Cirrus SR2X: Installing an NGT9000R in Place of a Panel Mount Transponder and a Skywatch 497

IMPORTANT — READ BEFORE PROCEEDING

This document is a guideline and has not been approved by any regulatory authority. It is intended as a planning aid to help installers navigate the full installation documentation — it does not replace, supersede, or substitute for any approved installation manual, service bulletin, or regulatory requirement.

All installation work must be performed in accordance with the approved installation manuals for the referenced products. References to those sections are included against the Installation Manual Revisions listed in the Manuals Section. In any case of conflict or ambiguity between this guide and an approved document, the approved document governs.

This guide does not capture all requirements, limitations, or safety-critical steps. Installers are reminded that responsibility for airworthiness rests with the certificated individual or repair station performing the installation.

This guide outlines the steps to install an NGT9000R (NGT) remote transponder in a Cirrus SR20 or SR22 G1, G2, or G3 aircraft equipped with an IFD540/550 (IFD5XX). Check the Avidyne website to ensure you have the latest Revision of this document.

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1. Introduction

The NGT combines a remote transponder, active traffic system, ADS-B traffic, and FIS-B weather in a single box. It is connected to and controlled by an IFD5XX. Replacing a panel-mounted transponder and an aging Skywatch 497 system with a NGT improves overall system reliability and trims approximately 8 pounds from the aircraft's weight. The NGT utilizes the same antenna and cables that were connected to the SKYWATCH 497. It is recommended that you install a new blade-style transponder antenna to optimize performance.

2. Parts and Documents Needed

Here is the list of products, manuals, and documents needed to complete and log the installation. Note that the hyperlinks require you to be logged into the Avidyne Dealer portal to view them.

Products:
850-00229-006 NGT-9000R Remote Mount w/Straight RF Kit
500-00268-000 TAS NGT App (active traffic license key)
200-00292-402 TNC Jack, Straight Plug (qty 2)
200-00292-403 BNC Jack, Straight Plug
850-00146-000 Vantage Readiness Kit (if no Vantage yet))
Comant CI105-16 Blade Transponder Antenna
Click Bond CN62-832-10CR mounting standoffs (qty 4)

Manuals:
600-00299-000 IFD5XX Installation Manual
SB2X-23-05R1 Rear Transponder Antenna Installation Instructions

Config Files:
NGT9000R Default Configuration

The following manuals and software are available on the Acron Aviation dealer portal. You can register for access here Register - Technical Publications and then find documents and software here Aviation Technical Publications. For Acron Tech support call (602) 334-3507 PST.

Acron Manuals:
0040-17001-01 NGT-9000 Installation Manual
0040-17000-01 NGT-9000 Pilot's Guide

Acron Documents:
SA02444AK Lynx NGT-9000 AML STC for Fixed Wing Aircraft

Acron Software:
8010-17002-0401 MPC tool and drivers for the NGT-9000 units
9020010-012 Lynx 9000 SW Release 4.1

2. Mount the NGT Box

Remove the Skywatch controller/wiring harness and replace it with the NGT box (Figure 1). On aircarft without A/C, this is typically in front of the wing spar under the co-pilot's seat. If the aircraft has A/C, it is typically in the same spot under the pilot's seat. Four Click Bond CN62-832-10CR mounting standoffs can be used to securely mount the frame without interfering with the access panel. The aluminum brackets from the 497 should be left in place as they hold up the nut plates for the front cover screws.

Figure 1: NGT tray mounted in place of a Skywatch 497

3. Install new Transponder Antenna

While you can utilize the existing whip transponder antenna, it is recommended that you add a new transponder antenna to use with the NGT. Many owners report transponder noise on certain model Bose headsets with the factory transponder antenna. In addition, the ground plane around the factory antenna is not symmetrical, which reduces performance.

A good antenna choice is the Comant CI105-16. It has extra-long studs which can accommodate wide variations in fiberglass thickness (Figure 2).

Figure 2: Comant CI105-16 Transponder Antenna

G3 Installation

On a G3, there is an existing spot in the cavity behind the baggage bulkhead to mount it (Figure 3). This can be accessed through the large inspection panel on the rear right side of the fuselage. A copper ground plane needs to be added (Figure 4). A video showing how to do this installation in a G3 can be found here: https://www.youtube.com/watch?v=CAyNLxPMFKI&list=PLyf5rhC3I1IK-RbCSyrD2PmybiOjW1iTG&index=4&t=2s

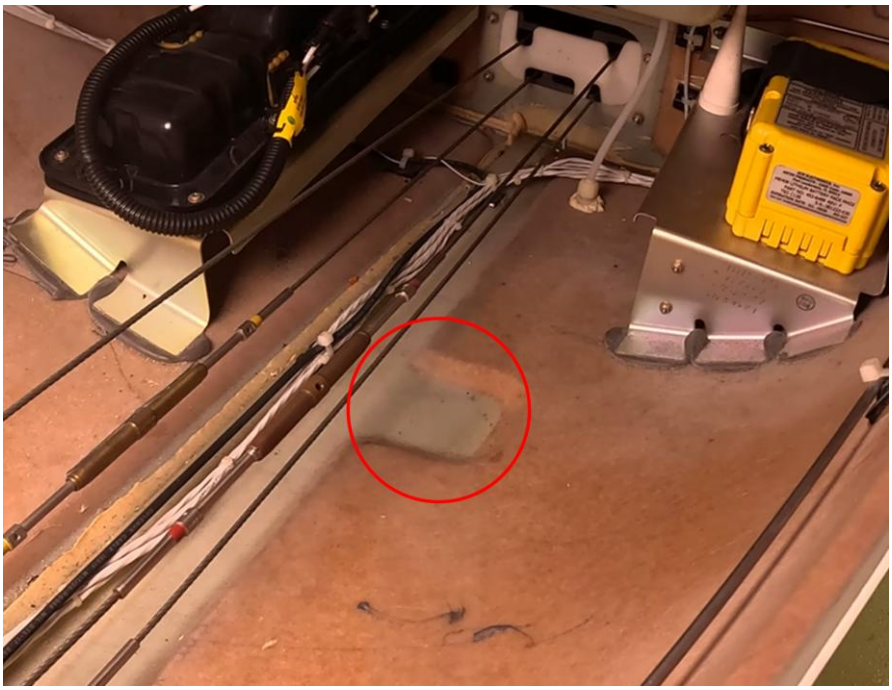

Figure 3: G3 Antenna Location

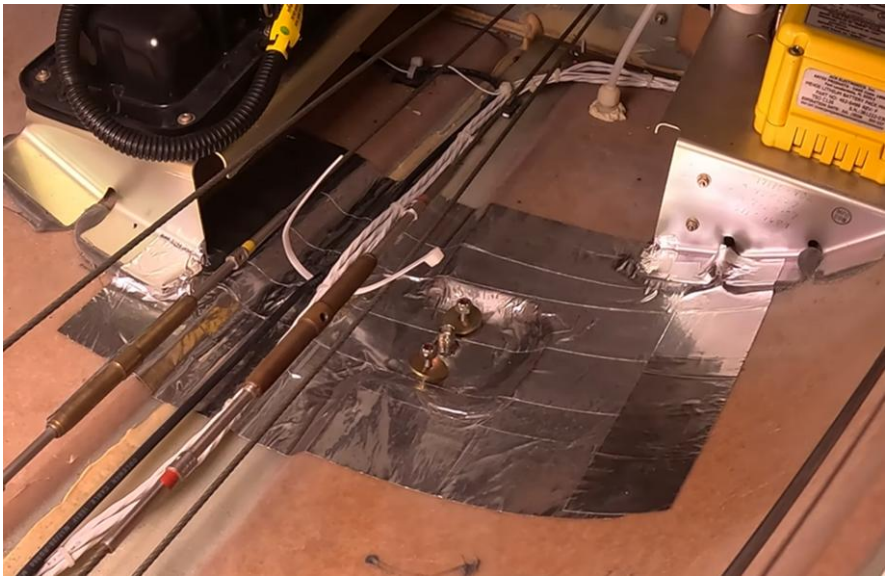

Figure 4: G3 Antenna Ground Plane

G1/G2 Installation

On a G1/G2, there is no pre-molded antenna spot as in the G3, nor is there a side inspection panel to easily access the space behind the baggage bulkhead. There are two Cirrus service bulletins that discuss this issue. Cirrus SB2X-34-19, which is no longer available on the Cirrus Tech Pubs site, describes installing a DME antenna behind the baggage bulkhead (Figure 5). This is a bit challenging on a G1, as there is no side access panel like on a G3. Another option is Cirrus SB2X-23-05R1, which specifies a location in the center inspection space under the rear seat for a transponder antenna installation (Figure 6). No fiberglass work is needed in either case – just the addition of the holes for the antenna and a copper ground plane.

Some dealers have sporadically reported interference with Bose Headsets when selecting the under-rear seat location with an active traffic transmitting device like the NGT with TAS enablement.

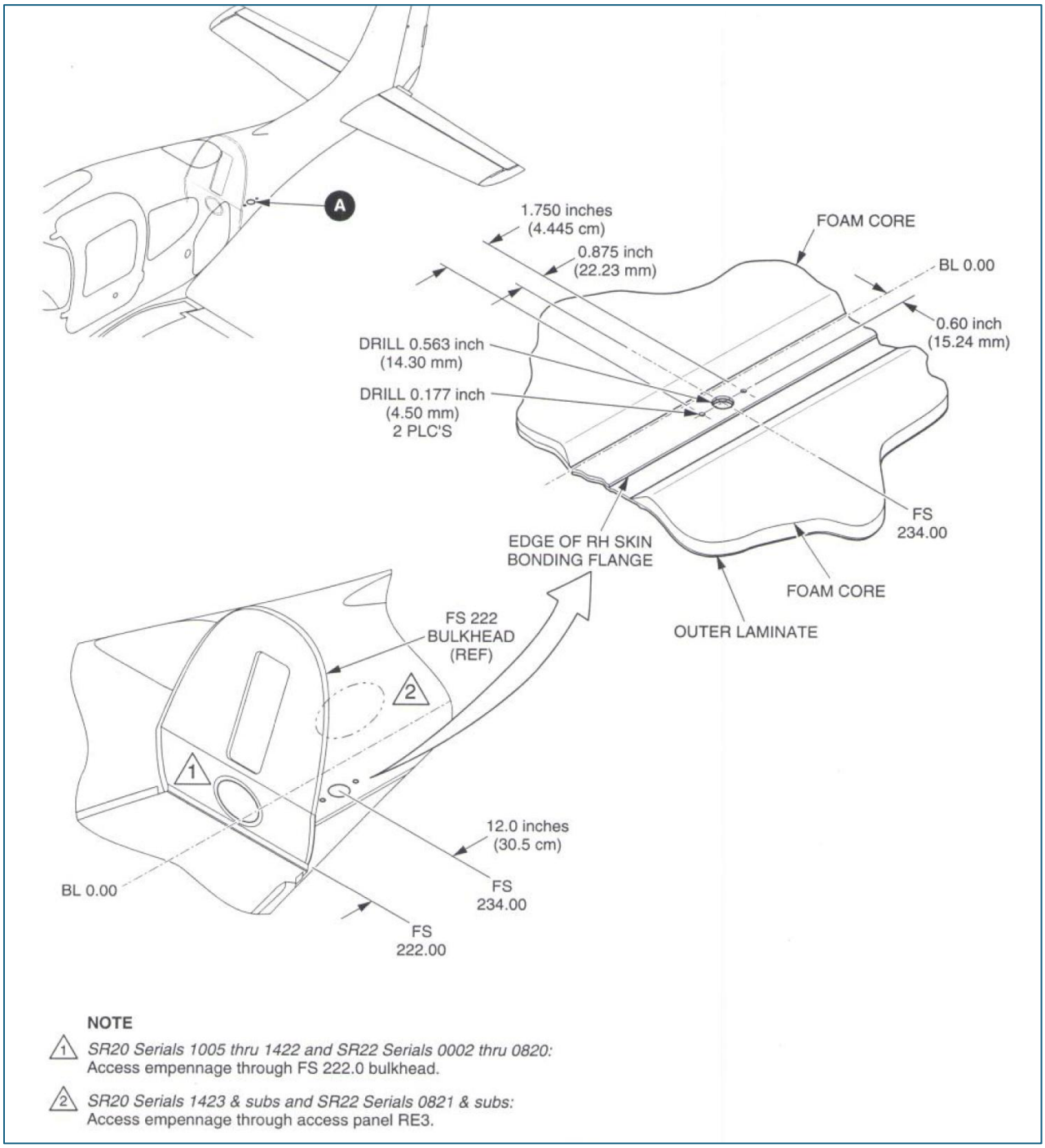

Figure 5: Cirrus SB2X-34-19

Figure 6: G1 Antenna Installed with Ground Plane

4. Wiring

Antennas

The NGT utilizes the same diversity antenna/cables that were connected to the Skywatch 497. They are color coded. One is BNC, the other two TNC (Figure 7). You do not need to install a GPS antenna, as the NGT will get GPS information from the IFD5XX over the ARINC 429 Ch 1 connection.

Note: The antenna connections are NOT in numerical order. The transponder antenna goes to A3 (Figure 7).

A 60-inch BNC right angle to TNC RG400 cable will reach the NGT from the new transponder antenna on a G1/G2. On a G3, you will need to measure for the transponder antenna, as the length depends on your wire routing. Maximum allowed cable loss is 1.5 dB (NGT IM section 2.3.3). NGT IM section 2.3.11.2.1 lists guidelines about routing the transponder cable.

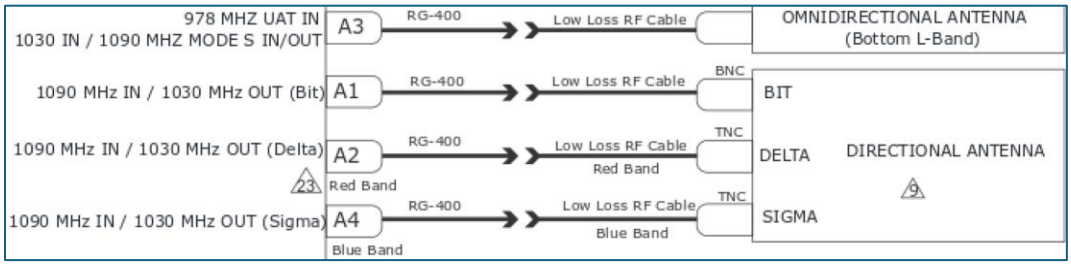

Figure 7: NGT Antenna Connections

Harness:

Next, create the wiring harness from the NGT to the IFD5XX. Remove the center rack of instruments. You will need access to the back of the IFD5XX and in the area behind the center rack for the new NGT harness. It is easiest to route the harness from the NGT box to the space above the center instrument rack.

You can remove the entire Skywatch 497 wiring harness, as it will be replaced by the new harness you will create for the NGT. This will make room for routing the new harness through the center console and behind the center instrument rack.

Fabricate a 72-inch harness starting at the NGT for the data lines, WOW, audio, and power wires (Figure 8). Attach the wires to the NGT backplane connector (high density DB female). The pin color coding in Figure 8 is for shielded wire sets.

Route the harness through the center console and up behind the now removed center instrument rack. Install the NGT configuration module (Figure 9).

Connect the NGT ARINC 429 In 2 wires (magnetic heading data source) to the PFD Fail Safe relay socket (on the lower right rail behind the PFD) terminals 5 and 6 (or any other convenient source of the PFD ARINC 429 output) (Figure 10). If Vantage has been installed, the socket will be empty. This will provide the NGT9000R with the ability to determine the direction the aircraft is facing when it is not moving on the ground so it can provide accurate traffic alerts while not in motion.

The NGT Audio Mute and IFD5XX Annunciate D and E wires are included for compatibility with a future traffic audio mute function.

Harness			Vantage	Console		
Function	Pin	Connector	DB25	Connector	Pin	Function
RS232 TX 1	62	NGT J1/P1	5	IFD540 P1001	59	RS232 In 2
RS232 RX 1	61	NGT J1/P1	6	IFD540 P1001	58	RS232 Out 2
ARINC 429 In 1A	40	NGT J1/P1	7	IFD540 P1001	46	ARINC 429 Out 1
ARINC 429 In 1B	41	NGT J1/P1	8	IFD540 P1001	47	ARINC 429 Out +
RS422 A-	53	NGT J1/P1	9	IFD540 P1001	57	RS232 In 1
Audio Out +	38	NGT J1/P1	10	AMX240 J1	44	Unswitched #2 hi
Audio Out -	39	NGT J1/P1	11	AMX240 J1	43	Unswitched #2 lo
Audio Mute	28	NGT J1/P1	12	N/A		Mute Traffic
WOW Input	29	NGT J1/P1	13	IFD540 P1001	8	WOW Output
		N/A	18	IFD540 P1001	10	Annunciate D
		N/A	19	IFD540 P1001	11	Annunciate E
28v	1 & 2	NGT J1/P1	21	From Xponder		Power
pass thru		Shield	22	Shield		pass thru
ARINC 429 In 2A	42	NGT J1/P1	<--->	PFD FS RELAY	5	ARINC 429 0A TX
ARINC 429 In 2B	43	NGT J1/P1	<--->	PFD FS RELAY	6	ARINC 429 0B TX

Figure 8: NGT Wiring Connections

The NGT9000R sources barometric altitude from the IFD 540, which in turn already sources it from the Vantage PFD, so a blind ADC is not required.

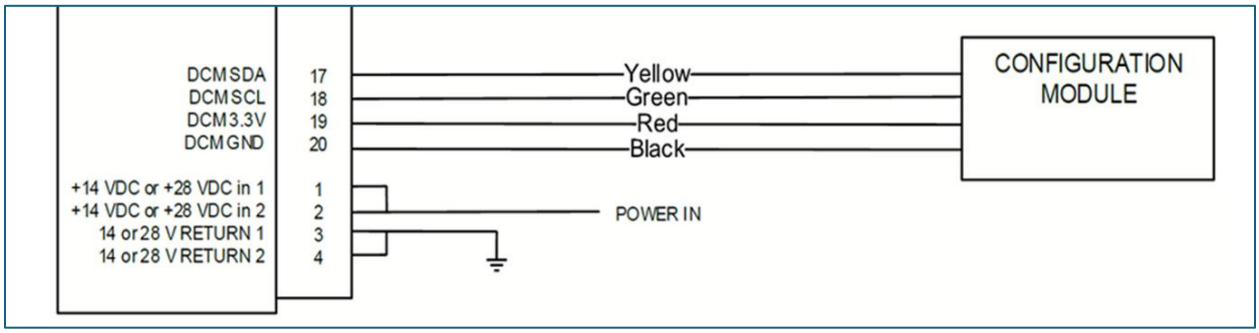

Figure 9: NGT Configuration Module

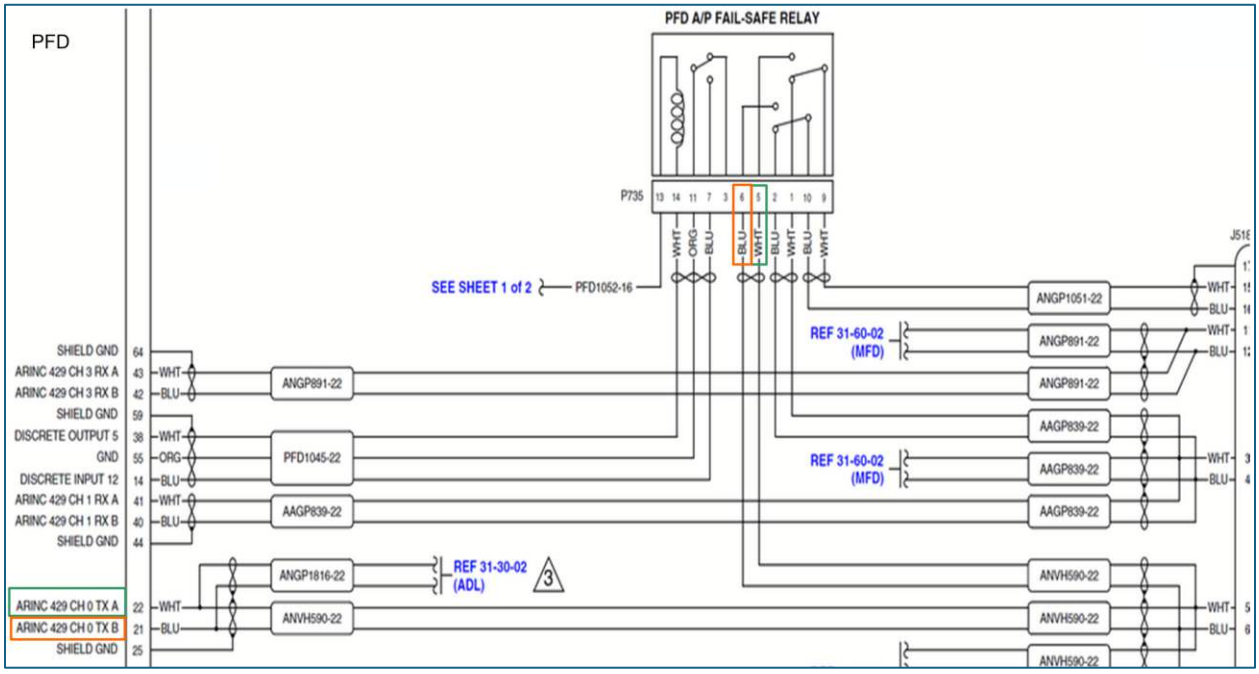

Figure 10: NGT ARINC 429 2 Connection to PFD429 Data

Vantage Already Installed

With the exception of some early Vantage installations, there should be a DB25 connector on the ethernet lines that go from the IFDs to the Vantage displays (Figure).

Figure 11: Vantage IFD Connector

Connect the remaining wires on the NGT harness to the DB25 connector on the Vantage side of the harness using the pinouts shown in the center column of Figure 8.

If the aircraft has Vantage, but the Vantage harness does not have a DB25 connector on the wires going to the IFDs, connect the remaining NGT harness wires to a new DB25 connector using the pinout shown in the center column of Figure 8.

Pre-Vantage

If the aircraft does not have Vantage, Avidyne sells a kit (850-00146-000) that includes an ethernet harness that goes from the IFDs to a DB25 connector. By installing this now you will save a full day off the installation time for Vantage, as you won't have to remove the instrument center stack again.

Connect the remaining NGT harness wires to the Vantage Readiness harness using a new DB25 connector that will connect to the Vantage Readiness harness using the pinout shown in the center column of Figure 8.

Power and Ground

There should be a ground connection left behind from the Skywatch 497 that can be used to ground the NGT pins 3 and 4 and its rack. Power for the NGT pins 1 and 2 is most easily accessed from the power wire in the center console from the now-removed panel mounted transponder (Figure 7). This allows you to utilize the existing transponder electrical breaker without breaker panel wiring changes.

Once the harness is installed, assemble the NGT backplane and connect the other end of the harness to the Vantage Readiness DB25 connector. Then install the NGT box.

IFD 5XX Connection

Connect the IFD5XX to the other end of the DB25 connector using the wiring diagram (Figure 7).

Stormscope (WX-500), if present, should be wired to the lower IFD440.

When complete, join the two DB25 connector ends together.

Cooling

Both IFDs need direct cooling to operate correctly. A 3 port avionics fan feeding the cooling ports on the IFD backplanes through 5/8" SCAT tubing (Spruce Part# 05-29901-5) and connected with 0.59-0.67 plastic hose clamps (Spruce Part# 05-02705) is an ideal solution. Note that, while it has a small vent port, the DFC90 does not require external cooling.

5. IFD5XX Configuration

The IFD5XX Main RS232 Config settings for CHNL 1 Input (Capstone HS Trfc + Wx) and CHNL 2 Input/Output (NGT9000R) are shown in 2. If your IFD 5XX or 440 was connected to a prior panel mount transponder, make sure and turn off any port connections that were removed with it.

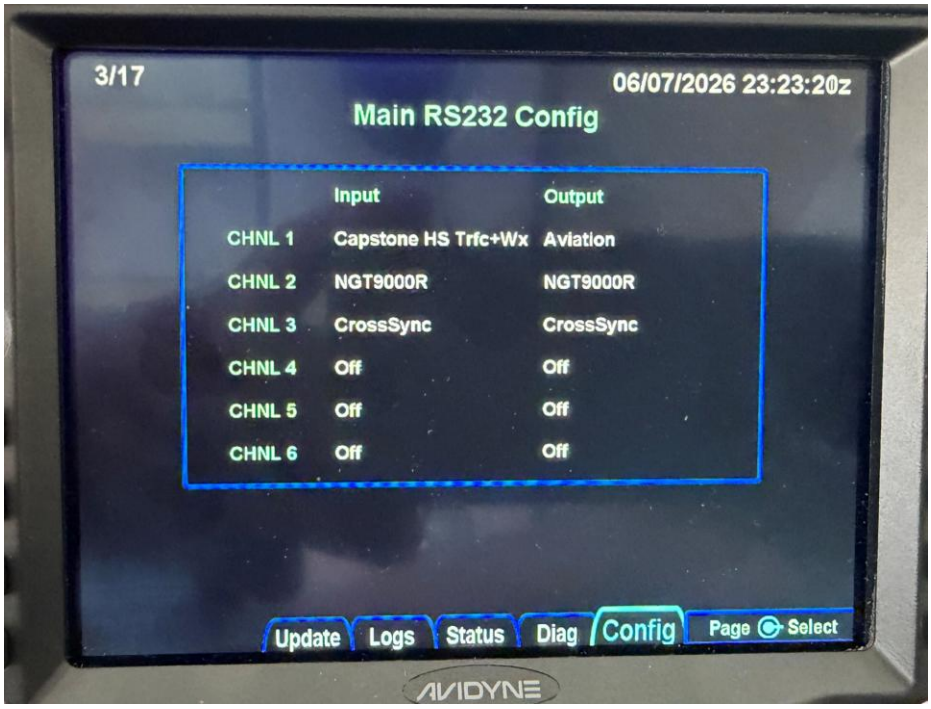

Figure 2: IFD 5XX RS232 Configuration for NGT

Stormscope (WX-500), traffic, and weather inputs should only be configured on one IFD. Turn the input off on the other IFD if both have it on. Ideally have the Stormscope (WX-500) on the other IFD from the one receiving the Capstone traffic and weather information. The IFDs and the Vantage displays will share the traffic and weather information over the crosslink connection and the ethernet bus.

Next set the Main ARINC 429 Config for Out 1 (Low Speed ARINC 743A+) as shown in Figure 13. This will provide GPS and Pressure Altitude data to the NGT (assuming the IFD5XX is connected to either an Entegra or Vantage PFD).

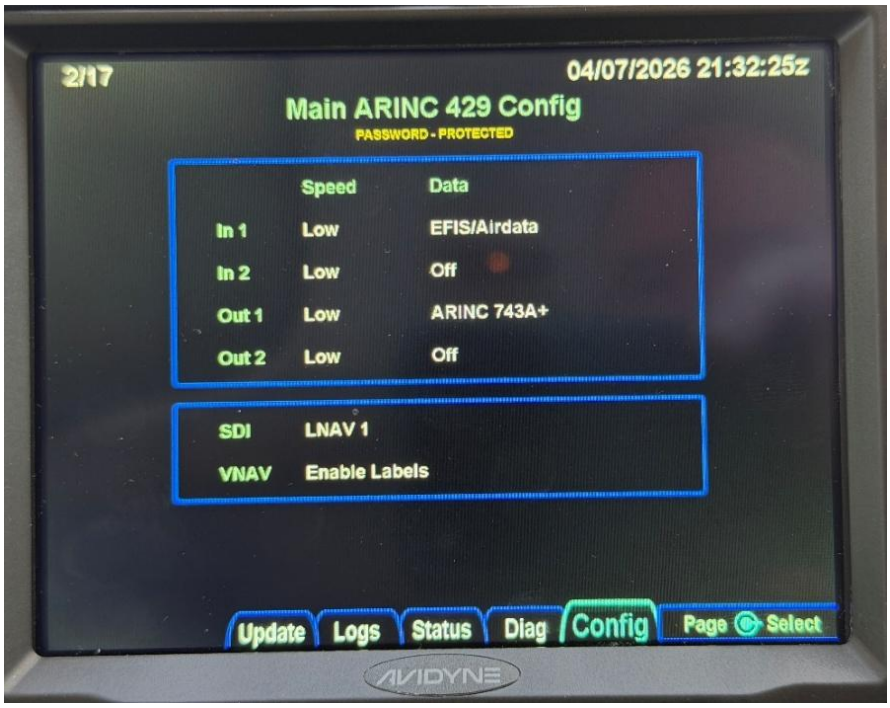

Figure 13: IFD 5XX ARINC 429 Configuration for NGT

6. NGT Configuration

To connect to the NGT, you will need a USB Mini Cable (Figure 14).

Figure14: USB Mini Connector

You will need a Windows laptop. Download both the MPC tool and drivers and SW Release 4.1 listed at the beginning of this document from the Acron Aviation dealer website onto the laptop (Figure). Also download the default configuration file from the Avidyne Dealer Portal. It is pre-configured for a Cirrus installation. All you will need to do is enter the tail number and Mode S code.

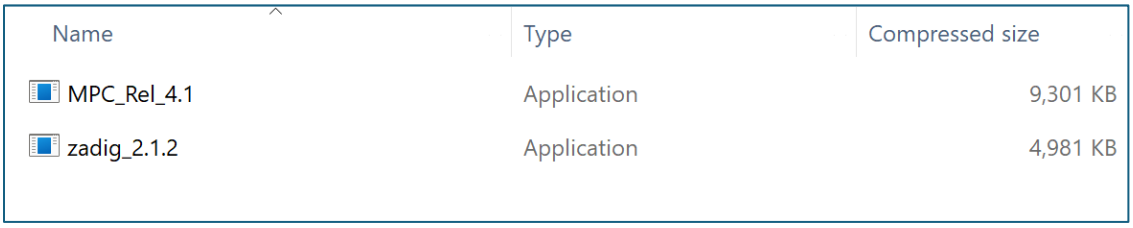

Figure 15: NGT Driver and Software Applications

Note: The NGT MUST be POWERED ON prior to connecting it to the Laptop.

Once the NGT is powered on and connected to the laptop with the USB Mini cable, run the zadig_2.1.2 app to install the drivers (Figure 16: NGT Zadig Driver Installation.

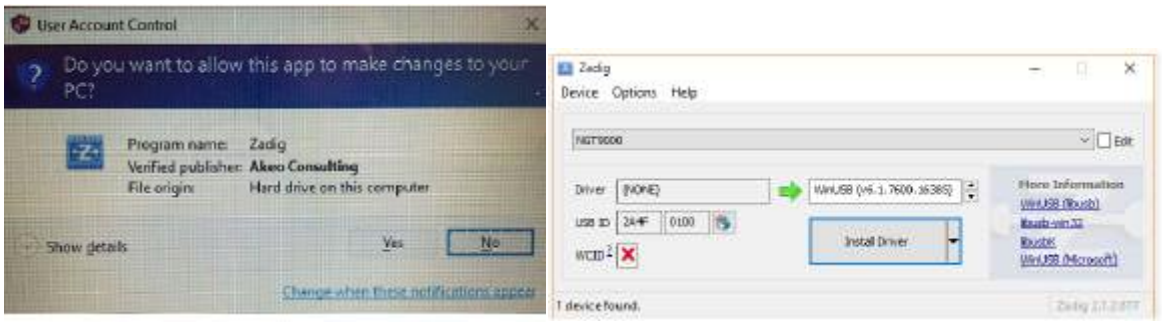

Figure 16: NGT Zadig Driver Installation

Once driver installation is completed, exit the Zadig tool and run the MPC_Rel_4.1 application.

Select the Connect/NGT9000/USB option (7). An image of the panel mounted NGT will appear but the Product note at the top will say NGT9000R.

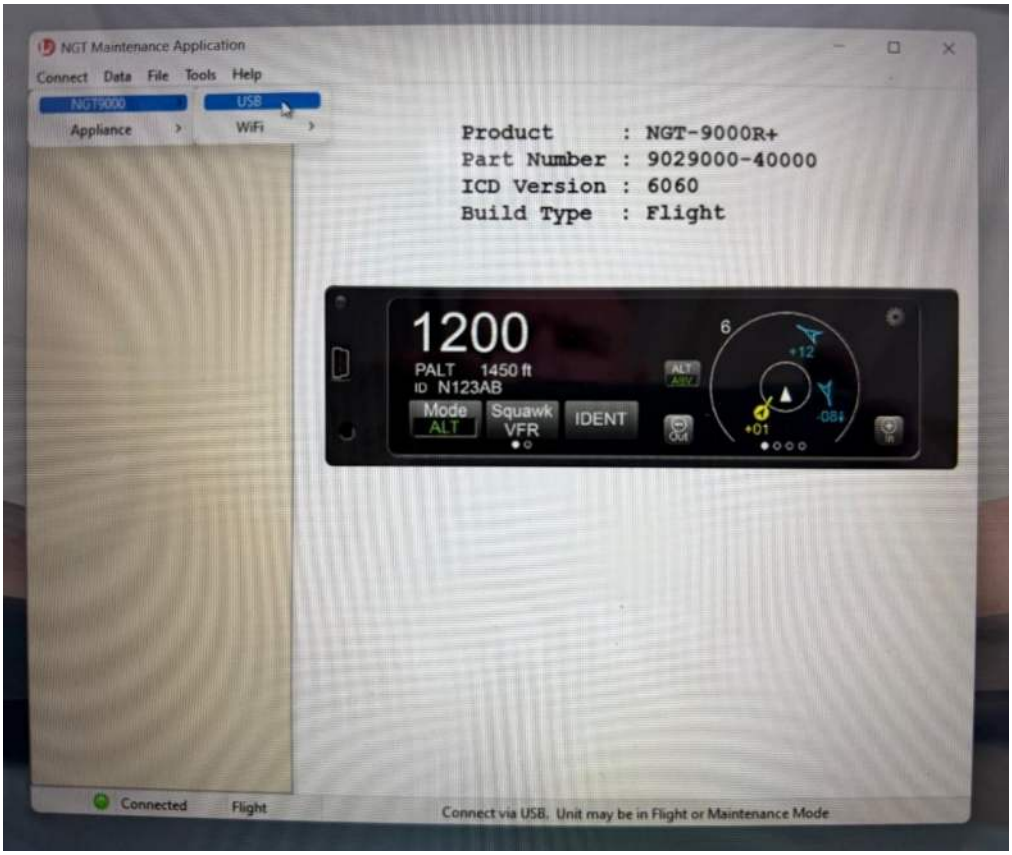

Figure17: NGT Initial Screen once Connected

Select Restart Unit and Maintenance (No WiFi) (Figure 18). Press Restart Unit at the bottom of the screen to reboot into configuration mode.

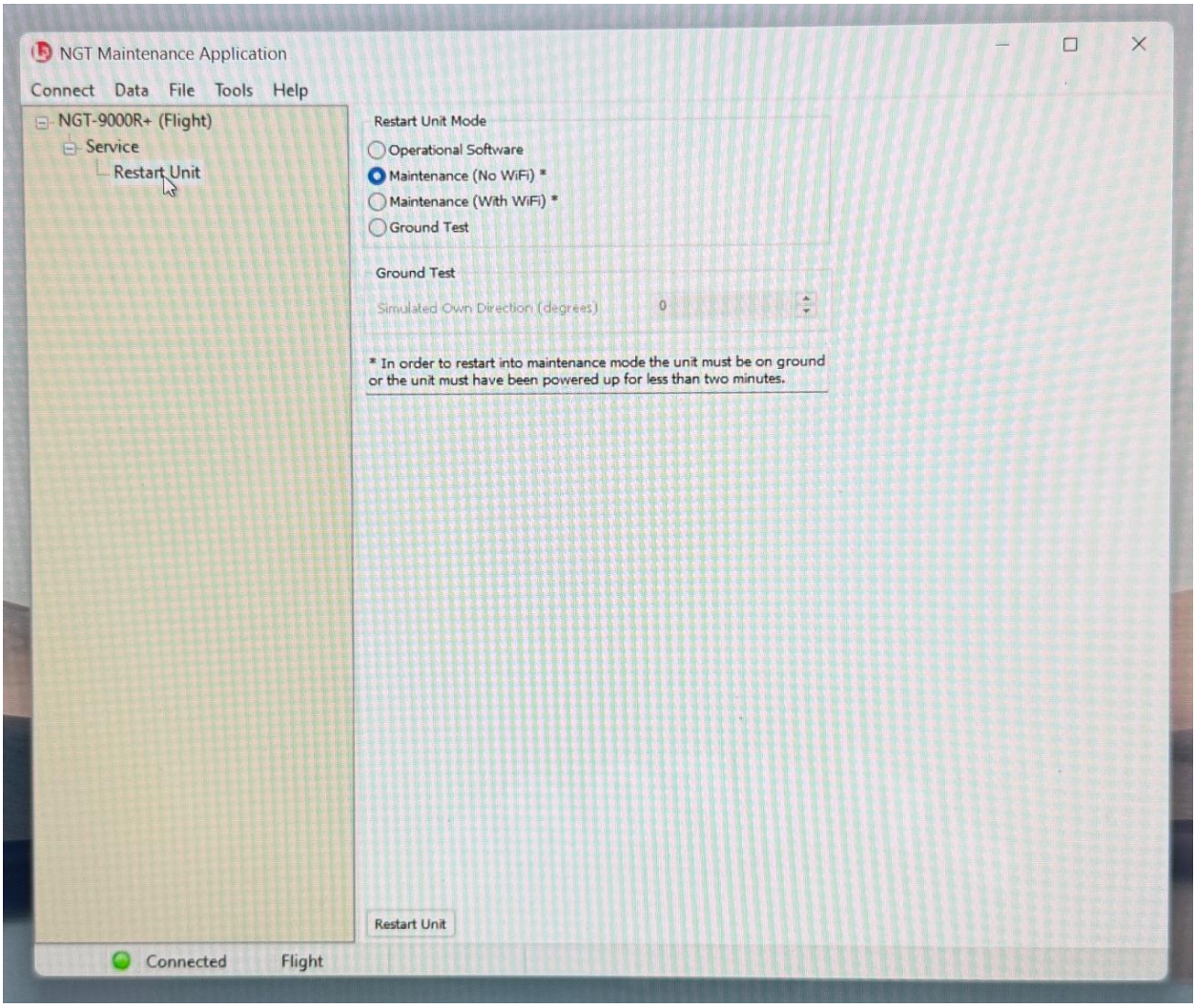

Figure 18: NGT Reboot into Maintenance Mode

Once you are in Maintenance mode, select the Restore option (Figure 28) and load the NGT9000R configuration file from the Avidyne Dealer Portal. Go to the Aircraft Specific 1 settings page (Figure 23). Enter the tail number and Mode S octal value at the top of the page. If you purchased the TAS option, change the Active Traffic setting to TAS and enter the license code you received via email from Acron.

When you have confirmed these changes, press Apply at the bottom of the screen. Everything else should already be properly configured if you followed the wiring instructions in Figure 8. This is a good time to Backup your settings.

Go to the Restart Unit page, select Operational Software, and press Restart Unit (Figure).

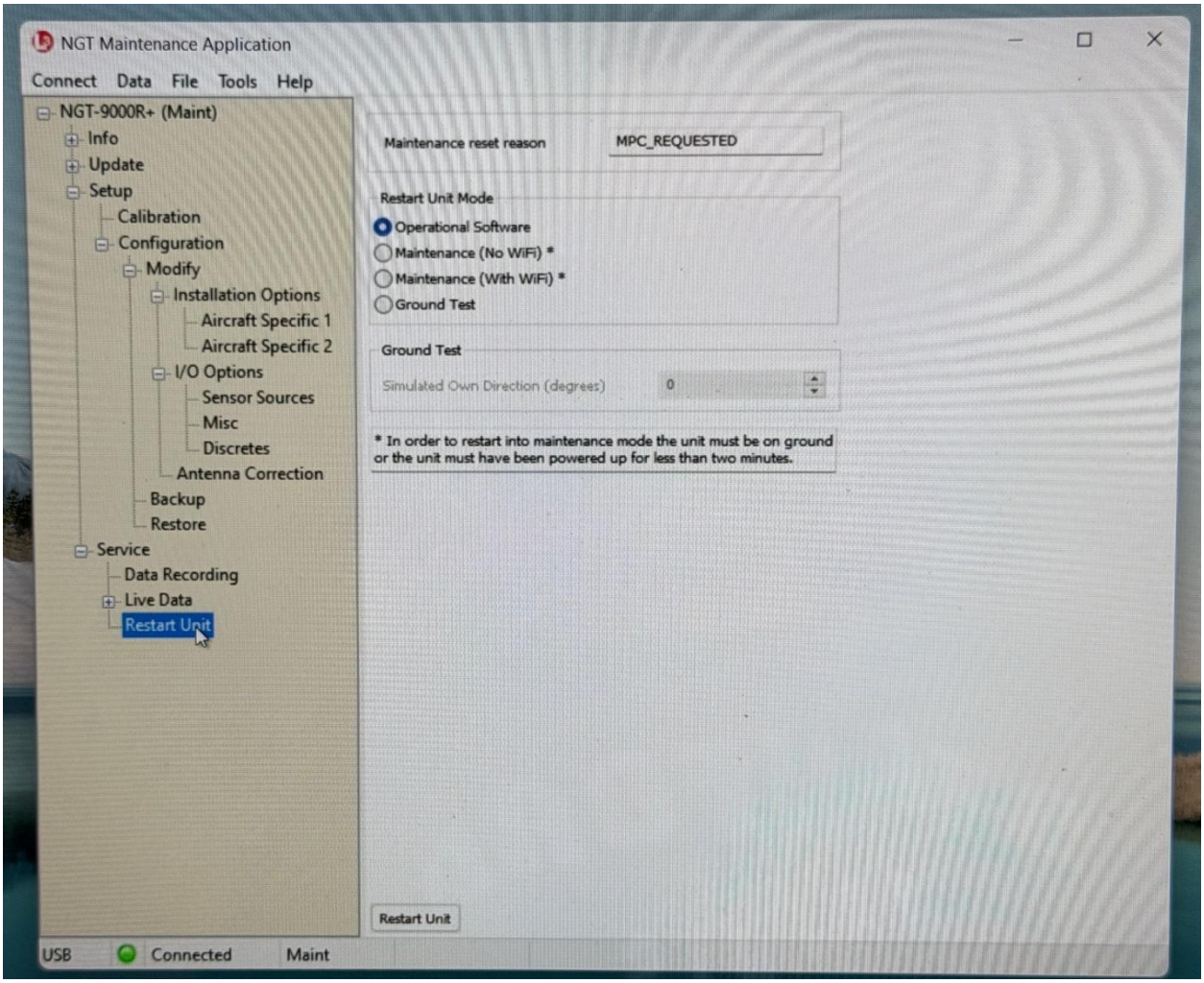

Figure 19: NGT Restart from Maintenance to Operational Mode

In the appendix of this document (Section 9) are images of the other settings pages in case any of them get accidentally changed.

7. Add the Transponder data block to the IFD5XX

You need to add a transponder data block to the IFD5XX display. This data block lets you set the squawk code and transponder mode. Putting it on the LEFT side is preferred so that it is always visible (Figure). See pages 1-33 and 5-40 of the IFD5XX Pilots Guide for instructions on how to set up the data blocks. You can only add it on the left if it is not selected in any other data blocks.

Figure 20A: IFD5XX Transponder Control Block

Note: The IFD5XX transponder data block will show a red X if the NGT is not getting TRUE GPS and pressure altitude values (Figure B).

Figure 20B: IFD5XX Not Getting Data from NGT

8. Testing and Troubleshooting

The full suite of ADS-B In, Out, Transponder and TAS testing should be performed via a ramp tester. Note that the MPC tool has a Ground Test Mode which artificially places ownership In Air with a user set heading to allow simulation of airborne ADS-B Out messages and Traffic checks (NGT IM Section 3.12.2.1).

The NGT requires a GPS WAAS signal to start outputting data to the IFD5XX. If you are in a hangar with inadequate GPS signal, the IFD5XX will show a red X and a transponder error message. The IFD must have a valid GPS WAAS signal to send to the NGT. Note that the red X might come and go over a few minutes, but the reason is the same: no reliable signals to the NGT.

To determine whether the NGT is getting pressure altitude and magnetic heading information, restart the NGT in maintenance mode and select Service/Live Data/Discrete Inputs (Figure). Pressure Altitude and Magnetic should be TRUE.

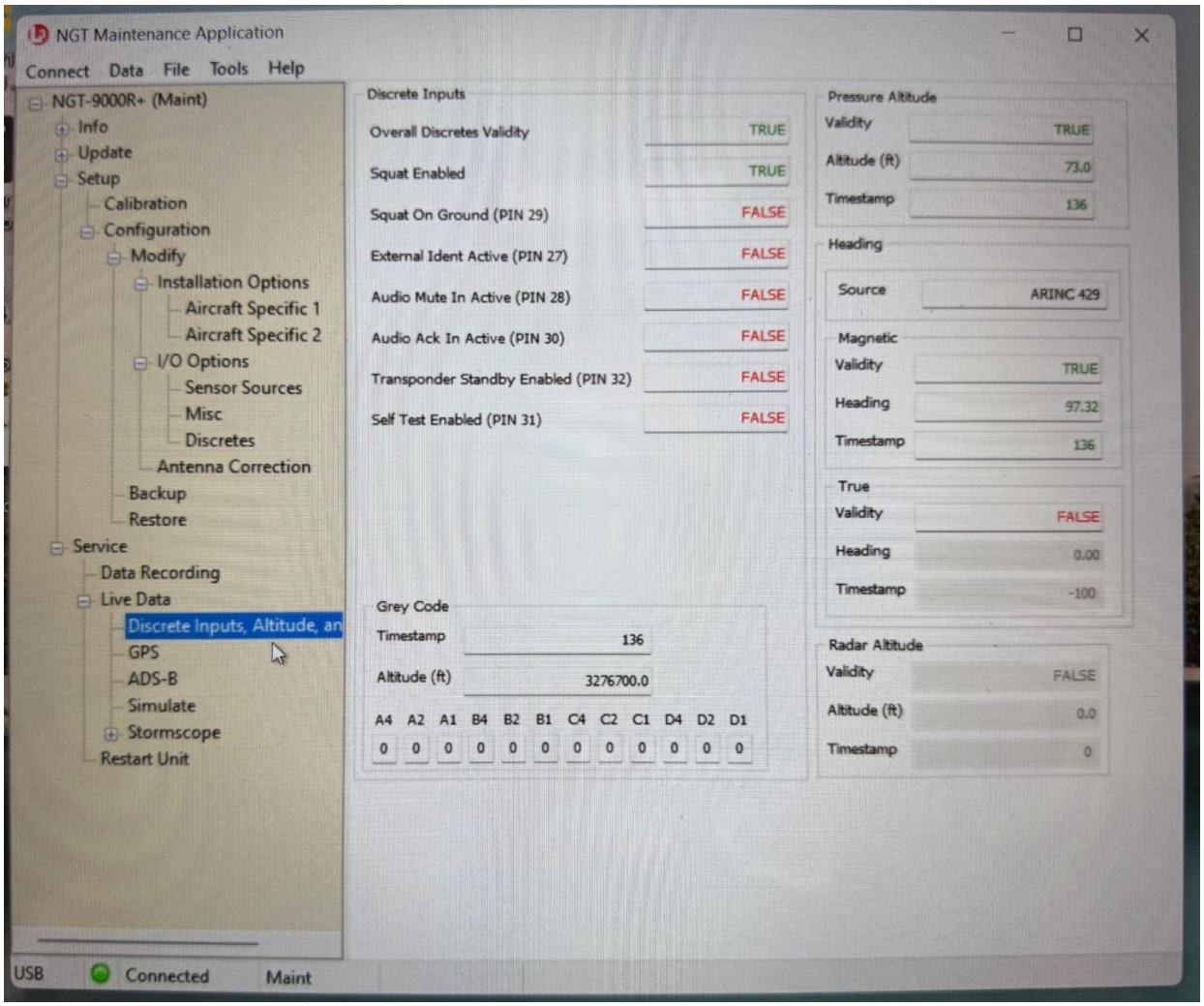

Figure 21: NGT Diagnostic Press Alt and Heading Data

Next select GPS (Figure). Overall GPS Validity should be TRUE. Figure was taken in a hangar without a GPS signal, thus the FALSE validity.

When you have finished checking the signal sources, Restart the NGT in Operational Software mode.

Take it out of the hangar to check operation.

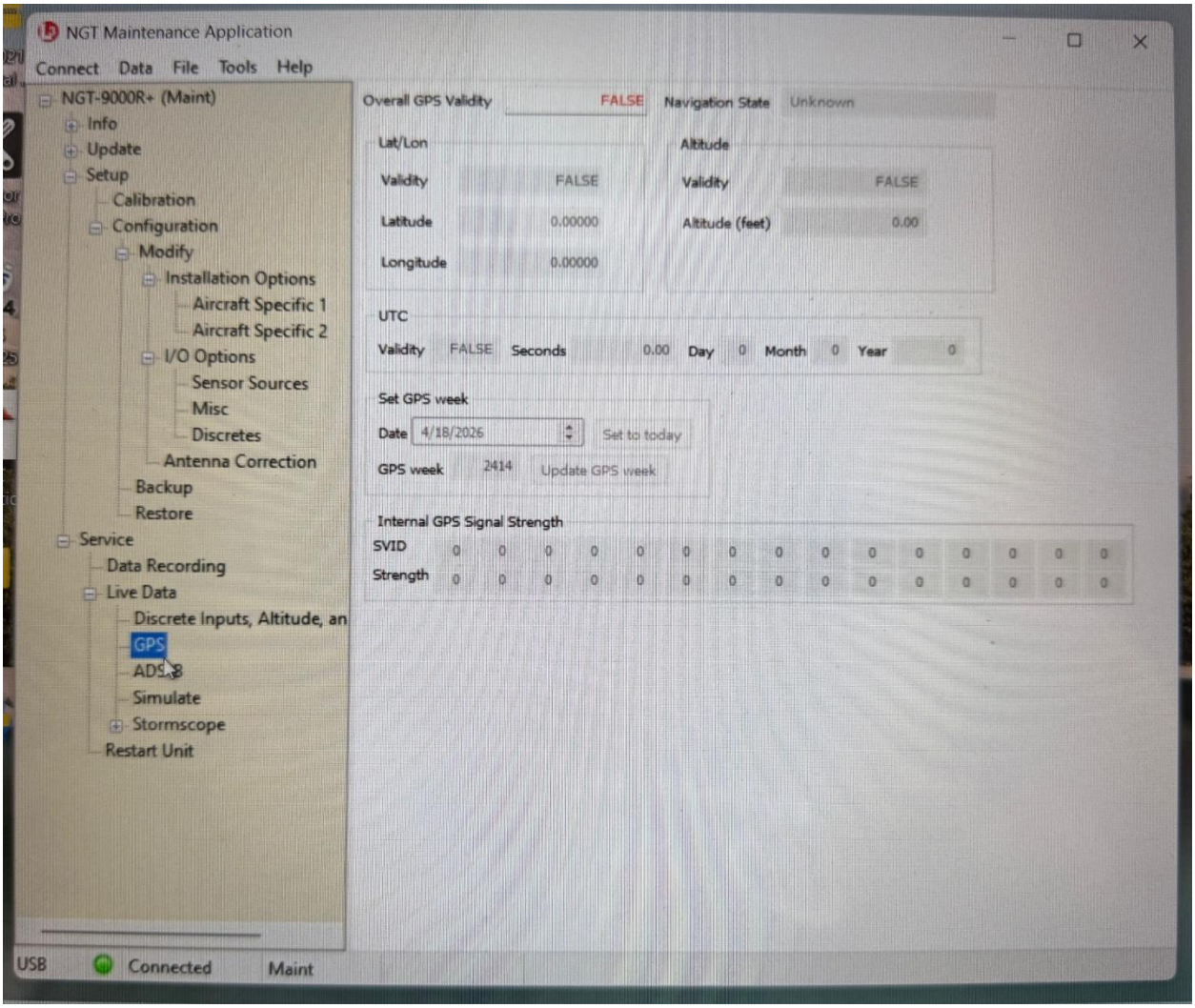

Figure 22: NGT Diagnostic GPS Validity

9. Appendix: NGT Reference Configuration Pages

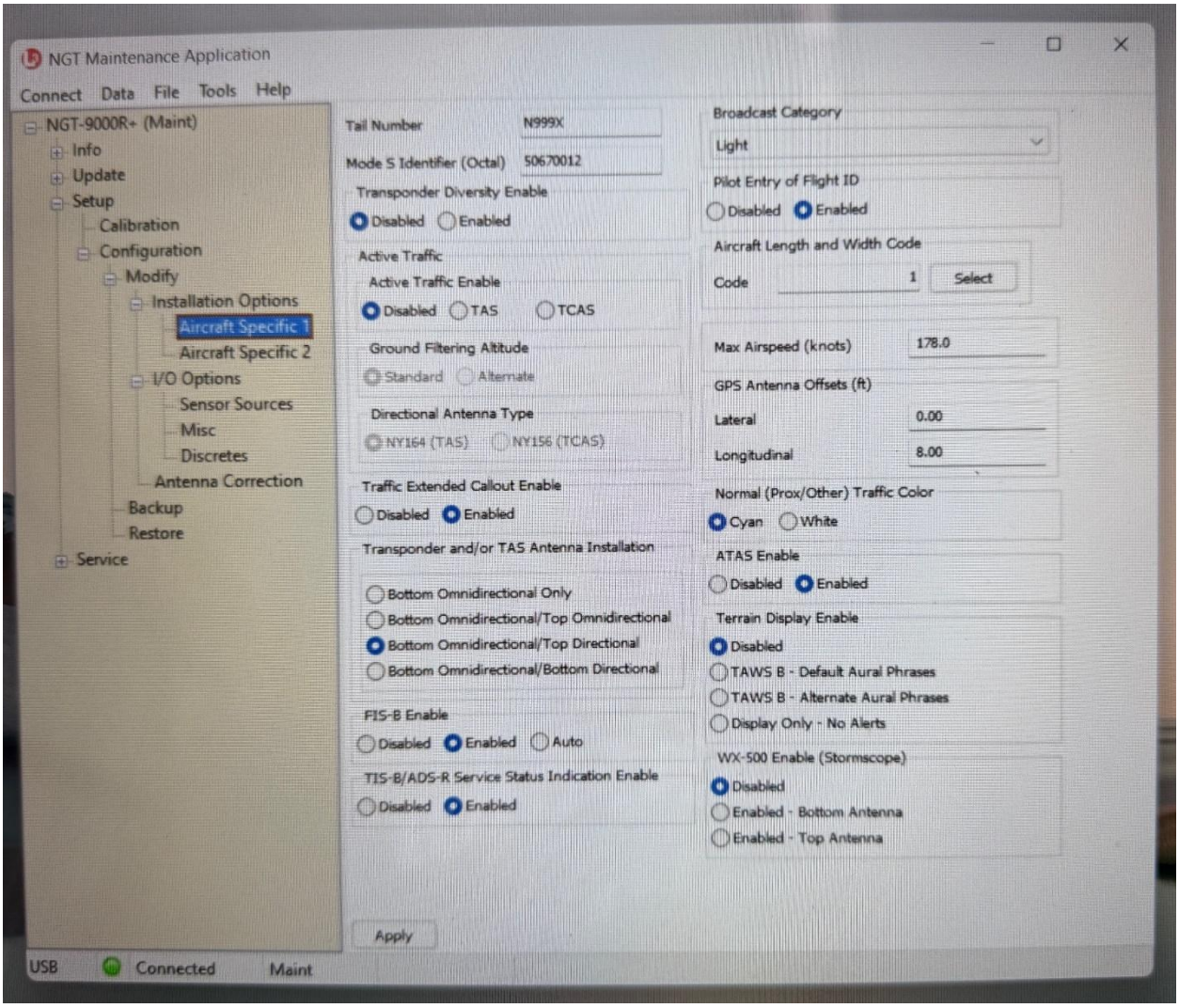

Figure 23: NGT Aircraft Specific 1 Settings (Prior to Active Traffic TAS installation)

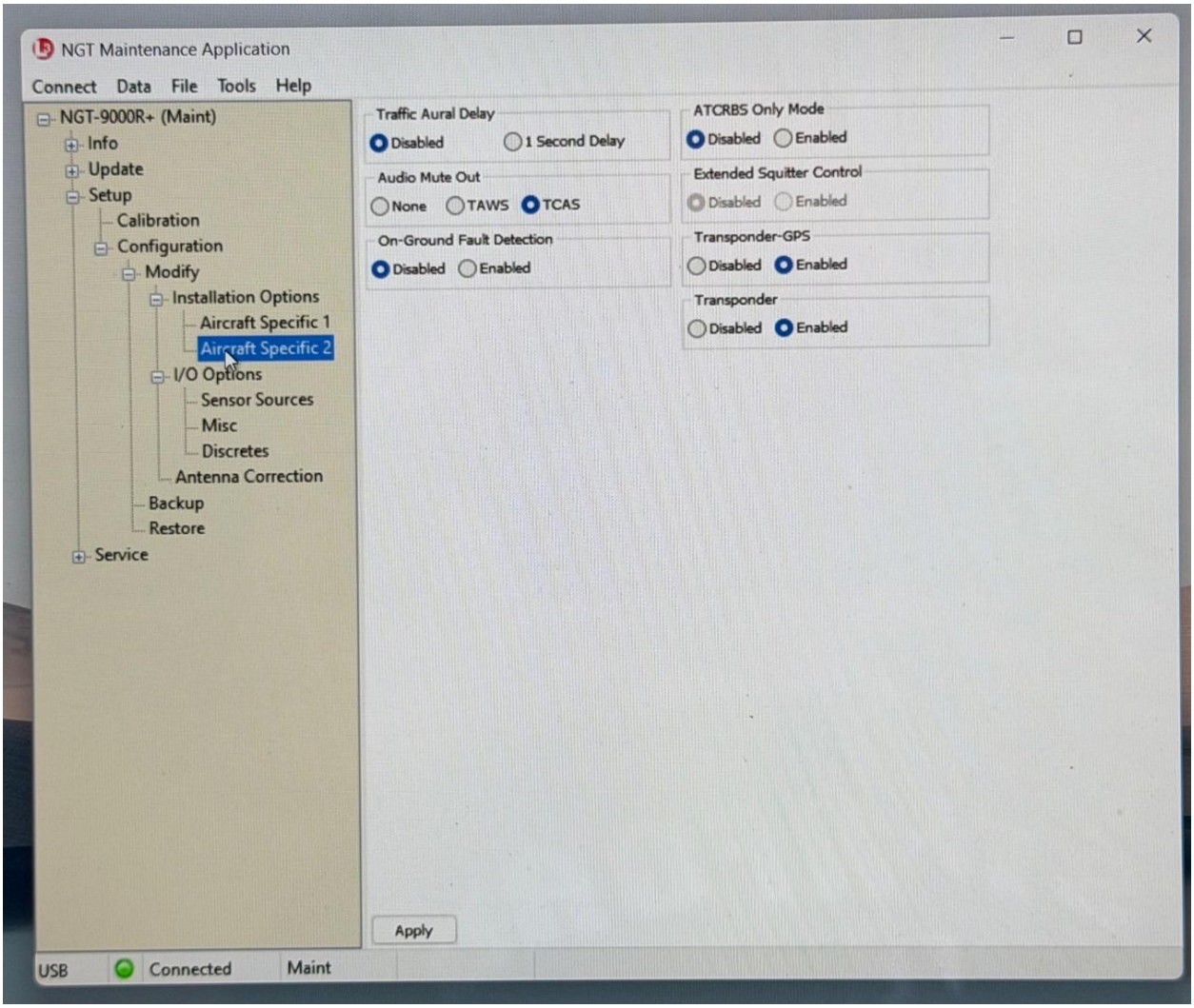

Figure 24: NGT Aircraft Specific 2 Settings

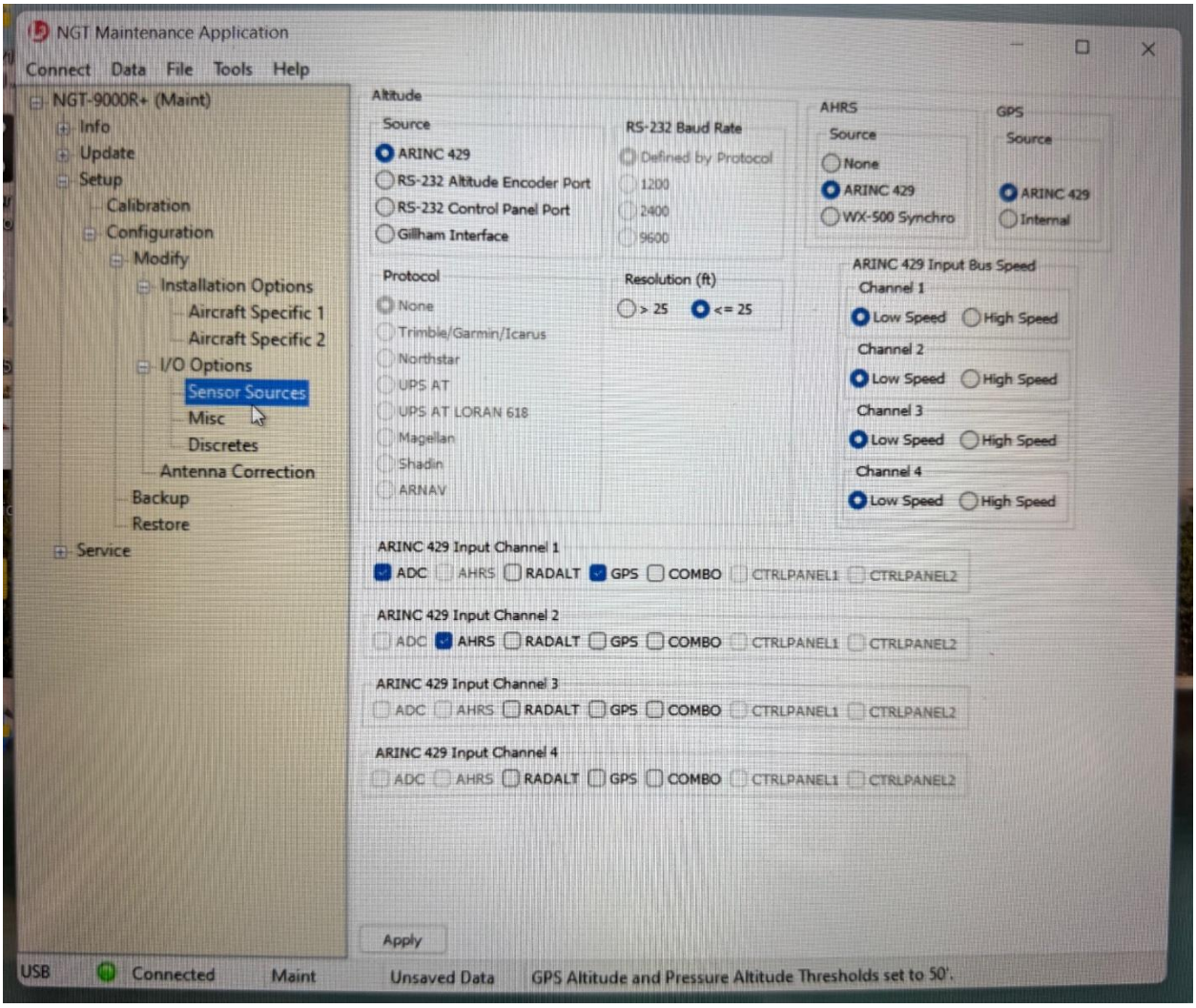

Figure 25: NGT Sensor Sources Setting

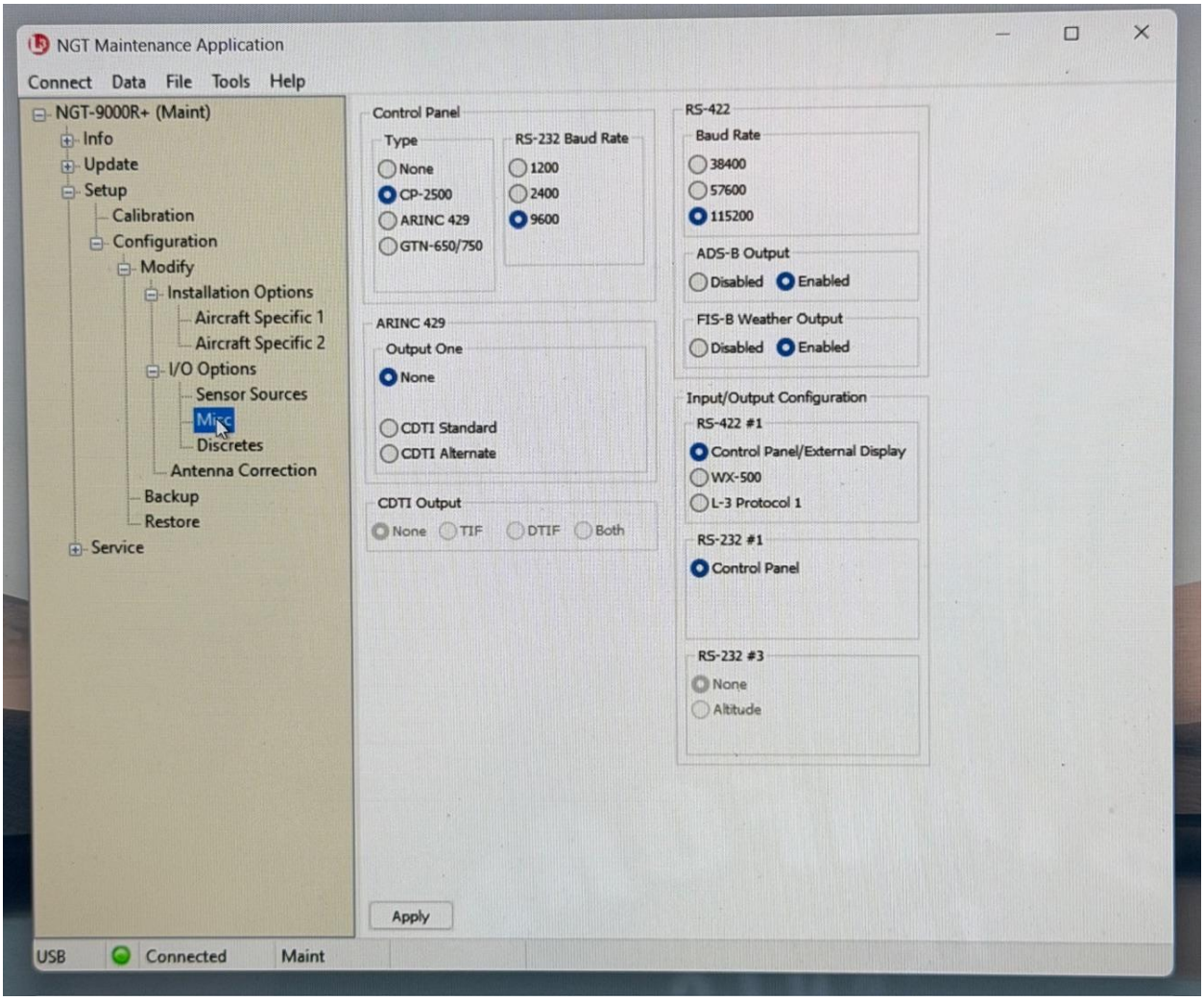

Figure 26: NGT Misc Settings

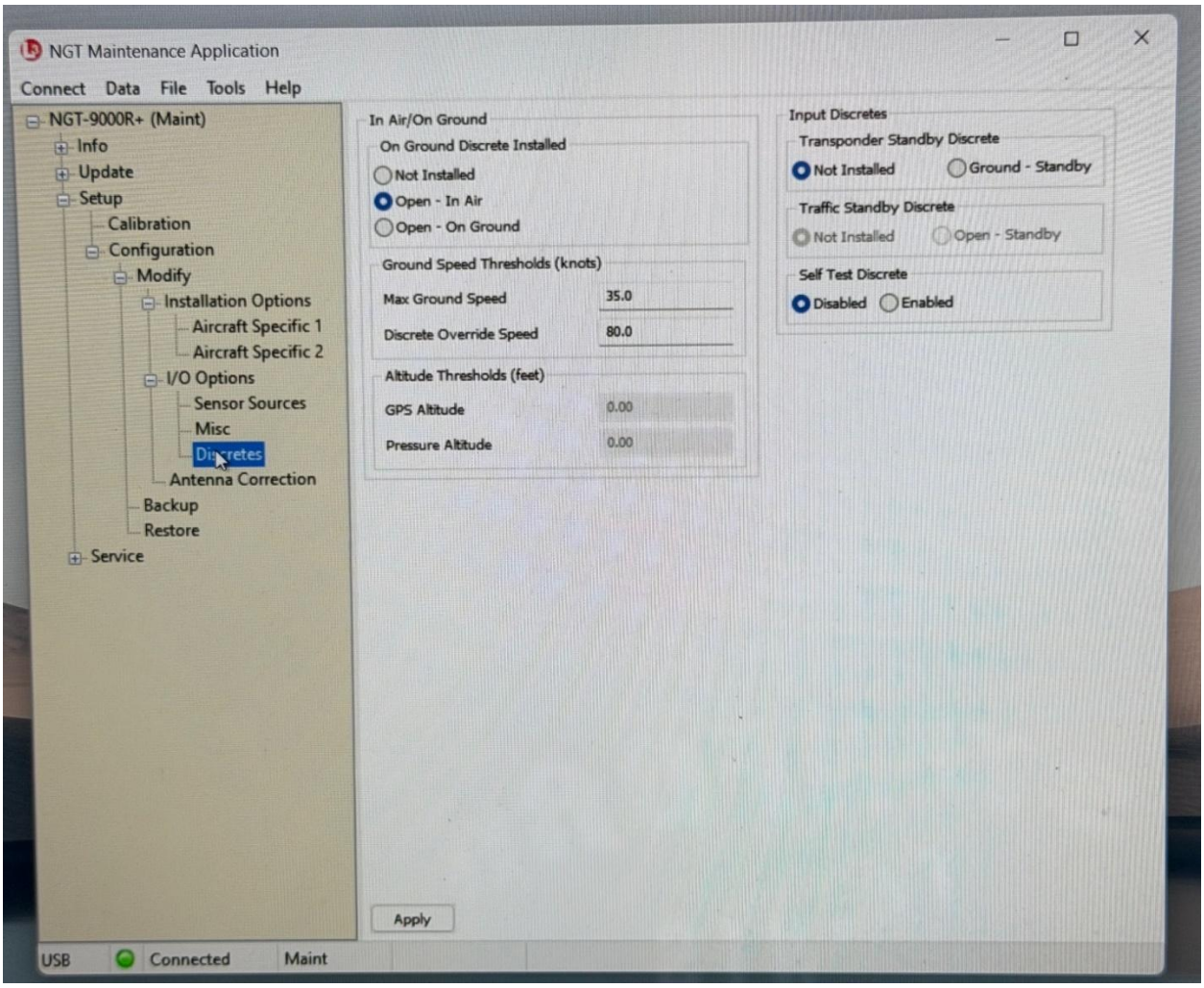

Figure 27: NGT Discretes Settings

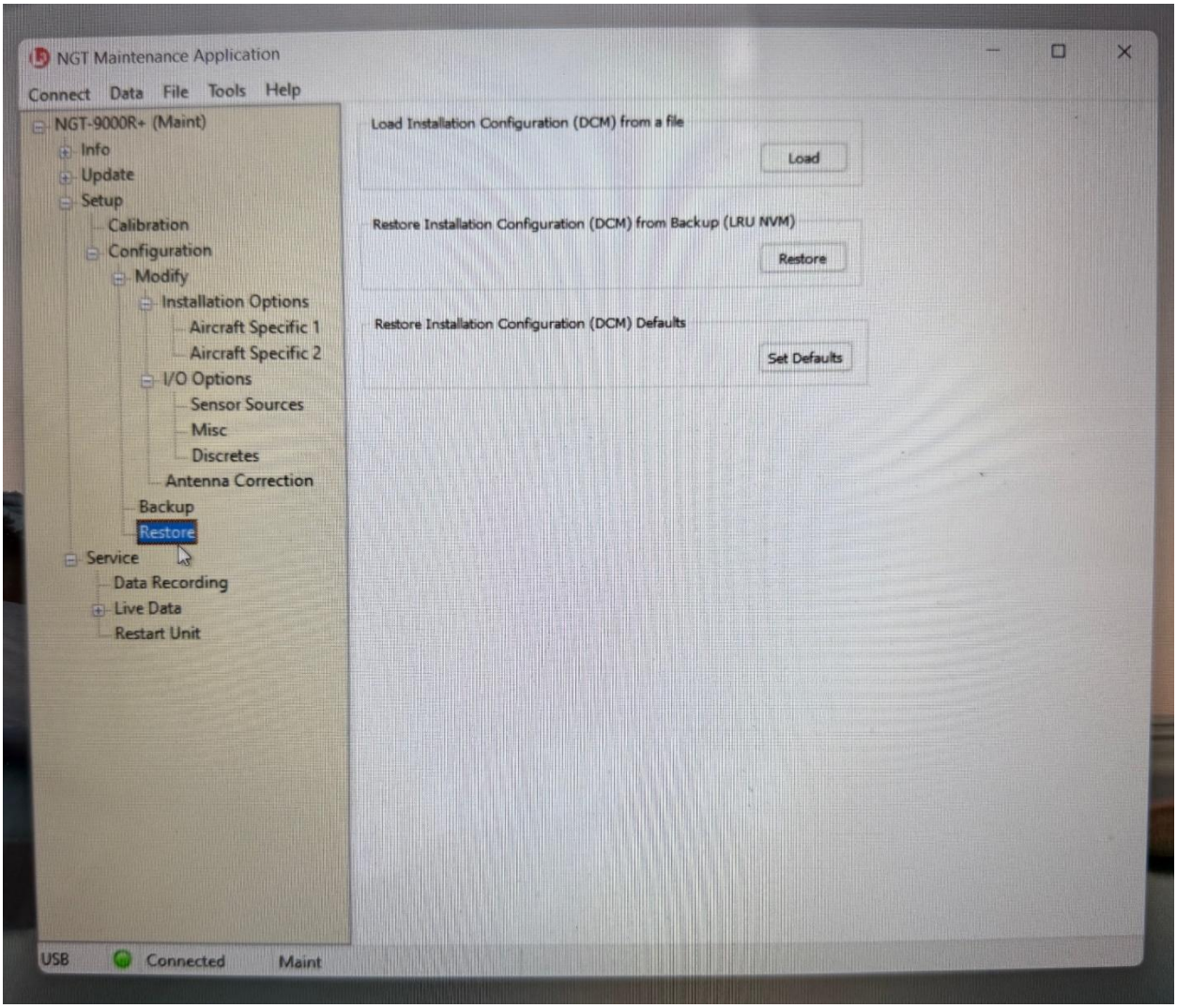

Figure 28: NGT Restore Settings

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