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Allen-Bradley
IMC 120 Resolver Excitation Module

(Cat. No. 1771-HR)

Product Data

Introduction

If you are using the IMC 120 system to control one to three servo controllers using resolver feedback, you need an IMC 120 resolver excitation module.

The resolver excitation module generates sinusoidal signals that excite the stator of resolver feedback devices in your application. These sinusoids are in quadrature (sin/cos) and are precisely matched in amplitude (7V RMS) and frequency (2.5K Hz). The module requires 0.4 W backplane and 7.8 W user power from the 1771-PS7 supply.

The resolver excitation module uses low-impedance output amplifiers to drive the stator windings of 1 to 6 receiver type (stator primary) resolvers. The feedback from these resolvers must go to the IMC 120 servo controller modules in the same chassis with the resolver excitation module.

The module features current limit protection on the stator drive outputs. Shutdown of the outputs may also occur due to partial loss of user power (from 1771-PS7), or the internal sin/cos generator.

Contents

This publication describes the functions and features of the IMC 120 resolver excitation module. The IMC 120 resolver excitation module is just part of an IMC 120 resolver feedback system. To learn more about IMC 120 resolver systems, refer to IMC 120 Motion Control System Installation Manual (Publication 1771-6.5.45).

We arrange the information in this data sheet in the following order:

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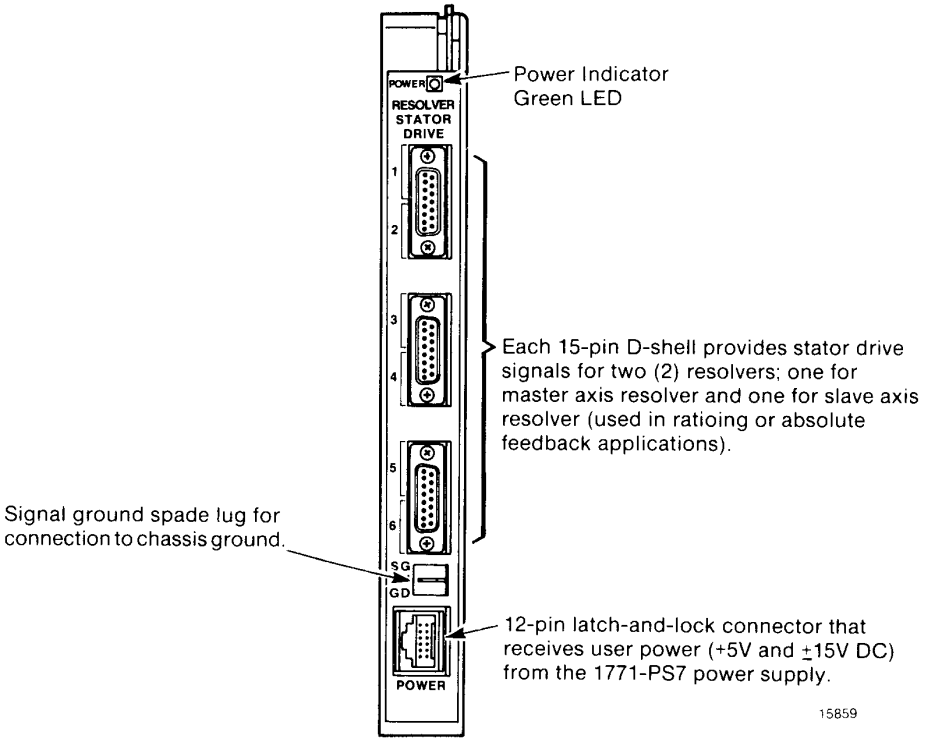
Front Panel Features

Figure 1 shows the IMC 120 resolver excitation module.

Figure 1
!MC 120 Resolver Excitation Module



Indicator (color)	Status	Meaning
POWER (Green)	ON	normal operation
	OFF	loss of user power (+5V or ± 15V DC from 1771–PS7)

Compatible Resolvers

It is important to choose a stator primary (receiver) resolver that fits your application and is compatible to the IMC 120 resolver interface specifications.

Table 1 lists resolvers that are potentially compatible with the IMC 120 resolver interface specifications (see table 2.F of IMC 120 Motion Control System Installation Manual (Publication No. 1771–6.5.45).

To determine which resolvers are best suited in any particular application, read Appendix C, How to Choose a Resolver also in IMC 120 Motion Control System Installation Manual 1771–6.5.45

Table 1
List of Resolvers

Harowe

Model #	Speed[1]	Rotor Output
11BRW-300-F	x1	3.3V RMS
11BRW-300-K	x1	3.4V RMS
11BRCT-300-F	x2	3.4V RMS
11BRCT-300-M	x2	6.9V RMS
11BRCT-300-T	x4	2.8V RMS
11BRCT-300-U	x5	1.6V RMS

Clifton

Model #	Speed[1]	Rotor Output
11-BHW-0IE	x1	2.7V RMS
11BHM-6F	x4	6.2V RMS
11BHM-4F	x5	4.0V RMS
11BHM-8HV	x10	2.0V RMS
11BHW-29	x1	3.1V RMS

1. Speed = # electrical cycles per revolution of resolver = # of poles divided by 2

Table 1
List of Resolvers (continued)

Singer Kearfott

Model #	Speed[1]	Rotor Output
CR4-1095-004	x1	3.4V RMS
CR4-1095-020	x4	3.3V RMS
CR4-1095-042	x2	7.6V RMS
CR4-1095-043	x2	7.6V RMS
CU9-1095-001	x1	3.4V RMS
CU9-1095-002	x1	3.4V RMS
CU9-1095-201	x2	3.3V RMS
CU9-1095-501	x5	2.8V RMS
CU9-1095-101	x10	1.8V RMS
CU9-1095-103	x10	1.8V RMS
CU9-1095-104	x10	1.8V RMS

Transicoil

Model #	Speed[1]	Rotor Output
11BRC-U27199	x1	3.4V RMS
11BRC-U217805	x2	3.3V RMS
11BRC-U217886	x5	1.2V RMS

Tamagawa Seiki

Model #	Speed[1]	Rotor Output
TS530N33E9	x1	3.9V RMS
TS20MN55E1	x5	1.7V RMS

1. Speed = # of electrical cycles per revolution of resolver = # of poles divided by 2

Installing the Resolver Excitation Module

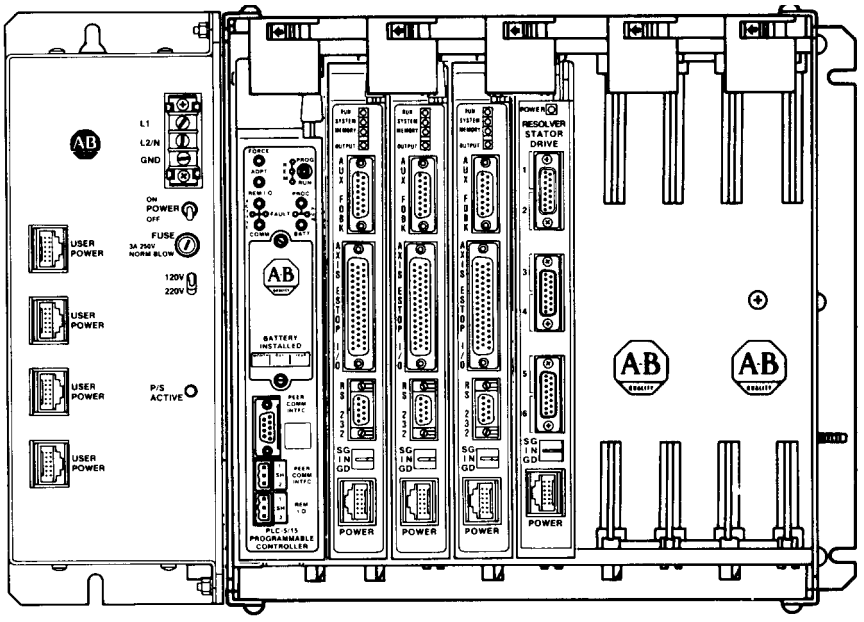
Locate the resolver excitation module in the slot to the immediate right of an IMC 120 servo controller module. All of the IMC 120 system modules should be located on the left side of the I/O chassis next to the in-rack processor or I/O expander module (figure 2).

Figure 2
Locating IMC 120 System Modules in an I/O Chassis

Processor Module or I/O Adaptor Module for remote chassis

(3) Servo Controller Modules

Resolver Excitation Module



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Installing Keying Bands

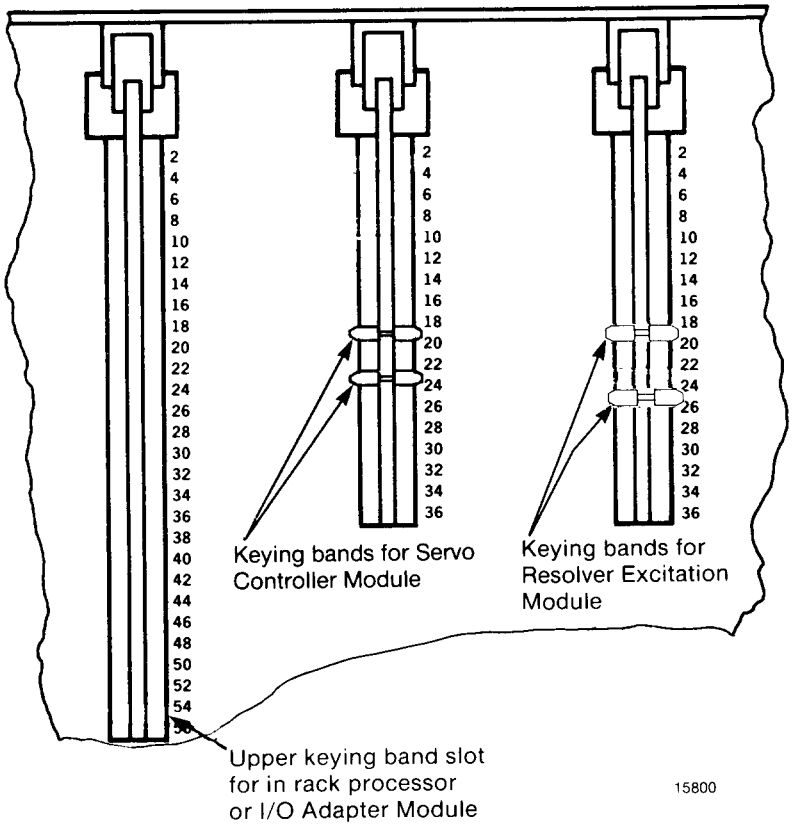
The resolver excitation module is slotted in two places at the rear edge. These slots are intended to mate with the yellow plastic keys we supply with each chassis. If you position the keys in the backplane connector to correspond with the slots in a particular module, you guard against inserting the wrong module into a slot. The keys also help align the module with the backplane connector.

Insert or remove keys with your fingers. If you use a tool, you can damage the backplane connector.

The two keying bands for resolver excitation modules are 18-20 and 24-26. Use the numbers to the right of the backplane socket shown in figure 3 as a guide when positioning the keying bands.

CAUTION: A module inserted into a wrong slot could be damaged by improper voltages. Use keying bands to prevent insertion of modules into the wrong slot.

Figure 3
Keying Band Positions for a Single Axis IMC 120 Resolver System



Inserting the Inserting Resolver Excitation Module

WARNING: Remove backplane power from the I/O chassis and disconnect user power cabling before inserting or removing a module.

- Failure to remove power from the backplane or to disconnect cabling could cause module damage, degradation of performance, or personal injury.
- Failure to remove power from the backplane could cause injury or equipment damage due to possible unexpected operation.

CAUTION: Do not force a module into a backplane connector. Forcing a module can damage the backplane connector or the module.

To insert a module into an I/O chassis, follow these steps:

1. Remove backplane and user side power from the I/O chassis before inserting or removing a module.
2. Open the module locking latch on the I/O chassis and insert the module into the slot keyed for it.
3. Firmly press to seat the module into its backplane connector.
4. Secure the module in place with the module locking latch.

Grounding and Shielding

Figure 4 shows a typical grounding and shielding block diagram for an IMC 120 system. All of the shields and signal commons (normally floating) are tied to earth ground at a single point. A signal ground lug has been provided on each IMC 120 module for this purpose. See figure 5 for connection details.

Avoid connecting shields to earth ground at both ends. It may result in circuit loops that are susceptible to both radiated and coupled noise.

Figure 4
Typical Grounding and Shielding Arrangement for a Single Axis IMC 120 Resolver System

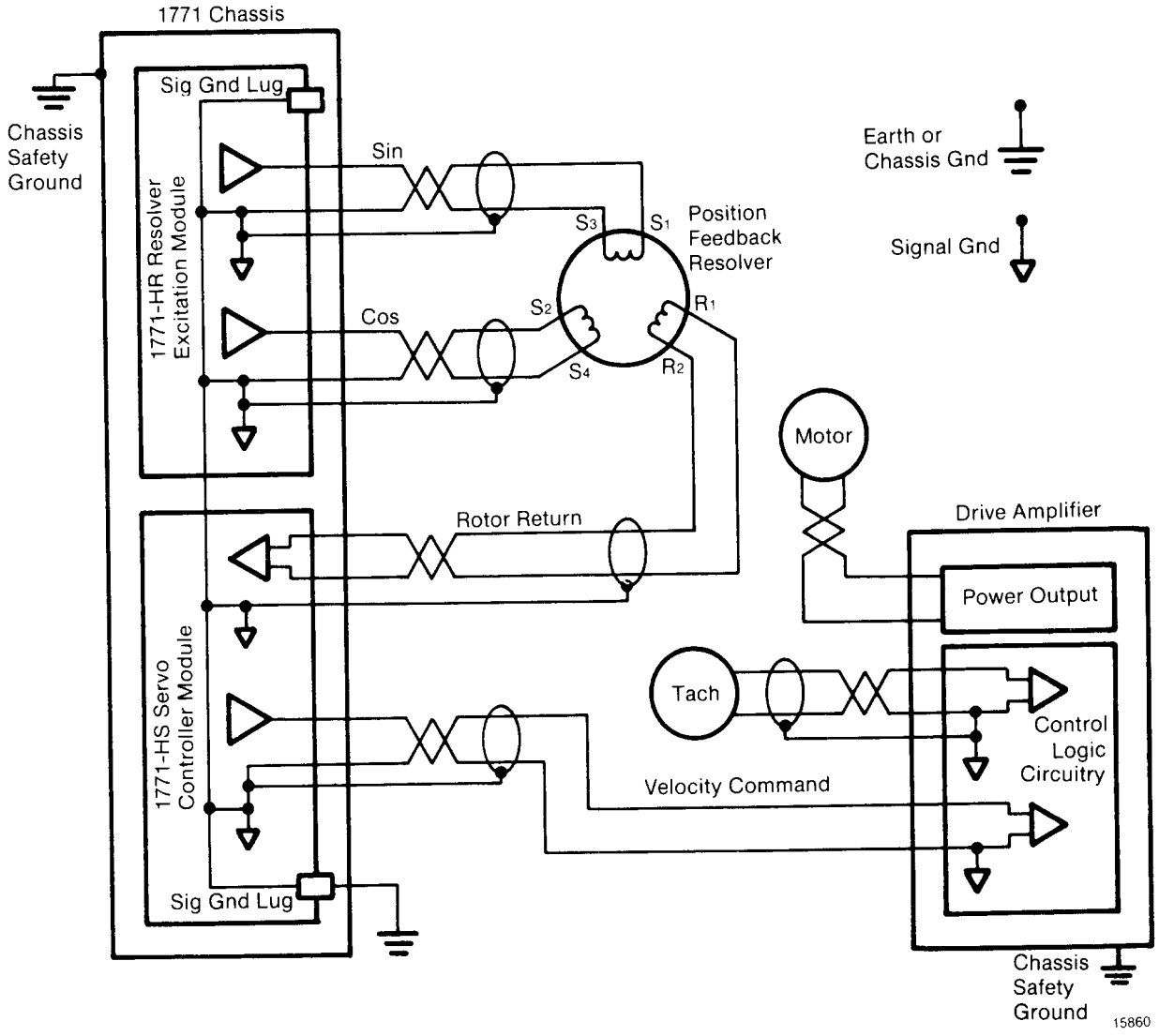
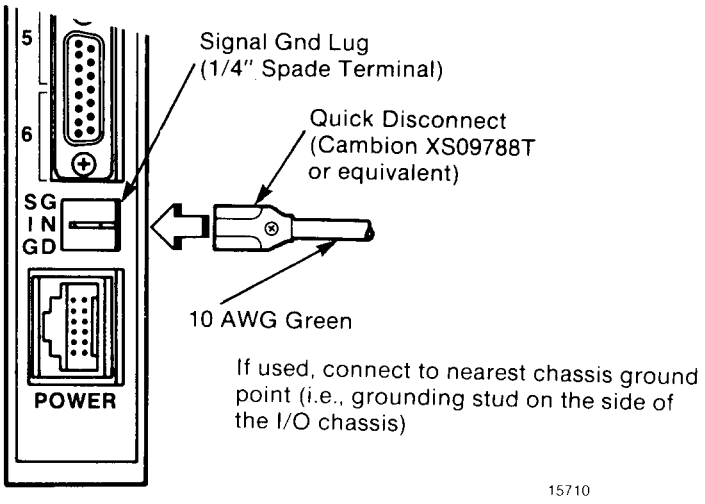


Figure 5
Grounding a Resolver Excitation Module



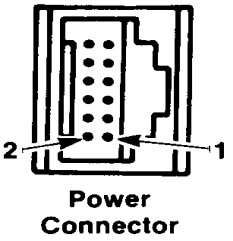
Connecting Cables

Make sure that power has been Connected to your 1771–PS7 power supply and that it is turned OFF before you connect cables.

Use the 1771–CAS cable to connect the 1771–PS7 to the POWER latch–n–lock connector of the resolver excitation module. When connecting this cable to the POWER connectors, route this cable away from AC input power and other cables.

The pinout of this 12 pin latch–n–lock connector is:

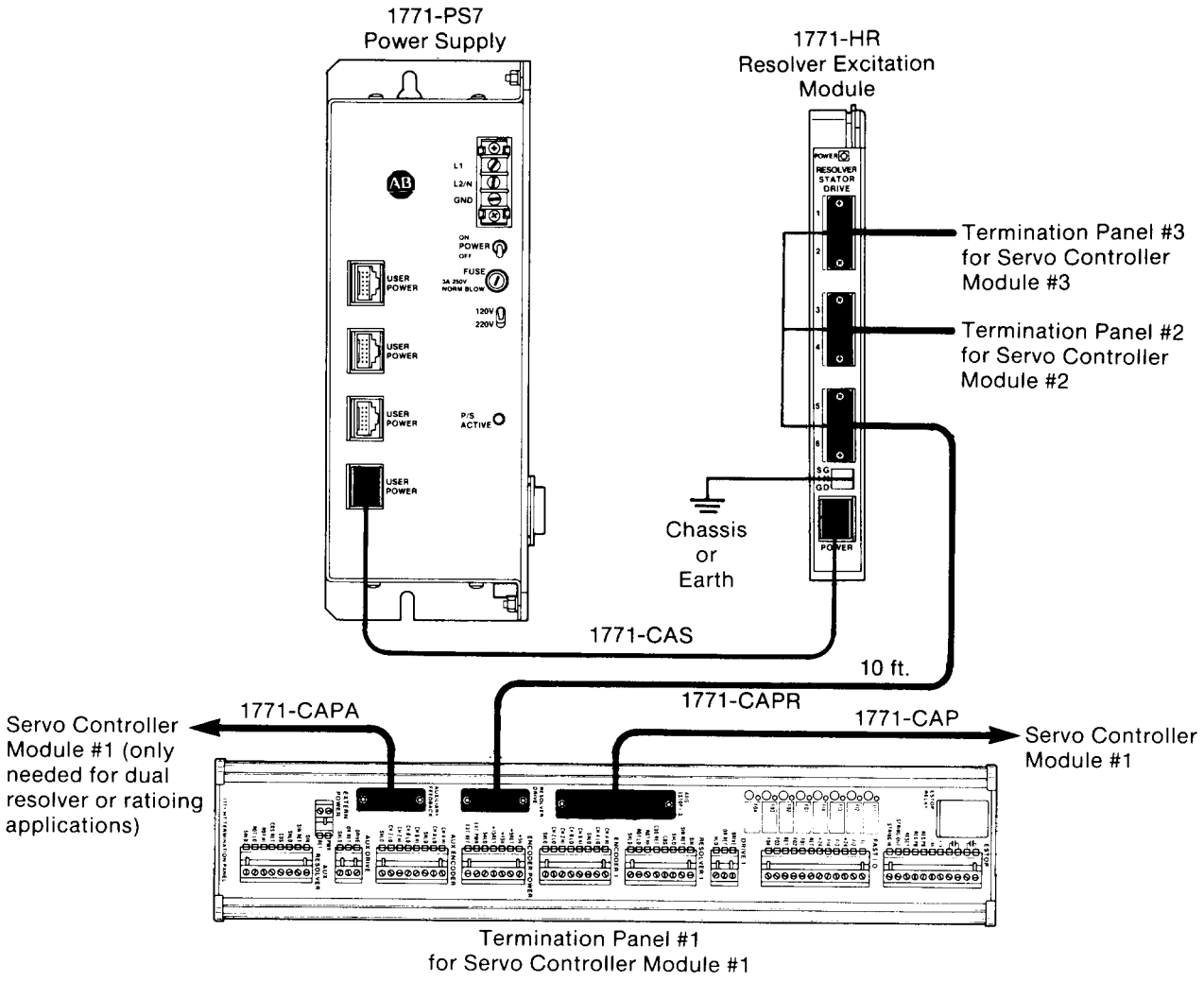
Pin#	Description
1	not used
2	not used
3	not used
4	not used
5	user +15VDC
6	user COM
7	user -15VDC
8	user COM
9	user +5VDC
10	user COM
11	user +5VDC
12	user COM
S	chassis gnd (Shield)



Use the 1771-CAPR cable to connect the STATOR DRIVE connectors of the resolver excitation module to the RESOLVER DRIVE connector on the IMC 120 termination panel.

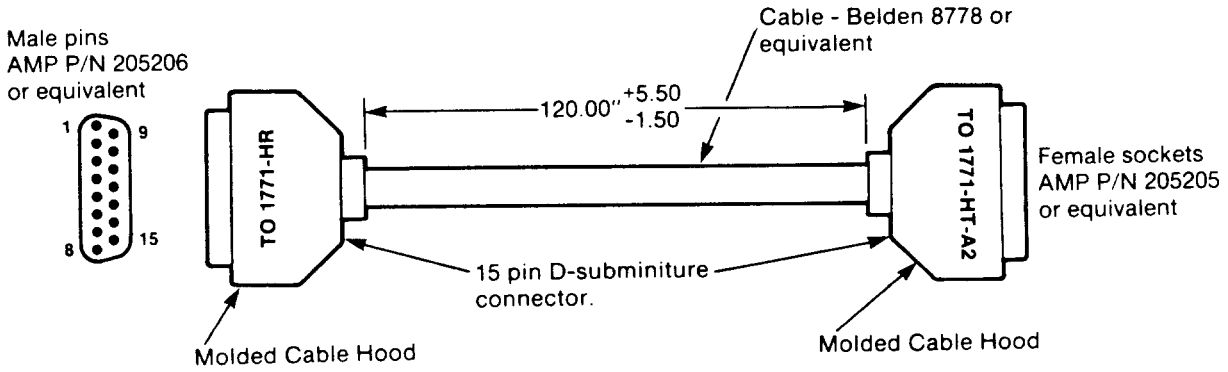
Figure 6 shows the cabling between the resolver excitation module, termination panel, and power supply.

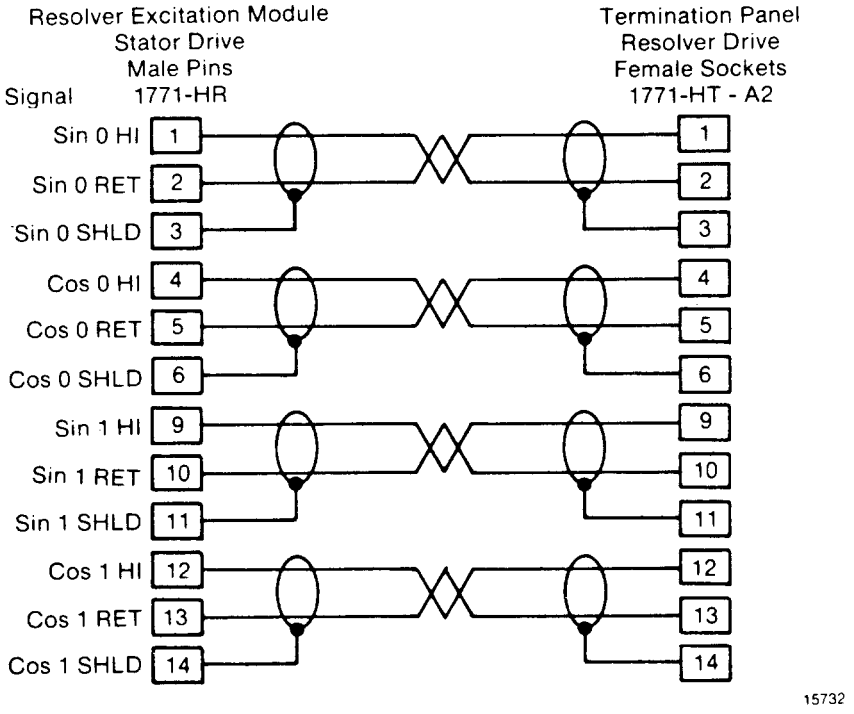
Figure 6
Resolver Excitation Module Connections



If you are not using a termination panel, you have to make your own cabling between the resolver excitation module and resolver devices. Figure 7 shows you the 1771-CAPR cable specifications and wiring diagram to assist you in making this cable.

Figure 7
1771-CAPR Cable Specifications and Wiring Diagram





Wiring Resolvers

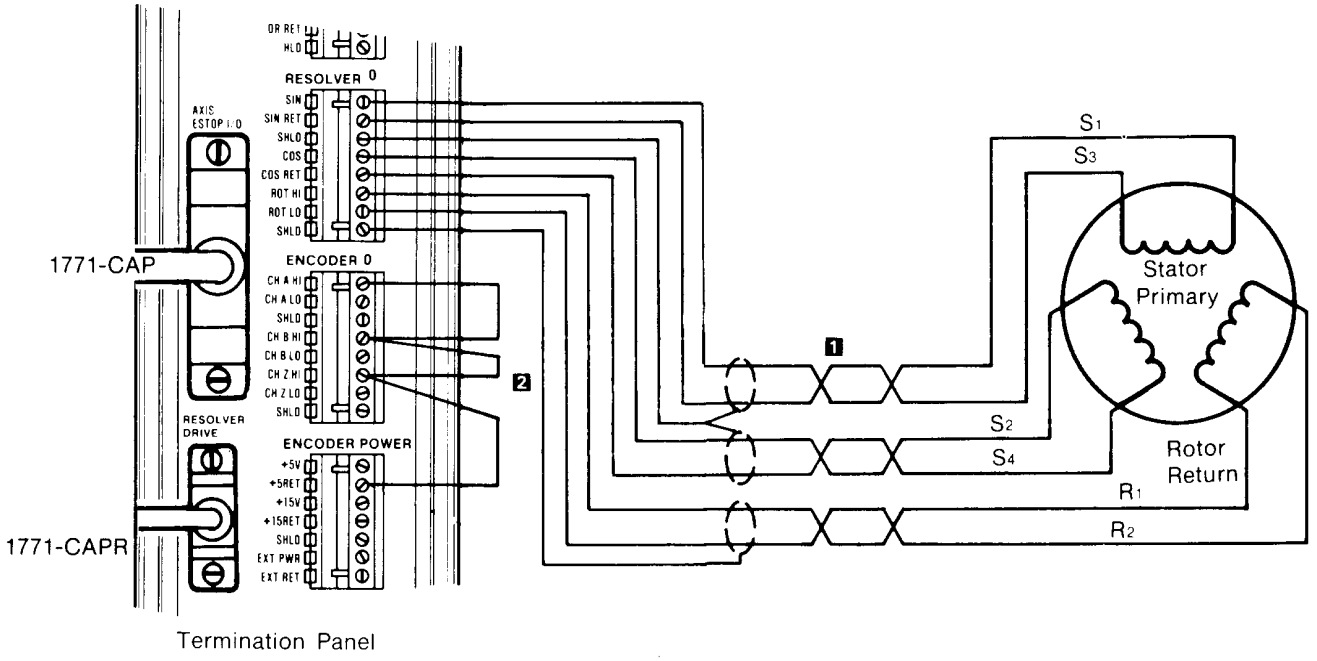
Use only a single, continuous, shielded cable segment to connect the resolver to the termination panel.

Each STATOR DRIVE connector of the resolver excitation module supports up to two resolver devices; the main resolver and the auxiliary resolver.

The main resolver is the feedback device for the drive amplifier controlled by the servo controller module. Figure 9 shows how to connect the main resolver to the termination panel.

Important: Distances specified in the following figures are expressed in "cable feet" from the termination panel to the resolver. If you are not using the termination panel, then 10 additional feet of cable is allowed.

Figure 9
Connecting the Main Resolver



Notes:

1. 3 pair individually twisted and shielded 22 gauge wire. 90 ft. maximum length.
2. These jumpers are required in order to properly configure the Servo Controller module for resolver operation.

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Wiring Ratioed Axes and Dual Resolvers

An auxiliary resolver is used in the following applications:

- axis ratioing
- dual resolver feedback for absolute positioning

In ratioed motion, the servo controller module is set up so that the motion of the axis it controls (slave) follows the motion of another axis (master) by a ratio defined in the MML program. Figure 10 shows the wiring of resolvers for axis ratioing applications.

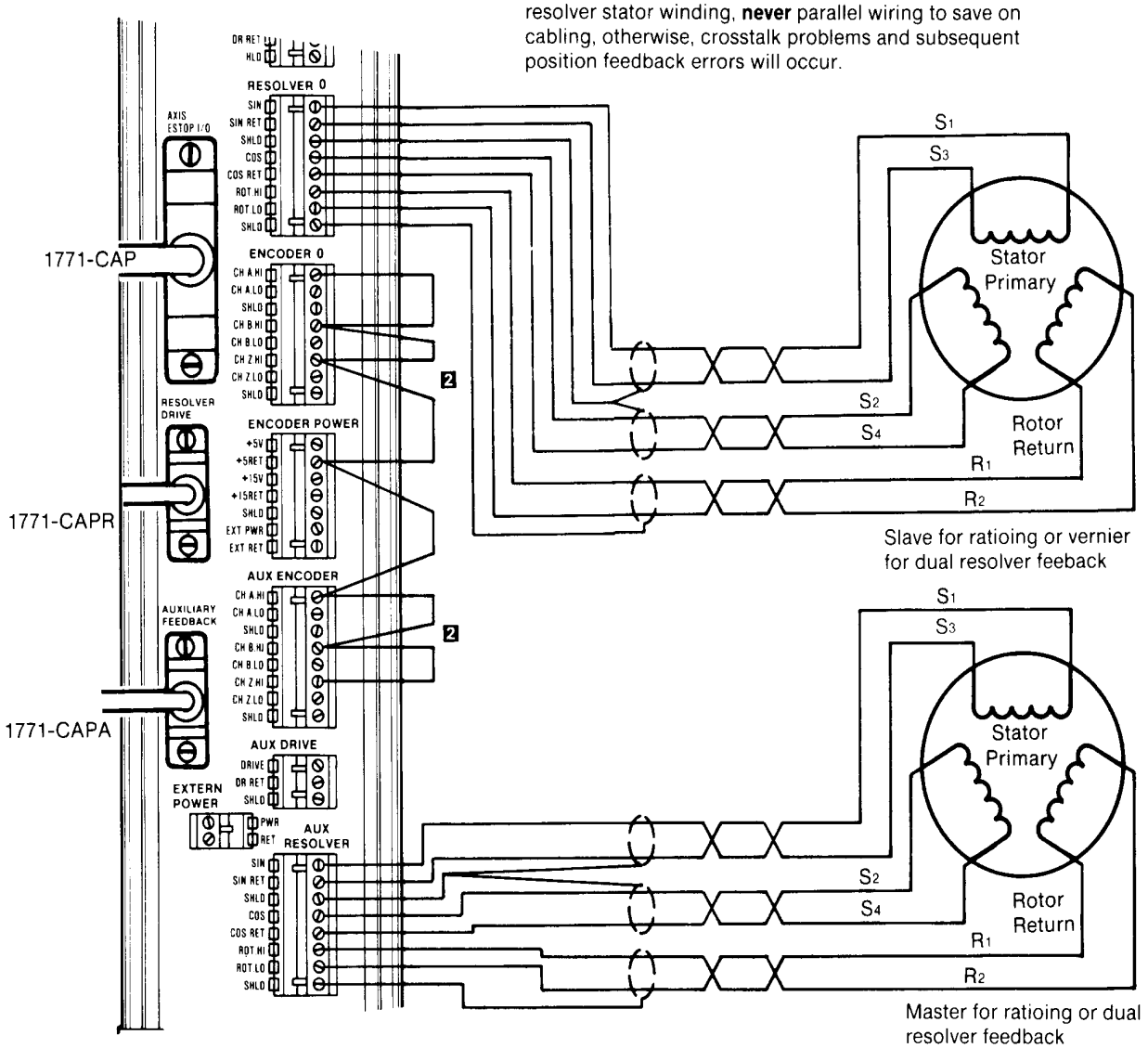
Several AMP parameters must be set for ratioed motion. Read Section 12.8, entitled Ratio/Probe Parameters in publication 1771-6.5.51, IMC 120 Motion Control System Programming Manual.

Dual Resolvers (master and vernier) can be connected for the purpose of checking axis absolute position at power up without homing. The vernier resolver is wired to the RESOLVER 0 connector and the master resolver is wired to the AUX RESOLVER connector as shown in figure 10.

When dual resolvers are installed, the axis must be homed once to initialize the absolute position. After this, the controller can check the axis absolute position after power up without homing. This feature can help simplify recovery from power failure.

Figure 10
Resolver Wiring for Ratioing and Dual Resolver Applications

Caution: Always run a separate twisted pair for each resolver stator winding, **never** parallel wiring to save on cabling, otherwise, crosstalk problems and subsequent position feedback errors will occur.



Notes:

1. 3 pair individually twisted and shielded 22 gauge wire. 90 ft. maximum length.
2. These jumpers are required in order to properly configure the Servo Controller module for resolver operation.

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Electrical Characteristics

power requirements (back plane)	0.4W
power requirements (user side)	7.8W
suggested warm-up time at power-up	20 minutes
Stator Drive Output Specifications	
output amplitude	6.72 V RMS (min.) 7.07 V RMS (typ.) 7.42 V RMS (max.)
sine to cosine amplitude matching	typ. ± 0.1% max. ± 0.3%
D.C offset voltage	typ. ± 0.005 VDC max. ± 0.01 VDC
signal distortion	typ. 0.05% THD max. 0.1% THD
output frequency	2.5 kHz ± 0.02% max
sine to cosine phase relationship	typ. 90° ± 2.7 Minutes max. 90° ± 5.4 Minutes
sample edge to sine phase offset	min. 0.27° (sine lags typ. 0.36° sample) max. 0.45°
sample edge to sine phase offset drift	± 5.4 Minutes
maximum output load (minimum load impedance)	max. 80 ohm @ 80 Degree (inductive)
output current limit	min. .18A typ. .28A max. .35A
power-up to output stable delay	max. 2 seconds

Related Publications

For more detailed information on the IMC 120 motion control system, please refer to these related publications:

Catalog Number	Title	Publication Number
	IMC 120 Motion Control System Product Data	1771-2.121
1771–HS	IMC 120 Motion Control System Installation Manual	1771-6.5.45
1771–PS7	120/220V AC Power Supply With User Power Product Data	1771-2.123
1771–HM	IMC 120 Plug in Memory Product Data	1771-2.124
1771–HT	IMC 120 Termination Panel Product Data	1771-2.126
1771–HD	IMC 120 Motion Control Handheld Pendant Operators Manual	1771-6.5.50
8100–HSKAR	IMC 120 Motion Control System Programming Manual	1771-6.5.51
1771–HCDOC	IMC 120 Motion Control System Installation Manual	1771 -65.45
	IMC 120 Motion Control Handheld Pendant Operators Manual	1771-6.5.50
	IMC 120 Motion Control System Programming Manual	1771-6.5.51

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