ADJUSTABLE FREQUENCY DRIVE
230V 0.5 TO 125HP 460V 0.5 TO 600HP
REFERENCE MANUAL

LANCER CPD 602

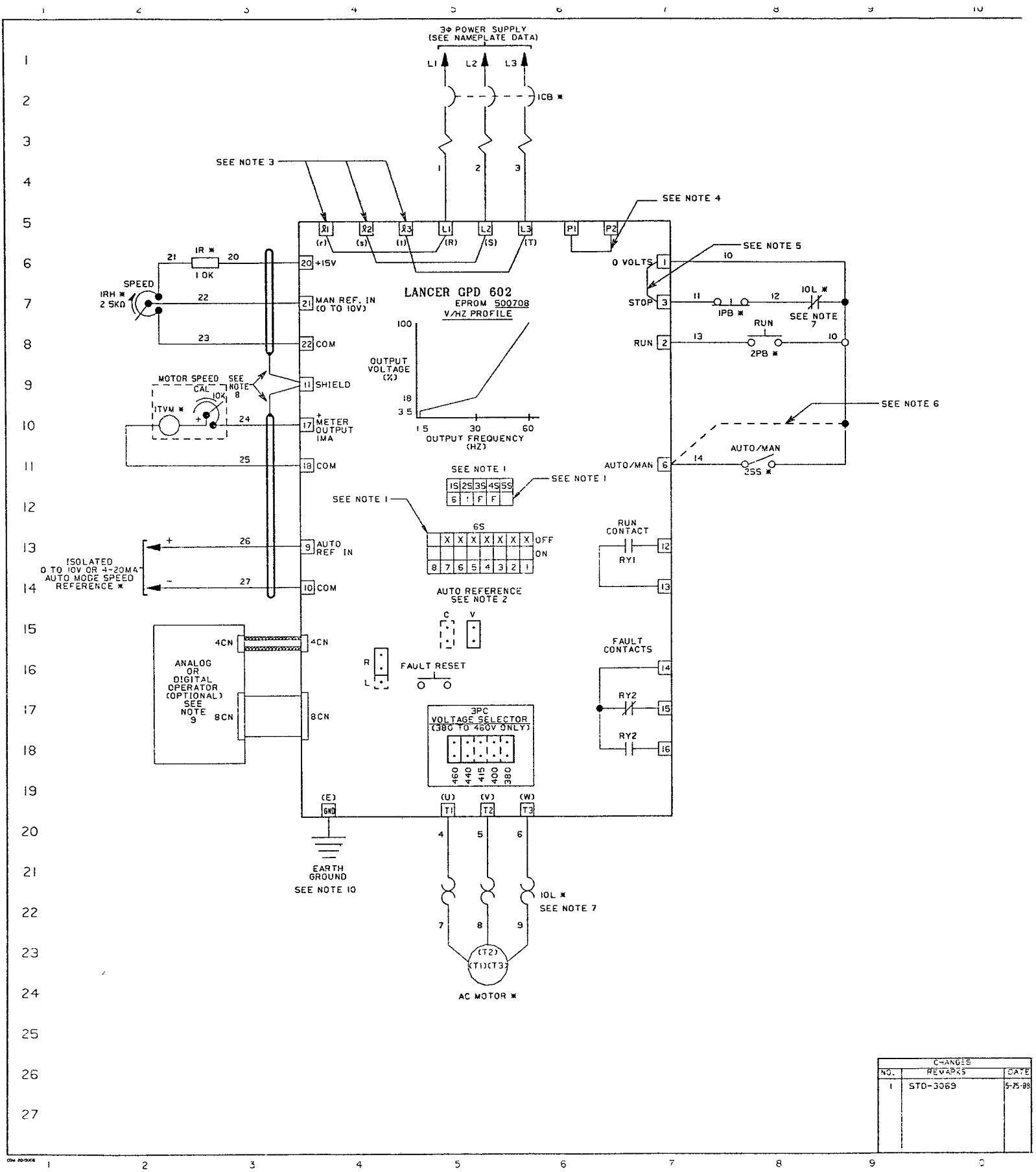
(VARIABLE TORQUE INVERTER)

MagneTek Drives & Systems

STANDARD

SCHEMATIC/INTERCONNECT

FOLLOWS



CHANGES		
NO.	REMARKS	DATE
1	STD-3069	5-25-88

NOTES:

* -INDICATES COMPONENTS NOT SUPPLIED.

☐ -INDICATES CUSTOMER CONNECTION TERMINAL, WIRE ONLY TO TERMINALS SHOWN.

( ) -INDICATES ALTERNATE TERMINAL MARKINGS, I e ,(r) AND ℓ1

1. THE SWITCHES INDICATE FACTORY SETTING. SWITCHES 5S AND 6S (8) ARE DEPENDENT ON DRIVE CAPACITY AND INPUT VOLTAGE RESPECTIVELY. 1S CHANGES THE V/HZ PROFILE WITH A MAXIMUM SETTING OF 180HZ. 2S CHANGES ACCEL/ DECEL TIME RANGE. REFER TO REFERENCE MANUAL FOR ADDITIONAL SETTINGS.

5S	DRIVE CAPACITY (HP)							
230V	.5 1	3	5 7.5	10 15	20 25 30	40	50 60	75
460V	.5 1	3	5 7.5	10 15 20	25 30	40	50 60	75 100
NOTCH	1	2	3	4	5	6	7	8
230V	100	125						
460V			150		200	250	300,350,400, 450,500,600	
NOTCH	9	A	B	C	D	E	F	

6S	OPERATION MODE		
NOTCH		SELECTION	
	FUNCTION	OFF	ON
8	SUPPLY VOLTAGE (V)	230	460

2. AUTO REFERENCE IS FACTORY SET FOR 0 TO 10V INPUT (V). IF 4-20MA IS DESIRED, MOVE JUMPER TO THE (C) POSITION.

3. TERMINAL ℓ3 (t) ONLY APPLIES TO 460V, 125 TO 400HP UNITS. TERMINALS ℓ1(r) AND ℓ2(s) ARE NOT AVAILABLE ON 230V. .5 TO 5HP UNITS JUMPERS ARE FACTORY INSTALLED

4. TERMINALS P1 AND P2 ARE NOT AVAILABLE ON 230V, .5 TO 10HP UNITS JUMPERS ARE FACTORY INSTALLED.

5. WHEN REMOTE OPERATORS ARE USED (IPB), REMOVE JUMPER BETWEEN TERMINALS 1 AND 3

6. FOR REMOTE MANUAL SPEED (IRH) ONLY, ADD JUMPER BETWEEN TERMINALS 1 AND 6.

7. THE LANCER GPD 602 DOES NOT CONTAIN OVERLOAD 10L: 10L IS A SEPARATE ITEM. ALSO, THE CONTACTS FROM THE SEPARATELY SUPPLIED OVERLOAD RELAY SHOULD BE INTERLOCKED WITH THE LANCER GPD 602 AS SHOWN, AND SHOULD BE MANUAL RESET TYPE TO PREVENT AUTOMATIC RESTART FOLLOWING A MOTOR FAULT AND SUBSEQUENT CONTACT RECLOSURE AFTER COOL DOWN.

8. INSULATED TWISTED SHIELED WIRE IS REQUIRED.
2 - CONDUCTOR #18GA. (BELDEN #8760 OR EQUIVALENT).
3 - CONDUCTOR #18GA. (BELDEN #8770 OR EQUIVALENT).
SHIELD TO BE CONNECTED TO PROPER TERMINAL AS SHOWN. CONNECT SHIELD ONLY AT END. STUB AND ISOLATE OTHER END

9. REMOTE OPERATORS, AS SHOWN, MAY NOT BE REQUIRED WHEN USING EITHER AN ANALOG OR A DIGITAL OPERATOR. WHEN USING A ANALOG OPERATOR, "R/L" JUMPER NEEDS TO BE PLACED IN "L", WHICH DOES NOT PERMIT USE OF REMOTE MANUAL SPEED REFERENCE.

10. CUSTOMER TO CONNECT TERMINAL GND (E) TO EARTH GROUND.

MagneTek Louis Allis Drives & Systems

LANCER GPD 602
VARIABLE TORQUE
208 TO 230V, 5 TO 75HP
380 TO 460V, 5 TO 600HP

D

SHEET 1 OF 1

3Y04464-0020

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WARNING

AFTER TURNING OFF AC INPUT POWER, AVOID DIRECT CONTACT WITH CIRCUIT COMPONENTS UNTIL "CHARGE" LAMP NO LONGER GLOWS. ATTEMPTING TO WORK ON THE UNIT WHILE THE LAMP IS LIT CAN CAUSE SEVERE ELECTRICAL SHOCK.

BEFORE CHANGING SWITCH SETTINGS (1S THRU 6S), TURN OFF AC INPUT POWER AND CONFIRM THAT THE "CHARGE" LAMP IS NOT GLOWING.

DO NOT CONNECT OR DISCONNECT WIRES AND CONNECTORS WHILE POWER IS APPLIED TO THE UNIT.

IMPORTANT

Be sure to ground the unit using terminal GND (E). (See para. 4.3.3). Never connect main circuit output terminals T1, T2, T3 to AC input power.

The Lancer GP Converter has been adjusted at the factory. Changes or adjustments should not be attempted until after reading this manual.

Do not hipot any part of this unit. The internal semiconductors are vulnerable to high voltage and can be severely damaged.

Performing insulation resistance tests with a megger requires special care and safety precautions. (Refer to para 4.3.4).

CAUTION

NEVER CONNECT CAPACITORS ACROSS THE CONVERTER OUTPUT AND MOTOR. UPON APPLICATION OF POWER, THE CONVERTER INITIALLY SEE THE CAPACITORS AS A SHORT CIRCUIT, HIGH CURRENTS RESULT AND EQUIPMENT WILL BE DAMAGED.

IF REQUIRED, POWER FACTOR CORRECITON CAPACITOR NETWORKS MAY BE CONNECTED ACROSS THE INPUT POWER SOURCE ONLY AFTER CONSULTING LOUIS ALLIS.

IMPROPER USE OF POWER FACTOR CORRECTION CAPACITOR NETWORKS WILL DAMAGE EQUIPMENT.

NOTICE

This equipment is exempted from FCC regulations. See 47CFR15.8Ø1.

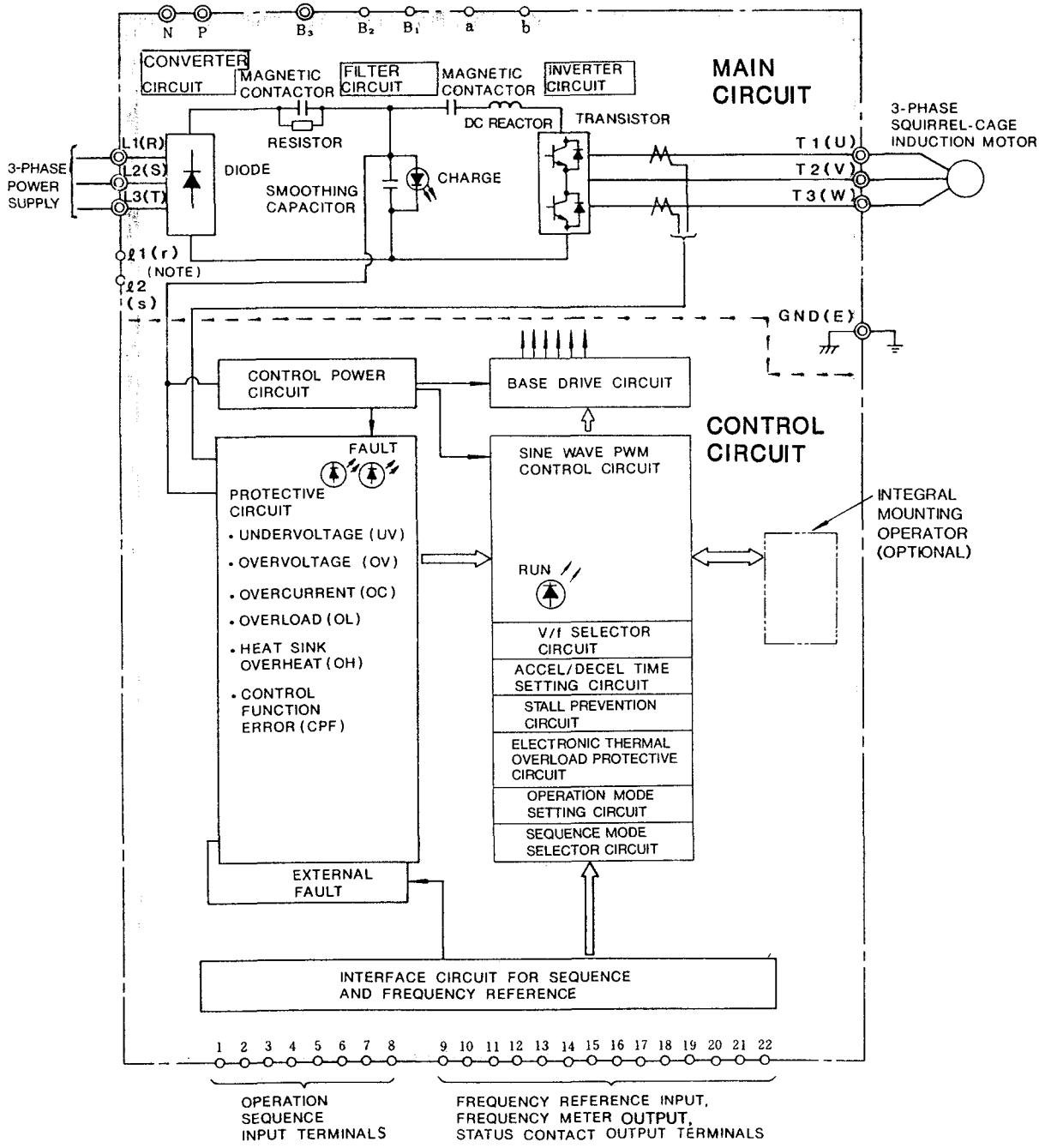
1. RECEIVING

All equipment is tested against defect at Louis Allis. Any damages or shortages evident when the equipment is received must be reported immediately to the commercial carrier who transported the equipment. Assistance, if required, is available from the nearest Louis Allis District Office. Always refer to the Louis Allis order number, equipment description, and serial number when contacting Louis Allis.

2. FUNCTIONAL DESCRIPTION

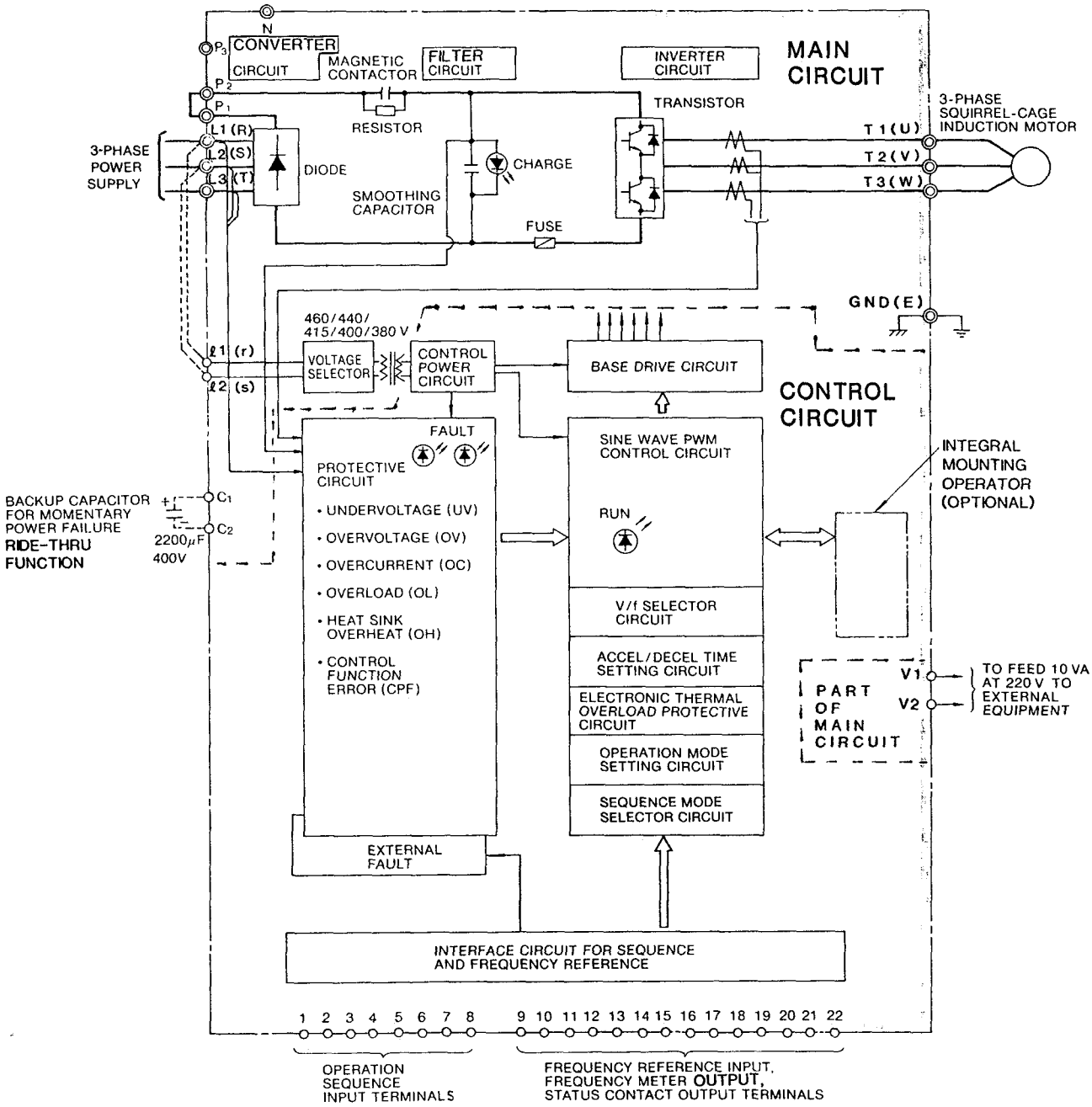
2.1 Functional Block Diagrams.

TYPICAL 2Ø8-23Ø VOLT UNIT



Note: Terminals ⑪(r) and ⑫(s) are not provided on 5 to 5 HP units

TYPICAL 380-460 VOLT UNIT



2.2 Circuit Operational Description

2.2.1 Main Circuit

(1) Converter: Converts three-phase AC input to DC voltage via diode rectification.

(2) Filter: Smoothes DC ripple via a capacitor.

(3) Converter: Coverts DC voltage to AC voltage of a preset frequency by switching six transistors. The output voltage level is controlled by changing the pulse width ratio.

2.2.2 Control Circuit

(1) Base drive circuit: Drives the transistors in the converter circuit.

(2) Sine wave PWM control circuit: Calculates the pulse width every time a reference signal is received from the V/f control circuit, and outputs a PWM signal approximating a sine wave.

(3) V/f selector circuit: Selects V/f pattern from 15 types of built-in voltage/frequency (V/f) patterns. (See Figure 3)

(4) Acceleration and deceleration circuit: Acceleration and deceleration times can be independently set by the acceleration (ACC) and deceleration (DEC) time setting potentiometers. (See Figure 4)

(5) Stall prevention circuit:

During acceleration, acceleration stops in the event of overcurrent condition and prevents the motor from stalling due to overcurrent. When the current returns to the rated value, acceleration is resumed.

During deceleration, deceleration stops in the event of overvoltage condition and prevents the motor from stalling due to overvoltage. When the voltage returns to the rated value, deceleration is resumed.

In Constant-Speed Operation, motor speed is reduced in the event of an overload condition to prevent the motor from stalling. When the overload condition is cleared, motor resumes running at set speed.

(6) Operation mode selector circuit: Allows selection of eight operation modes, to individually tailor the drive to a specific application.

2.2.3 Protective Circuits

NOTE
If a trip condition occurs, refer to Section 8.

(1) Undervoltage protective circuit: If supply voltage drops below a set level or any one phase* is open, the undervoltage protective circuit shuts off the power transistors in the main circuit and outputs a fault signal (UV operation). With the appropriate operation mode selected, operation can continue during power failures less than .2 seconds or up to 2 seconds with the ride-thru capacitor option. (230 volt units do not require the added capacitor; 2 second ride-thru is standard).

(2) Overvoltage protective circuit: If the main circuit DC voltage becomes higher than the set level, the overvoltage protective circuit shuts off the power transistors in the main circuit and outputs a fault signal (OV operation).

(3) Overcurrent protective circuit: If more than 200% of the rated current flow is detected, the overcurrent protective circuit shuts off the power transistors in the main circuit and outputs a fault signal (OC operation).

(4) Overload protective circuit: When a Converter or motor overload is detected, the overload protective circuit shuts off the power transistors in the main circuit after a specified time and outputs a fault signal (OL operation).

(5) Electronic thermal overload protective circuit: Automatically adjusts protective characteristics to current and time to maximize operating capability.

* Single phase protection is not available on 230V units rated 1Ø HP or less.

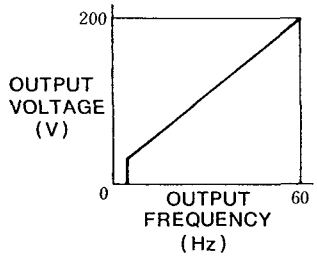


Figure 3. Example of V/f Pattern

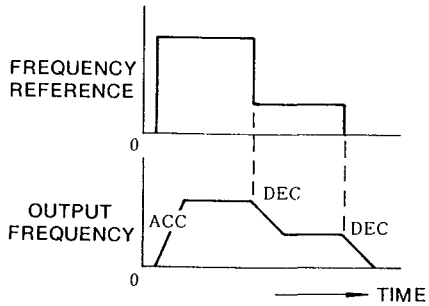


Figure 4. Accel/Decel Time Setting

3. INSTALLATION

3.1 Location

The equipment should be installed in areas where the following conditions exist.

- Ambient temperature: -1Ø to +4Ø°C
- Protected from rain or moisture
- Protected from direct sunlight
- Protected from corrosive gases or liquids
- Free from airborne dust or metallic particles
- Free from vibration

CAUTION

NEVER MOVE, LIFT OR HANDLE A WALL-MOUNT BY THE FRONT COVER.

3.2 Positioning

Sufficient clearances must be maintained around the unit for proper cooling and to allow for routine maintenance.

A wall-mounted unit must be installed on a flat vertical and level surface, using mounting holes provided. (See Figure 5)

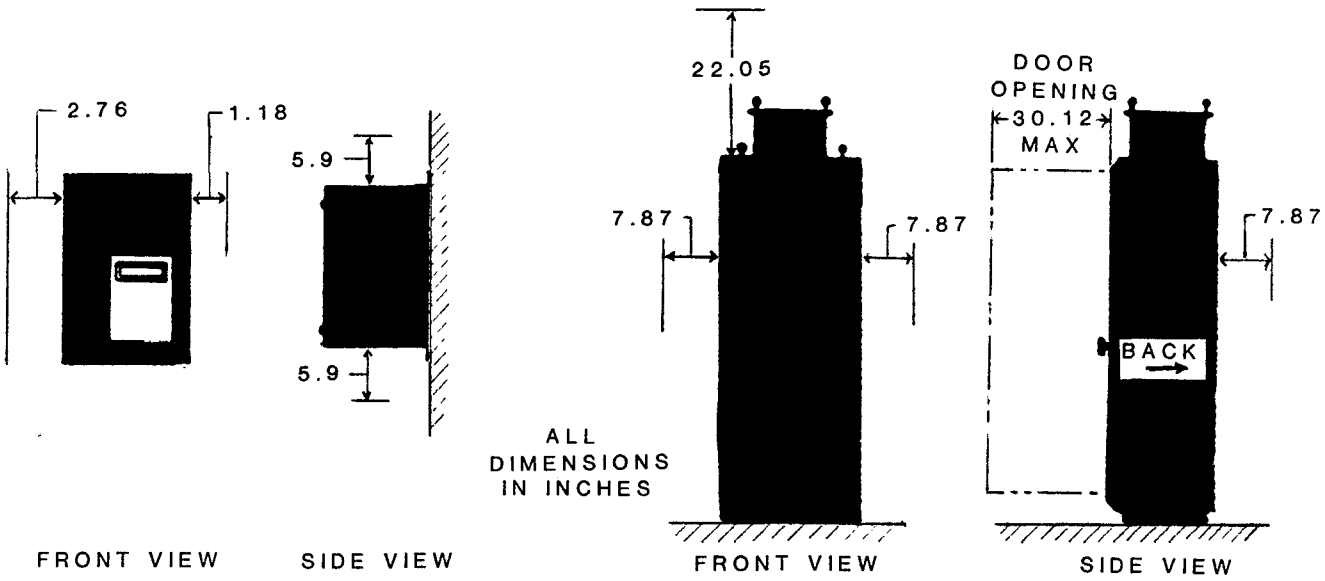


Figure 5.

3.3 Mounting Dimensions

The mounting dimensions for the controls are given in Table 1.

Table 1. Installation Dimensions

230 V UNITS							
					MOUNTING		
HP	FIGURE	W	H	D	W1	H1	d
.5	6A	7.87	7.87	8.Ø7	6.89	11.42	.187
1	6A	7.87	11.81	8.Ø7	6.89	11.42	.187
3	6A	7.87	11.81	8.Ø7	6.89	11.42	.187
5	6A	7.87	11.81	8.Ø7	6.89	11.42	.187
7.5	6B	7.87	13.78	8.46	4.92	13.39	.187
1Ø	6B	7.87	13.78	8.46	4.92	13.39	.187
15	6B	9.84	19.69	1Ø.Ø4	7.87	19.Ø9	.234
2Ø	6B	12.8Ø	21.65	1Ø.Ø4	1Ø.83	21.Ø6	.234
25	6B	12.8Ø	21.65	1Ø.Ø4	1Ø.83	21.Ø6	.234
3Ø	6B	12.8Ø	21.65	1Ø.Ø4	1Ø.83	21.Ø6	.234
4Ø	6B	12.8Ø	21.65	1Ø.Ø4	1Ø.83	21.Ø6	.234
5Ø	6B	18.7Ø	31.45	11.Ø2	14.76	3Ø.71	.39Ø
6Ø	6B	18.7Ø	31.45	11.Ø2	14.76	3Ø.71	.39Ø
75	6B	18.7Ø	31.45	11.Ø2	14.76	3Ø.71	.39Ø

NOTE: All dimensions are in inches.

Table 1. Installation Dimensions (Continued)

460 V UNITS							
					MOUNTING		
HP	FIGURE	W	H	D	W1	H1	d
.5	6A	7.87	13.78	9.25	6.89	13.39	.187
1	6A	7.87	13.78	9.25	6.89	13.39	.187
3	6A	7.87	13.78	9.25	6.89	13.39	.187
5	6A	7.87	13.78	9.25	6.89	13.39	.187
7.5	6B	7.87	15.75	11.42	6.89	15.35	.187
10	6B	7.87	15.75	11.42	6.89	15.35	.187
15	6B	9.84	19.69	12.00	7.87	19.09	.234
20	6B	9.84	19.69	12.00	7.87	19.09	.234
25	6B	9.84	19.69	12.00	7.87	19.09	.234
30	6B	12.80	21.65	10.04	10.43	21.06	.234
40	6B	12.80	21.65	10.04	10.43	21.06	.234

Table 1. Installation Dimensions (Continued)

460 V UNITS (Continued)							
					MOUNTING		
HP	FIGURE	W	H	D	W1	H1	d
5Ø	6B	13.78	28.54	11.Ø2	9.84	27.76	.312
6Ø	6B	13.78	28.54	11.Ø2	9.84	27.76	.312
75	6B	13.78	28.54	11.Ø2	9.84	27.76	.312
1ØØ	6B	22.64	36.42	11.Ø2	18.7Ø	35.43	.468
15Ø	6B	22.64	36.42	11.Ø2	18.7Ø	35.43	.468
2ØØ	6B	22.64	36.42	11.Ø2	18.7Ø	35.43	.468
25Ø	6C	31.5Ø	91.89	23.62	-	-	-
3ØØ	6C	31.5Ø	91.89	23.62	-	-	-
35Ø	6C	86.61	93.7Ø	31.5Ø	-	-	-
4ØØ	6C	86.61	93.7Ø	31.5Ø	-	-	-
45Ø	6C	86.61	93.7Ø	31.5Ø	-	-	-
5ØØ	6C	86.61	93.7Ø	31.5Ø	-	-	-
6ØØ	6C	86.61	93.7Ø	31.5Ø	-	-	-

NOTE: All dimensions are in inches.

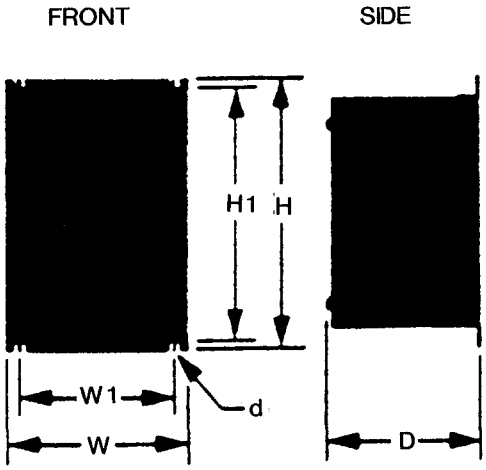


Figure 6A. Small Wall-Mount

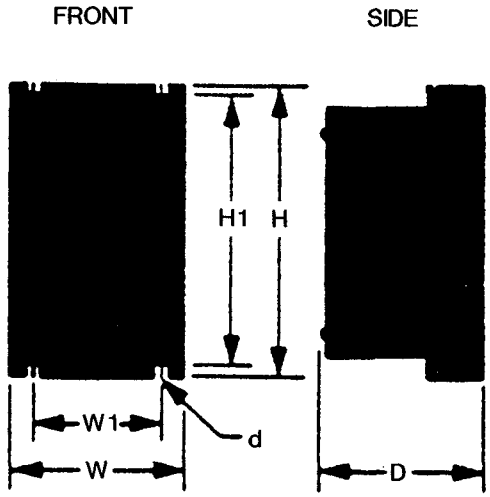


Figure 6B. Large Wall-Mount

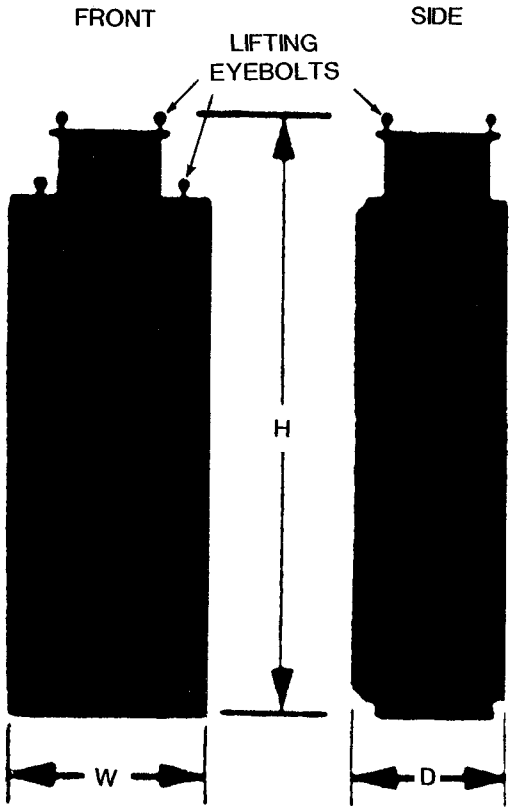


Figure 6C. Floor Standing Cabinet (NEMA 1)

4. WIRING

4.1 Interconnections

The unit nameplate identifies wiring diagrams which support your equipment. Refer to these diagrams for circuit, equipment and interconnection details. If the equipment is modified after installation, the diagrams may have to be updated to reflect changes made.

4.2 Wire Size

Wire sizes for main and control circuits are listed in Table 2. All established Electrical Codes take precedence over these recommendations for input and output wire sizes and motor overload protection.

Table 2. Wire Size for Main and Control Circuits.

230V UNITS		
MAIN CIRCUIT TERMINAL	**HP**	**WIRE SIZE AWG**
L1, L2, L3 T1, T2, T3 N (-), P (+), B1, B2, B3, a, b	.5 1 3 5 7.5	12
	10	10
L1, L2, L3, T1, T2, T3 N (-), P1, P2, P3	15 20	8
	25	4
	30	3
	40	1
	50	00
	60	000
	75	0000
Control Circuit Terminals 1-22, r, s	All	20-14
Ground	All	12-400

460V UNITS		
MAIN CIRCUIT TERMINAL	**HP**	**WIRE SIZE AWG**
L1, L2, L3 T1, T2, T3 N (-), P (+), B1, B2, a, b	.5 1 3 5 7.5 10 15	12
	20	10
	25	8
L1, L2, L3, T1, T2, T3, N (-), P1, P2, P3	30	8
	40	6
	50	4
	60	3
	75	1
	100	000
	150	0000
	200	400
	250	400
	300	600
	400	700
	450	700
	500	1500
	600	1500
Control Circuit Terminals 1-22, r, s, t	All	20-14
Ground	All	12-400

4.3 Wiring Instructions

Complete interconnections following the instructions given below. Check all connections before applying power.

4.3.1 Control Circuit

(1) SEPARATION OF CONTROL CIRCUIT LEADS AND MAIN CIRCUIT LEADS

Control circuit leads 1 thru 22 must be separated from main circuit leads L1, L2, L3, N (-), P1, P2, P3, T1, T2, and T3 to prevent erroneous operation caused by noise interference. If control circuit leads 12 thru 16 (relay contact output) are connected to an external power supply, it may be necessary to separate them from 1 thru 11 and 17 thru 22.

(2) CONTROL CIRCUIT

Use twisted-pair or shielded leads for the control circuit lines. Connect the shield to control terminals 4, 11, or 19. (See Figure 8)

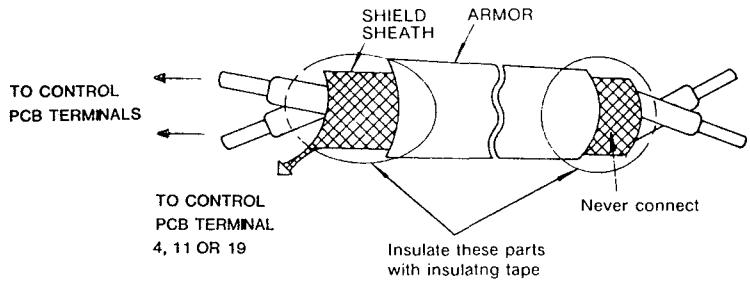


Figure 8. Shielded Lead Termination

(3) WIRING DISTANCE

It is recommended that the wiring distance of the signal leads 1 thru 22 be 164 feet or less.

4.3.2 Main Circuit

(1) PHASE ROTATION OF POWER

Phase rotation of power determines motor rotation.

When output terminals T1, T2, and T3 are matched to motor terminals T1, T2, and T3, motor rotation will be counterclockwise viewed from opposite drive end. To reverse the rotation, interchange any two of the motor leads or use the electronic forward/reverse feature built into the drive.

(2) Never connect input power supply to output terminals T1, T2, and T3.

(3) Care should be taken to prevent contact of wiring leads with Converter cabinet, as a short-circuit condition may occur.

(4) Never connect a power factor correction capacitor or noise filter to the Converter output.

4.3.3 Grounding

Make a positive ground using the ground terminal GND (E).

(1) Ground resistance should be 1ØØ ohms or less.

(2) Never ground the unit to the same common ground as welding machines, motors or other types of large electrical equipment. Run a separate ground lead for the Converter. Make the length as short as possible.

(3) Even when the unit is grounded through a mounting, such as channel base or steel plate, you must still ground the unit using the ground terminal.

(4) Where several units are used side by side, all the units should be connected directly to ground. However, connecting all the ground terminals of the units together and grounding only one is also permissible (See Figure 9). Do not form a loop with the ground leads.

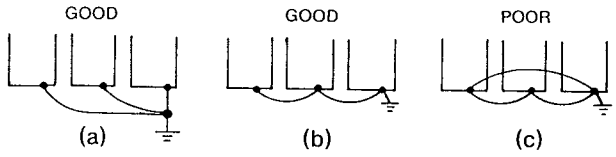


Figure 9. Grounding of Three Units.

4.3.4 Insulation Resistance Test

CAUTION

NEVER MEASURE THE INSULATION RESISTANCE OF CIRCUITS OTHER THAN THE MAIN CIRCUIT.

For megger-testing the main circuit, measure the insulation resistance with a 5ØØV megger. (See Figure 1Ø).

a. Use a common wire to short together all main circuit terminals except GND (E).

b. Use a common wire to short together all Control PCB terminals except 4, 11 and 19.

c. Measure the insulation resistance between the main circuit terminals and ground (terminal GND). A reading above 1 meg-ohm is considered satisfactory.

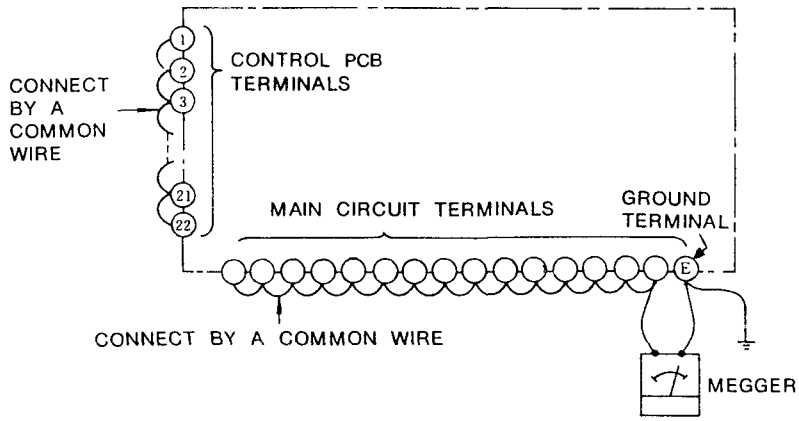


Figure 1Ø. Connections for Megger Testing

5. CONVERTER ADJUSTMENTS

5.1 Location of Adjustments

All internal adjustments for the Converter are located on the Control PC Board and (460V units only) the Voltage Selecting PC Board. The adjustments are listed in Table 3.

5.2 Description of Adjustments

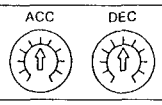
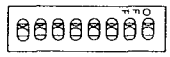
Before making adjustments, shut off AC input power and wait until the "CHARGE" lamp goes out. If any settings, except for accel/decel time, are performed with the power on, the following failure indication will occur:

- Both FAULT lamps (F1 and F2) on the Control PCB blink.
- CPF lamp, or display if the Analog or Digital Operator is used.

If any settings are changed during operation, operation will continue with the settings made before the change. The new settings will not effect operation until the power is removed, and then reapplied.

- The remote Operator Control Station (OCS) provides no failure indication for changing settings with the power ON.

Table 3. List of Converter Adjustments.

	Adjustment Name		Symbol	Function	Factory-setting
Control PC Board (1 PCB)	V/f Pattern Selector Switch			Selects one of 15 V/f patterns to match specific applications	Notch ⑥
	Accel/ Decel Time Setting	Switch		Selects accel/decel time range (0 2 to 1800 seconds)	Notch ①
		Potentiometer		Accel/decel times independently adjustable within the time range selected by 2S	Scale 5
	Sequence Mode Selector Switch			Selects one of 15 types of sequences according to application requirements **CAUTION** **Do not tamper with this switch.**	Notch Ⓕ
	Electronic Thermal Overload Protective Switch			Protects motor and Converter from overcurrent conditions if motor capacity is different from Converter capacity	Notch Ⓕ
	Converter Capacity Selector Switch			Set according to Converter capacity **CAUTION** **Do not tamper with this switch.**	(See Table 8)
	Operation Mode Selector Switch			Selects the operation mode according to specific applications.	—
	Auto Frequency Reference Signal Selector Shunt			Selects either a current signal (4-20mA) or a voltage signal (0–10V) to feed frequency reference signal at terminal ⑨	V (Voltage signal)
	Manual Frequency Reference Signal Selector Shunt			Set to input frequency reference at external terminal ㉑ When the Analog Operator is used for frequency setting, set the shunt on "L" because signals from external terminal ㉑ are not accepted	R

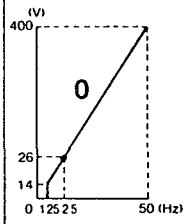
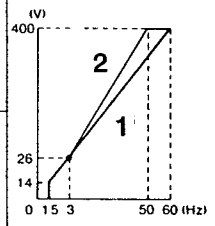
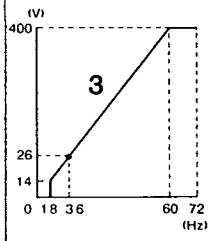
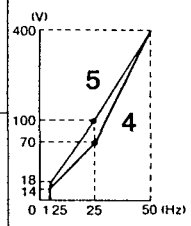
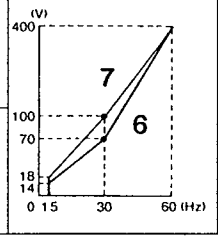
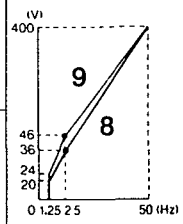
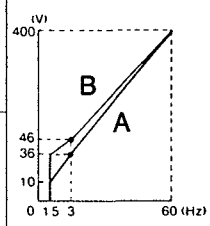
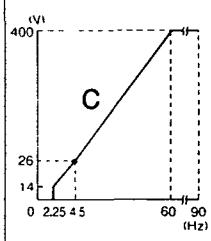
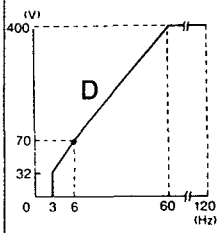
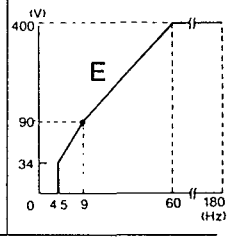
460V unit

Voltage Selecting PC Board (3 PCB)	Voltage Selector Shunt	See Figure 14	Selects voltage according to supply voltage	460V
	Radio Noise Reducing Filter Circuit Selector Shunt	See Figure 15	Selects radio noise reducing filter circuit according to application A. Ground interruptor not used. B. Ground interruptor used Shuts off ground circuit and prevents malfunction if the interruptor trips	A

(1) Setting of V/f pattern selector switch (1S)

The V/f pattern selector switch (1S) has been factory-set at notch 1. The customer should select the optimum V/f pattern according to his load characteristics. (See Table 4).

Table 4. V/f Pattern Selection

Application	Specification		1S Notch	V/f Pattern
General Purpose	50Hz		0	
	60Hz	60Hz Saturation	1	
		50Hz Saturation	2	
	72Hz		3	
Fans and Pumps	50Hz	Variable Torque 2	4	
		Variable Torque 1	5	
	60Hz	Variable Torque 2	6	
		Variable Torque 1	7	
High Starting Torque	50Hz	Starting Torque Low	8	
		Starting Torque High	9	
	60Hz	Starting Torque Low	A	
		Starting Torque High	B	
Machine Tools	90Hz		C	
	120Hz		D	
	180Hz		E	

Note:

1 Take account of the following conditions and others when selecting V/f pattern:
- Pattern matching the voltage-frequency characteristic of the motor
- According to the maximum motor speed

2. V/f pattern for high starting torque should be selected for:
- Long wiring distance
- Large voltage drop at start
- AC reactor connected to input or output of the Converter
- Use of motor of the rating below the max

3 Patterns shown for 400V input: for other inputs, multiply all (V) values shown by the factor (VIN/400)

2) Setting of acceleration and deceleration times (2S, ACC, DEC)

Set the acceleration and deceleration times using the time range selector switch (2S) and the acceleration (ACC) and deceleration (DEC) time setting potentiometers. (See Table 5)

2S has been factory-set to notch 1, and the ACC and DEC potentiometers have been individually set to 5Ø% (approximately 1Ø seconds).

Table 5. Accel/Decel Time Range Setting

2S NOTCH	ACCEL/DECEL TIME SETTING RANGE (SEC)
Ø	Ø.2-6
1 (Factory Setting)	1.8-18
2	6-6Ø
3	18-18Ø
4	6Ø-6ØØ
5 - D	18Ø-18ØØ
E	Ø
F	For Calibrating freq meter

(3) Selection of sequence mode (3S)

The standard sequence mode selector switch (3S) is factory-set (and paint-locked) to notch F.

(4) Setting of electronic thermal overload setting switch (4S)

Switch 4S is factory-set at notch F. When a motor has a capacity different from the maximum applicable capacity of the Converter, this setting can be changed to better protect the motor. For details, contact your Louis Allis Sales representative.

(5) Selection of Converter capacity (5S)

Switch 5S has been factory-set to agree with the Converter capacity as shown in Table 8. DO NOT CHANGE.

Table 8. Converter Capacity Selection

CONVERTER H.P.	INPUT VOLTS	5S SETTING
.5	230, 460	1
1	230, 460	
3	230, 460	2
5	230, 460	3
7.5	230, 460	
10	230, 460	4
15	230, 460	4
20	460	
20	230	5
25	230, 460	
30	230, 460	
40	230, 460	6
50	230, 460	7
60	230, 460	
75	230, 460	8
100	460	
150	460	B
200	460	D
250	460	E
300	460	F
350	460	
400	460	
450	460	
500	460	
600	460	

(6) Selection of operation modes (6S)

Select the operation modes from Table 9 according to the application, and set each notch of switch 6S as indicated.

NOTE

For 460V units, notches 1 thru 7 have been factory-set to OFF and 8 to ON.
For 230V units, notches 1 thru 8 have been factory-set to OFF.

Table 9. Selection of Operation Modes

6S NOTCH	FEATURES	DESIRED OPERATION	ON	OFF
1	DC INJECTION AT STOP	DC INJECTION IS APPLIED AFTER CONTROLLED DECELERATION TO 1/40 OF MAXIMUM SPEED.		X
		MOTOR COASTS BELOW 1/40 OF MAXIMUM SPEED.	X	
2	STOPPING MOTOR	CONTROLLED DECELERATION AS PER NOTCH 1.		X
		COAST TO STOP.	X	
3	BRAKING RESISTORS	DYNAMIC BRAKE OPTION IS NOT USED.		X
		DYNAMIC BRAKE OPTION IS USED.	X	
4	DC INJECTION AT START	DC INJECTION BEFORE STARTING (ANTI-WINDMILLING) FOR 1/5 OF DECELERATION TIME.	X	
		NORMAL ACCELERATION OPERATION.		X
5	POWER FAILURE RIDE-THRU	MOTOR COASTS TO STOP AFTER MOMENTARY POWER FAILURE.		X
		MOTOR CONTINUES OPERATION IF POWER FAILURE IS LESS THAN 2 SECONDS, OR COASTS TO A STOP IF FAILURE IS GREATER THAN 2 SECONDS.	X	

Table 9. Selection of Operation Modes (Continued)

6S NOTCH	FEATURES	DESIRED OPERATION	ON	OFF
6	SPEED SEARCH *	ABILITY TO START INTO A COASTING MOTOR (SPEED SEARCH). IMPORTANT - NOTCH 5 MUST BE ON.		X
		SPEED SEARCH OVER-RIDE.	X	
7	JOGGING	SOFT JOG OPERATION TO 1/1Ø SPEED.	X	
		NORMAL JOG OPERATION AT 1/1Ø SPEED.		X
8	SUPPLY VOLTAGE **	23ØV		X
		46ØV	X	

* Drive output frequency is synchronized with motor speed, then motor is accelerated back to set speed.

** **DO NOT CHANGE**.

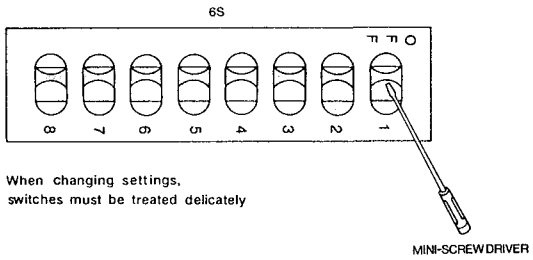


Figure 11. Switch 6S.

(7) Selection of master frequency reference signal

Input terminal 9 will accept either a current signal (4 to 2ØmA) or a voltage signal (Ø to 1ØVDC).

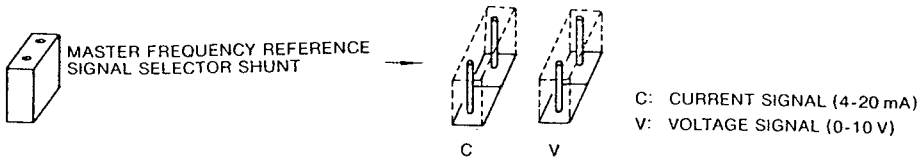


Figure 12. Master Frequency Reference Signal Selection

(8) Selection of auxiliary frequency reference signal

When the shunt is in the (R) position, terminal 21 can be used as a frequency reference input. If the shunt is in the (L) position, terminal 21 will not be operable.

The shunt is factory-set to (R) and must be changed to the (L) position when using the Analog Operator option.

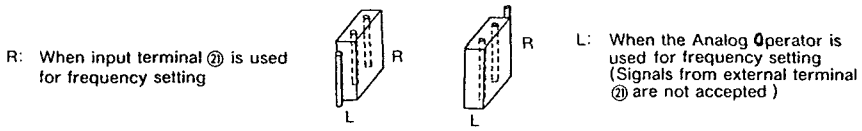


Figure 13. Auxiliary Frequency Reference Signal Selection

(9) Selection of supply voltage (46ØV units only)

Connect the shunt according to the supply voltage level. The voltage shunt comes preset in the 46ØV position and should not be changed unless undervoltage tripping occurs.

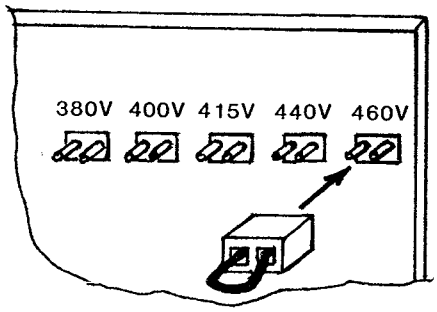


Figure 14. Voltage Selector.

(1Ø) Selection of radio noise reducing filter circuit (46Ø volt units only)

The RF noise filter is factory set to the "ON" position. Its function is to reduce the amount of RF noise that can be emitted by the Converter.

NOTE

When a separate ground fault interrupter is used, this circuit should be changed to the "OFF" position to prevent false tripping.

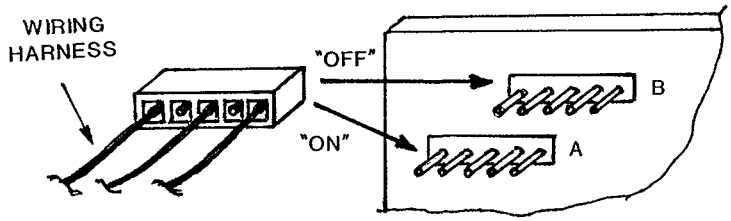


Figure 15. Radio Noise Filter Circuit Shunt.

6. MAINTENANCE

The Converter requires almost no routine checks. It will provide efficient and reliable service if it is kept clean, cool and dry, observing precautions listed in Section 3.1. Check for tightness of electrical connections, component discoloration or other signs of overheating. Use Table 1Ø as the inspection guide.

CAUTION

BEFORE INSPECTING, TURN OFF THE AC INPUT POWER AND ALLOW THE "CHARGE" LAMP TO GO OUT.

Table 1Ø. Periodic Inspection.

COMPONENT	CHECK	CORRECTIVE ACTION
EXTERNAL TERMINALS, UNIT MOUNTING BOLTS, CONNECTORS, ETC.	LOOSE SCREWS.	TIGHTEN
	LOOSE CONNECTORS.	TIGHTEN
HEAT SINK COOLING FINS	BUILD-UP OF DUST AND DIRT	CLEAN WITH DRY COMPRESSED AIR (15 TO 3Ø PSI).
PRINTED CIRCUIT BOARDS	FOR BUILD-UP OF CONDUCTIVE DUST AND OIL MIST.	CLEAN THE BOARD. IF DUST AND OIL CANNOT BE REMOVED, REPLACE THE BOARD.
	DISCOLORATION DUE TO HEAT.	REPLACE THE BOARD.
POWER ELEMENTS	ACCUMULATION OF DUST AND DIRT.	CLEAN WITH DRY COMPRESSED AIR (15 TO 3Ø PSI).
FILTER CAPACITOR	DISCOLORATION OR ODOR.	REPLACE THE CAPACITOR.

7. FAILURE INDICATION AND DETAILS

A failure, when detected, will shut off the output power transistors and output a FAULT signal by contact closure at Converter terminals 14, 15, and 16.

When an Analog or Digital Operator is used, failure indications listed in Table 11 will function; otherwise failure conditions are shown by the two FAULT lamps (F1 and F2) on the Control PCB in the Converter, as listed in Table 12.

Table 11. Failure Indication with an Analog or Digital Operator.

INDICATION ±	CAUSE
UV* OR (UU +) (UNDERVOLTAGE)	DC BUS VOLTAGE LOWER THAN APPROX. 45ØV FOR 46ØV UNITS, 225V FOR 23ØV UNITS.
OV OR (OU+) (OVERVOLTAGE)	DC BUS VOLTAGE HIGHER THAN APPROX. 79ØV FOR 46ØV UNITS, 395V FOR 23ØV UNITS.
OC (OVERCURRENT)	2ØØ PERCENT OF RATED CURRENT WAS EXCEEDED. (INSTANTANEOUS OPERATION)
OL (OVERLOAD)	OVERLOAD OF MOTOR AND CONVERTER DETECTED BY ELECTRONIC THERMAL CIRCUIT.
OH (HEAT SINK OVERHEAT)	THERMOSWITCH OPERATED BY OVERHEATING OF MAIN CIRCUIT SEMICONDUCTOR HEAT SINK.
CPF (CONTROL FUNCTION ERROR)	DETECTION OF CPU FAILURE OR MAIN CONTROL FUNCTION BY SELF-DIAGNOSTIC FUNCTION.
EB (OR Eb+) (EXTERNAL FAULT)	EXTERNAL FAULT SIGNAL INPUT AT CONVERTER TERMINAL 7.
FU (BLOWN FUSE)	MAIN CIRCUIT FUSE BLOWN.

* Operation continues after a momentary power failure when notch 5 of switch 6S is ON; UV lamp or display flashes for approximately two seconds.

\+ For Digital Operator display.

± FAULT will be displayed with individual failure indication on the screen of Digital Operator.

Table 12. Failure Indication on Control PCB.

INDICATION		CAUSE
F1	F2	
□	■ ▬	FU (FUSE BLOWN): MAIN CIRCUIT FUSE BLOWN
□	■ ■ ■	OC (OVERCURRENT): MORE THAN 2ØØ PERCENT OF RATED CURRENT WAS REQUIRED.
□	▬	OC (OVERLOAD): ELECTRONIC THERMAL CIRCUIT DETECTED MOTOR AND CONVERTER OVERLOAD.
■ ▬	▬	OV (OVERVOLTAGE): DC BUS VOLTAGE HIGHER THAN 79ØV FOR 46ØV UNITS, 395 FOR 23ØV UNITS.
■ ■ ■	▬	UV1 (UNDERVOLTAGE): DC BUS LOWER THAN SPEC. WITH 6S-5 SET TO ON. (BLINKS FOR 2 SEC.)
▬	▬	UV2 (UNDERVOLTAGE): DC BUS LOWER THAN 45ØV FOR 46ØV UNITS, 225V FOR 23ØV UNITS.
■ ▬	□	OH (OVERHEAT): THERMOSWITCH ON SEMICONDUCTOR HEAT SINK DETECTED EXCESSIVE TEMPERATURE.
■ ■ ■	□	EB (EXTERNAL FAULT): EXTERNAL FAULT SIGNAL INPUT AT CONVERTER TERMINAL 7.
▬	□	CPF (CONTROL FUNCTION ERROR): CPU FAILURE
■ ■ ■	■ ■ ■	CPF-SEL (SELECTION ERROR): SWITCH 1S THRU 6S CHANGED WITH POWER ON.

NOTE: INDICATION STATUS IS AS FOLLOWS:

□ LIGHT OFF.

■ ■ ■ BLINKING AT EQUAL INTERVALS.

■ ▬ BLINKING AT SHORT-LONG INTERVALS.

▬ LIGHT ON STEADY.

8. TROUBLESHOOTING

If the unit malfunctions, locate the cause and take corrective action by following the flowcharts given in this section.

MOTOR SYMPTOMS

FAULT CONDITIONS

If the cause cannot be located by the flowcharts, the Converter or some internal parts may be damaged. Contact a Louis Allis Representative for your nearest authorized repair center.

8.1 Measuring Points and Instruments

Since the Lancer GP Converter utilizes the PWM control mode, specified instruments must be used for correct measurements.

The measuring points and types of instruments are shown in Table 13 and Figure 16.

Table 13. Measuring Points and Instruments.

ITEM	POINTS	INSTRUMENTS	NOTE
SUPPLY VOLTAGE	L1-L2 L2-L3 L3-L1	VOLTMETER: RECTIFIER OR MOVING IRON TYPE	
SUPPLY CURRENT	L1, L2 L3	AMMETER: MOVING IRON TYPE	
SUPPLY POWER	W(L1), W(L1), W(L3)	WATTMETER: ELECTRODYNAMOMETER TYPE (INCORPORATING A HALL GENERATOR	P1 = W(L1) + W(L2) + W(L3)
OUTPUT VOLTAGE	T1-T2 T2-T3 T3-T1	VOLTMETER: RECTIFIER TYPE ONLY	1ØØØ V SCALE (46ØV) 5ØØV SCALE (23ØV)
OUTPUT CURRENT	T1, T2 T3	AMMETER: MOVING IRON TYPE	
OUTPUT POWER	W(T1), W(T2), W(T3)	WATTMETER: ELECTRODYNAMOMETER	P2 = W(T1) + W(T2) + W(T3)
FREQUENCY SETTING SIGNAL	9(+) TO 1Ø 21(+) TO 2Ø	VOLTMETER: MOVING-COIL TYPE INTERNAL RESISTANCE 5ØK OHM MAXIMUM	Ø TO 1Ø VDC
FREQUENCY MONITOR	17(+) TO 18		1Ø VDC AT MAX SPEED AND UNLOADED

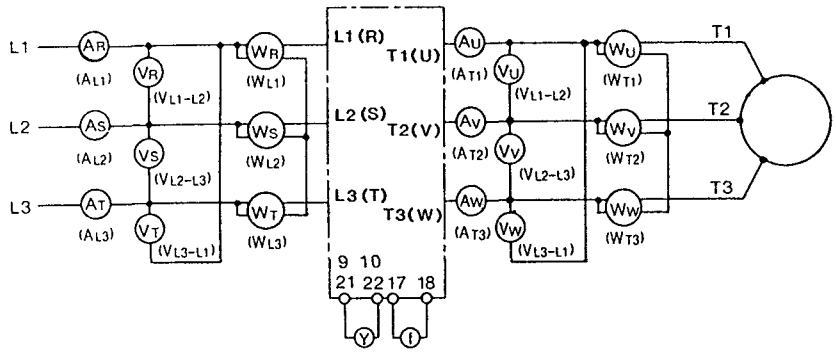


Figure 16.

Figure 17 shows an example of actually measured output voltage. The rectifier type instruments may give different readings depending on the type used.

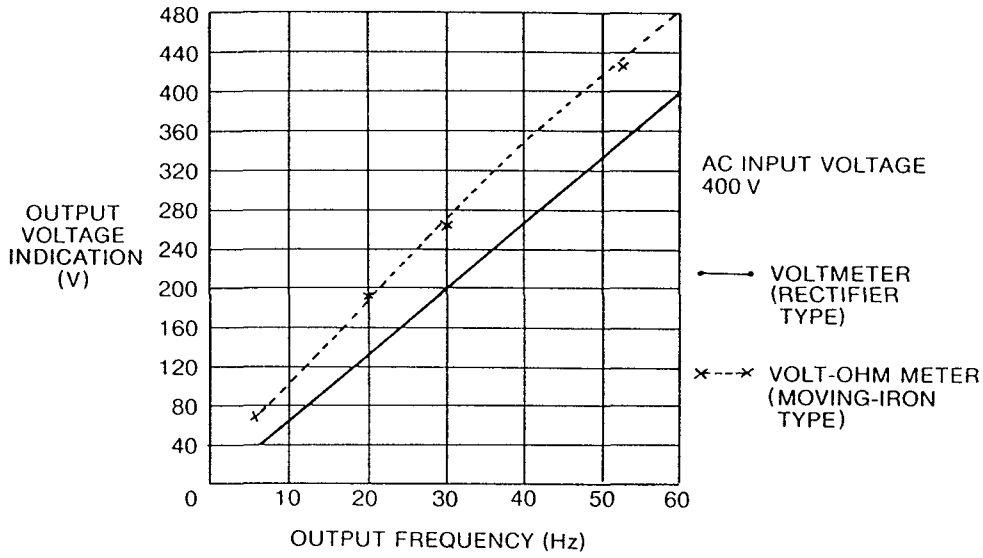
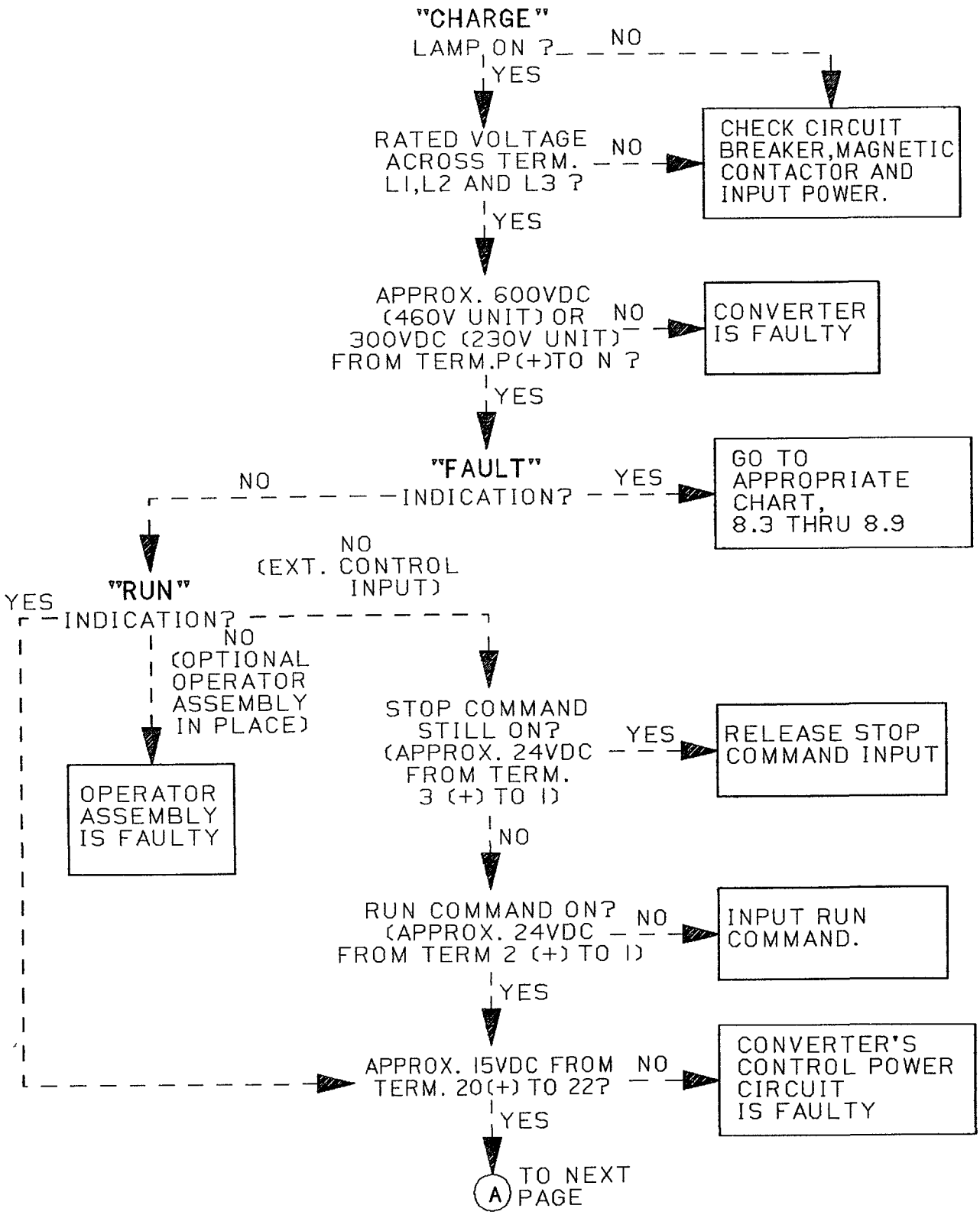


Figure 17.

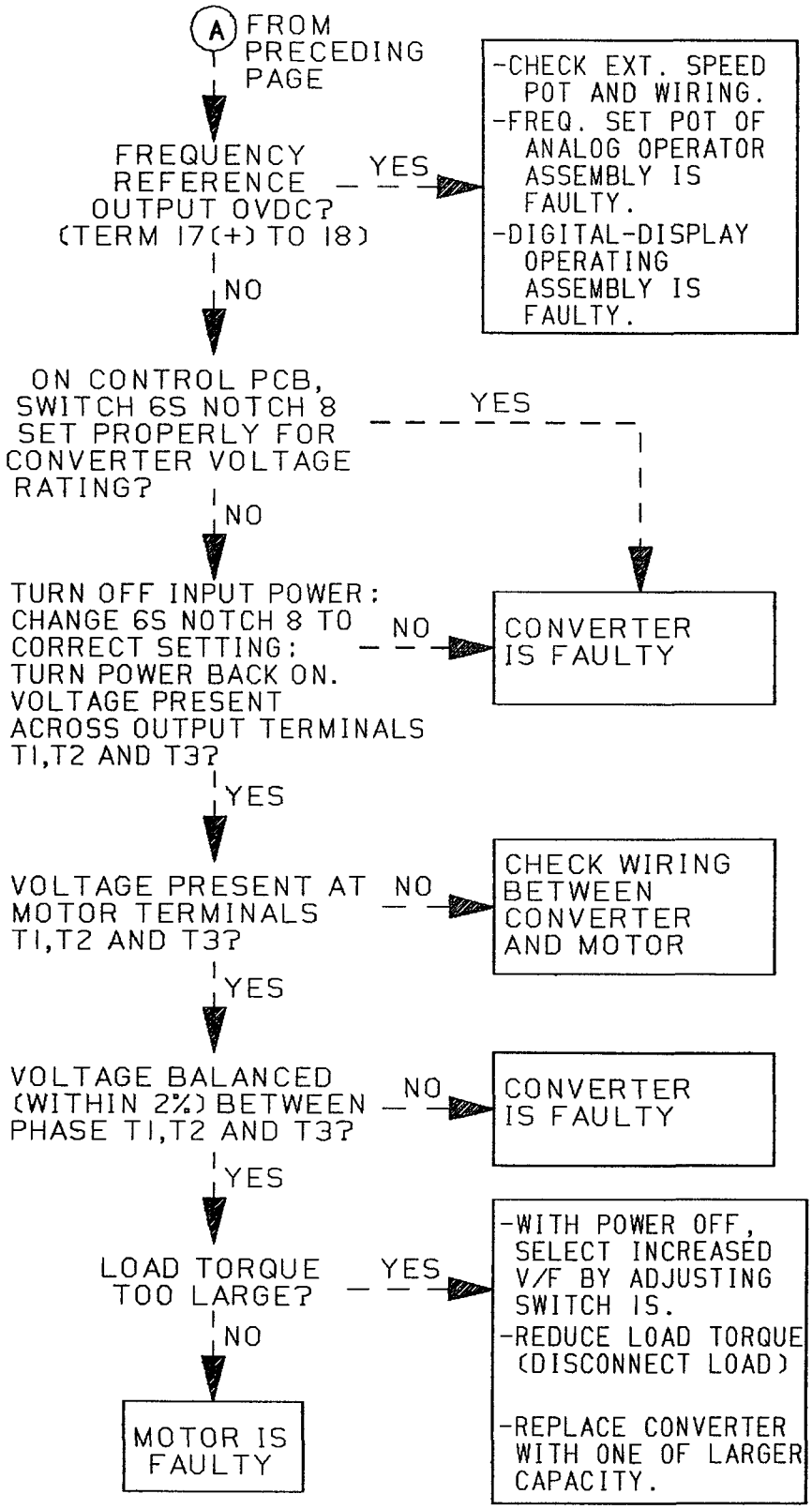
TROUBLESHOOTING CHART 8.1

MOTOR WILL NOT RUN



TD.I.4N.C 8.I.SHT I

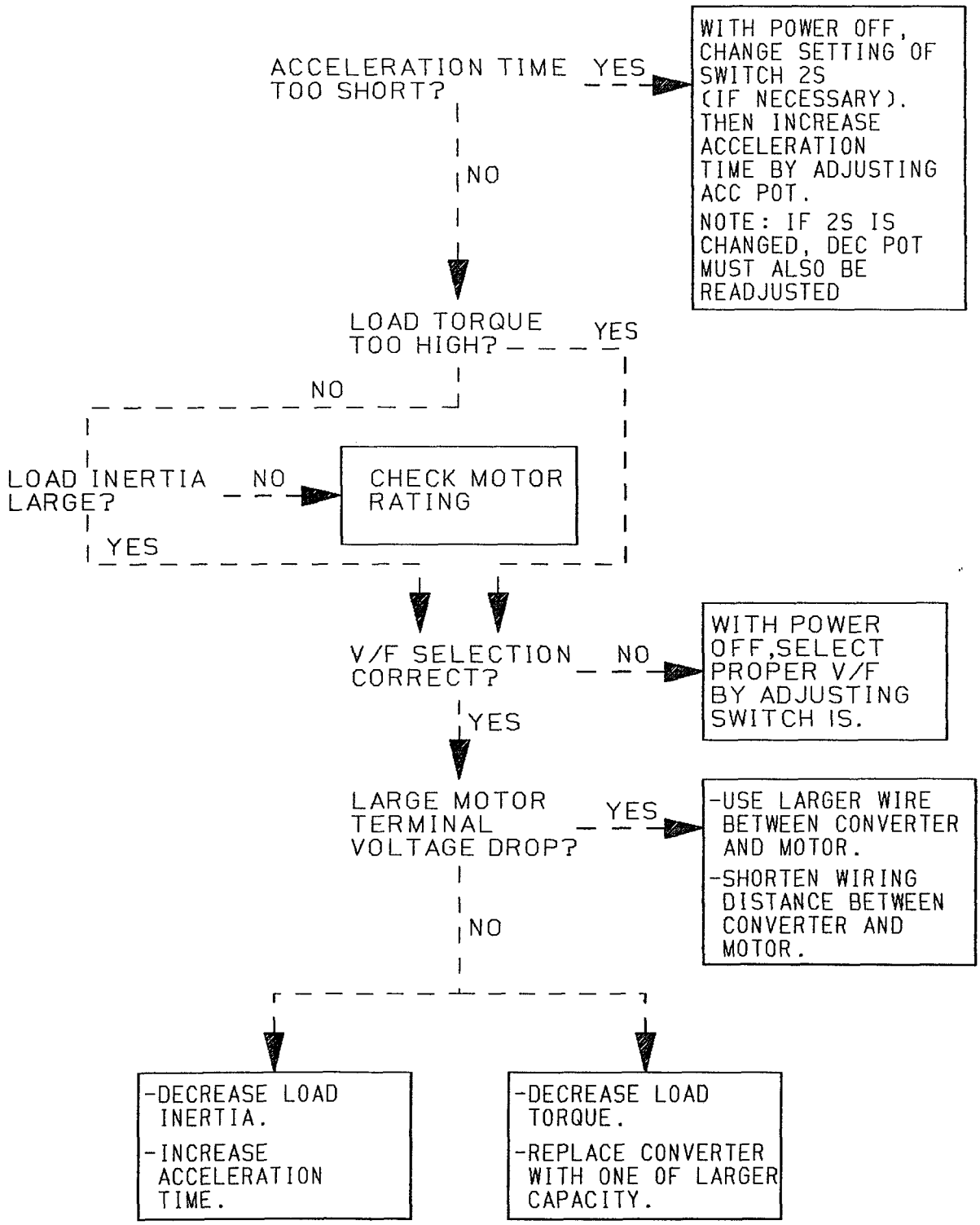
TROUBLESHOOTING CHART 8.1 (Continued)



TD1.4%C 8.1.SHT 2

TROUBLESHOOTING CHART 8.2

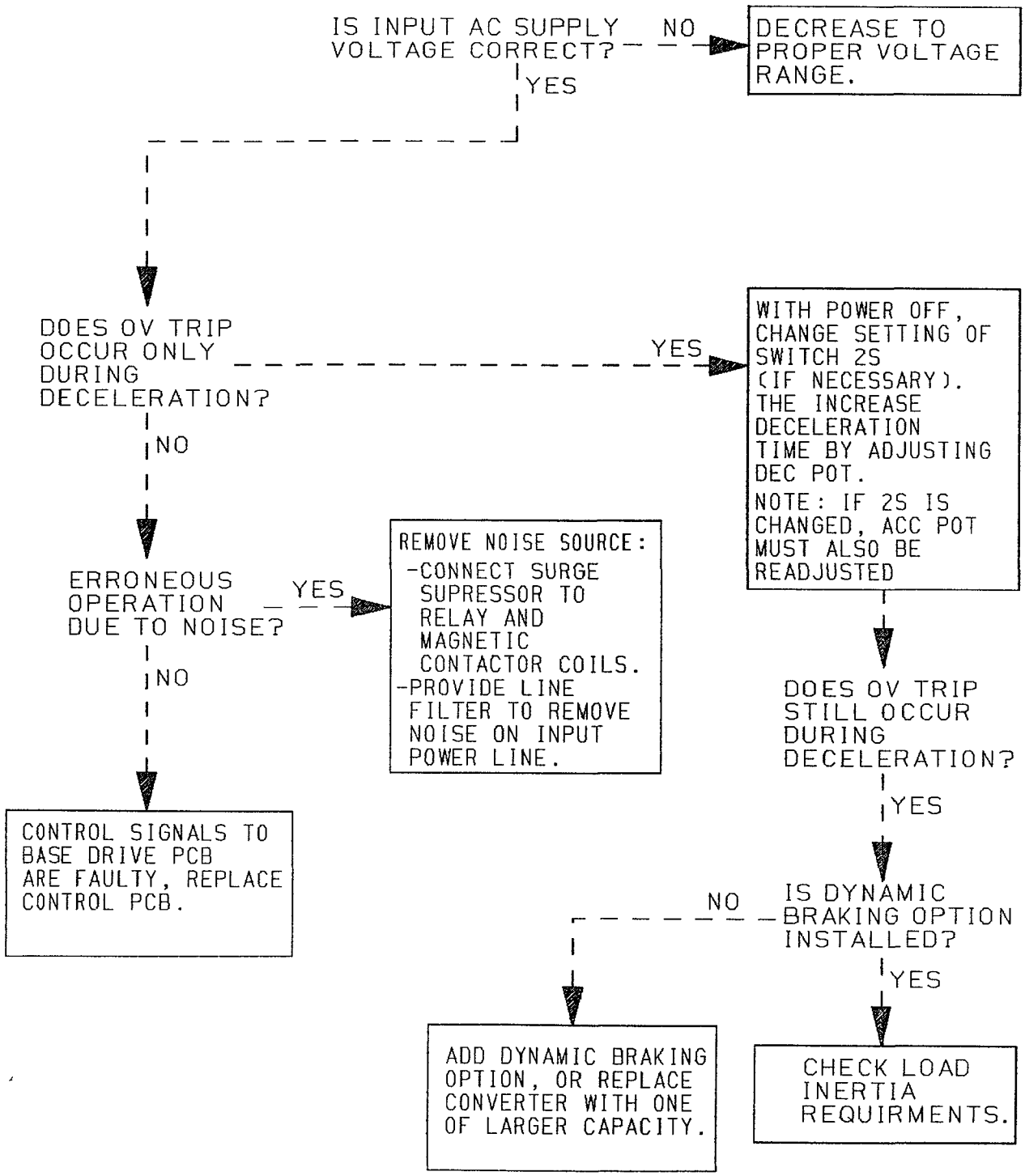
MOTOR STALLS DURING ACCELERATION



TDI.4W.C8.2

TROUBLE SHOOTING CHART 8.3

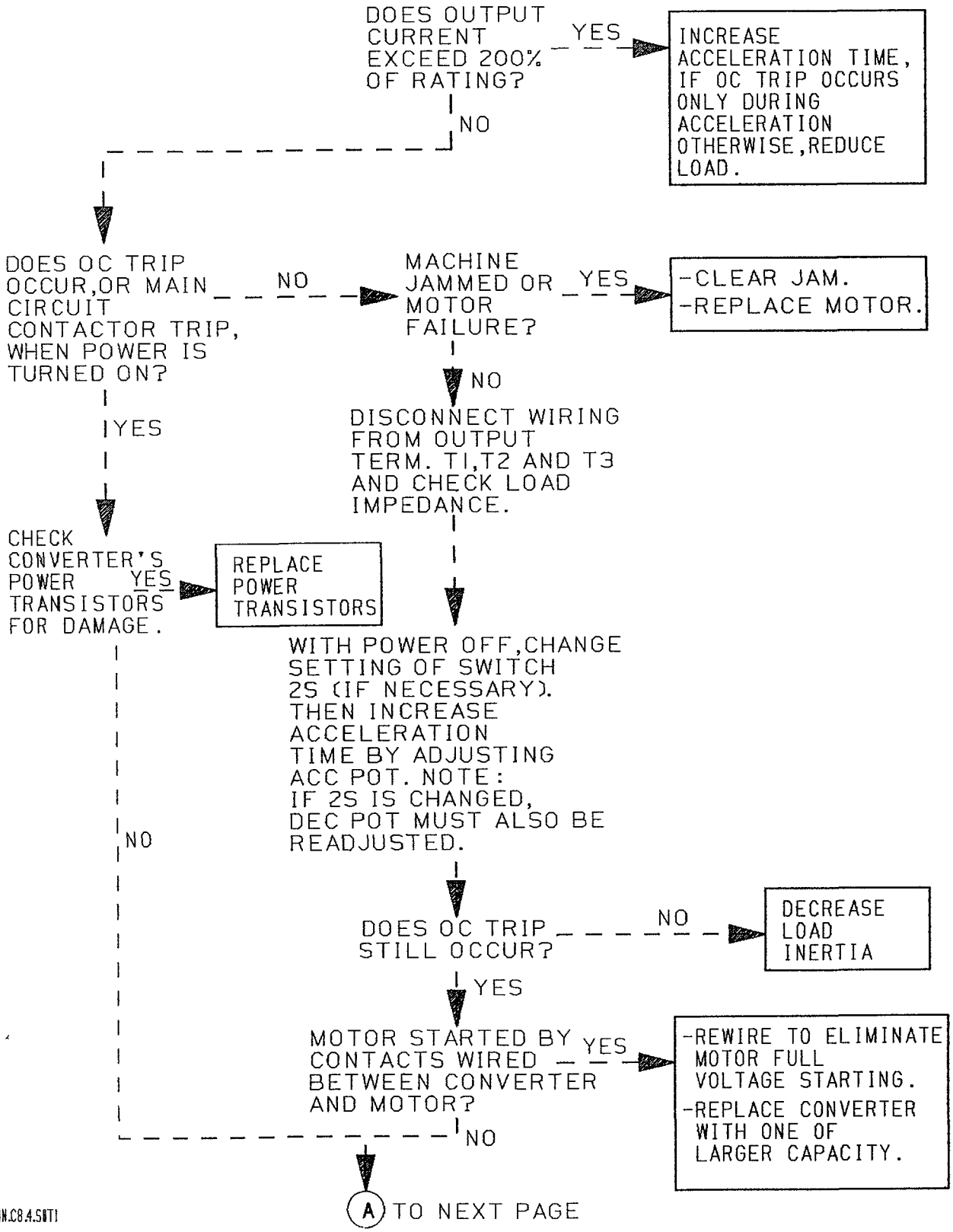
OVERVOLTAGE (OV OR OU) FAULT INDICATION



TD.I.4N C8.J

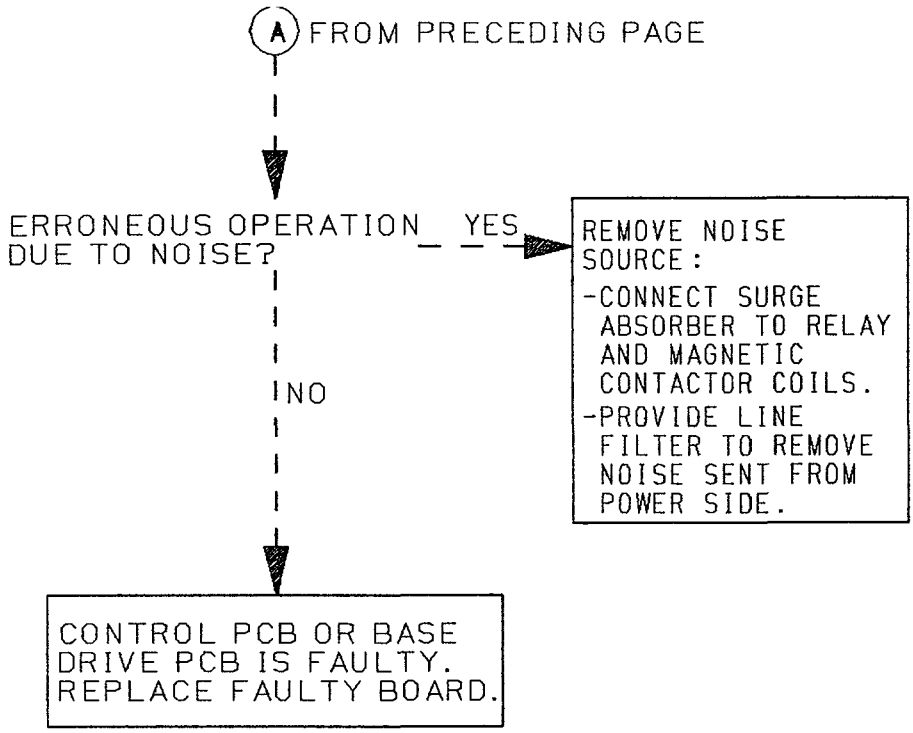
TROUBLESHOOTING CHART 8.4

OVERCURRENT (OC) FAULT INDICATION



ID.I.4N.C8.4.S8T1

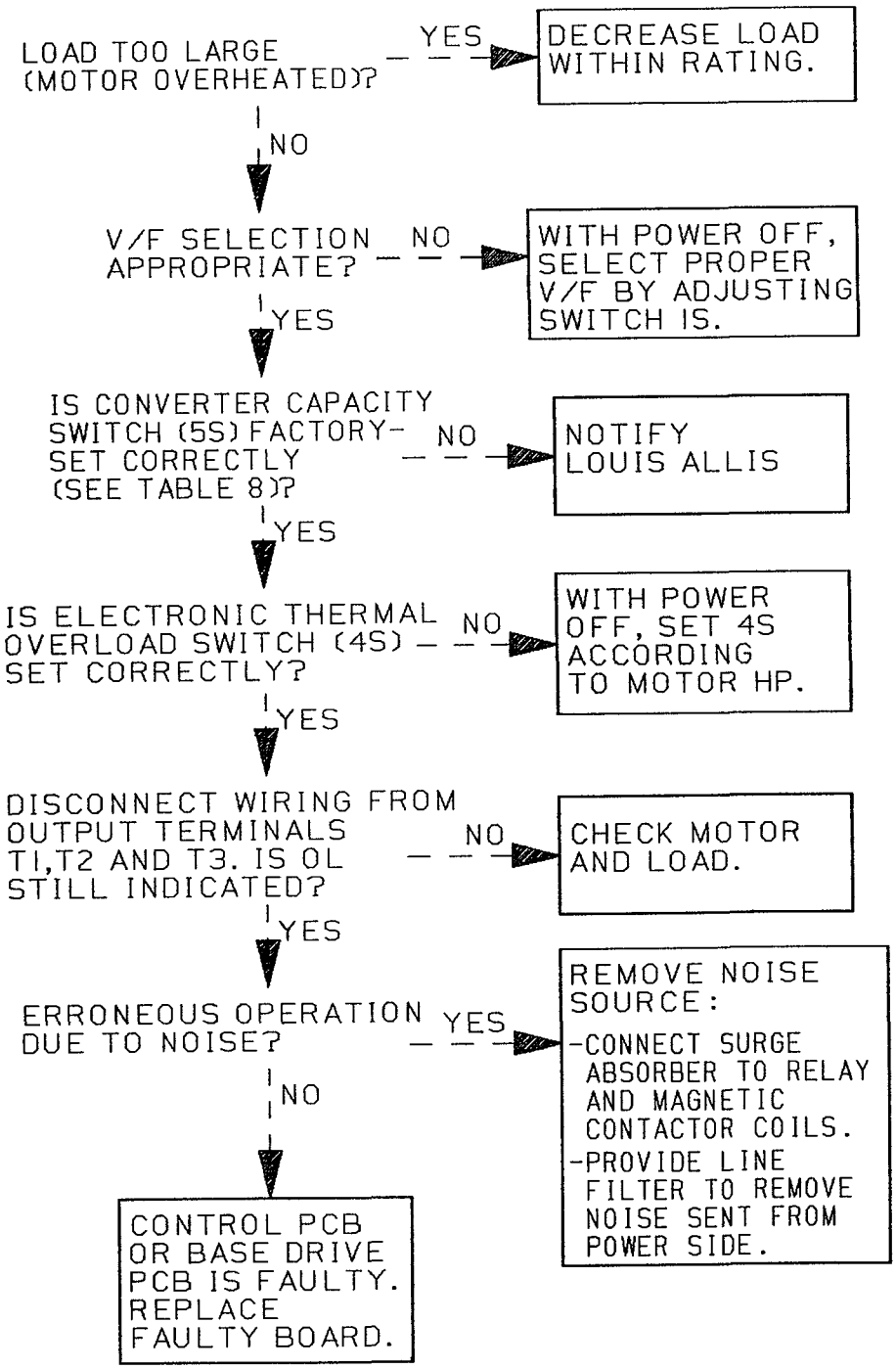
TROUBLESHOOTING CHART 8.4 (Continued)



ID.L4W.C8.4.SHT2

TROUBLESHOOTING CHART 8.5

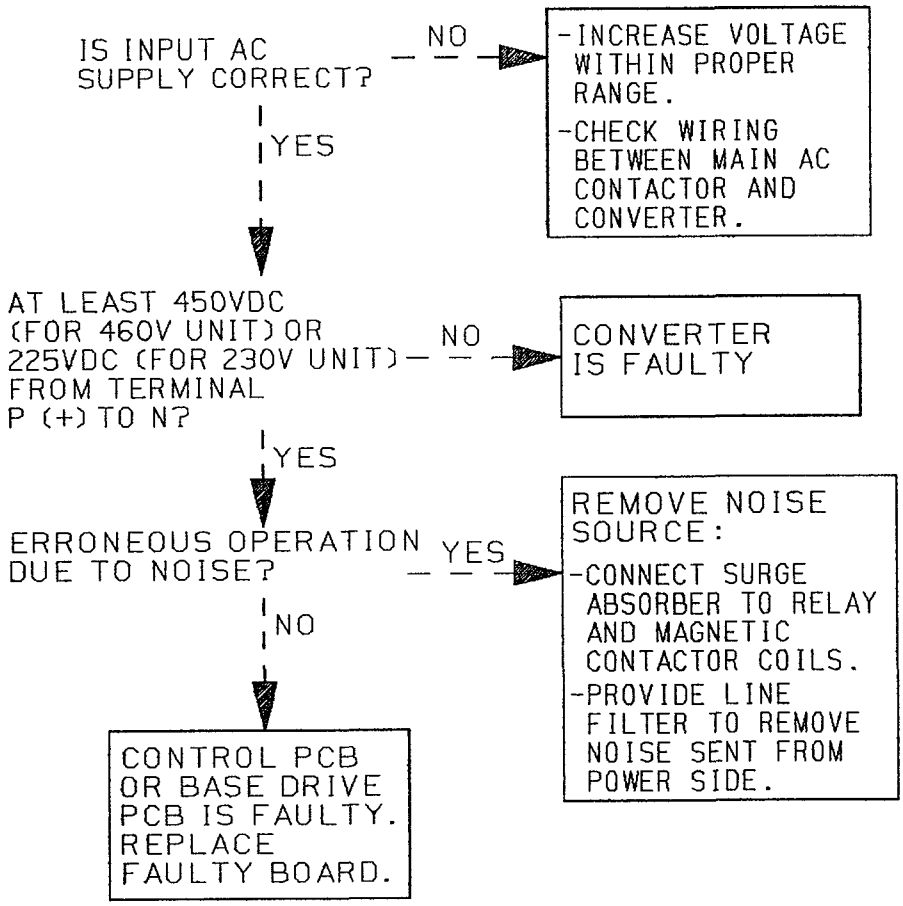
OVERLOAD (OL) FAULT INDICATION



TDI.4MC8.5

TROUBLESHOOTING CHART 8.6

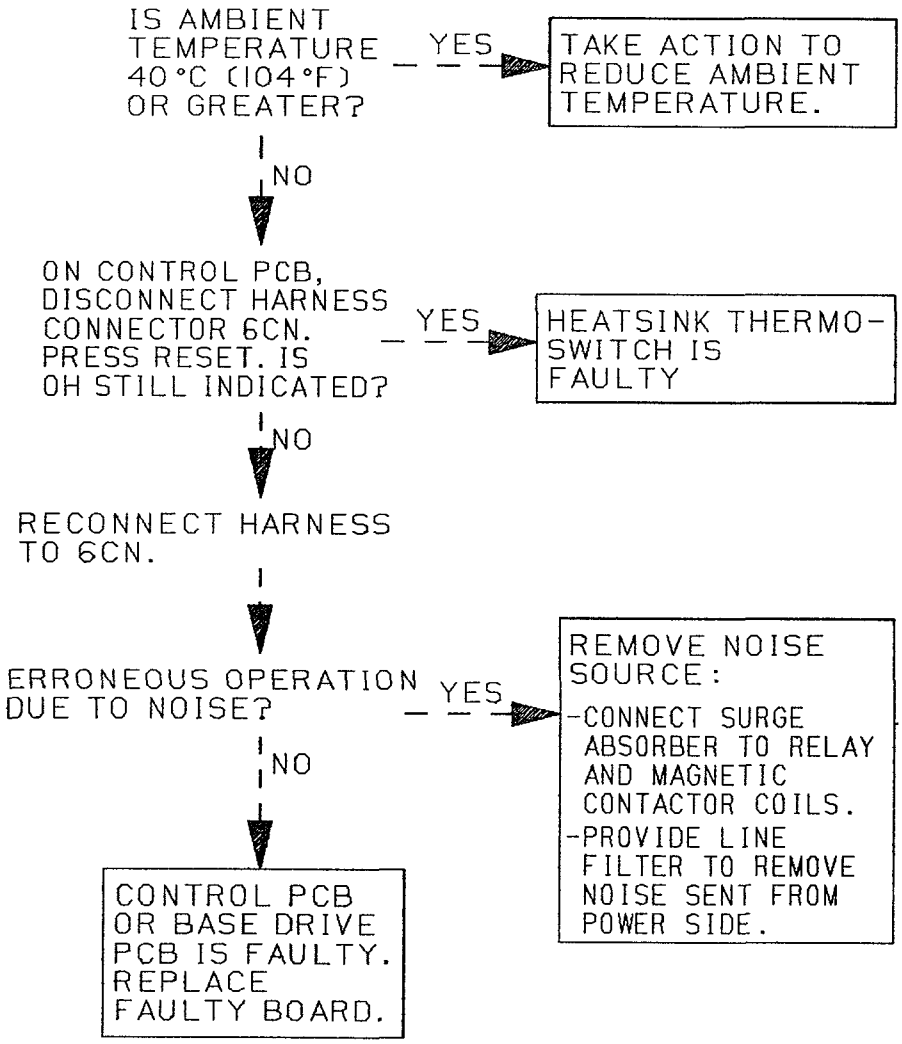
UNDERVOLTAGE (UV OR UU) FAULT INDICATION



TD.I.4N.C8.6

TROUBLESHOOTING CHART 8.7

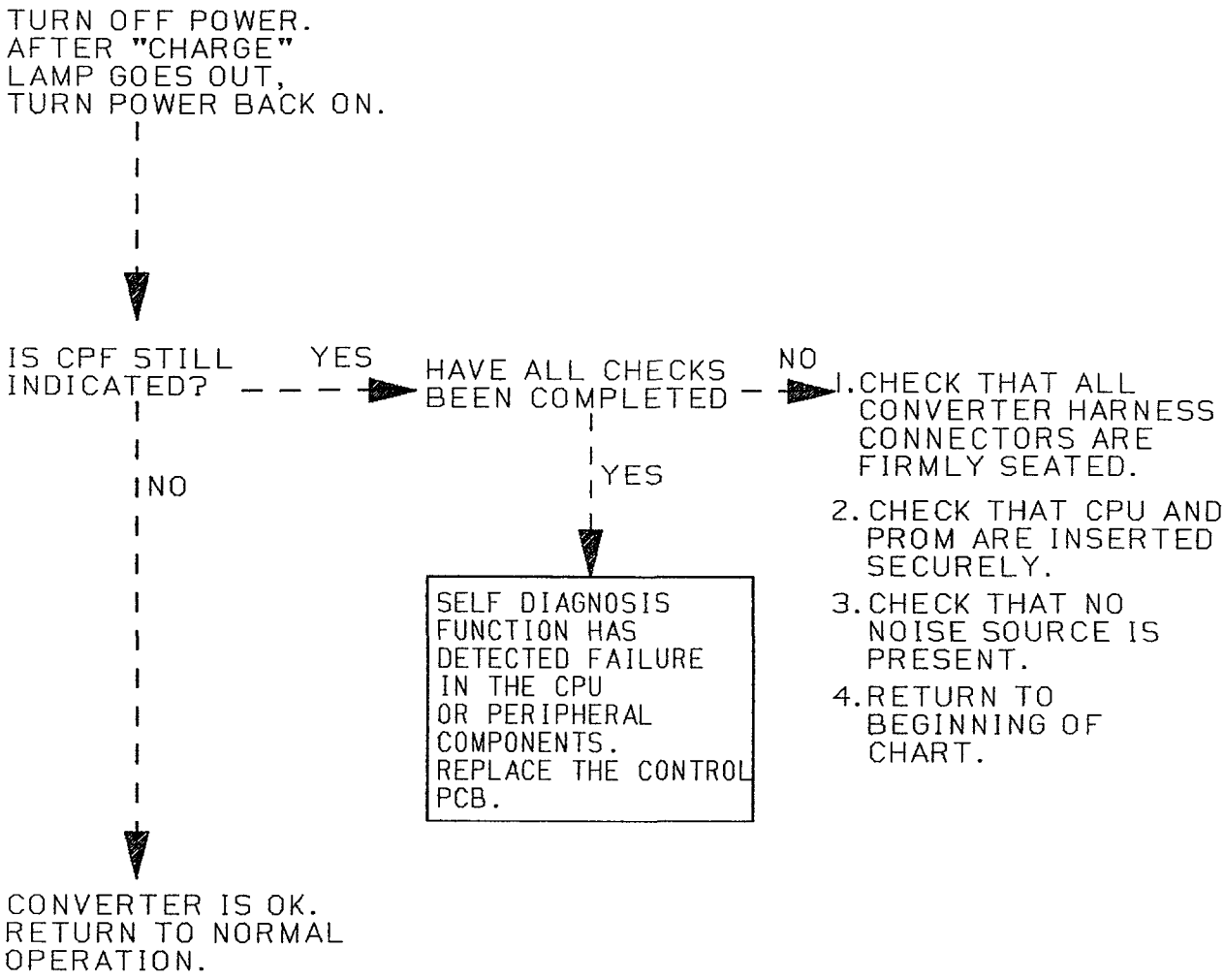
CONVERTER OVERHEATED (OH) FAULT INDICATION



TD.I.4N.C8.7

TROUBLESHOOTING CHART 8.8

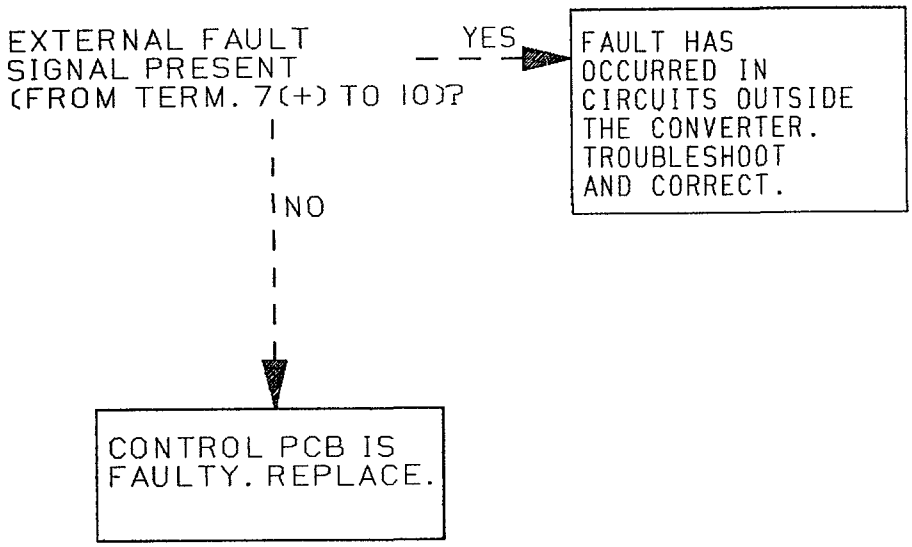
CONTROL FUNCTION ERROR (CPF) FAULT INDICATION



TD I.4N.C8.8

TROUBLESHOOTING CHART 8.9

EXTERNAL FAULT (EB OR Eb) INDICATION



APPENDIX 1. RATINGS AND SPECIFICATIONS

Ratings and Specifications
230 Volt Units

POWER INPUT

Voltage: 208-230 Volts AC ± 10%
Phase: Three (3)
Frequency: 50/60 Hertz ±5%

POWER OUTPUT

Voltage: 0 to 208-230 Volts AC
Phase: Three (3)
Frequency: Max 50, 60, 72, 90, 120, 180
Wave Form: Sine coded PWM
Frequency Range: 40 to 1

230 Volt

MAX HP	OUTPUT KVA	OUTPUT AMPS
.5	1.3	3.3
1	2.0	5.0
3	4.0	10.0
5	6.9	17.3
7.5	10.6	26.5
10	13.9	34.6
15	20.8	51.9
20	24.8	62.0
25	29.0	72.4
30	36.3	90.6
40	43.8	109.2
50	58.1	144.9
60	72.8	181.6
75	87.1	217.3

Ratings and Specifications
460 Volt Units

POWER INPUT

Voltage: 460 Volts AC ± 10%
Phase: Three (3)
Frequency: 50/60 Hertz ±5%

POWER OUTPUT

Voltage: Ø to 460 Volts AC
Phase: Three (3)
Frequency: Max 5Ø, 6Ø, 72, 9Ø, 12Ø, 18Ø
Wave Form: Sine coded PWM
Frequency
Range: 4Ø to 1

460 Volt

MAX HP	OUTPUT KVA	OUTPUT AMPS
.5	1.4	1.7
1	2.1	2.6
3	4.2	5.3
5	7.4	9.2
7.5	11.Ø	13.8
1Ø	14.5	18.1
15	18.6	23.2
2Ø	22.7	28.3
25	29.Ø	36.2
3Ø	36.7	45.8
4Ø	43.7	54.6
5Ø	58.Ø	72.4

MAX HP	OUTPUT KVA	OUTPUT AMPS
6Ø	74.5	93.Ø
75	87.Ø	1Ø8.6
1ØØ	1Ø9.Ø	136.5
15Ø	16Ø.Ø	199.5
2ØØ	2Ø4.Ø	254.1
25Ø	258.Ø	324.Ø
3ØØ	29Ø.Ø	36Ø.Ø
35Ø	345.Ø	43Ø.Ø
4ØØ	368.Ø	462.Ø
45Ø	417.Ø	52Ø.Ø
5ØØ	481.Ø	6ØØ.Ø
6ØØ	577.Ø	72Ø.Ø

Specifications - All Units

Frequency Accuracy: Digital command Ø.Ø1% (-1Ø to 4Ø°C)
Analog command Ø.2% (25° ± 1Ø°C)

ENVIRONMENTAL SPECIFICATION

Ambient Temperature: Operating -1Ø to 4Ø°C (14 to 1Ø4°F)
Storage -2Ø to 6Ø°C (-4 to 14Ø°F)
Humidity: Up to 9Ø% Relative (Non-Condensing)
Altitude: Up to 3,3ØØ Feet Above Sea Level

STANDARD FEATURES

Volts per Hertz: Constant or Variable (15 selectable curves total)
Low Frequency Voltage Boost: 4 selectable curves
Acceleration Time: Adjustable .2 to 18ØØ Seconds
Deceleration Time: Adjustable .2 to 18ØØ Seconds
Electronic Reversing: Standard
Speed Setting Signal Inputs: Ø to 1Ø VDC
(Input Impedance: 2ØK Ohms)
4 to 2Ø mA DC
(Input Impedance: 5ØØ Ohms)
Overcurrent Capacity: 15Ø% for 6Ø seconds
Regenerative Braking Torque: Approximately 2Ø% of Rated Full Load Torque
Isolated: Low Voltage DC Control Circuit

PROTECTIVE FEATURES

Power Failure Ride-Thru: .2 sec or *2 sec (switch selectable)
* Added external capacitor required on 46ØV units.

Undervoltage: Drive trips below 85% of Rated Line Voltage
Overvoltage: Drive trips above 115% of Rated Line Voltage
Overcurrent: Drive trips if 15Ø% of Rated Current exists for 6Ø seconds or more
Overtemperature: Drive trips if heat sink exceeds a safe operating temperature
Current Limited Stall Prevention: Operates during acceleration, deceleration, and while motoring
Trip Diagnostics: Two FAULT LED's indicate the type of trip by varying illumination
Ground Fault: Drive trips if a Phase-to-Ground short occurs. (Not available on 23Ø Volt units less than 15 HP)
Instantaneous Overcurrent: Trip occurs at 2ØØ% of Rated Output Current

SPECIAL FEATURES (SWITCH SELECTABLE)

Speed Search: Allows the Converter to start a coasting motor.
Anti-Windmill Protection: DC Injection before motor acceleration
DC Braking: DC injection below 1/4Ø of Rated Frequency
Electronic Thermal Motor Overload: Provides thermal protection for the motor when motor HP is less than or equal to the Converter Rating.

APPENDIX 2. TERMINAL FUNCTIONS

Terminal Functions and Voltage of Main Circuit

Table 15a. .5-1Ø HP, 23Ø Volts

TERMINALS	FUNCTIONS	LEVELS
L1 L2 L3	MAIN CIRCUIT INPUT POWER SUPPLY	THREE PHASE 2Ø8-23Ø VAC, AT 5Ø/6Ø HZ (VOLTAGE FLUCTUATION ± 1Ø%)
ℓ1 ℓ2	COOLING FAN INPUT POWER SUPPLY	SINGLE PHASE (FROM INPUT POWER SUPPLY)
T1 T2 T3	OUTPUT	THREE PHASE 2Ø8-23Ø VAC MAXIMUM (CORRESPONDING TO INPUT VOLTAGE)
B1, B2 a, b	BRAKING MODULE (INTERNAL MOUNTING OPTION)	Ø TO APPROXIMATELY 3ØØ VDC
B3, N-	BRAKING RESISTOR UNIT*	
P+ TO N-	MAIN CIRCUIT DC POWER SUPPLY	APPROXIMATELY 3ØØ VDC
GND	GROUND TERMINAL	

* External option, used with braking module.

Table 15b. 15-75 HP, 23Ø Volts

TERMINALS	FUNCTIONS	LEVELS
L1 L2 L3	MAIN CIRCUIT INPUT POWER SUPPLY	THREE PHASE 2Ø8-23Ø VAC, AT 5Ø/6Ø HZ (VOLTAGE FLUCTUATION ± 1Ø%)
ℓ1 ℓ2	COOLING FAN INPUT POWER SUPPLY	SINGLE PHASE (FROM INPUT POWER SUPPLY)
T1 T2 T3	OUTPUT	THREE PHASE 2Ø8-23Ø VAC MAXIMUM (CORRESPONDING TO INPUT VOLTAGE)
P1 TO N-	BRAKING UNIT *	Ø TO APPROXIMATELY 3ØØ VDC
P1, P2, P3 TO N-	MAIN CIRCUIT DC POWER SUPPLY	APPROXIMATELY 3ØØ VDC
GND	GROUND TERMINAL	

* External option.

Table 15c. .5-15Ø HP, 46Ø Volts

TERMINALS	FUNCTIONS	LEVELS
L1 L2 L3	MAIN CIRCUIT INPUT POWER SUPPLY	3-PHASE 46Ø VAC AT 5Ø/6Ø HZ (VOLTAGE FLUCTUATION ± 1Ø%)
ℓ1 ℓ2	CONTROL CIRCUIT INPUT POWER SUPPLY	SINGLE-PHASE (FROM INPUT POWER SUPPLY)
T1 T2 T3	OUTPUT	3-PHASE 46Ø VAC (CORRESPONDING TO INPUT VOLTAGE)
P1, P2	DC REACTOR FOR POWER FACTOR CORRECTION	
P3 TO N-	EXTERNAL CAPACITOR (UP TO THE SAME CAPACITY OF CAPACITOR INCORPORATED IN CONVERTER)	APPROXIMATELY 6ØØ VDC
P1 TO N-	BRAKING UNIT*	Ø TO APPROXIMATELY 6ØØ VDC
P1,P2,N-	MAIN CIRCUIT DC POWER SUPPLY	APPROXIMATELY 6ØØ VDC
C1, C2	BACKUP CAPACITOR FOR MOMENTARY FAILURE	APPROXIMATELY 3ØØ VDC
V1, V2	POWER SUPPLY TO EXTERNAL EQUIPMENT	22ØV, 5Ø/6Ø HZ
GND	GROUND TERMINAL	

* External option.

Table 15d. 1ØØ-6ØØ HP, 46Ø Volts

TERMINALS	FUNCTIONS	LEVELS
L1 L2 L3	MAIN CIRCUIT INPUT POWER SUPPLY	3-PHASE 46Ø VAC AT 5Ø/6Ø HZ (VOLTAGE FLUCTUATION ± 1Ø%)
ℓ1 ℓ2 ℓ3	CONTROL CIRCUIT INPUT POWER SUPPLY	3-PHASE (FROM INPUT POWER SUPPLY)
T1 T2 T3	OUTPUT	3-PHASE 46Ø VAC (CORRESPONDING TO INPUT VOLTAGE)
P1, P2	DC REACTOR FOR POWER FACTOR CORRECTION	
P3 TO N	EXTERNAL CAPACITOR (UP TO THE SAME CAPACITY OF CAPACITOR INCORPORATED IN CONVERTER)	APPROX 6ØØ DC
P1 TO N	BRAKING UNIT*	Ø TO APPROXIMATELY 6ØØ VDC
P1,P2,N	MAIN CIRCUIT DC POWER SUPPLY	APPROXIMATELY 6ØØ VDC
C1, C2	BACKUP CAPACITOR FOR MOMENTARY POWER FAILURE	APPROXIMATELY 3ØØ VDC
V1, V2	POWER SUPPLY TO EXTERNAL EQUIPMENT	22ØV, 5Ø/6Ø HZ
GND	GROUND TERMINAL	

* External option.

Table 16. Terminal Functions and Signals of Control Circuit

TERMINALS	FUNCTIONS	LEVELS
1	CONTROL CIRCUIT INPUT COMMON	COMMON
2	RUN SIGNAL	RUN AT CLOSED*
3	STOP SIGNAL	STOP AT OPEN+
4	CONNECTION TO SHIELD OF SIGNAL LEAD	GND.
5	FWD/REV OPERATION SELECTOR	FORWARD AT OPEN+, REV AT CLOSED*
6	AUTO/MAN FREQUENCY SIGNAL SELECTOR	AUTO SPEED AT OPEN+, MAN AT CLOSED*
7	EXTERNAL FAULT INPUT	EXTERNAL FAULT AT CLOSED*
8	FAULT RESET INPUT (EXTERNAL)	FAULT RESET AT CLOSED*
9 1Ø	"AUTO" MODE FREQUENCY SIGNAL INPUT	Ø TO +1ØV (2ØK OHM) OR 4-2Ø MA (5ØØ OHM) COMMON
11	CONNECTION TO SHIELD OF SIGNAL LEAD	GND.
12 13	RUN CONTACT OUTPUT (1 N.O.) CLOSED DURING RUN	CONTACT CAPACITY: 25Ø VAC AT 1A 3Ø VDC AT 1A
14 COM 15 N.C. 16 N.O.	FAULT CONTACTOR OUTPUT (FORM C) N.C. OPEN AT FAULT N.O. CLOSED AT FAULT	CONTACT CAPACITY: 25Ø VAC AT 1A 3Ø VDC AT 1A
17	FREQUENCY METER	APPROXIMATELY +1Ø V/1ØØ%, OUTPUT IMPEDANCE, 3K OHM
18		COMMON
19	CONNECTION TO SHIELD OF SIGNAL LEAD	GND.
2Ø 21 22	"MAN" MODE FREQUENCY SIGNAL INPUT	+15V (2ØMA MAX.) Ø TO 1Ø VDC COMMON

* Short-circuited with terminal 1.
\+ Not shorted to terminal 1.

APPENDIX 3. OPTIONS

Table 17.

NAME	FUNCTIONS
DIGITAL OPERATOR	MOUNTED ON THE CONVERTER WITH CONNECTION TO CONTROL PCB. ISSUES OPERATION COMMANDS, SETS THE FREQUENCY BY THE DIGITAL SIGNAL. DISPLAYS THE PRESET OR CURRENT FREQUENCY IN DIGITAL FORM. ALSO, DISPLAYS FAULT CODE WHEN A FAILURE OCCURS.
ANALOG OPERATOR	MOUNTED ON THE CONVERTER WITH CONNECTION TO CONTROL PCB. GIVES OPERATION COMMANDS, SETS THE FREQUENCY BY THE ANALOG SIGNAL. INDICATES THE CURRENT FREQUENCY ON THE FREQUENCY METER. ALSO, WHEN A FAILURE OCCURS, TYPE OF FAULT IS IDENTIFIED BY LAMP ILLUMINATION.
PROGRAMMING OPERATOR	WHEN A CONTROL EXPANSION OPTION IS PRESENT, ALLOWS PROGRAMMING OF CONSTANTS IN THAT OPTION'S EEPROM. OTHERWISE FUNCTIONS THE SAME AS DIGITAL OPERATOR.
MEMORY MODULE CONTROL EXPANSION	MOUNTS TO SIDE OF CONVERTER ENCLOSURE, WITH CONNECTION TO CONTROL PCB. ADDS ADDITIONAL (SETTABLE) CONSTANTS AND BACKUP MEMORY CAPABILITY TO CONTROL CIRCUIT PROGRAMMING.

APPENDIX 4. CHECKING OF DIODE AND TRANSISTOR MODULES

Diode Module

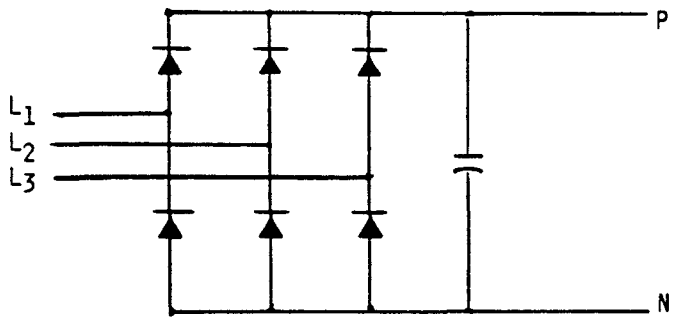
Measure the resistance across the module terminals with a volt-ohm meter. Set the meter at the X1 range. The measured resistance should be within the reference values listed in Table 18.

Table 18. Diode Module Resistances

+ ON	- ON	NORMAL READING (OHMS)	ABNORMAL READING (OHMS)
L1	P		
L2	P	1Ø	Ø
L3	P	TO	OR
N	L1	5Ø	INF
N	L2		
N	L3		

+ ON	- ON	NORMAL READING (OHMS)	ABNORMAL READING (OHMS)
L1	N		
L2	N		LESS
L3	N	INF	THAN
P	L1		
P	L2		
P	L3		
P	N	MAGNI-TUDE OF CAP CHARGE TO INF	Ø OR INF

RESISTANCE TEST FOR 3Ø CONVERTER MODULES (BRIDGE RECT)



VOM RESISTANCE SCALE RX1
+ IS THE POSITIVE POLARITY LEAD*
- IS THE NEGATIVE POLARITY LEAD

*THE VOM RED LEAD IS NOT NECESSARILY THE POSITIVE POTENTIAL IN THE RESISTANCE MODE. FOR THESE TESTS THE + LEAD REFERS TO THE POSITIVE POTENTIAL. MAKE SURE YOU KNOW WHICH POLARITY YOU HAVE ON YOUR VOM.

Transistor Module

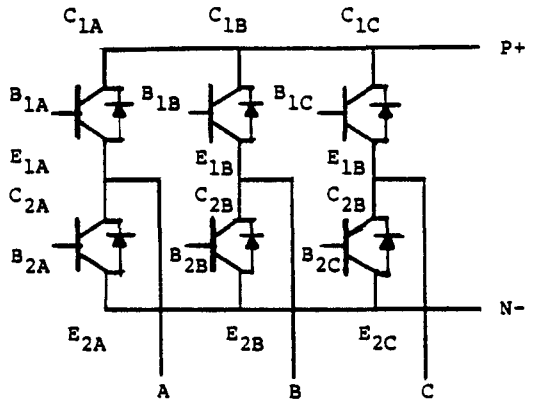
Measure the resistance across the module terminals with a volt-ohm meter. Set the meter to the X1 range. The measured resistance should be within the reference values listed in Table 19.

Table 19. Transistor Module Resistances

+ ON	- ON	NORMAL READING (OHMS)	ABNORMAL READING (OHMS)
P	A		
P	B	GREATER	
P	C		Ø
A	N	THAN	
B	N		
C	N	5ØK	
A	P		
B	P		Ø
C	P	1Ø TØ 5Ø	
N	A		OR
N	B		
N	C		INF

+ ON	- ON	NORMAL READING (OHMS)	ABNORMAL READING (OHMS)
B1A	A		
B1B	B		GREATER
B1C	C	1Ø TO 5Ø	
B2A	N		THAN
B2B	N		
B2C	N		1ØK
A	B1A		
B	B1B	2ØØ	Ø
C	B1C	TO	
N	B2A	5K	OR
N	B2B		
N	B2C		INF

RESISTANCE TEST FOR 3Ø TRANSISTOR MODULES



VOM RESISTANCE SCALE RX1
+ IS THE POSITIVE POLARITY LEAD*
- IS THE NEGATIVE POLARITY LEAD

*THE VOM RED LEAD IS NOT NECESSARILY THE POSITIVE POTENTIAL IN THE RESISTANCE MODE. FOR THESE TESTS THE + LEAD REFERS TO THE POSITIVE POTENTIAL. MAKE SURE YOU KNOW WHICH POLARITY YOU HAVE ON YOUR VOM.

APPENDIX 5. SPARE PARTS

Louis Allis recommends the customer stock on-site spare parts to minimize costly down time. Table 2Ø lists parts which have a high probability of needing replacement.

Table Entry

XXXXXXX	- Item Model Number
XXXXXXXX	- Part Number
X	- Qty in Converter

Table 2Ø. Recommended Spart Parts

Section A. Wall-Mount Units			
23ØV		**46ØV**	
HP	**DC BUS FUSE**	**HP**	**DC BUS FUSE**
15	CR2L-75 FUØØØ747 1	.5, 1 3, 5	8ØLF-15 FUØØØ76Ø 1
2Ø, 25	CR2L-1ØØ FUØØØ748 1	7.5, 1Ø	8ØLF-25 FUØØØ761 1
3Ø	CR2L-125 FUØØØ749 1	15, 2Ø, 25	8ØLF-5Ø FUØØØ762 1
4Ø	CR2L-15Ø FUØØØ75Ø 1	3Ø, 4Ø	CR6L-75 FUØØØ757 1
5Ø	CR2L-2ØØ FUØØØ751 1	5Ø	CR6L-1ØØ FUØØØ758 1
6Ø	CR2L-26Ø FUØØØ752 1	6Ø, 75	CR6L-15Ø FUØØØ756 1
75	CR2L-3ØØ FUØØØ753 1	1ØØ	CR6L-2ØØ FUØØØ755 1
-	-	15Ø	CR6L-3ØØ FUØØØ754 1

Table 20. Recommended Spart Parts (Continued)

Section B. 460V Floor Standing			
HP	INPUT POWER FUSE	DC BUS FUSE	FAN FUSE
200	CS5F-600 FU000616 2	CS10F-350 FU000789 1	FCF-2 FU000597 2
250, 300	CS5F-600 FU000616 2	CS10F-500 FU000680 1	FCF-2 FU000597 2
350 400 450	CS5F-800 FU000687 2	CS10F-800-P FU000804 1	
500, 600	CS5F-1000-P FU000802 2	CS10F-1000-P FU000801 1	

HVAC ADDENDUM
to
Reference Manual 4Y-5

LANCER GPD 602

1. INTRODUCTION

The following information and instructions are provided as a supplement to the standard Lancer GPD 602 Reference Manual 4Y-5. This addendum addresses those items which are unique to this drive system, specifically: a general description and adjustment procedure associated with the power conversion unit, optional printed circuit boards, and system logic; system logic control modes and detailed sequence of operation.

It is essential that the person who inspects, operates, and maintains the drive, thoroughly reads and understands Reference Manual 4Y-5 and this supplement.

Customer _____

LA Order No. _____

MagneTek Louis Allis Drives & Systems

2. DESCRIPTION

The Lancer GPD 602 drive system consists of the items checked in the following paragraphs.

2.1 Power Conversion Unit (1EA)

___ The Lancer GPD 602 is a standard _____ V, _____ HP unit. Refer to the reference manual and instruction sheet 02Y00025-0247 for all adjustments associated with the basic drive.

___ This unit contains a special EPROM IC (31ic). Its use required that certain internal drive switch settings be factory set. They SHOULD NOT BE CHANGED BY THE USER.

FACTORY SETTINGS	
SW	POS
1S	1
2S	3
3S	F
4S	F

Note: These settings take precedence over settings identified in Reference Manual 4Y-5.

All other switches are set as described in Reference Manual 4Y-5 and may be re-set as dictated by the users application.

2.2 Optional Printed Circuit Boards

___ 3-15 PSIG Follower PCB. This board accepts a 3-15 PSIG pneumatic speed signal from the customer process controller and converts it to a 0-11.54 VDC reference signal suitable for input to the drive. Customer connection to the drive is accomplished with a 1/4-NPT male connector (not supplied).

2.3 System Logic

2.3.1 Power Components

___ a. Input circuit breaker (1CB) connects/disconnects 3-phase power to the drive, system logic control transformer, and line (bypass) contactor 1ML.

___ b. Input contactor (2MV) connects/disconnects 3-phase power to the drive. 2MV is ALWAYS ENERGIZED.

CAUTION

2MV IS ENERGIZED WHENEVER INPUT POWER IS PRESENT. ALWAYS DISCONNECT INPUT POWER BEFORE REMOVING UNIT FRONT COVER. OTHERWISE EQUIPMENT DAMAGE OR PERSONNEL INJURY MAY OCCUR.

2.3.1 Power Components (Continued)

___ c. Output contactor (1MV) connects/disconnects 3-phase variable voltage and frequency to the motor. 1MV is energized with 2SS in INVERTER and 1SS in either MAN or AUTO. It is de-energized with 2SS in LINE or with 1SS in OFF, or following a drive/motor fault. It is electrically interlocked with 1ML.

___ d. The line (bypass) contactor (1ML) connects/disconnects fixed 3-phase at 60HZ to the motor. 1ML is energized with 2SS in LINE and 1SS in either MAN or AUTO. It is de-energized with 2SS in INVERTER or with 1SS in OFF, or following a motor fault, It is electrically interlocked with 1MV.

2.3.2 Control Components

a. Operators

___ 1) The INVERTER FAULT/RESET (1PBL) push button located on the outer enclosure door may be used to manually reset the drive following an inverter fault.

___ 2) The MOTOR FAULT/RESET (2PBL) push button located on the enclosure door is used to manually reset the motor fault circuit (1CR) following a motor fault such as overload or overtemperature.

___ 3) The system mode select MAN-OFF-AUTO switch (1SS) selects the system mode of operation. With 1SS in MAN, motor will run in either the Variable or Constant Speed mode. With 1SS in OFF, the motor will not run. With 1SS in AUTO, motor will run in either the Variable or Constant Speed mode following closure of customer Auto Mode Start/Stop contact.

___ 4) Motor operating on INVERTER-LINE switch (2SS) selects which source the motor will operate from. With 2SS in INVERTER, the motor will operate variable speed controlled by the MANUAL SPEED pot, FREQ. ADJ. pot, or 3-15 PSIG control signal. With 2SS in LINE, the motor will operate constant speed.

___ 5) MANUAL SPEED pot (1RH) controls motor speed with the system in the Manual-Variable Speed mode of operation (1SS in MAN, 2SS in INVERTER).

b. Indicators

1) Lights

___ a) POWER ON (1PL) illuminates white indicating presence of 115 VAC control power to the system logic.

___ b) INVERTER FAULT (1PBL) illuminates red for a drive fault.

___ c) MOTOR FAULT (2PBL) illuminates red for a motor fault.

1) Lights (Continued)

___ d) MOTOR CONSTANT (2PL) illuminates green when the motor is operating across the line.

___ e) MOTOR VARIABLE (3PL) illuminates green when the motor is operating on the drive.

2) Meters

___ a) MOTOR CURRENT (1AM) is calibrated in AAC, and indicates motor current in both Variable and Constant Speed modes of operation.

___ b) % SPEED (1TVM) is calibrated in percent, and indicates motor speed in both Manual and Auto-Variable Speed modes of operation.

___ c) LINE VOLTAGE (1VM) is calibrated in VAC, and indicates input voltage.

___ d) ELAPSED TIME METER (ETM) is calibrated in tenths of an hour, and indicates operating time of the motor.

c. Special Relay Functions

___ 1) Automatic restart following a power outage is provided by the Auto Restart (1TR) electronic timing relay, which is factory adjusted to energize 1 second after reapplication of power. A normally closed 1TR contact, in parallel with the RESET push button, performs this function. Once 1TR energizes, the normally closed contact opens, which returns manual reset capability to the motor fault circuitry.

___ 2) Speed Search (2TR) is an electronic timing relay set for 3 seconds. It enables starting the drive into a spinning motor when switching from constant speed to variable speed.

___ 3) Motor Overload Relay (1OL) provides motor protection under running and stall overloads. When a motor overload occurs, MOTOR FAULT light illuminates red. It is resettable by pressing the RESET push button.

3. OPERATION

Table 1 lists available control modes. In the paragraphs that follow, the sequence of operation in each mode is described in detail.

Table 1. Operating Modes

MODE OF OPERATION	1SS SETTING	2SS SETTING	START/STOP CONTROL	SPEED REFERENCE	SEQUENCE OF OPERATION PARAGRAPH
MAN-VARIABLE SPEED	MAN	INVERTER	1SS	MANUAL SPEED 1RH	3.1.1
MAN-CONSTANT SPEED	MAN	LINE	1SS	N/A	3.1.2
AUTO-VARIABLE SPEED	AUTO	INVERTER	1SS & Customer Auto Mode Start/Stop	3-15 PSIG, or 4-20mA Signal	3.1.3
AUTO-CONSTANT SPEED	AUTO	LINE	1SS & Customer Auto Mode Start/Stop	N/A	3.1.4

3.1 Operator Initiated

3.1.1 Manual-Variable Speed Operation

a. Start the DRIVE/motor by turning 1SS to MAN with 2SS in INVERTER position. Motor will accelerate to set speed on the drive.

b. The MANUAL SPEED pot (1RH) or FREQ. ADJ. pot controls motor speed; adjust as required.

c. Stop the drive/motor by turning 1SS to OFF. Motor will decelerate (ramp) to stop under drive control.

3.1.2 Manual-Constant Speed Operation

a. Start the motor by turning 1SS to MAN and 2SS to LINE. Motor will accelerate to full speed across the line.

b. Stop the motor by turning 1SS to OFF. Motor will coast-to-stop.

3.1.3 Automatic-Variable Speed Operation

a. Start drive/motor by turning 1SS to AUTO, 2SS to INVERTER and closing customer Auto Mode Start/Stop contact. Motor will accelerate to set speed on the drive.

b. The 3-15 PSIG or 4-20mA customer signal dictates the motor speed.

c. Stop drive/motor by turning 1SS to OFF, or opening Auto Mode Start/Stop contact. Motor will decelerate (ramp) to stop under drive control.

3.1.4 Automatic-Constant Speed Operation

a. Start the motor by turning 1SS to AUTO, 2SS to LINE, and closing customer Auto Mode Start/Stop contact. Motor will accelerate to full speed across the line.

b. Stop the motor by turning 1SS to OFF, or opening Auto Mode Start/Stop contact. Motor will coast-to-stop.

3.2 Initiated By Interruption Of Power

Normally closed 1TR contact in parallel with RESET push button (2PBL) provides automatic restart following reapplication of power.

3.3 Fault Initiated

3.3.1 Drive Fault

Motor will coast-to-stop on a drive fault -- overcurrent (OC), overload (OL), DC Bus over-voltage (OV), input under-voltage (UV) or heat sink overtemperature (E). General drive fault indication is provided by the red INVERTER FAULT (1PBL) light. Two LEDs on the Lancer GPD 602 provide individual annunciation (see Section 7 of the reference manual). To reset, momentarily press the INVERTER RESET PB (2PB).

3.3.2 Motor Fault

Motor will decelerate (ramp) to stop under drive control on motor fault -- opening of motor winding temperature actuated switch (if provided) or thermal overload relay contact 10L. General motor fault indication is provided by MOTOR FAULT (2PBL, RED) light. To reset, following TAS/OL contact reclosure, momentarily press RESET push button (2PBL).

4. ADJUSTMENTS

4.1 Lancer GPD 602

Refer to the reference manual and instruction sheet 02Y00025-0247 for all adjustments associated with the unit.

When the power is on, high voltage is applied to the Main Control printed circuit board.

Prior to connecting and disconnecting test equipment, follow the steps listed below.

a. Disconnect all input power.

b. Wait at least 5 minutes.

c. Remove the front cover of the drive and check that the CHARGE LED is OFF.

CAUTION

THE "CHARGE" LED BEING ILLUMINATED IMPLIES THAT HAZARDOUS DC BUS CAP POTENTIAL STILL EXISTS. AS AN ADDED SAFETY MEASURE, AFTER THE "CHARGE" LED EXTINGUISHES, VERIFY THAT THERE IS NO LONGER A CHARGE BY MEASURING THE POTENTIAL ACROSS CAPACITOR C1 WITH A VOLTMETER.

4.2 Optional Printed Circuit Boards

3-15 PSIG Follower PCB - The ZERO pot is factory set for 1.5HZ output from the drive with a process control signal of 3PSIG. SPAN is set for 60HZ output with a reference input of 15PSIG. Because ZERO and SPAN interact, several adjustments are required when resetting these pots.

Power and control products including Solid State starters, Eddy Current drives, DC drives and Adjustable Frequency drives

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