Service Bulletin

SB 2X-34-24 R1

Issued: 23 Oct 2007
Revised: 29 Jan 2008

Models SR20 and SR22

ATA 34-50: Dependent Position Determining
WAAS Antenna Installation on PFD Equipped Aircraft

COMPLIANCE

Optional: Accomplishment of this Service Bulletin is at the owner's option.

This Service Bulletin was revised to provide for the optional upgrade of GPS1 or GPS1/GPS2.

EFFECTIVITY

Cirrus Design SR20 serial numbers 1337 thru 1877 w/ Avidyne Entegra Primary Flight Display.

Cirrus Design SR22 serial numbers 0435 thru 2749 w/ Avidyne Entegra Primary Flight Display.

APPROVAL

FAA approval has been obtained on all technical data in this Service Bulletin that affects type design.

PURPOSE

The purpose of this Service Bulletin is to inform SR20 and SR22 owners of an optional WAAS kit and to facilitate installation of the WAAS kit.

DESCRIPTION

This Service Bulletin contains instructions for WAAS antenna/cable installation, GPS Navigator hardware upgrade(s), and PFD software upgrade.

The Garmin GPS Navigator WAAS installation consists of three parts:

- Procedures in this Service Bulletin for WAAS antenna(s) installation (including ELT shielding for affected aircraft).
- Avidyne PFD software upgrade. Refer to Avidyne Service Bulletin SB 601-00006-081: Release 7 PFD Re-Installation for Service.
- Garmin GPS Navigator upgrade. Refer to Garmin STC SA01933LA and Garmin STC Upgrade Installation Manual, PN 190-00357-06 Revision B or later.

Serials SR20-1802, 1816 thru 1877, Serials SR22-2578 thru 2749: Aircraft are already equipped with required WAAS hardware. Performance of Inspection/Check- PFD Software Version is the only requirement for compliance with SB 2X-34-24 R1.

Owners and operators with PFD software currently at Avidyne Release 6.2.2 may install this Service Bulletin; however, future upgrade to Avidyne Release 7.0 PFD software is required to provide GNS 430W/GNC 420W WAAS approach functionality. Cirrus recommends that Avidyne Release 7.0 PFD software be installed concurrently with this Service Bulletin.

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CAUTION: Under certain headings and geographic locations, using the existing GPS antenna locations could result in loss-of or weakened WAAS reception. On Cirrus aircraft, the Garmin 400W-Series Navigator requires an external antenna installation.

WARRANTY INFORMATION

Part and labor costs for this Service Bulletin are at the owner's expense.

MANPOWER REQUIREMENTS

Kit 70190-001: 11.0 manhours.

Kit 70190-002: 18.0 manhours (*Serials SR20-1798 thru 1877, SR22-2438 thru 2749:* 18.5 manhours).

Kit 70190-001 and Kit 70190-003: 35.0 manhours (*Serials w/ EMM repair:* 41.0 manhours).

Kit 70190-002 and Kit 70190-003: 40.0 manhours (*Serials w/ EMM repair:* 46.0 manhours).

Kit 70190-001 and Kit 70190-004: 14.5 manhours.

Kit 70190-002 and Kit 70190-004: 21.0 manhours.

OTHER PUBLICATIONS AFFECTED

SR20 Airplane Maintenance Manual (p/n 12137-001)

SR20 Illustrated Parts Catalog (p/n 12138-001)

SR20 Pilot's Operating Handbook (p/n 11934-003)

SR22 Airplane Maintenance Manual (p/n 13773-001)

SR22 Illustrated Parts Catalog (p/n 13774-001)

SR22 Pilot's Operating Handbook (p/n 13772-001)

WEIGHT AND BALANCE

N/A

MATERIAL INFORMATION

The following parts are required to comply with this Service Bulletin. Parts can be obtained from an Authorized Cirrus Design Service Center or Parts Distributor.

Serials SR20-1337 thru 1801, 1803 thru 1815, SR22-0435 thru 2577 w/o XM Weather: Order kit 70190-001 to obtain the following parts.

Item No.	Description	P/N or Spec.	Supplier	Quantity
1	Antenna, WAAS GPS	12744-004	Cirrus Design	1
3	Cable, GPS1 Antenna	18515-001	Cirrus Design	1
6	Gasket	18513-101	Cirrus Design	1
7	Washer, Flat, Wide Area	AN970-3	Cirrus Design	4
9	Nut, Self-locking, Nylon Insert, #8-32, Low Profile	MS21083N08	Cirrus Design	4
10	Screw, 100 Deg Countersunk, Self-Sealing, #8-32 × 1.375"	51952-138	Cirrus Design	4
11	Loom, Corrugated, 60" Length, 0.625-inch Dia.	50943-063	Cirrus Design	1

Item No.	Description	P/N or Spec.	Supplier	Quantity
13	Tape, Tin Plated Copper, 4", 64" Length	50379-002	Cirrus Design	1
17	SR20 Airplane Flight Manual Supplement	11934-S38	Cirrus Design	1
18	SR22 Airplane Flight Manual Supplement	13772-132	Cirrus Design	1
25	Service Bulletin	SB 2X-34-24 R1	Cirrus Design	1

Serials SR20-1337 thru 1801, 1803 thru 1815, SR22-0435 thru 2577 w/ XM Weather: Order kit 70190-002 to obtain the following parts.

Item No.	Description	P/N or Spec.	Supplier	Quantity
2	Antenna, WAAS GPS/XM	12744-005	Cirrus Design	1
3	Cable, GPS1 Antenna	18515-001	Cirrus Design	1
4	Cable, XM Antenna	18516-001	Cirrus Design	1
6	Gasket	18513-101	Cirrus Design	1
7	Washer, Flat, Wide Area	AN970-3	Cirrus Design	4
9	Nut, Self-locking, Nylon Insert, #8-32, Low Profile	MS21083N08	Cirrus Design	4
10	Screw, 100 Deg Countersunk, Self-Sealing, #8-32 × 1.375"	51952-138	Cirrus Design	4
11	Loom, Corrugated, 60" Length, 0.625-inch Dia.	50943-063	Cirrus Design	1
13	Tape, Tin Plated Copper, 4", 64" Length	50379-002	Cirrus Design	1
16	Precure Patch	70190-201	Cirrus Design	1
17	SR20 Airplane Flight Manual Supplement	11934-S38	Cirrus Design	1
18	SR22 Airplane Flight Manual Supplement	13772-132	Cirrus Design	1
19	Composite Repair Kit • L285 Base Resin, 71.5 g • H287 Curing Agent, 28.5 g • Fumed Silica (Aerosil 200), 1.6 g • Microfiller (Sil-Cell), 2.7 g • 70198-101 (45°), 3.8 × 3.3 inches • 70198-102 (-45°), 5.3 × 4.8 inches • 70198-103 (45°), 6.8 × 6.3 inches	70198-001	Cirrus Design	1
25	Service Bulletin	SB 2X-34-24 R1	Cirrus Design	1

Serials SR20-1337 thru 1797, SR22-0435 thru 2420 w/ Garmin GNS 430 or GNC 420 GPS2 requiring fuselage repair: Order kit 70190-003 to obtain the following parts.

Note: *Serials w/ Garmin GNC 250XL GPS2 or Serials not upgrading GPS2:* Kit 70190-003 is not required.

Item No.	Description	P/N or Spec.	Supplier	Quantity
1	GPS Antenna, WAAS	12744-004	Cirrus Design	1
5	Cable, GPS2 Antenna	18515-002	Cirrus Design	1
6	Gasket	18513-101	Cirrus Design	1
8	Washer, #8 × 0.032" Thick	NAS1149FN832P	Cirrus Design	4
9	Nut, Self-locking, Nylon Insert, #8-32, Low Profile	MS21083N08	Cirrus Design	4
10	Screw, 100 Deg Countersunk, Self-Sealing, #8-32 × 1.375"	51952-138	Cirrus Design	4
12	Loom, Corrugated, 84" Length, 0.5-inch Dia.	50943-050	Cirrus Design	1
14	Cable Anchors	50132-001	Cirrus Design	3
20	Composite Repair Kit • L285 Base Resin, 71.5 g • H287 Curing Agent, 28.5 g • Fumed Silica (Aerosil 200), 1.6 g • Microfiller (Sil-Cell), 2.7 g • 70198-201 (45°), 10.8 × 3.8 inches • 70198-202 (0°), 12.3 × 5.3 inches • 70198-203 (90°), 13.8 × 6.8 inches • 70198-204 (-45°), 15.3 × 8.3 inches	70198-002	Cirrus Design	1
21	Composite Repair Kit • EMM, 28.0 × 6.0 inches	70198-003	Cirrus Design	1
22	Composite Repair Kit • Epon 862, Heloxy 68 Blend 60.0 g • Epicure 3234 Curing Agent, 9.6 g	70198-004	Cirrus Design	2
24	Standoff, Locking, Clickbond #6-32	50757-014	Cirrus Design	2
25	Service Bulletin	SB 2X-34-24 R1	Cirrus Design	1

Serials SR20-1798 thru 1801, 1803 thru 1815, SR22-2421 thru 2577 w/ Garmin GNS 430 or GNC 420 GPS2 ***not*** *requiring fuselage repair:* Order kit 70190-004 to obtain the following parts.

Note: *Serials w/ Garmin GNC 250XL GPS2 or Serials not upgrading GPS2:* Kit 70190-004 is not required.

Item No.	Description	P/N or Spec.	Supplier	Quantity
1	GPS Antenna, WAAS	12744-004	Cirrus Design	1
5	Cable, GPS2 Antenna	18515-002	Cirrus Design	1
6	Gasket	18513-101	Cirrus Design	1
8	Washer, #8 × 0.032" Thick	NAS1149FN832P	Cirrus Design	4
9	Nut, Self-locking, Nylon Insert, #8-32, Low Profile	MS21083N08	Cirrus Design	4
10	Screw, 100 Deg Countersunk, Self-Sealing, #8-32 × 1.375"	51952-138	Cirrus Design	4
12	Loom, Corrugated, 84" Length, 0.5-inch Dia.	50943-050	Cirrus Design	1
14	Cable Anchors	50132-001	Cirrus Design	3
25	Service Bulletin	SB 2X-34-24 R1	Cirrus Design	1

Serials w/ 121.5 MHz ELT: Order 18389-001 to obtain the following part.

Item No.	Description	P/N or Spec.	Supplier	Quantity
26	ELT Shield	18389-001	Cirrus Design	1

ACCOMPLISHMENT INSTRUCTIONS

Note: *Serials SR20-1337 thru 1801, 1803 thru 1815, Serials SR22-0435 thru 2577:* SB 2X-34-24 R1 is comprised of three parts - instructions for WAAS antenna/cable installation, GPS Navigator hardware upgrade(s), and PFD software upgrade. Once modifications are underway, all three parts must be completed prior to the airplane returning to flight.

Serials SR20-1802, 1816 thru 1877, Serials SR22-2578 thru 2749: Performance of Inspection/Check - PFD Software Version is the only requirement for compliance with SB 2X-34-24 R1.

A. Perform Procedure - Upgrade Kit Options.

Note: If only one GPS antenna (GPS1) is upgraded, the other antenna will continue to function as previously installed; however, loss of crossfill functionality between GPS1 and GPS2 will exist **and** future updates to the different database cards for each transceiver will require dual maintenance.

Serials w/ Garmin GNC 250XL GPS2: Upgrade kit is not available for GPS2.

1. *Serials w/o XM Weather:* Order kit 70190-001 for GPS1.
2. *Serials w/ XM Weather:* Order kit 70190-002 for GPS1.

Note: *Serials w/ existing XM Weather **and** COM1/XM antenna configuration:* Cirrus Design has discontinued use of the COM1/XM antenna.

Although the COM1/XM antenna can remain functional in its intended configuration, it is preferable that those aircraft be equipped with the WAAS GPS/XM antenna using kit 70190-002 with one of the following configurations:

Configuration #1 - COM1/XM antenna replaced by the standalone COM1 antenna

or

Configuration #2 - COM1/XM antenna used exclusively for COM1 signal transmission

If installed, the existing COM1/XM antenna may be retained; however, future equipment options will be based on a standalone COM1 antenna with WAAS GPS/XM antenna configuration.

a. To replace COM1/XM antenna (Configuration #1):

(1) Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
COM1 Antenna	12740-001	Cirrus Design	Replace antenna.

(2) At antenna, disconnect COM1 antenna cable from aft antenna connector.

(3) At antenna, disconnect right-angle connector on XM antenna cable from forward antenna connector.

Note: If attenuator is installed between XM receiver and antenna cable, remove and discard attenuator.

(4) At receiver, disconnect antenna cable from antenna connector.

(5) At base of door pillar, remove cable ties securing antenna cable to existing wire loom.
(6) Remove any existing cable anchors and cable ties securing XM antenna cable.
(7) Remove XM antenna cable from airplane.
(8) Remove COM1/XM antenna. (Refer to AMM 34-50)
(9) Install COM1 antenna. (Refer to AMM 34-50)

b. To disable XM functionality in COM1/XM antenna (Configuration #2):
(1) At antenna, disconnect right-angle connector on XM antenna cable from forward antenna connector.

Note: If attenuator is installed between XM receiver and antenna cable, remove and discard attenuator.

(2) At receiver, disconnect antenna cable from antenna connector.
(3) At base of door pillar, remove cable ties securing antenna cable to existing wire loom.
(4) Remove any existing cable anchors and cable ties securing XM antenna cable.
(5) Remove XM antenna cable from airplane.

3. If completing the GPS2 antenna upgrade, an inspection of the ceiling structure is necessary to determine if repair is required prior to GPS2 installation.

The aft RH ceiling foam core edge runs parallel with the bondline at BL0. On earlier aircraft, however, the aft RH ceiling foam core edge exhibits an offset (joggle) that extends inboard. This offset interferes with the GPS2 installation area and requires fuselage repair. **(See Figure 07)**

a. At aft cabin ceiling, locate inboard edge of RH ceiling foam core running parallel with the bondline at BL0.
b. If inboard edge of RH ceiling foam core has characteristics of an inboard offset towards the bondline, fuselage repair is required to accommodate GPS2 installation. Order kit 70190-003 for GPS2.
c. If inboard edge of RH ceiling foam core runs straight and parallel with bondline, fuselage repair for GPS2 installation is not required. Order kit 70190-004 for GPS2.

B. Perform Inspection/Check - PFD Software Version.

Avidyne PFD software version must be P/N 530-00183-000 Rev 02 (Release 6.2.2) or later for installation of this Service Bulletin.

If PFD software version is P/N 530-00183-000 Rev 02 (Release 6.2.2), this Service Bulletin may be installed; however, future upgrade to P/N 530-00195-000 Rev 00 (Release 7.0) PFD software is required to provide GNS 430W/GNC 420W WAAS functionality.

During system startup, PFD software version is displayed on screen. Note existing PFD setup configuration. If software upgrade is required, existing PFD setup configuration will be erased and must be re-entered.

1. Set BAT 1 and AVIONICS switches to ON positions.
2. If PFD software version is P/N 530-00195-000 Rev 00 (Release 7.0) or higher, GNS 430W/GNC 420W compatibility is already provided. No PFD software upgrade is required.
3. If PFD software version is P/N 530-00183-000 Rev 02 (Release 6.2.2), GNS 430W/GNC 420W WAAS compatibility is not provided. Although not required for installation of this Service Bulletin, future PFD software upgrade will be required for GNS 430W/GNC 420W WAAS functionality.

4. If PFD software version is lower than P/N 530-00183-000 Rev 02 (Release 6.2.2), PFD software must be upgraded to Release 6.2.2 or higher. Upgrade PFD software:
   a. Contact Avidyne for upgrade instructions. (Refer to www.avidyne.com)
   b. Remove PFD. (Refer to AMM 31-60)
   c. Install upgraded PFD. (Refer to AMM 31-60 and Avidyne SB 601-00006-081: Release 7 PFD Re-Installation for Service)
   d. Perform Functional Test - PFD Setup. (Refer to AMM 31-60)
   e. Perform Functional Test - Magnetometer Calibration. (Refer to AMM 34-20)
   f. Perform Functional Test - Flight Guidance Programmer/Computer. (*SR20 Serials:* Refer to AMM 22-12, *SR22 Serials:* Refer to AMM 22-11)
5. *Serials SR20-1802, 1816 thru 1877, Serials SR22-2578 thru 2749:* Aircraft are already equipped with required WAAS hardware. No further action is required. Complete airplane records by noting compliance with SB 2X-34-24 R1 in Aircraft Logbook.

C. Remove key from ignition.

D. Set BAT 1, BAT 2, and AVIONICS switches to OFF positions.

E. Remove engine cowling. (Refer to AMM 71-10)

F. Disconnect battery. (Refer to AMM 24-30)

G. Upgrade GPS Navigator(s).
   1. Contact Garmin International for pre-registration and upgrade instructions. Refer to Garmin STC SA01933LA and Garmin STC Upgrade Installation Manual, PN 190-00357-06 Revision B or later.
   2. Remove GPS Navigator(s). (Refer to AMM 34-50)
   3. Install upgraded 400W-Series GPS Navigator(s). (Refer to AMM 34-50)

   CAUTION: Ensure hands are clean while working with headliners and trim pieces.

H. Remove both cabin seats. (Refer to AMM 25-10)

I. Remove glareshield. (Refer to AMM 25-10)

J. *Kit 70190-003 or Kit 70190-004:* Remove RH console panel. (Refer to AMM 25-10)

K. Remove RH A-pillar bottom door trim. (Refer to AMM 25-10)

L. *Kit 70190-002* ***and*** *Serials SR20-1798 thru 1877, SR22-2438 thru 2749:* Remove RH B-pillar top door trim. (Refer to AMM 25-10)

M. *Kit 70190-002* ***and*** *Serials SR20-1798 thru 1877, SR22-2438 thru 2749:* Remove RH rear cabin side trim. (Refer to AMM 25-10)

N. Remove forward headliner. (Refer to AMM 25-10)

O. Remove center headliner. (Refer to AMM 25-10)

P. Remove MFD. (Refer to AMM 31-60)

Q. Remove radio module assembly. (Refer to AMM 25-10)

R. Remove GPS antenna(s).

   Note: If only upgrading GPS1, do not remove antenna or cable for unaffected GPS2 installation.

   1. Remove GPS antenna(s). (Refer to AMM 34-40)
   2. Remove previously installed reclosable fasteners used to secure GPS antenna(s).
   3. Remove residual adhesive and solvent clean GPS installation area(s). (Refer to AMM 20-30)

4. Remove tie-downs securing GPS antenna cable(s).
5. Disconnect GPS antenna cables from GPS Navigators.

Note: To facilitate removal of GPS antenna cables, it is required to disconnect unrelated cables and lines interfering with removal. Remove cables/lines in order presented.

a. At MFD opening and sides of radio rack, locate P550 cables for autopilot. If cables obstruct removal of GPS antenna cables, disconnect and stow P550 cables.

Note: If audio panel is not installed at upper configuration above GPS Navigators, it is not necessary to disconnect P521 cable for audio panel.

b. Disconnect P521 cable for audio panel.
c. Disconnect COM1 antenna cable from GPS #1 transceiver.
d. Disconnect COM1 coolant line from GPS #1 transceiver.
e. Disconnect GPS1 antenna cable from GPS #1 transceiver.
f. Disconnect COM2 coolant line from GPS #2 transceiver.
g. Disconnect GPS2 antenna cable from GPS #2 transceiver.

6. Remove and discard existing GPS antenna cable(s) from airplane.

S. *Kit 70190-003 or Kit 70190-004:* Drill GPS2 antenna installation area. **(See Figure 08)**, **(See Figure 09)**

1. Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
Isopropyl Alcohol	TT-I-735 Grade A or B	Any Source	Clean installation area.
Cotton Cloth (clean and lint free)	-	Any Source	Clean installation area.
Drill Bit	0.25 inch (0.64 cm)	Any Source	Drill pilot holes for connector holes.
Drill Bit	0.14 inch (0.36 cm)	Any Source	Drill antenna mounting holes.
Hole Saw	0.75 inch (1.91 cm)	Any Source	Drill connector holes.
Deburring Tool	-	Any Source	Deburr.

2. From COM1 antenna forward installation screws, measure aft 22.20 inches (56.39 cm) and mark.
3. From previous mark, mark perpendicular line intersecting with BL0.
4. From intersection at BL0, measure 0.80 inch (2.03 cm) to the right, and mark forward RH antenna installation hole.
5. From previous mark, measure 3.30 inches (8.38 cm) aft, and mark aft RH antenna installation hole.
6. From previous mark, measure 1.60 inches (4.06 cm) to the left, and mark aft LH antenna installation hole.
7. From previous mark, measure 3.30 inches (8.38 cm) forward, and mark forward LH antenna installation hole.
8. From intersection of forward mounting holes at BL0, measure 1.04 inches (2.64 cm) aft, and mark antenna cable pass-through hole.
9. At antenna cable pass-through hole mark, use 0.25 inch (0.64 cm) drill bit to drill pilot hole.

10. At outer laminate, use 0.75 inch (1.91 cm) hole saw to drill antenna cable pass-through hole at pilot hole.
11. At each mounting hole mark, use 0.14 inch (0.36 cm) drill bit to drill mounting holes.
12. Deburr edges of pass-through and mounting holes.
13. Solvent clean installation area at antenna mounting holes with isopropyl alcohol. (Refer to AMM 20-30)

T. *Kit 70190-002* ***and*** *Serials w/ standalone XM antenna:* Repair fuselage for GPS1. **(See Figure 03)**

1. Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
Straight Edge	-	Any Source	Mark.
Permanent Marker	-	Any Source	Mark.
Flashlight	-	Any Source	Inspection.
Isopropyl Alcohol	TT-I-735 Grade A or B	Any Source	Clean installation area.
Cotton Cloth (clean, lint free)	-	Any Source	Clean installation area.
Compressed Air	-	Any Source	Clean installation area.
Vacuum	-	Any Source	Clean installation area.
Sandpaper	60 to 80-grit	Any Source	Abrade bonding surfaces.
Sandpaper	80 to 120-grit	Any Source	Abrade bonding surfaces.
Aluminum Foil Tape	-	Any Source	Prevent adhesive squish out.
Release Film [1]	WL4600 WL5200 A400R	Airtech International, Inc. Huntington Beach, CA 92647 714-899-8100	Protect lay-up surface.
	D5000	De-Comp Composites, Inc. Cleveland, OK 74020 877-609-5088	
Peel Ply	Stitch Ply G	Airtech International, Inc. Huntington Beach, CA 92647 714-899-8100	Make smooth and contaminate free repair surface.
Utility Knife	-	Any Source	Cut copper tape.

1. only required for vacuum-assisted repair techniques

2. Remove XM antenna and cable.
   a. At antenna, disconnect XM antenna cable from antenna connector.

      Note: If attenuator is installed between XM receiver and antenna cable, remove and discard attenuator.

   b. At receiver, disconnect antenna cable from antenna connector.

c. At base of door pillar, remove cable ties securing antenna cable to existing wire loom.
d. Remove any existing cable anchors and cable ties securing XM antenna cable.
e. Remove XM antenna cable from airplane.
f. Remove XM antenna. (Refer to AMM 34-50)

3. Remove copper tape below antenna installation area and surrounding repair area as required.
4. Measure oval hole in fuselage. Sand precure patch (item 16) as required to fit tightly in the hole.
5. Pre-fit faying surfaces of precure patch flush with outer laminate to ensure a maximum gap of 0.10 inch (2.54 mm) exists around the circumference of the precure patch during repair curing. If gap exceeds 0.10 inch (2.54 mm), contact Cirrus Design for disposition.
6. If precure patch fits proud with inner laminate, use 60 to 80-grit paper to sand precure patch flush with inner laminate.

Note: Prepare the repair area sufficiently beyond the area of the repair ply to ensure proper ply adhesion.

7. Prepare repair surface for wet-lay. (Refer to AMM 51-20)
8. Solvent clean with isopropyl alcohol. (Refer to AMM 20-30)
9. To prevent adhesive squish out, cover all holes at outer laminate of installation area with aluminum tape.

Note: Ensure plies extend at least 0.5 inch (1.27 cm) beyond repair area in all directions.

Ensure each ply overlaps the previous ply by at least 0.5 inch (1.27 cm) in all directions.

10. Mix MGS L285-based filler paste. (Refer to AMM 51-30)

Note: Forward installation holes can be reused for antenna installation. Do not apply filler paste to forward installation holes.

11. At inner laminate, apply filler paste to aft installation holes as required to fill any gouges. Fill to make flush with inner laminate. (Refer to AMM 51-20)

Note: Adhesive surface of previously installed aluminum tape may be used to affix precure patch in oval hole.

12. Install and affix precure patch into oval hole.
13. Mix MGS L285-based structural resin. (Refer to AMM 51-30)
14. Layup glass fabric repair plies. (Refer to AMM 51-20)
15. Cure repair plies. (Refer to AMM 51-20)
16. Remove aluminum tape.

U. *Kit 70190-003:* Repair fuselage for GPS2. **(See Figure 07)**

1. Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
Straight Edge	-	Any Source	Mark.
Permanent Marker	-	Any Source	Mark.
Flashlight	-	Any Source	Inspection.
Isopropyl Alcohol	TT-I-735 Grade A or B	Any Source	Clean installation area.
Cotton Cloth (clean, lint free)	-	Any Source	Clean installation area.
Compressed Air	-	Any Source	Clean installation area.
Vacuum	-	Any Source	Clean installation area.
Sandpaper	60 to 80-grit	Any Source	Abrade bonding surfaces.
Sandpaper	80 to 120-grit	Any Source	Abrade bonding surfaces.
Aluminum Foil Tape	-	Any Source	Prevent adhesive squish out.
Release Film [1]	WL4600 WL5200 A400R	Airtech International, Inc. Huntington Beach, CA 92647 714-899-8100	Protect lay-up surface.
	D5000	De-Comp Composites, Inc. Cleveland, OK 74020 877-609-5088	
Peel Ply	Stitch Ply G	Airtech International, Inc. Huntington Beach, CA 92647 714-899-8100	Make smooth and contaminate free repair surface.
Wire Saw	-	Any Source	Remove standoff fasteners.
5 Minute® Epoxy Gel (Hardener And Resin)	14240	Devcon Danvers, MA 01923 800-626-7226	Install standoff fasteners.
Compass	-	Any Source	Mark standoff fastener locations.
Deburring Tool	-	Any Source	Deburr.
Utility Knife	-	Any Source	Cut copper tape.

1. only required for vacuum-assisted repair techniques

2. Remove copper tape below antenna installation area and surrounding repair area as required.

3. *Serials SR20-1541 thru 1797, Serials SR22-1520 thru 2420:* Remove garment hook standoff fasteners.
   a. At interior of aft fuselage ceiling, locate garment hook standoff fasteners.

      Note: To facilitate standoff fastener reinstallation, use a template to transfer standoff fastener locations.

   b. To make template:
      (1) Over standoff fasteners, position 8.5 × 11.0 inch sheet of heavy construction paper so that shorter length of paper extends forward and aft.
      (2) Carefully puncture paper at center of both standoff fasteners. Slide paper over standoff fasteners.

         Note: To facilitate locator marking, ceiling surface at corners of paper need to remain tape free. Do not apply tape to corners of paper.

      (3) Ensure paper span is taut. Use tape to affix outboard ends of paper to ceiling.
      (4) To create template locators, use permanent marker to outline corners of template on ceiling.
      (5) To facilitate correct orientation of paper, mark forward arrow on paper surface.
      (6) Carefully remove tape from paper and retain template for standoff fastener reinstallation.

      CAUTION: Carefully saw at bondline so as to minimize damage to the fuselage.

   c. At bondline between standoff fasteners and fuselage, use wire saw to remove standoff fasteners.
4. Remove foam core and repair installation area.
   a. From COM1 antenna forward installation screws, measure aft 20.5 inches (52.07 cm) along inner laminate of the upper fuselage, and mark at intersection with BL0.
   b. From previous mark, locate RH beveled edge of foam core and mark.
   c. From previous mark, use straight edge parallel with BL0 to mark line aft to foam core edge.
   d. From forward end of previous line, measure 1.5 inches (3.8 cm) outboard, and use straight edge perpendicular with BL0 to mark line outboard.
   e. From outboard end of previous line, use straight edge parallel with BL0 to mark line aft to foam edge.
   f. At forward outboard corner of outline, mark 0.5 inch (1.27 cm) radius.
   g. Remove foam core from area defined by outline. (Refer to AMM 51-20)
   h. Sand cutout to bevel edges and 0.5 inch (1.27 cm) radius corners as required with shape of existing foam. (Refer to AMM 51-20)
   i. Remove all dust and debris with compressed air and a vacuum.
   j. Solvent clean repair area. (Refer to AMM 20-30)
   k. Prepare inner laminate of fuselage for wet-lay. (Refer to AMM 51-20)
   l. Solvent clean with isopropyl alcohol. (Refer to AMM 20-30)
   m. To prevent adhesive squish out, cover all holes at outer laminate of installation area with aluminum tape.

Note: Ensure plies extend at least 0.5 inch (1.27 cm) beyond area of foam core removal in all directions.

Ensure each ply overlaps the previous ply by at least 0.5 inch (1.27 cm) in all directions.

n. Mix MGS L285-based structural resin. (Refer to AMM 51-30)

o. Layup glass fabric repair plies. (Refer to AMM 51-20)

p. Cure repair plies. (Refer to AMM 51-20)

q. Remove aluminum tape.

5. *Serials SR20-1541 thru 1797, Serials SR22-1520 thru 2420:* Install garment hook standoff fasteners.

a. Solvent clean installation area with isopropyl alcohol. (Refer to AMM 20-30)

b. Abrade installation area with sandpaper. (Refer to AMM 51-20)

c. Solvent clean abraded areas. (Refer to AMM 20-30)

d. Position corners of template to locator marks on ceiling. Affix template to ceiling with tape.

e. Use permanent marker to mark center of standoff fasteners through template onto ceiling. Remove template.

f. At marks, use compass with 0.75 inch (19.05 cm) radius to mark diameter of standoff fasteners onto ceiling.

g. Mix epoxy gel per manufacturer's instructions. (Refer to AMM 51-20)

Note: Maximum bond gap thickness is 0.13 inch (0.33 cm).

h. Apply epoxy gel to back of standoff fasteners (item 24) and remove paper backing from standoff holding fixture.

Note: After cure cycle is completed, remove and discard standoff holding fixtures.

i. At marked outline, position standoff fastener to installation area and firmly press holding fixture to installation surface. Depress standoff to contact installation surface and allow to cure. Repeat standoff fastener installation at other marked outline. (Refer to AMM 51-20)

6. *Serials SR20-1337 thru 1797, SR22-0435 thru 2420:* Install EMM. **(See Figure 06)**

a. Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
Permanent Marker	-	Any Source	Mark.
Plastic Spreader	-	Any Source	Apply adhesive.
Masking Tape	-	Any Source	Mask area.
Sandpaper	80 to 120-grit	Any Source	Abrade bonding surfaces.
Isopropyl Alcohol	-	Any Source	Clean installation area.
Cotton Cloth (clean and lint free)	-	Any Source	Clean installation area.
Vacuum	-	Any Source	Clean installation area.
Paint Brush	-	Any Source	Clean installation area.

Description	P/N or Spec.	Supplier	Purpose
Spot-Lite, Light Weight Body Filler	100445	Fibre Glass-Evercoat Cincinnati, OH 45242 513-489-7600	Exterior body filler.
Flashbreaker Tape	-	Any Source	Make smooth and contaminate free repair surface.

b. From COM1 antenna forward installation screws, measure aft 20.72 ±0.75 inches (52.63 ±1.91 cm) along outer laminate at BL0 upper fuselage, and mark.

c. From previous mark, measure aft 6.00 ±0.25 inches (15.24 ±0.64 cm), and mark.

d. Position EMM between marks over curvature of outer laminate.

e. Using EMM as a template, mark lines extending outboard approximately 13 inches (33 cm) to left and right from both marks. Apply masking tape to outer perimeter of marked lines.

f. From BL0, remove paint, primer, and body filler at area between both lines extending outboard to the left and right. Continue sanding outboard until both edges of existing EMM are exposed. (Refer to AMM 51-20)

g. Using 80 to 120-grit sandpaper or finer, burnish existing EMM until shiny. Frequently clean surface of contaminants using vacuum and paint brush to ensure EMM is not damaged.

h. Using 80 to 120-grit sandpaper or finer, burnish replacement EMM until shiny.

i. Vacuum repair area.

j. Solvent clean installation area with isopropyl alcohol. (Refer to AMM 20-30)

CAUTION: Replacement EMM must overlap existing EMM by 1.0 inch (2.5 cm) and feature no breaks in continuity.

Note: If EMM is creased, flatten out creases by pressing a plastic spreader across the EMM on a smooth surface. This technique will also cause the EMM to curve slightly, conforming to the fuselage curvature.

k. Mix approximately 4.2 oz (120 g) of Epon resin. Add Aerosil and Sil-Cell in incremental quantities until smooth, spreadable consistency is achieved. (Refer to AMM 51-30)

CAUTION: Do not apply adhesive to the overlap areas.

l. Use plastic spreader to apply Epon adhesive paste onto bond area defined by marked lines on fuselage.

Note: Apply flashbreaker tape along the edges of EMM that want to lift away from the repair area.

m. Position EMM in place and use plastic spreader to smooth EMM into the adhesive. Scrape excess into cup and apply extra onto areas that want to lift.

Note: Flashbreaker tape should not extend over EMM by more than 0.10 inch (0.25 cm).

n. At EMM overlaps, apply flashbreaker tape to the edges of overlapping EMM. Use plastic spreader to apply adhesive to EMM overlap.

o. Burnish EMM and perform continuity check. If continuity is unacceptable, “stipple”, or tap down EMM at overlaps with plastic spreader and repeat continuity check.

p. Initial cure repair area between outboard EMM edges at room temperature. (Refer to AMM 51-20)

q. Remove flashbreaker tape. Final cure for 4 hours at 150° - 195° F (66° - 91° C). (Refer to AMM 51-20)

r. Apply body filler to repair area. (Refer to AMM 51-20)

s. Paint repair area. (Refer to AMM 51-20)

7. At pass-through and mounting holes for GPS2, re-drill existing holes where covered by repair plies.

8. Deburr edges of pass-through and mounting holes.

9. Solvent clean installation area at antenna mounting holes with isopropyl alcohol. (Refer to AMM 20-30)

V. *Kit 70190-001 or Kit 70190-002:* Drill GPS1 antenna installation area. **(See Figure 01)**, **(See Figure 04)**, **(See Figure 09)**

1. Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
Isopropyl Alcohol	TT-I-735 Grade A or B	Any Source	Clean installation area.
Cotton Cloth (clean and lint free)	-	Any Source	Clean installation area.
Sandpaper	80 to 120-grit	Any Source	Abrade bonding surfaces.
Drill Bit	0.25 inch (0.64 cm)	Any Source	Drill pilot holes for connector holes.
Drill Bit	0.14 inch (0.36 cm)	Any Source	Drill antenna mounting holes.
Hole Saw	0.75 inch (1.91 cm)	Any Source	Drill connector holes.
Deburring Tool	-	Any Source	Deburr.

2. *Serials replacing existing standalone XM antenna:* Mark antenna installation holes.

a. From forward RH antenna installation hole, measure 3.30 inches (8.38 cm) aft, and mark aft RH antenna installation hole.

b. From previous mark, measure 1.60 inches (4.06 cm) to the left, and mark aft LH antenna installation hole.

c. From intersection of forward mounting holes at BL0, measure 1.04 inches (2.64 cm) aft, and mark forward antenna cable pass-through hole.

3. *Serials **not** replacing existing standalone XM antenna:* Mark antenna installation holes.

a. From COM1 antenna forward installation screws, measure forward 40 inches (101.6 cm) and mark.

b. From previous mark, mark perpendicular line intersecting with BL0.

c. From intersection at BL0, measure 0.80 inch (2.54 cm) to the right, and mark forward RH antenna installation hole.

d. From previous mark, measure 3.30 inches (8.38 cm) aft, and mark aft RH antenna installation hole.

e. From previous mark, measure 1.60 inches (4.06 cm) to the left, and mark aft LH antenna installation hole.

f. From previous mark, measure 3.30 inches (8.38 cm) forward, and mark forward LH antenna installation hole.

g. From intersection of forward mounting holes at BL0, measure 1.04 inches (2.64 cm) aft, and mark forward antenna cable pass-through hole.

4. *Kit 70190-002:* From intersection of forward mounting holes at BL0, measure 2.74 inches (6.96 cm) aft, and mark aft antenna cable pass-through hole.
5. At antenna cable pass-through hole mark(s), use 0.25 inch (0.64 cm) drill bit to drill pilot hole(s).
6. At outer laminate, use 0.75 inch (1.91 cm) hole saw to drill antenna cable pass-through hole(s) at pilot hole(s).

Note: Use drill stop to prevent damage to underlying structure.

7. At each mounting hole mark, use 0.14 inch (0.36 cm) drill bit to drill mounting holes.
8. Deburr edges of pass-through and mounting holes.
9. Solvent clean installation area at antenna mounting holes with isopropyl alcohol. (Refer to AMM 20-30)

W. *Kit 70190-001 or Kit 70190-002:* Install GPS1 antenna and cable(s). **(See Figure 02), (See Figure 05), (See Figure 011)**

1. Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
Isopropyl Alcohol	TT-I-735 Grade A or B	Any Source	Clean installation area.
Cotton Cloth (clean and lint free)	-	Any Source	Clean installation area.
Tape Primer	94 Primer	3M Company St. Paul, MN 55144 888-364-3577	Prime installation surface.
Cable Ties	MS3367-1-9	Any Source	Secure cable.
Utility Knife	-	Any Source	Trim gasket/Cut copper tape.
Sealant [1] White Antique White Beige Gray	 151-8273 C-850A 151- 8281 C-910A 151-8299 C-920A 08361	 Sherwin Williams Company Ashland, KY 41101 606-324-3179 3M Company St. Paul, MN 55144 888-364-3577	Fillet seal at antenna base.

1. use applicable color

2. Using isopropyl alcohol, solvent clean installation area at antenna mounting holes and existing copper grounding tape in the surrounding area. (Refer to AMM 20-30)
3. Apply tape primer to installation area following manufacturer's instructions.

CAUTION: Ensure that a minimum of 0.50 inch (1.27 cm) overlap exists between the existing copper grounding tape and new copper grounding tape.

Ensure area of copper tape is centered below mounting hole pattern.

4. Center and install copper tape (item 13) over mounting holes, covering 5.5 × 5.5 inch (14.0 × 14.0 cm) area.
5. Along LH and RH sides of CAPS handle, install strips of copper tape with a minimum width of 0.5 inch (1.27 cm) to provide continuity between forward and aft copper tape installations.
6. *Serials SR20 and SR22 w/o SkyWatch:* Apply copper tape (item 13) to inner laminate of upper fuselage.
   a. Aft of CAPS handle mounting bracket in fuselage, measure 2.50 ±1.0 inches (6.35 ±2.54 cm) aft of FS 145.0 to locate copper tape installation forward edge. From forward edge, measure 20.6 ±1.0 inches (52.32 ±2.54 cm) aft to locate copper tape installation aft edge.
   b. Using 80 to 120-grit sandpaper, prepare inner laminate of upper fuselage for additional copper grounding tape.
   c. Using isopropyl alcohol, solvent clean existing copper grounding tape and area where additional copper grounding tape is being located. (Refer to AMM 20-30)
   d. Apply tape primer to installation area following manufacturer's instructions.

   CAUTION: Ensure that a minimum of 0.50 inch (1.27 cm) overlap exists between the existing copper grounding tape and new copper grounding tape.

   e. Apply copper grounding tape over prepared area, including nuts and bolt ends within prepared surface area. Smooth copper grounding tape to conform to fuselage shape.
7. Using utility knife, puncture copper tape at mounting holes and cut outline of antenna cable pass-through hole.
8. Solvent clean installation area with isopropyl alcohol. (Refer to AMM 20-30)
9. To improve cosmetic appearance of gasket installation, use utility knife to remove 0.2 inch (0.5 cm) from perimeter of new gasket.
10. *Kit 70190-001:* Position gasket (item 6) and WAAS antenna (item 1) on fuselage roof.
11. *Kit 70190-002:* Position gasket (item 6) and WAAS/XM antenna (item 2) on fuselage roof.

CAUTION: Verify o-ring is on each screw prior to antenna installation.

O-ring at screw head will be damaged if screw is tightened from screw head. Hold screw from top and tighten nut from bottom to secure antenna.

12. Loosely secure antenna to fuselage with screws (item 10), washers (item 7), and nuts (item 9).

CAUTION: Due to curvature of airplane surface, torque forward screws prior to torquing aft screws.

13. Torque forward screws to 12 - 15 in-lb (1.36 - 1.69 Nm). (Refer to AMM 20-60)
14. Torque aft screws to 12 - 15 in-lb (1.36 - 1.69 Nm). (Refer to AMM 20-60)

CAUTION: Do not apply sealant in screw holes or over screw heads.

Ensure entire top edge of antenna's metal base is visible above any installed sealant. Any sealant applied above the metal base must be wiped clean from the antenna.

15. Use sealant to fillet seal at antenna base. (Refer to AMM 20-10)

CAUTION: Ensure antenna cable overbraid does not contact the speaker or speaker mount. Reroute cable using cable ties as required.

Verify antenna cable is routed with right-angle plug connector positioned at antenna base.

Note: Route antenna cable with existing wires where applicable.

Hand tighten coupling nut to antenna until connector and cable cannot rotate on antenna.

To facilitate cable installation aft of radio rack by following suggested connection sequence covered later in this Service Bulletin, defer connecting GPS1 antenna cable to transceiver.

16. Install GPS1 antenna cable (item 3) from antenna to receiver using existing cable anchors and new cable ties.

CAUTION: Install loom over antenna cable to protect cable from chafing on nearby metal components. Ensure antenna cable is protected from lower door hinge bolts and contact with ground plane along inner fuselage ceiling.

17. At base of door pillar, install Ø 0.625-inch loom (item 11) over GPS1 antenna cable and secure antenna cable to existing wire loom with cable ties.
18. Stow antenna cable for GPS1 near aft radio rack for later installation.
19. *Kit 70190-002:* Install XM antenna cable. **(See Figure 05)**

CAUTION: Ensure antenna cable overbraid does not contact the speaker or speaker mount. Reroute cable using cable ties as required.

Verify antenna cable is routed with right-angle plug connector positioned at antenna base.

Note: Route antenna cable with existing wires where applicable.

Hand tighten coupling nut to antenna until connector and cable cannot rotate on antenna.

a. Install XM antenna cable (item 4) from antenna to receiver using existing cable anchors and new cable ties.

CAUTION: *Serials SR20-1337 thru 1797, SR22-0435 thru 2437:* Install loom over antenna cable to protect cable from chafing on nearby metal components. Ensure antenna cable is protected from lower door hinge bolts and contact with ground plane along inner fuselage ceiling.

b. *Serials SR20-1337 thru 1797, SR22-0435 thru 2437:* At base of door pillar, install Ø 0.625-inch loom (item 11) over XM antenna cable and secure antenna cable to existing wire loom with cable ties.

CAUTION: If installed, remove and discard attenuator. Use of attenuator with replacement XM antenna cable may result in non-functioning XM Weather system.

c. At XM receiver, connect XM antenna cable to antenna connector. Torque cable nut to 7 - 10 in-lb (0.79 - 1.1 Nm). (Refer to AMM 20-60)

Note: Hand tighten coupling nut to antenna until connector and cable cannot rotate on antenna.

d. At WAAS/XM antenna, connect right-angle connector on XM antenna cable to antenna connector.

X. *Kit 70190-003 or Kit 70190-004:* Install GPS2 antenna and cable. **(See Figure 010)**, **(See Figure 011)**

1. Acquire necessary tools, equipment, and supplies.

Description	P/N or Spec.	Supplier	Purpose
Isopropyl Alcohol	TT-I-735 Grade A or B	Any Source	Clean installation area.
Cotton Cloth (clean and lint free)	-	Any Source	Clean installation area.
Tin Plated Copper Tape	50379-002	Cirrus Design (Kit 70190-001 or Kit 70190-002)	Provide grounding.
Tape Primer	94 Primer	3M Company St. Paul, MN 55144 888-364-3577	Prime installation surface.
Cable Ties	MS3367-1-9	Any Source	Secure cable.
Epoxy Adhesive (if required)	5 Minute Epoxy	Devcon Danvers, MA 01923 800-933-8266	Adhesion.
Utility Knife	-	Any Source	Trim gasket/Cut copper tape.
Sealant [1] White Antique White Beige Gray	 151-8273 C-850A 151- 8281 C-910A 151-8299 C-920A 08361	 Sherwin Williams Company Ashland, KY 41101 606-324-3179 3M Company St. Paul, MN 55144 888-364-3577	Fillet seal at antenna base.

1. use applicable color

2. Using isopropyl alcohol, solvent clean installation area at antenna mounting holes and existing copper grounding tape in the surrounding area. (Refer to AMM 20-30)
3. Apply tape primer to installation area following manufacturer's instructions.

CAUTION: Ensure that a minimum of 0.50 inch (1.27 cm) overlap exists between the existing copper grounding tape and new copper grounding tape.

Ensure area of copper tape is centered below mounting hole pattern.

4. Center and install copper tape over mounting holes, covering 5.5 × 5.5 inch (14.0 × 14.0 cm) area.
5. Using utility knife, puncture copper tape at mounting holes and cut outline of antenna cable pass-through hole.
6. Solvent clean installation area with isopropyl alcohol. (Refer to AMM 20-30)
7. To improve cosmetic appearance of gasket installation, use utility knife to remove 0.2 inch (0.5 cm) from perimeter of new gasket.
8. Position gasket (item 6) and WAAS antenna (item 1) on fuselage roof.

CAUTION: Verify o-ring is on each screw prior to antenna installation.

O-ring at screw head will be damaged if screw is tightened from screw head. Hold screw from top and tighten nut from bottom to secure antenna.

9. Loosely secure antenna to fuselage with screws (item 10), washers (item 8), and nuts (item 9).

CAUTION: Due to curvature of airplane surface, torque forward screws prior to torquing aft screws.

10. Torque forward screws to 12 - 15 in-lb (1.36 - 1.69 Nm). (Refer to AMM 20-60)
11. Torque aft screws to 12 - 15 in-lb (1.36 - 1.69 Nm). (Refer to AMM 20-60)

CAUTION: Do not apply sealant in screw holes or over screw heads.

Ensure the entire top edge of the antenna's metal base is visible above any installed sealant. Any sealant applied above the metal base must be wiped clean from the antenna.

12. Use sealant to fillet seal at antenna base. (Refer to AMM 20-10)

CAUTION: Ensure antenna cable overbraid does not contact the speaker, speaker mount, or Stormscope antenna connector (if installed). Reroute cable using cable ties as required.

Verify antenna cable is routed with right-angle plug connector positioned at antenna base.

Note: Route antenna cable with existing wires where applicable.

Hand tighten coupling nut to antenna until connector and cable cannot rotate on antenna.

To facilitate cable installation aft of radio rack by following suggested connection sequence covered later in this Service Bulletin, defer connecting GPS2 antenna cable to transceiver.

13. Install GPS2 antenna cable (item 5) from antenna to receiver using existing cable anchors and new cable ties. Install new cable anchors (item 14) with epoxy adhesive as required.

    CAUTION: Install loom over antenna cable to protect cable from chafing on nearby metal components. Ensure antenna cable is protected from lower door hinge bolts and contact with ground plane along inner fuselage ceiling.

14. At base of door pillar, install Ø 0.625-inch loom (item 11) over GPS2 antenna cable and secure antenna cable to existing wire loom with cable ties.
15. Aft along inner fuselage ceiling, install Ø 0.5-inch loom (item 12) over GPS2 antenna cable from location where Ø 0.625-inch loom (item 11) ends to GPS2 antenna. Secure antenna cable to existing wire loom with cable ties.
16. Stow antenna cable for GPS2 near aft radio rack for later installation.

Y. Connect transceiver/audio panel cables and lines.

Note: To facilitate installation of GPS antenna cables at MFD opening and sides of radio rack, connect cables/lines in order presented.

1. If disconnected, connect GPS2 antenna cable to GPS #2 transceiver.
2. If disconnected, connect COM2 coolant line to GPS #2 transceiver.
3. If disconnected, connect GPS1 antenna cable to GPS #1 transceiver.
4. If disconnected, connect COM1 coolant line to GPS #1 transceiver.
5. If disconnected, connect COM1 antenna cable to GPS #1 transceiver.
6. If disconnected, connect P521 cable for audio panel.
7. If disconnected, connect P550 cable for autopilot.

Z. *Serials w/ 121.5 MHz ELT:* Install ELT shield. **(See Figure 012)**

1. Remove access panel CB6. (Refer to AMM 6-00)
2. Open quick release straps securing transmitter to mounting tray.
3. Position ELT shield (item 26) over ELT transmitter.
4. Close quick release straps securing transmitter to mounting tray.
5. Install access panel CB6. (Refer to AMM 6-00)

AA. Install radio module assembly. (Refer to AMM 25-10)

AB. Install MFD. (Refer to AMM 31-60)

AC. Connect battery. (Refer to AMM 24-30)

AD. Install engine cowling. (Refer to AMM 71-10)

AE. Perform Operational Test - Multi-Function Display. (Refer to AMM 31-60)

AF. Perform Functional Test - Garmin 400 Series GPS Navigator Setup.

1. Connect 28 ±1 VDC external power to external power receptacle.
2. Set BAT 1, BAT 2, and AVIONICS switches to ON positions.
3. Pull STARTER RELAY and FUEL PUMP RELAY circuit breakers.
4. On dual GNS or GNS/GNC units, rotate [C] knobs for COM power counter-clockwise to OFF positions.

   Note: Right data card slot contains blank card.

5. On dual GNS or GNS/GNC units, verify data cards are installed for GPS1 and GPS2 in left data card slot.

6. While holding [ENT], rotate [C] knobs for COM power clockwise to ON positions. Release [ENT] after display is on.
7. After power-up, the Self Test pages will display, followed by the Database page.
8. On dual GNS or GNS/GNC units, verify GPS1 and GPS2 have the same MAIN SOFTWARE VERSION, GPS SOFTWARE VERSION, and CYCLE numbers displayed.
9. On the Database page, press [ENT].
10. On the Instrument Panel Self-Test page, press [ENT].
11. Navigate subsequent pages by use of GNS 430 controls.

Note: Not all parameters are editable.

To turn on cursor, press inner dial of [CRSR] knob.

To move between data fields, rotate outer dial of [CRSR] knob.

To change a field that cursor is on, rotate inner dial of [CRSR] knob.

To accept entry of current selection, press [ENT].

To turn off cursor before switching pages, press inner dial of [CRSR] knob.

To switch between pages, rotate inner dial of [CRSR] knob.

a. Set parameters for the Main ARINC 429 Config page for GPS1.

	SPEED	**DATA**
IN 1	Low	Sandel EHSI
IN 2 - *Serials w/o SkyWatch*	Low	Off
IN 2 - *Serials w/ SkyWatch*	High	Traffic Advisory
OUT	Low	GAMA 429 grph w/int
SDI	LNAV 1	
VNAV - *Serials w/ PFD S/W Rel. 6.2.2*	Disable Labels	
VNAV - *Serials w/ PFD S/W Rel. 7 or higher*	Enable Labels	

b. Set parameters for the Main ARINC 429 Config page for GPS2.

	SPEED	**DATA**
IN 1	Low	Sandel EHSI
IN 2 - *Serials w/o SkyWatch*	Low	Off
IN 2 - *Serials w/ SkyWatch*	High	Traffic Advisory
OUT	Low	GAMA 429 grph w/int
SDI	LNAV 2	
VNAV - *Serials w/ PFD S/W Rel. 6.2.2*	Disable Labels	
VNAV - *Serials w/ PFD S/W Rel. 7 or higher*	Enable Labels	

c. Set parameters for the Main RS232 Config page for GPS1 and GPS2.

	INPUT	OUTPUT
CHAN 1	Icarus-alt	Aviation
CHAN 2 - *Serials w/o TAWS*	Off	Off
CHAN 2 - *Serials w/ TAWS (configure for GPS1 only)*	Off	HW EGPWS
CHAN 3	Crossfill	Crossfill
CHAN 4 - *Serials w/o Stormscope*	Off	Off
CHAN 4 - *Serials w/ Stormscope **and** w/ Main Software Version 2.00*	Off	Off
CHAN 4 - *Serials w/ Stormscope **and** w/ Main Software Version 3.0 or higher*	WX-500	Off
FUEL TYPE	AV gas	

d. The Main Inputs 1 page is not used.

e. The Main Inputs 2 page is not used.

f. Set parameters for the Instrument Panel Self-Test page.

LCDI	Half Left
LFLG	Out of View
TO/FRM	To
RMI	135°
DTK	150°

g. For the Main Lighting page, cover photocell and observe that display slowly dims and lighting values decrease.

Note: Main Lighting page values may differ from those below due to your unique lighting environment.

h. Set parameters for the Main Lighting page.

	DISPLAY	KEY
LIGHTING	0-9999	0-9999
SOURCE	PHOTO	28VDC
RESP TIME/MIN	4 080	4 40
SLOPE/OFFSET	50 50	50 50

i. Set parameters for the Date/Time Setup page.

j. Set parameters for the Main Discrete Inputs page.

GRAY CODE	00000000000
DECODED ALTITUDE	_ _ _ _ _ _ ft
RMT CDI	unchecked
RMT OBS	unchecked

k. The Main Discrete Outputs page is not used.

l. The Main CDI / OBS Config page is not used.

Note: Set SPACING only. Do not adjust any other settings.

m. Set parameters for the COM Setup page.

FREQ	136.975
SPACING	25.0 KHz
S 250	10
S 833	08
SIDE	07
MIC	44

n. The VOR Discrete Inputs page is not used.

Note: Set DME CGNL MODE only. Do not adjust any other settings.

o. Set parameters for the VOR/LOC/GS CDI page.

	CDI	**FLAG**	**S-FLG**	**TO-FR**
LAT	Center	Hide	Hide	From
VERT	Center	Hide	Hide	
SELECTED COURSE	No input			
DME CGNL MODE	Parallel 2x5			

p. Set parameters for the VOR / LOC / GS ARINC 429 Config page for GPS1.

	RX	**TX**
SPEED	Low	Low
SDI	VOR / ILS 1	
DME MODE	Directed freq 1	

q. Set parameters for the VOR / LOC / GS ARINC 429 Config page for GPS2.

	RX	TX
SPEED	Low	Low
SDI	VOR / ILS 2	
DME MODE	Directed freq 2	

r. Set parameters for the GPS Vertical Offset page.

GPS ANTENNA HEIGHT ABV GND 6.0ft

s. On the Main System Config page, set parameters for GPS1 and GPS2.

CONFIGURE	Terrain
TERRAIN TYPE	Terrain
TEST CARD	Untested
HW CONFIG	Terrain

t. Test the terrain data card on both GPS1 and GPS2.
   (1) Verify the HW CONFIG field displays “Terrain”.
   (2) Highlight the TEST CARD field, then press [ENT].
   (3) Verify the TEST CARD field indicates “Pass”.

u. When setup is completed, on dual GNS or GNS/GNC units, rotate [C] knobs for COM power counter-clockwise to OFF positions.

v. Allow display to blank completely.

w. On dual GNS or GNS/GNC units, rotate [C] knobs for COM power clockwise to ON positions.

The Self-Test pages will be displayed followed by the Database page.

x. On the Database page, press [ENT].

y. Set parameters on the Instrument Panel Self-Test page.

LCDI	Half Left
LFLG	Out of View
VCDI	Half Up
VFLG	Out of View
CAP - *SR20 Serials*	56gl
CAP - *SR22 Serials w/ 81 gallon wing*	81gl
CAP - *SR22 Serials w/ 92 gallon wing*	92gl
FOB	0gl

FF	0.0gl
TO/FRM	To
RMI	135°
OBS	150°
ANNUN	On
DTK	150°

12. Verify parameters for self-test data output by GNS 430 on the displays indicated.

Display	Parameter	Self-Test
VOR/PFD	Course Deviation	½ scale left deviation, TO flag, NAV flag pulled
MFD/PFD	Active Waypoint (WPT)	"GARMN"
MFD/PFD	Distance To Go (DIS)	10.0 nautical miles
MFD/PFD	Desired Track (DTK)	150°
MFD/PFD	Bearing to Wpt (BRG)	135°
MFD/PFD	Groundspeed (GS)	150 knots
MFD/PFD	Time to Go (ETE)	4 minutes

13. On dual GNS or GNS/GNC units, press [ENT]. Upon approval of the Database page, the Satellite Status page will be displayed.
14. Verify continuous GPS reception during COM transmissions for GPS1 and GPS2.
    a. Using large outer RH knob, select NAV group.
    b. Rotate small RH knob to select Satellite Status page.
    c. On audio panel, select “COM1”.
    d. Set COM1 to each of the following frequencies and verify that the reception of GPS1 and GPS2 is not lost during a COM transmission.

121.150 MHz	121.225 MHz	131.225 MHz	131.300 MHz
121.175 MHz	121.250 MHz	131.250 MHz	131.325 MHz
121.200 MHz	131.200 MHz	131.275 MHz	131.350 MHz

    e. On audio panel, select “COM2”.
    f. Set COM2 to each of the following frequencies and verify that the reception of GPS1 and GPS2 is not lost during a COM transmission.

121.150 MHz	121.225 MHz	131.225 MHz	131.300 MHz
121.175 MHz	121.250 MHz	131.250 MHz	131.325 MHz
121.200 MHz	131.200 MHz	131.275 MHz	131.350 MHz

15. Verify coupling between PFD and COM/NAVs:
    a. On PFD, press [Nav1] to select "GPS1".
    b. Verify Nav1 selection on PFD matches CDI setting of "GPS" on GNS 430.
    c. On PFD, press [Nav1] to select "VLOC1".
    d. Verify CDI setting on GNS 430 changes to "VLOC".
    e. On GNS 430, press [CDI] to select "GPS".
    f. On PFD, verify Nav1 selection changes back to "GPS1".
    g. Repeat coupling procedure for the lower GNS 430 or GNC 420.
16. Reset STARTER RELAY and FUEL PUMP RELAY circuit breakers.
17. Set BAT 1, BAT 2, and AVIONICS switches to OFF positions.
18. Disconnect 28 ±1 VDC external power from external power receptacle.

AG. *Serials w/ GPS1 WAAS **and** GPS2 WAAS:* Perform Functional Test - Dual Garmin 400 Series GPS Navigator Crossfill Setup. (Refer to AMM 34-50)

AH. Perform Operational Test - Garmin 400 Series GPS Navigator VHF COM Check. (Refer to AMM 34-50)

AI. *Serials w/ Garmin* GNC 420 *GPS2:* Perform Operational Test - Garmin 400 Series GPS Navigator VHF COM Check. (Refer to AMM 34-50)

AJ. *Serials w/ Garmin GNC 250XL GPS2:* Perform Operational Test - Garmin GNC 250XL GPS/COM Check. (Refer to AMM 34-50)

AK. *Serials w/ XM Weather:* Operational Test - XM Weather Receiver. (Refer to AMM 34-50)

AL. Install center headliner. (Refer to AMM 25-10)

AM. Install forward headliner. (Refer to AMM 25-10)

AN. *Kit 70190-002 **and** Serials SR20-1798 thru 1877, SR22-2438 thru 2749:* Install RH rear cabin side trim. (Refer to AMM 25-10)

AO. *Kit 70190-002 **and** Serials SR20-1798 thru 1877, SR22-2438 thru 2749:* Install RH B-pillar top door trim. (Refer to AMM 25-10)

AP. Install RH A-pillar bottom door trim. (Refer to AMM 25-10)

AQ. *Kit 70190-003 or Kit 70190-004:* Install RH console panel. (Refer to AMM 25-10)

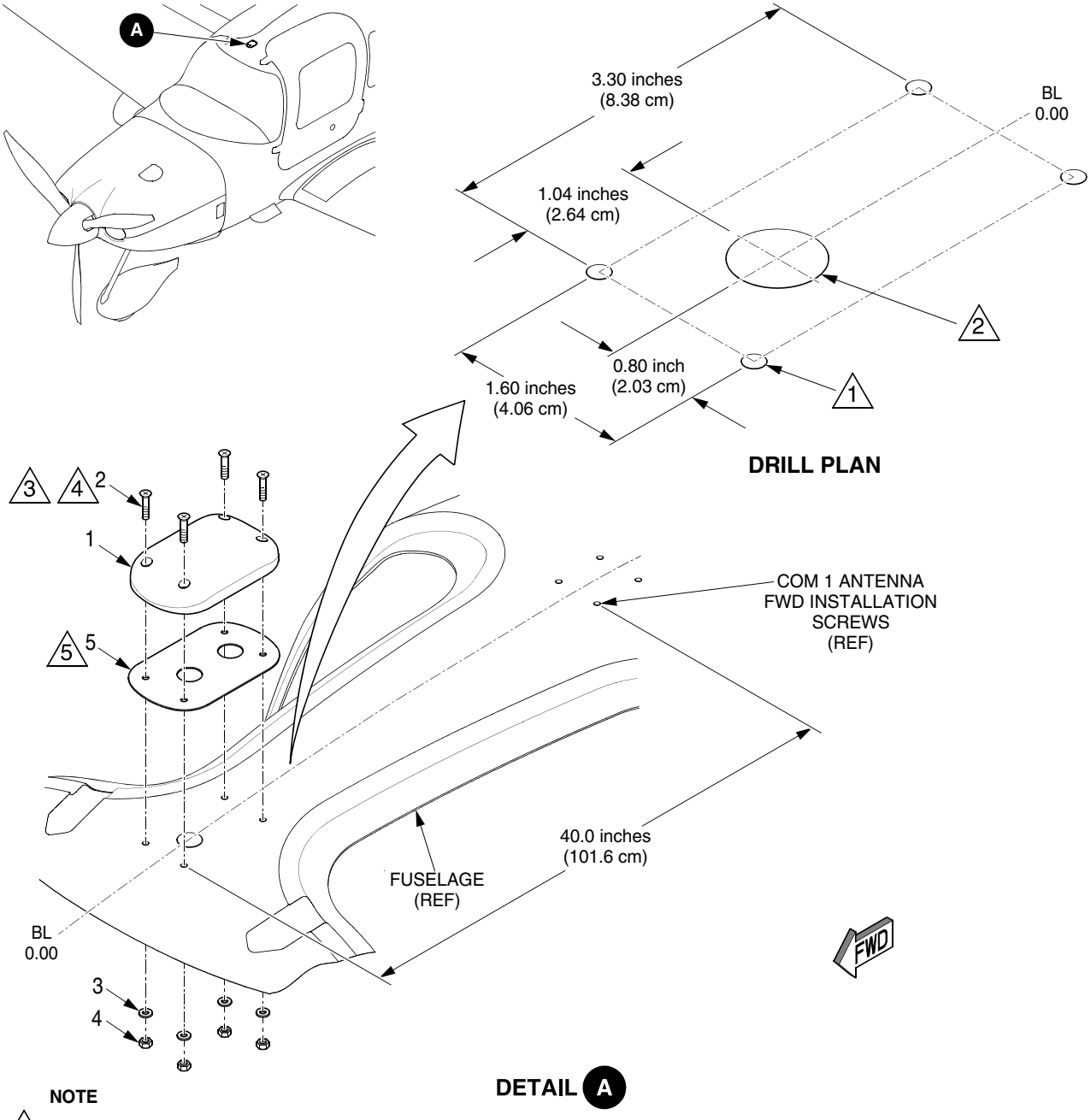
AR. Install glareshield. (Refer to AMM 25-10)

AS. Install both cabin seats. (Refer to AMM 25-10)

AT. Reset STARTER RELAY and FUEL PUMP RELAY circuit breakers.

AU. Set BAT 1, BAT 2, and AVIONICS switches to OFF positions.

AV. Complete airplane records by noting compliance with SB 2X-34-24 R1 in Aircraft Logbook.



NOTE

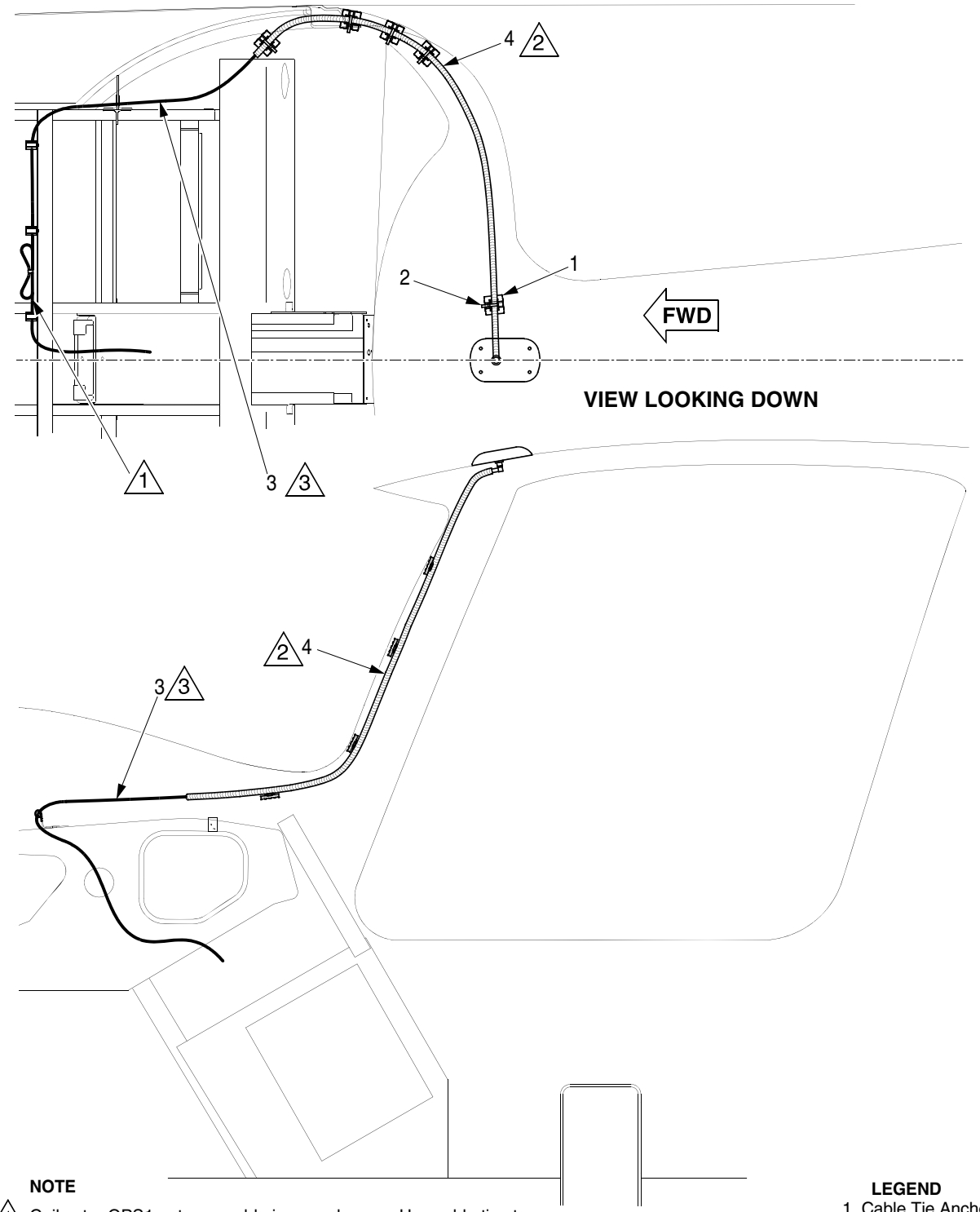
1. Use 0.14 inch (0.36 cm) drill bit to drill four mounting holes used for antenna installation.
2. At antenna cable pass-through hole mark, use 0.25 inch (0.64 cm) drill bit to drill pilot hole. At outer laminate, use 0.75 inch (1.91 cm) hole saw to drill antenna cable pass-through hole at pilot hole.
3. Ensure an o-ring is on each screw before installing. Torque nuts for forward two screws before torquing nuts for the aft two screws on the antenna. Apply a torque of 12 - 15 in-lbs (1.36 - 1.69 Nm).
4. Do not apply sealant in screw holes or over screw heads.
5. After installation, trim gasket as necessary to ensure gasket does not extend outside edge of antenna base.

LEGEND

1. WAAS GPS Antenna
2. Screw
3. Washer
4. Nut
5. Gasket

SR2_SB34_1226

Figure 01 - WAAS (GPS1) Antenna Installation - Kit 70190-001



NOTE

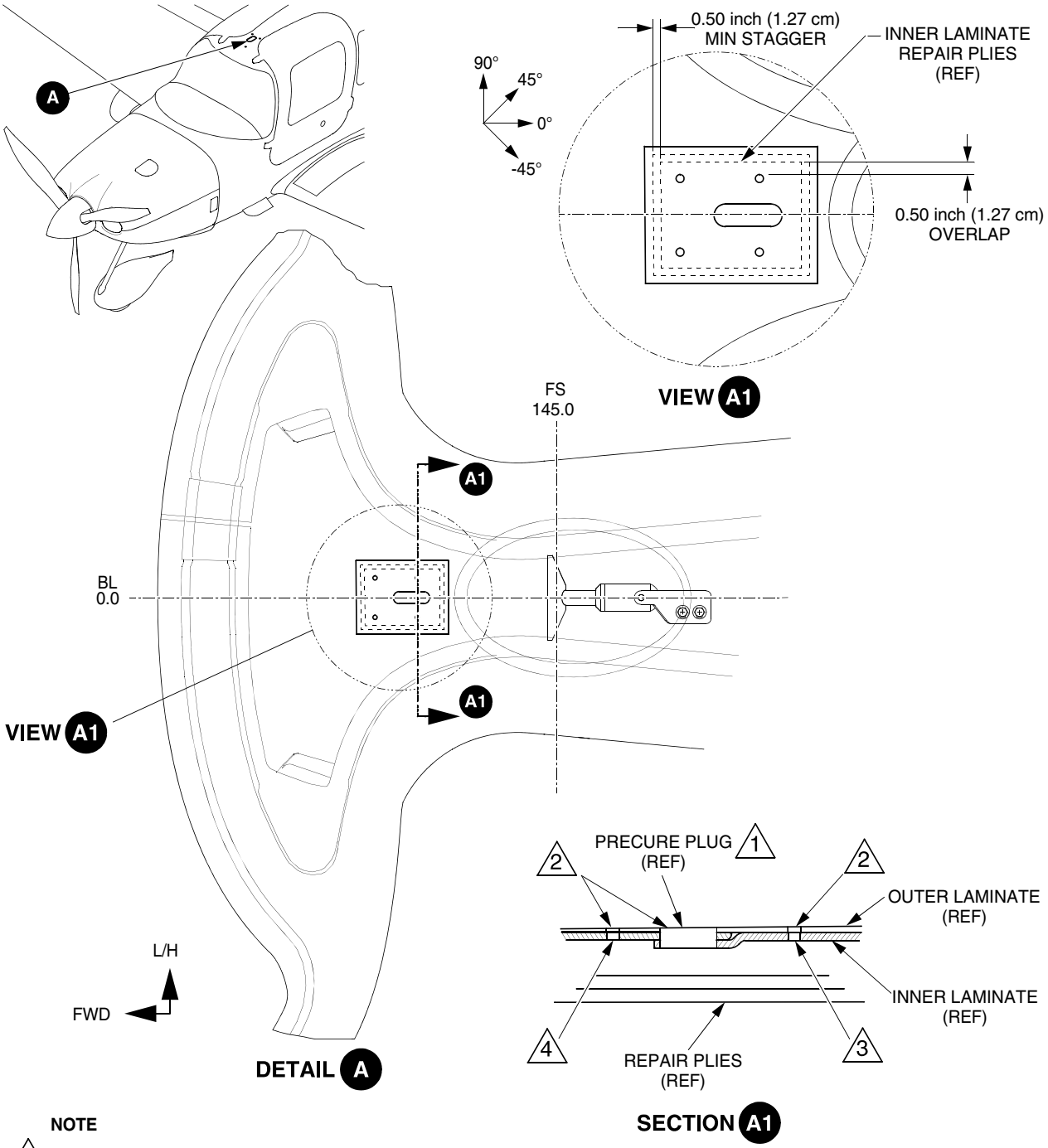
1. Coil extra GPS1 antenna cable in console area. Use cable ties to secure coil to existing harnesses.
2. Install Ø 0.625-inch loom over antenna cable to protect cable from chafing on nearby metal components. Ensure antenna cable is protected from lower door hinge bolts and contact with ground plane along inner fuselage ceiling.
3. Route cable with existing wires where applicable.

LEGEND

1. Cable Tie Anchor
2. Cable Tie
3. Antenna Cable
4. Loom, Ø 0.625-inch

SR2_SB34_1227

Figure 02 - WAAS (GPS1) Antenna Cable Routing - Kit 70190-001

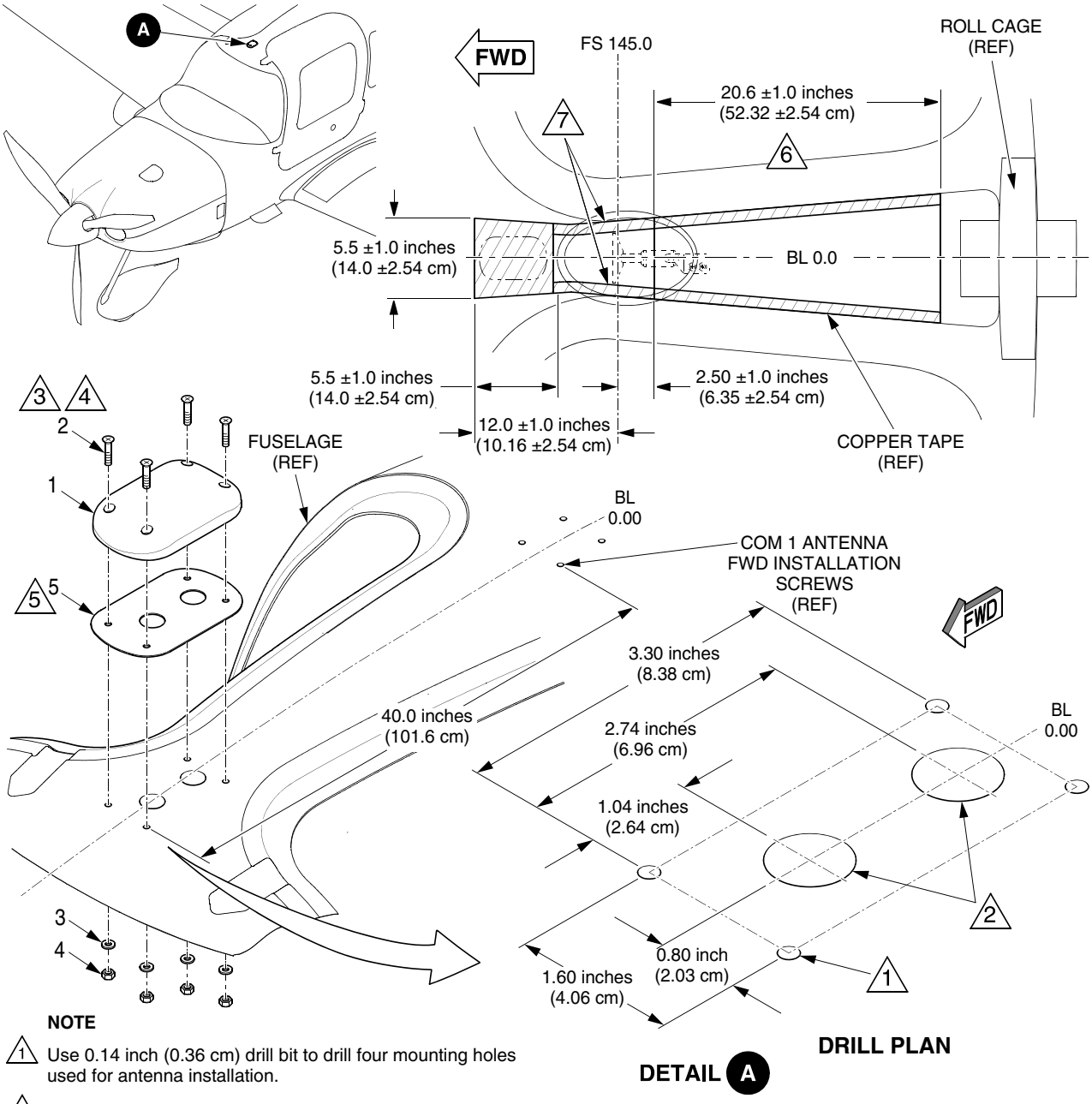


NOTE

1. Pre-fit faying surfaces of precure material flush with outer laminate to ensure a maximum gap of 0.10 inch (2.54 mm) exists around the circumference of the precure material during adhesive curing. If gap exceeds 0.10 inch (2.54 mm), contact Cirrus Design for disposition.
2. To prevent adhesive squish out, cover all holes at outer laminate of installation area with aluminum tape.
3. At inner laminate, apply filler paste to aft installation holes as required to fill any gouges. Fill to make flush with inner laminate.
4. Forward installation holes can be reused for antenna installation. Do not apply filler paste to forward installation holes.

SR2_SB34_1232

Figure 03 - WAAS (GPS1) Fuselage Repair - Kit 70190-002



DETAIL A

DRILL PLAN

NOTE

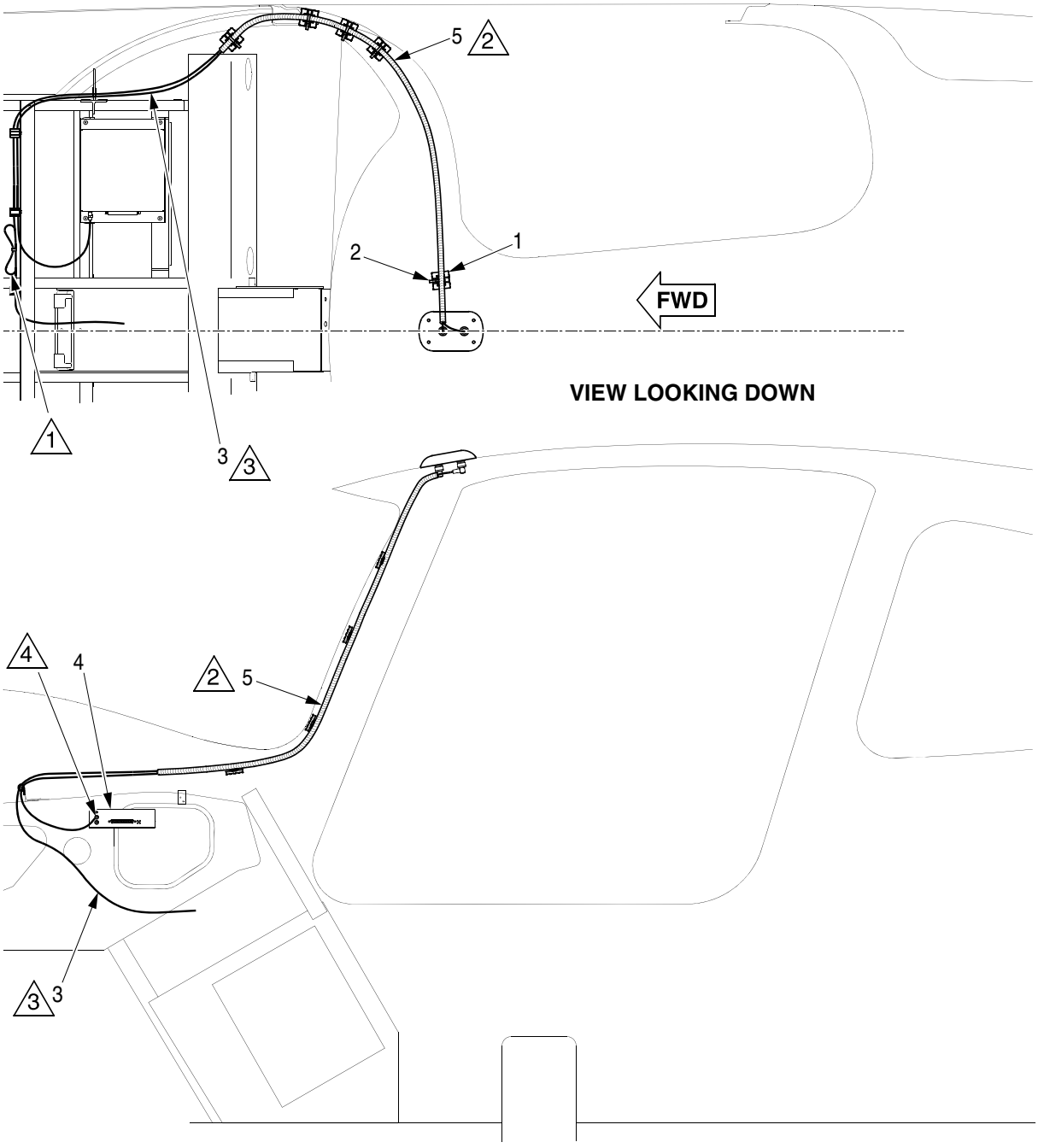
1. Use 0.14 inch (0.36 cm) drill bit to drill four mounting holes used for antenna installation.
2. At both antenna cable pass-through hole marks, use 0.25 inch (0.64 cm) drill bit to drill pilot holes. At outer laminate, use 0.75 inch (1.91 cm) hole saw to drill antenna cable pass-through holes at pilot holes.
3. Ensure an o-ring is on each screw before installing. Torque nuts for forward two screws before torquing nuts for the aft two screws on the antenna. Apply a torque of 12 - 15 in-lbs (1.36 - 1.69 Nm).
4. Do not apply sealant in screw holes or over screw heads.
5. After installation, trim gasket as necessary to ensure gasket does not extend outside edge of antenna base.
6. Only apply copper tape to this area if tape is not already applied by SkyWatch installations.
7. Trim strips of copper tape in this area to a minimum width of 0.5 inch (1.27 cm). Strips may be painted over to hide from view near CAPS handle.

LEGEND

1. WAAS GPS/XM Antenna
2. Screw
3. Washer
4. Nut
5. Gasket

SR2_SB34_1228

Figure 04 - WAAS (GPS1) Antenna Installation - Kit 70190-002



Serials SR20-1337 thru 1797, Serials SR22-0435 thru 2437.

NOTE

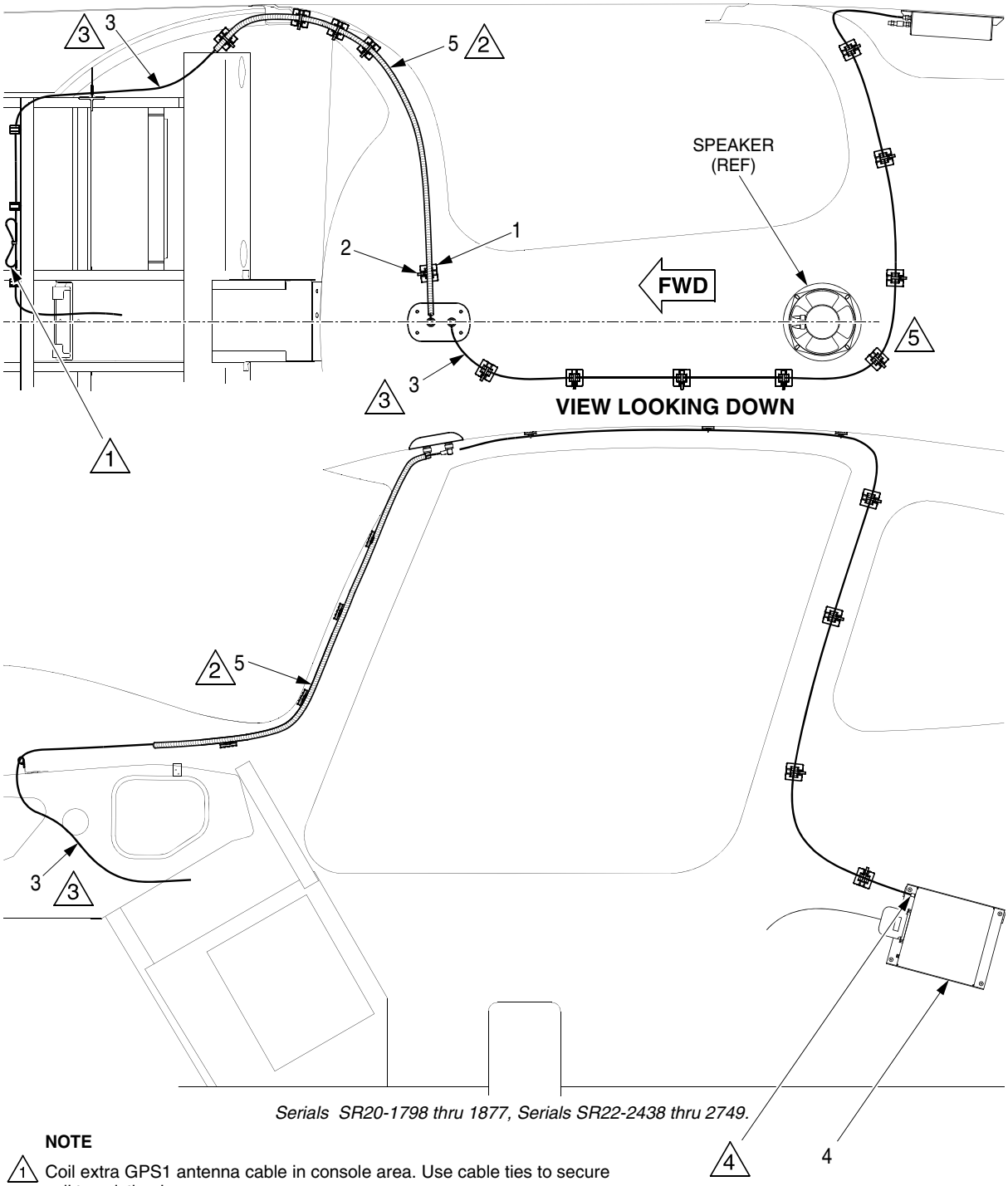
1. Coil extra GPS1 antenna cable in console area. Use cable ties to secure coil to existing harnesses.
2. Install Ø 0.625-inch loom over antenna cable to protect cable from chafing on nearby metal components. Ensure antenna cable is protected from lower door hinge bolts and contact with ground plane along inner fuselage ceiling.
3. Route cable with existing wires where applicable.
4. Torque nut to 7 - 10 in-lb. (0.79 - 1.1 Nm).

LEGEND

1. Cable Tie Anchor
2. Cable Tie
3. Antenna Cable
4. Receiver
5. Loom , Ø 0.625-inch

SR2_SB34_1254

Figure 05 - WAAS (GPS1) Cable Routing - Kit 70190-002 - *Serials SR20-1337 thru 1797, SR22-0435 thru 2437* (Sheet 1 of 2)



Serials SR20-1798 thru 1877, Serials SR22-2438 thru 2749.

NOTE

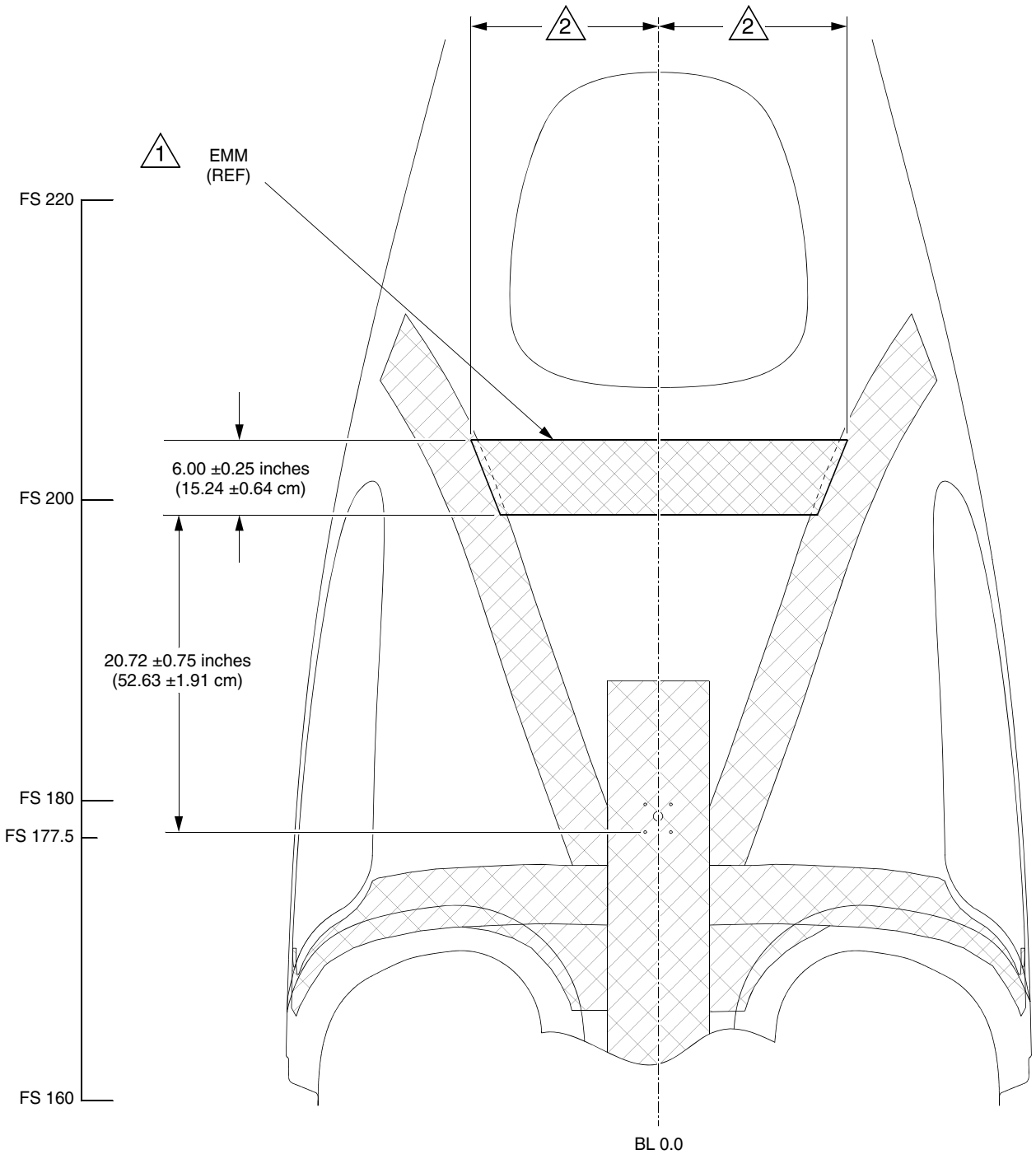
1. Coil extra GPS1 antenna cable in console area. Use cable ties to secure coil to existing harnesses.
2. Install Ø 0.625-inch loom over antenna cable to protect cable from chafing on nearby metal components. Ensure antenna cable is protected from lower door hinge bolts and contact with ground plane along inner fuselage ceiling.
3. Route cable with existing wires where applicable.
4. Torque nut to 7 - 10 in-lb (0.79 - 1.1 Nm).
5. Ensure XM antenna cable does not contact the speaker or speaker mount.

LEGEND

1. Cable Tie Anchor
2. Cable Tie
3. Antenna Cable
4. Receiver
5. Loom, Ø 0.625 inch

SR2_SB34_1237

Figure 05 - WAAS (GPS1) Cable Routing - Kit 70190-002 - *Serials SR20-1798 thru 1877, SR22-2438 thru 2749* (Sheet 2 of 2)



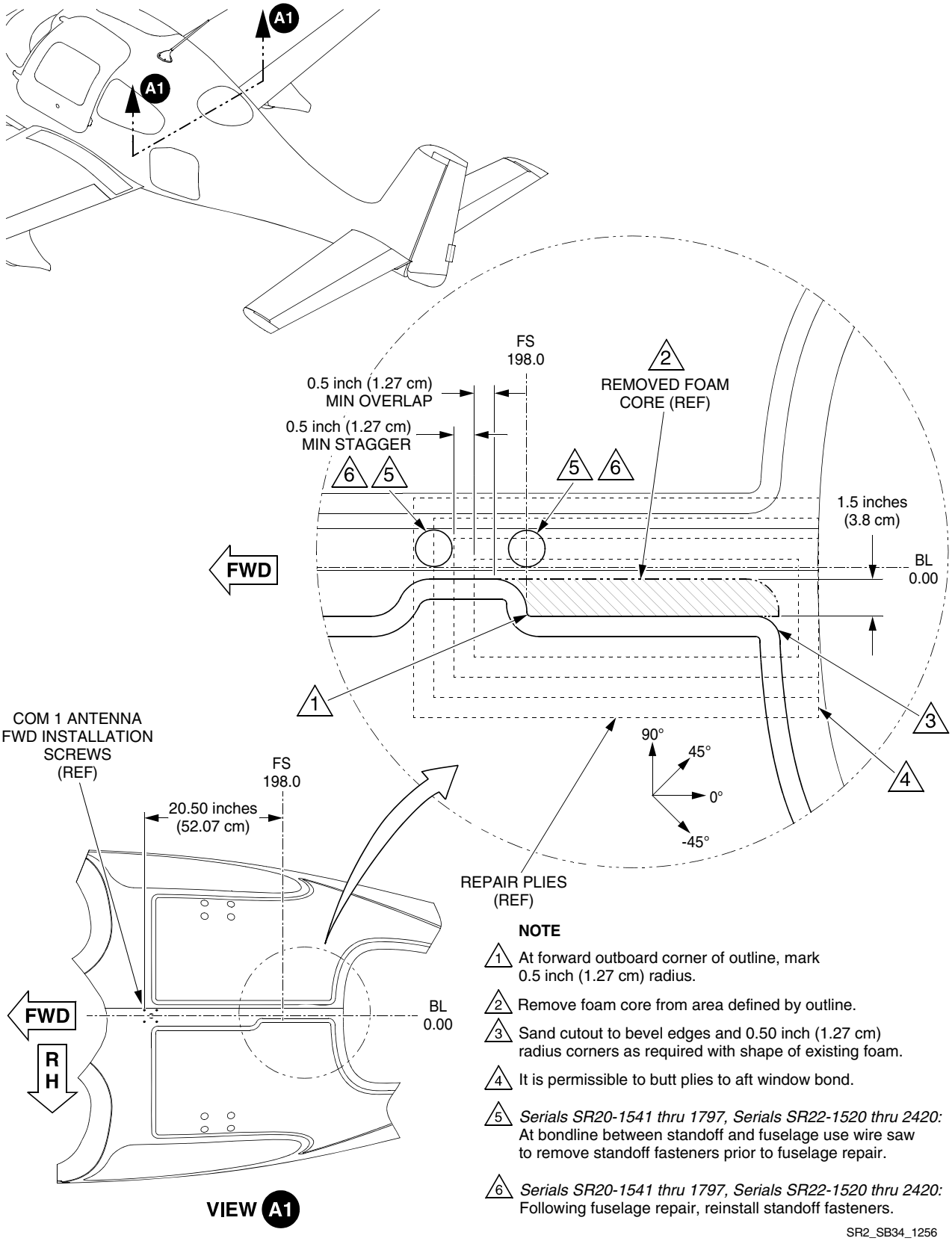
NOTE

1. Position EMM between marks over curvature of outer laminate.
2. Using EMM as a template, mark lines extending outboard approximately 13 inches (33 cm) to left and right from both marks.

DETAIL A

SR2_SB34_1246

Figure 06 - EMM Installation - Kit 70190-003

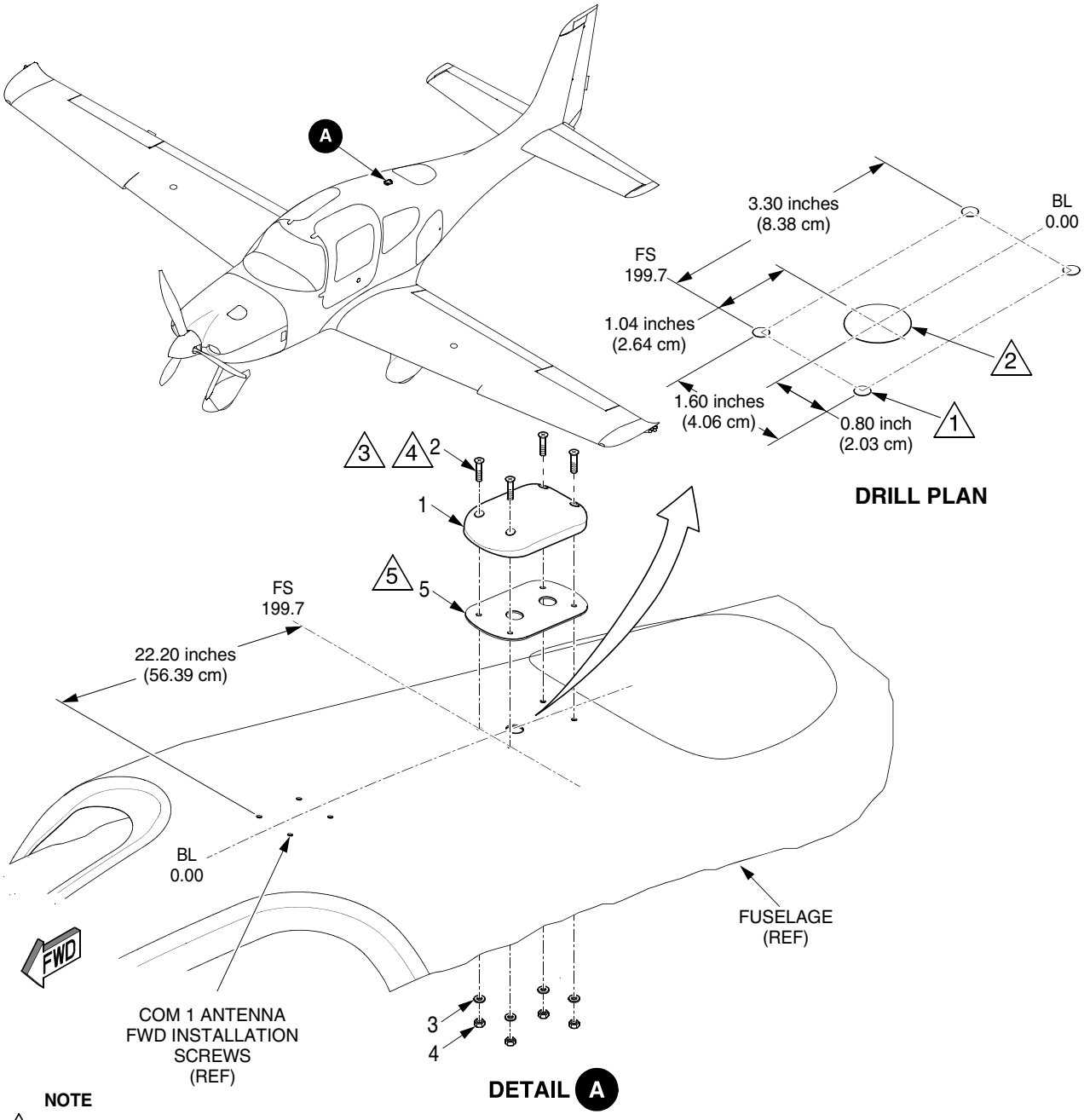


NOTE

1. At forward outboard corner of outline, mark 0.5 inch (1.27 cm) radius.
2. Remove foam core from area defined by outline.
3. Sand cutout to bevel edges and 0.50 inch (1.27 cm) radius corners as required with shape of existing foam.
4. It is permissible to butt plies to aft window bond.
5. *Serials SR20-1541 thru 1797, Serials SR22-1520 thru 2420:* At bondline between standoff and fuselage use wire saw to remove standoff fasteners prior to fuselage repair.
6. *Serials SR20-1541 thru 1797, Serials SR22-1520 thru 2420:* Following fuselage repair, reinstall standoff fasteners.

SR2_SB34_1256

Figure 07 - WAAS (GPS2) Fuselage Repair - Kit 70190-003



NOTE

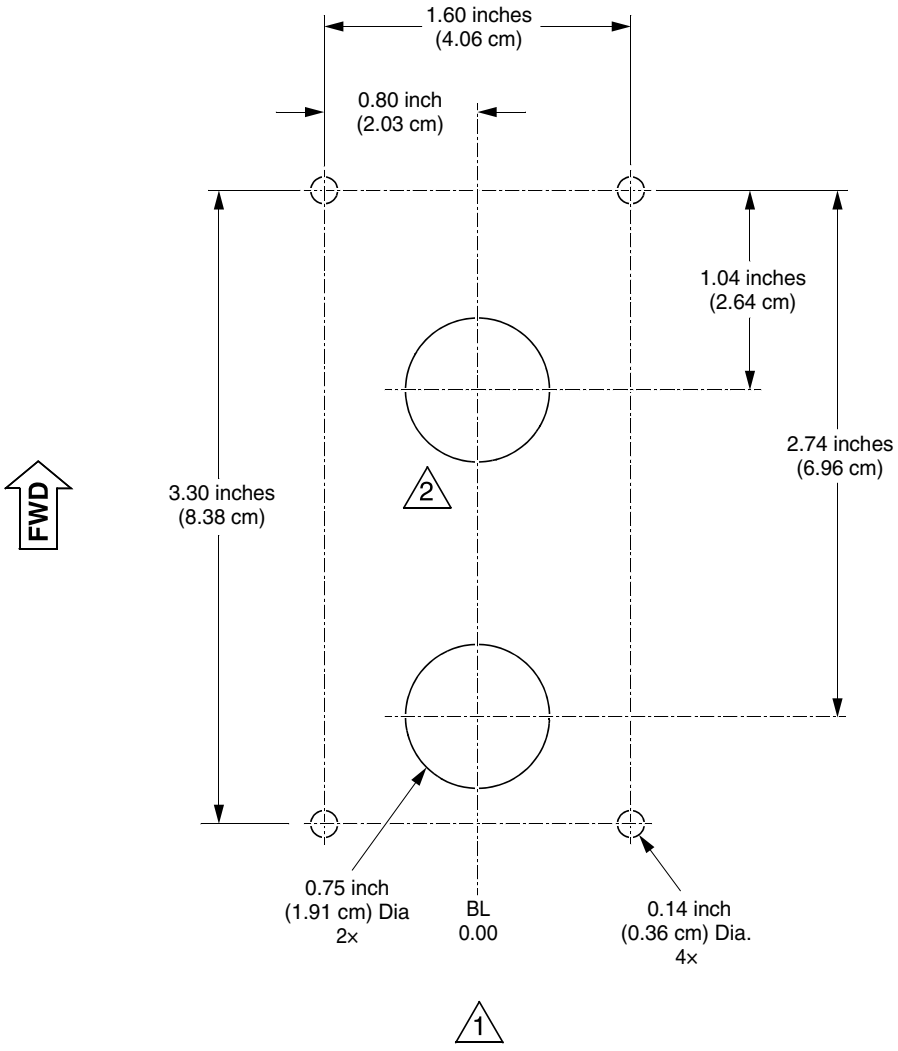
1. Use 0.14 inch (0.36 cm) drill bit to drill four mounting holes used for antenna installation.
2. At antenna cable pass-through hole mark, use 0.25 inch (0.64 cm) drill bit to drill pilot hole. At outer laminate, use 0.75 inch (1.91 cm) hole saw to drill antenna cable pass-through hole at pilot hole.
3. Ensure an o-ring is on each screw before installing. Torque nuts for forward two screws before torquing nuts for the aft two screws on the antenna. Apply a torque of 12 - 15 in-lbs (1.36 - 1.69 Nm).
4. Do not apply sealant in screw holes or over screw heads.
5. After installation, trim gasket as necessary to ensure gasket does not extend outside edge of antenna base.

LEGEND

1. WAAS GPS Antenna
2. Screw
3. Washer
4. Nut
5. Gasket

SR2_SB34_1230

Figure 08 - WAAS (GPS2) Antenna Installation - Kit 70190-003 and Kit 70190-004

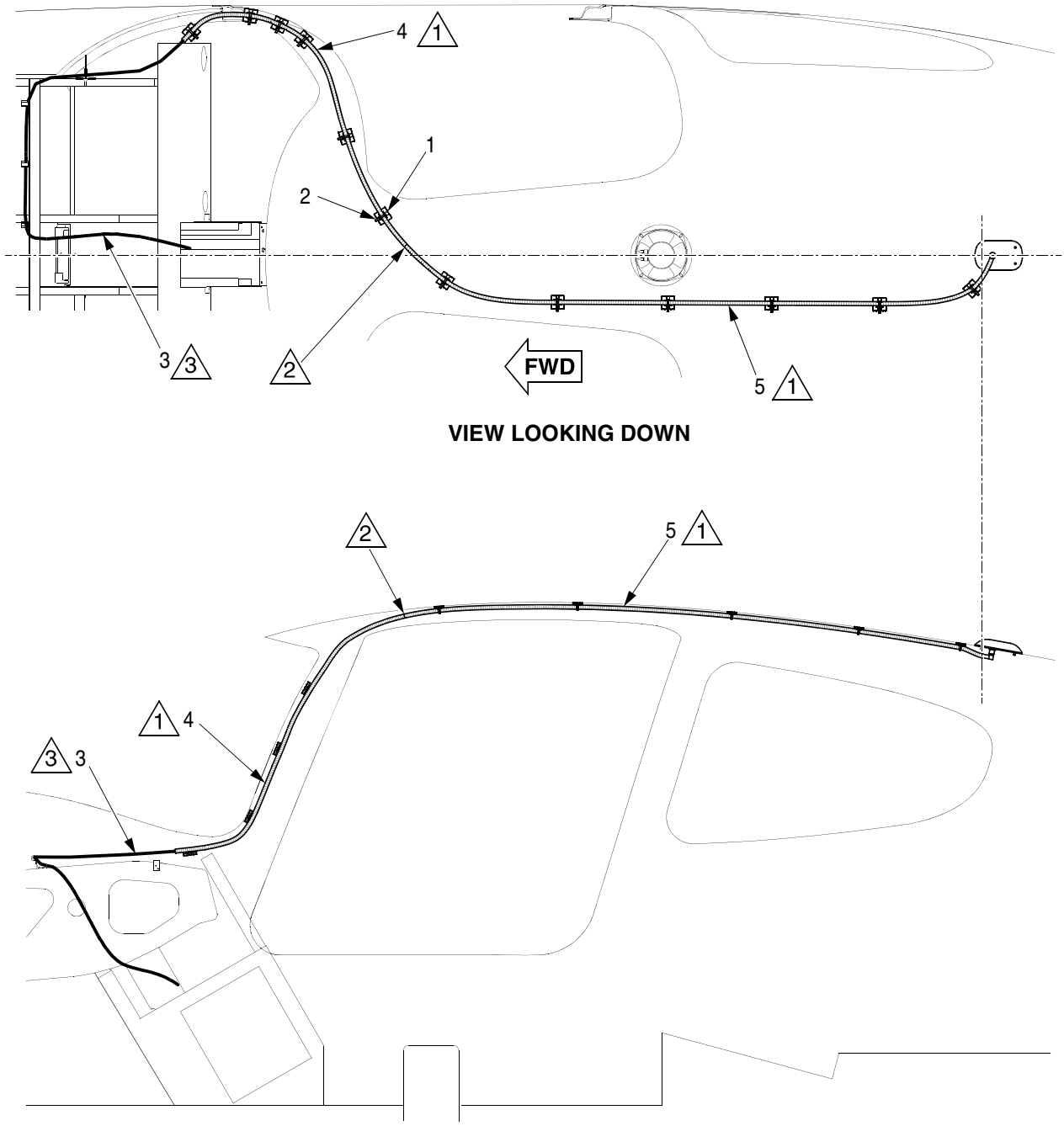


NOTE

1. Verify template is printed to scale.
2. Do not drill aft antenna cable pass-through hole for kits 70190-001, 70190-003, or 70190-004.

SR2_SB34_1245A

Figure 09 - WAAS (GPS1/GPS2) Antenna Hole Pattern Template



NOTE

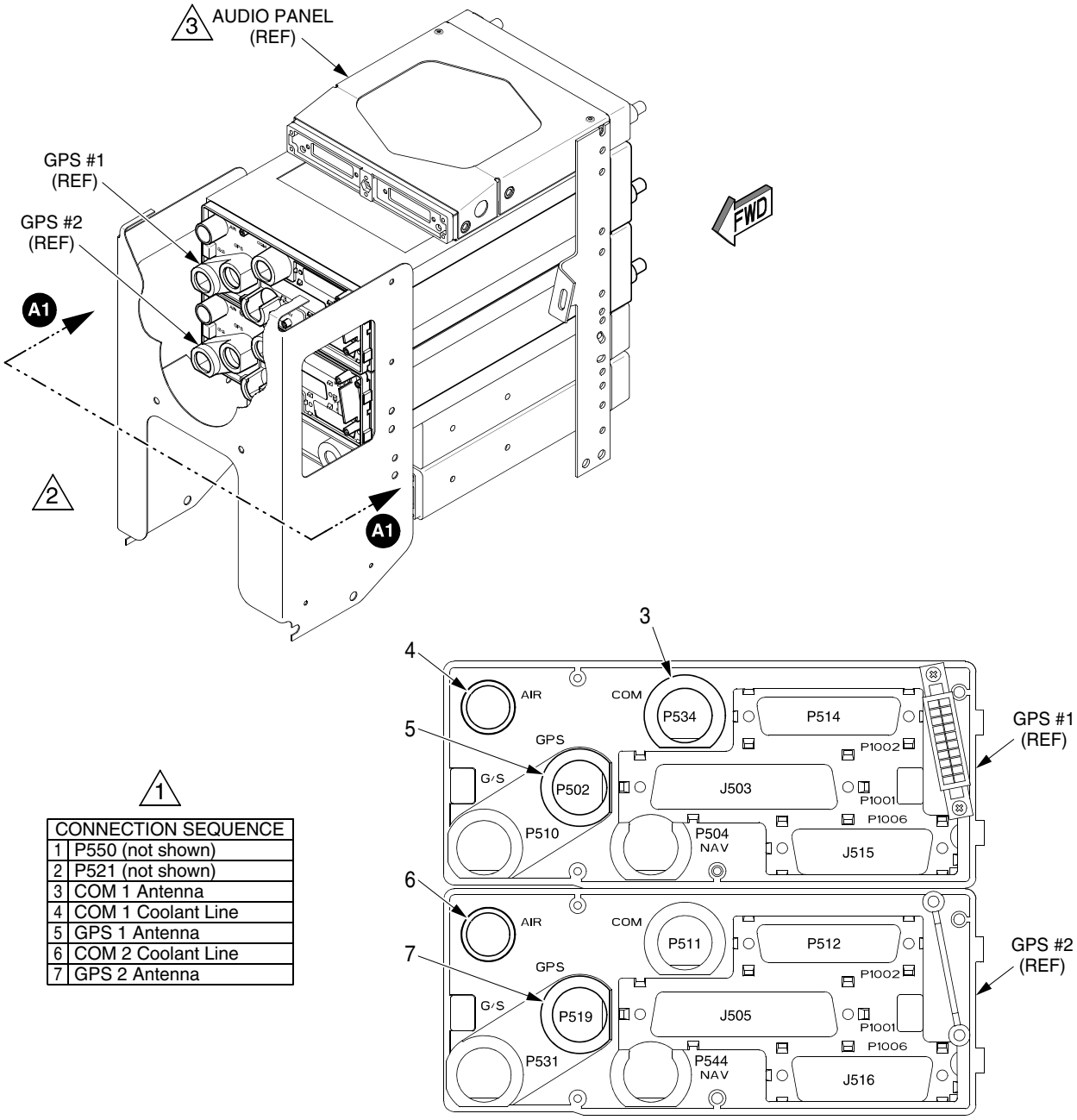
1. Install loom over antenna cable to protect cable from chafing on nearby metal components. Ensure antenna cable is protected from lower door hinge bolts and contact with ground plane along inner fuselage ceiling.
2. Aft along inner fuselage ceiling, install Ø 0.5-inch loom for GPS2 antenna cable from location where Ø 0.625-inch loom ends to GPS2 antenna.
3. Route cable with existing wires where applicable. Install anchor and cable ties as required to secure cable.

LEGEND

1. Cable Tie Anchor
2. Cable Tie
3. Antenna Cable
4. Loom, Ø 0.625-inch
5. Loom, Ø 0.50-inch

SR2_SB34_1231

Figure 010 - WAAS (GPS2) Cable Routing - Kit 70190-003 and Kit 70190-004



1

CONNECTION SEQUENCE	
1	P550 (not shown)
2	P521 (not shown)
3	COM 1 Antenna
4	COM 1 Coolant Line
5	GPS 1 Antenna
6	COM 2 Coolant Line
7	GPS 2 Antenna

NOTE

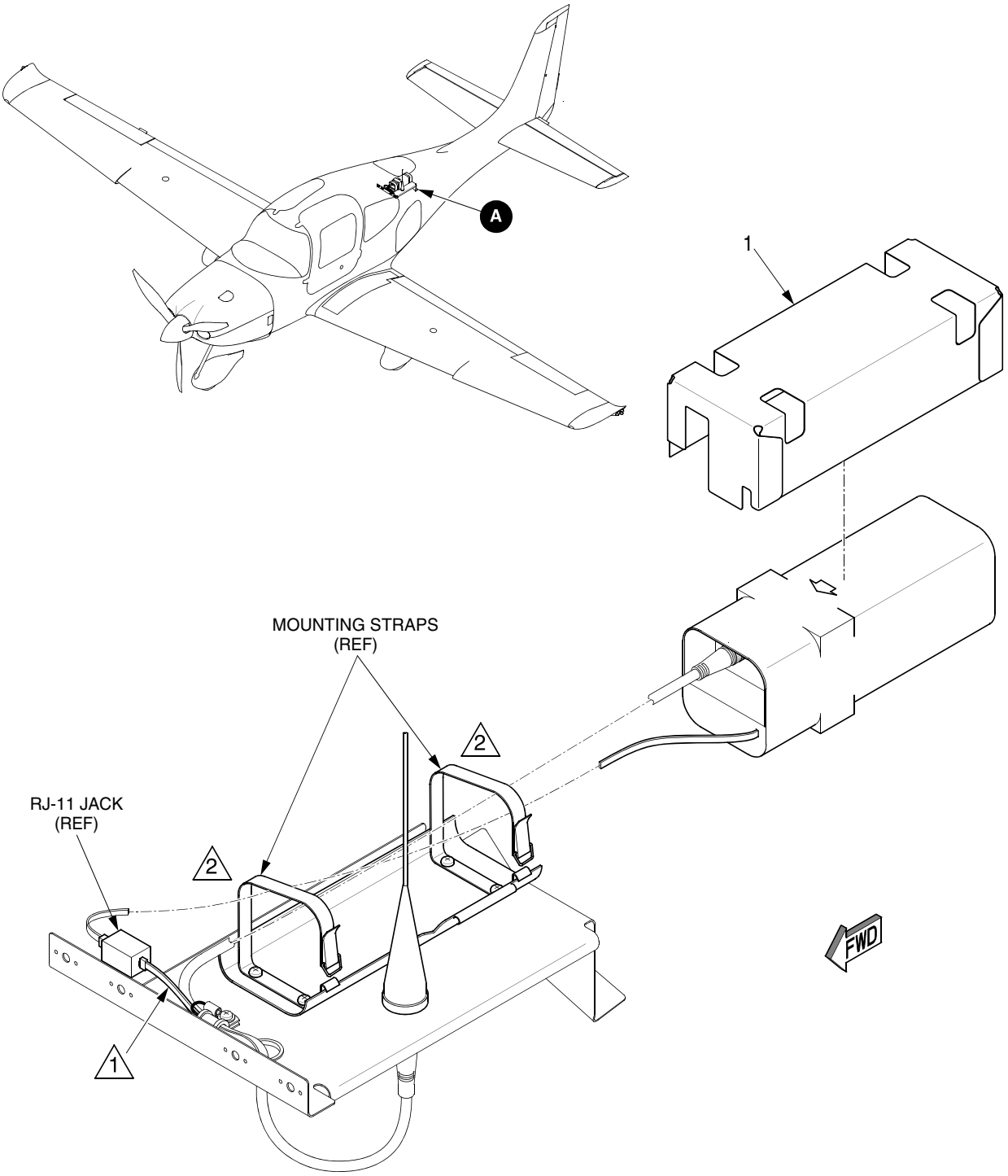
1. To facilitate removal of GPS antenna cables, it is required to disconnect unrelated cables and lines interfering with removal. Remove cables/lines in order presented in table. Follow reverse-order for reinstallation.

2. If P550 cables for autopilot obstruct removal of GPS antenna cables, disconnect and stow P550 cables.

3. Actual radio rack configuration may differ from options depicted in illustration. If audio panel is not installed at upper configuration above GPS transceivers, it is not necessary to disconnect P521 cable from the audio panel.

SR2_SB34_1235

Figure 011 - Radio Rack WAAS Connections



DETAIL A

NOTE

1. Install connecting cable in adel clamp so RJ-11 jack is on the ELT side of clamp.
2. Secure ELT shield onto ELT with mounting straps.

LEGEND

1. ELT Shield

SR2_SB34_1233A

Figure 012 - ELT Modification - *Serials w/ 125.1 MHz ELT*

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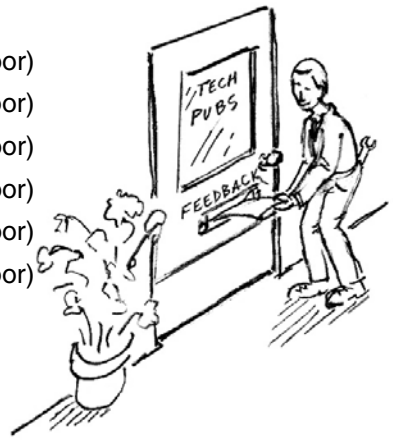

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