YASKAWA ELECTRIC

TOE-C843-8.25
INSTRUCTIONS

CNC SYSTEM FOR TURNING APPLICATIONS

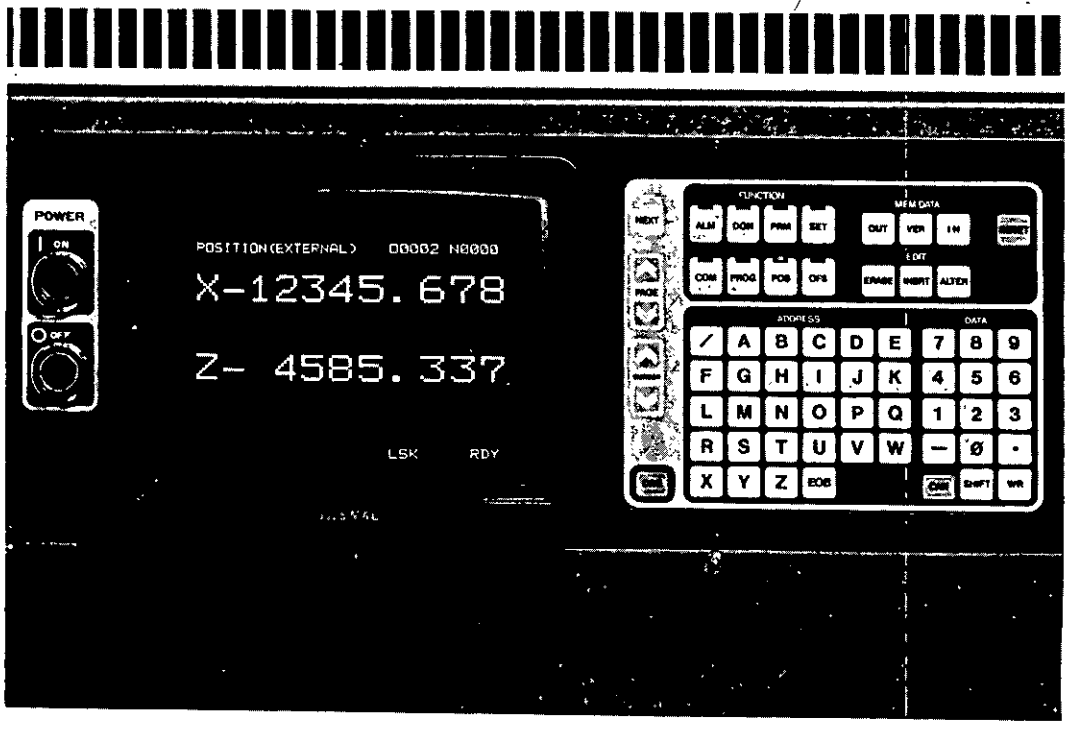
YASNAC LX2

MAINTENANCE MANUAL

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

This manual is primarily intended to give operators maintenance instructions for YASNAC LX2.

The information contained in this manual does not provide all details to be met concerning maintenance and troubleshooting. If uncertainties be encountered for particular maintenance operation, contact your nearest YASNAC service office.



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YASNAC LX2 OPERATOR'S STATION

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1. OUTLINE

The YASNAC LX2 is a high-performance CNC for simultaneously controlling basically 2 axes of a lathe. Emphasis is placed on ultra high-speed machining, and programming capability, made possible by 16-bit multi-processor system.

When the control uses 14" color graphics display, instead of 9" monochromatic display, called ACGC (Advanced Color Graphics Computer), the sophisticated NC functions required for machine requirements can be created and provided for customers. This constitutes an epoch-making NC system never before available.

Built-in PC process time has been increased up to approximately 2.7 μseconds/step and maximum memory of sequence program has been greatly extended up to 64K bytes (approximately 16,000 steps).

1.1 COMPONENT ARRANGEMENT OF YASNAC CONTROL SYSTEM

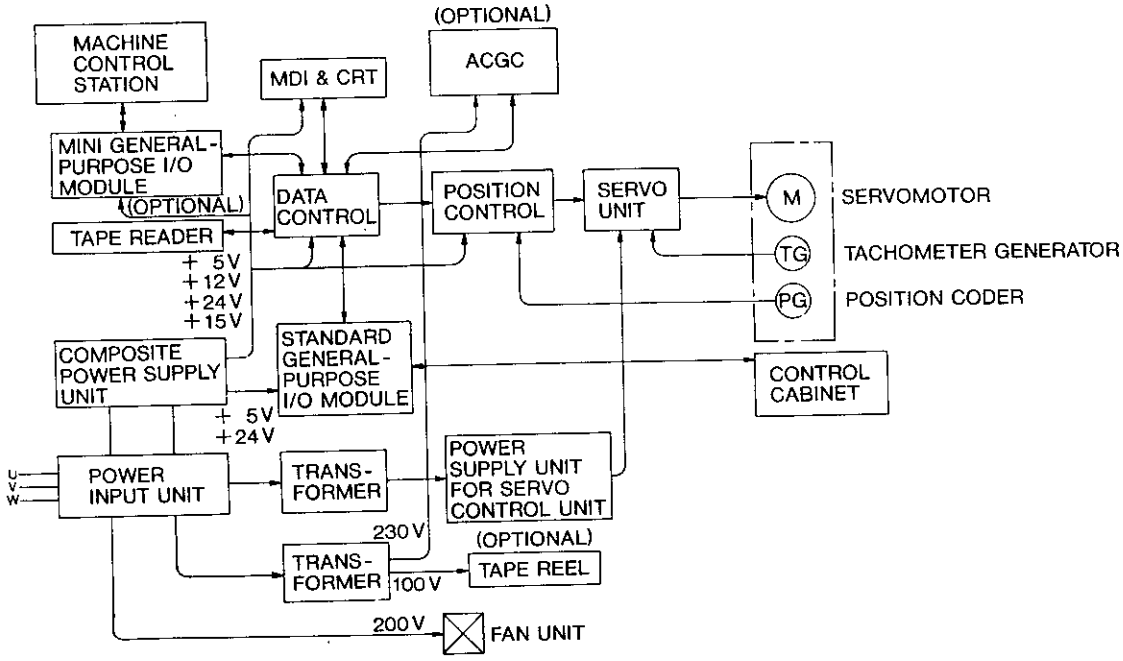


Fig. 1.1 Component Arrangement of YASNAC Control System

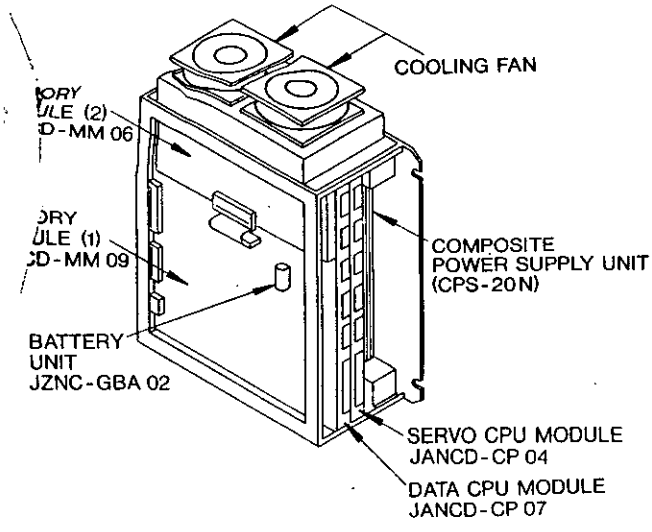


Fig. 1.2 CPU Rack

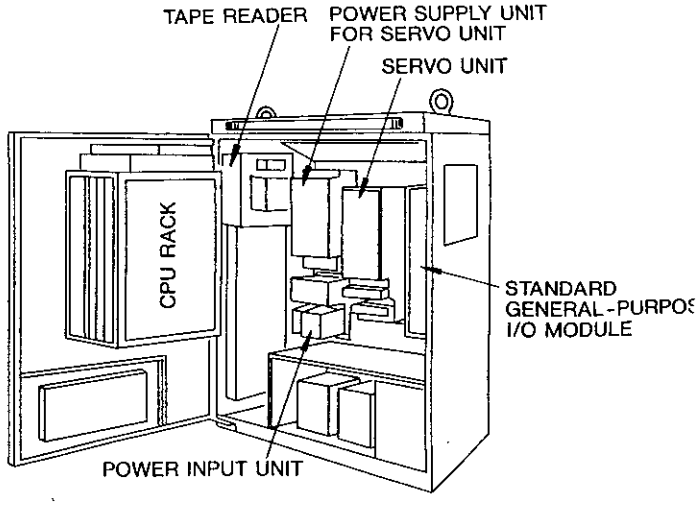


Fig. 1.3 Attached Type 2, with Door Open

1.1 COMPONENT ARRANGEMENT OF YASNAC CONTROL SYSTEM (Cont'd)

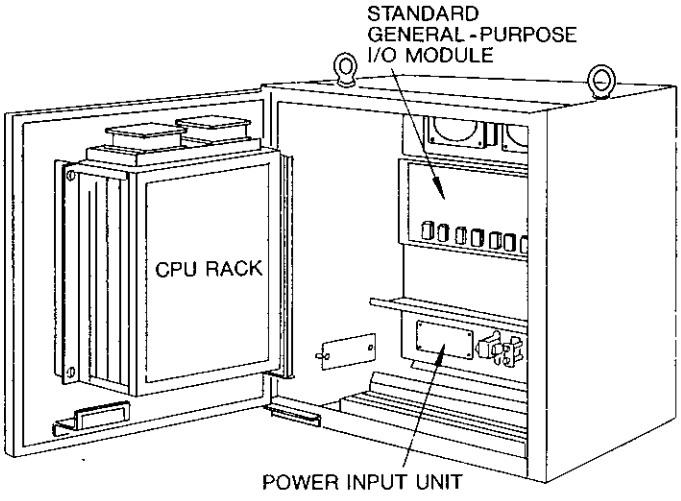


Fig. 1.4 Unbundled Type

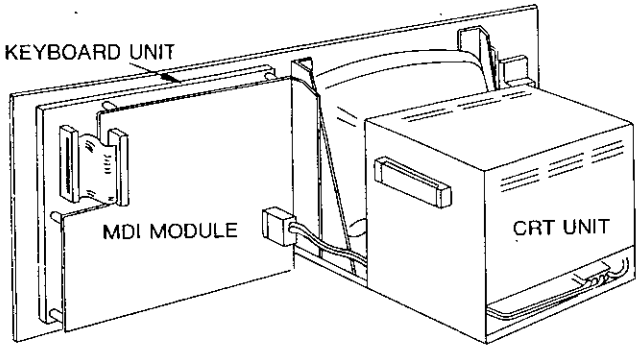


Fig. 1.5 MDI & CRT

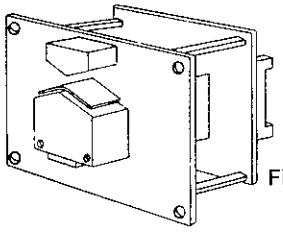


Fig. 1.6 Tape Reader Unit

Table 1.1 YASNAC Major Components

Component Name	Type	Component Code	Remarks
Power Input Unit	JZNC-TU 12	DUN 4970	—
	JZNC-TU 14	DUN 5650	Attached type 1
	JZNC-TU 18	DUN 6270	Attached type 2 Free-standing type
Power Input Control Module	JANCD-TU 02	DTN 3690	Included in the power input unit.
Composite Power Supply Unit	CPS-20 N	AVR 815	—
Tape Reader	MODEL 2401-1	RED 16	
Tape Reel	MODEL 1500	RED 14	6 inches
	—	—	—
Data CPU Module	JANCD-CP 07 C	DTN 4260	—
Servo CPU Module	JANCD-CP 04	DTN 3670	—
Memory Module (1)	JANCD-MM 09-02	DTN 4610	40 meters 80 meters
	JANCD-MM 09-03	DTN 4280	150 meters
Memory Module (2)	JANCD-MM 06	DTN 3630	320 meters
			320 meters
Battery Unit	JZNC-GBA 02	DUN 650	
Operator's Station Unit	JZNC-OP 20	DUN	
CRT Display Unit	TR-9 DD 1 B	CRT 4	Included in the operator's station unit.
Keyboard Unit	HMK-3993-04	SW 655	
MDI Module	JANCD-SP 01	DTN 3560	
Standard General-purpose I/O Module	JANCD-IO 02	DTN 3680	
Mini General-purpose I/O Module	JANCD-IO 01 B	DTN 3580	

Table 1.2 ACGC Major Components

Component Name	Type	Code No.	Remarks
14" CRT Unit	C-5470 YE	CRT 6	—
Keyboard Unit (M)	HMK-9993-02	SW 677	Main key
Keyboard Unit (S)	HMK-9993-20	SW 679	Soft key
Power Supply Unit	VST-5-522/ST	AVR 378	—
CPU Module	JANCD-CG 01 C	DTN 4470	—
Graphic Module	JANCD-CG 02	DTN 4490	—
Bubble Memory Module (1)	FBC-501 M 4 P	MEM 30	120K bytes
Bubble Memory Module (2)	FBC-502 M 4 P	—	256K bytes
Bubble Memory Module (4)	FBC-504 M 4 P	MEM 31	512K bytes

1. 2 BLOCK DIAGRAM OF YASNAC CONTROL SYSTEM

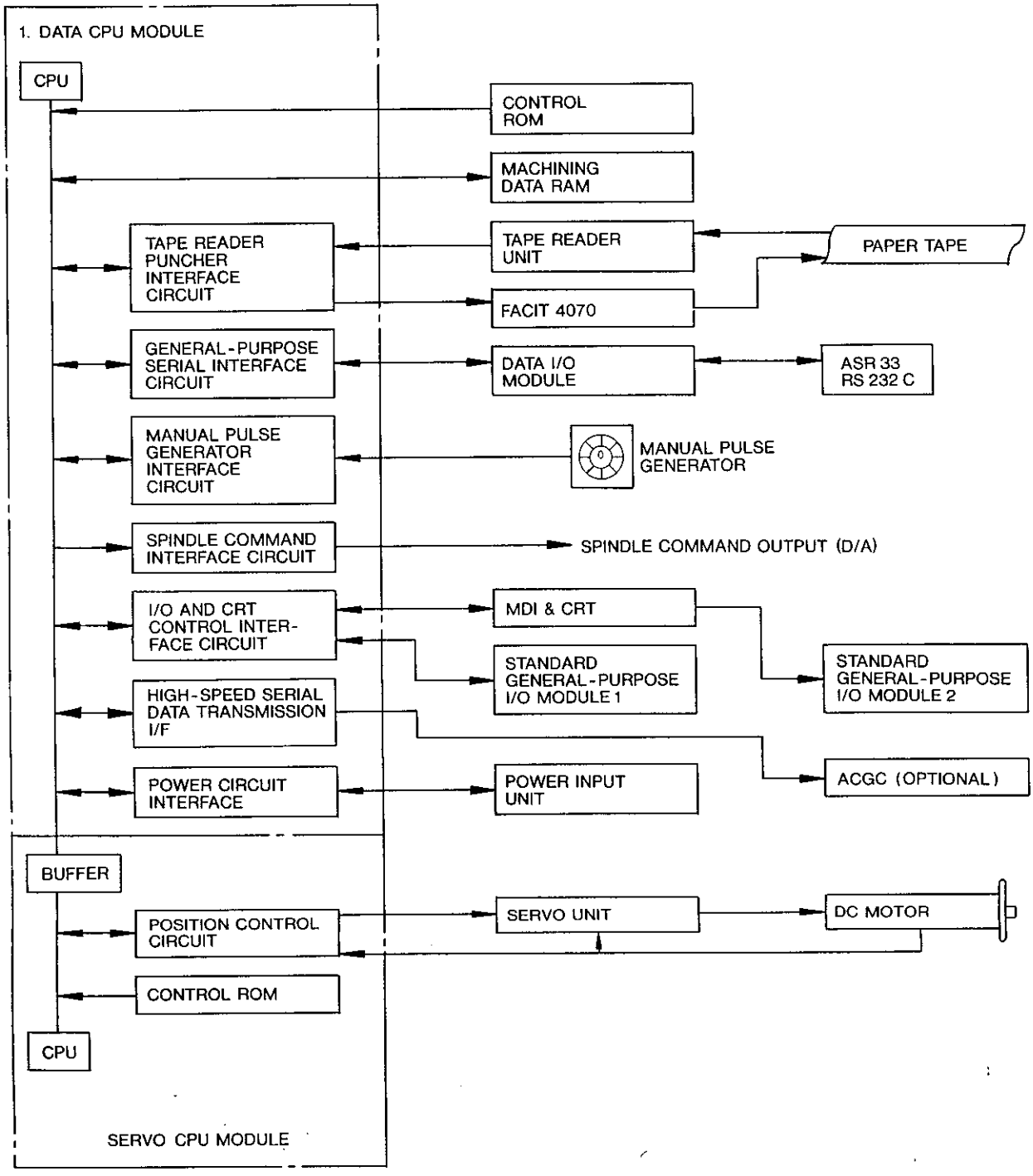


Fig. 1. 7 Block Diagram of YASNAC Control System

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: 10V, 30V 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, 30A, 50A 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. 3 Inspection Schedule.

Items		Frequency	With the system-off	With the system-on	Remarks
Tape Reader	Cleanihg 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	Vibration and noise	Daily		○	Feel by hand, and do the audible inspection.
	Motor contamination and breakage	Daily or as required	○	○	Inspect visually.
	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 motor		○		Clean with compressed air.
Battery		Daily	○	○	See if alarm for BATTERY is displayed on CRT screen.

Except for those checks which can be made with the NC in the energized state, such as checks for external cleanliness, vibration, and noise, be sure to turn off the power supply to the NC before starting to undertake routine maintenance service.

For this, turning off the power supply by pushing the POWER OFF button on the NC operator's station is not sufficient, because after this button is pushed, still several areas in the housing are energized, and are potentially dangerous.

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.

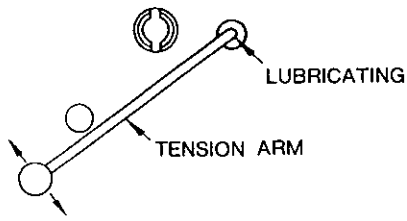
(2) Cleaning of tape tumble box (Weekly)

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

(b) Remove the tape outlet cover (See Fig. 1.2) 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)

Fig. 1.8

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.

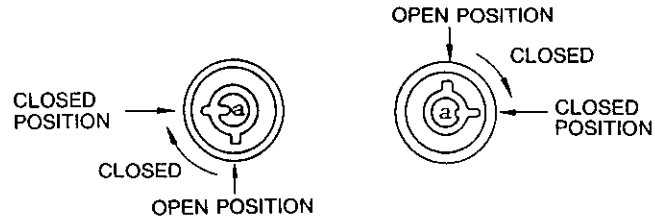
1.4.2 CONTROL PANEL

(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.

†Tension arm shaft available as an option.

(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)

Fig. 1.9

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.

1.4.3 SERVOMOTOR AND DC MOTOR FOR SPINDLE (Cont'd)

(3) Carbon brushes (Quarterly)

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.

(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.

Cup motor: 6 mm or below

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

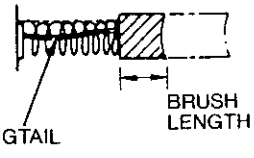


Fig. 1.10

NOTE

When replacing the brush assembly, consult YASNAC service personnel.

(4) Commutator surface

(a) Visually check surface roughness of the comutator 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.

(5) 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, brush-holders 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.

(6) 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 does not blink. If it is blinking, contact YASNAC service 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 service personnel called in 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?

2.1.2 OPERATIONS AND PROGRAMMING CHECKS (Cont'd)

- 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 printed 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?
- Where 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 voltage normal (+5V, ±12 V, +24 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?

(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

- Can the power supply be turned on and off normally?

(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?

(11) ACGC (optional)

- Can the power supply be turned on and off normally? Is the 5A glass-encased fuse on the rear panel in tact?

2.2 TROUBLESHOOTING BY ALARM CODES

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.

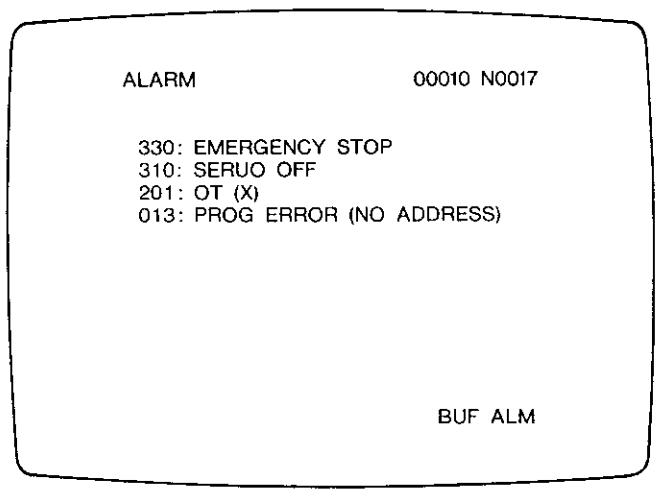


Fig. 2.1 Alarm Codes and Messages

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	Decelerated to stop	Overtravel, reference point return, positioning, machine ready
300 to 399	Decelerated to stop	Servo, emergency stop, overload FG, RPG
400 to 499	Decelerated to 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 Contact YASNAC Service Personnel.
900 to 999	–	Off-line error

2. 2. 1 LIST OF ALARM CODES

Code	Causes	Code	Causes
000		012	OVERFLOW (128 CH) BUFFER CAPACITY OVERFLOW IN A BLOCK (128 CHARACTERS).
001	ZR UNREADY (X) REFERENCE POINT RETURN NOT COMPLETED X.	013	PROG ERROR (NO ADDRESS) ADDRESS PLUS NO DATA AND NEXT ADDRESS COMMAND. OR NO ADDRESS PLUS DATA.
002	ZR UNREADY (Z) REFERENCE POINT RETURN NOT COMPLETED Z.	014	PROG ERROR ("−," ".") SIGN "−," AND "," NOT CORRECTLY USED.
003		015	PROG ERROR (UNUSABLE CH) UNUSABLE CHARACTER PROGRAMMED IN INSIGNIFICANT DATT AREA.
004		016	
005	RESET UNREADY (AFTER EDITING) CYCLE START WITHOUT DEPRESSING RESET BUTTON AFTER EDITING.	017	PROG ERROR (8 DIGITS) INPUT DATA OVERFLOW (MORE THAN 8 CHARACTERS).
006		018	
007		019	
008		020	PROG ERROR (G) UNUSABLE G CODE OR G CODE NOT INCLUDED IN OPTIONS PROGRAMMED.
009		021	PROG ERROR (G) G CODES IN 1, AND * GROUPS PROGRAMMED SIMULTANEOUSLY IN A BLOCK.
010	TH ERROR TAPE HORIZONTAL PARITY ERROR.	022	
011	TV ERROR TAPE VERTICAL PARITY ERROR.	023	

Code	Causes	Code	Causes
024	PROG ERROR (G, G41–44) UNUSABLE G CODE COMMANDED DURING NOSE RADIUS COMPENSATION.	036	PROG ERROR (P-G10) TOO LARGE P (NUMBER DESIGNATION) WHEN OFFSET IS PROGRAM-INPUT.
025		037	PROG ERROR (G10) TOO LARGE R WHEN WORK COORDINATE SYSTEM IS PROGRAM-INPUT.
026	PROG ERROR (G41–44) RISE ERROR IN NOSE RADIUS COMPENSATION.	038	
027	PROG ERROR (G41–44) ERROR DURING NOSE RADIUS COMPENSATION (ERROR IN CIRCULAR INTERPOLATION MODE).	039	
028		040	PROG ERROR (M98, G65/66) P NOT PROGRAMMED IN G65/66 BLOCK. P OR Q NOT PROGRAMMED IN M98 BLOCK.
029		041	NO PROG PROGRAM NO. (SEQUENCE NO.) NOT FOUND WHEN PROGRAM IS CALLED BY M98, M99, G65; G66, G, M, AND T.
030	PROG ERROR (F/E) NO F OR E COMMAND IN FEED COMMAND.	042	PROG ERROR (M98, G65/66 NEST) SUBPROGRAM (M98) OR MACRO CALL (G65/G66) FIVE-NESTED.
031	PROG ERROR (R = 0) CIRCLE WITH RADIUS 0 COMMANDED IN CIRCULAR ARC COMMAND	043	PROG ERROR (M91) P NOT SPECIFIED IN M91 BLOCK.
032		044	
033		045	
034	PROG ERROR (G02/03) CIRCULAR ARC R DESIGNATION ERROR.	046	
035	PROG ERROR (T OFS) TOO LARGE NO. OF T OFS CODE FOR TOOL RADIUS COMPENSATION AND TOOL LENGTH COMPENSATION.	047	

Code	Causes
048	PROG ERROR (G 41 - 44) INTERSECTION POINT NOT OBTAINED BY INTERSECTION COMPUTATION
049	PROG ERROR (G 41 - 44) REVERSE OR ALMOST REVERSE COMMANDED IN M 97 MODE.
050	PROG ERROR (G 11/12) I, K, R NOT CORRECTLY COMMANDED FOR BEVELING AND ROUNDING. VALUES OF I, K, R TOO LARGE.
051	PROG ERROR (G 11/12) TAPERING COMMAND IN BLOCKS FOR BEVELING AND ROUNDING.
052	PROG ERROR (G 01) ANGLE PROGRAMMING NOT CORRECT DURING ANGLE PROGRAMMING LINEAR INTERPOLATION BY G 01.
053	PROG ERROR (G 50 T/G 92 T) VALUES OF TOOL COORDINATE MEMORY OUT OF THE RANGE BETWEEN 51 TO 80 IN WORK COORDINATE SYSTEM SETTING BY G 50 T.
054	
055	PROG ERROR (M, S, T) M, S, T COMMANDS IN THE BLOCK IN WHICH M, S, T CODE CANNOT BE COMMANDED.
056	PROG ERROR (AXIS) AXIS COMMAND IN G 20, G 21 BLOCKS. AXIS NOT CORRECTLY COMMANDED IN G 04, G 36 - G 38.
057	
058	
059	ZR UNREADY G 28 NOT COMPLETED ON THE AXIS WHICH HAS G 29 COMMAND OR REFERENCE POINT RETURN NOT COMPLETED ON THE AXIS WHICH HAS G 30 COMMAND.

Code	Causes
060	PROG ERROR (G 34) LEAD INCREASE/DECREASE VALUE EXCEEDING MAXIMUM PROGRAMMABLE VALUE DURING VARIABLE LEAD THREAD CUTTING. MINUS VALUE OF LEAD COMMANDED.
061	PROG ERROR (G 11/G 12 IN THREAD) ROUNDING, BEVELING COMMANDED IN THREAD CUTTING BLOCK.
062	PROG ERROR (G 32/G 33) THREAD CUTTING COMMANDED IN G 98 MODE.
063	PROG ERROR (G 92/G 78/G 21) RAPID THREAD PULL-UP VALUE IN X-AXIS DIRECTION IN THREAD CUTTING WITH BEVELING SMALLER THAN BEVELING VALUE SET BY PARAMETER.
064	PROG ERROR (G 92/G 78/G 21) RAPID THREAD PULL-UP VALUE IN Z-AXIS DIRECTION IN THREAD CUTTING WITH BEVELING VALUE SET BY PARAMETER.
065	
066	CANNOT CONTINUOUS THREAD TOO SHORT TIME OF 1 BLOCK FOR CONTINUOUS THREAD CUTTING
067	
068	
069	
070	PROG ERROR (M 02/M 30/M 99) MEMORY OPERATION COMPLETION COMMAND NOT GIVEN.
071	
072	

Code	Causes
073	
074	
075	
076	
077	RS 232 C ERROR (OVER-RUN) 10 CHARACTERS MORE HAVE BEEN READ IN AFTER STOP CODE HAS BEEN TRANSMITTED THROUGH RS 232 C INTERFACE.
078	
079	
080	TOOL SET CMP ERROR T CODE COMMANDED BEFORE G 35 BLOCK. G 98 COMMANDED IN OR BEFORE G 35 BLOCK.
081	TOOL SET CMP ERROR ERROR OF PARAMETER SETTING FOR TOOL SET ERROR COMPENSATION (X).
082	TOOL SET CMP ERROR ERROR OF PARAMETER SETTING FOR TOOL SET ERROR COMPENSATION (Z).
083	TOOL WEAR CMP ERROR COMPENSATION NO. EXCEPT 01 TO 19 DESIGNATED AT TOOL WEAR COMPENSATION.
084	TOOL WEAR CMP ERROR TOOL WEAR COMPENSATION INPUTS WOM, WOP GIVEN SIMULTANEOUSLY.
085	EXTERNAL CMP ERROR MULTIPLICATION FACTOR SET BY PARAMETER EXCEEDING 11 FOR EXTERNAL TOOL COMPENSATION.
086	EXTERNAL CMP ERROR ERROR INPUT TURNED ON DURING EXTERNAL TOOL COMPENSATION.
087	PROG ERROR (G 31/G 35) TOUCH SWITCH NOT ON WHEN MOTION REACHES END POINT BY SKIP OR TOOL SET ERROR COMPENSATION COMMANDS.
088	
089	
090	PROG ERROR (G 70~76/G 72~78) P, Q NOT COMMANDED IN G 70, 71, 72, 73 BLOCKS.
091	PROG ERROR (G 70~76/G 72~78) BLOCK OF SEQUENCE NO. SPECIFIED BY P, Q IN G 70 NOT FOUND PROG NO. INCLUDING IN G 70 BLOCK.
092	PROG ERROR (G 70~76/G 72~78) NO. OF BLOCKS INCLUDING FINISHED SHAPE PROGRAM SPECIFIED BY P, Q IN G 70, G 71, G 72, AND G 73, OVER 46.
093	PROG ERROR (G 70~76/G 72~78) UNABLE G- AND M-CODE IN FINISHED SHAPE PROGRAM SPECIFIED BY P, Q IN G 70, G 71, G 72, AND G 73.
094	PROG ERROR (G 70~76/G 72~78) BEVELING AND ROUNDING COMMANDS AS LAST MOVE COMMAND FOR FINISHED SHAPE PROGRAM SPECIFIED BY P, Q IN G 70, G 71, G 72, AND G 73.
095	PROG ERROR (G 70~76/G 72~78) FAULTS IN FINISHED SHAPE PROGRAM SPECIFIED BY P, Q IN G 71, G 72.
096	PROG ERROR (G 70~76/G 72~78) D (CUTTING FREQUENCY) SPECIFIED BY G 73 ZERO OR 128 OR MORE. I, K (ROUGH CUTTING) SPECIFIED BY G 73 BOTH ZERO. D, K OF G 76 EXCEEDING PROGRAMMABLE RANGE.

2.2.1 LIST OF ALARM CODES (Cont'd)

Code	Causes	Code	Causes
097	PROG ERROR (G70-76/G72-78) FOUR OR MORE PROCESSING INTERRUPTIONS BY FINISHED SHAPE PROGRAM IN STOCK REMOVAL CYCLE BY G71 R1, OR G72 R1.	109	MACRO ERROR (# NO NOT LEFT) PROHIBITED VARIABLE DESIGNATED AS SUBSTITUTION.
098	PROG ERROR (G70-76/G72-78) DATA SPECIFIED BY G70 P, Q NOT REGISTERED IN INTERNAL KEEP MEMORY.	110	MACRO ERROR ([ ] 5 LIMIT) MULTIPLE LAYERS OF PARENTHESES EXCEEDING THE UPPER LIMITS.
099	PROG ERROR (G70-76/G72-78)	111	MACRO ERROR (MOVE G66-M99) MOVE COMMAND IN M99 FINISHING COMMAND OF MACRO CALLED BY G66.
100	CAL ERROR (FIXED POINT) MAGNITUDE OF FIXED POINT DATA EXCEEDING UPPER LIMIT.	112	MACRO ERROR MULTIPLE LEVELS OF MACRO CALL EXCEEDING THE UPPER LIMIT 4.
101	CAL ERROR (FLOATING) EXPONENT OF FLOATING POINT DATA EXCEEDING ALLOWABLE RANGE.	113	
102	CAL ERROR (DIVISION) CALCULATION DIVISOR ZERO OR OVERFLOW ERROR.	114	MACRO ERROR (DO-FORMAT) "DO" NOT CORRESPONDING TO "END."
103	CAL ERROR (SQUARE ROOT) ROOT VALUE IS A NEGATIVE $\sqrt{\quad(-)}$.	115	MACRO ERROR ([ ] UNMATCH) FORMAT ERROR IN <EQUATION>.
104	PROG ERROR (DOUBLE ADR) CHARACTER WHICH CANNOT BE REPEATED IN A BLOCK COMMAND IN REPETITION.	116	MACRO ERROR (DO END NO.)
105	MACRO ERROR (CONSTANT) CONSTANTS EXCEEDING THE LIMIT.	117	
106	MACRO ERROR TOO MANY CODES FOR CANCELLING G67.	118	MACRO ERROR (GO TO N) "n" in GOTO n out of range $0 \leqq n \leqq 9999$.
107	MACRO ERROR (FORMAT) ERROR IN THE FORMAT EXCEPT FOR EQUATION.	119	
108	MACRO ERROR (UNDEFIN #NO.) UNDEFINED VARIABLE NO. DESIGNATED.	120	PRTN ERROR (NOT FOUND) SEQUENCE NO. SEARCHED NOT FOUND IN PART PROGRAM.

Code	Causes
121	PRTN ERROR (G 50/G 92) G 31 COMMANDED DURING PROGRAM RESTART.
122	PRTN ERROR
123	PRTN ERROR (ORG)
124	PRTN ERROR (MDI MOVE) AXIS OPERATED BY MDI AFTER PROGRAM RESTART PREPARATION.
125	
126	
127	
128	

Code	Causes
134	NO PROG (EXT) NOT FOUND PROGRAM NO. SPECIFIED BY EXTERNAL NO. SEARCH.
135	EXT DATA ERROR IN DATA GIVEN BY EXTERNAL DATA INPUT.
136	
137	
138	
139	
140	PROG ERROR (G 111/G 112) ERROR IN ADDRESS WORD COMMANDING OF G 111 BLOCK.
	PROG ERROR (G 111/G 112) NGLE FOR ANGLE PROGRAMMING A, B BY G 111 JT OF RANGE $-360 \leq A, B \leq 360$.
	PROG ERROR (G 111/G 112) T BEVELING PORTION OUTSIDE RECTANGLE COM-)SED BY START AND END POINTS OR BETWEEN ;° STRAIGHT LINES OF START TO END POINTS AND ND TO START POINTS.
	PROG ERROR (G 111/G 112) RROR IN G 111 COMMAND BLOCK
	PROG ERROR (G 111/G 112) I, S, T COMMAND IN G 111, G 112 BLOCK.

Code	Causes	Code	Causes
145	PROG ERROR (G111/G112) ERROR IN COMMANDING ADDRESS WORD FOR G112 BLOCK.	157	
146	PROG ERROR (G111/G112) ERROR IN COMMANDING PROGRAMMED SHAPE FORMED BY G112 BLOCK.	158	
147		159	
148		170	MEM ERROR (OFS) TOOL OFFSET TOTAL CHECK ERROR.
149		171	
150		172	MEM ERROR (SET) SETTING AREA TOTAL CHECK ERROR.
151		173	MEM ERROR (PRM) PARAMETER AREA TOTAL CHECK ERROR.
152		174	
153		175	
154		176	
155		177	
156		178	

Code	Causes	Code	Causes
179	OVER TEMP PANEL INSIDE TEMPERATURE TOO HIGH.	201	OT (X) OVERTRAVEL X.
180	SEQ ERROR SEQUENCE ERROR (1)	202	OT (Z) OVERTRAVEL Z.
181		203	
182		204	
183		205	
184		206	
185		207	
186		208	
187		209	
188		210	
189		211	S-OT1 (X) STORED STROKE LIMIT FIRST AREA X.
200		212	S-OT1 (Z) STORED STROKE LIMIT FIRST AREA Z.

Code	Causes	Code	Causes
213		225	S-OT 3 (Z) STORED STROKE LIMIT THIRD AREA (OUTSIDE INHIBIT) Z.
214		226	
215		227	
216		228	
217		229	
218		230	
219		231	ZR ERROR-AREA (X) REFERENCE POINT RETURN AREA ERROR X.
220	S-OT 2 (INSIDE) STORED STROKE LIMIT SECOND AREA (INSIDE INHIBIT).	232	ZR ERROR-AREA (Z) REFERENCE POINT RETURN AREA ERROR Z.
221	S-OT 2 (X) STORED STROKE LIMIT SECOND AREA (OUTSIDE INHIBIT) X.	233	
222	S-OT 2 (Z) STORED STROKE LIMIT SECOND AREA (OUTSIDE INHIBIT) Z.	234	
223	S-OT 3 (INSIDE) STORED STROKE LIMIT THIRD AREA (OUTSIDE INHIBIT).	235	
224	S-OT 3 (X) STORED STROKE LIMIT THIRD AREA (OUTSIDE INHIBIT) X.	236	

Code	Causes	Code	Causes
237		249	
238		270	
239		271	P-SET ERROR (X) P SET ERROR X.
240		272	P-SET ERROR (Z) P SET ERROR Z.
241	ZR ERROR-POS (X) REFERENCE POINT RETURN POSITION ERROR X.	273	
242	ZR ERROR-POS (Z) REFERENCE POINT RETURN POSITION ERROR Z.	274	
243		275	
244		276	
245		277	
246		278	
247		279	
248		280	MACH UNREADY MACH RDY OFF.

Code	Causes	Code	Causes
281		313	
282		314	
283		315	
284		316	
285		317	
286		318	
287		319	
288		320	NC UNREADY NC UNREADY P SET UNREADY.
289		321	
310	SERVO OFF SERVO POWER NOT SUPPLIED.	322	
311		323	
312		324	

Code	Causes	Code	Causes
325		337	
326		338	
327		339	
328		340	
329		341	SERVO ERROR (X) SERVO ERROR X.
330	EMERGENCY STOP EMERGENCY STOP.	342	SERVO ERROR (Z) SERVO ERROR Z.
331	FUSE (X) FUSE BLOWN X.	343	
332	FUSE (Z) FUSE BLOWN Z.	344	
333		345	
334		346	
335		347	
336		348	

Code	Causes	Code	Causes
349		361	PG ERROR (X) PG ERROR X.
350		362	PG ERROR (Z) PG ERROR Z.
351	OL (X) OVERLOAD (1) X.	363	
352	OL (Z) OVERLOAD (1) Z.	364	
353		365	
354		366	
355		367	
356		368	
357	OL (OTHER) OVERLOAD (2).	369	
358		370	
359		371	FG ERROR (1) FG ERROR 1.
360		372	FG ERROR (2) FG ERROR 2.

Code	Causes	Code	Causes
373		385	
374		386	
375		387	
376		388	
377		389	
378		390	
379		391	TG ERROR (X) TG LEAD DISCONNECTION.
380		392	TG ERROR (Z) TG LEAD DISCONNECTION.
381	PRG ERROR PRG ERROR.	393	
382		394	
383		395	
384		396	

2. 2. 1 LIST OF ALARM CODES (Cont'd)

Code	Causes	Code	Causes
397		409	
398		810	
399		811	
400	SEQ ERROR SEQUENCE ERROR (2).	812	
401		813	
402		814	
403		815	
404		816	
405		817	
406		818	
407		819	
408		820	ROM ERROR ROM CHECK ERROR.

Code	Causes	Code	Causes
821		833	
822		834	
823		835	
824		836	
825		837	
826		838	
827		839	
828		840	CPU ERROR CPU ERROR (2).
829		841	
830	CPU ERROR CPU ERROR (1).	842	
831		843	
832		844	

Code	Causes
845	
846	
847	
848	
849	
910	TAPE-MEM ERROR MEMORY VERIFYING ERROR (OFF-LINE).
920	TAPE ERROR TAPE READING-IN ERROR (OFF-LINE).

ALARM "095"

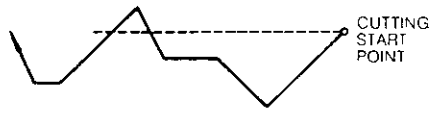
X-coordinates differnt between G71 command cutting start point and last block for finished shape program.

Z-coordinates different between G72 command cutting start point and last block for finished shape program.

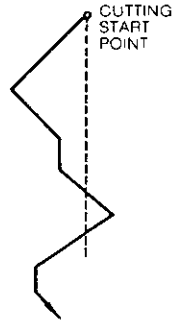
Z-coordinate for cutting start point by G71 command different from Z-coordinate for the first block of the finished shape program. (Command G71 ... R1 is excepted.)

X-coordinate for cutting start point by G72 command different from X-coordinate for the first block of the finished shape program. (Command G72 ... R1 is excepted.)

X-coordinate for finished shape program by G71 ... R1. Command exceeding cutting start point.



Z-coordinate for finished shape program by G72 ··· R1 command exceeding cutting start point.



ALARM "140"

- Commanding one or no address of addresses B, X(U), Z(W) specifying second straight line.
- Commanding two addresses of addresses B, X(U), Z(W) specifying second straight line. In addition to this, one or no address commanded among addresses A,I, K,specifying first straight line.
- Address C specifying first beveling and address P specifying first rounding commanded.
- Address D specifying second beveling and address Q specifying second rounding commanded.
- Commanding addresses X and Z specifying second straight line and Q and D specifying second beveling and rounding.

ALARM "143"

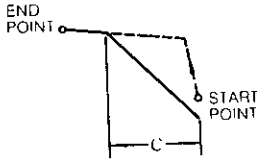
Command values for addresses A, I, K specifying first straight line are determined as follows, and programmed shape cannot be formed.

Command Value for A	–
−360.000, −180.000, 0, 180.000, 360.000	Address I commanded for specifying first straight line.
−270.000, −90.000, 90.000, 270.000	Address K commanded for specifying first straight line.

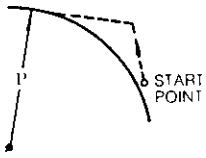
Command values for addresses B, X(U), Z(W) specifying second straight line are determined as follows, and programmed shape cannot be formed.

Command value for B	–
–360.000, –180.000 0, 180.000, 360.000	Address X (U) commanded for specifying second straight line.
–270.000, –90.000 90.000, 270.000	Address Z (W) commanded for specifying second straight line.

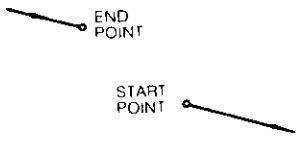
Command values for addresses C and D for beveling too large for the programmed shape. Operation cannot be made according to the command.



Command values for address P and Q specifying radius for rounding too large for the programmed shape. Operation cannot be made according to the command.



No intersecting point for first straight line and second straight line.



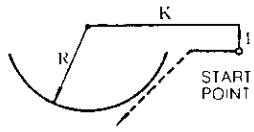
First straight line and second straight line on the same line.

ALARM "145"

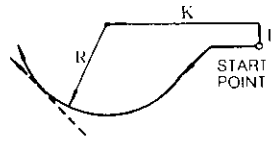
- X(U) or Z(W) not commanded.
- X(U) and Z(W) both commanded.
- R not commanded. Or "0" commanded for R.
- I and K not commanded. "0" commanded for I and K.
- P and C both commanded.
- Q and D both commanded.

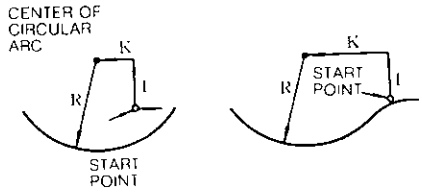
ALARM "146"

Beveling for command C cannot be made.

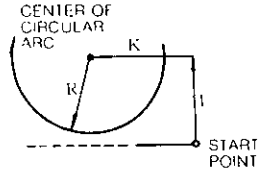


Beveling for command D cannot be made.

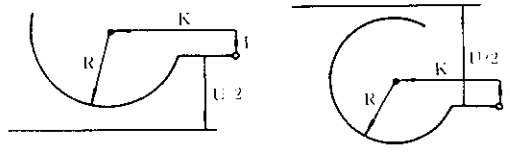




No intersecting point between circular arc and straight line.



No intersecing point between circular arc and end point.



2.2.2 COUNTERACTING ALARM CODES

(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.)

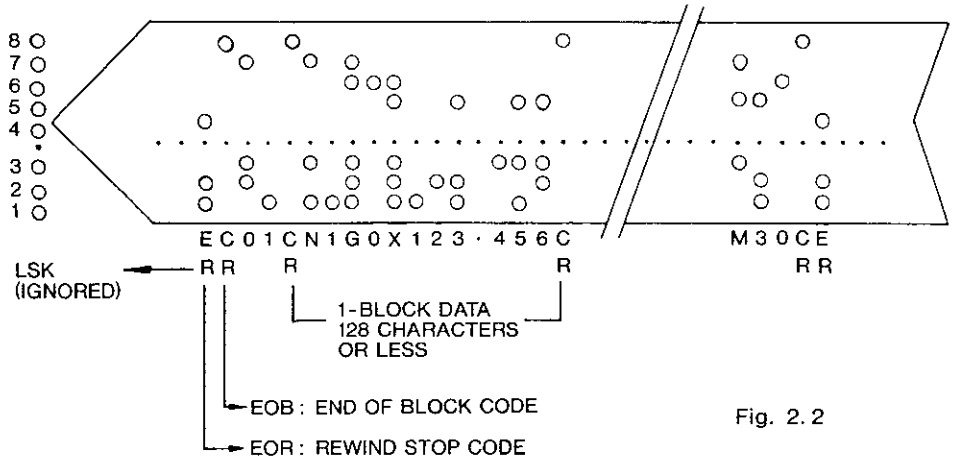


Fig. 2.2

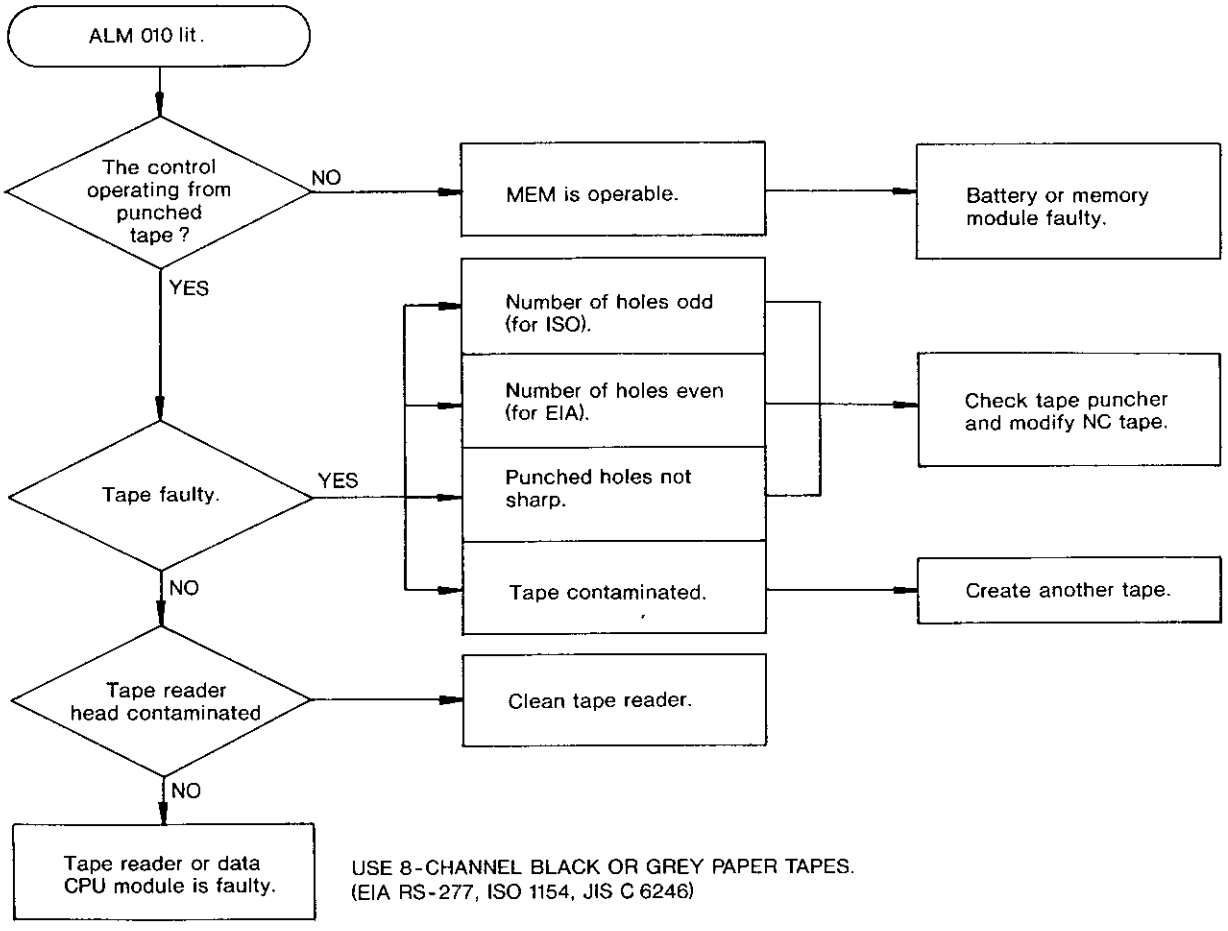


Fig. 2.3

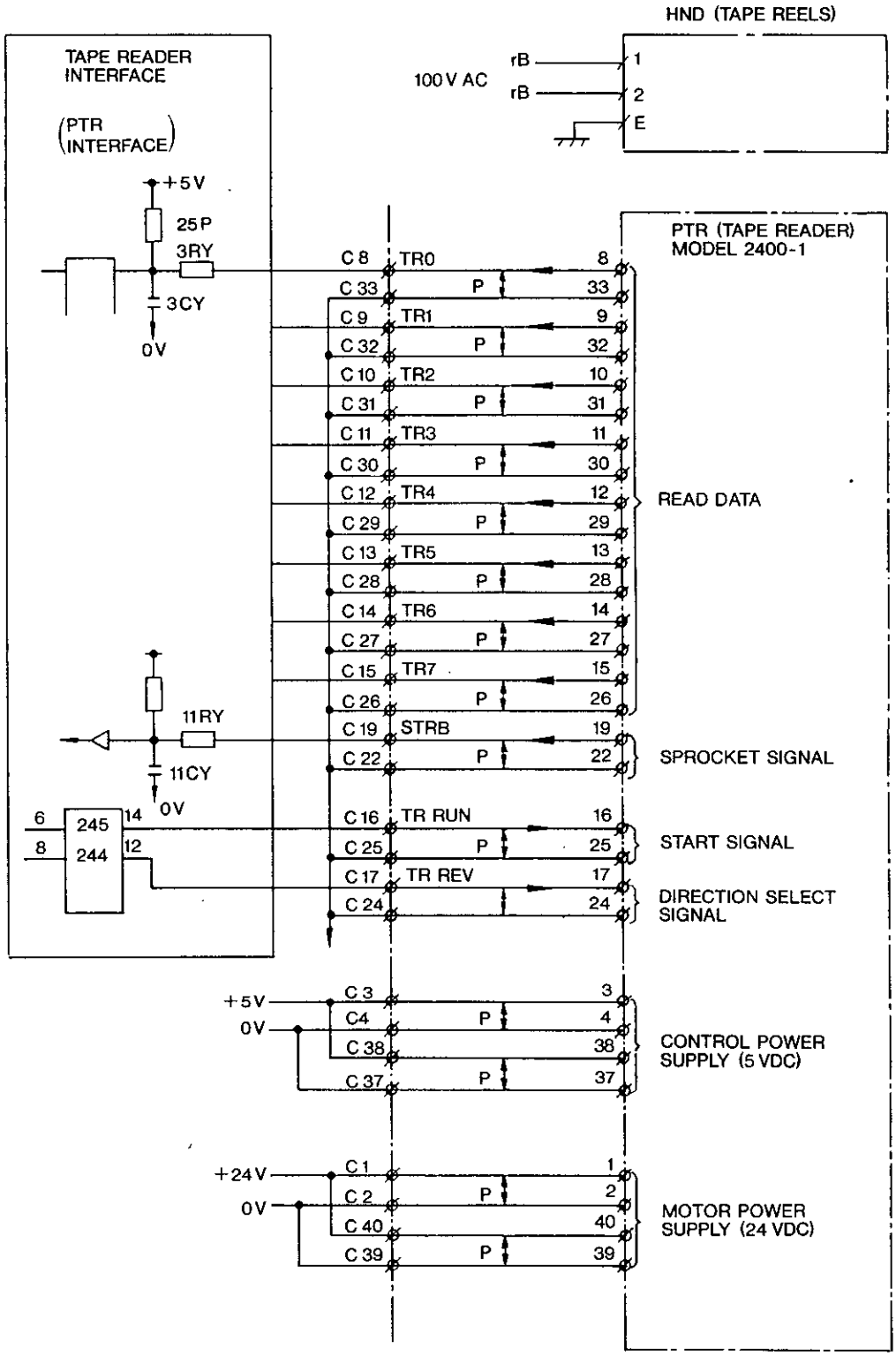


Fig. 2. 4 Tape Reader Connection Diagram

2. 2. 2 COUNTERACTING ALARM CODES (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.

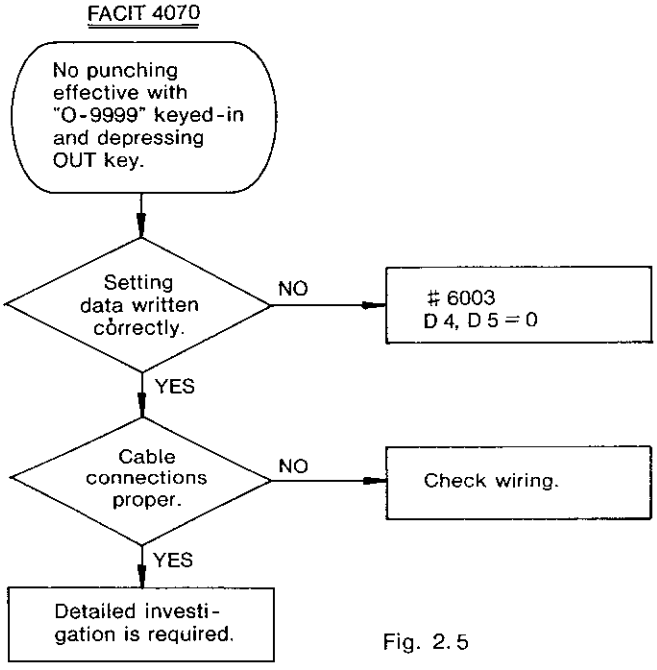


Fig. 2. 5

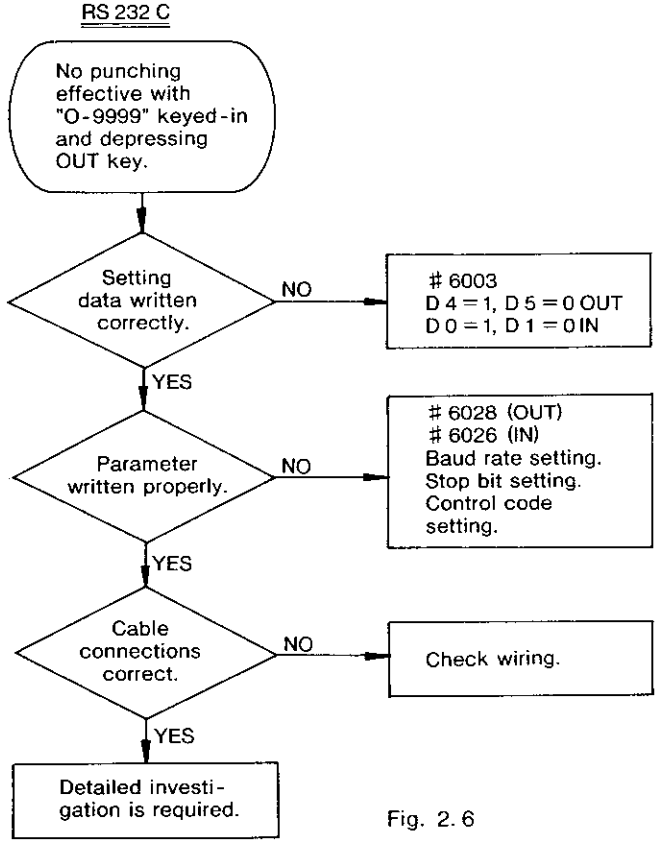


Fig. 2. 6

SELECTION OF INTERFACES

Select the interface to be used by sitting numbers.

(a) Selection of input interface

Input Interface to be used	# 6003 D 1 IDVCE 1	# 6003 D 0 IDVCE 0
PTR Interface *	0	0
RS 232 C Interface	0	1
RS 422 Interface	1	0

* Interface for tape reader unit (optional) only.

(b) Selection of output interface

Output Interface to be used	# 6003 D 5 ODVCE 1	# 6003 D 4 ODVCE 0
FACIT 4070 Interface	0	0
Current Loop Interface, RS 232 C Interface	0	1
RS 422 Interface	1	0

Common	Input/ Output	# 6026 D 3	# 6026 D 2	# 6026 D 1	# 6026 D 0
Independent	Input	# 6026 D 3	# 6026 D 2	# 6026 D 1	# 6026 D 0
	Output	# 6028 D 3	# 6028 D 2	# 6028 D 1	# 6028 D 0
Baud rate value	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

Setting of stop bit length

Common	Input/ Output	# 6026 D 4	= 1 : Two bits for stop bit = 0 : One bit for stop bit
Independent	Input	# 6026 D 4	
	Output	# 6028 D 4	

Setting of control code output

Common	Input/ Output	# 6026 D 5	= 1 : Does not send control code. = 0 : Sends control code.
Independent	Input	# 6026 D 5	
	Output	# 6028 D 5	

Signals and Connection Diagram for FACIT 4070

Timing

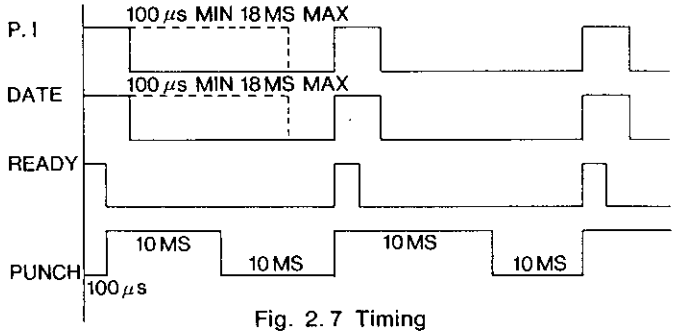


Fig. 2.7 Timing

FACIT 4070 Interface Connecting Cable

NC (MR-20 F)			Connections	External Equipment (DB-25 P)	
Symbol	Signal Name	Pin No.		Pin No.*	Symbol
PR	PUNCH READY	1	○——○	12	PR
TL	TAPE LOW	2	○——○	21	TL
ERR 1	ERROR	3	○——○	20	ERR 1
	Not Used	4			
+6V	FACIT/ ASR. Auto-selection	5	○——○	24	+6V
	Not Used	6			
	Not Used	7			
0V	GROUND	8			
0V	GROUND	9	○——○	10	SD
0V	GROUND	10	○——○	25	0V
CH 1	PUNCH DATA 1	11	○——○	1	CH 1
CH 2	PUNCH DATA 2	12	○——○	2	CH 2
CH 3	PUNCH DATA 3	13	○——○	3	CH 3
CH 4	PUNCH DATA 4	14	○——○	4	CH 4
CH 5	PUNCH DATA 5	15	○——○	5	CH 5
CH 6	PUNCH DATA 6	16	○——○	6	CH 6
CH 7	PUNCH DATA 7	17	○——○	7	CH 7
CH 8	PUNCH DATA 8	18	○——○	8	CH 8
CH 9	FEED HOLD	19	○——○	9	CH 9
PI	PUNCH INSTRUC-TION	20	○——○	11	PI

*Pin numbers are applicable when the external equipment is FACIT 4070 and plug-in connector is DB-25 P.

Current Loop (20mA) Interface Connection Cable

NC (MR-20 F)			Connection	External Equipment	
Symbol	Signal Name	Pin No.		Pin No.	Symbol
		1			
	Not Used	⋮			
		4			
+6V	FACIT/ASR. Auto-selection	5			
TTY 2	Current loop (−)	6	○——○		
TTY 1	Current loop (+)	7	○——○		
0V	GROUND	8			
		9			
	Not Used	⋮			
		20			

(Note 2)

Note:

1. The type of connector and pin number are different with external equipment.
2. When the current loop (20mA) interface is used, short-circuit pin No. 4 (signal RS) and pin No. 5 (signal CS) of plug connector DB-25P for RS 232 C. Then connect the plug to the NC receptacle DB-25 S.

RS 232 C Interface Connecting Cable (B)

NC (DB-25 P)			Connections	External Equipment	
Symbol	Signal Name	Pin No.		Pin No.	Symbol
FG	Frame grounding	1	○——○		FG
SD	Sending data	2	○——○		SD
RD	Sending data	3	○——○		RD
RS	Receiving data	4	○——○		RS
CS	Capable of sending	5	○——○		CS
	Not used	6	○——○		DR
SG	Signal grounding	7	○——○		SG
		8	○——○		
	Not used	⋮ 25	○——○		ER (OR IO ALARM)

2.2.2 COUNTERACTING ALARM CODES (Cont'd)

(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

These alarms warn that tool offset amount, setting data, and parameter have been changed due to any of the following reasons.

a. Battery unit failure (Battery alarm display)

b. Memory modules (2) not connected correctly.

c. Failure of memory module (1) or (2).

Alarm No.	CRT Display	Location on Memory Module MM 09-XX
170	MEMORY ERROR (OFS)	11 J, 11 K
172	MEMORY ERROR (SET)	
173	MEMORY ERROR (PRM)	

(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; either the ambient temperature is high, or the cooling fan inside the control panel or the external ventilation fan is stopped. Check for both.

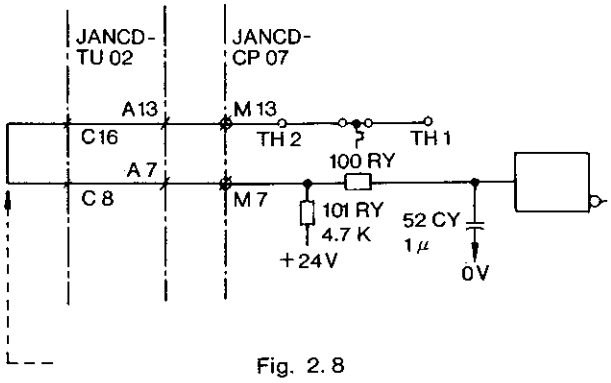


Fig. 2.8

NOTE

- The customer (OEM) can add another thermostat (contacts usually closed).
- When the system is not in use, short-circuit pins C8 and C16 at TU02, as illustrated.

(5) Alarms 231 (X), 232 (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 this error-check can be performed only after power supply is turned off and the manual return to reference zero point has been completed.

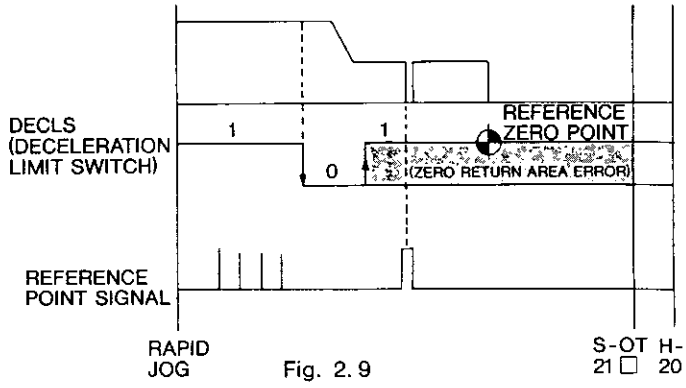


Fig. 2.9

(6) Alarms 241 (X), 242 (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.

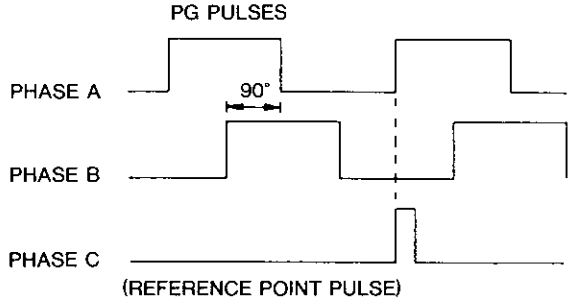


Fig. 2.10

NOTE

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

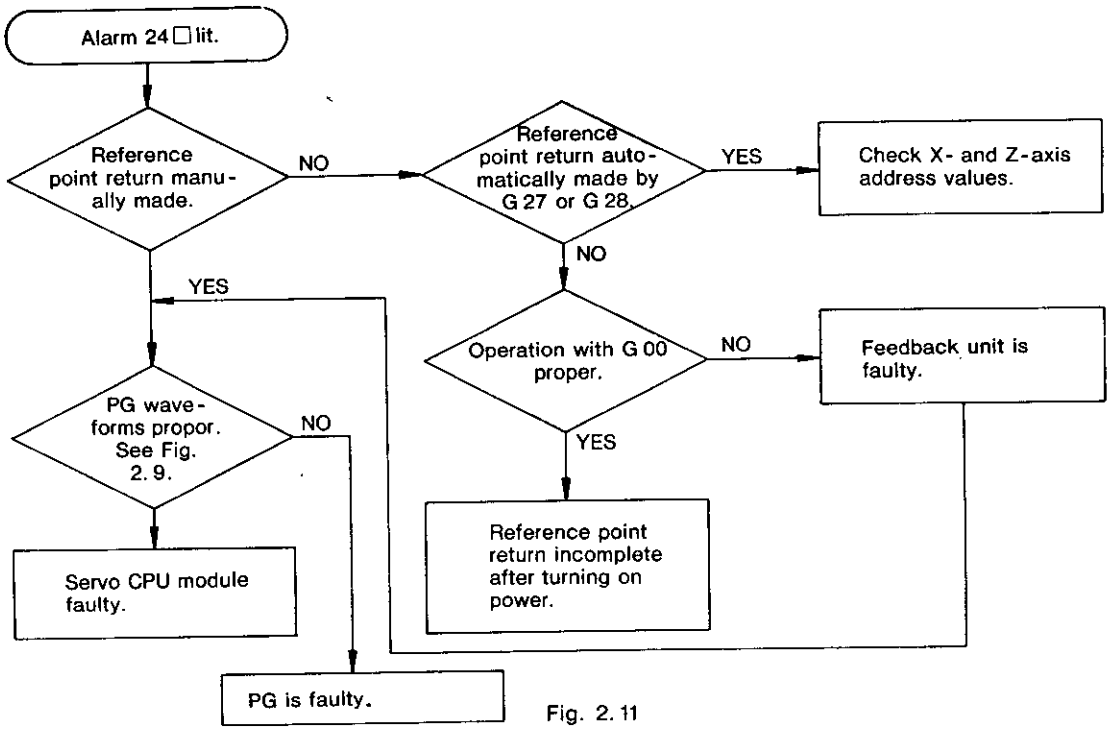


Fig. 2.11

(7) Alarms 271 (X), 272 (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

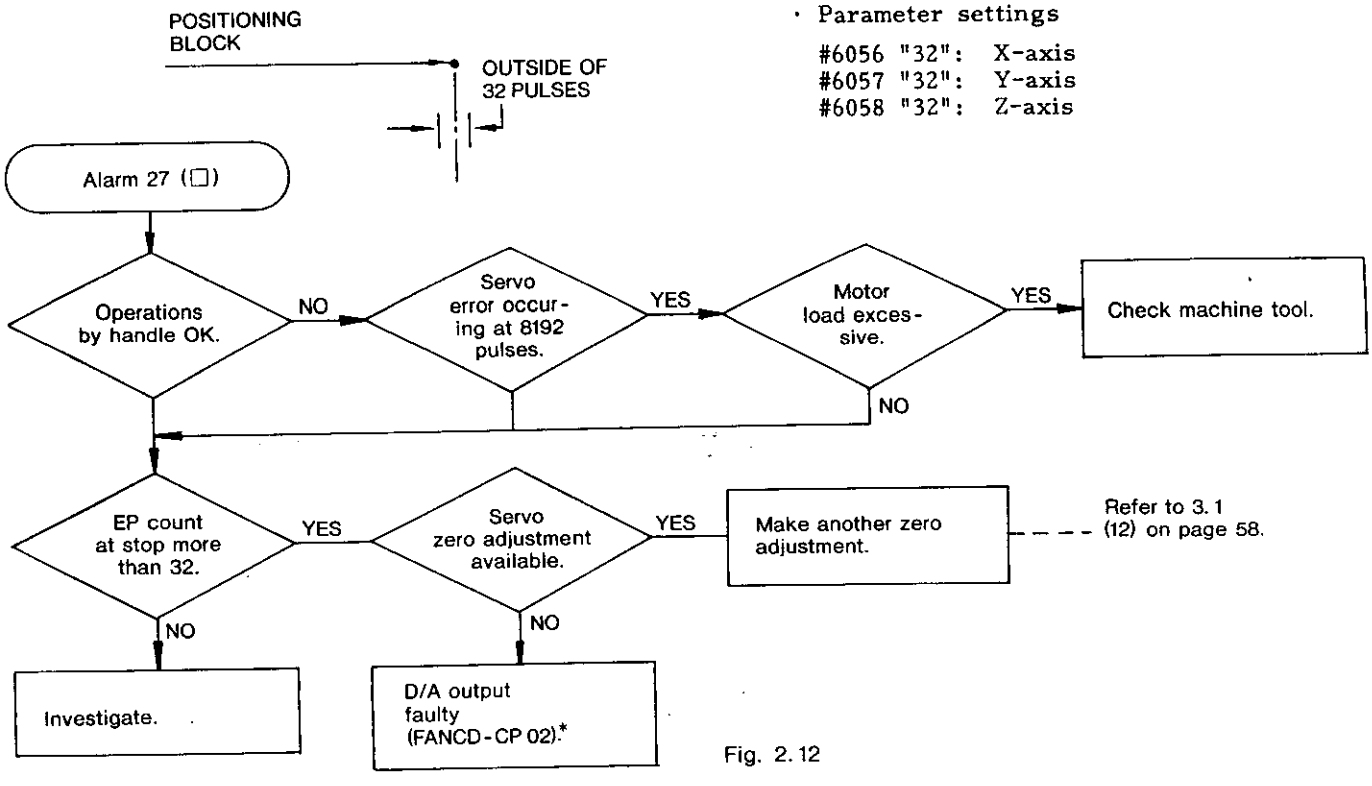


Fig. 2.12

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

2.2.2 COUNTERACTING ALARM CODES (Cont'd)

(8) Alarm 280 (Machine Unready)

This alarm results from the MRD (machine unready) signal being OFF after transmission of the NC Ready Signal. Check to see if the MRD signal is normal.

(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 (Z)
(Servo Fuse Blown)

These errors are attributable to damaged transistor(s). Immediately contact the YASNAC service personnel.

(11) Alarms 341 (X), 342 (Z) (Servo Error)

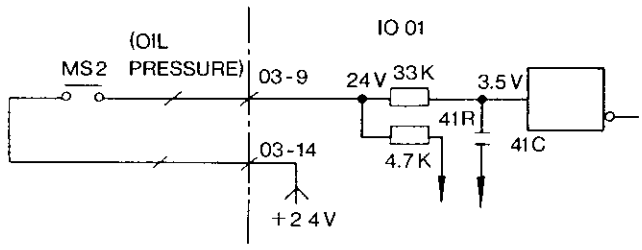


Fig. 2.13 Connection Example

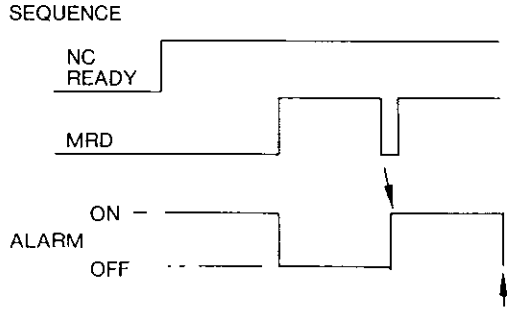


Fig. 2.14 Sequence

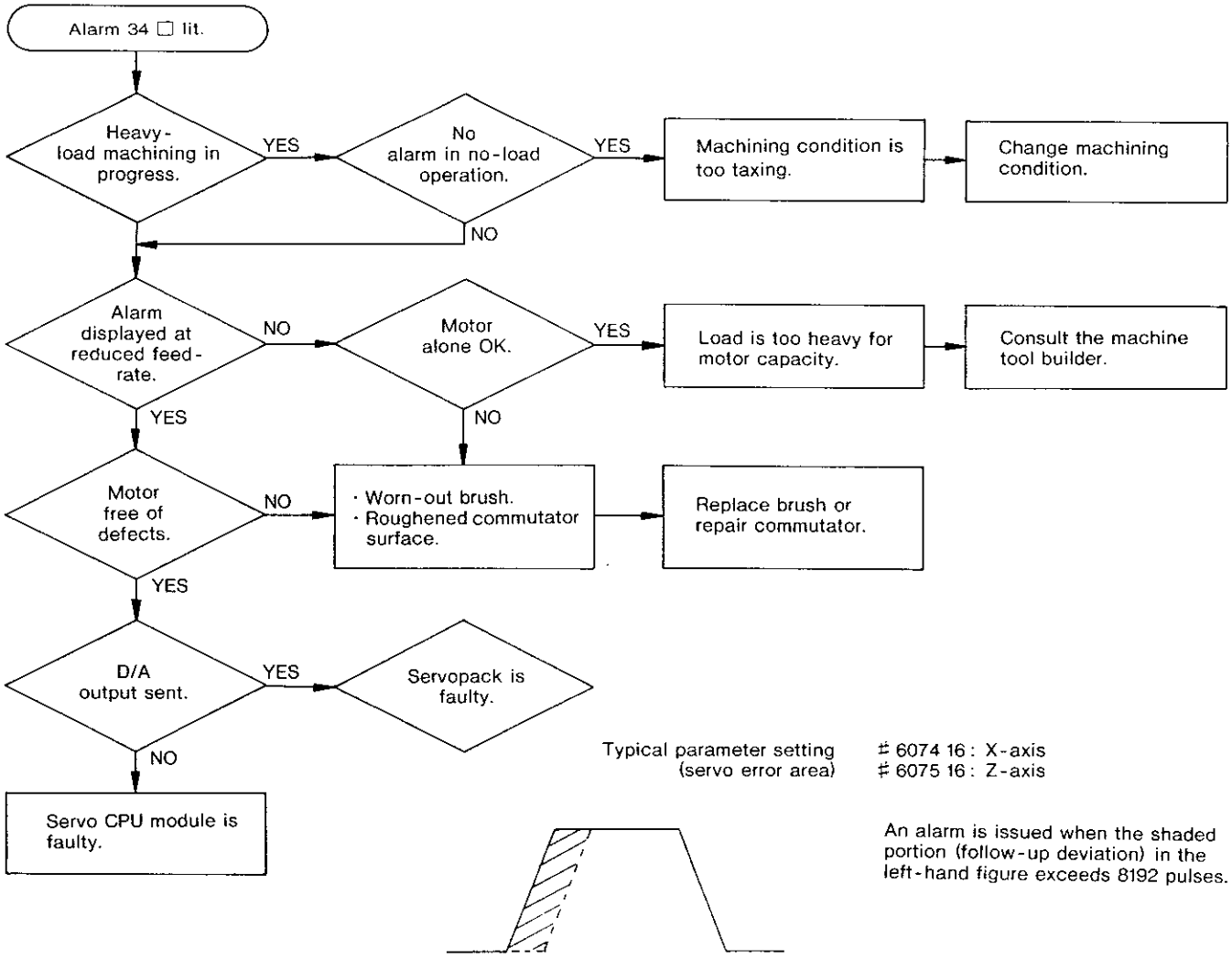


Fig. 2.15

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

Electronic thermal relay trip

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

(13) Alarm 357 (Overload (2))

This alarm is initiated by too high regenerative resistance temperature. Main causes are high motor operation frequency (100% or more of the rating), failures of servo drive unit and servomotor.

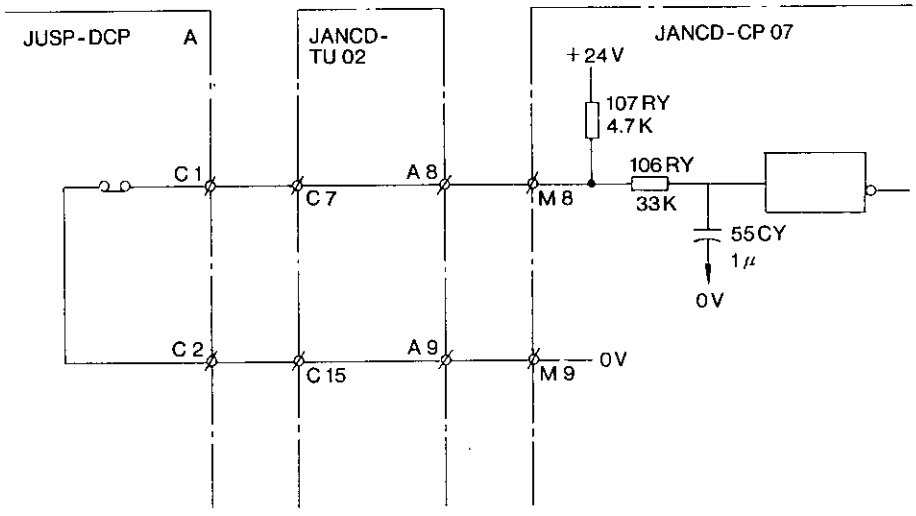


Fig. 2.16

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

The possible cause is that no PG input is given to the servo CPU module despite the Servopack TGON signal being turned on.

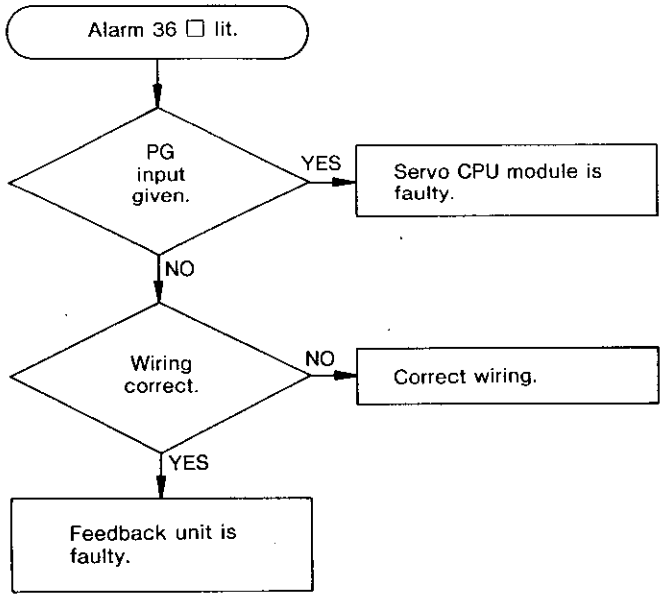


Fig. 2.17

· PG Waveforms (type ZC7)

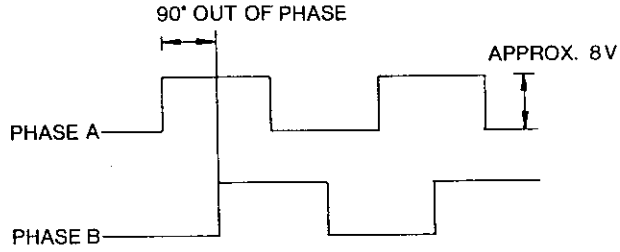


Fig. 2.18

· PG Waveforms (type ZD7)

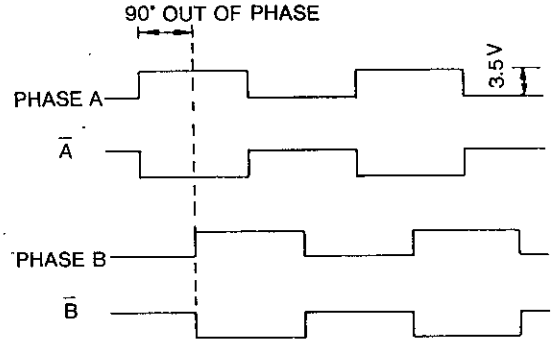
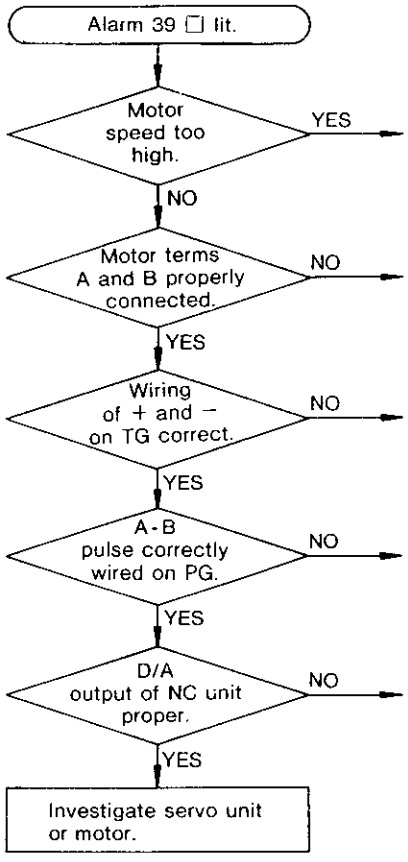


Fig. 2.19

(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 terminals. A and B should be connected to servo unit terminals. A and B, respectively.

If the rotation is counterclockwise viewed from drive end, motor terminals A and B should be connected to servo unit terminals 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 J 10 and J 11, respectively .

If the rotation is counterclockwise viewed from drive end, connect motor connecting pins L (G) and M (H) to TG pins J 11 and J 10, respectively.

If the rotation is clockwise viewed from drive end, connect motor connecting pins A and B to PG pins J 16 and J 18, respectively.

If the rotation is counterclockwise viewed from drive end, connect motor connecting pins A and B to PG pins J 18 and J 16, 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.

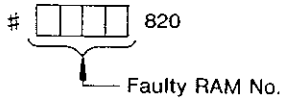
Fig. 2.20

(16) Alarm 810 (CPU error)

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

(17) Alarm 820

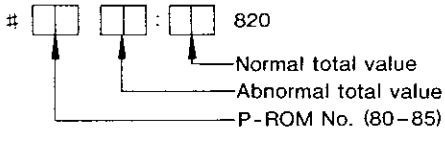
① RAM check error



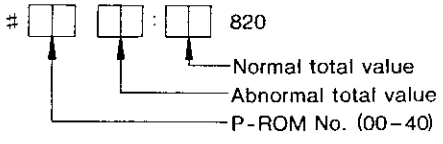
RAM No. and Location

RAM No.	Memory Module Type	Location on Module Board	RAM No.	Memory Module Type	Location on Module Board
# 100	MM 09	7 E	# 107	MM 09	3 D
# 101		7 D	# 108		2 E
# 102		6 E	# 109		2 D
# 103		6 D	# 110		1 E
# 104		5 E	# 111		1 D
# 105		5 D	# 500	CP 02	27 C
# 106		3 E	# 501	CP 02	27 A

② CP04 PROM error



③ MM09 PROM 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.

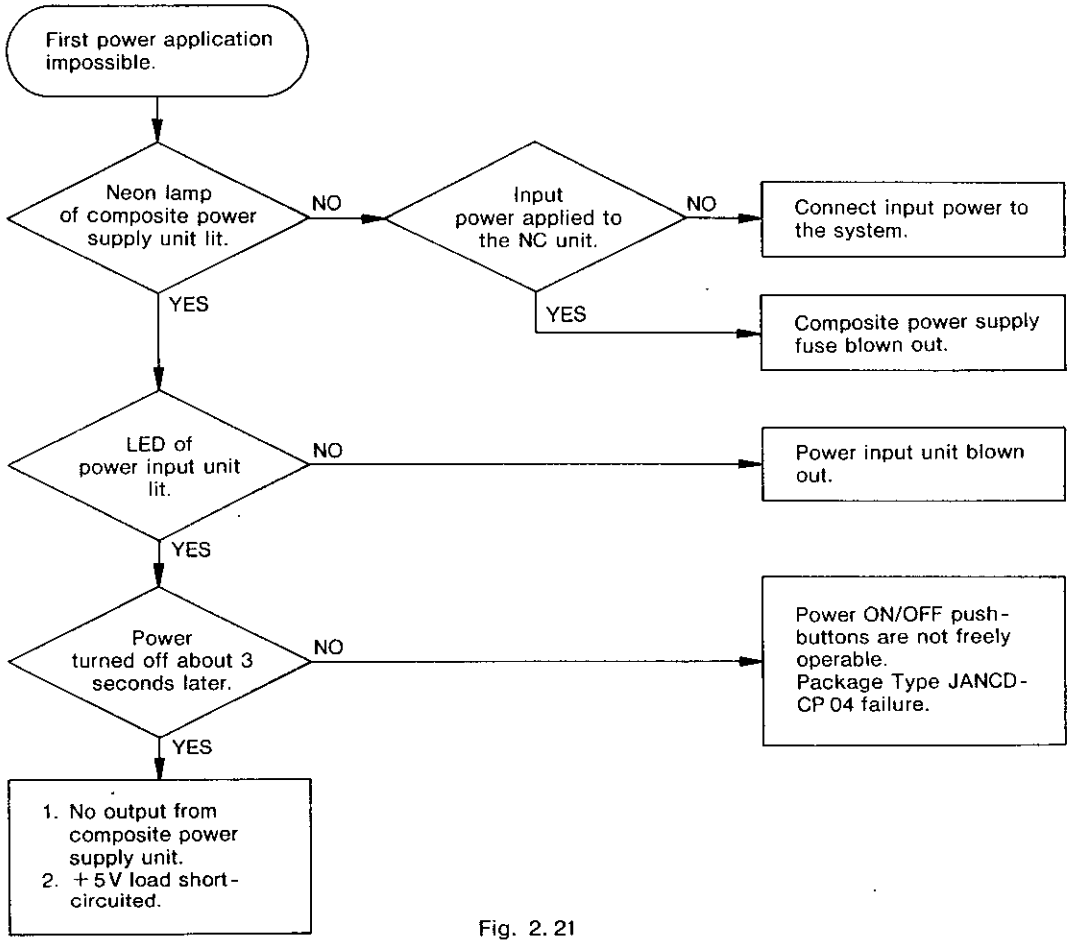


Fig. 2. 21

(2) CPU error (with no alarm No.)

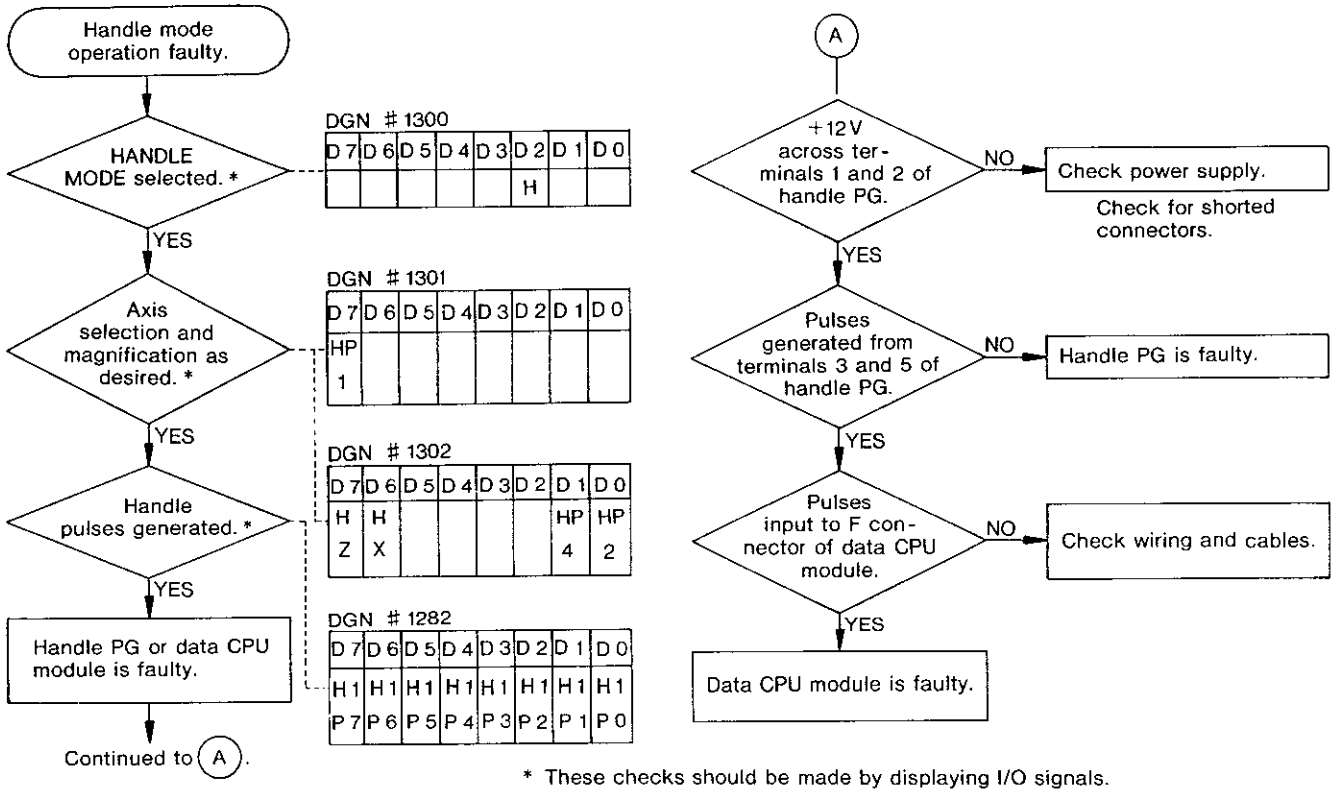
When CPU ERROR flashes on the CRT screen without indicating any error No., the CPU has malfunctioned and the watchdog timer has activated. Immediately contact YASNAC service personnel.

(3) No indication on the CRT screen

When the CRT screen remains blank after power is normally supplied, check the wiring to the operator's panel and the connector connection. If the cause cannot be found, contact YASNAC service personnel.

2. 3 TROUBLESHOOTING WITHOUT ALARM CODES (Cont'd)

(4) 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 # 6222 (maximum manual handle feedrate; 1 = 7.5 mm/min.)

Fig. 2. 22

· Handle PG Connection Diagram

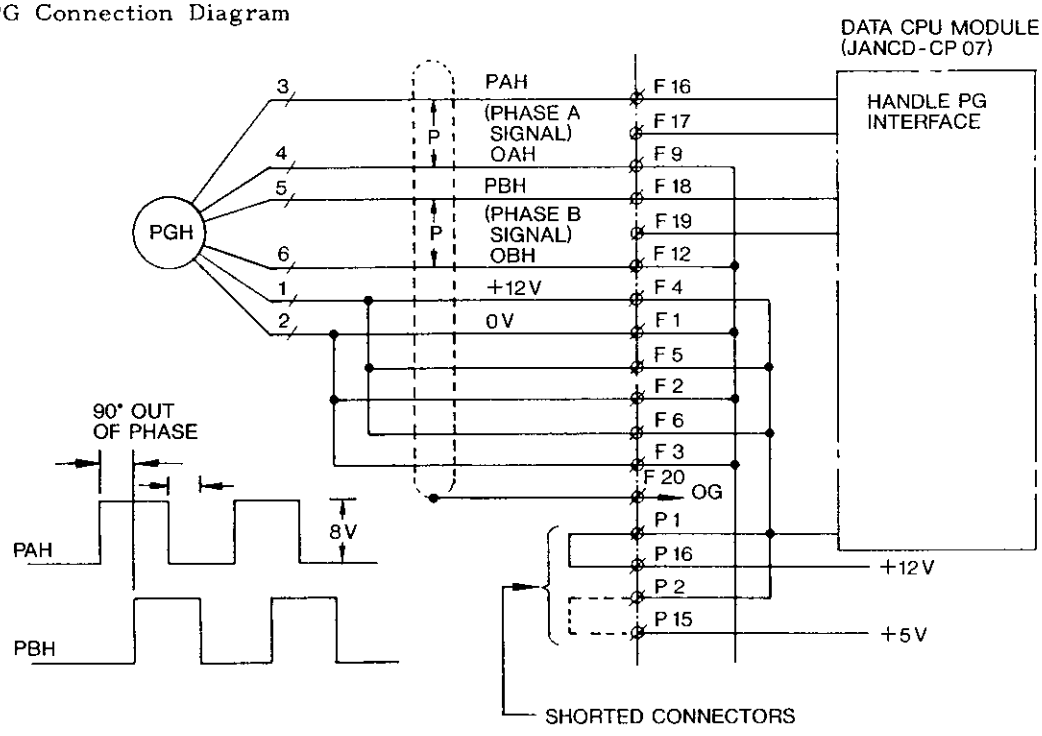


Fig. 2. 23

(5) Manual jog mode operation faulty

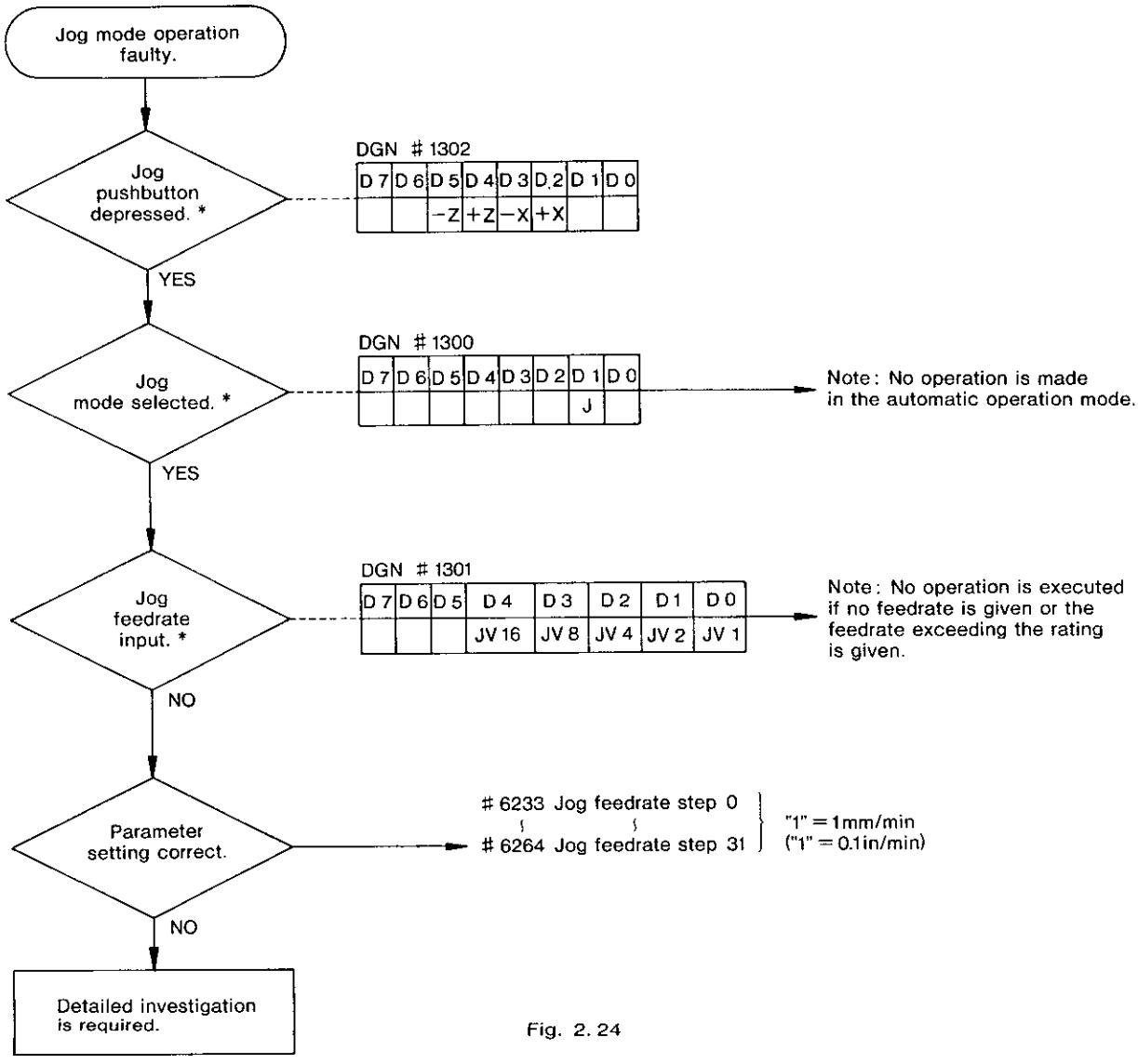


Fig. 2.24

* 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)

(6) Manual rapid mode operation faulty

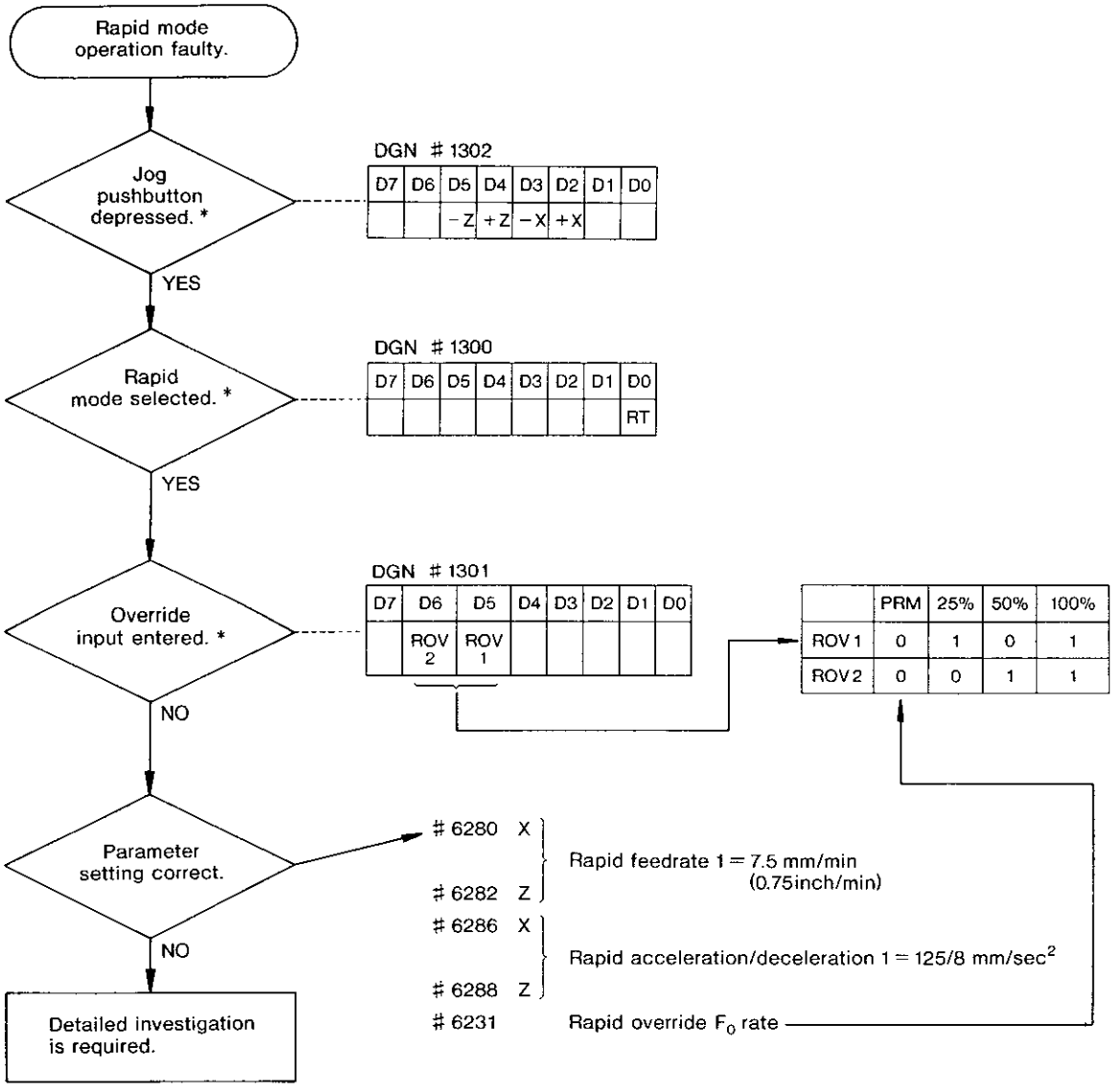


Fig. 2. 25

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

(7) Manual reference zero return operation faulty

(i)

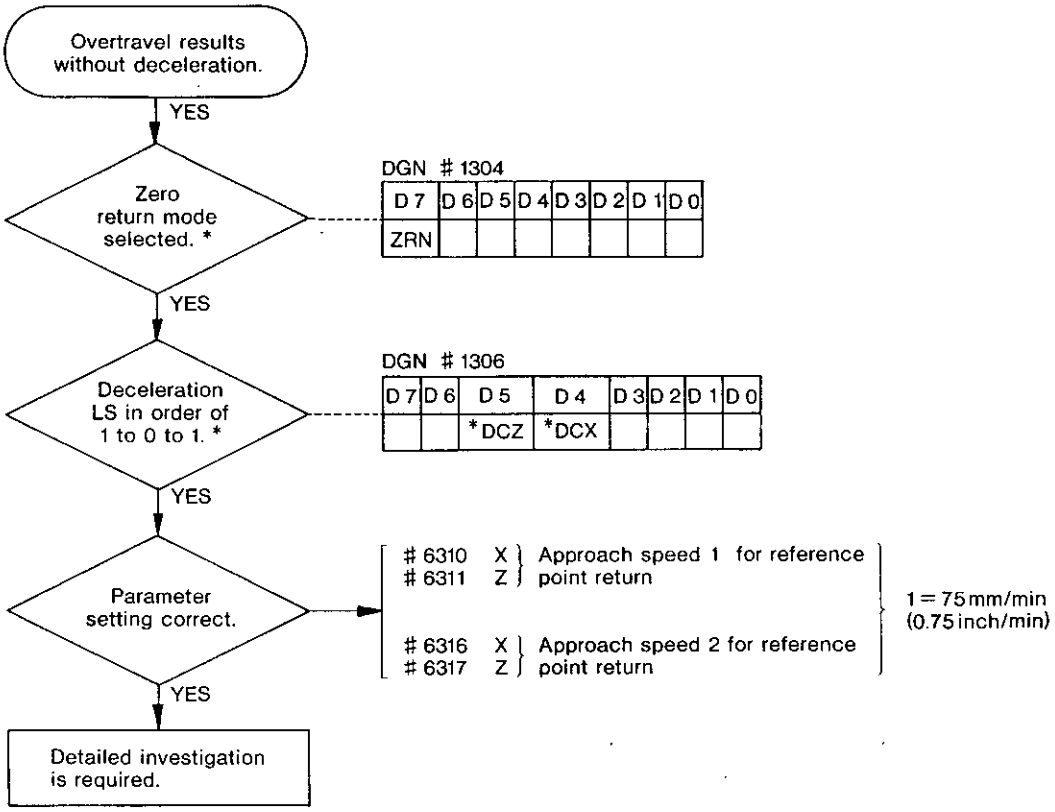


Fig 2. 26

(ii)

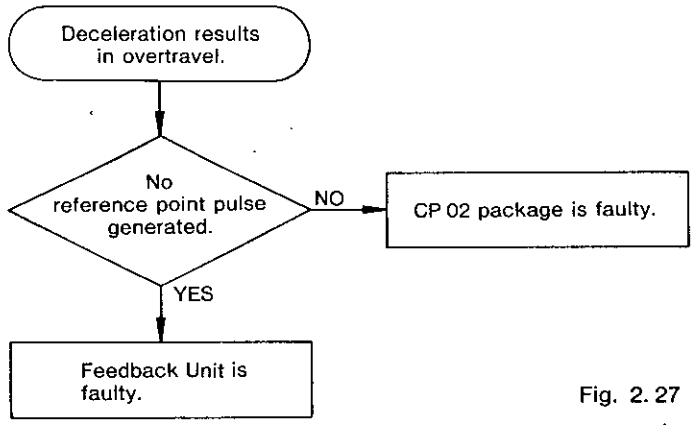
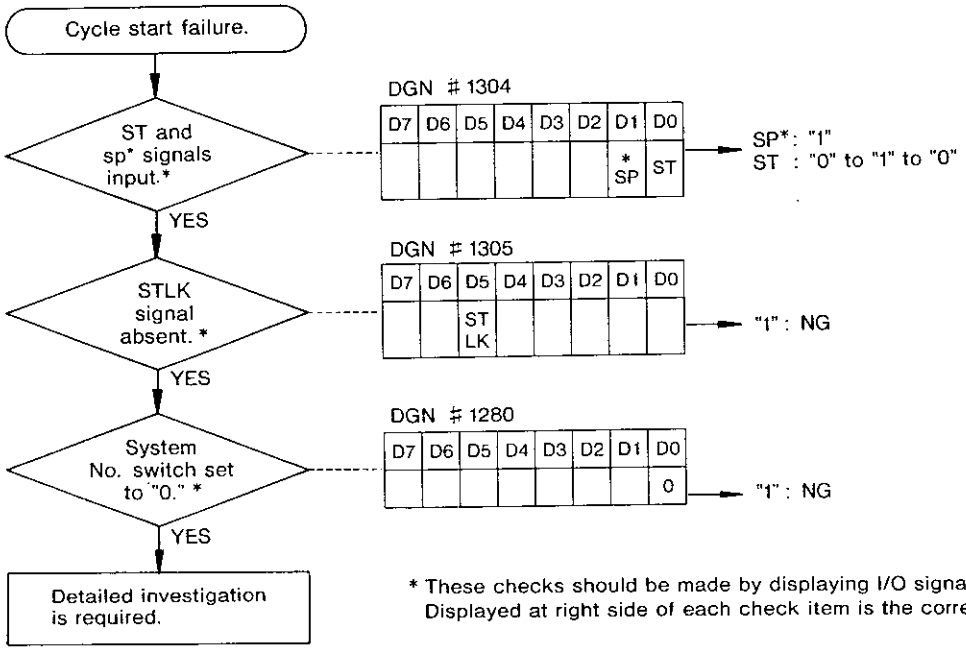


Fig. 2. 27

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

2.3 TROUBLESHOOTING WITHOUT ALARM CODES (Cont'd)

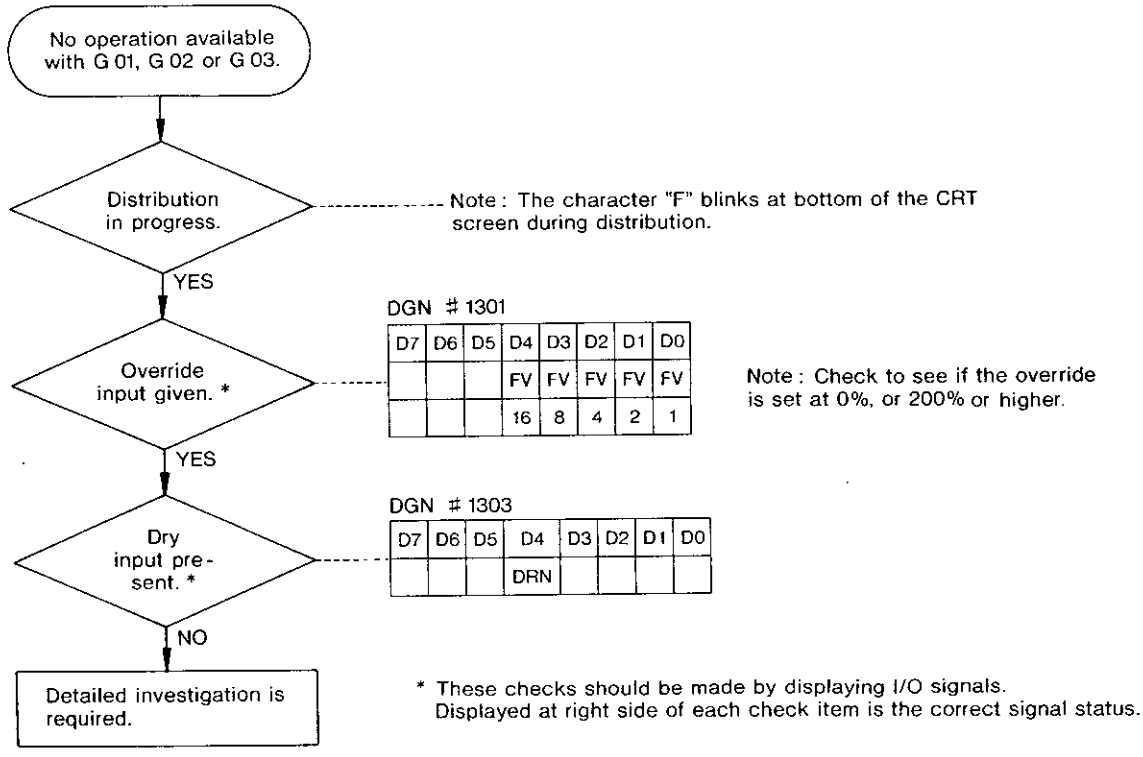
(8) Cycle start failure



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

Fig. 2.28

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



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

Fig. 2.29

(10) Spindle does not rotate.

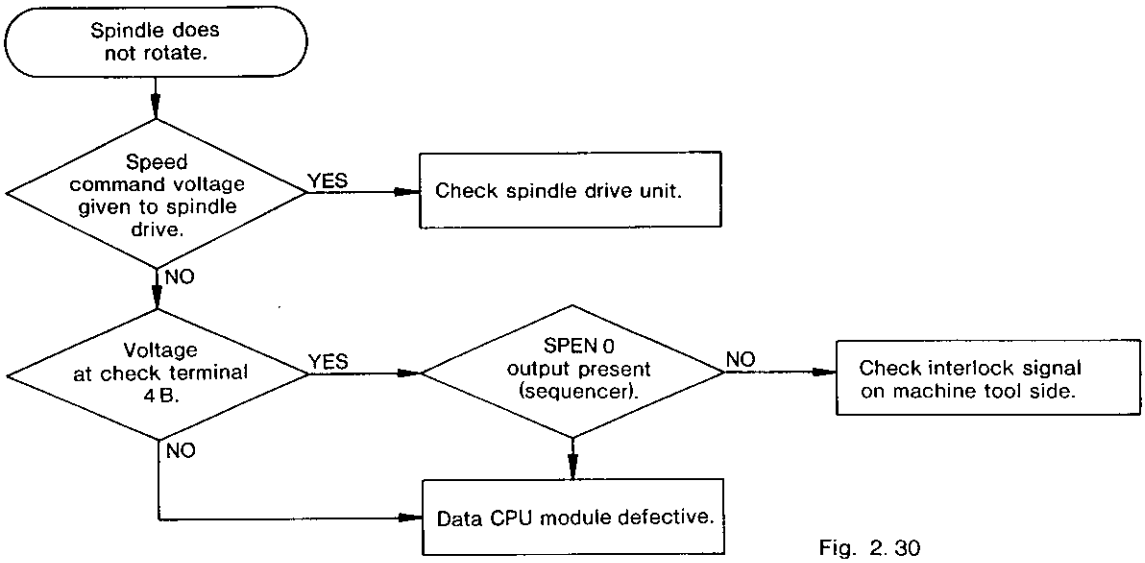


Fig. 2. 30

· Connection Diagram for Spindle

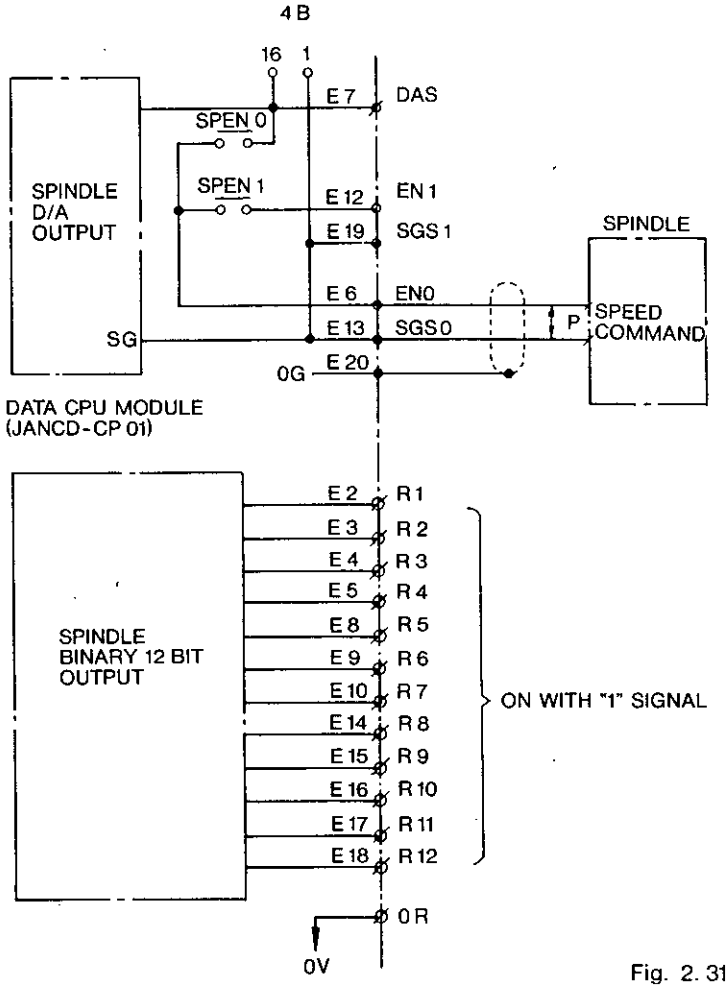


Fig. 2. 31

2.3 TROUBLESHOOTING WITHOUT ALARM CODES (Cont'd)

(11) The 9-inch CRT screen brightness adjustment

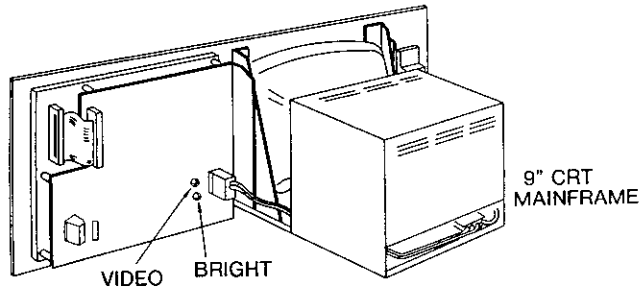


Fig. 2.32 9" CRT Screen Brightness Adjustment

The screen brightness can be adjusted by BRIGHT control to satisfy the desire of the user.

- BRIGHT: adjusts brightness
- VIDEO: adjusts contrast

Do not adjust the contrast unless there is a critical need.

2.4 ACGC MAINTENANCE

2.4.1 ACGC TROUBLE SERVICE ACTIVITY

The ACGC may fail as the result of one of the following:

(1) Hardware fault

(2) System software fault

(3) Application program fault

For (1) and (2), contact your YASNAC service personnel.

When the cause seems to be application program, contact the service agent of the applicable machine tool company.

2.4.2 ACGC ALARM INDICATION

(1) YASNAC system equipped with ACGC, a machine-triggered alarm may appear. For details of the alarm, refer to the Instruction Manual of the machine tool company.

(2) When no machine-triggered alarm appears, the screen indicates the alarm code for same content as for the "9-inch CRT NC operator's panel." For details, refer to para. 2.2 Trouble Shooting by Alarm Code.

(3) ACGC performs self-diagnosis and data check, and any trouble in ACGC is indicated by an alarm. Table 2.3 describes the alarms of ACGC.

Table 2.2 List of ACGC Alarms

Alarm Indication and Cause	Action
SYSTEM PROM TOTAL ERROR : ☐ The PROM containing the system software is faulty. The faulty PROM No. appears on ☐.	Contact YASNAC Personnel.
+12V/−12V POWER DOWN The power supply for RS232C interface is faulty.	Contact YASNAC personnel.
PARAMETER ERROR The parameter value indicating the bubble memory capacity stored in the bubble memory differs from the parameter value the ACGC has.	Initialize the bubble memory correctly.
BUBBLE ERROR : ☐ The bubble memory does not operate correctly. The detail of the bubble memory error appears on ☐. The possible cause may be a fault of the bubble memory, DC power unit, or graphic module (CG 02).	Contact YASNAC personnel.
BUBBLE READ ERROR When the bubble loader is used, the content of the bubble memory differs from that of the bubble loader.	The bubble loader is a maintenance device which is operated by YASNAC service personnel or machine tool manufacturer.

2.4.3 FAULTS NOT DISPLAYED BY ACGC ALARM INDICATION

(1) CRT screen remains blank:

If nothing appears on the CRT screen after power is turned on, check the following:

① AC power supply, e.g. one phase is open.

② CRT fuse blown.

③ Supply voltage at the ACGC rear panel terminal is 230 VAC ±15%.

④ DC supply in ACGC is normal. (Voltages are +5 V, +12 V, and -12 V.)

⑤ Wiring between the PCB and CRT is correct.

After checking these items, turn on power again. If the normal operation cannot be achieved, contact your YASNAC service personnel.

(2) No keyboard operation is accepted (hang up)

(a) Although message may appear on the CRT screen after power is turned on, no keyboard operation is accepted:

① Check keyboard wiring for loose or open connections.

② Check the terminals of the DC supply unit for +5 V, +12 V, and -12 V.

③ Depress a key and check for a beep.

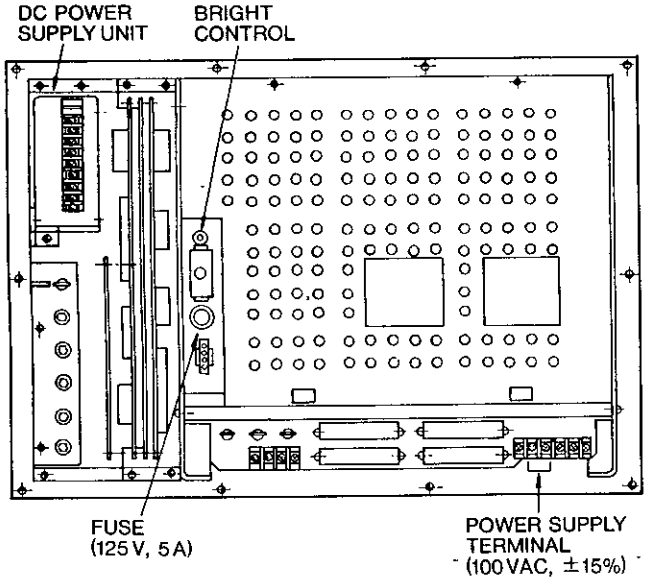


Fig. 2.33 Rear View of ACGC Unit

CAUTION

The brightness has been preset to the best condition at the factory. Adjustments may be made to compensate for local light conditions. If the bright control is maintained at a high setting, it may reduce the life of that circuit.

2.4.4 SOFTWARE VERSION INDICATION

If memory-related hardware, such as the bubble memory, fails, it is often desirable, after repair, to recover the stored software. For easy identification, software is managed with a version number, and can be determined by one of two methods:

(1) Indicated on "System No. Label" on the nameplate on the back of the CRT.

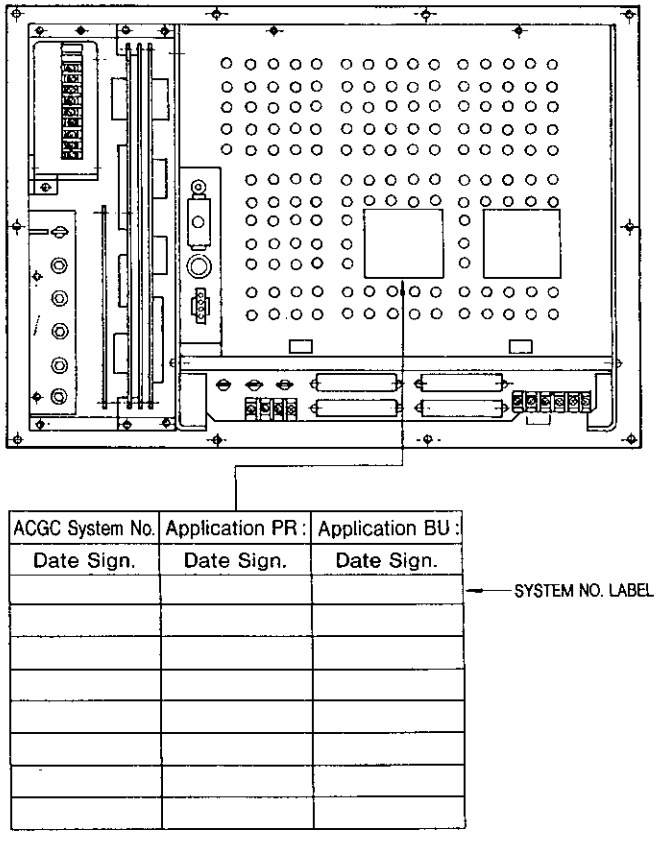


Fig 2.34 Nameplate On Back of CRT

2. 4. 4 SOFTWARE VERSION INDICATION (Cont'd)

(2) Displayed on the CRT screen

(a) A sample indication in NC mode is shown below. This appears only when power is turned on.

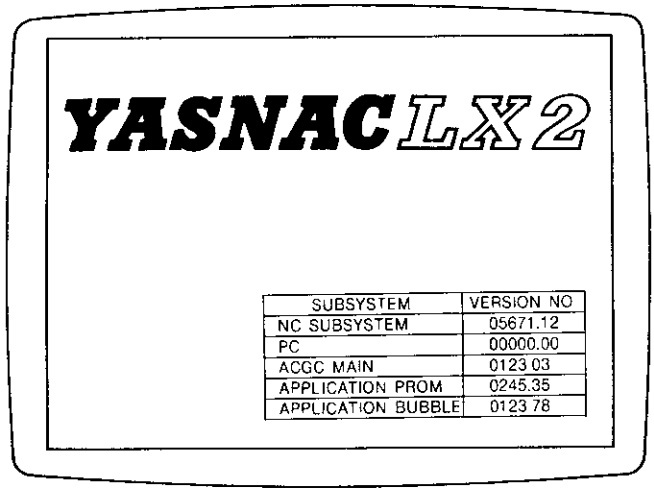


Fig. 2. 35 Sample of Various, Software Version Nos. in NC Mode

(b) A sample indication in ACGC mode is shown below.

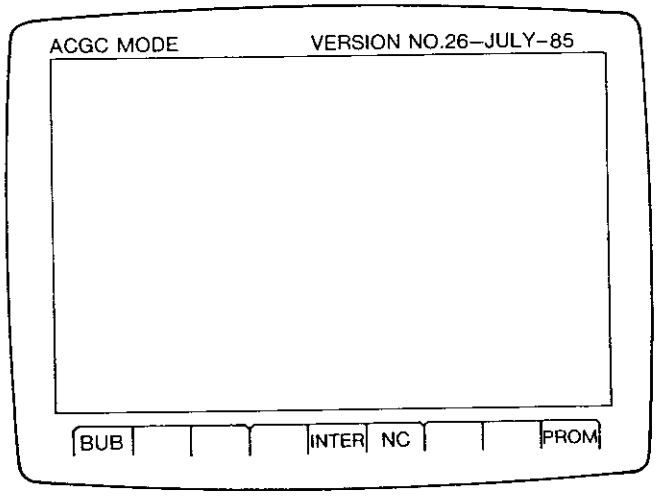
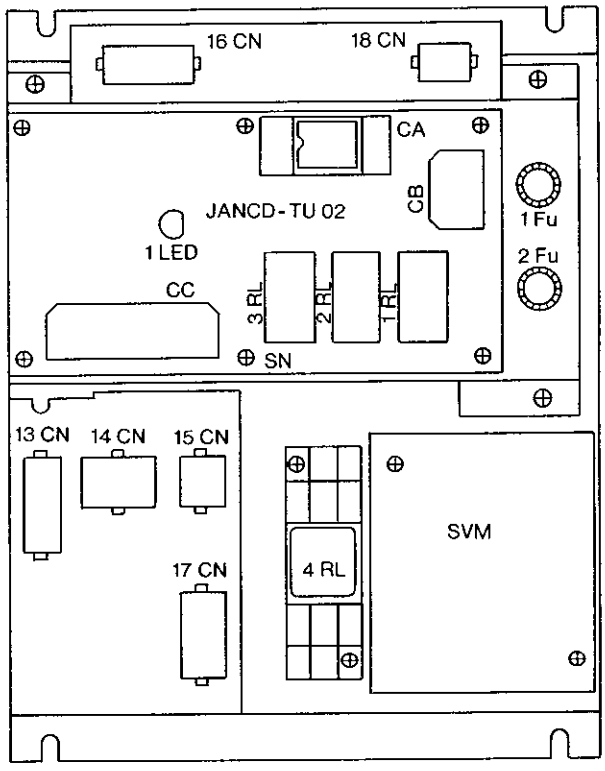


Fig. 2. 36 Sample of ACGC Main Software Version Nos. in ACGC Mode

When memory-related hardware fails, notify the service agent of machine tool manufacturer or your YASNAC service office and report the latest version number of the related software.

2. 5 SUPPLY VOLTAGE CHECK

2. 5. 1 CHECK POWER SUPPLY VOLTAGE



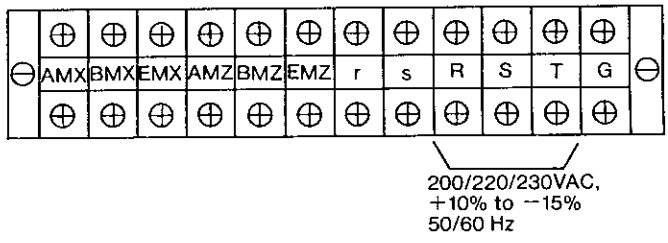


Fig. 2. 37 I/O Power Terminal

2. 5. 2 DC POWER SUPPLY VOLTAGE CHECK

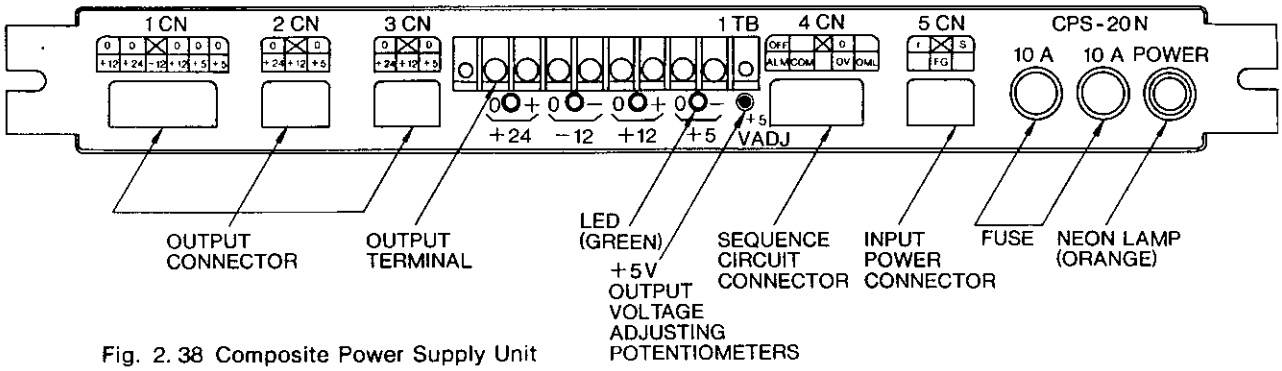


Fig. 2. 38 Composite Power Supply Unit

NEON lamp is lit when the NC unit is powered. It will be distinguished if any of the two glass-encased fuses is blown out.

Input Power Supply Voltage (r and s of 5CN)

200/220 VAC ±15%, 50/60 Hz ±2 Hz

Specifications of Composite Power Supply Unit

Table 2. 3

Rated Output	Rated Current	Applicable Voltage Range	Application
+5V	22A	5.0 – 5.25V	Logic circuitry, Read relay
+24V	3A	22.08 – 26.4V	CRT, tape reader, I/O signals
+12V	2.5A	11.4 – 12.6V	CRT, memory, Position control circuitry
−12V	0.5A	−12.0 – −13.8V	Position control circuitry

2. 6 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. 6. 1 OUTLINE OF DISPLAYS

Table 2. 4

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 in meaning depending on each power sequence program. Read the machine tool builder's manual.

2.6.2 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.

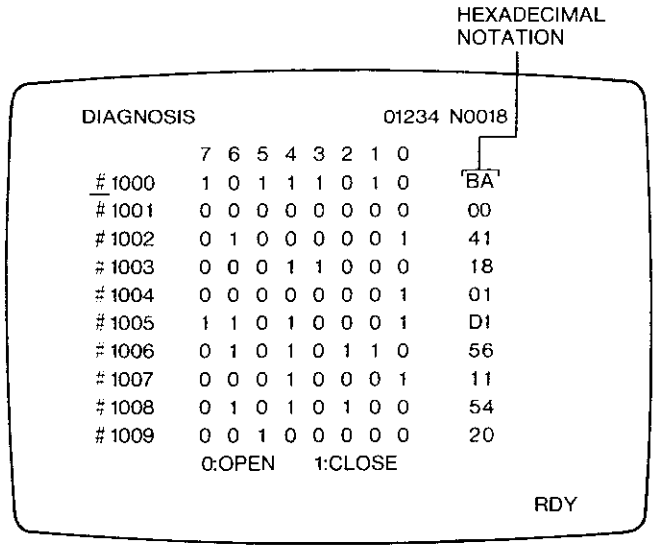


Fig. 2.39 Example of Input/Output Signal Display

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 pre- vious 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.

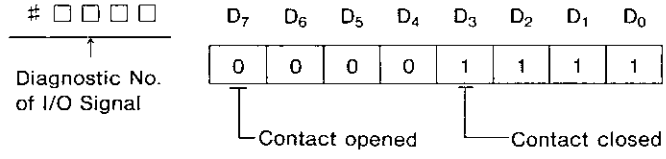
   The next page will be displayed.

6. Depress the [↑ PAGE] key.

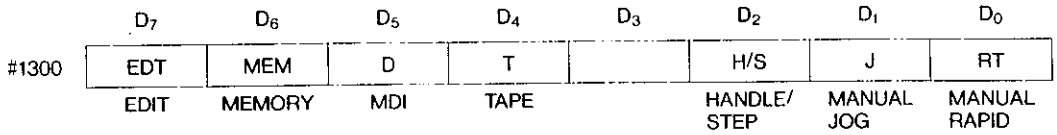
   The previous page will be displayed.

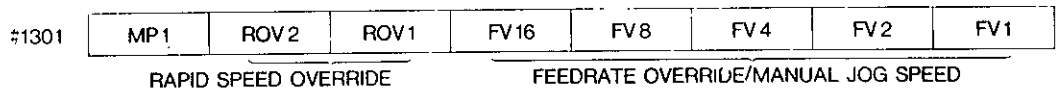
2.6.3 LIST OF STANDARD INPUT/OUTPUT SIGNALS

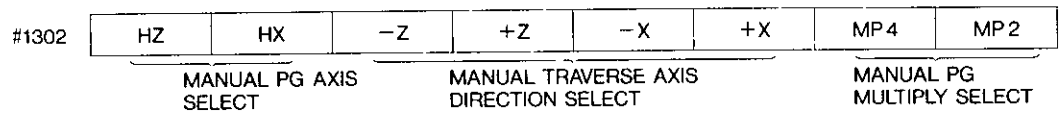
Refer to machine tool builder's manual.

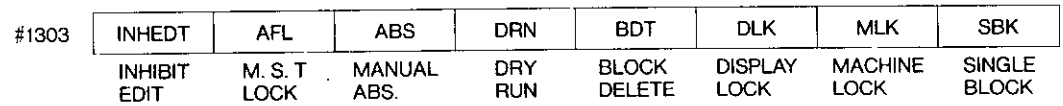


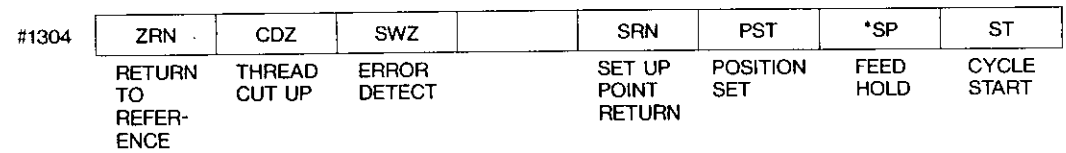
Input Signals

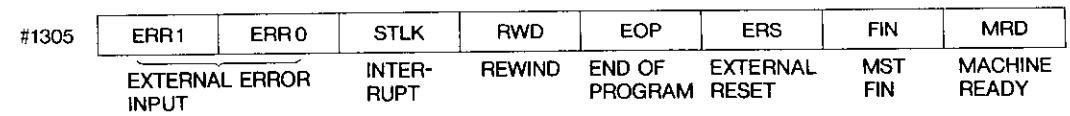


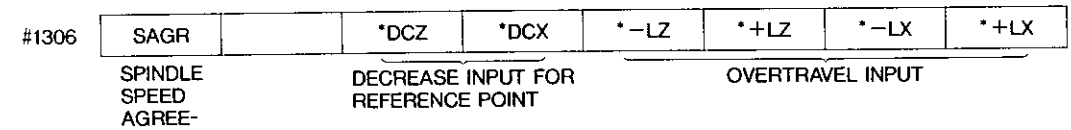


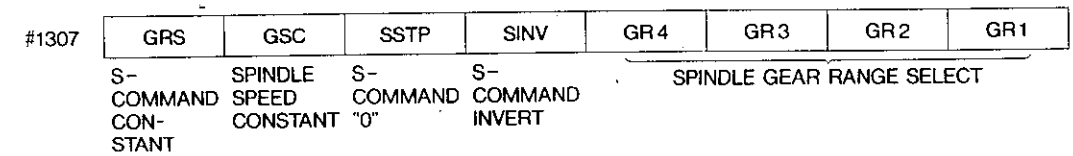






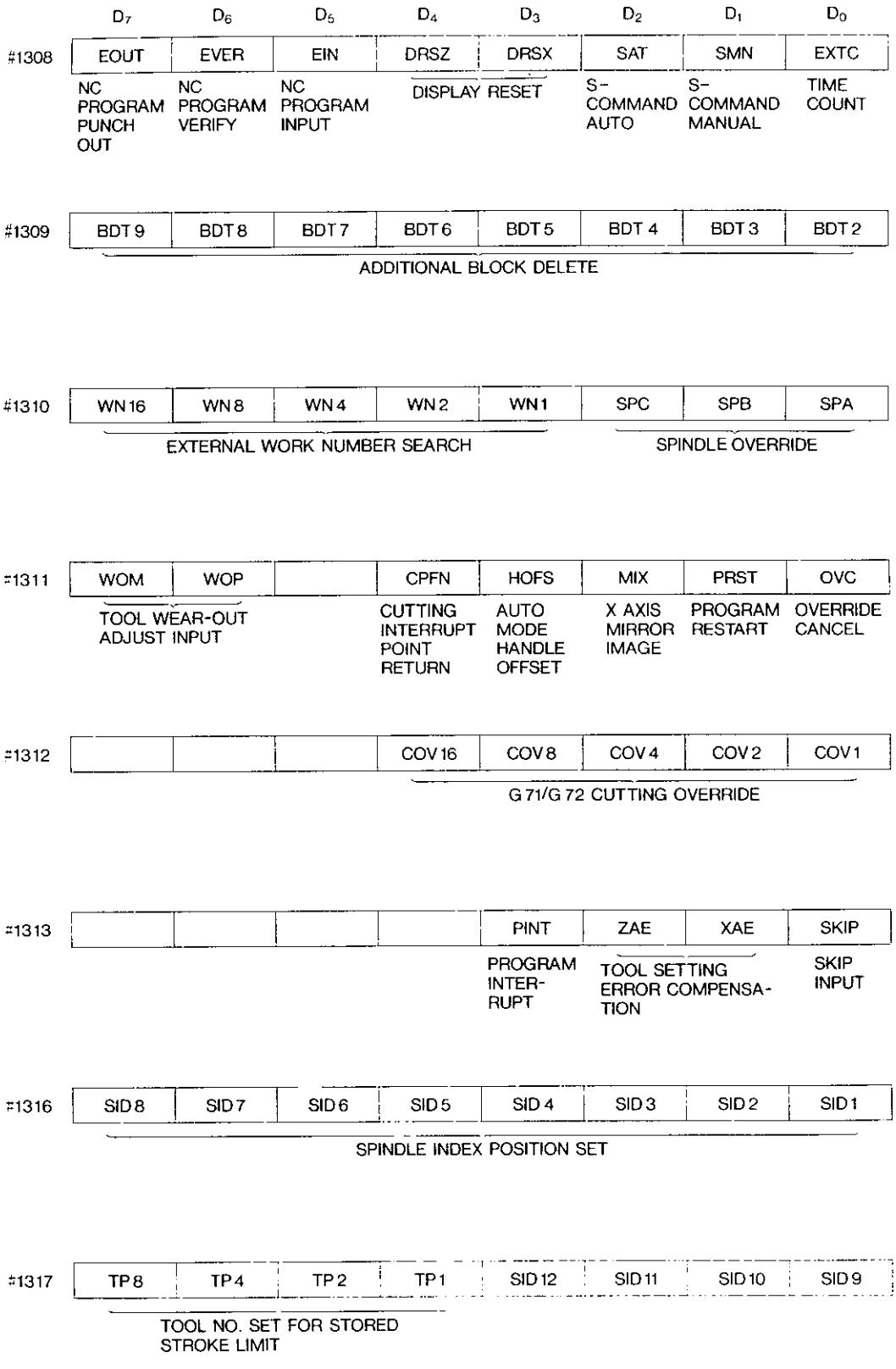




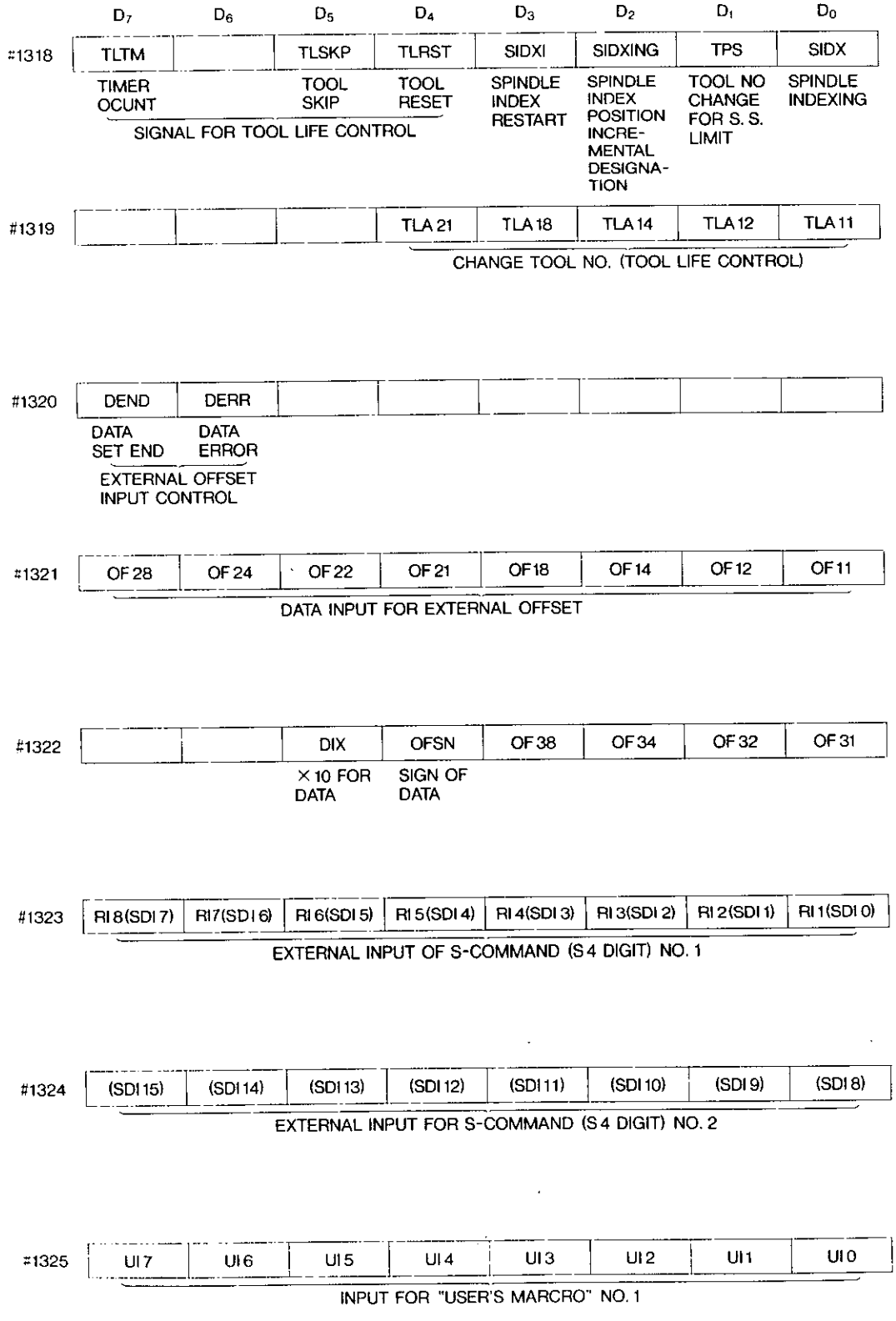


2. 6. 3 LIST OF STANDARD INPUT/OUTPUT SIGNALS (Cont'd)

Input Signals



Input Signals



2. 6. 3 LIST OF STANDARD INPUT/OUTPUT SIGNALS (Cont'd)

Input Signals

	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
#1326	UI15	UI14	UI13	UI12	UI11	UI10	UI9	UI8

INPUT FOR "USER'S MACRO" NO. 2

#1327	ED7	ED6	ED5	ED4	ED3	ED2	ED1	ED0

EXTERNAL DATA INPUT NO. 1

#1328	ED15	ED14	ED13	ED12	ED11	ED10	ED9	ED8

EXTERNAL DATA INPUT NO. 2

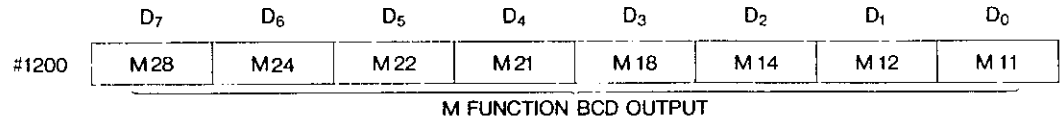
#1329	EDCL	EDS2	EDS1	EDS0	EDSD	EDSC	EDSB	EDSA

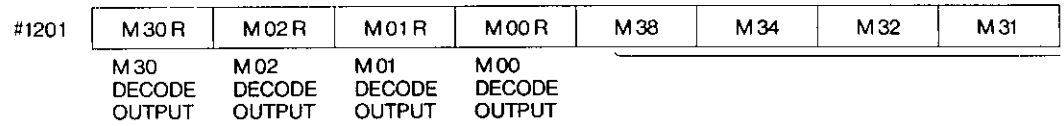
CONTROL SIGNAL FOR EXTERNAL DATA INPUT

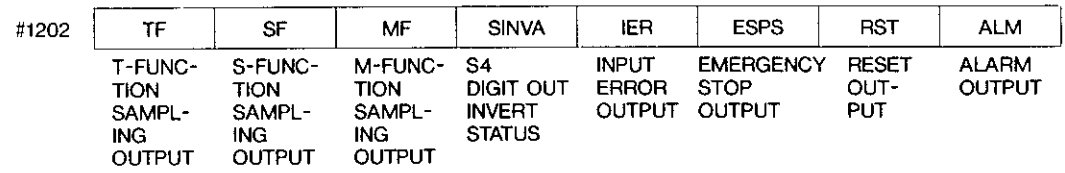
#1330								

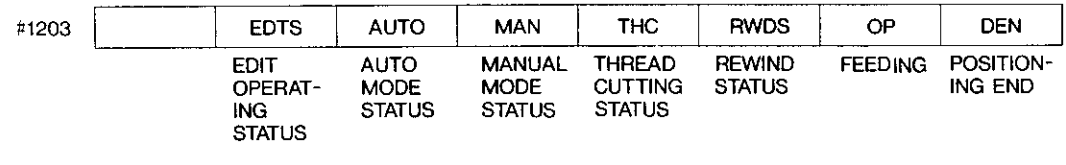
#1331								

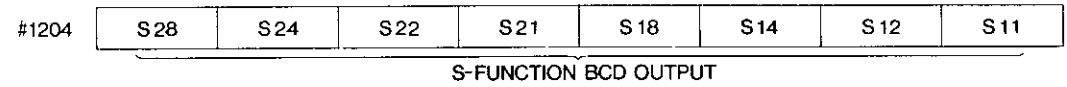
Output Signals

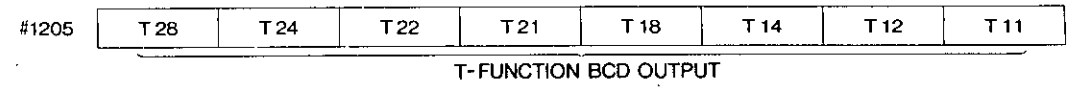


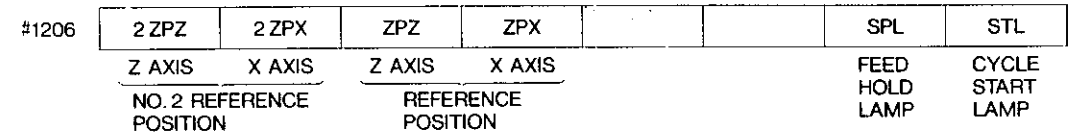


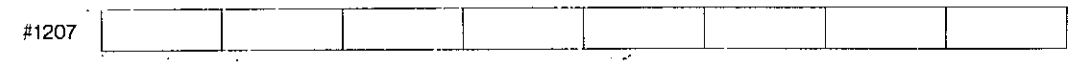












Output Signals

	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
#1216	R08 (SDD 7)	R07 (SDD 6)	R06 (SDD 5)	R05 (SDD 4)	R04 (SDD 3)	R03 (SDD 2)	R02 (SDD 1)	R01 (SDD 0)

EXTERNAL OUTPUT FOR S-COMMAND (S 4 DIGIT) NO. 1

#1217	(SDD 15)	(SDD 14)	(SDD 13)	(SDD 12)	RO 12 (SDD 11)	RO 11 (SDD 10)	RO 10 (SDD 9)	RO 9 (SDD 8)

EXTERNAL OUTPUT FOR S-COMMAND (S 4 DIGIT) NO. 2

#1218	REND	ZSTB	XSTB					

REND: EXTERNAL OFFSET INPUT READ END

ZSTB: Z AXIS EXTERNAL OFFSET INPUT STROBE

XSTB: X AXIS EXTERNAL OFFSET INPUT STROBE

#1219	ESEND	EREND			TLCH	SIDXO	TPSA	SIDXA

ESEND: EXTERNAL DATA SEARCH COMPLETION

EREND: EXTERNAL DATA INPUT COMPLETION

TLCH: TOOL CHANGE COMMAND (TOOL LIFE CONTROL)

SIDXO: SPINDLE INDEX EXECUTING

TPSA: S. 5. LIMIT AREA CHANGE END

SIDXA: SPINDLE INDEX END

#1220	UO 7	UO 6	UO 5	UO 4	UO 3	UO 2	UO 1	UO 0

OUTPUT FOR "USER'S MACRO" NO. 1

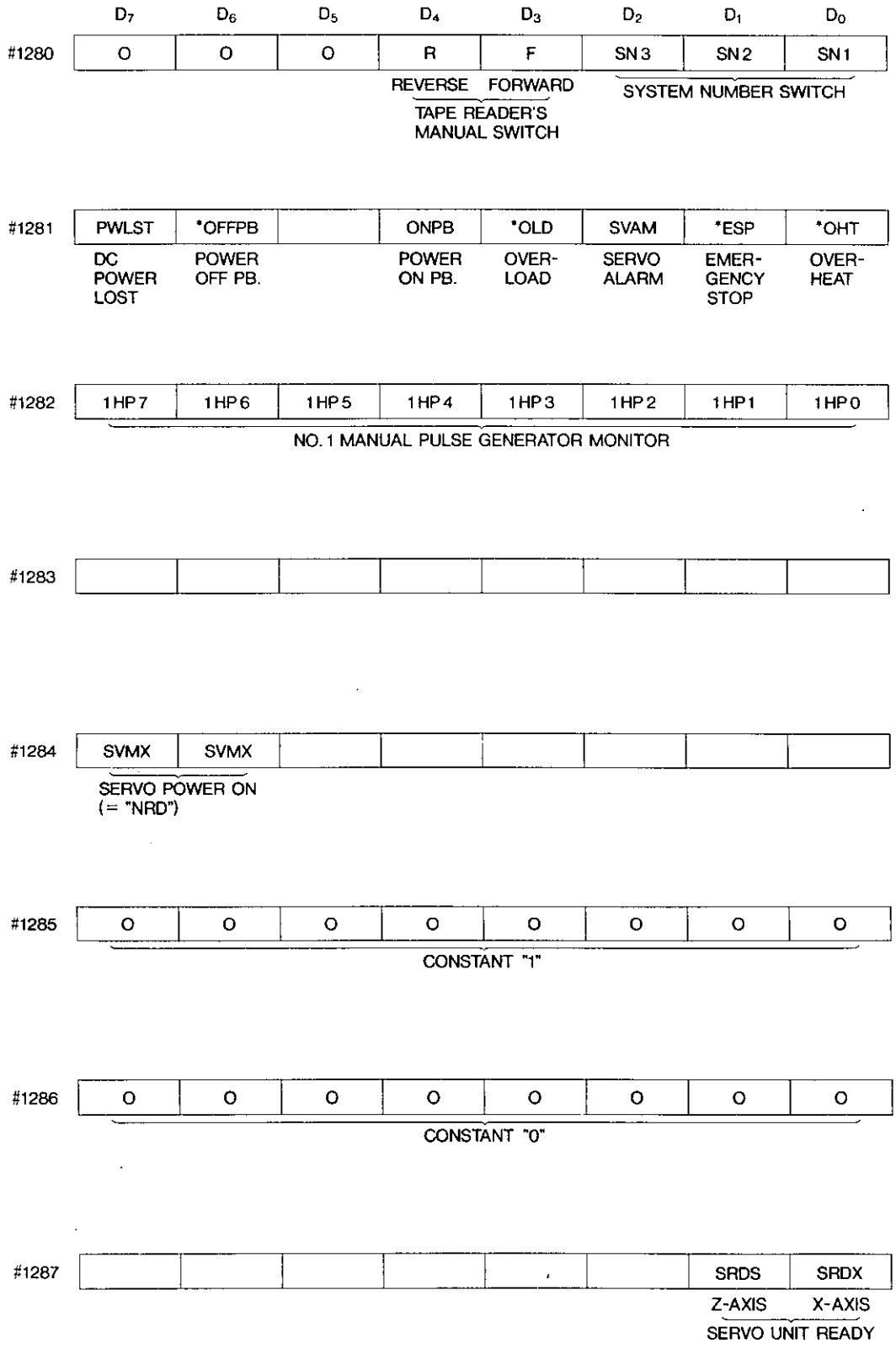
#1221	UO 15	UO 14	UO 13	UO 12	UO 11	UO 10	UO 9	UO 8

OUTPUT FOR "USER'S MACRO" NO. 2

#1222								

#1223								

Output Signals



2.6.3 LIST OF STANDARD INPUT/OUTPUT SIGNALS (Cont'd)

Output Signals

	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
#1288	ALMX	PGALMX	SERX	*TGONX	ALX	OLX	FUX	SRDX
	SERVO ALARM OF X AXIS (TOTAL)	PG ALARM OF X AXIS	SERVO ERROR OF X AXIS	MONITOR FOR SERVO UNIT OF X AXIS				
#1289	ALMX	PGALMZ	SERZ	*TGONZ	ALZ	OLZ	FUZ	SRDZ
	SERVO ALARM OF Z AXIS (TOTAL)	PG ALARM OF Z AXIS	SERVO ERROR OF Z AXIS	MONITOR FOR SERVO UNIT OF Z AXIS				
#1290								
#1291								
#1292								
#1293								
#1294	ALM28	ALM24	ALM22	ALM21	ALM18	ALM14	ALM12	ALM11
	ALARM CODE MONITOR							
#1295					ALM38	ALM34	ALM32	ALM31

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 tighteness.
- Check the cables and lead bunch inside the cabinet for damage.

(2) Check screw terminals for loose connections.

- Power input unit terminal block
- 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.

3.1 ADJUSTMENT PROCEDURES (Cont'd)

(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 short-circuited. Check for short-circuit between:

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

(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.
- Vefify the output voltages of the composite power supply unit.

Rated Output	Output Voltage Range
+ 5 V	4.75 to 5.25 V
+ 12 V	11.4 to 12.6 V
− 12 V	− 12.0 to − 13.8 V
+ 24 V	22.8 to 25.2 V

+5 V output is adjusted so that +5 V can be obtained at voltage check terminal of memory module.

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

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

(12) Perform a second power application.

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

- An alarm, if displayed, should be dealt with 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") of a servo position deviation value.
4. After adjustment, set the system No. switch 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 alarm 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 rapid 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 (2T)

When a control transformer (2T) 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

Supply Voltage	Tap Connections Transformer Primary Side
200 V	R-3, 3-7, 7-24, 24-20 S-11, 11-15, 15-8, 8-4 T-19, 19-23, 23-16, 16-12
220 / 240 V	R-2, 2-6, 6-24, 24-20 S-10, 10-14, 14-8, 8-4 T-18, 18-22, 22-16, 16-12
380 V	R-3, 4-7, 8-11 S-11, 12-15, 16-19 T-19, 20-23, 24-3
420 V	R-3, 4-6, 8-11 S-11, 12-14, 16-19 T-19 , 20-22, 24-3
460 / 480 V	R-2, 4-6, 8-10 S-10, 12-14, 16-8 T-18, 20-22, 24-2
550 V	R-1, 4-5, 8-9 S-9, 12-13, 16-17 T-17, 20-21, 24-1

3. 2. 2 TAP CHANGING ON CONTROL TRANSFORMER

When a control transformer 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.

Transformer Terminals

1	2	3	4	5	6	7	8
275	230	190	0	275	230	190	0

Table 3. 3 Transformer Tap Connections according to Supply Voltage

Supply Voltage	Tap Connections Transformer Primary Side
200 V	R-3, 3-7, 4-8 T-8
220 / 240 V	R-2, 2-6, 4-8 T-8
380 V	R-3, 4-7 T-8
420 V	R-3, 4-6 T-8
460 / 480 V	R-2, 4-6 T-8
550 V	R-1, 4-5 T-8

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.

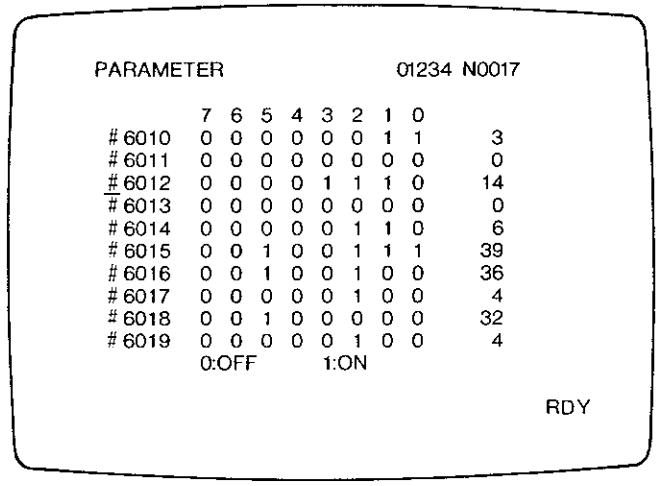


Fig. 3.1 Typical Parameter Display (in binary digits)

Parameters #6005 to #6049 are displayed in binary digits.

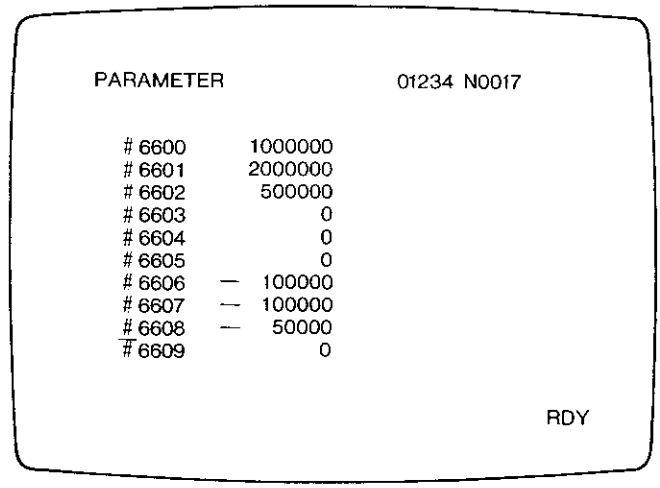


Fig. 3.2 Typical Parameter Display (in decimal digits)

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 WRITING PARAMETER DATA

Set the system No. switch to "1."

For display in binary disgits

1. Specify a desired parameter number.

2. Depress the INSRT key. The cursor will move from the parameter number to the binary digit display, indicating the bit position of D7 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).

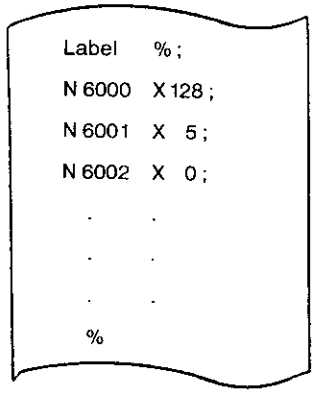
For display in decimal disgits

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 system No. switch back to "0."

3.3.4 TAPE INPUT OF SETTING DATA AND PARAMETER DATA

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

(1) The tape format is as follows:



Note:
"%" is used in the ISO code and "ER" in the EIA code.

Fig. 3.3

(2) The input operation procedure is as follows: Set the system No. switch to "1."

(a) Select the EDIT mode.

(b) Depress the [PRM] key.

(c) Set the setting/parameter data tape onto the tape reader.

(d) Depress the [RESET] key.

(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. Set the system No. switch back to "0."

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 [PRM] key.
3. Depress the [RESET] key.
4. Depress the [OUT] key. The setting and parameter data will be continuously punched out.
5. To interrupt the punching operation, depress the [RESET] key.

   Punching cannot be resumed. Restart operations from the beginning after interruption.

3.3.6 LIST OF SETTING NUMBERS

#6000	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

INHEDTT D_7

1: Turns on Edit Lock function.
0: Turns off Edit Lock function.

AFLT D_6

1: Turns on Auxiliary Function Lock.
0: Turns off Auxiliary Function Lock.

ABST D_5

1: Turns on Manual Absolute function.
0: Turns off Manual Absolute function.

DRNT D_4

1: Turns on Dry Run function.
0: Turns off Dry Run function.

BDTT D_3

1: Turns on Block Delete function.
0: Turns off Block Delete function.

DLKT D_2

1: Turns on Display Lock function.
0: Turns off Display Lock function.

MLKT D_1

1: Turns on Machine Lock function.
0: Turns off Machine Lock function.

SBKT D_0

1: Turns on Single Block function.
0: Turns off Single Block function.

Notes:

1. These settings are for setting internal toggle switches.
2. When each switch is provided with machine control station, the logical sum of these settings and toggle switch setting determines function on/off state.

Internal toggle switch	OFF	ON	OFF	ON
Toggle switch on machine	OFF	OFF	ON	ON
Resultant ON/OFF state	OFF	ON	ON	ON

#6001	D_7					D_2	D_1	D_0

BUZON D_7

1: Turns on touch buzzer (key switch on operator's panel).
0: Turns off touch buzzer.

SLT 3: D_2

1: Effective on the third Stored Stroke Limit.
0: Ineffective on the third Stored Stroke Limit.

The value of limit automatically changes by G38 or G39 command in part program.

SLT 2: D_1

1: Effective on the second Stored Stroke Limit.
0: Ineffective on the second Stored Stroke Limit.

The value of limit automatically changes by G36 or G37 command in part program.

INCHMM D_0

1: Selects inch input increment.
0: Selects metric input increment.

#6002	D_7	D_6	D_5	D_4				

ISOEIA D_7

1: Punches out tape code with ISO code.
0: Punches out tape code with EIA code.

TVCHK D_6

1: Executes TV check.
0: Does not execute TV check.

UMO9000E D_5

1: Effective on the edit interlock in O9000's.
0: Ineffective on the edit interlock in O9000's.

UMO8000E D_4

1: Effective on the edit interlock in O8000's
0: Ineffective on the edit interlock in O8000's.

#6003			D_5	D_4			D_1	D_0

D_5, D_4
ODVCE 1: Selects the output device of data
ODVCE 0: I/O interface.
D_1, D_0
IDVCE 1: Selects the input device of data
IDVCE 0: I/O interface

Setting Code		I/O Device No.	Input Device	Output Device	Parameter No. requiring Baud Rate Setting
0	0	0	Tape reader	FACIT PUNCHER	–
0	1	1	RS232C	RS232C ASR33/43	#6026 #6028
1	0	2	RS422	RS422	#6027 #6029

#6004	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

COV16I(D_7), COV8I(D_6), COV4I(D_5), COV2I(D_4), COV1I(D_3):

Sets the override of cut depth for Stock Removal in Turning (G71) and Stock Removal in Facing (G72) cycles.

COV16I	COV8I	COV4I	COV2I	COV1I	Cut Depth Override
0	0	0	0	0	0%
0	0	0	0	1	10%
0	0	0	1	0	20%
0	0	0	1	1	30%
0	0	1	0	0	40%
0	0	1	0	1	50%
0	0	1	1	0	60%
0	0	1	1	1	70%
0	1	0	0	0	80%
0	1	0	0	1	90%
0	1	0	1	0	100%
0	1	0	1	1	110%
0	1	1	0	0	120%
0	1	1	0	1	130%
0	1	1	1	0	140%
0	1	1	1	1	150%
1	0	0	0	0	160%
1	0	0	0	1	170%
1	0	0	1	0	180%
1	0	0	1	1	190%
1	0	1	0	0	200%

Note: These settings are effective when parameter #6023 D_2 (COVP) is "0."

UMO8000 D_2

1: Inhibits editing and punchout operations of the part program of program No. 8000 to 8999.
0: Permits editing and punchout operations.

UMSBK D_1

1: Makes Single Block Stop effective for the programs in user macro when single block input is on.
0: Does not permit Single Block Stop for the user macro blocks commanding operation and control.

SKIPIN D_0

1: Executes the next block when the skip signal is not given before completion of movement of block including Skip Function (G31).
0: Alarm "087" is displayed.

#6161	TG1LF
#6162	TG2LF
#6163	TG3LF
#6164	TG4LF
#6165	TG5LF
#6166	TG6LF
#6167	TG7LF
#6168	TG8LF
#6169	TG9LF

TG1LF to TG9LF:

Individual life expectancy for tools in groups 1 to 9 is set by part program.

Setting range: 0 - 9999 (Tool life control)
Setting: "1" = 1

#6170	TG10LF
#6171	TG11LF
#6172	TG12LF
#6173	TG13LF
#6174	TG14LF
#6175	TG15LF
#6176	TG16LF
#6177	TG17LF
#6178	TG18LF
#6179	TG19LF

TG10LF to TG19LF:

Individual life expectancy for tools in groups 10 to 19 is set by part program.

Setting range: 0 - 9999 (Tool life control)
Setting: "1" = 1 minute

#6181	TG1CNT
#6182	TG2CNT
⋮	⋮
#6198	TG18CNT
#6199	TG19CNT

TG1CNT to TG19CNT:

No. of times used and operating times are indicated individually for tools in groups 1 to 19.

Note: Writing is not permitted in this setting.

#6202	G71OFL

G71OFL:

Sets retraction value after completion of each cutting cycle in Stock Removal in Turning (G71).

Setting range: 0 - 65536
Setting: Least input increment

#6203	G72OFL

G72OFL:

Sets retraction value after completion of each cutting cycle in Stock Removal in Facing (G72).

Setting range: 0 - 65536
Setting: Least input increment

#6204	G74OFL

G74OFL:

Sets retraction value (δ) in Peck Drilling in Z-axis (G74).

Setting range: 0 - 65536
Setting: Least input increment

#6205	G75OFL

G75OFL:

Sets retraction value (δ) in Grooving in X-axis (G75).

Setting range: 0 - 65536
Setting: Least input increment

#6206	G76OFL

G76OFL:

Sets cut depth (in X-axis) "a" in Automatic Threadcutting (G76).

Setting range: 0 - 65536
Setting: Least input increment

#6207	TINON

When the tape without program no. is stored, program no. is set for the tape.

#6500	XSL2P
#6501	ZSL2P

XSL2P, ZSL2P:

Sets the boundary area in positive direction of Stored Stroke Limit second prohibit area on X-axis and Z-axis, respectively.

Setting range: 0 to ±99999999
Setting: Least output increment

#6502	XSL2M
#6503	ZSL2M

XSL2M, ZSL2M:
Sets the boundary area in minus direction of Stored Stroke Limit second prohibit area on X-axis and Z-axis, respectively.

Setting range: 0 to ±99999999
Setting: Least output increment

#6504	ZSL3P
#6505	ZSL3P

XSL3P, ZSL3P:

Sets the boundary area in positive direction of Stored Stroke Limit third prohibit area on X-axis and Z-axis, respectively.

Setting range: 0 to ±99999999
Setting: Least output increment

#6506	XSL3M
#6507	ZSL3M

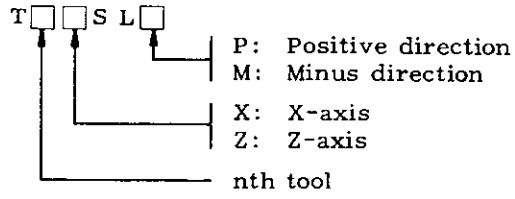
XSL3M, ZSL3M:

Sets the boundary area in minus direction of Stored Stroke Limit third prohibit area on X-axis and Z-axis, respectively.

Setting range: 0 to ±99999999
Setting: Least output increment

#6508	T1XSLP
#6509	T1ZSLP
#6510	T1XSLM
#6511	T1ZSLM
#6512	T2XSLP
#6513	T2ZSLP
#6514	T2XSLM
#6515	T2ZSLM
#6516	T3XSLP
#6517	T3ZSLP
#6518	T3XSLM
#6519	T3ZSLM
#6520	T4XSLP
#6521	T4ZSLP
#6522	T4XSLM
#6523	T4ZSLM
#6524	T5XSLP
#6525	T5ZSLP
#6526	T5XSLM
#6527	T5ZSLM
#6528	T6XSLP
#6259	T6ZSLP
#6530	T6XSLM
#6531	T6ZSLM
#6532	T7XSLP
#6533	T7ZSLP
#6534	T7XSLM
#6535	T7ZSLM
#6536	T8XSLP
#6537	T8ZSLP
#6538	T8XSLM
#6539	T8ZSLM

#6540	T9 XSLP
#6541	T9 ZSLP
#6542	T9 XSLM
#6543	T9 ZSLM
#6544	T10 XSLP
#6545	T10 ZSLP
#6546	T10 XSLM
#6547	T10 ZSLM
#6548	T11XSLP
#6549	T11ZSLP
#6550	T11XSLM
#6551	T11ZSLM
#6552	T12 XSLP
#6553	T12 ZSLP
#6554	T12 XSLM
#6555	T12 ZSLM
#6556	T13 XSLP
#6557	T13 ZSLP
#6558	T13 XSLM
#6559	T13 ZSLM
#6560	T14 XSLP
#6561	T14 ZSLP
#6562	T14 XSLM
#6563	T14 ZSLM
#6564	T15 XSLP
#6565	T15 ZSLP
#6566	T15 XSLM
#6567	T15 ZSLM



Sets the distance of Stores Stroke Limit from reference point.

Setting range: 0 to ±99999999
Setting: Least output increment

#6568	XSKIP

Indicates X-axis coordinate value when the skip signal is detected.

#6569	ZSKIP

Indicates Z-axis coordinate value when the skip signal is detected.

#8601	TGPN01
#8602	TGPN02
⋮	⋮
#8649	TGPN49
#8650	TGPN50

TGPN01 to TGPN50:

Part program determines the number of groups including tools (number 01 to 50).

Setting range: 0 to 20
(Tool life control)

#8651	TOFN01
#8652	TOGN02
⟆	⟆
#8669	TOFN49
#8670	TOFN50

TOFN01 to TOFN50:

Part program sets tool number using offset value of offset memory numbers 01 to 50 orderly.

Setting range: 0 to 50
(Tool life control)

#8701	TOFO01
#8702	TOFO02
⟆	⟆
#8749	TOFO49
#8750	TOFO59

TOFO01 to TOFO05:

Part program sets the order of using offset values in offset memories "01" to "50," sequentially.

Setting range: 0 to 5
(Tool life control)

3.3.7 LIST OF PARAMETER NUMBERS

#6005	D_7	D_6	D_5	D_4			D_1	D_0

GCDSP D_7

1: Uses special G code I as G code.
0: Uses standard G code as G code.

RSTG01 D_6

1: Determines G code of 01 group as G01 when resetting.
0: Determines G code of 01 group as G00 when resetting.

POSEXT D_5

1: Presets position external display by setting coordinate system.
0: Does not preset position external display by setting coordinate system.

EXTSET D_4

1: Resets the value at POSITION EXTERNAL display to "0."
0: Does not reset the value at POSITION EXTERNAL display to "0."

PONG04 D_1

1: Sets the G code in the 05 group to G99 when power is applied.
0: Sets the G code in the 05 group to G98 when power is applied.

PONG03 D_0

1: Sets the G code in the 03 group to G91 when power is applied.
0: Sets the G code in the 03 group to G90 when power is applied.

Note: Where the control is provided with special G code II option, determination of setting is changed as follows.

1: Uses special G code II.
0: Uses standard G code.

#6006	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

SDASGN2, SDASGN1: D_7, D_6

Setting of S4-digit (analog output) output.

SDASGN2	SDASGN1	At M03 Output	At M04 Output
0	0	Plus	Plus
0	1	Minus	Minus
1	0	Plus	Minus
1	1	Minus	Plus

IOIN D_5

1: Sets ten times the least input increment.
0: Sets the least input increment.

SAGRCH D_4

1: Checks to see if the spindle speed match signal (SAGR) is off upon transition from a rapid traverse block to a cutting feed block.
0: Provides no check on the spindle speed match signal (SAGR).

XRAD D_3

1: Radius designation.
0: Diameter designation.

RPDDRN D_2

1: Enables Dry Run in response to the rapid traverse command.
0: Disables dry Run in response to the rapid traverse command.

ZZRNILK D_1

1: Causes an alarm ("002") upon Cycle Start when Reference Point Return on Z-axis is not made manually after power is applied.
0: Causes no alarm.

XZRNILK D_0

1: Causes an alarm ("001") upon Cycle Start when Reference Point Return on X-axis is not made manually after power is applied.
0: Causes no alarm.

NOTE: Set "1" when Stored Lead Screw Error Compensation or Stored Stroke Limit is provided, set ZZRNILK at 1, XZRNILK at 1.

#6007	D_7	D_6		D_4	D_3	D_2	D_1	D_0

EDTSTLK D7

1: Does not cause an alarm upon Cycle Start without reset operation after part program edit operation.
0: Causes an alarm 005.

STUD D_6

1: Effective on Cycle Start when cycle start signal "1" changes to "0."
0: Effective on Cycle Start when cycle start signal "0" changes to "1."

RWDOUT D_4

1: Provides Rewinding Activate Signal when NC program is rewound by RESET & REWIND signal.
0: Provides no Rewinding Activate Signal when NC program is rewound by RESET & REWIND signal.

OUTPUT D_3

1: Sets the least output increment at 0.0001 inch.
0: Sets the least output increment at 0.001 mm.

SCRSOV D_2

1: Makes the Spindle Override 100% during tapping.
0: Does not make the Spindle Override 100% during tapping.

SLT3IO D_1

1: Establishes the prohibited area of the Stored Stroke Limit 3 outside the boundary.
0: Establishes the prohibited area of the Stored Stroke Limit 3 inside the boundary.

SLT2IO D_0

1: Establishes the prohibited area of the Stored Stroke Limit 2 outside the boundary.
0: Establishes the prohibited area of the Stored Stroke Limit 2 inside the boundary.

#6008			D_5				D_1	D_0

PONM97 D_5

1: M97 command (calculation of intersection) is selected at power-on.
0: M96 command (circular arc) is selected at power-on.

CVSAVE D_1

1: Does not clear user macro command variable #100 thru #149 by reset.
0: Clears user macro common variables #100 thru #140 by reset operation.

ZRNOFS D_0

1: Cancels the commanded block when the second reference point by G30 is commanded during Tool Position Offset or Tool Nose Radius Compensation.
0: Cancels the blocks following the commanded block.

#6009	D_7	D_6	D_5				D_1	D_0

ZMOVILK D7

1: After turning on power, if move command except by G28 is executed without returning Z-axis to reference point manually or automatically, alarm "001" will be caused.
0: Does not cause alarm in the same condition shown above.

XMOVILD D6

1: After turning on power, if move command except by G28 is executed without returning X-axis to reference point manually or automatically, alarm "001" will be caused.
0: Does not cause alarm.

OTALILK D_5

1: Causes an alarm at overtravel.
0: Does not cause an alarm at overtravel.

BLZDR, BLXDR D_1, D_0

Specify the start direction of backlash compensation on Z-, and X-axis, respectively.

1: Minus direction
0: Positive direction

#6010			D_5	D_4			D_1	D_0

AZRNHS D5

1: Executes the first reference point return (deceleration limit switch) and the subsequent automatic reference point returns in the same way when power is applied.

0: Executes high-speed reference point return (position at reference point).

MZRNHS D_4

1: Executes the first reference point return and the subsequent automatic reference point returns in the same way when power is applied.

0: Executes high-speed reference point return.

ZRNDRZ, ZRNDRX D_1, D0

Specify the start direction of Backlash Compensation on Z-, and X-axis, respectively.

1: Minus direction
0: Plus direction

#6015							D_1	D_0

ATSUPZ, ATSUPX D_1, D0

Specify whether or not the Automatic Coordinate System Setting is effective on the Z- and X-axis, respectively.

1: Effective
0: Ineffective

NOTE: The Automatic Coordinate System is established with the following parameters:

Inch system: #6631, #6630
Metric system: #6637, #6636

#6017	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

EIA#B7-B0 D_7 - D_0

Specify whether or not a hole is to be made on channels 8-1, respectively, in a code corresponding to symbol "#" (used with user macro) in the EIA code.

1: Hole
0: No hole

Example: EIA#B7-B0 = 01001001

The code with holes on channels 7, 4, and 1 is considered equivalent to symbol "#" in the EIA code. No code for use by the unit can be set.

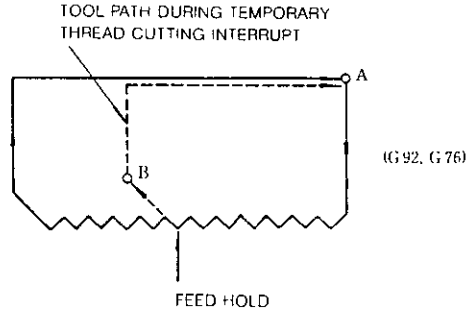
NOTE: The specification of EIA#B7-B0 = 00000000 assumes that symbol "#" is not used in the EIA code.

#6019	D_7		D_5	D_4	D_3			

G92FHP D_7

Specifies the position of temporary stop of threadcutting.

1: Stops at the position B where Threading-up is completed.
0: Returns to start point A and stops after Threading-up is completed.



SCRDRN D5

1: Enables Dry Run at threadcutting.
0: Disables Dry Run at threadcutting.

SKPFED D_4

1: Employs the feedrate set in parameter #6232 (G31F) for the Skip Function command (G31).
0: Employs the F code command as the feedrate for the Skip Function command (G31).

ESPRST D_3

1: Does not turn on RST output with ESP input ON.
0: Turns on RST output with ESP input ON.

#6020	D_7		D_5	D_4		D_2	D_1	D_0

OFSDSP D7

1: Displays programmed position in current position display (POSITION ABSOLUTE).
0: Displays programmed position modified with tool position offset in current position display (POSITION ABSOLUTE).

FOVAB D5

1: Effective with feedrate override signal "0."
0: Effective with feedrate override signal "1."

SSTPAB D4

1: Analog output zero with spindle S command zero input signal SSTP "0."
0: Analog output zero with spindle S command zero input signal SSTP "1."

PSTSGN D2

Shown in the calculation formula of storing data during MDI of measured work point into tool offset memories 00 to 50.

1: (Data of tool coordinate memory) = (Current value temporarily stored in the register) - (Written measurement value)

0: (Data of tool coordinate memory) = (Written measurement value) - (Current value temporarily stored in the register)

OFSG96 D1

1: Specifies the surface speed calculated by the X-axis coordinate value modified by tool position offset value in Constant Surface Speed Control.
0: Specifies the surface speed calculated by the programmed X-axis coordinate value in Constant Surface Speed Control.

POSG96 D0

1: Surface Speed Control functions on the block including Rapid Traverse (G00).
0: Surface Speed Control functions on the block including Rapid Traverse (G00), if programmed before the Cutting Feed block.

#6021	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

UMO9000 D7

1: Inhibts editing and punchout operations of the part program of program No. 9000 to 9999.
0: Permits editing and punchout operations

MERSIN D6

1: Replaces the stored program with a new one when part program is already stored.
0: Displays ALREADY ALARM.

PSONOF D5

1: Sets on and off RS (RS232C signal) by "%" character.
0: Keeps RS signal on until reading-in is finished.

CHKDR D4

1: Recognizes DR.
0: Does not recognize DR.

O - 9999O D3

1: Punches O0 when tape is punched with O, -, 9, 9, 9, 9 keyed in and OUT key depressed.
0: Does not punch O0 when tape is punched with O, -, 9, 9, 9, and 9 keyed in and OUT key depressed.

PONON D2

1: Does not clear program No. on power application.
(Program number is stored at power supply shut off.)
0: Clears program No. on power application.

PRGNO D_1

1: Employs the value following address O or N as the program number (specifiable in one block).
0: Employs the value following address O as the program number.

M02M99 D_0

1: Considers M02, M30 and M99 as the program end when part program is stored into memory.
0: Does not consider M02, M30 and M99 as the program end when part program is stored into memory.

#6022	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

HOFSMV D7

1: Enables the movement of automatic mode handle offset during cutting feed by interpolation.
0: Enables the movement of automatic mode handle offset except during execution of rapid traverse.

TLCC D_6

1: Effective on the next T code when offset amount is changed.
0: Effective on the next block when offset amount is changed.

TRDFH D_5

1: Executes the block next to the block specifying thread, and stops at single block operation or feedhold during thread cutting.
0: Stops on completion of the block specifying thread at single block operation or feedhold during thread cutting.

MABIN D_4

1: Ignores manual absolute function for incremental command by U and W.
0: Does not ignore manual absolute function for incremental command by U and W.

ISOPO D_3

1: Does not output parity bit (8th bit)when outputting ISO codes from NC by operating OUT key (in the EDIT mode).
0: Outputs parity bit.

ISOPI D_2

1: Ignores parity bit (8th bit) when outputting ISO codes by operating IN key (in the EDIT mode) and when reading-in ISO tape data in the TAPE mode.
0: Performs parity check.

HOFSZ, HOFSX D_1, D_0

Specifies whether automatic mode handle offset movement is effective or ineffective.

1: Effective automatic mode handle offset movement.
0: Ineffective automatic mode handle offset movement.

#6023	D_7	D_6	D_5	D_4		D_2		

PERIAB D7

1: Incremental setting of offset value for Stored Leadscrew Error Compensation.
0: Absolute setting of offset value for Stored Leadscrew Error Compensation.

PERST D_6

1: Regards "%" code as M30, if "%" is commanded before M02 or M30 in TAPE or MEM mode operaiton.
0: Ignores "%" code if commanded before M02 or M30 in TAPE or MEM mode operation.

MCHMST D_5

1: Lights feedhold lamp and stores M, S, and T commands when manual operation mode is selected during automatic operation.
0: Does not light feedhold lamp and M, S, and T commands are forced to reset when manual operation mode is selected during automatic operation.

WOPMCT D4

1: Ignores the second input when tool wear compensation input WOP (or WOM) is inputted continuously two times.
0: Adds or subtracts the offset value when tool wear compensation input WOP (or WOM) is inputted continuously two times.

CONP D_2

1: Sets cut depth value override with cut depth override input in Stroke Removal in Turning (G71) and stock removal in facing (G72).
0: Sets cut depth value override with setting #6004.

#6024		ORGZ	NZZ	CNZZ		ORGZ	NZX	CNZX

Sets the method of reference point return on Z- and X-axis.

Return to Reference Point System: X-axis / Z-axis	ORGX / ORGZ	NZX / NZZ	CNZX / CNZZ
Grid System (Reference Pulse)	1	0	0
Near zero System (Signal "1")	0	1	0
Near zero System (Signal "0")	0	1	1

Input for Current Loop and RS232C

#6026			D_5	D_4	D_3	D_2	D_1	D_0

SIF1CI D_5

Determines whether the input control code for current loop and RS232C interface is given or not.

1: Does not send control code.
0: Sends control code.

SIF1SI D_4

Determines the input stop bit for current loop and RS232C interface as two bits or one bit.

1: Determines stop bit as two bits.
0: Determines stop bit as one bit.

SIF1BID - SIF1BIA $D_3 - D_0$

Sets input baud rate for current loop and RS232C interface.

Baud Rate	SIF1BID	SIF1BIC	SIF1BIB	SIF1BIA
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

Output for Current Loop and RS232C

#6028			D_5	D_4	D_3	D_2	D_1	D_0

SIF1CO D_5

Determines whether output control code for current loop and RS232C interface is sent or not.

1: Does not send control code.
0: Sends control code.

SIF1SO D_4

Determines output stop bit for current loop and RS232C interface as two bits or one bit.

1: Determines stop bit as two bits.
0: Determines stop bit as one bit.

SIF1BOD-SIF1BOA $D_3 - D_0$

Sets output baud rate for current loop and RS232C interface.

Baud Rate	SIF1BOD	SIF1BOC	SIF1BOB	SIF1BOA
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

#6050	XBLP
#6051	ZBLP

XBLP, ZBLP:

Sets backlash compensation value for X- and Z-axis.

Setting range: 0 - 255
Setting: Least output increment

#6056	XPSET
#6057	ZPSET

XPSET, ZPSET:

Sets position error range for X- and Z-axis.

Setting range: 0 - 255
Setting: Least output increment

#6068	XPERML
#6069	ZPERML

XPERML, ZPERML:

Sets leadscrew error compensation multiplication factor for X- and Z-axis.
Outputs the result of the preset compensation value multiplied by the multiplication factor as the error compensation value.

Setting range: 0 - 3
(Setting 0 will not execute compensation.)

#6074	XSVER
#6075	ZSVER

XSVER, ZSVER:

Sets servo error limit for X- and Z-axis.
Position deviation exceeding the preset value causes an alarm "34 Δ."

Setting range: 0 - 255
Standard setting: 16
Setting: 1/16 x (D/A saturation value)

#6080	CUPRD

Rapid threading pull-out width during thread-cutting

Setting range: 0 - 255
Setting: 0.1 lead

#6081	SIDRG

Spindle indexing completion output allowable range

Setting range: 0 - 255
Setting: 1 = 1 pulse (= 360/4096 deg)

#6083	SIDGAN1

Sets spindle indexing command voltage gain No.1.

Setting range: 0 - 255
Setting: 1 = 0.31 mV/pulse

#6084	SIDGAN2

Sets spindle indexing command voltage gain No. 2.

Setting range: 0 - 255
Setting: 1 = 0.31 mV/pulse

#6085	SIDSER

Sets the percentage of the spindle speed for starting spindle indexing.

Setting range: 0 - 10
Setting: 1 = (Spindle indexing speed command) $\times \frac{1}{100}$

#6092	CUTACC

CUTACC:

Time constant at exponential Acceleration/ Deceleration during feed.

Setting range: 0 - 255

Setting: "n" = $\frac{t}{4} - 1$ t: constant (ms), set by 4 ms.

#6093	CUTBAS

CUTBAS:

Sets bias speed at Exponential Acceleration/ Deceleration during feed.

Setting range: 0 - 255
Setting: 120 mm/min (metric output)
120 in/min (inch output)

#6094	SCRACC

SCRACC

Time constant at Exponential Acceleration/ Deceleration during threadcutting.

Setting range: 0 - 255

Setting: "n" = $\frac{t}{4} - 1$ t: constant (ms), set by 4 ms.

#6095	SCRBAS

SCRBAS:

Sets bias speed at Exponential Acceleration/ Deceleration during threadcutting.

Setting range: 0 - 255
Setting: 2Kpps

#6096	WOIMUL

WOIMUL:

Sets the multiplication factor of changed compensation value from external input during external tool compensation function (M94, M95). The final changed value is the result of the changed compensation value by external input multiplied by this multiplication factor.

Setting range: 1 - 10
Setting: 0.1

#6108	UMEIA [
#6109	UMEIA]
#6110	UMEIA *
#6111	UMEIA =
#6112	UMEIA (
#6113	UMEIA)

UMEIAs:

Specify the punching pattern in EIA for special characters employed in user macro; [,] , *, =, (,), used in turn, beginning with #6108.

Setting range: 0 - 255
Setting: Sets the punching pattern using the decimal value converted from the binary value which defines the pattern.

Note: When "0" is set for each character, punching pattern will be as listed below.

Special Character	8	7	6	5	4	○	3	2	1
[				○	○	○	○		
]		○			○	○	○		
*					○	○	○	○	
=			○	○	○	○		○	○
(				○	○	○		○	
)		○			○	○		○	

#6114	NBUFM1
#6115	NBUFM2
#6116	NBUFM3
#6117	NBUFM4
#6118	NBUFM5
#6119	NBUFM6

NBUFM1, 2, 3, 4, 5, 6:

Sets up to 6 M codes for stopping advance reading function (buffering).

Setting range: 0 - 255

#6120	UMG1
#6121	UMG2
#6122	UMG3
#6123	UMG4
#6124	UMG5
#6125	UMG6
#6126	UMG7
#6127	UMG8
#6128	UMG9
#6129	UMG10

UMG1 - 10:

Sets G codes for calling user macro of program No. O9001 to O9004.

Setting range: 0 - 255

#6130	UMM1
#6131	UMM2
#6132	UMM3
#6133	UMM4

UMM1, UMM2, UMM3, UMM4:

Sets M codes for calling user macro of program No. O9001 to O9004.

Setting range: 0 - 255

#6134	UMT

UMT

1: Regards T-code command as macro call command calling the macro of program No. O9000.
0: Regards T-code command as basic T-code.

Note: This selection is effective only for the user macro option.

#6220	MSTF

MSTF:

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

Setting range: 0 - 65536 msec

#6222	HPMAX

HPMAX:

Specifies the maximum handle feedrate, which is common to the all axes.

Setting: "1" = 125 pulses/sec

#6224	SAGRT

SAGRT:

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

Setting range: 0 - 65536 msec

#6228	G98MAX

G98MAX:

Specifies the maximum feedrate at G98 command (feed per minute) common to all axes.

Setting range:

Setting: "1" = 1000 pulses/min

#6229	G35F

G35F:

Specified the feedrate at Tool Set Error Compensation (G35).

Setting range:

Setting: "1" = 1000 pulses/min

When the parameter is set at "0," feedrate follows F command.

#6230	NEGNR

NEGNR:

When a circular path is drawn in Tool Radius Compensation outside a corner approaching 180°, the movement follows describing a very small circular arc. This parameter is used to set the critical arc value, if this arc movement is considered to affect the workpiece surface machining.

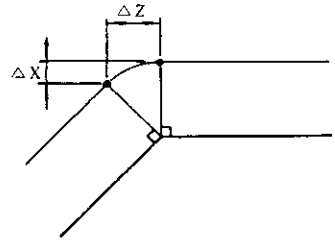
Setting range: 0 - 65536
Setting: Least input increment

The corner arc setting is ignored when:

$\Delta X \leqq$ NEGNR

$\Delta Y \leqq$ NEGNR

Standard setting = 5



#6231	ROVFO

ROVFO :

Specifies the FO speed for Rapid Traverse Override.

Setting range:
Setting: "1" = 125 pulses/sec

#6232	G31F

G31F:

Specifies the feedrate in the skip function (G31).

Setting range:

Setting: "1" = 1000 pulses/min

This setting is effective when parameter #6019D_4 (SKPFED) = 1.

#6233	JOG0
⋮	⋮
#6264	JOG31

JOG0~JOG31:

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

Setting range:

Setting: "1" = 0.5 mm/min (metric output)
"1" = 0.05 in./min (inch output)

Switch Position	Feedrate Override %	Parameter		Continuous Manual Feedrate	
		Number	Setting	mm/min	
0	0	#6233	0	0	
1	10	#6234	1	1	
2	20	#6235	2	2	
3	30	#6236	4	4	
4	40	#6237	6	6	
5	50	#6238	8	8	
6	60	#6239	10	10	
7	70	#6240	12	12	
8	80	#6241	15	15	
9	90	#6242	20	20	
10	100	#6243	25	25	
11	110	#6244	30	30	
12	120	#6245	40	40	
13	130	#6246	50	50	
14	140	#6247	60	60	
15	150	#6248	80	80	
16	160	#6249	100	100	
17	170	#6250	120	120	
18	180	#6251	150	150	
19	190	#6252	200	200	
20	200	#6253	250	250	
21	0	#6254	300	300	
22	0	#6255	400	400	
23	0	#6256	500	500	
24	0	#6257	600	600	
25	0	#6258	800	800	
26	0	#6259	1000	1000	
27	0	#6260	1200	1200	
28	0	#6261	1500	1500	
29	0	#6262	2000	2000	
30	0	#6263	2500	2500	
31	0	#6264	3000	3000	

#6266	MACGR1
#6267	MACGR2
#6268	MACGR3
#6269	MACGR4

MACGR1-MACGR4:

Sets spindle speed upper limit for gear 1, 2, 3, and 4 orderly.

Setting range: 0 - 6000 (rpm)

When the setting is at 0, the speed is not clamped.

#6270	GRSREV

GRSREV:

Sets the speed command output to spindle motor when gear shift input (GRS) is given.

Setting value: $\frac{\text{Gear shift spindle motor speed}}{\text{Spindle motor max speed (Command = 10 V)}}$ x 2047 --- 12-bit output

$\frac{\text{Gear shift spindle motor speed}}{\text{Spindle motor max speed (Command = 10 V)}}$ x 32512 --- Analog output

Setting range: 0 - 6000

#6271	GR1REV
#6272	GR2REV
#6273	GR3REV
#6274	GR4REV

GR1REV-GR4REV:

Specify the maximum speed of the spindle, respectively, for gears 1, 2, 3 and 4 each selected by an input signal. Set the spindle speed applicable when the speed command voltage is 10 V.

Setting range: 0 - 6000 (rpm)

#6275	GSCREV

GSCREV:

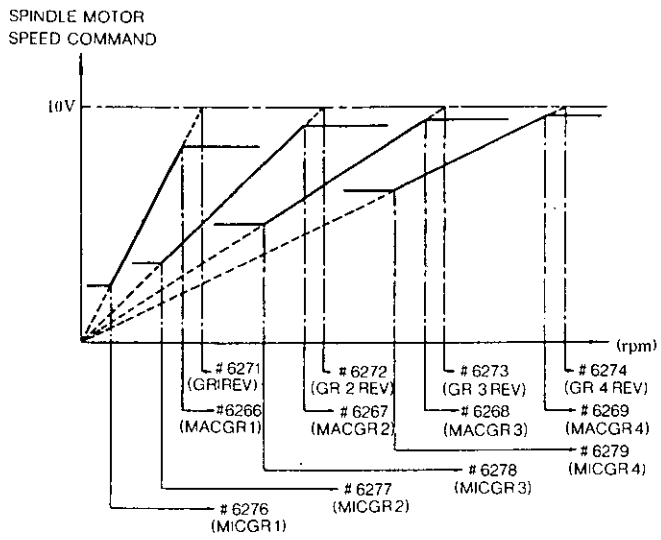
Specifies the spindle motor speed in effect when a spindle operation (GSC) input is entered.

Setting range: 0 - 6000 (rpm)

#6276	MICGR1
#6277	MICGR2
#6278	MICGR3
#6279	MICGR4

Specify the minimum speed of the spindle, respectively for gears 1, 2, 3 and 4 each selected by an input signal.

Setting range: 0 - 6000 (rpm)



#6280	RPDX
#6281	RPDZ

RPDX, RPDZ:

Specify the rapid traverse rate for X- and Z-axis, respectively.

Setting range: 0 - 3200
Setting: "1" = 125 pulses/sec

#6286	ACCX1
#6287	ACCZ1

ACCX1, ACCZ1:

Set the time constant for Linear Accel/Decel for X- and Z-axis, respectively.

Setting range:

Setting: "1" = $125/8 \times 10^3$ P/sec^2
(P: least output increment)

#6304	XREFP
#6305	ZREFP

XREFP, ZREFP:

Sets the traverse distance for Reference Point Return, respectively, on the X- and Z-axis.

Setting range: 0 - 32767

Setting: "1" = 1 pulse

#6310	XREFV1
#6311	ZREFV1

XREFV1, ZREFV1:

Specify the approach speed 1 for Reference Point Return, respectively, on the X- and Z-axes.

Setting range: 0 - 200

Setting: "1" = 125 pulses/sec

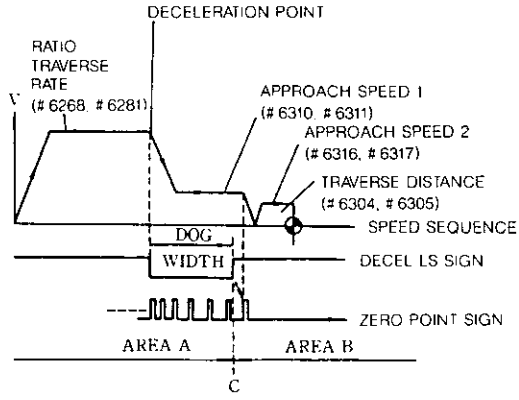
#6316	XREFV2
#6317	ZREFV2

XREFV2, ZREFV2:

Specify the approach speed 2 for Reference Point Return, respectively, on the X- and Z-axes.

Setting range: 0 - 200

Setting: "1" = 125 pulses/sec



· Reference point return direction:
#6010 (ZRNDRX, ZRNDRZ)

#6322	XPERED
#6323	ZPERED

XPERED, ZPERED:

Specify the number of the end point for Leadscrew Error Compensation, respectively, on the X- and Z-axes.

Setting range: 0 - 255

#6328	XPERST
#6329	ZPERST

XPERED, ZPERED:

Specify the number of the start point for Leadscrew Error Compensation, respectively, on X- and Z-axes.

Setting range: 0 - 255

#6334	XPEROR
#6335	ZPEROR

XPEROR, ZPEROR:

Specify the reference point for Leadscrew Error compensation, respectively, on the X- and Z-axes.

Setting range: 0 - 255

#6342	SIFREF

SIDREF:

Sets the reference point for spindle indexing.

Setting range: 0 - 4095

Setting: "1" = 1 pulse (= 360/4096 deg.)

#6343	SIDRV1

SIDRV1:

Sets the spindle speed for spindle indexing.

Setting range: 0 - 32512

Setting: 1 = 0.31 mV

#6344	SIDCRP

SIDCRP

Sets the spindle indexing creep speed.

Setting range: 0 - 31512

Setting: "1" = 0.31 mV

#6345	SIDCRS

SIDCRS

Sets the spindle indexing creep start position.

Setting range: 0 - 4095

Setting: 1 = 1 pulse (= 360/4096 deg)

#6346	SIDGEP

SIDGEP

Sets the spindle indexing command voltage gain No. 2 start position.

Setting range: 0 - 4095

Setting: "1" = 1 pulse (= 360/4096 deg)

#6600	XSL1P
#6601	ZSL1P

XSL1P, ZSL1P:

Specify the plus direction boundary value for Stored Stroke Limit 1, respectively, on the X-, and Z-axes.

Setting range: 0 - 99999999

Setting: "1" = 1 pulse

#6606	XSL1M
#6607	ZSL1M

XSL1M, ZSL1M:

Specify the minus direction boundary value for Stored Stroke Limit 1, respectively, on the X-, Z-axes.

Setting range: 0 - 99999999

Setting: "1" = 1 pulse

#6612	XZP2L
#6613	ZZP2L

XZP2L, ZZP2L:

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

Setting range: -99999999 - 99999999

Setting: "1" = 1 pulse

#6624	XBPTS
#6625	ZBPTS

XBPTS, ZBPTS:

Sets the absolute coordinate values of X- and Z-axis where the reference tool turns on touch switch during tool set error compensation of X- and Z-axis.

#6630	XSETI
#6631	ZSETI

XSETI, ZSETI:

Specify the value for Automatic Coordinate System Setting at the time of inch input, respectively, on the X-, and Z-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 range: -99999999 - 99999999

Setting: "1" = 0.0001 in.

#6636	XSETM
#6637	ZSETM

XSETM, ZSETM:

Specify the value for Automatic Coordinate System Setting at the time of metric input, respectively, on the X-, and Z-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 range: -99999999 - 99999999

Setting: "1" = 0.001 mm

#6642	XPEINT
#6643	ZPEINT

XPEINT, ZPEINT:

Specify the compensation inverval in Leadscrew Error Compensation, respectively, on the X- and Z-axes.

Setting range: -99999999 - 99999999

Setting: "1" = 1 pulse

#8000	PEMN0
⟆	⟆
#8255	PEMN255

PEMN0-PEMN255:

Specify the respective values of Leadscrew Error Compensation.

Setting range: 0 - ±15 (Incremental designation)
0 - ±128 (Absolute designation)

Setting: "1" = Output increment

Incremental/absolute designation is selected by parameter #6023D$_7$ (PERIAB).

Axis for compensation is specified by parameters #6322, 6323, 6328, and 6329.

APPENDIX STORED LEADSCREW ERROR COMPENSATION

This function automatically compensate 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, Z axes

No. of correction points: 256 Max.

Compensation base point: Reference point

Compensation interval: 6000 Pulses or more

Data setting system: Absolute/incremental
(Set by Parameter #6023D$_7$ PERIAB)

Compensation value:

Minimum compensation unit: 1 pulse (least output increment)

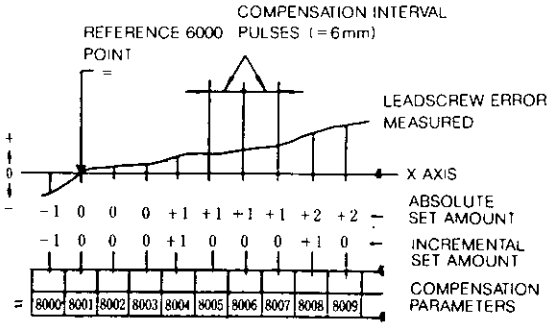
Compensation multiplication factor: 3X max.

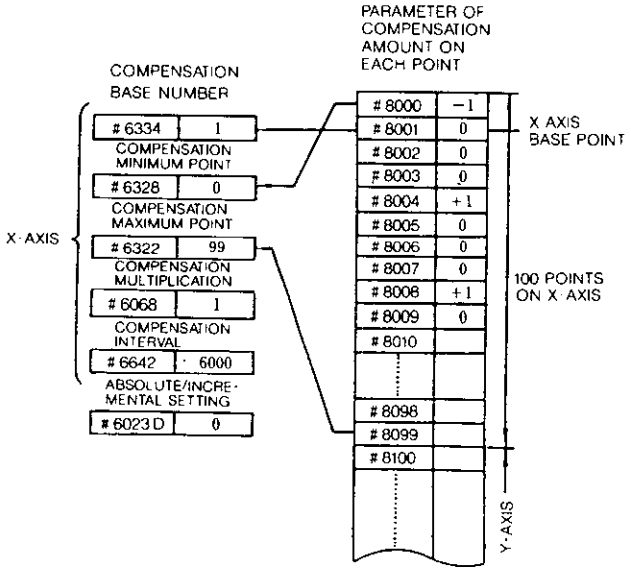
One-time-compensation value: 15 pulses max. (Compensation multiplication)

Notes:

1. Regardless of absolute/incremental setting, the difference between neighboring compensation values should be (15 pulses x compensation multiplication) and below.
2. Maximum set value in case of absolute setting is ±127 pulses. Compensation multiplication is taken on this value.
3. No. of correction points on each axis can be arbitrary as far as the total compensation points are within 256.

APPENDIX STORED LEADSCREW ERROR COMPENSATION (Cont'd)





	Axis	Parameter #	Functions
Compensation Interval	X	#6642 (XPEINT)	6000 OR MORE "1" = 1 pulse
	Z	#6642 (ZPEINT)	
Absolute/Incremental Setting Switchable		#6023 D_7 (PERIAB)	"0" = Incremental setting "1" = Absolute setting
Compenastion Reference No.	X	#6334 (XPEROR)	Value of parameter # of compensation on each point minus 8000 will be written.
	Z	#6335 (ZPEROR)	
Compensation Max Point	X	#6322 (XPERED)	
	Z	#6323 (ZPERED)	
Compensation Min Point	X	#6328 (XPERST)	
	Z	#6329 (ZPERST)	
Compensation Value on Each Point	X	#8000 - #8255	0 to ±7 (Incremental setting) 0 to ±127 (Absolute setting) "1" = 1 pulse
	Z		
Compensation Multiplication Factor	X	#6068 (XPERML)	0 to 3 "1" = 1X
	Z	#6069 (ZPERML)	

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Printed in Japan December 1985 85-12 0.6 TA