Cirrus SR2X: Installing an IFD 540

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 IFD540 in place of an IFD440 in a Cirrus SR22 G1, G2, or G3 aircraft. Check the Avidyne website to ensure you have the latest Revision of this document.

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1. Introduction

Installing an IFD540 in place of an IFD440 (or GNS430W) in a Cirrus center console requires reorganizing the center console devices to make room for the larger screen/bezel of the IFD540. This is accomplished by remote mounting the transponder and letting the IFD540 control it. You can then either move the DFC90 autopilot to the bottom of the stack (easiest, and the instructions on how to do so are included in this document) or move the audio panel to the bottom and place the IFD540 at the top (more time consuming). Avidyne makes a kit that dramatically shortens the time to install the IFD540 with the audio panel at the top. In either case you will want to install the Vantage Readiness harness if Vantage has not been installed yet.

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:
850-00182-000 IFD540,10W, GPS/NAV/COM/WIFI/BT/FLTA/SVS, BLK BEZEL
100-00560-200 VANTAGE READINESS KIT FOR IFD/DFC
820-00145-000 Radio rack modification kit

Manuals:
600-00299-000 IFD Installation Manual
AXP322/Skytrax200 Quick Installation Primer, or
NGT9000R Quick Installation Primer

Documents:
SA00343BO IFD Supplemental Type Certificate

3. Remote Mount Transponder Options

To make room for the IFD540, the center console transponder needs to be replaced with a remote mount transponder. The IFD540 will be used to control the new remote transponder.

The most cost-effective option is to install an Avidyne AXP322 remote transponder, optionally in combination with an Avidyne SkyTrax200 ADS-B In, TIS-B and FIS-B traffic and weather receiver (in markets where ADS-B is supported). If the aircraft has a Skywatch 497 active traffic system, the SkyTrax200 will blend the 497 active traffic data with the TIS-B traffic data to provide a unified traffic view.

A high-end option is to replace the transponder with a Lynx NGT9000R. It replaces both the panel mounted transponder and the legacy SKYWATCH 497 active traffic system with a fully integrated transponder, active traffic, ADS-B In, and TIS-B and FIS-B traffic and weather receiver. It mounts in place of the SKYWATCH 497. The NGT installation shaves about 8 pounds off the aircraft weight. It also utilizes the existing SKYWATCH 497 antenna and cables, which simplifies the installation.

See the appropriate Quick Installation Primer (linked in Section 1) for your remote transponder choice.

4. Center Console Device Order

Once you have decided on the transponder choice, you need to choose an order for the center console instruments.

Audio Panel on Top:

The simplest option (and easiest from an installation time standpoint) is to leave the audio panel on the top and move the DFC90 to the bottom, with the IFD540 and IFD440 occupying the middle two locations. Avidyne sells a kit that adapts the center console for this configuration (PN 820-00145-000). The kit includes new pre-drilled side rails and a new rack back shell that allows all the racks and connectors from the existing components to be repositioned for the new installation. For example, it lowers the two top back shell mounted connectors to provide the slack necessary to move the autopilot and lower navigator down without splicing wires. It also has larger side openings to make it easier to access the navigator BNC connectors. The kit also includes tools to reposition the throttle and prop governor cables to accommodate the additional depth of the DFC90 (more on that later). This document describes implementation using this kit.

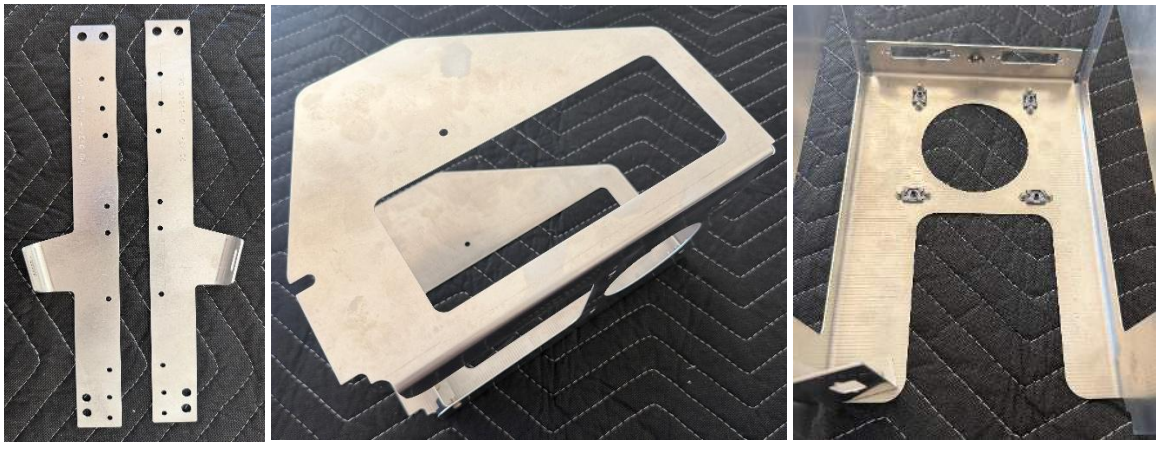


Figure 1: Rack and Shell Kit for IFD540

Audio Panel on Bottom:

If you choose to move the audio panel to the bottom slot, you will need to extend the 60 or so wires (most of them shielded) from the current top audio panel position to the bottom. This typically takes a full day of additional work. You won't need the 820-00145-000 kit, nor do you have to enlarge the cable opening (one hour of work - see below), so you can skip step 5.

5. Remove the Center Rack

Record the settings on both IFD440s. Remove the center console rack per the instructions in the Cirrus Maintenance Manual Chapter 25-10 (cabin) / Section 2 (Maintenance Practices) / Paragraph V (Radio Module Assembly).

6. Move the Throttle and Prop Cables

If you are keeping the audio panel on the top and moving the DFC90 Autopilot to the bottom slot, you need to move the throttle and prop cables downward. The autopilot tray is full depth, unlike the panel mounted transponder, so you need to create some additional room in the back lower corner of the rack space for the deeper autopilot tray.

To allow the DFC90 to be moved to the bottom slot, the throttle and prop governor cables need to be lowered at the point that they pass through the sheet metal plate at the rear of the center console cavity (**Error! Reference source not found.**). This involves using an Avidyne-supplied 1-3/8" hole punch (part of the 820-00145-000 kit) to enlarge the existing cable pass through slit on the bottom so that the cables can sit lower. It also involves removing the center support bracket if present in the aircraft (Figure 2).

While the process may seem daunting, it takes less than an hour and there is plenty of space to work in. An impact drill with a 15/16" (24mm) socket makes quick work of the hole punches.

You will be using the 1-3/16" hole punch in the Avidyne supplied kit to create a new hole for the throttle and prop governor cables that is centered 1.5 inches below the current cable slit (Figure). The factory slit is oriented to the right of center. You need to make the new holes in the center of the sheet metal plate.

- Remove the center support bracket if present in the aircraft (Figure 2) by cutting it just below the 90 degree bend and removing the Adel clamps around the two cables.
- Drill a 7/16" hole 1.5 inches below the bottom of the slit in the center of the sheet metal plate.

- Use the smallest punch to enlarge this hole.
- Use the 1-3/16-inch punch to enlarge the hold to its final size.
- Use that same punch to nibble away at the hole on the top until it connects to the slit.
- Drill two 3/16” holes at the bottom of the new hole (Figure 3 left).
- Use grommet edging at the bottom of the hole to protect the cables.
- Secure each cable with a tie wrap (Figure 3 right).

Figure 2: Support Bracket to Remove

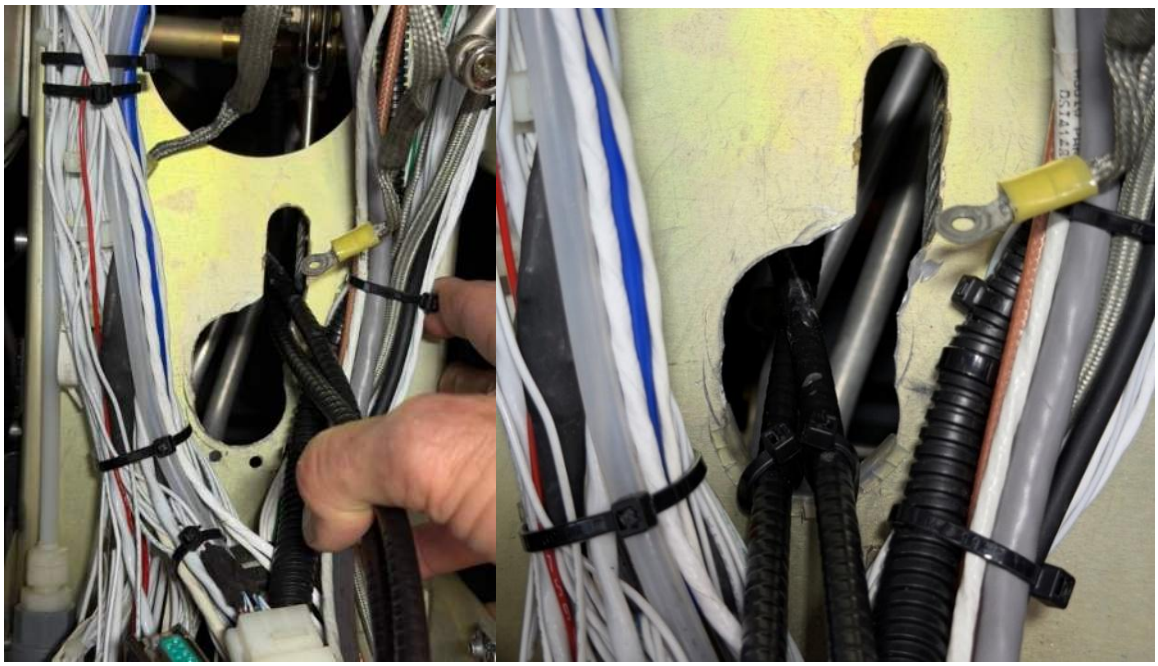


Figure 3: Cable Sheet Metal Notch Adjustment

7. Vantage Readiness

If you are doing a Vantage installation at the same time as the IFD540 installation, you will be adding 4 wire Ethernet connections to each of the IFDs. The Vantage wiring harness includes a DB25 connector that includes the eight Ethernet wires plus shield. You can use the other pins on the connector for the wires that go to either the AXP332/SkyTrax200 or the NGT9000R. See the Quick Installation Primers for each for details on using the Vantage Readiness connector.

If you are not doing a Vantage installation at the same time, you should get the Avidyne Vantage preparation kit (100-00560-200). It includes the IFD Ethernet dongle with the DB25 connector. Installing it now will save you from having to remove the center console when doing a future Vantage Installation, which is at least a day of work. You can also utilize the DB25 connector for the transponder wires as described above.

8. Assembling the Center Console Rack

You will need to move the backplane connectors to make them work with the larger IFD540. To do this, remove the wire over-braiding on all the wires in the center console harness except for the wire bundle going to the autopilot backplane.

Once the over-braiding is removed, you should be able to move the connector enough to fit both the IFD540 and IFD440 backplanes. The new center console backshell in the modification kit (820-00145-000) lowers the position of P517 and P518 that are mounted on the top of the backshell so that the connectors can be installed without any wiring changes (Figure 4).

Figure 4: New Backshell P517/P518 Mounts

The rails in the modification kit (820-00145-000) have the proper holes to mount the components with the audio panel on the top. You should test-fit the devices in the rack on the bench to ensure that the front bezels are aligned properly. As an example, the AMX240 audio panel and the DFC90 need to be mounted forward so that their bezels mount flush with the IFDs.

If you have a G1 and want to retain the factory side panels around the center stack (as opposed to installing a G3 bezel as described in step 11), you will need to drill and tap two 6-32 holes for the front lower corner screws on the bottom of the rack. You can use your old rails as guides for these holes (Figure). Another option is to obtain a G3 bezel from Vantage Associates and trim it to fit the G1 panel. It both updates the look of the aircraft and fits nicely around the new instrument stack.

Figure 5: G1 Side Rail Hole Addition

The ground connector tab on the IFD540 is in a different location than it is on the IFD440 (Figure). The ground connector you removed from the upper IFD440 should easily reach this new location.

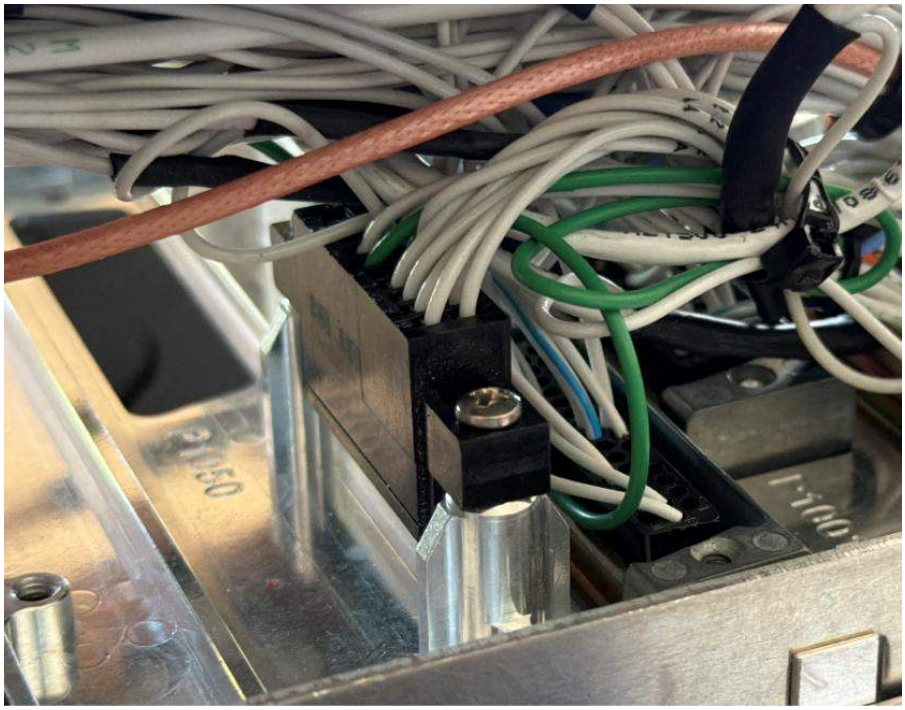


Figure 6: IFD 540 Ground Connection

Move the Nav Splitter

Your final step is to relocate the NAV splitter from the side of the center rack backshell to the location that was occupied by the ACK blind altitude encoder (no longer needed as the PFD429 ARINC line contains barometric altitude information from the PFD's altitude encoder). Four 18" BNC Male Angle to BNC Male Angle cables work well for relocating the Nav Splitter. See Figures 7 and 8.

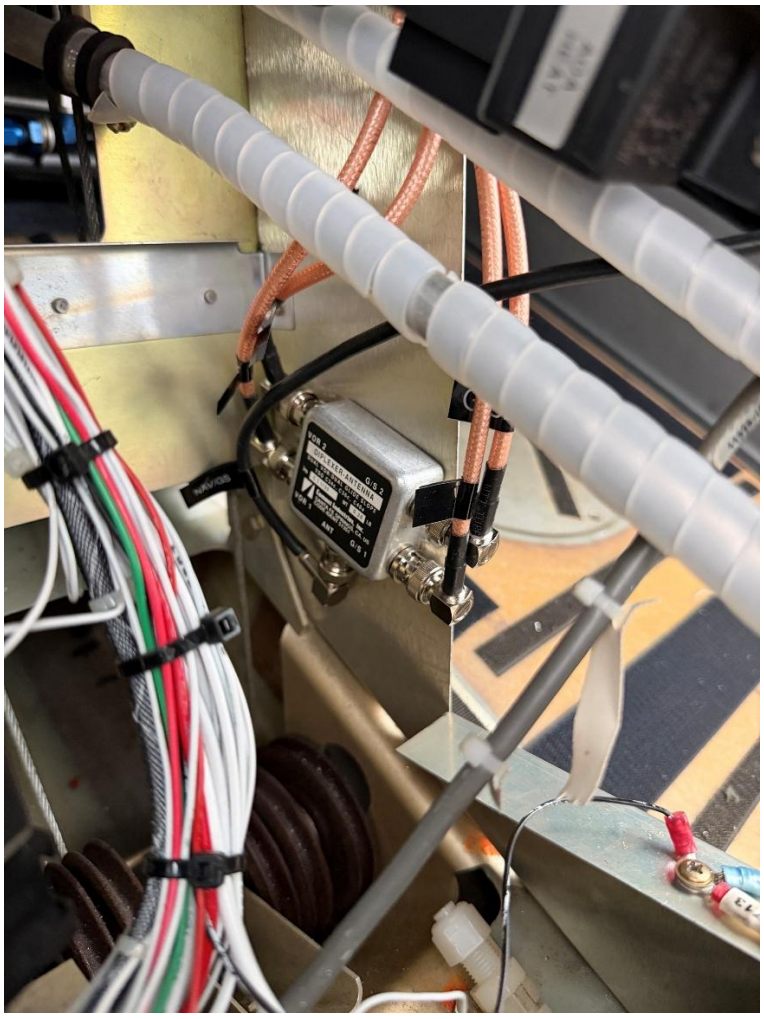


Figure 7: Nav Splitter1

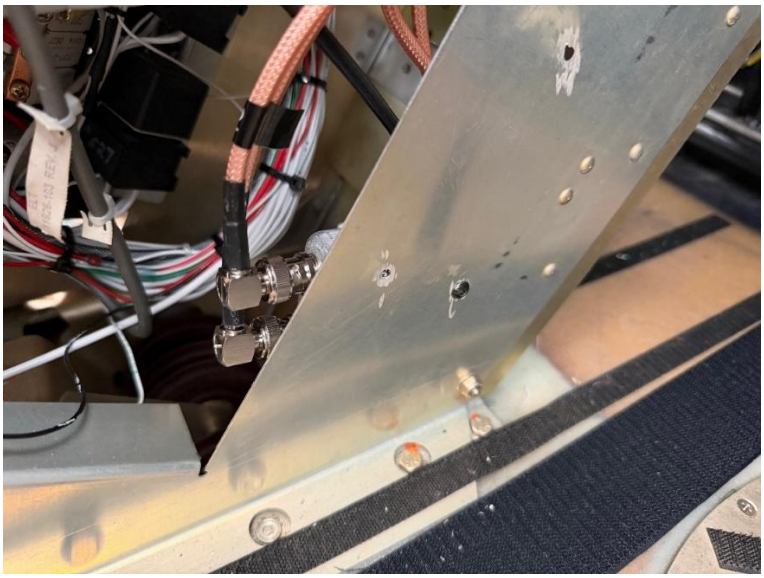


Figure 8: Nav Splitter 2

9. Things to Do While you have the Rack Out

Wire up the Remote Transponder

Follow the instructions for wiring up either your remote AXP322/Skytrax 200 or NGT9000R transponder.

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

Vantage Readiness:

We have already suggested adding the Vantage Readiness harness while you have the center radio rack out. This will save at least a day of work on any future Vantage installation.

DFC90 Tray:

If the original STEC-55X tray (Figure 9) was used when the DFC-90 was installed, you should replace it with the Avidyne tray for the DFC-90 (PN 850-00213-000).

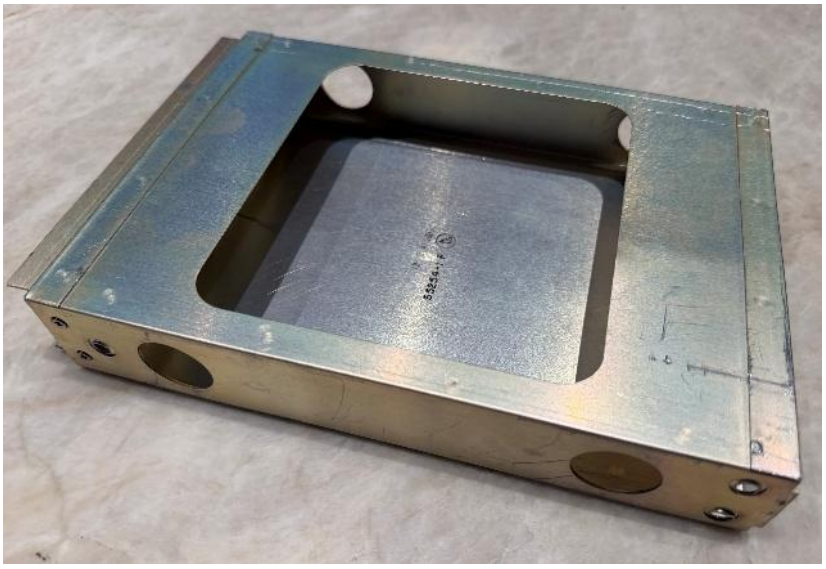


Figure 9: STEC Tray

DFC90 Flap Connection:

You should add the DFC90 flap wiring connection if it was not installed with the DFC90. On many installs, dealers chose to do a slide in replacement of the STEC-55X with the DFC90 to minimize cost. While this works fine, adding the flap connection allows the DFC90 to issue flap overspeed warnings and to use flap settings as part of its flight envelope protection logic. Included with the Vantage Readiness Kit is a flap connection module that simplifies connection to the flap switch. If you need a module, contact Avidyne support.

Audio Panel Monitor Function:

The AMX240 and some other audio panels support monitoring the standby frequencies of the radios. If the aircraft audio panel has this ability, add the appropriate wires from the IFDs. You should also add FLTA (terrain) audio from the IFDs if not yet wired. See Figure 10 for the wiring for an Avidyne AMX240 audio panel.

	AMX240 J1		IFD #1 P1006	
Mon 1 hi	7	S------	7	Com Mon Hi
Mon 1 lo	8	S------	34	Com Mon Lo
	AMX240 J1		**IFD #2 P1006**	
Mon 2 hi	21	S------	7	Com Mon Hi
Mon 2 lo	22	S------	34	Com Mon Lo
	AMX240 J1		**IFD #1 P1001**	
Unswitched #3 hi	29	S------	52	TAWS audio hi
Unswitched lo	32	S------	53	TAWS audio lo

Figure 10: AMX240 Audio Panel Wiring Additions

10. Finishing Rack Assembly

IFD Identification Dip Switches

Set the dip switches on the side of the IFDs so that the IFD540 is #1 and the IFD440 is #2 (IFD IM section 7.3 page 126).

Bezel Alignment

Load the instruments on the bench and confirm that all the bezels line up properly.

Cooling

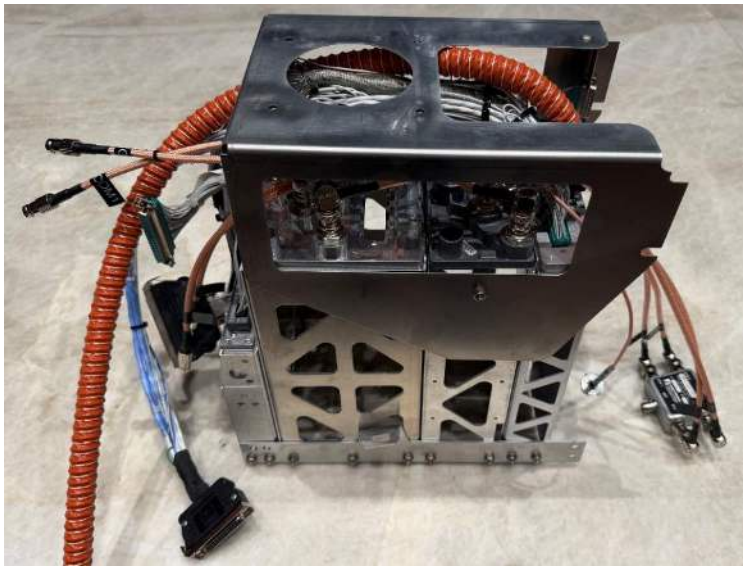
Both IFDs need direct cooling to operate correctly. A 3 port avionics fan feeding the cooling ports on the IFD backplanes through 5/8" SCAT tubing (Spruce Part# 05-29901-5) and connected with 0.59-0.67 plastic hose clamps (Spruce Part# 05-02705) is an ideal solution. Note that, while it has a small vent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

Cable Extensions

While the rear shell of the 820-00145-000 Radio rack modification kit has larger holes to reach and attach the various antenna cables to the IFD backplanes, many dealers add short extensions to the

IFD BNC GPS and Comm antenna connections to make it easier to install and remove the center console rack. Two 6” BNC Male Angle to BNC Female and two 12” BNC Male Angle to BNC Female cables work well for extending the IFD connections outside the rack (Figures 11 and 12).

Figure 11: Assembled Rack Side With One Cooling Hose Installed



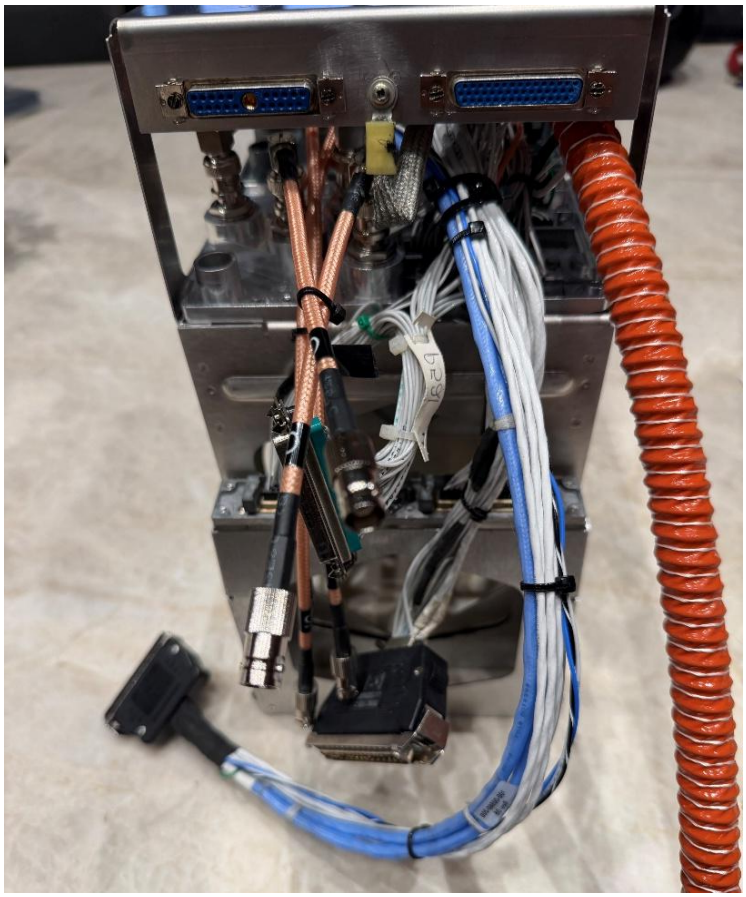


Figure 12: Assembled Rack Top

11. Installing the Rack

You should test fit the rack to ensure everything lines up (Figure 13).

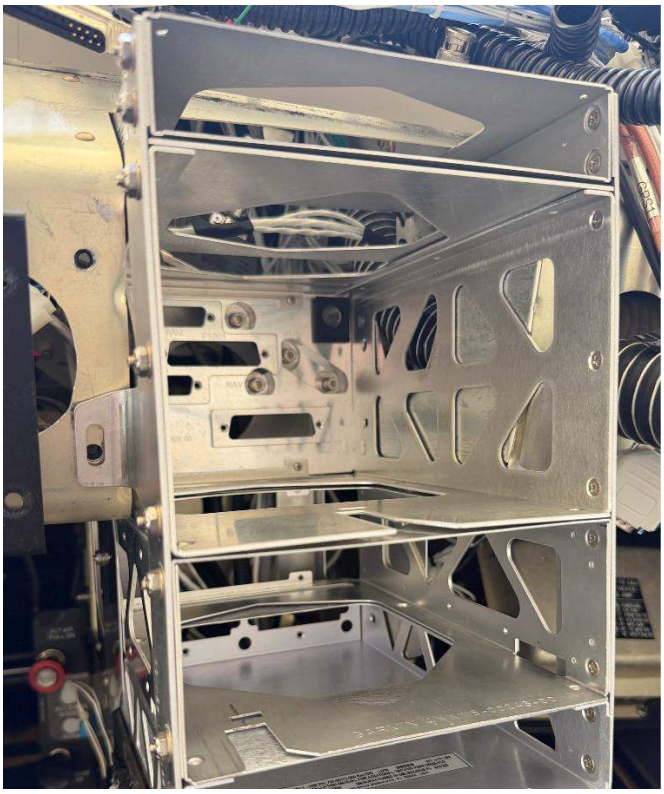


Figure 13: Installed Rack

12. Trimming the Front Surround Bezel

If you are working on a G1, there should be a spacer piece that fills in an approximately 1/2" space at the bottom of the rack. You will need to trim this filler piece so it is narrower, as the height of the new rack is about ¼" taller than the previous rack.

If you have a G2 or G3, the surround is one piece. You will need to trim a little off the bottom of the rack opening plastic to get it to fit.

Many shops use this opportunity to update the G1 bezels to use the G3 surround version. Cirrus sells part 18512-003 for a mind-numbing $6,665. However, Vantage Associates has produced a duplicate part UK18512-004 (and many other duplicate parts for early Cirrus models). Unfortunately, you need to send them a part to duplicate as an owner produced part as they are not PMA approved. Roger Whittier at Hands-On Aviation in Arizona has sent them a 18512-003 center console surround part to duplicate (Flycirrus@aol.com) and stocks and resells them in black for $700 plus shipping.

Figures 14 and 15 are bezel examples wrapped in padded leather to match the seats on a G1.

Figure 14: G3 Surround Covered in Leather

Figure 15: G1 with G3 Surround Installed

13. Configuring the IFD540

First set the configuration settings of the IFD540 to match those of the IFD440 it replaced (which you recorded in step 4). Then refer to the transponder Quick Installation Primer for the configuration values for the installed remote transponder.

Note that, to change RS232 CHNL 3, which is used for CrossSync, you must change the System Type to Legacy. When the System Type is Vantage, CHNL 3 is not editable to prevent errant setting of its value.

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.

If you are using a Wi-Fi link to connect a phone or a tablet to the IFD540, you need to turn off the Private Relay option on your handheld device. Otherwise the IFD540 will drop the connection when the device IP address changes.

This is a good time to adjust the Main Lighting settings on both IFDs. Figure 16 shows the settings that work well in a Cirrus. Notable changes are:

- Change the Mx Input to DimBus
- Set the dimBus voltages to 2 and 26
- Set the dimBus minimum to 30 / 30
- Set the dimBus slope to 100 / 100
- Set the dimBus maximum to 80 / 100

This allows the left knob on the bolster switch panel to properly control the IFD brightness.

14. Testing the Installation

Follow the steps in section 7.6 of the IFD IM to confirm proper operation of the IFD540.

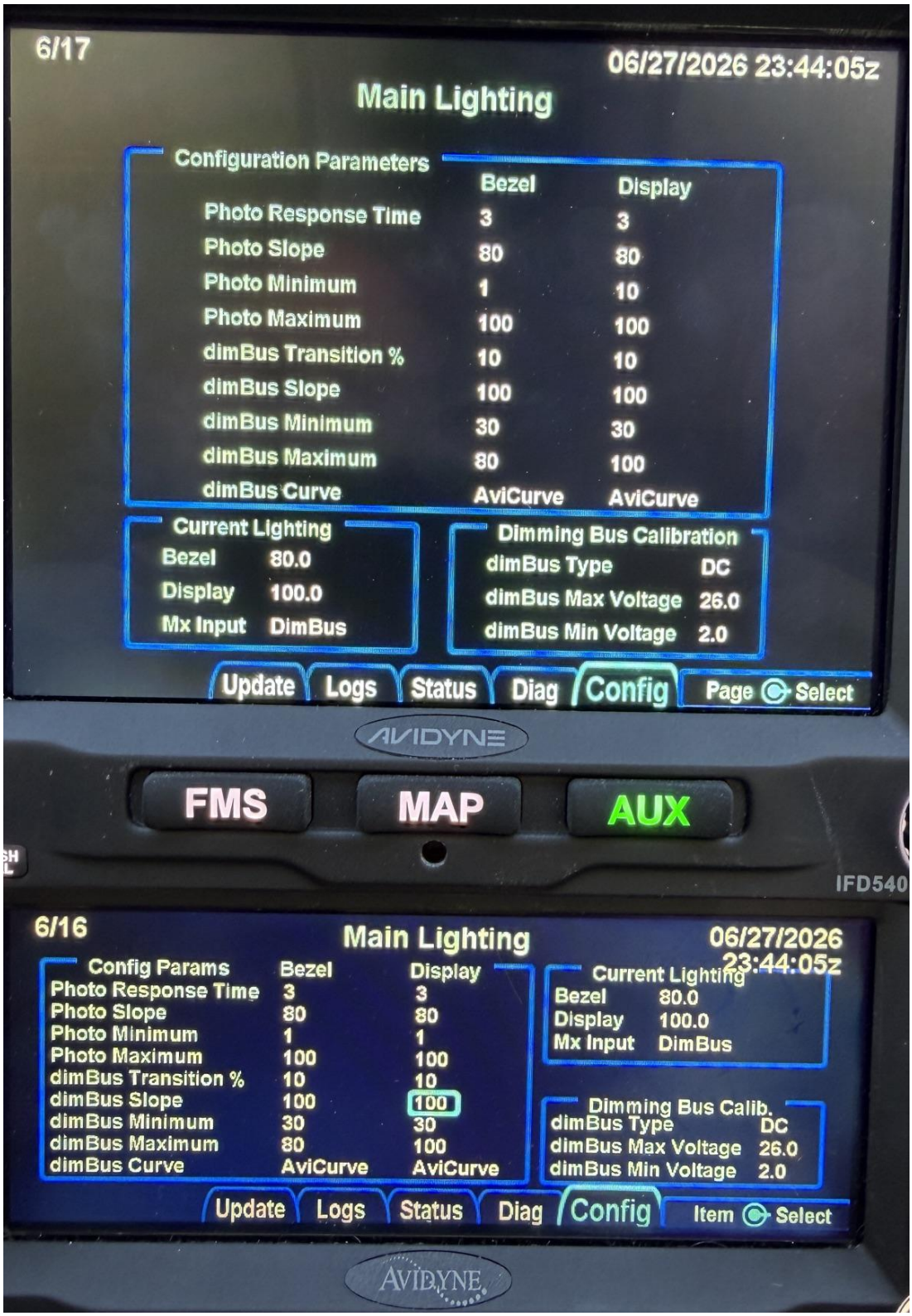


Figure 16: IFD 540/440 Main Lighting Settings

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