

THE FINISHED RUDDER HAS NO TWIST WHEN THE TRAILING EDGE SPLITS THE TAPERED SPAR IN THE MIDDLE. STAND BACK AND SIGHT THE TOP TRAILING EDGE IN THE MIDDLE OF THE SPAR. WITHOUT MOVING YOUR HEAD, DROP YOUR LINE OF SIGHT TO CHECK THAT THE TRAILING EDGE AT THE BOTTOM SPLITS THE SPAR IN THE MIDDLE.

**NUMBER DRILL BITS:**

- #40 = PILOT HOLES (.098")
- #30 = A4 (.129")
- #20 = A5 (.161")

**CLECO COLOR CODE**

- COPPER = #30 HOLE
- SILVER = #40
- BLACK = #20

**RIVET DESCRIPTION**

- A4 = AVEV 1/8" BLIND RIVET
- A5 = AVEV 5/32" BLIND RIVET

**EDGE DISTANCE:**

DISTANCE FROM THE EDGE OF THE SKIN TO THE CENTER OF THE HOLE. APPROX. 10MM OR 2.5 X DIAMETER

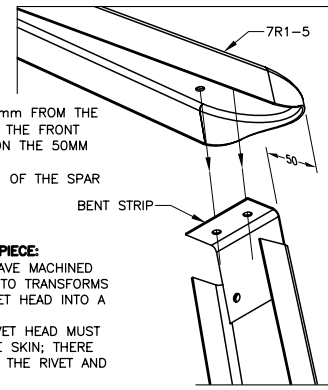
**STEP 7:** MARK A LINE 50mm FROM THE FRONT OF THE RIB. POSITION THE FRONT EDGE OF THE BENT STRIP ON THE 50MM LINE.

**CHECK:** 1318 FROM BOTTOM OF THE SPAR TO THE TOP OF 7R1-5.

**STEP 10: RIVETER NOSE PIECE:**

ALWAYS USE A SPECIAL CONCAVE MACHINED NOSE PIECE ON THE RIVETER TO TRANSFORMS THE FLAT COUNTERSUNK RIVET HEAD INTO A ROUND DOMED HEAD.

**CHECK:** THE EDGE OF THE RIVET HEAD MUST MAKE FULL CONTACT WITH THE SKIN; THERE SHOULD BE NO GAP BETWEEN THE RIVET AND THE SKIN.



DETAIL TO SHOW HOW THE BENT STRIP POSITIONS THE TIP RIB ABOVE THE END OF THE SPAR

**STEP 6: DRILLING THE RIBS:**

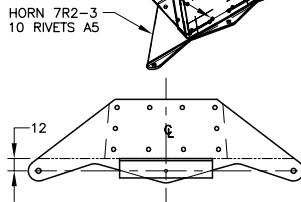
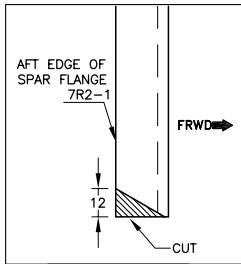
WITH A MARKER, DRAW A LINE IN THE MIDDLE OF THE RIB FLANGE. CLAMP THE RIB TO THE SPAR. CHECK THE RIB IS CENTERED BETWEEN THE LEFT AND RIGHT SPAR FLANGE. BACK-DRILL & CLECO A FIRST HOLE WHEN THE RIB FLANGE CENTER LINE IS VISIBLE THROUGH THE DRILLED HOLES IN THE SPAR.

**STEP 3B:** NOTE: DURING THE RUDDER WORKSHOP THE UPPER RUDDER HINGE ANGLES 7F2-4 ARE NOT INSTALLED, THE AREA IS MARKED AS A "NO RIVET ZONE" TO ALLOW EXACT ALIGNMENT WITH THE FUSELAGE ATTACHMENT POINTS.

7R1-3 REAR RIB #3 3XA4

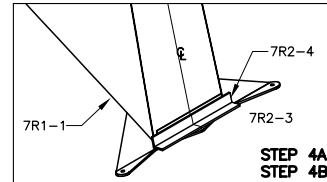
7R1-2 REAR RIB #2 3XA4

7R1-1 RUDDER BOTTOM RIB #1 4XA4



**STEP 3A:** LAYOUT THE RIB STATIONS REFERENCED FROM BOTTOM OF SPAR

**STEP 4B:** POSITION THE HORN AND EXTRUSION ASSEMBLY ON BOTTOM RIB #1 BY LINING UP CENTERLINES, TRACE AROUND THE HORN. REMOVE HORN AND LAYOUT 10 HOLES AT PIVOT PITCH FROM THE OUTLINE AND EDGE. SEE PART #3 ON DRAWING 7R2 FOR RIVET LAYOUT.

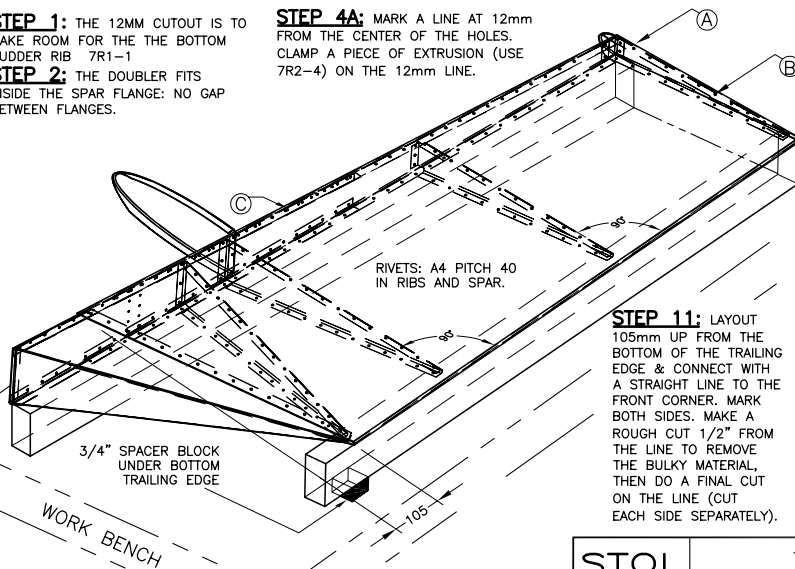


**STEP 4A**  
**STEP 4B**

**STEP 1:** THE 12MM CUTOUT IS TO MAKE ROOM FOR THE THE BOTTOM RUDDER RIB 7R1-1

**STEP 2:** THE DOUBLER FITS INSIDE THE SPAR FLANGE: NO GAP BETWEEN FLANGES.

**STEP 4A:** MARK A LINE AT 12mm FROM THE CENTER OF THE HOLES. CLAMP A PIECE OF EXTRUSION (USE 7R2-4) ON THE 12mm LINE.



- BUILDING SEQUENCE**
1. TRIM THE BOTTOM CORNERS OF THE SPAR FLANGE.
  2. POSITION THE DOUBLERS FLUSH WITH THE BOTTOM OF THE SPAR, TRACE THE 12MM CUTOUT & TRIM DOUBLER. MARK THE RIVET LINE IN THE MIDDLE OF THE FLANGE THAT OVERLAPS THE SPAR WEB.
  3. LAYOUT THE RIB STATIONS ON THE INSIDE OF THE SPAR, MARK THE NO RIVET ZONE FOR THE UPPER BEARINGS, PITCH 40 BETWEEN THE RIB STATION AND THE TOP OF THE DOUBLER. DRILL AND CLECO WITH #30, EVERY THIRD HOLE IN THE DOUBLER, THEN GO BACK AND DRILL THE IN BETWEEN HOLES.
  4. CLECO THE HORN 7R2-3 TO BOTTOM RIB 7R1-1
  5. LOCATE THE BOTTOM RIB INSIDE THE SPAR, SQUARE THE BOTTOM OF THE SPAR FLUSH WITH THE HORN. CLAMP THE SIDE OF THE RIB TO THE SPAR FLANGE. DRILL AND CLECO FRONT FLANGE WITH 4 X A4 (#30 HOLES).
  6. CONTINUE TO DRILL THE REAR RIBS TO THE SPAR, ADD THE NOSE RIB ON THE FRONT SIDE OF THE SPAR. NOTE: THE RIB FLANGES POINT DOWN.
  7. CLECO THE BENT STRIP TO THE TIP RIB 7R1-5. POSITION THE RIB ASSEMBLY AT THE END OF THE SPAR LEAVING A FEW MILLIMETERS BETWEEN THE RIB FLANGE AND THE SPAR.
  8. UNCLECO, DEBUR HOLES AND ROUGH EDGES AND CORNERS.
  9. REASSEMBLE AND CLECO SKELETON (WITHOUT THE HORN).
  10. RIVET RUDDER SKELETON ASSEMBLY: PLACE THE HEAD OF THE RIVET ON THE FRONT SIDE OF THE SPAR.
  11. CUT THE BOTTOM ANGLE OF THE REAR SKIN 7R2-1
  12. POSITION THE RUDDER SKELETON ASSEMBLY INSIDE OF SKIN TO MARK RIB STATIONS.
  13. PRE-DRILL REAR SKIN WITH #40 PILOT HOLES.
  14. CLECO THE SKIN AT POINT A,B & C. DRILL & CLECO TO SKELETON WITH #30 WHEN THE RIB FLANGE CENTER LINE IS VISIBLE. TURN OVER AND DRILL THE OTHER SIDE (WAIT TO DRILL THROUGH THE SPAR).
  15. SLIDE THE LEADING SKIN IN BETWEEN THE SPAR AND THE REAR SKIN AND DUCT TAPE DOWN; DRILL AND CLECO THROUGH THE SPAR: START IN THE MIDDLE AND WORK OUTWARDS. DRILL & CLECO THE OTHER SIDE.
  16. DRILL THE NOSE RIB BETWEEN THE CRIMPS.
  17. DEBUR & RIVET FINISH RUDDER.
  18. CUT THE HORN 7R2-3

**STEP 12 & 13:** SLIDE THE SKELETON INSIDE THE SKIN: THE FRONT OF THE SKIN IS FLUSH WITH THE SPAR, ALIGN THE TOP OF THE SKIN WITH BEND TANGENT OF THE RIB FLANGE (APPROX. 3mm BELOW THE TOP OF THE RIB). MARK THE RIB STATIONS ALONG THE FRONT EDGE OF THE SKIN. REMOVE THE SKIN TO LAYOUT THE RIVET LINES THROUGH THE RIB FLANGE: RIBS #3 & #4 ARE AT 90 DEGREES TO THE TRAILING EDGE, RIB #2 OVERLAPS THE END OF #1. USE DWG 7-R-3 TO HELP LAYOUT RIVET PITCH. PLAN FOR A RIVET AT THE INTERSECTION OF THE SPAR WITH THE RIBS. DRILL WITH #40 DRILL BIT, THE SECOND TO LAST HOLE FROM THE TRAILING EDGE THROUGH BOTH SIDES OF THE SKIN & CLECO INTO THE WORKBENCH. WAIT TO DRILL THE LAST HOLES, THEY WILL BE OFFSET TO AVOID RIVET INTERFERENCE. DRILL THE REST OF THE HOLES. DRILL EACH SIDE OF THE RIVET LINE THROUGH THE SPAR SEPARATELY.

**STEP 14:** POSITION THE RUDDER ON THE BOARDS (TO KEEP THE TRAILING EDGE STRAIGHT), THEN POSITION THE SPACER BLOCK BETWEEN THE WORKBENCH AND THE BOTTOM TRAILING EDGE. SLIDE THE SKELETON INSIDE THE SKIN: THE FRONT OF THE SKIN IS FLUSH WITH THE SPAR, ALIGN THE TOP OF THE SKIN WITH BEND TANGENT OF THE RIB FLANGE. DRILL & CLECO HOLES "A" & "B" IN THE TIP RIB, THEN "C" IN THE SPAR. ALIGN THE RIB TILL YOU SEE CENTERLINES AND DRILL. WAIT TO DRILL SPAR RIVET LINE.

**STEP 15:** THE NOSE RIB 7R1-6 IS AT 90 DEGREES TO THE SPAR. ALIGN THE TOP AFT CORNERS OF THE NOSE SKIN 7F3-2 FLUSH WITH THE TOP OF THE REAR SKIN. TRACE AROUND THE TIP RIB 7R1-5 ON THE INSIDE OF THE SKIN TO TRIM THE OVERHAND. MARK A 10MM OFFSET LINE FROM THE SPAR RIVET LINE AND TRIM EXCESS MATERIAL. CLECO AND RIVET THE NOSE SKIN TO OVERLAP ON TOP OF THE REAR SKIN.

STOL  
CH 701

701 RUDDER ASSEMBLY  
REF DWGS: 7-R-1, 7-R-2, & 7-R-3

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7-RW

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