Autotech Controls

M7350 CBusModule

Resolver Shut Height Controller

Instruction & Operation Manual

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MAN-M7350-001
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M7350 CBusModule Resolver Shut Height Controller (RSHC), ASY-M7350-RSHC

1. Introduction

The M7350 Resolver Shut Height Controller (RSHC) Module communicates with the programmable logic controller (PLC) through input and output registers. The module's input registers read coarse position, fine position, and I/O status. The output registers allow you to program module parameters.

Autotech's human factors engineering has made it possible to program all M7350 RSHC module functions through the PowerPanel or PLC interface module. The M7350 RSHC module communicates with AVG's multi-function PowerPanel through 2048 16-bit registers. These registers can be user mapped to monitor and configure the module functions. AVG's *u*WIN® Software allows the user to interface the data from the module into user-defined graphic screens.

The M7350 system can store up to 500 die-set programs. During die changeover, the operator can enter a particular die number or choose die by selecting the name, and after start can initiate the automatic positioning sequence.The M7350 RSHC senses the die position and adjusts the shut height to the preprogrammed position. An automatic anti-backlash routine is built into the die-set program so that the shut height motor will always approach the programmed position from the same direction. For better precision, a programmable coasting distance (correction factor) may be entered for each die so that the control motor will shut off in time to allow the die to coast to a stop at the desired shut height. For maximum precision, the motor can be pulse width modulated starting at the distance equal to correction factor above the programmed position.

The M7350 RSHC module offers Broken Wire Detection, No Motion Detection, and Drift Limit Detection through an I/O Status Word.

Broken Wire Detection
The Broken Wire I/O Status Bit is normally energized when the M7350 RSHC module is operating normally and the resolver wiring is intact. If one or more of the resolver wires are broken or disconnected, the I/O status bit will de-energize.

No Motion Detection
When the motor is ON and motion is not detected for longer than 1 second, this bit is energized.

Drift Limit Detection
When die position is beyond the programmed position, plus or minus the drift limit, this bit is de-energized.

The following information required for M7350 RSHC operation includes press-specific and die-specific parameters.

Press Specific Parameters include:

- Die Number selected
- Scale Factor, automatically computed in calibration mode
- Upper Safety Limit
- Lower Safety Limit
- Pulse On TIme
- Pulse Off Time
- Drift Limit
- Two Calibration Points for automatic calibration

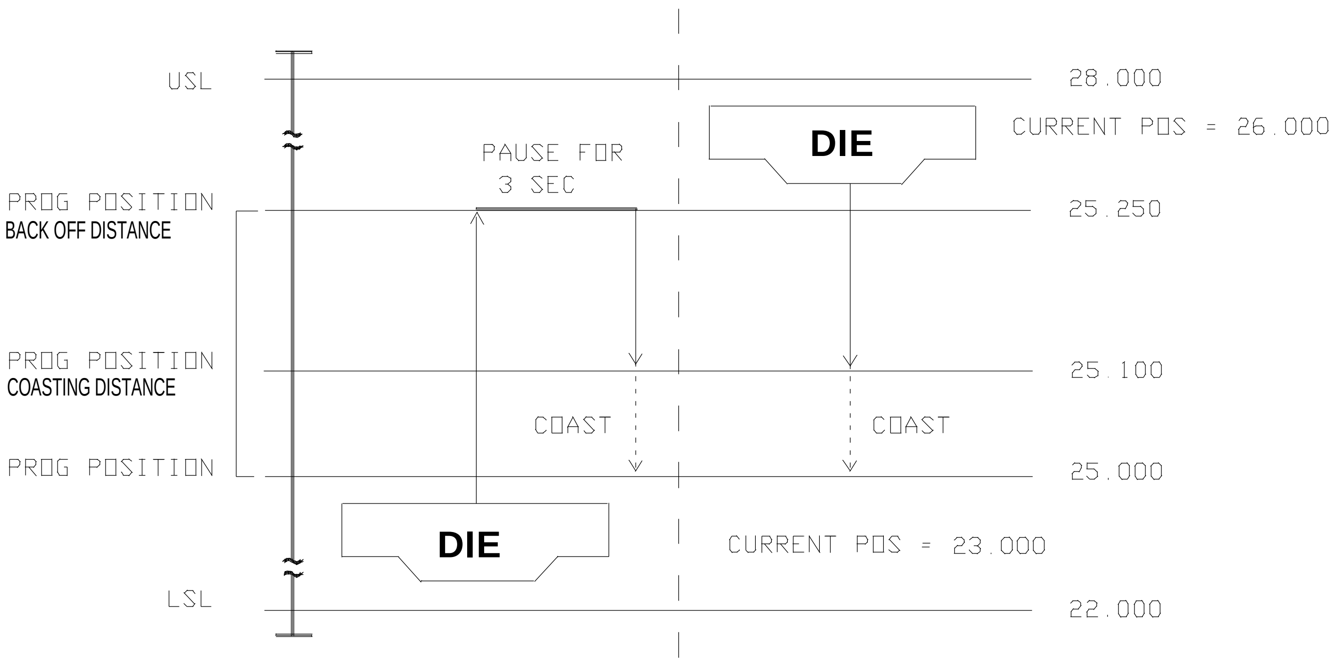
Die Specific Parameters include:

- Die Number
- Die Name, 8 alphanumeric characters
- Programmed Position
- Correction Factor

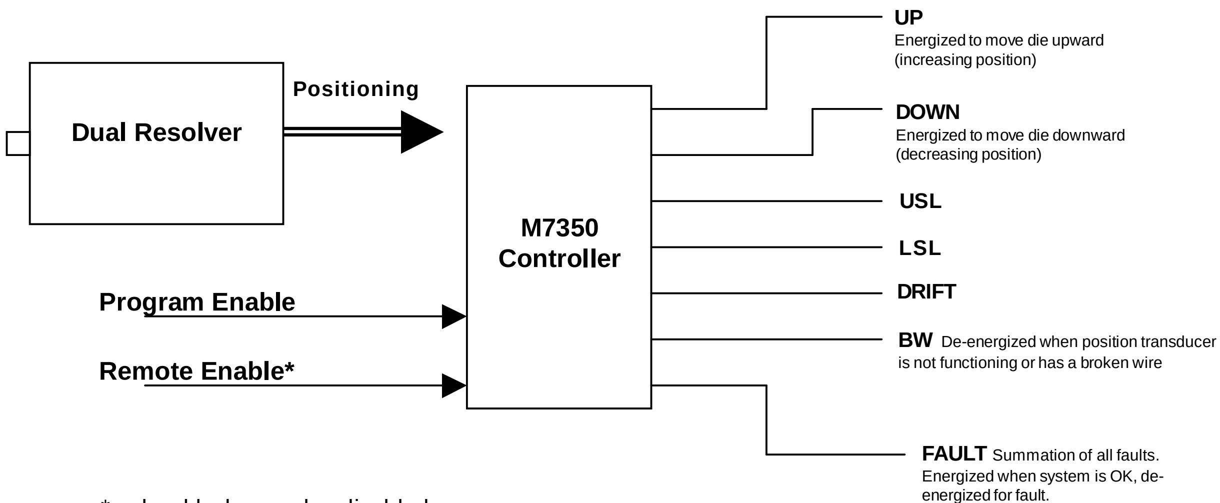
To understand automatic die-set function, read the following examples and refer to diagram below .

Example 1 (die lower than programmed position):
If the Programmed Die-Set Position is 25.000 inches, and the current die position is physically too low, the die will be moved the back off distance (about .25 inch) above the programmed position, pause for 3 seconds, and then descend to the die-set position. If pulse high and low times are programmed as zeroes, the motor will be turned off at programmed position plus coasting distance (correction factor). It will then coast until it comes to a full stop. If pulse times are other than zeroes, the motor will be pulsed according to the programmed parameters starting at programmed position plus coasting distance. When programmed position is reached, pulsing stops.

Example 2 (die higher than programmed position):
If the die begins in a position more than 1/4 inch too high, then only the second part of the positioning sequence will be executed (the part following the pause).

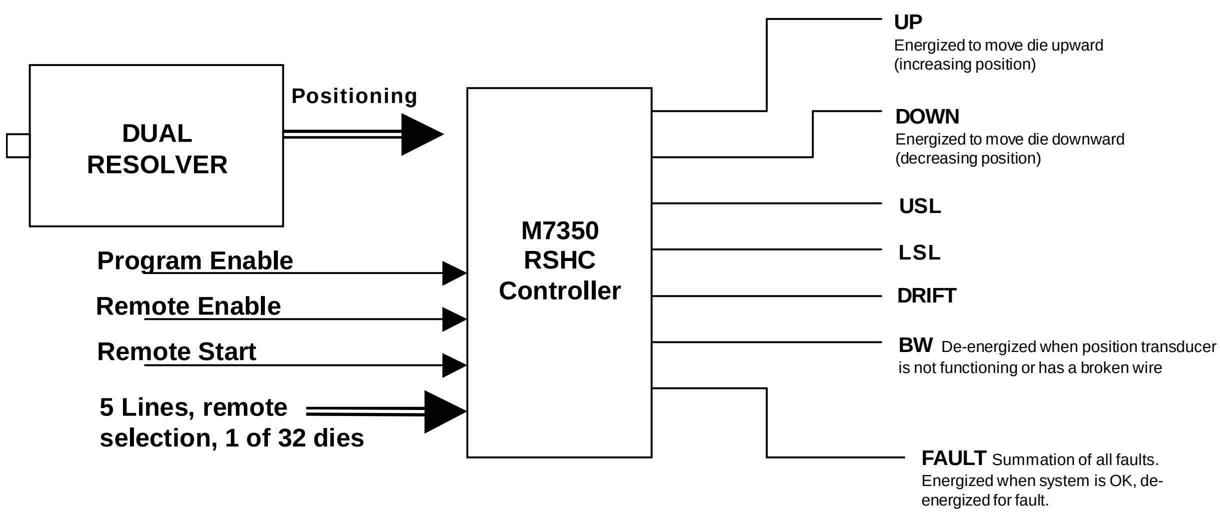


M7350 RSHC Module with A120 Modicon Cradle



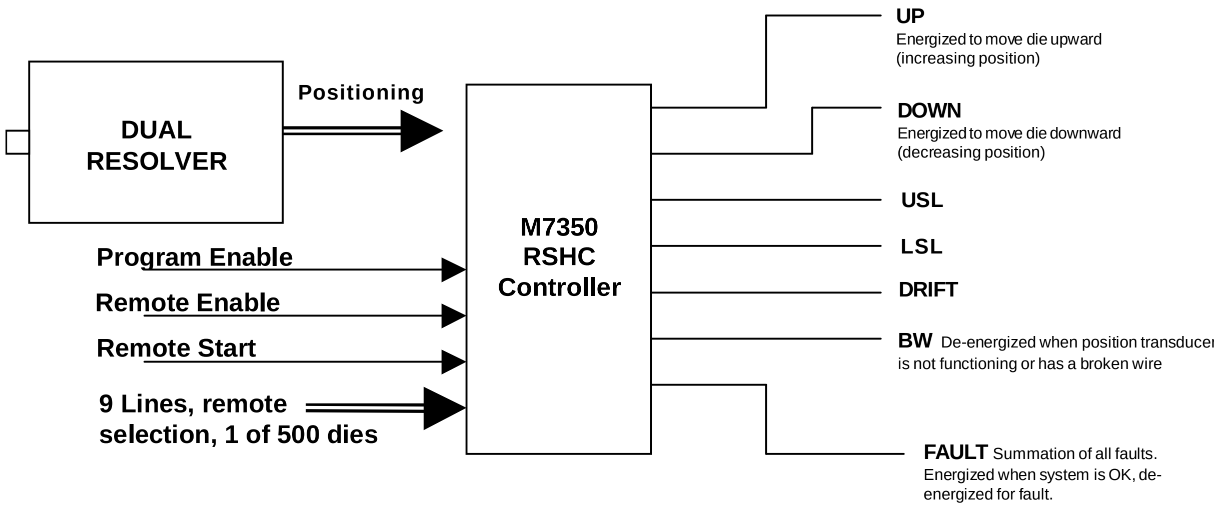
* should always be disabled

M7350 RSHC Module with the Quantum Module Cradle/MF1 Cradles/MF2 Cradles



When the M7350 RSHC Module is used with the A120, Quantum, MF1, and MF2 cradles, it is not possible to access remotely each of the 500 dies, but that function is always available by programming through the use of registers.

M7350 RSHC Module with MF5 Cradle



Decimal Address: 132

I/O Status (16 Bit)

MSD **LSD**

X	X	X	X	X	X	DL	NM	X	X	X	X	X	X	RE	PE

X = Not Used
PE = Program Enable
0 = No input
1 = Input
RE = Remote Enable
0 = No input
1 = Input
BW = Broken Wire
0 = Broken Wire Fault
1 = No Broken Wire Fault

NM = No Motion Fault
0 = No Fault
1 = No Motion Detected
DL = Drift Limit
0 = Programmed position is within drift limit
1 = Porgrammed position exceeds drift limit

MSD = Most significant digit
LSD = Least significant digit

Decimal Address: 134

Outputs (16 Bit)

MSD **LSD**

X	X	X	X	X	X	X	X	X	FLT	BWF	DLF	LSL	USL	MD	MU

X = Not Used
MU = Motor Up Command
1 = Move
MD = Motor Down Command
1 = Move
USL = Upper Safety Limit Fault
0 = Over safety limit
1 = Under safety limit (OK)
LSL = Lower Safety Limit Fault
0 = Under safety limit
1 = Over safety limit (OK)
DLF = Drift Limit Fault
0 = Programmed position exceeds + or - drift limit
1 = Programmed position within drift limit

BWF = Broken Wire Fault
0 = Broken wire detected
1 = No broken wire fault
FLT = Fault (summation of USL, LSL, Drift, BW and No Motion Faults)
0 = Fault detected
1 = No fault setected

2. Specifications

Input Power: 24 VDC @ 100 mA

Operating Temperature: -10 to +130° F (-23 to +55° F)

Position Output Format: BINARY

Position Resolution:

Update Time:

Programmable Parameters:
- Drift Limit
- Back Off Distance
- Pulse On TIme
- Pulse Off Time
- Die Number
- Die Name
- Programmed Position
- Correction Factor
- Upper Safety Limit
- Lower Safety Limit

Discrete I/O:

Inputs
- Program Enable
- Remote Start
- Remote Die Sleect 1 (1)
- Remote Die Select 2 (2)
- Remote Die Select 3 (4)
- Remote Die Select 4 (8)
- Remote Die Select 5 (16)

Outputs
- Motor Up
- Motor Down
- Upper Safety Limit Fault
- Lower Safety Limit Fault
- Drift Limit Fault
- Broken Wire Fault
- System Fault

Resolver Type:

I/O Electrical Specifications

Customer supplied 24V power Vs+, Vs-: 20 to 30VDC @ 100 mA + current used by user's loads and inputs.

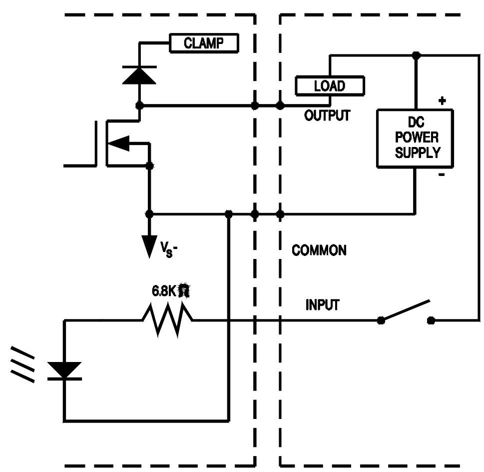
N-Channel Sinking Output

OUTPUT LOGIC LEVELS:

Logic True: MOSFET On, .2V Max @ 100 mA
Logic False: MOSFET Off, .05 mA leakage @ 30V
Max. Current per Output: 600 mA
Max. Current per Card: 2 Amps
Output Isolation: 1500V

INPUT LOGIC LEVELS (P-TYPE SOURCING):

Logic True: 6–30 VDC
Logic False: 0–1.5 VDC
Input Isolation: 1500 V



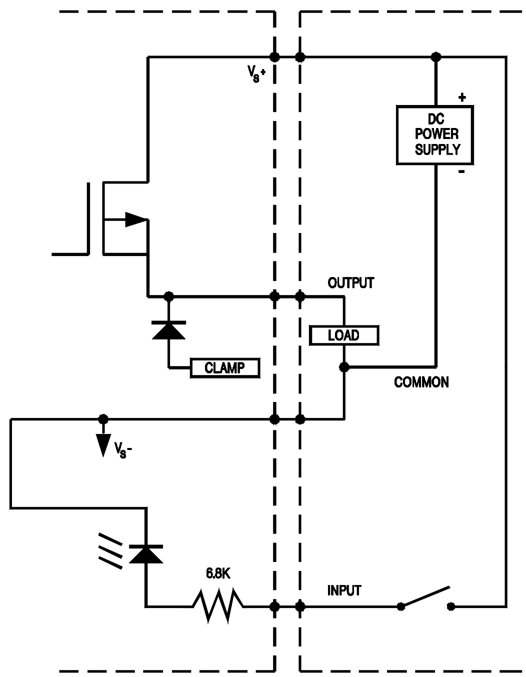
P-Channel Sourcing Output

OUTPUT LOGIC LEVELS:

Logic True: MOSFET On, .5V Drop @ 100 mA
Logic False: MOSFET Off, .05 mA leakage @ 30V
Max. Current per Output: 600 mA
Max. Current per Card: 2 Amps
Output Isolation: 1500 V

INPUT LOGIC LEVELS (P-TYPE SOURCING):

Logic True: 6–30 VDC
Logic False: 0–1.5 VDC
Input Isolation: 1500 V



3. Module Functions

Parameter	Definition	Range
Drift Limit		0.000 to 0.250 Default: 0.000
Back Off Distance		0.000 to 0.250 Default: 0.000
Pulse ON Time/ Pulse OFF Time		Maximum value is 59.99 seconds (resolution is 10 mS)
Die Number		1 to 500
Die Name		Limited to 8 ASCII characters
Programmed Position		Must in the range: Upper Safety Limit (0.250) to Lower Safety Limit (0.000)
Correction Factor		Must be less than Back Off Distance

4. Memory Map

Location	Register Definitions
Read Only Area	
0x0080	**Read Current Position**
	Whole part of position value, range 0-999
0x0082	Fractional part of position value, range 0-999
0x0084	**Read I/O Status**
	I/O status word
	b0 Program Enable (PE) input
	b1 Remote Enable (RE). Enables Die ID inputs and Remote Start Input
	b2-b7 not used
	b8 Broken Wire indication
	b9 No Motion Error. Detected when motor is ON and motion is not detected for longer than 1 Sec.
	b10 Drift Limit Error. Detected when ram position is beyond Programmed Position +/- Drift Limit
	b11-b15 not used
0x0086	**Read Outputs**
	Shut Height Controller output state
	b0 Motor Up command ON=move
	b1 Motor Down command ON=move
	b2 Upper Safety Limit ON=OK
	b3 Lower Safety Limit ON=OK
	b4 Drift Limit Fault ON=OK
	b5 Broken Wire Fault ON=OK
	b6 Fault as a summation of all faults (ON=OK): Upper Safety Limit FAULT, Lower Safety Limit FAULT, Drift Limit FAULT, Broken Wire FAULT, No Motion FAULT
	b7-b15 not used
0x009E	**Read Mode Status**
Write Only Area	
0x00A0	**Write Mode Control**
0x00B8	**Write Calibration Point 1** (whole part)
0x00BA	**Write Calibration Point 1** (fractional part)
0x00BC	**Write Calibration Point 2** (whole part)
0x00BE	**Write Calibration Point 2** (fractional part)
Read/Write Area	
0x0102	**R/W Active Tool Number**
0x0104	**R/W Upper Safety Limit** (whole part)
0x0106	**R/W Upper Safety Limit** (fractional part)
0x0108	**R/W Lower Safety Limit** (whole part)
0x010A	**R/W Lower Safety Limit** (fractional part)
0x010C	**R/W Drift Limit**
0x010E	**R/W Pulse On Time**
0x0110	**R/W Pulse Off Time**
0x0112	**R/W Active Programmed Position** (whole part)
0x0114	**R/W Active Programmed Position** (fractional part)
0x0116	**R/W Active Correction Factor**
0x0118	**R/W Back Off Distance**

Location	Register Definitions
Shared Area	
0x0380	**R/W Tool Command**
0x0382	**R/W Tool Number**
0x0384	**R/W Tool Name** (character 1, 2)
0x0386	**R/W Tool Name** (character 3, 4)
0x0388	**R/W Tool Name** (character 5, 6)
0x038A	**R/W Tool Name** (character 7, 8)
0x038C	**R/W Destination Tool Number**
0x038E	**R/W Programmed Position** (whole part)
0x0390	**R/W Programmed Position** (fractional part)
0x0392	**R/W Correction Factor**
0x0394	**R/W Scale Factor** (whole part)
0x0396	**R/W Scale Factor** (fractional part)
0x0398	**R/W Offset 1** (whole part)
0x039A	**R/W Offset 1** (fractional part)
0x039C	**R/W Offset 2** (whole part)
0x039E	**R/W Offset 2** (fractional part)
0x03A0	**R/W Active Tool Name** (character 1, 2)
0x03A2	**R/W Active Tool Name** (character 1, 2)
0x03A4	**R/W Active Tool Name** (character 1, 2)
0x03A6	**R/W Active Tool Name** (character 1, 2)

Dual Port RAM Errors

When writing to dual port RAM, the folloiwng errors are defined:

0 No error
1 Remote control is ON, programming is not allowed
2 Value is out of range
3 Function module is busy
4 Program enable is not ON
5 Mode is invalid
6 Wrong calibration points setup

5 Programming

To use the M7350 RSHC module, you will typically go through the following steps:

PRESS SETUP

1. Set Lower and Upper Safety Limits.
2. Set first and second Calibration Points.
3. Calibrate Shut Height Controller module.
4. Set Drift Limit.
5. Set Back Off Distance.
6. Set Pulse ON Time.
7. Set Pulse OFF Time.
8. Select Die Number.

DIE SETUP

1. Set Die Number.
2. Set Die Name.
3. Set Programmed Position.
4. Set Correction Factor.

Some of these parameters will have the following limitations and dependencies.

Upper Safety Limit — must be larger than the Lower Safety Limit
Lower Safety Limit — must be smaller than the Upper Safety Limit
1st Calibration Point — must be between Safety Limits
2nd Calibration Point — must be between Safety Limits
Drift Limit — must in in the range 0.000 to 0.250
Back Off Distance — must be in the range 0.000 to 0.250
Pulse ON Time — maximum value is 59.99 seconds (resolution is 10 mS)
Pulse OFF Time — maximum value is 59.99 seconds (resolution is 10 mS)
Die Number — from 1 to 500
Die Name — limited to 8 ASCII characters
Programmed Position — must be in the range: Upper Safety Limit 0.250 to Lower Safety Limit
Correction Factor — must be less than Back Off Distance

MODULE STATES

The M7350 RSHC can be in the following different states:

Module State	Read Mode Status register
READY	0x0001
JOG MODE	0x0002
AUTO BUSY	0x0004
NO MOTION ERROR	0x0008

MODULE STATES DESCRIPTION

READY
Module is ready for automatic sequencing, safe jogging up, down or recalibration.

JOG MODE
in this mode while jog performs.

AUTO BUSY
State is signaled only while RAM is moving during automatic sequencing, or during the wait (after Up movement, waits three seconds before Down movement at Programmed Position plus Back Off Distance.)

NO MOTION ERROR
This is signaled if RAM position is not changed afer one second since motor was turned ON.

Module State change is allowed by entering different commands to Write Mode Control register and new command perception occurs while register value transition takes place.

Command	Write Mode Control Register
STOP	0x0000
SET CALIBRATION POINT #1	0x0001
SET CALIBRATION POINT #2	0x0002
JOG_UP	0x0004
JOG_DOWN	0x0008
AUTO_START	0x0010
CLEAR NO MOTION	0x0020

MODULE COMMANDS DESCRIPTION

The SET CALIBRATION POINT #1 command should be entered after the Die is moved to a position near one end of its travel, but still within the Safety Limits. Also, a known position value should be placed in Write Calibration Point #1 registers and Write Calibration Point #2 registers prior to starting SET CALIBRATION POINT #1 and POINT #2 Command.

The SET CALIBRATION POINT #2 command is required to finish calibration procedure. Die should be near the other end of its travel. At this moment Write Calibration Point 2 registers should contain information about actual position value. After calibration procedure, information about current scale factor, offset 1 and offset 2 is available, and can be provided on request in R/W Scale Factor, R/W Offset 1, and R/W Offset 2 registers.

JOG UP and JOG DOWN instructions are active as long as respective values reside in Write Mode Control register. If for some reason RAM will be beyond Upper or Lower Safety Limits, it is still possible to use one of these instructions to move in the direction that will allow achieve safe, between limits RAM position.

AUTO_START initiates automatic Tool positioning function.

STOP command interrupts RAM movement if that has been performed before, and controller is forced to READY state.

PROGRAMMABLE INFORMATION IN THE SHARED AREA

Some of parameters related to press or die are assigned to shared area registers.

R/W Tool Command register bits can be set to execute the following commands:

	WRITE	LOCATION
Bit 0 – FIND	0x0001	0x0380 (R/W Tool Command)
Bit 1 – FIND_NEXT	0x0002	0x0380
Bit 2 – SELECT TOOL	0x0004	0x0380
Bit 3 – COPY TOOL	0x0008	0x0380
Bit 4 – WRITE TOOL	0x0010	0x0380
Bit 5 – DELETE TOOL	0x0020	0x0380
Bit 6 – READ TOOL	0x0040	0x0380
Bit 7 – READ CALIBRATION	0x0080	0x0380
Bit 8 – WRITE CALIBRATION	0x0100	0x0380

Only one bit is allowed to set at one time and will be cleared when the command is completed.

COMMANDS DESCRIPTION

FIND
The function module will search the dies for the first one with a name that matches the name in the die name registers — **R/W Tool Name**. The search will start at die #1. Unused characters in the search name are treated as wildcards. For example, “TOM” will match “TOMMY”, or “TOMORROW”. The number and name of the matching tool will be placed respectively in the **R/W Tool Number** and **R/W Tool Name** registers. Also Programmed Position and Correction Factor values related to that die will be placed in the **R/W Programmed Position** and **R/W Correction Factor** registers. If no match is found then the **R/W Tool Number** register is set to zero. Also the die name **R/W Tool Name** and die setup specific registers are filled with nulls (zeroes).

FIND_NEXT
The function module will search for the next die with a name that matches the search string entered in the last find command. The search will start at the tool number specified in the die number register **R/W Tool Number** . The number and name of the matching tool will be placed in the **R/W Tool Name** registers. Also Programmed Position and Correction Factor values related to that tool will be placed in the **R/W Programmed Position** and **R/W Correction Factor** registers. If no match is found then the **R/W Tool Number** register is set to zero. Also the tool name and tool setup specific registers are filled with nulls.

SELECT TOOL
The function module will select the tool with the name matching the name in the tool name registers as active tool. If the name of the tool specified by the tool number register is the same as the name in the tool name registers then that tool will be selected. Otherwise the function module will search for a tool with a matching name, starting at tool #1.If a match is found then that tool will become the active tool and it’s number and name will be placed in the tool number and tool name registers. Also Programmed Position and Correction Factor values related to that tool will be placed in the **R/W Programmed Position** and **R/W Correction Factor** registers. If match is not found then the active tool is not changed and tool number is set to zero. Also the tool name and tool setup specific registers are filled with zeros.

COPY TOOL
The function module will copy parameters set for the tool specified s a tool number in **R/W Tool Number**. Destination tool number is specified in the **R/W Destination Tool Number** register. The tool name for the destination tool will be set to spaces.

WRITE TOOL
The name, Programmed Position and Correction Factor for the tool number specified in the **R/W Tool Number** register will be changed to the name and the tool parameters in **R/W Tool Name**, and **R/W Programmed Position** registers. New value of Programmed Position Is always compared against Upper Safety Limit – 0.250 and Lower Safety Limit as press specific parameters. Correction Factor must not be higher than current Back Off Distance value.

DELETE TOOL
The function module will delete the program specified by the **R/W Tool number** register and the **R/W Tool Name** registers. If the name of the tool specified in the **R/W Tool Number** register matches exactly the name in the **R/W Tool Name** registers then that tool will be deleted. A deleted tool parameters will be set to zeros and deleted tool name registers will be filled with nulls.

READ TOOL
The name for the tool specified in the **R/W Tool Number** will be placed in the R/W Tool Name registers. Also Programmed Position and Correction Factor related to specified tool will be place in respective registers.

READ CALIBRATION
This command allows you to get actual press calibration parameters. Values of: Scale Factor, Offset 1, and Offset 2 will be placed in registers from R/W Scale Factor to R/W Offset 2 (fractional part).

WRITE_CALIBRATION
This command is provided to set all parameters required for press calibration. After setting proper values press with its control module doesn't need to perform standard calibration procedure. Using that command one condition should be fulfilled: RAM must be in the same position as in the moment while READ CALIBRATION command was issued and calibration specific registers were memorized.

READ PRESS CALIBRATION
After the press has been calibrated with the automatic calibration function, perform the following steps:

1. Accurately record and save the current ram position.

2. From the Die Menu Screen, select “MANUAL PRESS CALIBRATION.”

3. Select “READ CALIBRATION.”

4. Press button labeled — Press to read current press calibration parameters
   DIS:1
   Touch the screen to continue.

5. Record and save the following.
   a. SCALE FACTOR
   b. UNSCALED OFFSET
   c. POSITION OFFSET

NOTE: These parameters, along with the ram position when they were read, may be used to manually calibrate this unit.

WRITE PRESS CALIBRATION

If a “READ CALIBRATION” has been performed, and the values have been recorded and saved, the press can be calibrated manually by performing the following steps:

1. Position the ram to exact location that it was at when the “READ CALIBRATION” was performed.

2. Enter the saved value for the “SCALE FACTOR.”
   DIS:1
   Touch the screen to continue.

3. Enter the saved value for the “UNSCALED OFFSET.”

4. Enter the saved value for the “POSITION OFFSET.”

5. Press the “CALIBRATE” button.

6. Wiring

Fine Resolver Wiring

FINE RESOLVER WIRING				
CBUS Signal Number	**Designation**	**Wire Color CBL-RL210-xxxx**	**Resolver Terminal #**	**MS Connector Pin**
6	FS4	Blue	10	M
3	FS3	Red	9	L
4	FS2	Black/Blue	8	K
5	FS1	Black/Red	7	H
1	R1	Black/Green	1	A
2	R2	Green	2	B
Note: To change direction of count, reverse S1 and S3 connections. Black/White indicates black wire with white stripes.				

Coarse Resolver Wiring

COARSE RESOLVER WIRING				
CBUS Signal Number	**Designation**	**Wire Color CBL-RL210-xxxx**	**Resolver Terminal #**	**MS Connection Pin**
10 and 29	CS4	White	6	F
7 and 32	CS3	Yellow	5	E
8 and 31	CS2	Black/White	4	D
9 and 30	CS1	Black/Yellow	3	C
	Shield		GND (Green Screw)	S
Note: To change direction of count, reverse S1 and S3 connections. Black/White indicates black wire with white stripes.				

CBus Signal Number	M7350 RSHC Function
1	R1
2	R2
3	S3 Resolver
4	S2 Resolver
5	S1 Resolver
6	S4 Resolver
7	S3-2 Course Resolver
8	S2-2 Course Resolver
9	S1-2 Course Resolver
10	S4-2 Course Resolver
11	VS- (customer supplied power return)
12	VS+ (customer supplied power)
13	Up Output (on = move)
14	Down Output (on = move)
15	Upper Safety Limit Output (on = OK)
16	Lower Safety Limit Output (on = OK)
17	Drift Output (on = OK)
18	Fault Output (on = OK)
19	NC
20	NC
21	Program Enable (PE Input)
22	Remote Enable (Input)
23	Remote Start (Input)
24	Die Select 1 (LSB)
25	Die Select 2
26	Die Select 3
27	Die Select 4
28	Die Select 5 (MSB)
29	S4-2 Course Resolver
30	S1-2 Course Resolver
31	S2-2 Course Resolver
32	S3-2 Course Resolver

7. Troubleshooting

Table 8. Troubleshooting Table

Symptoms	Possible Causes
Unable to program unit parameters (Scale Factor, Offset, etc.)	1. Is the voltage level at the customer VS+/VS- input correct? 2. Is the machine moving? Programming of several parameters (i.e.,Scale Factor) is disabled if the resolver is turning faster than 3 RPM.
Program memory is changing by itself.	Have proper grounding and shielding practices been applied?
Position and RPM readings are incorrect.	1. Is the resolver correctly wired? Follow the steps below for a quick check. a. turn power off to M7350 unit b. measure with following with an ohm meter: -- (R1 to R2) = 15 to 50 ohms -- (S1 to S3) = 50 to 150 ohms -- (S4 to S2) = 50 to 150 ohms
Broken wire bit in I/O status word.	1. Is the resolver cable properly grounded and shielded? Supply (VS+, VS-) less than 20 VDC? 2. Is resolver wiring correct? Follow instructions for ohming out resolver wiring above.
Mechanical Zero drifts.	1. Is the mechanical Resolver linkage loose? 2. Has the offset value been changed?
If all fails.	Call the local distributor or (630)668-3900 for service.

8. How to Order

Function Module

ASY-M7350-[redacted]
ASY-M7350-RSHI .... programmable resolver shut height indicator

Compatible Position Transducers

The M7350-RSHC requires a single-turn or single-turn geared series, such as Autotech's RL100, E1R, E7R, E8R or E9R series of resolvers. Please see appropriate Position Transducer Manual for complete ordering information on position transducers, cables, and appropriate accessories.

Cable *(See appropriate Position Transducer Manual for ordering cable)*

CBL-10T22-Cxxx .... 22AWG, 10 conductor (5 twisted pairs) overall foil shielded cable, without connector. "xxx" length must be ordered as 010, 020, 050 feet and increments of 50 feet (i.e. 100, 150, etc.) (2500 ft. max.)

CBL-10T22-Mxxx .... 22 AWG, 10 conductor (5 twisted pairs) overall foil shielded cable, with 10 pin MS connector (ECM-10REC-ITT) on one end. "xxx" length must be ordered as 010, 020, 050 feet and increments of 50 feet.

WARRANTY

Autotech Controls warrant their products to be free from defects in materials or workmanship for a period of one year from the date of shipment, provided the products have been installed and used under proper conditions. The defective products must be returned to the factory freight prepaid and must be accompanied by a Return Material Authorization (RMA) number. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

The customer agrees to hold Autotech Controls harmless from, defend, and indemnify Autotech Controls against damages, claims, and expenses arising out of subsequent sales of Autotech Controls' products or products containing components manufactured by Autotech Controls and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or subcontractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.

No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The customer acknowledges the disclaimers and limitations contained and relies on no other warranties or affirmations.

CAUTION

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