CONTENTS

INTRODUCTION

This manual outlines the maintenance procedures for using the MELDAS AC servo system. It details the methods involved in replacing the transistor amplifiers as well as the inspection locations and adjustments, and it should thus be read before operating the AC servo system. Refer to the checkpoints before switching on the power.

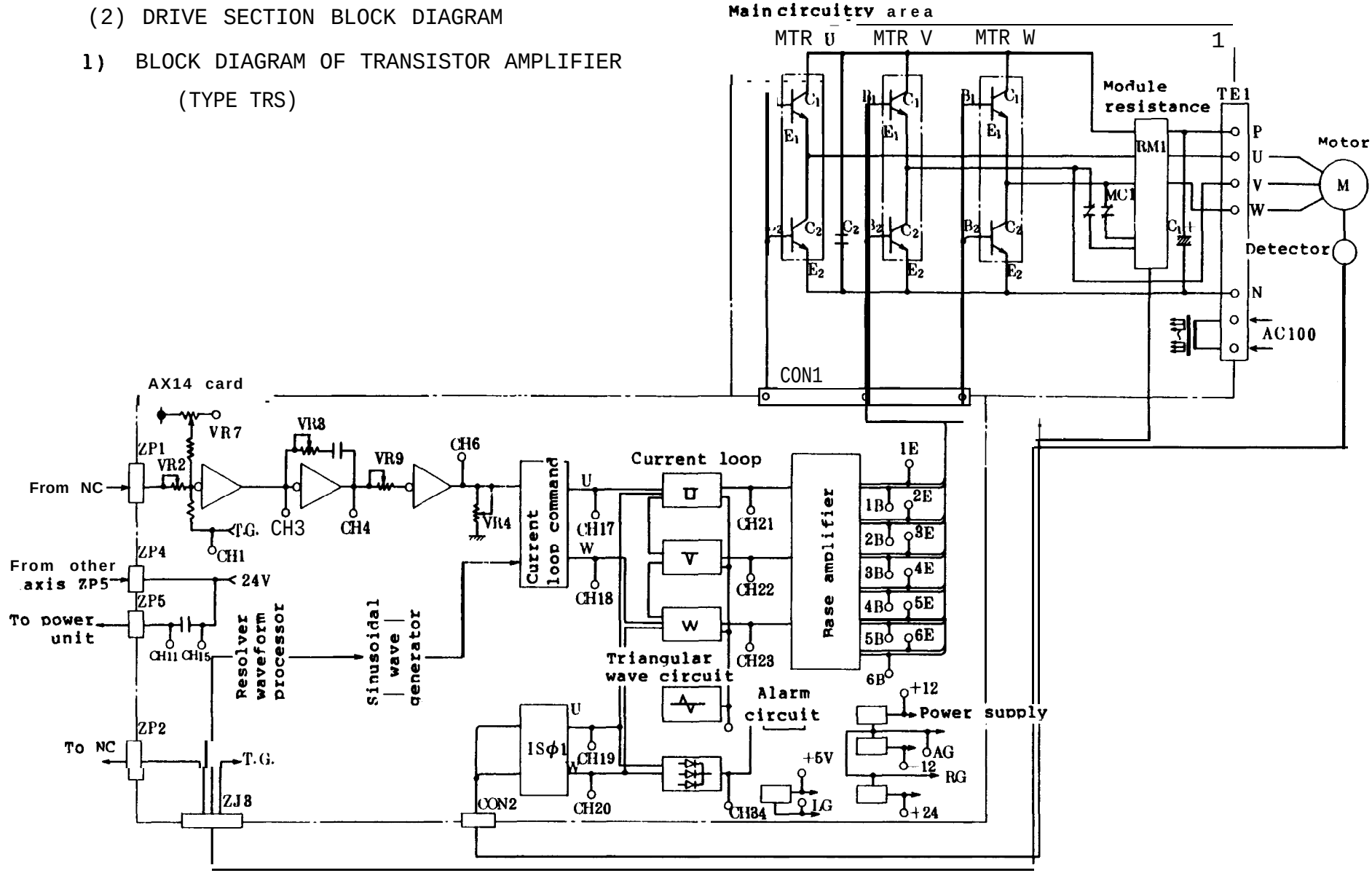
(1) SPECIFICATIONS

Item	TRS50	TRS75	TRS100	TRS150
Motor used	HA40/80	HA100	HA200	HA300
Continuous output current	20/30Arms	45Arms	66Arms	99Arms
Output torque (when used in combination with amplifier)	170/280 kg.cm	458 kg.cm	709 kg.cm	1036 kg.cm
Rated output voltage	155Vrms	155Vrms	155Vrms	155Vrms
Alarm circuits	Fin overheating protection (FOH), power unit alarm (PUAL), motor overloading (MOH), TG over-speeding (TGOV), over-current detection (OVC), instant over-current protection (OCP), no-signal detection (NSG), instant power failure compensation and under-voltage compensation (LVAL).			
Power supply	310V (DC) across P-N (With AC 220V factory power supply)			
Control loop	Current loop (sine wave approximation, PWM)/Speed loop			
Control characteristics	Speed control band: 500 rad/sec. Speed control range: 1:10,000			

(2) DRIVE SECTION BLOCK DIAGRAM

1) BLOCK DIAGRAM OF TRANSISTOR AMPLIFIER

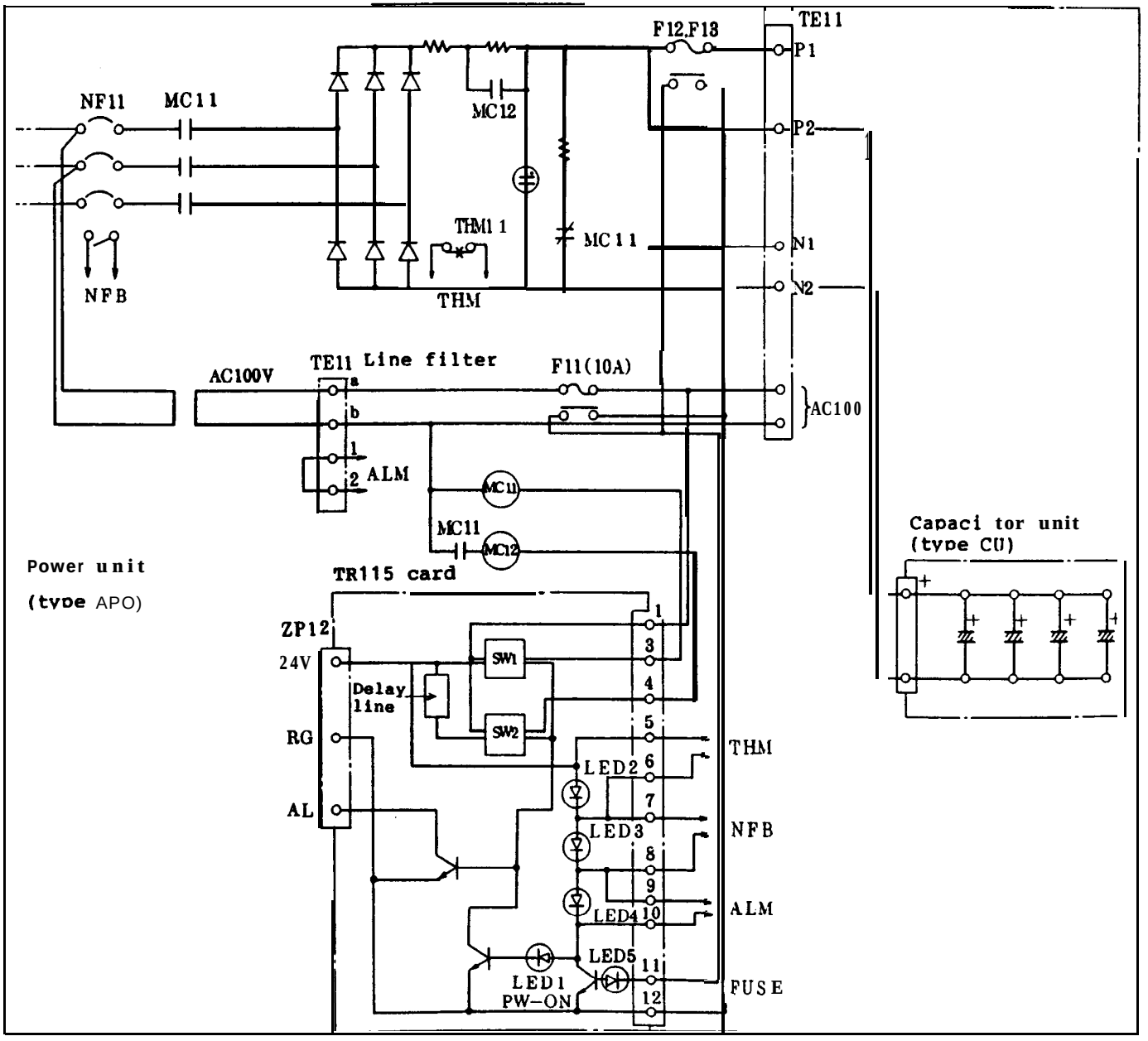
(TYPE TRS)



2) BLOCK DIAGRAM OF POWER UNIT

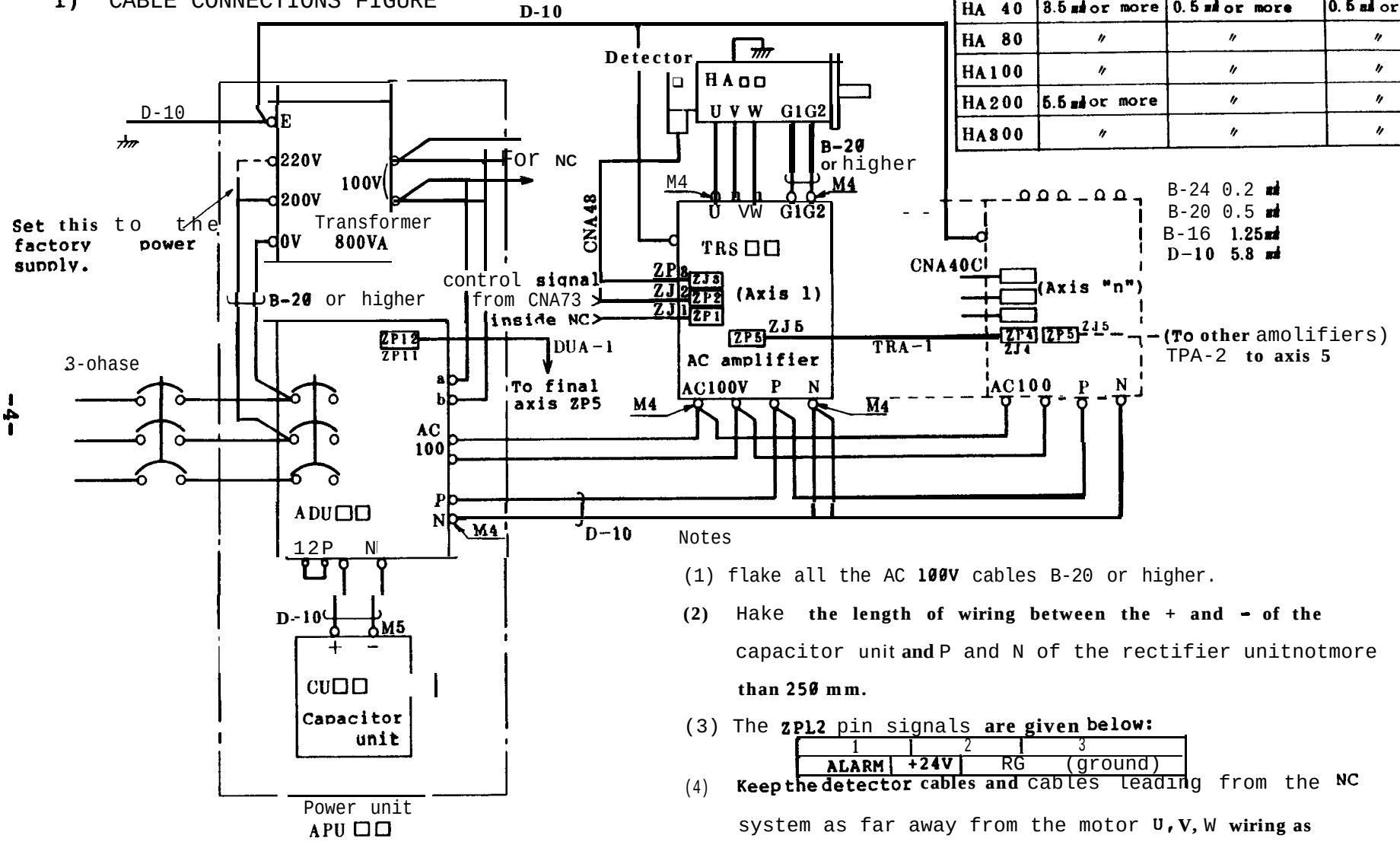
3-phase
AC200/220V
50/60Hz

Since transformers are not included in the power unit, the control unit and machine must be grounded.



(3) CABLES

1) CABLE CONNECTIONS FIGURE



Motor	Armature (UVW)	Thermostat (G1G2)	For brake drive
HA 40	3.5 ㎟ or more	0.5 ㎟ or more	0.5 ㎟ or more
HA 80	〃	〃	〃
HA100	〃	〃	〃
HA200	5.5 ㎟ or more	〃	〃
HA800	〃	〃	〃

B-24 0.2 ㎟
B-20 0.5 ㎟
B-16 1.25㎟
D-10 5.8 ㎟

Notes

(1) flake all the AC 100V cables B-20 or higher.

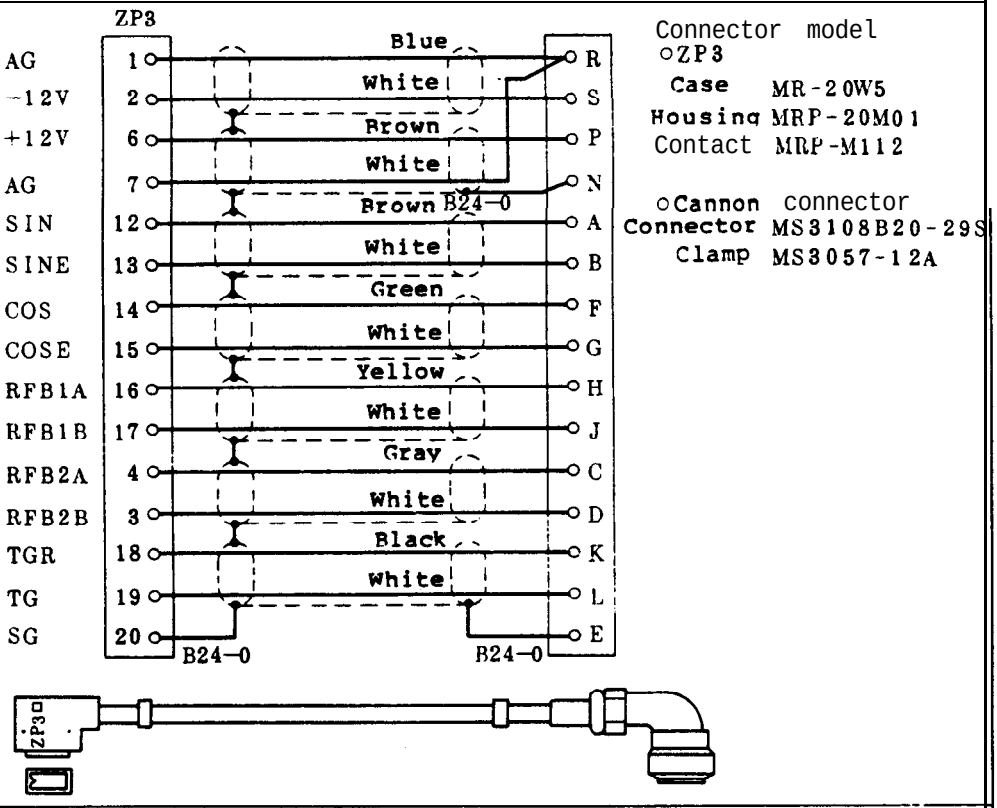
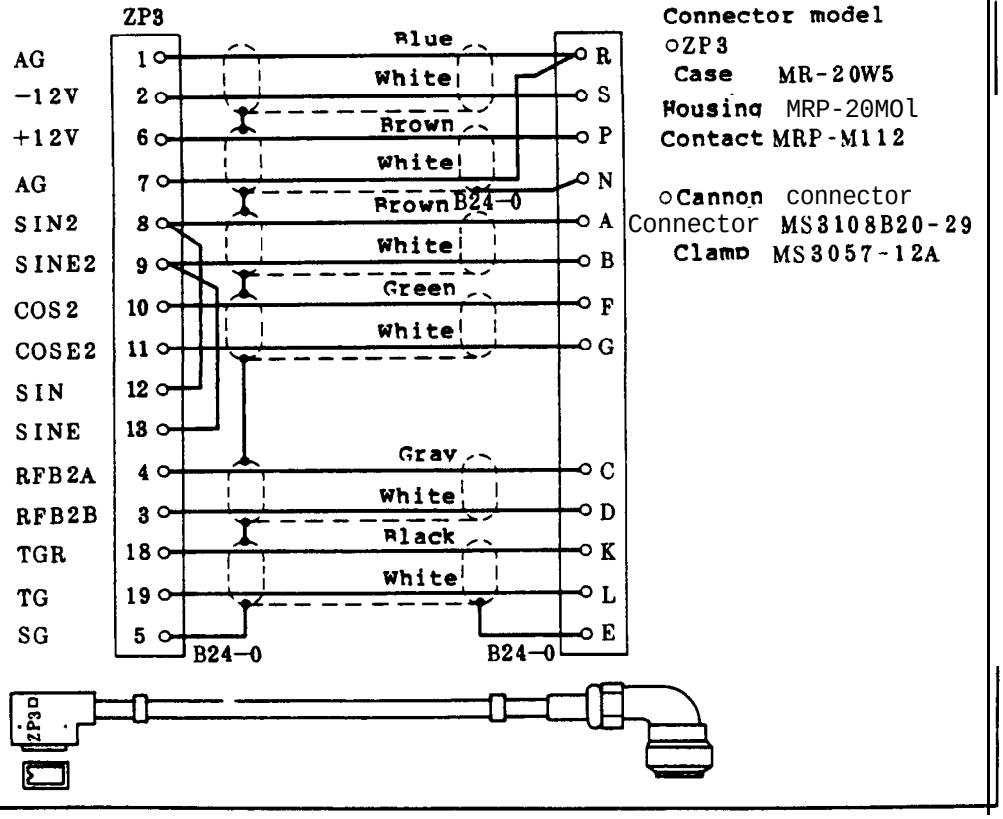
(2) Hake the length of wiring between the + and − of the capacitor unit and P and N of the rectifier unitnotmore than 250 mm.

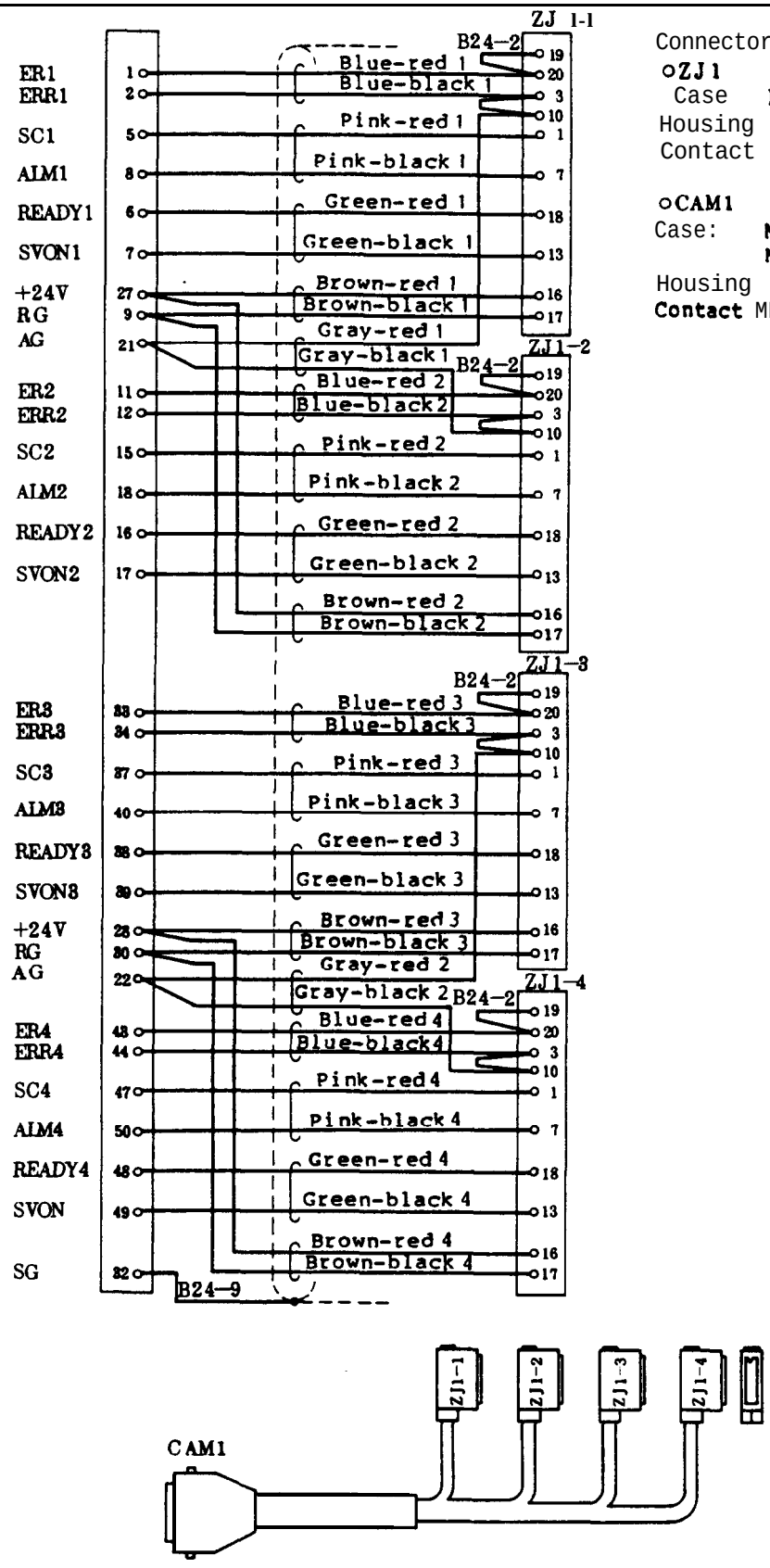
(3) The ZP12 pin signals are given below:

1	2	3
ALARM	+24V	RG (ground)

(4) Keep the detector cables and cables leading from the NC system as far away from the motor U, V, W wiring as possible.

2) CABLES

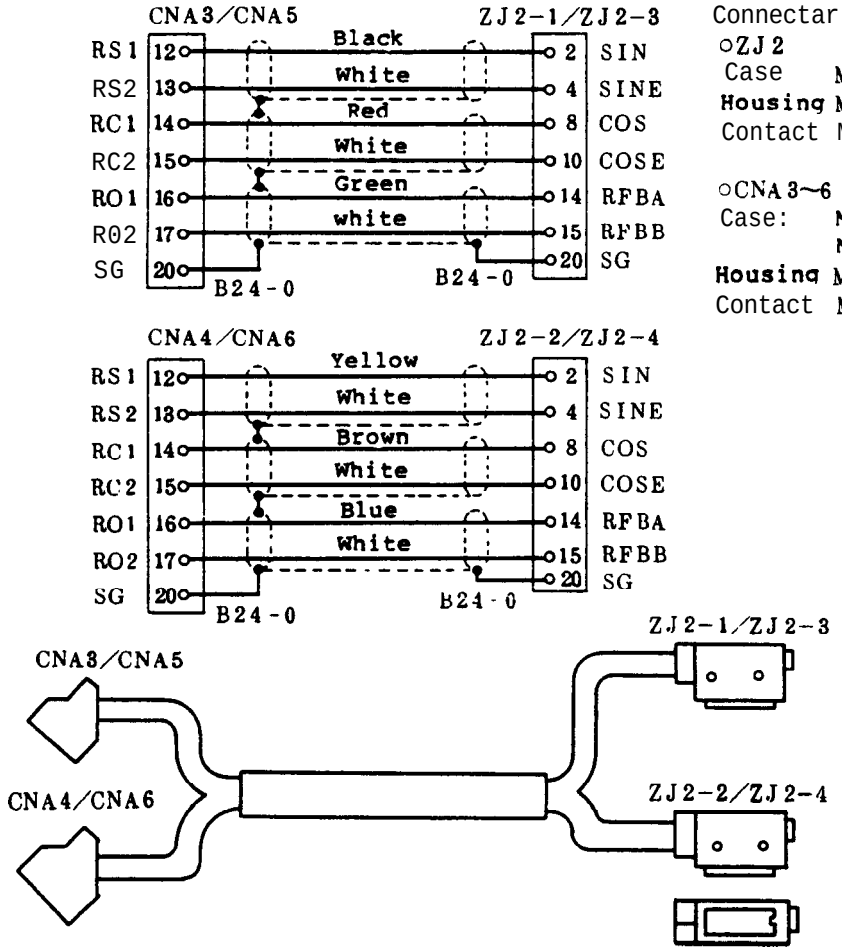
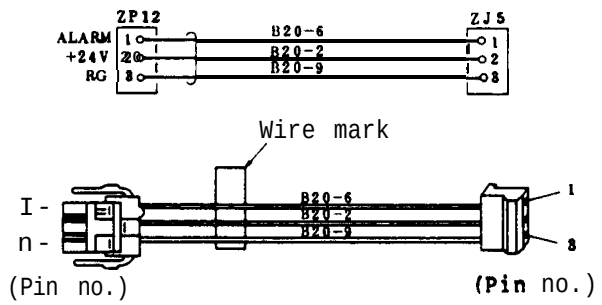
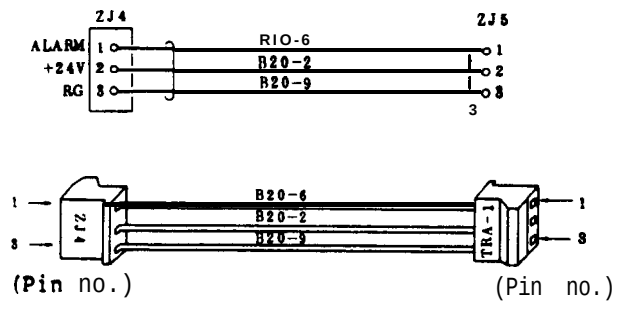
Cable name	Cable
CNA43-48 detector cables (for **ARST**)	
CNA53-58 detector cables (for **ATT**)	

Cable name	Cable
CA19-□ CNA73-□ (cable for control signals) between NC unit and amplifier	

Connector model

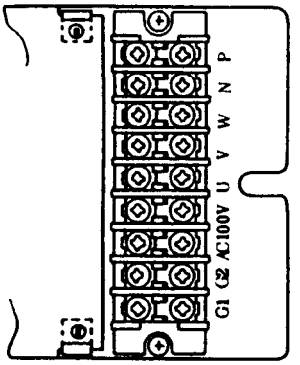
○ZJ1
Case MR-20W5
Housing MRP-20F01
Contact MRP-F112

○CAM1
Case: MR50L of MR-50W
Housing MRP-50F01
Contact MRP-F112

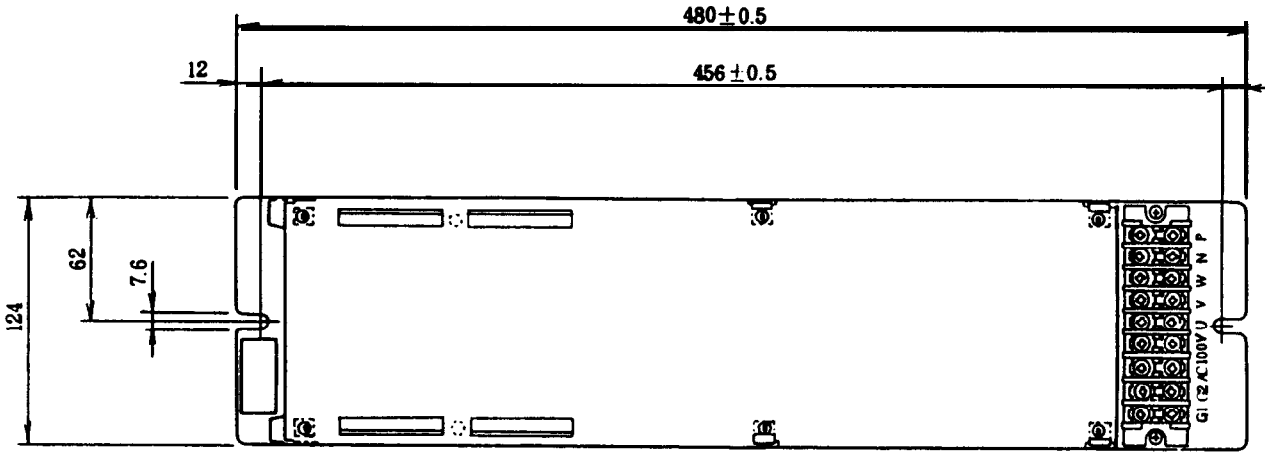
Cable name	Cable
CNA83-□ (cable for resolver signal) between NC unit and amplifier	 Connectar model ○ZJ2 Case MR-20W5 Housing MRP-20F01 Contact MRP-F112 ○CNA3~6 Case: MR-20L or MR-20W Housing MRP-20F01 Contact MRP-F112
DUA-1 'Dower unit ontrol cable)	 Connector model ○ZJ5 Housing 5258-034 Contact 5 16 7P BT ○ZP12 Housing l-350355-9 Contact 350019-2
TRA-1 power unit ontrol cable)	 Connector model ○ZJ4·ZJ5 Housing 5258-034 Contact 5 16 7PBT

(4) OUTLINE DRAWINGS

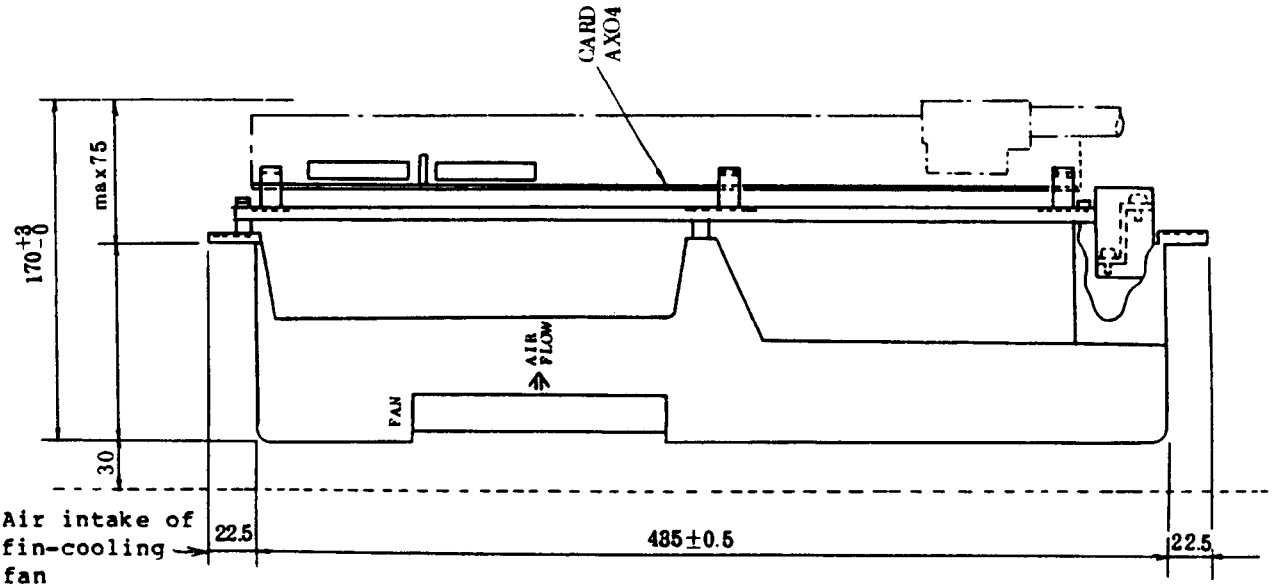
1) TRANSISTOR AMPLIFIER



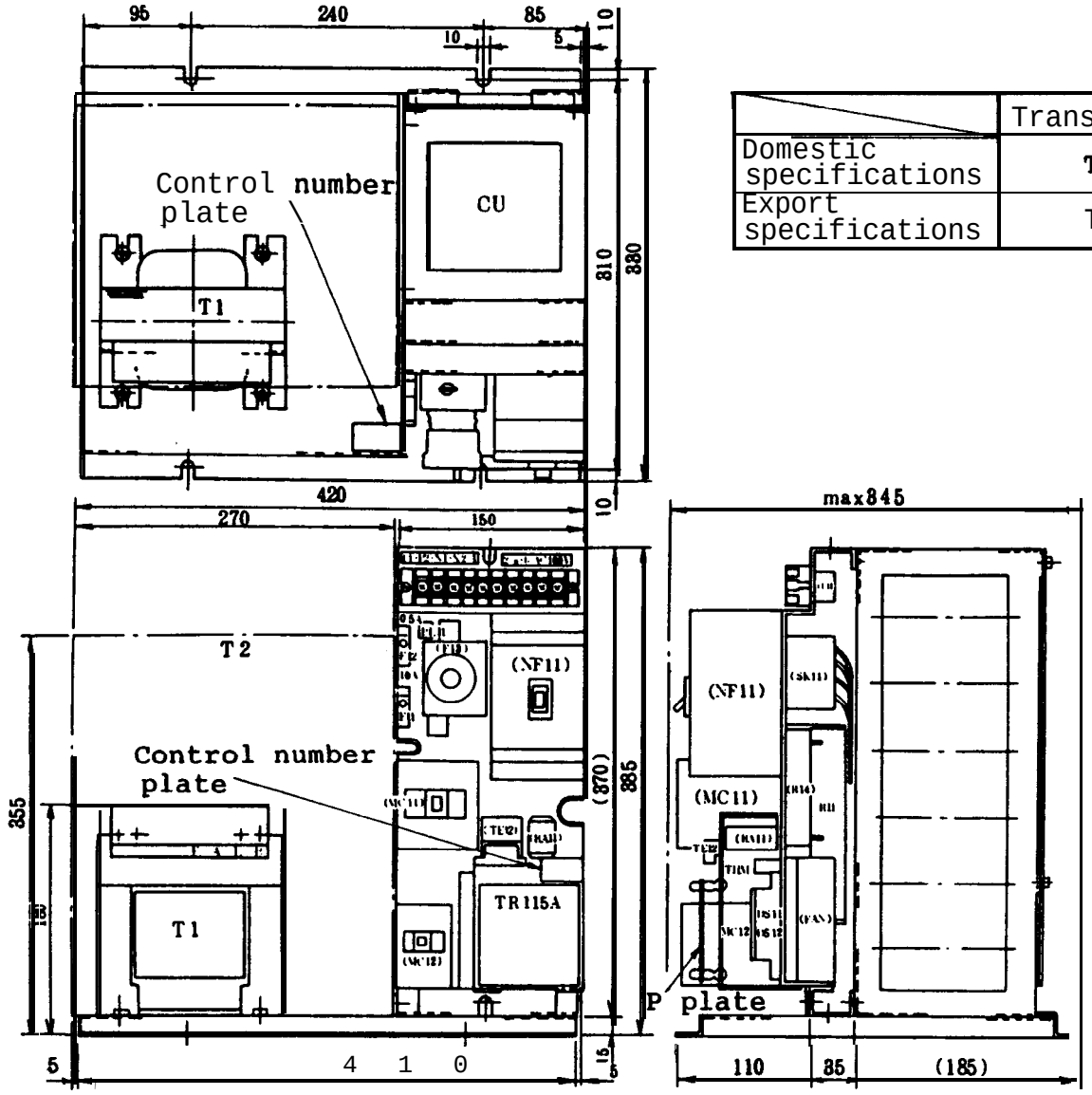
Note 1: Fin-cooling fans are not provided on the TRS50 or TRS75.



Block diagram of transistor amplifier



2) POWER UNIT

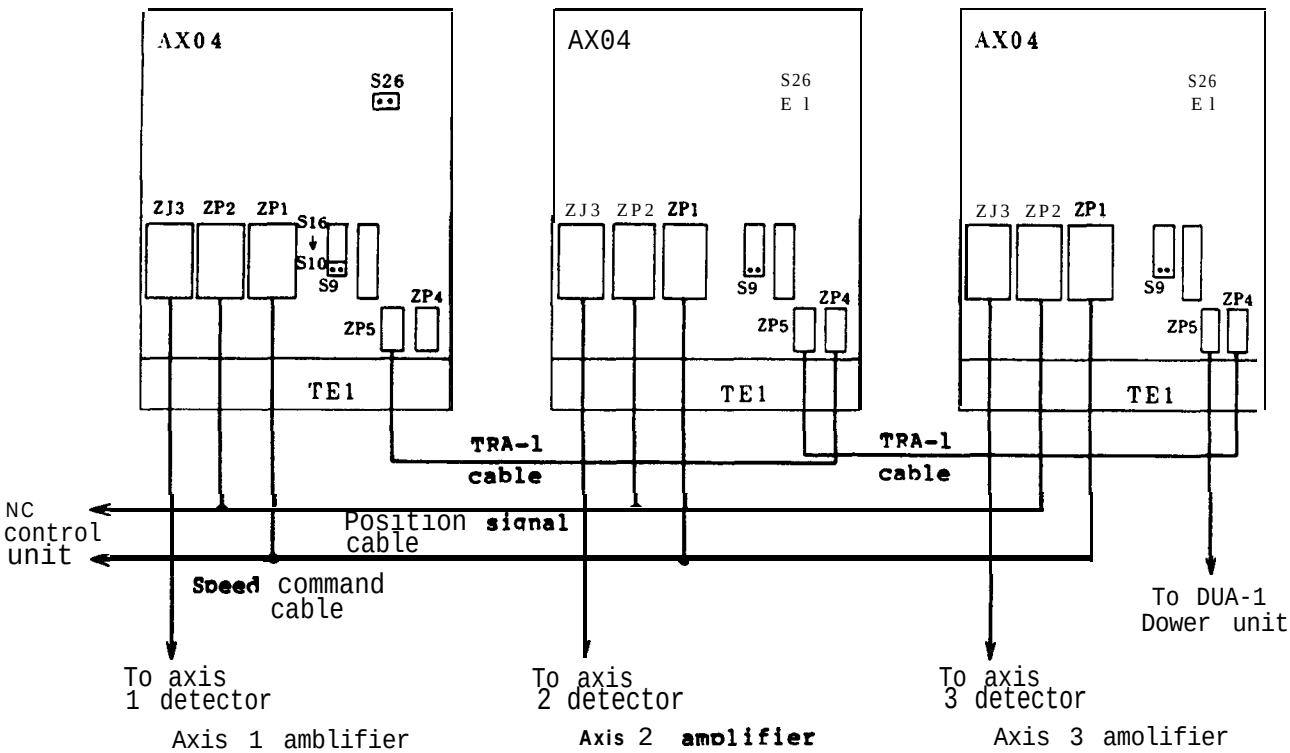


	Transformer	Unit
Domestic specifications	T1	APU15, 30, 70, 72
Export specifications	T2	APU 15-M, 30-M, 70-M, 72-M

Outline drawing of power unit

(5) REPLACING AND HANDLING THE TRANSISTOR AMPLIFIER

1) TRANSISTOR AMPLIFIER CONNECTIONS



(Terminal block **TE1** is connected with the drive motor. The unit proper can be mounted onto a rack with the two setscrews.)

(a) Insert all triangular wave setting plugs S26.

(b) The dither is not normally used. However, when it is used, plugs **S11** and S13 should be inserted.

(c) Connect the DUA-1 cable to **ZP5** on the final axis.

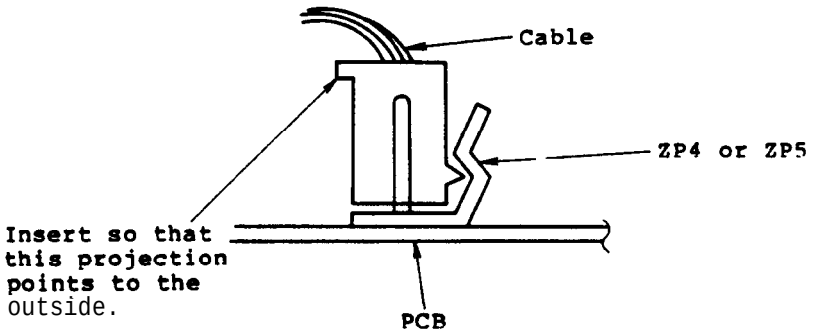
(d) Connect **the TRA-1 cable** from **ZP5** onthehead axis to **ZP4** of

the next axis.

(e) Perform step (d) for each of the axes involved.

(f) Keep the S9 setting plug inserted for the head axis only; remove the plugs for all other axes.

(g) How to insert the TRA-1 and DUA-1 cables



Notes:

(1) Setting plugs and the adjustable variable resistors (VRs) are located on the control card and they should be adjusted when the unit is replaced.

(2) When check pins CHA, CHB, 1B-6B and 1E-6E are observed using a synchroscope, do not connect the other check pins and ground simultaneously.

(3) Ensurethatproper connection is made to P and N of the transistor amplifier, and be sure to connect only after confirming that there is no faulty or improper wiring.

(4) When the control loop is a closed loop, the ZP2 cable need not be connected.

2) CHECKPOINTS BEFORE SWITCHING ON POWER

	Item	Checkpoint
1	P, N connections	Check whether the power unit P/N, AC 'transistor amplifier P/N and capacitor unit P/N connections have been made properly.
2	Transformer tap selection	The transformer tap selection (200/220V) is made to the factory power supply. (800VA transformer)
3	Motor connections	Check that the motor has been connected properly: Transistor amplifier pin U ——— Motor armature U V ——— V W ——— W G1G2 G1G2 (No polarity for G1, G2)
4	Loop polarity check	When the motor is rotating clockwise as viewed from the load side, check that a (-) voltage is supplied to CH1.
5	Setting plug, VR settings	Check that the proper setting plug and VR settings have been made.

3) CHECKPOINTS

(1) Keep the detector mounted in the same position as when it was shipped; moving it will cause the control modes to undergo change.

(2) Do not touch the base amplifier at the top of the AX04 card because of its high voltage.

(3) Under no circumstances should the power unit be touched since the capacitor will be charged even if no power is actually flowing the unitwhenthelampis on.

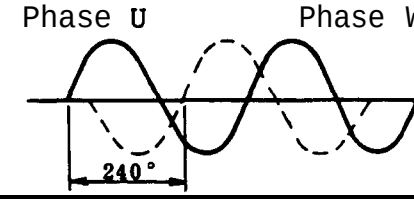
(4) The main circuitry area in the AC servo system is configured without transformers and so the machine system and control unit must be grounded.

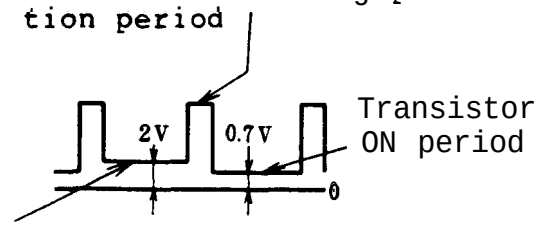
(5) Grounding

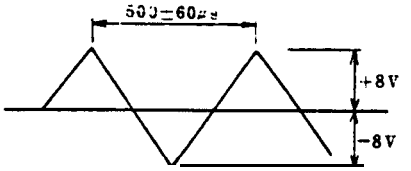
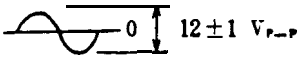
Since the OCP circuit is isolated from the other circuits, do not connect the OCP ground (CHB) and the ground AG/LG of the other circuits simultaneously with the synchroscope ground.

4) DESCRIPTION OF CHECK PINS

	Item	Check pin	Signal	Function
1	Control signal	CH7	Servo ON signal	Signal for checking servo ON/OFF. Servo OFF when low; ON when high.
		CH11	Power unit control signal	Pin for checking whether +24V is being supplied to power unit.
		CH15	"	"
2	Speed loop	CH1	TG feedback signal	Pin for checking TG signal. Output is 2V +/-10%/1000 rpm (ARST, ATT)
		CH3	Speed loop error	Indicates error between speed command signal and TG.
		CH4	"	Compensation circuit output
		CH5	Speed command	Check pin for when speed command is issued with VR1 by toggle switch ST1.
3	Current loop	CH6 CH32	Current command	Current loop command signals serving as torque commands.
		CH17	Current command (phase U)	Current command (sine wave) of current loop phase U. Waveform is as below: $V = Ei \sin\omega t$ Where Ei = CH6 voltage, $\sin \omega t$ = sine wave of 2 cycles per motor revolution. Note: Output is 0V when Ei or $\sin\omega t$ = 0

<table>
<tr><th></th><th>Item</th><th>Check pin</th><th>Signal</th><th>Function</th></tr>
<tr><td>3</td><td>Curren
loop</td><td>CH18</td><td>Current command (phase W)</td><td>Indicates same as above for phase W.</td></tr>
<tr><td></td><td></td><td>CH19</td><td>Current feedbac phase U</td><td>Indicates phase U current feedback signal.
Note: Detection resistance differs according to power unit. Output voltage with 1A current differs according to amplifier unit.
<table>
<tr><th>Amplifier</th><th>Detection resistor</th><th>Resistance</th><th>Voltage V/Arms</th></tr>
<tr><td>TRS 50</td><td>RMA-50</td><td>33mΩ</td><td>0.187V</td></tr>
<tr><td>TRS 75</td><td>RMA-75</td><td>20mΩ</td><td>0.113V</td></tr>
<tr><td>TRS100</td><td>RMA-100</td><td>15mΩ</td><td>0.085V</td></tr>
<tr><td>TRS150</td><td>RMA-150</td><td>10mΩ</td><td>0.057V</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>CH20</td><td>Current feedbac phase W</td><td>Indicates phase W current feedback signal. Same Note applies as for CH19. Phase is shifted 240 deg. from U.
 
</td></tr>
</table>

	Item	Check pin	Signal	Function
		CH21	Base amplifier control signal (phase U)	Signal which controls U phase transistors (upper transistors) Top/bottom transistor shorting prevention period 
		CH22	Base amplifier control signal (phase V)	Signal which controls V phase transistors.
		CH23	Base amplifier control signal (phase W)	Signal which controls W phase transistors.
4	Position loop	CH2	Error signal	For checking speed command signal output from NC system.
5	Power supply	CH31 CH33	Analog ground	Card AX04 analog ground
		+12	+12V	Card AX04 +12V power supply
		-12	-12v	Card AX04 -12V power supply
		+5	+5V	Card AX04 +5V power supply
		LG	Digital ground	Card AX04 digital ground

	Item	Check pin	Signal	Function
6	Dither	CH8 or CH12	Dither signal	For checking dither signal
7	Triangular wave	CH9 CH10 CH13 CH14	Triangular waveform	
8	Resolver	CH16	Resolver Eeedback	For adjusting amplitude of resolver feedback. Adjusted with VR10. 
		CH27	Resolver Eeedback	Signal produced by converting resolver feedback signal into digital signal.
		CH28	Resolver excitation	For checking resolver excitation (4.5kHz)
9	Clock	CH29	Clock signal	For checking clock signal (18MHz)
10	ovc	CH30	OVC circuit	Input signal of OVC circuit. Circuit is activated when input voltage falls below set value of OVC circuit.

Item	Check Signal pin		Function
10	ovc		This signal is produced by rectifying the **U,** V, W phase current and by converting the current from AC to DC. It can be used to check the response of the current loop at CH30. Note: CH30 current must be used with appropriate damping.  Insufficient damping　Appropriate damping　Excessive damping
	CH34	Load meter output signal	Used when measuring current at load meter output check pin. Refer to voltage and current measurement methods in **(6)-1)** for output voltage.

<table>
<tr><th></th><th>Item</th><th>Check pin</th><th>Signal</th><th>Function</th></tr>
<tr><td>1</td><td>OCP</td><td>CHA</td><td>OCP input</td><td>Input signal of OCP circuit.
Detection resistance differs according to amplifier and so output per 1A also varies.
<table>
<tr><th>Amplifier</th><th>Detection resistor</th><th>Resistance</th><th>Output voltage/1A</th></tr>
<tr><td>TRS50</td><td>RMA-50</td><td>31 mΩ</td><td>0.031 V</td></tr>
<tr><td>TRS75</td><td>RMA-75</td><td>20 mΩ</td><td>0.020 V</td></tr>
<tr><td>TRS100</td><td>RMA-100</td><td>12.5mΩ</td><td>0.0125V</td></tr>
<tr><td>TRS 150</td><td>RMA-150</td><td>3 mΩ</td><td>0.008 V</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>CHB</td><td>Ground</td><td>OCP circuit ground
Care is required since this ground is electrically insulated from AG/LG.
Therefore, connect the synchroscope ground to AG, LG and CHB simultaneously.</td></tr>
</table>

5) DESCRIPTION OF VRS

	Item	VR	Check pin	Signal	Function
1	Speed loop adjustment	VR1	CH5	Speed command input	VR for command when motor is driven by speed command. Switch ST1 is switched from P to V for use.
		VR3		Integral compensation	VR for adjusting integral compensation of speed loop. Response is increased when rotated clockwise.
		VR9		For servo rigidity	VR for servo rigidity which is increased when rotated clockwise. Servo system adjustments are usually done by VR3 and VR9.
2	Current loop	VR4	CH6	Current clamp setting	VR for adjusting current limit of current loop. Limit is increased when rotated clockwise.
		VR5 VR6		Current loop gain setting	VR for adjusting current loop gain. Set VR5 and VR6 to same gradation. These VRs should not be adjusted by customer.
3	Position loop	VR2		Position loop gain setting	VR for adjusting gain of position loop.

	Item	VR	Check	Signal	Function
		VR7		Offset adjustment	VR for adjusting position loop offset. Position deviation is made zero with this VR.
4	Resolver adjustments	VR 10	CH16	Amplitude adjustment	VR for adjusting amplitude of sine waves fed back from resolver. Adjust to 12 +/-1Vp-p.
		VR12	CH16	Amplitude fluctuation adjustment	VR for adjusting amplitude fluctuation of resolver feedback. Adjustment is made with motor driven.
		VR16	CH27 CH28	Phase adjustment	For adjusting phase of resolver feedback with respect to resolver excitation.
5	ovc adjustment	VR15			VR for setting operating point of OVC circuit.
6	Dither adjustment	VR8	CH6 CH31	Dither amplitude adjustment	Dither is used to eliminate effects of sticking or slipping (dither = 250Hz sine waves). Normally VR is kept at MIN setting.

Note:

VR11, VR13, VR14 and VR16 are adjusted by Mitsubishi and should not be touched by the customer.

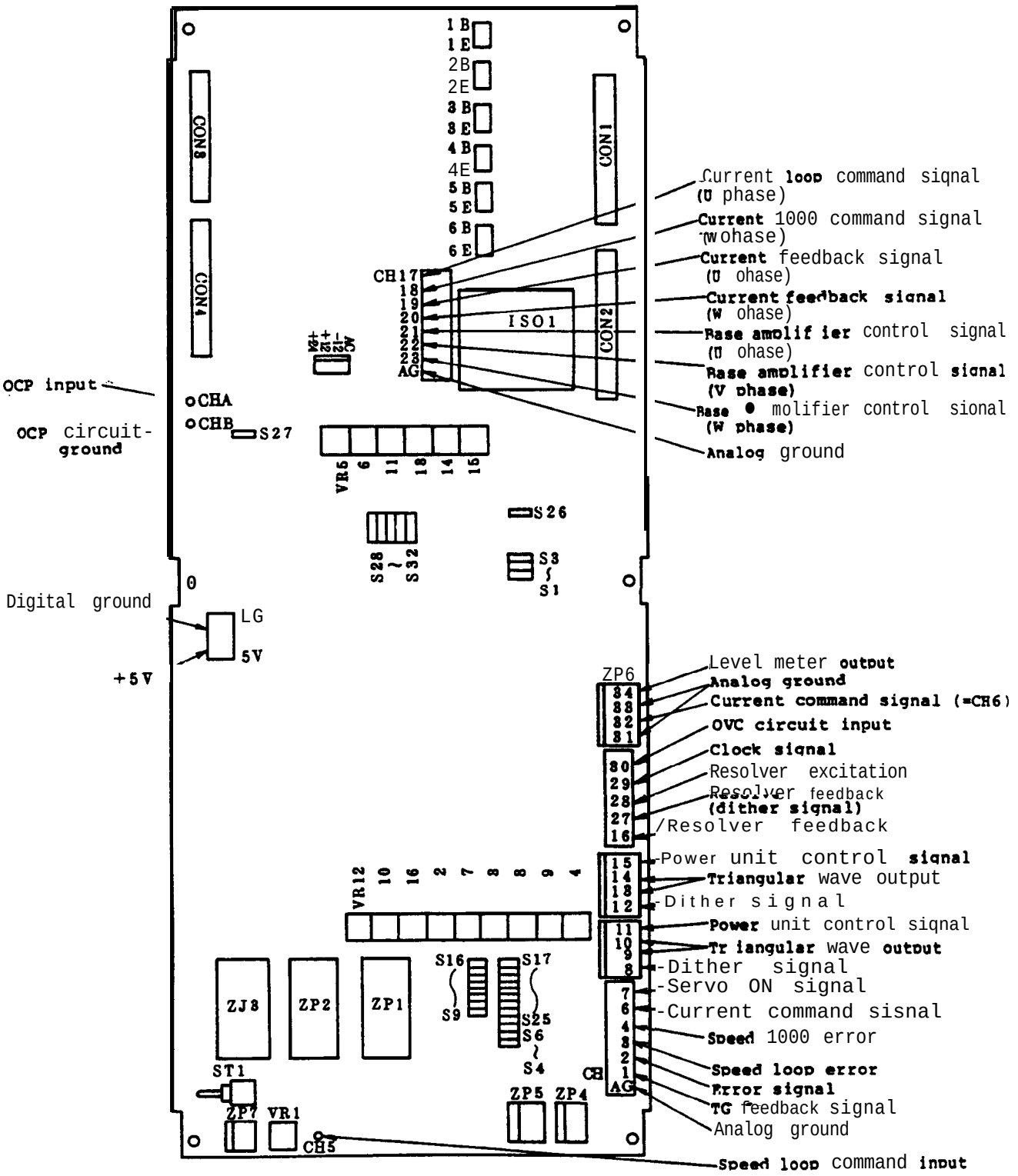
6) DESCRIPTION OF PLUGS

	Item	Plug	Function
1	Initial settings	s4	Normally inserted for external emergency stop uses. Removed when emergency stop is to be operated externally.
		S9	Set when supplying +24V to power unit.
		S10	When removed for error correction, errors can be corrected by NC with servo OFF.
		S24	For alarm; high-level signal is output to NC system when alarm state occurs.
		S25	For alarm; low-level signal is output to NC system when alarm state occurs.
		S1	Inserted when resolver feedback polarity is reverse of that of magnetic pole.
		s2	For changeover of load meter output level, usually used when plug is inserted.
		s3	For changeover of load meter output level, and the output increases when the plug is inserted during set S2 is short-circuited.
2	Speed loop operation	S6	Plug for short-circuiting capacitor in compensation circuit
		S12	Used when selecting non-linear gain. Gain is reduced with plug inserted.
		s21	Used when inserting non-linear circuit into speed loop compensation circuit for turret punch press.
		s22	Plug for inserting high resistance at either end of capacitor in compensation circuit.

	Item	Plug	Function
		S23	Plug to add capacitor in compensation circuit
3	Position loop	s14	Insert plug when selecting 22 kΩ input resistor of operational amplifier.
		S15	Insert plug when selecting 100 kΩ input resistor of operational amplifier.
		S16	Insert plug when selecting 200 kΩ input resistor of operational amplifier.
4	Resolver	S17	For adjusting resolver (for magnetic pole position) feedback amplitude.
		S18	For canceling resolver feedback no-signal detection.
5	Closed loop	S19 S20	Used when exciting resolver from amplifier with closed-loop operation.
6	Dither circuit	S11	Used when dither signal is inserted into control circuit for dither circuit connection.
		S13	Used when oscillating dither circuit.
7	ovc	S29	Used for OVC timer selection: timer time is reduced by inserting plug.
8	Triangular wave	S26	Used for triangular wave connection; normally inserted for use; removed when making triangular waves common between cards.

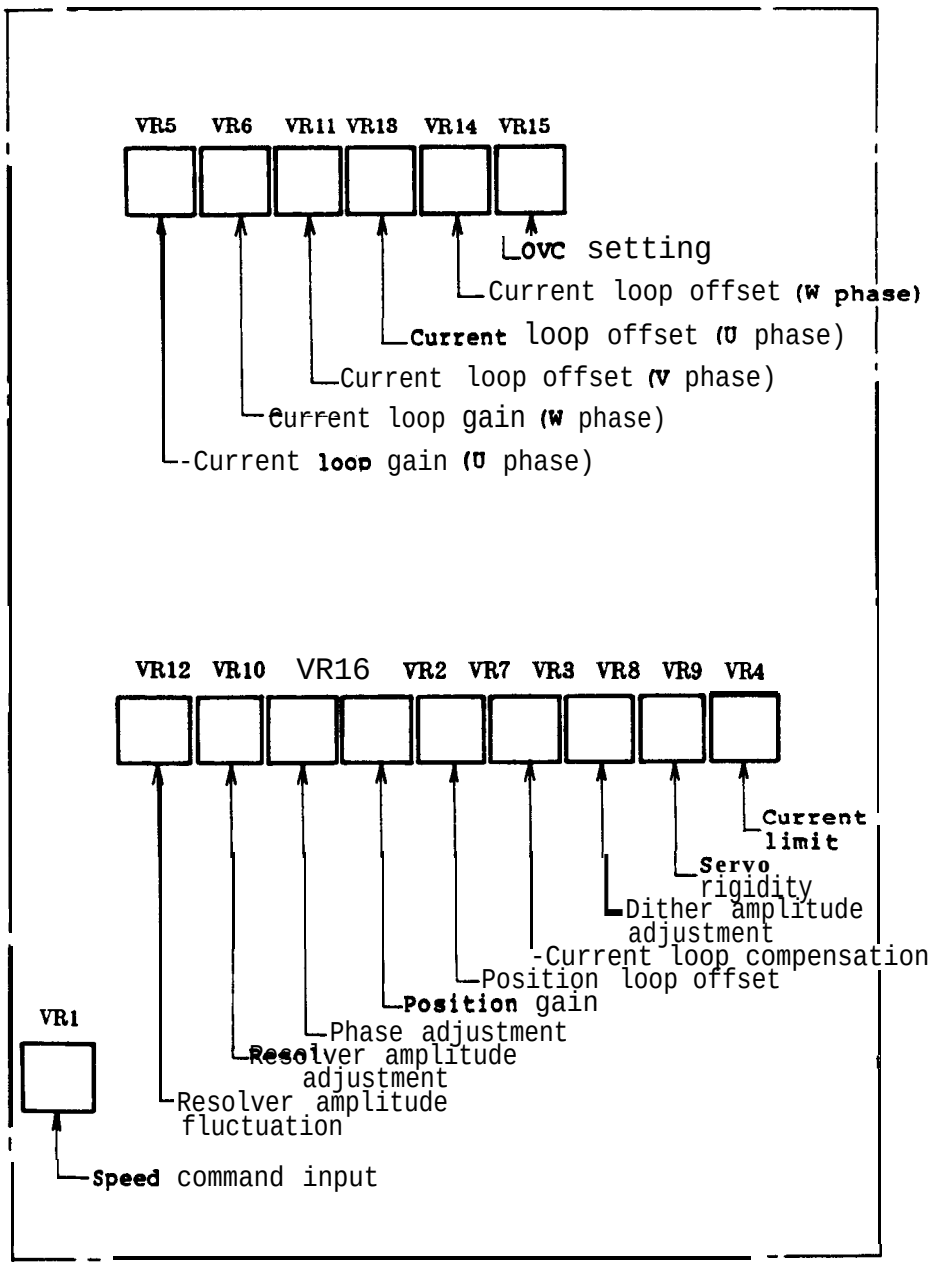
	Item	Plug	Function
9	TGOV	S30	Used for switching TGOV level; 3000 rpm specification applies when plug is inserted.
10	HA40 operation	S5	Used for HA40; torque command falls by inserting plug.
		S27	Used for selecting OCP operating level; plug is inserted when HA40 is used.
		S28	Used for selecting OVC comparison level; plug is inserted when HA40 is used.

7) CONNECTOR AND CHECK PIN LAYOUT



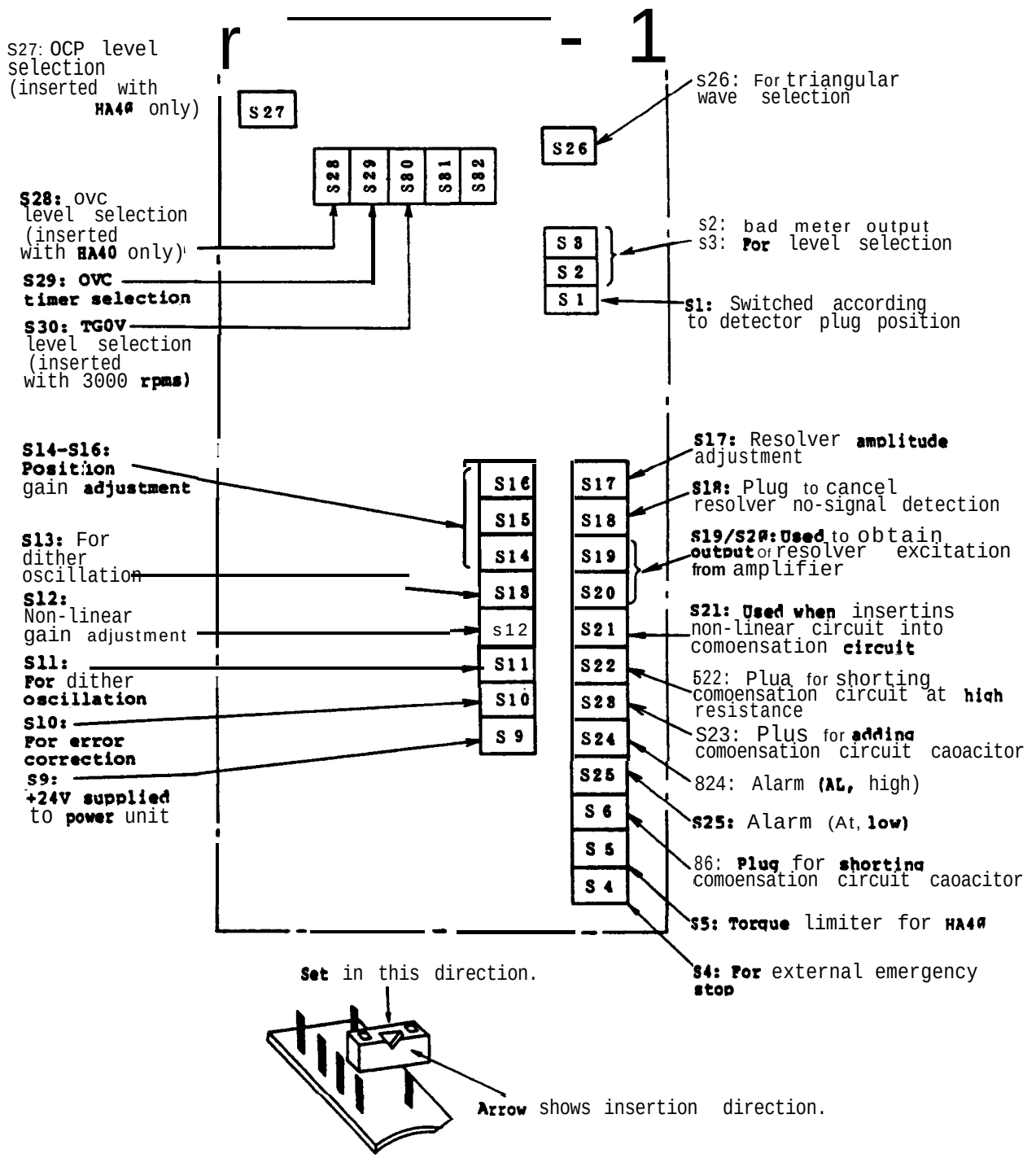
8) VR LAYOUT

Re-adjustment of these VRs is not necessary since they have already been set to the specifications of the machine builder when the unit was shipped from the manufacturing plant.



9) SETTING PLUG LAYOUT

Re-adjustment of these plugs is not necessary since they have already been set to the specifications of the machine builder when the unit was shipped from the manufacturing plant.

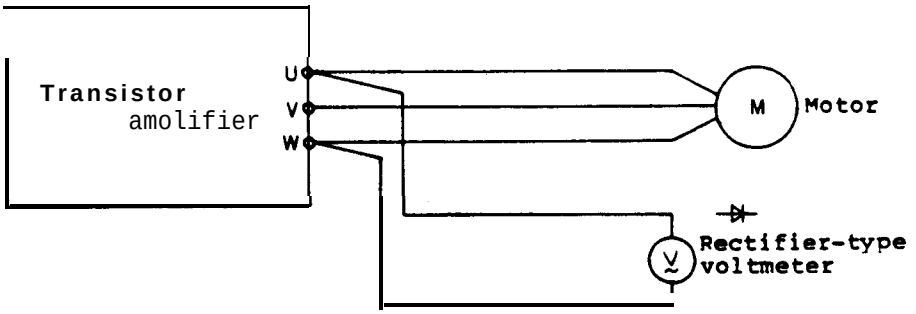


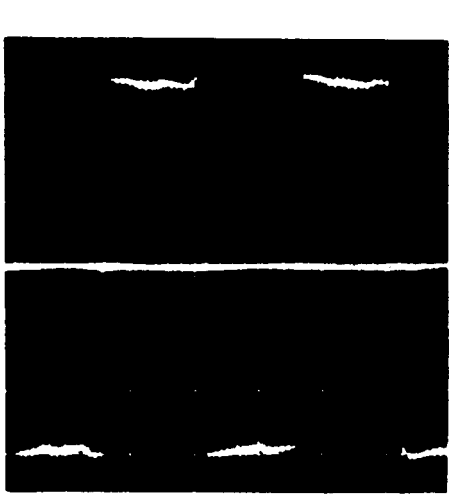
(6) INSPECTION AND ADJUSTMENT METHODS

1) HOW TO MEASURE THE VOLTAGES AND CURRENTS

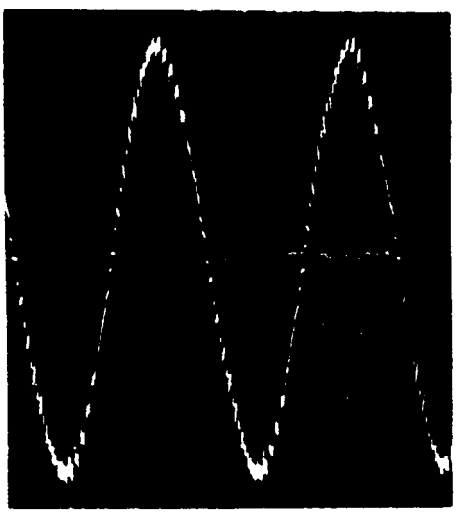
1. Motor voltage measurement

Since the voltage output from the transistor amplifier to the motor is PWM-controlled, it appears in the form of pulsive waveforms. The value of the voltage indicated may differ greatly depending on the type of measuring instrument used. To measure, first attach the filter shown below and then use a rectifier-type voltmeter.





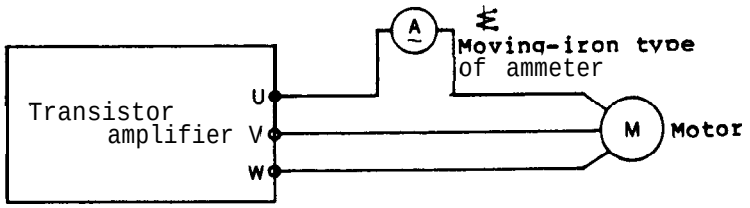
(Waveform before filter is attached)



(Waveform after filter has been attached)

2. Motor current measurement

(i) Due to the reactance of the motor, the current is somewhat smoothed from pulsive waveforms into sine waves. Therefore, connect a moving-iron type of ammeter for measurement.



(ii) Besides the method outlined in (i), the motor current can be measured by the voltage of CH34-AG on card AX04.

The output (DC output) is a result of 3-phase half-wave-rectifying the actual current. The table below shows the relationship between the actual current and voltage.

The output voltage differs according to the amplifier and the setting plug.

o When S2 is open

Transistor amplifier	CH34 voltage V/Arms
TRS50	0.190V
TRS75	0.115V
TRS100	0.085V
TRS150	0.057V

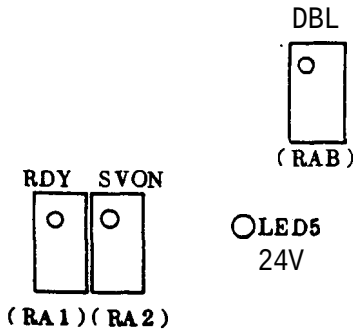
o When S2 is shorted

Transistor amplifier	Setting plug s3	CH34 voltage V/Arms
TRS50	o	0.060V
		0.024V
TRS75		0.015V
TRS100		0.011V
TRS150		0.0072V

o denotes shorted.

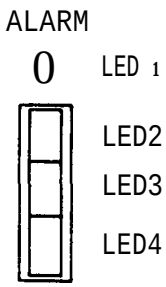
2) TRANSISTOR AMPLIFIER INSPECTION

a) Operating display lamps



Lamp	Function	LED
RDY (RA1)	For checking NC READY status	Lights with READY ON.
SVON (RA2)	For checking whether servo is ON or OFF.	Lights with servo ON.
DBL (RAB)	For checking dynamic brake operation.	Lights when brake is OFF.
24V (LED5)	Lights when start signal is is issued from NC system.	Lights when power is ON.

b) Alarm displays



ALARM CODE	LED	LVAL	OCP	OVC	TGOV	NSG	PUAL	FOH	MOH
	1	○	○	○	○	○	○	○	○
	2	○		○		○		○	
	3	○	○			○	○		
	4	○	○	○	○				

"O" LED lights

The alarms are detailed below:

1 Instantaneous power failure compensation/under-voltage compensation **(LVAL)**

The circuitry is protected when the supply voltage is instantaneously cut off or when the voltage drops to an abnormally low level.

2 Instantaneous overcurrent detection (OCP)

The transistors are protected when an overcurrent momentarily flows to the transistors in the circuitry.

3 Overcurrent detection (OVC)

This protection circuit functions when an overcurrent has flowed to main circuitry for more than a fixed period of time.

4 Overspeed (TGOV)

The motor is protected when the motor speed exceeds its rating due to a malfunction.

5 No-signal detection (NSG)

This alarm functions when the signals are no longer fed back from the resolver to the transistor amplifier. (This is for detecting the magnetic pole position.)

6 Power unit alarm (PUAL)

Power unit alarm display.

Refer to the section on INSPECTION OF POWER UNIT for further details of the alarm.

7 Fin overheating (F.OH)

Protection is provided when an overcurrent flows to the circuitry and the fin mounted on transistors overheats.

8 Motor overload (M.OH)

Protection is provided when motor is overloaded and it overheats.

c) REMEDIES FOR ALARMS

1) LVAL

(1) Measure the AC 100V voltage of the amplifier terminal block using a multimeter or synchroscope. Rating: 85-110V.

(2) When there is nothing unusual with the voltage, the trouble may be an instantaneous power failure. Check the AC 100V and AC 200V wiring connections.

2) OCP

(1) Check using a multimeter whether the power transistors have been damaged. Disconnect the wires and measure across the collector and emitter of the transistors. When nothing is wrong, the resistance is at infinity.

(2) Check whether the connections inside the amplifier have been made improperly and whether any screws are loose.

3) OVC

(1) Check whether a higher current than the rating is flowing to the motor.

(2) Check that the AX04 card settings have been made properly.

4) TGOV

(1) Check that the AX04 card settings have been made properly.

(2) Check that the TG voltage is **0V** while the motor has stopped.

5) NSG

(1) Use a synchroscope to measure whether the resolver feedback voltage is **12V.**

(2) When the voltage is **0V,** check the cables and connectors.

(3) When the voltage is lower, **use VR10** to adjusttheCH16 voltage to **12Vp-p.**

6) PUAL

(1) Check out the power unit.

(2) Refer to page 36 for the alarm displays

7) FOH

(1) Check that none of the amplifier's power transistors have been damaged.

(2) Check if any units other than the power transistors are generating heat.

8) MOH

(1) Check whether the motor is generating heat and measure the armature current. If the current is high, check whether the proper motor has been selected.

(2) If the motor is not hot, disconnect Gland G2 on the amplifier's terminal block and use a multimeter to check whether power is still flowing or not. When everything is in order, the resistance is zero.

3) **POWER UNIT INSPECTION**

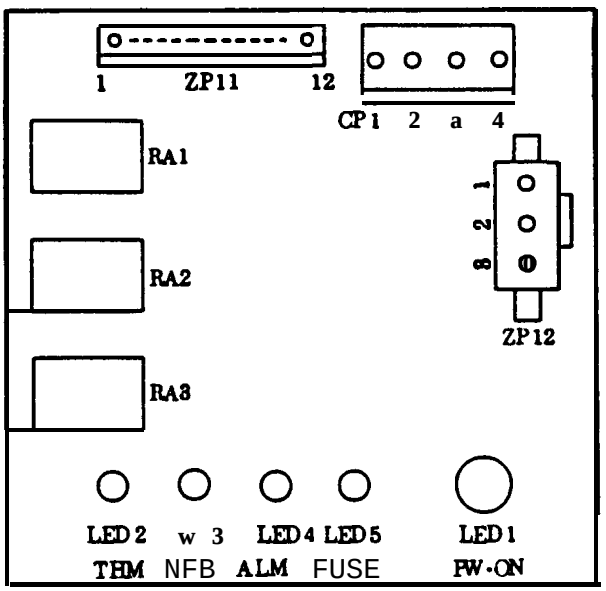
1) Power unit operation status displays and alarm display lamps (TR115A control card)

	Name	Lamp	Description of display
)p- :rat- ing sta- tus	Pilot lamp	PL11	Lights when DC voltage of rectifier unit is approx. 80V; off when approx. 40-50V. Do NOT touch since capacitor is still charged while lamp is lighted even if no power is being supplied.
	PW. ON	LED1 (green)	Lights when +24V is supplied by DUC-1 cable (ZP12 connector) from transistor amplifier.
Al- arm sta- tus	THM	LED2 (red)	Lights when temperature of rectifier diode exceeds prescribed temperature. Alarm for all axes.
	NFB	LED3 (red)	Lights when no-fuse breaker of rectifier unit is tripped or when it goes OFF. Alarm for all axes.
	ALM	LED4 (red)	When multi-tap transformer or RU unit is installed, the RU unit will be an alarm or when transformer thermal is operated this will be an alarm. Alarm for all axes.
	FUSE	LED5 (red)	Lights when the AC100V fuse or the fuse in the power unit output (P) breaks. Alarm for all axes.

2) Description of power unit check pins

Check pin	Signal	Description of signal
CP1	+24V	DC +24V is output at same time as +24V is supplied from NC system to amplifier. At this time, LED1 (green) lights.
CP2	RG	CP1-CP4 ground
CP3	AL	Low-level signal (normally open) when alarm occurs inside power unit. At this time, one of the lamps from LED2 to LED5 will light.
CP4	CR	Signal which observes time constant of soft-start circuit. Activates contactor sequence.

3) Power unit card



Control card (TR-115)

4) POSITION LOOP OFFSET AND DROOP ADJUSTMENTS

Item	Adjustment	Remarks
Offset adjustaent	1 Display screen 5 with ALARM/DIAGNOSIS control at NC side. (With M0) 2 Check that NC READY signal appears. 3 Adjust VR7 on AC transistor amplifier and set POSITION DROOP to +/-2.	
2 Droop adjustment	1 Display screen 5 with ALARM/DIAGNOSIS control at NC side. 2 Check that detector being used and name of detector on screen tally. 3 Check that TAU and LINEAR ZONE are correct. 4 Calculate position droop from formula below: $\frac{\text{Feedrate (mm/min)}}{60} \times 1 \times \frac{2}{\text{gain}}$ Feedrate is F1000 (approx. 100 rpm motor speed) 5 Feed axis 1 so that position droop is made (+) and use VR2 on AC transistor amplifier to adjust to position droop in (4).	Remember that this differs from machine's (+)(-) directions.

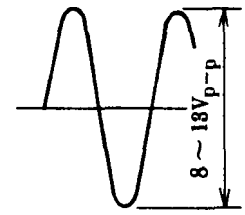
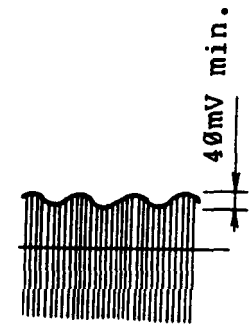
	Item	Adjustment	Remarks
		6 Feed other axes so that position droop is made (+) and adjust to within +/-1% of droop adjusted in (5).	

4) POSITION LOOP OFFSET AND DROOP ADJUSTMENTS

	Item	Adjustment	Remarks
	Offset adjust-ment	1 Display screen 5 with ALARM/DIAGNOSIS control at NC side. (With M0) 2 Check that NC READY signal appears. 3 Adjust VR7 on AC transistor ampli-fier and set POSITION DROOP to +/-2.	
2	Droop adjust-nent	1 Display screen 5 with ALARM/DIAGNOSIS control at NC side. 2 Check that detector being used and name of detector on screen tally. 3 Check that TAU and LINEAR ZONE are correct. 4 Calculate position droop from formula below: $\frac{\text{Feedrate (mm/min)}}{60} \times 1 \times \frac{2}{\text{gain}}$ Feedrate is F1000 (approx. 100 rpm motor speed) 5 Feed axis 1 so that position droop is made (+) and use VR2 on AC transistor amplifier to adjust to position droop in (4).	Remember that this differs from machine's (+) (-) direc-tions.

	Item	Adjustment	Remarks
		6 Feed other axes so that position droop is made (+) and adjust to within +/-1% of droop adjusted in (5).	

5) RESOLVER FEEDBACK ADJUSTMENT

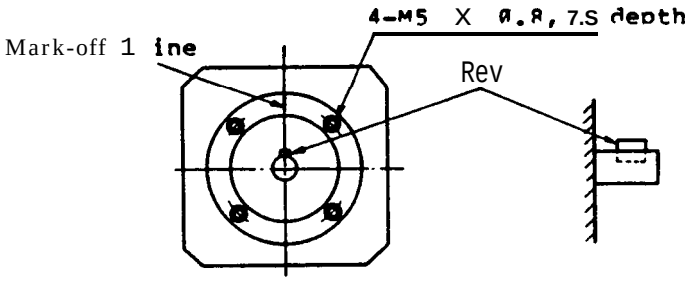
Item	Adjustment	Remarks
Feed-back voltage check	1 Measure check pin TP1 on GX96 card using synchroscope. (M-L0, M0) 2 Voltage should range from 8Vp-p to 13Vp-p. Short-circuit S5 if higher than 13Vp-p.	
Ampli-tude fluctua-tion adjust-ment	1 Obtain highest and lowest points of waveform at check pin TP1, set volt-age range to 0.2V/DIV and set time base to 0.1-0.2 sec/DIV. 2 Drive machine at 3-4 m/min and ad-just VR1 and VR2 so that amplitude fluctuation is made less than 40 mVp-p. (GX96 card) 3 To set voltage range to 0.2V/DIV, use synchroscope ADD and shift with both channels 1 and 2.	

6) MOUNTING THE DETECTOR

The motor's magnetic pole position (magnet position) must be detected in the AC servo system. Therefore, the detector is mounted differently from that in a DC servo system. The method is shown below.

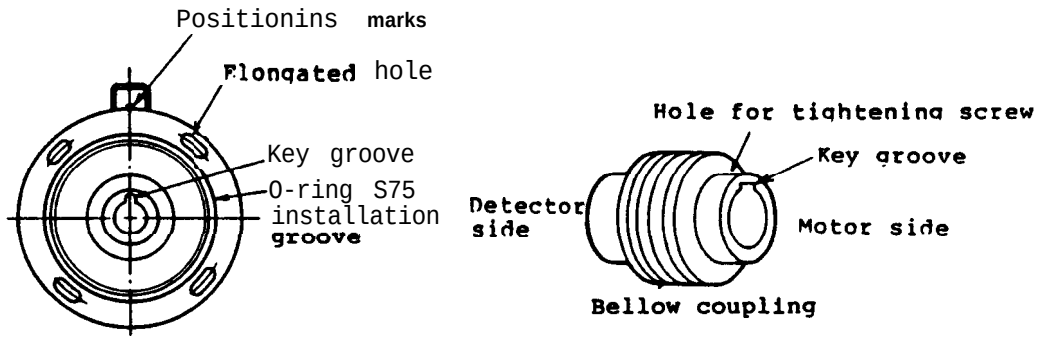
1) Detector mounting surface

Fig. 1 Motor detector mounting surface

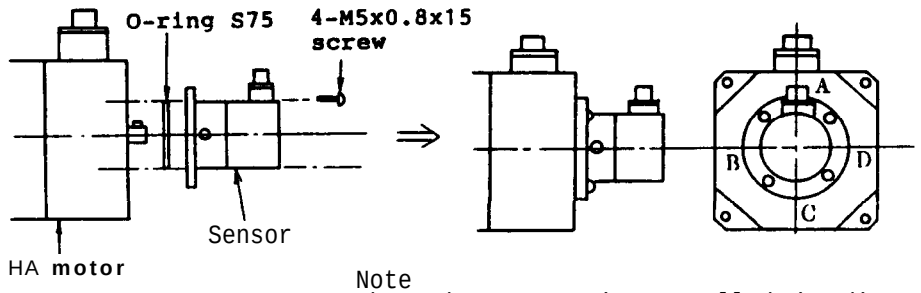


2) Detector
(With bellows)

Fig. 2 Detector (with bellows)



3) Installation (when sensor is installed in direction A)



Note
When the sensor is Installed in directions B, C or D, the sensor connector moves accordingly to positions B, C or D as shown in the above diagram.

4) Installation method

(1) Install the O-ring (S75) to the sensor flange.

(2) Install an M4 hexagonal bolt with hole to the coupling.

(3) Align the motor shaft key with key groove in the sensor bellows

(4) Align the sensor positioning mark with the motor mark off line.

(5) Install the sensor to the motor (using M5x0.8 screws).

(6) Tighten the screw on the key groove to secure the key so that it cannot move.

(7) Insert the sensor rubber plug

Note: The bellows should not be detached from the detector since the positions ofthesetwoparts stand in a precise relationship.