

# SERVICE BULLETIN

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**SUBJECT:** NAVIGATION - GPS-4X00( ) - SOFTWARE UPDATE TO ADDRESS TEMPORARY LOSS OF SATELLITE-BASED AUGMENTATION SYSTEMS, TRANSIENT LOSS OF GLOBAL NAVIGATION SATELLITE SYSTEM IN SATELLITE-BASED AUGMENTATION SYSTEM REGION, IMPROVE RADIO FREQUENCY INTERFERENCE ROBUSTNESS, AND UPDATE SATELLITE-BASED AUGMENTATION SYSTEM PROCESSING SOFTWARE RELATED TO MESSAGE TYPE 6 (CONVERTS UNIT PART NUMBER BLACK LABEL TO BLACK LABEL) (SUPERSEDES GPS-4X00()-34-514, 523-0835307, GPS-4X00()-34-510, 523-0829450)

## TRANSMITTAL INFORMATION SUMMARY

### SUMMARY

This is revision 2 of Service Bulletin (SB) GPS-4X00()-34-515 for the GPS-4000S Global Positioning System.

This revision updates description of existing condition in Step 1.C.(1)(e) and the software documents in Section 1.J. and Section 2.B.

Black bars in the margin indicates the change.

Replace the Revision 1 with this revision.

NOTE: Refer to Section 1.A. for effectivity.

### SERVICE BULLETIN REVISION HISTORY

REVISION	DATE OF RELEASE
Initial Release	February 26, 2024
Revision 1	April 25, 2024
Revision 2	May 17, 2024

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NOTE: This service bulletin supersedes Service Bulletin GPS-4X00()-34-514, 523-0835307 and GPS-4X00()-34-510, 523-0829450.

NOTE: This service bulletin may be installed only by a Collins Aerospace representative or an authorized Collins Aerospace Service Center.

NOTE: Refer to the referenced Service Information Letter All Avionics 3-03, titled "Disposal of Retired TSO Nameplates", for disposal of old unit identification plate.

NOTE: Implied by reference from this service bulletin, previously released service bulletins applicable to the old unit (to be converted) are also applicable to the unit created by this service bulletin. Mark out all SBs that are incorporated. The new unit part number indicates the installation of this service bulletin. Do not mark out Service Bulletin 515.

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**1. Planning Information**

A. Effectivity

The modification procedure described in this service bulletin changes the part number of the GPS-4000S, Global Positioning System listed in the following table.

UNIT	COLLINS PART NUMBER (CPN)	
	BEFORE CONVERSION	AFTER CONVERSION
GPS-4000S	822-2189-100	822-2189-102
GPS-4000S	822-2189-101	822-2189-102

NOTE: The modification contained in this service bulletin is strictly applicable to the status(es) listed and not applicable to additional status(es) within the GPS-4000S type number.

NOTE: Installation of units modified in accordance with this service bulletin requires a change to the aircraft Type Certificate/Supplemental Type Certificate (TC/STC) data unless the new equipment part number is already included in the data.

B. Concurrent Requirements

None.

NOTE: If several service bulletins that contain top level software are installed at the same time, only the latest version of the top level software needs to be installed. Installation of intermediate service bulletin top level software may be disregarded.

C. Reason

(1) Description of Existing Condition

- (a) The temporary loss of Satellite-Based Augmentation System (SBAS) mode issue can cause loss of Localizer Performance with Vertical Guidance (LPV) for up to five minutes due to reinitialization of occupied SBAS slots. Such a condition primarily occurs when transiting through boundary regions between two service providers.
- (b) The Transient Loss of Global Navigation Satellite System (GNSS) in SBAS Region issue can cause loss of navigation due to a reset of the GNSS card, caused by an assertion failure.
- (c) The Radio Frequency Interference (RFI) robustness issues can cause loss of the receiver due to reset/date issues when transiting through a region affected by interference/jamming.

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- (d) The GNSS software uses the Message Type 6 (MT 6) message beyond the timeout periods specified by the Minimum Operational Performance Standard (MOPS). In limited situations, this can result in mode degradation (SBAS to GPS) which can prevent LPV precision approaches.
- (e) (Additional condition applicable to GPS-4000S, CPN 822-2189-100) For the Coordinated Universal Time (UTC) Time Offset Issue, based upon original assumptions regarding potential changes in broadcast parameters of the satellites, it was determined the Line Replaceable Unit (LRU) could exhibit an anomaly that resulted in the loss of Global Positioning System (GPS) during the week starting June 11, 2023. However, that did not occur starting June 11, 2023. Instead, it was confirmed and verified that the starting date was May 5, 2024. For the GNSS Position Issue, the LRU will not support LPV approaches in the impacted region of +/- 20 degrees around 180 degrees West Longitude.

(2) Extent Condition Encountered

- (a) GPS-4000S, CPN 822-2189-100, may be affected by conditions described in Step 1.C.(1)(a) through 1.C.(1)(e).
- (b) GPS-4000S, CPN 822-2189-101, may be affected by conditions described in Step 1.C.(1)(a) through 1.C.(1)(d).

(3) Expected Benefits of Modification

- (a) Improved availability of LPV, navigation in SBAS Region, and robustness to RFI.
- (b) Implementation of this service bulletin is total and permanent.

(4) Safety Intent of Corrective Action

Not applicable.

(5) Regulatory Action

Not applicable.

D. Description

Install new software, and remove and replace the identification plate.

E. Compliance

	Optional - Service Bulletin for convenience or option.
	Desirable- Service Bulletin to introduce improvements.

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<b>X</b>	Recommended - Service Bulletin recommended to be accomplished to prevent significant operational disruptions.
	Mandatory - Service Bulletin must be accomplished.

F. Approval

GPS-4000S, CPN 822-2189-102, conforms to Federal Aviation Administration (FAA) Technical Standard Order (TSO) C145d Class Beta 3.

G. Manpower

The total estimated time to accomplish the work in this service bulletin is 4.0 man hours.

TASK	ESTIMATED HOURS
Preparation	1.0
Installation	1.5
Testing	1.5
<b>Total</b>	<b>4.0</b>

H. Weight and Balance

None.

I. Electrical Load Data

Not changed.

J. Software Accomplishment Summary

Software Accomplishment Summary documents, CPN 946-0NV9-007, CPN 946-0NV9-101, and CPN 946-0NV9-102, for GPS-4000S Global Positioning System, is written in accordance with Software Considerations in Airborne Systems and Equipment Certification, Radio Technical Commission for Aeronautics (RTCA)/DO-178A.

K. References

The following publications were used as source data to develop this service bulletin and are available if requested.

- (1) GPS-4000S Global Positioning System Component Maintenance Manual (with illustrated parts list) (CMMPL), CPN 523-0808221 (34-54-41)
- (2) GPS-4000( ) Global Positioning System, Installation Manual (IM), CPN 523-0780545
- (3) Avionics Standard Shop Practices Instruction Book, CPN 523-0768039 (20-00-01)

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- (4) Service Information Letter All Avionics SIL-3-93, titled "Non-Procurable Equipment Cleaning Solutions", CPN 523-0804806
- (5) Service Information Letter All Avionics SIL 3-03, titled "Disposal of Retired TSO Nameplates (This SIL Supersedes ALL Avionics SIL 3-98 and SIL 98-1)", CPN 523-0806251
- (6) Service Information Letter All Avionics SIL 05-2, titled "Clarification and Information on Usage and Ordering of Collins Nameplates and Modification Plates", CPN 523-0806340

L. Publications Affected

The next full revision to the referenced CMMPL and IM will include the information contained in this service bulletin.

M. Interchangeability and Intermixability of Parts

Interchangeability and Intermixability of parts are not recommended.

NOTE: Aircraft level Interchangeability/Intermixability is specified by the Aircraft Original Equipment Manufacturer (OEM) documentation.

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**2. Material Information**

A. Material - Price and Availability

No kit required.

NOTE: The current charge to install this service bulletin is \$4,478 United States Dollars (USD) and may be subject to future price adjustments. Pricing is only valid through December 31, 2024.

B. Industry Support Information

(1) This service bulletin may be installed only by a Collins Aerospace representative or an authorized Collins Aerospace Service Center.

(2) For CPN 822-2189-101 units in warranty, Collins Aerospace will install this service bulletin at no charge for the materials and labor. CPN 822-2189-101 units out of warranty must have the service bulletin installation completed prior to March 31, 2028 to qualify for the no charge installation.

NOTE: The in-warranty and out-of-warranty expiration date is March 31, 2028.

(3) For CPN 822-2189-100 units, Collins Aerospace will install this Service Bulletin at the current charge of \$4,478 USD and may be subject to future price adjustments. Pricing is only valid through December 31, 2024.

(4) For CPN 822-2189-100 units exchanged for CPN 822-2189-102 units, the current rental exchange fee will be applicable.

(5) With the exception of field damage, any repairs required beyond the scope of the Service Bulletin to return units to service will be accomplished free of charge for the units under warranty. Any repairs required that are out of warranty and beyond the scope of the Service Bulletin, the current repair or exchange fee will be applicable.

C. List of Components

NOTE: Material pricing is included in total service bulletin price. Refer to Section 2.A.

(1) Materials to be purchased.

Use the following materials to modify one (1) GPS-4000S Global Positioning System.



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NEW PART NUMBER	KEY WORD	DESCRIPTION	OLD PART NUMBER	QUANTITY	SPECIAL INSTRUCTION/ DISPOSITION
072-2781-007	Software Deliverable	Computer Program Configuration Item (CPCI) for the Global Navigation Satellite System (GNSS) Main Application	Not Applicable (N/A)	1	Install
983-8579-004	Identification Plate	Plate, Identification	983-8579-004	1	Discard/Install

(2) Materials supplied by operator.

None required.

D. Material Necessary for Each Spare

None required.

E. Reidentified Parts

None required.

F. Tooling – Price and Availability

None required.

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**3. Accomplishment Instructions**

A. Modification Procedure

**WARNING: BEFORE HANDLING ANY UNIT OR UNIT COMPONENT, GROUND THE REPAIR OPERATOR THROUGH A CONDUCTIVE WRIST STRAP OR OTHER DEVICE THAT USES A 470 KΩ OR 1 MΩ SERIES RESISTOR TO PREVENT PERSONAL INJURY BY LIMITING CURRENT THROUGH THE WRIST STRAP TO GROUND.**

CAUTION: TURN OFF POWER BEFORE DISCONNECTING ANY UNIT FROM WIRING. DISCONNECTING THE UNIT WITHOUT TURNING POWER OFF MAY CAUSE DAMAGE.

CAUTION: THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) COMPONENTS THAT CAN BE DAMAGED BY STATIC VOLTAGES PRESENT IN MOST REPAIR FACILITIES.

NOTE: Refer to the Disassembly and Assembly instructions in the referenced IM or CMMPL.

- (1) Use Software, CPN 072-2781-007, to perform the Software Load Procedures. Refer to the Testing and Fault Isolation section of the referenced CMMPL.
- (2) Proceed to Section 3.B. Testing Procedure.

B. Testing Procedure

Test the unit in accordance with the test procedures in the Testing and Fault Isolation section of the referenced CMMPL.

C. Re-identification of Equipment

NOTE: The identification procedure must be accomplished in order for the service bulletin to be complete.

- (1) Weigh unit and record weight to the nearest one-tenth (0.1) pound. Remove the existing identification plate, CPN 983-8579-004, from the unit.

NOTE: Refer to the referenced Service Information Letter All Avionics SIL 3-03, titled "Disposal of Retired TSO Nameplates", for disposal of old unit identification plates.

- (2) Order a new identification plate, CPN 983-8579-004, to reflect the unit weight noted in Step 3.C.(1).

NOTE: Refer to the referenced Service Information Letter All Avionics SIL 05-2, titled "Clarification and Information on Usage and Ordering of Collins Nameplates and Modification Plates", for ordering new identification plates.

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- (3) Verify the new identification plate, CPN 983-8579-004, for the correct part number and unit weight.
- (4) Install new identification plate, CPN 983-8579-004.
- (5) If the unit modification plate does not have the number 12 marked out, then use permanent ink to mark out the number 12 on the unit modification plate. Installation of Service Bulletin GPS-4X00( )-34-515 effectively installs Service Bulletin GPS-4X00( )-34-12.
- (6) Due to the change of the part number of this unit, the customer must be notified of the change by including the following statement, with the appropriate part numbers on the repair work sheet/service memorandum.

"This unit was received with a part number of CPN 822-2189-100 or 822-2189-101 and has been modified to a unit with a part number of CPN 822-2189-102 (refer to Service Bulletin GPS-4X00()-34-515). Installation of units modified in accordance with Service Bulletin GPS-4X00()-34-515 requires a change to the aircraft TC/STC data unless the new part number is already included in the data."

**NOTE:** Installation of Service Bulletin GPS-4X00()-34-515 is indicated by the Top Level CPN on the nameplate. SB 515 is NOT marked on the product modification plate.