4M-2
EFFECTIVE
4/84

LANCER® JR

TYPE M CONTROLLER

1 THRU 10 HP

230/460 VOLT 3 PHASE

INSTRUCTION MANUAL

Litton LOUIS ALLIS

This instruction manual covers installation, operation, adjustments and maintenance of the equipment, but does not provide for every possible circumstance that may occur, nor does it define all modifications, variations or details of the equipment Should further information be desired or should particular problems develop which are not covered sufficiently herein, please contact your nearest Louis Allis representative

WARRANTY

Standard products manufactured by the Company are warranted to be free from defects in workmanship and material for a period of one year from the date of shipment, and any products which are defective in workmanship or material will be repaired or replaced, at the option of the Company, at no charge to the Buyer Final determination as to whether a product is actually defective rests with the Company The obligation of the Company hereunder shall be limited solely to repair and replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period, and in the case of components or units purchased by the Company, the obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof No products shall be returned to the Company without its prior consent Products which the Company consents to have returned shall be shipped f o b the Company's factory The Company cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective The life of the products of the Company depends, to a large extent, upon type of usage thereof, and THE COMPANY MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO PERIOD OF SERVICE UNLESS THE COMPANY SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE

This warranty does not apply to experimental or developmental products

RECEIPT OF SHIPMENT

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

EQUIPMENT STORAGE

For long periods of storage, equipment should be covered to prevent corrosion Equipment should be stored in a clean, dry location After storage, insure that equipment is dry and no condensation has accumulated before applying power All rotating equipment stored longer than three months requires regreasing

SAFETY FIRST

This equipment has been designed to provide maximum safety for operating personnel However, hazardous voltages exist within the confines of the enclosure Installation and servicing should therefore be accomplished by qualified personnel only and in accordance with OSHA regulations

TABLE OF CONTENTS

INTRODUCTION

This instruction manual describes controllers which are serial numbered 4000 thru 4999 and also 5000 and above. Information which pertains to a specific serial numbered group will be so noted, otherwise, the information will be applicable to all. Refer to controller nameplate to determine its serial number.

This instruction manual contains installation, operation, and troubleshooting procedures for the Lancer R JR variable frequency 3-phase AC motor drive, hereafter referred to as the Controller.

The Lancer® JR controller operates directly from 230 volt/460 volt (voltage must be specified at time of ordering - 230V and 460V models are not interchangeable), 3-phase, 50/60Hz plant. By producing adjustable frequency, adjustable voltage 3-phase output, the Controller allows the use of conventional squirrel cage induction motors or synchronous reluctance motors (please specify synchronous motors when ordering) as adjustable speed devices.

Although every precaution has been taken in the Controller design and manufacturing to ensure reliability under extreme operating conditions, it is still possible to damage the Controller through misuse or misapplication. Therefore, these instructions should be reviewed carefully before installing and operating the Controller.

WARNING

THE LANCER® JR CONTROLLER IS TO BE USED ONLY IN CONJUNCTION WITH THREE-PHASE AC INDUCTION OR SYNCHRONOUS RELUCTANCE MOTORS. USE WITH ANY OTHER TYPES OF ELECTRICAL APPLIANCES CAN BE HAZARDOUS.

GENERAL SPECIFICATIONS

* PULSE-WIDTH MODULATION (PWM) OUTPUT - PWM allows more efficient use of the switching elements in the controller and reduces harmonic currents thru the motor thereby giving smoother operations at low speeds. It also allows for greater efficiency of the entire controller system because the power is only controlled once without using complex, inefficient front end voltage control circuitry.

* MICROPROCESSOR CIRCUITRY - Large scale integration (LSI) has increased the capabilities of the Controller while drastically reducing the number of components in the unit. The result is greater reliability, noise immunity, and flexibility for individual application requirements.

* FREQUENCY RANGE - 0-120 HZ (consult factory for speed requirements in excess of 120 HZ).

* CONSTANT TORQUE - The Controller is factory set for constant torque from 5-60 Hz. The 460 VAC Controller may be factory adjusted for constant torque from 5-120 HZ.

* CONSTANT HORSEPOWER - From 60-120 HZ.

* ELECTRONIC RUNNING REVERSE

* JOG SPEED - Adjustable between 0-20 Hz.

* LINEAR ACCELERATION/DECELERATION - Independently adjustable from 2 to 30 seconds for 0-120 HZ.

* MINIMUM/MAXIMUM SPEEDS - Minimum speed is adjustable 0-40 HZ, maximum 40-120 HZ.

* REGENERATION - The Controller can accept regenerative energy from overhauling loads, up to 125% of its maximum continuous rating, for a maximum of 12% of any one minute duty cycle.

* OUTPUT FREQUENCY STABILITY - Can maintain a stability of .1% per e , 1 degree C change in operating temperatures. Solid state circuitry provides accuracy for the most demanding requirements.

* LOW SPEED TORQUE BOOST - PWM and automatic boost give smooth, low speed performance, especially helpful when extra breakaway torque is required.

* MOMENTARY POWER INTERRUPTIONS - The loss of input power for up to .1 second will have no effect on the Controller (as standard).

* MOTOR FREQUENCIES - May be used for both 50 and 60 HZ motors.

* CONTROLLED STOP - Provides controlled deceleration to zero speed before stopping the motor.

* HIGH-LOW VOLTAGE PROTECTION - The high-low voltage circuit monitors the input line for incorrect voltage levels and causes the Controller to de-energize when either high or low line voltage exists.

* RELIABILITY - The Controller has been designed for reliability. By using state-of-the-art microprocessor technology, the Controller has a multitude of standard features in a small, compact package using fewer components. The PWM waveform gives higher efficiencies without commutation circuitry. The unit is also self-protected four ways:

OUTPUT PROTECTION

Running Current Limit (with logic board #1557): When motor load exceeds Converter ratings the converter will limit the current to the motor at 150% of the Converters rating for a period of 60 seconds. If, after 60 seconds, the overload still exists, the Converter will trip. For further information reference note #2 on page 26.

- Electronic Fusing: Automatic fuseless overcurrent circuitry senses phase-to-phase shorts within 26 microseconds, resulting in system shutdown until the overload is corrected. However, phase-to-ground shorts can be protected against by either an isolation transformer, or the Ground Fault Protection Option. Reference page 23 for further information

- Backup Fuses: As secondary protection, these built-in fuses sense high-speed electrical problems which bypass the primary protection circuits.

INPUT PROTECTION

- The high voltage characteristics of Gate Turn-Off Switches (GTOs) enable the Controller to resist typical line power surges, notching and other plant power interruptions. These will not damage the Controller.

* QUALITY CONTROL - The Controller is rigidly inspected at almost every production stage. The Controller goes through two separate "burn-ins" where it is run for days under proof loads. In addition, all printed circuit boards undergo a complete computer circuit and function test to ensure total reliability.

* PACKAGING - The standard Controller is mounted in a NEMA 1 enclosure. If needed, an optional operator's station which includes a frequency meter, speed potentiometer, and control buttons for AC on/run, trip/jog, forward/ reverse, and stop is available.

* DIAGNOSTIC LIGHTS - All Controllers have indicator lights on all power switches and fuses so that each Controller can be troubleshot without using a meter.

OPERATING SPECIFICATIONS

MODEL NUMBER	3 PHASE VOLTAGE	HP RATING	KVA	FULL LOAD OUTPUT RMS Amps/Phase	MAX. INTERMITTENT OUTPUT RMS AMPS/Phase*
91005J	230	1	1.7	4.3A	6.4A
91006R	460	1	1.7	2.2A	3.3A
91007P	230	2	2.8	7.0A	10.5A
91008N	460	2	2.8	3.5A	5.2A
91009L	230	3	4.0	10.0A	15.0A
91010Q	460	3	4.0	5.0A	7.5A
91011F	230	5	6.0	15.0A	22.5A
91012M	460	5	6.0	7.5A	11.2A
91013K	460	7.5	8.0	10.0A	15.0A
91014S	460	10	12.0	15.0A	22.5A

* Duty cycle not to exceed two minutes out of every 10 minutes.

1. POWER INPUT 3-PHASE, 3 WIRE

   a. Either 230VAC or 460VAC +10%, -5%, 50 or 60 Hz, ±2 Hz.
   b. Fixed diode rectifier presents a constant 0.95 power factor to line.
   c. Insensitive to input phase rotation.

2. ENVIRONMENTAL CONDITIONS

   a. Altitude to 3300 feet above sea level.
   b. Ambient temperature -
      Operating: 0 to 40°C.
      Storage: -25° to +70°C.
   c. Noncondensing relative humidity to 95%.

3. NOMINAL OUTPUT

   a. Variable up to either 230V or 460V.
   b. 3-phase, 3-wire ungrounded.
   c. Frequency range
      Factory setting: 5-60 Hz constant V/Hz
      60-120 Hz constant volts
      Adjustable to: 0-120 Hz constant V/Hz
   d. 100% rated amps continuous.
   e. 150% rated amps overload for 1 min. (1 HP through 10 HP).

4. CONTROL FEATURES

   a. Regulation 3% (depends upon motor slip).
   b. Drift 0.1% per 1°C. after reaching stable operational temperature.
   c. Jog speed - separately adjustable 0-20 Hz.
   d. Minimum speed - adjustable 0-25 Hz.
   e. Maximum speed - adjustable 40-120 Hz.
   f. Low speed boost.
   g. Volts/Hertz control.
   h. Electronic Forward/Reverse.
   i. Controlled ramp stop (except with certain mods).
   j. 125% dynamic braking (12% duty cycle).
   k. Separately adjustable accel/decel 2-30 seconds for 0-120 Hz speed change

5. PROTECTIVE FEATURES

   a. High voltage GTOs for transient protection.
   b. Current limit trip when current exceeds limit setting time.
   c. Instantaneous electronic trips react within 26 microseconds when large faults occur.
   d. DC bus and control circuit transformer fusing.
   e. Grounded control circuit.
   f. Low level, 12 volt, operator's and logic control.
   g. Undervoltage trip, overvoltage trip.

6. MOTOR COMPATIBILITY

   a. All standard NEMA electrical Designs A, B and C of either 50 or 60 hertz design.
   b. Must be compatible in voltage, KVA and amps with controller model selected.
   c. NEMA D and synchronous-reluctance motors normally require controller oversizing and output chokes. Refer to Louis Allis.
   d. Upon determining size of Controller for a given motor and application, due to the effect of square wave harmonics, increase rated motor amps by a factor of 1.05 (NEMA B type) or 2.25 (NEMA D type) of 1.40 (synchronous type).
   e. If multiple motors are used, the sum of all current ratings under all operating conditions must be less than the continuous current rating of the Controller. In addition, provide all application details to Louis Allis to determine if an optional output choke should be added to the Controller.

Heat Dissipation

Model	HP	Volts	F.L.A.	Watts*
91005J	1	230V	4.3	129
91006R	1	460V	2.2	132
91007P	2	230V	7.0	210
91008N	2	460V	3.5	210
91009L	3	230V	10.0	300
91010Q	3	460V	5.0	300
91011F	5	230V	15.0	450
91012M	5	460V	7.5	450
91013K	7.5	460V	10.0	600
91014S	10	460V	15.0	900

*NOTE: Values given in table are minimum values to be used only when the Controller is operating continuously above 30 HZ. When operating continuously below 30 HZ, use multiplying factor of 1.09 times the given wattage value to obtain proper wattage when operating in the region. Refer to page 13 for further information relative to mounting Controller in another cabinet.

I. DESCRIPTION OF TERMINALS
(See Figure)

A. CONTROL TERMINALS TB1-1 thru TB1-12)

-1. +12VDC. This terminal is electrically identical to TB2-L (12). Maximum current drain (for both TB1 and TB2) from +12VDC to common is 120mA.

-2. FORWARD/REVERSE TERMINAL. Forward is activated with no connection to this terminal, reverse is activated when this terminal is connected to 12VDC (terminal 1). A maintained switch must be used for reverse (not internally latched).

-3. RUN INPUT TERMINAL. (12VDC internally latched).

-4. JOG INPUT TERMINAL. Active only when the Controller is in "stop", and 12VDC is applied to this terminal.

-5. STOP INPUT TERMINAL. Stop is initiated by removing 12VDC momentarily from this terminal.

NOTE
(Logic board part #1556, serial #4000 thru 4999). The Controller is furnished with a controlled stop plug-in card.

NOTE
(Logic Board Part #1557, Serial #5000 and above). Controlled Stop is built in to the Logic Board.

When stop is initiated, the Controller will decelerate to zero speed at the rate set by the DECEL potentiometer before going into the stop mode.

-6. LOGIC COMMON. This terminal is used for all control common connections and for the connection of shields when using shielded control wiring. Logic common is internally terminated to chassis ground.

-7. TRIP INDICATOR. This terminal is used to light the TRIP LED in the standard operator's station or may be used to drive a low current 12VDC pilot relay for other external indication. This terminal will sink 20mA when the Controller is in a trip condition.

-8. RUN INDICATOR. This terminal is used to light the RUN LED in the standard operator's station or may be used to drive a low current 12VDC pilot relay for other external indication. This terminal will sink 20mA when the Controller is in run.

-9. SPEED SIGNAL INPUT TERMINAL. Internal impedance is 1 MEG in parallel with a 1mf capacitor. Speed signal range is 0-10VDC. This can be obtained by connecting a 5K ohm potentiometer across terminals 10 (10VDC) and 6 (logic common) and connecting the wiper of the potentiometer to this terminal.

-10. 10VOLTS DC. This terminal is the 10VDC source terminal for manual speed control. Allowable current: 10mA.

-11. STOP INDICATOR. This terminal is used to light the 12VDC STOP LED in the standard operator's station. It also flashes during initial power up to indicate that the DC BUSS is charging. If an external indicator is used instead of the control station, this terminal sinks 20mA max.

-12. METER OUTPUT. This terminal is for connection of frequency meter. The meter used in the standard operator's station is 0-1mA full-scale. If using your own meter, make sure that it has an internal impedance not exceeding 1K ohms. Note; With no meter connected to this terminal, a VOM type meter or suitable 1mA type voltmeter may be connected to read 0-10VDC relative to output frequency (12Hz per 1VDC).

B. OPTION TERMINALS (TB2-A(1) thru TB2-L (12) See figure.

-A(1) thru -D(4) OPTION CONNECTIONS. All series options that require external connections in conjunction with a plug-in card use terminals -A(1), -B(2), -C(3), -D(4) for this purpose. Refer to specific wiring instructions that are included with the option package for information regarding terminal connection. (The note below pertains only to Controller serial #4000 to 4999, Logic Board Part #1556).

NOTE

The standard plug-in card for Controlled stop uses a jumper which is physically located between option terminals -A(1) and -B(2). These terminals can provide an F-Stop function if desired. Simply remove the jumper, and wire a maintained normally closed pushbutton between terminals -A(1) and -B(2). When this pushbutton is pressed, the Controller will immediately go into the E-STOP (coasting) mode, bypassing the normal deceleration to zero speed that occurs before stopping.

-E(5) LOGIC COMMON. This terminal is used for all option wiring connections to logic common where required. Logic common is internally terminated to chassis ground.

-F(6), -G(7) are used only on Controller serial #5000 and above. (Logic Board Part #1557).

NOTE

Controlled stop is built into Logic Board Part #1557, and uses a jumper which is physically located between option terminals -F(6) and -G(7). These terminals can provide an E-STOP function if desired. Simply remove the jumper, and wire a maintained normally closed pushbutton between terminals -F(6) and -G(7). When this pushbutton is pressed, the Controller will immediately go into the E-STOP (coasting) mode, bypassing the normal deceleration to zero speed that occurs before stopping.

-H(8) (-) EXTERNAL RELAY CONNECTION. This terminal may be used with TB2 terminal -K(11) or -L(12) for connection of a relay for RUN/STOP, trip indication or for interlocking the RUN/STOP circuits of more than one Controller. This terminal when connected to 12VDC through a relay coil will energize a relay in run and de-energize that relay in stop or trip. Allowable current: 20mA.

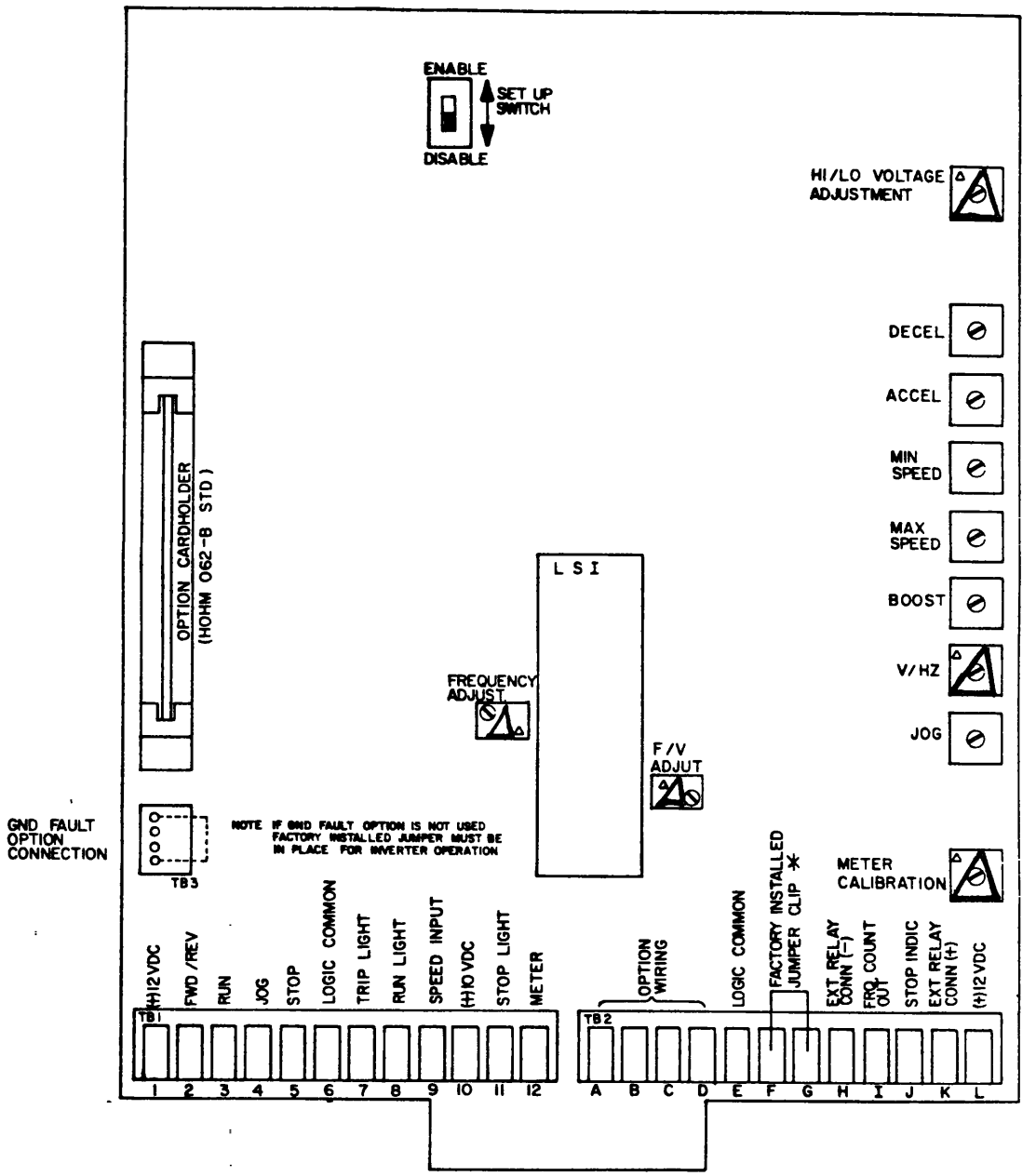
-I(9) F COUNT OUT. This terminal is for use with a digital frequency meter for output frequency indication. A frequency meter should be connected to terminal -I(9) (+) and -E(5) (-) and should have a load impedance of 10K ohm or greater. The signal is from 0-120Hz (standard) 12VDC P-P square wave.

-J(10) STOP INDICATOR. This terminal is for driving a 12VDC pilot relay or LED for remote stop indication. Unlike the stop light (TB1-11), this indicator will not flash while the DC BUS is charging. Allowable current: 20mA.

-K(11) (+) EXTERNAL RELAY CONNECTION. This is the +12VDC terminal for connection of a pilot relay for RUN/STOP, Trip indication. This terminal is not active in the set-up mode for applications where energizing the pilot relay during set-up would be undesirable. Allowable current: 20mA.

-L(12) +12VDC. This terminal provides 12VDC for options requiring an external power source. This terminal is electrically identical to TB1-1. Maximum current drain (for both TB2 and TB1) from +12VDC to common is 120mA.

LOGIC BOARD PART NUMBER 1557



*A N.C. MOMENTARY PUSH BUTTON MAY BE INSTALLED IN PLACE OF JUMPER CLIP TO PROVIDE AN "E-STOP" FUNCTION. IF MOTOR OVERLOADS ARE USED, THE N.C. OVERLOAD CONTACT MUST ALSO BE WIRED IN PLACE OF THIS JUMPER. (SEE POWER CONNECTION DIAGRAM, FIG. 1)

△ FACTORY ADJUSTMENT.

> **WARNING**
>
> FOLLOW THESE INSTRUCTIONS EXACTLY TO ENSURE PROPER INSTALLATION AND PREVENT DAMAGE TO THE CONTROLLER

Preinstallation

1. Unpack and inventory the Controller to see that all items have been included in the shipment.

2. Inspect the Controller for loose parts, broken components, dents, or any other evidence of rough handling.

3. Check the nameplate in the Controller to see that model number, input voltage, and horsepower match the order.

4.
> **CAUTION**
>
> CHECK YOUR 3-PHASE LINE VOLTAGES BEFORE INSTALLING THE COTROLLER. FOR 230V MODELS, THE 3-PHASE INPUT LINE VOLTAGE MUST BE 230V +10% -5%; FOR 460V MODELS, 460V +10% -5%. IF YOU HAVE HIGH INPUT VOLTAGES, A STEPDOWN TRANSFORMER MUST BE USED; IF YOU HAVE LOW INPUT VOLTAGES, A STEPUP TRANSFORMER MUST BE USED.

5.
> **WARNING**
>
> DO NOT USE POWER FACTOR IMPROVEMENT CAPACITORS WITH THIS CONTROLLER, AS DAMAGE MAY RESULT FROM HIGH VOLTAGES GENERATED WHEN CAPACITORS ARE SWITCHED.

6. Ensure that you have the proper line fuses.

> **WARNING**
>
> USE ONLY BUSSMANN LIMITRON FAST-ACTING FUSES. LIMITRON KTN SERIES FOR 230V MODELS AND KTS SERIES FOR 460V MODELS. THE FUSES SHOULD BE SIZED TO 150% OF CONTINUOUS FULL LOAD CURRENT RATING OF THE CONTROLLER.
>
> DO NOT USE ANY OTHER FAST-ACTING FUSES.

Refer to Page 38 for complete fuse chart.

For NEMA 1 and NEMA 4 units, start with step 1A and skip step 1B. For chassis units, start with step 1B.

1A. MOUNTING OF UNIT (NEMA 1/NEMA 4)

The Converter should be mounted vertically, on a flat surface, with a clearance all around equivalent to the cabinet width (refer to the list on dimensions and weights for clearance space).

NOTE: For 7.5 HP and 10 HP units, allow for a minimum of 10" below the bottom plate to accommodate the cooling shroud (shroud to be assembled by customer).

Failure to provide proper clearance may cause excessive cabinet temperatures and eventual Controller malfunction.

1B. MOUNTING OF UNIT (Chassis Mount)

CAUTION

A. WHEN MOUNTING THE HEATSINKED CONTROLLER IN ANOTHER ENCLOSURE, THE CUSTOMER IS RESPONSIBLE FOR ASSURING THAT THE MAXIMUM TEMPERATURE WITHIN HIS ENCLOSURE DOES NOT EXCEED 50 DEGREES C.

B. SIZING: When sizing an enclosure for the Controller, the energy dissipation of all components enclosed within that cabinet must be considered. Determine the dissipation of the Controller from the "Heat Dissipation Table" on page 8. The heatsink temperature of the Controller must not exceed 65 degrees C. Unless designed for special environments, the Controller should be installed in an enclosure that meets the following conditions.

a) Temperature within the enclosure must not exceed 50 degress C (122 degrees F). A metal enclosure finished with an enamel paint will typically dissipate 10 watts per square foot of exposed surface area. This assumes that the ambient temperature does not exceed 40 degrees C (104 degrees F). Exposed surface area of the enclosure does not include the back if mounted against a wall or the bottom surface.

Determine the maximum heat dissipation of all the enclosed devices and size an enclosure with adequate exposed surface area. It is also important to fan cool the Controller(s) within the enclosure. Use two 100 c.f.m. muffin fans to blow up through each heatsink of the Controller.

b) Interior of enclosure must be clean and dry, and free of flammable or combustible vapors, chemical fumes, coal dust, oil vapor, steam, powder, and metal dust.

c) Controllers must not be subjected to vibrations.

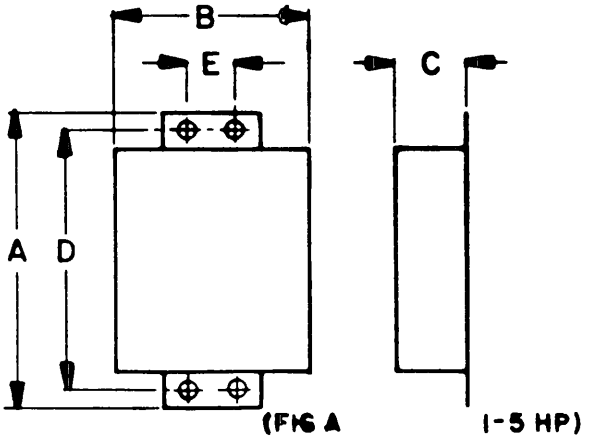
When a Controller is ordered for mounting in a separate enclosure, please specify this on the order. Different base and end plates will be provided to make the installation easier. Even though the standard end plates will not work in this application, the mounting holes will be exactly the same.

CAUTION

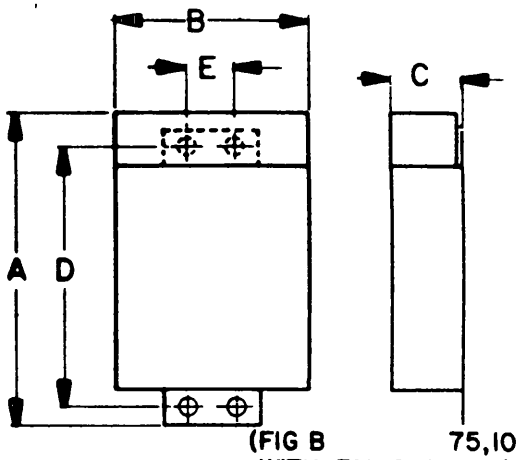
WHEN DRILLING CONDUIT OR OTHER HOLES IN THE CABINET, CARE MUST BE EXERCISED TO AVOID LETTING METAL CHIPS AND FILINGS GET INTO THE CONTROLLER. THEY CAN CAUSE ARCING AND SHORTING RESULTING IN DAMAGE TO THE CONTROLLER. ALWAYS COVER THE CONTROLLER BEFORE DRILLING, OR PRECUT CONDUIT HOLES PRIOR TO INSTALLATION.

CONTROLLER DIMENSIONS & WEIGHTS

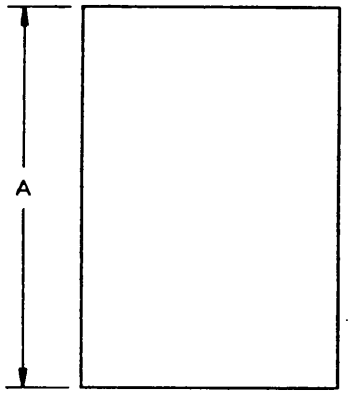
FIGURE	DESCRIPTION		DIMENSIONS (IN.)					WEIGHT (LBS.)
	VOLTAGE	HP	A	B	C	D	E	
FIG. A	230 VAC 460 VAC	1,2,3 1,2,3,5	23.0	13.5	6.5	20.5	5.5	48
	230 VAC	5	31.0	13.5	6.5	28.5	5.5	56
FIG. B	460 VAC	7.5,10	32.25	16.5	7.25	28.5	5.5	67



(FIG A 1-5 HP)



(FIG B 75,10 HP WITH FAN SHROUD)

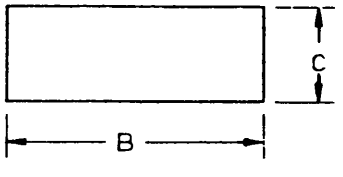


APPROXIMATE OPERATORS CONTROL STATION DIMENSIONS (INCHES)

NEMA 1 MODELS	A	B	C
70280K	7 00	3 00	2 75
70282Q	8 12	3 00	2 75
91018K/91019S	9 00	3 75	3 75

NEMA 13 MODELS (OILTIGHT)	A	B	C
70287Q	9 00	3 50	2 88
70288T	11 00	3 50	2 88
70290K	11 00	3 50	2 88

NEMA 4 MODELS (WATERTIGHT)	A	B	C
91022J	9 31	3 44	3 38
91021L	9 50	7 00	5 50



2. INPUT POWER

A. Connect the input power to terminals R(L1), S(L2), and T(L3) on the power terminal strip located near the bottom of the Controller, as shown on the Power Connection Diagram.

ENSURE THAT THE CORRECT NAMEPLATE VOLTAGE IS APPLIED. The two standard voltage ranges are as follows:

230VAC, +10%, -5% (253 to 218VAC)

460VAC, +10%, -5% (504 to 437 VAC)

CAUTION

EXCEEDING THE INPUT POWER +10% OR -5% LIMITS WILL DAMAGE THE CONTROLLER.

In applications where the input voltage will exceed the stated limits, the CUSTOMER MUST USE A STEP-DOWN/SET-UP TRANSFORMER. An optional buck-boost transformer is available for 5 and 10% line voltage reduction or boost.

Isolation transformers are available with ±5% voltage adjustments taps.

Transformers should be sized for continuous output KVA.

B. A ground connection must be made to terminal E on the Power Terminal strip as shown on the Power Connection Diagram.

TO MEET THE NATIONAL ELECTRICAL CODE, A FUSED MANUAL DISCONNECTING DEVICE OR 3-PHASE CIRCUIT BREAKER SHOULD BE INSTALLED BY THE USER IN THE AC INPUT LINE. SEE FIGURE 5 FOR FUSING. CONSULT YOUR LOCAL ELECTRICAL CODES FOR PROPER INSTALLATION.

CAUTION

DO NOT USE THE MANUAL DISCONNECTING DEVICE OR ANY TYPE OF INPUT CONTACTOR FOR "LINE" STARTING OR STOPPING THE CONTROLLER AS DAMAGE TO THE CONTROLLER MAY RESULT FROM FREQUENT DISCONNECTION AND RECONNECTION OF THE INPUT LINE.

3. MOTOR CONNECTIONS

A. NOTE: The Controller provides full motor control. No starters, contactors, or other devices are needed.

CAUTION

IT IS IMPERATIVE THAT THE CONTROLLER CHASSIS BE GROUNDED TO EARTH GROUND.

B. Connect the motor leads to terminals U(T1), V(T2), and W(T3) on the Power Board terminal strip, as shown on the Power Connection Diagram.

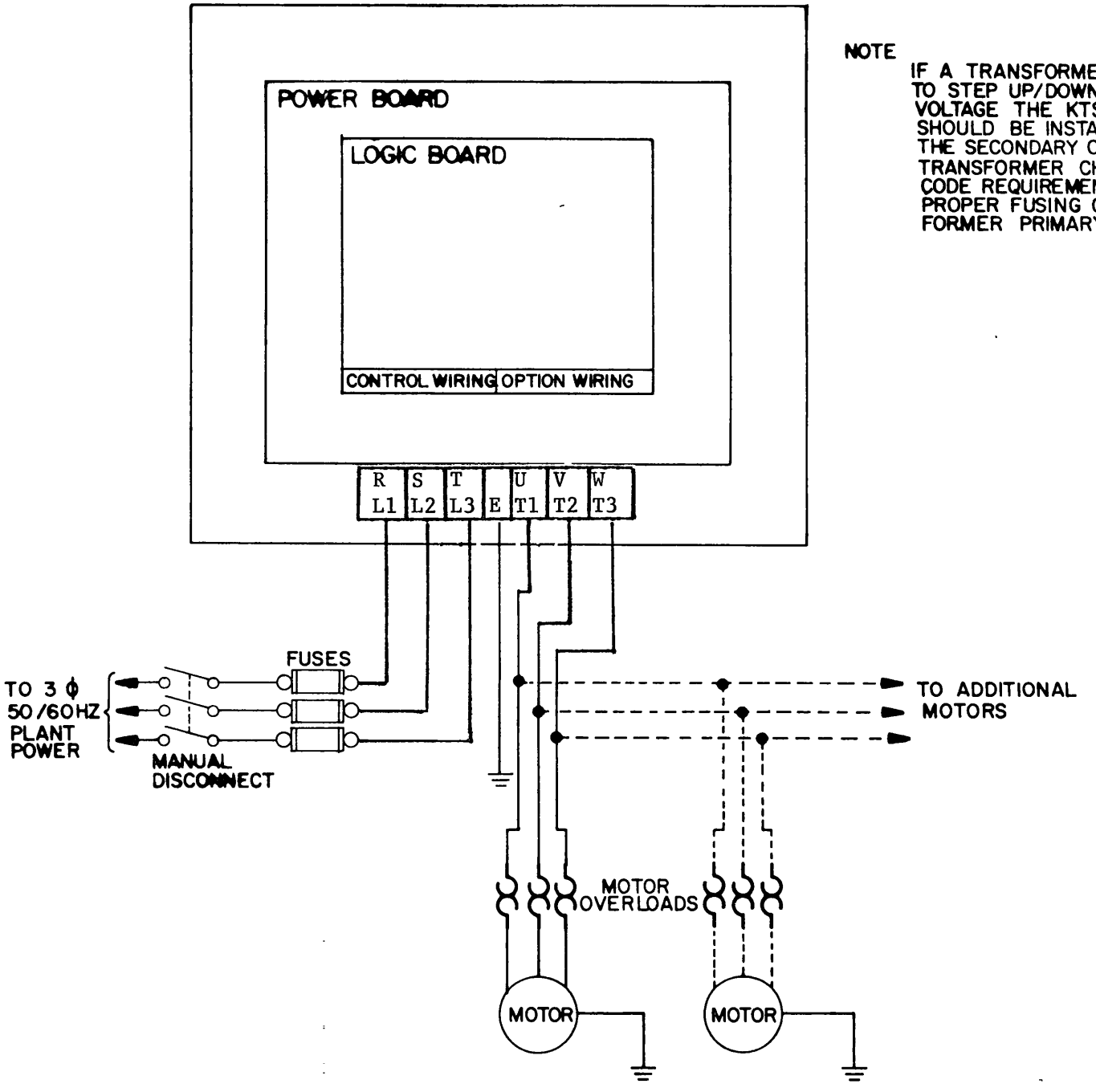
WARNING

A DISCONNECT TYPE SWITCH OR STARTER SHOULD NOT BE USED BETWEEN THE MOTOR AND THE CONTROLLER. INTERRUPTION OF THIS CIRCUIT WHENEVER THE CONTROLLER IS ENERGIZED CAN RESULT IN DAMAGE TO THE CONTROLLER.

NOTE

The use of properly sized motor overload relays is strongly recommended, in order to meet the National Electrical Code. Overload relays are necessary to protect the motor from high ambient temperatures or motor current overload conditions below the Controller current limit trip.

POWER CONNECTION DIAGRAM



NOTE

IF A TRANSFORMER IS USE TO STEP UP/DOWN THE LINE VOLTAGE THE KTS/KTN FU SHOULD BE INSTALLED ON THE SECONDARY OF THE TRANSFORMER CHECK LOC CODE REQUIREMENTS FOR PROPER FUSING OF TRANS FORMER PRIMARY

NOTE (cont'd)

The overload relay coil must be wired into the motor portion of the circuit, not into the Controller input circuit. The overload relay contacts must be wired in series with the Controller E-STOP circuit. Refer to Figure 1 for connection to the E-Stop circuit.

NOTE

Current limit on #1557 logic board is a timed function; if the motor load exceeds 150% of the inverters continuous current rating, the motor current is limited to 150% for a period of 60 seconds. If after 60 seconds, the overload still exists, the inverter will trip. Current limit on other logic boards initiates a trip instantly. Reference note 2 on page 26 for further information.

NOTE

Check the rotation of the motor. Make sure that forward is the correct direction of rotation for your operation.

If not, reverse the leads T1 and T3.

IMPORTANT

The Controller is not designed to protect itself from damage caused by phase-to-ground faults. The Louis Allis warranty does not cover damage to the Controller caused by phase-to-ground faults. On applications where phase-to-ground faults are common occurrances (i.e., washdown areas, mines, sewage treatment, high humidity areas, outdoor applications, etc.) add an option electronic ground fault protection or an optional isolation transformer. If your application is even susceptible to phase-to-ground faults, LOUIS ALLIS RECOMMENDS ONE OF THESE OPTIONS BE USED TO PROTECT YOUR UNIT.

4. CONTROL CONNECTIONS

A. CAUTION

FOR BEST PERFORMANCE AND/OR NOISE SUPPRESSION, RIBBON CABLE OR SHIELDED CABLE SHOULD BE USED FOR CONTROL WIRING. SHIELDED WIRE IS MANDATORY FOR RUNS EXCEEDING 50 FEET. SHIELD SHOULD BE TERMINATED AT LOGIC COMMON TERMINAL -6 ON TB1. WIRE SIZE SHOULD BE CALCULATED NOT TO EXCEED A 1 VOLT DROP AT THE LOGIC INPUT TERMINALS. CONTROL WIRES CONNECTED TO LOGIC TERMINALS TYPICALLY CARRY 12MA.

B. CAUTION

DO NOT PUT THE MOTOR LEADS AND INPUT HIGH VOLTAGE LINES IN THE SAME CONDUIT WITH CONTROL WIRINGS. HIGH VOLTAGE SWITCHING OF THE CONTROLLER CAN FALSELY TRIGGER THE LOW VOLTAGE CONTROL CIRCUIT.

C. WARNING

LOGIC BOARD COMMON AND CONTROL CIRCUITRY COMMON ARE INTERNALLY TERMINATED TO EARTH GROUND. ANY CONTROL CIRCUITRY CONNECTED TO THIS UNIT MUST NOT BE CONNECTED TO A HIGH VOLTAGE LINE.

NOTE: If you are using the standard control station, proceed to step E. If you are going to use your own control station, proceed to step F.

D. CAUTION

LOUIS ALLIS RECOMMENDS THE USE OF SUITABLE PUSHBUTTONS OR RELAY CONTACTS IN CONJUNCTION WITH THE LOGIC START/STOP CIRCUITRY TO PERFORM THE START/STOP FUNCTION. THE USE OF CONTACTORS, MOTOR STARTERS, ETC. MAY DAMAGE THE POWER MODULES AND REGENERATIVE CIRCUITY. REFER TO PAGE 31 FOR CORRECT WIRING.

E. Connect the control station to the Controller using the numbered terminal strip. DO NOT USE THE LETTERED TERMINAL STRIP.
NOTE: See Figure 2 for wiring instructions.

F. To use your own control station, the following parts are required.

NOTE

Maximum current drain for both TB1 and TB2 from +12VDC to common is 120mA.

1. Pilot Lights - Square D KP33 low current type.

2. Contact Blocks (pushbutton switches) Allen-Bradley Bulletin 800H Reed Blocks (low resistance type).

3. A 2.5K to 5K 2W Potentiometer.

4. Relays: Low Contact Resistance type.

5. Any suitable 12-pole terminal block.

6. Any suitable enclosure.

Use Figure 2 and Figure 3 for circuit wiring. See G below for special notes on control wiring.

G. Special Control Wiring Notes

1. Forward/reverse function. Controller will run in forward mode with logic terminal No. 2 open. Reverse is initiated by connecting terminal No. 1 to terminal No. 2.

To lock out the forward/reverse function, simply leave logic terminal 2 unconnected.

2. Jog Function. Jog function may be used only while the Controller is in the stop mode. The jog button should be wired between logic terminal No. 4 and 5. This is for SAFETY REQUIREMENTS; if a stop button is depressed, another remote station cannot jog. If the Controller is in the run mode, jog will have no effect.

3. TWO-WIRE CONTROL

A. There must be connections from terminal 1 to terminal 3 (run) and 5 (stop). See Figure 3 for circuit wiring.

B. There must be a speed pot connection (high side of pot connected to terminal 10, low side of the pot to terminal 6 and the center wiper to terminal 9). See Figure 4 for hookup.

C. It is not necessary for operation to have any meters or lights hooked up.

D. WARNING

TWO-WIRE CONTROL WILL PERMIT IMMEDIATE RESTART OF THE CONTROLLER AFTER A POWER OUTAGE OR INTERRUPTION. THIS MAY RESULT IN PERSONAL INJURY OR EQUIPMENT DAMAGE. CONTROL INTERLOCK MUST BE INCORPORATED TO PREVENT THIS AUTOMATIC RESTART WHEN POWER RESUMES.

FIELD ASSEMBLY - LANCER® Jr. SHROUD
MODEL 91031S (Used With 7.5 H.P. Controller)
MODEL 91032Q (Used With 10 H.P. Controller)

WARNING

Before installing the shroud assembly, ensure that there is a minimum 10" clearance above and below and power is disconnected before proceeding.

NOTE

If your unit has the factory installed power plug skip steps 2 & 3.

Remove the existing top end plate assembly and install the one provided in the kit.

Route the power wires as shown in the "Field Assembly Shroud" drawing #892911 and connect it to the "S" and "T" terminals.

CAUTION

When installing this unit on 10 HP models, ensure that the wire is "layed" into place and not pulled tight or mounted onto any part of the unit or circuit boards. Sufficient slack should be left in the end to prevent damage to the components.

Slip the side shrouds in place on either side of the unit. Each side shroud should cover all cooling fins on that side and rest in place without restraint.

NOTE

If for any reason they do not remain in place, a light piece of line may be used to secure them temporarily.

Install the fan shroud assembly as follows:

a. Plug the fan into the power plug in the top end plate assembly.

b. Slip the fan assembly over the ends of the side shrouds.

c. Mount the fan assembly to the side shrouds with two 6-32 x 1/4 screws. Do not tighten down too hard.

Clamp the bottoms of the side shrouds using the fan shroud strap as follows:

a. Wrap the strap around the side shrouds and fix in place with the 6-32 x 1/2 screws provided.

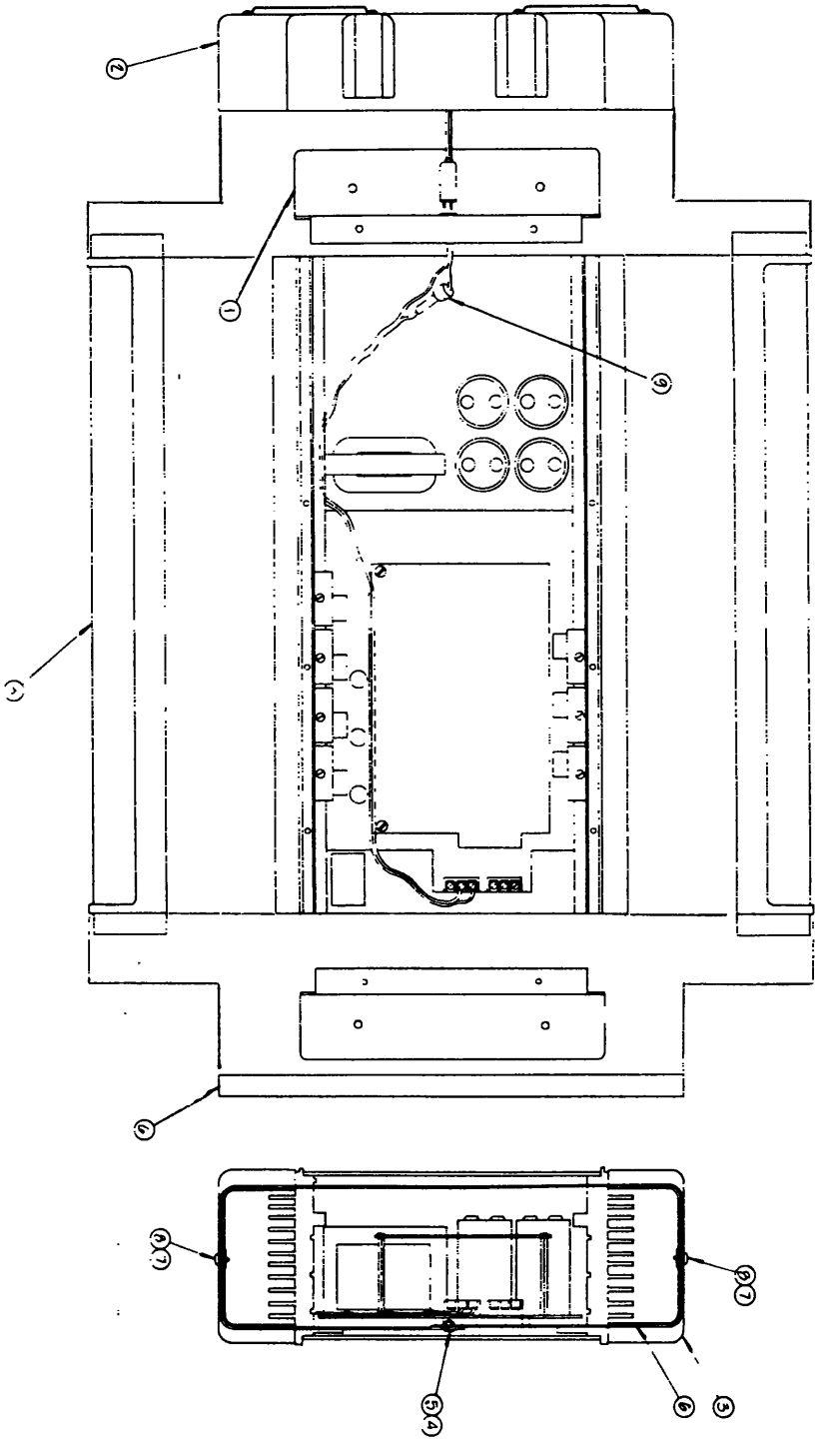
b. Pull the strap snug and bolt the two ends together using the hardware provided.

Install line fuse provided.

Reference Drawing #892911 immediately following.

ITEM	DESCRIPTION	QTY
9	FUSE 250V, 0.2A	1
8	SCREW, 8-32X3/8 PHMS PHIL	4
7	TINNERMAN NUT 8-32	4
6	BOTTOM STRAP	1
5	SCREW, 8-82X1/2 PHMB PHIL	1
4	NUT, HEX 8-32	1
3	SIDE SHROUD	2
2	FAN SHROUD ASS'Y	1
1	TOP END PLATE ASS'Y	1

FIELD ASSEMBLY SHROUD



Field Assembly Shroud

INTERNAL CONTROLS AND ADJUSTMENTS

(See photographs for location)

1. SETUP SWITCH, INVERTER ENABLE: This switch allows the setting of the minimum, maximum, acceleration/deceleration rates and jog speed controls without operating the motor. To place the inverter in the set-up mode, slide the set-up switch down. The amber inverter enable light, marked INVERT ENABLE, will be "off" in the set-up mode. Make all necessary adjustments. Place the inverter in "stop". Switch the set-up switch up to enable the inverter. The inverter enable light will be "on", and the motor will be enabled.

NOTE: The controller must be in the "STOP" mode when the setup switch is activated.

2. MIN (Minimum Speed Adjust): Located on the logic board, this control sets the speed output at the "0" setting of the speed potentiometer on the operator's station. The adjustment is from 0 to 25Hz.

> CAUTION
> AT "0" SPEED SETTING, THE MOTOR WILL BE RECEIVING IDLE CURRENT (EVEN WHEN NOT TURNING). TO ELIMINATE CURRENT FLOW, THE STOP FUNCTION MUST BE ACTIVATED.

3. MAX (Maximum Speed Adjust): Located on the logic board, this control sets the speed output at the "10" setting of the speed potentiometer on the operator's station. The maximum speed is normally adjusted to 60Hz at the factory before shipping. For applications requiring 120Hz, the Converter output Frequency can be limited from 40 to 120Hz. See CAUTION relative to decel control setting.

4. JOG SPEED: The speed of the AC motor is proportional to the frequency supplied to it. The JOG potentiometer varies the frequency supplied to t motor between 0 and 20Hz as long as the JOG pushbutton on the Operator Control Station is pressed.

5. ACCEL: Located on the logic board, this control sets the rate at which the motor will accelerate from 0 to the set speed. The lower this setting (slow accel), the less starting current will be drawn. If this control is set too high, the controller will initiate internal current limiting circuitry and trip. Acceleration time range adjustment is from 2 to 30 seconds for 120Hz.

NOTE

Logic Board 1556 ACCEL pot rotated CCW increases accel time; rotation CW decreases accel time. Logic Board 1557 ACCEL pot rotated CCW decreases accel time; rotation CW increases accel time.

6. DECEL: Located on the logic board, this control sets the rate at which the motor will decelerate when the speed control potentiometer is turned from full scale frequency to zero. Time range adjustment is from 2 to 30 seconds for 120Hz. If this control is set at too high a rate, the overload light will illuminate, and the unit will trip off. The motor will then coast to a stop at a rate based on the friction and inertia of the load.

> CAUTION
>
> IN APPLICATIONS REQUIRING 120HZ OUTPUT, THIS CONTROL SHOULD BE SET TO MINIMUM (VERY SLOW) PRIOR TO ADJUSTING MAXIMUM SPEED ADJUST. MINIMUM DECEL SETTING ON LOGIC BOARD #1557 IS FULLY COUNTERCLOCKWISE. MINIMUM DECEL SETTING ON ALL OTHER LOGIC BOARDS IS FULLY CLOCKWISE.

7. BOOST:

Located on the logic board, this control sets the amount of voltage the unit will supply to the motor during the first 20 Hz of operation.

8. V/HZ:

Located on the logic board, this control sets the ratio between the output voltage and frequency that the controller will supply to the motor.

9. CURRENT LIMIT:

In the LANCER ^{R} JR, the current limit is located on a plug-in card on the power board.

The current limit is factory set at 150% of the controller's running amperes. The current limit can be adjusted to a lower setting as follows:

1) Lock the motor rotor.

2) Make sure minimum speed adjust is set at "0".

3) Make sure the speed potentiometer is set at "0".

4) Measure output amperage on each leg using a true RMS ampmeter.

5) Start the controller and slowly rotate the speed potentiometer until the desired current trip point is reached, as indicated by the ammeter.

6) A. Part # 1556 Logic PCB and corresponding Current Limit Card

Slowly rotate CURRENT LIMIT pot counter-clockwise until unit trips as indicated by the TRIP LED on the Logic PCB. Proceed to step 7.

B. Part # 1557 Logic PCB and corresponding Current Limit Card

Slowly rotate CURRENT LIMIT pot clockwise until the Current Limit LED on the Logic PCB illuminates thus indicating that a limiting condition exists. The controller would trip (TRIP LED on Logic would illuminate(if the current limiting condition were maintained for 60 seconds. Adjustment is complete.

7) To reset the trip mode, depress STOP and restart.

When the controller is started, the motor will accelerate to the preset speed set by the speed control potentiometer at the rate set by the accel potentiometer on the logic board. When the speed potentiometer is reset to a lower speed, the motor will be decelerated to the new setting at the rate set by the decel potentiometer on the logic board.

10. CONTROLLED STOP:

When the STOP pushbutton is pressed, the motor speed will decrease to zero at a rate determined by the DECEL potentiometer.

IMPORTANT

FOR DRIVES EQUIPPED WITH CONTROLLED STOP, AN EMERGENCY STOP (E-STOP) PUSHBUTTON SHOULD BE USED TO BYPASS THE CONTROLLED STOP FEATURE IN CASE OF AN EMERGENCY. THE E-STOP PUSHBUTTON MAY BE OCS MOUNTED OR IN ANY ACCESSIBLE LOCATION.

NOTE

For further information on braking, read note 3 BRAKING on page 26.

11. HIGH AND LOW VOLTAGE TRIP:

These adjustments are factory set and should not be adjusted.

SET-UP PROCEDURE

(See photographs for location of controls and adjustments.)

1. Set the set-up/operate switch (located on the logic board) to the SETUP position.

2. Turn on the master AC power and wait for at least three seconds. (The STOP light AC ON, and either the FWD or REV light will be illuminated on the operator station, and the amber enable LED will be OFF.

   For Neon Lamps on Power Modules -- All NEON lamps on the power modules and the regen modules should be illuminated and no Neon lamps on the power board should be illuminated. DO NOT CONTINUE if the status of the lamps is not observed. Refer to the troubleshooting section.

   For Red LED indicators on power modules -- All Red LED indicators and the Neon lamps on the power board should not be illuminated. The Neon on the regen module should be illuminated. DO NOT CONTINUE if the status of the lamps is not observed. Refer to the troubleshooting section.

3. To set the maximum speed, depress the RUN button and rotate the speed pot fully clockwise, then counterclockwise while observing the meter. (If your application does not use the standard Controller remote station, see 3A.)

   The meter should indicate speed change as the speed pot is rotated. Turn the speed pot fully clockwise. Set the maximum speed desired using the meter by rotating the maximum speed adjustment pot on the logic board.

3A. THIS STEP ONLY FOR APPLICATIONS WHICH DO NOT USE THE STANDARD CONTROLLER REMOTE CONTROL STATION.

   Use a VOM type meter connected between logic terminal 6 (common) an . (positive) with the range set at 10 volts DC full scale. Do step 3 by using the voltmeter as a hertz meter. The voltage at logic terminal #12 will indicate the frequency very closely at a rate of 12 Hz per volt.

   NOTE. For best results, use a high impedance digital multimeter while reading voltages across terminals 6 and 12.

4. To set the minimum speed, rotate the speed pot fully counterclockwise. Set the minimum speed desired by rotating the MIN speed adjustment pot on the logic board.

5. Repeat steps 3 and 4, as there is a slight interaction between these two controls.

6. While rotating the speed pot fully clockwise and then counterclockwise, set the desired acceleration and deceleration rates by adjusting the appropriate "ACCEL" or "DECEL" adjustment pot on the logic board.

   NOTE: The Controller incorporates special circuitry when relatively long acceleration times are set. The Controller will accelerate rapidly to 5 Hz to achieve faster motor rotor synchronization, and then accelerate at the rate set on the "ACCEL" adjustment pot. This step start is overridden when the speed pot is set at "0", and the minimum speed is set above 5 Hz.

7. Depress the "STOP" button.

8. If the jog function is to be used, push the "JOG" button and set the jog speed by rotating the JOG adjustment pot on the logic board.

NOTE: The jog acceleration rate is independent of the "run" acceleration and is set at the factory.

9. Depress setup switch to the operate position so that the amber INVERTER ENABLE LED is lit.

10. V/HZ ADJUSTMENT: This control is factory adjusted for a 460V output at 60Hz (230V on 230V controls). This setting allows constant V/Hz operation up to 60Hz and constant voltage operating from 60 to 120Hz.

The voltage may be optimized for a given application (motor and load) by observing the motor current with a clamp-on meter. Run at maximum speed and load and adjust the V/Hz pot for minimum current. This adjustment will assure optimum motor voltage at best efficiency for the application.

For applications in which constant V/Hz (constant torque) is required above 60Hz (to 120Hz), use a 460V controller and a motor connected for 230V. (Note controller must be rated for the motor current at the 230V connection).

Adjust the V/Hz control as follows:

1. Prior to starting the controller, set the V/Hz pot to zero (CCW), and then turn 1/5 of a revolution CW. Put a clamp-on meter on a motor lead.

2. Push the RUN pushbutton.

3. Ensure that the application is operating at worst case loading.

4. Increase speed slowly to about 40Hz. If the motor does not start, increase V/Hz slightly. At 40Hz (motor loaded) adjust V/Hz for minimum motor current.

5. Continue to increase speed, in steps, readjusting the V/Hz pot at each point until top speed and load are reached.

NOTE

V/HZ AND BOOST ADJUSTMENTS SLIGHTLY INTERACT; ADJUSTING ONE MAY REQUIRE ADJUSTMENT OF THE OTHER.

11. BOOST ADJUSTMENT: This control is factory adjusted to allow proper starting under most conditions. Under some circumstances, such as high inertia or high friction loads, this setting may not provide enough boost. If the motor does not start, or if the controller trips off at low speed while accelerating, proceed as follows:

1. If the load has high inertia and the controller trips while accelerating, increase the accel time.

2. If the adjustment does not solve the problem, or if the load has high starting friction, increase the BOOST pot setting slightly (CW) until proper starting and acceleration are obtained. DO NOT ADJUST BOOST BEYOND THIS POINT. Too high a setting will also cause a trip or may overheat the motor.

Some motors may require less boost than normal. If the controller trips off when the run button is first actuated or when the motor is operated at a low constant speed, reduce the BOOST setting.

At very load speeds, the shaft will tend to step rather than turn smoothly. This condition is normal. However, if these steps cause excessive noise in the motor or couplings, reduce the BOOST setting. The best setting is the lowest which will allow proper starting and acceleration of the connected load.

Follow the procedure below to obtain best operation:

1) Place a clamp-on ammeter (amprobe) on one of the motor leads.

2) Place the controller in "run".

3) Ensure that the application is operating at worst case loading.

4) Set the SPEED control for 15 Hz.

5) Adjust the BOOST adjustment until you achieve minimum current.

NOTE: CW - INCREASE VOLTAGE OUT

CCW - DECREASE VOLTAGE OUT

12. SYNCHRONOUS MOTOR MODIFIED UNITS: Synchronous motor modified units include special output chokes. These chokes must be wired in series with the output side of the controller which goes to the motor (i.e., between controller and motor). These chokes will protect the unit if the motor is ever overloaded and the motor is pulled "out of synchronous".

The three most important adjustments in a synchronous motor drive are:

1. Acceleration rate.

2. Low speed boost level.

3. Volts/Hz.

The acceleration rate must be reduced for synchronous motors since they will attempt to draw a starting current of approximately 10 times the running current when starting at a fast accel rate. In order to minimize the starting currents that can cause the unit to trip out, a slower acceleration rate should be used. Sufficient low speed boost is required to keep the motor in synchronization at low speed. Proper Volts/Hz must be maintained to ensure stable operation of the motor. If any one of the three adjustments is not at the proper level, the unit will trip out, or the motor will operate in an unstable manner, i.e., not in synchronization.

SPECIAL NOTES

1. START CONDITION

The Controller will start only when either of two circumstances exist. Either the logic input terminal 3 (run) and terminal 5 (stop) must be brought up to logic level "1" (12 volts DC) simultaneously, or terminal 5 (stop) brought up before terminal 3 (run). The Controller will not initiate a run mode if terminal 5 (stop) is not at logic level "1" (12 volts DC).

2. CURRENT LIMIT TRIP

All units have a current limit trip circuit. Logic Board #1557 current limit trips if the motor load exceeds 150% of rated current for 60 seconds. All other # Logic Boards current limit trip instantly when the motor load exceed 150% of rated current. When the trip occurs, the Conroller deenergizes immediately and the motor will coast to a stop. The TRIP light in the operator station and a red LED on the Logic Board will be illuminated. To reset the overload, simply push the STOP button, then the Controller is ready for restart. If the Controller should go into current limit during acceleration or deceleration, the acceleration and deceleration ramps will automatically be adjusted to a rate that will allow the Controller to accelerate or decelerate at 150% current to the motor. If this is a repetitious occurrence, re-adjust the accel and/or decel potentiometers to a slower setting. If this condition occurs repeatedly during normal run conditions, check machine for smooth operation and/or motor/Controller sizing for the specific application. If the load to be driven by the Controller requires high peak currents, it may have to be oversized to avoid nuisance overload trips. Consult factory in such applications.

3. BRAKING

A mechanical or electro-mechanical brake may also be used for braking. A 12VDC miniature relay with a coil drawing less than 6mA such as P&B R10S-E1-Y2-J2.5K can be connected to terminals H&K on the Logic Board. A contact to this relay can then be used as a pilot device for the brake. This relay will not be energized in the set-up mode.

4. AUTOMATIC DYNAMIC BRAKING

The Controller contains automatic dynamic braking circuits so that the energy from motor regenerative loads can be absorbed without damage. The Controller can handle a maximum 125% of the motor load rating for a 12% duty cycle; i.e., the generation can be on for 7.2 seconds, then must be off for 52.8 seconds during each minute. The dynamic braking (DB) load resistor is connected to the terminals on the power board as shown on the connection diagram. When the Controller is in the DB mode, a neon bulb on the power board will be illuminated.

5. CONTROLLED STOP

The STOP pushbutton in the operator control station or the opening of the relay contact (2 wire control) across pins 1 and 3 on the Logic Board will activate the Controlled Stop. Controlled Stop decelerates the motor to zero speed, at a rate determined by the decel potentiometer. Once zero speed is attained, all outputs to the motor are opened.

6. FREQUENCY COUNTER OUTPUT

A standard frequency counter output is available at terminal "E" (ground) and "I". This signal is the motor frequency which is 12 volts peak-to-peak DC reference. The motor frequency signal is a symmetrical square wave loaded with a 10K resistor to prevent ringing in your frequency counter cables.

OPTIONS

1. ANAOLG RATIO CONTROL (Analog Master Reference/Slave Ratio Control)

   This modification enables two or more Controllers to be associated together such that all units will derive their speed signal from the unit that is chosen as "Master". In addition, the common speed relationship can be modified by a speed ratio adjustment for each "Slave" unit. (eg: if a slave's speed ratio is set for 37%, that slave will always run at 37% of the speed of the master, within the limits of the slave's min/max speed, and accel/decel adjustments). The ratio accuracy is 1% and the maximum ratio range is 10:1. The modification consists of a master card that plugs into a card holder on the logic board of the Controller chosen as master, a slave card to plug into the Controller designated as slave and an analog Master/Slave Ratio Control in a NEMA 1 enclosure. Either common or individual Run-Stop-Jog-Forward/Reverse functions can be used, depending upon the operator's control elements chosen for the system.

2. TACHOMETER FOLLOWER

   The standard Controller derives its speed setting from a manually adjusted potentiometer in the operator's control station. This manual arrangement may be replaced or supplemented by the tachometer follower modification which permits the Controller to follow an "auto" speed signal from a tachometer generator driven by another motor or another machine. The modification consists of an interface card that plugs into a card holder on the logic board. The tachometer generator is not included, but should be an industrial type which will produce 50VDC per 1000 RPM. If availability of a manual speed function is still desired, an appropriate operator's station including a two-pole Man/Auto speed mode selector switch should be chosen as part of the system.

3. DIGITAL SLAVE RATIO CONTROL

   Often an application requires exact speed matching, but with the added ability to establish a settable ratio between the master reference source and the slave Controller. This is the function of the Digital Slave Ratio Control (DSRC). The DSRC can be used to associate the slave in a precise digital ratio relationship with a standard analog Controller (designated the master). The DSRC consists of a Digital Slave Ratio Receiver card and a Digital Master Transmitter card that replace, respectively, the standard programming cards of the logic boards in the Controllers designated as slave and master. The modification also includes a separate NEMA 1 enclosure which includes three thumbwheel switches that permit a ratio range of 99.9% to 0.1% to be preset.

4. TACHOMETER FEEDBACK

   The standard LANCER JR Controller is specified as having base speed regulation of approximately 3%, depending upon motor slip, with the standard open loop system. The tachometer feedback modification will improve the base speed regulation to 1%, by using actual shaft RPM feedback information from a tachometer generator driven by the motor shaft. The modification consists of an interface card that plugs into a card holder on the logic board. The tachometer generator is not included, but should be an industrial type which will produce 50VDC per 1000 RPM.

5. PROCESS SIGNAL FOLLOWER (4 to 20mA)

   Similar to tachometer follower (item 2) except that the Controller is arranged to follow a 4 to 20mA signal from a process controller or other transmitter. The modification consists of an interface card that plugs into a card holder on the logic board.

If manual speed function is also desired, choose any appropriate operator's control station as shown on Figure 2.

6. PROCESS SIGNAL FOLLOWER

The Process Signal Follower accepts a 0-10 VDC signal from a Process Control Transmitter and delivers a corresponding isolated 0-10VDC Speed Control Signal to the Lancer Jr. Controller.

7. 3-15PSI SIGNAL FOLLOWER

The 3-15PSI Signal Follower converts a 3-15PSI pneumatic pressure signal to a proportional 0 to 10VDC voltage signal for speed reference control of the LANCER Jr. controller. The 0 to 10VDC output signal is isolated from the 3-15 PSI follower enclosure and thus isolated from earth ground.

8. OSCILLATOR FOLLOWER

This modification enables two Lancer Jr. Controllers to be associated together such that both units will run exactly at the frequency set on the unit that is chosen as "master". The modification consists of a master card that plugs into a card holder on the logic board of the Controller chosen as master and a slave card to plug into the logic board of the Controller designated as the slaves. Either common or individual Run and Stop functions can be used depending upon the operator's control elements chosen for the system. Jog not available. Fwd/Rev preselection possible when unit is in off mode. This modification provides hardware for one master and one slave. A total of 10 slave Controllers may be associated with one master Controller.

The master Controller requires a transmitter card in its logic board and each slave requires a receiver card in its logic board. Please note that the accel/decel, jog, and minimum/maximum functions of the slave units are disabled when operating on this mode. Running reverse of the slave unit is also disabled.

9. OPTION EXTENDER

This modification permits up to three options on one unit and includes a low current 12VDC pilot relay that can be used to provide a run on trip function indicating contact. It consists of a NEMA 1 enclosure containing a suitable relay, three option card sockets and a suitable terminal strips. In addition, a 30" ribbon connector with a plug to connect it to the option socket of the unit, is furnished.

10. GROUND FAULT PROTECTION

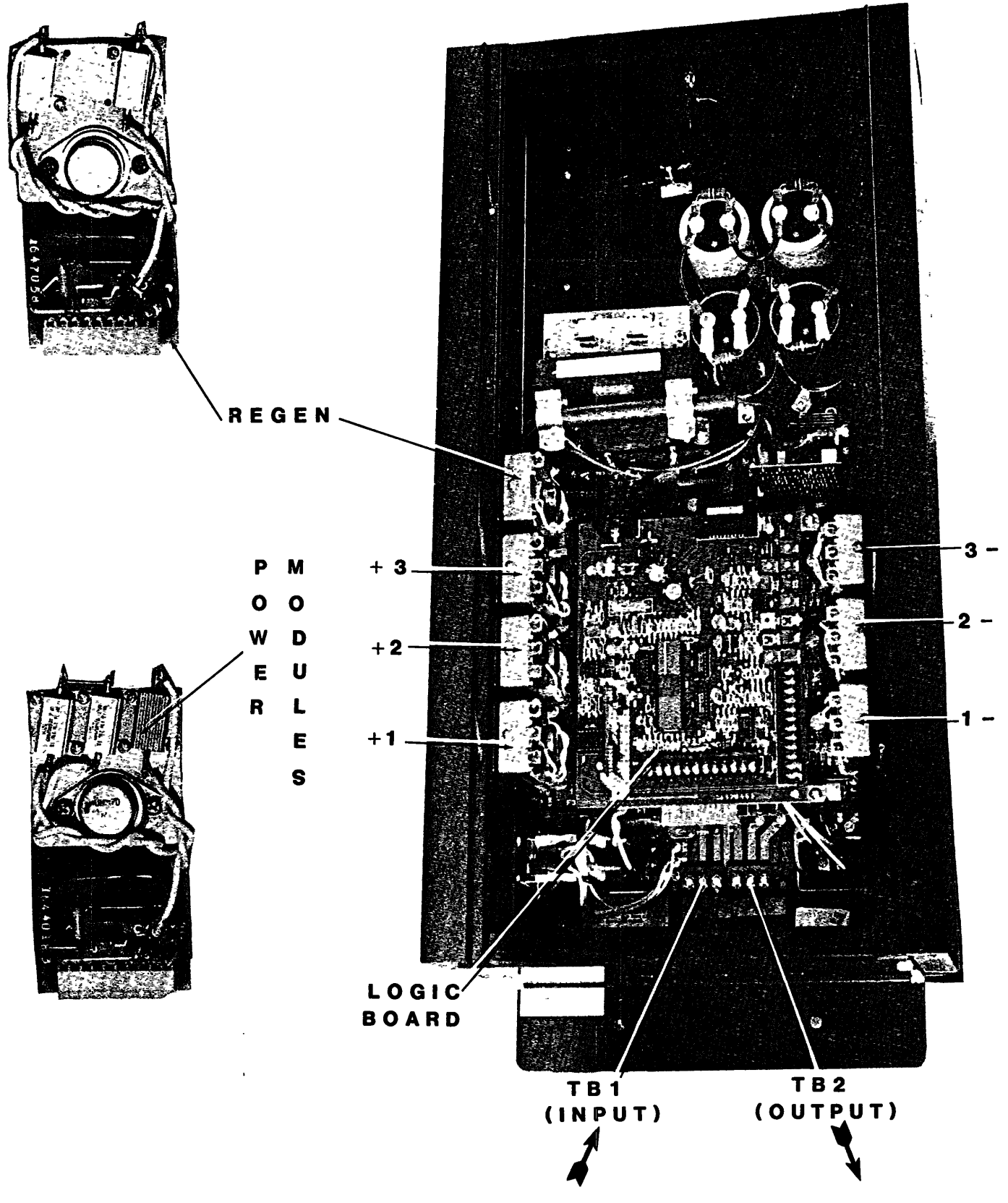
Makes it possible to attain ground fault protection without the use of an isolation transformer.

Serial #5000 and above have the ground fault circuitry incorporated in the Logic Board #1557. Installation is as described below:

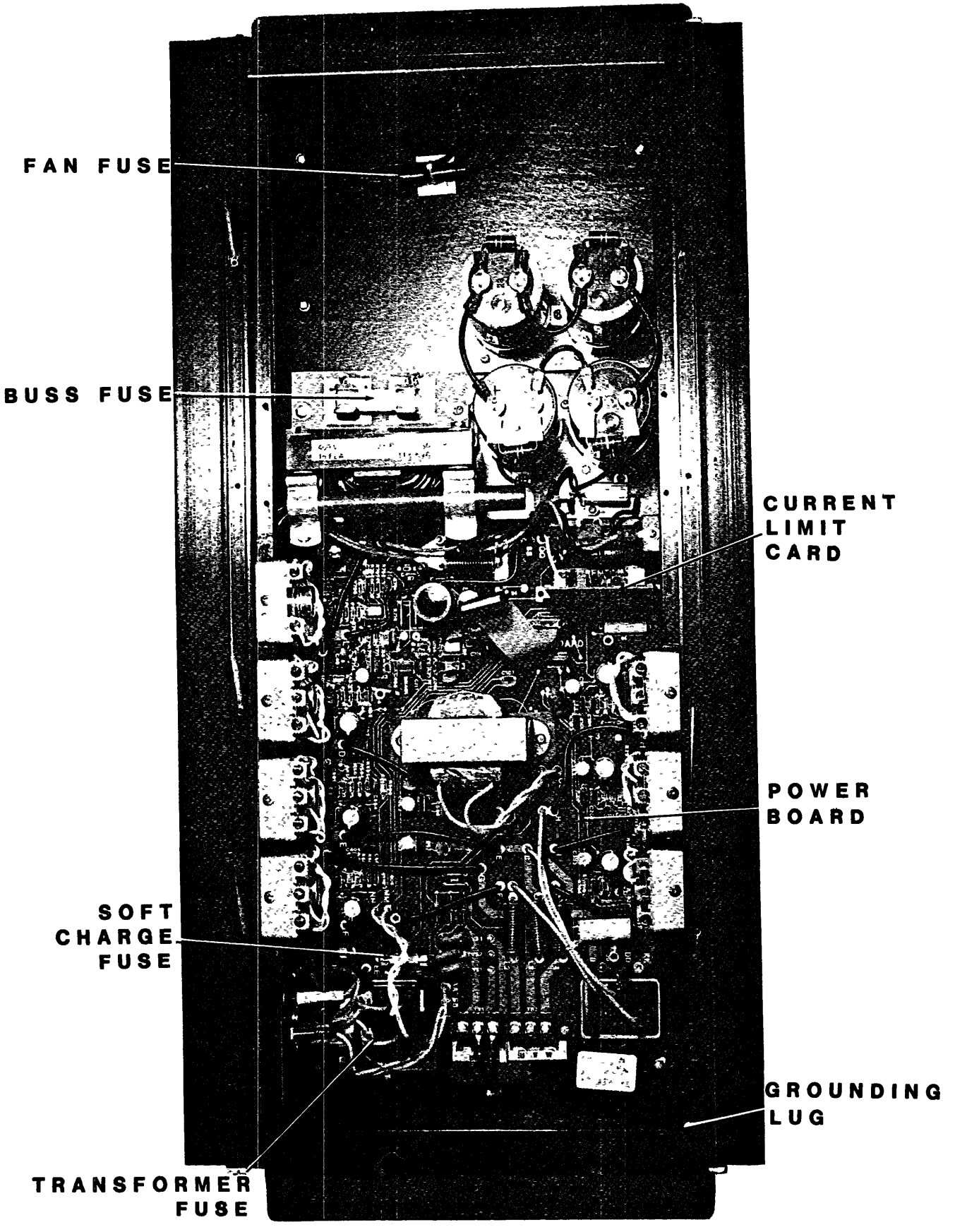
1. Remove the standard end plate and install the ground fault protection end plate.

2. All connections made to the power section of the inverter are made via quick connect plugs.

A ground fault protection retrofit kit is available for serial #4999 and below. If you wish to retrofit an existing serial #4999 and below drive, consult your local Louis Allis District Office.

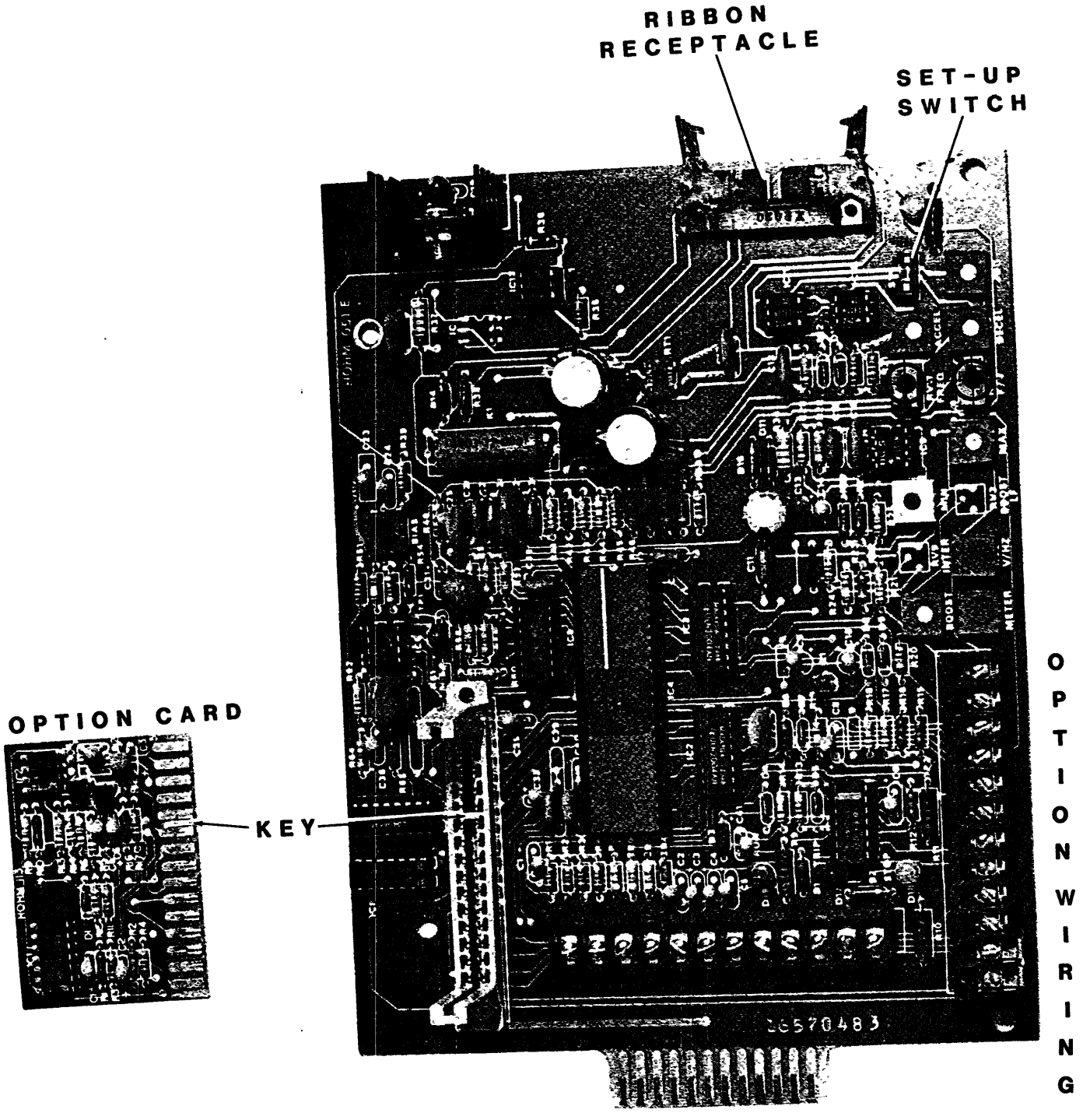


LANCER® JR (COVER REMOVED)

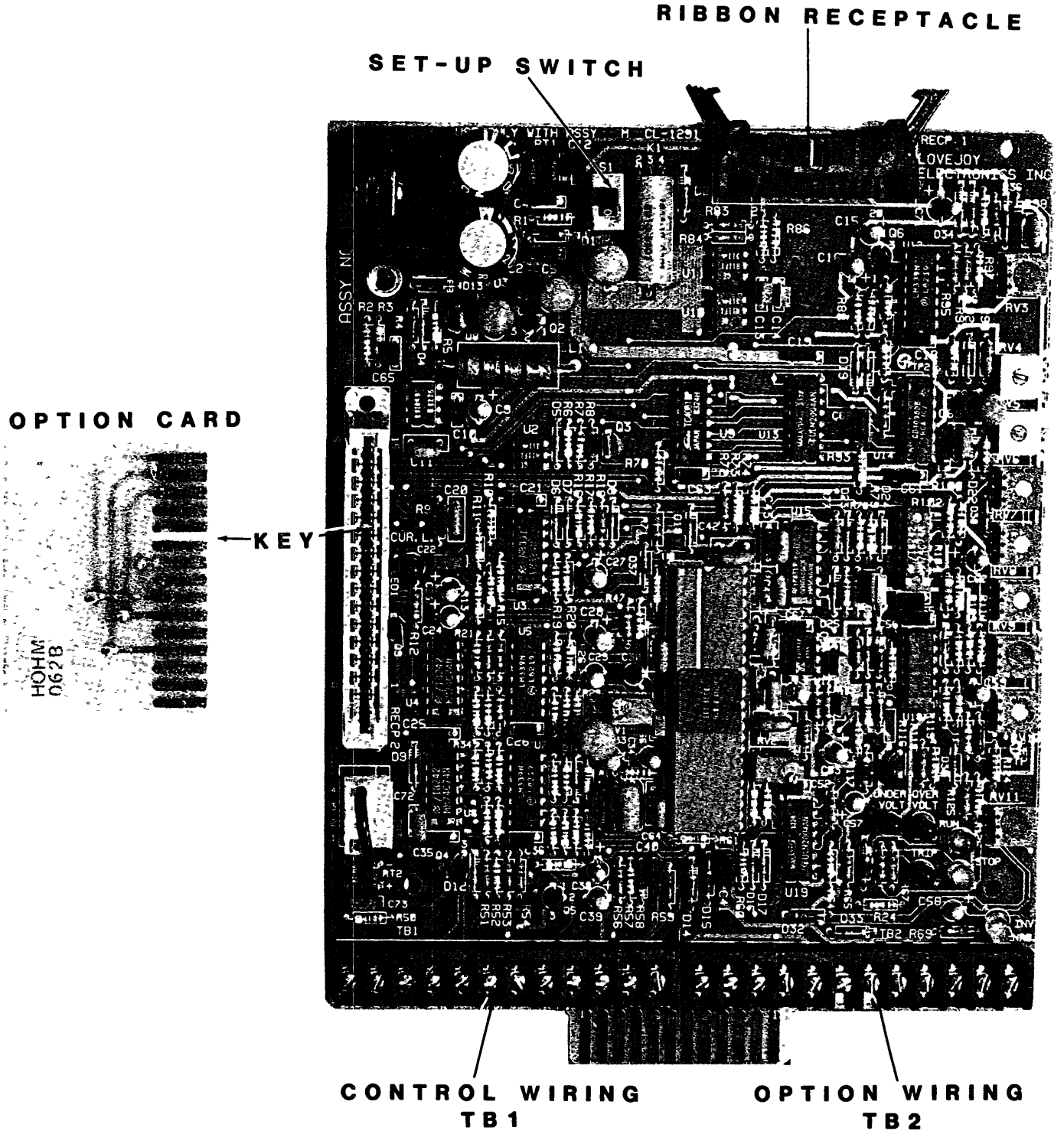


LANCER® JR (LOGIC BOARD REMOVED)

LOGIC BOARD
PART #1556 SERIAL #4000 THRU 4999

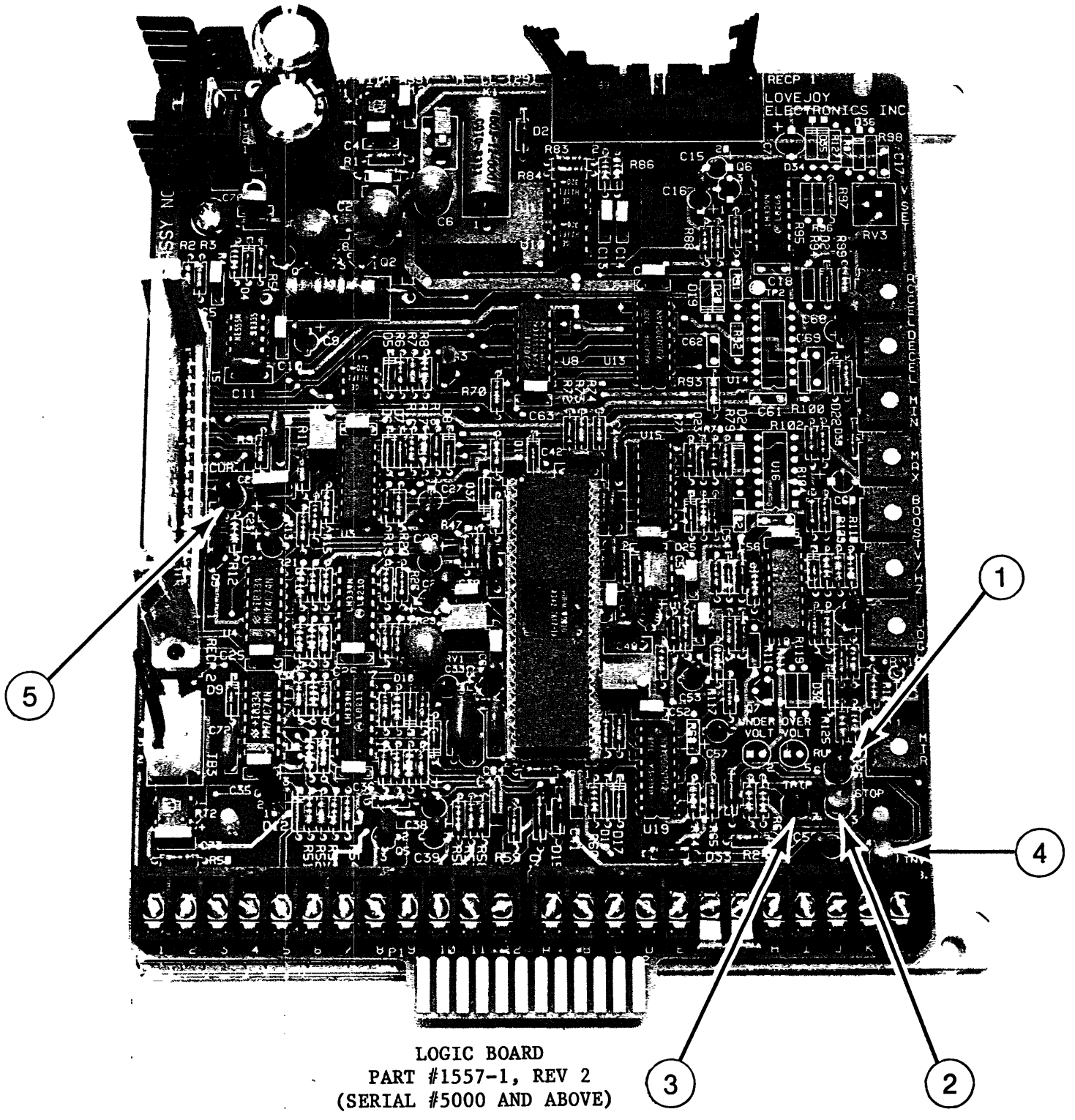


FACTORY ADJUST ONLY



LOGIC BOARD

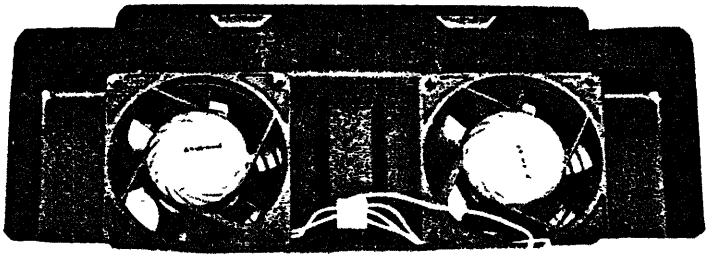
PART #1557-1 REV 1 SERIAL #5000 AND ABOVE



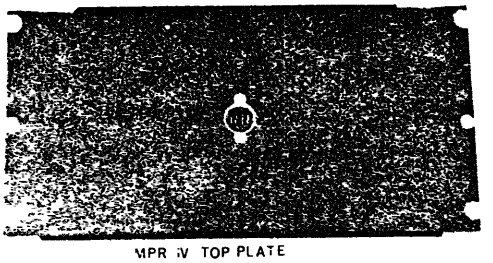
LOGIC BOARD
PART #1557-1, REV 2
(SERIAL #5000 AND ABOVE)

CALLOUTS (LEDs)

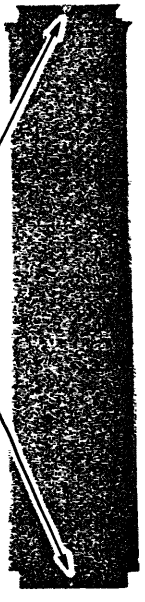
1. RUN (Green)
2. STOP (Orange)
3. TRIP (Red)
4. INV. ENABLE (Yellow)
5. CUR. L. (Red)



MUFFIN FAN ASSEMBLY

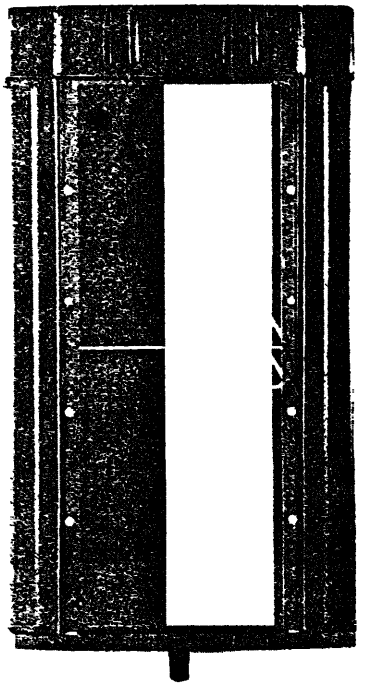


MPR IV TOP PLATE

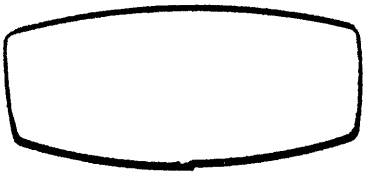


TANNERMAN NUTS

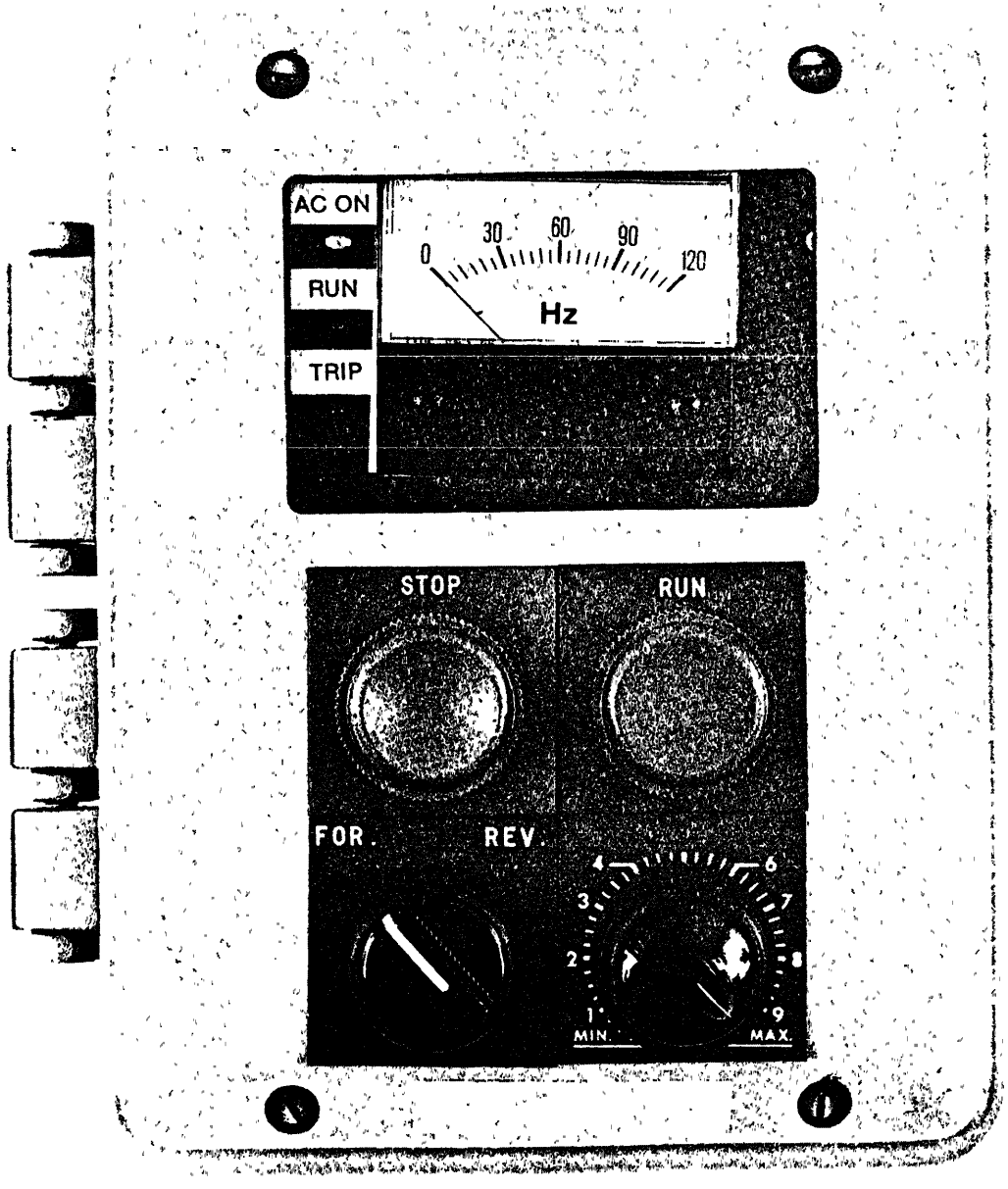
SHROUD ASSY

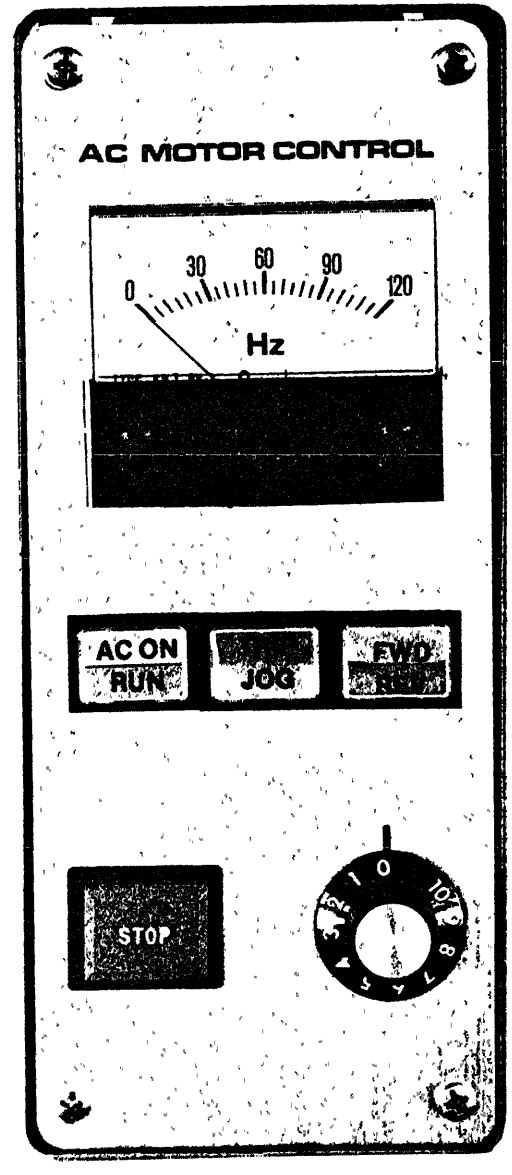


SHROUD ASSY



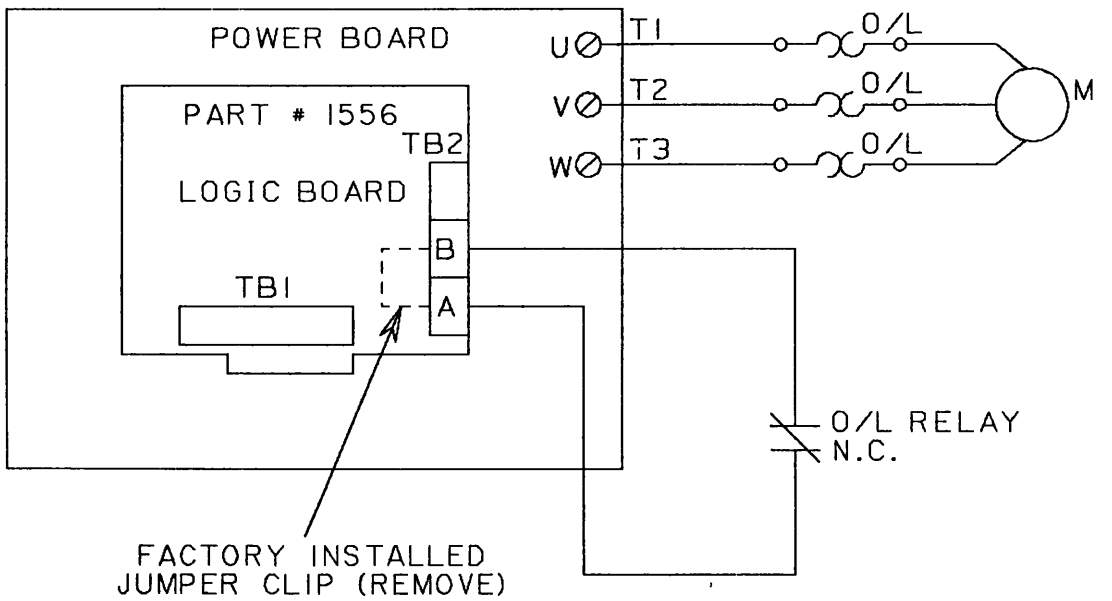
STRAP ASSY





NEMA 4
REMOTE

SERIAL NUMBER 4000 TO 4999



SERIAL NUMBER 5000 AND ABOVE

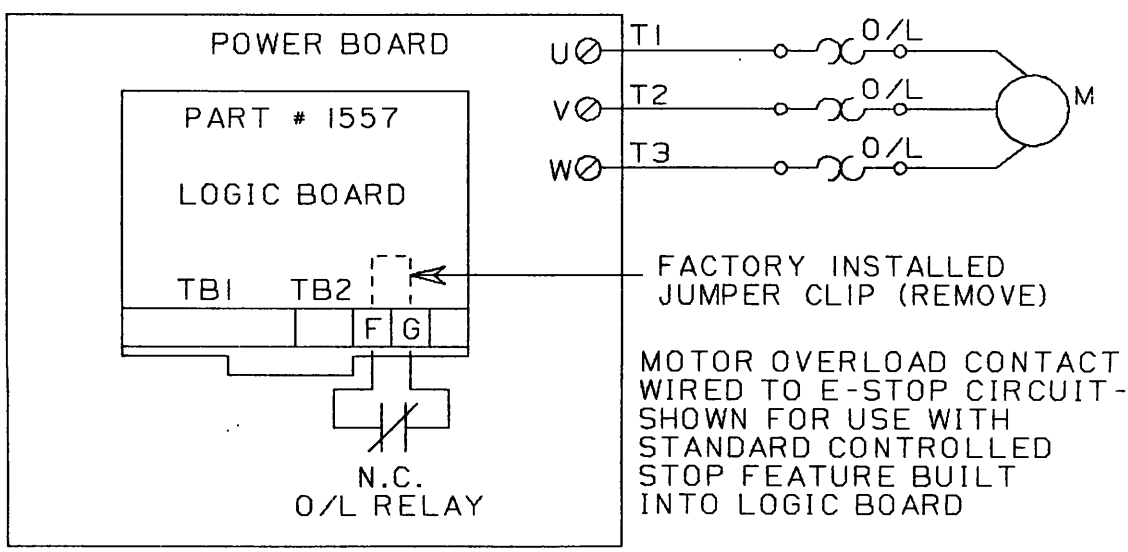


FIGURE 1

FIG 1

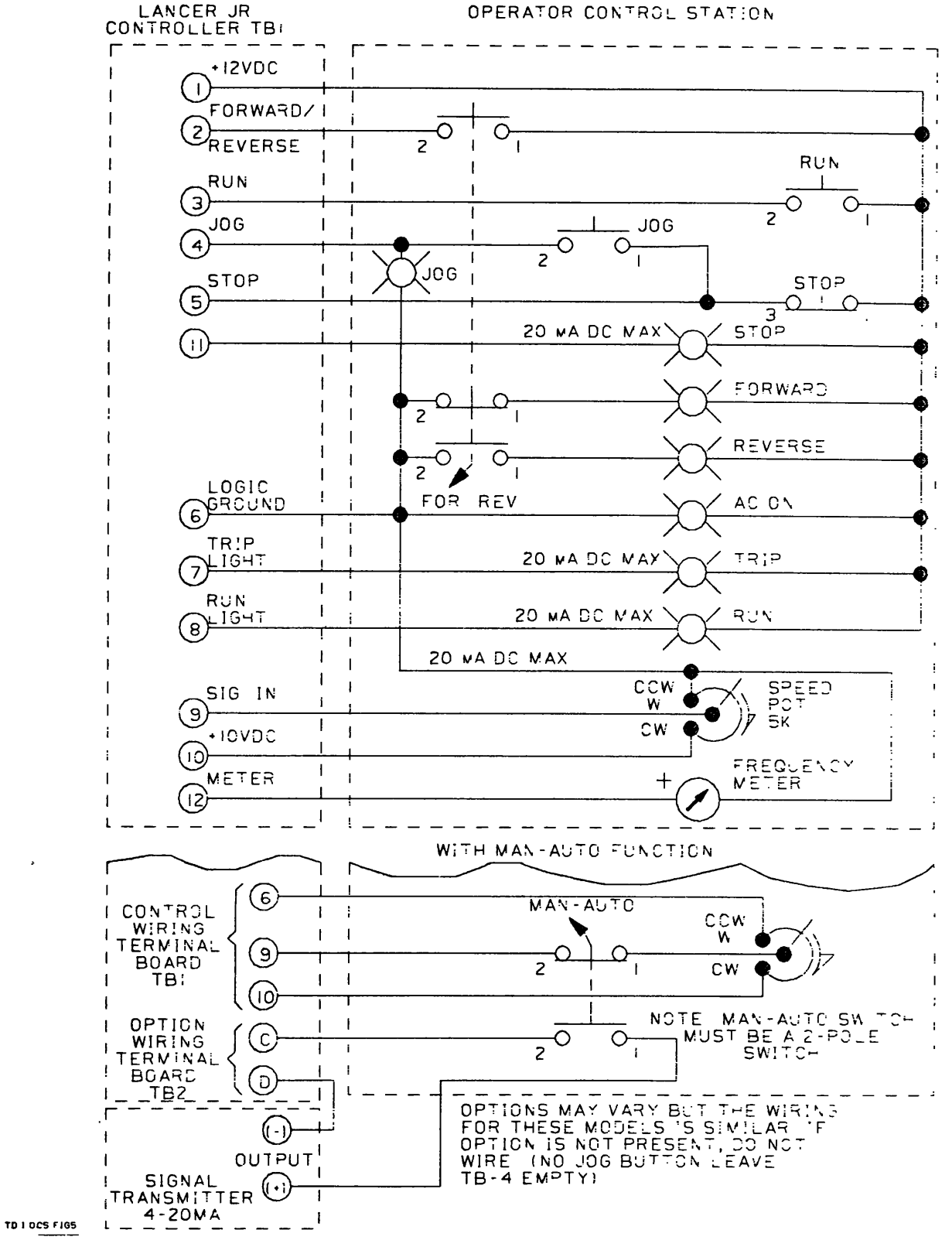
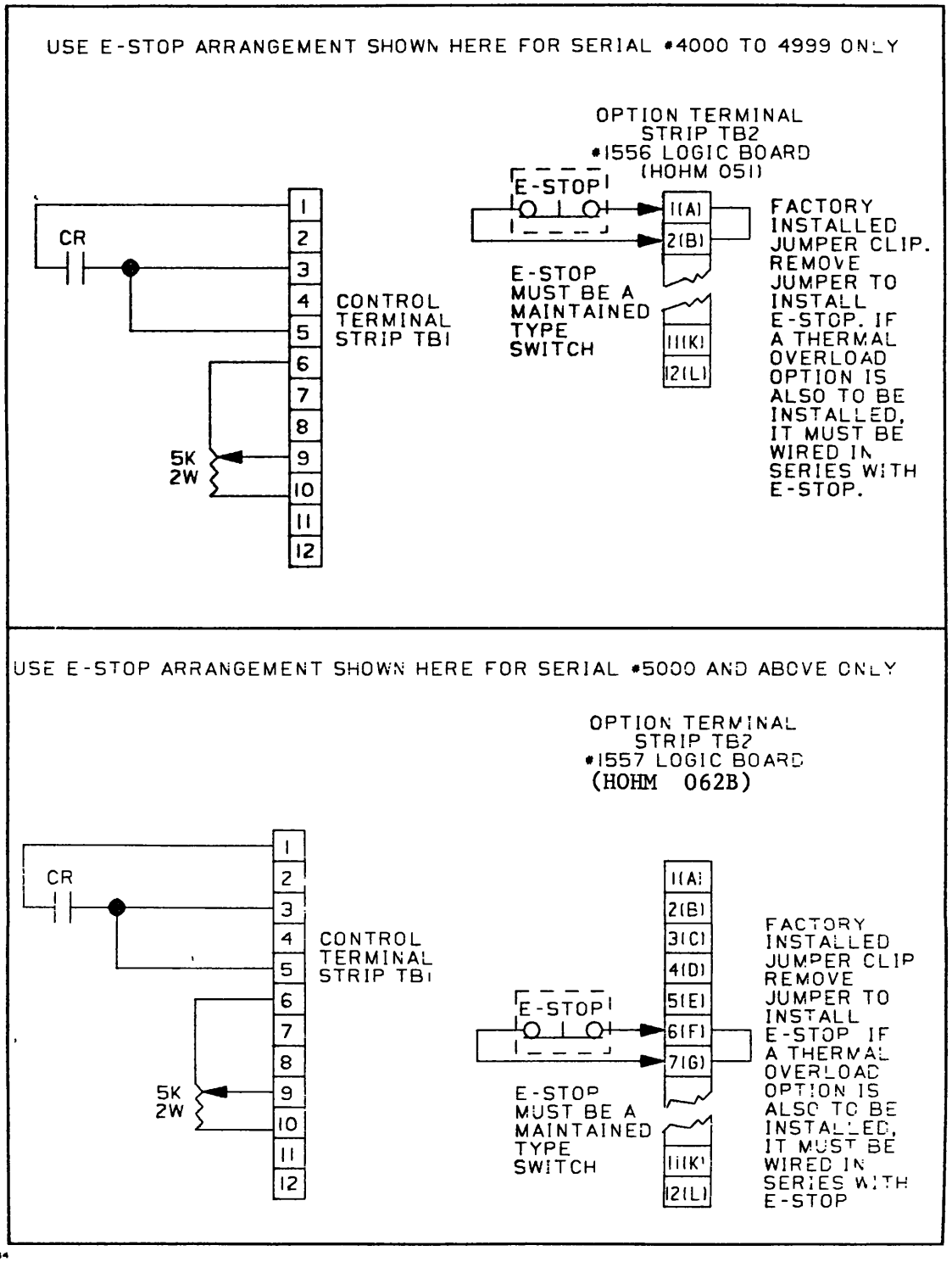


FIGURE 2 OPERATOR CONTROL STATION WIRING DIAGRAM

FOR MODELS 70280K, 70282K, 70287Q, 70288F, 70290R

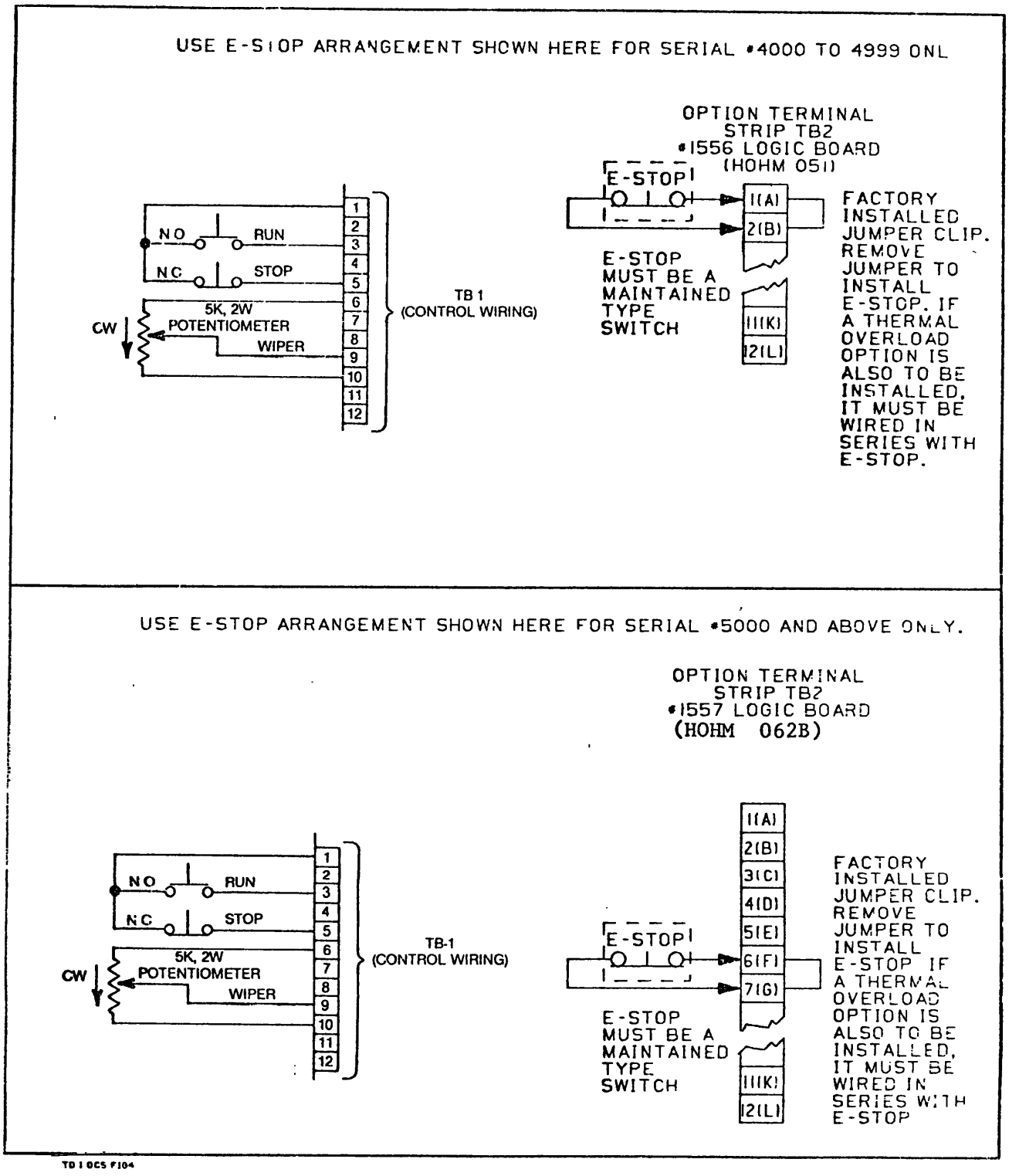
Figure 3

TWO WIRE CONTROL
WIRING DIAGRAMS



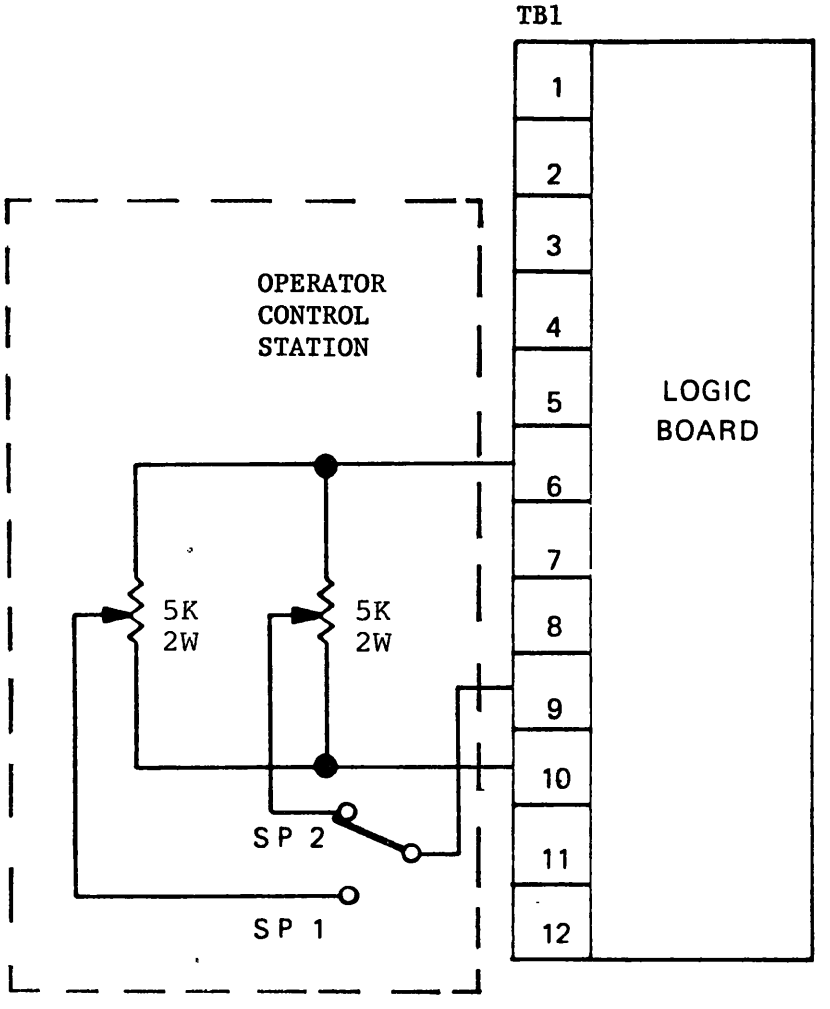
TD 1 OCS FIG4

FIGURE 4 THREE-WIRE CONTROL WIRING DIAGRAM



MULTIPLE PRESET SPEED

2 Preset Speeds



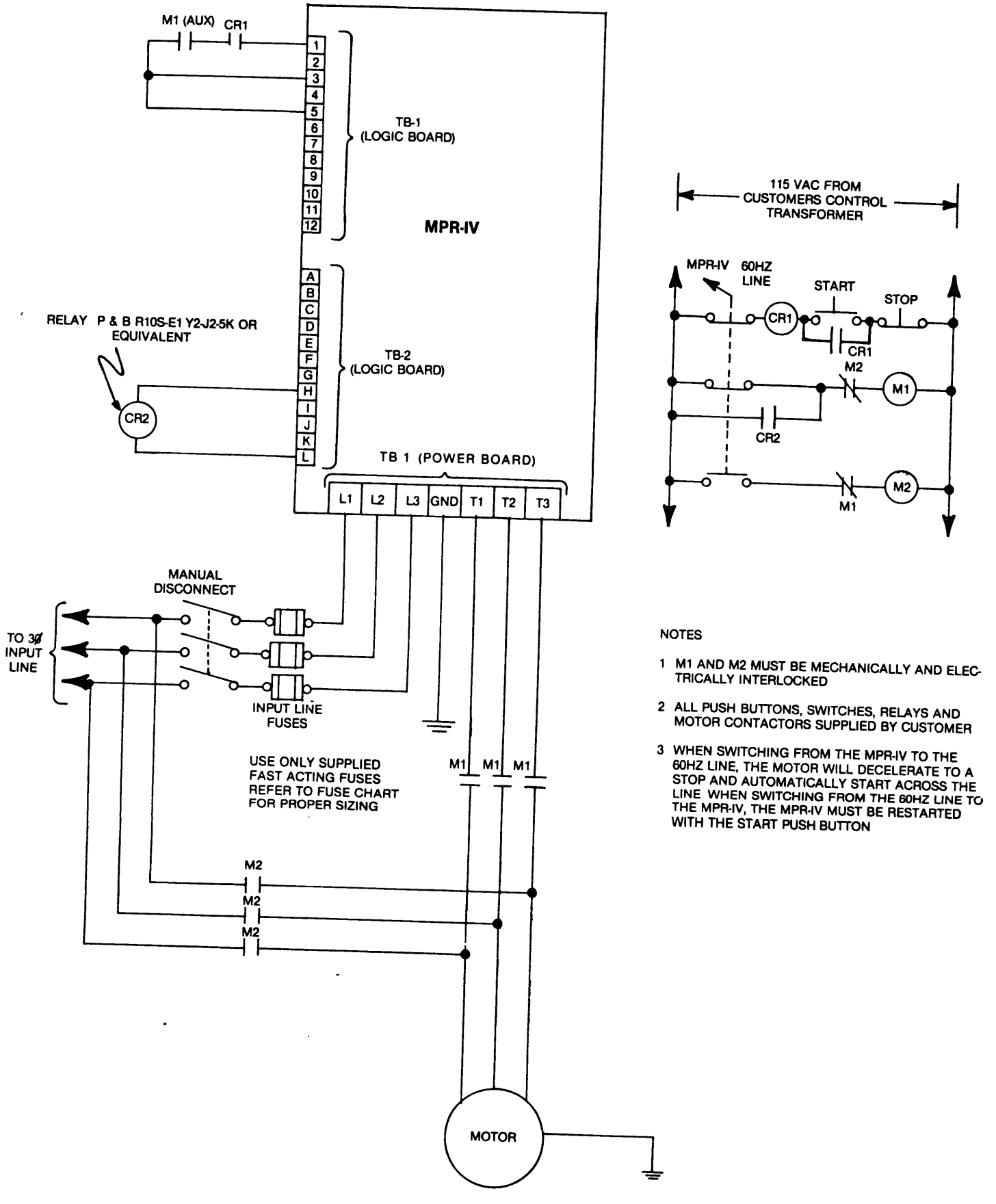
1 For more than 2 pre-set speeds the wiper arm of the potentiometer and the positive side of the potentiometer must be switched

2 TOTAL CURRENT DRAW FROM TERMINAL 10 (+ 10VDC SUPPLY) MUST NOT EXCEED 10mA

3. SPEED SIGNAL INPUT IMPEDANCE (TERMINAL 9) IS 1MEGOHM IN PARALLEL WITH A 1mf CAPACITOR

FIGURE 5

60HZ BYPASS CIRCUIT WIRING



NOTES

1 M1 AND M2 MUST BE MECHANICALLY AND ELECTRICALLY INTERLOCKED

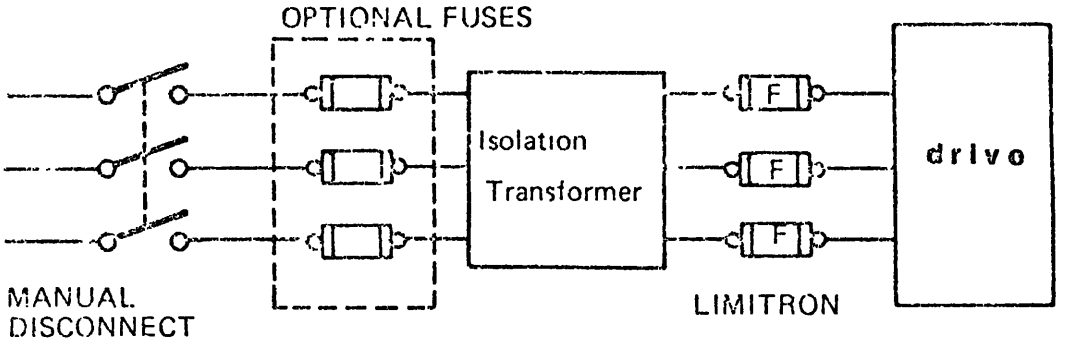
2 ALL PUSH BUTTONS, SWITCHES, RELAYS AND MOTOR CONTACTORS SUPPLIED BY CUSTOMER

3 WHEN SWITCHING FROM THE MPR-IV TO THE 60HZ LINE, THE MOTOR WILL DECELERATE TO A STOP AND AUTOMATICALLY START ACROSS THE LINE WHEN SWITCHING FROM THE 60HZ LINE TO THE MPR-IV, THE MPR-IV MUST BE RESTARTED WITH THE START PUSH BUTTON

FIGURE 6

FUSING OF UNIT

WITH ISOLATION TRANSFORMER



NO TRANSFORMER OF ANY TYPE

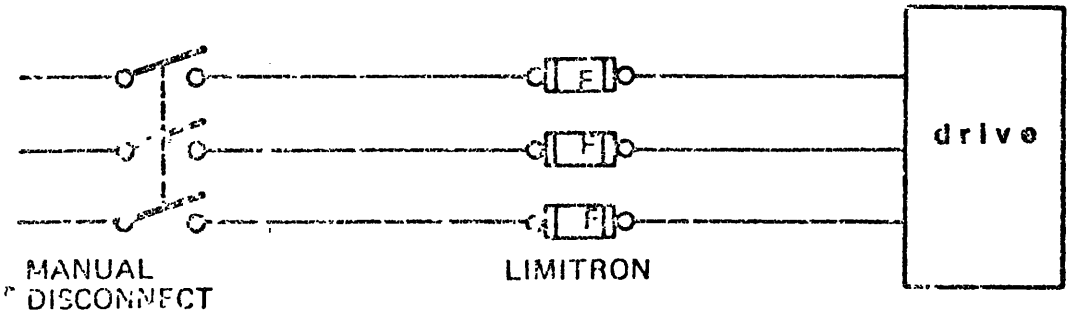


FIGURE 7

RECOMMENDED SPARE PARTS LIST

POWER MODULE

MODEL NUMBER	DRIVE	PART NUMBER (SERIAL #4000 THRU 4999)	PART NUMBER (SERIAL #5000 AND ABOVE)
91005J	1HP/230V	1321	1360
91007P	2HP/230V	1322	1360
91009L	3HP/230V	1323	1361
91011F	5HP/230V	1324	1361
91006R	1HP/460V	1351	1363
91008N	2HP/460V	1352	1363
91010Q	3HP/460V	1353	1363
91012M	5HP/460V	1354	1363
91013K	7.5HP/460V	1355	1364
91014S	10HP/460V	1356	1364

RECOMMENDATIONS: Stock two spare Power Modules per five (5) Controllers of the same HP and voltage rating.

REGEN MODULE FOR ALL UNITS - PART NUMBER 1386

RECOMMENDATION: Stock one spare Regen Module per five (5) controllers of same voltage.

* LOGIC BOARD

LOGIC BOARD (ALL HORSEPOWERS) - PART NUMBERS: Serial #4999 and below: 1556; Serial #5000 and above: 1557-1, Rev. 1 or 1557-1, Rev. 2.

RECOMMENDATION: Stock one spare Logic Board per five (5) controllers.

* A 1557 Logic Board may be used as a replacement for the 1556 Logic Board with the following conditions:

1. Since the 1557 is larger, it requires a different Logic Shield. By ordering Part #1455, the Logic Board shield and all necessary mounting hardware will be supplied.

2. The 1557 will function exactly as the 1556, but by just replacing the Logic Board, you have not obtained Running Current Limit or Ground Fault Protection.

3. Control and option wiring hook up to the same terminals except for the E-Stop connection which changes from A and B, to F and G.

RECOMMENDED SPARE PARTS LIST (cont'd)

The following table lists which boards are supplied within a particular serial numbered controller.

SERIAL #4000 - 4999	SERIAL #5000 AND ABOVE
Power Board - 1657	Power Board -- 1658
Logic Board - 1556	Logic Board - 1557-1 REV 1, undervoltage and overvoltage LEDS mounted directly on Logic Board. Logic Board - 1557-1 REV 2, undervoltage and overvoltage LEDS mounted on Current Limit PCB.

FUSES

RECOMMENDATIONS are for identical controllers (Horsepower/Voltage).

For five or less controllers: Quantity three each per controller of BUSS (F4). TRANSFORMER (F1) and SOFT CHARGE (F3) fuses.

FOR ADDITIONAL CONTROLLERS: Quantity one each per controller of F4, F1, and F3.

For Fuse Part Numbers, consult the controller fuse chart (Page 41.1).

ICs

Direct Replacements (NO SUBSTITUTIONS) are required for the below items:

RECOMMENDATION: 5-10 pieces each for any quantity of controllers.

NE555N - PART NUMBER - 891049
H11F1 - PART NUMBER - 891063

LANCER R JR CONTROLLER SERIES FUSE CHART

VOLTAGE	HORSEPOWER	INPUT LINE FUSES	BUSS FUSE (F4)	TRANSFORMER FUSE (F1)	SOFT CHARGE FUSE (F3)
230V	1 HP	KTN-10	WICK 10A 1 FWP-10 2	ABC 1A	MDA 2/10A
230V	2 HP	KTN-10	WICK 16A 1 FWP-15 2	ABC 1A	MDA 2/10A
230V	3 HP	KTN-15	WICK 16A 1 FWP-15 2	ABC 1A	MDA 2/10A
230V	5 HP	KTN-20	WICK 16A 1 FWP-25 2	ABC 1A	MDA 2/10A
460V	1 HP	KTS-08	FWP-10	ABC ½A	AGC 8/10A
460V	2 HP	KTS-08	FWP-10	ABC ½A	AGC 8/10A
460V	3 HP	KTS-15	FWP-10	ABC ½A	AGC 8/10A
460V	5 HP	KTS-20	FWP-15	ABC ½A	AGC 8/10A
460V	7.5HP	KTS-20	FWP-15	ABC ½A	AGC 8/10A
460V	10 HP	KTS-25	FWP-25	ABC ½A	AGC 8/10A

KTN-10	Part No. 891443	WICKMANN 10A	Part No. 891422	ABC 1A	Part No. 891402
KTN-15	Part No. 891444	WICKMANN 16A	Part No. 891414	ABC ½A	Part No. 891435
KTN-20	Part No. 891445	FWP 10	Part No. 891484	MDA 2/10A	Part No. 891416
KTS-08	Part No. 891463	FWP 15	Part No. 891485	AGC 8/10A	Part No. 891417
KTS-15	Part No. 891465	FWP 25	Part No. 891486		
KTS-20	Part No. 891466				
KTS-25	Part No. 891467				

1 Serial #4000 thru 4999.

2 Serial #5000 and above.

LIGHT STATUS LIST

LIGHT NAME	LOCATION	NEON/LED TYPE	COLOR	LIGHT ON	LIGHT OFF	COMMENTS
INVERTER ENABLE	Logic Board - Right-Hand Corner	LED	Yellow	Controller is fully enabled; 12VDC logic voltage is present	Controller in set-up mode	Controlled by the set-up switch.
STOP	Lower Section	LED	Orange	Controller is in stop mode (Output disabled)	Controller is in run, jog or trip mode	When controlled stop is used, light will not illuminate until inverter ramps to 0 frequency.
RUN	Lower Section	LED	Green	Controller is in run mode	Controller is in jog, or stop mode	Will not extinguish when trip LED lights.
TRIP	Lower Section	LED	Red	Controller is in trip mode	Any time the controller is not in trip mode	Trip point controlled by pot on current limit card Indicates that the Controller in the "Trip" mode. This may occur under the following conditions. 1) Current Limit Trip: If the Controller remains in current limit for a period of time exceeding the Current Limit Timer (approx. 60 sec.). 2) Peak Trip: Occurs when a Controller phase to phase short appears on the output of Controller (or a ground fault when the ground fault option is used). Will also occur when there is a component failure within the Controller. (Shorted GTO, etc) 3) Over/Under Voltage Trip If a high line or low line voltage condition occurs when the Controller is in run or jog, the "Trip" circuit will be activated and the "Trip" light will also light if the Controller is restarted before the high or low line condition is corrected.
CURRENT LIMIT	On Current Limit PCB used with Logic Board Part #1556	LED	Red	Controller is in Current Limit	Controller is not in Current Limit	The adjustment for the Current Limit point is located on the Current Limit Card Fully clockwise is the minimum setting. Fully CCW is the maximum setting
CURRENT LIMIT	Logic Board Part #1557 - Middle Left Side	LED	Red	Controller is in Current Limit	Controller is not in Current Limit	The adjustment for the Current Limit point is located on the Current Limit Card. Fully clockwise is the maximum setting Fully CCW is the minimum setting
REGEN MONITOR	Power Board - Upper Left-Hand Corner	NEON	White	Regen module is firing	All other times	Will Flicker briefly when main power is turned off
BUSS FUSE INDICATOR	Next to Buss fuse in Upper Left Part of Unit	NEON	White	When Buss fuse is blown	When Buss fuse is good	Check for shorted GTOs PWRC 100 or RC 100.
SOFT CHARGE FUSE INDICATOR	Next to Soft Charge in Lower Left Hand Corner of Unit	NEON	White	When soft charge fuse is blown	When soft charge fuse is good	Check run relay and for shorted GTO.
TRANSFORMER FUSE INDICATOR	Next to Transformer fuse in Lower Left Corner of Unit.	NEON	White	When transformer fuse is blown	When transformer fuse is good	Check control transformer
REGEN MODULE INDICATOR	On Regen Module	NEON	White	When power is applied and GTO is good	When GTO is shorted	

LIGHT STATUS LIST

LIGHT NAME	LOCATION	NEON/LED TYPE	COLOR	LIGHT ON	LIGHT OFF	COMMENTS
*POWER MODULE (Serial # 4000 thru 4999)	On Power Module	NEON	White	When power is applied and GTO is good	When GTO is shorted	
POWER MODULE (Serial # 5000 and above)	On Power Module	LED	White	When power is applied and GTO is good	When GTO is shorted	
POWER MODULE INDICATOR	On Power Module	LED	Red	When the controller is in run or jog mode	When the controller is in stop or trip mode	1) If lit in stop or trip - GTO shorted 2) if out in run or jog· a) replace module b) replace Logic Board c) replace H11FL &NE555N
OVERVOLTAGE HIGH LINE TRIP	On Current Limit PCB used with Logic Board Part #1556.	LED	Red	When controller trips due to high line voltage	All other times	Indicates that the line voltage has exceeded the high line setting for at least 50m Sec. The Controller may not be restarted until the high line condition no longer exists. Once the line voltage is correct, the Controller may be restarted, but the "Over Volt" LED will remain lit as long as power is applied. To reset the "Over Volt" LED, line power must be removed for at least 5 seconds
OVERVOLTAGE HIGH LINE TRIP	On Logic Board PCB Part #1557-1 Rev 1 Lower right-hand corner	LED	Red	When controller trips due to high line voltage.	All other times	Same as above
OVERVOLTAGE HIGH LINE TRIP	On Current Limit PCB used with Logic board Part #1557-1, Rev 2.	LED	Red	When controller trips due to high line voltage.	All other times	Same as above
UNDERVOLTAGE LOW LINE TRIP	On Current Limit PCB used with Logic Board Part #1556.	LED	Red	When controller trips due to low line voltage	All other times	Indicates that the line voltage has exceeded the low line setting for at least 50m sec. The Controller may not be restarted until the low line condition no longer exists. Once the line voltage is correct, the Controller may be restarted, but the "Under Volt" LED will remain lit as long as power is applied. To reset the "Under Volt" LED, power must be removed for at leat 5 seconds
UNDERVOLTAGE LOW LINE TRIP	On Logic Board Part #1557, Rev 1 Lower right-hand corner.	LED	Red	When controller trips due to low line voltage.	All other times.	Same as above.
UNDERVOLTAGE LOW LINE TRIP	On Current Limit PCB used with Logic Board Part #1557-1, Rev 2.	LED	Red	When controller trips due to low line voltage	All other times.	Same as above.

*Except for the 460V, 1 and 2 horsepower unit, mixing LED and Neon style modules will not have an adverse effect on the operation of the drive.

When purchasing power modules for a 460V, 1 or 2 horsepower unit, specify whether Neon or LED. Do not attempt to operate a 460V, 1 or 2 horsepower unit with Neon and LED type Power Modules mixed in the same unit.

SAFETY

This equipment employs voltages which are dangerous and may be fatal to operating personnel. Extreme caution should be exercised when working with the equipment.

DO NOT CHANGE FUSES OR MODULES WHILE THE EQUIPMENT IS ENERGIZED.

Under certain conditions, dangerous potentials may exist in the circuits due to charges retained by the capacitors. Ensure that the lights on the Regen module flicker when power is turned off.

Under no circumstances should any person service or adjust the equipment without the presence or assistance of another person capable of rendering aid.

WARNING

VOLTAGES OVER 300 VOLTS SHOULD BE MEASURED AS FOLLOWS:

1. De-energize the equipment. Ground the terminals to be measured in order to discharge any capacitors connected to these terminals.

2. Connect meter to terminals to be measured using a range higher than the expected voltage.

3. WITHOUT TOUCHING METER OR TEST LEADS, energize the equipment and read the meter.

4. De-energize the equipment. Ground the terminals connected to the meter before disconnecting meter.

NOTES

A. MAKE SURE you are NOT GROUNDED whenever you are adjusting equipment or using measuring equipment.

B. In general, only USE ONE HAND when servicing equipment.

C. If test meter must be held of adjusted while voltage is applied, DO NOT touch the live equipment or personnel working on live equipment while you are holding the meter.

D. DO NOT FORGET that high voltages MAY BE PRESENT across terminals that are nominally low voltage, due to equipment breakdown. Be careful even when measuring low voltages.

E. DO NOT use test equipment known to be in poor condition.

F. WARNING: THE DC BUSS CAPACITORS MUST BE DISCHARGED PRIOR TO WORKING ON THE UNIT. THE MAIN POWER MUST BE TURNED OFF AND THE CAPACITOR TERMINALS SHOULD THEN BE SHORTED TOGETHER USING A 100 OHM, 50 WATT RESISTOR. A SPARE REGEN HEATER BAR MAY BE USED. DO NOT SHORT THE TERMINALS TOGETHER WITH A SCREWDRIVER OR OTHER TOOL.

RESUSCITATION

An approved poster illustrating the rules for resuscitation by the mouth-to-mouth method should be prominently displayed in each work space and laboratory.

TROUBLESHOOTING PROCEDURES

1. Most problems encountered on the initi startup of adjustable speed drives are due to improper wiring. Before proceeding with the troubleshooting procedures, recheck

   a. Input Wiring
   b. Output Wiring
   c. Control Wiring
   d. Any Interconnecting Wiring
   e. Incoming Voltage

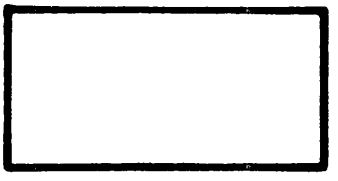
2. If you have completed la to le above, proceed with the troubleshooting chart

   a. Insure that you understand the symbols used in the charts (see No. 3 on page 28).

b. Find the problem description that most closely fits your problem in the index on page 47.

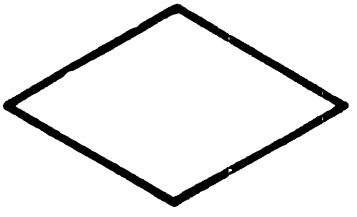
c. Proceed with the steps as written in the chart. (See example in No. 3 on Page 29.

3. SYMBOLS



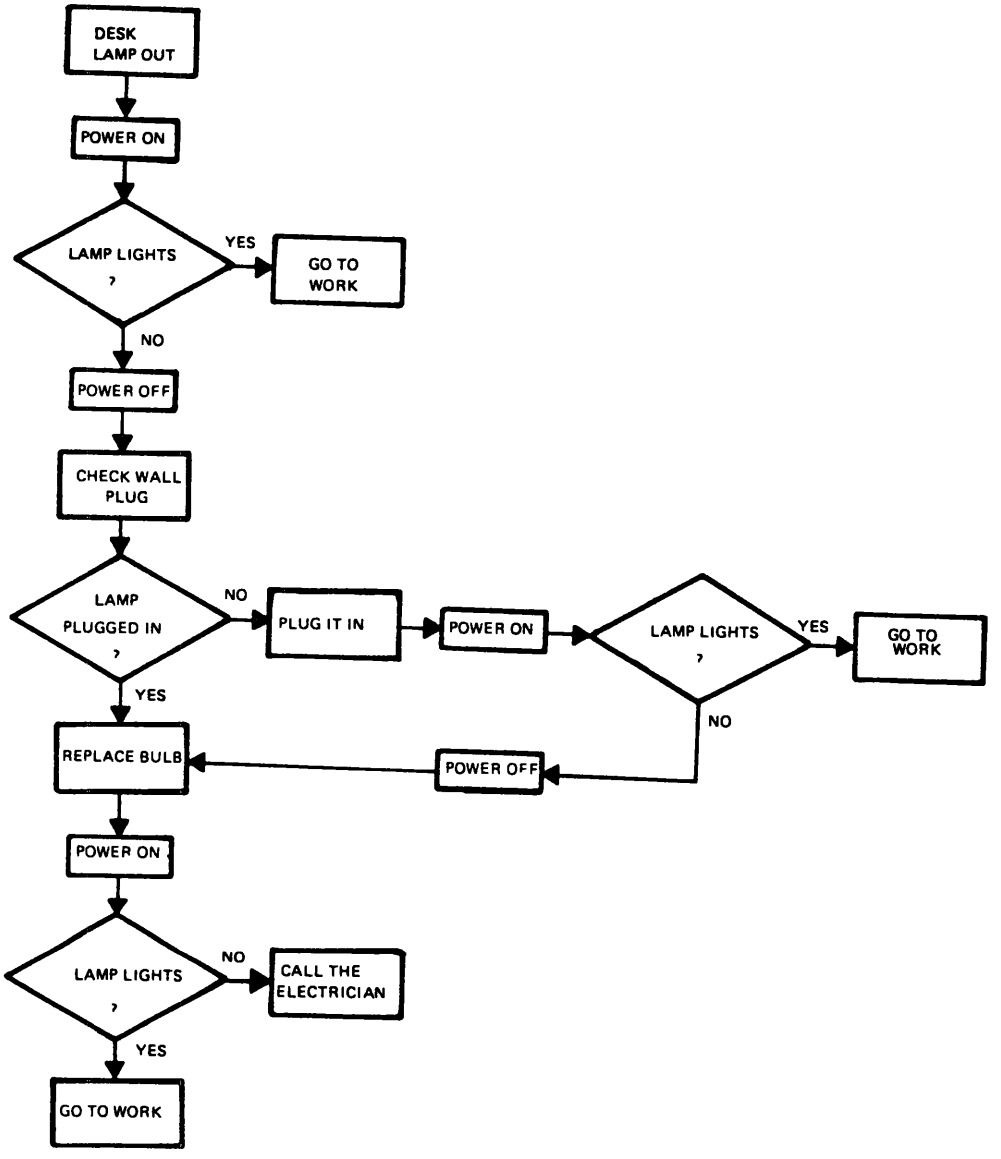
ACTION STE P
(What to do or Check)

POWER ON/OFF STEP
(Point to turn power on or off)



EVALUATION STEP

DIRECTION OF LOGIC FLOW



TROUBLESHOOTING CHART EXAMPLE

TROUBLESHOOTING CHARTS INDEX

	TROUBLE	ACTION
1.	One power module indicates fault.	Refer to Chart 3
2.	More than one power module indicates fault.	Refer to Chart 4
3.	Controller will not run.	Refer to Chart 1
4.	Controller will run but trips.	Refer to Chart 3
5.	Soft charge fuse light on and power module lights indicates fault condition.	Refer to Chart 4
6.	Buss fuse light on.	Refer to Chart 4
7.	"Stop" LED on logic board off.	Refer to Chart 2
8.	Unit goes into run, then in stop/immediately 1. Continuity to run relay coil. 2. Relay contacts bad. 3. Bad logic board.	
9.	No speed control. Check 0-10V on Pin 9 with respect to Pin 6 on logic board. 0V min. speed, 10V max. speed.	
10.	Unit continues to trip.	Refer to Chart 3

TROUBLESHOOTING PROCEDURES

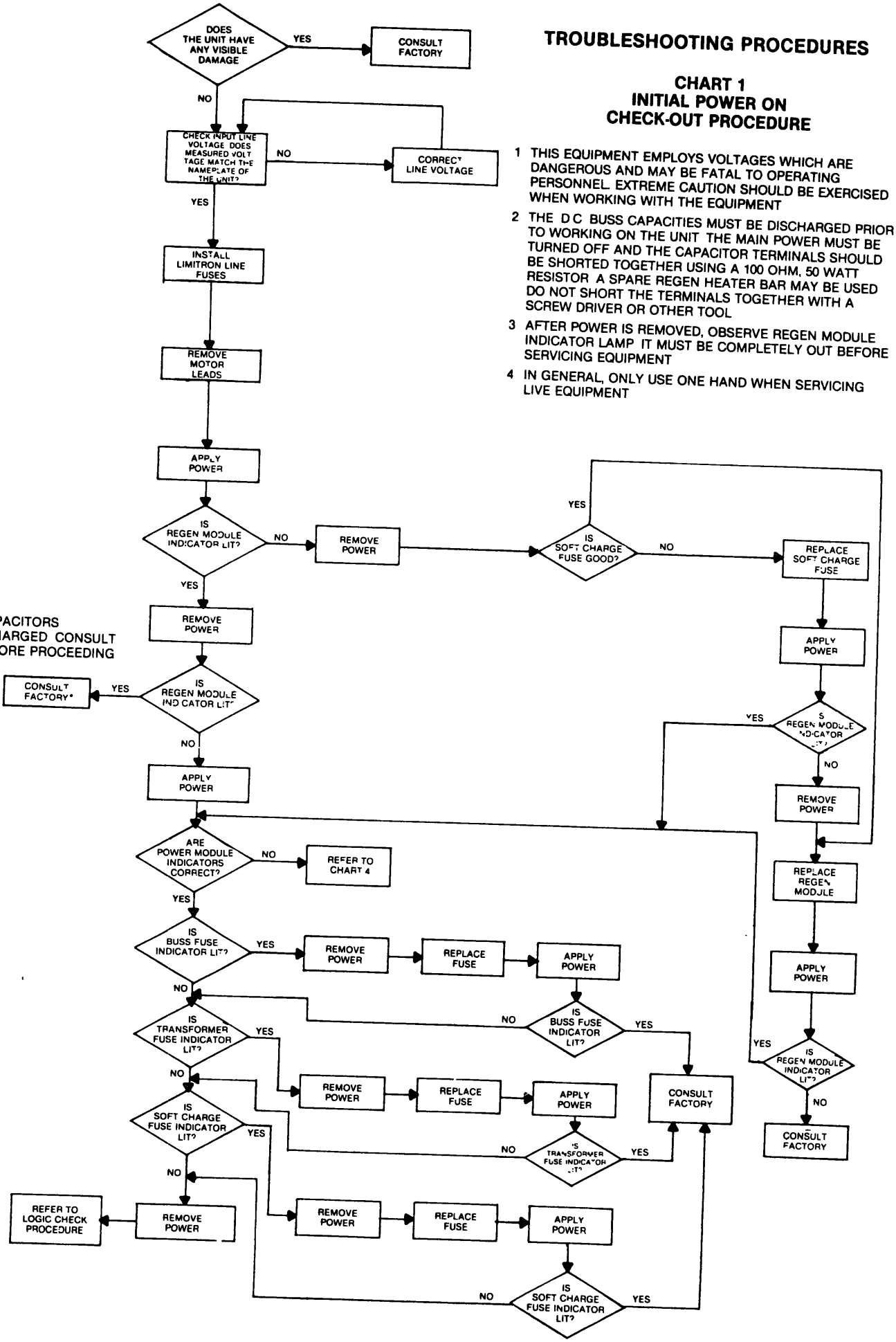
CHART 1
INITIAL POWER ON
CHECK-OUT PROCEDURE

1 THIS EQUIPMENT EMPLOYS VOLTAGES WHICH ARE DANGEROUS AND MAY BE FATAL TO OPERATING PERSONNEL. EXTREME CAUTION SHOULD BE EXERCISED WHEN WORKING WITH THE EQUIPMENT

2 THE D C BUSS CAPACITIES MUST BE DISCHARGED PRIOR TO WORKING ON THE UNIT. THE MAIN POWER MUST BE TURNED OFF AND THE CAPACITOR TERMINALS SHOULD BE SHORTED TOGETHER USING A 100 OHM, 50 WATT RESISTOR. A SPARE REGEN HEATER BAR MAY BE USED. DO NOT SHORT THE TERMINALS TOGETHER WITH A SCREW DRIVER OR OTHER TOOL

3 AFTER POWER IS REMOVED, OBSERVE REGEN MODULE INDICATOR LAMP. IT MUST BE COMPLETELY OUT BEFORE SERVICING EQUIPMENT

4 IN GENERAL, ONLY USE ONE HAND WHEN SERVICING LIVE EQUIPMENT



* WARNING
D C BUSS CAPACITORS ARE FULLY CHARGED. CONSULT FACTORY BEFORE PROCEEDING

CHART 2
LOGIC BOARD CHECK-OUT PROCEDURE

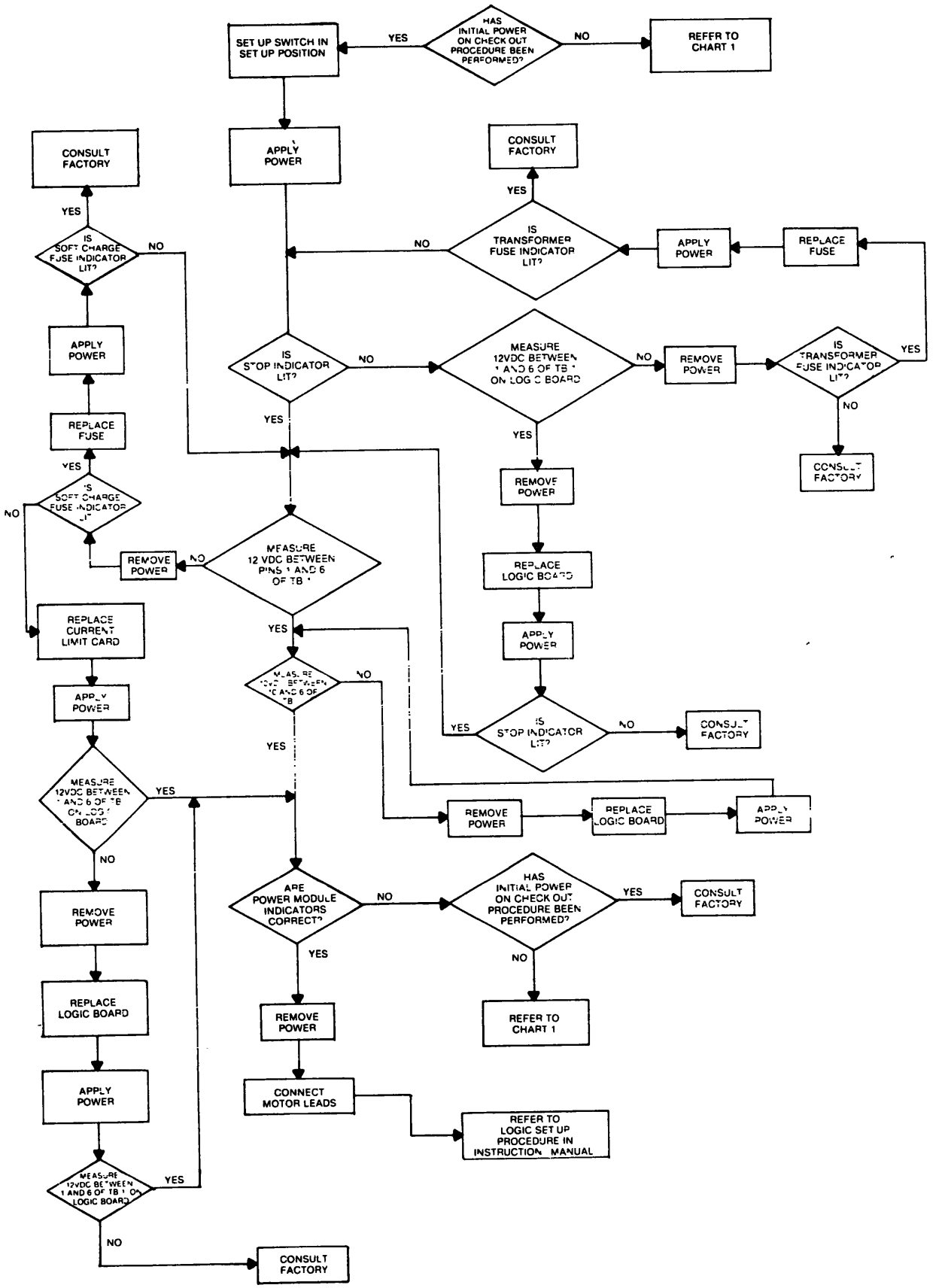


CHART 3
POWER SECTION FAULT ISOLATION
(UNIT TRIPS ON RUN COMMAND)

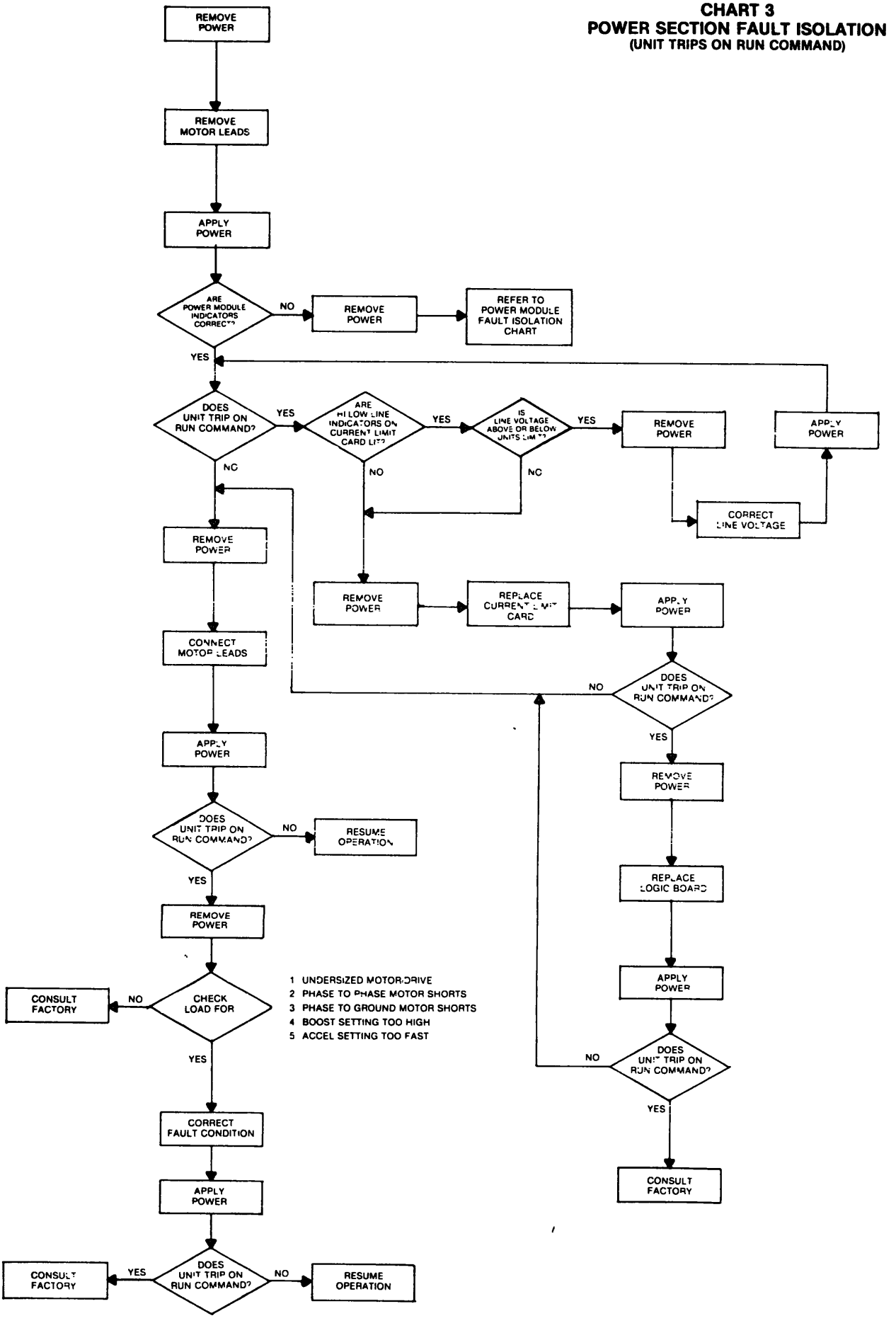
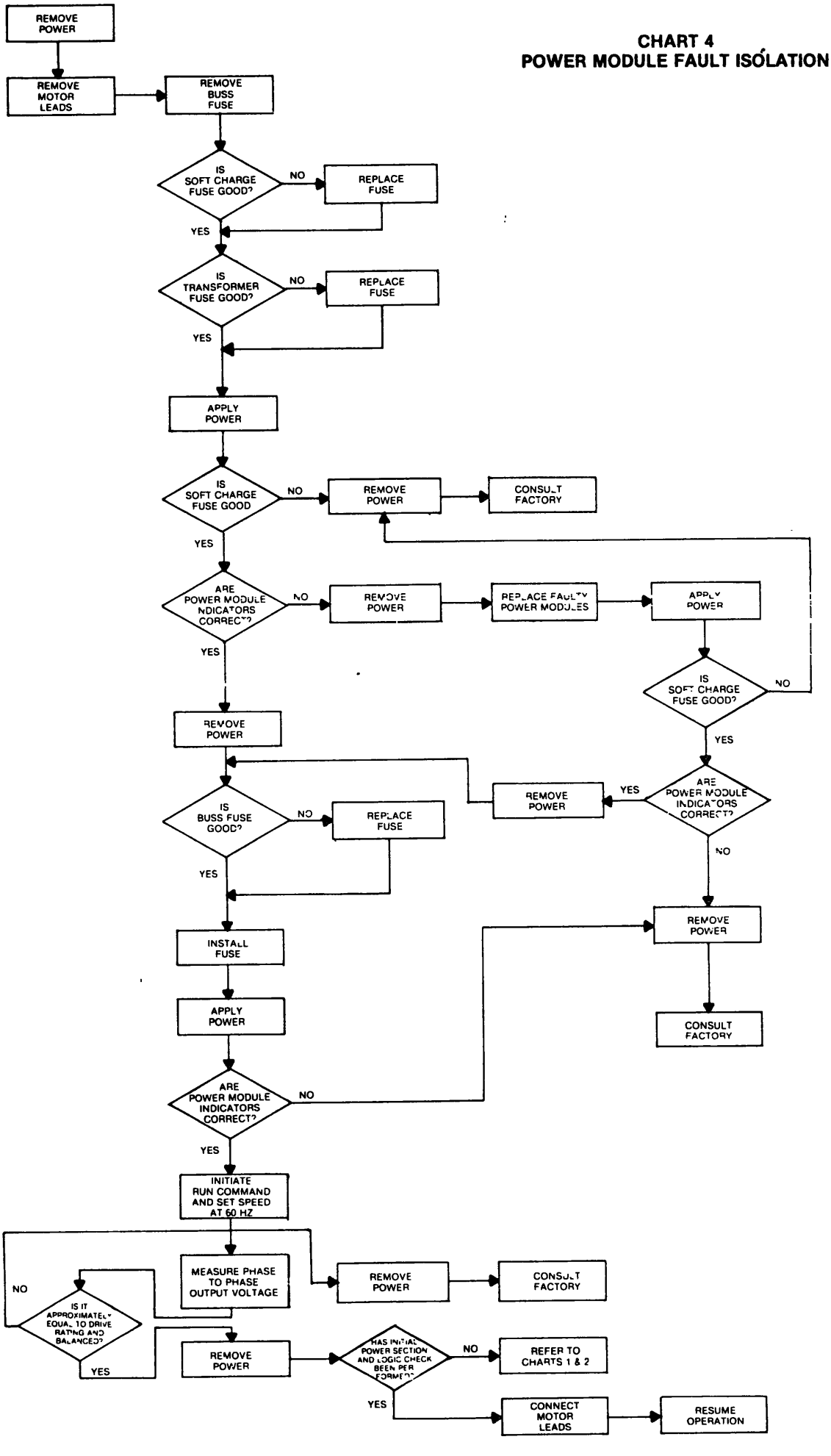
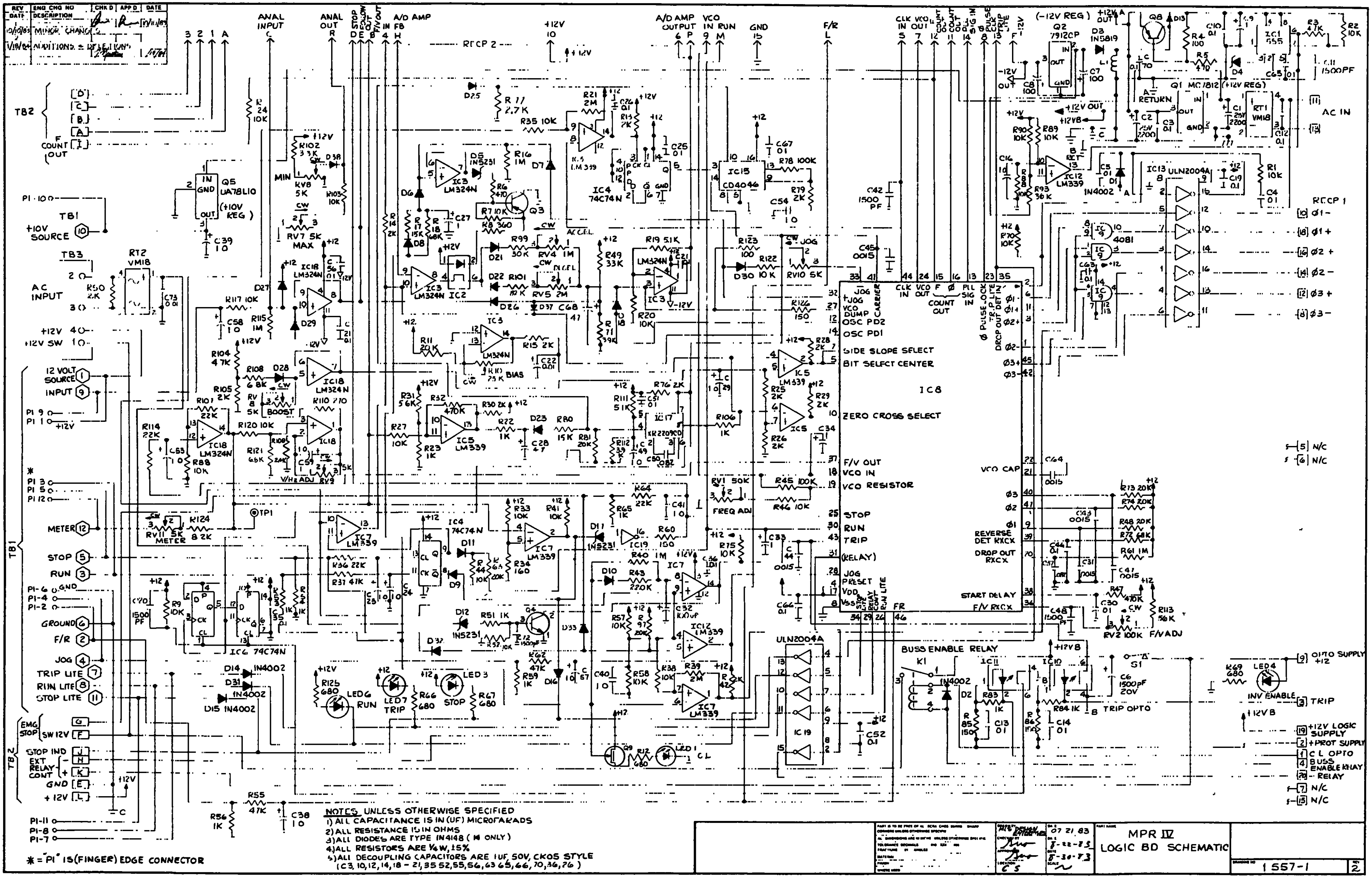
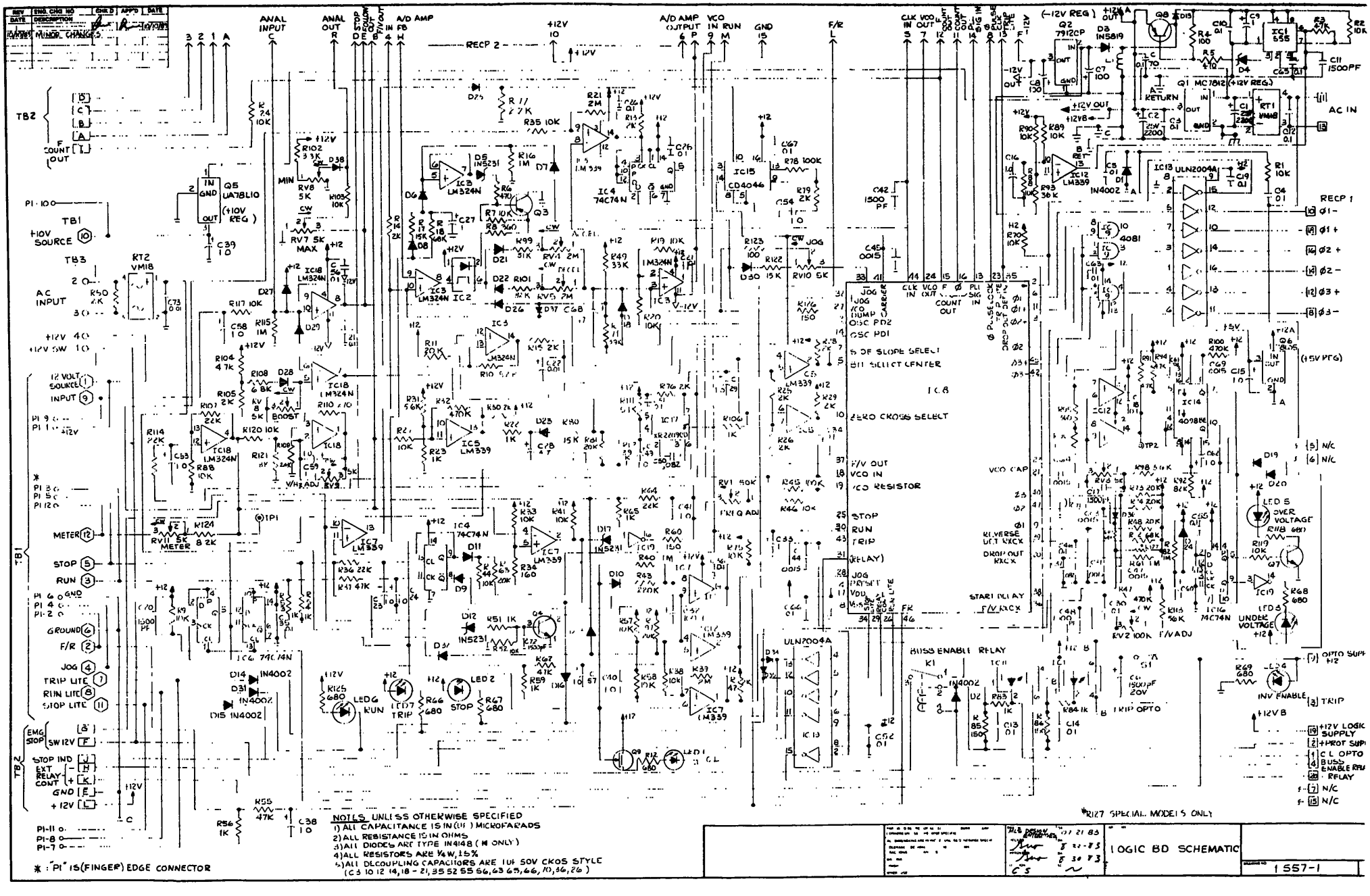
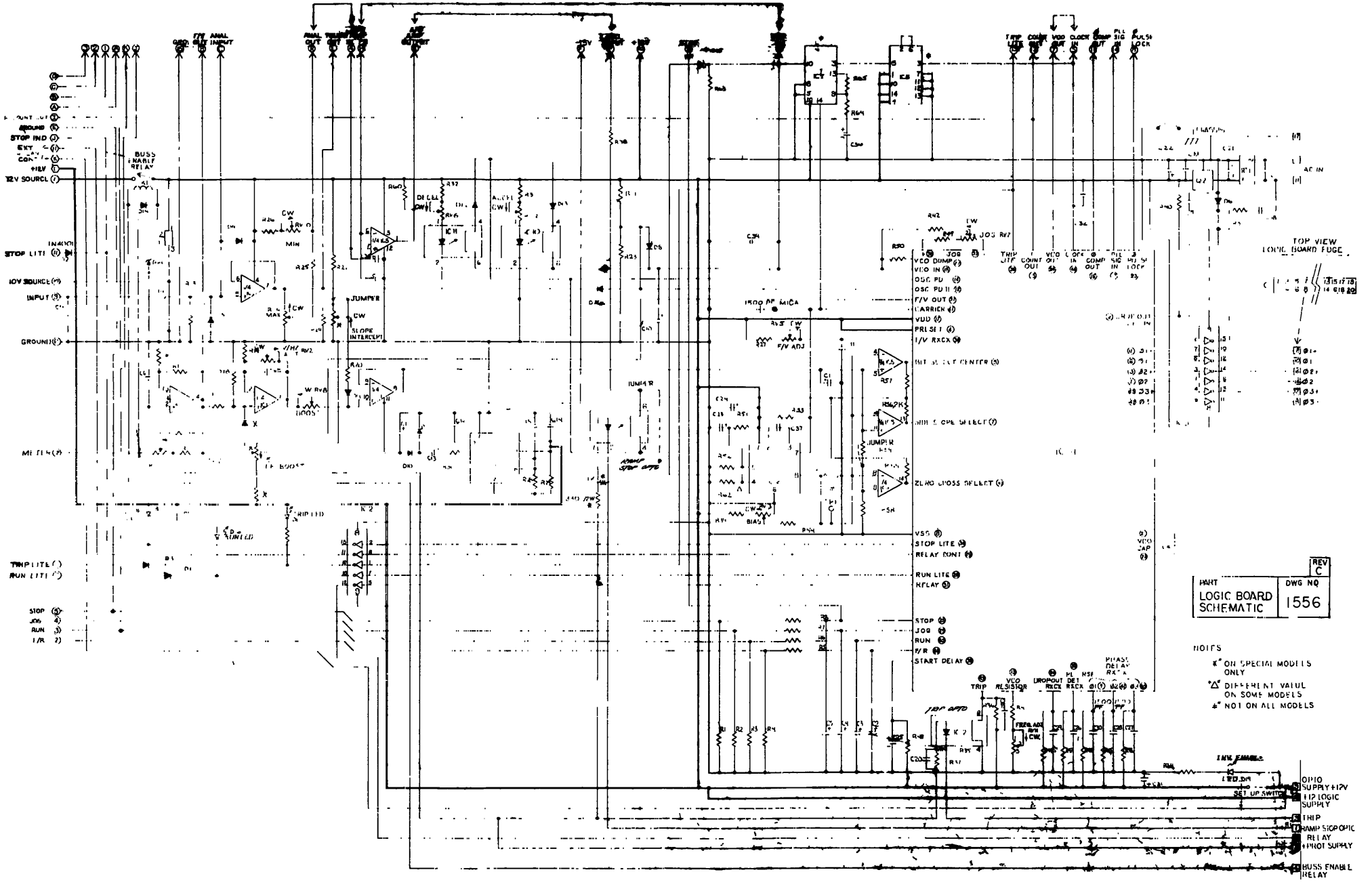


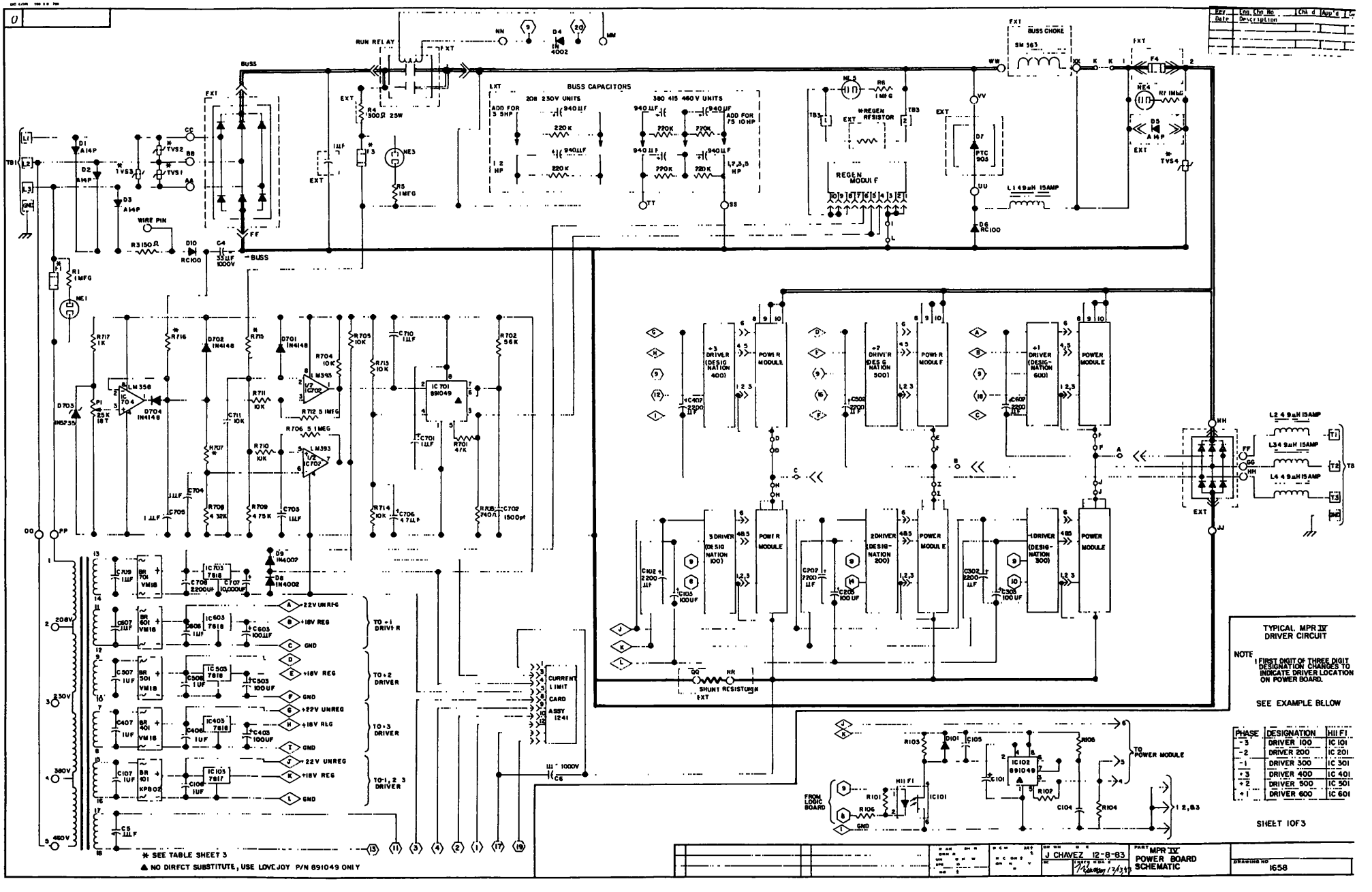
CHART 4
POWER MODULE FAULT ISOLATION




NOTES UNLESS OTHERWISE SPECIFIED
1) ALL CAPACITANCE IS IN (UF) MICROFARADS
2) ALL RESISTANCE IS IN OHMS
3) ALL DIODES ARE TYPE IN4148 (▯ ONLY)
4) ALL RESISTORS ARE ¼W, ±5%
5) ALL DECOUPLING CAPACITORS ARE 1UF, 50V, CKOS STYLE
(C3, 10, 12, 14, 18 - 21, 35 52, 55, 56, 63 65, 66, 70, 36, 76)
* = "P1" IS (FINGER) EDGE CONNECTOR
MPR IV
LOGIC BD SCHEMATIC
1557-1
2


MINOR CHANGES
ANAL INPUT
ANAL OUT
A/D AMP
A/D AMP OUTPUT
VCO IN RUN
GND
F/R
CLK VCO IN OUT
(-12V REG)
(+12V REG)
AC IN
RECP 1
RECP 2
TB1
TB2
TB3
+10V SOURCE
AC INPUT
12 VOLT SOURCE
METER
STOP
RUN
JOG
GROUND
TRIP LITE
RUN LITE
STOP LITE
EMG STOP
STOP IND
EXT RELAY CONT
+12V
IC1 555
IC2 LM324N
IC3 LM324N
IC4 74C74N
IC5 LM339
IC6
IC7 LM339
IC8 ULN2004A
IC9 4081
IC10 4011
IC11 4098B
IC12 LM339
IC13 ULN2004A
IC14 4098B
IC15 CD4046
IC16 74C74N
IC17 LM339
IC18 LM324N
F/V OUT
VCO IN
VCO RESISTOR
STOP
RUN
TRIP
(RELAY)
ZERO CROSS SELECT
BIT SELECT CENTER
% OF SLOPE SELECT
REVERSE DET KICK
DROP OUT KICK
START DELAY
F/V KICK
F/V ADJ
VCO CAP
FREQ ADJ
BUSS ENABLE RELAY
TRIP OPTO
OVER VOLTAGE
UNDER VOLTAGE
INV ENABLE
OPTO SUPP +12
+12V LOGIC SUPPLY
+PROT SUPP
C L OPTO
BUSS ENABLE RELAY
N/C
TRIP
LED1 C L
LED2 STOP
LED3 UNDER VOLTAGE
LED4
LED5 OVER VOLTAGE
LED6 RUN
LED7 TRIP
*R127 SPECIAL MODELS ONLY
* : "P1" IS (FINGER) EDGE CONNECTOR
NOTES UNLESS OTHERWISE SPECIFIED
1) ALL CAPACITANCE IS IN (UF) MICROFARADS
2) ALL RESISTANCE IS IN OHMS
3) ALL DIODES ARE TYPE IN4148 (M ONLY)
4) ALL RESISTORS ARE ¼W, 5%
5) ALL DECOUPLING CAPACITORS ARE 1UF 50V CKOS STYLE (C5 10 12 14, 18 - 21, 35 52 55 56, 63 65, 66, 70, 56, 26)
LOGIC BD SCHEMATIC
1557-1


REV C
PART
LOGIC BOARD SCHEMATIC
DWG NO
1556
NOTES
"K" ON SPECIAL MODELS ONLY
"Δ" DIFFERENT VALUE ON SOME MODELS
± NOT ON ALL MODELS
TOP VIEW LOGIC BOARD EDGE
OPTO SUPPLY +12V
+12 LOGIC SUPPLY
TRIP
RAMP STOP OPTIC
RELAY +PHOT SUPPLY
BUSS ENABLE RELAY
SET UP SWITCH
STOP LITE
RUN LITE
TRIP LITE
STOP
JOG
RUN
F/R
START DELAY
VCO DUMP
VCO IN
OSC PD
OSC PD II
F/V OUT
CARRIER
VDD
PRESET
F/V RACK
VSS
STOP LITE
RELAY CONT
RUN LITE
RELAY
TRIP
VCO RESISTOR
DROPOUT RACK
PHASE DELAY RACK
JOG RV7
F/V ADJ
SLOPE INTERCEPT
JUMPER
BIAS
BOOST
MIN
MAX
1500 PF MICA
12V SOURCE
GROUND
INPUT
STOP IND
BUSS ENABLE RELAY
AC IN



TYPICAL MPR IV DRIVER CIRCUIT

NOTE
1 FIRST DIGIT OF THREE DIGIT DESIGNATION CHANGES TO INDICATE DRIVER LOCATION ON POWER BOARD.

SEE EXAMPLE BELOW

PHASE	DESIGNATION	HI FI
-3	DRIVER 100	IC 101
-2	DRIVER 200	IC 201
-1	DRIVER 300	IC 301
+3	DRIVER 400	IC 401
+2	DRIVER 500	IC 501
+1	DRIVER 600	IC 601

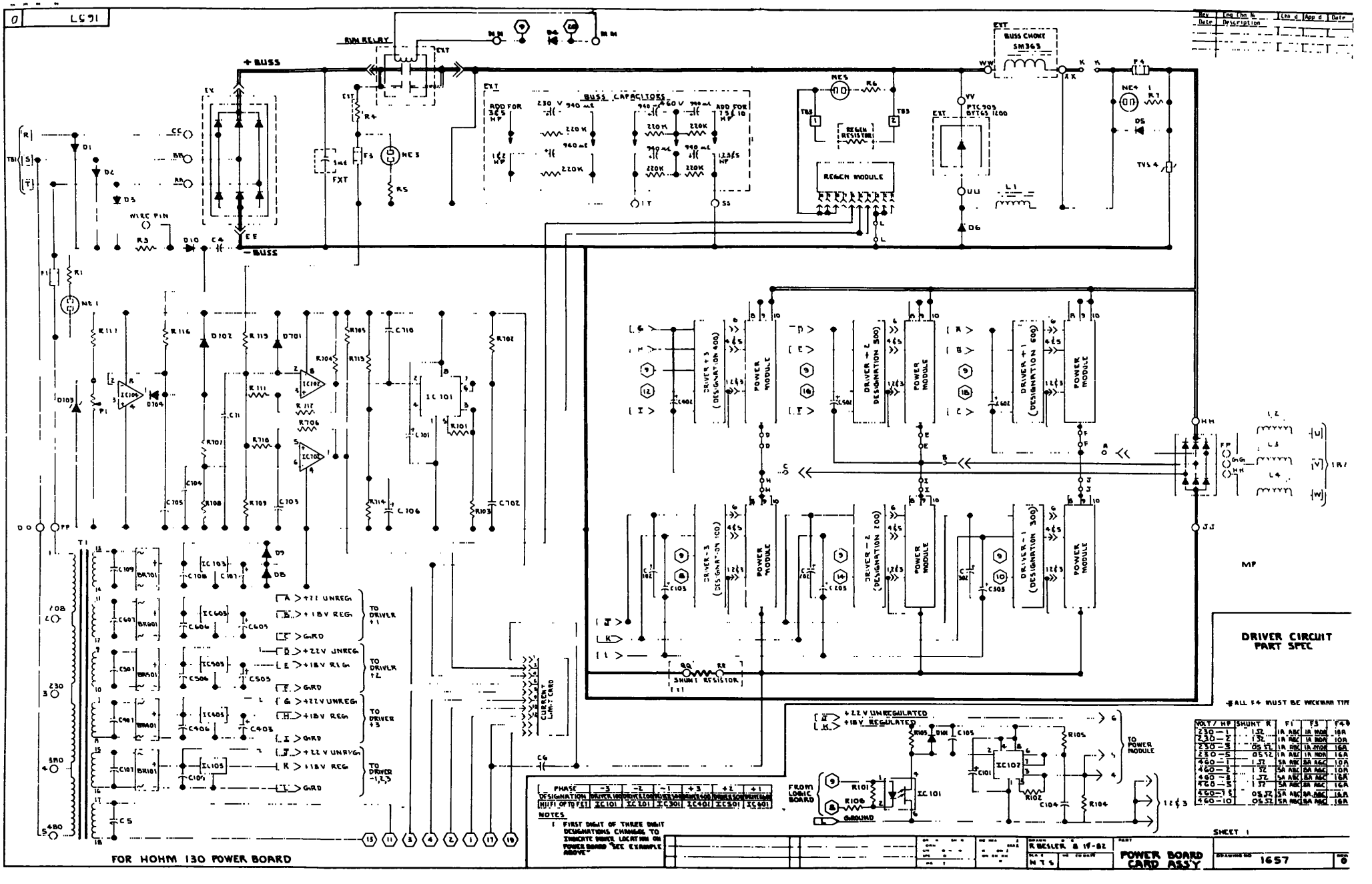
SHEET 1OF3

Rev Date	Eng Chn No Description	Chk'd	App'd

J CHAVEZ 12-8-83

PART MPR IV POWER BOARD SCHEMATIC

DRAWING NO 1658


+BUSS
-BUSS
RUN RELAY
BUSS CAPACITORS
BUSS CHOKE
REGEN MODULE
REGEN RESISTOR
WIRE PIN
DRIVER +3 (DESIGNATION 400)
DRIVER +2 (DESIGNATION 500)
DRIVER +1 (DESIGNATION 600)
DRIVER -3 (DESIGNATION 100)
DRIVER -2 (DESIGNATION 200)
DRIVER -1 (DESIGNATION 300)
POWER MODULE
SHUNT RESISTOR
CURRENT LIMIT CARD
+22V UNREGULATED
+18V REGULATED
GROUND
FROM LOGIC BOARD
TO POWER MODULE
TO DRIVER +1
TO DRIVER +2
TO DRIVER +3
TO DRIVER -1,2,3
FOR HOHM 130 POWER BOARD
DRIVER CIRCUIT PART SPEC
POWER BOARD CARD ASS'Y
R. BESLER 8-19-82
1657

Louis Allis complete "Spectrum of Service" puts maximum up-time into packaged drives and drive systems

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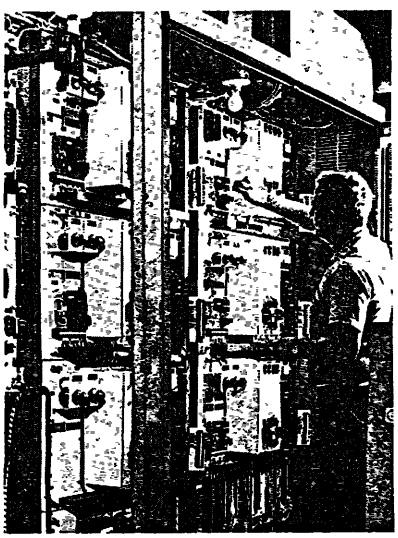

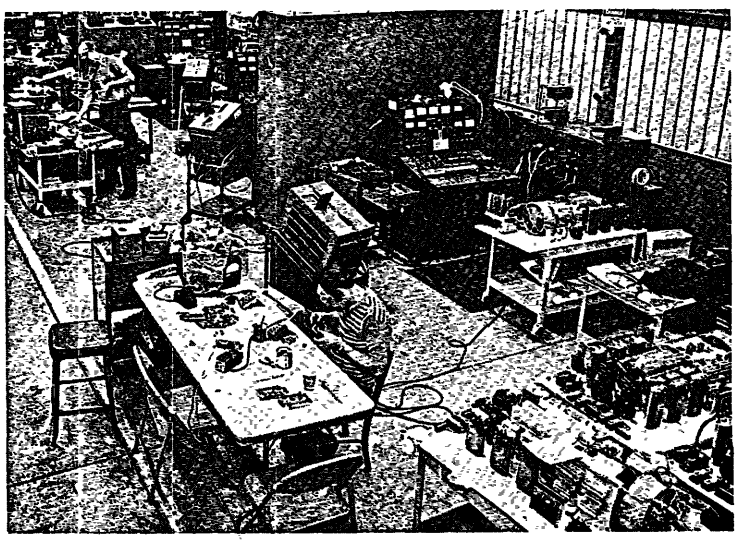

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