

GPS-4000S (-100) and GLU-2100
FREQUENTLY ASKED QUESTIONS

Released 8/20/20

Q: What are the GPS-4000S (-100) and GLU-2100 issues?

A: On June 9, 2019, Collins Aerospace received reports that certain GPS and GLU equipment were not acquiring GPS constellations after power-up. The root cause was identified as a software design error that resulted in the system misinterpreting GPS time updates due to a "leap second" event. This typically occurs every few years in line with the GPS satellite almanac update. Our GPS software engine in the GPS-4000S CPN 822-2189-100 and GLU-2100 CPN 822-2532-100 reacted to this leap second change by not tracking satellites upon power-up and subsequently failing.

On December 10, 2019, Collins Aerospace discovered another anomaly where certain GPS and GLU equipment was not transitioning the International Date Line correctly and causing units to lock up. In addition this same error affected the Lateral and Vertical accuracy of the GPS in certain regions of the globe. The root cause was traced to improper computation of the longitude at which the GPS signal penetrates the ionosphere when the satellite is located across 180° degrees West (W) Longitude (International Date Line) from the GPS receiver. This computational issue occurs 20° on either side of 180° West (W) Longitude and extends from the Northern Hemisphere to 10° Latitude in the Southern Hemisphere.

Additionally, on June 12, 2020, some GPS-4000S units that were in use during GPS week 128 (12 through 19 June 2020) encountered an unexpected loss of Availability after the units were power cycled. This loss of availability could be recovered through a workaround. A typical symptom is GPS FAIL, visible on the flight deck displays. The cause of this issue was determined to be related to the Week 9 Issue encountered on the GPS units on June 9, 2019. This related issue is due to the 128 week difference between a date/time input provided to the GPS and the week of the GPS almanac that was issued on June 12, 2020.

Q: What specific equipment is included in this issue?

- A: The two units affected are:
- GPS-4000S - P/N 822-2189-100
 - GLU-2100 - P/N 822-2532-100

Q: Why did these issues occur?

A: The GLU-2100 and GPS-4000S-100 have a common GPS software. The root cause of the two issues affecting the GPS and GLU have been traced to software design errors. The GPS "Leap Second" cause was traced to a misinterpretation of the GPS Almanac time update. The "Date Line" cause was traced to a transition problem when the GPS crosses the International Date Line.

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Q: If I don't have these part numbers on my aircraft, am I impacted?

A: No. If you do not have either of the above part number units installed on your aircraft you are not affected by this issue.

Q: Where can I find information on the GPS-4000S (-100) and GLU-2000 "Leap Second" issue?

A: Please refer to the following document for further information for additional information and the recommended actions to take.

- OPSB 0195-19 - P/N 523-0826459 - Global Positioning System Reception Outage
- GPS-4000S - SIL P/N 523-0826445: NON-VOLATILE MEMORY (NVM) CLEARING FOR UNIVERSAL TIME COORDINATED (UTC) TIME OFFSET ISSUE
- GLU-2100 - SIL P/N 523-0826444: NON-VOLATILE MEMORY (NVM) CLEARING FOR UNIVERSAL TIME COORDINATED (UTC) TIME OFFSET ISSUE
- GPS-4000S - P/N 822-2189-100: SIL P/N 523-0831893: UNEXPECTED LOSS OF GPS DUE TO 128 WEEK DIFFERENCE BETWEEN DATE/TIME INPUT PROVIDED GPS AND THE WEEK OF THE GPS ALMANAC
- All SIL's are available through the Collins Technical Publications [website](#)

Q: Where can I find information on the GPS-4000S (-100) and GLU-2000 "Date Line" issue?

A: Please refer to the following document for further information for additional information and the recommended actions to take.

- OPSB 0207-20 - P/N 523-0829692 - Temporary Exclusions of LPV Selection for Certain Alaskan Approaches
- GPS-4000S - SIL P/N 523-0829428: NO SUPPORT TO PERFORM LOCALIZER PERFORMANCE WITH VERTICAL (LPV) AND REQUIRED NAVIGATION PERFORMANCE (RNP) LESS THAN 0.3 NAUTICAL MILE APPROACHES OVER ALASKA
- GLU-2100 - SIL P/N 523-0829427: NO SUPPORT FOR REQUIRED NAVIGATION PERFORMANCE (RNP) LESS THAN 0.3 NAUTICAL MILE PROCEDURES OVER ALASKA
- All SIL's are available through the Collins Technical Publications [website](#)

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Q. What should I expect from my GPS-4000(S) or GLU-2100 after June 16, 2019 (00:00 UTC)?

A: Collins has performed multiple tests on the GPS and GLU. Provided the unit is currently functional no further issues will be experienced before June 11, 2023. To rectify the issues and to prevent any further potential failures Collins Aerospace strongly recommends updating the affected units. You should accomplish this at the earliest opportunity, at your next maintenance input or at least before the end of Dec 31st 2022.

Q: What is Collins Aerospace doing to address the issue?

A. Collins Aerospace has released new software for the GLU and GPS Units to rectify both issues affecting the GPS Software.

- GLU-2100 units can be upgraded on-wing and in the service center but we recommend accomplishment on wing if possible. Complete details on how to accomplish this are provided in the following SIL: SIL P/N 523-0829457: SOFTWARE UPDATE FOR UNIVERSAL TIME COORDINATED (UTC) TIME OFFSET AND GNSS POSITION NEAR 180 DEGREES WEST LONGITUDE
- GPS-4000 units will need to undergo a part number conversion from a -100 to a -101. In order to expedite and simplify the conversion, Collins has created a pool of units for exchange. GPS-4000S -101 units will be available FOC on an exchange basis with the return of a GPS-4000S -100.

Q: Whom should I contact with additional questions?

A: Customers may contact their Collins Avionics Customer Support Engineer (CSE) or our main Collins Avionics Customer Support Center:

- You can find your regional [CSE](#) on our website.
- For any other questions, please contact +1.319.295.5000 or AvioincSupport@Collins.com.

Q: When will the solution be available?

A. The solution for the GPS and the GLU is available now.

Q: How do I get my aircraft updated?

- The GLU software can be loaded on wing using SIL P/N 523-0829457: SOFTWARE UPDATE FOR UNIVERSAL TIME COORDINATED (UTC) TIME OFFSET AND GNSS POSITION NEAR 180 DEGREES WEST LONGITUDE.
- The GPS units require a part number roll and have to be modified at a Collins Service Facility. Replacement units can be ordered FOC from our Rental Exchange Team. Further details on ordering replacement units can be found later in the FAQ's.

Q. How much will the software update cost?

A: The software update will be Free of Charge for all customers.

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Q. How do I get my GLU-2100 Units Updated?

A: GLU-2100 Units can be updated on wing via SIL P/N 523-0829457: SOFTWARE UPDATE FOR UNIVERSAL TIME COORDINATED (UTC) TIME OFFSET AND GNSS POSITION NEAR 180 DEGREES WEST LONGITUDE. Any qualified facility, Collins Dealer or airline can carry out the modification.

Q. How do I get my GPS-4000S Units Updated?

A: Collins Aerospace is providing a pool of GPS-4000S -101 units for Free of Charge exchange with the return of a GPS-4000S -100 Unit. Contact our Rental Exchange team to coordinate unit availability. Please note that expedited Unit return is expected for this program. A 10 day core return time is required and extended use fees will be charged after 10 days. International Shipping times will be taken into consideration on a case by case basis.

Q. Are you offering Shipping/Freight Reimbursement?

A: Reimbursement for GPS-4000S units is available up to \$100 Maximum with proof of shipping charges.

Q. How do I contact Rental Exchange to order GPS-4000S -101 units?

A: Collins Aerospace Avionics Rental Exchange Team can be reached at:

- 1-800-713-7693 (in the U.S.)
- 319-295-4361 (outside the U.S.)
- Exchangepoolmodsupport@rockwellcollins.com

The following information will be required for all orders on a hard copy Purchase Order:

- Serial numbers of the GPS-4000S (-100) cores being sent in
- Aircraft type
- Aircraft Tail Number
- Aircraft Serial Number
- End user of the Aircraft

Q. Who can carry out the GPS Replacement?

A: Replacement of the GPS-4000S units can be carried out by any qualified facility or Collins Dealer.

Q. Can I intermix GPS-4000S units?

A: Collins Aerospace Strongly recommends that units are exchanged as a ship set. The pool of -101 units available allows you to order the ship set quantity when placing your order. In addition, intermix is NOT approved with Collins Aerospace STC's. Intermix may be possible with Third Party STC's. Contact your STC supplier to confirm but we strongly advise against this action as further maintenance will be required at a later date.

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Aircraft operating with a mixed configuration of CPN 822-2189-100 and CPN 822-2189-101 are subject to the aircraft level limitations described in SIL GPS-4X00()-19-3. GPS-4000S CPN 822-2189-100 and CPN 822-2189-101 should not be used in a mixed configuration with previous versions of the GPS-4000(), CPN 822-2189-001/-002/-003/-004/-005/-006/-007/-010/-011.

Q. How do I approve the installation of the -101 GPS-4000s?

A: Collins Aerospace has developed AML STC's to provide authorization to install the new GPS-4000s Part Number. This may require an updated STC from your STC holder or Service Bulletin from your OEM. The following STC's are available:

- GLU-2100 AML STC ST01943WI - This covers 767-300F, 747-400/400F, and MD11 and allows these aircraft to update their GLUS-2100 software to part number COL4C-0087-0003.
- GPS Part 25 AML STC ST01833WI
- GPS Part 23 AML STC SA01848WI
- At this time, the only approved Foreign Validation is for Part 23 GPS AML STC SA01848WI, which was completed for Europe (EASA) on August 12, 2020. We are currently awaiting approval from other foreign regulators.

Q. When will the LPV Selection for the Alaskan approaches be added back into the Nav Database?

- A. Alaskan LPV approaches were removed from the Navigation Database at the request of the FAA. At this time Collins are not allowed to add the approaches back into the Database until all GPS-4000S 822-2189-100 units in the field have been upgraded to 822-2189-101. Targeted completion for this is on or before December 31, 2022 to align with the expected FAA AD.

Q. Is there any information on an Alternative Method of Compliance (AMOC) to Airworthiness Directive (AD) 2020-03-20 for GLU-2100?

- A. AML STC ST01943WI installs new GLU-2100 OPS software, part number COL4C-0087-0003, which resolves the issue of loss or degradation of Global Positioning System (GPS) positional accuracy, identified as the unsafe condition in AD 2020-030-20. The manager of the Seattle ACO Branch approves installation of GLU-2100 OPS software in accordance with AML STC ST01943WI, as an AMOC to revising the limitations or certificate limitations section of the existing AFM, as required by paragraph (g) of AD 2020-03-20. For operators with common flight crew procedures used for multiple affected airplanes in their fleet, operators must update the software on all of their affected airplanes prior to removing the limitation from the AFM(s).