

# APPENDIX D

## SPECIFICATIONS

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### D.1 INTRODUCTION

The Specifications for the PSR4/5 and BDS4 are provided in this appendix. Derating information is also included for environments with high ambient

temperatures. As a general rule, the failure rate of solid state components doubles for every ten degrees Celsius rise in temperature. This exponential failure rate is strong incentive for lower ambient temperatures.

Table D.1. PSR4/5 Specifications

DESCRIPTION	PSR4/5-112	PSR4/5-120
Main AC Line Input Voltage	90 - 160 VAC	90 - 160 VAC
Phase	1 Phase	1 Phase
Frequency	47 - 63 HZ	47 - 63 HZ
Current RMS/Phase, Continuous	12 AMPS	20 AMPS
Current RMS/Phase, Peak (2 Sec.)	24 AMPS	40 AMPS
Current RMS/Phase, Peak (50 msec.)	50 AMPS	80 AMPS
Control AC Line Input Voltage	95 - 132 VAC	95 - 132 VAC
Phase	1 Phase	1 Phase
Frequency	47 - 63 HZ	47 - 63 HZ
Current RMS	1.5 AMPS	1.5 AMPS
Output Power	1.0 K WATTS	1.7 K WATTS
Volts	140 VDC	140 VDC
Unregulated Logic Bus Output		
<u>No Load</u>	± 26 VDC MAX + 14 VDC MAX	
<u>Full Load</u>	± 14.5 VDC MIN. @ 1 AMPS + 6.5 VDC MIN. @ 2 AMPS	
Internal Shunt Regulator, Peak Current	30 A	30 A
Internal Shunt Regulator, Resistance	7.5 OHM	7.5 OHM
Internal Shunt Regulator, Resistor Power	40 WATTS	40 WATTS
External Shunt Regulator, Peak Current	50 A	50 A
External Shunt Regulator, Min. Resistance	5.5 OHM	5.5 OHM
External Shunt Regulator, Resistor Power	Model Dependant	Model Dependant
Internal Power Dissipation, Continuous (Less Shunt Regulator)	60 W	90 W
Soft-Start Surge Current (MAX)	35 AMPS	35 AMPS
Soft-Start Charge Time (MAX)	0.25 SEC.	0.25 SEC.

Table D.1. PSR4/5 Specifications (Con't)

DESCRIPTION	PSR4/5-212	PSR4/5-220
Main AC Line Input Voltage	207 - 253 VAC	207 - 253 VAC
Phase	3 Phase	3 Phase
Frequency	47 - 63 HZ	47 - 63 HZ
Current RMS/Phase, Continuous	12 AMPS	20 AMPS
Current RMS/Phase, Peak (2 Sec.)	24 AMPS	40 AMPS
Current RMS/Phase, Peak (50 msec.)	48 AMPS	80 AMPS
Control AC Line Input Voltage	95 - 132 VAC	95 - 132 VAC
Phase	1 Phase	1 Phase
Frequency	47 - 63 HZ	47 - 63 HZ
Current RMS	1.5 AMPS	1.5 AMPS
Output Power	3.6 K WATTS	6.0 K WATTS
Volts	310 VDC	310 VDC
Unregulated Logic Bus Output <u>No Load</u>	± 26 VDC MAX + 14 VDC MAX	
<u>Full Load</u>	± 14.5 VDC MIN. @ 1 AMPS + 6.5 VDC MIN. @ 2 AMP	
Internal Shunt Regulator, Peak Current	32 A	32 A
Internal Shunt Regulator, Resistance	12.5 OHM	12.5 OHM
Internal Shunt Regulator, Resistor Power	40 WATTS	40 WATTS
External Shunt Regulator, Peak Current *	50 A	50 A
External Shunt Regulator, Min. Resistance *	8.8 OHMS	8.8 OHMS
External Shunt Regulator, Resistor Power	Model Dependant	Model Dependant
Internal Power Dissipation, Continuous (Less Shunt Regulator)	60 W	90 W
Soft-Start Surge Current (MAX)	80 AMPS	80 AMPS
Soft-Start Charge Time (MAX)	0.25 SEC.	0.25 SEC.

\* The -XX03 Electrical Option version has a peak regulator current of 75 amps, a minimum resistance of 5.8 ohms, and a power rating of 700 watts.

Table D.1. PSR4/5 Specifications (Con't)

DESCRIPTION	PSR4/5-250	PSR4/5-275
Main AC Line Input Voltage	207 - 253 VAC	207 - 253 VAC
Phase	3 Phase	3 Phase
Frequency	47 - 63 HZ	47 - 63 HZ
Current RMS/Phase, Continuous	50 AMPS	75 AMPS
Current RMS/Phase, Peak (2 Sec.)	75 AMPS	112 AMPS
Current RMS/Phase, Peak (50 msec.)	100 AMPS	150 AMPS
Control AC Line Input Voltage	95 - 132 VAC	95 - 132 VAC
Phase	1 Phase	1 Phase
Frequency	47 - 63 HZ	47 - 63 HZ
Current RMS	3.0 AMPS	3.0 AMPS
Output Power	15 K WATTS	22.5 K WATTS
Volts	310 VDC	310 VDC
Unregulated Logic Bus Output <u>No Load</u>	± 26 VDC MAX + 14 VDC MAX	
<u>Full Load</u>	± 14.5 VDC MIN. @ 2 AMPS + 6.5 VDC MIN. @ 4 AMPS	
Shunt Regulator, Peak Current	100 A	200 A
Shunt Regulator, Min. Resistance	4.3 OHM	2.15 OHM
Internal Power Dissipation, Continuous (Less Shunt Regulator)	175 W	250 W
Internal Power Dissipation, Peak (2 SEC.)	325 W	475 W
Soft-Start Surge Current (MAX)	40 AMPS	40 AMPS
Soft-Start Charge Time (MAX)	0.5 SEC.	0.5 SEC.

Table D.2. BDS4 Specifications

DESCRIPTION	BDS4-103X	BDS4-106X	BDS4-110X	BDS4-120X
MAIN DC BUS Minimum Maximum	125 VDC 225 VDC	125 VDC 225 VDC	125 VDC 225 VDC	125 VDC 225 VDC
Unregulated Logic Bus Input	± 14.5-26 VDC @ 0.25 AMPS	± 14.5-26 VDC @ 0.25 AMPS	± 14.5-26 VDC @ 0.25 AMPS	± 14.5-26 VDC @ 0.25 AMPS
	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS
Fan AC Line Input	---	---	---	95-132 VAC 50/60 HZ @ 0.5 AMPS
Output Current (RMS/PHASE) Convection Cooled (45° C AMB) Continuous (RMS) Peak (2.0 SEC.) (RMS)	3.0 AMPS 6.0 AMPS	6.0 AMPS 12.0 AMPS	10.0 AMPS 20.0 AMPS	(Fan Cooled) 20.0 AMPS 40.0 AMPS
Output KVA (@ 160 VDC BUS) Continuous (45°C AMB) Peak (2.0 SEC.)	0.5 KVA	1.0 KVA	1.7 KVA	3.3 KVA
	1.0 KVA	2.0 KVA	3.3 KVA	6.7 KVA
Internal Heat Dissipation	30 WATTS	50 WATTS	75 WATTS	135 WATTS
PWM Switching Frequency	10.0 KHZ	10.0 KHZ	10.0 KHZ	10.0 KHZ
Motor Current Ripple Frequency ± 10%	20.0 KHZ	20.0 KHZ	20.0 KHZ	20.0 KHZ
Resolver Excitation Frequency	7.0 KHZ	7.0 KHZ	7.0 KHZ	7.0 KHZ
Form Factor RMS/AVG	≤ 1.01	≤ 1.01	≤ 1.01	≤ 1.01
Speed Regulation (Long Term)	0.075%/°C	0.075%/°C	0.075%/°C	0.075%/°C
†Minimum Controllable Speed: Standard 12-Bit R/D With 8000 RPM Max. Tracking Rate	2.0 RPM	2.0 RPM	2.0 RPM	2.0 RPM
12-Bit R/D With 14000 RPM Max. Tracking Rate	3.5 RPM	3.5 RPM	3.5 RPM	3.5 RPM
14-Bit R/D With 2000 RPM Max. Tracking Rate	1/8 RPM	1/8 RPM	1/8 RPM	1/8 RPM
14-Bit R/D With 3500 RPM Max. Tracking Rate	1/4 RPM	1/4 RPM	1/4 RPM	1/4 RPM
16-Bit R/D With 500 RPM Max. Tracking Rate	1/64 RPM	1/64 RPM	1/64 RPM	1/64 RPM

† Minimum controlled speed is defined as the minimum speed that can readily be run. The standard BDS4 is configured with a 12-bit R/D converter for a maximum motor speed of 8,000 RPM. Other resolutions and maximum motor speeds (tracking rates) must be ordered as specials.

**Table D.2. BDS4 Specifications (Con't)**

DESCRIPTION	BDS4-203X	BDS4-206X	BDS4-210X	BDS4-220X
MAIN DC BUS Minimum Maximum	250 VDC 360 VDC	250 VDC 360 VDC	250 VDC 360 VDC	250 VDC 360 VDC
Unregulated Logic Bus Input	± 14.5-26 VDC @ 0.25 AMPS	± 14.5-26 VDC @ 0.25 AMPS	± 14.5-26 VDC @ 0.25 AMPS	± 14.5-26 VDC @ 0.25 AMPS
	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS
Fan AC Line Input	---	---	---	95-132 VAC 50/60 HZ @ 0.5 AMPS
Output Current (RMS/PHASE) Convection Cooled (45° C AMB) Continuous (RMS) Peak (2.0 SEC.) (RMS)	3.0 AMPS 6.0 AMPS	6.0 AMPS 12.0 AMPS	10.0 AMPS 20.0 AMPS	(Fan Cooled) 20.0 AMPS 40.0 AMPS
Output KVA (@330 VDC BUS) Continuous (45°C AMB) Peak (2.0 SEC.)	1.1 KVA 2.2 KVA	2.2 KVA 4.4 KVA	3.6 KVA 7.3 KVA	7.3 KVA 14.5 KVA
Internal Heat Dissipation	40 WATTS	65 WATTS	95 WATTS	175 WATTS
PWM Switching Frequency	10.0 KHZ	10.0 KHZ	10.0 KHZ	10.0 KHZ
Motor Current Ripple Frequency ± 10%	20.0 KHZ	20.0 KHZ	20.0 KHZ	20.0 KHZ
Resolver Excitation Frequency	7.0 KHZ	7.0 KHZ	7.0 KHZ	7.0 KHZ
Form Factor RMS/AVG	≤ 1.01	≤ 1.01	≤ 1.01	≤ 1.01
Speed Regulation (Long Term)	0.075%/°C	0.075%/°C	0.075%/°C	0.075%/°C
†Minimum Controllable Speed:				
Standard 12-Bit R/D With 8000 RPM Max. Tracking Rate	2.0 RPM	2.0 RPM	2.0 RPM	2.0 RPM
12-Bit R/D With 14000 RPM Max. Tracking Rate	3.5 RPM	3.5 RPM	3.5 RPM	3.5 RPM
14-Bit R/D With 2000 RPM Max. Tracking Rate	1/8 RPM	1/8 RPM	1/8 RPM	1/8 RPM
14-Bit R/D With 3500 RPM Max. Tracking Rate	1/4 RPM	1/4 RPM	1/4 RPM	1/4 RPM
16-Bit R/D With 500 RPM Max. Tracking Rate	1/64 RPM	1/64 RPM	1/64 RPM	1/64 RPM

Table D.2. BDS4 Specifications (Con't)

DESCRIPTION	BDS4-230X	BDS4-240X	BDS4-255X
MAIN DC BUS Minimum Maximum	250 VDC 360 VDC	250 VDC 360 VDC	250 VDC 360 VDC
Unregulated Logic Bus Input	$\pm 14.5-26$ VDC @ 0.25 AMPS	$\pm 14.5-26$ VDC @ 0.25 AMPS	$\pm 14.5-26$ VDC @ 0.25 AMPS
	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS	+ 6.5-14 VDC @ 0.50 AMPS
Fan AC Line Input	95 - 132 VAC @ 0.5 AMPS	95 - 132 VAC @ 0.5 AMPS	95 - 132 VAC @ 0.75 AMPS
Output Current (RMS/PHASE) (45° C AMB) Continuous (RMS) Peak (2.0 SEC.)	(FAN COOLED) 30 AMPS 60 AMPS	(FAN COOLED) 40 AMPS 80 AMPS	(FAN COOLED) 55.0 AMPS 110 AMPS
Output KVA (@ 330 VDC BUS) Continuous (45°C AMB) Peak (2.0 SEC.)	11.0 KVA 22.0 KVA	14.5 KVA 29 KVA	20 KVA 40 KVA
Internal Heat Dissipation	255 WATTS	335 WATTS	445 WATTS
PWM Switching Frequency	10.0 KHZ	10.0 KHZ	10.0 KHZ
Motor Current Ripple Frequency $\pm 10\%$	20.0 KHZ	20.0 KHZ	20.0 KHZ
Resolver Excitation Frequency	7.0 KHZ	7.0 KHZ	7.0 KHZ
Form Factor RMS/AVG	$\leq 1.01$	$\leq 1.01$	$\leq 1.01$
Speed Regulation (Long Term)	0.075%/°C	0.075%/°C	0.075%/°C
†Minimum Controllable Speed:			
Standard 12-Bit R/D With 8000 RPM Max. Tracking Rate	2.0 RPM	2.0 RPM	2.0 RPM
12-Bit R/D With 14000 RPM Max. Tracking Rate	3.5 RPM	3.5 RPM	3.5 RPM
14-Bit R/D With 2000 RPM Max. Tracking Rate	1/8 RPM	1/8 RPM	1/8 RPM
14-Bit R/D With 3500 RPM Max. Tracking Rate	1/4 RPM	1/4 RPM	1/4 RPM
16-Bit R/D With 500 RPM Max. Tracking Rate	1/64 RPM	1/64 RPM	1/64 RPM

† Minimum controlled speed is defined as the minimum speed that can readily be run. The standard BDS4 is configured with a 12-bit R/D converter for a maximum motor speed of 8,000 RPM. Other resolutions and maximum motor speeds (tracking rates) must be ordered as specials.

**Table D.3. Derating Data**

Derating Information (Continuous Duty)			
BDS4	60HZ Derating @55° C*	50HZ Operation In 45° Max. Ambient	50HZ % Total Derating @ 55°C
3 A	20%	No Derating	20%
6 A	20%	No Derating	20%
10 A	20%	No Derating	20%
20 A	20%	No Derating	20%
30 A	20%	20%	36%
40 A	20%	20%	36%
55 A	20%	20%	36%

PSR4/5 Logic Bus Supply	60HZ Derating @55° C*	50HZ Operation In 45° Max. Ambient	50HZ % Total Derating @ 55°C
12A	10%	No Derating	10%
20A	10%	No Derating	10%
50A	10%	No Derating	10%
75A	10%	No Derating	10%

PSR4/5 Main Bus Supply	60HZ Derating @55° C*	50HZ Operation In 45° Max. Ambient	50HZ % Total Derating @ 55°C
12A	No Derating	20%	20%
20A	No Derating	20%	20%
50A	10%	10%	20%
75A	10%	10%	20%

\* Based on Derating of 2% /° C from 45° C to 55° C.  
Consult Factory for Derating Above 55° C.



**Table D.4. Environmental Specifications**

Operating Temperature	0° C to 45° C
Storage Temperature	-20° C to 70° C
Humidity (Non-Condensing)	10% to 90%

**Table D.5. Mechanical Specifications**

MODEL NUMBER	WIDTH		HEIGHT		DEPTH		WEIGHT	
	MM	IN.	MM	IN.	MM	IN.	Kg(f)	LB.
BDS4-X03X-	60	2.3	340	13.5	280	11	2.95	6 1/2
BDS4-X06X-	60	2.3	340	13.5	280	11	3.40	7 1/2
BDS4-X10X-	88	3.5	340	13.5	280	11	6.01	13 1/4
BDS4-X20X-	106	4.2	340	13.5	280	11	6.35	14
BDS4-230X-	140	5.5	340	13.5	284	11.2	9.75	21 1/2
BDS4-240X-	140	5.5	340	13.5	284	11.2	9.98	22
BDS4-255X-	160	6.3	340	13.5	284	11.2	10.43	23
PSR4/5-X12-	80	3.1	340	13.5	280	11	4.76	10 1/2
PSR4/5-X20-	80	3.1	340	13.5	280	11	5.44	12
PSR4/5-X50-	140	5.5	340	13.5	284	11.2	12.02	26 1/2
PSR4/5-X75-	140	5.5	340	13.5	284	11.2	12.25	27



# APPENDIX E

## OPTIONS

Options are brought into existence from time to time to satisfy specific needs and to add versatility to the product. (Refer to the Model Number Schemes in Appendix B.)

The BDS4 and PSR4/5 may be ordered with various mechanical and electrical options, standard or custom designed for particular applications. If a feature is desired which is not covered here, consult the Industrial Drives Sales Staff for information on custom designed options.

### E.1 PSR4/5A/V ELECTRICAL OPTIONS

12 and 20 AMP Models:

OPTION:

- 01 400 watts external regeneration resistor kit for 230V systems (refer to Section 4.7).
- 02 200 watts external regeneration resistor kit for 115V systems (refer to Section 4.7).
- 03 700 watts external regeneration resistor kit for 230V systems (refer to Section 4.7).
- 80 without Regen or dynamic brake
- 81 with 240 V logic supply, without Regen or dynamic brake

50 and 75 AMP Models:

OPTION:

- 20 with undervolt fault
- 50 without soft-start circuitry.

### E.2 BDS4 ELECTRICAL OPTIONS

The standard BDS4 servo amplifier is fitted with a 12-bit R/D converter which allows a maximum tracking rate of 8000 RPM and a maximum operating speed of 7500 RPM.

The BDS4 amplifiers are available with standard options which are discussed in the following sections. These options are either integrated into the main circuit board of the BDS4 amplifier or appear as Option Boards that are mounted inside of the BDS4 chassis.

#### E.2.1 Integrated Options

##### R/D Converter Resolution and Tracking Rate Options:

Optional R/D resolutions and tracking rates are available and produce higher resolution position information and/or better low-speed performance. These options are integrated into the main circuit board (motor control board) within the BDS4 amplifier and are as follows:

Option - 08 contains a 14-bit R/D, produces a maximum tracking rate of 3500 RPM, and a maximum operating speed of 3200 RPM.

Option - 11 contains a 16-bit R/D, produces a maximum tracking rate of 500 RPM, and a maximum operating speed of 450 RPM.

Option - 16 contains a 14-bit R/D, produces a maximum tracking rate of 2000 RPM, and a maximum operating speed of 1800 RPM.

Accuracies, repeatability, and resolution specifications are recorded in the tables located in Section E.2.2.4.

**E.2.2 BDS4-OPT2/3A Option Board**

The option board can support 10-, 12- 14-, or 16-bit R/D converters (mounted within the BDS4). The card may be configured one of three ways:

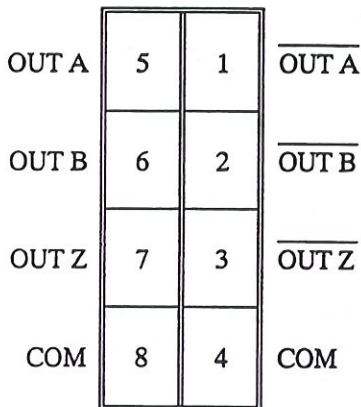
- 01- as a differential quadrature encoder interface with marker pulse.
- 02- as a 12- to 16-bit buffered parallel resolver data interface.
- 03- as a 12- to 16-bit buffered parallel resolver data interface with drive control signals.

**E.2.2.1 BDS4-OPT2/3A-01 BOARD  
Electronic Encoder Output**

When configured as a BDS4-OPT2/3A-01 board, only the encoder outputs are offered. The board functions only to convert the binary (motor shaft) position information from the R/D (Resolver-to-Digital) converter, located within the BDS4 amplifier, to differential quadrature encoder signals with marker pulse.

The output interface connections are made via Connector 32, mounted on the BDS4-OPT2/3A-01 Board. This connector is an 8-Pin Molex MINI-FIT JR connector and is located just to the left of Connector C1 mounted in the top front of the BDS4 amplifier .

The pin outs are as follows:



**Figure E.1. Connector 32**

The encoder interface option provides a differential quadrature synthesized encoder output and a differential marker pulse output for customer use. Each output pair (OUT A or A phase, OUT B or B phase, and OUT Z or Z phase) is driven by a DS8830/SN75183 differential line driver integrated circuit. The voltage levels transition between + 5 volts and common. This interface is capable of sinking and sourcing 40 milliamps of current. The differential outputs are designed to drive long lengths of coaxial cable, strip line, or twisted pair transmission lines with characteristic impedances of 50 to 500 ohms.

The quadrature signal is generated by the following sequence:

Refer to Drawing D-93179-1.

Up to sixteen parallel resolver data bits are brought to the BDS4-OPT2/3A Option Board via connectors 7 and 33. These bits first pass through LS244 data buffers. Next the data bits are routed to a double row jumper/header (component 35). At this header the quadrature resolution is selected by manipulating two jumpers. The resolution can be from 16 to 16384 encoder lines in increments of power of two (2<sup>X</sup>) (i.e., 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384). The following jumper table shows the jumper combinations for the resolutions available. After two of the twelve data bits have been selected at the jumper/header block (Component 35) by the two jumper selections, these two signals are routed to a pair of Exclusive-Or gates. This is where the quadrature (A Phase offset from B Phase by 90 degrees) signal pair are generated.

After this the two quadrature signals are latched by a pair of LS175 flip-flops. The non-inverting output from each flip-flop drives an LED. The inverting output from each flip-flop drives a pair of DS8830 or 75183 line drivers. The line driver outputs route straight across a jumper/header strip (this is used with other options) and terminate at customer Connector 32.

The marker pulse signal is generated by the following sequence:

All sixteen parallel resolver data bits are brought to the BDS4-OPT2/3A Option Board. These bits first pass through LS244 data buffers. Next the data bits are routed to a bank of DIP switches consisting of

Components 23 and 26. At these switches the marker pulse width is selected. For a minimum pulse width all switches should be closed. As more switches are opened from the LSB to the MSB, the pulse width will become wider. The marker pulse width selected has no effect on the quadrature resolution selected although these two types of signals are normally related on a standard encoder. The jumper/switch table that follows shows the wide and narrow marker pulse selection with each of the eleven encoder equivalent resolutions available. After the dip switch, the selected signals are **Anded** together then **Anded** with all of the MSB data lines that were not switch-selectable. Note that the combination of the two Nand gates feeding into an Or gate results in the equivalent of a large Nand gate. The output of the Or gate feeds into a LS175 flip-flop. The non-inverting output of the flip-flop drives an LED. The inverting output of the flip-flop drives a DS8830 or 75183 line driver. The line driver outputs route straight across a jumper/header strip (this is used with other options) and terminate at customer Connector 32.

The encoder resolution (OUT A and OUT B) can be jumpered for resolutions between 16 to 16384 lines in binary ( $2^x$ ) increments. The OUT Z (Marker Pulse) can be switch-selected for either a narrow pulse width or a wide pulse width in relation to the particular resolution selected. Note that any other marker pulse width can be selected as it has no direct effect on the selected resolution of the encoder equivalent signal.

#### STANDARD 12-BIT CONFIGURATION

Place two jumpers on header #35:

JUMPER PINS I-J  
JUMPER PINS K-L

Adjust the Dip Switch #23 & #36 to:

SWITCH A - OFF  
SWITCH B - OFF  
SWITCH C - OFF  
SWITCH D - OFF  
SWITCH E - OFF  
SWITCH F - ON  
SWITCH G - ON  
SWITCH H - ON  
SWITCH I - ON  
SWITCH J - ON

SWITCH K - ON  
SWITCH L - ON

Double Row Header #28:

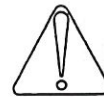
JUMPER 1-2  
JUMPER 3-4  
JUMPER 5-6  
JUMPER 7-8  
JUMPER 9-10  
JUMPER 11-12

See Schematic Drawing D-93179

#### E.2.2.2 BDS4-OPT2/3A-02 BOARD

Electronic Encoder with Parallel Output (Without Drive Signals)

The parallel resolver data option provides 12 - 16 bits of buffered resolver data output. The signals are output on one 34-pin ribbon cable connector. The mating connector for the ribbon cable connector is a Berg P/N 66900-234 or equivalent. The ribbon cable pinouts are listed in Table E.2 and on drawing C-93185.



**NOTE**

***POS00-POS15 are sequenced to agree with PMC-960 positioner board signal names for a 12-bit configuration. Due to this, POS12-POS15 will appear to be out of sequence.***

#### E.2.2.3 BDS4-OPT2/3A-03 BOARD

Electronic Encoder with Parallel Output (With Drive Signals)

This option is similar to that discussed in Section E.2.2.2 with the exception that it also provides for a means by which the Industrial Drives' 960 position controller can interface directly with the BDS4 motor controller. This is accomplished by adding a small cable between Connector 32 on the BDS4 OPT2/3A board and Connector C1 of the BDS4 amplifier. The BDS4 motor controller signals are identified in the above table by the addition of an asterisk by the pin numbers. Connector 37 on the BDS4-OPT2/3A board is located just to the left of Connector C1 mounted in the top front of the BDS4.

### E.2.2.4 BDS4 AND BDS4-OPT2/3A (BOARD) SYSTEM SPECIFICATIONS

Accuracies, repeatability, and resolution specifications are recorded in Table E.3.

## E.3 BDS4-OPT-D/L OPTION BOARD

- **Function:**

The BDS4-OPT-D/L option board functions as an interface module between the BDS4 and machine travel limit switches. There are separate inputs for the CW and CCW directions of motor shaft rotation (viewing the motor from the output shaft end). In the event a machine limit switch is activated, the motor will decelerate (at maximum rate) to zero speed and remain against the "stop" in a reduced current mode. The BDS4 will remain fully operational with full current and torque available for movement in the opposite direction (provided the opposite limit switch is not activated).

- **Wiring**

Reference to Drawing A-93541 will assist in wiring the D/L option board. The speed command (position error) to the BDS4 amplifier must be wired to 1 and 4 of the special differential input terminals on the D/L option board, NOT TO THE STANDARD INPUT OF THE BDS4. In order to initiate restricted movement the customer must provide 5 to 28 VDC, through limit switches on the machine, to the CW and CCW inputs of the D/L option board. The 5 to 28 VDC supply must be capable of sourcing 20 ma of current.

- **Board Configuration:**

The D/L option board is shipped from the factory configured so that the absence of input (5 to 28 VDC) from either of its CW or CCW inputs activate the direction limit mode. If it is desired that direction limit be activated by the presence of voltage, remove Jumper 26 located between Pins 2 and 3 on the board and install it between Pins 1 and 2.

- **Direction Limit Indication:**

When the Direction Limit mode is activated, a red LED will become illuminated. The LED is located just behind option board Connector 3 and can be seen through the opening in the front of the BDS4.

- **Adjustments:**

There is only one adjustment on the D/L option board. It is the Command Scale Pot, and is located next to option board Connector 67.

Perform the adjustment procedure in the following manner:

1. Adjust the Command Scale pot in the front of the BDS4 fully CCW.
2. Adjust the Command Scale pot on the D/L option board in the standard manner by referring to Section 4.4.1.3 or 4.4.1.4 of this manual.



Table E.2. OPT2/3A-02 and OPT2/3A-03 Pinouts

CONNECTOR #4		
*1	ICMD	DIFF HI (current/velocity command) (analog)
*2	ACOM	DIFF LOW (connected to analog common)
*3	TACH	TACH HI (analog signal)
*4	ACOM	TACH LOW (connected to analog common)
5	ALOCK	ANALOG LOCK HI (analog signal)
6	ACOM	ANALOG LOCK LOW (analog common)
*7	DRVENB'	Servo Drive Enable (active low)
8	DCOM	Digital Common
*9	DRVRDY'	Servo Drive Ready (active low)
10	DCOM	Digital Common
11	BUSY	Resolver's R-to-D Converter Busy (active high)
12	DCOM	Digital Common
13	N/C	Reserved
14	DCOM	Digital Common
15	POS00	Least Significant Bit for 12-Bit R/D
16	DCOM	Digital Common
17	POS01	Next to Least Significant Bit for 12-Bit R/D
18	DCOM	Digital Common
19	POS02	One Input Bit of Resolver
20	POS03	One Input Bit of Resolver
21	POS04	One Input Bit of Resolver
22	POS05	One Input Bit of Resolver
23	POS06	One Input Bit of Resolver
24	POS07	One Input Bit of Resolver
25	POS08	One Input Bit of Resolver
26	POS09	One Input Bit of Resolver
27	POS10	Next to Most Significant Bit of the Resolver
28	POS11	Most Significant Bit of the Resolver
29	POS12**	Next to Least Significant Bit for 14-Bit R/D
30	POS13**	Least Significant Bit for 14-Bit R/D
31	POS14**	Next to Least Significant Bit for 16-Bit R/D
32	POS15**	Least Significant Bit for 16-Bit R/D
33	N/C	Reserved
34	SHIELD	EMI Isolated Shield Common

\* These signals are only available on the OPT2/3A-03 option.

\*\* These signals are not available on all models of the BDS4.



Table E.3. System Specifications

ACCURACIES	J GRADE R/D	H GRADE R/D
R/D CONVERTER ACCY	± 4.0 ARC MIN	± 22.0 ARC MIN
RESOLVER ACCY	± 7.0 ARC MIN	± 7.0 ARC MIN
RESOLVER MOUNTING	± 3.0 ARC MIN	± 3.0 ARC MIN
UNCERTAINTY** (± 1 Count)	± 5.27 ARC MIN	± 5.27 ARC MIN
WORST CASE ACCY*	19.27 ARC MIN	37.27 ARC MIN
	0.32 DEGREES	0.62 DEGREES
	± 1.8 BITS	± 3.5 BITS
TYPICAL ACCY	13.87 ARC MIN	28.55 ARC MIN
	0.22 DEGREES	0.48 DEGREES
	± 1.3 BITS	± 2.5 BITS
REPEATABILITY	5.27 ARC MIN	5.27 ARC MIN
	0.088 DEGREES	0.088 DEGREES
	1.0 BIT	1.0 BIT
RESOLUTION	2 <sup>12</sup> BITS (4096)	2 <sup>12</sup> BITS (4096)

\* Worst Case Analysis assumes all errors add together.

\*\* For 12-bit systems only. For 14-bit systems, the uncertainty drops to ± 1.32 arc min and for 16-bit systems, the uncertainty drops to ± 0.33 arc min. Therefore, the worst case and typical accuracies will be reduced slightly for 14- and 16-bit systems.

*Table E.4. R/D Converter Speeds*

R/D CONVERTER MAXIMUM SPEED			MAXIMUM OPERATING SPEED
R/D RESOLUTION	TRACKING RATE		
12-Bit	233.33 RPS	8000 RPM	7500
12-Bit	133.33 RPS	8000 RPM	7500
14-Bit	58.33 RPS	3500 RPM	3150
14-Bit	33.33 RPS	2000 RPM	1800
16-Bit	15.0 RPS	900 RPM	800
16-Bit	13.33 RPS	500 RPM	450

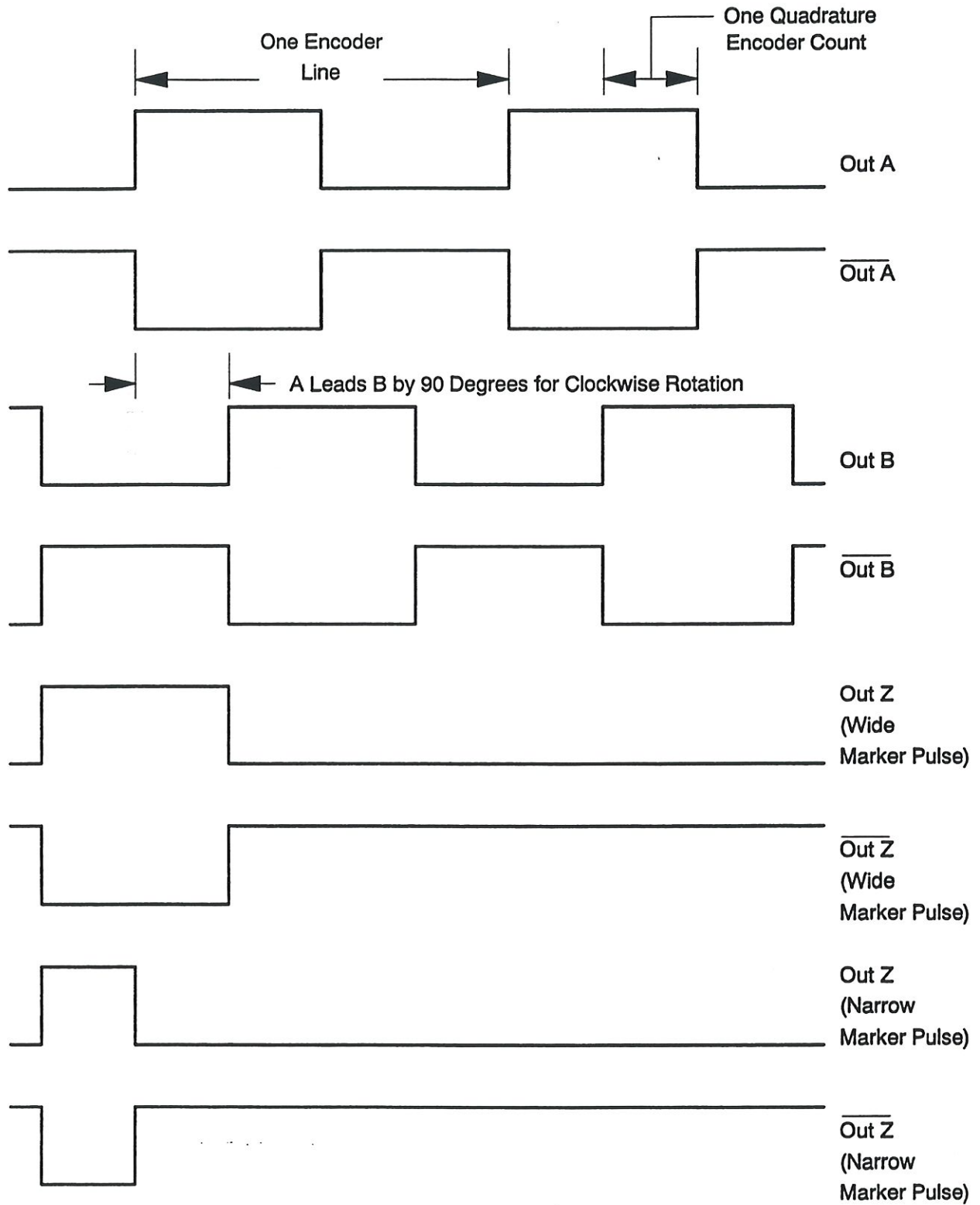


Figure E.2. Encoder Output Timing



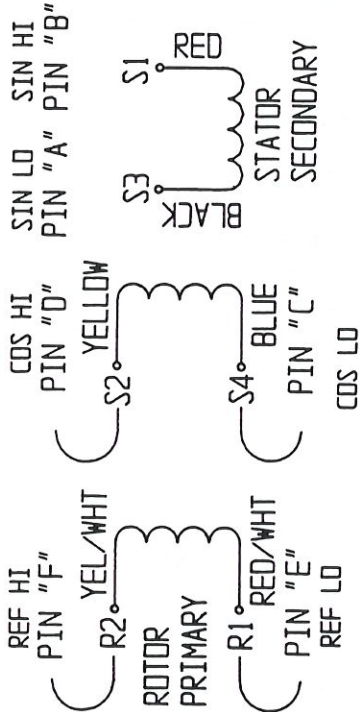
# APPENDIX F

## DRAWINGS

<u>DRAWING</u>	<u>PAGE</u>	<u>DRAWING</u>	<u>PAGE</u>
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PHASE A (BROWN LEAD) - PIN "A"  
 PHASE B (RED LEAD) - PIN "B"  
 PHASE C (WHITE LEAD) - PIN "C"  
 CASE GROUND (GREEN W/  
 YELLOW STRIPE LEAD) - PIN "D"

MOTOR LEAD CONNECTIONS



RESOLVER CONNECTION DIAGRAM

THERMISTAT (BLACK LEADS) - PINS "T" & "U"  
 TACH (BLACK LEAD) - PIN "R"  
 (WHITE LEAD) - PIN "S"  
 BRAKE (BLUE LEADS) - PINS "N" & "P"

THERMISTAT, TACH & BRAKE CONNECTIONS  
 (LOCATED IN RESOLVER CABLE ASSEMBLY)

NOTES:

- 1 - WITH A PHASE SEQUENCE A, C, B MOTOR ROTATION SHALL BE C.W. FACING MOUNTING END.
- 2 - THERMISTAT PRESET TO OPEN AT 170°C ±5°C AND CLOSE AT 132°C ±5°C, NORMALLY CLOSED, CONTACTS RATED TO 4 AMPS, 120 V.A.C.
- 3 - OPTIONAL TACH - WITH ROTATION PER NOTE #1, A POSITIVE VOLTAGE IS GENERATED ON PIN "R" WITH RESPECT TO PIN "S".

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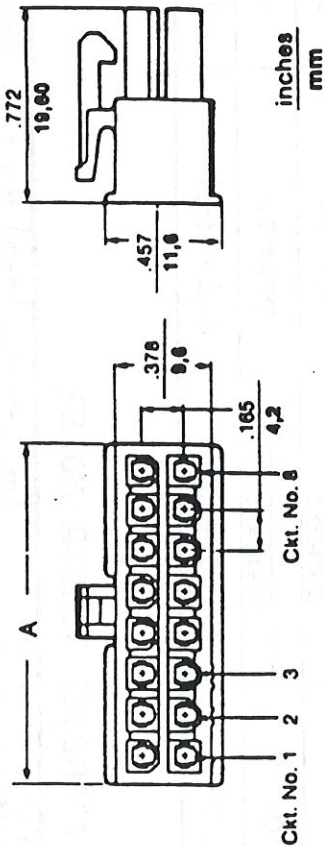
  

<b>Kollmorgen Industrial Drives</b> RADFORD, VIRGINIA				MOTOR CONNECTION	
DWG. BY: TDG	DATE: 11-03-92	CHK. BY: C.JF	DATE: 11-09-92	SCALE: 1:1	DWG. NO. <b>A-63542</b>
					ISSUE <b>2</b>

CAD DWG.

NOTES

- 1.) USE PIN # A-83909 - - - - WITH THIS CONNECTOR.
- 2.) MATERIAL: UL 94V-0 NYLON



DWG. NO.	Circuits	Dim. A	Dim. B	Dim. C
002	2	.213 5.4	-	.606 15.4
004	4	.378 9.6	.165 4.2	.772 19.6
006	6	.543 13.8	.331 8.4	.937 23.8
008	8	.709 18.0	.496 12.6	1.102 28.0
010	10	.874 22.2	.661 16.8	1.268 32.2
012	12	1.039 26.4	.827 21.0	1.433 36.4
014	14	1.205 30.6	.992 25.2	1.598 40.6
016	16	1.370 34.8	1.157 29.4	1.764 44.8
018	18	1.535 39.0	1.323 33.6	1.928 49.0
020	20	1.701 43.2	1.488 37.8	2.094 53.2
022	22	1.866 47.4	1.654 42.0	2.260 57.4
024	24	2.031 51.6	1.819 46.2	2.425 61.6

NUMBER OF CIRCUITS

APPROVED VENDOR: MOLEX # (39-01-2-51)

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

**8** COPY CODE

PURCHASE SPEC. FOR  
MINI-FIT, JR. SERIES CONNECTOR

SCALE DWG NO **A-83908** ISSUE **1**

DWG BY **V.A.** DATE **11/29/88**  
CHK'D BY  
APP'D BY **(signature)** DATE **12-6-88**

ISS	ECN NO	DATE	APP'D	ISS	ECN NO	DATE	APP'D
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UNLESS OTHERWISE SPECIFIED  
R R DEC PLACES ± 0.01  
R R DEC PLACES ± 0.05  
ANG DIM ± .1"

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

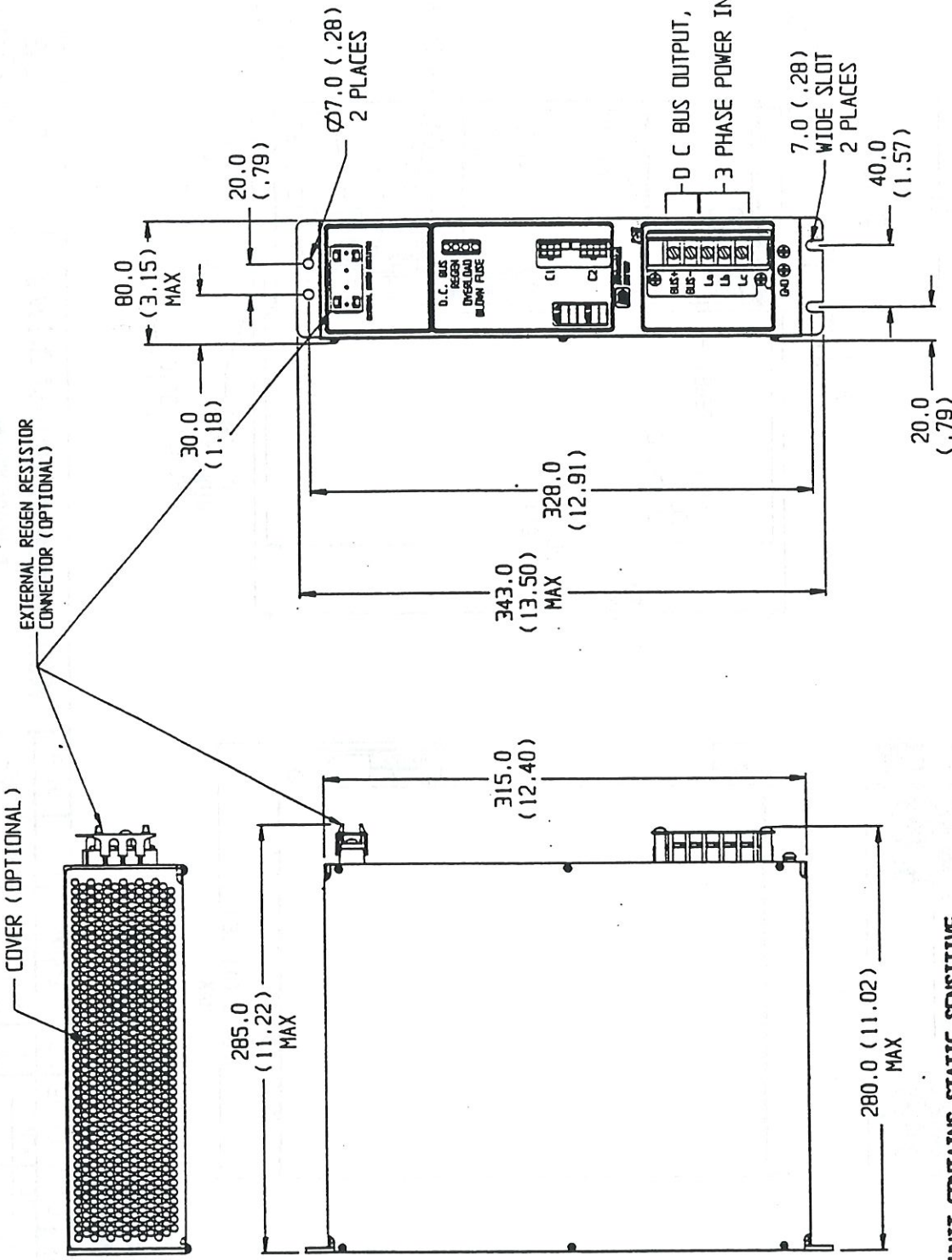




UNLESS OTHERWISE SPECIFIED ANG. DIM. ±.1" (METRIC) X DEC. PLACES ±.4 XX DEC. PLACES ±.015 IN. (INCHES) XX DEC. PLACES ±.005 IN. DO NOT SCALE DWG. USE DIMENSIONS ONLY. ALL DIMENSIONS ARE MILLIMETERS WITH INCHES IN PARENTHESES. UNLESS OTHERWISE SPECIFIED.

DWG. NO. A-84385

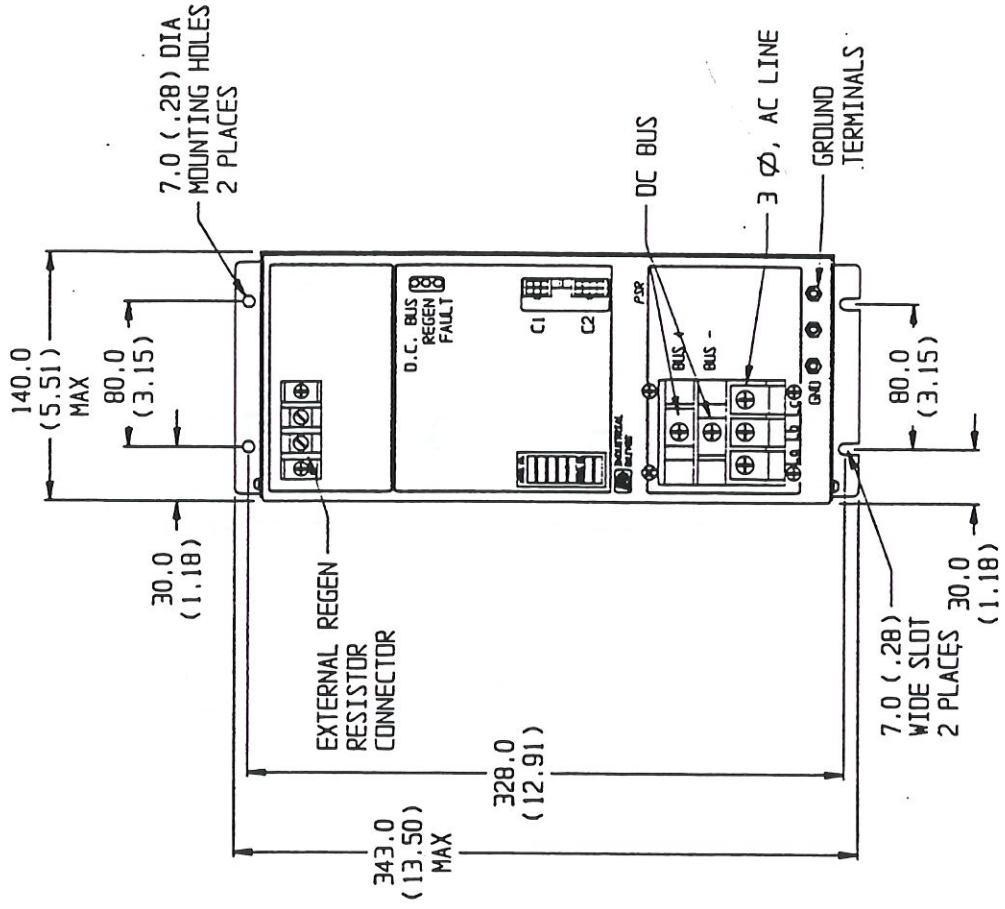
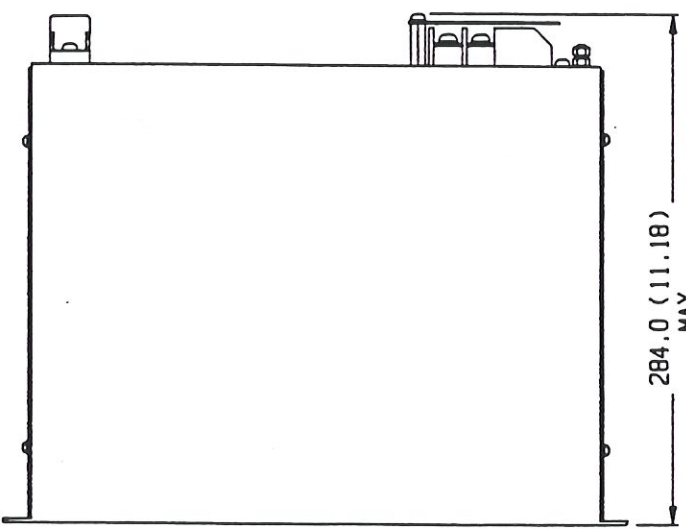
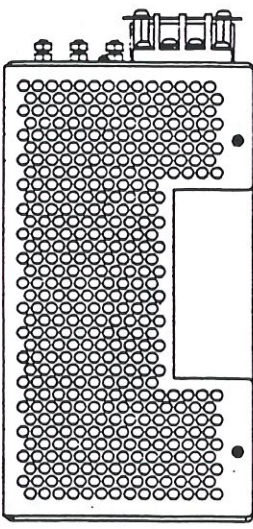
ISSUE 3



THIS UNIT CONTAINS STATIC SENSITIVE MATERIAL, HANDLE ACCORDINGLY.

CAD DWG. (0-31)

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				84111 EWR	8/91	<i>[Signature]</i>	DATE	DATE	DATE	DATE
							11-89	11-89	1-30-90	1-30-90
							FMJ	SCM	1:4	1:4
							OK. BY:	APP'D. BY:	PLUT SCALE	DWG. NO.
										A-84385
										ISSUE 3



**THIS UNIT CONTAINS STATIC SENSITIVE MATERIAL, HANDLE ACCORDINGLY.**

CAD DWG.

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--		APP'D.		APP'D.		APP'D.		APP'D.		APP'D.	
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Kollmorgen Industrial Drives RADFORD, VIRGINIA				OUTLINE & DIMENSION PSR4/5-50 & 75 AMP				SCALE 1:4			
DATE 1-05-91		DATE 3-19-91		DATE 3-19-91		DATE 3-19-91		DATE 3-19-91		DATE 3-19-91	
CHK. BY: FTD		CHK. BY: HP		CHK. BY: HP		CHK. BY: HP		CHK. BY: HP		CHK. BY: HP	
DWG. BY: VA		DWG. BY: VA		DWG. BY: VA		DWG. BY: VA		DWG. BY: VA		DWG. BY: VA	
A-93031				A-93031				A-93031			
ISSUE 2				ISSUE 2				ISSUE 2			





1/4-20 x 1/2 PAN HD. SCREW, QTY(2)  
 1/4 LOCKWASHER, QTY(2)  
 1/4 FLATWASHER .75" O.D., QTY(2)  
 STANDOFF, SPRUCE PNE # 2165-1B, QTY(2)

500W CONTINUOUS  
 4.5 OHM RESISTOR  
 QTY(1) 1.750 DIA.

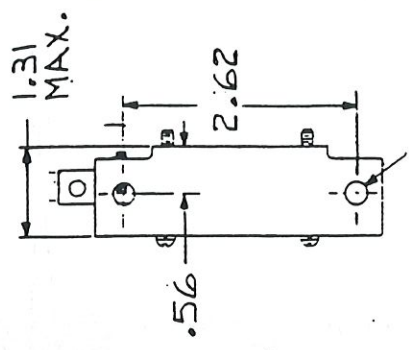
SET TRIP CURRENT  
 TD: 10.5A [2] [3]

.219

16.25

17.88

CONNECT RESISTOR TO  
 TERM. BLOCK LOCATED  
 AT TOP OF PSRAVS  
 SEE NOTE 1.



7/32 DIA.  
 2 MOUNT. HOLES

[ ] [ ] [ ] [ ] **B** COPY CODE

**CAUTION** - 1) DO NOT INSTALL RESISTOR NEAR  
 FLAMMABLE MATERIAL.

NOTES: 2) SHOCK HAZARD & RESISTOR CONNECTED TO HIGH VOLTAGE.

1. RECOMMENDED WIRE: # 8AWG, 125°C

2. BOTTOM STANDOFFS ARE THREADED 1/4-20 x 3/8" DP

FOR MOUNTING RESISTORS TO PANELS, ETC.

3. OUTPUT CONTACTS: WIRED TO DROP MAIN LINES WHEN

CONTACTS OPEN ON OVERLOAD.

SEE  
 NOTE  
 # 3

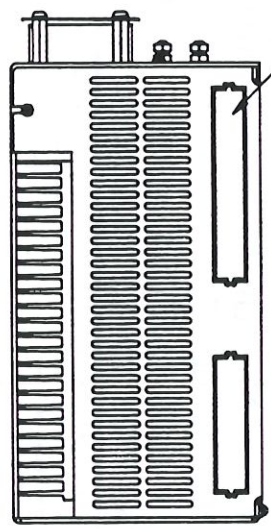
**Kollmorgen Industrial Drives**  
 RADFORD, VIRGINIA

WIRING & MOUNTING DIAG.	
ER-20	
SCALE: ~	DWG. NO. <b>A-93141</b>
ISSUE	<b>3</b>

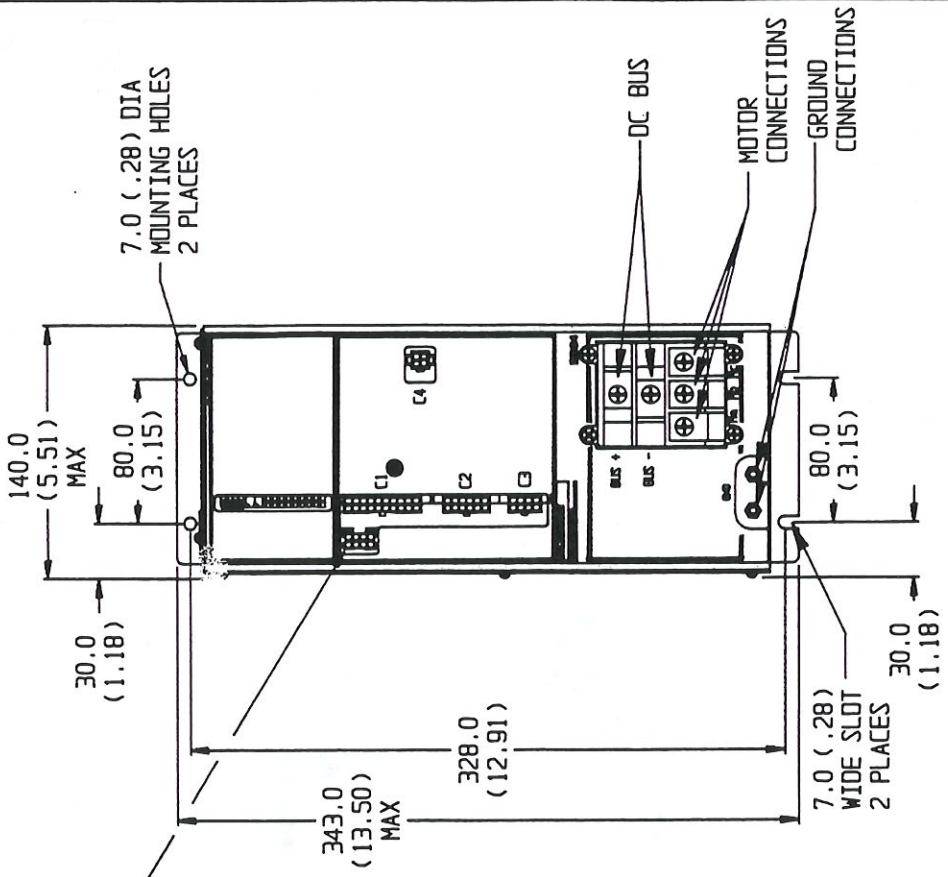
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3	84007	2/29/91	GEARHEART	3	84007	2/29/91	GEARHEART	CHK BY	
								APPD BY	1-15-91

UNLESS OTHERWISE SPECIFIED  
 XX DEC. PLACES 2,018  
 XXX DEC. PLACES 1,008  
 ANG. DIM. 1'

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



POSSIBLE OPTION BOARD CONNECTOR(S)



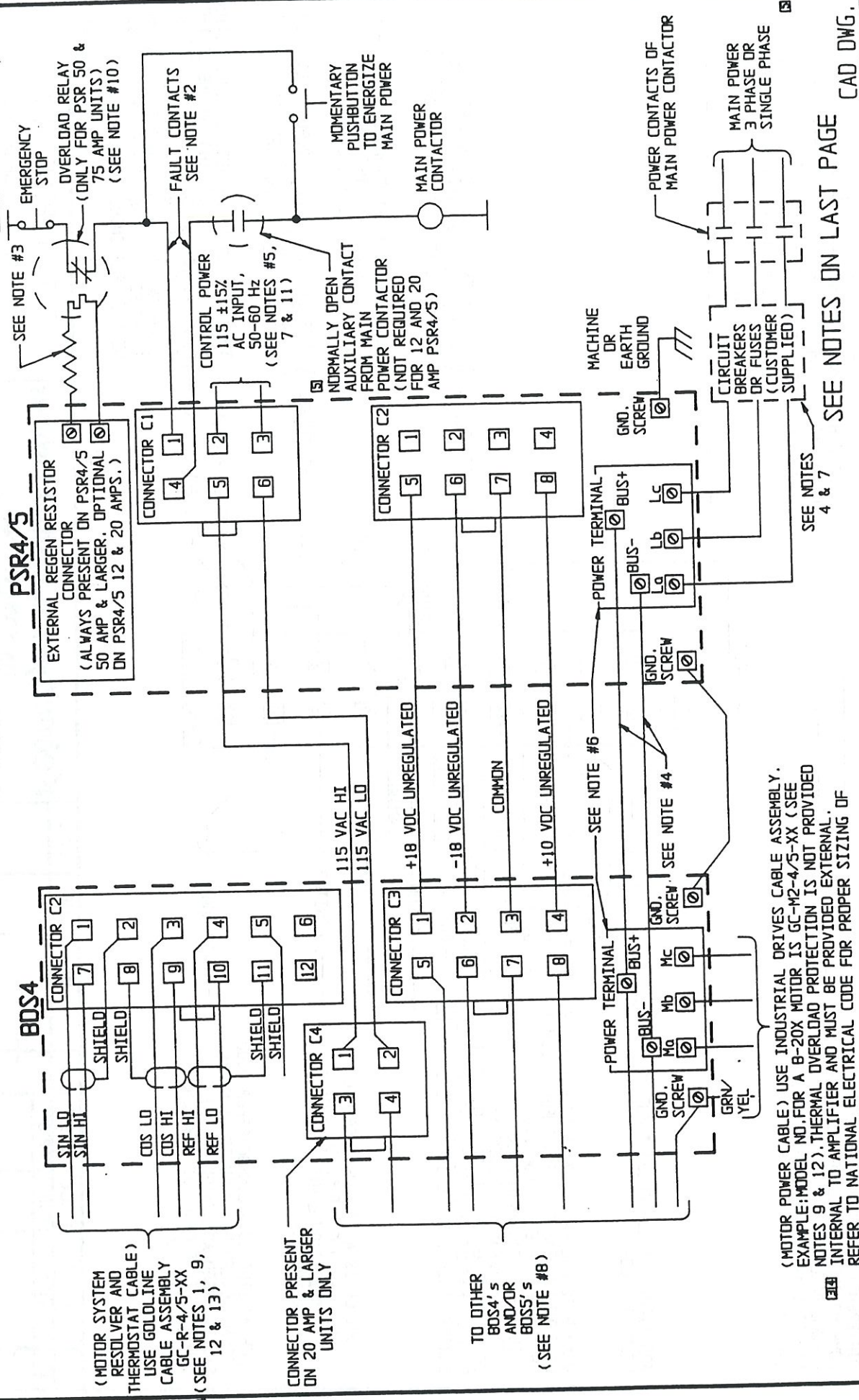
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CAD DWG.

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ISS.	ECN NO.	DATE	APP'D.										
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3	84919	10G	1-7-93	CJF									

Kollmorgen Industrial Drives RADFORD, VIRGINIA				OUTLINE & DIMENSION BDS4A-30 & 40 AMP			
OWN. BY:	DATE	OK. BY:	DATE	APP'D. BY:	DATE	SCALE	ISSUE
EWR	07-12-91	CJF	07-17-91			1:4	3
				DWG. NO.	A-93156		



(MOTOR POWER CABLE) USE INDUSTRIAL DRIVES CABLE ASSEMBLY.  
 EXAMPLE: MODEL NO. FOR A B-20X MOTOR IS GC-M2-4/5-XX (SEE NOTES 9 & 12). THERMAL OVERLOAD PROTECTION IS NOT PROVIDED INTERNAL TO AMPLIFIER AND MUST BE PROVIDED EXTERNAL. REFER TO NATIONAL ELECTRICAL CODE FOR PROPER SIZING OF OVERLOAD PROTECTION.

SEE NOTES ON LAST PAGE  
 CAD DWG.

C 8		COPY CODE		ISS.		ECN NO.		DATE		APP'D.	
ISS.	ECN NO.	DATE	APP'D.	2	84451 TDG	4-30-92	CJF	DATE	APP'D. BY:	DATE	DATE
7	85118 TDG	3-22-93	CJF	3	84719 EWR	9-01-92	CJF	DATE	DATE	6-01-91	6-01-91
8	85244 LLS	5-17-93	CJF	4	84837 TDG	11-3-92	CJF	DATE	DATE	6-01-91	6-01-91
				5	84824 TDG	1-11-93	CJF	DATE	DATE	6-01-91	6-01-91
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**Kolmorgen Industrial Drives**  
 RADFORD, VIRGINIA

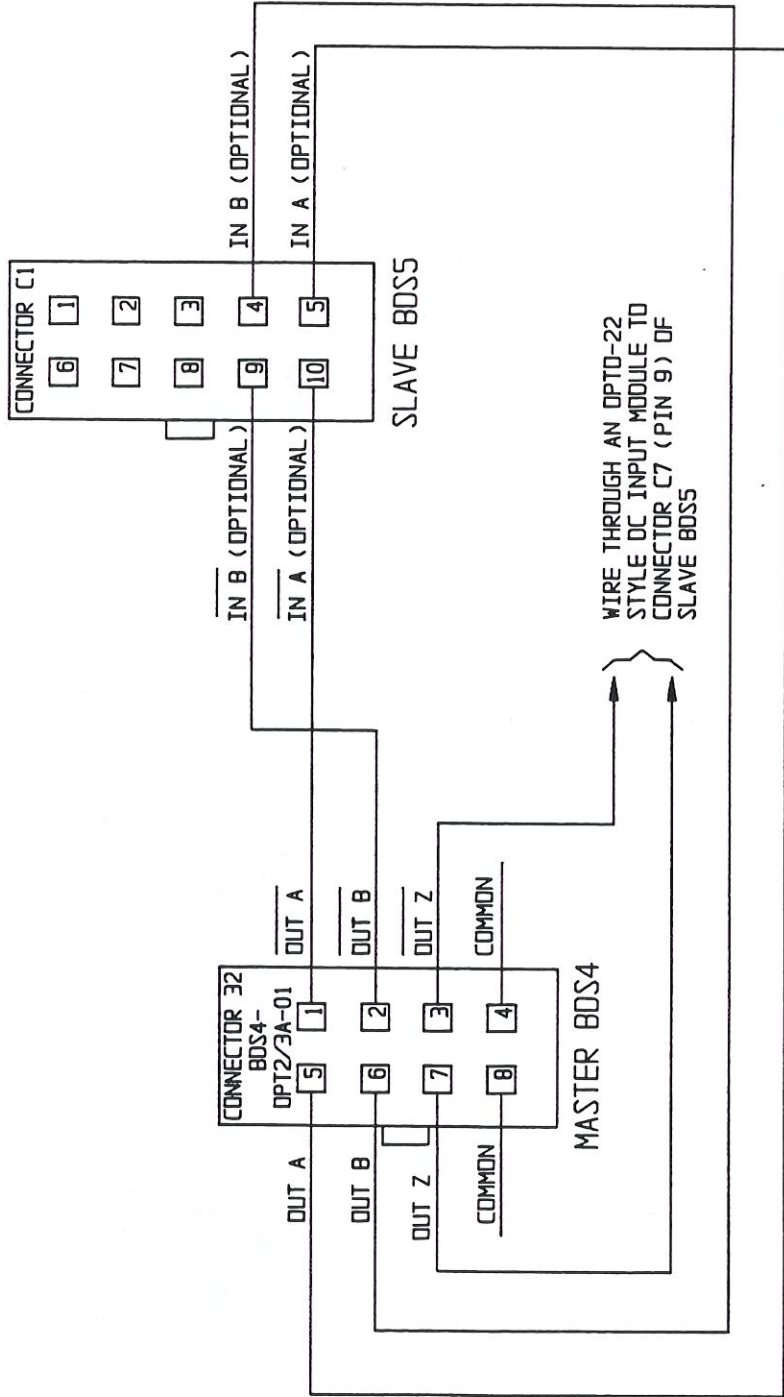
BDS4 WIRING DIAGRAM  
 (PSR4/5 & MOTOR CONNECTIONS)







- NOTES:
- A. THE COMMONS OF MASTER BDS4 AND SLAVE BDS5 MUST BE CONNECTED. THIS IS ACCOMPLISHED THROUGH CONNECTOR C3 IN THE BDS4 AND CONNECTOR C4 IN THE BDS5 IF THEY SHARE ONE PSR4/5.
  - B. IF THE BDS5 USES THE OPTIONAL ANALOG INPUT CARD (BDS5-OPT1), THE OPTIONAL ENCODER INPUTS IN CONNECTOR C1 ARE NOT ALLOWED.



MASTER BDS4 AND SLAVE BDS5

CAD DWG.

**Kolmogor Industrial Drives**  
 RADFORD, VIRGINIA

BDS4 WIRING DIAGRAM  
 (OPTIONAL ENCODER EQUIVALENT)

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DATE	CHK. BY:	DATE	APP'D. BY:	DATE	PLT SCALE	DWG. NO.	SHEET 4 OF 5	ISSUE
VA 2-19-91					1:1	A-93231		8

**(ALL WIRES TO BE COPPER WITH MIN. TEMP RATING OF 60°C)**

NOTES:

1. WARNING: THE MOTOR THERMOSTAT AUTOMATICALLY RESETS WHEN THE MOTOR COOLS. THE CUSTOMER IS RESPONSIBLE FOR LATCHING THIS SIGNAL TO INHIBIT OPERATION AFTER A MOTOR THERMOSTAT FAULT. CONNECT THERMOSTAT USING TWISTED PAIR WIRE.
2. CAUTION: THE PSR4/5 FAULT CONTACTS (RATED 115 VAC 1AMP) MUST BE WIRED IN SERIES WITH THE OVERLOAD RELAY AS SHOWN ON SHEET 1. ON 12 & 20 AMP PSR4/5; THIS CONTACT IS NORMALLY OPEN AND WILL CLOSE WITHIN 250 MSEC. AFTER APPLICATION OF CONTROL AND MAIN POWER. THIS CONTACT OPENS IN FAULT CONDITIONS. ON 50 & 75 AMP PSR4/5 THIS CONTACT CLOSURES ON APPLICATION OF CONTROL POWER AND WILL OPEN IN FAULT CONDITION.
3. WARNING: RESISTOR IS CONNECTED TO HIGH VOLTAGE; ENSURE SUFFICIENT ELECTRICAL CLEARANCE WHEN MOUNTING. RESISTOR MAY BECOME VERY HOT DURING OPERATION. DO NOT MOUNT NEAR MATERIALS THAT ARE FLAMMABLE OR DAMAGED BY HEAT. VENTILATION MAY BE REQUIRED. SEE WIRING DRAWING FOR SPECIFIC REGEN RESISTOR KIT. EACH KIT HAS DIFFERENT SERIES/PARALEL RESISTOR CONNECTIONS TO OBTAIN SPECIFIC RESISTANCE AND POWER RATING.
4. WIRE SIZES, BREAKERS AND FUSES FOR PSR4/5:  
 PSR4/5-X12 HAS A MAXIMUM MAIN POWER INPUT CURRENT OF 12 AMPS RMS,  
 PSR4/5-X20 HAS A MAXIMUM MAIN POWER INPUT CURRENT OF 20 AMPS RMS,  
 PSR4/5-X50 HAS A MAXIMUM MAIN POWER INPUT CURRENT OF 50 AMPS RMS,  
 PSR4/5-X75 HAS A MAXIMUM MAIN POWER INPUT CURRENT OF 75 AMPS RMS.  
 THE ACTUAL APPLICATION MAY REQUIRE LESS CURRENT. USE 600 VAC INSULATED WIRE AND REFER TO LOCAL ELECTRICAL CODES FOR PROPER WIRE SIZE FOR THE CURRENTS LISTED ABOVE. FUSES FOR MAIN POWER SHOULD BE A U.L. RATED TIME DELAY TYPE, SUCH AS, BUSS FRN-R SERIES.  
 THE POWER BUS BETWEEN A PSR4/5 AND BDS4 SHOULD USE THE FOLLOWING WIRE GAUGE WITH 600 VAC INSULATION:  
 PSR4/5-X12, 14 AWG (OR LARGER) WIRE,  
 PSR4/5-X20, 10 AWG WIRE,  
 PSR4/5-X50, 8 AWG (OR LARGER) WIRE,  
 PSR4/5-X75, 8 AWG (OR LARGER) WIRE.
5. ALL SIGNAL AND CONTROL WIRES TO BE 22-18 AWG WIRE. THE CRIMP TERMINALS FOR 22-18 AWG WIRE ARE SUPPLIED FOR USE WITH BDS4 CONNECTORS C1, C2, C3, C4, OPTION CONNECTOR AND PSR4/5 CONNECTORS C1 & C2. FOR 16 AWG WIRE USE MOLEX #39-00-0078 TERMINALS.
6. IN THE BDS4 3 AMP THRU 20 AMP AND THE PSR4/5 12 AMP AND 20 AMP, THE SCREWS IN THE POWER TERMINAL BLOCKS ARE CAPTIVE. DO NOT ATTEMPT TO REMOVE THEM TO USE RING TERMINALS. USE LOCKING SPRING SPADE TERMINALS SUCH AS HOLLINGSWORTH #XSS20954S OR #SS20947SF FOR 16 AWG WIRE AND #XSS20836 OR #SS20832F FOR 12/10 AWG WIRE.
7. ALL AC LINES SHOULD BE TWISTED CABLES.
8. THE TOTAL NUMBER OF AXES ALLOWED, PER PSR4/5, DEPENDS ON THE PSR4/5 MODEL AND THE COMBINATION OF BDS4's AND/OR BDS5's:  
 PSR4/5-X12: A MAXIMUM OF 4 BDS4s OR 3 BDS5s,  
 PSR4/5-X20: A MAXIMUM OF 4 BDS4s OR 3 BDS5s,  
 PSR4/5-X50: A MAXIMUM OF 6 BDS4s OR 6 BDS5s,  
 PSR4/5-X75: A MAXIMUM OF 6 BDS4s OR 6 BDS5s.  
 (IF THE BDS's ARE MIXED, THEN THE TOTAL NUMBER OF AXES THAT CAN BE USED WOULD BE THE MAXIMUM GIVEN FOR THE BDS5s.)
9. AXIS EXPANSION ON THE PSR4/5 50 AND 75 AMP UNITS ARE ALSO LIMITED TO A MAXIMUM OF 4 BDS4s OR 3 BDS5s ON EITHER SIDE OF THE PSR4/5.
10. XX IN THE CABLE NUMBER STANDS FOR CABLE LENGTH IN METERS. CABLE LENGTH IS AVAILABLE FROM 3 TO 75 METERS IN INCREMENTS OF 3 METERS.
11. A THERMAL OVERLOAD RELAY IS SUPPLIED IN THE REGEN RESISTOR KIT FOR THE 50 AND 75 AMP PSR4/5's. THE THERMAL OVERLOAD RELAY, INCLUDED IN THE KIT, WAS SIZED FOR YOUR RESISTANCE AND POWER RATING. THE OUTPUT CONTACTS OF THE RELAY MUST BE WIRED TO DROP POWER TO THE MAIN POWER CONTACTOR IN A FAULT CONDITION, AS SHOWN ON SHEET 1.
12. DO NOT WIRE CONTROL POWER (PSR4/5 CONNECTOR C1) THROUGH THE MAIN POWER CONTACTOR. THIS IS SO THAT CONTROL POWER WON'T BE REMOVED IF PSR4/5 FAULT CONTACTS OPEN (THIS WOULD TURN OFF ANY FAULT LEADS).
13. ALL SHIELDED CABLES MUST HAVE SHIELD CONTINUITY FOR THE FULL LENGTH OF THE CABLE.
14. RESOLVER CABLE MUST BE INDIVIDUALLY SHIELDED PAIRS.
15. RECOMMENDED TORQUES FOR CONNECTION TO TERMINAL BLOCKS AND GROUND.
  - A. BDS4/5-3 TO 20 AMP AND PSR4/5-12 AND 20 AMP  
 MAX TORQUE PER UL IS 12 IN/LB, EXTERNAL REGEN, MAIN POWER AND BUS CONNECTION.  
 MAX TORQUE 12 IN/LB GROUND SCREW
  - B. BDS4/5-30 TO 55 AMP  
 MAX TORQUE 20 IN/LB MOTOR, BUS CONNECTION AND GROUND STUD
  - C. PSR4/5-50 TO 75 AMP  
 MAX TORQUE 20 IN/LB MAIN POWER, BUS CONNECTION AND GROUND STUD  
 MAX TORQUE 12 IN/LB EXTERNAL REGEN CONNECTION

**Kolmorgen Industrial Drives**  
 RADFORD, VIRGINIA

**BDS4 WIRING DIAGRAM**  
 (NOTES)

CAD DWG.

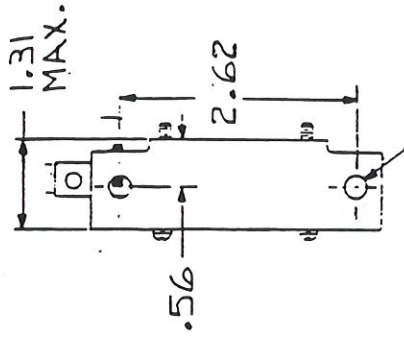
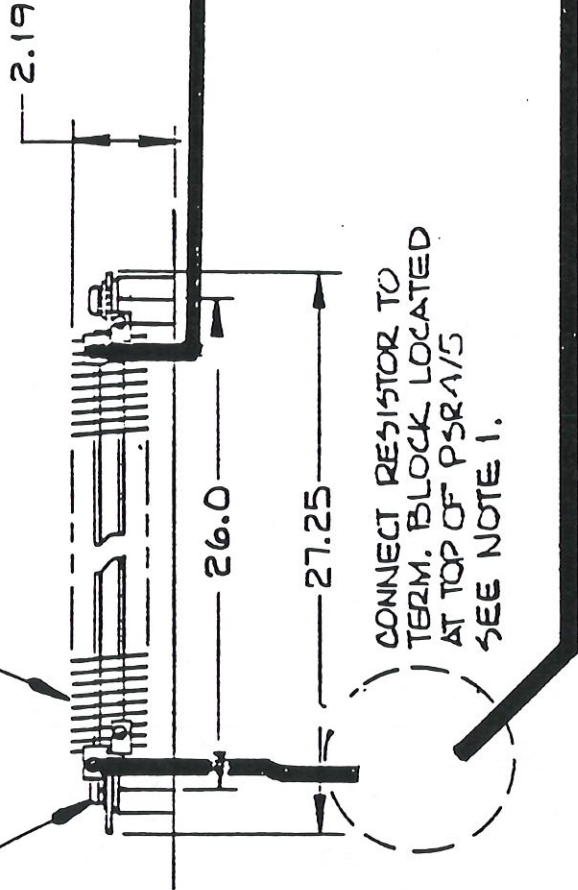
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DWM. DT:	DATE	APP'D. DT:	DATE	SCALE	DRG. NO.	ISSUE
VA	2-13-91			1:1	A-93231	8

- 1/4-20 x 1/2 PAN HD. SCREW, QTY(2)
- 1/4 LOCKWASHER, QTY(2)
- 1/4 FLATWASHER, .75" O.D., QTY(2)
- STANDOFF, SPRUCE PINE # 2165-1B, QTY(2)

- 1000 W CONTINUOUS
- 4.4 OHM RESISTOR
- QTY(1) 1.750 DIA.

SET TRIP CURRENT  
TO: 15 AMPS



**CAUTION-1) DO NOT INSTALL RESISTOR NEAR FLAMMABLE MATERIAL.**

**NOTES:** 2) SHOCK HAZARD & RESISTOR CONNECTED TO HIGH VOLTAGE.

- 1. RECOMMENDED WIRE: # 8AWG, 125°C
- 2. BOTTOM STANDOFFS ARE THREADED 1/4-20 x 3/8" DP FOR MOUNTING RESISTORS TO PANELS, ETC.
- 3. OUTPUT CONTACTS: WIRED TO DROP MAIN LINES WHEN CONTACTS OPEN ON OVERLOAD.

SEE NOTE # 3

7/32 DIA.  
2 MOUNT. HOLES

□ □ □ □ B COPY CODE

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

WIRING & MOUNTING DIAG.  
ER-21

SCALE: ~

DWG. NO. **A-93314**

ISSUE **1**

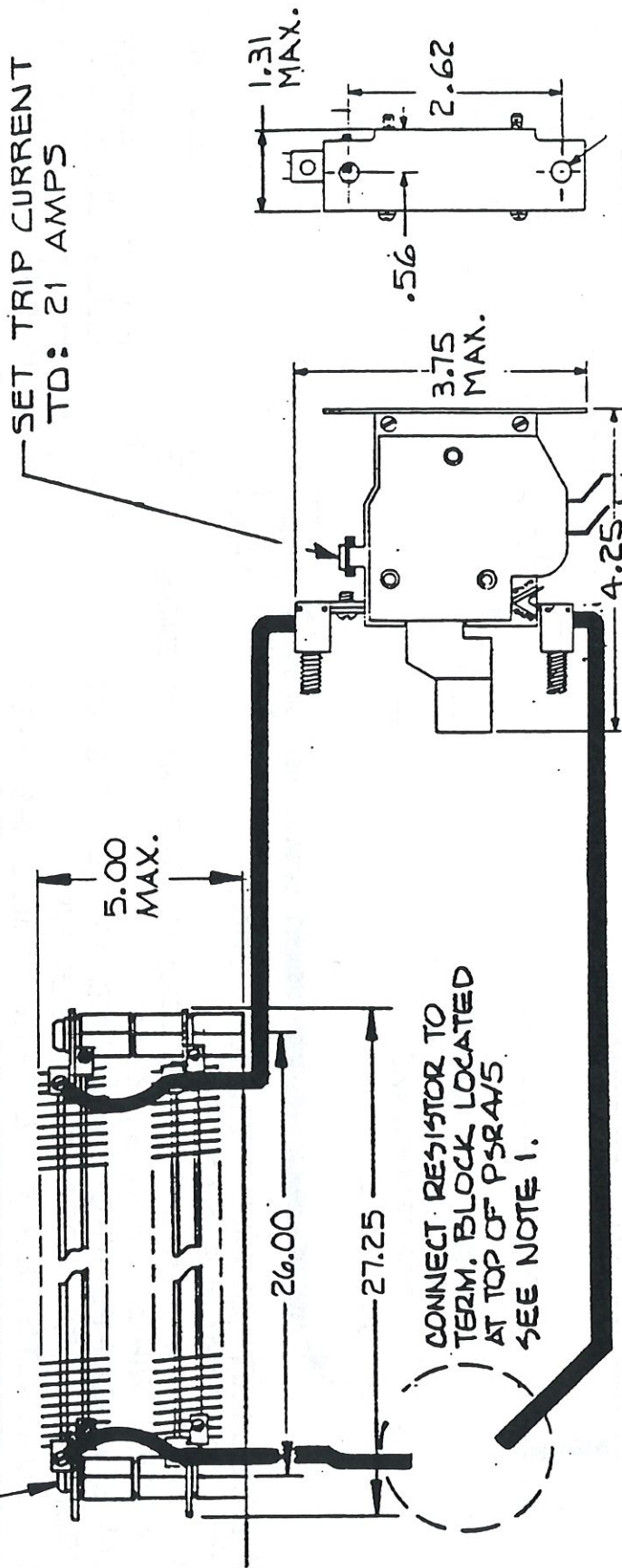
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---	---	---	---	---	---	---	---	CHK BY	---
---	---	---	---	---	---	---	---	APPD BY	5/21/91

UNLESS OTHERWISE SPECIFIED  
X1 DEC. PLACES 2,010  
X10 DEC. PLACES 2,000  
ANG. DIM. 1/16"

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

RATED POWER: 1000 W  
TOTAL RESISTANCE: 2.25 Ω

- 1/4-20 x 1/2 PAN HD. SCREW QTY (2)
- 1/4 LOCKWASHER QTY (2)
- 1/4 FLATWASHER QTY (2)
- 1/4-20 x 1/2 THREADED STUD QTY (4)
- STAND-OFF, SPRUCE PINE #2165-1B QTY (6)
- 4.5 OHM RESISTOR, 500 W QTY (2)



7/32 DIA.  
2 MOUNT. HOLES

SEE NOTE # 3

**CAUTION** - DO NOT INSTALL RESISTOR NEAR FLAMMABLE MATERIAL.

- NOTES: 2) SHOCK HAZARD & RESISTOR CONNECTED TO HIGH VOLTAGE.
- 1. RECOMMENDED WIRE: # 8 AWG, 125°C
- 2. BOTTOM STANDOFFS ARE THREADED 1/4-20 x 3/8" DP FOR MOUNTING RESISTORS TO PANELS, ETC.
- 3. OUTPUT CONTACTS: WIRED TO DROP MAIN LINES WHEN CONTACTS OPEN ON OVERLOAD.

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

WIRING & MOUNTING DIAG.  
ER-22

ISS.	ECN NO.	DATE	APPD	ISS	ECN NO.	DATE	APPD	DWN BY	DATE
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								CHK BY	
								APPD BY	5-23-91

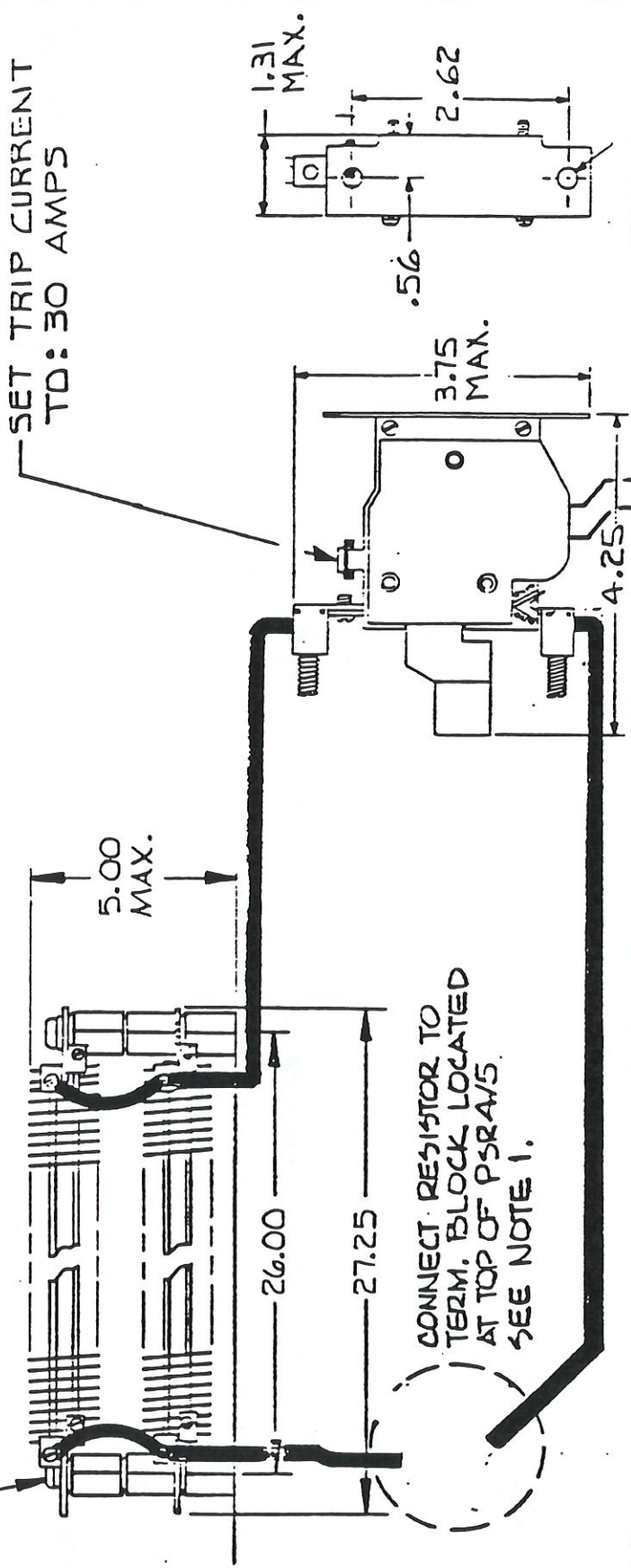
SCALE: **A-93315** ISSUE 1

UNLESS OTHERWISE SPECIFIED  
XX DEC. PLACES 2,010  
XXX DEC. PLACES 1,000  
ANG. DIM. 1,1'

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

RATED POWER: 2000 W  
TOTAL RESISTANCE: 2.2 Ω

- 1/4-20 x 1/2 PAN HD. SCREW QTY (2)
- 1/4 LOCKWASHER QTY (2)
- 1/4 FLATWASHER QTY (2)
- 1/4-20 x 1/2 THREADED STUD QTY (4)
- STAND-OFF, SPRUCE PINE #2165-1B QTY (6)
- 4.4 OHM RESISTOR, 1000 W QTY (2)



**CAUTION -** DO NOT INSTALL RESISTOR NEAR FLAMMABLE MATERIAL.

- NOTES: 2) SHOCK HAZARD & RESISTOR CONNECTED TO HIGH VOLTAGE.
- 1. RECOMMENDED WIRE: # 8 AWG, 125°C
- 2. BOTTOM STANDOFFS ARE THREADED 1/4-20 x 3/8" DP FOR MOUNTING RESISTORS TO PANELS, ETC.
- 3. OUTPUT CONTACTS: WIRED TO DROP MAIN LINES WHEN CONTACTS OPEN ON OVERLOAD.

□ □ □ □ **B** COPY CODE

**Koillmorgen Industrial Drives**  
RADFORD, VIRGINIA

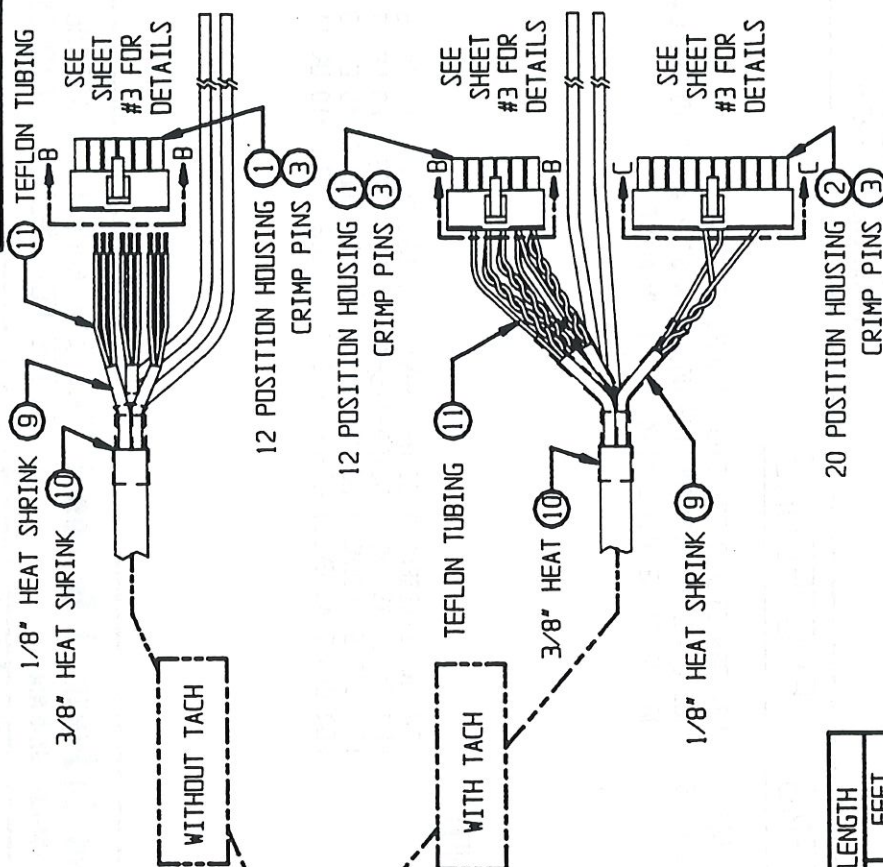
WIRING & MOUNTING DIAG.  
ER-23

SCALE: — DWG. NO. **A-93316** 1

ISS.	ECN NO.	DATE	APP'D	ISS	ECN NO.	DATE	APP'D	DW'N BY	DATE
								TDG	5-21-91
								CHK' BY	
								APP'D BY	5-23-91

UNLESS OTHERWISE SPECIFIED  
X.X DEC. PLACES 1.010  
X.XX DEC. PLACES 1.000  
ANG. DIM. 1/16"

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



**TUBING & SLEEVING PARTS LIST**  
 (FOR CONNECTORS & RELATED PARTS, SEE INDIVIDUAL SHEETS)

ITEM #	DESCRIPTION	ID		MANUFACTURER	
		PART NUMBER	NAME	PART NUMBER	
#8	FBRGLASS SLEEVING	A-84824-025	MARKEL	H455BA1000	
#9	1/8" SHRINK TUB.	G-15266	RAYCHEM	RNF-100-1-1/8"	
#10	3/8" SHRINK TUB.	H-15063	RAYCHEM	RNF-100-1-3/8"	
#11	TEFLON TUB.	H-15079	RAYCHEM	TFL-5/8"	
#12	5/8" SHRINK TUB.	H-15577	RAYCHEM	RNF-100-1-5/8"	
#13	1/2" SHRINK TUB.	H-15699	RAYCHEM	RNF-100-1-1/2"	

DASH NO.	CABLE LENGTH		DASH NO.	CABLE LENGTH		DASH NO.	CABLE LENGTH	
	METERS	FEET		METERS	FEET		METERS	FEET
-003	3	10	-027	27	90	-051	51	170
-006	6	20	-030	30	100	-054	54	180
-009	9	30	-033	33	110	-057	57	190
-012	12	40	-036	36	120	-060	60	200
-015	15	50	-039	39	130			
-018	18	60	-042	42	140			
-021	21	70	-045	45	150			
-024	24	80	-048	48	160			

**PART NUMBER DESCRIPTION**

GC-RXX-4/5-XX  
 GOLDLINE CABLE  
 BODS4 or 5 AMPLIFIER

R = THERMISTAT/RESOLVER  
 RT = THERMISTAT/RESOLVER/TACH  
 RB = THERMISTAT/RESOLVER/BRAKE  
 RBT = THERMISTAT/RESOLVER/BRAKE/TACH

**Kollmorgen Industrial Drives**  
 RADFORD, VIRGINIA

GOLDLINE AMPLIFIER ASSEMBLY GUIDE FOR RESOLVER CABLES			
ISS. ECN NO.	DATE	COPY CODE	ISS.
2	84691 EWR	8-21-92	2
3	84797 EWR	10-5-92	3
APP'D.	DATE	APP'D.	DATE
FOO	8-21-92	FOO	8-21-92
FOO	10-5-92	FOO	10-5-92
DATE	DATE	DATE	DATE
05-10-92	05-10-92	05-10-92	05-10-92
SCALE	SCALE	SCALE	SCALE
1:1	1:1	1:1	1:1
ENG. NO.	ENG. NO.	ENG. NO.	ENG. NO.
A-93369	A-93369	A-93369	A-93369
SHEET 1 OF 11	SHEET 1 OF 11	SHEET 1 OF 11	SHEET 1 OF 11
3	3	3	3









**+** (W/SOLDERED MOTOR CONNECTOR) **+**

**GOLDLINE RESOLVER CABLE WITH THERMOSTAT AND TACH (GC-RT-4/5-XX)**

**PARTS LIST**

CABLE			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER PART NUMBER
#4	6 PAIR	A-84819 BELDEN	87778

MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER PART NUMBER
#5	MOTOR HOUSING	A42867-1419 SDURIAU	851-06EC14-19S50

BDS4 C2 OR BDS5 C3 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER PART NUMBER
#1	12 POS. HOUSING	A-83908-012 MOLEX	39-01-2125
#3	CRIMP PIN	A-83909-002 MOLEX	39-00-0039
	CRIMP TOOL	N/A	HTR-60622

BDS4 C1 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER PART NUMBER
#2	20 POS. HOUSING	A-83908-020 MOLEX	39-01-2205
#3	CRIMP PIN	A-83909-002 MOLEX	39-00-0039
	CRIMP TOOL	N/A	HTR-60622

**CONNECTION CHART**

MOTOR CONNECTION ITEM #5	* CABLE ITEM #4	BDS4 C2 or BDS5 C3 ITEM #1	BDS4 C1 ITEM #2
TERMINAL A	RED	TERMINAL 7	N/C
TERMINAL B	BLACK	TERMINAL 1	
N/C	SHIELD	TERMINAL 8	
TERMINAL C	GREEN	TERMINAL 3	
TERMINAL D	BLACK	TERMINAL 9	
N/C	SHIELD	TERMINAL 2	
TERMINAL E	WHITE	TERMINAL 10	
TERMINAL F	BLACK	TERMINAL 4	
N/C	SHIELD	TERMINAL 5	
TERMINAL N	SEE NOTE #1	N/C	
TERMINAL P			
TERMINAL R	BROWN		T TERM. 12
TERMINAL S	BLACK	N/C	A TERM. 16
N/C	SHIELD		C
TERMINAL T	YELLOW	CUSTOMER	H TERM. 5
TERMINAL U	BLACK	THERMOSTAT	
N/C	SHIELD	HOOK-UP	

NOTE: SEE SHEET 2 AND 3 FOR CONNECTOR DETAILS.

\* THIS CABLE ASSEMBLY TO BE LABELED "GC-RT-4/5-XX".

CABLE LENGTH

NOTE:  
1. RESOLVER END: CUT-OFF REMAINING PAIR 12.7MM (1/2") FROM CABLE JACKET AND FOLD BACK OVER JACKET, PLACE UNDER HEAT SHRINK.  
MOTOR END: CUT-OFF REMAINING PAIR EVEN WITH CABLE JACKET.

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

**GOLDLINE AMPLIFIER ASSEMBLY**  
**GUIDE FOR RESOLVER CABLES**

DATE	08-12-92	DATE		SCALE	1:1	DWG. NO.	A-93369	SHEET 9 OF 11	ISSUE	3
DATE		DATE								
APP'D.	EWR	APP'D.								

<sup>+</sup> (W/SOLDERED MOTOR CONNECTOR)

GOLDLINE RESOLVER CABLE WITH THERMOSTAT, BRAKE, AND TACH (GC-RBT-4/5-XX)

CONNECTION CHART

PARTS LIST

CABLE			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#4	6 PAIR	A-84819	BELDEN 87778
MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#5	MOTOR HOUSING	A42867-1419	SOURTAU 851-06EC14-19SS0
BDS4 C2 OR BDS5 C3 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#1	12 POS. HOUSING	A-83908-012	MOLEX 39-01-2125
#3	CRIMP PIN	A-83909-002	MOLEX 39-00-0039
	CRIMP TOOL	N/A	MOLEX HTR-60622
BDS4 C1 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#2	20 POS. HOUSING	A-83908-020	MOLEX 39-01-2205
#3	CRIMP PIN	A-83909-002	MOLEX 39-00-0039
	CRIMP TOOL	N/A	MOLEX HTR-60622

MOTOR CONNECTION ITEM #5	* CABLE ITEM #4	BDS4 C2 or BDS5 C3 ITEM #1	BDS4 C1 ITEM #2
TERMINAL A	RED	TERMINAL 7	N/C
TERMINAL B	BLACK	TERMINAL 1	
N/C	SHIELD	TERMINAL 8	
TERMINAL C	GREEN	TERMINAL 3	
TERMINAL D	BLACK	TERMINAL 9	
N/C	SHIELD	TERMINAL 2	
TERMINAL E	WHITE	TERMINAL 10	
TERMINAL F	BLACK	TERMINAL 4	
N/C	SHIELD	TERMINAL 5	
TERMINAL N	BLUE	CUSTOMER	
TERMINAL P	BLACK	BRAKE	
N/C	SHIELD	HOOK-UP	
TERMINAL R	BROWN		T TERM. 12
TERMINAL S	BLACK	N/C	A TERM. 16
N/C	SHIELD		C TERM. 16
TERMINAL T	YELLOW		H TERM. 5
TERMINAL U	BLACK	CUSTOMER	
N/C	SHIELD	THERMOSTAT	
		HOOK-UP	

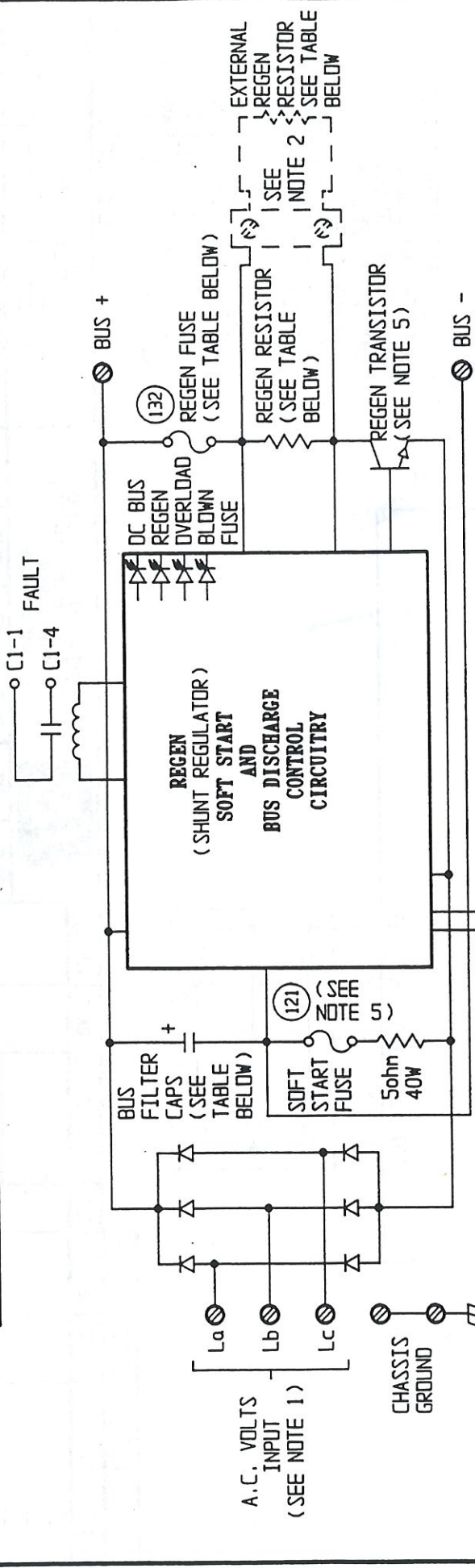
SEE SHEET 2 AND 3 FOR CONNECTOR DETAILS.  
 \* THIS CABLE ASSEMBLY TO BE LABELED "GC-RBT-4/5-XX".

CABLE LENGTH

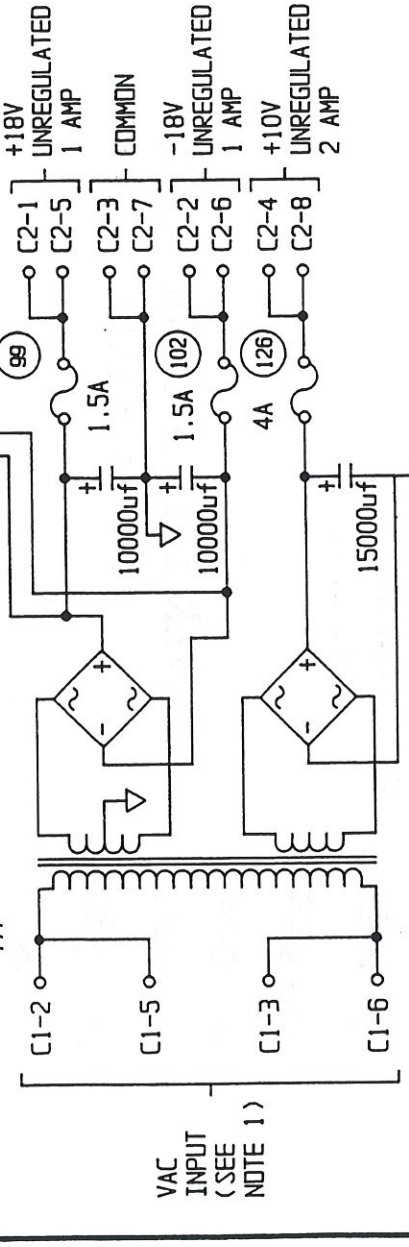
**Kollmorgen Industrial Drives**  
 RADFORD, VIRGINIA

GOLDLINE AMPLIFIER ASSEMBLY  
 GUIDE FOR RESOLVER CABLES

ISS.	ECN NO.	COPY CODE	ISS.	ECN NO.	DATE	APP'D.	DATE	APP'D.	DATE	APP'D.	DATE	SCALE	DMG. NO.	SHEET 11 OF 11	ISSUE
												1:1	A-93369		3



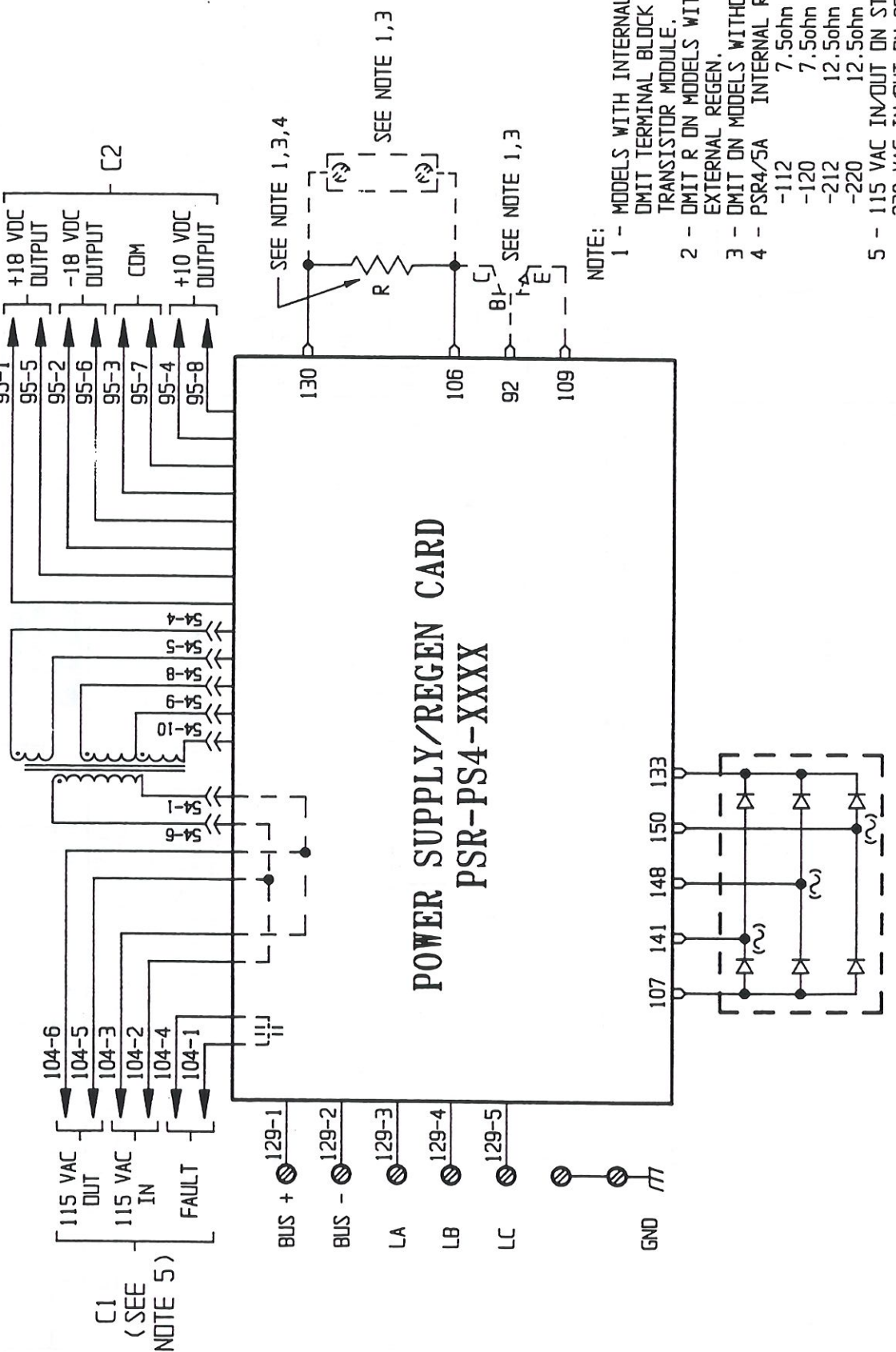
REGENERATION CAPABILITY	MODEL	REGEN RES	REGEN FUSE	CAP
NOTE 3	PSR4/5A-212	25ohm 100w	5A	1650uf
	PSR4/5A-220	12.5ohm 200w	8A	2970uf
	PSR4/5A-112	15ohm 100w	5A	1650uf
NOTE 4	PSR4/5A-120	7.5ohm 200w	7A	2970uf
	PSR4/5A-212-XXX1	8.8ohm 750w	12A	1650uf
	PSR4/5A-220-XXX1	8.8ohm 750w	12A	2970uf
	PSR4/5A-112-XXX2	5.5ohm 500w	8A	1650uf
	PSR4/5A-120-XXX2	5.5ohm 500w	8A	2970uf
	PSR4/5A-220-XXX3	7.8ohm 1000w	15A	2970uf
0	PSR4/5A-X12-XX8X	OPEN	OPEN	1650uf



NOTE:  
 1 - INPUT VOLTAGE DEPENDS ON MODEL.  
 2 - TERMINAL BLOCK PROVIDED ONLY ON EXTERNAL REGEN RESISTOR MODELS. NO INTERNAL REGEN RESISTOR PROVIDED ON EXTERNAL RESISTOR MODELS.  
 3 - THESE VALUES FOR INTERNAL REGEN ONLY.  
 4 - THESE VALUES FOR EXTERNAL REGEN ONLY.  
 5 - VALUE DEPENDS ON MODEL.

CAD DWG. (D-112)

<b>INDUSTRIAL DRIVES</b> RAUFORD, VIRGINIA A KOLLMOGER DIVISION		PSR4/5A-12 & 20AMP SIMPLIFIED SCHEMATIC	
ISS.	ECN NO.	ISS.	APP'D.
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DATE	DATE	DATE	DATE
---	---	05-22-92	6-1-92
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---	---	LLS	[Signature]
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1/1	A-93408	1/1	A-93408
ISSUE		ISSUE	
1		1	



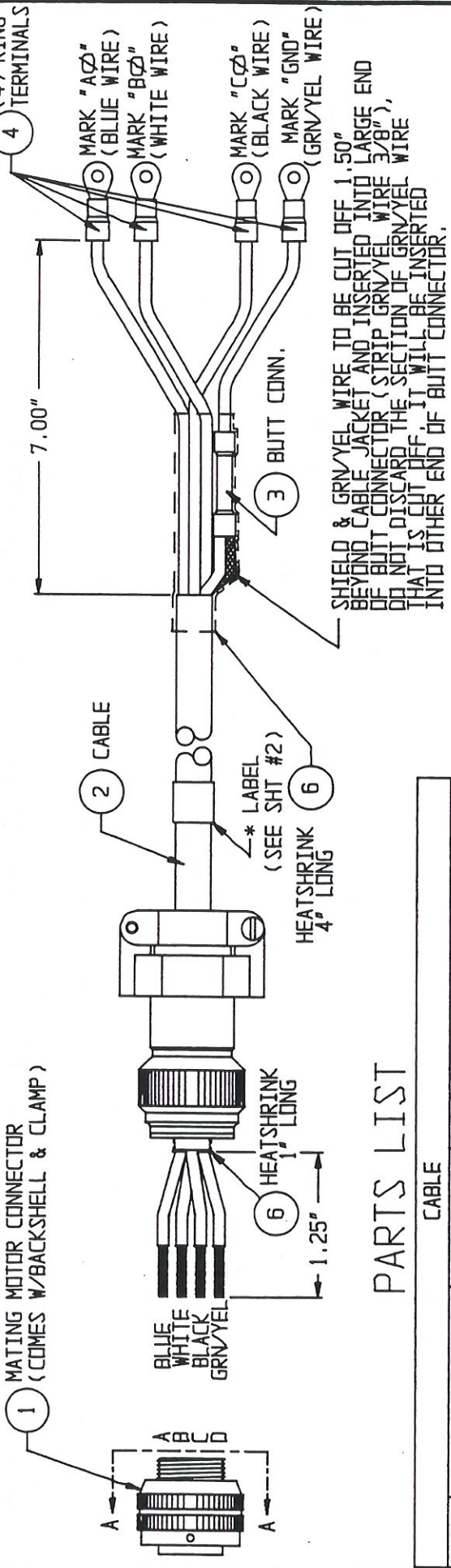
**POWER SUPPLY/REGEN CARD  
 PSR-PS4-XXXX**

- NOTE:
- 1 - MODELS WITH INTERNAL REGEN OMIT TERMINAL BLOCK AND TRANSISTOR MODULE.
  - 2 - OMIT R ON MODELS WITH EXTERNAL REGEN.
  - 3 - OMIT ON MODELS WITHOUT REGEN.
  - 4 - PSR4/5A INTERNAL R VALUE
    - 112 7.5ohn 100w
    - 120 7.5ohn 100w
    - 212 12.5ohn 100w
    - 220 12.5ohn 100w
  - 5 - 115 VAC IN/OUT ON STANDARD MODEL  
 230 VAC IN/OUT ON SPECIAL

C 6		COPY CODE		CAD DWG. (0-112)	
ISS.	ECN NO.	DATE	APP'D.	ISS.	PSR4/5A
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---	---	---	---	DWG. NO.	A-93409
---	---	---	---	DATE	15-1-92
---	---	---	---	APP'D. BY:	
---	---	---	---	DATE	
---	---	---	---	OK. BY:	
---	---	---	---	DATE	
---	---	---	---	INDUSTRIAL DRIVES	
---	---	---	---	RAUFORD, VIRGINIA	
---	---	---	---	A KOLLYERGEN DIVISION	
---	---	---	---	DWG. NO.	A-93409
---	---	---	---	ISSUE	1



+ (W/SOLDERED CONNECTOR) +  
GOLDLINE MOTOR CABLE (802A, 802B, 804A, 804B, & 806A MOTOR)



PARTS LIST

CABLE			
ITEM #	DESCRIPTION	ID	MANUFACTURER
#2	4 CONDUCTOR #8 AWG	A-93553-001	DMNI
			ID0804TBTPR-FLEX
MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID	MANUFACTURER
#1	MOTOR PLUG	A-43828	VEAM
			CTR 06F-32-17S

ITEM #	DESCRIPTION	ID	MANUFACTURER
#4	RING TERMINAL	A-79406-002	HOLLINGSWORTH
			R3027BF
#3	CRIMP TOOL	N/A	HOLLINGSWORTH
			#H6E
#6	3/4" SHRINK TUB.	A-80654-004	HOLLINGSWORTH
		G-17634	RAYCHEM
			RNF-100-1-3/4"

\* THIS CABLE ASSEMBLY TO BE LABELED "GC-M8A-4/5-XX".

CABLE LENGTH  
(IN METERS)

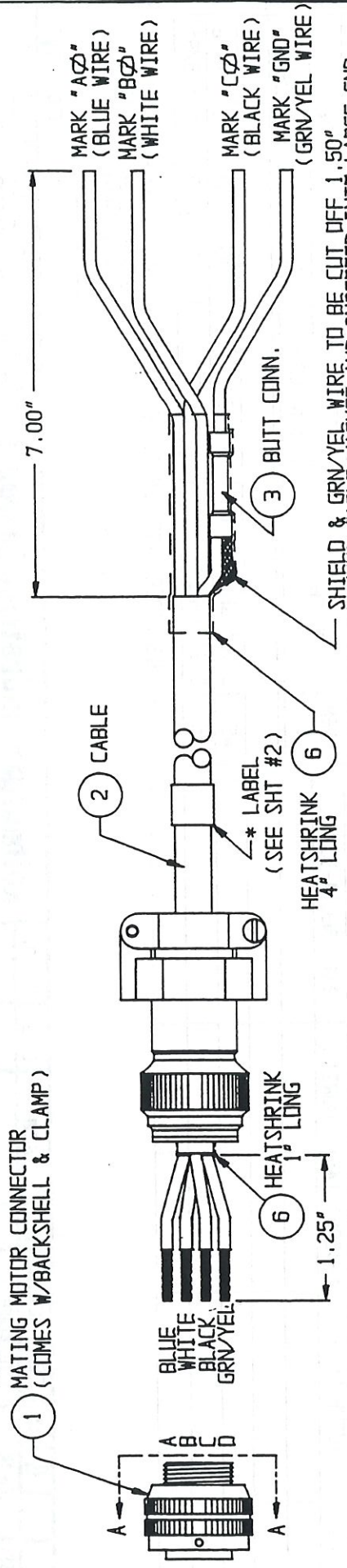
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ECN NO.	DATE	APP'D.	DATE	ECN NO.	DATE	APP'D.	DATE	ECN NO.	DATE	APP'D.	DATE

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

GOLDLINE AMPLIFIER ASSEMBLY GUIDE FOR MOTOR CABLES (30, 40, & 55 AMP)		SCALE	DATE	DATE	DATE	DATE
DWG. NO.	A-93414	1:1				
SHEET 6 OF 8	ISSUE					



**+ (W/SOLDERED CONNECTOR) +  
 GOLDLINE MOTOR CABLE (804C & 806B MOTOR)**



SHIELD & GRN/YEL WIRE TO BE CUT OFF 1.50" BEYOND CABLE JACKET AND INSERTED INTO LARGE END OF BUTT CONNECTOR (STRIP GRN/YEL WIRE 3/8"), DO NOT DISCARD THE SECTION OF GRN/YEL WIRE THAT IS CUT OFF. IT WILL BE INSERTED INTO OTHER END OF BUTT CONNECTOR.

**PARTS LIST**

CABLE			
ITEM #	DESCRIPTION	ID	MANUFACTURER
#2	4 CONDUCTOR #4 AWG	A-93553-005	OMNI
			ID0404BTBPR-FLEX
MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID	MANUFACTURER
#1	MOTOR PLUG	A-43828	VEAM
			CIR 06F-32-17S

ITEM #	DESCRIPTION	ID	MANUFACTURER
	CRIMP TOOL	N/A	HOLLINGSWORTH
#3	BUTT CONN.	A-80654-004	HOLLINGSWORTH
#6	3/4" SHRINK TUB.	G-17634	RAYCHEM

\* THIS CABLE ASSEMBLY TO BE LABELED "GC-M8B-4/5-XX".  
 CABLE LENGTH (IN METERS)

**Kollmorgen Industrial Drives**  
 RADFORD, VIRGINIA

GOLDLINE AMPLIFIER ASSEMBLY  
 GUIDE FOR MOTOR CABLES  
 (30, 40, & 55 AMP)

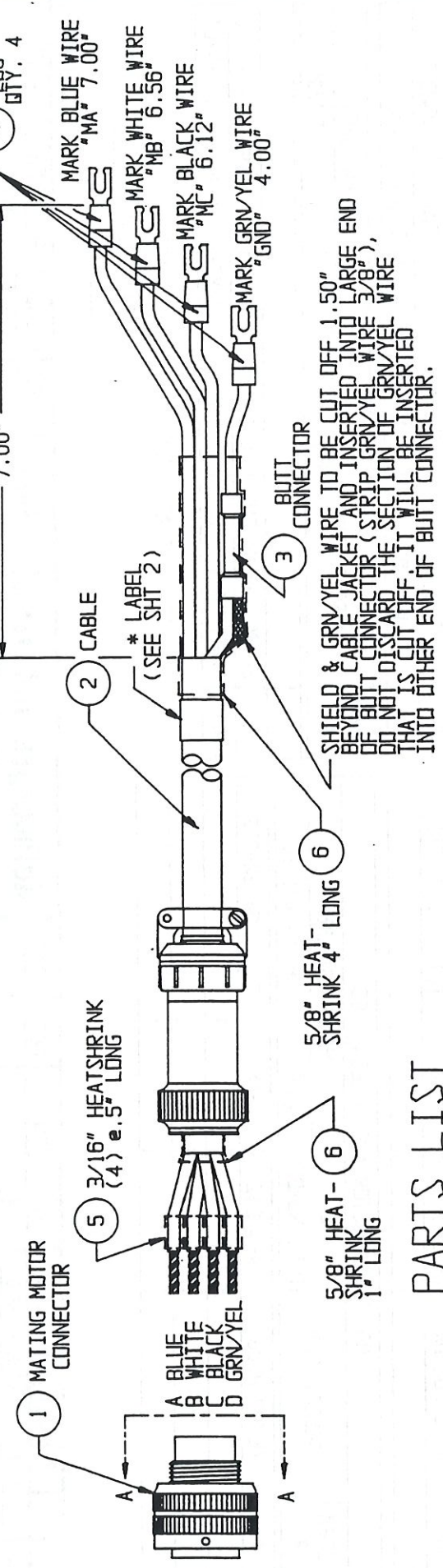
ISS.	ECN NO.	DATE	APP'D.	ISS.	ECN NO.	DATE	APP'D.

DATE	CHK. BY:	DATE	APP'D. BY:	DATE	SCALE	DWG. NO.	SHEET 8 OF 8	ISSUE
08-28-92	EWB				1:1	A-93414		3



**+ (SOLDERED)**  
**GOLDLINE MOTOR CABLE (FOR 206D & 40X EXC. 406C MOTOR)**



**PARTS LIST**

ITEM #	DESCRIPTION	ID	MANUFACTURER
#2	4 CONDUCTOR	A-93535-003	DMNI
#4	SPADE LUG	A-84267-002	HOLLINGSWORTH
#3	BUTT CONN.	A-80654-003	HOLLINGSWORTH
	CRIMP TOOL	N/A	HOLLINGSWORTH

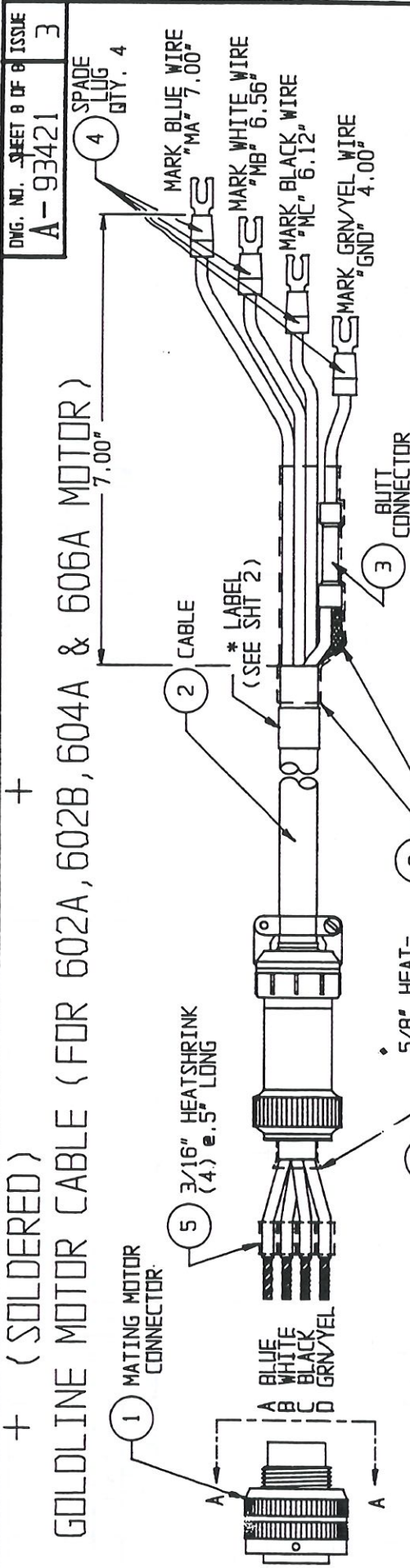
ITEM #	DESCRIPTION	ID	MANUFACTURER
#5	3/16" SHRINK TUB.	G-15265	RAYCHEM
#6	5/8" SHRINK TUB.	H-15577	RAYCHEM

\* THIS CABLE ASSEMBLY TO BE LABELED "GC-M2B OR M4A-4/5-XX".

CABLE LENGTH  
(IN METERS)

CAD DWG.

<b>Kollmorgen Industrial Drives</b> RADFORD, VIRGINIA		GOLDLINE AMPLIFIER ASSEMBLY GUIDE FOR MOTOR CABLES (3 THRU 20 AMP)	
ISS.	ECN NO.	ISS.	ECN NO.
DATE	APP'D.	DATE	APP'D.
DATE	DATE	DATE	DATE
CHK. #1	CHK. #2	SCALE	DWG. NO.
05-18-92		1:1	A-93421
EMR			SHEET 6 OF 8
			ISSUE <b>3</b>



SHIELD & GRN/YEL WIRE TO BE CUT OFF 1.50" BEYOND CABLE JACKET AND INSERTED INTO LARGE END OF BUTT CONNECTOR (STRIP GRN/YEL WIRE 3/8"), DO NOT DISCARD THE SECTION OF GRN/YEL WIRE THAT IS CUT OFF. IT WILL BE INSERTED INTO OTHER END OF BUTT CONNECTOR.

**PARTS LIST**

CABLE			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#2	4 CONDUCTOR	A-93553-003	OMNI ID12041BTPR-FLEX
MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#1	MOTOR PLUG	A-43642	VEAM CIR. 06F-22-22S
#4	SPADE LUG	A-84267-002	HOLLINGSWORTH XSS20836
#3	BUTT CONN.	A-80654-003	HOLLINGSWORTH B4046BF
	CRIMP TOOL	N/A	HOLLINGSWORTH #H6E
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#5	3/16" SHRINK TUB.	G-15265	RAYCHEM RNF-100-1-3/16"
#6	5/8" SHRINK TUB.	H-15577	RAYCHEM RNF-100-1-5/8"

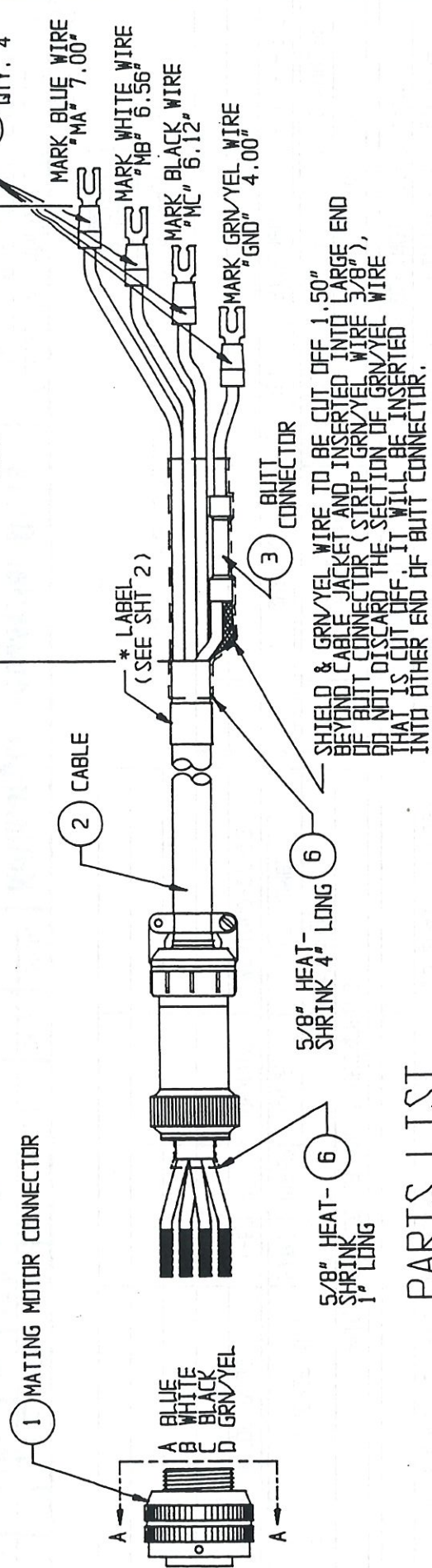
\* THIS CABLE ASSEMBLY TO BE LABELED "GC-M6A-4/5-XX".

CABLE LENGTH (IN METERS)

CAD DWG.

ISS.		COPY CODE		ISS.	ECN NO.	DATE	APP'D.
E.C.N. NO.		DATE	APP'D.	Kollmorgen Industrial Drives		GOLDLINE AMPLIFIER ASSEMBLY	
E.C.N. NO.		DATE	APP'D.	RAYCHEM, VIRGINIA		GUIDE FOR MOTOR CABLES	
E.C.N. NO.		DATE	APP'D.	(3 THRU 20 AMP)		SCALE	1:1
E.C.N. NO.		DATE	APP'D.	DWG. NO.		SHEET 8 OF 8	
E.C.N. NO.		DATE	APP'D.	A-93421		ISSUE	
E.C.N. NO.		DATE	APP'D.	A-93421		3	

+ (SOLDERED MOTOR CONNECTOR) +  
GOLDLINE MOTOR CABLE (FOR 40X EXC. 406C MOTOR)



SHIELD & GRN/YEL WIRE TO BE CUT OFF 1.50" BEYOND CABLE JACKET AND INSERTED INTO LARGE END OF BUTT CONNECTOR (STRIP GRN/YEL WIRE 3/8"), DO NOT DISCARD THE SECTION OF GRN/YEL WIRE THAT IS CUT OFF. IT WILL BE INSERTED INTO OTHER END OF BUTT CONNECTOR.

PARTS LIST

ITEM #	DESCRIPTION	ID		MANUFACTURER	
		PART NUMBER	NAME	PART NUMBER	NAME
#4	SPADE LUG	A-84267-002	HOLLINGSWORTH	XSS20836	
#3	BUTT CONN.	A-80654-003	HOLLINGSWORTH	B4046BF	
	CRIMP TOOL	N/A	HOLLINGSWORTH	#H6E	

ITEM #	DESCRIPTION	ID		MANUFACTURER	
		PART NUMBER	NAME	PART NUMBER	NAME
#6	5/8" SHRINK TUB.	H-15577	RAYCHEM	RNF-100-1-5/8"	

\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-MAA-4/5-XX".

CABLE LENGTH (IN METERS)

CAD DWG.

CABLE			
ITEM #	DESCRIPTION	MANUFACTURER	PART NUMBER
#2	4 COND. (12 AWG)	OMNI	ID1204BTBR-FLEX

MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	MANUFACTURER	PART NUMBER
#1	MOTOR PLUG	BENDIX	MS3106E-18-10S

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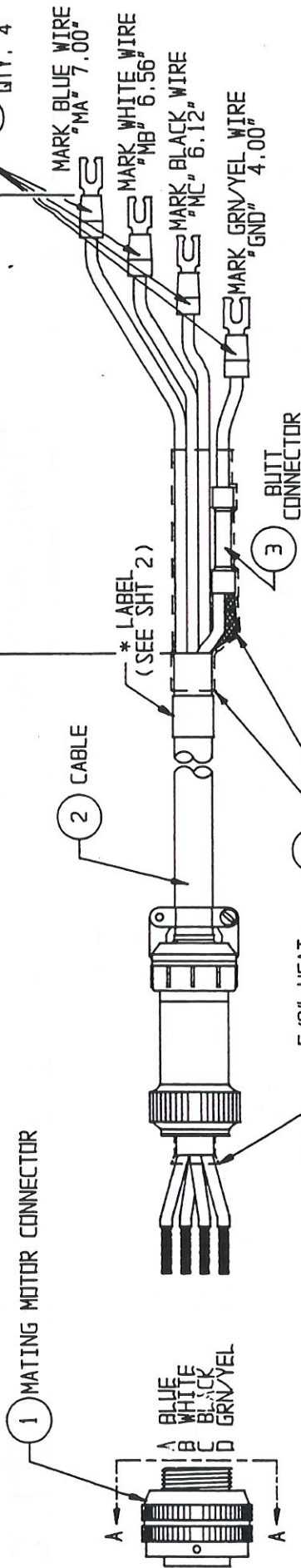
  

B C		ISS.		ECN NO.		DATE		APP'D.	
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Kollmorgen Industrial Drives		GOLDLINE AMPLIFIER ASSEMBLY		SHEET 4 OF 6	
RADFORD, VIRGINIA		GUIDE FOR MOTOR CABLES		ISSUE	
		(3 THRU 20 AMP)		4	

**+ (SOLDERED MOTOR CONNECTOR) +  
GOLDLINE MOTOR CABLE (FOR 602A, 602B, 604A & 606A MOTOR)**



SHIELD & GRN/YEL WIRE TO BE CUT OFF 1.50" BEYOND CABLE JACKET AND INSERTED INTO LARGE END OF BUTT CONNECTOR (STRIP GRN/YEL WIRE 3/8"), DO NOT DISCARD THE SECTION OF GRN/YEL WIRE THAT IS CUT OFF. IT WILL BE INSERTED INTO OTHER END OF BUTT CONNECTOR.

**PARTS LIST**

CABLE			
ITEM #	DESCRIPTION	MANUFACTURER	PART NUMBER
#2	4 COND. (12 AWG)	OMNI	ID12041BTPR-FLEX

MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	MANUFACTURER	PART NUMBER
#1	MOTOR PLUG	BENDIX	MS3106E-22-22S

ITEM #	DESCRIPTION	ID	MANUFACTURER
#4	SPADE LUG	A-84267-002	HOLLINGSWORTH
#3	BUTT CONN.	A-80654-003	HOLLINGSWORTH
	CRIMP TOOL	N/A	HOLLINGSWORTH

ITEM #	DESCRIPTION	ID	MANUFACTURER
#6	5/8" SHRINK TUB.	H-15577	RAYCHEM
			RNF-100-1-5/8"

\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-M6A-4/5-XX".

CABLE LENGTH (IN METERS)

CAD DWG.

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

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

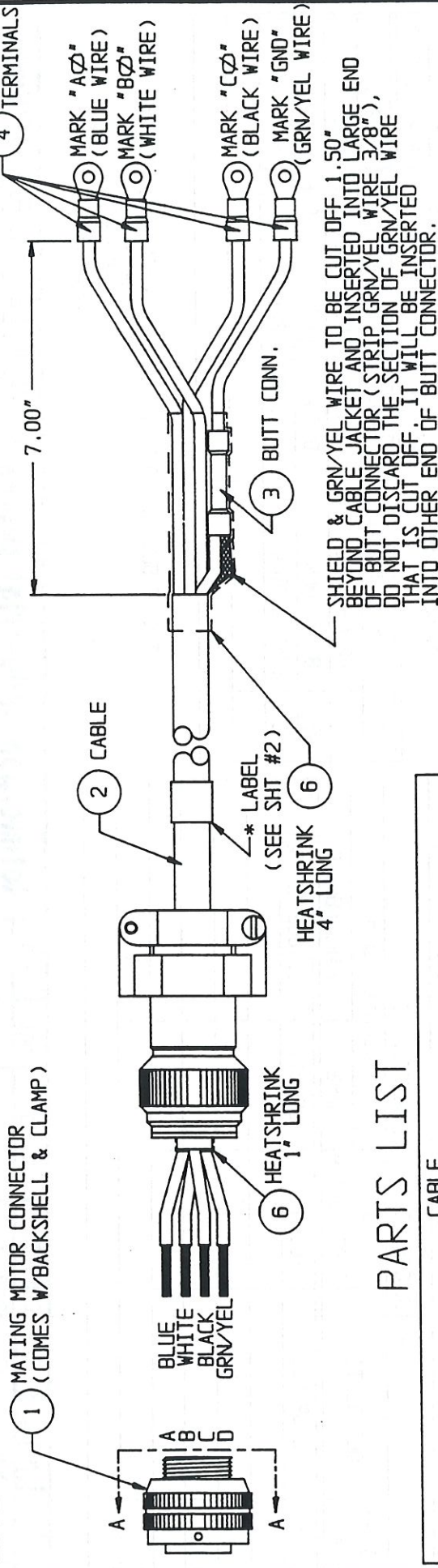
  

GOLDLINE AMPLIFIER ASSEMBLY GUIDE FOR MOTOR CABLES (3 THRU 20 AMP)			
DWG. NO.	SCALE	DATE	DATE
A-93538	1:1		

DWG. NO.	SCALE	DATE	DATE
A-93538	1:1		

**GOLDLINE MOTOR CABLE (406C MOTOR)**



**PARTS LIST**

CABLE		MANUFACTURER	
ITEM #	DESCRIPTION	PART NUMBER	NAME
#2	4 CONDUCTOR #8 AWG	A-93553-001	DMNI
			ID0804T8TPR-FLEX
MOTOR CONNECTOR AND ACCESSORIES		MANUFACTURER	
ITEM #	DESCRIPTION	PART NUMBER	NAME
#1	MOTOR PLUG	A-63197	BENDIX
			MS3106E-22-22S

ITEM #	DESCRIPTION	PART NUMBER	ID	NAME	MANUFACTURER
#4	RING TERMINAL	A-79406-002	HOLLINGSWORTH	R3027BF	
#3	CRIMP TOOL	N/A	HOLLINGSWORTH	#H6E	
#6	BUTT CONN.	A-80654-004	HOLLINGSWORTH	B4047BF	
	3/4" SHRINK TUB.	G-17634	RAYCHEM	RNF-100-1-3/4"	

\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-M48-4/5-XX".

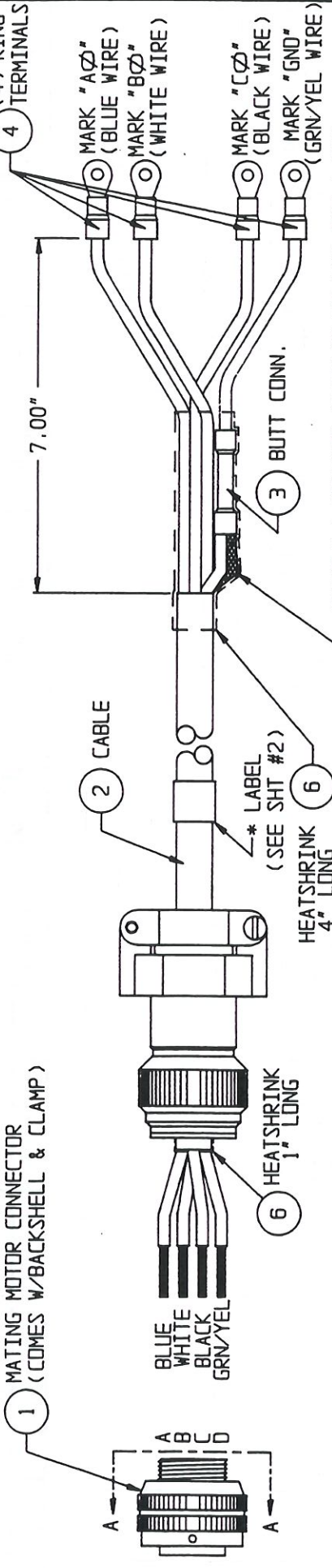
CABLE LENGTH  
(IN METERS)

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

GOLDLINE AMPLIFIER ASSEMBLY  
GUIDE FOR MOTOR CABLES  
(30, 40, & 55 AMP)

ISS.	ECN NO.	DATE	APP'D.	ISSUE
				3
DMN. BY:	DATE	APP'D. BY:	DATE	SCALE
EWR	10-01-92			1:1
DWG. NO.	SHEET 4 OF 9	ISSUE		
A-93539		3		

**GOLDLINE MOTOR CABLE (604B, 604C, 606B, 606C, & 606D MOTOR) + (W/SOLDERED CONNECTOR)**



SHIELD & GRN/YEL WIRE TO BE CUT OFF 1.50" BEYOND CABLE JACKET AND INSERTED INTO LARGE END OF BUTT CONNECTOR (STRIP GRN/YEL WIRE 3/8"), DO NOT DISCARD THE SECTION OF GRN/YEL WIRE THAT IS CUT OFF. IT WILL BE INSERTED INTO OTHER END OF BUTT CONNECTOR.

**PARTS LIST**

ITEM #	DESCRIPTION	CABLE		MOTOR CONNECTOR AND ACCESSORIES	
		ID	MANUFACTURER	ID	MANUFACTURER
#2	4 CONDUCTOR #8 AWG A-93553-001	DMNI	ID0804TBTPR-FLEX		
#1	MOTOR PLUG	A-63197	BENDIX	MS3106E-22-22S	

ITEM #	DESCRIPTION	CABLE		MOTOR CONNECTOR AND ACCESSORIES	
		ID	MANUFACTURER	ID	MANUFACTURER
#4	RING TERMINAL	A-79406-002	HOLLINGSWORTH	R3027BF	
	CRIMP TOOL	N/A	HOLLINGSWORTH	#H6E	
#3	BUTT CONN.	A-80654-004	HOLLINGSWORTH	B4047BF	
#6	3/4" SHRINK TUB.	G-17634	RAYCHEM	RNF-100-1-3/4"	

\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-M68-4/5-XX".

CABLE LENGTH (IN METERS)

ISS.		COPY CODE		ISS.		ECN NO.		DATE		APP'D.	
ECN NO.	DATE	APP'D.	DATE	ECN NO.	DATE	APP'D.	DATE	ECN NO.	DATE	APP'D.	DATE

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

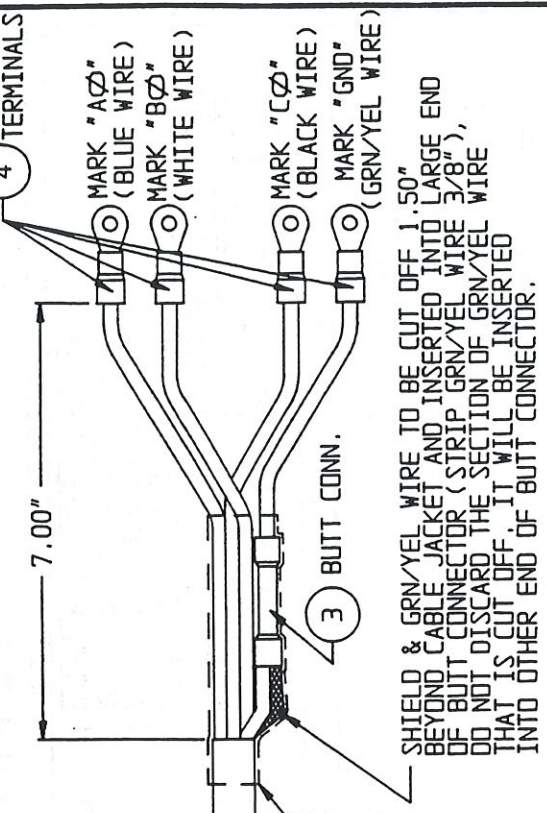
GOLDLINE AMPLIFIER ASSEMBLY  
GUIDE FOR MOTOR CABLES  
(30, 40, & 55 AMP)

DWG. NO.	SCALE	DATE	DATE	DATE	DATE
<b>A-93539</b>	1:1				

SHEET 6 OF 9 ISSUE **3**



**GOLDLINE MOTOR CABLE (802A, 802B, 804A, 804B, & 806A MOTOR)**



SHIELD & GRN/YEL WIRE TO BE CUT OFF 1.50" BEYOND CABLE JACKET AND INSERTED INTO LARGE END OF BUTT CONNECTOR (STRIP GRN/YEL WIRE 3/8"), DO NOT DISCARD THE SECTION OF GRN/YEL WIRE THAT IS CUT OFF, IT WILL BE INSERTED INTO OTHER END OF BUTT CONNECTOR.

**PARTS LIST**

CABLE		ID	MANUFACTURER
ITEM #	DESCRIPTION	PART NUMBER	NAME
#2	4 CONDUCTOR #8 AWG	A-93553-001	OMNI
MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	PART NUMBER	MANUFACTURER
#1	MOTOR PLUG	A-93613-004	POWELL
	CRIMP CONTACTS	A-93614-004	POWELL
	CRIMP TOOL	N/A	BENDIX

ITEM #	DESCRIPTION	ID	MANUFACTURER
		PART NUMBER	NAME
#4	RING TERMINAL	A-79406-002	HOLLINGSWORTH
	CRIMP TOOL	N/A	HOLLINGSWORTH
#3	BUTT CONN.	A-80654-004	HOLLINGSWORTH
#5	3/16" SHRINK TUB.	G-15265	RAYCHEM
#6	3/4" SHRINK TUB.	G-17634	RAYCHEM

\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-M8A-4/5-XX".

CABLE LENGTH (IN METERS)

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

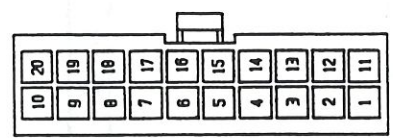
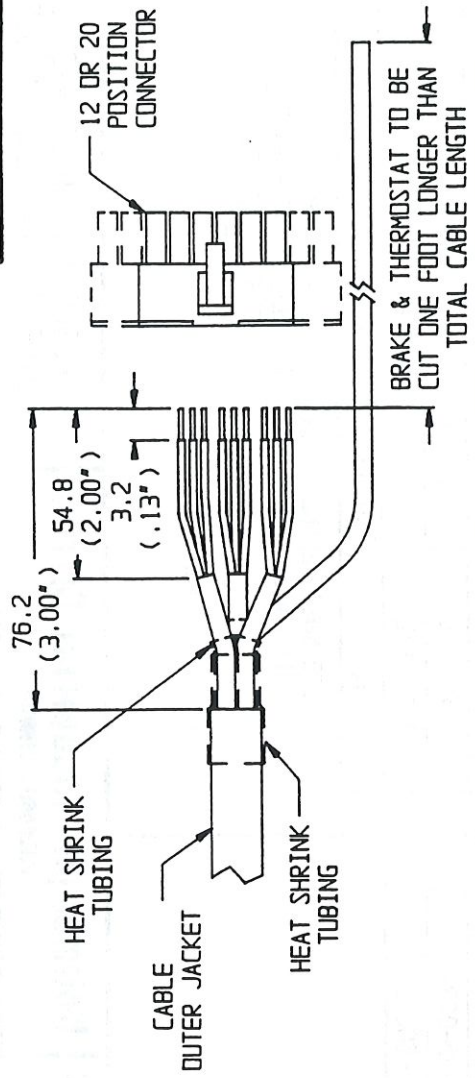
**GOLDLINE AMPLIFIER ASSEMBLY**  
GUIDE FOR MOTOR CABLES  
(30, 40, & 55 AMP)

ISS.	ECN NO.	DATE	APP'D.	ISS.	ECN NO.	DATE	APP'D.
-	-	-	-	-	-	-	-

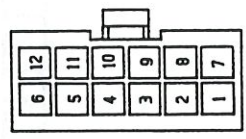
DWG. NO.	SCALE	DATE	APP'D. BY:	DATE	DATE	CHK. BY:	DATE
A-93539	1:1	10-01-92	EWR	10-01-92			

DWG. NO.	SCALE	DATE	APP'D. BY:	DATE	DATE	CHK. BY:	DATE
A-93539	1:1	10-01-92	EWR	10-01-92			





DETAIL C - C

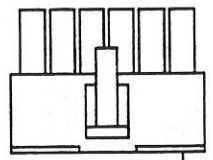


DETAIL B - B

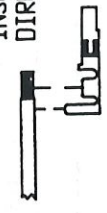
## CONNECTOR ASSEMBLY PROCEDURE

- STEP 1** BEFORE ANY OUTER JACKET HAS BEEN REMOVED FROM THE CABLE, PERFORM STEP 3 FOR EACH REMAINING PAIRS.
- STEP 2** SLIDE A SECTION OF HEAT SHRINK TUBING ONTO THE CABLE. STEP 4
- STEP 3** STRIP THE CABLE OUTER JACKET BACK, 381MM (15.00"). THIS WILL EXPOSE THE INDIVIDUAL FOIL SHIELDS. STEP 5
- STEP 4** ACCORDING TO THE CONNECTION CHART, SELECT ONE OF THE WIRE PAIRS AND COMPLETE THE FOLLOWING OPERATIONS. SEE NOTE #1. OF THE CABLE AND SHRINK, AS SHOWN ABOVE.

- A REMOVE THE FOIL SHIELD FROM THE WIRE.
- B COVER SHIELD WIRE WITH TUBING.
- C COVER THE THREE LEADS WITH HEAT SHRINK.
- D USE STRIPPING PLIERS TO STRIP INSULATION FROM INDIVIDUAL WIRES, 3.2MM (.13").
- E CRIMP PINS TO EACH OF THE THREE WIRES.
- F INSERT WIRES INTO 12 OR 20 POSITION CONNECTOR.



INSERT ALL PINS IN THIS DIRECTION AS SHOWN.



<b>Kollmorgen Industrial Drives</b> ROANOKE, VIRGINIA				GOLDLINE AMPLIFIER ASSEMBLY GUIDE FOR RESOLVER CABLES			
ISS.	ECN NO.	COPY CODE	ISS.	ECN NO.	DATE	APP'D.	SCALE
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---	---	---	---	---	---	---	<b>A-93540</b>
---	---	---	---	---	---	---	ISSUE 1

(W/SOLDERED MOTOR CONNECTOR)  
GOLDLINE RESOLVER CABLE WITH THERMOSTAT (GCA-R-4/5-XX)

PARTS LIST

CABLE			
ITEM #	DESCRIPTION	ID	MANUFACTURER
	PART NUMBER	NAME	PART NUMBER
#4	4 PAIR	A-81948 BELDEN	8725
MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID	MANUFACTURER
	PART NUMBER	NAME	PART NUMBER
#5	MOTOR HOUSING	G-10158 BENDIX	MS3106E-22-14S
BDS4 C2 OR BDS5 C3 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID	MANUFACTURER
	PART NUMBER	NAME	PART NUMBER
#1	12 PDS. HOUSING	A-83908-012 MOLEX	39-01-2125
#3	CRIMP PIN	A-83909-002 MOLEX	39-00-0039
	CRIMP TOOL	N/A MOLEX	HTR-60622

CONNECTION CHART

MOTOR CONNECTION ITEM #5	* CABLE ITEM #4	BDS4 C2 or BDS5 C3 ITEM #1	BDS4 C1 ITEM #2
TERMINAL A	RED	TERMINAL 7	N/C
TERMINAL B	BLACK	TERMINAL 1	
N/C	SHIELD	TERMINAL 8	
TERMINAL C	WHT/YEL	TERMINAL 3	
TERMINAL D	WHT/GRN	TERMINAL 9	
N/C	SHIELD	TERMINAL 2	
TERMINAL E	WHT/RED	TERMINAL 10	
TERMINAL F	WHT/BLK	TERMINAL 4	
N/C	SHIELD	TERMINAL 5	
TERMINAL N			
TERMINAL P		N/C	
TERMINAL R			
TERMINAL S		N/C	
TERMINAL T	GREEN	CUSTOMER	
TERMINAL U	WHITE	THERMOSTAT	
N/C	SHIELD	HOOK-UP	

SEE SHEET 2 AND 3 FOR CONNECTOR DETAILS.  
\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-R-4/5-XX".

CABLE LENGTH

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

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

DMG. NO.	DATE	CHK. BY:	DATE	APP'D. BY:	DATE	SCALE	SHEET 5 OF 11	ISSUE
A-93540	10-07-92	EWR				1:1	A-93540	1

GOLDLINE AMPLIFIER ASSEMBLY  
GUIDE FOR RESOLVER CABLES

(W/SOLDERED MOTOR CONNECTOR)  
GOLDLINE RESOLVER CABLE WITH THERMOSTAT AND BRAKE (GCA-RB-4/5-XX)

PARTS LIST

CABLE			
ITEM #	DESCRIPTION	PART NUMBER	MANUFACTURER
#4	6 PAIR	A-84819	BELDEN
			87778

MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	PART NUMBER	MANUFACTURER
#5	MOTOR HOUSING	G-10158	BENDIX
			MS3106E-22-14S

BDS4 C2 OR BDS5 C3 AND ACCESSORIES			
ITEM #	DESCRIPTION	PART NUMBER	MANUFACTURER
#1	12 POS. HOUSING	A-83908-012	MOLEX
#3	CRIMP PIN	A-83909-002	MOLEX
	CRIMP TOOL	N/A	MOLEX
			HTR-60622

CONNECTION CHART

MOTOR CONNECTION	* CABLE	BDS4 C2 or BDS5 C3	BDS4 C1
ITEM #5	ITEM #4	ITEM #1	ITEM #2
TERMINAL A	RED	TERMINAL 7	N/C
TERMINAL B	BLACK	TERMINAL 1	
N/C	SHIELD	TERMINAL 8	
TERMINAL C	GREEN	TERMINAL 3	
TERMINAL D	BLACK	TERMINAL 9	
N/C	SHIELD	TERMINAL 2	
TERMINAL E	WHITE	TERMINAL 10	
TERMINAL F	BLACK	TERMINAL 4	
N/C	SHIELD	TERMINAL 5	
TERMINAL N	BLUE	CUSTOMER	
TERMINAL P	BLACK	BRAKE	
N/C	SHIELD	HOOK-UP	
TERMINAL R	SEE NOTE #1	N/C	
TERMINAL S			
TERMINAL T	YELLOW	CUSTOMER	
TERMINAL U	BLACK	THERMOSTAT	
N/C	SHIELD	HOOK-UP	

NOTE:  
SEE SHEET 2 AND 3 FOR CONNECTOR DETAILS.  
\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-RB-4/5-XX".

[CABLE LENGTH]

1. RESOLVER END: CUT-OFF REMAINING PAIR 12.7MM (1/2") FROM CABLE JACKET AND FOLD BACK OVER JACKET, PLACE UNDER HEAT SHRINK.  
MOTOR END: CUT-OFF REMAINING PAIR EVEN WITH CABLE JACKET.

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

GOLDLINE AMPLIFIER ASSEMBLY  
GUIDE FOR RESOLVER CABLES

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

DATE	CHK. BY:	DATE	APP'D. BY:	DATE	SCALE	DWG. NO.	SHEET 7 OF 11	ISSUE
10-07-92	EWR				1:1	A-93540		1

( W/ SOLDERED MOTOR CONNECTOR )  
GOLDLINE RESOLVER CABLE WITH THERMOSTAT AND TACH ( GCA-RT-4/5-XX )

PARTS LIST

CABLE			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#4	6 PAIR	A-84819	BELDEN 87778
MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#5	MOTOR HOUSING	G-10158	BENDIX MS3106E-22-14S
BDS4 C2 DR BDS5 C3 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#1	12 PDS. HOUSING	A-83908-012	MOLEX 39-01-2125
#3	CRIMP PIN	A-83909-002	MOLEX 39-00-0039
	CRIMP TOOL	N/A	MOLEX HTR-60622
BDS4 C1 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID PART NUMBER	MANUFACTURER NAME PART NUMBER
#2	20 PDS. HOUSING	A-83908-020	MOLEX 39-01-2205
#3	CRIMP PIN	A-83909-002	MOLEX 39-00-0039
	CRIMP TOOL	N/A	MOLEX HTR-60622

CONNECTION CHART

MOTOR CONNECTION ITEM #5	* CABLE ITEM #4	BDS4 C2 or BDS5 C3 ITEM #1	BDS4 C1 ITEM #2
TERMINAL A	RED	TERMINAL 7	N/C
TERMINAL B	BLACK	TERMINAL 1	
N/C	SHIELD	TERMINAL 8	
TERMINAL C	GREEN	TERMINAL 3	
TERMINAL D	BLACK	TERMINAL 9	
N/C	SHIELD	TERMINAL 2	
TERMINAL E	WHITE	TERMINAL 10	
TERMINAL F	BLACK	TERMINAL 4	
N/C	SHIELD	TERMINAL 5	
TERMINAL N	SEE NOTE #1		
TERMINAL P		N/C	
TERMINAL R	BROWN		T TERM. 12
TERMINAL S	BLACK	N/C	A TERM. 16
N/C	SHIELD		C TERM. 5
TERMINAL T	YELLOW	CUSTOMER	N/C
TERMINAL U	BLACK	THERMOSTAT	
N/C	SHIELD	HOOK-UP	

NOTE:  
1. RESOLVER END: CUT-OFF REMAINING PAIR 12.7MM (1/2") FROM CABLE JACKET AND FOLD BACK OVER JACKET, PLACE UNDER HEAT SHRINK. MOTOR END: CUT-OFF REMAINING PAIR EVEN WITH CABLE JACKET.

SEE SHEET 2 AND 3 FOR CONNECTOR DETAILS.  
\* THIS CABLE ASSEMBLY TO BE LABELED "GCA-RT-4/5-XX".

[CABLE LENGTH]

ISS.		ECN NO.		COPY CODE		ISS.		ECN NO.		DATE		APP'D.		
<b>Kollmorgen Industrial Drives</b> RADFORD, VIRGINIA														
GOLDLINE AMPLIFIER ASSEMBLY GUIDE FOR RESOLVER CABLES														
SCALE 1:1										DWG. NO. A-93540		SHEET 9 OF 11		ISSUE 1

(W/SOLDERED MOTOR CONNECTOR)

GOLDLINE RESOLVER CABLE WITH THERMOSTAT, BRAKE, AND TACH (GCA-RBT-4/5-XX)

PARTS LIST

CABLE			
ITEM #	DESCRIPTION	ID	MANUFACTURER
		PART NUMBER	PART NUMBER
#4	6 PAIR	A-84819	BELDEN 87778

MOTOR CONNECTOR AND ACCESSORIES			
ITEM #	DESCRIPTION	ID	MANUFACTURER
		PART NUMBER	PART NUMBER
#5	MOTOR HOUSING	G-10158	BENDIX MS3106E-22-14S

BDS4 C2 DR BOSS C3 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID	MANUFACTURER
		PART NUMBER	PART NUMBER
#1	12 POS. HOUSING	A-83908-012	MOLEX 39-01-2125
#3	CRIMP PIN	A-83909-002	MOLEX 39-00-0039
	CRIMP TOOL	N/A	MOLEX HTR-60622

BDS4 C1 AND ACCESSORIES			
ITEM #	DESCRIPTION	ID	MANUFACTURER
		PART NUMBER	PART NUMBER
#2	20 POS. HOUSING	A-83908-020	MOLEX 39-01-2205
#3	CRIMP PIN	A-83909-002	MOLEX 39-00-0039
	CRIMP TOOL	N/A	MOLEX HTR-60622

CONNECTION CHART

MOTOR CONNECTION ITEM #5	* CABLE ITEM #4	BDS4 C2 or BDS5 C3 ITEM #1	BDS4 C1 ITEM #2
TERMINAL A	RED	TERMINAL 7	N/C
TERMINAL B	BLACK	TERMINAL 1	
N/C	SHIELD	TERMINAL 8	
TERMINAL C	GREEN	TERMINAL 3	
TERMINAL D	BLACK	TERMINAL 9	
N/C	SHIELD	TERMINAL 2	
TERMINAL E	WHITE	TERMINAL 10	
TERMINAL F	BLACK	TERMINAL 4	
N/C	SHIELD	TERMINAL 5	
TERMINAL N	BLUE	CUSTOMER	
TERMINAL P	BLACK	BRAKE	
N/C	SHIELD	HOOK-UP	
TERMINAL R	BROWN		T TERM. 12
TERMINAL S	BLACK	N/C	A TERM. 16
N/C	SHIELD		C TERM. 5
TERMINAL T	YELLOW	CUSTOMER	
TERMINAL U	BLACK	THERMOSTAT	
N/C	SHIELD	HOOK-UP	

SEE SHEET 2 AND 3 FOR CONNECTOR DETAILS.  
 \* THIS CABLE ASSEMBLY TO BE LABELED "GCA-RBT-4/5-XX".

[CABLE LENGTH]

**Kollmorgen Industrial Drives**  
 ROANOKE, VIRGINIA

GOLDLINE AMPLIFIER ASSEMBLY  
 GUIDE FOR RESOLVER CABLES

ISS.	ECN NO.	DATE	COPY CODE	ISS.	ECN NO.	DATE	APP'D.

DWG. NO.	SHT 11 OF 11	ISSUE	SCALE	DWG. NO.	SHEET 11 OF 11	ISSUE
A-93540		1	1:1	A-93540		1













THIRD ANGLE PROJECTION

METRIC

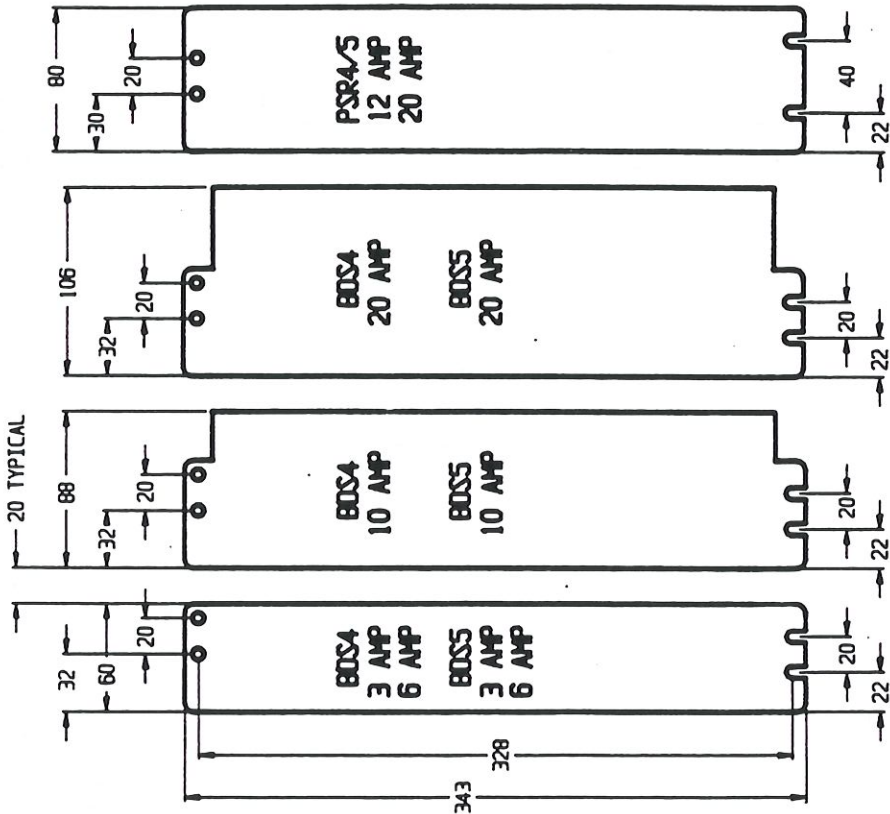
UNLESS OTHERWISE SPECIFIED  
ANG. DIM. ±1 DEGREE

METRIC  
X DEC. PLACES ±.4  
XX DEC. PLACES ±.13

[INCHES]  
XX DEC. PLACES ±.015 IN.  
XXX DEC. PLACES ±.005 IN.

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

DWG. NO. SHT 1 OF 2  
A-93656  
ISSUE 1



1-A 25mm MINIMUM FREE SPACE SHOULD BE MAINTAINED AROUND THE SYSTEM.  
 2-LOCATE THE HIGHEST CURRENT BDS4/5 AMPLIFIER NEXT TO THE PSR4/5 POWER SUPPLY AND REMAINING BDS4/5 AMPLIFIERS IN DESCENDING ORDER.

ISS.	ECN NO.	DATE	APP'D.	ISS.	ECN NO.	DATE	APP'D.
---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---

CAD DWG.

<b>Kollmorgen Industrial Drives</b> RADFORD, VIRGINIA				MOUNTING HOLE PATTERN BDS4, BDS5, PSR4/5			
DN. BT:	DATE	CHK. BT:	DATE	APP'D. BT:	DATE	SCALE	DWG. NO.
TOG	11-06-92			cqf	11-12	1:4	A-93656
						SHT 1 OF 2	ISSUE 1



THIRD ANGLE PROJECTION

**METRIC**

UNLESS OTHERWISE SPECIFIED  
ANG. DIM. ±1 DEGREE

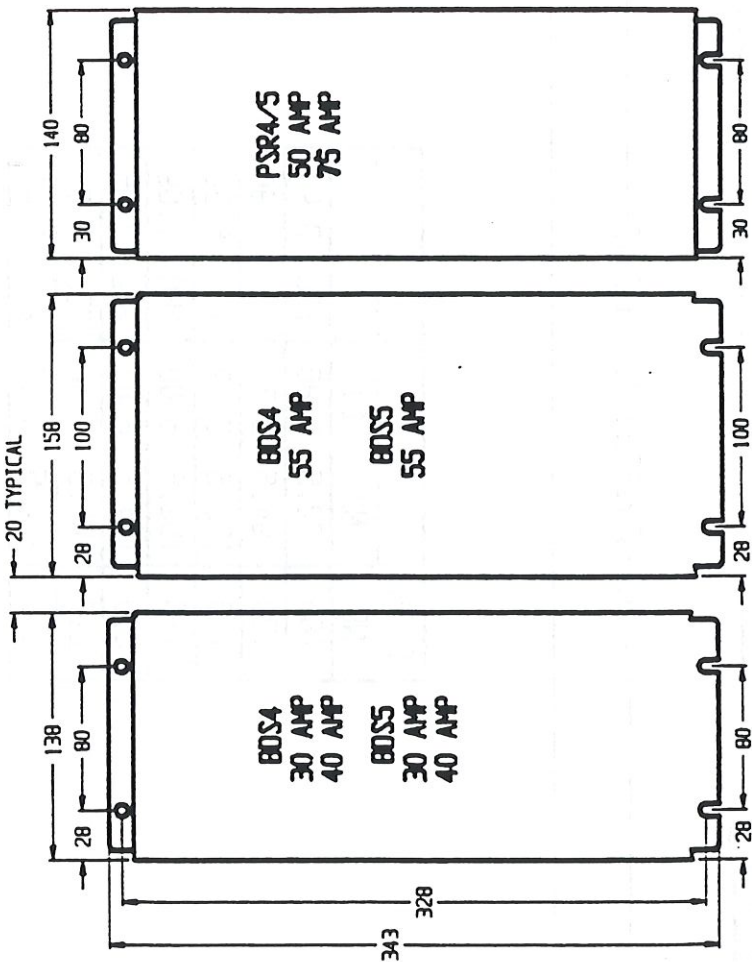
METRIC  
X DEC. PLACES ±.4  
XX DEC. PLACES ±.13

(INCHES)  
XX DEC. PLACES ±.015 IN.  
XXX DEC. PLACES ±.005 IN.

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

DWG. NO. SHT 2 OF 2  
**A-93656**

ISSUE  
**1**



SEE NOTES ON SHEET 1.

ISS.		ECN NO.		ISS.		ECN NO.		APP'D.		DATE	
---	---	---	---	---	---	---	---	---	---	---	---

COPY CODE		APP'D.		DATE	
---	---	---	---	---	---

**Kollmorgen Industrial Drives**  
RADFORD, VIRGINIA

DATE	DATE	DATE	DATE	DATE	DATE
11-06-92					

DATE	DATE	DATE	DATE	DATE	DATE

MOUNTING HOLE PATTERN  
BDS4, BDS5, PSR4/5

SCALE	DWG. NO.	SHT 2 OF 2	ISSUE
1/4	<b>A-93656</b>		<b>1</b>

CAD DWG.

UNLESS OTHERWISE SPECIFIED  
ANG. DIM. ±1 DEGREE

METRIC  
X DEC. PLACES ±.4  
XX DEC. PLACES ±.13

(INCHES)  
XX DEC. PLACES ±.015 IN.  
XXX DEC. PLACES ±.005 IN.

DO NOT SCALE DWG. USE DIMENSIONS ONLY.  
ALL DIMENSIONS ARE MILLIMETERS WITH INCHES  
IN BRACKETS. UNLESS OTHERWISE SPECIFIED.

DWG. NO. **A-93700**

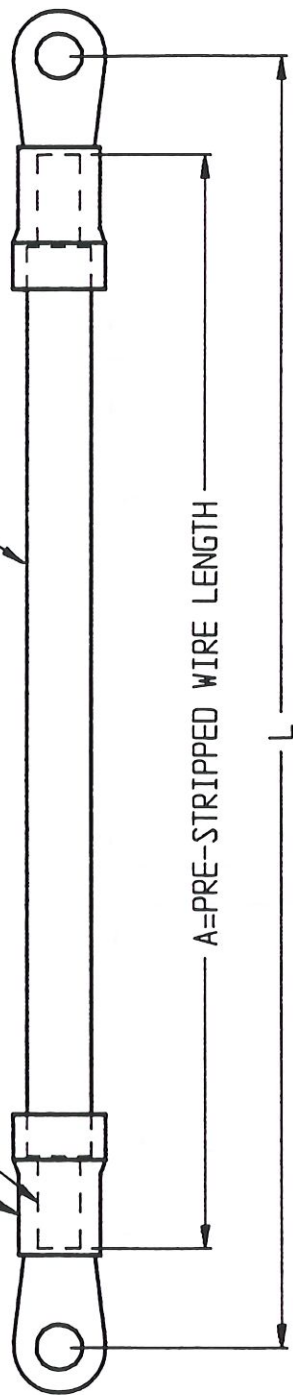
ISSUE **2**

THIRD ANGLE PROJECTION  
**METRIC**

A-79407-005  
TERMINAL LUG  
QTY. 2

STRIP WIRE 13MM [.50"]  
ON BOTH ENDS

A-81290-002 #6 AWG BLACK WIRE  
LENGTH PER CHART



DASH NO.	A		L	
	MM	IN	MM	IN
100	72.5	2.86	100	3.94
120	94.5	3.72	122	4.80
160	132.5	5.22	160	6.30
180	152.5	6.00	180	7.09
200	174.5	6.87	202	7.95
220	192.5	7.58	220	8.66
240	212.5	8.37	240	9.45

CAD DWG.

ISS.		ECN NO.		ISS.		ECN NO.		ISS.		ECN NO.	
DATE		APP' D.		DATE		APP' D.		DATE		APP' D.	
Kollmorgen Industrial Drives RADFORD, VIRGINIA				DC BUS CABLE ASSEMBLY FOR BDS4/5 & PSR4/5				SCALE 1:1		ISSUE 2	
DOW. BY: TDG				CHK. BY: CJF		DATE 12-15-92		DATE 12-18-92		DWG. NO. A-93700	





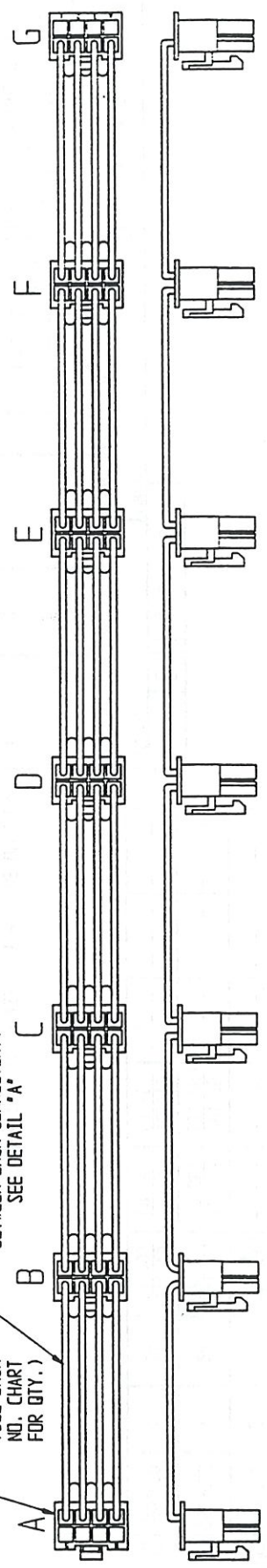


DO NOT SCALE DWG. USE DIMENSIONS ONLY.  
 ALL DIMENSIONS ARE MILLIMETERS  
 UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED  
 MAX. DEPT. PLACES ±.005  
 ANG. DIM. ±.1°

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

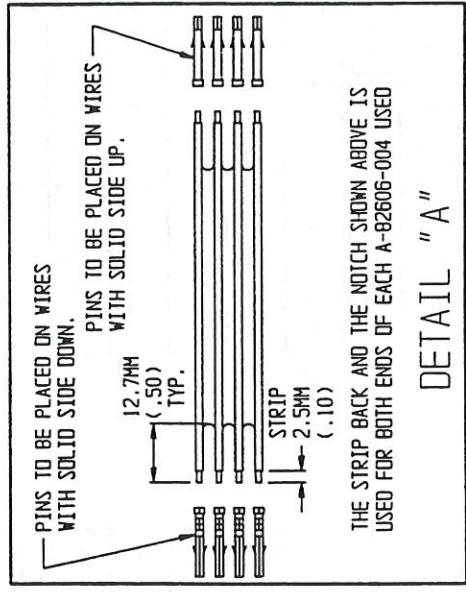
ISSUE DATE: 5/90  
 DWG. NO.: B-84929  
 SH 1 OF 2  
 ISSUE: 11



A-83908-008  
 A-83909-002  
 (SEE DASH NO. CHART FOR QTY.)

A-82606-004 (SEE DASH NO. CHART FOR LENGTH OF WIRE BETWEEN EACH CONNECTOR.)  
 SEE DETAIL "A"

CONFIG.	CABLE LENGTH	CONFIG.	CABLE LENGTH	CONFIG.	CABLE LENGTH
-1-1-	111.75 (4.40)	-3-1-	151.75 (5.98)	-6-2-	211.75 (8.34)
-1-2-	111.75 (4.40)	-3-2-	151.75 (5.98)	-6-3-	211.75 (8.34)
-1-3-	111.75 (4.40)	-3-3-	151.75 (5.98)	-6-5-	211.75 (8.34)
-1-5-	111.75 (4.40)	-3-5-	151.75 (5.98)	-6-6-	211.75 (8.34)
-1-6-	111.75 (4.40)	-3-6-	151.75 (5.98)	-6-H-	311.75 (12.27)
-1-L-	131.75 (5.19)	-3-L-	171.75 (6.76)	-L-1-	111.75 (4.40)
-1-H-	211.75 (8.34)	-3-H-	271.75 (10.70)	-L-2-	111.75 (4.40)
-2-1-	131.75 (5.19)	-5-1-	191.75 (7.55)	-L-3-	111.75 (4.40)
-2-2-	131.75 (5.19)	-5-2-	191.75 (7.55)	-H-1-	111.75 (4.40)
-2-3-	131.75 (5.19)	-5-3-	191.75 (7.55)	-H-2-	111.75 (4.40)
-2-5-	131.75 (5.19)	-5-5-	191.75 (7.55)	-H-3-	111.75 (4.40)
-2-6-	131.75 (5.19)	-5-6-	191.75 (7.55)	-H-5-	111.75 (4.40)
-2-L-	151.75 (5.98)	-5-H-	291.75 (11.49)	-H-6-	111.75 (4.40)
-2-H-	231.75 (9.12)	-6-1-	211.75 (8.34)		



POSITION CODE CHART	
DESCRIPTION	CODE
NO MODULE IN THIS POSITION	0
BDS4 3 & 6 AMP	1
BDS5 3 AMP	1
BDS4 10 AMP	2
BDS4 6 AMP	2
BDS4 20 AMP	3
BDS5 10 & 20 AMP	3
BDS4 & 5 30 & 40 AMP	5
BDS4 & 5 55 AMP	6
PSR4/5 12 & 20 AMP	L
PSR4/5 50 & 75 AMP	H

NOTES:  
 SEE DWG. A-84050 FOR SPACING BETWEEN UNITS.

MATERIAL		FINISH:		DATE		DATE		DATE		DATE		DATE		DATE	
ISS	ECN NO.	DATE	APP'D.	ISS	ECN NO.	DATE	APP'D.	ISS	ECN NO.	DATE	APP'D.	ISS	ECN NO.	DATE	APP'D.
7	84473 EWR	9/92	CJF	2	83952 VA	4/91	CJF	7	84709 EWR	10-92	CJF	3	84137 LS	8/91	CJF
8	84709 EWR	10-92	CJF	3	84137 LS	8/91	CJF	8	84903 EWR	12-92	CJF	4	84363 EWR	3/92	CJF
9	84903 EWR	12-92	CJF	4	84363 EWR	3/92	CJF	9	85255 T06	5-93	CJF	5	84473 EWR	5/92	F00
10	85255 T06	5-93	CJF	5	84473 EWR	5/92	F00	10	85313 T06	6-93	CJF	6	84546 EWR	6/92	CJF
11	85313 T06	6-93	CJF	6	84546 EWR	6/92	CJF								

ISSUE DATE: 5/90  
 DWG. NO.: B-84929  
 SH 1 OF 2  
 ISSUE: 11

ISSUE DATE: 5/90  
 DWG. NO.: B-84929  
 SH 1 OF 2  
 ISSUE: 11

**Kollmorgen Industrial Drives**  
 MANASSAS, VIRGINIA

BDS4 AND BDS5  
 LOGIC CABLE ASSEMBLY

FOOT SCALE: DWG. NO. B-84929  
 SH 1 OF 2  
 ISSUE: 11

**DASH NUMBER CHART**

EXAMPLE: B-84929-H 111000  
 DWG. NUMBER **111000** SEE POSITION CODE CHART

DASH NO.	CONN QTY.	PIN QTY.	WIRE LENGTH FROM (CUT WIRE TO LENGTH SHOWN BELOW)							MILLIMETERS (INCHES)
			A TO B	B TO C	C TO D	D TO E	E TO F	F TO G		
12L0000	3	16	111.75 (4.40)	151.75 (5.98)	---	---	---	---	---	---
111L0000	4	24	111.75 (4.40)	131.75 (5.19)	---	---	---	---	---	---
11L00000	2	8	131.75 (5.19)	---	---	---	---	---	---	---
23H3200	5	32	131.75 (5.19)	271.75 (10.70)	111.75 (4.40)	151.75 (5.98)	---	---	---	---
1111H32	7	48	111.75 (4.40)	111.75 (4.40)	211.75 (8.34)	111.75 (4.40)	151.75 (5.98)	---	---	---
111123H	7	48	111.75 (4.40)	111.75 (4.40)	111.75 (4.40)	131.75 (5.19)	271.75 (10.70)	---	---	---
1111L00	5	32	111.75 (4.40)	111.75 (4.40)	131.75 (5.19)	---	---	---	---	---
H555000	4	24	111.75 (4.40)	191.75 (7.55)	191.75 (7.55)	---	---	---	---	---
55H6000	4	24	191.75 (7.55)	291.75 (11.49)	111.75 (4.40)	---	---	---	---	---
5400000	2	8	291.75 (11.49)	---	---	---	---	---	---	---
555H000	4	24	191.75 (7.55)	291.75 (11.49)	191.75 (7.55)	---	---	---	---	---
H655000	4	24	111.75 (4.40)	211.75 (8.34)	191.75 (7.55)	---	---	---	---	---

5\*\* THIS CABLE ASSEMBLY MUST BE USED ONLY WITH BDS4 AMPLIFIERS!!

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

UNLESS OTHERWISE SPECIFIED  
 XX DEC. PLACES ±.015  
 XXX DEC. PLACES ±.005  
 ANG. DIM. ± 1"

DWG. NO. SH 2 OF 2  
**B-84929** ISSUE **11**

DASH NO.	CONN QTY.	PIN QTY.	WIRE LENGTH FROM (CUT WIRE TO LENGTH SHOWN BELOW)						
			A TO B	B TO C	C TO D	D TO E	E TO F	F TO G	
9 H111100	5	32	111.75 (4.40)	111.75 (4.40)	111.75 (4.40)	111.75 (4.40)	---	---	---
9 11L0000	3	16	111.75 (4.40)	131.75 (5.19)	---	---	---	---	---
9 2H00000	2	8	231.75 (9.12)	---	---	---	---	---	---
9 3H00000	2	8	271.75 (10.70)	---	---	---	---	---	---
9 6H00000	2	8	311.75 (12.27)	---	---	---	---	---	---

**B C COPY CODE**

MATERIAL: \_\_\_\_\_ FINISH: \_\_\_\_\_

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

DATE: 5/90  
 TIME: 2:28  
 APP'D. BY: SCH  
 JOB NO. 91  
 CROSS REF. NO. \_\_\_\_\_

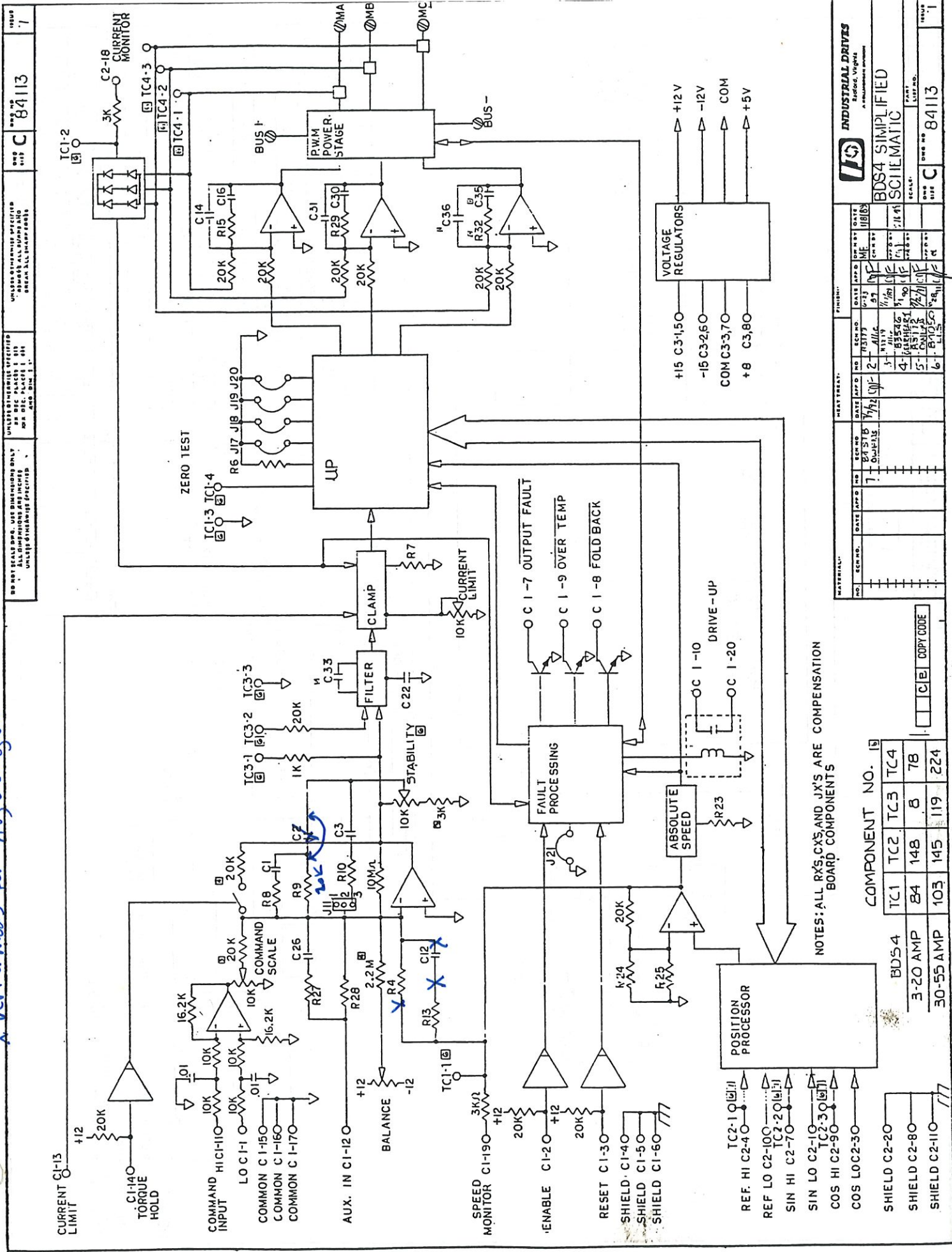
CAD DWG

**Kollmorgen Industrial Drives**  
 RADFORD, VIRGINIA

BDS4 AND BDS5  
 LOGIC CABLE ASSEMBLY

R101 SCALE: DWG. NO. SH 2 OF 2 ISSUE  
 1:1 B-84929 11

*X vertex mds for A2, dome, clk*



DO NOT SCALE DIM. USE DIMENSIONS ONLY FOR DIM. PLACES 1-819 UNLESS OTHERWISE SPECIFIED. SEE DIM. 1-1.

UNLESS OTHERWISE SPECIFIED, ALL DIM. PLACES 1-819 ARE IN MILLIMETERS. UNLESS OTHERWISE SPECIFIED, ALL DIM. PLACES 1-819 ARE IN INCHES.

DATE: 11/81

DESIGNER: ME

DRAWN BY: ME

CHECKED BY: ME

APPROVED BY: ME

SCALE: 1:1

NO. 84113

REV. 1

NOTES: ALL RX'S, CX'S, AND JX'S ARE COMPENSATION BOARD COMPONENTS

MATERIAL		HEAT TREAT.		FINISH	
NO.	QTY.	DATE	APPROVED	NO.	DATE
1	1	11/81	ME	1	11/81
2	1	11/81	ME	2	11/81
3	1	11/81	ME	3	11/81
4	1	11/81	ME	4	11/81
5	1	11/81	ME	5	11/81
6	1	11/81	ME	6	11/81

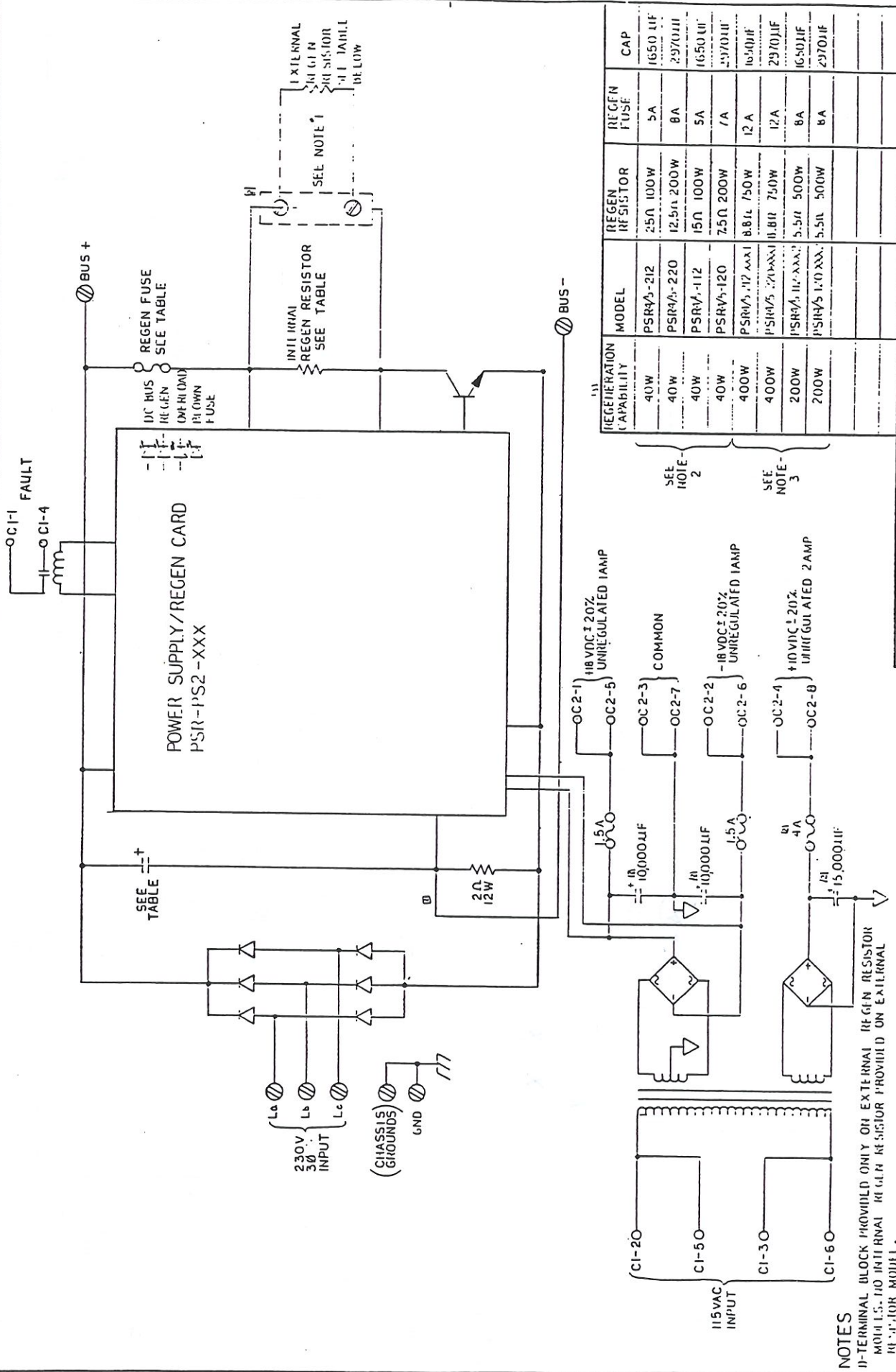
COMPONENT NO.	
TC1	TC2
84	148
103	145
103	119
103	224

INDUSTRIAL DRIVES  
A Division of Rockwell Automation

BDS4 SIMPLIFIED SCHEMATIC

NO. 84113

REV. 1



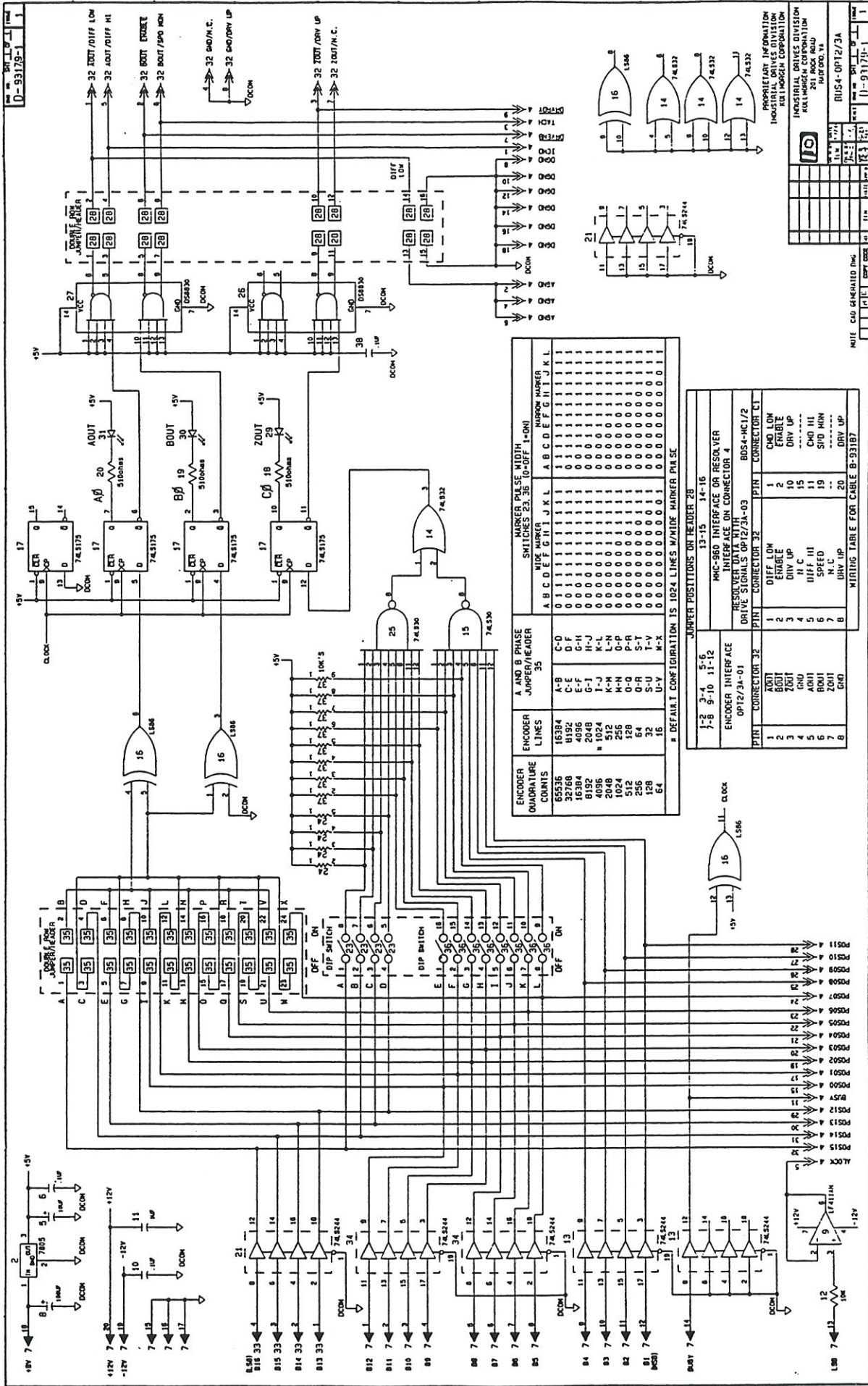
REGEN CAPABILITY	MODEL	REGEN RESISTOR	REGEN FUSE	CAP
40W	PSR/PS-212	25Ω 100W	5A	1650 μF
40W	PSR/PS-220	12.5Ω 200W	8A	2970 μF
40W	PSR/PS-112	15Ω 100W	5A	1650 μF
40W	PSR/PS-120	7.5Ω 200W	7A	2970 μF
400W	PSR/PS-17 AAA	8.8Ω 750W	12A	1650 μF
400W	PSR/PS-20 AAA	11.8Ω 750W	12A	2970 μF
200W	PSR/PS-11 AAA	5.5Ω 500W	8A	1650 μF
200W	PSR/PS-10 AAA	5.5Ω 500W	8A	2970 μF

DATE	BY	CHKD	APP'D	NO.	REV.	DESCRIPTION
10/73	C			1		INITIAL
10/73	C			2		REGEN RESISTOR
10/73	C			3		REGEN FUSE

**NOTES**  
 1) EXTERNAL REGEN RESISTOR PROVIDED ON EXTERNAL REGEN ONLY.  
 2) THE SE VALUE FOR INTERNAL REGEN ONLY.  
 3) THE SE VALUE FOR EXTERNAL REGEN ONLY.











# GLOSSARY

**Acceleration**

The change in velocity as a function of time. Acceleration usually refers to increasing velocity and deceleration describes decreasing velocity.

**Ambient Temperature**

The temperature of the cooling medium, usually air, immediately surrounding the motor or another device.

**Amplifier**

Electronics which convert low level command signals to high power voltages and currents to operate a servo motor.

**Brushless Servo Drive**

A servo drive used to control a permanent magnet synchronous AC motor. May also be referred to as an AC Servo Drive.

**Drive**

This is the electronics portion of the system that controls power to the motor.

**Drive, Analog**

Usually referring to any type of motor drive in which the input is an analog signal.

**Drive, Servo**

A motor drive which utilizes internal feedback loops for accurate control of motor current and/or velocity.

**Efficiency**

The ratio of output power to input power.

**Encoder, Absolute**

A digital position transducer in which the output is representative of the absolute position of the input shaft within one (or more) revolutions. Output is usually a parallel digital word.

**Encoder, Incremental**

A position encoding device in which the output represents incremental changes in position.

**Encoder, Marker**

A once-per-revolution signal provided by some incremental encoders to specify a reference point within that revolution. Also known as Zero Reference signal or index pulse.

**Encoder Resolution**

A measure of the smallest positional change which can be detected by the encoder.

**Feedback**

A signal which is transferred from the output back to the input for use in a closed loop system.

**Following Error**

The position error during motion resulting from use of a position control loop with proportional gain only.

**Friction**

A resistance to motion caused by surfaces rubbing together. Friction can be constant with varying speed (coulomb friction) or proportional to speed (viscous friction) or present at rest (static friction).

**Full Load Current**

The armature current of a motor operated at its full load torque and speed with rated voltage applied.

**Full Load Speed**

The speed of a motor operated with rated voltage and full load torque.

**Gain**

The ratio of system output signal to system input signal. The control loop parameter that determines system performance characteristics.

**HP: Horsepower**

One horsepower is equal to 746 watts. Since  $\text{Power} = \text{Torque} \times \text{Speed}$ , horsepower is a measure of a motor's torque and speed capability (e.g. a 1 HP motor will produce 35 lb-in. at 1800 rpm).

**I/O: Input/Output**

The reception and transmission of information between control devices. In modern control systems, I/O has two distinct forms: switches, relays, etc., which are in either an on or off state, or analog signals that are continuous in nature such as speed, temperature, flow, etc.

**Inertia**

The property of an object to resist changes in velocity unless acted upon by an outside force. Higher inertia objects require larger torques to accelerate and decelerate. Inertia is dependent upon the mass and shape of the object.

**Inertial Match**

An inertial match between motor and load is obtained by selecting the coupling ratio such that the load moment of inertia referred to the motor shaft is equal to the motor moment of inertia.

**Inrush Current**

The current surge generated when a piece of equipment such as a servo amplifier is connected to an AC line. This surge is typically due to the impulse charging of a large capacitor located in the equipment.

**Instability**

Undesirable motion of an actuator that is different from the command motion. Instability can take the form of irregular speed or hunting of the final rest position.

**Limits**

Motion control systems may have sensors called limits that alert the control electronics that the physical end of travel is being approached and that motion should stop.

**Logic Ground**

An electrical potential to which all control signals in a particular system are referenced.

**Loop, Feedback Control**

A control method that compares the input from a measurement device, such as an encoder or tachometer, to a desired parameter, such as a position or velocity and causes action to correct any detected error. Several types of loops can be used in combination (i.e. velocity and position together) for high performance requirements.

**Master Slave Motion Control**

A type of coordinated motion control where the master axis position is used to generate one or more slave axis position commands.

**Motor, AC**

A device that converts electrical alternating current into mechanical energy. Requires no commutation devices such as brushes. Normally operated off commercial AC power. Can be single or multiple phase.

**Oscillation**

An effect that varies periodically between two values.

**PLC**

Programmable Logic Controller. Also known as a programmable controller, these devices are used for machine control and sequencing.

**Power**

The rate at which work is done. In motion control,  $\text{Power} = \text{Torque} \times \text{Speed}$ .

**Pulse Rate**

The frequency of the step pulses applied to a step-per motor driver. The pulse rate divided by the resolution of the motor/drive combination (in steps per revolution) yields the rotational speed in revolutions per second.

**Ramping**

The acceleration and deceleration of a motor. May also refer to the change in frequency of the applied step pulse train.

**Rated Torque**

The torque producing capacity of a motor at a given speed. This is the maximum continuous torque the

motor can deliver to a load and is usually specified with a torque/speed curve.

**Regeneration**

The action during motor braking, in which the motor acts as a generator and takes kinetic energy from the load, converts it to electrical energy, and returns it to the amplifier.

**Repeatability**

The degree to which the positioning accuracy for a given move performed repetitively can be duplicated.

**Resolution**

The smallest positioning increment that can be achieved. Frequently defined as the number of steps or feedback units required for a motor's shaft to rotate one complete revolution.

**Resolver**

A position transducer utilizing magnetic coupling to measure absolute shaft position over one revolution.

**RMS Current**

Root mean square current. In an intermittent duty cycle application, the RMS current is equal to the value of steady state current which would produce the equivalent resistive heating over a long period of time.

**Rotor**

The rotating part of a magnetic structure. In a motor, the rotor is connected to the motor shaft.

**Servo Amplifier/Servo Drive**

An electronic device which produces the winding current for a servo motor. The amplifier converts a low level control signal into high voltage and current levels to produce torque in the motor.

**Servo System**

An automatic feedback control system for mechanical motion in which the controlled or output quantity is position, velocity, or acceleration. Servo systems are closed loop systems.

**Shunt Resistor**

A device located in a servo amplifier for controlling regenerative energy generated when braking a motor. This device dissipates or "dumps" the kinetic energy as heat.

**Single Point Ground**

The common connection point for signal grounds in a control wiring environment.

**Slew**

In motion control the portion of a move made at a constant non-zero velocity.

**Speed Regulation**

For a speed control system, speed regulation is the variation in actual speed expressed as a percentage of set speed.

**Stiffness**

Ratio of an applied force torque to change in position for a mechanical system.

**Stator**

The non-rotating part of a magnetic structure. In a motor the stator usually contains the mounting surface, bearings, and non-rotating windings or permanent magnets.

**Tachometer**

An electromagnetic feedback transducer which produces an analog voltage signal proportional to rotational velocity. Tachometers can be either brush or brushless.

**Torque**

The rotary equivalent to force. Equal to the product of the force perpendicular to the radius of motion and distance from the center of rotation to the point where the force is applied.

**Velocity**

The change in position as a function of time. Velocity has both a magnitude and direction.



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