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BASIC DIGITAL FLIGHT INSTRUMENT, KIT INSTALLATION INSTRUCTIONS

MODELS: BELL 205A-1

Read all of the Instructions for Continuing Airworthiness thoroughly prior to performing any activities relating to this product

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Notes

1. If changes to this document are required, Alpine Aerotech LP shall revise all pages and reissue the entire document.
2. Alpine Aerotech LP shall make any subsequent revisions of this document available free of charge upon request. Alpine Aerotech LP also recommends that the end user of this product periodically verify the revision level of this document.

SECTION 1 DESCRIPTION

The following information provides a functional description of the Basic Digital flight Instrument, Kit as defined in Alpine Aerotech LP authority dataset AAL-280-070-001.

The AAL Basic Digital Flight Instrument, Kit allows for the replacement of the OEM mechanical attitude and heading instruments with standalone digital instruments.

SECTION 2 INSTALLATION & REMOVAL INSTRUCTIONS

Applicability

The Basic Digital Flight Instrument, Kit (AAL-280-070-001) is applicable to all 205A-1 serial numbers including aircraft equipped with co-pilot instrumentation per BHT Service Instruction 205-3.

Weight & Balance

<u>Part Number</u>	<u>Description</u>	<u>Weight</u>	<u>Long. Arm</u>	<u>Lat. Arm</u>
AAL-280-070-001	Basic Digital Instrument, Kit	4.28*	42.44	2.34 (LBL)
		1.91 (Kg)	1.08 (m)	.06 (m)

* Represents total weight of applicable kit only. Subtract weight of all items removed and recalculate C of G as appropriate.

General Notes

1. All Installation Instructions shall be accomplished in accordance with (IAW) standard aircraft practices. Refer to the current revision of the FAA Advisory Circular AC 43.13-1 and AC 43.13-2 for details on standard aircraft practices.
2. Torque fasteners IAW the tension type torque limits indicated in the current revision of the FAA Advisory Circular AC 43.13-1, Table 7-1 unless otherwise specified.
3. All Dimensions are in imperial measures (inches/pounds).
4. Refer to ICA document AAL-280-075-701, Section 4: Maintenance Instructions for instructions on maintenance for the item(s) referenced within this section.
5. Refer to ICA document AAL-280-075-701, Section 9: Illustrated Parts Breakdown for the part numbers of the item(s) referenced within this section.

Installation Notes

1. Handle the instruments with extreme care. Do not drop, jar or shake the instruments and avoid touching the screen. For proper care and handling instructions refer to Kelly Manufacturing publication No. 1401-5 for the Heading Indicator and No. 1401-3 for the Attitude Indicator.
2. Cable and wire routing shown is recommended, deviation from routing shown is permitted to accommodate individual aircraft configuration.
3. Coat the inside of all drilled holes with high solids epoxy primer per MIL-PRF-2377, Type 1, Class C2.
4. Secure cables & wiring harnesses IAW standard aircraft practices detailed in BHT-ELEC-SPM. Cable clamps are not provided and must be procured locally.
5. For installation on aircraft engaged in day VFR operation only, the installer may omit Steps 3, and 4 and identify Attitude and Heading circuit breakers with locally fabricated "PLT ATT", "PLT HDG", and/or "CPLT ATT" and "CPLT HDG" labels as applicable. Circuit breakers must be identified as being connected to the essential 28 VDC bus. Refer to Appendix B for more information regarding electrical installation.



Typical item number for all like items in this view unless otherwise specified.



Mark lit overlay panels IAW SAE-AS7788, Class 1-W, Type 4.

Font: Futura Demi Bold

Size: .125 (switch labels), .156 (section headings)

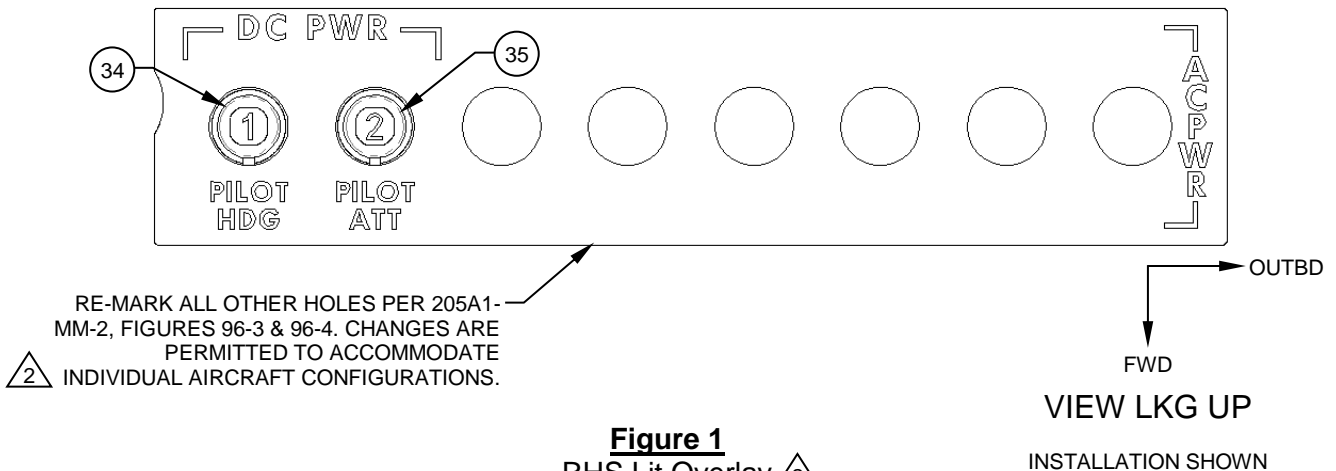
Installation Instructions

1. Gain access to the aircraft and make the aircraft ready for maintenance.
2. Prior to installation, remove the following instruments and equipment as applicable based on aircraft serial number and aircraft configuration.
 - i. Pilot attitude indicator
 - ii. Co-pilot attitude indicator & associated 204-070-749-3 bracket (if so equipped)
 - iii. Pilot course deviation indicator
 - iv. Co-pilot course deviation indicator (if so equipped)
 - v. Pilot turn & slip indicator
 - vi. Co-pilot turn & slip indicator (if so equipped)
 - vii. C-14A directional gyro
 - viii. Flux valve & compensator
 - ix. MAG/DG switch
 - x. Compass slaving switch
 - xi. Compass slaving indicator

NOTE

When removing the above referenced equipment, removal of all unused portions of the wiring harness is preferred. However, it is permissible to stow the affected portion(s) of the wiring harness that are no longer used. Recalculate weight and balance accordingly.

3. Remove the lit overlay on the RHS overhead breaker panel and have it re-marked as shown. Alternately, if only day VFR operations are anticipated, it is permissible to identify Attitude and Heading circuit breakers with locally fabricated “PLT ATT” and “PLT HDG labels. Reference Figure 1. Changes to the layout are permitted to accommodate individual aircraft configurations.



Installation Instructions

- Remove the lit overlay on the LHS overhead breaker panel and have it re-marked as shown. Alternately, if only day VFR operations are anticipated, it is permissible to identify Attitude and Heading circuit breakers with locally fabricated “CPLT ATT” and “CPLT HDG” labels. Reference Figure 2.

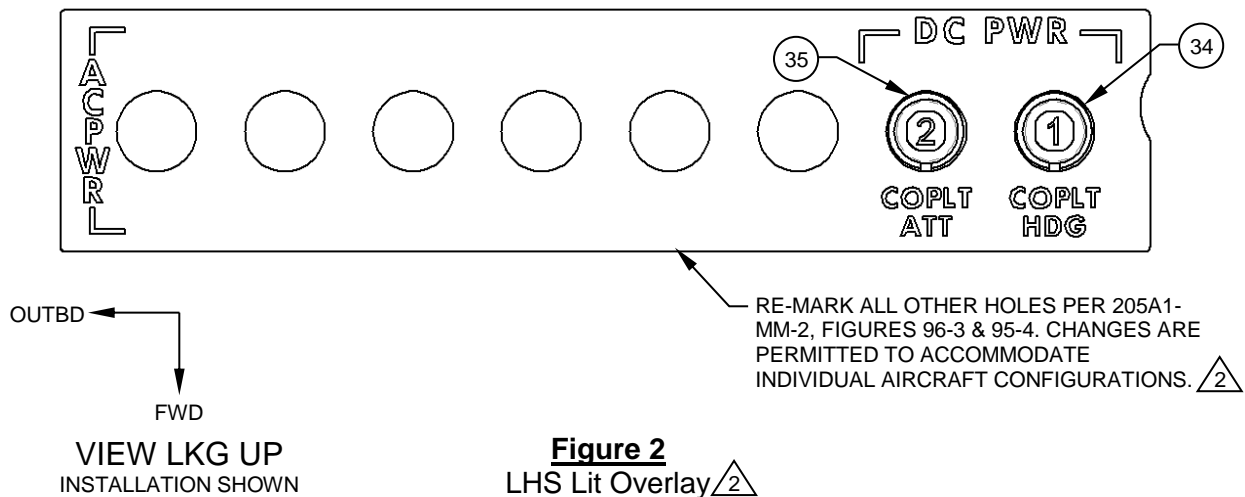



Figure 2
LHS Lit Overlay 

- Install Circuit Breaker, Details (Items 34 & 35) in the locations shown. The Circuit Breaker locations shown are preferred, however changes to the breaker locations are permitted to accommodate individual aircraft configuration. Reference Figures 1 & 2 and Steps 3 & 4. Cut existing AC bus bars to segregate AC power from DC power. Ensure adequate separation between the AC & DC bus bars. Reference Figures 1 & 2. Connect the terminated end of Wiring Harness, Assys (Items 40 & 41) to the DC bus bar. Cut the Wiring Harness, Assy to length and terminate with the provided ring terminal (Item 38). Ensure that the final cut length of the wiring harness is as short as practical. Connect the newly terminated ends to 28 VDC essential bus. Reference Appendix B.

Installation Instructions

6. Install the Doubler, Detail (Item 23) as shown in preparation for mounting the GPS Antenna (Item 22). Reference Figure 3. When installing the Doubler, Detail (Item 23), ensure that provisions are made to electrically bond/ground the antenna as per the requirements of BHT-ELEC-SPM, chapter 8.

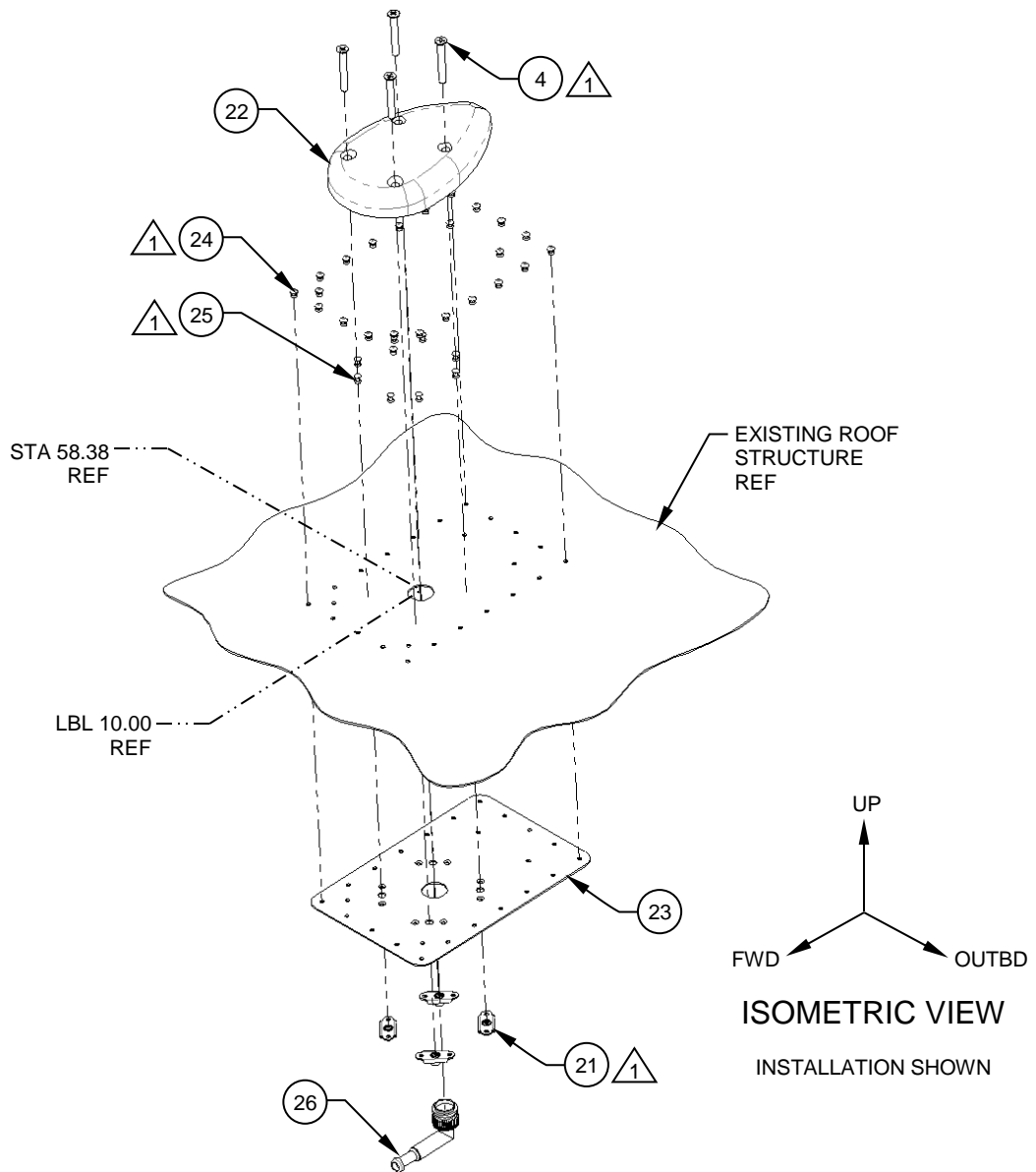


Figure 3
Doubler/Antenna Installation

Installation Instructions

7. Install the GPS Antenna (Item 22) with the provided fasteners. Ensure that the GPS Antenna is electrically bonded/grounded per the requirements of BHT-ELEC-SPM, chapter 8. Reference Figure 3. Apply a fillet of Sealant, Corrosion Inhibitive (Item C01) around the base of the GPS Antenna. If required after installation, coat the area surrounding the GPS antenna (Item 22) with high solids epoxy primer per MIL-PRF-2377, Type 1, Class C2 and polyurethane paint in the appropriate color. Do not coat the GPS antenna.
8. Remove the existing spare bulb holder clip (205-030-617-037) and replace with the Clip, Assy (Item 27). Back-drill the Clip, Assy (Item 27) from the existing holes making sure that the clip is positioned to keep the spare bulbs from contacting the Coax Cable, Assy (Item 13). Rivet in place with MS20470AD(X)-(X) rivets. Reference Figure 4.

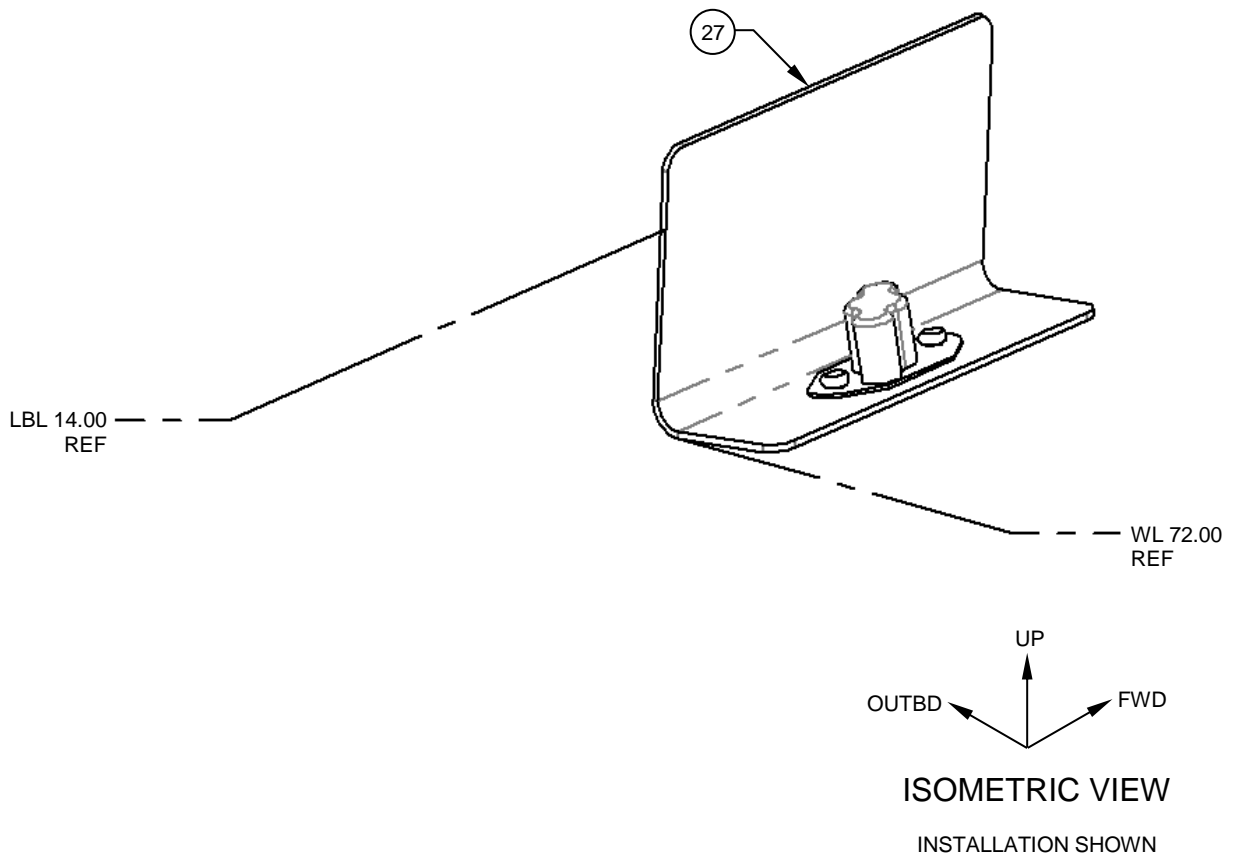


Figure 4
Clip, Assy (Item 27)
Installation shown

Installation Instructions

- Install the Splitter, GPS (Item 9) with the supplied fasteners as shown. Reference Figure 5. The position shown is the preferred location however, deviation is permitted to accommodate individual aircraft configurations. Recalculate weight and balance accordingly.

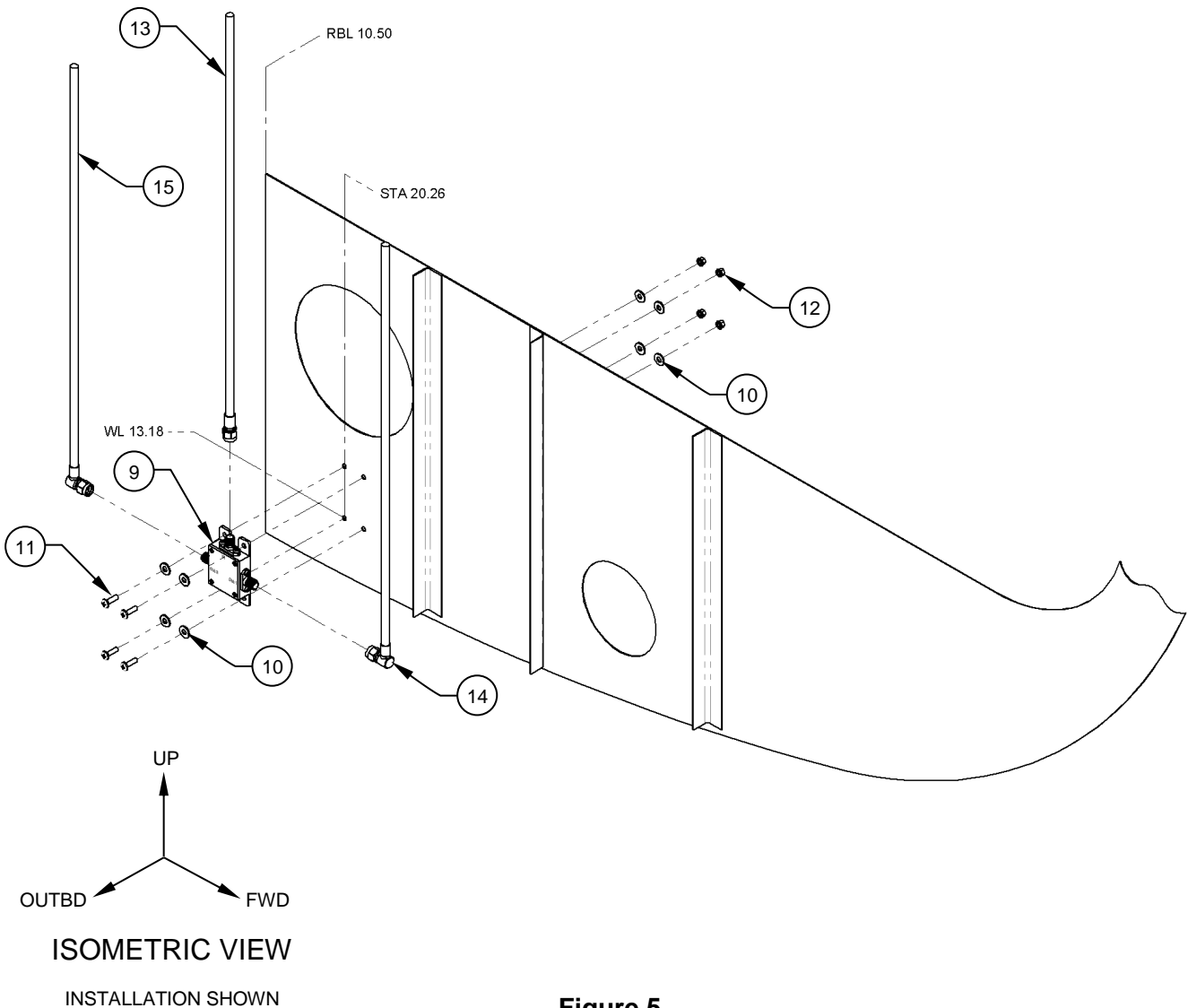


Figure 5
Splitter, Installation

Installation Instructions

10. If present, remove the 204-070-749-3 bracket and drill out the four holes in the instrument panel (shown) to $\text{Ø}.209''$ (#4). Coat the insides of the holes with primer and install the Click Bond® two-lug nut plates (Item 20) oriented as shown. Reference Figures 6, 7, 8 & Appendix A.

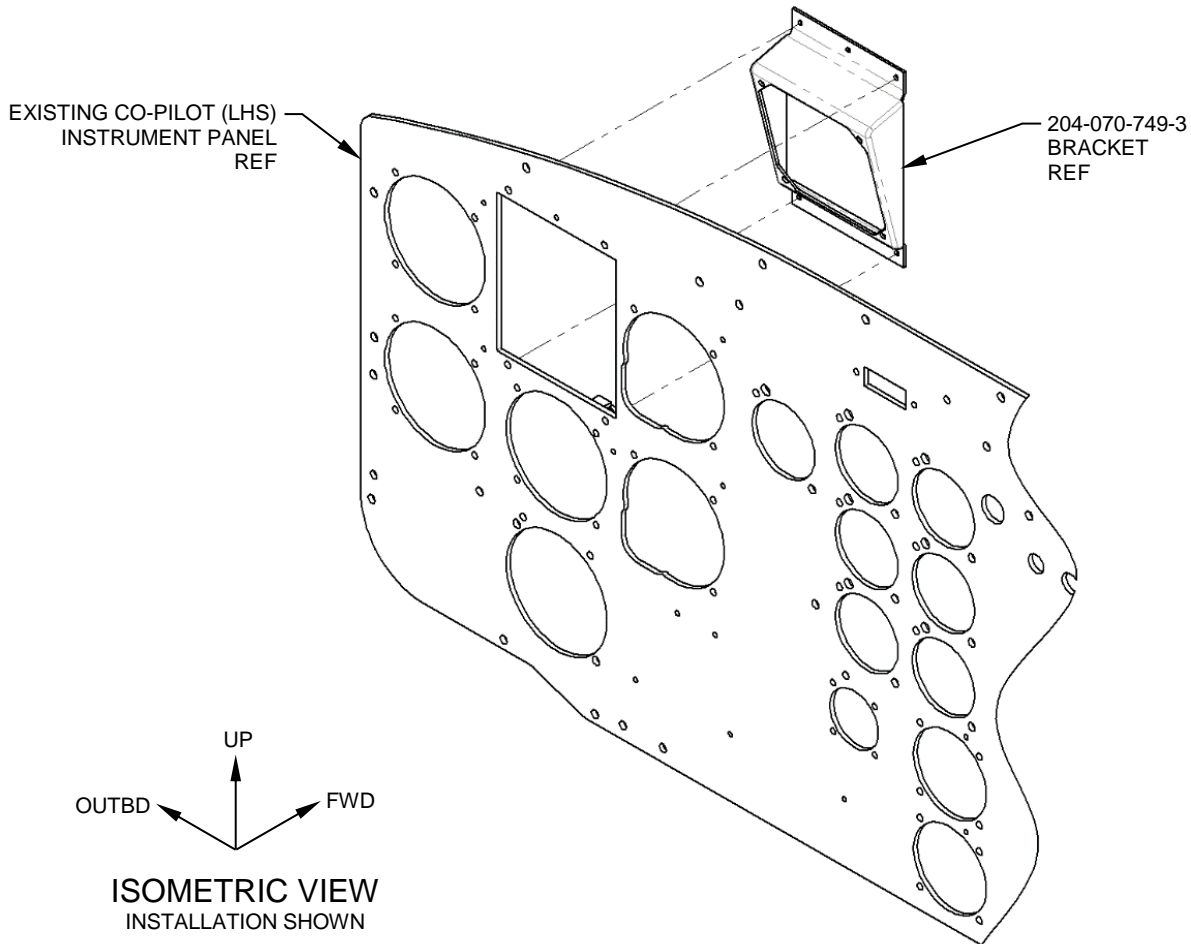


Figure 6
LHS instrument panel
bracket removal

Installation Instructions

11. Install the Attitude Indicators into the Adaptor, Detail(s) (Items 1 & 5) with the associated hardware as shown. Reference figures 6, 7 & 8. If the aircraft is not equipped with a 204-070-749-3 bracket, then install the co-pilot Attitude Indicator (Item 7) directly into the existing standard 3-inch hole in the instrument panel. Reference Figures 7 & 8 & 9.

CAUTION

Use extreme care when handling the instruments and avoid touching the screen if at all possible. For proper care and handling refer to Kelly Manufacturing publication No. 1401-5 for the Heading Indicator and No. 1401-3 for the Attitude Indicator.

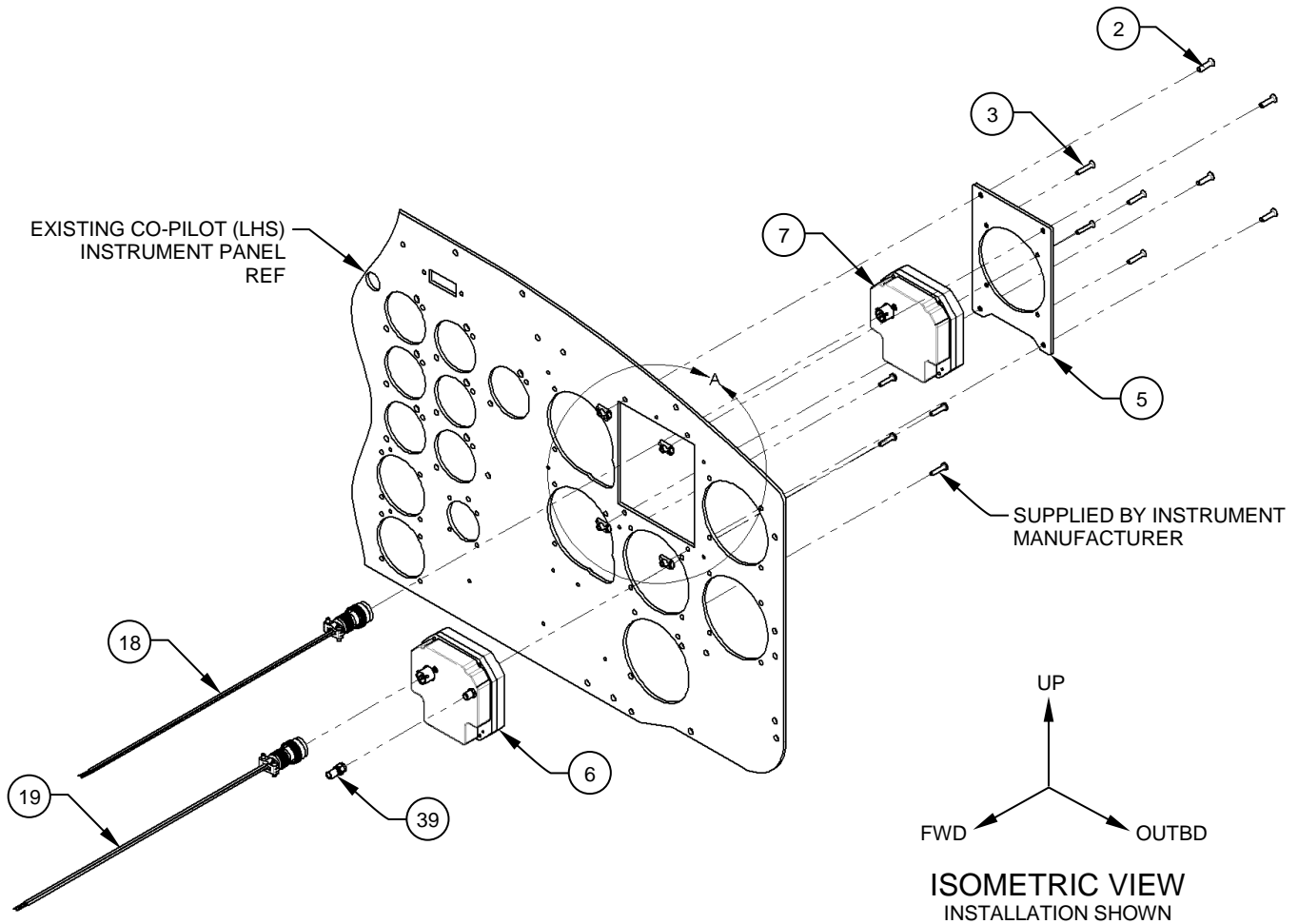


Figure 7
Co-pilot (LHS) Adaptor, Detail & Instrument installation shown

Installation Instructions

- Attach the Adaptor, Detail (Item 5) as shown to the co-pilot (LHS) instrument panel in the location that previously housed the old attitude indicator using the provided fasteners (Item 2). Reference Figure 7. Install the Heading Indicator (Item 6) in the LHS of the instrument panel in the existing hole that previously housed the old heading indicator. Reference Figure 7.

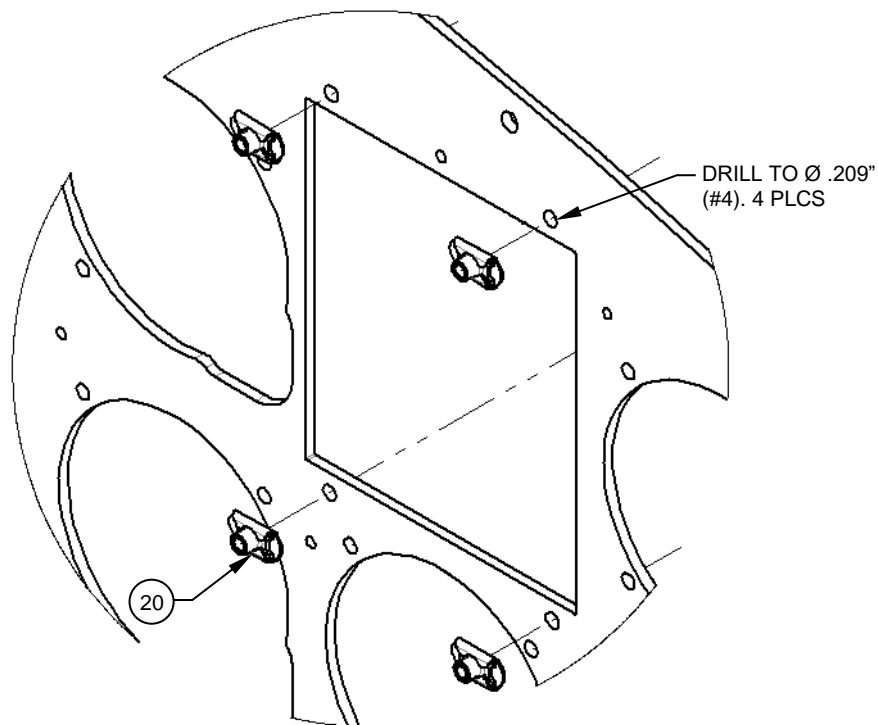


Figure 8

Detail: A

Click Bond® nut plate installation
(nut-plate orientation is mandatory)

Installation Instructions

13. Attach the Adaptor, Detail (Item 1) as shown to the pilot (RHS) instrument panel in the location that previously housed the old attitude indicator using the provided fasteners (Items 2 & 3). Reference Figure 9. Install the Heading Indicator (Item 6) in the RHS of the instrument panel in the existing hole that previously housed the old heading indicator. Reference Figure 9.

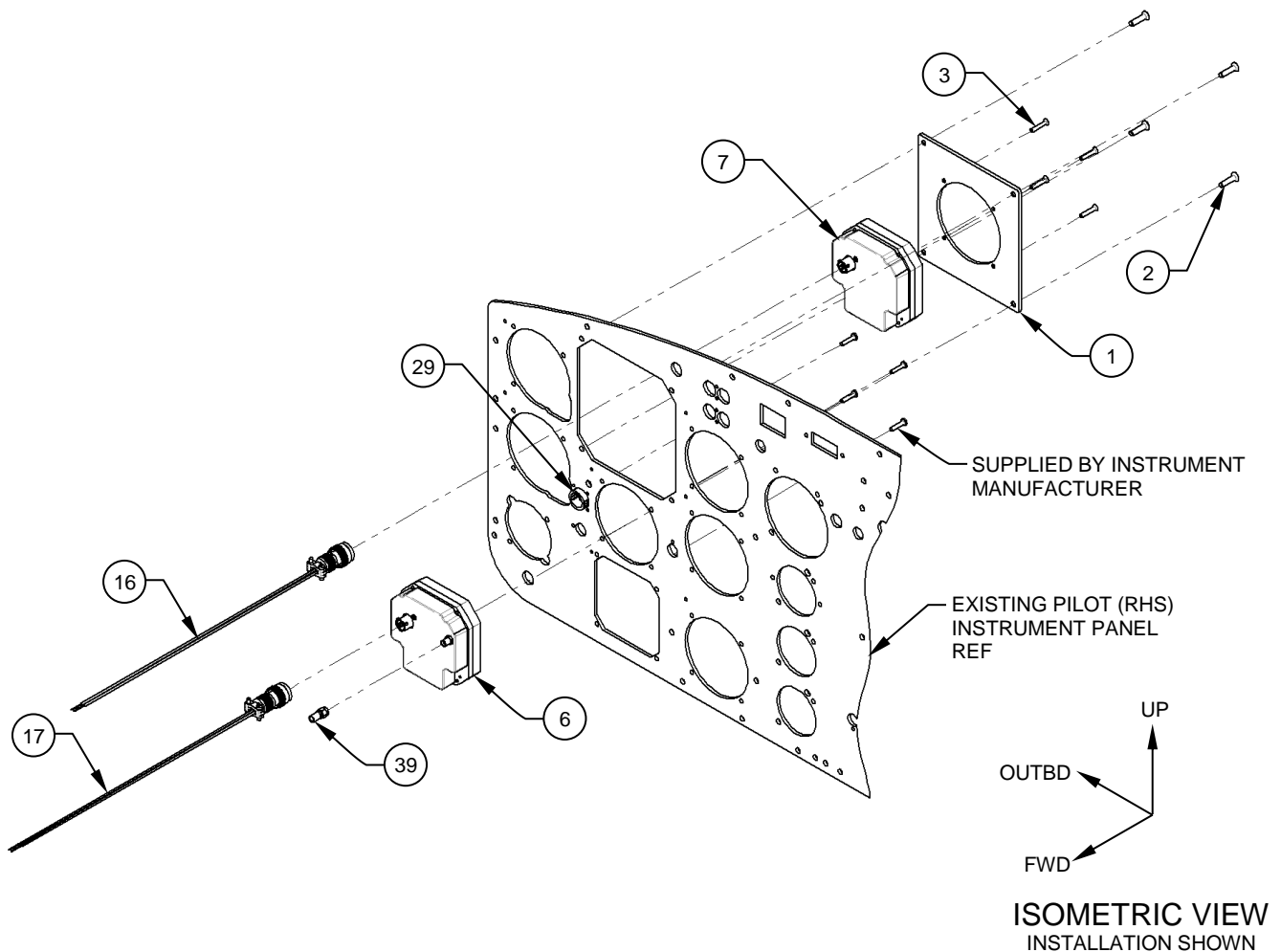


Figure 9
Pilot (RHS) Adaptor, Detail &
Instrument installation shown

14. Install the Blanking Plate, Detail(s) (Item 42) in the position(s) previously occupied by the pilot and co-pilot turn/slip indicator(s) as applicable. Re-use the existing fasteners.

Installation Instructions

15. Install the Coax Cable, Assy (Item 13) by fastening the SMA connector to the to the “IN” port of the Splitter (Item 9). Drill $\varnothing.437$ ” holes through frames 205-030-617-099/205-030-617-041 and 205-030-617-029 as applicable. Coat the inside of each hole with primer per MIL-PRF-23377, Type 1, Class C2 and install Grommet, Rubber (Item 33) in each hole once primer has cured. Route the Coax Cable, Assy (Item 13) through the grommets and secure with Cable Tie Mounts (Item 32) and Tie Straps (Item 28). Position the cable tie mounts to avoid interference with 204-030-636-003 Handle, Assy. Reference Figures 3, 5 & 10 and Appendix B. Cut the un-terminated end of the cable to length and terminate the end with the provided TNC Connector (Item 26) at the GPS, Antenna (Item 22) Reference Figure 3. Connect the newly terminated end to the GPS, Antenna (Item 22).

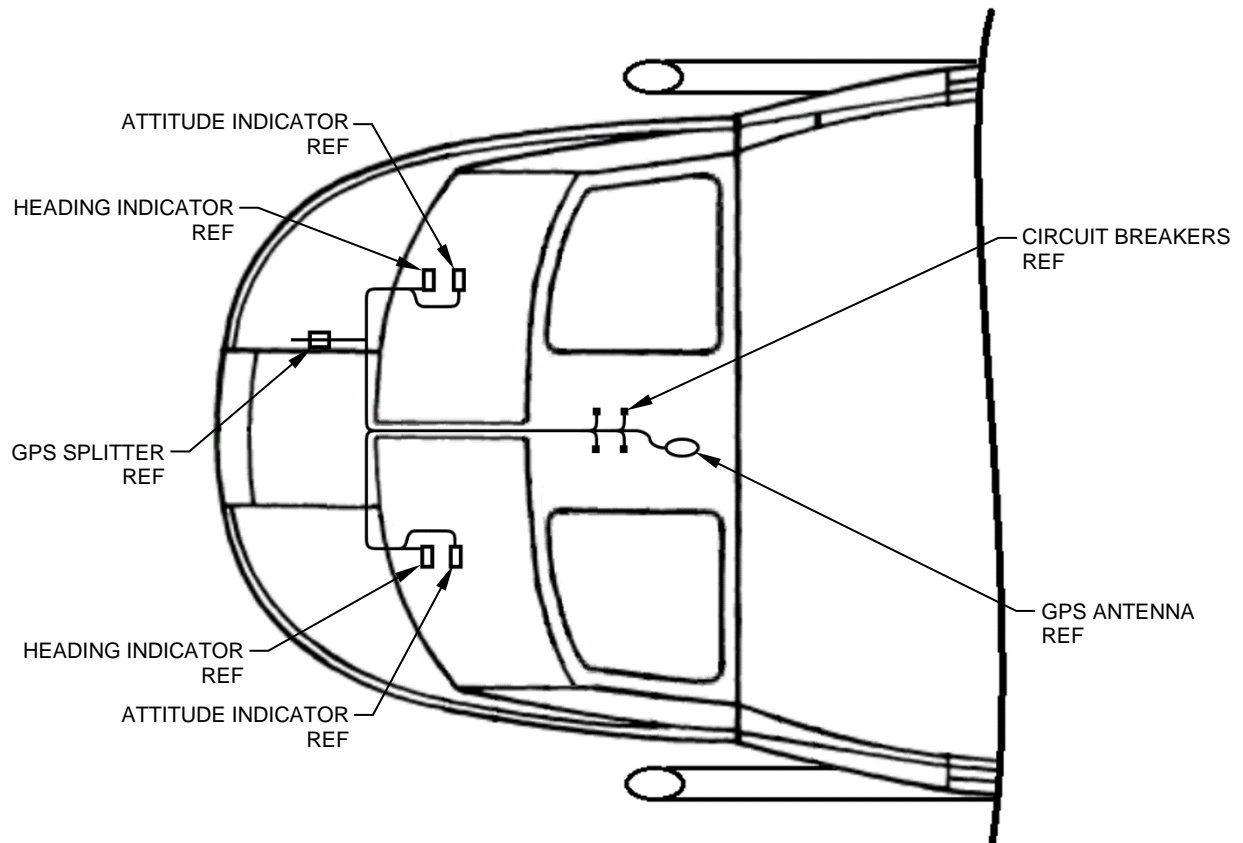


Figure 10
Recommended Wire Routing
Top view shown

16. Install the Coax Cable, Assy (Item 14) by fastening the Coax Cable, Assy to the back of the pilot (RHS) Heading Indicator (Item 6) and route the cable as shown. Reference Figures 7, 9, 10 & 11 and Appendix B. Cut the Coax Cable, Assy to length and terminate with the SMA connector (Item 39). Fasten the newly terminated end of the Coax Cable, Assy to the “OUT 1” port of the Splitter (Item 9) Reference Figure 5.

Installation Instructions

17. Install the Coax Cable, Assy (Item 15) by fastening the Coax Cable, Assy to the back of the co-pilot (LHS) Heading Indicator (Item 6) and route the cable as shown. Reference Figures 7, 9, 10 & 11 and Appendix B. Cut the Coax Cable, Assy to length and terminate with the SMA connector (Item 39). Fasten the newly terminated end of the Coax Cable, Assy to the “OUT 2” port of the Splitter (Item 9) Reference Figure 5.

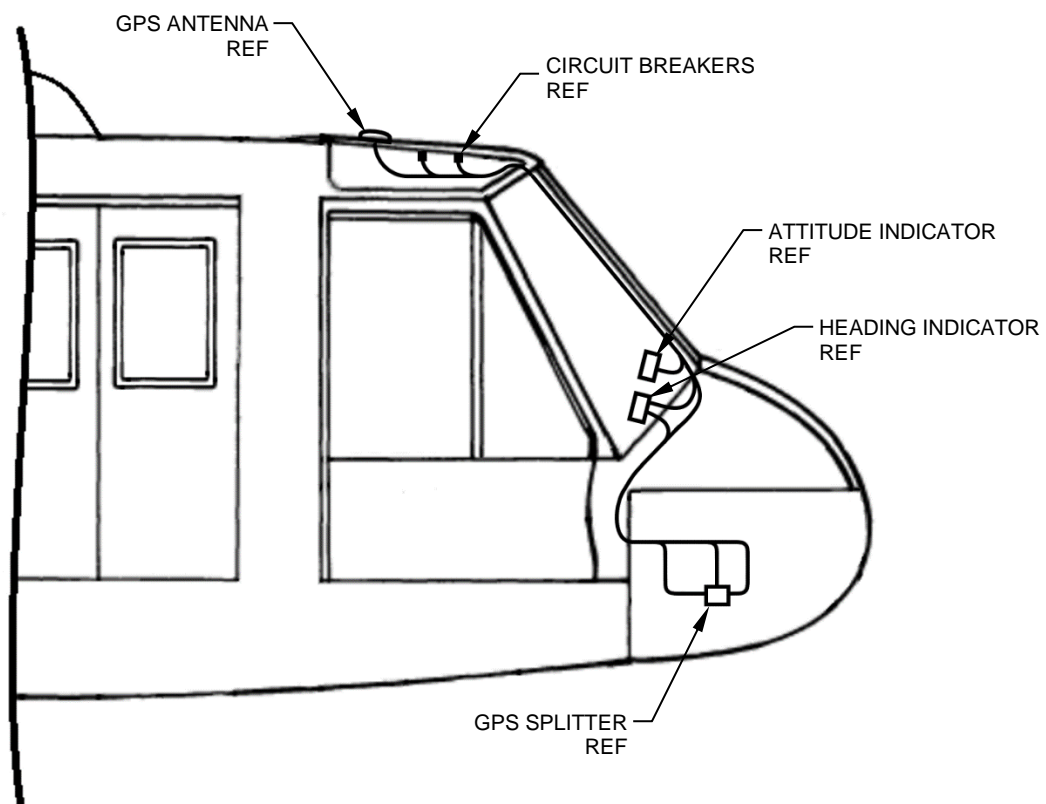


Figure 11
Recommended Wire Routing
RHS view shown

18. Install Cap-plug, Plastic (Items 29, 30 & 31) in any un-used breaker holes, the compass slaving switch hole the MAG/DG switch hole and the compass slaving indicator hole(s) as applicable. Reference Figure 9.

Installation Instructions

19. Install the re-marked lit overlays onto the overhead breaker panels or label circuit breakers as detailed in Steps 3 & 4. Reference Figures 1 & 2 and Steps 3 & 4.
20. Install the Wiring Harness, Assy (Item 17) by fastening the connector to the back of the pilot Heading Indicator (Item 6) and route the wires as shown. Reference Figures 9, 10 & 11. Cut the un-terminated end of the wires to length and terminate with the provided ring terminals (Items 36 & 37) as per the wiring diagram. Reference Appendix B. Connect the newly terminated ends to the Circuit Breakers (Items 34 & 35) as per the wiring diagram and connect ground wires to existing ground stud or ground block if available. If new ground studs or ground blocks are required, install IAW BHT-ELECT-SPM, Chapter 8. Reference Appendix B.
21. Install the Wiring Harness, Assy (Item 19) by fastening the connector to the back of the co-pilot Heading Indicator (Item 6) and route the wires as shown. Reference Figures 7, 10 & 11. Cut the un-terminated end of the wires to length and terminate with the provided ring terminals (Items 36 & 37) as per the wiring diagram. Reference Appendix B. Connect the newly terminated end to the Circuit Breakers (Items 34 & 35) as per the wiring diagram and connect ground wires to existing ground stud or ground block if available. If new ground studs or ground blocks are required, install IAW BHT-ELECT-SPM, Chapter 8. Reference Appendix B.
22. Install the Wiring Harness, Assy (Item 16) by fastening the connector to the back of the pilot Attitude Indicator (Item 7) and route the wires as shown. Reference Figures 9, 10 & 11. Cut the un-terminated end of the wires to length and terminate with the provided ring terminals (Items 36 & 37) as per the wiring diagram and connect ground wires to existing ground stud or ground block if available. If new ground studs or ground blocks are required, install IAW BHT-ELECT-SPM, Chapter 8. Reference Appendix B. Connect the newly terminated end to the Circuit Breakers (Items 34 & 35) as per the wiring diagram. Reference Appendix B.

Installation Instructions

23. Install the Wiring Harness, Assy (Item 18) by fastening the connector to the back of the co-pilot Attitude Indicator (Item 7) and route the wires as shown. Reference Figures 7, 10 & 11. Cut the un-terminated end of the wires to length and terminate with the provided ring terminals (Items 36 & 37) as per the wiring diagram and connect ground wires to existing ground stud or ground block if available. If new ground studs or ground blocks are required, install IAW BHT-ELECT-SPM, Chapter 8. Reference Appendix B. Connect the newly terminated end to the Circuit Breakers (Items 34 & 35) as per the wiring diagram. Reference Appendix B.

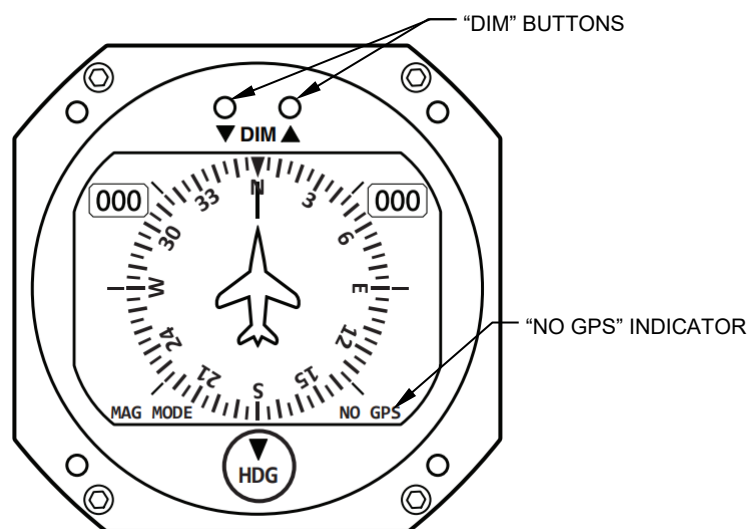


Figure 12
Heading Indicator

24. Perform a General Inspection of all items to ensure proper installation and function.
25. Connect aircraft to external power and power up the instruments. On initial start-up the instruments will show a blue "Self-Test" screen that will display a list of data including the instrument serial number. Record the serial number(s) in the ICA document as well as the logbook for future reference. After roughly 30 seconds the "Self-Test" will be cleared from the displays and a prominent red "X" will be displayed across the screens while the instrument initializes. The red "X" should not be present on the screens for more than 3 minutes.
26. Confirm that the instrument readings are stable.
27. Move the aircraft outside to allow the Heading Indicator(s) to acquire a GPS signal. The "NO GPS" indicator should extinguish once the signal is established. Reference Figure 12.

Installation Instructions

- 28. With the aircraft on the ground, cycle power to the instruments one at a time using the associated circuit breakers in the overhead breaker panel to ensure proper breaker function. The Attitude Indicators will go into battery mode and will begin the automatic 60 second countdown procedure. To override the countdown and force shutdown of the instruments, hold down both “DIM” buttons simultaneously. For more information regarding the 60 second countdown procedure, refer to Section 4 of ICA document AAL-280-075-701.
- 29. Perform magnetic calibration procedure as defined in Instructions for Continued Airworthiness (Doc. No.: AAL-280-075-701) Section 7 – General
- 30. Update the aircraft logbook for the installation of the Basic Digital Instrument, Kit.
- 31. Installation complete. Record instrument serial numbers below for future reference.

Pilot (RHS) Attitude S/N		Co-pilot (LHS) Attitude S/N	
Pilot (RHS) Heading S/N		Co-pilot (LHS) Heading S/N	

Removal Instructions

1. Remove the lit overlays from the overhead breaker panels and re-mark/re-label them as per the prior breaker configuration. Reference Figures 1 & 2, Installation Note 5 and Flag note 2 (\triangle_2).
2. Remove the instruments and all of the associated wiring, coax cables and circuit breakers associated with the Basic Digital Instrument, Kit.
3. Remove the Adaptor, Details (Item 1 and/or Item 6) as applicable and all of the associated hardware.
4. Remove the Splitter, Assy (Item 9) and the associated hardware.
5. Remove the GPS Antenna (Item 22) and locally fabricate a blanking plate to cover the mounting hole IAW standard aircraft practices as detailed in FAA publication AC-43.13. Coat the blanking plate with high solids epoxy primer per MIL-PRF-2377, Type 1, Class C2 prior to installation. After installation of the blanking plate, apply a fillet of Sealant, Corrosion Inhibitive (Item C01) around the base of the blanking plate. Coat the blanking plate and the surrounding area with polyurethane paint in the appropriate color.
6. Re-install all instruments and equipment removed during installation procedure including any associated wiring and bracketry. Reference Step 2 of installation procedure.
7. Re-install the 204-070-749-3 bracket substituting MS35214 screws and MS21042 nuts for rivets in the four corner holes. Rivet the remaining hole with an MS20426 rivet. Procure rivets, screws and nuts locally.

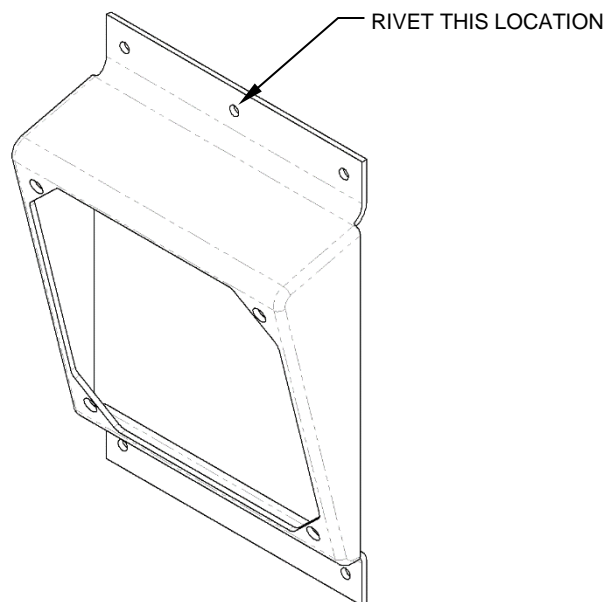


Figure 13
204-070-749-3 Bracket

Removal Instructions (cont.)

8. Re-install the re-marked/re-labeled lit overlays on the overhead breaker panels.
9. Perform a General Inspection of all items to ensure proper installation and function.
10. Update the aircraft logbook for the removal of the Basic Digital Instrument, Kit.

SECTION 3 CONFIGURATION SETTINGS

1. Reference Instructions for Continued Airworthiness (Doc. No.: AAL-280-075-701) Section 7 – General, for all configuration settings.

APPENDIX: A

Nut-plate Installation Procedure

This appendix outlines the procedures associated with the installation of Adhesive Mounted (Click Bond®) nut-plates (Item 20).

1. Gain access to the installation location for the Click Bond® two-lug nut plates (Item 20) Reference step 10 and Figure 8 of the Installation Instructions.
2. Prepare the substrate as follows:
 - a. Solvent wipe the mounting surface to remove all debris and surface contaminants using a clean, lint free cloth saturated with acetone, MEK or denatured alcohol.
 - b. Abrade the substrate to bare metal where the nut-plates are to be installed with 150-180 grit sandpaper using a random motion.
 - c. Solvent wipe the mounting surface again to remove all contaminants generated by sanding. Always use a new clean cloth for each wipe and wipe from the center out using a single rolling motion. Never wipe with the same side of the cloth more than once. Keep wiping the surface with clean cloths until no residue is present on the cloth after wiping. Allow the solvent time to flash-off prior to bonding. Reference Figure A-1.

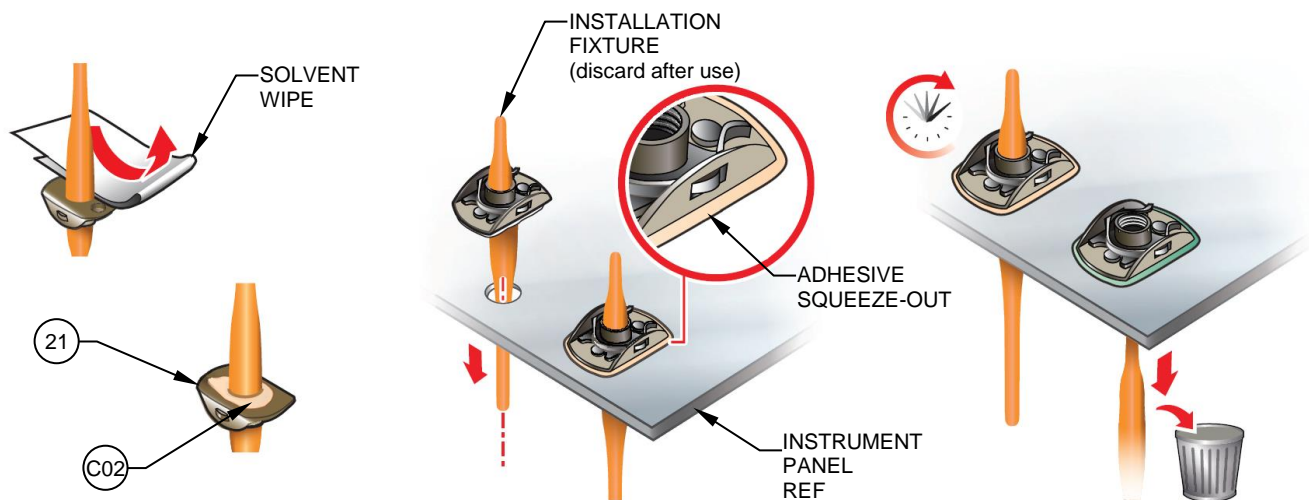


Figure A-1

3. Solvent wipe the base of the Click Bond® two-lug nut plates (Item 21) in one rolling motion. Allow the solvent to flash-off. Reference Figure A-1.
4. Apply Hysol Epoxy Paste Adhesive (Item C02) to the base of the nut-plate. Use enough adhesive to produce a small even amount of squeeze-out around the base of the nut-plate.

APPENDIX: A (continued)

5. Insert the installation fixture into the instrument panel fastener hole in the proper orientation. Reference Figure 7 in the Installation Instructions. Tug gently on the installation fixture until nut-plate is seated securely against the instrument panel surface and adhesive squeeze-out is visible around the entire periphery of the nut-plate. Reference Figure A-1. Do not wipe away squeeze-out.

NOTE


Don't pull excessively hard on the installation fixture when seating the nut-plate. It is imperative that the installation fixture stays with the nut-plate until the adhesive has cured.

6. Allow adhesive to cure per adhesive manufacturer's instructions. Do not disturb the nut-plates during the cure period.
7. Once adhesive is cured, remove the installation fixture and discard. Reference Figure A-1.
8. Touch up coatings as applicable.

APPENDIX: B ELECTRICAL CONNECTIONS

Electrical Notes

This appendix outlines the electrical details associated with the installation of the Basic Digital Flight Instrument, Kit and includes the wiring schematic.

1. Unless otherwise specified, all wiring terminations at connectors shall be IAW BHT-ELECT-SPM Chapters 4, 5 and 7 and the connector manufacturer's instructions or applicable military or commercial standard for stripping procedures, crimping procedures and required tooling.
 2. Use existing ground stud or ground block if available. If new ground studs or ground blocks are required, install IAW BHT-ELECT-SPM, Chapter 8.
 3. All wiring shall be routed and secured IAW BHT-ELECT-SPM, Chapter 6. Particular attention to minimum bend radii, clamp spacing, service loop separation from control, and fluid and oxygen systems must be observed.
 4. Refer to ICA document AAL-280-075-701, Section 9: Illustrated Parts Breakdown for the part numbers of the item(s) referenced within this appendix.
 5. All solder connections are to be made using a rosin flux cored solder wire (63% tin, 37% lead) and following standard aircraft practices.
-  Connect to 28VDC essential bus. Trim Wiring Harness, Assy (Items 40 & 41) as short as is practical.

1. Wiring Schematic

