YASKAWA ELECTRIC

TOE-C843-7-35D
INSTRUCTIONS

CNC SYSTEM FOR MACHINING CENTERS

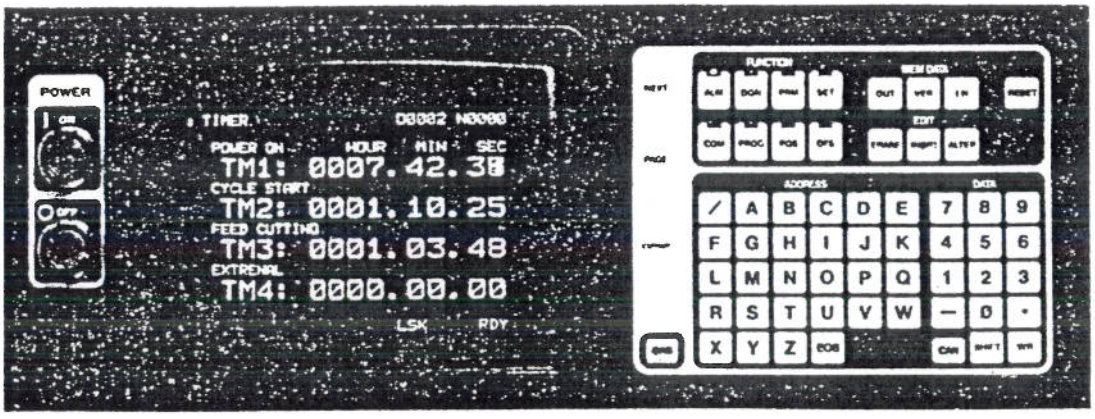
YASNAC® MX1

MAINTENANCE MANUAL

Before initial operation read these instructions thoroughly, and retain for future reference.

This manual is primarily intended to give operators instructions for YASNAC MX1 programming, operation and maintenance.

This manual applies to the basic and optional features of YASNAC MX1. The optional features are marked with a dagger. For the specifications of your YASNAC MX1, refer to the machine tool builder's manual.



YASNAC MX1 OPERATOR'S STATION

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1. GENERAL

The YASNAC MX1 is a high-performance CNC for simultaneously controlling 3 or 4 axes of a machining center, with emphasis placed on high-speed machining, unattended automatic operation, or feedback gauging control.

With the NC logic incorporating 16-bit microprocessors and various LSIs, the YASNAC MX1 incorporates a compact design with a wide range of capabilities. The memory comprises permanent, semi-permanent and programmable software storage used in combination to utilize each one to maximum advantage.

The data input-output interface has been expanded in concept, and, in addition to conventional interfaces such as FACIT4070 and RS 232C, RS422 is able to accommodate requirements for new modes of operations such as high-speed, long-distance data transmission.

The YASNAC can incorporate a programmable machine interface, and the logic diagram can be edited easily from the NC operator's station.

1.1 COMPONENT ARRANGEMENT OF YASNAC CONTROL SYSTEM

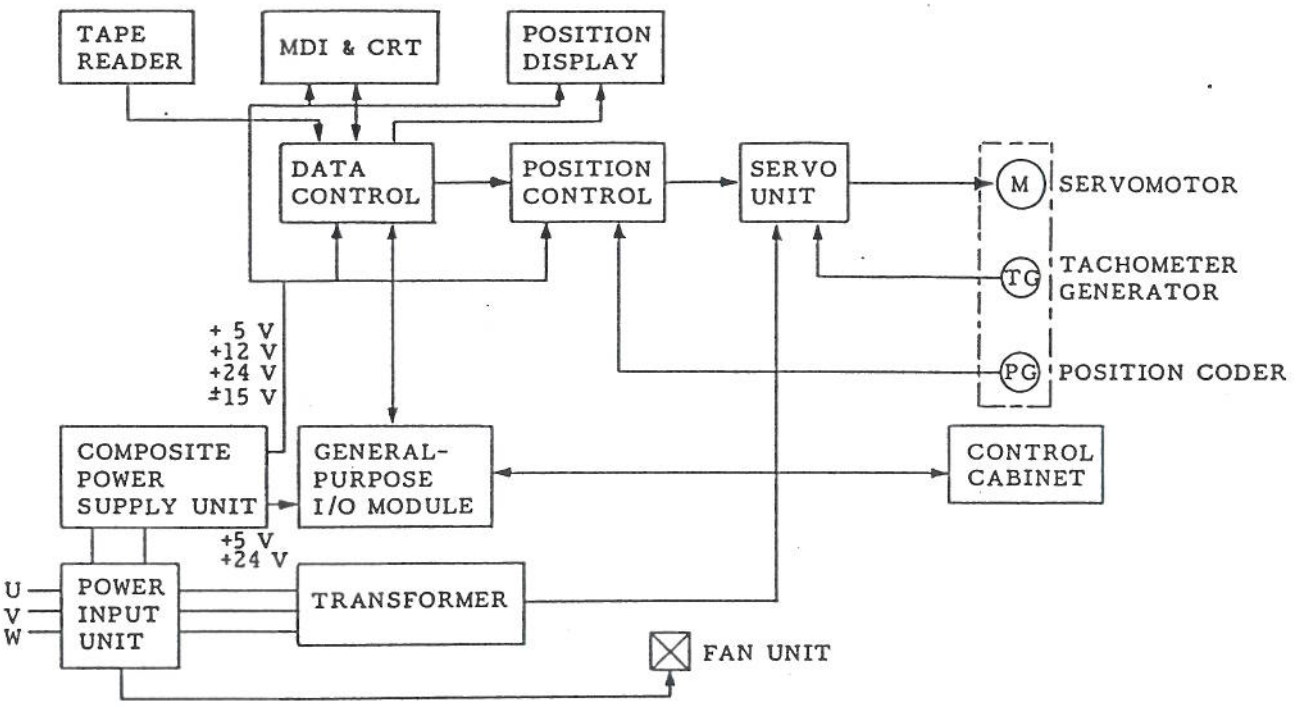


Fig. 1.1 Component Arrangement of YASNAC Control System

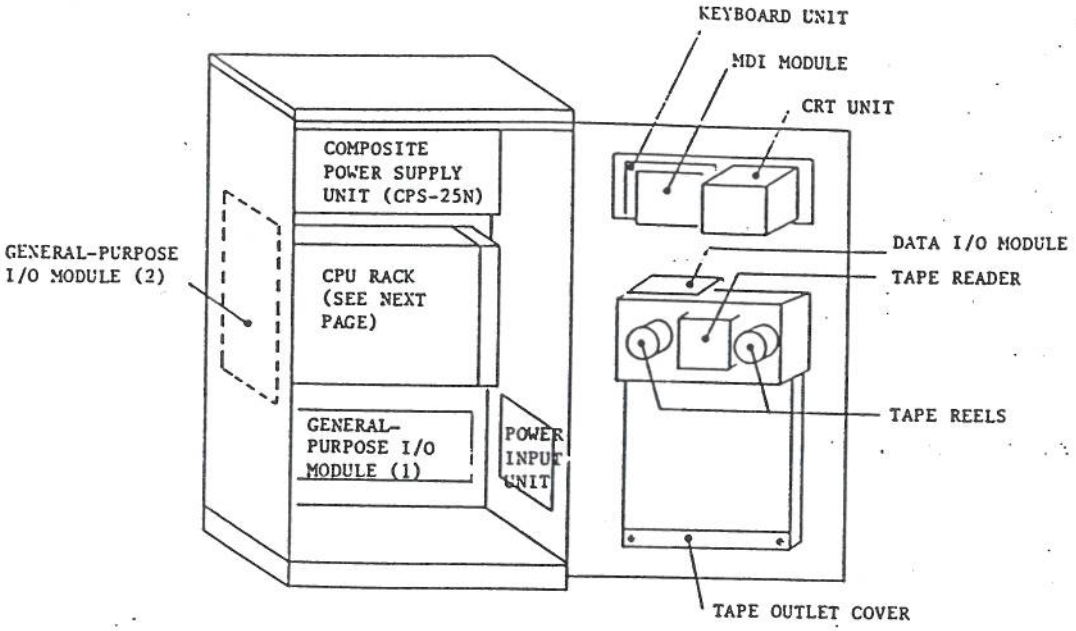


Fig. 1.2 Built-in Type 1, with Door Open

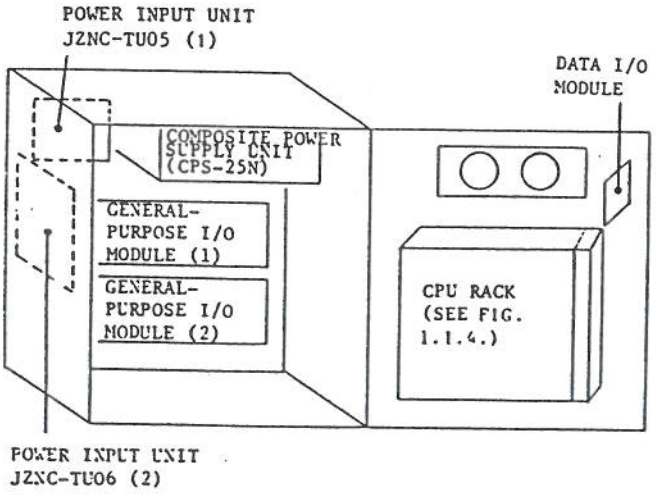


Fig. 1.3 Unbundled Type, with Door Open

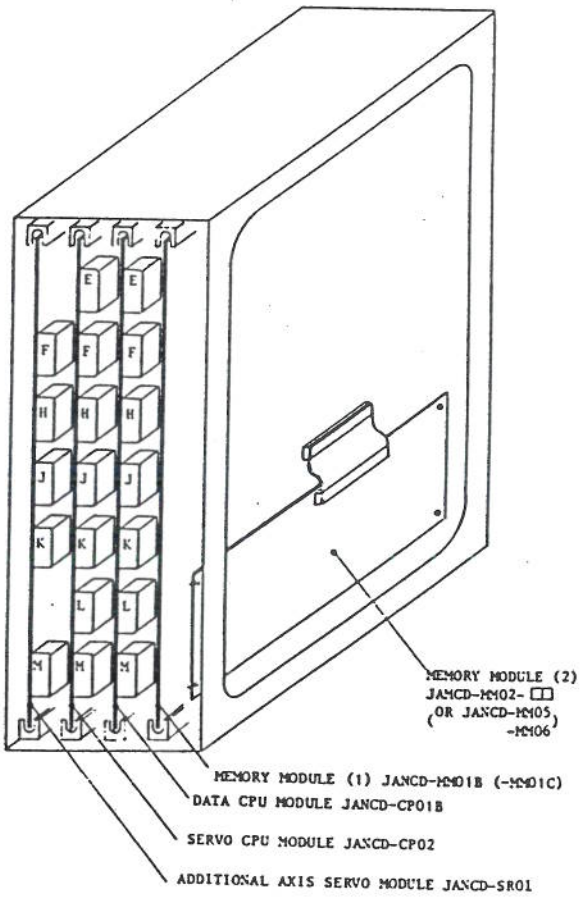


Fig. 1.4 CPU Rack

Table 1.1 List of Major Component Units

Component Name	Type Name	Component Code	Remarks
Power input unit	JZNC-TU04		Built-in type 1
	JZNC-TU05/06		Unbundle type
	JZNC-TU17		Free-standing type
Power control module	JANCD-TU01	DTN 3570	Included in the power input unit
Composite power supply unit	CPS-25N	AVR 808	
Tape reader	MODEL 2401-1	RED 16	
Tape reels	MODEL 1500	RED 14	6 inches
	MODEL 1402-1	RED 13	8 inches
Data CPU module	JANCD-CP03	DTN 3700	
	JANCD-CP01B	DTN 3650	
Servo CPU module	JANCD-CP02	DTN 3510	
Memory module (1)	JANCD-MM01B	DTN 3590	
	JANCD-MM01C-02	DTN 3730	150M Max
Memory module (2)	JANCD-MM02-42	DTN 3540	20M
	JANCD-MM02-44	DTN 3550	40M
	JANCD-MM05	DTN 3620	70M
	JANCD-MM05	DTN 3620	320M
	JANCD-MM06	DTN 3630	
Battery unit	JZNC-GBA02	DUN 650	
Additional axis control module	JANCD-SR01	DTN 3600	
Control panel unit	JZNC-OP01	DUN 4210	
CRT display unit	TR-9DD1B	CRT 4	Included in the control panel unit
Keyboard unit	HMK-3993-02	SW 651	
MDI module	JANCD-SP01	DTN 3560	
Data I/O module	JANCD-GIF02	DTN 2340	
General-purpose I/O module	JANCD-IO01B	DTN 3580	

1.2 BLOCK DIAGRAM OF YASNAC CONTROL SYSTEM

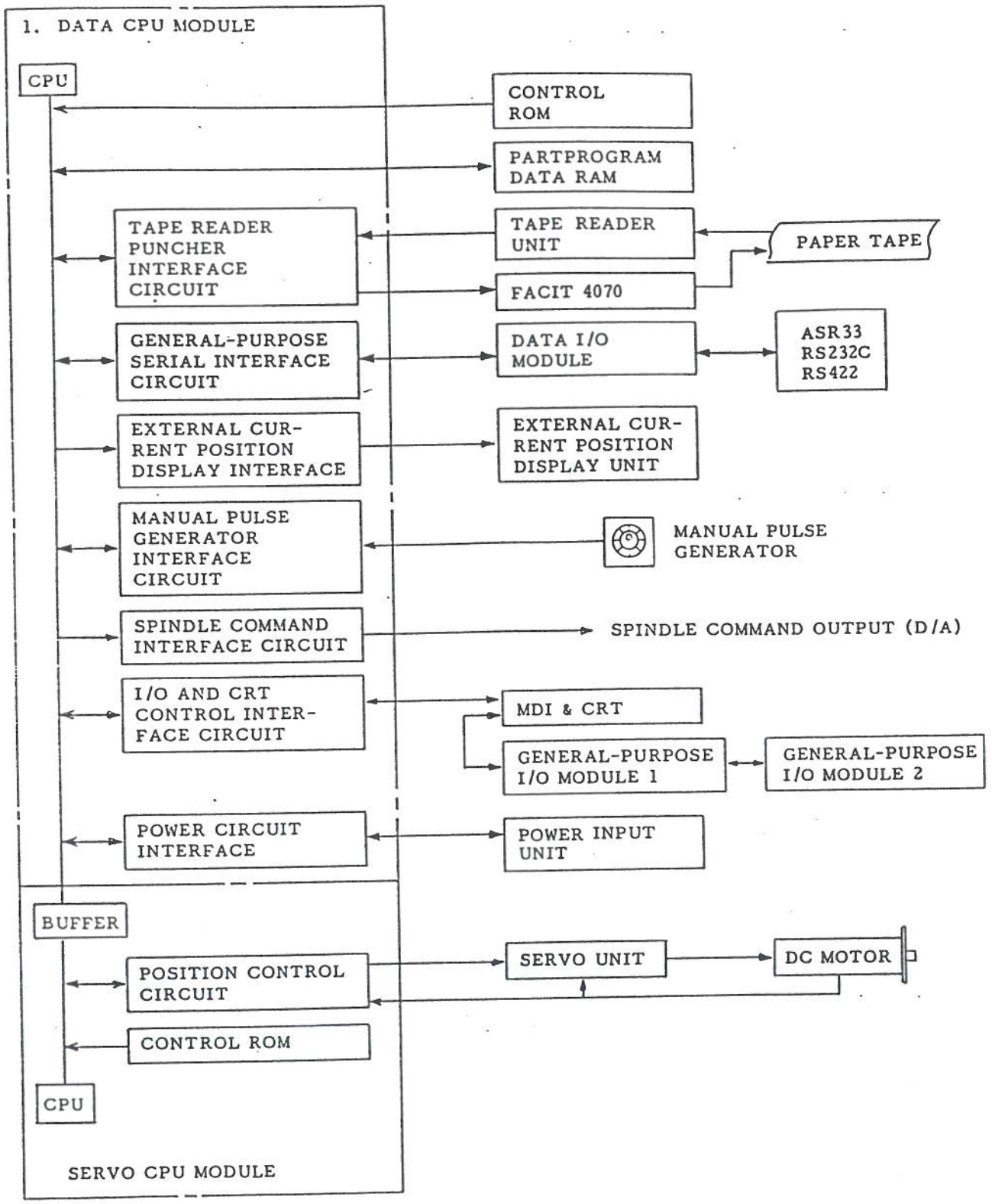


Fig. 1.5 Block Diagram of YASNAC Control System

1.3 MAINTENANCE INSTRUMENTS

(1) Measuring instruments

Name	Specifications	Purpose
AC voltmeter	Capable of measuring AC power voltage Tolerance: ±2% or less	To measure AC power voltages
DC voltmeter	Maximum range: 10 V, 30 V Tolerance: ±2% or less (A digital voltmeter may be required.)	To measure DC power voltages
Oscilloscope	2-channel type, with a frequency range of 5 MHz or higher	To measure tape reader output waveforms, etc.
DC ammeter	Maximum range: 10 A, 30 A, 50 A Tolerance: ±2% or less	To measure currents flowing through DC motors

(2) Tools
- Phillips screwdriver: large, medium and small
- Standard screwdrivers: medium and small

(3) Chemicals
- Cleaning agent for tape reader (absolute alcohol)

1.4 ROUTINE INSPECTION SCHEDULE

The following table shows the minimum requirements to be observed for maintenance time in order to keep the equipment in optimum condition for an extended period.

Table 1.2 Inspection Schedule

Items		Frequency	With the system-off	With the system-on	Remarks
Tape reader	Cleaning of reading head	Daily	○		Including light source part.
	Cleaning of tape tumble box	Weekly	○		
	Lubricating of tension arm shaft end	As required	○		
Control panel	Tight closing of doors	Daily	○		
	Checking for loose fit and gaps of side plates and worn door gaskets	Monthly	○		
Servomotor and DC motor for spindle	Vibration and noise	Daily		○	Feel by hand, and do the audible inspection.
	Motor contamination and breakage	Daily or as required	○	○	Inspect visually.
	Clearance of ventilation openings		○	○	Inspect mainly spindle DC motor.
	Burned spots, cracks, wear, and pressure of brushes	Every three months	○		Check the length of brushes.
	Roughened commutator surface		○		Check dark bar, threading and grooving of commutator.
	Dirt in interior of motor		○		Clean with compressed air.
Battery		Daily	○	○	See if alarm for BATTERY is displayed on CRT screen.

1.4.1 TAPE READER

(1) Cleaning the tape reader head (Daily)

A. Remove tape rubbish and dust from the glass with a blower brush. If the glass is stained with oil or oily dust, wipe it using a gauze or soft cloth with absolute alcohol. Also clean the tape guide and the tape retainer.

B. Remove the dust, if any, on LED (light source) on top with a blower brush.

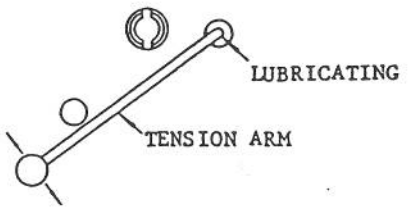
(2) Cleaning of tape tumble box (Weekly)

A. Clean the braided nylon leading tape with a clean, soft cloth.

B. Remove the tape outlet cover (See Fig. 1.1.2) by loosening two mounting screws and clean the bottom of the tape tumble box with cloth or brush.

(3) Lubricating of tension arm shaft†

For the control with 6 inch or 8 inch diameter reels, lubricate the shaft end of tension arm, when the tension arm does not move smoothly.



(In the case of 8-inch diameter reel)

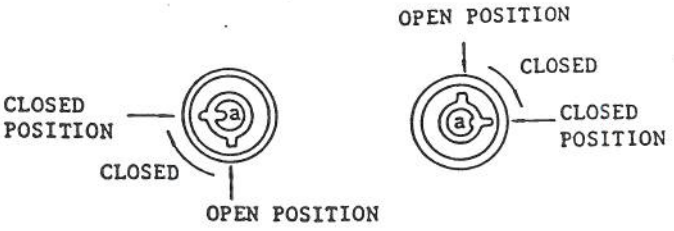
NOTE: When trouble occurs in feeding or winding tape with 8 inch diameter reels, open the front door and brush away dust around the photo-coupler by using a blower brush.

1.4.2 CONTROL PANEL

(1) Checks on doors for tight closing (Daily)

A. The control panel is constructed as a dust-proof, sheet-steel enclosure with gasketed doors so as to keep off dust and oil mists. Keep each door tightly closed at all times.

B. After inspecting the control with door open, close the door and fasten door locks (2 per door) securely using the key provided (No. YE001). When opening or closing, insert the key all the way into the keyhole and turn until it clicks (approximately a quarter-turn). The key can be removed from an open or closed position.



With the door lock on right side of the door (Left-hand Hinged Door)

With the door lock on left side of the door (Right-hand Hinged Door)

NOTE: If the optional door interlocking switch is provided, opening the door shuts off the main power supply and stops all operations.

C. Check gaskets on the rims of front and rear doors.

D. See if the inside of enclosure is dusty. Clean it, if necessary.

E. Check for any opening in the door base with the doors shut tightly.

1.4.3 SERVOMOTOR AND DC MOTOR FOR SPINDLE

(1) Vibration and noise (Daily)

Vibration can be checked by resting the hand on the motors, and for noise, using a listening stick is recommended. If any abnormality is found, contact maintenance personnel immediately.

(2) Motor contamination and impairment (Daily)

Check the motor exterior visually. If dirt or damage should be observed, inspect the motor by removing the machine cover. Refer to the machine tool builder's manual.

† Tension arm shaft available as an option.

(3) Clearance of ventilation window blockage (Daily)

Check the ventilation window of DC (or AC) spindle motor. If it is clogged with dust or dirt, inspect the spindle motor removing the machine cover. Refer to the machine tool builder's manual.

Inspection of commutators and brushes is essential for maintaining the excellent performance of the control. Inspection work to be executed is described in the following three items.

Quarterly Inspection of Commutators and Brushes

The carbon dust from brushes, accumulated around the commutator, inside the motor, may cause motor troubles such as the layer short of armature and the flashover of commutator. In the worst case, it may lead to fatal damage. To avoid this, be sure to have an inspection on the commutators and brushes at least every three months.

Double check to be sure power is OFF by turning off both control power and servo power before inspecting brushes and servomotor inside. (Disconnecting the circuit breaker of the power supply unit for servo control unit cannot shut off power completely). Failure to do so may cause fatal or serious injury.

(4) Carbon brushes

A. Under normal operating conditions, brush wears by 2 to 4 mm per 1000 operating hours. If wear is excessive, check to see if oil has contaminated armature surface, or if abnormal overcurrent flows through motor circuit.

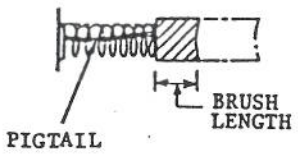
B. When brush length becomes shorter than those shown below, replace the brush with a new one.

Minertia motor junior series: 6 mm or below

DC motor for spindle: 17 mm or below

Minertia motor J series: 7 mm or below

C. If either the brush, or pigtail is broken, the brush assembly must be replaced as a whole unit.



NOTE: When replacing the brush assembly, consult the company.

(5) Commutator surface

A. Visually check surface roughness of the commutator through inspection window.

After 100 to 200 operating hours, the commutator should take on a polished light brown or chocolate color. The motor has developed an ideal commutator film and needs no attention other than to be kept clean.

B. See if a blackened bar, threading (or grooving) is on the commutator. If any of the above is observed, investigate the cause of trouble.

Threading or grooving on the commutator surface may be due to too small of a motor load. A blackened bar is the result of carbon dust in commutator slots, or accidentally produced sparkings. If the carbon dust is a cause of blackened bar, wipe the commutator with a clean dry cloth to smooth the surface. If sparking occurs, contact the maintenance representative.

(6) Motor inside (dirty)

A. Visually check the motor interior through inspection window.

The dried carbon dust will not affect motor running, but it is recommended that the inner parts such as commutator, brushholders and brushes be cleaned with a dry compressed air (air pressure: 2-4 kg/cm^2, 28.5-56.5 ps)

B. If oily carbon dust exists inside the motor due to poor oil seal or defective enclosure, contact YASNAC service personnel.

(7) Servomotor with oil seal

As the life expectancy of oil seals and brushes is 5000 hours, the inspection and maintenance by the company should be done every 5000 hours. If possible, yearly inspection taking less than 8 hours is recommended.

1.4.4 BATTERY

Make sure that "BAT" or "A/B" on the right-low position of CRT screen is not displayed. If it is displayed, contact maintenance personnel. The battery must be replaced with a new one within a month.

2. TROUBLESHOOTING

2.1 TROUBLE ISOLATION

Try to fully analyze the circumstances in which the trouble occurred. This is necessary for isolating the trouble and/or for having the YASNAC serviceman calledin to correct the trouble. Verifying the following points will minimize the down time of your system:

2.1.1 NATURE AND CIRCUMSTANCES OF TROUBLE

(1) Type of trouble

- In what mode did the trouble occur?
- In what mode(s) does the system normally operate?
- What was the display of MDI & CRT when the trouble occurred?
- Was the positioning incorrect (error axis, positioning error, displayed position values?
- Was the tool path erroneous (by how much)?
- Was the feedrate correct?
- Was an auxiliary function used?
- What was the alarm number?
- In which program did the trouble occur? What was the sequence number?
- Does the trouble recur in a particular mode?
- Is the trouble related to tool changing?
- Is the trouble associated with feedrate?

(2) Frequency of trouble

- When did the trouble develop? (Did it occur when other machines were in operation?)
- How often did it occur?

(3) Recurrence of trouble

- Run the program tape that experienced the trouble several times. Check the values in the NC unit and compare them with those being programmed. Is the trouble attributable to external disturbances?
- Verify the offset values and remaining distributed values being stored.
- Increase or decrease the override value.
- Ask the operator to explain the circumstances under which the trouble occurred.

2.1.2 Operations and Programming Checks

(1) Operations

- Was the operator properly trained?
- Was there a recent change of operators?
- Was the operator well familiar with the program?
- Was the program interrupted before completion?
- Was the program placed under incremental or absolute command?
- Was the tool compensation properly set?
- Can other operating modes be selected?
- Was the optional block skip function properly used?
- Was the tape correctly set?
- Was the program properly coded?
- Were there any inadvertent or erroneous operations?

(2) Punched tape

- Was the tape contaminated?
- Was the tape bent or crimpled?
- Were tapes properly spliced?
- Was the program successfully run prior to this operation?
- Was the tape correctly punched?
- Was the tape puncher operating normally?
- Was a black tape used?

(3) Programming

- Is the program new?
- Was the program formulated according to the instruction manual?
- Did the trouble occur in a particular block?
- Did the trouble occur in a subprogram?
- Was a check list made and used for tape verification?

(4) Settings

- Were there any corrections or adjustments made prior to starting the operation?
- Was a fuse blown?

- Was an emergency stop maintained?
- Was the machine tool ready to operate?
- Was an alarm state in effect?
- What was the alarm number?
- Was the alarm lamp lit on a module (on print board)?
- Was the MODE switch in normal position?
- Was the override set to "0"?
- Was the machine lock set?
- Was the feed hold set?

(5) External factors

- Was the machine tool recently repaired or adjusted?
- Was the control cabinet recently repaired or adjusted?
- Was the NC unit recently repaired or adjusted?
- Is there any noise source (e.g., crane, high frequency sewing machine, electrical discharge machine, welding machine) within interference range?
- Was there any new machine recently installed nearby?
- Is there any other NC unit that has developed similar failures in your factory?
- Has the user made an attempt at adjustments inside the NC unit?
- Has the same trouble occured previously with this unit?

(6) Ambient conditions

- What was the temperature?
- Was there any abrupt change in temperature?
- Was the tape reader contaminated?
- Was there any oil or cutting fluid splashed, in the immediate area?
- Were there any vibrations?
- Was the system exposed to the direct sunlight?

2.1.3 NC UNIT CHECK

(1) Control unit exterior

- Was the MDI & CRT unit normal?
- Was the tape reader kept clean?
- Was the tape reader door closed?
- Was the unit operated with its door open?
- Did any machining chips enter the cabinet interior?

(2) Tape reader

- Was the tape reader contaminated?
- What were the characteristics of the waveforms from the tape reader?

(3) Control unit interior

- Was the control unit interior contaminated?
- Was the fan motor operating normally? (Was the air flow from the cooling air exhaust port normal?)
- Was the interior damaged by corrosive gas?

(4) Composite power supply unit

- Was the input voltage normal?
- Were the output voltages normal (+5 V, +12 V, +24 V, ±15 V)?
- Was each voltage within tolerance?
- Was a fuse blown?
- Was the circuit breaker tripped?
- Was the shield properly grounded?
- Was the wiring properly inside the control cabinet?
- How much did the input voltage fluctuate?
- Was there any significant drop in input voltage?
- Was the front or rear door open (with door interlock in effect)?
- Is there any machine that consumes a large amount of current in the factory (e.g., welding machine, electrical discharge machine)?

(5) Grounding

- Was grounding properly connected?
- Was the shield grounding proper?

(6) Cables

- Were cable connectors securely inserted?
- Was any internal cable damaged?
- Was any external cable damaged?
- Was any cable broken or contaminated?

2.1.3 NC UNIT CHECK (Cont'd)

(7) Modules (on printed circuit board)

- Were all modules securely installed?
- Were plug connectors properly secured?
- What was the revision letter?
- Were connections (on flat cable) between modules correct?

(8) MDI & CRT unit

- Were push buttons freely operable?
- Was the flat keyboard operable?
- Was the flat cable free of defects?

(9) Parameters

Did the actual parameters match those in the parameter table attached to the NC unit?

(10) Interface

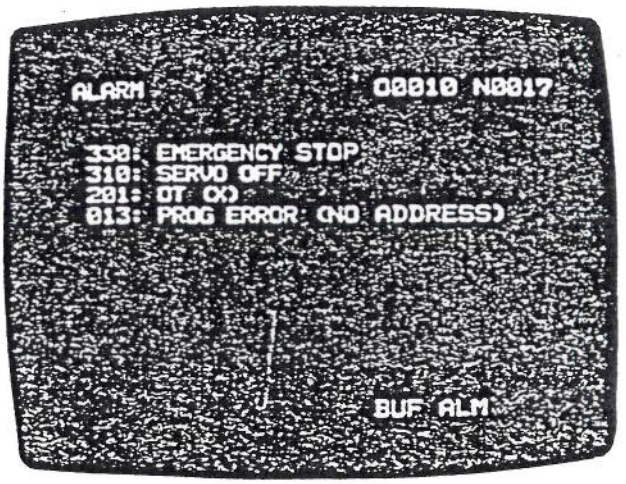
- Were the power cable and NC cable separately installed?
- Was the cable positively shielded?
- Were the relay, solenoid, motor, etc. each equipped with a noise suppressor?
- Were the I/O signals normally generated by the DGN (diagnostic) function?

2.2 TROUBLESHOOTING BY ALARM CODE

If an alarm condition occurs, a display "ALM" or "A/B" (for battery alarm) blinks on the bottom line of the CRT screen regardless of the mode or function. In this case, detailed information of the alarm condition will be displayed by the following operations:

1. Depress the (ALM) key

This will cause up to 4 pairs of alarm codes and alarm messages to appear in order of importance, with the most serious one at the top.
NOTE: In an alarm state, the alarm screen appears taking priority over any other display. There is no need to operate the (PAGE) key.



Alarm Codes and Messages

Eliminate the cause of the alarm and depress the (RESET) key, and the alarm state and the alarm display will be reset. Notice that the alarm codes "800," "810," "820," "830" and "840" are displayed regardless of the selected function key.

2. The alarm codes are categorized as follows:

Table 2.1

Alarm No.	Spindle Operation	Type of Alarm
000 to 099	Stop at block end	Tape format error alarm
100 to 199	Stop at block end	Macro, operation, external input/output error, sequence error (1)
200 to 299	Immediate stop	Overtravel, reference point return, positioning, machine ready
300 to 399	Immediate stop	Servo, emergency stop, overload FG, RPG
400 to 499	Immediate stop	Sequence error (2)
500 to 599		
600 to 699		Sequencer message
700 to 799		
800 to 899	NC system stop	CPU error, RAM error, ROM error
900 to 999	———	Off-line error

2.2.1 LIST OF ALARM CODES

Table 2.2 List of Alarm Codes

Code	Causes	Code	Causes
000	POWER OFF	014	PROG ERROR ("-," "0")
	SETTING THE PARAMETER REQUIRING TURNING OFF POWER.		SIGN "-," "0" NOT CORRECTLY USED.
001	ZR UNREADY (X)	015	PROG ERROR (UNUSABLE CH)
	REFERENCE POINT RETURN NOT COMPLETED X.		UNUSABLE CHARACTER PROGRAMMED IN INSIGNIFICANT DATA AREA.
002	ZR UNREADY (Y)	016	PROG ERROR (UNUSABLE AXIS)
	REFERENCE POINT RETURN NOT COMPLETED Y.		INPUT OF A, B, C, U, V, W NOT DEFINED AS ADDITIONAL AXIS OR B-FUNCTION.
003	ZR UNREADY (Z)	017	PROG ERROR (8 DIGITS)
	REFERENCE POINT RETURN NOT COMPLETED Z.		INPUT DATA OVERFLOW (MORE THAN 8 CHARACTERS).
004	ZR UNREADY (4)	020	PROG ERROR (G)
	REFERENCE POINT RETURN NOT COMPLETED 4.		UNUSABLE G CODE OR G CODE NOT INCLUDED IN OPTIONS PROGRAMMED.
005	ZR UNREADY (5)	021	PROG ERROR (G)
	REFERENCE POINT RETURN NOT COMPLETED 5.		G CODE IN 1, 4, * GROUP PROGRAMMED SIMULTANEOUSLY IN A BLOCK.
010	TH ERROR	022	PROG ERROR (G02/03, G43/44)
	TAPE HORIZONTAL PARITY ERROR.		G43, G44 COMMANDED IN CIRCULAR INTERPOLATION MODE (G02, G03).
011	TV ERROR	023	PROG ERROR (G)
	TAPE VERTICAL PARITY ERROR.		UNUSABLE G CODE COMMANDED IN CANNED CYCLE.
012	OVERFLOW (128 CH)	024	PROG ERROR (G, G41/42)
	BUFFER CAPACITY OVERFLOW IN A BLOCK (128 CHARACTERS).		UNUSABLE CODE COMMANDED DURING COMPENSATION MODE.
013	PROG ERROR (NO ADDRESS)	025	PROG ERROR (G70/71/72)
	ADDRESS PLUS NO DATA AND NEXT ADDRESS COMMANDED. OR NO ADDRESS PLUS DATA.		G70 TO G72 COMMANDED EXCEPT IN CANNED CYCLES.

NOTES:
1. No move command in three blocks in series at G41 (G42) command.
2. M00 commanded when rise.
3. Rise at circular interpolation block.

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
026	PROG ERROR (G41/42)	038	PROG ERROR (P, G10)
	RISE ERROR AT COMPENSATION C (COMMAND WHICH CANNOT BE ACCOMODATED CORRECTLY IN COMPENSATION C MODE) SEE NOTES		TOOL LARGE P WHEN WORK COORDINATE SYSTEM IS PROGRAM-INPUT
027	PROG ERROR (G41/42)	040	PROG ERROR (M98, G65/66)
	ERROR AT COMPENSATION C (ERROR IN CIRCULAR INTERPOLATION MODE)		• P NOT PROGRAMMED IN M98, G65, G66, G25. • P DIFFERENT FROM Q IN NO. IN G25MODE. • G25 AND M98/M99 PROGRAMMED SIMULTANEOUSLY.
030	PROG ERROR (F)	041	PROG ERROR (M08/09, G65/66)
	NO F-COMMAND IN FEED COMMAND		PROGRAM NO. (SEQUENCE NO.) NOT FOUND WHEN PROGRAM IS CALLED BY M98, M99, G65, G66, G25, G, M, T
031	PROG ERROR (R = 0)	042	PROG ERROR (M98, NEST)
	CIRCLE WITH RADIUS 0 COMMANDED IN CIRCULAR ARC COMMAND		SUBPROGRAM (G25) OR MACRO CALL FIVE-NESTED.
032	PROG ERROR (G02/03)	043	PROG ERROR (G75)
	COMMANDS ON THREE AXES IN CIRCULAR ARC COMMAND WITHOUT HELICAL OPTION		UNUSABLE ADDRESS COMMANDED IN G75.
033	PROG ERROR (G02/03)	044	PROG ERROR (G12/13)
	COMMANDS ON MORE THAN FOUR AXES IN CIRCULAR ARC PLANE WHOSE ARC CANNOT BE SELECTED FROM THE COMMAND		IN CIRCLE CUTTING, PROGRAMMED RADIUS R IS SMALLER THAN COMPENSATION D.
034	PROG ERROR (G02/03)	045	CAL ERROR (G41/42)
	CIRCULAR ARC R DESIGNATION ERROR		———
035	PROG ERROR (D, H)	046	PROG ERROR (G41/42)
	TOO LARGE NO. OF H OR D CODE FOR TOOL RADIUS COMPENSATION AND TOOL LENGTH COMPENSATION		IN COMPENSATION C MODE, CIRCULAR ARC OUTSIDE OF COMPENSATION PLANE PROGRAMMED.
036	PROG ERROR (P, G10)	047	PROG ERROR (G41/42)
	TOO LARGE P (NUMBER DESIGNATION) WHEN OFFSET IS PROGRAM -INPUT		COMPENSATION PLANE CHANGED DURING COMPENSATION C MODE
037	PROG ERROR (P, G10)	048	PROG ERROR (G41/42)
	TOOL LARGE R WHEN WORK COORDINATE SYSTEM IS PROGRAM-INPUT		INTERSECTION POINT NOT OBTAINED BY INTERSECTION COMPUTATION

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
049	PROG ERROR (G41/42)	070	PROG ERROR (M02/30/99)
	REVERSE OR ALMOST REVERSE COMMANDED IN M97 MODE.		MEMORY OPERATION FINISH COMMAND NOT GIVEN.
050	SCALING ERROR	075	RS232C
	UNUSABLE G CODE (G92, G28 TO G30, G36 TO G38, G70 TO G72) IN SCALING MODE.		RS232C INTERFACE DISAGREEMENT OF NO. OF BITS AND NO. OF BAUD RATES.
051	SCALING ERROR	076	RS232C
	ERROR IN G51 AND G50 BLOCK FORMAT. SCALING FACTOR ZERO.		DATA TRANSMISSION FAILURE THROUGH RS232C INTERFACE.
055	PROG ERROR (M, S, T, B)	077	RS232C
	M, S, T, B COMMANDS IN THE BLOCK IN WHICH M, S, T, B CODE CANNOT BE COMMANDED		MORE THAN 10 CHARACTERS HAVE BEEN READ IN AFTER STOP CODE HAS BEEN TRANSMITTED THROUGH RS232C INTERFACE.
056	PROG ERROR (AXIS)	080	PROG ERROR (G10, G22/23)
	AXIS COMMAND IN G04, G20, AND G21 BLOCKS.		G10, G22, AND G23 COMMANDED WITH AXIS DATA.
058	MIRROR IMAGE (G28)	084	MIRROR IMAGE (G36/37/38)
	G28 COMMANDED DURING MIRROR IMAGE.		MIRROR IMAGE IS ON WITH G36 TO G38.
059	ZR UNREADY	085	PROG ERROR (G36/37)
	G28 NOT COMPLETED ON THE AXIS WHICH HAS G29 COMMAND OR REFERENCE POINT RETURN NOT COMPLETED ON THE AXIS.		COMMAND OF I (J) ON MORE THAN ONE AXIS AT G36 (G37).
066	RESET UNREADY (AFTER EDITING)	086	PROG ERROR (G38)
	—		COMMAND OTHER THAN K AT G38.
067	—	087	PROG ERROR (G31/36/37/38)
	POWER TURNED OFF DURING WRITING MEMORY.		TOUCH SWITCH NOT ON WHEN MOTION REACHES AT END POINT BY G31, G36 TO G38 COMMANDS.
068	—	088	PROG ERROR (G36/37/38)
	EDITING BEING EXECUTED IN THE EDIT INHIBIT AREA.		TOUCH SWITCH CALCULATION ERROR AT G36 TO G38 COMMANDS.

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
100	CAL ERROR (FIXED POINT)	111	MACRO ERROR (MOVE G66-M99)
	MAGNITUDE OF FIXED POINT DATA EXCEEDING UPPER LIMIT.		MOVE COMMAND IN M99 FINISHING COMMAND OF MACRO CALLED BY G66.
101	CAL ERROR (FLOATING)	114	MACRO ERROR (DO-FORMAT)
	EXPONENT OF FLOATING POINT DATA EXCEEDING ALLOWABLE RANGE.		NO. OF DOs AND ENDs NOT THE SAME.
102	CAL ERROR (DIVISION)	115	MACRO ERROR ([ ] UNMACH)
	CALCULATION DIVISOR ZERO OR OVERFLOW ERROR.		NO. OF LEFT BRACKETS AND RIGHT BRACKETS NOT THE SAME.
103	CAL ERROR (SQUARE ROOT)	116	MACRO ERROR (DO-END NO.)
	ROOT VALUE IS A NEGATIVE(−).		CONDITION $1 \leq n \leq 3$ NOT ESTABLISHED IN DOn.
104	PROG ERROR (DOUBLE ADD)	117	—
	SAME ADDRESS REPEATED MORE THAN TWICE IN A BLOCK.		—
105	MACRO ERROR (CONSTANT)	118	MACRO ERROR (GOTO N)
	CONSTANTS USABLE IN USER MACRO EXCEEDING THE LIMIT.		CONDITION $0 \leq n \leq 9999$ NOT ESTABLISHED OR NO SEQUENCE NO. IN GO TO n.
107	MACRO ERROR (FORMAT)	120	PRTN ERROR (NOT FOUND)
	ERROR IN THE FORMAT AND EQUATION.		SEQUENCE NO. NOT FOUND IN PART PROGRAM.
108	MACRO ERROR (UNDEFIN # NO)	121	PRTN ERROR (G92)
	UNDEFINED VARIABLE NO. DESIGNATED.		G92 COMMANDED THROUGH MDI OPERATION DURING PROGRAM RESTART.
109	MACRO ERROR (#NO NOT LEFT)	122	PRTN ERROR (G54-G59)
	COMMANDED PROHIBITED VARIABLE AS SUBSTITUTION IN LEFT-HAND SIDE OF THE EQUATION.		G54 TO G59 COMMANDED THROUGH MDI OPERATION DURING PROGRAM RESTART.
110	MACRO ERROR ([ ]5 LIMIT)	123	PRTN ERROR (ORG)
	MULTIPLE LAYERS OF PARENTHESES EXCEEDING THE UPPER LIMIT (5).		COORDINATE SYSTEM CHANGED BY DEPRESSING THE ORG BUTTON DURING PROGRAM RESTART.

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
124	PRTN ERROR (MDI MOVE)	145	—
	AXIS OPERATED BY MDI AFTER PROGRAM RESTART.		—
130	EXT DATA	146	PROG ERROR (G100)
	DATA ERROR IN A GROUP DATA.		HIGH-SPEED CUTTING COMMAND G101 OR G102 NOT CANCELLED BY G100.
131	EXT MESSAGE	147	PROG ERROR (PARAMETER ON)
	NO ALARM NUMBER CORRESPONDING TO EXTERNAL ALARM MESSAGE TO BE CLEARED.		PARAMETER #6008 (D7) SET TO 1 AT HIGH-SPEED CUTTING COMMAND.
132	EXT MESSAGE	170	MEM ERROR (OFS)
	NO CORRESPONDING ALARM NO. WHEN EXTERNAL ALARM MESSAGE IS CLEARED.		TOOL OFFSET TOATAL CHECK ERROR.
133	EXT MESSAGE	172	MEM ERROR (SET)
	NO CORRESPONDING ALARM NO. WHEN EXTERNAL ALARM MESSAGE IS CLEARED.		SETTING AREA TOTAL CHECK ERROR.
140	PROG ERROR (P NO.)	173	MEM ERROR (PRM)
	NO AXIS COMMAND IN HIGH-SPEED CUTTING PROGRAM AT HIGH-SPEED CUTTING COMMAND.		PARAMETER AREA TOTAL CHECK ERROR.
141	PROG ERROR (FILE OVER)	179	OVER TEMP
	NO. OF BLOCKS IN REGISTERED PROGRAM EXCEEDING THE SPECIFIED VALUE IN HIGH-SPEED CUTTING.		PANEL INSIDE TEMPERATURE TOO HIGH.
142	PROG ERROR (G00/G01/G02)	180	SEQ ERROR
	G CODE OTHER THAN G00, G01, G02 AND G03 OR M, S, T CODE COMMANDED IN REGISTERED PROGRAM AT HIGH-SPEED CUTTING COMMAND.		SEQUENCE ERROR (1).
143	—	181	SEQ ERROR
	—		SEQUENCE ERROR (1).
144	PROG ERROR (G101/G100)	182	SEQ ERROR
	ADDRESS OTHER THAN P COMMANDED IN G100, G101, G102 BLOCK.		SEQUENCE ERROR (1).

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
183	SEQ ERROR	193	SEQ ERROR
	SEQUENCE ERROR (1).		SEQUENCE ERROR (1).
184	SEQ ERROR	194	SEQ ERROR
	SEQUENCE ERROR (1).		SEQUENCE ERROR (1).
185	SEQ ERROR	195	SEQ ERROR
	SEQUENCE ERROR (1).		SEQUENCE ERROR (1).
186	SEQ ERROR	196	SEQ ERROR
	SEQUENCE ERROR (1).		SEQUENCE ERROR (1).
187	SEQ ERROR	197	SEQ ERROR
	SEQUENCE ERROR (1).		SEQUENCE ERROR (1).
188	SEQ ERROR	198	SEQ ERROR
	SEQUENCE ERROR (1).		SEQUENCE ERROR (1).
189	SEQ ERROR	199	SEQ ERROR
	SEQUENCE ERROR (1).		SEQUENCE ERROR (1).
190	SEQ ERROR	201	OT (X)
	SEQUENCE ERROR (1).		OVERTRAVEL X.
191	SEQ ERROR	202	OT (Y)
	SEQUENCE ERROR (1).		OVERTRAVEL Y.
192	SEQ ERROR	203	OT (Z)
	SEQUENCE ERROR (1).		OVERTRAVEL Z.

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
204	OT (4)	223	S-OT2 (Z)
	OVERTRAVEL 4.		STORED STROKE LIMIT SECOND AREA (OUTSIDE INHIBIT) Z.
205	OT (5)	224	S-OT2 (4)
	OVERTRAVEL 5.		STORED STROKE LIMIT SECOND AREA (OUTSIDE INHIBIT) 4.
211	S-OT1 (X)	230	TOOL BROKEN
	STORED STROKE LIMIT FIRST AREA X.		AT BROKEN TOOL DETECTION BY G32, G33, Z-AXIS MOVES TO THE SET POSITION BUT SENS (T) INPUT NOT TURNED ON.
212	S-OT1 (Y)	231	ZR ERROR-AREA (X)
	STORED STROKE LIMIT FIRST AREA Y.		REFERENCE POINT RETURN AREA ERROR X.
213	S-OT1 (Z)	232	ZR ERROR-AREA (Y)
	STORED STROKE LIMIT FIRST AREA Z.		REFERENCE POINT RETURN AREA ERROR Y.
214	S-OT1 (4)	233	ZR ERROR-AREA (Z)
	STORED STROKE LIMIT FIRST AREA 4.		REFERENCE POINT RETURN AREA ERROR Z.
215	S-OT1 (5)	234	ZR ERROR-AREA (4)
	STORED STROKE LIMIT 1ST AREA 5.		REFERENCE POINT RETURN AREA ERROR 4.
220	S-OT2 (INSIDE)	235	ZR ERROR-AREA (5)
	STORED STROKE LIMIT SECOND AREA (INSIDE INHIBIT).		REFERENCE POINT RETURN ERROR 5.
221	S-OT2 (X)	241	ZR ERROR-POS (X)
	STORED STROKE LIMIT SECOND AREA (OUTSIDE INHIBIT) X.		REFERENCE POINT RETURN AREA ERROR X.
222	S-OT2 (Y)	242	ZR ERROR-POS (Y)
	STORED STROKE LIMIT SECOND AREA (OUTSIDE INHIBIT) Y.		REFERENCE POINT RETURN AREA ERROR Y.

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
243	ZR ERROR-POS (Z)	274	P-SET ERROR (4)
	REFERENCE POINT RETURN AREA ERROR Z.		P SET ERROR 4.
244	ZR ERROR-POS (4)	275	P-SET ERROR (5)
	REFERENCE POINT RETURN AREA ERROR 4.		PROGRAM SET ERROR 5.
245	ZR ERROR-POS (5)	280	MACH UNREADY
	REFERENCE POINT RETURN POSITION ERROR 5.		MACH RDY OFF.
250	S-OT3-5 (INSIDE)	310	SERVO POWER NOT SUPPLIED
	STORED STROKE LIMIT 3RD, 4TH, 5TH AREA INSIDE PROHIBITED.		SERVO POWER NOT SUPPLIED.
251	S-OT3-5 (X)	320	NC UNREADY
	STORED STROKE LIMIT 3RD, 4TH, 5TH AREA OUTSIDE PROHIBITED X.		NC UNREADY. SET UNREADY P SET UNREADY.
252	S-OT3-5 (Y)	330	EMERGENCY STOP
	STORED STROKE LIMIT 3RD, 4TH, 5TH AREA OUTSIDE PROHIBITED Y.		EMERGENCY STOP.
253	S-OT3-5 (Z)	331	FUSE (X)
	STORED STROKE LIMIT 3RD, 4TH, 5TH AREA OUTSIDE PROHIBITED Z.		FUSE BLOWN X.
271	P-SET ERROR (X)	332	FUSE (Y)
	P SET ERROR X.		FUSE BLOWN Y.
272	P-SET ERROR (Y)	333	FUSE (Z)
	P SET ERROR Y.		FUSE BLOWN Z.
273	P-SET ERROR (Z)	334	FUSE (4)
	P SET ERROR Z.		FUSE BLOWN 4.

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
335	FUSE (5)	355	OL (5)
	FUSE BLOWN 5.		OVERLOAD (1) 5.
341	SERVO ERROR (X)	357	OL (OTHERS)
	SERVO ERROR X.		OVERLOAD (2).
342	SERVO ERROR (Y)	361	PG ERROR (X)
	SERVO ERROR Y.		PG ERROR X.
343	SERVO ERROR (Z)	362	PG ERROR (Y)
	SERVO ERROR Z.		PG ERROR Y.
344	SERVO ERROR (4)	363	PG ERROR (Z)
	SERVO ERROR 4.		PG ERROR Z.
345	SERVO ERROR (5)	364	PG ERROR (4)
	SERVO ERROR 5.		PG ERROR 4.
351	OL (X)	365	PG ERROR (5)
	OVERLOAD (1) X.		PG ERROR 5.
352	OL (Y)	371	FG ERROR (X)
	OVERLOAD (1) Y.		FG ERROR X.
353	OL (Z)	372	FG ERROR (Y)
	OVERLOAD (1) Z.		FG ERROR Y.
354	OL (4)	373	FG ERROR (Z)
	OVERLOAD (1) 4.		FG ERROR Z.

Table 2.2 List of Alarm Codes (Cont'd)

Code	Causes	Code	Causes
374	FG ERROR (4)	394	TG ERROR (4)
	FG ERROR 4.		TG LEAD DISCONNECTION.
375	FG ERROR (5)	395	TG ERROR (5)
	FG ERROR 5.		TG LEAD DISCONNECTION.
381	RPG ERROR (X)	400	SEQ ERROR
	RPG ERROR 1.		SEQUENCE ERROR (2).
382	RPG ERROR (Y)	419	SEQ ERROR
	RPG ERROR 2.		SEQUENCE ERROR (2).
383	RPG ERROR (Z)	500	SEQ ERROR
	RPG ERROR 3.		SEQUENCE ERROR (3).
384	RPG ERROR (4)	519	SEQ ERROR
	RPG ERROR 4.		SEQUENCE ERROR (3).
385	RPG ERROR 5	800	MEM ERROR
	PROGRAM ERROR 5.		BUBBLE FAILURE INPUT/OUTPUT FAILURE.
391	TG ERROR (X)	801	MEM ERROR
	TG LEAD DISCONNECTION.		BUBBLE FAILURE INITIAL ERROR.
392	TG ERROR (Y)	802	MEM ERROR
	TG LEAD DISCONNECTION.		BUBBLE FAILURE UNDEFINED COMMAND.
393	TG ERROR (Z)	803	MEM ERROR
	TG LEAD DISCONNECTION.		BUBBLE FAILURE TRANSFER MISSING.

Table 2.2 List of Alarm Codes

Code	Causes	Code	Causes
804	MEM ERROR		
	BUBBLE FAILURE. PARITY ERROR.		
805	MEM ERROR		
	BUBBLE FAILURE. NO MARKER.		
806	MEM ERROR		
	BUBBLE FAILURE. MANY DEFECT LOOPS.		
810	RAM ERROR		
	RAM CHECK ERROR.		
820	ROM ERROR		
	ROM CHECK ERROR.		
830	CPU ERROR		
	CPU ERROR (1).		
840	CPU ERROR		
	CPU ERROR (2).		
910	TAPE MEM ERROR		
	MEMORY VERIFYING ERROR (OFF-LINE).		
920	TAPE ERROR		
	TAPE READING-IN ERROR (OFF-LINE).		

2.2.2 COUNTERACTING ALARMS

(1) Alarm 010 (Tape Horizontal Parity Error)

The number of data holes for each character is checked on the NC tape. An alarm is issued when the number is:

Even: for EIA tape

Odd: for ISO tape

(The description that follows applies to the EIA code.)

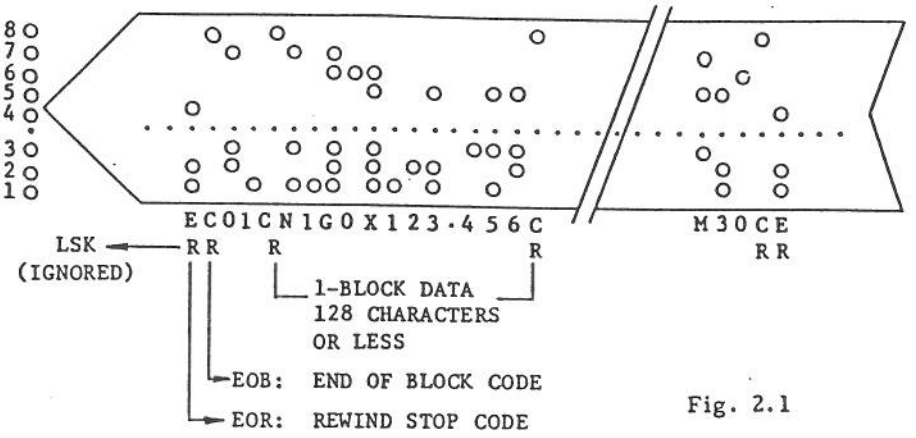


Fig. 2.1

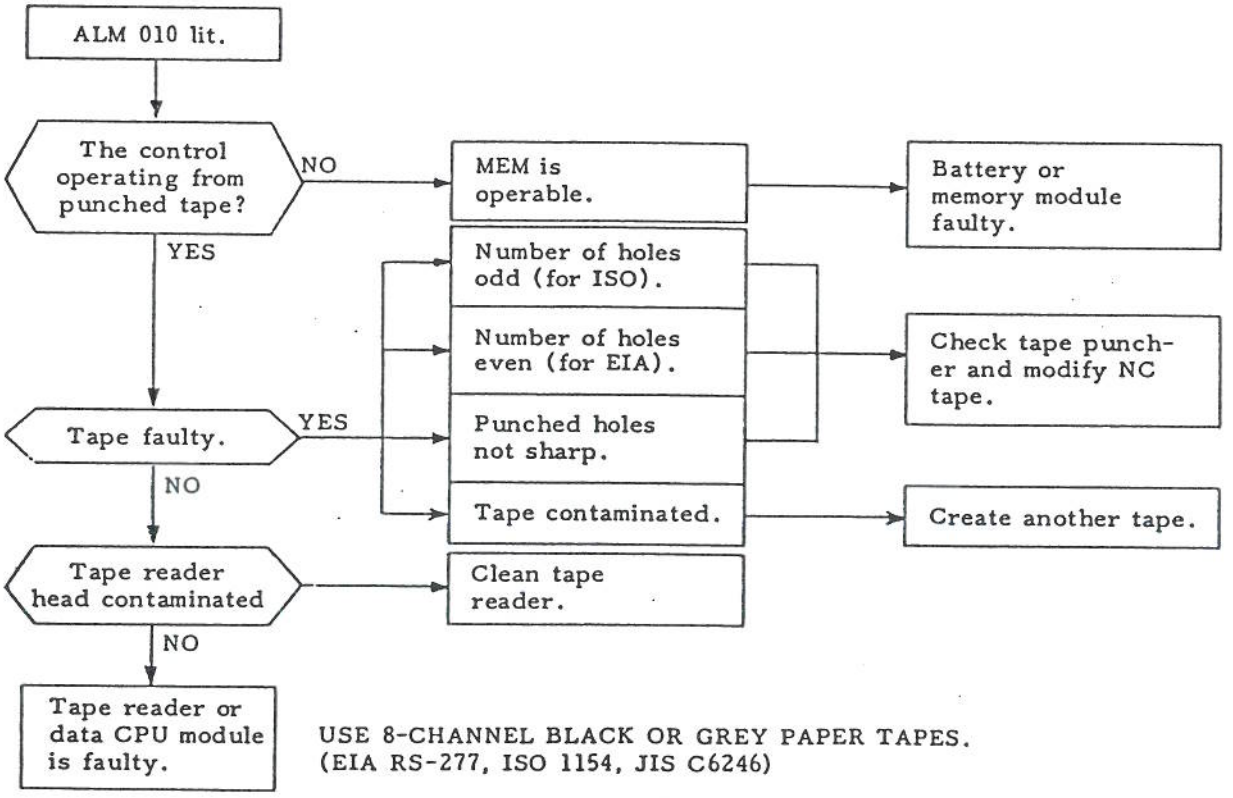


Fig. 2.2

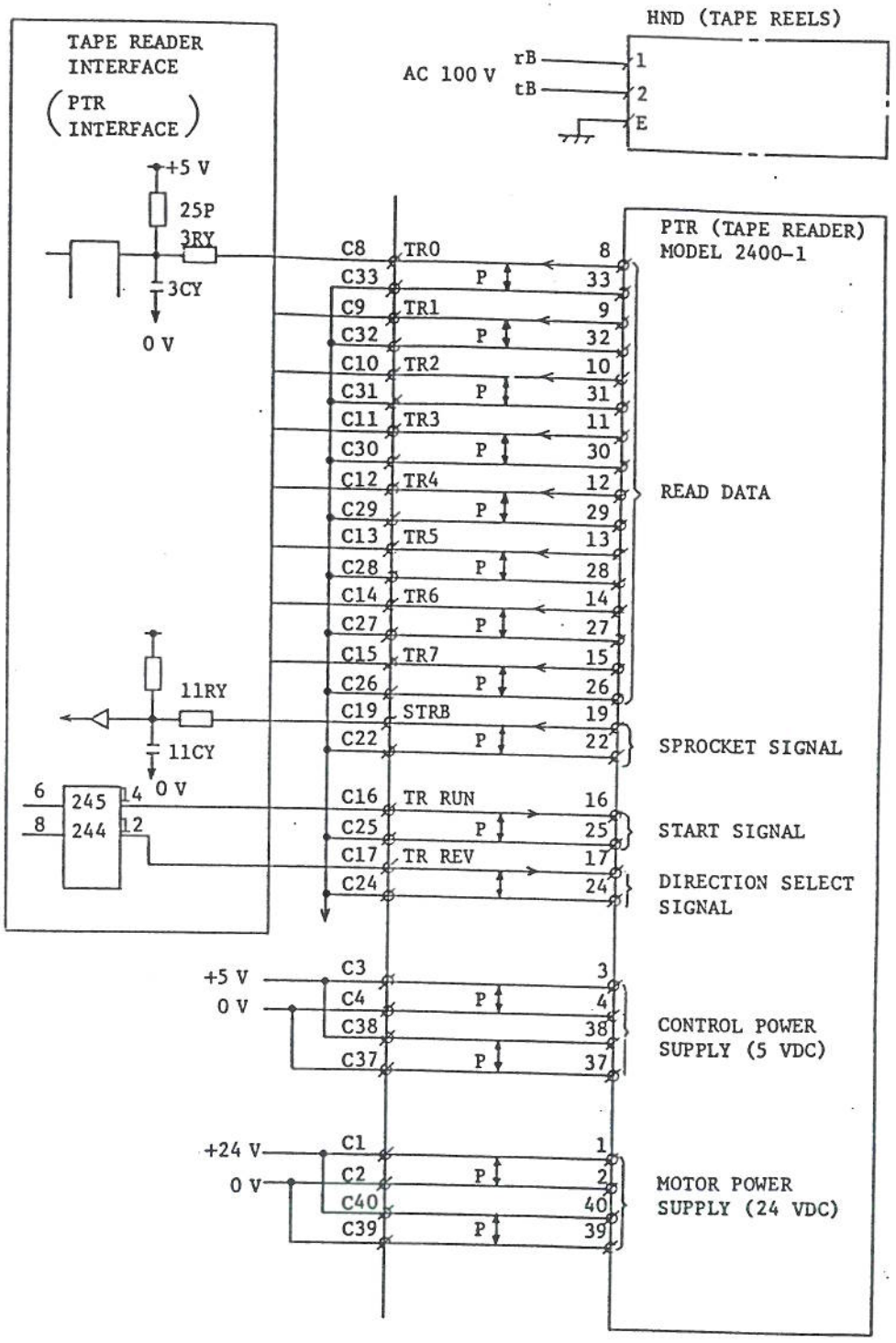


Fig. 2.3 Tape Reader Connection Diagram

2.2.2 COUNTERACTING ALARMS (Cont'd)

(2) Alarm 075, 076, 077 (RS 232C faulty)

075: RS 232C interface; disagreement between no. of bits and no. of baud rates

076: RS 232C interface; transmission failure

077: RS 232C interface; 10 characters or more were read in after stop code was issued.

FACIT 4070

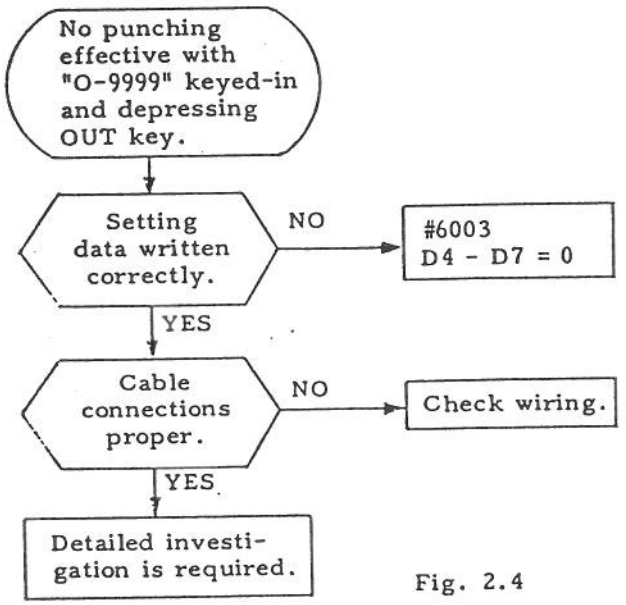


Fig. 2.4

RS 232C

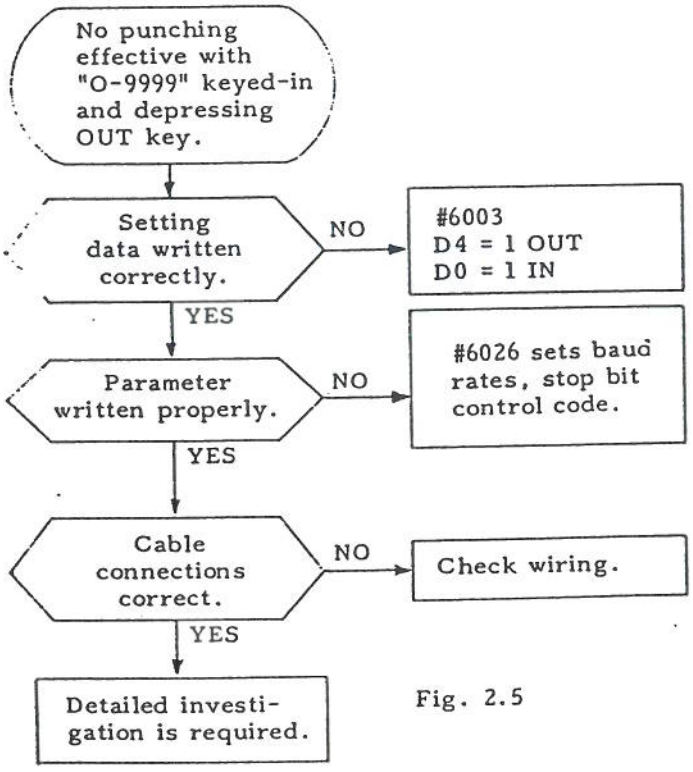


Fig. 2.5

Setting for Using FACIT, RS 232C and Teletypewriter (ASR-33)

Parameter (setting) setting

Interface establishing Setting #6003

IN	OUT	Output device				Input devic		
		D7	D6	D5	D4	D3	D2	D1
PTR	FACIT	0	0	0	0	0	0	0
PTR	ASR 33	0	0	0	1	0	0	0
RS 232C	RS 232C	0	0	0	1	0	0	0

Baud rate setting Parameter #6026

Baud rate of I/O devices	–	–	RSCB	STP	Baud rate set		
	D7	D6	D5	D4	D3	D2	D1
110 bauds					0	0	1
300 bauds					0	1	0
600 bauds					0	1	1
1200 bauds					0	1	1
2400 bauds					1	0	0
4800 bauds					1	0	0
9600 bauds					1	0	1

Stop BIT STP = D4 0: 1 BIT
1: 2 BIT

Control code RSCB = D5
0: Control code signal transmitted
1: No control code signal transmitted

Teletypewriter setting (for ASR-33)

#6003

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	1	0	0	0	0

#6026

D7	D6	D5	D4	D3	D2	D1	D0
0	0	1	1	0	0	1	0

START	8 BITS	STOP

NOTE: Short-circuit 1RO-4 (RS) and 1RO-5 (CS) when using the teletypewriter (ASR-33).

Signals and Connection Diagram for FACIT 4070

Timing

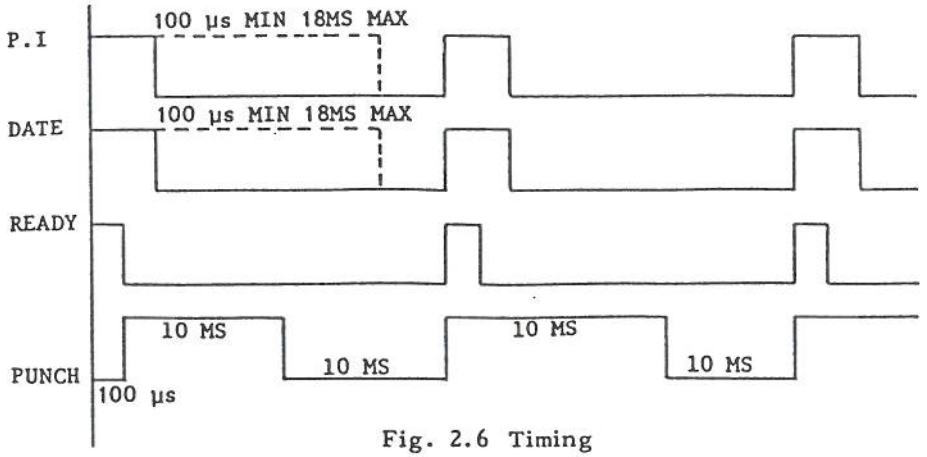


Fig. 2.6 Timing

FACIT connection diagram

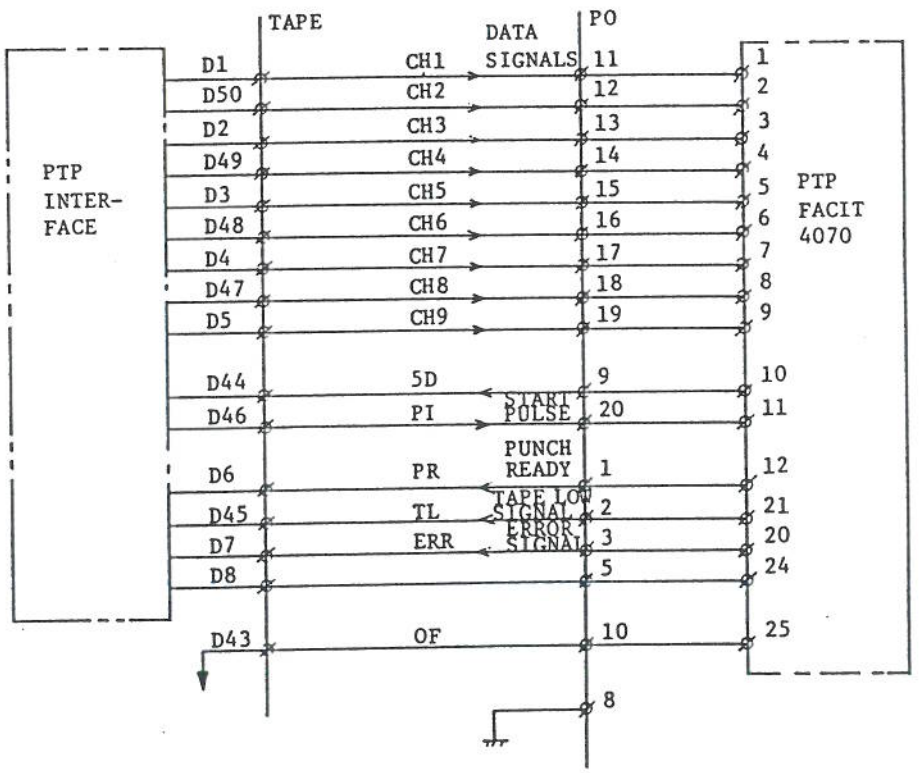


Fig. 2.7 FACIT Connection Diagram

RS 232C Connection Diagram

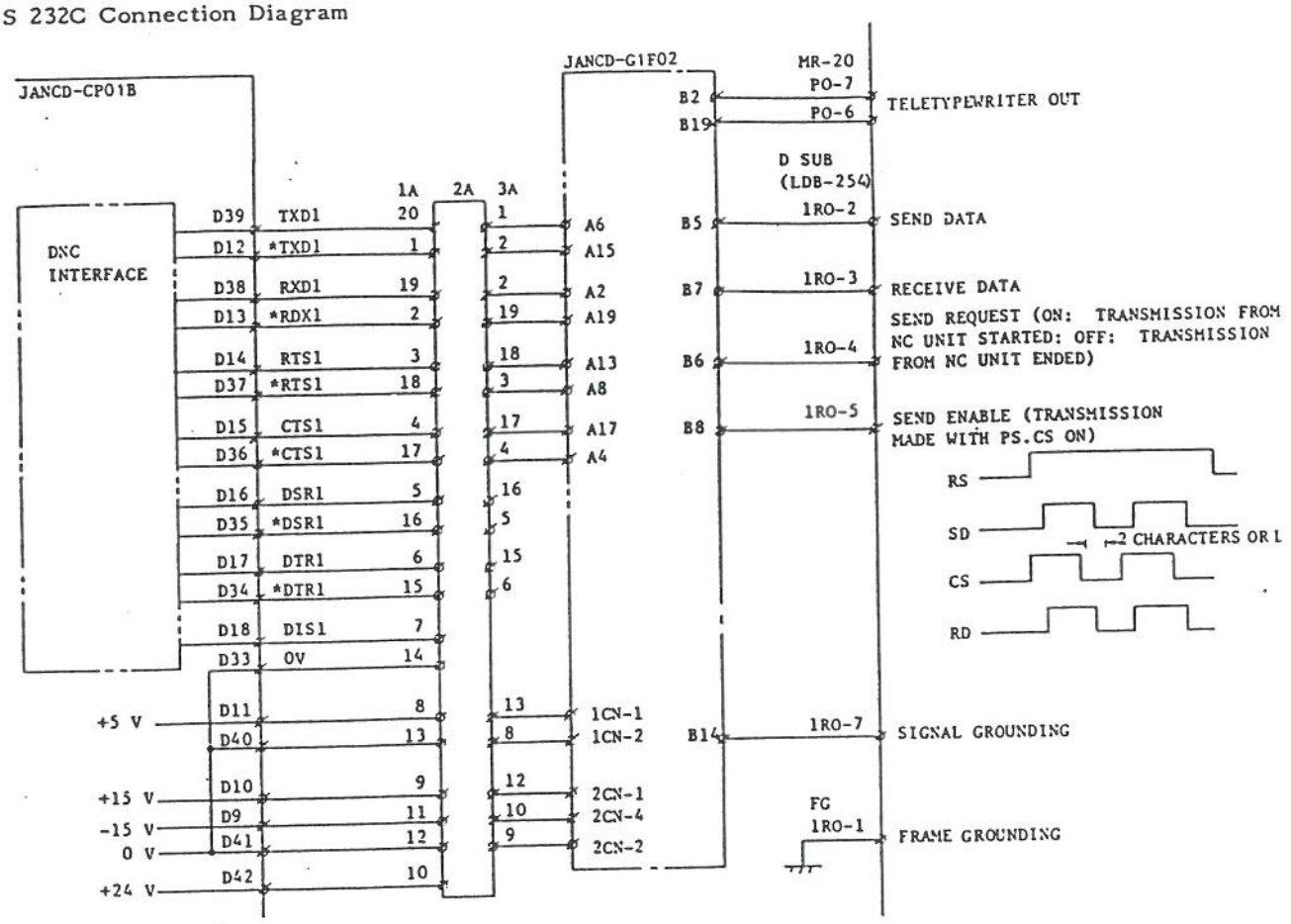


Fig. 2.8 RS 232C Connection Diagram

(3) Alarms 170, 172, 173 (MEM Error)

170: MEM error (OFS); tool offset total check error

172: MEM error (SET); setting area total check error

173: MEM error (PRM); parameter area total check error

Alarm No.	CRT Display	Location on Memory Module		
		MM02-XX	MM05	MM01C-XX
170	MEMORY ERROR (OFS)	20C, 20D	1D	3M
172	MEMORY ERROR (SET)	19C, 19D	1C	3L
173	MEMORY ERROR (PRM)	18C, 18D 17C, 17D		

(4) Alarm 179 (Panel Inside Temperature Tool High)

This alarm is activated when the panel inside temperature is 45°C or higher. There are two possible causes: the ambient temperature is high, or the cooling fan inside the control panel or the external ventilation fan is stopped. Check for both conditions.

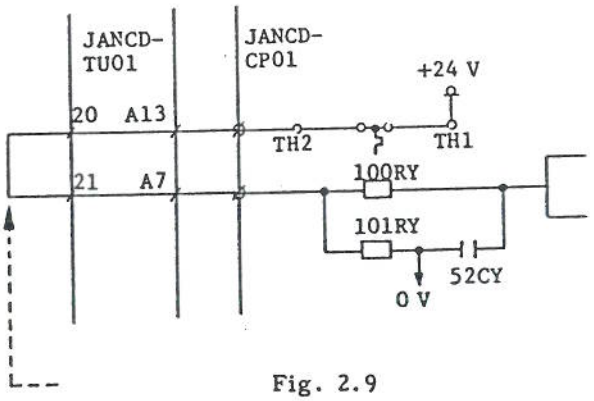


Fig. 2.9

NOTE:

- The customer (OEM) can add another the mostat (contacts usually closed).
- When the system is not in use, short-circ pins 20 and 21 at TU01, as illustrated.

(5) Alarms 231 (X), 232 (Y), 233 (Z) (Zero Return Area Error)

As shown below, an alarm results when reference zero point return is made between DECLS and reference zero point. Note that these alarms cannot be issued on a first run after power is applied.

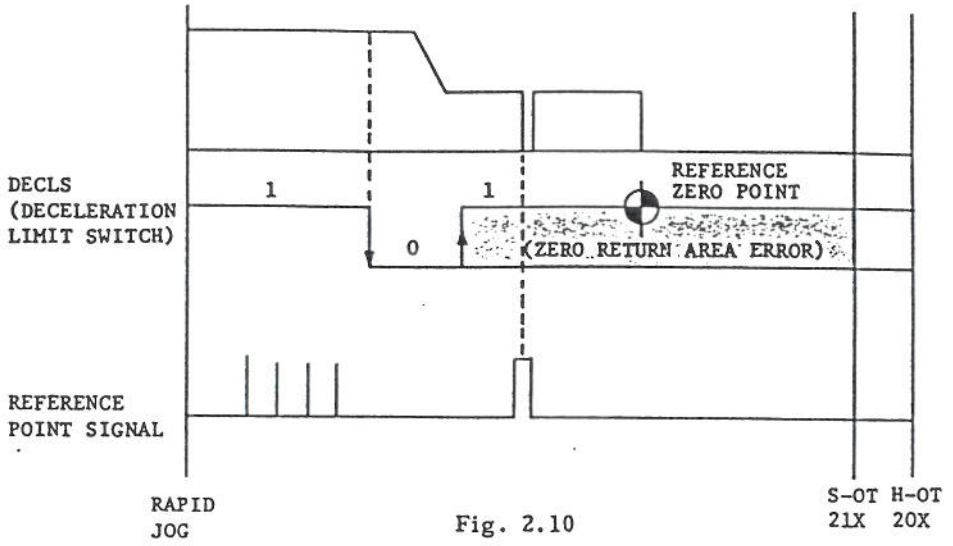


Fig. 2.10

(6) Alarms 241 (X), 242 (Y), 243 (Z) (Reference Point Return Area Errors)

This type of alarm results when the reference point return performed manually or automatically (G27 or G28) is different from the previous reference point.

NOTE: This check is made when the system No. switch is set to "0."

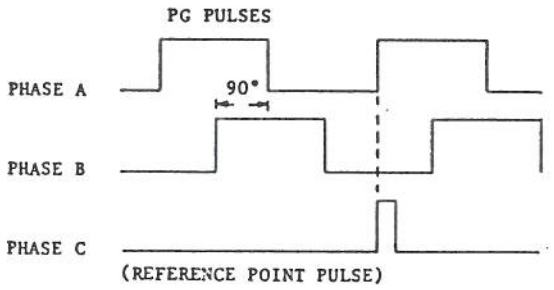


Fig. 2.11

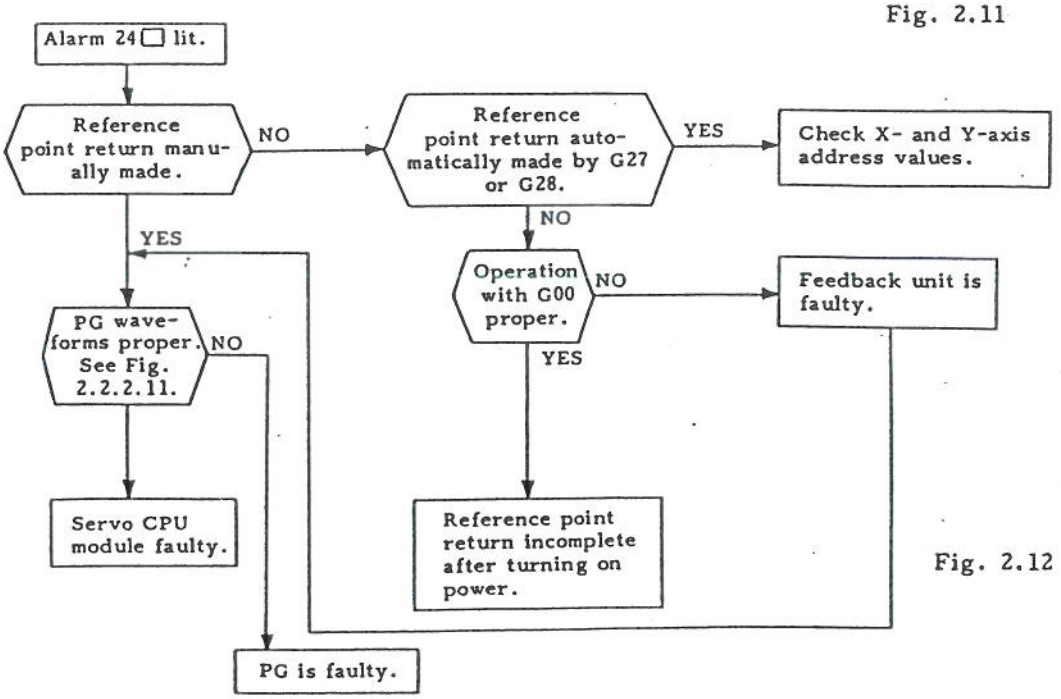


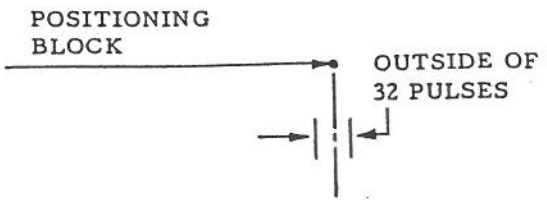
Fig. 2.12

(7) Alarms 271 (X), 272 (Y), 273 (Z) (PSET Error)

This type of error results when a difference between current position value and command value is 32 pulses or below (set by parameter) after positioning according to command.

Display on the CRT is:

COMMAND X 100
POSITION X Less than 99.968
or
100.33 or more



· Parameter settings

#6056 "32": X-axis
#6057 "32": Y-axis
#6058 "32": Z-axis

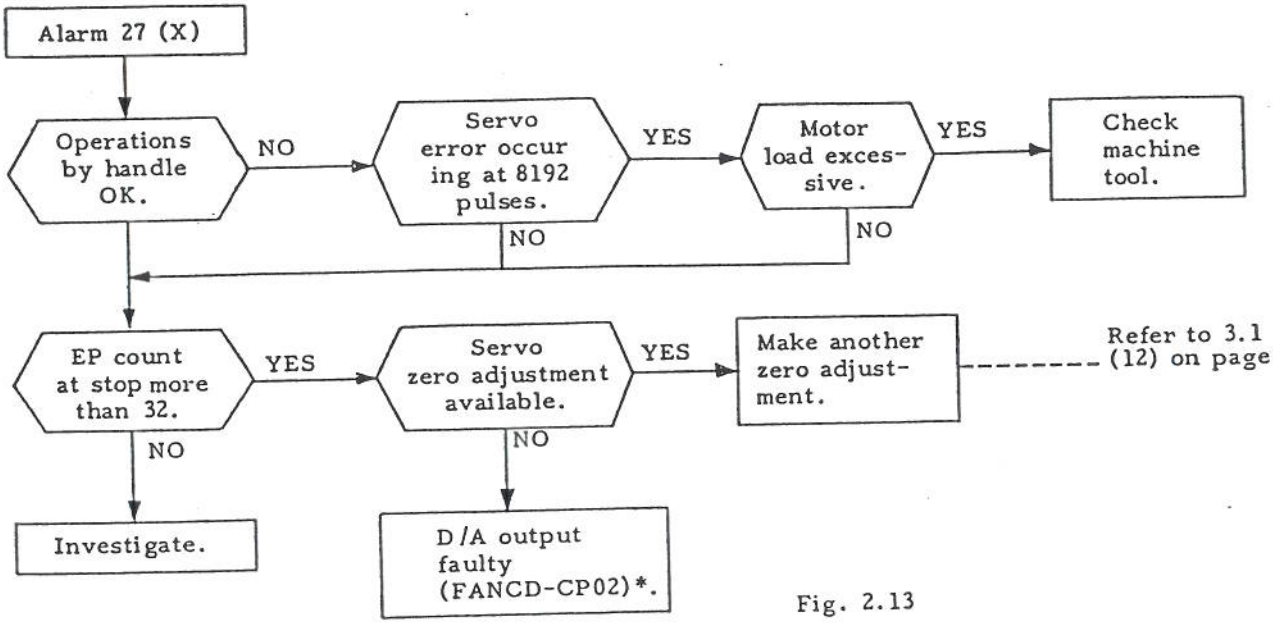


Fig. 2.13

* Measure the D/A voltage on an initial power application (1 pulse = 1.22 mV).

(8) Alarm 280 (Machine Unready)

This alarm results from the MER (machine unready) signal being off after transmission of the NC Ready Signal. Check to see if the MRD signal is normal. (See Fig. 2.14 and 2.15.)

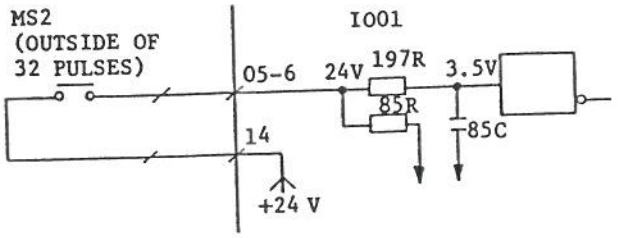


Fig. 2.14 Connection Example

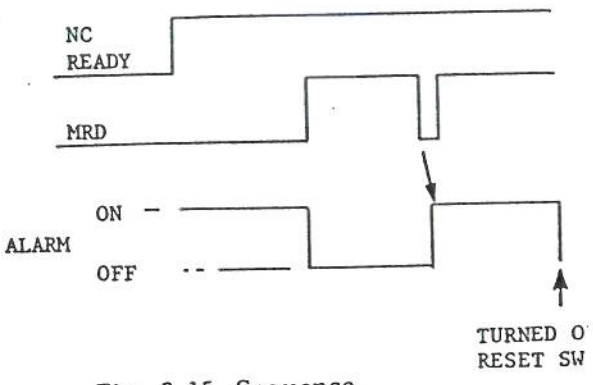


Fig. 2.15 Sequence

(9) Alarm 330 (Emergency Stop)

This alarm is displayed and the system comes to a stop when the emergency stop pushbutton is depressed or when the machine stroke end limit switch is turned on.

(10) Alarms 331 (X, 332 (Y), 333 (Z), 334 (4) (Servo Fuse Blown)

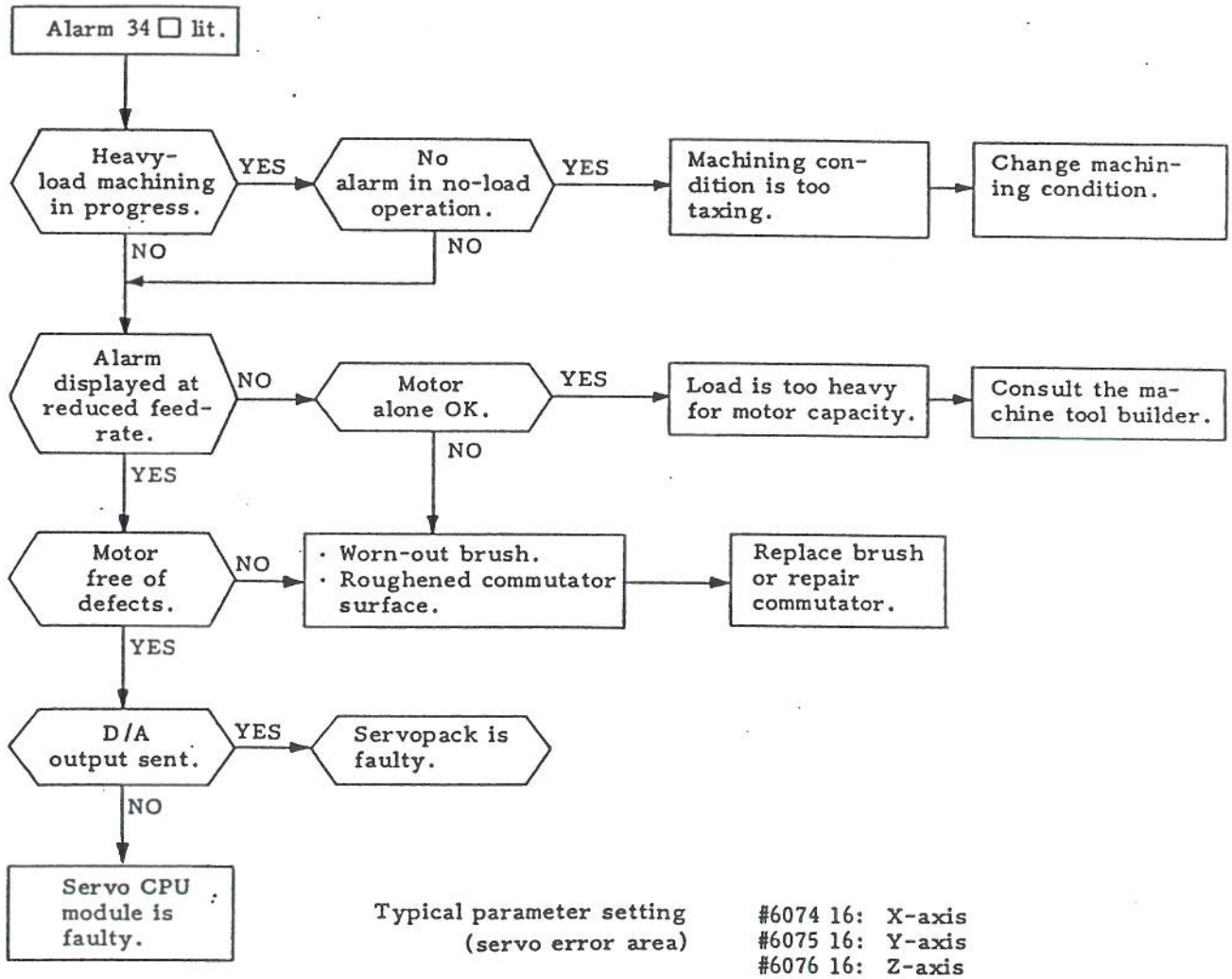
(Errors)

MR-G: Servopack NFB off or tripped

MR-K: Servopack fuse blown

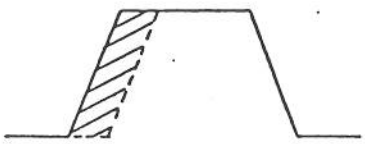
These errors caused by damaged transistor(s). Troubleshoot the error, take corrective action, and turn on the power again. Read the servo unit instruction manual for further details.

(11) Alarms 341 (X), 342 (Y), 343 (Z), 344 (4) (Servo Error)



Typical parameter setting (servo error area)

#6074 16: X-axis
#6075 16: Y-axis
#6076 16: Z-axis
#6077 16: 4th-axis



An alarm is issued when the shaded portion (follow-up deviation) in the left-hand figure exceeds 8192 pulses.

Fig. 2.16

2.2.2 COUNTERACTING ALARMS (Cont'd)

(12) Alarms 351 (X), 352 (Y), 353 (Z)
(Overload (1))

MR-G: Servopack thermal relay trip
MR-K: Electronic thermal relay trip

These alarms indicate overload. Check the machining condition or machine tool load.

Table 2.3

Servomotor Type (With feedback unit)		Servopack Type	Thermal Relay Type(1)
Minertia Motor	UGMMEM-06AA1SF	CPCR-MR023G □ Note	RH-35/6.2HV
	UGMMEM-13AA1SF	CPCR-MR053G □	RH-35/6.9HV
	UGMMEM-25AA1SF	CPCR-MR073G □	RH-35/12.5HV
	UGMMEM-50AA1SF	CPCR-MR153G □	RH-35/12.5HV
	UGMMEM-1AAA1SF	CPCR-MR553G □	RH-35/24.5HV
Minertia Motor J Series	UGJMED-40LA2OF	CPCR-MR054G □	RH-35/7.8HV
	UGJMED-60MA2OF	CPCR-MR084G □	RH-35/7T
	UGJMED-60LA2OF	CPCR-MR154G □ 2	RH-35/15T1
	UGJMED-80MA2OF	CPCR-MR154G □	RH-35/15T2
	UGJMED-80LA2OF	CPCR-MR224G □	RH-35/26T
	UGJMED-80KA2OF	CPCR-MR374G □	RH-35/30T
Cup Motor A Series	UGCMED-04AA1SF	CPCR-MR052G □	RHK-35/8C
	UGCMED-08AA1SF	CPCR-MR082G □	RHK-36/6.4C
	UGCMED-15AA1SF	CPCR-MR152G □	RHK-35/11.2C
	UGCMED-22A1SF	CPCR-MR222G □	RHK-35/17C
	UGCMED-37AA1SF	CPCR-MR552G □ 1	RH-35/27HV
Hi-Cup Motor G Series	UGHMED-03GG2OF	CPCR-MR055G □	RHK-35/8C
	UGHMED-06GG2OF	CPCR-MR085G □ 2	RHK-35/6.4C
	UGHMED-12GG2OF	CPCR-MR155G □ 2	RHK-35/10.5C
	UGHMED-20GG2OF	CPCR-MR225G □ 2	RHK-35/16C
	UGHMED-30GG2OF	CPCR-MR555G □ 2	RH-35/21HV

(1) Thermal relay is built-in the servomotor controller Servopack.

Note: □ is filled with a revision letter and changed with product modification.

(13) Alarm 357 (Overload (2))

Regenerative resistance: provided for Servopack Type MR08 or larger.
Thermostat: provided for minertia motor junior series

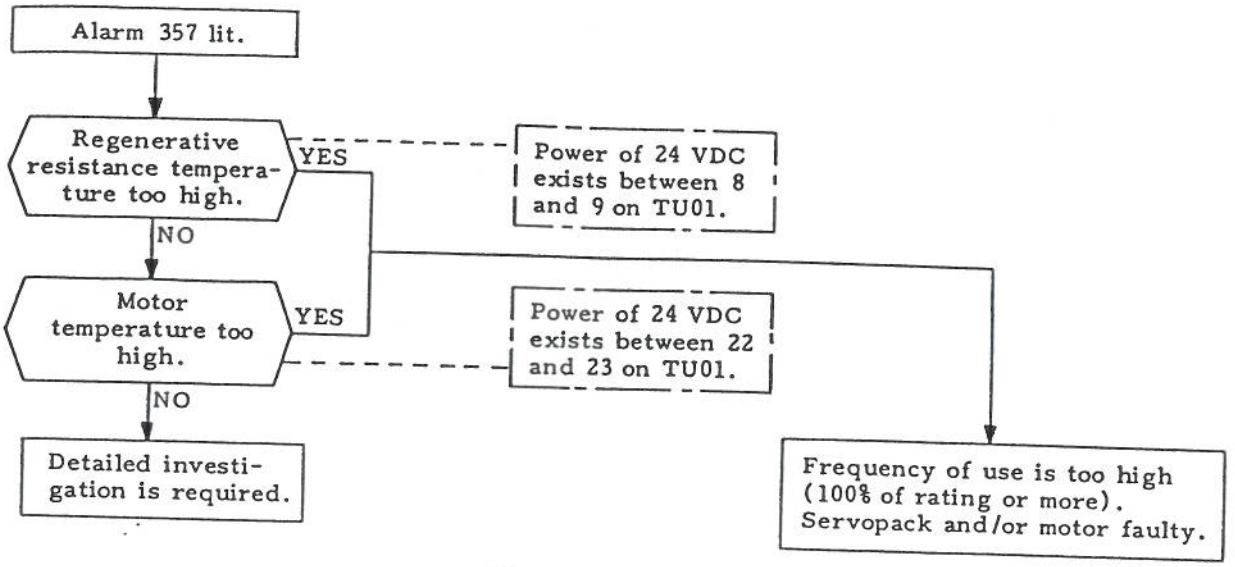


Fig. 2.17

· Connection Diagram (for type MR-G)

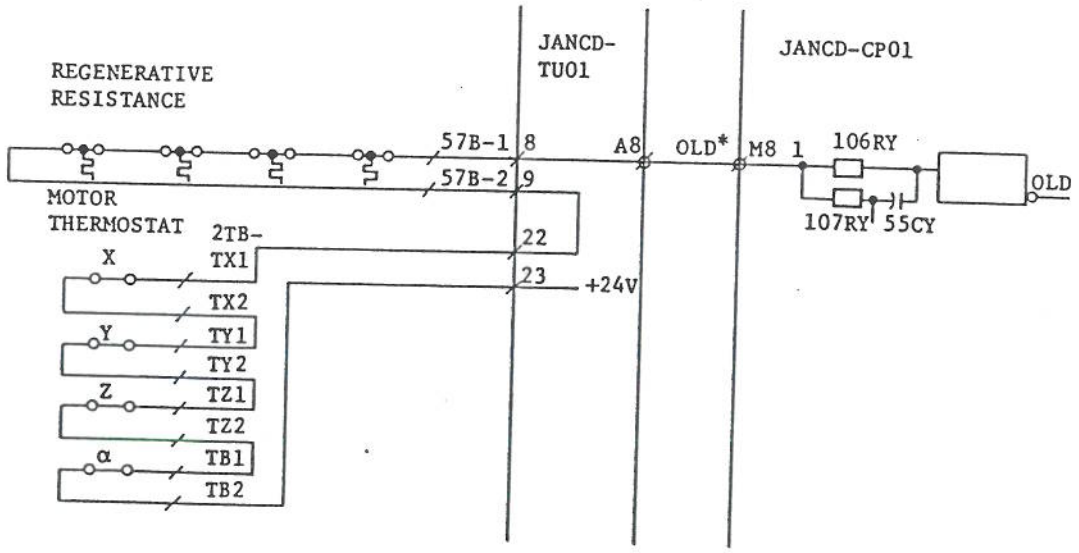


Fig. 2.18

2.2.2 COUNTERACTING ALARMS (Cont'd)

(14) Alarms 361 (X), 362 (Y), 363 (Z) (PG error)

The possible cause is that no PG input is given to the servo CPU module despite the Servopack $\overline{\text{TGON}}$ signal being turned on.

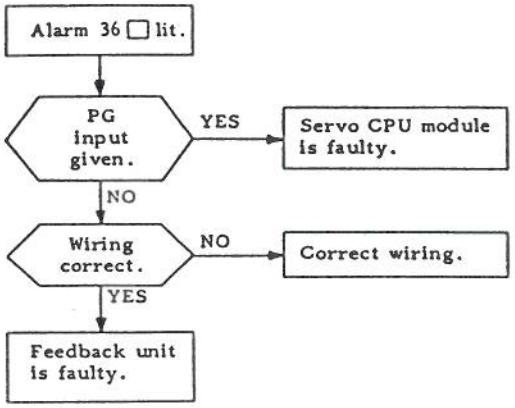


Fig. 2.19

· PG Waveforms (type ZC7)

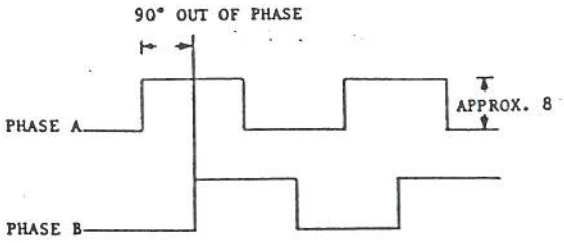


Fig. 2.20

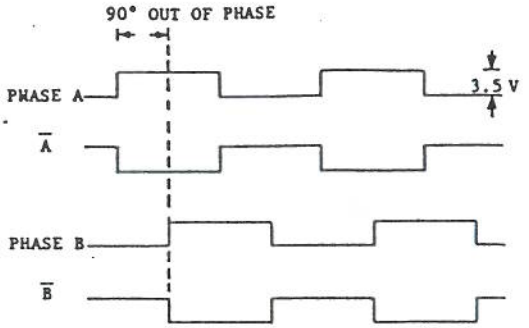
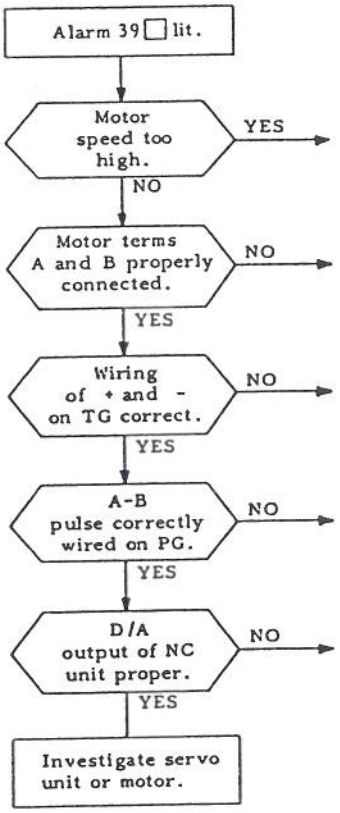


Fig. 2.21

(15) Alarms 391 (X), 392 (Y), 393 (Z) (TG error)

MR-K: The alarm is lit when PG and/or TG is wired in reverse or disconnected, or when A and B on the motor are wired in reverse.



Check the TG voltage.

- Does motor speed exceed the rating?
- Is the TG wiring correct?

If the rotation is clockwise viewed from drive end, motor terms A and B should be connected to servo unit terms A and B, respectively.

If the rotation is counterclockwise viewed from drive end, motor terms A and B should be connected to servo unit terms B and A, respectively.

If the rotation is clockwise viewed from drive end, connect motor connecting pins L(G) and M(H) to TG pins J10 and J11, respectively.

If the rotation is counterclockwise viewed from drive end, connect motor connecting pins L(G) and M(H) to TG pins J11 and J10, respectively.

If the rotation is clockwise viewed from drive end, connect motor connecting pins A and B to PG pins J16 and J18, respectively.

If the rotation is counterclockwise viewed from drive end, connect motor connecting pins A and B to PG pins J18 and J16, respectively.

On a first power application, check the D/A output.

On a second power application, use EP (error pulse) for verification to check the D/A output.

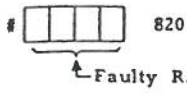
Fig. 2.22

(16) Alarm 810 (CPU error)

This alarm is displayed when a CPU malfunction prevents the operation.

(17) Alarm 820

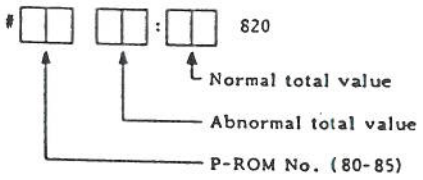
① RAM check error



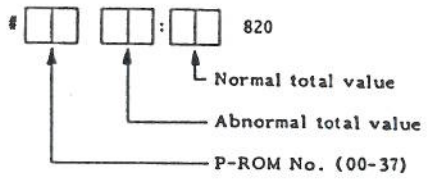
RAM No. and Location

RAM No.	Memory Module Type MM	Location on Module Board	RAM No.	Memory Module Type MM	Location on Module Board	RAM No.	Memory Module Type MM	Location on Module Board
#98	01C	2E	#105	01B	11C	#111	01B	8C
#99	01C	2C		01C	3D		01C	5C
#100	01B	13D	#106	01B	10D	#112	01B	7D
	01C	2F		01C	4E		01C	5F
#101	01B	13C	#107	01B	10C	#113	01B	7C
	01C	2D		01C	4C		01C	5D
#102	01B	12D	#108	01B	9D	#500	(CP02)	27C
	01C	3E		01C	4F	#501	(CP02)	27A
#103	01B	12C	#109	01B	9C			
	01C	3C		01C	4D			
#104	01B	11D	#110	01B	8D			
	01C	3F		01C	5E			

② CP02 error



③ MM01 error



2.3 TROUBLESHOOTING WITHOUT ALARM CODES

The following flow charts are the instructions for correcting troubles not shown by alarm codes, in which basic operations are abnormal.

(1) Power cannot be applied.

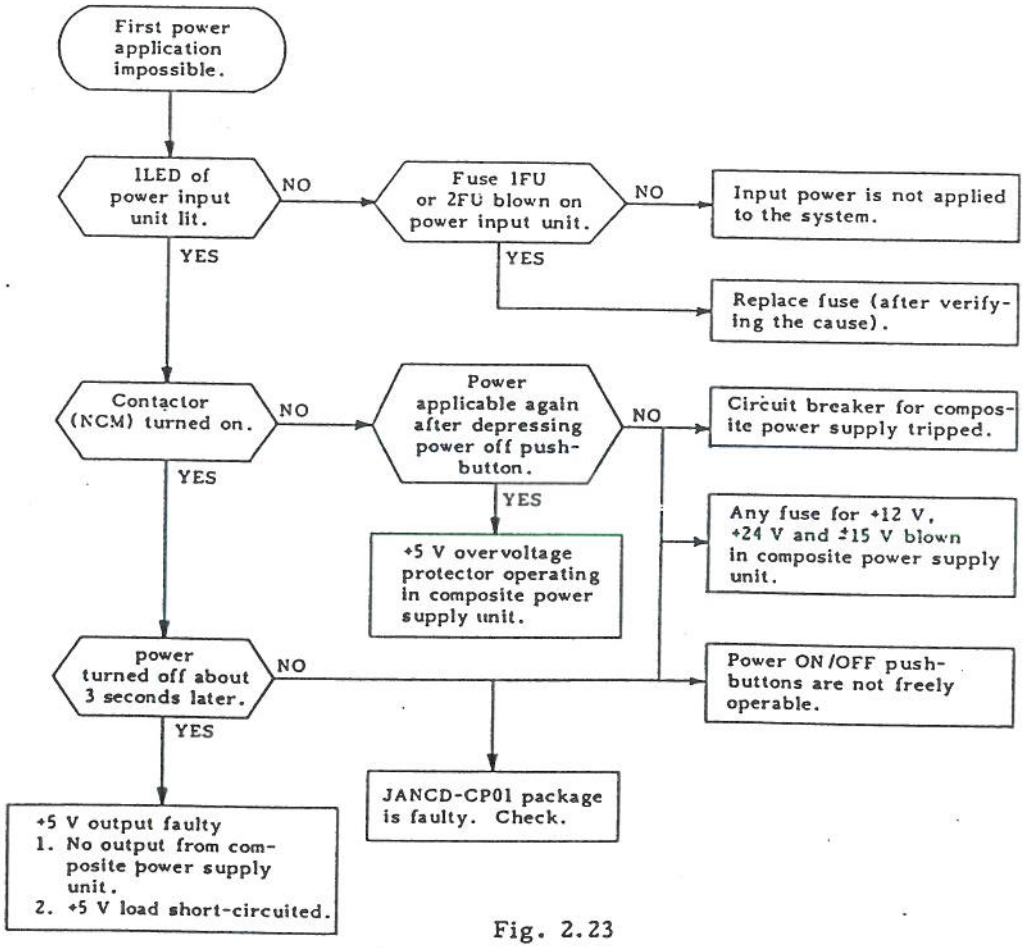
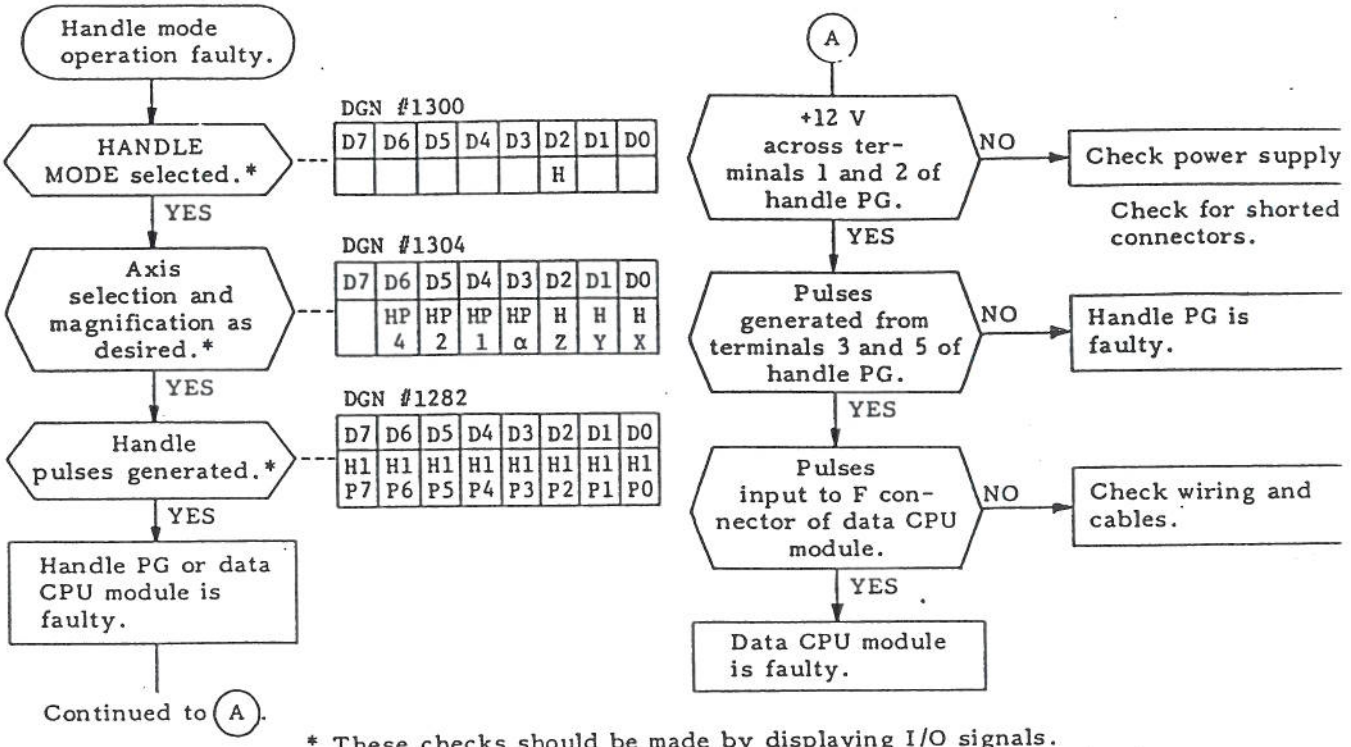


Fig. 2.23

(2) HANDLE MODE operation is faulty.



* These checks should be made by displaying I/O signals.
Displayed at right side of each check item is the correct signal states.

NOTE: Set correctly the parameter #6272 (maximum manual handle feedrate; 1 = 7.5 mm/min.)

Fig. 2.24

· Handle PG Connection Diagram

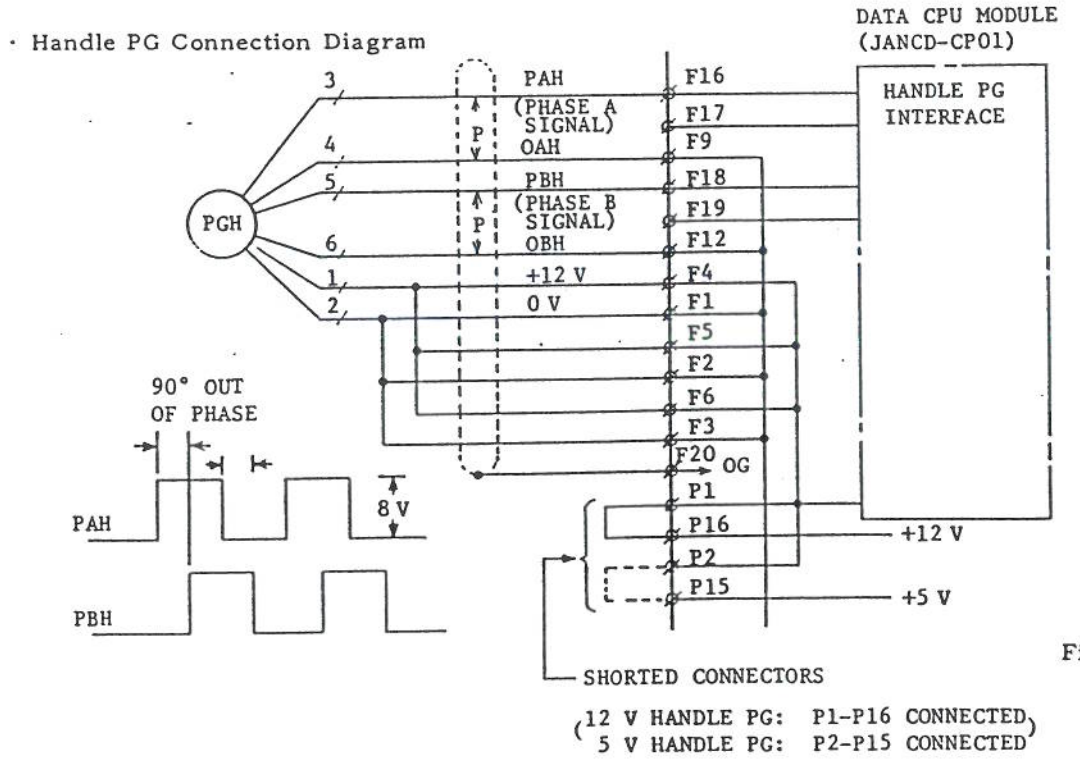


Fig. 2.25

(3) Manual jog mode operation faulty

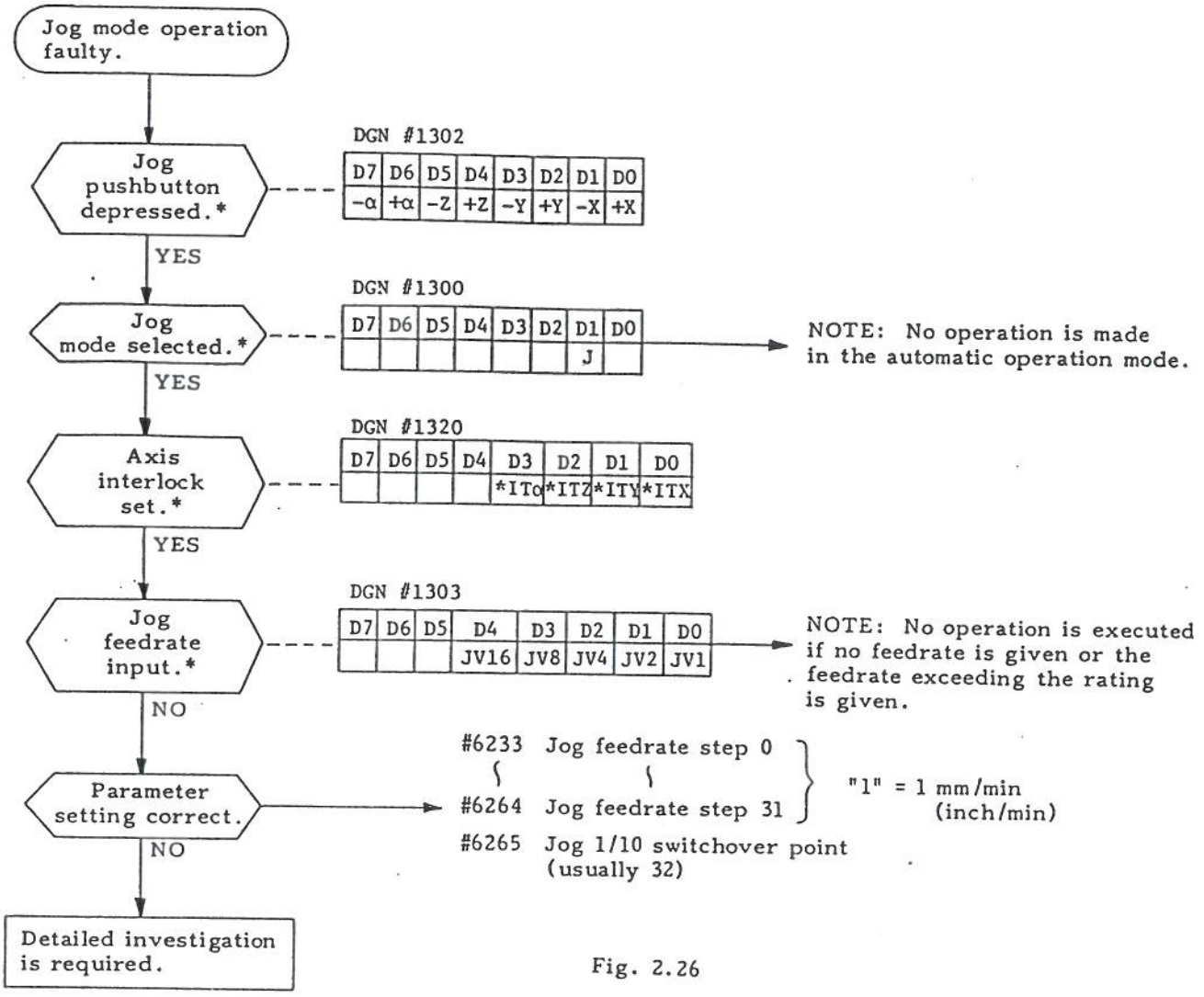


Fig. 2.26

* These checks should be made by displaying I/O signals.
Displayed at right side of each check item is the correct signal states.

2.3 TROUBLESHOOTING WITHOUT ALARM CODES (Cont'd)

(4) Manual rapid mode operation faulty

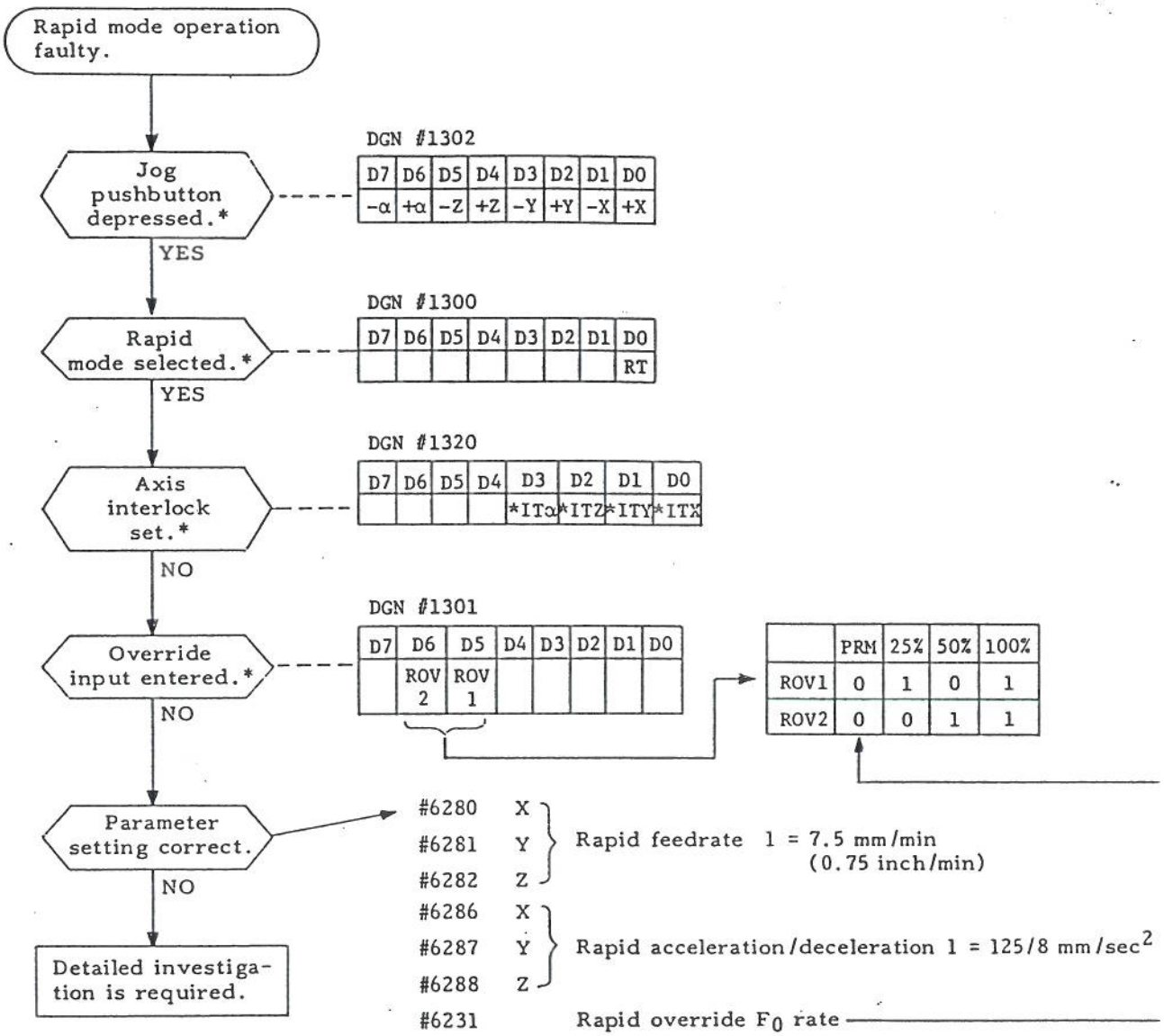
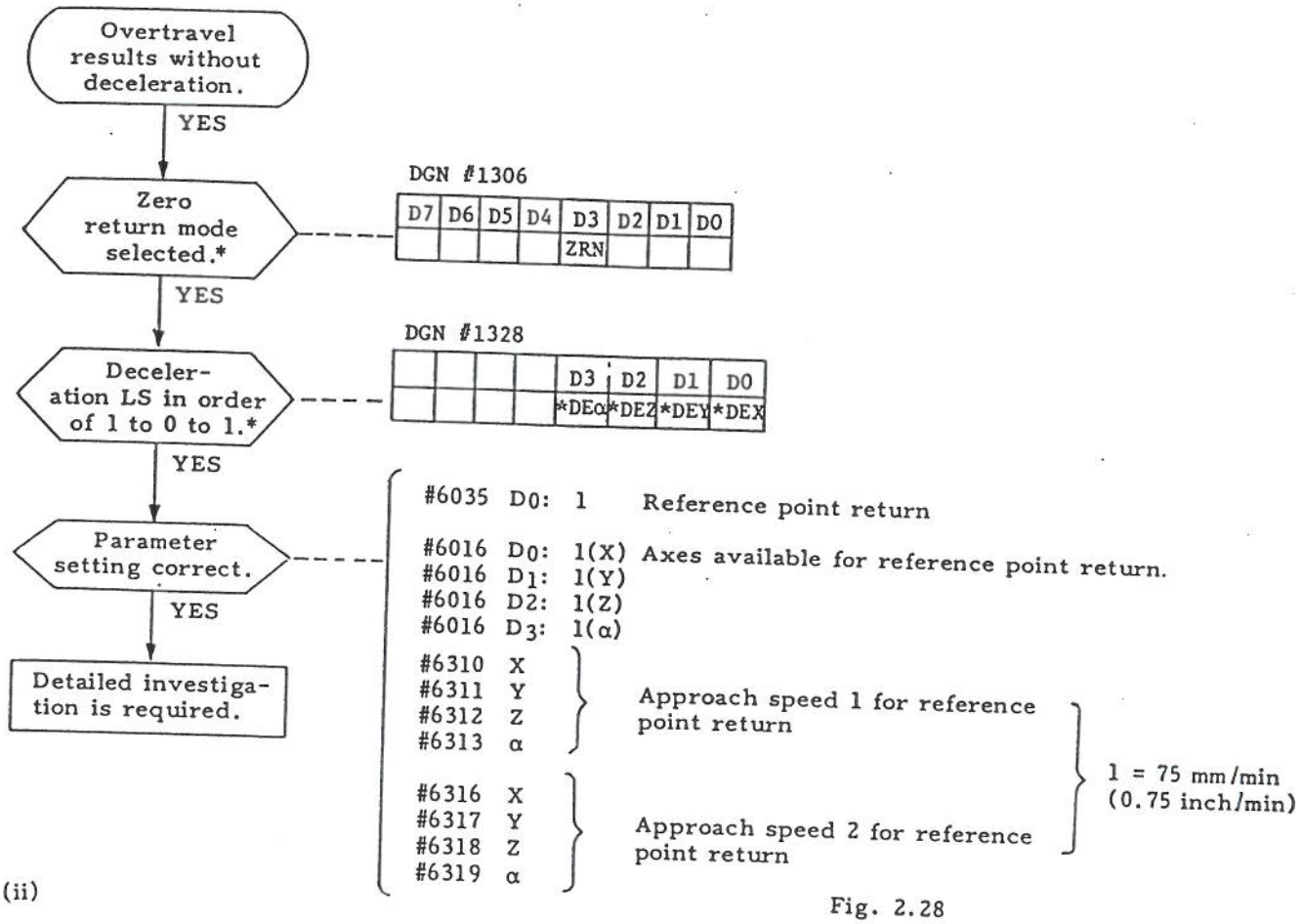


Fig. 2.27

* These checks should be made by displaying I/O signals.
Displayed at right side of each check item is the correct signal status.

(5) Manual reference zero return operation faulty

(i)



(ii)

Fig. 2.28

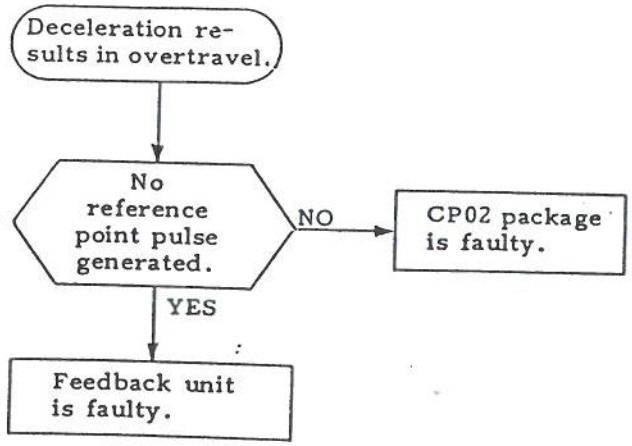


Fig. 2.29

* These checks should be made by displaying I/O signals.
Displayed at right side of each check item is the correct signal status.

2.3 TROUBLESHOOTING WITHOUT ALARM CODES

(6) Cycle start failure

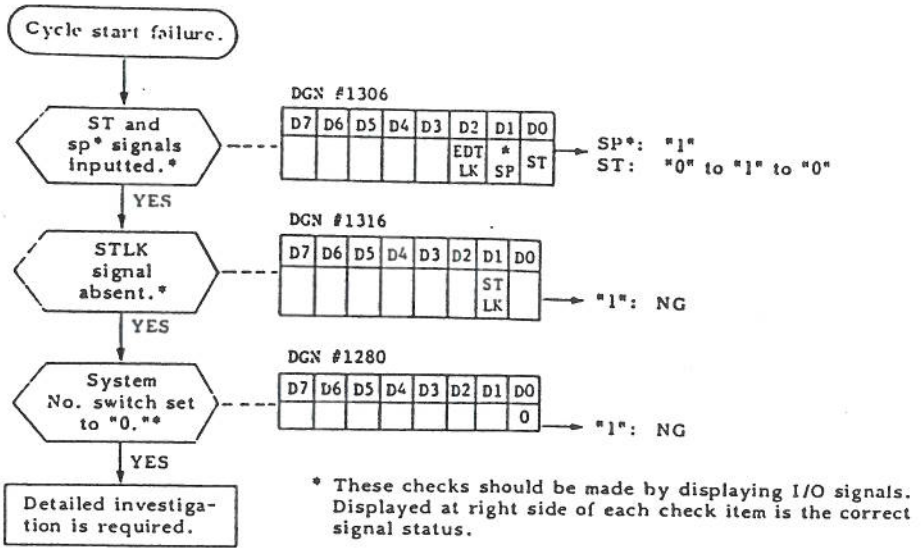


Fig. 2.30

(7) No operation available with G01, G02 or G03

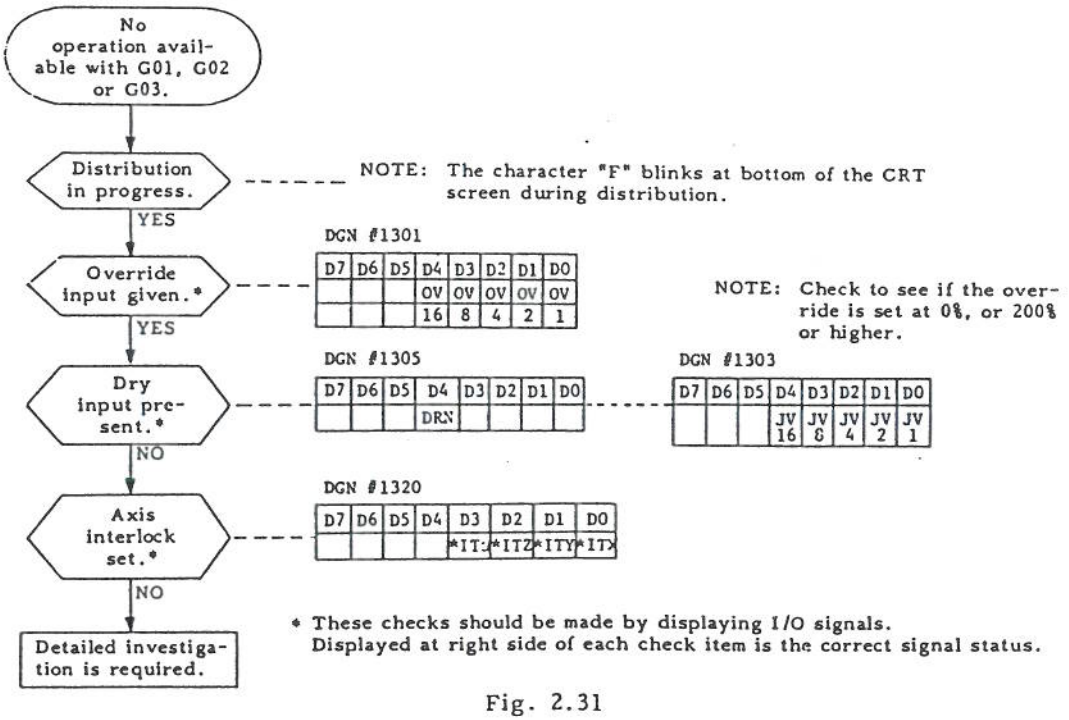


Fig. 2.31

(8) Spindle does not rotate.

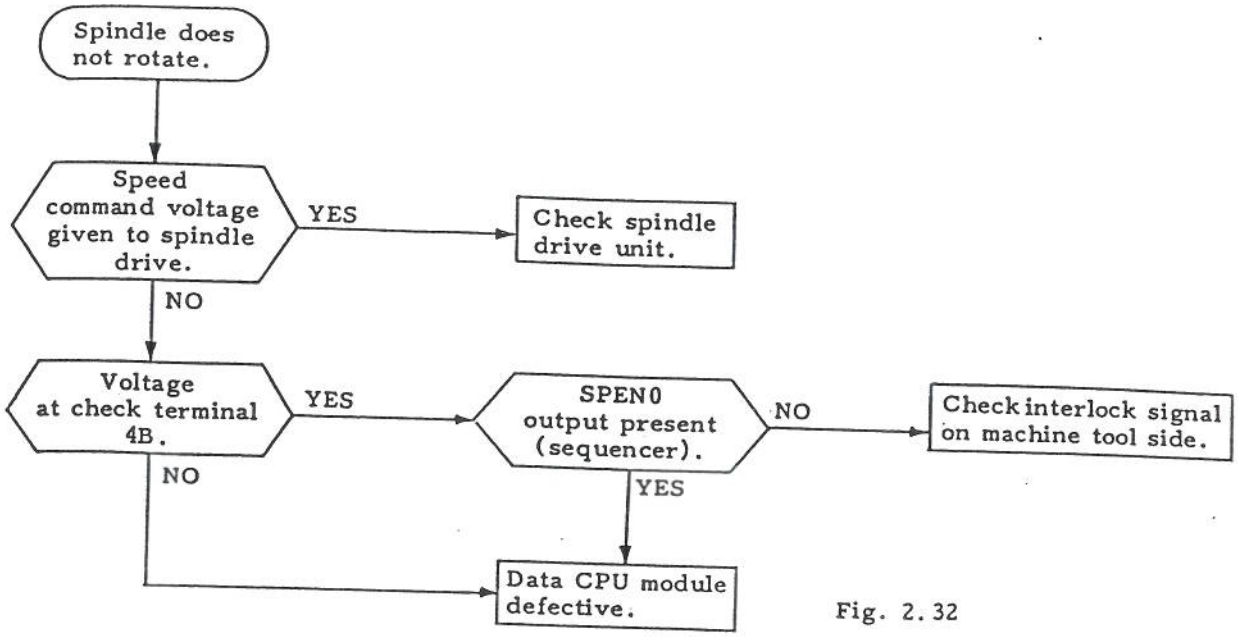


Fig. 2.32

· Connection Diagram for Spindle

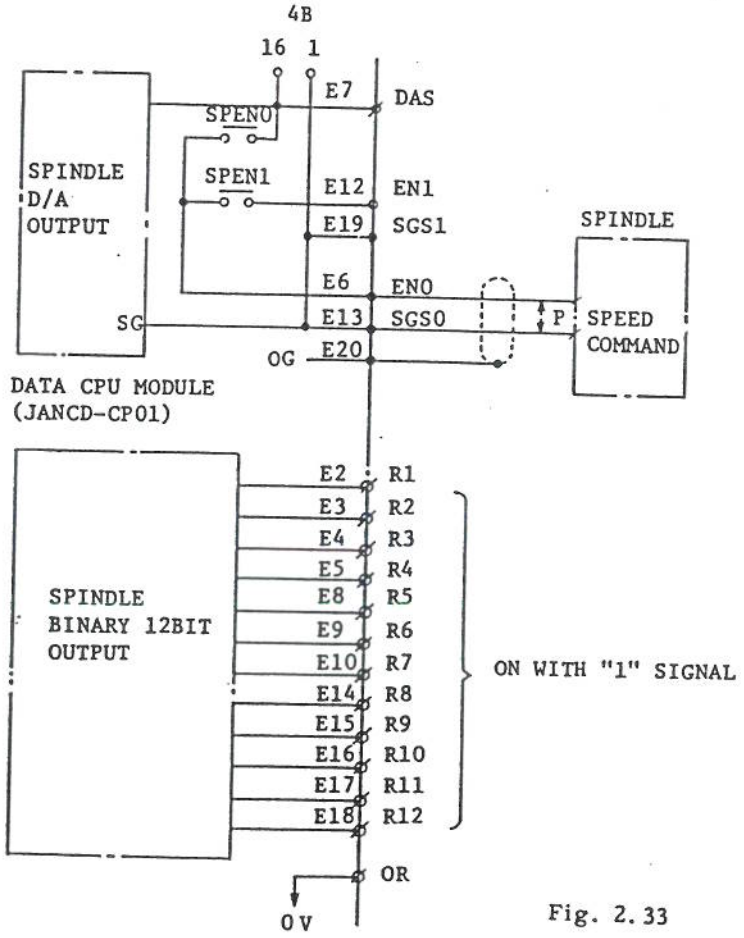


Fig. 2.33

2.3 TROUBLESHOOTING WITHOUT ALARM CODES (Cont'd)

(9) CRT screen display faulty

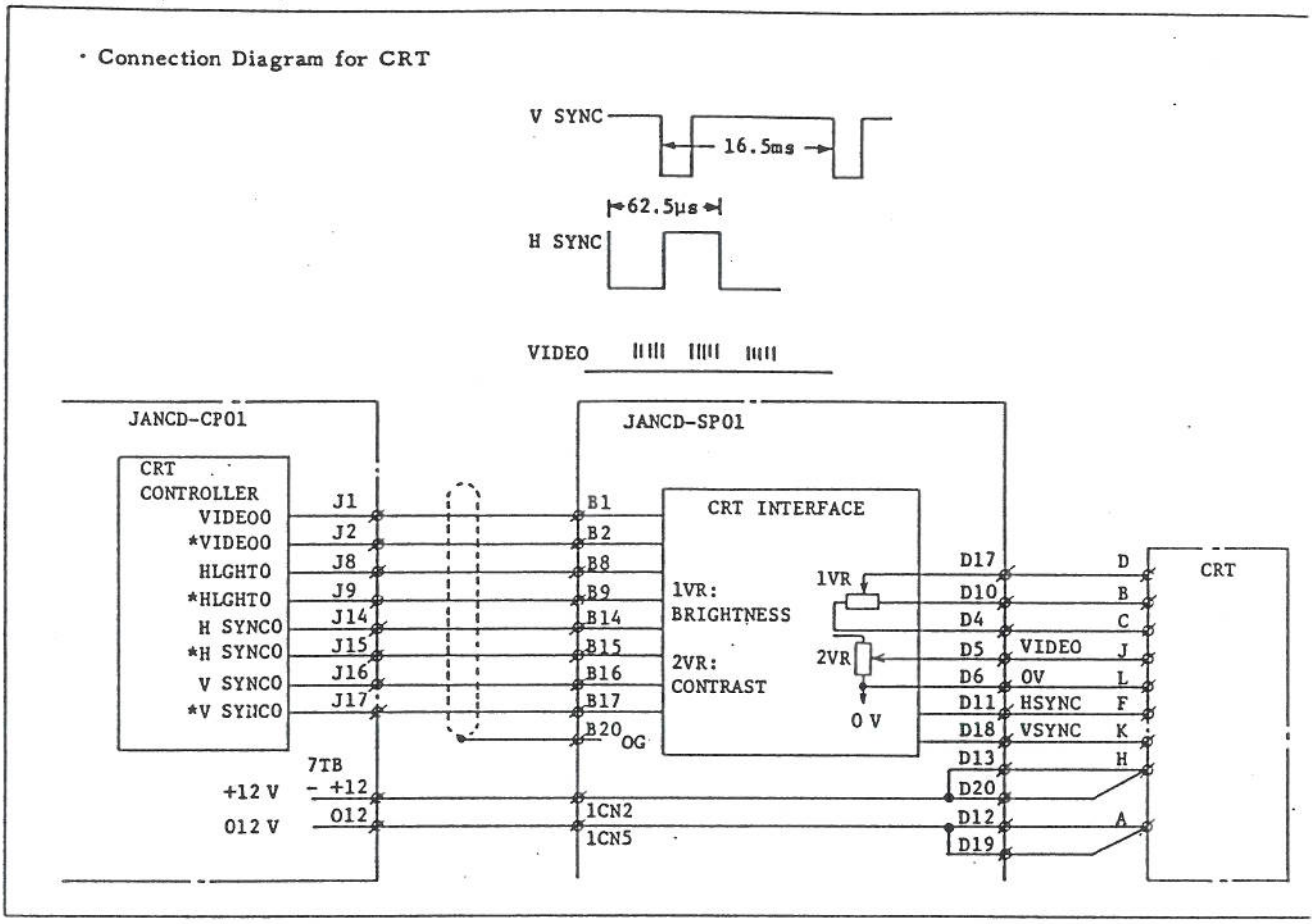


Fig. 2. 34

(1) Description of CRT Signals

H SYNC and VIDEO signals

A. In normal state

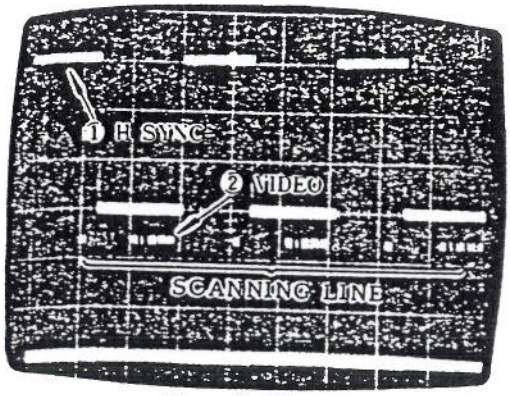


Fig. 2. 35

Use a 2-channel oscilloscope.

In the left-hand figure, 1 represents the H SYNC signal and 2 the VIDEO signal.

- With VIDEO signal 2 , the screen brightness is in proportion to the number of characters. The screen is least bright in the alarm mode, and brightest in PRM and DGN modes.
- Check the signal 1 by measuring the voltage across CRT connectors L and F . Check the signal 2 by measuring L and J .

If synchronization is not obtained, have the H SYNC signal triggered.

B. With no VIDEO signal

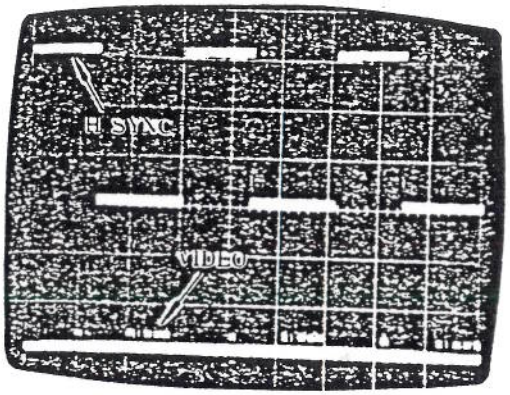


Fig. 2. 36

- The screen appears as shown left when no H SYNC signal comes in.
- Either JANCD-CP01 or JANCD-SP01 is defective. As shown in the left-hand figure, the VIDEO signal drops in level and remains unchanged even if the characters are changed on the screen.

C. With no H SYNC signal

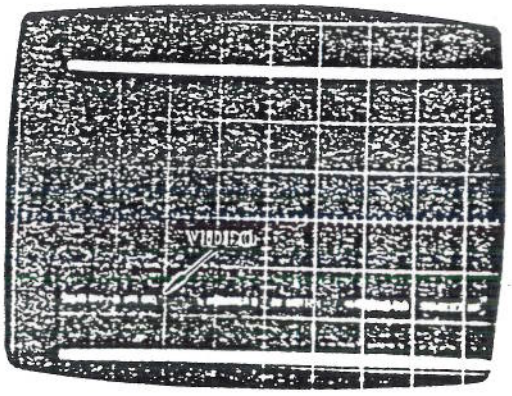


Fig. 2. 37

- The screen appears as shown left when no H SYNC signal comes in.
- The screen disappears, and the mask is not visible even with the Bright Control turned on.

2.3 TROUBLESHOOTING WITHOUT ALARM CODES (Cont'd)

(2) V SYNC and VIDEO signals

A. In normal state

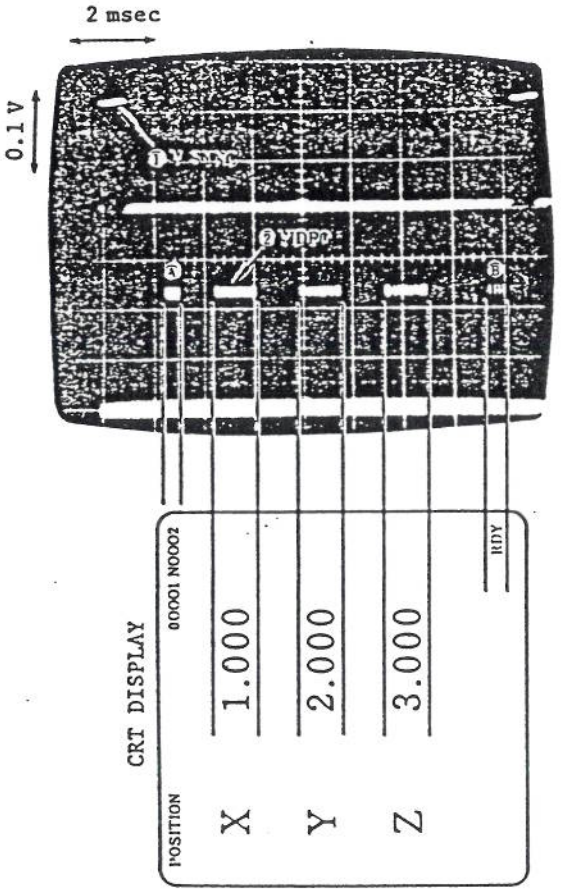


Fig. 2.38

Use a 2-channel oscilloscope.

In the left-hand figure, 1 represents the V SYNC signal (across CRT connectors L and K) and 2 the VIDEO signal (across CRT connectors L and J).

- With the VIDEO signal, the CRT screen appears as bright as viewed crosswise. As shown left, the scanning lines are most dense in the POS mode with PRM and DGN. Only A and B sppear in the ALM mode when corresponding alarm is not detected.

  NOTE: With no synchronization, have the V SYNC signal triggered.

B. With no VIDEO signal

The above VIDEO waveforms disappear, the V SYNC alone remains, and the CRT screen disappears. But the mask is visible by operation of the Bright Control.

C. With no V SYNC signal

The characters on the screen shift vertically. The waveforms are the same as shown in Fig. 2.3.5.

- If the H SYNC, V SYNC and VIDEO signals are normal and the screen fails to appear, the CRT unit is defective.
- If the waveforms of the H SYNC, V SYNC and/or VIDEO signal are abnormal, check or replace JANCD-CP01 or NANCD-SP01.

2.4 SUPPLY VOLTAGE CHECK

2.4.1 CHECK POWER SUPPLY VOLTAGE

1LED: Glows red while power is being applied to the NC unit.

1FU, 2FU: Either of these glass-encased fuses turns off 1LED when blown.

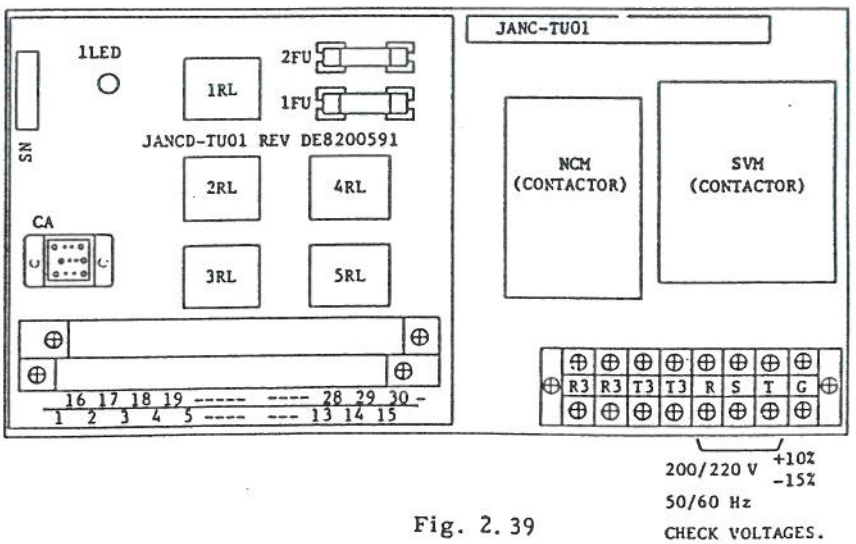


Fig. 2.39

2.4.2 DC POWER SUPPLY VOLTAGE CHECK

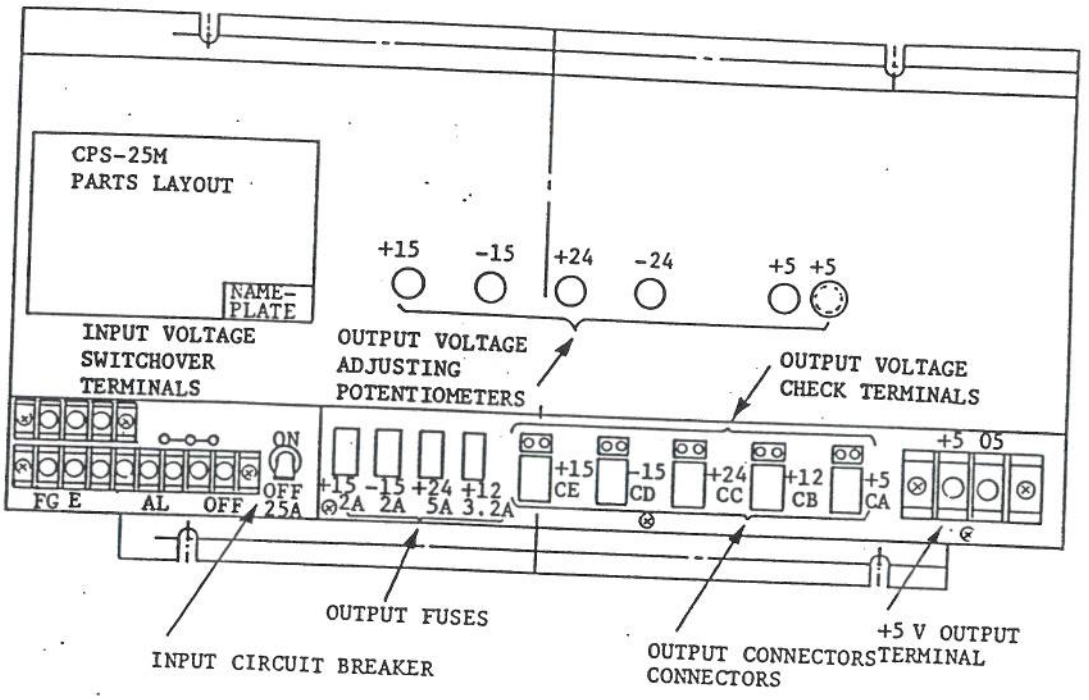


Fig. 2.40

(1) Switchover by input power supply voltage

Switch the input power supply voltage switchover terminal common bars (see Fig. 2.4.2) according to the input power supply voltage.

(2) Specifications of composite power supply unit

Table 2.4

Rated output	Rated current	Allowable voltage range	Applications
+5 V	25 A	5.15 V	Logic circuitry, reed relay
+12 V	2 A	11.88 - 12.12 V	CRT, memory
+24 V	4.2 A	23.76 - 24.24 V	Tape reader, CRT I/O signals
+15 V	1.5 A	14.85 - 15.15 V	Position control circuitry
-15 V	1.5 A	-14.85 - -15.15 V	Position control circuitry

Each output voltage is factory-set and usually requires no further adjustment. But if any output voltages are not in allowable voltage range, adjust to the normal value using voltage adjusting potentiometers.

2.5 STATUS DISPLAY BY ON-LINE DIAGNOSTICS FUNCTION (DCN)

When the I/O section of the NC unit is suspected of failure, diagnostic numbers can be keyed in on the NC control panel to display and check I/O signals for status.

2.5.1 OUTLINE OF DISPLAYS

Diagnostic No.	Display contents
#1000 - #1096	Input signals for machine tool
#1100 - #1157	Output signals to machine tool
#1200 - #1291	Output signals to power sequence (PC)
#1300 - #1350	Input signals from power sequence (PC)

NOTE: With a power sequence (PC) setup built in, signals #1000 to #1157 vary in meaning depending on each power sequence program. Read the machine tool builder's manual.

2.5.2 OPERATING PROCEDURE TO DISPLAY INPUT/OUTPUT SIGNALS

1. Depress the (DGN) key.

   A page containing the diagnostic number specified previously will appear on the CRT screen, with the status of I/O signals displayed in "1," "0" and hexadecimal digits.

2. Key in the diagnostic number to be displayed, and depress the CURSOR ↑ or ↓ key. This will change the screen to the page containing keyed-in number.

"1": contact closed "0": contact open

   The data on each line is displayed in hexadecimal digits in the rightmost positions on the screen.

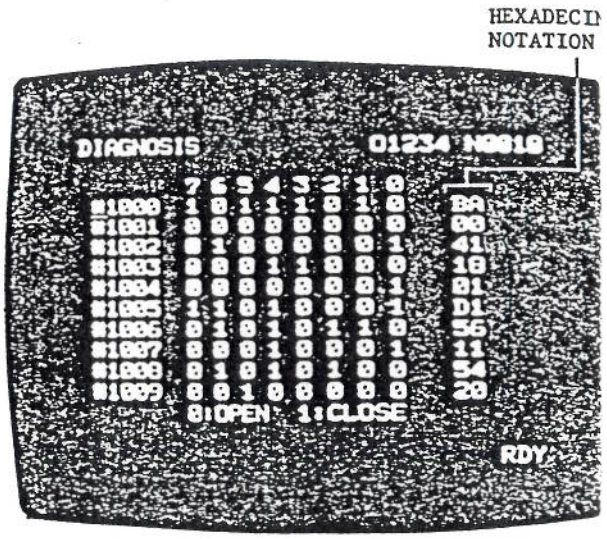


Fig. 2.41 Example of Input/Output Signal Display

3. Press the [CURSOR ↓] key.

   The cursor will move down by 1 line to the next diagnostic number. Keeping this key depressed continuously moves down the cursor. When the cursor reaches the last lower line, the screen switches to the next page.

4. Press the [↑ CURSOR] key.

   The cursor will move up by 1 line to the previous diagnostic number. Keeping this key depressed continuously moves up the cursor. When the cursor reaches top line, the screen switches to the previous page.

5. Depress the [PAGE ↓] key.

   The next page will be displayed.

6. Depress the [↑ PAGE] key.

   The previous page will be displayed.

2.5.3 LIST OF STANDARD INPUT/OUTPUT SIGNALS

Table 2.5.3 shows the list of I/O diagnostic numbers and their corresponding I/O signal names.

DISPLAY

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	1	1	1	1

Contact open — Contact closed

Table 2.5 List of Standard Input Signals

	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
#1300	EDT	MEM	D	T	S	H	J	RT
	EDIT	MEMORY	MDI	TAPE	STEP	HANDLE	MANUAL FEED	RAPID TRAVERSE
#1301	OVC	ROV2	ROV1	OV16	OV8	OV4	OV2	OV1
	OVERRIDE CANCEL	RAPID TRAVERSE RATE OVERRIDE		FEEDRATE OVERRIDE				
#1302	-α	+α	-Z	+Z	-Y	+Y	-X	+X
	JOB PB							
#1303	SPC	SPB	SPA	JV16	JV8	JV4	JV2	JV1
	SPINDLE SPEED OVERRIDE			MANUAL FEEDRATE OVERRIDE				
#1304	DRS	MP4	MP2	MP1	Hα	HZ	HY	HX
	DISPLAY RESET	HANDLE PULSE MULTIPLY			HANDLE AXIS			
#1305	AFL	MLK	OPT	DRN	BDT	DLK		SBK
	M-FUNCTION LOCK	MACHINE LOCK	OPTIONAL STOP	DRY RUN	BLOCK DELETE	DISPLAY LOCK		SINGLE BLOCK
#1306	SRN	F1	RET	TLMI	ZRN	EDTLK	SP	ST
	PROGRAM RESTART	F1-DIGIT	RETRACT	TLMIN	ZERO RETURN	EDIT LOCK	FEED HOLD	CYCLE START
#1307	PINT	ANG	ABS		MI	MIZ	MIY	MIX
	PROGRAM INTER-RUPTION	Z-AXIS LOCK	MANUAL ABSOLUTE		MIRROR IMAGE			
#1308	9BDT	8BDT	7BDT	6BDT	5BDT	4BDT	3BDT	2BDT
	SPECIAL BLOCK DELETE							

Table 2.5 List of Standard Input Signals (Cont'd)

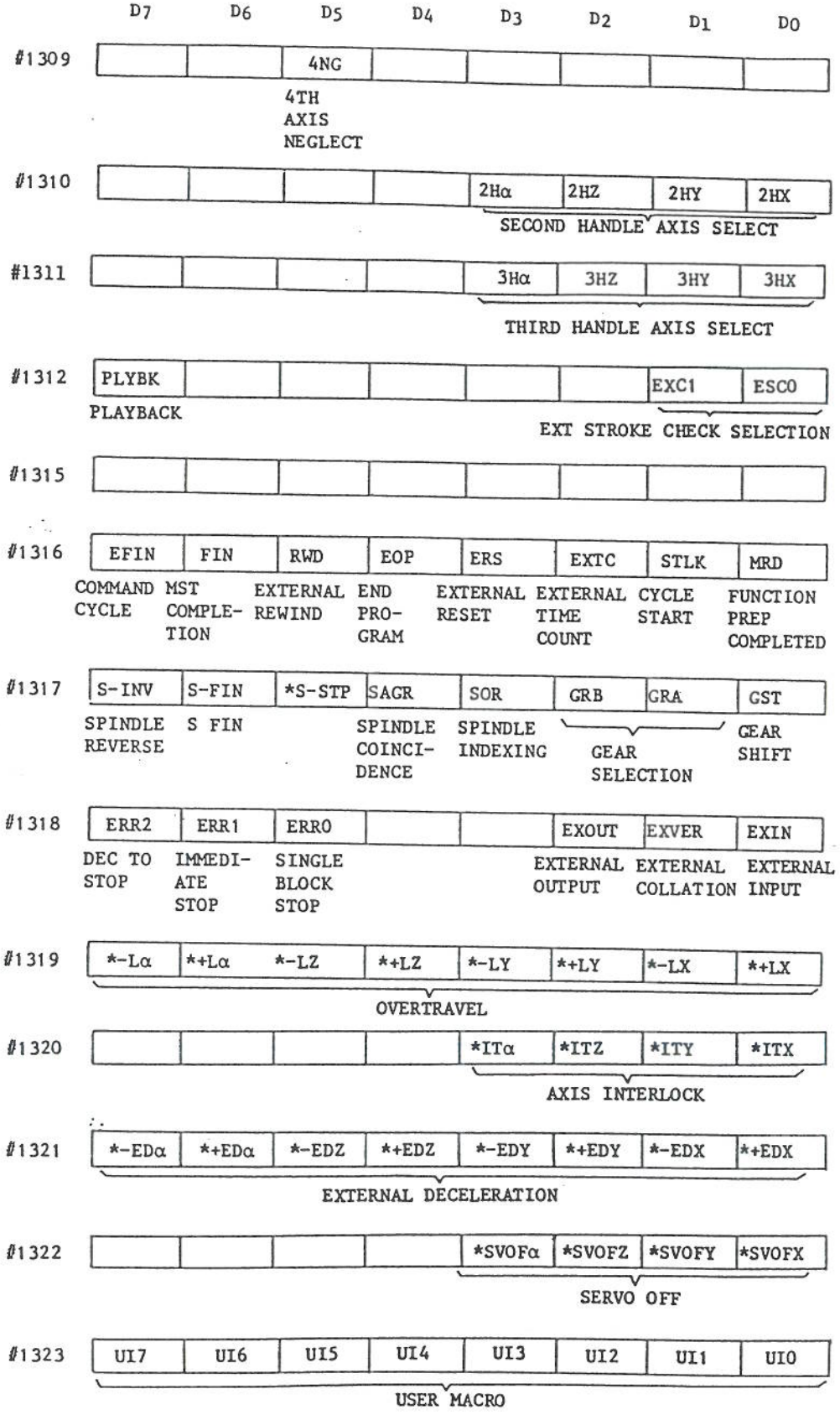


Table 2.5 List of Standard Input Signals (Cont'd)

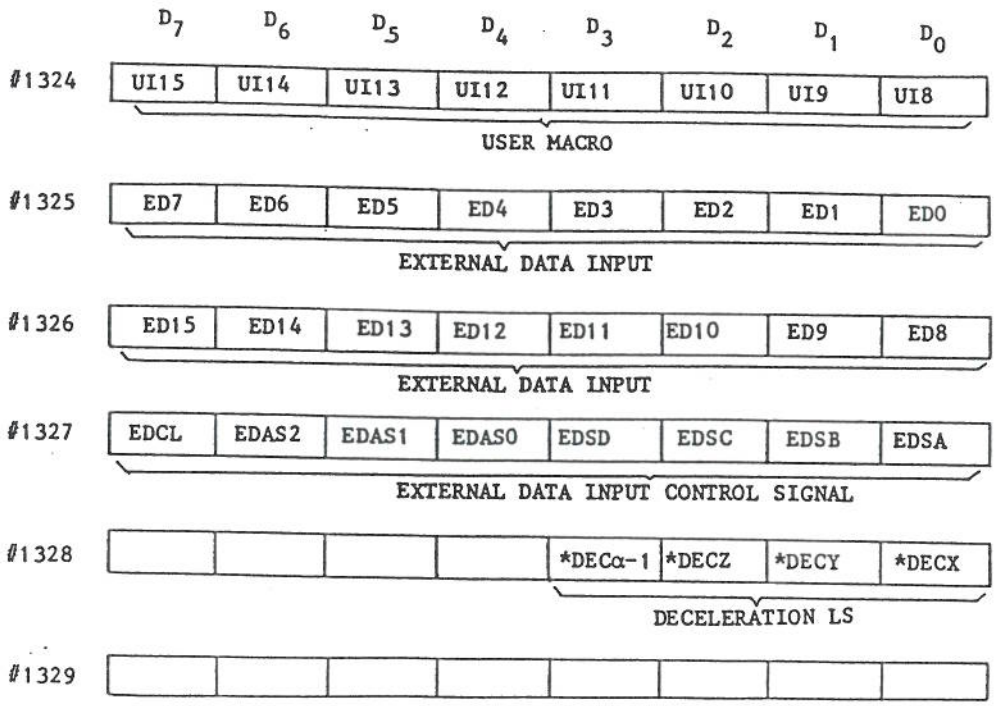


Table 2.5 List of Standard Input Signals (Cont'd)

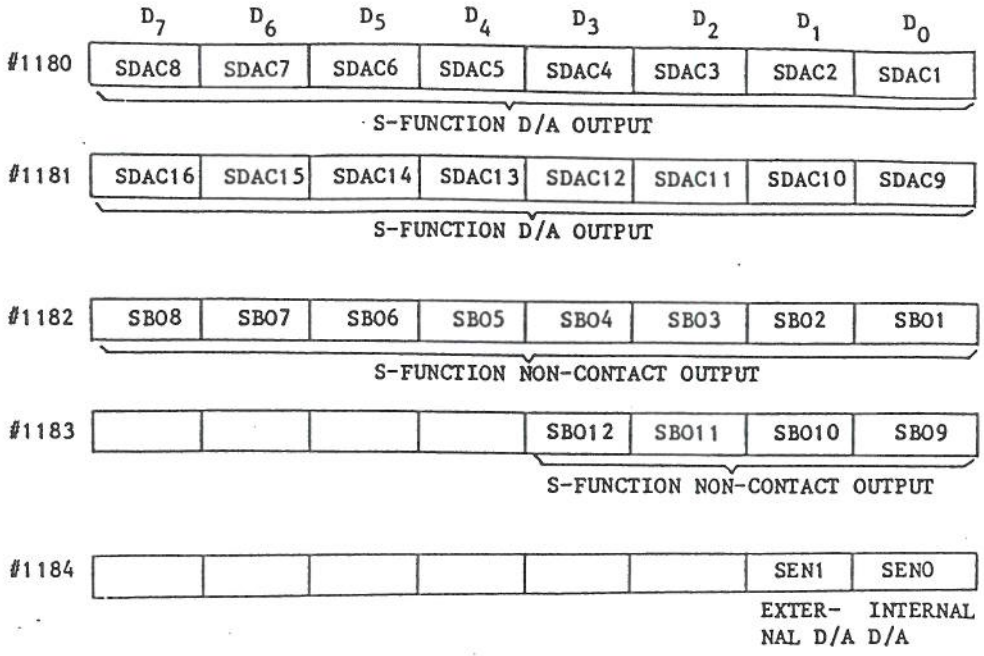


Table 2.6 List of Standard Output Signals

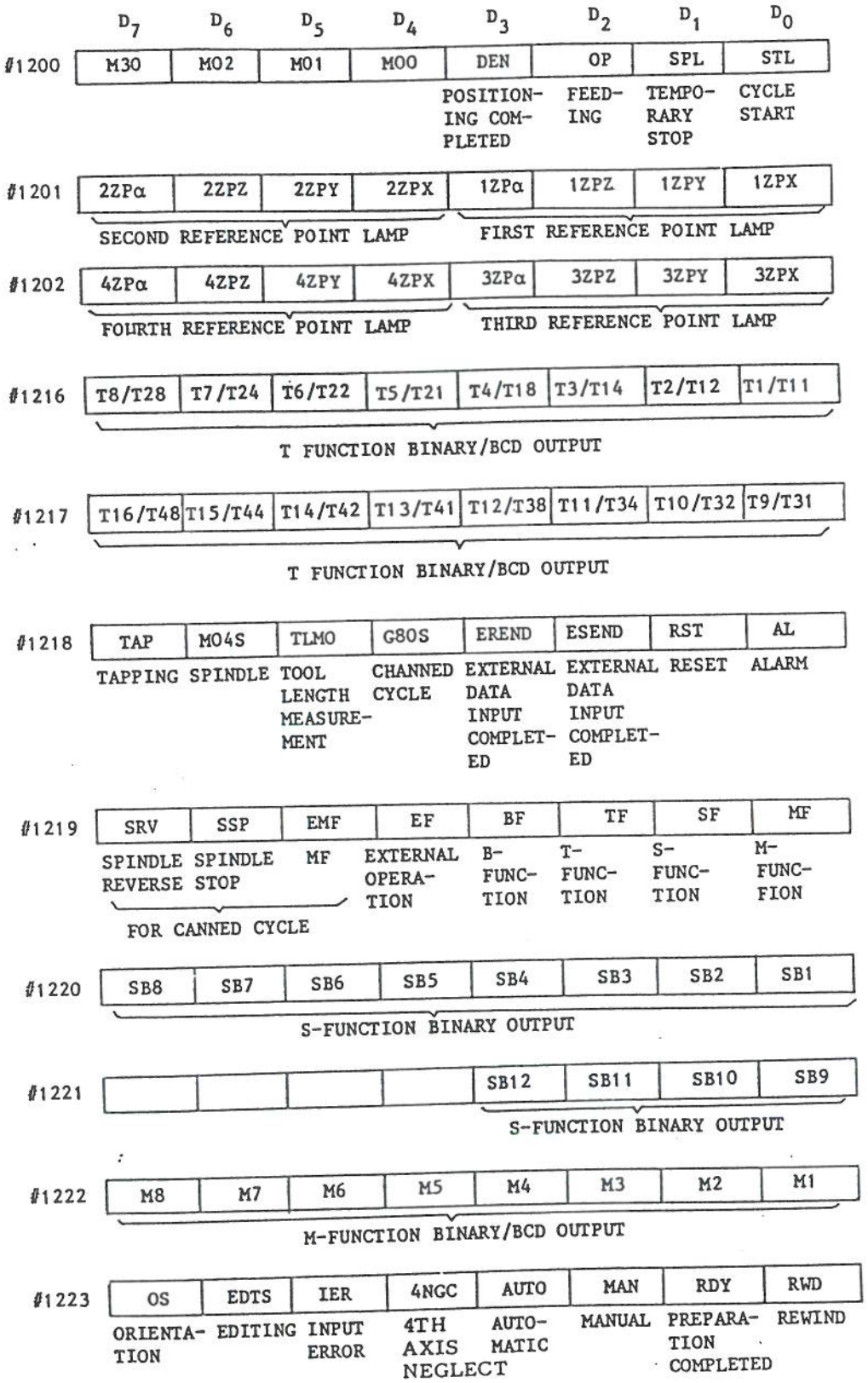


Table 2.6 List of Standard Output Signals (Cont'd)

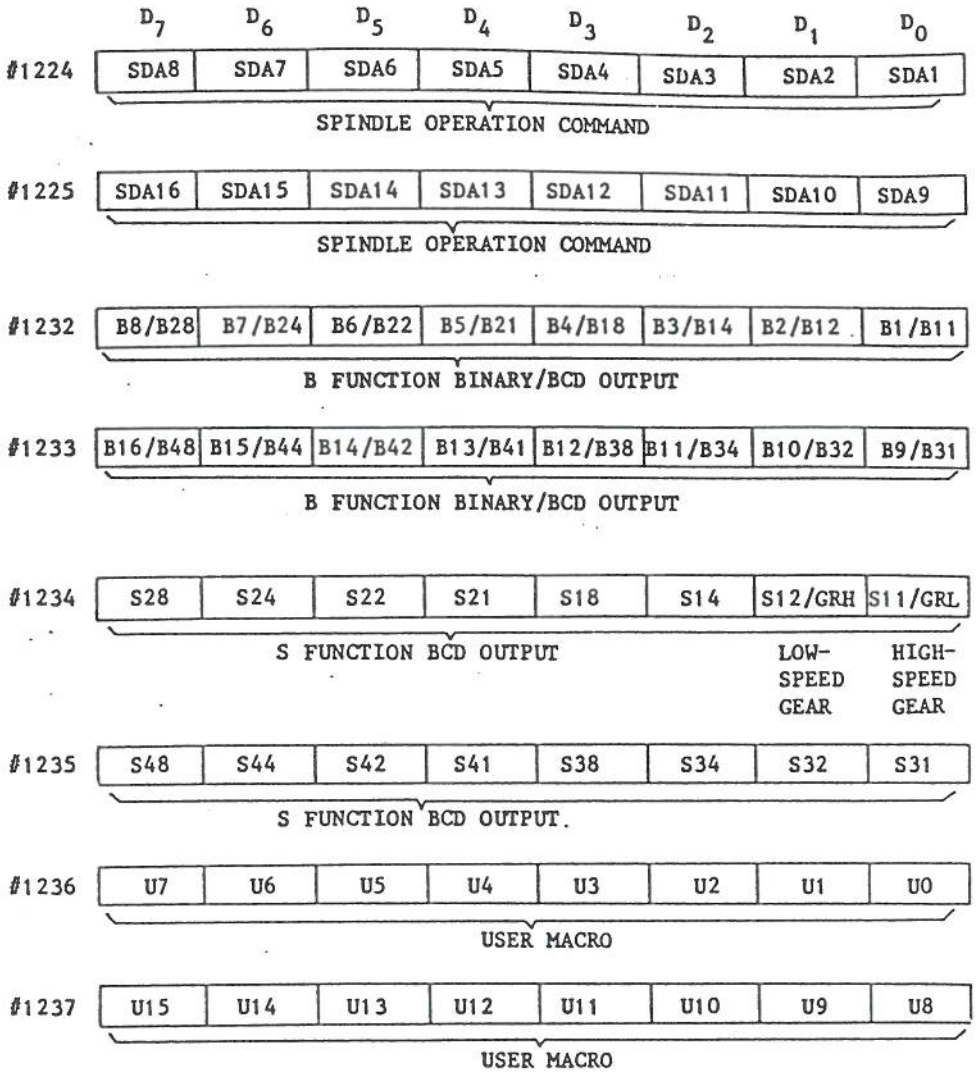


Table 2.6 List of Standard Output Signals (Cont'd)

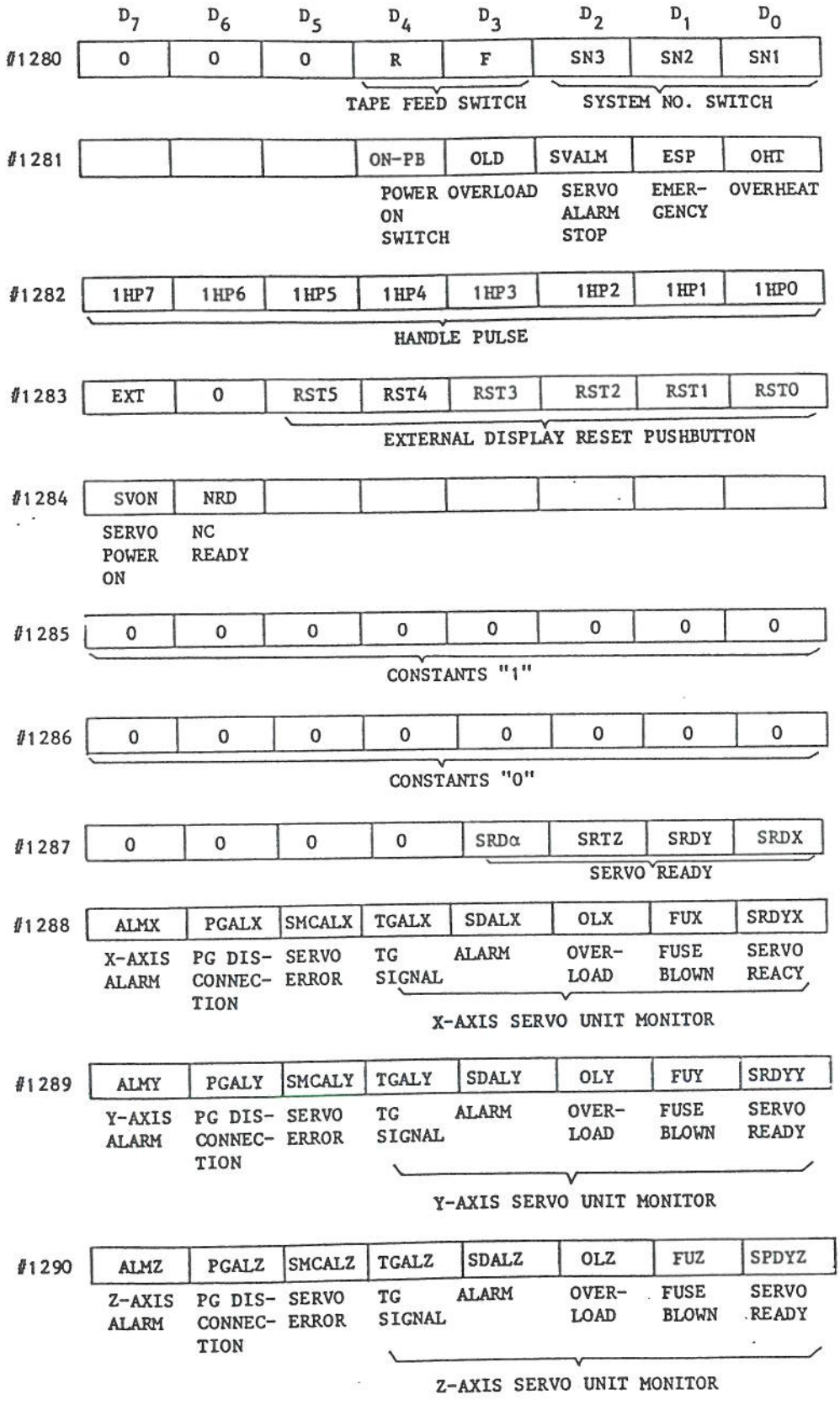
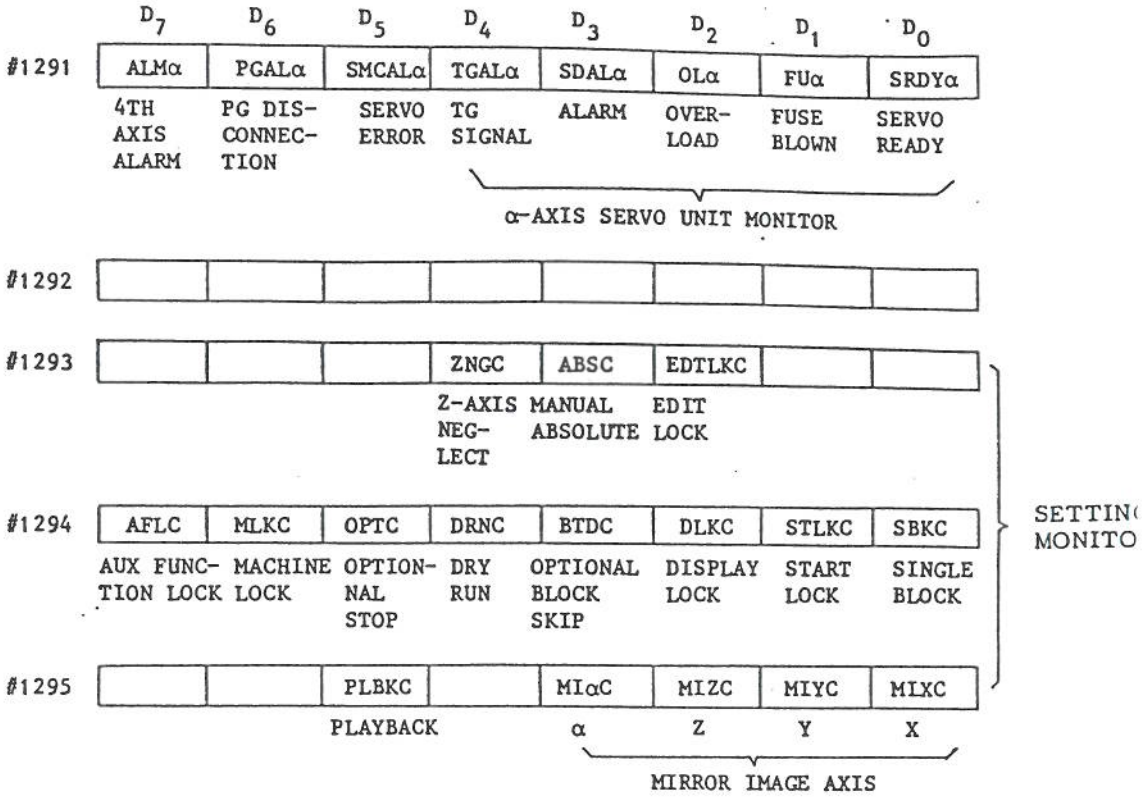


Table 2.6 List of Standard Output Signals (Cont'd)



3. ADJUSTMENTS UPON INSTALLATION

3.1 ADJUSTMENT PROCEDURES

Upon installation, make adjustments in reference to the adjustment procedures given in the table below.

Table 3.1 Adjustment Procedures

No.	Procedure	Remarks
1	Check the interior and exterior of the control cabinet.	
2	Check screw terminals for tightness.	
3	Connect external cables and check.	
4	Connect the power input cable.	
5	Check connector and module locations to be sure of positive connections.	
6	Check settings.	
7	Check the input power supply voltage and frequency.	
8	Check that the composite power supply unit outputs are not short-circuited.	
9	Check the output voltages after a first power application.	
10	Check the I/O signals between the NC unit and the machine tool.	
11	Check parameters and setting data.	
12	Perform a second power application.	
13	Check to be sure the emergency stop functions.	
14	Check movement on each axis by manual feed.	
15	Adjust the servo system.	
16	Check that all NC functions are successfully operable.	

(1) Check the interior and exterior of the control cabinet.

- Check the control panel exterior for contamination and damage.
- Check the module connections inside the cabinet for tightness.
- Check the cables and lead bunch inside the cabinet for damage.

(2) Check screw terminals for loose connections.

- Power input unit terminal block
- Composite power supply unit terminal block (+15 V, 0 V)
- CPU rack terminal block (+5 V, 0 V, +12 V, +24 V, ±15 V)
- Power on/off pushbutton switches on MDI and CRT unit
- Control power transformer terminal block
- Check each terminal block cover, if any, for dislocation.

(3) Connect external cables.

- Check that the cable shield is connected to the ground block through clamp.
- Check that the MDI and CRT unit is equipped with a serial transfer bus terminal connector (JZNC-TN01).
- Check that a protective ground wire is installed between the control unit and the machine tool.
- Check that the protective ground wire is of a one-point ground type.

(4) Connect the power input cable.

Before connecting the power input cable, verify that power input terminals R, S and T inside the control unit are not shorted.

(5) Check connector and module locations and insertions.

- Check that the screws on the module clamps are tightened on the CPU rack.
- Check that the clamp claws on Honda connectors are tightened and that clamp screws are securely in place.
- Check that the clamp claws on power supply connectors are in place.
- Check that the clamp claws on flat cables are in place.

(6) Check settings.

Verify the control power transformer setting in reference to the input power supply voltage (see 3.2).

(7) Check input power supply voltage and frequency.

- Check that the power supply voltage and frequency meet ratings.
- Check that the input power supply capacity is high enough for power consumption of the control unit.

(8) Check that the composite power supply unit outputs are not shirt-circuited. Check for short-circuit between:

- +5 V and 0 V
- +12 V and 0 V
- +24 V and 0 V
- +15 V and 0 V
- -15 V and 0 V

(9) Check the output voltages after a first power application.
Depress the POWER ON pushbutton for first power application.

- Check that the air flow from the cooling air exhaust port is normal.
- Verify the output voltages of the composite power supply unit.

+5 V	5.15 V
+12 V	11.88 - 12.12 V
+24 V	23.76 - 24.24 V
+15 V	14.85 - 15.15 V
-15 V	-14.85 - -15.15 V

The +5 V output can be adjusted with an ADJ potentiometer in the composite power supply unit.

(10) Check the I/O signals between the control unit and the machine tool.
Check the I/O signals according to the list I/O signals (see 2.5 Status Display by Sel Diagnostic Function).

(11) Check parameters and setting data.
Conduct checkups according to the list of parameters (see 3.3 Displaying and Writin Parameters).

(12) Perform a second power application.

Press the POWER-ON pushbutton again for second power application.

- An alarm, if displayed, should be dealt wit according to the list of alarms.
- Check that each axis can be placed under servo clamp.
- Adjust the ZERO ADJ potentiometer on the servo drive unit so that the servo position deviation comes within 0 ±2 pulses in the servo clamp state.

NOTE: Servo deviation pulses can be displayed on the MDI & CRT unit by following the steps given below:

1. Set the system No. switch to "4."
2. Depress the POS key.
3. Depress the [PAGE ↓] or [↑ PAGE] key to select the display (POSITION "ERROR") c a servo position deviation value.
4. After adjustment, set the system No. swit back to "0."

(13) Verify the emergency stop.

With emergency stop activated (e.g., by emergency stop pushbutton, machine end LS check that the second power supply (servo power supply) is turned off and that the ala display "330: EMERGENCY STOP" appears.

(14) Check movement on each axis by manual feed

- Check that the machine tool properly follows up on the movement made by handle or step feed.
- Operate the machine tool by manual jog feed. Activate its OT limit switch intentionally, and check to see that the machine is stopped by detection of an overtravel alarm.
- Check that the machine tool follows in the entire feedrate range in manual jog and rapi feed.

(15) Adjust the servo system.

- Operate the machine tool by F4-digit feed or G00 feed in the MDI mode. Check the servo position deviation on the MDI & CRT unit. With the feedrate and servo position deviation, the position gain Kp is obtained by the formula:

$$Kp = 16.7 \times \frac{F}{E}$$

where, F: feedrate (mm/min)

E: servo position deviation (0.001 mm)

Kp: position gain ($sec.^{-1}$)

Turn the INPUT ADJ potentiometer for servo position deviation adjustment on the servo drive unit so that the position gain comes within ±10% of the target value. The difference between the axes should be 1% or less.

(16) Check that all NC functions are successfully operable.

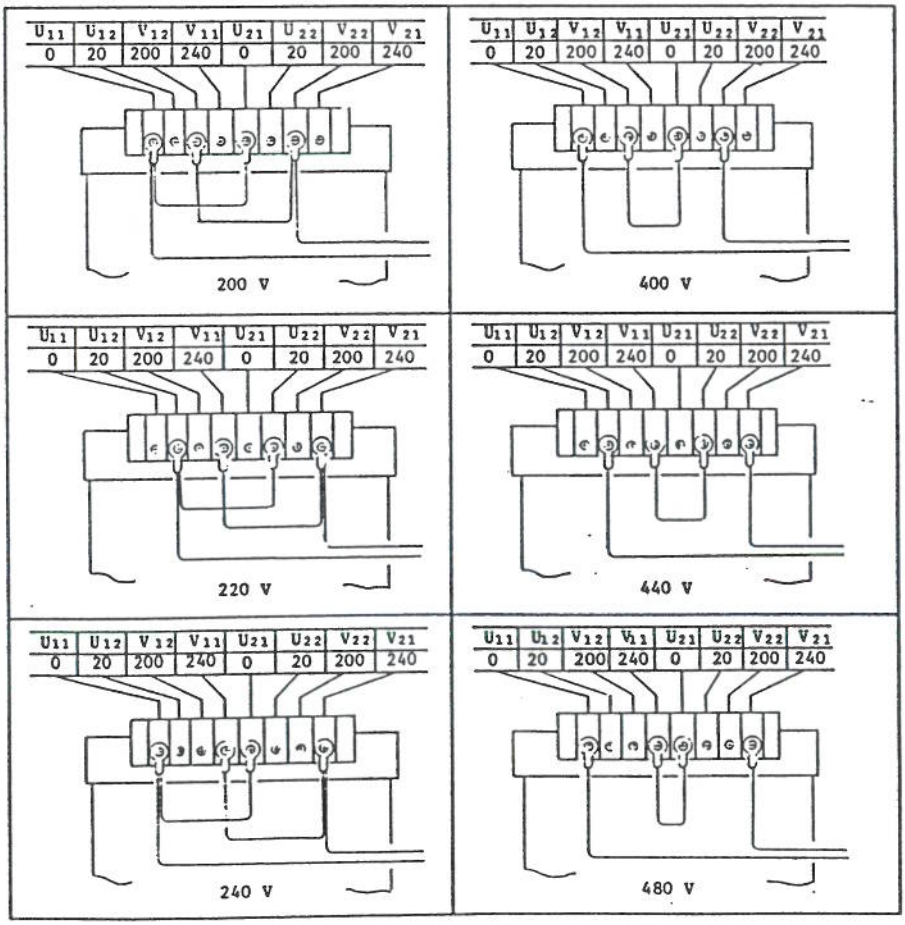
- Check that reference point return is normally performed.
- Run the test tape on each machine for check.

3.2 POWER TRANSFORMER CONNECTIONS

3.2.1 TAP CHANGING ON CONTROL TRANSFORMER (1T)

When a control transformer (1T) is incorporated, check the tap connections on the primary side of the transformer. The supply voltage must be within +10% and -15% of the tap voltage. If this condition is not met, change the tap connection according to the following figures.

Table 3.2 Transformer Tap Connections according to Supply Voltage



3.3 DISPLAYING AND WRITING PARAMETERS

This system has various parameters stored in memory. They determine operating conditions such as tape coding and feedrate. The parameters can always be displayed regardless of the mode even during automatic operation.

3.3.1 PARAMETER TYPES

Parameters are displayed either in binary or in decimal digits.

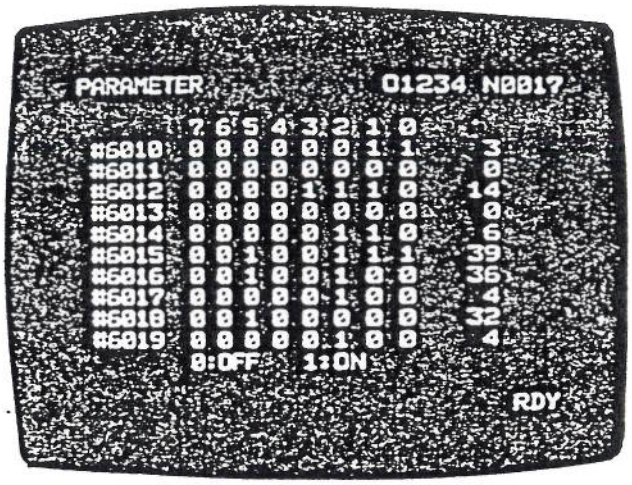


Fig. 3.3.1.1 Typical Parameter Display (in binary digits)

Parameters #6005 to #6045 are displayed in binary digits.

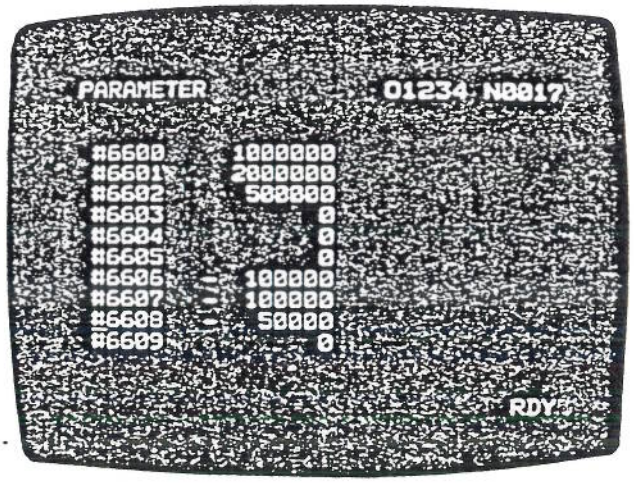


Fig. 3.3.1.2 Typical Parameter Display (in decimal digits)

Parameters #6050 and larger are displayed in decimal digits.

3.3.2 PARAMETER DATA DISPLAY

1. Key in a parameter number and press the [CURSOR ↓] or [↑ CURSOR] key. The symbol "#" need not be typed. Up to ten parameter numbers and their contents can be displayed.
2. The parameter number specification can be updated by operating the [CURSOR ↓] or [↑ CURSOR] key. The screen can be updated by operating the [PAGE ↓] or [↑ PAGE] key.

3.3.3 PARAMETER DATA WRITING

Set the system No. switch to "1."

For display in binary digits

1. Specify a desired parameter number.
2. Depress the INSRT key. The cursor will move from the parameter number to the bit digit display, indicating the bit position of first.
3. Depress the [CURSOR ↓] key. The cursor moves by 1 bit towards the bit position D0 every time this key is pressed. Keeping this key depressed can continuously move the cursor to the desired position.
4. Depress the WR key, and the designated bit data reverses (0 to 1 or 1 to 0). Pressing the key again will reverse the data. Generally, "1" represents the function being on and "0" being off.
5. Only when the cursor is set to the rightmost decimal position decimal data can be keyed in.

Key-in data	7	6	5	4	3	2	1	0	
[0] [WR] →	0	0	0	0	0	0	0	0	0
[2] [5] [5] [WR] →	1	1	1	1	1	1	1	1	255

6. Repeat steps 2. to 5. to write desired parameter data.
   Keeping the [CURSOR ↓] or [↑ CURSOR] key depressed moves the cursor continuously on the screen.

7. With the writing completed, depress the INSRT key in a "sandwitching" manner (INSRT, data, and INSRT in that order).

For display in decimal digits

1. Specify a desired parameter number.
2. Key in the data and depress the WR key. The data will be written to the parameter number indicated by the cursor.
3. The parameter number specification can be updated by operating the [CURSOR ↓], [↑ CURSOR] or [PAGE ↓], [↑ PAGE] key. Check that the writing has normally completed, and set the sytem No. switch back to "0."

3.3.4 TAPE INPUT OF SETTING DATA AND PARAMETER DATA

Although setting data and parameter data are generally inputted through MDI operation, they can also be entered by means of punched paper tape. The two types of data may be inputted from a single tape.

(1) The tape format is as follows:

```
Label   % ;
#6000  X128 ;
#6001  X  5 ;
#6002  X  0 ;
  .     .
  .     .
  .     .
  %     .
```

Notes:
1. "%" is used in the ISO code and "ER" in the EIA code.
2. "N" is used in the EIA code instead of "#."

Fig. 3.3

(2) The input operation procedure is as follows:

A. Select the EDIT mode.

B. Depress the [RESET] key.

C. Depress the [PRM] key.

D. Set the setting/parameter data tape onto the tape reader.

E. Depress the [IN] key. The tape reader will start reading the tape. "IN" blinks on the CRT screen while the data is being read.

F. On completion of reading symbol % (or characters ER), the tape reader comes to a stop and causes the "IN" display to disappear from the CRT screen. This completes the data input.

3.3.5 PUNCHING-OUT OF SETTING DATA AND PARAMETER DATA

The punching out procedure is as follows:

1. Select the EDIT mode.
2. Depress the [RESET] key.
3. Depress the [PRM] key. The setting and parameter data will be continuously punched out.
4. To interrupt the punching operation, depress the [RESET] key.

3.3.6 PARAMETER NUMBERS AND THEIR CONTENTS

#6005	D_7	D_6	D_5	D_4	D_3	D_2	D_1	

D_7 1: Stores the H code for reset, G92 and G28.

0: Sets the H code to H00 for reset, G92 and G28.

D_6 1: Stores the G code in the 01 group for reset.

0: Sets the G code in the 01 group to G00 for reset.

D_5 1: Allows the current value display (universal) to be preset by the coordinate system seeeing command G92.

At this time, the [ORG] key is capable of Zero Setup.

0: Keeps the current value display (universal) from being preset by the coordinate system setting command G92.

At this time, the [ORG] key is incapable of Zero Setup.

D_4, D_3: Status of G codes at power on.

D_4	D_3	Initial status
1	0	Sets the G code in the 08 group to G44 on power application.
0	1	Sets the G code in the 08 group to G43 on power application.
0	0	Sets the G code in the 08 group to G49 on power application.

D_2 1: Sets the G code in the 01 group to G01 on power application.

0: Sets the G code in the 01 group to G00 on power application.

D_1 1: Sets the G code in the 05 group to G95 on power application.

0: Sets the G code in the 05 group to G94 on power application.

D_0 1: Sets the G code in the 05 group to G91 on power application.

0: Sets the G code in the 05 group to G90 on power application.

#6006	D7	D_6	D_5	D_4	D_3	D_2		I

D7, D_6 Signs of S4-digit analog (SDA) output

D7	D_6	Sign	
1	1	Minus	Plus
1	0	Plus	Minus
0	1	Minus	Minus
0	0	Plus	Plus
		SINV signal off	SINV signal on

D5 1: Sets the least input increment to 0.01 (or 0.001 in., 0.01 deg.).

0: Sets the least input increment to 0.00 mm (or 0.0001 in., 0.001 deg.).

D_4 1: Checks to see if the spindle speed mat signal (SAGR) is off upon transition from a rapid traverse block to a cuttir feed block.

0: Provides no check on the spindle spee match signal (SAGR).

D_3 1: Enables the internal toggle switches.

0: Disables the internal toggle switches.

D_2 1: Enables dry run in response to the rapid traverse command.

0: Disables dry run in response to the rapid traverse command.

D_1 1: Causes an alarm ("001-004") upon cycl start when reference point return is not made after power application.

0: Causes no alarm.

NOTE: Set "1" when pitch error compensation or stored stroke limit is provided.

#6007		D6		D4	D3	D2		D0

D6 1: Employs the newly entered tool compensation value in place of the old value.

0: Adds the newly entered tool compensation value to the soterd value to establish another offset.

D4 1: Provides output during rewinding.

0: Provides no output during rewinding.

D3 1: Sets the least increment to 0.0001 in.

0: Sets the least increment to 0.001 mm.

D2 1: Makes the spindle override 100% during tapping.

0: Does not make the spindle override 100% during tapping.

D0 1: Establishes the 2nd prohibited area of the stored stroke limit outside the boundary.

0: Establishes the 2nd prohibited area of the stored stroke limit inside the boundary.

#6008							D1	

D1 1: Does not clear the common variables of #100 through #149.

0: Clears the common variables of #100 through #149.

Note: Some controls are not provided with the parameter #6008.

#6009					D3	D2	D1	D0

D_3, D_2, D_1, D_0

Specify the start direction of backlash compensation on the 4th-, Z-, Y- and X-axes, respectively, upon power application.

1: Minus direction

0: Plus direction

#6010					D3	D2	D1	D0

D_3, D_2, D_1, D_0

Specify the direction of reference point return on the 4th-, Z-, Y- and X-axes, respectively.

1: Minus direction

0: Plus direction

NOTE: The specification is effective for an axis with #6016 at "1."

#6012					D3	D2	D1	D0

D_3, D_2, D_1, D_0

Specify whether or not the plus-direction external deceleration signal is effective on the 4th-, Z-, Y- and X-axes, respectively.

1: Makes the plus-direction external deceleration signal effective.

0: Makes the plus-direction external deceleration signal ineffective.

#6013					D3	D2	D1	D0

D_3, D_2, D_1, D_0

Specify whether or not the minus-direction external deceleration signal is effective on the 4th-, Z-, Y- and X-axes, respectively.

1: Makes the minus direction external deceleration signal effective.

0: Makes the minus direction external deceleration signal ineffective.

#6014					D3	D2	D1	D0

D_3, D_2, D_1, D_0

Specify the direction of the G60 unidirectional approach upper limit on the 4th-, Z-, Y- and X axes, respectively.

1: Minus direction

0: Plus direction

NOTE: The approach upper limit is set with #6062 to #6065.

3.3.6 PARAMETER NUMBERS AND THEIR CONTENTS (Cont'd)

#6026			D_5	D_4	D_3	D_2	D_1	D_0
#6027			D_5	D_4	D_3	D_2	D_1	D_0

#6026, #6027:

D_5 1: Does not allow the control code (DC1 - DC4) to be used on the I/O device.

0: Allows the control code (DC1 - DC4) to be used on the I/O device.

D_4 1: Employs 2 stop bits on the I/O device.

0: Employs 1 stop bit on the I/O device.

$D_3 - D_0$

Baud rate setting

Baud rate	D_3	D_2	D_1	D_0
50	0	0	0	0
100	0	0	0	1
110	0	0	1	0
150	0	0	1	1
200	0	1	0	0
300	0	1	0	1
600	0	1	1	0
1200	0	1	1	1
2400	1	0	0	0
4800	1	0	0	1
9600	1	0	1	0

NOTE: #6026 provides the setting on I/O device 1 (SIO-1) and #6027 on I/O device 2 (SIO-2). For #6028, #6029, see YASNAC MX1 OPERATOR'S MANUAL ADDENDUM section 6.3.

#6030	D_7	D_6		D_4				D_0

D_7 1: Provides an additional axis control module.

0: Does not provide an additional axis control module.

D_6 1: Causes the system to filter the spindle PG reference point signal before reading it.

0: Allows the system to read the spindle PG reference point signal as it is.

D_4 1: Enables the axis interlock function.

0: Disables the axis interlock function.

D_0 1: Enables data output with DIAGNOSE.

0: Disables data output with DIAGNOSE.

#6031						D_2	D_1	D_0

D_2, D_1, D_0

Specify whether or not the direct-in signals IN2, IN1 and IN0 are effective, respectively.

1: Effective with signal "0"

0: Effective with signal "1"

#6032						D_2	D_1	D_0

D_2, D_1, D_0

Specify whether or not the direct-in signals IN2, IN1 and IN0 are effective, respectively.

1: Ineffective

0: Effective

#6050	(X-axis)
#6051	(Y-axis)
#6052	(Z-axis)
#6053	(4th-axis)

#6050 to #6053:

Specify the backlash compensation, respectively, on the X-, Y-, Z- and 4th-axes (setting range: 0-255; "1" = least output increment).

#6056	(X-axis)
#6057	(Y-axis)
#6058	(Z-axis)
#6059	(4th-axis)

5056 to #6059:

pecify the position error offset, respec-
vely, on the X-, Y-, Z- and 4th-axes
setting range: 0 - 255; "1" = least output
ıcrement). The standard setting is 32.

#6068	(X-axis)
#6069	(Y-axis)
#6070	(Z-axis)
#6071	(4th-axis)

#6068 to 6071:

Output in pitch error offset pulses the pitch error compensation times each magnification specification, respectively, for the X-, Y-, Z- and 4th axes. The setting range is 1 to 3, and "1" represents a magnification of 1.

#6062	(X-axis)
#6063	(Y-axis)
#6064	(Z-axis)
#6065	(4th-axis)

#6062 to #6065:

ɔecify the overtravel, respectively, on the
-, Y-, Z- and 4th-axes in unidirectional
ɔproach (G60; setting range: 0 - 255;
:" = least input increment).

#6074	(X-axis)
#6075	(Y-axis)
#6076	(Z-axis)
#6077	(4th-axis)

#6074 to #6077:

Causes an alarm "34*" when a position deviation exceeding the critical servo error value is detected respectively, on the X-, Y-, Z- and 4th axes.

3.3.6 PARAMETER NUMBERS AND THEIR CONTENTS (Cont'd)

Setting formula: $n = 16 \times \frac{c}{b}$

Standard setting: 16 (b = c)

b: D/A saturation value (pulse count) set in #6080 - #6083

c: Critical servo error value (pulse count)

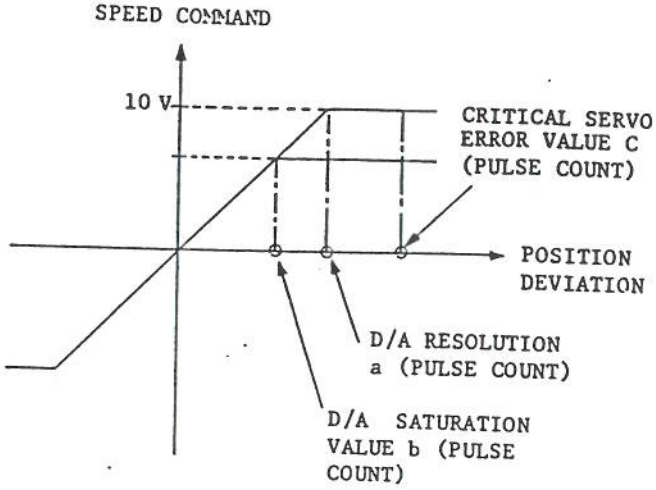


Fig. 3.3.6.1

#6080	(X-axis)
#6081	(Y-axis)
#6082	(Z-axis)
#6083	(4th-axis)

#6080 to #6083:

Specify the D/A saturation value, respectively, for the X-, Y-, Z- and 4th axes.

Setting formula: $2^{(7+n)} = b$

b: D/A saturation value (pulse count)

NOTE: "n" is set.

Standard setting: 6 (b = 8192 pulses)

NOTE: Make the setting so that b = a.

a: D/A resolution (pulse count)

#6086	(X-axis)
#6087	(Y-axis)
#6088	(Z-axis)
#6089	(4th-axis)

#6086 to #6089:

Specify the PG pulse magnification and D/A resolution, respectively, for the X-, Y-, Z- and 4th-axes.
Setting formula: n1 + n2

(1) PG pulse magnification value n1

PG pulse magnification	n1
x 1	64
x 2	80
x 4	112
x 8	48

(2) D/A resolution value n2

D/A resolution a (pulse count)	n2
32768 pulses	14
16384 pulses	13
8192 pulses	12
4096 pulses	11

Standard value: n2 = 12

#6092	

Specifies the exponential function acceleration/deceleration time constant for cutting feed (common to all axes).

The setting formula is: "n" = $\frac{t}{4} - 1$

where, t: time constant(ms), specifiable in units of 4 ms

#6093	

Specifies the exponential function acceleration/deceleration speed bias for cutting feed (common to all axes).

Setting: "1" = 2 kpps.

#6094	(X-axis)
#6095	(Y-axis)
#6096	(Z-axis)
#6097	(4th-axis)

#6094 to #6097:

Specify the reference point return method, respectively, for the X-, Y-, Z- and 4th-axes.

"0" of NZ signal enabled		○	
NZ signal employed		○	○
Reference point pulse used	○		
Parameter setting	64	48	32

Standard setting: 64

#6106	

Specifies the "rapid traverse section" for a "returning semicircle" by the proportionate semicircle radius in circle cutting (G12, G13).

Setting range: 0 - 10 (x 10%)

Examples:

1. A setting of 0 creates a rapid traverse section automatically computed by the program command values.
2. A setting of 10 (= 100%) makes the entire "returning semicircle" into a "rapid traverse section."

#6107	

Specifies the number of manual pulse generators.

Setting range: 1 - 3

#6120	G-1
#6121	G-2
#6122	G-3
#6123	G-4
#6124	G-5
#6125	G-6
#6126	G-7
#6127	G-8
#6128	G-9
#6129	G-10

#6120 to #6129:

Specify up to 10 G codes for calling user macros.

#6130	M-1
#6131	M-2
#6132	M-3
#6133	M-4

#6130 to #6133:
Specify up to 4 M codes for calling user macros.

Setting range: 03 - 29, 31 - 89

NOTE: M00, M01, M02, M30 and M90 - M99 cannot be called by user macros.

#6134	

1: Allows the T code to call a user macro.

0: Does not allow the T code to call a user macro.

#6141	
#6142	
#6143	
#6144	
#6145	
#6146	
#6147	
#6148	
#6149	

#6141 to #6149:
Specify the feedrate change for one increment on a manual pulse generator, for F1 to F9, respectively, of F1-digit designation.

Setting: "1" = 0.1 mm/min.

#6220	

Specifies the interval from the time, M, S, T and B codes are transmitted until the time MF, SF, TF and BF are transmitted.

Setting: "1" = 1 ms

#6221	

Specifies the interval from gear output (GRH, GRL) unit SF transmission when an S5-digit designation is added.

Setting: "1" = 1 ms

#6222	

Specify the maximum handle feedrate, which is common to the linear axes (X, Y, Z, U, V, W).

Setting: "1" = 7.5 mm/min.

NOTE: The settings for the rotary axes (A, B, C) are made with #6348.

#6223	

Specifies the tool shift speed for canned cycles of G76 and G77.

Setting: "1" = 1 mm/min.

NOTE: This specification is effective when $\#6019D_0 = 1$.
If $\#6019D_0 = 0$, rapid traverse is is effective regardless of this parameter specification.

#6224	

Specifies the delay time for checking the spindle speed reaching signal (SAGR).

Setting: "1" = 1 ms

#6225

Specifies the feedrate for the rapid traverse section in circle cutting (G12, G13).

Setting: "1" = 1 mm/min.

#6226

#6227

#6226, #6227

Specify the maximum feedrate for F1-digit designation.

Setting: "1" = 1 mm/min.

NOTE: The maximum feedrate for F1-F4 commands is set in #6226 and that for F5-F9 commands in #6227. Any feedrates increased on manual pulse generators are bunched into these settings.

#6228

Specifies the maximum cutting feedrate for the linear axes (X, Y, Z, U, V, W).

Setting: "1" = 1 mm/min.

#6229

Specifies the maximum cutting feedrate for the rotary axes (A, B, C).

Setting: "1" = 1 mm/min.

NOTE: Any cutting feedrates greater than those set in #6228 and #6229 are bunched into those settings.

#6230

When a circular path is drawn in tool radius compensation outside a corner approaching 180°, the movement follows on a very small circular arc. In this, arc movement is considered to affect the workpiece surface machining, this parameter is used to set the critical arc value.

Setting: "1" = 0.001 mm (metric system)
"1" = 0.0001 in. (inch system)

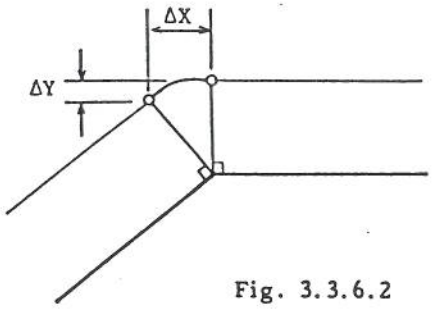


Fig. 3.3.6.2

The corner arc setting is ignored when:

$\Delta X \leq$ #6230

$\Delta Y \leq$ #6230

Standard setting = 5

#6231

Specifies the F_0 speed for rapid traverse override.

Setting: "1" = 7.5 mm/min.

#6232

Specifies the feedrate in the skip function (G31).

Setting: "1" = 1 mm/min.

NOTE: This setting is effective when parameter #6019D_4 = 1.

#6233

⋮

#6264

#6233 to #6264

Specify the feedrate for the respective positions on the jog feedrate select switch.

Setting: "1" = 1 mm/min.

Typical settings

Typical Settings

mm/min

Switch position	Parameter		Continuous manual feedrate	
	Number	Setting	#6250 = 0	#6265 = 10
0	#6233	0	0	0
1	#6234	1	1	0.1
2	#6235	2	2	0.2
3	#6236	4	4	0.4
4	#6237	6	6	0.6
5	#6238	8	8	0.8
6	#6239	10	10	1.0
7	#6240	12	12	1.2
8	#6241	15	15	1.5
9	#6242	20	20	2.0
10	#6243	25	25	25
11	#6244	30	30	30
12	#6245	40	40	40
13	#6246	50	50	50
14	#6247	60	60	60
15	#6248	80	80	80
16	#6249	100	100	100
17	#6250	120	120	120
18	#6251	150	150	150
19	#6252	200	200	200
20	#6253	250	250	250
21	#6254	300	300	300
22	#6255	400	400	400
23	#6256	500	500	500
24	#6257	600	600	600
25	#6258	800	800	800
26	#6259	1000	1000	1000
27	#6260	1200	1200	1200
28	#6261	1500	1500	1500
29	#6262	2000	2000	2000
30	#6263	2500	2500	2500
31	#6264	3000	3000	3000

#6265

The manual feedrates set in parameters #6233 to #6264 can each be reduced to a tenth of the original setting. This applies to the settings on all switch positions lower than the value specified in this parameter #6265.

Setting: 0 - 31 (switch position)

#6266

#6267

#6268

#6269

#6266 to #6269:

Specify the spindle speed upper limit, respectively, for gears 1, 2, 3 and 4 (specifiable only in S5-digit designation).

Setting: 0 - 9999 (rpm)

#6270

Specifies the speed command output value to the spindle motor when a gear shift (GR0) input is entered (specifiable only in S5-digit designation). The setting formula is:

$$\frac{\text{Gear shift spindle motor speed}}{\text{Maximum speed of spindle motor (command = 10 V)}} \times 32767$$

Setting range: 0 - 32767

#6271	
#6272	
#6273	
#6274	

#6271 to #6274:

Specify the maximum speed of the spindle, respectively, for gears 1, 2, 3 and 4 each selected by an input signal (specifiable in S5-digit designation). Set the spindle speed applicable when the speed command voltage is 10 V.

Setting range: 0 - 99999 (rpm)

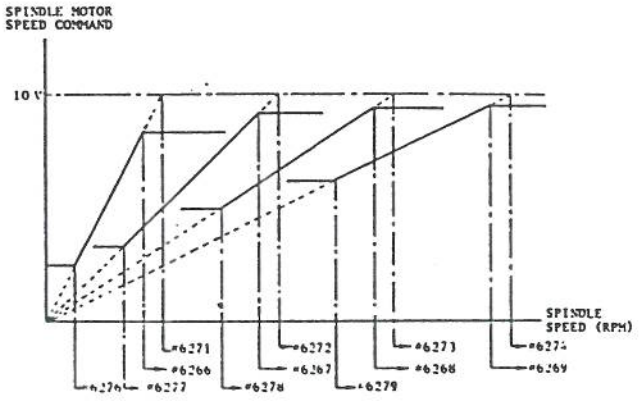


Fig. 3.3.6.3

#6275	

Specifies the spindle motor speed in effect when a spindle orientation (SOR) input is entered (specifiable in S5-digit designation).

Setting range: 0 - 99999 (rpm)

#6276	
#6277	
#6278	
#6279	

#6276 to #6279:

Specify the minimum speed of the spindle, respectively, for gears 1, 2, 3 and 4 each selected by an input signal (specifiable in S5-digit designation).

Setting range: 0 - 99999 (rpm)

#6280	(X-axis)
#6281	(Y-axis)
#6282	(Z-axis)
#6283	(4th-axis)

#6280 to #6283

Specify the rapid traverse rate, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 7.5 mm/min.

#6286	(X-axis)
#6287	(Y-axis)
#6288	(Z-axis)
#6289	(4th-axis)

#6286 to #6289:

Specify the first-stage time constant in linear acceleration/deceleration, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 125/8 (mm/sec^2)

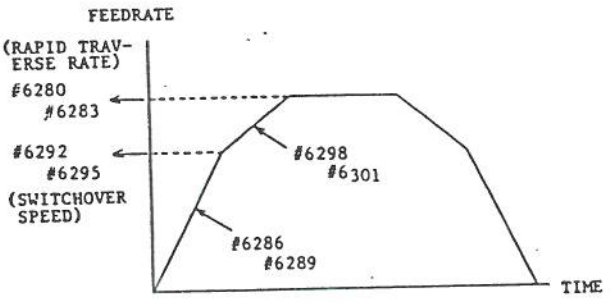


Fig. 3.3.6.4

#6292	(X-axis)
#6293	(Y-axis)
#6294	(Z-axis)
#6295	(4th-axis)

#6292 to #6295:

Specify the second-stage time constant switchover speed in linear acceleration/deceleration, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 7.5 mm/min.

#6298	(X-axis)
#6299	(Y-axis)
#6300	(Z-axis)
#6301	(4th-axis)

#6298 to #6301:

Specify the second-stage time constant in linear acceleration/deceleration, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 125/8 (mm/sec^2)

#6304	(X-axis)
#6305	(Y-axis)
#6306	(Z-axis)
#6307	(4th-axis)

#6304 to #6307:

Specify the traverse distance for reference point return, respectively, on the X-; Y-, Z- and 4th-axes.

Setting: "1" = 0.001 mm

#6310	(X-axis)
#6311	(Y-axis)
#6312	(Z-axis)
#6313	(4th-axis)

#6310 to #6313:

Specify the approach speed 1 for reference point return, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 7.5 mm/min.

#6316	(X-axis)
#6317	(Y-axis)
#6318	(Z-axis)
#6319	(4th-axis)

#6316 to #6319:

Specify the approach speed 2 for reference point return, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 7.5 mm/min.

NOTE: The parameters associated with reference point return operations are as follows:

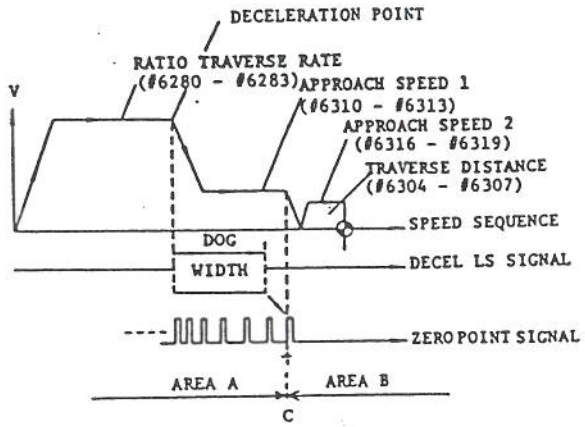


Fig. 3.3.6.5

- Reference point return direction: #6010 D_0 - D_3
- Reference point return enabled/disabled: #6016 D_6 - D_3

#6322	(X-axis)
#6323	(Y-axis)
#6324	(Z-axis)
#6325	(4th-axis)

#6322 to #6325:

Specify the number of the start point for pitch error compensation, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: 0 - 511

#6328	(X-axis)
#6329	(Y-axis)
#6330	(Z-axis)
#6331	(4th-axis)

#6328 to #6331:

Specify the number of the start point for pitch error compensation, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: 0 - 511

#6334	
#6335	
#6336	
#6337	

#6334 to #6337:

Specify the reference point for pitch error compensation, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: 0 - 511

#6340	

Specifies the external deceleration speed for rapid traverse.

Setting: "1" = 7.5 mm/min. (common to all axes)

#6341	

Specifies the external deceleration speed for cutting feed.

Setting: "1" = 1 mm/min. (common to all axes)

#6342	(X-axis)
#6343	(Y-axis)
#6344	(Z-axis)
#6345	(4th-axis)

#6342 to #6345:

Specify the offset in external workpiece coordinate system shift, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: 1 = 0.001 mm

NOTE: Usually, these parameters are automatically set from the machine tool side through the external data input function.

#6348	

Specifies the maximum speed for handle feed on the rotary axes (A, B, C).

Setting: "1" = 7.5 mm/min.

#6600	(X-axis)
#6601	(Y-axis)
#6602	(Z-axis)
#6603	(4th-axis)

#6600 to #6603:

Specify the plus direction boundary value for stored stroke limit 1, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 0.001 mm

#6606	(X-axis)
#6607	(Y-axis)
#6608	(Z-axis)
#6609	(4th-axis)

#6606 to #6609:

Specify the minus direction boundary value for stored stroke limit 1, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 0.001 mm

#6612	(X-axis)
#6613	(Y-axis)
#6614	(Z-axis)
#6615	(4th-axis)

#6612 to #6615:

Specify the distance between the first and the second reference point, respectively, on the X-, Y-, Z- and 4th-axes.

#6618	(X-axis)
#6619	(Y-axis)
#6620	(Z-axis)
#6621	(4th-axis)

#6618 to #6621:

Specify the distance between the first and the third reference point, respectively, on the X-, Y-, Z- and 4th-axes.

#6624	
#6625	
#6626	
#6627	

#6624 to #6627

Specify the distance between the first and the fourth reference point, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 0.001 mm

#6630	(X-axis)
#6631	(Y-axis)
#6632	(Z-axis)
#6633	(4th-axis)

#6630 to #6633

Specify the value for automatic coordinate system setting at the time of inch input, respectively, on the X-, Y-, Z-, and 4th-axes. A desired value should be set in inches for the distance between the first reference point and the reference point of the coordinate system to be established.

Setting: "1" = 0.0001 in.

#6636	(X-axis)
#6637	(Y-axis)
#6638	(Z-axis)
#6639	(4th-axis)

#6636 to #6639

Specify the value for automatic coordinate system setting at the time of metric input, respectively, on the X-, Y-, Z- and 4th-axes. A desired value should be set in millimeters for the distance between the first reference point and the reference point of the coordinate system to be established.

Setting: "1" = 0.001 mm

NOTE: Each setting is effective only for an axis with parameter #6015 at "1."

#6642	(X-axis)
#6643	(Y-axis)
#6644	(Z-axis)
#6645	(4th-axis)

#6642 to #6645

Specify the compensation interval in pitch error compensation, respectively, on the X-, Y-, Z- and 4th-axes.

Setting: "1" = 0.001 mm (metric output)
"1" = 0.0001 in. (inch output)

#8000	(number 0)
⋮	
#8511	(number 511)

#8000 to #8511

Specify the respective values of pitch error compensation.

Setting: 0 - ±15 (output increment)

NOTE: Parameters #6322 to #6339 determine specific combinations of settings and axes.

APPENDIX STORED LEADSCREW ERROR COMPENSATION

This function automatically compensates for leadscrew error on each axis according to the compensation data set by parameter and is effective after completion of reference point return. The compensation data are made on the distances between the reference point on each axis and specified points.

Compensation axes: X, Y, Z and 4th axes (including rotary axis)

No. of correction points: 512 Max.

Compensation base point: Reference point

Compensation interval: 6000 Pulses or more

Data setting system: Absolute/incremental (Set by Parameter #6039$_{D2}$)

Compensation value:

Minimum compensation unit: 1 pulse (least output increment)
Compensation multiplication: X3 max.
One-time-compensation value: 15 pulses max.
(Compensation multiplication)

Note 1:

Regardless of absolute/incremental setting, the difference between neighboring compensation values should be (15 pulses x compensation multiplication) and below.

Note 2:

Maximum set value in case of absolute setting is ±127 pulses. Compensation multiplication is take on this value.

Note 3:

No. of correction points on each axis can be arbitrary as far as the total compensation points are within 512.

Note 4:

Where the 4th axis is a rotary axis, operation is possible within ±200 revolutions maximum.

	Axis	Parameter #	Functions.
Compensation interval	X to α	#6642 to #6645	6000 OR MORE "1" = 1 pulse
Absolute/incremental setting switchable		#6039$_{D2}$	"0" = Incremental setting "1" = Absolute setting
Compensation reference no.	X to α	#6334 to #6337	Value of parameter # of compensation on each point minus 8000 will be written
Compensation max point	X to α	#6322 to #6325	
Compensation min point	X to α	#6328 to #6331	
Compensation value on each point	X to α	#8000 to #8511	-15 to +15 (Incremental setting) "1" = 1 pulse
Compensation multiplication	X to α	#6068 to #6071	0 to 3 "1" = 1X

The figure below shows the example of writing the data for X axis.

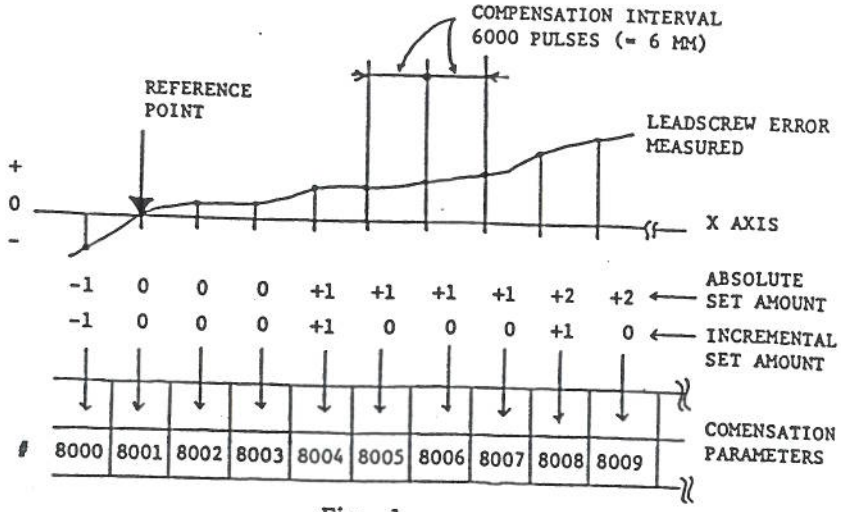


Fig. 1

In the above figure,

Compensation interval: 6000 pulses

Absolute/incremental: Incremental

Compensation multiplication: x 1

Compensation point on X axis: 100 points

Each parameter is set as follows:

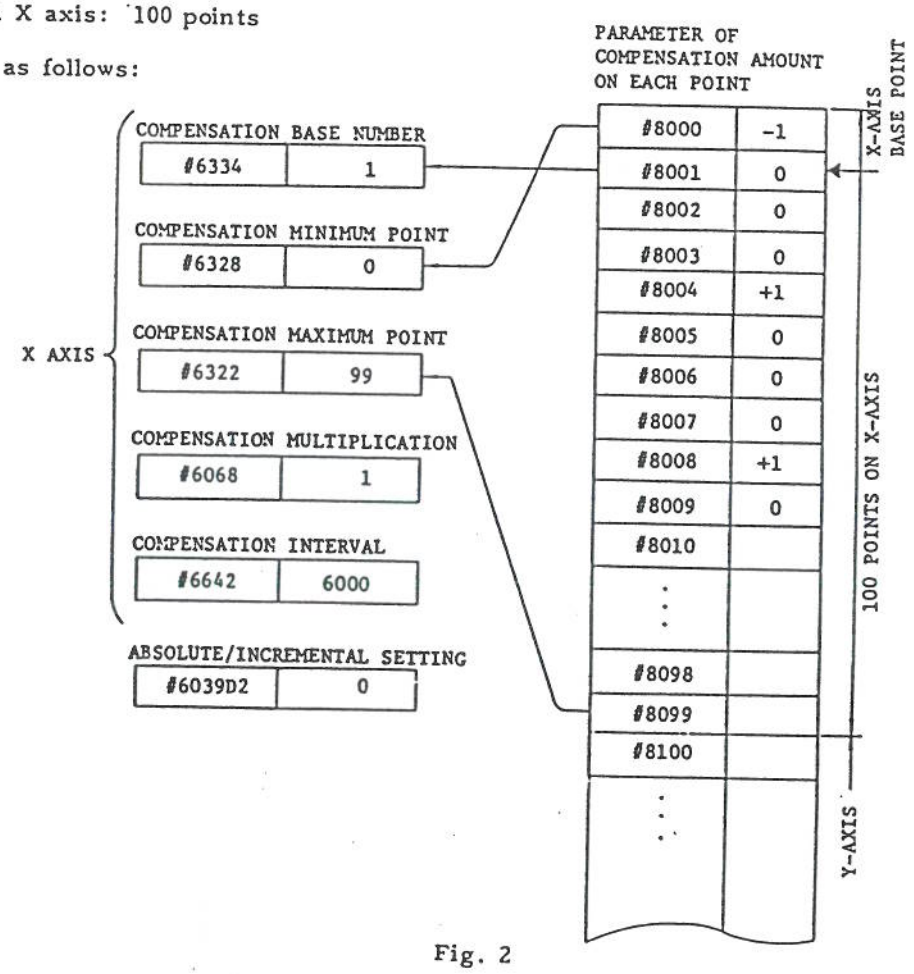


Fig. 2