INSTRUCTIONS for CONTINUED AIRWORTHINESS

GDC31 Roll Steering Converter

1049-2170-02

REV B

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## Record of Revisions

<table>
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<th>REV</th>
<th>DESCRIPTION</th>
<th>DATE</th>
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<tr>
<td>IR</td>
<td>INITIAL RELEASE</td>
<td>E294-01</td>
<td>LW</td>
</tr>
<tr>
<td>A</td>
<td>Add data for T210, PA46, 58P and follow-on</td>
<td>E390-02</td>
<td>LW</td>
</tr>
<tr>
<td>B</td>
<td>Correct Appendix D wiring diagram to reflect 429 data out from Garmin 400 Series GPS Recvr &amp; add jumper between pins 11 &amp; 21</td>
<td>E557</td>
<td>LW</td>
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</tbody>
</table>
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LIST OF EFFECTIVE PAGES

When updated, this document is changed in its entirety.

A current revision of this ICA is available on the DAC website at http://www.dacint.com/dacecd.htm (Technical Data section).
1. INTRODUCTION
This procedure provides instructions for the continued airworthiness of the GDC31 Roll Steering Converter.

1.1 Scope
This document identifies the Instructions for Continued Airworthiness (ICA) for the modification of aircraft under the above referenced STC and accompanying Approved Model List (AML). Appendices B through G provide wiring and equipment location drawings for aircraft models Cessna T210M, Piper PA46-310P Malibu and Beech 58P Baron. Appendix A provides an equipment location form and generic wiring diagram for use in follow-on approvals of the GDC31 Roll Steering Converter into aircraft listed on the AML.

1.2 Follow-On Installations
Reference Approved Model List of DAC International STC SA10236SC. Complete the data in Appendix A for follow-on installations into aircraft on the AML.

1.2.1 Equipment Location
Refer to the block diagram in section 2 of this document.

The AP/SEL switch is located near the autopilot control panel or near the HSI, in the pilot’s primary field of view and easily accessible by the pilot.

The GDC31 Roll Steering Converter can mount in the avionics bay, shelf or other suitable structure. It can be mounted in any orientation. Refer to the data in Appendix A through G for specific location details. Also refer to the Equipment Installation manual, 1049-2510-01, for additional details and equipment limitations regarding equipment location.

1.2.2 Wire Routing
Route wires along existing wire bundles where practical. For installations where the GDC31 RSC is not located behind the instrument panel, describe the wire routing details using the form in Appendix A.

1.2.3 Mounting
For mounting the annunciator switch, refer to the Equipment Installation manual, 1049-2510-01, for details regarding panel cutout.

Mount the GDC31 RSC using four sets of #8 hardware described in section 4 of this ICA. MS or AN locking nut plates may be substituted for nuts and lock washers.
2. DESCRIPTION

The GDC31 Roll Steering Converter is designed to receive RS232 or RS422 serial data from a GPS Navigation System to produce both an analog Roll Sum Steering (RSS) signal and ARINC 429 labels bank angle command and ground speed. The GDC31 output signal connects to the heading error input of the aircraft’s existing autopilot. The GDC31 mimics the heading error signal of the aircraft’s installed HSI or DG. The GDC31 does not reduce or otherwise alter any existing safety features of the autopilot, such as bank limiting, rate limiting and protection from a hard over. The GDC31 provides lateral (roll) data only (no pitch data is supplied by the GDC31). The ARINC 429 output can drive digital autopilots or converters. The pilot selects between existing heading mode or GPS mode using a switch / annunciator. In heading mode, the autopilot operates as always, tracking the heading bug. In GPS mode, the GDC31 output signal supplies the autopilot’s heading channel. The GDC31 calculates the correct course intercept angle from data supplied by the GPS to guide the aircraft onto course then maintain that course.

**Block Diagram**

(Dashed items represent existing aircraft equipment)
3. OPERATION

3.1 Control
The GDC31 provides conversion of Serial data from a GPS receiver into a steering signal connected to the autopilot heading channel through switching controlled by the HDG/GPS mode selector switch. There are no other operator controls associated with the GDC31 unit.

3.2 Equipment Checkout
The GPS receiver and the Autopilot must both be operational in order to perform this ground functional checkout.

1. Insure that all control surfaces are clear and that the control wheel is centered in roll.
2. Apply power to the GPS Receiver and Autopilot.
3. Set the HDG/GPS Mode selector to HDG.
4. On the HSI, center the heading bug.
5. Engage the autopilot in Heading Mode.
6. Operate the heading bug, observe that the control wheel turns left and right in response to the heading bug operation.
7. Center the control wheel using the heading bug.
8. Place the HDG/GPS Mode selector in the GPS position. For installations using an ARINC 429 data source, the GPS annunciator blinks until ground speed is greater than 40 knots. For installations using and RS232 data source, observe GPS illuminates and is not blinking.
9. Verify that the control wheel remains centered (very slow displacement is acceptable).
10. Disengage the autopilot.
4. SERVICING INFORMATION

All servicing of the GDC31 must be accomplished by an approved service facility using DAC International approved maintenance manual, P/N 1049-2500-01. On aircraft servicing is limited to removal and replacement of the GDC31 and repair of the interconnect wiring. Refer to the following tables and lists, and appendices A through G.

All wiring is 22 to 24AWG.

- Single Wire: MIL-W-22759/16 or equivalent
- Shielded Wire: MIL-C-27500 or equivalent
- Circuit Breaker: Klixon 7277-2-2 or equivalent

Mounting Hardware and Replacement Parts:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1049-4000-03*</td>
<td>GDC31, ROLL STEERING CONVERTER</td>
</tr>
<tr>
<td>MS35206-245</td>
<td>SCREW, PAN HD, CROSS POINT, 8/32 X .5</td>
</tr>
<tr>
<td>MS35338-42</td>
<td>WASHER, LOCK, #8, CAD PLTD</td>
</tr>
<tr>
<td>AN960-8L</td>
<td>WASHER, FLAT, STEEL, #8</td>
</tr>
<tr>
<td>MS35649-282</td>
<td>NUT, PLAIN HEX, STEEL, 8/32</td>
</tr>
<tr>
<td>M24308/2-3F</td>
<td>CONNECTOR, RECEPTACLE, 25 PIN D-SUB</td>
</tr>
<tr>
<td>M39029/63-368</td>
<td>SOCKET, CRIMP, FEMALE</td>
</tr>
<tr>
<td>P10219*</td>
<td>SLIDE LATCH KIT</td>
</tr>
<tr>
<td>P10220*</td>
<td>BACKSHELL, 25 PIN D-SUB, SIZE 3</td>
</tr>
<tr>
<td>P10280*</td>
<td>MODE ANNUNCIATOR/SWITCH WITH 28V LAMPS</td>
</tr>
<tr>
<td>P10301*</td>
<td>LAMP, 14V</td>
</tr>
</tbody>
</table>

*Available through DAC International

5. MAINTENANCE INSTRUCTIONS

Condition and airworthiness inspections of the GDC31 will coincide with each Annual and/or 100-hour inspection. Other than regular periodic inspections and functional checks outlined here, maintenance of the GDC31 is “on condition” with no specific overhaul period.

At each Annual and/or 100-hour inspection:

1. The GDC31 will be inspected for security and attachment.
2. The switch/annunciator will be inspected for legibility and attachment.
3. Wiring integrity will be inspected according to AC 43.13-1B, Paragraph 11-96. Refer to wiring diagrams in the appendices.
4. Perform a functional test in accordance with paragraph 3.2.
### 6. TROUBLESHOOTING INFORMATION

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>RESOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS annunciator fails to turn on.</td>
<td>1. Check Avionics Master Switch in the ON position.</td>
</tr>
<tr>
<td></td>
<td>2. Check RSC circuit breaker set.</td>
</tr>
<tr>
<td></td>
<td>3. Verify Mode annunciator lamps are serviceable.</td>
</tr>
<tr>
<td></td>
<td>4. Remove GDC31 and check wiring IAW wiring diagram.</td>
</tr>
<tr>
<td></td>
<td>5. Remove and replace GDC31.</td>
</tr>
<tr>
<td>GPS annunciator blinks.</td>
<td>1. Verify GPS receiver is on and operational.</td>
</tr>
<tr>
<td></td>
<td>2. Remove GDC31 and check wiring IAW wiring diagram.</td>
</tr>
<tr>
<td>Aircraft overshoots or undershoot when</td>
<td>1. Verify program pin wiring is according to wiring diagram.</td>
</tr>
<tr>
<td>intercepting GPS course.</td>
<td>2. Verify Reference input voltage is present according to wiring.</td>
</tr>
<tr>
<td></td>
<td>3. Check remaining wiring IAW wiring diagram.</td>
</tr>
<tr>
<td></td>
<td>4. Remove and replace GDC31.</td>
</tr>
</tbody>
</table>
7. REMOVAL AND REPLACEMENT INFORMATION

7.1 Equipment Removal

7.1.1 GDC31 Removal
1. Open the circuit breaker powering the GDC31.
2. Disengage connector slide-latch, unplug connector.
3. Remove 4 retaining screws and related hardware (retain hardware for later installation).

7.1.2 Mode Annunciator Removal
1. Open the circuit breaker powering the GDC31.
2. Pull firmly on the edges of the lens to disengage the lamp assembly from the body. The lamp assembly will hinge out and away from the body.
3. Release the two (2) pawls by unscrewing the flat-head screws located inside the body.
4. Unplug the lamp module from the sleeve.

7.2 EQUIPMENT INSTALLATION

7.2.1 GDC31 Installation
1. Open the circuit breaker powering the GDC31.
2. Attach GDC31 using 4 retaining screws and other hardware from removal procedure.
3. Attach connector and secure using slide-latch.
4. Close the circuit breaker.
5. Perform Equipment Checkout per 3.2.

7.2.2 Mode Annunciator Installation
1. Open the circuit breaker powering the GDC31.
2. Plug the lamp module into the sleeve.
3. Secure by engaging the two (2) pawls to the sleeve.
4. Plug the lamp module into the body - it will snap into place.
5. Close the circuit breaker.
6. Perform Equipment Checkout per 3.2.
8. DIAGRAMS
See appendices for wiring and equipment location diagrams.

9. SPECIAL INSPECTION REQUIREMENTS
NONE

10. APPLICATION OF SPECIAL TREATMENTS
NONE

11. DATA
Refer to Master Drawing List 1049-0000-XX.

12. SPECIAL TOOLS
Use the following crimp tool to ensure reliable crimp contact connections to connector J1.
- Crimp tool M22520/2-01
- Positioner M22520/2-08
13. RECOMMENDED OVERHAUL PERIODS

NONE

14. AIRWORTHINESS LIMITATION SECTION

The Airworthiness Limitations section is FAA approved and specifies maintenance required under Sections 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

NONE

15. REVISIONS

The Design Change Notification Procedure outlined in the DAC International Quality Assurance Manual will be used to inform service centers, distributors and the FAA of significant changes to this ICA. For further information, contact DAC International at (512) 331-5323 or www.dacint.com. In addition, the latest approved revision of this ICA is available at http://www.dacint.com/ecd/ecdtech.htm
APPENDIX A – Follow-On Installation Data Instructions

For follow-on installations, complete the data sheet and wiring diagram found on the following pages.

On the data sheet, complete the aircraft make and model, registration number and serial number sections. Then describe the location of the GDC31 converter in sufficient detail, using station location numbers or other common reference points. For example, “GDC31 located under the instrument panel, right outboard side.” Use of sketches is recommended. Likewise describe the location of the annunciator/switch. Describe or sketch the wire bundle routing.

Mark-up the Follow-on Installation Wiring Diagram to reflect the aircraft wiring. Use of wiring diagrams extracted from the installation manual, 1049-2510-01, or sketches are also acceptable.

Include a copy of this document along with the data sheet and wiring diagram with the aircraft records.
APPENDIX A – Follow-On Installation Data Sheet

AIRCRAFT MAKE AND MODEL: ____________________________________________

AIRCRAFT TAIL NUMBER: ____________________________________________

AIRCRAFT SERIAL NUMBER: ____________________________________________

<table>
<thead>
<tr>
<th>LOCATION DESCRIPTION of GDC31 ROLL STEERING CONVERTER:</th>
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<thead>
<tr>
<th>LOCATION DESCRIPTION of MODE/ANNUNCIATOR switch:</th>
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WIRE ROUTING:

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APPENDIX A – Follow-On Installation Wiring Diagram

ALL WIRES ARE 22 TO 24AWG.
SINGLE WIRE IS MIL-W-22759 OR EQUIV.
SHLDED WIRE IS MIL-C-27500 OR EQUIV.
CIRCUIT BRKR IS KLIXON 7277-2-2 OR EQUIV.
APPENDIX B – Wiring Diagram for the Cessna T210M Centurion

CIRCUIT BRKR IS KLIXON 7277-2-2 OR EQUIV.
SHLDED WIRE IS MIL-C-27500 OR EQUIV.
SINGLE WIRE IS MIL-W-22759 OR EQUIV.

HDG SIGNAL
LIGHTING BUS

ALL WIRES ARE 22 TO 24AWG.
SINGLE WIRE IS MIL-W-22759 OR EQUIV.
SHLDED WIRE IS MIL-C-27500 OR EQUIV.
CIRCUIT BRKR IS KLIXON 7277-2-2 OR EQUIV.

CONN = M24308/2/4F WITH M39029/634-368 SOCKETS
APPENDIX C – Equipment Locations for the Cessna T210M Centurion
APPENDIX D – Wiring Diagram for the Piper PA46-310P Malibu

**Schematic Diagram**

- **KI 525A**
- **A1**
- **SWITCH / ANNUNC**
- **P10280**
- **RSS CONVERTER**
- **GDC31**
- **KFC-150**
- **KC-19(X) FLIGHT COMPUTER**
- **P19(X)1**
- **P19(X)2**
- **+15 VDC REG**
- **-15 VDC REG**
- **DATUM REF**
- **HDG DATUM**
- **DATUM REF**
- **SIGNAL GND**
- **CHASSIS GND**
- **+15 VDC REG**
- **-15 VDC REG**
- **10**
- **7**
- **11**
- **12**
- **24**
- **1**
- **5**
- **8**
- **11**
- **21**
- **22**
- **13**
- **14**
- **23**
- **20**
- **429 SHIELD**
- **7**
- **8**
- **19**
- **10**
- **10**
- **1**
- **3**
- **12**
- **15**
- **2**
- **16**
- **5**
- **24**
- **23**
- **20**
- **429 RXA**
- **229 RXB**
- **429 SHIELD**
- **+28 VDC Avionics Bus**
- **RSC**
- **28VDC Avionics Bus**
- **7277-2-2**

---

**Notes:**
- All wires are 22 to 24 AWG.
- Single wire is MIL-W-22759 or equiv.
- SHLDED wire is MIL-C-27500 or equiv.
- Circuit BRKR is KLIXON 7277-2-2 or equiv.
APPENDIX E – Equipment Locations for the Piper PA46-310P Mailbu
APPENDIX F – Wiring Diagram for the Beech 58P Baron

KI 525A

SWITCH / ANNUNC

P10280

RSS CONVERTER

GDC31

KFC-200 / KFC-300

COMPUTER

+15 VDC

-15 VDC

SIGNAL GND

HDG/CRS REF

HDG ERROR

P

S

f

Y

j

i

10

7

4

8

11

12

5

3

2

6

15

6

12

GPS LAMP A

GPS LAMP B

PROG PIN COMMON

GAINSEL2

GAINSEL0

PHASE SELECT

TYPE SELECT

429 SHIELD

429 RXA

429 RXB

28VDC Avionics Bus

2ARSC

12

3

2

5

11

8

24

12

21

11

22

13

23

7

20

14

7

8

4

5

10

7

4

3

6

11

12

GPS RECEIVER

429 OUT

429 COM

SUPER FLAG

GPS

AP-OUT

AP-COM

AP-REF2

GPS LAMP A

GPS LAMP B

CREOSOTEL2

CREOSOTEL0

AP-REF3

AP-COM

AP-OUT

+15 VDC REG

-15 VDC REG

SIGNAL GND

LG-102A

DIRECTIONAL

GYRO

DATUM REF

HDG DATUM

H

K

M

J

ALL WIRES ARE 22 TO 24AWG.
SINGLE WIRE IS MIL-W-22759 OR EQUIV.
SHIELDED WIRE IS MIL-C-27500 OR EQUIV.
CIRCUIT BRKR IS KLIXON 7277-2-2 OR EQUIV.

LIGHTING BUS

CONN = M24308/2/4F WITH M39029/634-368 SOCKETS
APPENDIX G – Equipment Locations for the Beech 58P Baron