NC-9EX II

MULTIPLE AXIS GAUGING

Operating Instructions

LAPIS SERVICES INC
(219)-464-9131
AMADA AMERICA, INC.

NC9EX2-E01-198909

Amada Support, Rebuilds,
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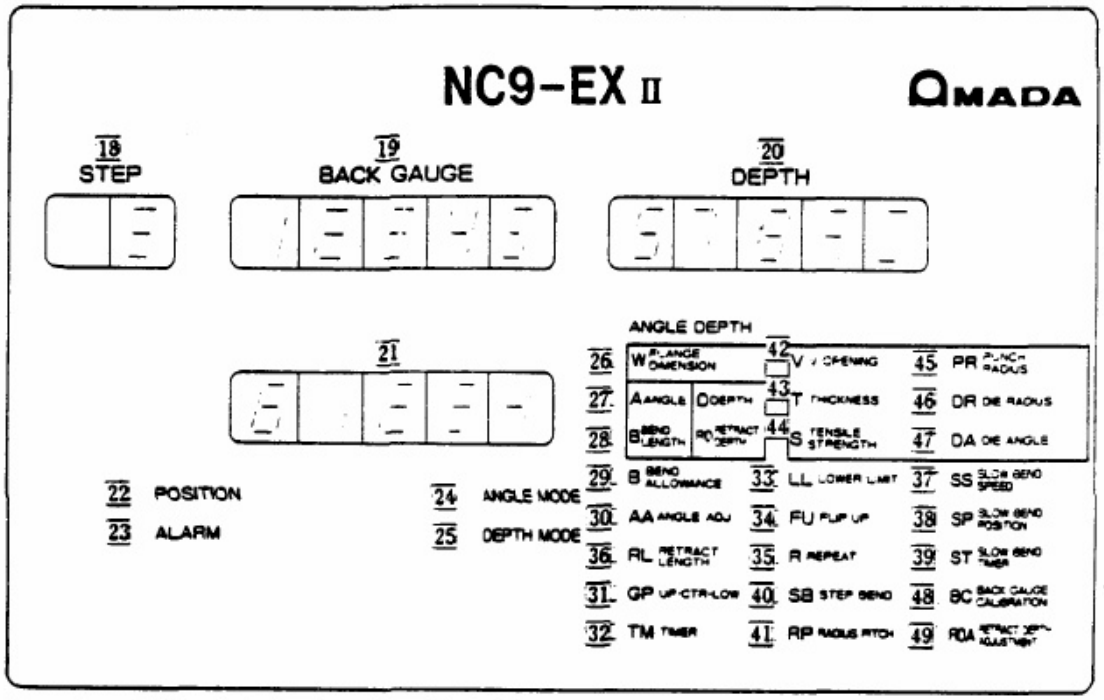
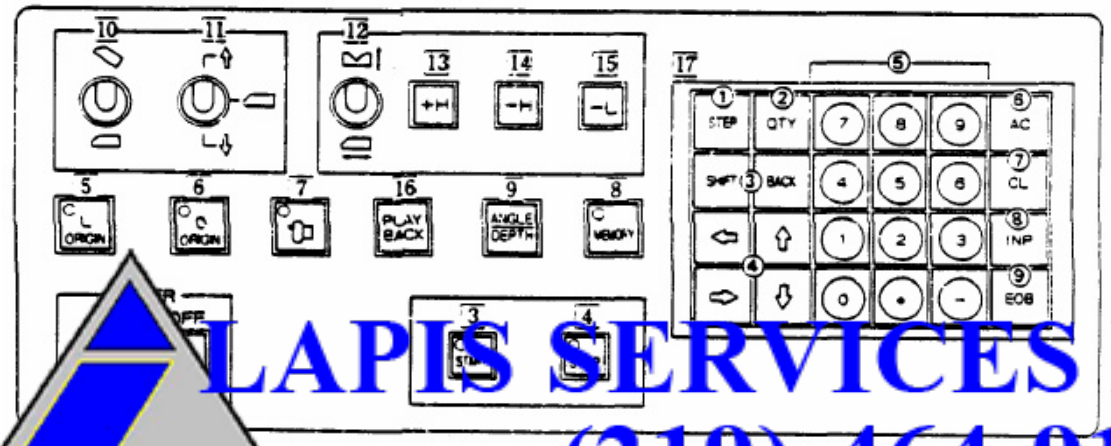
CONTROL DESCRIPTION





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ht in it illuminates and the power is supplied to the NC sys-
the STEP display [18]. Five seconds later, the "H4" will
e first process number (when a series of work processes
o indicate that the NC system is ready for operation.

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2. POWER OFF key

When this key is pressed, the power to the NC system is turned off.

NOTE: Before turning the power on again, wait at least 5 seconds after pressing the POWER OFF key. Otherwise, an alarm may occur or the NC system may operate erroneously.

3. START key

When this key is pressed, the light in it illuminates. A series of work processes will start automatically when the following four conditions are satisfied:

(1) The lights in the ORIGIN L [5] and D [6] keys are illuminated to indicate that the origin of the L- and D-axes are already set.
(2) The light in the upper limit setting handwheel ON/OFF key [7] is off.
(3) All the data are correct.
(4) The NC system is not in an alarm condition.

4. STOP key

When this key is pressed, the automatic operation stops. The origin setting of the L-axis will also stop. The light in the key will illuminate.

5. ORIGIN L key

When this key is pressed, the backgauge automatically moves in order to set the L-axis origin. The light in the key blinks while the backgauge is moving and remains on after it has reached the origin.

NOTE: The numeral on the BACKGAUGE display [19] may differ from the previous one if the backgauge is again moved to set the origin. This is not an indic on that a different position has been set, only a different number being indicated.

6. ORIGIN D key

This k used when setting the origin of the D-axis (lower beam). When this key is pressed, the D-axis i set. Refer to the "Se the L-axis to the origin" in the OPERATION se per setting rocedure.

ng handwheel ON/OFF key

ing the upper limit setting handwheel while the NC system is on. The minate to indicate that the handwheel is ready for operation. When the light goes off. The handwheel can not be operated when the be on when setting the D-axis origin with the ORIGIN D key

anual operation of the backgauge, as well as the memory performed while the upper limit setting handwheel ON/

handwheel cannot be used if the system is equipped nal remote-controlled upper limit setting unit.

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8. MEMORY key

This key is used when storing data in the memory. When the key is pressed while the light in the STOP key [4] is on, the light in the MEMORY key illuminates to indicate that data is ready to be stored.

Refer to page 17 for the data entry procedure. To release the memory setting, press the MEMORY key again (The light in it will go out).

NOTE: Pressing the START key [3] releases the memory mode and the automatic operation will start.

9. ANGLE/DEPTH mode select key

This key is used to select either ANGLE or DEPTH mode when entering the data. Each time the key is pressed, the ANGLE mode LED [24] and DEPTH mode LED [25] alternately illuminate to indicate that the data can be entered in the desired mode.

Select the desired mode after pressing the MEMORY key [8] and set the process number on the STEP display [18]. The input mode cannot be changed after the process data has been entered.

10. Manual stopper retract switch

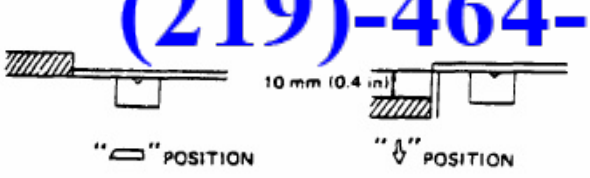
This switch is used to flip up the optional two stoppers located on the center position. Flip up the switch to retract the optional stoppers when workpieces are to be bent in a wide bending width; flip down the switch to use the optional stoppers when they are to be bent in a short bending width.

NOTE: This switch is not effective for automatic operation. Use the FU (flip-up) function [34] to retract the stoppers.

11. Manual stopper-positioning switch

This switch is used to change the height of the stoppers in relation to the shape of workpieces while the light in the STOP key [4] is on. When the switch is flipped up "⇧", the stoppers move 10 mm (0.4 in.) upward from the center position; when it is flipped down "⇩", the stoppers move 10 mm (0.4 in.) downward from the center position. When the switch is set to the position "⇔", the stoppers will return to the center.

NOTE: This switch is not effective during automatic operation. Use the GP function [31].



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12. Manual feed axis select switch

This switch is used when moving the L- or D-axis with manual axis feed keys [13], [14] and [15]. When the switch is flipped up, the lower beam (D-axis) is ready to move either up or down; when it is flipped down, the backgauge (L-axis) is ready to move either forward or backward.

13. [+H]
14. [−H] **Manual axis feed key**
15. [−L]

These keys are used to manually move the axis selected by the manual feed axis select switch [12]. The axis moves while the corresponding key is being pressed.

Axis	Key	Direction	Feed speed
L	+H	Backward	As per parameter [1 – 30 m (3.3 – 98.4 ft)/min.]
	−H	Forward	
	−L	,,	300 mm (11.8 in.)/min.
D	+H	Down	1000 mm (39.4 in.)/min.
	−H	Up	
	−L	,,	100 mm (3.94 in.)/min.

NOTE: a. When raising the lower beam, the bar pedal should be pressed together with the axis feed key.

b. When two or three keys are pressed simultaneously, the axis which is in operation will stop.

c. The key enables the corresponding axis to move in the reverse direction if the axis has overtravelled. When the L-axis has overtravelled in the "+" direction, for example, only key [−H] or [−L] is effective.

If the POWER OFF key [2] is pressed, although the alarm light is on and the -axis has overtravelled, pressing the POWER ON key [1] and then the ORIGIN key will not cause the axis to return to the origin because the overtravel light illuminates again. At this point, any of the [+L], [−H] and [−L] keys will not activate. In such a case, move the backgauge with your hand, press [CL] key [17] to cancel the alarm and then reset the L-axis to the

in the memory the value obtained by trial bending using the his method is utilized as one of the data entry methods for lower beam). For the data entry procedure, refer to page

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17. Function key and numeric keypad

These keys are used when entering data or displaying it.

17-1. [STEP] key

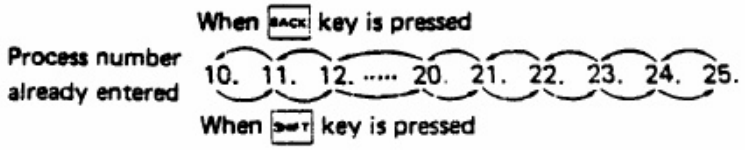
When this key is pressed while the MEMORY key [7] is on, the decimal point "." on the STEP display [18] blinks to indicate that the process numbers from 1 to 99 can now be entered using the numeric keypad.
When the MEMORY key [7] is off and the STOP key [4] is on, pressing the [STEP] key [17] causes the already entered process numbers to be called using the numeric keypad.

17-2. [QTY] key

This key is used to set or show the number of workpieces to be processed during the automatic operation. The required number of workpieces to be processed can be entered with the numeric keypad while the [QTY] key is held pressed. The MEMORY key [7] should be on. The number entered will be shown on the data display [21]. When the number is set to "0", automatic operation continues to be performed regardless of the number of workpieces.
The current number of workpieces that have been processed can also be shown on the data display while the [QTY] key is held pressed. To reset the total number of processed workpieces to "0", press the [AC] key [17-6] while holding the [QTY] key.

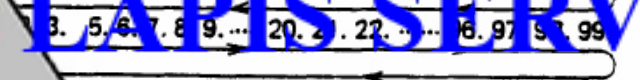
17-3. [SHIFT] and [BACK] keys

These keys are used to call either the previous or subsequent process number, rather than the current process number. When the [SHIFT] key is pressed, the current process number advances; when the [BACK] key is pressed, the process number backs up.



NOTE: Each time the key is pressed, one process number advances or retracts accordingly. Holding the key causes the process numbers to move continuously.

[key]



[⇨] keys

ct input data items. Each time the key is pressed, data items move
The data items move continuously when the key is held.

keys

key and decimal point key are used to enter data.

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17-6. [AC] key

This key is used to clear data.

(1) To clear all data in one process number, press the MEMORY key to illuminate the light in it, display the process number on the STEP display and then press the [AC] key. Any desired data indicated by LEDs [26] to [41] will be cleared, except the stopper height, instructed in item [31] will automatically be set to the center position.
With [AC] key held, pressing either [SHIFT] or [BACK] key clears the data of the process number displayed.

(2) To clear the data of all process numbers, press the MEMORY key to illuminate the light in it, and then press the [AC] key while holding the STOP key [4] in. The stopper height will automatically be set to the center position.

(3) To clear the total number of the processed workpieces, press the [AC] key while holding the [QTY] key in.

17-7. [CL] key

This key is used when clearing one item of data which has been entered or cancelling an alarm. To clear the item, turn on the corresponding LED and press the [CL] key while the MEMORY key is on; to cancel a blinking alarm number shown on the data display [21], eliminate the cause of the problem and then press the [CL] key.

17-8. [INP] key

Press this key everytime after entering all the data of one work process. The data of its process will then be stored in the memory.

NOTE: After entering each data item, pressing the [EOB] key enables the next item to be entered. At this point, however, the data item is not stored in the memory. Be sure to press the [INP] key after entering all the data of one work process.

17-9. [EOB] key

When this key is pressed after entering each data item, the LED which corresponds with the next item blinks to indicate that it is ready for entry.

18.

work process numbers. When it is ready for entry of the process numbers, he lower right side of the display blinks. r "P" appears on the display, it refers to the parameter mode. Do not meral while the "P" appears on the display; instead, press the [INP] , erroneous operation may occur.

value for the backgauge in each work process during the t position value in other than MEMORY mode.

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20. DEPTH display

This display shows the command value of each work process for the lower beam ("D" value) in the MEMORY mode as well as the current value in any mode other than MEMORY.

21. Data display

This display shows the data of any item when the corresponding LED is blinking.
When the [QTY] key is pressed, information on the number of workpieces which is required appears on the data display.
NOTE: When an alarm occurs, the corresponding alarm number blinks on the display.

22. POSITION LED

This LED glows to indicate that both the D- and L-axes have been set to the specified position during automatic operation; it goes out when an alarm occurs or when either axis is moving. This LED remains off when the machine is not operating in the automatic mode.

23. ALARM LED

This LED blinks when an alarm occurs. For the contents of alarms and cancellation procedures, refer to the "Alarm Number Display" on page 21. This LED goes out after the cause of the alarm has been eliminated and the [CL] key is pressed.

24. ANGLE MODE LED

25. DEPTH MODE LED

These LEDs illuminate to indicate that data entry will be ready in their corresponding input modes selected by the ANGLE/DEPTH key. Before entering data, make sure the input mode selected is correct by observing the illumination of the corresponding LED. While data is not being entered, the corresponding LED illuminates to indicate which mode the data appeared on the display is entered.

26. t DATA LEDs

W fo Ds [6] th u [49] ar blink g the cor sp nding data ite s
ered.

D

ch is indicated on the product drawing, is entered while the AN-
backgauge automatically moves to a position which the actual
unt of elongation has already been counted) is obtained.

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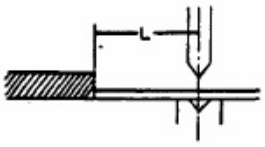
When dimension "L" (the distance between the backgauge and punch center) is entered while the DEPTH MODE LED is on, the position to which the backgauge should move can be instructed directly.

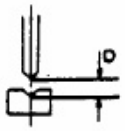


27. A ANGLE/D DEPTH LED

When bending angle "A" of the product is entered during the ANGLE mode, the position to which the lower beam should rise is computed automatically.

The integer should be entered in degrees "°" and the decimal in minutes (').

In the DEPTH mode, the position "D" (the distance between the punch and die) to which the lower beam should rise in order to bend the workpiece can be instructed directly.



28. B BEND. LENGTH / RD RETRACT DEPTH LED

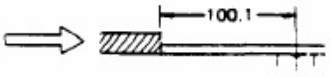
Bending length "B" of the product can be entered in the ANGLE mode.

In the DEPTH mode, the position of the lower beam, at which the "pullback function" begins, be instructed. Select a value "RD" slightly smaller than the total value of the V-gro th of the die to be used plus the workpiece thickness.

E LED

ackgauge can be compensated for.

tion of the backgauge is changed from 100 mm to 100.1 mm, e "0.10".



nter value "0.10" as B

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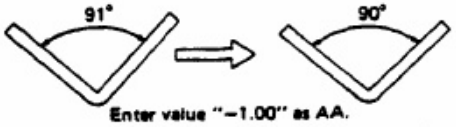
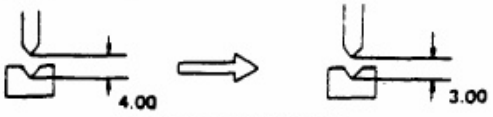
30. AA ANGLE ADJ. LED

The bending angle can be compensated for. When a bending angle has already been entered in the ANGLE mode, correct the angle in the same mode. If the actual bending angle of 91° is obtained instead of the required angle of 90°00', for example, enter the value "−1.00" (−1°) as a compensation value.



Enter value "−1.00" as AA.

When the bending angle has been entered in the DEPTH mode, correct the bending angle in the same mode. If "D" equals 4.00 and −1.00 is entered, for example, a value of 3.00 (4.00 − 1.00) will be obtained after compensation.



Enter value "−1.00" as AA.

31. GP UP-CTR-LOW LED

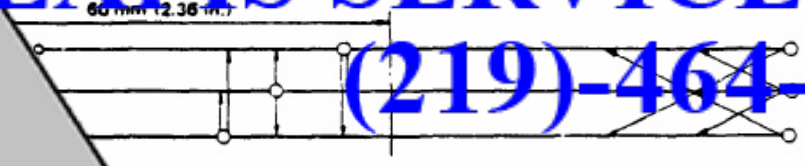
In the automatic mode, the height of the stoppers can be set to the UP (upper end), CTR (center) or LOW (lower end) position. The stoppers can be moved 10 mm (0.4 in.) up and down from center position. Movement of the stoppers is instructed by numerals "1" through "9".

UP 1, 4, 7
CTR 2, 5, 8
LOW 3, 6, 9

When moving the backgauge backward, entering any numeral from "1" to "9" starts to move the stoppers up or down 0.2 seconds after the backgauge has moved. The backgauge moves forward in relation to the numeral entered as described below.

1, 2 or 3

When the backgauge is positioned at a distance within 60 mm (2.36 in.) from the punch center, starts to move 0.2 seconds after the stoppers have moved; when the backgauge is at a beyond 60 mm (2.36 in.), the backgauge and stoppers start to move simultan



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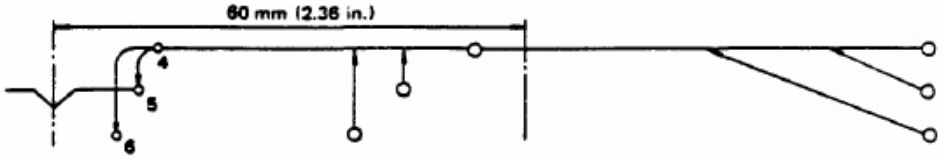
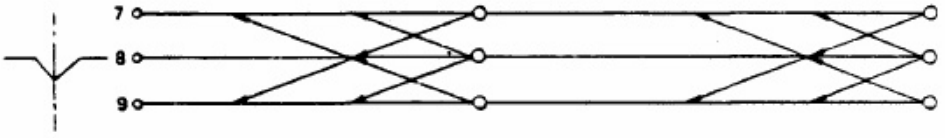
4, 5 or 6

The stoppers move to the UP position first. When the backgauge has moved to the specified position, the stoppers move to the position instructed by the corresponding number. When the backgauge is within 60 mm (2.36 in.) from the punch center, it starts to move 0.2 seconds after the stoppers have moved.



7, 8 or 9

The backgauge and stoppers move simultaneously.



NOTE: When there is no instruction or when the CL or AC key is pressed to clear the data, the numeral "2" is automatically selected.

32. TM TIMER LED

When bending has been performed and the bar pedal released during the automatic operation, the backgauge immediately starts to move to the next position of the work process. During that time, if the backgauge moves forward while removing the workpiece, the backgauge strikes against the workpiece. To prevent this, a timer is used to pause the backgauge temporarily. The timer can be set from 1 to 99 seconds at increments of 1 second.

33. LL LOWER LIMIT LED

The lower travel limit of the lower beam can be set at any of three positions by using the corresponding limit switch of the three located on the right side of the machine. To set the lower t l limit, enter the numeral "1", "2" or "3" of the required switch. Each limit switch adjusted by means of the dog.

NO the LOWER LIMIT function is sel hoos the ower limit setting level n me.

-up stopper (optional) can be instructed. When the numeral "0" is to the normal position; when "1" is entered, the stopper is set to

eated. Enter the numeral (1 thru 9) which corresponds d.

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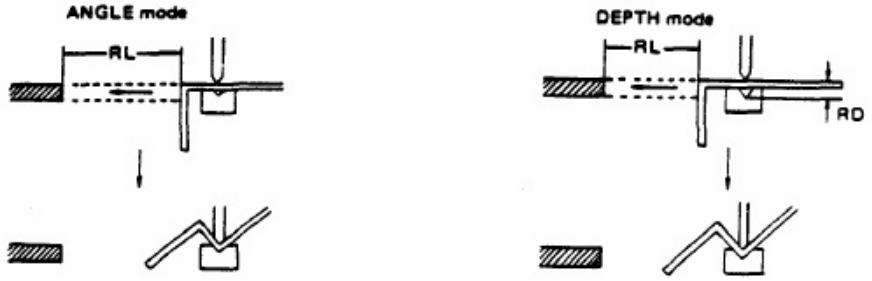
36. RL RETRACT LENGTH LED

The distance required for the backgauge to move backward can be entered.
When the distance is entered in the ANGLE mode, the lower beam temporarily stops at a computed position where the workpiece is to be pinched, and the backgauge will move backward; when it is entered in the DEPTH mode, the lower beam temporarily stops at the position instructed by the RD [28], and the backgauge will move backward. The lower beam starts to raise again after the backgauge has moved backward by the required distance.



37. SS SLOW BEND SPEED LED

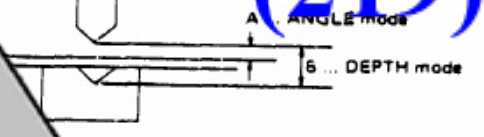
One of the nine slow bending speeds can be selected. Enter the optimum slow bending speed from among those listed in the table below.

Input numeral	1	2	3	4	5	6	7	8	9
Bending speed mm (in.)/min.	8 (0.31)	14 (0.55)	25 (0.98)	40 (1.57)	70 (2.76)	130 (5.12)	250 (9.84)	500 (19.7)	1000 (39.4)

NOTE: When this SS function is used, depth value "D" should be smaller than "SP" (D<SP) and "SP" is greater than "RD" (RD<SP). Otherwise, an alarm will occur.

38. SP SLOW BEND POSITION LED

The po[illegible]n where the SS [37] function starts can be set. In the ANGLE mode, enter the distan[illegible] measured from the upper surface of the workpiece; in the DEPTH mode, enter "B[illegible] from the bottom of the V-groove.



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39. ST SLOW BEND TIMER **LED**

The timer can be set the length of time to stop the lower beam at the starting position of the slow bend function. The length of stop time at this position can be set from 0 to 99 seconds.

40. SB STEP BEND. **LED**

41. RP RADIUS PITCH **LED**

The number of partial bending operations "SB" and the radius pitch "RP" can be set to perform the "R bending" operation.

The "R bending" refers to a bending method to produce a workpiece having a large radius using standard punches and dies.

To perform the "R bending", set the number of bending times and the radius pitch as follows:

(1) Determine the arc length "ℓ" of an intended product using its "IR" and the following equation:

ℓ (arc length) = $2\pi \times IR \times (180 - A)/360$

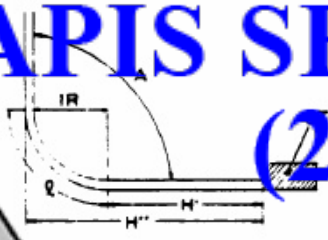
(2) When the number of bends required has priority over the radius pitch, the latter is determined by the equation "RP = ℓ/SB"; when the priority is reversed, the number of bends (integers only) required is determined by the equation "SB = ℓ/RP".

When the values "SB" and "RP" are entered, along with the length H' of the straight line on the stopper side, and the open angle "A" in the ANGLE mode, the first bending position is automatically determined.

NOTE: After completing the "R bending" mode, if there is a difference between the required angle and the measured angle, enter the compensation value in the AA [30].

In the DEPTH mode, also enter the values "SB" and "RP" obtained from the equations, as well as the length H" on the stopper side as the "W" value.

NOTE: The depth value varies with changes in the angle A and material and thickness of the workpiece. For this reason, it is best to determine the depth value after trial bending.



The 99 processes can be used for the "R bending" mode.

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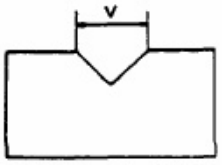
The following itemized data from 42 to 47 and 49 should be entered only when the ANGLE mode is used.

42. V V OPENING LED

The V opening of the die to be used can be entered.



43. T THICKNESS LED

The thickness of the workpiece to be processed can be entered.

44. S TENSILE STRENGTH LED

The tensile strength (kg/mm^2) of the workpiece to be processed can be entered. The standard tensile strength of typical types of material are shown below for reference.

Aluminum	10 – 15
Mild steel	32
Hard steel	60 – 80

NOTE: Enter the data for tensile strength of the workpiece in units of kg/mm^2.

45. PR PUNCH RADIUS LED
46. DR DIE RADIUS LED
47. DA DIE ANGLE LED

Enter the punch radius "R", the die shoulder radius "DR" and the die angle "DA", respectively, when their corresponding LEDs are on.
However, when the V opening [42] of the die is entered, the data of these three items for the stan 2V die is set automatically, as indicated in the table below.

Standard 2 V die mm (in.)

	10 (0.39)	12 (0.47)	14 (0.55)	16 (0.63)	18 (0.71)	20 (0.79)	25 (0.98)	32 (1.26)	40 (1.57)	50 (1.97)	63 (2.48)	80 (3.15)	100 (3.94)
	0.2 (0.008)	0.2 (0.008)	0.2 (0.008)	0.2 (0.008)	0.2 (0.008)	0.2 (0.008)	0.2 (0.008)	3.0 (0.118)	6.0 (0.236)	6.0 (0.236)	6.0 (0.236)	10.0 (0.393)	10.0 (0.393)
	0.5 (0.019)	0.5 (0.019)	0.8 (0.031)	0.5 (0.019)	0.5 (0.019)	0.5 (0.019)	0.8 (0.031)	4.0 (0.157)	4.0 (0.157)	4.0 (0.157)	5.0 (0.197)	6.0 (0.236)	7.0 (0.275)
	90	88	88	88	88	88	88	85	85	85	85	85	85

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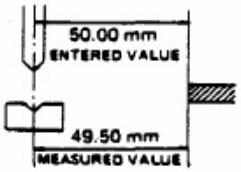
NOTE: a. Change the data on the DR [46] and DA [47] when used with any die other than the standard 2V die.

b. The 2V die with a V opening of 12 mm is available in two types of V-angles, 88° and 90°. If the 2V die with a V-angle of 88° is used, enter the numeral "88" (88°) for the DA [47].

48. BC BACKGAUGE CALIBRATION LED

When this LED is on, the origin error of the backgauge (L-axis) can be compensated for. Enter the difference between the entered value and the actual distance between the punch center and the backgauge.



If the difference is as shown in the figure above, for example, enter the numeral "0.5" (mm) which is obtained from the equation "50.00 (entered value) – 49.50 (measured value)". After entering "0.5", press the ORIGIN key to perform the origin setting.

49. RDA RETRACT DEPTH ADJUSTMENT LED

The position of the lower beam, at which the pullback function of the backgauge begins, can be compensated for when the RETRACT (pullback) function is used in the ANGLE mode.
To clear the compensation data, blink this LED, press the [CL] key and then [INP] key.

NOTE: Once the compensation data is entered in one bending process, all processes are compensated for according to the entered data.
The bend position varies according to the compensation data.
The compensation data is not stored in the cassette tape memory.

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Number of units available

Symbol		Item	mm				in.			
			Angle mode		Depth mode		Angle mode		Depth mode	
Angle	Depth		Integer	Decimal	Integer	Decimal	Integer	Decimal	Integer	Decimal
W		FLANGE DIMENSION	3	2	3	2	2	3	2	3
A	D	A: ANGLE D: DEPTH	3	2	3	2	2	3	1	4
B	RD	B: BEND LENGTH RD: RETRACT DEPTH	4	1	3	2	3	2	1	4
B		BEND ALLOWANCE	±1	2	±1	2	±0	3	±0	3
AA		ANGLE ADJ.	±2	2	±2	2	±2	2	±0	4
GP		UP-CTR-LOW	1	0	1	0	1	0	1	0
TM		TIMER	2	0	2	0	2	0	2	0
LL		LOWER LIMIT	1	0	1	0	1	0	1	0
FU		FLIP UP	1	0	1	0	1	0	1	0
R		REPEAT	1	0	1	0	1	0	1	0
RL		RETRACT LENGTH	3	0	3	0	2	1	2	1
SS		SLOW BEND SPEED	1	0	1	0	1	0	1	0
SP		SLOW BEND POSITION	3	1	3	1	1	4	1	4
ST		SLOW BEND TIMER	2	0	2	0	2	0	2	0
SB		STEP BEND	3	0	3	0	3	0	3	0
RP		RADIUS PITCH	3	2	3	2	2	3	2	3
V		V OPENING	3	1	–	–	2	2	–	–
T		THICKNESS	2	2	–	–	1	3	–	–
		TENSILE STRENGTH	2	0	–	–	2	0	–	–
		CH RADIUS	2	1	–	–	1	2	–	–
		RADIUS	3	1	–	–	1	3	–	–
		GLE	3	1	–	–	3	1	–	–
		GE CALIBRATION	±1	2	±1	2	±0	3	±0	3
		PTH	2	2	2	2	1	3	1	3

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OPERATION

PREPARATIONS FOR OPERATION

Turn power on.
↓
Return the L-axis to the origin.
↓
Set the D-axis to the origin.
↓
Enter the data.
↓
Automatic operation.

TURN POWER ON

Turn the factory's main power on and press the POWER ON key on the NC control panel.

RETURN THE L-AXIS TO THE ORIGIN

Press the ORIGIN L key [5]. The backgauge will automatically move to set the L-axis origin.

NOTE: Before pressing the key [5], make sure alarm number "3F04" does not blink on the data display [21]. If it does, the backgauge is not parallel to the machine. After turning off the power by POWER OFF key [2], move the backgauge with your hand to set it parallel.

SET THE D-AXIS TO THE ORIGIN

1. Press the upper limit setting handwheel ON/OFF key [7]. The light in it will illuminate.
2. Check to see if the punches and dies are secure and tight.
3. P… bar pedal.
4. …per limit setting h…dwh…el slowly to rais… the ta…le u…il …he pre…ure ga…e …g".

…e sure to observe the allowable …nna… on the punches and dies installed.

… D key [6]. The light in it will illuminate and numeral "1.00" (or: …dicated on the DEPTH display [20].

…g handwheel ON/OFF key [7]. The light in it will go out.

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ENTER THE DATA

1. Press the MEMORY key [8]. The decimal point will blink at the lower right section of the STEP display [18] to indicate that work process numbers are ready to be entered.
2. Enter the work process number using the numeric keypad, and press the EOB key.
3. Select the method of the data entry with the ANGLE/DEPTH mode select key [9]. The corresponding LED [24] or [25] will glow.
   NOTE: The ANGLE or DEPTH mode can be selected for each work process.
4. Enter the required data in the ANGLE or DEPTH mode, as follows:
   - DEPTH mode

   (1) Press the EOB key. The "W" LED [26] will blink. Enter the flange length, confirm that the numeral shown on the data display [21] is correct, and then press the EOB key. The "D" LED [27] will then blink.
   (2) Enter the required "D" data and press the EOB key.
   (3) Similarly, enter the data in relation to the LEDs [28] through [41].
   (4) Press the INP key [17-8] to store all data in the memory.
   (5) The work process number will then advance by one. Enter the next work process data.

   NOTE: a. Although the process number advances by one, the data that has been entered in relation to the LEDs [26] and [27] will not be cancelled. When the bending data (length, angle and width) are the same, the data need not be re-entered.
   b. Data items for the LEDs [26] through [41] can be moved using the EOB key.

   - ANGLE mode

   (1) Press the EOB key and enter the data selected for "V OPENING" [42] with the arrow keys [17-4]. Confirm that the numeral shown on the data display [21] is correct, then press the EOB key. The "T" LED [43] will then glow.
   (2) Similarly, enter the subsequent data up to LED [47].
   (3) Back up to "W" LED [26] using the arrow key and enter the data.
   (4) Similarly, enter the required data up to LED [41].
   (5) Press the INP key [17-8] to store all data in the memory.
   NOTE: a. Although the process number advances by one, the data which has already been entered for the LEDs [26], [27] and [28] and [42] through [49] will not be cancelled. In other words, the same data need not be re-entered.
   b. Wait approximately 1.5 seconds (for the NC system to process the data) after pressing the INP key before entering the next process data.
   c. Data items for the LEDs [26] through [49] can be moved using the

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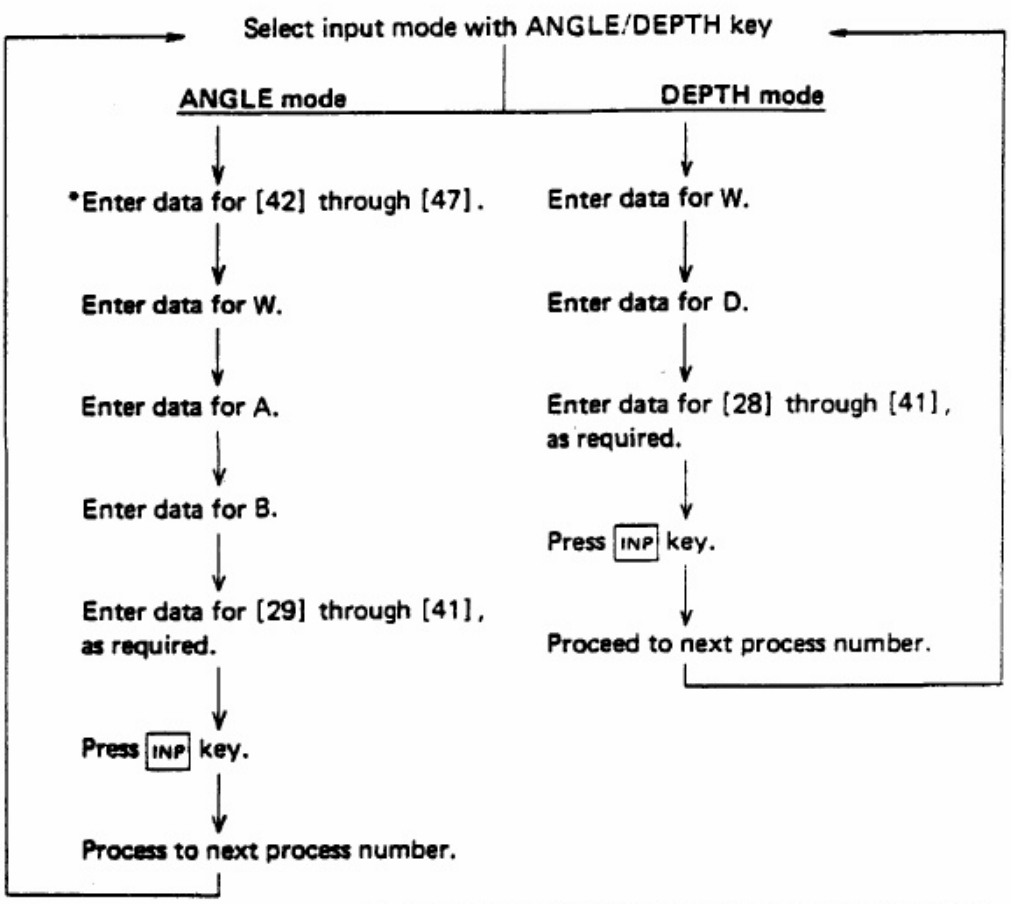

*: May be omitted for 2nd and subsequent processes.

5. After entering the required data, press the MEMORY key [8]. The light in it will go out and the memory mode will be released. The data display will show the smallest of the series of process numbers.
(e.g.: When data has been entered for process numbers 8 through 12 but none for process numbers 7 and 13, pressing the MEMORY key causes process number 8 appear on the data display.)

Whenever any data of item number [29] through [41] is re-entered, be sure to call the process number using the STEP key, SHIFT key or BACK key just before entering the data.

When the START key [3] is pressed, the memory mode is cancelled and automatic operation starts, beginning with the process number on the data display.

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Clearing the input data

1. One data item
   (1) Recall the process number which contains the data to be cleared from memory.
   (2) Press the EOB key.
   (3) Press the MEMORY key [8].
   (4) Use the arrow key to show the data on the data display.
   (5) Press the CL key to clear the data.
2. All data of one process
   Press the MEMORY key and recall the process number to be cleared from memory. When the AC key is pressed, any data of process numbers [26] through [41] shown on the data display will be cleared. The stoppers, whose positions are determined by data item number [31], will be automatically set to the center position.
   NOTE: Data for item numbers [42] through [49] will not be cleared.
3. All processes and all data
   Press the MEMORY key and then the STOP key. With the STOP key held in, press the AC key. All data for all item numbers [26] through [49] will be cleared. The stoppers, whose positions are determined by data item number [31], will be automatically set to the center position.

Playback function

This function is used when entering data for the upper limit position ("D" value) of the lower beam. This position, where the worksheet is actually bent, can be directly entered into the NC system. The playback function is effective only when entering the data in the DEPTH mode.
To enter the data, proceed as follows:

1. Press the STEP key [17-1] and recall the required process number from memory.
2. Press the upper limit setting handwheel ON/OFF key. The light in it will illuminate.
3. With the bar pedal depressed, turn the upper limit setting handwheel to bend the worksheet at the required angle.
4. After properly bending the worksheet, release the bar pedal and press the upper limit handwheel ON/OFF key. The light in it will go out.
   MORY key [8]. The light in it will illuminate.
   YBACK key [16]. The upper limit position of the lower beam will be ory.
   key [8]. The light in it will go out and the memory mode will be

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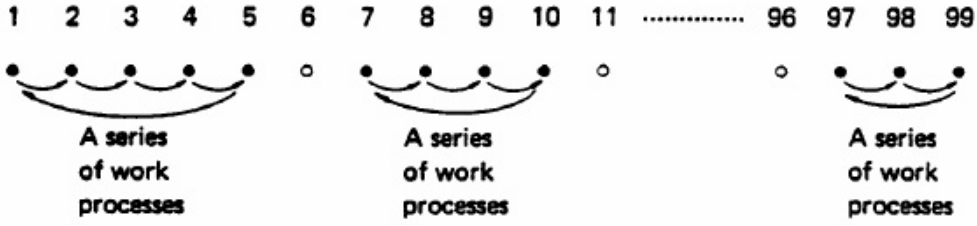
AUTOMATIC OPERATION

The automatic operation refers to the repeated operation of a series of work processes, as shown below.



NOTE: In the above instance, work process number 1 cannot be input after 99 as a series of work processes.

CAUTION: **Never forget to carry out a trial operation once or twice to confirm the entered data before performing an actual bending operation.**

1. Set the NC ON/OFF switch on the electrical enclosure to on and press the START key [3]. After the backgauge has been set to the proper position, the POSITION LED glows and the buzzer sounds for approximately 0.5 seconds.

2. Butt the worksheet against the backgauge stoppers and press the bar pedal. After bending the worksheet, releasing the pedal causes the next process to appear on the STEP display and the backgauge to move to the next position. The buzzer will then sound to indicate that the backgauge has positioned again.

3. After confirming that the backgauge has been set in position, butt the worksheet against the stoppers and then press the bar pedal. Release the pedal after bending the worksheet.

4. Repeat step [3] above.

5. Upon completion of the final work operation in a series of work processes, the total number of worksheets advances by one and the buzzer sounds three times to indicate that the series of bending processes have ended.

NOTE: a. Prior to automatic operation, check to make sure the following lights and LEDs are as indicated below:

ORIGIN L light [5] . . . . . ON
ORIGIN D light [6] . . . . . ON
per limit setting handwheel ON/OFF key [7] . . . OFF
ARM LED [23] . . . . . OFF

op automatic operation, press the STOP key [4].
eration will stop if any of the following occurs.
number of worksheets has reached the predetermined value
ous process data
curs due to problems in the NC system
the power supply of the press brake off, be sure to press the
on the NC control panel.

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ALARM NUMBER DISPLAY

When a problem occurs, its corresponding alarm number appears on the data display for identification of the problem.
NOTE: The letter "F" contained in the alarm number refers to a blank.

Alarm No.	Meaning	Corrective Action
Hardware problems		
FFF1	ROM/RAM of NC3B board is faulty.	Contact Amada.
FFF2	Data transfer system inside NC3B board is faulty.	" "
FFF3	Servo system is faulty.	" "
0F01	RAM of CPU board is faulty.	" "
0F02	ROM of CPU board is faulty.	" "
0F04	Servo speed is too fast.	" "
0F05	Servo speed is too slow.	" "
0F06	Feedback system of positioning D-axis is faulty.	" "
0F07	Feedback system of positioning L_1-axis is faulty.	" "
0F08	Feedback system of positioning L_2-axis is faulty.	" "
0F09	Encoder processing circuit of NC3B board is faulty.	" "
0F1	Signal from upper limit switch or bar pedal is faulty.	" "
	...itioning of ...axis ...faulty.	" "
		" "
	...occurred in data stored ...hile power is off. ...retained in memory ...eable batteries. If ...current flow for ...ne month or if ...rrent flow is ..., an alarm ...y occu...	Check for proper retention of all data in memory and correct if erroneous data has occurred. When charging batteries, leave power on for more than 48 hours. If error has occurred although battery is in good order, contact Amada.

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Alarm No.	Meaning	Corrective Action
Operational errors		
3F00	L_1 -axis has overtravelled in the (+) direction.	Move affected axis in reverse direction with manual axis key and press CL key.
3F01	L_2 -axis has overtravelled in the (+) direction.	" " "
3F02	D-axis has overtravelled in the (+) direction.	" " "
3F03	D-axis has overtravelled in the (—) direction.	" " "
3F04	Stretch's parallelism to punches and dies is greatly deflected.	Turn power off and manually correct stretch positioning. Turn power on and press CL key.
3F11	START key is pressed before setting L- and D-axis origins.	Press CL key and solve the problem.
3F12	START key is pressed before setting L-axis origin.	" " "
3F13	START key is pressed before setting D-axis origin.	" " "
3F15	Specified number of worksheets is exceeded.	" " "
3F16	Total number of "R" bending processes has exceeded "20".	" " "
3F17	Pedal is released while backgauge moves backward in pullback process.	" " "
3F18	Pedal is released while D-axis moves after L-axis is retracted in pullback process.	" " "
	al is depressed before D-axis ioning is completed.	" " "
	s pressed at "0" or umber.	" " "
	s data to set	" " "
	greater than	" " "

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Alarm No.	Meaning	Corrective Action
Input data errors		
4F04	D-axis data is minus or greater than 100 mm (3.937 in.).	" " "
4F05	Relationship between data for slow bend positioning and amount of pullback is incorrect (D>SP, RD>SP, D>RD).	" " "
4F06	"R" bend data is incorrect (L>RP x SB).	Press [CL] key and solve the problem.
4F07	"D" value entered with PLAYBACK key is minus.	" " "
4F08	Result of data calculation in ANGLE mode is faulty.	" " "
4F09	When SB is not "0", RP is "0." Or when RP is not "0", SB is "0."	" " "
Mechanical response error		
6F00	Lower beam fails to raise when bar pedal is pressed.	" " "
6F01	Cassette tape is unloaded.	" " "
6F04	Data for lower limit of ram is other than 0, 1, 2 or 3.	" " "
Others		
7F00	Either STOP button is pressed or main power is off. (Fuse may have blown.)	Press [CL] key and solve the problem.
	sette tape memory device ulty.	Clean and check. Then press [CL] key.
	nsfer system between CPU B boards is faulty.	Contact Amada.
	meter inside NC3B rect.	Press [CL] key and solve the problem.

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SPECIAL ACCESSORIES

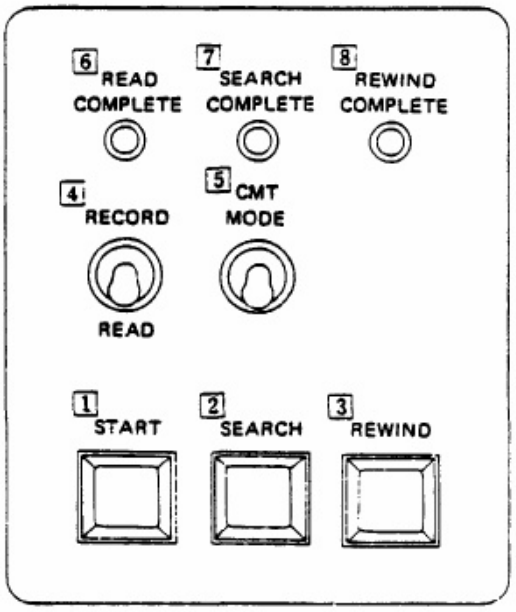
CASSETTE TAPE MEMORY DEVICE

This device is equipped as a standard accessory on models destined for the U.S.A.

This device is used to record data entered in the NC system on a cassette tape or enter the data recorded on the cassette tape into the NC system.

A maximum of 35 data for 99 processes are available to be recorded on each side of the tape.

CONTROL DESCRIPTION



1. START button (w/light)

When the START button is pressed, data starts to be recorded on the cassette tape from the NC system or to be entered into the NC system from the tape.

2. SEARCH button (w/light)

When the SEARCH button is pressed after the product number has been instructed, the corresponding data recorded on the cassette tape is automatically searched.

3. REWIND button (w/light)

When the REWIND button is pressed, the tape rewinds.

4. RECORD/READ select switch

When this select switch is set to RECORD, data is recorded on the cassette tape; when the switch is set to READ, data recorded on the tape is entered into the NC system.

5 [illegible] switch

[illegible] when using the cassette tape memory device. The device will become

[illegible]ETE LED

[illegible]dicate that data recorded on the cassette tape has been entered into the

[illegible] LED

[illegible]at the instructed data on the tape has been located.

[illegible]e cassette tape has been rewound completely.

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OPERATION

Loading the cassette tape

1. Press the eject button to open the pocket.
2. Load the cassette tape properly into the pocket.
3. Manually close the pocket. A click should be heard.

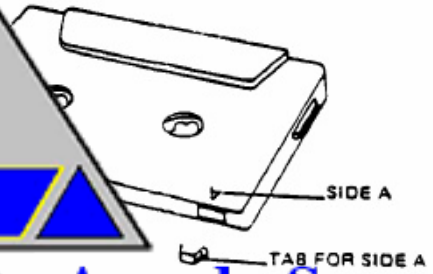
Formatting the tape

1. Press the MEMORY key [8] on the NC control panel.
2. Flip the CMT MODE switch [5] up.
3. Press the numeric key [.] (decimal point).
4. Press the START key [3]. The formatting will start and [F:] will appear on the data display.
5. Upon completion of formatting, the READ COMPLETE LED [6] will glow.
   NOTE: Formatting on one side is completed in approximately five minutes.
6. After proper formatting, press the REWIND button [3] to rewind the tape.

CAUTION: a. Be sure to format when a new cassette tape is to be used. Otherwise, NC data cannot be read at all.
b. Formatting a tape cancels any data previously recorded on the tape.

Writing the data

1. Flip the CMT MODE switch [5] up.
2. Set the RECORD/READ select switch to RECORD.
3. Enter one of the numerals from 1 to 35 for the product number desired using the numeric keypad, and then press the [EOB] key.
4. Pres[illegible] START button [1]. The tape will locate the position corresponding to the pr[illegible]mber and NC dat[illegible] will be record[illegible] at that po[illegible]ition. [35][XX] XX refers [illegible]mber) will appear [illegible] the data display.
5. [illegible]ecording the tape, the READ COMPLETE LED [6] glows. [illegible]identally erasing any data recorded on the tape, remove the tabs. The [illegible]sed for re-entry of new data after installing the tabs in position.



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Reading out the data

To enter data recorded on the tape into the NC system, proceed as follows:

1. Flip the CMT MODE switch [5] up.
2. Set the RECORD/READ switch [4] to READ.
3. Enter the required product number with the numeric keypad, and press the EOB key.
4. Press the START button [1]. The data for the product number will then be located and entered into the NC system. The product number C4 XX (XX refers the product number) will also appear on the data display.
5. The READ COMPLETE LED [6] glows to indicate that reading has been completed.

Unloading the tape

1. Press the MEMORY key [8].
2. Flip the CMT MODE switch [5] up.
3. Press the REWIND button [3].
4. Press the START button [1]. While the tape is rewinding, the lights in the START and REWIND buttons remain on and the data display shows C2 . The READ COMPLETE LED [6] will then glow to indicate that the tape has been rewound completely.
   NOTE: Before unloading the tape, always rewind it completely for storage.
5. Press the eject button to open the pocket.
6. Unload the tape and close the pocket.

Searching for the data

When a particular product number needs to be located in advance for reading or recording purposes, proceed as follows:

1. F MT MODE switch [5] up.
2. RCH button [2].
   ed product number using the numeric keypad. The product number will display.
   [3]. The tape will automatically be set to locate the instructed RCH COMPLETE LED will glow to indicate that the product
   essing the CL key.

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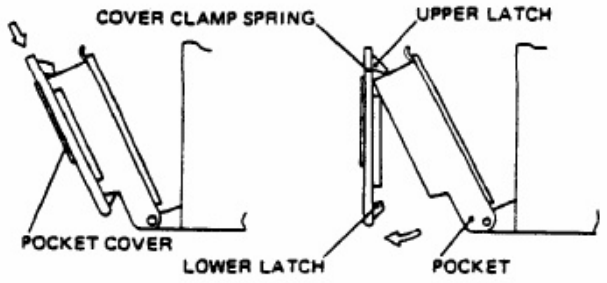
CLEANING

Every 200 readouts or every month, clean the cassette tape memory device as follows:

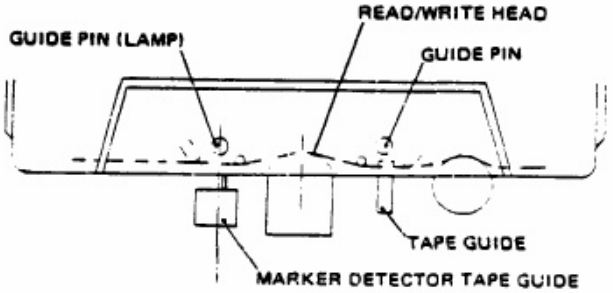
1. Remove the pocket cover.



2. Carefully and completely clean the head and tape guides with a clean cloth or a swab dampened with head cleaner solvent. Also clean the tape roller's contact surface of tape carefully in a similar manner. See the figure below.
   NOTE: Do not apply an excess of cleaner solvent.

3. Using a dry cloth, wipe the two guide pins and the other inner mechanisms.

NOTE: Do not touch the tape and any part of the tape memory device interior with your hand as this causes dust or dirt to accumulate easily.
Keep the interior clean and free from any foreign particles.



4. [illegible] pocket cover in its positi[illegible]

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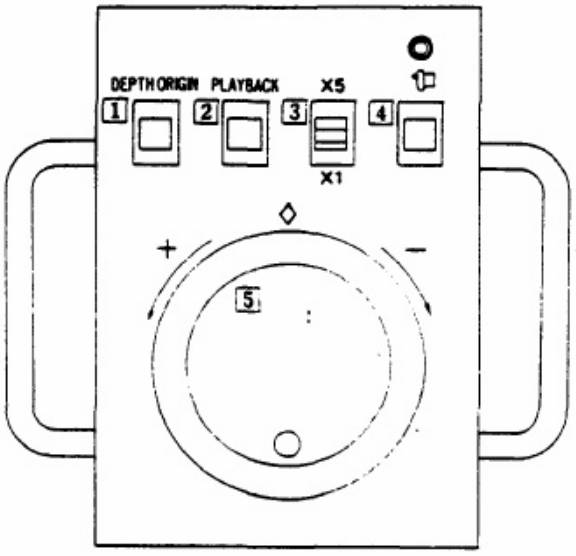
REMOTE-CONTROLLED UPPER LIMIT SETTING UNIT

This device is isolated from the machine and provides the upper limit setting of the lower beam in place of the upper limit setting handwheel for operator convenience.



1. DEPTH ORIGIN key

This key is used when setting the origin of the D-axis and has the same function as the ORIGIN D key [6] located on the NC control panel.

2. PLAYBACK key

This key is used when entering the data for the "D" value (upper limit position of the lower beam) and has the same function as the PLAY-BACK key [16] on the NC control panel.

3. x5/x1 select switch

When this switch is set to x1, turning the upper limit setting handwheel one complete rotation causes the upper limit position of the lower beam to lower or raise by 1 mm (0.039 in.); when it is set to x5, turning the handwheel one complete rotation causes the upper limit position of the lower beam to lower or raise by 5 mm (0.197 in.).

4. Handwheel mode key ( )

This key turns on and off the remote-controlled upper limit setting unit. When the key is ON, the LED directly above it glows.

NOTE: When the NC system is on, the upper limit setting handwheel on the machine cannot be used.

5. *setting handwheel*

ets the upper limit position of the lower beam and has the same function setting handwheel on the machine. When the handwheel is turned clockwise, position of the lower beam is raised; when it is turned counterclockwise, of the lower beam is lowered.

rn the handwheel faster than 5 rotations per second, as the actual ment cannot follow the handwheel rotations.

has been overtravelled by using the handwheel, return it using feed key (+H , −H or −L).

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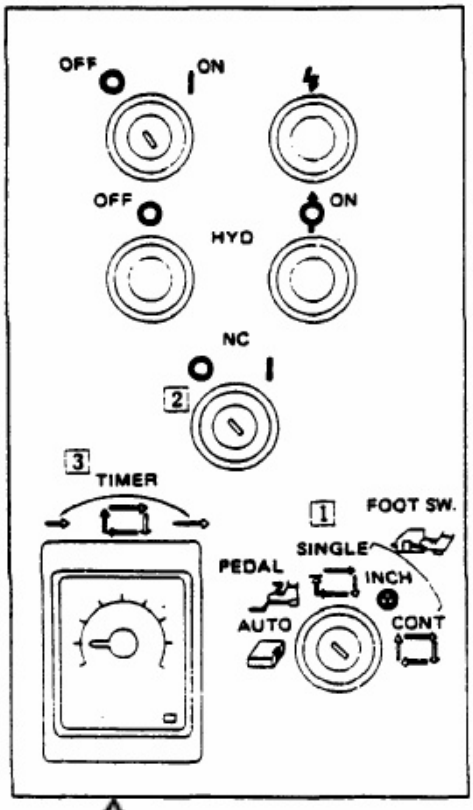
FOOT SWITCH

This foot switch cannot be equipped on models destined for the U.S.A.

The foot switch is used in place of the bar pedal on the machine to operate the press brake. On machines equipped with this foot switch, four different operational modes—PEDAL, SINGLE, INCH and CONT.—can be selected.

CONTROL DESCRIPTION



1. Mode switch

PEDAL

When the mode switch is set to PEDAL, the lower beam is raised or lowered by the bar pedal only.

NOTE: Do not set the mode switch to PEDAL from any other mode while the "⇧" (up) foot switch is being pressed.

INCH

When the "⇧" (up) foot switch is pressed with the mode switch set to INCH, the lower beam will raise; when the "⇩"(down) foot switch is pressed, the lower beam will lower. Releasing the foot switch will stop the lower beam at that position.

NOTE: Do not set the mode switch from PEDAL to INCH while the "⇧" (up) foot switch is being pressed.

SING

Wh (up) foot witc i cont ously ressed wit the m de sw to set to SING E th will rise to the upper limit position and sta there for approxi ately 0.5 n lower to the lower limit position and stop. Releasing the "⇧"(up) foot er beam is being raised, lower th beam t the lower limit positi n switch to raise the lower be stem is in use, press the foot switch after the D- and L-axis of the en set; otherwise, the lower beam will not move. n alarm occurs e lower beam will stop immediately.

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CONT

When the "⇧" (up) foot switch is continuously pressed with the mode switch set to CONT, the lower beam will raise to the upper limit position and stay there for approximately 0.5 seconds. It will then lower to the lower limit position and stop. After the preset time has elapsed, the lower beam raises to repeat the same operation. Releasing the "⇧" (up) foot switch while the lower beam is being raised, lowers the beam to the lower limit position and stop.

CAUTION: a. When the NC system is in use, press the foot switch after the D- and L-axis of the NC system has been set; otherwise, the lower beam will not move. If an alarm occurs in the NC system, the lower beam will stop immediately.

b. When the STOP key on the NC control panel is pressed, the continuous operation will stop. However, simply pressing the START key causes the continuous operation. This may result in an unexpected accident. If the operation is to be stopped, always release the "⇧" (up) foot switch to stop the lower beam before pressing the STOP key for safety's sake.

AUTO

This mode cannot be used.

2. NC system ON/OFF switch

When the NC system is used in conjunction with the machine, set the ON/OFF switch to "|" (ON); when it is not used, set the switch to "○" (OFF).

3. Timer

This timer sets the length of time required for the lower beam to remain at the lower limit position in the CONT mode. When the timer knob is turned clockwise, the stopping time is lengthened. The timer is rated at a range of approximately 0 to 30 seconds.

NOTE: The timer will activate after the D- and L-axis of the NC system has been set.

OPERATIONAL PROCEDURES

1. Set the control circuit ON/OFF switch (on the electrical enclosure on the machine) to "ON".
2. ...WER ON key on the NC control panel.
   ...os "1" and "2" above are reversed, the ALARM LED on the NC panel may ...tess the CL key to release the alarm.
   ...er limit setting lever is loose and the EMERG. STOP light (orange) ...per beam is off. If the light is on, press the DOWN button on the ...e beam to the lower limit position.
   ...n (in the electrical enclosure). The light in it will illuminate ...or will start.
   ...tart if the bar pedal or "⇧" (up) foot switch is pressed, or if ... the lower limit position.

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5. Set the NC system ON/OFF switch to " | " (ON) and press the START key on the control panel.
6. Select the desired mode with the mode switch.
7. Press the foot switch (or: the bar pedal if the PEDAL mode is selected) to start operation.
   NOTE: Except in the PEDAL mode, pressing the bar pedal stops the lower beam at that position.
8. After processing all worksheets, press the DOWN button on the machine to lower the lower beam to its lower limit position.
   NOTE: Release the "⇧"(up) foot switch when the SINGLE or CONT mode has been used; press the DOWN foot switch when the INCH mode has been used.
9. Press the POWER OFF key on the NC control panel to turn off the power.
10. Press the HYD. OFF button (in the electrical enclosure) to stop the motor.
    NOTE: When the HYD. OFF button is pressed before turning off the power to the NC system, an alarm will occur in the system which is not an indication of a problem.
11. Set the control circuit ON/OFF switch to OFF.

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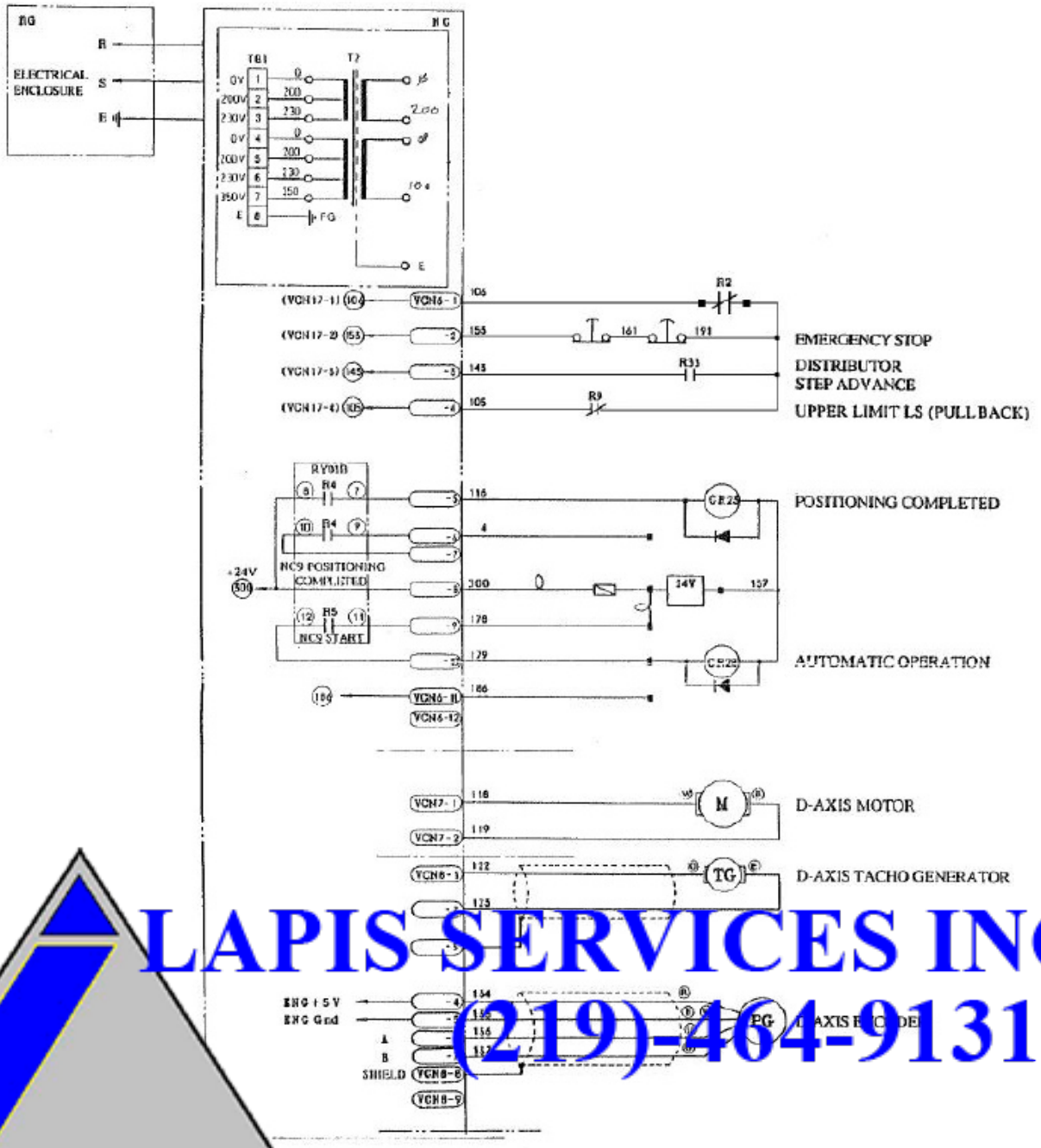
NC ELECTRICAL CIRCUIT (RG)



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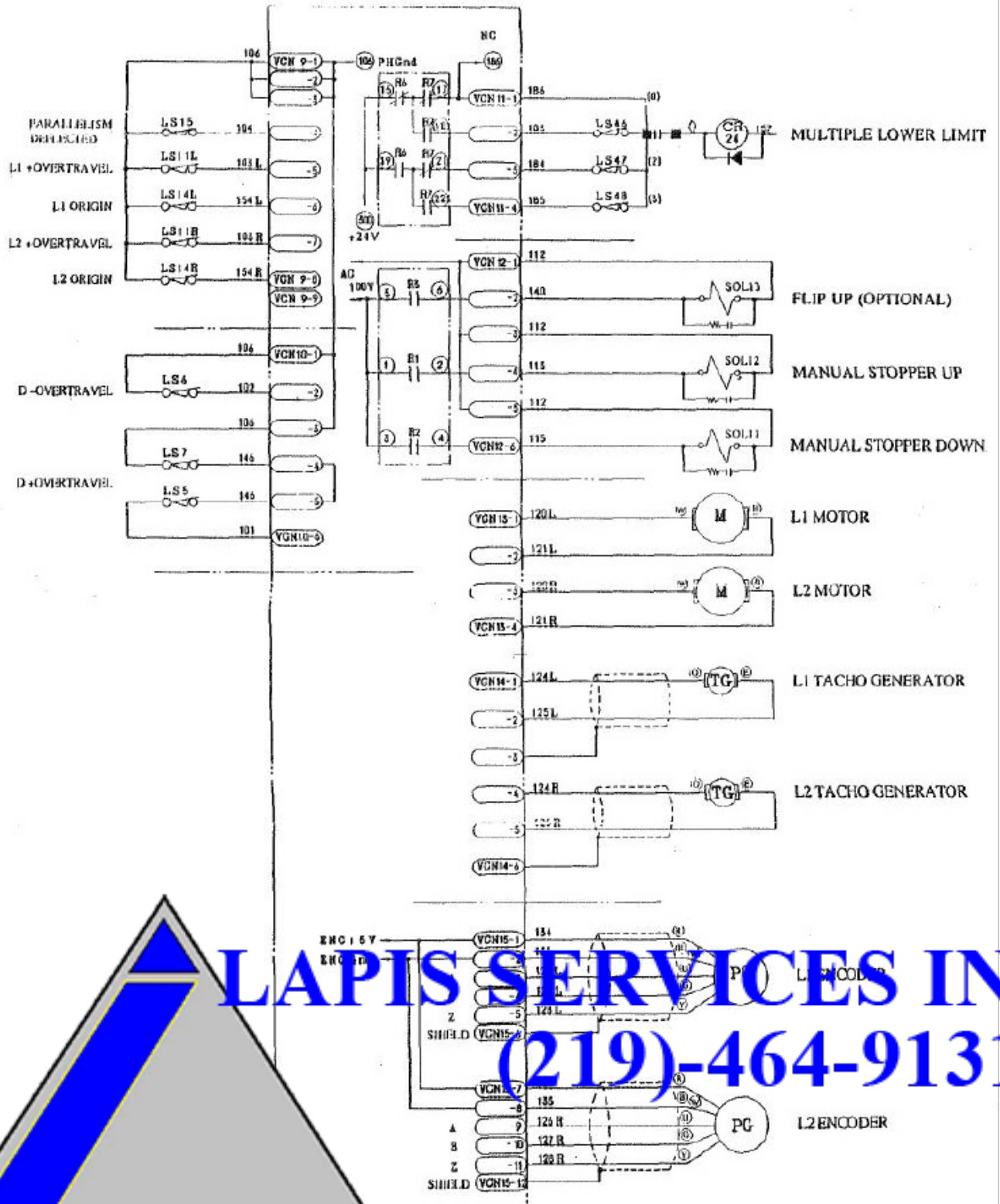

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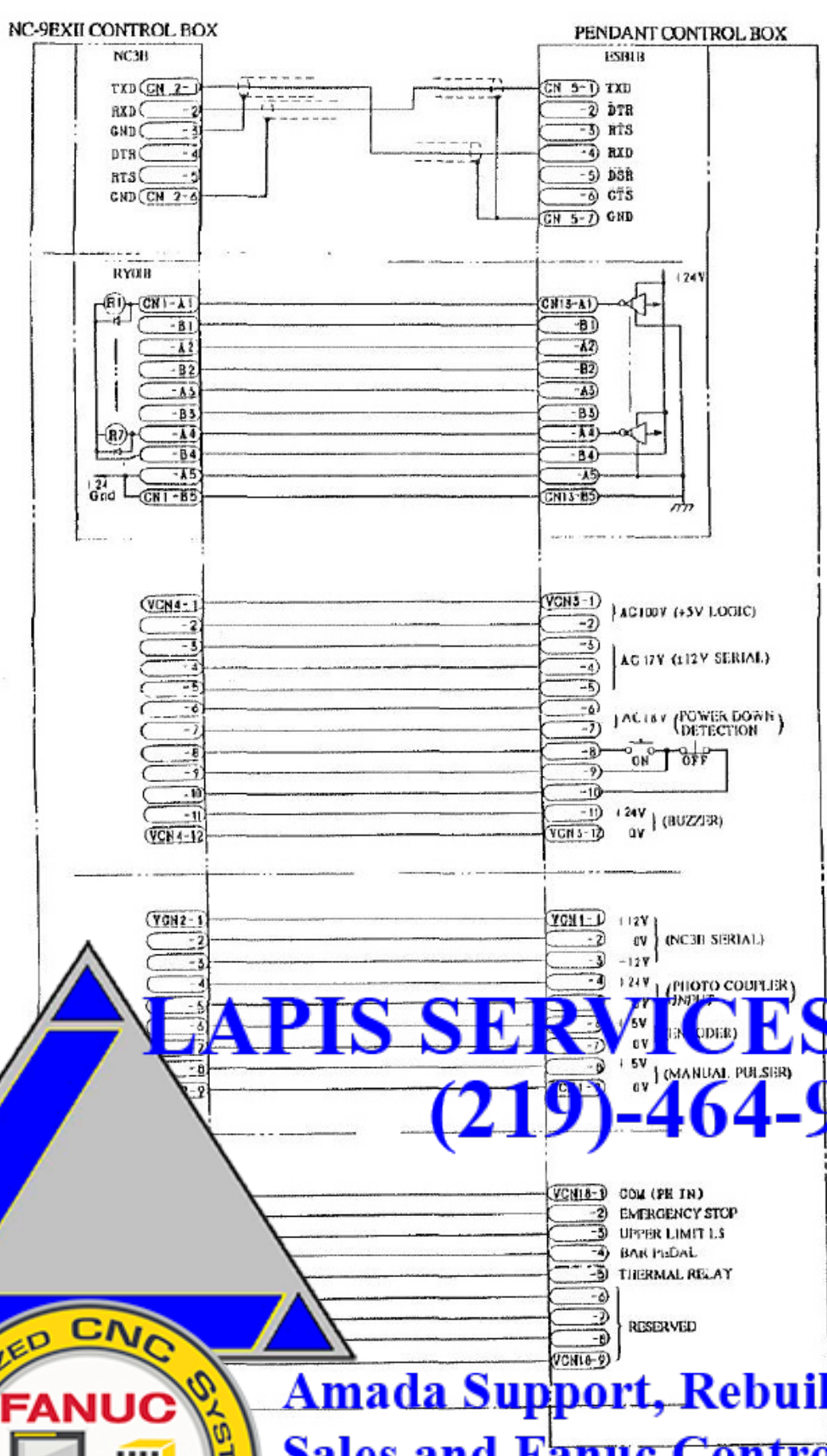

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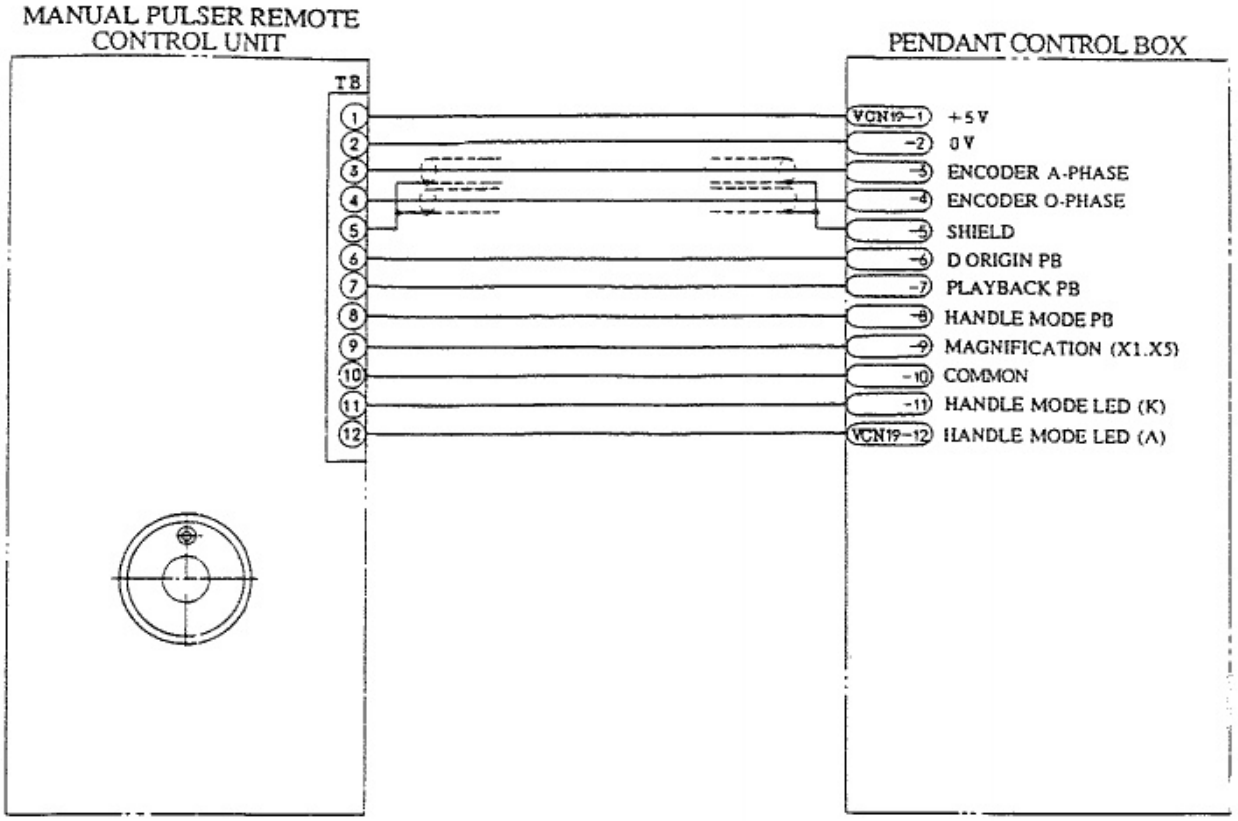
AUTHORIZED CNC SYSTEM
FANUC
INTEGRATOR



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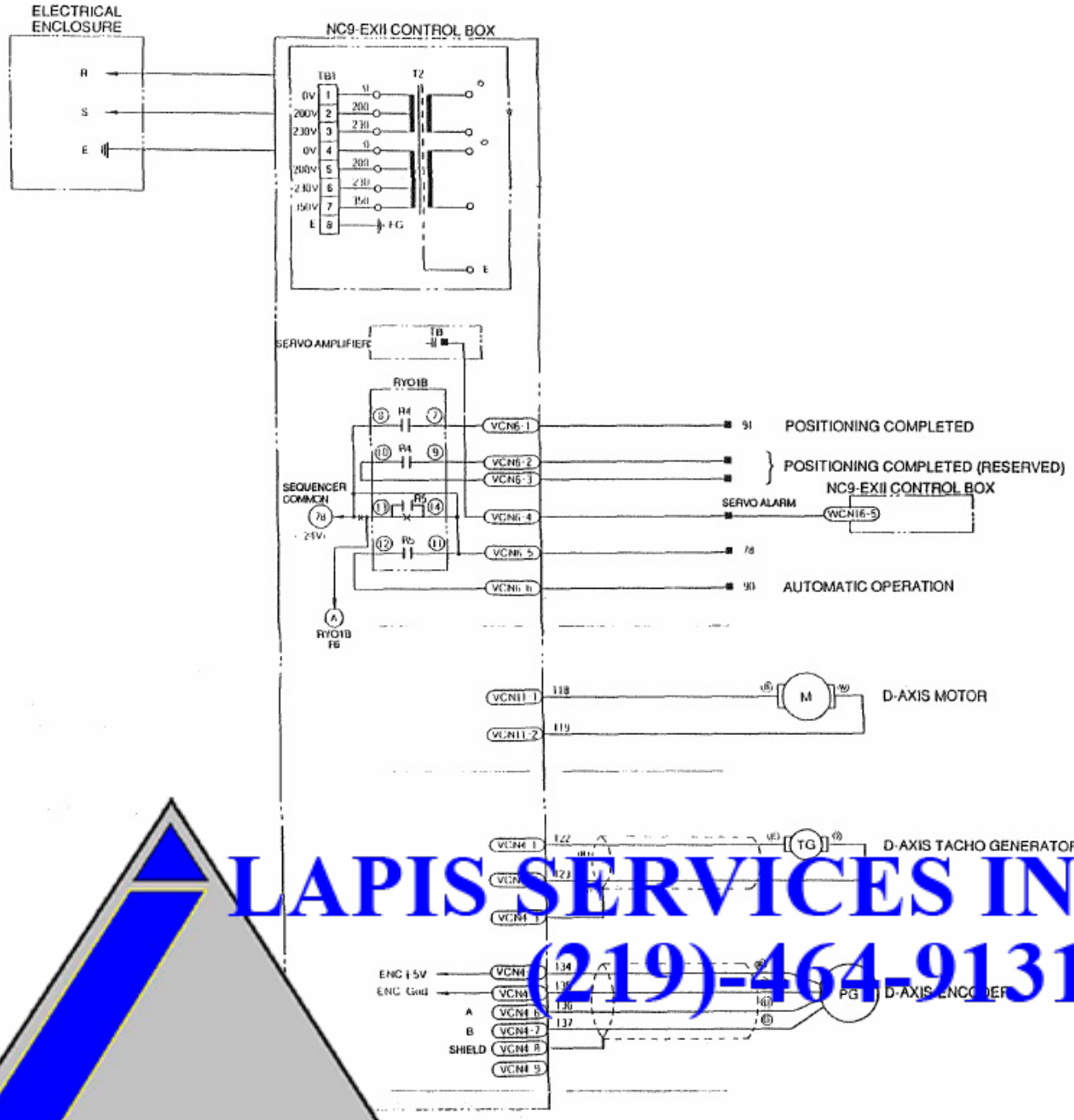
NC ELECTRICAL CIRCUIT (FBD)



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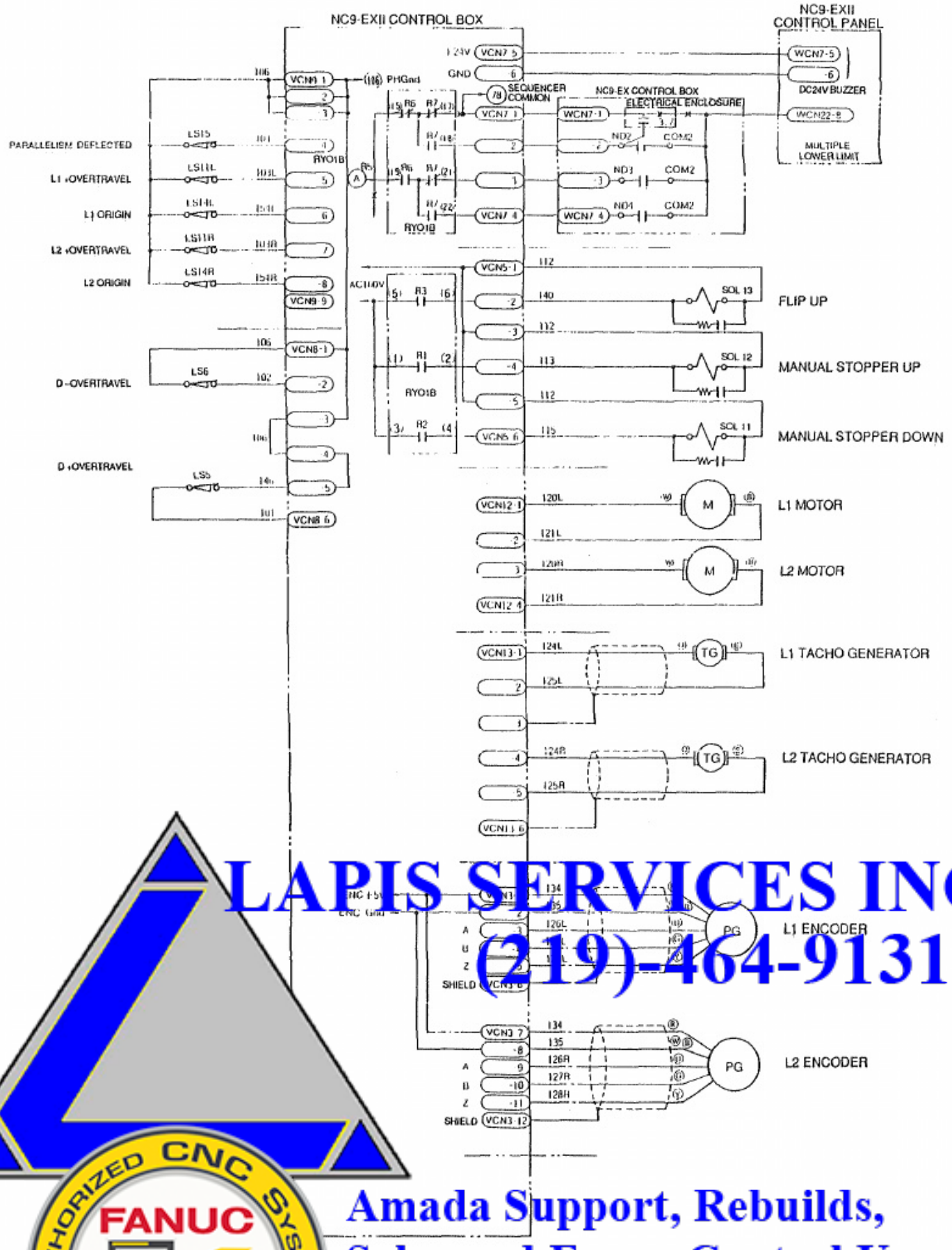

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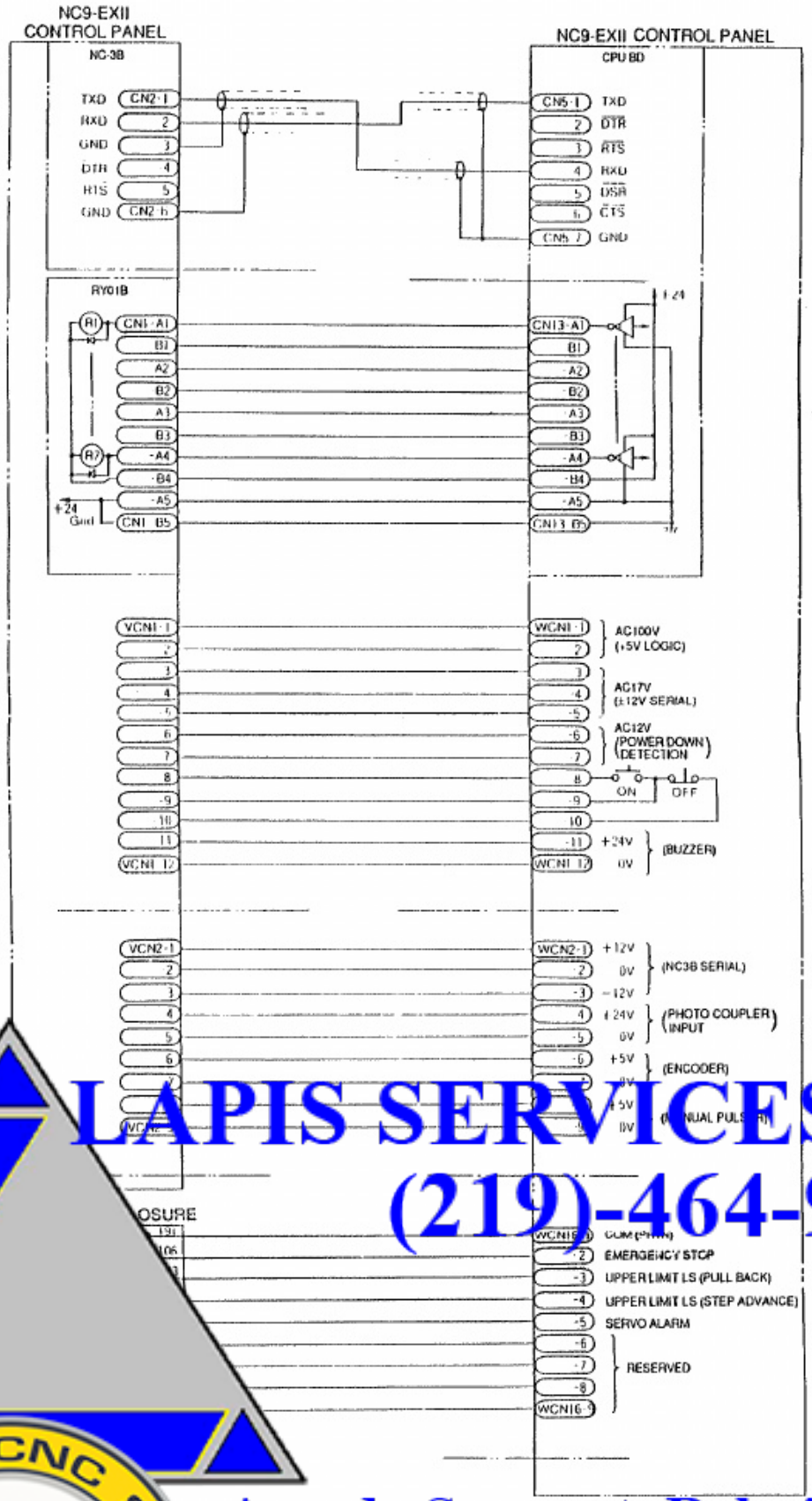

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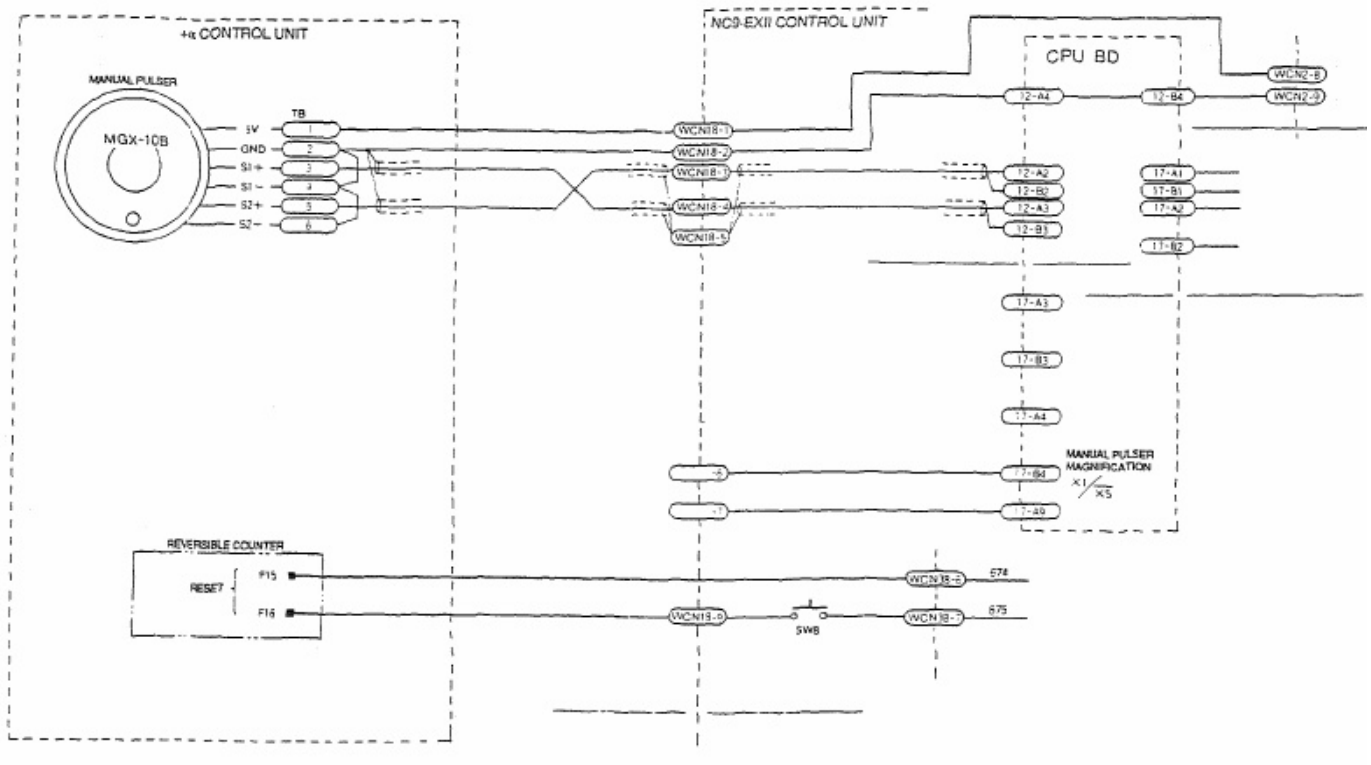

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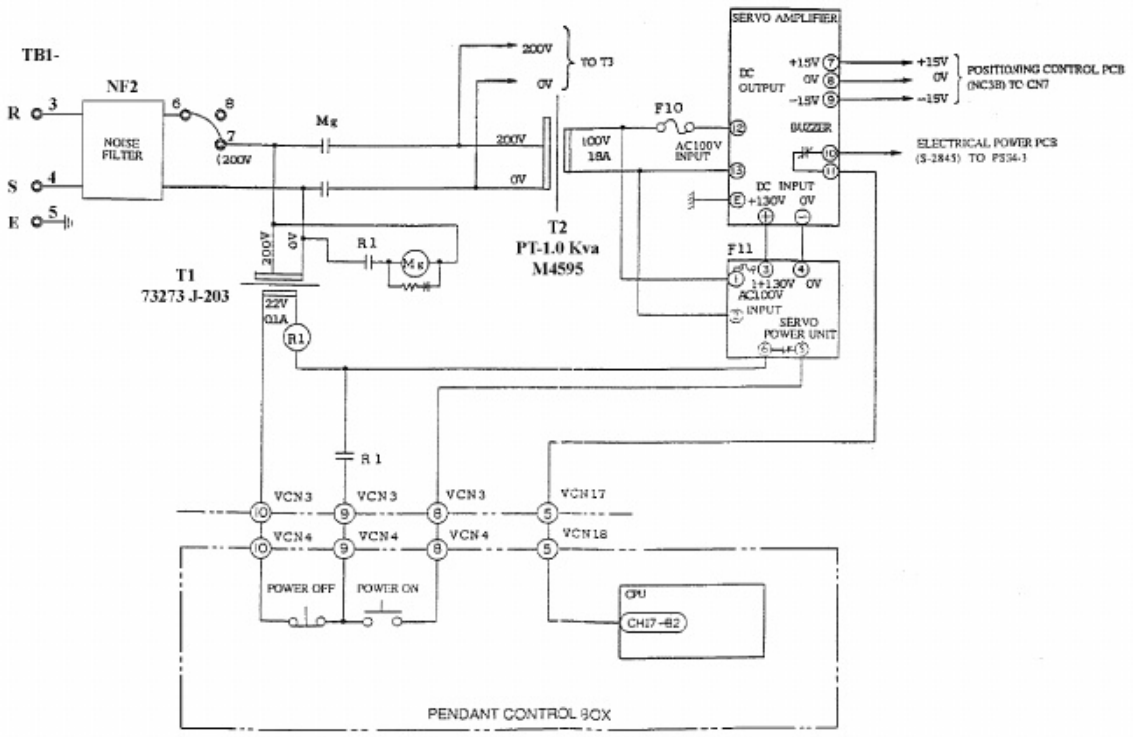
ELECTRICAL POWER CIRCUIT DIAGRAM



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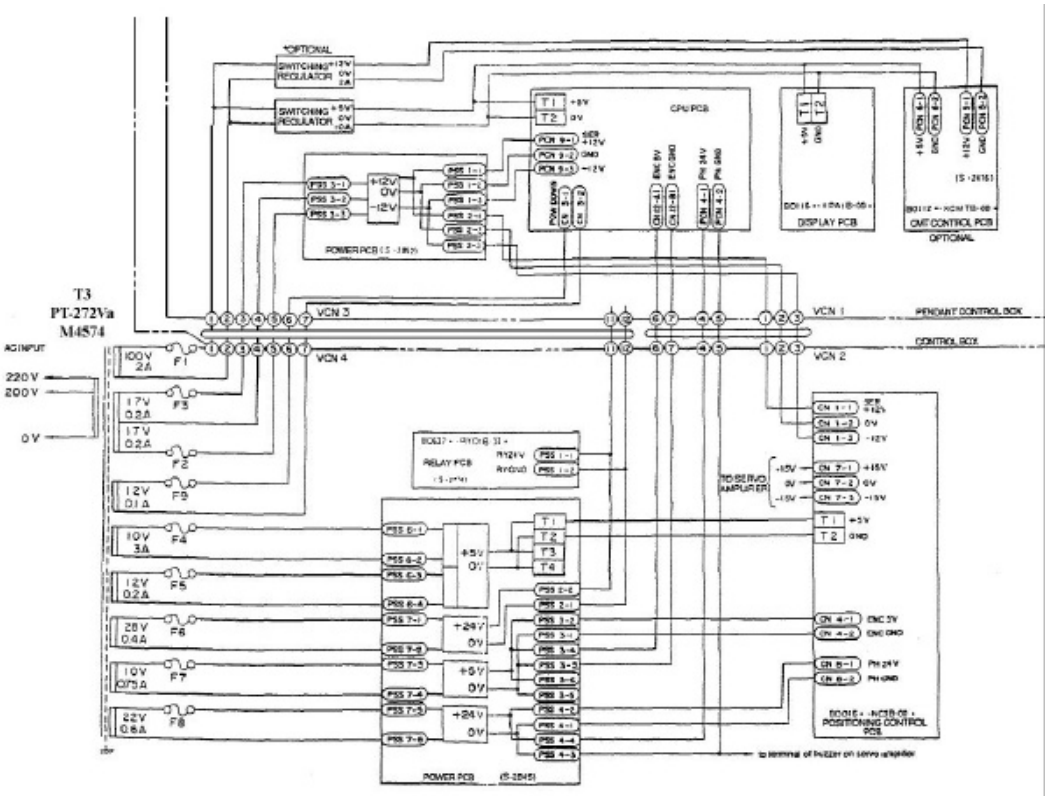

*This switching regulator added when cassette tape memory device is equipped.

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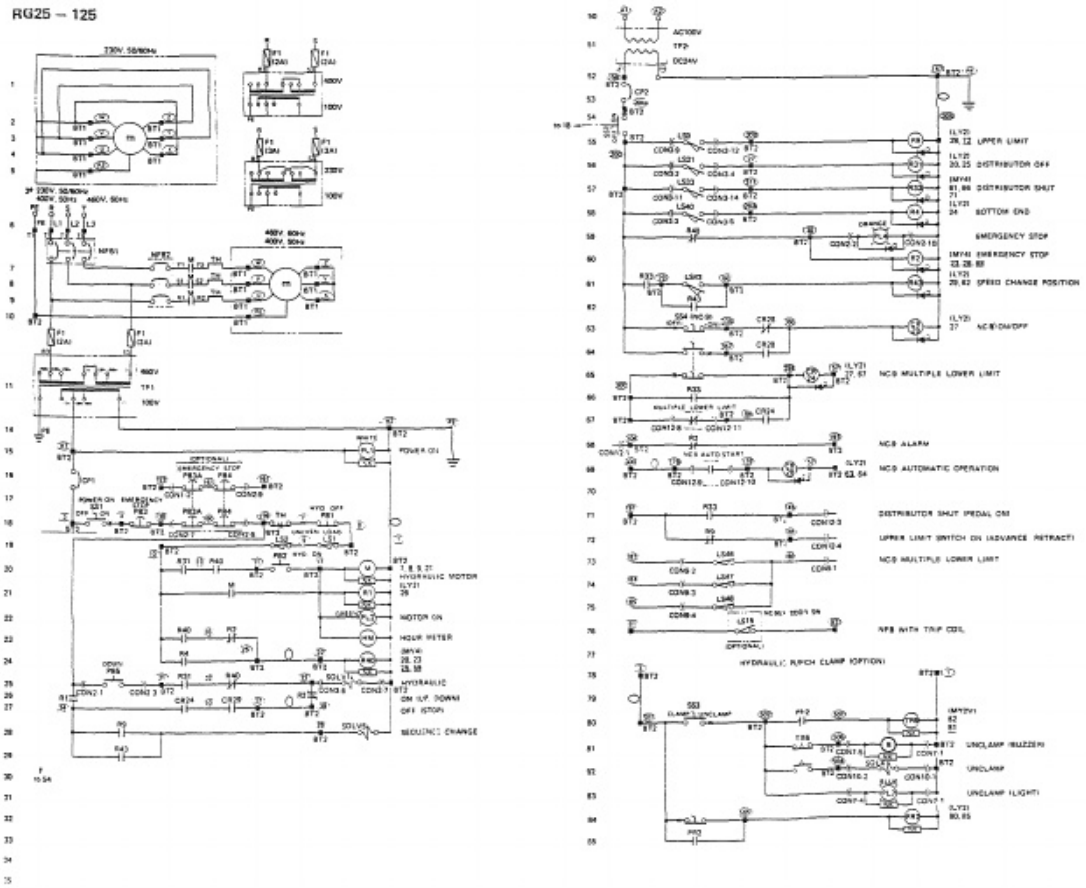

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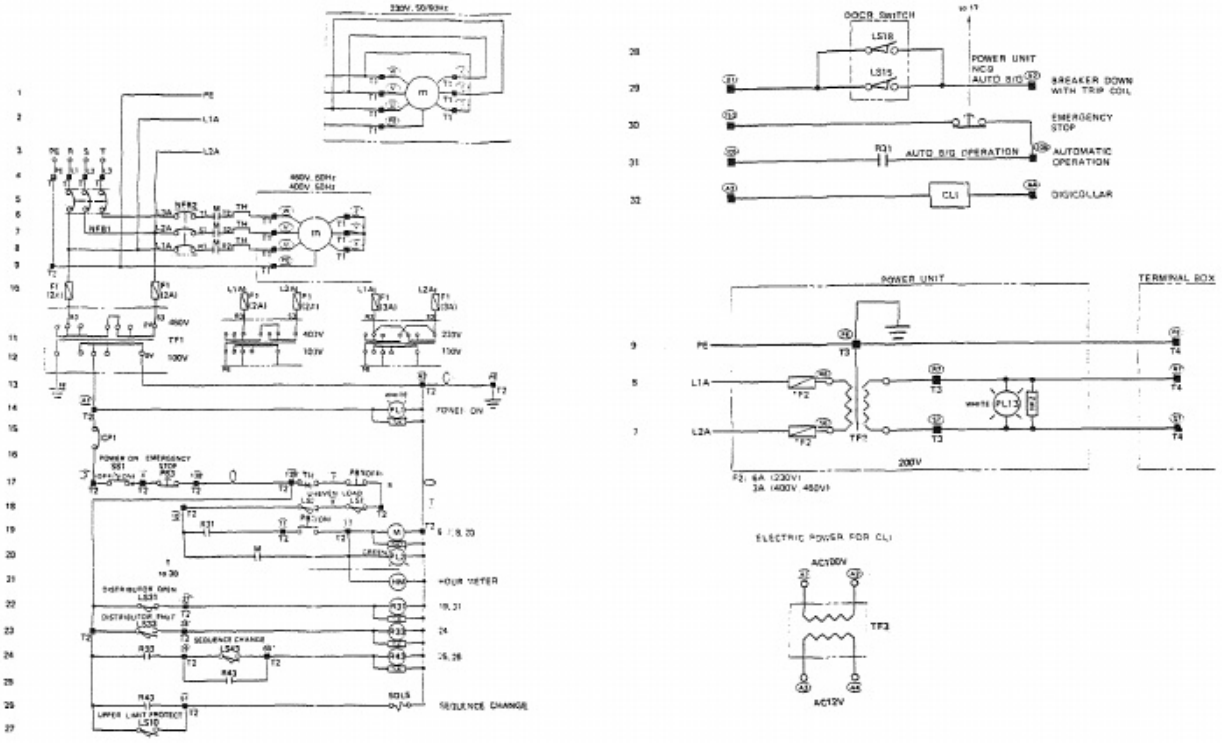

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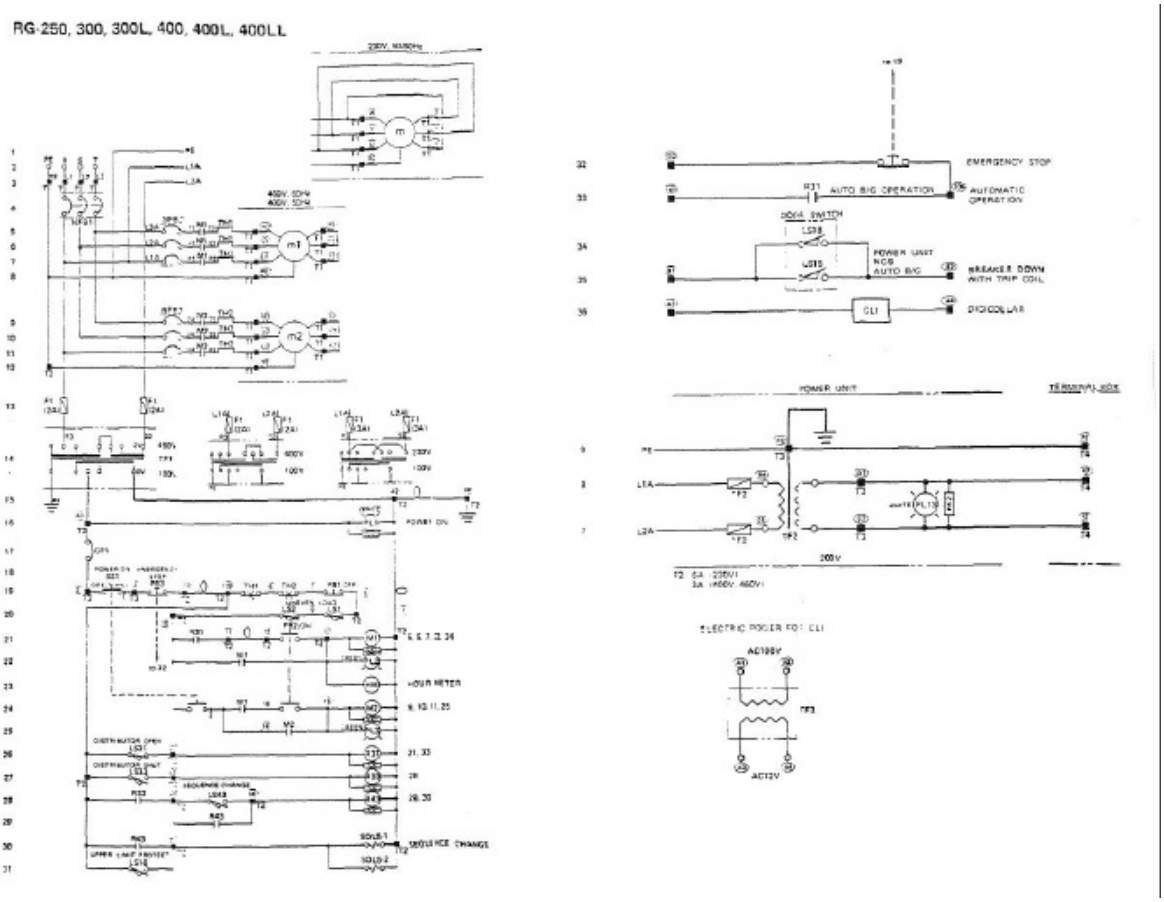

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SPECIFICATIONS

Feed speed	L-axis: Variable at 1 m (3.28 ft)/min. intervals in 1 – 30 m (3.28 – 98.43 ft)/min. range by parameters D-axis: 1 m (3.28 ft)/min.
Measuring length	L-axis: 0 – 500.00 mm (0 – 19.685 in.) D-axis: 0 – 99.99 mm (0 – 3.9366 in.)
Positioning accuracy	L-axis: ±0.1 mm (0.004 in.) D-axis: ±0.01 mm (0.0004 in.)
Height adjustment of stretch	90 – 165 mm (3.54 – 6.50 in.) . . . FBD25 – FBD125 RG-25 – RG-125 60 – 135 mm (2.36 – 5.31 in.) . . . FBD150 – FBD400 RG-150 – RG-400 (from upper surface of lower beam to lower surface of stopper set at center)
Vertical stroke of stopper	10 mm (0.4 in.) to each direction from center position
Ambient temperature range	0 – 40°C (32 – 104°F) [Keep control section away from direct sunlight.]
Air pressure required	5 kg/cm² (71.2 psi)
Position command	Absolute values
No. of axes controlled	3 (simultaneous control)
Inp	MDI (numeric keypad) Playback (2 axes only) Cassette tape (optional)
	L-axis: 0.01 mm or 0.001 in. D-axis: 0.01 mm or 0.0001 in.
	Digital (LEDs)
	99 work processes (6930 work processes**)
	2 KVA
	Displayed by alarm code numbers for operational/setting errors, problems, etc. in NC system
del ssette tape memory device	Specifications are subject to change without prior notice.

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