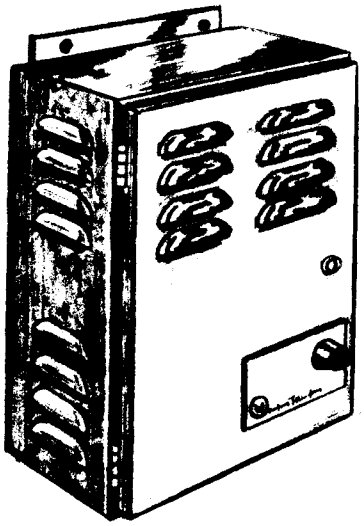
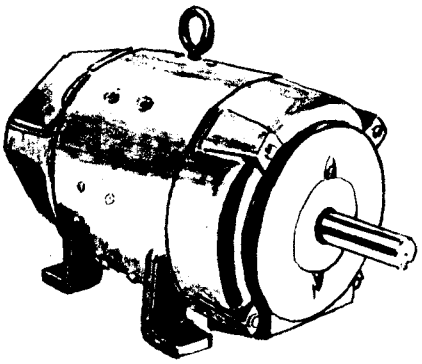
Westinghouse

22-1000
Adjustable Speed Drives





INSTALLATION INSTRUCTIONS FOR A
22-1000 1 PHASE NON-REVERSING MANUAL DRIVE
I. L. 22-1000-3

INSTALLATION INSTRUCTIONS FOR A

22-1000 1 PHASE NON-REVERSING MANUAL DRIVE

A manual drive consists of three basic components, the controller, the dc drive motor and the operators control station. The identity of the controller is determined by HP and AC input power, the operators control station by the current rating of the rotary power switch, but the motor selection is far more flexible and is not readily fixed in identity. Table No. 1 shows the identities of the controllers and operators control station associated with each controller identity.

TABLE No. 1

CONTROLLER					OPERATORS CONTROL STATION
	AC INPUT		DC MOTOR RATING		
STYLE	POWER	HP	ARM VOLTS	FIELD VOLTS	STYLE
1459A06G01	115V 1ϕ 50/60HZ	1/4	90VDC	100VDC	A22-1000 1459A13G01
1459A06G02	115V 1ϕ 50/60HZ	1/3	90VDC	100VDC	A22-1000 1459A13G01
1459A06G03	115V 1ϕ 50/60HZ	1/2	90VDC	100VDC	A22-1000 1459A13G01
1459A06G04	115V 1ϕ 50/60HZ	3/4	90VDC	100VDC	A22-1000 1459A13G01
1459A06G05	230V 1ϕ 50/60HZ	1	180VDC	200VDC	A22-1000 1459A13G01
1459A06G06	230V 1ϕ 50/60HZ	1-1/2	180VDC	200VDC	A22-1000 1459A13G01
1459A07G01	230V 1ϕ 50/60HZ	2	180VDC	200VDC	B22-1000 1459A14G01
1459A07G02	230V 1ϕ 50/60HZ	3	180VDC	200VDC	B22-1000 1459A14G01
1459A07G03	230V 1ϕ 50/60HZ	4	180VDC	200VDC	B22-1000 1459A14G01
1459A07G04	230V 1ϕ 50/60HZ	5	180VDC	200VDC	B22-1000 1459A14G01

Check the Drive, operators station, and the dc drive motor with Table No. 1.

Examine all components for damage which could have occurred during shipment. If a component is damaged, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse Sales Office if any damage to the equipment exists.

INSTALLATION INSTRUCTIONS

Installation of the three components should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire used should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool, dry, dustfree atmosphere, easily accessable for maintenance and good housekeeping practices.

The dc drives motor must be located, mounted, aligned, and operated in accordance with the specific type of motor being applied.

Mounting Of Equipment

1. Mounting of the Controller Or Drive (BC)

   The drive enclosure or cabinet is NEMA I and therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dustfree, and relatively cool to obtain long trouble free operation.

   a. Using four 3/8" bolts, the cabinet can be bolted to any vertical surface that is smooth, dry, and of sufficient area and strength to accept and support the drive.

2. Mounting Of The Operators Control Station (OS)

   The operators control station is NEMA I and therefore must be located in an area suitable for NEMA I type enclosures. The location should be dry, dust-free, and away from servere heat.

   a. The station can be surface mounted by removing the top and bottom screws holding on the front cover and then mounting the box on a suitable vertical surface using the two mounting holes in the rear of the box. 1/4" hardware should be used. The box has one hole in one end for conduit entry, be sure to orient the box to suit either top or bottom conduit entry when surface mounting the station.

   b. The station can also be mounted, if only a short length conduit is used, as a pendant station, with conduit entry from either the top or bottom.

3. Mounting Of The DC Drive Motor (MOT)

Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be followed.

Electrical Interconnections REF Schematic 22-1000-3

Diagram I shows the recommended interconnections between drive (BC), dc motor (MOT) and the operators control station (OS). The wiring as shown provides the most flexible and economical (for most installations) interconnection between the three pieces of equipment.

1. Run four wires from the dc motor terminals through conduit to the drive cabinet entering at the bottom of the cabinet using one of the conduit openings. (Motor wires should be sized according to HP - armature curren...)

2. Connect motor lead A1 to the large screw on the bottom of overload relay OL.

3. Connect motor shunt field lead F1 to terminal F1 on the bottom of the TPA. (Thyristor power assembly).

4. Connect motor shunt field lead F2 to terminal F2 on the bottom of TPA.

5. Run motor lead A2 across the bottom of the drive cabinet and out through the conduit going between the drive cabinet and the operators control station. Connect the motor lead A2 to terminal 1 of the rotary power switch, (SW), in the control station.

   These dc motor connections will cause the dc motor to rotate CCW (Counter Clockwise) when viewed from the dc motor commutator end. If CW rotation is required it is recommended that the motor shunt field leads are reversed rather than the normal practice of switching of the armature leads A1 and A2.

6. Pull four wires through the conduit from the drive cabinet to the operators control station, one heavy (same size as motor armature wires A1 and A2) the other smaller size standard control wire. (identify both ends of the wires as follows. The heavy wire as N, the three smaller size wires as Max-1, Min and R1.

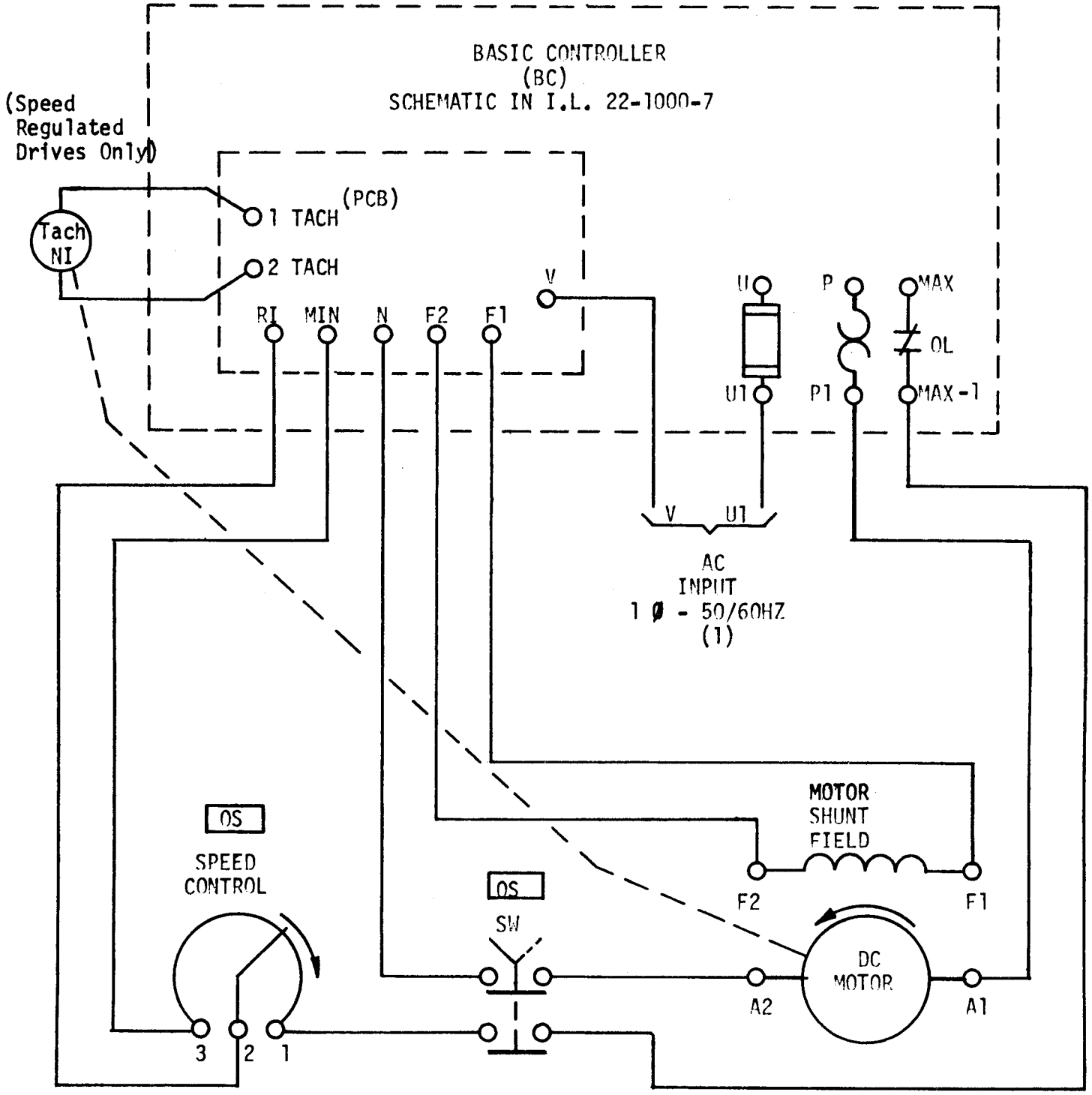
7. Connect the heavy wire marked N to terminal N on the TPA in the drive cabinet and to terminal 2 of the rotary power switch, (SW), in the operators control station (OS).

8. In the drive cabinet connect the wire marked Min to terminal Min on printed circuit board, (PCB), and the wire marked R1 to terminal R1 on (PCB). Connect the wire marked Max-1 to the small screw terminal that has no wire connected ot it on the bottom of overload relay OL. This is the screw terminal located between the large screw terminal and a small screw terminal on the bottom of OL.

9. In the operators control station, (OS), connect the wire marked P1 to the screw terminal 2 on the insulated pot mounting, see diagram 1 for location of terminal 2. Connect the wire marked Min to terminal 3 on the insulated pot mounting. Connect wire marked Max-1 to terminal 5 on the rotary power switch (SW).

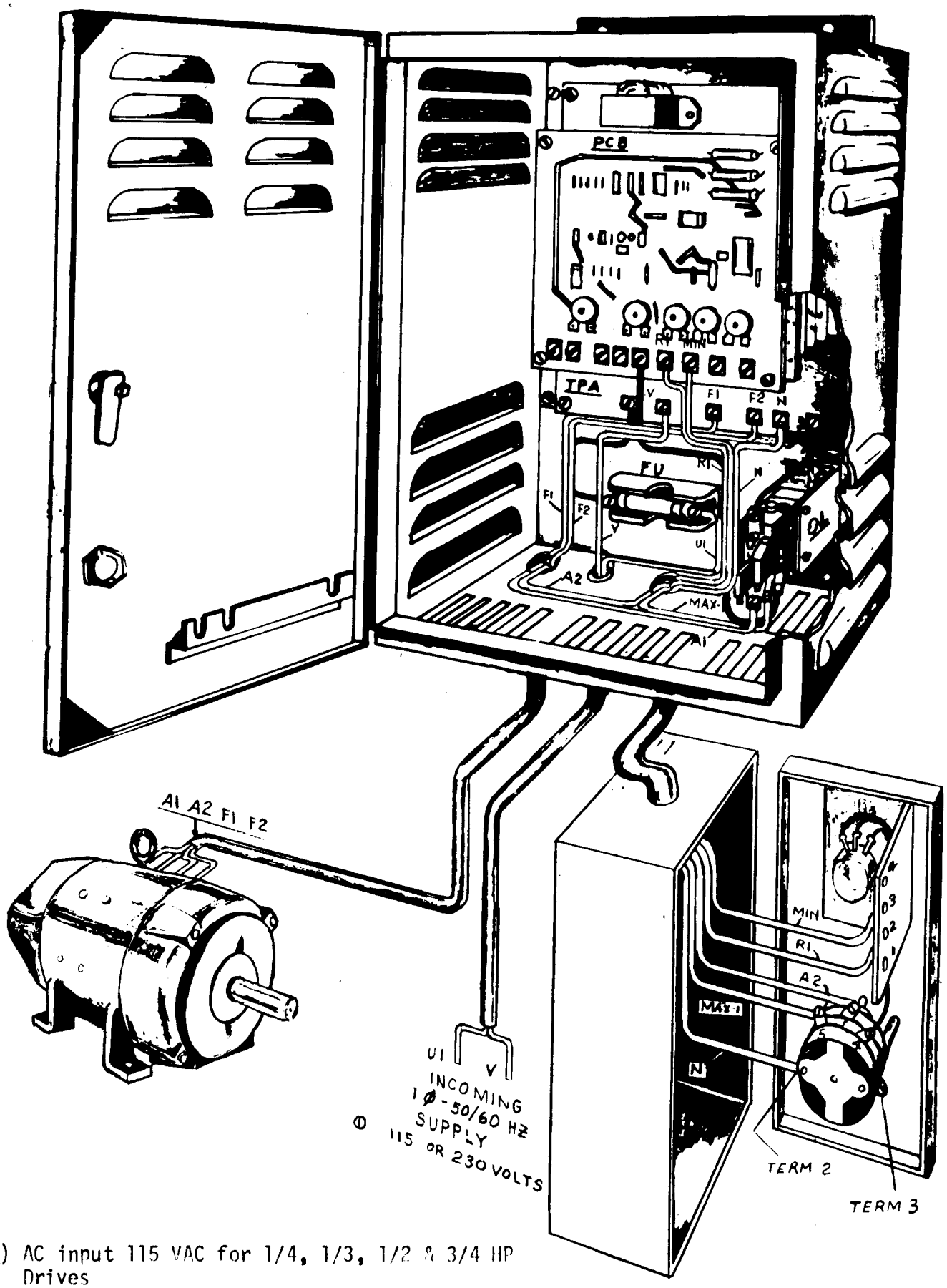
10. The AC input is made to terminal U1 on the fuse FU and to terminal V on the TPA. Be sure that the correct AC input supply is applied. Check Table No. 1 for the normal AC input power to be used. Check AC input with a voltmeter prior to making any connections to the drive.

11. Before applying AC power recheck all connections, be sure that all wires are secure and that the dc motor rotation is correct before coupling into the mechanical load.



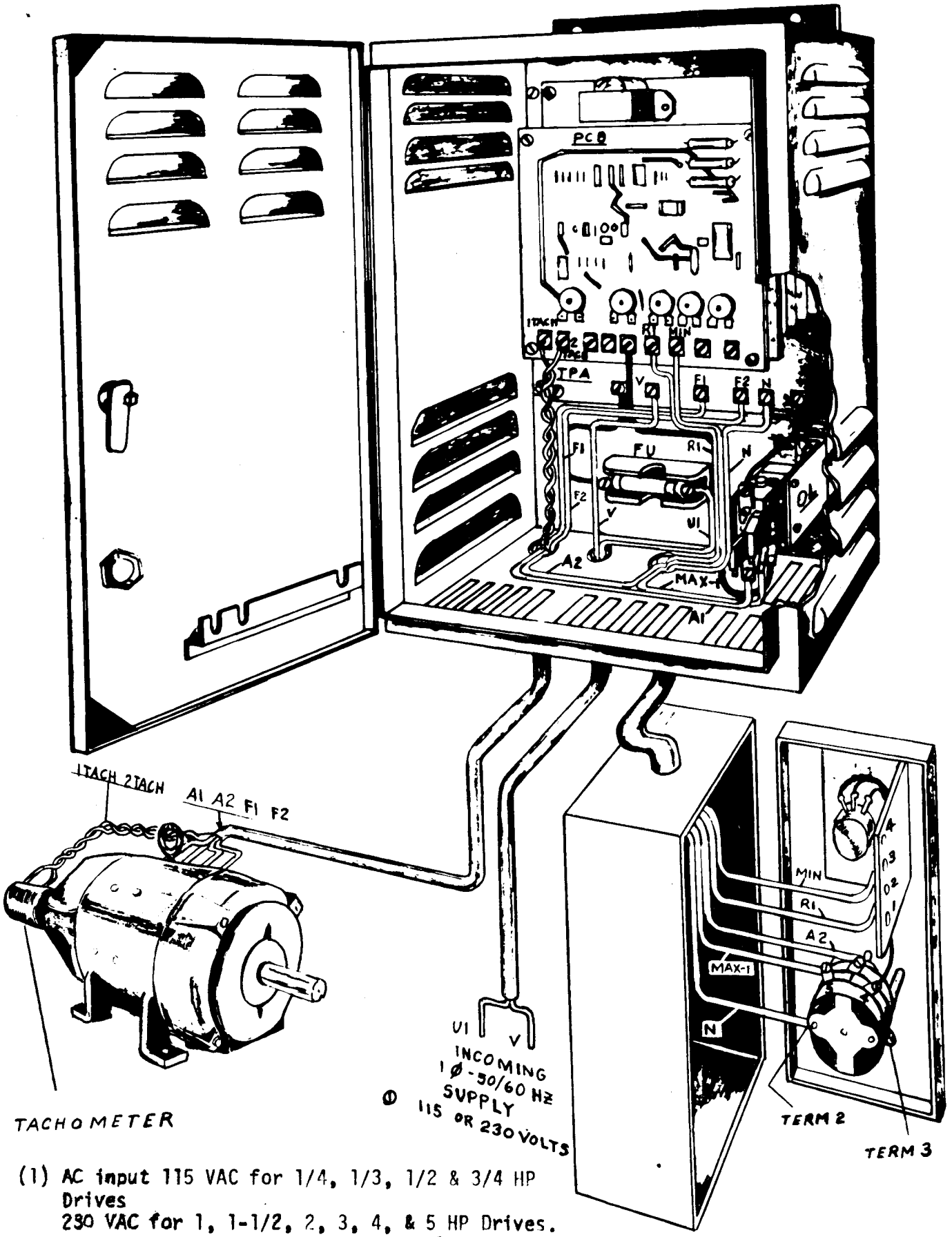
(1) AC input 115 VAC for 1/4, 1/3, 1/2 & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives.

SCHEMATIC DIAGRAM 22-1000-3



(1) AC input 115 VAC for 1/4, 1/3, 1/2 & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives.

DIAGRAM I



(1) AC input 115 VAC for 1/4, 1/3, 1/2 & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives.

DIAGRAM I

Start-Up Instructions

Recommended start-up procedure:

1. Check all interconnections per diagram 1.
2. Tighten all terminal screws.
3. Check to be sure that the AC input voltage, terminals U1 to V, is correct. See note (1) on diagram 1.
4. Check dc motor rotation. Rotation as connected per diagram 1 is CCW when viewed from the dc motor commutator end. (Carbon brushes mounted on commutator end). If CW rotation is desired interchange the connections of shunt-field leads F1 and F2 preferably at the motor conduit box. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date, but the motor armature circuitry will change for some functions).
5. Set the rotary power switch (SW), in the operators control station (OS), in the OFF position.
6. Set the speed control potentiometer (SP), in OS in the Maximum CCW position - minimum speed position.
7. Apply correct AC input power to terminals U1 and V in the basic controller (BC).
8. Turn switch SW in the ON position. The dc motor should start to rotate - check for desired motor rotation, if incorrect go back to step 4 and make changes to obtain desired rotation. Minimum speed is set by pot 2P on PCB, see I.L. 22-1000-7.
9. Adjust the speed control pot (SP), on OS to the maximum CW maximum speed position, see I.L. 22-1000-7 for adjustment of maximum speed pot 1P on PCB.
10. Return SP to the minimum speed position (CCW) and recheck minimum speed, adjust pot 2P on PCB if required.
11. Setting of Current Limit, CL, pot 3P on PCB, reference I.L. 22-1000-7.
    a. Turn switch SW to OFF.
    b. Remove AC input power.
    c. Set pots 3P (CL) and 4P (torque limit) on PCB in the maximum CCW position.
    d. Disconnect lead F1 at PCB - removes the dc motor shunt field. CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected cannot develop enough torque to cause the dc motor to rotate. Monitor motor speed while performing CL adjustment.
    e. Connect a suitable dc ammeter in the dc motor armature circuit, meter must have range of at least 250% of rated armature current of drive. Suggested location of ammeter - remove lead A1 from OL, connect the (+) terminal of the ammeter to OL and lead A1 to the (-) terminal of the ammeter.
    f. Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.
    g. Apply AC power.
    h. Turn switch SW to ON. Armature current will increase rapidly up to the setting of CL pot 3P. Adjust 3P CW until the armature current has increased up to 200% of rated armature current. Turn switch SW to OFF.
    i. CL should now be set at 150% rated current at motor base speed and at 200% rated current for stall conditions.
    j. Remove AC power.

Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR	
	VOLTS	AMPS	AMPS	AMPS	
1/4	90	2.8	4.2	5.6	
1/3		3.3	4.95	6.6	
1/2		5.5	8.25	11	
3/4		8.1	12.15	16.2	
1	180	5.2	7.8	10.4	
1-1/2		7.4	11.1	14.8	
2		9.6	14.4	19.2	
3		14.2	21.3	28.4	
4		19	27.5	38	
5		25	37.5	50	

12. Setting of Torque Limit, TL, pot 4P on PCB, reference I.L. 22-1000-7.
    a. Torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If drive is used in an application such as a winder in which torque limit control is

is required CW adjustment of pot 4P will function to cause CL to be limited a lower level at high motor speeds than at low motor speeds as shown on figure 3.

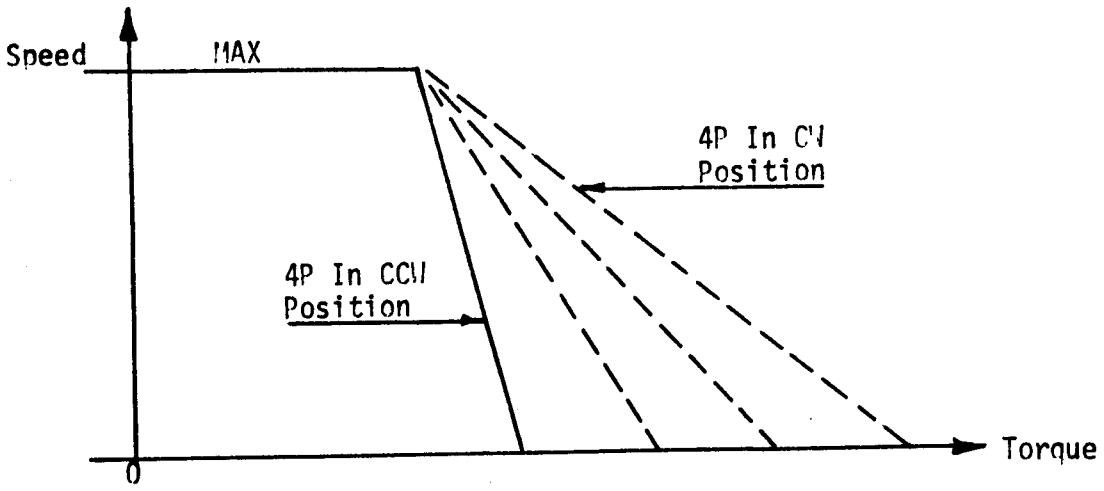


FIGURE 3

TORQUE LIMIT ADJUSTMENT

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor speed CL is the same for all settings of torque limit.

13. The setting of I.R. drop compensation, IR Comp, pot 5P on PCB, reference I.L. 22-1000-7.
    a. Pot 5P is always set in max CCW position for speed regulated (Tach feedback) drives.
    b. For voltage regulated, CEMF, drives pot 5P is set to give flat motor RPM full-load to minimum load, this setting usually is made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full load as at maximum load at this low motor speed. If the minimum operating speed is greater than 20 to 25% of motor base speed set I.R. Comp at this minimum operating speed.

Trouble Shooting

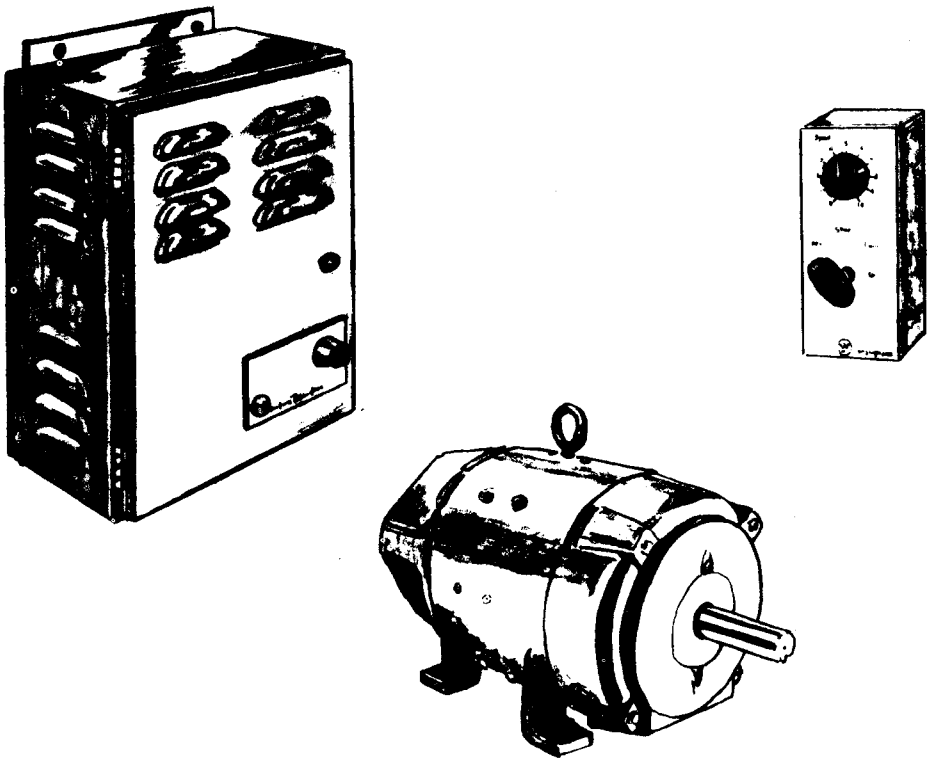
This I.L. covers trouble shooting not covered in the trouble shooting section of I.L. 22-1000-7.

1. Check per applicable steps in I.L. 22-1000-7.
2. Check voltages directly at speed control pot SP in OS.
3. Check operation of switch SW to be sure that all required switch contacts function properly.
4. Check motor terminal voltage directly at dc motor if motor does not run and other voltage checks indicate controller is functioning properly.

If preceeding steps do not determine cause of malfunction contact nearest Westinghouse representative.

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A
22-1000 1-PHASE REVERSING MANUAL DRIVE
I. L. 22-1000-4

INSTALLATION INSTRUCTIONS FOR A

22-1000 1 PHASE REVERSING MANUAL DRIVE

A Manual drive consists of three basic components, the controller, the DC drive motor, and the operators control station. The identity of the controller is determined by HP and AC control power, the operators control station by the current rating of the rotary power switch, but the motor selection is far more flexible and is not readily fixed in identity. Table No. 1 shows the identities of the controllers and operators control station associated with each controller identity.

TABLE NO. I

CONTROLLER (BC)					OPERATORS CONTROL STATION (OS)
	AC INPUT		DC MOTOR RATING (MOT)		
STYLE	POWER	HP	ARM. VOLTS	FIELD VOLTS	STYLE
1459A06G01	115V 1 50/60HZ	1/4	90VDC	100VDC	A22-1000 1459A13G02
1459A06G02	115V 1 50/60HZ	1/3	90VDC	100VDC	A22-1000 1459A13G02
1459A06G03	115V 1 50/60HZ	1/2	90VDC	100VDC	A22-1000 1459A13G02
1459A06G04	115V 1 50/60HZ	3/4	90VDC	100VDC	A22-1000 1459A13G02
1459A06G05	230V 1 50/60HZ	1	180VDC	200VDC	A22-1000 1459A13G02
1459A06G06	230V 1 50/60HZ	1.5	180VDC	200VDC	A22-1000 1459A13G02
1459A07G01	230V 1 50/60HZ	2	180VDC	200VDC	B22-1000 1459A14G02
1459A07G02	230V 1 50/60HZ	3	180VDC	200VDC	B22-1000 1459A14G02
1459A07G03	230V 1 50/60HZ	4	180VDC	200VDC	B22-1000 1459A14G02
1459A07G04	230V 1 50/60HZ	5	180VDC	200VDC	B22-1000 1459A14G02

Check the drive (BC), operators station (OS), and the dc drive motor (MOT) with Table I.

Examine all components for damage which could have occurred during shipment. If a component is damaged when unpacked, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse representative if any damage to equipment exists.

INSTALLATION INSTRUCTIONS

Installation of the three components, BC, OS, and MOT, should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire used should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool, dry, dust-free atmosphere, easily accessable for maintenance, and good housekeeping practices.

The dc drive motor must be located, mounted, aligned and operated in accordance with the specific type of motor being applied.

MOUNTING OF EQUIPMENT

1. Mounting of the Basic Controller or Drive (BC)

The drive enclosure or cabinet is NEMA I and therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dust-free, and relatively cool, 40 Degrees C ambient or less, to obtain long trouble free operation.

2. Mounting of the Operators Control Station (OS)

The operators control station is NEMA I and therefore must be located in an area suitable for NEMA I enclosures.

a. The OS can be surface mounted by removing the top and bottom screws holding on the front cover and then mounting the box on a suitable vertical surface using the two mounting holes in the rear of the box. 1/4" hardware should be used. The box has a conduit entry hole in one end, be sure to orient the box for either bottom or top conduit entry when mounting the box.

   The OS can also be pendant mounted, if only a short length of conduit is used to maintain a rigid mounting.

3. Mounting Of The DC Drive Motor (MOT)

Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be used.

Electrical Interconnections

Reference Schematic 22-1000-4 Diagram I

Diagram I shows the recommended interconnections between BC, OS, and MOT per schematic 22-1000-4. The wiring as shown provides the most flexible and economical (for most installations) interconnection between the three pieces of equipment.

1. Run four wires from the dc motor terminals (MT) through conduit to the basic controller cabinet (BC), entering at the bottom of the cabinet using the large conduit opening on the bottom of BC. (Motor armature Wires A1 and A2 should be sized according to HP - motor armature current). Two motor armature leads A1 and A2 and two smaller motor shunt field leads F1 and F2.

2. Connect motor shunt field lead F1 to terminal F1 on the printed circuit board (PCB).

3. Connect motor shunt field lead F2 to terminal F2 on PCB.

4. Run the two armature leads A1 and A2 across the bottom of the cabinet of BC and out through the large conduit between BC and operators Control Station (OS). Connect motor armature lead A2 to terminal 7 of the Rotary Power Switch, (SW) in OS. Connect armature lead A1 to terminal 1 on SW.

   These dc motor connections will cause the dc motor to rotate CCW (Counter-Clockwise) rotation is required it is recommended that the motor shunt field leads F1 and F2 be reversed rather than the normal practice of switching the armature leads A1 and A2.

5. Pull seven wires through the conduit between BC and OS. Four heavy leads, the same size as motor armature leads, A1, A2, A & B, and three wires of standard control wire size. Identify all wires at both ends. The four large leads should be marked N, P1, A, B, the three control leads as Max-1, Min, and R1.

6. At BC connect the seven wires as follows:

   a. Heavy lead marked N to terminal N on the Thyristor Power Assembly (TPA).
   b. Heavy lead marked P1 to the large screw terminal connection on the bottom of overload relay OL.
   c. Heavy lead marked A to one of the connection points on the dynamic braking resistor. (MTD on the door of the basic controller BC) DBR.
   d. Heavy lead marked B to the remaining connection point on DBR.
   e. Control lead marked Max-1 to the small screw terminal connection on the bottom of OL that has no wire connected to it.
   f. Control lead marked Min to terminal Min on the bottom of Printed Circuit board (PCB).
   g. Control lead marked R1 to terminal R1 on the bottom of PCB.

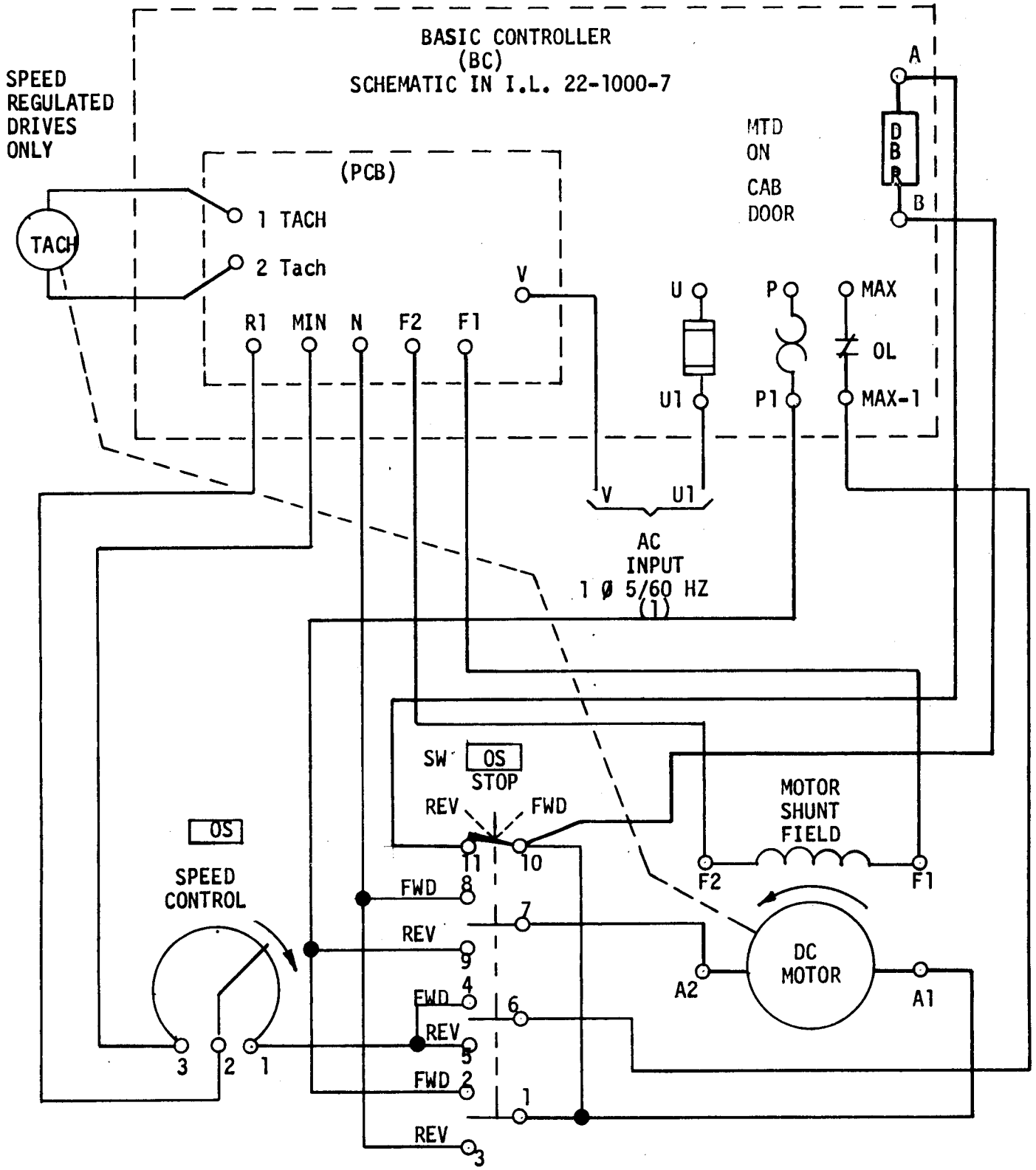
7. At OS connect the seven wires as follows:

   a. The heavy lead marked N to terminal 3 of Rotary Power Switch (SW).
   b. The heavy lead marked P1 to terminal 2 of SW.

c. Heavy lead marked A to terminal 11 on the rotary power switch.
d. Heavy lead marked B to terminal 7 on the rotary power switch.
e. Control lead marked Max-1 to terminal 6 of SW.
f. Control lead marked Min to terminal 3 of the insulated pot mounting for speed control pot SP.
g. Control lead Marked R1 to terminal 2 of the insulated pot mounting.

8. The AC input is made to terminal U1 on fuse FU in BC and to terminal V on the TPA. Be sure that the correct AC input supply is applied. Check Table No. I for the normal AC to be used. Check the AC input with a voltmeter (AC) prior to making connections to the drive.

9. Before applying AC power recheck all connections, be sure that all wires are secure and that the dc motor rotation is correct before coupling into the mechanical load.



(1) Ac input 115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives.

SCHEMATIC DIAGRAM 22-1000-4

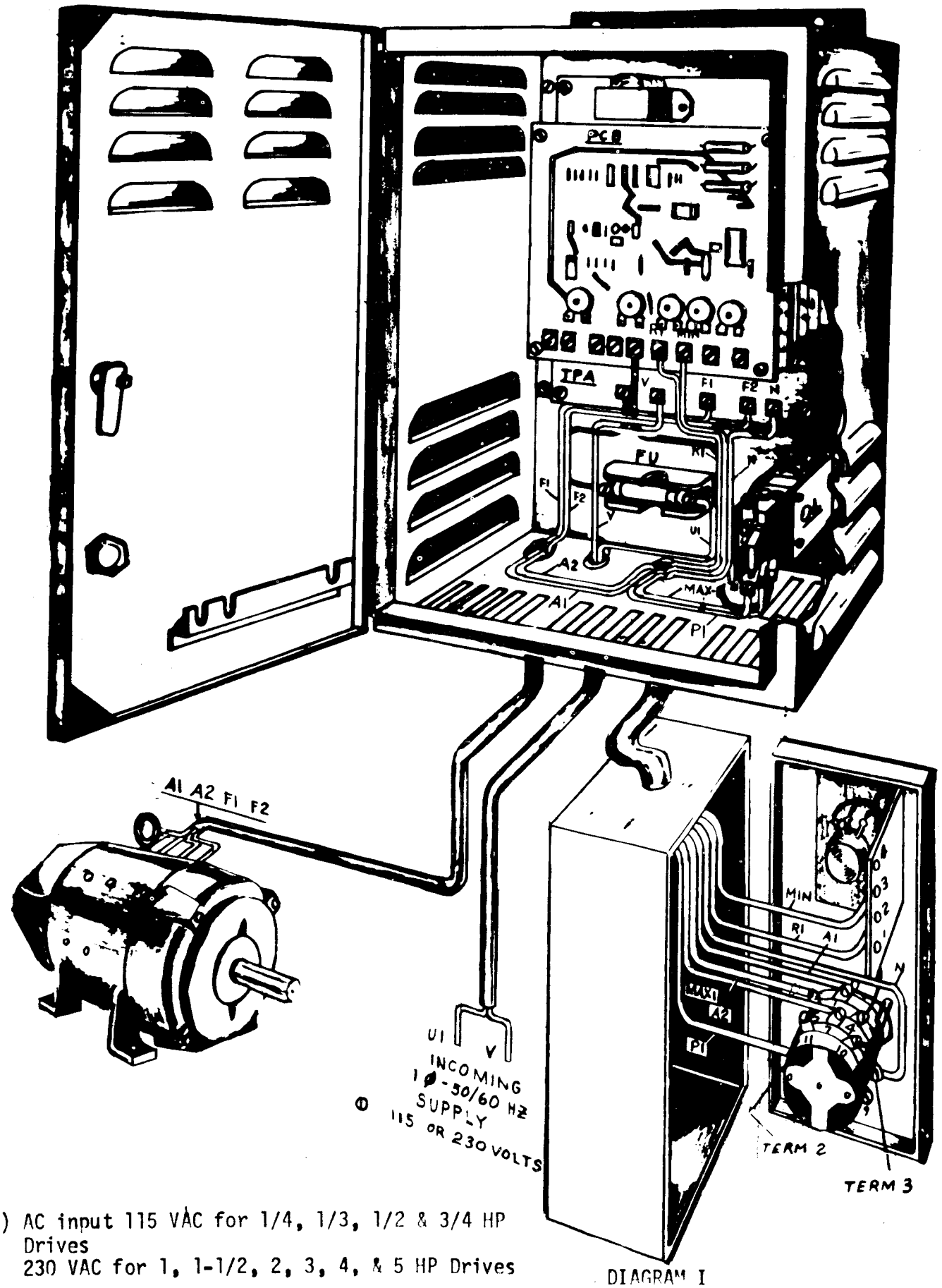
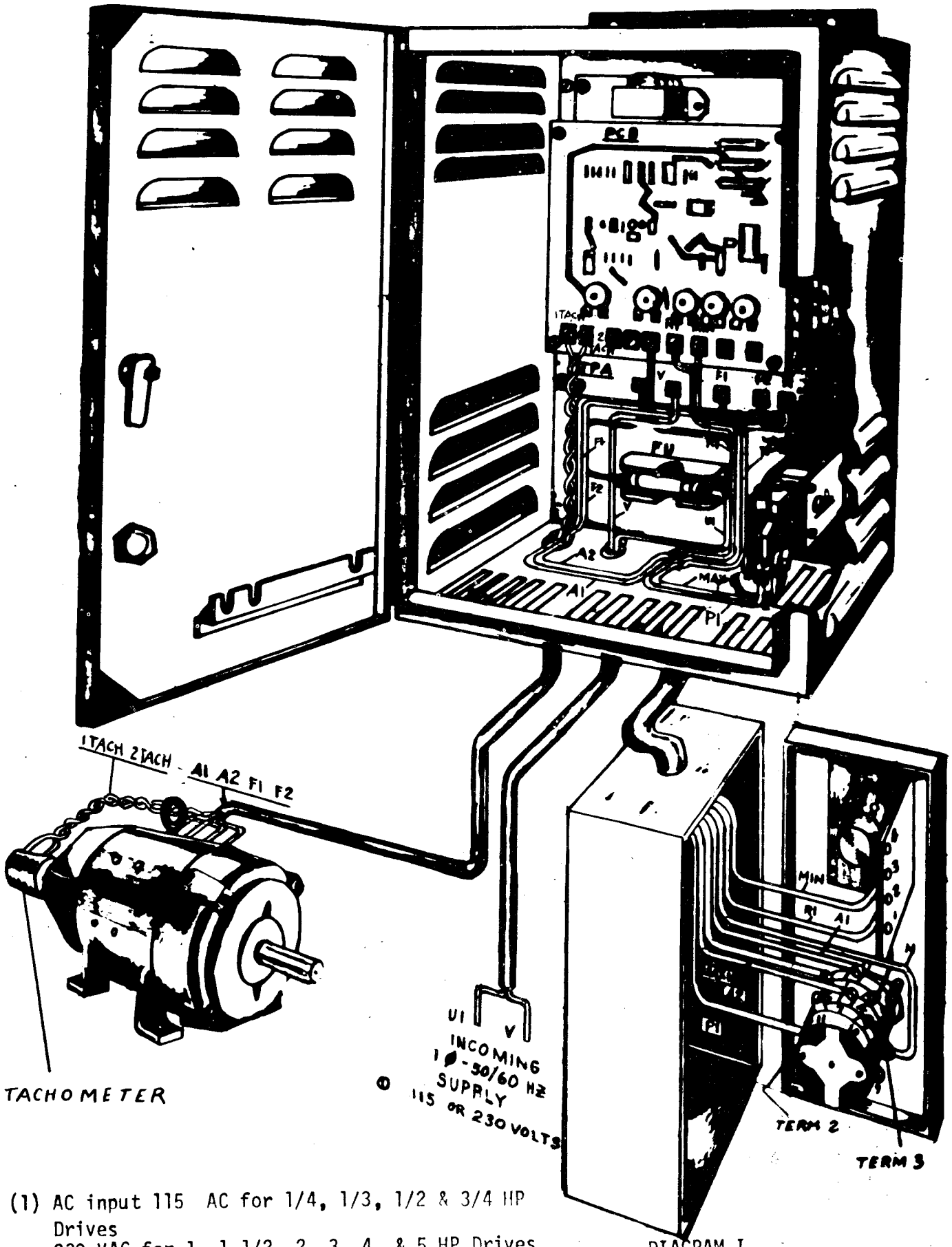


DIAGRAM I

(1) AC input 115 VAC for 1/4, 1/3, 1/2 & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives



(1) AC input 115 AC for 1/4, 1/3, 1/2 & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM I

START-UP INSTRUCTION

Recommended Start-Up Procedure:

1. Check all interconnections per diagram I.

2. Tighten all terminal screws.

3. Check to be sure that the AC input voltage, terminals U1 to V is correct. See note (1) on diagram 1.

4. Check dc motor rotation. Rotation as connected per diagram 1 is CCW when viewed from the dc motor commutator end (Carbon brushes are mounted on the commutator end) with switch SW set in the FWD position. If CW rotation is required with SW in FWD interchange the connections of motor shunt field leads F1 and F2 preferably at the motor conduit box. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date, but the motor armature circuitry could be changed for some functions.)

5. Set switch SW in the OFF position.

6. Set the Speed Control Pot SP in OS in the maximum CCW, minimum speed position.

7. Apply correct AC input power to terminals U1 and V in BC.

8. Turn switch SW to the FWD position. The dc motor should start to rotate - check for desired direction of rotation for FWD, if incorrect go back to step 4 and make changes to obtain the desired motor rotation. Minimum speed is the same for FWD and REV and is set by pot 2P on PCB, see I.L. 22-1000-7.

9. Adjust the Speed Control Pot, (SP), on OS to its maximum CW position, maximum speed is the same for FWD and REV and is set by pot 1P on PCB. See I.L. 22-1000-7

10. Return SP to the minimum speed position (CCW) and recheck minimum speed, adjust pot 2P on PCB if required.

11. Turn switch SW to the OFF Position.

12. Check REV operation by pushing in on the handle of switch SW and turning to the REV position. While pushing in the switch handle the dc motor should start to rotate in the opposite direction from the motor rotation obtained with the switch in the FWD direction. Minimum speed should be approximately the same as obtained in Step 8.

13. Adjust speed control pot SP to the maximum speed position. The motor speed should increase to approximately the same speed as Step 9.

14. Return SP to the minimum speed position, turn SW to OFF.

15. Setting of Current Limit, CL, pot 3P on PCB.

    Reference I.L. 22-1000-7

    a. Turn switch SW to OFF.
    b. Remove the AC input power.
    c. Set pots 3P (CL) and 4P (Torque Limit) on PCB IN the maximum CCW position.
    d. Disconnect lead F1 at PCB - removes the dc motor shunt field. CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected can not develop enough torque to cause the dc motor to rotate.
    e. Connect a suitable dc ammeter in the dc motor armature circuit, meter must have range of at least 250% of rated armature current of drive. Suggested location of ammeter - remove lead P1 from bottom of OL, connect the (+) terminal of the ammeter to OL and lead P1 to the (-) terminal of the ammeter.
    f. Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.
    g. Apply AC power.
    h. Turn switch SW to FWD position. Armature current will increase rapidly up to the setting of CL pot 3P. Adjust 3P CW until the armature current has increased up to 200% of rated armature current. Turn switch SW to OFF.
    i. CL should now be set at 150% rated current at motor base speed and at 200% rated current for stall conditions.
    j. Remove AC power.

    Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR	
	VOLTS	AMPS	AMPS	AMPS	
1/4	90	2.8	4.2	5.6	
1/3		3.3	4.95	6.6	
1/2		5.5	8.25	11	
3/4		8.1	12.15	16.2	
1	180	5.2	7.8	10.4	
1-1/2		7.4	11.1	14.8	
2		9.6	14.4	19.2	
3		14.2	21.3	28.4	
4		19	27.5	38	
5		25	37.5	50	

16. Setting of Torque Limit, TL, pot 4P on PCB, reference I.L. 22-1000-7.
    a. Torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If drive is used in an application such as a winder in which torque limit control is required CW adjustment of pot 4P will function to cause CL to be limited a lower level at high motor speeds than at low motor speeds as shown in Figure 3.

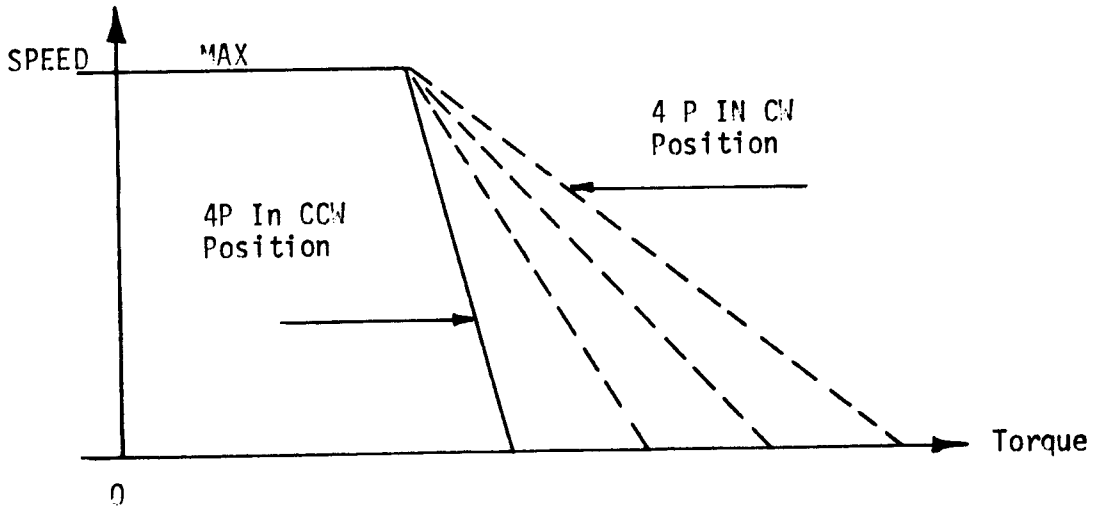


FIGURE 3
TORQUE LIMIT ADJUSTMENT

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor speed CL is the same for all settings of torque limit.

17. The setting of I.R. drop compensation, IR comp, pot 5P on PCB, reference I.L. 22-1000-7.
    a. Pot 5P is always set in max CCW position for speed regulated (Tach feedback) drives.
    b. For voltage regulated, CEMF, drives pot 5P is set to give flat motor RPM full load to minimum load, this setting usually is made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full load as at minimum load at this low motor speed. If the minimum operating speed is greater than 20 to 25% of motor base speed set I.R. Comp at this minimum operating speed.

TROUBLE SHOOTING

This I.L. covers trouble shooting not covered in the trouble shooting section of I.L. 22-1000-7.

1. Check per applicable steps in I.L. 22-1000-7.

2. Check voltages directly at speed control pot SP in OS.

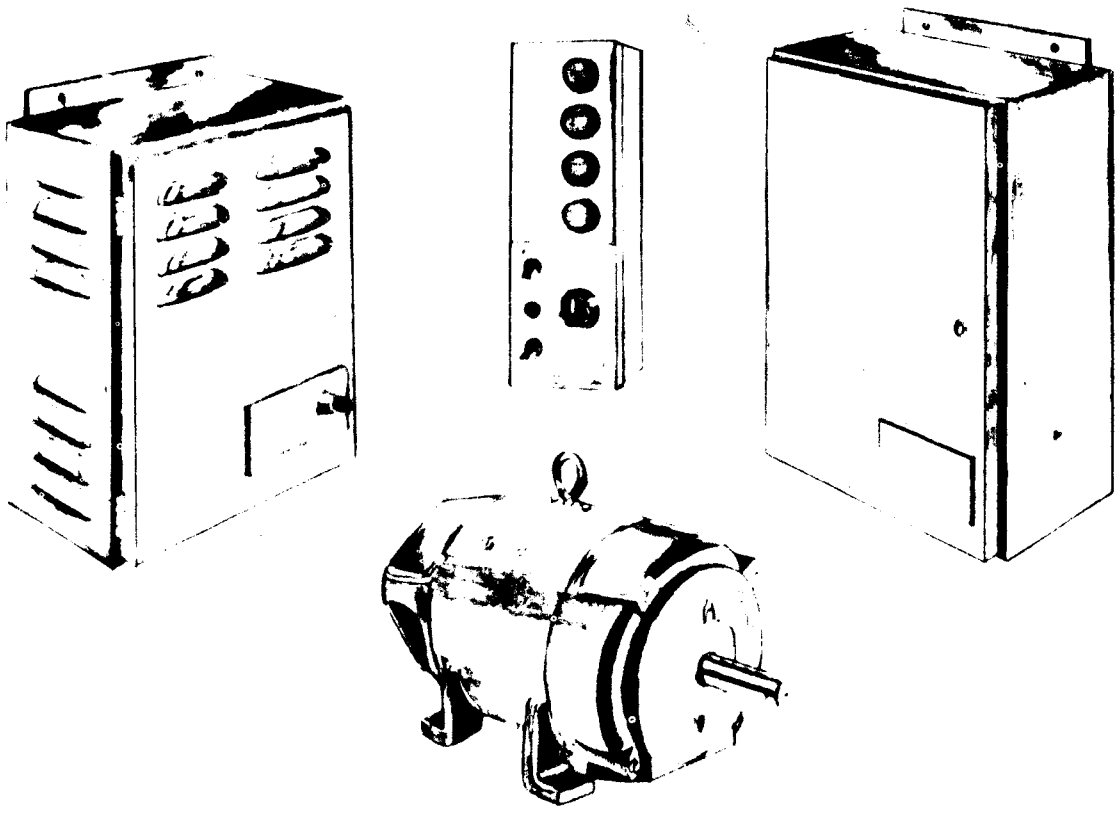
3. Check operation of switch SW to be sure that all required switch contacts function properly - reference diagram 1.

4. Check motor terminal voltage directly at DC motor if motor does not run and other voltage checks indicate controller is functioning properly.

   If preceeding steps do not determine cause of malfunction contact nearest Westinghouse representative.

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A

22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE

I. L. 22-1000-5

4
INSTALLATION INSTRUCTIONS FOR A
22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE

A magnetic drive consists of four basic components, the basic controller, (BC), the magnetic logic cabinet, (LC), consisting of the magnetic contactor assembly (MCA) and the logic board (LB), the operators control station (OS), and the dc drive motor (MOT). The dc drive motor selection is flexible and is not readily fixed in identity. Two styled OS are available one for the standard non-reversing drive, and the other for a non-reversing drive incorporating signal follow.

TABLE I

DC MOTOR (MOT) RATING			BASIC CONTROLLER (BC)	MAGNETIC LOGIC CABINET (LC)	OPERATORS CONTROL STATION (OS)	
HP	ARM VOLTS	FIELD VOLTS	STYLE	STYLE	STANDARD STYLE	FOLLOWER STYLE
1/4	90	100	1459A06601	1459A08601	1459A12601	1459A12603
1/3	90	100	1459A06602	1459A08601	I.L.22-1000-5	I.L.22-1000-11
1/2	90	100	1459A06603	1459A08601		
3/4	90	100	1459A06604	1459A08601		
1	180	200	1459A06605	1459A08603		
1-1/2	180	200	1459A06606	1459A08603		
2	180	200	1459A06601	1459A08605		
3	180	200	1459A07602	1459A08605		
4	180	200	1459A07603	1459A08605		
5	180	200	1459A07604	1459A08605		

Check the basic controller, magnetic logic cabinet, operators control station, and the dc drive motor rating with Table I.

Examine all components for damage which could have occurred during shipment. If a component is damaged, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse representative if any damage to the equipment exists.

INSTALLATION INSTRUCTIONS

Installation of the four pieces of equipment should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire used should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool dry, dust-free atmosphere, easily accessable for maintenance and good housekeeping practices.

The dc drive motor must be located, mounted, aligned, and operated in accordance with the specific type of motor being applied.

MOUNTING OF EQUIPMENT

1. Mounting of the Basic Controller (BC)

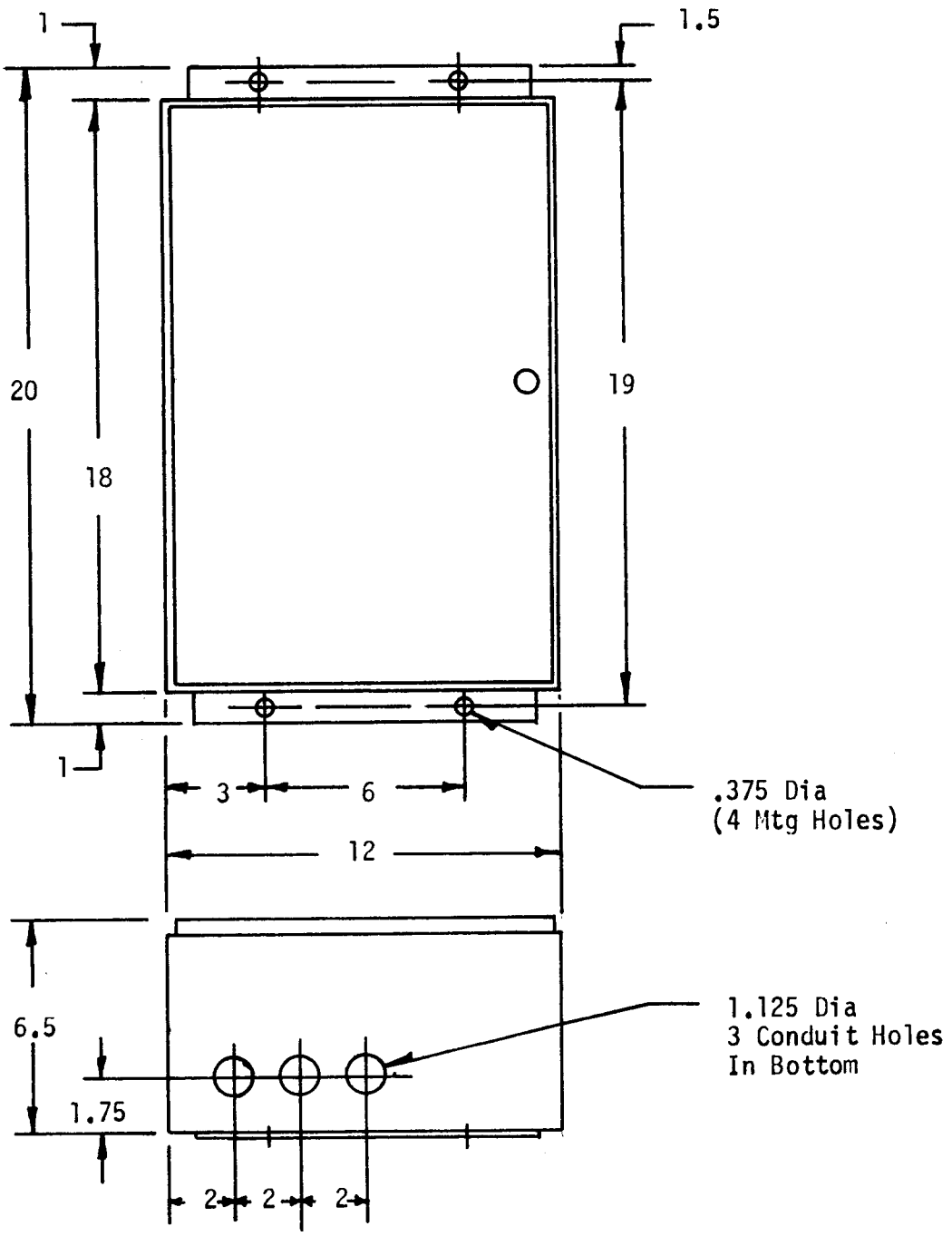
The BC enclosure or cabinet is Nema I and therefore must be located in an area suitable for Nema I enclosures. The location should be dry, dust-free, and relatively cool (40 Degrees C ambient or less) to obtain long trouble-free operation.

a. See I.L. 22-1000-7 for mounting dimensions for the mounting of BC.
b. Use four 3/8" bolts, or screws, to mount the enclosure to a suitable vertical surface that is smooth, dry, and of sufficient area and strength to accept and support the basic controller.

2. Mounting Of The Magnetic Logic Cabinet (LC)

The enclosure for LC is of NEMA I design, therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dust-free, and relatively cool (40 Degrees C ambient or less) to obtain long trouble free operation.

Figure 1, is the installation plan for mounting of LC. Use 3/8" mounting hardware.



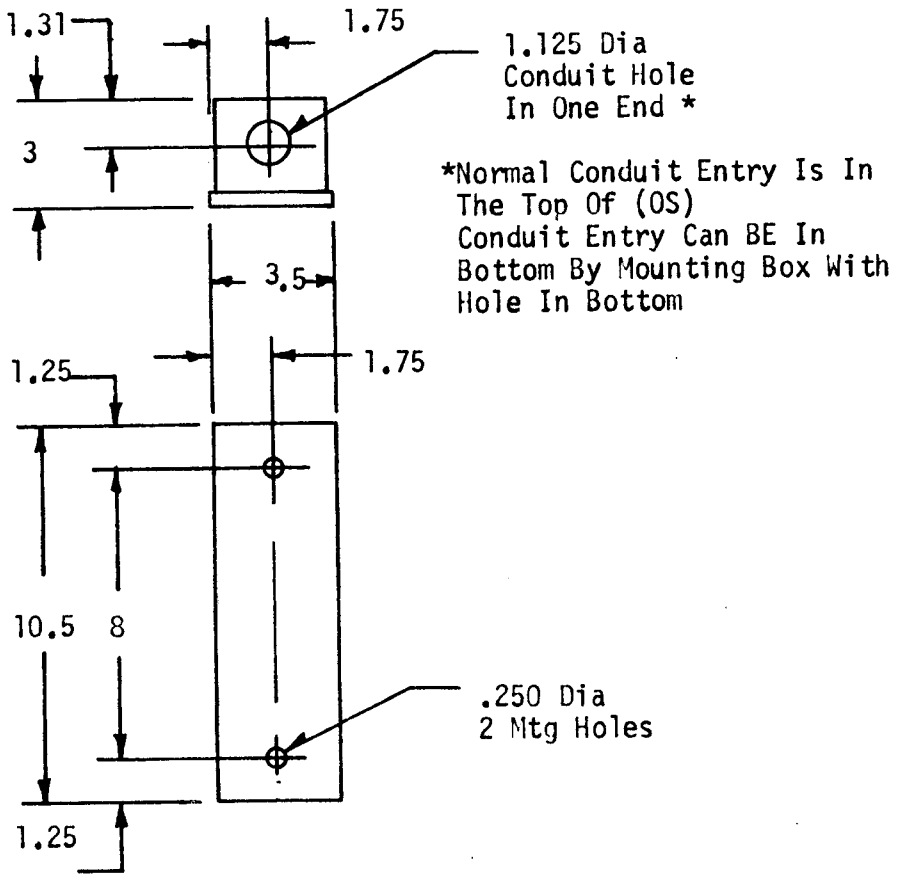
INSTALLATION PLAN FOR MAGNETIC LOGIC CABINET (LC)

FIGURE I

3. Mounting Of The Operators Control Station (OS).

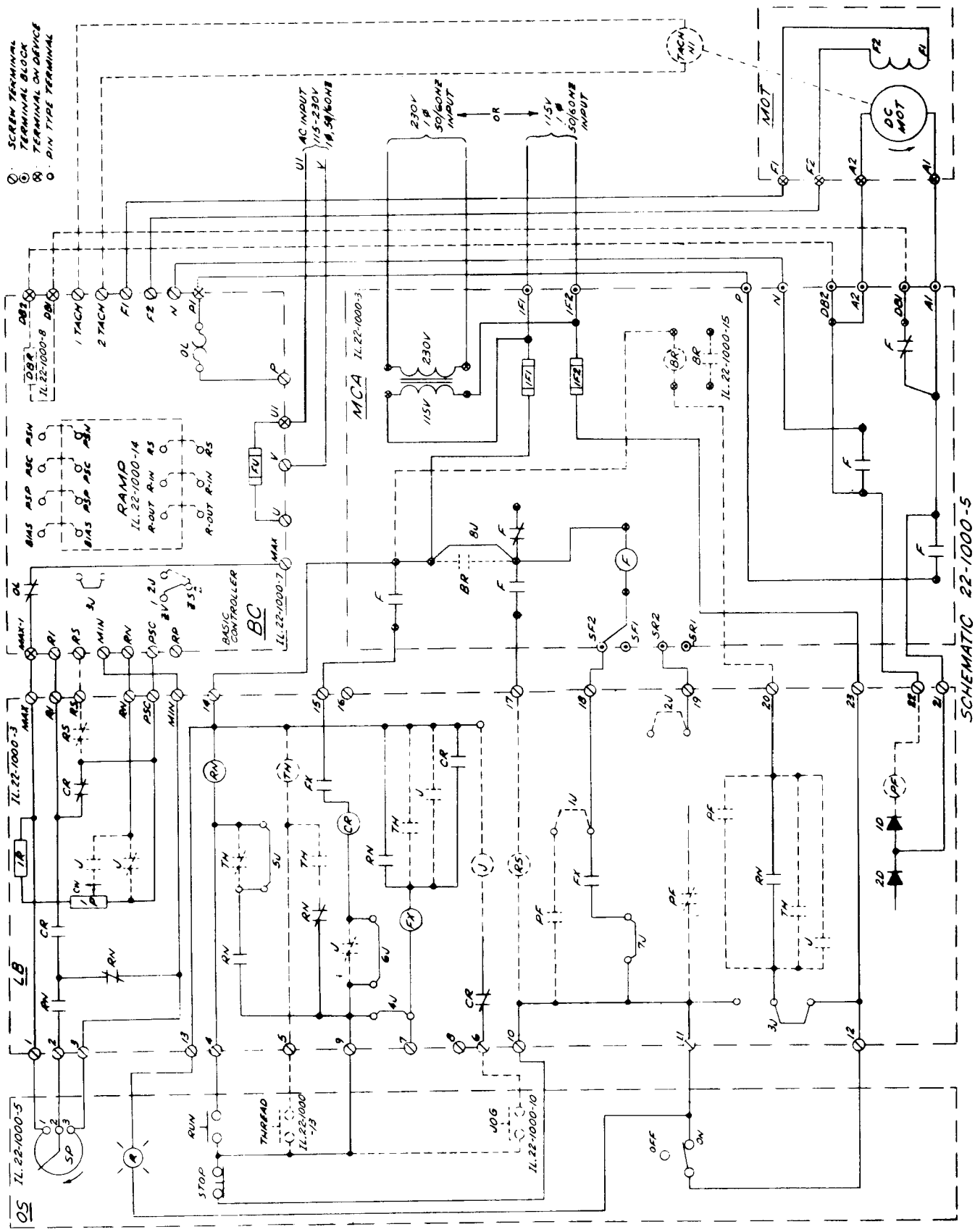
The OS is NEMA I design, therefore, must be located in an area suitable for NEMA I enclosures.

Figure 2 is the installation plan for the mounting of OS



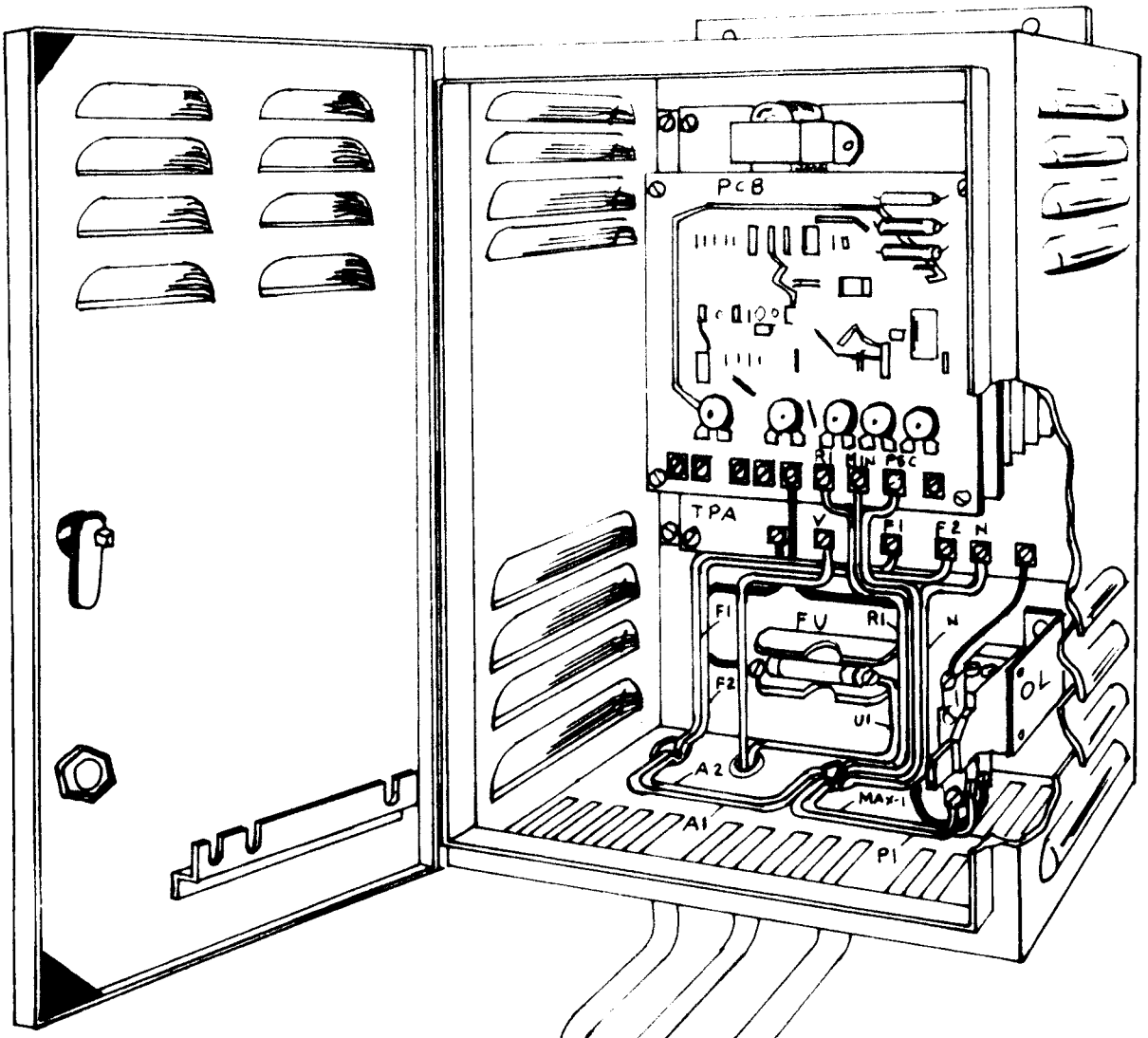
INSTALLATION PLAN FOR OPERATORS CONTROL STATION (OS)

FIGURE 2

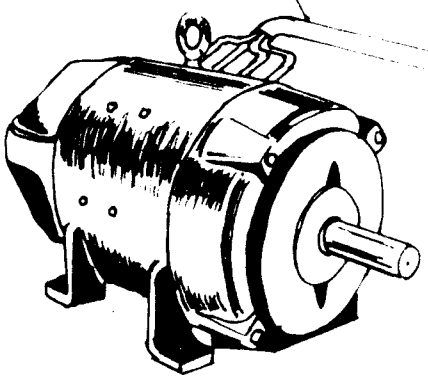


SCHEMATIC 22-1000-5

Basic Controller



A1 A2 F1 F2



U1 V

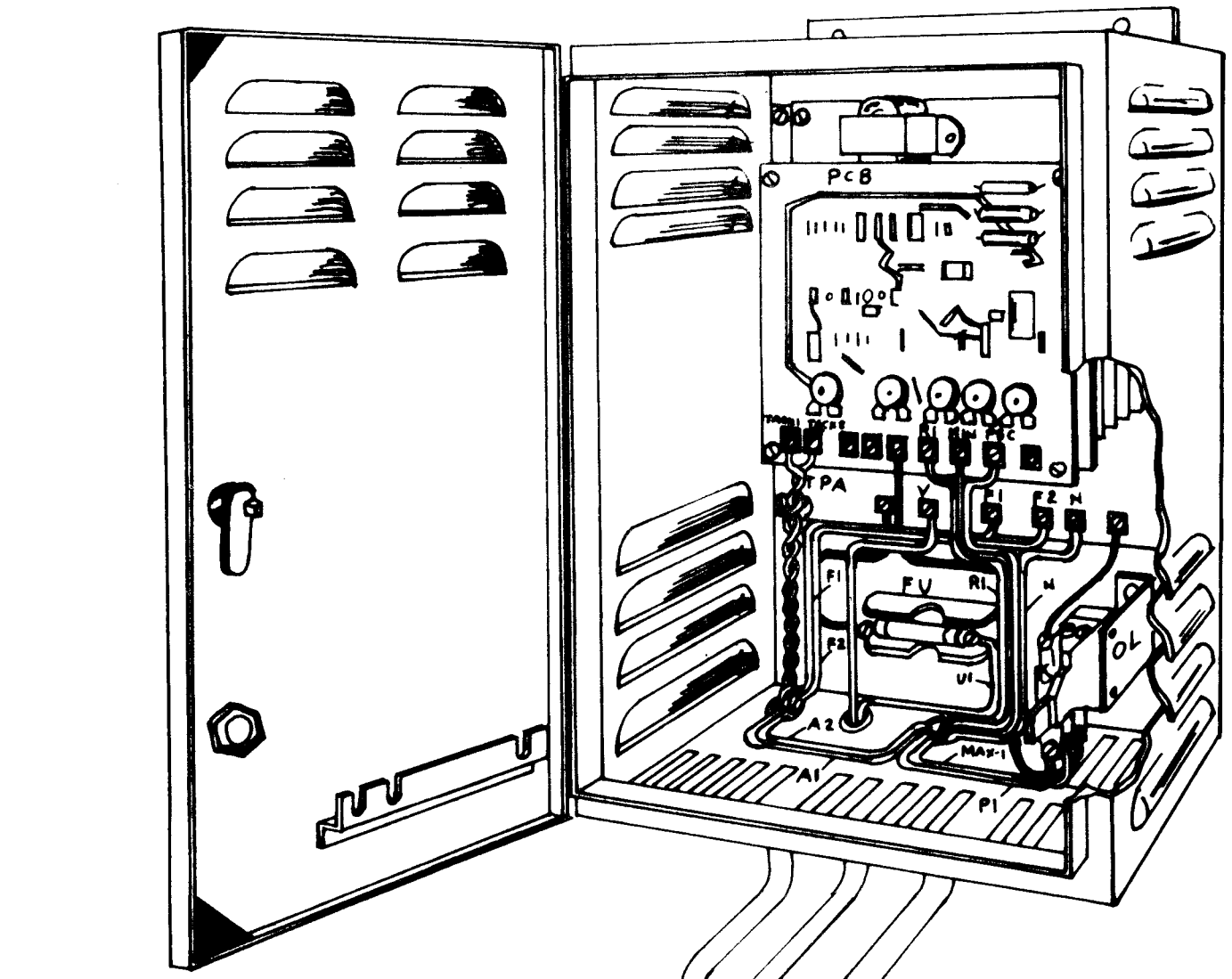
Incoming Supply (1)

To Magnetic Controller Diagram 2

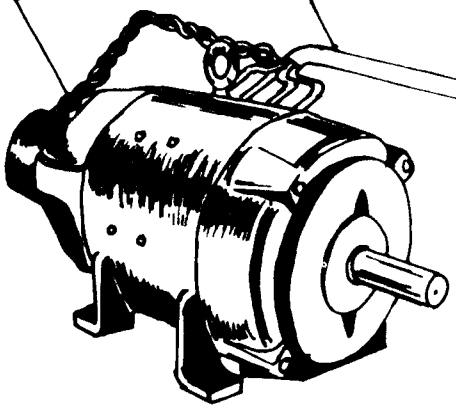
(1) 1Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1V

Basic Controller



TACH1 TACH2 A1 A2 F1 F2



U1 V

Incoming Supply ①

To Magnetic Controller Diagram 2

① 1Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1S

Magnetic Controller

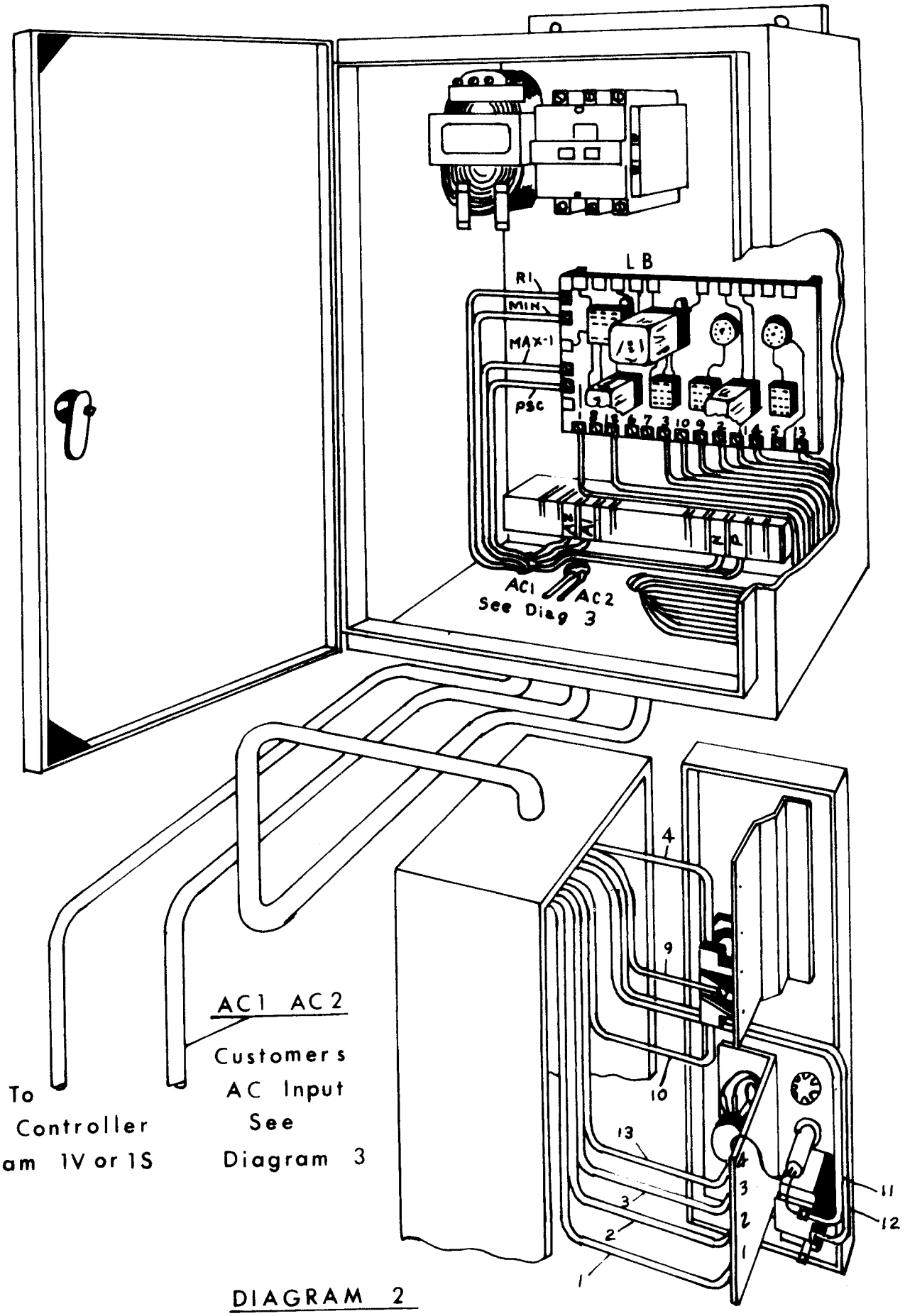


DIAGRAM 2

4. Mounting of the DC Drive Motor ("MOT)

Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be followed.

Electrical Interconnections

Reference Schematic 22-1000-5
Diagrams 1V, 1S, and 2.

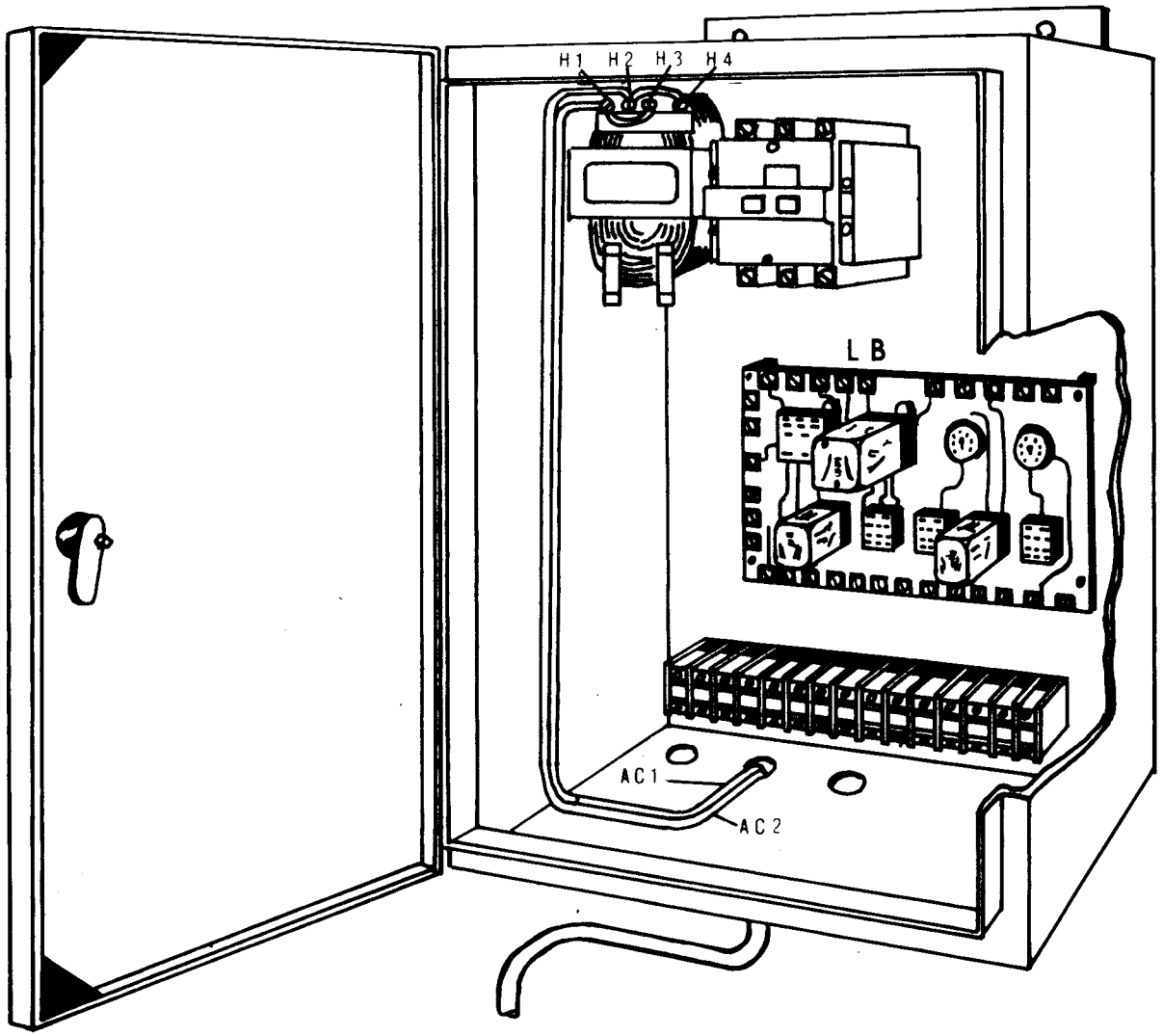
Schematic 22-1000-5 is a composite schematic showing the magnetic non-reversing drive and the standard options that can be incorporated in the drive either at time of purchase or by using "function kits" added at any future date. The options are shown by dotted or broken lines in the circuit flow. It is suggested that the composite schematic by up-dated each time a function kit is added by changing the associated dotted or broken lines to solid lines as detailed in the I.L. accompanying each "kit".

Diagram 1V shows the recommended interconnections between BC, LC, OS, and the DC drive motor per schematic 22-1000-5 for CEMF regulated drives. Diagram 1S shows the recommended interconnections between BC, LC, OS, and the DC drive motor (including the motor mounted tachometer) per schematic 22-1000-5 for speed regulated drives. Leads 1 Tach. and 2 Tach shown in dotted lines on schematic 22-1000-5 and the motor mounted dc tachometer, (N1), are added to the CEMF regulated drive to change to a speed regulated drive. (I.R. Comp pot 5P, on BC must be set in the maximum CCW position on all speed regulated drives).

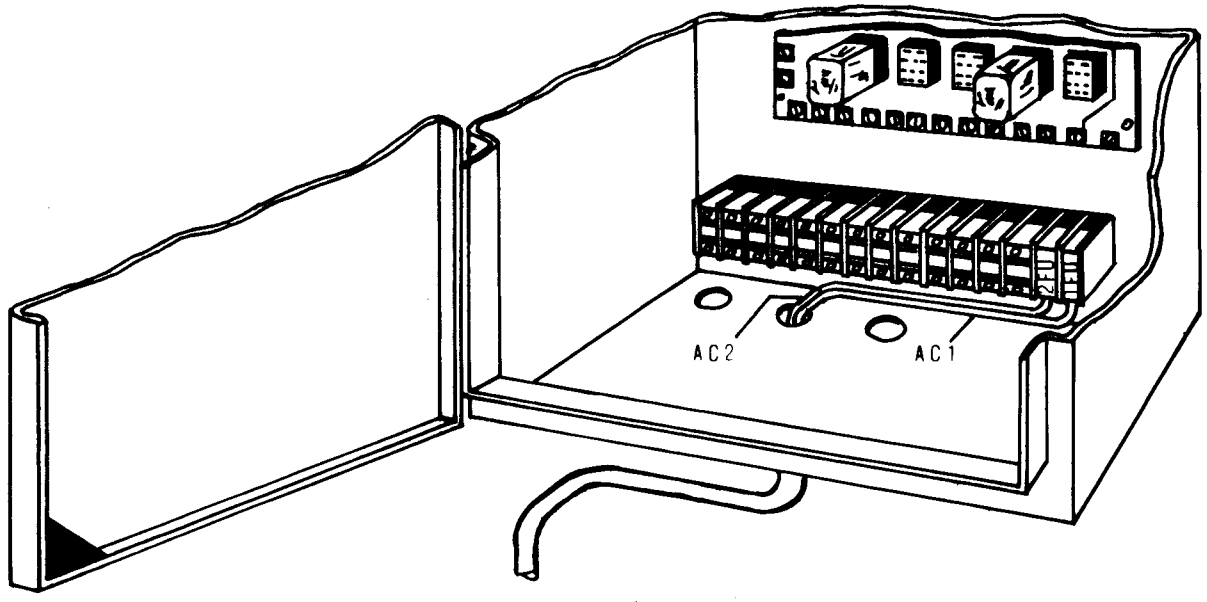
Diagram 2 shows the interconnections for the customer incoming AC supply, leads AC1 and AC2. The transformer is used when customer control voltage is 230V, 1 Phase, 50/60HZ. The transformer is not required if 115V, 1 Phase, 50/60 HZ input control power is used.

The wiring as shown provides the flexibility required to permit the addition of the various "function kits", shown in broken line on schematic 22-1000-5, at any time using the detailed installation instructions provided with each function kit.

Magnetic Controller



230V – 1 Ø – 50 / 60 HZ



115 V – 1 Ø – 50 / 60 HZ

DIAGRAM 3

1. Interconnections MT to BC and MT to LC

1.1 CEMF Regulated Drives - Diagram 1V

Run four wires from the dc motor terminals (MT) through conduit to the basic controller cabinet (BC), entering at the bottom of the cabinet using one of the large conduit openings. Motor armature leads (A1 and A2) should be sized according to motor HP -- motor armature current, and the motor shunt field leads (F1 and F2) can be standard control wire of #16 or larger. Mark leads on both ends.

1.1.1 Connect shunt field lead marked F1 to screw terminal F1 on the bottom of printed circuit board PCB.

1.1.2 Connect shunt field lead marked F2 to screw terminal F2 on the bottom of PCB.

1.1.3 Run the two armature leads (A1 and A2) across the bottom of BC and out through the conduit running between BC and the magnetic logic cabinet (LC). Connect motor armature lead marked A1 to terminal block A1 on the bottom of the panel in LC. Connect armature lead marked A2 to terminal block A2 in LC.

1.2 Speed Regulated Drives - Diagram 1S

Complete all connections between MT and BC for CEMF regulated drives except run a total of six leads between MT and BC. The fifth and sixth leads should be a twisted pair, running between the tachometer (MT) and LC. Connect one conductor to screw terminal 1 Tach and the other conductor to screw terminal 2 Tach, both on the bottom of PCB. The control circuit must not be grounded at any time. Neither of the two conductors can be grounded.

2. Interconnections BC to LC

Run six leads from BC through conduit to the magnetic logic cabinet (LC). Two of the leads should be the same size as the dc motor armature leads (A1 and A2) and four leads can be standard control wire of #16 or larger. Mark the leads at both ends, the heavy leads mark as P1 and N, the four control leads as Max-1, Min, P1 and PSC.

2.1 Connections at BC

2.1.1 Connect the heavy lead marked P1 to the large screw terminal on the bottom of overload relay (OL).

2.1.2 Connect the heavy lead marked N to screw terminal N on the bottom of the Thyristor Power Assembly (TPA).

2.1.3 Connect control lead marked Max-1 to the small screw terminal on the bottom of OL that has no wire connected to it.

2.1.4 Connect control lead marked R1 to screw terminal R1 on the bottom of PCB.

2.1.5 Connect control lead marked Min to screw terminal Min on the bottom of PCB.

2.1.6 Connect control lead marked PSC to screw terminal PSC on the bottom of PCB.

2.2 Connections At LC

2.2.1 Connect heavy lead marked P1 to terminal block P on the blue terminal block group.

2.2.2 Connect heavy lead marked N to terminal block N on the blue terminal block group.

2.2.3 Connect control lead marked R1 to screw terminal R1 on the left side of logic board (LB).

2.2.4 Connect control lead marked Min to screw terminal Min on the left side of LB.

2.2.5 Connect control lead marked Max-1 to screw terminal Max on the left side of LB.

2.2.6 Connect control lead marked PSC to screw terminal PSC on the left side of LB.

3. Interconnections LC to OS

Run nine wires of standard control size #16 or larger from LB in LC through conduit to the operators control station (OS). Mark all leads at both ends.

3.1 Connections At LC On LB

All nine leads connect to screw terminals on the bottom of LB. The leads in a bundle after connections are made on LB.

3.1.1 Connect lead marked 1 to screw terminal 1.

3.1.2 Connect lead marked 2 to screw terminal 2.

3.1.3 Connect lead marked 3 to screw terminal 3.

3.1.4 Connect lead marked 4 to screw terminal 4.

3.1.5 Connect lead marked 9 to screw terminal 9.

3.1.6 Connect lead marked 10 to screw terminal 10.

3.1.7 Connect lead marked 11 to screw terminal 11.

3.1.8 Connect lead marked 12 to screw terminal 12.

3.1.9 Connect lead marked 13 to screw terminal 13.

3.2 Connections in OS

3.2.1 On the ON-OFF switch connect lead marked 11 to terminal ON, a factory installed wire should already be connected to this point, the addition of lead marked 11 will make two wires connected to the ON terminal.

3.2.2 On the On-Off Switch connect lead marked 12 to the common terminal of the switch. (Center terminal of the switch).

3.2.3 Connect lead marked 1 to terminal (bottom terminal) of the insulated pot mounting (IPM).

3.2.4 Connect lead marked 2 to terminal 2 (Next to bottom terminal) on IPM.

3.2.5 Connect lead marked 3 to terminal 3 (Next to top terminal) on IPM.

3.2.6 Connect lead marked 13 to terminal 4 (Top terminal) on IPM.

3.2.7 Connect lead marked 4 to the RUN (top terminal) of the pushbutton contact block.

3.2.8 Connect lead marked 9 to the common terminal between RUN and STOP (Center terminal) of the pushbutton contact block.

3.2.9 Connect lead marked 10 to the STOP (Bottom terminal) of the pushbutton contact block.

4. AC Power Input Into BC

Refer to Table I for the correct AC input voltage to be applied. Be sure that the correct 1 Phase AC power is connected to BC.

4.1 Connect incoming AC lead V to terminal V on the bottom of TPA.

4.2 Connect incoming AC lead U1 to the screw terminal on fuse FU that has no wire connected to it. Incoming AC is fused on one side at all times - do not by-pass fuse FU at any time.

5. AC Power Into LC

Diagram 2 shows the connections for the two acceptable incoming 1 Phase, 50/60 HZ voltages. The top of the diagram shows the connections for 230V input into the transformer CT.

5.1 230V Input

5.1.1 Between transformer CT primary terminals add a jumper TJ1 between terminals H1 and H3.

5.1.2 Between transformer CT primary terminals add a jumper TJ3 between terminals H2 and H4.

5.1.3 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC1 to transformer CT, terminal H1.

5.1.4 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC2 to transformer CT, terminal H4.

5.2 115V Input
The bottom of Diagram 2 shows the connections for 115V, 1 Phase, 50/60HZ input power to LC.

5.2.1 Connect incoming AC 115V, 1 Phase, 50/60 HZ, lead AC1 to terminal block 1FU on the blue terminal block group in LC.

5.2.2 Connect incoming AC 115V, 1 Phase, 50/60HZ, lead AC2 to terminal block 2FU on the blue terminal block group in LC.

Before applying AC power recheck all connections, be sure that all wires are secure and that the dc motor rotation is correct before coupling the motor into the mechanical load.

START-UP INSTRUCTIONS

Recommended Start-Up Procedure:

1. Check all interconnections per Diagram 1V for CEMF Drives or Diagram 1S for Speed regulated drives.

2. Check incoming 1 Phase, 50/60HZ incoming AC power per Diagram 2 and instructions in sections 4 and 5 of Electrical interconnections.

3. Check dc motor rotation. Rotation as connected per Diagram 1V and 1S is CCW when viewed from the DC motor commutator end (Carbon brushes are mounted on the commutator end). If CW rotation is required interchange the motor shunt field leads, F1 and F2, preferably at the motor terminals. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date, but the motor armature circuitry could be changed for some functions).

4. Set the speed control pot SP on OS in the minimum speed, fully CCW, position. Set ON-OFF switch to OFF.

5. Apply correct AC input power to U1 and V in BC,

6. Apply correct AC input power AC1 and AC2 in LC.

7. Set the ON-OFF switch on OS to ON. The red indicating light on OS should indicate the presence of AC control power in OS and LC.

8. Besure that the minimum speed potentiometer 2P on PCB is set in the minimum, fully CCW, position, see I.L. 22-1000-7 for instructions.

9. Depress the RUN pushbutton on OS. The dc motor should start to rotate - check direction of rotation, if incorrect go back to step 3 and follow instructions. See I.L. 22-1000-7 for instruction on setting minimum speed.

10. Adjust the Speed Control Pot (SP) on OS to its maximum, fully CW, position. The motor should accelerate up to base speed (Motor Nameplate RPM). See I.L. 22-1000-7 for instruction for setting the maximum speed pot, 1P on PCB. Return SP to its minimum speed position.

11. Recheck the minimum speed, trim pot 2P on PCB if required.

12. Depress the STOP pushbutton on OS, the motor should coast to a ston.

13. Setting of Current Limit, (CL), pot 3P on PCB in BC reference I.L. 22-1000-7.
    a. Turn ON-OFF switch on OS to OFF.
    b. Set pots 3P (CL) and 4P (Torque Limit)(TL) on PCB in the maximum CCW positions.
    c. Disconnect dc motor shunt field lead F1 at terminal CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected can not develope enough torque to cause the motor to rotate.
    d. Connect a suitable dc ammeter in the dc motor armature circuit meter must have a range of at least 250% of rated armature current of drive. Suggested location of ammeter - remove lead P1 from the bottom of overload relay OL in BC, connect the (+) terminal of the ammeter to OL and lead P1 to the (-) terminal of the ammeter.

e. Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.
f. Apply AC input power to BC and LC.
g. Set the ON-OFF switch to ON. The indicating light on OS will be lighted.
h. Depress the RUN pushbutton on OS, be prepared to quickly depress the STOP pushbutton on OS to minimize the time that armature current is permitted to flow. Armature current will increase rapidly up to approximately 75% of rated motor armature current. Adjust CL pot 3P on PCB CW until 200% rated armature amps is reached. Press the STOP pushbutton on OS. CL should now be set at 150% rated armature amps at motor base speed and 200% for stalled conditions.
i. Set ON-OFF switch in the OFF position.
j. Remove all AC power.

Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR	
	VOLTS	AMPS	AMPS	AMPS	
1/4	90	2.8	4.2	5.6	
1/3		3.3	4.95	6.6	
1/2		5.5	8.25	11	
3/4		8.1	12.15	16.2	
1	180	5.2	7.8	10.4	
1-1/2		7.4	11.1	14.8	
2		9.6	14.4	19.2	
3		14.2	21.3	28.4	
4		19	27.5	38	
5		25	37.5	50	

14. Setting of Torque Limit (TL) pot 4P on PCB in BC Reference I.L. 22-1000-7.

The torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If the drive is used in an application such as a winder in which torque limit control is required CW adjustment of pot 4P will cause CL to be limited at a lower level at high motor speeds than at low motor speed as shown in Figure 1.

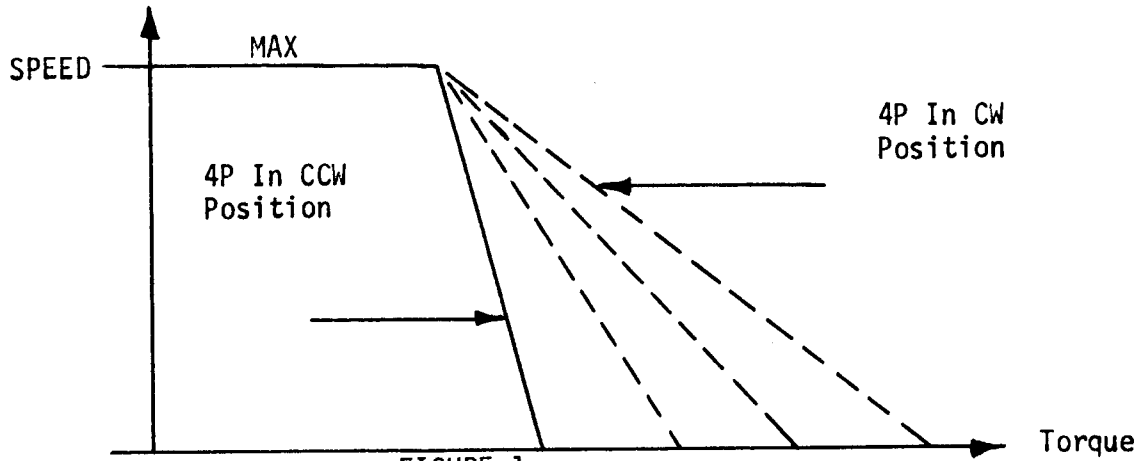


FIGURE 1
TORQUE LIMIT ADJUSTMENT

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor RPM the CL is the same for all settings of torque limit. Be sure that the use of torque limit and CL is understood before making any adjustment of TL pot 4P or damage to equipment can result.

15. I.R. Drop Compensation, IR COMP, Pot 5P on PCB in BC.
Reference I.L. 22-1000-7.
   a. Pot 5P is always set in the maximum CCW position for speed regulated (Tach feedback) drives.
   b. For voltage regulated CEMF, drive pot 5P is set to give flat motor RPM full-load to minimum load. This setting is usually made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full-load current as at minimum load at this low motor RPM. If the minimum operating speed is greater than 20 to 25% of motor base speed, set I.R. Comp at this minimum operating speed.

TROUBLE SHOOTING

Refer to I.L. 22-1000-7

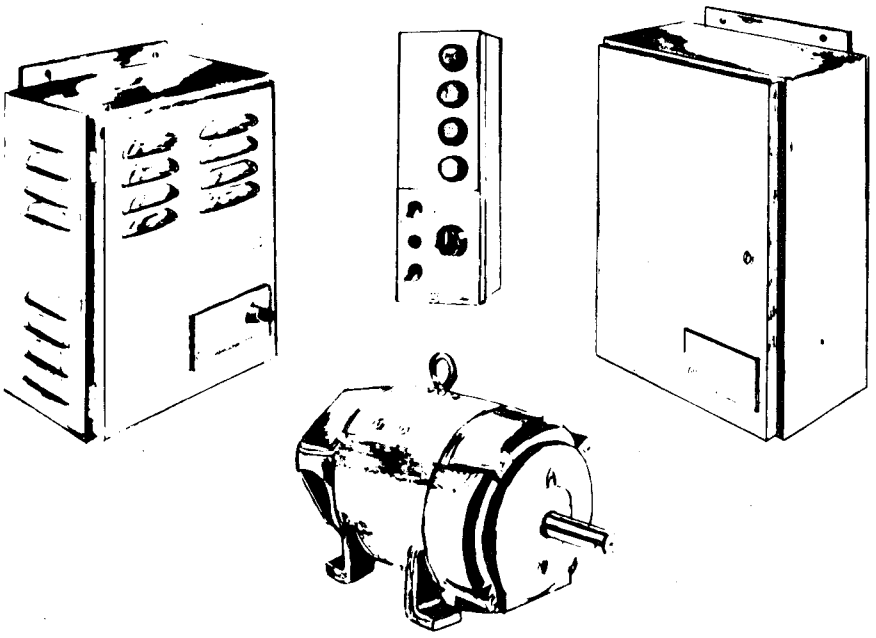
Additional checks should include the following:

1. Incoming AC, leads AC1 and AC2 on schematic 22-1000-5 and Diagrams 1V, 1S, and 2.
2. Interconnections between BC, LC, OS, and MOT.
3. Fuses FU1 and FU2.
4. Plug in relays RN, CX, and FX, check to see that they are secure.
5. Tighten screw terminals on LB and in OS.
6. Check switch and contact blocks in OS for proper operation.

If preceeding steps do not locate cause of malfunction, or if trouble cannot be corrected, contact nearest Westinghouse representative.

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A
22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE
I. L. 22-1000-5A

Westinghouse Electric Corporation

Printed in USA

INSTALLATION INSTRUCTIONS FOR A

22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE

A magnetic drive consists of four basic components, the basic controller, (BC), the magnetic controller, (MC), consisting of the magnetic contactor assembly (MCA) and the Relay Board (RB), the operators control station (OS), and the dc drive motor (MOT). The dc drive motor selection is flexible and is not readily fixed in identity. Two styled OS are available, one for the standard non-reversing drive, and the other for a non-reversing drive incorporating signal follow.

TABLE I

DC MOTOR (MOT) RATING			BASIC CONTROLLER (BC)	MAGNETIC CONTROLLER (MC)	OPERATORS CONTROL STATION (OS)	
HP	ARM VOLTS	FIELD VOLTS	STYLE	STYLE	STANDARD STYLE	FOLLOWER STYLE
1/4	90	100	1459A06G01	1459A08G01	1459A12G01	1459A12G03
1/3	90	100	1459A06G02	1459A08G01	I.L. 22-1000-5	I.L. 22-1000-11
1/2	90	100	1459A06G03	1459A08G01		
3/4	90	100	1459A06G04	1459A08G01		
1	180	200	1459A06G05	1459A08G03		
1-1/2	180	200	1459A06G06	1459A08G03		
2	180	200	1459A06G01	1459A08G05		
3	180	200	1459A07G02	1459A08G05		
4	180	200	1459A07G03	1459A08G05		
5	180	200	1459A07G04	1459A08G05		

Check Table I for the basic controller, the magnetic controller, the operators control station, and the dc drive motor listing for ratings and style numbers.

Examine all components for damage. If any damage to equipment exists when received, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse representative for instructions about handling damage claims.

INSTALLATION INSTRUCTIONS

Installation of the four pieces of equipment should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool, dry, dust-free atmosphere, easily accessable for maintenance and good housekeeping practices.

The dc drive motor must be located, mounted, aligned, and operated in accordance with the specific type of motor being applied.

Westinghouse Electric Corporation

Printed in USA

MOUNTING OF EQUIPMENT

1. Mounting the Basic Controller (BC)

The Basic Controller (BC) when in an enclosure or cabinet is a type Nema I controller and therefore should be located in an area suitable for this enclosure class. The location should be dry, dust-free, and relatively cool (40 Degrees C ambient or less) to obtain long trouble-free operation.

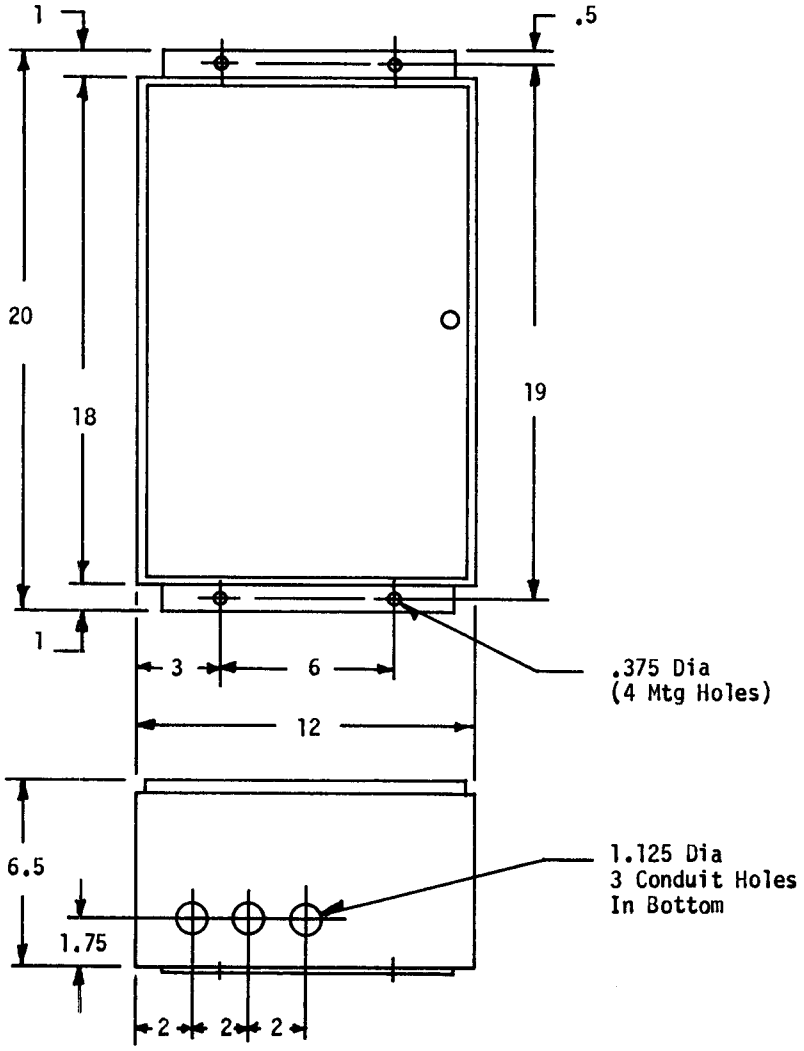
a. See I.L. 22-1000-7 for the mounting dimensions.

b. Use four 3/8" bolts, or screws, to mount the enclosure to a suitable vertical surface that is smooth, dry, and of sufficient area and strength to accept and support the basic controller.

2. Mounting the Magnetic Controller (MC)

The Magnetic Controller (MC) when in an enclosure or cabinet is a type Nema I controller and therefore should be located in an area suitable for this enclosure class. The location should be dry, dust-free, and relatively cool (40 Degrees C ambient or less) to obtain long trouble-free operation.

Figure 1, is the installation plan for mounting of (MC). Use 3/8" mounting hardware.



INSTALLATION PLAN FOR THE MAGNETIC CONTROLLER (MC)

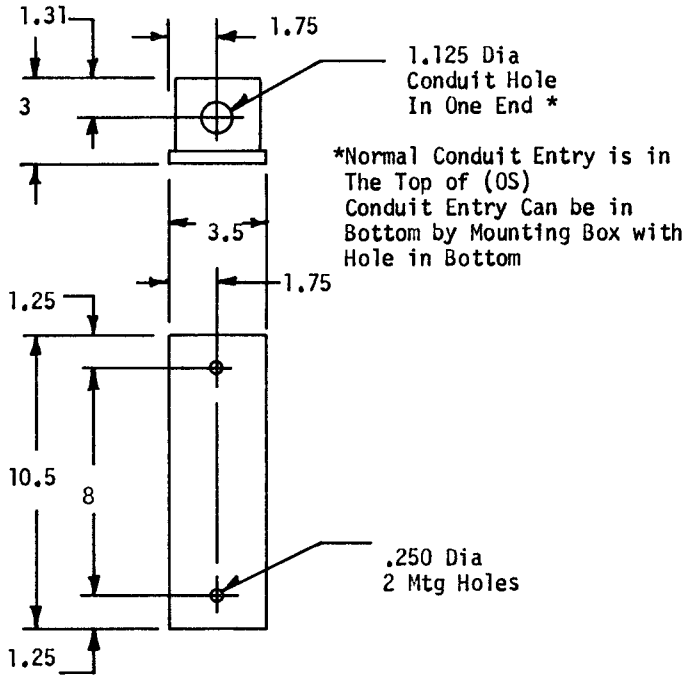
FIGURE I

Printed in USA

3. Mounting The Operators Control Station (OS).

The OS is a type Nema I design, therefore should be located in an area suitable for this enclosure class.

Figure 2 is the installation plan.



INSTALLATION PLAN FOR THE OPERATORS CONTROL STATION (OS)

FIGURE 2

4. Mounting the DC Drive Motor (MOT)

Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be followed.

Printed in USA

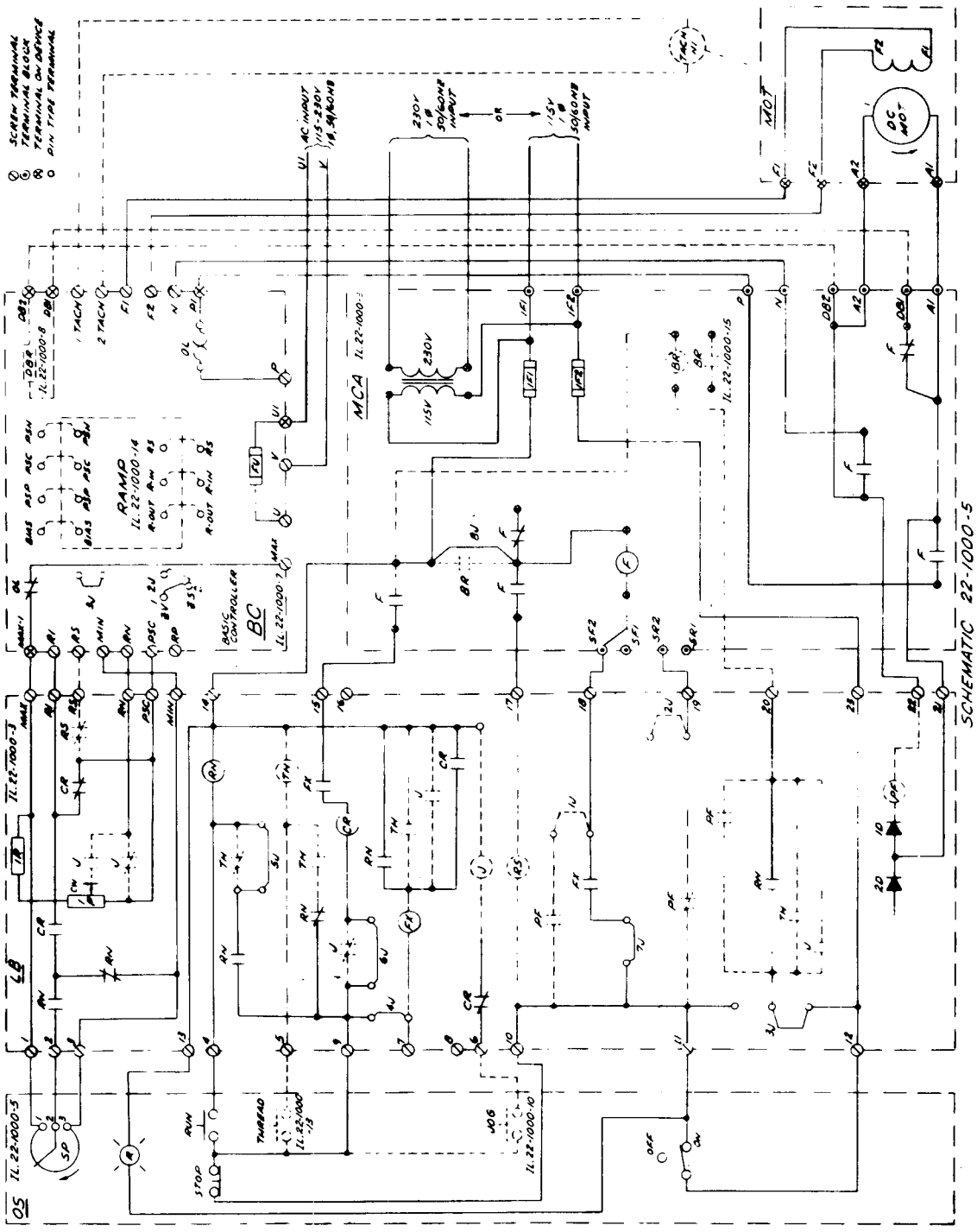
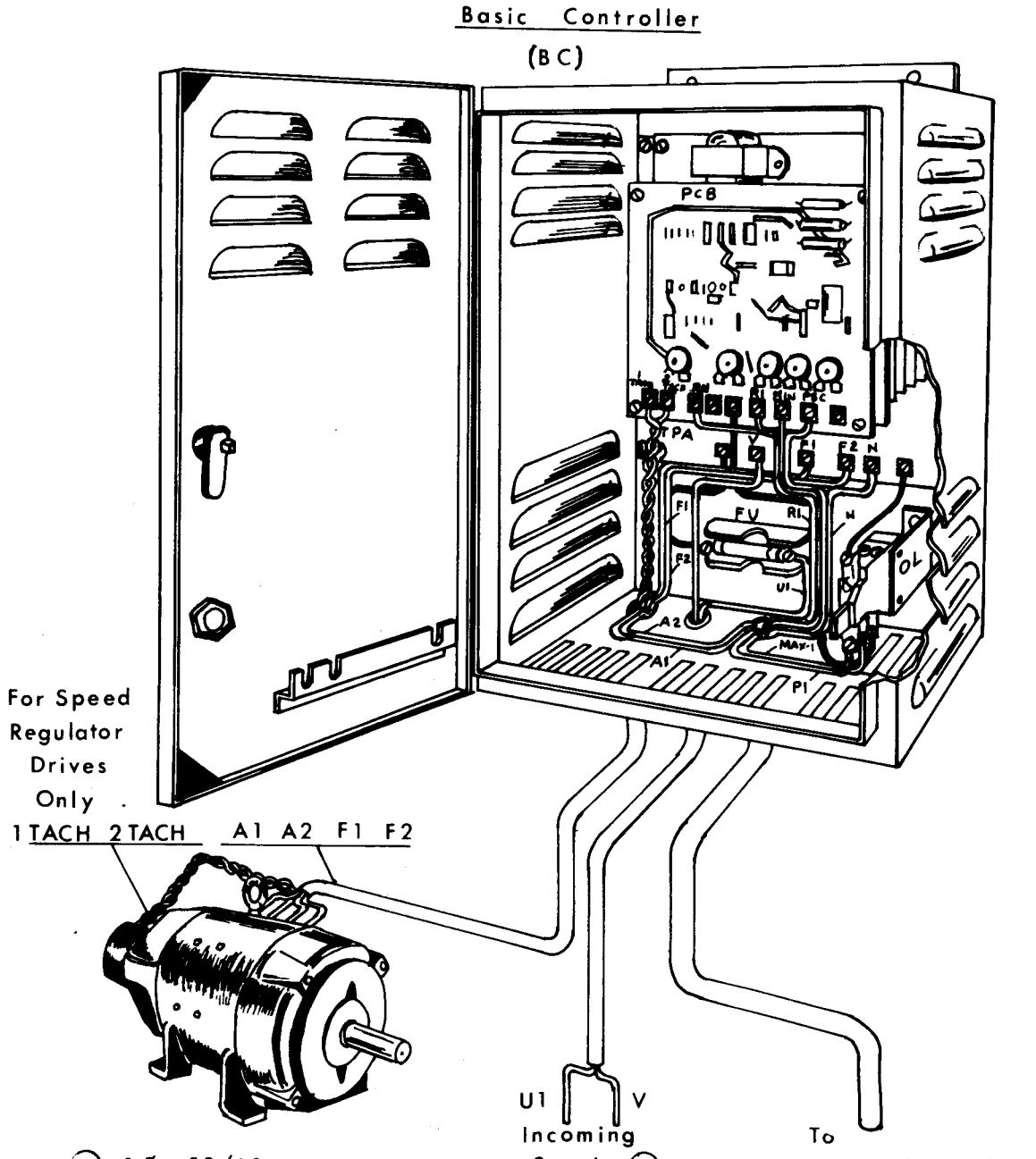


FIGURE 3

Printed in USA

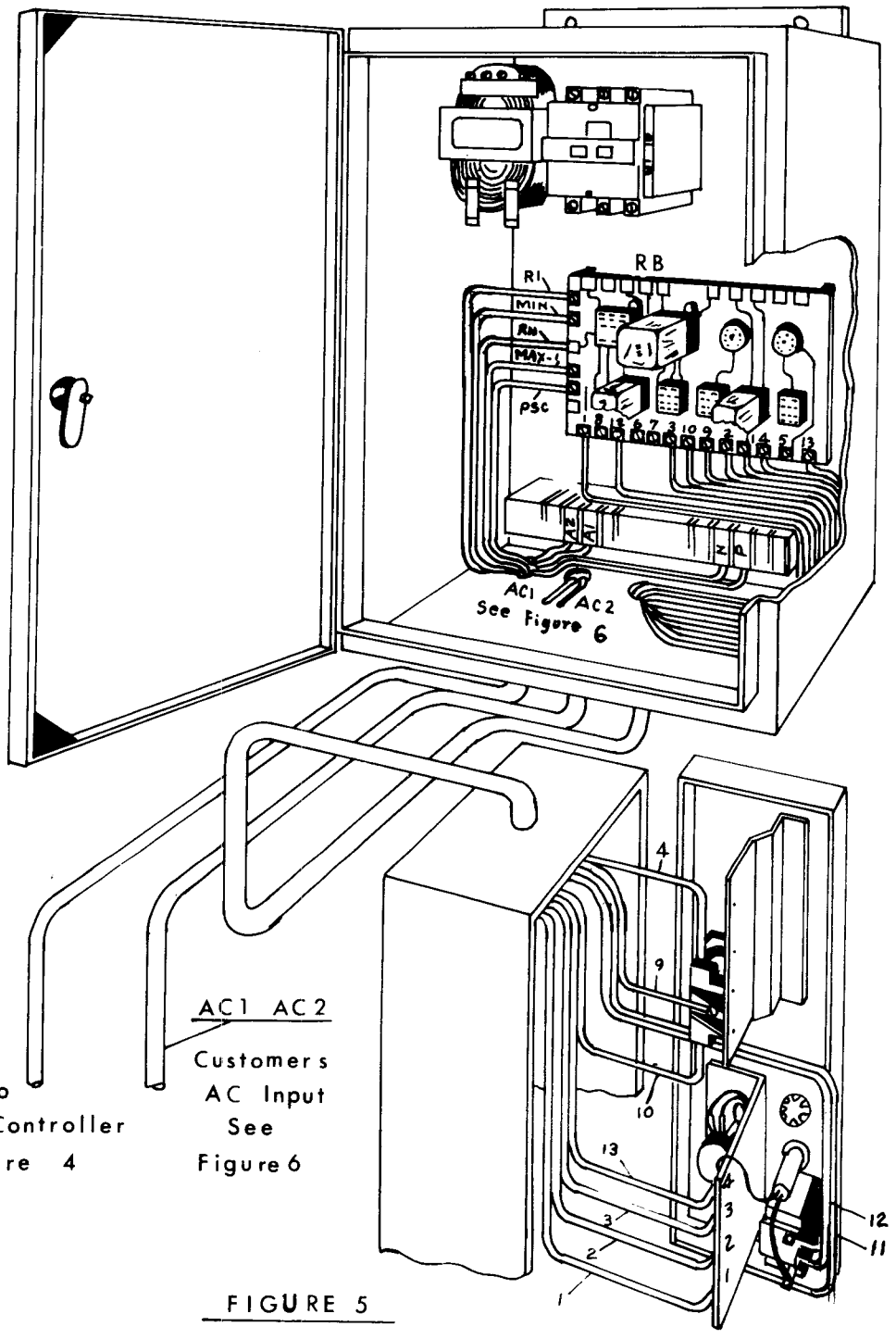


① 1 Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

FIGURE 4

Printed in USA

Magnetic Controller
(MC)



To
Basic Controller
Figure 4

AC1 AC2

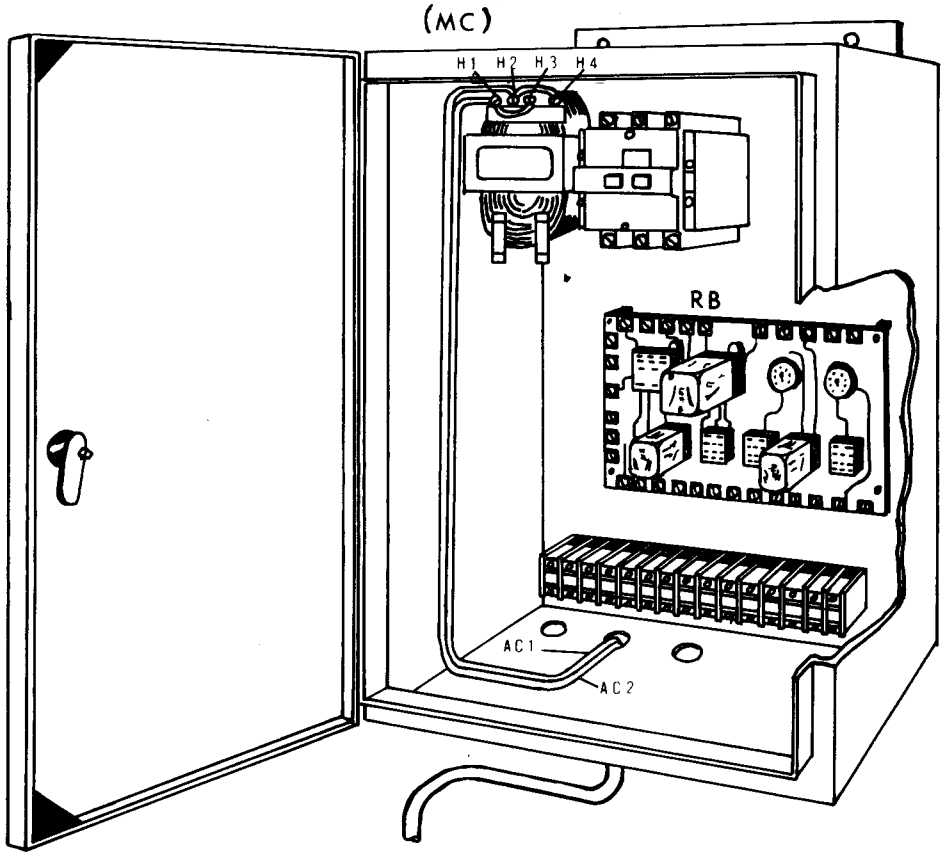
Customers
AC Input
See
Figure 6

FIGURE 5

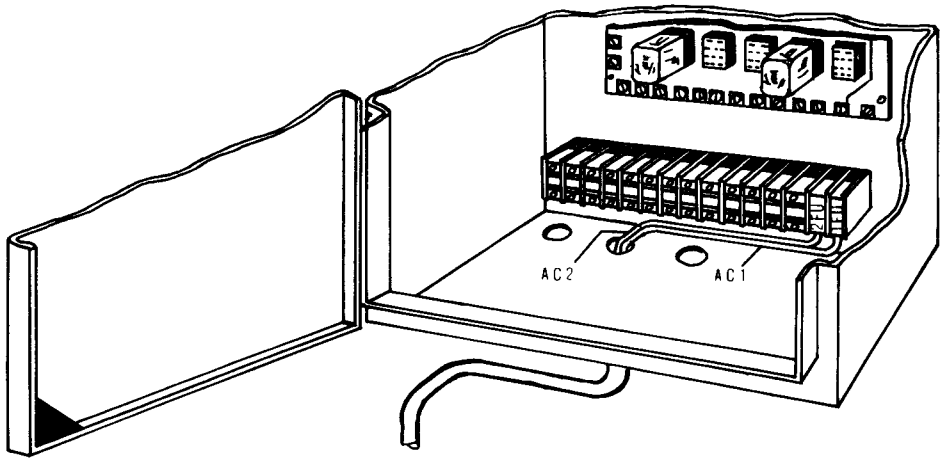
Westinghouse Electric Corporation

Printed in USA

Magnetic Controller
(MC)



230V – 1 Ø – 50 /60 HZ



115 V – 1 Ø – 50 / 60 HZ

FIGURE 6

Printed in USA

Electrical Interconnections

Reference Schematic 22-1000-5 Figure 3
Diagrams - Figures 4, 5, and 6

DO NOT GROUND ANY CONTROL CIRCUIT LEADS AT ANY TIME

NOTE 1: If the control circuitry cannot be isolated from ground then only the positive side of the incoming signal intelligence can be grounded.
(TPM positive, TP, is directly tied to the drive common PSC. If the negative input REF were earth grounded and a second earth ground occurred that would cause PSC to also go to earth ground, it is possible to destroy the controller and damage the DC motor).

Schematic 22-1000-5 is a composite schematic showing the magnetic non-reversing drive and the standard options that can be incorporated in the drive either at time of purchase or by using "Function Kits" added at any future date. The options are shown by dotted or broken lines in the circuit flow. It is suggested that the composite schematic be up-dated each time a function kit is added by changing the associated dotted or broken lines to solid lines as detailed in the I.L. accompanying each "kit".

Diagrams Figure 4 and 5 show the recommended interconnections between BC, MC, OS, and the DC drive motor per schematic 22-1000-5 for CEMF regulated drives. Plus two leads 1 Tach, and 2 Tach shown in dotted lines on schematic 22-1000-5 with motor mounted dc tachometer, will change the CEMF regulated drive to a speed regulted drive. (I.R. Comp pot 5P, on BC must be set in the maximum CCW position on all speed regulated drives).

Diagram Figure 6 shows the interconnections for the customer incoming AC supply, leads AC1 and AC2. The transformer is used when customer control voltage is 230V, 1 Phase, 50/60HZ. The transformer is not required if 115V, 1 Phase, 50/60HZ input control power is used.

The wiring as shown provides the flexibility required to permit the addition of the various "function kits", shown in broken line on schematic 22-1000-5, at any time using the detailed installation instructions provided with each function kit.

1. Interconnections Between DC Motor (MOT) and Basic Controller (BC)

1.1 CEMF Regulated Drives - Diagram Figure 3
Run four wires from the dc motor (MOT) through conduit to the basic controller cabinet (BC), entering at the bottom of the cabinet using one of the large conduit openings. Motor armature leads (A1 and A2) should be sized according to motor HP -- motor armature current, and the motor shunt field leads (F1 and F2) can be standard control wire of #16 or larger. Mark leads on both ends.

1.1.1 Connect shunt field lead marked F1 to screw terminal F1 on the bottom of printed circuit board PCB.

1.1.2 Connect shunt field lead marked F2 to screw terminal F2 on the bottom of PCB.

1.1.3 Run the two armature leads (A1 and A2) across the bottom of BC and out through the conduit running between BC and the magnetic controller (MC). Connect motor armature lead marked A1 to terminal block A1 on the bottom of the panel in MC. Connect armature lead marked A2 to terminal block A2 in MC.

1.2 Speed Regulated Drives - Diagram Figure 4

Complete all connections between MOT and BC for CEMF regulated drives except run a total of six leads between MOT and BC. The fifth and sixth leads should be a twisted pair, running between the tachometer (MOT and BC). Connect one conductor to screw terminal 1 Tach and the other conductor to screw terminal 2 Tach, both on the bottom of PCB. The control circuit must not be grounded at any time. Neither of the two conductors can be grounded.

Printed in USA

2. Interconnections

Run seven leads from BC through conduit to the magnetic controller (MC). Two of the leads should be the same size as the dc motor armature leads (A1 and A2) and five leads can be standard control wire of #16 or larger. Mark the leads at both ends, the heavy leads mark as P1 and N, the five control leads as Max-1, Min, R1, RN and PSC.

2.1 Connections at BC

2.1.1 Connect the heavy lead marked P1 to the large screw terminal on the bottom of overload relay (OL).

2.1.2 Connect the heavy lead marked N to screw terminal N on the bottom of the Thyristor Power Assembly (TPA).

2.1.3 Connect control lead marked Max-1 to the small screw terminal on the bottom of OL that has no wire connected to it.

2.1.4 Connect control lead marked R1 to screw terminal R1 on the bottom of PCB.

2.1.5 Connect control lead marked Min to screw terminal Min on the bottom of PCB.

2.1.6 Connect control lead marked PSC to screw terminal PSC on the bottom of PCB.

2.1.7 Connect control lead marked RN to screw terminal RN on thebottom of PCB.

2.2 Connections at MC

2.2.1 Connect heavy lead marked P1 to terminal block P on the blue terminal block group.

2.2.2 Connect heavy lead marked N to terminal block N on the blue terminal block group.

2.2.3 Connect control lead marked R1 to screw terminal R1 on the left side of relay board (RB).

2.2.4 Connect control lead marked Min to screw terminal Min on the left side of RB.

2.2.5 Connect control lead marked Max-1 to screw terminal Max on the left side of RB.

2.2.6 Connect control lead marked PSC to screw terminal PSC on the left side of RB.

2.2.7 Connect control lead marked RN to screw terminal RN on the left side of RB.

3. Interconnections Between Magnetic Controller (MC) and Operator Station (OS)

Run nine wires of standard control size #16 or larger from RB in MC through conduit to the operators control station (OS). Mark all leads at both ends as follows 1, 2, 3, 4, 9, 10, 11, 12, and 13 per Figure 5.

3.1 Connections At MC

All nine leads connect to screw terminals on the bottom of RB, identified with the same number as the lead.

3.2 Connections in OS

Printed in USA

3.2.1 On the ON-OFF switch connect lead marked 11 to terminal ON, (Bottom terminal) a factory installed wire should already be connected to this point, the addition of lead marked 11 will make two wires connected to the ON terminal.

3.2.2 On the ON-OFF Switch connect lead marked 12 to the common terminal of the switch. (Center terminal of the Switch).

3.2.3 Connect lead marked 1 to terminal 1 (Bottom terminal) of the insulated pot mounting (IPM).

3.2.4 Connect lead marked 2 to terminal 2 (next to bottom terminal) on IPM.

3.2.5 Connect lead marked 3 to terminal 3 (next to top terminal) on IPM.

3.2.6 Connect lead marked 13 to terminal 4 (Top terminal) on IPM.

3.2.7 Connect lead marked 4 to the RUN (Top terminal) of the pushbutton contact block.

3.2.8 Connect lead marked 9 to the common terminal between RUN and STOP (Center terminal) of the pushbutton contact block.

3.2.9 Connect lead marked 10 to the STOP (Bottom terminal) of the pushbutton contact block.

4. AC Power Input Into BC

Diagram (Figure 4) shows the connections for the incoming 1 Phase 50/60HZ voltages

Refer to Table I for the correct AC input voltage to be applied. Be sure that the correct 1 phase AC power is connected to BC.

4.1 Connect incoming AC lead V to terminal V on the bottom of thyristor power assembly in the basic controller.

4.2 Connect incoming AC lead U1 to the screw terminal on fuse FU that has no wire connected to it. Incoming AC is fused on one side at all times - do not by-pass fuse FU at any time.

5. AC Power Into MC

Figure 6 shows the connections for the two acceptable incoming 1 phase, 50/60HZ voltages, the top section of Figure 6 shows the connections for 230V input into the transformer CT. The bottom section of Figure 6 shows the connections for 115V input.

5.1 230V Input

5.1.1 Between transformer CT primary terminals add a jumper TJ1 between terminal H1 and H3.

5.1.2 Between transformer CT primary terminals add a jumper TJ3 between terminals H2 and H4.

5.1.3 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC1 to transformer CT, terminal H1.

5.1.4 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC2 to transformer CT, terminal H4.

5.2 115V Input

5.2.1 Connect incoming AC 115V, 1 Phase, 50/60HZ, lead AC1 to terminal block 1FU on the blue terminal block group in MC.

5.2.2 Connect incoming AC 115V, 1 Phase, 50/60HZ, lead AC2 to terminal block 2FU on the blue terminal block group in MC.

Before applying AC power recheck all connections, be sure that all wires are secure and that the dc motor connections will give the rotation before coupling the motor into the mechanical load.

Printed in USA

START-UP INSTRUCTIONS

Recommended Start-Up Procedure:

1. Check all interconnections per Figure 4 and 5.

2. Check incoming 1 Phase, 50/60HZ incoming AC power per Figure 6 and instructions in sections 4 and 5 of Electrical Interconnections.

3. Check dc motor rotation. Rotation as connected per Figure 4 is CCW when viewed from the DC motor commutator end (Carbon brushes are mounted on the commutator end). If CW rotation is required interchange the motor shunt field leads, F1 and F2, preferably at the motor terminals. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date, but the motor armature circuitry could be changed for some functions).

4. Set the speed control pot (SP) on OS in the mini mum speed, fully CCW, position. Set ON-OFF switch to OFF.

5. Apply correct AC input power to U1 and V in BC.

6. Apply correct AC input power AC1 and AC2 in MC.

7. Set the ON-OFF switch on OS to ON. The red indicating light on OS should indicate the presence of AC control power in OS and MC.

8. Besure that the minimum speed potentiometer 2P on PCB is set in the minimum, fully CCW, position.

9. Depress the RUN pushbutton on OS. The dc motor should start to rotate - check direction of rotation, if incorrect go back to step 3 and follow instructions. See I.L. 22-1000-7 for instruction on setting minimum speed.

10. Adjust the Speed Control Pot (SP) on OS to its maximum, fully CW, position. The motor should accelerate up to base speed (Motor Nameplate RPM). See I.L. 22-1000-7 for instruction for setting the maximum speed pot, 1P on PCB. Return SP to its minimum speed position.

11. Recheck the minimum speed, trim pot 2P on PCB if required.

12. Depress the STOP pushbutton on OS, the motor should coast to a stop.

13. Setting of Current Limit, (CL), pot 3P on PCB in BC reference I.L. 22-1000-7.
    a. Turn ON-OFF switch on OS to OFF.
    b. Set pots 3P (CL) and 4P (Torque Limit) (TL) on PCB in the maximum CCW positions.
    c. Disconnect dc motor shunt field lead F1 at terminal F1 on PCB CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected can not develop enough torque to cause the motor to rotate.
    d. Connect a suitable dc ammeter in the dc motor armature circuit. Meter must have a range of at least 250% of rated armature current of the drive. To connect the ammeter remove lead P1 from the bottom of overload relay OL in BC, Connect the (+) terminal of the ammeter to OL and lead P1 to the (-) terminal of the ammeter.
    e. Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.
    f. Apply AC input power to BC and MC.
    g. Set the ON-OFF switch to ON. The indicating light on OS will light.
    h. Depress the RUN pushbutton on OS, be prepared to quickly depress the STOP pushbutton on OS to minimize the time that armature current is permitted to flow. Armature current will increase rapidly up to approximately 75% of rated motor armature current. Adjust CL pot 3P on PCB CW until 200% rated armature amps is reached. Press the STOP pushbutton on OS. CL should now be set at 150% rated armature amps at motor base speed and 200% for stalled conditions.
    i. Set ON-OFF switch in the OFF position.
    j. Remove all AC power.

    Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR
	VOLTS	AMPS	AMPS	AMPS
1/4	90	2.8	4.2	5.6
1/3	90	3.3	4.95	6.6
1/2	90	5.5	8.25	11
3/4	90	8.1	12.15	16.2
1	180	5.2	7.8	10.4
1-1/2	180	7.4	11.1	14.8
2	180	9.6	14.4	19.2
3	180	14.2	21.3	28.4
4	180	19	27.5	38
5	180	25	37.5	50

14. Setting of Torque Limit (TL) pot 4P on PCB in BC reference I.L. 22-1000-7.

The torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If the drive is used in an application such as a winder in which torque limit control is required CW adjustment of pot 4P will cause CL to be limited at a lower level at high motor speeds than at low motor speeds as shown in Figure 7.

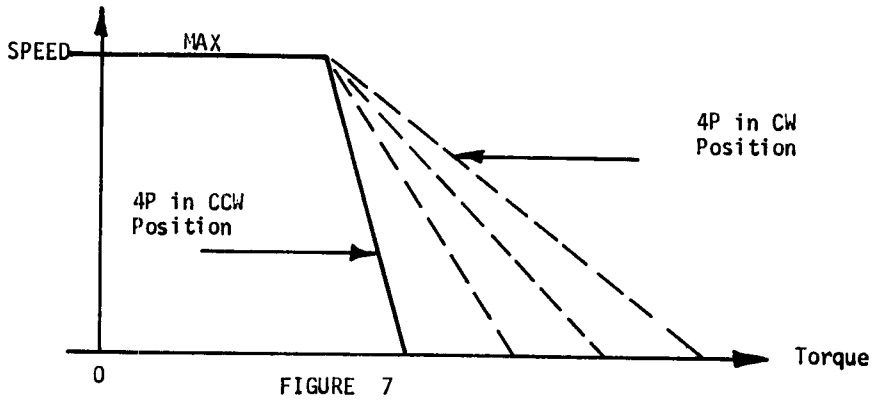


FIGURE 7

TORQUE LIMIT ADJUSTMENT

Printed in USA

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor RPM the CL is the same for all settings of torque limit. Be sure that the use of torque limit and CL is understood before making any adjustment of TL pot 4P or damage to equipment can result.

15. I.R. Drop Compensation, IR COMP, Pot 5P on PCB in BC.
Reference I.L. 22-1000-7.
a. Pot 5P is always set in the maximum CCW position for speed regulated (Tach feedback) drives.
b. For voltage regulated CEMF, drive pot 5P is set to give flat motor RPM full-load to minimum load. This setting is usually made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full-load current as at minimum load at this low motor RPM. If the minimum operating speed is greater than 20 to 25% of motor base speed, set I.R. Comp at this minimum operating speed.

TROUBLE SHOOTING

Refer to I.L. 22-1000-7

Additional checks should include the following:

1. Check incoming AC, leads AC1 and AC2 on schematic 22-1000-5 Figure 3 and Diagrams, Figures 4, 5, and 6.

2. Check Interconnections between BC, MC, OS, and MOT.

3. Check fuses FU1 and FU2.

4. Check plug in relays RN, CX, and FX, to see that they are secure.

5. Tighten screw terminals on LB and in OS.

6. Check switch and contact blocks in OS for proper operation.

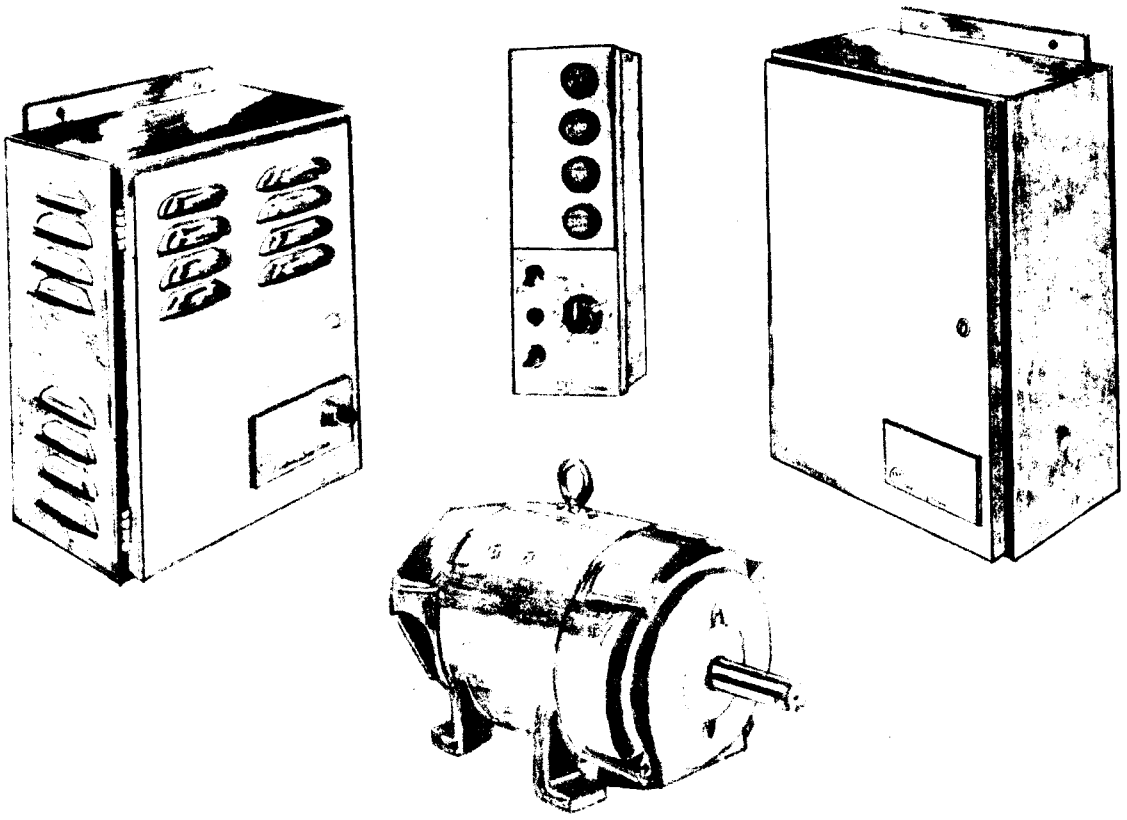
If preceeding steps do not locate cause of malfunction, or if trouble cannot be corrected, contact nearest Westinghouse representative.

Westinghouse Electric Corporation

Printed in USA

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A

22-1000 1 PHASE REVERSING MAGNETIC DRIVE

I. L. 22-1000-6

INSTALLATION INSTRUCTIONS FOR A 22-1000 1 PHASE REVERSING MAGNETIC DRIVE

A magnetic drive consists of four basic components, the basic controller, (BC), the magnetic logic cabinet, (LC), consisting of the magnetic contactor assembly (MCA) and the logic board (LB), the operators control station, (OS), and the dc drive motor (MOT). The dc drive motor selection is flexible and is not readily fixed in identity. Two styled OS are available, one for the standard reversing drive, and the other for a reversing drive incorporating signal follow.

TABLE I

DC MOTOR (MOT) RATING			BASIC CONTROLLER (BC)	MAGNETIC LOGIC CABINET (LC)	OPERATORS CONTROL STATION (OS)	
HP	ARM VOLTS	FIELD VOLTS	STYLE	STYLE	STANDARD STYLE	FOLLOWER STYLE
1/4	90	100	1459A06G01	1459A08G02	1459A12G02	1459A12G04
1/3	90	100	1459A06G02	1459A08G02	I.L.22-1000-6	I.L.22-1000-12
1/2	90	100	1459A06G03	1459A08G02		
3/4	90	100	1459A06G04	1459A08G02		
1	180	200	1459A06G05	1459A08G04		
1-1/2	180	200	1459A06G06	1459A08G04		
2	180	200	1459A07G01	1459A08G06		
3	180	200	1459A07G02	1459A08G06		
4	180	200	1459A07G03	1459A08G06		
5	180	200	1459A07G04	1459A08G06		

Check the basic controller, magnetic logic cabinet, operators control station, and the dc drive motor rating with Table I.

Examine all components for damage which could have occurred during shipment. If a component is damaged, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse representative if any damage to the equipment exists.

INSTALLATION INSTRUCTIONS

Installation of the four pieces of equipment should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire used should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool, dry, dust-free atmosphere, easily accessible for maintenance and good housekeeping practices.

The dc drive motor must be located, mounted, aligned, and operated in accordance with the specific type of motor being applied.

MOUNTING OF EQUIPMENT

1. Mounting of the Basic Controller (BC)

   The BC enclosure or cabinet is NEMA 1 and therefore must be located in an area suitable for NEMA 1 enclosures. The location should be dry, dust-free, and relatively cool (40°C ambient or less) to obtain long trouble-free operation.

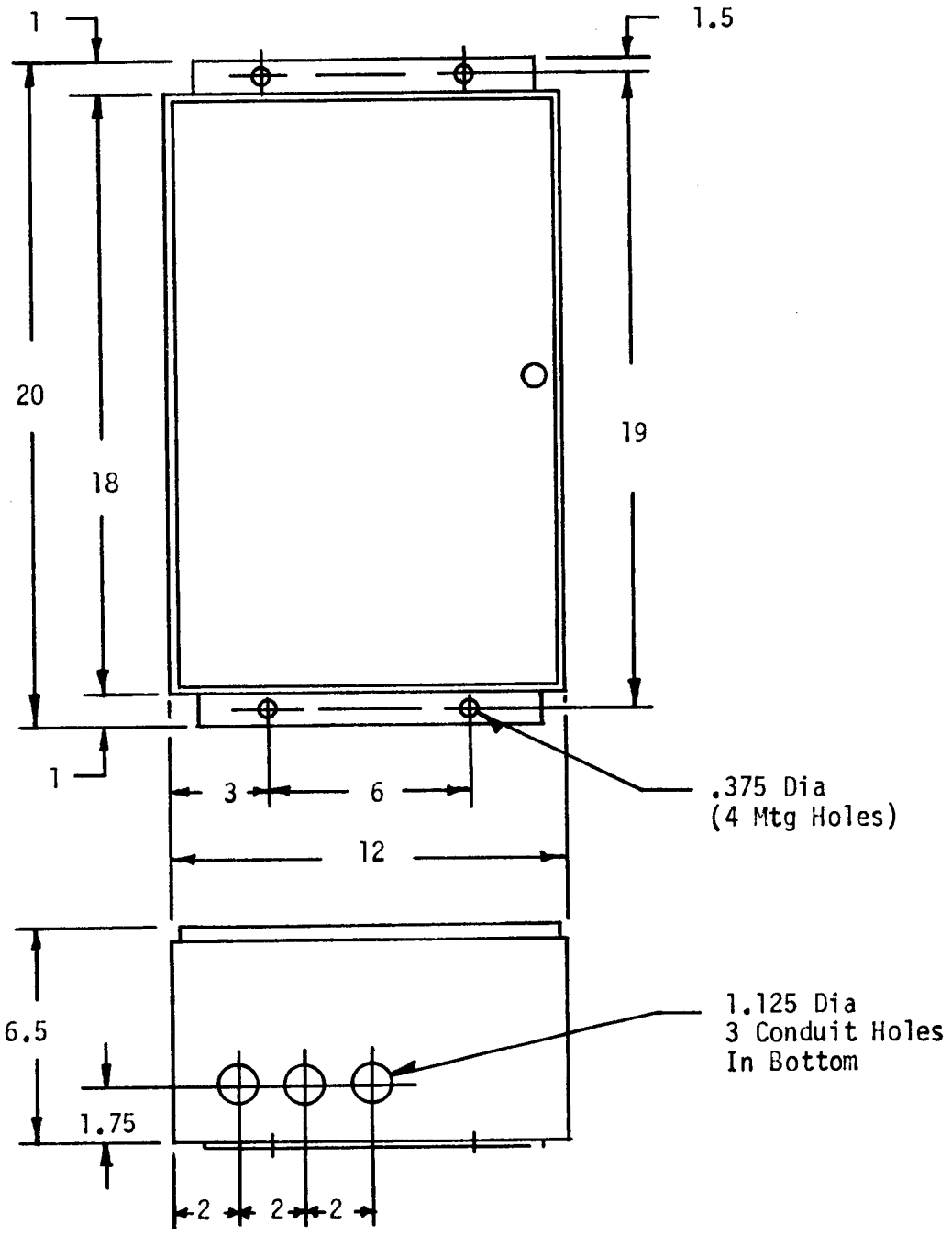
   (a) See IL 22-1000-7 for mounting dimensions for the mounting of BC.

   (b) Use four 3/8" bolts, or screws, to mount the enclosure to a suitable vertical surface that is smooth, dry, and of sufficient area and strength to accept and support the basic controller.

2. Mounting of the Magnetic Logic Cabinet (LC)

   The enclosure for LC is of NEMA 1 design, therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dust-free, and relatively cool (40°C ambient or less) to obtain long trouble-free operation.

   Figure 1, is the installation plan for mounting of LC. Use 3/8" mounting hardware.



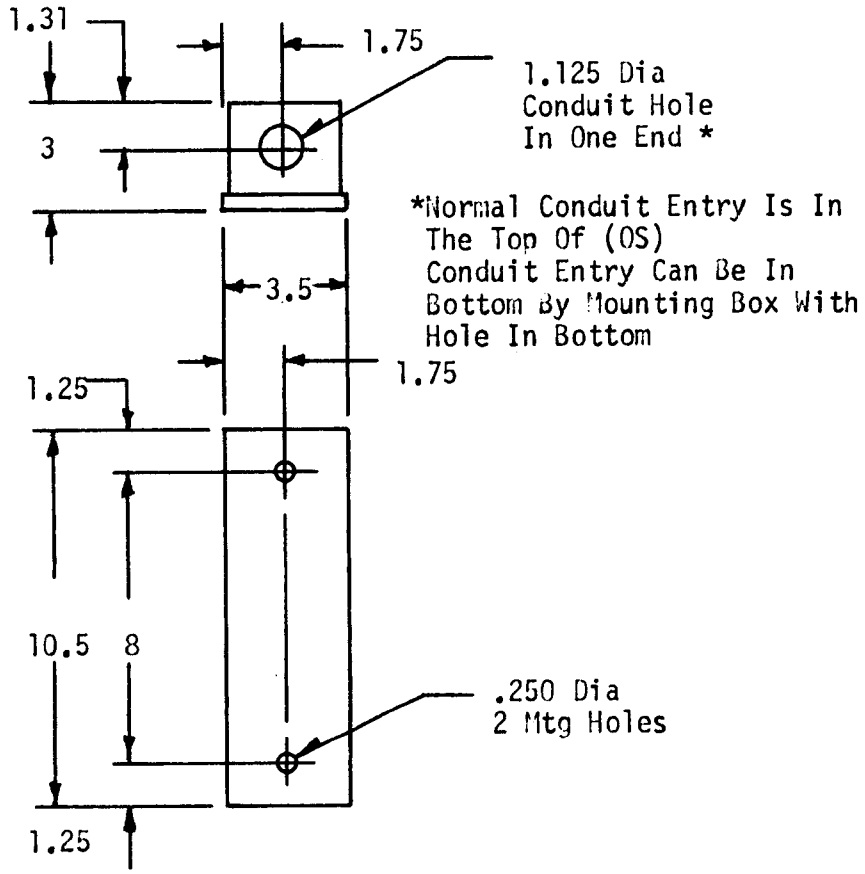
INSTALLATION PLAN FOR MAGNETIC LOGIC CABINET (LC)

FIGURE 1

3. Mounting of the Operators Control Station (OS)

The OS is NEMA 1 design, therefore must be located in an area suitable for NEMA 1 enclosures.

Figure 2 is the installation plan for the mounting of OS.

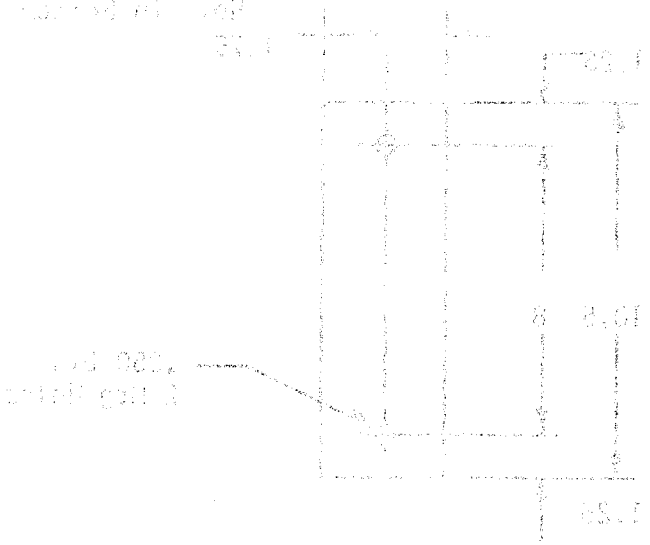


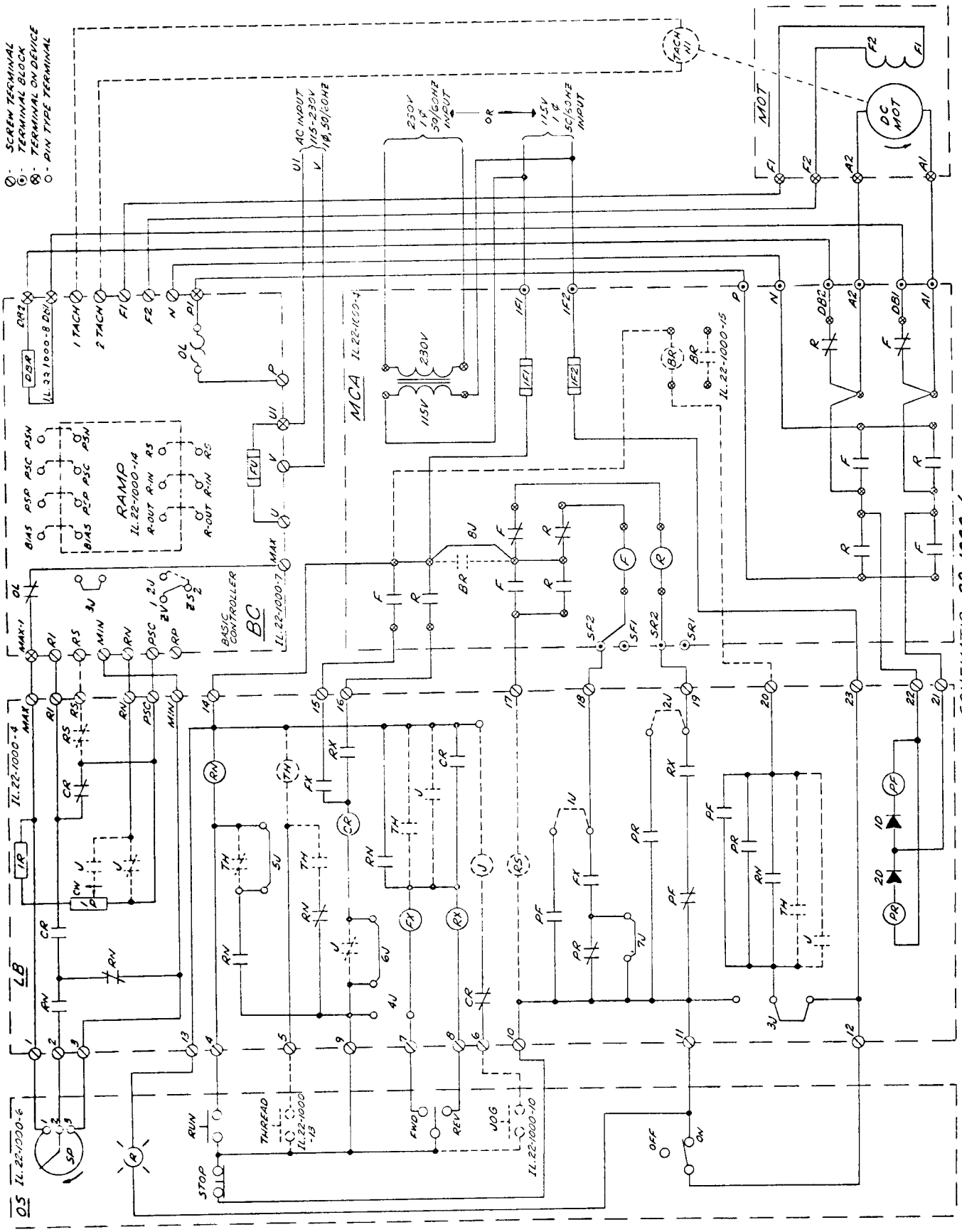
INSTALLATION PLAN FOR OPERATORS CONTROL STATION (OS)

FIGURE 2

4. Mounting of the DC Drive Motor (MOT)

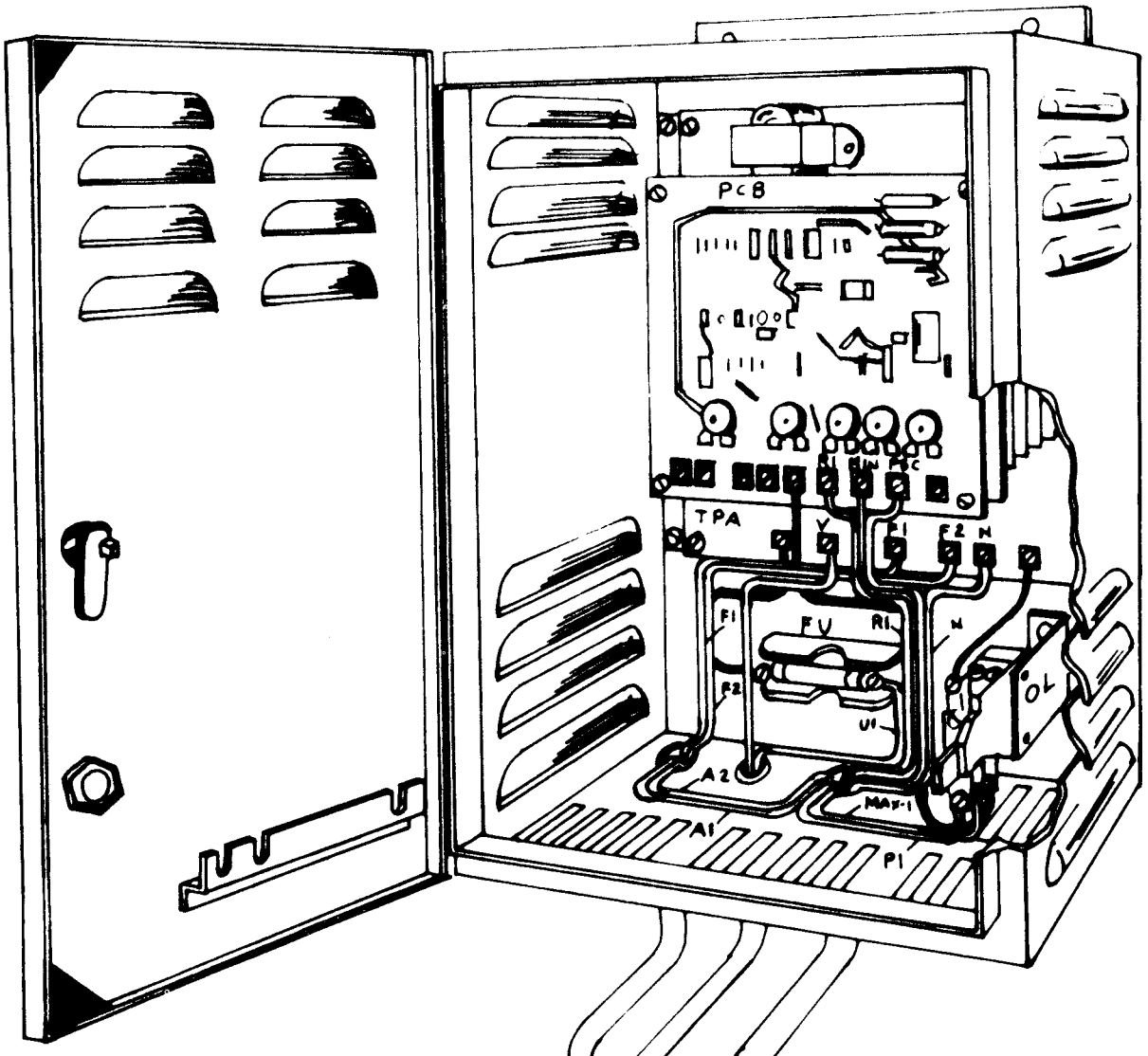
Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be followed.



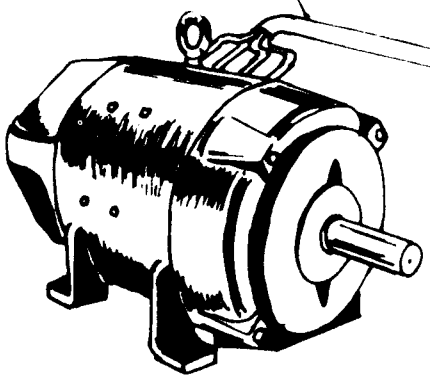


SCHEMATIC 22-1000-6

Basic Controller



A1 A2 F1 F2



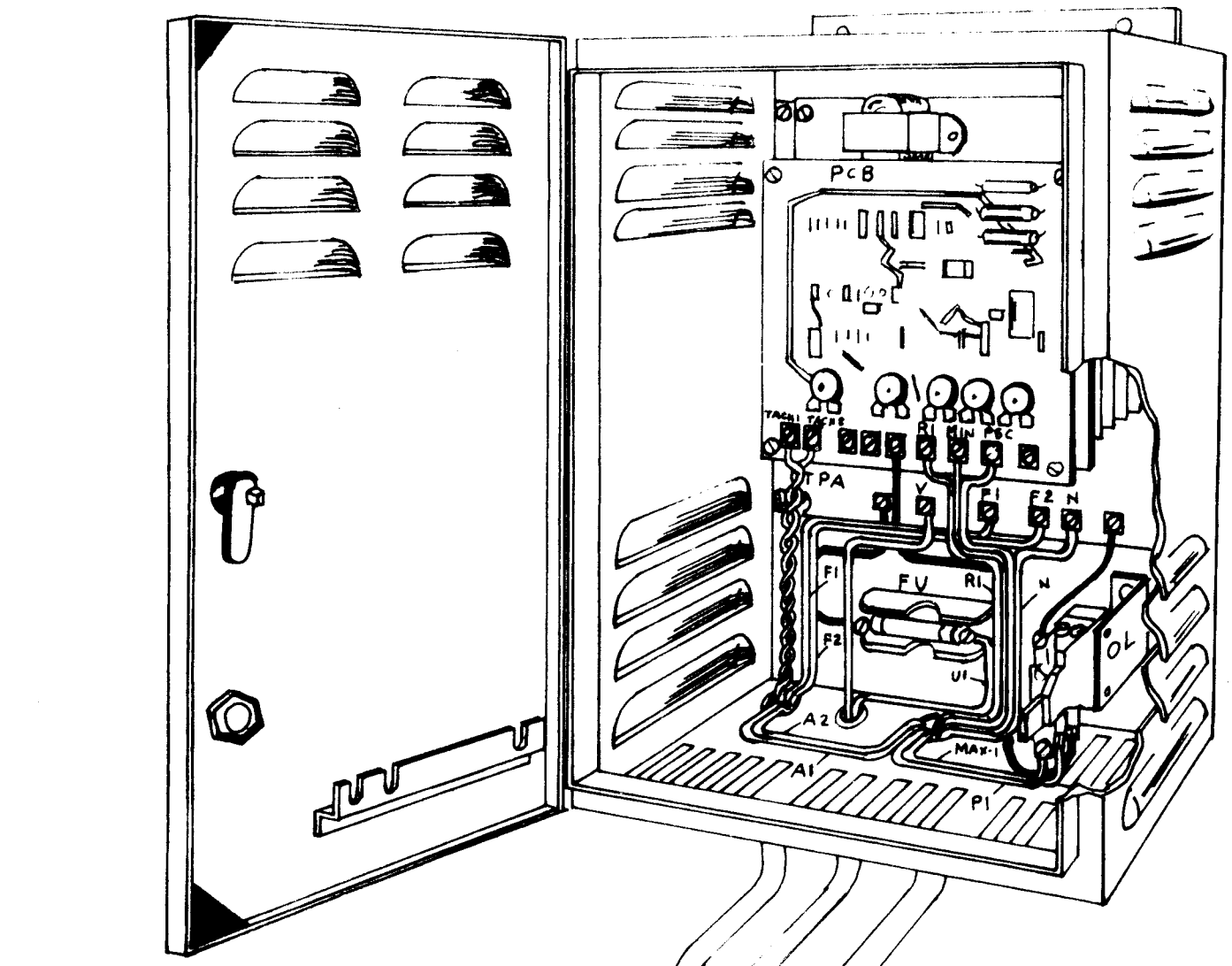
U1 V
Incoming
Supply (1)

To
Magnetic Controller
Diagram 2

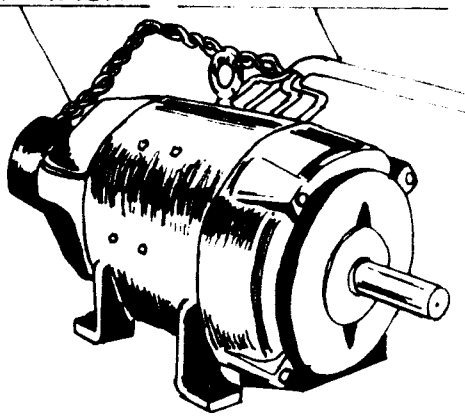
(1) 1Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1V

Basic Controller



TACH1 TACH2 A1 A2 F1 F2



U1 V

Incoming Supply (1)

To Magnetic Controller Diagram 2

(1) 1Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1S

Magnetic Controller

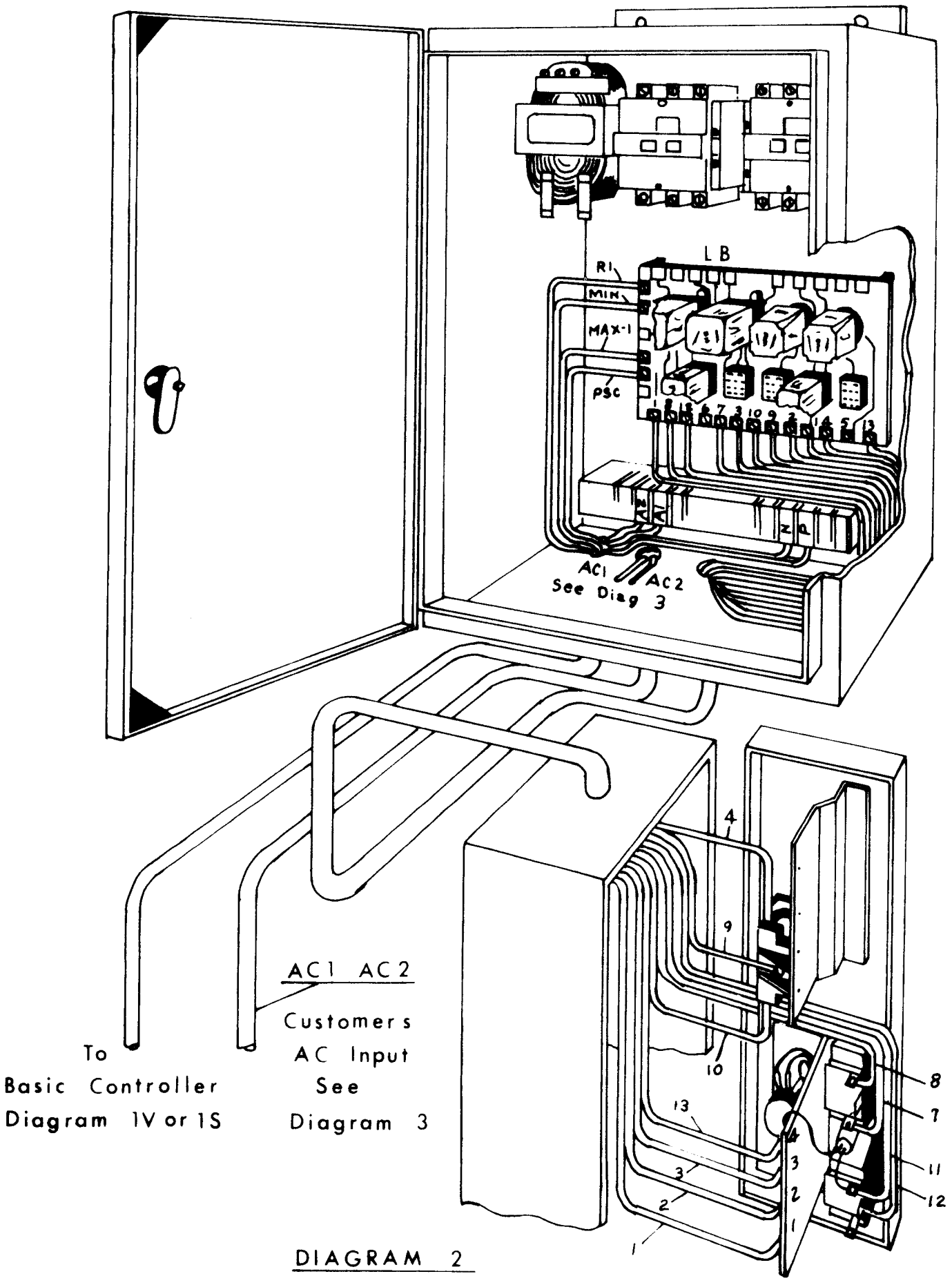


DIAGRAM 2

ELECTRICAL INTERCONNECTIONS

Reference Schematic 22-1000-6
Diagrams 1V, 1S, and 2

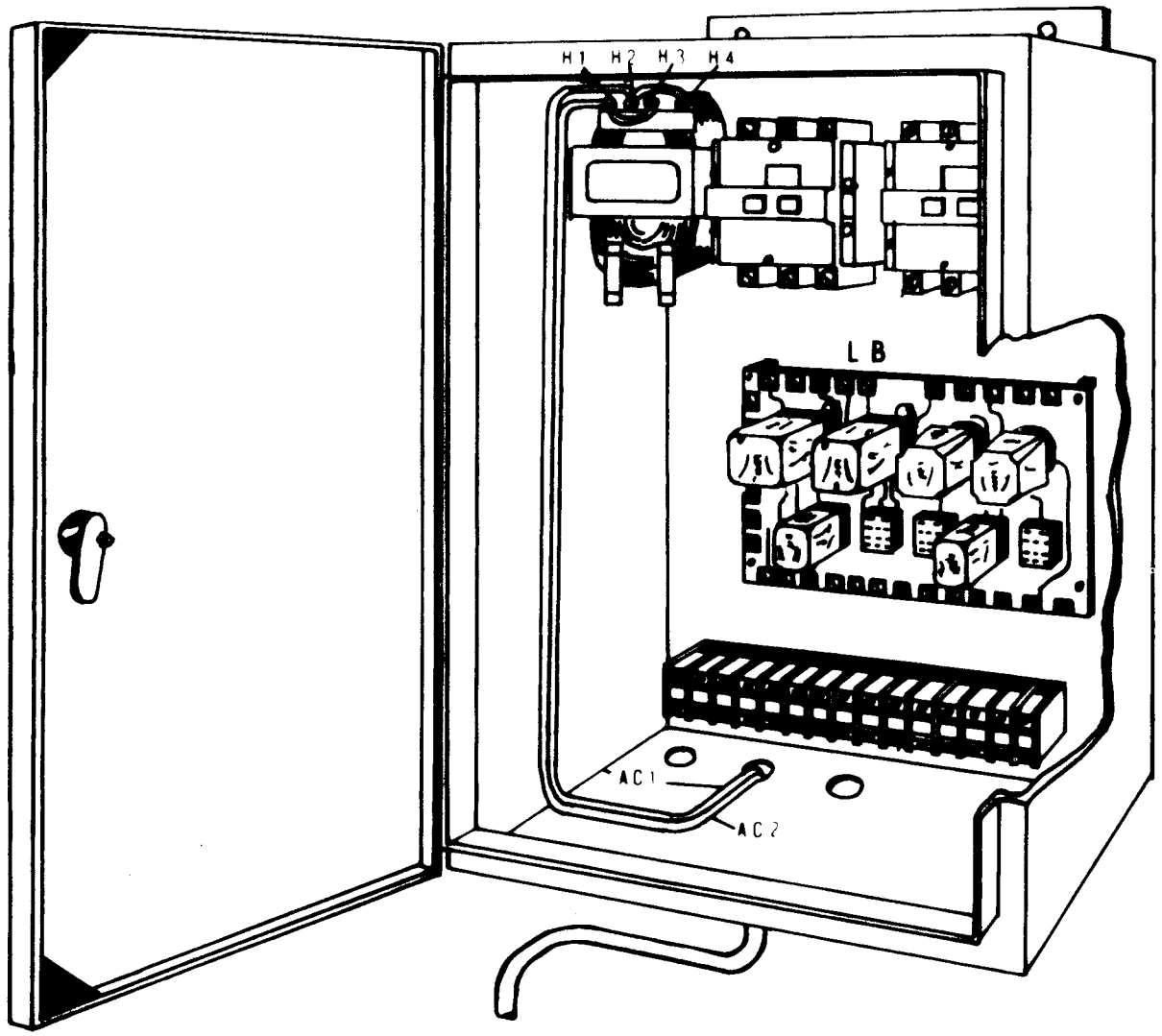
Schematic 22-1000-6 is a composite schematic showing the magnetic reversing drive and the standard options that can be incorporated in the drive either at time of purchase or by using "function kits" added at any future date. The options are shown by dotted or broken lines in the circuit flow. It is suggested that the composite schematic by up-dated each time a function kit is added by changing the associated dotted or broken lines to solid lines as detailed in the IL accompanying each "kit".

Diagram 1V shows the recommended interconnections between BC, LC, OS, and the dc drive motor per schematic 22-1000-6 for CEMF regulated drives. Diagram 1S shows the recommended interconnections between BC, LC, OS and the dc drive motor (including the motor mounted tachometer) per schematic 22-1000-6 for speed regulated drives. Leads 1 TACH and 2 TACH shown in dotted lines on schematic 22-1000-6 and the motor mounted dc tachometer, N1, are added to the CEMF regulated drive to change to a speed regulated drive. (IR Comb pot, 5P, on BC must be set in the maximum CCW position on all speed regulated drives).

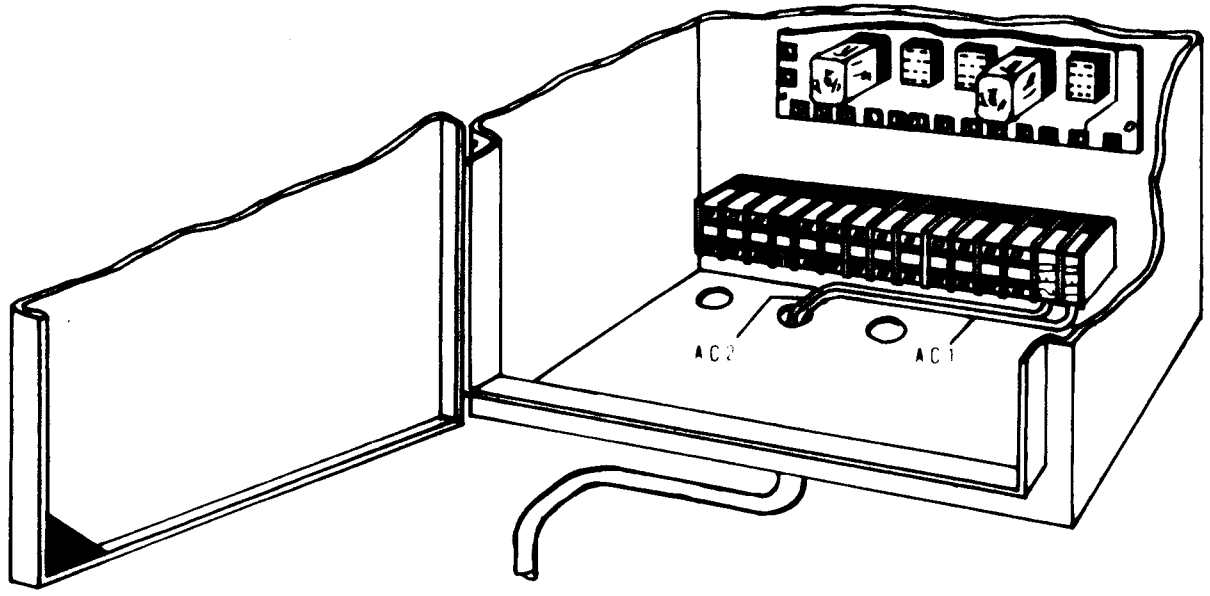
Diagram 2 shows the interconnections for the customer incoming AC supply, leads AC1 and AC2. The transformer is used when customer control voltage is 230V, 1 Ø , 50/60 Hz. The transformer is not required if 115V, 1 Ø, 50/60 Hz input control power is used.

The wiring as shown provides the flexibility required to permit the addition of the various "function kits", shown in broken line on schematic 22-1000-6 at any time using the detailed installation instructions provided with each function kit.

Magnetic Controller



230V - 1 Ø - 50 / 60 HZ



115 V - 1 Ø - 50 /60 HZ

DIAGRAM 3

1. INTERCONNECTIONS MT TO BC AND MT TO LC

1.1 CEMF REGULATED DRIVES DIAGRAM 1V

Run four wires from the dc motor terminals (MT) through conduit to the basic controller cabinet (BC), entering at the bottom of the cabinet using one of the large conduit openings. Motor armature leads (A1 and A2) should be sized according to motor HP - motor armature current, and the motor shunt field leads (F1 and F2) can be standard control wire of #16 or larger. Mark leads on both ends.

1.1.1 Connect shunt field lead marked F1 to screw terminal F1 on the bottom of printed circuit board PCB.

1.1.2 Connect shunt field lead marked F2 to screw terminal F2 on the bottom of PCB.

1.1.3 Run the two armature leads (A1 and A2) across the bottom of BC and out through the conduit running between BC and the magnetic logic cabinet (LC). Connect motor armature lead marked A1 to terminal block A1 on the bottom of the panel in LC. Connect armature lead marked A2 to terminal block A2 in LC.

1.2 SPEED REGULATED DRIVES DIAGRAM 1S

Complete all connections between MT and BC for CEMF regulated drives except run a total of six leads between MT and BC. The fifth and sixth leads should be a twisted pair running between the tachometer (MT) and LC. Connect one conductor to screw terminal 1 TACH and the other conductor to screw terminal 2 TACH, both on the bottom of PCB. The control circuit must not be grounded at any time. Neither of the two conductors can be grounded.

2. INTERCONNECTIONS BC TO LC

Run six leads from BC through conduit to the magnetic logic cabinet (LC). Two of the leads should be the same size as the dc motor armature leads (A1 and A2) and four leads can be standard control wire of #16 or larger. Mark the leads at both ends, the heavy leads mark as P1 and N, the four control leads as MAX-1, MIN, R1, and PSC.

2.1 Connections at BC

2.1.1 Connect the heavy lead marked P1 to the large screw terminal on the bottom of overload relay (OL).

2.1.2 Connect the heavy lead marked N to screw terminal N on the bottom of the Thyristor Power Assembly (TPA).

2.1.3 Connect control lead marked MAX-1 to the small screw terminal on the bottom of OL that has no wire connected to it.

2.1.4 Connect control lead marked R1 to screw terminal R1 on the bottom of PCB.

2.1.5 Connect control lead marked MIN to screw terminal MIN on the bottom of PCB.

2.1.6 Connect control lead marked PSC to screw terminal PSC on the bottom of PCB.

2.2 Connections at LC

2.2.1 Connect heavy lead marked P1 to terminal block P on the blue terminal block group.

2.2.2 Connect heavy lead marked N to terminal block N on the blue terminal block group.

2.2.3 Connect control lead marked R1 to screw terminal R1 on the left side of logic board (LB).

2.2.4 Connect control lead marked MIN to screw terminal MIN on the left side of LB.

2.2.5 Connect control lead marked MAX-1 to screw terminal MAX on the left side of LB.

2.2.6 Connect control lead marked PSC to screw terminal PSC on the left side of LB.

3. INTERCONNECTIONS LC TO OS

Run eleven wires of standard control size #16 or larged from LB in LC through conduit to the operators control station (OS). Mark all leads at both ends.

3.1 Connections at LC on LB

All nine leads connect to screw terminals on the bottom of LB. The leads in a bundle after connections are made on LB.

3.1.1 Connect lead marked 1 to screw terminal 1

3.1.2 Connect lead marked 2 to screw terminal 2

3.1.3 Connect lead marked 3 to screw terminal 3

3.1.4 Connect lead marked 4 to screw terminal 4

3.1.5 Connect lead marked 9 to screw terminal 9

3.1.6 Connect lead marked 10 to screw terminal 10

3.1.7 Connect lead marked 11 to screw terminal 11

3.1.8 Connect lead marked 12 to screw terminal 12

3.1.9 Connect lead marked 13 to screw terminal 13

3.1.10 Connect lead marked 7 to screw terminal 7

3.1.11 Connect lead marked 8 to screw terminal 8

3.2 Connections in CS

3.2.1 On the ON-OFF switch connect lead marked 11 to terminal ON, a factory installed wire should already be connected to this point, the addition of lead marked 11 will make two wires connected to the ON terminal.

3.2.2 On the ON-OFF switch connect lead marked 12 to the common terminal of the switch. (Center terminal of the switch).

3.2.3 Connect lead marked 1 to terminal 1 (bottom terminal) of the insulated pot mounting (IPM).

3.2.4 Connect lead marked 2 to terminal 2 (Next to bottom terminal) on IPM.

3.2.5 Connect lead marked 3 to terminal 3 (Next to top terminal) on IPM.

3.2.6 Connect lead marked 13 to terminal 4 (Top terminal) on IPM.

3.2.7 Connect lead marked 4 to the RUN (Top terminal) of the pushbutton contact block.

3.2.8 Connect lead marked 9 to the common terminal between RUN and STOP (Center terminal) of the pushbutton contact block.

3.2.9 Connect lead marked 10 to the STOP (Bottom terminal) of the pushbutton contact block.

3.2.10 Connect lead marked 8 to the top or REV contact on the FWD-REV switch

3.2.11 Connect lead marked 7 to the bottom or FWD contact on the FWD-REV switch.

4. AC POWER INPUT INTO BC

Refer to Table 1 for the correct AC input voltage to be applied. Be sure that the correct 1 Ø AC power is connected to BC.

4.1 Connect incoming AC lead V to terminal V on the bottom of TPA.

4.2 Connect incoming AC lead U1 to the screw terminal on fuse FU that has no wire connected to it. Incoming AC is fused on one side at all times---do not bypass fuse FU at any time.

5. AC POWER INTO LC

Diagram 2 shows the connections for the two acceptable Incoming 1 Ø, 50/60 Hz voltages. The top of the diagram shows the connections for 230V input into the transformer CT.

5.1 230V Input

5.1.1 Between transformer CT primary terminals add a jumper TJ1 between terminals H1 and H3.

5.1.2 Between transformer CT primary terminals add a jumper TJ3 between terminals H2 and H4.

5.1.3 Connect incoming AC 230V, 1 Ø, 50/60 Hz, lead AC1 to transformer CT, terminal H1.

5.1.4 Connect incoming AC 230V, 1 Ø, 50/60 Hz, lead AC2 to transformer CT, terminal H4.

5.2 115V Input

The bottom of Diagram 2 shows the connections for 115V, 1 Ø, 50/60 Hz input power to LC.

5.2.1 Connect incoming AC 115V, 1 Ø, 50/60 Hz, lead AC1 to terminal block 1FU on the blue terminal block group in LC.

5.2.2 Connect incoming AC 115V, 1 Ø, 50/60 Hz, lead AC2 to terminal block 2FU on the blue terminal block group in LC.

Before applying AC power recheck all connections, be sure that all wires are secure and that the dc motor rotation is correct before coupling the motor into the mechanical load.

START-UP INSTRUCTIONS

Recommended Start-Up Procedures

1. Check all interconnections per Diagram 1V for CEMF drives or Diagram 1S for speed regulated drives.

2. Check incoming 1 Ø, 50/60 Hz incoming AC power per Diagram 2 and instructions in Sections 4 and 5 of Electrical Interconnections.

3. Check dc motor rotation. Rotation as connected per Diagrams 1V and 1S is CCW when viewed from the dc motor commutator end (Carbon brushes are mounted on the commutator end), with the FWD-REV switch in OS in the FWD position. If in the FWD direction CW rotation is required interchange the motor shunt field leads, F1 and F2, preferably at the motor terminals. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date, but the motor armature circuitry could be changed for some functions).

4. Set the speed control pot, SP, on OS in the minimum speed, fully CCW, position. Set ON-OFF switch to OFF, and the FWD-REV switch in OS in the FWD position.

5. Apply correct AC input power to U1 and V in BC.

6. Apply correct AC input power to AC1 and AC2 in LC.

7. Set the ON-OFF switch on OS to ON. The red indicating light on OS should indicate the presence of AC control power in OS and LC.

8. Be sure that the minimum speed potentiometer 2P on PCB is set in the minimum, fully CCW, position, see IL 22-1000-7 for instructions.

9. Depress the RUN pushbutton on OS. The dc motor should start to rotate -- check direction of rotation, if incorrect go back to Step 3 and follow instructions. See IL 22-1000-7 for instructions on setting minimum speed. MInimum speed is the same for both FWD and REV directions.

10. Adjust the Speed Control pot (SP) on OS to its maximum, fully CW, position. The motor should accelerate up to base speed (Motor nameplate RPM). See IL 22-1000-7 for instructions for setting of the maximum speed pot, 1P, on PCB. Return SP to its minimum speed position. Maximum speed is the same for both FWD and REV directions.

11. Recheck the minimum speed, trim pot 2P on PCB if required.

12. Depress the STOP pushbutton on OS, the motor should coast to a stop.

13. Setting of Current Limit, (CL), pot 3P on PCB in BC
Reference IL 22-1000-7

    (a) Turn ON-OFF switch on OS to OFF

    (b) Set pots 3P (CL) and 4P (Torque Limit) (TL) on PCB in the maximum CCW positions.

    (c) Disconnect dc motor shunt field lead F1 at terminal F1 on PCB, -- removes the dc motor shunt field. CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected cannot develop enough torque to cause the motor to rotate.

    (d) Connect a suitable dc ammeter in the dc motor armature circuit meter must have a range of at least 250% of rated armature current of drive. Suggested location of ammeter - remove lead P1 from the bottom of overload relay OL in BC, connect the (+) terminal of the ammeter to OL and lead P1 to the (-) terminal of the ammeter.

    (e) Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.

    (f) Apply AC input power to BC and LC.

    (g) Set the ON-OFF switch to ON. The indicating light on OS will be lighted.

    (h) Depress the RUN pushbutton on OS, be prepared to quickly depress the STOP pushbutton on OS to minimize the time that armature current is permitted to flow. Armature current will increase rapidly up to approximately 75% of rated motor armature current. Adjust CL pot 3P on PCB CW until 200% rated armature amps is reached. Press the STOP pushbutton on OS. CL should now be set at 150% rated armature amps at motor base speed and 200% for stalled conditions.

(i) Set ON-OFF switch in the OFF Position.

(j) Remove all AC power.

Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR	
	VOLTS	AMPS	AMPS	AMPS	
1/4	90	2.8	4.2	5.6	
1/3		3.3	4.95	6.6	
1/2		5.5	8.25	11	
3/4		8.1	12.15	16.2	
1	180	5.2	7.8	10.4	
1-1/2		7.4	11.1	14.8	
2		9.6	14.4	19.2	
3		14.2	21.3	28.4	
4		19	27.5	38	
5		25	37.5	50	

14. Setting of Torque Limit (TL) pot 4P on PCB in BC
Reference IL 22-1000-7

The torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If the drive is used in an application such as a winder in which torque limit control is required CW adjustment of pot 4P will cause CL to be limited at a lower level at high motor speeds than at low motor speeds as shown in Figure 1.

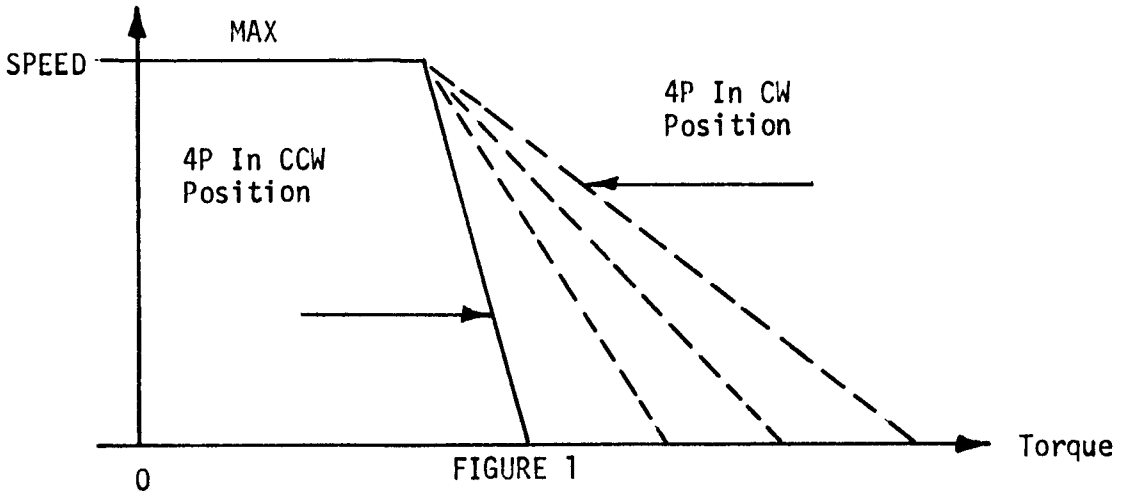


FIGURE 1
TORQUE LIMIT ADJUSTMENT

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor RPM the CL is the same for all settings of torque limit. Be sure that the use of torque limit and CL is understood before making any adjustment of TL pot 4P or damage to equipment can result.

15. I.R. Drop Compensation, I.R. Comp, pot 5P on PCB in BC
Reference IL 22-1000-7

(a) Pot 5P is always set in the maximum CCW position for speed regulated (Tach feedback) drives.

(b) For voltage regulated, CEMF, drives pot 5P is set to give flat motor RPM full-load to minimum load. This setting is usually made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full-load current as at minimum load at this low motor RPM. If the minimum operating speed is greater than 20 to 25% of motor base speed set I.R. Comp at this minimum operating speed.

TROUBLE SHOOTING

Refer to IL 22-1000-7

Additional checks should include the following:

1. Incoming AC, leads AC1 and AC2 on schematic 22-1000-5 and Diagrams 1V, 1S, and 2.

2. Interconnections between BC, LC, OS, and MOT.

3. Fuses FU1 and FU2.

4. Plug-in relays RN, CX, FX, PF, and PR, check to see that they are secure.

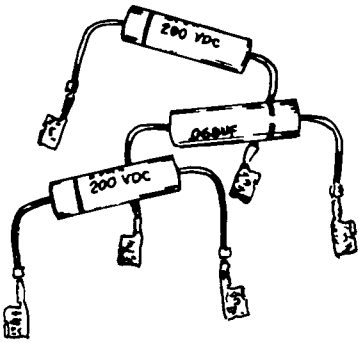
5. Tighten screw terminals on LB and in OS.

6. Check switch and contact blocks in OS for proper operation.

If preceding steps do not locate cause of malfunction, or if trouble cannot be corrected, contact nearest Westinghouse representative.

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A
50HZ MODIFICATION KIT FOR 22-1000 DRIVES 3 PHASE
I. L. 22-1000-9

Westinghouse Electric Corporation

Printed in USA

22-1000 50HZ MODIFICATION KIT

FOR 3 PHASE 22-1000 DRIVES

S#1527A50G01

The 50 HZ modification kit is used to modify the standard 22-1000 3 phase drive, to operate on 230 Volts, 3 phase, 50 HZ.

The kit consists of a plastic bag containing the following components.

1. Installation instructions I.L. 22-1000-9

2. Conversion Capacitor S#1527A50G02 (3).

If a shortage exists contact nearest Westinghouse representative.

Recalibration is done by inserting additional capacitance in parallel with capacitors 25C, 27C, and 29C as shown in schematic 22-1000-9 Figure 1.

INSTALLATION INSTRUCTIONS

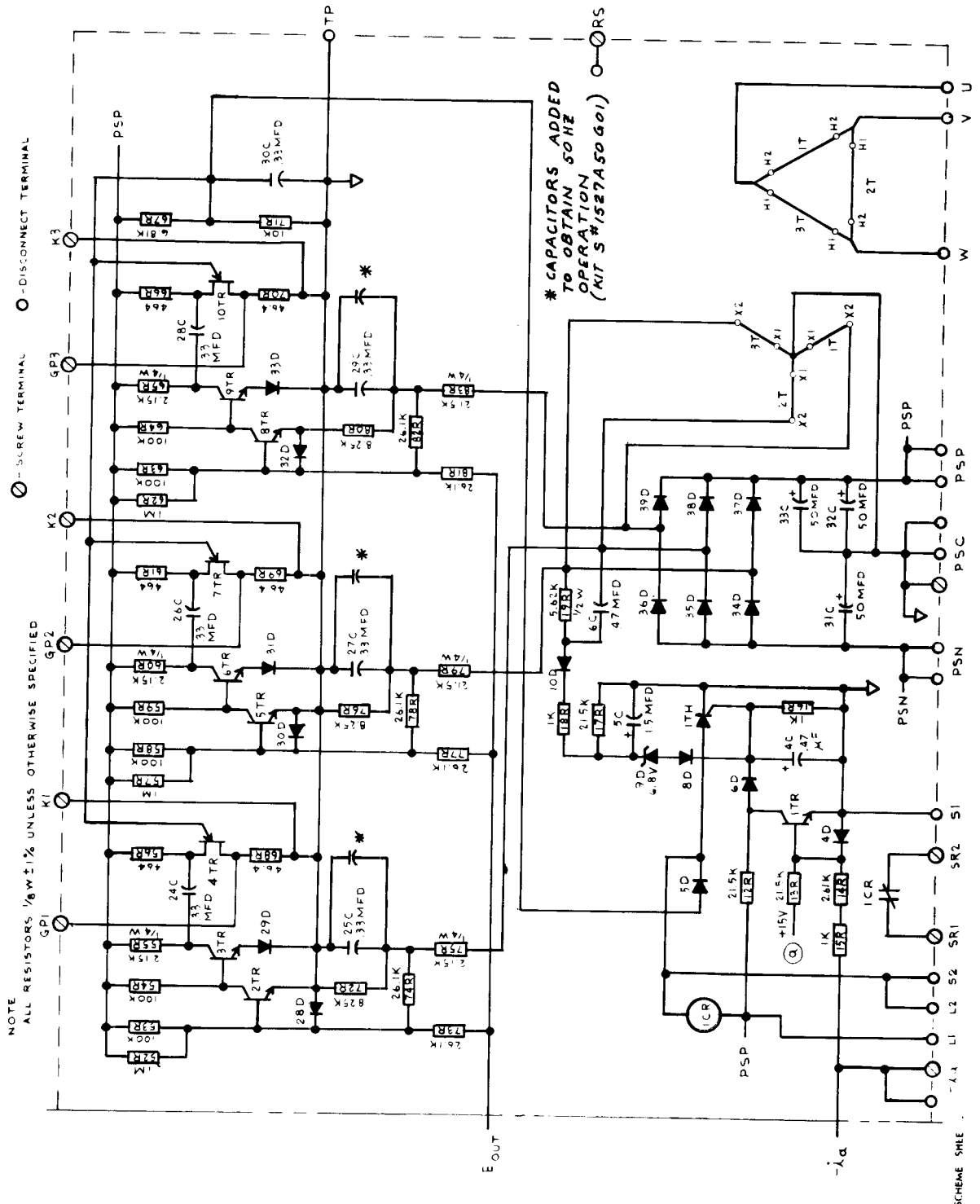
1. Check the three capacitor assemblies to be sure that they are complete with connectors which are securely fastened to capacitor leads.

2. Carefully but securely, press the connectors on the two lance terminals for each of the three gating circuits. See Figure 2 for the location of the three gating circuits and the two lance terminals provided for mounting the capacitor assembly.

3. Installation of the modification kit is complete.

Westinghouse Electric Corporation

Printed in USA



SCHEMATIC 22-1000-9

FIGURE 1

Printed in USA

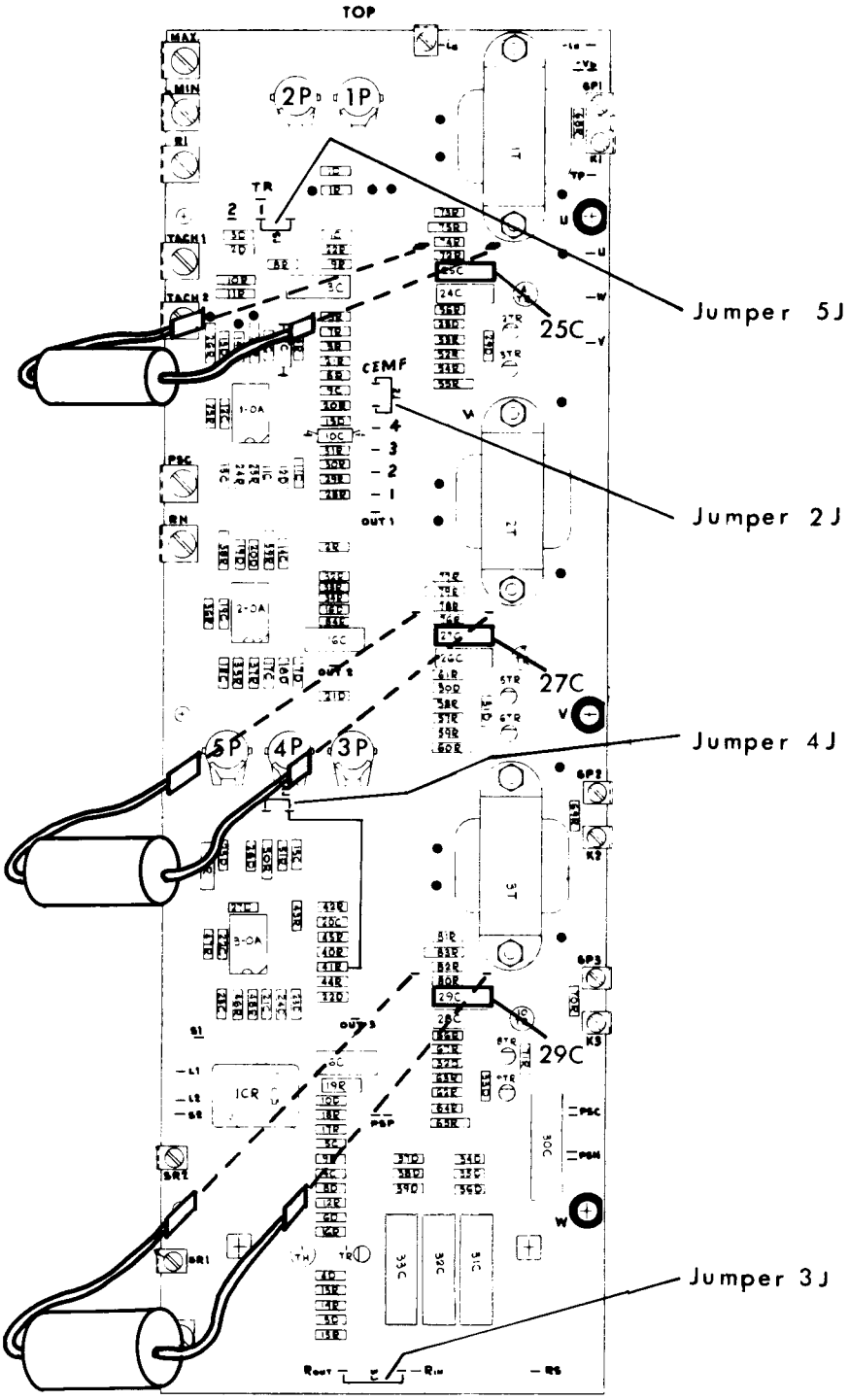
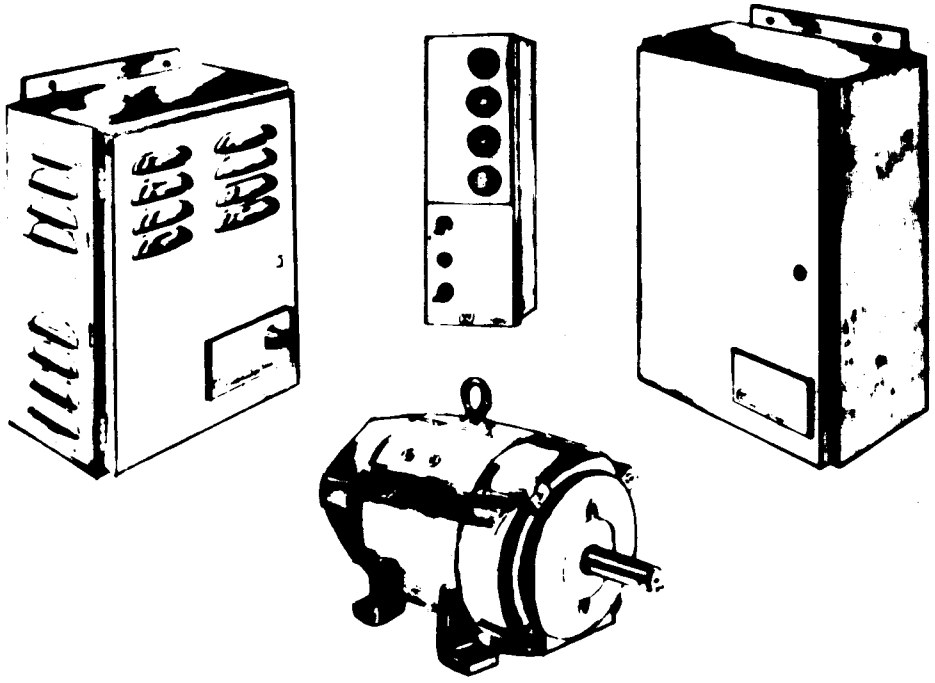


FIGURE 2

Printed in USA

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A
22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE
WITH SIGNAL FOLLOW
I. L. 22-1000-11

Westinghouse Electric Corporation

INSTALLATION INSTRUCTIONS FOR A

22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE

WITH SIGNAL FOLLOW

A magnetic drive consists of four basic components, the basic controller, (BC), the magnetic logic cabinet, (LC), consisting of the magnetic contactor assembly (MCA) and the logic board (LB), the operators control station (OS), and the dc drive motor (MOT). The dc drive motor selection is flexible and is not readily fixed in identity. Two styled OS are available one for the standard non-reversing drive, and the other for a non-reversing drive incorporating signal follow.

TABLE I

DC MOTOR (MOT) RATING			BASIC CONTROLLER (BC)	MAGNETIC LOGIC CABINET (LC)	OPERATORS CONTROL STATION (OS)	
HP	ARM VOLTS	FIELD VOLTS	STYLE	STYLE	STANDARD STYLE	FOLLOWER STYLE
1/4	90	100	1459A06G01	1459A08G01	1459A12G01	1459A12G03
1/3	90	100	1459A06G02	1459A08G01	I.L.22-1000-5	I.L.22-1000-11
1/2	90	100	1459A06G03	1459A08G01		
3/4	90	100	1459A06G04	1459A08G01		
1	180	200	1459A06G05	1459A08G03		
1-1/2	180	200	1459A06G06	1459A08G03		
2	180	200	1459A07G01	1459A08G05		
3	180	200	1459A07G02	1459A08G05		
4	180	200	1459A07G03	1459A08G05		
5	180	200	1459A07G04	1459A08G05		

Check the basic controller, magnetic logic cabinet, operators control station, and the dc drive motor rating with Table I.

Examine all components for damage which could have occurred during shipment. If a component is damaged, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse representative if any damage to the equipment exists.

INSTALLATION INSTRUCTIONS

Installation of the four pieces of equipment should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire used should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool dry, dust-free atmosphere, easily accessable for maintenance and good housekeeping practices.

The dc drive motor must be located, mounted, aligned, and operated in accordance with the specific type of motor being applied.

MOUNTING OF EQUIPMENT

1. Mounting of the Basic Controller (BC)

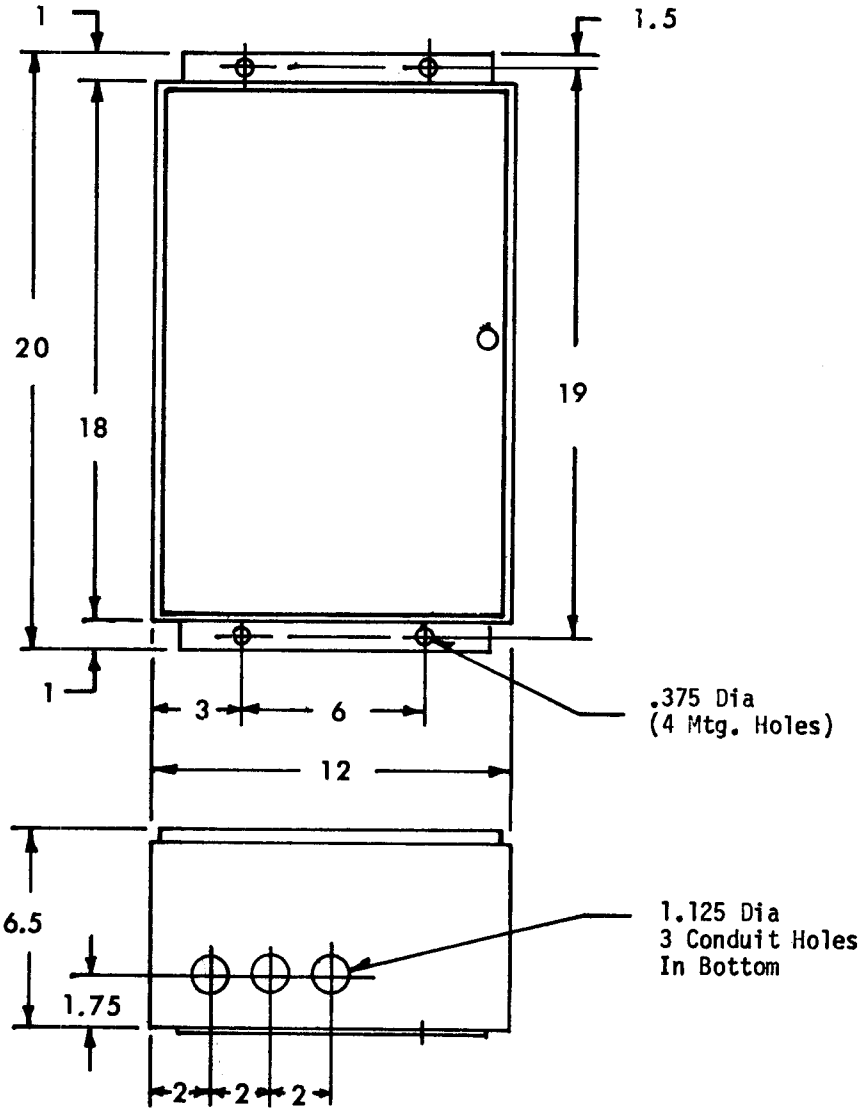
The BC enclosure or cabinet is Nema I and therefore must be located in an area suitable for Nema 1 enclosures. The location should be dry, dust-free, and relatively cool (40 degrees C ambient or less) to obtain long trouble-free operation.

a. See I.L. 22-1000-7 for mounting dimensions for the mounting of BC.
b. Use four 3/8" bolts, or screws, to mount the enclosure to a suitable vertical surface that is smooth, dry, and of sufficient area and strength to accept and support the basic controller.

2. Mounting Of the Magnetic Logic Cabinet (LC)

The enclosure for LC is of NEMA I design, therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dust-free, and relatively cool (40 degrees C ambient or less) to obtain long trouble free operation.

Figure 1, is the installation plan for mounting of LC. Use 3/8" mounting hardware.



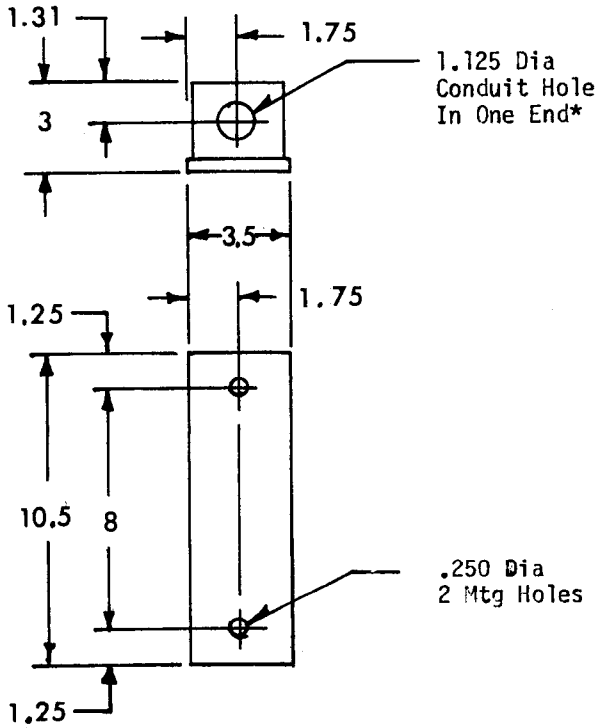
INSTALLATION PLAN FOR MAGNETIC LOGIC CABINET (LC)

FIGURE 1

3. Mounting Of The Operators Control Station (OS)

The OS is NEMA I design, therefore, must be located in an area suitable for NEMA I enclosures.

Figure 2 is the installation plan for the mounting of OS



*Normal Conduit Entry Is In The Top Of (OS)
Conduit Entry Can Be In Bottom By Mounting
Box With Hole In Bottom

INSTALLATION PLAN FOR OPERATORS CONTROL STATION (OS)

FIGURE 2

4. Mounting of the DC Drive Motor (MOT)

Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be followed.

Electrical Interconnections

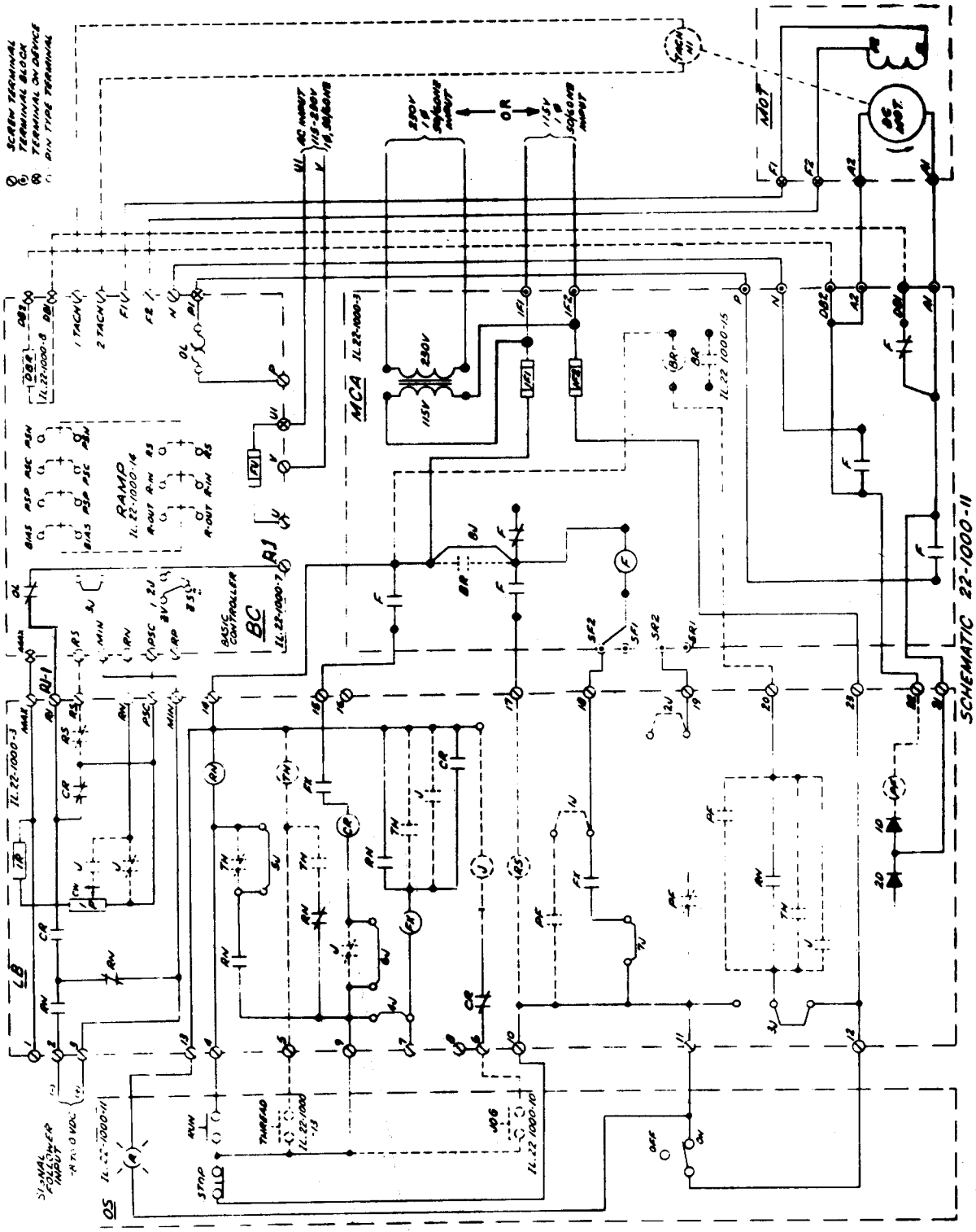
Reference Schematic 22-1000-11
Diagrams 1V, 1S, and 2.

Schematic 22-1000-11 is a composite schematic showing the magnetic non-reversing drive and the standard options that can be incorporated in the drive either at time of purchase or by using "Function Kits" added at any future date. The options are shown by dotted or broken lines in the circuit flow. It is suggested that the composite schematic be up-dated each time a function kit is added by changing the associated dotted or broken lines to solid lines as detailed in the I.L. accompanying each "kit".

Diagram 1V shows the recommended interconnections between BC, LC, OS, and the DC drive motor per schematic 22-1000-11 for CEMF regulated drives. Diagram 1S shows the recommended interconnections between BC, LC, OS, and the DC drive motor (including the motor mounted tachometer) per schematic 22-1000-11 for speed regulated drives. Leads 1 Tach. and 2 Tach shown in dotted lines on schematic 22-1000-11 and the motor mounted dc tachometer, (N1), are added to the CEMF regulated drive to change to a speed regulated drive. (I.R. Comp pot 5P, on BC must be set in the maximum CCW position on all speed regulated drives).

Diagram 3 shows the interconnections for the customer incoming AC supply, leads AC1 and AC2. The transformer is used when customer control voltage is 230V, 1 Phase, 50/60HZ. The transformer is not required if 115V, 1 Phase 50/60 HZ input control power is used.

The wiring as shown provides the flexibility required to permit the addition of the various "function kits", shown in broken line on schematic 22-1000-11, at any time using the detailed installation instructions provided with each function kit.


SCHEMATIC 22-1000-11
BC
BASIC CONTROLLER
RAMP
MCA
AC INPUT
115-230V
1Ø, 50/60HZ
230V
1Ø, 50/60HZ
OR
115V
1Ø, 50/60HZ
230V
115V
BASIC CONTROLLER
IL.22-1000-7
IL.22-1000-3
IL.22-1000-8
IL.22-1000-14
IL.22-1000-5
IL.22-1000-15
IL.22-1000-11
IL.22-1000-13
IL.22-1000-10
SCREW TERMINAL
TERMINAL BLOCK
TERMINAL ON DEVICE
DIN TYPE TERMINAL
1 TACH
2 TACH
STOP
START
FORWARD
REVERSE

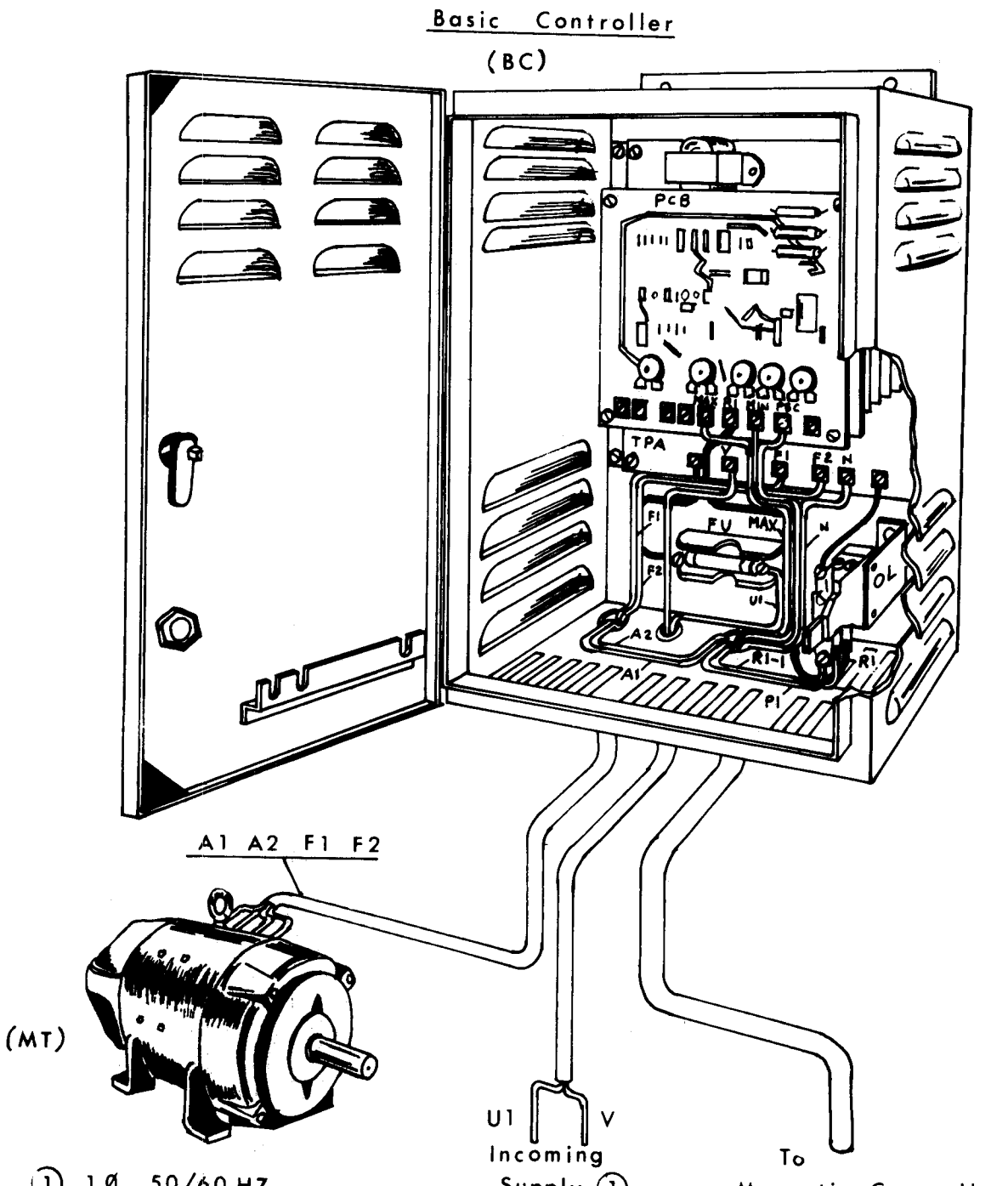

Basic Controller
(BC)
PCB
TPA
L1
L2
N
F1
F2
FU
MAX
OL
U1
A2
A1
R1-1
R1
P1
A1 A2 F1 F2
(MT)
U1
V
Incoming
Supply ①
To
Magnetic Controller
Diagram 2
① 1 Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1V

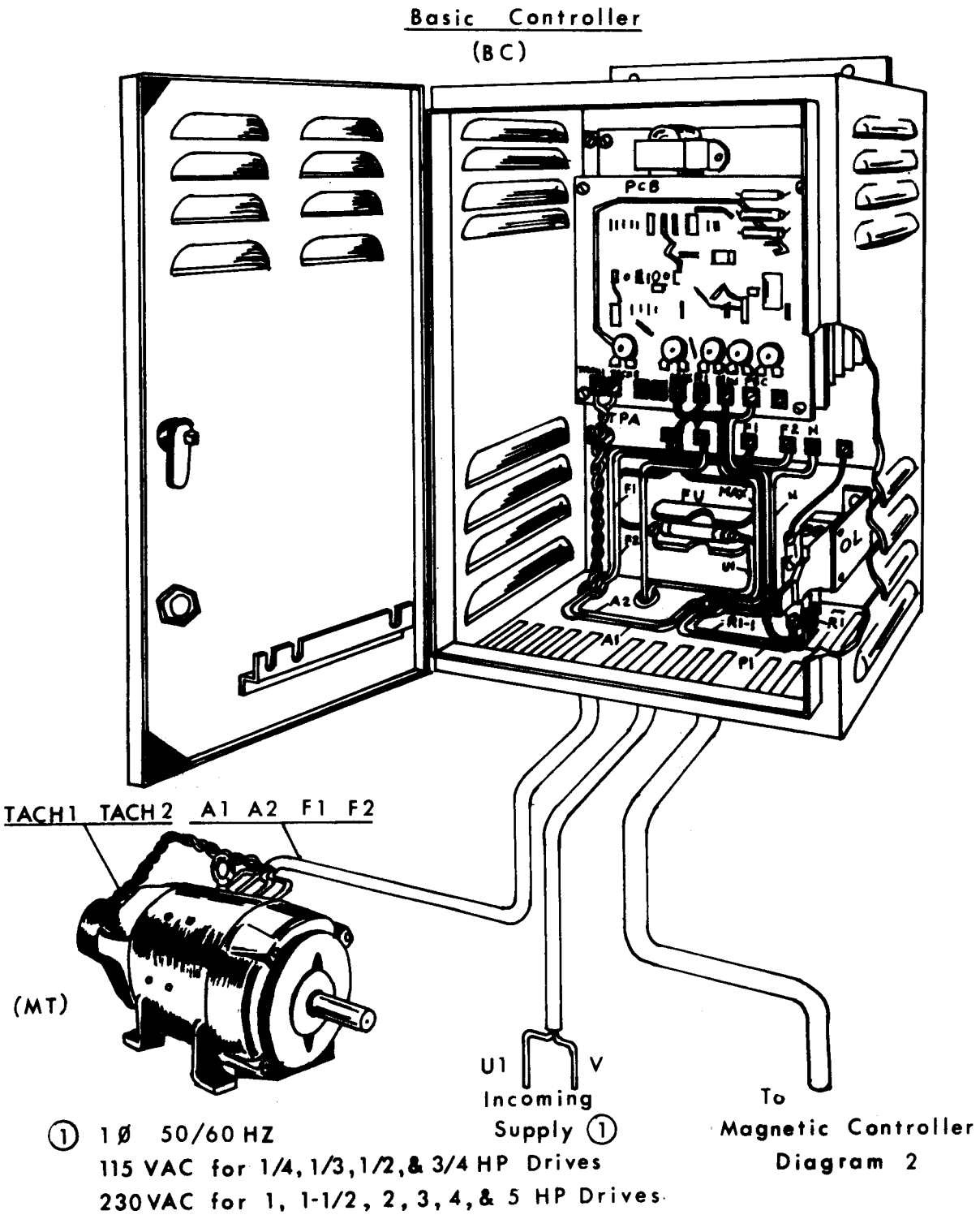

Basic Controller
(BC)
PCB
TPA
F1
F2
M
OL
A2
A1
P1
TACH1 TACH2 A1 A2 F1 F2
(MT)
U1
V
Incoming
Supply ①
To
Magnetic Controller
Diagram 2
① 1 Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1S

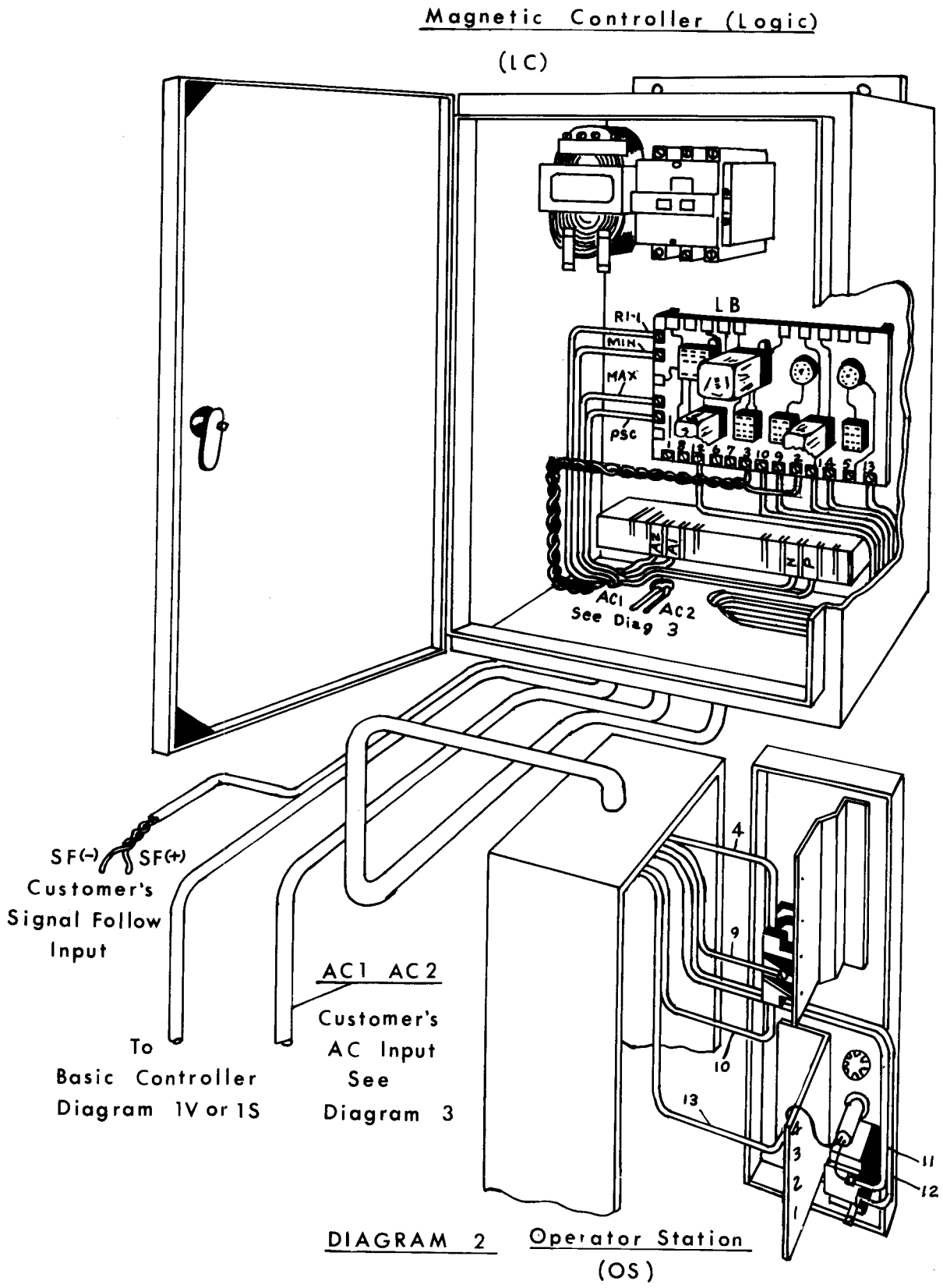
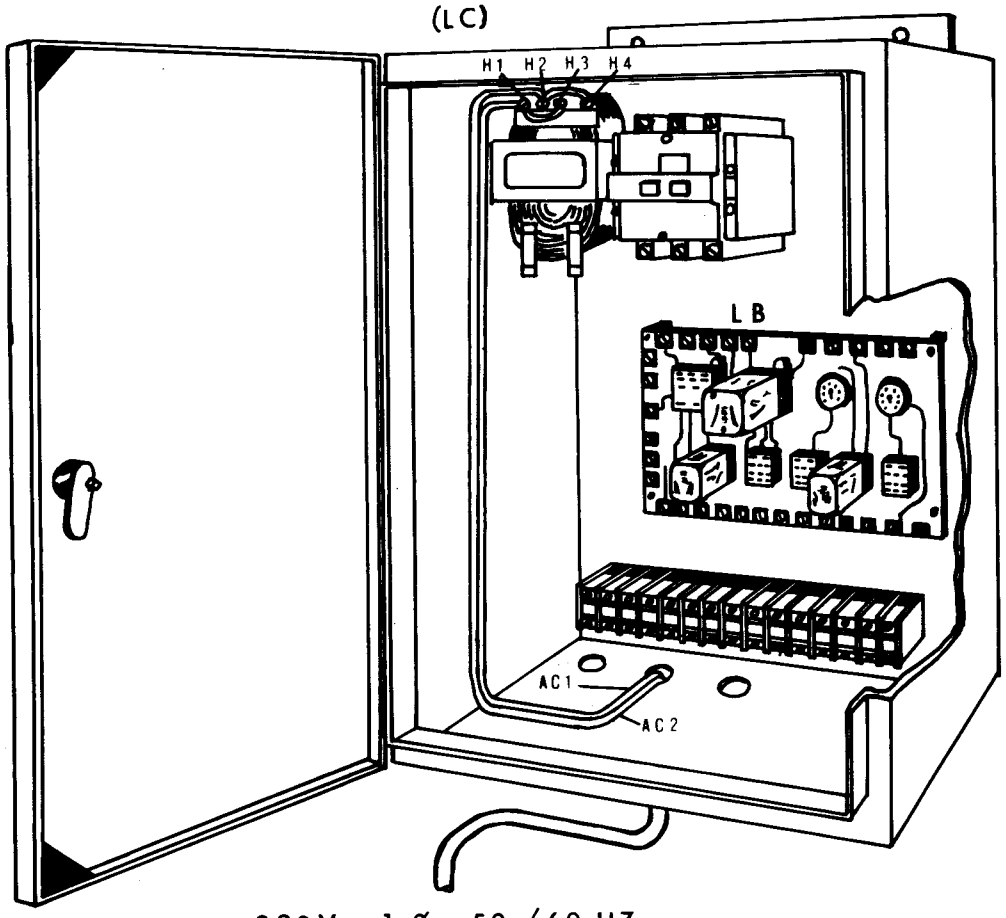
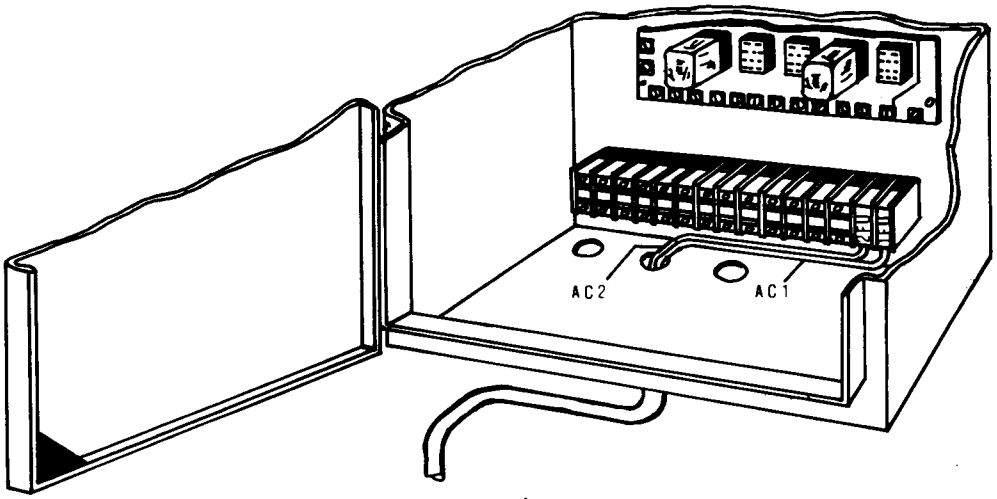

Magnetic Controller (Logic)
(LC)
LB
RI-1
MIN
MAX
PSC
AC1
AC2
See Diag 3
SF(-)
SF(+)
Customer's
Signal Follow
Input
To
Basic Controller
Diagram 1V or 1S
AC1 AC2
Customer's
AC Input
See
Diagram 3
4
9
10
13
11
12
Operator Station
(OS)

DIAGRAM 2

Magnetic Controller (Logic)
(LC)



230V – 1 Ø – 50 /60 HZ



115 V – 1 Ø – 50 / 60 HZ

DIAGRAM 3

1. Interconnections MT to BC and MT to LC

1.1 CEMF Regulated Drives - Diagram 1V

Run four wires from the dc motor terminals (MT) through conduit to the basic controller cabinet (BC), entering at the bottom of the cabinet using one of the large conduit openings. Motor armature leads (A1 and A2) should be sized according to motor HP -- motor armature current, and the motor shunt field leads (F1 and F2) can be standard control wire of #16 or larger. Mark leads on both ends.

1.1.1 Connect shunt field lead marked F1 to screw terminal F1 on the bottom of printed circuit board PCB.

1.1.2 Connect shunt field lead marked F2 to screw terminal F2 on the bottom of PCB.

1.1.3 Run the two armature leads (A1 and A2) across the bottom of BC and out through the conduit running between BC and the magnetic logic cabinet (LC). Connect motor armature lead marked A1 to terminal block A1 on the bottom of the panel in LC. Connect armature lead marked A2 to terminal block A2 in LC.

1.2 Speed Regulated Drives - Diagram 1S

Complete all connections between MT and BC for CEMF regulated drives except run a total of six leads between MT and BC. The fifth and sixth leads should be a twisted pair, running between the tachometer (MT) and BC. Connect one conductor to screw terminal 1 Tach and the other conductor to screw terminal 2 Tach, both on the bottom of PCB. The control circuit must not to brounded at any time. Neither of the two conductors can be grounded

2 Interconnections within BC.

2.1 Remove the lead between screw terminal Max on PCB that goes to OL, at MAX, reconnect this end of lead to screw terminal R1 on PCB.

3 Interconnections BC to LC

Run six leads from BC through conduit to the magnetic logic cabinet (LC). Two of the leads should be the same size as the dc motor armature leads (A1 and A2), and four leads of standard control wire of #16 or larger. Mark the leads at both ends, the heavy leads mark as P1 and N, the four control leads as MIN, MAX, R1-1 and PSC.

3.1 Connections at BC

3.1.1 Connect the heavy lead marked P1 to the large screw terminal on the bottom of overload relay (OL).

3.1.2 Connect the heavy lead marked N to screw terminal N on the bottom of the Thyristor Power Assembly (TPA).

3.1.3 Connect control lead marked R1-1 to the small screw terminal on the bottom of OL that has no wire connected to it.

3.1.4 Connect control lead marked MIN to screw terminal MIN on the bottom of PCB.

3.1.5 Connect control lead marked MAX to screw terminal MAX on the bottom of PCB.

3.1.6 Connect control lead marked PSC to screw terminal PSC on the bottom of PCB.

3.2 Connections at LC

3.2.1 Connect heavy lead marked P1 to terminal block P on the terminal block group.

3.2.2 Connect heavy lead marked N to terminal block N on the terminal block group.

3.2.3 Connect control lead marked R1-1 to screw terminal R1 on the left side of the logic board (

3.2.4 Connect control lead marked MIN to screw terminal MIN on the left side of LB.

3.2.5 Connect control lead marked MAX to screw terminal MAX on the left side of LB.

3.2.6 Connect control lead marked PSC to screw terminal PSC on the left side of LB.

4. Interconnections LC to OS

Run six wires of standard control size #16 or larger from LB in LC through conduit to the operators control station (OS). Mark all leads at both ends.

4.1 Connections at LC on LB

All six leads connect to screw terminals on the bottom of LB. Tie leads in a bundle after connections are made on LB.

4.1.1 Connect lead marked 4 to screw terminal 4.

4.1.2 Connect lead marked 9 to screw terminal 9.

4.1.3 Connect lead marked 10 to screw terminal 10.

4.1.4 Connect lead marked 11 to screw terminal 11.

4.1.5 Connect lead marked 12 to screw terminal 12.

4.1.6 Connect lead marked 13 to screw terminal 13.

4.2 Connections in OS

4.2.1 On the ON-OFF switch connect lead marked 11 to terminal ON, a factory installed wire should already be connected to this point, the addition of lead marked 11 will make two wires connected to the ON terminal.

4.2.2 On the ON-OFF switch connect lead marked 12 to the common terminal on the switch. (Center terminal of switch).

4.2.3 Connect lead marked 13 to erminal 4 (top terminal) on the insulated mounting (IPM).

4.2.4 Connect lead marked 4 to the RUN (top terminal) of the pushbutton contact block.

4.2.5 Connect lead marked 9 to the common terminal between RUN and STOP (Center terminal) of the pushbutton contact block.

4.2.6 Connect lead marked 10 to the STOP (Bottom Terminal) of the pushbutton contact block.

5. Signal Follow Connections

The signal follow reference input signal must be a dc signal, ungrounded , having a range of 0 to -8VDC, preferrably 0 to -10VDC, feeding into approximately 25,000 ohms burden.

5.1 Connections on LB in LC

5.1.1 Connect the negative lead of the incoming signal follow intelligence to screw terminal 2 on bottom of LB.

5.1.2 Connect the positive lead of the incoming signal follow intelligence to screw terminal 3 on the bottom of LB.

6. AC Power Input Into BC

Refer to Table I for the correct AC input voltage to be applied. Be sure that the correct 1 Phase AC power is connected to BC.

6.1 Connect incoming AC lead V to terminal V on the bottom of TPA.

6.2 Connect incoming AC lead U1 to the screw terminal on fuse FU that has no wire connected to it. Incoming AC is fused on one side at all times - do not by-pass fuse FU at any time.

7. AC Power Into LC

Diagram 3 shows the connections for the two acceptable incoming 1 Phase, 50/60HZ voltages; The top of the diagram shows the connections for 230 V input into the transformer CT.

7.1 230V Input

7.1.1 Between transformer CT primary terminals add a jumper TJ1 between terminals H1 and H3.

7.1.2 Between transformer CT primary terminals add a jumper TJ3 between terminals H2 and H4.

7.1.3 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC1 to transformer CT, terminal H1.

7.1.4 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC2 to transformer CT, terminal H4.

7.2 115V Input
The bottom of Diagram 3 shows the connections for 115V, 1 Phase, 50/60HZ input power to LC.

7.2.1 Connect incoming AC 115V, 1 Phase, 50/60HZ, lead AC1 to terminal block 1FU on the blue terminal block group in LC.

7.2.2 Connect incoming AC 115V, 1 Phase, 50/60HZ, lead AC2 to terminal block 2FU on the blue terminal block group in LC.

START-UP INSTRUCTIONS

Recommended Start-Up Procedure:

1. Check all interconnections per Diagram 1V for CEMF Drives or Diagram 1S for speed regulated drives.

2. Check incoming 1 Phase, 50/60HZ incoming AC power per Diagram 3 and instructions 6 and 7 of Electrical interconnections.

3. Check dc motor rotation. Rotation as connected per Diagram 1V and 1S is CCW when viewed from the DC motor commutator end (Carbon brushes are mounted on the commutator end). If CW rotation is required interchange the dc motor shunt field leads, F1 and F2 perferably at the motor terminals. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date but the motor armature circuitry could be changed for some functions).

4. If possible, reduce the magnitude of the incoming signal follow intelligence to zero VDC, or to a low signal level (negative 2 to 3).

5. Apply correct AC input power to U1 and V in BC.

6. Apply correct AC input power to AC1 and AC2 in LC.

7. Set the ON-OFF switch on OS to ON. The red indicating light on OS should indicate the presence of AC control power in OS and LC.

8. Depress the "RUN" pushbutton on OS. The dc motor should start to rotate very slowly. If no rotation occurs go back to step 4 and provide a low signal follow signal. Check motor rotation, if incorrect go back to step 3 and follow instructions.

9. Slowly increase the signal follow input intelligence until the dc motor armature voltage has reached rated no-load (minimum load) base voltage as shown in Table 1 this I.L. If drive is speed regulated the signal follow input intelligence is increased until motor no-load base RPM at rated armature voltage and field excitation (hot condition) is obtained.

   It is suggested that if the signal follow input intelligence cannot be limited at approximately (-) 8VDC for rated conditions that a voltage divider be incorporated in the input circuit to limit the signal follow input to no greater than (-) 10VDC maximum at any time or condition. This (-) 10VDC would give approximately 25% increase in motor armature voltage at rated load.

10. Reduce the signal follow input intelligence to minimum. Depress the "STOP" pushbutton on OS, the dc motor should coast to a stop.

11. Setting of current limit, (CL), pot 3P on PCB in BC reference I.L. 22-1000-7.

    a. Turn ON-OFF switch on OS to OFF.
    b. Set pots 3P (CL) and 4P (Torque Limit) (TL) on PCB in the maximum CCW positions.
    c. Disconnect dc motor shunt field lead F1 at terminal.CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected can not develope enough torque to cause the motor to rotate.
    d. Connect a suitable dc ammeter in the dc motor armature circuit,meter must have a range of at least 250% of rated armature current of drive. Suggested location of ammeter--remove lead P1 from the bottom of overload relay OL in BC, connect the (+) terminal of the ammeter to OL and lead P1 to the (-) terminal of the ammeter.
    e. Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.
    f. Apply AC input power to BC and LC.
    g. Set the ON-OFF switch on ON. The indicating light on OS will be lighted.
    h. Depress the RUN pushbutton on OS, be prepared to quickly depress the STOP pushbutton on OS to minimize the time that armature current is permitted to flow. Armature current will increase rapidly up to approximately 75% of rated motor armature current. Adjust CL pot 3P on PCB CW until 200% rated armature amps is reached. Press the STOP pushbutton on OS. CL should now be set at 150% rated armature amps at motor base speed and 200% for stalled conditions.
    i. Set ON-OFF switch in the OFF position.
    j. Remove all AC power.

   Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR
	VOLTS	AMPS	AMPS	AMPS
1/4	90	2.8	4.2	5.6
1/3	↓	3.3	4.95	6.6
1/2	↓	5.5	8.25	11
3/4	↓	8.1	12.15	16.2
1	180	5.2	7.8	10.4
1-1/2	↓	7.4	11.1	14.8
2	↓	9.6	14.4	19.2
3	↓	14.2	21.3	28.4
4	↓	19	27.5	38
5	↓	25	37.5	50

12. Setting of Torque Limit (TL) pot 4P on PCB in BC reference I.L. 22-1000-7.

The torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If the drive is used in an application such as a winder in which torque limit control is required CW adjustment of pot 4P will cause CL to be limited at a lower level at high motor speeds than at low motor speed as shown in Figure 1.

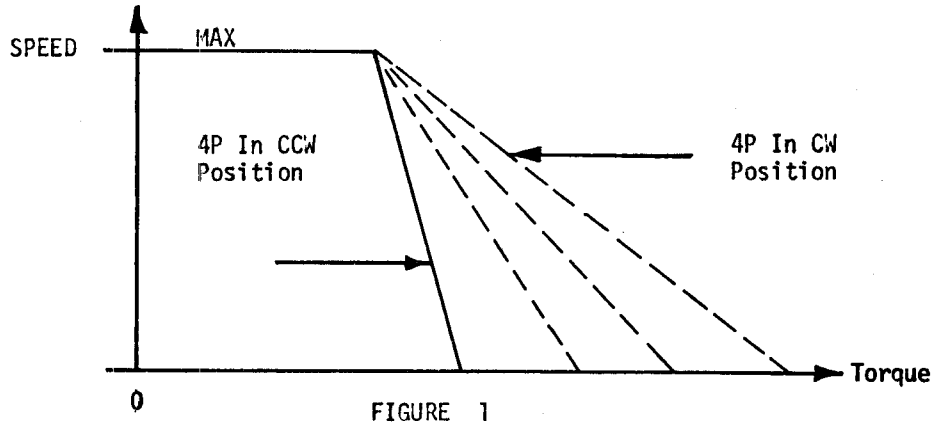


FIGURE 1
TORQUE LIMIT ADJUSTMENT

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor RPM the CL is the same for all settings of torque limit. Be sure that the use of torque limit and CL is understood before making any adjustment of TL pot 4P or damage to equipment can result.

13. I.R. Drop Compensation, IR COMP, Pot 5P on PCB in BC.

Reference I.L. 22-1000-7.

a. Pot 5P is always set in the maximum CCW position for speed regulated (Tach feedback) drives.
b. For voltage regulated CEMF, drive pot 5P is set to give flat motor RPM full-load to minimum load. This setting is usually made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full-load current as at minimum load at this low motor RPM. If the minimum operating speed is greater than 20 to 25% of motor base speed, set I.R. Comp at this minimum operating speed.

TROUBLE SHOOTING

Refer to I.L. 22-1000-7

Additional checks should include the following:

1. Incoming AC, leads AC1 and AC2 on schematic 22-1000-11 and Diagrams 1V, 1S and 2,

2. Interconnections between BC, LC, OS, and MOT.

3. Fuses FU1 and FU2.

4. Plug in relays RN, CX, and FX, check to see that they are secure.

5. Tighten screw terminals on LB and in OS.

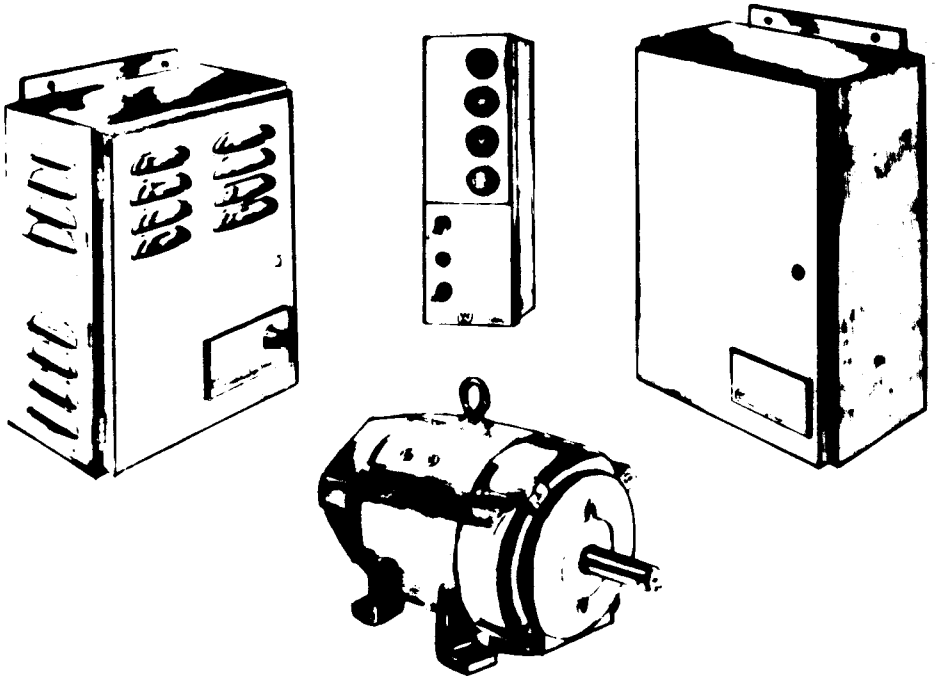
6. Check switch and contact blocks in OS for proper operation.

7. Check signal follow input circuitry and voltage level.

If preceeding steps do not locate cause of malfunction, or if trouble cannot be corrected, contact nearest Westinghouse representative.

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A
22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE
WITH SIGNAL FOLLOW
I. L. 22-1000-11

Westinghouse Electric Corporation

INSTALLATION INSTRUCTIONS FOR A 22-1000 1 PHASE NON-REVERSING MAGNETIC DRIVE WITH SIGNAL FOLLOW

A magnetic drive consists of four basic components, the basic controller, (BC), the magnetic logic cabinet, (LC), consisting of the magnetic contactor assembly (MCA) and the logic board (LB), the operators control station (OS), and the dc drive motor (MOT). The dc drive motor selection is flexible and is not readily fixed in identity. Two styled OS are available one for the standard non-reversing drive, and the other for a non-reversing drive incorporating signal follow.

TABLE I

DC MOTOR (MOT) RATING			BASIC CONTROLLER (BC)	MAGNETIC LOGIC CABINET (LC)	OPERATORS CONTROL STATION (OS)	
HP	ARM VOLTS	FIELD VOLTS	STYLE	STYLE	STANDARD STYLE	FOLLOWER STYLE
1/4	90	100	1459A06G01	1459A08G01	1459A12G01	1459A12G03
1/3	90	100	1459A06G02	1459A08G01	I.L.22-1000-5	I.L.22-1000-11
1/2	90	100	1459A06G03	1459A08G01		
3/4	90	100	1459A06G04	1459A08G01		
1	180	200	1459A06G05	1459A08G03		
1-1/2	180	200	1459A06G06	1459A08G03		
2	180	200	1459A07G01	1459A08G05		
3	180	200	1459A07G02	1459A08G05		
4	180	200	1459A07G03	1459A08G05		
5	180	200	1459A07G04	1459A08G05		

Check the basic controller, magnetic logic cabinet, operators control station, and the dc drive motor rating with Table I.

Examine all components for damage which could have occurred during shipment. If a component is damaged, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse representative if any damage to the equipment exists.

INSTALLATION INSTRUCTIONS

Installation of the four pieces of equipment should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire used should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool dry, dust-free atmosphere, easily accessable for maintenance and good housekeeping practices.

The dc drive motor must be located, mounted, aligned, and operated in accordance with the specific type of motor being applied.

MOUNTING OF EQUIPMENT

1. Mounting of the Basic Controller (BC)

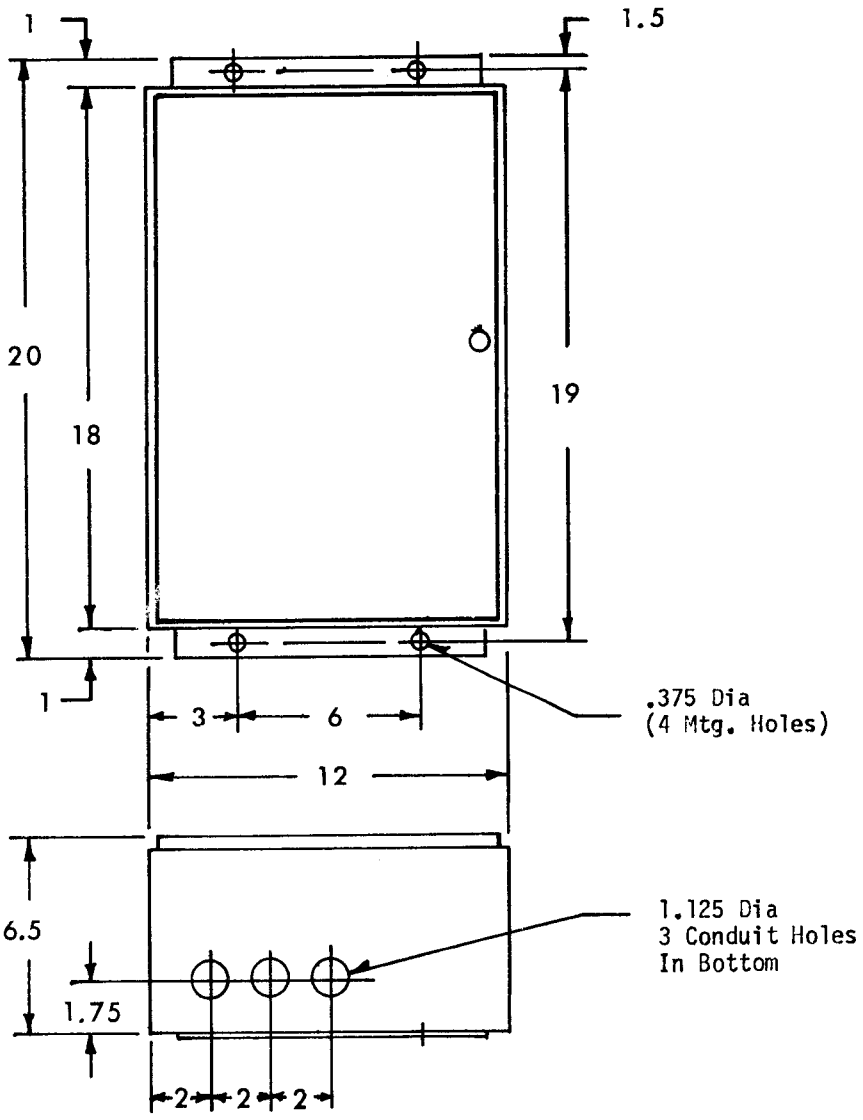
The BC enclosure or cabinet is Nema I and therefore must be located in an area suitable for Nema I enclosures. The location should be dry, dust-free, and relatively cool (40 degrees C ambient or less) to obtain long trouble-free operation.

a. See I.L. 22-1000-7 for mounting dimensions for the mounting of BC.
b. Use four 3/8" bolts, or screws, to mount the enclosure to a suitable vertical surface that is smooth, dry, and of sufficient area and strength to accept and support the basic controller.

2. Mounting Of the Magnetic Logic Cabinet (LC)

The enclosure for LC is of NEMA I design, therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dust-free, and relatively cool (40 degrees C ambient or less) to obtain long trouble free operation.

Figure 1, is the installation plan for mounting of LC. Use 3/8" mounting hardware.



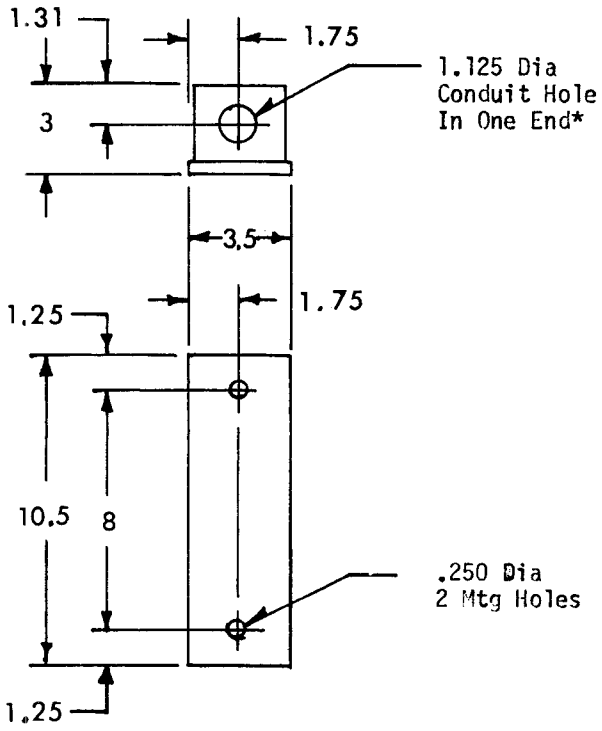
INSTALLATION PLAN FOR MAGNETIC LOGIC CABINET (LC)

FIGURE 1

3. Mounting Of The Operators Control Station (OS)

The OS is NEMA I design, therefore, must be located in an area suitable for NEMA I enclosures.

Figure 2 is the installation plan for the mounting of OS



*Normal Conduit Entry Is In The Top Of (OS)
Conduit Entry Can Be In Bottom By Mounting
Box With Hole In Bottom

INSTALLATION PLAN FOR OPERATORS CONTROL STATION (OS)

FIGURE 2

4. Mounting of the DC Drive Motor (MOT)

Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be followed.

Electrical Interconnections

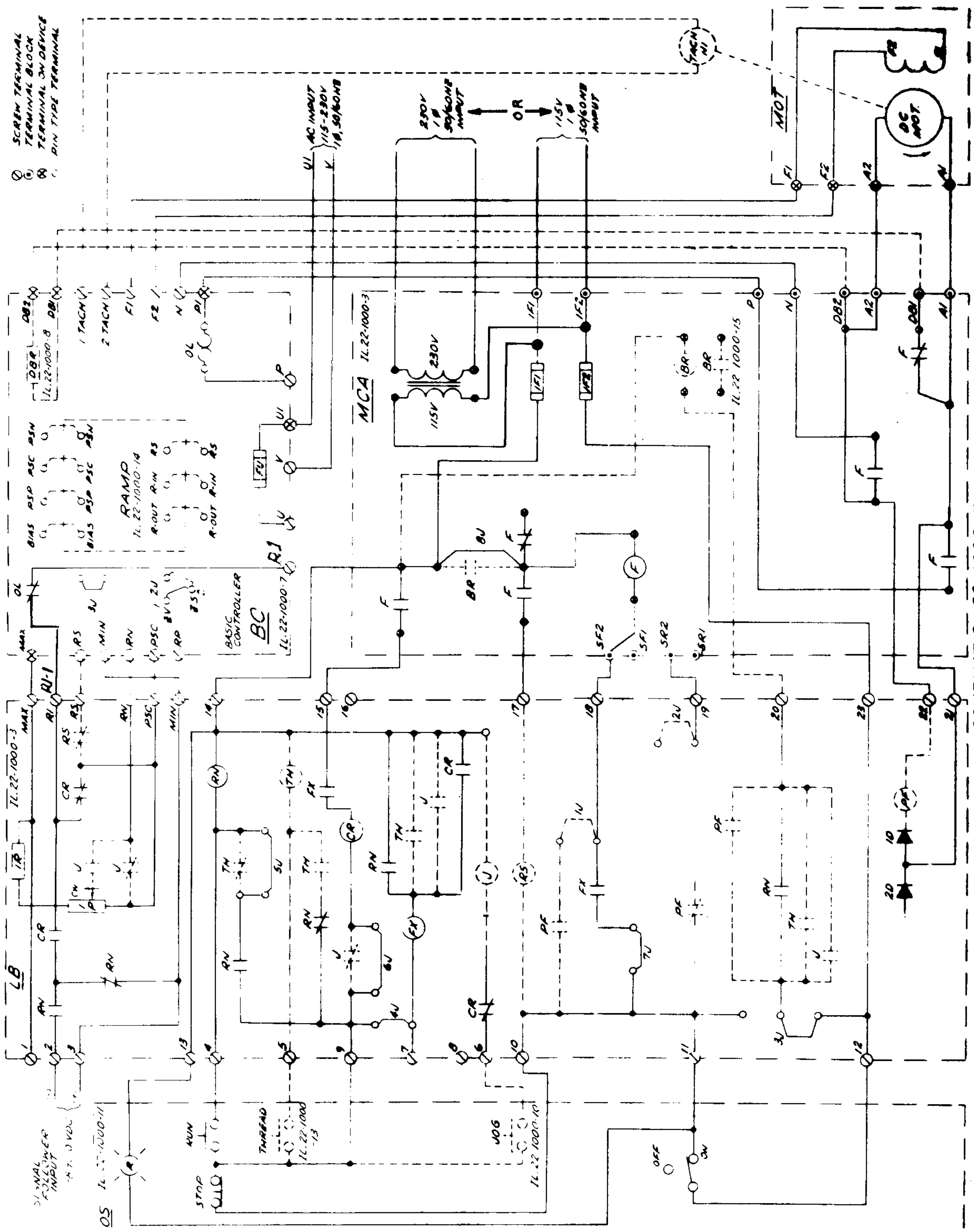
Reference Schematic 22-1000-11
Diagrams 1V, 1S, and 2.

Schematic 22-1000-11 is a composite schematic showing the magnetic non-reversing drive and the standard options that can be incorporated in the drive either at time of purchase or by using "Function Kits" added at any future date. The options are shown by dotted or broken lines in the circuit flow. It is suggested that the composite schematic be up-dated each time a function kit is added by changing the associated dotted or broken lines to solid lines as detailed in the I.L. accompanying each "kit".

Diagram 1V shows the recommended interconnections between BC, LC, OS, and the DC drive motor per schematic 22-1000-11 for CEMF regulated drives. Diagram 1S shows the recommended interconnections between BC, LC, OS, and the DC drive motor (including the motor mounted tachometer) per schematic 22-1000-11 for speed regulated drives. Leads 1 Tach. and 2 Tach shown in dotted lines on schematic 22-1000-11 and the motor mounted dc tachometer, (N1), are added to the CEMF regulated drive to change to a speed regulated drive. (I.R. Comp not 5P, on BC must be set in the maximum CCW position on all speed regulated drives).

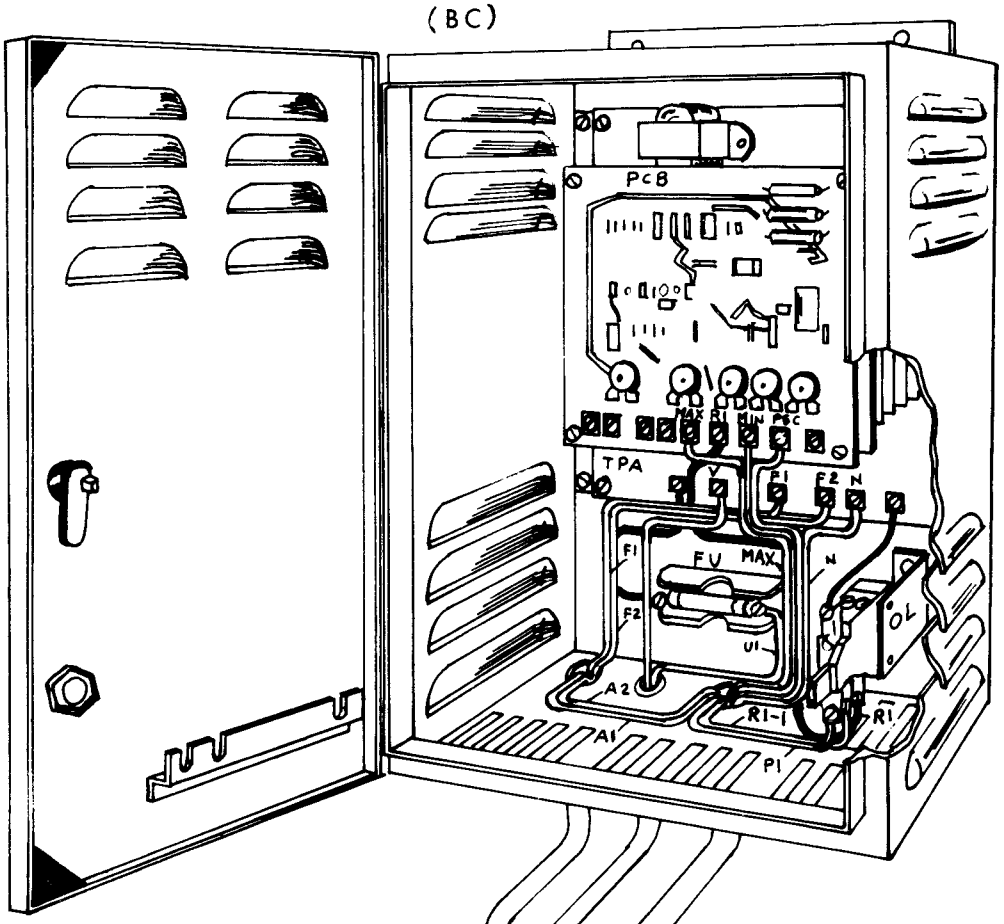
Diagram 3 shows the interconnections for the customer incoming AC supply, leads AC1 and AC2. The transformer is used when customer control voltage is 230V, 1 Phase, 50/60HZ. The transformer is not required if 115V, 1 Phase 50/60 HZ input control power is used.

The wiring as shown provides the flexibility required to permit the addition of the various "function kits", shown in broken line on schematic 22-1000-11, at any time using the detailed installation instructions provided with each function kit.


SCHEMATIC 22-1000-11
MOT
MCA
BC
LB
RAMP
OS
SCREW TERMINAL
TERMINAL BLOCK
TERMINAL ON DEVICE
PIN TYPE TERMINAL

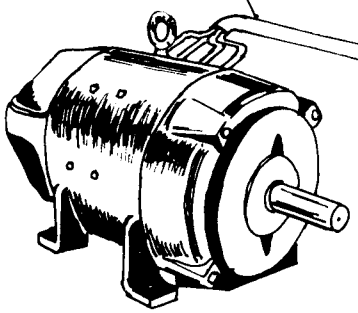
Basic Controller

(BC)



A1 A2 F1 F2

(MT)



U1 V

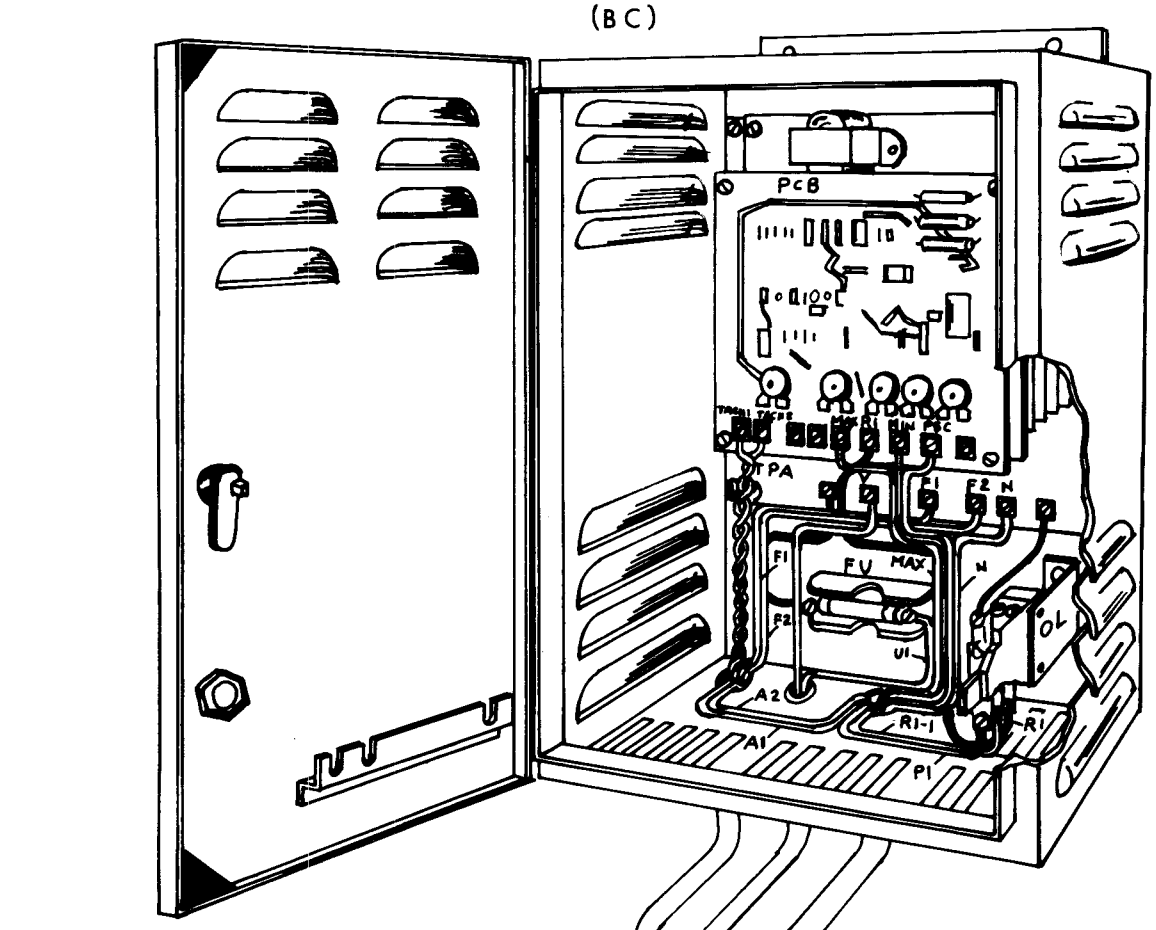
Incoming Supply ①

To Magnetic Controller Diagram 2

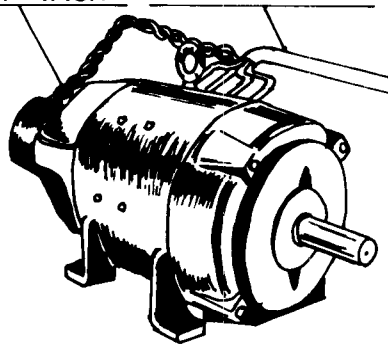
① 1 Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1V

Basic Controller
(BC)



TACH1 TACH2 A1 A2 F1 F2



(MT)

U1 V
Incoming
Supply ①

To
Magnetic Controller
Diagram 2

① 1Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1S

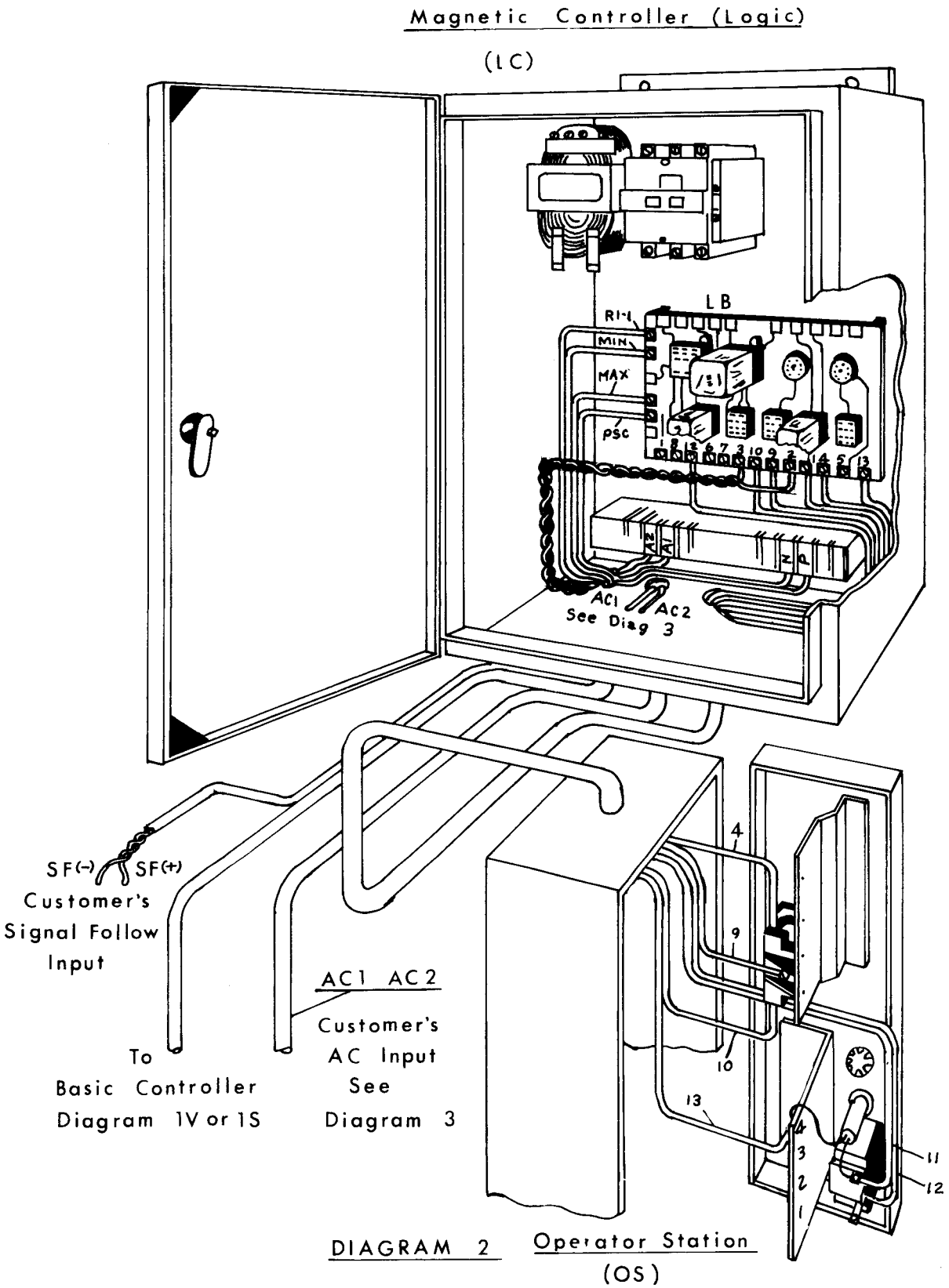
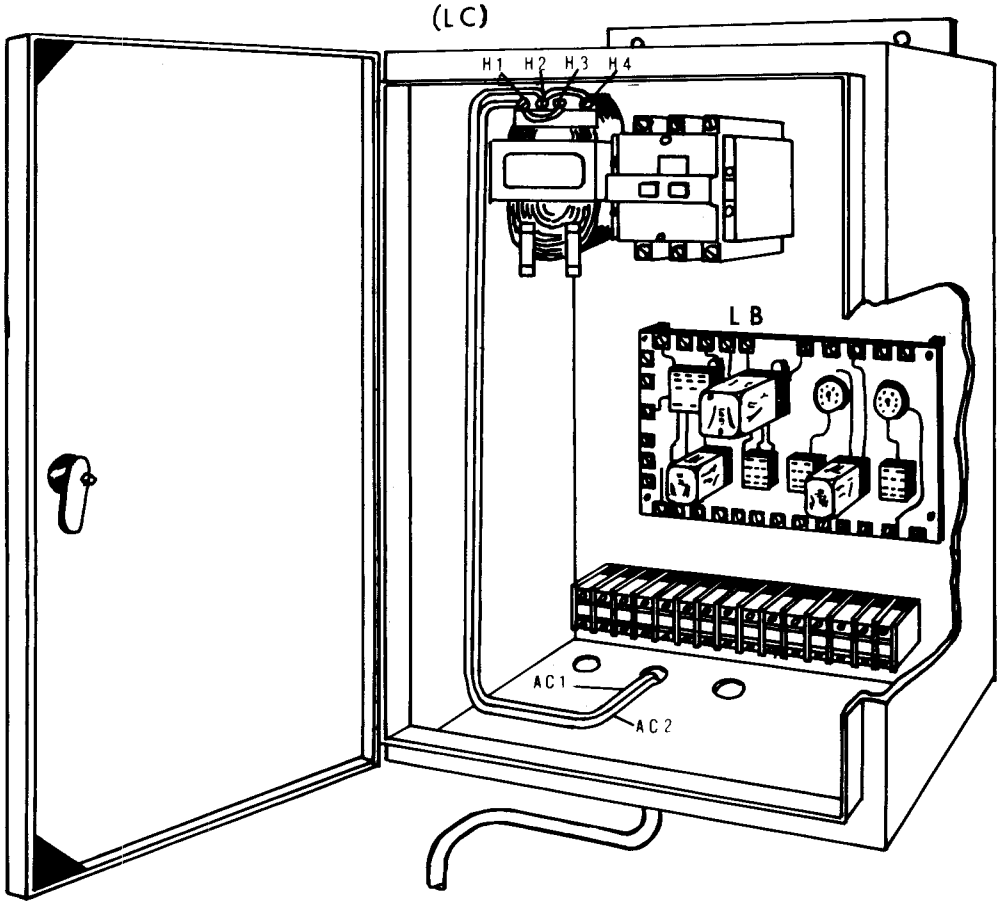
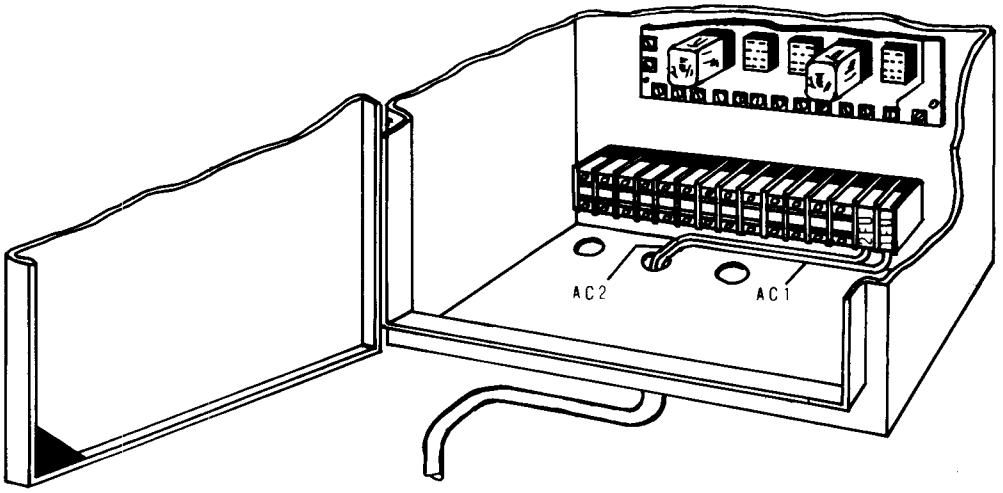

Magnetic Controller (Logic)
(LC)
LB
RI-1
MIN
MAX
PSC
AC1 AC2
See Diag 3
SF(-) SF(+)
Customer's
Signal Follow
Input
To
Basic Controller
Diagram 1V or 1S
AC1 AC2
Customer's
AC Input
See
Diagram 3
4
9
10
13
11
12
Operator Station
(OS)

DIAGRAM 2

Magnetic Controller (Logic)
(LC)



230V – 1 Ø – 50 /60 HZ



115 V – 1 Ø – 50 / 60 HZ

DIAGRAM 3

1. Interconnections MT to BC and MT to LC

1.1 CEMF Regulated Drives - Diagram 1V

Run four wires from the dc motor terminals (MT) through conduit to the basic controller cabinet (BC), entering at the bottom of the cabinet using one of the large conduit openings. Motor armature leads (A1 and A2) should be sized according to motor HP -- motor armature current, and the motor shunt field leads (F1 and F2) can be standard control wire of #16 or larger. Mark leads on both ends.

1.1.1 Connect shunt field lead marked F1 to screw terminal F1 on the bottom of printed circuit board PCB.

1.1.2 Connect shunt field lead marked F2 to screw terminal F2 on the bottom of PCB.

1.1.3 Run the two armature leads (A1 and A2) across the bottom of BC and out through the conduit running between BC and the magnetic logic cabinet (LC). Connect motor armature lead marked A1 to terminal block A1 on the bottom of the panel in LC. Connect armature lead marked A2 to terminal block A2 in LC.

1.2 Speed Regulated Drives - Diagram 1S

Complete all connections between MT and BC for CEMF regulated drives except run a total of six leads between MT and BC. The fifth and sixth leads should be a twisted pair, running between the tachometer (MT) and BC. Connect one conductor to screw terminal 1 Tach and the other conductor to screw terminal 2 Tach, both on the bottom of PCB. The control circuit must not to brounded at any time. Neither of the two conductors can be grounded

2 Interconnections within BC.

2.1 Remove the lead between screw terminal Max on PCB that goes to OL, at MAX, reconnect this end of lead to screw terminal R1 on PCB.

3 Interconnections BC to LC

Run six leads from BC through conduit to the magnetic logic cabinet (LC). Two of the leads should be the same size as the dc motor armature leads (A1 and A2), and four leads of standard control wire of #16 or larger. Mark the leads at both ends, the heavy leads mark as P1 and N, the four control leads as MIN, MAX, R1-1 and PSC.

3.1 Connections at BC

3.1.1 Connect the heavy lead marked P1 to the large screw terminal on the bottom of overload relay (OL).

3.1.2 Connect the heavy lead marked N to screw terminal N on the bottom of the Thyristor Power Assembly (TPA).

3.1.3 Connect control lead marked R1-1 to the small screw terminal on the bottom of OL that has no wire connected to it.

3.1.4 Connect control lead marked MIN to screw terminal MIN on the bottom of PCB.

3.1.5 Connect control lead marked MAX to screw terminal MAX on the bottom of PCB.

3.1.6 Connect control lead marked PSC to screw terminal PSC on the bottom of PCB.

3.2 Connections at LC

3.2.1 Connect heavy lead marked P1 to terminal block P on the terminal block group.

3.2.2 Connect heavy lead marked N to terminal block N on the terminal block group.

3.2.3 Connect control lead marked R1-1 to screw terminal R1 on the left side of the logic board (LB).

3.2.4 Connect control lead marked MIN to screw terminal MIN on the left side of LB.

3.2.5 Connect control lead marked MAX to screw terminal MAX on the left side of LB.

3.2.6 Connect control lead marked PSC to screw terminal PSC on the left side of LB.

4. Interconnections LC to OS

Run six wires of standard control size #16 or larger from LB in LC through conduit to the operators control station (OS). Mark all leads at both ends.

4.1 Connections at LC on LB

All six leads connect to screw terminals on the bottom of LB. Tie leads in a bundle after connections are made on LB.

4.1.1 Connect lead marked 4 to screw terminal 4.

4.1.2 Connect lead marked 9 to screw terminal 9.

4.1.3 Connect lead marked 10 to screw terminal 10.

4.1.4 Connect lead marked 11 to screw terminal 11.

4.1.5 Connect lead marked 12 to screw terminal 12.

4.1.6 Connect lead marked 13 to screw terminal 13.

4.2 Connections in OS

4.2.1 On the ON-OFF switch connect lead marked 11 to terminal ON, a factory installed wire should already be connected to this point, the addition of lead marked 11 will make two wires connected to the ON terminal.

4.2.2 On the ON-OFF switch connect lead marked 12 to the common terminal on the switch. (Center terminal of switch).

4.2.3 Connect lead marked 13 to erminal 4 (top terminal) on the insulated mounting (IPM).

4.2.4 Connect lead marked 4 to the RUN (top terminal) of the pushbutton contact block.

4.2.5 Connect lead marked 9 to the common terminal between RUN and STOP (Center terminal) of the pushbutton contact block.

4.2.6 Connect lead marked 10 to the STOP (Bottom Terminal) of the pushbutton contact block.

5. Signal Follow Connections

The signal follow reference input signal must be a dc signal, ungrounded , having a range of 0 to -8VDC, preferrably 0 to -10VDC, feeding into approximately 25,000 ohms burden.

5.1 Connections on LB in LC

5.1.1 Connect the negative lead of the incoming signal follow intelligence to screw terminal 2 on bottom of LB.

5.1.2 Connect the positive lead of the incoming signal follow intelligence to screw terminal 3 on the bottom of LB.

6. AC Power Input Into BC

Refer to Table I for the correct AC input voltage to be applied. Be sure that the correct 1 Phase AC power is connected to BC.

6.1 Connect incoming AC lead V to terminal V on the bottom of TPA.

6.2 Connect incoming AC lead U1 to the screw terminal on fuse FU that has no wire connected to it. Incoming AC is fused on one side at all times - do not by-pass fuse FU at any time.

7. AC Power Into LC

Diagram 3 shows the connections for the two acceptable incoming 1 Phase, 50/60HZ voltages; The top of the diagram shows the connections for 230 V input into the transformer CT.

7.1 230V Input

7.1.1 Between transformer CT primary terminals add a jumper TJ1 between terminals H1 and H3.

7.1.2 Between transformer CT primary terminals add a jumper TJ3 between terminals H2 and H4.

7.1.3 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC1 to transformer CT, terminal H1.

7.1.4 Connect incoming AC 230V, 1 Phase, 50/60HZ, lead AC2 to transformer CT, terminal H4.

7.2 115V Input
The bottom of Diagram 3 shows the connections for 115V, 1 Phase, 50/60HZ input power to LC.

7.2.1 Connect incoming AC 115V, 1 Phase, 50/60HZ, lead AC1 to terminal block 1FU on the blue terminal block group in LC.

7.2.2 Connect incoming AC 115V, 1 Phase, 50/60HZ, lead AC2 to terminal block 2FU on the blue terminal block group in LC.

START-UP INSTRUCTIONS

Recommended Start-Up Procedure:

1. Check all interconnections per Diagram 1V for CEMF Drives or Diagram 1S for speed regulated drives.

2. Check incoming 1 Phase, 50/60HZ incoming AC power per Diagram 3 and instructions 6 and 7 of Electrical interconnections.

3. Check dc motor rotation. Rotation as connected per Diagram 1V and 1S is CCW when viewed from the DC motor commutator end (Carbon brushes are mounted on the commutator end). If CW rotation is required interchange the dc motor shunt field leads, F1 and F2 perferably at the motor terminals. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date but the motor armature circuitry could be changed for some functions).

4. If possible, reduce the magnitude of the incoming signal follow intelligence to zero VDC, or to a low signal level (negative 2 to 3).

5. Apply correct AC input power to U1 and V in BC.

6. Apply correct AC input power to AC1 and AC2 in LC.

7. Set the ON-OFF switch on OS to ON. The red indicating light on OS should indicate the presence of AC control power in OS and LC.

8. Depress the "RUN" pushbutton on OS. The dc motor should start to rotate very slowly. If no rotation occurs go back to step 4 and provide a low signal follow signal. Check motor rotation, if incorrect go back to step 3 and follow instructions.

9. Slowly increase the signal follow input intelligence until the dc motor armature voltage has reached rated no-load (minimum load) base voltage as shown in Table 1 this I.L. If drive is speed regulated the signal follow input intelligence is increased until motor no-load base RPM at rated armature voltage and field excitation (hot condition) is obtained.

   It is suggested that if the signal follow input intelligence cannot be limited at approximately (-) 8VDC for rated conditions that a voltage divider be incorporated in the input circuit to limit the signal follow input to no greater than (-) 10VDC maximum at any time or condition. This (-) 10VDC would give approximately 25% increase in motor armature voltage at rated load.

10. Reduce the signal follow input intelligence to minimum. Depress the "STOP" pushbutton on OS, the dc motor should coast to a stop.

11. Setting of current limit, (CL), pot 3P on PCB in BC reference I.L. 22-1000-7.

    a. Turn ON-OFF switch on OS to OFF.
    b. Set pots 3P (CL) and 4P (Torque Limit) (TL) on PCB in the maximum CCW positions.
    c. Disconnect dc motor shunt field lead F1 at terminal.CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected can not develope enough torque to cause the motor to rotate.
    d. Connect a suitable dc ammeter in the dc motor armature circuit,meter must have a range of at least 250% of rated armature current of drive. Suggested location of ammeter--remove lead P1 from the bottom of overload relay OL in BC, connect the (+) terminal of the ammeter to OL and lead P1 to the (-) terminal of the ammeter.
    e. Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.
    f. Apply AC input power to BC and LC.
    g. Set the ON-OFF switch on ON. The indicating light on OS will be lighted.
    h. Depress the RUN pushbutton on OS, be prepared to quickly depress the STOP pushbutton on OS to minimize the time that armature current is permitted to flow. Armature current will increase rapidly up to approximately 75% of rated motor armature current. Adjust CL pot 3P on PCB CW until 200% rated armature amps is reached. Press the STOP pushbutton on OS. CL should now be set at 150% rated armature amps at motor base speed and 200% for stalled conditions.
    i. Set ON-OFF switch in the OFF position.
    j. Remove all AC power.

    Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR
	VOLTS	AMPS	AMPS	AMPS
1/4	90	2.8	4.2	5.6
1/3	↓	3.3	4.95	6.6
1/2	↓	5.5	8.25	11
3/4	↓	8.1	12.15	16.2
1	180	5.2	7.8	10.4
1-1/2	↓	7.4	11.1	14.8
2	↓	9.6	14.4	19.2
3	↓	14.2	21.3	28.4
4	↓	19	27.5	38
5	↓	25	37.5	50

12. Setting of Torque Limit (TL) pot 4P on PCB in BC reference I.L. 22-1000-7.

The torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If the drive is used in an application such as a winder in which torque limit control is required CW adjustment of pot 4P will cause CL to be limited at a lower level at high motor speeds than at low motor speed as shown in Figure 1.

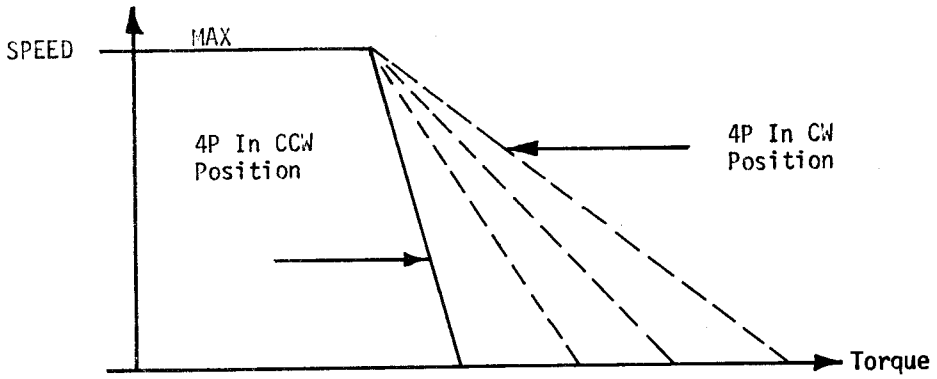


FIGURE 1
TORQUE LIMIT ADJUSTMENT

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor RPM the CL is the same for all settings of torque limit. Be sure that the use of torque limit and CL is understood before making any adjustment of TL pot 4P or damage to equipment can result.

13. I.R. Drop Compensation, IR COMP, Pot 5P on PCB in BC.

Reference I.L. 22-1000-7.

a. Pot 5P is always set in the maximum CCW position for speed regulated (Tach feedback) drives.
b. For voltage regulated CEMF, drive pot 5P is set to give flat motor RPM full-load to minimum load. This setting is usually made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full-load current as at minimum load at this low motor RPM. If the minimum operating speed is greater than 20 to 25% of motor base speed, set I.R. Comp at this minimum operating speed.

TROUBLE SHOOTING

Refer to I.L. 22-1000-7

Additional checks should include the following:

1. Incoming AC, leads AC1 and AC2 on schematic 22-1000-11 and Diagrams 1V, 1S and 2,

2. Interconnections between BC, LC, OS, and MOT.

3. Fuses FU1 and FU2.

4. Plug in relays RN, CX, and FX, check to see that they are secure.

5. Tighten screw terminals on LB and in OS.

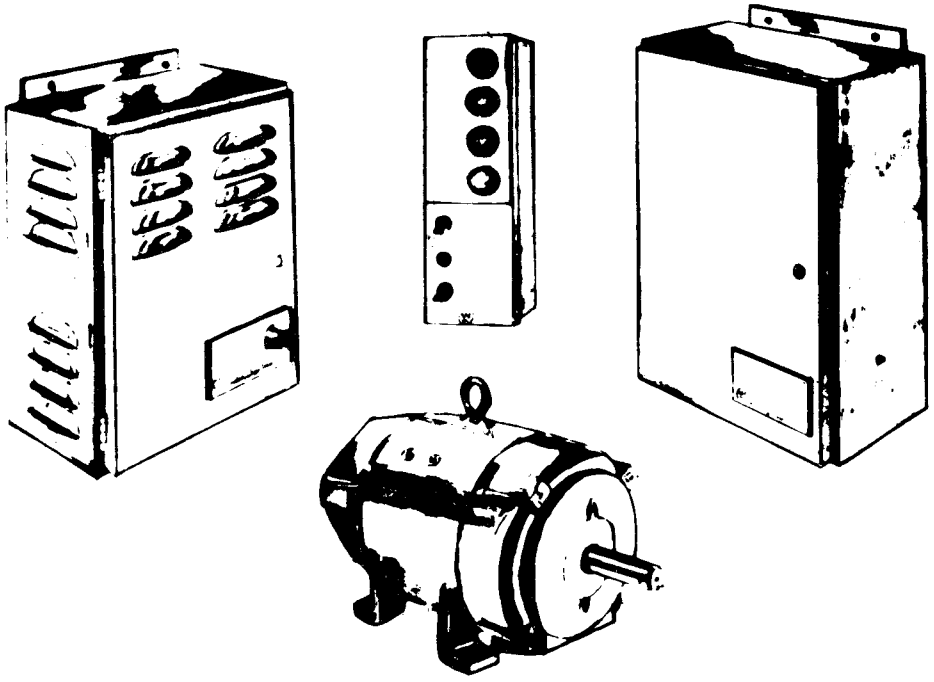
6. Check switch and contact blocks in OS for proper operation.

7. Check signal follow input circuitry and voltage level.

If preceeding steps do not locate cause of malfunction, or if trouble cannot be corrected, contact nearest Westinghouse representative.

Westinghouse

22-1000
Adjustable Speed Drives



INSTALLATION INSTRUCTIONS FOR A
22-1000 1 PHASE REVERSING MAGNETIC DRIVE
WITH SIGNAL FOLLOW
I. L. 22-1000-12

Westinghouse Electric Corporation

INSTALLATION INSTRUCTIONS FOR A 22-1000 1 PHASE REVERSING MAGNETIC DRIVE WITH SIGNAL FOLLOW

A magnetic drive consists of four basic components, the basic controller, (BC), the magnetic logic cabinet, (LC), consisting of the magnetic contactor assembly (MCA) and the logic board (LB), the operators control station, (OS), and the dc drive motor (MOT). The dc drive motor selection is flexible and is not readily fixed in identity. Two styled OS are available, one for the standard reversing drive, and the other for a reversing drive incorporating signal follow.

TABLE I

DC MOTOR (MOT) RATING			BASIC CONTROLLER (BC)	MAGNETIC LOGIC CABINET (LC)	OPERATORS CONTROL STATION (OS)	
HP	ARM VOLTS	FIELD VOLTS	STYLE	STYLE	STANDARD STYLE	FOLLOWER STYLE
1/4	90	100	1459A06G01	1459A08G02	1459A12G02	1459A12G04
1/3	90	100	1459A06G02	1459A08G02	I.L.22-1000-6	I.L.22-1000-12
1/2	90	100	1459A06G03	1459A08G02		
3/4	90	100	1459A06G04	1459A08G02		
1	180	200	1459A06G05	1459A08G04		
1-1/2	180	200	1459A06G06	1459A08G04		
2	180	200	1459A07G01	1459A08G06		
3	180	200	1459A07G02	1459A08G06		
4	180	200	1459A07G03	1459A08G06		
5	180	200	1459A07G04	1459A08G06		

Check the basic controller, magnetic logic cabinet, operators control station, and the dc drive motor rating with Table I.

Examine all components for damage which could have occurred during shipment. If a component is damaged, examine the shipping carton or crate for visible shipping damage. Contact the nearest Westinghouse representative if any damage to the equipment exists.

INSTALLATION INSTRUCTIONS

Installation of the four pieces of equipment should be done using good shop practices for the installation and operation of electrical and mechanical equipment. The power and control wire used should be selected in line with all existing local and national electrical codes.

Mounting of the equipment should be in a cool, dry, dust-free atmosphere, easily accessible for maintenance and good housekeeping practices.

The dc drive motor must be located, mounted, aligned, and operated in accordance with the specific type of motor being applied.

MOUNTING OF EQUIPMENT

1. Mounting of the Basic Controller (BC)

The BC enclosure or cabinet is NEMA I and therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dust-free, and relatively cool (40 Degrees C ambient or less) to obtain long trouble-free operation.

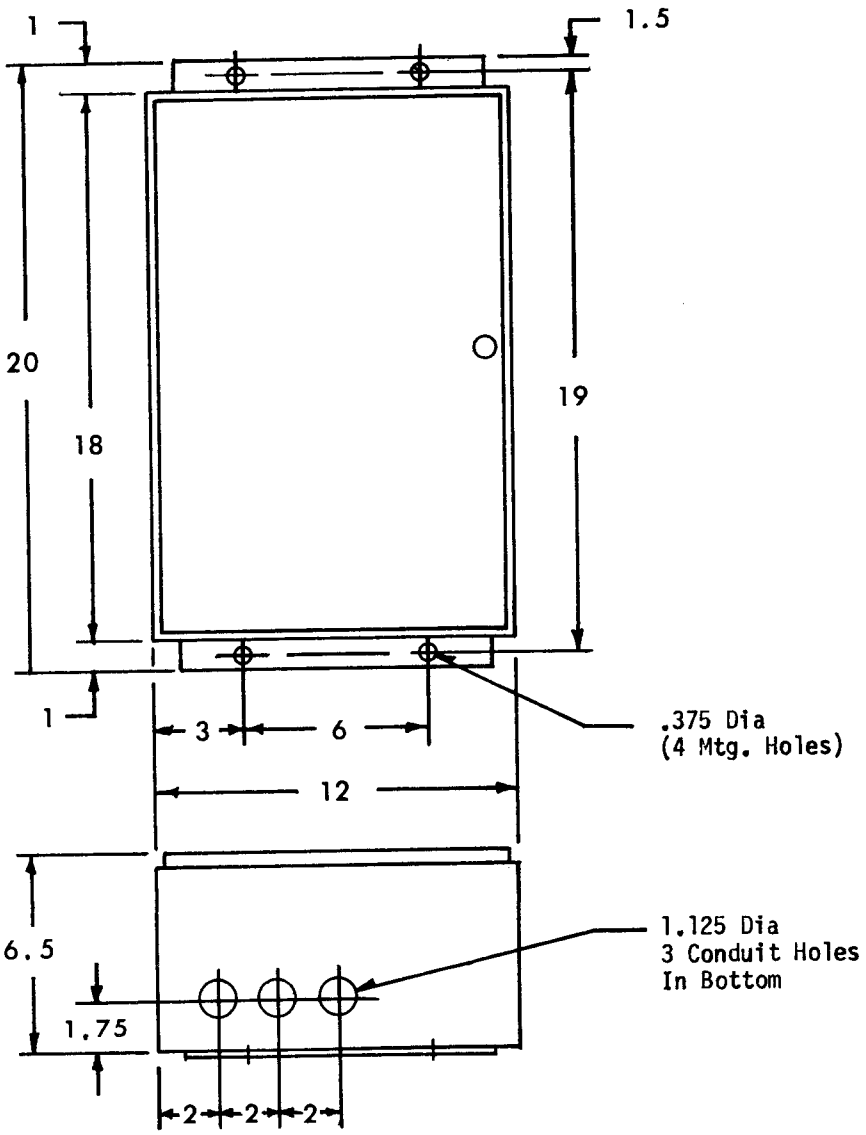
(a) See IL 22-1000-7 for mounting dimensions for the mounting of BC.

(b) Use four 3/8" bolts, or screws, to mount the enclosure to a suitable vertical surface that is smooth, dry, and of sufficient area and strength to accept and support the basic controller.

2. Mounting of the Magnetic Logic Cabinet (LC)

The enclosure for LC is of NEMA I design, therefore must be located in an area suitable for NEMA I enclosures. The location should be dry, dust=free, and relatively cool (40 Degrees C ambient or less) to obtain long trouble-free operation.

Figure 1, is the installation plan for mounting of LC. Use 3/8" mounting hardware.



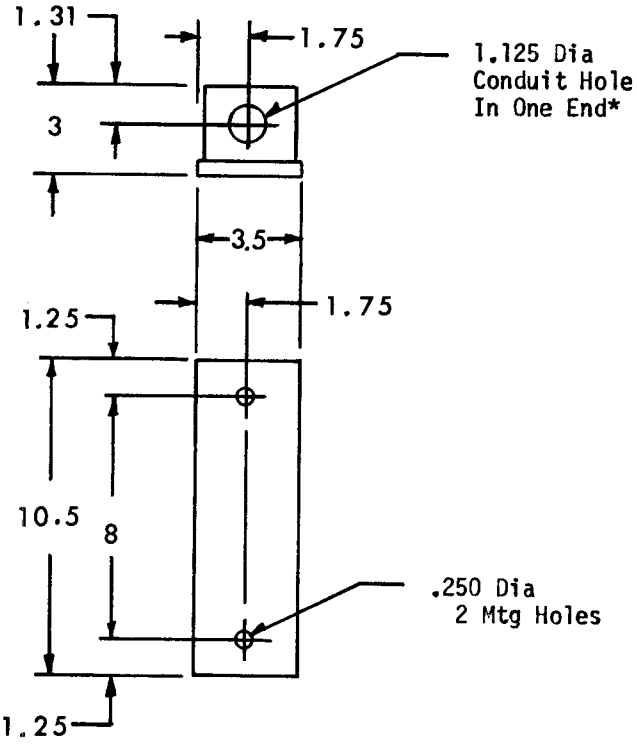
INSTALLATION PLAN FOR MAGNETIC LOGIC CABINET (LC)

FIGURE 1

3. Mounting of the Operators Control Station (OS)

The OS is NEMA I design, therefore must be located in an area suitable for NEMA I enclosures.

Figure 2 is the installation plan for the mounting of OS.



*Normal Conduit Entry Is In The Top Of (OS) Conduit Entry
Can Be In Bottom By Mounting Box With Hole In Bottom

INSTALLATION PLAN FOR OPERATORS CONTROL STATION (OS)

FIGURE 2

4. Mounting of the DC Drive Motor (MOT)

Mounting is dependent upon the type of drive motor supplied and its application. Normal mounting and alignment practices should be followed.

ELECTRICAL INTERCONNECTIONS

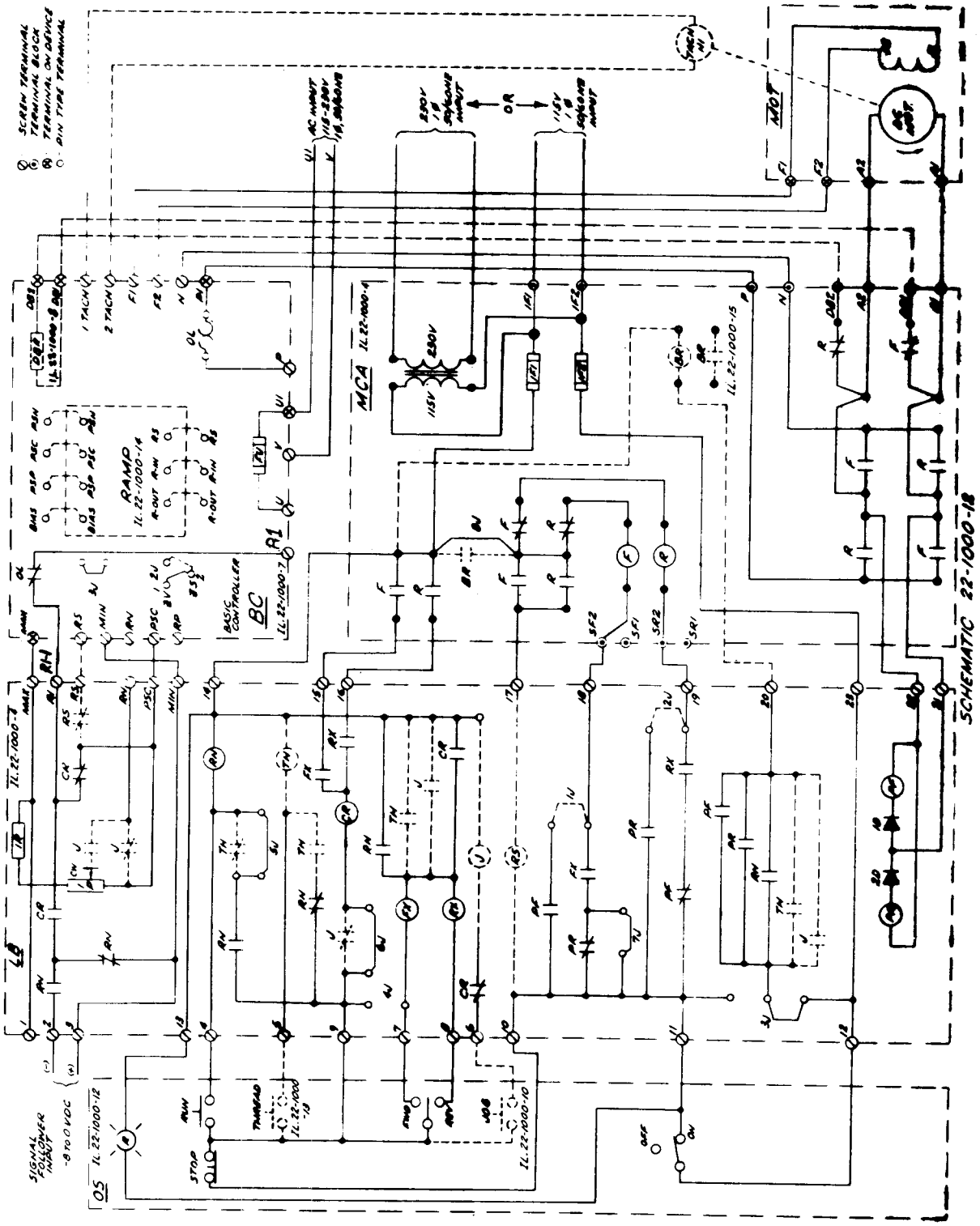
Reference Schematic 22-1000-12
Diagrams 1V, 1S, and 2

Schematic 22-1000-12 is a composite schematic showing the magnetic reversing drive and the standard options that can be incorporated in the drive either at time of purchase or by using "Function Kits" added at any future date. The options are shown by dotted or broken lines in the circuit flow. It is suggested that the composite schematic be up-dated each time a function kit is added by changing the associated dotted or broken lines to solid lines as detailed in the IL accompanying each "kit".

Diagram 1V shows the recommended interconnections between BC, LC, OS and the dc drive motor per schematic 22-1000-12 for CEMF regulated drives. Diagram 1S shows the recommended interconnections between BC, LC, OS and the dc drive motor (including the motor mounted tachometer) per schematic 22-1000-12 for speed regulated drives. Leads 1 Tach and 2 Tach shown in dotted lines on schematic 22-1000-12 and the motor mounted dc tachometer, N1, are added to the CEMF regulated drive to change to a speed regulated drive. (IR Comb pot, 5P, on BC must be set in the maximum CCW position on all speed regulated drives).

Diagram 2 shows the interconnections for the customer incoming AC supply, leads AC1 and AC2. The transformer is used when customer control voltage is 230V, 1 phase, 50/60HZ. The transformer is not required if 115V, 1 phase, 50/60 HZ input control power is used.

The wiring as shown provides the flexibility required to permit the addition of the various "Function kits", shown in broken line on schematic 22-1000-12 at any time using the detailed installation instructions provided with each function kit.


SCHEMATIC 22-1000-18

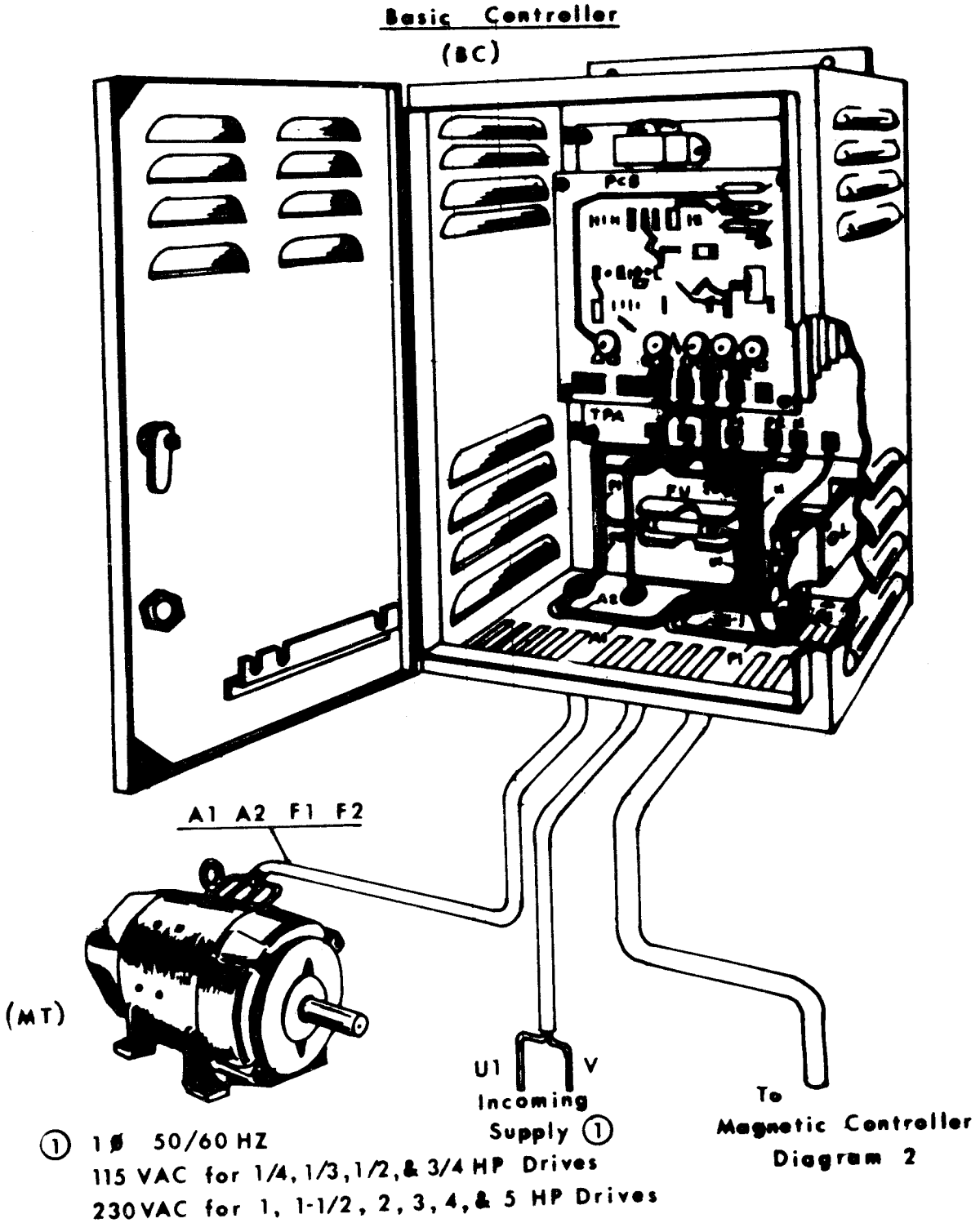
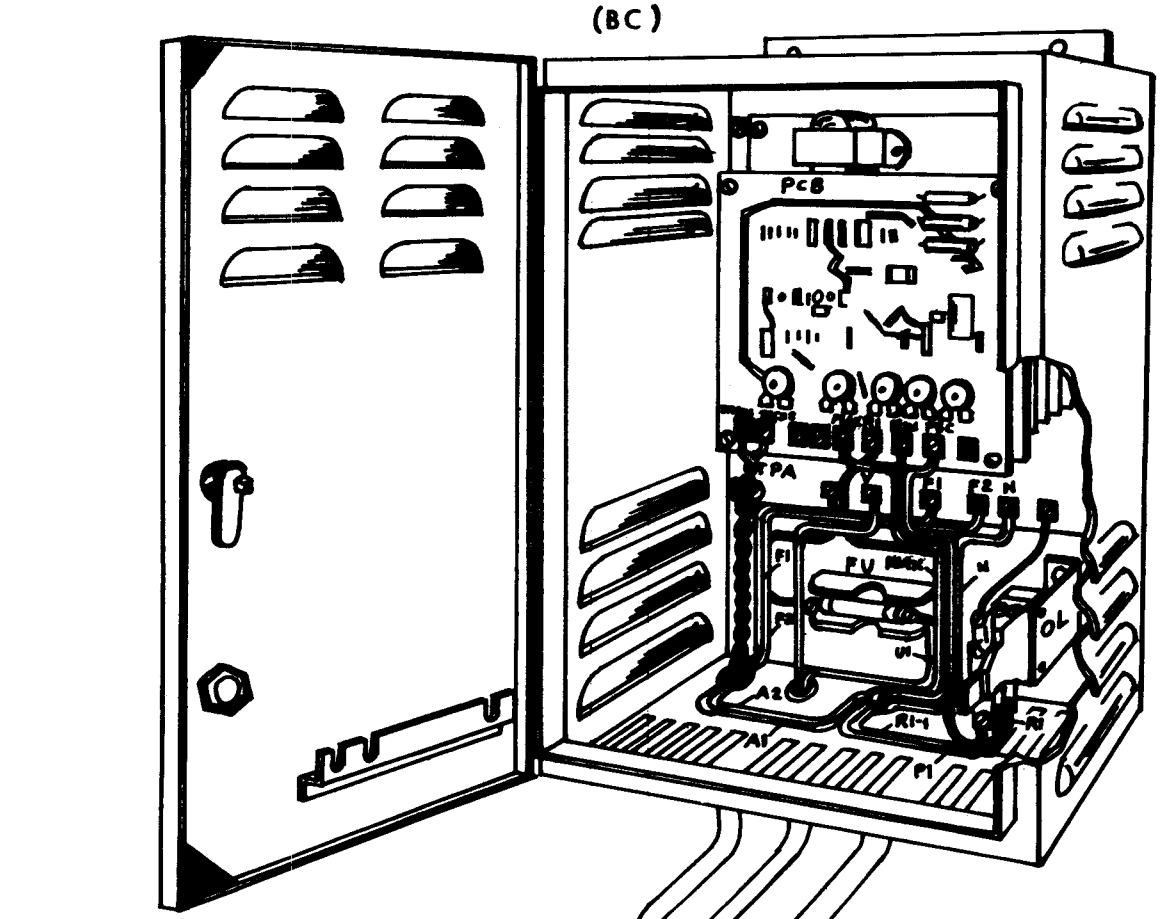
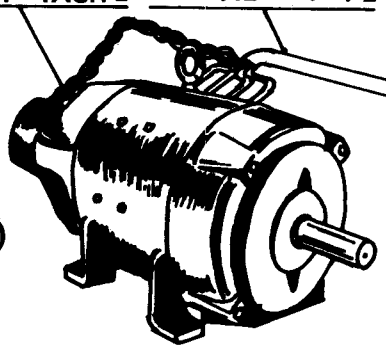

Basic Controller
(BC)
A1 A2 F1 F2
(MT)
U1
V
Incoming
Supply ①
To
Magnetic Controller
Diagram 2
① 1ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM IV

Basic Controller
(BC)



TACH1 TACH2 A1 A2 F1 F2



(MT)

U1 V
Incoming
Supply ①

To
Magnetic Controller
Diagram 2

① 1 Ø 50/60 HZ
115 VAC for 1/4, 1/3, 1/2, & 3/4 HP Drives
230 VAC for 1, 1-1/2, 2, 3, 4, & 5 HP Drives

DIAGRAM 1S

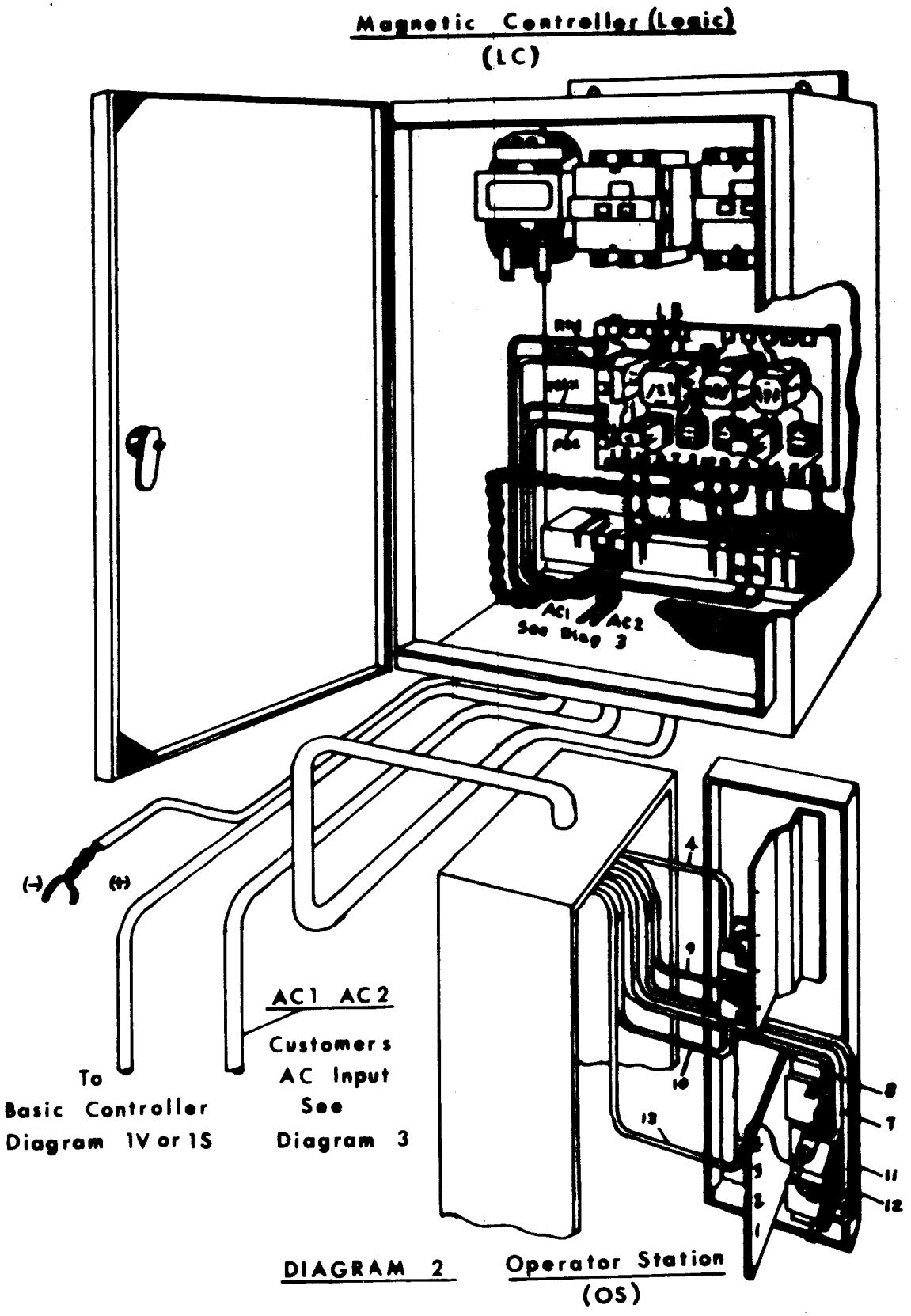
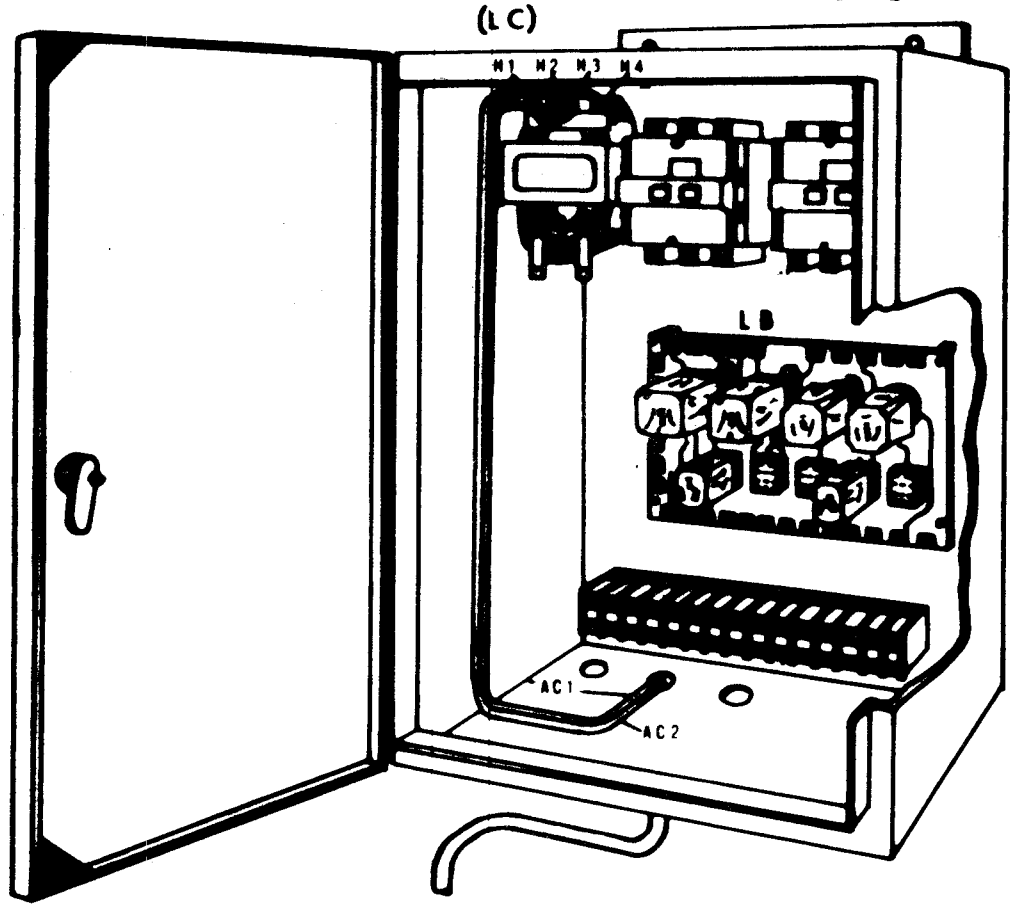
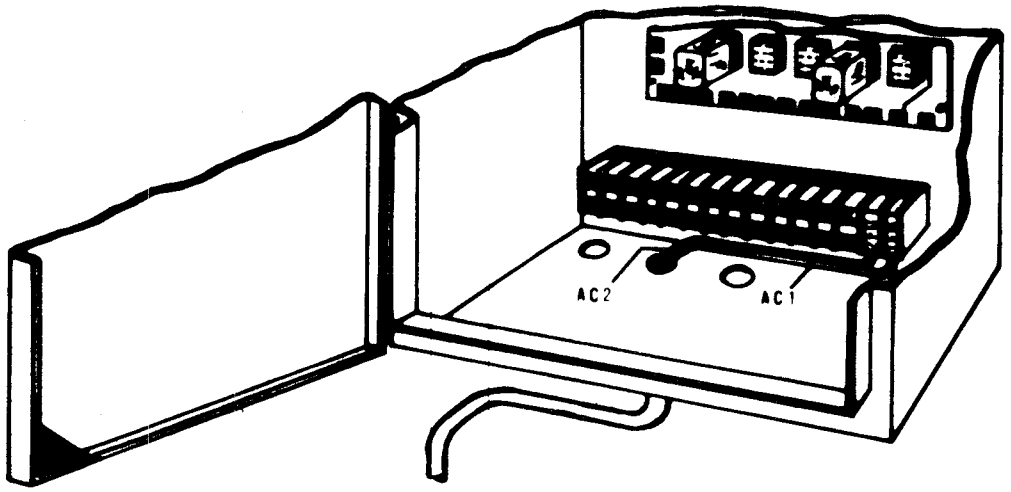

Magnetic Controller (Logic)
(LC)
AC1
AC2
See Diag 3
(-)
(+)
AC1 AC2
Customers
AC Input
See
Diagram 3
To
Basic Controller
Diagram 1V or 1S
4
9
10
13
8
7
11
12
3
2
1
Operator Station
(OS)

DIAGRAM 2

Magnetic Controller (Logic)
(LC)



230V - 1 ϕ - 50 / 60 HZ



115 V - 1 ϕ - 50 /60 HZ

DIAGRAM 3

1. INTERCONNECTIONS MT TO BC AND MT TO LC

1.1 CEMF REGULATED DRIVES DIAGRAM IV

Run four wires from the dc motor terminals (MT) through conduit to the basic controller cabinet (BC), entering at the bottom of the cabinet using one of the large conduit openings. Motor armature leads (A1 and A2) should be sized according to motor HP - motor armature current, and the motor shunt field leads (F1 and F2) can be standard control wire of #16 or larger. Mark leads on both ends.

1.1.1 Connect shunt field lead marked F1 to screw terminal F1 on the bottom of printed circuit board PCB.

1.1.2 Connect shunt field lead marked F2 to screw terminal F2 on the bottom of PCB.

1.1.3 Run the two armature leads (A1 and A2) across the bottom of BC and out through the conduit running between BC and the magnetic logic cabinet (LC). Connect motor armature lead marked A1 to terminal block A1 on the bottom of the panel in LC. Connect armature lead marked A2 to terminal block A2 in LC.

1.2 SPEED REGULATED DRIVES DIAGRAM 1S

Complete all connections between MT and BC for CEMF regulated drives except run a total of six leads between MT and BC. The fifth and sixth leads should be a twisted pair running between the tachometer (MT) and LC. Connect one conductor to screw terminal 1 Tach and the other conductor to screw terminal 2 Tach, both on the bottom of PCB. The control circuit must not be grounded at any time. Neither of the two conductors can be grounded.

2. INTERCONNECTIONS BC TO LC

Run six leads from BC through conduit to the magnetic logic cabinet (LC). Two of the leads should be the same size as the dc motor armature leads (A1 and A2) and four leads can be standard control wire of #16 or larger. Mark the leads at both ends, the heavy leads mark as P1 and N, the four control leads as MAX, MIN, R1-1 and PSC.

2.1 Connections at BC

2.1.1 Connect the heavy lead marked P1 to the large screw terminal on the bottom of overload relay (OL).

2.1.2 Connect the heavy lead marked N to screw terminal N on the bottom of the Thyristor Power Assembly (TPA).

2.1.3 Connect control lead marked R1-1 to the small screw terminal on the bottom of OL that has no wire connected to it.

2.1.4 Connect control lead marked MIN to screw terminal MIN on the bottom of PCB.

2.1.5 Connect control lead marked MAX to screw terminal MAX on the bottom of PCB.

2.1.6 Connect control lead marked PSC to screw terminal PSC on the bottom of PCB.

2.1.7 Move lead connected to screw terminal MAX to screw terminal R1 on PCB. (Lead to N.C. contact on OL).

2.2 Connections at LC

2.2.1 Connect heavy lead marked P1 to terminal block P on the blue terminal block group.

2.2.2 Connect heavy lead marked N to terminal block N on the blue terminal block group.

2.2.3 Connect control lead marked R1-1 to screw terminal R1 on the left side of logic board (LB).

2.2.4 Connect control lead marked MAX to screw terminal MAX on the left side of LB.

2.2.5 Connect control lead marked MIN to screw terminal MIN on the left side of LB.

2.2.6 Connect control lead marked PSC to screw terminal PSC on the left side of LB.

3. INTERCONNECTIONS LC TO OS

Run eight wires of standard control size #16 or larged from LB in LC through conduit to the operators control station (OS). Mark all leads at both ends.

3.1 Connections At LC ON LB

3.1.1 Connect lead marked 7 to screw terminal 7.

3.1.2 Connect lead marked 8 to screw terminal 8.

3.1.3 Connect lead marked 4 to screw terminal 4

3.1.4 Connect lead marked 9 to screw terminal 9

3.1.5 Connect lead marked 10 to screw terminal 10

3.1.6 Uonnect lead marked 11 to screw terminal 11

3.1.7 Connect lead marked 12 to screw terminal 12

3.1.8 Connect lead marked 13 to screw terminal 13

3.2 Connections in OS

3.2.1 On the ON-OFF switch connect lead marked 11 to terminal ON, a factory installed wire should already be connected to this point, the addition of lead marked 11 will make two wires connected to the ON terminal.

3.2.2 On the ON-OFF switch connect lead marked 12 to the common terminal of the switch. (Center terminal of the switch).

3.2.3 Connect lead marked 13 to terminal 4 (Top terminal) on IPM.

3.2.4 Connect lead marked 4 to the RUN (Top terminal) of the pushbutton contact block.

3.2.5 Connect lead marked 9 to the common terminal between RUN and STOP (Center terminal) of the pushbutton contact block.

3.2.6 Connect lead marked 10 to the STOP (Bottom terminal) of the pushbutton contact block.

3.2.7 Connect lead marked 8 to the top of REV contact on the FWD-REV switch.

3.2.8 Connect lead marked 7 to the bottom or FWD contact on the FWD-REV switch.

4. AC POWER INPUT INTO BC

Refer to Table 1 for the correct AC input voltage to be applied. Be sure that the correct 1 phase AC power is connected to BC.

4.1 Connect incoming AC lead V to terminal V on the bottom of TPA.

4.2 Connect incoming AC lead U1 to their screw terminal on fuse FU that has no wire connected to it. Incoming AC is fused on one side at all times - do not bypass fuse FU at any time.

5. AC POWER INTO LC

Diagram 3 shows the connections for the two acceptable incoming 1 phase, 50/60 HZ voltage. The top of the diagram shows the connections for 230 V input into the transformer CT.

5.1 230V Input

5.1.1 Between transformer CT primary terminals add a jumper TJ1 between terminals H1 and H3.

5.1.2 Between transformer CT primary terminals add a jumper TJ3 between terminals H2 and H4.

5.1.3 Connect incoming AC 230 V, 1 phase, 50/60HZ, lead AC1 to transformer CT, terminal H1.

5.1.4 Connect incoming AC 230V, 1 phase, 50/60HZ, lead AC2 to transformer CT, terminal H4.

5.2 115V Input

The bottom of Diagram 3 shows the connections for 115 V, 1 phase, 50/60HZ input power to LC.

5.2.1 Connect incoming AC 115V, 1 phase, 50/60HZ, lead AC1 to terminal block 1FU on the blue terminal block group in LC.

5.2.2 Connect incoming AC 115V, 1 phase, 50/60HZ, lead AC2 to terminal block 2FU on the blue terminal block group in LC.

Before applying AC power recheck all connections, be sure that all wires are secure and that the dc motor rotation is correct before coupling the motor into the mechanical load.

6. Signal Follow Connections

The signal follow reference input signal must be a dc signal, ungrounded, having a range of 0 to -8 VDC, preferrably 0 to -10VDC, feeding into approximately 25,000 ohms burden.

6.1 Connections on LB in LC

6.1.1 Connect the negative lead of the incoming signal follow intelligence to screw terminal 2 of bottom of LB.

6.1.2 Connect the positive lead of the incoming signal follow intelligence to screw terminal 3 on the bottom of LB.

START-UP INSTRUCTIONS

Recommended Start-Up Procedures

1. Check all interconnections per Diagram 1V for CEMF drives or Diagram 1S for speed regulated drives.

2. Check incoming 1 phase, 50/60HZ incoming AC power per Diagram 2 and instructions in Sections 4 and 5 of Electrical interconnections.

3. Check dc motor rotation. Rotation as connected per Diagrams 1V and 1S is CCW when viewed from the dc motor commutator end (Carbon brushes are mounted on the commutator end), with the FWD-REV switch in OS in the FWD position. If in the FWD direction CW rotation is required interchange the motor shunt field leads, F1 and F2, preferably at the motor terminals. (The dc motor shunt field circuit does not change with the addition of functional kits at a later date, but the motor armature circuitry could be changed for some functions).

4. Set the signal follow input in the minimum speed position. Set ON-OFF switch to OFF, and the FWD-REV switch in the FWD position.

5. Apply correct AC input power to U1 and V in BC.

6. Apply correct AC input power to AC1 and AC2 in LC.

7. Set the ON-OFF switch on OS to ON. The red indicating light on OS should indicate the presence of AC control power in OS and LC.

8. Depress the RUN pushbutton on OS. The dc motor should start to rotate - check direction of rotation, if incorrect go back to Step 3 and follow instructions.

9. Adjust the signal follow input to its maximum, (-) 8VDC, position. The motor should accelerate up to base speed (Motor nameplate RPM). Return signal follow input to its minimum speed position. Maximum speed is the same for both FWD and REV directions.

10. Depress the STOP pushbutton on OS, the motor should coast to a stop.

11. Setting of Current Limit, (CL), pot 3P on PCB in BC
Reference I.L. 22-1000-7

    (a) Turn ON-OFF switch on OS to OFF.

    (b) Set pots 3P (CL) and 4P (Torque Limit) (TL) on PCB in the maximum CCW positions.

    (c) Disconnect dc motor shunt field lead F1 at terminal F1 on PCB, - removes the dc motor shunt field. CL is set under stalled motor conditions. Normally the dc motor with the shunt field disconnected cannot develop enough torque to cause the motor to rotate.

    (d) Connect a suitable dc ammeter in the dc motor armature circuit meter must have a range of at least 250% of rated armature current of drive. Suggested location of ammeter-remove lead P1 from the bottom of overload relay OL in BC, connect the (+) terminal of the ammeter to OL and lead P1 to the (-) terminal of the ammeter.

    (e) Perform the following steps as quickly as possible since large armature currents will flow in the dc motor.

    (f) Apply AC input power to BC and LC.

    (g) Set the ON-OFF switch on ON. The indicating light on OS will be lighted.

    (h) Depress the RUN pushbutton on OS, be prepared to quickly depress the STOP pushbutton OS to minimize the time that armature current is permitted to flow. Armature current will increase rapidly up to approximately 75% of rated motor armature current. Adjust CL pot 3P on PCB CW until 200% rated armature amps is reached. Press the STOP pushbutton OS. CL should now be set at 150% rated armature amps at motor base speed and 200% for stalled conditions.

(i) Set ON-OFF switch in the OFF position.

(j) Remove all AC power.

Rated armature current is obtained from the dc motor nameplate or can be approximated from Table 2.

TABLE 2

HP	ARM VOLTS	RATED ARM AMPS	CL 150% FLR	CL 200% FLR
	VOLTS	AMPS	AMPS	AMPS
1/4	90	2.8	4.2	5.6
1/3	↓	3.3	4.95	6.6
1/2	↓	5.5	8.25	11
3/4	↓	8.1	12.15	16.2
1	180	5.2	7.8	10.4
1-1/2	↓	7.4	11.1	14.8
2	↓	9.6	14.4	19.2
3	↓	14.2	21.3	28.4
4	↓	19	27.5	38
5	↓	25	37.5	50

12. Setting of Torque Limit (TL) pot 4P on PCB in BC
Reference IL 22-1000-7.

The torque limit pot 4P, normally is set in the maximum CCW position, and should require no adjustment during start-up. If the drive is used in an application such as a winder in which torque limit control is required CW adjustment of pot 4P will cause CL to be limited at a lower level at high motor speeds than at low motor speeds as shown in Figure 1.

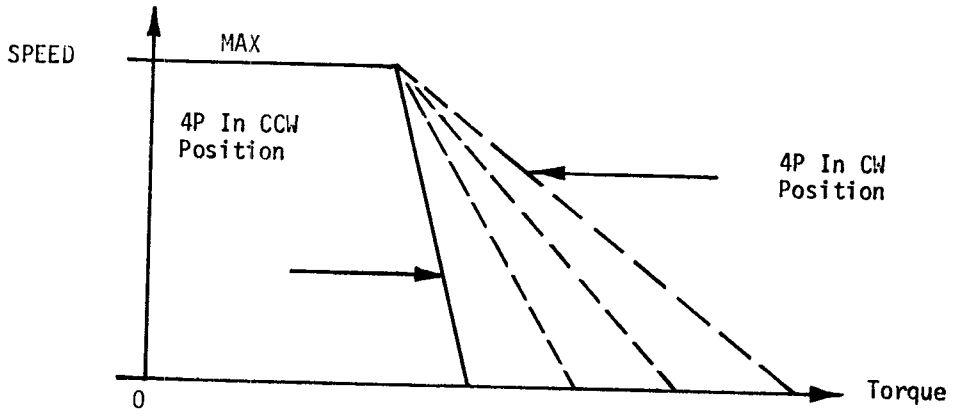


FIGURE 1

TORQUE LIMIT ADJUSTMENT

Care must be exercized to keep the maximum torque setting within safe limits for the equipment in use. Note that at maximum motor RPM the CL is the same for all settings of torque limit. Be sure that the use of torque limit and CL is understood before making any adjustment of TL pot 4P or damage to equipment can result.

13. I.R. Drop Compensation, I.R. Comp, pot 5P on PCB in BC
Reference IL 22-1000-7

(a) Pot 5P is always set in the maximum CCW position for speed regulated (Tach feedback) drives.

(b) For voltage regulated, CEMF, drives pot 5P is set to give flat motor RPM full-load to minimum load. This setting is usually made at some operating speed of approximately 20 to 25% of motor base speed. Pot 5P is adjusted to obtain the same motor RPM at rated full load current as at minimum load at this low motor RPM. If the minimum operation speed is greater than 20 to 25% of motor base speed set I.R. Comp at this minimum operating speed.

TROUBLE SHOOTING

Refer to I.L. 22-1000-7

Additional checks should include the following:

1. Incoming AC, leads AC1 and AC2 on schematic 22-1000-5 and Diagrams 1V, 1S, and 2.

2. Interconnections between BC, LC, OS, and MOT.

3. Fuses FU1 and FU2.

4. Plug-in relays RN, CX, FX, PF, and PR, check to see that they are secure.

5. Tighten screw terminals on LB and in OS.

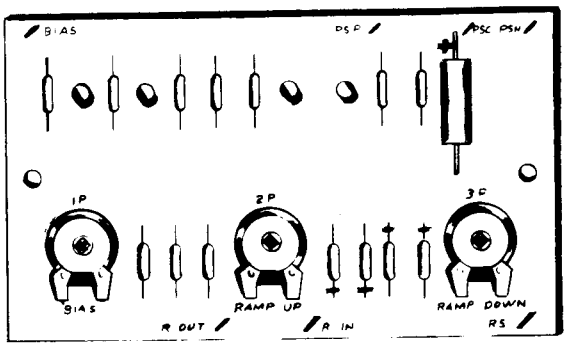
6. Check switch and contact blocks in OS for proper operation.

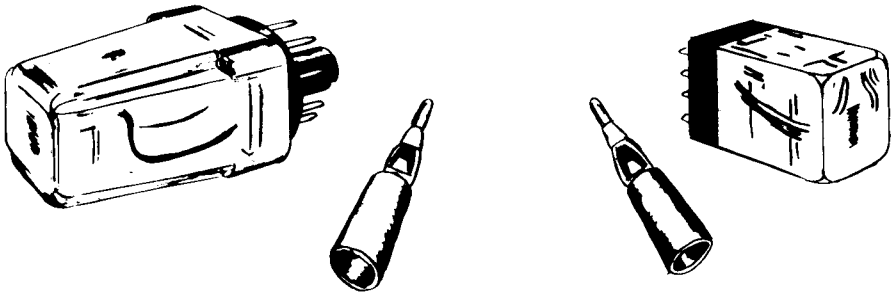
7. Check the signal follow input for polarity and magnitude.

If preceding steps do not locate cause of malfunction, or if trouble cannot be corrected, contact nearest Westinghouse representative.

Westinghouse

22-1000
Adjustable Speed Drives





INSTALLATION INSTRUCTIONS FOR A
RAMP FUNCTION GENERATOR KIT FOR 22-1000 DRIVES
I. L. 22-1000-14

Westinghouse Electric Corporation

Printed in USA

INSTALLATION INSTRUCTIONS

22-1000 ADJUSTABLE ACCEL-DECEL KIT

S#1459A15G01 for Non-Reversing
S#1459A15G02 for Reversing

The adjustable accel-decel kit, or ramp function generator kit (RFG) is used in conjunction with 22-1000 magnetic drives to provide acceleration and deceleration times that are independently adjustable by potentiometers 3P and 2P respectively.

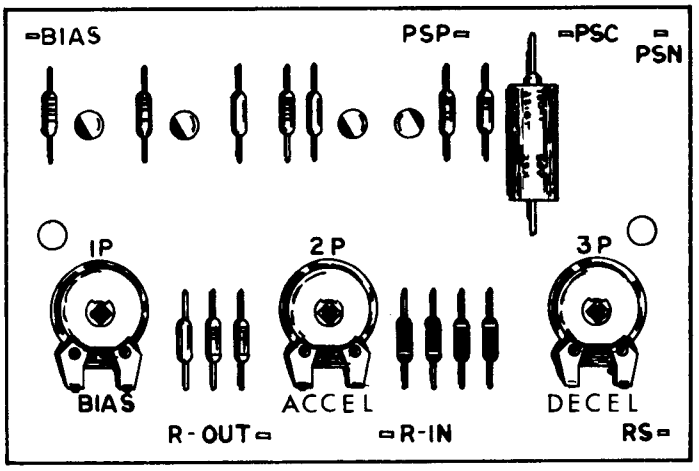


FIGURE 1

ADJUSTABLE ACCEL-DECEL KIT, PRINTED CIRCUIT BOARD S#1459A05G01

Constant current generators, the negative current generator for acceleration and the positive current generator for deceleration, provide charging and discharging current for timing capacitor 1C, (100 MFD). The ramp is adjustable over a time range of 2 to 32 seconds.

A reset circuit is provided to rapidly discharge timing capacitor, (1C), when the armature contactors drop out such as in stopping or reversing.

Printed in USA

The RFG board is mounted on the printed circuit board (PCB) on the basic controller (BC) for 1 phase drives (Figure 3), and on the regulator control board (CB) in the controller (9CR) for 3 Phase drives (Figure 5).

Relay RS, a plug-in relay provides the reset function upon stopping and reversing and anti-plugging relays provide circuitry for decelerating by ramp when the drive is stopped or reversed. The anti-plugging relays function to maintain the armature contactor energized until the armature voltage has been reduced to the drop out voltage of anti-plugging relay PF, for non-reversing drives, and PF and PR for reversing drives, approximately 10 to 11 V DC. When relay PF or PF and PR drop out at low armature voltage and DC motor will coast to a stop, or if dynamic braking option is incorporated the motor will stop under dynamic braking.

In the 1 phase drives the bias pot 1P on RFG is used to insure zero motor RPM for zero reference voltage at R-IN. The bias pot 1P is not used in 3 phase drives.

The output of RFG is R-OUT and is the input reference to the basic controller BC.

The "Kit" consists of a plastic bag containing the following components and hardware. Check the contents of the plastic bag.

1. Installation instructions IL 22-1000-14
2. Ramp functiongenerator board S#1459A05G01 in plastic bag.
3. Nylon specers for mounting of RFG board S#487B382H02 (2)
4. 115 Volt "Plug-In" Relays (RS) S#487A159H03 (1) & (PF) S#1459A21H01 (1) (Group 01 only)
5. .164 Wide Stl. Washers (2)
6. .164 Stl. Lockwasher (2)
7. .164-32 X 1-1/2 Fil. Stl. Mach. SCR (2)
8. Jumpers (wire) S#487B384G09 (7) (Long)
9. Jumpers (wire) S#487B384G03 (2) (Small)

If a shortage exists, contact the nearest Westinghouse representative.

INSTALLATION INSTRUCTIONS

1. Remove the AC input power from both the BC and the MC in 1 phase drives or (9CR) in 3 phase drives.

2. Run a control sized wire, #16 or larger from BC through the existing conduit to MC. Connect the wire to screw terminal RS on the bottom of PCB in BC and in MC connect the wire to screw terminal RS on the left side of relay board RB (1 phase only).

3. Remove and scrap jumper 3J on the bottom of PCB, see figure 3 - for 1 phase or Figure 5 for 3 phase.

Reference to Figure 3 and 5

4. Insert the two nylon spacers into the two 5/16" square holes in PCB or CB, pointed end into hole.

5. Using the two sets of hardware, as shown in Figure 3 or 5 mount the RFG board on the two nylon spacers, be sure that the three pots on RFG are in the position shown in Figure 1. Tighten screws securely but do not over tighten because nylon spacers will strip.

6. Install the long push-on lance type jumpers S#487B384G09 between RFG and PCB as identified in Figure 1. Seven jumpers for 1 phase drives, six jumpers for 3 phase drives.

   a. Bias pin on RFG to Bias pin on PCB (1 phase only).
   b. PSP pin on RFG to PSP pin on PCB or CB.
   c. PSC pin on RFG to PSC pin on PCB or CB.
   d. PSN pin on RFG to PSN pin on PCB or CB.
   e. R-OUT pin on RFG to R-OUT pin on PCB or CB.
   f. R-IN pin on RFG to R-IN pin on PCB or CB.
   g. RS pin on RFG to RS pin on PCB or CB.

Westinghouse Electric Corporation

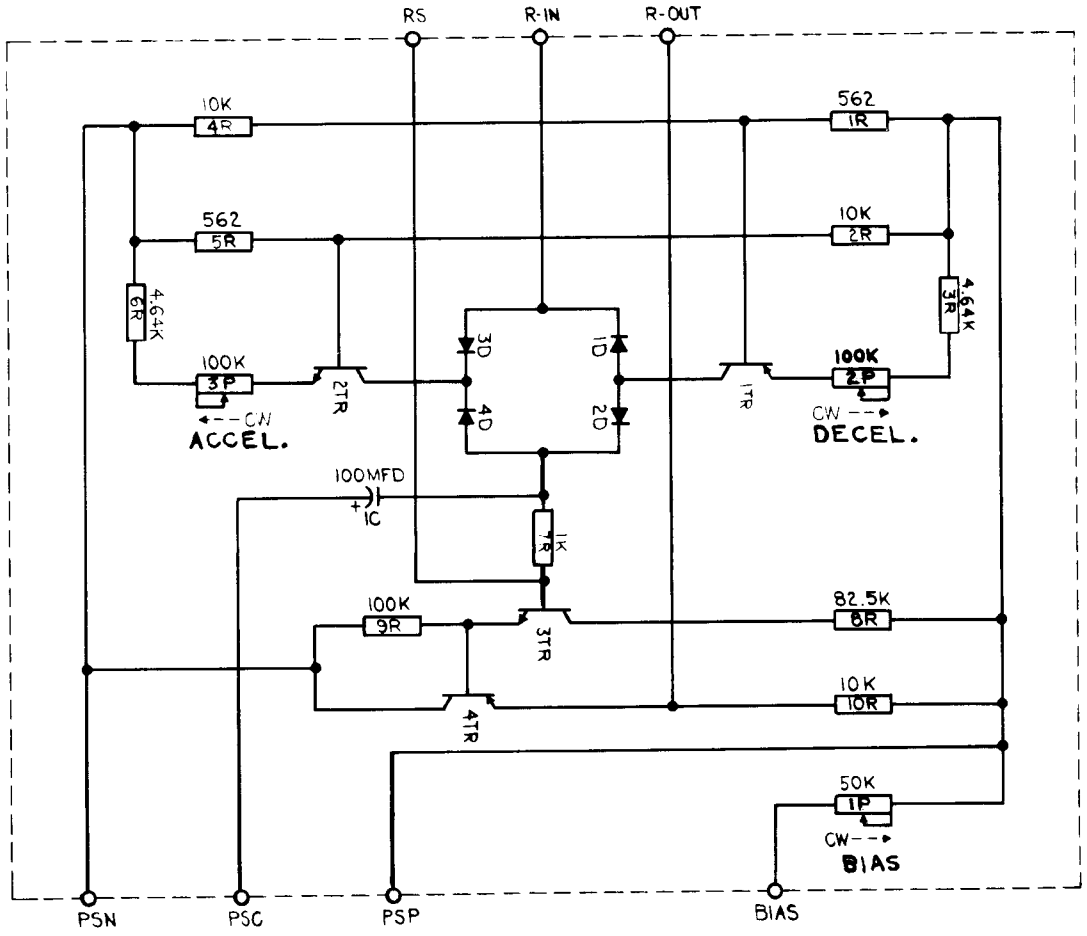
Printed in USA

7. Plug-in relay, RS, S#487A159H03, into socket identified as RS on relay board (RB) in magnetic cabinet (MC) or controller (9CR) See Figure 4.

8. Plug-in relay, PF, 1459A21H01, into socket identified as PF on relay board RB. If the drive is a reversing drive relay PF will already be provided.

9. Install jumpers 1J and 2J if they are not already in place on RB, see schematic diagram of existing drive. (It is suggested that the ramp devices and circuitry, shown on the schematic diagram of existing drive as dotted or broken line, be changed to solid line to show that the RFG is now part of the drive).

The "RFG FUNCTION KIT" is now mechanically installed.



SCHEMATIC 22-1000-14

FIGURE 2

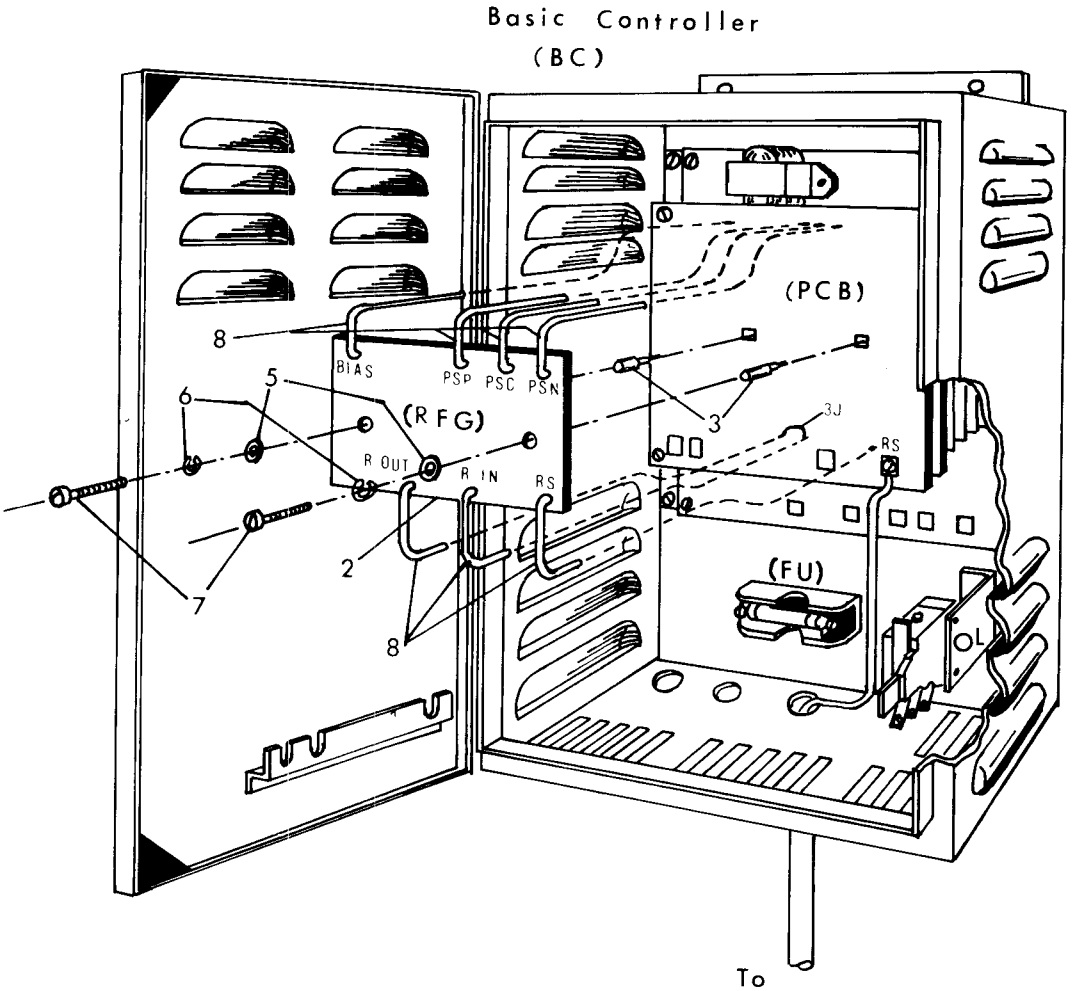


Figure 4

FIGURE 3

Printed in USA

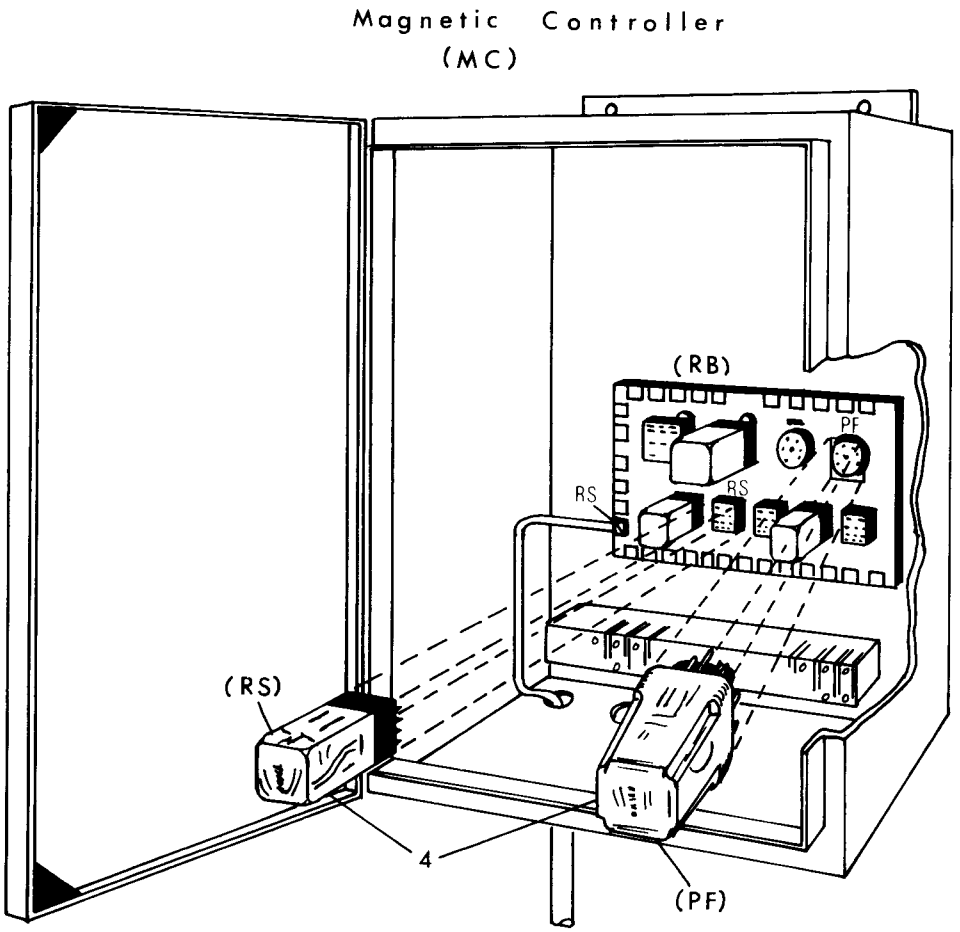


Figure 3

FIGURE 4

Printed in USA

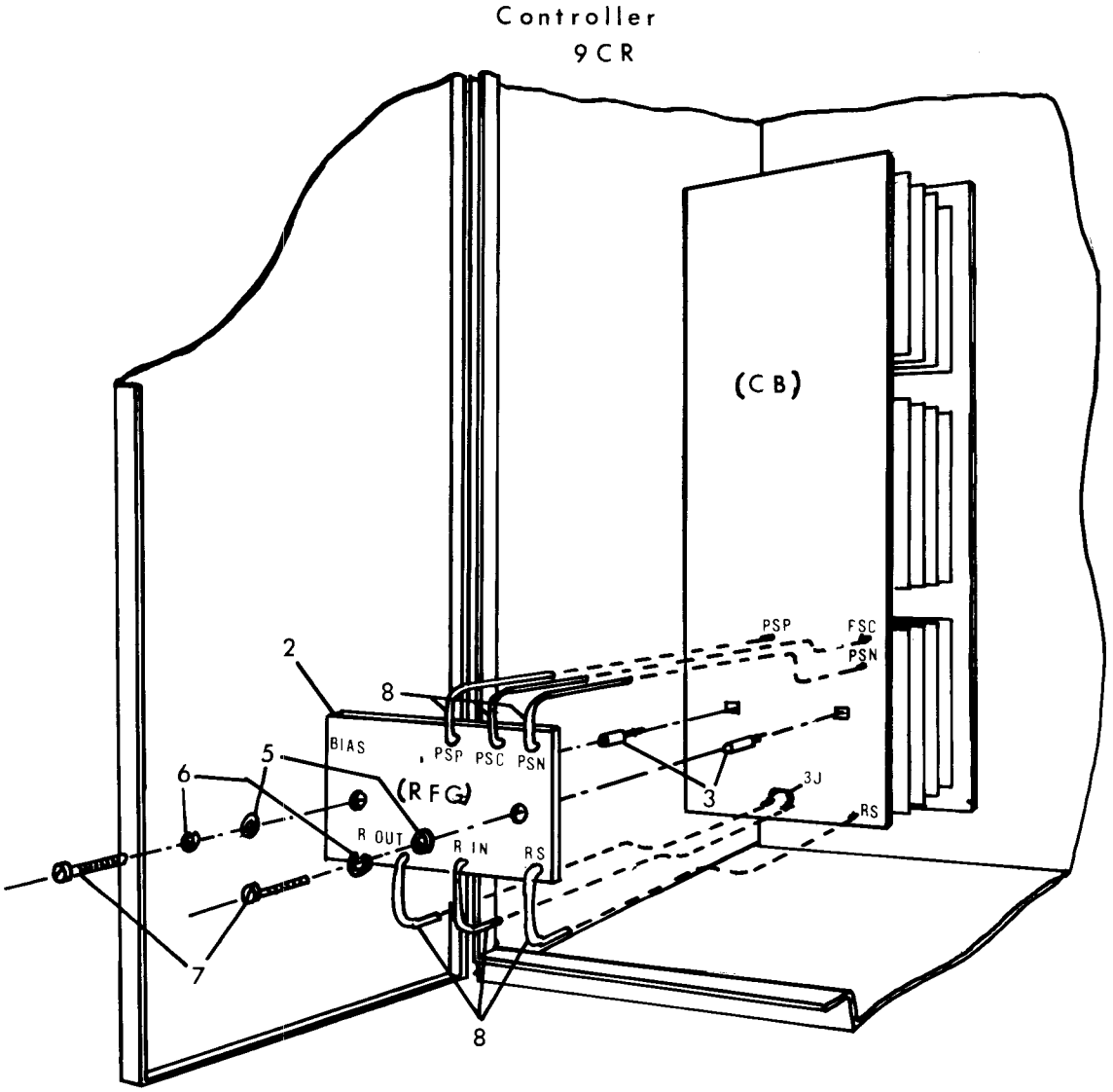


FIGURE 5

Printed in USA

ELECTRICAL ADJUSTMENTS

Following mechanical installation the RFG must be turned or adjusted to provide the desired operating conditions. Accel and decel time is adjustable from 2 to 32 seconds by pots 3P and 2P on RFG respectively.

1. Set the voltage R-IN to PSC to zero as follows (PSC positive).

   a. Speed pot SP in OS at zero - minimum speed pot 2P on PCB in BC for 1 phase and on CB for 3 Phase may have to be turned to its maximum CCW position to obtain this. (mark original position of 2P).

   b. For a follower system, set the follower signal to zero - minimum speed pot 2P need not be set to its maximum CCW position if follower signal is zero.

   c. If necessary, in 1 phase drives only, with steps (a) or (b) satisfied, trim BIAS pot, 1P on RFG to obtain zero dc motor RPM for zero input at R-IN (R-IN to PSC, PSC would be positive). The BIAS pot is not required on 3 phase drives. Compensation is entergral within CB.

   d. Reset minimum speed pot, 2P, to original setting as marked in step (a).

2. Accel and Decel pots 3P and 2P on RFG set accel and decel ramp times respectively. Set the reference to be applied to R-IN at maximum speed position or level. (Speed pot SP at maximum CW position or follower signal at maximum reference input level). Start the drive, sequence as required to cause the motor to rotate. Time the acceleration from initiation to maximum, R-OUT, to PSC. To increase acceleration adjust pot 3P on RFG CW, to decrease acceleration adjust 3P CCW.

3. Reduce the reference signal at R-IN to minimum. Time the deceleration (R-OUT to PSC). Adjust pot on RFG CW to increase deceleration time and CCW to decrease ramp down time.

   NOTE: For ramp control of the dc motor deceleration rate, the decel ramp must always be set for a longer time than the coast to stop time of the dc motor. If the decel ramp time is set for a shorter time than the coast-to-stop time of the motor when connected to its normal load the motor will coast to stop. If the ramp time exceeds the coast-to-stop time the decel ramp will control the rate of motor deceleration.

   The "RFG Function Kit" is now installed and ready for normal operation.

Printed in USA