P178

AUDIO MIXER

PART 29

INSTALLATION MANUAL

MDL 7002-ML-001 Rev -- STC SR02444SE
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Number SR02444SE

This certificate, issued to

Eagle Copter USA, Inc.
19717 62nd Ave South, Suite E-101
Kent, WA 98032

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part * of the * Regulations.

Original Product—Type Certificate Number: * See attached Federal Aviation Administration (FAA) Approved Model List (AML) SR02444SE for approved rotorcraft models and applicable airworthiness regulations

Make: 
Model: 

Description of the Type Design Change: Installation of P178 FailSafe Audio Mixer in accordance with Master List as listed on AML SR02444SE, or later FAA-approved revision. Maintained in accordance with Instructions for Continued Airworthiness (ICA) as listed on AML SR02444SE, or later FAA-accepted revision.

Limitations and Conditions: Approval of this change in type design applies to the rotorcraft listed on AML SR02444SE only. This approval should not be extended to other rotorcraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and other previously approved modifications will introduce no adverse effect upon the airworthiness of that rotorcraft. A copy of this certificate, AML SR02444SE, and the ICA, must be maintained as part of the permanent records for the modified aircraft.

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: February 3, 2015
Date of issuance: June 30, 2015

By direction of the Administrator

[Signature]

Manager, Seattle Aircraft Certification Office

[Title]

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.
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* Or later FAA Approved Revision
** Or Later FAA Accepted Revision

FAA Approved: [Signature]
Manager, Seattle Aircraft Certification Office

AMENDED: 
REISSUED:
Master List

P178 Failsafe Audio Mixer

7002-ML-001

Revision --

Prepared
C. Bonar

Date Prepared 30 OCT 2014

Checked
S. Cudnofsky

Date Checked 30 OCT 2014

Released
C. Bonar

Date Released 30 OCT 2014

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Record of Revisions

<table>
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<th>Date</th>
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<td>Modification Instructions</td>
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<td>10/30/14</td>
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Modification Instructions

P178 Failsafe Audio Mixer

7002-MI-001

Revision --

Prepared

Date Prepared 30 OCT 2014

C. Bonar

Checked

Date Checked 30 OCT 2014

S. Cudnorskey

Released

Date Released 30 OCT 2014

C. Bonar

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Table of Contents

1. Scope ................................................................................................................................................. 4
2. Abbreviations ...................................................................................................................................... 4
3. References .......................................................................................................................................... 4
4. General Information .......................................................................................................................... 4
5. Installation .......................................................................................................................................... 5
6. System Wiring ..................................................................................................................................... 6
7. System Testing .................................................................................................................................... 9
8. Kit Parts List ...................................................................................................................................... 10
9. Specifications ..................................................................................................................................... 11
10. Weight and Balance .......................................................................................................................... 11
1. **Scope**

These modification instructions are for the installation of the Eagle Copters P178 Failsafe Audio Mixer.

2. **Abbreviations**

EMI ............ Electro-Magnetic Interference

3. **References**

7002-TP-001   EMI Test Procedure

4. **General Information**

4.1 The Audio Mixer provides 3 composite outputs from up to 8 input signals. Channel 1 and Channel 2 composite outputs are failsafe relay protected for Master Caution or Essential Tones to ensure that no fault in the system or an electrical bus failure can prevent pass through of Essential Warnings or Tones. Channels 3 through 8 are for non-essential tones and will drop off line in case of fault or Avionics Bus failure.

4.2 The P178 Failsafe Audio Mixer removes the need for external relays to ensure Essential Tones are passed to unswitched inputs on any audio system. The mixer also has internal fault detection. Upon fault, the relays go to their normally closed (Failsafe) position.

4.3 There are no restrictions as to the quantity of Audio Mixers that are installed. However, it is the installer’s responsibility to verify that the installation of this device does not interfere with other installed equipment and to perform an electrical load analysis to verify that the aircraft electrical buss can support the installation of the Audio Mixer.
5. **Installation**

5.1 The Audio Mixer is designed to be mounted in a variety of locations within the airframe, provided it is protected from the environment. It may be mounted to a deck, bulkhead, tray, avionics shelf or other structure rated to carry a 0.50 lb load. The exact mounting location is left to the installer’s discretion provided that the installation of the Audio Mixer does not interfere with other installed equipment.

5.2 Mount the Audio Mixer using (4) #8-32 screws, washers and locknuts or nutplates.

5.3 When mounting into composite structure, #8-32 potted inserts (not included in kit) should be used.

5.4 Unless otherwise specified, follow aircraft manufacturer’s standard practices and maintenance manuals for installation of all hardware.

5.5 Maintain a minimum 2 e/d edge margin for all installed fasteners.

5.6 Refer to Figure 1 for Audio Mixer reference dimensions that may be used when planning the installation.

---

**Figure 1 Audio Mixer Dimensions**
6. System Wiring

6.1 Unless otherwise specified, follow the aircraft manufacturer’s electrical wiring practices and maintenance manuals for installation of all system wiring.

6.2 Refer to Figure 2 for cable harness fabrication instructions to connect to the Audio Mixer.

6.3 Ground Audio Shields at ONE end only.

6.4 Unless otherwise noted, all shielded wire is M27500-(ga)TG(n)T14 and all unshielded wire is M22759/16-(ga)-9, where (ga) is the wire gauge and (n) is the number of wires inside the shield.

6.5 Unless otherwise noted, all wire is 22 GA.

6.6 Route all system cabling through existing cable runs.

6.7 Secure all cabling using nylon cable ties and/or cable clamps using standard practices.

6.8 Cable lengths are dependent on Audio Mixer installation location.

6.9 Notes for Figure 2:

1. Power to be supplied by either Avionics or Essential Bus 1 if equipped. Circuit Breaker to be MS26574-1 1 Amp or equivalent part number appropriate for the bus the mixer is being connected to.

2. This pin may optionally be used as a pull low for a remote fail indicator for the mixer. Power would be supplied to the desired indicator and this pin would supply a ground to the indicator if a fault occurred. This is optional and not a requirement for installation.

3. Audio Source 1D and 2D are the relay protected inputs. When connected to a Master Caution System with a single Output the two Inputs may be connected in parallel. If two Outputs are available from the Device use both independently for redundancy. The Setup Instructions on this document must be followed exactly to ensure proper operation.

4. Audio Output 1 Direct and 2 Direct are Relay Protected Outputs from Audio Sources 1D and 2D. Connect these Outputs to the Pilot's and Co-Pilot's Unswitched or Alert Tone Inputs of the installed audio system. Do Not connect Outputs 1 and 2 Direct in parallel. The Setup Instructions on this document must be followed exactly to ensure proper operation.
Figure 2 Cable Wiring
6.10 Refer to Figure 3 for Audio Mixer pin designation.

Figure 3 Pin Designation

---

EXTERNAL CONNECTOR
PIN ASSIGNMENT

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<td>2</td>
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<tr>
<td>3</td>
<td>IN 2 HI</td>
</tr>
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<td>OUT 2D LO</td>
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<tr>
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Connector: TE p/n 205165-1
Contacts: TE p/n 205090-1
Backshell: CONEC p/n 165X10159XE

Optional Connector Kit:
Mil: M24308/2-8F Kit

NOTE: QUICK CONNECT / RELEASE STYLE BACKSHELLS ARE NOT TO BE USED IN THIS INSTALLATION.
7. 

System Testing

*Failure to follow these instructions will result in improper operation.*

7.1 If the mixer is not powered or is in fault mode (Essential), Input 1 will be connected directly via relay closure to Output 1D, and Input 2 will be connected directly to Output 2D. It is important to follow the setup instructions exactly in order for the mixer to work properly in the Essential Mode.

7.2 The mixer has internal fault detection. Upon fault, the relays go to their normally closed (Failsafe) position and the FAIL indicator light will illuminate. Optionally, the installer may connect Pin #10 (pull low) to an external fault indicator (see note #2 in Section 6.9). There are no internal adjustments, jumpers or user serviceable parts. If the mixer fails, return it to Eagle Copters USA, Inc. for repair or replacement.

7.3 The direct inputs in essential mode are non-adjustable. The level that is present at Inputs 1 and 2 will be present at 1D and 2D respectively.

7.4 Output 3 is not relay direct protected and therefore will drop off line in unpowered or fail mode. This output is designed to be a monitor port to a non-critical device.

7.5 Before applying power, perform a continuity check of all leads to confirm they are connected properly.

7.6 With the circuit breaker to the mixer pulled (Off) and the audio system on, adjust the source to Audio Source 1D and 2D so that the proper level is heard at both the Pilot and Co-Pilots Headsets when the source is triggered, i.e. Master Caution. DO NOT adjust the 1D or 2D outputs of the mixer; instead, adjust the source to the mixer.

7.7 With all other avionics off, push the mixer's circuit breaker In (On). Verify visually that the power indicator (PWR) is on, and the FAIL indicator is off. The mixer is now in powered mode. Trigger the source for Inputs 1D and 2D. Adjust the mixer Output Adjustments 1D and 2D so that the proper level is heard in the Pilot and Co-Pilot Headsets. It should be the same as in the unpowered mode. Pull the circuit breaker to the mixer in order to verify this operation.

7.8 Once steps 7.6 and 7.7 are completed, turn on all avionics or other sources connected to Audio Sources 3 through 8. Adjust the levels as required at Inputs 3 through 8 on the mixer. DO NOT change the adjustments on Outputs 1D, 2D or 3.

7.9 After Completion of Steps 7.6 through 7.8, adjust Output 3 to the desired level required by the device connected to Output 3.

7.10 Conduct EMI test in accordance with EMI Test Procedure 7002-TP-001.
8. Kit Parts List

**P178 Failsafe Audio Mixer Kit**

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** Optional: use Connector Kit M2430812-8F in place of these items
9. Specifications

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10. Weight and Balance

10.1 Weight of the Audio Mixer and mounting hardware = 0.50 lbs.

10.2 The arm will depend on the exact location that it is installed.

10.3 The installer will record the location for the Audio Mixer along with its installed weight on the aircraft’s weight and balance record.
EMI Test Procedure

7002-TP-001

Revision --

Prepared

C. Bonar

Date Prepared

30 OCT 2014

Checked

S. Cudnofskey

Date Checked

30 OCT 2014

Released

C. Bonar

Date Released

30 OCT 2014
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<td>Initial Release</td>
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</table>
Table of Contents

1. Scope.................................................................................................................................................. 4
2. Applicable Documents .......................................................................................................................... 4
3. Witnessing of EMI Test ......................................................................................................................... 4
4. Equipment Under Test .......................................................................................................................... 4
5. Test Procedure ..................................................................................................................................... 4
6. Items To Evaluate.................................................................................................................................. 5
1. **Scope**

   This document is a test plan to be used to establish that newly installed electrical equipment does not interfere with essential aircraft equipment in any way that would impair safety of flight of the aircraft. Satisfactory completion of this test plan confirms that the newly installed equipment satisfies the EMI requirements of the Federal Aviation Administration. This test plan is applicable to CFR part 29 Rotorcraft.

2. **Applicable Documents**

   CFR 29.1309(c), 29.1351(b)(1), 29.1351(b)(2), and 29.1353(a).

3. **Witnessing of EMI Test**

   This test shall be witnessed by someone who is authorized by the FAA to return the aircraft to service. This would include an FAA licensed Avionics Technician, A&P Mechanic, Inspector of Airworthiness, or the Repair Station’s Director of Maintenance. In addition, an FAA representative, such as a DAR or DER may witness the test.

4. **Equipment Under Test**

   The newly installed Equipment Under Test (EUT) by this test plan shall be in proper working order throughout the test. If the EUT fails during this test, then this test shall be repeated with the EUT in proper working order.

5. **Test Procedure**

   Testing shall normally be conducted with the aircraft running on the ground, or with battery or external ground power where appropriate. In the event that an aircraft system or component can only be evaluated for the effects of interference with the aircraft in flight, then the evaluation of that system or component shall be conducted with the aircraft in flight. Testing conducted with the aircraft in flight shall be performed with safety of flight in mind and with only necessary personnel on board.

   Testing shall be conducted on the aircraft with all aircraft systems and equipment operating normally, and cycled as necessary to conduct the test. The EUT shall be operated normally. The EUT shall be cycled on and off. The EUT shall also be cycled through all of its operating modes.

   Each aircraft system or component being evaluated for the effects of EMI will be observed as the EUT is cycled. A transient motion or flicker is acceptable provided no permanent deviation is established. There can be no stand-off conditions displayed on an instrument. In the case of audio equipment being evaluated for the effects of EMI, a change in the audio (such as background noise) that does not interfere with the intended purpose of the audio is acceptable.

   For each aircraft system or component being evaluated for the effects of EMI, mark the item as PASS or FAIL based upon the outcome of this test procedure.
If an aircraft system or component being evaluated for the effects of EMI fails this test procedure, then corrective action must be taken to reduce the interference to an acceptable level which allows the aircraft system or component being evaluated for the effects of EMI to pass this test. When re-testing after corrective action, the only tests to be repeated are the tests that failed previously. Items that previously passed do not need to be re-tested, unless the method of corrective action results in changes to the EUT, which might cause the EUT to fail previously passed items. Mark the N/A field on the retest test plan for the items that previously passed and are not being re-tested.

6. **Items To Evaluate**

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<tr>
<td>Warning Horn</td>
<td>N/A</td>
<td></td>
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<tr>
<td>Outside Air Temperature Indicator</td>
<td>N/A</td>
<td></td>
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<tr>
<td>Transponder</td>
<td>N/A</td>
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VOR

Set controls to mode C code 1200, or other code assigned by ATC. Cycle EUT and confirm proper data transmitted, either by use of transponder ground test equipment, or by confirmation from ATC of proper reception of correct data. Check for proper operation of reply light.

DME

Perform self test with EUT cycled. Note that no skips in miles display occurs. Observe that mile indications do not drift and there is no audible interference in Ident tone.
Magnetic Compass  
N/A __ Pass __ Fail __
Swing compass and adjust with EUT operating normally. If EUT causes erratic operation of magnetic compass, then mark compass as Fail.

VHF Communications System  
N/A __ Pass __ Fail __
Tune each comm receiver to a low, middle, and high frequency within its frequency range. Listen for audio interference. Transmit on low, middle, and high frequencies. Listen on an external receiver for audio interference.

GPS Navigation Receiver  
N/A __ Pass __ Fail __
Check for proper operation. Observe signal to noise ratio readings to determine if reception is interfered with.

Crew Interphone System  
N/A __ Pass __ Fail __
Check for normal operation of the interphone system. Listen for excessive background noise.

ADF  
N/A __ Pass __ Fail __
Check for needle offset. Listen for audio interference.

Glide Slope/LOC  
N/A __ Pass __ Fail __
Check for needle offset. Perform test using TAC/30b or equivalent ground test equipment, or during flight while established on an ILS glide slope.

Radio Altimeter  
N/A __ Pass __ Fail __
Perform test with appropriate ground test equipment, or check reading in flight.

The space below is provided to include additional systems or devices not listed previously. These would include any Transceivers, Nav Aids, Radar, or Auto Pilot systems. Use the Manufacturers test procedures for each component listed with the EUT operating normally.

Other Equipment: __________________  
N/A __ Pass __ Fail __
Describe test: ________________________________________________________________

Other Equipment: __________________  
N/A __ Pass __ Fail __
Describe test: ________________________________________________________________

Other Equipment: __________________  
N/A __ Pass __ Fail __
Describe test: ________________________________________________________________

Other Equipment: __________________  
N/A __ Pass __ Fail __
Describe test: ________________________________________________________________

Other Equipment: __________________  
N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
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Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
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Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
____________________________________________________________________________
Other Equipment: __________________  N/A __ Pass __ Fail __
Describe test: ________________________________________________________________
Aircraft Tested:

Model _______________, Registration ____________, Serial Number ______

Location of Test _______________________, Date ______________

Equipment Under Test:

List: MODEL, PART NUMBER, SERIAL NUMBER

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Test performed by _______________________________________

Name __________________________ Credentials _______________

Test witnessed by _______________________________________

Name __________________________ Credentials _______________

I hereby certify that I have witnessed the above documented test and that the results documented above reflect my observations.

__________________________  __________________________
Signature                    Date
G13120 AUDIO MIXER

WEIGHT = 8 OZ MAX

VOLTAGE = 20 VDC MIN TO START
12 VDC TO HOLD
32 VDC MAX

POWER = .25 AMP MAX

NOTE: DIMENSIONS SHOWN ARE FOR REFERENCE ONLY