Rockwell Automation
Allen-Bradley

8510 Wiring Guide

Objectives

This guide provides the information needed to properly wire the 8510 AC Drive System. Included in the guide are general wiring recommendations and detailed wiring procedures for power and signal wiring

General Wiring Information

Since most start-up difficulties are the result of incorrect wiring, every precaution must be taken to assure that the wiring is done as instructed. **All items must be read and thoroughly understood before the actual wiring begins.**

ATTENTION: The following information is a general guide for proper installation. The National Electrical Code and any governing regional or local codes will overrule this information. The Allen-Bradley Company cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this system or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

The information supplied in this manual on wire sizes, practices, layouts, system configurations and grounding/shielding techniques for the 8510 AC Drive System are presented as guidelines. Due to the diversity of applications and systems, no single method of wiring is completely applicable

Important: This information represents common system wiring configurations, size and practices that have proven satisfactory in a majority of applications. The National Electrical Code, local electrical codes, special operating temperatures, duty cycles or system configurations will take precedence over the values and methods listed

Important: For proper interconnection, it is recommended that Allen-Bradley Termination Panels, Cable Assemblies and/or connectors be used

Wire Sizes

Unless noted, the wire sizes in this manual are recommended minimums and assume type MTW wire (machine tool wire, 75 deg C, minimum) per NFPA 79. In all cases, the user is responsible for selecting the appropriate wire type to comply with all applicable national and local codes and to satisfy the needs of the particular application and environmental conditions. Since ambient conditions vary widely, on certain applications, a derating factor has to be taken into account. Also, wiring to systems or motors exceeding 15 meters (50 feet) in length (total includes to and from device) may cause excessive voltage drops. Consult the National Electrical Code or appropriate national or local code for factors on ambient conditions, length etc

Shielding

Reasonable care must be taken when connecting and routing power and signal wiring on a machine or system. Radiated noise from nearby relays (relay coils should have surge suppressors), transformers, other electronic drives, etc. may be induced into the signal lines causing undesired movement of the motor. All signal wiring must use shielded cables. All power wiring must be installed in a metal conduit or wireway. Power leads are defined here as the transformer primary and secondary leads, motor leads and any 115V AC or above control wiring for relays, fans, thermal protectors etc. Signal wiring is defined as velocity command, feedback, enable lines and low level logic signal lines. Feedback, command signal and other shields must be insulated from each other and terminated as specified in this guide. This helps to minimize radiated and induced noise problems and ground loops. Refer to the paragraph entitled Grounding. Open ended shields must be insulated so that they do not accidentally cause ground loops. All analog signals to and from the drive use twisted, shielded pairs. The typical installation practice is to terminate the shield at the signal source end. While this usually gives good results, there may be systems that require other shield grounding schemes for best results. If noise is a problem with the typical shield grounding methods, try terminating the shields at the load end or at both ends and evaluate the results. There is no single solution that is best for all situations

Grounding

All equipment and components of a machine or process system shall have their chassis connected to a common earth ground point. This ground system provides a low impedance path that helps minimize shock hazards to personnel and damage to equipment caused by short circuits, transient overvoltages and accidental connection of energized conductors to the equipment chassis. Grounding requirements, conventions and definitions are contained in the National Electrical Code or appropriate national codes. Local codes will usually dictate what particular rules and regulations are to be followed concerning system safety grounds

Wiring Clearance and Routing

Although the minimum clearance should be maintained for proper cooling, this space may not always provide proper wiring clearance. The minimum allowable wire bending radius may necessitate that extra space be provided to accommodate power wiring. Consult the National Electrical Code or the appropriate national or local code for the proper wiring method

Signal Wiring

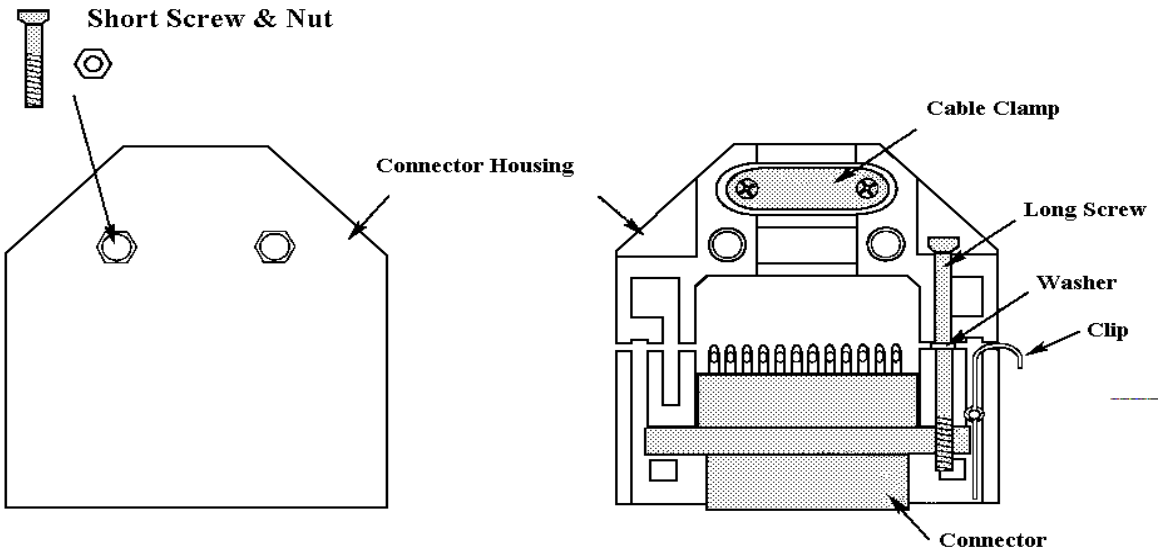
The 8510 inputs and outputs are all rated for +24V DC. The +24V DC voltage source must be supplied by the user. Each input that is used requires about 10mA of input current and all outputs are physical contact closures. All signal connections are made through MR series Honda connectors. The mating connectors required for signal interfaces are as follows:

Function	**Number**	**Honda Type**
Standard I/O (**1**)	CN9	MR-50LF
Motor Resolver Feedback (**1**)	CN3	MR-20LF
Digital Position/Speed Input (**2**)	CN10	MR-20LF
Spindle Orient Feedback (**2**)	CN2	MR-20LF
Dual Winding Motor Control (**2**)	CN1	MR-20LF

Three termination options are available for each of the connectors

1.) A mating connector kit that requires the user to supply the cable and terminate directly to the Honda connector. This is a solder type connector. A crimp connector, the MRP series, is available from the manufacturer
2.) A termination panel that provides a prefabricated 1.5 m (5 ft.) cable from the drive connector to a DIN rail mounted terminal block interface module. User wiring is to the terminal block
3.) A cable assembly in varying lengths with the Honda connector wired to one end. The other end is loose cable leads for user termination as required.

Figure 1.1
Connector Wiring



Honda Connector Wiring and Assembly

Refer to the following information and the instruction sheet provided with the connector kit for assembly procedure.

1.) Disassemble the connector by removing the 2 short screws and nuts (see Figure 1.1). Since the connector contains a number of small pieces, care should be taken during disassembly.

2.) Prepare cable and wire ends. Using a rosin core solder, carefully solder wires to connector using the cable information provided in this guide.

3.) Install cable clamp around cable(s). To allow positioning, do not tighten clamp completely.

4.) Place connector into housing and slide cable clamp to position shown in Figure 1.1. Tighten cable clamp.

5.) Install the 2 long screws and washers through the holes in the connector. Position screws and washers as shown in Figure 1.1.

6.) Place clips into housing and secure remaining housing piece over assembly using the 2 short screws and nuts previously removed.

The maximum wire size that the terminals in the Honda connector can accept is 24 AWG (0.28 mm^2). For each connector, the cable type recommended in this guide, or an equivalent, must be used to assure proper system operation. If larger wire sizes are preferred, the optional Termination Panels will allow use of up to 16 AWG (1 mm^2) wire. If larger cable sizes are used, the cable configuration and shielding must conform to that specified for the standard cable. All shields must be terminated in accordance with the following wiring diagrams. If one end of a shield is to be left open, take care to insulate and properly isolate the open end of shield to avoid shorting it to ground.

Motor and Drive Power Wiring

In accordance with NEC, the power wiring size should be based on the 30 minute overload rating of the applicable motor. The user must determine if national or local codes specify other requirements. All power wiring should be terminated to the bolt or screw terminals on the drive and motor using ring type terminal lugs.

ATTENTION: To guard against the hazard of personal injury or damage to equipment, the interconnections to the motor and feedback device must be made as explained in this guide. Failure to do so could cause loss of motor control and/or severe oscillation of the motor shaft.

The size of the power terminal connections on the drive for incoming AC line power and motor power terminations is shown below.

Table 1.A
Power Terminal Sizes

Drive Catalog Number	Bolt/Screw Size	Maximum Lug Width
8510A-A04-x1	M4	10.8 mm (0.425 in.)
8510A-A06-x1	M4	10.8 mm (0.425 in.)
8510A-A11-x2	M6	17.0 mm (0.668 in.)
8510A-A22-x2	M8	17.0 mm (0.668 in.)

The size of the power terminal connections in the motor terminal box for motor power is shown in Table 3.1.

Table 1.B
Motor Terminal Sizes

Motor Catalog Number	Bolt/Screw Size	Maximum Lug Width
1327AC-AFM-02-F	M5	13 mm
1327AC-AFM-04-x	M5	13 mm
1327AC-AFM-06-x	M5	13 mm
1327AC-AFL-08-x	M6	17 mm
1327AC-AFL-11-x	M6	17 mm
1327AB-AFL-15-x	M8	24 mm
1327AB-AFL-19-x	M8	24 mm
1327AB-AFL-22-x	M8	24 mm
1327AD-ABL-04-x	M8	23 mm
1327AD-ABL-06-x	M8	23 mm
1327AD-ABL-08-E	M8	23 mm
1327AD-ACL-08-F	M8	23 mm
1327AD-MK-11-x	M8	23 mm
1327AD-MK-15-x	M10	29 mm
1327AD-MK-19-x	M10	29 mm

To minimize radiated PWM noise, the individual motor phase wires must be part of a single multi-conductor cable or run very close together. The motor cables should be contained in grounded metal conduit or raceways.

Power Transformers

The allowable AC input voltage range is 200 to 230VAC, ±10% at 60 Hz and 200 to 220V AC, ±10% at 50 Hz. In larger plants with high capacity power systems, it is not uncommon to encounter exceptionally high AC line voltage that will exceed the +10% specification during part of the day. In these cases the nominal secondary voltage of the transformer should be set for 5-10% less than the maximum allowable nominal input voltage of the drive. This will help avoid drive damage caused by the high AC line voltage. Transformers supplied by Allen-Bradley are wound with 220V AC secondaries. Either autotransformers or isolation transformers can be used. When using isolation transformers, a "Y" secondary with the neutral grounded is recommended. Power transformer kVA requirements depend on the power rating of the motor being used. Table 1.C defines the transformer requirements.

Table 1.C
Transformer Requirements

Motor Rating (Cont/30 Min. kW)	Transformer Rating (kVA)
2.2/3.7	6
3.7/5.5	9
5.5/7.5	12
7.5/11	17
11/15	22
15/18.5	26
18.5/22	32
22/30	40

Power Grounding

The wire size used for power grounds must be at least as large as the wire gauge of the power conductors or as defined by local codes.

Other Devices and Noise Suppression

Inductive devices (e.g. solenoids, motor starters and relays) must be equipped with suppression devices that will not allow a dv/dt of greater than 200 V/µsec. Devices that produce a strong magnetic field (e.g. chokes, transformers and reactors) must not be mounted

closer than 254 mm (10 in.) to the drive. The associated wiring to any of these devices must be physically separated from any low level signal wiring to minimize induced voltages.

Power Wiring

AC Input Power To the 8510 Drive

AC line input terminals are located at the bottom of the drive. Input current requirements and wire size are dependent on the motor kW rating and the AC line voltage. The following table defines the drive AC line input current requirements at a nominal 220V AC line voltage and at the low line voltage limit of 180V AC. Wire sizes are selected per NFPA-79 and IEC-204 for wires in a cable or raceway and are based on 75° C wire (70° C for IEC-204).

Table 1.D
AC line Input Current Requirements

Motor Power (Cont./30Min. kW)	30 Minute Current Rating at 220V AC	at 180V AC	Wire Size[1, 2] (AWG/mm^2)
2.2/3.7	15A	18A	12/2.5
3.7/5.5	22A	27A	10/4.0
5.5 /7.5	30A	37A	8/6.0
7.5/11	42A	51A	8/l0.0
11 /15	55A	67A	6/16.0
15/18.5	65A	79A	4/25.0
18.5/22	78A	95A	3/25.0
22/30	100A	122A	2/35.0

1 AWG wire sizes are based on 220V AC, -10%, with 75° C wire. The mm^2 wire sizes are based on 70° C wire. For other input voltages, select wire size according to local electrical codes.

2 If 90° C wire is used, the wire sizes can be reduced about one wire size. Refer to the NEC for proper wire sizing for higher temperature wire.

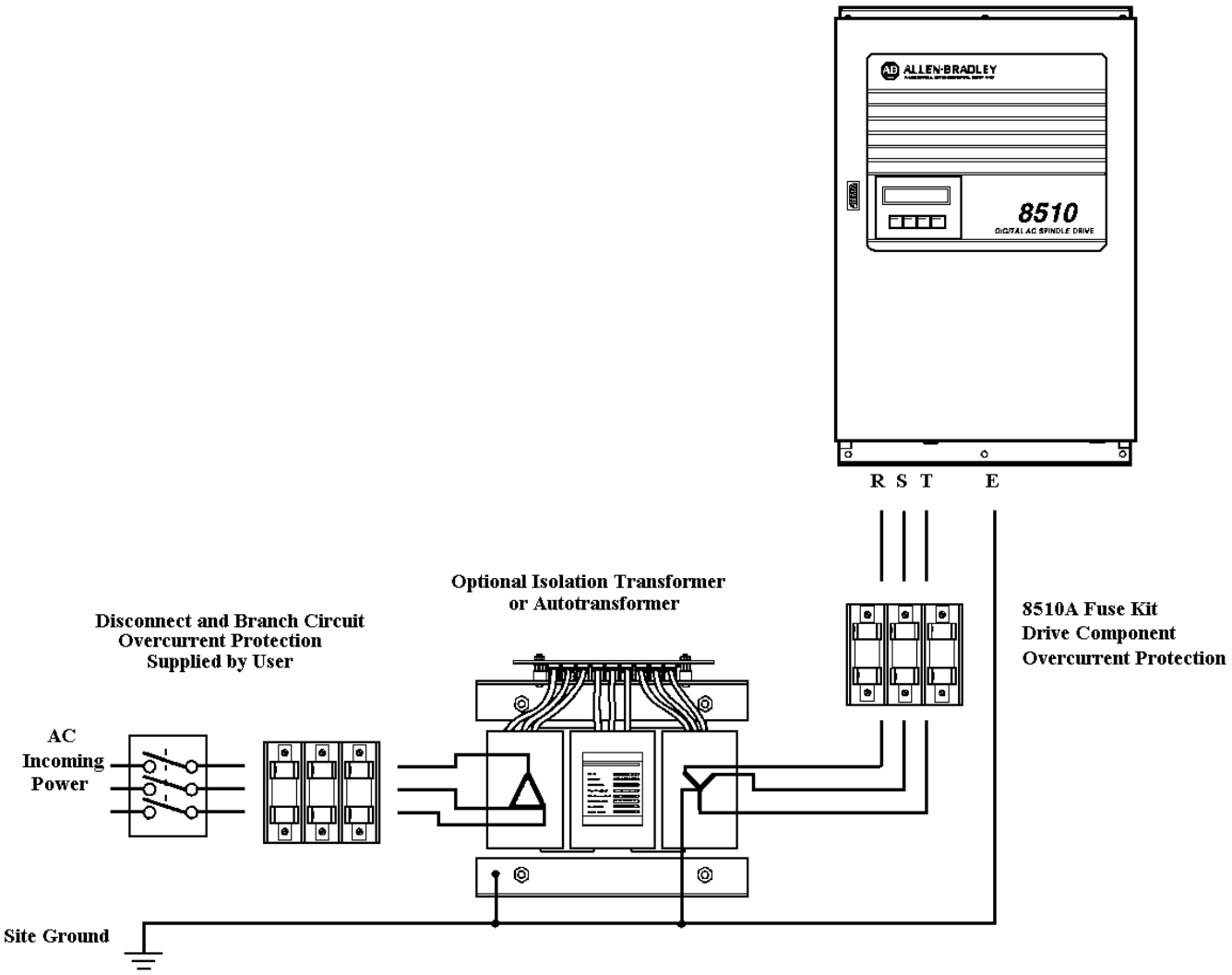
The 8510 does not include incoming AC line overcurrent protection. Either current limiting fuses or a high speed circuit breaker must be installed between the drive and the AC power source. Optional fuse kits that include properly sized high speed, current limiting fuses and the appropriate fuse block are available. The components supplied in the fuse kits are defined in Table **E.**

Table 1.E
Recommended AC Line Fuses

Fuse Kit Catalog Number	for use with Drive Model	Fuse Type (Qty. 3)		Fuse Holder	
		Bussmann	Gould Shawmut	Bussmann	Gould Shawmut
8510SA-FA04	8510A-A04-x1	JKS40	A4J40	J60060-3CR	60608J
8510SA-FA06	8510A-A06-xl	JKS60	A4J60	J60060-3CR	60608J
8510SA-FAll	8510A-All-x2	JKSl00	A4Jl00	J60100-3CR	61008J
8510SA-FA22	8510A-A22-x2	JKSl75	A4Jl75	J60200-lCR (Qty. 3)	62003J

The recommended AC input power connection is shown in Figure 1.2. If an autotransformer or isolation transformer is used, follow the connection diagram supplied with the transformer to determine proper wiring to the drive.

Figure 1.2
Recommended AC Input Power Connection



Power From 8510 Drive To The 1327A Series Motor

The motor power output terminals are located at the bottom of the drive. Motor current requirements and wire size are dependent on the specific motor type. Table 1.F defines the drive output current requirements when used with the various motor catalog numbers. Wire sizes are selected per NFPA-79 and IEC-204 for wires in a cable or raceway and are based on 75° C wire (70° C for IEC-204).

The motor fan should be wired to the motor fan power terminals on the bottom of the drive. The terminals in both the drive and motor use M4 screws. The motor fan current ranges from 0.3A in the smallest motor to 1.2A in the largest motor. The power output terminals are fused in the drive with 5A fuses. A #20 AWG/0.50 mm^2 wire is adequate for the motor fan wiring.

Table 1.F
Motor Current Requirements

Motor Catalog Number	Power Rating (Cont./30 Minute kW)	Current Rating (Cont./30 Minute A)	Wire Size [1, 2] (AWG/mm^2)
1327AC-AFM-02-F	2.2/3.7	20/27	10/4.0
1327AC-AFM-04-x	3.7/5.5	27/33	8/6.0
1327AC-AFM-06-x	5.5/7.5	36/43	8/10.0
1327AC-AFL-08-x	7.5/11	45/59	6/16.0
1327AC-AFL-11-x	11/15	73/91	3/25.0
1327AB-AFL-15-x	15/18.5	97/112	2 at 4 / 2 at 16.0 [3]
1327AB-AFL-19-x	18.5/22	120/135	2 at 3 / 2 at 16.0 [3]
1327AB-AFL-22-x	22/30	122/153	2 at 3 / 2 at 25.0 [3]
1327AD-ABL-04-x	3.7/5.5	25/34	8/6.0
1327AD-ABL-06-x	5.5/7.5	37/45	8/10.0
1327AD-ABL-08-E	7.5/11	50/68	6/16.0
1327AD-ACL-08-F	7.5/11	52/68	6/16.0
1327AD-MK-11-x	11/15	65/87	4/25.0
1327AD-MK-15-x	15/19	83/102	2 at 6 / 2 at 16.0 [3]
1327AD-MK-19-x	19/22	95/110	2 at 4 / 2 at 16.0 [3]

1 AWG wire sizes are based on 75° C wire. The mm^2 wire sizes are based on 70° C wire. Both ratings are based on 30° C ambient.
2 If 90^0 C wire is used, the wire sizes can be reduced about one wire size. Refer to the NEC for proper wire sizing for higher temperature wire.
3 Due to terminal block size limitations on the drive, run two conductors per phase of the size indicated.

See Figure 1.3 for the configuration of a typical terminal box on a standard 1327AB series motor. The power interconnect wiring between the drive and a standard 1327AB series motor is shown in the following diagram.

Figure 1.3
Terminal Box - Standard Motor

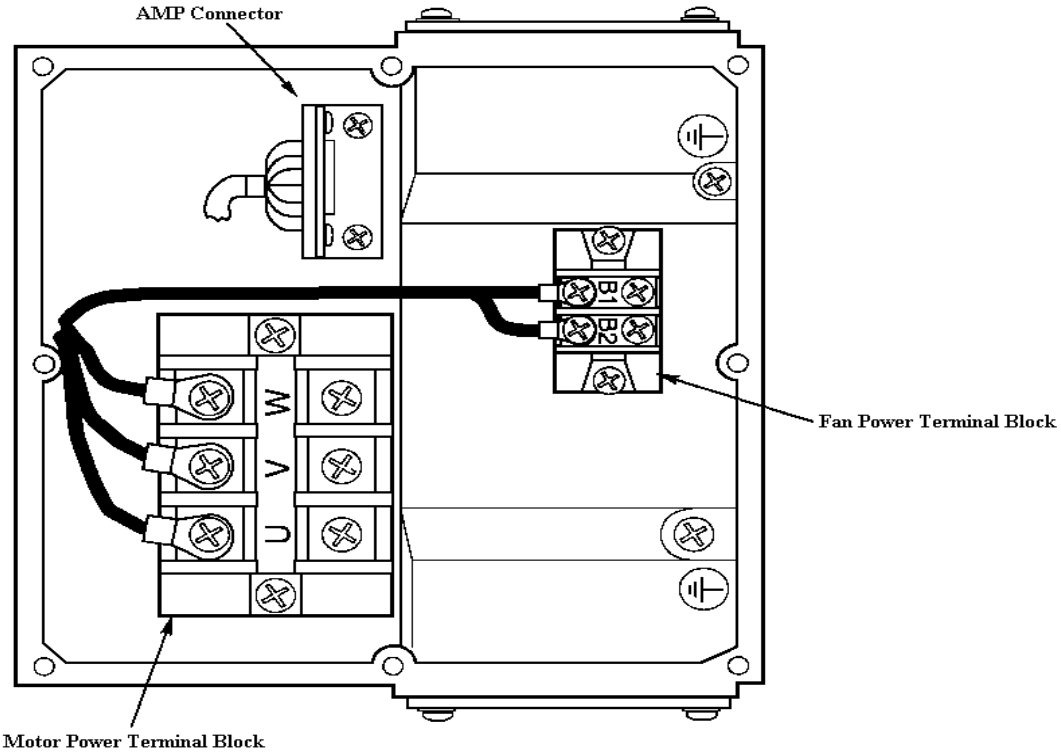
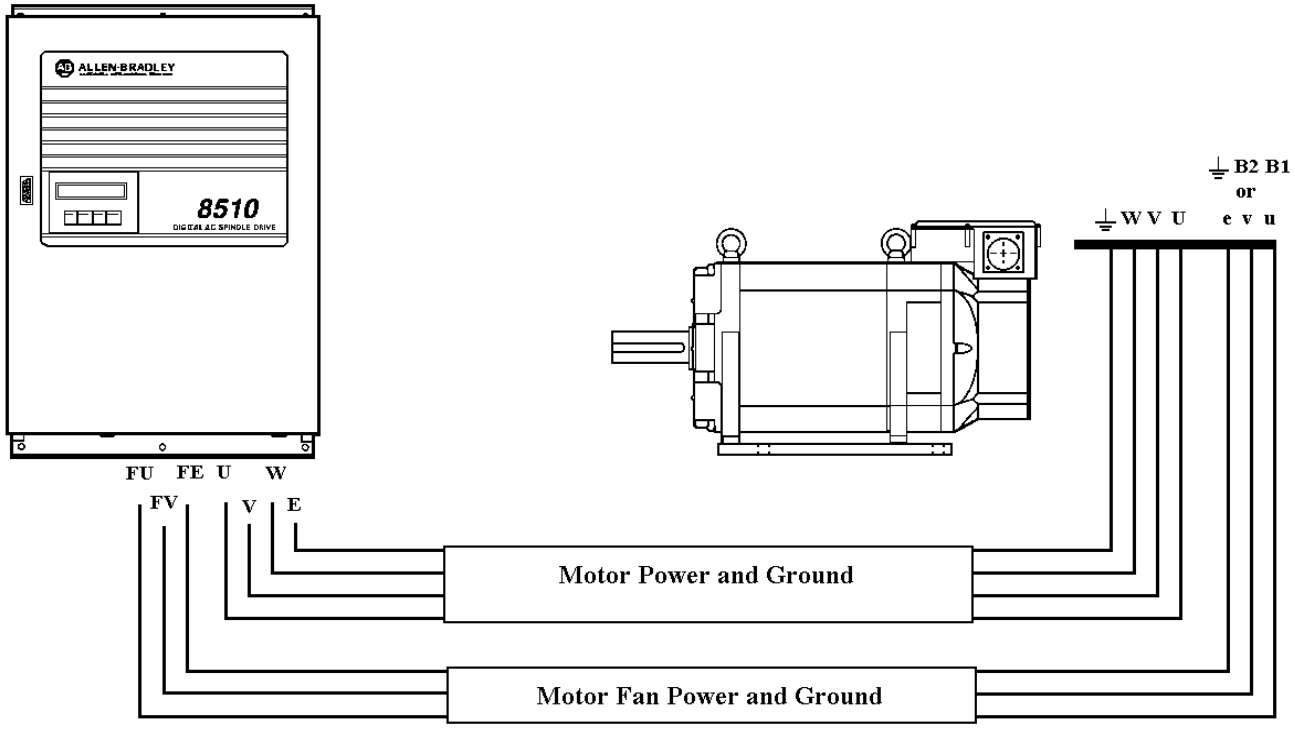


Figure 1.4
Standard Motor Power Connections



If a 1327AD series dual winding motor is being used, two additional power contactors must be mounted and wired to the drive. See Figure 1.5 for the configuration of a typical terminal box on a dual winding type 1327AD series motor. The externally mounted contactors used with the 1327AD series motors must be wired according to Figure 1.6.

Figure 1.5
Terminal Box - Dual Winding Motor

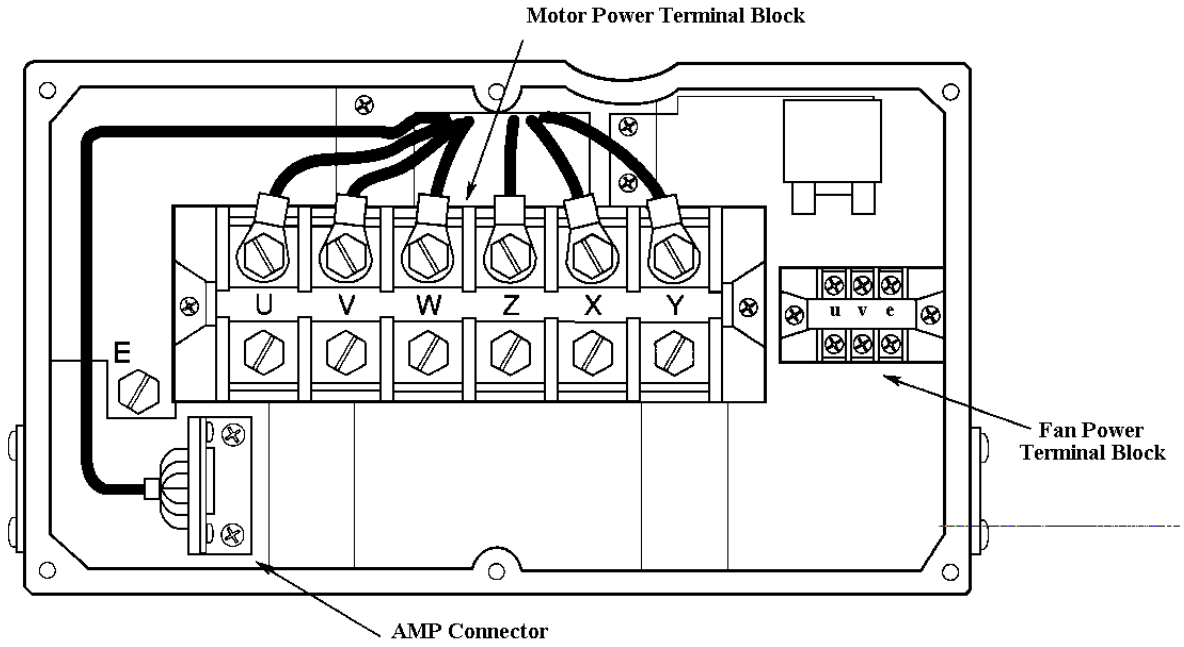
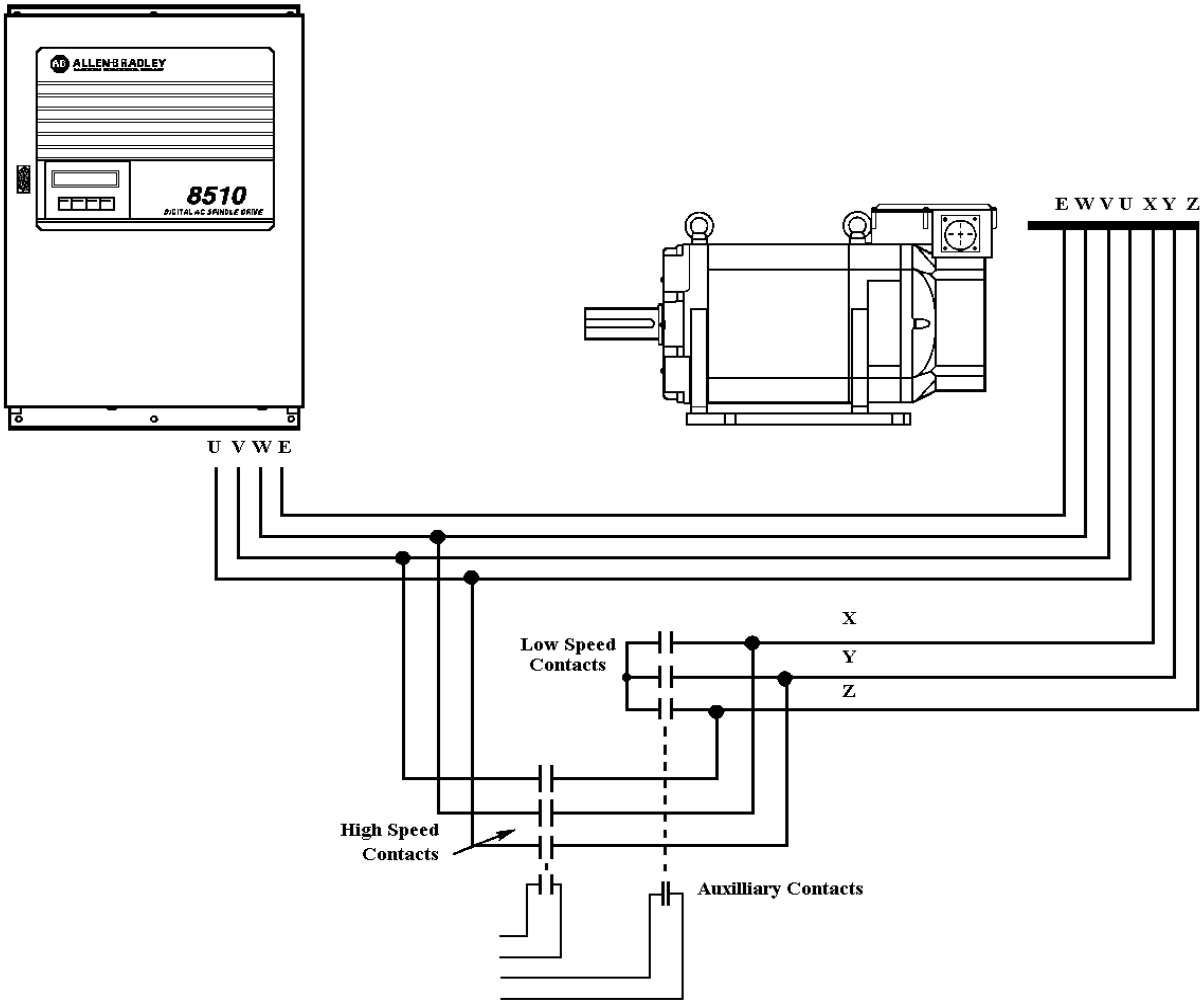


Figure 1.6
Dual Contact Wiring



Signal Wiring

I/O Interface Wiring

All standard discrete digital control signals and analog inputs and outputs are connected to the drive through the 50 pin CN9 connector. This interface is required for all 8510 systems. Since both digital and analog signals are passed through the same connector, it is recommended that two separate cables be run into the connector to achieve the proper shielding and grounding. The recommended cables are:

Discrete Digital Signals - Furukawa #0AW(C)SB-18P (18 twisted pairs, #28 AWG)
Analog Signals - Belden # 8164 (4 twisted, shielded pairs, #24 AWG)

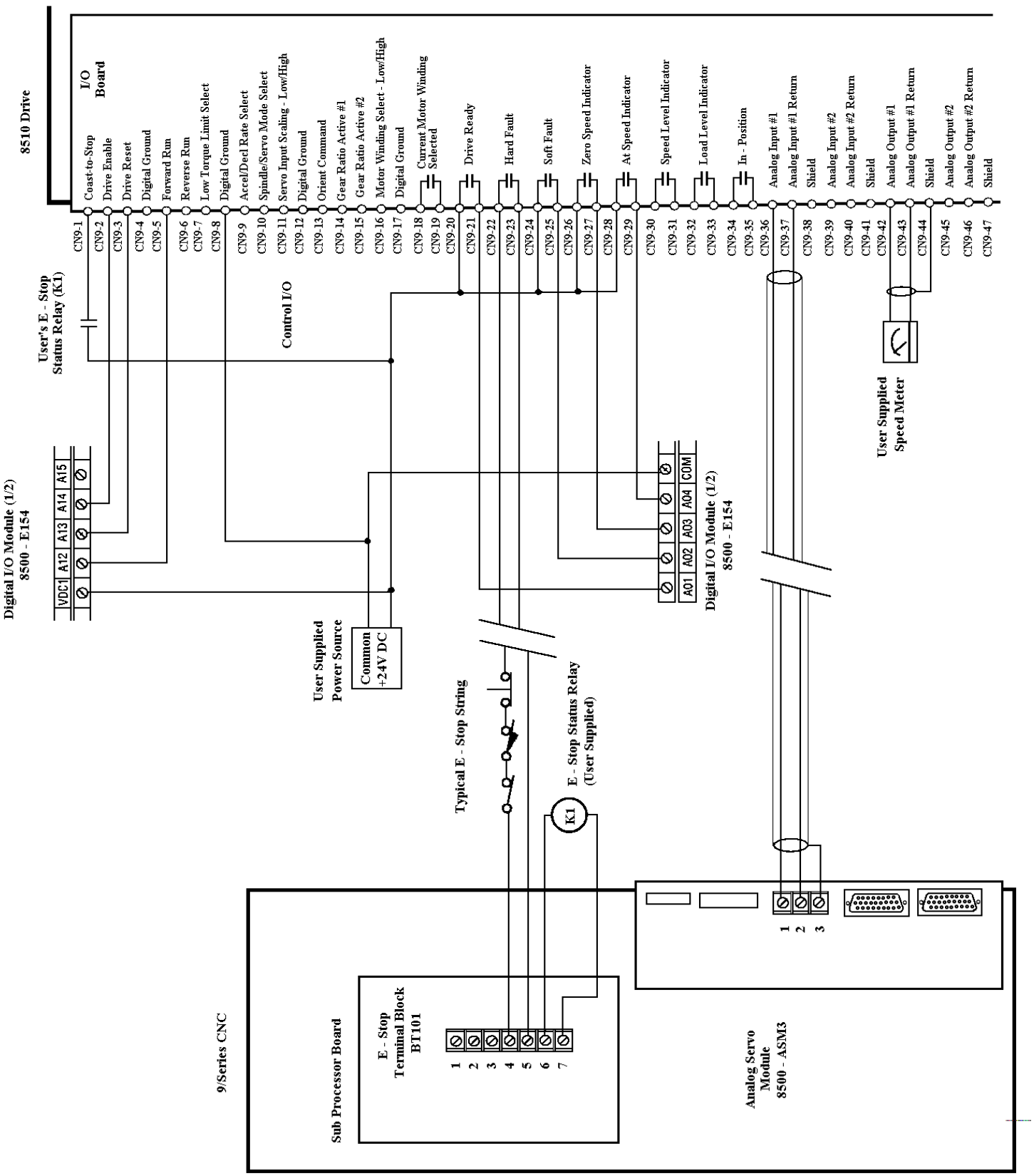
As previously described, three termination options are available for this connector: l.) a mating connector kit, 2.) a termination panel, and 3.) an interface cable assembly. Table 1.G shows the I/O function assignment for each of these termination options. Figure 1.7 shows a typical interface to an Allen-Bradley 9/Series CNC for a basic spindle application. Additional I/O connections will be required to access more of the 8510 drive features

Table 1.G
Standard I/O Interface Wiring Information

Signal Description	Honda Connector Pin Number	Termination Panel Terminal Number	Cable Assem. Wire Color and (Pair #)
Digital Inputs			
Coast to Stop	1	1	Black (1)
Drive Enable	2	2	Pink (1)
Drive Reset	3	3	Brown (2)
Digital Ground	4	4	Pink (2)
Forward Run	5	5	Red (3)
Reverse Run	6	6	Pink(3)
Low Torque Limit Select	7	7	Orange (4)
Digital Ground	8	8	Pink (4)
Accel/Decel Rate Select	9	9	Yellow (5)
Spindle/Servo Mode Select	10	10	Pink (5)
Servo Input Scaling - Low/High	11	11	Green (6)
Digital Ground	12	12	Pink (6)
Orient Command	13	13	Blue (7)
Gear Ratio Active #1	14	14	Pink (7)
Gear Ratio Active #2	15	15	Black (8)
Motor Winding Select - High/Low	16	16	White (8)
Digital Ground	17	17	Brown (9)
Digital Outputs			
Current Motor Winding Selected	18	18	Red (10)
Current Motor Winding Selected Return	19	19	White (10)
Drive Ready	20	20	Orange (11)
Drive Ready Return	21	21	White (11)
Hard Fault	22	22	Yellow (12)
Hard Fault Return	23	23	White (12)
Soft Fault	24	24	Green (13)
Soft Fault Return	25	25	White (13)
Zero Speed Indicator	26	26	Blue (14)
Zero Speed Indicator Return	27	27	White (14)
At Speed Indicator	28	28	Violet (15)
At Speed Indicator Return	29	29	White (15)
Speed Level Indicator	30	30	Gray (16)
Speed Level Indicator Return	31	31	White (16)
Load Level Indicator	32	32	Pink (17)
Load Level Indicator Return	33	33	White (17)
In-Position	34	34	Black (18)
In-Position Return	35	35	Gray (18)
Analog Inputs			
Analog Input #1	36	36	Red (1)
Analog input #1 Return	37	37	Black(1)
Shield[1]	38	38	Drain (1)
Analog Input #2	39	39	White (2)
Analog Input #2 Return	40	40	Black (2)
Shield[1]	41	41	Drain (2)
Analog Outputs			
Analog Output #1	42	42	Green (3)
Analog Output #1 Return	42	42	Black (3)
Shield	44	44	Drain (3)
Analog Output #2	45	45	Blue (4)
Analog Output #2 Return	46	46	Black (4)
Shield	47	47	Braid (4)

1 - Shields should be terminated only at the signal source end

Figure 1.7
Typical 9/Series CNC Interconnect



Resolver Feedback Wiring

The motor resolver feedback signals and the motor thermal switch are connected to the drive through the 20 pin CN3 connector. This interface is required for all 8510 systems. The feedback cable can be routed through the same conduit used for motor power leads, but it is essential that a properly shielded cable is used. The cable must have four twisted shielded pairs with an overall shield. The recommended cable type is:

Belden # 8164 (4 twisted, shielded pairs, #24 AWG)

The cable is terminated inside the motor terminal box to a connector (see Figure 1.3 or Figure 1.5). On 1327AB Series A and 1327AD Series A motors, an AMP Commercial MATE-N-LOK connector is used. On 1327AB Series B, 1327AC Series A, and 1327AD Series B motors, an AMP Dynamic Series connector is used. Different sizes of the AMP Commercial MATE-N-LOK connector are used on the 1327AB and 1327AD series motors. The connector component part numbers and the Allen-Bradley connector kit catalog numbers are:

For 1327AB Series A Motors
Connector Housing - AMP # 1-480438-0 (16 pin housing)
Pins (12 required) - AMP # 60617-6 (24 - 18 AWG, phosphor bronze with gold)
Connector Kit Catalog Number - 8510SA-CABC

For 1327AD Series A Motors
Connector Housing - AMP # 1-480285-0 (10 pin housing)
Pins (9 required) - AMP # 60617-6 (24 - 18 AWG, phosphor bronze with gold)
Connector Kit Catalog Number- 8510SA-CADC

These connectors use crimp type pins. AMP crimp tool #90123-2 is recommended to properly crimp these pins to the wire. As an alternative, any similar sized hand crimp tool or pliers can be used for the basic mechanical connection. The lead must then be soldered to complete the electrical connection. With the AMP Dynamic Series connector, the same connector is used on all motors. However, the mating connectors are available for either crimp or solder type wire termination. The component connector part numbers and the Allen-Bradley connector kit catalog numbers are:

Crimp Type For 1327AB Series B1327AC Series A and 1327AD Series B Motors
Connector Housing - AMP # 178289-5 (10 pin housing)
Pins (9 required) - AMP # 1-175217-2 (24 - 20 AWG, high force, gold plated)
Connector Kit Catalog Number - 8510SA-CMRC

Solder Type For 1327AB Series B1327AC Series A and 1327AD Series B Motors
Connector Housing - AMP # 178289-5 (10 pin housing)
Pins (9 required) - AMP # 1-175218-2 (20 - 16 AWG, high force, gold plated, with preformed ferrule)
Connector Kit Catalog Number - 8510SA-CMRS

For the crimp type connectors, AMP crimp tool # 90683-1 or # 91459-2 is required to properly crimp the pins to the wire

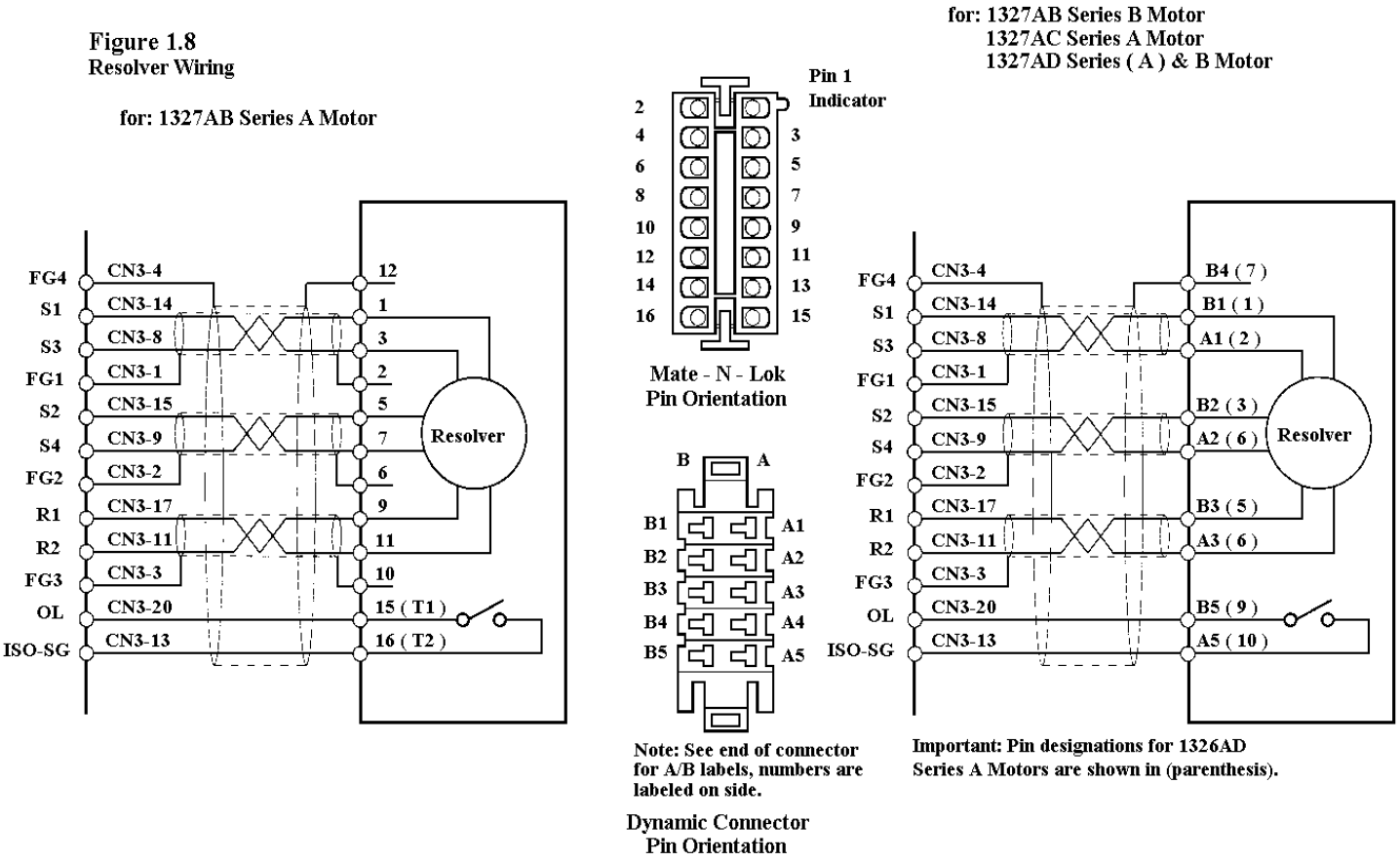
A pin extraction tool (AMP # 914677-1) is required to remove a pin from the housing. Both items are available from Allen-Bradley as part of the 8510SA-CTA crimp tool kit. As previously described, three termination options are available for the CN3 connector: 1.) a mating connector kit, 2.) a termination panel, and 3.) an interface cable assembly. The following table shows the I/O function assignment for each of these termination options

Table 1.H
Resolver Connector/Cable information

Signal Description	Honda Connector Pin Number	Termination Panel Terminal Number	Cable Assembly Wire Color and (Pair #)	Connector Pin Number for 1327AB Series A	Connector Pin Number for 1327AD Series A	Connector Pin Number for 1327AB Series B, 1327AC Series A, 1327AD Series B
Stator - S1	14	14	Red (1)	1	1	B1
Stator - S3	8	8	Black (l)	3	2	A1
Pair Shield	1	1	Shield (1)	2	Cut	Cut
Stator - S2	15	15	White (2)	5	3	B2
Stator - S4	9	9	Black (2)	7	4	A2
Pair Shield	2	2	Shield (2)	6	Cut	Cut
Rotor - R1	17	17	Green (3)	9	5	B3
Rotor - R2	11	11	Black (3)	11	6	A3
Pair Shield	3	3	Shield (3)	10	Cut	Cut
Thermal Switch	20	20	Blue (4)	15	9	B5
Thermal Switch	13	13	Black (4)	16	10	A5
Overall Shield	4	4	Braid Shield	12	7	B4

See Figure 1.8 for typical resolver interconnect wiring

Figure 1.8
Resolver Wiring



Orient Feedback Wiring

In most systems, the spindle orient function can be performed in either the CNC or the spindle drive. If the position control for spindle orient is provided by the drive, the spindle position feedback must be connected to the 8510 through the 20 pin CN2 connector. The 8510 drive can use either a conventional optical encoder or the high resolution magnetic feedback to provide spindle position feedback. The feedback device must be mechanically coupled l:1 to the spindle shaft being positioned. If an optical encoder is used, it must provide an A, B, and Z channel output, have a single ended push-pull type output, and use a +12V DC input voltage. The recommended Allen-Bradley encoder is the 845T series with a type 3 electrical option and a type 3 signal option. The 845T encoder provides an MS style connector for the interface.

The high resolution magnetic feedback, from 225,000 to 500,000 counts/turn, consists of a precision gear that must be mounted to the spindle shaft and a sensor head that mounts to the headstock adjacent to the gear. Refer to the instructions provided with the feedback sensor for installation details. The sensor has an integral 2 meter (6 ft.) cable. An interconnection box with terminal strips or connectors must be mounted in a convenient location to complete the wiring to the drive. Assure that continuity of all cable shields is maintained through this box. Both feedback types are connected to the drive through the CN2 connector, with a unique set of pins for each feedback device. The required interface cable type is the same for either device. The recommended cable type is:

Madison # 08CFJ00004 (4 twisted pairs with shield, # 24 AWG)

Three termination options are available for the CN2 connector: l.) a mating connector kit, 2.) a termination panel, and 3.) an interface cable assembly. There are unique versions of the 2nd and 3rd option for optical encoder feedback and high resolution magnetic feedback. The following table shows the function assignment for each of these termination options for the optical encoder interface. Actual connections to the encoder depend on the specific encoder chosen and connector type chosen for the encoder

Table 1.1
Optical Encoder Cable Information

Signal Description	Honda Connector Pin Number	Termination Panel Terminal Number	Cable Assem. Wire Color and (Pair #)
Channel A Output	16	16	Black (1)
Ground	10	10	White (1)
Channel B Output	15	15	Red (2)
Ground	9	9	Green (2)
Channel Z Output	14	14	Brown (3)
Ground	8	8	Blue (3)
+12V DC Power Source	5	5	Orange (4)
Ground	4	4	Yellow (4)
Cable Shield	1	1	Cable Shield

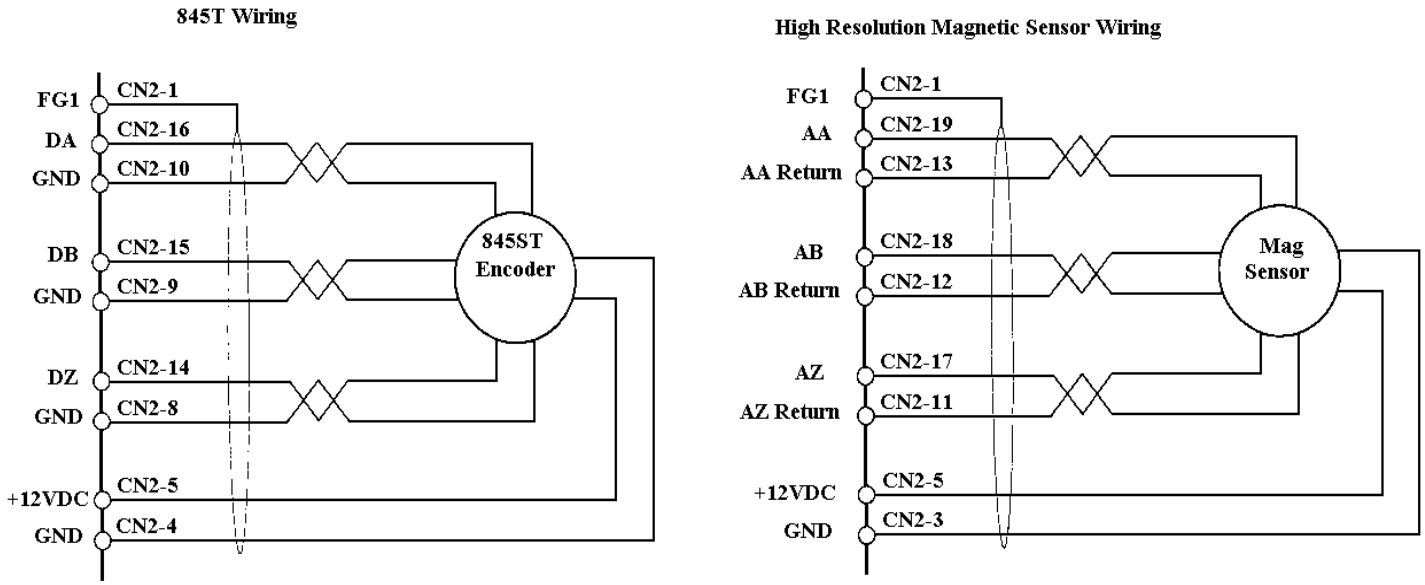
Table 1.J shows the function assignments for the high resolution magnetic feedback and the comparable wire color on the magnetic analog sensor cable.

Table 1.J
High Resolution Magnetic Feedback Cable Information

Signal Description	Honda Connector Pin Number	Termination Panel Terminal Number	Cable Assem. Wire Color and (Pair #)	Magnetic Sensor Wire Color
Channel A Output	19	19	Black (1)	Blue
Ground	13	13	White (1)	Blue/Black
Channel B Output	18	18	Red (2)	Green
Ground	12	12	Green (2)	Green/Black
Channel Z Output	17	17	Brown (3)	Yellow
Ground	11	11	Blue (3)	Yellow/Black
+12V DC Power Source	5	5	Orange (4)	Red
Ground	3	3	Yellow (4)	Black
Cable Shield	1	1	Cable Shield	Shield

Figure 1.9 shows the basic wiring for each of these feedback devices

Figure 1.9
Orient Feedback Wiring



Dual Winding Motor Contactor Control Wiring

When a dual winding 1327AD series motor is used with the 8510, the user must supply two power contactors that will be used to switch the motor between the A and Y winding configurations. In addition, a 24V DC power source must be supplied to operate the contactors. The drive will control the operation of these contactors through the 20 pin CNl connector. The interface cable for this function requires four twisted pairs. The recommended cable is:

Madison #08CFJ00004 (4 twisted pairs with shield, # 24 AWG)

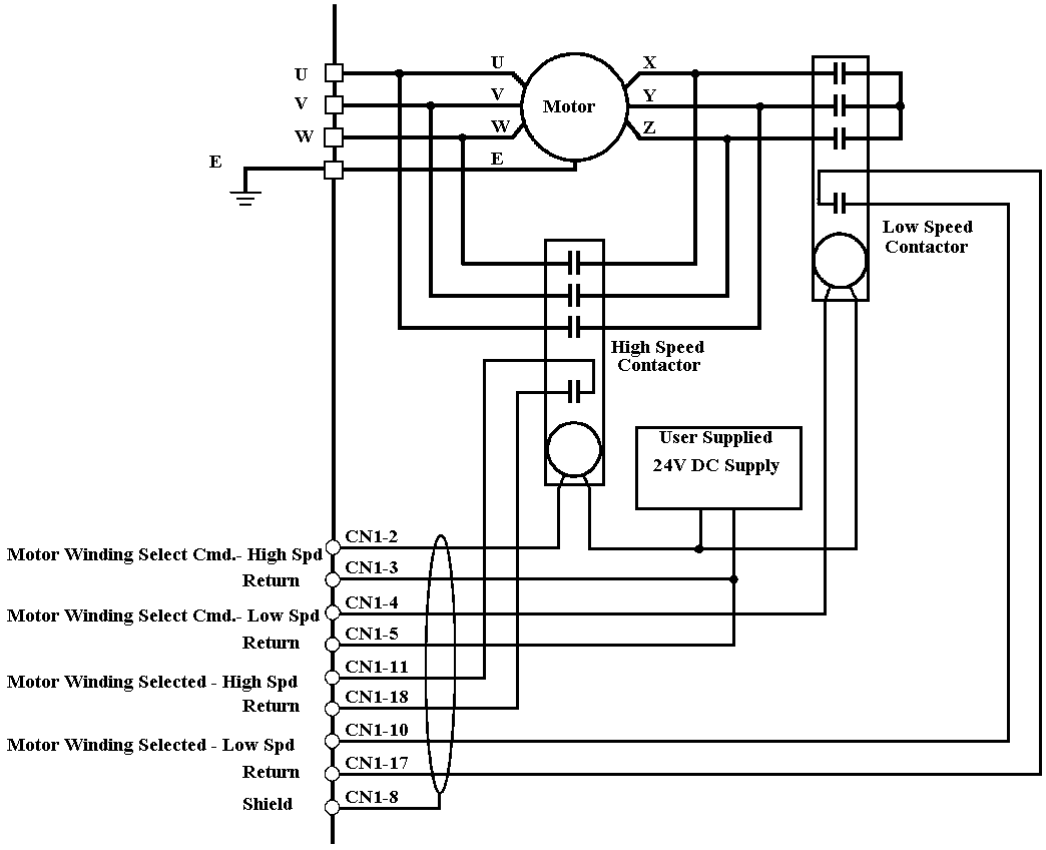
Three termination options are available for the CNI connector: l.) a mating connector kit, 2.) a termination panel, and 3.) an interface cable assembly. The following table shows the I/O function assignment for each of these termination options

Table 1.K
Dual Winding Contactor Control Cable Information

Signal Description	Honda Connector Pin Number	Termination Panel Terminal Number	Cable Assem. Wire Color and (Pair #)
Motor Winding Select Command - High Speed	2	2	Black (1)
Return for High Speed Select Command	3	3	White (1)
Motor Winding Select Command - Low Speed	4	4	Red (2)
Return for Low Speed Select Command	5	5	Green (2)
Motor Winding Selected Confirm - High Speed	11	11	Brown (3)
Return for High Speed Winding Confirm	18	18	Blue (3)
Motor Winding Selected Confirm - Low Speed	10	10	Orange (4)
Return for Low Speed Winding Confirm	17	17	Yellow (4)
Shield	8	8	Shield

Figure 1.10 shows the signal interconnect wiring for the dual winding motor control contactors

Figure 1.10
Dual Winding Contactor Wiring



Digital Position/Speed Command Wiring

When the 8510 is ordered with the "-Bx" or "-Dx" I/O option, a 16 bit parallel digital command input can be applied through connector CN10. This command can be used for either a digital speed command or orient position command. The interface cable for this function requires 10 twisted pairs with an overall shield. The recommended cable is:

Madison #20CFK00001 (10 twisted pairs w/shield, 24 AWG)

Three termination options are available for the CN10 connector: 1.) a mating connector kit, 2.) a termination panel, and 3.) an interface cable assembly. Table 1.L shows the I/O function assignment for each of these termination options.

Table 1.L
Digital Speed/Position Wiring

Signal Description	Honda Connector Pin Number	Termination Panel Terminal Number	Cable Assem. Wire Color and (Pair #)
Input 1 - Bit 0	1	1	Black (1)
Input 2 - Bit 1	2	2	Red (1)
Input 3 - Bit 2	3	3	Black (2)
Input 4 - Bit 3	4	4	White (2)
Signal Common	5	5	Black (3)
Input 5 - Bit 4	6	6	Green (3)
Input 6 - Bit 5	7	7	Black (4)
Input 7 - Bit 6	8	8	Blue (4)
Input 8 - Bit 7	9	9	Black (5)
Signal Common	10	10	Yellow (5)
Input 9 - Bit 8	11	11	Black (6)
Input 10 - Bit 9	12	12	Brown (6)
Input 11 - Bit 10	13	13	Black (7)
Input 12- Bit 11	14	14	Orange (7)
Signal Common	15	15	Red (8)
Input 13 - Bit 12	16	16	White (8)
Input 14 - Bit 13	17	17	Red (9)
Input 15 - Bit 14	18	18	Green (9)
Input 16 - Bit 15	19	19	Red (10)
Signal Common/Shield	20	20	Blue (10)/Shield

These inputs can be driven by PLC or CNC digital outputs or from thumbwheel or selector switches

Figure 1.11
8510 System Interconnect

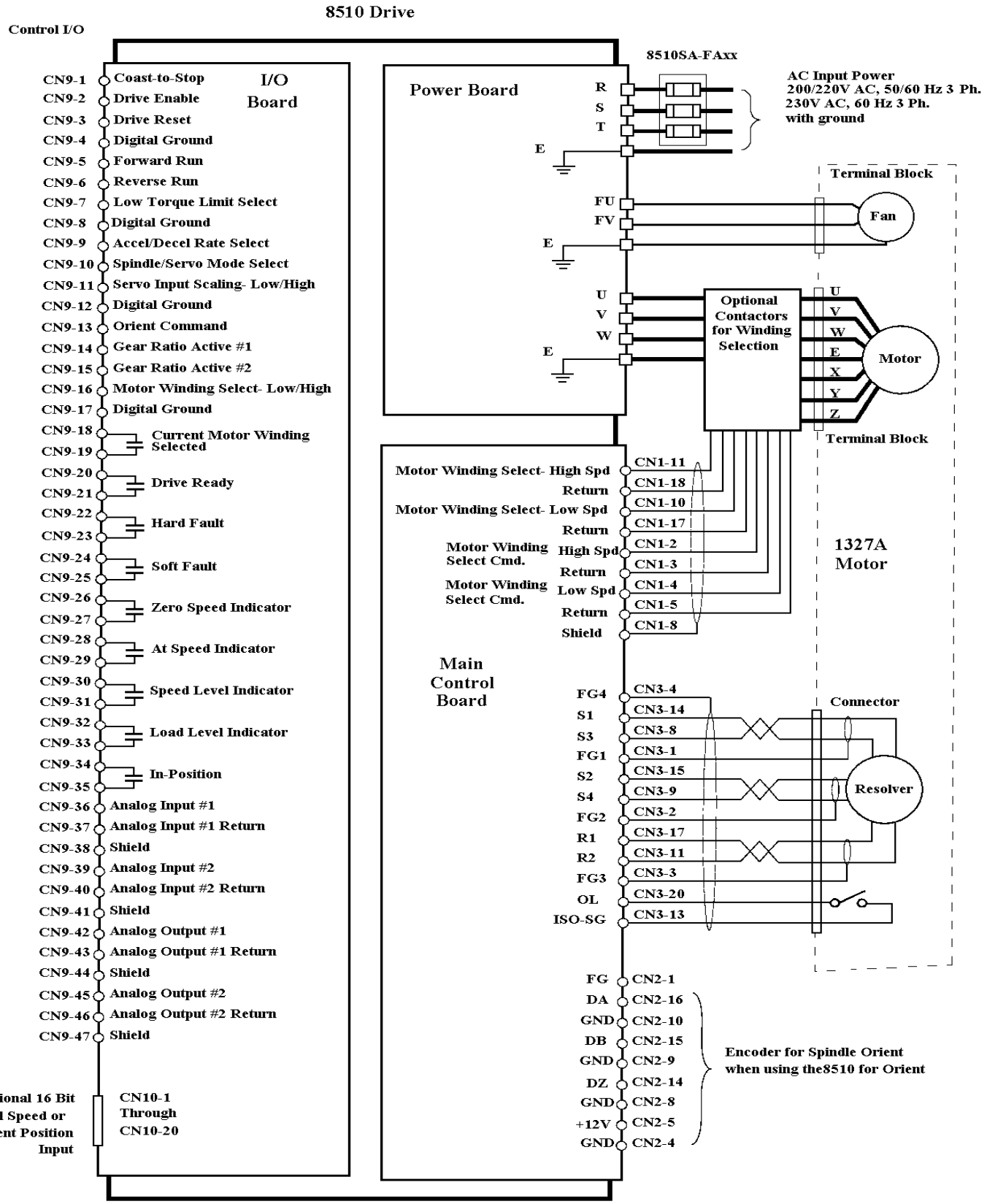
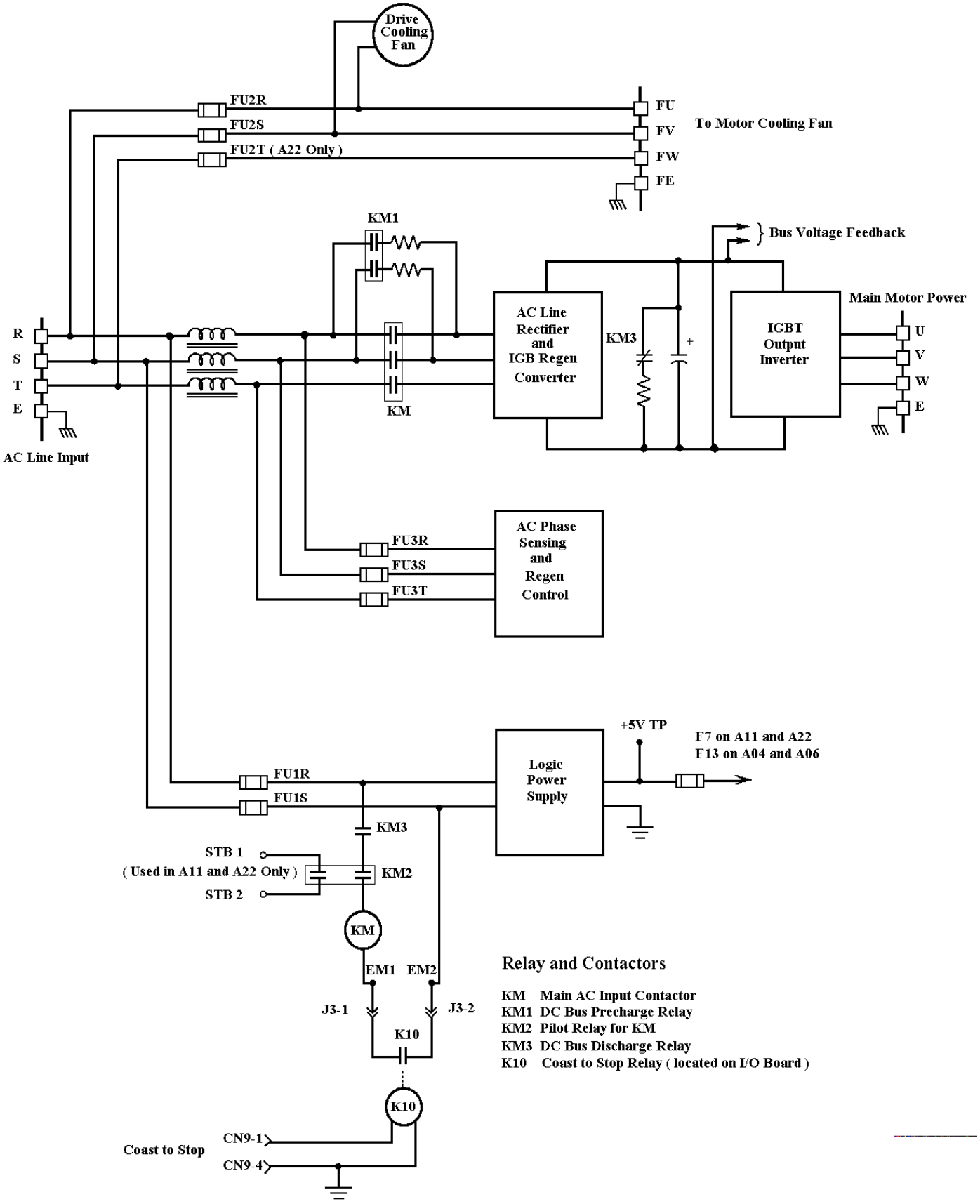


Figure 1.12
8510 Main Power and Control Interconnect Diagram



Relay and Contactors

KM Main AC Input Contactor
KM1 DC Bus Precharge Relay
KM2 Pilot Relay for KM
KM3 DC Bus Discharge Relay
K10 Coast to Stop Relay (located on I/O Board)