TOSHIBA

40 TO 200 KVA SUPPLEMENT

FOR THE 1.5 TO 33KVA

INSTRUCTION

AND

MAINTENANCE

MANUAL

VT130G1 TRANSISTOR INVERTER

40 TO 200KVA
(40 TO 200HP)
460 VOLT
3 PHASE

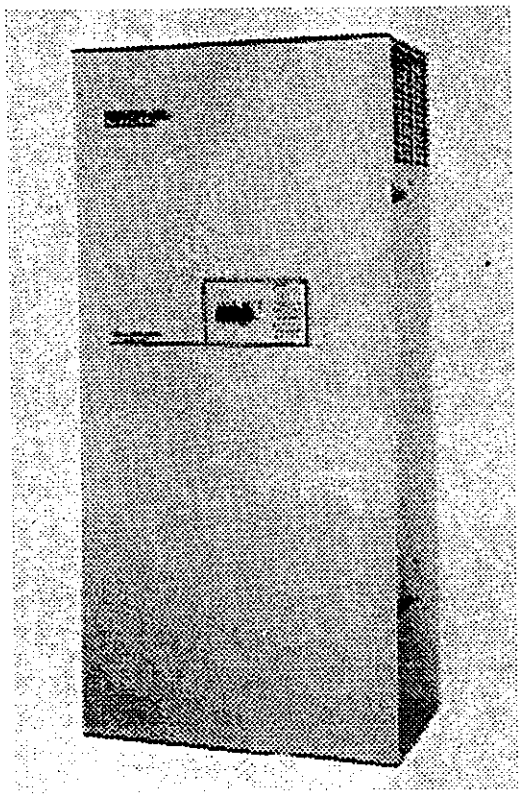
November, 1989
Part # 31755
Rev. 2

Requesting After Sales Service

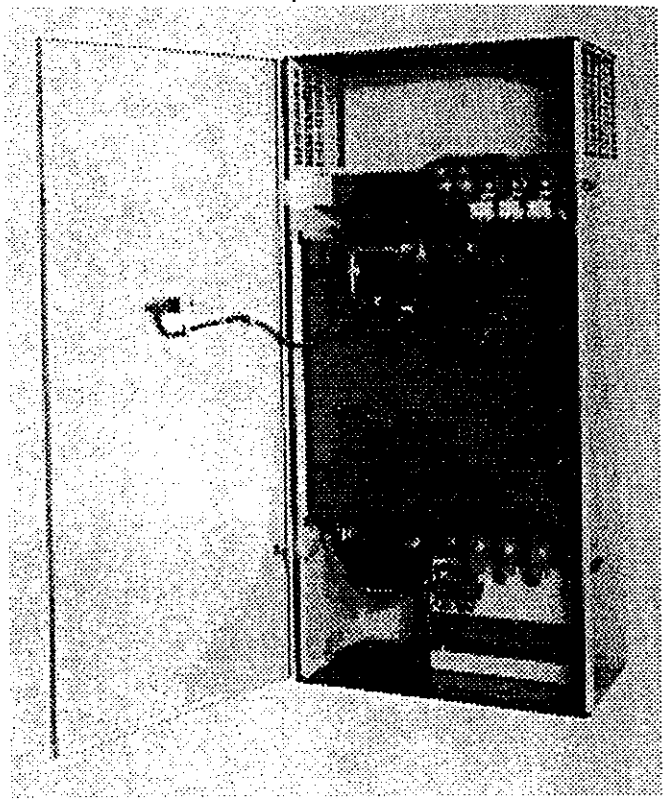
When requesting after-sales service, report the contents of the following PROBLEM INFORMATION SHEET, which will help us repair the system quickly.

Problem Information Sheet

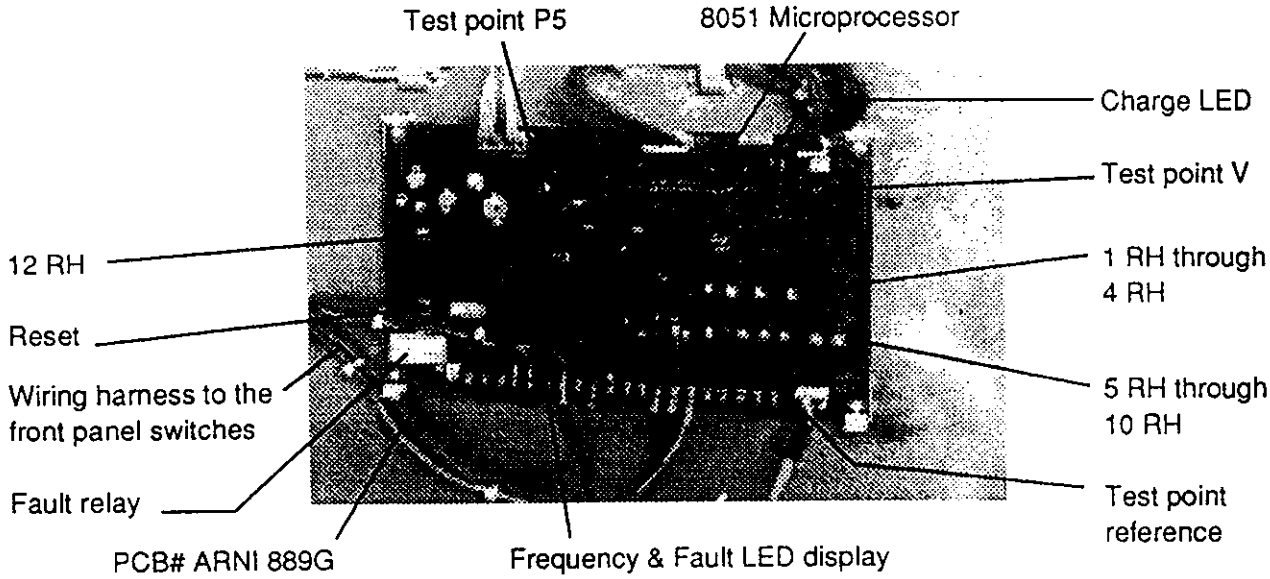
Item		
Refer to	Customer's name	
	Person in charge	
	Address	
	Telephone No.	
Inverter spec.	Model No.	
	Serial No.	
	Test No.	
Delivery date		
Time in service		
Date when problem arose		
Status of Use	Use	
	Motor rating	Poles, Hp, V, Hz.
		Made by Toshiba? Made by another company?
		New? Number of units?
		(Alternate? Continuous?)
	Ambient condition	Indoor? Outdoor? Temperature range?
		Humidity:
		Dust composition and size:
		Presence of salt and extent of corrosion from it:
		Vibrations, in micrometers:
		Presence of corrosive gas:
		Availability of air conditioning:
Phenomenon	Power source	Number of phases:
		Voltage between L1 phase and L2 phase:
		Voltage between L2 phase and L3 phase:
		Voltage between L3 phase and L1 phase:
		Number of Hz:
	State of motor when problem was found	1. Problem occurred hours after motor had been started. Motor has been stopped for hours.
		2. Problem occurred during periodic inspection?
		Problem occurred when motor was started?
		Problem occurred during acceleration?
		Problem occurred during deceleration?
		Problem occurred while motor was not running?
	Frequency of problem	First time? Problem occurred times in the past.
		Problem occurs sometimes?
		Problem occurs every time motor is operated?
		When did problem first occur?
	Trouble indicator	☐ Does not light Light ☐OC ☐OP ☐UP ☐OH
Detailed description of problem		
Temporary diagnosis and corrective action:		
Date defective product shipped:		To:
Deadline for repairs:		



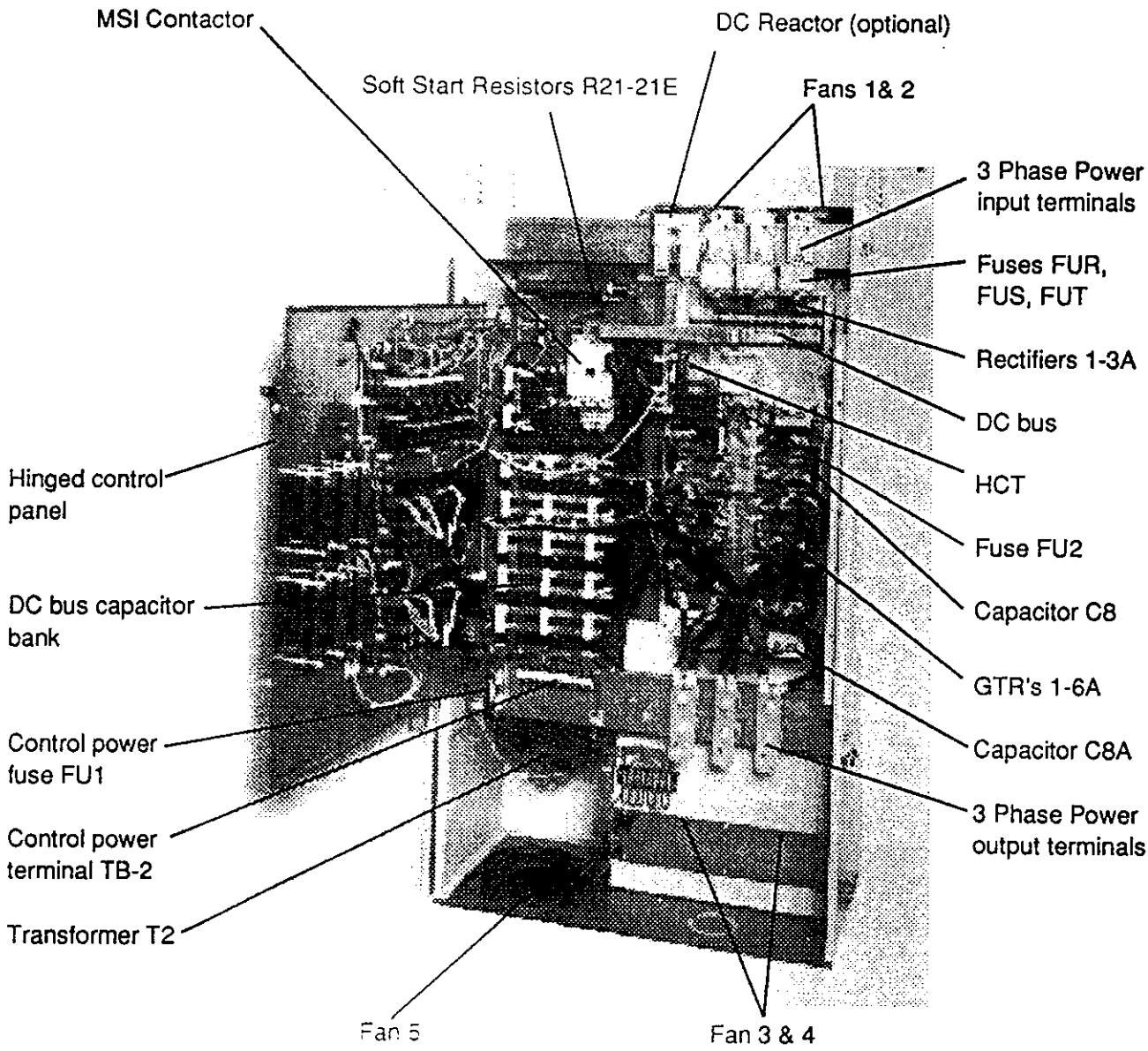
(a) Front view of the VT 130G1 series 150 KVA inverter.



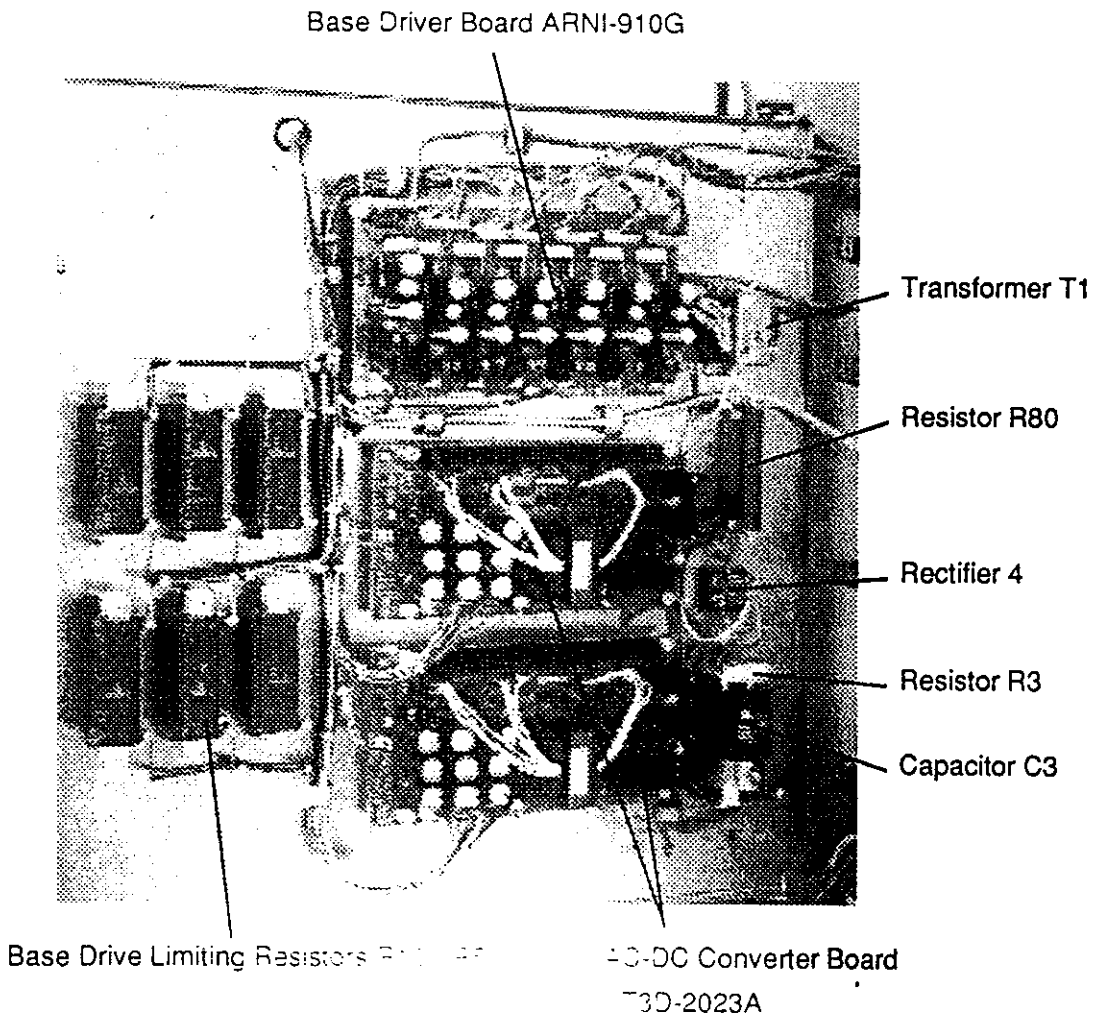
(b) Front view of the VT 130G1 series 150 KVA inverter with the front door open exposing the hinged control panel and the control board.



(c) View of the control circuit on the control panel of the VT 130G1 150 KVA inverter. This view shows the major components, the location of the test points and the variable resistors. This view is typical for the 125 & 200 KVA inverters.



(d) Typical internal view of the 125 through 200 KVA VT 130G1 series inverter showing major components.



(e) Typical 125 through [illegible] Panel (Rear View)

SECTION 2
STANDARD SPECIFICATIONS

The standard specifications are shown in Table 1A. If there are any special specifications with your order, they will be described separately.

TABLE 1A STANDARD SPECIFICATIONS (G1 SERIES)

Model (VT130G1-	Applicable Motor Power (HP) MAX.	Rated KVA	Rated Current (A)	Max. Motor KW (4 pole)	Weight (pounds)
4015	1	1.5	2.5	0.75	18
4025	2	2.5	3.7	1.5	18
4035	3	3.5	5	2.2	18
4055	5	5.5	8	3.7	20
4080	7.5	8	11	5.5	33
4110	10	11	15	7.5	35.5
4160	15	16	22	11	42
4220	20	22	30	15	92
4270	25	27	38	18.5	97
4330	30	33	45	22	106
4400	40	40	55	30	125
4500	50	50	69	37	125
4600	60	60	83	45	165
4750	75	75	104	55	169
4100K	100	100	138	75	176
412K	125	125	172	125	400
415K	150	150	206	150	405
420K	200	200	275	200	435

TABLE 1A (CONTINUED)

POWER SUPPLY	VOLTAGE/FREQUENCY	3-Phase, 460V, 60HZ
	ALLOWABLE VARIATION	Voltage ± 10% frequency ± 2HZ
CONTROL SPECIFI-CATIONS	CONTROL SYSTEM	Sinusoidal wave PWM control
	INPUT VOLTAGE	3-Phase, 460, 415, 380VAC
	OUTPUT VOLTAGE	3-Phase, 460V (maximum)
	FREQUENCY ACCURACY	± 0.5% of highest frequency (at 25°C ± 10°C)
	VOLTAGE/FREQUENCY RATIO	0.5 to 60HZ: V/F constant 60 to 80HZ: V constant
	OVERLOAD CAPACITY	150% for 60 seconds; 110% continuous < 100KVA 130% for 30 seconds; 110% continuous ≥ 100KVA
	SPEED REFERENCE	0 to 12 VDC or 4 to 20 mA
	ACCELERATION/ DECELERATION TIME	6 to 60 seconds (acceleration and deceleration individually adjustable)
	IR COMPENSATION	IR compensation standard (125-200KVA)
OPERATING FUNCTION	BRAKING	By capacitor charge
	STARTING	By dry contact (maintained)
	FORWARD, REVERSE	Reversing can be added using a dry contact or switch
	UPPER AND LOWER SPEED LIMITS	Upper and lower speed limits are adjustable

TABLE 2 STANDARD WIRE SIZE

INVERTER	WIRE SIZE MAIN POWER INPUT AND MOTOR OUTPUT	WIRE SIZE CONTROL POWER SUPPLY 460V	WIRE SIZE SPEED REFERENCE FREQ/AMMETER	WIRE SIZE OTHER CONTROL CIRCUITS
MODEL	AWG	AWG	AWG	AWG
VT130G1-4015	# 14	# 14	3-WIRE SHIELDED CABLE (SPEED REFERENCE)	# 18
-4025				
-4035				
-4055				
-4080				
-4110	# 12			
-4160	# 10			
-4220	# 8			
-4270				
-4330				
-4400	# 6		2-WIRE SHIELDED CABLE (METERS)	
-4500	# 4			
-4600	# 2			
-4750			# 20	
-4100K	1/0			
-412K	2/0			
-415K	4/0			
-420K	300 MCM			

* Wire sizing is based upon NEC Table 310-16 using 75°C cable, an ambient of 30°C and cable runs less than 500 ft.

* For cable runs greater than 500 ft, consult the factory before installing.

* * Use of CT down to 3A necessary, consult the factory.

TABLE 3 INVERTER RATING AND SWITCH GEAR CHART

INVERTER		APPLICABLE MOTOR	MOLDED CASE CIRCUIT BREAKER (MCCB) SIEMENS	MOLDED CASE CIRCUIT BREAKER (MCCB) WESTINGHOUSE	ELECTRO-MAGNETIC CONTACTOR (MC)	OVERLOAD RELAY TH-RY
MODEL	RATED KVA	OUTPUT HP/KW	MODEL NO.	MODEL NO.	MODEL NO.	MODEL NO.
VT130G1-4015	1.5	1/0.75	E63A003	MCP 0358R	3TF20	R-20E-1.8
-4025	2.5	2/1.5	E63A005			R-20E-3.6
-4035	3.5	3/2.2	E63A010	MCP 03150R		R-20E-4.2
-4055	5.5	5/3.7				R-20E-6.6
-4080	8	7.5/5.5	E63A025		3TF46	R-20E-11
-4110	11	10/7.5		MCP 13300R		R-35E-15
-4160	16	15/11	E63A040			R-35E-22
-4220	22	20/15		MCP 23480R		R-35E-28
-4270	27	25/18.5	E63A050			R-35E-35
-4330	33	30/22		MCP 331000R		R-65E-43
-4400	40	40/30	E63A100		3TF47	R-65E-60
-4500	50	50/37			3TF48	R-80E-57
-4600	60	60/45		MCP 431800R		R-80E-70
-4750	75	75/55	FX63A150		C-180E	R-150E-85
-4100K	100	100/75	FX63A250			R-150E-108
-412K	125	125/90	FXD63A250	MCP 532500R		* *
-415K	150	150/110			C-250E	* *
-420K	200	200/150	JXD63A400	MCP 53400		* *

TABLE 4. Description of Variable (RH) Resistors on 40 thru 100KVA Control PCB

RH No.	Symbol	Adjustment Function	When the RH is Turned Clockwise	Adjustment At Shipment	Remarks
1RH	FM	Remote frequency meter calibration	Sweep of the frequency meter increases		
2RH	FRQ	Output frequency adjustment	Output frequency decreases	60 Hz	
3RH	V-BS	Output voltage bias (Voltage boost)	Minimum output voltage increases	-	
4RH	V-GN	Output voltage gain	V/F ratio decreases	100%	
5RH	I-BS	Current input bias	Output V and F increase	0%	4 mA input
6RH	I-GN	Current input gain	Output gain decreases	100%	20 mA input
7RH	ACC	Acceleration time adjustment	Acceleration time decreases	about 20 sec.	1 ~ about 120 sec.
8RH	DEC	Deceleration time adjustment	Deceleration time decreases	about 20 sec.	1 ~ about 120 sec.
9RH 10RH	UL LL	REF input upper limit REF input lower limit	Limit value increases Limit value increases	60 Hz 0 Hz	
J5		Deceleration time control	When connected, increases decel. time to avoid OP trip	connected	Cut Jumper when using dynamic brake

Note: Do not adjust variable resistors which are not described above.

Adjustments Procedures

The ESP-G1 Built-up Assembly is adjusted for standard 3 to 60 Hz operation. Before re-adjusting, determine if factory adjustment is not satisfactory. If the speed range is not correct for the motor or machine, recalibration is necessary. If inverter stalling or shutdown occurs during normal machine operation, adjustment is necessary. Table 5, page 21 shows a list of adjustments and ranges.

WARNING!

Adjusting the inverter with power on requires special precautions:

All test equipment should be connected and disconnected with POWER OFF.

High voltage exists on the base driver board, all potentiometers should be adjusted with insulated handle screwdrivers.

Grounded test equipment, such as oscilioscopes, may damage the inverter.

Isolate all instruments from ground before using. The D.C. bus remains charged for several minutes after power is removed.

TABLE 4A. Description of Variable (RH) Resistors On 125 Thru 200KVA Control PCB

RH No.	Symbol	Adjustment Function	When the RH is Turned Clockwise	Adjustment At Shipment	Remarks
1RH	FM	Remote frequency meter calibration	Sweep of the frequency meter increases		
2RH	FRQ	Output frequency adjustment	Output frequency decreases	60 Hz	
3RH	V-BS	Output voltage bias (Voltage boost)	Minimum output voltage increases	-	
4RH	V-GN	Output voltage gain	V/F ratio decreases	100%	5VDC @ Test Point V to COM
5RH	I-BS	Current input bias	Output V and F increase	0%	4 mA input
6RH	I-GN	Current input gain	Output gain decreases	100%	20 mA input
7RH	ACC	Acceleration time adjustment	Acceleration time decreases	about 20 sec.	6 ~ 60 sec.
8RH	DEC	Deceleration time adjustment	Deceleration time decreases	about 20 sec.	6 ~ 60 sec.
9RH	UL	REF input upper limit	Limit value increases	60 Hz	
10RH	LL	REF input lower limit	Limit value increases	0 Hz	
12RH	UV	Undervoltage Adjustment	Undervoltage % increase	85%	
J5		Deceleration time control	When connected, increases decel. time to avoid OP trip	connected	Cut Jumper when using dynamic brake

Adjustments Procedures

The ESP-G1 Built-up Assembly is adjusted for standard 60 Hz operation. Before readjusting, determine if factory adjustment is not satisfactory. If the speed range is not correct for the motor or machine, recalibration is necessary. If inverter stalling or shutdown occurs during normal machine operation, adjustment is necessary. Table 5, page 21 shows a list of adjustments and ranges.

WARNING!

Adjusting the inverter with power on requires special precautions:

All test equipment should be connected and disconnected with POWER OFF.

High voltage exists on the base driver board, all potentiometers should be adjusted with insulated handle screwdrivers.

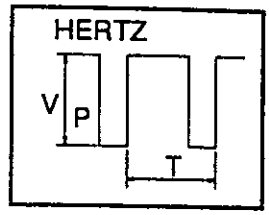
Grounded test equipment, such as oscilloscopes, may damage the inverter.

Isolate all instruments from ground before using. The D.C. bus remains charged for several minutes after power is removed.

Table 5 shows a test sheet that gives test points and voltages at different speeds to aid readjustment. The following describes each test point. Tests should be made with a digital voltmeter (DVM) because many analog multimeters do not have a sufficiently high input impedance.

TABLE 5

DESCRIPTION OF TEST	TEST POINT TO		0 Hz	30Hz	60Hz NO LOAD	60Hz FULL LOAD	RPM 80Hz Max.	TYPE
SPEED REFERENCE	REF	OV	*0 V	6 V	12 V	--	12 V	+VDC
4-20mA INPUT	IRF		2.04 V	5.1 V	8.16 V	8.16 V	10.2 V	+VDC
V	V		0 V	2.5 V	5 V	5 V	6.67 V	+VDC
HERTZ	OF	——	0 ms	.029 ms	0.14 ms	--	.0109 ms	PULSE



SPEED REFERENCE - is measured at the wiper of the speed pot. at the power unit, REF to OV. 12 VDC means maximum output of the inverter.

4 to 20 mA REFERENCE is measured at terminal IRF to OV. Potentiometer 5RH adjusts for zero speed at 4 mA.

Voltage, Frequency REF is measured at test point REF to common. Factory set at the voltages shown in Table 5, potentiometer 9RH can be used to adjust desired maximum output frequency (Speed). The V/Hz ratio stays the same for proper motor operation. Potentiometer 10RH adjusts the minimum frequency (Speed).

V is used to determine the V/Hz ratio. Measured at V test point to common, 5V means maximum output voltage has been reached.

HERTZ - is measured at OF test point. Hertz is a strobe pulse with a frequency 1152 times inverter output frequency. 69120Hz means the inverter is running 60 Hz. (This test point is an open collector and requires a 20K ohm pull up resistor for measurements.)

VOLTAGE BOOST - is a V/Hz adjustment at 3RH. Output voltage at low frequencies is increased for more starting torque.

A procedure is described below for recalibrating the power unit assuming all potentiometers are misadjusted. When using an oscilloscope or frequency counter, the motor does not have to be connected.

1. **Initial Conditions 3RH -** full counter clockwise (C.C.W.), 9RH - full C.W., 10RH - full C.C.W.

2. **Set Maximum Frequency.** Run inverter. Adjust pot. 2RH for *desired* maximum speed with manual speed pot. fully clockwise. Digital frequency meter will show true output hertz.

3. **Calibrate Remote Meter.** Use 1RH pot. to set scale on optional remote meter.

4. **Adjust Volts Per Hertz.** Turn manual speed pot. to 60 Hz. Adjust 4RH pot. for 5 VDC @ test point "V" to Com.

5. **4 to 20 mA Input.** Enable auto mode. Minimum speed at 4 mA can be adjusted with pot. 5RH. Maximum speed at 20 mA can be adjusted with pot. 6RH Pots. 5RH and 6RH interact.

* 0.07 Vdc set at factory on DVM.

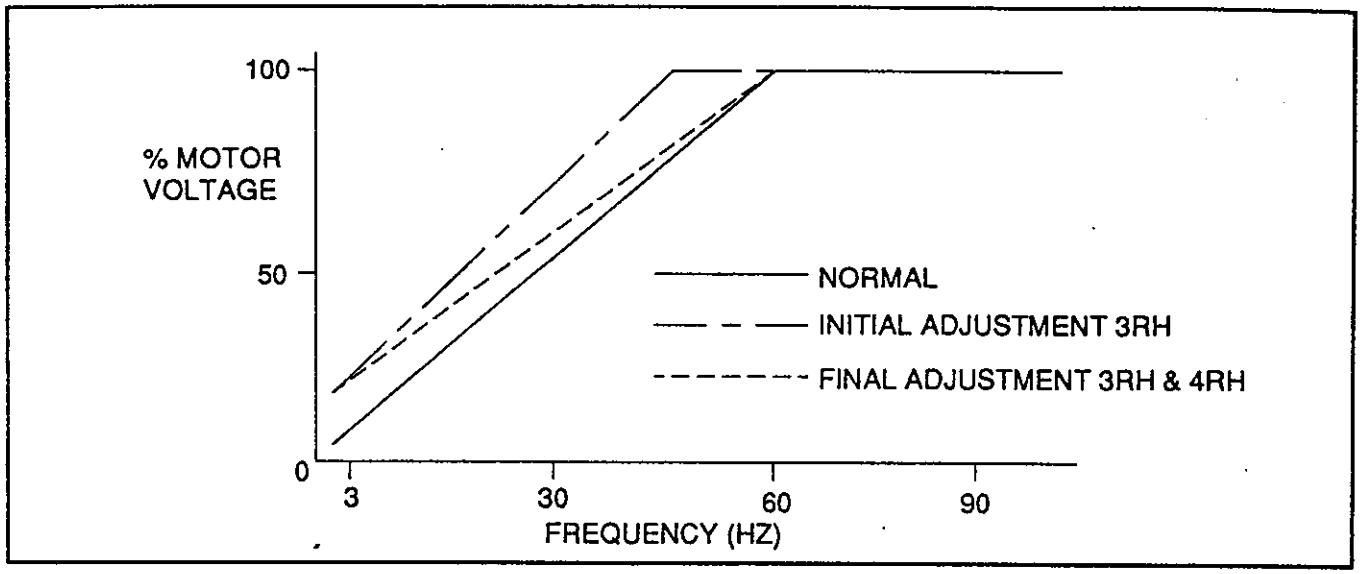


FIGURE 5-3

6. **Upper and Lower Limits** Pot. 10RH adjusts lower limit and will override minimum speed set in step 5. Pot. 9RH adjusts upper limit and will override maximum speeds set in 2 and 5.

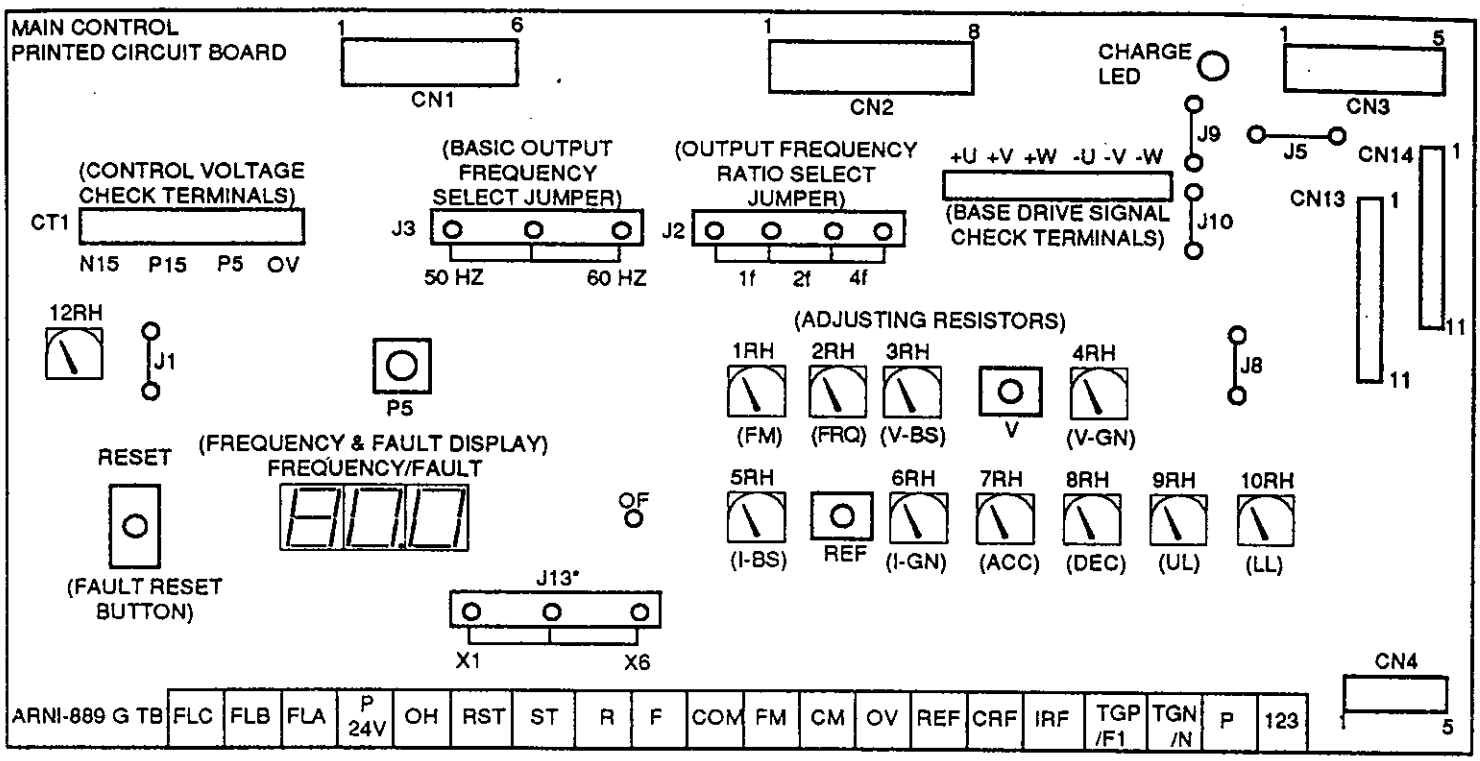
7. **Voltage Boost Pot.** 3RH increases low speed breakaway torque. **Note:** High voltages at low frequency may burn up the motor.

8. **Overvoltage Level** factory set for safe operation. It should never be adjusted.

9. **Check Motor Current** at several different operating speeds after completion of adjustments. Continuous currents above the motor nameplate (rated) current may damage the motor.

Figure 5-4A shows location of terminals, connectors, adjusting resistors, FREQUENCY/FAULT display, test points, charge LED and fault reset button on the 125 thru 200KVA control PCB.

FIGURE 5-4A



Terminal Symbol	Terminal Function
FLC	Signal Common
FLB	"Open" Output is obtained between FLB and FLC during inverter fault
FLA	"Closed" Output is obtained between FLA and FLC during inverter fault
P24V	+ 24 Volts out
OH	Over temperature contact input. OH indication when connected to + 24 V (normally "Open" contact)
RST	Fault reset input. Reset when connected to COM (Normally "open" contact)
ST	Start preparation/command input: start preparation complete when ST connected to COM, then start command complete when F or R is selected
R	Reverse operation input. Reverse operation when connected to ST
F	Forward operation input. Forward operation when connected to ST
COM	Signal common (0 volts)
FM	Remote frequency meter (1 mA meter between FM and OV)
CM	Remote ammeter (1 mA meter between CM and OV with 20K calibration rheostat in series)
OV	Signal common
REF	External frequency reference input (0 - 12 VDC)
CRF	Power supply output to external frequency setting device
IRF	Current loop input (4 - 20 mA between IRF and OV)
TGP/FI	TG feedback signal (TGP - TGN) (option)
TGN/N	Pressure converter output (F1 - N) (option)
P	Pressure converter power supply (option)
123	Pressure converter set point input (option)

* Note: On 125 - 200KVA units, the J13 jumper should be removed and a soldered jumper installed on the X6 post.

SPARE PARTS

It is recommended that the following parts be ordered with the inverter unit in order to reduce system downtime. Rank A signifies parts of high necessity. Rank B signifies parts of relatively low necessity.

RANK A

INVERTER MODEL	FUSE		GTR	
VT-130G1	MODEL	QTY. USED	MODEL	QTY. USED
-4015	A70P20 * (FWP20-20A)	1	MG25M2CK2	3
	KLM-3A	1		
-4025	A70P20 * (FWP20-20A)	1		
-4035	KLM-3A	1	MG25M1BK1(GTR7)	1
-4055	A70P20 * (FWP20-20A)	1	MG25M1BK1(GTR7)	1
	KLM-3A	1	MG50M2CK2	3
-4080	A50P40 * (FWH40) * (50SHA35)	3	MG50M1BK1(GTR7)	1
-4110	A70P40 * (FWP40) * (70SHA35)	1	MG50M2CK2	3
	PC1-3A	1		
-4160	A50P60 * (FWH60) * (50SHA55)	3	MG50M2CK2 (GTR7)	1
	A70P60 * (FWP40) * (70SHA55)	1	MG75M2CK1	3
	PC1-3A	1		
-4220	A50P80 * (FWH80) * (50SHB75)	3	MG75M1BK1 (GTR7)	1
-4270	A70P80 * (FWP40) * (70SHB75)	1	MG150M2CK1	3
	6JX5	1		
-4330	A50P100 * (FWH100) * (50SHB100)	3	MG75M1BK1(GTR7)	1
	A70P100 * (FWP100) * (70SHB100)	1	MG150M2CK1	3
	6JX5	1		
-4400	A50P150 * (FWH150)	3	MG200M1FK1 (GTR7)	1
	A70P150 * (FWP150)	1	** MG300N1FK1 or FK2	6
	6JX5	1		
-4500	A50P150 * (FWH150)	3	MG200M1FK1 (GTR7)	1
	A70P150 * (FWP150)	1	** MG300N1FK1 or FK2	6
	6JX5	1		
-4600	A50P150 * (FWH150)	3	MG200M1FK1 (GTR7)	1
	A70P150 * (FWP200)	1	** MG300N1FK1 or FK2	12
	6JX10	1		
-4750	A50P200 * (FWH200)	3	MG200M1FK1 (GTR7)	1
	A70P200 * (FWP250)	1	** MG300N1FK1 or FK2	12
	6JX10	1		
-4100K	A50P200 * (FWH300)	3	MG200M1FK1 (GTR7)	1
	A70P200 * (FWP300)	1	**MG300N1FK1 or FK2	12
	6JX10	1		
-412K	A050F300	3	MG300N1FK2	12
	A070F350	1		
	6JX10	1		
-415K	6.6-BODK-CA-URB-3ITTC-400	3	MG300N1FK2-F1, H1, I1, J1 or	12
	6.6-BODK-CA-URB-3ITTC-500	1	MG300N1FK2-F, G, H, I, J	
	6JX10	1		
-420K	6.6-BODK-CA-URB-3ITTC-500	3	MG300N1FK2-F1, H1, I1, J1 or	18
	6.6-BODK-CA-URB-3ITTC-630	1	MG300N1FK2-F, G, H, I, J	
	6JX10	1		

NOTE * SUBSTITUTE FUSES

CAUTION

** Do not mix output transistor MG300N1FK1 with MG300N1FK2 in any one output phase.

SPARE PARTS

It is recommended that the following parts be ordered with the inverter unit in order to reduce system downtime. Rank A signifies parts of high necessity. Rank B signifies parts of relatively low necessity.

RANK A

INVERTER MODEL	FUSE		GTR	
VT-130G1	MODEL	QTY. USED	MODEL	QTY. USED
-4015	A70P20 * (FWP20-20A)	1	MG25M2CK2	3
	KLM-3A	1		
-4025	A70P20 * (FWP20-20A)	1		
-4035	KLM-3A	1	MG25M1BK1(GTR7)	1
-4055	A70P20 * (FWP20-20A)	1	MG25M1BK1(GTR7)	1
	KLM-3A	1	MG50M2CK2	3
-4080	A50P40 * (FWH40) * (50SHA35)	3	MG50M1BK1(GTR7)	1
-4110	A70P40 * (FWP40) * (70SHA35)	1	MG50M2CK2	3
	PC1-3A	1		
-4160	A50P60 * (FWH60) * (50SHA55)	3	MG50M2CK2 (GTR7)	1
	A70P60 * (FWP40) * (70SHA55)	1	MG75M2CK1	3
	PC1-3A	1		
-4220	A50P80 * (FWH80) * (50SHB75)	3	MG75M1BK1 (GTR7)	1
-4270	A70P80 * (FWP40) * (70SHB75)	1	MG150M2CK1	3
	6JX5	1		
-4330	A50P100 * (FWH100) * (50SHB100)	3	MG75M1BK1(GTR7)	1
	A70P100 * (FWP100) * (70SHB100)	1	MG150M2CK1	3
	6JX5	1		
-4400	A50P150 * (FWH150)	3	MG200M1FK1 (GTR7)	1
	A70P150 * (FWP150)	1	** MG300N1FK1 or FK2	6
	6JX5	1		
-4500	A50P150 * (FWH150)	3	MG200M1FK1 (GTR7)	1
	A70P150 * (FWP150)	1	** MG300N1FK1 or FK2	6
	6JX5	1		
-4600	A50P150 * (FWH150)	3	MG200M1FK1 (GTR7)	1
	A70P150 * (FWP200)	1	** MG300N1FK1 or FK2	12
	6JX10	1		
-4750	A50P200 * (FWH200)	3	MG200M1FK1 (GTR7)	1
	A70P200 * (FWP250)	1	** MG300N1FK1 or FK2	12
	6JX10	1		
-4100K	A50P200 * (FWH300)	3	MG200M1FK1 (GTR7)	1
	A70P200 * (FWP300)	1	**MG300N1FK1 or FK2	12
	6JX10	1		
-412K	6.6-BODK-CA-URB-3ITTC-400	3	MG300N1FK2-F1, H1, I1, J1 or	12
	6.6-BODK-CA-URB-3ITTC-500	1	MG300N1FK2-F, G, H, I, J	
	6JX5	1		
-415K	6.6-BODK-CA-URB-3ITTC-400	3	MG300N1FK2-F1, H1, I1, J1 or	12
	6.6-BODK-CA-URB-3ITTC-500	1	MG300N1FK2-F, G, H, I, J	
	6JX5	1		
-420K	6.6-BODK-CA-URB-3ITTC-500	3	MG300N1FK2-F1, H1, I1, J1 or	18
	6.6-BODK-CA-URB-3ITTC-630	1	MG300N1FK2-F, G, H, I, J	
	6JX5	1		

NOTE * SUBSTITUTE FUSES

CAUTION

** Do not mix output transistor MG300N1FK1 with MG300N1FK2 in any one output phase.

63A ADDENDUM 1 This sheet should be used to correct errors for the fuses in the VT-130G1-412K Model Inverter and to correct errors for the control fuses in the VT-130G1-415K and the VT130G1-420K Model Inverter.

SPARE PARTS (CONT.)

It is recommended that the following parts be ordered with the inverter unit in order to reduce system downtime. Rank B signifies parts of relatively low necessity.

RANK B

INVERTER MODEL VT-130G1	PRINTED CIRCUIT BOARD				AC-DC CONVERTER	QTY
	CONTROL	QTY	BASE DRIVE	QTY		
-4015	ARNI-889E	1	ARNI-891D	1		
-4025	ARNI-889E	1	ARNI-891D	1		
-4035	ARNI-889E	1	ARNI-891D	1		
-4055	ARNI-889E	1	ARNI-891E	1		
-4080	ARNI-889E	1	ARNI-915C	1		
-4110	ARNI-889E	1	ARNI-915C	1		
-4160	ARNI-889E	1	ARNI-915D	1		
-4220	ARNI-889F	1	ARNI-910C	1		
-4270	ARNI-889F	1	ARNI-910C	1		
-4330	ARNI-889F	1	ARNI-910D	1		
-4400	ARNI-889F	1	ARNI-910D	1		
-4500	ARNI-889F	1	ARNI-910D	1		
-4600	ARNI-889F	1	ARNI-910E	1		
-4750	ARNI-889F	1	ARNI-910E	1		
-4100K	ARNI-889F	1	ARNI-910E	1		
-412K	ARNI-889G	1	ARNI-910G	1	VT3D-2023A	2
-415K	ARNI-889G	1	ARNI-910G	1	VT3D-2023A	2
-420K	ARNI-889G	1	ARNI-910G	1	VT3D-2023A	2

Connection Diagram Notes

DANGER: HAZARD OF ELECTRICAL SHOCK OR BURN
TO AVOID EXPOSURE TURN OFF POWER BEFORE TOUCHING INTERNAL PARTS

WARNING: Failure to wire "EC1" and "EC2" according to factory specifications will result in Non warranty damage to soft charge circuitry.

* 1 Connect earth ground to terminal "E". Use a minimum wire size of 10AWG.

* 2 Control power should be applied between terminals "T1" (AC COM) and "R46" (460V) or "R40" (400V). Check the incoming voltage before connecting power to "R46" or "R40". DO NOT connect to both terminals.

* 3 Connect a surge suppressor in parallel with the coil of the input contactor "MC" (500 ohm 1/4W and 0.1 uf @ 400V).

* 4 The terminals "ST1" and "COM" provide an optional customer interlock. If no customer interlock is required, connect a jumper between "ST1" and "COM". These terminals must be connected before unit will run.

* 5 A 2-conductor shielded cable is recommended for connecting remote control devices. Connect the shield to the grounding terminal "E".

* 6 Ensure "CHARGE" LED is off before performing inspection or maintenance. DC BUS capacitors may retain a charge even after incoming power has been turned off.

The purpose of this supplement is to extend the **1.5 to 33KVA Instruction and Maintenance Manual** up to 200KVA. Follow the Supplement Instructions below.

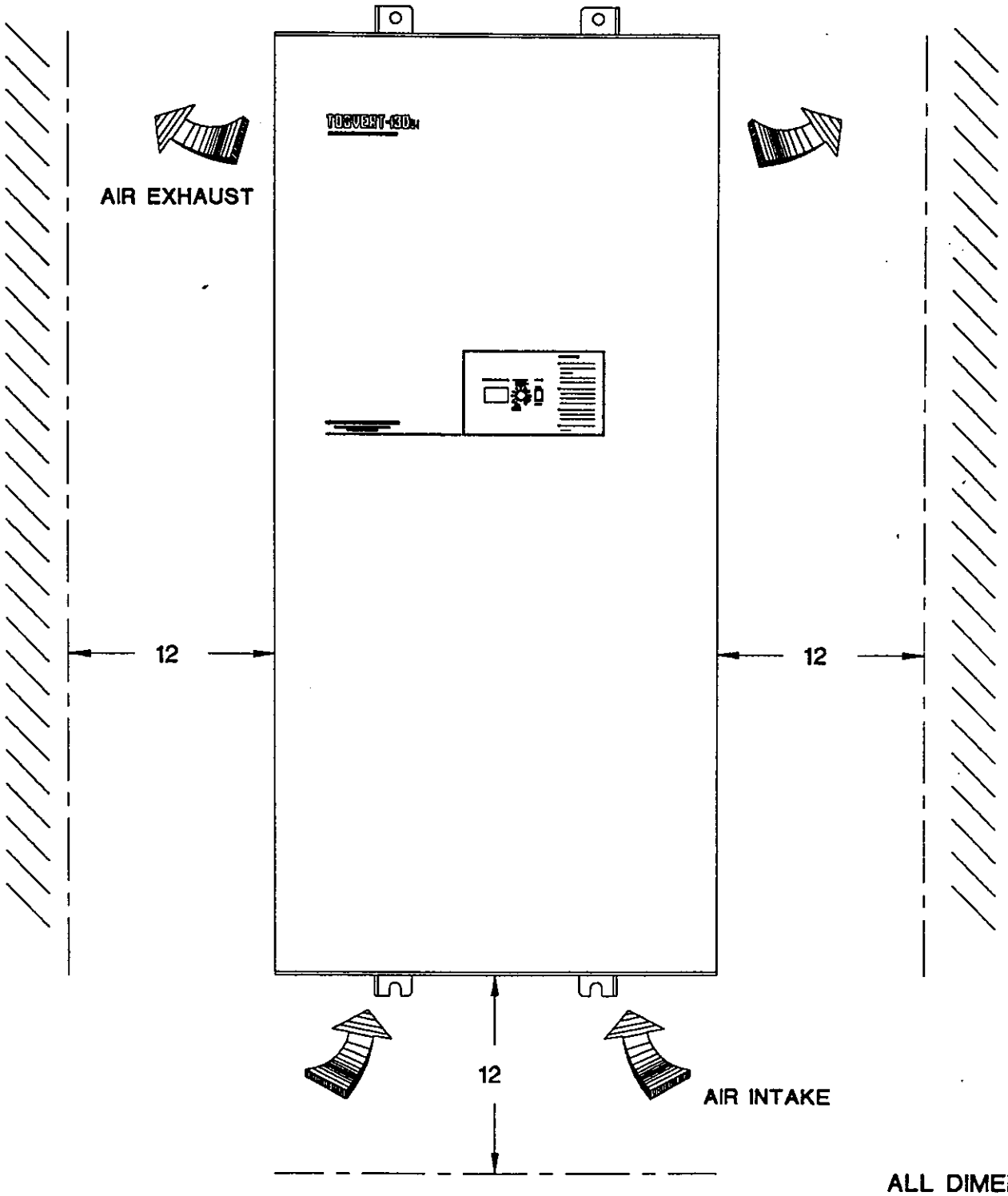
SUPPLEMENT INSTRUCTIONS

	SUPPLEMENT PAGE	REPLACES MANUAL PAGE
WARRANTY REGISTRATION	iii-iv	ADD ONLY
SUPPLEMENT INSTRUCTIONS	v	ADD ONLY
REQUESTING AFTER SALES SERVICE	vi	ADD ONLY
INVERTER PHOTOS	vii-ix	ADD ONLY
STANDARD SPECIFICATIONS	3A-B	3
VENTILATION REQUIREMENTS(125-200KVA)	11A	ADD ONLY
40-100KVA STANDARD CONNECTION DIAGRAM	15A	ADD ONLY
125-200KVA STANDARD CONNECTION DIAGRAM	15B	ADD ONLY
CONNECTION DIAGRAM NOTES	15C	ADD ONLY
INVERTER APPLICATION AND BUILDUP CHART	16A	16
DESCRIPTION OF VARIABLE RESISTOR (RH)	20A	20
DESCRIPTION OF VARIABLE RESISTOR (125 - 200 KVA)	20B	ADD ONLY
SECTION 5	21A	21
SECTION 5	22A	22
MAIN CONTROL PCB LAYOUT(125-200KVA)	24A	ADD ONLY
SPARE PARTS	63A-B	63
MOUNTING DIMENSIONS	*67A	ADD ONLY
ELECTRICAL CONNECTIONS	*67B	ADD ONLY
DYNAMIC BRAKE RESISTOR OUTLINES	69A	69 - 70
EMI NOISE REDUCTION FILTER OUTLINES	71A	71 - 72
COMPONENT LAYOUT(125-200KVA)	153A - D	ADD ONLY
STANDARD ADJUSTMENTS(125-200KVA)	155A	ADD ONLY
SCHEMATICS	*157A	ADD ONLY

* The schematics, mounting dimensions and electrical connections for the 40 to 100KVA inverters are located on pages 143 to 156 of the **1.5 to 33KVA Instruction and Maintenance Manual.**

VENTILATION SPACE REQUIREMENTS

G1 460V 125-200 HP INVERTER



ALL DIMENSIONS ARE IN INCHES

NOTE: ENSURE THAT AIR DRAWN INTO THE INVERTER IS NOT DISCHARGED FROM THE MOTOR.

OUTLINE

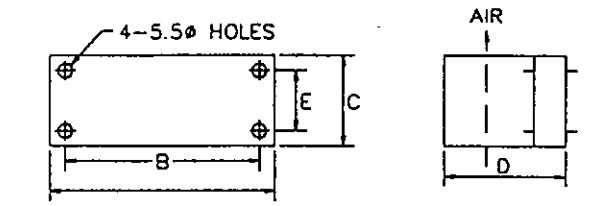


FIG. A

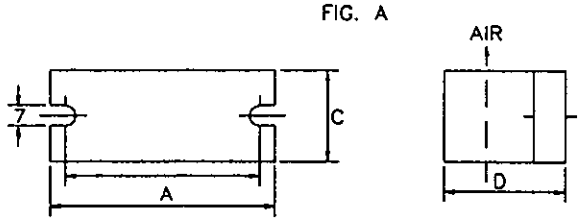


FIG. B

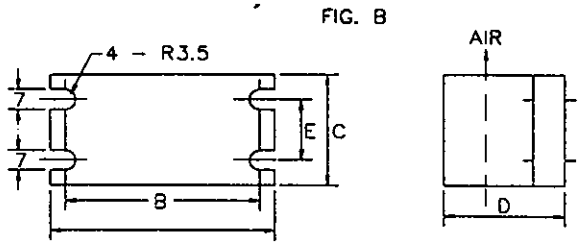
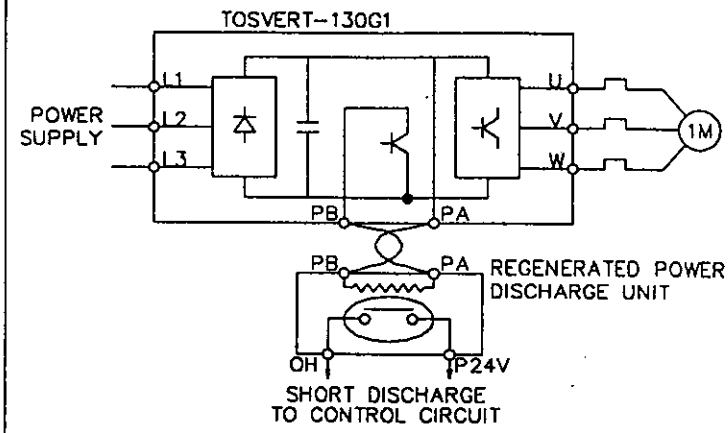


FIG. C

CONNECTION



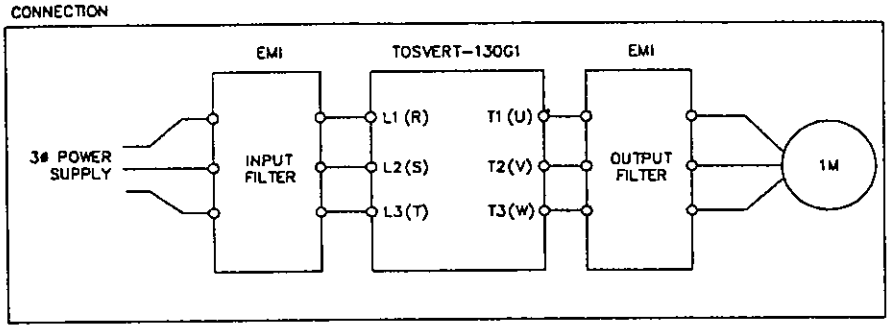
MODELS AND RATINGS

INVERTER MODEL	DYNAMIC BRAKING RES.	CAPACITY RESISTANCE	DIMENSIONS IN (MM) A	B	C	D	E	FIGURE	WEIGHT LBS. (KG)
VT130G1–4015	PBR4020–20	66W–270Ω	9.61 (244)	7.87 (200)	4.13 (105)	4.33 (110)	3.74 (95)	A	5.51 (2.5)
VT130G1–4025									
VT130G1–4035	PBR4055–20	142W–110Ω							
VT130G1–4055									
VT130G1–4080	PBR4110–20	200W–55Ω	12.2 (310)	11.5 (292)	3.94 (100)	3.74 (95)	–	B	5.51 (2.5)
VT130G1–4110									
VT130G1–4160	PBR4160–20	400W–36Ω	12.2 (310)	11.5 (292)	3.94 (100)	6.30 (160)	–	B	8.82 (4.0)
VT130G1–4220	PBR4330–20	1080W–16.7Ω	18.4 (457)	17.4 (443)	7.48 (190)	5.71 (145)	2.76 (70)	C	22.0 (10)
VT130G1–4270									
VT130G1–4330									
VT130G1–4400	PBR4500–20	1440W–10Ω							
VT130G1–4500									
VT130G1–4600	PBR4600–20	1800W–8Ω							
VT130G1–4750	PBR4750–20	2160W–6.6Ω							
VT130G1–4100K	PBR410K–20	2520W–5Ω							
VT130G1–412K									
VT130G1–415K									
VT130G1–420K									

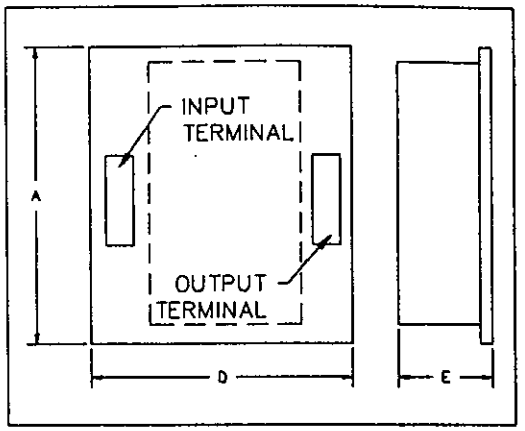
• NOTE: CONSULT THE FACTORY.

NOTE: ALL DIMENSIONS SHOWN ARE ESTIMATED AND THE FACTORY SHOULD BE CONSULTED FOR CERTIFICATION

CONNECTION



OUTLINE



INPUT FILTERS

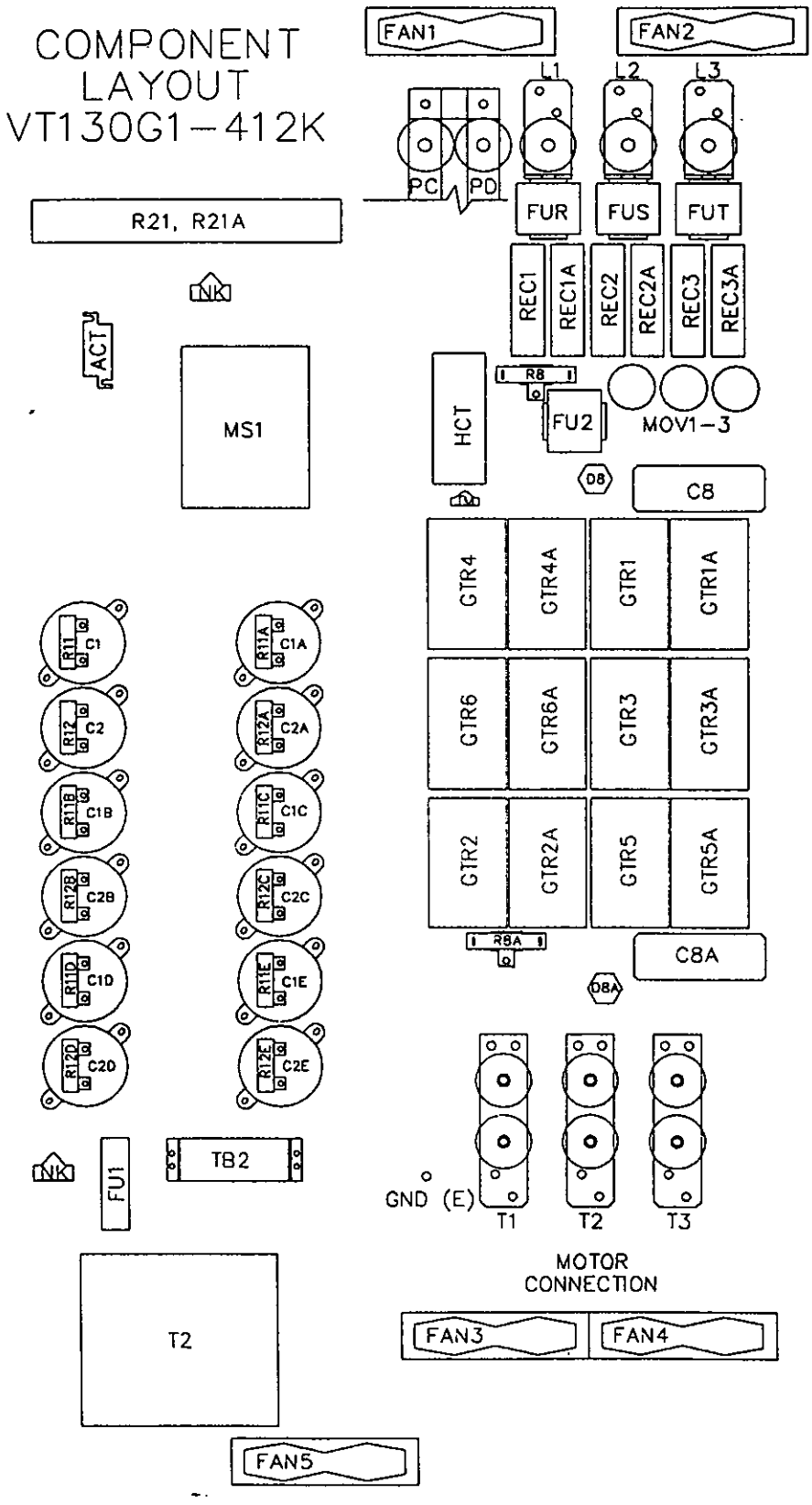
INVERTER MODEL	FILTER MODEL NO.	QTY. OF FILTERS	RATED CURRENT	DIMENSIONS (MM)		
				A	D	E
VT130G1-4015	PR00120P35	1	5A	120	110	45
VT130G1-4025	PR00120P35	1	5A	120	110	45
VT130G1-4035	PR00121P35	1	10A	180	150	65
VT130G1-4055	PR00121P35	1	10A	180	150	65
VT130G1-4080	PR00122P35	1	20A	180	150	65
VT130G1-4110	PR00122P35	1	20A	180	150	65
VT130G1-4160	PR00123P35	1	30A	180	150	65
VT130G1-4220	PR00124P35	1	40A	180	240	80
VT130G1-4270	PR00125P35	1	50A	180	240	80
VT130G1-4330	PR00123P35	2*	60A	180	240	80
VT130G1-4400	PR00124P35	2*	80A	180	150	65
VT130G1-4500	PR00125P35	2*	100A	180	240	80
VT130G1-4600	PR00124P35	3*	120A	180	240	80
VT130G1-4750	PR00125P35	3*	150A	180	240	80
VT130G1-4100K	PR00125P35	4*	200A	180	240	80
VT130G1-412K	NOTE: CONSULT THE FACTORY					
VT130G1-415K						
VT130G1-420K						

OUTPUT FILTERS

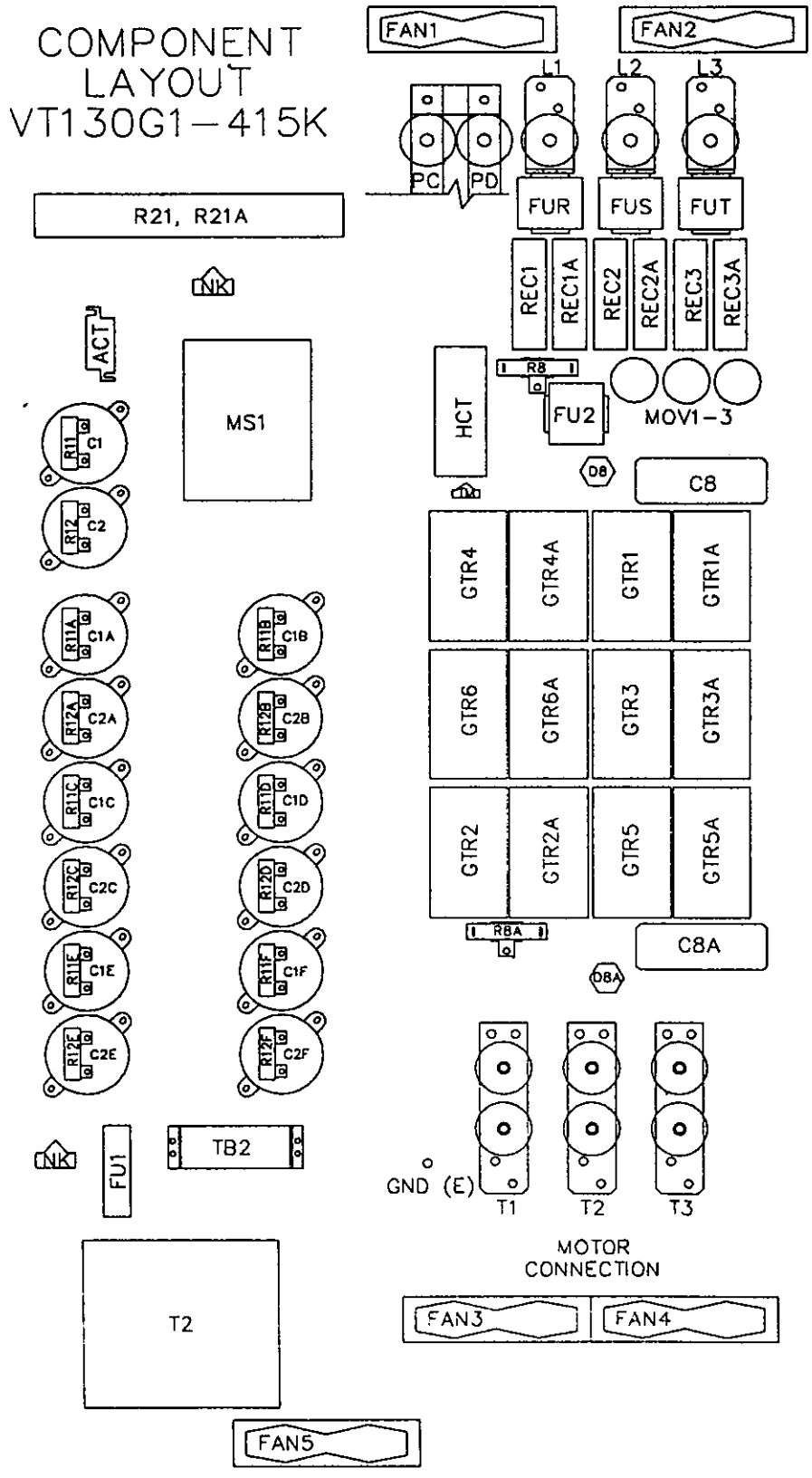
INVERTER MODEL	FILTER MODEL NO.	QTY. OF FILTERS	RATED CURRENT	DIMENSIONS (MM)		
				A	D	E
VT130G1-4015	PR00130P35	1	10A	100	140	45
VT130G1-4025	PR00130P35	1	10A	100	140	45
VT130G1-4035	PR00130P35	1	10A	100	140	45
VT130G1-4055	PR00130P35	1	10A	100	140	45
VT130G1-4080	PR00131P35	1	20A	100	140	45
VT130G1-4110	PR00131P35	1	20A	100	140	45
VT130G1-4160	PR00132P35	1	35A	100	140	45
VT130G1-4220	PR00132P35	1	35A	100	140	45
VT130G1-4270	PR00133P35	1	45A	180	260	65
VT130G1-4330	PR00133P35	1	45A	180	260	65
VT130G1-4400	PR00134P35	1	75A	320	540	240
VT130G1-4500	PR00134P35	1	75A	320	540	240
VT130G1-4600	PR00135P35	1	110A	340	540	270
VT130G1-4750	PR00135P35	1	110A	340	540	270
VT130G1-4100K	PR00134P35	2*	150A	320	540	240
VT130G1-412K	NOTE: CONSULT THE FACTORY					
VT130G1-415K						
VT130G1-420K						

* THESE ITEMS REQUIRE MORE THAN ONE FILTER AND ARE WIRED IN PARALLEL. DIMENSIONS ARE FOR INDIVIDUAL FILTERS.

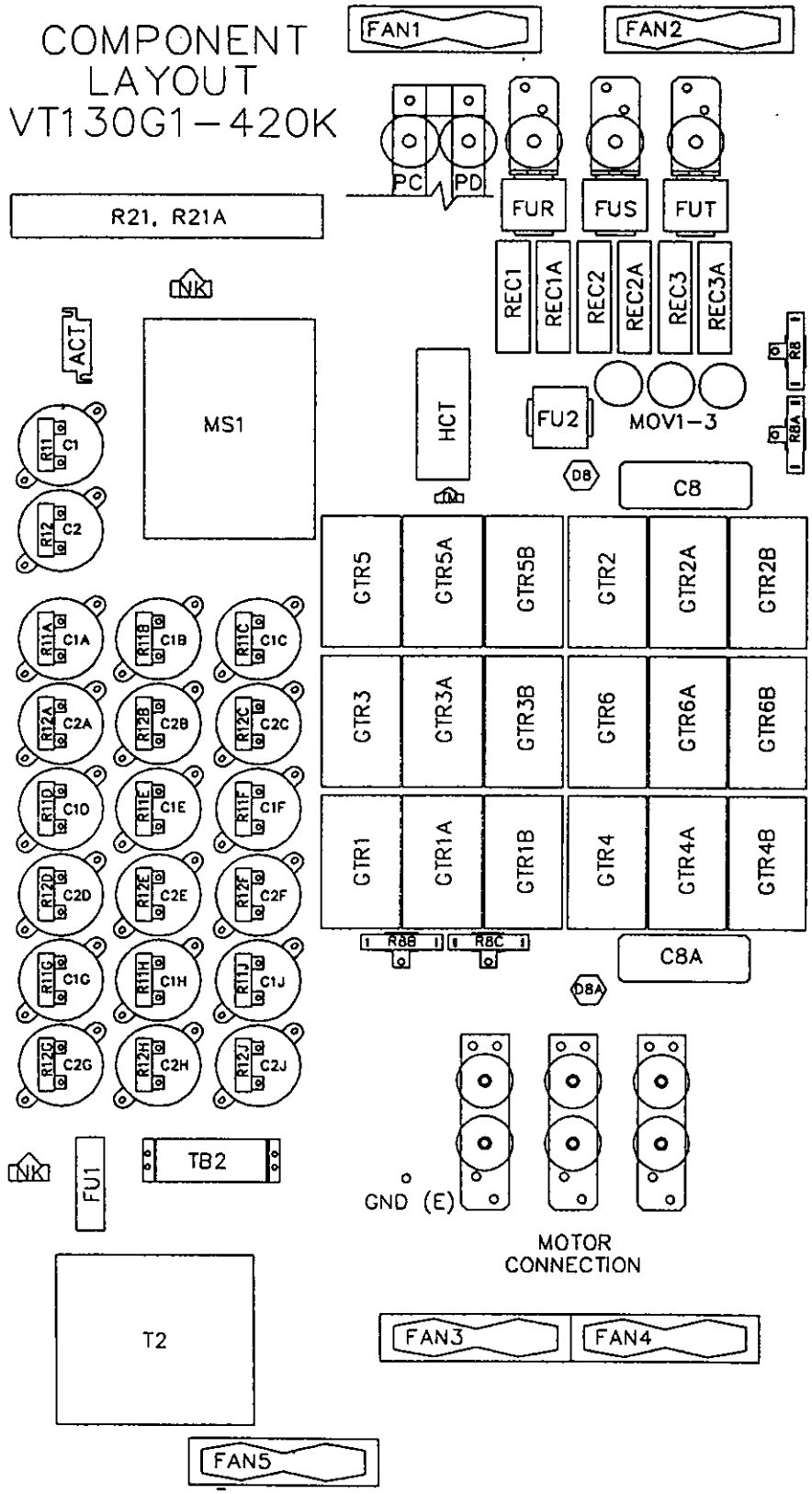
COMPONENT LAYOUT VT130G1-412K



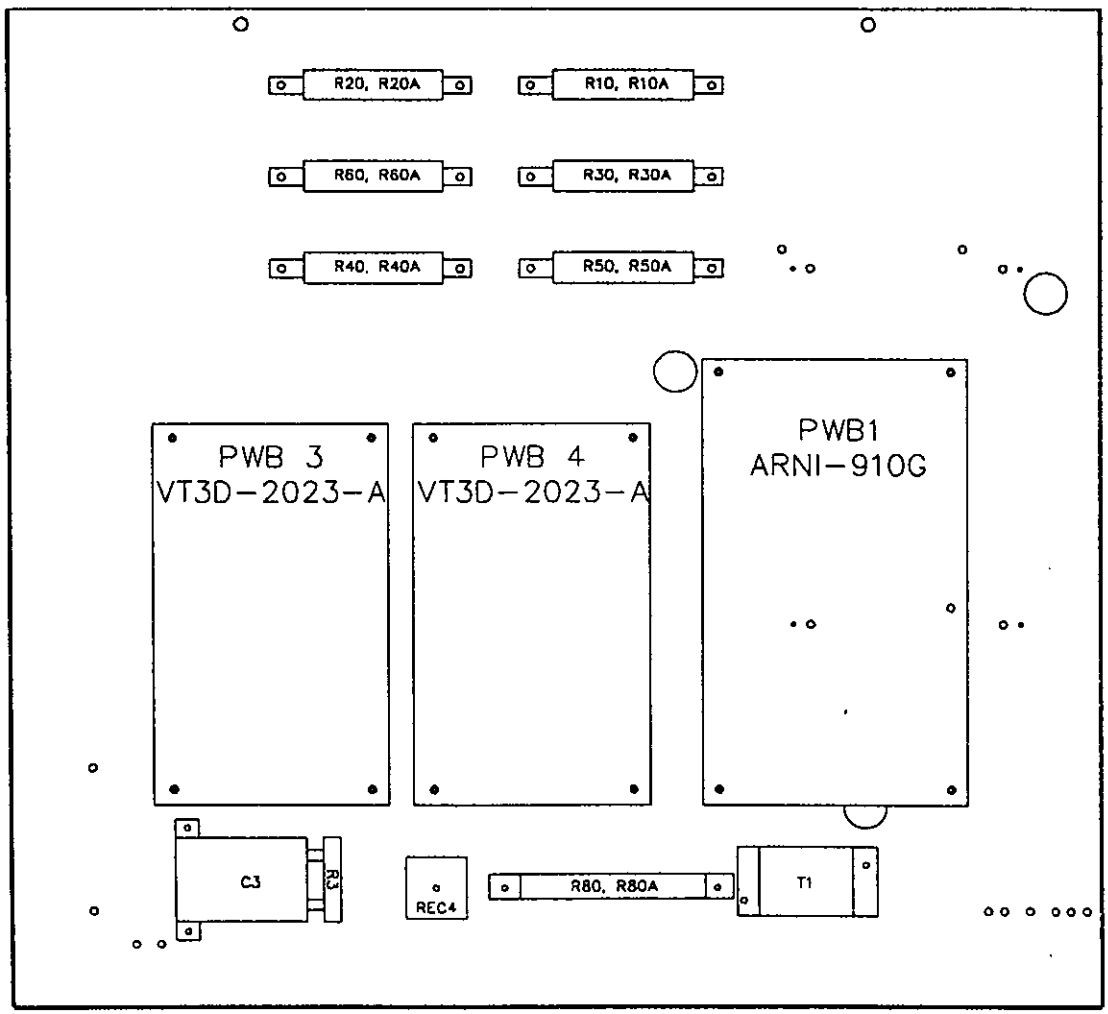
COMPONENT LAYOUT VT130G1–415K



COMPONENT LAYOUT VT130G1-420K



BACKSIDE OF HINGED PCB PANEL
COMPONENT LAYOUT
VT130G1-412K
VT130G1-415K
VT130G1-420K



Standard Adjustment List For Inverter Unit Type Form: 412K, 415K, 420K

VR: VARIABLE RESISTOR (RHEOSTAT)

	VR-NO	USE	STANDARD ADJUST
Control PWB ARNI-889G	1RH	Frequency Meter Adjustment	0 - Notch
	2RH	Output Frequency Adjustment	Refer to Fig. 11 This Page
	3RH	Output Voltage Adjustment (Low Level Bias Adjustment)	
	4RH	Output Voltage Gain Adjustment	
	5RH	I-IN : 4~20mA REF Adjustment (Bias)	
	6RH	I-IN : 4~20mA REF Adjustment (Gain)	
	7RH	Acceleration time 6-60sec.	6-60sec.
	8RH	Deceleration time 6-60sec.	6-60sec.
	9RH	Upper Limit (Max. Output Freq. Limit)	Refer to Fig. 12 This Page
	10RH	Lower Limit (Min. Output Freq. Limit)	0 - Notch
	12RH	Under Voltage Adjustment	Refer to "UP" Level
Base Drive PWB ARNI-910G	21RH	Over Voltage Adjustment	Refer to "OP" Level
	HCT-GIN	Hall Effect CT Circuit Output Gain Adjustment	Peak 4.63V At Rating Current
	HCT-OFS	Hall Effect CT Circuit Output Null Adjustment	OV at 0 Ampere

PROTECTION LEVEL

OC:	OVER CURRENT	*1 195%
OP:	OVER POTENTIAL (OVER VOLTAGE)	MAX. DC 800V
UP:	UNDER POTENTIAL (UNDER VOLTAGE)	*2 85%
OH:	GTR AND/OR POWER Discharge Unit Over Heat	90°C
STALL CURRENT LEVEL		*1 130%
CURRENT LIMIT LEVEL		*1 160%

*1: Percentage of Rated Output Current.
*2: Percentage of Rated Supply Voltage.

UNIT TYPE FORM VT130G1	RATING KVA	RATING CURRENT 110% CONTINUOUS 130% 30 SECONDS
-412K	125 KVA	175A
-415K	150 KVA	206A
-420K	200 KVA	275A

ARNI-889G-F137 JUMPER SELECTION

J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12
Open	"1f"	"60Hz"	Open	Close	Close	Open	Close	Close (A-D)	Close	Open	Open

ARNI-910G

J1
Open

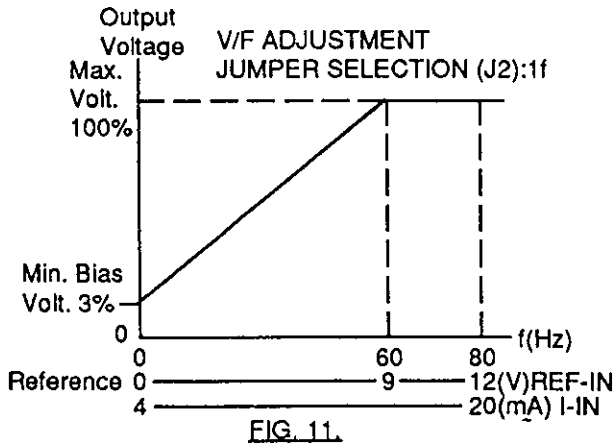


FIG. 11.

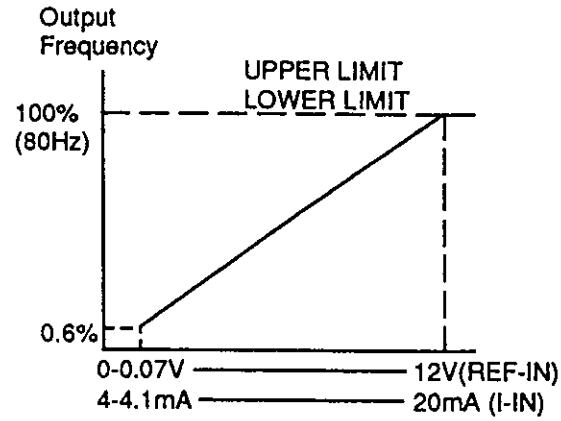


FIG. 12

SCHEMATICS

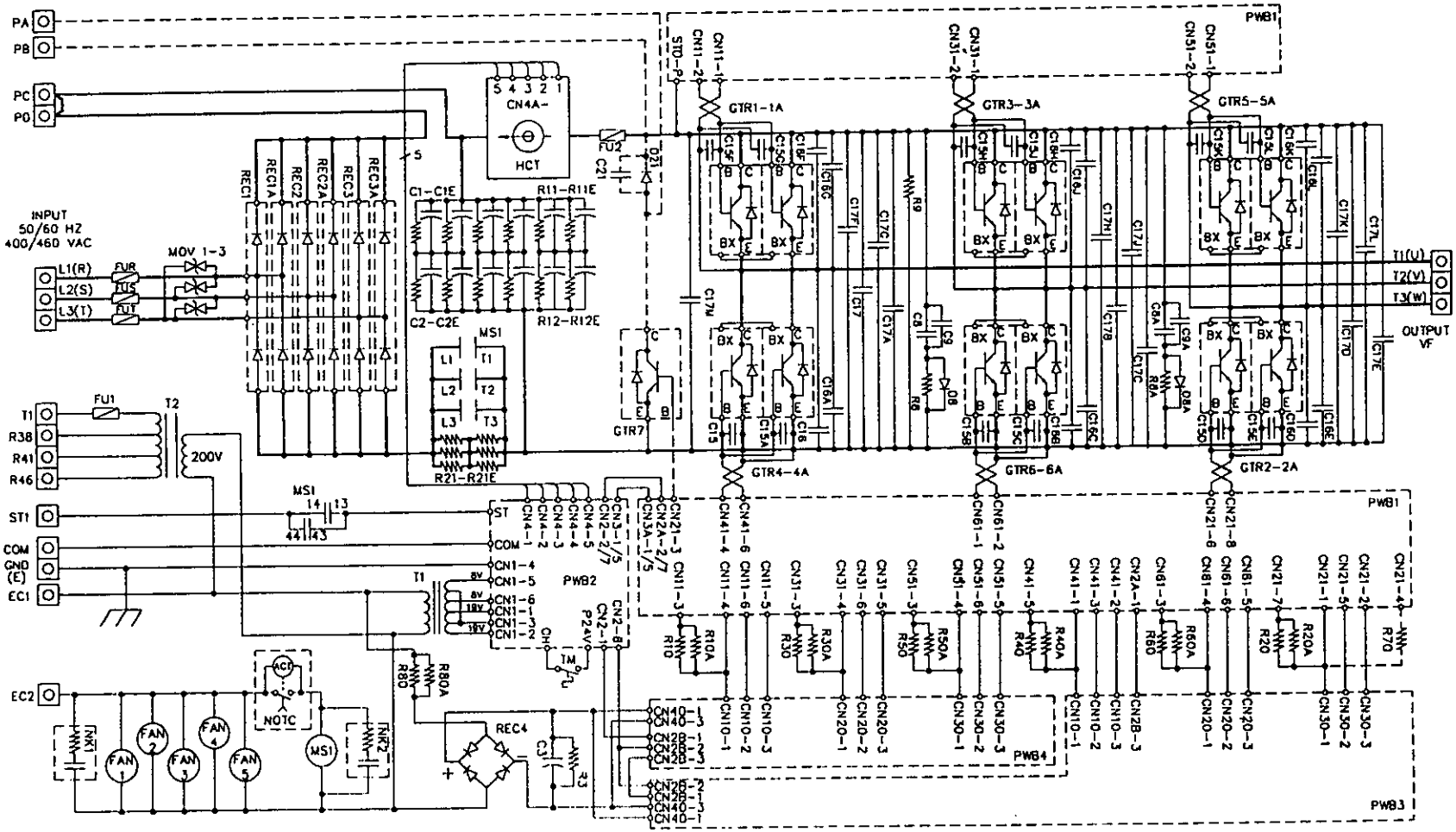
COMPONENT LIST	
ACT	220VAC .1SEC
C1-C1E	400VDC 3900MFD
C2-C2E	400VDC 3900MFD
C3	400VDC 470MFD
C8-C8A	500VDC 5MFD
C9-C9A	1000VDC .15MFD
C15-C15L	1000VDC .22MFD
C16-C16L	3000V .001MFD
C17-C17M	1000V .15MFD

COMPONENT LIST	
D8-D8A	1000V 25AMP
FAN 1-5	220VAC 33WATT
FU1	600V 5AMP
FU2	660V 500AMP
FUR,S,T	660V 400AMP
GTR1-6A	1000VCE 300AMP
HCT	4V/230AMP-1T
MOV 1-3	825V 230J
MS1	240V 75AMP

COMPONENT LIST	
NK 1-2	250V 220 OHM
PWB1	ARNI-910G
PWB2	ARNI-889G
PWB 3-4	VT3D-2023A
R3	51K OHM 5WATT
R8-R8A	20 OHM 20WATT
R9	180K OHM 5WATT
R11-R11E	25K OHM 10WATT
R12-R12E	25K OHM 10WATT

COMPONENT LIST	
R10-R60A	3.3 OHM 55WATT
R21-R21E	2 OHM 100WATT
R80-R80A	20 OHM 50WATT
REC1-3A	1600V 240AMP
REC4	600V 25AMP
T1	28VA
T2	1KVA

OPTIONS	
C21	1000V .15MFD
D21	1000V 25AMP
GTR7	1200VCE 300AMP
R70	3.3 OHM 55WATT



ECN	DATE	BY

DRAWN: 10/26/89

CHECKED:

APPROVED:

TOSHIBA/HOUSTON
INTERNATIONAL CORPORATION
USA

TITLE: G1-412K

REV: 1
DISK: STD20

SCALE:

DRAWING NO.:

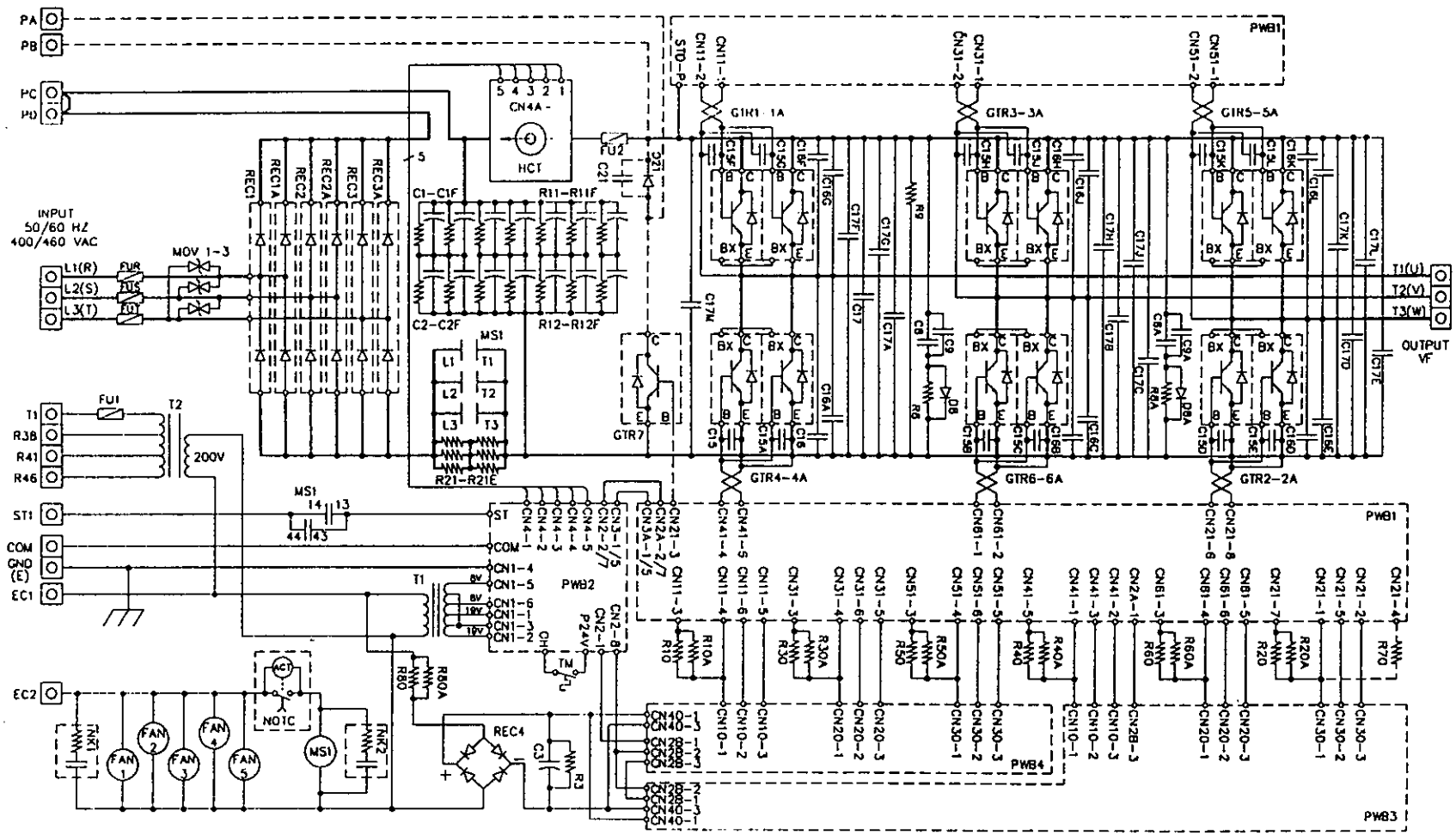
COMPONENT LIST	
ACT	220VAC .1SEC
C1-C1F	400VDC 3900MFD
C2-C2F	400VDC 3900MFD
C3	400VDC 470MFD
C8-C8A	500VDC 5MFD
C9-C9A	1000VDC .15MFD
C15-C15L	1000VDC .22MFD
C16-C16L	3000V .001MFD
C17-C17M	1000V .15MFD

COMPONENT LIST	
D8-D8A	1000V 25AMP
FAN 1-5	220VAC 33WATT
FU1	600V 5AMP
FU2	660V 500AMP
FUR,S,T	660V 400AMP
GTR1-6A	1000VCE 300AMP
HCT	4V/275AMP-1T
MOV 1-3	825V 230J
MS1	240V 75AMP

COMPONENT LIST	
NK 1-2	250V 220 OHM
PWB1	ARNI-910G
PWB2	ARNI-889G
PWB 3-4	VT3D-2023A
R3	51K OHM 5WATT
R8-R8A	20 OHM 20WATT
R9	180K OHM 5WATT
R11-R11F	25K OHM 10WATT
R12-R12F	25K OHM 10WATT

COMPONENT LIST	
R10-R60A	3.3 OHM 55WATT
R21-R21E	2 OHM 100WATT
R80-R80A	20 OHM 50WATT
REC1-3A	1600V 240AMP
REC4	600V 25AMP
T1	28VA
T2	1KVA

OPTIONS	
C21	1000V .15MFD
D21	1000V 25AMP
GTR7	1200VCE 300AMP
R70	3.3 OHM 55WATT



			DRAWN: 10/26/89
			CHECKED:
			APPROVED: KAL 10/26/89
ECN	DATE	BY	

TOSHIBA/HOUSTON
INTERNATIONAL CORPORATION
USA

TITLE: G1-415K

REV: 1
DISK: STD20

SCALE:

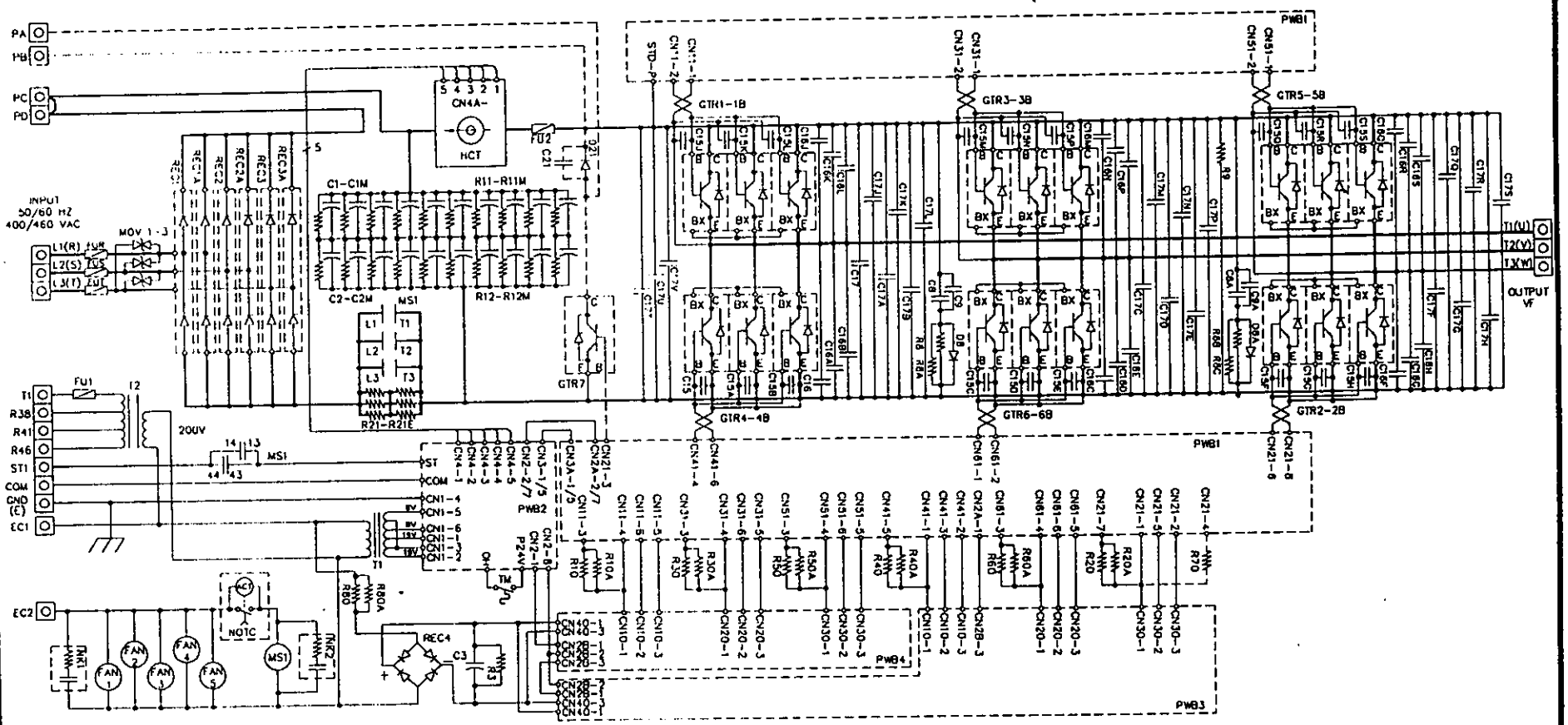
DRAWING NO.:

COMPONENT LIST	
ACT	220VAC .1SEC
C1-C1M	400VDC 3900MFD
C2-C2M	400VDC 3900MFD
C3	400VDC 470MFD
C8-C8A	1000VDC 10MFD
C9-C9A	1000V .15MFD
C15-C15S	1000VDC .22MFD
C16-C16S	3000V .001MFD
C17-C17V	1000VDC .15MFD
D8-D8A	1000V 25AMP
FAN 1-5	220VAC 33WATT
FU1	600V 5AMP

COMPONENT LIST	
FU2	660V 630AMP
FUR,S,T	660V 500AMP
GTR1-6B	1000VCE 300AMP
HCT	4V/370AMP-1T
MOV 1-3	825V 230J
MS1	240V 110AMP
NK 1-2	250V 220 OHM
PWB1	ARNI-910G
PWB2	ARNI-889G
PWB 3-4	VT30-2023A
R3	51K OHM 5WATT
R8-R8C	20 OHM 20WATT
R9	180K OHM 5WATT

COMPONENT LIST	
R11-R11M	25K OHM 10WATT
R12-R12M	25K OHM 10WATT
R10-R60A	3.3 OHM 55WATT
R21-R21E	2 OHM 100WATT
R80-R80A	20 OHM 50WATT
REC1-3A	1600V 240AMP
REC4	600V 25AMP
T1	28VA
T2	1KVA

OPTIONS	
C21	1000V .15MFD
D21	1000V 25AMP
GTR7	1200VCE 300AMP
R70	3.3 OHM 55WATT



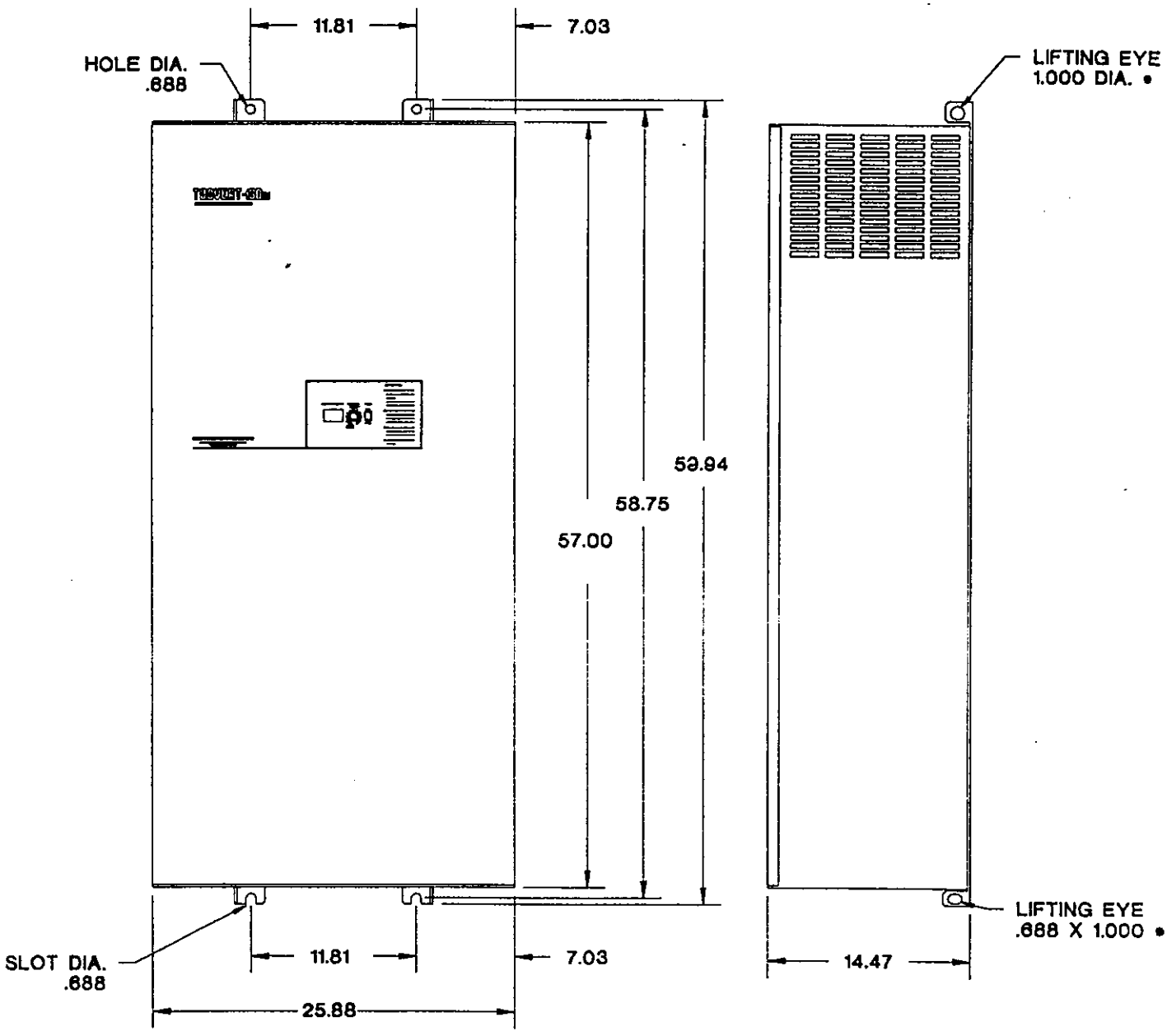
			DRAWN: 10/26/89
			CHECKED:
#00598	11/89	SA	
ENG. PROTOTYPE REVISIONS	10/89	SA	APPROVED: KAK 11/1/89
ECN	DATE	BY	

TOSHIBA/HOUSTON
INTERNATIONAL CORPORATION
USA

TITLE: G1-420K REV: 2
DISK: STD20

SCALE: DRAWING NO.:

ENCLOSURE AND MOUNTING DIMENSIONS



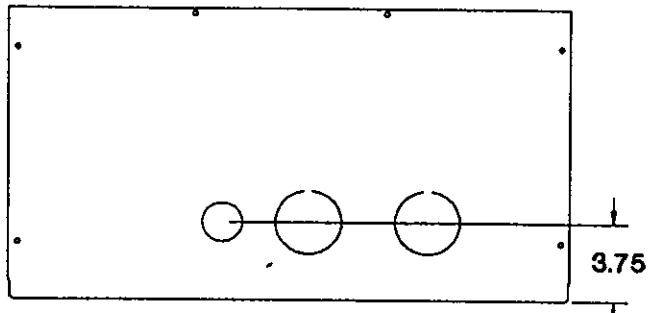
G1 460V 125-200 HP INVERTER

ALL DIMENSIONS ARE IN INCHES.

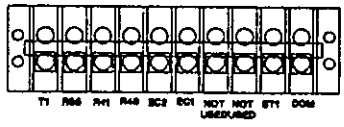
WEIGHT:
G1-412K 405 LB.
G1-415K 405 LB.
G1-420K 435 LB.

• THESE HOLES ARE FOR LIFTING PURPOSES ONLY AND ARE NOT DIMENSIONED.

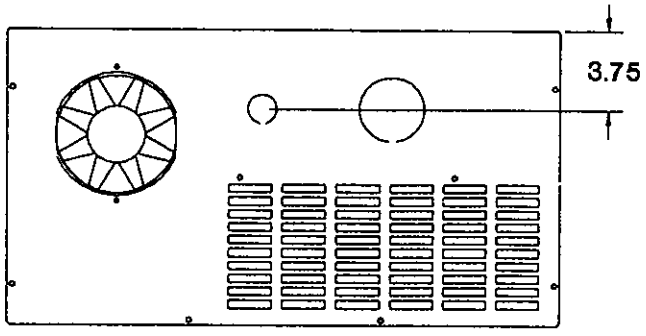
ELECTRICAL CONNECTIONS
G1 460V 125-200 HP INVERTER



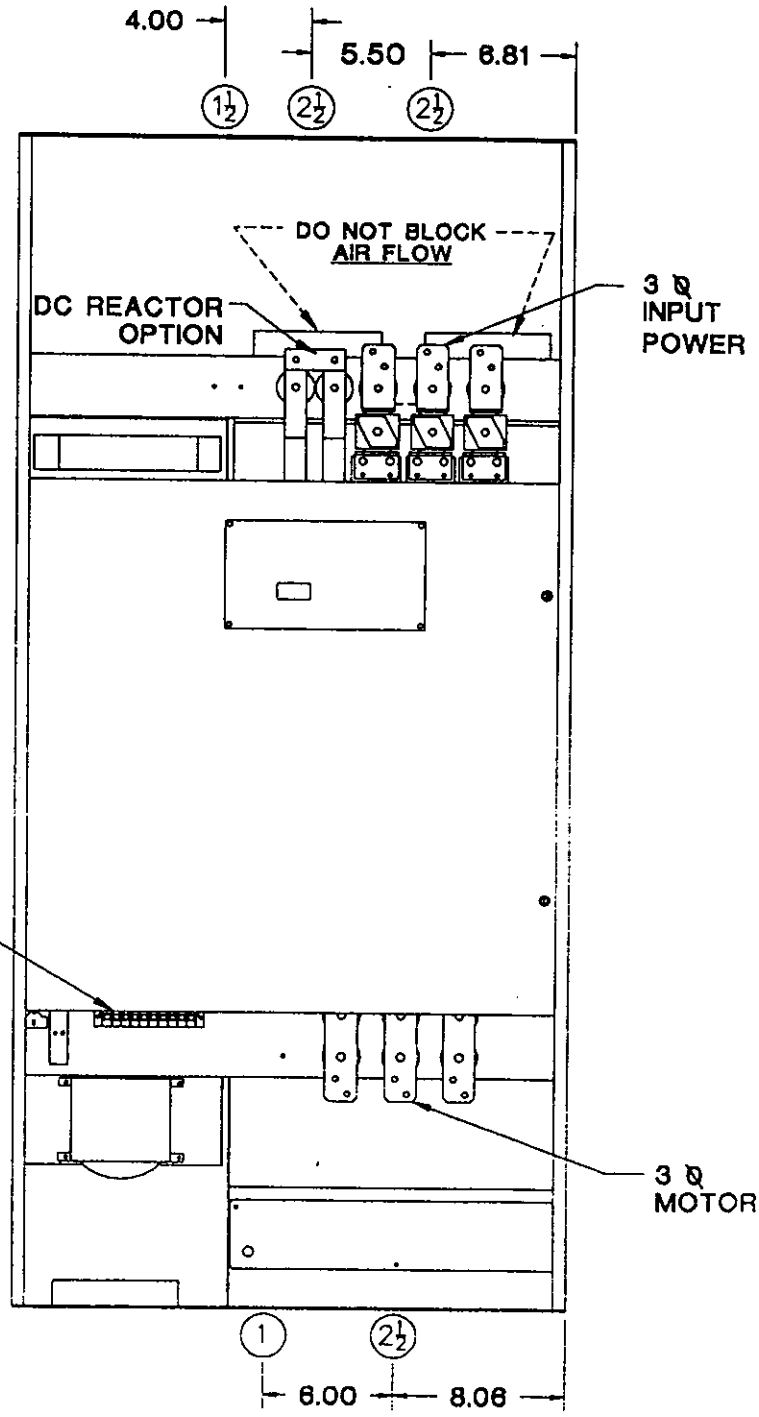
TOP COVER KNOCKOUT LOCATIONS



CONTROL POWER TERMINAL BLOCK CONNECTIONS



BOTTOM COVER KNOCKOUT LOCATIONS

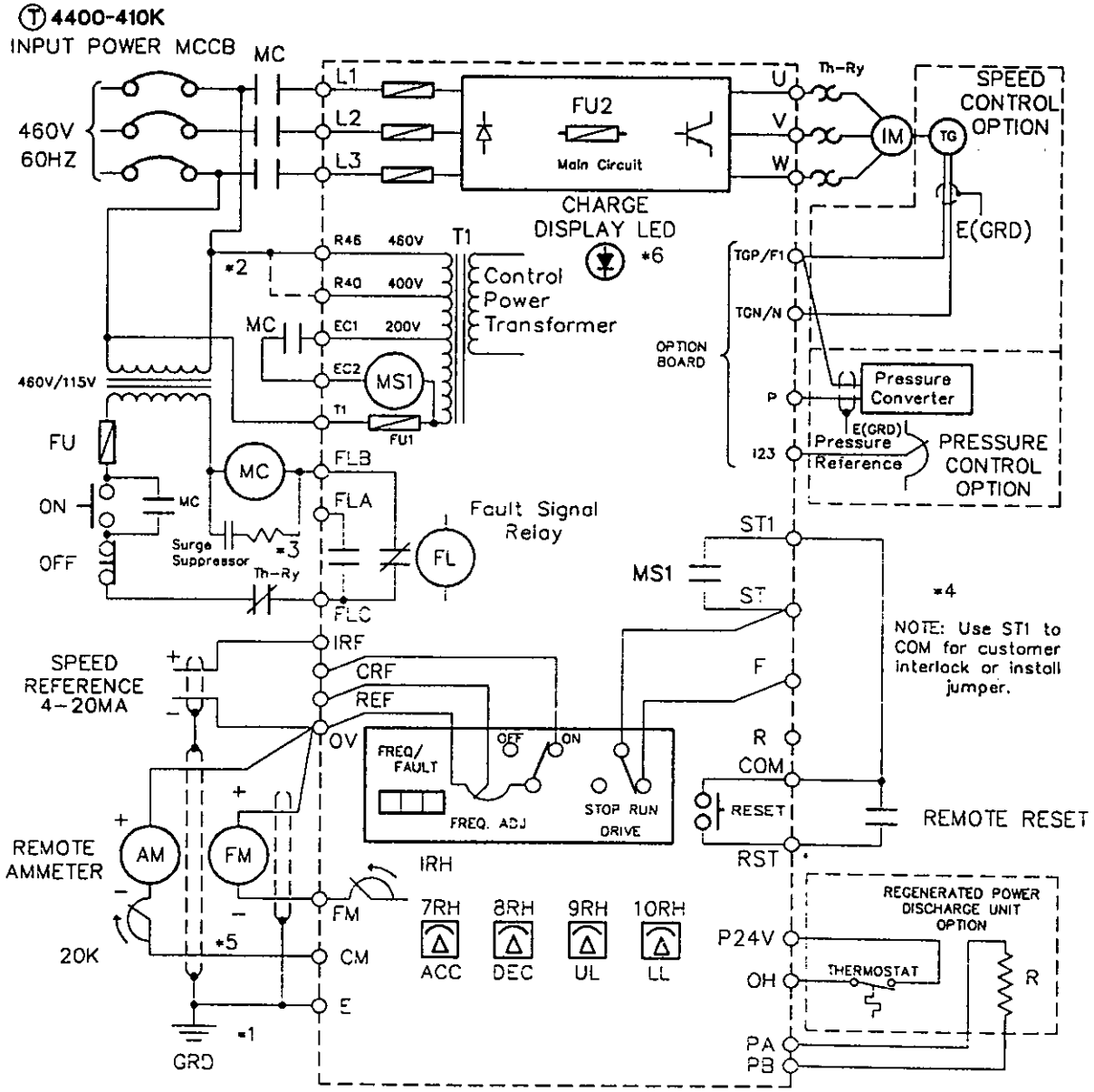


INSIDE ELEVATION

ALL DIMENSIONS ARE IN INCHES

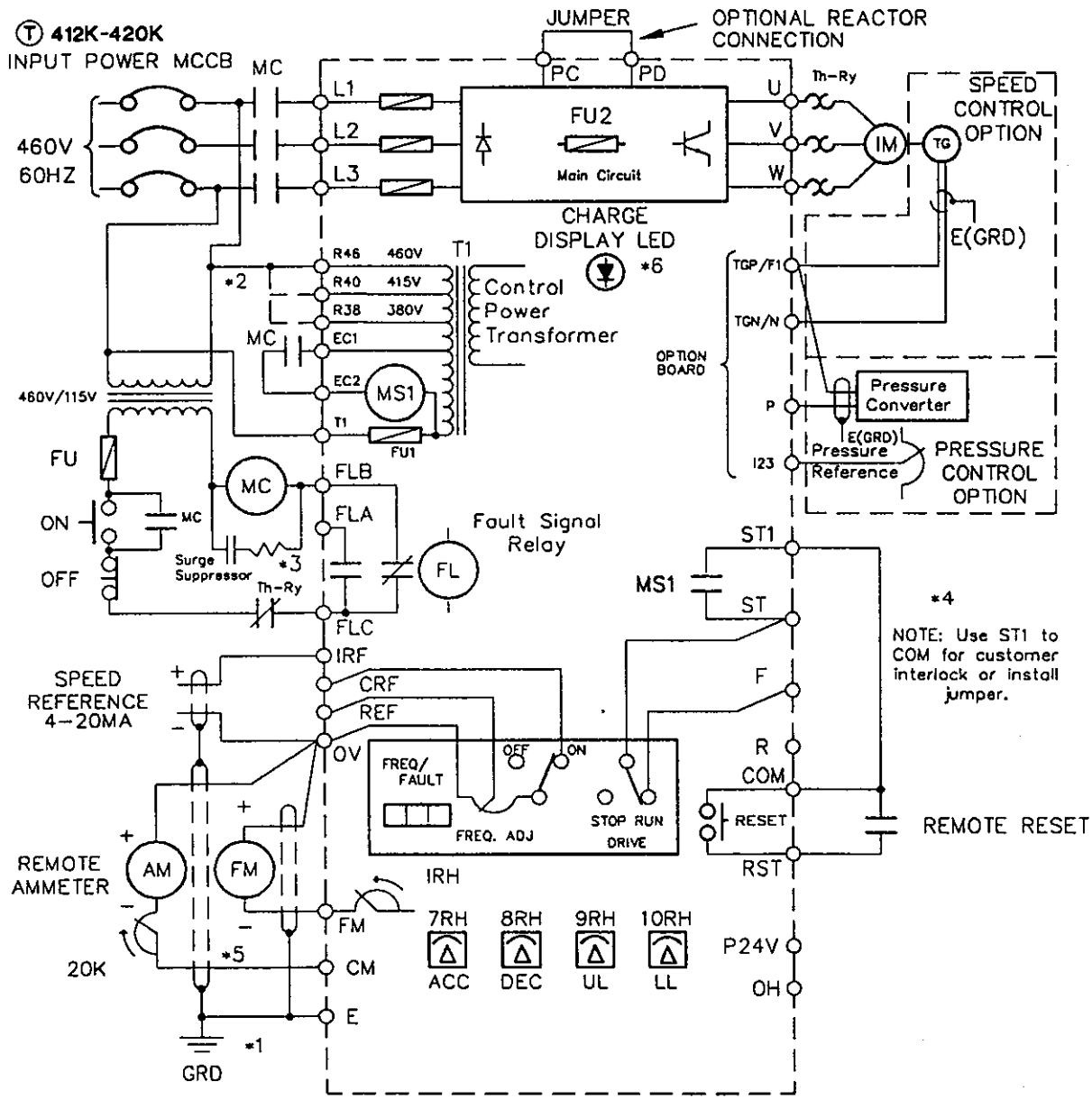
◯ CONDUIT KNOCKOUT SIZE

STANDARD CONNECTION DIAGRAM
VT130G1-4400 - 4100K



SEE CONNECTION NOTES ON PAGE 15C

STANDARD CONNECTION DIAGRAM
VT130G1-412K - 420K



SEE CONNECTION NOTES ON PAGE 15C