INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

FOR

P139-HD DIGITAL AUDIO SYSTEM
MDL GA182
FOR
MODEL BELL 206, 206L & 407 HELICOPTERS

Report No.: ICA182-3
STC No.: SR00521SE

APPROVED BY:  C. Bonar
Rev. A DATE: 10/15/12
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<td>18</td>
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Section 1.0 Introduction

1.1 Scope
This manual provides description, operation, disassembly, inspection, repair and testing instructions, and an Illustrated Parts List for P/N P139-HD Digital Audio System.

1.2 Purpose
The purpose of this manual is to maintain the P/N P139-HD Digital Audio System in peak operating efficiency with the greatest service life.

1.3 Revision Control Procedure
All revisions to this document shall be identified in the Details of Revisions. All pages will be summarized on page 4, “List of Effective Pages.”

1.4 Service Difficulty Reporting
A record of sales shall be maintained by Eagle Copters. Any changes to these instructions resulting from service difficulties shall be distributed to all previous recipients.

1.5 Applicability
This manual shall be used to maintain the P139-HD Digital Audio System for Bell 206, 206L & 407 Helicopters.

1.6 Abbreviations and Units of Measure

\[
\begin{align*}
in & = \text{inches} \\
lbs & = \text{pounds} \\
P/N & = \text{part number} \\
I/N & = \text{item number} \\
LH & = \text{left hand} \\
RH & = \text{right hand}
\end{align*}
\]
1.7 Precautions
The following precaution definitions will be used to indicate the seriousness of the hazard or condition.

**WARNING:** May be a maintenance procedure, practice, condition, etc., which could result in personal injury or loss of life.

**CAUTION:** May be a maintenance procedure, practice, condition, etc., which could result in damage or destruction of equipment.

**NOTE:** May be a maintenance procedure, practice, condition, etc., or a statement that needs to be highlighted

1.8 Distribution
This manual will be distributed to end users (or their mechanics or maintenance departments). A copy of this ICA shall be provided by Eagle Copters with each kit sold.

1.9 Description
The Eagle Audio GA182 Audio system provides a communication system for aircraft crew members and passengers.

1.9.1 The P139-HD Digital Audio System Includes the Following:

a. An Audio Router. The Audio Router comes in 3 different configurations. The 2 analog Audio Routers P/N G11426 (6 slot) or P/N G12320 (8 slot) contain removable printed circuit boards (control boards) which can be interchanged for diagnostic and spares purposes. The 3rd option is a Digital Router (P/N G13000).

b. A minimum of 2 Audio Control Panels for the pilot and co-pilot. A typical installation will include 3 or more Audio Control panels for the pilot, co-pilot, crew members, and/or passengers. The Control Panels come in 6 different configurations P/Ns G11431, G11460, G11462, G11470, G11480, G11490, G13115, and G13116 as shown in Figure 6 through Figure 13. The Audio Control Panels can be used interchangeably, depending on the control functions desired.

c. Sheet metal support brackets, doublers and required hardware for mounting the Audio Router.
d. Sheet metal support brackets and required hardware for mounting G11431 Control Panels (if installed).
Figure 2: G11426 6 Slot Analog Audio Router

Figure 3: G12320 8 Slot Analog Router
Figure 4: Digital Audio System Overview
Figure 5: G13000 Digital Router
Figure 6: G11431 Control Panel

Figure 7: G11460 Control Panel
Figure 8: G11462 Control Panel

Figure 9: G11470 Auxiliary Control Panel
Figure 10: G11480 Control Panel

Figure 11: G11490 Control Panel
Figure 12: G13115 Control Panel

Figure 13: G13116 Control Panel
Section 2.0 Airworthiness Limitations

There are no airworthiness limitations associated with this STC.

The Airworthiness Limitation section is FAA approved and specifies inspections and other maintenance required under Part 43.16 and 91.403 of Federal Regulations unless an alternate program has been FAA approved.
Section 3.0  Inspection Requirements and Overhaul Schedule

3.1 Inspection Requirements

3.1.1 2 Year/2000 Hour Inspection

a. Make sure the individual modules are properly secured and the restraining hardware is not damaged or deformed.

b. Remove the Router Assembly from the mounting brackets. See Section 4.0 for the Analog Routers and Section 5.0 for the Digital Router.

c. Inspect all sheet metal components for damage and corrosion. If damage or excessive corrosion is found replace parts per Section 4.0 for the Analog Routers and Section 5.0 for the Digital Router. Corrosion that has penetrated more than .02" is cause for replacement in machined aluminum components. Corrosion that has penetrated more than .02" is cause for replacement on sheet metal components.

d. Inspect all wiring for damage and proper security. Any wires that are damaged need to be repaired or completely replaced.

e. Reinstall any removed or replaced parts per applicable portions of Section 4.0 and Section 5.0 and return aircraft to operational condition.

3.1.2 Special Inspections

a. In the event that the aircraft experiences a “Hard Landing”, then conduct the inspection requirements called out in Section 3.1.1.

b. In the event that the aircraft experiences a “Lightning Strike”, then conduct the inspection requirements called out in Section 3.1.1.

3.2 Overhaul Schedule

There is no overhaul schedule for this kit.
Section 4.0 Analog Audio Router Removal, Inspection and Re-Installation

4.1 Analog Router Removal

a. Disconnect all cables from the Analog Router.

b. The installation of the Router will vary depending on the aircraft configuration. Disconnect all hardware attaching the Router to the aircraft and completely remove the entire Router Assembly.

4.2 Analog Router Inspection

**WARNING**

Most electronic devices are subject to damage by electrostatic discharge (ESD). Installation or removal of components or circuit boards should follow the guidelines in AC43.13-1b Par 12-2 and AC 43-206 Par 905, which are summarized below:

When removing ESD-sensitive equipment from the aircraft, the aircraft should be grounded and power removed. Prior to disconnecting the cables from the equipment, personnel should touch the metal case of the equipment to equalize any electrostatic potential. Once the cables are disconnected, conductive dust caps or conductive grid tape should be placed on the connector receptacles.

Circuit cards and components should be packaged in ESD-protective packaging prior to leaving the ESD workstation. Static shielding bags which have a static-dissipative inner layer and a conductive outer layer are used for this purpose. They should be noncorrosive and should zip-lock or heat seal closed. Cushion wrap (bubble wrap) used around circuit cards should also be made of static-dissipative material.

a. Inspect the Router Shell for cracks or excessive corrosion. If any of the parts are cracked or excessively corroded (refer to Section 3.1.1 for corrosion limits) they must be removed and replaced.

b. The Audio Control Boards (P/N G11428) in the Router are field replaceable. The Audio Control Boards as shown in Slots 1-6 of Figure 14 and Slots 1-8 in Figure 15 are physically identical and may be interchanged for diagnostic and spares purposes.

c. To remove an Audio Control Board remove the 2 retaining screws and apply pressure two the 2 card ejector tabs on either side of the Audio Control Board.
The Audio Control Boards have no serviceable parts. If an Audio Control Board is found to be broken or defective it must be returned to Eagle Copters for repair or replacement.

Figure 14: Typical 6 Slot Router Configuration
Assembly shown is typical in configuration. Optionally, the quantities and positions for G11428, G11429, G12358, G11426-4, G11426-8 and G11426-10 may change depending on the installers desired configuration requirements.

G11437 Relay Module may Replace G11427 COM1 Direct Board depending on the installers desired configuration requirements.

G11430 Audio Expander may be omitted depending on the installers desired configuration requirements.

Parts List for Figure 14:

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* [a] Quantities and positions for these components may change depending on the installer’s desired configuration requirements.

* [b] Audio systems shall be fitted with either one G11427 COM1 Direct OR G11437 Relay Module.

* [c] Audio systems shall be fitted with either G11429 ICS Audio Board OR G12358 Headset Expander Boards.
Figure 15: Typical 8 Slot Router Configuration

Assembly shown is typical in configuration. Optionally, the quantities and positions for G11428, G11429, G12358, G11426-4, G11426-8 and G11426-10 may change depending on the installers desired configuration requirements.

G11437 Relay Module may Replace G11427 COM1 Direct Board depending on the installers desired configuration requirements.

G11430 Audio Expander may be omitted depending on the installers desired configuration requirements.
Parts List for Figure 15:

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<td>GNET Config Port</td>
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</tbody>
</table>

* [a] Quantities and positions for these components may change depending on the installer’s desired configuration requirements.

* [b] Audio systems shall be fitted with either one G11427 COM1 Direct OR G11437 Relay Module

* [c] Audio systems shall be fitted with either G11429 ICS Audio Board OR G12358 Headset Expander Boards

4.3 Analog Router Reinstallation

a. The router may be mounted into a rack, such as the Eagle Audio P142 Modular Equipment Rack (STC # SR00474SE). It also may be mounted to an aircraft structure that is designed to carry the load of the router (11 lbs). Since installation will vary depending the aircraft configuration, the installer is responsible for receiving FAA approval for the mounting of the router to the structure if not previously approved. Two G12340 Brackets may also be used for mounting the router to the aircraft structure.
Section 5.0 **Digital Audio Router Removal, Inspection and Re-Installation**

5.1 **Digital Router Removal**

a. Disconnect all cables from the Digital Router.

b. Loosen barrel nut on the front of the Router as shown in Figure 16 and slid router out of tray.

**NOTE**

The Tray and Doublers do not need to be removed on a regular basis for inspection or overhaul. The Tray and Doublers should only be removed if cracked or excessively corroded and need to be replaced.

c. Remove the 4 MS24693S277 Screws, 4 #10 NAS1149F0332P Washers, and 4 #10-32 MS21042L3 Locknuts connecting the Tray to the Hat Rack Deck as shown in Figure 16.

d. To remove the Doublers (G13006-4) drill out the 12 #4 Rivets connecting each doubler to the Hat Rack Deck as shown in Figure 16.
Figure 16: Bell 407 Digital Router Installation Overview
Parts List for Figure 16:

<table>
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<tr>
<th>I/N</th>
<th>QTY</th>
<th>PART NUMBER</th>
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<td>G13006-4</td>
<td>Doubler</td>
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<td>Rivet, #4 Round Head</td>
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<td>8</td>
<td>4</td>
<td>MS21042L3</td>
<td>Locknut, #10-32</td>
</tr>
</tbody>
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5.2 Digital Router and Support Bracket Inspection

a. The Digital Router contains no user serviceable internal components. Do not disassemble router or the factory warranty will be voided. Return the unit to Eagle Copters for service.

b. Inspect all sheet metal doublers and brackets for cracks or excessive corrosion. If any of the parts are cracked or excessively corroded (refer to Section 3.1.1 for corrosion limits) they must be removed from the aircraft and replaced.
5.3 Digital Router Re-Installation

NOTE

This installation provides mounting provisions for the G13000 Digital Router in the Hat Rack area for the Bell 407. The location is shown for reference only. The exact placement of the components is dependant on the other pre-existing installed equipment. Mount Router aft of the fuel cell area.

NOTE

If the Tray (P/N G13009) has not been removed skip to step (c) and connect to the Router to the existing Tray. If Tray has been replaced continue to step (a).

a. Locate Tray (P/N G13009) to avoid existing structures and devices installed. Orientation of the tray is at the installer’s discretion.

b. Before installing doublers, assemble with tray to maintain proper spacing. For each doubler, back drill Hat Rack Deck and install 12 #4 Rivets, MS20470AD4-4 as shown in Figure 16.

c. Mount Tray to deck using 2 G13009-3 Shims, 4 MS24693S277 Screws, 4 #10 NAS1149F0332P Washers, and 4 #10-32 MS21042L3 Locknuts.

d. Slide router into tray and tighten Barrel Nut to secure router. Be sure router is seated fully down.

e. Reconnect all applicable cables to the Digital Router. Reference Figure 17 for all Digital Router Connection Ports.
Figure 17: Digital Router Connector Layout

Router Connections:

J1 is used to connect radios 1, 3-11.

J2 is used to connect radios 2, 12-20.

J3 is used to connect the pilot’s control panel, pilot’s headset group, and passengers 1-5 headsets and control panels.

J4 is used to connect the copilot’s control panel, copilot’s headset group, and passengers 6-10 headsets and control panels.

J5 is used to connect power, ground, pilot’s COM1 ISOLATE, and copilot’s COM2 ISOLATE and dimmer inputs.

J6 is a network port used for system configuration control.

J7 is a memory card slot used for storing system configuration data onto removable media.
Section 6.0  **Cable Maintenance**

6.1  **General Notes**

   a. The installation of the Eagle Audio GA182 Audio System requires the application of accepted aircraft equipment practices, according to FAA publication, AC43.13-1B, *ACCEPTABLE METHODS, TECHNIQUES AND PRACTICES, AIRCRAFT INSPECTION AND REPAIR*, and the installer shall strictly comply with paragraph 428.a of that Advisory Circular.

   b. The requirement regarding the securing of wire bundles using nonmetallic clamps is addressed by the use of nylon cable ties. The part numbers and description of these ties is as follows:

   **Cable Tie Selection Chart**
   **Thomas & Betts Brand**

<table>
<thead>
<tr>
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   c. Following the guidelines in AC43.13-1B, cable ties are attached at a maximum of 4” spacing and ties are attached to nylon cable tie anchors, as necessary.

   d. The configuration of the wiring and cabling will vary from aircraft to aircraft. The installation of the Eagle Audio System will not change the existing wiring or cabling, but rather will utilize existing wire and cable runs and will not interfere with the existing aircraft equipment installations.
6.2 Cable Maintenance

a. Refer to Figure 19 and Figure 20 for the Cable Part Numbers associated with a general Analog Audio System installation. Refer to Figure 98 through Figure 109 for the detailed wiring schematic used in the installation of an Audio System with a Digital Router.

b. Each cable configuration and location will vary from installation to installation. Refer to notes made during installation to determine exactly where each cable is installed. Be sure to carefully document the Radios and Control panels installed and their related connections for future maintenance and troubleshooting purposes.

c. If a cable needs to be repaired or replaced due to damage, refer to the appropriate cable drawing in Section 6.3. Refer to Figure 21 and Figure 22 to identify materials labeled on all cable drawings. Refer to Figure 23 through Figure 35 for all cable assembly details. All cables should be built utilizing proper aviation practices.
Figure 18: Audio System Pilot/CoPilot
Figure 19: Audio System Passenger
Figure 20: Audio System Router/Com1 Direct Hookup
6.3 Cable Construction

Figure 21: Connector and Wire Parts List Part 1
Figure 22: Connector and Wire Parts List Part 2
Figure 23: Cable Assembly Detail Wire Termination
Figure 25: Cable Assembly Detail Wire Preparation

1. Cut ground wire to length.

2. Strip insulation from ends.

3. Cut and remove jacketing from shielded cable.

4. Roll shield back over jacketing.

5. Trim excess shield.

6. Solder ground wire to shield.

7. Cover junction with heatshrink.

8. Apply heat until sealed.

Refer to AC 43.13-1B, Chapter 11, Section 12, Figure 11-13 for allowable nicked or broken strands.

Be sure to use the correct size stripping hole to avoid nicked or broken strands.
WHEN FABRICATING A CABLE ASSEMBLY WITH MORE THAN ONE SHIELDED CABLE, BE SURE TO STAGGER SHIELD TERMINATIONS TO AVOID DAMAGE TO CABLE DUE TO PINCHING OR CRUSHING. SEE TABLES ON PAGE 16 OF THIS DOCUMENT FOR MORE INFORMATION.

1. CUT BONDING WIRE TO LENGTH

2. STRIP INSULATION FROM ENDS

3. CUT AND REMOVE JACKETING FROM SHIELDED CABLES

4. ROLL SHIELDS BACK OVER JACKETING

5. TRIM EXCESS SHIELDS

6. SOLDER BONDING WIRE TO SHIELDS

7. COVER JUNCTIONS WITH HEATSHRINK

8. APPLY HEAT UNTIL SEALED

Figure 26: Cable Assembly Detail Wire Preparation 2
CRIMPING TOOL INSTRUCTIONS

1. REFER TO DATA PLATE ON TURRET HEAD TO DETERMINE CORRECT TURRET POSITIONER FOR THE GAUGE OF WIRE AND FITTING BEING CRIMPED.

2. WITH TOOL IN OPEN POSITION, PRESS TURRET POSITIONER LATCH TO RELEASE TURRET POSITIONER AND ROTATE CORRECT POSITIONER TO INDEX MARK, PRESS THE POSITIONER INTO THE TURRET UNTIL IT SNAPS IN.

3. REFER TO THE SELECTOR KNOB OR DATA PLATE TO DETERMINE THE CORRECT SELECTOR KNOB SETTING FOR THE GAUGE OF WIRE BEING CRIMPED.

4. REMOVE SPRING CLIP (IF PRESENT), LIFT SELECTOR KNOB AND ROTATE TO CORRECT SETTING, REPLACE SPRING CLIP.

5. INSERT PREPARED WIRE AND FITTING INTO THE REAR OF THE TOOL TO THE INTERNAL STOP.

6. SQUEEZE HANDLES TOGETHER UNTIL RATCHET RELEASES, TOOL AUTOMATICALLY RETURNS TO OPEN POSITION.

7. INSPECT FITTING FOR PROPER CRIMP.

Figure 27: Cable Assembly Detail Crimping Tool
1. Use contact insertion tool to install contacts as shown.

2. Scrape off Alodine and solder ground wire to connector body along back edge of metal body as shown.

Figure 28: Cable Assembly Detail Contacts and Shield
WHEN FABRICATING A CABLE ASSEMBLY WITH MORE THAN ONE SHIELDED CABLE, BE SURE TO STAGGER SHIELD TERMINATIONS TO AVOID DAMAGE TO THE CABLE DUE TO PINCHING OR CRUSHING. SEE TABLES ON PAGE 16 OF THIS DOCUMENT FOR MORE INFORMATION.

1. TERMINATE SHIELD AS APPROPRIATE

2. SCORE THE INSULATION OF THE WIRE AS SHOWN

3. STRIP THE INSULATION WITH A RAZOR KNIFE

4. STRIP INSULATION FROM END OF WIRE

5. LAY SPLICED WIRE ALONGSIDE AND SOLDER

6. COVER JUNCTION WITH HEATSHRINK

7. APPLY HEAT UNTIL SEALED

Figure 29: Cable Assembly Detail Inline Splice
Figure 30: Cable Assembly Detail Amphenol R/A SMA Connector
Figure 31: Cable Assembly Detail BNC, Coaxial
TERMITE OUTER SHIELD AT ANTENNA END ONLY, AT TRANSCEIVER END. TRIM OUTER SHIELD BACK APPROXIMATELY 0.5 INCHES PAST FERRULE AND HEATSHRINK AS NORMAL.

1. STRIP OUTER JACKETING OF TRIAXIAL CABLE.

2. ROLL BACK OUTER SHIELD, DO NOT TRIM.

3. STRIP INNER JACKETING OF TRIAXIAL CABLE.

4. FLARE AND TRIM INNER SHIELD.

5. STRIP INSULATOR, EXPOSING CENTER CONDUCTOR.

6. INSERT CENTER CONDUCTOR INTO PIN.

7. CRIMP PIN.

8. SLIP FERRULE AND HEATSHRINK INTO CABLE.

9. INSERT CABLE INTO CONNECTOR BODY. PIN WILL SNAP IN.

10. SLIDE INNER SHIELD AND FERRULE INTO BODY AND CRIMP FERRULE.

11. SLIDE OUTER SHIELD OVER FERRULE (ONE END ONLY, SEE NOTES).

12. SAFETY OUTER SHIELD TO FERRULE.

13. COVER FERRULE WITH HEATSHRINK.

14. APPLY HEAT UNTIL SEALED.

Figure 32: Cable Assembly Detail BNC, Triaxial
FOR ALL D-SUB ASSEMBLIES:

- When terminating cables without individual wire sleeves, shield backshell all the wires and cable to prevent strain relief stacking of the wire sleeves.
- Shield backshell all the wire sleeves to prevent strain relief stacking of the wire sleeves.

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Figure 33: Cable Assembly Detail Spice and Shield Staggering
Figure 34: Cable Assembly Detail Spice and Shield Staggering

Figure 35: Cable Assembly Detail AMP 22395-1 50 OHM
Figure 36: G12002 Passenger Audio and Keying Cable

Figure 37: G12005 COM 1 Direct to Audio Control Interconnect Cable
Figure 38: G12006 Audio Control J2 to Audio Expander J3 Cable

Figure 39: G12007 Audio Expander to Backplane Interconnect Cable
Figure 40: G12008 Radio to Backplane Interconnect Cable

Figure 41: G12009 Bulkhead XLRs to/from Audio Backplane Cable
Figure 42: G12010 Receive Audio to Backplane Cable

Figure 43: G12011 Scanner Audio Cable

Figure 44: G12012 Inline XLR3F to Audio Backplane Cable
Figure 45: G12013 Audio to Backplane Cable

Figure 46: G12014 Audio Backplane J17 Cable

Figure 47: G12015 Audio Cable
Figure 48: G12016 From Backplane to Bulkhead XLR3M Cable

Figure 49: G12017 Audio Cable

Figure 50: G12018 Audio Router Power Cable
CONNECT THE FOLLOWING PINS TOGETHER FOR GNET ADDRESSING AS SPECIFIED IN SYSTEM REQUIREMENTS

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Figure 51: G12019 Standard GNET Cable

Figure 52: G12020 GNET Non-Standard D9F to D9F and D9M Cable
Figure 53: G12021 GNET Non-Standard D9F to D9F Power Only Cable

<table>
<thead>
<tr>
<th>GNET ID</th>
<th>ADDRESS PINS</th>
<th>GNET ID</th>
<th>ADDRESS PINS</th>
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<tr>
<td>0</td>
<td>5,6,7,8,9</td>
<td>8</td>
<td>5,6,7,9</td>
</tr>
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<td>1</td>
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</tr>
<tr>
<td>7</td>
<td>RM</td>
<td>F</td>
<td>NONE</td>
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</table>
CONNECT THE FOLLOWING PINS TOGETHER FOR GNET ADDRESSING AS SPECIFIED IN SYSTEM REQUIREMENTS

0 = 5-6-7-8-9
1 = 6-7-8-9
2 = 5-7-8-9
3 = 7-8-9
4 = 5-6-8-9
5 = 6-8-9
6 = 5-8-9
7 = 8-9
8 = 5-6-7-9
9 = 6-7-9
A = 5-7-9
B = 7-9
C = 5-6-9
D = 6-9
E = 5-9
F = NONE

Figure 54: G12022 Non-Standard Data Only GNET Cable

CONNECT THE FOLLOWING PINS TOGETHER FOR GNET ADDRESSING AS SPECIFIED IN SYSTEM REQUIREMENTS

0 = 5-6-7-8-9
1 = 6-7-8-9
2 = 5-7-8-9
3 = 7-8-9
4 = 5-6-8-9
5 = 6-8-9
6 = 5-8-9
7 = 8-9
8 = 5-6-7-9
9 = 6-7-9
A = 5-7-9
B = 7-9
C = 5-6-9
D = 6-9
E = 5-9
F = NONE

Figure 55: G12032 Non-Standard, Two Device GNET Cable
Figure 56: G12033 Power Cable

Figure 57: G12036 Pilot Isolate Cable

Figure 58: G12038 Non-Standard Male End GNET Cable
Figure 59: G12041 Scanner Power Cable

Figure 60: G12046 Antenna Coax Cable

Figure 61: G12047 Non-Standard Triple D9F Data Only GNET Cable
Figure 62: G12048 Shielded Cable

Figure 63: G12050 TX or ICS Keying Audio Footswitch

Figure 64: G12063 Non-Standard D9F to D9F and D9M Data Only GNET Cable
Figure 65: G12064 Non-Standard D9F to D9F External Power GNET Cable

Figure 66: G12088 Cable
Figure 67: G12092 12V External Jumper Power Cable

Cover cable area with Flexo PET 1/4” Black Braided Expandable sleeving, Flexo P/N 3TO.258K.

Figure 68: G12096 FM Radio Pigtail Antenna Cable

Figure 69: G12099 Triax Antenna Cable
Figure 70: G12263 Pilot/Copilot Audio Cable

Figure 71: G12264 Passenger Audio Cable
Figure 72: G12265 Audio Router Power Cable

Figure 73: G12296 PA Audio Cable
Figure 74: G12297 Receive Only Audio Cable

Figure 75: G12299 Auxiliary In Audio Cable

Figure 76: G12306 Coax Antenna Cable
CONNECT THE FOLLOWING PINS TOGETHER FOR GNET ADDRESSING AS SPECIFIED IN SYSTEM REQUIREMENTS

| 0 = 5-6-7-8-9 | 8 = 5-6-7-9 |
| 1 = 6-7-8-9 | 9 = 6-7-9 |
| 2 = 5-7-8-9 | A = 5-7-9 |
| 3 = 7-8-9 | B = 7-9 |
| 4 = 5-6-8-9 | C = 5-6-9 |
| 5 = 6-8-9 | D = 6-9 |
| 6 = 5-8-9 | E = 5-9 |
| 7 = 8-9 | F = NONE |

Figure 77: G12360 Terminal GNET Cable

Figure 78: G12361 Headset Expander to Audio Cable
Figure 79: G12467 D9M to XLR3F Audio Cable

Figure 80: G12468 Dual Auxiliary Audio Input Audio Cable
Figure 81: G12475 Rear Passengers Audio Wiring
Figure 82: G12538-1 GNEET Config Port Extension Cable
### Figure 83: G12538 GNET Config Port Assembly

**Parts List for Figure 83**

<table>
<thead>
<tr>
<th>I/N</th>
<th>QTY</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
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<td>1</td>
<td>1</td>
<td>G12538-1</td>
<td>GNET Config Port Extension Cable</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>G10426-10</td>
<td>Cable Guide Cover Plate</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>8493</td>
<td>Bushing, Split, Black (Keystone)</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>534-7231</td>
<td>Jackscrew/Nut/Washer Set (Mouser)</td>
</tr>
</tbody>
</table>
Figure 84: G12590 MW Expander Out to BrightEye 30 Analog in Audio Cable

Figure 85: G12597 Expander J2 to VU Meter Audio Cable
Figure 86: G12598 BE54 Tone Out to Audio Backplane Audio Cable

Figure 87: G12628 VTR to VTR Audio Control J2 Audio Cable
Figure 88: G12737 Non-Standard All D9F Ends, Data Only Pigtail GNET Cable

Figure 89: G12805 MW Audio Expander to BE30 and MWTX Audio Cable
Figure 90: G12871 Audio System Dual Foot Switch Cable

Figure 91: G12910 Bulkhead XLR3F to Inline XLR3M Audio Cable
Figure 92: G12912 MWTX Audio Monitor Out Audio Cable

Figure 93: G12914 Backplane J17 Audio Cable
Figure 94: G12915 Repeater Audio Control Board Jumper Plug

Figure 95: G12999 Dual XLR3F to Link L1050 Encoder Cable
Figure 96: G13010 Link L2000 Receiver Audio XLR5F to Dual XLR3M Cable

Figure 97: G13011 Audio Expander to Dual XLR3M Cable
NOTES:

1. Unless otherwise noted: All wires are 22 AWG; all shielded wire is MIL-DTL-27500; all unshielded wire is MIL-W-22759/16.

2. All Bonding and Grounding will be I/A/W AC 43.13-1B, Chapter 11, Section 15.

   ◆ Ground the shield return to the metal connector backshell if used, or otherwise to the metal connector housing.

   ◆ SPARE KEY line function and connections are installer defined and depend on the specific system configuration.

   ◆ D50M connector assembly consists of: Tyco/AMP housing 205170-1 or 1757819-5; Tyco/AMP pin contacts 205090-1; Cinch backshell DD-24661-34; 2ea. Cinch Screwlocks D20420-0. Alternate Backshell: Conec 165X10179X.

   ◆ D50F connector assembly consists of: Tyco/AMP housing 205169-1 or 1757820-5; Tyco/AMP socket contacts 205090-1; Cinch backshell DD-24661-34; 2ea. Cinch Screwlocks D20420-0. Alternate Backshell: Conec 165X10179X.

   ◆ D9F connector assembly consists of: Tyco/AMP housing 205161-1 or 1757820-1; Tyco/AMP socket contacts 205090-1; Cinch backshell DE-24657-30; 2ea. Cinch Screwlocks D20419-46. Alternate Backshell: Conec 165X10159X.

   ◆ When COM10DIR (P5, Pin 10) is not grounded, the Pilot headset is in EMERGENCY mode and the following lines are diverted:

      HEADSET 1 connects directly to RX1, RX11 (Unswitched Alert Tones) and the emergency intercom. MIC 1 connects directly to TX1 and the emergency intercom. XMIT KEY 1 and SPARE KEY 1 connect to TX KEY 1. ICS KEY 1 keys the emergency intercom, if at least one Power Input Circuit Breaker to the G13000 Audio Router has power.

   ◆ When COM20DIR (P5, Pin 11) is not grounded, the Copilot headset is in EMERGENCY mode and the following lines are diverted:

      HEADSET 2 connects directly to RX2, RX20 (Unswitched Alert Tones) and the emergency intercom. MIC 2 connects directly to TX2 and the emergency intercom. XMIT KEY 2 and SPARE KEY 2 connect to TX KEY 2. ICS KEY 2 keys the emergency intercom, if at least one Power Input Circuit Breaker to the G13000 Audio Router has power.

   ◆ TERMINAL BLOCK assembly consists of: Deutsch block CTJ122E05E; Deutsch socket contacts CTS-S222/2 or M39029/22-191. A GNET channel that is connected to only one control panel or other device may be wired directly without using a terminal block.

   ◆ D15FS connector preferred assembly consists of: Tyco/AMP housing 205163-1 or 1757820-2; Tyco/AMP socket contacts 205090-1; Cinch backshell DA-24658-31; 2ea. Cinch Screwlocks D20419-46. Alternate Backshell: Conec P/N: 165X10149X. Splices on 20 AWG wire shall also be 20 AWG, length 3 inches maximum. Alternate assembly consists of: Kobiconn Solder-Cup Connector 156-1315(T-E) and Cinch backshell DA-24658-31; 2ea. Cinch Screwlocks D20419-46. Alternate Backshell: Conec P/N: 165X10179X. Conductors shown with splices may be implemented by soldering the supply wire to both pins after soldering and insulating the adjacent connections.

   ◆ The Audio System works with a range of supply voltages, as specified in the installation instructions. Breaker ratings and wire sizes shown are for 28V systems. For 12V systems, the breaker ratings must be increased to 10A and the size of the shielded supply and ground wires must be increased to 18 AWG. The splice wires at P5 remain at 20 AWG.

   ◆ D9M connector assembly consists of: Tyco/AMP housing 205162-1 or 1757819-1; Tyco/AMP socket contacts 205090-1; Cinch backshell DE-24657-30; 2ea. Cinch Screwlocks D20419-46. Alternate Backshell: Conec 165X10139X.

   ◆ The externally mounted COM 1 Isolate Switch connected to COM1DIR shown on sheet11 is mandatory and may not be deleted unless a G13115 or G13118 Control Head is installed in accordance with sheet 13. When G13115NS or G13116NS Control Heads are used for non-critical mission applications. No Switch wiring is required.


DEFINITIONS:

N/C: MAKE NO CONNECTION. The pin is not connected to anything internally and therefore shall have no connection externally

RESERVED: MAKE NO CONNECTION. Internal circuitry may be added in the future, or may be present and relevant for testing but not relevant to operation for flight.

Figure 98: Notes for Digital Router Wiring
Figure 99: Digital Audio System Plug Wiring Map P1, P2
Figure 100: Digital Audio System Plug Wiring Map P3, P4, P5
Figure 101: Digital Audio System Router J1 Connections
Figure 102: Digital Audio System Router J2 Connections
Figure 103: Digital Audio System Router J3 Connections
Figure 104: Digital Audio System Router J4 Connections
Figure 105: Single Board Router Wiring Map P2, P4, P5
Figure 106: Single Board Router J2 Connections
Figure 107: Single Board Router J4 Connections
Figure 108: Digital Audio System Router J5 Connections
Figure 109: Digital Audio System GNET Interconnects
The J3 connector on the G13115 and G13116 series control heads connect to physical toggle switches on the control head. All switches connect to the ground on the control head J3 pin7 when closed.

The switch connected to the "COM ISO" switch can be used in place of a separate EMERGENCY/NORMAL switch for either the COM1DIR or COM2DIR function on the Audio System when used as a pilot or copilot control head.

If the control head is not used in the pilot or copilot position, then the "COM ISO" pin should not be connected. The "ICS PTT" and "TX PTT" switches will still work.

The switches connected to the "ICS PTT" and "TX PTT" switches can be used as PTT lines for any given headset port and can optionally be wired in parallel with external PTT switches e.g. mounted in the aircraft or on a dropcord.

The COMxDIR pins on G13000 J5 will stay in normal mode if they are connected to ground. If the control panel COM ISO switch and an external COMxDIR switch are wired in parallel the audio system would only switch to emergency mode if BOTH switches were in the emergency position. For this reason if the COM ISO switch on the control panel is being used, the external COMxDIR switch MUST be removed and the wires capped and stowed.

Example Wiring is for the Pilot position. For the copilot position use the following pins on the G13000:
- J5 pin 11 - COM2DIR
- J3 pin 35 - ICS KEY 2
- J3 pin 36 - XMIT KEY 2

Figure 110: G13115 Control Head Wiring
Section 7.0 Audio System Testing

NOTE

Anytime a the Router or Control Panel has been replaced complete a full Audio System Load Analysis, Audio System Functional Check and a Final Inspection as described in Section 7.0.

7.1 Audio System Load Analysis

a. At the completion of the installation of the audio system, the installer shall perform a load analysis test of the electrical branch circuit (buss) that powers the audio system, and also the entire aircraft electrical load, to confirm that the addition of the audio system will not cause an overload to the electrical branch circuit or the aircraft generator.

b. The current shall be measured using a properly calibrated clamp on ammeter, Amprobe Instrument model number ACDC-600A, or equivalent.

c. Perform the branch circuit load analysis test by powering up all equipment that is intended to be operated at the same time on the branch circuit that the audio system is connected to. Additionally, key the three highest power communication transmitters at the same time, if possible, while the current measurements are being taken.

d. Measure the current of the branch circuit powering the audio system, by clamping the meter around the branch circuit wire near its origin at the aircraft master electrical distribution box. Confirm that the current draw during the above described test conditions is less than the current limiter (fuse or circuit breaker) rating for that branch circuit.

e. If the current draw is greater than the current limiter rating, it becomes the installer’s responsibility to re-distribute enough of the other equipment powered by this branch circuit to another suitable branch circuit, in order to reduce the load on the audio system’s branch circuit to less than the current limiter rating.
f. Once the branch circuit loads are within limits, test the current load for the entire aircraft while all power for the aircraft is being supplied by the aircraft generator. Perform this load analysis test by powering up all equipment on the aircraft that is intended to be operated at the same time as the audio system. Additionally, key the three highest power communication transmitters at the same time, if possible, while the current measurements are being taken. Clamp the ammeter around the generator output wire near the point that it enters the aircraft master electrical distribution box. Confirm that the current draw during the above described test is less than the generator system rating.

7.2 Audio System Functional Check

a. Perform a check of all power and ground leads to confirm they are connected properly before applying power to the system. Incorrect wiring may cause damage to the units.

b. Connect headset adapter cables, headsets and switches. Apply power to audio system, radios and related accessories. Activate ICS and confirm proper operation. Place ‘PILOT ISOLATE/NORMAL’ switch in ‘PILOT ISOLATE’ position. Key transmit switch and confirm proper operation of COM1. If a Co-Pilot COM2 Isolate switch is installed, repeat this process for the Co-Pilots installation.

c. Place the ‘PILOT ISOLATE’ switch in ‘NORMAL’ position and check all transceivers, receivers and audio devices. Repeat this process for the Co-Pilots COM2 Isolate switch if installed.

d. If testing a Digital Audio System, or an Analog Audio system fitted with G11437 Relay Modules, perform steps c and d with COPILOT ISOLATE switch and copilot/COM2 operation.

e. Check all pilot, copilot and passenger audio control panels for proper operation

f. Perform run-up of aircraft to verify proper operation of all control heads, radios, and headset locations. Perform test of aircraft alert tones and verify their presence, proper threshold, and proper audio level. Do not test fly aircraft if any aircraft native alert tone is not performing properly. Correct any defects noted and re-test prior to any test flight.
7.3 Final Inspection

Perform final inspection of installation confirming:

a. There are no chaffing issues.
b. There are no mechanical interference issues.
c. Security of fasteners.
d. Removal of all tools.
e. Chips, shavings and other debris are removed.
f. Proper reassembly of aircraft.
g. Aircraft is airworthy prior to returning to service
Section 8.0  **Weight and Balance**

Refer to helicopter equipment list for updated weight and balance information.
Section 9.0 Typical Analog Audio System Wiring Configurations

Figure 111: Auxiliary Switch Panel Wiring

Figure 112: Copilot’s Control Panel Wiring
Figure 113: Passenger Audio Wiring

Figure 114: Radios, COM1-COM16
Figure 115: Auxiliary Control Module (Optional)
Figure 116: Aircraft Power Supply and Lighting Dimmer Connection
Figure 117: Pilot Control Panel Connection