YASKAWA ELECTRIC

SIE-C815-9.13C
DESCRIPTIVE INFORMATION

Memocon™*-SC* R84H, U84, U84J, 584

POSITIONING MODULES

1000 SERIES

TYPE JAMSC-B1083C

1. INTRODUCTION

The Memocon-SC 1000 Series I/O Positioning Module JAMSC-B1083C, or B1083C for short, is designed to comprise a positioning system in combination with the Programmable Controller Memocon-SC R84H, U84, U84J, or 584, simply and conveniently.

This module has the following features.

- Simple point-to-point positioning function with linear acceleration/deceleration.
- Simple on-line setting of travel distance, speed, and acceleration/deceleration time from R84H, U84, U84J or 584, for each positioning motion.
- Analog output speed commands, allowing direct connection to YASKAWA Servopack.
- Simultaneous multiple axes control capability, allowing up to 8 axes (1 axis/module) to be controlled by one R84H.
- Extensive assortment of feedback pulse input modes.

B1083C is mounted on the mounting base of 1000 series I/O modules. It is double the size (2 spans) of usual 1000 series I/O modules.

This manual describes the composition of a positioning system using the B1083C. Following are additional reference manual.

- Memocon-SC R84H Designer's Reference Manual (SIE-C815-9.4)
- Memocon-SC U84 User's Manual Design and Maintenance (SIE-C815-10.1)
- Memocon-SC 584 I/O Adapters (SIE-C815-7.80)

Positioning Module
Type JAMSC-B1083C

B1083C is an improved and modified version of the conventional type B1083B, and the differences between them are as follows:

	B1083B	B1083C
External Input Terminal A16	Used for EXTERNAL START	Used either for EXTERNAL START or EXTERNAL STOP depending on operation mode setting.
Input Relay • 1014+16n (R84H) • 10014+16n (U84, U84J, 584)	Not used	Used for PULSE OUTPUTTING COMPLETION signals.

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2. CONFIGURATION

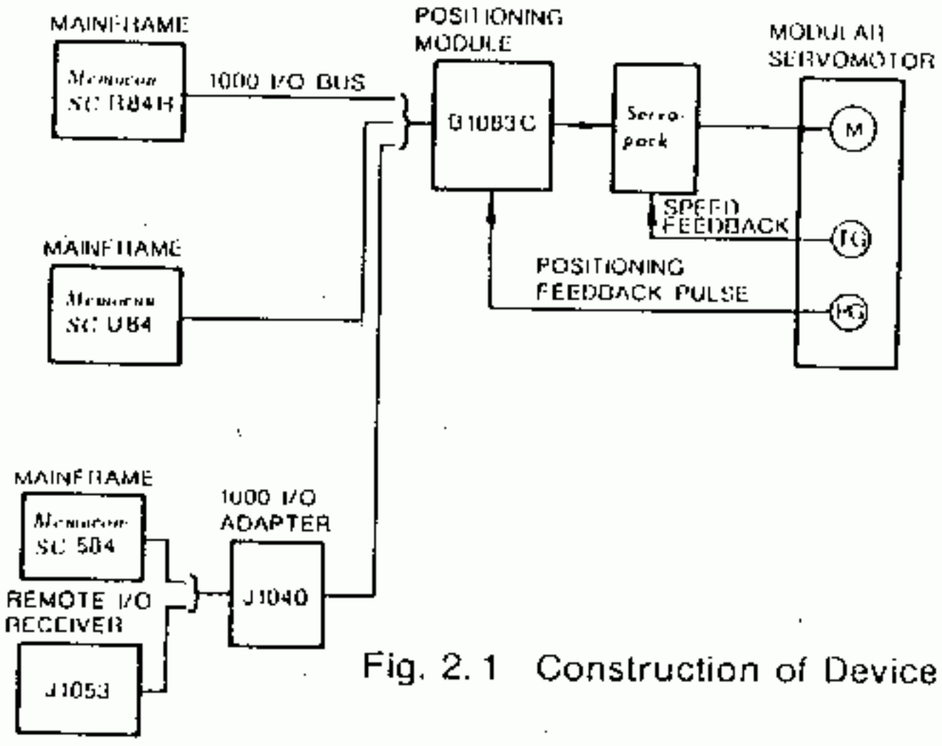


Fig. 2.1 Construction of Device

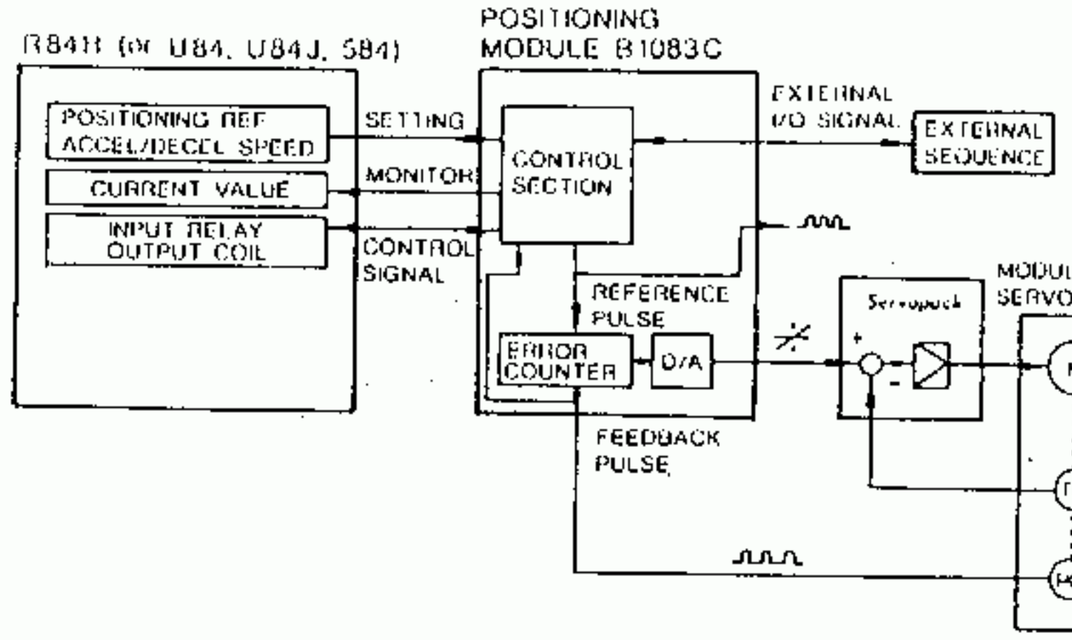


Fig. 2.2 Block Diagram for Positioning

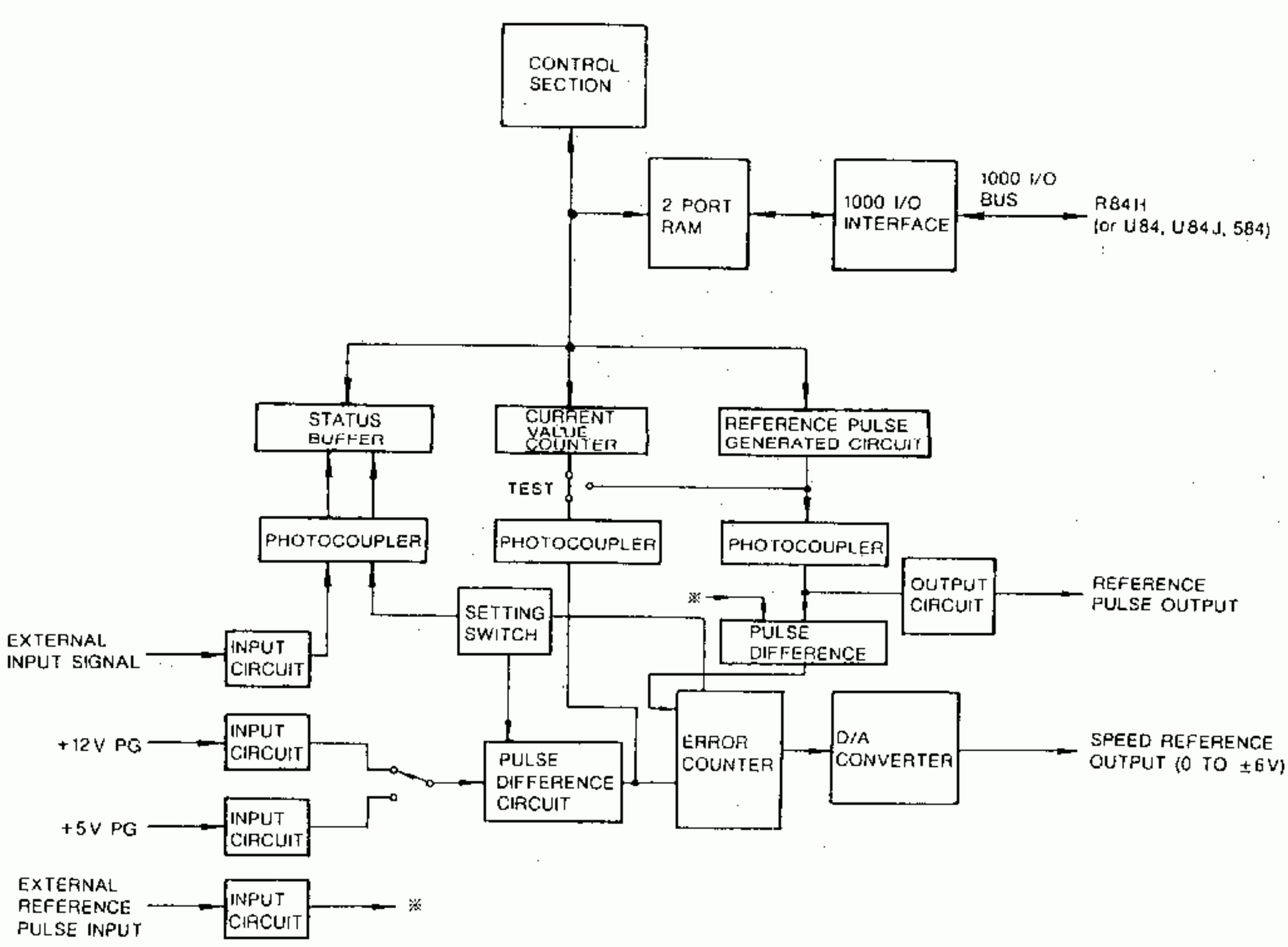


Fig. 2.3 Block Diagram of B1083C

3. SPECIFICATIONS

3.1 BASIC SPECIFICATIONS

Table 3.1 Basic Specifications

Item	Specification
Type	JAMSC-B1083C
Ambient Temperature	0 to +55°C
Storage Temperature	−20°C to +85°C
Humidity	5% to 95% RH (non-condensing)
Vibration Resistance	In compliance with JIS* C0911.
Shock Resistance	10G max
Environmental Condition	Free from explosive, inflammable and corrosive gases.
Dimensions in mm	70(W)×250(H)×160(D) (2 spans)
Approx Weight	1.6kg

*Japanese Industrial Standard

3.2 ELECTRICAL CHARACTERISTICS

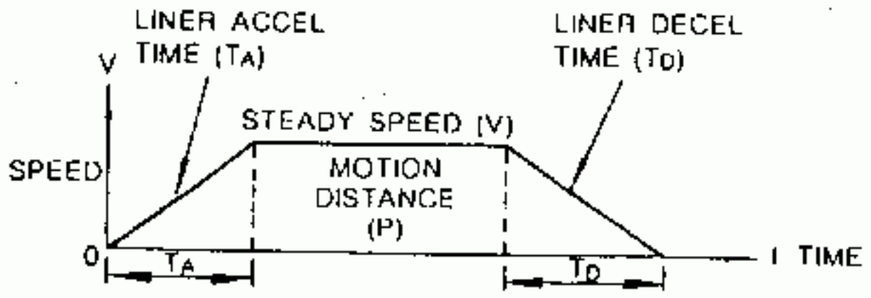
Table 3.2 Electrical Characteristics

Item		Specification	Remarks
Function		Point-to-point automatic positioning	With liner accel/decel speed
Number of Control Axis		1 Axis	—
Applicable Programmable Controller		*Memocon-SC* R84H, U84, U84J, 584	Selectable by switch
Motion Distance		−999,999 to +999,999 (R84H) −99,999,999 to +99,999,999 (U84, U84J, 584)	—
Reference Speed		10 to 99,990pps	Setting by unit of 10pps
Liner Accel/Decel Speed Time		10 to 990ms, 1 to 99sec	Selectable by switch
Positioning Mode		Absolute mode, incremental mode	Selectable by switch
Setting Data		Data for next one position	During operation, next setting possible.
Zero Return		Provided	—
JOG Function		High speed, low speed, creep speed	Accel/decel and speed setting possible, separately.
Loop Back Test		Provided	Selectable by switch
Monitor of Setting Contents		Possible	—
Self-checking Function		ROM total check, RAM check, WDT check, Error codes	—
Counter Specifications	Pulse Input Voltage	+12V, +5V (line receiver)	Selectable by switch
	PG Output Form	+12V open collector +12V emitter follower +5V line driver	Selectable by switch
	Max. Counting Speed	100kpps (×1), 50kpps (×2), 25kpps (×4)	—
	Pulse System	A-/B-phase, sign + pulse	Selectable by switch
	Multiplier	×1, ×2, ×4	Selectable by switch
External Input Signal		$\overline{\text{External reference pulse input enable}}$, External START/ $\overline{\text{External STOP}}$, Servo normal, $\overline{\text{DECEL LS}}$	—
External Reference Pulse Input		Pulse input voltage: +12V PG output form: Open collector Max. counting speed: 100kpps Pulse system: A-/B-phase Multiplier: ×1	—
External Output Signal		$\overline{\text{CLEAR}}$, FAULT	—
Speed Reference Output		Analog output: 0 to ±6V Pulse line: Sign + pulse, 100kpps max.	—
Indicator Lamp		24 lamps	—
External Power Supply		+12VDC ±3%, 0.4A −12VDC ±3%, 20mA +5VDC ±5%,-1.0A	Protection fuse built-in (1.6A)

4. FUNCTION

4.1 BASIC OPERATION FUNCTION

4.1.1 1-Step Speed Pattern



Motion distance = Area
Liner accel time T_A = liner decel time T_D
= liner accel/decel time

- Motion distance : 0 to ±999,999(R84H)
  0 to ±99,999,999(U84, U84J, 584)
- Speed : 10 to 99,990 pps
- Liner accel/decel time : 10 to 999ms, 1 to 99s

Fig. 4.1 Basic Operation Pattern

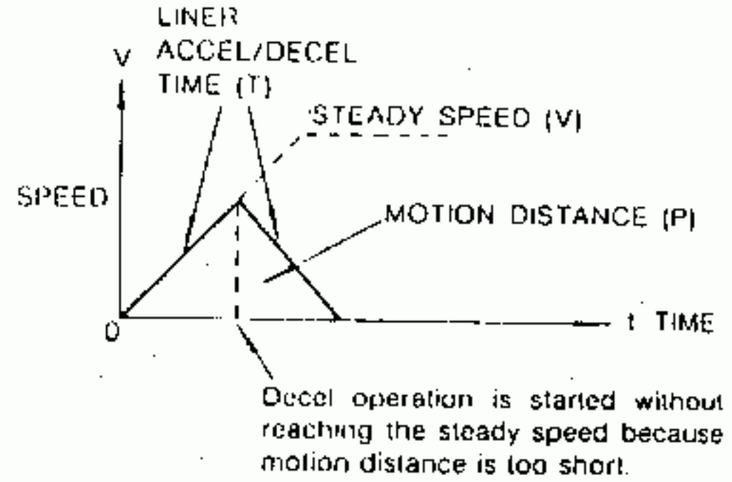


Fig. 4.2 Where Short Motion Distance

4.1.2 2-Step Speed Pattern

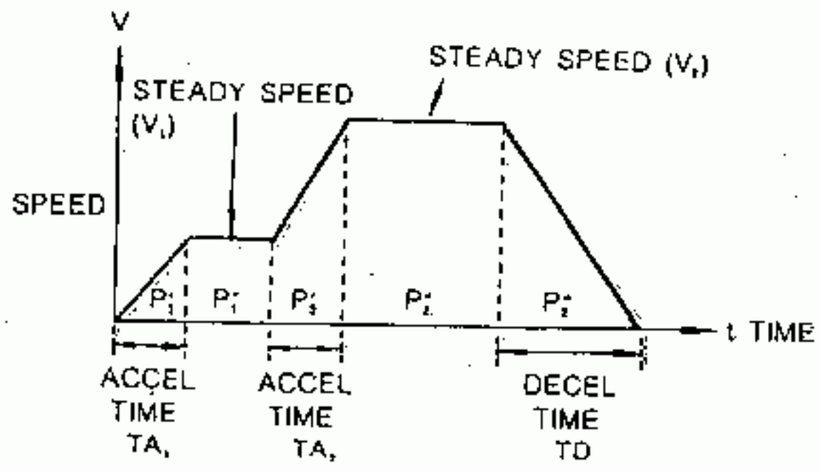


Fig. 4.3 2-Step Speed Pattern ($V_1 < V_2$)

- Motion distance $P_1 = P_1' + P_1''$
- Motion distance $P_2 = P_2' + P_2'' + P_2'''$
- Total motion distance $P = P_1 + P_2$
- ACCEL time $T_A = T_{A1} + T_{A2}$ = DECEL time T_D

- Motion distance : 0 to ±999,999(R84H)
  0 to ±99,999,999(U84,U84J,584)
- Speed : 10 to 99,990 pps
- Liner accel/decel time : 10 to 990 ms
  0.1 to 9.9 s
  1 to 99 s

(1) Setting Items

Acceleration time T_{A1}, steady speed V_1, motion distance P_1, steady speed V_2 and motion distance P_2.

(2) Basic Operation

At the start command, the machine accelerates for acceleration time T_{A1} until steady speed V_1 is attained. Then, the machine operates at steady speed V_1 until specified distance P_1 is covered. Then the machine again accelerates at the same rate (T_{A1}) until steady speed V_2 is reached. During running at V_2, when the remaining distance becomes P_2''', the machine starts to decelerate at the same rate (T_{A1}) and eventually stops at P_2.

4.1.3 2-Step Speed Pattern ($V_1 > V_2$)

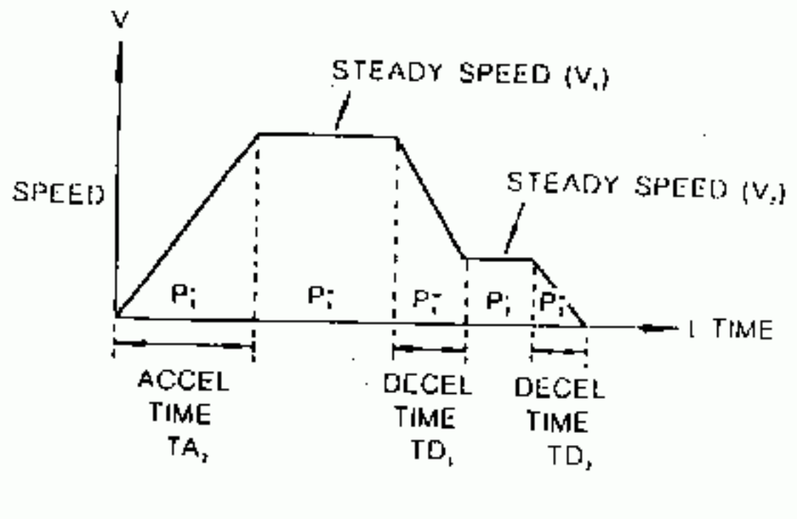


Fig. 4.4 2-Step Speed Pattern ($V_1 > V_2$)

Motion distance $P_1 = P_1' + P_1'' + P_1'''$
Motion distance $P_2 = P_2' + P_2''$
Total motion distance $P = P_1 + P_2$
ACCEL time T_A = DECEL time T_D T_{D1} , T_{D2}

Motion distance : 0 to ±999,999(R84H)
0 to ±99,999,999(U84,U84J,584)

Speed : 10 to 99,990 pps
Liner accel/decel time : 10 to 990 ms
0.1 to 9.9 s
1 to 99 s

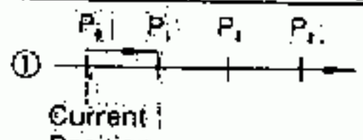
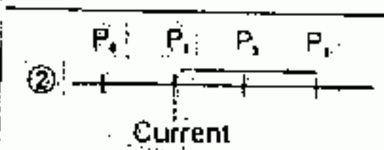
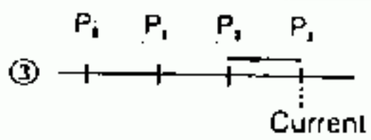
(1) Setting Items

Acceleration time T_{A1}, steady speed V_1, motion distance P_1, steady speed V_2, and motion distance P_2.

(2) Basic Operation

At the start command, the machine accelerates for acceleration time T_{A1} until reaching steady speed V_1. Then, the machine operates at steady speed V_1 until specified distance P_1 becomes remaining distance P_1'''. Then, it decelerates at the same rate (T_A) until passing P_1, reaching steady speed V_2. Operation continues at V_2 until remaining distance becomes P_2'', then it again decelerates at same rate (T_A) and eventually stops at specified distance P_2.

4.1.4 Incremental Mode and Absolute Mode

	Incremental Mode	Absolute Mode
① 	For moving from current position P_0 to P_1, sigh is set for forward, and $\|P_1-P_0\|$ is set as position command.	For moving from current position P_0 to P_1, sign is set in plus range, and P_1 is set as position preset value.
② 	For moving from current position P_1 to P_2, sign is set for forward, and $\|P_2-P_1\|$ is set as position command.	For moving from current position P_1 to P_2, sign is set in plus range, and P_2 is set as position preset value.
③ 	For moving from current position P_2 to P_3, sign is set for reverse, and $\|P_3-P_2\|$ is set as position command.	For moving from current position P_2 to P_3, sign is set in plus range, and P_3 is set as position preset value.

4.1.5 Current Value Counting Range

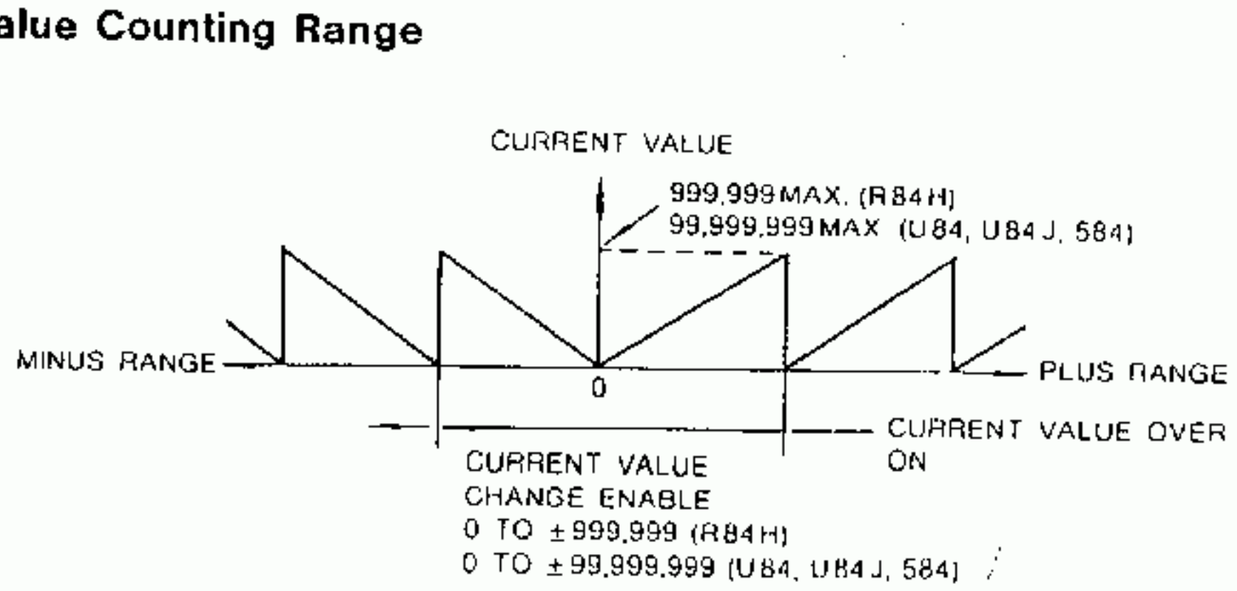


Fig. 4.5 Current Value Counting Range

In the absolute mode, when CURRENT VALUE OVER is ON, automatic operation is inhibited, and only zero return operation, JOG, and external reference pulse input remain operational. At this time, the number of CURRENT VALUE OVER is not counted, so that when one underflow (passing 0 gives 999,999 or 99,999,999) occurs, CURRENT VALUE OVER is cleared.

Even while CURRENT VALUE OVER is ON, the current value counter continues counting.

In the incremental mode, overflow is neglected, and CURRENT VALUE OVER will not turn ON under any circumstances.

4.2 ZERO RETURN

4.2.1 Zero Return A-mode

(1) Operation

When a zero return command is turned on, the machine starts to move toward the zero position at the preset zero return speed. When an external input signal $\overline{\text{DECEL LS}}$ ON is detected, the machine decelerates for the zero return accel/decel time until the creep speed (same as JOGC speed) is reached. The first phase-C pulse during creeping is the zero point.

When a phase-C pulse is detected, B1083C clears the current reference value and the current feedback value (Fig. 5.1), and clears the error counter (also outputs external output signal $\overline{\text{CLEAR}}$).

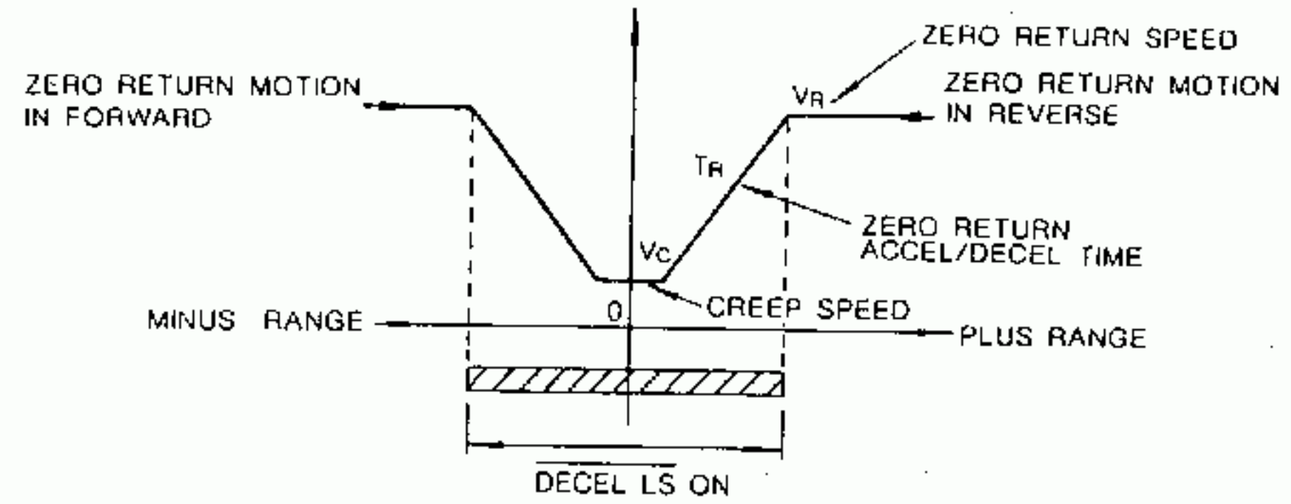


Fig. 4.6 Zero Return Operation

(2) Zero Return Speed and Stopping Accuracy

If the zero return speed is excessively high, the position reaching creep speed varies due to deviation (5 ms max.) in $\overline{\text{DECEL LS}}$ signal detection time. Therefore, with a PG having a small number of slits, a stop position error corresponding to one rotation may occur by incorrect dog setting.

Example:

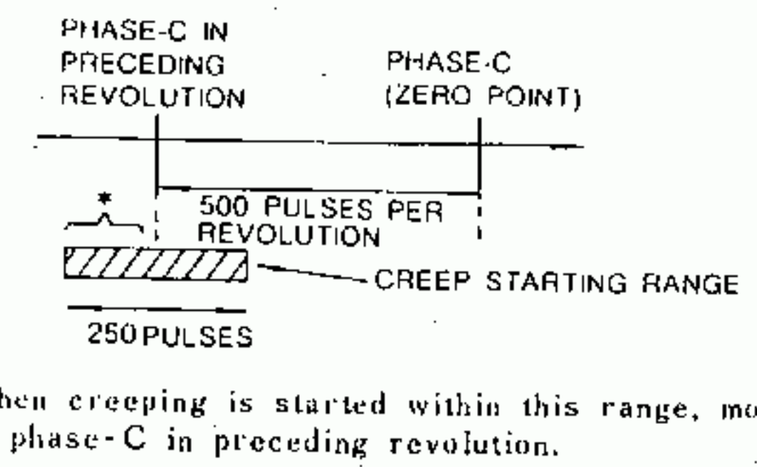
When zero return speed is 50 kpps,

50,000 pulses/sec × 0.005 sec = 250 pulses

(0.005 sec: Detection time deviation)

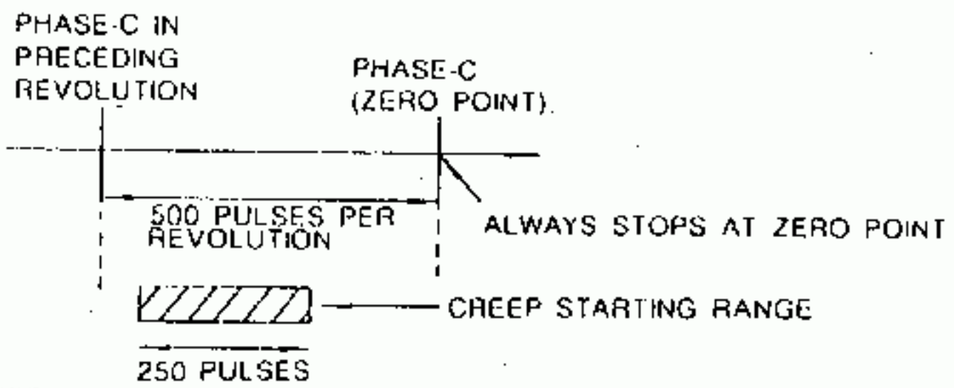
4.2.1 Zero Return A Mode (Cont'd)

With a PG of 500 pulses per revolution, the situation is as shown below.



* When creeping is started within this range, motor stops at phase-C in preceding revolution.

(a) Example of incorrect dog setting



(b) Example of correct dog setting

Fig. 4.7 Adjustment of Dog

4.2.2 Zero Return B Mode

- Operation

At a zero return command, the machine starts to move toward the zero point at speed V_R, and decelerates for zero return accel/decel time T_R after detecting external input signal DECEL LS ON. After slowing down to the creep speed (same as JOGC speed), the first phase-C pulse, after detecting DECEL LS signal OFF, is taken as the zero point.

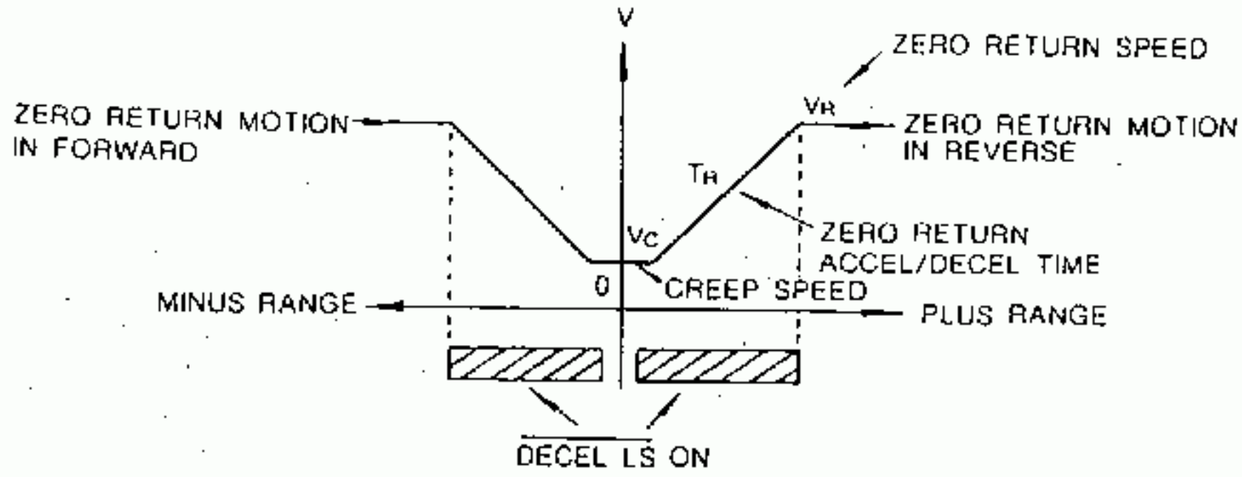


Fig. 4.8 Zero Return B Mode

4.2.3 Zero Return Precautions

(1) Keep zero return command FWD RTN (or RVS RTN) ON during the returning movement. Use a COIN input relay for zero return completion signal, and turn off the zero return command with this signal.

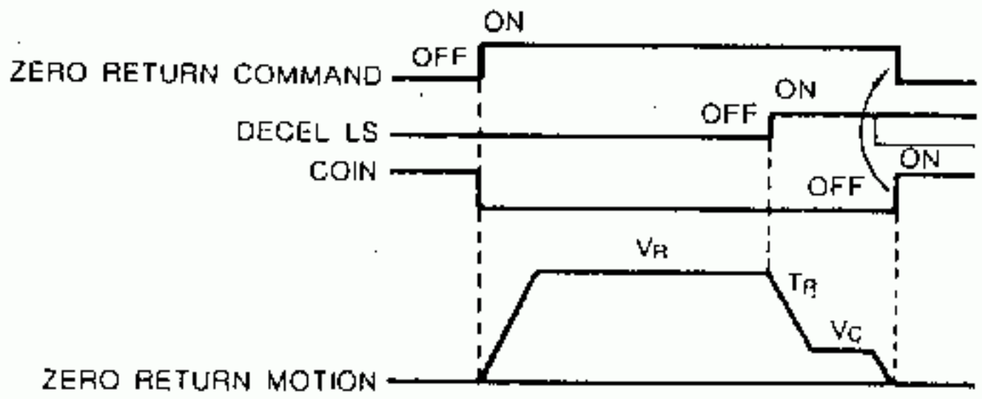


Fig. 4.9 Zero Return Command

(2) After a zero return motion other zero return motions are disabled. For another zero return motion, automatic operation, JOG, or an external manual pulse input must be made. Be sure to turn off the zero return command after returning to zero, before starting the next motion.

(3) If a zero return motion is executed while DECEL LS signal is ON, an error state is activated, and no motion takes place (see par. 10.1 B1083C Error Code).

In this case, bring the machine out of the DECEL LS ON range by JOG motion. Turn off DECEL LS, and then, attempt zero return again.

(4) In the zero return B mode, if the zero return motion is executed in the zero position (after returning to the zero position, and the power supply has been turned off and immediately turn on again), B1083C regards the zero return command as valid because DECEL LS signal is also OFF. The machine at the zero position will attempt the zero return operation to unspecified zero position. This may cause machine overtravel. To prevent this, be sure to set an overtravel detection LS on the other side of the zero position.

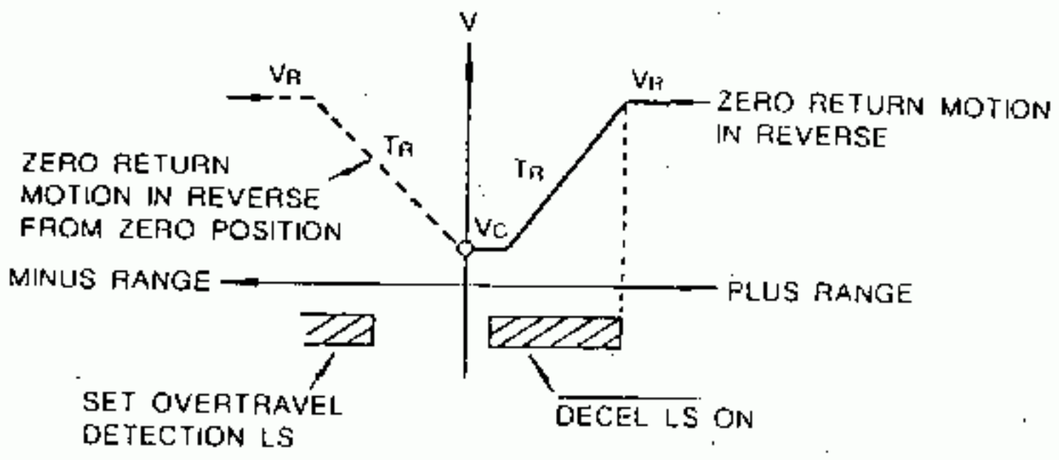


Fig. 4.10 Overtravel Detection LS

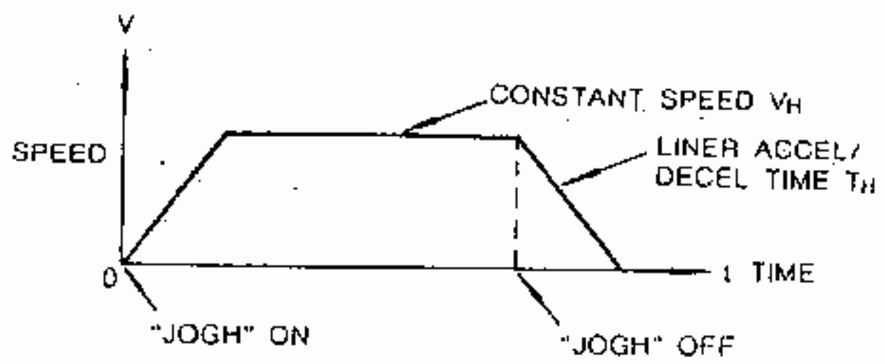
(5) In the zero return motion, the manual creep speed is used. Therefore, a JOGC accel/decel speed must be set. If a zero return is attempted without setting a JOGC accel/decel speed, an error state occurs (see par. 10.1 B1083C Error Code).

(6) Phase-C pulses always return to the CPU as HOME signals.

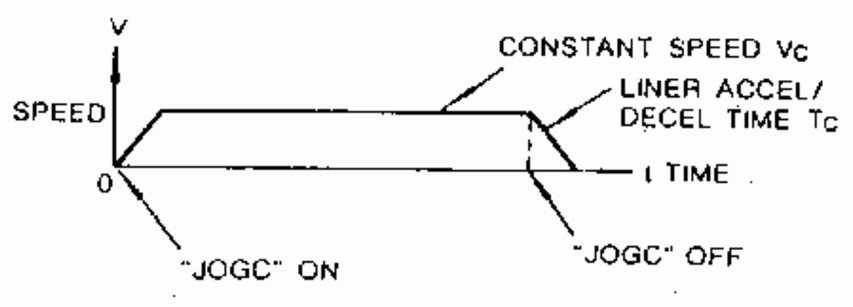
4.3 JOG OPERATION

Three JOG modes; JOGH (high speed), JOGL (low speed) and JOGC (creep speed) are available, and speeds and accel/decel times can be separately set for them. JOGC is also used as the zero return creep speed.

• JOGH (HIGH SPEED)



• JOGC (CREEP SPEED)



• JOGL (LOW SPEED)

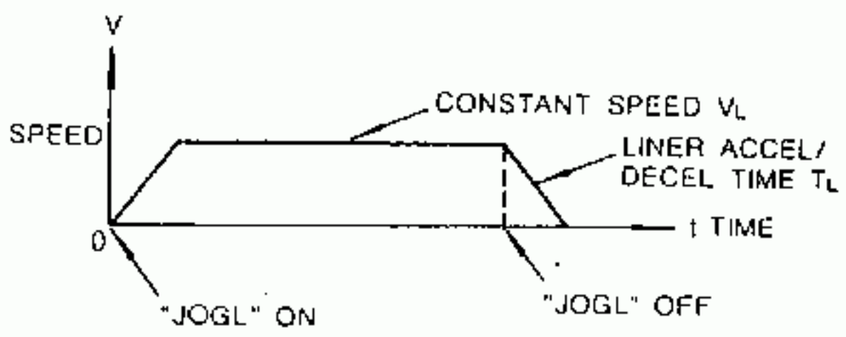


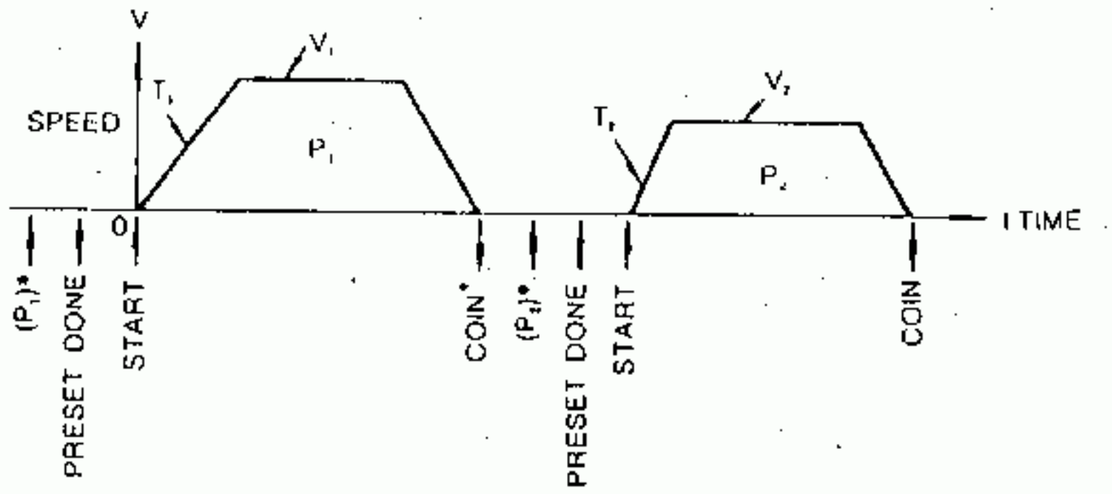
Fig. 4.11 JOG Operation

4.4 AUTOMATIC OPERATION PATTERN

4.4.1 1-Step Speed Pattern

(1) Incremental Mode

(a) Basic pattern



* Positioning setting
† Positioning completion signal

Fig. 4.12 Basic Pattern in Incremental Mode

(b) When repeating the same operation, positioning setting is not necessary each time.

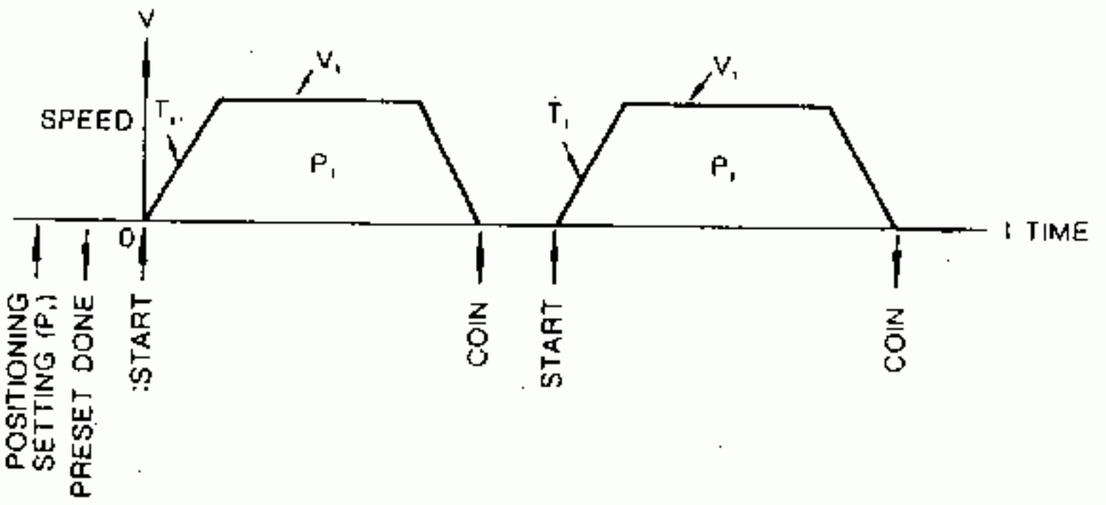
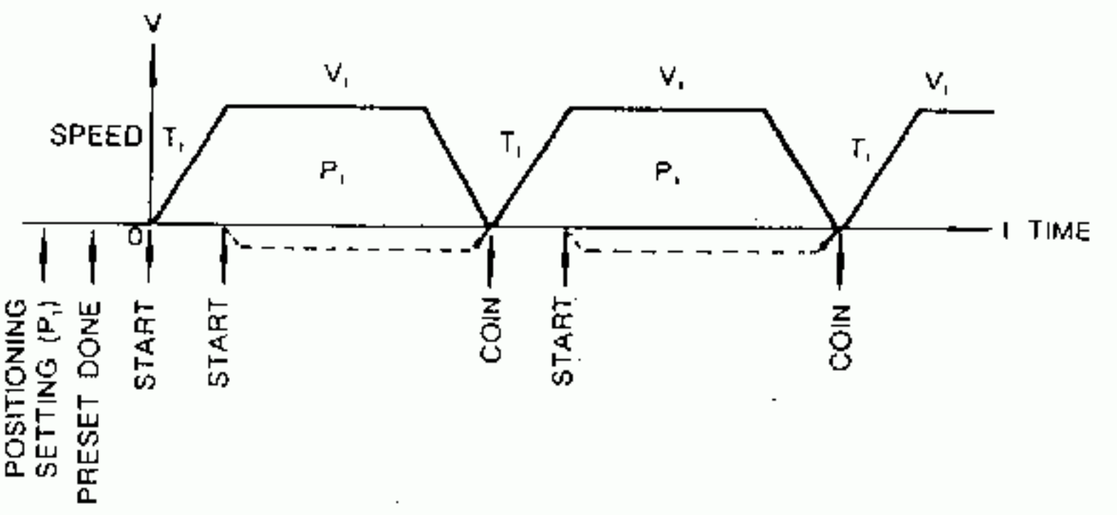


Fig. 4.13 Omission of Positioning Setting

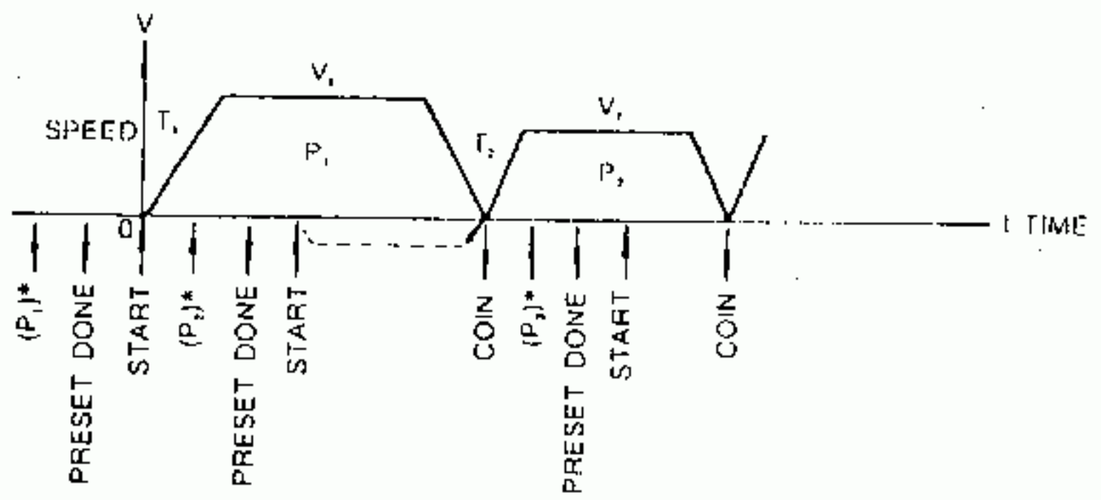
(c) During motion, the start command for the next positioning can be specified. In this case, the next positioning is started immediately upon the completion of positioning (COIN).



Note : In practice, there is a slight delay before COIN is turned on, due to some servo system delay.

Fig. 4.14 Start Command during Operation

(d) During motion, the next positioning setting can be made.



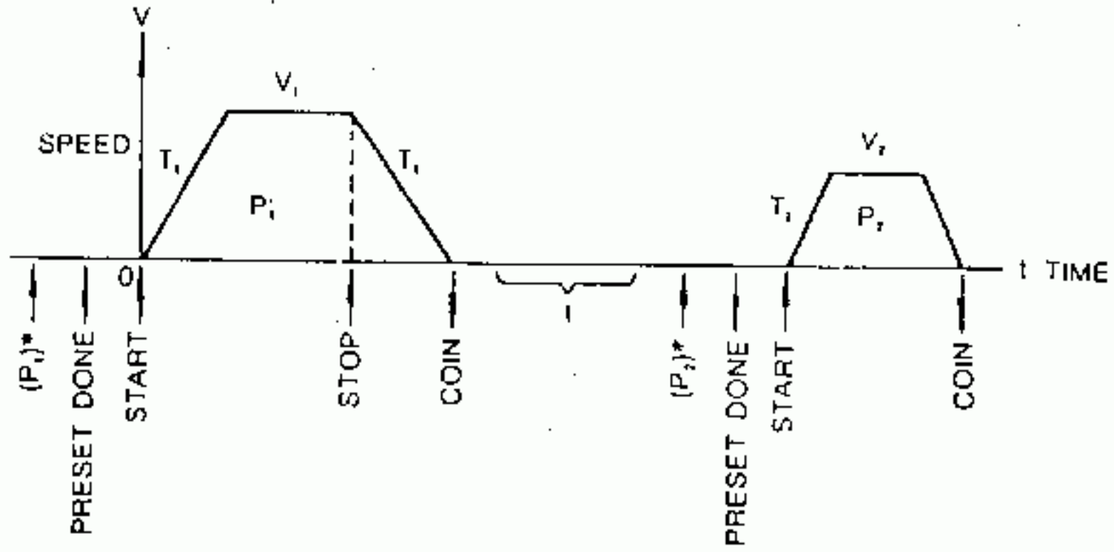
* Positioning setting

Fig. 4.15 Positioning Setting during Operation

(e) Temporary pausing in incremental mode

When PAUSE is executed in the incremental mode, the remaining distance $|P_1 - P_1'|$ is cancelled. When motion is restarted without setting the P_2 position, the machine moves again by the distance P_1. The start command for the next positioning is cancelled by STOP.

Positioning setting for P_2 can be made during the motion to P_1. In this case, the P_2 setting is not cancelled by STOP.



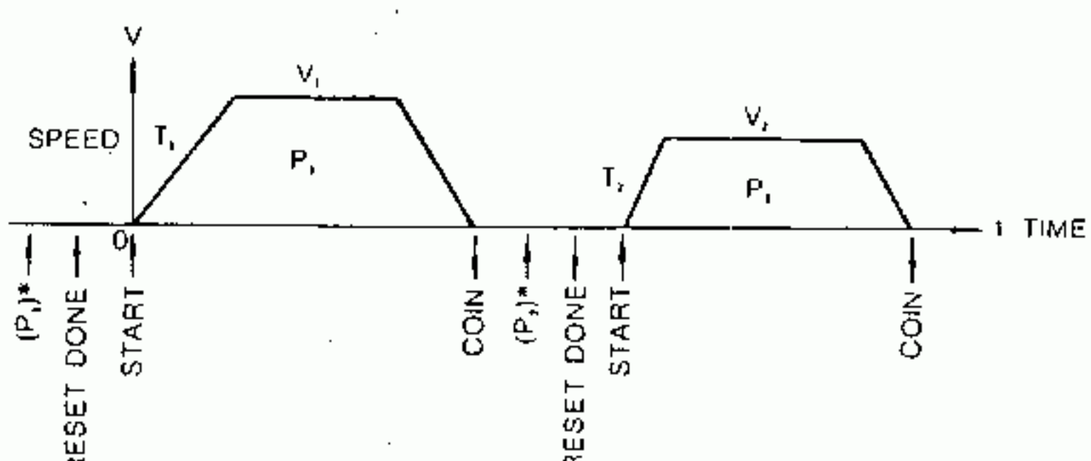
* Positioning setting

† During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Fig. 4.16 Temporary Pausing in Incremental Mode

(2) Absolute Mode

(a) Basic pattern

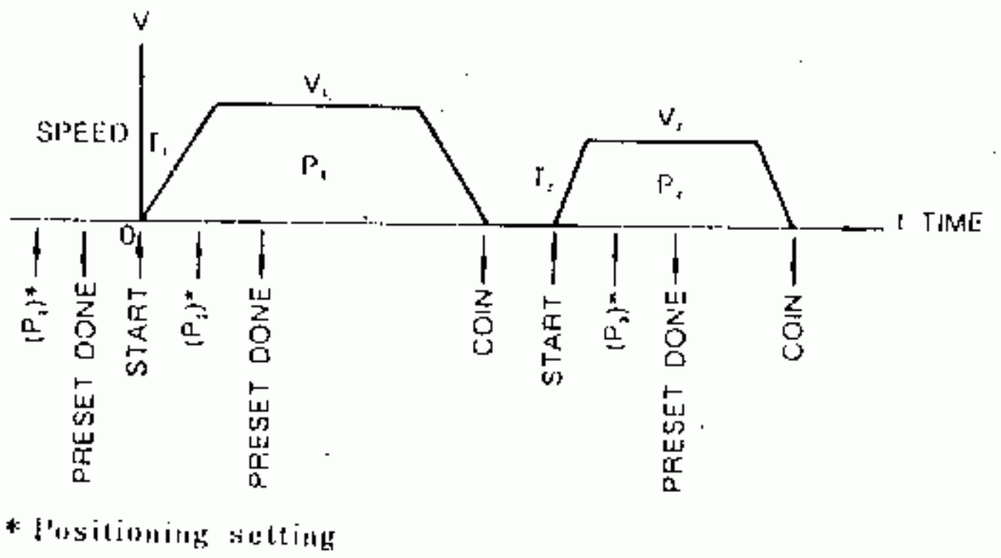


* Positioning setting

Fig. 4.17 Basic Pattern in Absolute Mode

4.4.1 1-Step Speed Pattern (Cont'd)

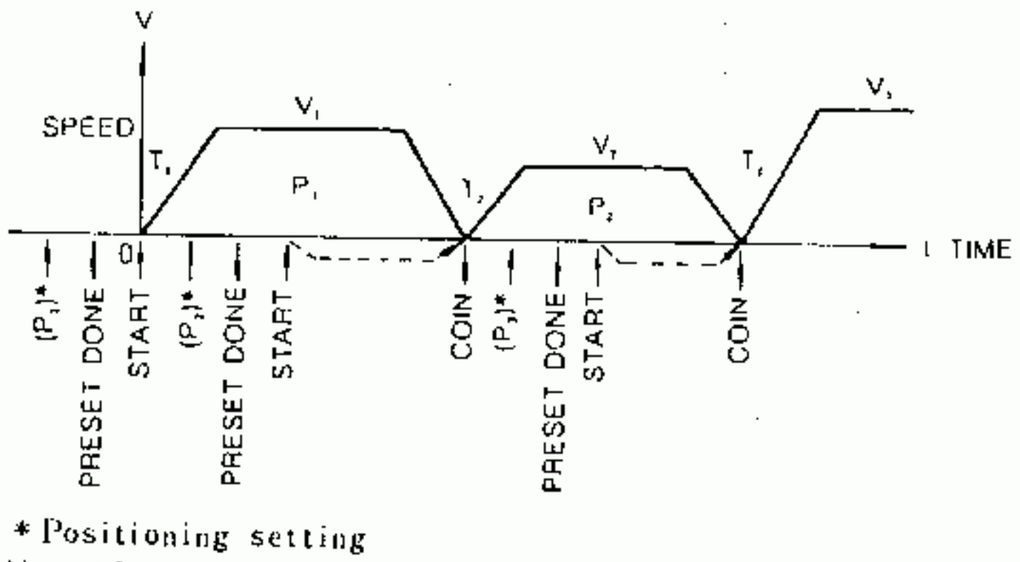
(b) The next positioning setting can be made during motion.



* Positioning setting

Fig. 4.18 Positioning Setting during Motion

(c) The start command for the next positioning can be set during motion.



* Positioning setting

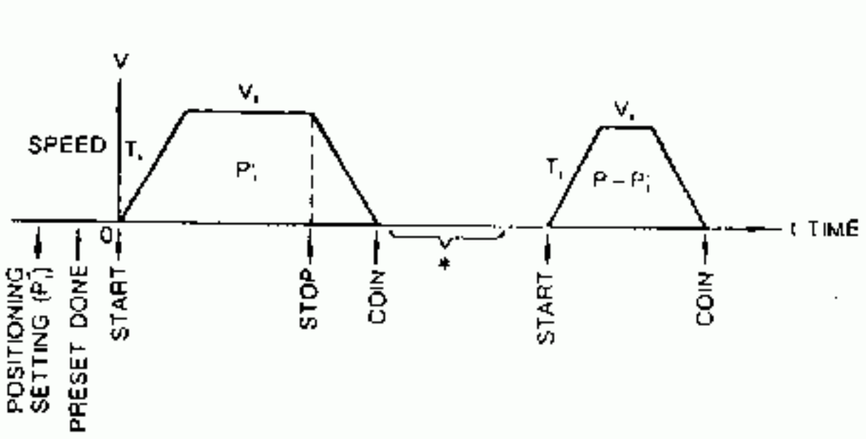
Note : In practice, there is a slight delay before COIN is turned on, due to servo system delay.

Fig. 4.19 Start Command during Motion

(d) Temporary pause in absolute mode

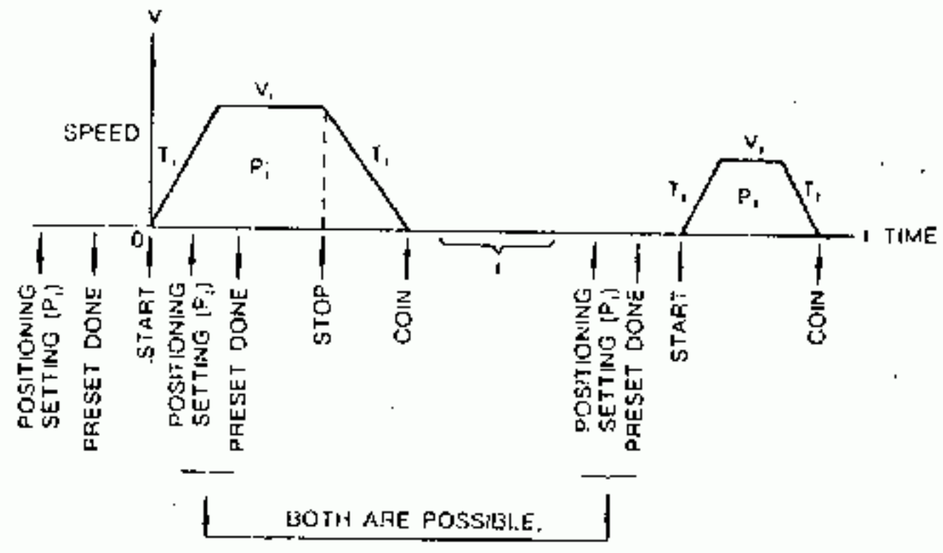
After a temporary pause, if there is no next positioning setting, the machine moves by the remaining distance (Fig. 4.20).

When positioning setting is made after temporary pausing, the machine starts positioning toward the new position command value (Fig. 4.21)



* During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Fig. 4.20 Temporary Pause in Absolute Mode



* If next START command is set here, it is cancelled at STOP command.

† During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Note : Remaining distance ($P_1 - P_1'$) is cancelled by positioning setting (P_2).

Fig. 4.21 Positioning Setting after Temporary Pause

Operation where JOG or external reference pulse is input in absolute mode:

· No positioning setting after temporary pause (Fig. 4.20)

(1) P_1 P_2	While positioning towards P_2, the operation stops at P_1' by STOP ON.
(2) P_1 P_1' P_2	Machine moves from P_1' to P_1'' when JOG or external reference pulse is input.
(3) P_2 P_1'' P_1	When automatic positioning start command is given again, (P_2-P_1'') is calculated, and positioning is started toward P_2.

· Positioning is set after temporary pause (Fig. 4.21)

(1) P_1 P_2	While positioning towards P_2, the operation stops at P_1' by STOP ON
(2) P_1 P_1' P_2	Machine moves from P_1' to P_1'' when JOG or external reference pulse is input.
(3) P_2 P_1' P_1'' P_1	When automatic positioning start command is given after setting P_2, $(P_1''-P_2)$ is calculated, and positioning motion is started toward P_2.

4.4.2 2-Step Speed Pattern

(1) Incremental Mode

(a) Basic pattern

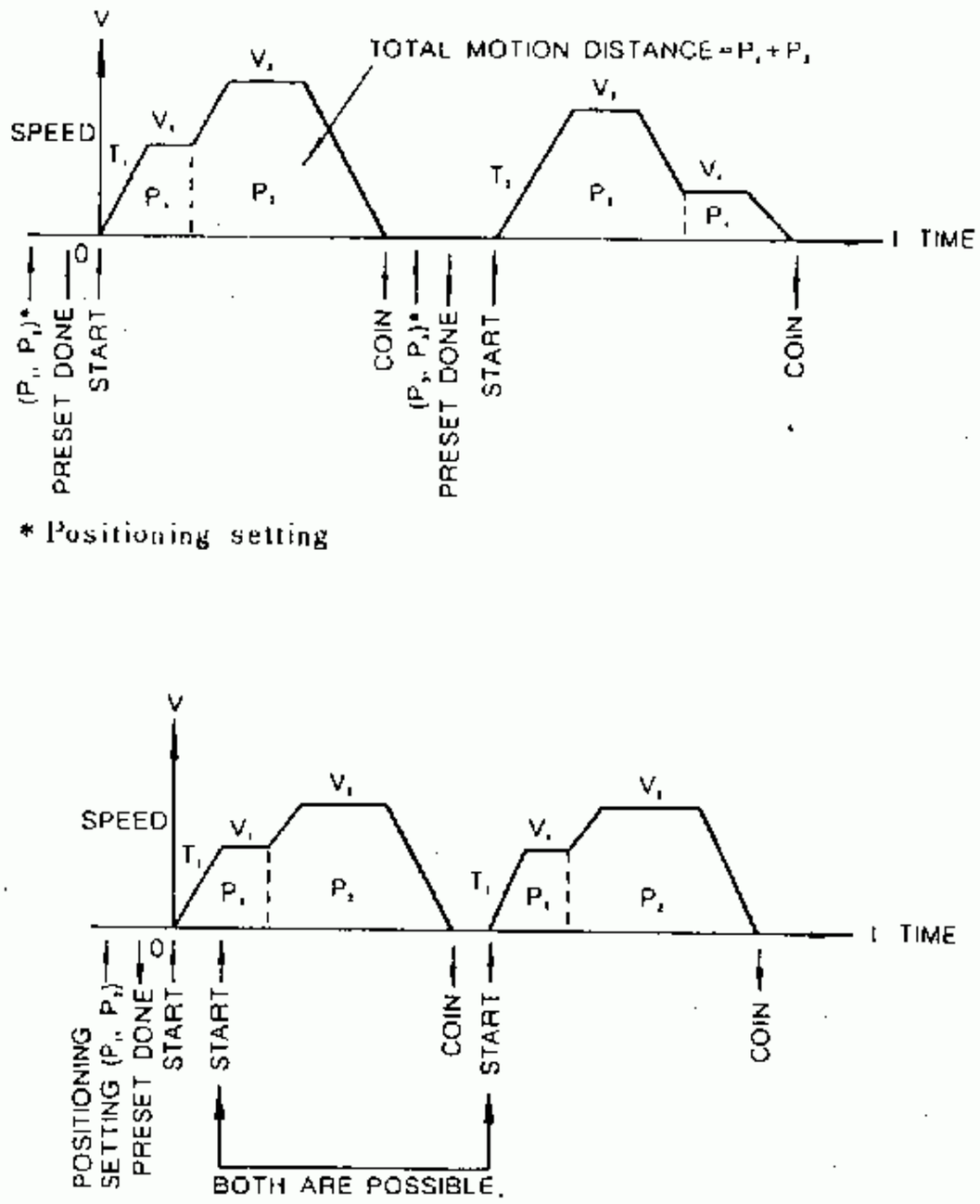


Fig. 4.22 Basic Pattern in Incremental Mode

(b) Omission of positioning setting

Fig. 4.23 Omission of Positioning Setting

(c) Positioning setting during motion

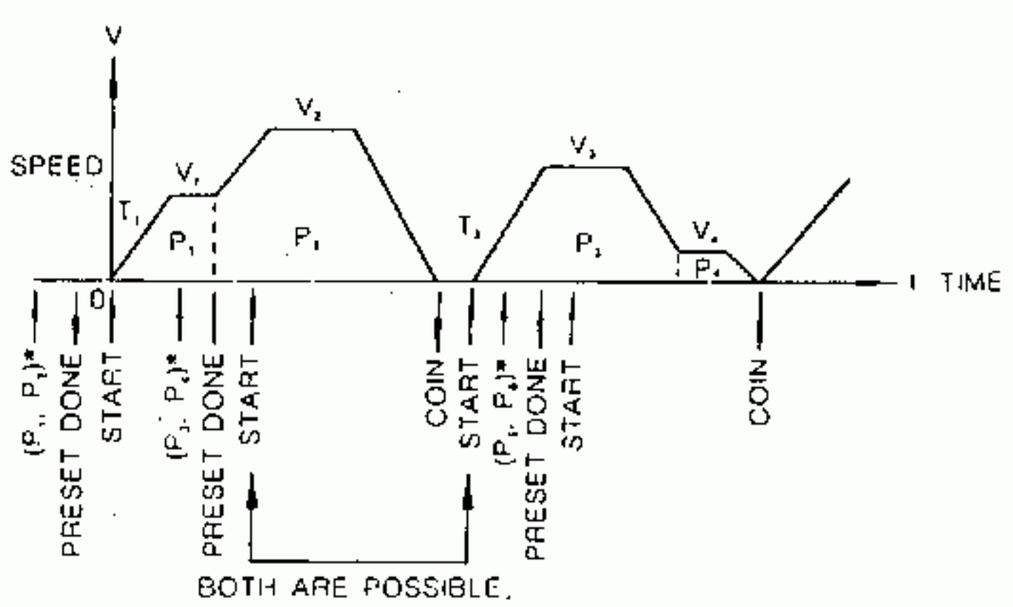
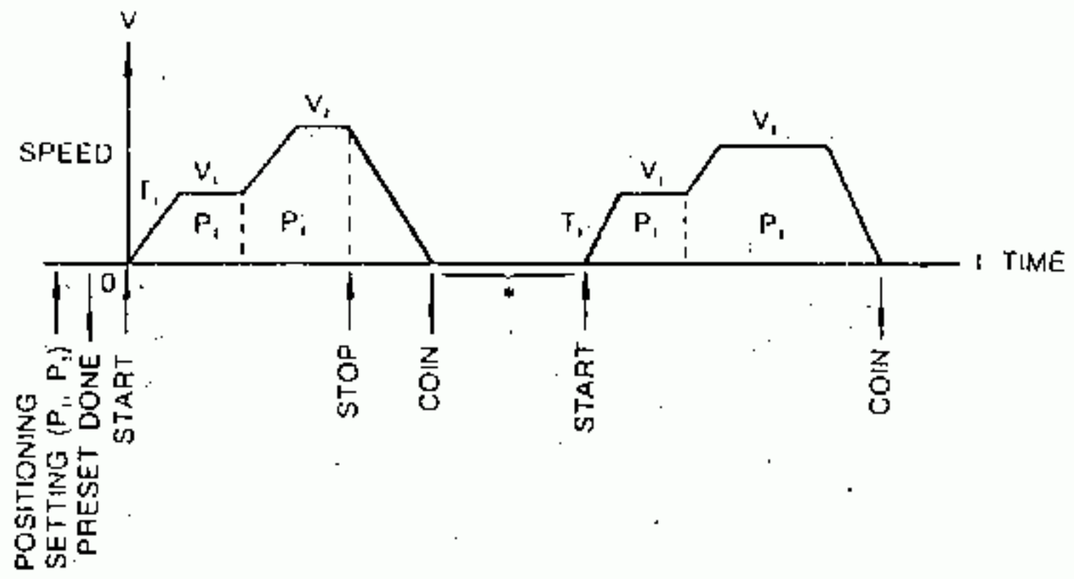


Fig. 4.24 Positioning Setting during Motion

4.4.2 2-Step Speed Pattern (Cont'd)

(d) Temporary pause in incremental mode

When PAUSE is executed in the incremental mode, the remaining distance $|P_1 - P_2'|$ is cancelled.

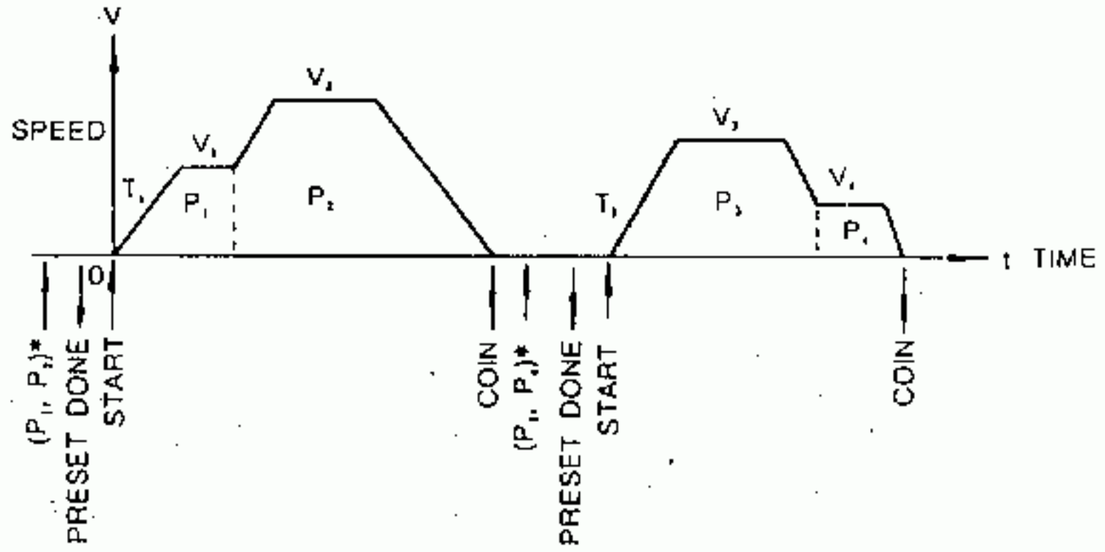


* During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Fig. 4.25 Temporary Pause in Incremental Mode

(2) Absolute Mode

(a) Basic pattern



* Positioning setting

Fig. 4.26 Basic Pattern in Absolute Mode

(b) Positioning setting during motion

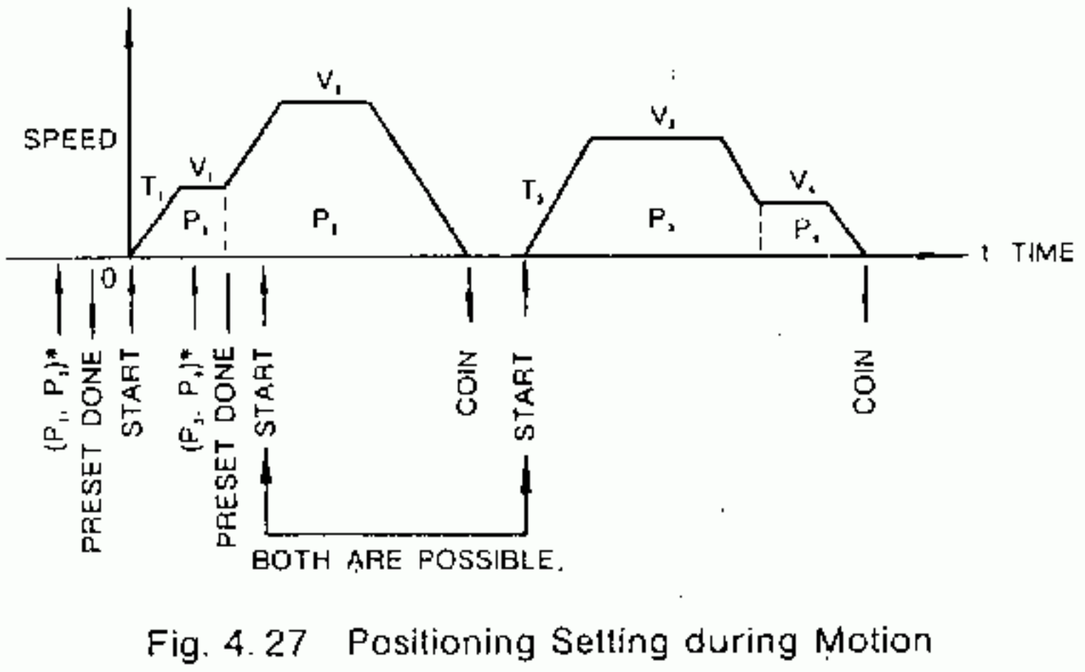
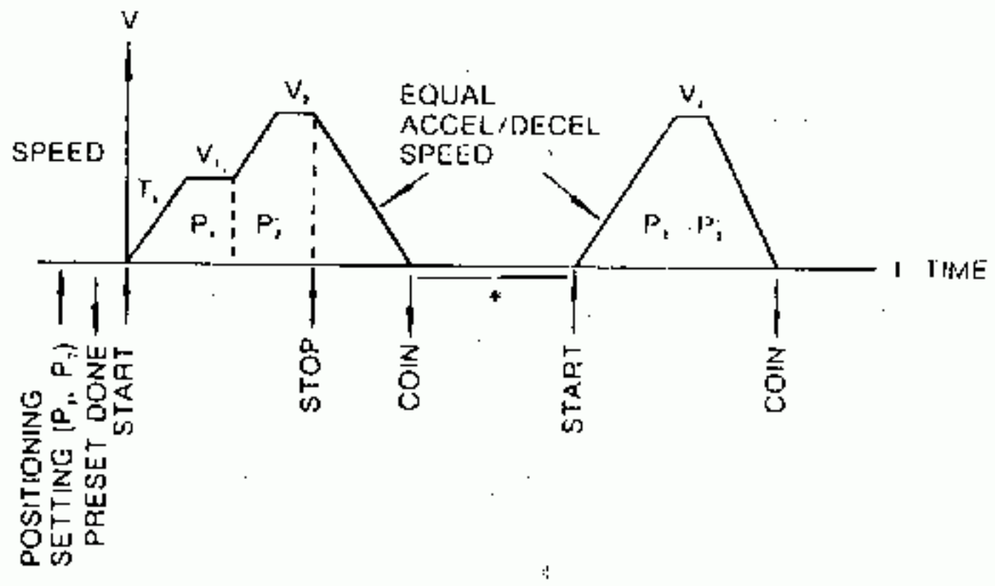


Fig. 4.27 Positioning Setting during Motion

(c) Temporary pause in absolute mode

After a temporary pause, if no next positioning setting exists the machine moves by the remaining distance by START.

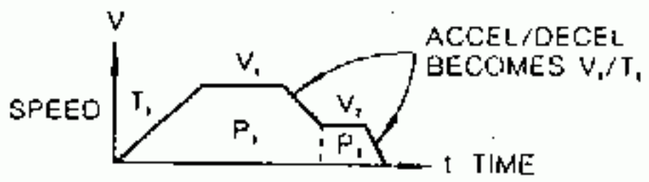


* During this time, JOG or EXTERNAL INPUT PULSE (MANUAL PULSE) can be input.

Fig. 4.28 Temporary Pause in Absolute Mode

(d) 2-step speed pattern precautions

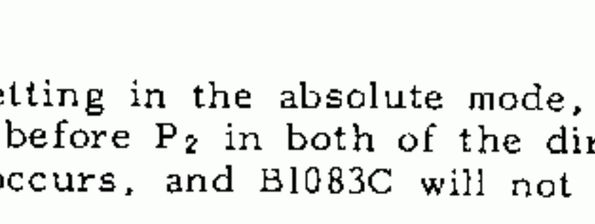
· In the 2-step speed pattern, only one accel/decel time is effective.

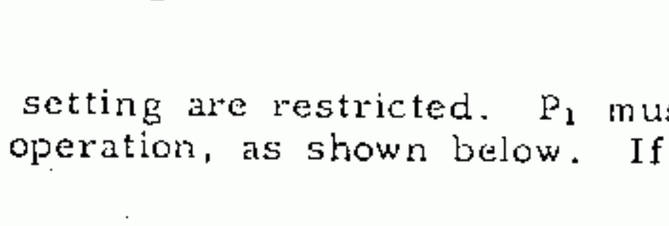


· With setting in the absolute mode, P_1 and P_2 setting are restricted. P_1 must be positioned before P_2 in both of the directions of operation, as shown below. If not so, error occurs, and B1083C will not operate.

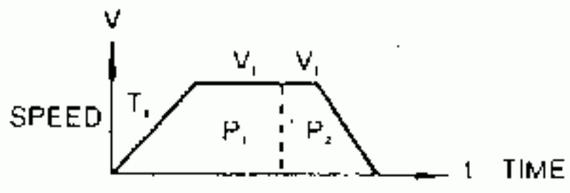
Positioning	Possible	Impossible
In Forward Run	CURRENT VALUE P_1 P_2	CURRENT VALUE P_2 P_1
In Reverse Run	P_2 P_1 CURRENT VALUE	P_1 P_2 CURRENT VALUE

· When $V_1 > V_2$, if the motion distance P_2 is too small so that no interval for speed V_2 is present, this is regarded as an error, and B1083C will not operate.





· When $V_1 = V_2$, the motion has the appearance of the 1-step speed pattern.



5. INTERNAL INTERFACE

5.1 MAINFRAME→B1083C

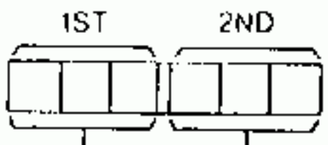
5.1.1 Setting Data (Output Register)

To preset various setting data from the mainframe to B1083C, four consecutive output registers are used. The output registers actually to be used are determined by the I/O allocation.

Table 5.1 Output Register

Function	Setting	R84H	U84, U84J, 584
Current Value Change	Current Value	1ST 2ND 0 ~ 999,999	1ST 2ND 0 ~ 99,999,999
	Not used	3RD 4TH	3RD 4TH
Position, Accel/decel and Speed for Automatic Operation	Position	1ST 2ND 0 ~ 999,999	1ST 2ND 0 ~ 999,999,999
	Accel/decel and Speed	3RD 4TH 1~99 ACCEL/DECEL 1~9999 SPEED	3RD 4TH 1~99 ACCEL/DECEL 1~9999 SPEED
Accel/decel and Speed for JOGH, JOGL and JOGC	Not used	1ST 2ND	1ST 2ND
	Accel/decel and speed	3RD 4TH 1~99 ACCEL/DECEL 1~9999 SPEED	3RD 4TH 1~99 ACCEL/DECEL 1~9999 SPEED
Accel/decel and Speed for Zero Return	Mode	1ST 2ND OPERATION MODE ZERO RETURN MODE	1ST 2ND OPERATION MODE ZERO RETURN MODE
	Accel/decel and speed	3RD 4TH 1~99 ACCEL/DECEL 1~9999 SPEED	3RD 4TH 1~99 ACCEL/DECEL 1~9999 SPEED

Note: 1ST: 1st output register 2ND: 2nd output register
3RD: 3rd output register 4TH: 4th output register



ZERO RETURN MODE

R84H	U84, 584	Zero Return Mode
000	0000	A Mode
001	0001	B Mode
Other than above		Error (Error code 37)

OPERATION MODE:

R84H	U84, U84J, 584	Operation Mode (Speed Pattern)	Accel/decel Time	External Input Terminal A16
000	0000	1-Step	10-990ms/1-99sec Selection by switch	EXTERNAL START
001	0001	2-Step		
011	0011	2-Step	0.1 to 9.9sec	
100	0100	1-Step	10-990ms/1-99sec Selection by switch	EXTERNAL STOP
101	0101	2-Step		
111	0111	2-Step	0.1 to 9.9sec	
Other than above		Error (Error Code 33)		

Note:

1. After turning on power supply to R84H (or U84, U84J, 584), or after module resetting, all the setting values in B1083C are blank. Before starting operation, all the necessary values must be set in B1083C.
2. When setting the zero return accel/decel and speed, set also the operation mode and the zero return mode.

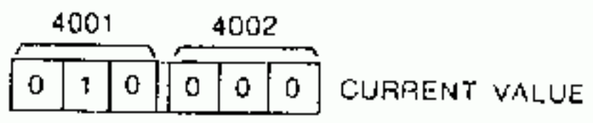
   If mode settings are not made, the 1-step speed pattern operation mode and the A mode zero return are automatically set. Set these modes immediately after turning on the power or after module resetting, and before making various settings.

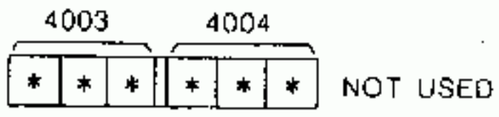
   Once some mode has been set, it can not be changed unless the power supply is switched on again or the module is reset.
3. When 011 (0011) or 111 (0111) is selected as operation mode setting, the accel/decel time of 0.1–9.9sec (in 0.1sec unit) can be set only for the 2-step speed pattern, without regard to the accel/decel time select switch. This accel/decel time unit becomes common to all the accel/decel time settings.
4. Although it depends on the setting value, the actual speed may be up to 50% lower than the set value.

Setting Example: R84H using output registers 4001 to 4004

(1) Changing current value to 10,000 (pulses)

Set the following values in the output registers 4001 to 4004, and execute OFF to ON transition of the "current value change" output coil. (At this time, the "AUTO/$\overline{\text{MAN}}$" output coil must be OFF, and the STOP output coil must be ON.)

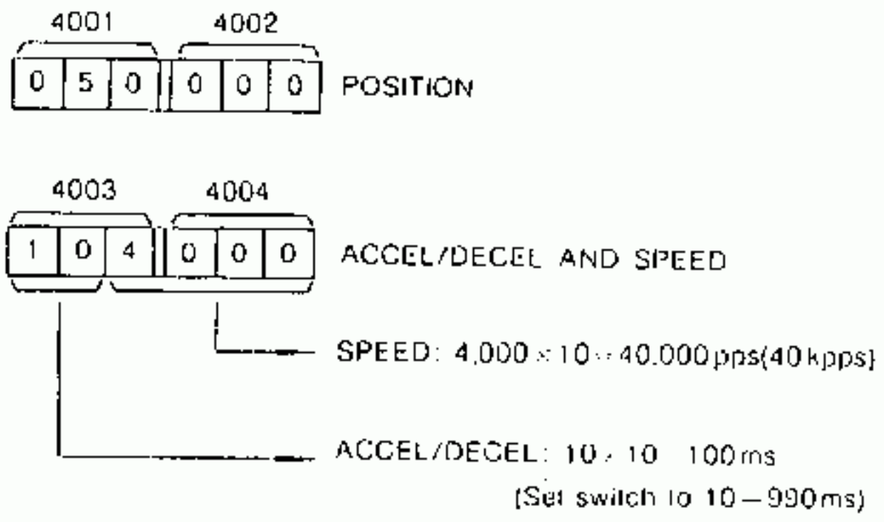




*Any digit is usable.

(2) The machine automatically moves to the specified position of 50,000 (pulses) with a linear accel/decel time of 100 ms and at a steady speed of 40 kpps, in the 1-step speed pattern and absolute mode.

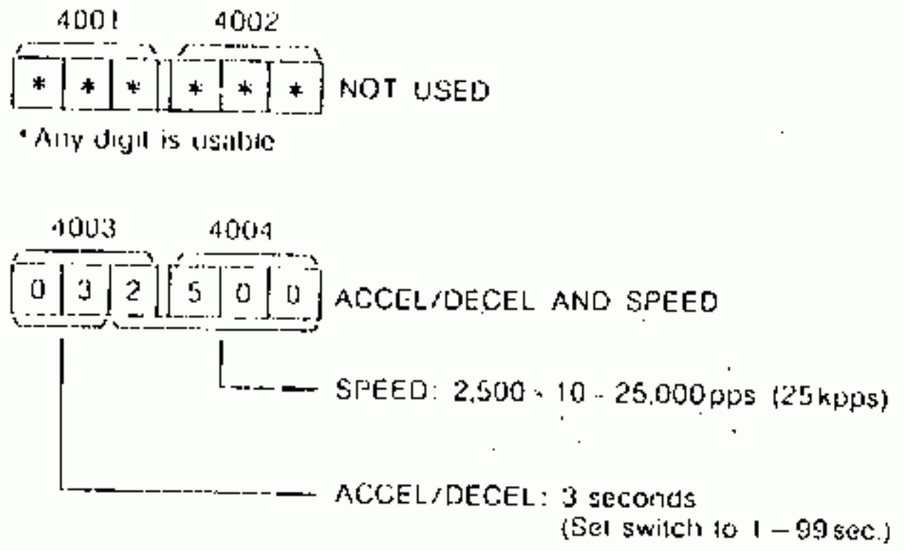
Set the following values in output registers 4001 to 4004, and turn on the "positioning setting" output coil for 1 scan only.



5.1.1 **Setting Data** (Output Register) (Cont'd)

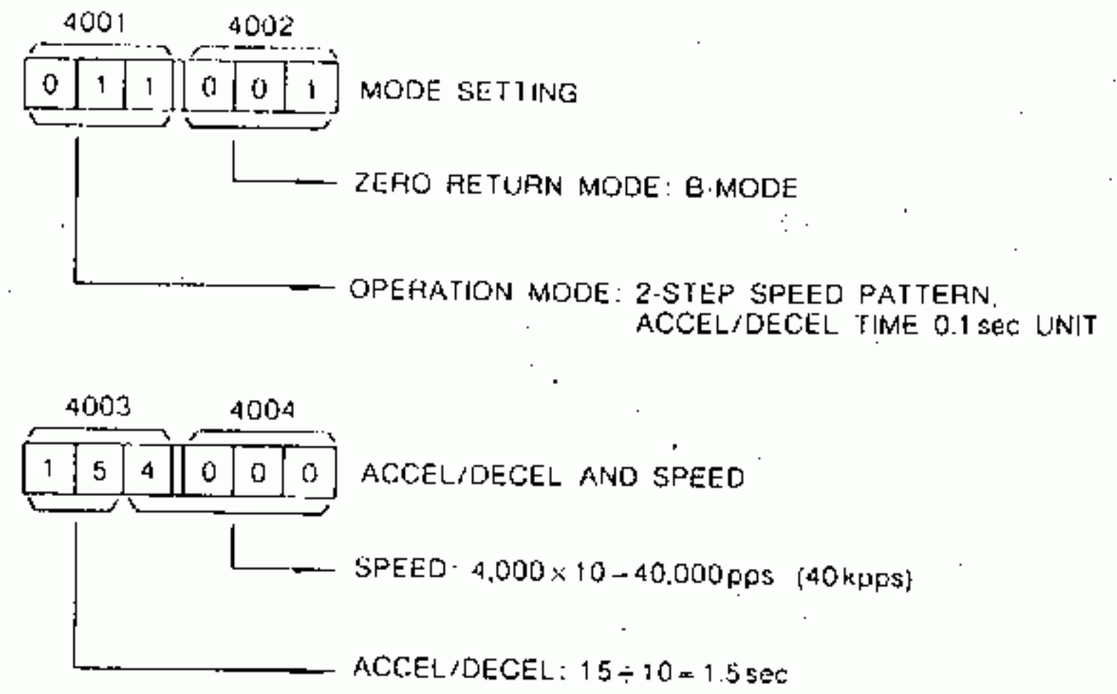
(3) Set the JOGH accel/decel time to 3 seconds, and steady speed to 25 kpps.

Set the following values in output registers 4001 to 4004, turn on the JOGH output coil, and execute OFF to ON transition of the JOG accel/decel and speed setting output coil. At this time, the AUTO/$\overline{\text{MAN}}$ output coil must be OFF, and the STOP output coil must be ON.



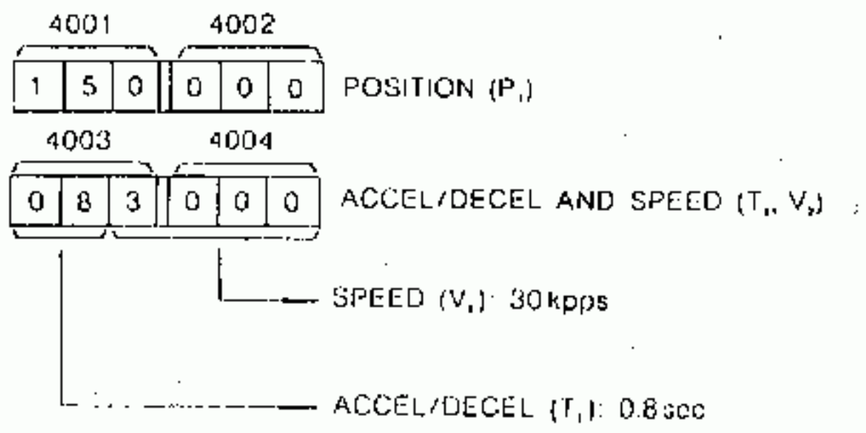
(4) Set the zero return accel/decel time to 1.5 sec, steady speed to 40 kpps, and set the operation mode to the 2-step speed pattern, accel/decel time in 0.1 sec. unit, and the zero return mode to B mode.

Set the following values in output registers 4001 to 4004, turn on the FWD RTN (or RVS $\overline{\text{RTN}}$) output coil, and perform JOG accel/decel output coil. At this time, the AUTO/$\overline{\text{MAN}}$ output coil must be OFF, and the STOP output coil must be ON. Also, make these settings before other settings.

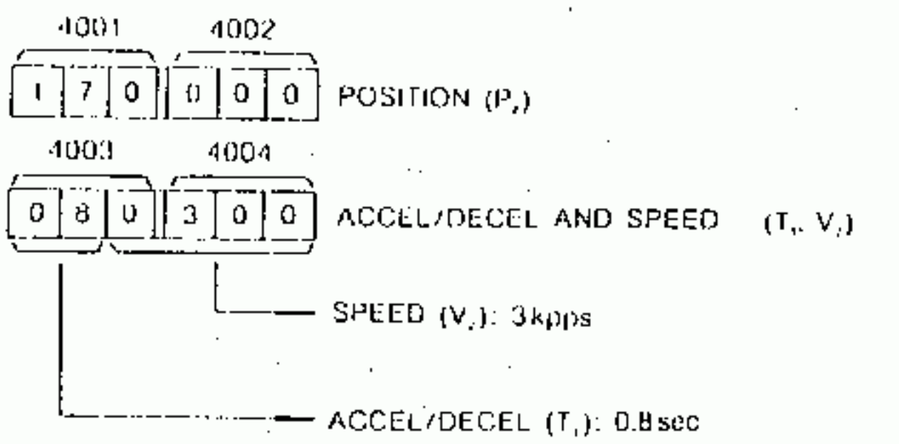


(5) Assuming the mode setting as in the above (4), the machine moves toward the specified position 150,000 (pulses) in the absolute mode, accelerating for 0.8 second at a steady speed of 30 kpps, then decelerates to a steady speed of 3 kpps from 150,000 (pulses), and eventually automatically positions to 170,000 (pulses).

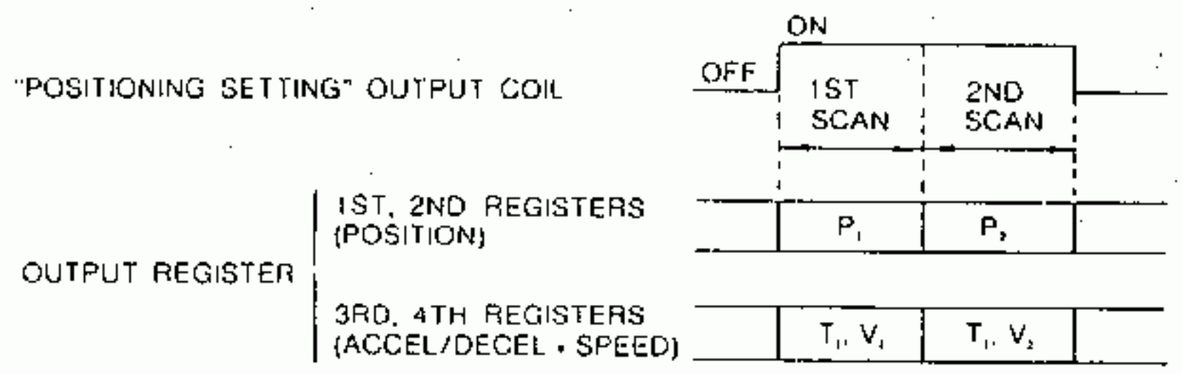
In the scan of execution OFF to ON transition of the "positioning setting" output coil, set the following values in output registers 4001 to 4004.



For the next scan, set the following values in output registers 4001 to 4004. Then, turn the "positioning setting" output coil ON and keep it on for 2 scans.



The timing chart is given below:



Note: accel/decel time for the 2nd scan shoud be equal to the time for the 1st scan.

5. 1. 2 **Control Signal** (Output Coil)

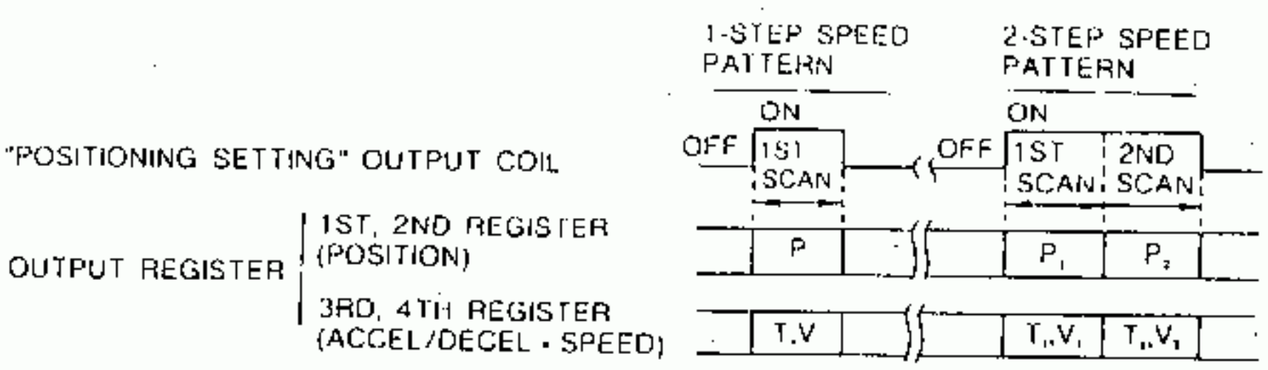
Table 5. 2 Output Coil List

R84H	U84, U84J, 584	Signal Name
0001+16n	00001+16n	Module reset
0002+16n	00002+16n	AUTO/$\overline{\text{MAN}}$
0003+16n	00003+16n	STOP
0004+16n	00004+16n	Current value change
0005+16n	00005+16n	Positioning Setting
0006+16n	00006+16n	JOG accel/decel and speed setting
0007+16n	00007+16n	Sign (+)/$\overline{\text{sign (−)}}$
0008+16n	00008+16n	START
0009+16n	00009+16n	FWD RTN
0010+16n	00010+16n	RVS RTN
0011+16n	00011+16n	JOGH
0012+16n	00012+16n	JOGL
0013+16n	00013+16n	JOGC
0014+16n	00014+16n	Monitor 1
0015+16n	00015+16n	Monitor 2
0016+16n	00016+16n	Monitor 3

Note: n=0, 1, 2.....

5.1.2 Control Signal (Output Coil) (Cont'd)

Table 5.3 Output Coil

Signal Name	Description
Module Reset	When B1083C receives module reset signal, it starts power-up process (as after power switching), and resets all set values, current values and the error counter to 0. Effective when executing OFF to ON transition. Keep ON for more than one scan. When B1083C starts power-up processing, READY input relay is turned OFF, and, upon completion in approx. 0.6 sec, READY input relay is turned ON.
AUTO/$\overline{\text{MAN}}$	ON.....Automatic operation (AUTO) OFF ..Manual operation (MANUAL)
STOP	Stop command: Effective when ON. Stops at the linear accel/decel time.
Current Value Change	Command to change current value. Effective when executing OFF to ON transition. Keep ON for more than 1 scan. When CURRENT VALUE CHANGE is performed OFF to ON transition, the applicable output register must have been set for the setting data. Note that when monitors 1, 2 and 3 are all ON, executing OFF to ON transition of CURRENT VALUE CHANGE resets the error code.
Positioning Setting	Setting command of position, accel/decel, and speed for automatic positioning. With the 1-step speed pattern, turned ON for one scan only, and with the 2-step speed pattern, turned ON for two scans only. 
JOG Accel/decel and Speed Setting	Setting command of accel/decel and speed for JOG or zero return. Used in combination with any of the output coils for JOGH, JOGL, JOGC, FWD RTN, and RVS RTN. Effective when executing OFF to ON transition. Keep ON more than 1 scan. When JOG accel/decel and speed setting is performed OFF to ON transition, setting data must be set in applicable output registers in advance.
Sign(+)/$\overline{\text{Sign(−)}}$	(1) Effective when "current value change" is executed OFF to ON transition. ON: Plus range OFF: Minus range (2) Effective when "positioning setting" is executed OFF to ON transition. (3) Effective with manual operation (JOGH, JOGL, JOGC). ON: Forward run OFF: Reverse run
START	Start command for automatic positioning. Effective when executing OFF to ON transition. Keep ON for more than 1 scan.
FWD RTN	Start command for zero return in forward run when AUTO/$\overline{\text{MAN}}$ is ON. Effective when ON. Sets FWD RTN accel/decel and speed in combination with "JOG accel/decel and speed setting", when AUTO/$\overline{\text{MAN}}$ is OFF.
RVS RTN	Start command for zero return in reverse run when AUTO/$\overline{\text{MAN}}$ is ON. Effective when ON. Sets RVS RTN accel/decel and speed in combination with "JOG accel/decel and speed setting", when AUTO/$\overline{\text{MAN}}$ is OFF.
JOGH	Manual high speed command. However, while STOP is ON, sets JOGH accel/decel and speed in combination with "JOG accel/decel and speed setting".
JOGL	Manual low speed command. However, while STOP is ON, sets JOGL accel/decel and speed in combination with "JOG accel/decel and speed setting".
JOGC	Manual creep speed command. However, while STOP is ON, sets JOGC accel/decel and speed in combination with "JOG accel/decel and speed setting".
Monitor 1 Monitor 2 Monitor 3	These three output coils designate data to be monitored. (See Table 5.6)

Operation Mode	Sign(+)/$\overline{\text{sign(−)}}$	Command
Incremental Mode	ON	Forward run
	OFF	Reverse run
Absolute Mode	ON	Plus range
	OFF	Minus range

Table 5.4 Output Coils and B1083C Function

B1083C Function \ Coil Name		Module Reset	AUTO/$\overline{\text{MAN}}$	STOP	Current Value Change	Positioning Setting	JOG Accel/decel and Speed Setting	START	FWD RTN	RVS RTN	JOGH	JOGL	JOGC
Module Reset		OFF→ON*	—	—	—	—			—	—	—	—	—
STOP		—	—	ON*	—	—	—	—	—	—	—	—	—
Current Value Change		—	OFF	ON	OFF→ON*	—	—	—	—	—	—	—	—
Accel/decel and Speed Setting	JOGH	—	OFF	ON	—	—	OFF→ON*	—	OFF	OFF	ON	OFF	OFF
	JOGL	—	OFF	ON	—	—	OFF→ON*	—	OFF	OFF	OFF	ON	OFF
	JOGC	—	OFF	ON	—	—	OFF→ON*	—	OFF	OFF	OFF	OFF	ON
	FWD RTN	—	OFF	ON	—	—	OFF→ON*	—	ON	OFF	OFF	OFF	OFF
	RVS RTN	—	OFF	ON	—	—	OFF→ON*	—	—	ON	OFF	OFF	OFF
Operation	JOGH	—	OFF	OFF	—	—	—	—	—	—	ON*	OFF	OFF
	JOGL	—	OFF	OFF	—	—	—	—	—	—	OFF	ON*	OFF
	JOGC	—	OFF	OFF	—	—	—	—	—	—	OFF	OFF	ON*
Positioning Setting		—	—	—	—	OFF→ON*	—	—	—	—	—	—	—
Positioning Start		—	ON	OFF	—	—	—	OFF→ON*	—	—	—	—	—
Zero Return Start at Forward Running		—	ON	OFF	—	—	—	—	ON*	—	—	—	—
Zero Return Start at Reverse Running		—	ON	OFF	—	—	—	—	—	ON*	—	—	—

*Asterisked coil statuses can be effective when they are set after achieving all the other coil statuses for the corresponding B1083C functions.

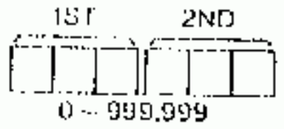
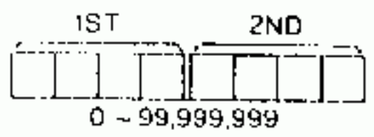
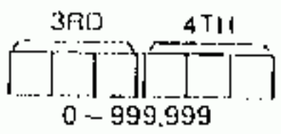
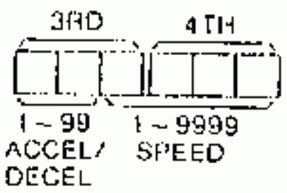
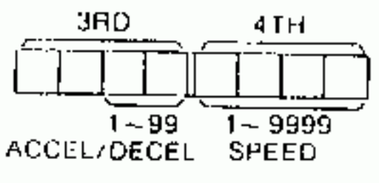
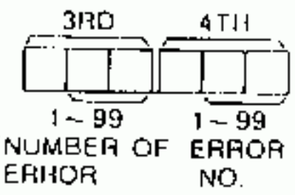
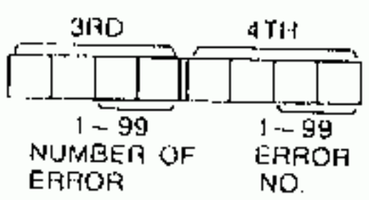
Note: Where the status of two or more coils among JOGH, JOGL, JOGC are ON, the settings are executed in order of JOGC, JOGL, JOGH.

5. 2 B1083C→MAINFRAME

5. 2. 1 Monitor Data (Input Register)

To monitor various data in B1083C from the mainframe, four consecutive input registers are used. The input register to be used are determined by I/O allocation.

Table 5. 5 Input Resister

Monitor Item	R84H	U84, U84J, 584
Current Value		
Current Value Change, Position Reference Value		
Accel/decel and Speed (Automatic, JOGH, JOGL, JOGC, Zero return)		
Error Code		

Note. 1ST: 1st register 2ND: 2nd register
3RD: 3rd register 4TH: 4th register

Table 5. 6 Monitor Code and Monitor Contents

Monitor Code			Monitor Contents		
Monitor 1	Monitor 2	Monitor 3	1ST and 2ND Input Register	3RD and 4TH Input Register	
OFF	OFF	OFF	Current value (Feedback Current Value)	Current Value Change	
ON	OFF	OFF		Position Reference Value	
OFF	ON	OFF		Automatic	Accel/decel and Speed
ON	ON	OFF		JOGH	
OFF	OFF	ON		JOGL	
ON	OFF	ON		JOGC	
OFF	ON	ON		Zero Return	
ON	ON	ON	Reference current value	Error Code	

Note:

1. With the monitor code of "000", the setting data given to B1083C when changing the current value can be monitored with the 3rd and 4th input registers.
2. For zero return, both FWD RTN and RVS RTN can be set, but since only one monitor is used, FWD RTN has priority. When FWD RTN is not set, RVS RTN is monitored.
3. With the monitor code of "111", the current command value can be monitored with the 1st and 2nd input registers, and the error code can be monitored with the 3rd and 4th input registers.
4. With the monitor code of "111", when the "current value change" coil is executed OFF to ON transition with STOP turned ON, error codes can be reset. Therefore, to change the current value, monitor codes other than "111" should be used.
5. With the 2-step speed pattern, when the position command value, and accel/decel and speed are monitored with the monitor codes "100" and "010", the 1st step set data and the 2nd step set data are diplayed alternately.

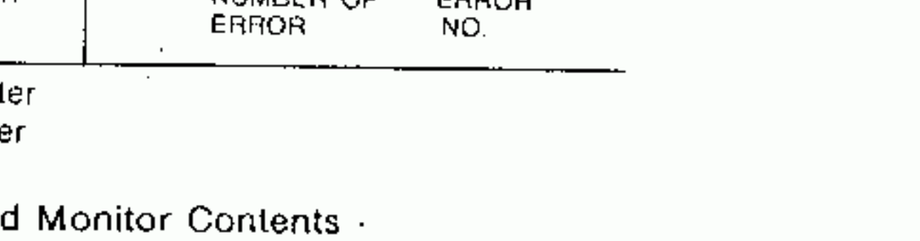


Fig. 5. 1 Feedback Current and Command Current Value

5. 2. 2 **Control Signal** (Input Relay)

Table 5. 7 Input Relay List

R84H	U84, 584	Signal Name
1001+16n	10001+16n	READY
1002+16n	10002+16n	PRESET DONE
1003+16n	10003+16n	Sign(+)/sign(−)
1004+16n	10004+16n	FWD
1005+16n	10005+16n	RVS
1006+16n	10006+16n	PLUS/MINUS
1007+16n	10007+16n	Current value over
1008+16n	10008+16n	HOME
1009+16n	10009+16n	COIN
1010+16n	10010+16n	DECEL LS
1011+16n	10011+16n	ERROR
1012+16n	10012+16n	Fault
1013+16n	10013+16n	Not used
1014+16n	10014+16n	Pulse outputting completion
1015+16n	10015+16n	Not used
1016+16n	10016+16n	Not used

Note: n=0, 1, 2.....

Table 5. 8 Input Relay

Signal Name	Contents
READY	B1083C self diagnosis result is indicated. It is ON when in normal, and OFF when in fault (ROM total check, RAM check error, WDT error). It is turned off for approx. 0.5 second when the power supply is turned on, or the module is reset.
PRESET DONE	It is ON for 1 sean after the completion of preset action in B1083C.
Sign(+)/Sign(−)	Effective when monitoring "current value change" and "position reference value". Monitors sign(+)/sign(−) preset for "current value change" and "position reference value". (1) When monitor code is "current value change": ON: plus range OFF: minus range (2) When monitor code is "position reference value": Action Mode / Sign(+)/sign(−) / Command Incremental Mode / ON / Forward run Incremental Mode / OFF / Reverse run Absolute Mode / ON / Plus range Absolute Mode / OFF / Minus range
FWD	ON while B1083C forward run command is ON
RVS	ON while B1083C reverse run command is ON
PLUS/MINUS	Current value counter range is indicated. ON: plus range OFF: minus range
Current Value	Turns ON when current value counter contents exceed the current value change range.
HOME	Always ON while PG phase-C is detected.
COIN	Positioning completion pulse. Turns ON for more than 1 scan when the pulses have been output after automatic positioning starting or zero return starting, and when the contents of the error counter have reached the COIN setting width (set by switch). Turns ON also at temporary pause or in the event of hardware error. Effective when AUTO/MAN is ON.
DECEL LS	Indicates the state of external input signal "DECEL LS". Turns ON when "DECEL LS" is ON ("L" level).
ERROR	Turns ON when B1083C detects an error. For error codes, see par. 10.1 B1083C error code.
Fault	Indicates that B1083C is outputting external output signal "FAULT". It is ON when "FAULT" is OFF ("H" level). For faults, refer to par. 6.2 External I/O signals.
Pulse Outputting Completion	Turns ON only for 1 scan when the pulse outputting has been completed in automatic operation, or in zero return operation. However, not turned ON at temporary pause. Effective when AUTO/MAN is ON.

Note: Especially with the R84H mainframe, when no ladder circuit is stored, a scan time that is too short may result in turning OFF the READY input relay occasionally. This fault can be eliminated when laddre circuits are stored.

5.3 I/O ALLOCATION

5.3.1 R84H I/O Allocation

B1083C requires the following signals when operating under R8411 mainframe:

- Discrete input relays: 16
- Discrete output coils: 16
- Input registers: 4
- Output registers: 4

Therefore, the R84H mainframe allocation to B1083C is as follows (when B1083C connector is plugged into slot 2).

Allocation Table No.	Stored Digits
4102	0 4 2 → Discrete input relay: 2 bytes; Binary input register: 4 sets
4002	0 4 2 → Discrete output coil: 2 bytes; Binery output register: 4 sets

Note:
1. The 4 sets of input and output registers are always consecutive.
2. Always specify binary numerals for the input and output registers.
3. B1083C occupies two mounting base slots, but has the signal connector on the right side. Be sure to allocate I/O signals to the right slot. The left slot requires no allocation. B1083C can be mounted to any slot.

5.3.2 584 I/O Allocation

B1083C requires the same discrete signals and register signals with 584 as with R84H. To connect B1083C to the 584 mainframe, an I/O adapter (Model: DISCT-J1040) for 584 connection is used. The I/O allocation is required both to the 584 mainframe and to J1040 adapter.

The I/O allocation where B1083C is mounted to slot 2 of a J1040 adapter connected to CH1 of 584 is shown as in the example below:

(1) Allocation conversion table

Allocate the input and output between the 584 mainframe and the J1040 adapter according to the allocation conversion table in Table 5.9.

Table 5.9 Example of Allocation Conversion Table

Input					Output				
584 Side			1000 Series I/O Side		584 Side			1000 Series I/O Side	
SLOT		Input	R/D	Slot	SLOT		Output	R/D	Slot
Odd Channel	1	10001	D	02	Odd Channel	1	00001	D	02
	2	30001	R	02		2	40001	R	02
	3	30002	R	02		3	40002	R	02
	4	30003	R	02		4	40003	R	02
	5	30004	R	02		5	40004	R	02
	6	INHIBIT	—	—		6	INHIBIT	—	—
	7	INHIBIT	—	—		7	INHIBIT	—	—
	8	INHIBIT	—	—		8	INHIBIT	—	—

(2) Example of I/O allocation to 584 mainframe

CHANNEL : 01

INPUT			OUTPUT		
SLOT	REF #	TYPE	SLOT	REF #	TYPE
1	10001	DISCRETE	1	00001	DISCRETE
2	30001	BIN REG	2	40001	BIN REG
3	30002	BIN REG	3	40002	BIN REG
4	30003	BIN REG	4	40003	BIN REG
5	30004	BIN REG	5	40004	BIN REG
6	.....	INHIBIT	6	.....	INHIBIT
7	.....	INHIBIT	7	.....	INHIBIT
8	.....	INHIBIT	8	.....	INHIBIT

Fig. 5.2 Example of I/O Allocation Setting to 584 on Programming Panel P190

For the I/O allocation method for the J1040 adapter, refer to "Memocon-SC 584 I/O Adapters" (SIE-C815-7.80).

5.3.2 584 I/O Allocation (Cont'd)

(3) I/O allocation to U84 and U84J

For U84 and U84J, the same discrete signals and register signals are required by B1083C, as for R84H or 584, as follows:

- Discrete input relay: 16
- Discrete output relay: 16
- Input register: 4
- Output register: 4

The I/O allocation for B1083C mounted to slot 2 of rack 2, in channel 1 of U84 or U84J is shown in a display on programming panel P190 below.

CHANNEL : 01 RACK : 2

INPUT

	DISCRETE		REGISTER		
SLOT	REF #	POINTS	REF #	BCD	BINARY
1	.....	INH	.....	INH	INH
2	10081	16	30022	INH	4
3	.....	INH	.....	INH	INH
:					

CHANNEL : 01 RACK : 2

OUTPUT

	DISCRETE		REGISTER		
SLOT	REF #	POINTS	REF #	BCD	BINARY
1	.....	INH	.....	INH	INH
2	00081	16	40027	INH	4
3	.....	INH	.....	INH	INH
:					

Fig. 5.3 Example of I/O Allocation Setting to U84 or U84J on Programming Panel P190

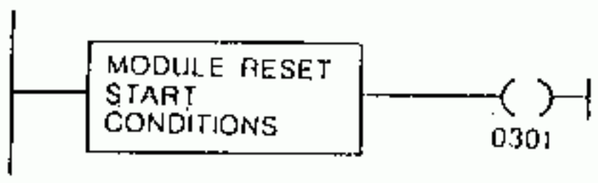
5.4 LADDER DIAGRAM FOR DATA SETTING

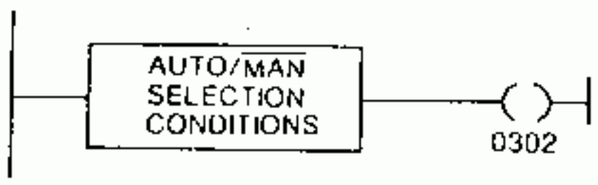
5.4.1 Example of Ladder Diagram to R84H

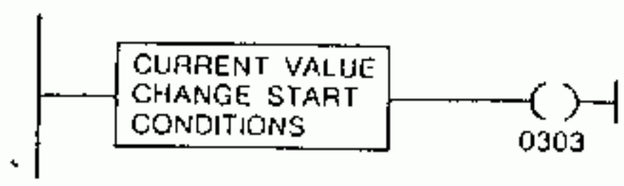
- 1001 to 1016: Input relay
- 3001 to 3004: Input register
- 0001 to 0016: Output coil
- 4001 to 4004: Output register
- 4101, 4102: JOGH
- 4103, 4104: JOGL
- 4105, 4106: JOGC

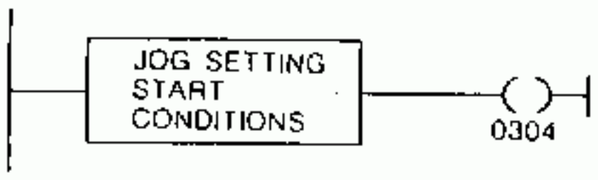
  (JOGH, JOGL, JOGC: accel/decel and speed setting value)
- 4107, 4108: Zero return accel/decel and speed setting value
- 4109, 4110: Current value change
- 4111, 4112: Position refcrence value
- 4113, 4114: Accel/decel setting value

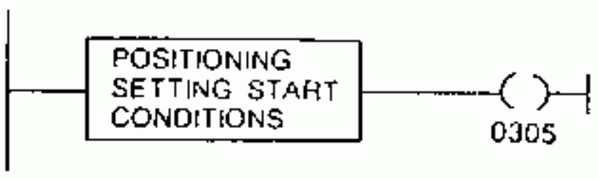
  (Position reference value, Accel/decel setting value: automatic positioning (1-step speed pattern))

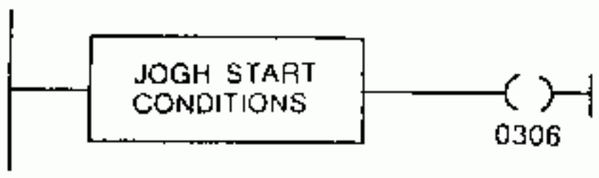

MODULE RESET
START
CONDITIONS
0301


AUTO/MAN
SELECTION
CONDITIONS
0302

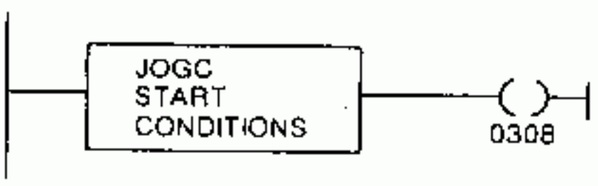

CURRENT VALUE
CHANGE START
CONDITIONS
0303

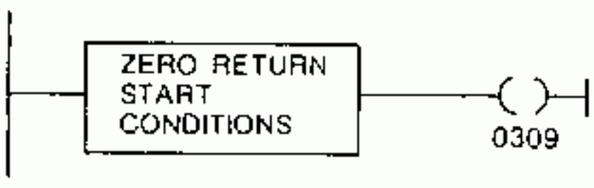

JOG SETTING
START
CONDITIONS
0304

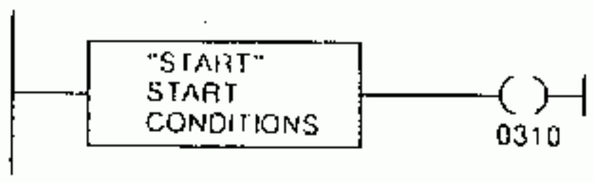

POSITIONING
SETTING START
CONDITIONS
0305

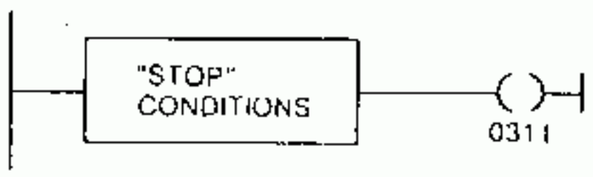

JOGH START
CONDITIONS
0306

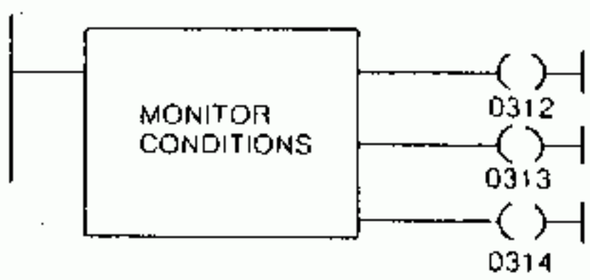

JOGL
START
CONDITIONS
0307

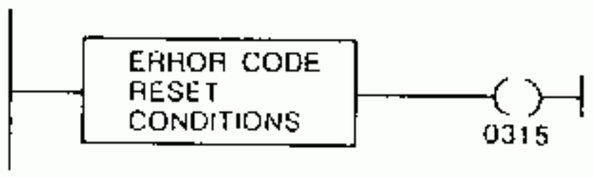

JOGC
START
CONDITIONS
0308

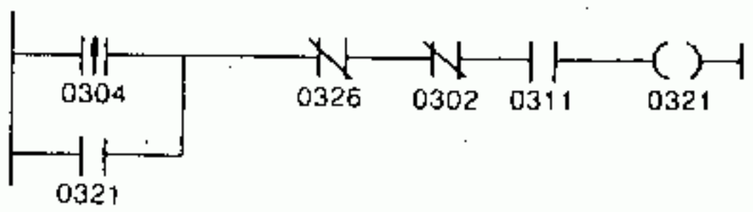

ZERO RETURN
START
CONDITIONS
0309

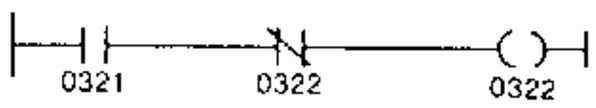

"START"
START
CONDITIONS
0310

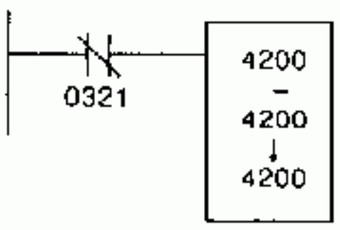

"STOP"
CONDITIONS
0311

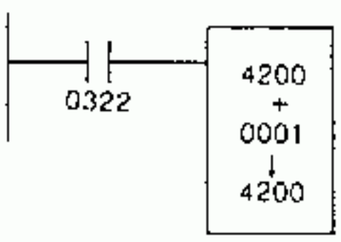

MONITOR
CONDITIONS
0312
0313
0314


ERROR CODE
RESET
CONDITIONS
0315

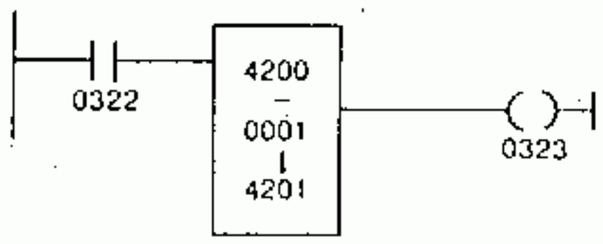

0304
0326
0302
0311
0321
0321

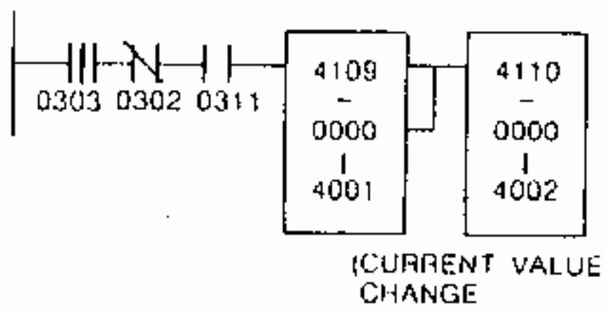

0321
0322
0322

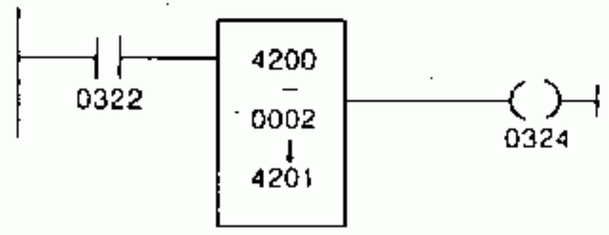

0321
4200
-
4200
4200

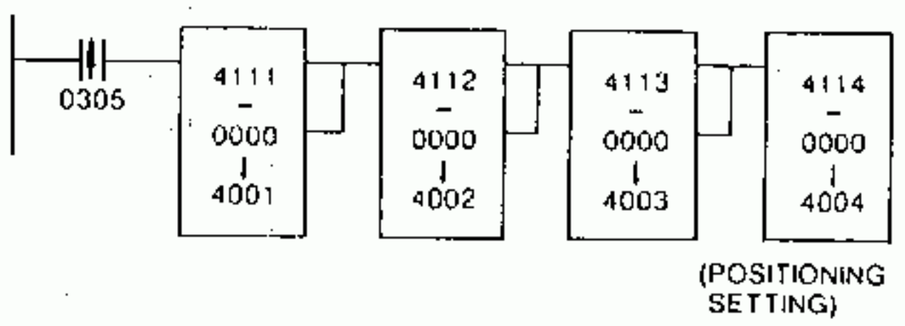

0322
4200
+
0001
4200

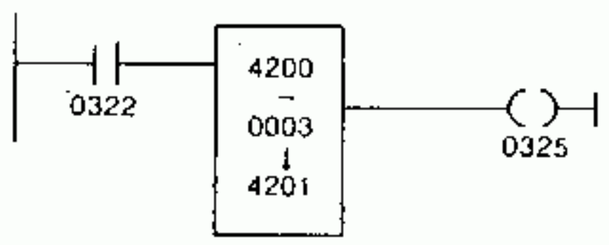
5.4.1 Example of Ladder Diagram to R84H (Cont'd)

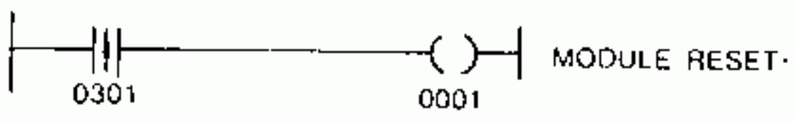


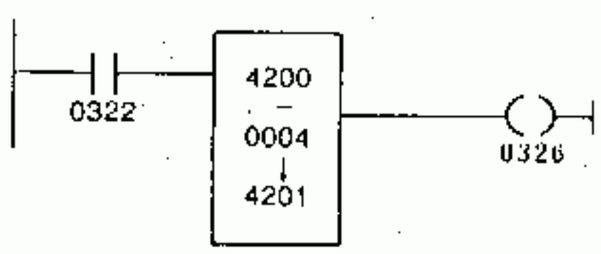


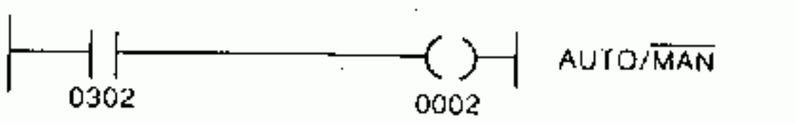


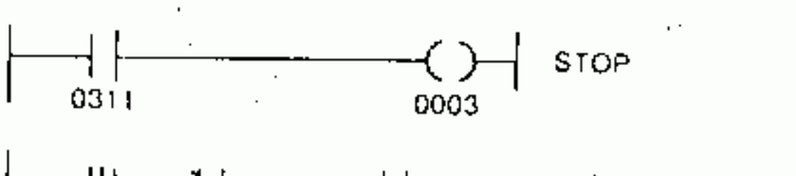


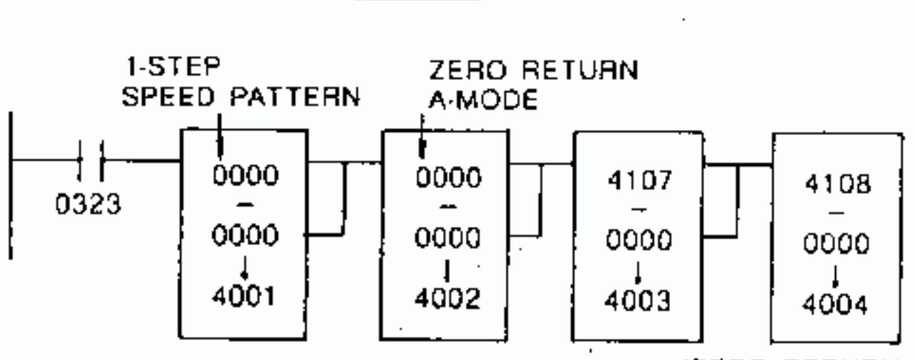


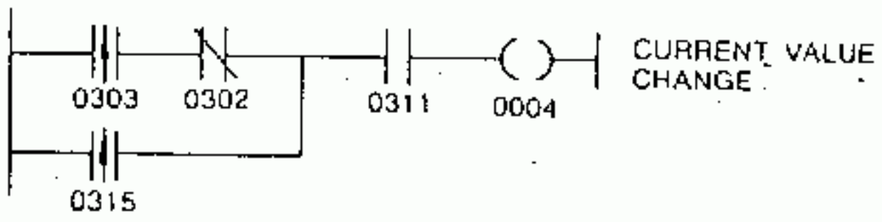


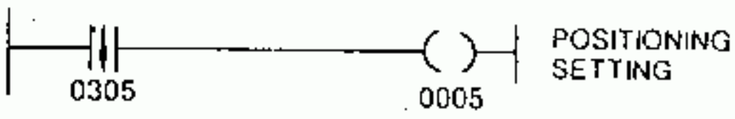


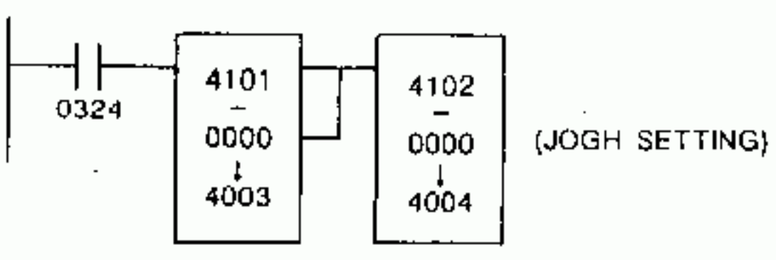


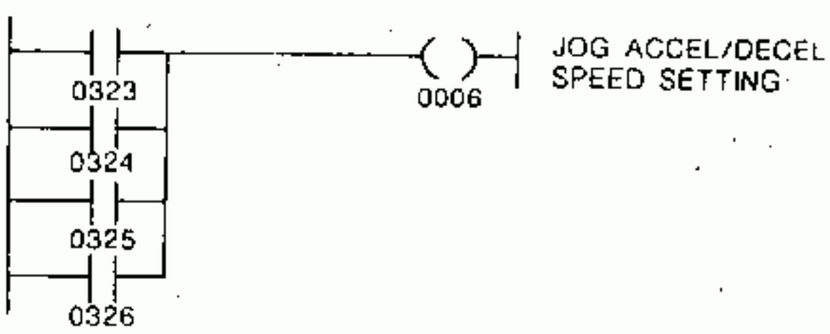


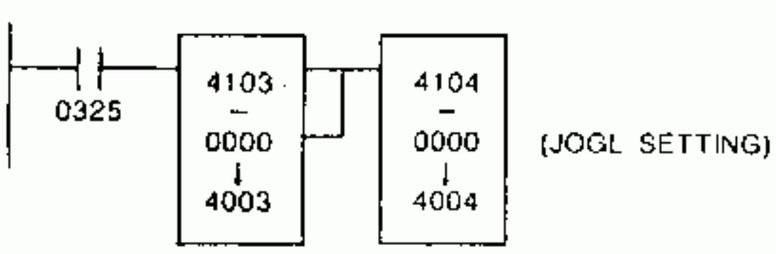


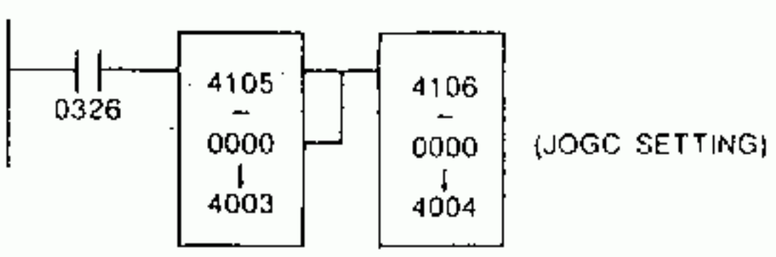


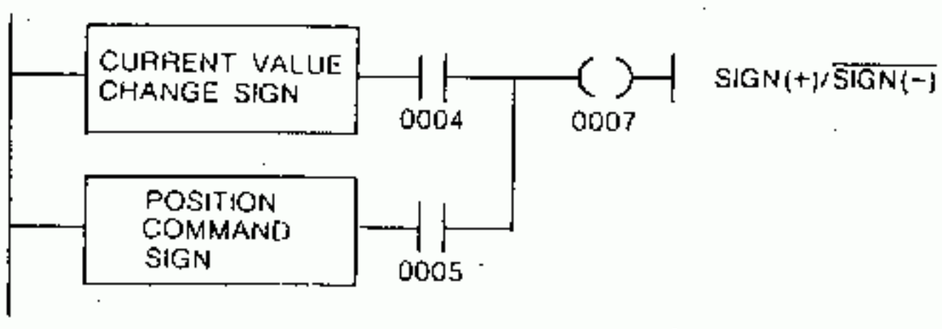


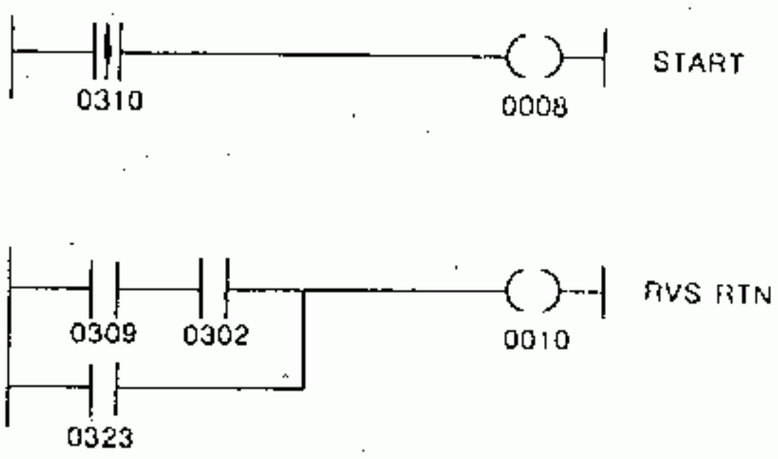


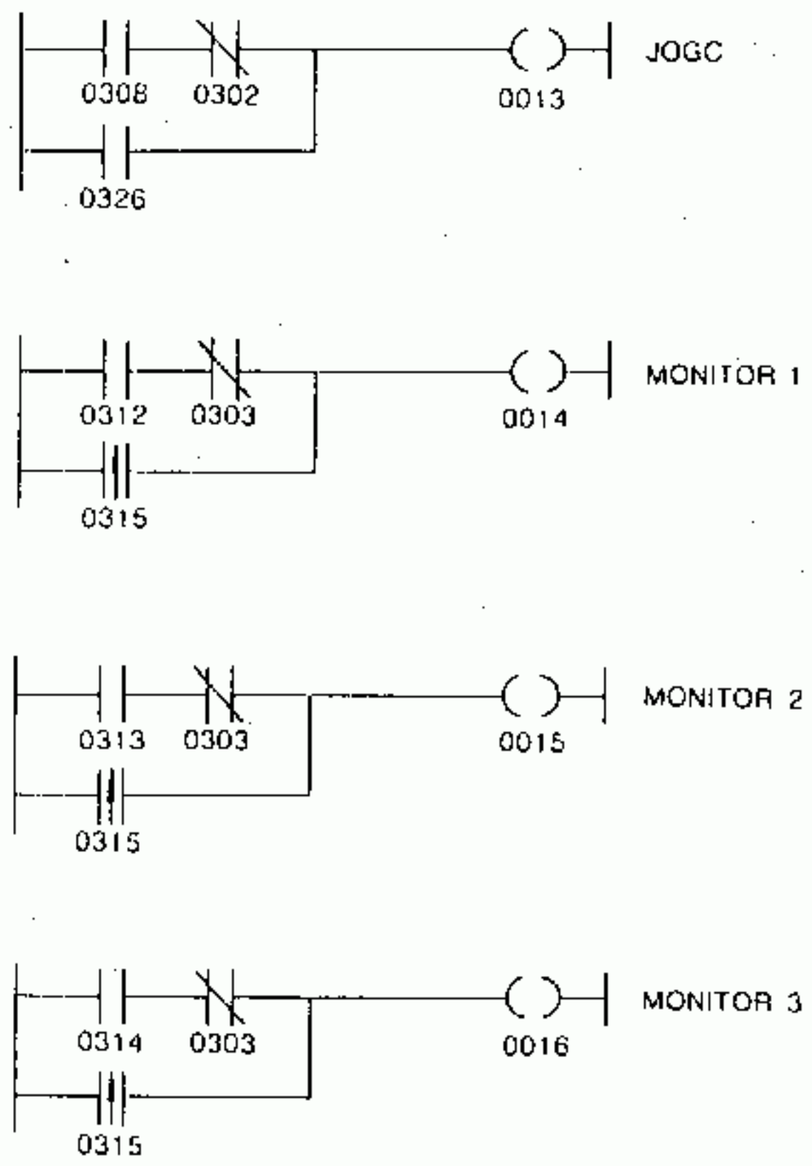










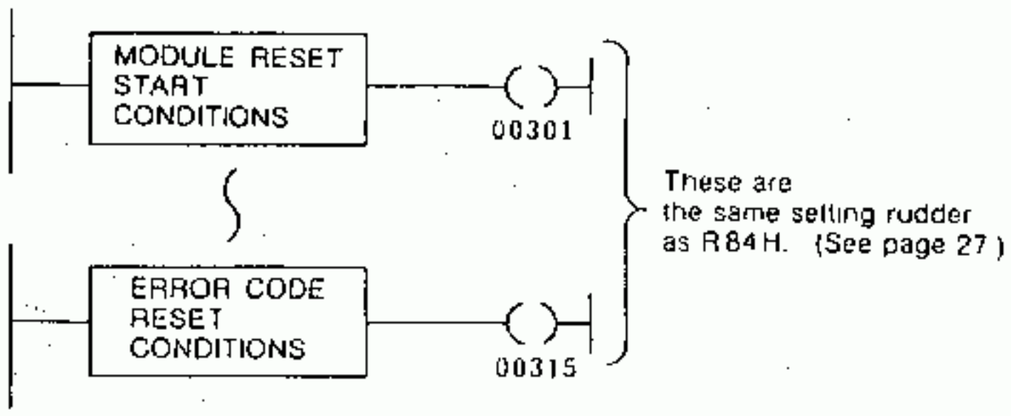


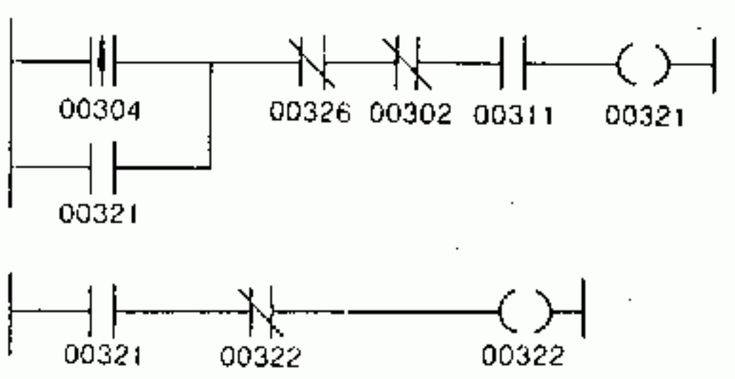
5. 4. 2 Example of Ladder Diagram to U84, U84J, 584

- 10001 to 10016: Input relay
- 30001 to 30004: Input register
- 00001 to 00016: Output coil
- 40001 to 40004: Output register
- 40101, 40102: JOGH
- 40103, 40104: JOGL
- 40105, 40106: JOGC

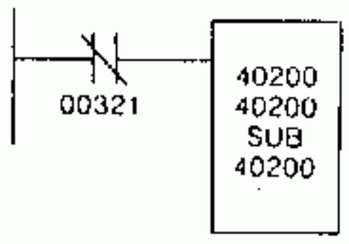
  (accel/decel and speed setting value)
- 40107, 40108: Zero return accel/decel and speed setting value
- 40109, 40110: Current value change
- 40111, 40112: Positioning Reference value (P_1)
- 40113, 40114: Accel/decel setting value (T_1, V_1)
- 40115, 40116: Positioning Reference value (P_2)
- 40117, 40118: Accel/decel setting value (T_1, V_2)

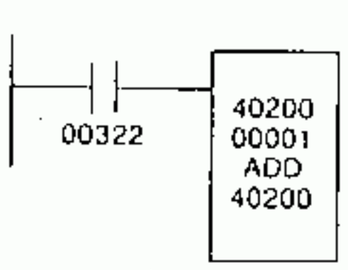
  (Automatic positioning (2-step speed pattern))

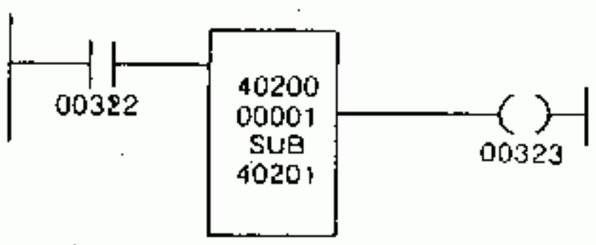


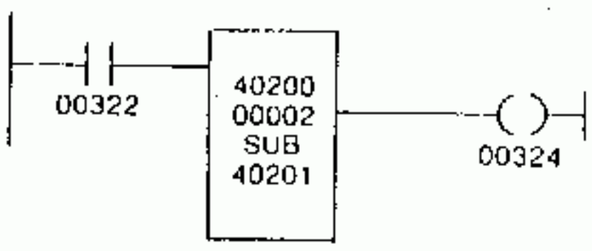


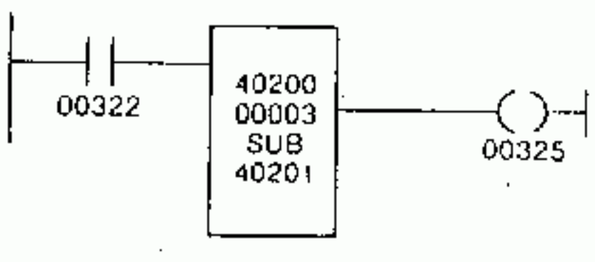
5.4.2 Example of Ladder Diagram to U84, U84J, 584 (Cont'd)

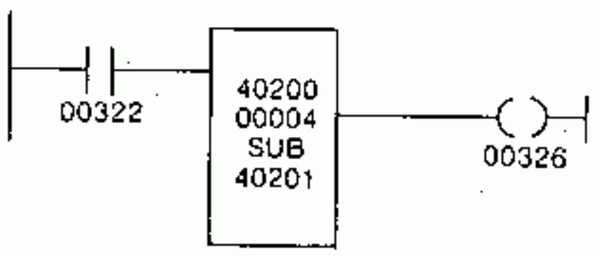


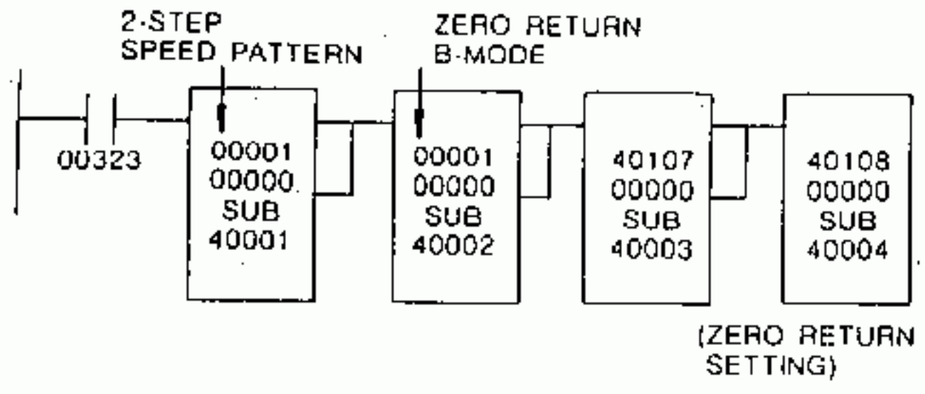


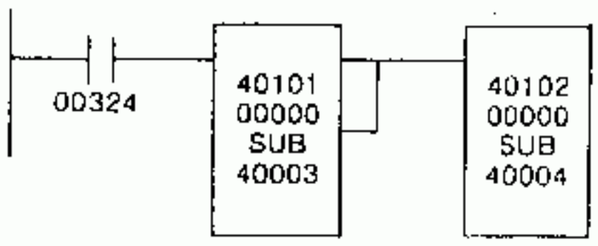


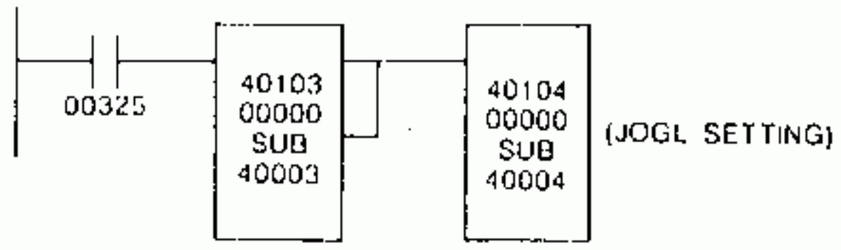


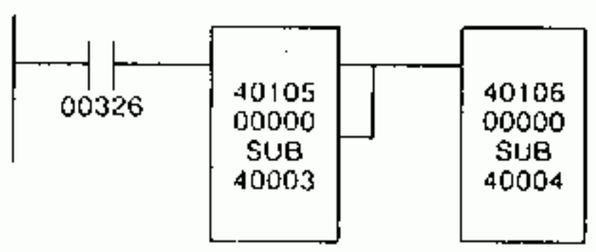


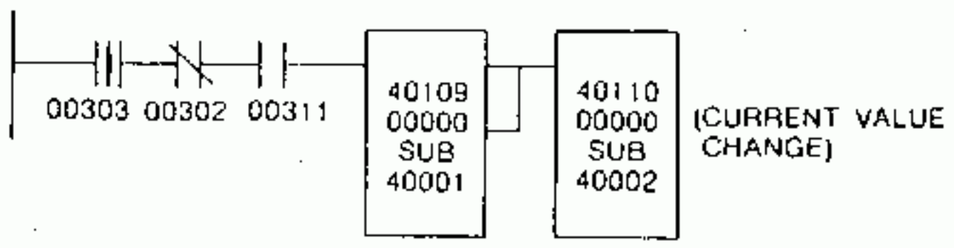


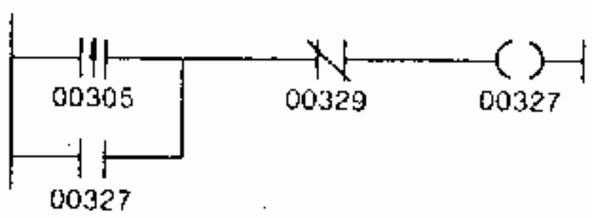


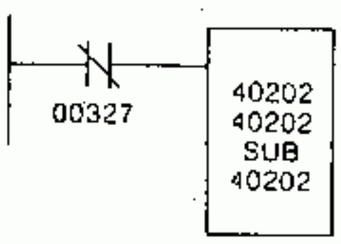


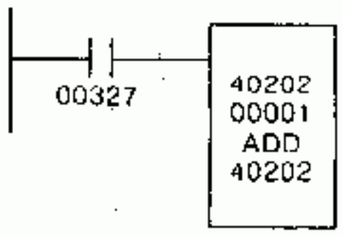


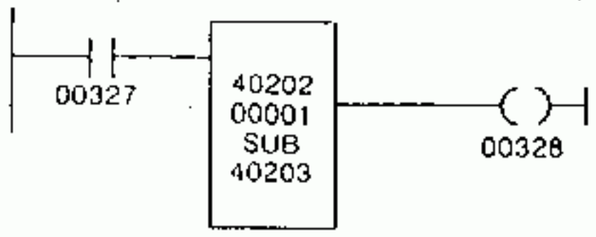


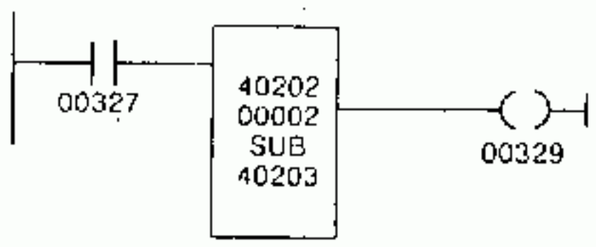


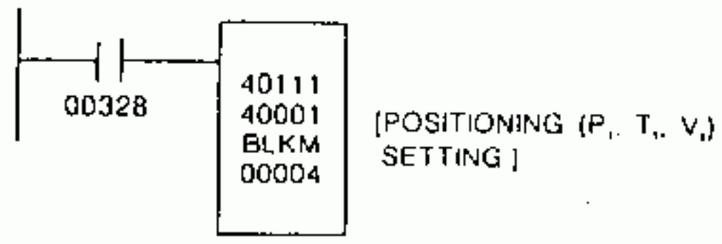


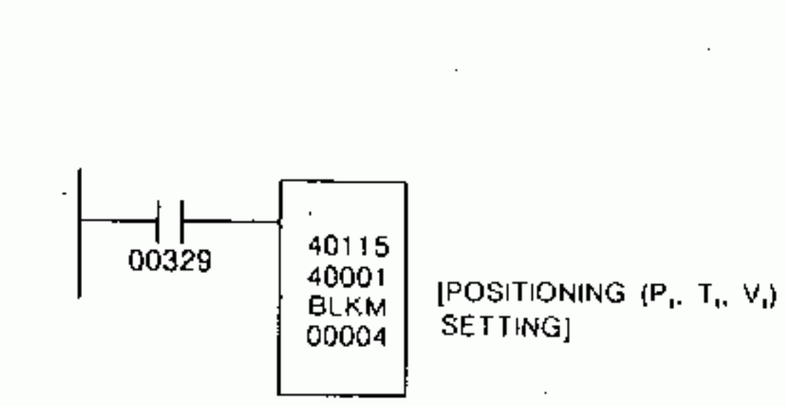


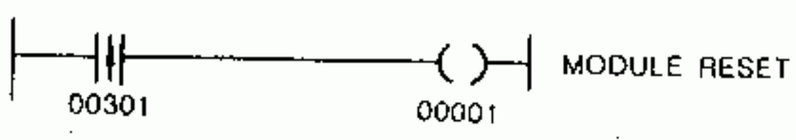


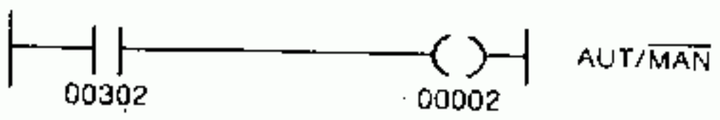


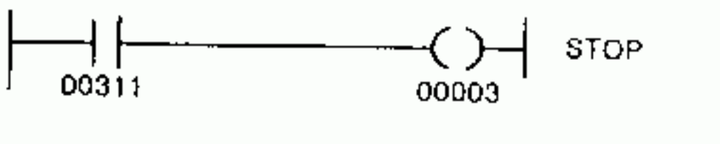


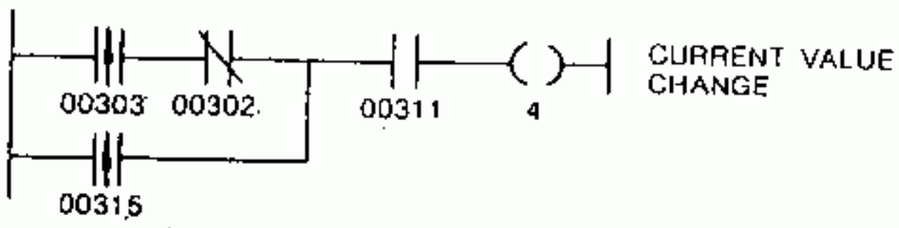

00328
40111
40001
BLKM
00004
[POSITIONING (P_1, T_1, V_1) SETTING]


00329
40115
40001
BLKM
00004
[POSITIONING (P_1, T_1, V_1) SETTING]

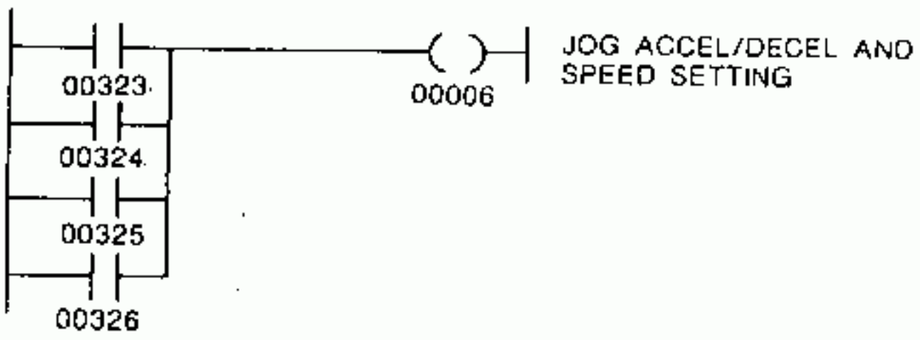

00301
00001
MODULE RESET

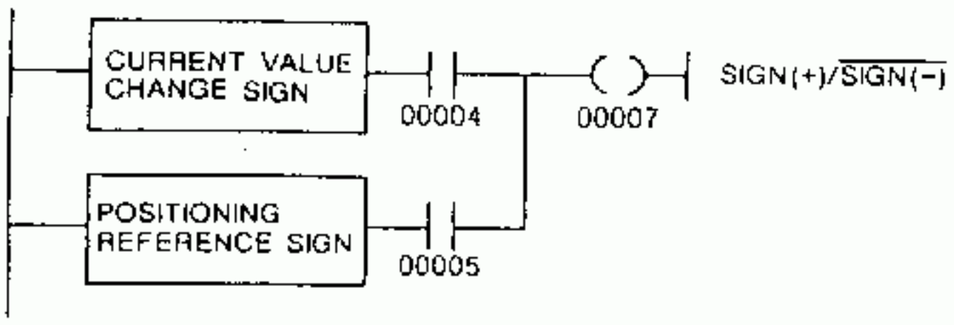

00302
00002
AUT/MAN

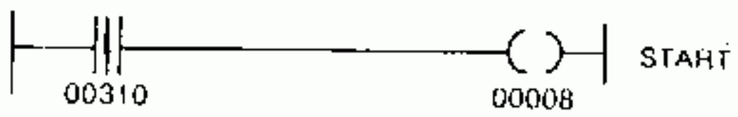

00311
00003
STOP

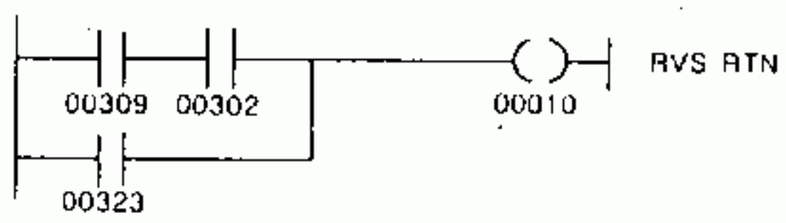

00303
00302
00311
4
00315
CURRENT VALUE CHANGE

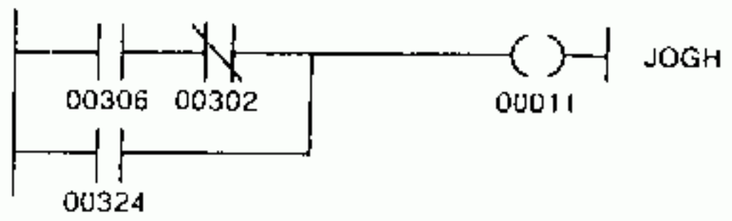

00327
00005
POSITIONING SETTING

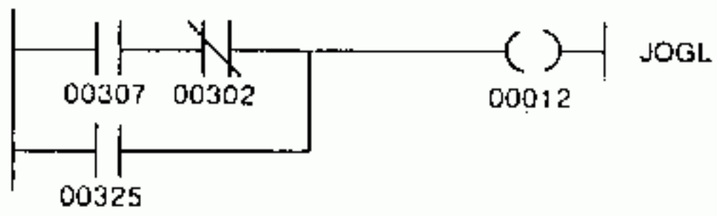

00323
00324
00325
00326
00006
JOG ACCEL/DECEL AND SPEED SETTING

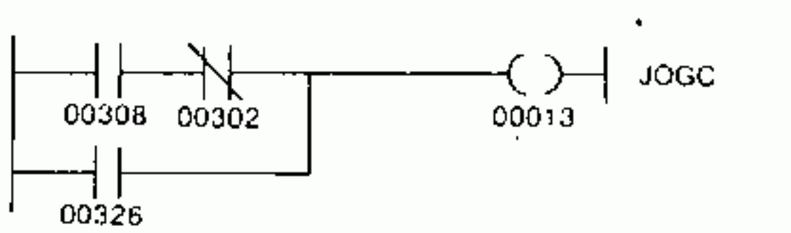

CURRENT VALUE CHANGE SIGN
00004
00007
SIGN(+)/SIGN(−)
POSITIONING REFERENCE SIGN
00005

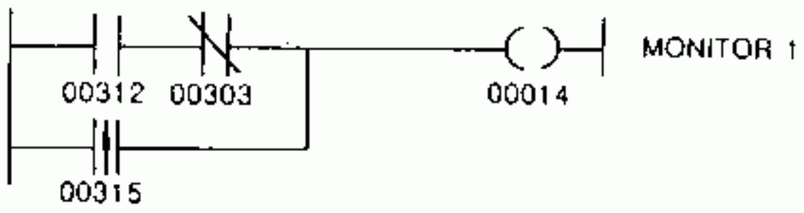

00310
00008
START

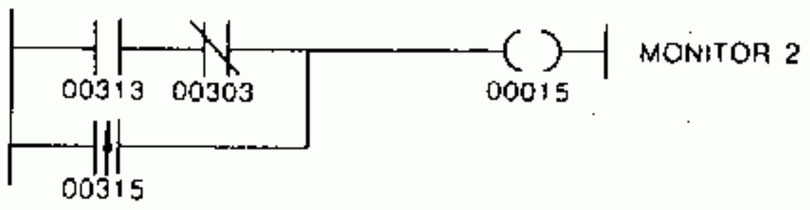

00309
00302
00323
00010
RVS RTN

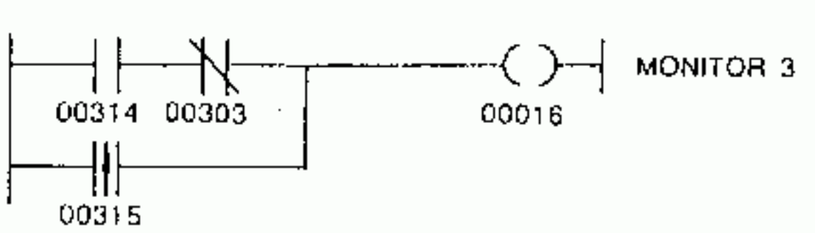

00306
00302
00324
00011
JOGH


00307
00302
00325
00012
JOGL


00308
00302
00326
00013
JOGC


00312
00303
00315
00014
MONITOR 1


00313
00303
00315
00015
MONITOR 2


00314
00303
00315
00016
MONITOR 3

6. EXTERNAL INTERFACE

6.1 FRONT PANEL OF B1083C

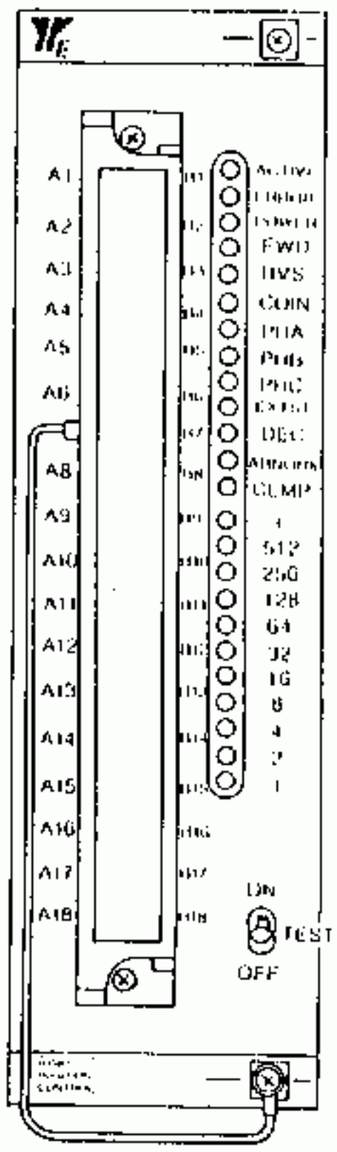


Fig. 6.1 Front Panel of B1083C

6.2 EXTERNAL INPUT/OUTPUT SIGNAL

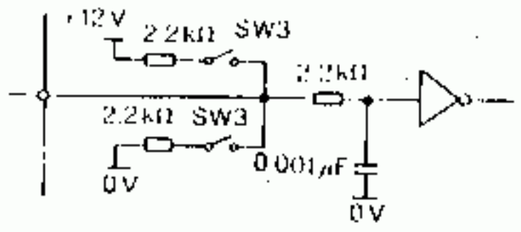
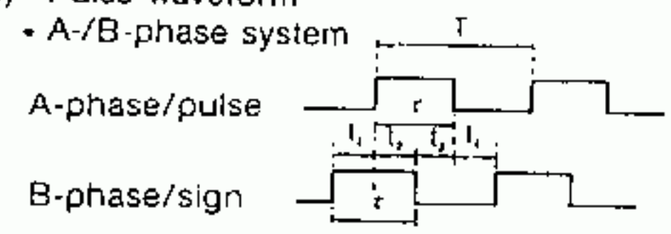
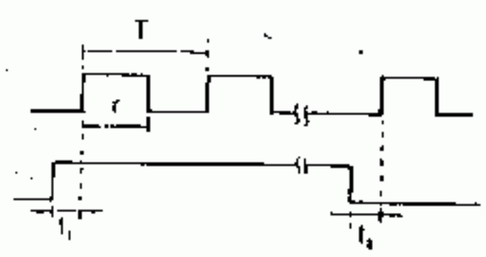
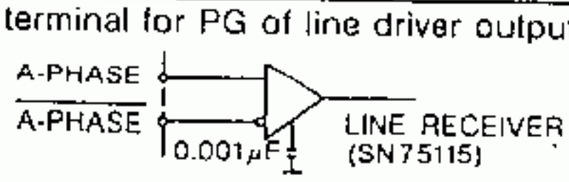
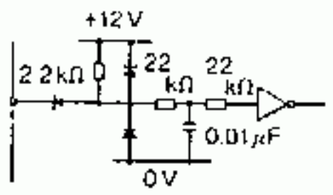
6.2.1 Terminal Block Arrangement

Table 6.1 Terminal Block Arrangement List

A	Signal Name	B	Signal Name
1	A-phase/pulse (+12V)	1	A-phase (+5V)
2	B-phase/sign (+12V)	2	$\overline{\text{A-phase}}$ (+5V)
3	C-phase (+12V)	3	B-phase (+5V)
4	0V	4	$\overline{\text{B-phase}}$ (+5V)
5	+12V PG power supply	5	C-phase (+5V)
6	0V	6	$\overline{\text{C-phase}}$ (+5V)
7	FG	7	FG
8	External reference input (A-phase)	8	+5V PG power supply
9	External reference input (B-phase)	9	0V
10	0V	10	Reference pulse output
11	D/A output (±6V)	11	Reference sign output
12	0V	12	$\overline{\text{CLEAR}}$
13	Spare	13	Fault
14	$\overline{\text{External reference pulse input enable}}$	14	0V
15	$\overline{\text{Servo normal}}$	15	External power supply (+12V)
16	$\overline{\text{External start /External stop}}$	16	External power supply (−12V)
17	$\overline{\text{DECEL LS}}$	17	External power supply (+5V)
18	0V	18	0V

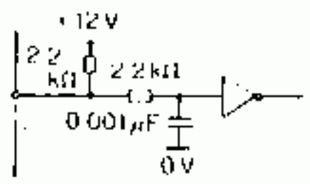
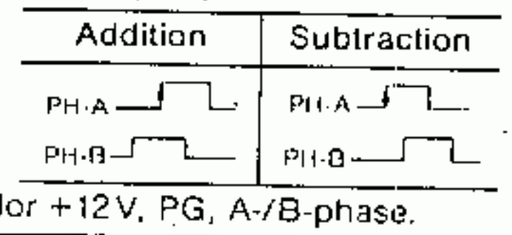
6. 2. 2 External Input Signal

Table 6. 2 External Input Signal

Signal Name	Contents
A-phase/pulse (+12V) B-phase/sign (+12V) C-phase (+12V)	(1) Input circuit  (2) Input voltage and input current • H-level: +10V to +12V • L-level: 0V to +1.2V • Hysteresis: 1.0V minimum • Input current: 5.5mA (Output current from the input terminal at 0V.) (3) PG output form • Switchable by open collector or emitter follower (4) Maximum counting frequency • 100kpps (1-multiplier) • 50kpps (2-multiplier) • 25kpps (4-multiplier) (5) Pulse counter timing Counter / Addition / Subtraction A-/B-phase System ×1: PH-A, PH-B / PH-A, PH-B A-/B-phase System ×2: PH-A, PH-B / PH-A, PH-B A-/B-phase System ×4: PH-A, PH-B / PH-A, PH-B Sign+pulse ×1: PH-A, PH-B / PH-A, PH-B *A-phase/pulse †B-phase/sign (6) Pulse waveform • A-/B-phase system  $\frac{\tau}{T} \times 100 = 50 \pm 10\%$ $t_1, t_2, t_3, t_4 \geqq 2\,\mu s$ • Sign + pulse  $\tau \geqq 5\,\mu s$ $\frac{\tau}{T} \times 100 \leqq 50\%$ $t_1, t_2 > 5\,\mu s$
A-phase (+5V) $\overline{\text{A-phase}}$ (+5V) B-phase (+5V) $\overline{\text{B-phase}}$ (+5V) C-phase (+5V) $\overline{\text{C-phase}}$ (+5V)	Input terminal for PG of line driver output type.  The pulse waveform is the same as +12V PG.
$\overline{\text{EXTERNAL START}}$/ $\overline{\text{EXTERNAL STOP}}$	Use either $\overline{\text{EXTERNAL START}}$ or $\overline{\text{EXTERNAL STOP}}$ according to the operation mode setting. • $\overline{\text{EXTERNAL START}}$: An external start command for automatic positioning, equivalent to START of the output coil. Effective at L-level. • $\overline{\text{EXTERNAL STOP}}$: An external STOP command for JOG and automatic positioning, ORed with the output coil STOP. During JOG or automatic operation, when output coil STOP is turned on, or the $\overline{\text{EXTERNAL STOP}}$ input terminal becomes L-level, B1083C decelerates and stops. To start JOG or automatic operation, output coil STOP must be OFF, and the $\overline{\text{EXTERNAL STOP}}$ input terminal must be H-level. (1) Input circuit  (2) Input voltage and input current • H-level: +10V minimum • L-level: 0 to +1.2V • Hysteresis: 0.7V minimum • Max. input voltage: +29V • Input current: 5.5mA (Output current from the input terminal at 0V) (3) Pulse width: must be L-level for 30ms minimum

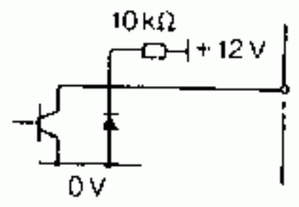
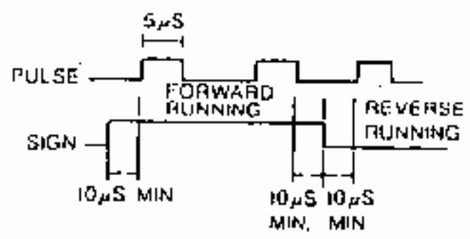
6.2.2 External Input Signal (Cont'd)

Table 6.2 External Input Signal (Cont'd)

Signal Name	Contents
SERVO normal	Connect so that it becomes L-level when the servo system is normal. The input circuit is the same as EXTERNAL START.
DECEL LS	Connect so that it becomes L-level when the deceleration limit switch is turned on. Input signal required for zero return operation. The input circuit is the same as EXTERNAL START.
EXTERNAL REFERENCE PULSE INPUT ENABLE	When this is L-level, and the STOP output coil is ON, external reference pulse input is enabled. While B1083C is outputting the command pulses, external command input pulses are not accepted, even when the input is made low. The input circuit is the same as for EXTERNAL START.
External Reference Pulse • Input (A-phase) • Input (B-phase)	(1) Input circuit  (2) Input voltage and input current • H-level: +10 to +12V • L-level: 0 to +1.2V • Hysteresis: 1.0V minimum • Input current: 5.5mA (Output current from input terminal 0V) (3) PG output form • Open collector (4) Max. counting frequency: 100kpps (5) Pulse count timing: A-/B-phase (1-multiplier)  (6) Pulse waveform: Same as that for +12V, PG, A-/B-phase.
External Power Supply	• +12VDC ±3%, 0.4A (Including 0.2A for +12V PG power supply) • −12VDC ±3%, 20mA • +5VDC ±5%, 1.0A (Including 0.2A for +5V PG power supply) • Incorporated protection fuses are all 1.6A.
FG	Shielded grounding terminal

6.2.3 External Output Signal

Table 6.3 External Output Signal

Signal Name	Contents
Reference Pulse Output (Pulse, sign)	(1) Output circuit  (2) Output voltage and output current • Load voltage: +12V • Load current: 100mA (max.) • Output voltage when ON: +0.7V max. (3) Max. output frequency: 100kpps (4) Output waveform 
CLEAR	Clear output signal for error counter, becomes L-level for over 100μs in the following cases: • B1083C external power supply is turned on. • B1083C internal power supply is turned on. • Module is reset. • Zero return motion completes. • Hardware error occurs (continuous clear) The output circuit is the same as for reference pulse output.
FAULT	Normally L-level, and becomes H-level when the following occur. • B1083C detects hardware error at self-diagnosing • External input signal SERVO normal becomes H-level • External power supply is faulty. • B1083C error counter overflows. The output circuit is the same as for reference pulse output.
D/A output	Analog speed command output. Output voltage: 0 to ±6V Load resistance: 5kΩ minimum Gain multiplier selection: ×1, ×2, ×4 and ×8 (with switch)
+12V PG Power	With +12V PG power supply output, supplying upto 0.2A. Supplied by +12V external power
+5V PG Power	With +5V PG power supply output, supplying up to 0.2A. Supplied by +5V external power

6.3 INDICATOR LAMP

Table 6.4 Indicator Lamp

Name	Color	Description
ACTIVE	G*	Lights when B1083C is normal
ERROR	R†	Lights when B1083C detects some error, interlocked with input relay ERROR.
POWER	G	Lights when external power supplies (+12 V, −12 V, and +5 V) are normal.
FWD	R	Lights while B1083C is forward running counting.
RVS	R	Lights while B1083C is reverse running counting.
COIN	R	Lights while error counter count is within COIN setting width.
PHA	R	Lights when A-phase / pulse signal is input.
PHB	R	Lights when B-phase / sign signal is input.
PHC	R	Lights while C-phase signal is input.
EXSTART	R	Lights when $\overline{\text{EXTERNAL START}}$ signal is L.
DEC	R	Lights while $\overline{\text{DECEL LS}}$ signal is L. Interlocked with input relay $\overline{\text{DECEL LS}}$.
ABNORM	R	Lights when FAULT signal is output. Interlocked with input relay ABNORM.
CLMP	R	Lights when the servo lag pulses exceed the saturation of the error counter.
+	R	Lights when the sign of the servo lag pulses in the error counter is plus.
512	R	The number of servo lag pulses in the error counter is indicated (Table 6. 6).
256	R	
128	R	
64	R	
32	R	
16	R	
8	R	
4	R	
2	R	
1	R	

*Green †Red

The saturation value of error counter varies depending on the D/A converter gain.

Table 6.5 Gain Setting and Saturation Value

D/A Gain Bit	Saturation Value (CLMP Lights) Pulse	Over flow (Error Code 50) Pulse
9	512 min.	1024 min.
10	1024 min.	2048 min.
11	2048 min.	4096 min.
12	4096 min.	8192 min.

The relationship between the number of servo lag pulses ε in the error counter and the total D(ε) of the lighting error indicator LED values are as follows:

- 9 Bit —— $\varepsilon = \dfrac{D(E)}{2}$
- 10 Bit —— $\varepsilon = D(E)$
- 11 Bit —— $\varepsilon = 2 \times D(E)$
- 12 Bit —— $\varepsilon = 4 \times D(E)$

Table 6.6 Correspondence between Error Counter and Error Indicator LED

Error Indicator LED / D/A Gain	Error Counter Content			
	9 Bit	10 Bit	11 Bit	12 Bit
512 ○	256	512	1024	2048
256 ○	128	256	512	1024
128 ○	64	128	256	512
64 ○	32	64	128	256
32 ○	16	32	64	128
16 ○	8	16	32	64
8 ○	4	8	16	32
4 ○	2	4	8	16
2 ○	1	2	4	8
1 ○	–	1	1 or 2	1, 2 or 4

7. SWITCH SETTING METHOD

7.1 SW1 SETTING

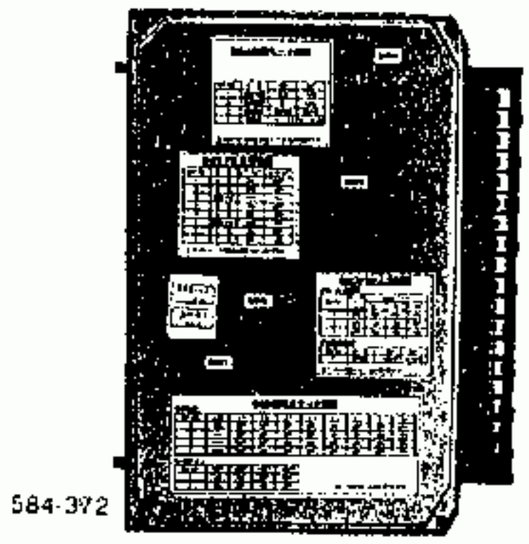


Fig. 7.1 Left Side of B1083C

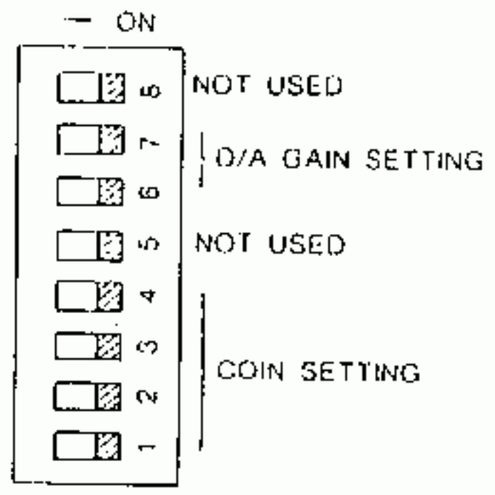


Fig. 7.2 SW1

(1) COIN Setting

Set the detection width of positioning completion signal COIN.

Table 7.1 COIN Setting List

COIN Detection Width (pulses)	SW 1-1	SW 1-2	SW 1-3	SW 1-4
± 63	ON	*	*	*
± 7	OFF	OFF	OFF	OFF
± 6	OFF	OFF	OFF	ON
± 5	OFF	OFF	ON	OFF
± 4	OFF	OFF	ON	ON
± 3	OFF	ON	OFF	OFF
± 2	OFF	ON	OFF	ON
± 1	OFF	ON	ON	OFF
0	OFF	ON	ON	ON

*Both ON and OFF can be set.

(2) D/A Converter Setting

For setting the D/A converter gain, calculate starting time and positioning loop gain.

Table 7.2 Machine Specifications and Electrical Specifications

Machine Specifications		Applied Motor		Applied Servopack	
Axis		Type		Type	CPCR-
Moving Member Speed (Max.)	/min	Rated Speed (N)	rpm	AC Input	V, ϕ
Overall Reduction Ratio		Raled Motor Torque (TM)	kg·cm	Max. Output Voltage	V
Load Torque at Motor Shaft (T_L)	kg·cm	Rotor Inertia (GD^2_M)	kg·cm^2	Max. Oulpul Current	A
Load Inertia at Motor Shaft (GD^2_L)	kg·cm^2	Rated Motor Current (ia)	A	Continuous Output Current	A
Electrical Resolution	/PULSE	Feedback Unil Type		Max. Sel Current (ip)	A
Electrical Accuracy (At Molor Shalt End)	± PULSE	TG = ___V / ___rpm PG = ____P/R		Adjust ip according to machine specifications. If necessary, refer to Servopack technical sheel	

· Starting time

$$t_a = \frac{(GD^2_M + GD^2_L) \times N \times 10^{-2}}{375 \times (ip/ia \times T_M \times 0.95 - T_L)} \boxed{\quad\quad} s$$

· Positioning loop gain

$$k_p = \frac{2}{1.4 \times t_a} = \boxed{\quad\quad} s^{-1}$$

· No. of lag pulses in error counter

$$\varepsilon = \frac{fin}{k_p} = \boxed{\quad\quad} \text{ pulses}$$

fin: Reference pulse frequency (pps)

Select the number of bits for D/A converter and the setting width for the positioning completion (COIN) signal from Table 7.3 according to the applicable ε values. Note that the required setting width (±Δε) may not always be obtained due to restrictions imposed by the load conditions.

Table 7.3 Number of Bits for D/A Converter and Setting Width of Positioning Completion Signal

Lag Pulses in Error Counter : ε	No. of Bits for D/A Converter	Positioning Completion Signal Setting Width : ±Δε (Target)
ε<512 (pulse)	9 Bit	±2 pulses
512≦ε<1024	10 Bit	±3 pulses
1024≦ε<2048	11 Bit	±4 pulses
2048≦ε<4096	12 Bit	±5 pulses

· Ramp Input

When acceleration/deceleration command time is added to the input reference pulses, set the time longer than the starting time (ta).

Table 7.4 D/A Converter Gain Setting List

No. of Bits for DIA Converter	SW 1-6	SW 1-7
9 Bit	ON	ON
10 Bit	ON	OFF
11 Bit	OFF	ON
12 Bit	OFF	OFF

7.2 SW2 SETTING

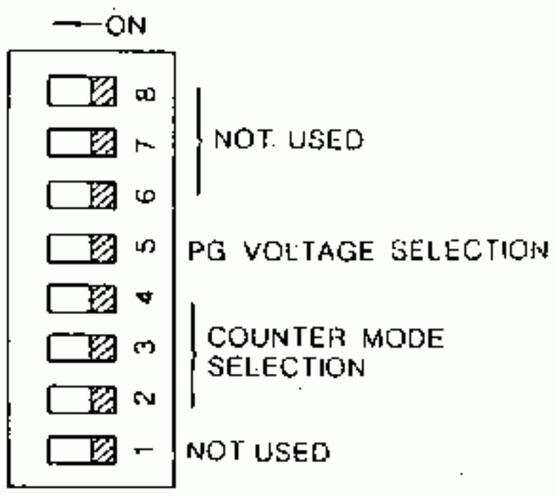


Fig. 7.3 SW2

(1) Switching of Counter Mode

Table 7.5 Count Mode Setting List

		SW 2-2	SW 2-3	SW 2-4
A- / B- phase	×1 count	ON	ON	ON
	×2 count	OFF	ON	ON
	×4 count	ON	OFF	ON
Sign + pulse	×1 count	ON	ON	OFF

(2) Switching of PG Voltage

Table 7.6 PG Voltage Switching

	SW 2-5
+ 5 V PG	ON
+12 V PG	OFF

7.3 SW3 SETTING

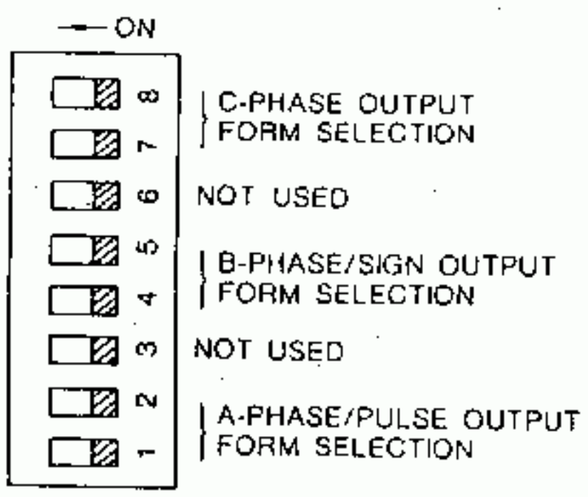


Fig. 7.4 SW3

Table 7.7 PG Output Form Selection

	A-Phase/Pulse		B-Phase/Sign		C-Phase	
	SW 3-1	SW 3-2	SW 3-4	SW 3-5	SW 3-7	SW 3-8
Open Collector	ON	OFF	ON	OFF	ON	OFF
Emitter Follower	OFF	ON	OFF	ON	OFF	ON

Note: For SW 3-1 and SW 3-2, SW 3-4 and SW 3-5, SW 3-7 and SW 3-8, one switche should be set ON and the other OFF.

7.4 SW4 SETTING

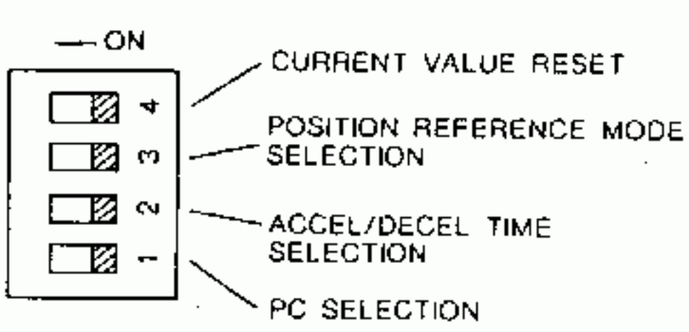


Fig. 7.5 SW4

Table 7.8 SW4

Switch	Setting	ON	OFF
SW 4-1	PC selection	584U, U84	R84H
SW 4-2	Accel / decel time selection	1 to 99 s.	10 to 990 ms
SW 4-3	Position reference mode selection	Absolute mode	Incremental mode
SW 4-4	current value reset	Reset	Not reset

Note

1. While the position reference mode is in absolute, the SW 4-4 state is disregarded.
2. In the incremental mode, when SW 4-4 is ON, B1083C first resets the current value and then starts the positioning at a start command. The positioning is always started from the current value of 0.
3. When 001 (0011) is specified as the operation mode the selection of SW 4-2 is disregarded, and accel / decel time becomes 0.1 to 9.9 s.

7.5 FACTORY SETTING

SW 1-1	OFF
SW 1-2	OFF
SW 1-3	OFF
SW 1-4	OFF
SW 1-5	OFF
SW 1-6	OFF
SW 1-7	OFF
SW 1-8	OFF

→ COIN DETECTION WIDTH : ±7 PULSES

→ D/A CONVERTER GAIN · 12 BITS

SW 2-1	OFF
SW 2-2	ON
SW 2-3	ON
SW 2-4	ON
SW 2-5	OFF
SW 2-6	OFF
SW 2-7	OFF
SW 2-8	OFF

→ COUNTER MODE : A-/B- PHASE 1 MULTIPLIER

→ PG VOLTAGE : +12 V

SW 3-1	ON
SW 3-2	OFF
SW 3-3	OFF
SW 3-4	ON
SW 3-5	OFF
SW 3-6	OFF
SW 3-7	ON
SW 3-8	OFF

→ A-PHASE/PULSE : OPEN COLLECTOR

→ B-PHASE/SIGN : OPEN COLLECTOR

→ C-PHASE : OPEN COLLECTOR

SW 4-1	OFF
SW 4-2	OFF
SW 4-3	OFF
SW 4-4	OFF

→ MAINFRAME : R84H

→ ACCEL/DECEL TIME : 10 – 990 ms

→ POSITION REFERENCE MODE : INCREMENTAL MODE

→ CURRENT VALUE RESET : NO RESET

7.6 TEST SWITCH

When the TEST switch in the lower part of the B1083C front panel is turned on, the reference pulses are directly returned to the current value counter in B1083C. This is mainly used for adjustment during trial run and for troubleshooting during operation. When the TEST switch is turned on, the reference pulse is directly input to the current value counter (instead of the feedback pulse), enabling the B1083C controller to be checked.

During normal operation, leave the TEST switch in the OFF position.

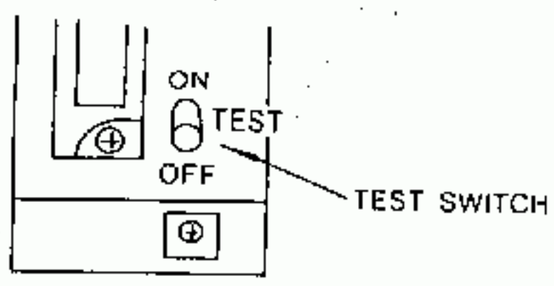


Fig. 7.6 TEST Switch

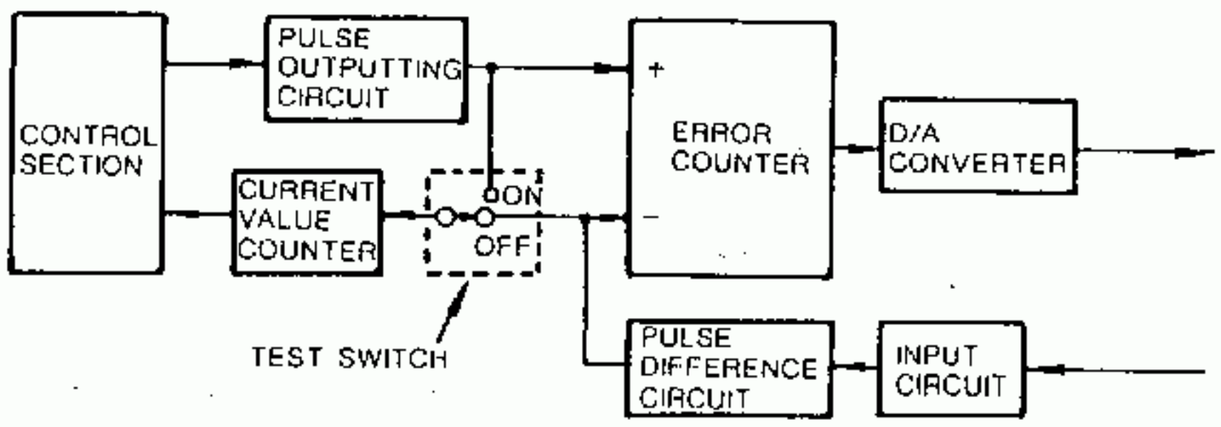
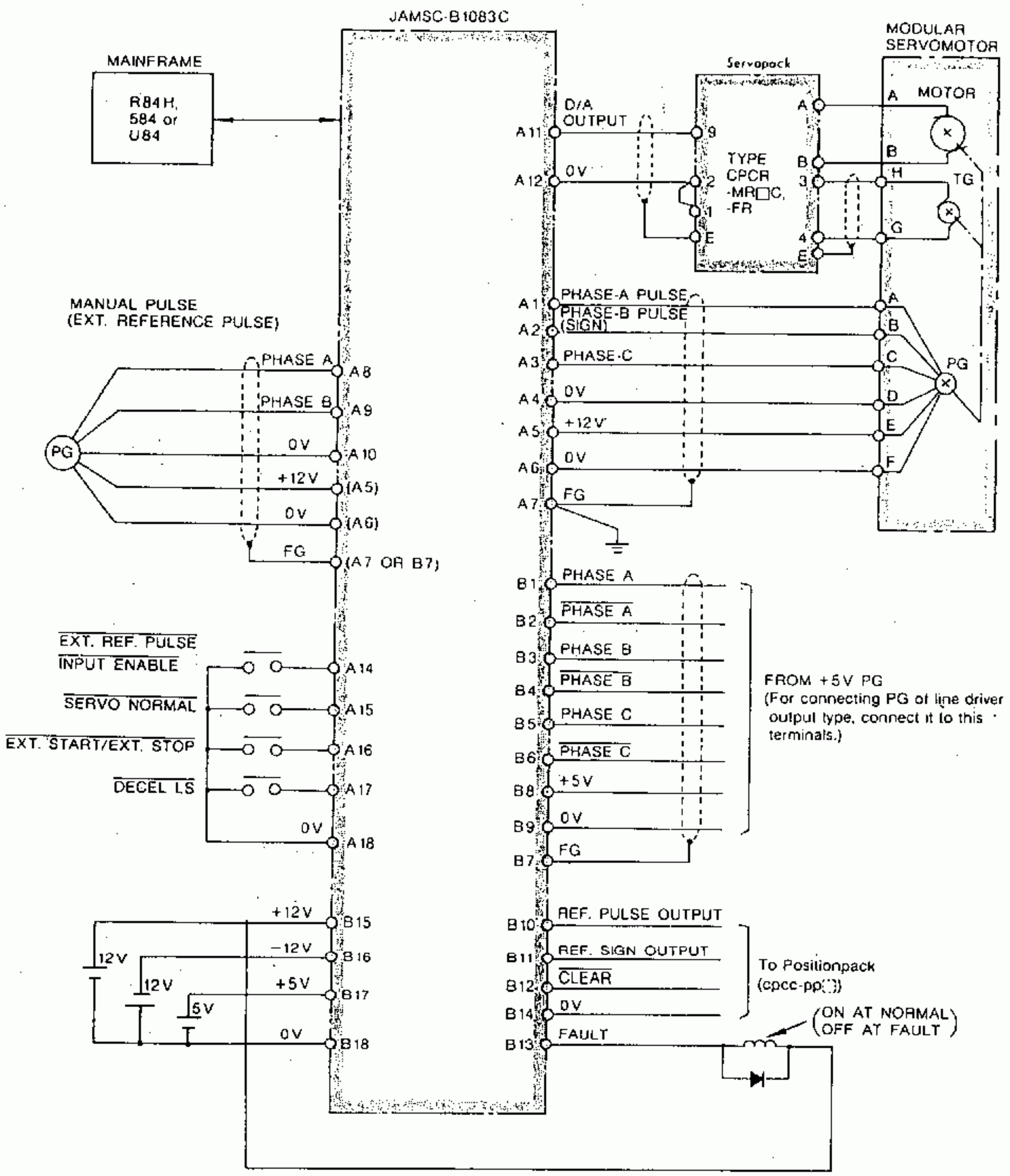


Fig. 7.7 Block Diagram of TEST Switch Periphery

8. CONNECTION

8.1 EXAMPLE OF CONNECTION DIAGRAM



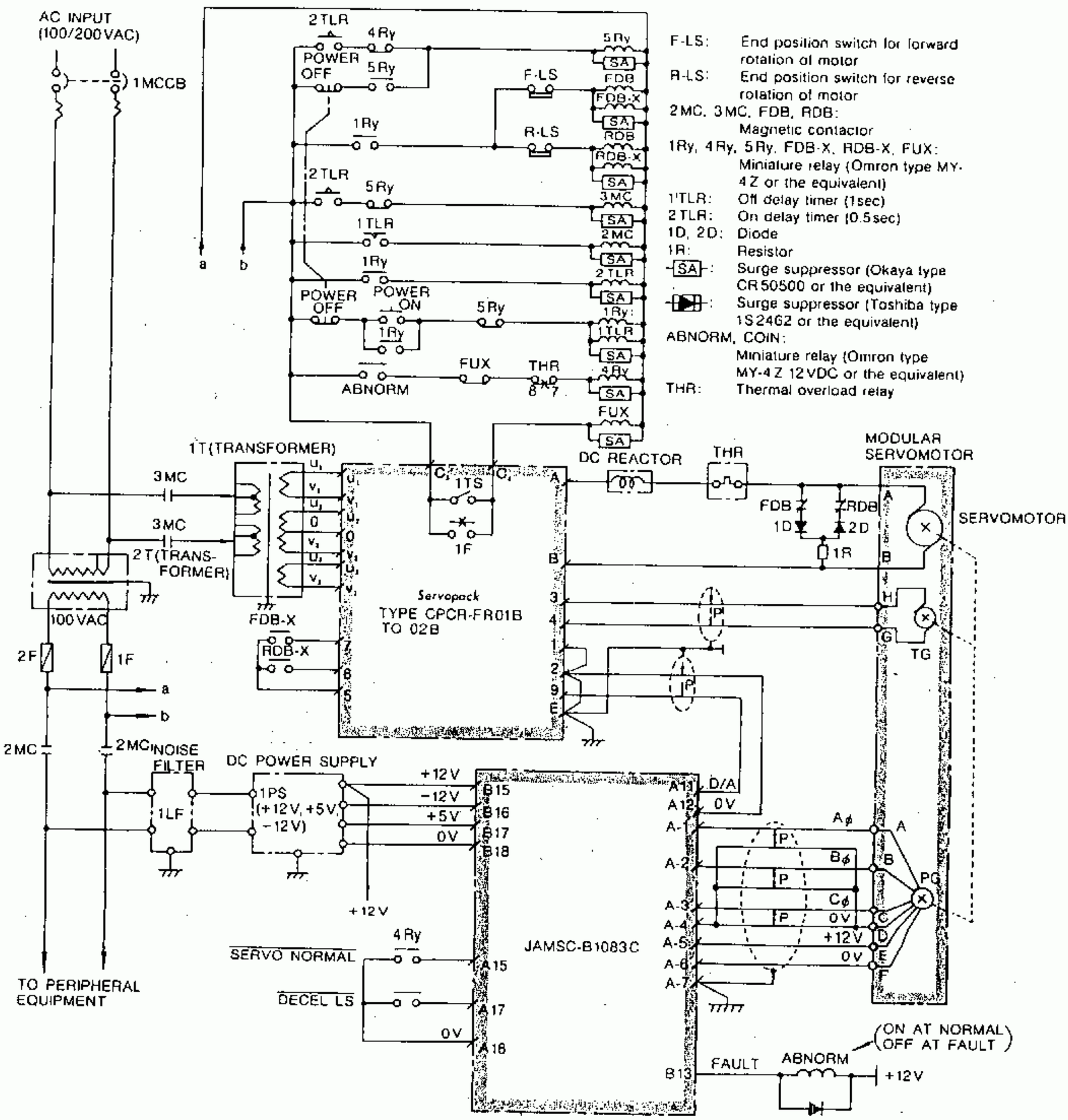
Note :

1. Not all the external I/O signals need to be connected. I/O signals not used by the system may be kept open. However, the SERVO NORMAL and DECEL LS input signals must always be used. If the SERVO NORMAL input signal is open, B1083C will not operate, and if DECEL LS input signal is open, the zero return can not be executed.
2. B1083C turns on the FAULT output once, after the internal power supply has been turned on or after a module resetting, to wait for the SERVO NORMAL input signal to be turned on. Until the SERVO NORMAL input is turned on, B1083C can not output the D/A output and reference pulses.

Fig. 8.1 Connection Diagram

8. 2 TYPICAL INTERCONNECTION DIAGRAM

(1) When used with Servopack Types CPCR-FR01B to 02B.



F-LS: End position switch for forward rotation of motor

R-LS: End position switch for reverse rotation of motor

2MC, 3MC, FDB, RDB: Magnetic contactor

1Ry, 4Ry, 5Ry, FDB-X, RDB-X, FUX: Miniature relay (Omron type MY-4Z or the equivalent)

1TLR: Off delay timer (1sec)

2TLR: On delay timer (0.5sec)

1D, 2D: Diode

1R: Resistor

SA: Surge suppressor (Okaya type CR50500 or the equivalent)

: Surge suppressor (Toshiba type 1S2462 or the equivalent)

ABNORM, COIN: Miniature relay (Omron type MY-4Z 12VDC or the equivalent)

THR: Thermal overload relay

Fig. 8. 2 Typical Interconnection Diagram
(Servopack Types CPCR-FR01B to 02B)

8.2 TYPICAL INTERCONNECTION DIAGRAM (Cont'd)

(2) When used with Servopack Types CPCR-MR01C to 07C.

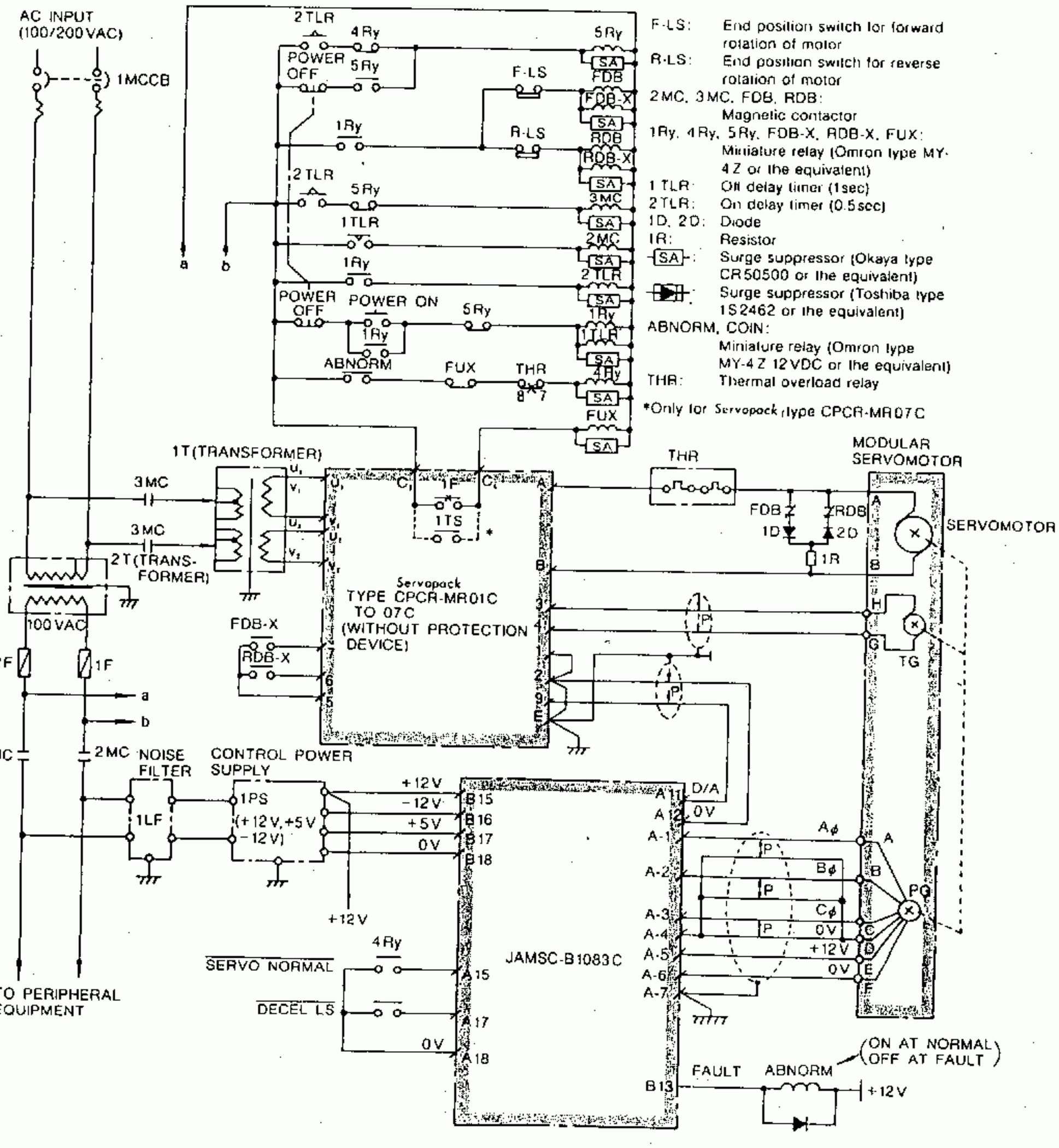


Fig. 8.3 Typical Interconnection Diagram
(Servopack Types CPCR-MR01C to 07C)

(3) When used with Servopack Types CPCR-MR01C to 07C with Protection Device and Regenerative Unit.

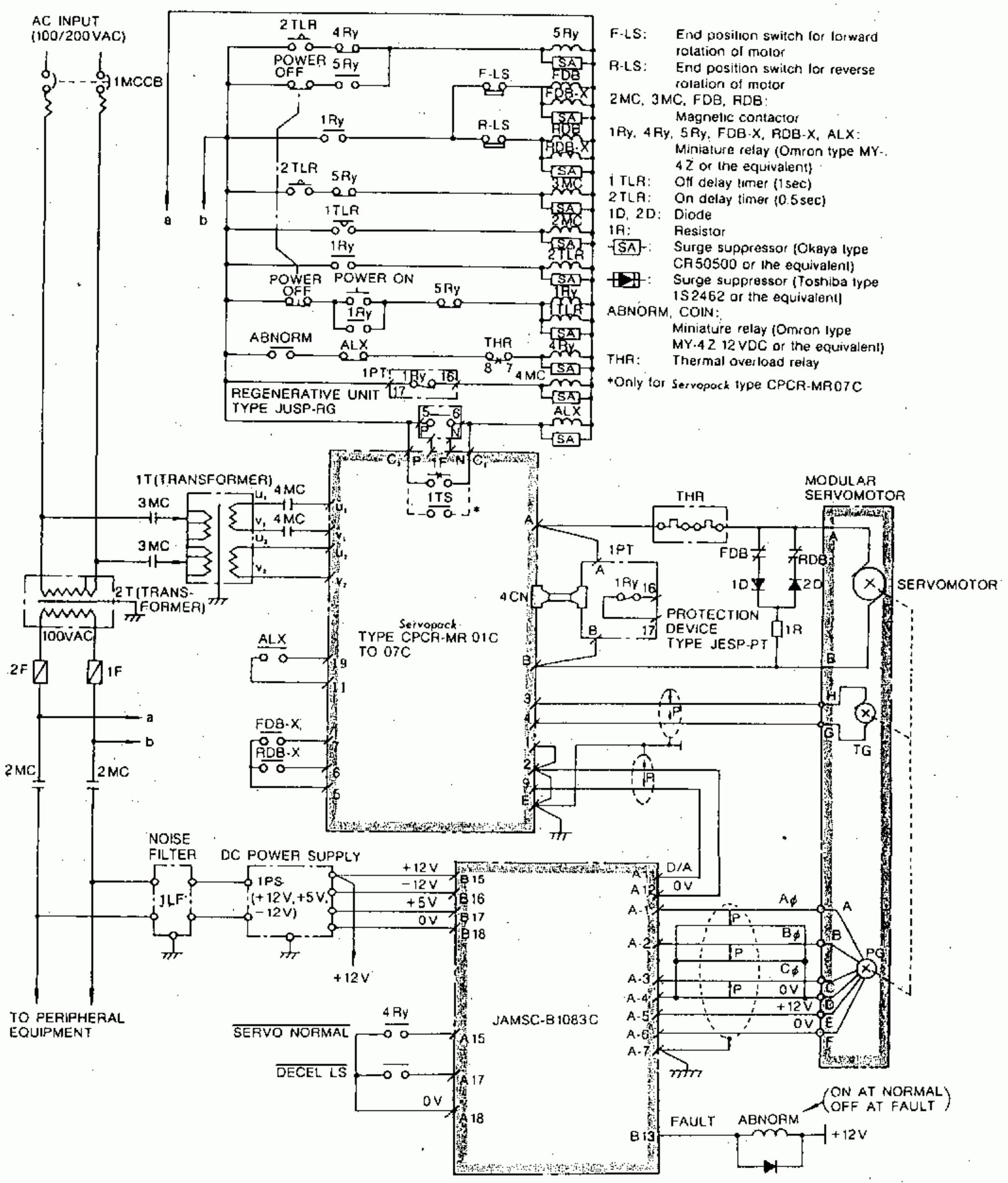


Fig. 8.4 Typical Interconnection Diagram (*Servopack* Types CPCR-MR01C to 07C)

8.2 TYPICAL INTERCONNECTION DIAGRAM (Cont'd)

(4) When used with Servopack Types CPCR-MR08C to 55C.

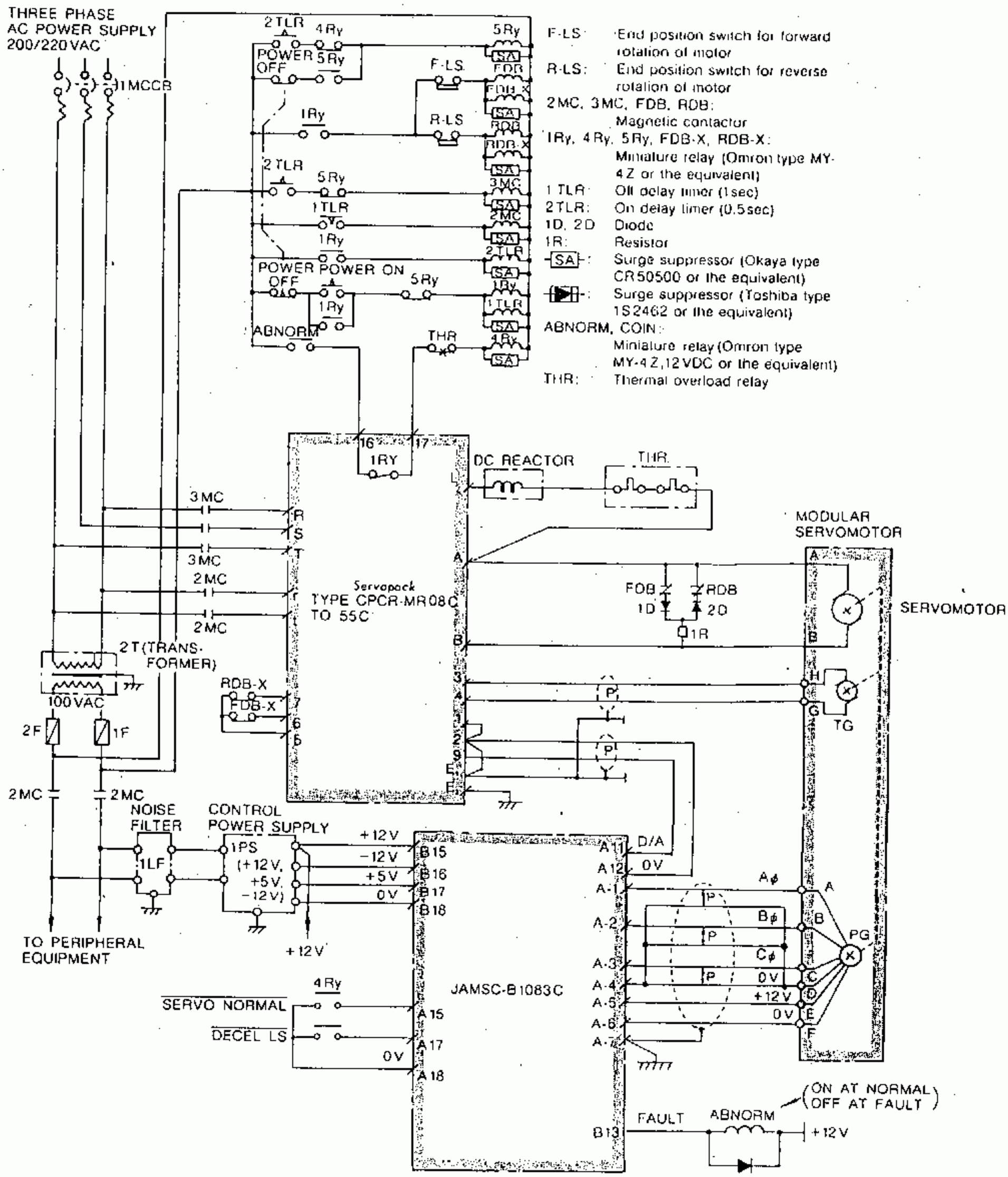
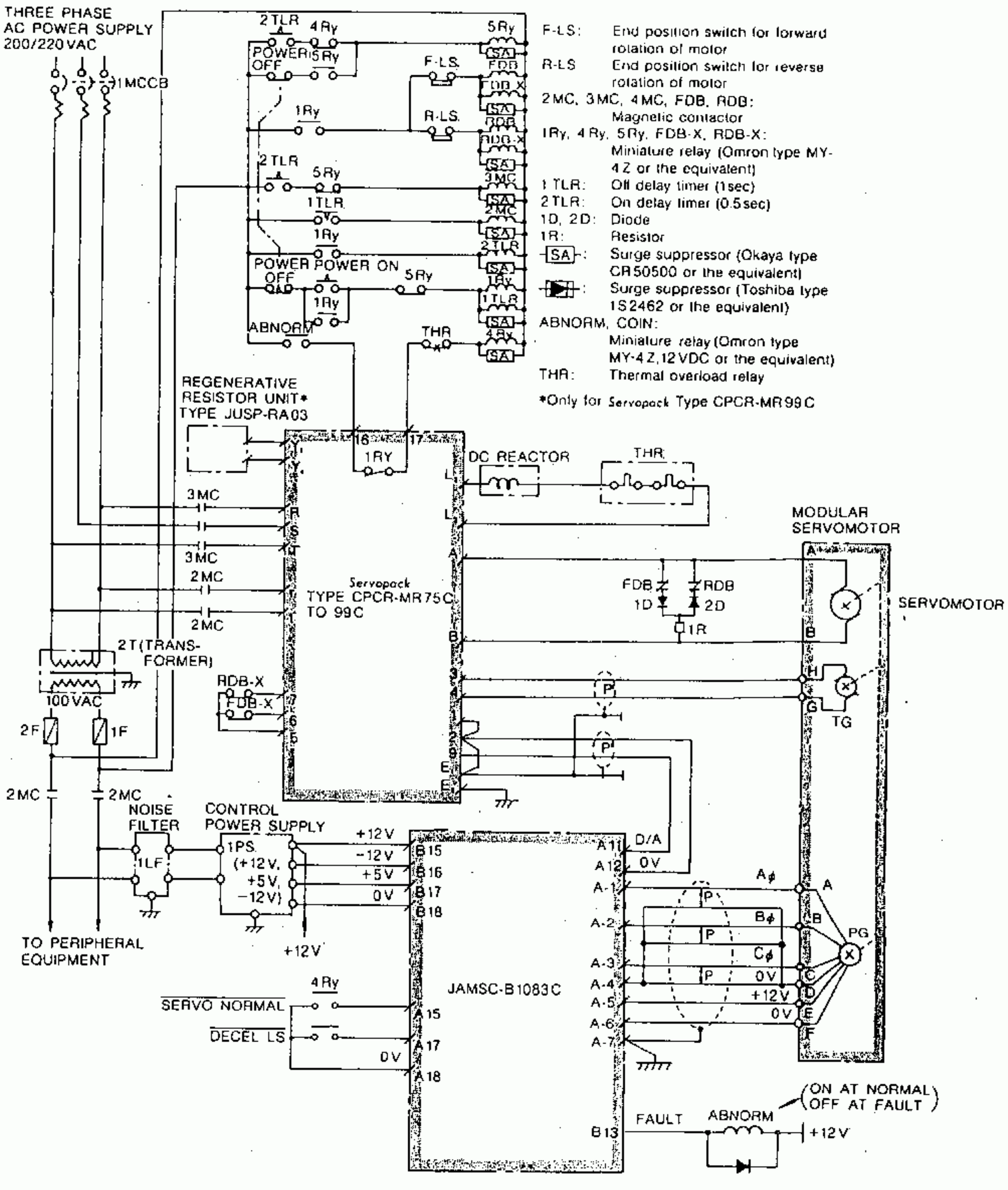


Fig. 8.5 Typical Interconnection Diagram
(Servopack Types CPCR-MR 08C to 55C)

(5) When used with Servopack Types CPCR-MR75C and 99C.



F-LS: End position switch for forward rotation of motor

R-LS End position switch for reverse rotation of motor

2MC, 3MC, 4MC, FDB, RDB: Magnetic contactor

1Ry, 4Ry, 5Ry, FDB-X, RDB-X: Miniature relay (Omron type MY-4Z or the equivalent)

1TLR: Off delay timer (1sec)

2TLR: On delay timer (0.5sec)

1D, 2D: Diode

1R: Resistor

SA: Surge suppressor (Okaya type CR50500 or the equivalent)

: Surge suppressor (Toshiba type 1S2462 or the equivalent)

ABNORM, COIN: Miniature relay (Omron type MY-4Z, 12VDC or the equivalent)

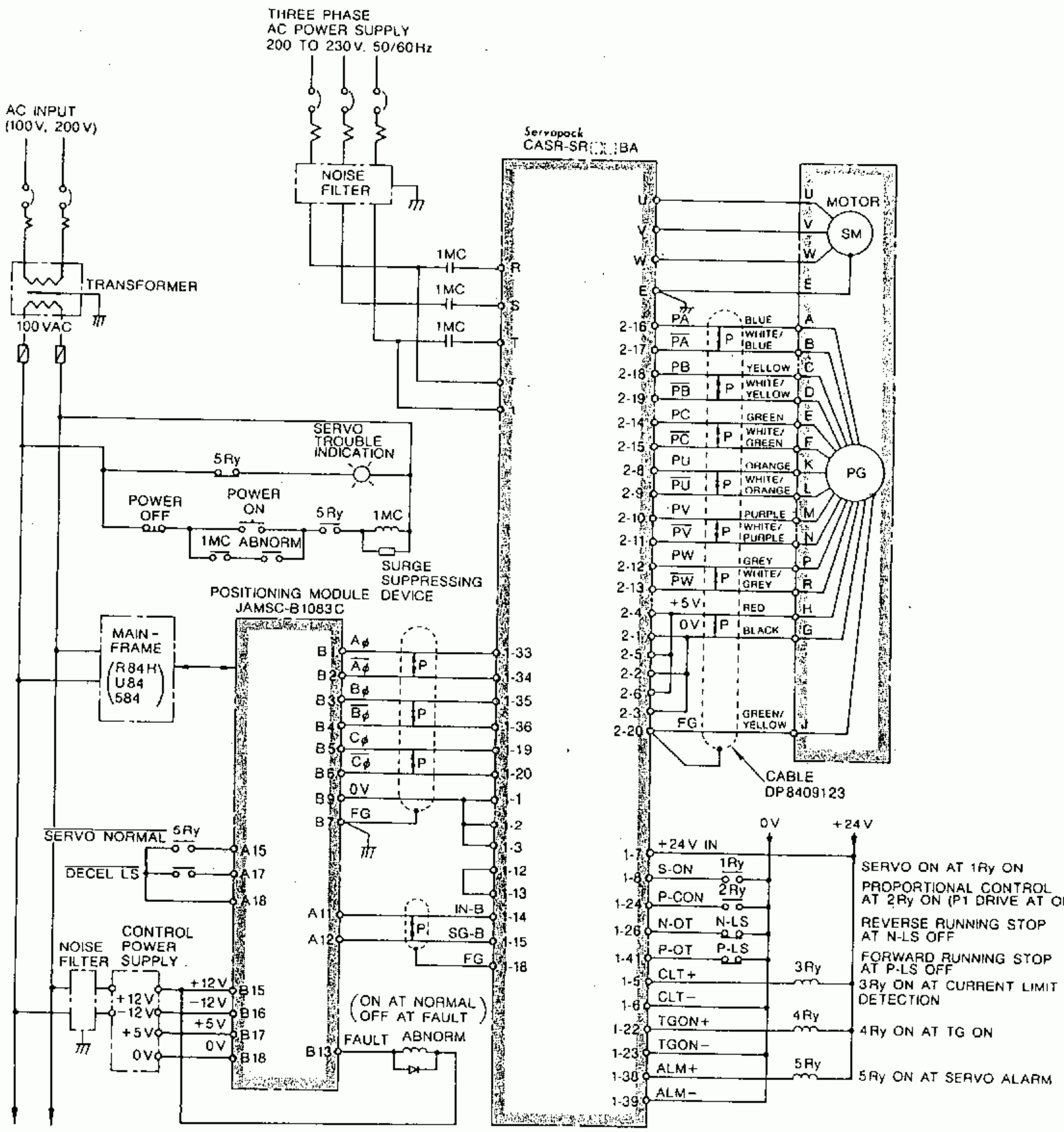
THR: Thermal overload relay

*Only for Servopack Type CPCR-MR99C

Fig. 8.6 Typical Interconnection Diagram
(Servopack Types CPCR-MR75C and 99C)

TYPICAL INTERCONNECTION DIAGRAM FOR AC SERVO DRIVE (FOR REFERENCE ONLY)

When used with 1000rpm Series for Machine Tools.



Note :

1. For emergency stop dynamic braking (DB) circuit, refer to bulletin par. 6. 9 in "AC Servo Drives 1000 rpm Series for Machine Tools" (TSE-S800-1. 1)
2. ⫴ : Twisted cable.

Fig. 8. 7 Typical Interconnection Diagram for AC Servo Drive (1000rpm Series)

8.3 WIRING FOR POWER SUPPLY

(1) Be sure to make sequence so that AC power is supplied to Servopack at 0.5 second and over after DC power supply unit (1PS) is energized (Make sequence so that $\overline{\text{CLEAR}}$ signal will be applied to the digital control unit within the above period).

(2) Disconnect the AC power supply to the Servopack at least 1 second before DC power supply unit (1PS) is de-energized.

(3) If B1083C is applied for vertical axis control, avoid dropping of object at power-on or power-off.

8.4 WIRING OF PROTECTIVE DEVICES

(1) Make sure that contacts of thermal relay (THR), thermostat (1TS) for detection of fin temperature and fuse alarm (FUX) are connected to the coil circuits of relay and that the power supply to Servopack is intrrupted if they should operate.

(2) When a driven machine has limited traveling distance, be sure to provide a limit switch for protection of the machine and control units, and make following sequence.

· Apply dynamic braking if alarm limit switch operates.

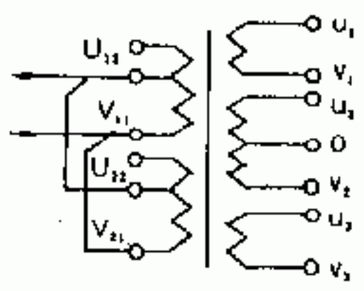
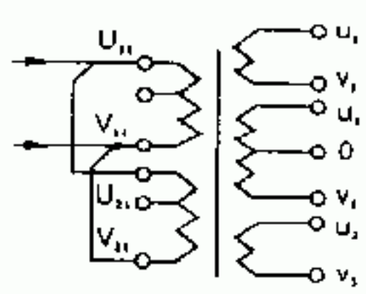
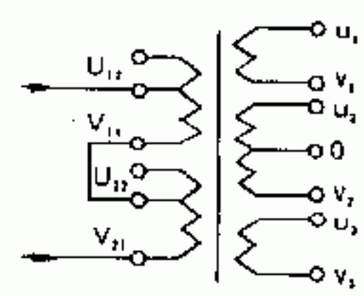
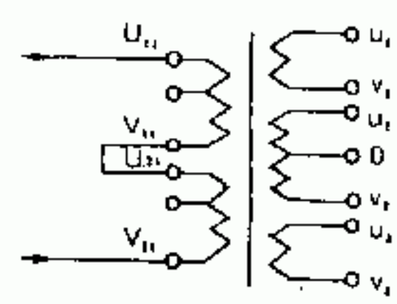
· Disconnect all the power if overtravel limit switch operates.

(3) Overrunning of the motor as a result of failed TG or PG (breakage and disconnection of coil, etc.) cannot be prevented, so protect the machine and control unit by using alarm and overtravel limit switch.

8.5 WIRING PRECAUTIONS

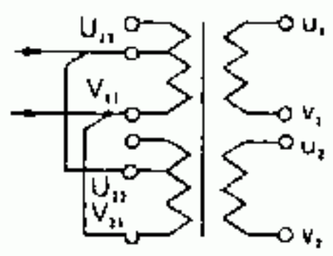
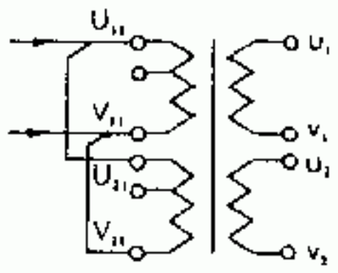
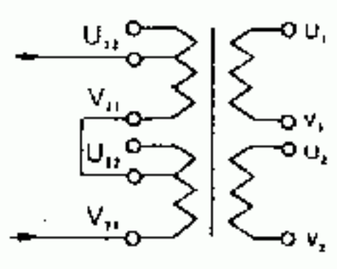
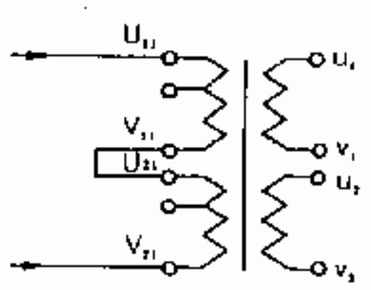
(1) Make tap connection of power transformer (1T) for Servopack type CPCR-FR01B to 02B as shown in Table 8.1.

Table 8.1 Tap Connection of Power Transformer (1T) for Servopack Type CPCR-FR01B to 02B

Supply Voltage	100 VAC (50/60 Hz)	110 VAC (50/60 Hz)	200 VAC (50/60 Hz)	220 VAC (50/60 Hz)
Tap Connection				

(2) Make tap connection of power transformer (1T) for Servopack type CPCR-MR01C to 07C as shown in Table 8.2.

Table 8.2 Tap Connection of Power Transformer (1T) for Servopack Type CPCR-MR01C to 07C

Supply Voltage	100 VAC (50/60 Hz)	110 VAC (50/60 Hz)	200 VAC (50/60 Hz)	220 VAC (50/60 Hz)
Tap Connection				

8.5 WIRING PRECAUTIONS (Cont'd)

(3) Two-core twisted shielded wire (Type RG-108 A/U made by Fujikura Cable Works, Ltd., Japan, or the equivalent) should be used as signal lead to Servopack types CPCR-MR□C, -FR. Lead length should be 3 meters or less.

(4) Use a shielded wire as feedback pulse signal lead from PG to B2083C, and ground the shielding at B1083C. Lead length should be 10 meters or less.

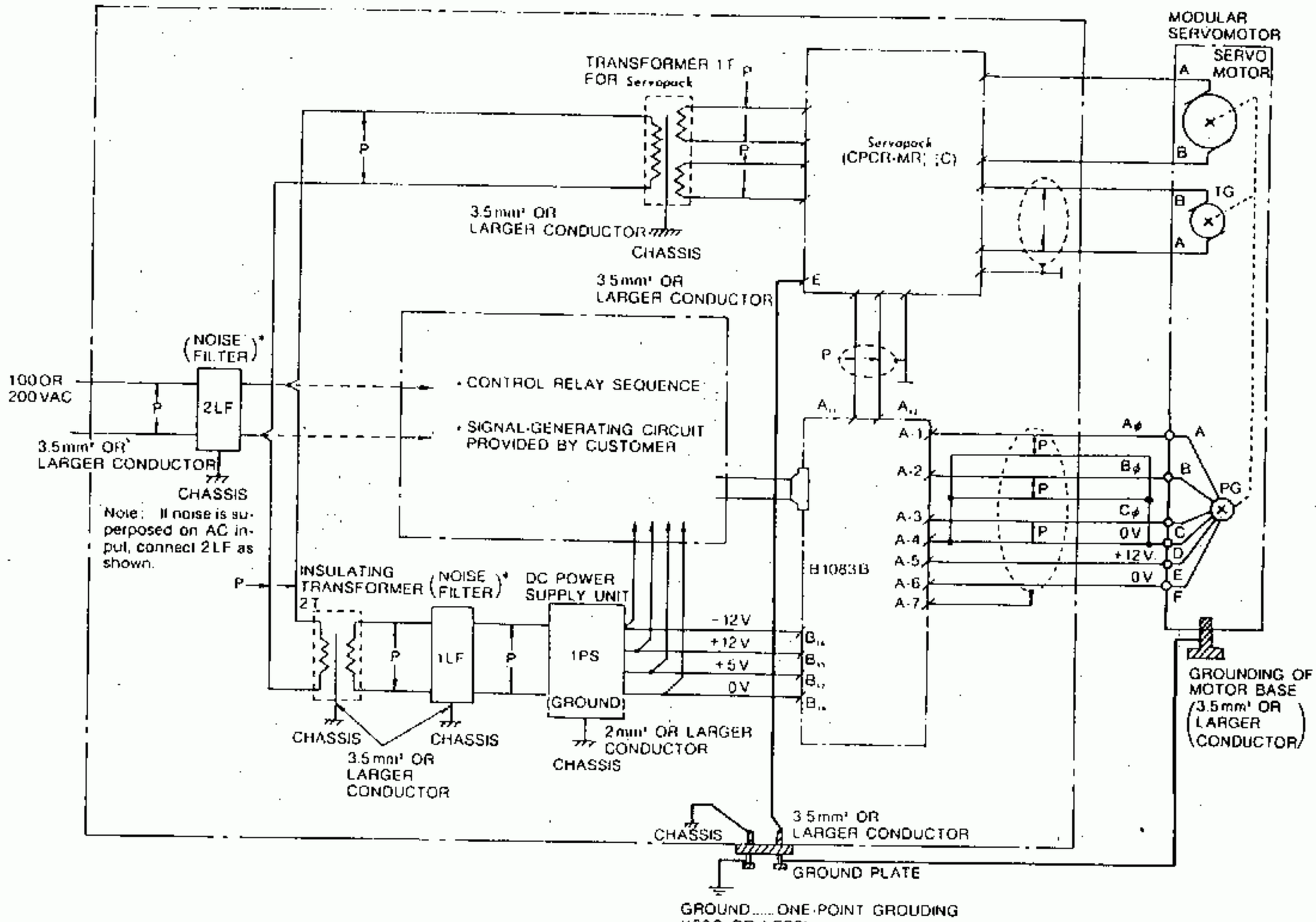
(5) To avoid malfunction caused by noise.

- Install an insulating transformer (2T) and noise filter (1LF) between DC power unit (1PS) and AC power supply.
- Install the noise filter, DC power unit, Positionpack unit and indicating counter as close as possible to each other.
- Do not run connections to primary and secondary windings of the transformer (2T) and noise filter (1LF) together. Ground terminal should be connected to ground pole or the equivalent by ground conductor.
- Connect surge-absorbing circuit to coils of relays, contactors and solenoids.
- Make connection with a space of 30 cm between AC power lines and DC power lines or signal lines and do not run within same bundle or duct.

(6) Make one point ground connection (up to 100 Ω in accordance with Japanese standards, or refer to national local codes) and use a larger conductor (braided-copper wire or the equivalent). Refer to Fig. 8.8 Typical Wiring for Grounding.

(7) If motor should be electrically insulated from machine by oil, etc., make a separate connection from motor base to ground.

(8) Use leads over 2 mm^2 for DC power lines (+5 V, +12 V, -12 V). When two or more B1083C are used, they should be connected individually to DC power supply. Failure to do so may cause malfunction due to voltage drop. Branch directly from the DC power unit terminals to each unit using junction terminals. See Fig. 8.9.



*Recommended noise filter (made by Tohoku Metal Industries, Ltd.)
1LF : LF-205A
2LF : Select it among LF-205A series according to the capacity.

Note :

1. Use braided-copper conductor of 3.5 mm² or larger for grounding.
2. Zero volt lines in the circuits should be connected to ground at the terminal E of Servopack (CPCR-MR[ ]C).

Fig. 8.8 Typical Wiring for Grounding

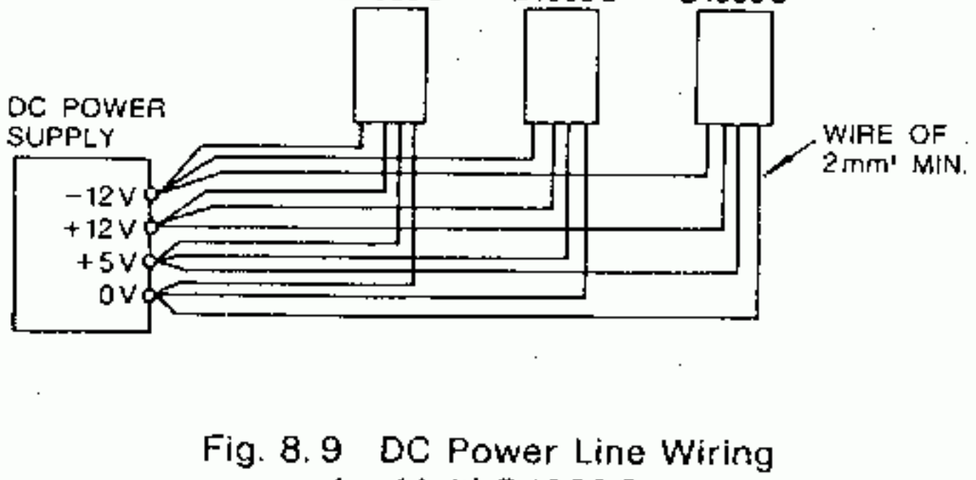


Fig. 8.9 DC Power Line Wiring for Multi B1083C

9. TEST OPERATION ADJUSTMENT

9.1 CHECKS BEFORE TEST OPERATION

Before turning on the power supply, carefully check the wiring for conformance with the connection examples given in Section 8.

(1) Incorrect connection of the power supply (-12 V, +12 V, +5 V) to the B1083C, or connecting the output relay surge absorbing diode with the wrong polarity may burn out or damage electrical parts in the B1083C.

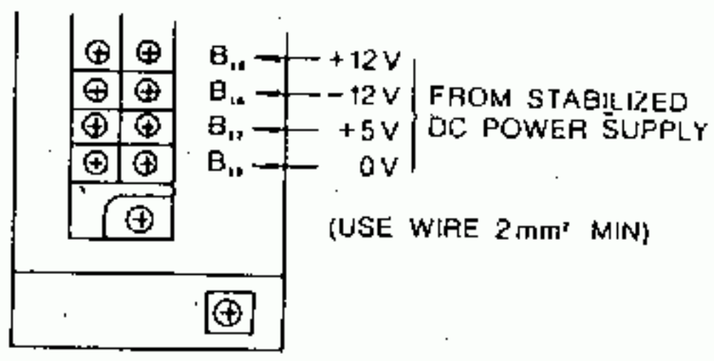


Fig. 9.1 B1083C Power Supply Terminal

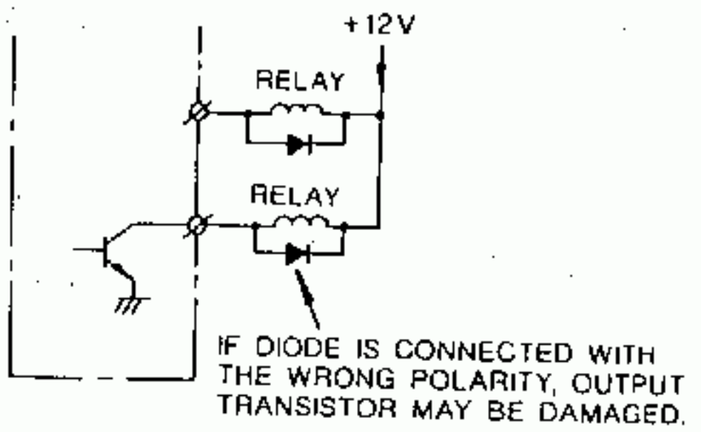


Fig. 9.2 Output Relay Circuit

(2) If the wires are connected in reverse polarity to the motor, TG and PG, the motor runs out of control. Make sure that the feedback loops for TG and PG are constructed in the negative feedback mode.

· Connection when Motor and PG (YASKAWA) are in one unit.

Fig. 9.3 shows correct connections to various units for forward running (CCW when viewed from load side). With the PG output pulses, phase A is 90° behind phase B. If any one of the connections is reversed, the motor runs out of control or hunts.

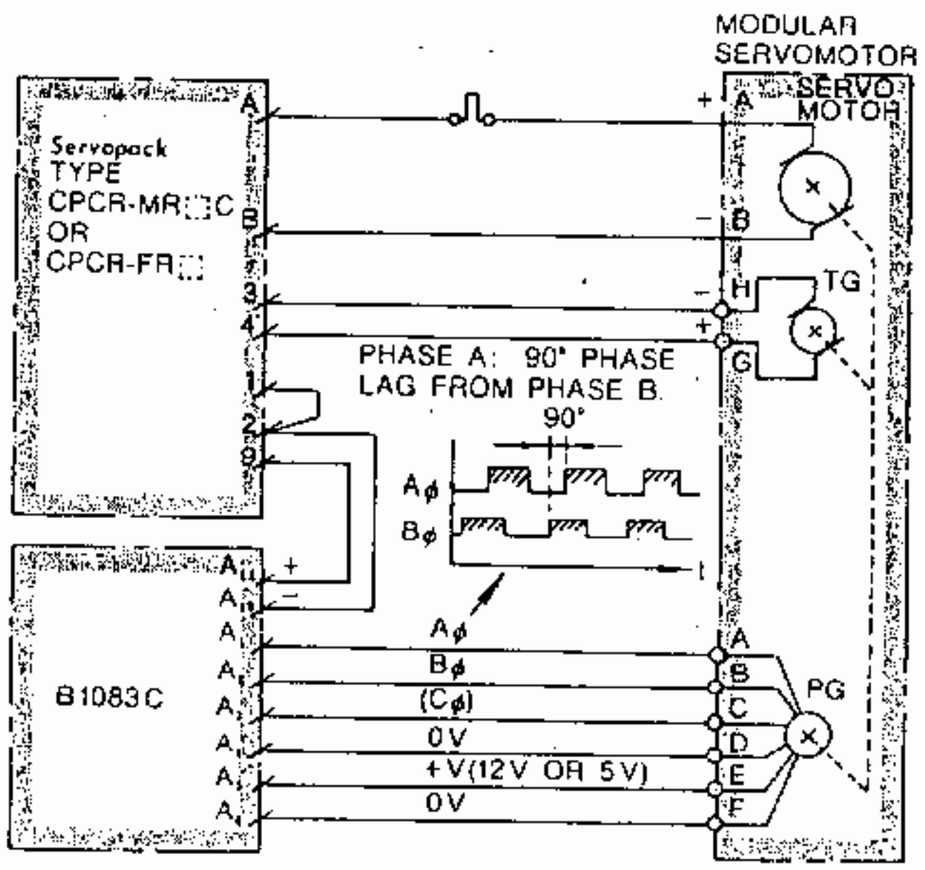


Fig. 9.3 Polarity at Correct Running of Motor

· Connection when Motor and PG are installed separately.

Fig. 8.4 shows correct connections for forward running (CCW when viewed from load side). Make connection so that lag pulses of A- and B-phase (output pulse) for the separately installed PG are as shown in Fig. 8.4.

NOTE

To reverse the reference direction and motor running direction, reverse the polarity of the servomotor, TG, and A- and B-phase of the PG.

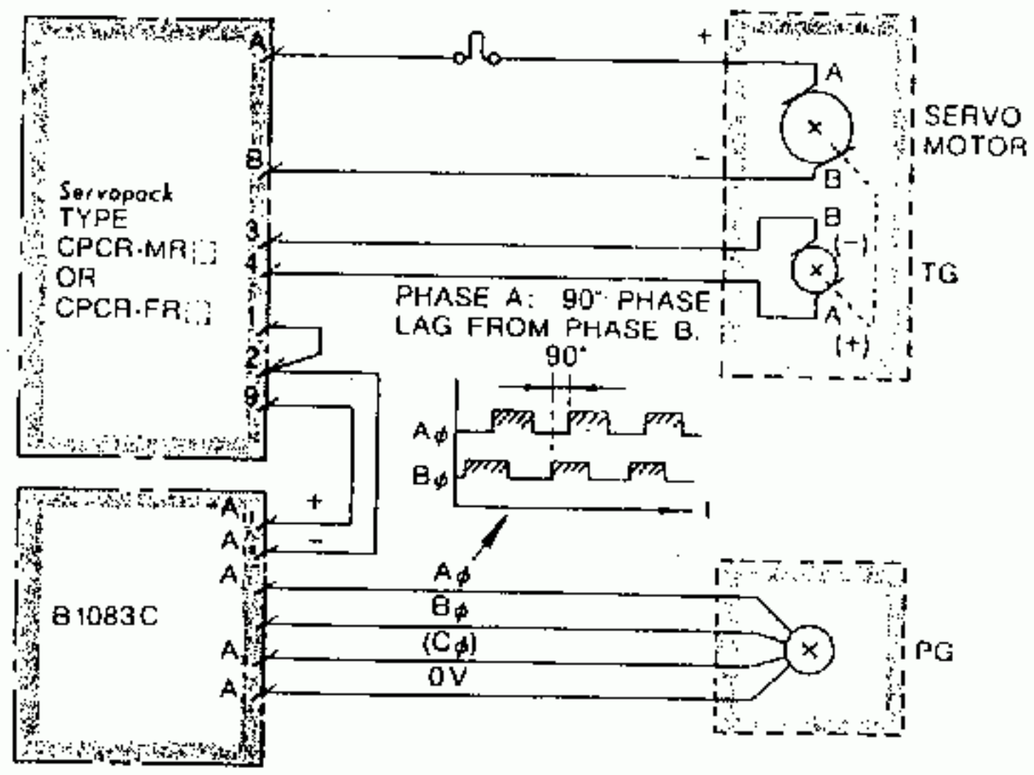


Fig. 9.4 Polarity at Correct Running of Motor
(Separately Installed PG)

9.2 TURNING ON POWER SUPPLY

NOTE

When starting the test operation with modular servomotor, first run the servomotor without a load, to avoid unexpected mishaps. Where the test operation must be started with the motor coupled to the driven machine, start the motor after preparing for an immediate emergency stop.

(1) After B1083C setting and the wiring check have been completed, turn on the power supply. If the sequence has been made correctly (see Figs. 8.1 to 8.6 Overall Connection Examples), B1083C is energized, and, after the timer count (0.5 sec min.), the Servopack is energized. In this condition, B1083C is reset to the initial state, and the error counter is 0, so that no reference voltage is applied to the Servopack.

(2) The following LEDs light to indicate the correctly energized state.

- Servopack: [POWER]
- B1083C: [POWER]

(3) Run the motor by giving reference pulses of a low frequency.

- When FB pulse Aϕ (PH-A input) is input correctly,

[PH-A] blinks, and when Bϕ (PH-B input) is input correctly.
[PH-B] blinks.

(The above LEDs light continuously when the signal line is broken, and if it is short-circuited to 0 V, the LEDs go off.)

- With the reference for forward running, the error counter counts the lag pulses as ⊕ values, and LED [+] lights. Check the motor running direction for conformance with the commanded running direction. With the reference for forward running, the motor runs CCW when viewed from the load side (Cup motor, Print motor).

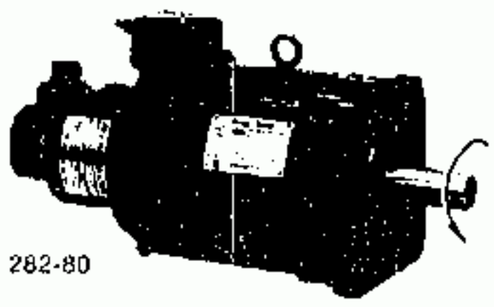


Fig. 9.5 Direction of Rotation of Motor
at Forward Running Command

- Check the deviation indicator LEDs [1] through [512] for blinking.
- Check that the motor stops when the reference pulse is discontinued.

9.3 ADJUSTMENT

Adjust the system with the servomotor coupled to the driven machine. Refer to Fig. 9.6, Flow Chart for Adjustment.

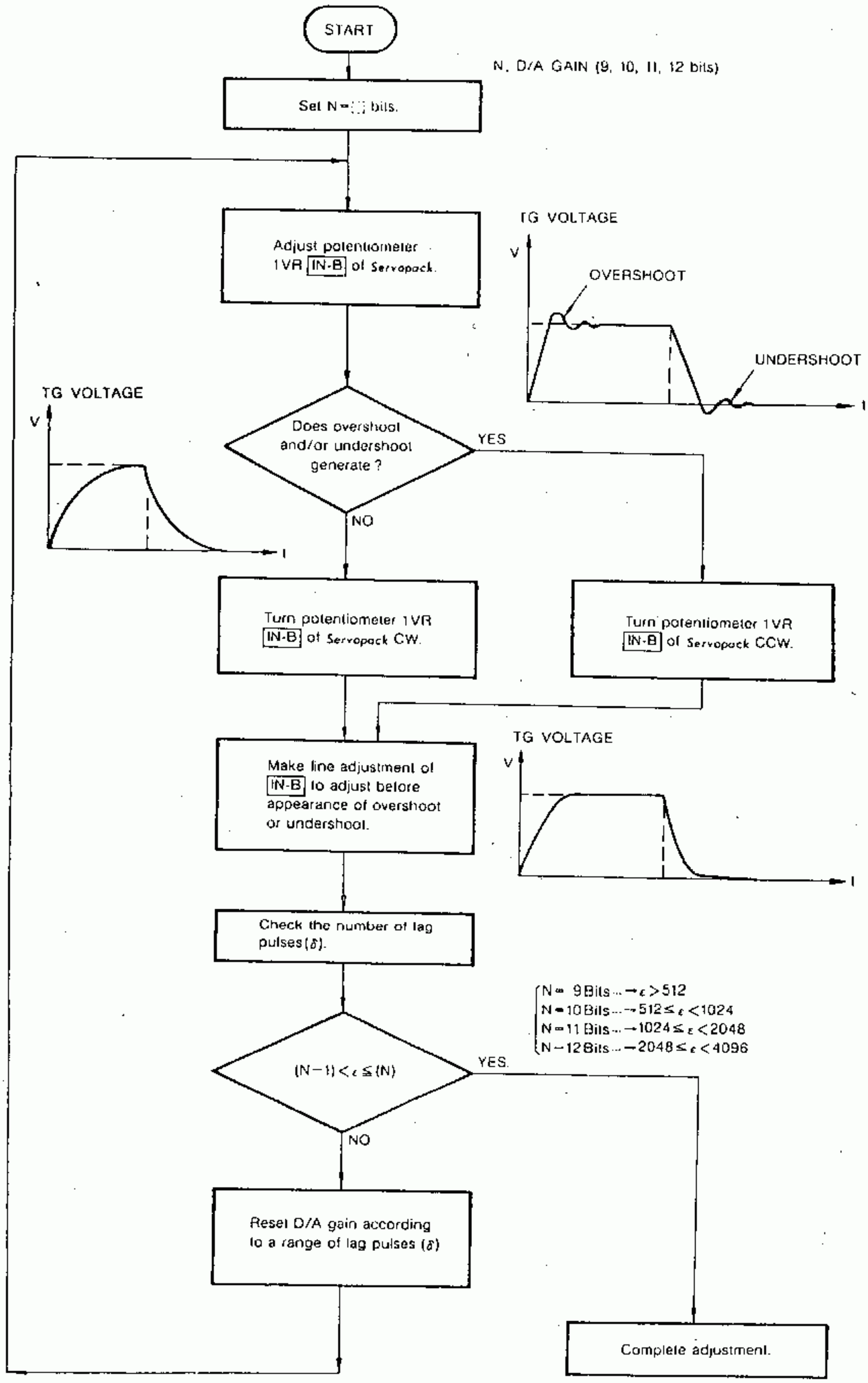


Fig. 9.6 Flow Chart for Adjustment

(1) Connect an oscilloscope (memory scope is preferable) to the check terminals TG (+) and SG0V (0V) on the Servopack.

(2) Input the maximum frequency reference pulse for the specifications of the system being used, and observe the TG waveform. The TG voltage should be 7V/1000 rpm within ± 10%.

An example of TG waveform for forward running is shown in Fig. 9.7.

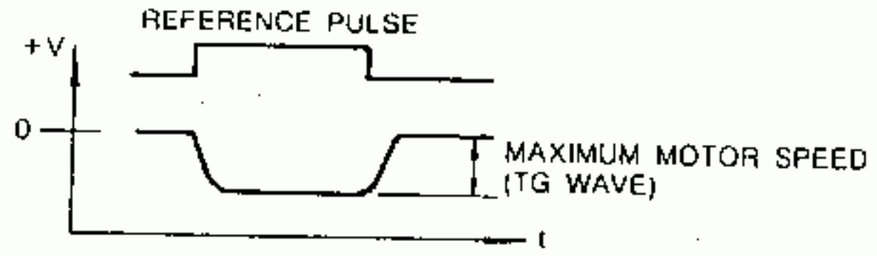


Fig. 9.7 Example of TG Waveform at Forward Running of Motor

(3) When the TG waveform overshoots or undershoots at the leading or trailing edges, turn the IN-B potentiometer on the Servopack counter clockwise until the overshoot or undershoot just begins to damp out, and leave the potentiometer at this position.

If LED CLAMP on the B1083C panel lights at this time, the D/A gain is too high. Readjust after setting the D/A gain of the B1083C to the next lower bit: for example, from 9 bits to 10 bits. Potentiometer IN-B is used for position loop gain (kp) adjustment.

(4) An Example of optimum setting from the TG, waveform is shown Fig. 9.8. Measure the TG waveform across terminals (3) and (4), which are on the 0 V side of the Servopack.

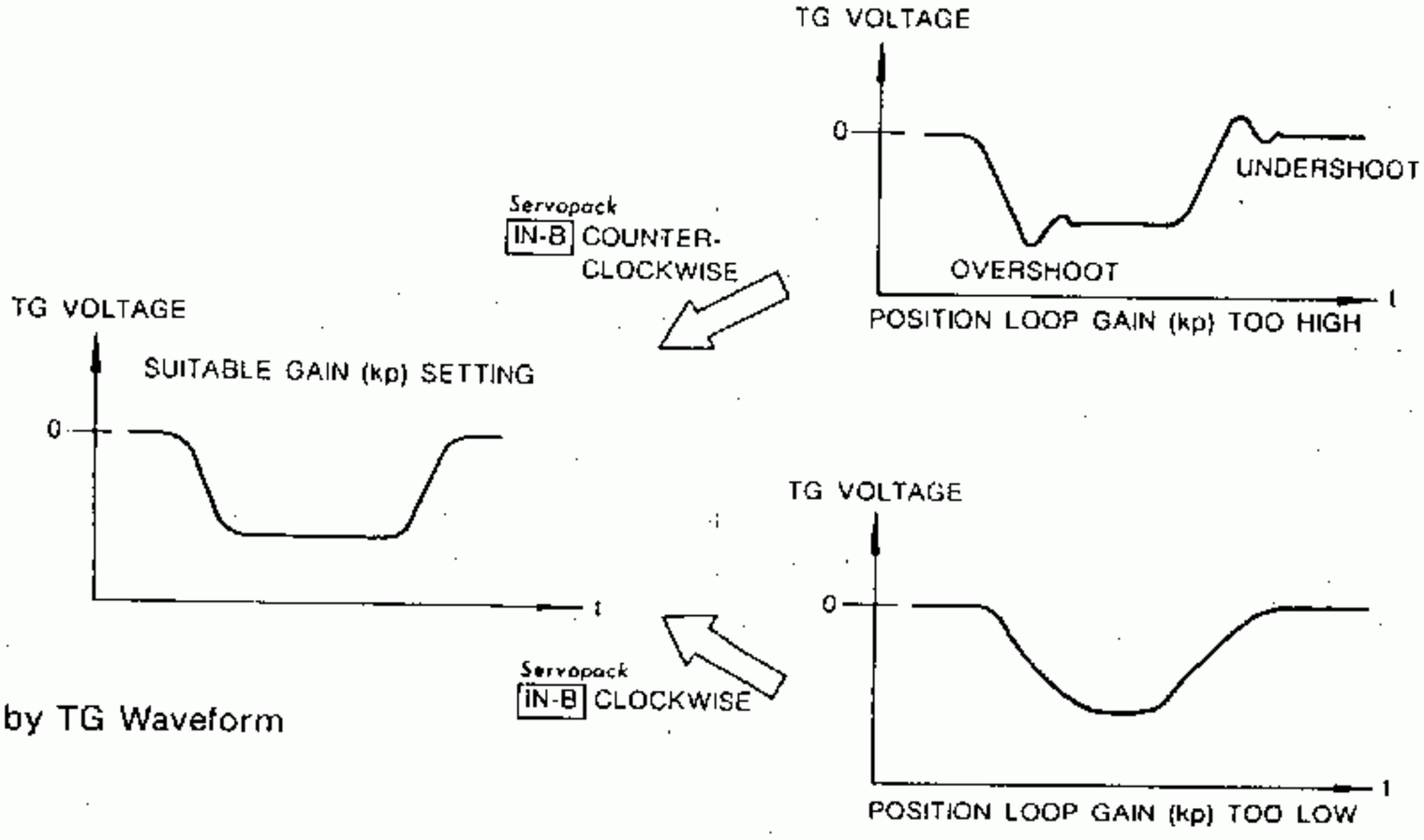


Fig. 9.8 Adjustment by TG Waveform

(5) Obtain the number of lag pulses for the maximum motor speed from the deviation indication LEDs on the B1083C panel. The number of lag pulses ε are calculated from the sum D(ε) of the values of the lit deviation LEDs for the respective D/A bits, referring to Table 9.1

(6) When the number of lag pulses ε is within the D/A bit setting range, the adjustment is completed.

(9 Bits: $\varepsilon < 512$, 10 Bits: $512 \leqq \varepsilon < 1024$,

11 Bits: $1024 \leqq \varepsilon < 2048$, 12 Bits: $2048 \leqq \varepsilon < 4096$)

(7) Obtain the required D/A bit from the number of lag pulses ε.

(8) When converting 12 bits to 9 bits, if 12 bits are set to gain 1, the D/A gain will increase by ×2, ×4, ×8.
Therefore, after changing the D/A bit, turn the potentiometer IN-B on the Servopack CCW 2 graduations or so, and then readjust.

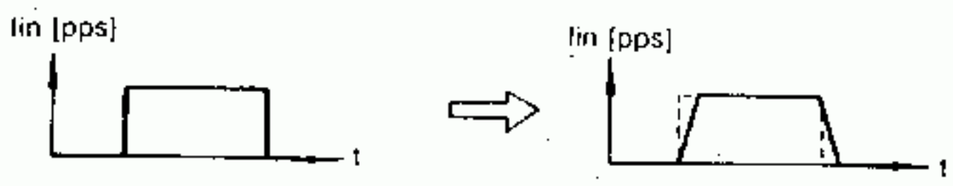
9.3 ADJUSTMENT (Cont'd)

(Example) When the number of lag pulses is 1560 with D/A gain = 12 bits, change D/A gain to 11 bits.

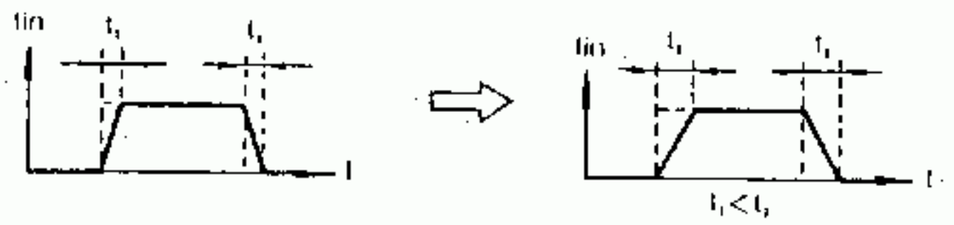
· Procedure when Adjustment is Impossible

With D/A gain set to 12 bits, when overshoot or undershoot cannot be eliminated by turning the potentiometer IN-B on, the Servopack fully CCW, no further adjustment is possible with Servopack and B1083C. Proceed as follows:

(1) Use acceleration/deceleration control on the reference pulse input to make it a ramp input.



(2) When the ramp input is already used, extend the acceleration and deceleration time.



(3) Divide the B1083C D/A output by resistors to reduce the command voltage to the Servopack.

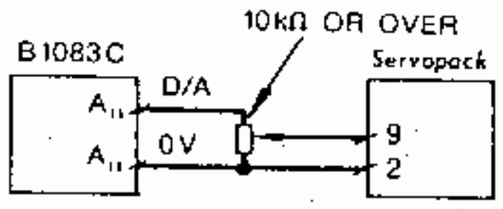


Fig. 9.9 Procedure when Adjustment Impossible

9.4 ERROR INDICATOR LED

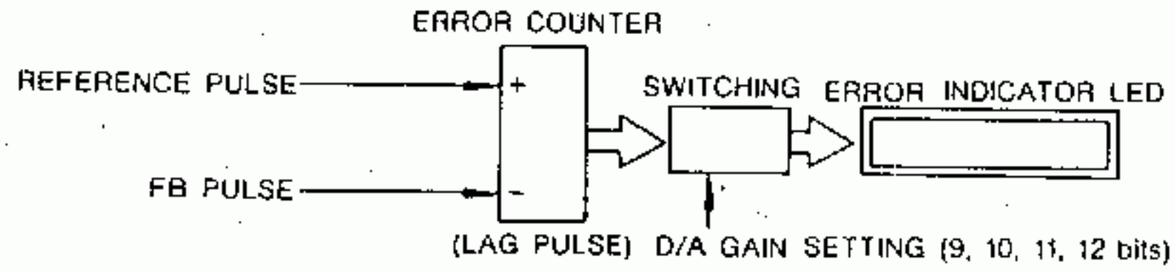


Fig. 9.10 Conceptual Diagram of Error Indicator LED

The contents of the error counter are shifted by D/A gain setting as shown in Table 9.1 to light the error indicator LEDs.

Table 9.1 Correspondence between Error Counter and Error Indicator LED

Error Indicator LED \ D/A Gain	Error Counter Content			
	9-Bit	10-Bit	11-Bit	12-Bit
1	—	1	1 or 2	1, 2 or 4
2	1	2	4	8
4	2	4	8	16
8	4	8	16	32
16	8	16	32	64
32	16	32	64	128
64	32	64	128	256
128	64	128	256	512
256	128	256	512	1024
512	256	512	1024	2048

The relationship between the error counter contents, i.e., the number of lag pulses ε and the sum D(ε) of the lit LED values are as follows.

- 9 Bits —— $\varepsilon = \frac{D(\varepsilon)}{2}$
- 10 Bits —— $\varepsilon = D(\varepsilon)$
- 11 Bits —— $\varepsilon = 2 \times D(\varepsilon)$
- 12 Bits —— $\varepsilon = 4 \times D(\varepsilon)$

9.5 RELATIONSHIP BETWEEN NUMBER OF LAG PULSES AND D/A OUTPUT

The relationship between the number of lag pulses and D/A output for any D/A gain setting bits is shown in Fig. 9.11.

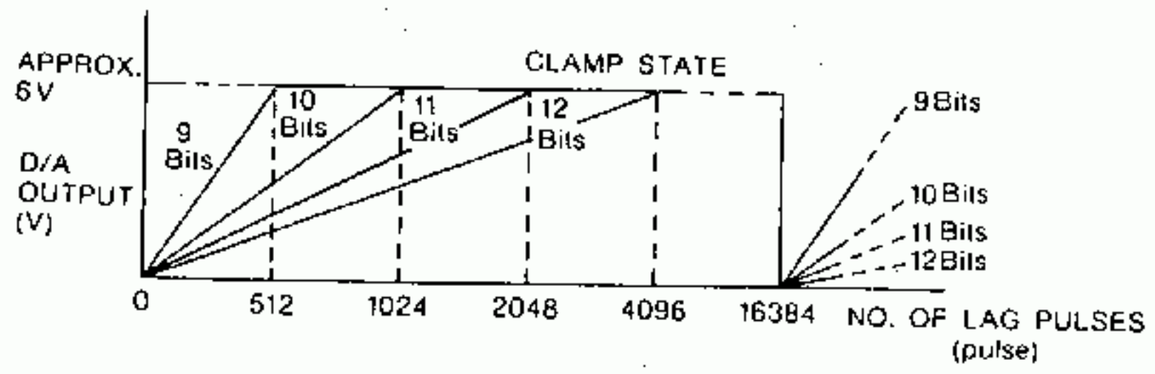


Fig. 9.11 Relationship between Number of Lag Pulses and D/A Output

9.6 CONNECTING B1083C AND Servopack FOR D/A OUTPUT

In B1083C positioning system, positioning loop gain is adjusted in two ways:

· Rough adjustment – Selection of bit number of D/A converter (×1, ×2, ×4, ×8)

· Fine adjustment – IN-B potentiometer of Servopack

For adjusting with IN-B potentiometer, D/A output of B1083C should be connected to to terminal 9 of Servopack. If Servopack terminal 1 is used instead of terminal 9, adjustment with IN-B potentiometer can not be done.

By adjusting the positioning loop gain, D/A output voltage varies. As shown in Fig. 9.12, when a reference pulse is sent to Positionpack at a constant frequency, the motor runs at a constant speed in proportion to reference pulse frequency. At this time, D/A output voltage V (D/A) corresponds to speed feedback voltage-V_{TG} from TG at input side of Servopack speed amplifier:

$$\frac{(-V_{TG})}{R_T} + \frac{V(D/A)}{R_X} \fallingdotseq 0$$

R_t: Input impedance (constant value) of speed feedback loop

R_x: Resistance value of IN-B potentiometer

$$V_{(D/A)} \fallingdotseq R_X \times \frac{V_{TG}}{R_T}$$

In the formula shown above, when R_X is changed (Adjustment of IN-B potentiometer), D/A output voltage V(D/A) of B1083C varies. For example, when D/A output voltage is decreased, lag pulses in the error counter become small. This means the positioning loop gain increases.

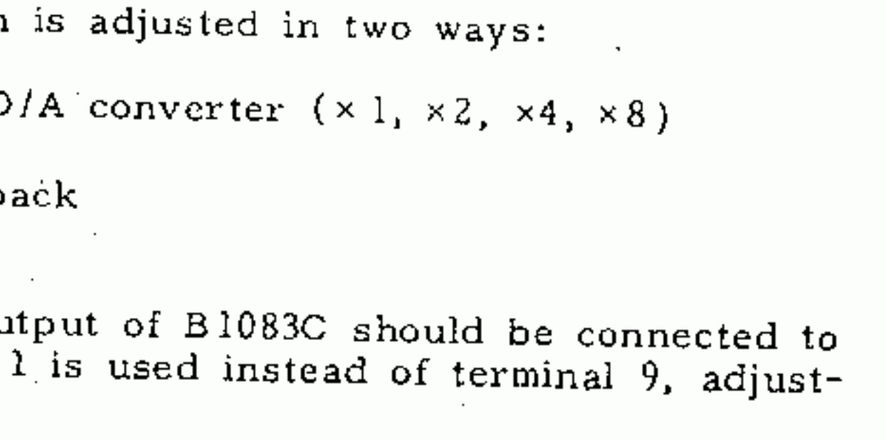


Fig. 9.12 Positioning Loop System

10. TROUBLESHOOTING

10.1 B1083C ERROR CODE

With monitor code "111," the 3rd and 4th input registers give error codes. For monitor codes, refer to Table 5.6.

10.1.1 Hardware Errors

Table 10.1 Hardware Errors

Code	Cause	Remedy
—	ROM total check error	Self-diagnostic error. Module must be reset or internal power suppy must be turned off and on. If the same error is repeated, replace B1083C.
—	RAM check error	
—	WDT error	
01	External power supply fault ; POWER lamp goes off.	When error code is 01, check external power supply (+12 V, −12 V, +5 V) must be checked, when error code is 02, SERVO NORMAL input signal system must be checked. In both cases, when the cause is eliminated, the error code goes off, and the automatic positioning operation can be kept on.
02	Servo fault ; External input signal $\overline{\text{SERVO NORMAL}}$ is H-level.	
50	Overflow ; Servo lag pulses overflow in error counter.	To return, module must be reset, or the internal power supply must be turned off and on. Check the servo system.

Note :

1. When a hardware error occurs, B1083C is disconnected from I/O bus, and all the input relays to the mainframe are turned off (including the READY input relay).
2. If a hardware error occurs, during positioning operation, zero return operation, or JOG operation, B1083C stops outputting reference pulses (linear acceleration and deceleration are disabled), and continues clearing the error counter.
   When the external power supply or the servo system is faully, eliminating the cause turns off the error code and restores the normal state.
   When the operation of B1083C is stopped during positioning by a servo fault, the current value remains correct unless the PG power supply fails. Therefore, when operation is restarted after error elimination, the operation is continued from the stopped position.
3. The internal power supply means the power supply for the mainframe.

10.1.2 Setting Errors

Table 10.2 Setting Errors

Code	Contents	Remedy
20	Speed data 0 setting	B1083C rejects setting. When correct setting is made, error code goes out.
21	Accel / decel time 0 setting	
22	Accel / decel time exceeding 99	
23	Data exceeding 9999	
24	(JOGC speed < FWD RTN, RVS RTN speed) is not kept.	
27	Two or more output coils among "current value change," "positioning setting," and "JOG accel / decel speed setting," are turned on simultaneously.	B1083C rejects setting. Make correct setting.
28	While STOP is OFF, "current value change" coil or "JOG accel / decel speed setting" coil is turned on.	
29	While "JOG accel/decel speed setting" coil is ON, there is no specified coil.	
30	While "JOG accel/decel speed setting" coil is ON, two or more coils are designated.	
31	While AUTO/$\overline{\text{MAN}}$ is ON, two or more coils, among START, FWR RTN and RVS RTN, are turned on simultaneously.	

Table 10.2 Setting Errors (Cont'd)

Code	Contents	Remedy
32	While AUTO/$\overline{\text{MAN}}$ is ON, "JOG accel/decel speed setting" coil is turned on.	B1083C rejects setting. Make correct setting.
33	Setting mode, other than 000, 001, 011, 100, 101, 111 (0000, 0001, 0011, 0100, 0101, 0111) is specified for operation mode.	
34	When setting 2-step speed pattern positioning, "positioning setting" output coil turns on only for one scan.	
37	Setting mode, other than 000, 001 (0000, 0001) is specified for zero return mode.	
35	When setting 2-step speed pattern positioning, the relative positions of P_1 and P_2 are not in the same turning direction.	B1083C accepts the setting, but error is detected upon starting, and no operation. Correct the setting.
36	When setting 2-step speed pattern positioning, distance P_2 is too short to secure an interval for speed V_2.	

10.1.3 Errors during Operation

Table 10.3 Errors during Operation

Code	Contents	Remedy
51	START is turned on without setting positioning, or zero return is attempted without setting JOGC accel/decel speed.	START is disregarded.
52	FWD RTN or RVS RTN is turned off during zero return.	B1083C decelerates and stops.
53	AUTO/$\overline{\text{MAN}}$ is switched during operation.	B1083C decelerates to stop.
54	Zero return reference is turned on during positioning operation.	Zero return reference is disregarded.
55	START is turned on during zero return.	START is disregarded.
56	In absolute mode, countable range is exceeded. (OVER input relay ON.)	Move the machine within countable range by JOG or external command pulse input or, start zero return.
57	Mainframe scan time too short.	There is no ladder circuit in mainframe. Store a ladder circuit.
58	While DECEL LS is ON, zero return is started.	B1083C disregards zero return. Bring the machine out of the DECEL LS ON range by JOG motion. Turn off DECEL LS, and then, attempt zero return again.

Note :

1. Turning on the START coil earlier than or in the same scan as the "positioning setting" coil results in error 51. Turn on the START coil after confirming the turning on of the RESET DONE input relay, or after the completion of the scan in which the "positioning setting" coil was turned on. In most cases, the PRESET DONE coil is turned on after the completion of the scan in which the "positioning setting" coil is turned on.
2. If the operation of the mainframe stops, B1083C stops after deceleration (ACTIVE lamp lights, and ERROR lamp goes out).

   When starting the mainframe (RUN) after stopping by the programming panel, the B1083C will continue the operation from the stop position. Do not reset the module.

10. 1. 4 Error Statuses

Table 10.4 Error Statuses

Type	Input Relay			Indicator Lamp		External Output	
	READY	ERROR	FAULT	ACTIVE	ERROR	$\overline{\text{CLEAR}}$	FAULT
Hardware Error (Self-diagnostic error)	OFF	*	*	OFF	†	No output	Output
Hardware Error (Error codes 01, 02, 50)	ON	ON	ON	OFF	ON	Output	Output
Setting Error	ON	ON	OFF	ON	ON	No output	No output
Error during Operation	ON	ON	OFF	ON	ON	No output	No output

*B1083C is ON, but since it is disconnected from the I/O bus, the input relay to the mainframe is OFF.

Self-diagnostic Error	Error Indicator Lamp
ROM Total Check Error	Fast blinking (0.4 sec on / 0.4 sec off)
RAM Error	Slow blinking (1 sec on / 1 sec off)
WDT Error	Fast / slow blinking

Note : To reset error codes for setting errors and errors during operation, turn on the STOP coil (AUTO/$\overline{\text{MAN}}$ may be in any position), set monitor code "111" (error code), and turn the "current value change" coil ON.

If two or more error codes occur, the one with the lowest code number is monitored, and is reset when the "current value change" coil is ON. Then, the next lowest error code number is monitored.

10. 2 TROUBLESHOOTING FOR SYSTEM

If a malfunction occurs, checking must be started with the assumption that the failure was caused by either erroneous operation of faulty equipment.

10. 2. 1 DC Power Supply

Faulty, or fluctuation of, DC power supply voltage exceeding limits shown below, may cause overrunning of the motor or inaccurate control. Voltage measured at the following terminals in B1083C should not exceed the limits given below.

Terminals No.

1TB-11: -12 V ±5%
1TB-12: +12 V ±5%
1TB-13: +5 V to +5.25 V
1TB-14: 0 V

If measured voltage exceeds the above limit, check the DC power supply unit and wiring. Wire size should be 2 mm^2 or above.

10. 2. 2 Motor does not Rotate.

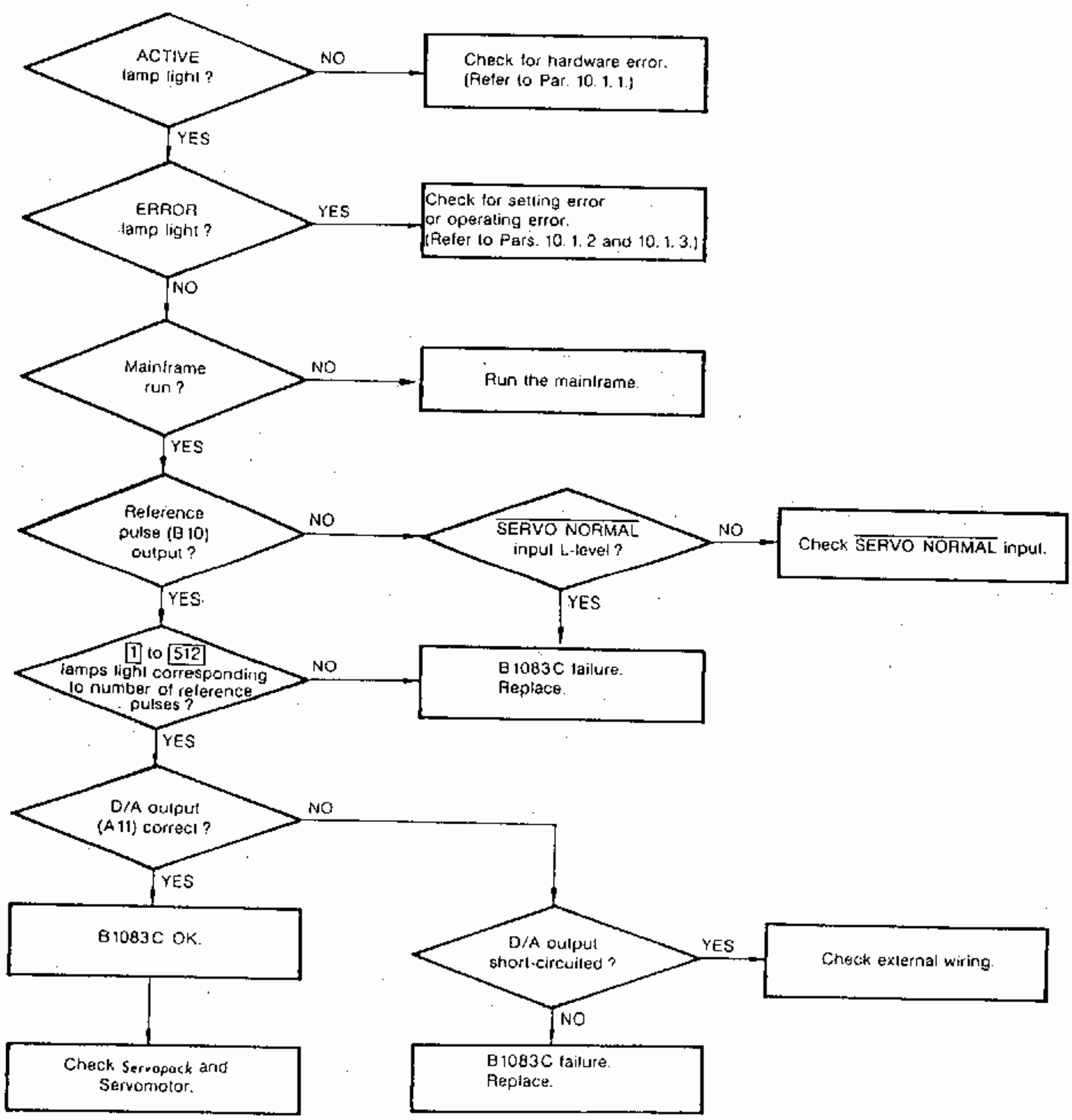


Fig. 10.1 Troubleshooting when Motor does not Rotate.

10. 2. 3 **Motor does not Stop.** (Including Overrun)

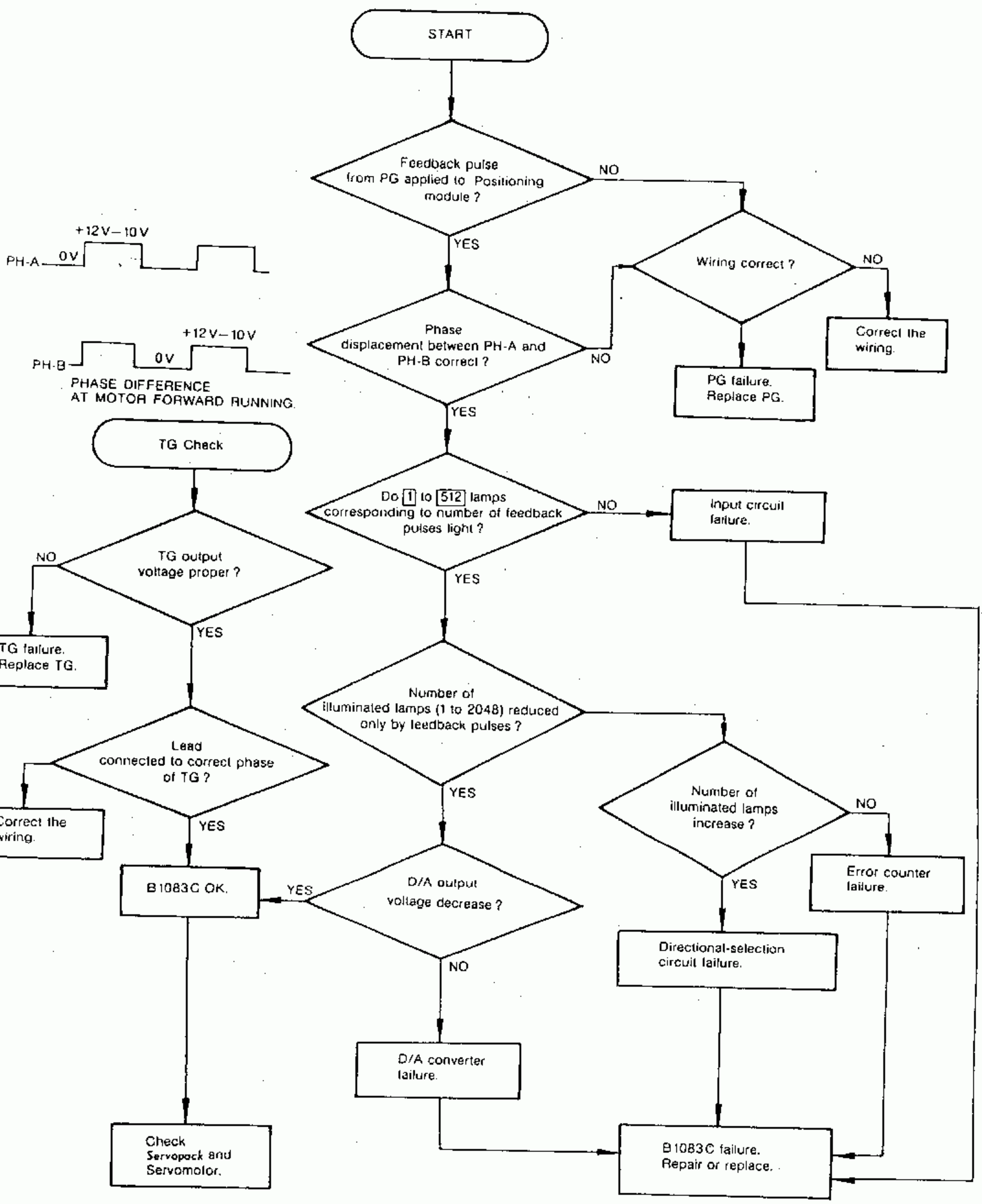


Fig. 10. 2 Troubleshooting when Motor does not Stop (Including Overrun)

10. 2. 4 Overflow Signal appears immediately after Starting.

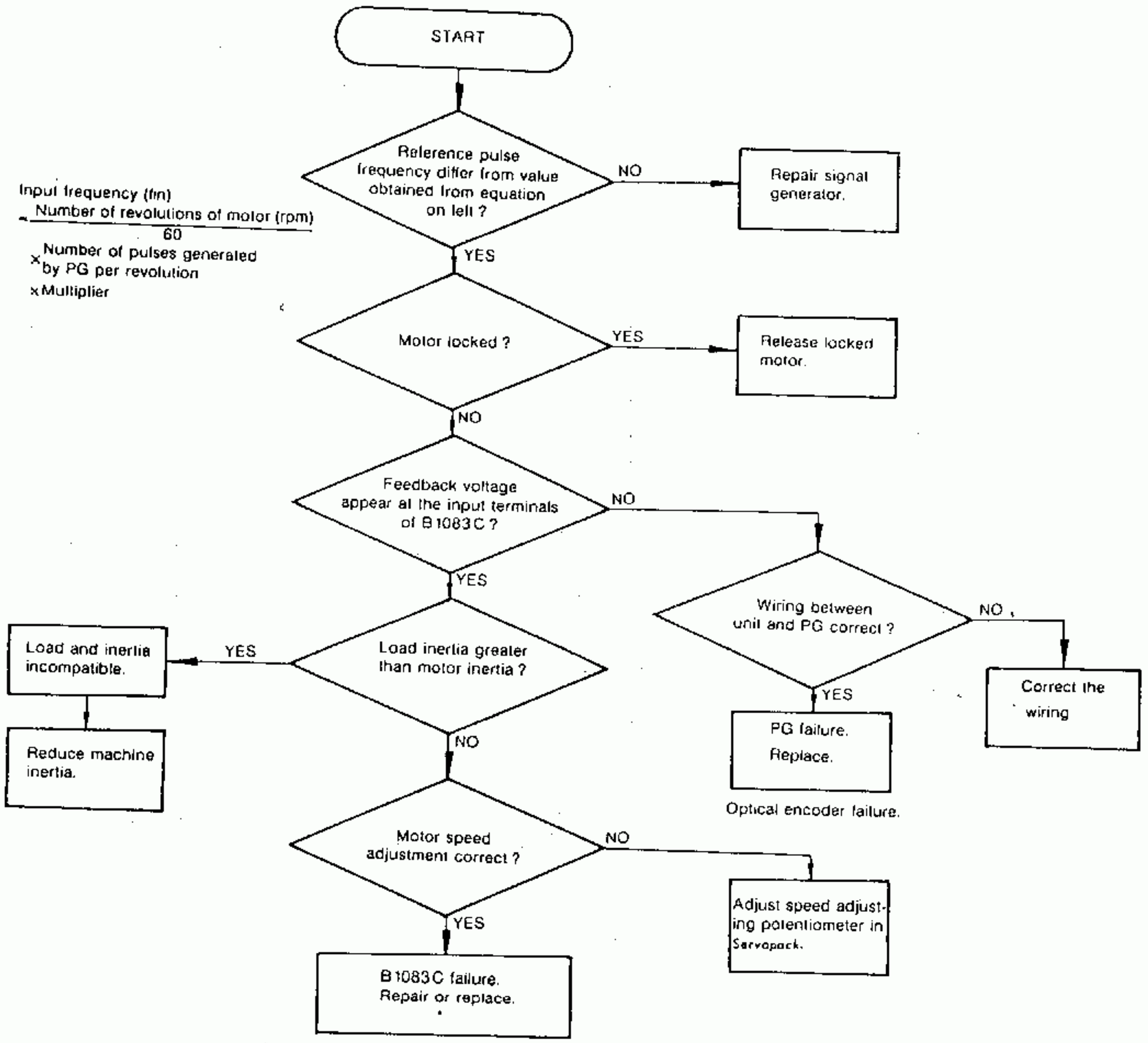


Fig. 10. 3 Troubleshooting when Overflow Signal Appears immediately after Starting

10. 2. 5 Inaccurate Positioning

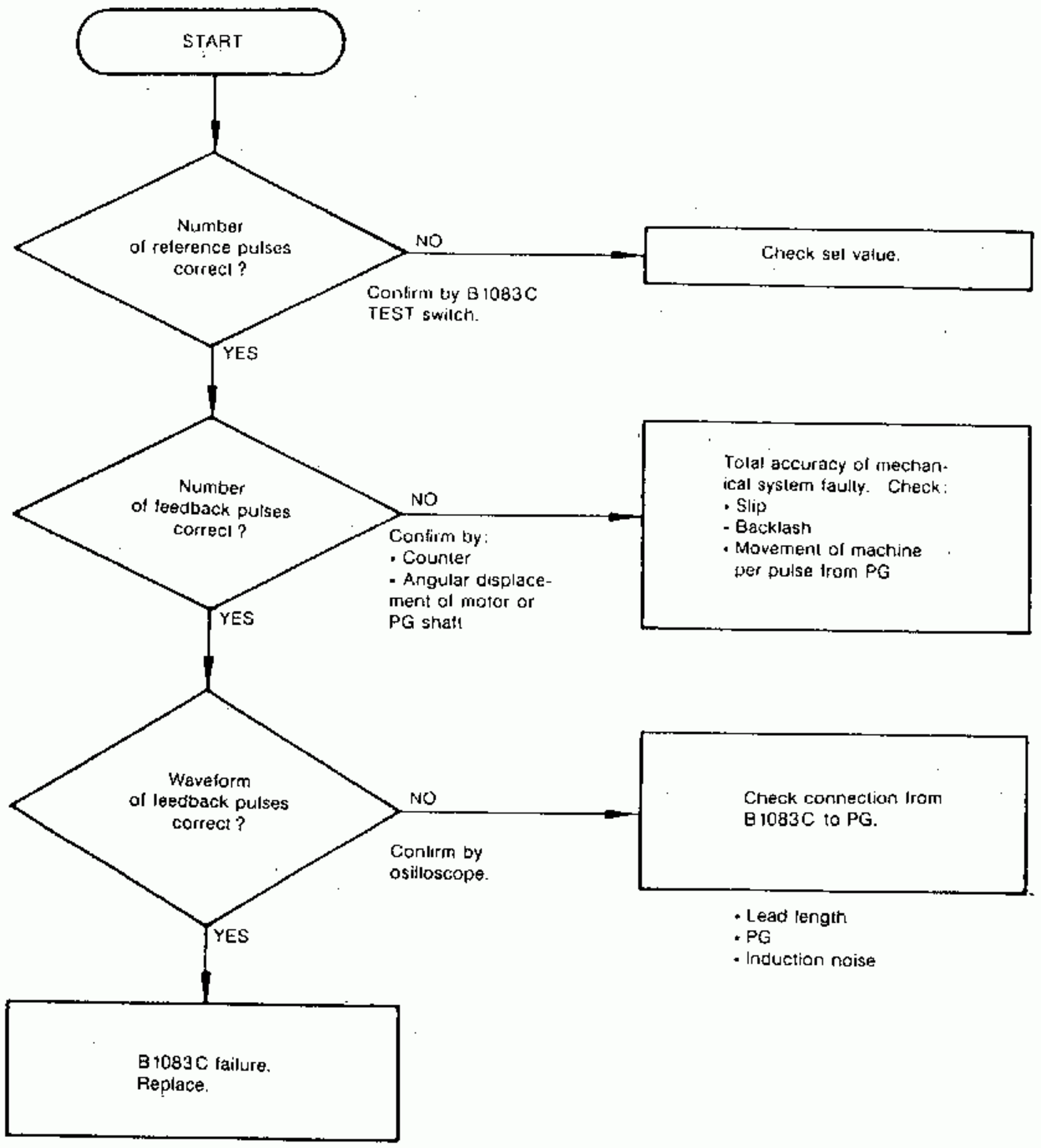


Fig. 10. 4 Troubleshooting for Inaccurate Positioning

11. DIMENSIONS in mm

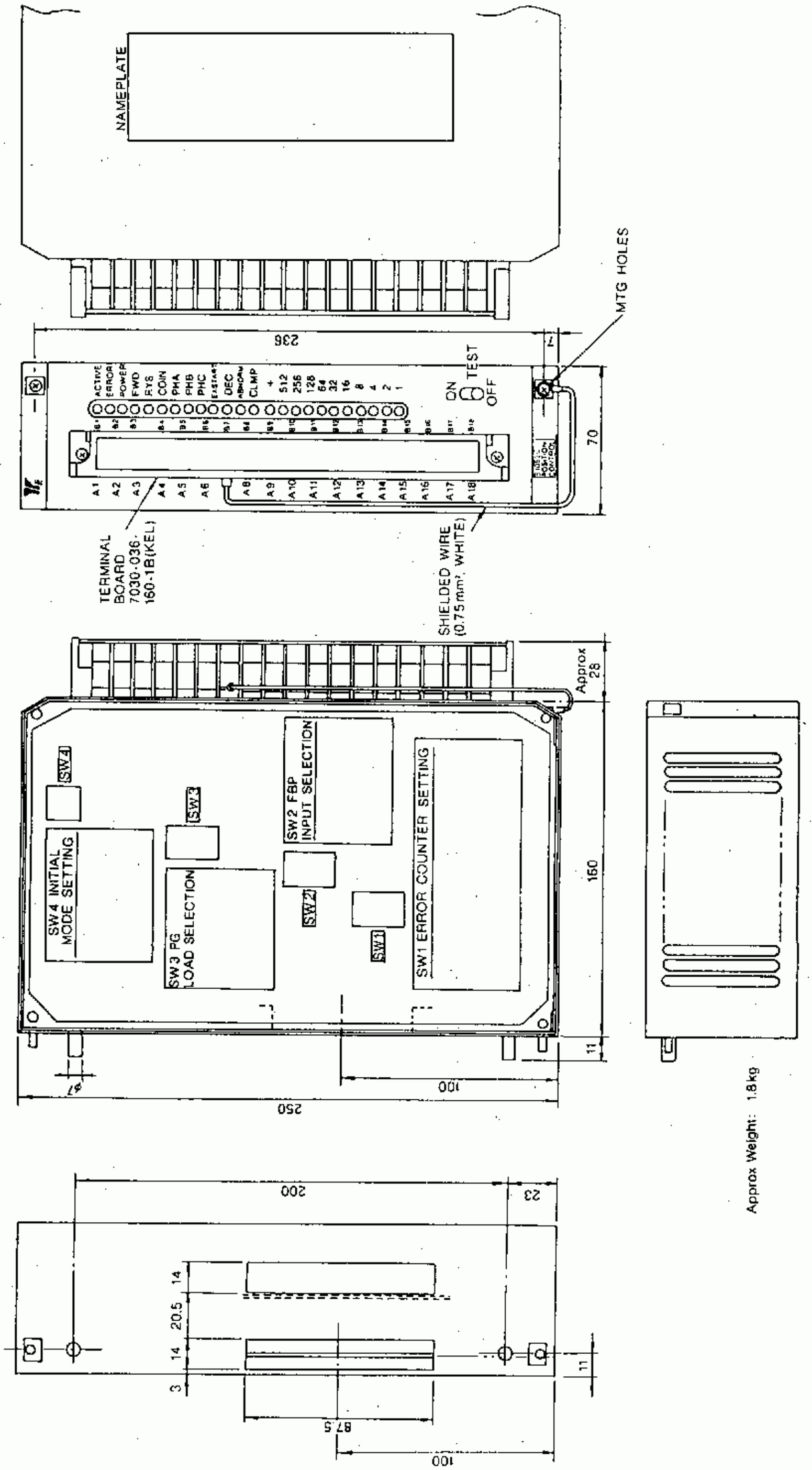


Fig. 11 Dimensions of Positioning Module in mm

Memocon™*-SC* R84H, U84, U84J, 584

POSITIONING MODULES 1000 SERIES TYPE JAMSC-B1083C

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