Diamond Engineering

Automated Measurement Systems

DAMS Automated Antenna Measurement Systems

x100B Series

Users Manual

http://www.DiamondEng.net · 6051 Enterprise Drive, Suite 101 · Diamond Springs, CA 95619 · (530) 626-3857

Diamond Engineering

Automated Measurement Systems

Congratulations on your purchase!

Thank you for choosing Diamond Engineering's Desktop Antenna Measurement System! We're excited to welcome you to a new level of antenna testing and development. When paired with our powerful and intuitive software, this system unlocks a wide range of measurement capabilities, all fully customizable to suit your project needs. From rich 3D radiation plots to saving, recalling, and exporting data, every feature is designed to help you explore, innovate, and push your designs further. Advanced tools like our 'Group Delay' analysis deliver precise distance calculations, reveal multi-path reflections, and streamline your workflow by reducing the need for extra test equipment.

This manual walks you step-by-step through assembly, configuration, and practical use so you can get the most from your new system. A working knowledge of microwave and antenna design principles will help you unlock its full potential, but we've designed the software and workflow to be as smooth and user-friendly as possible. If you don't see a feature you need, feel free to email us at support@DiamondEng.net - we take customer suggestions seriously, and if a capability is truly missing, we may be able to add it.

Before you get started, please take a moment to read this guide thoroughly. Having a solid understanding of the setup and operating procedures ensures safe operation, protects your equipment, and preserves your warranty so you can enjoy everything your new measurement system has to offer.

Best regards,

Diamond Engineering, Inc.

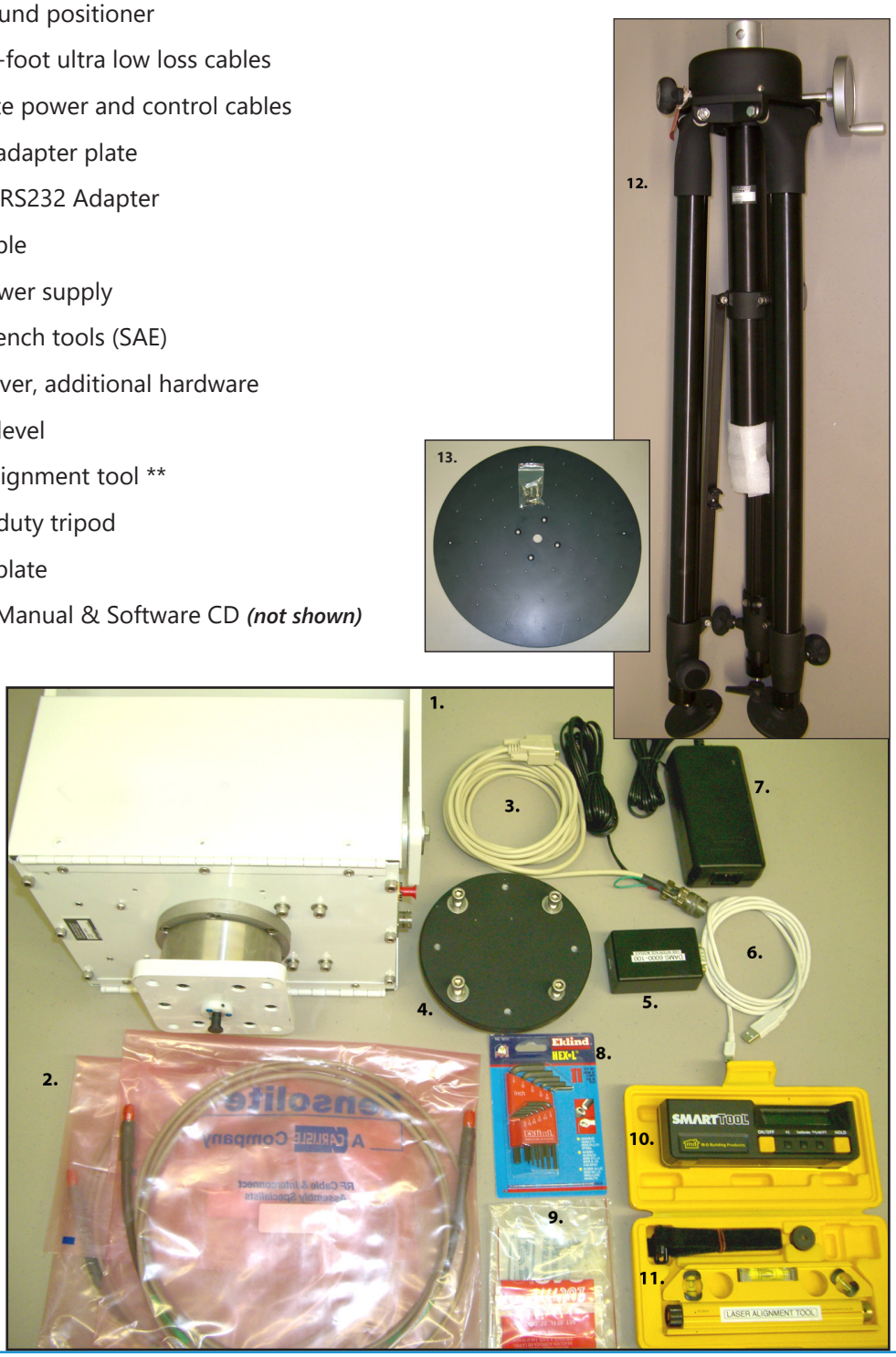
The Diamond Engineering Team

Package Contents

Main Components

Upon receiving your shipment of the DAMS x100 series, please verify you've received all items below while checking for any damages that may have occurred during the shipment process. Please contact us immediately if you note any missing items or discover damaged components.

1. 100-pound positioner
2. Two 10-foot ultra low loss cables
3. Separate power and control cables
4. Tripod adapter plate
5. USB to RS232 Adapter
6. USB cable
7. 24V power supply
8. Hex wrench tools (SAE)
9. SMA saver, additional hardware
10. Digital level
11. Laser alignment tool **
12. Heavy-duty tripod
13. Thrust plate
14. DAMS Manual & Software CD ***(not shown)***



Tripod & Positioner Assembly

Assembly Steps

CAUTION: Damaging any SMA connectors during assembly may result in faulty readings.

BEFORE YOU BEGIN: Unpack all items and ensure there are no damaged or missing parts.

1. Lay the positioner on its side and attach the Tripod Adapter Plate to the bottom using the four Hex-Cap Screws and included hex wrenches. Use the blue marks for proper orientation. ***(Fig. 1)***

2. Unfold and stand up the tripod, then loosen the height lock and crank the height up to ~2 inches. ***(Fig. 2)***

3. Place the positioner on the tripod by holding it upright and sliding the shaft on the adapter plate into the hole in the top of the tripod neck. Rotate the assembly until you can fit the red-handled hex wrench into the set screw located inside of the hole. Tighten the set screw and the positioner now should be securely mounted onto the tripod. ***(Fig. 3)***

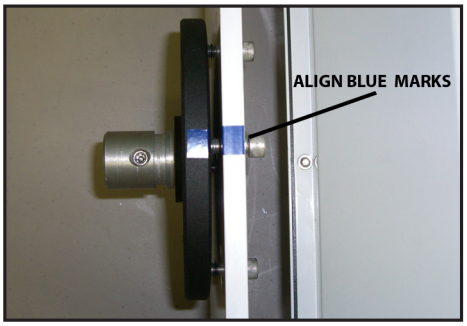


Fig. 1

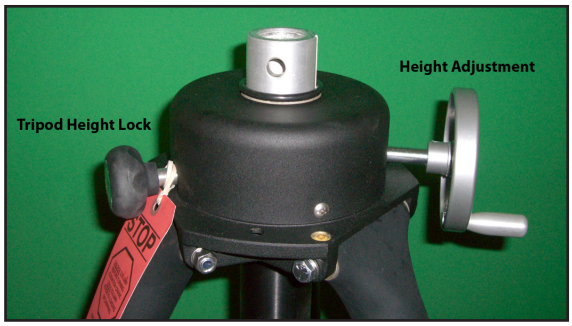


Fig. 2

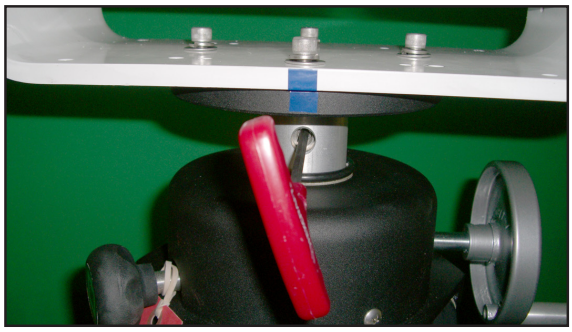


Fig. 3

Attaching the Cables

Cable Connections

1. Attach the control/power cables to the side of the positioner. ***(Fig. 1)***
2. Connect USB cable to white cable (from control cable) to USB interface; DO NOT connect to PC yet. ***(Fig. 2)***
3. Connect power supply to power cable ***(Fig. 3)***
4. Connect precision RF cable to positioner. Tighten but do not over-torque. ***(Fig. 4)***
5. Connect other side of RF cable to ports 1 or 2 of test equipment. ***(Not shown)***

Fig. 1

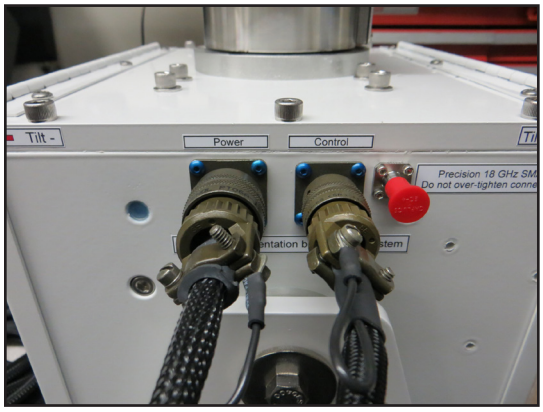


Fig. 2

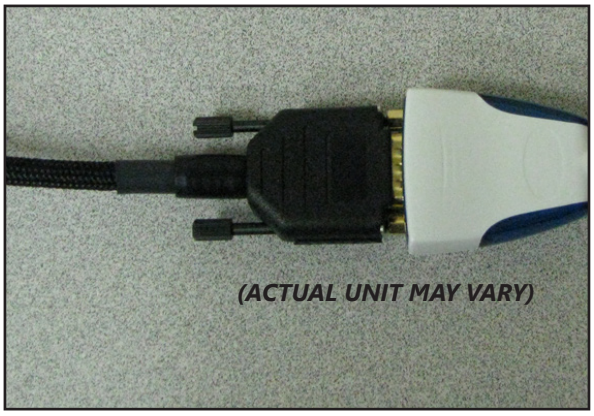
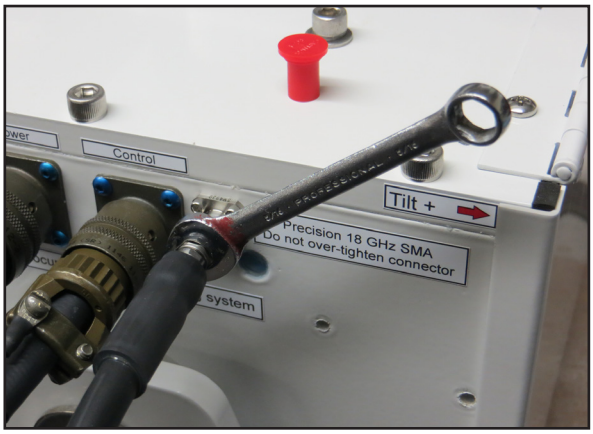


Fig. 3

Fig. 4



Using the DAMS x100 Positioner

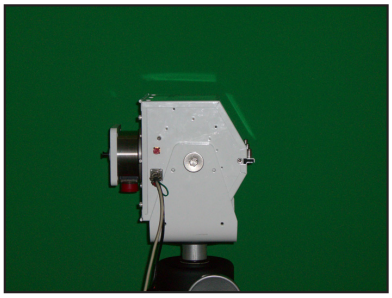
Encoder Zeroing Procedure

NOTE: This section is related to the DAMS 6100B positioner ONLY. The 6100 positioner follows the same procedures as the original 5000B, 6000B, or 7000B positioners with exception to a few key items.

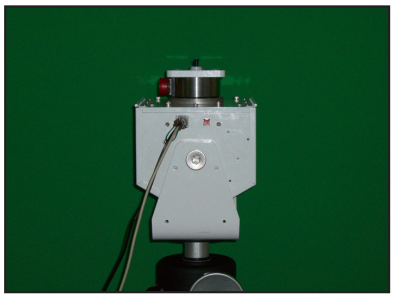
The positioner is tracked using internal, absolute encoders at zero degrees so the positioner will always be in the same position.

Before making any measurements, ensure the positioner is at 0 degrees azimuth and 0 degrees elevation by using the Reset ALL Init Pos button in the software. Attach your antenna to the positioner, ensuring it is properly oriented to the fixed reference antenna. The pictures below show the orientation of the positioner for the given position settings. When making a scan measurement (horizontal and vertical) the positioner will move from 0 to 360 degrees for the first cut. The positioner will then tilt and scan back from 360 degrees to 0 degrees. It will continue this pattern of motion until the measurement is complete.

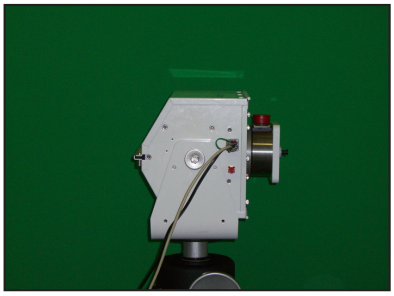
POSITIONER EXAMPLE: ELEVATION / TILT



-90 degrees elevation

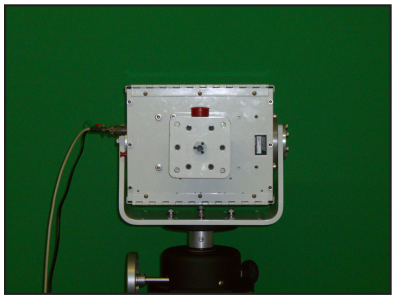


0 degrees elevation

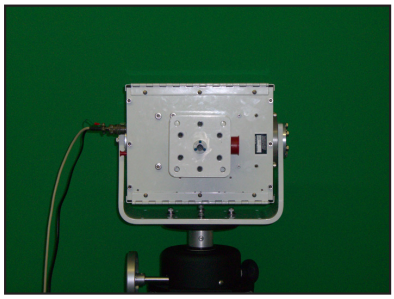


+90 degrees elevation

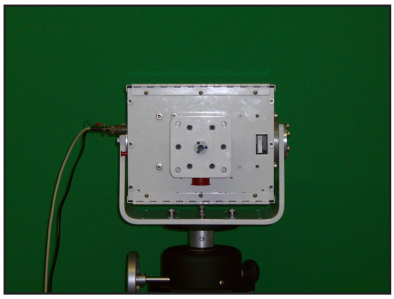
POSITIONER EXAMPLE: AZIMUTH / PAN



+90 degrees elevation
0 / 360 degrees azimuth



+90 degrees elevation
90 degrees azimuth



+90 degrees elevation
180 degrees azimuth

Unit Calibration & Positioner Verification

Verifying Positioner Connectivity and Operation

These steps will assist you with verifying the x100 Series positioner's operation with the DAMS software. All previous steps for installing and configuring the software and connecting cables should be completed before performing the following steps.

1. Ensure all cables are connected and power supply is plugged in.

2. Start the DAMS Software.

3. **Elevation / Vertical Movement Test**
   Select -90 from "El jog to" pull-down - positioner should tilt 90 degrees towards reference antenna. Select +90 from "El jog to" pull-down. Positioner should tilt all the way to +90 degrees. ***(See image below)***

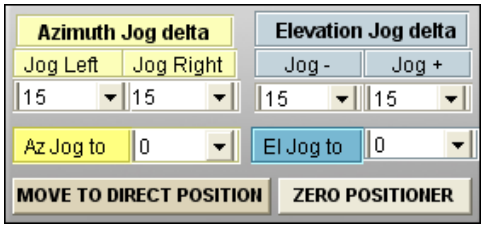
4. **Azimuth / Horizontal Movement Test**
   Select 180 from "Az jog to" pull-down. Positioner should rotate 180 degrees of reference antenna. Select 360 from "Az jog to" pull-down. Positioner should finish the rotation to 360 degrees. ***(See image below)***

5. Resetting to 0, 0 Degrees Click 

which clears all position settings, and moves the positioner to 0 degrees azimuth and degrees elevation.

Testing and Calibration Complete

Proceed to the Antenna Measurement Studio Installation chapter to complete the installation and begin making measurements.



Software Installation & Configuration

Software Installation

IMPORTANT: Administrator privileges are required to install software.

1. Insert USB Drive into PC, Launch Setup.exe from flash drive

2. Click Next/OK through all setup screens.

3. Agilent Runtime and I/O libraries Setup may also launch. If so, install as well.

4. To verify installation is complete click ***Start Menu*** → ***Programs*** and ensure the folders below are present. If so, you may launch Antenna Measurement Studio.

   - Agilent Vee Pro Runtime 8.0
   - Agilent I/O Libraries
   - DAMS

NOTE: If any folders are missing, an installation error occurred - manually install components by following instructions below.

Manually Installing Runtime / IO Libraries

Antenna Measurement Studio is dependent on the application below. It is normally installed during setup, but can fail in certain situations. In this event, run this setup file individually:

Agilent I/O Libraries — ***Start Menu → Run c:\DAMS\runtime\iolib\Setup.exe*** (or launch from CD menu)

Entering Your License Key

1. In main screen of DAMS software, at the top of the screen, press "system options" and "License Information", NOT Simulator License

2. Enter the license key located on the Flash Drive Baggie or from the front or back of the users manual itself. Press "Verify and Save".

3. Notification key has been verified should appear. Next, click "QUIT" and restart the software to update the license.

License Problems?

E-mail us at Support@DiamondEng.net or call (530) 626-3857. We're open Monday to Friday, 9:00 A.M. to 5:00 P.M. (PST).

USB Driver Installation & Configuration

Installing the USB Driver

IMPORTANT: If you ordered a pre-configured PC, you do NOT need to perform any of these steps unless you are re-installing the system.

Antenna Measurement Studio should be installed before performing the steps below.

1. Connect DAMS Platform Controller to PC using included USB cable. Notification indicating a new device has been found should appear. Allow windows to check for a driver automatically. If no internet connectivity or Windows cannot find driver, still proceed with steps 2-5.

2. Check the box labelled "***Search Manually***" and click "***Next***".

3. Select CD-ROM, click "***Next***"

4. Notification may appear that driver has not passed the WHQL certification. Click "***Continue Anyway***". Click Finish.

5. New notification indicating another device has been found should appear. Allow Windows to search for a driver if it was successful the first time. If not, repeat steps 2-5 above.

6. Open up Control Panel ***(Start→ Settings → Control Panel)***, and open System. (If using category view, you must click "***Performance and Maintenance***" before you can open System). Open the Hardware tab and click on "Device Manager"

7. Click the "+" sign next to "***Ports COM&LPT***", and the controller will listed as "USB Serial Port". Make note of the port number it shows.

Configuring DAMS Software for x100 Series Positioners

1. In Antenna Measurement Studio, click "Positioner Settings".

2. Select the x100 series from the "Interface" pull down menu.

3. Select the COM port that you previously noted from the "Port" pull down menu.

4. Under the x100 pull down menu, select your model.

5. Set "Gear Ratio" to 10 for both azimuth and elevation

6. Change "Motor Res." to 2.5 for 5100 Systems, or 1 for 6100 and 7100 and all x100b models.

7. Press the "SAVE" and "QUIT" buttons to save settings and quit.

Positioner Troubleshooting

Possible Problems & Solutions

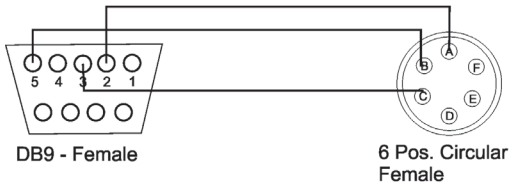
The DAMS x100 Series Positioner is a very robust and stable positioner. In the event that you believe you may have a problem with your positioner. Please check the items below. If you do not see your problem listed below or you are not able to get your problem resolved, please contact us and we will be happy to assist you with your problems.

Problem: *Software message is displayed that the positioner has reached its limit.*
Possible Cause: *The Horizontal or Vertical tracking may be out of sync in the software?*
Solution: *Restart software and press* Reset ALL Init Pos *button to reset all settings.*

Problem: *When instructed to move, the positioner does nothing.*
Possible Cause: *Power is not connected? Wrong port selection? Software glitch?*
Solution: *Check all cables, reboot PC, disconnect and reconnect positioner power.*

CONTROL CABLE PINOUT

X100 FUNCTION	DB9-F	6 pin Circular
	PIN	PIN
	1	
TX	2	A
RX	3	C
	4	
GROUND	5	B
	6	
	7	
	8	

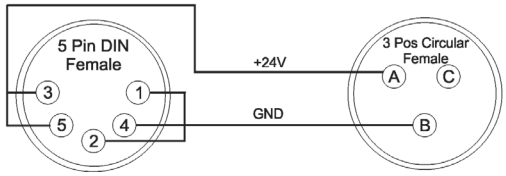


DB9 - Female

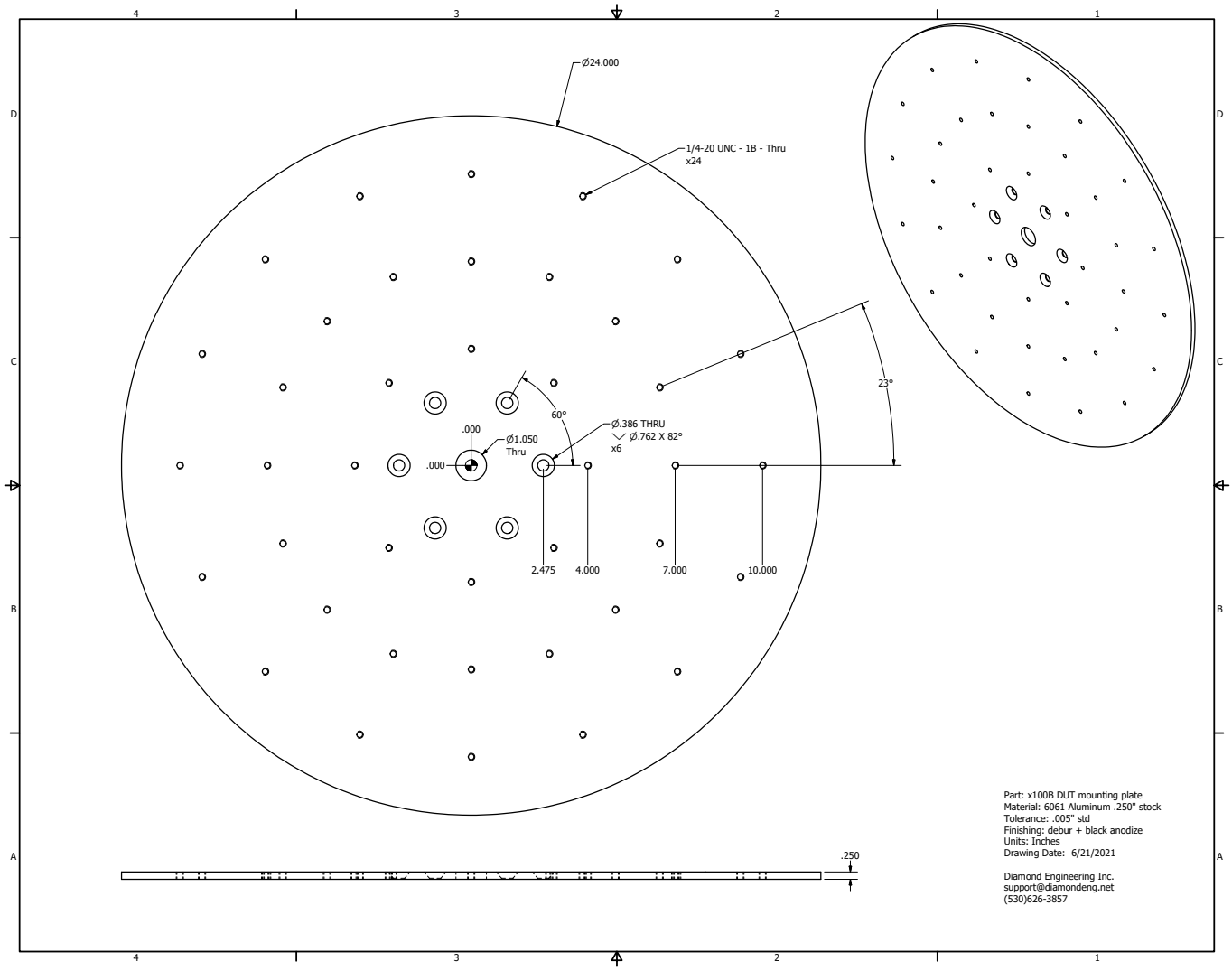
6 Pos. Circular Female

POWER CABLE PINOUT

DESCRIPTION	5pos DIN Female	3 Pos. Circular- F
	PIN	PIN
+24V	3	A
+24V	5	A
GND	1	B
GND	2	B
GND	4	B



x100B Plate and Hub Drawings



X100B Hub Drawing