Document Update DU

1391 AC Servo Controller Instruction Manual

Introduction

This publication provides updated information for the 1391 Instruction Manual (1391-5.1, dated October, 1992). Please place this publication with your manual for future reference.

Page 1-5

The following is updated Option/Modification information.

- Anti-Backlash
  Provisions to use the 1388 Anti-Backlash module (1388-XA) are available.
- Linear Accel/Decel
  Linear accel/decel can be set using the CR-APG-001 Control Module. This module provides a manually generated trapezoidal velocity profile for up to four preset speeds. A single acceleration/deceleration rate can be set for all speeds.

Page 2-1

The following specification has been added.

Speed Regulation	0.05% (max.) of maximum motor speed with 95% load change

Page 3-3

The Planetary Gearbox catalog number description is being added. In addition, several descriptions have been clarified. Refer to pages 2 and 3.

Page 5-4

External Shunt Regulator Resistor (TB5, Terminals 8, 9, 10)

The following sentence supplements the current material.

Bus voltage can be monitored on terminals 9 (+) and 7 (–) of TB5.

Page 5-8

Scaling information for the 1326AB-A1G motor has been added.

Table 5.C
Typical Scaling for 1326 AC Servomotors

Motor Catalog Number[2]	I_c (A)	S1 Switch Setting[1]		
		1391B-AA15	1391B-AA22	1391B-AA45
1326AB-A1G	4.5	4	3	

Page 7-4

The following error example should be added to step 15.

$$\text{Following Error} = \frac{\text{Velocity}}{\text{Gain}} = \frac{100 \text{ ipm}}{1 \text{ ipm/ml}} = 100 \text{ ml}$$

Planetary Gearbox

1326AB – PG A 05 – LB – 21

First Position
Bulletin Number

Second Position
Type

Code	Description
PG	Straight Planetary Gearbox
RP	Right Angle Planetary Gearbox

Third Position
Used on 1326AB Motor Series

Code	Description
A	Series A
B	Series B
C	Series C

Fourth Position
Gear Ratio
(Motor Shaft:Output Shaft)

Code	Description
03	3:1
05	5:1
10	10:1
15	15:1
20	20:1
30	30:1
50	50:1
100	100:1

Fifth Position
Options

Code	Description
Blank	No Options
LB	Low Backlash Option

Sixth Position
Adapter

Code	Description
21	Metric
11	English

Bulletin 1391B Controller

1391B – A A 45 – XXX

First Position
Bulletin Number

Code	Description
B	Standard

Second Position
Speed Capability

Letter	Description
Blank	Standard 1391B

Third Position
Type and Construction

Letter	Description
A	Open Frame, Internal Heat Sink

Fourth Position
Nominal Output Voltage

Letter	Description
A	230V AC, Three-Phase

Fifth Position
Current Rating

Number	Description
15	15A RMS Cont./ 30A Peak
22	22.5A RMS Cont./ 45A Peak
45	45A RMS Cont./ 90A Peak

Sixth Position
Options (if required)

Description

Three character field assigned to special modifications. Contact your local Allen-Bradley Sales Representative for further information.

Code	Description
A06	265% peak torque using standard 1391B (superseded by 1391B-ES)
A07	24V DC Contactor Coil (22A Only)
A08	240V AC Contactor Coil (15/22A Only)
A11	Zero current option for 1391B (superseded by 1391B-ES with A13 option)
A12	Rare Earth Motor Option

Accessory Modules

1388 – X B

Bulletin No.		Module		Accessory	
Description		Code	Description	Code	Description
1388		X	Accessory Module for 1391	A	Anti-Backlash Module w/mounting assembly
				B[1]	Accel/Decel Board w/mounting rack
				C[1]	Velocity Reference Board w/mounting rack
CR-APG		Blank		001	Linear Accel/Decel Board w/power supply & 4 preset speeds

[1] A combination of the 1388-XB and XC is superseded by the CR-APG-001.

Power and Feedback Cables

1326 – C P AB T 15

First Position	Second Position		Third Position		Fourth Position		Fifth Position		Sixth Position	
Bulletin Number	**Type**		**Function**		**Motor Size Used On**		**Power Track Cable**		**Cable Length**	
	Letter	Description	Letter	Description	Code	Type	Letter	Description	Code	Description
	C	Connector & Cable Assembly	P	Power Connection	AB	Series A & B (except 1326AB-B4)	T	All Series, used for high flex applications	K	Connector Kit (No Cable)
	CC	Connector on both ends (for use with 1391C-HB)			C	Series C & 1326AB-B4	Blank	Standard Cable	15	15' (4.6m)
			F	Commutation & Feedback Connection	U	All Series			30	30' (9.1m)
			E	845H Encoder					50	50' (15.2m)
			V	All 4.25" (108 mm) Resolver Packages					100	100' (30.4m)

External Shunt Regulator Resistor

1391 – MOD – SR22A

Bulletin Number	Type		Description	
	Code	Description	Code	Description
	MOD	Modification Kit	SR22A	Shunt Regulator Resistor for 22.5A Controller
			SR45A	Shunt Regulator Resistor for 45A Controller

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Linear Accel/Decel Control Module

The following information is new and explains manual controller operation with the Linear Accel/Decel Control Module (CR-APG-001). This module provides adjustable acceleration/deceleration control for the 1391 controller. Up to four remote or local preset speeds are available.

The 1391 can be manually operated with controlled trapezoidal motion profiles when the module is installed as follows:

❑ 1. Perform the Start-Up Procedure presented earlier in this chapter.

❑ 2. Remove all system power.

❑ 3. Install and interconnect the Linear Accel/Decel Control Module as shown in Figure 7.3. Refer to Figure 7.4 for dimension information.

❑ 4. Set all of the Speed pots (SPD 1-SPD 4 or remote pots) to the maximum clockwise position (speed minimum). Set the front panel Accel and Decel pots to the maximum counterclockwise position (minimum accel/decel time).

Important: All potentiometers on the module are 15 turn, bi-directional. The Local Speed pots are setup such that counterclockwise rotation will increase output and clockwise rotation will decrease output. Counterclockwise rotation of the Accel/Decel pots will decrease time, while clockwise rotation will increase time.

❑ 5. Apply 115V AC to terminals 1 & 2 of J3. Using a voltmeter, verify that this voltage is present. Also verify that +10V DC is present between terminals 9 (+) and 2 (–) of J1. The "ON/OFF" LED located on the front of the module will be illuminated.

❑ 6. Select Remote or Local speed control.

To select Remote Speed

a) Connect an external, 1k ohm, 1/2 watt speed potentiometer as shown in Figure 7.3.

b) Energize the R/L 1 input (terminals 3 & 4 of J2) with either 24V DC or 115V AC.

c) Energize the speed select input, SEL 1 (terminals 1 & 2 of J2) with the same voltage used in the previous step. The front panel "R/L 1" LED will illuminate.

d) Repeat steps *a* through *c* for any of the other three preset speeds.

Important: If more than one speed is selected at the same time, the resulting speed for the velocity profile will not be predictable.

To select Local Speed

a) Energize the speed select input, SEL 1 (terminals 1 & 2 of J2) with either 24V DC or 115V AC. The front panel "SEL 1" LED will illuminate.

b) Repeat the above step for any of the other three preset speeds.

Important: If more than one speed is selected at the same time, the resulting speed for the velocity profile will not be predictable.

Important: In the following steps, the local speed control (SPD 1) will be used. If your application utilizes remote speed pots, the remote pot should be substituted for SPD 1.

❑ 7. Connect a voltmeter between terminals 11 (+) and 10 (–) of J1. While monitoring the meter, turn the speed pot (SPD 1 or remote) counterclockwise until the output voltage is approximately +10V DC. Toggle the FWD/REV switch. The voltage measured should change in polarity.

If the polarity does not change, recheck the wiring and connections of the FWD/REV relay and switch.

Important: Changing direction with the speed input follows the accel/decel times set on the module.

❑ 8. Move the meter leads to controller terminals 1 (–) & 2 (+) of TB2. The meter should indicate a voltage of approximately +10V DC.

❑ 9. Rotate the Accel and Decel pots (located on the module front panel) approximately 7 turns.

❑ 10. De-energize the SEL 1 input (terminals 1 & 2 of J2) and note the time needed for the meter voltage to reach zero (minimum) volts. Energize the SEL 1 input and note the time needed for the voltage to reach +10V DC (maximum).

❑ 11. Adjust the Accel/Decel pots for desired ramp times (approximate range is 0.25 to 6.5 seconds) by repeating step 10. The final ramp time will be set during final system calibration. Rotate the speed pot fully clockwise for minimum speed. Remove the SEL1 input.

ATTENTION: To protect against rapid accel/decel commands from the module and possible machine damage or personal injury, the "Bypass" input (terminals 19 & 20 of J2) must not be energized. Applying 24V DC or 115V AC to this input will remove the Accel/Decel pot settings from the circuit, causing the output to immediately ramp to +10V DC or zero volts.

❑ 12. The output of the module is controlled by the "Deadman" input at terminals 10 & 11 of J1. Applying 24V DC or 115V AC to this input will cause the module to operate. The front panel "Dedman" LED will be off. When this input is de-energized, the module output will be connected to logic ground, thus disabling output. At this point the "Dedman" LED will illuminate.

Energize the "Deadman" input with 24V DC or 115V AC.

ATTENTION: During subsequent steps, the servomotor may begin to rotate and cause incorrect machine movement when the controller is enabled. Be prepared to remove power by opening (MCB) or the branch circuit disconnect device if this occurs. This movement may be due to a wiring error or system component malfunction and must be corrected before proceeding with this procedure. Damage to machine system components can occur due to uncontrolled machine movements.

❑ 13. Apply power to the controller and module. Initiate a Start command by selecting speed input, SEL1. Command a speed through the speed pot, SPD 1 that represents approximately 10% of maximum speed (i.e. 1V DC).

The motor should rotate slowly under control (following the speed pot). If the motor is uncontrollable or rotates incorrectly, de-energize SEL 1. Remove all power and check wiring.

If the controller current limit function is used – slowly adjust the Current Limit potentiometer (R148) to the desired setting after the motor is stable. Refer to Chapter 5 for more information on the this potentiometer.

If the application requires reverse direction, use the FWD/REV toggle switch to check operation in the reverse direction.

❑ 14. With a zero velocity command from the module, use the controller Offset pot (R1) to set zero motor speed. Refer to Chapter 5 for more information on this adjustment.

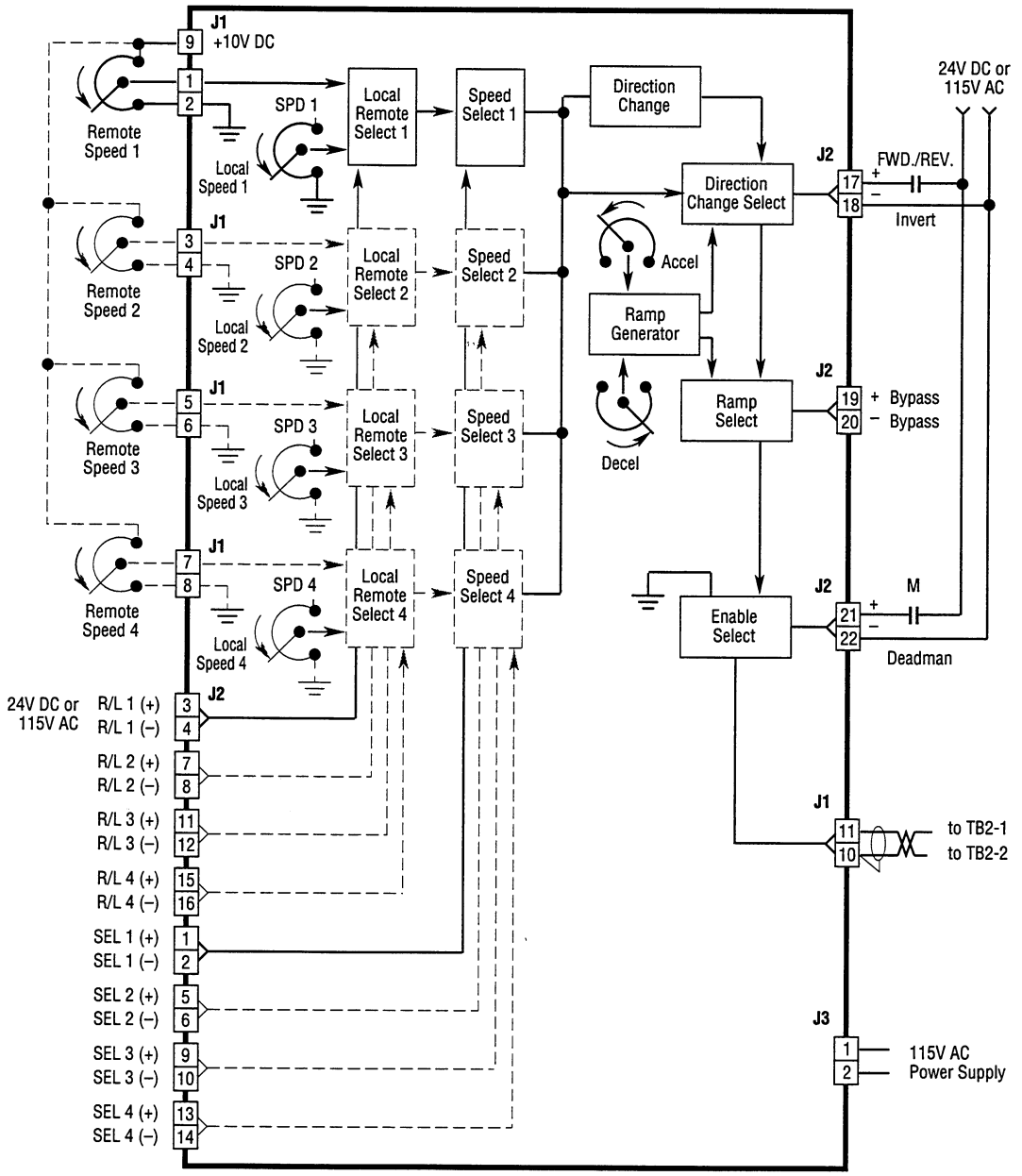
Important: The motor may begin to move slowly after a period of time (several minutes) even though the Offset pot is set to zero.

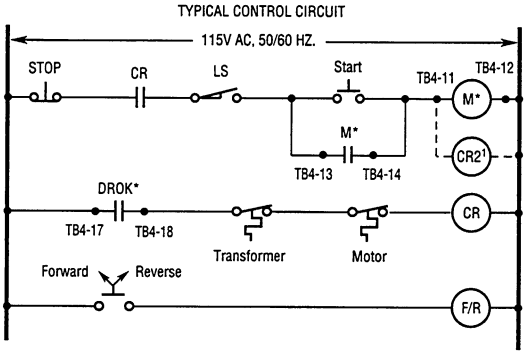
❑ 15. Rotate the speed pot (SPD 1) fully counterclockwise. Adjust the Velocity Command Scale pot (R132) to give the desired motor speed.

❑ 16. Check the accel/decel rate settings at speeds selected for the application. Refer to steps 10 & 11.

❑ 17. If applicable, repeat steps 6-16 for any of the other 3 preset speeds

Figure 7.3
Linear Accel/Decel Control Module Wiring

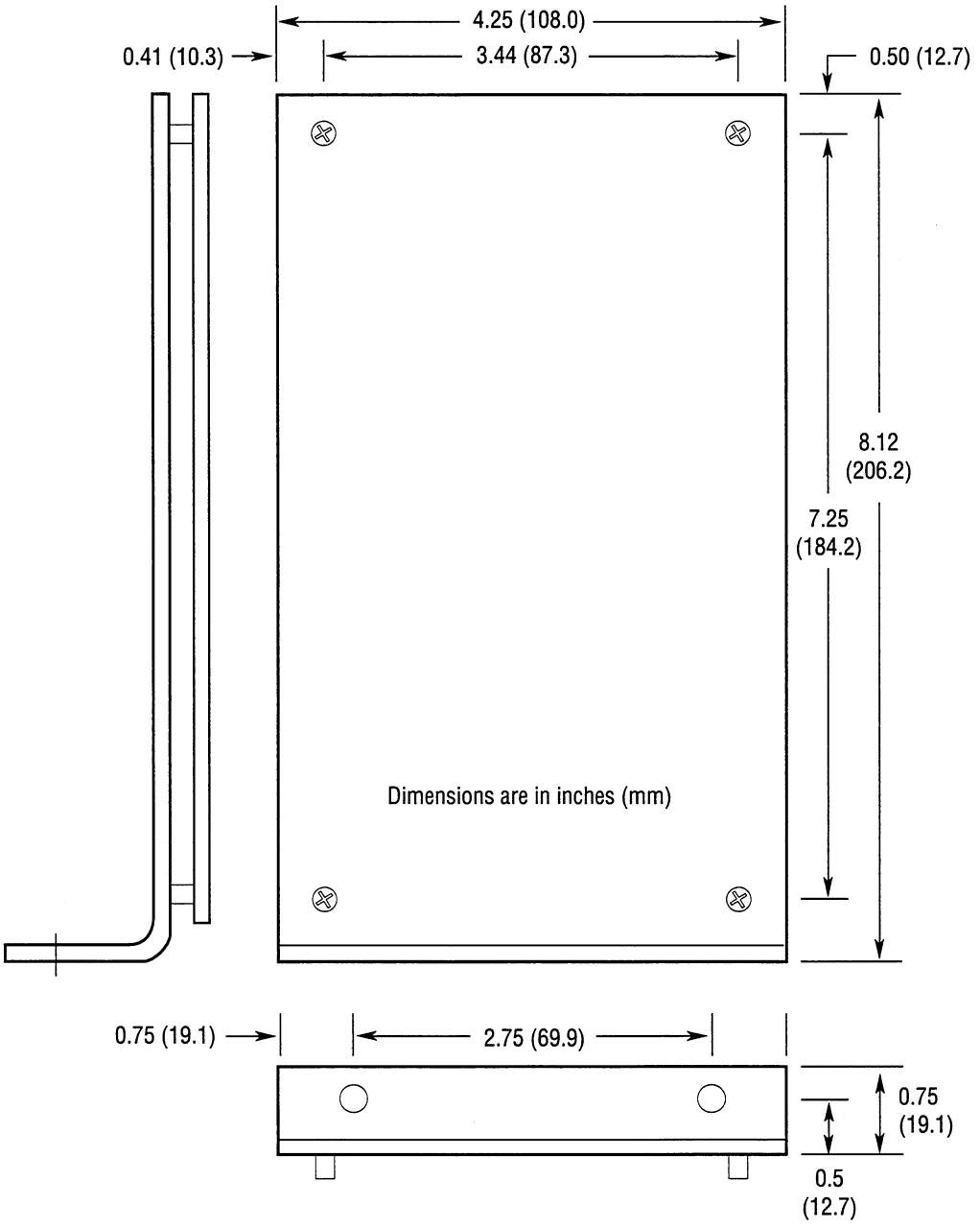




* Indicates component located in controller

[1] Required only with IMC 110, 120, 121 AND 123 controllers

Figure 7.4
Linear Accel/Decel Control Module Dimensions



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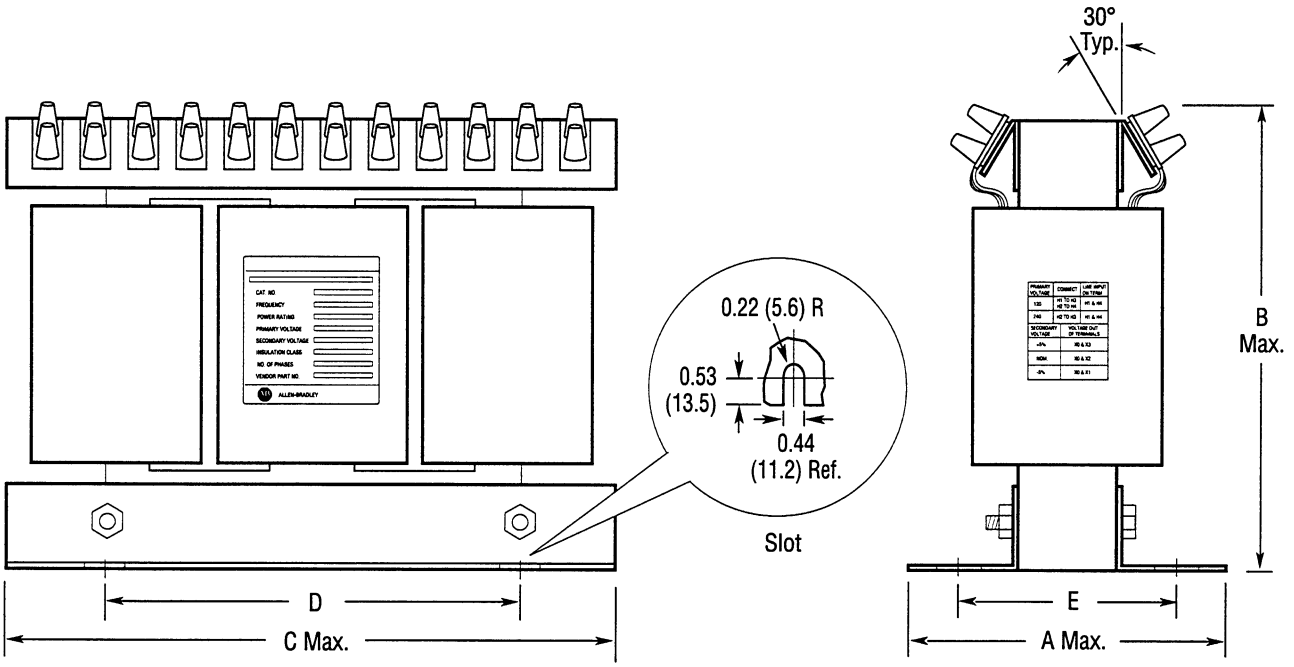
Drawing has been updated and "NT" has been added to the catalog numbers shown.

1391 Isolation Transformer Dimensions
Dimensions are in inches and (millimeters)



Catalog Number	kVA	A	B	C	D	E	Weight
1391-T015DT	1.5	9.00 (228)	10.00 (254)	13.00 (330)	5.00 (127)	3.10 (79)	27 (12.2)
1391-T015ET/NT		9.00 (228)	10.00 (254)	13.00 (330)	5.00 (127)	3.50 (89)	40 (18.2)
1391-T025DT	2.5	11.00 (279)	11.00 (279)	14.00 (356)	6.00 (152)	3.30 (84)	42 (19.0)
1391-T025ET/NT		11.00 (279)	11.00 (279)	14.00 (356)	6.00 (152)	4.00 (102)	60 (27.2)
1391-T035DT	3.5	11.00 (279)	11.00 (279)	14.00 (356)	6.00 (152)	4.50 (114)	60 (27.2)
1391-T035ET/NT		11.00 (279)	11.00 (279)	14.00 (356)	6.00 (152)	4.50 (114)	85 (38.6)
1391-T050DT	5.0	11.00 (279)	11.00 (279)	14.00 (356)	6.00 (152)	5.25 (133)	75 (34.0)
1391-T050ET/NT		11.00 (279)	11.00 (279)	14.00 (356)	6.00 (152)	6.00 (152)	100 (45.4)
1391-T100DT	10.0	12.00 (305)	12.50 (317)	16.00 (406)	8.00 (203)	5.85 (149)	112 (50.8)
1391-T100ET/NT		12.00 (305)	12.50 (317)	16.00 (406)	8.00 (203)	5.85 (149)	140 (63.6)
1391-T150DT	15.0	13.00 (330)	14.00 (356)	17.50 (444)	9.50 (241)	6.00 (152)	150 (68.0)
1391-T150ET/NT		13.00 (330)	14.00 (356)	17.50 (444)	9.50 (241)	6.00 (152)	200 (90.9)

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The following items are included with the NEMA Type 1 Enclosure.

Qty.	Description
2	Steel Mounting Channels
4	3/8-16 x 1.0 HHCS Screw
4	3/8-16 x 1.5 HHCS Screw
8	3/8 Flat Washer
8	3/8 Split Lock Washer
8	3/8-16 Hex Nuts

Appendix B

The following changes have been made to the interconnect diagrams in Appendix B.

Diagram	Description of Change
Interconnect	Note added to C.T. of transformer. CR2 added to Control Circuit. Capacitors added at resolver.
IMC	New diagrams. CR2 and M contact added.
8400	Removed.
8600	Removed.
MAX/CONTROL	New diagram. Notes and terminal block designations have been clarified. M contact added.
IMC-S/20x	New diagram.
IMC-S/21x	New diagram.
IMC-S/23x	New diagram.
IMC-201	New diagram.
IMC 110	New diagram.
9/Series	New information.

Note 10 has been added.

Notes:

1) Power Wiring unless Noted:

15A	12 AWG (3.3 mm^2) min. 75C min.
22.5A	10 AWG (5.3 mm^2) min. 75C min.
45A	8 AWG (8.4 mm^2) min. 75C min.

2) Signal Wiring: 18 AWG (0.8 mm^2) min.

3) Allen-Bradley Supplied Cable:

8 AWG (8.4 mm^2) Motor	126473
12 AWG (3.3 mm^2) Motor	126474
Resolver	116190

4) Customer Supplied Resolver Cable:
   Belden 9873 or equivalent, 20 AWG (0.5 mm^2), 30 pf/ft (97.5 pf/m) max. capacitance between conductors.

5) Terminate shield on source end only.

6) Do not make connections to unused pins on the resolver connector.

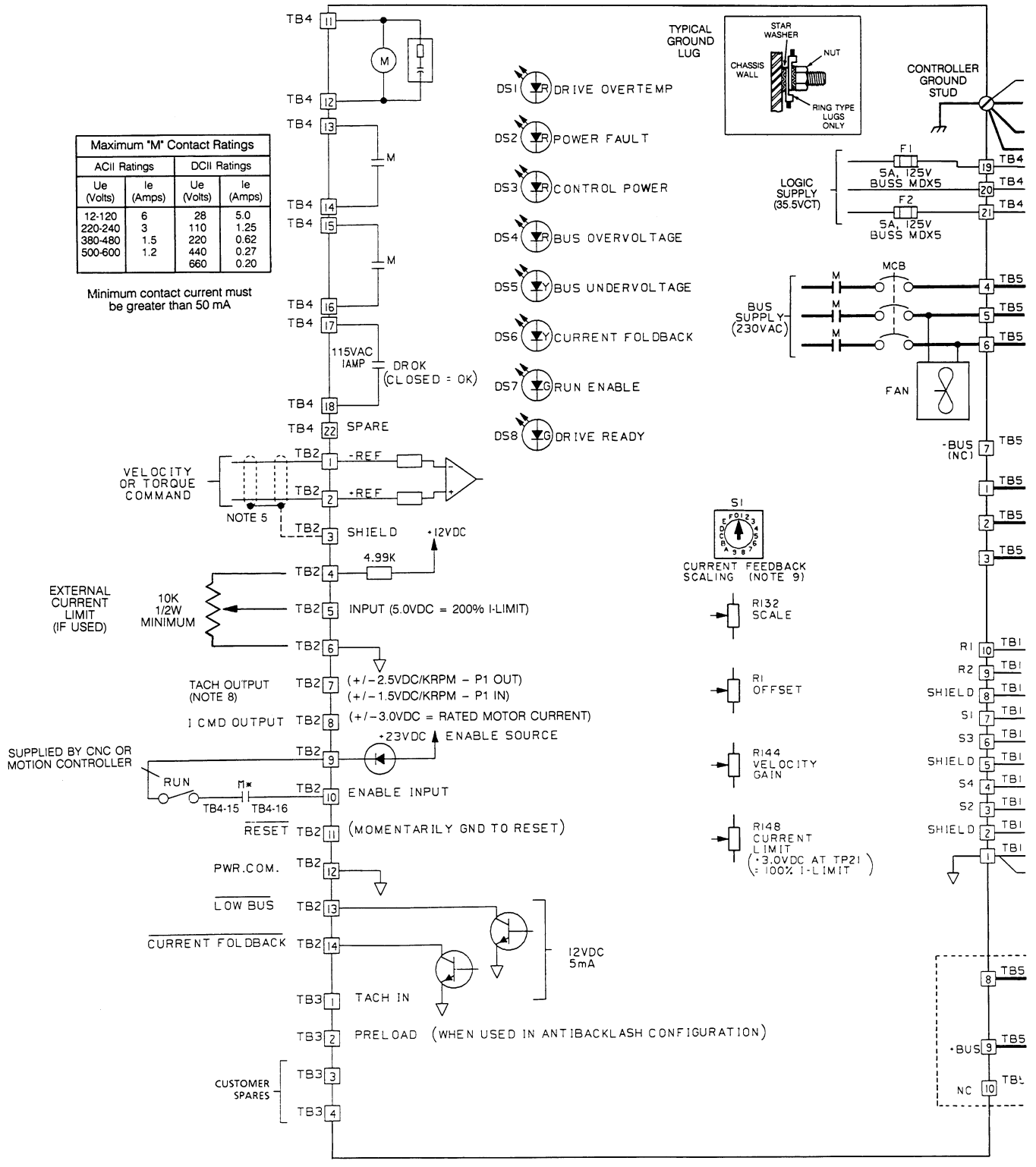
7) F3 provided on 15 & 22.5a units only. 15A=KLM-10, 22.5A=FNQ 6 1/4 series B only.

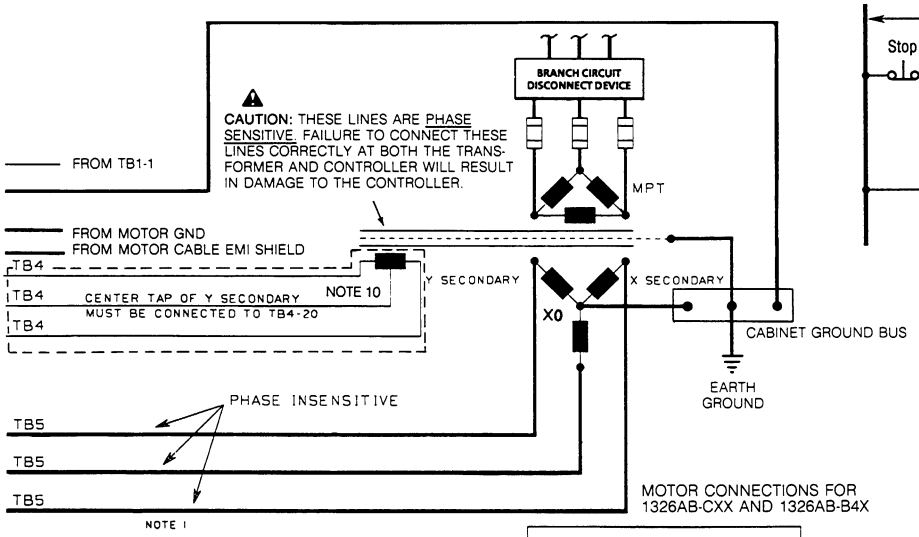
8) P1 inserted for 1.5V/krpm, P1 removed for 2.5V/krpm

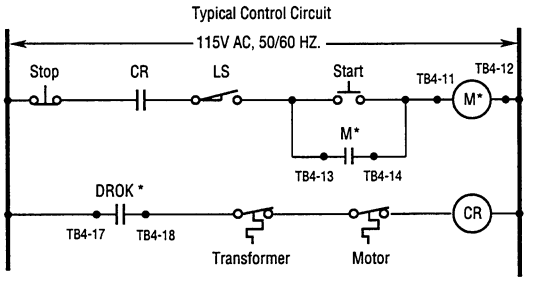
9) Current Feedback Scaling: See Chapter 5

10) On all Series D controllers (verify with controller nameplate) the secondary center tap must not be grounded. Grounding this will cause damage to the controller.

Figure B.1
1391 Interconnect Diagram



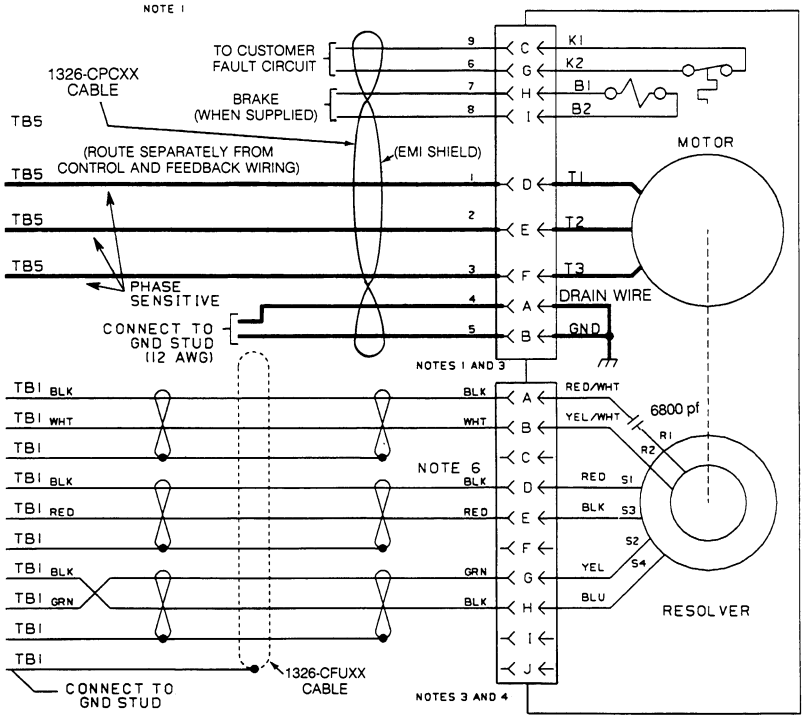




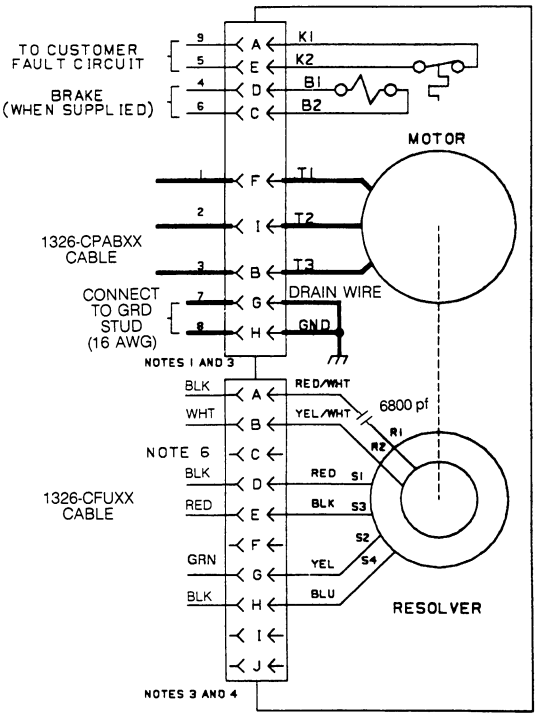
* Indicates component located in controller

IMPORTANT:
THE THERMAL SWITCH AND BRAKE WIRES ARE ROUTED NEAR MOTOR POWER AND CAN PICK UP PWM RADIATION. ISOLATION FROM CONTROL DEVICES MAY BE REQUIRED.

MOTOR CONNECTIONS FOR 1326AB-CXX AND 1326AB-B4X



MOTOR CONNECTIONS FOR 1326AB-BXX AND 1326AB-AXX



SHUNT REGULATOR CONNECTIONS

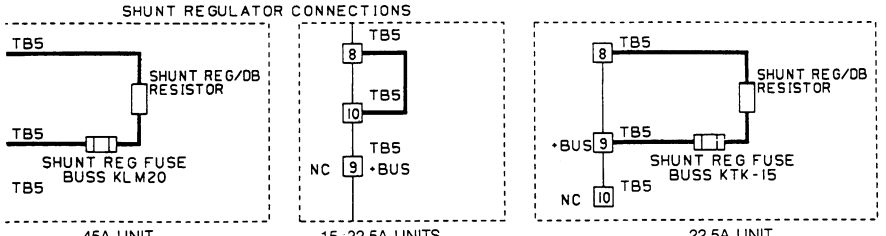
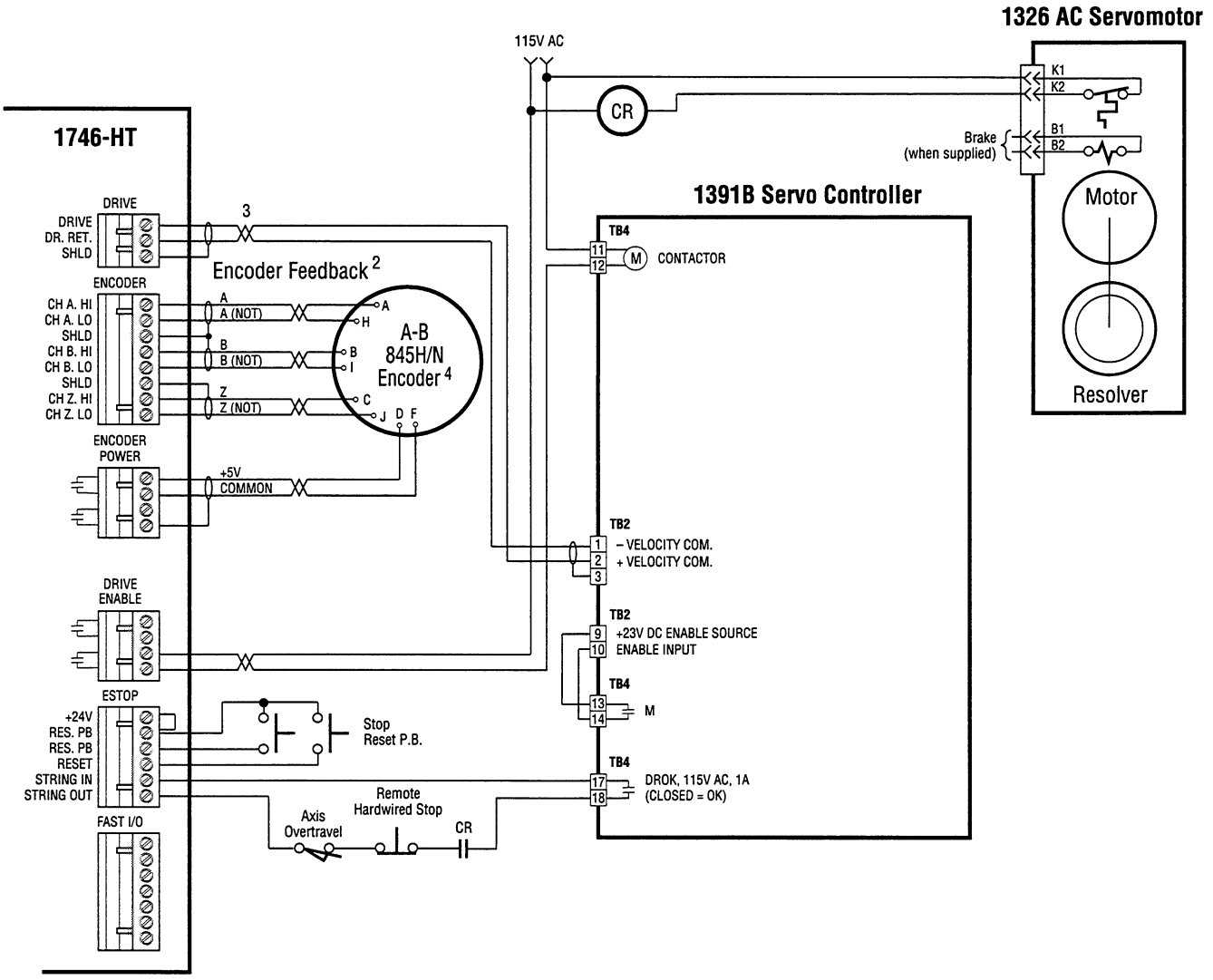


Figure B.2
Typical IMC 110 Interconnect Diagram [1]



1 Refer to the 1391 Interconnect Drawing for further details.

2 Use Belden brand #9504 or equivalent twisted pair, shielded cable, 40 feet (12.2 meters) maximum. Shields grounded at controller only.

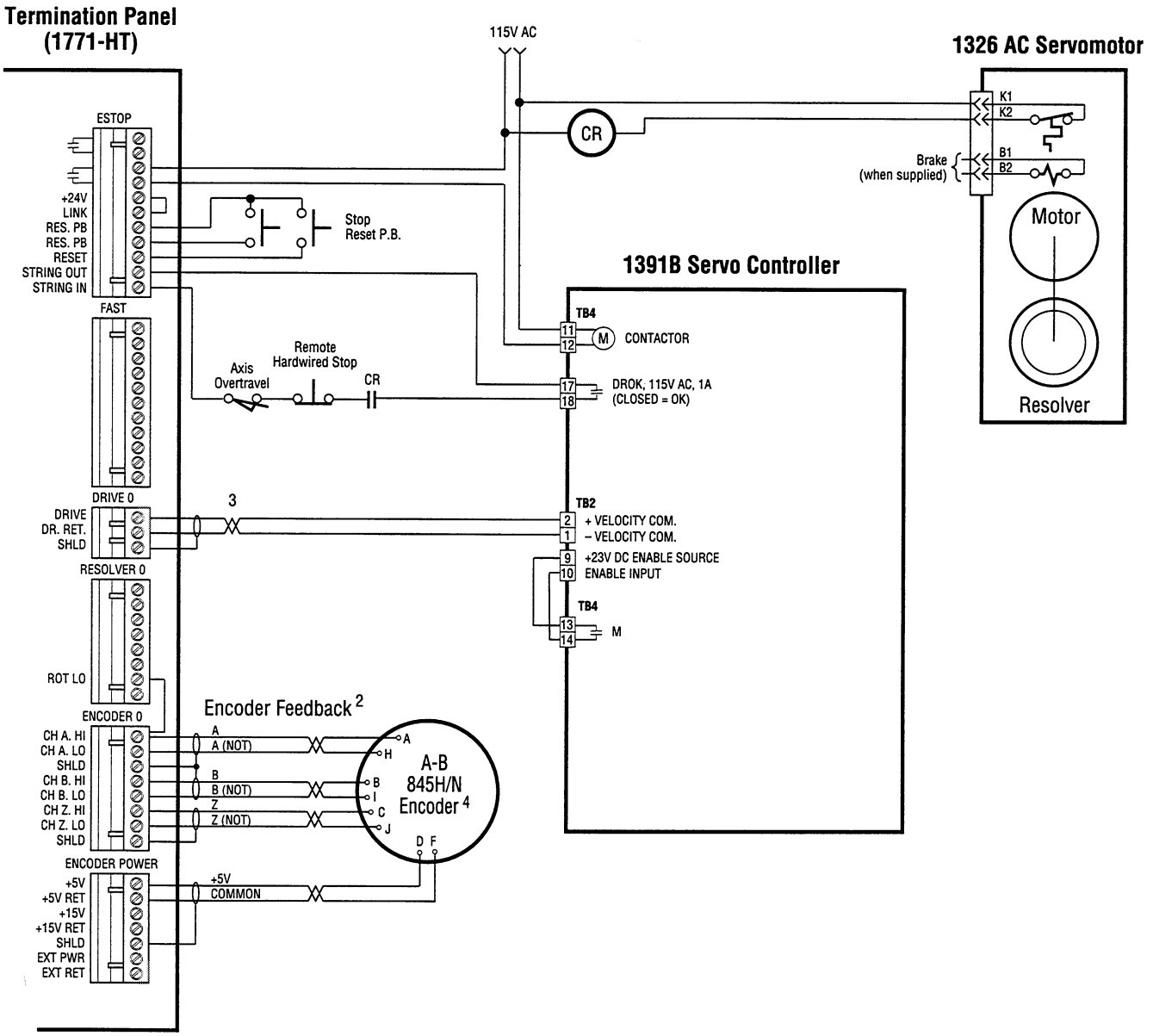
3 Use Belden brand #8760 or equivalent shielded cable.

4 Maximum allowable cable distance using 22 AWG (0.283 mm^2) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm^2) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

Figure B.3
Typical IMC 120 Interconnect Diagram [1]



1 Refer to the 1391 Interconnect Drawing for further details.

2 Use Belden brand #9504 or equivalent twisted pair, shielded cable, 40 feet (12.2 meters) maximum. Shields grounded at controller only.

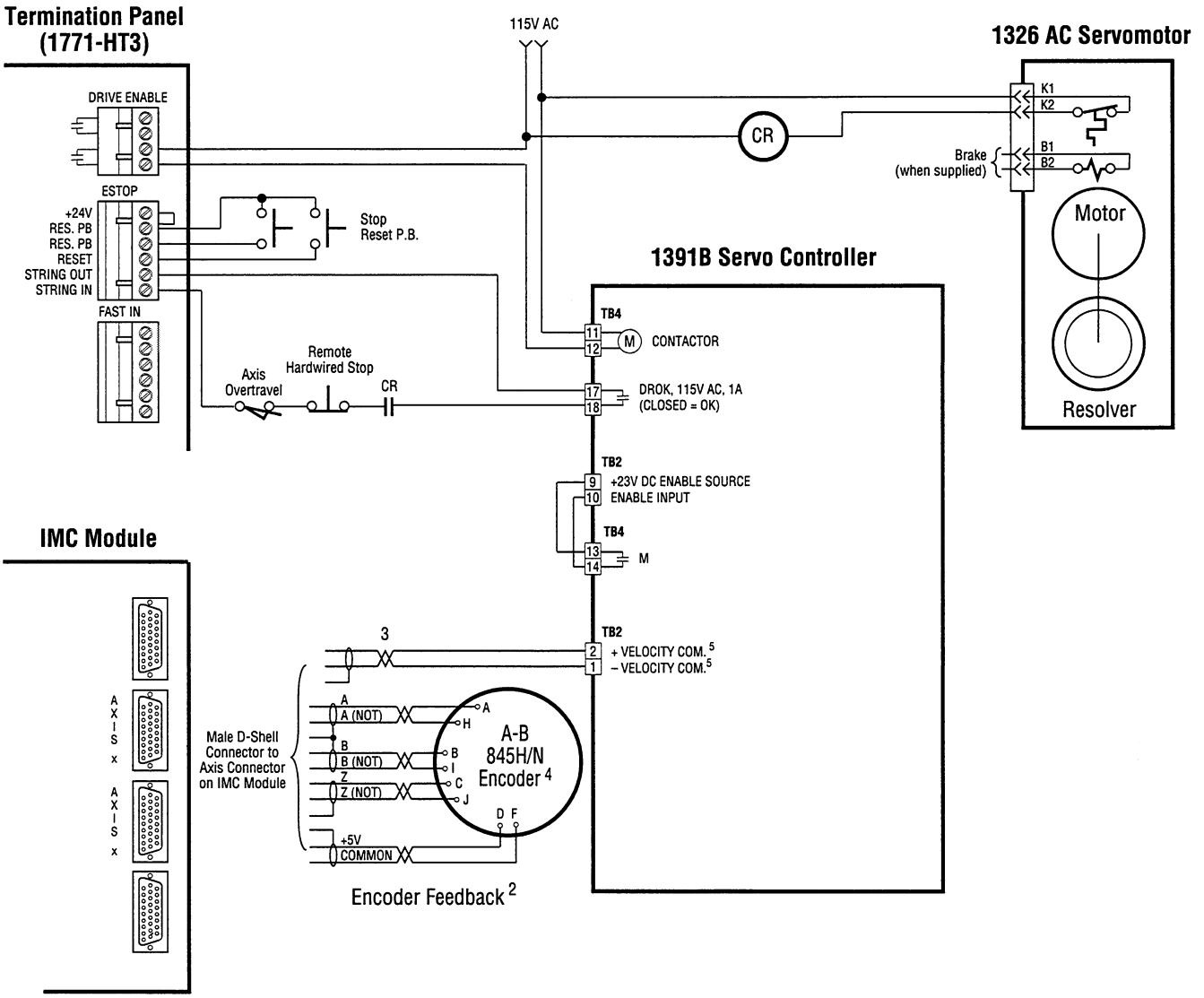
3 Use Belden brand #8760 or equivalent shielded cable.

4 Maximum allowable cable distance using 22 AWG (0.283 mm^2) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm^2) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

Figure B.4
Typical IMC 121, 123 and 123CR Interconnect Diagram [1]



1 Refer to the 1391 Interconnect Drawing for further details.

2 Use Belden brand #9504 or equivalent twisted pair, shielded cable, 40 feet (12.2 meters) maximum. Shields grounded at controller only.

3 Use Belden brand #8760 or equivalent shielded cable.

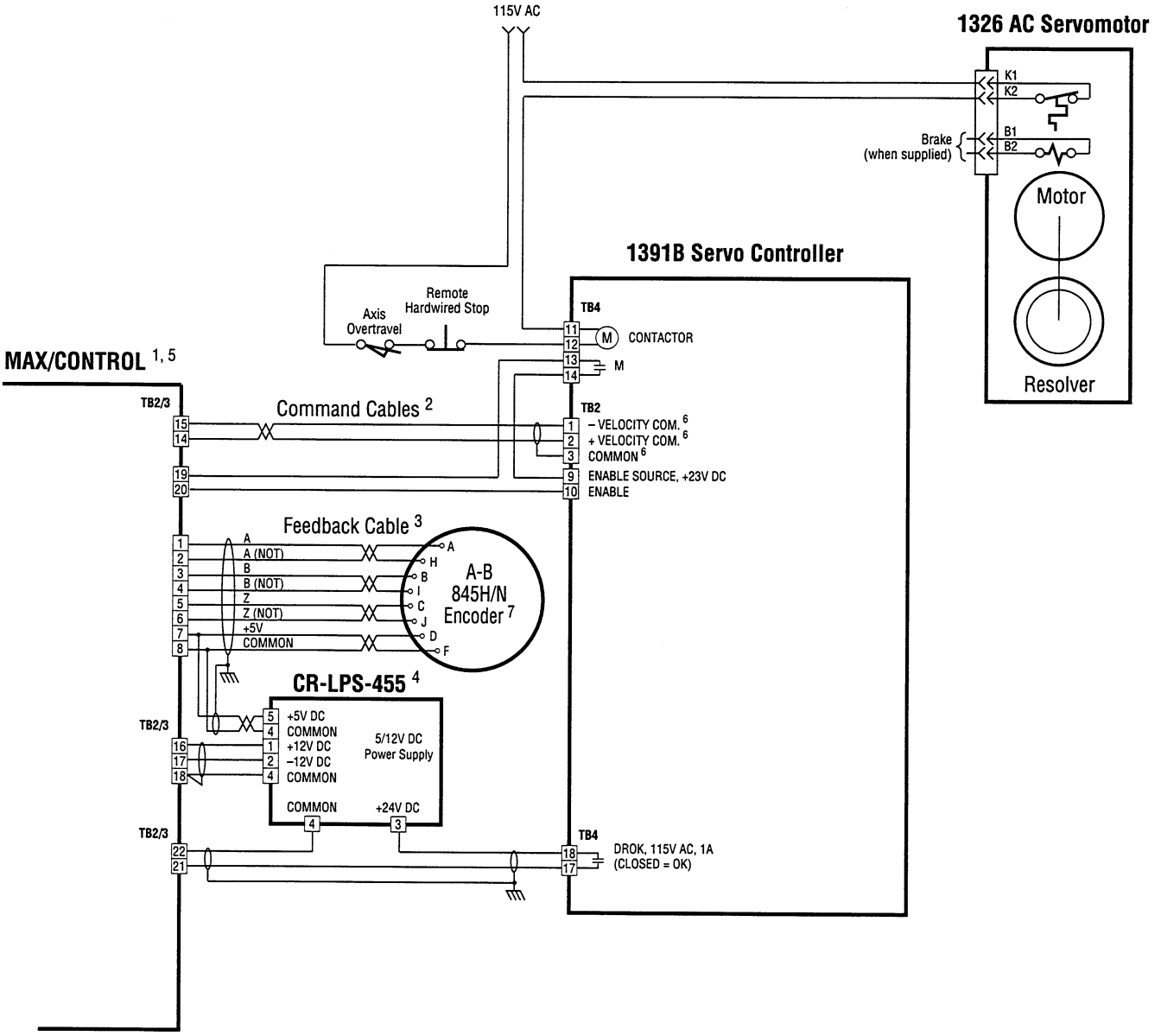
4 Maximum allowable cable distance using 22 AWG (0.283 mm²) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm²) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

5 If the drive is to be operated as a torque block from an IMC 121 or 123, command wires should be connected to TB2-15, 16 & 17.

Figure B.5
Typical MAX/CONTROL Interconnect Diagram



1 Refer to the MAX/CONTROL Installation and Setup Manual (999-051) and the 1391 Interconnect Drawing for further details.

2 Use Belden brand #8760 or equivalent shielded cable.

3 Use Belden brand #9504 or equivalent twisted pair, shielded cable, 40 feet (12.2 meters) maximum. Shields grounded at controller only.

4 Use Belden brand #9533 or equivalent shielded cable.

5 X-axis connections are shown – Y-axis connections (TB3) are identical.

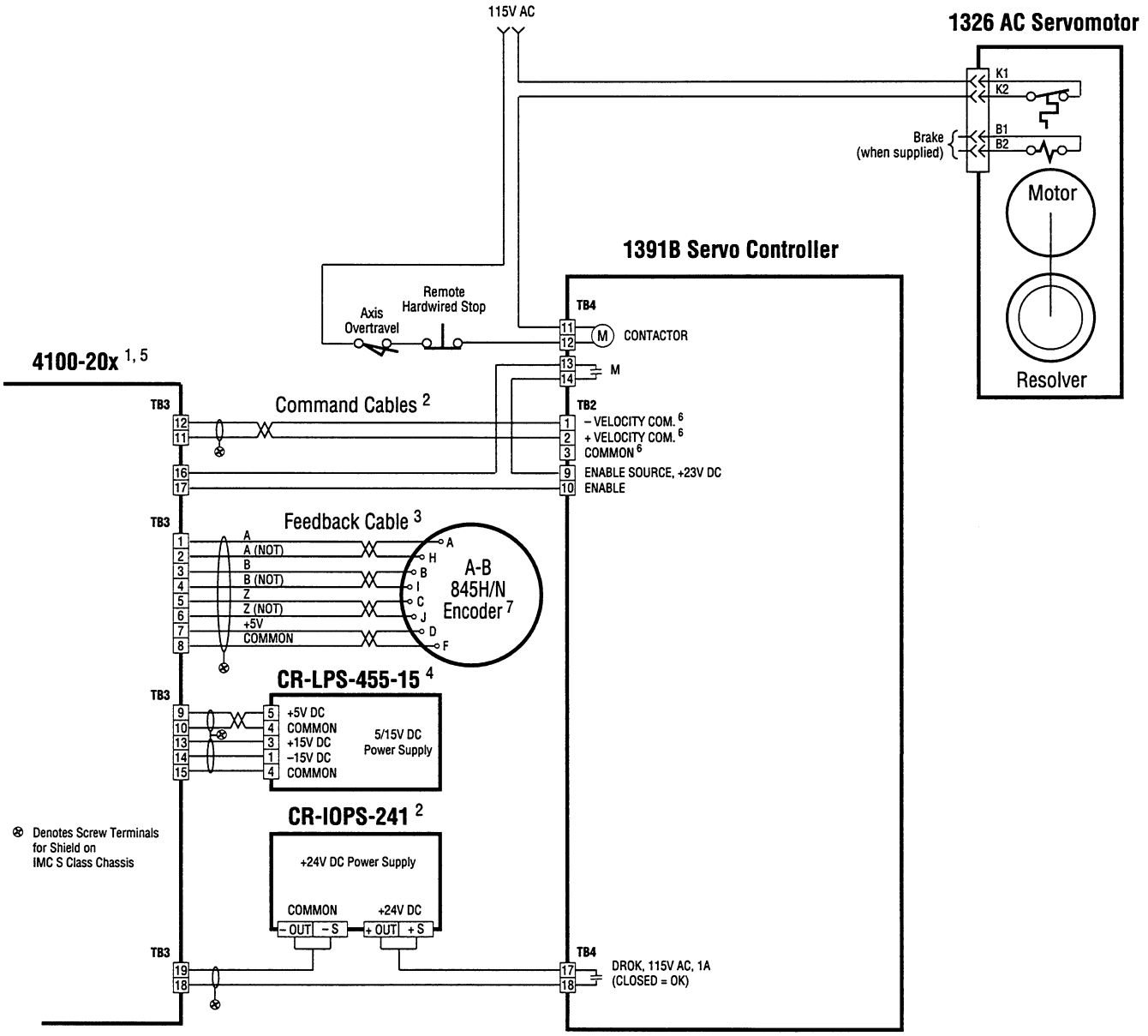
6 If the drive is to be operated as a torque block, command wires should be connected to 1391 TB2-15, 16 & 17.

7 Maximum allowable cable distance using 22 AWG (0.283 mm²) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm²) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

Figure B.6
Typical IMC-S/20x Interconnect Diagram



1 Refer to the IMC-S/20x Installation and Setup Manual (999-105) and the 1391 Interconnect Drawing for further details.

2 Use Belden brand #8760 or equivalent shielded cable.

3 Use Belden brand #9504 or equivalent twisted pair, shielded cable, 40 feet (12.2 meters) maximum. Shields grounded at controller only.

4 Use Belden brand #9533 or equivalent shielded cable.

5 Axis 0 (TB3) connections are shown – Axis 1, 2, 3 connections are identical (use TB5 for Axis 1, TB4 for Axis 2, and TB6 for Axis 3).

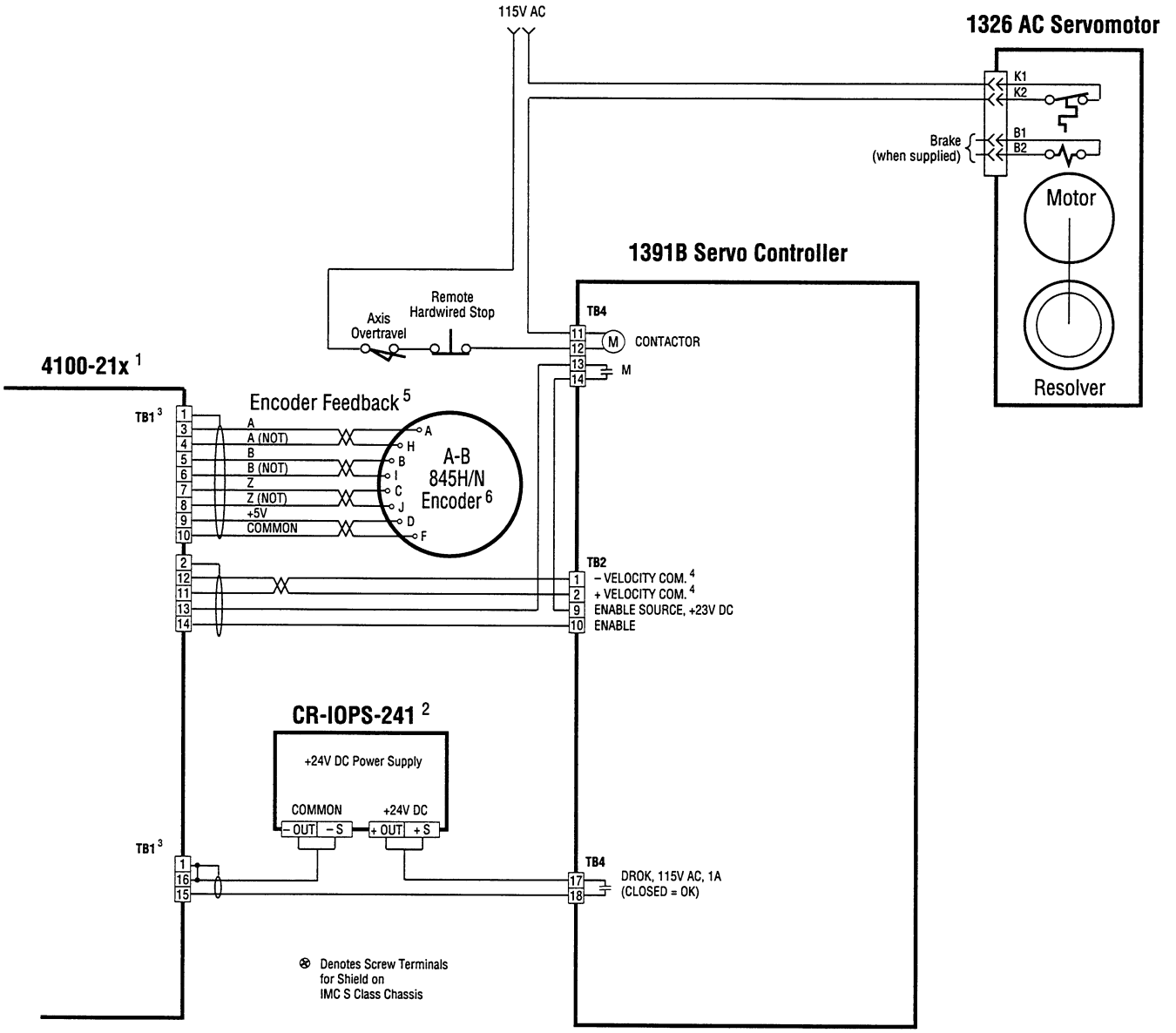
6 If the drive is to be operated as a torque block, command wires should be connected to 1391 TB2-15, 16 & 17.

7 Maximum allowable cable distance using 22 AWG (0.283 mm^2) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm^2) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

Figure B.7
Typical IMC-S/21x Interconnect Diagram



1 Refer to the IMC-S/21x Installation and Setup Manual (999-103) and the 1391 Interconnect Drawing for further details.

2 Use Belden brand #8760 or equivalent shielded cable.

3 Axis 0 connections (TB1) are shown – Axis 1, 2, 3 connections are identical (use TB3 for Axis 1, TB4 for Axis 2 and TB5 for Axis 3).

4 If the drive is to be operated as a torque block, command wires should be connected to 1391 TB2-15, 16 & 17.

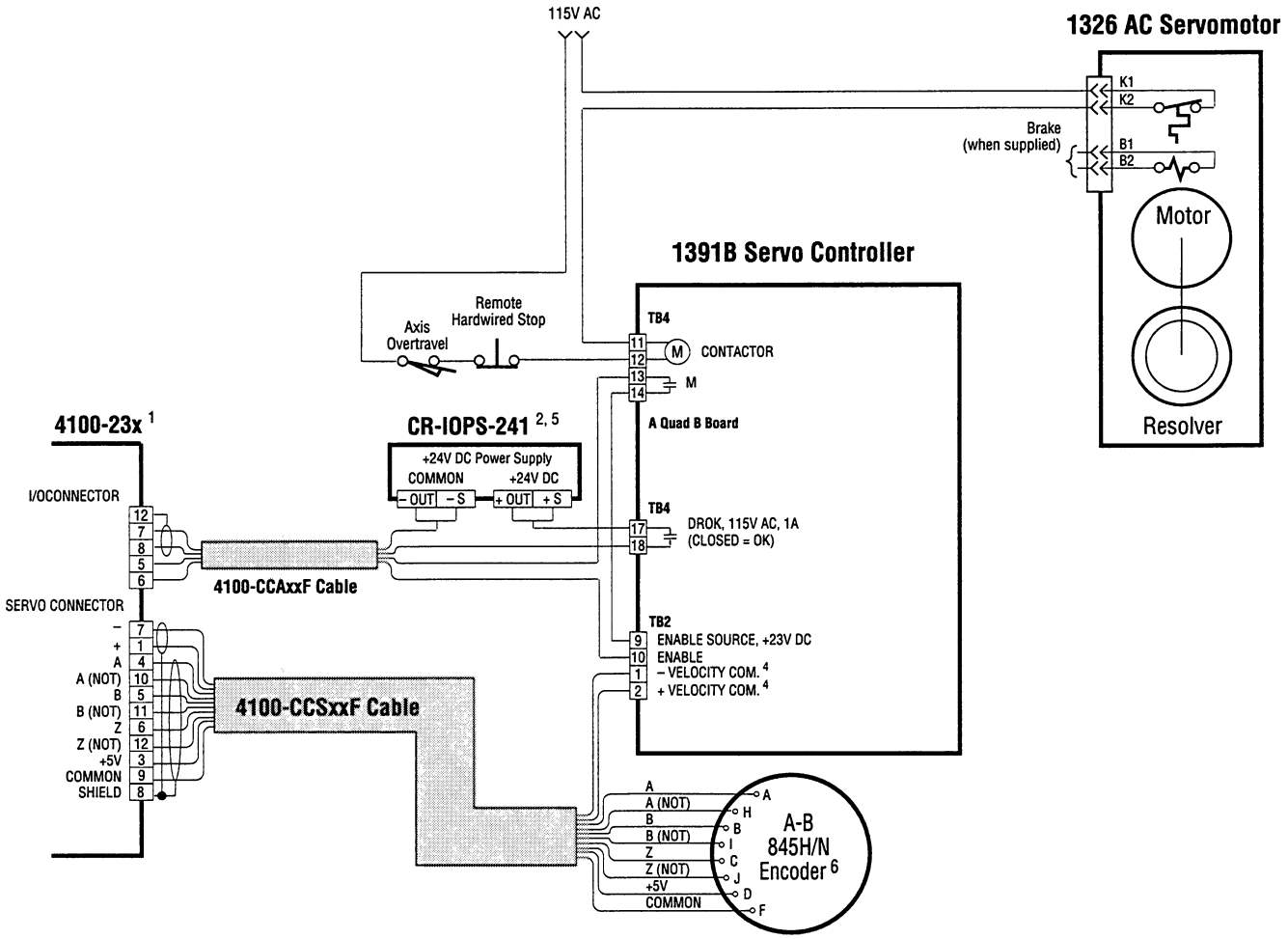
5 Use Belden brand #9504 or equivalent twisted pair, shielded cable, 40 feet (12.2 meters) maximum. Shields grounded at controller only.

6 Maximum allowable cable distance using 22 AWG (0.283 mm^2) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm^2) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

Figure B.8
Typical IMC-S/23x Interconnect Diagram



1 Refer to the IMC-S/23x Installation and Setup Manual and the 1391 Interconnect Drawing for further details.

2 Use Belden brand #8760 or equivalent shielded cable.

3 Axis 0 connections are shown – Axis 1, 2, 3 connections are identical.

4 If the drive is to be operated as a torque block, command wires should be connected to 1391 TB2-15, 16 & 17.

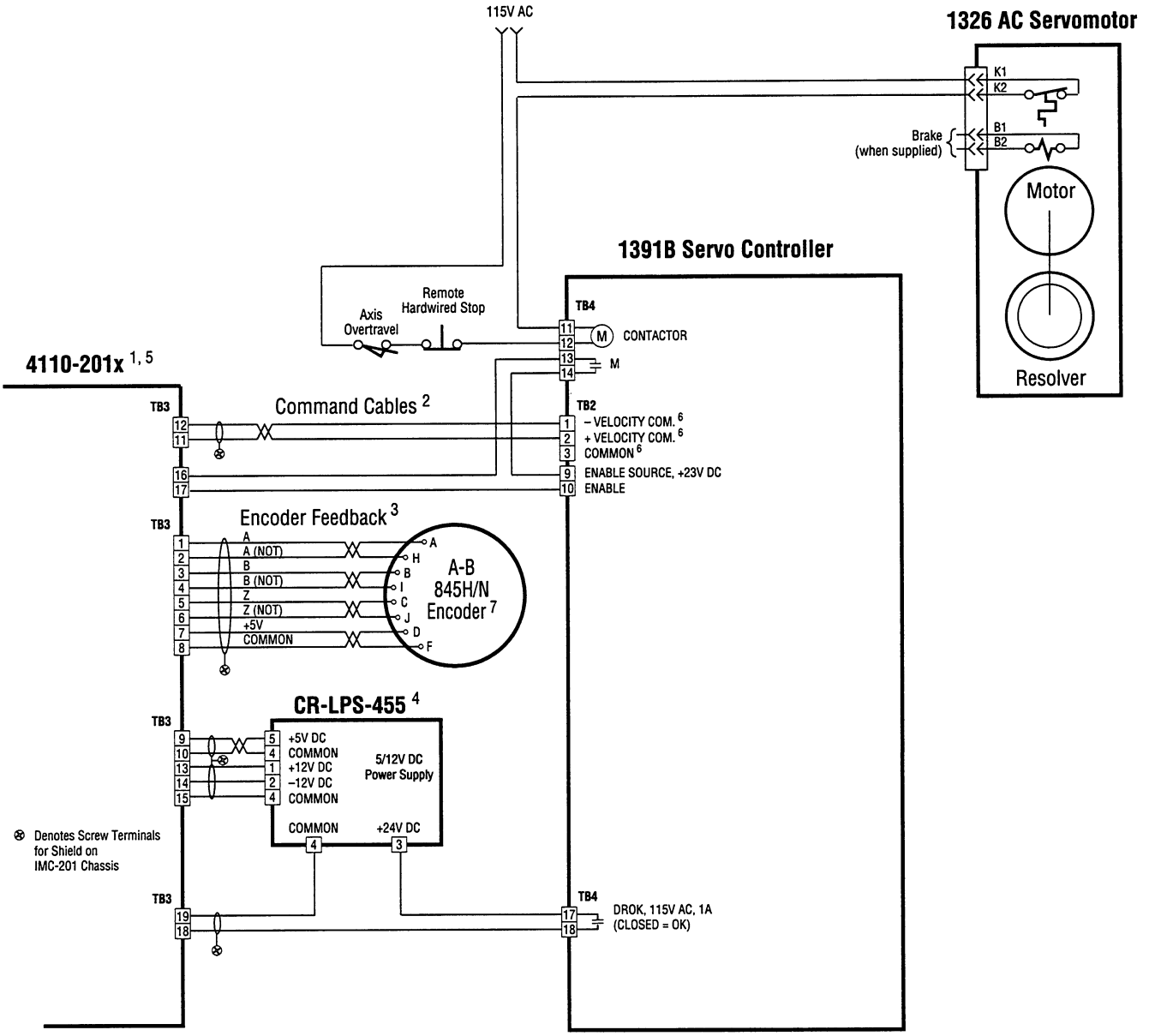
5 Separate from the 24V DC I/O power supply.

6 Maximum allowable cable distance using 22 AWG (0.283 mm^2) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm^2) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

Figure B.9
Typical IMC-201 Interconnect Diagram



1 Refer to the IMC-201 Installation and Setup Manual (999-108) and the 1391 Interconnect Drawing for further details.

2 Use Belden brand #8760 or equivalent shielded cable.

3 Use Belden brand #9504 or equivalent twisted pair, shielded cable, 40 feet (12.2 meters) maximum. Shields grounded at controller only.

4 Use Belden brand #9533 or equivalent shielded cable.

5 X Axis (TB3) connections are shown – secondary feedback (TB5) connections are identical to the TB3 connections.

6 If the drive is to be operated as a torque block, command wires should be connected to 1391 TB2-15, 16 & 17.

7 Maximum allowable cable distance using 22 AWG (0.283 mm^2) cable and a 5V DC supply is 39 feet (11.9 meters). If greater cable distance is needed, use a 8-15V DC power supply or larger cable.

Example: Encoder requires a regulated supply between 4.75 and 5.25V DC and will draw 200mA (max.). A 5V DC supply is being used.
Maximum Allowable Cable Resistance = R = V / I = (5–4.75) / 0.20 = 1.25 ohms

Assuming the cable is 22 AWG (0.283 mm^2) with a resistance rating of 16 ohms/1000 feet (300 meters), 78 feet (23.8 meters) of cable will have the maximum allowable resistance of 1.25 ohms. Both the supply and return leads must be considered, so the actual length of the cable is 39 feet (11.9 meters), or 1/2 the calculated length.

Figure B.10
9/ Series Interconnect Diagram

For detailed 9/Series interconnect information, please refer to the following publications :

Controller	Publication
9/240	9/240 Integration Manual, publication 8520-4.1
9/230, 9/260, 290	9/230, 9/260 or 9/290 Integration Manual, publication 8520-6.2

Notes

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