 - USE OF NUMERICAL CONTROL (TYPE MB)

15 - 1 PRELIMINARY OPERATIONS

- Start-up: refer to section 11.2.
- The type of numerical control and the date of the software program are displayed for a few seconds (24). This display is followed by another, indicating the number of startups.
- The flashing entry START appears on the alphanumeric display device (item 31).
- One of the indicator lights up (inches or millimeters).
- Various segments appear on the displays (17 and 18).
- After this first operating phase, which takes place in a very brief time, the microprocessor is ready to carry out a first origin setting operation (X, Y, R or Z).
- Press the flashing START key  (31) to start the origin setting.
- When resetting is completed (beep), go into write mode by pressing the  key (29).
Display the adjustment values; hold down the  key (11) for more than 2 seconds.
- The adjustment values are then displayed and can be modified. Check that they indeed correspond to the values shown on the inspection sheet that comes with your machine.
- Follow the procedure in section 15.4 to change the resetting values.

15 - 2 OPERATION

15 - 2 - 1 MANUAL MODE

- Press the  key (30) to go into manual mode.
- Select the mm or inch unit by holding down  (13) for 2 seconds.
- By pressing the    (1, 2 or 3) keys, the alphanumeric display (24) shows the entry MANUAL X, MANUAL Y or A = nn.n.

a) MANUAL X :

- Pressing the  key (7) makes the X axis move away from the bending axis.
- Pressing the  key (8) makes the X axis move closer to the bending axis.

b) MANUAL Y :

- Pressing the  key (7) makes the distance between the punches and dies increase (pedal up, engaged).
- Pressing the  key (8) makes the distance between the punches and dies decrease (pedal up, engaged).

A short impulse on (7) or (8) results in a movement of 0.01 mm.

NOTE :

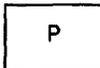
Simultaneous pressing of (7) or (8) and (6) results in high-speed rotation of the motor of the axes in question (X or Y).

c) A = nn.n

- Pressing the key (7) makes the rear gauge stop fingers rise or separate (as per R or Z configuration of gauge assembly).
- Pressing the key (8) makes the rear gauge stop fingers descend or come closer to each other.

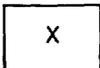
When the values X, Y, R or Z have been reached in accordance with the procedure below, the operator can carry out the bending operation.

15 - 2 - 2 PROGRAMMING

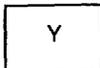
- Go into programming mode by pressing  (29). All the display windows are empty, except for 19 (bend number) and 20 (program number set to 1).
- The indicator lights (27) light up in accordance with the last selection made (inches or millimeters).
- Select the program number (from 1 to 9) then press key  (9).

The amount of available memory is displayed (maximum of 81 steps). The program number selected is displayed on (20). The number of the first non-programmed bend is displayed on (19).

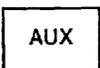
1 - ENTERING X-AXIS VALUE

- Enter the dimension on the numeric key-pad (26).
- Press  key (1); the value appears on the display (18).

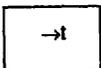
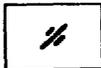
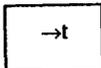
2 - ENTERING Y-AXIS VALUE

- Enter the dimension on the numeric key-pad (26).
- Press  key (2); the value appears on the display (17).
- A sound signal indicates and confirms that it has been stored in memory.

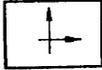
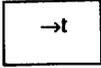
3 - ENTERING AUX-AXIS VALUE

- Enter the dimension on the numeric key-pad (26).
- Press  key (3); the value appears on the display (24).

4 - RELEASE OF PART

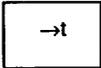
- Between two successive bends, it may prove necessary to provide a withdrawal on the X axis, or simply a waiting time for this axis, before positioning a new part.
- After a bend has been made, the rear gauge assembly is locked for a time that can be programmed from 0 to 9 seconds.
- Program this time on numeric key-pad (26).
- Press  key (4).
- The withdrawal time is then entered in memory.
- Programming of a withdrawal time validates this value on the selected bend(s).
- To cancel the withdrawal time programming, simultaneously press the  key (25) and the  key (4).

5 - CHANGING THE REAR GAUGE BLOCK WITHDRAWAL VALUE (IN PROGRAMMING MODE)

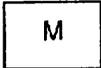
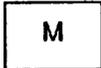
- Use the  key (11) to call up the calibration values.
- Hold down  (4) for two seconds to read the withdrawal values.
- Enter the selected dimension on the numeric key-pad (26) (0 to 600) and press  (4).

For example:

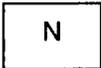
- Gauge assembly value (X) = 100
- Required withdrawal = 50
- Enter 50 on the key-pad (26)
- The maximum withdrawal value must not exceed the capacity of the gauge assembly, i.e. 600 mm.

- Press the  key (4) to validate.
- The gauge assembly moves back to 150 mm, awaits the program time "t" before positioning itself for the next bend.

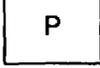
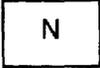
6 - MACHINE FUNCTION

- Key  (5) is used to confirm an external all or nothing function (for example, a solenoid).
- This function can be associated to making the selected bend, within a given program.
- Type the number of the function on the numeric key-pad (26) (from 1 to 6).
- Then press the  key (5).
- To cancel a machine function, type 0 on the numeric key-pad (26) and press  (5).

7 - PROGRAMMING OF NEXT BEND

- Press the  key (10); program the bend according to the same procedure used for bend number 1.

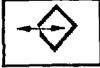
15 - 2 - 3 - RUNNING A PROGRAM

- Press the  key (29) to go into programming mode. Type the number of the program you wish to use on the key-pad (25), then press the  key (9).
- Press  (10) to display 1 in window 19.
- Press  (28) to go into run mode.
- The **START** indicator light (31) lights up.
- Press **START**. The axes are positioned for bend number 1.
- Make the bend (see cycle selection heading in section 11.3).
- Each time the press starts to open, the axes are positioned for the next bend.

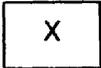
15 - 2 - 4 CORRECTION OF A BEND WITHIN A PROGRAM

Corrections may be made to the following parameters:

- Back position value (X).
- Penetration value (Y).
- Gauge assembly withdrawal value.
- Gauge assembly withdrawal delay.
- Machine function (auxiliary axis).

In all cases, press  (29) to go into programming mode.

1 - BACK POSITIONING OR PENETRATION VALUE

- Select the correction sign on the key-pad (26): <10 mm on X axis.
- Type in the correction value on the key-pad (26): <10 mm on the Y axis.
- Type  (1) or  (2), according to the axis selected.

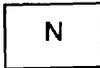
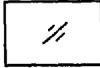
2 - GAUGE ASSEMBLY WITHDRAWAL DELAY

The gauge assembly withdrawal delay consists of reprogramming with new value(s), according to the procedure described in 15.2.2.

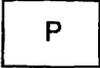
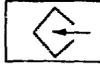
Warning: Only one withdrawal value per part can be selected for *n* bends.

3 - MACHINE FUNCTIONS (SEE 15.2.6)

4 - DELETING A BEND

- Enter the number of the bend to be deleted on the key-pad.
- Press  key (10) and hold down; press the  key (25).
- **WAIT** appears on the alpha-numeric display (24).
- Release the keys.
- A sound signal indicates cancellation.
- The numbering of the bends is automatically changed.

15 - 2 - 7 TRANSFER OF A PROGRAM FROM EXTERNAL MEMORY INTO INTERNAL MEMORY

- Find an available programme number or make one available for a transfer into external memory, as explained in the preceding section.
- Press the  key (9) to make sure that there are enough bends available.
- Type 1 or 2 on key-pad (26), according to area of external memory to be transferred.
- Press the  key (15) to make transfer.
- The following message appears on the alpha-numeric display (24):

Write symbol W S 1234 program name

number of program
selected

NOTE :

If there is a programming error (incorrect recording of data, entry error, omission, etc.), the word **ERROR**, followed by a number, appears on the alpha-numeric display device. This number is a means of identifying the type of error (see section 15.5). Correct the faulty parameter.

15 - 3 USE IN TEACHING MODE

- Press the  key (30).
- Position the axes as described in section 15.2.1.
- When the axes are positioned, press  (29).
- Press the  key (10) to confirm the first available bend.
- Press  (12), then simultaneously press  (1) or  (2) or  (3).

The value of X, Y or AUX will be stored in memory.

LEARNING USING MECHANICAL CONTROL WHEEL ON Y AXIS

- Press the  key (29). At this time, the Y axis motor is in electrical "free wheel" mode.
- Operate handle by hand to obtain depth of bending desired.
- To store the Y axis dimension in memory, simultaneously press  (12) and  (2).

15 - 4 SELF-DIAGNOSTIC

The self-diagnostic is a software programme that checks the operating status of certain components in the MB numerical control.

15 - 4- 1 INSTRUCTIONS FOR USE

To go into diagnostic mode:

- Press any key on the key-pad (1 to 16) before powering up.
- Turn on by holding down key until end of sound signal.
- The alpha-numeric display device (24) displays the DIAGNOSTIC message.
- After a few moments, the LED TEST message appears on the alpha-numeric display (24).
- This is the first check.
- To run the test, press the key (2) (YES).
- To go to the next test before the preceding one is completed, press the key (10) (NO).

15 - 4 - 2 CHECKING PHASE

The following checks are made:

LED test
FM test
MEN test
EXT test
MAN test
KEY test

1 - LED Test:

- The LED test checks the operation of the displays by lighting up the various segments, and of the LEDs related to the control keys, items 28, 29, 30 and 31.

2 - FM Test:

- The FM test checks the operation of the machine functions on 1 to 9, through sound signals (8 or 9 are software functions).

3 - MEN Test:

- The MEN test checks the operation of the two ER 3400 memories and initializes them.
- The alpha-numeric display (24) displays the message PASSED 1 and PASSED 2 and INIZ MEM.

4 - EXT Test:

- The EXT test checks the operation the change of steps, the ends of travel, the encoders and the X, Y and AUX axes.
- This test is carried out by lighting up the various segments on the display (17, 18, 19, 20, 21 and 22).

5 - MAN Test:

- The MAN test checks the operation of the motors in manual mode.
- Simultaneously press one of the keys **X** **Y** or **AUX** (1, 2 or 3) and the key **+** or **-** (7 or 8) (slow-speed).
- Simultaneously press the  key (6) and one of the **+** or **-** keys (7 or 8) (high-speed); only the keys that define the axis must be held down when checking the motors. Operation stops when they are released.
- When running the motors, the displays related to the program and to the steps display the increments per turn (19, 20 and 24).
- To continue the self-diagnostic after the end of the test, simply press the **N** key (10).

6 - KEY Test:

- The KEY test checks the operation of the function control keys and the key-pad keys.
- When one of the keys are pressed down, the alpha-numeric display (24) displays the key required.

7 - Exit from DIAGNOSTIC mode

- At the end of the test, you can go back to the beginning of the diagnostic. It is possible to again run the MB numeric control; to do this, simultaneously press **+** (7), **M** (5) and **AUX** (3). After the beep, the numeric control is operational and requests a START.

8 - Return to Beginning of DIAGNOSTIC Mode

- At the end of the KEY test, you can go back to the beginning of the DIAGNOSTIC mode by simultaneously pressing **X** (1) **M** (5) and **P** (9).

15 - 5 ERROR MESSAGES

- ERROR 00 - The position resetting has not been made correctly (see 16.1).
- ERROR 10 - The position resetting program does not contain the data required.
- ERROR 11 - The program only contains one step, hence impossible to increment step.
- ERROR 12 - It is not possible to access the next step if the step in progress is not completed.
- ERROR 13 - It is not possible to enter adjustment data in inches.
- ERROR 14 - The number of axes is not correct. START to restart the operation along three axes (see 16.1).
- ERROR 20 - It is not possible to write this data first into a completely empty step.
- ERROR 21 - Value greater than permissible maximum.
- ERROR 22 - Value lower than permissible minimum.
- ERROR 23 - The algebraic sum of successive corrections is greater than the maximum permissible value.
- ERROR 24 - The data containing the + or - sign is not permissible in this case.
- ERROR 25 - The data contains a comma, while a whole number value is permissible in this case.
- ERROR 26 - The required program is not between 1 and 9 inclusive.
- ERROR 27 - The required step is not between 1 and 30 inclusive.
- ERROR 28 - It is not possible to request a step in the adjustment program.
- ERROR 29 - It is not possible to write this value into the adjustment program.
- ERROR 30 - There is no machine function greater than 8.
- ERROR 40 - The external memory is not correctly placed in its housing.
- ERROR 41 - The external memory does contain any data. The external memory is deleted.
- ERROR 42 - It is not possible to read or write the adjustment program into or from the external memory.
- ERROR 43 - The data written on the alpha-numeric display is not correct.

- **ERROR 44** - It is not possible to transfer an empty program into the external memory.
- **ERROR 45** - The external memory does not have enough space to continue the program that you wish to transfer.
- **ERROR 46** - The internal memory does not have enough space to hold the program that you wish to read from the external memory.
- **ERROR 47** - It is not possible to transfer a program with a bend which is not completely defined into the external memory.
- **ERROR 50** - It is not possible to run the adjustment program in automatic mode.
- **ERROR 51** - The last program is not completely written.
- **ERROR 52** - Program not runnable because it is completely empty.
- **ERROR 53** - Withdrawal impossible because greater than maximum dimension for X.
- **ERROR 60** - Dimension of data displayed greater than maximum permissible value.
- **ERROR 78** - Impossible to delete a step that does not exist.
- **ERROR 80** - Memory needs to be initialized. Control code missing (see 16.1 and run MEM test (see 15.4.3)).
- **ERROR 81** - Internal memory 1 not operating correctly, sampled in self-diagnostic mode (see 16.1).
- **ERROR 82** - Internal memory 2 not operating correctly, sampled in self-diagnostic mode (see 16.1).
- **ERROR 91** - Faulty operation of X axis motor in automatic mode. Positioning control not executed.
- **ERROR 92** - Faulty operation of Y axis motor in automatic mode. Positioning control not executed.
- **ERROR 93** - Faulty operation of AUX axis motor in automatic mode. Positioning control not executed.
- **ERROR 95** - The X axis has a dimension lower than 0 (see 15.1).
- **ERROR 96** - The position resetting has not been made. It is impossible to going to manual or automatic mode (see 16.1).

15 - 6 TROUBLE - SHOOTING

FAILURES	POSSIBLE CAUSES AND CORRECTIVE ACTIONS	Error n°
Total blockage of one or several motors	<ul style="list-style-type: none"> - For X and Y axes D.C. motors: possible fault on CMT board, or deterioration of transformer secondary supply fuses - For motors: possible fault on APP 3, RCC or MOT boards. 	<p>91 92 93</p>
Incorrect operation of one or several motors.	<ul style="list-style-type: none"> - For D.C. motors: faulty connection of armatures. - Probable fault on intermediate boards (speed control, direction of running) - See trouble shooting table. 	<p>91 92</p>
<p>Faults that show up as incorrect counting in axes movement. The values indicated do not correspond to the actual values.</p> <p>Incorrect counting on one of axes (see diagnostic mode).</p>	<ul style="list-style-type: none"> - Check entry of position resetting. - Probable fault on microprocessor board. - Probable fault on encoder of axis concerned. - Probable fault on intermediate board. 	
<p>Faults involving storage in memory of data and involving external memory*.</p> <p>Memory storage general failure: the data is not stored in memory, neither in internal nor external memory.</p>	<ul style="list-style-type: none"> - No supply voltages for memories (-30 V* and -12 V*) being looked for an emergency stop (power) and AL3 (numerical control unit) boards. - Probable fault on intermediate board. 	<p>80</p>

* It is possible to use the external memory along with a voltmeter to check the -30 V and -12 V voltages.

FAILURES	POSSIBLE CAUSES AND CORRECTIVE ACTIONS	Error n°
Failure involving external memory.	<ul style="list-style-type: none"> - A particular external memory is not working correctly (memory damaged or deteriorated). - No external memory is operating correctly. - On the external memory base: between the foot of the base, there may be dust or grease, for example, which isolates the contact, or the contacts on the base are not correctly clamped onto the memory pins. 	<p>40 41 44 45</p>
<p>Failures due to incorrect operation of particular display or keys.</p> <p>A particular display or segment is not attained.</p> <p>One or several keys do not respond to commands.</p>	<ul style="list-style-type: none"> - Probably a faulty component (alpha-numeric or numeric display) O. - Probable fault on display decoding circuit on front panel board. - Faulty key → KEY test. - Probable fault at decoding level (see troubleshooting table when an operating error has been made). 	
<p>General blockage of equipment.</p> <p>General blockage with total extinction of displays and LEDs.</p> <p>General blockage with steady light-up of displays and no reaction to key commands.</p>	<ul style="list-style-type: none"> - No +5 V power supply available on AL3 or AU (emergency stop) boards. - Temporary unavailability of supply voltage: in this case, it is advisable to turn off and turn the equipment back on. - Much disturbance on electric line, affecting equipment. - The microprocessor is probably damaged. 	
Fault involving one or several machines.	<ul style="list-style-type: none"> - Probable failure on interface circuit on intermediate board. <p>IMPORTANT : Fit the machine function relay with diodes set in parallel on the coil.</p>	