

Module Overview

The 1200 module is a high speed resolver input module that resides in a Rockwell Automation ControlLogix rack. There are two versions of the 1200 module, the 1241 and the 1242.

The 1241 is a 13 bit single channel resolver unit that can be connected to a single turn resolver. The ability to offset the position data and monitor the stopping time are also available on this unit.

The 1242 is a dual channel unit that can be connected to two single turn resolver transducers or to a single dual resolver multiturn transducer. When configured for two single turn resolvers, the unit has 13 bit resolution and channel 1 can monitor the stopping time. When configured for one multiturn transducer, the unit has 12 bit resolution per turn but stop time monitoring is not available.

Note 1: All module setup parameters, Scale Factor, Offset, Preset, Direction, and Velocity Response are programmed using a Setup Message instruction.

Note 2: The machine position for each resolver can be preset to the programmed value using the Apply Preset Message instruction. The Circular Offset value calculated from this preset operation is reported with the Channel Input Data.

Note 3: The 1200 module stores its parameters through power down in an EEPROM. This device has a minimum of 100,000 write cycles.

Note 4: Terminal TB2 is the Brake Input that accepts both + and -24VDC between pins 1 and 2. The input is bipolar, that is power can be applied to either terminal. This input becomes active when power is removed, that is less than 2VDC.

Note 5: The brake monitor function is available on both a 1241 module and channel 1 of a 1242 module. The brake monitor function is not available on a 1242 module that has been configured to use an HTT-20-X multiturn transducer.

Note 6: The Stop Position reflects the position of Resolver 1 when The Brake Input is applied and the Stop Time reflects the time in mS from the active edge of The Brake Input until the position change of Resolver 1 is less than 8/8192 of one rotation cycle for 125mS.

Note 7: The 1200 module uses a VENDOR ID = 10 for AMCI, a PRODUCT TYPE = 9 for resolver and a PRODUCT CODE = 15 for Resolver Input.

Installing the 1200 module in a ControlLogix System

1. Open RSLogix 5000 and the project in which you want to install the AMCI 1200 module.
2. Right click on I/O Configuration in the Project Tree.
3. Select New Module.
4. Select the following module type and description from the list that appears.

Type = 1756-MODULE
 Description = Generic 1756 Module

5. Click on OK.
6. Enter the following module properties.

Name: *Your Choice* (must begin with a letter)
Description: *Your Choice*
Comm Format: *Data-DINT* (must be Data-DINT)
Slot: *location of 1200 module*

7. Enter the Connection Parameters from the following table. Please note the different parameters for 1 single turn Resolver, 2 single turn Resolvers, and one Multiturn Resolver.

CONNECTION PARAMETERS

1241 Module		
	Assembly Instance	Size in 32 bit words
INPUT	100	6
OUTPUT	195	1
CONFIGURATION	1	0
1242 with two single turn Resolvers		
INPUT	101	9
OUTPUT	195	1
CONFIGURATION	243	0
1242 with one Multiturn Resolver		
INPUT	102	4
OUTPUT	195	1
CONFIGURATION	244	0

8. Click on Next >
9. Set the RPI (Rate Packet Interval) Time to the desired value. The minimum value for the 1200 module is 0.3ms.
10. Click on Finish >>
11. The 1200 module will now appear in the project tree and three new data tags will have been created, Local:X.I.Data[Y], Local:X.O.Data[Y] and Local:X.C.Data[Y] where "X" is the slot number and "Y" is the word number. The status, position, velocity, and stop time information are located in the Input tags. The Output and Configuration tags are not used by the 1200 module.

Module Specifications

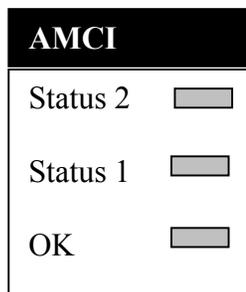
Current Draw:

65mA @24Vdc typical
 250mA @24Vdc with reference voltage pins shorted
 250mA @5Vdc

Throughput Time:

Position Update: 200µs
 Backplane Updated: 400µs

Front Panel:



LED Function

Status 1 & 2 LEDs (for Resolver 1 and 2)

Solid Red: Module Fault, such as no reference voltage (Status 1 only)
Blinking Red: Non-Clearable Transducer Fault
Blinking Green: Clearable Transducer Fault
Solid Green: Module and Transducer are OK
Off: Unit is a 1241 or has been configured for Multiturn Resolvers (Status 2 only)

OK LED

Solid Green: Module Owned, two-way communication
Blinking Green: PLC is in Program Mode or one-way communication, Module only sends data to the PLC
Blinking Red: Communication between module and PLC interrupted

Resolver Connector Pin Out:

The resolver signals are brought into the 1200 module through a 10 pin connector. The four wiring combinations for this connector are shown in the following tables.

Pin	1241 Wiring	1242 Wiring Two Single Turn Resolvers	Beldin 9873 or 9730 Wire Color
10	NC	S3 channel 2	Black of the white/black pair
9	NC	S4 channel 2	Green
8	S3	S3 channel 1	Black of the white/black pair
7	S1	S1 channels 1 & 2	White
6	S4	S4 channel 1	Green
5	S2	S2 channels 1 & 2	Black of the green/black pair
4	Shields	Shields	
3	Shields	Shields	
2	R2	R2 channels 1 & 2	Red
1	R1	R1 channels 1 & 2	Black of the red/black pair

Pin	1242 Wiring One Multiturn Resolver	Beldin 9731 Wire Color
10	S1F	Yellow
9	S2F	Black of the blue/black pair
8	S3C	Black of the white/black pair
7	S1C & S3F	White and black of the yellow/black pair
6	S2C	Black of the green/black pair
5	S4F & S4C	Blue and green
4	Shields	
3	Shields	
2	R2	Black of the red/black pair and black of the brown/black pair
1	R1	Red and brown

Pin	1242 Multiturn Autotech Wiring	Beldin 9731 Wire Color
10	S4F	Blue
9	S1F	Yellow
8	S2C	Black of the green/black pair
7	S4C & S2F	Green and black of the blue/black pair
6	S3C	Black of the white/black pair
5	S3F & S1C	Black of the yellow/black pair and white
4	Shields	
3	Shields	
2	R2	Black of the red/black pair and black of the brown/black pair
1	R1	Red and brown

Notes:

1. When plugged into the unit, pin 1 is located towards the bottom of the module.
2. For the Multiturn Wiring, the “F” indicates the Fine resolver and the “C” indicates the Coarse resolver.
3. The shield pins can be connected to the mounting tab of the rack chassis to provide a better low impedance path to ground.

Brake Connector Pinout

Terminal TB2 is a two pin connector for the Brake Input that accepts a 24VDC signal across pins 1 and 2. Pin 1 is located towards the bottom of the module. The brake monitor function is performed when power is removed from the input.

Voltage Range: 0 to 24Vdc

On State: 10 to 24Vdc

Off State: 0 to 2Vdc

Current Draw: 5mA @ 24Vdc

A bicolor LED indicates when the Brake Input is receiving power.

Input Wiring	LED Color
Pin 1=+24Vdc and Pin 2 = Common	Green
Pin 1 = Common and Pin 2 = +24Vdc	Red

Input Tags (Data sent from the 1200 module to the PLC)

The data transferred from the 1200 module to the PLC is in DINT format. That is, each of the data words is 32 bits long. This data is read by the PLC at the RPI (Rate Packet Interval) time, which is asynchronous to the Ladder Logic Program. This data should be buffered to internal registers to insure that it is the same throughout the entire PLC program. Please note that the minimum RPI time for the 1200 module is 0.3ms.

The following table shows the input data format for a 1241 module, 1 single turn resolver.
 (Assembly Instance Input = 1 and Assembly Instance Configuration = 1)

32 bit Word	Function
0	Status Word
1	Position
2	Velocity
3	Circular Offset
4	Stop Time
5	Stop Position

The following table shows the input data format for a 1242 module configured for 2 single turn resolvers.
 (Assembly Instance Input = 101 and Assembly Instance Configuration = 243)

32 bit Word	Channel	Function
0	Both	Status Word
1	1	Position
2	1	Velocity
3	1	Circular Offset
4	2	Position
5	2	Velocity
6	2	Circular Offset
7	1	Stop Time
8	1	Stop Position

The following table shows the input data format for a 1242 module, configured for a multiturn resolver.
 (Assembly Instance Input = 102 and Assembly Instance Configuration = 244)

32 bit Word	Function
0	Status Word
1	Position
2	Velocity
3	Circular Offset

Word 0: Status Word

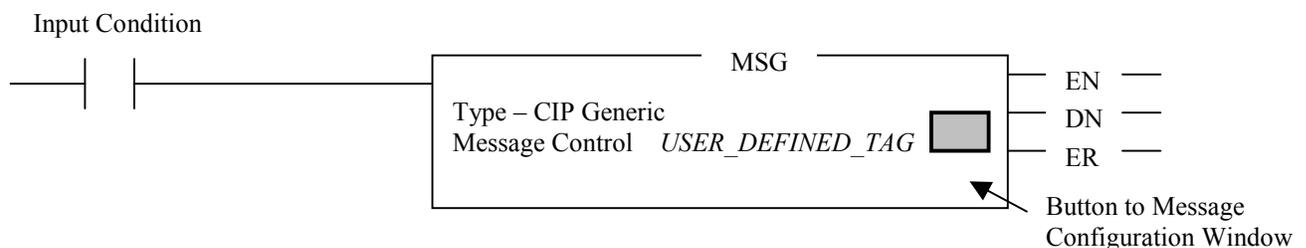
- Bit 0: Module Error: This bit will be set if the module's self test fails, or if jumper JP4 is missing from the main board.
- Bit 1: Transducer Fault on Channel 1- set if no transducer is attached, if the transducer is faulty, if the cable is improperly wired, or if the transducer is not compatible.
- Bit 2: Transducer Fault on Channel 2- set if no transducer is attached, if the transducer is faulty, if the cable is improperly wired, or if the transducer is not compatible.
- Bits 3 to 11: Reserved for future use.
- Bit 12: Brake Status: Set if the brake is active (no power on brake input). This bit will always be reset when the module is being used with a multiturn resolver.
- Bit 13: Velocity at Zero Channel 1: This bit will be set if the velocity on Channel 1 has been less than 1 rpm for 1 velocity update cycle. This bit is also used to indicate zero velocity on a 1242 that has been configured to work with Multiturn resolvers.
- Bit 14: Velocity at Zero Channel 2: This bit will be set if the velocity on Channel 2 has been less than 1 rpm for 1 velocity update cycle. This bit will always be reset if the unit is a 1241 or if a 1242 module has been configured to work with multiturn resolvers.
- Bit 15: Acknowledge Bit: Changes state with any new message received.
- Bits 16 to 31: Reserved for future use.

Output Data sent from the PLC to the 1200 module

Even though a single 32 bit output word has been created, the 1200 module ignores any data that the PLC places in this word.

Message Instructions

The programming of the Setup Data, Applying the Preset Value, and Clearing Transducer Faults requires the use of a Message Instruction. The format of this instruction is shown below.



1. The message instruction sends data to the 1200 module only when the rung transitions from false to true.
2. The *USER_DEFINED_TAG* used for Message Instruction Control must have the MESSAGE data type.
3. The *USER_DEFINED_TAG* error bit will be set if there is a problem with either the setup of the Message instruction or with the data that is sent to the 1200 module. If it is a problem with the data, *USER_DEFINED_TAG.ERR* will be equal to 9, and the type of error will be displayed in *USER_DEFINED_TAG.EXERR*.
4. Clicking on the button in the Message Instruction opens the Message Configuration Window, shown below.

Message Configuration - amci_setup_message

Configuration | Communication | Tag

Message Type: CIP Generic

Service Type: Custom Source Element: amci_setup.control_bi

Service Code: 4c (Hex) Class: 4 (Hex) Source Length: 10 (Bytes)

Instance: 200 Attribute: 0 (Hex) Destination: [Blank]

Buttons: New Tag...

Enable Enable Waiting Start Done Done Length: 0

Error Code: Extended Error Code: Timed Out

Error Path: Error Text:

Buttons: OK Cancel Apply Help

Service Type: Must be Custom

Service Code: See the table on page 8

Class: See the table on page 8

Instance: See the table on page 8

Attribute: Must be set to zero.

Source Element: If the Message Instruction is being used to send data to the 1200 module, then the source parameter will be the tag that contains the data to be sent to the 1200 module.

If the Message Instruction is being used to read data from the 1200 module, then the source parameter must be left blank.

Source Length: If the Message Instruction is being used to send data to the 1200 module, then the Source Length parameter must be set to the number of bytes of data that are being sent to the module. See the tables below for a listing of the number of elements.

If the Message Instruction is being used to read data from the 1200 module, then the Source Length Parameter must be set to zero.

Destination: If the Message Instruction is being used to send data to the 1200 module, then the Destination Parameter must be left blank.

If the Message Instruction is being used to read data from the 1200 module, then the Destination Parameter must be set to the tag address where the data will be placed.

Message Configuration – user defined tag (Communication Tab)

When the Configuration window shown above is completed, click on the Communication tab and set the path parameter to the 1200 module. All of the remaining Communication parameters can remain at their default settings. The Message Instruction is used with the following information to program the 1200 module.

LADDER MESSAGES FOR PROGRAMMING PARAMETERS

Setup Resolver Channel 1	SERVICE CODE	4C	CLASS	4	Configuration 1 or 243
	INSTANCE	200	NUMBER OF BYTES	10	
Setup Resolver Channel 2	SERVICE CODE	4C	CLASS	4	Configuration 243 only
	INSTANCE	201	NUMBER OF BYTES	10	
Setup Multiturn	SERVICE CODE	4C	CLASS	4	Configuration 244 only
	INSTANCE	203	NUMBER OF BYTES	28	
Apply Preset Position	SERVICE CODE	4C	CLASS	4	All Configurations
	INSTANCE	204	NUMBER OF BYTES	2	
Clear Fault	SERVICE CODE	4C	CLASS	4	All Configurations
	INSTANCE	205	NUMBER OF BYTES	2	

Single Turn Setup Programming Message Data (10 bytes)

The following table shows the data used to program a single turn resolver channel. This data consists of five 16 bit words, 10 bytes in total, and can be used to program a 1241 module or each single turn channel of a 1242 module. Instance 200 is used to program channel 1 of either module and Instance 201 is used to program channel 2 of a 1242 module.

16 bit Word	Function	Value Range	Default
0	Setup Bits	See Note 1 Below	0
1	Scale Factor	2...8191	1024
2	Preset Value	Linear Offset... Linear Offset + (Scale Factor-1)	0
3	Circular Offset	0...(Scale Factor-1)	0
4	Linear Offset	0...(32768-Scale Factor)	0

Multiturn Setup Programming Message Data (28 bytes)

The following table shows the data used to program a 1242 module configured to interface with a multiturn transducer. This data consists of six 32 bit words, 28 bytes in total. Instance 203 is used to program this data.

32 bit word	Function	Value Range	Default
0	Setup Bits	See Note 1 below	0
1	Full Scale Count	For AMCI (Type 100,180): 2... (Number of Turns)*4096 For AMCI (Type 1000,1800): 2... (Number of Turns)/10*4096 For Autotech (Type 128): 2...(Number of Turns)*1024	409,600
2	Preset Value	Linear Offset to Linear Offset + (Scale Factor - 1)	0
3	Circular Offset	0... (Full Scale Count-1)	0
4	Linear Offset	0...1,000,000-Scale Factor	0
5	Number of Turns	For Type 100: 100,50,25,20,10,5,4,2,1 For Type 1000: 1000,500,250,200,100,50,40,20,10 For Type 180: 180,90,60,45,36,30,20,18,15,12,10,9,6,5,4,3,2,1 For Type 1800: 1800,900,600,450,360,300,200,180, 150,120,100, 90,60,50,40, 30,20,10 For Type 128: 128,64,32,16,8,4,2,1	100
6	Transducer Type	For AMCI: 100,180,1000,1800 For Autotech: 128	100

Note 1: Word 0: Setup Bits

Bit 0: CHANGE OF STATE: 0 = COS function disabled, 1 = COS function enabled
 Bit 1: Direction, 0 = CW increasing, 1 = CCW increasing
 Bit 2: Velocity Update Time: 0 = 120ms, 1 = 32ms.
 Bit 3: Transducer Fault Latch: 0 = self-clearing, 1 = fault latched.
 Bits 4 to 7: Reserved, must be set to zero
 Bit 8: Resolver Type: 0 = AMCI, 1 = Autotech.
 Bits 11 to 15: Reserved, must be set to zero. (Bits 16 to 31 must also be set to zero if the unit is a 1242 configured to use multiturn transducers.)

Note 2: The Change Of State feature causes the PLC to read all of the data from the 1200 module, including status and velocity data from both channels, each time it has detected a change in the position. On two channel units, the data for the entire module will be updated only when the position changes on the channel where the COS function has been enabled.

Note 3: On two channel units, setting the Resolver Type bit on either channel affects both channels.

Note 4: The Resolver Type bit must be set the Autotech before the Transducer Type can be set to 128. If this bit is not set, a Transducer Type Error will be generated.

Apply Preset Position Message

- Bit 0: Apply Preset Channel 1 (single turn or multiturn resolver)
- Bit 1: Apply Preset Channel 2 (2 single turn resolvers only) Must be 0 for instances 1 and 244.
- Bits 2 ... 15: reserved, must be set to zero

Clear Fault Message

The content of the message word is not used, that is, each of the bits in this word can be 0 or 1. The Clear Fault Message can only be used to clear transducer faults. This command will not remove the Extended Error Codes from a Message Instruction. These faults can only be cleared by resending the message instruction with valid data.

Extended Error Codes

The Message Instructions used to send data to the 1200 module have an error register that can be used to obtain diagnostic information from the module. This register's address is *USER_DEFINED_TAG.EXERR*. The following table shows the values that will be displayed in this register for all of the Message Instructions used to send data to the 1200 module. Please note that these error codes are only valid when register address *USER_DEFINED_TAG.ERR* is equal to 9.

Error Code	Function
1	1. Unused bits are set in the Setup Word. 2. If the programming block is not valid for the unit, including: Programming channel 2 of a 1 channel unit. Programming multiturn data on a 1 or 2 channel unit. Programming channel 1 or channel 2 data on a multiturn unit. 3. Presetting a channel that is not present. 4. Sending the Apply Preset message data without any bits set. 5. Sending the Apply Preset message data with any of the reserved bits set. 6. Attempting to apply the preset when there is a transducer fault.
2	Scale Factor/Full Scale Count Error
3	Preset Value Error
4	Circular Offset Value Error
5	Linear Offset Value Error
6	Programmed Number of Turns Error for multiturn resolvers
7	Multiturn Resolver Type Error

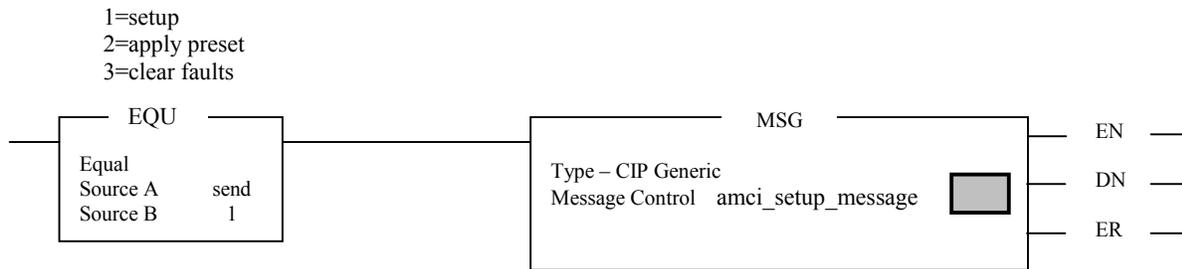
Revision History:

Revision 0.0 was created on 2/13/02 and was the initial release of the specifications.

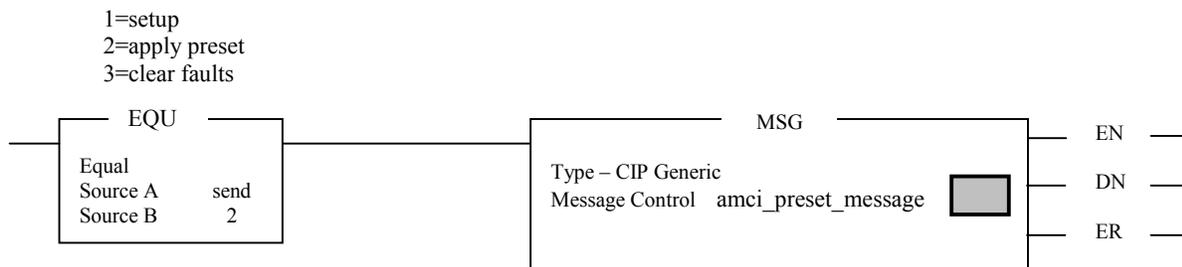
Revision 1.0 was released on 3/11/02. The input data is now in DINT format. Separate programming blocks are used for channel 1, channel 2, and multiturn units. The extended error codes are now consistent for all of the programming blocks. A sample program was added to the specifications.

Sample Program

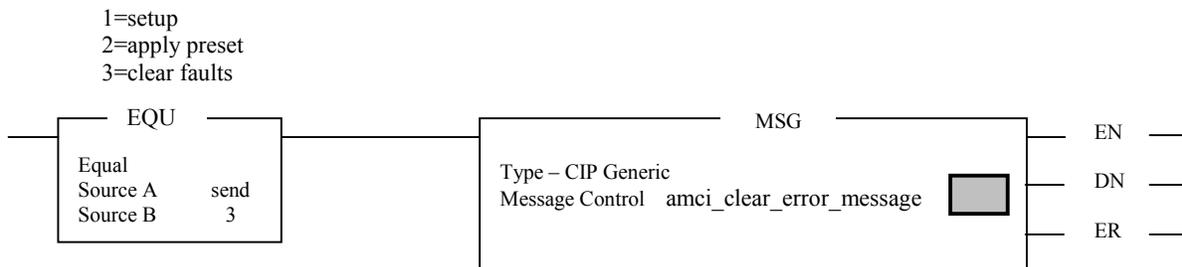
The SEND tag is used to control data transfer to the AMCI 1200 module. When this tag becomes one, the following rung changes from false to true and the channel 1 setup data is transferred to the 1200 module. This data is 10 bytes long and contains the Setup Bits, the Scale Factor, the Preset Value, the Circular Offset, and the Linear Offset. If the message instruction's ER bit becomes set, then there was a problem with either the format of the message instruction or with the data sent to the 1200 module. If it is a problem with the data, the tag amci_setup_message.err will equal 9, and the tag amci_setup_message.exerr will indicate the type of error. This rung must become false before new data can be sent to the 1200 module. The transfer only takes place on the false to true transition of the rung



The SEND tag is used to control the data transfer to the AMCI 1200 module. When this tag becomes two, the following rung changes from false to true and the channel 1 current position is changed to the Preset Value. This data is two bytes long. If the message instruction's ER bit becomes set, then there was a problem with either the format of the message instruction or with the data sent to the 1200 module. If it is a problem with the data, the tag amci_preset_message.err will equal 9, and the tag amci_preset_message.exerr will be equal to 1. This is the only Extended Error Code available for the Apply Preset Message block. This rung must become false before new data can be sent to the 1200 module. The transfer only takes place on the false to true transition of the rung



The SEND tag is used to control the data transfer to the AMCI 1200 module. When this tag becomes three, the following rung changes from false to true and the Clear Error command is transferred to the 1200 module. This data is 2 bytes long. If during the transfer the message instruction's ER bit becomes set, then there was a problem with the format of the message instruction. The Clear Error command does not have any Extended Error Codes. This rung must become false before new data can be sent to the 1200 module. The transfer only takes place on the false to true transition of the rung



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