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DATA INQUIRY-HOST TRANSMISSION

CHARACTER 1: STX

The leading character must always be the ASCII STX.

CHARACTERS 2 & 3: DEVICE NUMBER

The device address of the M-Track.

CHARACTER 4: MSG TYPE

The message type is the ASCII 2 for a data inquiry message.

CHARACTERS 5 & 6: PARAMETER NUMBER

This is the parameter code number for the desired variable.

CHARACTERS 7 TO 14: DATA

Set to zero in the message to the M-Track.

CHARACTER 15: DATA FORMAT

Set to zero in the message to the M-Track.

CHARACTER 16: ETX

The message should terminate with the ASCII ETX character.

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DATA INQUIRY - M-TRACK RESPONSE

CHARACTER 1: STX

The leading character is the ASCII STX.

CHARACTERS 2 & 3: DEVICE NUMBER

The device address is echoed back.

CHARACTER 4: ERROR CODE

The Error Code is transmitted back as appropriate. See Parameter Send - Error Code for the bit pattern of the error code.

CHARACTERS 5 & 6: PARAMETER NUMBER

The Parameter Number is echoed back.

CHARACTERS 7 TO 14: DATA

This is the requested data for the selected parameter. See Data Explanation starting on Page 7-10.

CHARACTER 15: DATA FORMAT

This code tells how to interpret the returned data for positive, negative, and decimal point location.

ASCII Code	Data Format
0	+ XXXXXX.
1	+ XXXXX.X
2	+ XXXX.XX
3	+ XXX.XXX
4	+ XX.XXXX
5	+ X.XXXXX
6	- XXXXXX.
7	- XXXXX.X
8	- XXXX.XX
9	- XXX.XXX
:	- XX.XXXX
;	- X.XXXXX

CHARACTER 16: ETX

The message always terminates with the ASCII ETX character.

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DATA EXPLANATION

Most data returned by the M-Track in response to a Data Inquiry command can be easily interpreted via the Data and Data Format fields. However, a few variables return an eight bit coded response which must be decoded to allow interpretation.

To interpret an eight bit coded number, refer to the appropriate Figure below to identify the M-Track information.

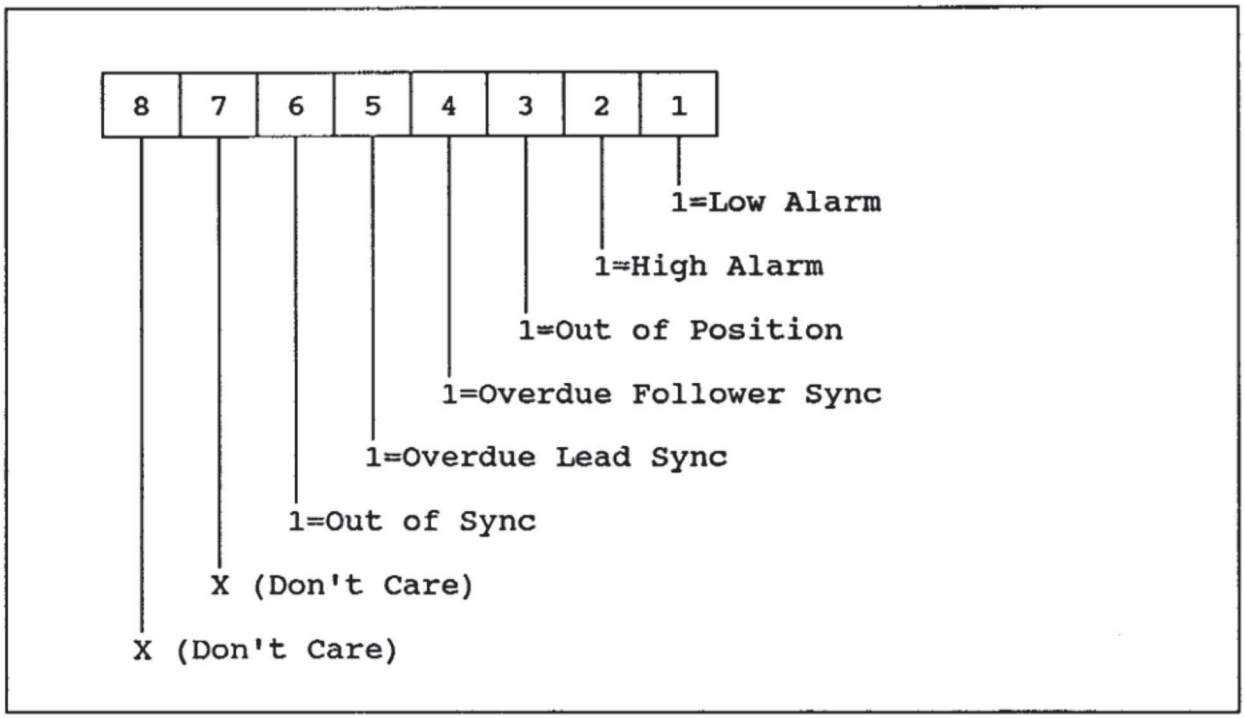


Figure 7-1: MV-51 Interpretation

As above, assume that decimal 5 (HEX 35) is returned by the M-Track in response to MV-51 Data Inquiry Command. Using Table 7-3, the number 5 converts to 00000101:

0	0	0	0	0	1	0	1	(5)
8	7	6	5	4	3	2	1	

Using Figure 7-1 above, 5 can now be interpreted to indicate the following Alarm Status: Low Alarm and Out of Position.

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0	00000000	32	00100000
1	00000001	33	00100001
2	00000010	34	00100010
3	00000011	35	00100011
4	00000100	36	00100100
5	00000101	37	00100101
6	00000110	38	00100110
7	00000111	39	00100111
8	00001000	40	00101000
9	00001001	41	00101001
10	00001010	42	00101010
11	00001011	43	00101011
12	00001100	44	00101100
13	00001101	45	00101101
14	00001110	46	00101110
15	00001111	47	00101111
16	00010000	48	00110000
17	00010001	49	00110001
18	00010010	50	00110010
19	00010011	51	00110011
20	00010100	52	00110100
21	00010101	53	00110101
22	00010110	54	00110110
23	00010111	55	00110111
24	00011000	56	00111000
25	00011001	57	00111001
26	00011010	58	00111010
27	00011011	59	00111011
28	00011100	60	00111100
29	00011101	61	00111101
30	00011110	62	00111110
31	00011111	63	00111111

Table 7-3: Decimal to Binary Conversion

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The following figures provide the interpretations for the other eight bit coded variables. The technique to interpret these variables is identical to the MV-51 example demonstrated on Page 7-10.

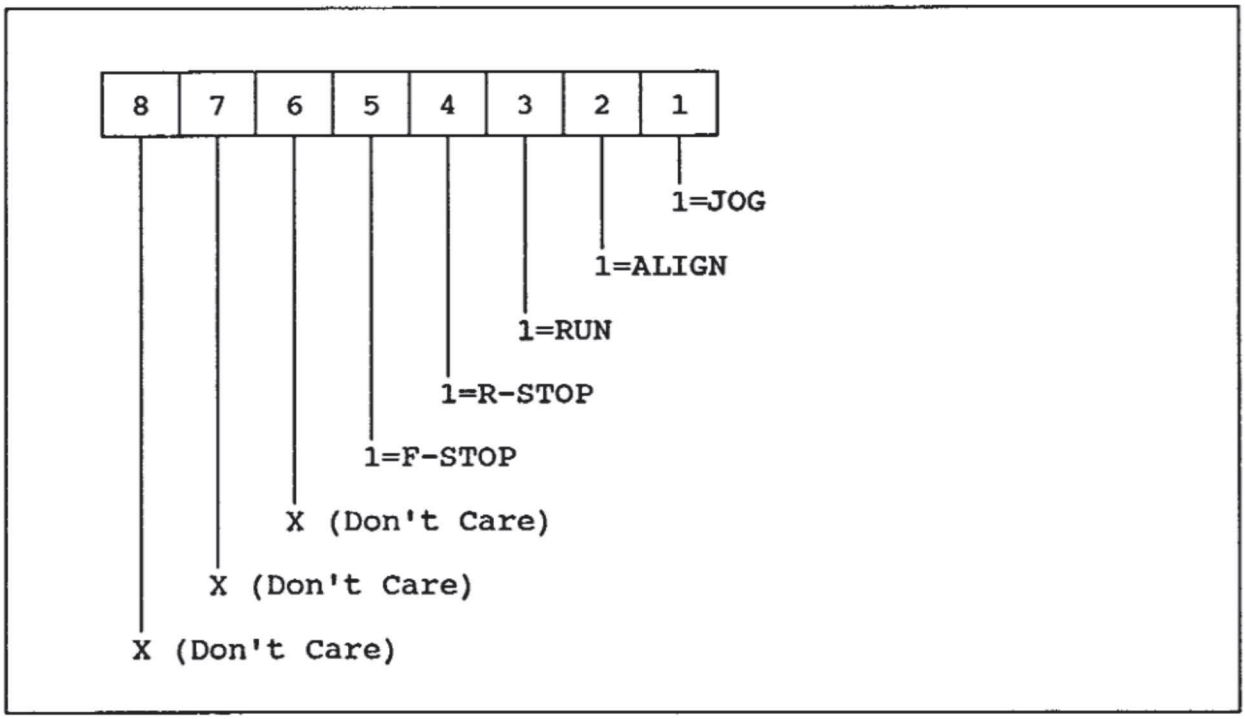


Figure 7-2: MV-52 Interpretation

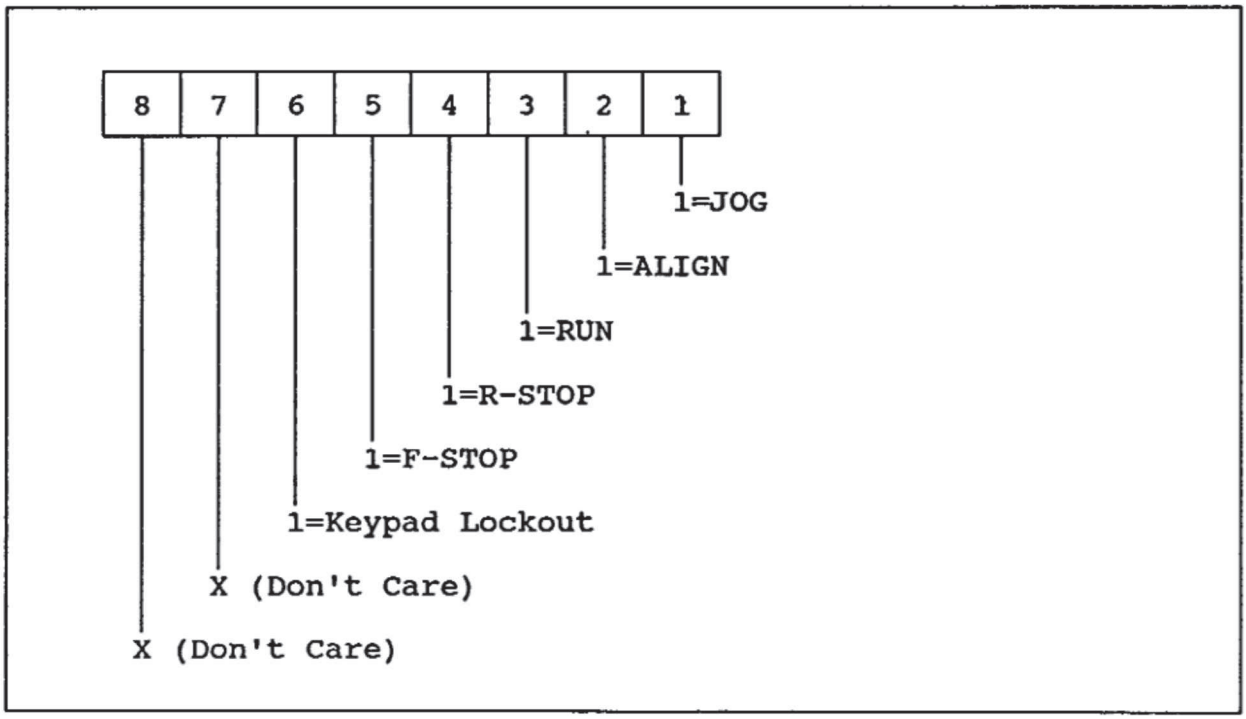


Figure 7-3: MV-53 Interpretation

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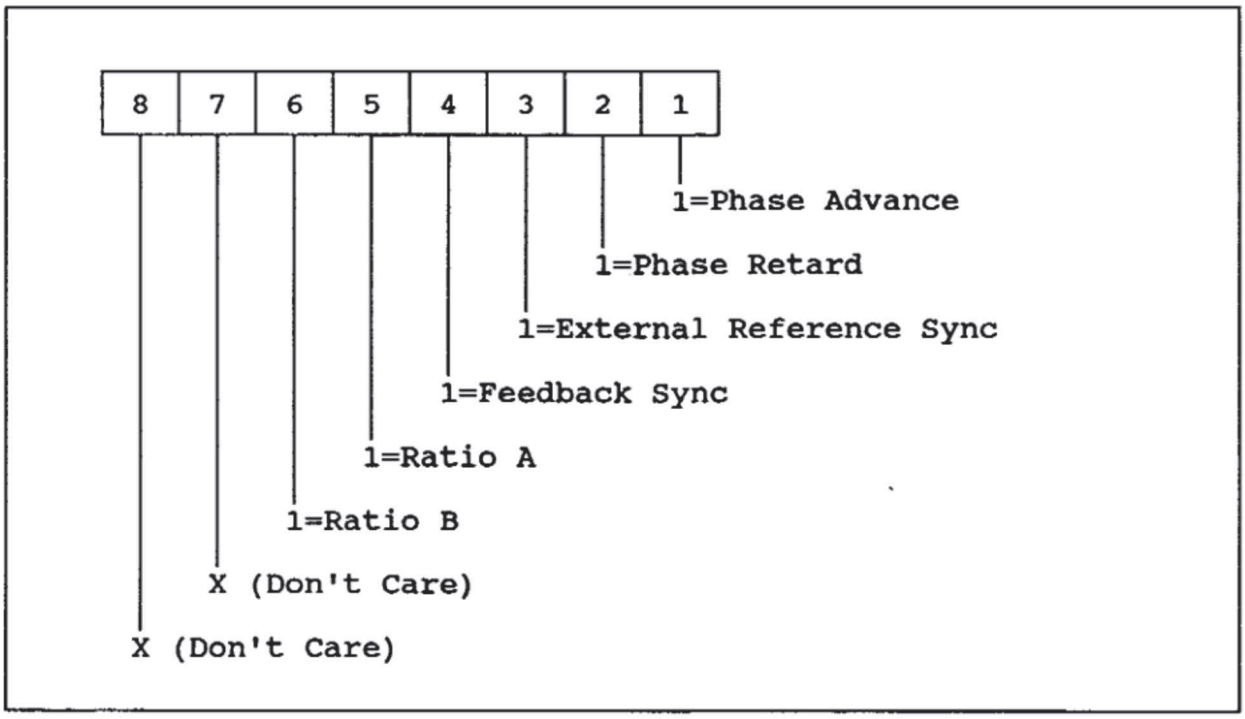


Figure 7-4: MV-54 Interpretation

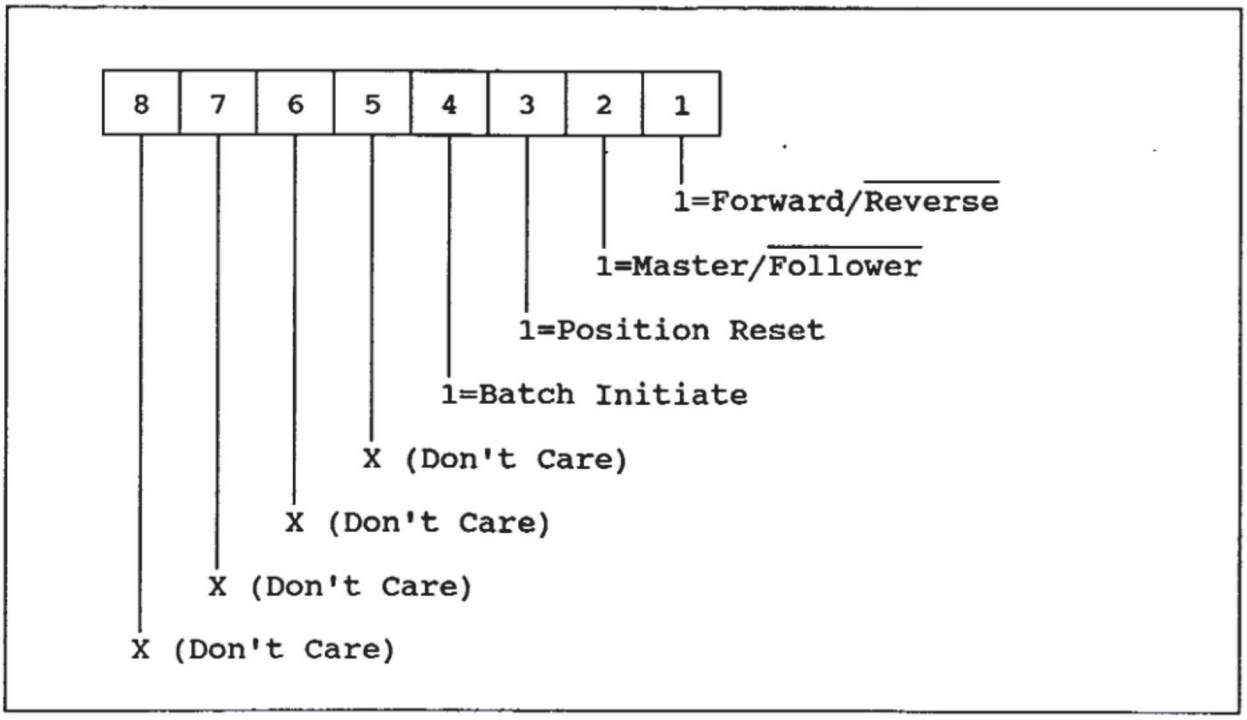


Figure 7-5: MV-55 Interpretation

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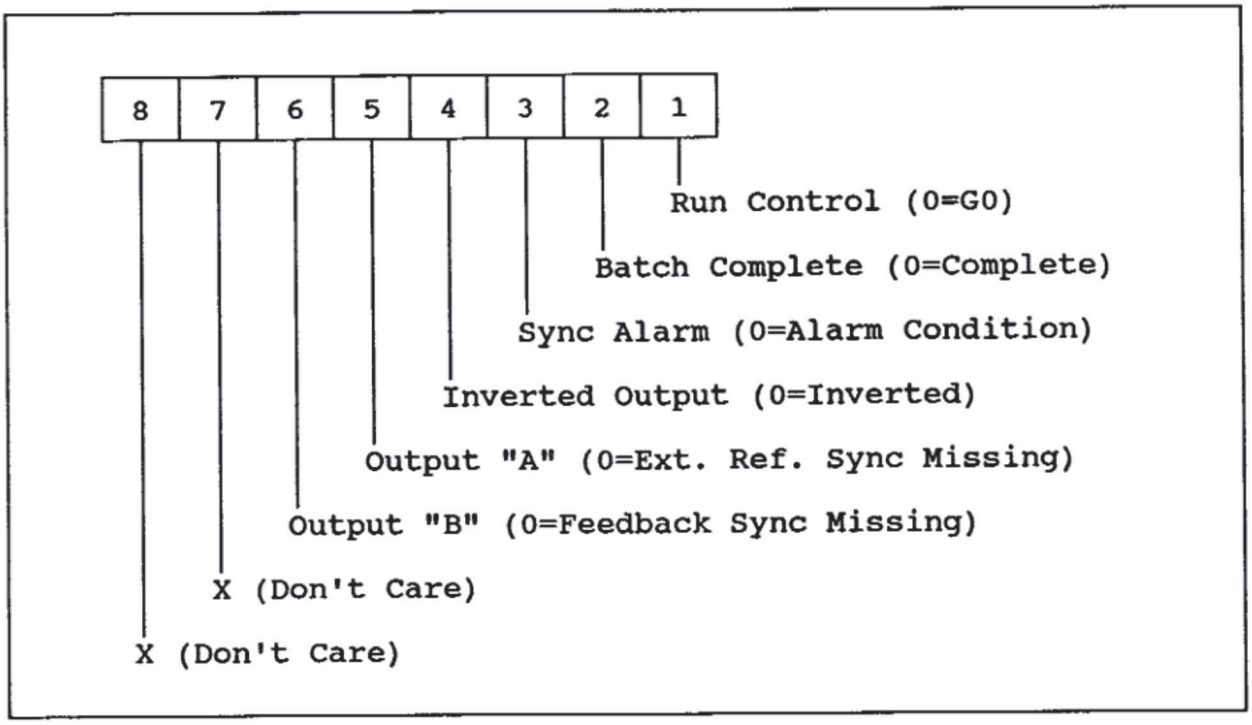


Figure 7-6: MV-56 Interpretation

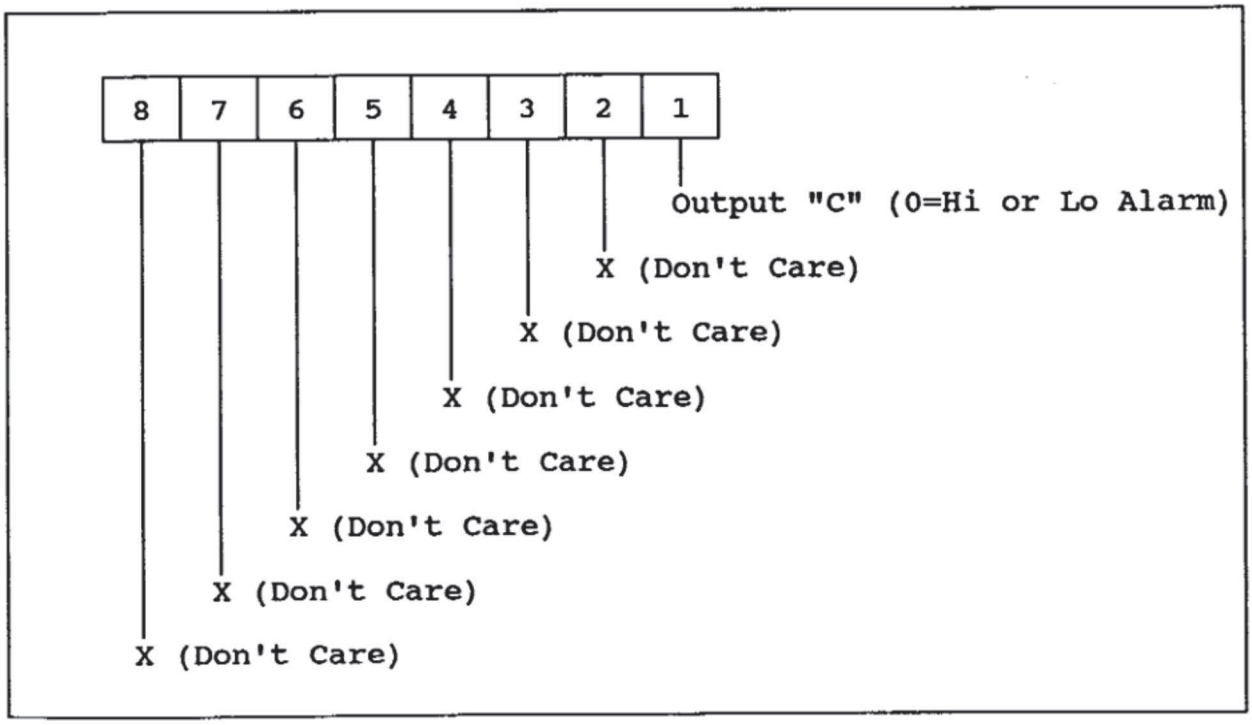


Figure 7-7: MV-57 Interpretation

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NOTE: CP-73 indicates whether the computer has control over the listed variables. 1 indicates that the computer has control, 0 indicates the computer does not have control.

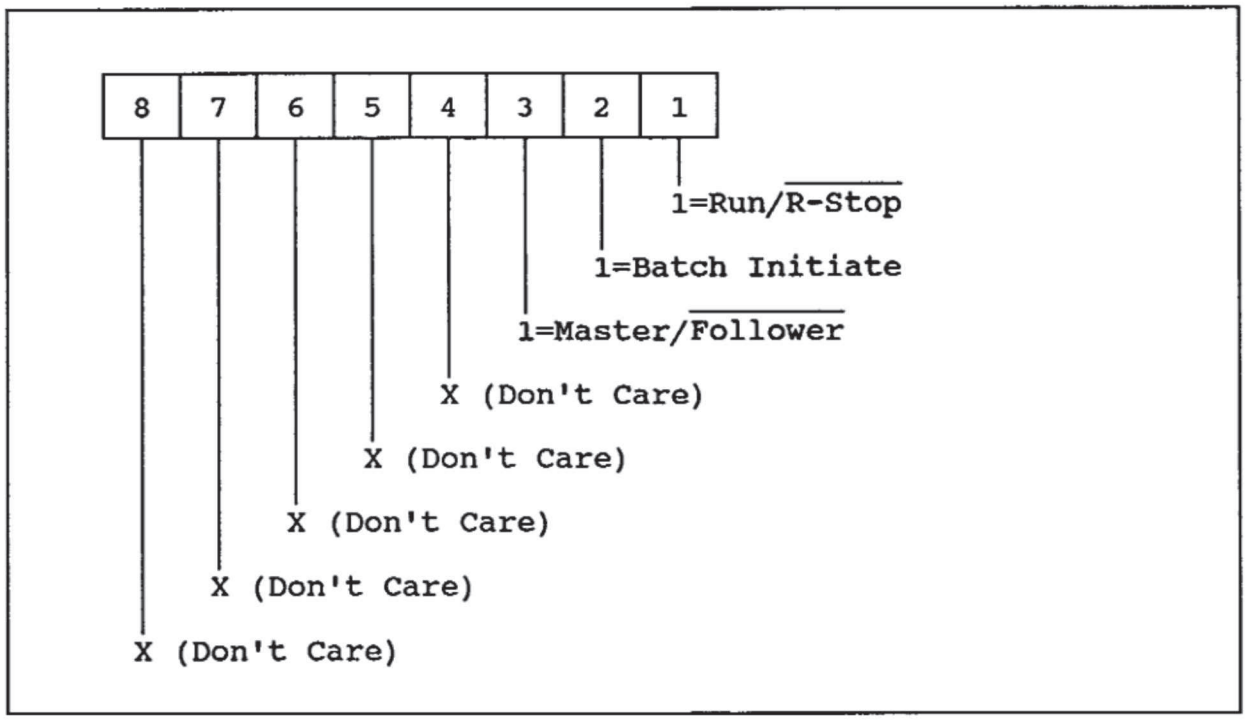


Figure 7-8: CP-73 Interpretation

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CONTROL COMMAND SEND - HOST TRANSMISSION

CHARACTER 1: STX

The message always begins with the ASCII STX character.

CHARACTERS 2 & 3: DEVICE NUMBER

The desired M-Track device address. A device number of "00" for characters 2 and 3 will be globally recognized by all devices on the serial communications line.

CHARACTER 4: MESSAGE TYPE

Set to 1 for this message type.

CHARACTERS 5 & 6: PARAMETER NUMBER

Set to 0 for this message type.

CHARACTERS 7 THROUGH 12: DATA 1,000,000s through 100s

Set to 0 for this message type.

Note: If a global command is sent (characters 2 and 3 set to zero), then characters 7 through 10 should be ommitted. This reduces the message to a 12 character format.

CHARACTERS 13 & 14: DATA 10s & 1s

Enter data control command character code as follows:

01 - Fast Stop	09 - Not Used
02 - Ramp Stop	10 - Not Used
03 - Run	11 - Not Used
04 - Enable Master Mode	12 - Not Used
05 - Enable Follower Mode	13 - Not Used
06 - Batch Initiate	14 - Not Used
07 - Not Used	15 - Not Used
08 - Not Used	

CHARACTER 15: DATA FORMAT

Set to 0 for this message type.

CHARACTER 16: ETX

The message always terminates with the ASCII character ETX.

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CONTROL COMMAND SEND - M-TRACK RESPONSE

CHARACTER 1: STX

The message always begins with the ASCII STX character.

CHARACTERS 2 & 3: DEVICE NUMBER

The device address of the M-Track.

CHARACTER 4: ERROR CODE

Error Code for the received message.

See Parameter Send - Error Code for the bit pattern to decode the error message.

CHARACTERS 5 & 6: PARAMETER NUMBER

Always 0 for this message type.

CHARACTERS 7 THROUGH 12: DATA 1,000,000s through 100s

Always 0 for this message type.

CHARACTERS 13 & 14: DATA 10s & 1s

The command mode from the receive message is returned by the M-Track.

CHARACTER 15: DATA FORMAT

Always 0 for this message type.

CHARACTER 16: ETX

Message always terminates with the ETX character.

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NOTES

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INTRODUCTION

This chapter explains some of the advanced programming capabilities of the M-Track. These capabilities include three additional Scaling Formats, two Auxiliary Follower functions, Batch Control and Limit and Alarm functions. The four major sections of this chapter are:

Alternative Scaling Formats
Auxiliary Follower Functions
Batch Control
Limits and Alarms

ALTERNATIVE SCALING FORMATS

Chapter 5 explains in detail Learn Mode Follower Scaling. The M-Track has four additional Scaling Formats: Fixed Follower Scaling, Flex Follower Scaling, Master Scaling and Direct Scaling.

FIXED FOLLOWER SCALING

Fixed Follower Scaling is an alternative method of providing the follower/lead scaling ratio to the M-Track. In Learn Mode Scaling, the ratio was calculated by the M-Track during the Learn Mode procedure. With Fixed Follower Scaling, the ratio must be manually calculated for the process and entered as the setpoint.

The first step in using Fixed Follower Scaling is to correctly calculate the Scale Factor for the given process. The Scale Factor is defined as the ratio of the Follower Job Space to the Lead Job Space. It is imperative that all gear ratio reductions, etc. get taken into account when determining the two job spaces. A job space is defined by the number of encoder lines that occur at the respective frequency input (either the External Reference Lead -- J3 pin 5, or the Feedback (Follower) -- J3 pin 9) during the time between two respective sync pulses (External Reference Sync J3 pin 10, or Feedback J3 pin 12).

$$\text{Scale Factor} = \frac{\text{Follower Job Space}}{\text{Lead Job Space}}$$

Where Job Space = number of encoder lines between sync pulses

To enter in the calculated Scale Factor, the Fixed Follower Scaling must first be enabled. To enable Fixed Follower Scaling, enter the value "1" into CP-18.

Note: When enabling Fixed Follower Scaling, all Learn Mode Scaling ratios will be erased and are not recoverable.

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Once the Fixed Follower Scaling is enabled, the Scale Factors can be directly entered into CP-1, CP-2 and CP-3. The desired setpoint is activated from CP-1, CP-2 or CP-3 through the Ratio A and Ratio B discrete inputs. With both discrete inputs open, the scale factor entered into CP-1 will be activated. With only Ratio A closed, the CP-2 scale factor is activated. With only the Ratio B or both inputs closed, the CP-3 scale factor is activated.

Unlike Learn Mode, trending is not active with Fixed Follower Scaling. The M-Track will always attempt to use the entered Scale Factor in Fixed Follower Scaling. If the calculated Scale Factor is suspect, MV-85 can be used to monitor the True Scale Factor as determined by the M-Track.

FLEX FOLLOWER SCALING

The Flex Follower Scaling is the same as Fixed Follower Scaling with the exception of an added trending capability.

In Flex Follower Scaling, the original Scale Factor is calculated and entered as with Fixed Follower Scaling (see Page 8-1). However, unlike Fixed Follower Scaling, the active scale factor may be modified by the trending function. Every sixteen job spaces, the M-Track calculates an average scale factor from the Lead and Follower job space calculations. This number is then used as the Active Scale Factor (MV-86). This function is intended to compensate for small or gradual changes in job spaces such as for web stretch.

The Active Scale Factor is always limited to within a one-eighth variance of the entered setpoint scale factor in Flex Follower Scaling.

MASTER SCALING FORMAT

The Master Scaling Format is the simplest M-Track scaling format. The motor speed is controlled by only one variable: the Speed Setpoint. The motor speed is directly proportional to the Speed Setpoint.

In order to properly scale the Master Format, it is necessary to enter the appropriate values into two of the M-Track Control Parameters. First, the PPR (pulses per revolution) of the feedback or slave sensor (encoder) should be entered into CP-11. Second, the maximum RPMs of the feedback shaft containing the feedback sensor should be entered into CP-13.

After the scaling constants have been entered, the Master Format Setpoint in RPMs can be entered via CP-5. The actual feedback RPMs can be monitored at MV-40 or by simply pressing the "TACH" keypad.

This scaling format is called Master because an M-Track operating under Master Format is often used to control the speed of an entire process line, setting the pace for other M-Tracks following the Master at various controlled speed ratios.

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DIRECT SCALING FORMAT

The Direct Scaling Format is intended for use in calibration and trouble-shooting procedures. It is not a normal mode of operation. In Direct Scaling, the analog output of the M-Track, connected to the motor drive, can be directly set to a specified level. It is an open-loop control mode that ignores all internal scaling information and all input signals except the Run and Stop logic.

To enable the Direct Scaling Format, enter a value of "1" into CP-19. The Direct Analog Command can then be entered into CP-7. The entry units are DAC bits with 4095 representing a 100% positive output level, 0 representing a 0 analog voltage level and -4095 representing a 100% negative output level.

AUXILIARY FOLLOWER FUNCTIONS

SYNC WINDOWS

The presence of extraneous or invalid sync pulses can cause gross misbehavior in M-Track applications. A feature called sync windows helps prevent stray sync pulses from creating system malfunctions. The Sync window filters out (ignores) all sync pulses that occur outside the specified Sync Window. Also, the M-Track recognizes only the first sync pulse that occurs within the window. All subsequent sync pulses in the window are ignored. If no sync pulse is received during the sync window, the M-Track creates a pulse at the zero degree point in order to maintain synchronization.

To enable the sync window, a value of "1" must first be entered into CP-37. The size of the Sync Flag Window is now entered into CP-33. The units for the Sync Flag Window are in degrees of job space with half of the entered value preceding the calculated sync location and half following the calculated sync location. Therefore, an entered value of 240 for CP-33 would create a Sync Window of 120 degrees prior and 120 degrees following the calculated sync location.

The M-Track automatically fully opens the Sync Flag Windows when it lacks valid position (sync) information such as during the Learn Mode procedure or after a Position Reset. After the sync information is established, the next calculated sync location is known and the windows close to the specified level.

PHASING

In certain process setups, it is difficult to physically align or mount the sync sensors at the desired locations. The M-Track has a feature called "Phasing" that allows the entry of a sync offset to accommodate these situations.

Phasing is activated by entering the desired offset into CP-31. The units for this parameter are encoder lines. The CP-31 value is a bipolar number. Negative numbers will adjust the phase to move the follower further ahead in relation to the lead. Positive CP-31 entries will move the follower behind in relation to the lead.

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An alternative method of making the phase adjustment is through the use of the Phase Advance (J4 pin 12) and Phase Retard (J4 pin 14) discrete inputs. Shorting the Phase Advance input to common will add negative numbers to CP-31 and move the follower ahead in relation to the lead. The Phase Retard will add positive numbers to CP-31 and move the follower behind in relation to the lead.

The amount of adjustment made by the Phase Advance and Phase Retard inputs is determined by the CP-29 entry. The CP-29 value is added to CP-31 at the rate of 10 times per second.

BATCH CONTROL

The M-Track has a rudimentary Batch Control feature. An internal batch counter counts the Follower or Feedback Sync pulses (J3 pin 12) and activates an alarm output (J1 pin 14) when the specified Batch Count is reached. The Batch Count is entered into CP-27. The bach counter is initialized or reset to 0 by shorting the Batch Initiate discrete input (J4 pin 5) to common, or after a power up.

The actual batch count can be viewed by pressing the "Batch Count" function key or viewing MV-43. The number of counts remaining before reaching the Batch Limit can be viewed in MV-44.

ALARMS AND LIMITS

LED INDICATORS

Next to the M-Track programming keypad are five LEDs. When on, these LEDs indicate the following:

LED On	Indicates
RUN	M-Track is in the RUN state
SYNC ERROR	M-Track is out of sync
REF SYNC	M-Track Reference Sync signal is present
FDBK SYNC	M-Track Feedback Sync signal is present
ALARM	One of the M-Track alarm conditions is present (View MV-51 to identify alarm condition)

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LIMITS

In Master Scaling Format only, it is possible to set both Minimum and Maximum velocity limits. In the RUN State, the M-Track will always attempt to maintain a speed at the setpoint between these limits.

To set the Minimum Limit, enter the desired minimum velocity into CP-20. To set the Maximum Limit, enter the desired maximum velocity into CP-21.

ALARMS

The M-Track has three alarms: Low, High and Position.

The Low and High Alarms are set through parameters CP-22 and CP-23 respectively. If either alarm condition is reached, the Alarm Output C (J1 pin 19) will be activated until the alarm condition is abated.

The Position Alarm is set through CP-24. If the M-Track is out of position (sync) as established by CP-24, then the Position Alarm output is activated (J1 pin 15).

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INTRODUCTION

This chapter contains information designed to assist in diagnosing and solving M-Track problems, and is divided into the following sections:

Diagnostics — Provides information for running the M-Track Diagnostic Routines.

Noise Recovery — Provides information to recover from EMI noise (indicated by -----1, ------2 or -----3 M-Track display.

Spare Parts List — Lists the available spare parts which can be ordered from the factory.

EPROM Replacement — Contains a procedure for replacing the EPROM.

Restore Settings — Provides a procedure which restores the M-Track to the default factory settings.

If the information in this chapter does not solve your problem with the M-Track, consult the factory.

The Contrex service number is (800) 342-4411.

DIAGNOSTICS

The M-Track contains a number of internal diagnostic routines designed to verify that the M-Track is running correctly, and to identify specific M-Track problems if they occur. The first set of diagnostic routines are initiated by a specific power-up procedure, while the second set of diagnostics involve entering M-Track input values, and verifying subsequent M-Track frequency calculations.

CLEAR/4 POWER UP TESTS

Initiate Test

1. Remove power from the M-Track.
2. While simultaneously pressing "CLEAR" and "4" on the Operator Keypad, apply power to the M-Track.
   Response: "HELP 1" is shown in the upper display.
3. Press the TACH (decrement) or STATUS (increment) keys to select which of the nine tests to initiate. Each of the nine tests can be performed without repeating steps 1 and 2 above.
4. Press CODE SELECT key to exit diagnostics.

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1. RSEG TEST

1. Display "HELP 1" in the M-Track upper display.
2. Press ENTER to start test.
3. If RSEG fails, an "EE" is displayed in the lower display. Consult Factory.
4. If RSEG is good, a "PP" is displayed in the lower display.
5. Press CLEAR to eliminate the "PP" from the lower display.

2. DSEG TEST

1. Display "HELP 2" in the M-Track upper display.
2. Press ENTER to start test.
3. If DSEG fails, an "EE" is displayed in the lower display. Consult Factory.
4. If DSEG is good, a "PP" is displayed in the lower display.
5. Press CLEAR to eliminate the "PP" from the lower display.

3. CSEG TEST

1. Display "HELP 3" in the M-Track upper display.
2. Press ENTER to start test.
3. If CSEG fails, an "EE" is displayed in the lower display. Consult Factory.
4. If CSEG is good, a "PP" is displayed in the lower display.
5. Press CLEAR to eliminate the "PP" from the lower display.

4. NUMERIC LED TEST

1. Display "HELP 4" in the M-Track upper display.
2. Press ENTER to start test.
3. M-Track displays the following:

0.0.0.0.0.0.0.0.	0.0.0.0.0.0.0.0.
1.1.1.1.1.1.1.1.	1.1.1.1.1.1.1.1.
2.2.2.2.2.2.2.2.	2.2.2.2.2.2.2.2.
3.3.3.3.3.3.3.3.	3.3.3.3.3.3.3.3.
4.4.4.4.4.4.4.4.	4.4.4.4.4.4.4.4.
5.5.5.5.5.5.5.5.	5.5.5.5.5.5.5.5.
6.6.6.6.6.6.6.6.	6.6.6.6.6.6.6.6.
7.7.7.7.7.7.7.7.	7.7.7.7.7.7.7.7.
8.8.8.8.8.8.8.8.	8.8.8.8.8.8.8.8.
9.9.9.9.9.9.9.9.	9.9.9.9.9.9.9.9.
-.-.-.-.-.-.-.-.	A.A.A.A.A.A.A.A.
E.E.E.E.E.E.E.E.	b.b.b.b.b.b.b.b.
H.H.H.H.H.H.H.H.	C.C.C.C.C.C.C.C.
L.L.L.L.L.L.L.L.	d.d.d.d.d.d.d.d.
P.P.P.P.P.P.P.P.	E.E.E.E.E.E.E.E.
. . . . .	F.F.F.F.F.F.F.F.

"HELP 4" is displayed at the end of the test. (Incorrect display indicates failure).

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5. ANNUNCIATOR LED TEST

1. Display "HELP 5" in the M-Track upper display.
2. Press ENTER to start test.
   The following LEDs are illuminated in order: Code Select, Status, Tach, Setpoint, Batch Count, Run, Sync Error, Ref Sync, Fdbk Sync, Alarm

6. KEYPAD TEST

1. Display "HELP 6" in the M-Track upper display.
2. Press ENTER to start test.
3. Press each Operator Keypad Key. The M-Track displays a number according to the key pressed:

Press	Display	Press	Display	Press	Display
-	-	4	4	SETSPEED	10
.	.	5	5	TACH	11
0	0	6	6	BATCH COUNT	12
1	1	7	7	STATUS	13
2	2	8	8	ENTER	14
3	3	9	9	CODE SELECT	15
				CLEAR	

4. Press CLEAR to exit test.

7. INPUT TEST

1. Display "HELP 7" in the M-Track upper display.
2. Press ENTER to start test.
3. Close input switches. The M-Track displays a number according to the input pressed.

Input Closure		Display	Input Closure		Display
REF SYNC	(J3-10)	10	RUN	(J4-6)	02
FDBK SYNC	(J3-12)	11	R-STOP	(J4-8)	03
RATIO A	(J3-13)	12	F-STOP	(J4-9)	04
RATIO B	(J3-15)	13	KEYLOCK	(J4-11)	05
FWD/REV	(J3-16)	14	PHASE ADV	(J4-12)	06
MAST/FOLL	(J4-2)	15	PHASE RET	(J4-14)	07
POS RESET	(J4-3)	16	ALIGN	(J4-15)	01
BATCH INIT	(J4-5)	17	JOG	(J4-17)	00

4. Press CLEAR to exit test.

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8. DISCRETE OUTPUT TEST

1. Display "HELP 8" in the M-Track upper display.
2. Press ENTER to start test.
3. Press keys 1 - 7 to enable outputs. Pull-up resistors and meter or LED is required.

Key	Output	Key	Output
1	RUN CTL	5	OUTPUT A
2	BATCH CMPL	6	OUTPUT B
3	SYNC ALARM	7	OUTPUT C
4	INVERSION		

4. Press CLEAR to exit test.

9. SPEED COMMAND OUTPUT TEST

1. Display "HELP 9" in the M-Track upper display.
2. Press ENTER to start test.
3. Use an oscilloscope to view Speed Command Analog Output (J1 Pin 9).
4. Output is a ramp from +10 volts to -10 volts, then back to +10 volts.
5. Press CLEAR to exit test.

10. SERIAL INPUT TEST

Prerequisites: Jump J1 Pin 4 to J1 Pin 2, and Jump J1 Pin 5 to J1 Pin 3.

1. Display "HELP 10" in the M-Track upper display.
2. Press ENTER to start test.
3. Failures:
   M-Track displays 03 if 300 baud failure.
   M-Track displays 24 if 2400 baud failure.
   M-Track displays 96 if 9600 baud failure.
   M-Track displays EE at the end of test if any failures occurred.
4. Pass:
   M-Track displays PP if there were no failures.
5. Exit is automatic.

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11. CODE # TEST

1. Display "HELP 11" in the M-Track upper display.
2. Press ENTER to start test.
3. M-Track displays date code of software.
4. Exit is automatic.

VERIFYING M-TRACK QUAD INPUTS

1. Quad Input Test

1. Connect Quad frequency into:
   a) External Reference Channel A and Channel B
   b) Feedback Channel A and Channel B
2. Verify input by checking the following M-Track Monitor Variables:
   a) MV-41 (External Reference Input)
   b) MV-42 (Feedback Input)

NOISE RECOVERY

The M-Track provides three display indications to assist the user in isolating sources of power line failure or EMI noise.

1. -----1 Displayed

   A dashed 1 display on the M-Track indicates that the AC power line voltage is below the specified level for the M-Track. The power line should be checked for AC voltage integrity. MV-59 is provided as a device to monitor line notching.

2. -----2 Displayed

   A dashed 2 display on the M-Track indicates that a CPU watchdog failure has occurred. This generally is a result of EMI or high frequency noise on the power or signal lines. Suggestions to prevent further failures include:

   - Ensure proper chassis and AC power grounding.
   - Shield signal wires with shield ground attached at one end only.
   - If AC line noise is suspected, place a power line filter on the AC line.
   - Ensure isolation of internal signal common (J3 pin 4) and chassis ground (J2 pin 1).

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- Place ARC suppressors on relay and contactors in close proximity to the M-Track.
- Physically place (isolate) all signal wires from AC power wiring.

Because the dashed 2 status indicates the CPU has malfunctioned, it is important to restore all the M-Track memory locations to a known status. To recover from a dashed 2 status, use the CLEAR 7 Power-Up procedure explained in the Restore Settings section of this chapter.

3. -----3 Displayed

A dashed 3 display on the M-Track indicates that there is a checksum error in the Parameter Code area of memory.

Perform the same EMI prevention and recovery measures as suggested in the dashed 2 section.

SPARE PARTS LIST

Part Number	Description
6441-0200	Fuse
6340-0021	Shunt Jumper-2 Position (Power Board)
6340-0031	Shunt Jumper-6 Position (CPU Board)
6310-0223	3 Position Terminal Connector (Power Board)
6310-0224	16 Position Terminal Connector (CPU Board)
6310-0228	18 Position Terminal Connector (CPU Board)
6310-0225	20 Position Terminal Connector (Power Board)
Call Factory	PROM Number

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EPROM LOCATION

It is possible that the EPROM may be replaced at the customer's location. Figure 9-1 below illustrates the location of this EPROM.

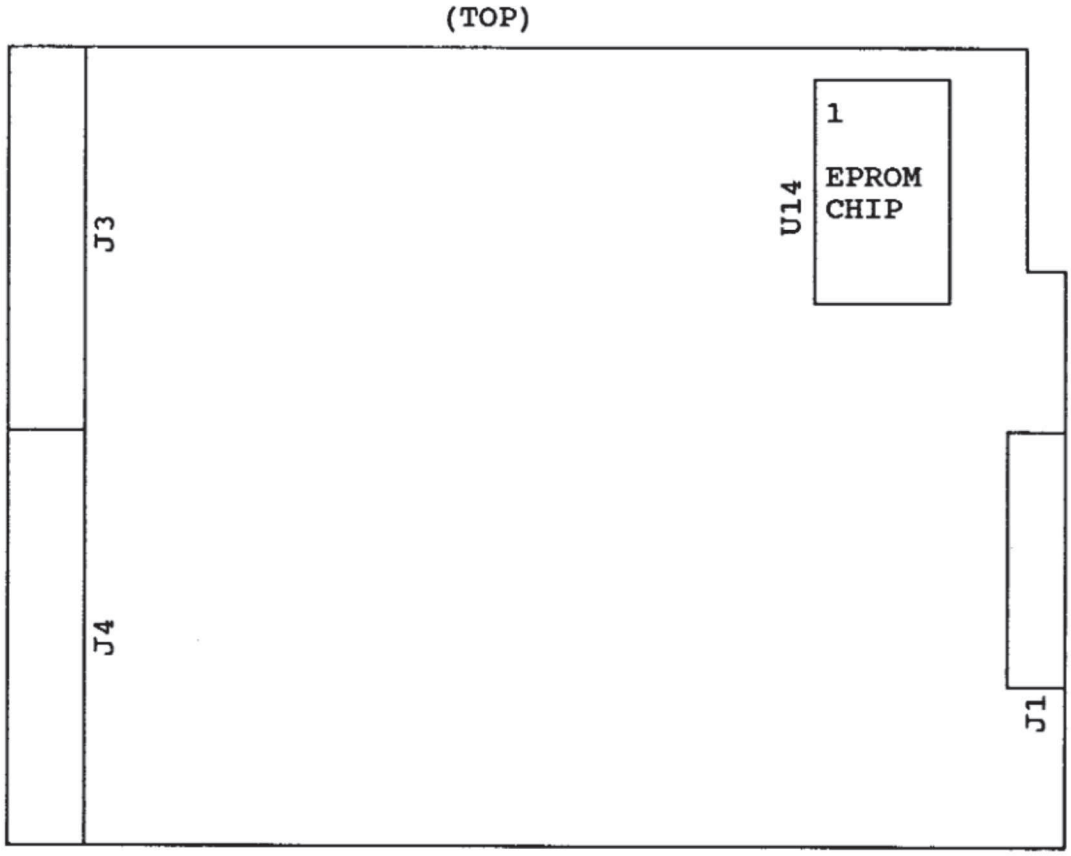


Figure 9-1: EPROM Location

RESTORE SETTINGS

CAUTION: This procedure restores the M-Track to the factory default settings. Any User-entered parameters or programming will be erased.

1. Remove power from the M-Track.

2. While pressing "Clear" and "7" on the Operator Keypad, apply power to the M-Track.
   Response: The M-Track restores the factory default settings, and then performs the Power Up routine.

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APPENDIX A - FEEDBACK SENSORS A

INTRODUCTION

For the M-Track to accurately control a motor, the M-Track must receive a feedback signal reflecting the actual motor speed. This appendix contains information concerning two methods to provide this signal: Quadrature Ring Kit and Quadrature Encoders.

QUADRATURE RING KIT

A quadrature ring kit (Fenner 7300-1310) is used to provide a hall effect sensor which detects the actual speed of the motor being controlled. This ring kit is typically comprised of 2 parts: A machined aluminum ring with a specific number of gear teeth and a specific bore diameter, and a hall effect sensor which mounts in the ring.

NEMA C-FACE RING MOUNT

Best performance is achieved with a quadrature hall effect sensor mounted in a C-face ring. Shielded cable connections to the sensor are made by soldering and taping inside the conduit adapter box as shown below.

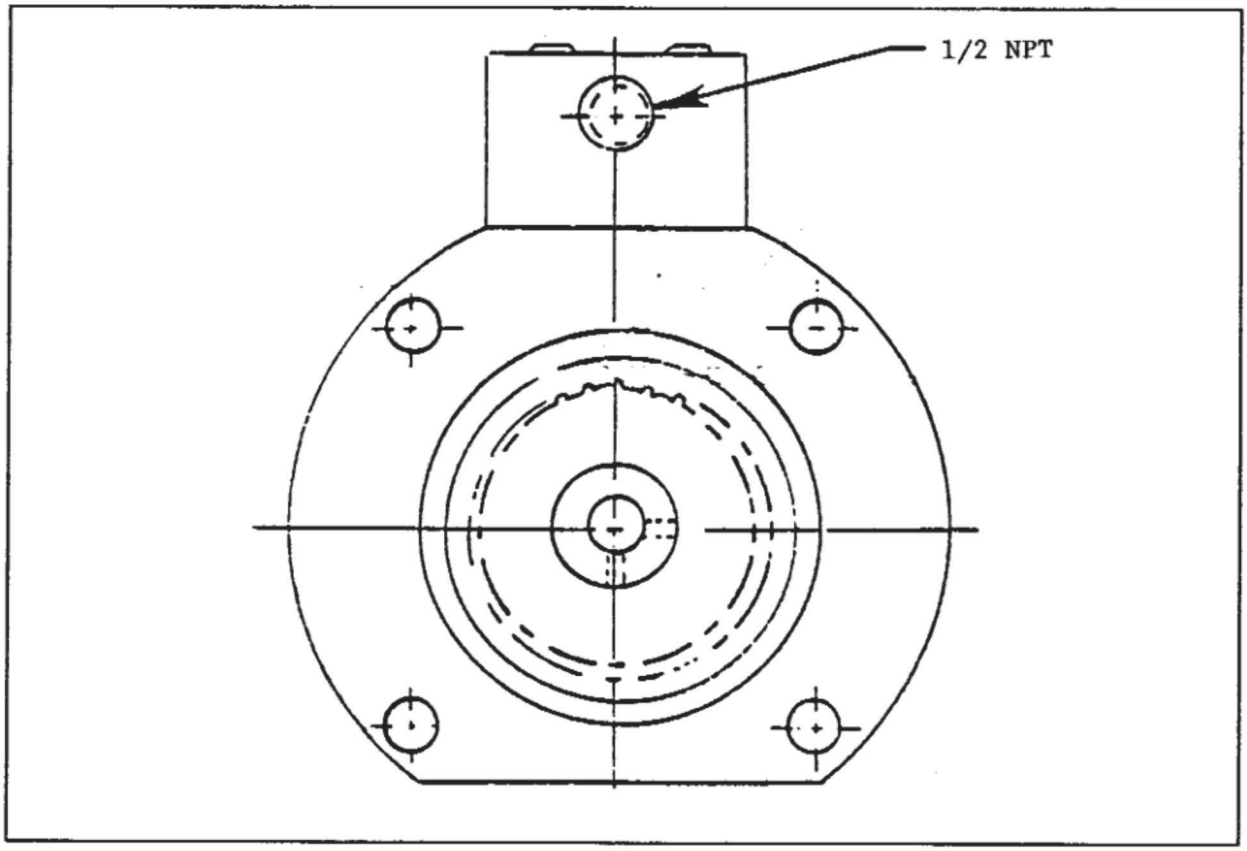


Figure A-1: Hall Effect Ring Kit

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QUADRATURE ENCODERS

When the application requires a high resolution of feedback or external reference, it may be necessary to use a quadrature encoder.

Figures A-2 and A-3 provide details on the Fenner 3200-1341 quadrature encoder kit.

SPECIFICATIONS

ELECTRICAL

Code: Incremental
Cycles per Shaft Turn: 600

Output:
3904: current sinking up to 40 mA

Output Format: 2 channels (A&B) in quadrature $\pm 27^{\circ}$ electrical typical

Supply Voltage:
3904: 5Vdc

Current Requirements:
3904: 80 mA typical
Illumination: light emitting diode (LED)
Frequency Response: 100 kHz

MECHANICAL

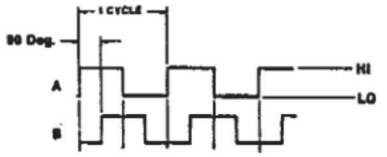
Shaft Diameter: 3/8"
Hollow shaft

Shaft Loading: 80 lbs. axial and 80 lbs. radial
Shaft Runout: .001 T.I.R. maximum
Shaft Torque: 1.0 in-oz maximum at 25 $^{\circ}$ C without shaft seal
Bearings: 52100 bearing steel
Shaft: 303 Stainless steel
Housing and Cover: die cast aluminum with chemical film finish (iridite)
Bearing Life: 1.5×10^{9} revs. at 80 lbs. radial load
Moment of Inertia: 2.0×10^{-4} oz-in-sec^{2}
Maximum RPM: 10,000
(also see frequency response)
Weight: 9 oz. typical

ENVIRONEMENTAL

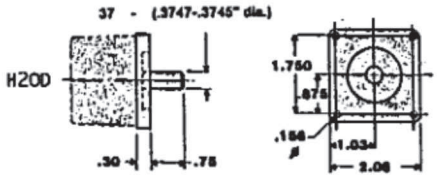
Temperature: Operating: 0 to 70 degrees C standard, extended temperature testing available to -40 $^{\circ}$ C (requires oil lube bearing quadrature +36 $^{\circ}$ C at -40 $^{\circ}$ C).
Storage: -25 to 90 $^{\circ}$ C
Shock: 50 G's for 11 msec duration
Vibration: 5 to 2000 Hz @ 20 G's
Humidity: 99% RH without condensation

FIGURE 1 - OUTPUT WAVEFORMS



DIMENSIONS

HOUSING TYPE



COVER AND TERMINATION

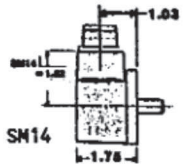
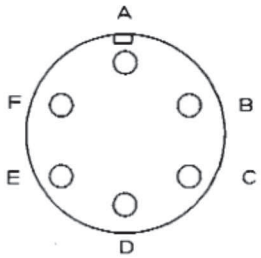


Figure A-2: 3200-1341 Quadrature Encoder: Specifications and Dimensions

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CONNECTIONS

OUTPUT TERMINATION



A...POWER SUPPLY COMMON

B...5 VOLT POWER SUPPLY

C...NOT USED

D...CHANNEL B SIGNAL

E...CHANNEL A SIGNAL

F...NOT USED

EX: M-TRACK FEEDBACK

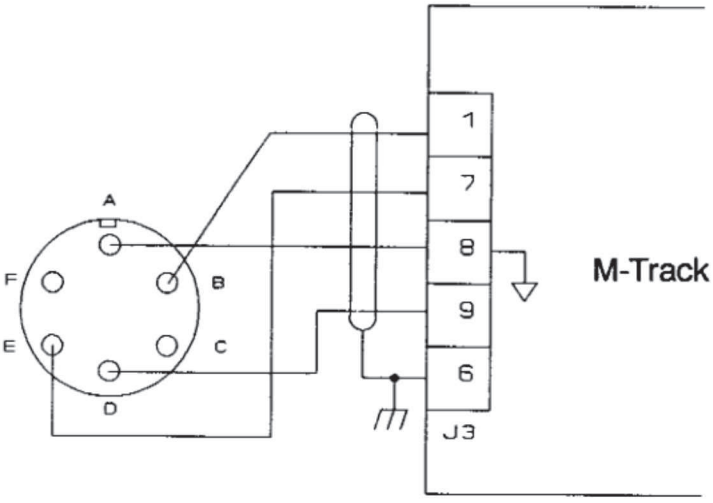


Figure A-3: 3200-1341 Quadrature Encoder Connections

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APPENDIX B - FORMULAS B

To Be Supplied.

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