$25.00

Installation and Service Manual

BDS3-208 AND BDS3-230 SERIES
Brushless Motor Controller

M-8507 ISSUE 13

NOTICE:

Upon receipt of the amplifier, closely inspect the components to ensure that no damage has occurred in shipment. If damage has occurred, notify the appropriate carrier at once.

> Caution:
>
> Dangerous voltages exist in this equipment. Do not attempt connecting or probing in this equipment with power on.
>
> Should any question arise regarding any step outlined in this manual please call the factory.

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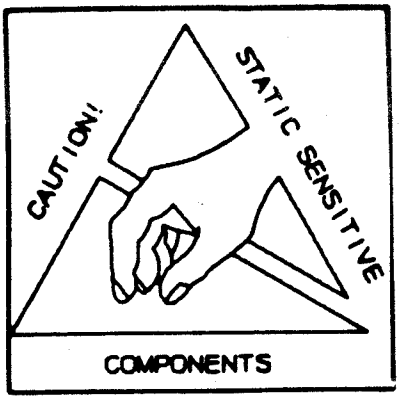

INSTALLATION AND SERVICE MANUAL
BDS3-208 AND BDS3-230 SERIES
BRUSHLESS MOTOR CONTROLLER
M-8507, Issue 13

NOTICE:

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WARNING:

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PREFACE

This Installation and Service Manual is a general document and is applicable to the entire BDS3 Series product line. However, since these motor controllers are interfaced with motors of varying sizes having different operating characteristics such as internal resistance, inductance, rotor inertia, etc., the complete model number of these amplifiers will vary more or less with the motors they are made compatible with. Thus, after the BDS3 and a particular motor are connected together to form a complete velocity loop, the model number applied to the BDS3 nameplate may be understood to be the basic model number for the system; consisting of the following:

(1) BDS3,
(2) PSR3,
(3) Motor and
(4) Transformer

However, the PSR3 main bus power supply, the motor, and the transformer will have nameplates bearing their specific model numbers.

The Test Limits and Modification Sheet (TL) is a specific document and is applicable only to individual systems. The TL Sheet contains such information as maximum operating speed, peak current limits, and the component compensation values which make the amplifier motor combination compatible. The compensation components are located on the compensation board (see Figures 12 and 13). In addition, the microprocessor program will change from motor to motor. The proper microprocessor is also indicated by the TL Sheet (see Figure 11).

With exception to the comp board, microprocessor and continuous current rating, the brushless BDS3 motor controllers are identical. Options may be added by way of option board OPT1, OPT2, OPT3, etc. Versatility can be enhanced by the addition of various OPTION BOARDS.

MODEL NUMBER SCHEME

Example: BDS3-208/20-02-100-4501AXX
A B C D E

BDS3 . . . . . Brushless Drive Sine Wave Controller

A - 208, 230 . . . . . Output L-L RMS Voltage

B - 6,12,20,30,40,55 . . . . . Output RMS Current per Phase, Continuous

C - . . . . . Mechanical Configuration

- 01 . . . . . Standard, Fan Cooled, 4" Module
- 21 . . . . . Standard Fan Cooled, 6" Module (55 A.)
- 27 . . . . . Same as 21, but w/o Cover for DPS Systems
- 29 . . . . . Same as 21, w/DPS Siring System

D - . . . . . Option

- 100 . . . . . No Option
- 101 . . . . . Same as 100 w/opt 2 Card
- 102 . . . . . Same as 100 w/Opt 3 Card
- 105 . . . . . Same as 100 w/Spindle Orient Card
- 123 . . . . . Same as 100 w/Opt 8 Card
- 200 . . . . . With Pigtail Harness and Bus Bars
- 201 . . . . . Same as 200 w/Opt 2 Card
- 202 . . . . . Same as 200 w/Opt 3 Card
- 203 . . . . . Same as 201 w/14 Bit R/D Converter
- 204 . . . . . Same as 201 w/10 Bit R/D Converter

MODEL NUMBER SCHEME (CON'T)

205 . . . . . Same as 200 w/Spindle Orient Card

206 . . . . . Same as 205 but w/10-Bit R/D Converter

207 . . . . . Same as 200 w/14 Bit R/D Converter

208 . . . . . Same as 200 w/OPT 5 Card

209 . . . . . Same as 200 w/OPT 6 Card

210 . . . . . Same as 200 w/Notch Filter

211 . . . . . Same as 201 w/Notch Filter

212 . . . . . Same as 202 w/Notch Filter

213 . . . . . Same as 203 w/Notch Filter

215 . . . . . Same as 210 w/Spindle Orient Interface Card

220 . . . . . Same as 200 w/14 Bit R/D & OPT 4 Card

221 . . . . . Same as 200 w/OPT 7 Card

222 . . . . . Same as 200 w/10 Bit R/D Converter

223 . . . . . Same as 200 w/OPT 8 Card

224 . . . . . Same as 200 w/OPT 9 Card

225 . . . . . Same as 200 w/OPT 10 Card

229 . . . . . Same as 200 w/OPT 6-01 Card

240 . . . . . Same as 200 w/14 Bit R/D Scaled for 3500 RPM

241 . . . . . Same as 200 w/16 Bit r/D Scaled for 960 RPM

MODEL NUMBER SCHEME (CON'T)

242 ..... Same as 200 w/14 Bit R/D w/Reversing
..... Error Offset Adjustment and Scaled for 3500 RPM

400 ..... Same as 200 w/Hybrid R/D (1S24)

E - ..... Motor Compensation

NOTE: **All BDS3 models require a PSR3-208/25,50, or 75 power supply. -100 Models require a bus bar and connector kit, BDS3C-XXX. The kit is configured to have the power supply located to the right of the controller(s). A BDS3C-001 would be used for a single axis system: --002 for a two axis system, etc.**

Motor Cable Assembly B-82098 and Resolver Cable Assembly B-82096 are available in 10' incremental lengths but must be ordered separately if required.

B-82095 - SAME AS B-82098 BUT WITH TWO EXTRA WIRES FOR THERMOSTAT.

B-82097 - SAME AS B-82096 BUT WITH TWO EXTRA WIRES FOR TACH.

A 12-Bit R/D Converter (Refer to Figure 11) is shipped in standard BDS3 motor controllers. Optional 10, 14, and 16 Bit R/D units are available for providing position loop feedback information. R/D units other than the standard 12-Bit unit are identified in the BDS3 complete model number (refer to the model number breakdown scheme).

MODEL NUMBER SCHEME

Example: PSR3-208/50-01-002
A B C D

PSR3 . . . . . Power Supply with Regen for BDS and ACS Systems

A - 208, 230 . . . . . Amplifier (L-L RMS Voltage When Using This Power Supply

B - 25, 50, 75 . . . . . A.C Line Current, RMS*

C - . . . . . Mechanical Configuration

01 . . . . . Standard, Fan Cooled (4" Module)

21 . . . . . Standard, Fan Cooled (6" Module) 75 A.

D - . . . . . Regen Capability

002 . . . . . Regen, 7.5 Ohms, 300W (4" Module)
(Not Available with Remote Regen Resistor)

003 . . . . . Remote Regen Resistor, (4" Module)

005 . . . . . Regen, 15 Ohms, 150W (4" Module)
(Not Available with Remote Regen Resistor)

201 Thru 206 . Remote Regen Resistor (6" Module) Refer to Drawing C-82260

NOTE:

-003 MODEL REQUIRES PSR3-EXT/RES-202, REGEN RESISTOR KIT, 4.5 OHMS, 600W MAX. (COOLING DEPENDANT)

MODEL NUMBER SCHEME (CON'T)

-201 THRU -206 MODELS REQUIRE ONE OF THE FOLLOWING REGEN RESISTOR KITS:

-201 PSR3-EXT/RES-201 (6.8 OHMS, 300W) O/L RELAY A-35026; HEATER-K93034
-202 PSR3-EXT/RES-202 (4.5 OHMS, 600W) O/L RELAY A-35026; HEATER-K-93040
-203 PSR3-EXT/RES-203 (3.2 OHMS, 900W) O/L RELAY A-35026; HEATER-K93043
-205 PSR3-EXT/RES-205 (2.31 OHMS, 1500W) O/L RELAY A-35026; HEATER-K93047
-206 PSR3-EXT/RES-206 (2.55 OHMS, 2000W) O/L RELAY A-35026; HEATER-K93049
-301 PSR3-EXT/RES-301 (5.0 OHMS, 525W) O/L RELAY A-35026; HEATER-K93034 @ 25° C, DERATE LINEARLY TO 300W @ 55° C, (Mounted in Cage Assembly)
-302 PSRE-EXT/RES-302 (2.25 OHMS, 3000W) MOUNTED ON BACK PANEL W/TERMINAL STRIP AND TWO 6 INCH FANS.

*The PSR3 supply capability is the product of 208 VAC or 230 VAC 3 X RMS (L-L) current per phase.

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1.0 DESCRIPTION

Industrial Drives' BDS3 Product Lines are 3-phase sinewave brushless motor controllers. They are fully regenerative, four-quadrant, bi-directional velocity loop amplifiers designed to be used with Industrial Drives' high performance, permanent magnet brushless motors.

The Industrial Drives brushless motors feature the latest in permanent magnet technology utilizing high energy Samarium-Cobalt and Neodymium-Iron-Boron alloys. These brushless motors consist of permanent magnet rotors and 3-phase Y stator windings. Being brushless motors, there are no commutators or associated brushes. These motors run as synchronous motors -- meaning the rotor speed is the same as the speed (frequency) of the rotating stator magnetic field. A brushless resolver is utilized as the feedback device and is mounted internally as part of the overall motor construction. An integral brush tachometer is also available as an option.

An unregulated 300 V DC bus or 325 V DC bus (derived from full-wave ratification of a 3-phase 208 or 230 V AC line, respectively, by the PSR3 power supply unit) is used to power the BDS3 motor controller. A shunt regulator, or "regen" module located within the PSR3 unit, is used to prevent the bus from being "pumped up" during periods of regeneration.

Benefits resulting from the BDS3 and brushless motor construction are:

1. Lower rotor inertia permits higher acceleration rates.

2. The motor is thermally more efficient since all heat is generated in the stator windings which are located in the outside shell.

3. Higher speed operation and high peak horsepower are achieved. There is no commutation limit.

4. Smaller physical motor size for a given horsepower rating.

5. Higher reliability and less motor maintenance. There is no commutator or brushes.

6. Smooth output torque.

7. The BDS3 sine-wave controller allows for a wider speed range because of the ability to electronically change the angle between the rotor flux and the stator flux...commonly known as the "torque angle."*

8. The BDS3 sine-wave controller has the capability to dynamically and adaptively change the torque angle as a function of speed and load, thus, allowing the system to operate at the most efficient operating point.

* INDUSTRIAL DRIVES' Patent Number: 4543500, other (including foreign) patents pending.

Ratings

Input Power: 208 or 230 Volts RMS (L-L)
3-Phase (± 10%)
115 Volts A.C. 1-Phase Control Power

Output Power: PSR3 Power Supply-D.C. Bus
300 or 325 Volts D.C. Nominal
No Load

BDS3 Amplifier (At rated load) 200 or 220 V RMS (L-L)
Nominal ± 10%.

CONTINUOUS CURRENT (AMPS RMS/PHASE)	INTERMITTENT CURRENT (5 SEC. MAX., 30% DUTY CYCLE) (AMPS RMS/PHASE)
6	10
12	20
20	35
30	53
40	70
55	96

NOTE: A MAXIMUM OF 6 AMPLIFIERS CAN BE DRIVEN BY A SINGLE POWER SUPPLY.

AMBIENT OPERATING TEMPERATURE	0° - 55° C
SWITCHING FREQUENCY	4 KHZ
COOLING	FAN, CONVECTION (COLD PLATE)
*OPTIONS	DYNAMIC BRAKING
	REGENERATION (Power Dumping)
	DIRECTIONAL LIMITS
	BRUSHLESS TACH/BRUSH TACH
	CURRENT FOLDBACK PROTECTION
	10, 12, 14, OR 16 BIT ENCODER OUTPUT
WEIGHT	BDS3 (4" MODULE) 19 LBS
	PSR3 (4" MODULE) 25 LBS
	BDS3 (6" MODULE) 20 LBS
	PSR3 (6" MODULE) 26 LBS

*Refer to Model Number Scheme for other options.

2.0 MOUNTING

Refer to the appropriate outline and dimension drawings listed in the Table of Contents.

It is recommended that the BDS3 and the PSR3 units be mounted in their "up-right" (vertical) positions with the PSR3 mounted to the right of the BDS3 units.

CAUTION: Particular attention should be given to the notes on the Outline and Dimension drawings for information concerning mounting details.

3.0 WIRING

Refer to the notes on the appropriate System Wiring Diagram listed in the Table of Contents.

NOTE:

In order to adhere to suitable engineering practices, it is strongly recommended the 115 VAC circuit be connected in a manner that the 115 VAC is applied first in order to activate the control and fault circuits before applying the main bus voltage.

Remove the plastic front covers from the BDS3 and PSR3 by removing the four #4 screws (refer to Figures 1 and 2).

There are several types of package configurations offered as options; therefore, reference to the NOTES on the appropriate System Wiring Diagram will aid in correctly "wiring the system up."

The following precautions are also recommended:

1. Twist all AC leads to minimize electromagnetic emissions and "noise."

2. Avoid running signal leads in close proximity to power leads, armature leads, or other sources of electromagnetic noise.

3. Minimize lead lengths as much as practical.

4. Double-check all interface wiring. Carefully inspect all connections.

5. DO NOT USE MAIN CONTACTOR FOR CONTROL FUNCTIONS.

IMPORTANT:

Motor, tachometer (optional) and resolver phasing are critical for proper operation.

The method of connecting the motor is accomplished either one of two ways:

1. By way of a connector -- where the leads of the three phase motor stator are brought out to pins A, B, and C of the motor connector. Pin D is normally grounded at the BDS3. However, it may be grounded at the main ground point.

   Simply wire pins A, B, and C of the motor connector to the points of the power terminal block mounted at the top of the BDS3 chassis, identified M_A, M_B, and M_C (refer to the System Wiring Diagram and Figures 7 and 8).

2. By way of flying leads -- where the leads of the three phase motor stator are color coded and are available directly out of the motor.

Notice the information on the System Wiring Diagram referring to the correct method of wiring the motor stator. The BROWN, GREEN, and ORANGE leads should be connected to the points identified as M_A, M_B, and M_C, respectively, on the power terminal block (refer to the System Wiring Diagram and Figures 7 and 8).

The three phase 208 or 230 V input power, from the secondary of the three phase transformer (refer to Drawing A-M80421), should be brought through a customer supplied circuit breaker and connected to points identified as L_A, L_B, and L_C on the power terminal block mounted at the top of the PSR3 chassis. The system is not AC line phase sensitive (refer to the System Wiring Diagram and Figures 9 and 10). Connect the 300 or 325 V DC output, the 115 VAC, and the regeneration circuit from the PSR3 to the BDS3 with the strapping bars and the small 115 VAC and regen cable (refer to Figures 3 and 4).

CAUTION:

Check to insure that the small cable is connected to the correct pins and that it is not offset to one side (refer to the System Wiring Diagram and Figures 3 and 4).

To access the control terminal strips to wire the BDS3, remove the plastic front cover by removing the four #4 screws (refer to Figures 1, 2, 5, and 6). Do the following:

1. It is recommended that the signal wires be brought into the BDS3 from the bottom in order to keep them segregated from the power wires entering at the top of the unit. The wiring should be neatly dressed in order not to interfere with remounting the plastic cover.

2. Unplug the 10 and 20 point strips (97 and 210) from their connectors on the ACS3-MC2, Motor Control Board (the board on the right-hand side). This will prevent over flexing the board when wiring up the connectors.

3. After removing the two terminal strips, wire them per the appropriate System Wiring Diagram (refer to Section 3.2).

4. Neatly dress the wire cable in a way that it will not interfere with securing the plastic front cover. Signal cables should be dressed separately, not with the AC or power wiring.

5. Leave sufficient length in the wiring to allow the Motor Control Board to slide out enough to expose the small compensation board (refer to Figures 5, 6, 12, and 13). Insert the wired terminal strips back onto their connectors.

CAUTION:

The motor thermostat is an AUTOMATIC RESETTING device and should be connected into a latched (LOCKED-OUT) power down type circuit.

The Motor Overload relay (customer furnished) if set to the AUTOMATIC MODE, should be used in a latched power down type circuit.

3.1 Grounding Scheme

Refer to the appropriate System Wiring Diagram.

It is important that the motor be grounded at the BDS3 motor terminal block as shown on the Wiring Diagram or at the main ground point. Connect the shields of cables at one end only. Truncate the other end.

3.2 Signal Inputs and Modes of Operation

The following descriptions are given to help the user decide what inputs and modes of operation to incorporate into the overall system and to identify the appropriate connecting points of connector 210 (refer to Figures 5 and 6).

The Drive-Up contact closure (internally) is provided at Pins 1 and 2 and may be utilized one of two ways:

1. When jumper J3 is removed and J20 is installed on the ACS3-COMP1 or ACS3-COMP1A Board, an internal contact will close when the Remote Inhibit circuit is closed (is pulled low) indicating to the "outside world" that the BDS3 is in the Drive-Up Mode. The internal contact will open when the Remote Inhibit input circuit is opened (goes high) indicating that the BDS3 is in the Inhibit Mode.

   In the event that a fault occurs within the BDS3, as may be indicated by an illuminated red LED, the internal contact will remain open regardless of the state of the Remote Inhibit input circuit.

2. When J3 is installed on the ACS3-COMP1 or ACS3-COMP1A Board, an O.K. to Enable function is introduced to the Drive-Up Mode of operation. When J20 is removed, J3 is installed, the Remote Inhibit circuit is open (is high), and there are no fault LED's illuminated, the internal contact will remain closed indicating that the BDS3 is O.K. to enable. The Remote Inhibit circuit may then be pulled low to enable the BDS3. Otherwise, the internal contact will remain open indicating that the BDS3 is in a fault mode.

   The Drive-Up contact is rated at 115 VAC at 2 amps.

The Sum 1 and Sum 2 inputs, at Pins 4 and 5, are auxiliary inputs. These inputs are normally used in conjunction with various optional interfacing schemes; such as special situations requiring two BDS3 systems working together in an Antibacklash or any one of several other types of Master-Slave applications.

The V Error (Velocity Error Signal) is brought out at Pin 6. This signal represents the difference between the commanded speed and actual motor speed. The V Error output, like Sum 1 and Sum 2 above, is optional and generally needed when the BDS3 is used in Master-Slave applications.

The Torque Hold mode allows the amplifier to be put into a low gain or torque mode by closing a contact or installing a jumper between either Sum 1 or Sum 2 and V Error.

The External Current Limit (when provided) may be utilized, when external control of motor torque is desired, by opening a contact between Pins 7 and 11 (D-Common). Refer to the T.L. Sheet for reduced current limit value. Normal operation requires a contact closure or jumper between these two points.

The Remote Inhibit allows a means by which the BDS3 may be disabled without removing the main power. When a contact is closed between Pins 8 and 11 (D-Common), the BDS3 will be put into the "Drive-Up" mode. Opening the contact will put the BDS3 into the "Inhibit" mode.

The A-Common points at Pin 9 and 10 are shield and signal commons. These points provide commons (returns) between external equipment (Numerical Controls, etc.) and the BDS3 (AC coupled to true common).

The D-Common point at Pin 11 is utilized with the External Current Limit and Remote Inhibit modes of operation (AC coupled to true common).

The I Offset, (an option) at Pin 13 is an input provided for injecting voltage levels into the BDS3 when used in antibacklash and other special types of applications.

The Input Reference Signal (not to exceed ± 8 volts) is applied to the BDS3 at Pin 14 with respect to 15.

-12 volts is available at Pin 17 and +12 volts is available at Pin 20 and may be used as a signal source for manual and semi-automatic machines (maximum available current is 12 ma from each supply).

The I Mon Current Monitor signal may be observed at Pin 18. There is a direct relationship between this voltage and the actual motor currents. A D.C. voltmeter placed between Pins 18 and Pins 9 or 10 can serve as a means to monitor motor current.

The current scale factor at the Current Monitor test point above may be determined by the following chart:

BDS3 CONTINUOUS CURRENT RATING (RMS Per Phase)	AMPS RMS/D.C. VOLT (Per Phase)
6	1.313
12	2.625
20	4.375
30	6.625
40	8.75
55	12.031

The Tach Out at Pin 19 is a signal which represents speed. A D.C. voltmeter between Pin 19 and Pins 9 or 10 (calibrated in RPM) can serve as a means by which speeds may be monitored. Refer to the T.L. Sheet for the system, for the scale factor in volts/RPM (8 volts = maximum rated motor speed).

4.0 PRELIMINARY CHECKS

Refer to the appropriate System Wiring Diagram.

Once the BDS3 system has been installed and wired in, check the following to ensure proper operation before the main power is applied:

4.1 Checking the AC Input Voltage

Open the circuit breaker or remove the fuses in the secondary of the large 3-phase isolation transformer.

Apply power. With an AC voltmeter, check the 3-phase transformer secondary line-to-line voltage. The voltage should be approximately 208 or 230 volts RMS ± 10%. Remove power. Close the circuit breaker or replace the fuses in the secondary of the large 3-phase isolation transformer.

4.2 Checking the PSR3 DC Output voltage

DO NOT APPLY THE 115 VOLT AC. Apply power to the large 3-phase transformer only.

With a DC voltmeter, monitor the 300 or 325 volt DC bus bars at the bottom of the PSR3 and BDS3 units. The bus bar on the outside should be positive with respect to the inner bus bar.

The voltage from the PSR3 should be approximately + 300 or 325 volts DC ± 10%. Remove power.

4.3 Checking the Brushless Motor Phasing

If the motor stator is wired according to the System Wiring Diagram, the phase sequence will automatically be correct.

Remove the motor's 3-phase stator connector from the motor. Check continuity between the pins of the motor stator connector and the terminal block of the BDS3 unit; as identified by the System Wiring Diagram. Note the color code of the stator wires in the flying lead series.

4.4 Checking the Brush Tach Phasing (When Used)

With a DC voltmeter (on a sensitive VDC scale), monitor input connector 210-19 with respect to 210-9. Have an assistant rotate the motor shaft clockwise. The voltmeter should read positive (pin R on the motor connector should connect to connector 210-19).

4.5 Checking the Resolver Phasing

If the resolver is wired according to the System Wiring Diagram, the resolver phase sequence will automatically be correct. Remove the motor's system resolver connector at the motor. Remove connector 97 from the BDS3 unit (refer to Figures 5 and 6). Check continuity between pins of the resolver connector and pins of connector 97 at the BDS3 unit per the System Wiring Diagram.

5.0 CONNECTING THE INPUT SIGNAL SOURCE (N/C, C/N/C, ETC.)

CAUTION:

INCORRECT SERVO TO POSITION LOOP PHASING CAN CAUSE LARGE EXCURSION OSCILLATIONS OR RUNAWAYS.

Appropriate precautions should be taken to stop the machine if necessary. Slides, etc. should be moved a reasonable distance away from hard stops or motor drive belt removed, etc., before applying power.

Apply power, enable the BDS3. Observe the action of the machine. If it is determined that the direction of rotation of the motor is reversed (slide moves in the wrong direction, etc.), do the following:

1. Remove all power. Remove the front cover from the BDS3.

2. Slide the Motor Control Board out and remove the small Compensation Board (refer to Figures 5, 6, 12 and 13).

3. Notice the NON-INVERTING and INVERTING jumpers 10 and 11. Only one of the two will be installed (refer to Drawing C-81506-1 or C-84070-1).

4. Remove the jumper installed. Add the jumper presently missing.

5. Replace the Compensation Board. Slide the Motor Control Board back into the amplifier chassis.

6.0 ADJUSTMENTS

Remove power. Remove the front cover from the BDS3 chassis by removing the four (4) #4 screws. The adjustment pots are located on the front edge of the boards (refer to Figures 5, 6, 7, 8, 9, and 10).

6.1 ZERO Adjustment

For N/C or C/N/C machines:

If the "Following Error: is displayed by way of read-out, simply adjust the Zero Pot 30 (located on the Compensation Board) for zero "Following Error" at zero speed.

Optional: Monitor "INPUT HI" with respect to "INPUT LO" at 14 and 15 (screw heads of terminal strip 210) with a DC voltmeter. Command zero speed from the N/C or C/N/C. Adjust the Zero Pot 30 for zero volts.

For Manually Operated Machines:

With the input signal at zero volts, simply adjust Pot 30 for zero speed.

6.2 SPEED SCALE FACTOR Adjustment (with N/C or C/N/C)

If the "Following Error" is displayed by way of read-out, command an appropriate speed (preferably a slow feed rate) and adjust Pot 31 (located on the Compensation Board) for the proper amount of "Following Error."

6.3 SPEED SCALE FACTOR Adjustment (Manually Operated Machines)

Turn the Speed Scale Factor Pot (31) fully counterclockwise (CCW). Apply input signal level which equals desired motor speed in RPM.

Adjust Pot 31 clockwise (CW) until motor obtains desired speed in RPM (normally done with a manual input signal level).

6.4 GAIN Adjustment

In many cases, Pot 32 (located on the Compensation Board) will not need to be adjusted. However, if necessary, the Gain Pot can be used to improve the dynamic response of the servo loop. To increase the "AC Gain," monitor the internal "TACH OUT" signal at Terminal Strip 210-19 and "I MON" signal at 210-18 with respect to 210-9 with an oscilloscope. Turn Pot 32 fully counterclockwise

(CCW). Apply a step input command signal while accelerating and decelerating the motor at approximately 25% of maximum speed. Adjust the Gain Pot 32 clockwise (CW) and notice the tach and current signal response. Watch for indication of instability in either of these two waveforms. Turn Pot 32 counterclockwise (CCW) until the tendency to go unstable diminishes.

CAUTION:

INCREASING THE GAIN TOO MUCH MAY CAUSE THE SYSTEM TO GO UNSTABLE.

6.5 RESOLVER EXCITATION Adjustment

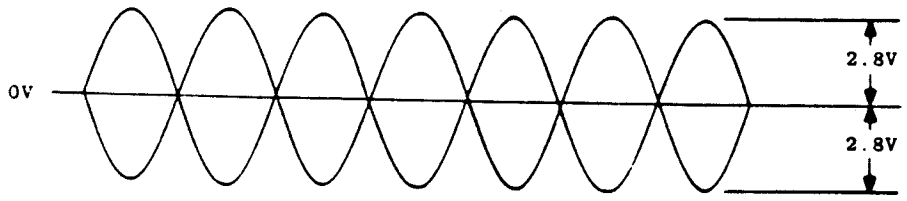
If the resolver lead lengths are in excess of 100 ft., the Resolver Excitation Voltage adjustment may have to be adjusted. To make this adjustment, refer to Figures 5, 6, and 11. Do the following:

1. Inhibit the BDS3.

   With an oscilloscope, monitor the sine function at resolver connector 97, terminal 1, with respect to 2.

   This signal will peak twice in one mechanical revolution of the motor.

2. Have an assistant rotate the motor shaft manually until a maximum peak voltage is obtained. Adjust Pot 24 for 2.8 Volts Peak as shown below.



6.6 HALL EFFECT CURRENT SENSOR ZERO Adjustments

WARNING:

DO NOT ADJUST THE CURRENT FEEDBACK GAIN POTS ON THE BASE DRIVE BOARD. POTS 50 AND 55 ARE FACTORY SET AND SEALED ADJUSTMENTS ONLY. IF EITHER OF THESE SEALS IS EVER BROKEN, RETURN THE COMPLETE BDS3 AMPLIFIER TO THE FACTORY FOR ALIGNMENT.

Inhibit the BDS3. With a DC voltmeter, monitor TP386 on the motor control board with respect to TP350 (common). Adjust Pot 54 on the base drive board for zero volts ± 10 mv. Monitor TP348 on the motor control board with respect to TP350 (common). Adjust Pot 49 on the base drive board for zero volts ± 10 mv.

6.7 REGEN LEVEL Adjustment

Refer to Figures 9 and 10.

Inhibit the BDS 3.

For BDS3-208 Volt Amplifiers:

With a DC voltmeter, monitor TP22 on the Regen Board (BDS3-REG 1) within the PSR3 unit. Adjust Pot 17 for 8.20 volts.

For BDS3-230 Volt Amplifiers:

With a DC voltmeter, monitor TP22 on the Regen Board (BDS3-REG 1) within the PSR3 unit. Adjust Pot 17 for 7.40 volts.

6.8 OVERVOLTS Adjustment

Refer to Figures 9 and 10.

Inhibit the BDS3.

For BDS3-208 Volt Amplifiers:

With a DC voltmeter, monitor TP20 on the Regen Board (BDS3-REG 1) within the PSR3 unit. Adjust Pot 19 for 6.15 volts.

For BDS3-230 Volt Amplifiers:

With a DC voltmeter, monitor TP20 on the Regen Board (BDS3-REG1) within the PSR3 unit. Adjust Pot 19 for 5.68 volts.

6.9 BDS3 SYSTEM RESOLVER ZERO

The BDS3 System Resolver Zero has been factory set and secured. The following procedure is given only in the event the resolver becomes misaligned during motor repair, etc. (refer to Figures 22, 23, and 24).

PLEASE USE CAUTION

1. Remove power.
2. Place a jumper between TP95 and TP96 on the ACS3-MC2 Control Board.
3. Place a jumper between Connector 210-4 and 6.
4. Disconnect the A Phase motor lead from the amplifier.
5. Connect a digital DC voltmeter to TP219, with respect to common (TP350).
6. Remove the screws which hold the end plate to the rear end bell of the motor. Remove the end plate.
7. If applicable, loosen but do not remove the Application Resolver* plate lock-down bolt. Loosen the resolver clamp, move the Application Resolver plate assembly and pinion away from the motor gear. Loosen and remove the motor gear clamp and gear.
8. The frameless resolver rotor is slid forward onto the motor shaft and secured by a large lock nut. This part of the resolver should not be disturbed.
9. Apply power, but inhibit the BDS3 by opening the circuit at connector 210-8. Rotate the motor shaft clockwise (CW) by hand until the zeroing LED (refer to Section 8.2, Point 3) is on continuously.

*The POSITION LOOP RESOLVER NOT the INDUSTRIAL DRIVES' SYSTEM RESOLVER (speed loop resolver).

10. Enable the BDS3 by closing the circuit at connector 210-8. Input a reference voltage, at the I OFFSET input of Connector 210-13, until the DVM (connected to TP219) reads -1.5 ± 100 mv. The motor should be locked into one of the three low torque points located 120 mechanical degrees apart, around the motor stator. The ZEROING LED should still be on continuously (not blinking). If the LED remains illuminated continuously, no further action is necessary. The system resolver is correctly set. Remove jumpers, DVM, and reconnect the motor lead. If blinking, please proceed.

11. Loosen, but do not remove the two servo clamp screws holding the resolver stator secure. Rotate the resolver stator (outside portion). As the zero position is approached, the LED should blink increasingly faster. If this cannot be achieved, rotate the motor shaft to another one of the three "locked" positions (approximately 120 mechanical degrees) from where the motor shaft is at present. The LED should blink. Once again, adjust the resolver stator for a steady illuminated LED. Tighten the two servo clamp screws to secure the resolver stator. Open the REMOTE INHIBIT circuit at Connector 210-8 and common. Rotate the motor shaft 1/8 of a turn. Enable the BDS3 by closing the REMOTE INHIBIT circuit. The motor shaft should snap back into position.

    Remove power. Install the motor gear. Reset the Application Resolver and pinion to the original location. Attach the end plate. Remove the jumper between TP95 and TP96 on the Motor Control Board. Remove the jumper between Connector 210-4 and 6. Reconnect the A Phase motor lead to the BDS3. Remove the DVM.

7.0 PSR3 POWER SUPPLY MODULE

The PSR3 Power Supply Modules are available in three current ratings: 25, 50, and 75 amps continuous. Each PSR3 incorporates control circuitry that limits the DC bus voltage to a safe level during periods of regeneration. The 25 and 50 amp units have a regeneration power resistor mounted within the module (refer to Model Breakdown Scheme in the front of the manual and Figures 9 and 10). The 75 amp PSR3 requires the regeneration power resistor to be mounted externally. IT MUST BE ENSURED THAT ITS INSTALLATION IS NOT CLOSE TO ANY FLAMMABLE MATERIALS.

PSR3-208,230/25:

This model is available with an internal regen power resistor of 15 ohms, fused for 10 amps. There is no option for an external power resistor (refer to Drawing C-81543).

PSR3-208,230/50:

This model is available with an internal regen power resistor of 7.5 ohms (two 15 ohm resistors in parallel) fused for 15 amps. There is an option for an external power resistor of 4.5 ohms fused with 30 amps (refer to Drawing C-81543).

PSR3-208,230/75:

This model is available with only an external regen power resistor. Protection for this circuit is accomplished by an internal thermal overload relay. THE CONTACT FROM THIS RELAY MUST BE WIRED IN SUCH A MANNER THAT THE THREE PHASE POWER TO THE PSR3 IS REMOVED IF AN OVERLOAD IS DETECTED (refer to the appropriate System Wiring Diagram and Drawings C-82182 and C-82260).

8.0 TROUBLESHOOTING HINTS

The BDS3 and PSR3 are designed to promote minimum downtime situations. Due to the smaller package size, these units are to be replaced if they cease to function properly. Therefore, the best defense against downtime is to keep on hand one or more complete spare BDS3 and PSR3 units. The BDS3 units are directly interchangeable provided:

1. They are of the same continuous current rating.

2. The Motor Control Card contains the proper microprocessor unit per the TL Sheet.

3. The Compensation (Personality) Card is matched with the motor.

Some recommended equipment for troubleshooting the BDS3 and PSR3:

1. Adjustable signal source 0 to ± 8 V (small 9 VDC battery with input reversing switch will do).

2. Dual trace oscilloscope.

3. D.C. voltmeter.

Before beginning the troubleshooting process, consider the following points:

I. There are five (5) distinct areas within which a fault may occur:

1. External Interface

(1) Circuitry external to, but connecting to, the BDS3 and PSR3.

2. BDS3 Control Stage (refer to Figures 5, 6, 11, and 12)

(1) ACS3-MC2, Motor Control Board, containing the following:

a. ACS3-Comp1 or ACS3-COMP1A (Compensation) Board (refer to TL Sheet and Figures 12 and 13)

b. OPT1, OPT2, OPT3, etc. (refer to Figures 14, 15, 16, 17, 18, 19 and 20). OPT1 not shown in Figures.

c. Microprocessor Unit (refer to TL Sheet)

d. R/D Converter Unit

3. BDS3 Power Stage (refer to Figures 7 and 8)

(1) Heat Sink, containing the following:

a. BDS3-BD1, Base Drive Board, Control Power Supplies

b. Fuse (115 VAC, 1 1/2 AMP MDL) refer to parts list

c. Power Transistor Paks

d. Thermostat

4. PSR3 Control Stage (refer to Figures 9 and 10)

(1) BDS3-REG 1, Regeneration Board

5. PSR3 Power Stage (refer to Figures 9 and 10)

(1) Heat Sink, containing the following:

a. Power Transistor (Regeneration)

b. Resistive Load (Regeneration on Chassis)

c. Rectifier Paks (Main D.C. Bus)

d. Large Filter Capacitors (Main D.C. Bus)

e. Fuse 1 1/2 amp AGC (115 V AC on Chassis) Refer to Parts List

f. Fuse according to the following:

(a) PSR3-208,230/25-XX-005 = 10 AMP

(b) PSR3-208,230/50-XX-003 = 30 AMP with external regen resistor.

(c) PSR3-208,230/50-XX-002 = 15 AMP with internal regen resistor (regeneration fuse, on chassis) refer to Parts List.

(d) PSR3/75-XX-Overload relay with proper heater element (refer to PSR3 MODEL NUMBER SYSTEM in front of Manual).

II. There are only two (2) basic fault characteristics to be considered:

1. The motor exhibits very low torque or is totally inoperative.

2. The motor is erratic or exhibits an improper mode of operation.

8.1 The Motor Exhibits Very Low Torque or is Totally Inoperative

Prerequisites for motor movement:

1. All power must be present.

2. The BDS3 must be in the enable mode, as indicated by the Bar Graph DRIVE UP LED (refer to Figure 1).

3. A command signal (other than zero) must be present at the input of the BDS3.

4. The BDS3 and PSR3 must be wired correctly, per the appropriate System Wiring Diagram. Also, check the External Current Limit input circuit and confirm that it is pulled low (tied to common). If this input is not tied to common, the motor torque will be restricted to approximately one third of its peak rating. Refer to EXTERNAL CURRENT LIMIT, Section 3.2.

5. Fault circuits must not be activated. Fault modes are identified by diagnostic bar-graph indicators (refer to Figures 1, 2, and Section 8.2).

   Five of the ten (10) LED INDICATORS are latched fault modes. To reset any of the faults identified as a latched condition, by Section 8.2, simply remove the power, wait 60 seconds, then reapply it.

8.2 LED Status, Diagnostic Bar Graph

1. BUS FAULT (RED)

   (a) The Main Bus should be 300 V DC ±10% for BDS3-208 and 325 V DC ±10% for BDS3-230 units.

   The LED will become illuminated if the Main DC Bus rises above 415 V. The BDS3 will become latched in the inhibit mode (may happen if the PSR3 unit does not have a BDS3-REG 1 Board or if this board malfunctions -- refer to Figures 9 and 10).

   (b) This LED will also become illuminated if the Main Bus is insufficient or absent. See Figures 3 and 4.

   (c) This LED will become illuminated if the Regen Fuse blows. Usually means the Regeneration load resistor bank is insufficient.

   This resistor load is utilized with a shunt regulator power transistor switch and BDS3-REG 1 Board located within the PSR3 unit. The circuit is used to prevent the Main Bus from being "pumped up" during deceleration periods by overhauling motor loads (refer to Figures 9, 10, and Drawing C-82260).

2. OVERSPEED (RED)

In the event the motor obtains an excessive speed, the OVERSPEED fault circuit will activate, latch the BDS3 in the inhibit mode, and the LED will become illuminated.

3. ZEROING (YELLOW)

This LED is not a fault indicator but is used to help set the BDS3 system resolver zero point (refer to Section 6.9-9).

4. REMOTE INHIBIT (YELLOW)

This LED is not a fault indicator. When the LED is illuminated, it simply means the BDS3 is in the inhibit mode. This LED will always take the opposite state to that of the DRIVE UP LED when J20 is installed on the Compensation Board.

5. DIRECTION (GREEN)

This LED is not a fault indicator. It indicates direction of rotation of the motor shaft. It will be illuminated to indicate C.W., extinguished to indicate C.C.W.

6. DRIVE UP (GREEN)

This LED is not a fault indicator. When the LED is illuminated, it simply means the BDS3 is in the enable mode. The LED will always take the opposite state to that of the REMOTE INHIBIT LED when J20 is installed on the Compensation Board. There will be no motor movement until this LED becomes illuminated.

7. FOLDBACK (YELLOW)

When the LED becomes illuminated, it is an indication that the motor peak current is remaining at a high level too long or the duty cycle is too severe. In either case, the peak current will be reduced automatically to the continuous current rating of the BDS3 until the load demand is removed.

8. POWER LOSS (YELLOW)

When the LED becomes illuminated, it is an indication that the + 5 volt logic supply is not functioning properly, usually because the 115 VAC has been

momentarily interrupted. In this event, the BDS3 will become latched in the inhibit mode.

9. OVERTEMP (RED)

   In the event the transistor power stage overheats, a thermostat (mounted on the power stage heat sink) will open, the LED will become illuminated, and the BDS3 will become latched in the inhibit mode (refer to Figures 7 and 8 for location of thermostat).

10. OVERCURRENT (RED)

    When this LED becomes illuminated, it indicates an overcurrent condition usually due to a shorted load (motor) or a shorted power transistor (BDS3). The BDS3 will become latched in the inhibit mode. If this LED becomes illuminated, remove the power and disconnect the motor. Reapply power. If the BDS3 comes up without this LED becoming illuminated, suspect a faulty motor. If the BDS3 comes up with the LED illuminated, suspect a faulty BDS3 power stage.

8.3 The Motor is Erratic or Exhibits an Improper Mode of Operation

Prerequisites for proper motor operation:

1. Proper grounding scheme. The motor ground wire should be grounded as shown by the appropriate System Wiring Diagram or grounded to the main ground point.

2. Motor armature leads must not be run in conduit or wire ducts with any signal carrying conductors.

3. The resolver leads and motor armature leads must be wired according to the appropriate System Wiring Diagram.

4. The tachometer leads (when used) must be connected so that a clock-wise turn of the motor shaft will produce a positive voltage at Connector 210-19 with respect to 210-9.

5. The motor system resolver must be set at its zero point (refer to Section 6.9).

6. The motor should be loaded, otherwise, the system may become unstable.

9.0 OPTIONS

Option boards are brought into existence from time to time to satisfy specific needs and to add versatility to the product.

The Option Boards are mounted on four (4) circuit board supports of the ACS3-MC2 Motor Control Board (refer to Figure 11 and the appropriate Option Board Assembly Drawing and Figure).

If the Option Board has already been mounted, please proceed to the desired Option Board Section.

Procedure for mounting the Option Board to the ACS3-MC2 Motor Control Board:

1. Remove all power from the BDS3 unit.

2. Remove the plastic front cover from the unit by removing all four (4) #4 screws.

3. Pull the ACS3-MC2 Motor Control Board approximately halfway out of the BDS3 unit.

4. Remove the multi-wire ribbon connector from the Motor Control Board (Connector 163).

5. Remove the thermostat connector from the Motor Control Board (Connector 143).

6. Remove the Motor Control Card.

7. Secure the four (4) circuit board supports (Part Number A-79287-003) with four (4) #8-32 nylon nuts (Part Number H-15140) to the component side of the Motor Control Board.

8. Snap the Option Board onto the four (4) circuit board supports.

9. Install the 50 pin ribbon cable assembly (Part Number A-82061-003) between Connector 100 of the ACS3-MC2 Board and Connector of the Option Board.

10. Reinstall the Motor Control Board into the BDS3 unit. Reconnect the multi-wire cable. Reconnect the small thermostat cable.

NOTICE:

Use of the ACS3-OPT5 Option Board requires that the optional inhibit jumper (a zero OHM resistor) on the Compensation Card be removed. Remove Jumper J13 from the Compensation Board of the BDS3 Motor Controller.

9.1 ACS3-OPT2

The ACS3-OPT2 is an encoder board. The main function of this board is to convert the binary (motor shaft) position information from the R/D converter (mounted on the ACS3-MC2 Board) into an encoder output format. An LED display of the signals is provided (refer to Drawing C-81991-1 and Figure 14).

Each BDS3 Amplifier has a R/D (Resolver-to-Digital) converter mounted on its ACS3-MC2 Board. The R/D may be a 10, 12, 14 or 16 bit unit. The ACS3-MC2 Board works in conjunction with the R/D to generate the encoder output lines. The Standard 100, 101, 200, 201, and 202 Series BDS3 Amplifiers have 12 Bit R/D units. Refer to the Model Number Scheme in the front of the manual to determine what R/D your BDS3 amplifier may have.

Also, there are two types of R/D units currently in use -- the Open Housed unit and the Encapsulated unit. Refer to Chart 1 for information concerning restrictions in motor speed in RPM for the two different types of R/D units. All jumpers and switches on the OPT2 Board have been previously set at the factory.

The ACS3-OPT2 Board, in conjunction with the R/D unit, generates two line quadrature channels of information with a third channel of marker pulses. The two line quadrature channel options are as follows:

1. With a 10-Bit R/D unit (mounted on the ACS3-MC2 Board) the ACS3-OPT2 converts 10 bits of R/D (Resolver-to-Digital) information into two 256 line quadrature channels.

2. With a 12-Bit R/D (configured as an 11-Bit unit), the ACS3-OPT2 converts 11 bits of R/D information into two 512 line quadrature channels.

3. With a 12-Bit R/D (Standard) the ACS3-OPT2 converts 12 bits of R/D information into two 1024 line quadrature channels.

4. With a 14-Bit R/D (configured as a 13-Bit unit), the ACS3-OPT2 converts 13 bits of R/D information into two 2048 line quadrature channels.

5. With a 14-Bit R/D, the ACS3-OPT2 converts 14 bits of R/D information into two 4096 line quadrature channels.

6. With a 16-Bit R/D (configured as a 15-Bit unit), the ACS3-OPT2 converts 15 bits of R/D information into two 8192 line quadrature channels.

7. With a 16-Bit R/D, the ACS3-OPT2 converts 16 bits of R/D information into two 16384 line quadrature channels.

If you have ordered the ACS3-OPT2 Board option as a separate item to add to your BDS3 amplifier, please refer to Chart 1 for information concerning the ACS3-OPT2 jumper and switch configurations.

ACS3 - OPT2 OUTPUT CONFIGURATIONS

R/D RESOLUTION LOCATED ON ACS3-MC2 BOARD	COMPONENT 13 PIN AND JUMPER LOCATIONS	COMPONENT 15 SWITCH LOCATIONS O = OFF 1 = ON								OPTIONAL ENCODER LINES
		1	2	3	4	5	6	7	8	
10 BITS OR GREATER	J13-7 TO 13-10; 13-8 TO 13-9	o	o	o	o	o	o	o	1	256
*12 BITS OR GREATER	J13-7 TO 13-8; 13-10 TO 13-11	o	o	o	o	o	o	1	1	512
12 BITS OR GREATER	J13-5 TO 13-12; 13-6 TO 13-11	o	o	o	o	o	1	1	1	1024
+14 BITS OR GREATER	J13-5 TO 13-6; 13-12 TO 13-13	o	o	o	o	1	1	1	1	2048
14 BITS OR GREATER	J13-3 TO 13-14; 13-4 TO 13-13	o	o	o	1	1	1	1	1	4096
**16 BITS OR GREATER	J13-3 TO 13-4; 13-14 TO 13-15	o	o	1	1	1	1	1	1	8192
16 BITS OR GREATER	J13-1 TO 13-16; 13-2 TO 13-15	o	1	1	1	1	1	1	1	16384

☐ COMPONENT 13 IS AN ARRAY OF PINS FOR INSTALLING JUMPERS

☐ ☐ COMPONENT 15 IS A DIP SWITCH (8 POSITION)

* CONFIGURED AS AN 11 BIT R/D

+ CONFIGURED AS A 13 BIT R/D

** CONFIGURED AS A 15 BIT R/D

MAXIMUM SPEED FOR R/D BEING USED	OPEN R/D	INCAPSULATED R/D
10 BIT	62400 RPM	34680 RPM
12 BIT	15600 RPM	8670 RPM
14 BIT	3900 RPM	2168 RPM
16 BIT	975 RPM	542 RPM

CHART 1

9.2 ACS3-OPT3

The ACS3-OPT3 is an encoder, position feedback, interface board. Its function is to act as the communication link between the INDUSTRIAL DRIVES' BDS3 Motor Controller and the INDUSTRIAL DRIVES' DPS Position Loop Controller (refer to Drawing C-82045 and Figure 15).

Connector 1 mates with Connector 100 on the ACS3-MC2 Motor Control Board and is common to both Connectors 9 and 10.

The I/O Connector part located on the FPS Position Loop Controller, by way of ribbon cable, mates with Connector 9. Mainly, command and position information is transmitted over this link.

The I/O Connector part located on the FPS Position Loop Controller, by way of ribbon cable, mates with Connector 10. Mainly, status and fault information is transmitted over the link.

9.3 ACS3-OPT5

The ACS3-OPT5 Board contains one JAM DETECT circuit. This board monitors motor speed as well as motor current. If the motor current remains above a preset level for a specific time period, while the motor speed is above a preset level, the ACS3-OPT5 Board will act and inhibit the motor controller. The specified duration between fault detection and motor controller inhibit is adjustable from 0.05 to 2.4 seconds. To reset the circuit, remove the 115 VAC control power for several seconds and then reapply it (refer to Figure 16 and Drawing C-83470).

9.3.1 ADJUSTMENTS

The three adjustments have been factory set to the following conditions:

SPEED	POT 54	TP52 +8 VOLTS
CURRENT	POT 55	TP57 +4.6 VOLTS
DURATION	POT 58	FULLY C.C.W.

Circuit adjustments require the use of a digital voltmeter (refer to Drawing C-83470). All DVM monitoring must be made with respect to test point TP-350, analog ground, located on the ACS3-MC2 motor control board.

9.3.2 SPEED THRESHOLD

The voltage level at TP52 may be adjusted from 0 to 8 volts; representing motor speeds from 0 to maximum. Pot 54 is used to adjust the motor speed above which the circuit will recognize a jammed condition.

For example: When Pot 54 is adjusted so that + 4 volts is present at TP52, a jammed condition will only be recognized if the motor tachometer voltage is between + 4 and +9 volts. The + 9 volt level representing an excessive speed.

9.3.3 CURRENT THRESHOLD

The voltage level at TP57 may be adjusted from 0 to 8 volts; representing the amplifier's RMS current rating from 0 to maximum. Pot 55 is used to adjust the amplifier's RMS current to the desired threshold level.

For example: When Pot 55 is adjusted so that + 2.5 volts is present at TP57, a jammed condition will only be recognized if the amplifier's RMS current is above that represented by the 2.5 volts appearing at TP57.

9.3.4 TIME DELAY

Adjustment Pot 58 sets the duration of the jammed (fault) condition, before acting to inhibit the motor controller. The fault duration may be adjusted from 0.05 to 2.4 seconds. Turning Pot 58 fully clockwise will allow a sustained jammed condition of 0.05 seconds. Turning Pot 58 fully counterclockwise will allow a sustained jammed condition of 2.4 seconds.

9.4 ACS3-OPT6

The ACS3-OPT6-01 Board (refer to Figure 17 and Drawing C-83182-1) contains four circuit functions.

1. Up-to-Speed indication occurs when the motor reaches 90% of the commanded speed.

2. Low Speed indication occurs when the motor speed drops below the adjustable speed setting in the range of 50 to 375 RPM.

3. External Load Meter Option provides a means by which the customer may adjust the scaling of the current monitor signal for specific applications.

4. Ramp Circuit alters the speed reference step input signal to provide an adjustable Ramp Output command.

The ACS3-OPT6-02 Board contains three circuit functions:

1. Up-to-Speed circuit.

2. Low Speed circuit.

3. External Load Meter Option.

The ACS3-OPT6-03 Board contains one circuit function:

1. Ramp Circuit.

NOTE:

The ACS3-OPT6 ramp circuit can only be activated with use of the ACS3-COMP1A Compensation Board. Jumper 10A must be removed from the ACS3-COMP1A Board to activate this option (refer to Figure 13).

9.4.1 RELAY CONTACT RATINGS

MAXIMUM CONTACT RATINGS	2 AMPS AC OR DC
MAXIMUM SWITCHED VOLTAGE	125 VAC OR 150 VDC
SWITCHED POWER	30 W OR 50 VA
MINIMUM SWITCHED CURRENTS	50 MICROAMPS AC OR DC
MINIMUM SWITCHED VOLTAGE	50 mV AC OR DC

All pinouts from the relays will be to Phoenix style connectors.

9.4.2 ADJUSTMENTS

Circuit adjustments require the use of a Digital Voltmeter. All DVM monitoring must be made with respect to test point TP-46, analog ground, of the ACS3-OPT6 Board (refer to Drawing C-83132-1). Green LED's will become illuminated to indicate the Up-to-Speed and the Low-Speed modes of operation. All adjustments will be made by use of 10 or 20 turn potentiometers.

9.4.3 UP-TO-SPEED ADJUSTMENT

If the Speed Scale Factor (Speed) adjustment has not been made, make the Speed Scale Factor adjustment by referring to Section 6.2 or 6.3.

With a digital voltmeter, monitor the ABSOLUTE VALUE OF TACHOMETER VOLTAGE at TP-3. Enable the amplifier and command a motor speed that will produce + 4 volts at TP-3.

Move the DVM from TP-3 to SCALED SPEED REFERENCE, TP-23. Adjust the (Speed Agree) Pot 22 for - 4 volts at the meter.

Select the speed range over which the Up-to-Speed signal is to be high. This range is adjustable from 5 - 13%. Let us assume that we desire the Up-to-Speed signal to be HIGH when the tach voltage (motor speed) is within ± 5% of the command speed of - 4 volts at TP-23. While the - 4 volts is at TP-23, move the DVM to TP-32 and adjust %ADJ, Pot 31 for (0.05 X 4.00) = 0.200 volts.

9.4.4 LOW SPEED ADJUSTMENT

With a DVM monitor N Detect TP-11, adjust Pot 10 for zero volts. Remove the DVM. Command the spindle speed desired to initiate the Low Speed output signal. With the spindle now running at the appropriate speed, slowly adjust Pot 10 until the N Detect LED just becomes illuminated.

9.4.5 LOAD METER SCALING ADJUSTMENT

The Current Monitor (I MON) is an absolute value analog signal that represents the RMS phase current to the motor. The signal after entering the ACS3-OPT6 Board is normally scaled for + 8 volts and represents the maximum RMS amplifier phase current at TP-40. However, this signal may be scaled over a limited range for an external load meter. To scale this signal for an external load meter, connect a DVM to TP-40. Adjust Pot 39, Load Meter Scaling for the desired value in amps/volt.

9.4.6 RAMP ADJUSTMENT

The Ramp circuit alters the speed reference signal. For a step input reference voltage, adjust Pot 71 fully counterclockwise for command signals of 1.525 seconds per volt or fully clockwise for 0.025 seconds per volt ramps. The adjustment range is linear between the extremes.

9.5 ACS3-OPT9

The ACS3-OPT9 is a dual-slope ramp generator and direction limit board. Separate acceleration and deceleration ramps are provided. The slopes are totally independent and adjustable from 44 volts per second to 1 volt per second ± 20%. Adjustment of the slopes are accomplished by Pot 74 (RAMP-UP) and Pot 76 (RAMP-DN) on the ACS3-OPT9 Board. No interface connections from outside the amplifier are necessary for utilization of the ramp options. Refer to Drawing D-84179 and Figure 18.

To utilize the direction limit option, simply connect a limit switch in series with the high side of a + 24 VDC supply to TB25-1 on the ACS3-OPT9 Board. Also connect a limit switch in series with the high side of a + 24 VDC supply to TB25-3. Connect the + 24 VDC common to TB25-2 and 4.

NOTE:

The ACS3-OPT9 dual-slope ramp function can only be activated with use of the ACS3-COMP1A Compensation Board. Jumper 10A must be removed from the ACS3-COMP1A Board to activate this option (refer to Figure 13).

When either direction limit switch is contacted and opened (CW or CCW), the motor current producing torque for that direction will be clamped to zero. However, the amplifier will be capable of producing maximum torque for movement in the opposite direction.

9.6 ACS3-OPT10

The ACS3-OPT10 is a Fault Monitoring Board. This option board works in conjunction with the ACS3-MC2 Motor Control Board to perform and record shut-down operations. Refer to Drawings C-84097, C-84305, and Figure 19.

The OPT10 Board monitors the status of the following circuits through the use of "Open Collector" outputs for use by N/C or C/N/C controllers:

OVERSPEED	If the motor obtains an excessive speed, Pin 3 of Connectors 46 and 47 on the OPT10 Board will transition LOW. The BDS3 will become latched in the inhibit mode. LED 2 on the BDS3 bar graph will become illuminated. Refer to Section 8.2-2.
FOLDBACK	If the motor's peak current (torque) remains too high for too long or the duty cycle becomes too severe, Pin 2 of Connectors 46 and 47 on the OPT10 Board will transition LOW. The peak current will be reduced automatically and the BDS3 will become latched in the inhibit mode. LED 70 on the OPT10 Board will become illuminated. LED 7 on the bar graph of the BDS3 will also become illuminated. Refer to Section 8.2-7.
OVERTEMP	If the BDS3 transistor power stage attains an excessive temperature, Pin 8 of Connectors 46 and 47 on the OPT10 Board will transition LOW. The BDS3 will become latched in the inhibit mode. LED 9 on the BDS3 bar graph will become illuminated. Refer to Section 8.2-9.
OVERCURRENT	If the power stage of the BDS3 experiences an overcurrent condition, Pin 1 of Connectors 46 and 47 on the OPT10 Board will transition LOW. The BDS3 will become latched in the inhibit mode. LED 10 on the BDS3 bar graph will become illuminated. Refer to Section 8.2-10.
RESOLVER LOSS	In the event the resolver information is lost, a fault circuit will activate on the OPT10 Board, and latch the BDS3 in the inhibit mode. LED 71 on the OPT10 Board will become illuminated.

If one or more of the above five faults becomes active, the BDS3 will be put into the inhibit mode. The Remote Inhibit LED (Yellow) on the BDS3 bar graph will become illuminated, the Drive Up LED (Green) will become extinguished, and the

9.7 ACS3-OPT12

The ACS3-OPT12 is an encoder board. The main function of this board is to convert the binary (motor shaft) position information from the R/D converter (mounted on the ACS3-MC2 Board) into an encoder output format. Two L.E.D. monitors (when flashing) indicate that A and B channel outputs are active. Also, a third L.E.D. monitor (when flashing) indicates that channel C (marker pulse) output is active (refer to Drawing C-93149-1 and Figure 20).

Each BDS3 Amplifier has a R/D (Resolver-to-Digital) converter mounted on its ACS3-MC2 Board. The R/D may be a 10, 12, 14 or 16 bit unit. The ACS3-MC2 Board works in conjunction with the R/D to generate the encoder output lines. The Standard 100, 101, 200, 201 and 202 series BDS3 amplifiers have 12 bit R/D units. Refer to the Model Number Scheme in the front of the manual to determine what R/D your BDS3 amplifier may have.

Also, there are two types of R/D units currently in use--the open housed unit and the encapsulated unit. Refer to Chart 2 for information concerning restrictions in motor speed in RPM for the two different types of R/D units. All jumpers and switches on the OPT12 Board have been previously set at the factory.

The ACS3-OPT12 Board, in conjunction with the R/D unit, generates two line quadrature channels of information with a third channel of marker pulses. The two line quadrature channel options are as follows:

1. With a 10-bit R/D unit (mounted on the ACS3-MC2 Board) the ACS3-OPT12 converts 10 bits of R/D (Resolver-to-Digital information into two 256 line quadrature channels.

2. With a 12-bit R/D (configured as an 11-bit unit), the ACS3-OPT12 converts 11 bits of R/D information into two 512 line quadrature channels.

3. With a 12-bit R/D (Standard) the ACS3-OPT12 converts 12 bits of R/D information into two 1024 line quadrature channels.

4. With a 14-bit R/D (configured as a 13-bit unit), the ACS3-OPT12 converts 13 bits of R/D information into two 2048 line quadrature channels.

5. With a 14-bit R/D, the ACS3-OPT12 converts 14 bits of R/D information into two 4096 line quadrature channels.

6. With a 16-bit R/D (configured as a 15-bit unit), the ACS3-OPT12 converts 15 bits of R/D information into two 8192 line quadrature channels.

7. With a 16-bit R/D, the ACS3-OPT12 converts 16 bits of R/D information into two 16384 line quadrature channels.

If you have ordered the ACS3-OPT12 Board option as a separate item to add to your BDS3 amplifier, please refer to Chart 2 for information concerning the ACS3-OPT12 jumper and switch configurations.

ACS3 - OPT12 OUTPUT CONFIGURATIONS

R/D RESOLUTION LOCATED ON ACS3-MC2 BOARD	COMPONENT 30 PIN AND JUMPER LOCATIONS	COMPONENT 28 SWITCH LOCATIONS O = OFF 1 = ON								OPTIONAL ENCODER LINES
		1	2	3	4	5	6	7	8	
10 BITS OR GREATER	7 TO 10; 8 TO 9	o	o	o	o	o	o	o	1	256
*12 BITS OR GREATER	7 TO 8; 10 TO 11	o	o	o	o	o	o	1	1	512
12 BITS OR GREATER	5 TO 12; 6 TO 11	o	o	o	o	o	1	1	1	1024
+14 BITS OR GREATER	5 TO 6; 12 TO 13	o	o	o	o	1	1	1	1	2048
14 BITS OR GREATER	3 TO 14; 4 TO 13	o	o	o	1	1	1	1	1	4096
**16 BITS OR GREATER	3 TO 4; 14 TO 15	o	o	1	1	1	1	1	1	8192
16 BITS OR GREATER	1 TO 16; 2 TO 15	o	1	1	1	1	1	1	1	16384

☐ COMPONENT 30 IS AN ARRAY OF PINS FOR INSTALLING JUMPERS

☐ ☐ COMPONENT 28 IS A DIP SWITCH (8 POSITION)

* CONFIGURED AS AN 11 BIT R/D

\+ CONFIGURED AS A 13 BIT R/D

** CONFIGURED AS A 15 BIT R/D

MAXIMUM SPEED FOR R/D BEING USED	OPEN R/D	INCAPSULATED R/D
10 BIT	62400 RPM	34680 RPM
12 BIT	15600 RPM	8670 RPM
14 BIT	3900 RPM	2168 RPM
16 BIT	975 RPM	542 RPM

CHART 2

Drive Up contact within the BDS3 will become open, indicating that the BDS3 is in the inhibit mode. Refer to Sections 8.2-4, 8.2-6, and 3.2.

The BDS3 may be externally reset by momentarily toggling the Customer Reset HIGH (temporarily open a switch between Pins 12/22 of Connector 62 and D-Common on the OPT10 Board).

9.8 ACS3-SO1 - INT

The ACS3-SO1-INT is an interface board. It is used to allow the BDS3 motor controller to interface with Industrial Drives' SPINDLE ORIENT 1 module. Refer to Drawings C-82879, C-82552-1, and Figure 21.

The Spindle Orient 1 module (must be ordered separately) stops the spindle at a fixed position by utilizing position information obtained from a resolver which is directly connected to the machine spindle. The precise spindle position is continuously updated by a resolver-to-digital converter and displayed on a twelve bit LED bar graph. For further information on the Spindle Orient 1 module, please refer to Manual M-8704 or contact INDUSTRIAL DRIVES' Sales Engineering Department.

9.9 REMOTE EXTERNAL CURRENT LIMIT

An optional remote external current limit adjustment may be incorporated via a two conductor shielded cable installed between Connector 35 (pins 3 and 4) on the ACS3-COMP1A Compensation Board, and a rheostat mounted at a remote location (Operator's panel, etc.). The shield of the cable is grounded at Connector 35 pin 2.

The remote adjustment provides a means to further reduce the motor current (torque) to a more exact value when in the EXTERNAL CURRENT LIMIT MODE (refer to Section 3.2, Figure 13, Drawing C-84070-1 and the TL-Sheet).

10.0 SPARE PARTS LIST

The BDS3 and PSR3 are designed to promote minimum downtime situations. Their design features promote change out if they cease to function properly. Therefore, the best defense against downtime is to keep on hand one or more complete spare BDS3 and PSR3 units. PLEASE GIVE COMPLETE MODEL NUMBER OF AMPLIFIER WHEN ORDERING SPARE PARTS.

BDS3	
MOTOR CONTROL BOARD	BDS3-MC1 (Discontinued)
MOTOR CONTROL BOARD	ACS3-MC2 (Must have ACS3-MC2 micro to replace BDS3-MC1)
F65	1 1/2 A. Slo-Blo 3AE 250V
ACS3-MC2 CONNECTOR 97	A-81014-010
ACS3-MC2 CONNECTOR 210	A-81014-020
MICROPROCESSOR	Refer to TL Sheet for System
R/D CONVERTER: 10 Bit - A-80994-001 14 Bit - A-80994-003 12 Bit - A-80994-002 16 Bit - A-80994-004	
COMP (Personality) BOARD	ACS3-COMP1
COMP (Personality) BOARD	ACS3-COMP1A (MOST CURRENT)
THERMOSTAT	A-80078
OPTION BOARDS (WHEN USED):	
Encoder Board	ACS3-OPT2
Interface Board	ACS3-OPT3 (DPS POSITION LOOP)
Jam Detect Board	ACS3/BDS3-OPT5
Speed Indication Board	ACS3-OPT6-01
Speed Indication Board	ACS3-OPT6-02
Speed Indication Board	ACS3-OPT6-03
Ramp Generator Board	ACS3-OPT9-02
Direction Limit Board	ACS3-OPT9-03
Fault Monitor Board	ACS3-OPT10
Encoder Board	ACS3-OPT12
Interface Board	ACS3-SO1 (SPINDLE ORIENT 1)

SPARE PARTS LIST (CON'T)

BDS3-208,230/06	
BASE DRIVE BOARD	BDS3-BD1-06 (208V) BDS3-BD1-230/06 (230V)
POWER STAGE TRANSISTOR	A-80121

BDS3-208,230/12	
BASE DRIVE BOARD	BDS3-BD1-12 (208V) BDS3-BD1-230/12 (230V)
POWER STAGE TRANSISTOR	A-80121

BDS3-208,230/20	
BASE DRIVE BOARD	BDS3-BD1-20 (208V) BDS3-BD1-230/20 (230V)
POWER STAGE TRANSISTOR	A-79957

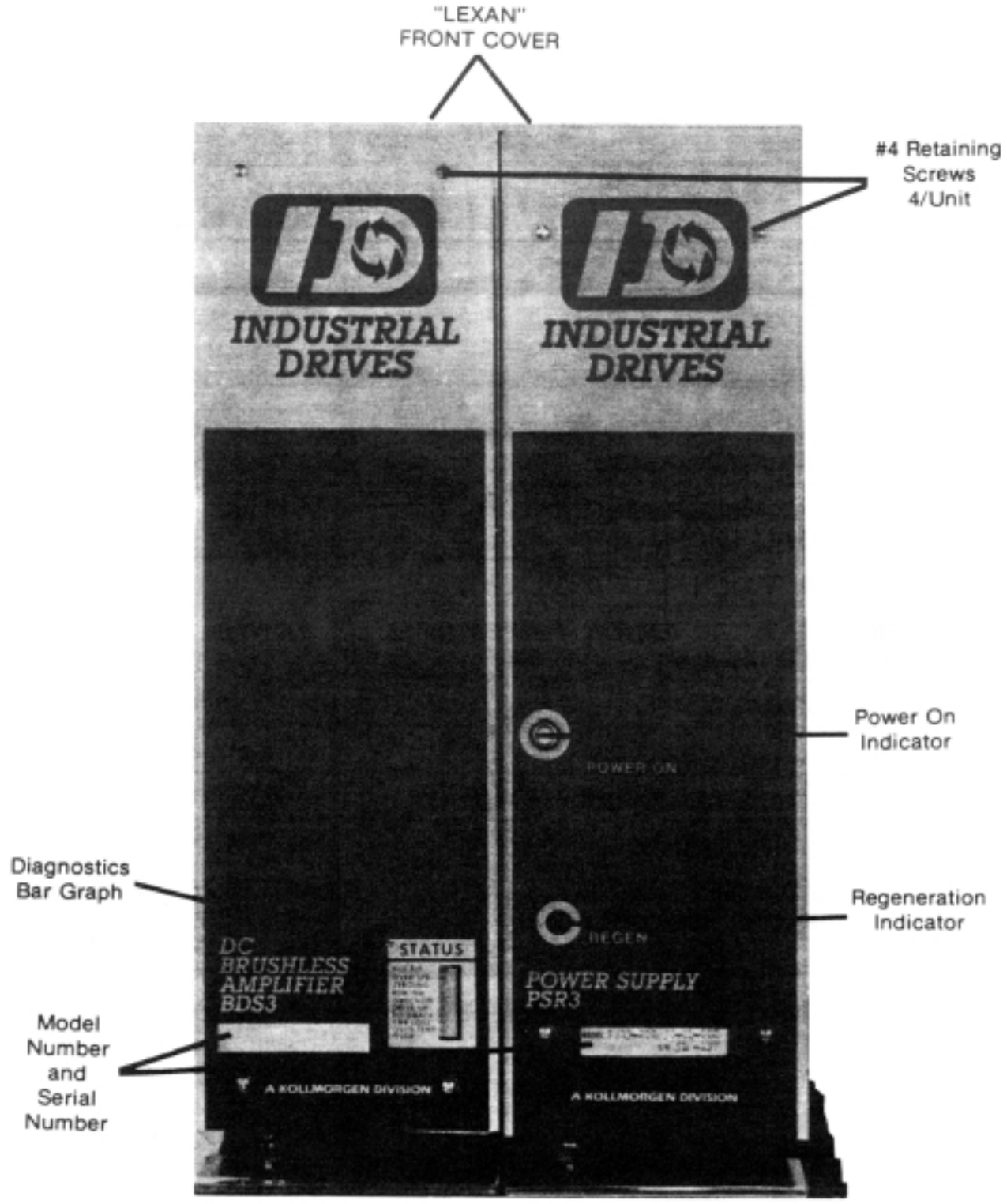
BDS3-208,230/30	
BASE DRIVE BOARD	BDS3-BD1-30 (208V) BDS3-BD1-230/30 (230V)
POWER STAGE TRANSISTOR	A-80641

BDS3-208,230/40	
BASE DRIVE BOARD	BDS3-BD1-40 (208V) BDS3-BD1-230/40 (230V)
POWER STAGE TRANSISTOR	A-81707

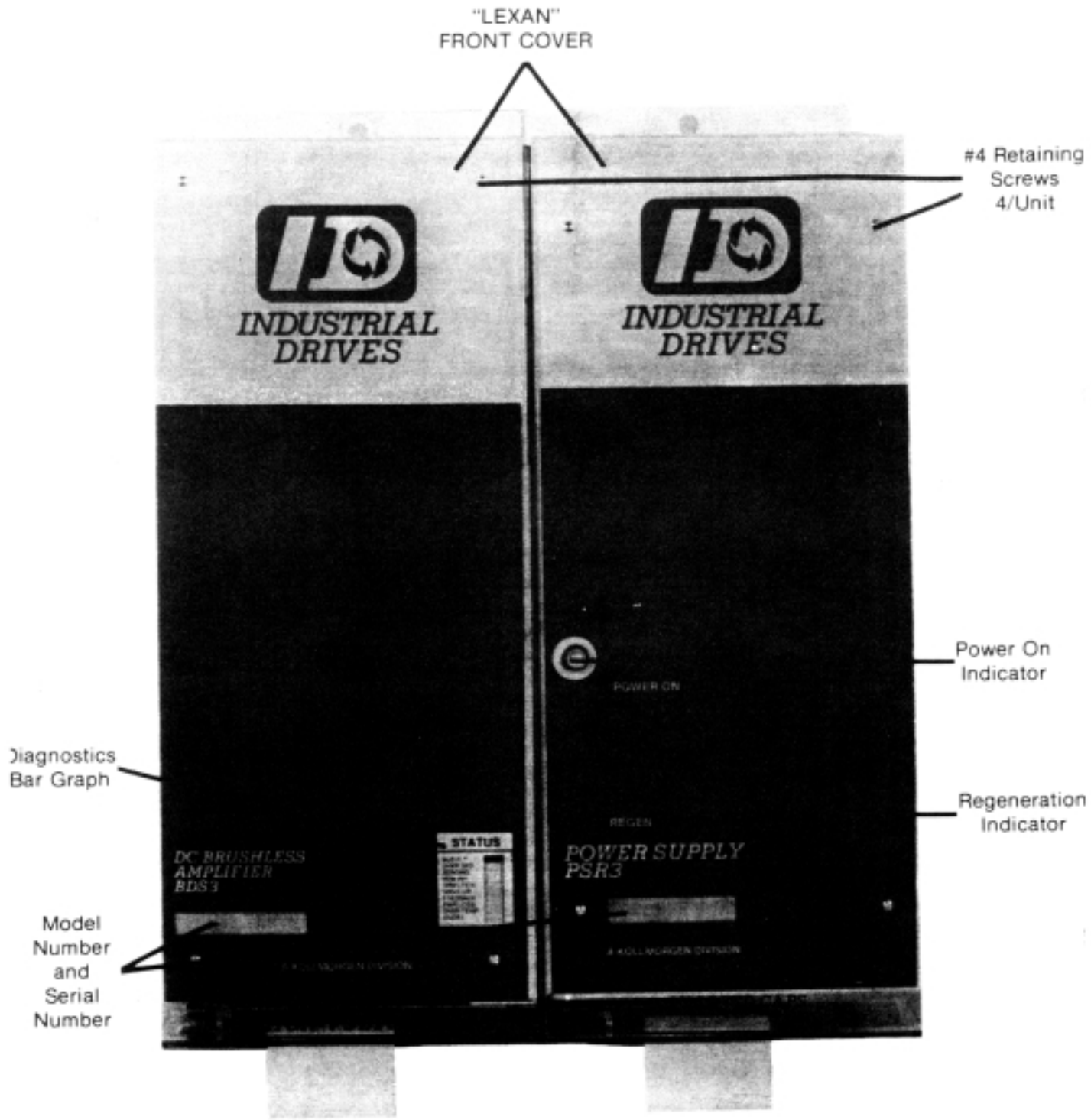
BDS3-208,230/55	
BASE DRIVE BOARD	BDS3-BD1-55 (208V) BDS3-BD1-230/55 (230V)
POWER STAGE TRANSISTOR	A-81707

PSR3	
REGENERATION BOARD	BDS3-REG1
REGENERATION RESISTOR LOAD (INTERNAL) 15 OHM 280W	A-81162
REGENERATION FUSE	**
REGENERATION POWER TRANSISTOR (MODULE 100 AMP)	A-81080
F54 5 AMP/250V	A-78896-013
**PSR3-208,230/25-XX-005 10 AMP	A-79787-001
**PSR3-208,230/50-XX-002 15 AMP	A-79787-002
**PSR3-208,230/50-XX-003 30 AMP	A-79787-005
**PSR3-208,230/75-XX-XXX (OVERLOAD RELAY/HEATER)	REFER TO PSR3 MODEL NUMBER SYSTEM IN THE FRONT OF THE MANUAL

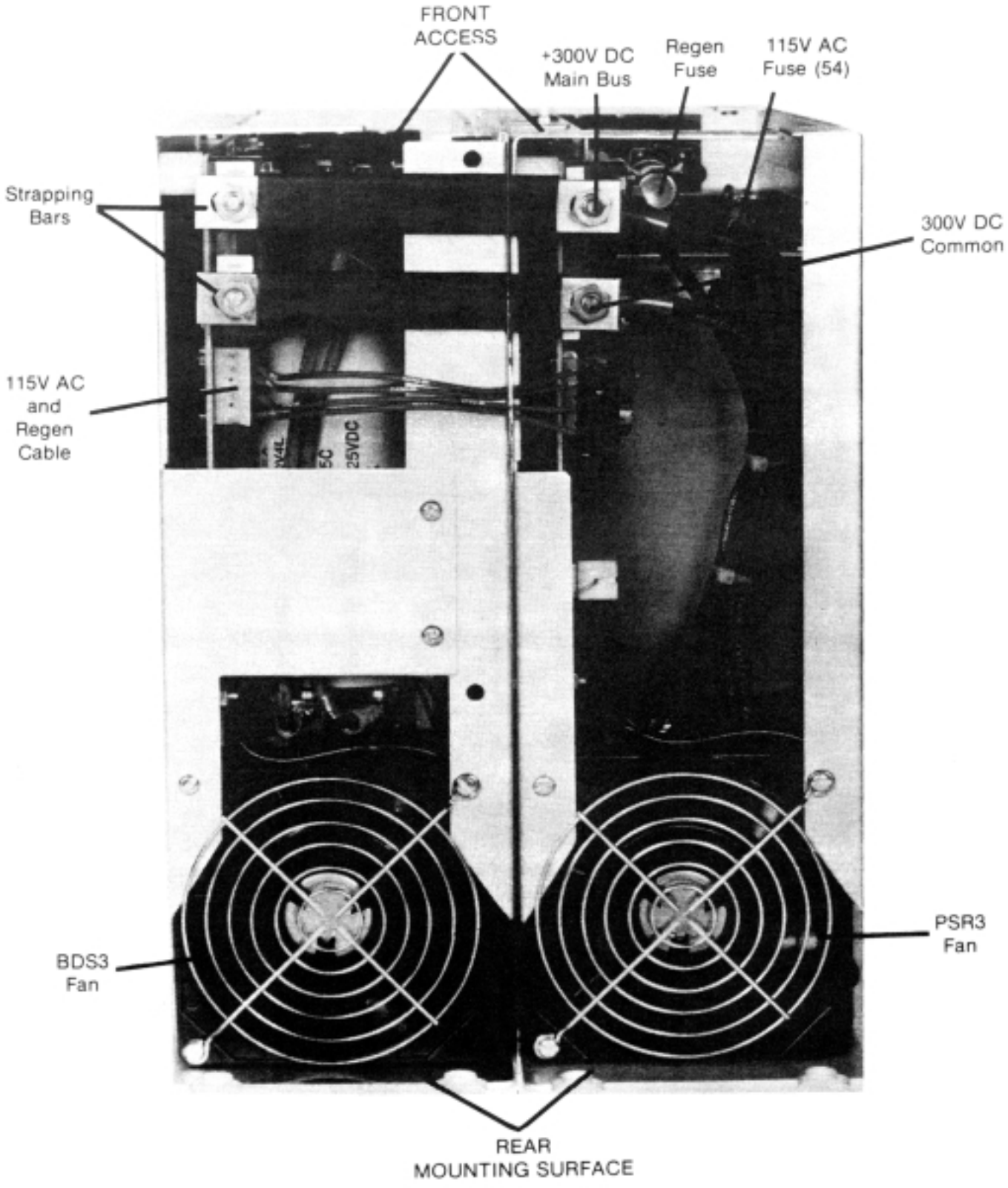
**Refer to Model Number Scheme in the front of the manual.



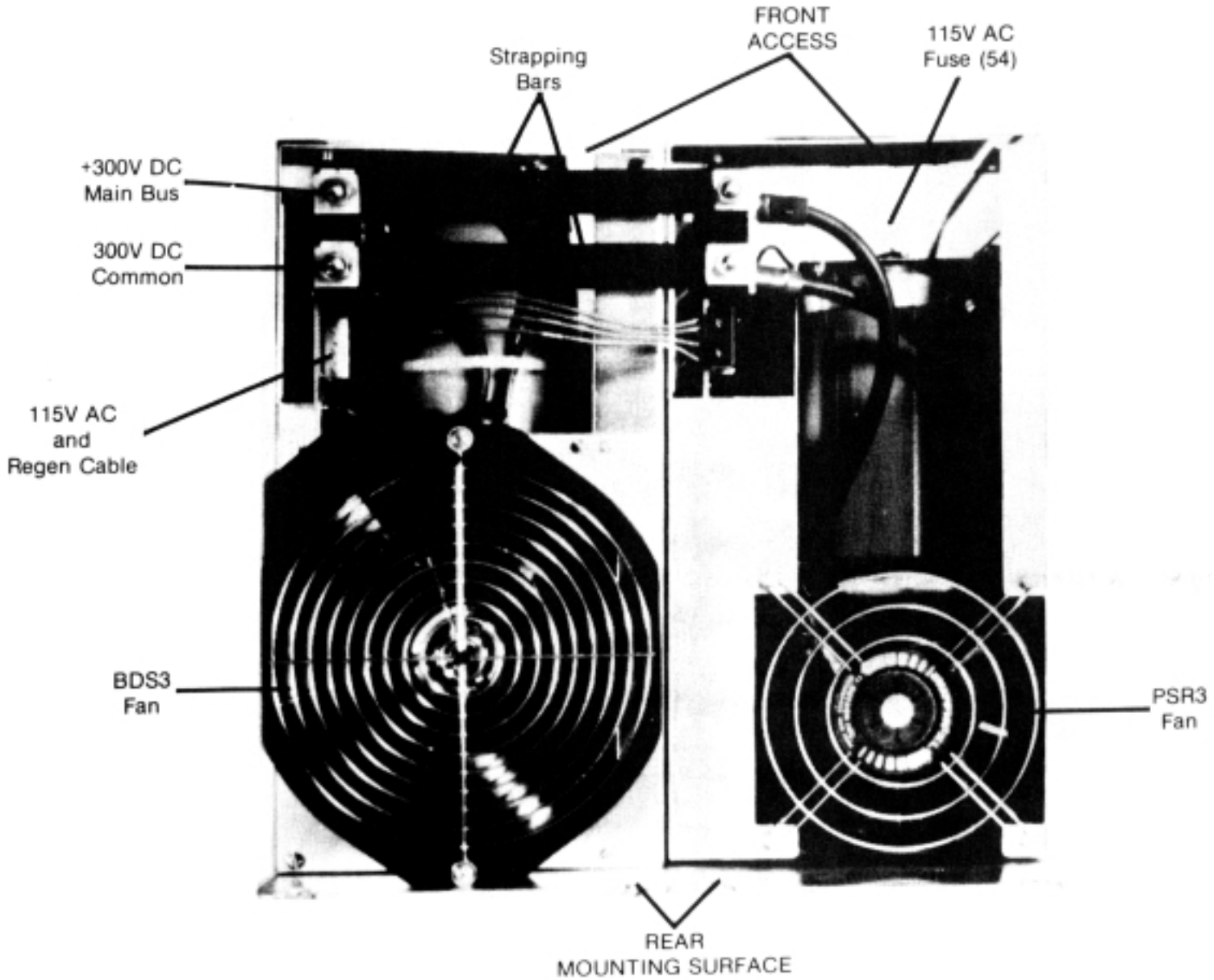
BDS3 - 12/20/30/40 AMP AND PSR3 - 25/50 AMP
(FRONT VIEW)
FIGURE 1



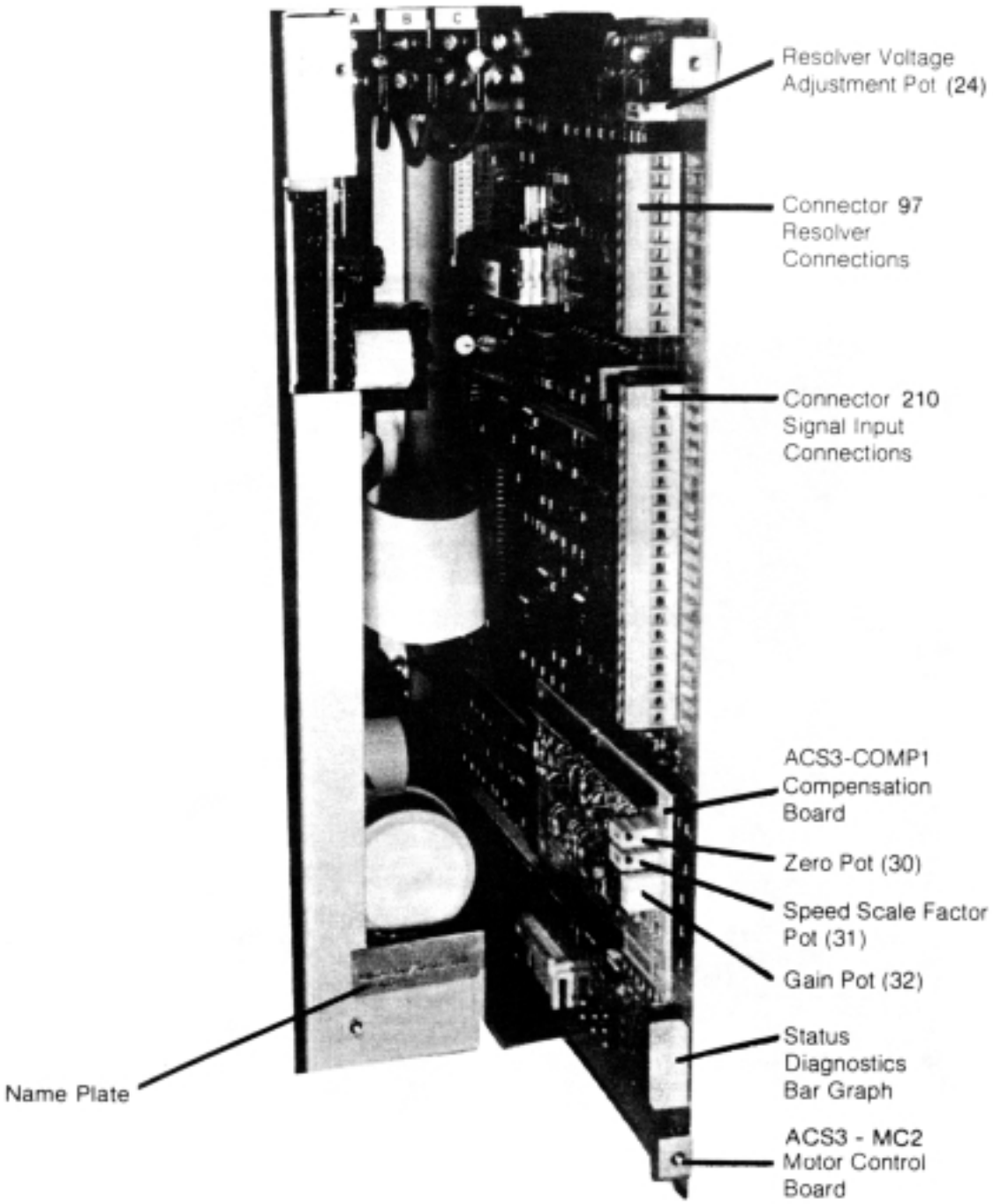
BDS3 - 55 AMP AND PSR3 - 75 AMP
(FRONT VIEW)
FIGURE 2



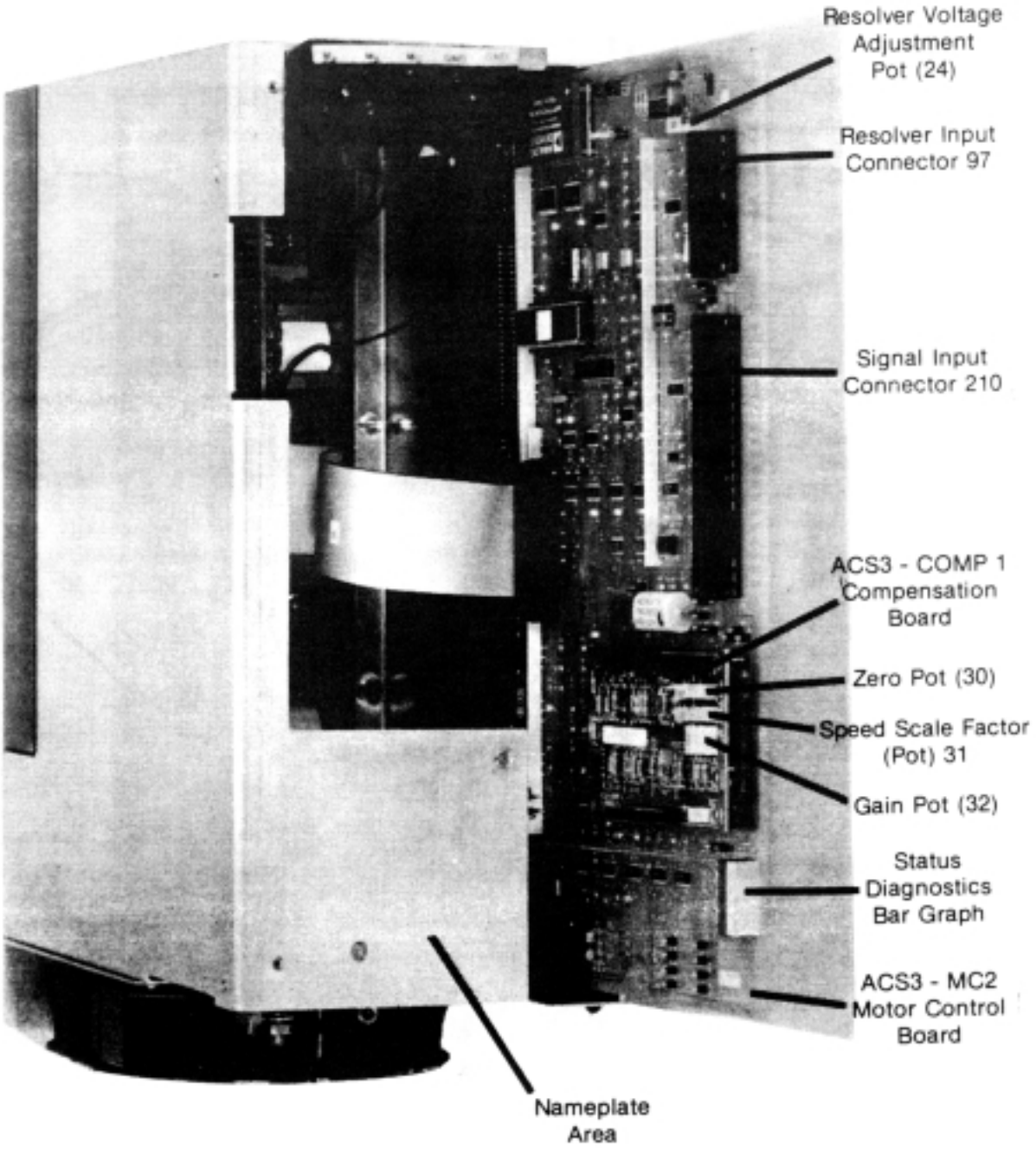
BDS3 - 12/20/30/40 AMP AND PSR3 - 25/50 AMP
(BOTTOM VIEW)
FIGURE 3



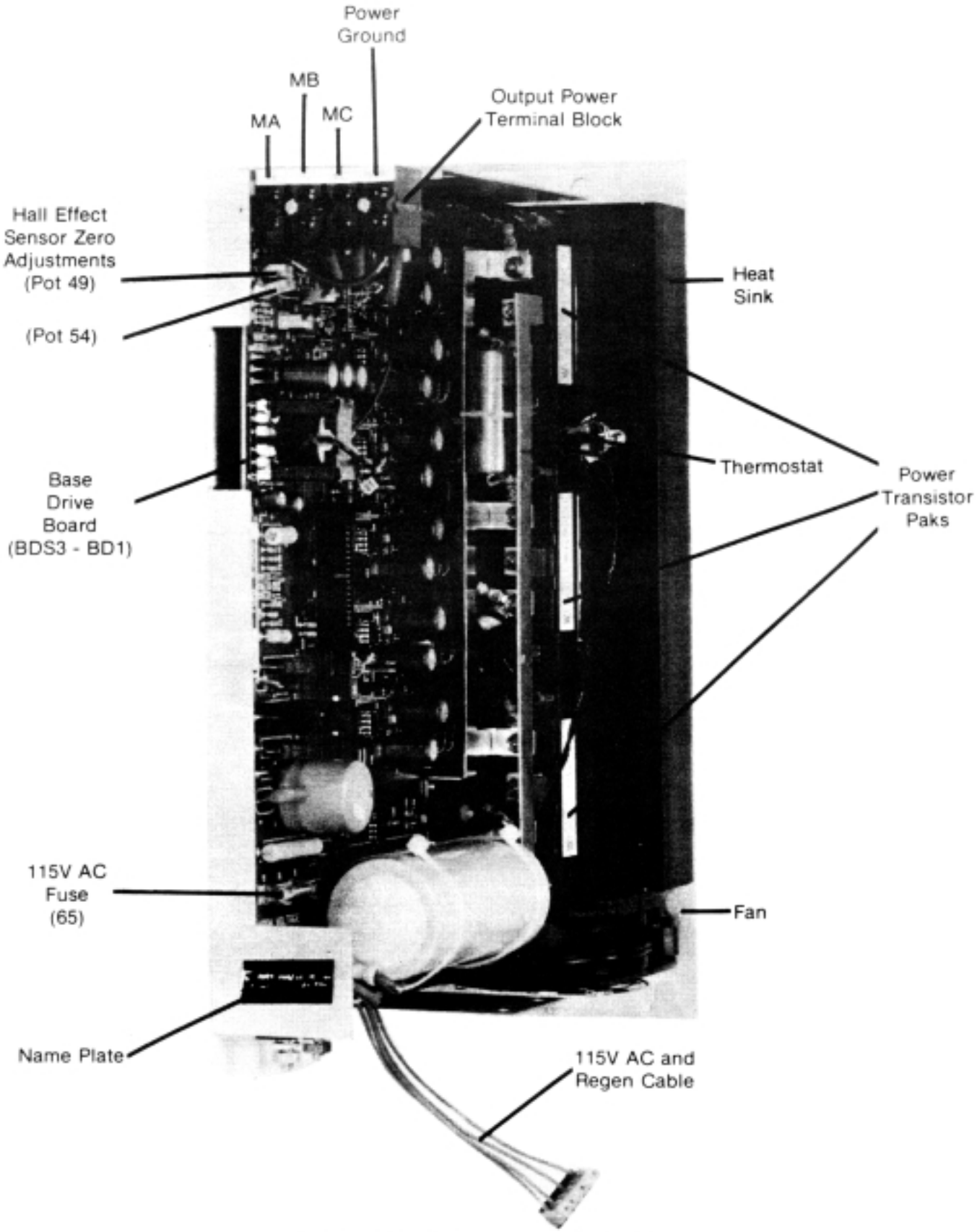
BDS3 - 55 AMP AND PSR3 - 75 AMP
(BOTTOM VIEW)
FIGURE 4



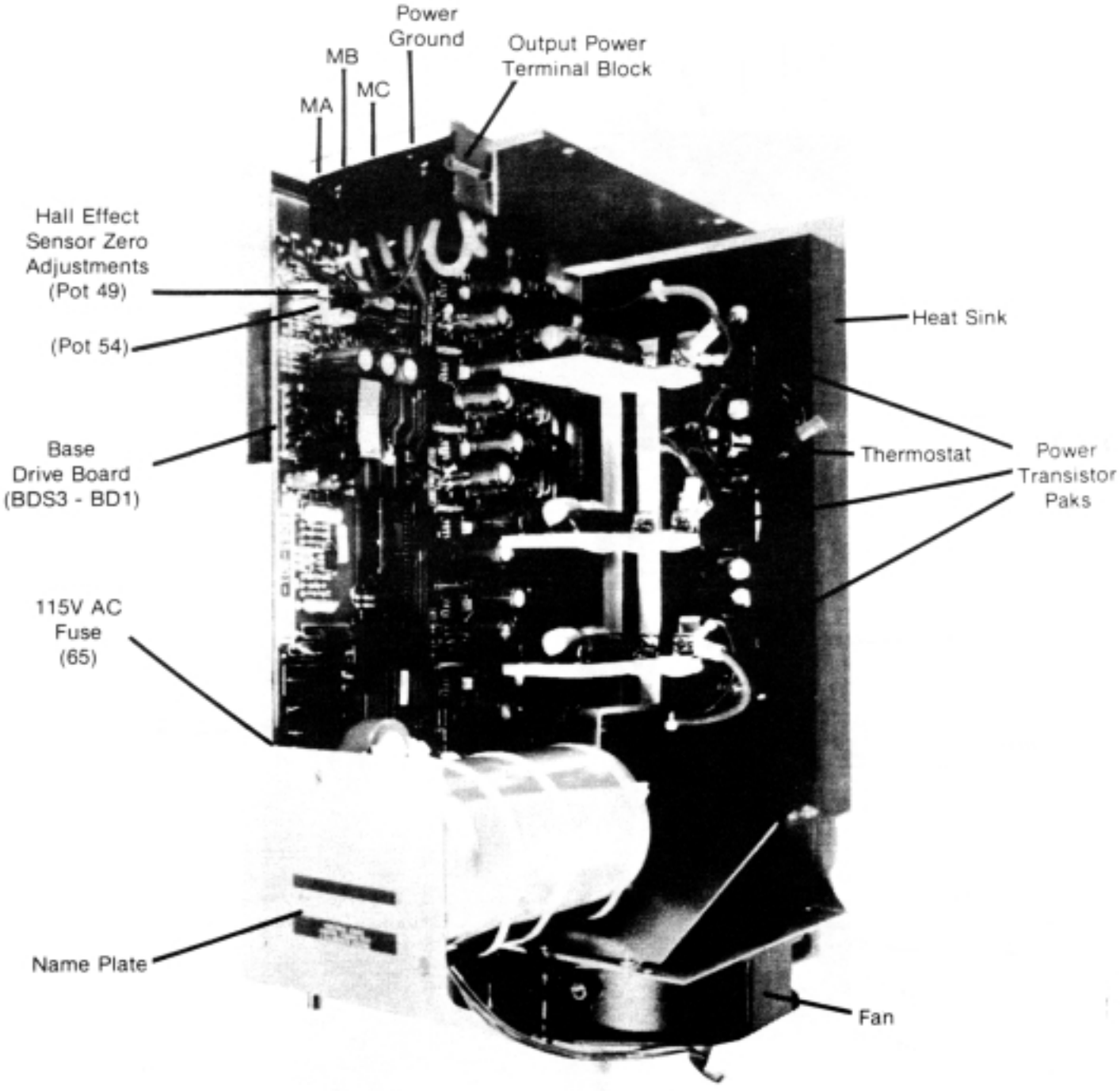
BDS3 - 12/20/30/40 AMP (RIGHT SIDE)
SHOWING ACS3 - MC2
MOTOR CONTROL BOARD
FIGURE 5



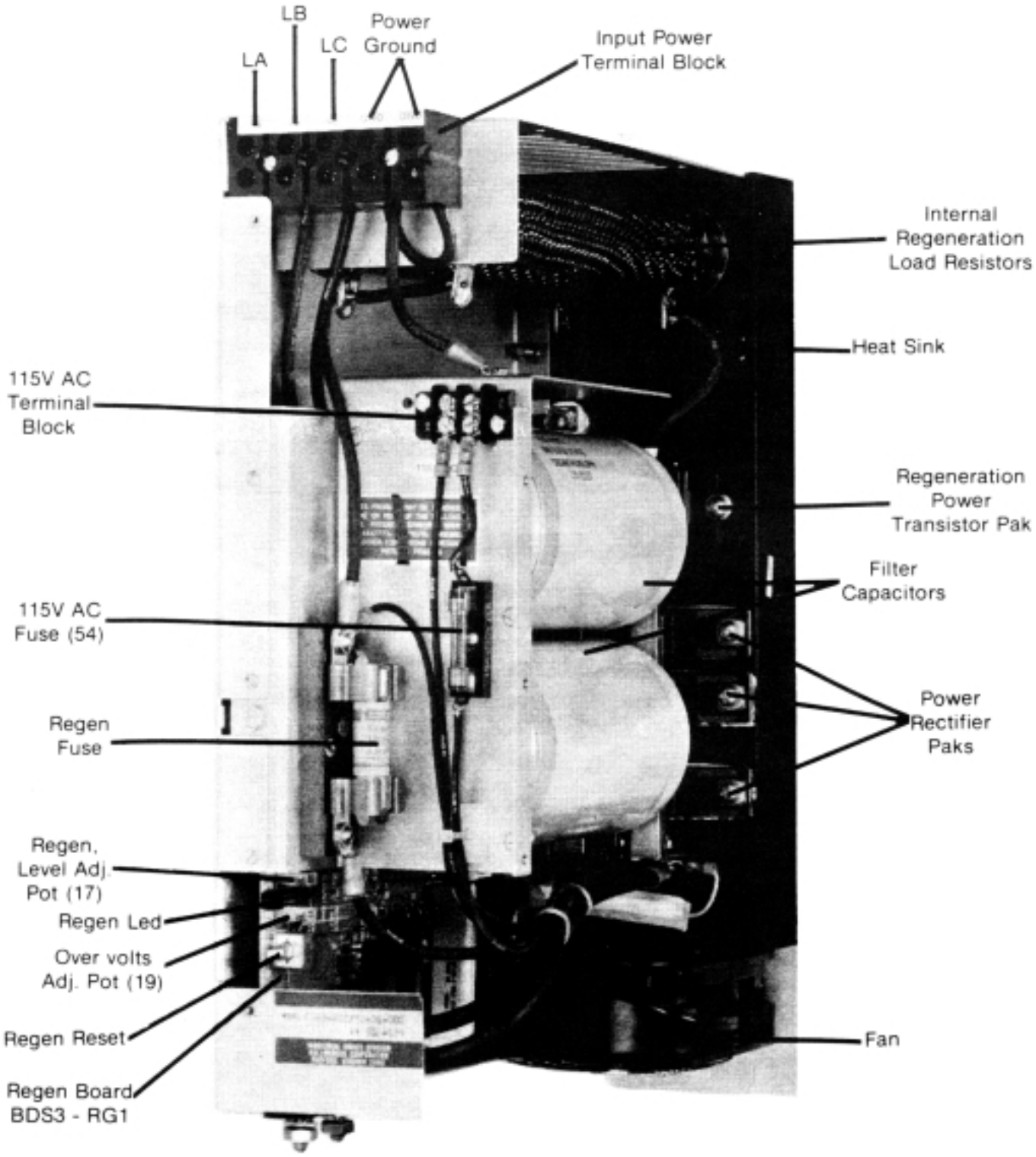
BDS3 - 55 AMP (RIGHT SIDE)
SHOWING ACS3 - MC2
MOTOR CONTROL BOARD
FIGURE 6



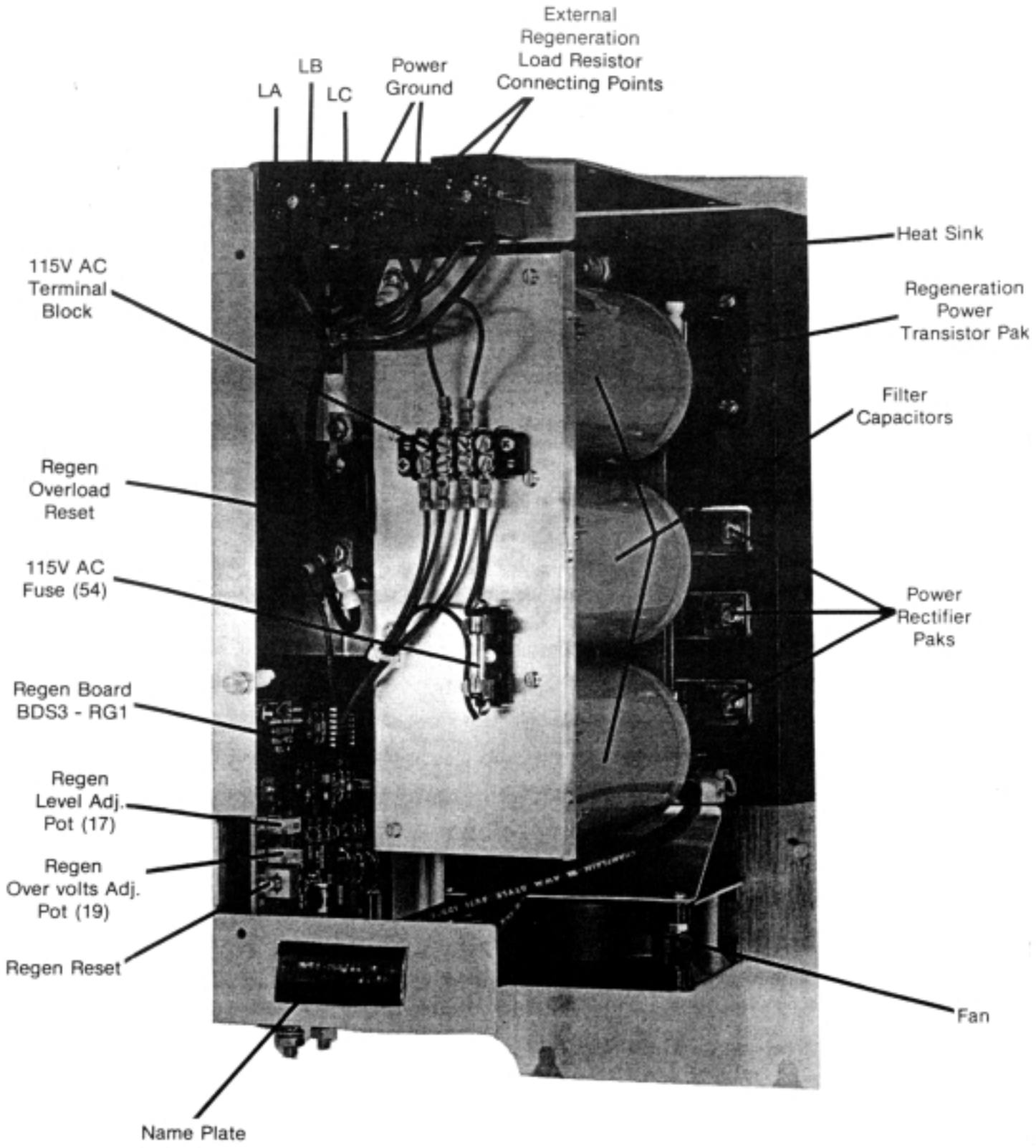
**BDS3 - 12/20/30/40 AMP (LEFT SIDE)
SHOWING POWER STAGE WITH
BASE DRIVE BOARD
BDS3 - BD1
FIGURE 7**



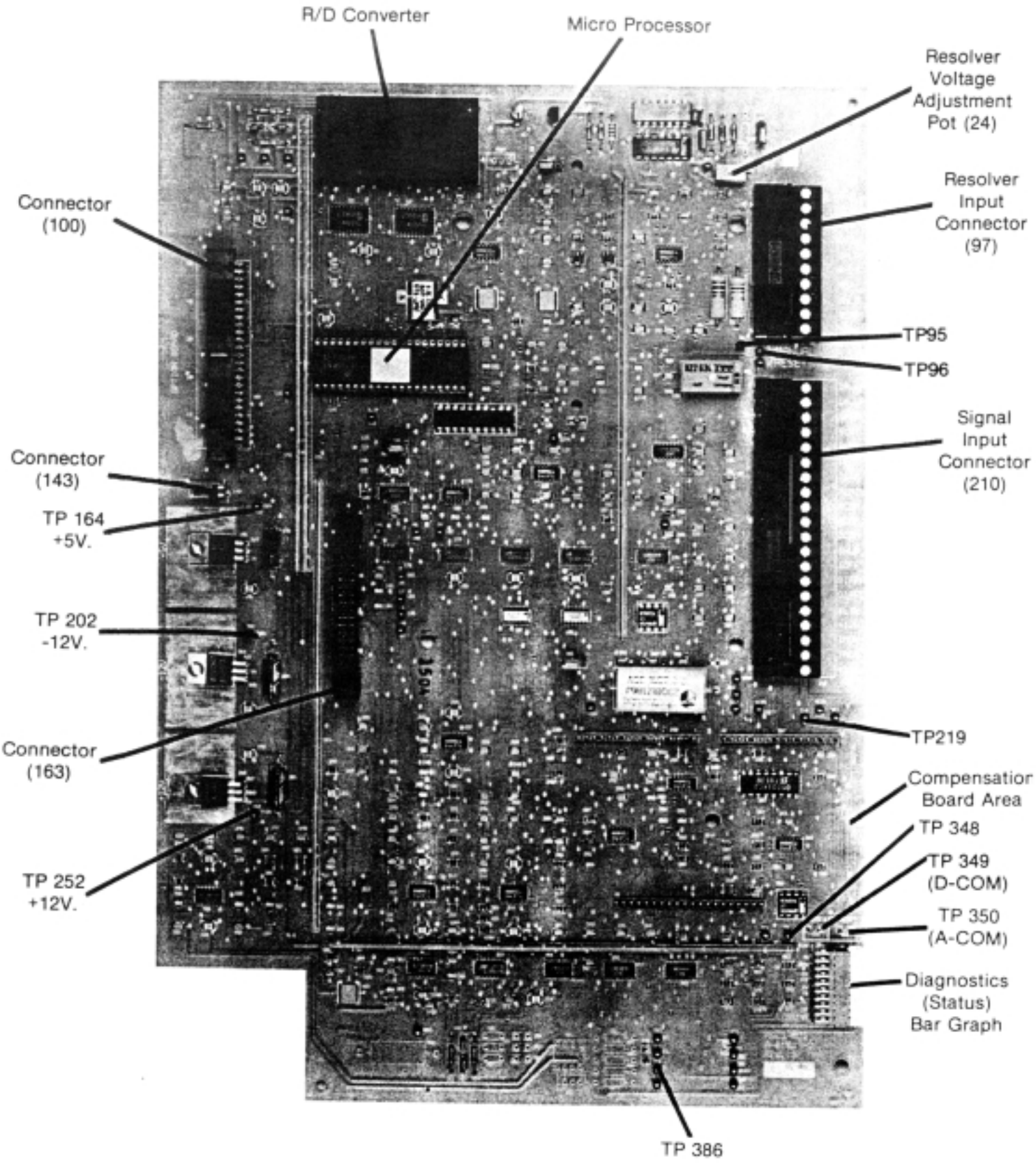
BDS3 - 55 AMP (LEFT SIDE)
SHOWING POWER STAGE WITH
BASE DRIVE BOARD
BDS3 - BD1
FIGURE 8



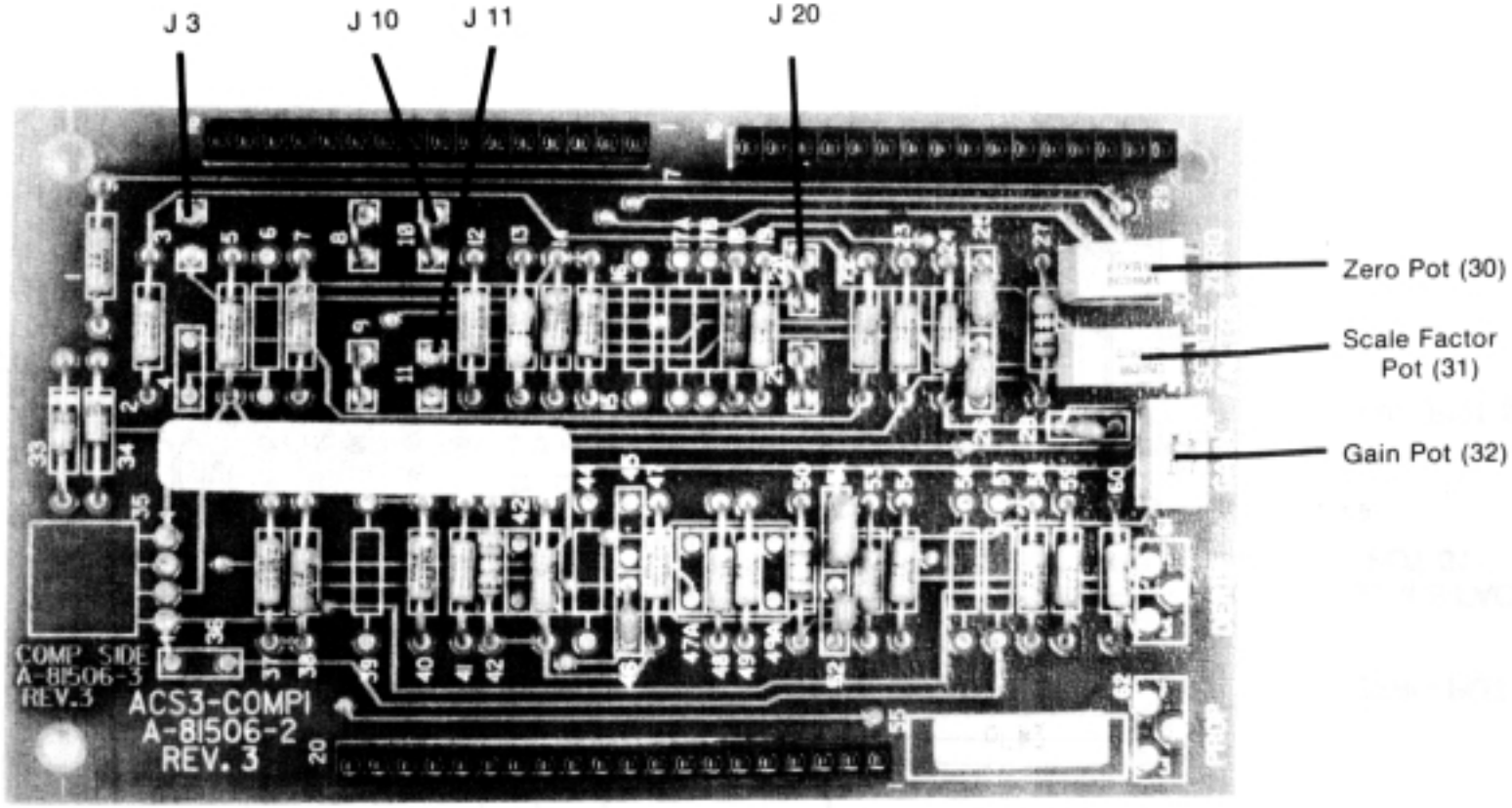
PSR3 - 25/50 AMP
POWER SUPPLY
(LEFT SIDE)
FIGURE 9



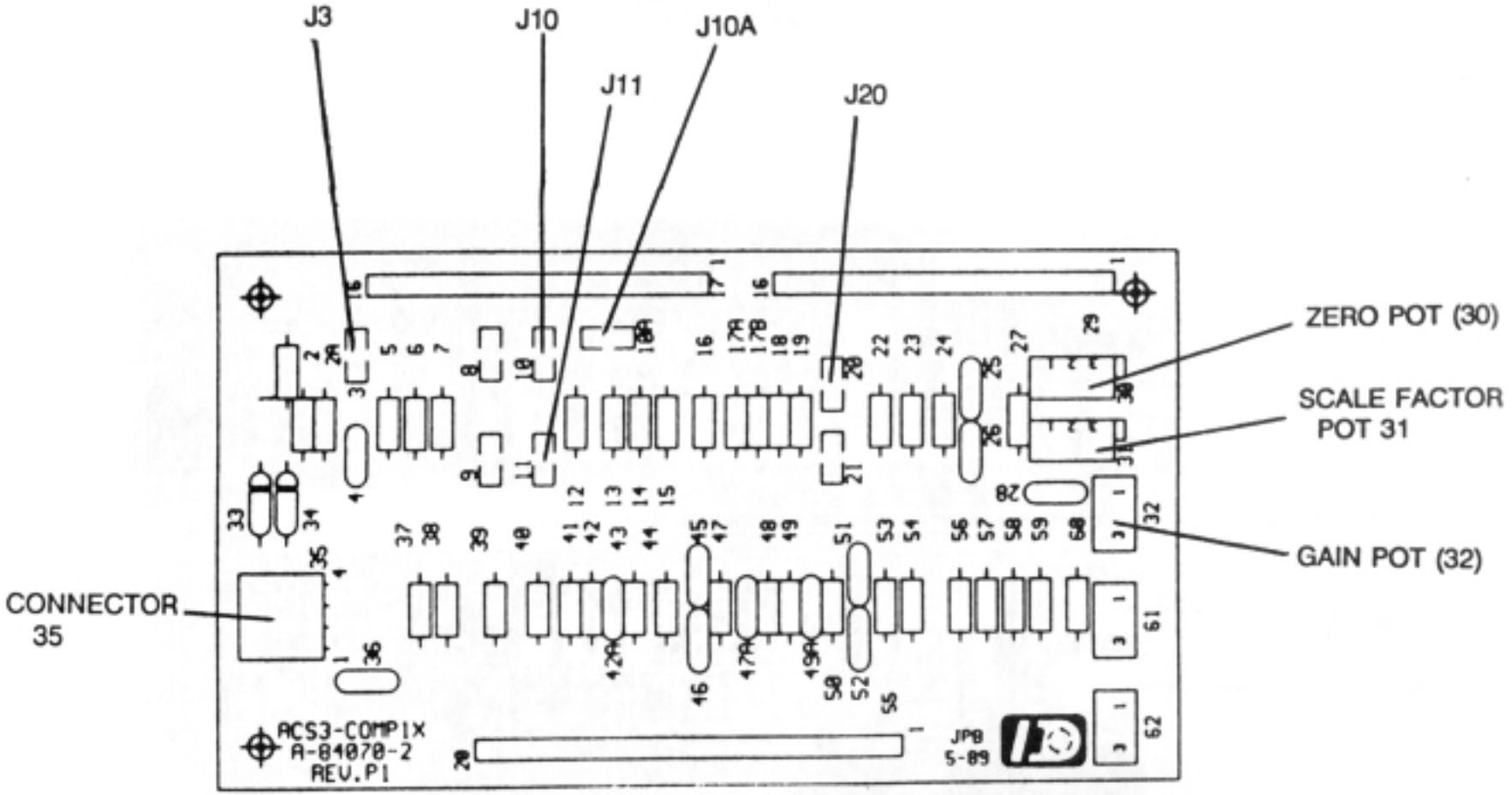
PSR3 - 75 AMP
POWER SUPPLY
(LEFT SIDE)
FIGURE 19



ACS3 - MC2
MOTOR CONTROL BOARD
FIGURE 11

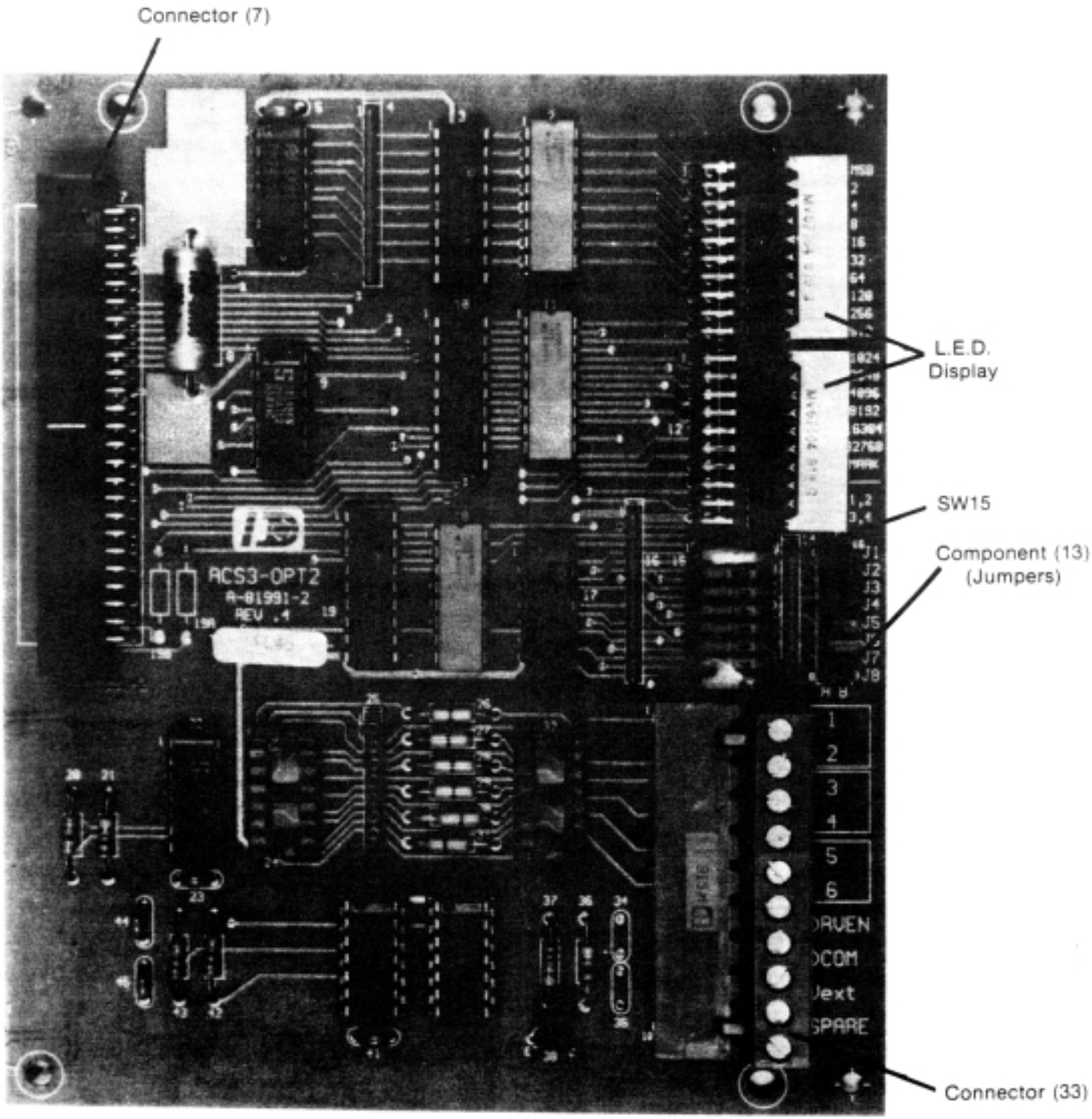


ACS3 - COMP 1
COMPENSATION BOARD
FIGURE 12

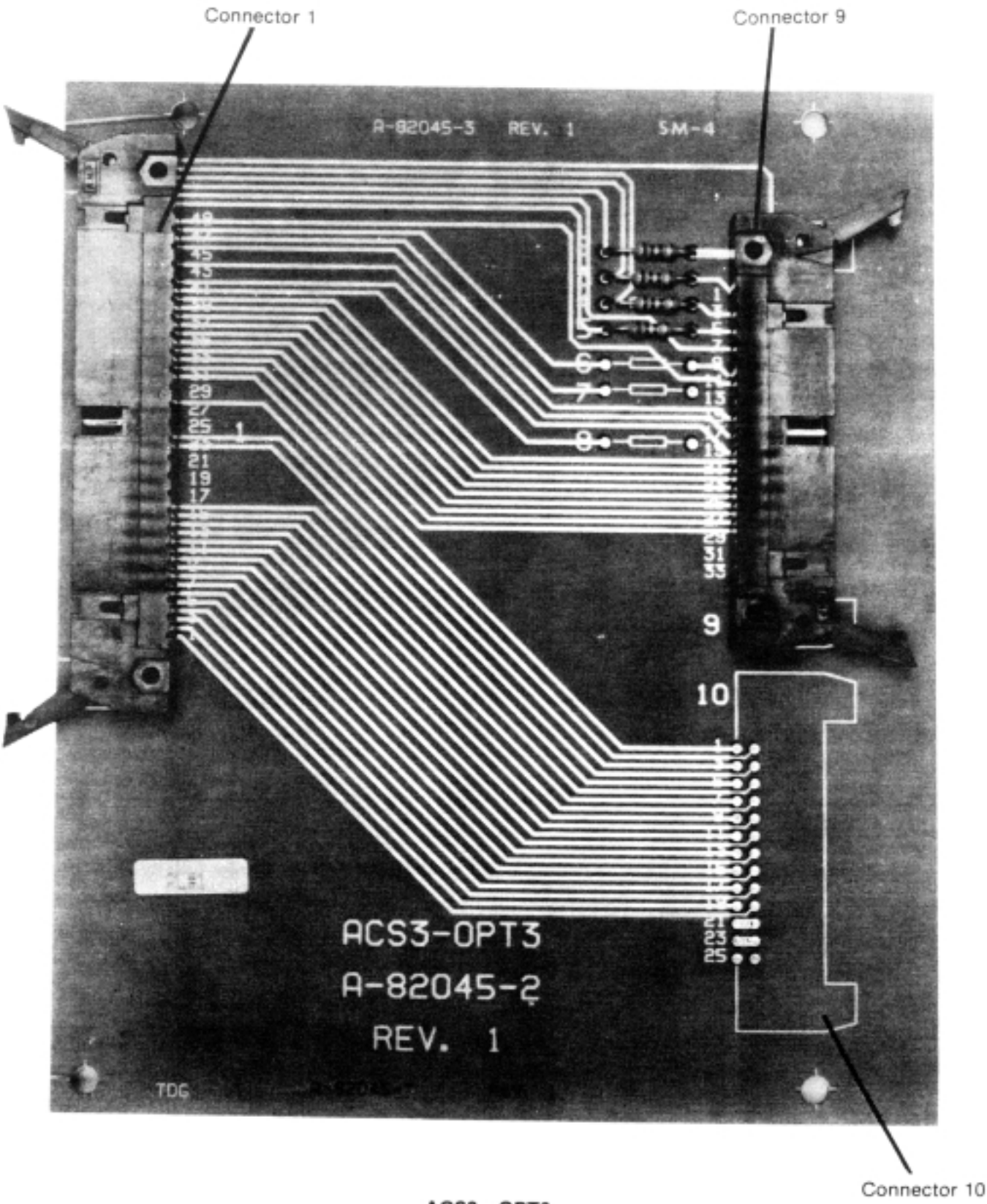


ACS3-COMP1A
COMPENSATION BOARD

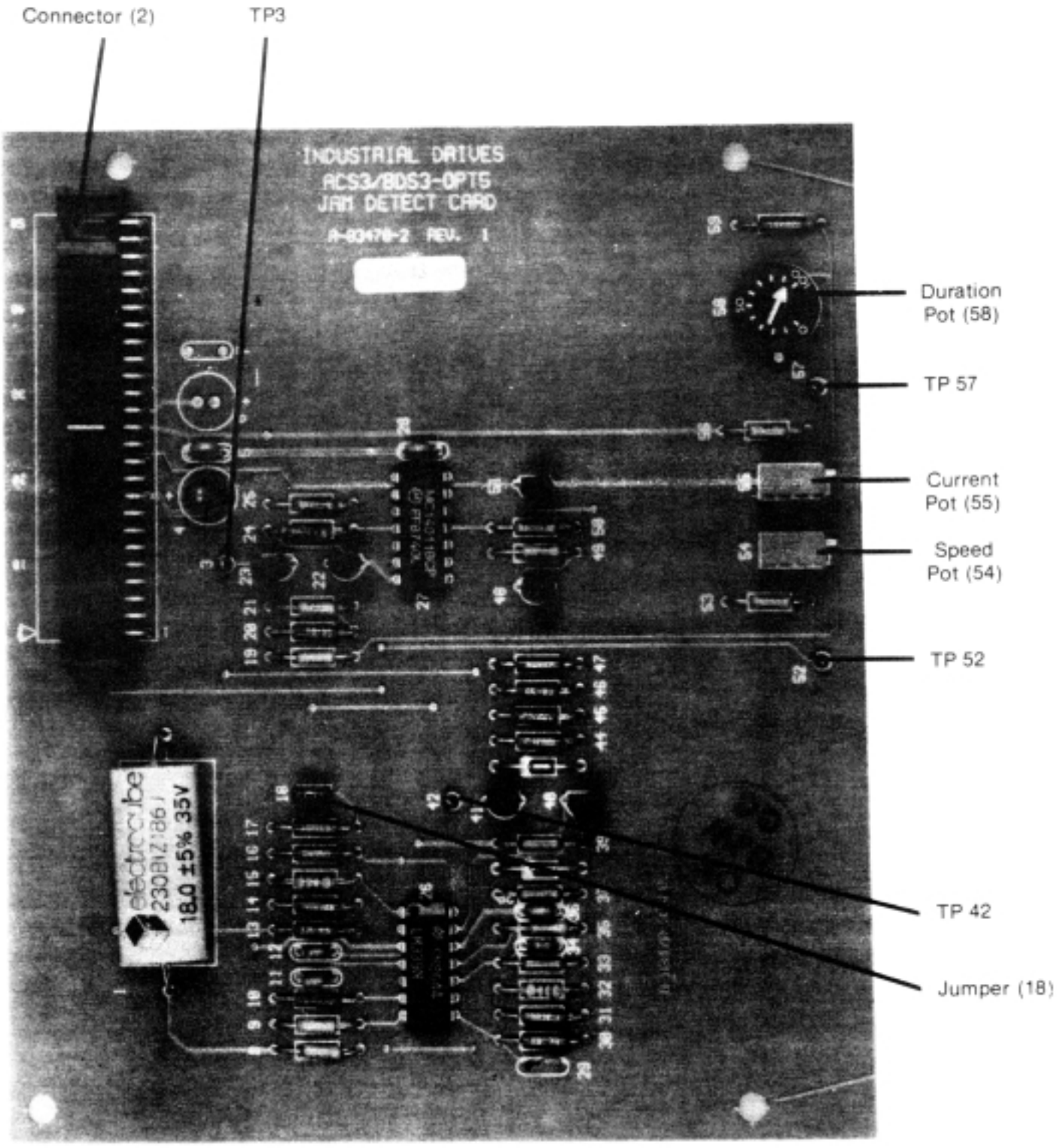
FIGURE 13



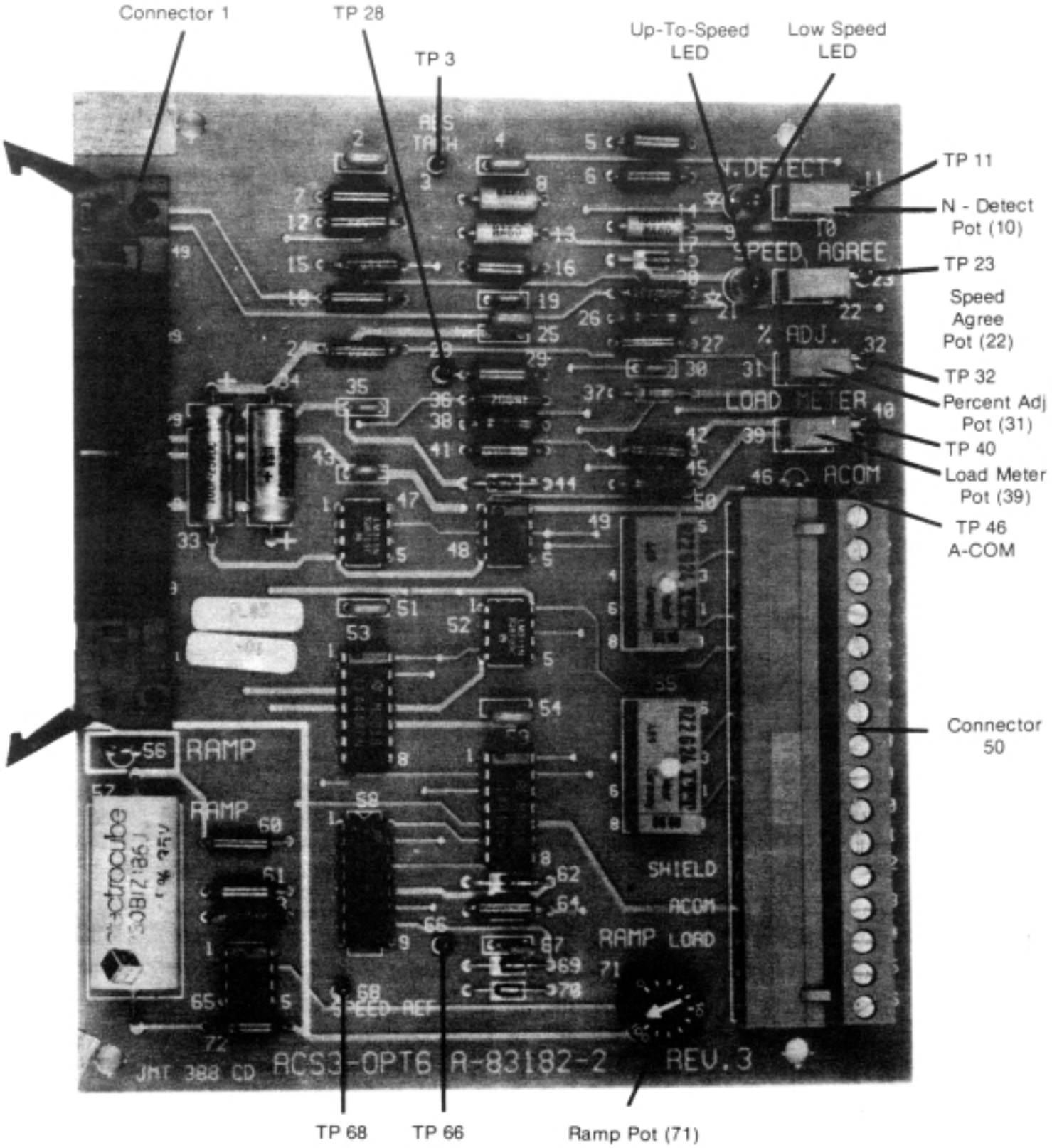
ACS3 - OPT2
ENCODER BOARD
FIGURE 14



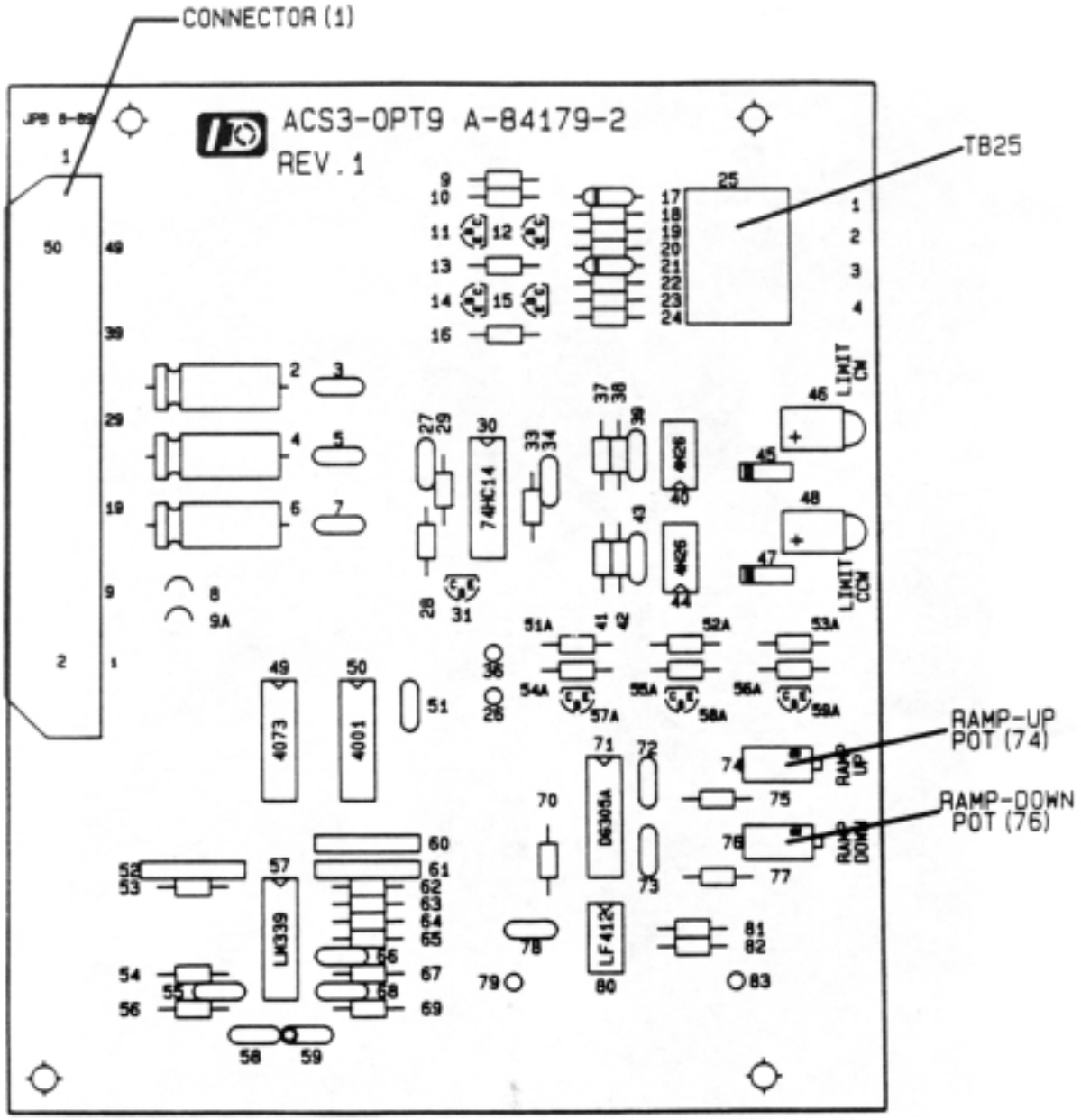
ACS3 - OPT3
INTERFACE BOARD
FIGURE 15



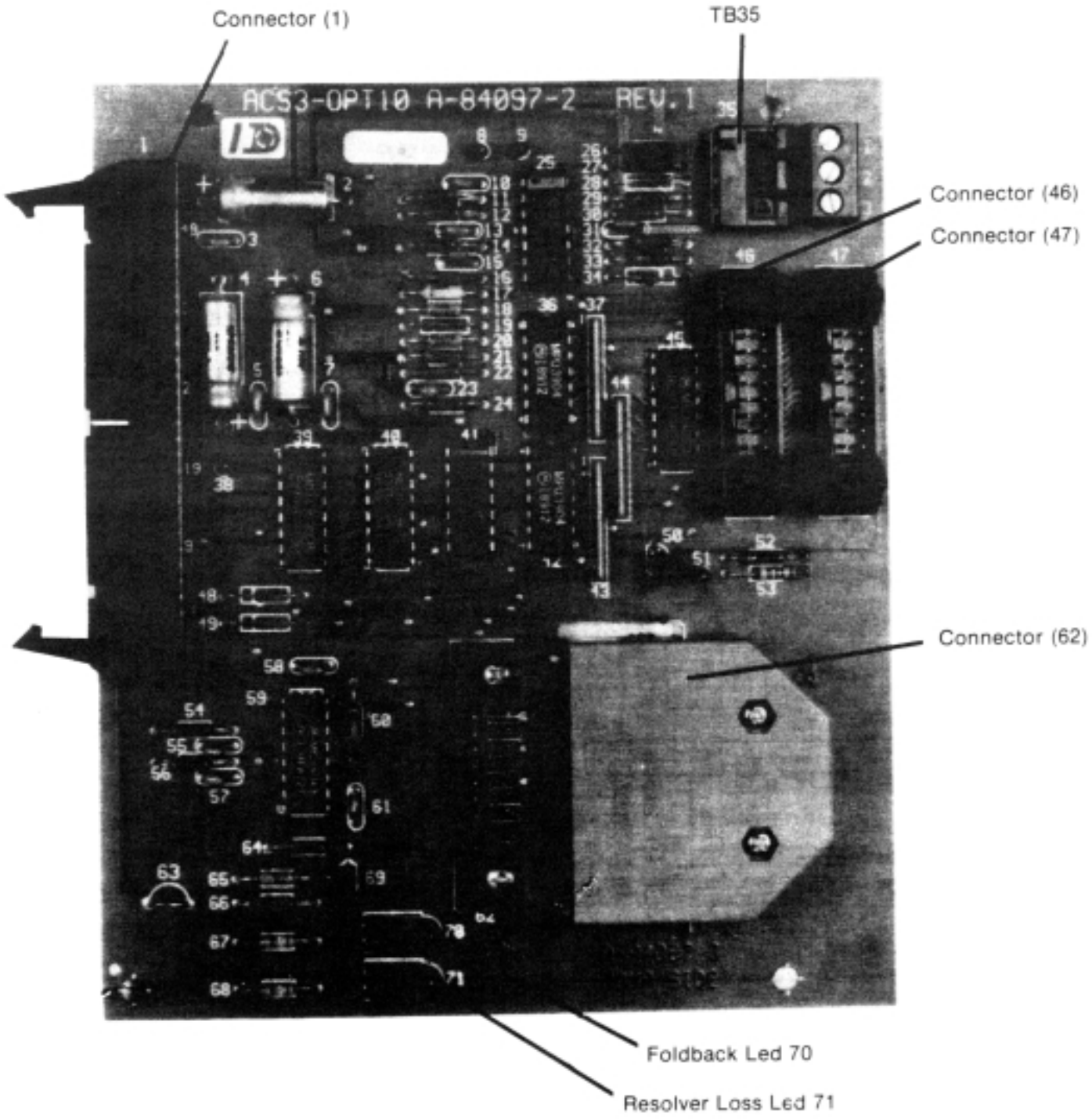
ACS3/BDS3 - OPT5
JAM DETECT BOARD
FIGURE 16



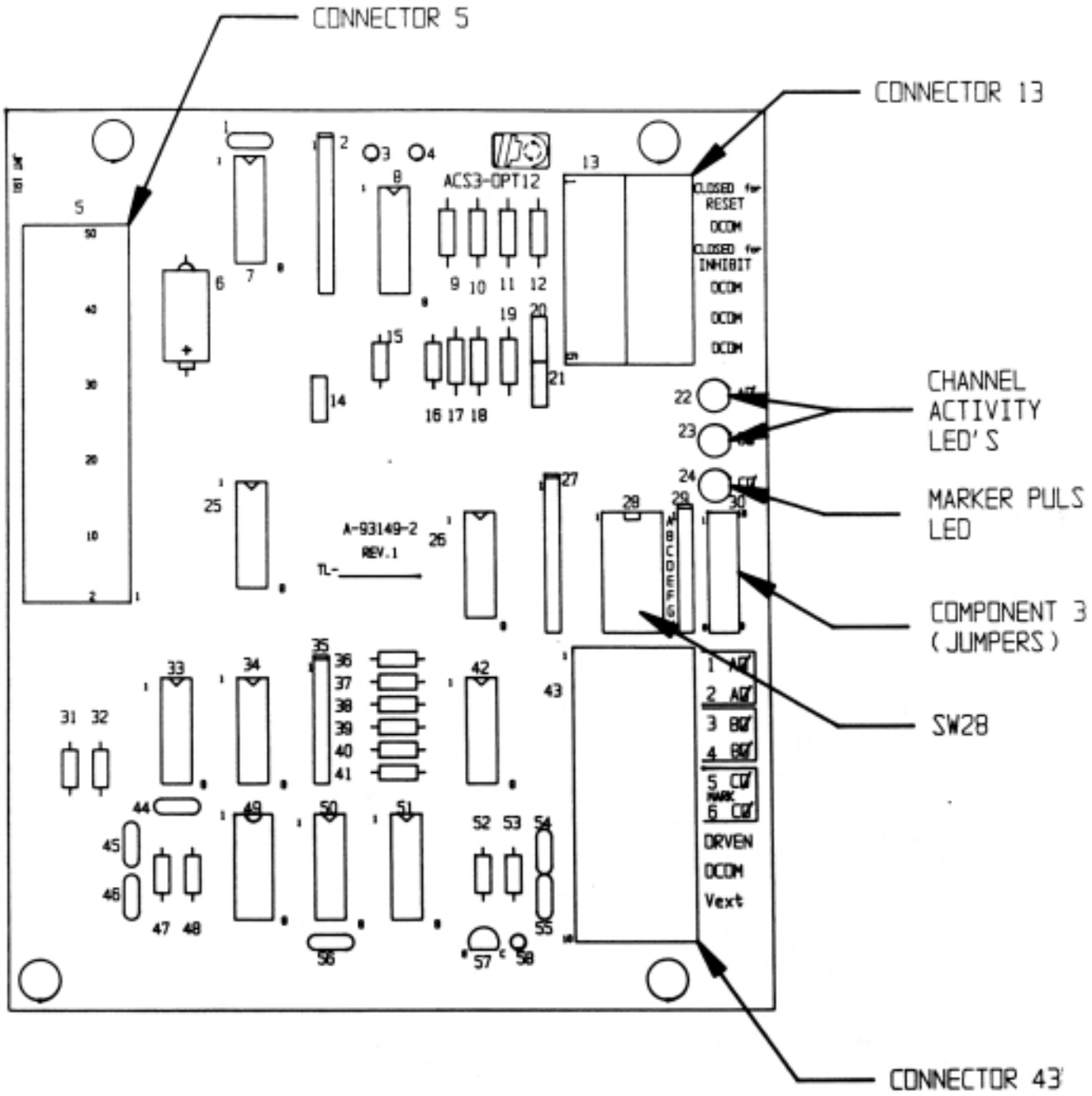
ACS3-OPT6
SPEED INDICATION BOARD
FIGURE 17



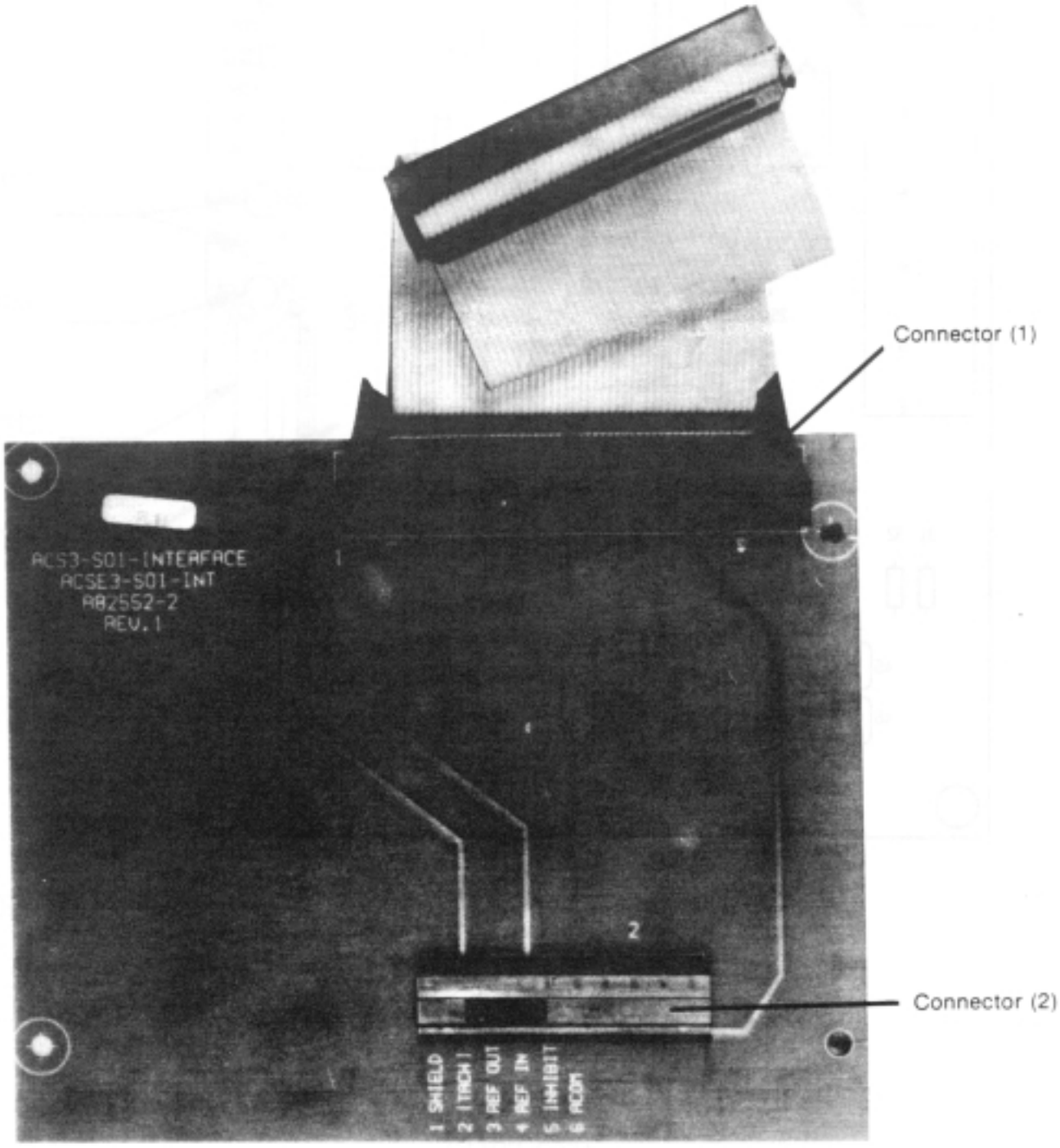
ACS3-OPT9
DUAL-SLOPE RAMP AND
DIRECTION LIMIT BOARD
FIGURE 18



ACS3 - OPT10
FAULT BOARD
FIGURE 19



ASC3-OPT12
ENCODER BOARD
FIGURE 20



ACS3 - SO1 - INT
INTERFACE BOARD
FIGURE 21

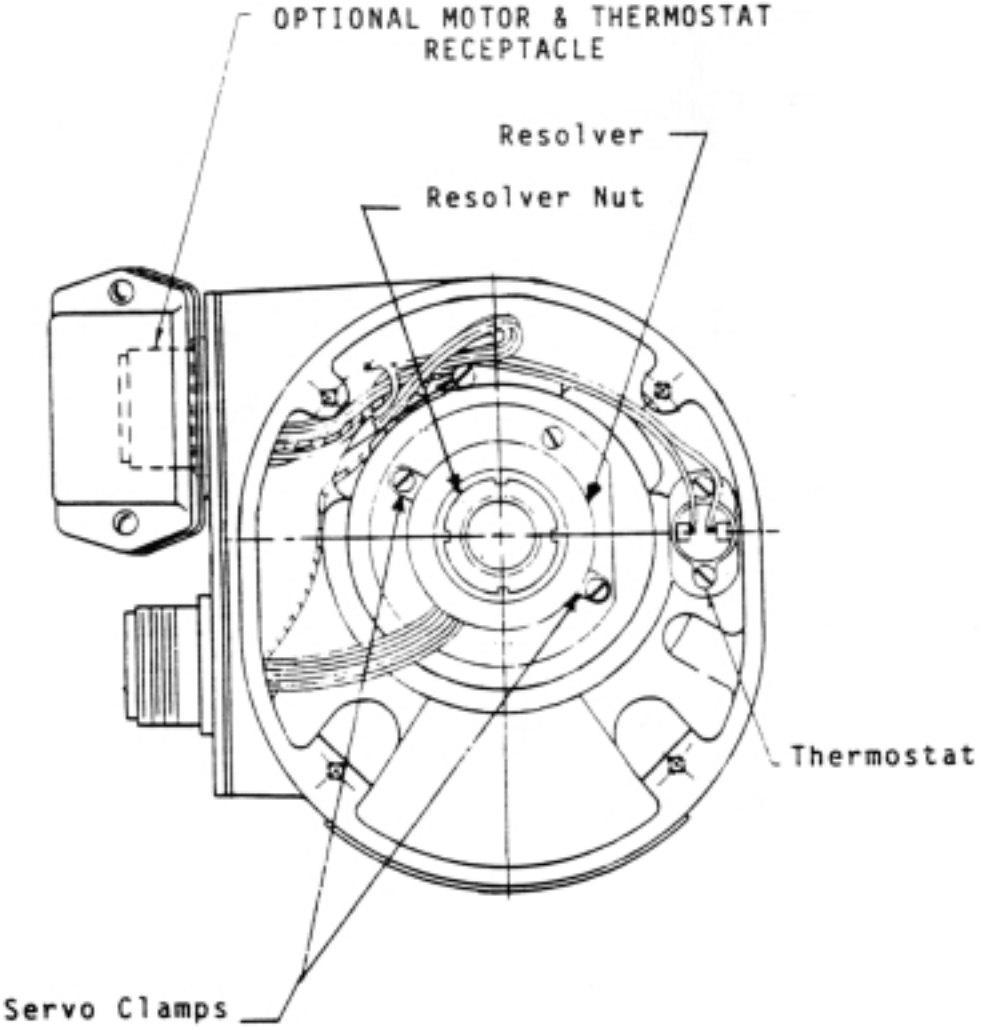

OPTIONAL MOTOR & THERMOSTAT
RECEPTACLE
Resolver
Resolver Nut
Thermostat
Servo Clamps

Figure 22

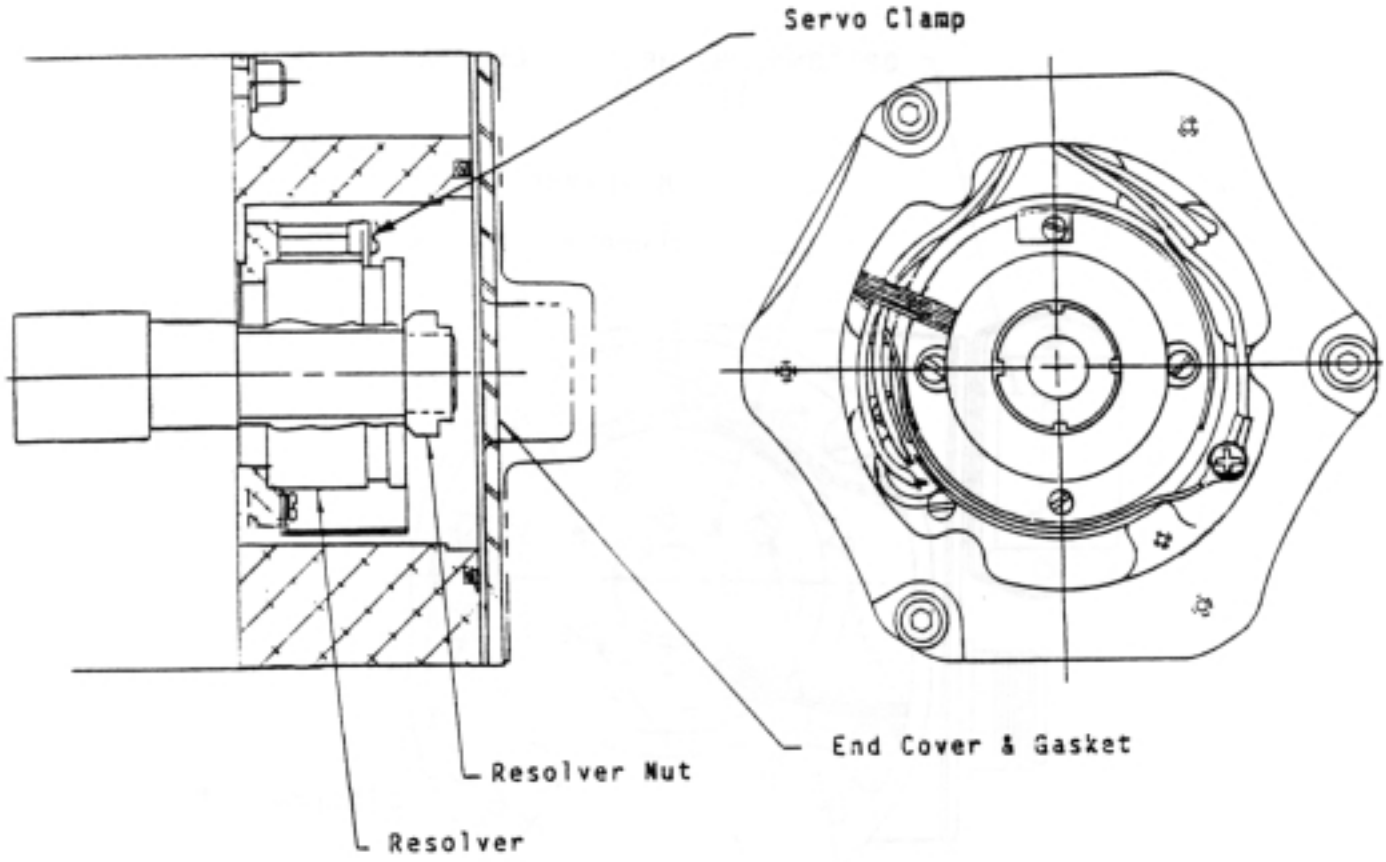


Figure 23

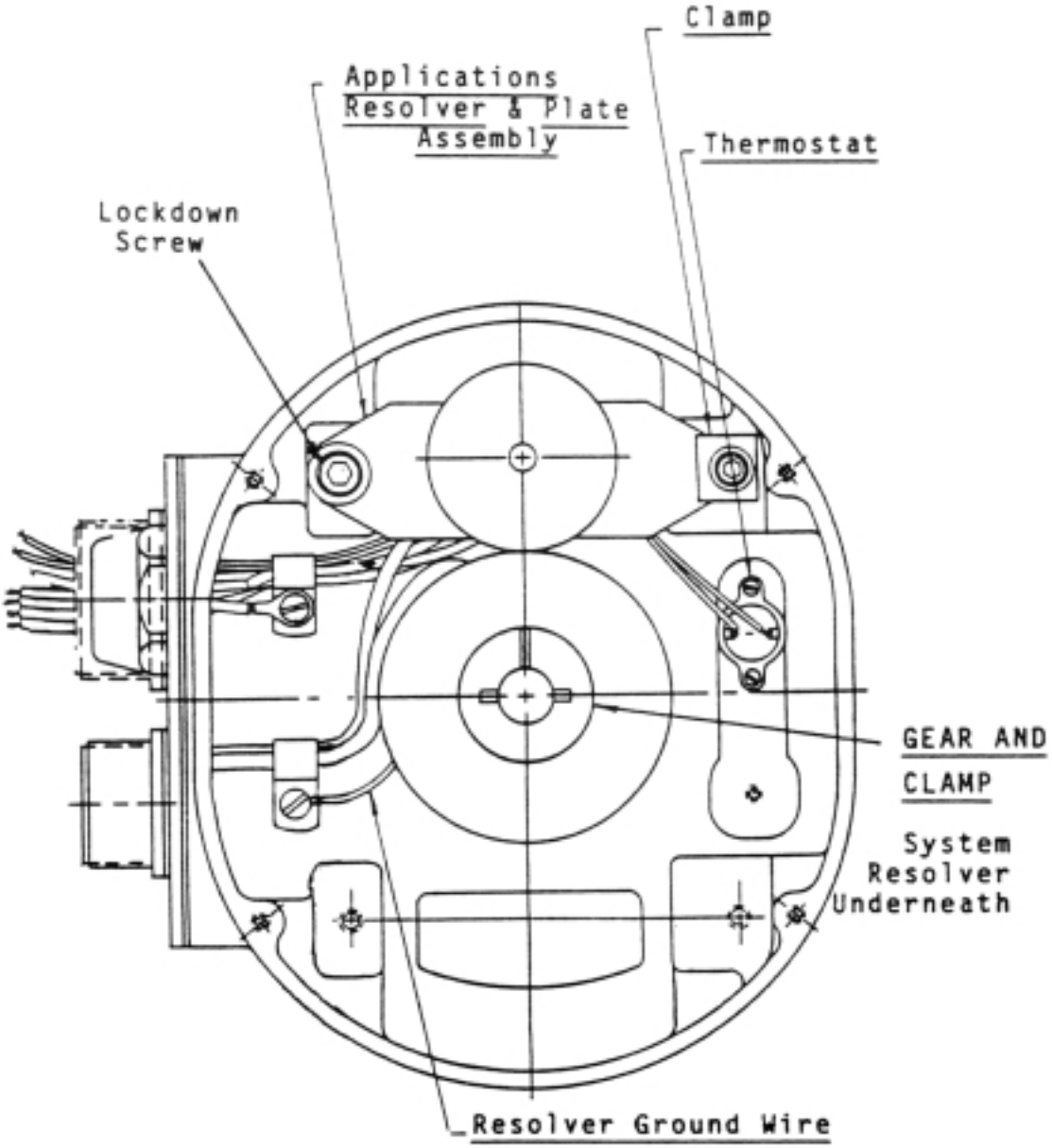
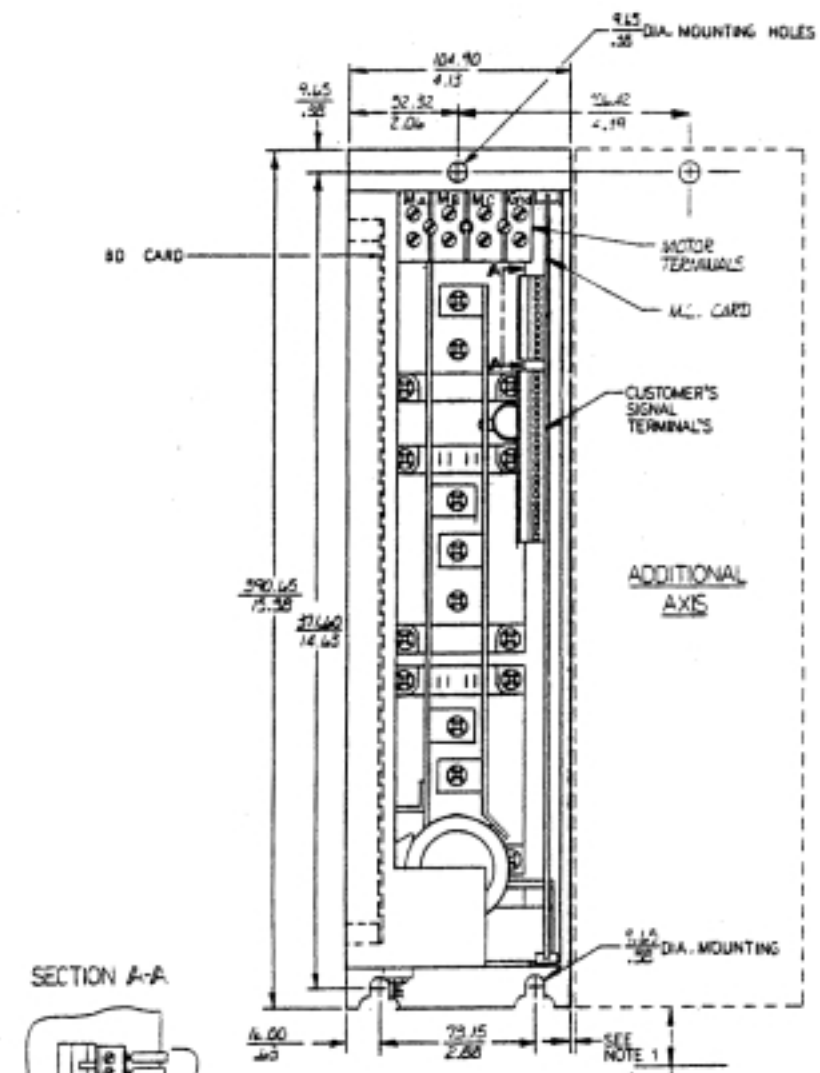
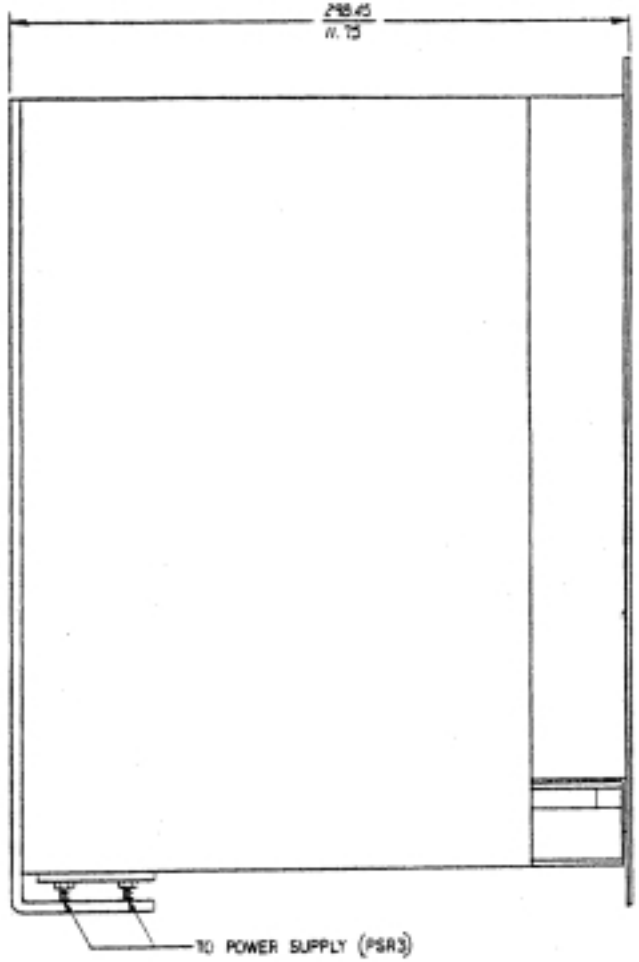
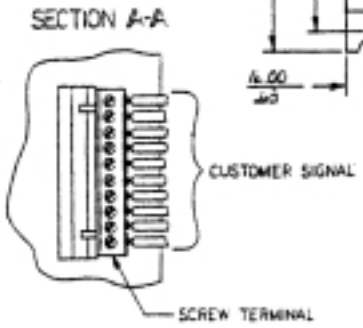

Clamp
Applications
Resolver & Plate
Assembly
Thermostat
Lockdown
Screw
GEAR AND
CLAMP
System
Resolver
Underneath
Resolver Ground Wire

Figure 24





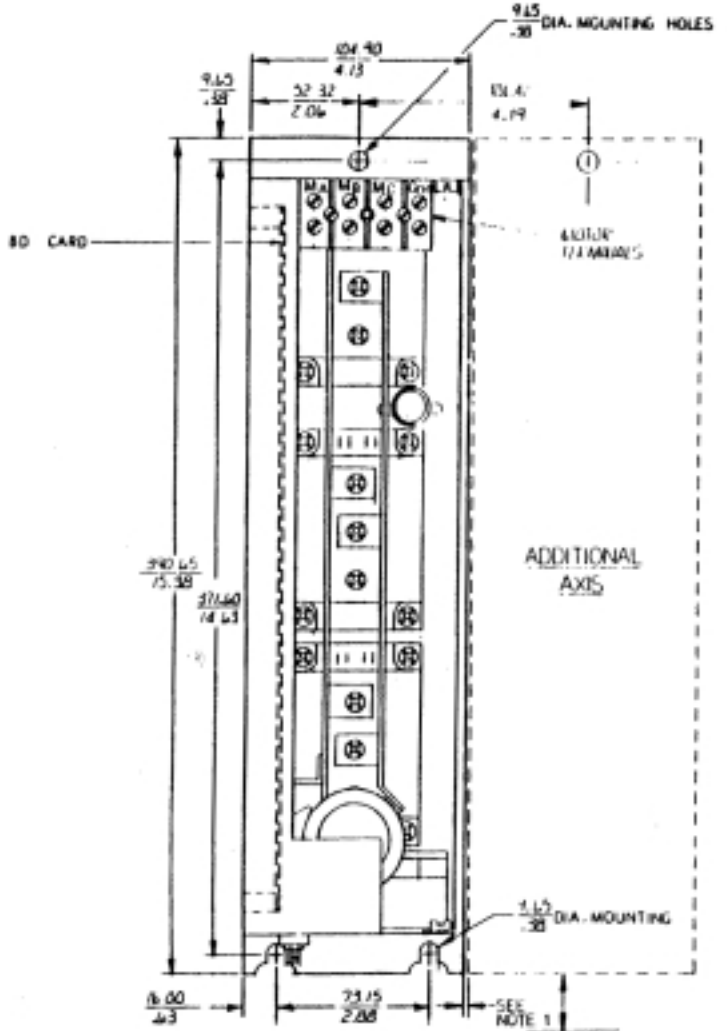


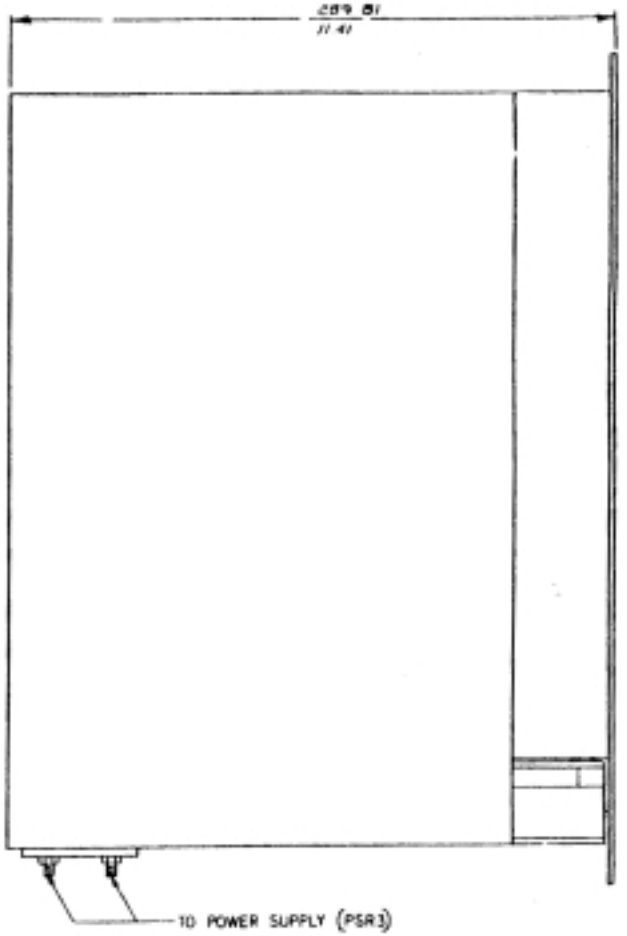
NOTES:

1) ALLOW 1/16" (1.59) BETWEEN MODULES.
2) WEIGHT APPROX. 18 LBS.
3) DIMENSIONS MM/INCHES

OUTLINE & DIMENSION
BDS3/ACS3-C

C 81027 3





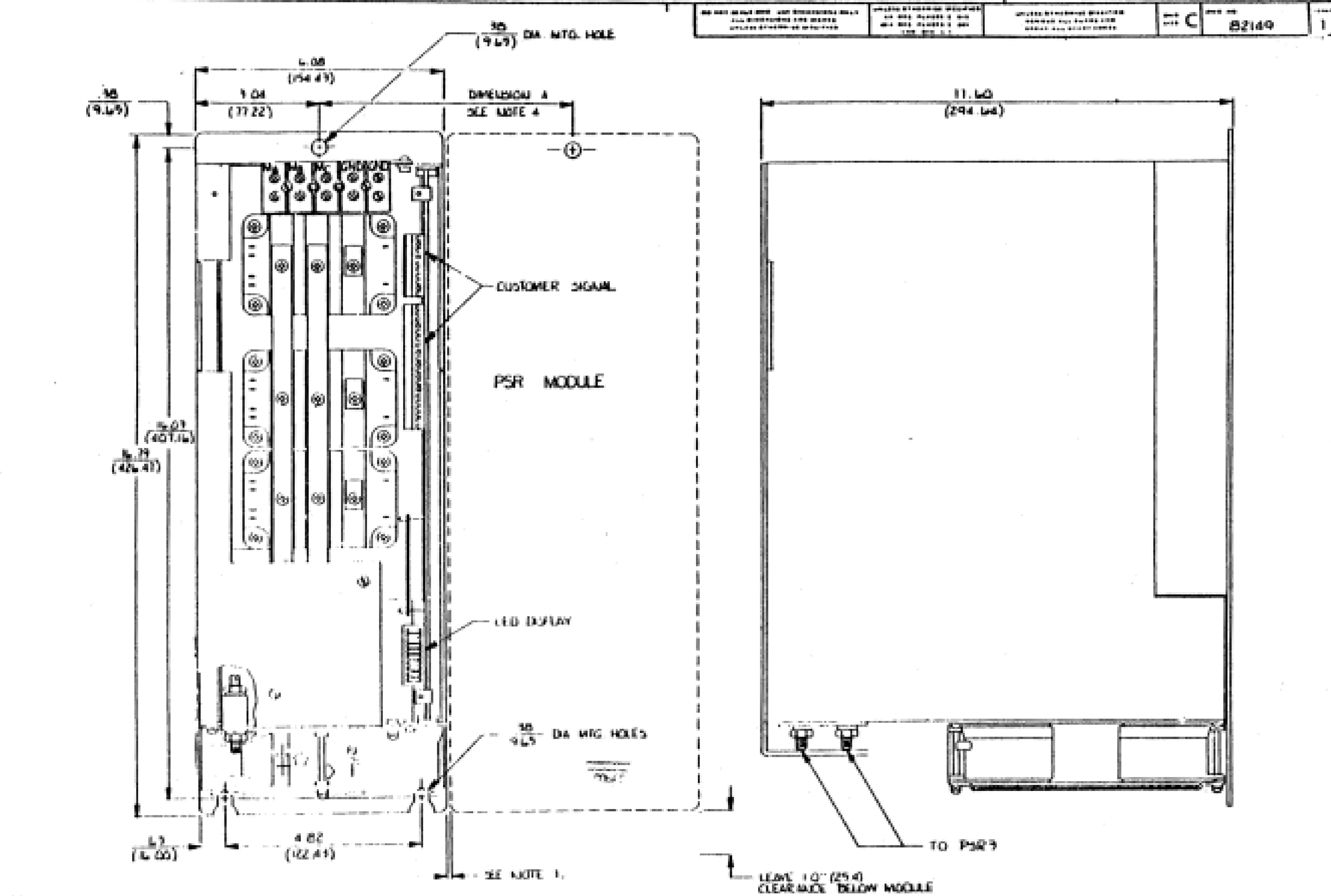
NOTES:

1) ALLOW 1/16" (1.59) BETWEEN MODULES.
2) WEIGHT APPROX. 18 LBS.
3) DIMENSIONS MM / INCHES

KC INDUSTRIAL DRIVES DIVISION RADFORD, VIRGINIA

OUTLINE & DIMENSION
BDS3/ACS3-04

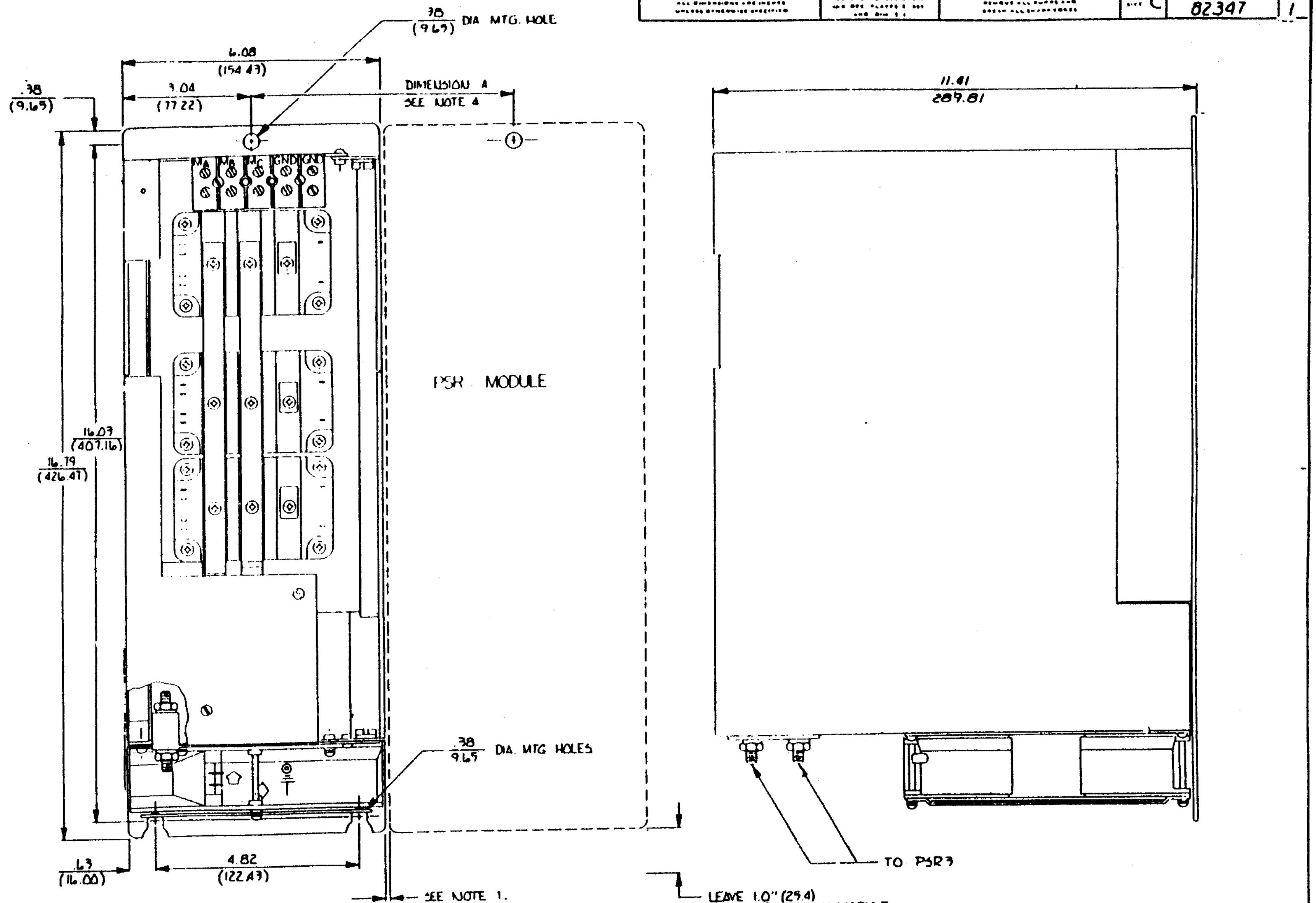
C 82344 2



NOTES:
1. ALLOW 1/16" 1.59 BETWEEN MODULES
2. WEIGHT: APPROX. 29 LBS.
3. DIMENSIONS: INCHES / (MM)
4. DIMENSION A: 50 AMP PSR = 5.18 (131.80)
   75 AMP PSR = 6.14 (155.96)

OUTLINE & DIMENSION DRWG
BD39 (77 AMP)

C 82149 1



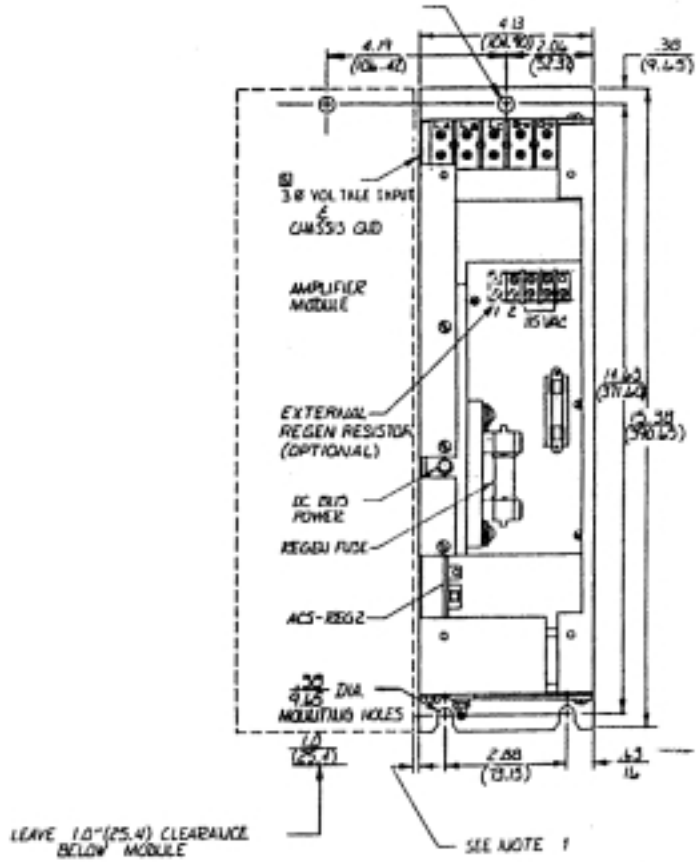
NOTES:

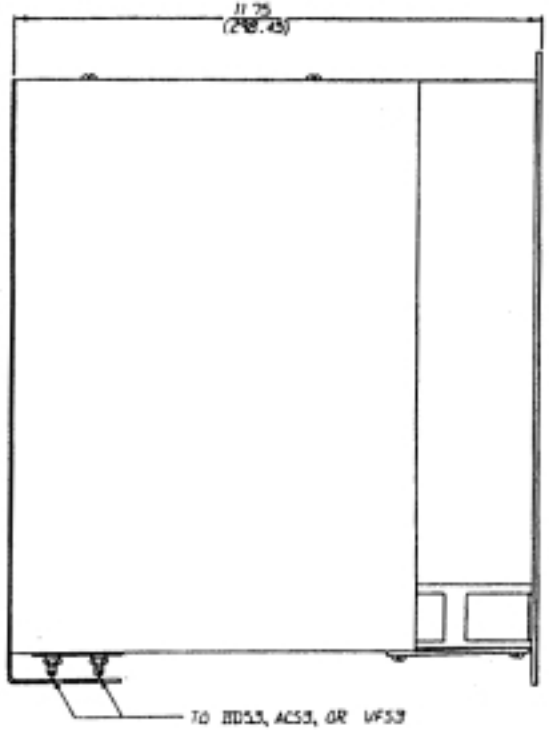
1. ALLOW 1/16" 1.59 BETWEEN MODULES
2. WEIGHT: APPROX. 29 LBS.
3. DIMENSIONS: INCHES / (MM)
4. DIMENSION A: 50 AMP PSR = 5.18 (131.70)
   75 AMP PSR = 6.14 (155.96)

INDUSTRIAL DRIVES

OUTLINE & DIMENSION DRWG BDS3 (55 AMP) -24

C 82347 1



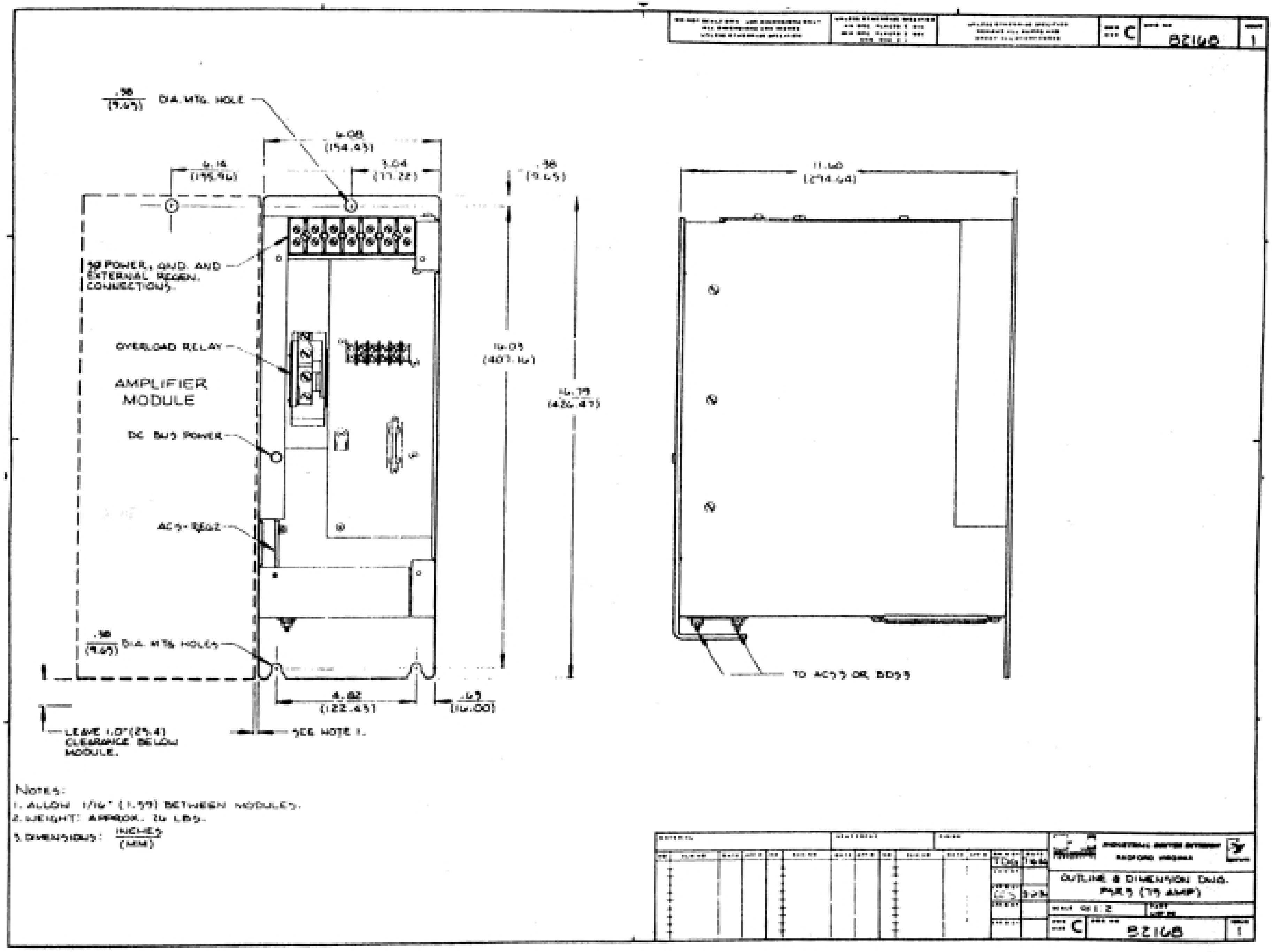


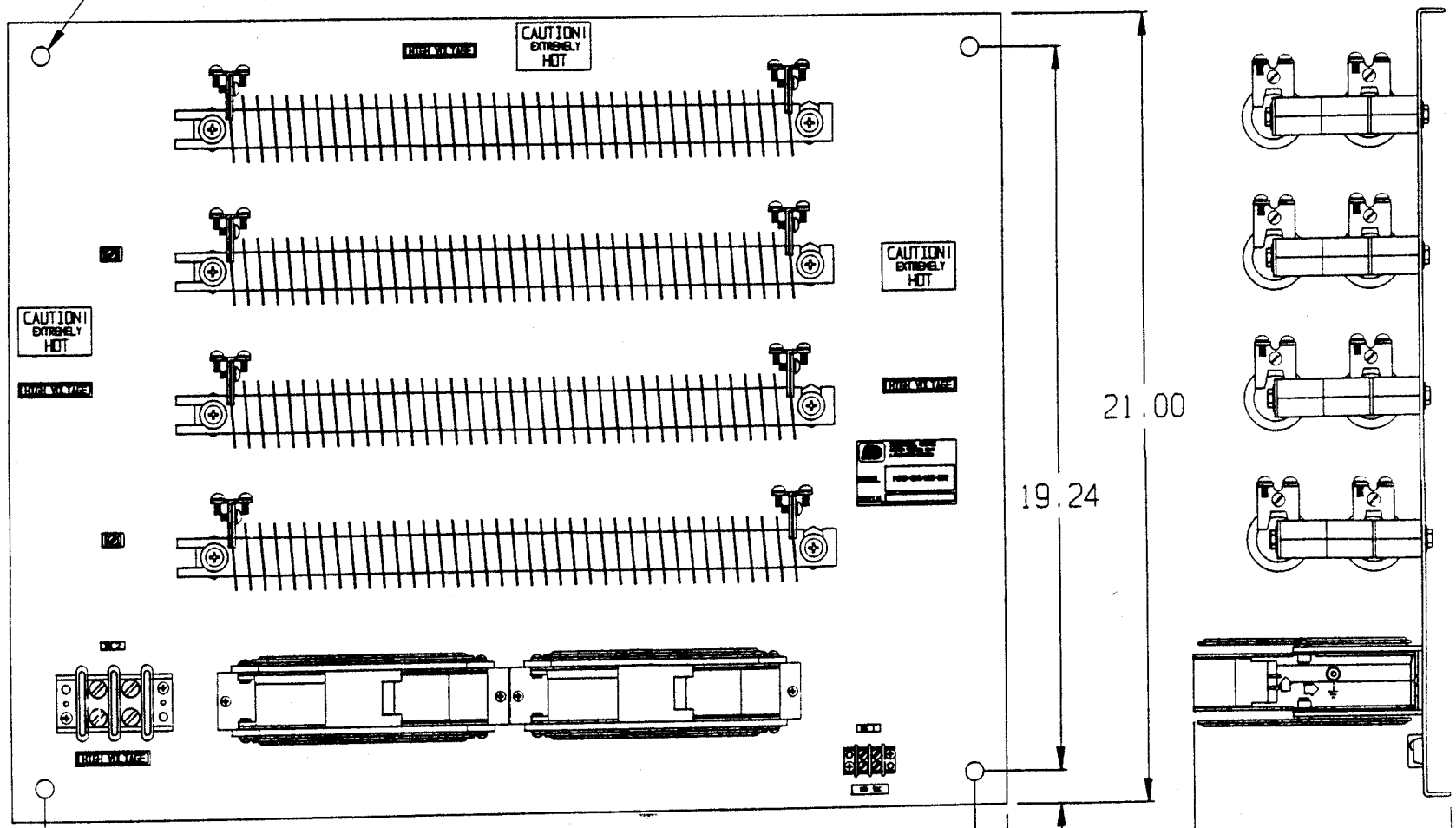
NOTES

1 ALLOW 1/16" (1.59) BETWEEN MODULES
2 WEIGHT APPROX. 21 LBS.
3 DIMENSIONS : INCHES
(MM)

OUTLINE & DIMENSION
PSR 3 - 25/50

C 81056 3


C
82168
1
.38 (9.65) DIA. MTG. HOLE
6.08 (154.43)
6.14 (155.96)
3.04 (77.22)
.38 (9.65)
11.60 (274.64)
3Ø POWER, GND. AND EXTERNAL REGEN. CONNECTIONS.
OVERLOAD RELAY
AMPLIFIER MODULE
16.03 (407.16)
16.79 (426.47)
DC BUS POWER
AC5-REG2
.38 (9.65) DIA. MTG. HOLES
4.82 (122.43)
.63 (16.00)
TO AC55 OR BD55
LEAVE 1.0" (25.4) CLEARANCE BELOW MODULE.
SEE NOTE 1.
NOTES:
1. ALLOW 1/16" (1.59) BETWEEN MODULES.
2. WEIGHT: APPROX. 26 LBS.
3. DIMENSIONS: INCHES / (MM)
INDUSTRIAL DRIVES
RADFORD VIRGINIA
OUTLINE & DIMENSION DWG.
PSR5 (75 AMP)
C
82168
1



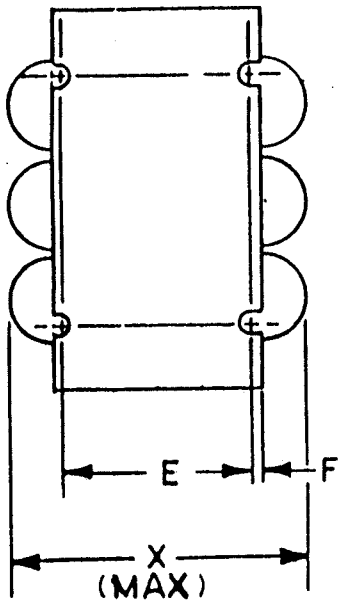
DO NOT SCALE DWG. USE DIMENSIONS ONLY. ALL DIMENSIONS ARE INCHES UNLESS OTHERWISE SPECIFIED.	UNLESS OTHERWISE SPECIFIED XX DEC. PLACES +/-.015 XXX DEC. PLACES +/-.005 ANG. DIM. +/- 1 DEGREE	UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS AND BREAK ALL SHARP EDGES.	DWG. NO. C-84973 ISSUE 1

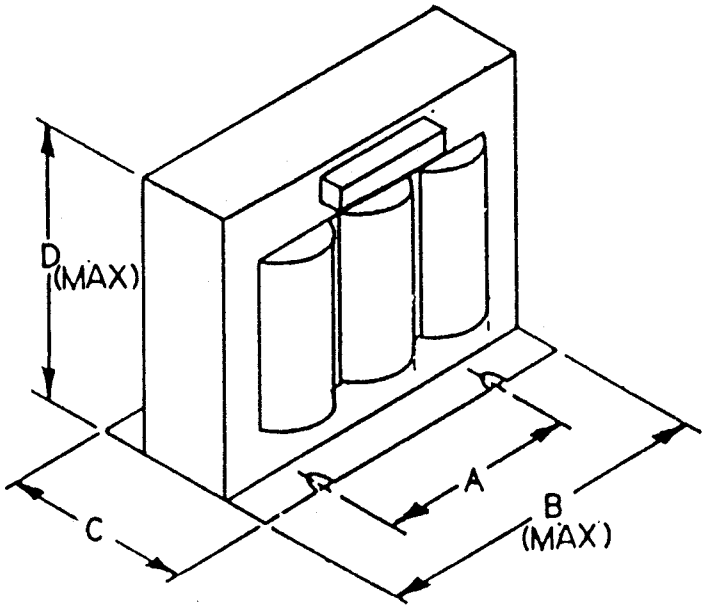
MATERIAL:	FINISH:	APPL BY: VA 7/90	INDUSTRIAL DRIVES
		APPL BY: N/A	OUTLINE & DIMENSION FOR PSR3-EXT/RES-302
		JOB NO:	SCALE N/A DWG. NO. C-84973 ISSUE 1
		CHECKED REF. NO:	

COPY CODE

CAD DWG.

70





	DASH	X	A	B	C	D	E	F
[5] [2]	001	6.5	8.5	12.5	6.5	7.5	4.88	7/16
[2]	002	8	10.5	15	6.75	11.25	5.88	7/16
[2]	003	8.5	10.5	15	7.5	11.75	6.63	7/16
[3]	004	12	10.75	15.88	9.75	9.75	7.50	1.13
[3]	005	8.5	12	16.5	9	12.5	8.13	7/16
	006	9½	12	15.25	8.5	13.5	7.25	5/8
[3]	007	13½	14	20¾	8¼	13	7⅞	7/16
[3]	008	11.5	12.0	16.0	8.38	15.5	6.87	.75
	009							
[2]	010	12.0	18.5	22.5	10.63	15.0	9.75	7/16
[3]	011		19.0	21	8.25	17.	6.5	.87
	012							
	013							
	014							
[3]	015	11.5	12	16	8.5	14	6.87	.782

EXAMPLE: TR3 – 230 / 7.5 – 16 – 00 — OPEN CONSTRUCTION

- 00 — 240/480 PRIMARY
- 16 — IRMS
- 7.5 — 230 VRMS SECONDARY
- 230 — 3 PHASE TRANSFORMER 240/480 VAC RMS PRIMARY
- TR3

ROCKWELL INTERNATIONAL CORPORATION — INDUSTRIAL DRIVES DIVISION — RADFORD, VIRGINIA

OUTLINE/CONNECTION
3 PHASE POWER TRANS.

SCALE: NONE | DWG NO. SH. 1 OF 2 A-M80421 | SHEET 3

UNLESS OTHERWISE SPECIFIED
XX DEC PLACES ± .01
XXX DEC. PLACES ± .005
ANG. DIM ± 1°

DO NOT SCALE DWG USE DIMENSIONS ONLY
ALL DIMENSIONS ARE INCHES
UNLESS OTHERWISE SPECIFIED

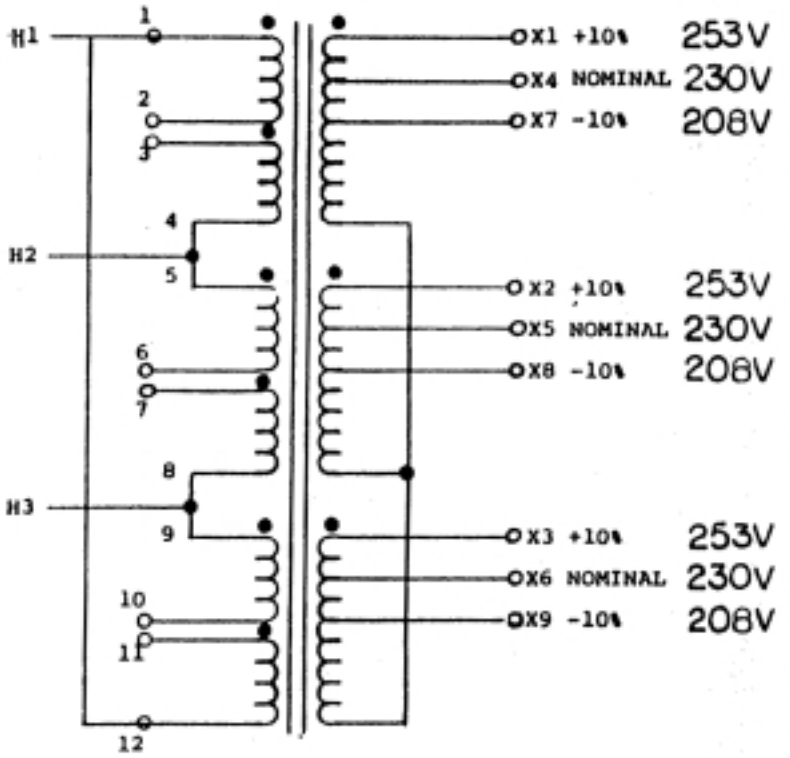
NO.	ECN NO.	DATE	APP'D.
2	83203ME	7/12 89	Y.W.
3	83632 EWR	2/22/90	Y.W.

DW'N BY EWR 2-27-87
CH'K BY
APP'D BY Y.W. 2-27-87

THIS INFO MUST BE ON A LABEL & AFFIXED TO UNIT!

	VOLTS	CONNECTION	LINES
PRI	240	1-3, 2-4, 5-7, 6-8, 9-11, 10-12	H1-H2-H3
PRI	480	2-3, 6-7, 10-11	H1-H2-H3
SEC	253	----------	X1-X2-X3
SEC	230	----------	X4-X5-X6
SEC	208	----------	X7-X8-X9

DASH NO.	IDD MODEL NUMBER	IRMS	VRMS (NOMI) SEC. VOLT.	CONST.
001	TRJ-230/75-16-00	7.5	230	OPEN
002	/013	13		
003	/020	20		
004	/030	30		
005	/038	38		
006	/058	58		
007	/075	75		
008	/095	95		
010	/113	113		
011	/151	151		
012	/188	188		
013	/289	289		
014	/377	377		
[3] 015	/074	74		



DWG. NO SH 2 OF 2
A-M80421
REV 3

ROCKWELL INTERNATIONAL
INDUSTRIAL DRIVES DIVISION
RADFORD, VIRGINIA

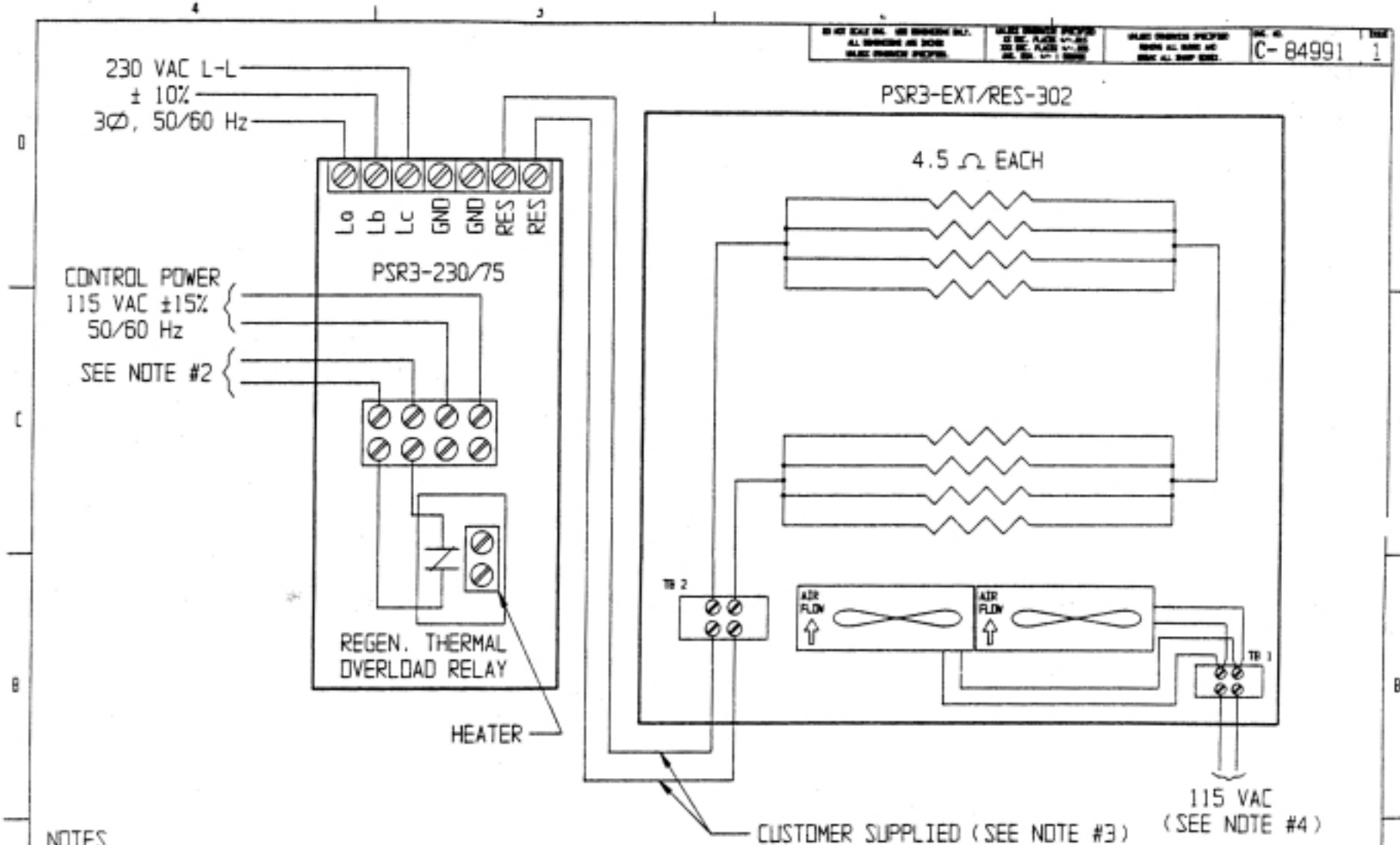
UNLESS OTHERWISE SPECIFIED
XX DEC. PLACES ±.01
XXX DEC. PLACES ±.005
ANG. DIM. ±1°
DO NOT SCALE DWG. USE DIMENSIONS ONLY
ALL DIMENSIONS ARE INCHES
UNLESS OTHERWISE SPECIFIED

NO.	ECN NO.	DATE	APP'D.	NO.	ECN NO.	DATE	APP'D.

DW'N BY | DATE
CH'K BY
APP'D BY

OUTLINE/CONNECTION
3 ↕ PHASE POWER TRANS

SCALE: NONE | DWG. NO. SH 2 OF 2 A-M80421 | REV 3

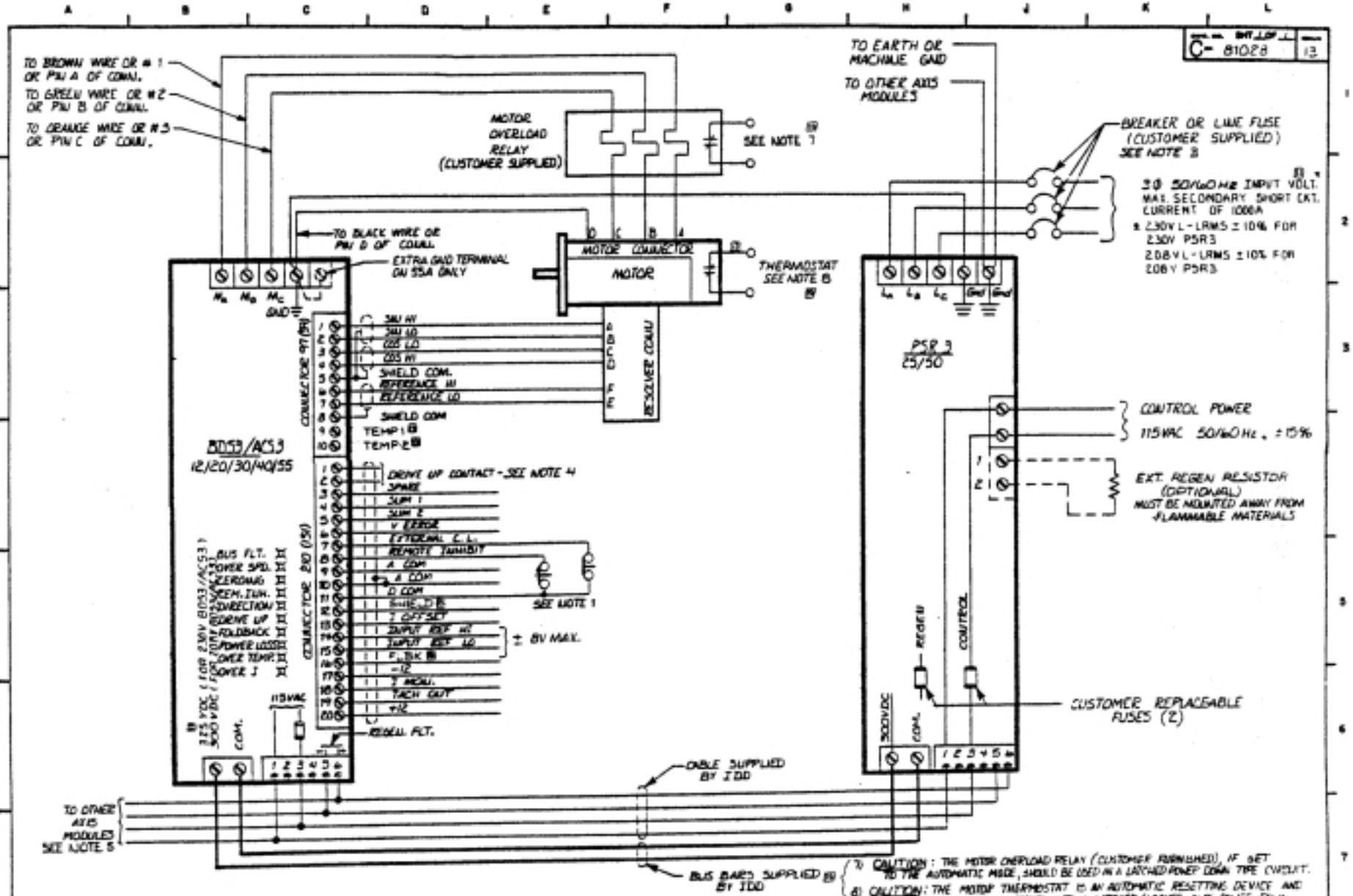


NOTES

1. PSR3-EXT/RES-302 UNIT IS RATED FOR 3000 WATTS CONTINUOUS AND MUST BE MOUNTED AWAY FROM FLAMMABLE MATERIALS.
2. REGEN OVERLOAD CONTACT ON PSR3, MUST BE CONNECTED TO DROP MAIN POWER.
3. WIRE MUST BE SIZED TO HANDLE 3000 WATTS.
4. FANS MUST BE OPERATIVE TO PROVIDE PROPER COOLING.

SYSTEM WIRING DIAGRAM
PSR3-EXT/RES-302

C- 84991



NOTES:

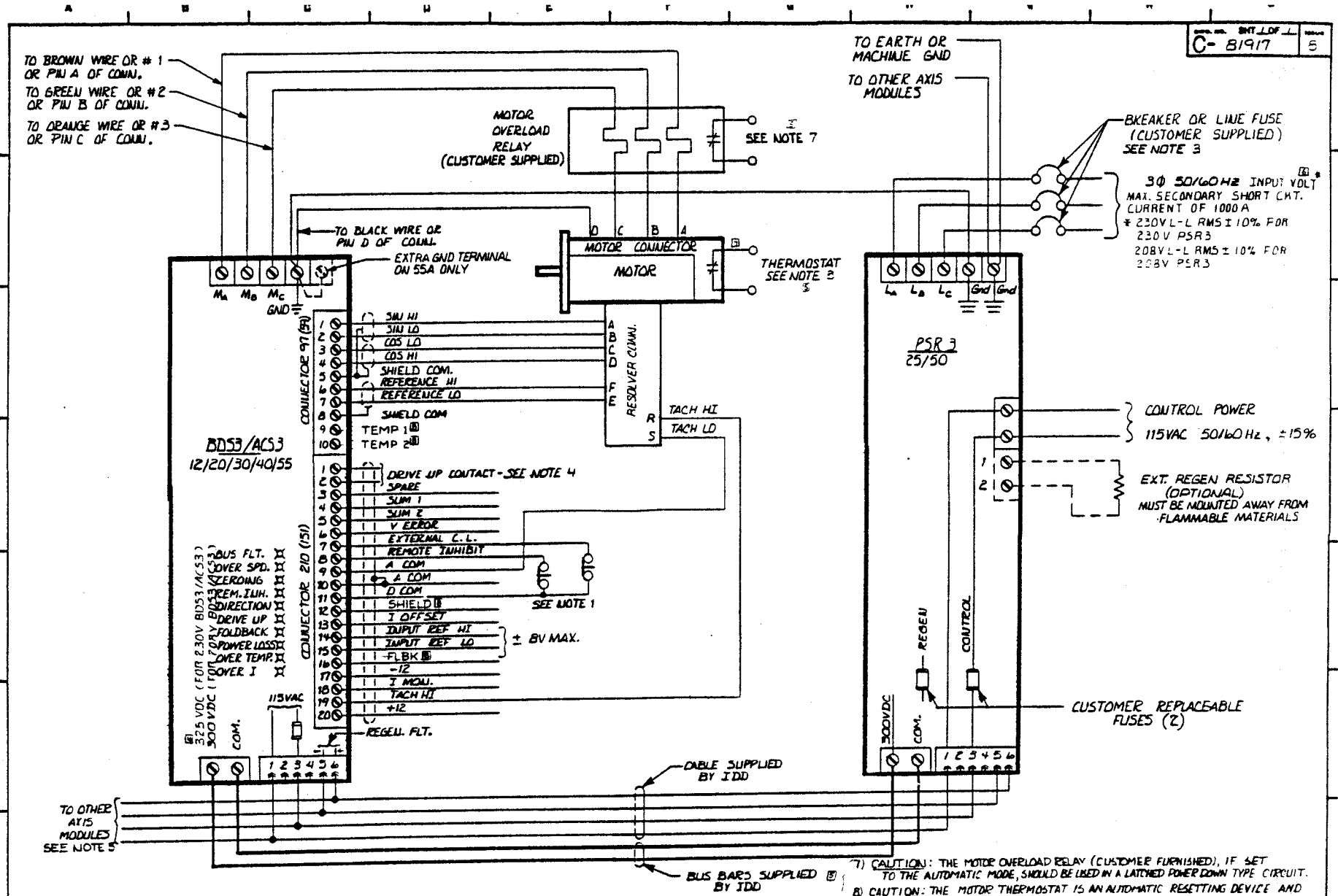
1) NORMALLY CLOSED CONTACTS, RATED 15V, 1mA, OPEN FOR DESIGNATED FUNCTION: EXAMPLE: OPEN FOR REMOTE INHIBIT
2) GROUND SHIELDS AS SHOWN. DO NOT GROUND SHIELDS AT BOTH ENDS.
3) INCOMING LINES SHOULD BE SIZED AND FUSED TO CARRY THE CONTINUOUS RATED POWER SUPPLY CURRENT. EXAMPLE: PSR3/50 SHOULD BE FUSED FOR 50 A MAX. CONTINUOUS. IF MAX. SYSTEM REQUIREMENTS ARE LESS, FUSE FOR APPROPRIATE LOWER CURRENT.
4) ISOLATED CONTACT RATED 115 VAC, 1A
5) A MAXIMUM OF 6 AMPLIFIERS CAN BE DRIVEN BY A SINGLE POWER SUPPLY.
6) CONNECTOR NUMBERS IN PARENTHESIS ARE FOR OLDER MODEL AMPLIFIERS USING A MC1 CONTROL CARD.
7) CAUTION: THE MOTOR OVERLOAD RELAY (CUSTOMER FURNISHED), IF SET TO THE AUTOMATIC MODE, SHOULD BE USED IN A LATCHED POWER DOWN TYPE CIRCUIT.
8) CAUTION: THE MOTOR THERMOSTAT IS AN AUTOMATIC RESETTING DEVICE AND SHOULD BE CONNECTED INTO A LATCHED (LOCKED-OUT) POWER DOWN TYPE CIRCUIT.

C- 81028

INDUSTRIAL DRIVES

BDS3/ACS3 & PSR3-25/50 SYSTEM WIRING DIAGRAM

C- 81028



NOTES:

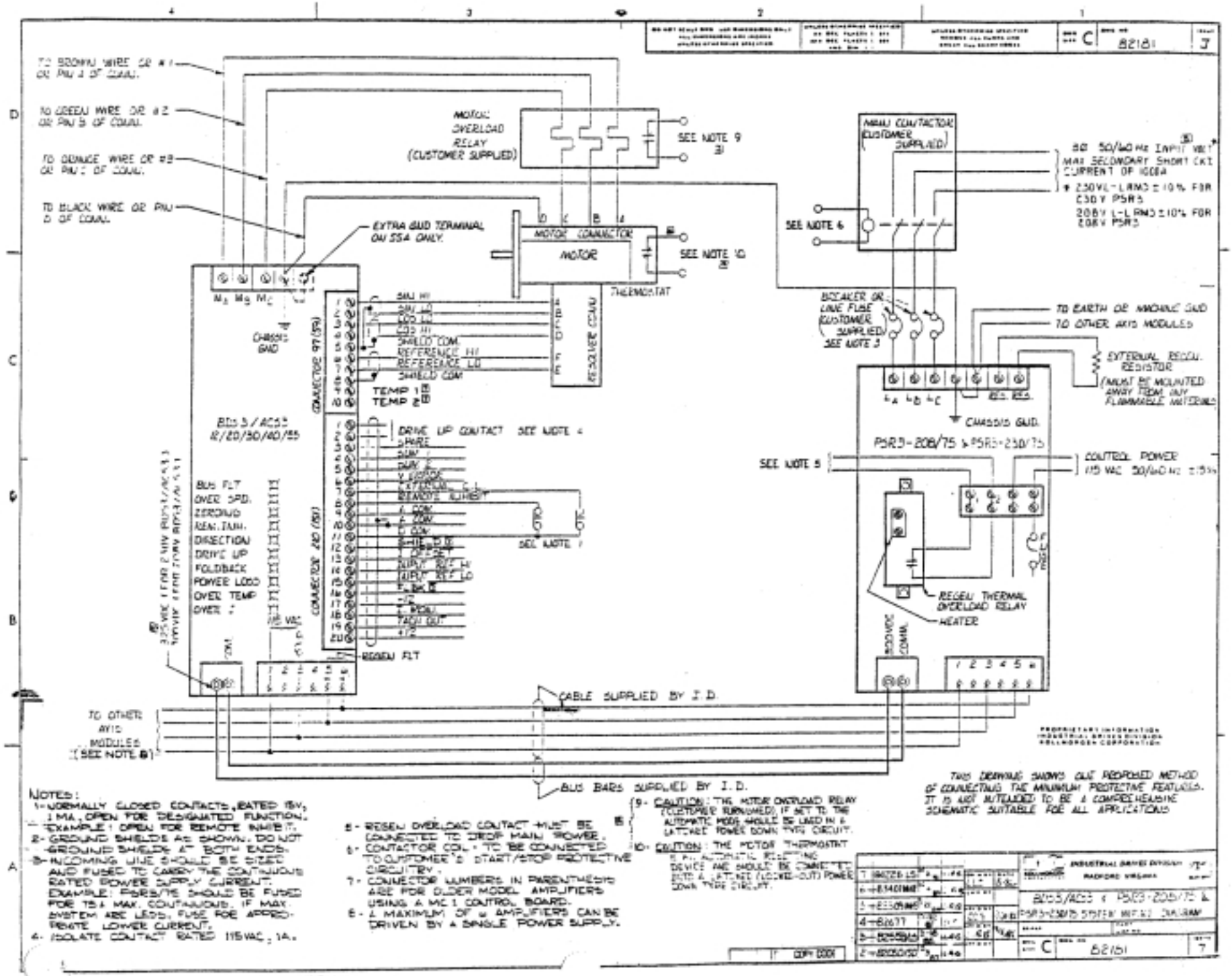
1) NORMALLY CLOSED CONTACTS, RATED 15V, 1MA, OPEN FOR DESIGNATED FUNCTION:
   EXAMPLE: OPEN FOR REMOTE INHIBIT
2) GROUND SHIELDS AS SHOWN. DO NOT GROUND SHEILDS AT BOTH ENDS.
3) INCOMING LINES SHOULD BE SIZED AND FUSED TO CARRY THE CONTINUOUS RATED POWER SUPPLY CURRENT.
   EXAMPLE: PSR3/50 SHOULD BE FUSED FOR 50A MAX. CONTINUOUS IF MAX. SYSTEM REQUIREMENTS ARE LESS, FUSE FOR APPROPRIATE LOWER CURRENT.
4) ISOLATED CONTACT RATED 115 VAC, 1A
5) A MAXIMUM OF 6 AMPLIFIERS CAN BE DRIVEN BY A SINGLE POWER SUPPLY.
6) CONNECTOR NUMBERS IN PARENTHESIS ARE FOR OLDER MODEL AMPLIFIERS USING A MC1 CONTROL CARD.
7) CAUTION: THE MOTOR OVERLOAD RELAY (CUSTOMER FURNISHED), IF SET TO THE AUTOMATIC MODE, SHOULD BE USED IN A LATCHED POWER DOWN TYPE CIRCUIT.
8) CAUTION: THE MOTOR THERMOSTAT IS AN AUTOMATIC RESETTING DEVICE AND SHOULD BE CONNECTED INTO A LATCHED (LOCKED-OUT) POWER DOWN TYPE CIRCUIT.

8	84226 LS			
7	83401 MHE			
6	83309 MHE			
5	82667			
4	82555 LS			
3	82064 SD			
2	81716 FC			

INDUSTRIAL DRIVES

BDS3/ACS3 & PSR3-25/50
SYSTEM WIRING DIAGRAM (WITH TACH)

C- 81917 SHT 1 OF 1 REV 8



NOTES:

1- NORMALLY CLOSED CONTACTS, RATED 15V, 1 MA, OPEN FOR DESIGNATED FUNCTION. EXAMPLE: OPEN FOR REMOTE INHIBIT.

2- GROUND SHIELDS AS SHOWN. DO NOT GROUND SHIELDS AT BOTH ENDS.

3- INCOMING LINE SHOULD BE SIZED AND FUSED TO CARRY THE CONTINUOUS RATED POWER SUPPLY CURRENT. EXAMPLE: PSR3/75 SHOULD BE FUSED FOR 7.5 A MAX. CONTINUOUS. IF MAX. SYSTEM ABC LEGS, FUSE FOR APPROPRIATE LOWER CURRENT.

4- ISOLATE CONTACT RATED 115 VAC, 1A.

5- REGEN OVERLOAD CONTACT MUST BE CONNECTED TO DROP MAIN POWER.

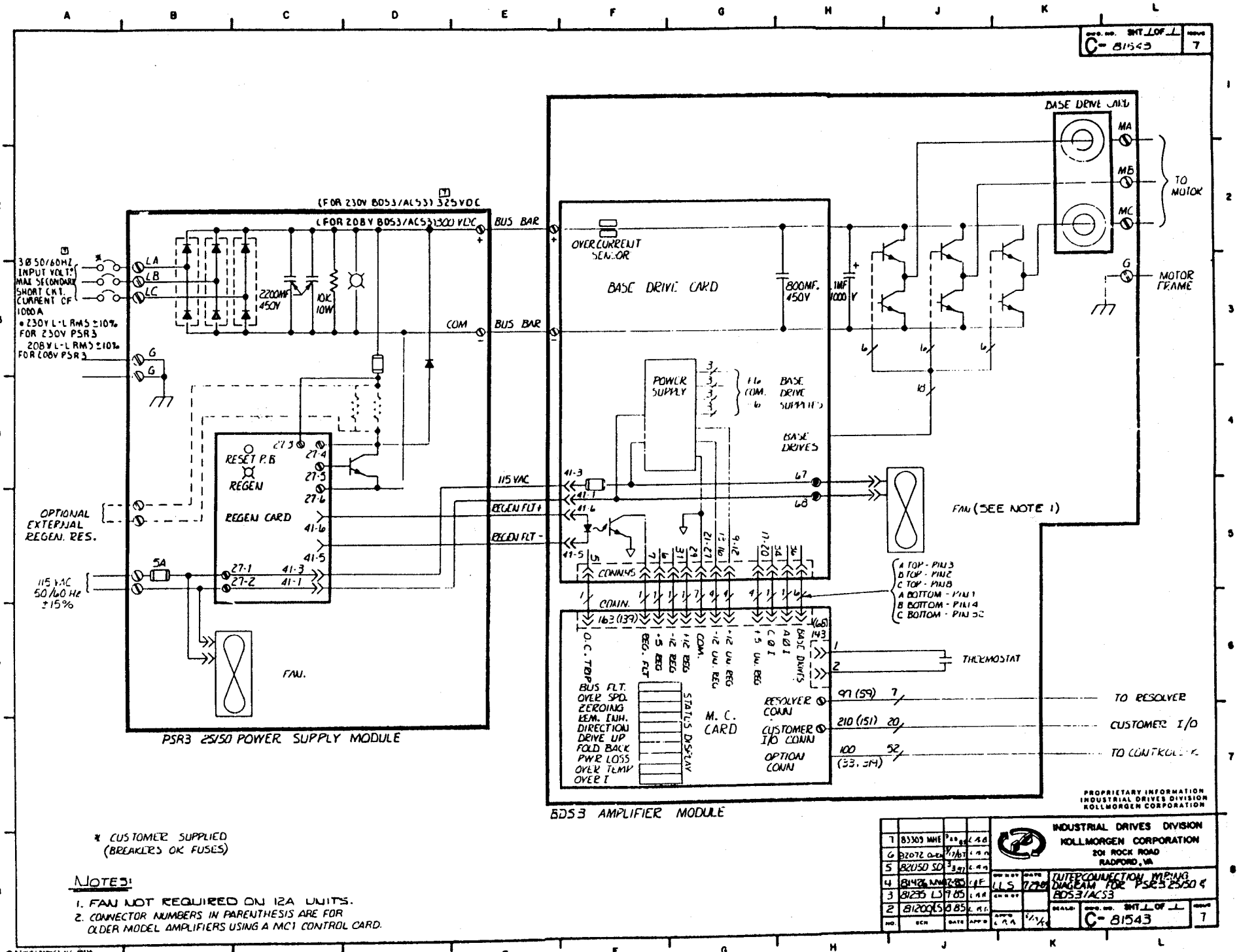
6- CONTACTOR COIL TO BE CONNECTED TO CUSTOMER'S START/STOP PROTECTIVE CIRCUITRY.

7- CONNECTOR NUMBERS IN PARENTHESIS ARE FOR OLDER MODEL AMPLIFIERS USING A MC 1 CONTROL BOARD.

8- A MAXIMUM OF 4 AMPLIFIERS CAN BE DRIVEN BY A SINGLE POWER SUPPLY.

9- CAUTION: THE MOTOR OVERLOAD RELAY (CUSTOMER SUPPLIED) IF NOT TO THE AUTOMATIC MODE SHOULD BE USED IN A LATCHED POWER DOWN TYPE CIRCUIT.

10- CAUTION: THE MOTOR THERMOSTAT IF AN AUTOMATIC RESETTING DEVICE ARE SHOULD BE CONNECTED INTO A LATCHED (LOCKED-OUT) POWER DOWN TYPE CIRCUIT.



* CUSTOMER SUPPLIED (BREAKERS OR FUSES)

NOTES:

1. FAN NOT REQUIRED ON 12A UNITS.
2. CONNECTOR NUMBERS IN PARENTHESIS ARE FOR OLDER MODEL AMPLIFIERS USING A MC1 CONTROL CARD.

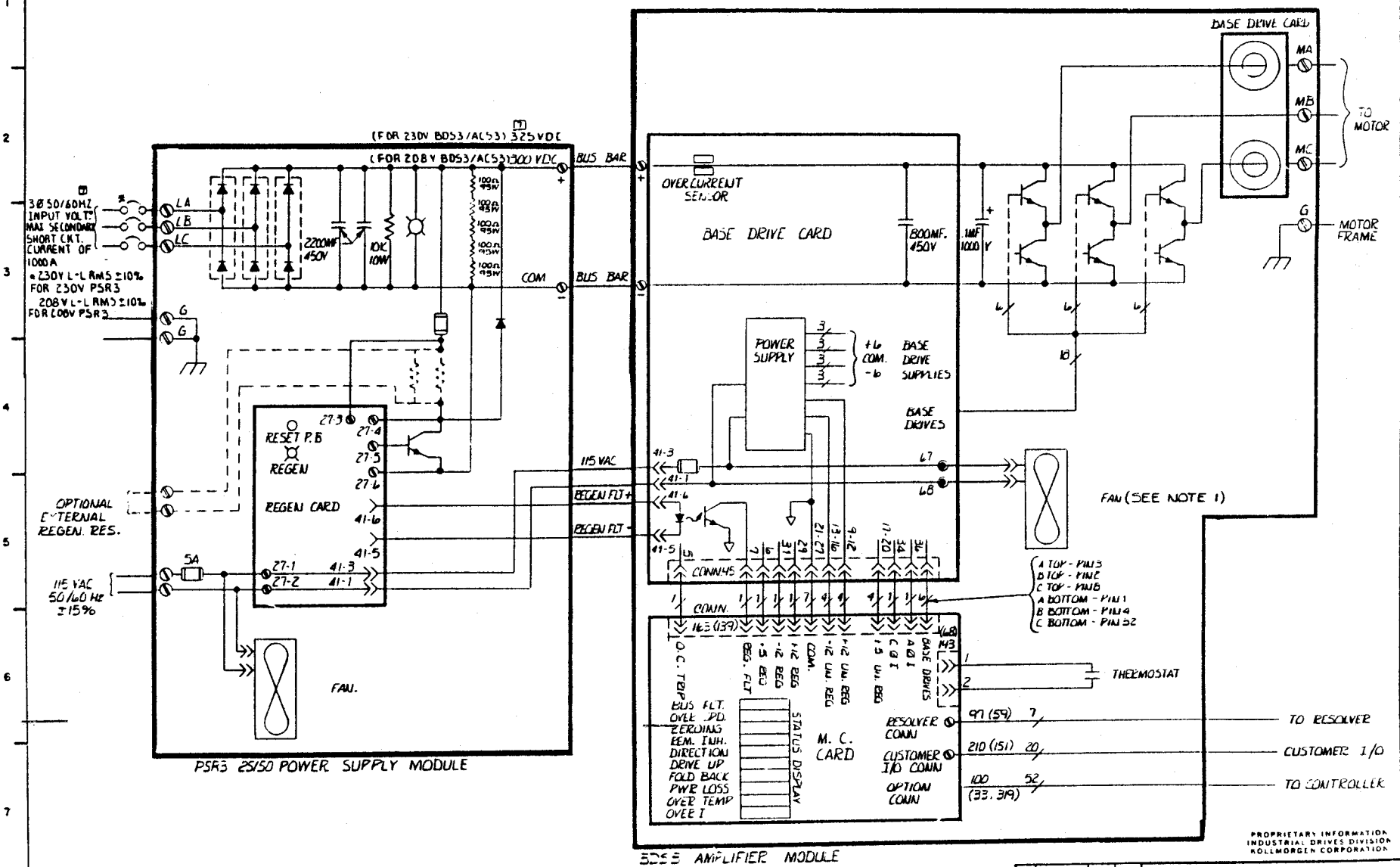
NO.	ECN	DATE	APP'D
7	83309 MME	9/88	L.A.A.
6	82072 CAH	9/87	L.A.A.
5	82050 SO	3/87	L.A.A.
4	81428 MME	2/85	L.A.A.
3	81235 LJ	1/85	L.A.A.
2	81200 LS	1/85	L.A.A.

PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
201 ROCK ROAD
RADFORD, VA

DRAWN	LLS 7/79
CHECKED	
APP'D	L.A.A. 7/79
DRAWING NO.	C- 81543
SHT.	1 OF 1
REV.	7

INTERCONNECTION WIRING DIAGRAM FOR PSR3 25/50 & BDS3/ACS3



* CUSTOMER SUPPLIED (BREAKERS OR FUSES)

NOTES:

1. FAN NOT REQUIRED ON 12A UNITS.
2. CONNECTOR NUMBERS IN PARENTHESIS ARE FOR OLDER MODEL AMPLIFIERS USING A MC1 CONTROL CARD.

PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

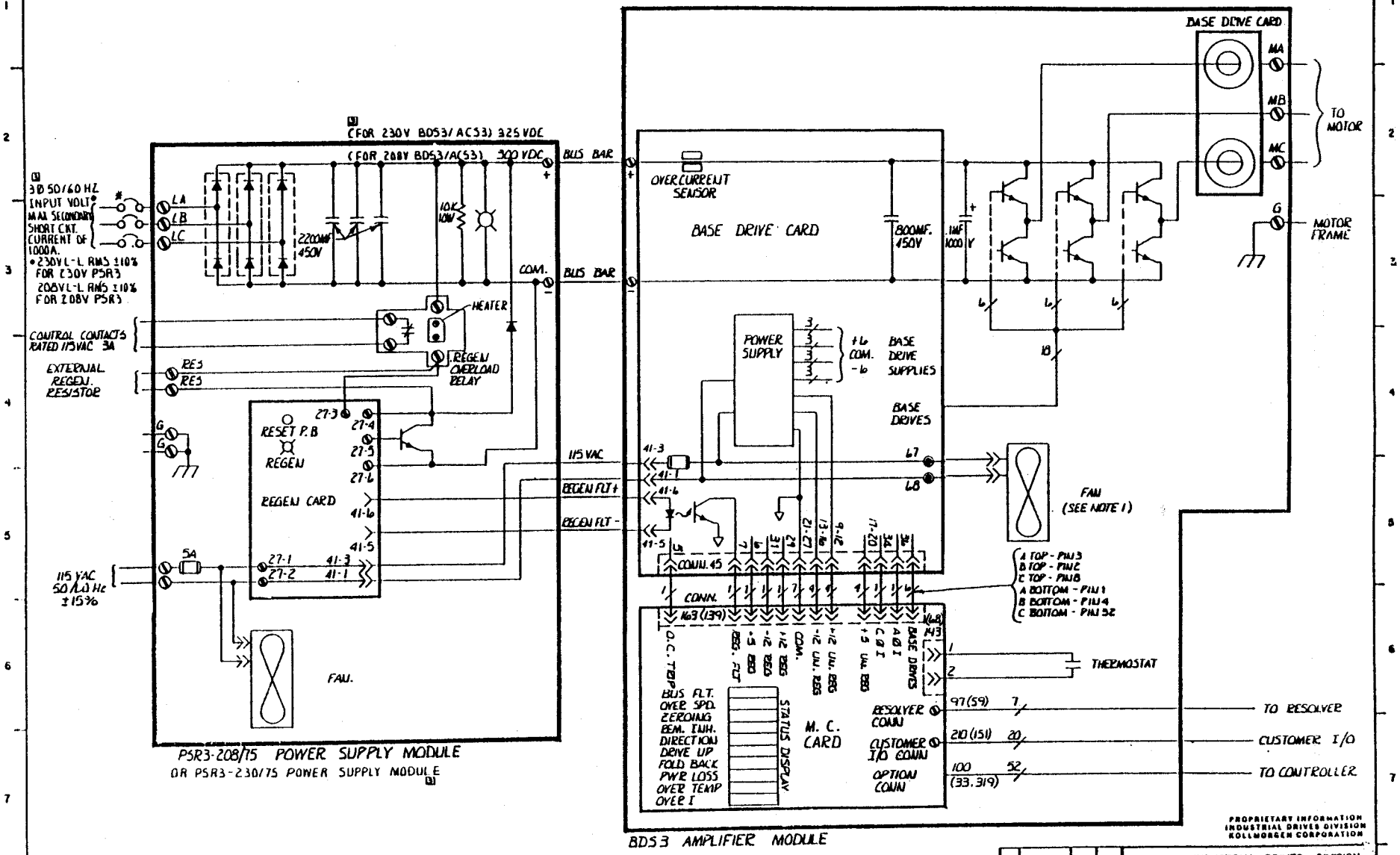
INDUSTRIAL DRIVES

DWG. NO.	C-93253
SHT 1 OF 1	
REV	1
DRAWN BY	
DATE	12-91
CHK'D BY	
SCALE	
APP'D	

INTERCONNECTION WIRING DIAGRAM FOR PSR3 25/50-C BDS3/AC55E

COPY CODE

NO.	ECN	DATE	APP'D



* CUSTOMER SUPPLIED (BREAKERS OR FUSES)

NOTES:
1. FAN NOT REQUIRED ON 12A UNITS.
2. CONNECTOR NUMBERS IN PARENTHESIS ARE FOR OLDER MODEL AMPLIFIERS USING A MC1 CONTROL BOARD.

PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

3	83308 MHE				
2	82050 ISD				
NO.	SCN	DATE	APP'D		

D COPY CODE

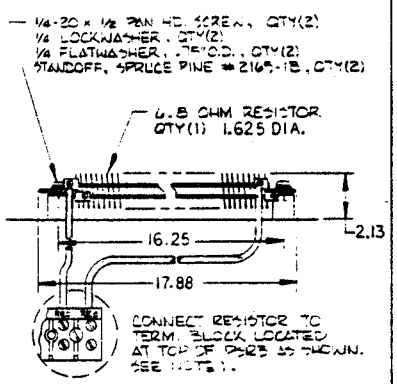
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
201 ROCK ROAD
RADFORD, VA

DRN'D BY LLS DATE 8/4/82
CHK'D BY
APP'D CCS 8/21/82

INTERCONNECTION WIRING DIAGRAM FOR PSR3-208/15 & PSR3-230/15 (BDS3/AC53)

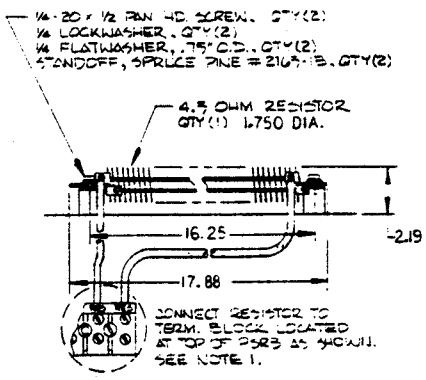
SCALE: | DWG. NO. SHT 1 OF 1 C-82182 | ISSUE 3

DO NOT SCALE DWG. USE DIMENSIONS ONLY. ALL DIMENSIONS ARE NOMINAL UNLESS OTHERWISE SPECIFIED. UNLESS OTHERWISE SPECIFIED: AS DEC PLACES ± .010, ANG ± 1°. REMOVE ALL BURRS AND BREAK ALL SHARP EDGES. SIZE C. DWG NO 82260. ISSUE 2



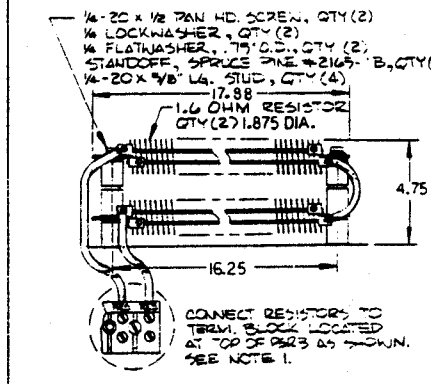
-201

RATED CONTINUOUS WATTS: 300 W
TOTAL RESISTANCE: 6.8 Ω



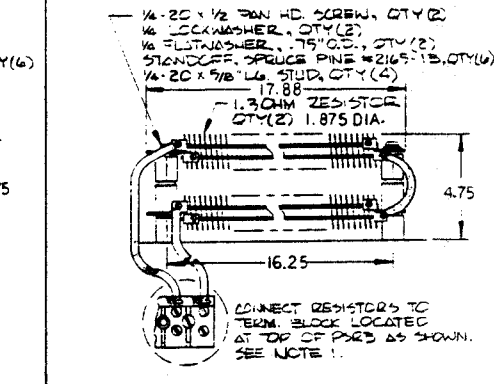
-202

RATED CONTINUOUS WATTS: 600 W
TOTAL RESISTANCE: 4.5 Ω



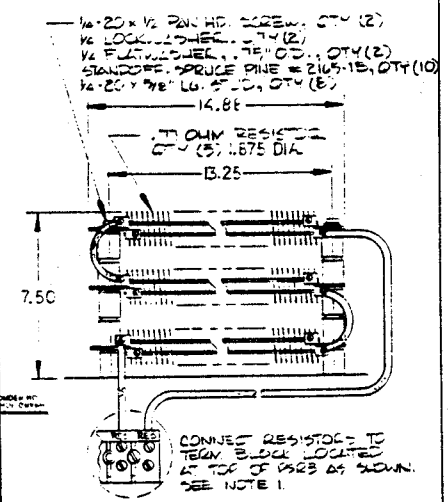
-203

RATED CONTINUOUS WATTS: 900 W
TOTAL RESISTANCE: 3.2 Ω



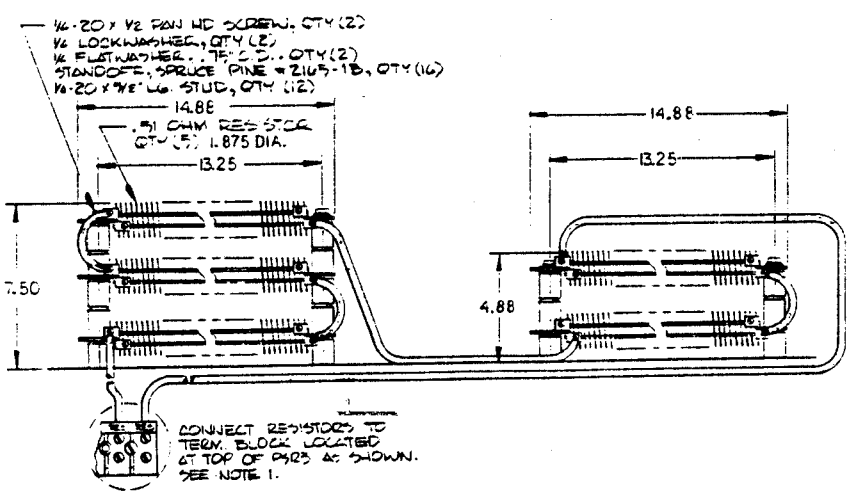
-204

RATED CONTINUOUS WATTS: 1200 W
TOTAL RESISTANCE: 2.6 Ω



-205

RATED CONTINUOUS WATTS: 1500 W
TOTAL RESISTANCE: 3.3 Ω



-206

RATED CONTINUOUS WATTS: 2000 W
TOTAL RESISTANCE: 2.55 Ω

CAUTION- DO NOT INSTALL RESISTORS NEAR FLAMMABLE MATERIALS.

NOTES:
1. RECOMMENDED WIRE: #8 AWG, 125° C.
2. BOTTOM STANDOFFS ARE TAPPED 1/4-20 x 3/8" DEEP FOR MOUNTING RESISTORS TO PANEL, ETC.

COPY CODE

MATERIAL | HEAT TREAT | FINISH

NO	SCH NO	DATE	APP'D
1	82250	SD	5/87
2			
3			
4			
5			
6			

TMG 9/2/86

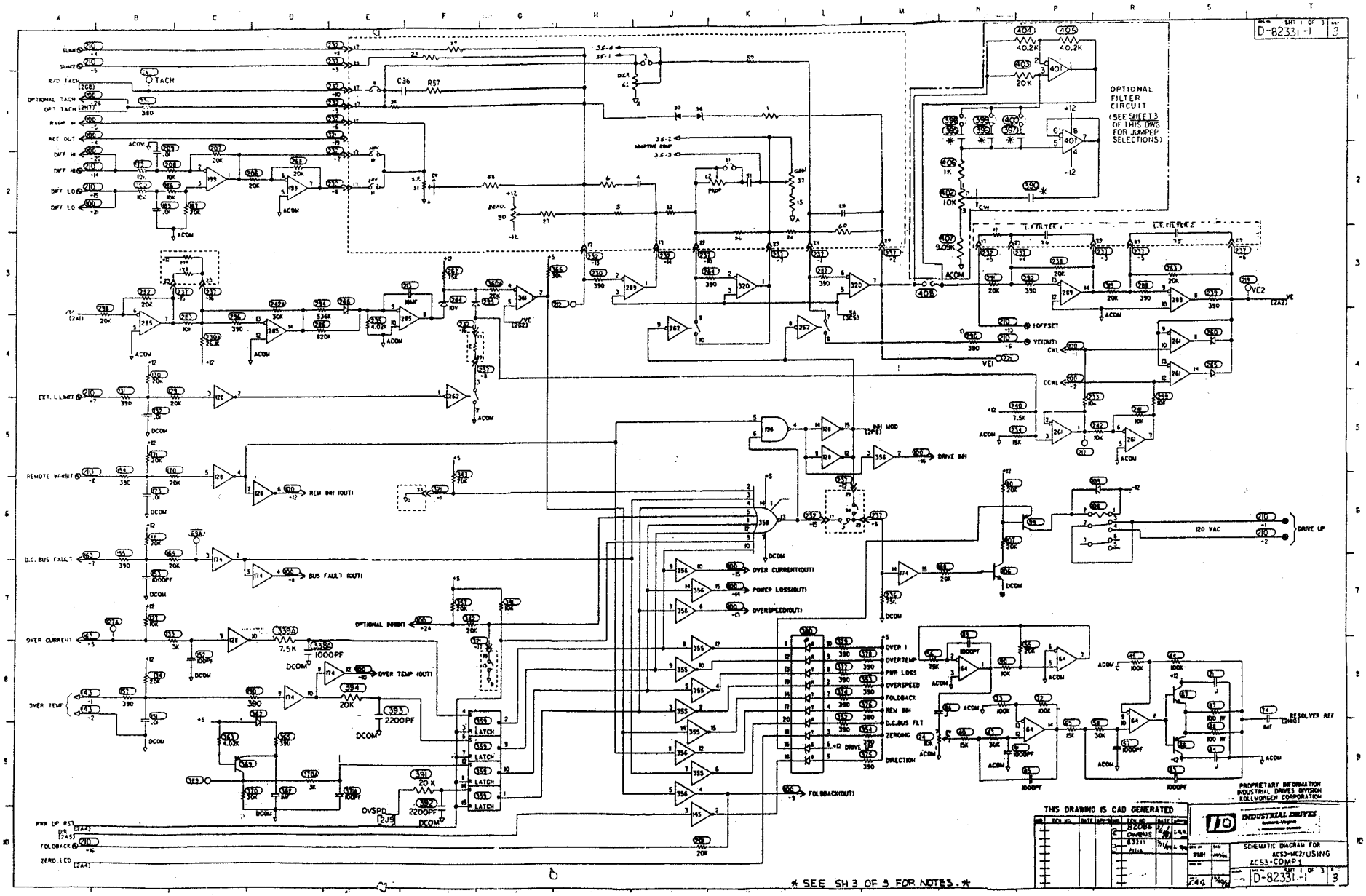
INDUSTRIAL DRIVES DIVISION
RADFORD VIRGINIA

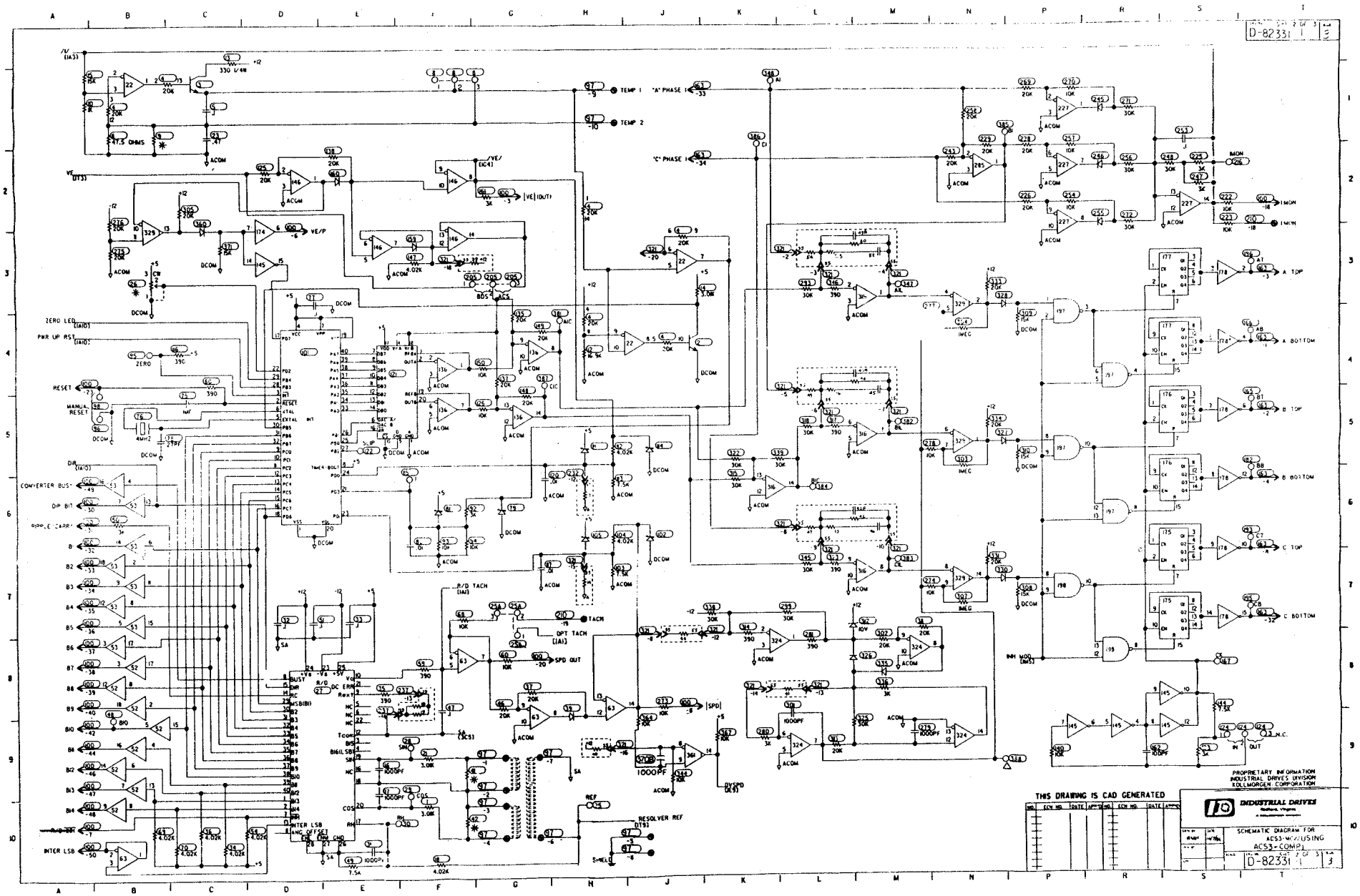
EXTERNAL REGEN. RESISTOR WIRING DIAGRAM FOR PSR3-75AMP

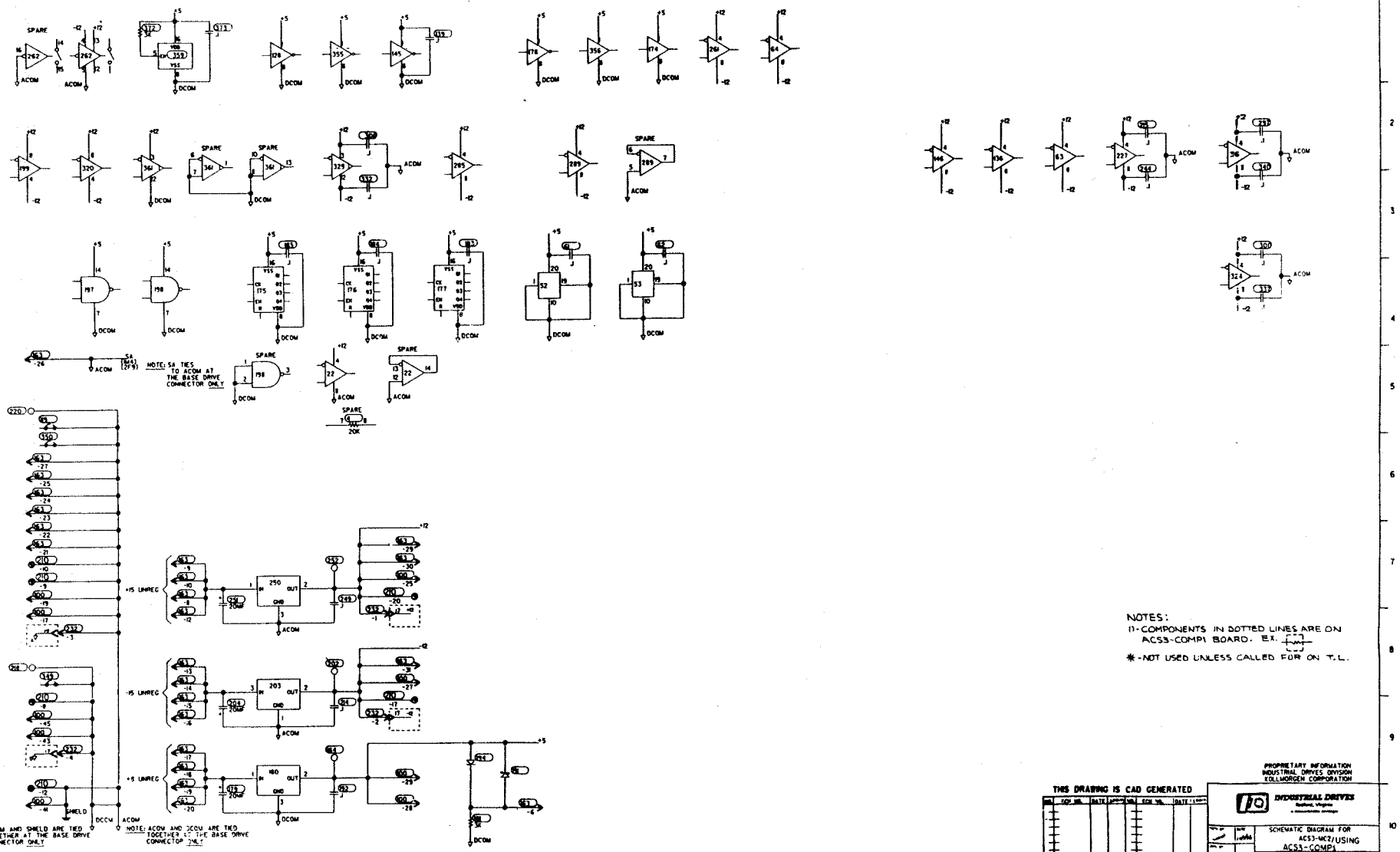
SCALE | PART NO

SIZE C DWG NO 82260 ISSUE 2

80


D-82331-1
OPTIONAL FILTER CIRCUIT
(SEE SHEET 3 OF THIS DWG FOR JUMPER SELECTIONS)
TACH
OVER CURRENT
OVER TEMP
D.C. BUS FAULT
REMOTE INHIBIT
EXT. LIMIT
DRIVE UP
DRIVE DN
FOLDBACK
ZERO LED
OVERSPEED
POWER LOSS
OVERTEMP
DIRECTION
RESOLVER REF
120 VAC
* SEE SH 3 OF 3 FOR NOTES. *
THIS DRAWING IS CAD GENERATED
INDUSTRIAL DRIVES
SCHEMATIC DIAGRAM FOR ACS3-MC2/USING ACS3-COMP1
D-82331-1


D-82331
TEMP 1
TEMP 2
"A" PHASE I
"C" PHASE I
VE/P
SPD OUT
SPD
TACH
OPT TACH
RESOLVER REF
A TOP
A BOTTOM
B TOP
B BOTTOM
C TOP
C BOTTOM
PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
ROLLMORGEN CORPORATION
THIS DRAWING IS CAD GENERATED
INDUSTRIAL DRIVES
SCHEMATIC DIAGRAM FOR
ACS3-MOTUSING
ACS3-COMP1
D-82331



NOTES:
1- COMPONENTS IN DOTTED LINES ARE ON ACS3-COMP1 BOARD. EX.
* - NOT USED UNLESS CALLED FOR ON T.L.

THIS DRAWING IS CAD GENERATED

PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

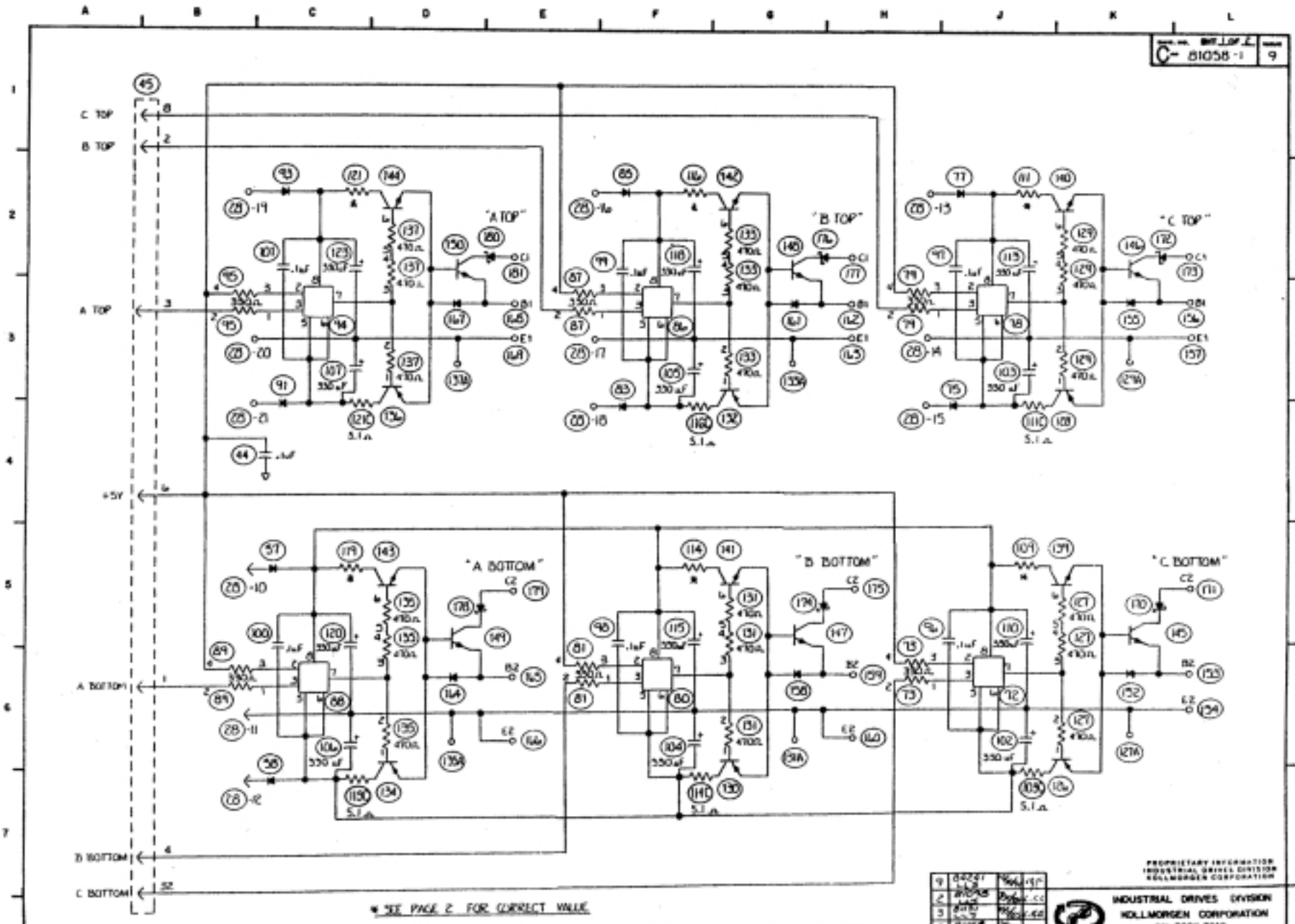
INDUSTRIAL DRIVES
Radford, Virginia

SCHEMATIC DIAGRAM FOR
ACS3-MCI/USING
ACS3-COMP1

D-82731-1

SHT 3 OF 3

REV 3



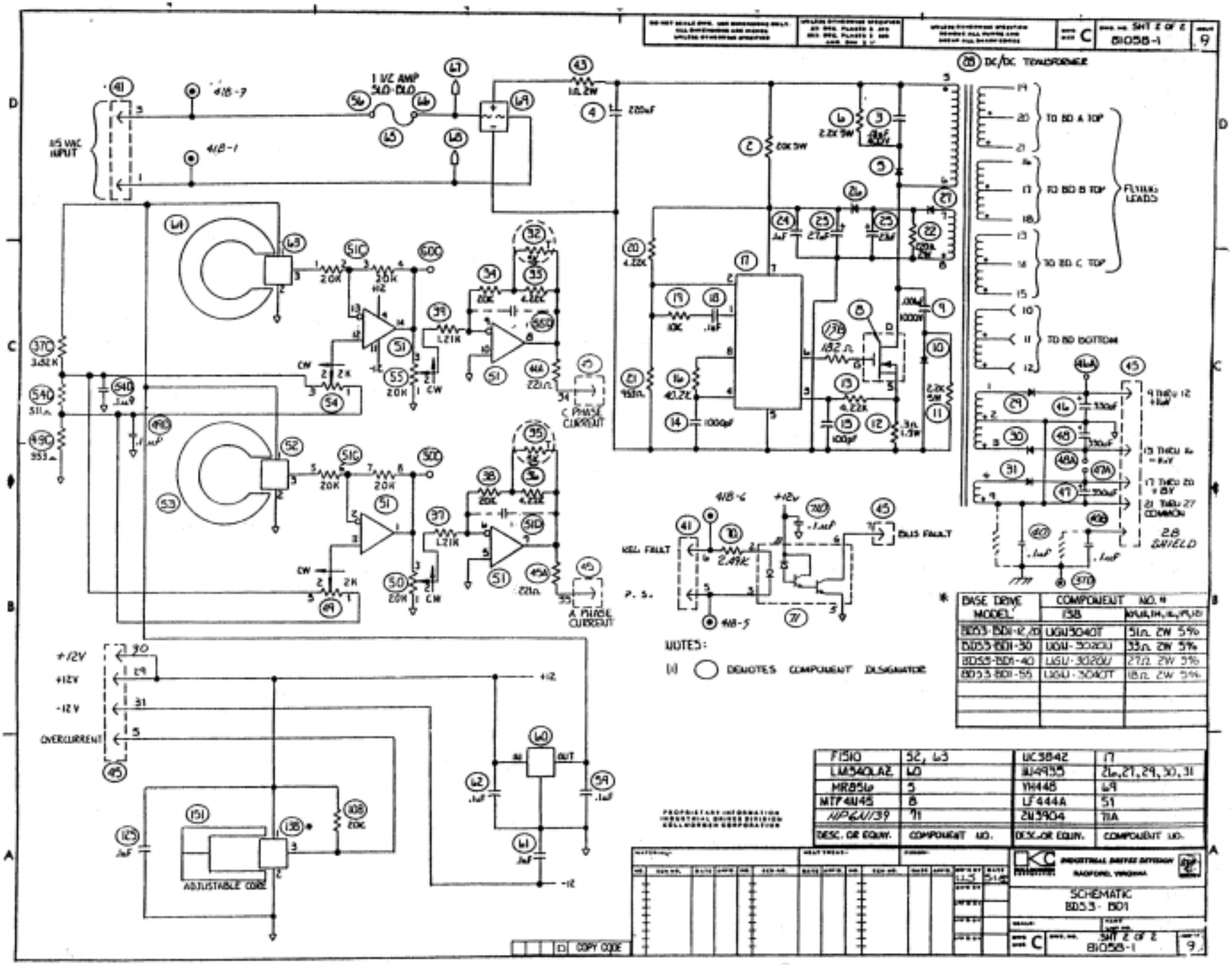
IN4935	57,58,75,77,83, 85,91,93	MR850	152,155,158,161, 164,167	TIP125	126,128,130,132, 134,136	HCPL 2200	92,78,80,84,88, 94
IN5820	170,172,174,176, 178,180	MUE-200	139,140,141,142, 143,144	ET206 OR MUH6V004	145,146,147,148, 149,150		
OR EQUIV.	COMPONENT NO.	DESC. OR EQUIV.	COMPONENT NO.	DESC. OR EQUIV.	COMPONENT NO.	DESC. OR EQUIV.	COMPONENT NO.

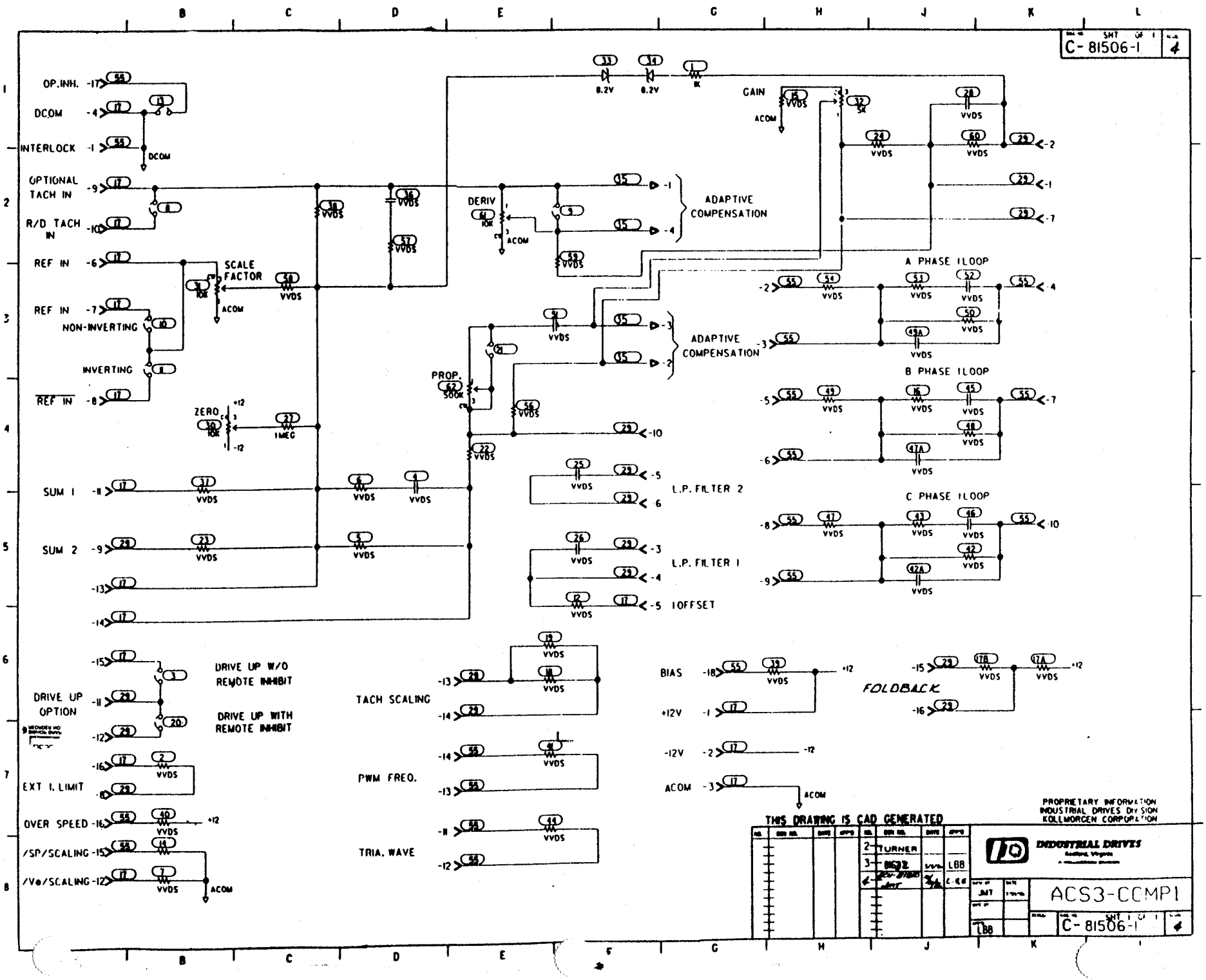
PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

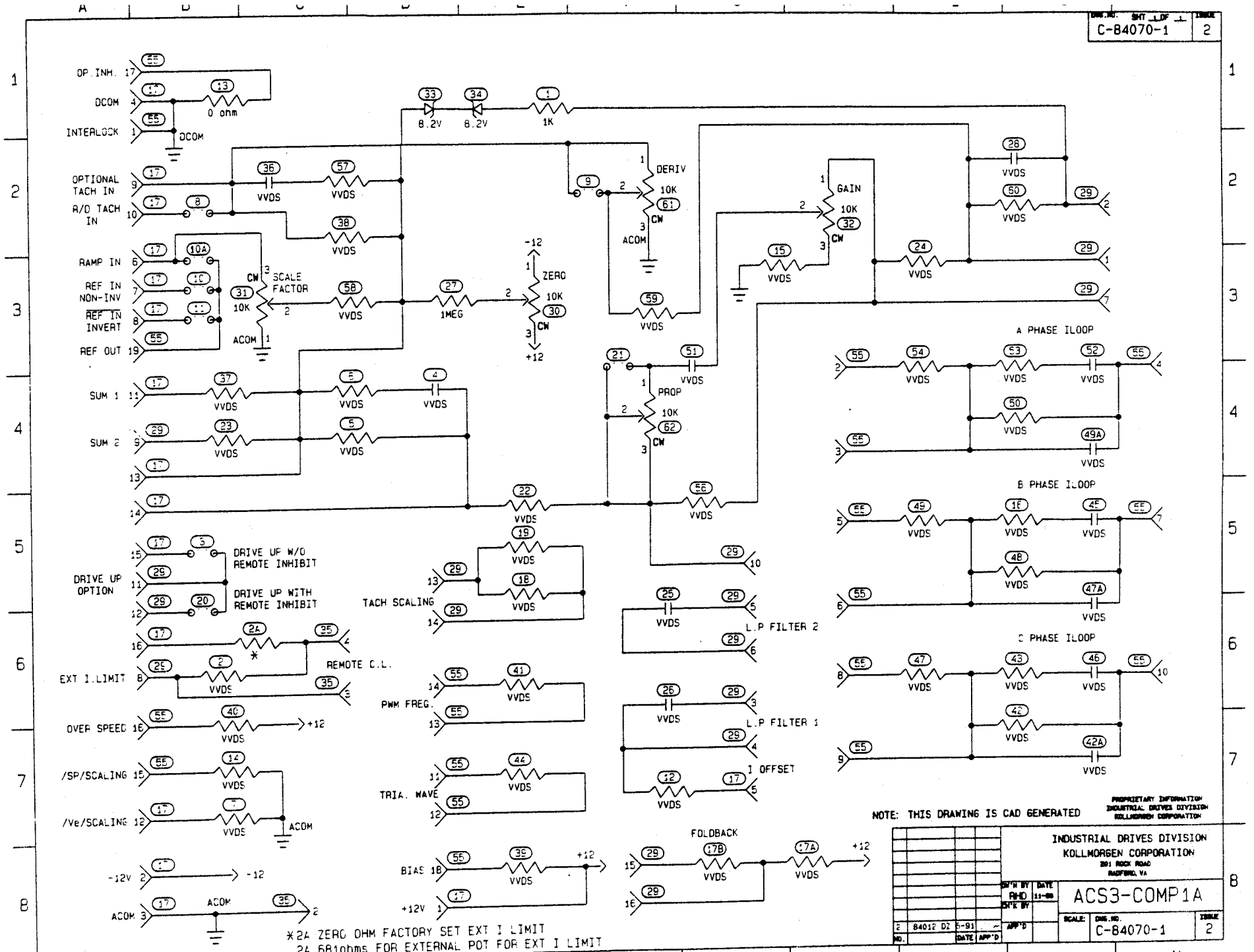
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
201 ROCK ROAD
RADFORD, VA

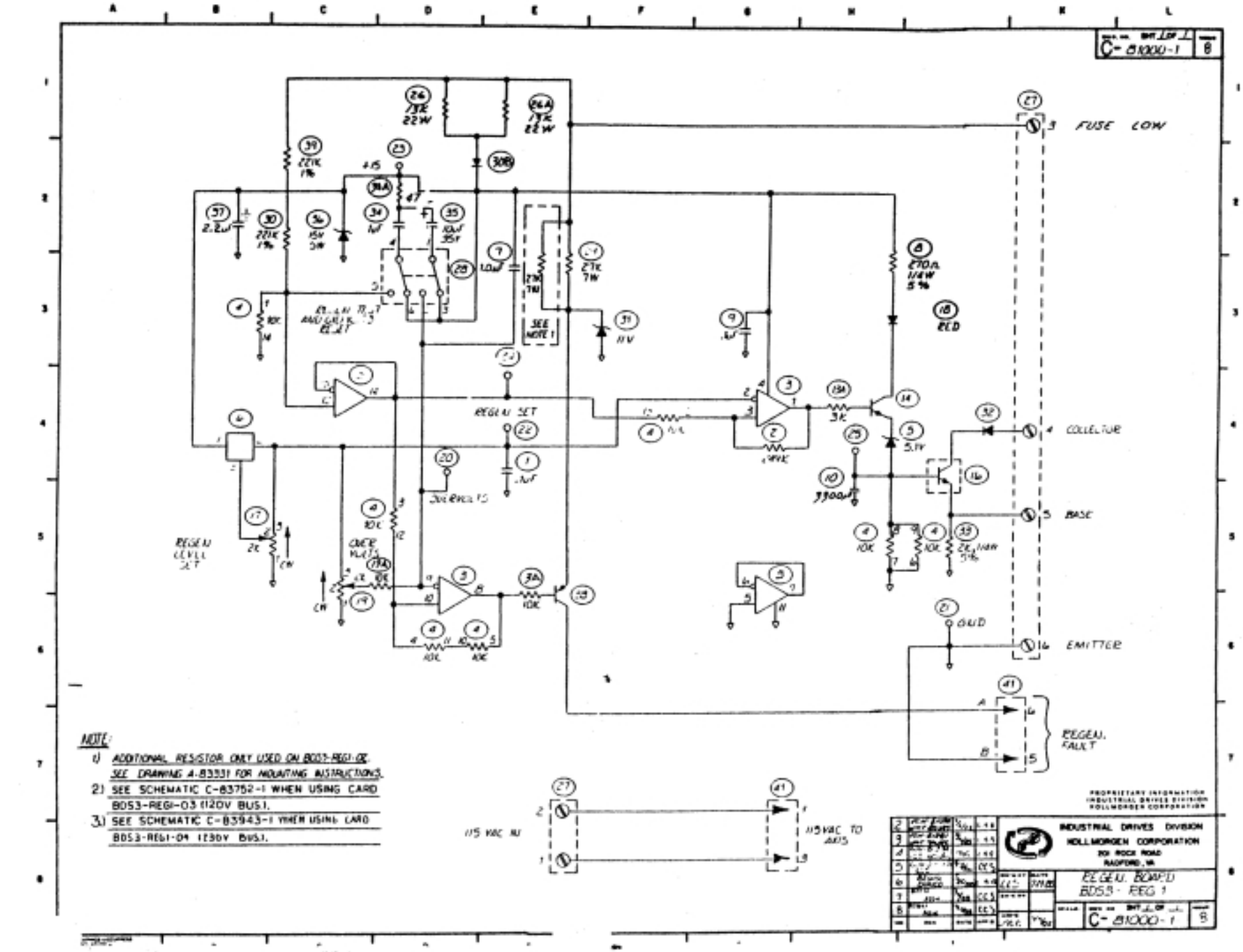
SCHEMATIC
8055-8D1

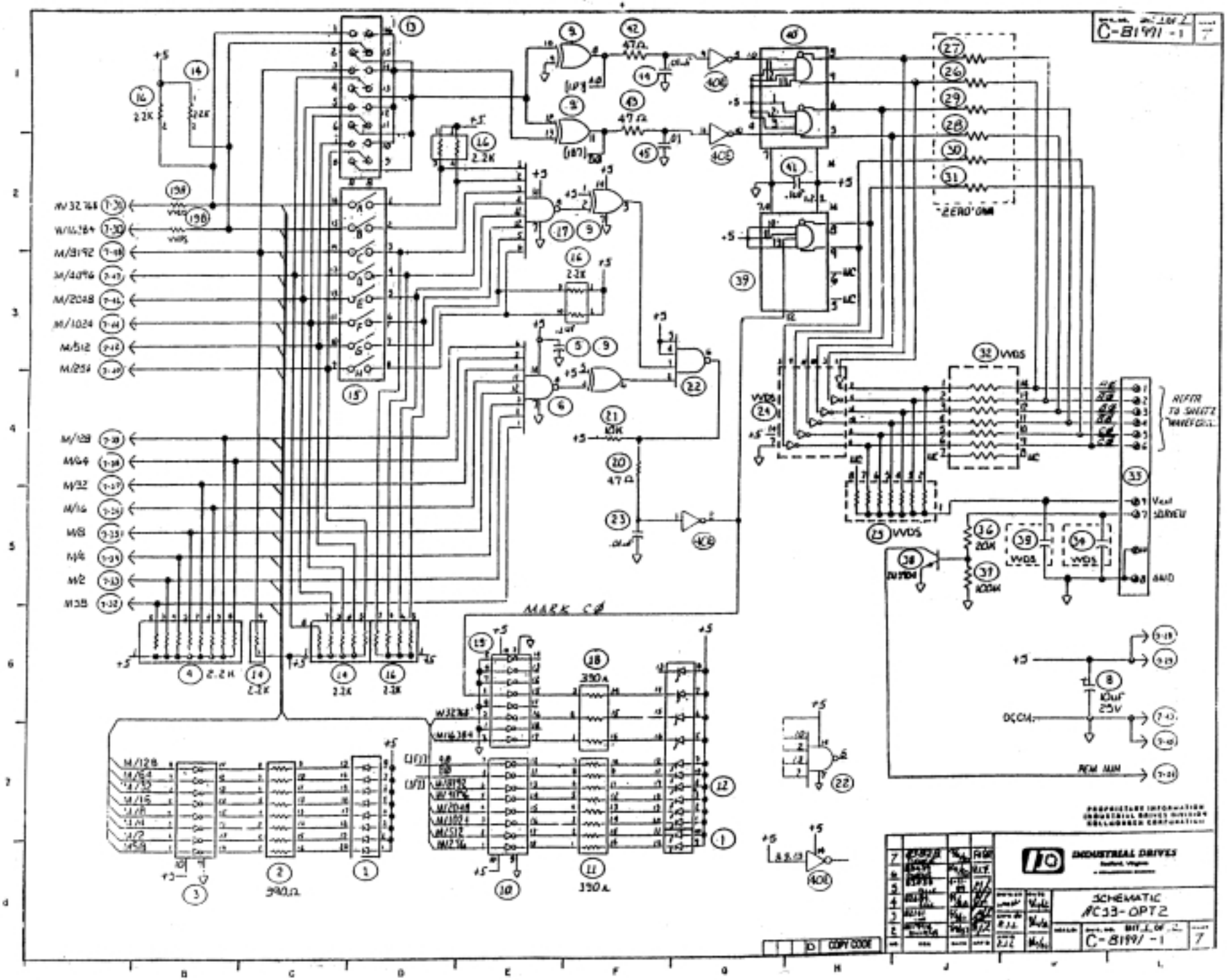
C- 81058-1 9


115 VAC INPUT
1 VC AMP 240-260
DC/DC TRANSFORMER
TO BD A TOP
TO BD B TOP
TO BD C TOP
FLYING LEADS
TO BD BOTTOM
C PHASE CURRENT
A PHASE CURRENT
ADJUSTABLE CORE
OVERCURRENT
+12V
-12V
P.S.
BASE DRIVE MODEL
COMPONENT NO.
ITEM
BD53-BD1-10,20
BD53-BD1-30
BD53-BD1-40
BD53-BD1-55
UGW30401
UGW-30200
UGW-30200
UGW-30401
5Ω 2W 5%
33Ω 2W 5%
27Ω 2W 5%
18Ω 2W 5%
NOTES:
DENOTES COMPONENT DESIGNATOR
FI510
LM340LAZ
MR856
MTP4N45
HP6N139
UC3842
IRF9955
YN448
LF444A
2N3904
DESC. OR EQUIV.
COMPONENT NO.
SCHEMATIC
BD53-BD1
SHT 2 OF 2
81058-1
REV C
COPY CODE


C-81506-1
OP.INH.
DCOM
INTERLOCK
OPTIONAL TACH IN
R/D TACH IN
REF IN
REF IN
NON-INVERTING
INVERTING
REF IN
SCALE FACTOR
ZERO
SUM 1
SUM 2
DERIV
PROP.
GAIN
ADAPTIVE COMPENSATION
ADAPTIVE COMPENSATION
L.P. FILTER 2
L.P. FILTER 1
OFFSET
A PHASE LOOP
B PHASE LOOP
C PHASE LOOP
DRIVE UP OPTION
DRIVE UP W/O REMOTE INHIBIT
DRIVE UP WITH REMOTE INHIBIT
EXT I. LIMIT
OVER SPEED
/SP/SCALING
/Ve/SCALING
TACH SCALING
PWM FREQ.
TRIA. WAVE
BIAS
+12V
-12V
ACOM
FOLDBACK
THIS DRAWING IS CAD GENERATED
PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
INDUSTRIAL DRIVES
ACS3-CCMP1
C-81506-1


DWG. NO. C-84070-1
SHT 1 OF 1
ISSUE 2
OP. INH.
DCOM
INTERLOCK
0 ohm
8.2V
8.2V
1K
OPTIONAL TACH IN
A/D TACH IN
VVDS
DERIV
10K
CW
ACOM
GAIN
RAMP IN
REF IN NON-INV
REF IN INVERT
REF OUT
SCALE FACTOR
ZERO
1MEG
+12
-12
SUM 1
SUM 2
PROP
A PHASE ILOOP
B PHASE ILOOP
C PHASE ILOOP
DRIVE UP OPTION
DRIVE UP W/O REMOTE INHIBIT
DRIVE UP WITH REMOTE INHIBIT
EXT I.LIMIT
REMOTE C.L.
OVER SPEED
/SP/SCALING
/Ve/SCALING
TACH SCALING
PWM FREQ.
TRIA. WAVE
BIAS
L.P FILTER 2
L.P FILTER 1
I OFFSET
FOLDBACK
-12V
+12V
NOTE: THIS DRAWING IS CAD GENERATED
*2A ZERO OHM FACTORY SET EXT I LIMIT
2A 681ohms FOR EXTERNAL POT FOR EXT I LIMIT
PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
201 ROCK ROAD
RADFORD, VA
ACS3-COMP1A
C-84070-1
ISSUE 2
SCALE:
DWG. NO.
APP'D
DATE
CH'K BY
DR'N BY
RHD
84012 D2


C-81000-1
FUSE LOW
COLLECTOR
BASE
EMITTER
REGEN. FAULT
REGEN SET
REGEN LEVEL SET
CHECK VALUES
SEE NOTE 1
115 VAC IN
115 VAC TO AXIS
NOTE:
1) ADDITIONAL RESISTOR ONLY USED ON BDS3-REGI-03. SEE DRAWING A-83331 FOR MOUNTING INSTRUCTIONS.
2) SEE SCHEMATIC C-83752-1 WHEN USING CARD BDS3-REGI-03 (120V BUS).
3) SEE SCHEMATIC C-83943-1 WHEN USING CARD BDS3-REGI-04 (230V BUS).
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
REGEN. BOARD
BDS3 - REG 1
C-81000-1


C-8199 -1
MARK CB
ZERO ONE
REFER TO SHEET 7
SCHEMATIC
MC33-OPT2
C-8199/ -1
INDUSTRIAL DRIVES
COPY CODE

ACS3-OPT2 OUTPUT CONFIGURATIONS										
	▲ COMPONENT 13	▲▲ COMPONENT 15								
R/D RESOLUTION LOCATED ON ACS3-MC2 BOARD	PIN AND JUMPER LOCATIONS	SWITCH LOCATIONS O=OFF I=ON								OPTIONAL ENCODER LINES
		1	2	3	4	5	6	7	8	
10 BITS OR GREATER	J13-7 to 13-10; 13-8 to 13-9	0	0	0	0	0	0	0	1	256
*12 BITS OR GREATER	J13-7 to 13-8; 13-10 to 13-11	0	0	0	0	0	0	1	1	512
12 BITS OR GREATER	J13-5 to 13-12; 13-6 to 13-11	0	0	0	0	0	1	1	1	1024
†14 BITS OR GREATER	J13-5 to 13-6; 13-12 to 13-13	0	0	0	0	1	1	1	1	2048
14 BITS OR GREATER	J13-3 to 13-11; 13-4 to 13-13	0	0	0	1	1	1	1	1	4096
**16 BITS OR GREATER	J 13-3 to 13-4; 13-14 to 13-15	0	0	1	1	1	1	1	1	8192
16 BITS OR GREATER	J13-1 to 13-16 13-2 to 13-15	0	1	1	1	1	1	1	1	16384

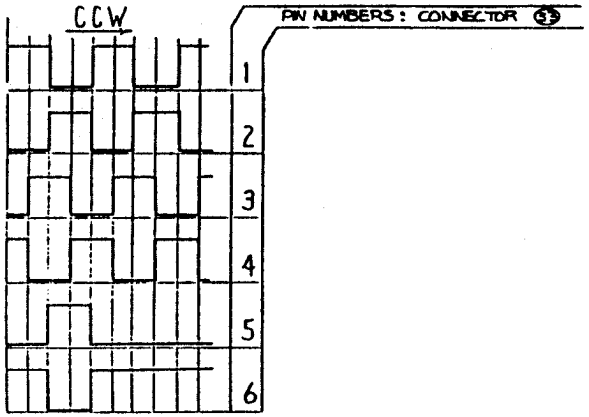
▲ = COMPONENT 13 IS AN ARRAY OF PINS FOR INSTALLING JUMPERS

▲▲ = COMPONENT 15 IS A DIP SWITCH (8 POSITION)

* = CONFIGURED AS AN 11 BIT R/D

† = CONFIGURED AS A 13 BIT R/D

** = CONFIGURED AS A 15 BIT R/D



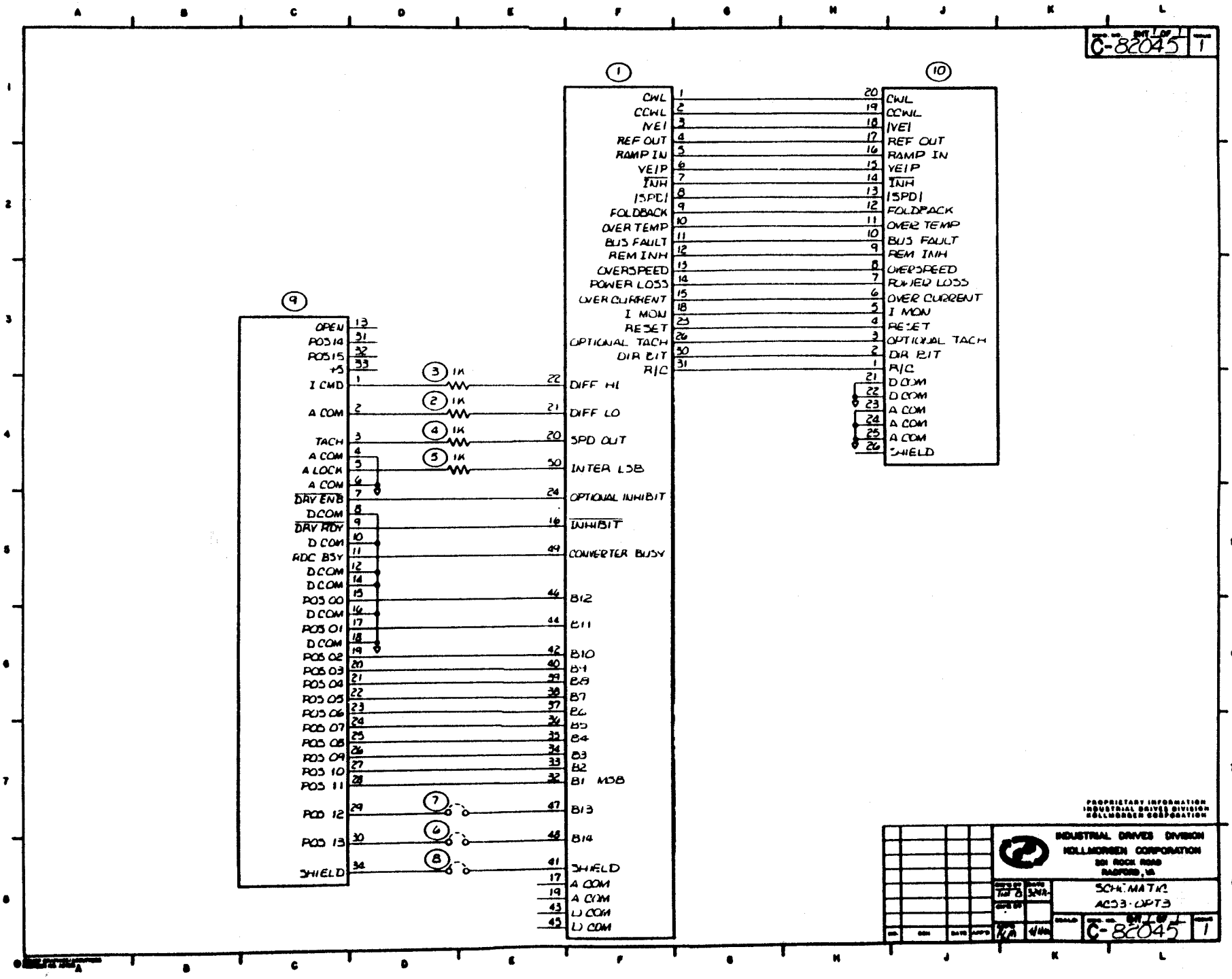
WAVEFORMS

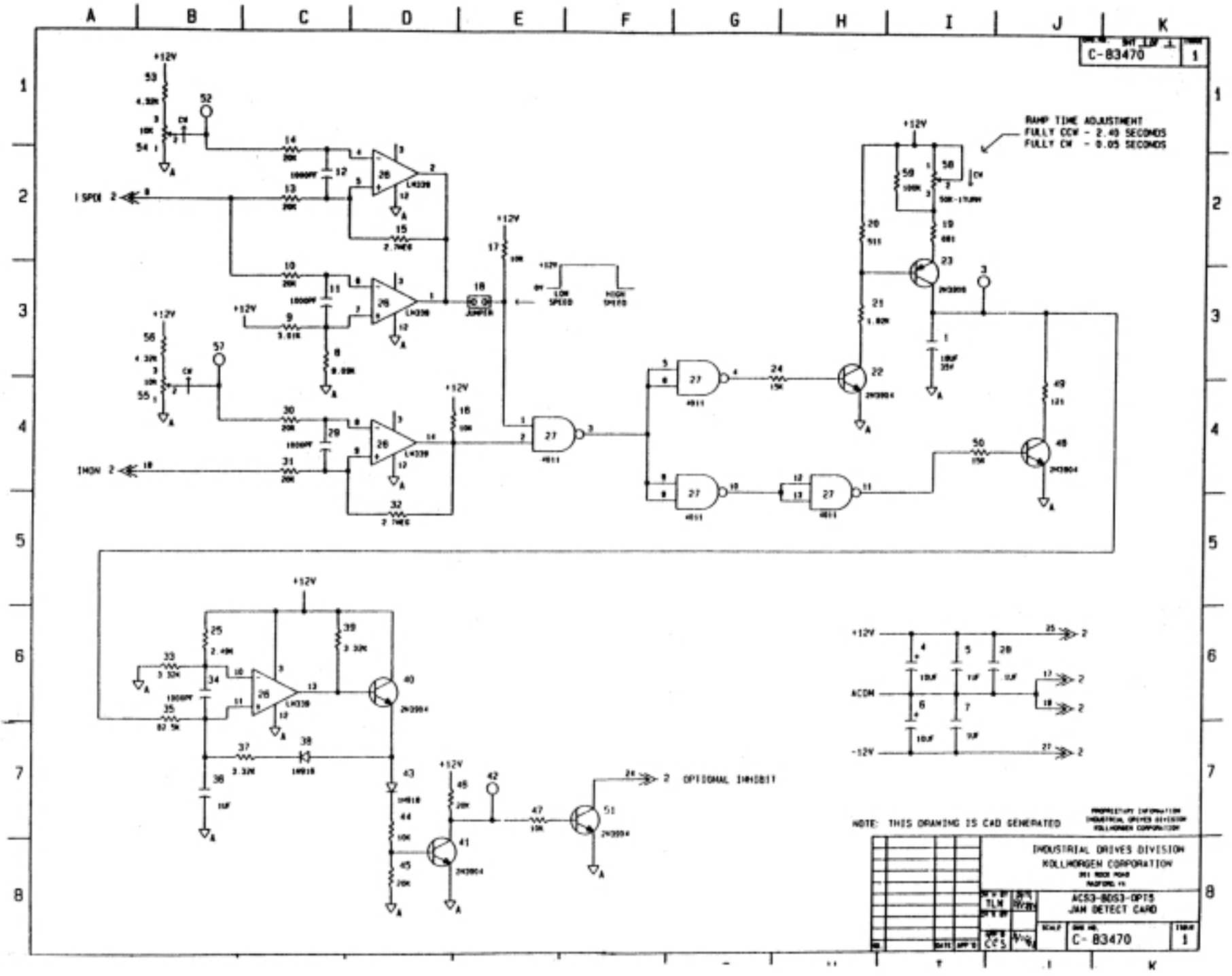
MAX. SPEED FOR R/D BEING USED	OPEN R/D	INCAPSULATED R/D
10 BIT	62400 RPM	34680 RPM
12 BIT	15600 RPM	8670 RPM
14 BIT	3900 RPM	2168 RPM
16 BIT	975 RPM	542 RPM

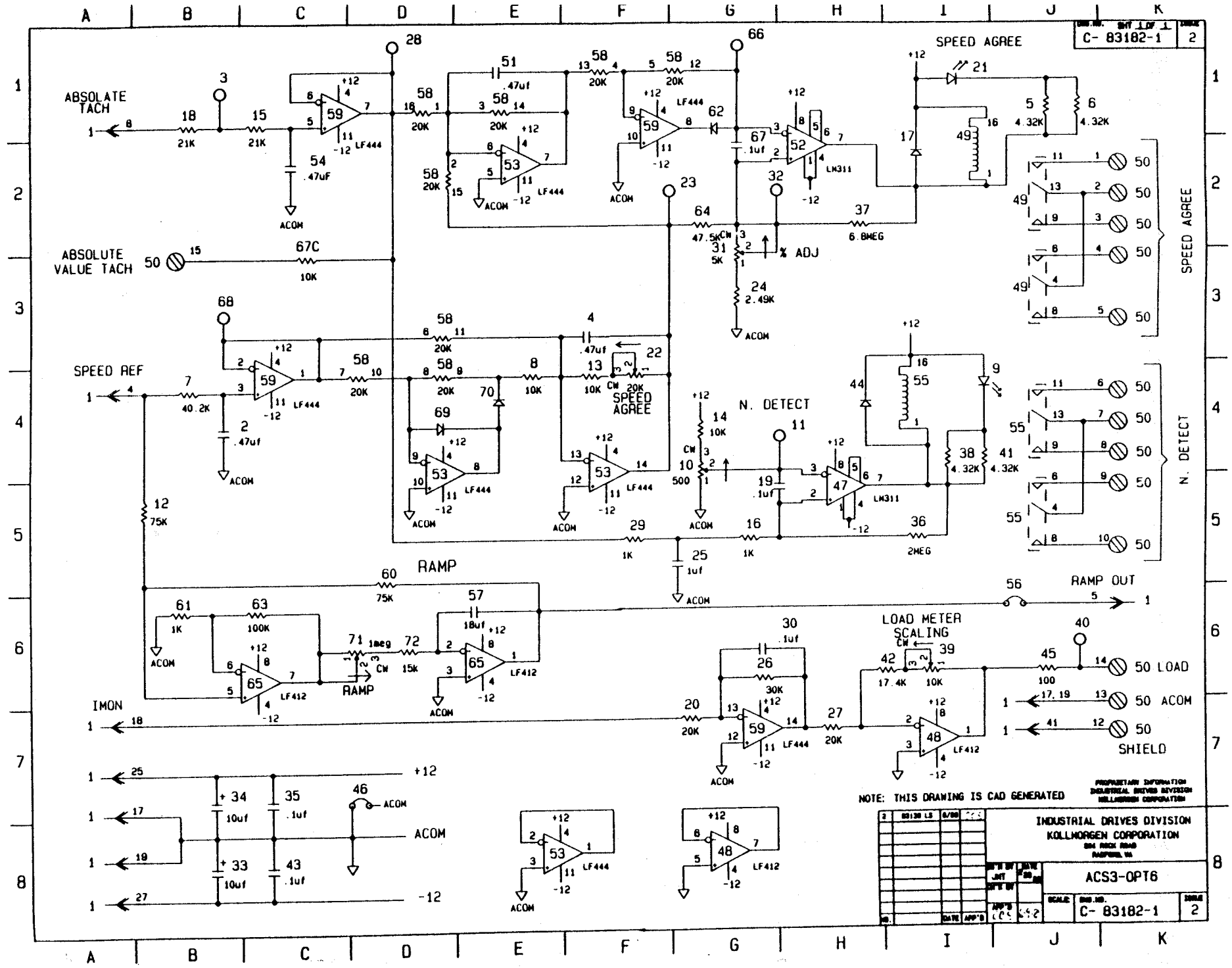
INDUSTRIAL DRIVES

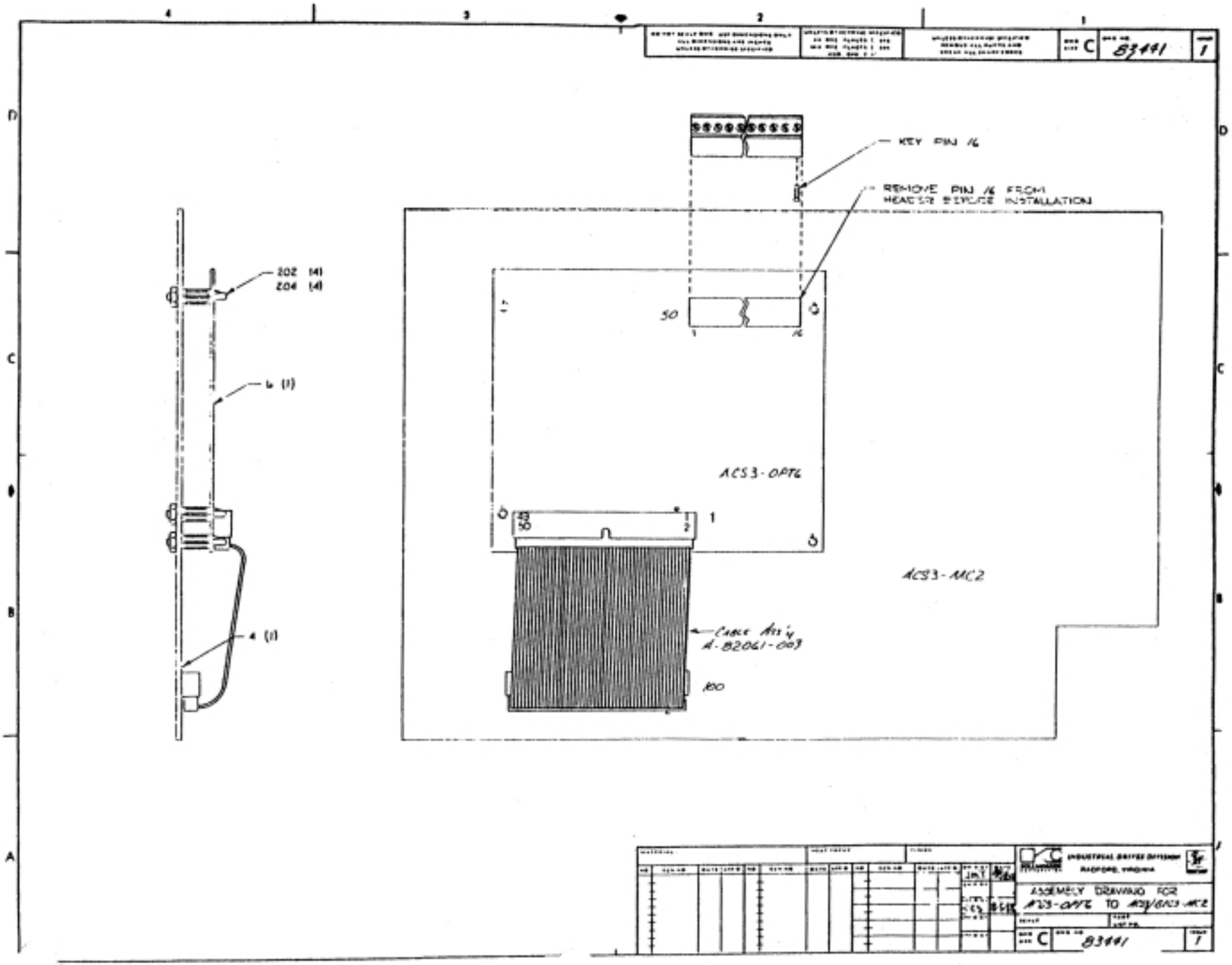
SCHEMATIC
ACS3-OPT2

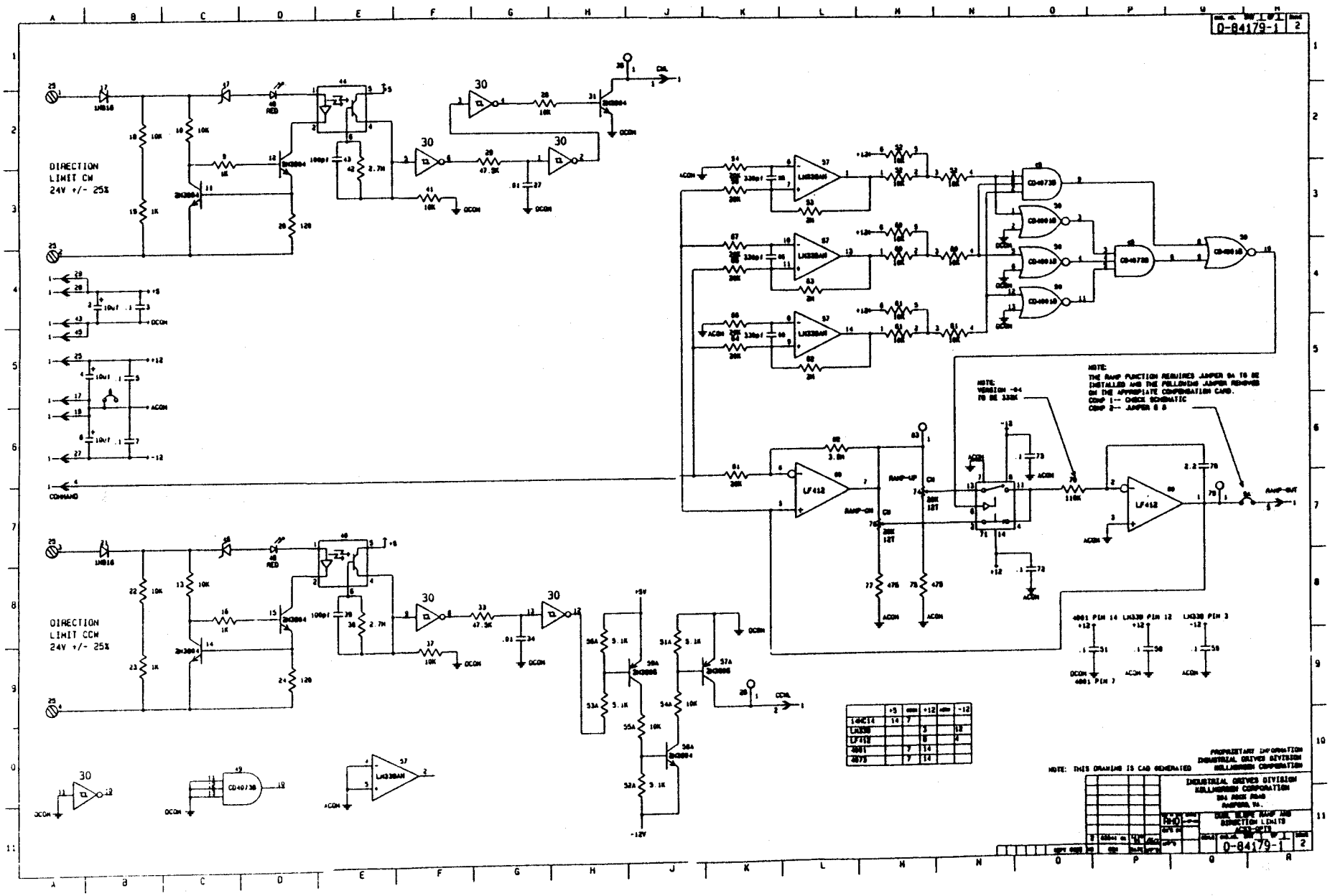
SIZE C 81991-1 SHEET 2 OF 2 7


C-82045 T
(1)
CWL 1
CCWL 2
|VE| 3
REF OUT 4
RAMP IN 5
VE|P 6
INH 7
|SPD| 8
FOLDBACK 9
OVER TEMP 10
BUS FAULT 11
REM INH 12
OVERSPEED 13
POWER LOSS 14
OVER CURRENT 15
I MON 18
RESET 23
OPTIONAL TACH 26
DIR BIT 30
R/C 31
(10)
20 CWL
19 CCWL
18 |VE|
17 REF OUT
16 RAMP IN
15 VE|P
14 INH
13 |SPD|
12 FOLDBACK
11 OVER TEMP
10 BUS FAULT
9 REM INH
8 OVERSPEED
7 POWER LOSS
6 OVER CURRENT
5 I MON
4 RESET
3 OPTIONAL TACH
2 DIR BIT
1 R/C
21 D COM
22 D COM
23 A COM
24 A COM
25 A COM
26 SHIELD
(9)
OPEN 13
POS 14 31
POS 15 32
+5 33
I CMD 1
A COM 2
TACH 3
A COM 4
A LOCK 5
A COM 6
DRV ENB 7
D COM 8
DRV RDY 9
D COM 10
RDC BSY 11
D COM 12
D COM 14
POS 00 15
D COM 16
POS 01 17
D COM 18
POS 02 19
POS 03 20
POS 04 21
POS 05 22
POS 06 23
POS 07 24
POS 08 25
POS 09 26
POS 10 27
POS 11 28
POD 12 29
POS 13 30
SHIELD 34
(3) 1K
(2) 1K
(4) 1K
(5) 1K
(7)
(6)
(8)
DIFF HI 22
DIFF LO 21
SPD OUT 20
INTER LSB 50
OPTIONAL INHIBIT 24
INHIBIT 16
CONVERTER BUSY 49
B12 46
B11 44
B10 42
B9 40
B8 39
B7 38
B6 37
B5 36
B4 35
B3 34
B2 33
B1 MSB 32
B13 47
B14 48
SHIELD 41
A COM 17
A COM 19
D COM 43
D COM 45
PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
ROLLMORGEN CORPORATION
INDUSTRIAL DRIVES DIVISION
ROLLMORGEN CORPORATION
901 ROCK ROAD
RADFORD, VA
SCHEMATIC
AC33-OPT3
C-82045 1

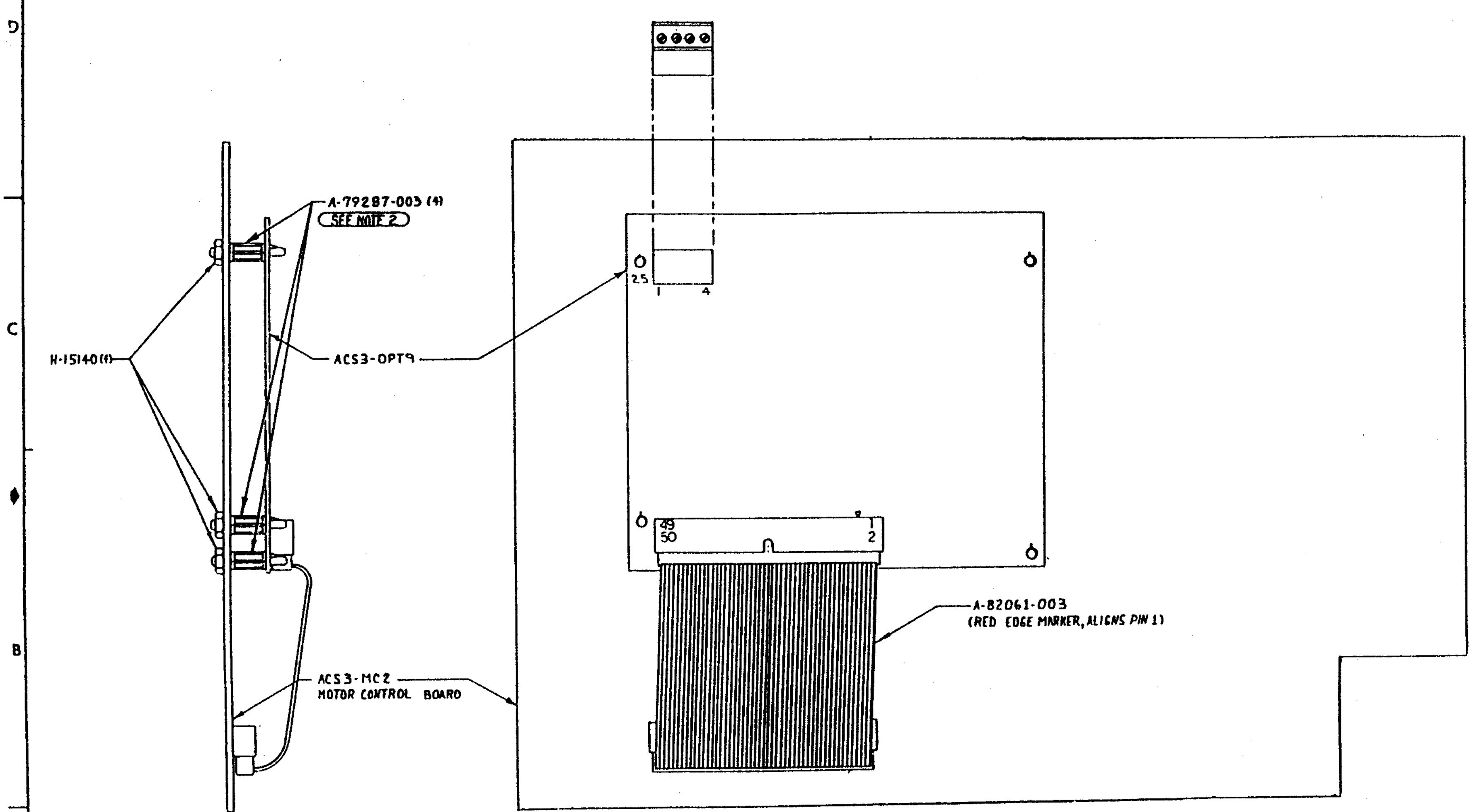

C-83470
RAMP TIME ADJUSTMENT
FULLY CCW - 2.40 SECONDS
FULLY CW - 0.05 SECONDS
+12V
-12V
ACOM
I SPDI
IHON
OPTIONAL INHIBIT
NOTE: THIS DRAWING IS CAD GENERATED
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
ACS3-BDS3-OPTS
JAM DETECT CARD
C-83470


C- 83182-1
2
SPEED AGREE
ABSOLATE TACH
ABSOLUTE VALUE TACH
67C
10K
SPEED REF
40.2K
SPEED AGREE
N. DETECT
% ADJ
RAMP
RAMP OUT
LOAD METER SCALING
IMON
50 LOAD
50 ACOM
50 SHIELD
+12
ACOM
-12
LF444
LF412
LM311
NOTE: THIS DRAWING IS CAD GENERATED
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
ACS3-OPT6
C- 83182-1
2


KEY PIN #6
REMOVE PIN #6 FROM HEADER B'FORE INSTALLATION
202 (4)
204 (4)
6 (1)
4 (1)
50
ACS3-OPT6
ACS3-MC2
Cable Ass'y A-B2061-003
100
ASSEMBLY DRAWING FOR ACS-OPT6 TO ACS/ACS-MC2
C
83441
1


DIRECTION
LIMIT CW
24V +/- 25%
DIRECTION
LIMIT CCW
24V +/- 25%
COMMAND
RAMP-UP
RAMP-DN
RAMP-OUT
NOTE:
THE RAMP FUNCTION REQUIRES JUMPER 9A TO BE
INSTALLED AND THE FOLLOWING JUMPER REMOVED
ON THE APPROPRIATE COMPENSATION CARD.
COMP 1-- CHECK SCHEMATIC
COMP 2-- JUMPER 6 8
NOTE:
VERSION -04
TO BE 330K
4001 PIN 14
LM339 PIN 12
LM339 PIN 3
4001 PIN 7
NOTE: THIS DRAWING IS CAD GENERATED
PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
ROLLINGHEN CORPORATION
INDUSTRIAL DRIVES DIVISION
ROLLINGHEN CORPORATION
DUAL RAMP AND
DIRECTION LIMITS
0-84179-1
0-84179-1

84826 T



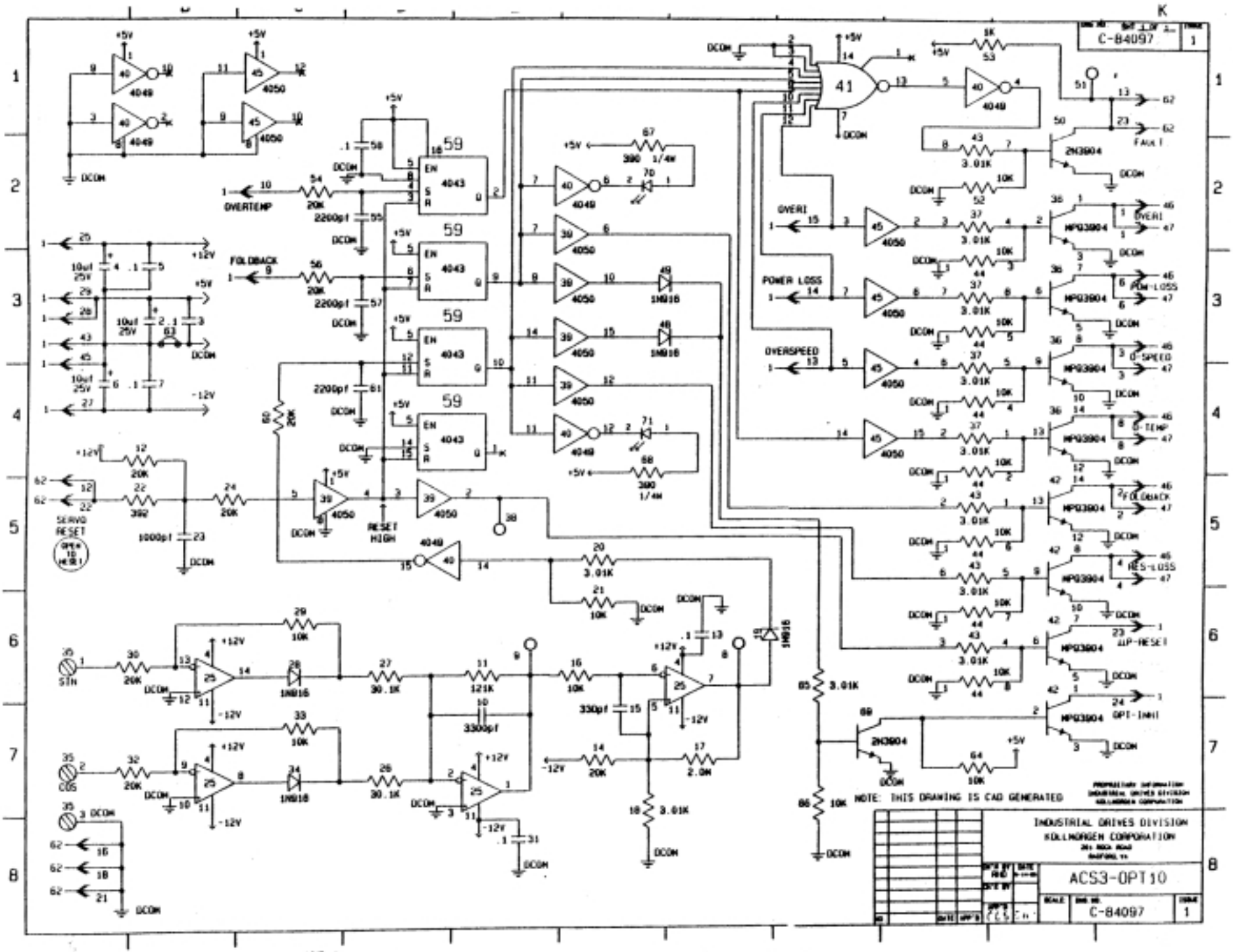
NOTES:
1) RIBBON CABLE ASS'Y. A-82061-003 FROM CONN. 25 ON THE ACS3-OPT9 OPTION CARD TO CONN. 180 ON THE ACS3-MC2 MOTOR CONTROL BOARD.
2) TO BE INSTALLED BY THE CUSTOMER.

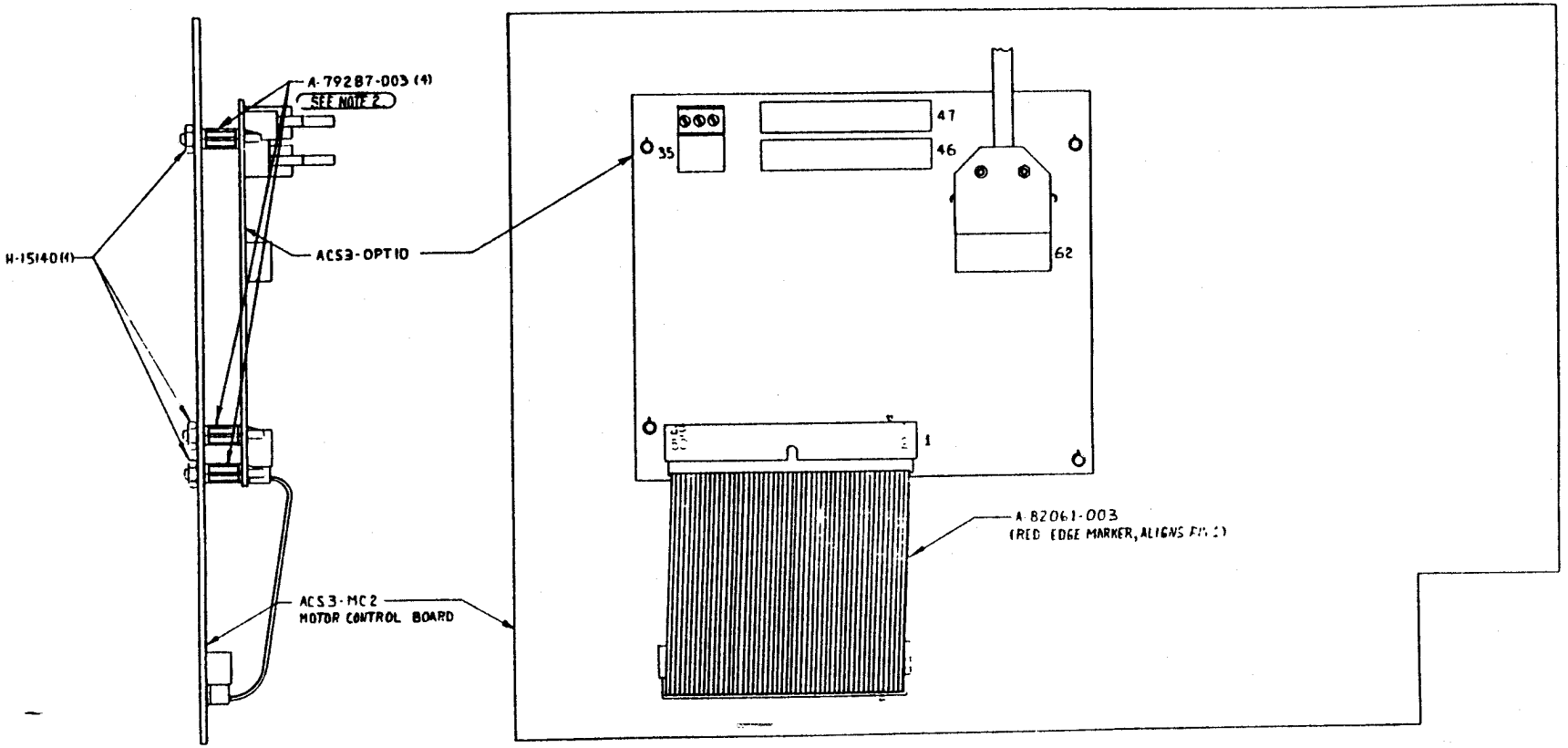
INDUSTRIAL DRIVES

ASSEMBLY DRAWING FOR ACS3-OPT9 TO ACS3-MC2

C 84826 T

96


C-84097
1
OVERTEMP
FOLDBACK
OVERI
POWER LOSS
OVERSPEED
SERVO RESET
RESET HIGH
SIN
COS
FAULT
O-SPEED
O-TEMP
FOLDBACK
RES-LOSS
UP-RESET
OPT-INH
NOTE: THIS DRAWING IS CAD GENERATED
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
ACS3-OPT10
C-84097
1



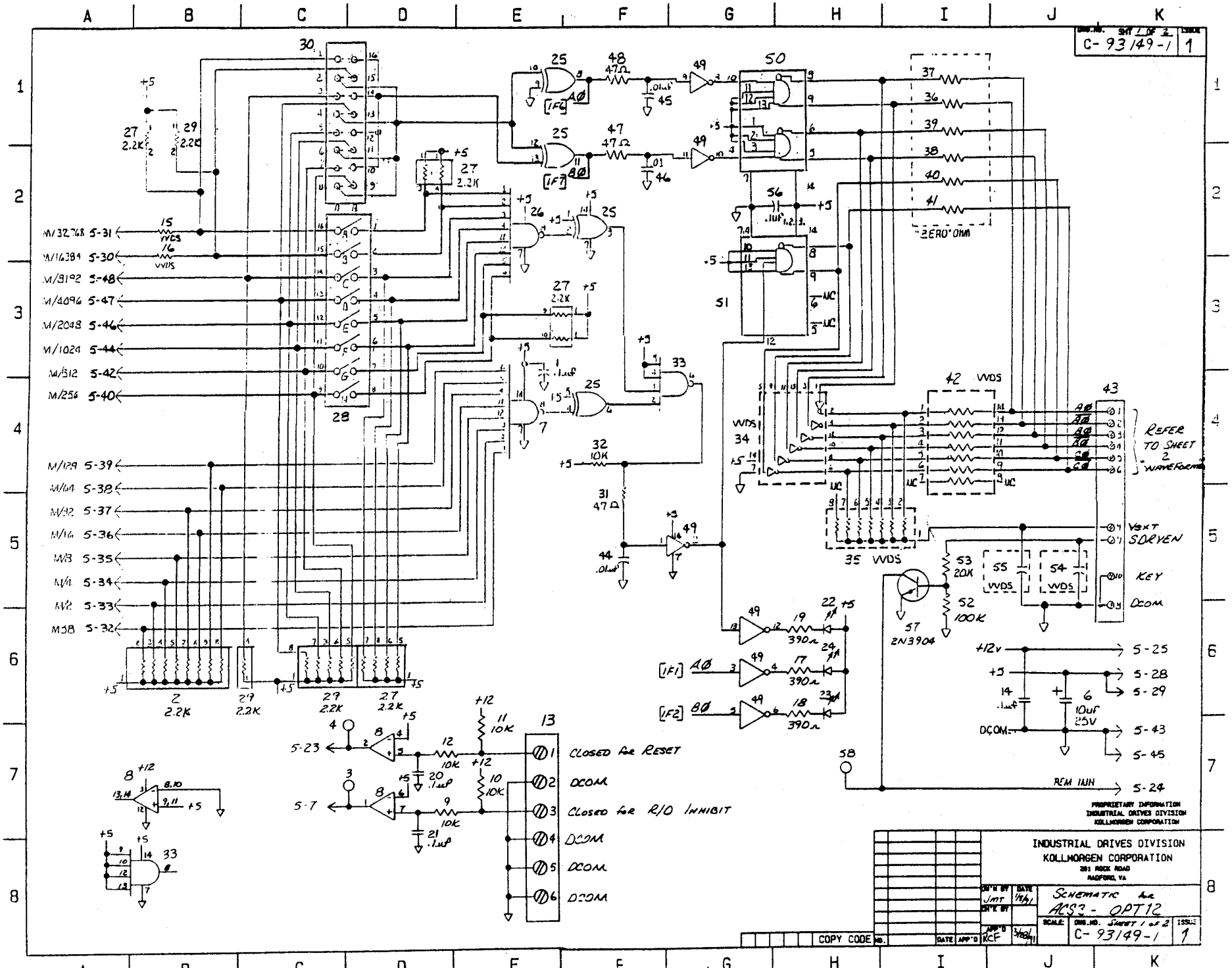
NOTE

1.) RIBBON CABLE ASS'Y. A-82061-003 FROM CONN.1 ON THE ACS3-OPT10 OPTION CARD TO CONN. 180 ON THE ACS3-MC2 MOTOR CONTROL BOARD.

2.) TO BE INSTALLED BY THE CUSTOMER.

INDUSTRIAL DRIVES DIVISION
RADFORD VIRGINIA

ASSEMBLY DRAWING FOR
ACS3-OPT10 TO ACS3-MC2


DWG. NO. SHT 1 OF 2 C-93149-1 ISSUE 1
M/32768 5-31
M/16384 5-30
M/8192 5-48
M/4096 5-47
M/2048 5-46
M/1024 5-44
M/512 5-42
M/256 5-40
M/128 5-39
M/64 5-38
M/32 5-37
M/16 5-36
M/8 5-35
M/4 5-34
M/2 5-33
M/1 5-32
ZERO OHM
REFER TO SHEET 2 WAVEFORMS
VEXT
SERVEN
KEY
DCOM
+12V 5-25
+5 5-28
5-29
DCOM 5-43
5-45
REM INH 5-24
5-23
5-7
CLOSED for RESET
DCOM
CLOSED for R/D INHIBIT
DCOM
DCOM
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION
201 ROCK ROAD
RADFORD, VA
SCHEMATIC for
ACSS - OPT12
DWG. NO. SHEET 1 OF 2 C-93149-1 ISSUE 1
COPY CODE
PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

ACS3-OPT12 OUTPUT CONFIGURATIONS

R/D RESOLUTION LOCATED ON ACS3-MC2 BOARD	▲ COMPONENT 30 PIN AND JUMPER LOCATIONS	▲▲ COMPONENT 28 SWITCH LOCATIONS 1=OFF 0=ON 1 2 3 4 5 6 7 8	OPTIONAL ENCODER LINES
10 BITS OR GREATER	7 to 10; 8 to 9	0 0 0 0 0 0 0 1	256
*12 BITS OR GREATER	7 to 8; 10 to 11	0 0 0 0 0 0 1 1	512
12 BITS OR GREATER	5 to 12; 6 to 11	0 0 0 0 0 1 1 1	1024
T14 BITS OR GREATER	5 to 6; 12 to 13	0 0 0 0 1 1 1 1	2048
14 BITS OR GREATER	3 to 14; 4 to 13	0 0 0 1 1 1 1 1	4096
**16 BITS OR GREATER	3 to 4; 14 to 15	0 0 1 1 1 1 1 1	8192
16 BITS OR GREATER	1 to 16; 2 to 15	0 1 1 1 1 1 1 1	16384

STANDARD →

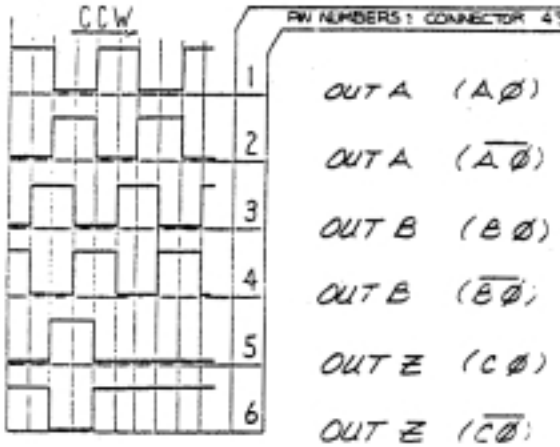
▲ = COMPONENT 30 IS AN ARRAY OF PINS FOR INSTALLING JUMPERS

▲▲ = COMPONENT 28 IS A DIP SWITCH (8 POSITION)

* = CONFIGURED AS AN 11 BIT R/D

T = CONFIGURED AS A 13 BIT R/D

** = CONFIGURED AS A 15 BIT R/D



WAVEFORMS

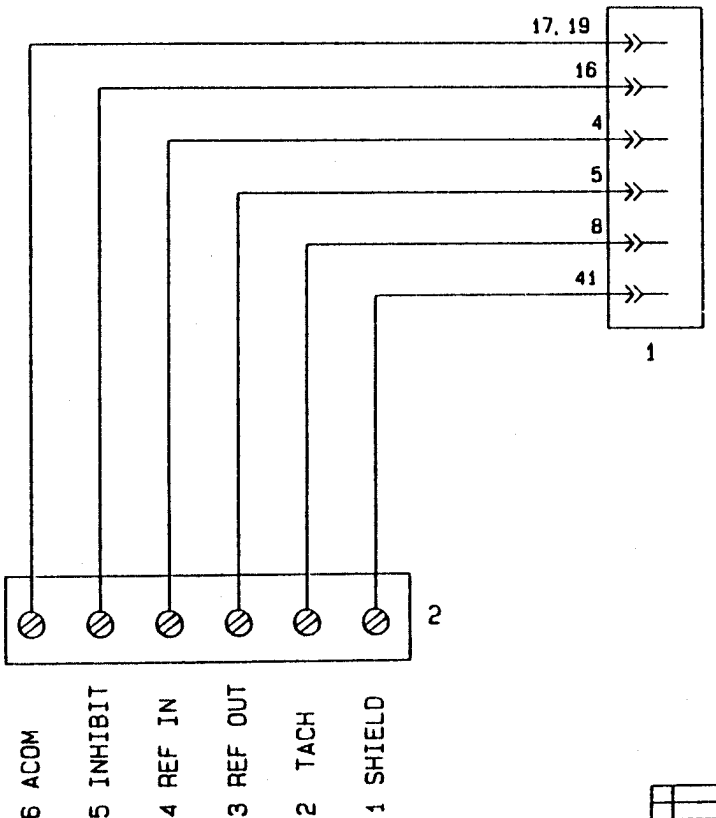
MAX. SPEED FOR R/D BEING USED	OPEN R/D	INCAPSULATED R/D
10 BIT	62400 RPM	34680 RPM
12 BIT	15600 RPM	8670 RPM
14 BIT	3900 RPM	2168 RPM
16 BIT	975 RPM	542 RPM

INDUSTRIAL DRIVES

SCHEMATIC
ACS3 - OPT12

SIZE C 93149-1 SHEET 1 OF 2 1

100



TO CONNECTOR #100 ON
ACS3-MC2 BOARD

PROPRIETARY INFORMATION
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

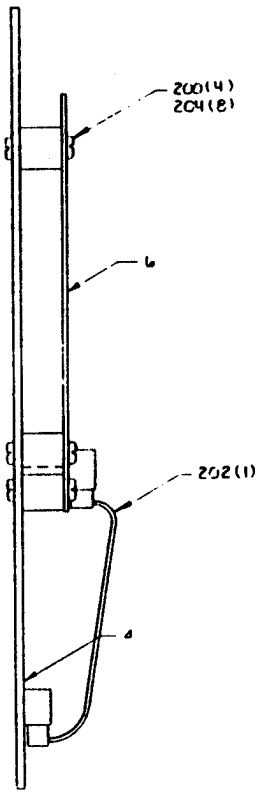
INDUSTRIAL DRIVES DIVISION
KOLLMORGEN CORPORATION

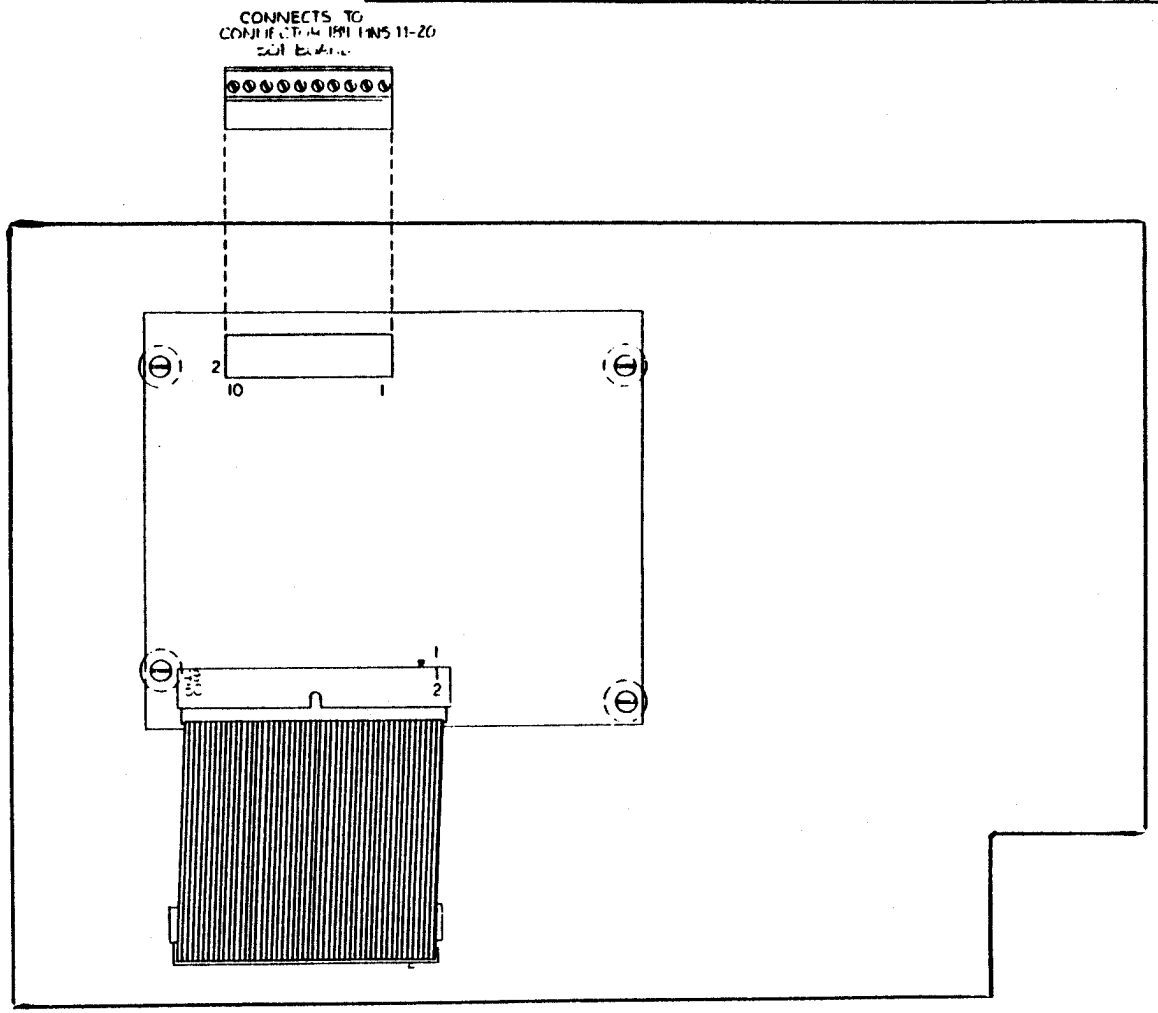
ACS3-S01-INTERFACE

C- 82552-1 | 2

COPY CODE

			C	82879





NOTE

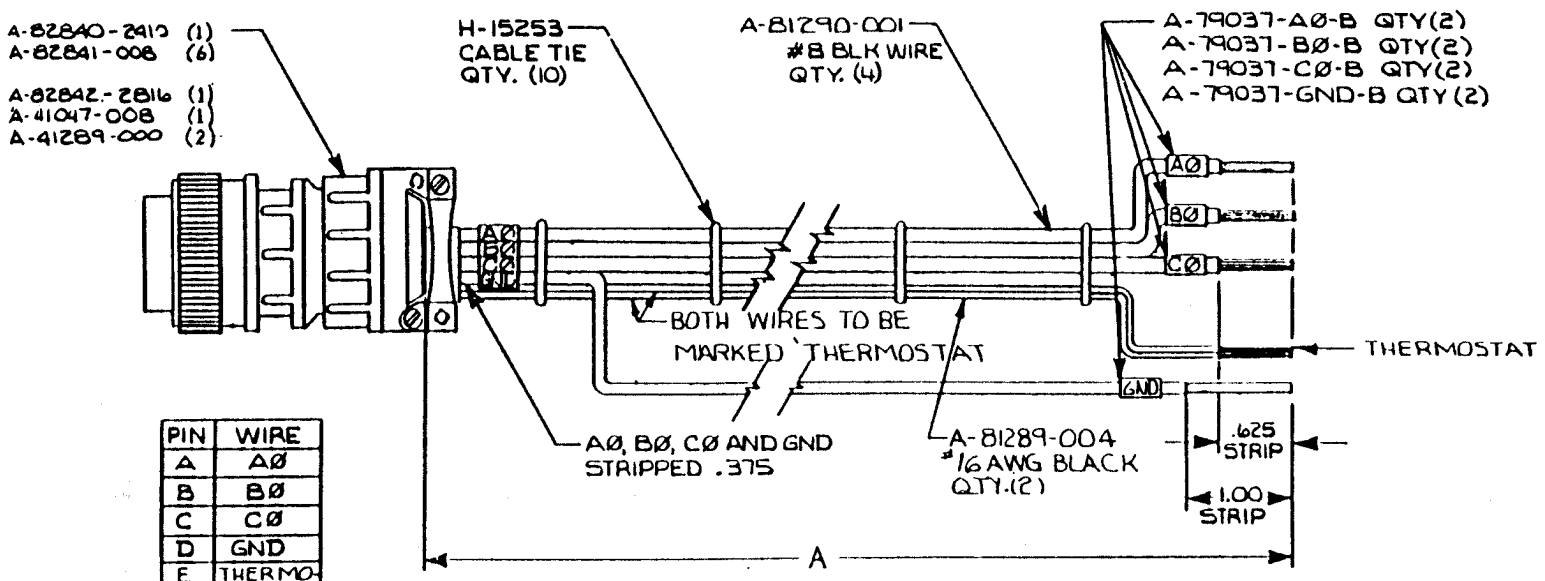
RIBBON CABLE ASSY A-820W-005 FROM 6-1 TO 4-100.

			C	82879

INDUSTRIAL DRIVES

ASSEMBLY DRAWING FOR ACS3-SOI-INT TO ACS3-MC2

DO NOT SCALE DWG. USE DIMENSIONS ONLY ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED | UNLESS OTHERWISE SPECIFIED XX DEC. PLACES ± .01 XXX DEC. PLACES ± .005 ANG. DIM ± 1° | UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS AND BREAK ALL SHARP EDGES | DWG SIZE B | DWG. NO. 82095 | 4



PIN	WIRE
A	AØ
B	BØ
C	CØ
D	GND
E	THERMO-
F	STAT

WIRE LENGTH

DASH	'A'	DASH	'A'	DASH	'A'
-003	10.00FT	-030	100.00FT	-057	190.00FT
-006	20.00FT	-033	110.00FT	-060	200.00FT
-009	30.00FT	-036	120.00FT		
-012	40.00FT	-039	130.00FT		
-015	50.00 FT	-042	140.00FT		
-018	60.00 FT	-045	150.00FT		
-021	70.00 FT	-048	160.00FT		
-024	80.00 FT	-051	170.00 FT		
-027	90.00 FT	-054	180.00FT		

MATERIAL | HEAT TREAT | FINISH

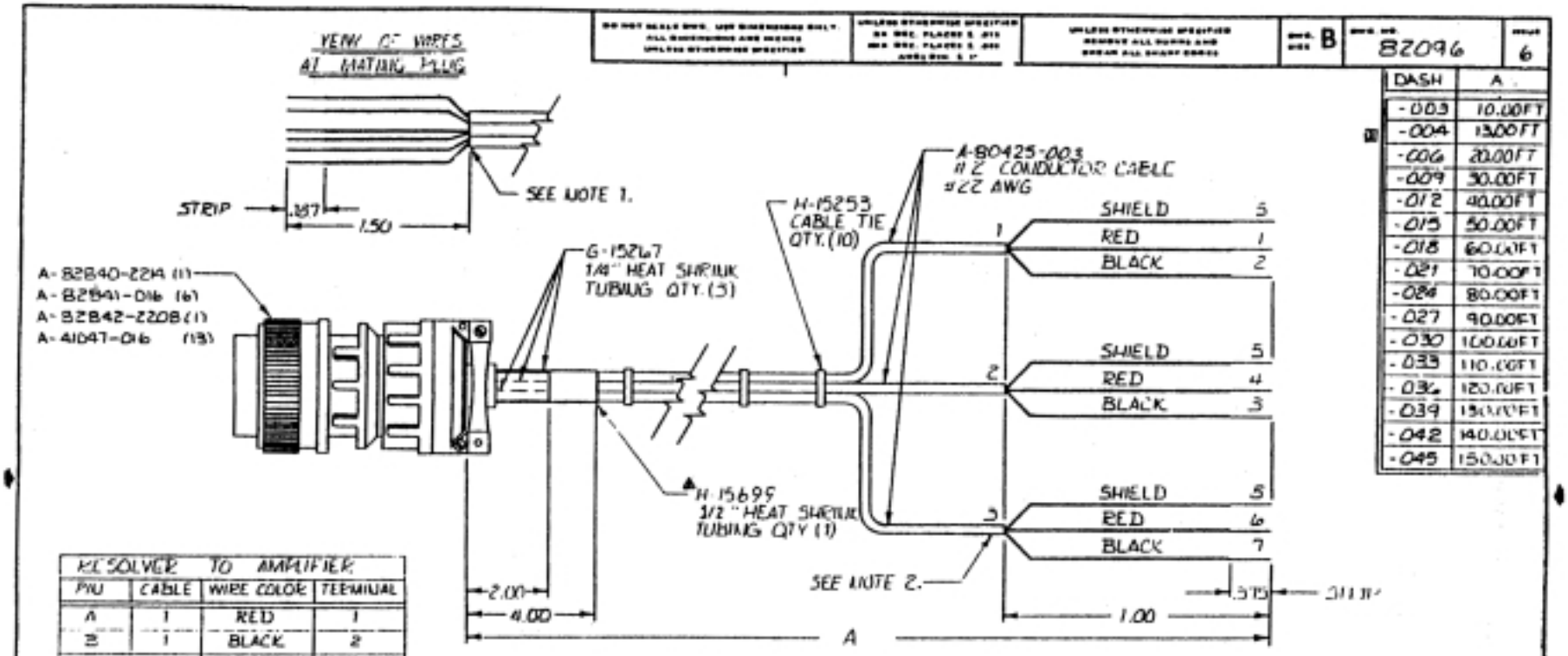
NO	ECN NO	DATE	APP'D
2	8170	5/6/96	L.G.B.
3	82092	1-8	
4	8128	5/13/96	L.G.B.

DWN BY TLG | CHK'D BY | APP'D BY L.G.B. | JOB NO. | DO NO. | PART LIST NO.

KOLLMORGEN CORP.
INLAND MOTOR INDUSTRIAL DRIVES DIV.
RADFORD, VIRGINIA

BRUSHLESS CABLE ASS'Y THERMOSTAT & MOTOR

SCALE: | DWG SIZE B | DWG NO. 82095 | 4



DASH	A
-003	10.00FT
-004	13.00FT
-006	20.00FT
-009	30.00FT
-012	40.00FT
-015	50.00FT
-018	60.00FT
-021	70.00FT
-024	80.00FT
-027	90.00FT
-030	100.00FT
-033	110.00FT
-036	120.00FT
-039	130.00FT
-042	140.00FT
-045	150.00FT

RESOLVER TO AMPLIFIER			
PIN	CABLE	WIRE COLOR	TERMINAL
A	1	RED	1
B	1	BLACK	2
D	2	RED	4
C	2	BLACK	3
F	3	RED	6
E	3	BLACK	7

NOTES:

1 SHIELD ON PLUG END OF EACH CABLE IS NOT TO BE USED. CUT AS SHORT AS POSSIBLE.

2 LABEL EACH CABLE WITH APPROPRIATE NUMBER.

3 LABEL EACH WIRE WITH APPROPRIATE NUMBER.

COPY CODE

INDUSTRIAL DRIVES

RESOLVER CABLE ASSY, BDI53

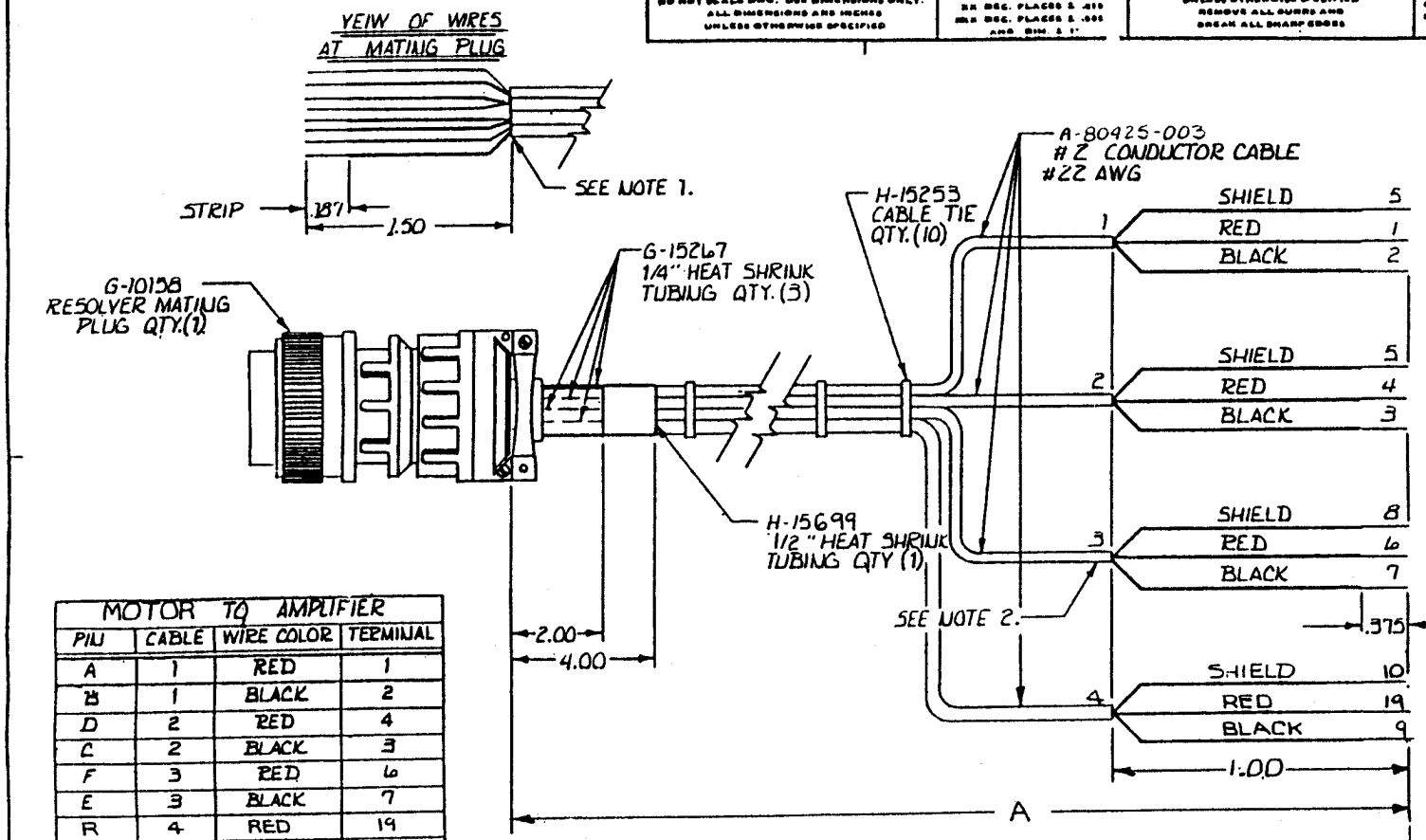
B 82096 6

DO NOT SCALE DWG. USE DIMENSIONS ONLY. ALL DIMENSIONS AND NOTES UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED XX DEC. PLACES ± .01 XXX DEC. PLACES ± .005 ANG. MIN. ± 1°

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS AND BREAK ALL SHARP EDGES

DWG. SIZE B | DWG. NO. 82097 | ISSUE 2



WIRE LENGTH	
DASH	A
-003	10.00FT
-006	20.00FT
-009	30.00FT
-012	40.00FT
-015	50.00FT
-018	60.00FT
-021	70.00FT
-024	80.00FT
-027	90.00FT
-030	100.00FT
-033	110.00FT
-036	120.00FT
-039	130.00FT
-042	140.00FT
-045	150.00 FT
-048	160.00 FT
-051	170.00FT
-054	180.00FT
-057	190.00FT
-060	200.00FT

MOTOR TO AMPLIFIER			
PIN	CABLE	WIRE COLOR	TERMINAL
A	1	RED	1
B	1	BLACK	2
D	2	RED	4
C	2	BLACK	3
F	3	RED	6
E	3	BLACK	7
R	4	RED	19
S	4	BLACK	9

NOTES:
1 - SHIELD ON EACH CABLE IS NOT TO BE USED CUT AS SHORT AS POSSIBLE.
2 - LABEL EACH CABLE WITH APPROPRIATE NUMBER.
3 - LABEL EACH WIRE WITH APPROPRIATE NUMBER.

COPY CODE

MATERIAL | HEAT TREAT | FINISH

NO.	SCN NO.	DATE	APP'D.	NO.	SCN NO.	DATE	APP'D.	NO.	SCN NO.	DATE	APP'D.
								2	63890 VA	2-27 91	JCM

DWN'D BY TDG 3-26 | CHK'D BY | APP'D BY | 4/4/91 | APP'D BY

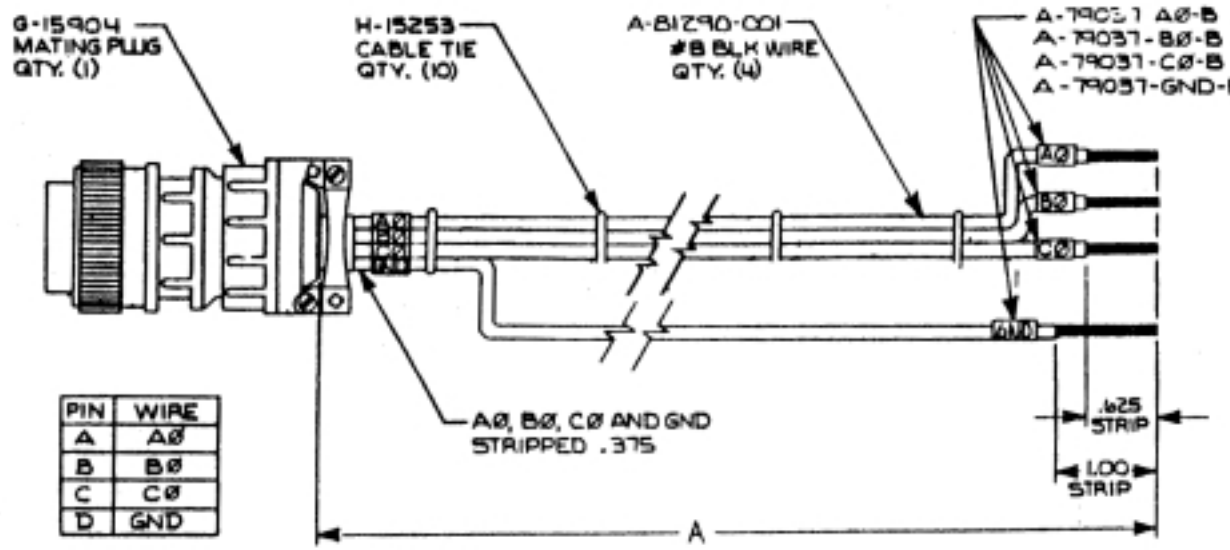
KOLLMORGEN CORPORATION — INDUSTRIAL DRIVES DIVISION — RADFORD, VIRGINIA

CABLE ASSEMBLY TACH AND RESOLVER

SCALE: | PART LIST NO.

DWG. SIZE B | DWG. NO. 82097 | ISSUE 2

SIZE B	B2098	ISSUE 1	



PIN	WIRE
A	AØ
B	BØ
C	CØ
D	GND

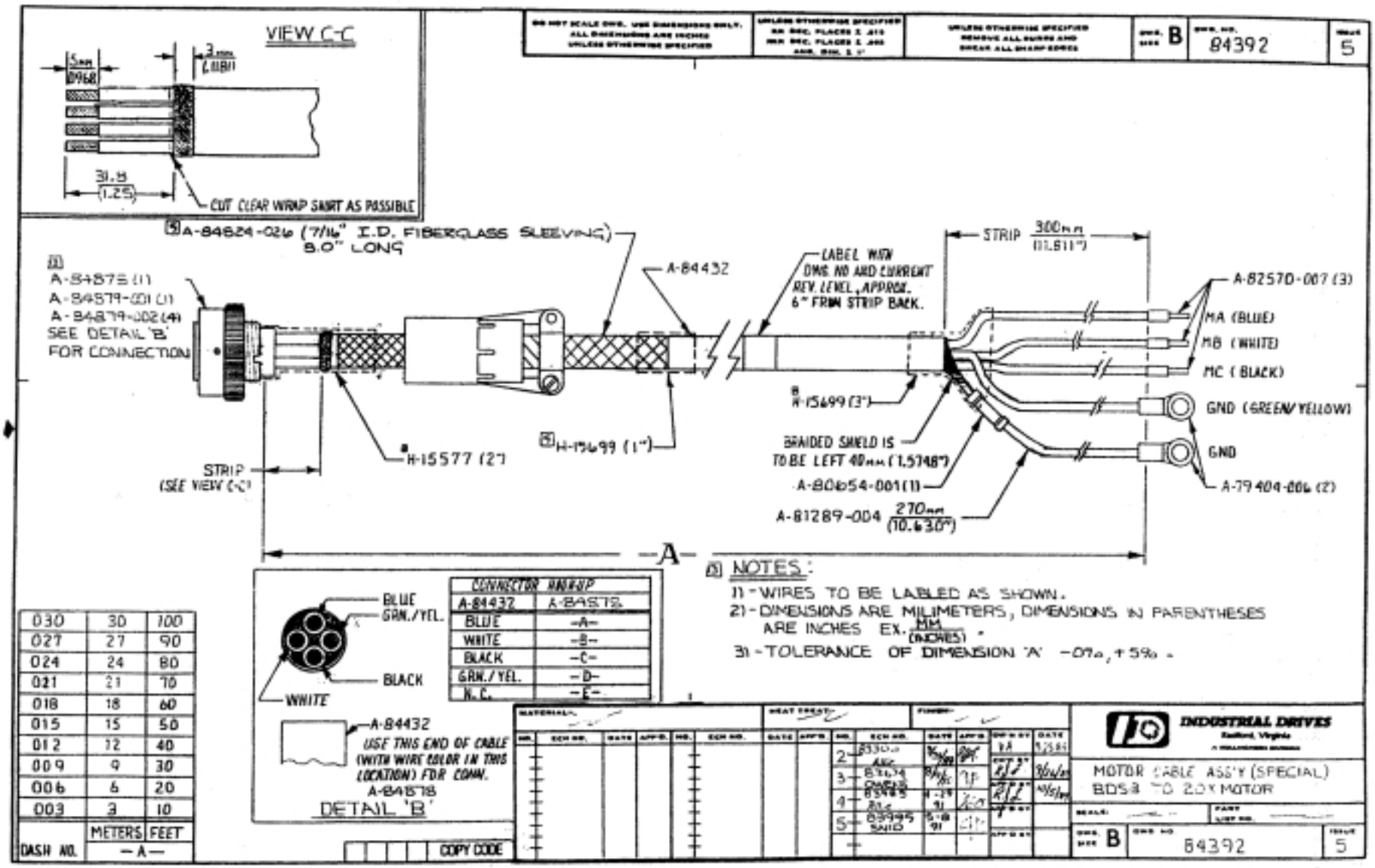
WIRE LENGTH

DASH	A	DASH	A	DASH	A
-003	10.00 FT	-018	60.00FT	-033	110.00FT
-006	20.00 FT	-021	70.00FT	-036	120.00FT
-009	30.00 FT	-024	80.00FT	-039	130.00FT
-012	40.00 FT	-027	90.00FT	-042	140.00FT
-015	50.00 FT	-030	100.00FT	-045	150.00FT

KOLLMORGEN CORP
INLAND MOTOR INDUSTRIAL DRIVES DIV.
RADFORD, VIRGINIA

CABLE ASSY.
BRUSHLESS MOTOR

SIZE B	B2098	ISSUE 1



CONNECTOR MAKEUP	
A-84432	A-84575
BLUE	-A-
WHITE	-B-
BLACK	-C-
GRN./YEL.	-D-
N.C.	-E-

DASH NO.	METERS -A-	FEET -A-
030	30	100
027	27	90
024	24	80
021	21	70
018	18	60
015	15	50
012	12	40
009	9	30
006	6	20
003	3	10

NOTES:
1) - WIRES TO BE LABLED AS SHOWN.
2) - DIMENSIONS ARE MILIMETERS, DIMENSIONS IN PARENTHESES ARE INCHES EX. MM (INCHES).
3) - TOLERANCE OF DIMENSION 'A' -0%, +5%.

DO NOT SCALE DWG. USE DIMENSIONS ONLY. ALL DIMENSIONS ARE INCHES UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED TWO PLACES ± .015 THREE PLACES ± .005 ANG. BEND ± 1°

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS AND BREAK ALL SHARP EDGES

SIZE B | DWG. NO. 84392 | ISSUE 5

INDUSTRIAL DRIVES
Rockford, Virginia

MOTOR CABLE ASS'Y (SPECIAL)
BOSCH TO 2.0 X MOTOR

SCALE: | PART LIST NO.:

SIZE B | DWG NO 84392 | ISSUE 5

COPY CODE

107

WIRE LENGTH					
DASH	'A'	DASH	'A'	DASH	'A'
-003	10.00FT	-018	60.00FT	-033	110.00FT
-006	20.00FT	-021	70.00FT	-036	120.00FT
-009	30.00FT	-024	80.00FT	-039	130.00FT
-012	40.00FT	-027	90.00FT	-042	140.00FT
-015	50.00FT	-030	100.00FT	-045	150.00FT

VIEW OF FINISHED ASSEMBLY

VIEW D

A-84822 (1)
A-84823-0010 (1)
A-84823-0020 (1)
SEE CHART FOR CONNECTION

H-15577 2.75" LG

SEE NOTE #5

H-15699 1" LG.

.25

.125

1.25 (JACKET STRIP)

A-84824-025

A-81248

H16565 (1)

A-81289-002 (WT: 34.5#)

G-15265 (1.5#)

(SEE NOTE #3)

H-15577 (2#)

H-15699 (.5LTS)

A-82570-004 (3)

LABEL WIRE IN APPROX. LOCATION SHOWN "SHIELD".

SEE DETAIL "A"

SEE DETAIL "B"

SEE DETAIL "C"

A-81014-010 (1)
SEE VIEW 'D' FOR COMPLETED CABLE END

RED
BLK
WHT/RED
WHT/GRN
SHIELD
WHT/BLK
SHIELD
U

10

NOTES:

1) STRIP CABLE 90 CM (35.433") FROM END, ALSO STRIP THE GREEN/WHITE PAIR 90 CM (35.433"). AFTER STRIPPING THE GREEN/WHITE PAIR CUT THE SHIELD JUST LONG ENOUGH TO TWIST AND INSTALL THE BUTT SPLICE. AFTER BUTT SPLICE AND WIRE (A-81289-002) IS INSTALLED COVER THE CONNECTION WITH HEAT SHRINK.

2) PLACE A PIECE OF TAPE (ANY TYPE) AROUND THE PLASTIC WRAP ON EACH PAIR SO THAT THE EDGE OF THE TAPE CLOSEST TO THE END OF THE WIRE IS BACK AT LEAST 3.625" FROM THE END.
* THIS IS TO KEEP THE PLASTIC WRAP FROM COMING UNWRAPPED.

3) WIRE LENGTH FOR CABLE IS DIMENSION "A" IN WIRE LENGTH CHART.

4) LABEL CABLE WITH DWG. NO., DASH NO., AND CURRENT ISSUE NO.

5) CUT DRAIN WIRE OFF. HEATSHRINK OVER END OF BACK SHIELD AND POLYESTER WRAP TO PREVENT SHIELDS FROM TOUCHING. (USE G-15265 (.5#) (ONE EACH LOCATION)

CONNECTION CHART			
CONNECTOR MOTOR	CABLE A-81144	TERMINATION	
A	RED	A-81014-010	1
B	BLACK		2
— —	SHIELD		5
C	WHT/YEL		3
D	WHT/GRN		4
— —	SHIELD		5
E	WHT/RED		1
F	WHT/BLK		6
— —	SHIELD		8
T	GRN	A-82570-004	
U	WHT	A-82570-004	
— —	SHIELD	A-82570-004	

SEE NOTE #2

G-15265 (1.5#)

R-15079 (2.3#)

SHIELD
BLACK
RED

WIRE LENGTHS	
SHIELD	2.625
BLACK	1.875
RED	1.625

.25

DETAIL "C"

SEE NOTE #2

G-15265 (1.5#)

R-15079 (2.3#)

SHIELD
WHT/GRN
WHT/YEL

WIRE LENGTHS	
SHIELD	2.625
WHT/GRN	2.375
WHT/YEL	2.125

.25

DETAIL "B"

SEE NOTE #2

G-15265 (1.5#)

R-15079 (2.3#)

SHIELD
WHT/RED
WHT/BLK

WIRE LENGTHS	
SHIELD	3.375"
WHT/RED	3.125"
WHT/BLK	2.875"

.25

DETAIL "A"

COPY CODE

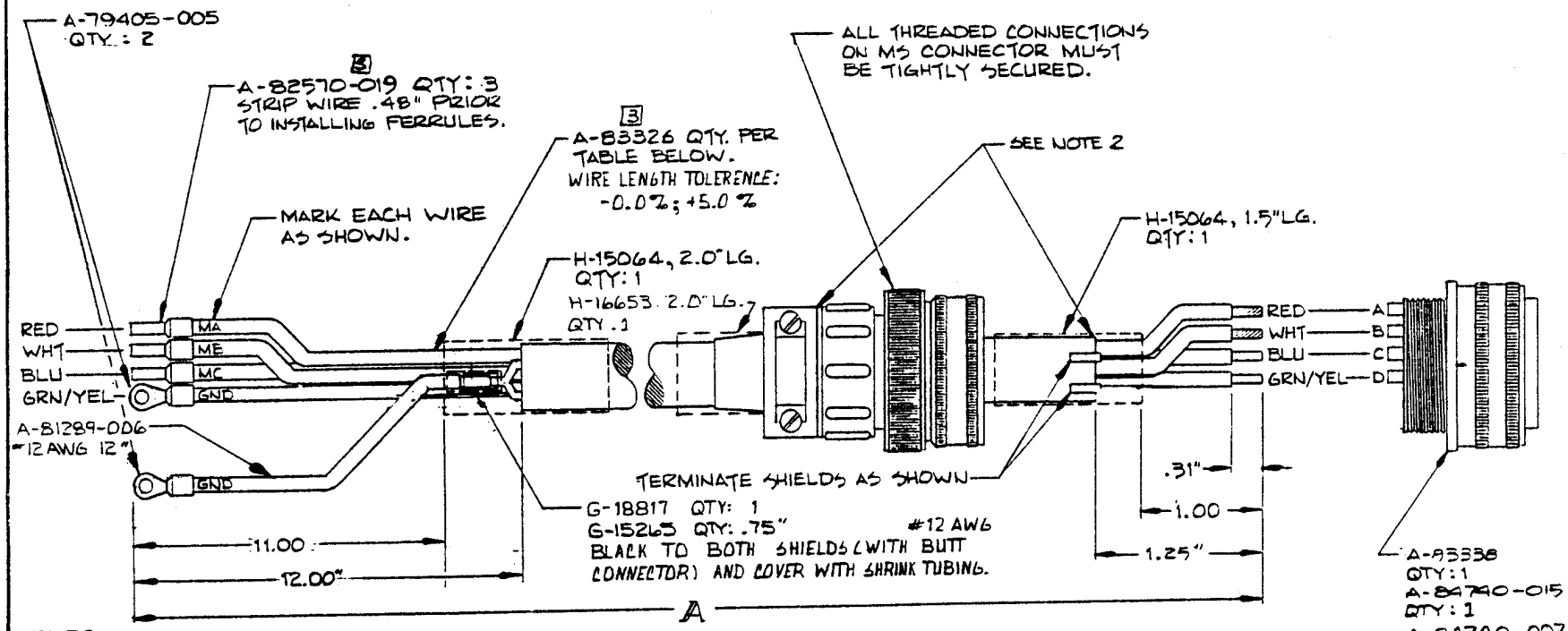
3											
2											
1											

INDUSTRIAL DRIVES

RESOLVER CABLE ASSEMBLY FOR BR206

SIZE	DWG. NO.	REV
C	84393	4

DO NOT SCALE DWG. USE DIMENSIONS ONLY. ALL DIMENSIONS ARE INCHES UNLESS OTHERWISE SPECIFIED	UNLESS OTHERWISE SPECIFIED XX DEC. PLACES ± .01 XXX DEC. PLACES ± .005 ANG DIM ± 1°	UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS AND BREAK ALL SHARP EDGES	DWG NO B - 93056	ISSUE 3



NOTES:

1) - TERMINATE YELLOW AND YELLOW/BLACK WIRES ON BOTH ENDS TO WHERE JACKET IS CUT BACK AND COVER WITH HEATSRINK TUBING.

HIPOT TEST: EACH CONNECTOR PIN SHALL BE HIPOTTED TO ALL ADJACENT PINS, TO THE CABLE SHIELD AND TO THE METAL SHELL OF THE CONNECTOR AT 500 VAC.

2) - THE END OF CABLE SLEEVE MUST NOT EXTEND PAST THE CABLE CLAMP ON THE CONNECTOR BOOT ASSY.

DASH NO.	A=FEET	DASH NO.	A=FEET	DASH NO.	A=FEET
-018	60	-036	120		
-015	50	-033	110		
-012	40	-030	100		
-009	30	-027	90		
-006	20	-024	80		
-003	10	-021	70		

MATERIAL	HEAT TREAT	FINISH

ISS	ECN NO	DATE	APP'D	ISS	ECN NO	DATE	APP'D	ISS	ECN NO	DATE	APP'D
								2	84033 L-3	6-5-91	
								3	84242 EWR	11-1-91	

DWN BY	DATE
OWENS	5/16/90
CHK'D BY	
APP'D BY MEC	10-16-90
APP'D BY	
APP'D BY	

INDUSTRIAL DRIVES
Rockford, Virginia
A HOLLINGSWORTH COMPANY

MOTOR CABLE ASSEMBLY FOR BDS3 TO SDXA MOTOR

SCALE	DWG NO	ISSUE
	B - 93056	3