RDP-PC OPTION
MANUAL

P/N: EDO112 (V1.1)

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If you should have any questions about the RDP-PC board or comments regarding the documentation, please refer to Aerotech online at:
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The RDP- PC board is a product of Aerotech, Inc.

The RDP-PC Option Manual Revision History:

Rev 1.0	February 8, 2000
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CHAPTER 1: RDP-PC SETUP

In This Section:

1.1. RDP Board Hardware Setup

The RDP board connects between the UNIDEX 600/500 and a feedback device, such as an inductosyn or resolver. Before the RDP board can be installed into the PC, it must be properly configured .

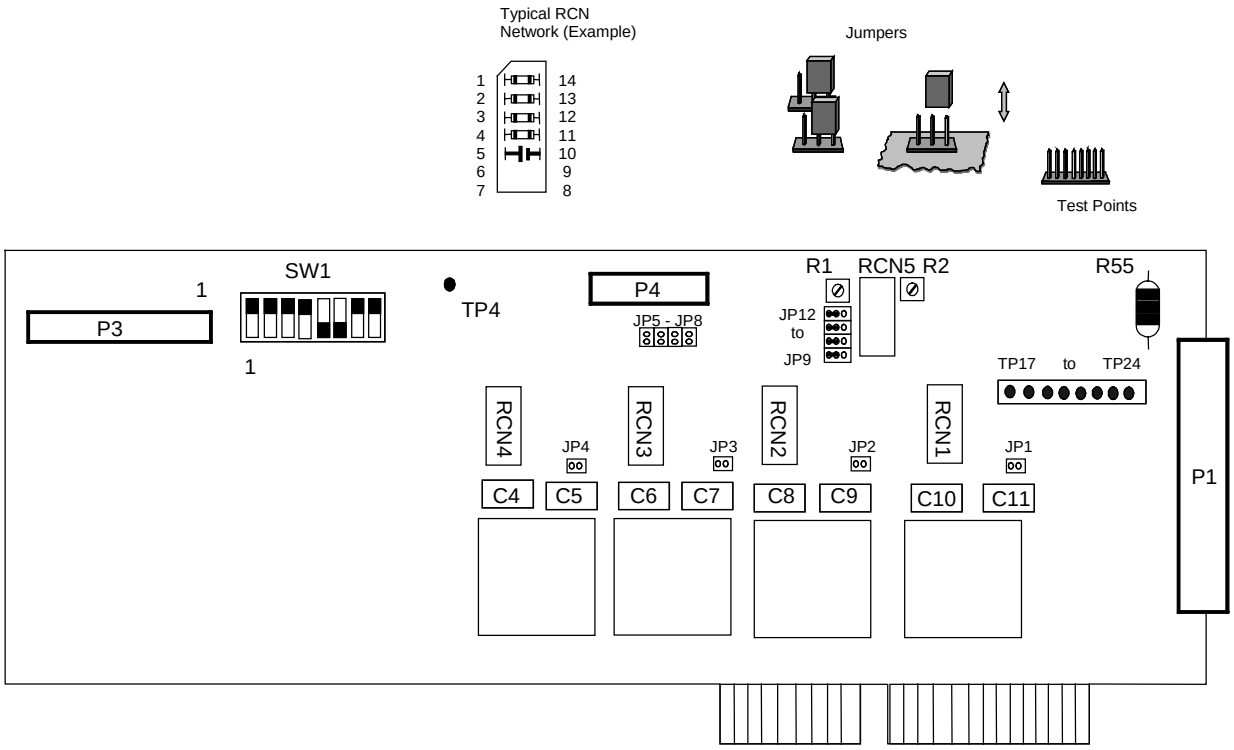


Figure 1-1. RDP-PC Board

The first step is to configure the jumpers on the board. See the following tables for jumper settings and refer to Figure 1-1 for jumper locations.

Table 1-1. Jumper Settings for Converter Demodulator Adjust Mode (RDP)

Axis	Enable	Disable
1	Install JP1	Remove JP1 (default)
2	Install JP2	Remove JP2 (default)
3	Install JP3	Remove JP3 (default)
4	Install JP4	Remove JP4 (default)

The jumpers JP1-JP4 should only be enabled when adjusting the phase offset pot (R1) for rotary inductosyn.

Table 1-2. Jumper Settings for Over Temperature Thermistor Input (RDP)

Axis	Disable	Enable
1	Install JP5 (default)	Remove JP5
2	Install JP6 (default)	Remove JP6
3	Install JP7 (default)	Remove JP7
4	Install JP8 (default)	Remove JP8

Table 1-3. RDP Board Extension Bus Address Settings

Extension Bus Address	Dip Switch Settings
RDP board # 1 use if one board installed (default)	SW1  1
RDP board # 2	SW1  1
RDP board # 3	SW1  1
RDP board # 4	SW1  1

RDP board #1 uses feedback channels 1 through 4 and RDP board #2 uses feedback channels 5 through 8, etc. If only one board is installed, use the default switch setting.

Table 1-4. Inductosyn or Resolver Jumper Settings

Axis	Resolver	Inductosyn
#1	Set JP9 to 1-2 (default)	Set JP9 to 2-3
#2	Set JP10 to 1-2 (default)	Set JP10 to 2-3
#3	Set JP11 to 1-2 (default)	Set JP11 to 2-3
#4	Set JP12 to 1-2 (default)	Set JP12 to 2-3

The next step is to configure the resistor network RCN5 (see Figure 1-1) for the oscillator frequency that will be used, refer to Table 1-5.

Table 1-5. Oscillator Frequency Configuration for RCN5

RCN5							
Description	**Pins 1-14**	**Pins 2-13**	**Pins 3-12**	**Pins 4-11**	**Pins 5-10**	**Pins 6-9**	**Pins 7-8**
Standard 10 kHz (default)	1.96 kΩ 1%	1.96 kΩ 1%	6.2 kΩ	3.9 kΩ	1500 pF	OPEN	OPEN
7.5 kHz	1.1 kΩ 1%	1.1 kΩ 1%	6.2 kΩ	3.9 kΩ	1500 pF	OPEN	OPEN
5 kHz	560 Ω 1%	560 Ω 1%	6.2 kΩ	3.9 kΩ	1500 pF	OPEN	OPEN
Linear inductosyn 10 kHz	1.96 kΩ 1%	1.96 kΩ 1%	6.2 kΩ	3.9 kΩ	OPEN	OPEN	OPEN

In addition, capacitors 4 through 11 must be configured for the oscillator frequency that will be used, refer to Table 1-6.

Table 1-6. Oscillator Frequency Configuration for Capacitors RDP board

Axis	10 kHz	7.5 kHz	5 kHz
Axis #1 C10, C11	Install a 270 pF capacitor (default)	Install a 390 pF capacitor	Install a 560 pF capacitor
Axis #2 C8, C9	Install a 270 pF capacitor (default)	Install a 390 pF capacitor	Install a 560 pF capacitor
Axis #3 C6, C7	Install a 270 pF capacitor (default)	Install a 390 pF capacitor	Install a 560 pF capacitor
Axis #4 C4, C5	Install a 270 pF capacitor (default)	Install a 390 pF capacitor	Install a 560 pF capacitor

The configuration of the resistor networks RCN1 through RCN4 and the bit resolution entered in the axis configuration screen determines the bit resolution used, refer to Table 1-7.

Table 1-7. Bit Resolution Configuration RCN1 through RCN4 on RDP Board

RCN1 Through RCN4 (where RCN1 = Axis #1)							
Description	**Pins 1-14**	**Pins 2-13**	**Pins 3-12**	**Pins 4-11**	**Pins 5-10**	**Pins 6-9**	**Pins 7-8**
16 Bit Resolution 1K BW	8.2 kΩ	390 pF	1800 pF	360 kΩ	62 kΩ	OPEN	OPEN
16 Bit Resolution 750 BW	8.2 kΩ	680 pF	3300 pF	270 kΩ	62 kΩ	OPEN	OPEN
16 Bit Resolution 500 BW	8.2 kΩ	1500 pF	8200 pF	180 kΩ	62 kΩ	OPEN	OPEN
14 Bit Resolution 500 BW	33 kΩ	1500 pF	8200 pF	180 kΩ	56 kΩ	OPEN	OPEN
12 Bit Resolution 1K BW	130 kΩ	390 pF	1800 pF	360 kΩ	62 kΩ	OPEN	OPEN
12 Bit Resolution 750 BW	130 kΩ	680 pF	3300 pF	270 kΩ	62 kΩ	OPEN	OPEN
10 Bit Resolution 500 BW	510 kΩ	470 pF	2200 pF	560 kΩ	180 kΩ	OPEN	OPEN

To connect the RDP board to the UNIDEX 600/500 board, connect the 50-pin ribbon cable from P3 of the RDP board to P3 of the UNIDEX 600/500 board, refer to Figure 1-2.

Make sure pin #1 of the ribbon cable mates with pin #1 of the P3 connectors.

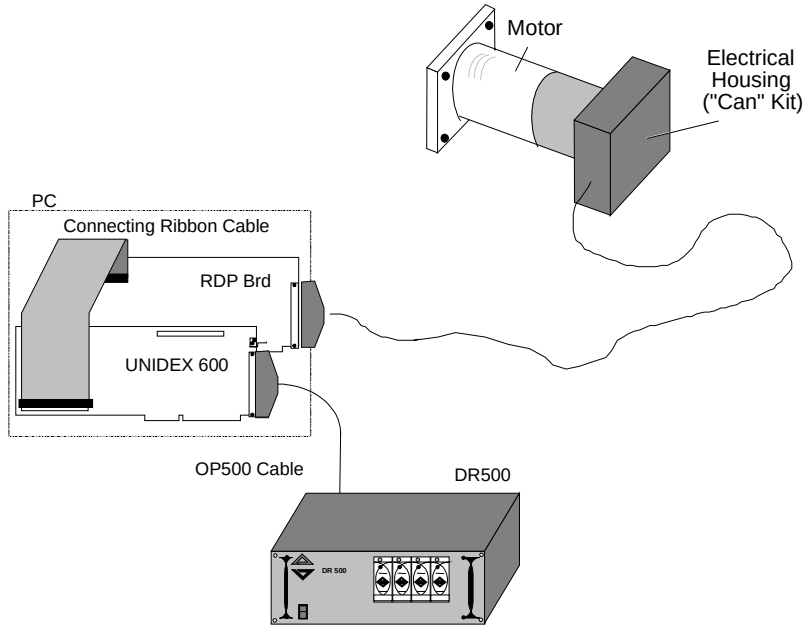
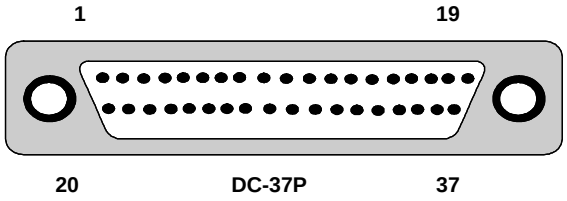


Figure 1-2. RDP Board Connection to UNIDEX 600 Board

Resolvers or inductosyns connect to the RDP board through P1 on the back of the board, see Figure 1-3. The pinouts for the connector are listed in Table 1-8.

Table 1-8. RDP Board Pinouts

Pin #	Axis #	Signal	Pin #	Axis #	Signal
1	4	Shield	20	4	COS -
2	4	COS +	21	4	SIN -
3	4	SIN +	22	-	Ground
4	4	Ground	23	4	Over-Temp thermistor input
5	4	REF +	24	-	Ground
6	3	REF +	25	3	Over-Temp thermistor input
7	3	Shield	26	3	Ground
8	3	COS +	27	3	COS -
9	3	SIN +	28	3	SIN -
10	2	Over-Temp thermistor input	29	-	Ground
11	2	REF +	30	2	Ground
12	2	Shield	31	-	Ground
13	2	COS +	32	2	COS -
14	2	SIN +	33	2	SIN -
15	1	Over-Temp thermistor input	34	-	Ground
16	1	REF +	35	1	Ground
17	1	Shield	36	1	COS -
18	1	COS +	37	1	SIN -
19	1	SIN +			



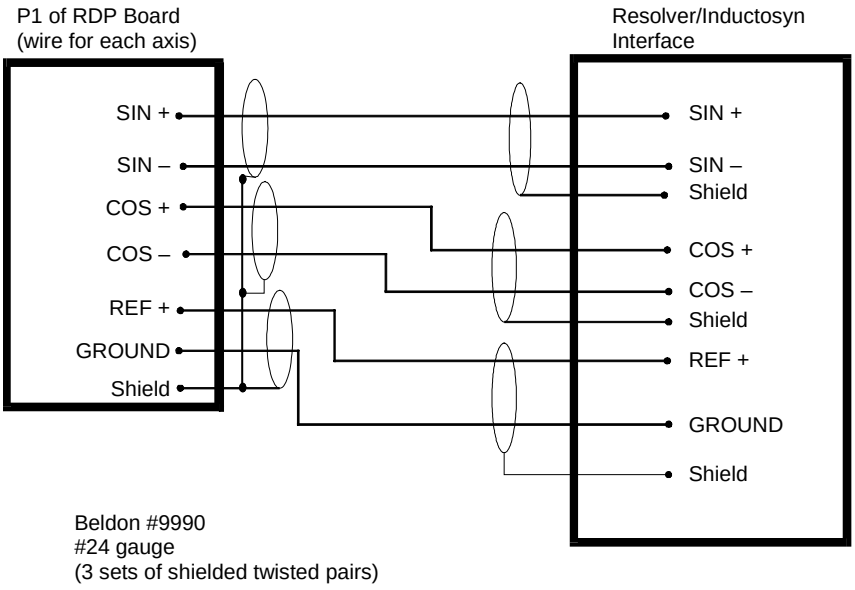


Figure 1-3. Suggested Cabling from RDP Board to Resolver/Inductosyn

Once a resolver or inductosyn is connected to the RDP board, the user must verify that a sinusoidal signal is being sent from the feedback device and adjust the amplitude if necessary. The signals can be monitored from the test points listed in Table 1-9.

Table 1-9. RDP Board Test Points

Test Points	Axis #	Sine/Cosine Signal
TP17	4	COS
TP18	3	COS
TP19	2	COS
TP20	1	COS
TP21	1	SIN
TP22	2	SIN
TP23	3	SIN
TP24	4	SIN
TP4	-	Ground

To verify that a sinusoid signal is being received from the axis with a resolver or inductosyn, perform the following steps.

1. Connect an oscilloscope (O-scope) to the COS signal of the axis being tested and connect the ground of the O-scope to TP4. Move the resolver or inductosyn; a COS signal (sinusoid) should be observed on the O-scope.
2. Connect the O-scope to the SIN signal of the axis being tested. Move the resolver or inductosyn again verifying that a SIN signal (sinusoid) is seen on the O-scope.
3. Verify that the amplitude of the sinusoidal signal of the axis being tested is within specification. Connect an O-scope to either the SIN or COS signal, connect the ground lead to TP4. Move the resolver or inductosyn and observe the amplitude increase and decrease.
    - Notice that when the COS signal's amplitude is at maximum, the SIN signal's amplitude is at minimum and vice-versa.
4. Stop moving the resolver or inductosyn when the amplitude of the sinusoid is at its maximum. All resolvers and inductosyns should be connected to the system at this point in the test (due to reference oscillator loading).
    - The maximum should be 2 volts RMS, which is ≈2.8284 volts peak or ≈5.6568 volts peak to peak.
5. If it is not 2 volts RMS, then adjust the R2 potentiometer until it is.

To null the phase offset, for rotary inductosyns, perform the following.

1. Disable the axis being tested.
2. Set the appropriate converter demodulator adjust mode jumper (JP1 through JP4) for the axis being tested to the "enabled" configuration.
3. Connect an O-scope to pin #1 of the appropriate RCN# (where RCN1 = Axis #1, RCN2 = Axis #2, etc.). For example, if checking axis #1, then connect the O-scope to pin #1 of RCN1. Connect the ground lead to TP4.
4. Adjust the phase offset pot (R1) until the ideal rectified signal is present, refer to Figure 1-4. Get as close as possible.
    - A different capacitor may be needed for pins 5 and 10 of RCN5.
    - The R1 pot adjusts the phase offsets for all four axes (only applies if they are rotary inductosyns), so if more than one rotary inductosyn is being used, they have to be of the same type.
5. Return the previously set jumper (JP1 through JP4) to the "disabled" configuration.

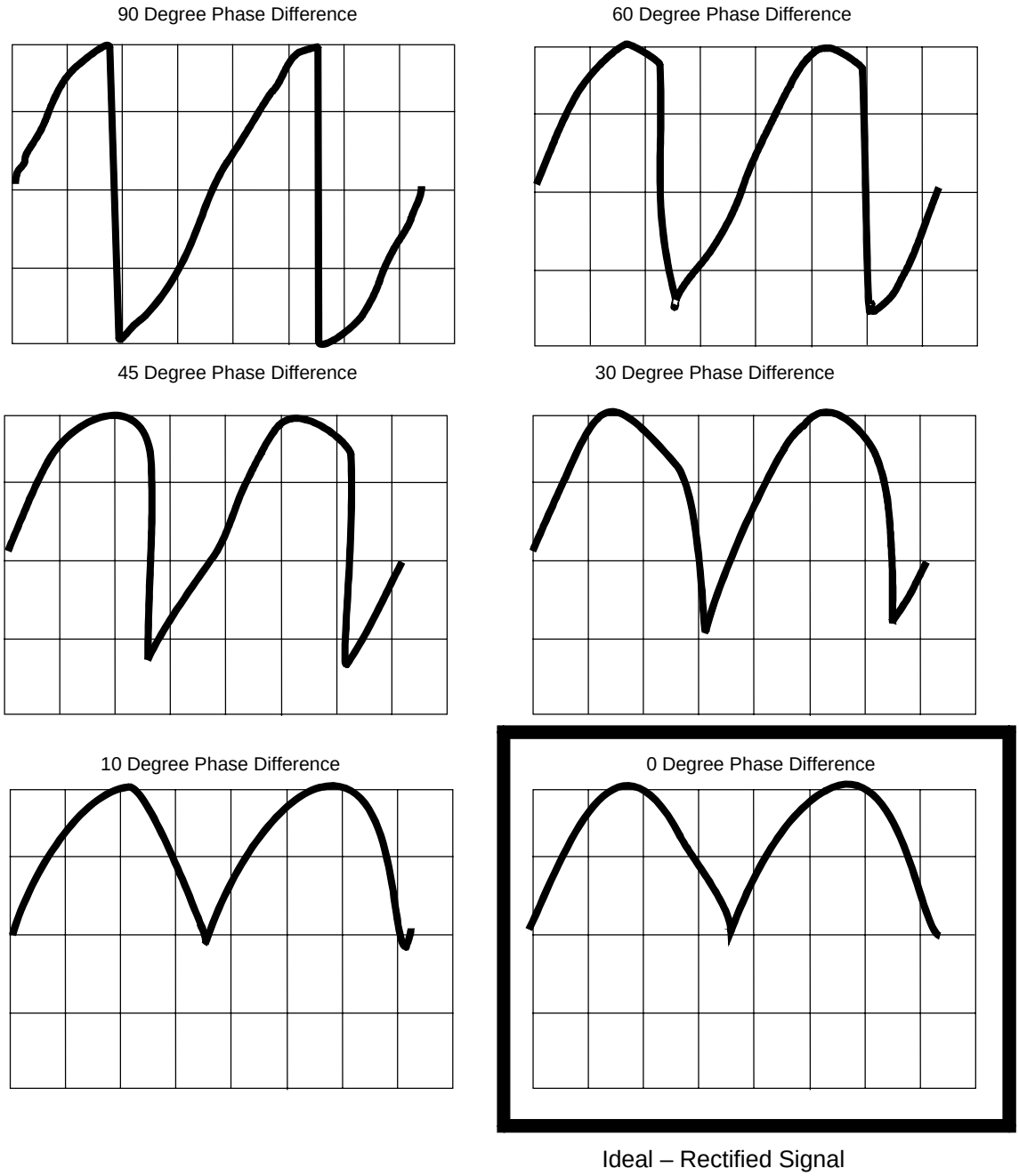
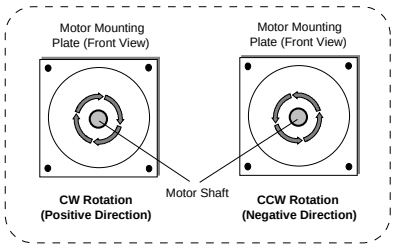


Figure 1-4. Rectified Signals with the Most Ideal Signal

1.2. U600 RDP Board Software Setup

To setup the RDP board and configure it for input from the primary or secondary feedback device, go to the Main Page on the software interface and select Setup. From there, select Axis Configuration and use the Wizard that guides the user through the procedure of configuring each axis.



To verify that the resolver or inductosyn works after properly adjusting the gain, perform the following:

1. While in the MMI 600 Manual Page, with the axis disabled, turn the motor shaft clockwise. The Position Display should count positively. Turning the motor shaft counter-clockwise should make the Position Display count negatively. Otherwise, the SIN+ and SIN- lines must be swapped.
2. After completing the first test, the next procedure determines whether the resolver or inductosyn is losing counts.

The motor must already be tuned. If not, the following test cannot be performed.

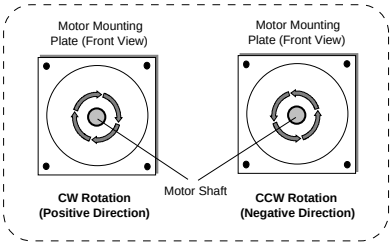
In addition, this test assumes that the X axis is being tested which can be easily modified if working with any other axis.

3. Execute the following program and verify that the axis does not mis-position. While in the Manual Page, enter the following command lines on the MDI line.

```
DRIVE.X=1          ;enable drive
G91                ;set incremental mode
:loop
G0 X10
G0 X-10
GOTO loop
```

1.3. U500 RDP Board Software Setup

The UNIDEX 500 software needs to be configured to use the RDP board for the input from the primary or secondary feedback device. Parameters from the Motor and Feedback tab will need to be updated to reflect the hardware settings of the RDP board as shown in the following steps.



1. Set "Position feedback channel" (parameter x38) to use the RDP Board.

   To use the RDP Board to incorporate a primary feedback device, set the "Position feedback channel" parameter (x38) as shown in the following table:

Table 1-10. Settings for Parameter x38 "Position Feedback Channel"

Axis	"Position channel" for RDP Board #1	"Position channel" for RDP Board #2
1	9 (default)	13
2	10 (default)	14
3	11 (default)	15
4	12 (default)	16

   If using an RDP board to incorporate a secondary feedback device, the same settings apply, but to parameter (x39) "Velocity feedback channel". Otherwise, the "Velocity feedback channel" parameter should be zero.

2. Set "Primary feedback setup code" (parameter x40) to use the RDP Board

   To use the RDP Board to incorporate a primary feedback device, set "Position setup code" parameter (x40) for the hardware resolution as configured by RCN 1 through RCN 4. Refer to the following table:

Table 1-11. Settings for Parameter x40 "Primary Feedback Setup Code"

Resolution	Counts/Revolution	"Primary feedback setup code"
16-14 bit dynamic resolution	65,536	5
16 bit	65,536	4
14 bit	16,384	3
12 bit	4096	2
10 bit	1024	1
Not used	------	0

   If using an RDP board to incorporate a secondary feedback device, the same settings apply, but to parameter (x41) "Secondary Feedback Setup Code". Otherwise, the "Secondary Feedback Setup Code" parameter should be zero.

3. Save the parameter changes and reinitialize the UNIDEX 500 to make them take effect.

4. Verify Resolver or Inductosyn Operation

   To verify that the resolver or inductosyn works after properly adjusting the gain, perform the following:

   a. From the UNIDEX 500 Diagnostics Display (Figure 1-5), with the axis disabled, turn the motor shaft clockwise. The Position Display should count positively. Turning the motor shaft counterclockwise should make the Position Display count negatively. Otherwise, the SIN+ and SIN- lines must be swapped.

   b. The UNIDEX 500 will reference to the resolver null during the home cycle. The hexadecimal representation of the absolute position from the R/D converter should read zero after the home cycle for the axis is complete (The hexadecimal number is the axis position shown inside the brackets in the figure below). Use the "home" command from the U500 MDI line to command a home cycle.

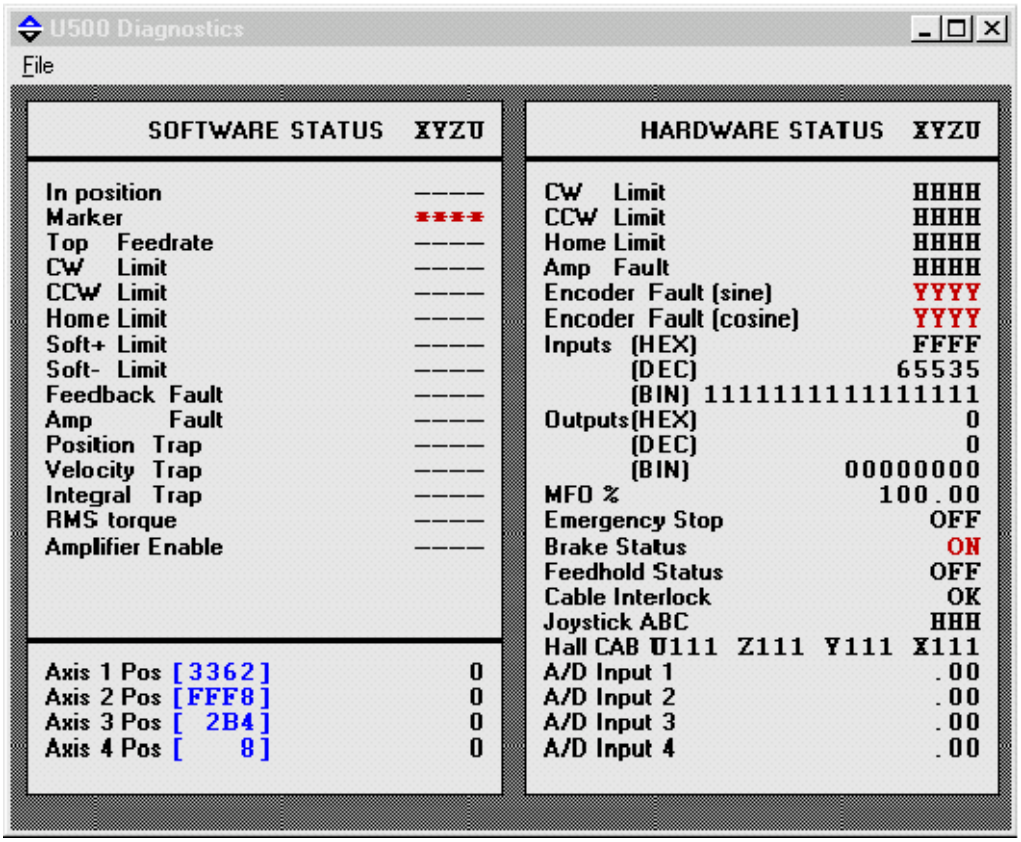


Figure 1-5. The U500 Diagnostics Popup Window

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APPENDIX A: WARRANTY AND FIELD SERVICE

In This Section:

Aerotech, Inc. warrants its products to be free from defects caused by faulty materials or poor workmanship for a minimum period of one year from date of shipment from Aerotech. Aerotech's liability is limited to replacing, repairing or issuing credit, at its option, for any products which are returned by the original purchaser during the warranty period. Aerotech makes no warranty that its products are fit for the use or purpose to which they may be put by the buyer, whether or not such use or purpose has been disclosed to Aerotech in specifications or drawings previously or subsequently provided, or whether or not Aerotech's products are specifically designed and/or manufactured for buyer's use or purpose. Aerotech's liability or any claim for loss or damage arising out of the sale, resale or use of any of its products shall in no event exceed the selling price of the unit.

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Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. Aerotech must be notified within (30) days of shipment of incorrect materials. No product may be returned, whether in warranty or out of warranty, without first obtaining approval from Aerotech. No credit will be given nor repairs made for products returned without such approval. Any returned product(s) must be accompanied by a return authorization number. The return authorization number may be obtained by calling an Aerotech service center. Products must be returned, prepaid, to an Aerotech service center (no C.O.D. or Collect Freight accepted). The status of any product returned later than (30) days after the issuance of a return authorization number will be subject to review.

Returned Product Warranty Determination

After Aerotech's examination, warranty or out-of-warranty status will be determined. If upon Aerotech's examination a warranted defect exists, then the product(s) will be repaired at no charge and shipped, prepaid, back to the buyer. If the buyer desires an air freight return, the product(s) will be shipped collect. Warranty repairs do not extend the original warranty period.

Returned Product Non-warranty Determination

After Aerotech's examination, the buyer shall be notified of the repair cost. At such time the buyer must issue a valid purchase order to cover the cost of the repair and freight, or authorize the product(s) to be shipped back as is, at the buyer's expense. Failure to obtain a purchase order number or approval within (30) days of notification will result in the product(s) being returned as is, at the buyer's expense. Repair work is warranted for (90) days from date of shipment. Replacement components are warranted for one year from date of shipment.

Rush Service

At times, the buyer may desire to expedite a repair. Regardless of warranty or out-of-warranty status, the buyer must issue a valid purchase order to cover the added rush service cost. Rush service is subject to Aerotech's approval.

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If an Aerotech product cannot be made functional by telephone assistance or by sending and having the customer install replacement parts, and cannot be returned to the Aerotech service center for repair, and if Aerotech determines the problem could be warranty-related, then the following policy applies:

Aerotech will provide an on-site field service representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs. For warranty field repairs, the customer will not be charged for the cost of labor and material. If service is rendered at times other than normal work periods, then special service rates apply.

If during the on-site repair it is determined the problem is not warranty related, then the terms and conditions stated in the following "On-Site Non-Warranty Repair" section apply.

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If any Aerotech product cannot be made functional by telephone assistance or purchased replacement parts, and cannot be returned to the Aerotech service center for repair, then the following field service policy applies:

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