Cozy Mark IV 'M' Drawing Supplements

Fuselage Shaping and Conduit Templates
Canard, Wing and Winglet Templates,
and Fittings Drawings

Revision 1.2
December 26, 2015
**Table of Contents**

<table>
<thead>
<tr>
<th>Sheet</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet 6</td>
<td>Introduction</td>
</tr>
<tr>
<td>Sheet 7</td>
<td>Revision notes</td>
</tr>
<tr>
<td>Sheet 9</td>
<td>Template usage notes</td>
</tr>
<tr>
<td>Sheet 12</td>
<td>Front seat back forward face top left and right corners</td>
</tr>
<tr>
<td>Sheet 13</td>
<td>Front seat back bottom right corner</td>
</tr>
<tr>
<td>Sheet 14</td>
<td>Front seat back bottom left corner</td>
</tr>
<tr>
<td>Sheet 15</td>
<td>Landing gear bulkhead F-110.25 top left and F-118.5 top aft</td>
</tr>
<tr>
<td>Sheet 16</td>
<td>Landing gear bulkhead F-110.25 top right, firewall rudder cable pulley bracket, and cowl filler</td>
</tr>
<tr>
<td>Sheet 17</td>
<td>Fuselage corner shaping</td>
</tr>
<tr>
<td>Sheet 18</td>
<td>Canard A, B and M. Straight cutting guide</td>
</tr>
<tr>
<td>Sheet 19</td>
<td>Canard C and straight cutting guide</td>
</tr>
<tr>
<td>Sheet 20</td>
<td>Canard D, elevator, outboard mass balance</td>
</tr>
<tr>
<td>Sheet 21</td>
<td>Canard K jigs</td>
</tr>
<tr>
<td>Sheet 22</td>
<td>Canard K jigs</td>
</tr>
<tr>
<td>Sheet 23</td>
<td>Canard L jigs</td>
</tr>
<tr>
<td>Sheet 24</td>
<td>Canard profile E and F. Elevator travel checking</td>
</tr>
<tr>
<td>Sheet 25</td>
<td>Center spar cap</td>
</tr>
<tr>
<td>Sheet 26</td>
<td>Wing core B.L. 31.0 - right</td>
</tr>
<tr>
<td>Sheet 27</td>
<td>Wing core B.L. 31.0 - left</td>
</tr>
<tr>
<td>Sheet 28</td>
<td>Wing core B.L. 67.5 - left</td>
</tr>
<tr>
<td>Sheet 29</td>
<td>Wing core B.L. 67.5 - right</td>
</tr>
<tr>
<td>Sheet 30</td>
<td>Wing core B.L. 118.25 - right</td>
</tr>
<tr>
<td>Sheet 31</td>
<td>Wing core B.L. 118.25 - left</td>
</tr>
<tr>
<td>Sheet 32</td>
<td>Wing core B.L. 169.0 - right and left</td>
</tr>
<tr>
<td>Sheet 33</td>
<td>Aileron tip, torque tube clearance, and electrical conduit</td>
</tr>
<tr>
<td>Sheet 34</td>
<td>Aileron root and mid-span</td>
</tr>
<tr>
<td>Sheet 35</td>
<td>Wing jig #5 - <em>obsolete</em> (See revision notes and sheet 46 - 52)</td>
</tr>
<tr>
<td>Sheet 36</td>
<td>Wing jig #4 - <em>obsolete</em> (See revision notes and sheet 46 - 52)</td>
</tr>
<tr>
<td>Sheet 37</td>
<td>Wing jig #3 - <em>obsolete</em> (See revision notes and sheet 46 - 52)</td>
</tr>
<tr>
<td>Sheet 38</td>
<td>Wing jig #2 - <em>obsolete</em> (See revision notes and sheet 46 - 52)</td>
</tr>
<tr>
<td>Sheet 39</td>
<td>Wing jig #1 - <em>obsolete</em> (See revision notes and sheet 46 - 52)</td>
</tr>
<tr>
<td>Sheet 40</td>
<td>Rudder conduit at wing tip - left and right</td>
</tr>
<tr>
<td>Sheet 41</td>
<td>Vortilons and alignment guide</td>
</tr>
<tr>
<td>Sheet 42</td>
<td>Winglet root - left and right</td>
</tr>
<tr>
<td>Sheet 43</td>
<td>Winglet top and bottom tip - left and right</td>
</tr>
<tr>
<td>Sheet 44</td>
<td>Fuel tank rib R33</td>
</tr>
<tr>
<td>Sheet 45</td>
<td>Fuel tank rib R57 - <em>obsolete</em> (See revision notes and sheet 53)</td>
</tr>
<tr>
<td>Sheet 46</td>
<td>Setup drawing for version B wing jigs</td>
</tr>
<tr>
<td>Sheet 47</td>
<td>Wing jig #1 (Version B)</td>
</tr>
<tr>
<td>Sheet 48</td>
<td>Wing jig #2 (Version B)</td>
</tr>
<tr>
<td>Sheet 49</td>
<td>Wing jig #3 (Version B)</td>
</tr>
<tr>
<td>Sheet 50</td>
<td>Wing jig #4 (Version B)</td>
</tr>
<tr>
<td>Sheet 51</td>
<td>Wing jig #5 (Version B)</td>
</tr>
<tr>
<td>Sheet 52</td>
<td>Wing jig #6 (Version B)</td>
</tr>
<tr>
<td>Sheet 53</td>
<td>Wing Tank Rib R57 (Version B)</td>
</tr>
<tr>
<td>Sheet 54</td>
<td>NC-2, NC-3, and NC-7 elevator component drawings and templates</td>
</tr>
<tr>
<td>Sheet 55</td>
<td>NC-3 bearing, NC-6, CS-10, and CS-11 elevator component drawings and templates</td>
</tr>
<tr>
<td>Sheet 56</td>
<td>CZNC12A assembly</td>
</tr>
<tr>
<td>Sheet 57</td>
<td>CZNC12A-1, CZNC12A-2, CZNC12A-3 and CZNC12A-5 elevator component drawings</td>
</tr>
<tr>
<td>Sheet 58</td>
<td>CZNC12A-4 elevator component drawings and templates</td>
</tr>
<tr>
<td>Sheet 59</td>
<td>CZNC5A elevator trim control arm assembly</td>
</tr>
<tr>
<td>Sheet 60</td>
<td>CZNC5A-2 elevator trim control arm</td>
</tr>
<tr>
<td>Sheet 61</td>
<td>CZNC12B assembly and clearance hole analysis</td>
</tr>
<tr>
<td>Sheet 62</td>
<td>CZNC12B-1 elevator component drawings</td>
</tr>
<tr>
<td>Sheet 63</td>
<td>CZNC12B-2 elevator component drawings and templates</td>
</tr>
<tr>
<td>Sheet 64</td>
<td>CZNC-58 - elevator trim control arm assembly</td>
</tr>
<tr>
<td>Sheet 65</td>
<td>CZNC-58-1 elevator trim component drawings</td>
</tr>
<tr>
<td>Sheet 66</td>
<td>CZNC-58-2 elevator trim component drawings</td>
</tr>
<tr>
<td>Sheet 67</td>
<td>CN-2 and CNL canard mounting bushing, lift tab nutplate mount component drawings</td>
</tr>
<tr>
<td>Sheet 68</td>
<td>NG-30 Template</td>
</tr>
<tr>
<td>Sheet 69</td>
<td>Nose gear actuator general assembly</td>
</tr>
<tr>
<td>Sheet 70</td>
<td>NG-50B component drawing and template</td>
</tr>
<tr>
<td>Sheet 71</td>
<td>NG-51 component drawing and template</td>
</tr>
<tr>
<td>Sheet 72</td>
<td>NG-14, NG-52, NG-54 and NG-55 component drawings</td>
</tr>
<tr>
<td>Sheet 73</td>
<td>NG-53, and NG-70 component drawing</td>
</tr>
<tr>
<td>Sheet 74</td>
<td>NG-57, NG-60, NG-62 and NG-69 component drawings</td>
</tr>
<tr>
<td>Sheet 75</td>
<td>Shock strut general assembly</td>
</tr>
<tr>
<td>Sheet 76</td>
<td>LST-1 and LST-2 component drawings</td>
</tr>
<tr>
<td>Sheet 77</td>
<td>LST-3, LST-4, LST-5 and LST-7 component drawings</td>
</tr>
<tr>
<td>Sheet 78</td>
<td>??</td>
</tr>
<tr>
<td>Sheet 79</td>
<td>??</td>
</tr>
<tr>
<td>Sheet 80</td>
<td>??</td>
</tr>
<tr>
<td>Sheet 81</td>
<td>??</td>
</tr>
<tr>
<td>Sheet 82</td>
<td>??</td>
</tr>
</tbody>
</table>
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**Table of Contents - Continued**

Sheet 83  Wing mounting jig - tip  
Sheet 84  Wing mounting jig - mid  
Sheet 85  CS-132, CS132-1, and CS132-2 component drawings and template  
Sheet 86  CS-132B, CS-132B-1 and CS-132B-2 component drawings  
Sheet 87  CS-128 componentet drawings and template  
Sheet 88  CS-127 component drawings and template  
Sheet 89  CS-131, CS-1A, CS-50, and CS-181 component drawings  
Sheet 90  MKCS-71 component drawings and template  
Sheet 91  MKCS-71B component drawings and template  
Sheet 92  Additional templates for MKCS-71 and CS-127  
Sheet 93  Additional templates for MKCS-71B  
Sheet 94  CS-72 component drawings  
Sheet 95  CS-72 templates  
Sheet 96  CS-72B component drawings  
Sheet 97  CS-72B templates  
Sheet 98  MKCS-124-1 component drawing, templates and AN970-3 modified for MB-4 rod ends  
Sheet 99  MKCS-124B component drawings and templates  
Sheet 100  CS-108 and CS-117 component drawings and templates  
Sheet 101  CS-109 component drawings and templates  
Sheet 102  CS-118 component drawings and templates
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Introduction

These supplementary notes and drawings were developed as an addition to the 'M' drawings. They serve to deal with some of the paper distortion issues associated with the original paper templates as well as to better document the design of some of the mechanical components. In some cases there have been significant revisions to the original designs. These are clearly noted.

One of the more prominent revisions is to the wing alignment jigs. These were found fit very poorly so new jigs were developed from a master loft created for the entire wing. The fit of the revised jigs was much more acceptable. See the revision 1.2 notes for more details. An additional jig was also created to simplify the joining of the inboard foam core component.

Alternate designs for some of the welded components are also presented. These were developed to minimize the amount of welding, and consequently welding jigs and fixtures, required. They do, however, involve making machined components.
Revision Notes

Revision 1.0
August 16, 2014
- Original release

Revision 1.1
August 22, 2014
- Sheet 24 - Moved B.L. 37.0 and B.L. 52.0 bottom spar cap templates so that B.L. 52.0 did not interfere with B.L. 62.5 bottom spar cap template dimensions.
- Sheet 37 - Added bottom leading edge hidden line. Added reference label to LE hidden line.

Revision 1.2
December 12, 2015
- Produced master wing loft and rellofted wing assembly jigs to correct for poor fit of original Jigs #1 to #5.
  - Added additional wing jig to improve fitting of inboard wing core to middle wing core. Revised wing core jigs are on sheets 46 - 52.
- Original wing core jigs labeled as obsolete
- Table of contents extended to additional page and revision notes section added
- Revised template usage notes to include ‘Suggestions for Mounting the Wing Jig Template Patterns’
- Sheet numbers resequenced.
- Revised fuel tank rib R57 based on revised wing loft. Minor revisions to upper surface line on the rear third of this rib. Original rib now labeled as obsolete. New rib is on sheet 53.
  - Note that other ribs have not been redone because the differences between the current drawing and the revised shapes from the rellofted wing are insignificant.
- Added sheets 54 - 58 with detailed elevator component drawings and template sets.
- Added sheets 60 - 62 with detailed elevator component drawings for alternate torque tube and control arm assembly that does not require welding or assembly jigs.
- Added sheet 64 with NG-30 template corrected as per newsletter #86.
- Added additional blank pages for table of contents and notes expansion.
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Template Usage Notes

Printing Suggestions

1) The template sheets are designed to be printed full size on 11" x 17" paper. When printing with Adobe Acrobat® set page scaling to none. There is a reference border on each sheet and it measures exactly 15.20" x 10.50". Allowable printing tolerances are 15.20" ±0.05" and 10.50" ±0.04". Paper size changes due humidity changes and age will add to this. It is suggested that the maximum allowable size change be kept to less than 15.20" ±0.07" and 10.50" ±0.05".

2) Print the templates on 24lb paper. Standard 20lb paper is acceptable but is a more difficult to keep straight when gluing down long and narrow template patterns.

Suggestions for Assembling Multiple Sheet Templates

1) Carefully cut off the left side border from the second (and third) sheets. Align the left border of the second sheet to the right border of the first sheet. Use a straight edge against the lower reference border to help keep the sheets aligned vertically. Use clear tape to hold the sheets together. If required repeat for the third sheet.

2) The horizontal allowable tolerances are non-cumulative. This means that the left reference border of the second sheet is 15.20" ±0.05" from the left reference border of the first sheet and, if required, the left reference border of the third sheet is 30.40" ±0.05" from the left reference border of the first sheet.

Suggestions for Gluing Down Template Patterns

1) DO NOT use water based adhesives. They WILL cause unacceptable distortions in the template patterns.

2) Spray adhesives are suggested. Follow the manufacturers directions.

Suggestions for Mounting the Wing Jig Template Patterns

1) The wing jig patterns are large and difficult to mount accurately on the wing jig blanks. A good solution is to place the template pattern in the correct position on the wing jig blank and hold it in place with tape around the perimeter of the template. Use a small staple gun to place a staple about every 1.5" around the perimeter of the airfoil cutout area and next to the jig split lines.

Suggestions for Final Cutting and Shaping of the Templates

1) Follow the recommendations in the builders manual. An additional rough cut reference line has been added to the airfoil template patterns. This is to provide a more accurate initial cutting reference before sanding to the final shape.

2) Where required both 'left' and 'right' templates have been provided. This removes the need to duplicate the 'talking numbers' and reference lines on the opposite side of the template. It does, however, increase the number of templates that the builder must make. The additional templates are provided as a convenience for those who might prefer this approach.

Additional Notes

1) Where multiples of the same pattern are required there is a separate pattern for each item. This avoids the need to trace duplicates.

2) Where conduit or control clearance holes exist on a sloping bulkhead, forward and rear surface templates are provided. This was done to help with the correct shaping of the oval and sloping holes that are required.
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OUTBOARD MASS BALANCE MOUNTING JIG
MAKE TWO (2) FROM 1/8" PLYWOOD

OUTBOARD MASS BALANCE MOUNTING JIG
MAKE TWO (2) FROM 1/8" PLYWOOD
USE \( \frac{3}{8}'' \) PARTICLE BOARD OR SIMILAR MATERIAL
MAKE 10 (10) IDENTICAL PIECES
USE \( \frac{3}{8} \)" PARTICLE BOARD OR SIMILAR MATERIAL
MAKE 10 (10) IDENTICAL PIECES
This line must be level when the top longerons are level

CANARD TOP PROFILE CHECKING TEMPLATE

MAKE ONE

TRAILING EDGE

B

E

CANARD BOTTOM CONTOUR CHECKING TEMPLATE

MAKE ONE

THIS LINE MUST BE LEVEL WHEN THE TOP OF THE LONGERONS ARE LEVEL

ELEVATOR TRAVEL CHECKING TEMPLATE

MAKE ONE

FULL FORWARD STICK

FULL AFT STICK

+30

+20

+10

+5

0

-10

-15

-20

-25

-30

+15

+10

+5
WING CORE B.L. 31.0 TEMPLATE - RIGHT

P = PAUSE
S = START

LEVEL LINE

W.L. 17.4

NAIL HOLE
WING CORE B.L. 31.0 TEMPLATE - LEFT

P = PAUSE
S = START

W.L. 17.4

LEVEL LINE

NAL HOLE
WING CORE B.L. 67.5 TEMPLATE - LEFT

USE TWICE FOR EACH WING

RELOCATION OF HOLE
ELECTRICAL CABLE

P = PAUSE
S = START
WING CORE B.L. 118.25 TEMPLATE - RIG

USE TWICE FOR EACH WING

W.L. 17.4

LEVEL LINE

FUTURE LOCATION OF HOLE FOR ELECTRICAL CABLE

PAUSE START

UP

SHEAR WEB CUT ACCURATELY
FLYING CORE B.L. 118.25 TEMPLATE - LEFT

USE TWICE FOR EACH WING

LEVEL LINE

UP

W.L. 17.4

FUTURE LOCATION OF HOLE FOR ELECTRICAL CABLE

P = PA
S = ST

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Sheet - 31-2 Rev. 1.2 April 15, 2015
OBSOLETE
WING JIG #2
AFT UPPER
Chapter 19 Step 1

WING JIG #2
AFT LOWER
Chapter 19 Step 1

W.L. 17.4

TE REFERENCE

2.00

14.25

3.00

8.00

Cozy Mk IV

OBSOLETE
WINGLET ROOT RIGHT
USE FOR TOP RIGHT AND BOTTOM LEFT WINGLET

INBOARD

NAIL HOLE

LEVEL LINE
THIS RIB IS SIZED FOR A TANK SKIN FOAM CORE THICKNESS OF 0.350".
IF YOUR SKIN THICKNESS VARY MODIFY RIB ACCORDINGLY
THIS RIB IS SIZED FOR A TANK SKIN FOAM CORE THICKNESS OF 0.350".
IF YOUR SKIN THICKNESS VARY MODIFY RIB ACCORDINGLY

DB BUTTS HERE

TTE BUTTS HERE

W.L. 17.4

OBSOLETE
WING JIG 5 (Ver. B)
UPPER

WING JIG 5 (Ver. B)
LOWER

W.L. 17.4

2.00

3.75

9.00
WING JIG 6 (Ver. B)
UPPER

WING JIG 6 (Ver. B)
LOWER

W.L. 17.4

3.75

9.00

2.00
THIS RIB IS SIZED FOR A TANK SKIN FOAM CORE THICKNESS OF 0.350".
IF YOUR SKIN THICKNESS VARY MODIFY RIB ACCORDINGLY

DB BUTTS HERE  TTE BUTTS HERE

W.L. 17.4
CZNC-12A
ELEVATOR TORQUE TUBE
CONTROL ARM AND HINGE
WELDED ASSEMBLY

MAKE 1 LEFT (SHOWN) AND 1 RIGHT
CZNC-12A-1 ELEVATOR
TORQUE TUBE COUPLER
MATRL: OD x 0.095 WALL 4130N TUBING
(4 REQ'D)

CZNC-12A-2 ELEVATOR
TORQUE TUBE OFFSET JOINER
MATRL: 0.080" 4130N
(2 REQ'D)

CZNC-12A-3 ELEVATOR
TORQUE TUBE OFFSET COUPLER
MATRL: 3/4 OD x 0.058 WALL 4130N TUBING
(2 REQ'D)

CZNC-12A-5 ELEVATOR
HINGE
MATRL: 1.00" 4130N BAR
(2 REQ'D)
CZNC-5A-2 TRIM ARM

MATRL: 0.050" 4130N
(1 REQ'D)

CUTTING TEMPLATE
ELEVATOR TORQUE TUBE CLEARANCE HOLE ANALYSIS

(0.53" ADDITIONAL CLEARANCE TO CZNC-12B-1 HAS BEEN ADDED)

CZNC-12B
ELEVATOR TORQUE TUBE
CONTROL ARM AND HINGE
ASSEMBLY

MAKE 1 LEFT (SHOWN) AND 1 RIGHT

This component is an alternate design for the CZNC-12A. Installation procedures are not covered in the official plans set.
This component is part of an alternate design for the CZNC-12A. Installation procedures are not covered in the official plans set.

CZNC-12B-1
ELEVATOR TORQUE TUBE
COUPLER

MAKE 1 LEFT (SHOWN) AND 1 RIGHT

MATRL: 1.5" DIA. 2024-T3

FILE 0.050" DIA. STRESS RELIEF IN EACH CORNER

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Sheet - 62 Rev. 1.2 October 12, 2015
CZNC-12B-2 CONTROL ARM

MATERIAL: 0.125" 2024-T3
(2 REQ'D)

DRILL #64" (3 PLACES)
MATCH DRILL #27 WITH CZNC-12B-1 AFTER ALIGNMENT

CHAMFER AS REQUIRED
FOR FIT TO CZNC-12B-1

This component is part of an alternate design for the CZNC-12A. Installation procedures are not covered in the official plans set.
CZNC-5B
ELEVATOR TRIM CONTROL ARM
ASSEMBLY

This component is an alternate design for the CZNC-5A. Installation procedures are not covered in the official plans set.
CZNC-5B-2
ELEVATOR TRIM CONTROL
ARM

MAKE 1

MATRL: 0.125" 2024-T3

This component is part of an alternate design for the CZNC-5A. Installation procedures are not covered in the official plans set.
CN-2 BUSHING
MATRL: 0.375” 4130N or 1020 STEEL ROD
(2 REQ’D)

LIFT TAB NUT PLATE MOUNT
MATRL: AN970-4 WASHER
(FOR K1000-4 ANCHOR NUT)
(2 REQ’D)

CNL BUSHING
MATRL: 0.625” DIA. 2024-T3 or 6061-T6
(2 REQ’D)

LIFT TAB NUT PLATE MOUNT
ALTERNATE DESIGN
MATRL: AN970-4 WASHER
(FOR MK1000-4 ANCHOR NUT)
(2 REQ’D)
NG-30 (Revised per N L. 86)

MATRL: 1/2 H100 FOAM
(2 REQ'D)

SEE NEWSLETTER #86 FOR REVISED LAYUP SCHEDULE
NG-50B ACTUATOR ARM

MATRL: 0.125" 4130N or 1020 STEEL
(2 REQ'D)

CUTTING TEMPLATE

THIS PART IS MATCH DRILLED
WITH THE FIRST PART
NG-14 SPACER

MATRL: \( \frac{3}{4} \text{ 2024-T3 OR 8061-T6 ALUM. ROD} \)
(2 REQ'D)

NG-52 SHAFT

MATRL: \( \frac{3}{16} \text{ O.D. x 0.095" W.T. 4130N TUBING} \)
(1 REQ'D)

NG-54 Bearing

MATRL: FB1012-4 OILITE BUSHING
(2 REQ'D)

NG-55 COLLAR

MATRL: \( \frac{3}{4} \text{ O.D. x 0.058" W.T. 4130N STEEL} \)
(1 REQ'D)
NG-53B WORM GEAR

MATRL: BOSTON GEAR D1145 BRONZE WORM GEAR

MACHINE HUB AS SHOWN
WEB HOLES ARE MATCH DRILLED TO NG-506
(1 REQ'D)

0.50” SPOT FACE
BOTH SIDES

MATCH DRILL 0.196 TO NG-506
(3 PLACES)

0.47

NG-70 SPACER

MATRL: 5/8 2024-T3 ALUM. RCD
(3 REQ'D)

TRIM EDGE TO FIT NG-53B

0.233

0.500

0.189

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NG-62 SPACER
MATRL: 1/4" 2024-T3 ALUM. ROD
(2 REQ'D)

NG-57 BEARING BLOCK
MATRL: 1/2" sq. 2024-T3 ALUM. BAR
(2 REQ'D)

THIS SURFACE AGAINST
NG-81 MATCH DRILL NG-61
AFTER POSITIONING MIL-H-1 WORM

NG-69 SHEAR PLATE
MATRL: 0.063" 4130N or 1020 STEEL
(1 REQ'D)

NG-60 SHAFT
MATRL: 0.3125" DIA. DRILL ROD
(1 REQ'D)
LST-1 INNER SHOCK STRUT

MATRL: 1/2 O.D. x 0.156" W.T. 4130N TUBING
(1 REQ'D)

LST-2 OUTER SHOCK STRUT

MATRL: 3/8 O.D. x 0.065" W.T. 4130N TUBING
(1 REQ'D)
WING MOUNTING JIG - TIP
LOCATE AT 130.75 ALONG TE FROM B.L. 31.0
ALIGN PERPENDICULAR TO TE
WING MOUNTING JIG - MID
LOCATE AT 42.25 ALONG TE FROM B.L. 31.0
ALIGN PERPENDICULAR TO TE
CS-132B CONTROL ARM
REVISED FOR HM-4 ROD END
(2 REQ'D)

This component is part of an alternate design for the CS-132.
Installation procedures are not covered in the official plans set.

CS-132B-2 CONTROL ARM
MATRL: 0.125" 2024-T3 ALUMINUM
(2 REQ'D)

CS-132B-1 FLANGE
MATRL: 1.50" DIA 2024-T3 OR 6061-T6 ALUMINUM
(2 REQ'D)

MATCH DRILL #12 TO CS-152R

APPROXIMATE RIVET LOCATIONS (8)

MATCH DRILL CS132B-1 AFT ARM ALIGNMENT
USE AN470AD-36 RIVETS (8)
OR BSC-34 (8)

CUTTING TEMPLATE

Sheet - 86 Rev. 1.2 November 29, 2015

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CS-128 BELLCRANK
MATRL: 0.125" 2024-T3 ALUMINUM
REVISED FOR HM-4 ROD END
(2 REQ'D)

APPROXIMATE RHET HOLE LOCATIONS (6)
MATCH DRILL #35 TO BGAW10 BEARING
USE AN4704D-46 RIVETS (6)

CUTTING TEMPLATE
CS-127 BRACKET

MATERIAL: 0.032" 2024-T3 ALUMINUM
(4 REQ'D)

FOR EACH PAIR
SEND ONE UP AND
ONE DOWN

BEND LINE
BEND 90°

MATCH DRILL TO MATE
AFTER BENDING

DRILL #12 (.3 PLACES)

ADDITIONAL CUTTING TEMPLATE
ON SHEET 52
This component is an alternate design for the MKCS-71. Installation procedures are not covered in the official plans set.

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Sheet - 91 Rev. 1.2 December 19, 2015
This component is an alternate design for the MKCS-72. Installation procedures are not covered in the official plans set.
MKCS-124 CONTROL ARM
MATRL: 0.050” 4130N STEEL
MAKE 1 LEFT and 1 RIGHT CS-124 ASSEMBLY

RETAINER WASHER
FOR MB-4 ROD ENDS
MATRL: AN970-3 WASHER
(10 REO/D)

DRILL 1/4"
**MKCS-124B ASSEMBLY**

**MAKE 1 LEFT AND 1 RIGHT**

**TWIST NOT SHOWN**

**MKCS-124B-2**

**CS-125B 0.825 O.D. x 0.049 W. T. 4130N**

**MKCS-124B-1**

**13.20**

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**MKCS-124B-2 FLANGE**

**MATRL: 1.50" DIA 2024-T3 OR 6061-T6 ALUMINUM (2 REQ'D)**

**MATCH DRILL #12 TO MKCS-124B**

**APPROXIMATE RIVET LOCATIONS (5)**

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**MKCS-124B-1 CONTROL ARM**

**MATRL: 0.125" 2024-T3 ALUMINUM**

**MAKE 1 LEFT AND 1 RIGHT MKCS-124B ASSEMBLY**

**TWIST TO REQUIRED ANGLE BEFORE ASSEMBLY TO MKCS-124B-2**

**NOTE: LEFT AND RIGHT HAVE OPPOSITE TWIST.**

**MATCH DRILL MKCS124B-2 AFTER ARM ALIGNMENT USE AM472AC-3/4 RIVETS (5) OR BSC-34 (5)**

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This component is part of an alternate design for the MKCS-124. Installation procedures are not covered in the official plans set.

Sheet - 99 Rev. 1.2 December 27, 2015
CS-118 BEARING PLATE
MATRL: 0.250" BIRCH PLYWOOD
(2 REQ'D)

#12 MATCH DRILL TO CS-117

CUTTING TEMPLATE

Sheet - 102 Rev. 1.2 January 1, 2016
ELEVATOR 0° JIG BLOCK TEMPLATE

USE ½" MDF
MAKE FOUR (2) IDENTICAL PIECES