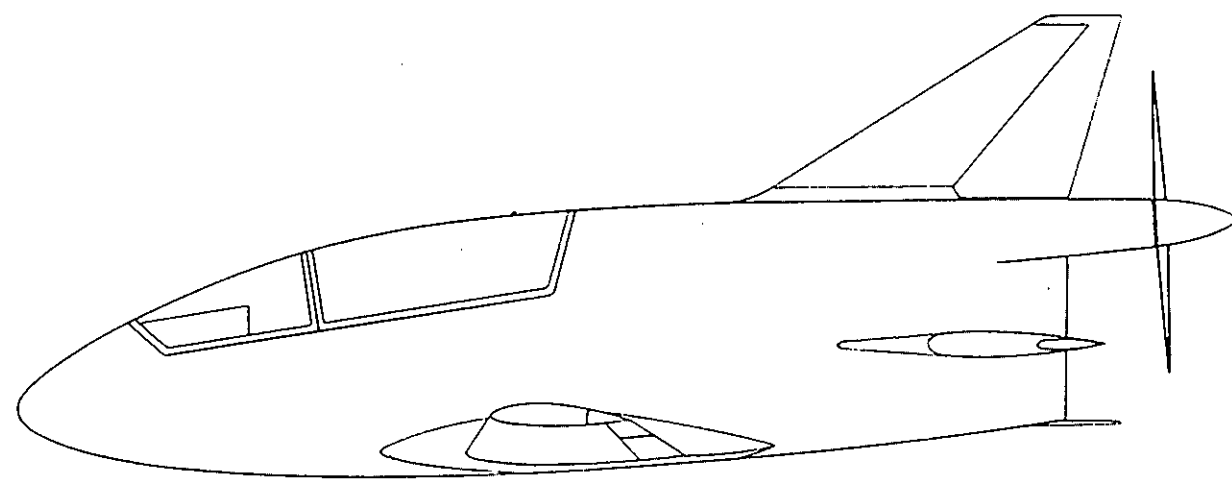


Chapter Seven

CONTROL SYSTEM CONSTRUCTION



PARTS & MATERIALS CALL OUT

FLAP HANDLE INSTL

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CF 36	Flap Handle	1	BD-5-M-0136	.190 2024-T3
CF 37	Spring Retainer	2	BD-5-M-0025	.016 2024-T3
CF 38	Detent	1	BD-5-M-0138	.31 Phenolic
CF 39	Pin	1		AN4-11A Bolt
CF 41	Knob	1	Procure Locally	.50 Hardwood
CF 1	Spring	1	MBD5CF1	.125 Music Wire QQ-W-470
CF 6	Cable	1	BD-5-M-0132	3/32 Gal. Cable MIL-C-1511
CF 46	Rub Plate	1	BD-5-M-0141	.020 4130 "N" STL
CF 45	Stop	2	BD-5-M-0123	.50 O.D. x .028 Wall 2024-T3 Tube

RUDDER PEDALS

CR 14	Lower Tab	4	BD-5-M-0105	.050 4130 Cond "N" STL SHT
CR 15	Outboard Tab	2	BD-5-M-0105	.050 4130 Cond "N" STL SHT
CR 16	Mid Tab	2	BD-5-M-0105	.050 4130 Cond "N" STL SHT
CR 17	Inboard Tab	2	BD-5-M-0113	.063 4130 Cond "N" STL SHT
CR 18	Lower Tab	2	BD-5-M-0107	.625 O.D. x .049W 4130 Cond "N"
CR 19	Vertical Tube	2	BD-5-M-0107	.625 O.D. x .049W 4130 Cond "N"
CR 20	Upper Tube	2	BD-5-M-0107	.625 O.D. x .049W 4130 Cond "N"
CR 21	Side Outboard L. H.	1	BD-0013	.063 1x1 angle 2024-T3 AL
CR 22	Side Inboard L. H.	1	BD-0013	.063 1x1 angle 2024-T3 AL
CR 23	Face	2	BD-5-M-0029	.050 2024-T3 AL Sheet
CR 24	Brake Mount	2	BD5LG208	2024-T4 AL Extrusion
CR 25	Brake Arm Outboard L. H.	1	BD-5-M-0008	.063 2024-T3 AL Sheet
CR 26	Brake Arm Inboard L. H.	1	BD-5-M-0008	.063 2024-T3 AL Sheet
CR 27	Outboard Pedal Mount	2	BD-5-M-0029	.050 2024-T3 AL Sheet
CR 28	Lever Tube	1	BD-5-M-0156	.50 O.D. x .058W 4130 Cond "N"
CR 29	Lever	1	BD-5-M-0105	.050 4130 Cond "N" Sheet
CR 30	Cover	1	BD-5-M-0029	.050 2024-T3 AL Sheet
CR 31	Stop Angle	1	BD-0007	.125x1.5x1.0 Extruded Angle AL 2024-T3511
CR 33	Pedal Assy L. H.	1		Consists Of CR14 (2), CR15, CR16, CR17, CR18, & CR19
CR 34	Pedal Assy R. H.	1		Consists Of CR14 (2), CR15, CR16, CR17, CR18, & CR19
CR 35	Lever Assy	1		Consists Of CR28 & CR29
CR 38	Spacer	4	BD-5-M-0095	1/4" O.D. x .028W 4130 Cond "N" Steel Tubing
CR 39	Brake Arm Outboard RH	1	BD-5-M-0008	.063 2024-T3 AL Sheet
CR 40	Brake Arm Inboard RH	1	BD-5-M-0008	.063 2024-T3 AL Sheet
CR 41	Side Outboard RH	1	BD-0013	.063 1x1 Angle 2024-T3
CR 42	Side Inboard RH	1	BD-0013	.063 1x1 Angle 2024-T3
CR 43	Spacer	2	BD-5-0046	5/16 O.D. x .028W 4130 Cond "N" Steel Tubing
CR 44	Spacer	2	BD-5-M-0095	1/4 O.D. x .028W 4130 Cond "N" Steel Tubing

CONTROL SYSTEM

THE DRAWING ON THE FACING PAGE ILLUSTRATES LOCATIONS OF PARTICULAR CONSTRUCTION DETAILS OF THE CONTROL SYSTEM.

Before Beginning Construction, Note The Following:

- 1 Assemble all parts so that related pivot points are parallel in all axis.
- 2 Steel tube spacers at pivot points are cut to length during assembly to provide a minimum clearance between moving parts of .03".
- 3 Dimensions not given may be scaled from full size drawings.
- 4 Position flap handle detent block so that the flap handle forward position (up flap) is as shown on page 7⁶.

Beginning Construction

- 1 Fabricate all parts pages 7⁷ through 7¹¹
- 2 Complete all welded assemblies page 7⁷ and 7¹⁰. (See Note 1 page 7²)
- 3 Construct sheet metal portion of pedal assemblies and fasten parts together permanently. (CR 21, 41, 22, 42, 25, 39, 26, 40, reference pages 7³ and 7⁴) See Special Notes 1 and 3 page 7¹
- 4 Assemble the rudder pedal assemblies complete with brake cylinders and install them on nosegear box. (Reference pages 7³ and 7⁴)
- 5 Install CR 35 control stop arm and related parts including threaded rods on nosegear box. (Reference pages 7³ and 7⁴) See Special Notes 2 and 3 page 7¹.
- 6 Lay a flat, straight piece of wood across the aft face of the pedals and clamp it to each pedal so that it holds each pedal in the horizontal position shown in View BB page 7³.
- 7 Adjust the length of the threaded rods so that they hold the pedals in the vertical position shown on page 7³ and CR 35 arm is perpendicular with BL0.00 as in View AA page 7-4.
- 8 Fasten threaded rods to pedals (View FF page 7⁴ and 7⁸)
- 9 Position LG 179's on LG 178 using No.12 bolt holes to align them and drill rivet holes. (Reference page 7⁵) Disassemble, deburr, and reassemble with cables in place. Proseal and rivet LG 179's to LG 178 note locations of cables LG 39 and 40, 45 and 46 page 7⁵.
- 10 Position LG 183 onto LG 180 and fasten with temporary bolt through existing No.12 holes. Using LG 183 as a guide, drill and csk No.12 hole through LG 180. Disassemble, deburr and install MS24694-554 screw. (Reference page 7⁵)
- 11 Install gear handle assembly on LG178 pulley assembly with bolts. (Reference page 7⁵)
- 12 Slide LG185 shaft into handle assembly and place an LG69 bearing block (with bushing installed) on each end.
- 13 Install handle assembly on nosegear box and clamp both LG69 bearing blocks firmly to FU125 and 126. Both ends of the LG185 shaft should be at the same waterline and station location and the handle pulley should clear the fuselage skins. A thin strip of sheet metal can be clamped across the lower flanges of FU125 and 126 to simulate the fuselage skins. (Reference page 7⁵)
- 14 Using a 6" extension drill, drill the two No.40 holes at the top of the left hand LG69 through FU125. Drill from the right hand side with drill passing over the top of FU126.
- 15 Enlarge the two holes to No.12 and using them as access holes, drill the four No.40 holes through the right hand LG69 and FU126. Enlarge these holes to No.12 and drill lower holes in left hand LG69 using same procedure.
- 16 Position the handle assembly on LG185 shaft so that the center line of the handle pulley is aligned with the gap between the two pulleys at the top of the gear well. Mark the position of the LG180 tube on the LG185 shaft. Identify each LG96 bearing block right hand or left hand and top and bottom.
- 17 Remove handle assembly and bearing blocks from gear box assembly. Remove handle pulley from handle. Align LG180 with mark on LG185 and drill and install bolt. (Reference page 7⁵)
- 18 Build up flap handle assembly and place on LG185 shaft (CF1 flap spring should be held in compressed position with wire or tape). Place LG69 bearing blocks on shaft and install entire assembly in gearbox assembly with temporary bolts (reference pages 7⁵, 7⁶ and 7⁹).
- 19 Remove wire or tape from CF1 spring. Position CF 38 and 46 on FU125 and clamp in place. Rotate flap handle to insure that the detent pin drops into all detent holes in CF38 and 46. (See Note 4 page 7¹).
- 20 Using a 6" extension drill, drill two No.40 holes through FU126 (right hand side) at a point approximately in line with the attach holes at each end of CF38 and 46. Using these holes as access holes, drill two No.40 holes through CF38, 46, and FU125. Enlarge these holes to No.12 and install bolts.

- 21 Remove gear and flap handle assembly from gear box. Install handle pulley on handle and reinstall flap and gear handle assemblies permanently in a gear box.

Note: If the optional aft nosegear door is to be used, the hinge brackets should be installed and the hinge cutouts made on the nose gear box.

INSTALLING NOSE GEAR BOX

- 22 Pilot drill with No.40 all holes common to the nosegear box assembly and fuselage skins. These holes are to be drilled through nosegear box only at this time (Reference pages 1⁵⁵ through 1⁵⁹ and page 6¹⁴ of chapters I & VI)
- 23 Position nosegear box in fuselage (Reference pages 7³, 7⁵, and 7⁶. Also pages 1⁴⁶, 1⁴⁷ of Chapter I)
- 24 Drill all holes common to the nosegear box assembly and fuselage skins with No.40 and cleco in place. Using the No.40 holes in the nosegear box attach angles as a guide, mark the hole locations which cannot be drilled with the nosegear box in place. A sharp scribe should be used. Mark the fuselage skins deep enough to make these hole locations easy to find when the nosegear box is removed.
- 25 Position CR27 as shown on page 7³ and using a scribe, mark the four No.40 holes on fuselage skins.
- 26 Remove nosegear box from fuselage and drill with No.40 all hole locations marked with scribe through fuselage skins. Wooden brace can be removed from rudder pedals.

MAKING NOSE GEAR DOOR CUTOUT

- 27 Cleco several long strips of light cardboard approximately 1.5" wide to the gearbox attach angles on each side and ends of the gear door opening. Trim these strips to match the skin trim lines. Remove these strips from the gearbox and cleco to fuselage skins being careful to use the correct holes. Trace around these strips with felt tip pen and make cutout in fuselage (Reference page 6¹⁴). A 1/8" router bit may be used to make cutout, finish with rotary file or hand file.
- 28 Complete Nosegear Fabrication and Installation, Chapter 6, pages 6¹ through 6⁸. Note: If optional aft nosegear door is used, fabricate and install all actuating linkage and related brackets and hardware.
- 29 Remove FU77 from gearbox and cut 2" hole. (Reference View AA Page 1⁶⁵ of Chapter I)
- 30 Complete steps 1 through 22 page 1⁶³ (Chapter I) and reinstall FU77.
- 31 Complete steps 1 through 7 page 6⁹ (Chapter VI). Center line of door should align with BL 0.00 in both the open and closed position. Adjust hinge position if necessary.
- 32 Remove FU77 from fuselage and permanently install on nosegear box assembly with rivets and proseal. (Reference pages 1⁴⁶ and 1⁴⁷ and 1⁵⁵ through 1⁵⁹.) (Chapter I)
- 33 Dimple all holes common to nosegear box and fuselage skins and drill to No.29.
- 34 Complete step 24 page 1⁶³. (Chapter I)
- 35 Permanently install nosegear box assembly in fuselage with proseal and rivets. Nosegear doors should not be installed until landing gear cables are hooked up and gear is operating (See Chapter 6, "Landing Gear Cable Rigging")

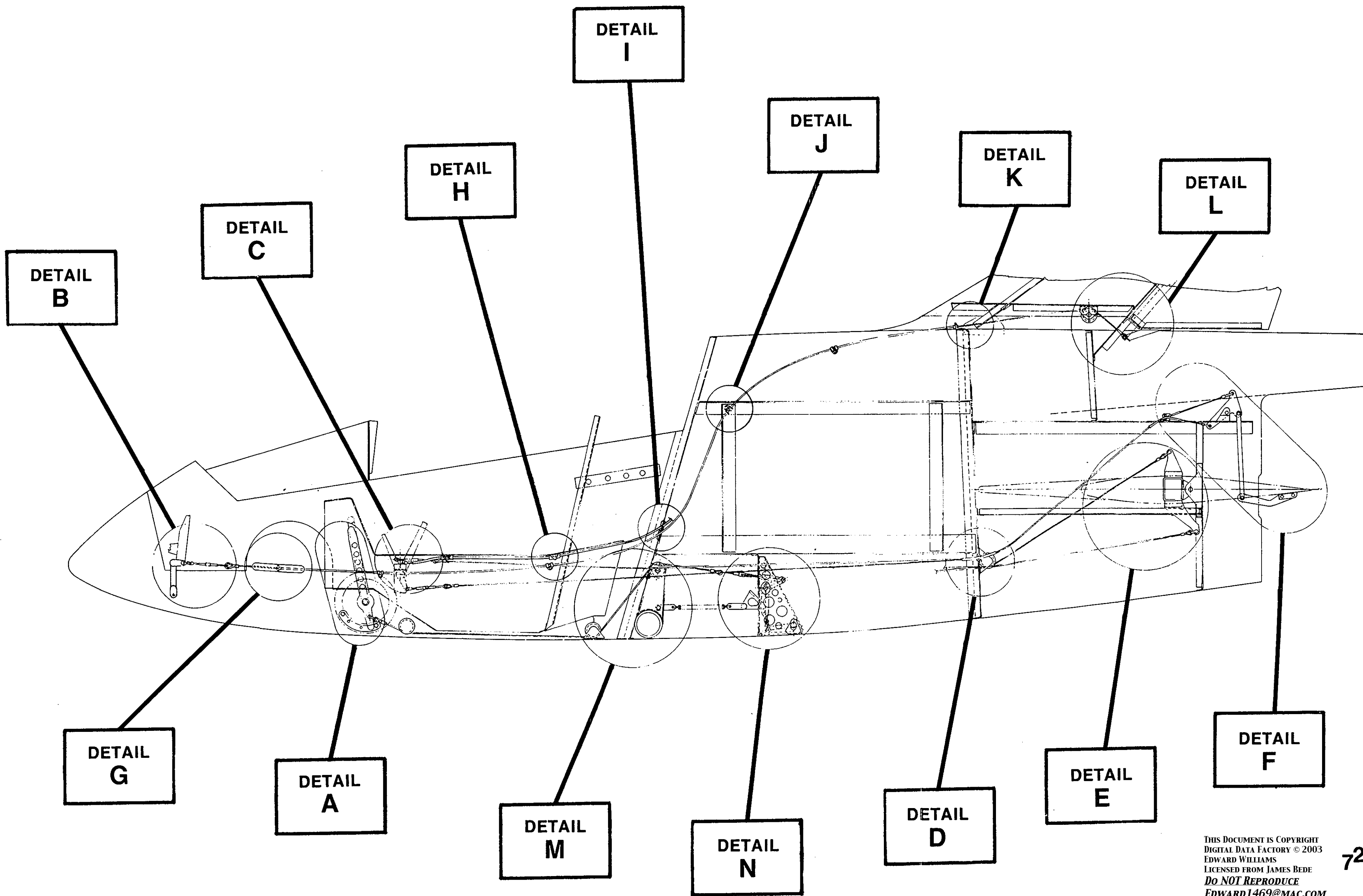
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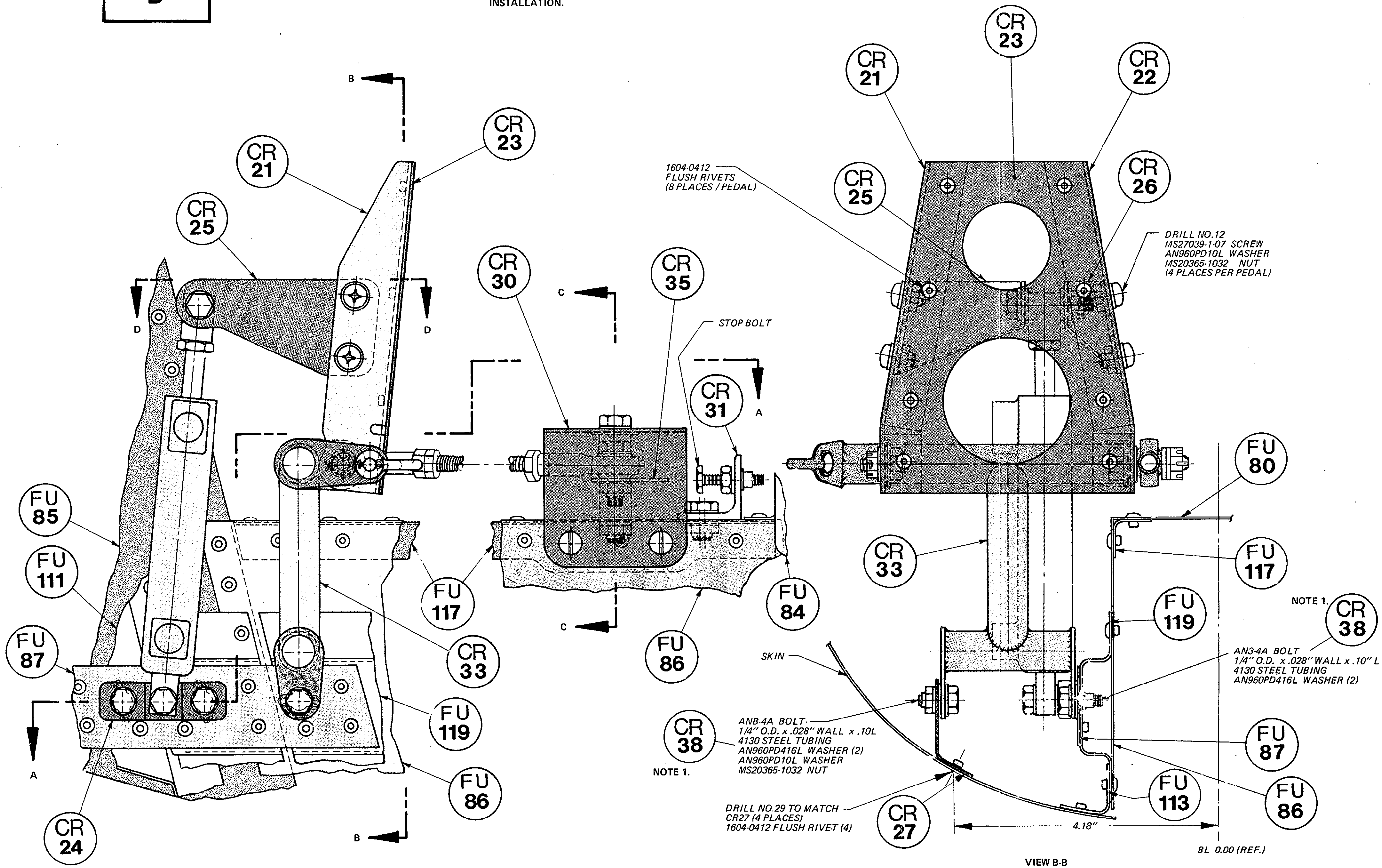


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**DETAIL
B**

NOTE:

1. VERIFY SPACERS ARE OF SUFFICIENT LENGTH TO ENSURE FREE MOVEMENT OF RUDDER PEDAL.
2. TRIM BD-0078 BEARINGS TO .680" LONG ON INSTALLATION.



1604-0412
FLUSH RIVETS
(8 PLACES / PEDAL)

DRILL NO.12
MS27039-1-07 SCREW
AN960PD10L WASHER
MS20365-1032 NUT
(4 PLACES PER PEDAL)

STOP BOLT

NOTE 1.

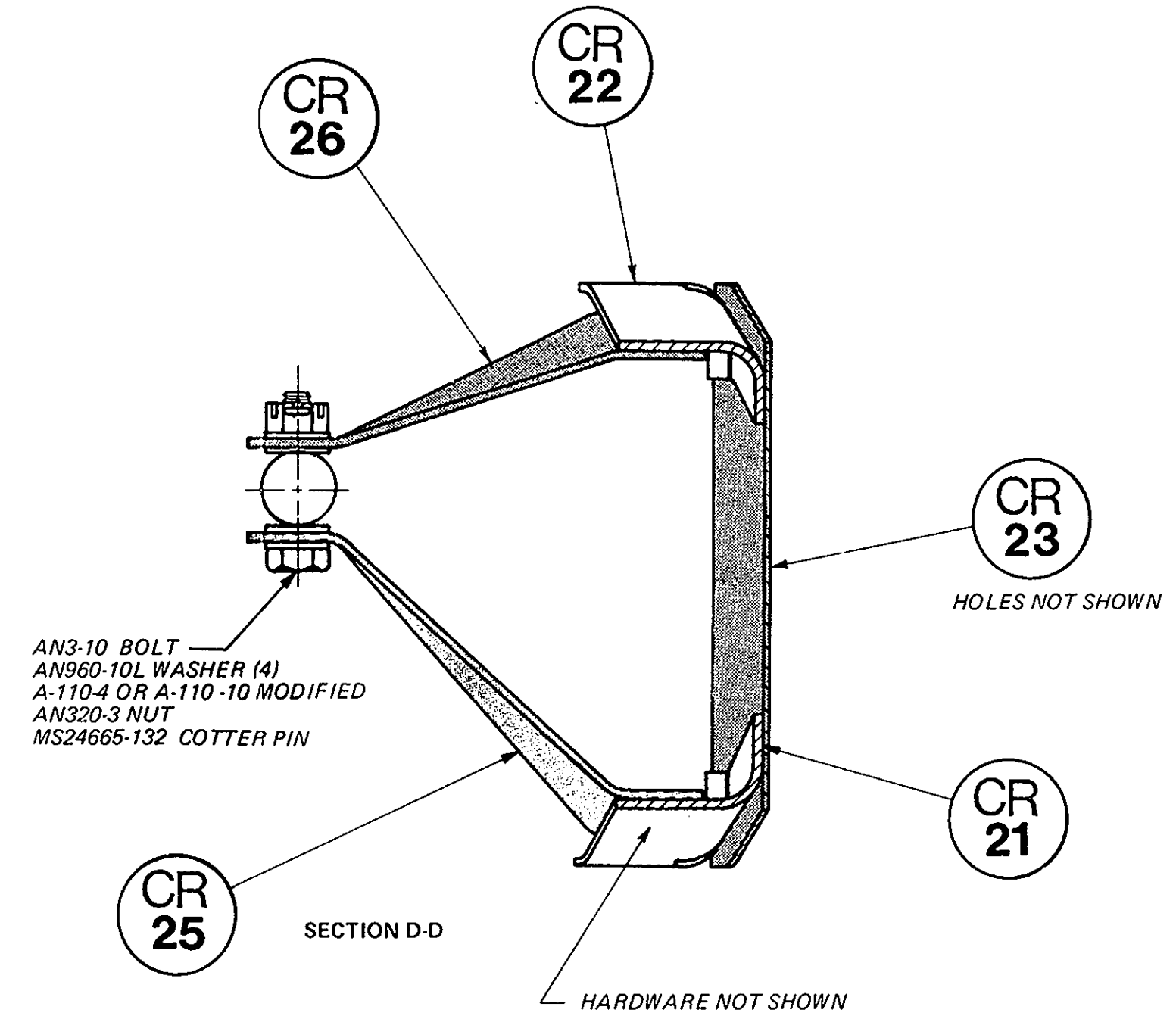
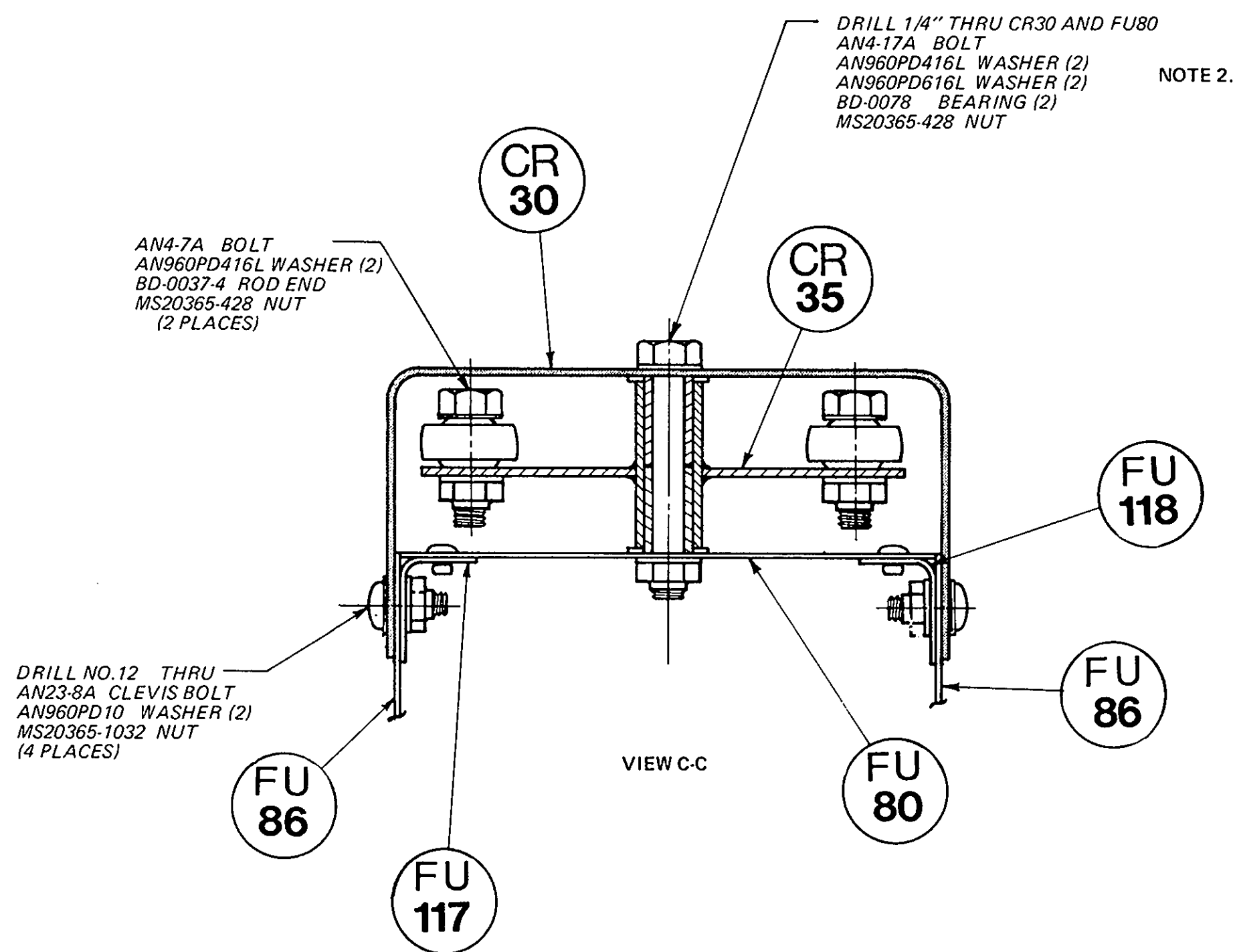
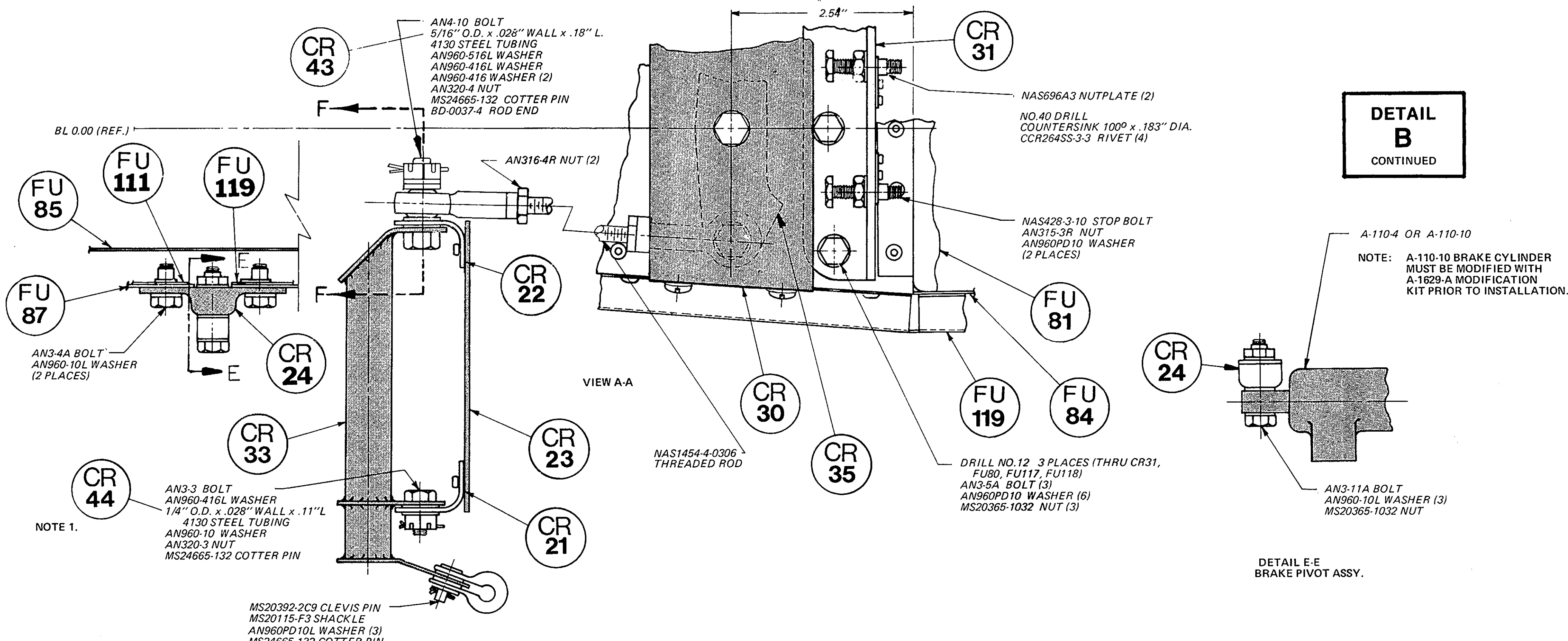
NOTE 1.
AN3-4A BOLT.
1/4" O.D. x .028" WALL x .10L
4130 STEEL TUBING
AN960PD416L WASHER (2)
AN960PD10L WASHER
MS20365-1032 NUT

DRILL NO.29 TO MATCH
CR27 (4 PLACES)
1604-0412 FLUSH RIVET (4)

NOTE 1.
AN3-4A BOLT
1/4" O.D. x .028" WALL x .10" L
4130 STEEL TUBING
AN960PD416L WASHER (2)

VIEW B-B

BL 0.00 (REF.)



AN3-24A BOLT
AN960-10L WASHER (2)
MS202365-1032 NUT

10° 45"

60° (REF)

STA
45.00

**DETAIL
A**

LG
184

LG
183

HANDLE SHOWN IN
GEAR DOWN POSITION

STA
41.15
(REF)

LG
39

LG
179

LG
40

No.12 HOLE THRU
LG178, LG179 (2) AND
LG180 TO MATCH LG183
AN3-10A BOLT
AN960-10 WASHER
MS20365-1032 NUT

N.G. ASSEMBLY
(REF.)

No.12 HOLE
THRU LG180 TO MATCH
LG183 COUNTERSINK
100° x .385" DIAMETER IN
LG180
MS24694-554 SCREW
AN960-10 WASHER
MS20365-1032 NUT

LG
180

LG
178

.31" (TYP)

.31" (TYP)

.75" (TYP)

1601-04.14" DOME RIVET
(21 REQUIRED)

HANDLE IN GEAR UP
POSITION (REF)

WL
17.75

FU
125

LG
45

MAKE FROM CENTER
SECTION OF MBD5LG69
(SEE BD5LG1103 SHEET 4)

No.12 HOLE THRU
LG69 AND FU125 OR FU126
AN3-4A BOLT
AN960-10L WASHER
MS20365-1032 NUT
(8 EACH REQUIRED)

LG
69

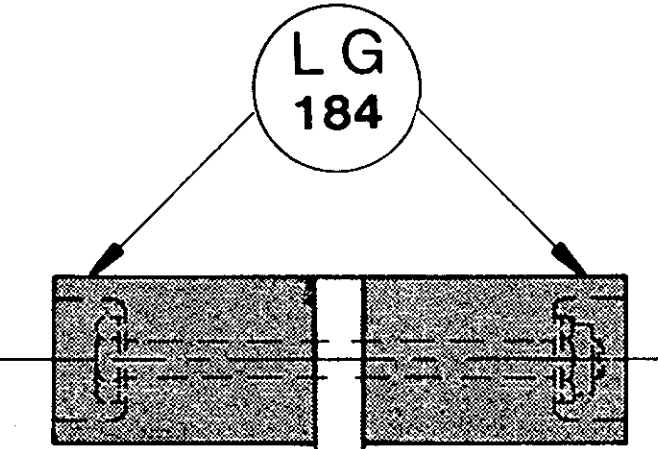
6.150" DIAMETER
(AN3-6A BOLT; AN3-10A
RIVETS ϕ TO BE ON THIS CIRCLE)

FU
127

LG
46

No.12 HOLE THRU
LG178 AND LG179 (2)
TO MATCH LG180
AN3-6A BOLT
AN960-10 WASHER
MS20365-1032 NUT

LG
185



LG
184

LG
183

LG
40

LG
39

LG
179

LG
179

LG
45

No.12 HOLE THRU
LG180 AND LG185
AN3-12A BOLT
AN960-10L WASHER
MS20365-1032 NUT

LG
69

FU
125

LG
185

LG
69

FU
126

LG
180

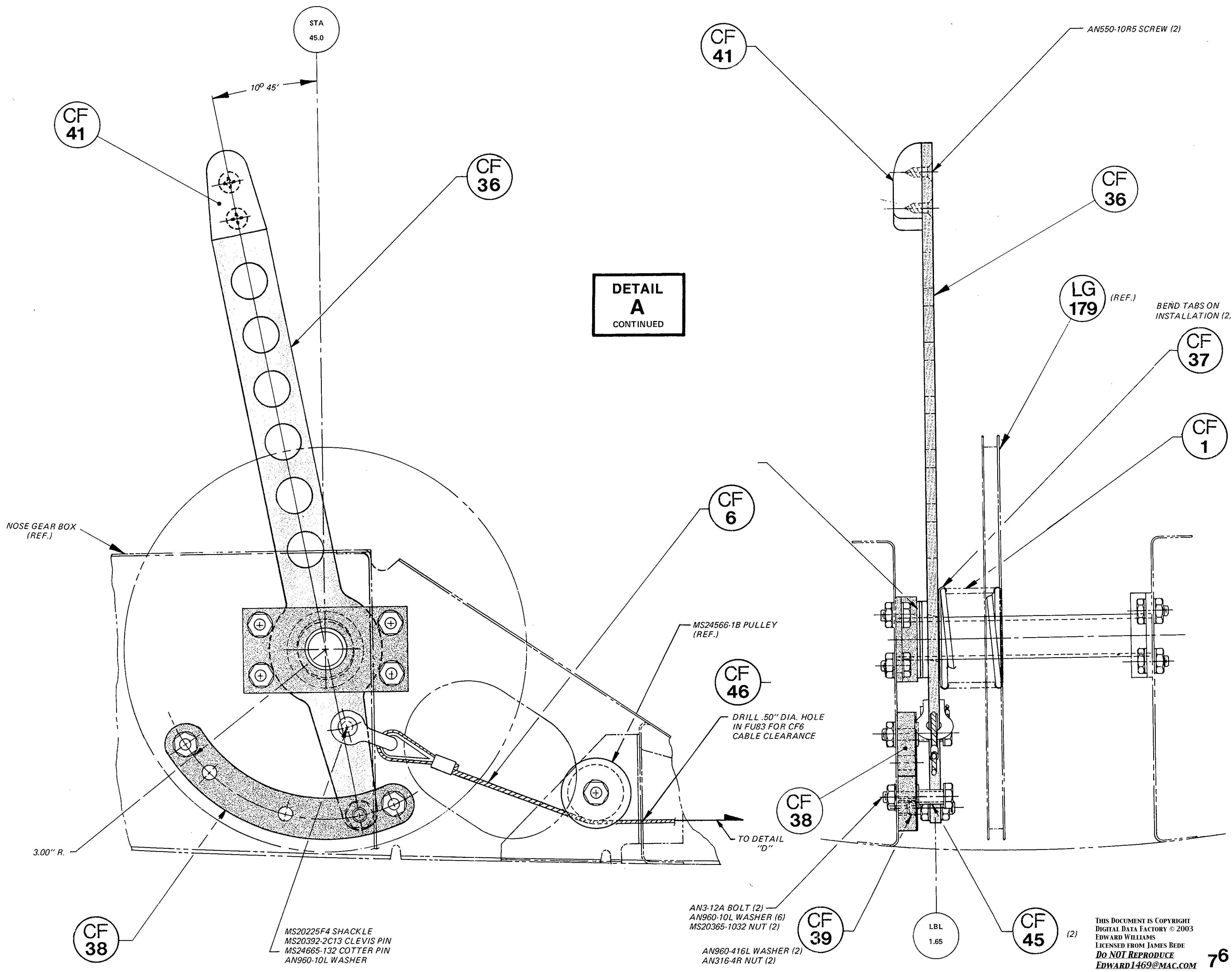
LG
178

LG
46

.45"

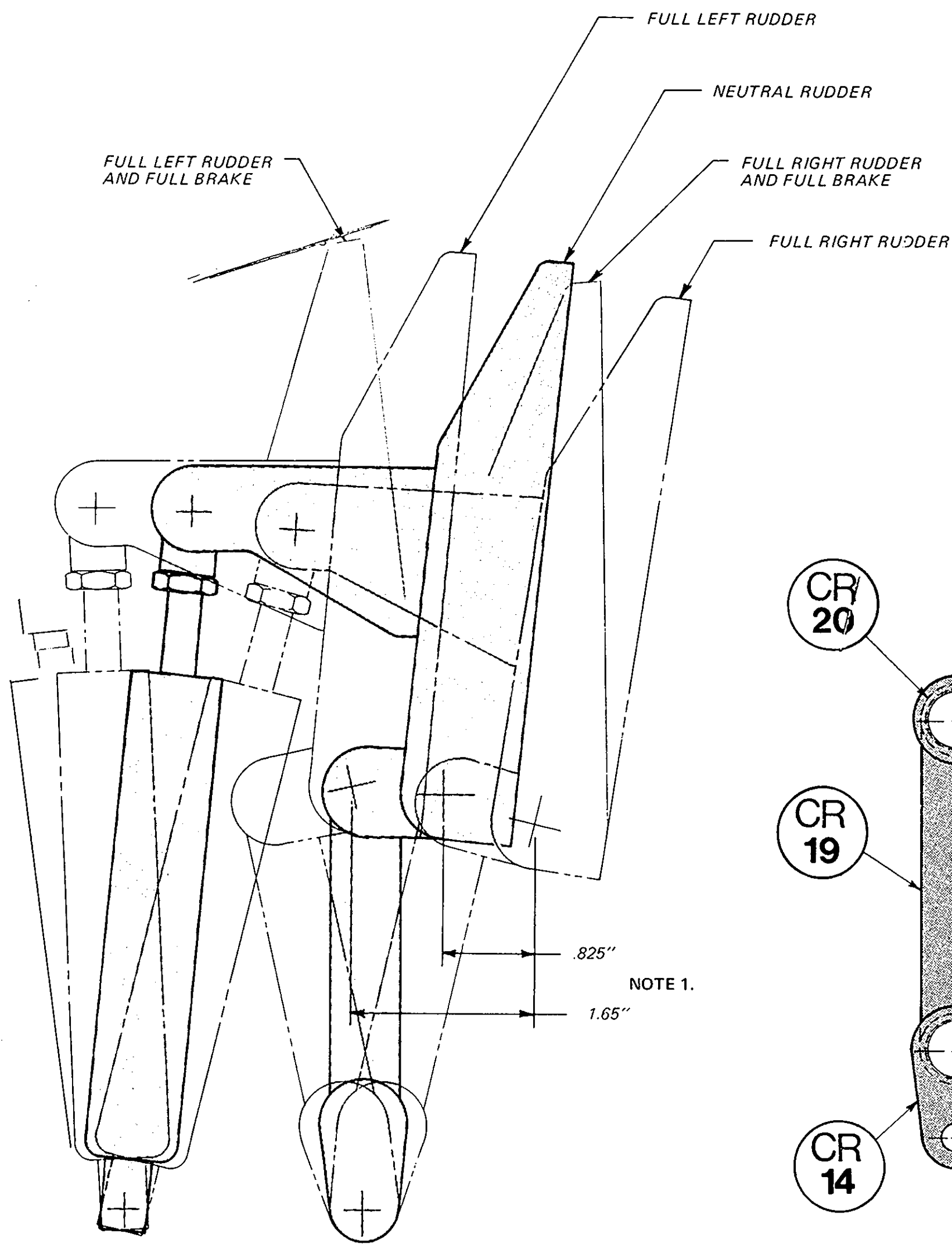
2.28" (REF)
(2 PLACES)

B.L.
0.00

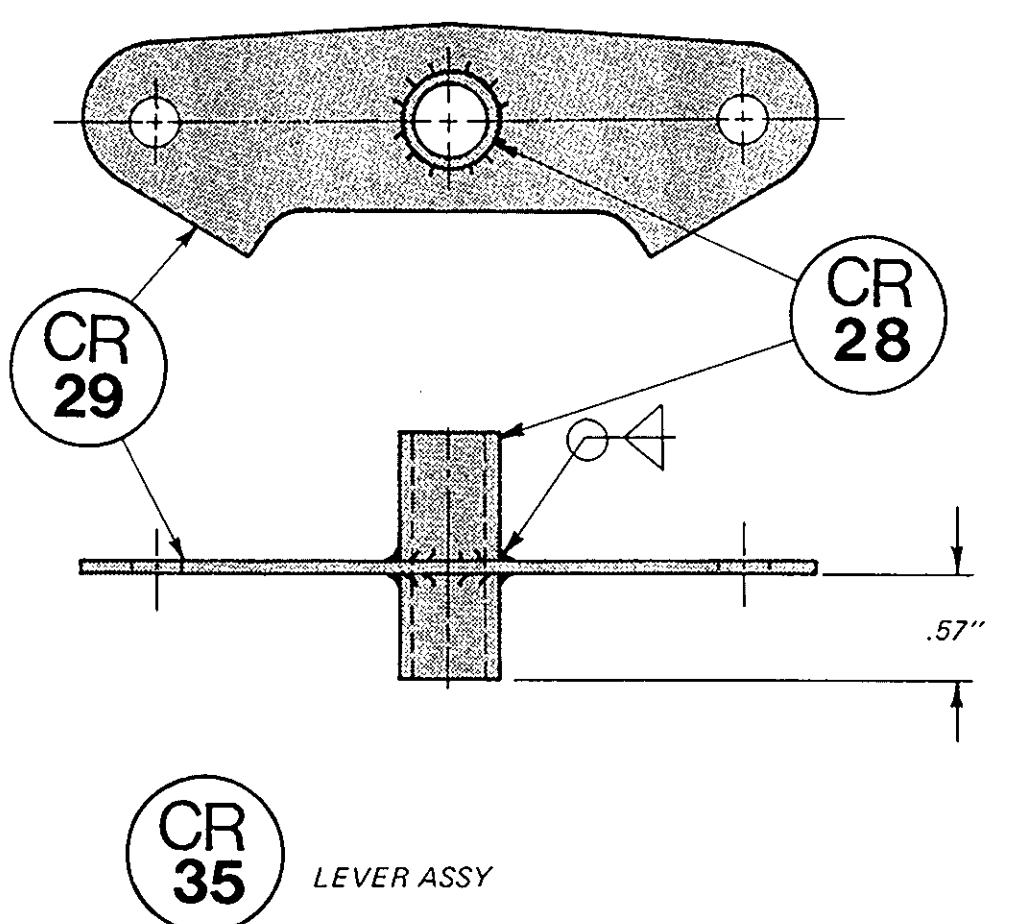
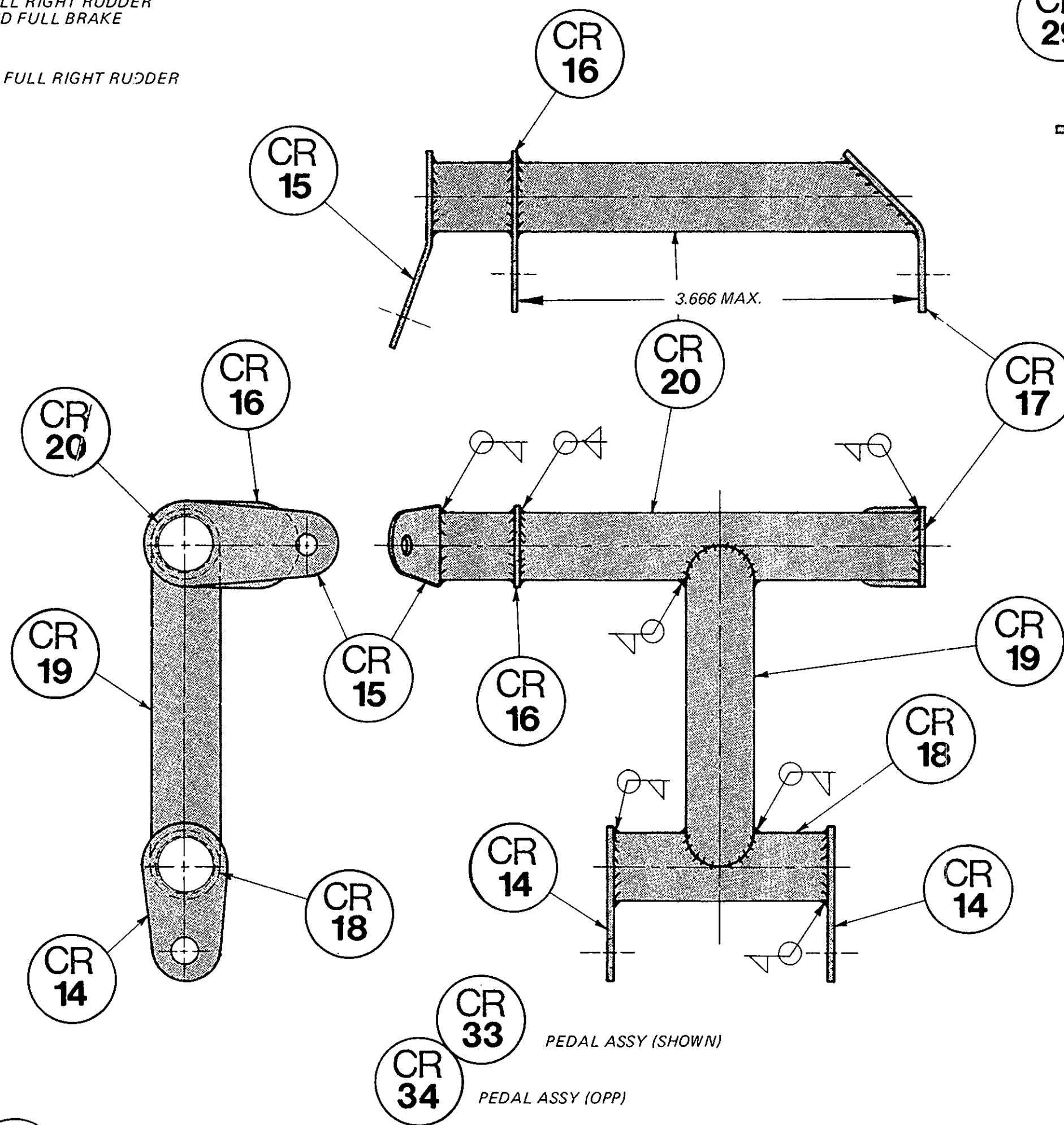


DETAIL A
CONTINUED

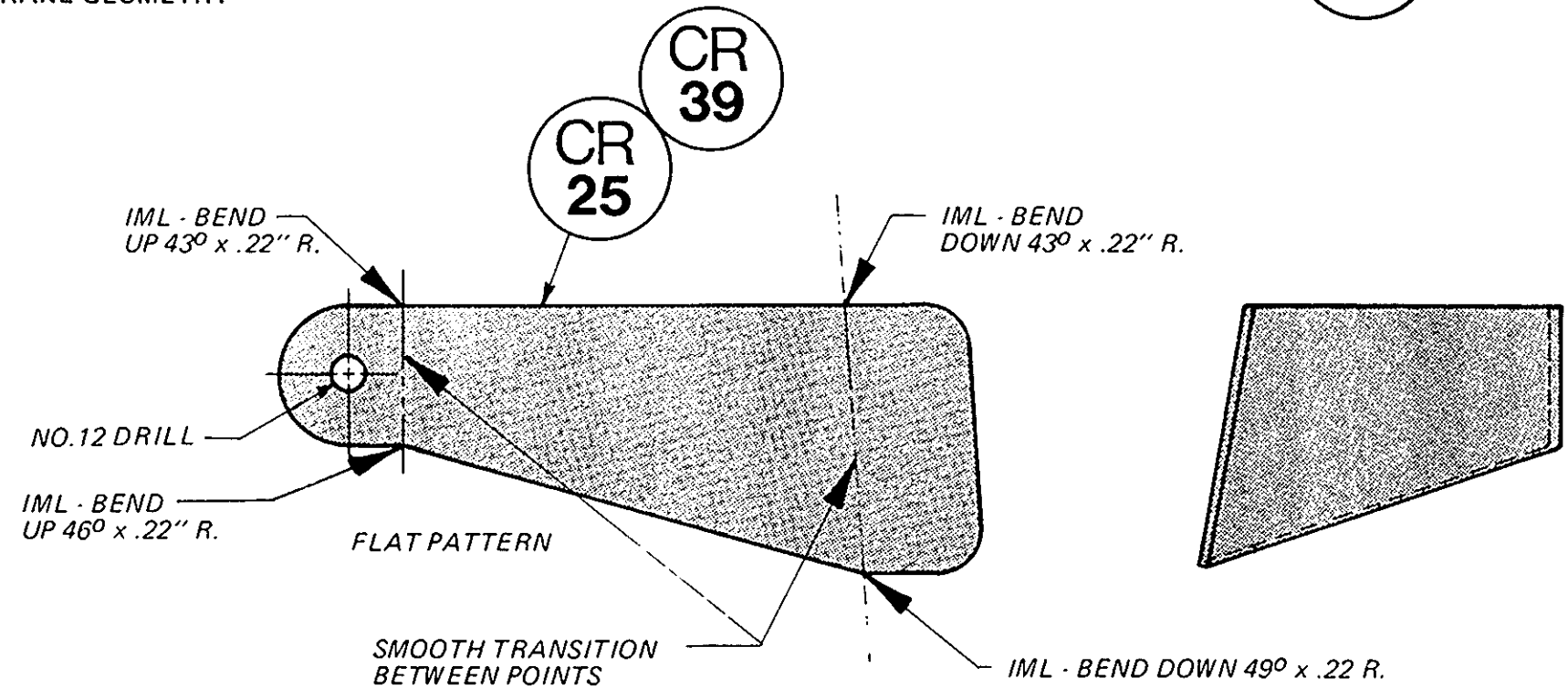
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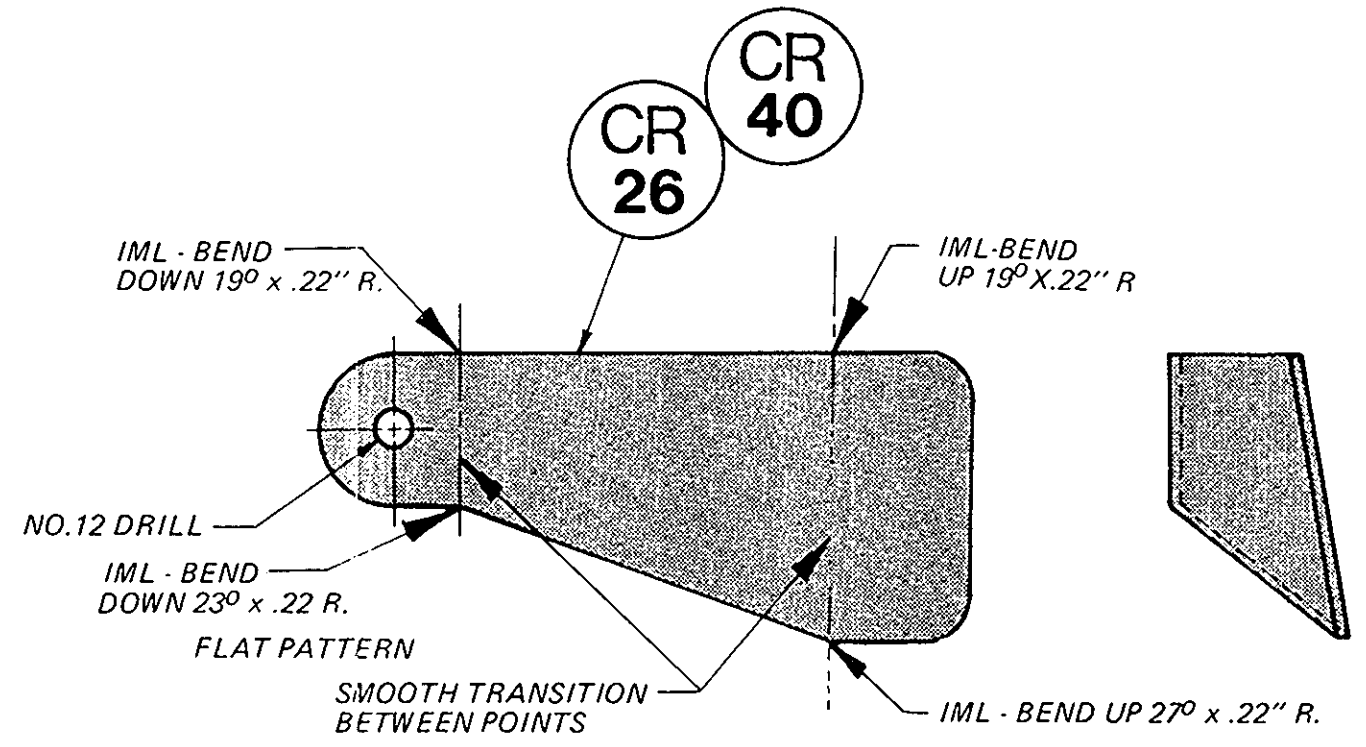
NOTE:
1. ALIGN RIGHT AND LEFT RUDDER PEDALS UP TO ESTABLISH THE NEUTRAL POSITION.
ADJUST THE STOP SCREWS UNTIL DIMENSIONS SHOWN ARE OBTAINED.



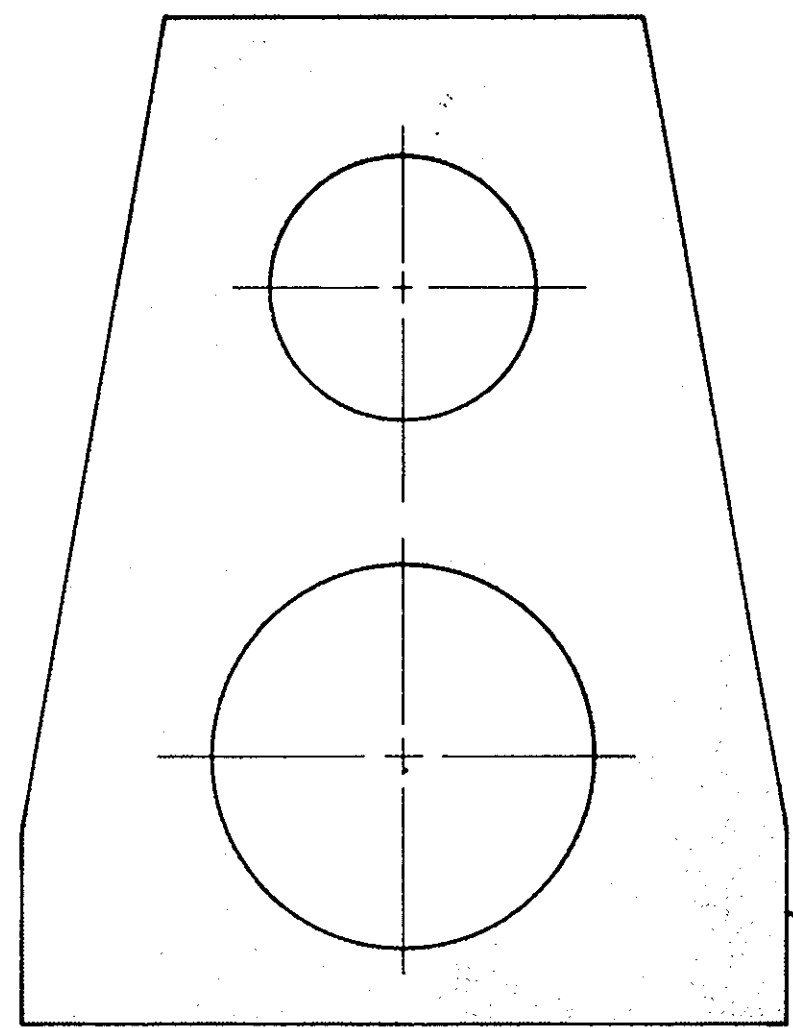
LEFT RUDDER PEDAL AND BRAKE GEOMETRY



MAKE ONE PART (CR25) SHOWN AND ONE OPPOSITE PART (CR39) FROM .063" 2024-T3

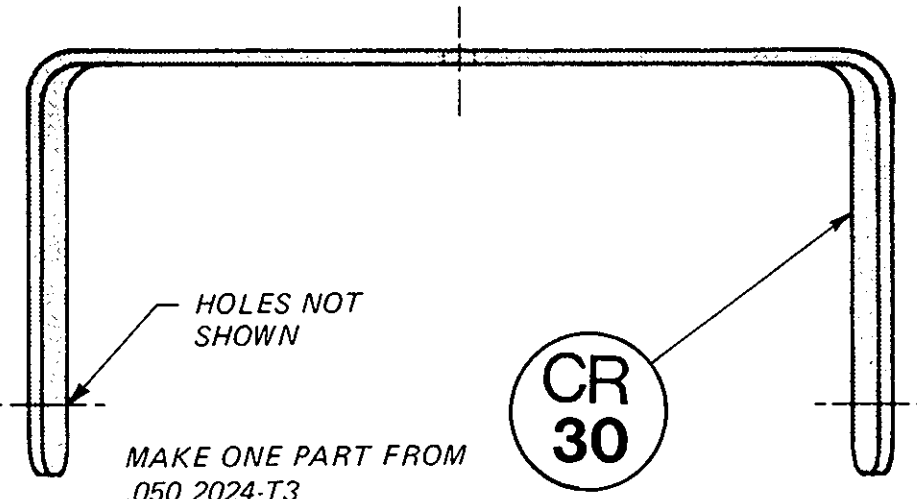
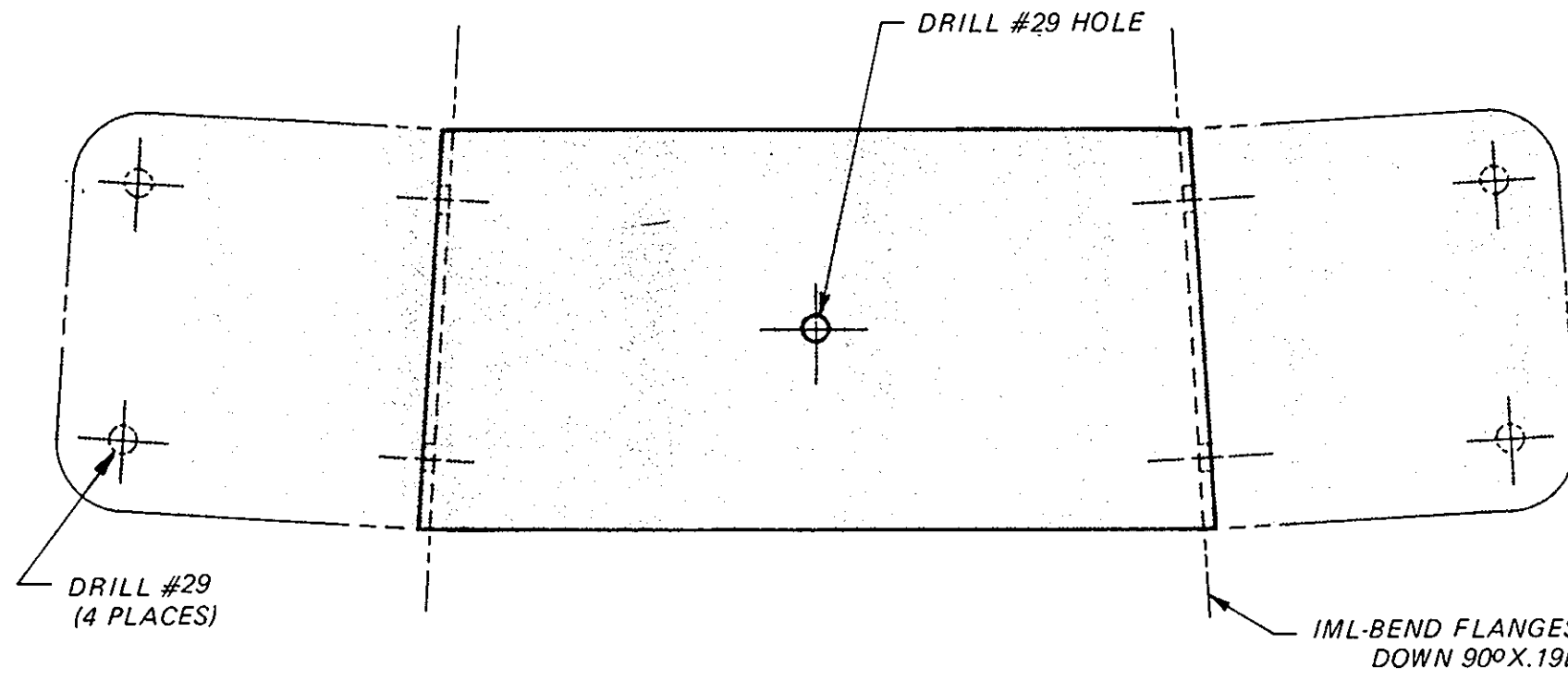


MAKE ONE PART (CR26) SHOWN AND ONE OPPOSITE PART (CR40) FROM .063 2024-T3

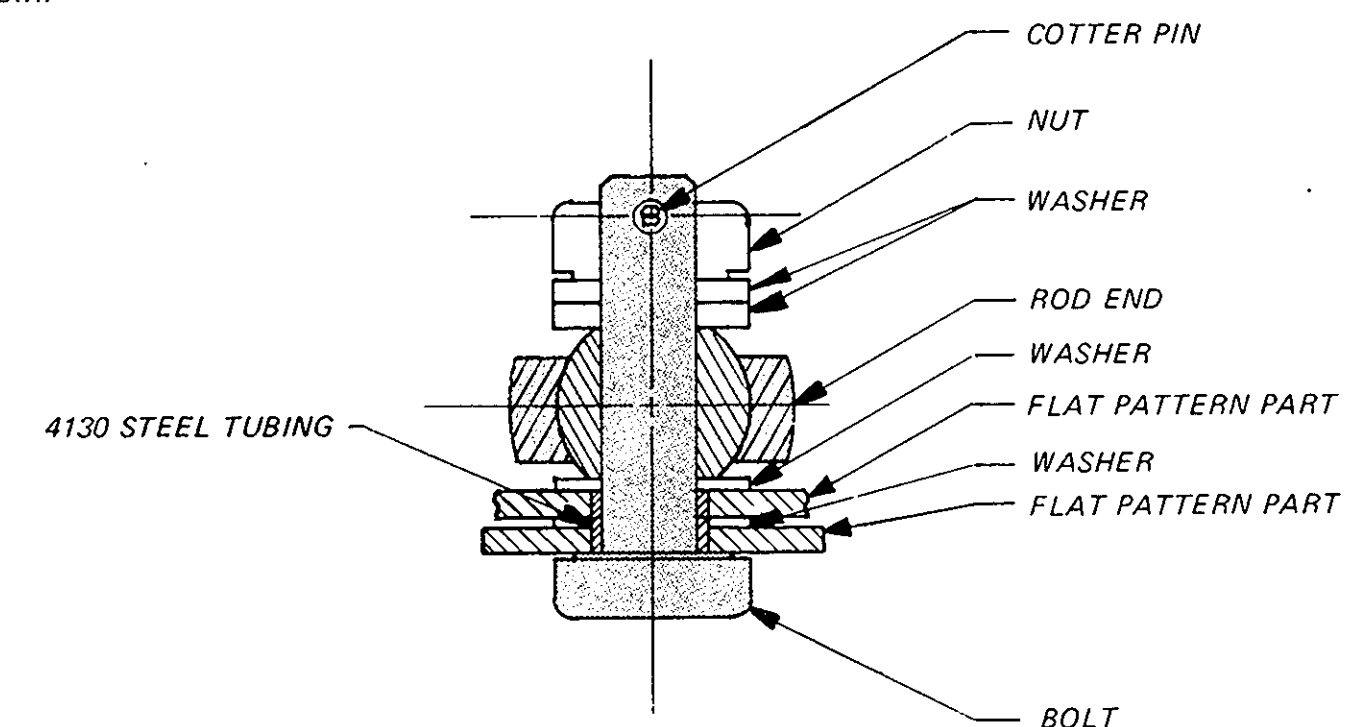
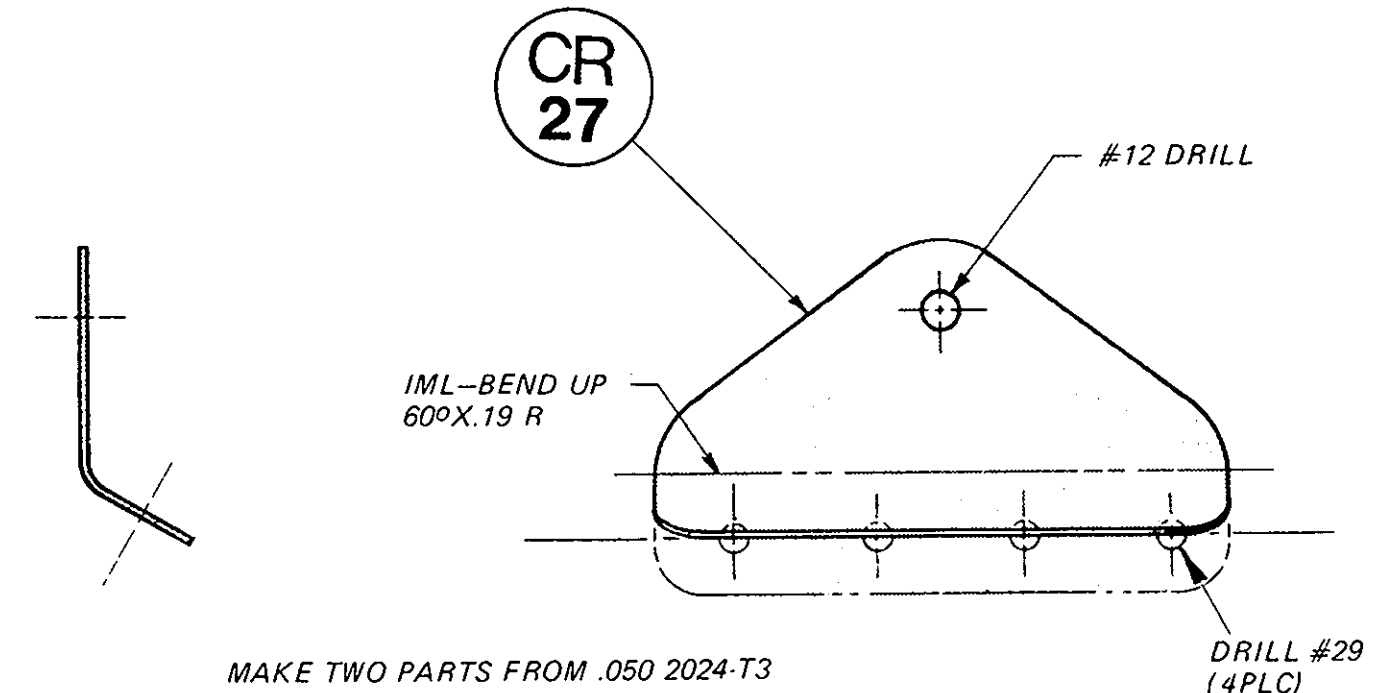


MAKE TWO PARTS FROM
.050 2024-T3

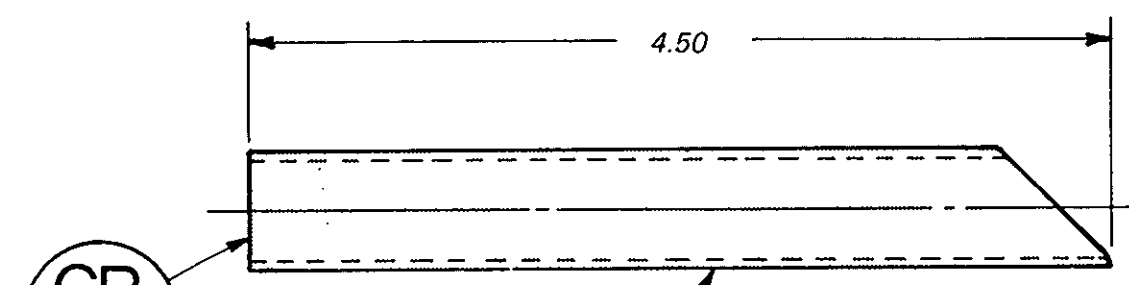
CR 23



CR 30

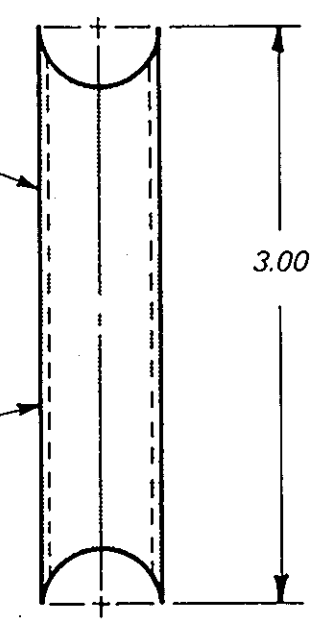


VIEW F-F
SCALE 2:1
TYPICAL PROCEDURE FOR
INSTALLING 4130 STEEL
TUBING, SPACER

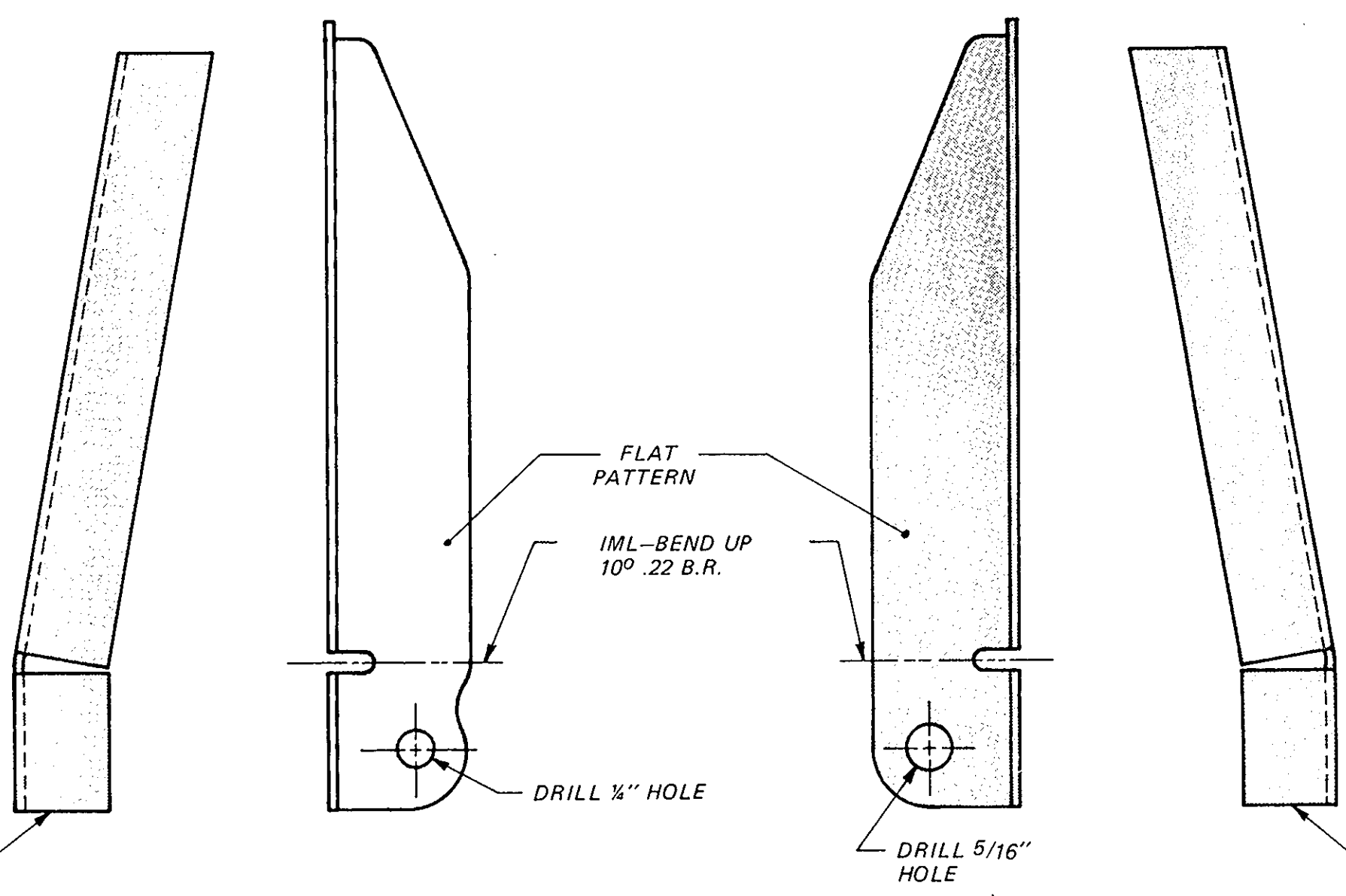


CR 20

MAKE TWO OF EACH PART
FROM .625 O.D. X .049W
4130 STL TUBING



CR 19



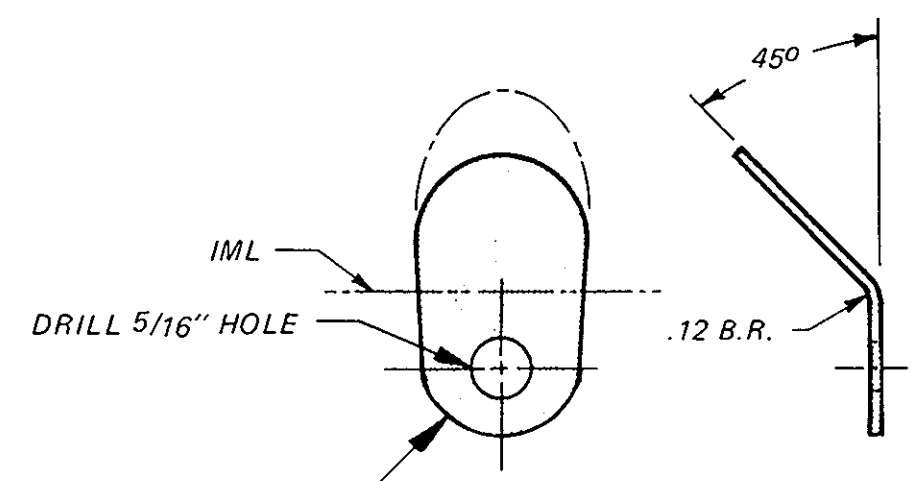
CR 21

MAKE ONE PART (CR21) AS SHOWN
AND ONE OPPOSITE PART (CR41)
FROM BD-0013

MAKE ONE PART (CR22) AS SHOWN
AND ONE OPPOSITE PART (CR42)
FROM BD-0013

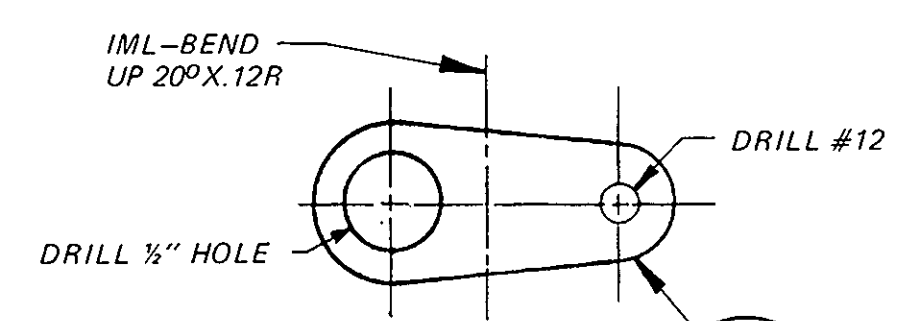
CR 22

CR 42



CR 17

MAKE TWO PARTS
FROM .050 4130 STL

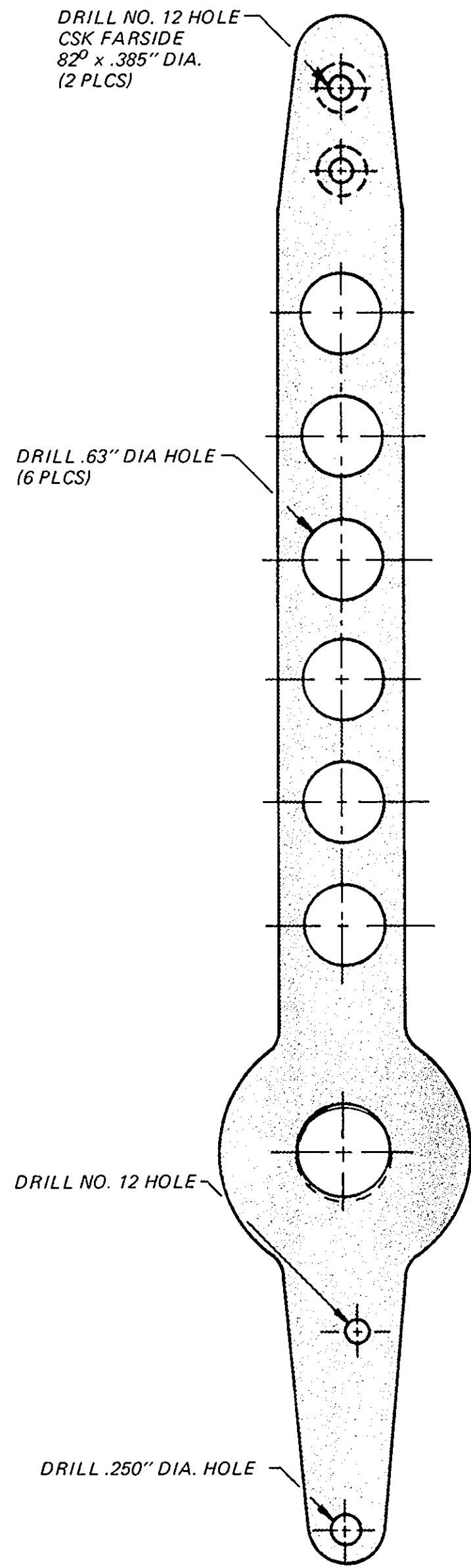


MAKE TWO PARTS FROM
.063 4130 STL

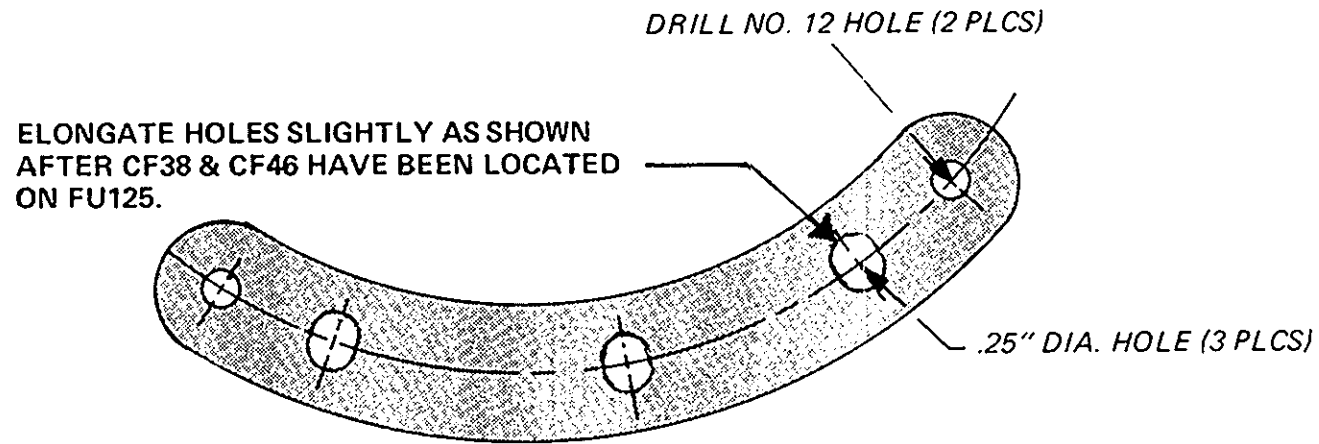
CR 15

CR 18

CR 41



CF 36 FLAP HANDLE
MAKE ONE FROM 2024-T3
.190" ALCLAD

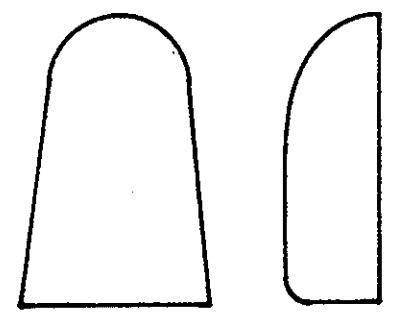
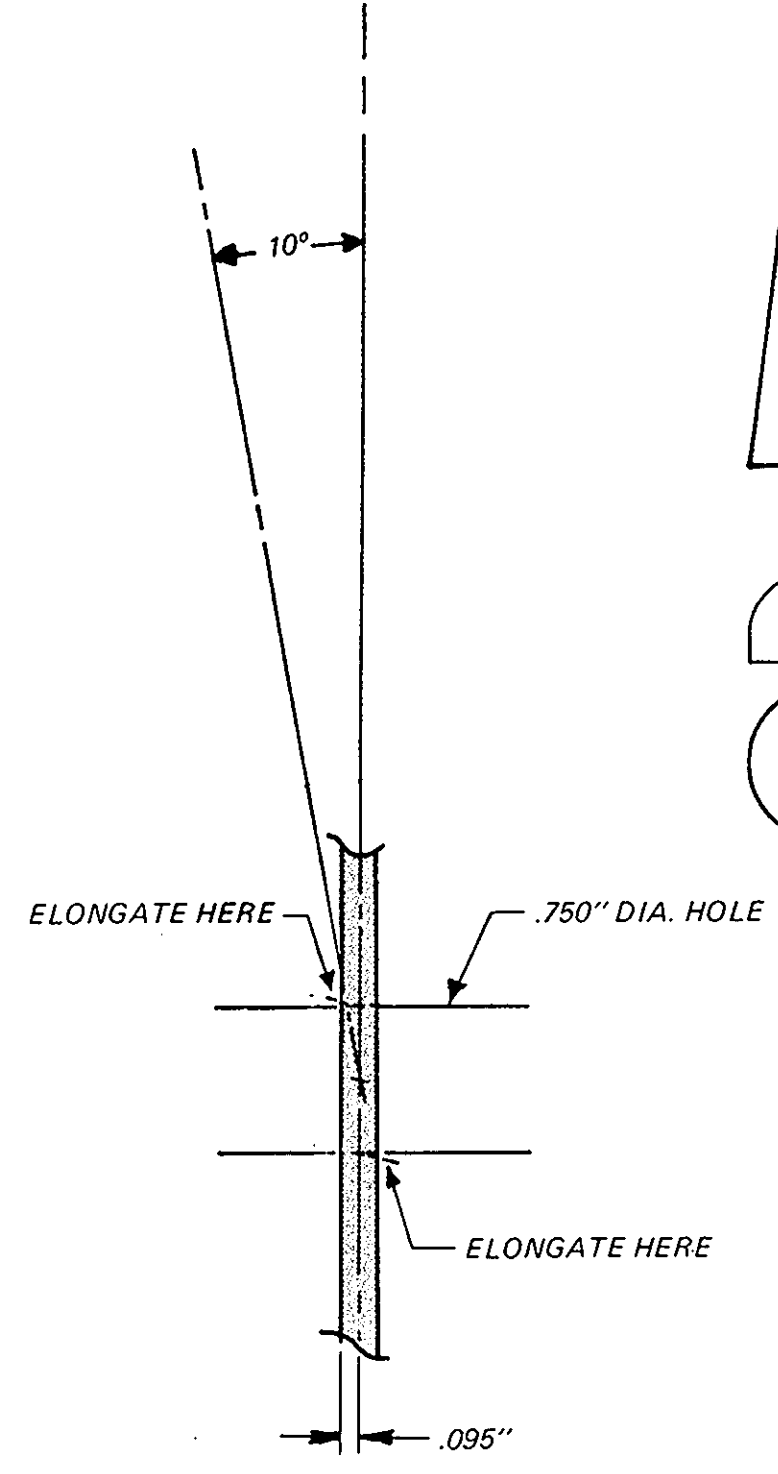


CF 38 DETENT
MAKE ONE FROM .31 THICK
PHENOLK BLOCK

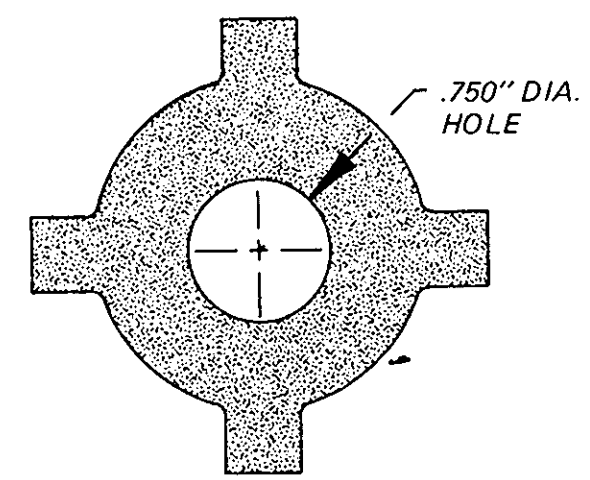
CF 46 RUB PLATE
MAKE ONE FROM 4130 COND 'N'
.020" STEEL



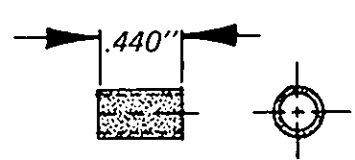
DRILL HOLE 90° TO SURFACE
THEN ELONGATE TO ALLOW
HANDLE TO ROTATE 10° THIS
DIRECTION ONLY.



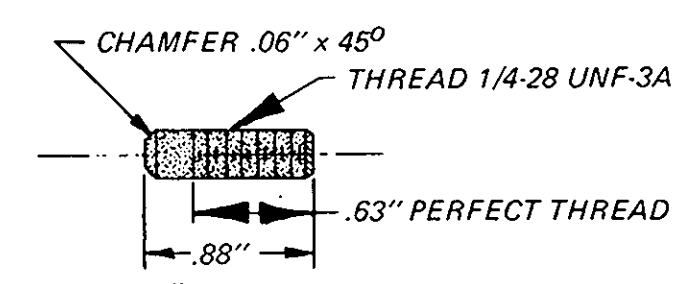
CF 41 KNOB
MAKE ONE FROM .50" THICK
MAHOGANY



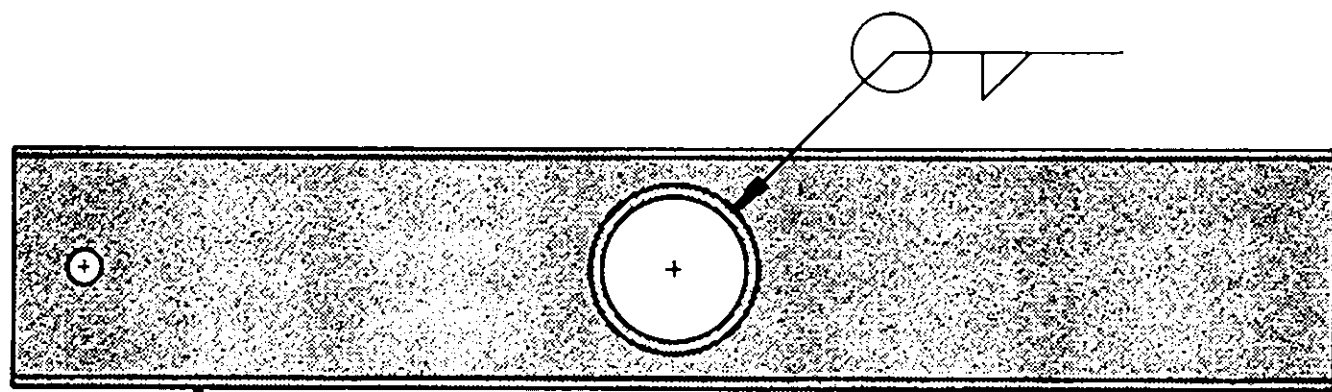
CF 37 SPRING RETAINER
MAKE TWO (2) FROM 2024-T3
.016 ALCLAD



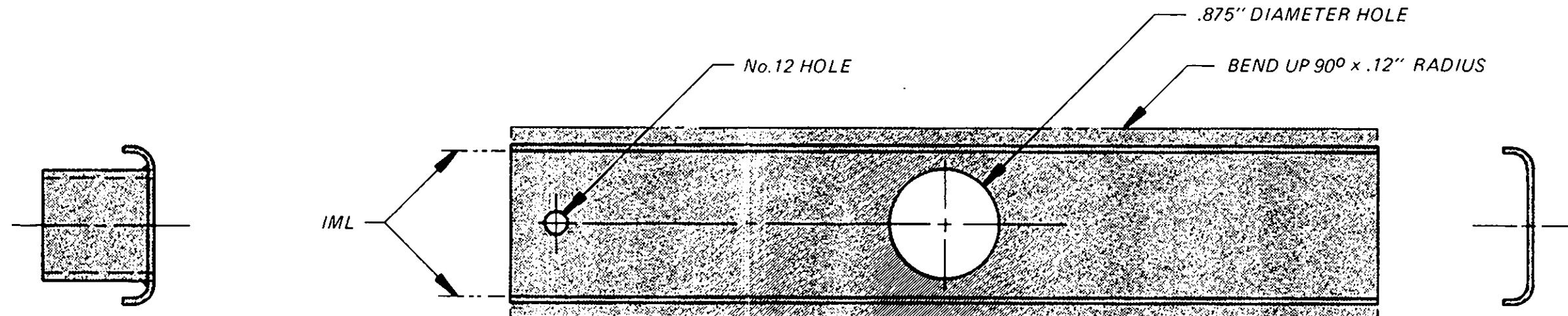
CF 45 STOP
MAKE TWO (2) FROM 2024-T3
.250" O.D. x .028" WALL TUBE



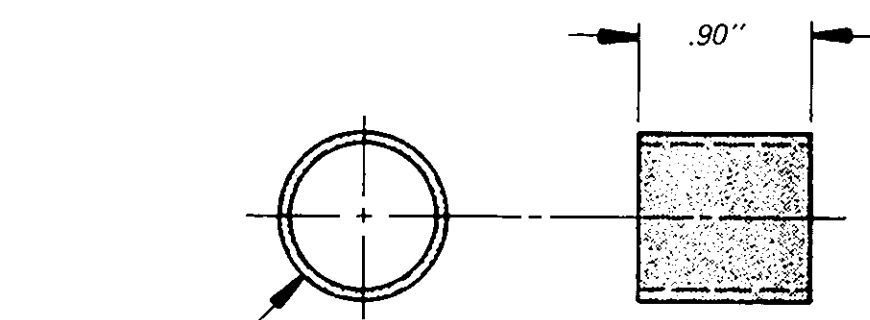
CF 39 PIN
MAKE ONE FROM AN4-11A
BOLT AS SHOWN



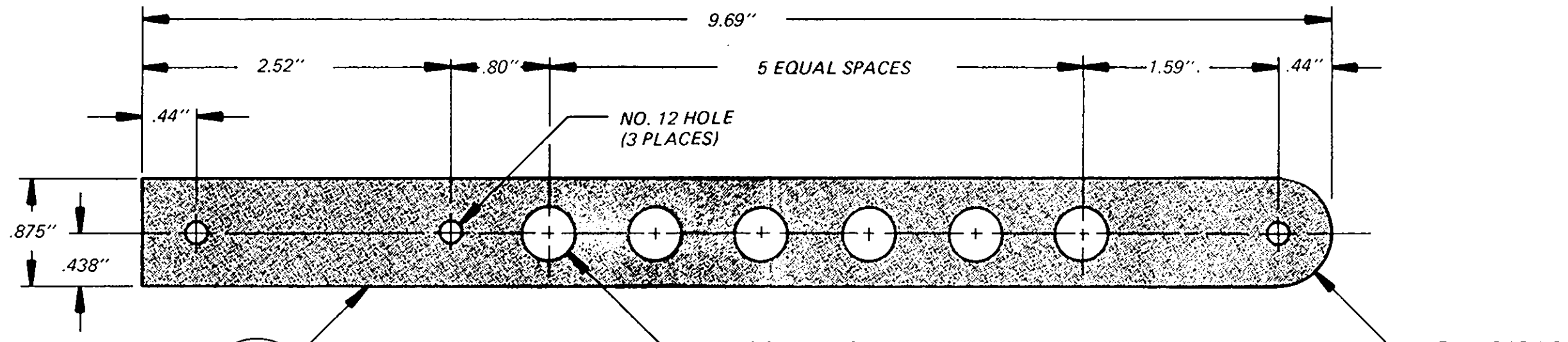
LG 180
 CONSISTS OF ONE (1) BD5 LG181
 AND ONE (1) BD5 LG182



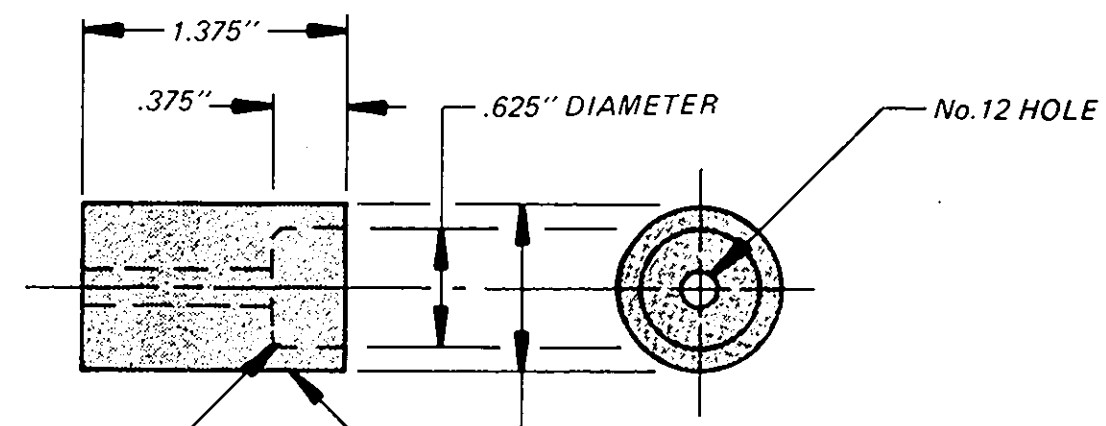
LG 182
 MAKE ONE (1) PART AS SHOWN FROM .050" 4130 STEEL CONDITION



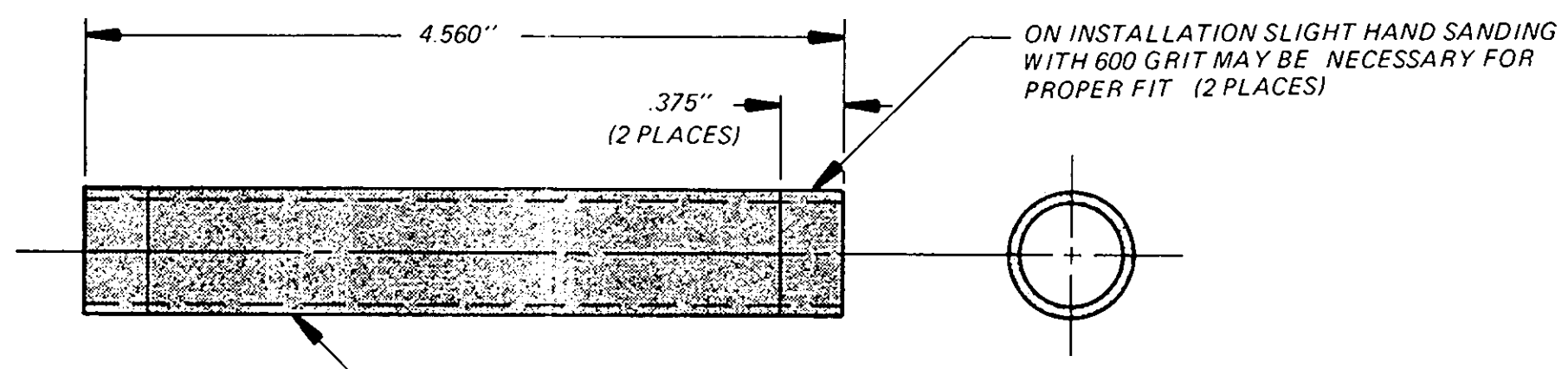
LG 181
 MAKE ONE (1) PART AS SHOWN FROM .875" O.D.
 x .058" WALL 4130 STEEL TUBE CONDITION



LG 183
 MAKE ONE (1) PART AS SHOWN FROM
 .250" 2024-T351

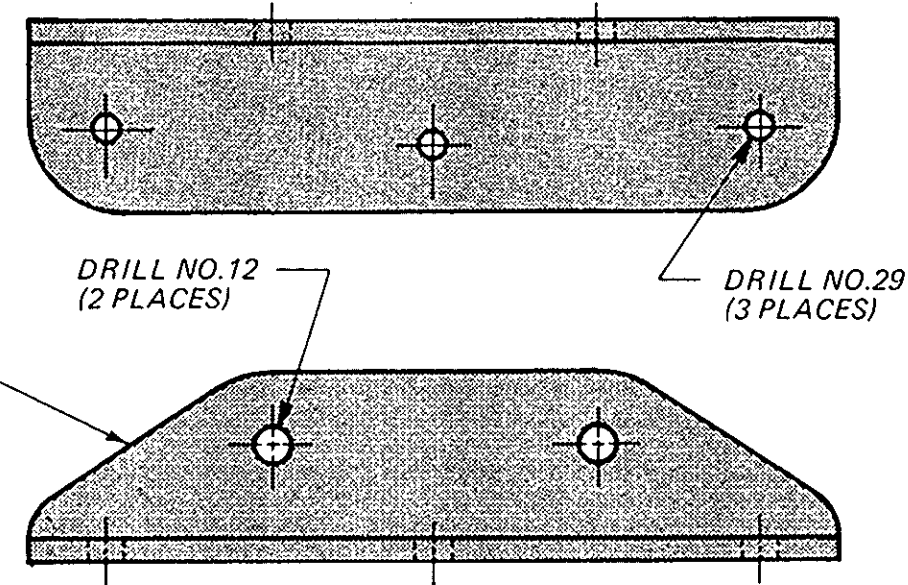


LG 184
 MAKE TWO (2) PARTS AS SHOWN FROM MAHOGONY



LG 185
 MAKE ONE (1) PART AS SHOWN FROM .75" O.D. x .065 WALL
 4130 STEEL TUBE CONDITION

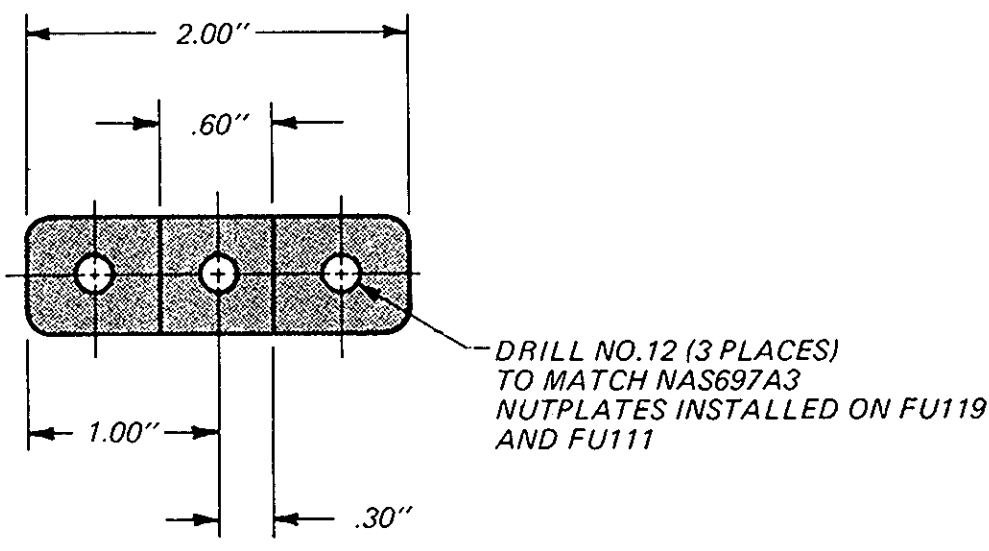
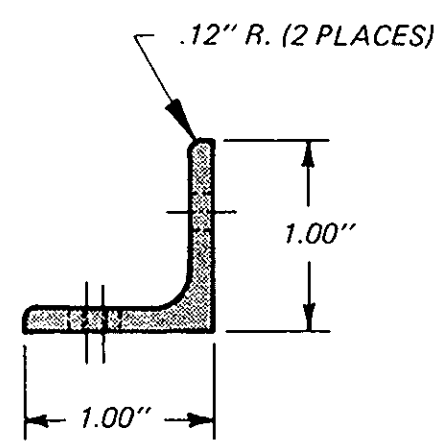
CR 31



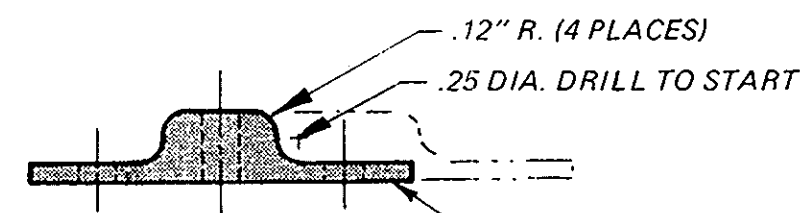
DRILL NO.12
(2 PLACES)

DRILL NO.29
(3 PLACES)

MAKE ONE PART FROM BD-0007



DRILL NO.12 (3 PLACES)
TO MATCH NAS697A3
NUTPLATES INSTALLED ON FU119
AND FU111

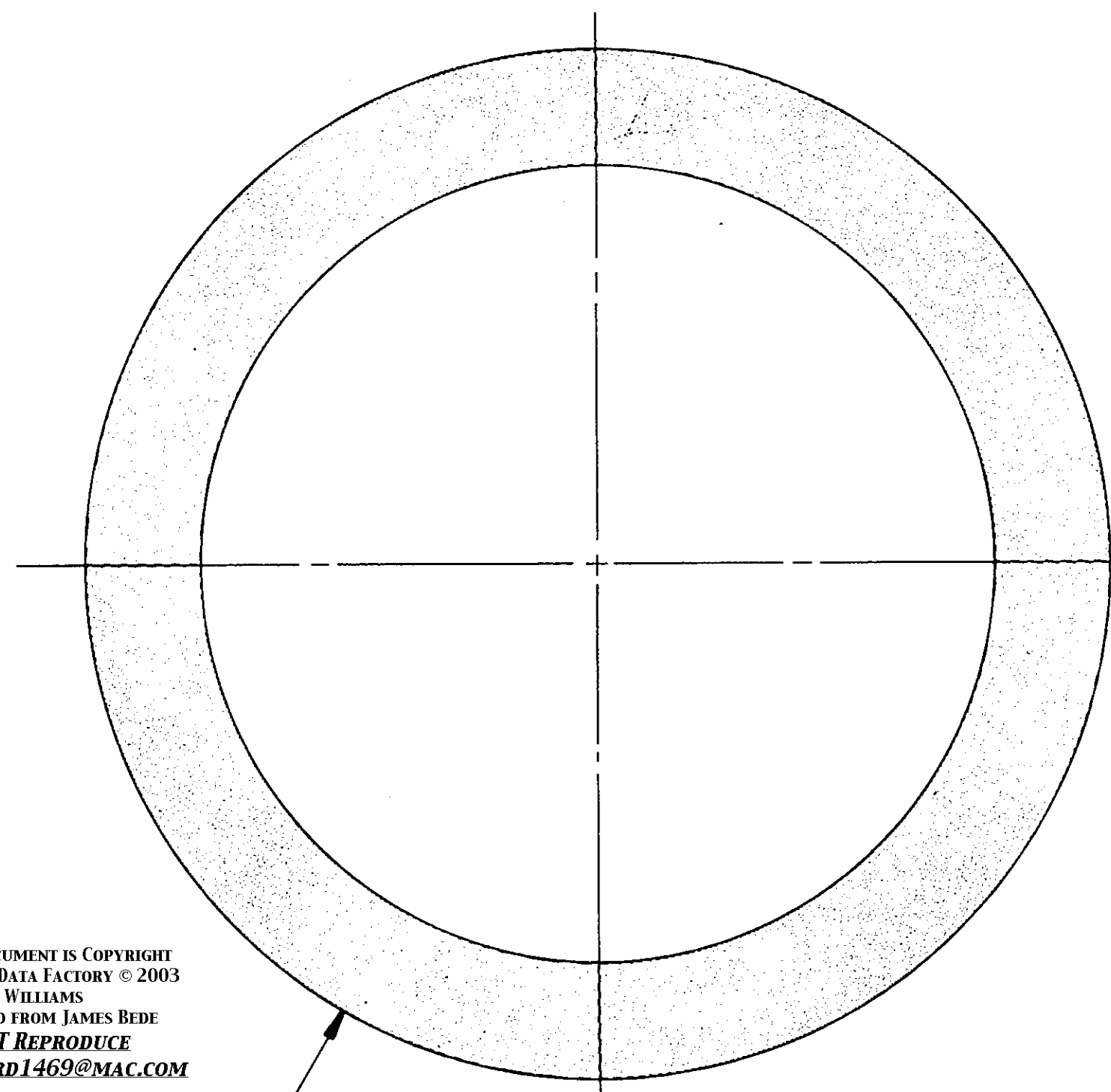
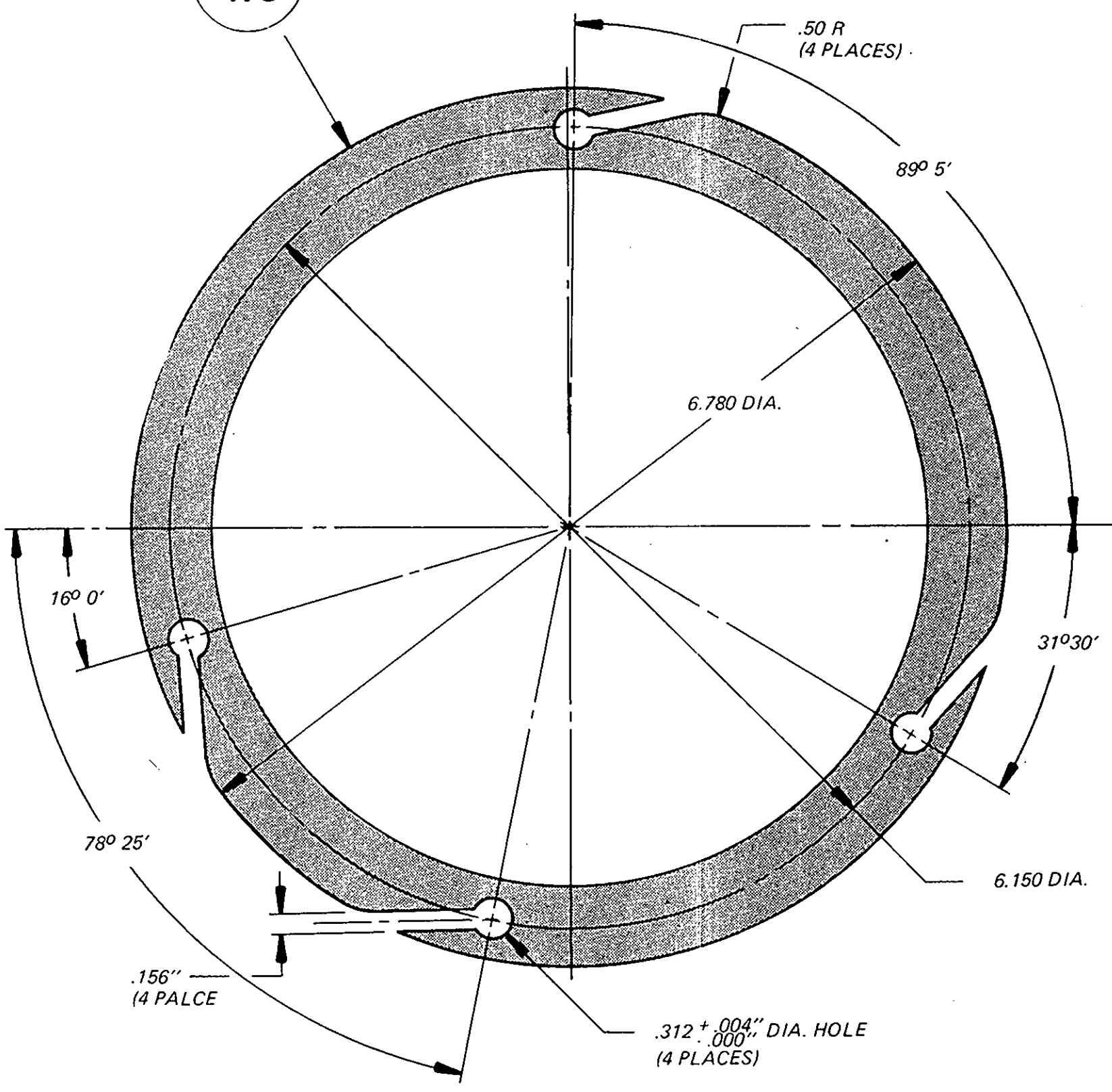


MAKE TWO PARTS FROM
THE SPARE PIECE OF LG69
BEARING BLOCK MATERIAL

CR 24

LG 178

MAKE ONE (1) PART AS SHOWN FROM
.250" 2024-T351



LG 179

MAKE TWO (2) PARTS AS SHOWN
FROM .020 2024-T3 ALCLAD

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CONTROL STICK INSTALLATION

Before Beginning Construction, Note The Following:

- 1** The side consoles and floorboards should be installed before proceeding with this portion of the plans. See Chapter Eight.
- 2** The position and alignment of the control arms and control stick is critical. A jig for this operation is described in the text and it's use is recommended.
- 3** Be extremely careful when drilling bolt holes through the tube assemblies so that the bolts are 90° to the surface and pass through the center of the tubes. Drill all bolt holes in direction shown.
- 4** All steel parts are to be coated with zinc chromate primer before installation.

Beginning Construction

1. Fabricate all parts shown in detail J and K.
2. Assemble CA7 control stick and CA1 control fork with proper bushings and bolt (Do not install nut) Ref. Detail A.
3. Rotate the CA7 and file as required until the CA7 contacts the CA1 and stops at the correct pitch up and pitch down position. Note that the neutral position is established with the centerline of CA7 perpendicular to the centerline of CA1. Ref. Detail C. A small cardboard protractor can be constructed using the dimensions given in Detail C and glued to one side of CA1. Mark CA1 "Top" and "Bottom" and disassemble CA7 and CA1.
4. Fit the CA6 stick grip to CA7 by filing CA7 as required until CA6 slides snugly onto CA7 and the attaching screw can be inserted through both parts. Remove CA6 from CA7. Ref. Detail A.
5. Assemble the control stick box assembly and cleco together. Ref. Detail D (Do not install CA4 and CA5 and do not rivet box assembly).
6. Slide a B538 DD bearing onto shank of CA1. This should be a very light press fit so that the bearing can be installed or removed by hand. Sand down shank of CA1 if necessary.
7. Insert CA1 with bearing installed into end of CA9 torque tube until bearing inner race is firmly captured between shoulder of CA1 and CA9 tube.
8. Drill No. 29 through CA9 and CA1 and enlarge hole to No. 12. Drill hole so that bolt head will be on "Top" side of CA1. Drill hole so that it passes through the center of CA9 and CA1 and is perpendicular to their centerline. Ref. Detail A. Mark CA9 "Top" and "Bottom" to match CA1 and disassemble parts.
9. Position CA5 bearing retainer on stick box assembly and drill in place being careful to align the .88 diameter hole with the matching hole in CA28. Ref. Detail D.
10. Press the B538DD bearing into the CA4 phenolic block and bolt the CA4 and CA5 on stick box assembly. Ref. Detail D.
11. Drill CA29 onto CA7 and install bolts. Install CA7 and CA8 on CA1 and bolt in place.
12. Insert CA1 into B538DD bearing in stick box assembly.
13. Rotate CA7 side to side. The CA8 sleeve should stop against the MS21266 Grommet in CA27 at 20° each side of neutral. Ref. Detail B. Modify the hole size in CA27 as necessary to achieve this. A cardboard protractor can be constructed using the dimensions shown in Detail B. The base of the protractor should rest on top of the stick box assembly. Note that the neutral position is established when the centerline of CA7 is perpendicular with the top of the stick box assembly. Ref. Detail B.
14. Sand down the diameter of the aft end of CA9 tube until a B539DD bearing will slide onto CA9 for a distance of approximately three (3) inches.
15. Cut a 1" diameter clearance hole in FU14 bulkhead as shown in Detail F, and elongate the existing clearance hole in FU1 bulkhead as shown in Detail G.

16. Install two B539DD bearings in two CA19 phenolic blocks. Position a CA20 retainer on CA21 bulkhead (two places) and drill in place. Assemble two CA19 and CA20 bearing assemblies and bolt to CA21 bulkhead. Ref. Detail H.
17. Insert aft end of CA9 through clearance holes in FU1 and FU14. Slide the CA34 phenolic bushing, CA18 arm and CA21 bulkhead assembly onto CA9. Position CA21 bulkhead approximately as shown and clamp top flange to FU18 longeron. (Ref. Detail I.)
18. Position stick box assembly in fuselage with CA7 pivot point on STA 50.00 and clamp to CC 68. Slide CA9 onto CA1 being careful to match "top" marks on both parts and insert bolt through both parts using access hole on bottom side of stick box assembly. (Do not install nut). Ref. Detail A and E.
19. Insert a .50" OD X 24" long dowel or tube into the right hand wing aileron torque tube.
20. Fit the right hand wing onto FU99 and bolt in place. Extend the dowel inboard until it contacts the fuselage skin. Cut a .75" or 1" clearance hole in the fuselage skin at this point and extend the dowel through this hole so that it passes below CA9.
21. Position the CA18 arm on CA9 as shown in Detail H. Note that the fore and aft position of CA18 is established when the centerline of the CA16 tube (dowel) is .25" aft of CA18. Mark the position of CA18 on CA9 and mark CA18 "Top".
22. Loosen clamp and adjust position of CA21 bulkhead to correspond with dimensions shown in Detail I. Slide CA34 bushing forward to the FU14 bulkhead and carefully trace it's outline of FU14. CA9 tube should not be touching FU1 and FU14 bulkhead before or after CA34 is in place. Elongate holes in bulkheads if necessary.
23. Drill all rivet holes common to stick box assembly, CC68 longeron and fuselage skins with No.40. Ref. Details D&E.
24. Drill all holes common to CA21 bulkhead and fuselage skins with No. 40 except for the three holes through the inboard flange. These will be drilled later. CA21 is to be located so that the B539DD bearing and CA9 tube are aligned to prevent binding. Use a 6" extension drill bit to drill as many holes as possible. Mark the holes that cannot be drilled with a scribe and drill through skin after CA21 is removed.
25. Remove CA21 bulkhead, CA9 tube and stick box assembly from fuselage. Finish drilling any holes marked with scribe and dimple all holes common to fuselage skins, CC68 and FU18 longerons, stick box assembly and CA21 bulkhead. Ref. Details D, E, and F.
26. Place CA34 bushing on FU14 bulkhead and clamp it in place. Drill two No. 19 holes through FU14 using CA34 as a drill guide. Mark CA34 "Top" and remove from FU14. Sand or ream hole in CA34 until it will spin freely on CA9. (Approx. .003 clearance).
27. Remove CA1 and CA9 from stick box assembly and pro-seal and rivet stick box assembly together. (Do not rivet stick box assembly to fuselage). Ref. Detail D.
28. Pin CA1 and CA9 together with bolt with "Top" marks matching. Place CA9 in fixture similar to that shown in Detail G. Slide forward CA18 arm onto CA9 and align it with the marks on CA9. Ref. paragraph 21 and Detail I.
29. Slide the protractor onto CA9 until it contacts CA18 and secure it to the table with clamps. Bolt CA18 to protractor and drill the No. 12 attaching bolt hole through CA18 and CA9. Remove protractor. Ref. Detail G.
30. Slide the aft CA18 arm onto CA9 and locate it measuring from forward CA18. Install protractor as before and drill the No. 12 attaching hole through CA18 and CA9. Cut off excess portion of CA9 flush with the aft end of the rear CA18 arm.
31. Re-install CA9 tube in fuselage. Bolt CA34 bushing to FU14 bulkhead. Slide forward CA18 arm onto CA9 and rivet CA21 bulkhead in place using pro-seal. (Do not bolt CA18 arms to CA9).
32. Pro-seal and rivet stick box assembly to fuselage. Position CA1 and CA9 with "Top" marks down. Insert bolt through CA1 and CA9 then rotate 180°. "Top" marks and bolt head will now be on top side.
33. Install nut and washer on CA1 and CA9 attach bolt and tighten. Install bolts through both CA18 arms and tighten and permanently install CA7 on CA1.
34. Glue three tabs of cardboard to fuselage skin so that the inboard portions cover the three J-nut locations on the stick box assembly and drill with No. 40 through tabs and stick box. Ref. Detail E.
35. Glue a large cardboard tab to the forward portion of CC91-2 floorboard so that it covers the nutplate location on CA38 and make No. 12 hole in cardboard to match that in CA38.
36. Make control stick cutout in CC8 console and install console in fuselage with cardboard tabs on outside. Drill screw holes through CC8 using the holes in the cardboard tabs as a guide. Ref. Detail B and E.

PARTS & MATERIALS CALL OUT

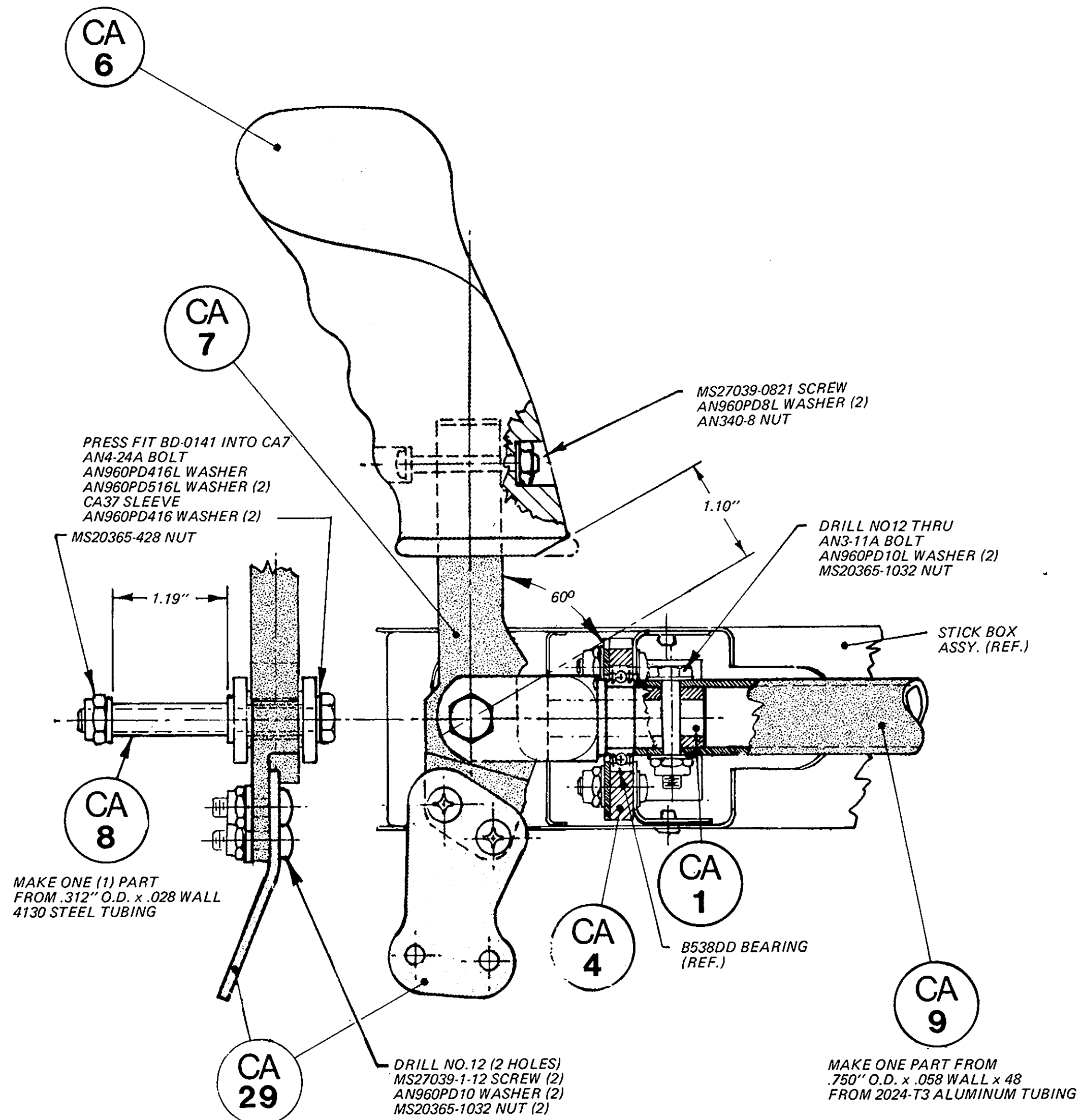
STICK ASSY

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CA 1	Fork	1	MBD5CA1	2024T351 Bar
CA 6	Grip	1	MBD5CA6	Plastic Molding
CA 7	Column	1	BD-5-M-0174	2024-T351 Bar
CA 8	Spacer, Stop Bolt	1	BD-5-M-0154	.312 O.D. x .028 W 4130 Cond "N" Tubing
CA 9	Torque Tube, Longitudinal	1	BD-5-M-0037	.75 O.D. x .058 W 2024-T3 Tubing
CA 29	Bracket, Hor. Stab Control	1	BD-5-M-0112	.090 2024-T3 Sheet
CA 37	Sleeve	1	BD-5-M-0184	.3125 x .028W Steel Tubing

STICK BOX ASSY

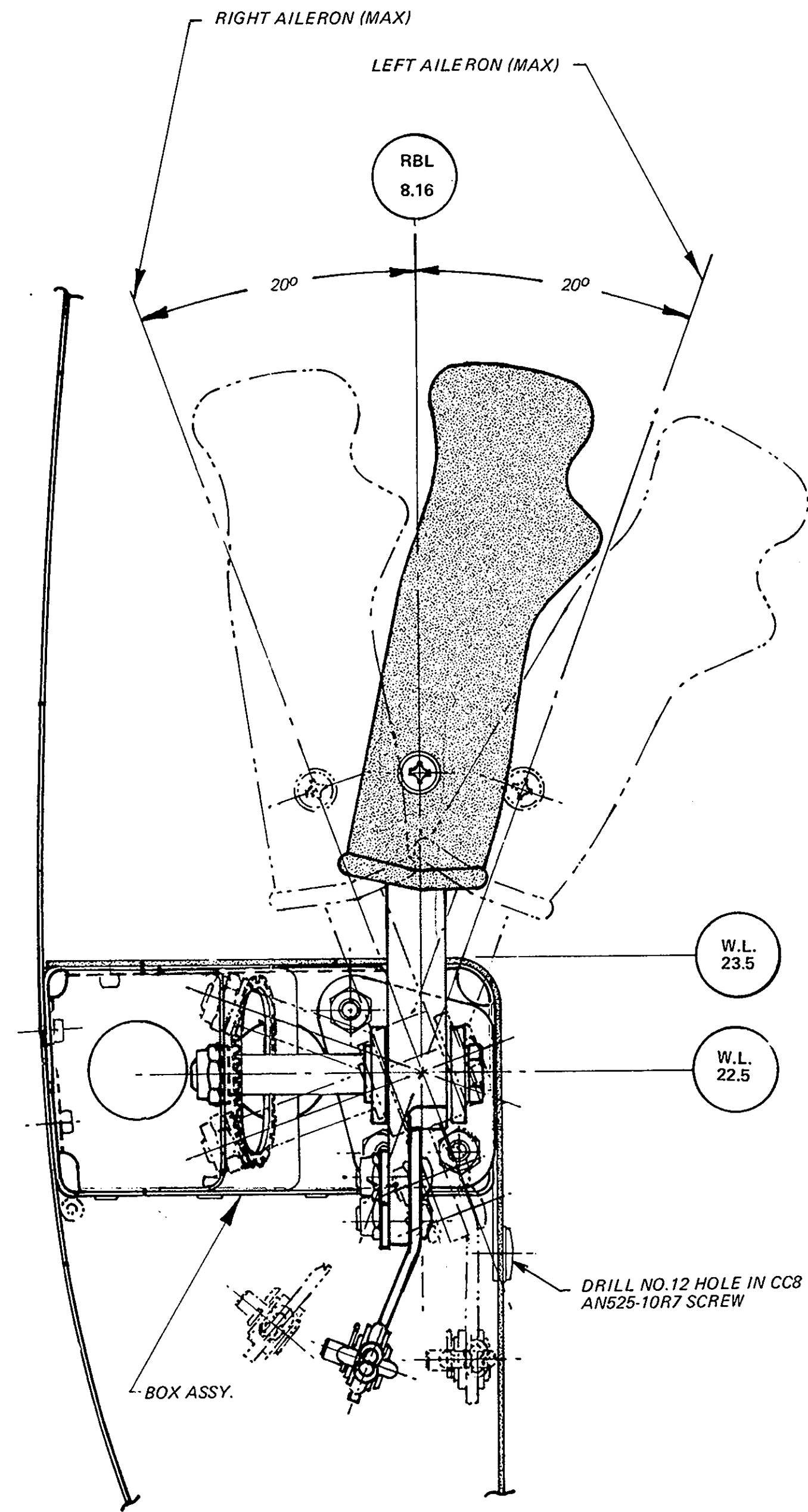
DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CA 4	Housing, Bearings	1	BD-5-M-0151	.025 Phenolic Rate
CA 5	Cover, Bearing	1	BD-5-M-0029	.050 2024-T3 Sheet
CA 25	Bracket Half, Stick Box, Upper	1	BD-5-M-0027	.025 2024-T3 AL AL Sheet
CA 26	Bracket Half, Stick Box, Lower	1	BD-5-M-0027	.025 2024-T3 AL AL Sheet
CA 27	Web, Stop Bolt	1	BD-5-M-0101	.032 2024-T3 AL AL Sheet
CA 28	Web, Stick Box Bearing	1	BD-5-M-0101	.032 2024-T3 AL AL Sheet
CA 31	Grommet, Edging	1	MS21266-1N	Plastic

**DETAIL
A**



STICK ASSY.

**DETAIL
B**

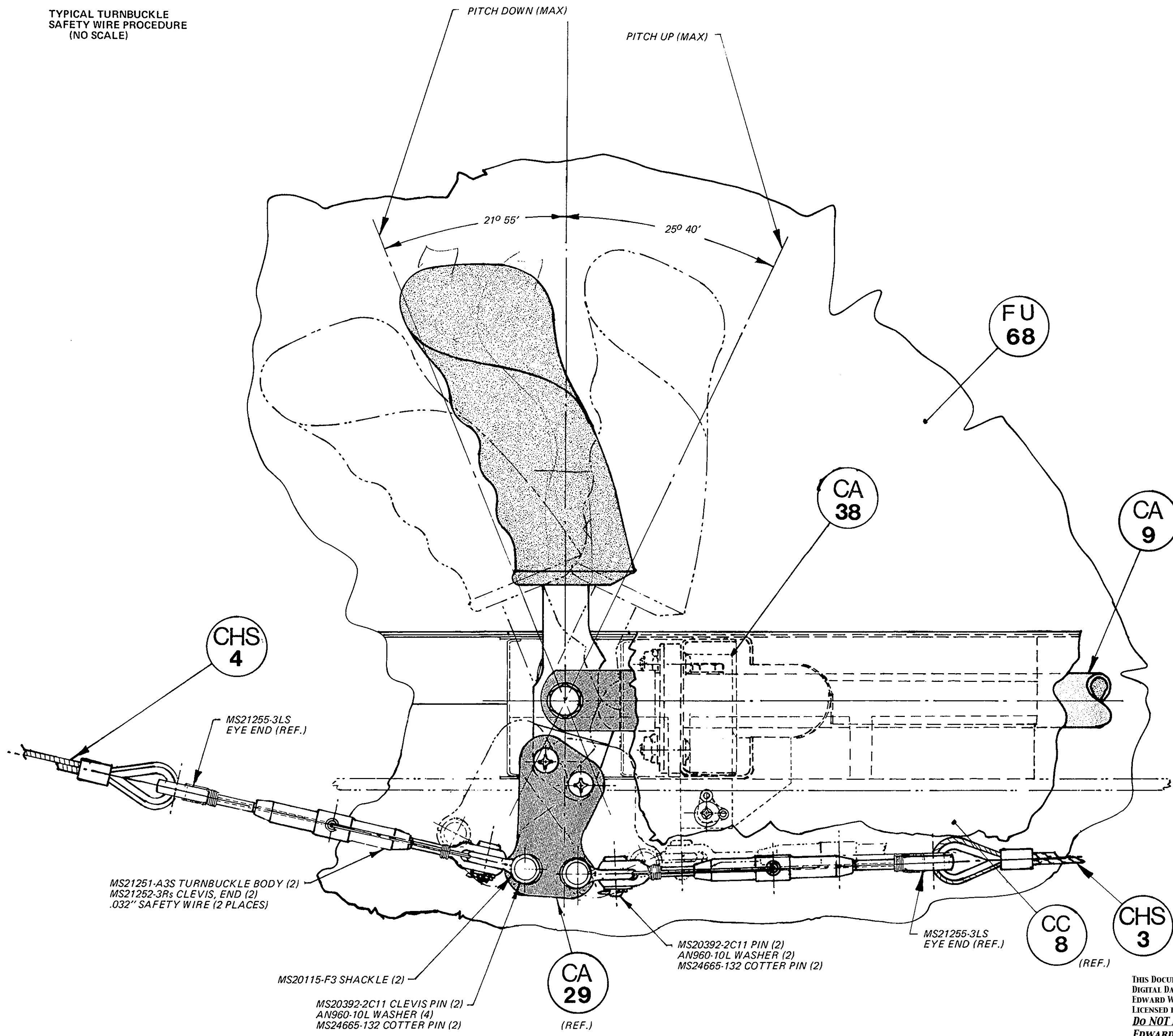




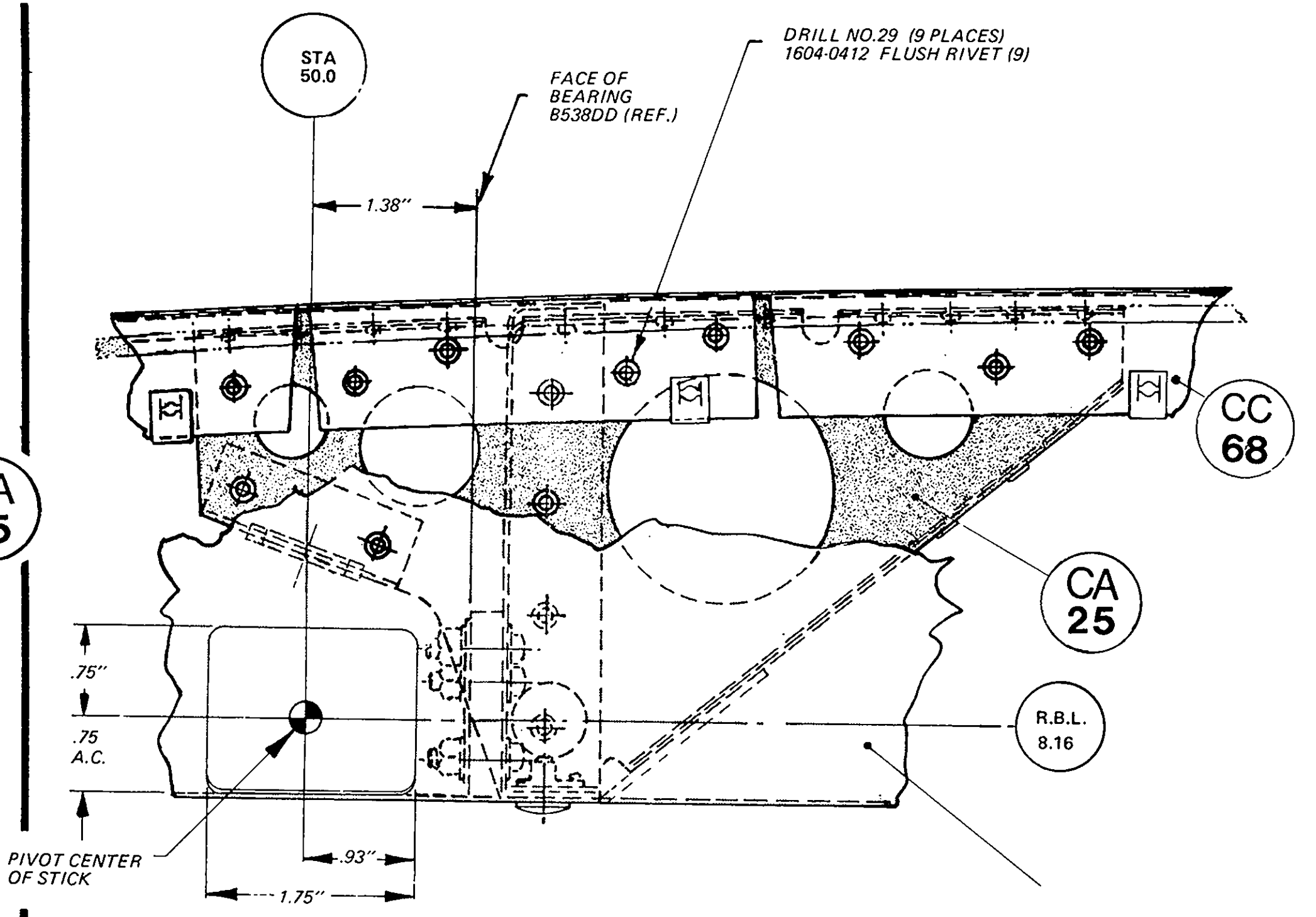
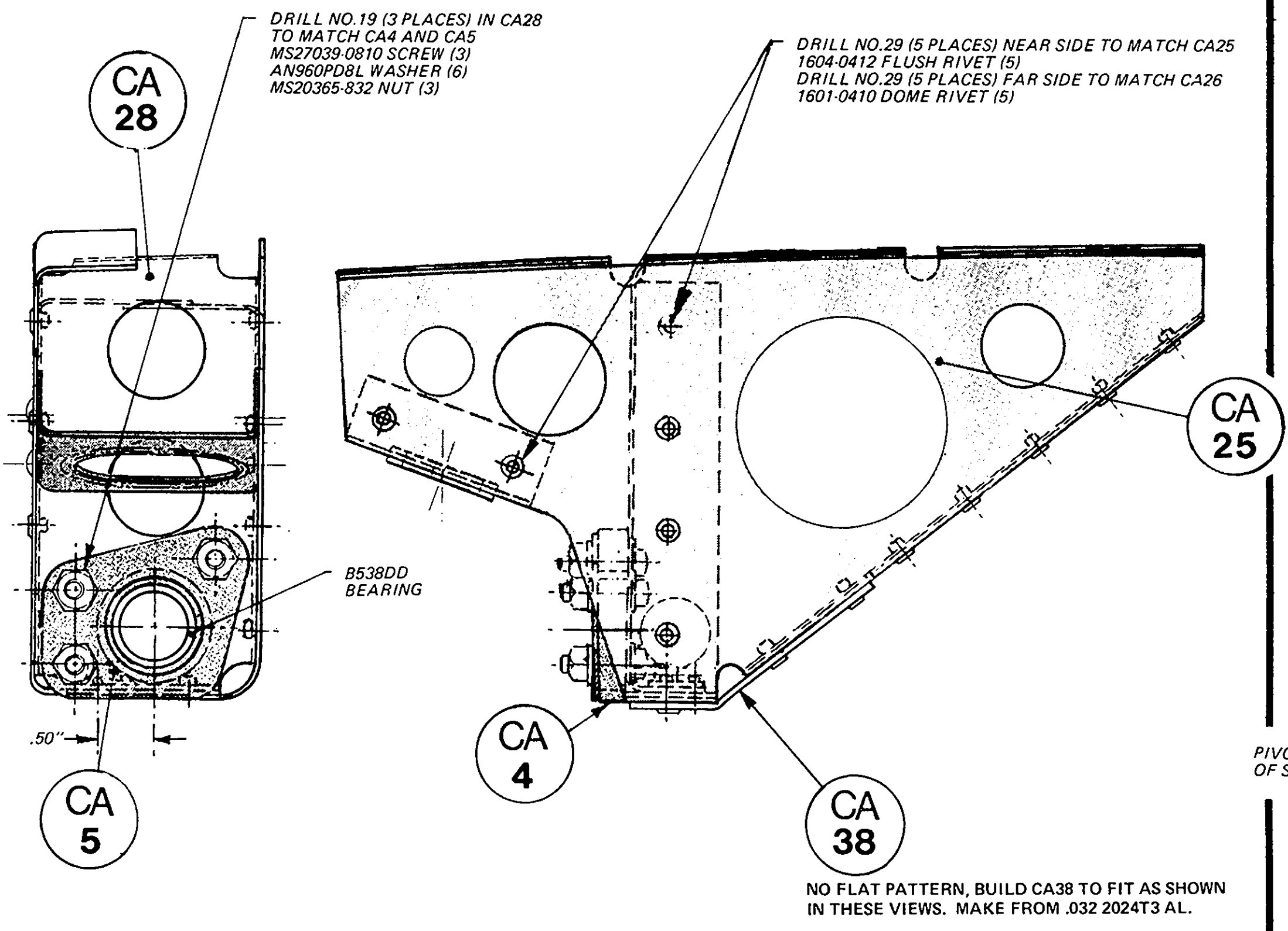
TYPICAL TURNBUCKLE
SAFETY WIRE PROCEDURE
(NO SCALE)

STA
50.0
READ SPECIAL INSTRUCTIONS
BEFORE LOCATING STICK BOX
ASSEMBLY BD5CA1002

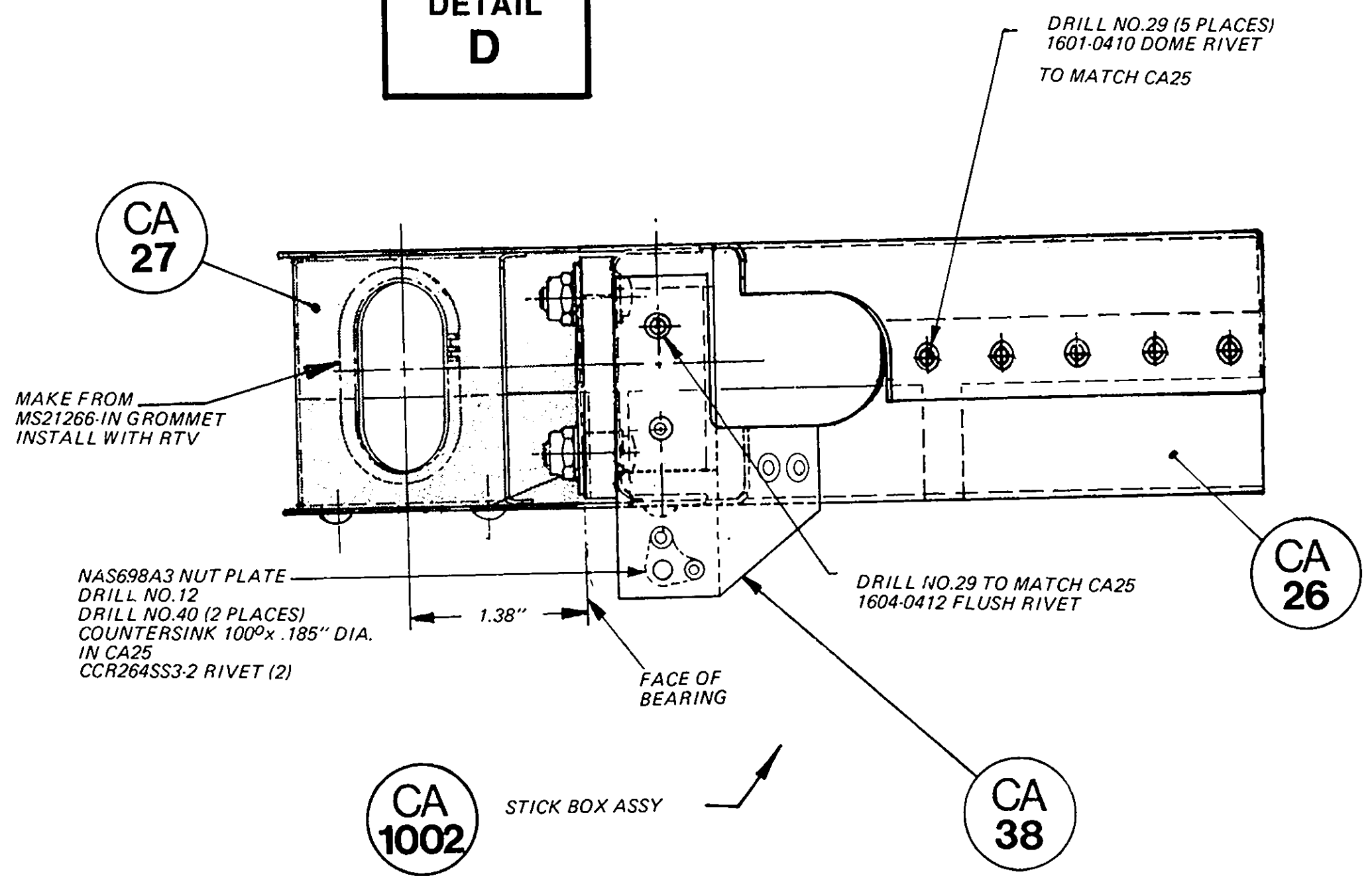
DETAIL
C



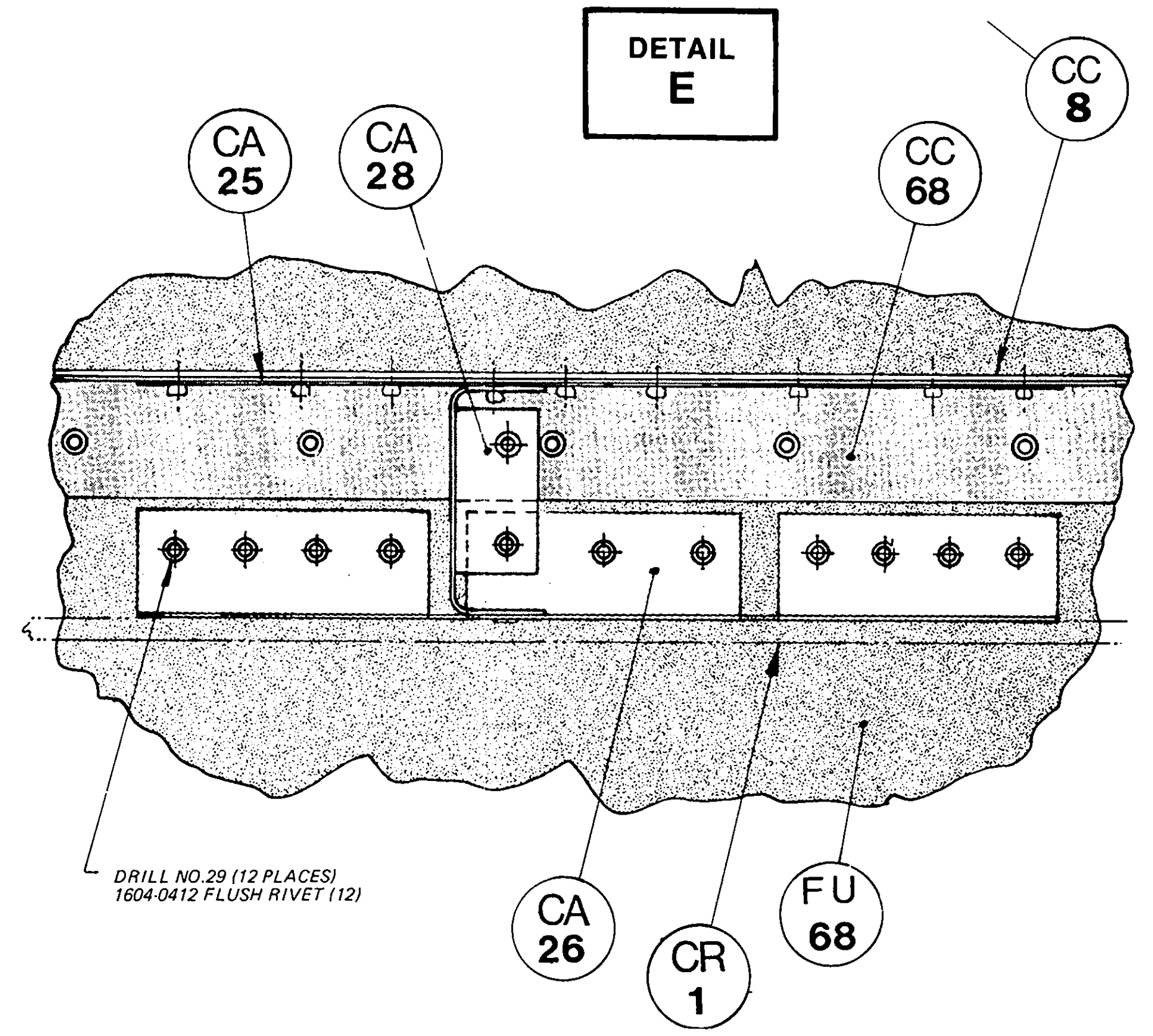
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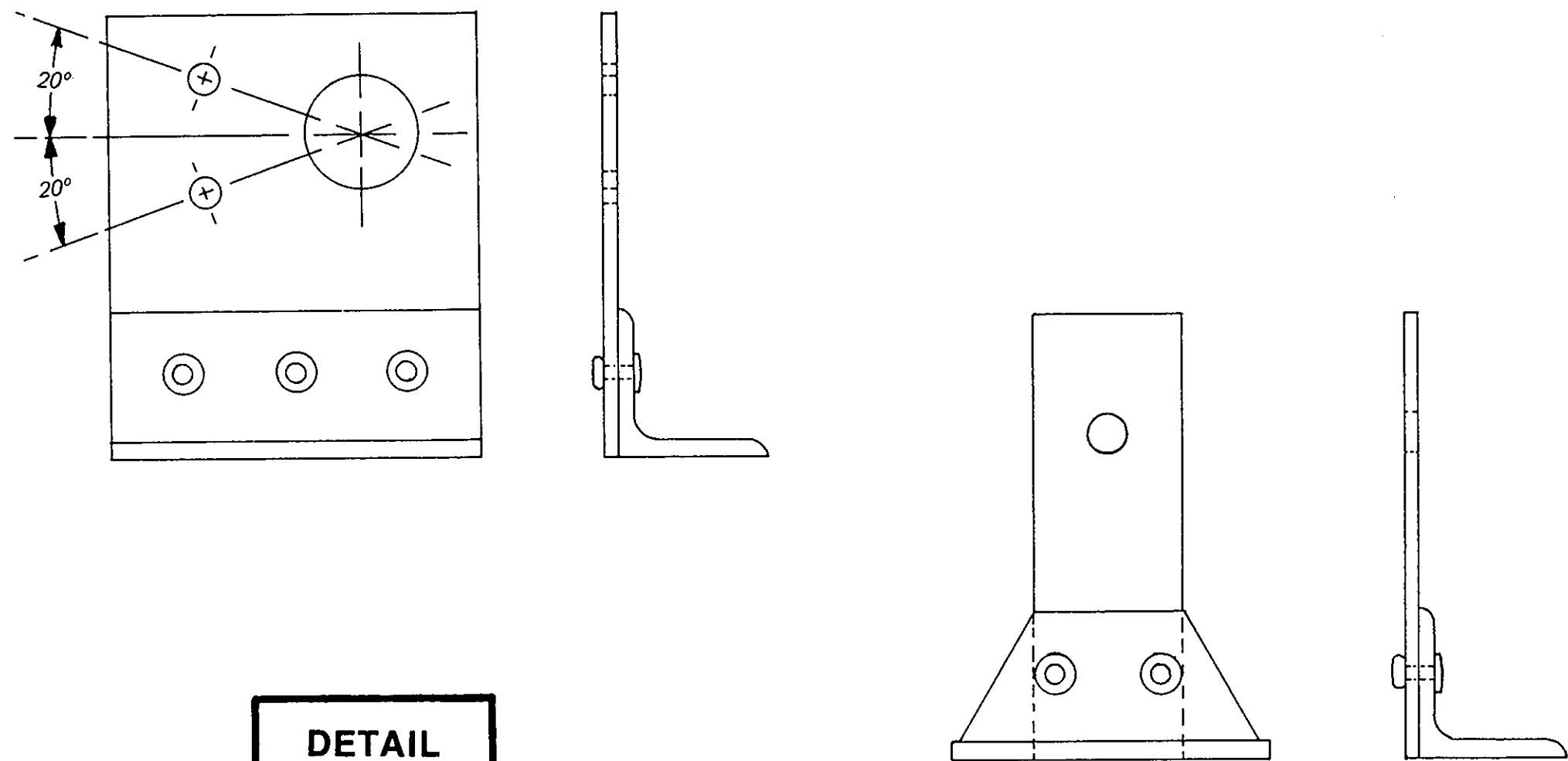
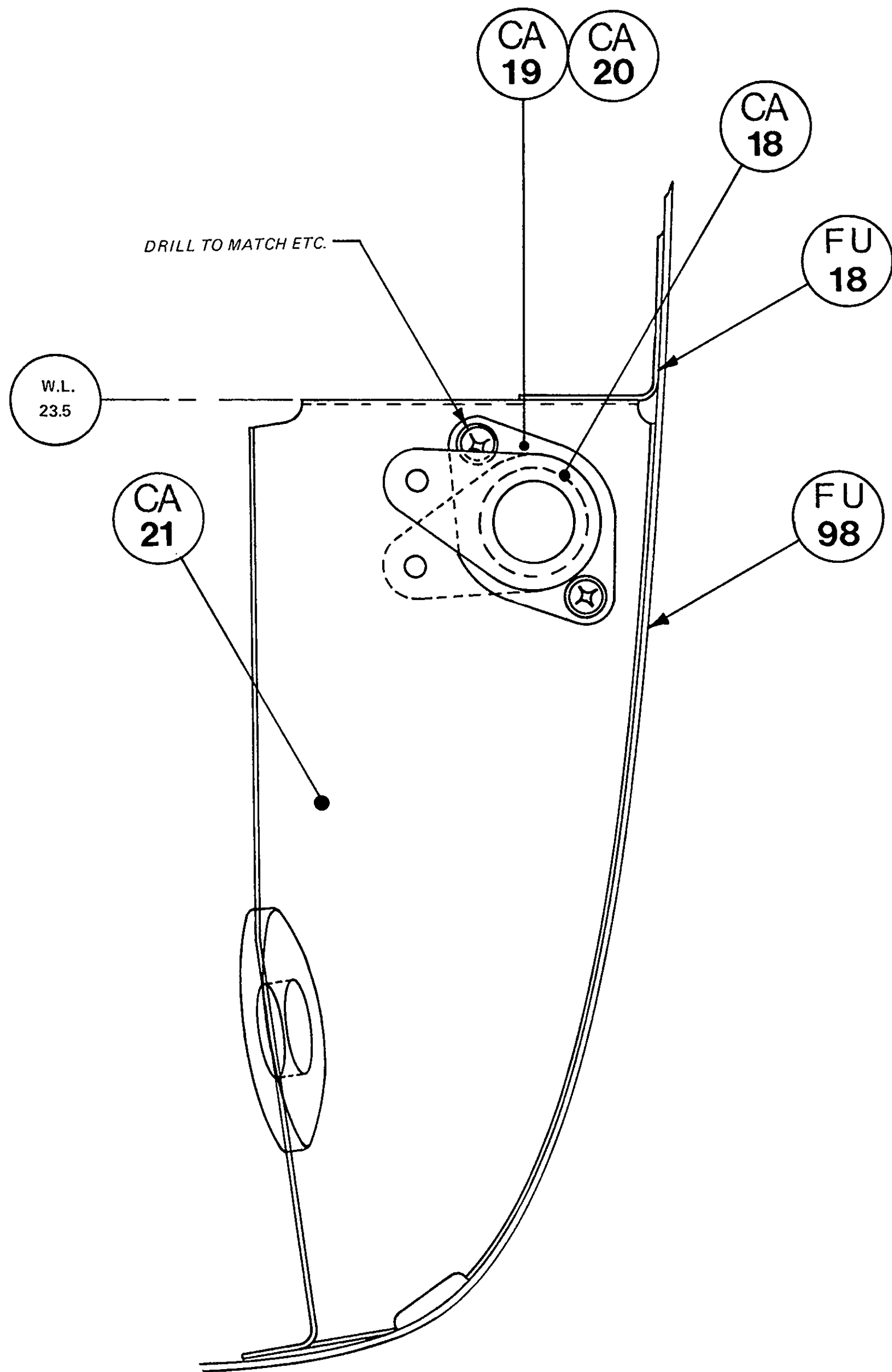
DETAIL D



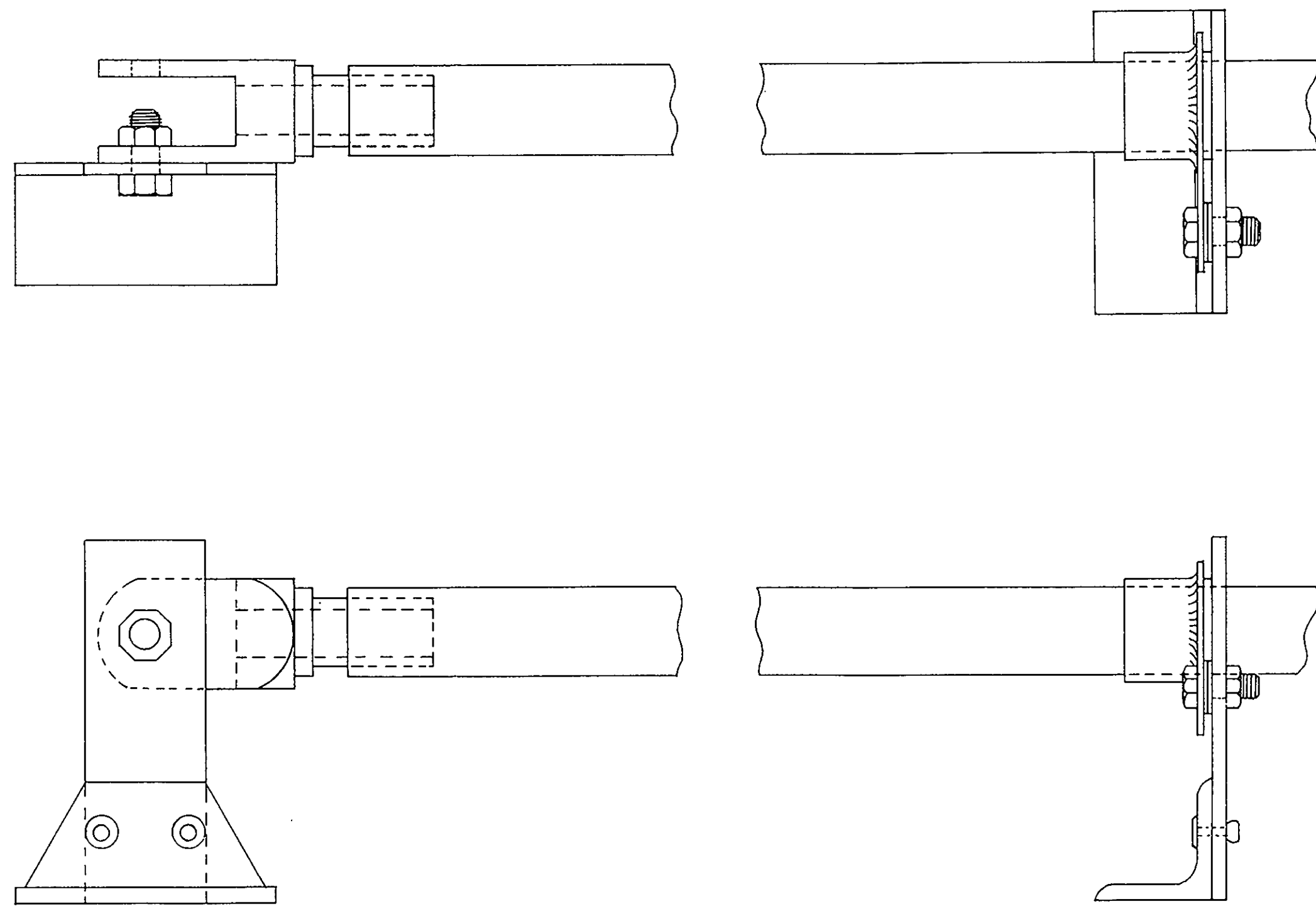
DETAIL E



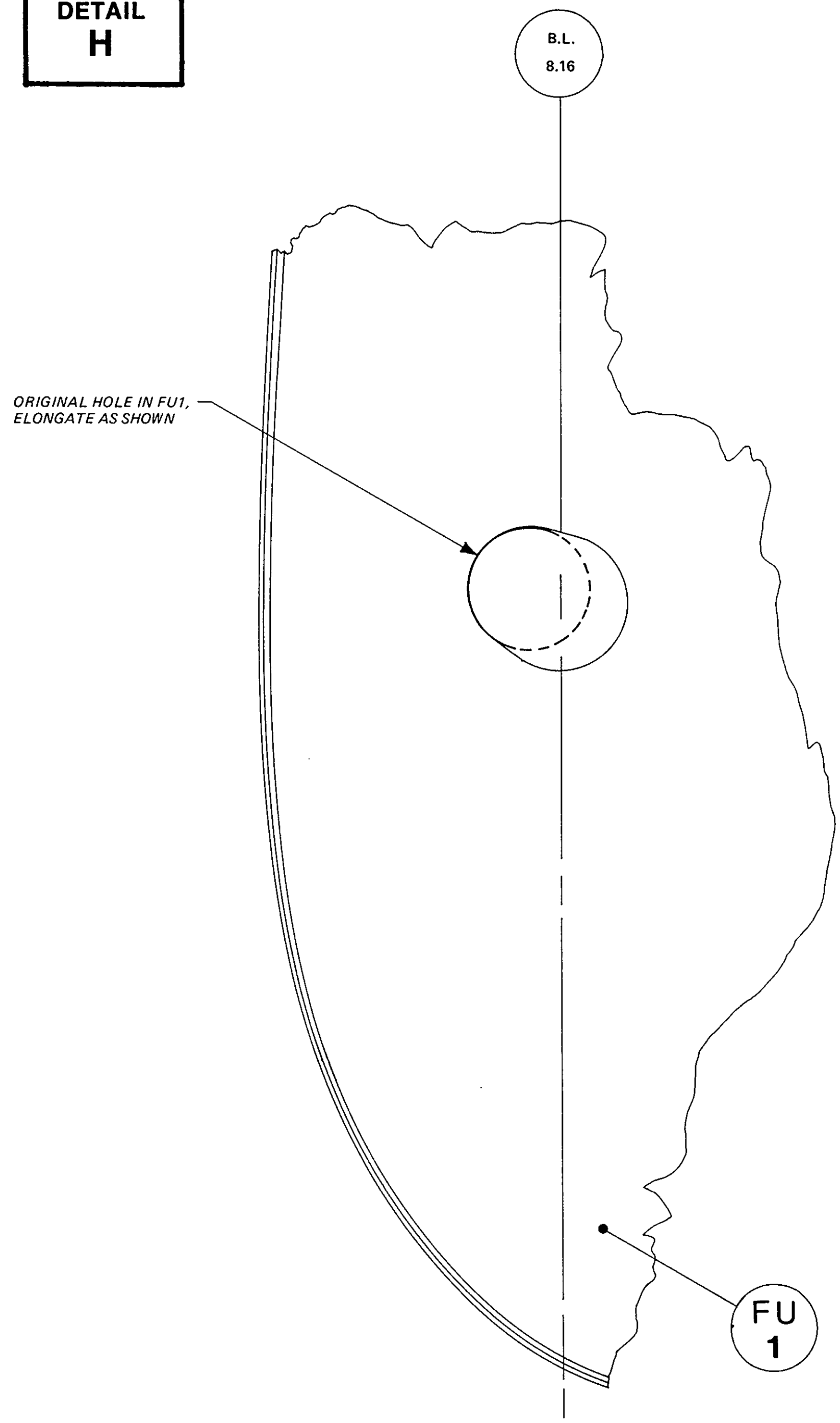
DETAIL F



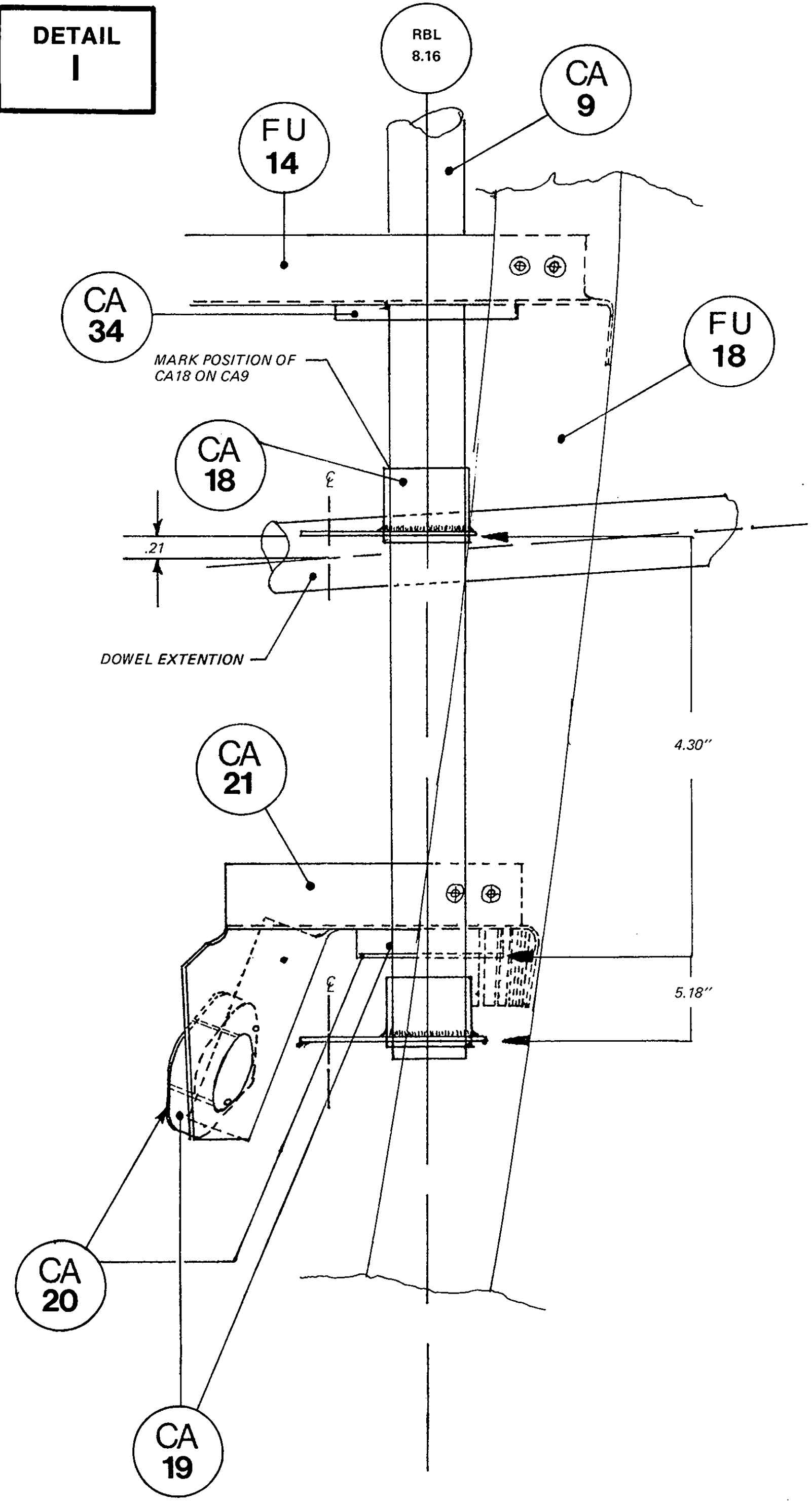
DETAIL G



**DETAIL
H**



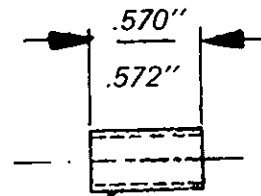
**DETAIL
I**



DRILL NO.40
(12 PLACES)

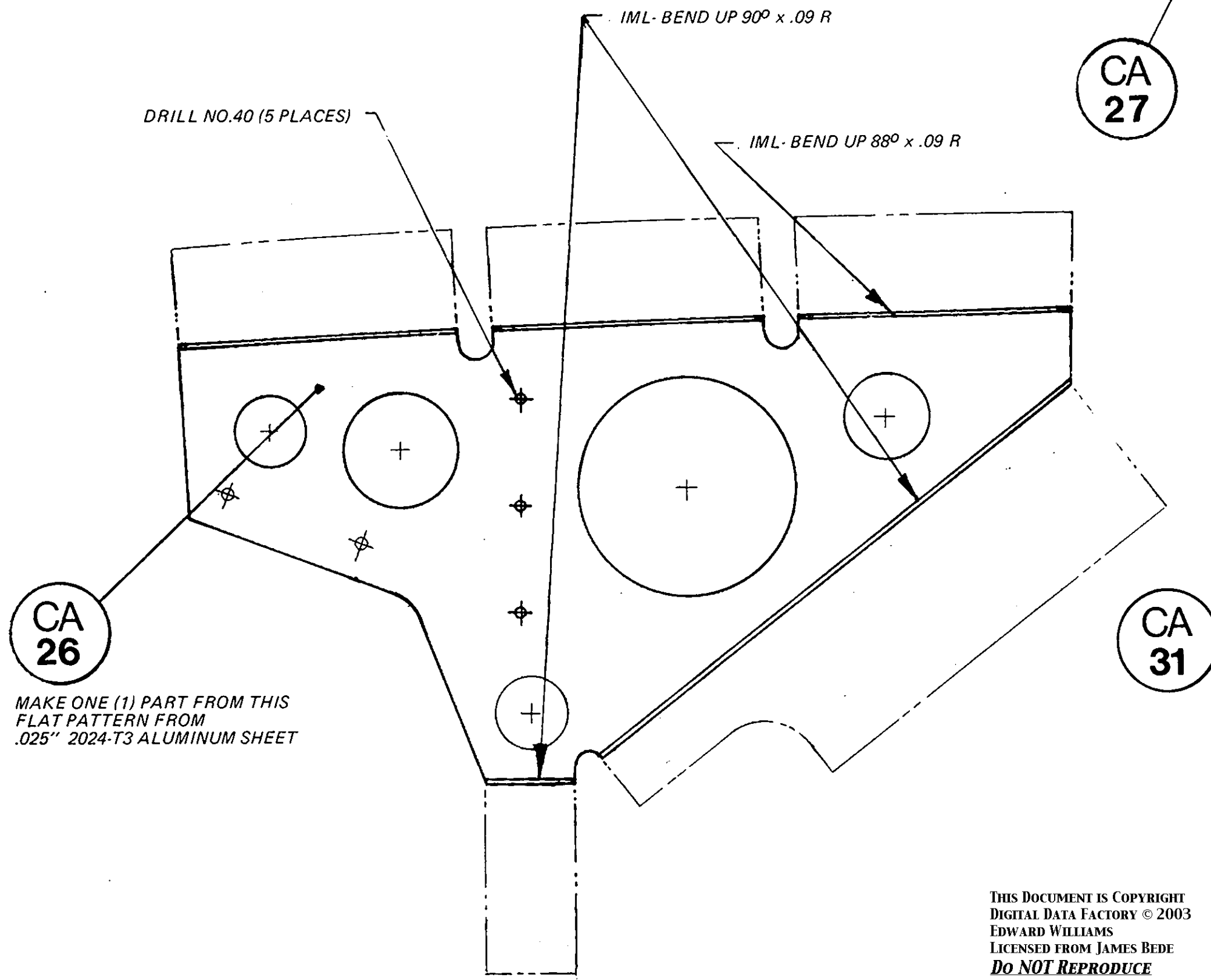
CA 25

MAKE ONE (1) PART FROM THIS FLAT PATTERN FROM .025 2024-T3 ALUMINUM SHEET



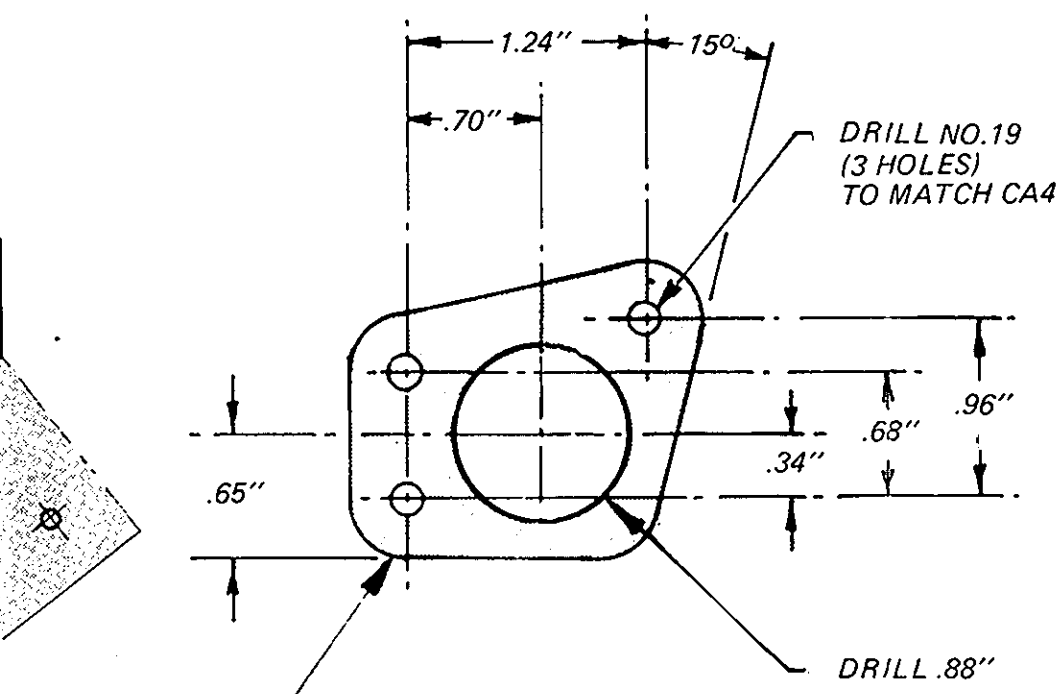
CA 37

MAKE ONE (1) PART FROM .3125 O.D. x .028 WALL STEEL TUBING



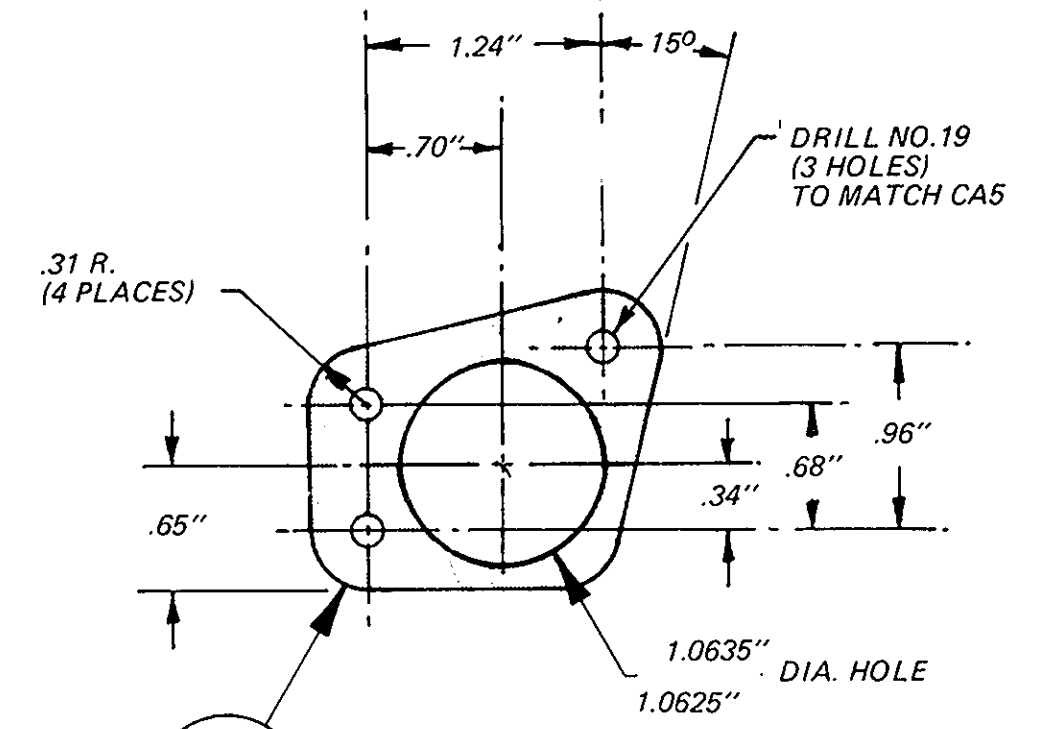
CA 26

MAKE ONE (1) PART FROM THIS FLAT PATTERN FROM .025 2024-T3 ALUMINUM SHEET



CA 5

MAKE FROM .050 2024-T3 ALUMINUM SHEET MAY BE USED AS FLAT PATTERN



CA 4

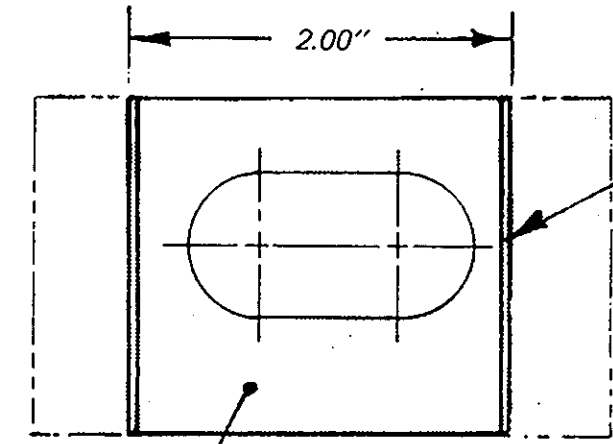
MAKE FROM .25 PHENOLIC MAY BE USED AS FLAT PATTERN

IML-BEND DOWN 90° x .09" R.

IML-BEND DOWN 90° x .31" R.

IML-BEND UP 90° x .09 R

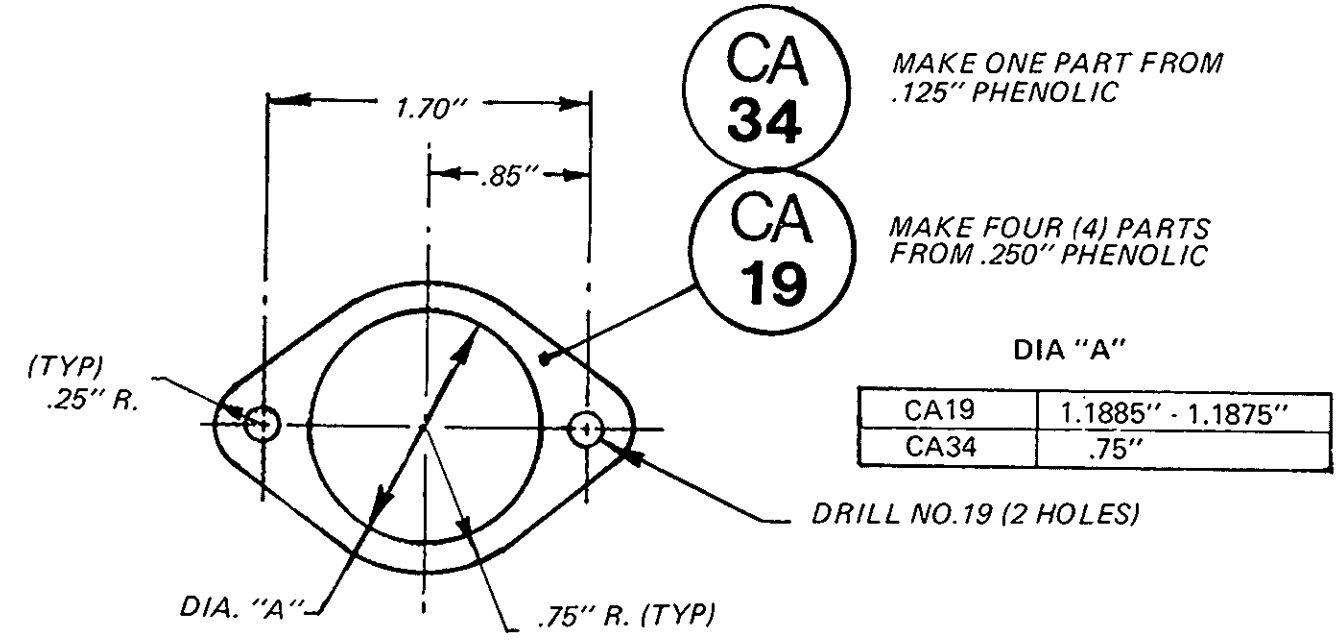
IML-BEND UP 88° x .09 R



CA 27

MAKE ONE (1) PART FROM THIS FLAT PATTERN FROM .032 2024-T3 ALUMINUM SHEET

IML-BEND UP 90° x .12" R. (2 PLACES)



CA 34

CA 19

MAKE ONE PART FROM .125 PHENOLIC

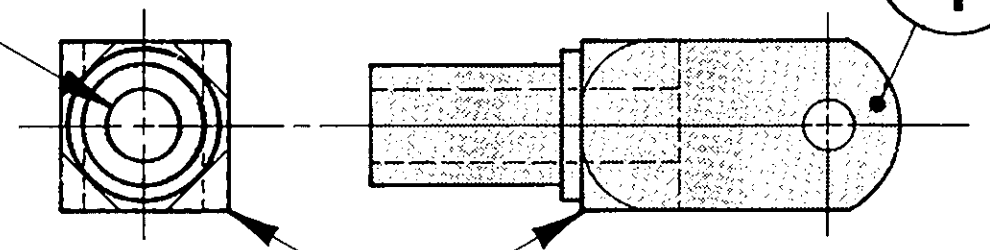
MAKE FOUR (4) PARTS FROM .250 PHENOLIC

DIA "A"	
CA19	1.1885" - 1.1875"
CA34	.75"

DRILL NO.19 (2 HOLES)

DETAIL J

DRILL .38" HOLE THRU



MAKE ONE PART FROM MBD5CA1

CA 1

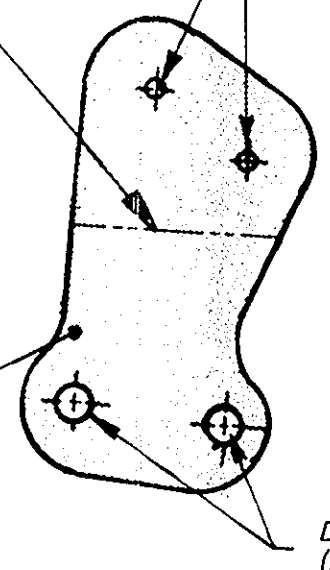
TRIM TO CLEAR BOLTS IN CA4 AND CA5

IML-BEND DOWN 23° x .50" R.

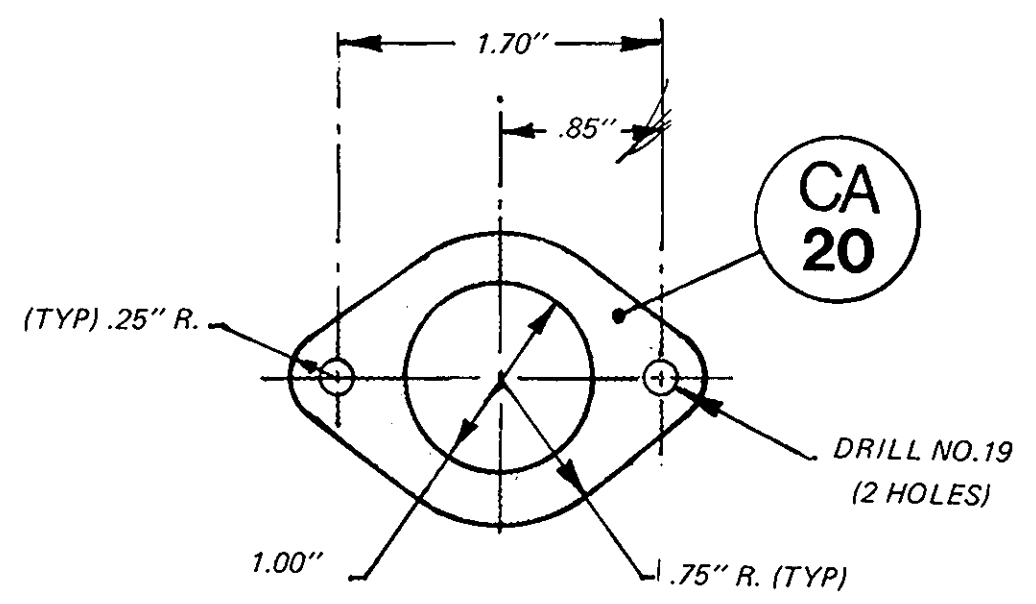
CA 29

MAKE FROM THIS FLAT PATTERN ONE PART FROM .090 2024-T3 ALUMINUM SHEET

DRILL NO.40 (2 HOLES) MUST MATCH HOLES IN CA7



DRILL NO.12 (2 HOLES)

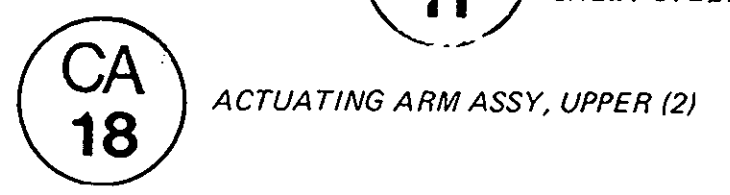
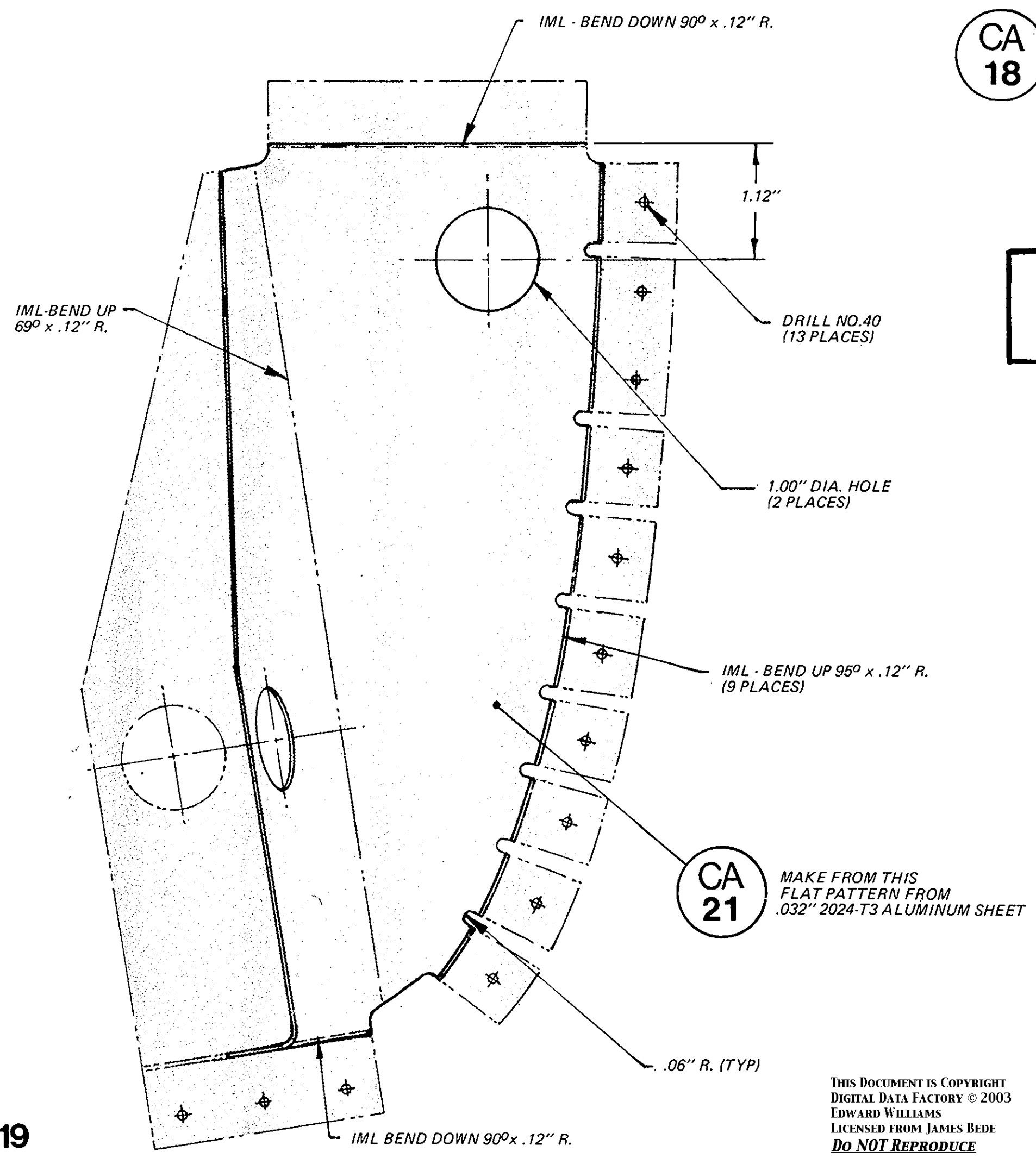
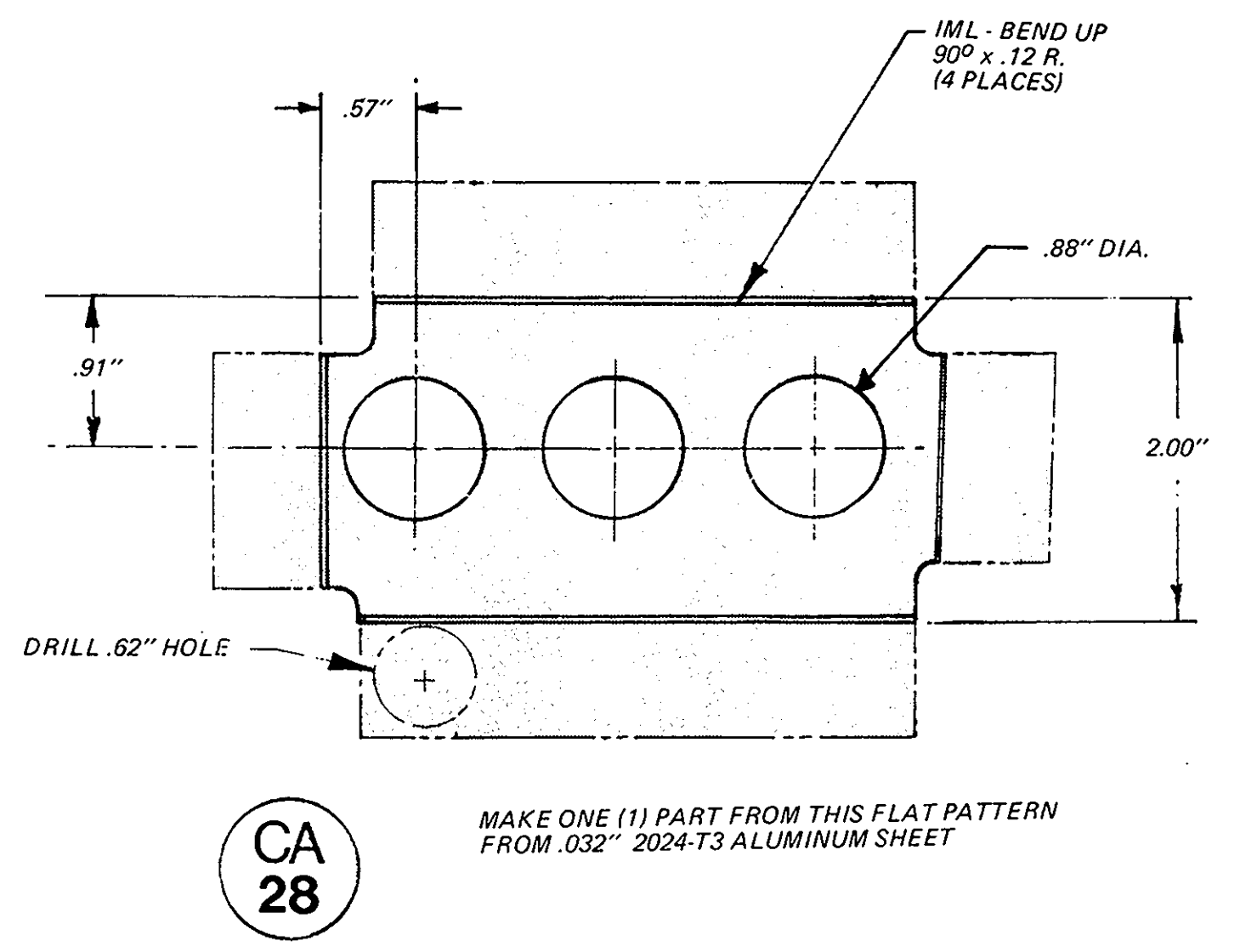
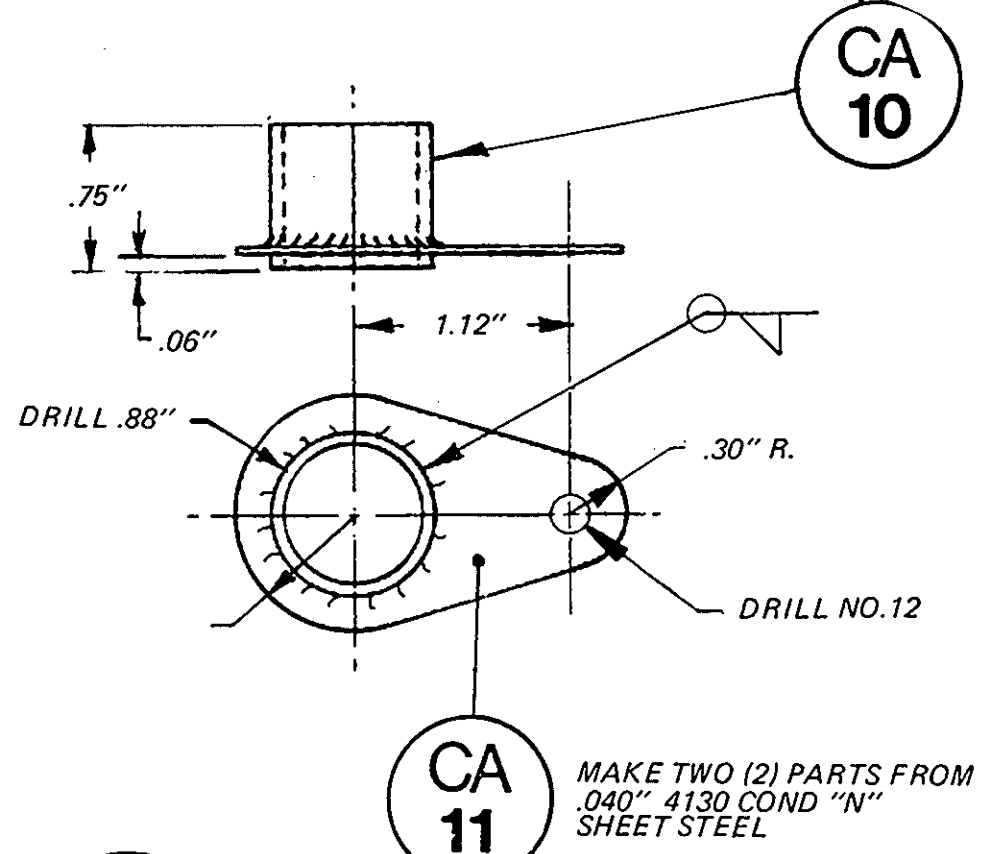
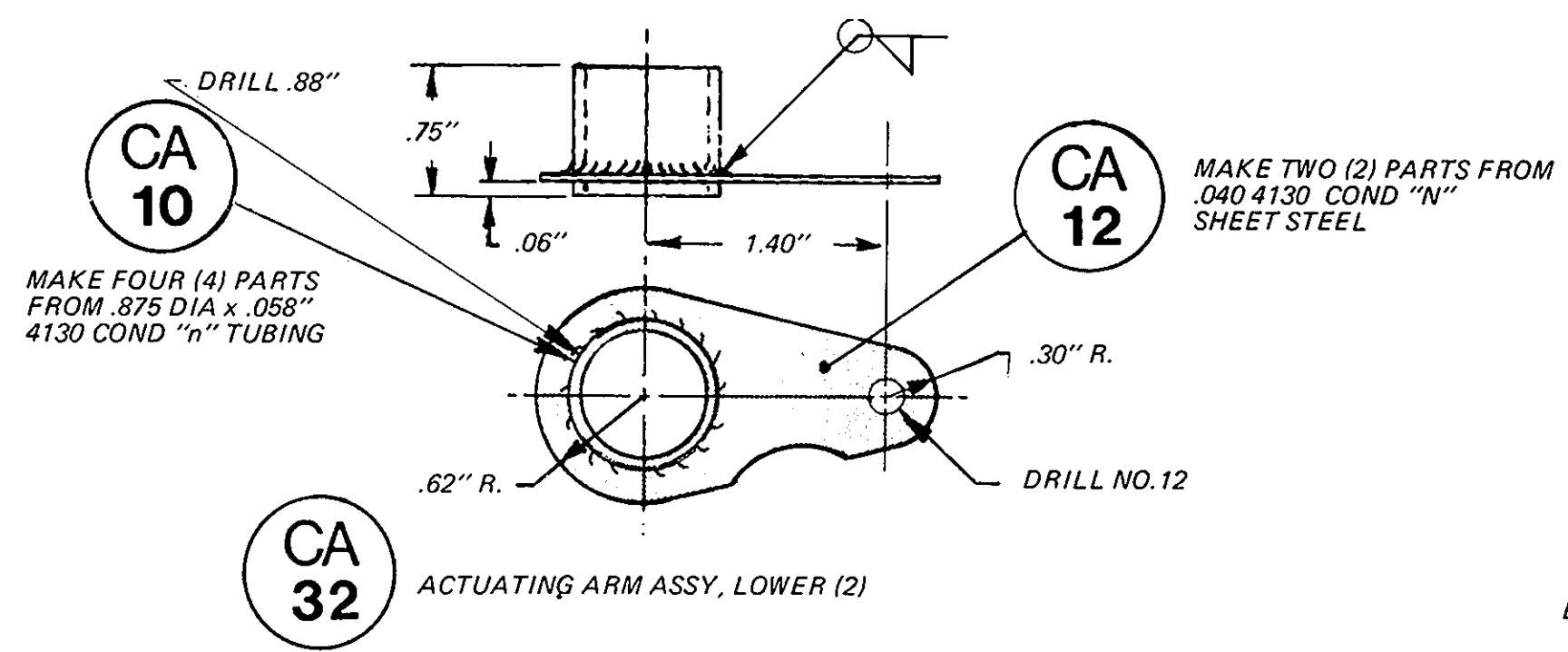


CA 20

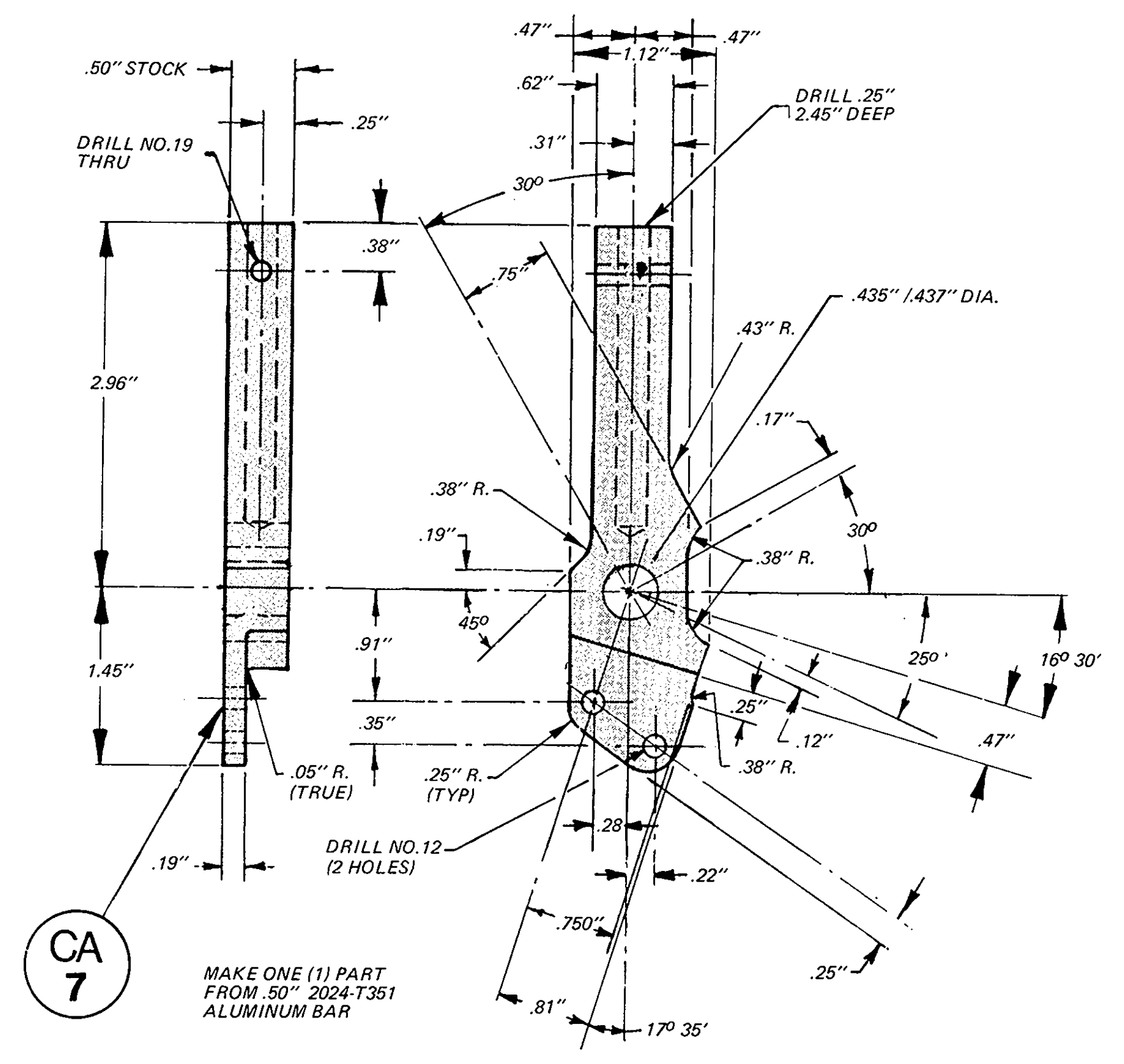
DRILL NO.19 (2 HOLES)

MAKE FOUR (4) PARTS FROM .032 2024-T3 ALUMINUM SHEET

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DETAIL K



AILERON & FLAP CONTROL INSTL

Before Beginning Construction, Note The Following:

1 Extreme care should be exercised during the aileron control installation as mistakes in this area generally require the replacement of two or more parts.

2 All views are shown with parts in the neutral position unless noted otherwise. It is important that the "clocking" or position of the various control arms remains as shown.

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Beginning Construction

- Fabricate all parts shown in detail D.
- Cut off A5 (short wing) or AIT (long wing) aileron tube on left hand wing so that it extends .90 inches inboard of the W52 bearing bracket assembly. Smooth end of tube with file and install A 3 and A14 but do not drill in place. Ref. Detail A & E. Repeat procedure on right hand wing.
- Install B 539 DD bearings in two CA 19 phenolic blocks and install CA 19 & 20 assemblies on to CA 23 & 24 brackets. Note direction of attaching screws for left hand and right hand parts. Details A & B.
- Install wings and bolt in place. Using a 1/2" OD dowel determine the point at which the left hand aileron torque tube will pass through the fuselage skin. Make cutouts in fuselage using pattern shown in Detail D also, See special instructions in Detail D.
- Make the CA 16 tubes 1/2" longer than shown in Details A & B. Insert CA 2 fittings flush with ends of tubes and drill & bolt in place. Note direction of bolts. Ref. section X-X Detail A. Make two CF 30 collars and slide onto CA 16 tubes. Insert tubes into CA 23 & 24 bracket assemblies and fit CA 16 tubes on CA 3 fittings. Ref. Details A & B.
- Position the CA 23 & 24 brackets on fuselage skins so that the CA 16 tubes are aligned with the A 17 aileron torque tubes in all axis. Form the tabs on the CA 23 & 24 brackets as required to achieve proper alignment of the tubes and bearings and drill and cleco the CA 23 & 24 brackets in place. Note: If both long and short wings are to be used, see special instructions

Special Instructions

Use only if both long and short wings are used.

Because of the difference in taper between the long and short wings, the point at which the A 5 or A 17 torque tubes would (if extended) pass through the fuselage skin differs by .040". Therefore, it is necessary to split this difference between the two sets of wings so that only a slight mis-alignment exists between the CA 16 tube and the A 5 or A 17 tubes.

If long wings are being fitted, follow instructions in paragraph 8 except move the CA 23 & 24 aft .020" and drill in place. If short wings are being fitted, move the CA 23 & 24 forward .020".

Using this method, the mis-alignment at the A 2 and A 3 fittings will only be 1/16" and is entirely acceptable provided that the A 2 and A 3 fittings are drilled in place with the flat lugs in the proper position as call for later in the text.

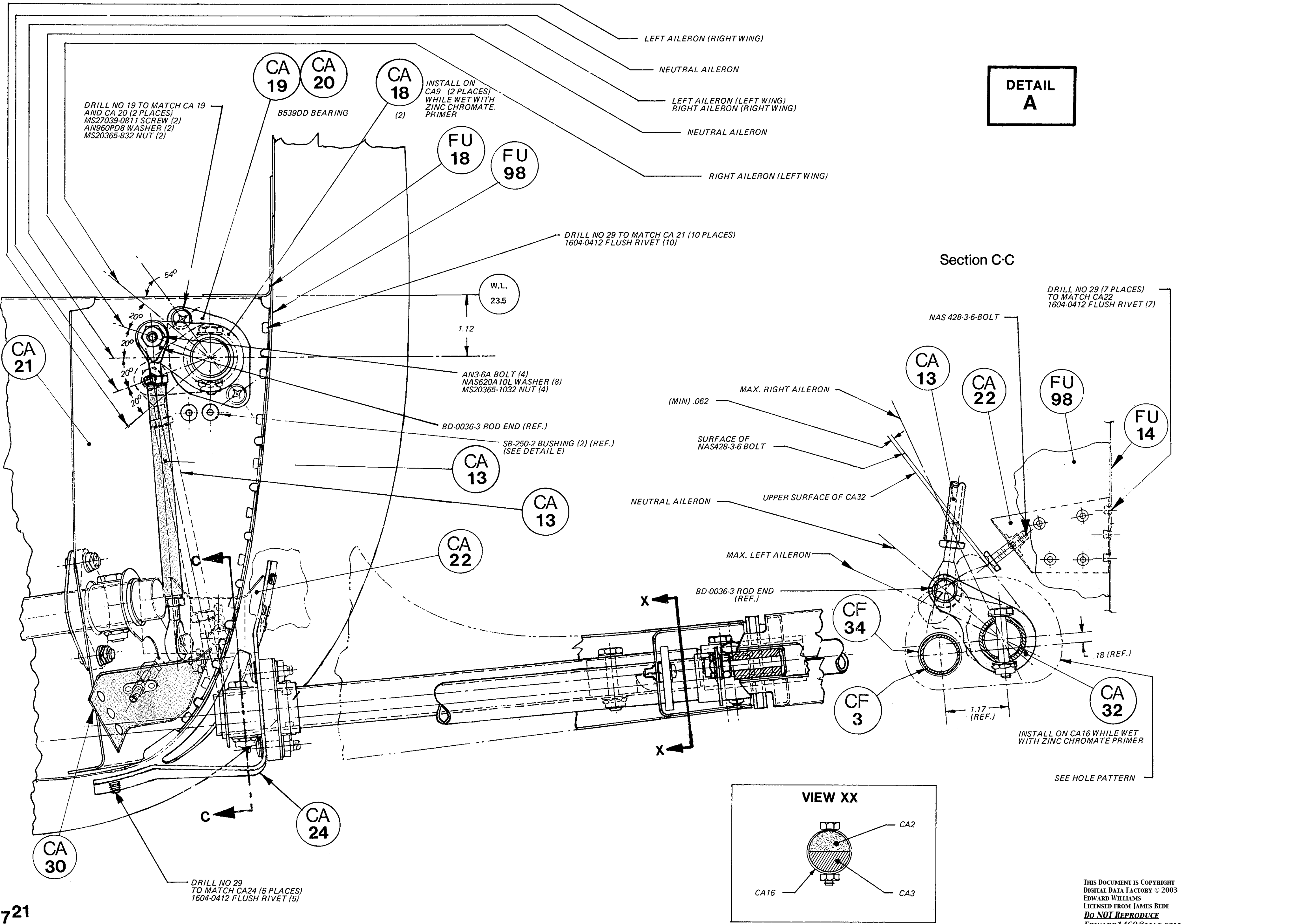
- Push the CA 16 tubes outboard to insure that the A 2 & A 3 fittings are fully engaged. Slide the CF 30 collars inboard until they contact the inner race of the B 539 DD bearings and carefully mark their position on the CA 16 tubes. Ref. Details A & B.
- Remove the CA 23 & 24 brackets and tube assemblies from fuselage by sliding the CA 16 tubes inboard until A 2 & A 3 fittings disengage.

- Align the CF 30 collars with the marks on the CA 16 tubes and drill a No. 29 hole through collars and tubes at top and bottom. Ref. Details A, B, & C. Cleco collars in place.
 - Place a CA 32 arm on the end of the right hand CA 16 tube. Slide the CA 32 arm outboard until the inner race of the B 539 DD bearing is firmly captured between the CA 32 and the CF 30 collar. Ref. Detail A & C.
 - Position the CA 32 arm so that its relationship to the A 2 fitting is as shown in section C-C & X-X of Detail A, and drill a No. 12 hole through the CA 32 arm and the CA 16 tube. Cut off excess portion of CA 16 tube.
 - Measuring from inboard side of the B 539 DD bearing, cut the left hand CA 16 tube to the length shown in Detail C.
 - Fabricate and install a CA 17 filler in end of tube and insert the Universal joint as shown in Detail C.
 - Position universal joint in CA 16 tube so that its relationship with the CA 2 fitting is exactly as shown in Detail B and drill No. 12 hole through CA 16 tube, CA 17 filler and universal joint and install bolt. (Note: Direction of Bolt.)
 - Fabricate the CA 15 crossover tube (Ref. Detail C) and install a CA 17 filler in outboard end. Slide the CA 15 tube assembly onto the universal joint and drill and install bolt. (Note: Correct direction of bolt.) Ref. Detail C.
 - Re-install both left and right hand tube assemblies in fuselage and cleco CA 23 & 24 brackets in place. Be sure to insert the CA 15 crossover tube into the B 539 DD bearings on the CA 21 bracket (Ref. Detail C) and be sure both CA 2 fittings. The CF 30 retaining collars can now be riveted in place on the tubes. Ref. Details A, B, & C.
 - Position the CA 21 bracket web so that the B 5399 DD bearing is perfectly aligned with the CA 15 tube and drill and cleco in place.
 - Place a CA 32 arm over the end of the CA 15 tube and connect the CA 18 & CA 32 arms with two CA 13 control rods. The correct AN bolts and hardware should be used to attach the CA 13 rods to the CA 32 arms and regular, nonlocking hardware store bolts and nuts should be used to connect the CA 13 rods to the CA 18 arms. Tighten all bolts but leave the jam nuts loose on all ball rod ends. Before proceeding, read all special notes Page 7.
 - Place the control stick in the neutral aileron position and secure it from movement. Ref. control stick installation portion of this chapter.
 - Position the CA 15 crossover tube assembly so that the universal joint and A 2 fittings are in neutral position. Slide the CA 32 arm firmly against the bearing inner race and drill & bolt in place. Ref. Details A & C.
 - Check to see that the CA 32 arm and A 2 fittings on the right hand tube are in neutral position. Adjust length of CA 13 rod if necessary to accomplish this.
- Adjusting Aileron Travel
- The neutral aileron position of the control stick must be established and a method devised so that the control stick can be returned to this position and secured from movement.
 - The adjustments are to be made with the wings installed by with the CA fitting undrilled and free to rotate inside the A 5 or A 17 aileron tube. Both ailerons should be taped to prevent movement.
 - Make adjustment to right hand wing first. Place aileron protractor on CA 16 tube and glue or tape the top portion to the fuselage skins. Install pointer on CA 16 tube and align with neutral mark on aileron protractor then clamp in place.
 - Move control stick to full right and left aileron position and check the amount of rotation of the CA 16 tube at each position. If travel is correct proceed to left hand CA 16 and repeat this procedure.
 - If travel of the right hand CA 16 is incorrect, return the control stick to neutral position and secure in place.
 - Remove the bolt connecting the upper end of the CA 13 rod assembly to the CA 18 arm and lengthen or shorten the CA 13 rod assembly. Re-install bolt connecting CA 13 and CA 18 and tighten.
 - Loosen pointer and realign it with the neutral mark on the aileron protractor and tighten in place. (The control stick must remain in its neutral position.)
 - Move the control stick to full right and left aileron position and check the amount of rotation of CA 16 tube at each position. Repeat this procedure as many times as necessary until the correct amount of rotation is obtained and the control stick and pointer both reach their neutral positions simultaneously.
 - Move to left hand CA 16 and adjust as necessary using the same procedure.
 - When both CA 16 tubes have the correct amount of rotation and both pointers reach their neutral position simultaneously with the control stick, the jam nuts at both ends of the CA 13 rod assemblies should be tightened. NOTE: the ball rod ends of CA 13 assemblies must be positioned as shown in details A & C with control stick in neutral position to prevent possible binding at the full up or down positions.
 - Remove the temporary hardware store bolts at the upper end of the CA 13 rod assemblies and install the correct bolts, washers and nuts. Ref. Detail A.
 - Install the CA 22 and CA 30 control stop assemblies and adjust the stop bolts so that there is .062" clearance from the CA 32 arms with control stick placed in the full right and left aileron positions. Ref. Detail A & C.
 - Re-check rotation of CA 16 tubes and secure control stick in neutral position.
 - Place W 74 aileron protractor on right hand wing and position aileron so that its trailing edge is 1° down from the neutral. Secure the aileron in this position and drill a No. 12 hole through the A 14 spacer, A 5 or A 17 torque tube and A 3 fittings and install bolt. Note direction of bolt. Ref. Detail E. Repeat procedure on left hand wing.
- 35 Pages 7²⁹ thru 7³² of this section show details of the flap control system. No text is supplied as the mechanism is a simple one and the drawings are sufficiently noted.

PARTS & MATERIALS CALL OUT

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CA 2	Disconnect Half-Inb'd	2	MBD5CA2	2024-T3 Alum Bar
CA 3	Disconnect Half-Outb'd	2	MBD5CA3	2024-T3 Alum Bar
CA 10	Mount Tube	4	BD-5-M-0155	.875 O.D. x .058 W 4130 "N" Stl Tube
CA 13	Control Rod, Aileron	2	BD-5-M-0149	.312 O.D. x .075 W 4130 Cond "N" Stl Tb
CA 11	Actuating, Arm Assy	2	BD-5-M-0111	.040 4130 "N" Stl Sht
CA 12	Actuating, Arm Assy	2	BD-5-M-0111	.040 4130 "N" Stl Sht
CA 15	Torque Tube, Cross	1	BD-5-M-0036	.750 O.D. x .35W 2024-T3 Alum Tubing
CA 16	Torque Tube, Fillet	2	BD-5-M-0036	.750 O.D. x .35W 2024-T3 Alum Tubing
CA 17	Spacer, U Joint	2	BD-5-M-0148	3/8 IPS, Schedule 40 D 6061-T6 Alum Tube
CA 20	Cover, BRG, Torque Tube	4	BD-5-M-0101	.032 2024-T3 Sheet
CA 21	Bracket, Support	1	BD-5-M-0101	.032 2024-T3 Sheet
CA 22	Stop, Right Aileron Control	1	BD-5-M-0101	.032 2024-T3 Sheet
CA 23	Bracket, Fillet Torque Tube L.H.	1	BD-5-M-0030	.063 2024-T3 Sheet
CA 24	Bracket, Fillet Torque Tube R.H.	1	BD-5-M-0030	.063 2024-T3 Sheet
CA 30	Bracket, Stop, Aileron	1	BD-5-M-0028	.032 2024-T3 Sheet
CA 32	Actuation Arm Assy, Lower	2		Consists of CA10 & CA12
CA 34	Support Intermediate	1	BD-5-M-0152	.125 Phenolic Sheet
CA 35	Trim Tab Aileron	1	BD-5-M-0027	2024-T3 Alclad
CF 2	Mount Tube Outer	2	BD-5-M-0056 & BD-5-M-0155	.875 O.D. x .058 W 4130 "N" Stl. Tube
CF 3	Torque Tube, Flap	2	BD-5-M-0150	.750 O.D. x .049 W 2024-T3 Al.
CF 4	Pin, Actuation Arm	2	MS20073-03-15	Steel Bolt
CF 7	Retainer	2	BD-5-M-0173	.125 Nylon Strip
CF 18	Web Outer Arm	2	BD-5-M-0111	.040 4130 "N" Stl Sht.
CF 27	Actuation Arm Assy, Outer	2		Consists of CF2, CF4, CF18, & CF35
CF 30	Retainer, Lower	2	BD-5-M-0134 & BD-5-M-0172	.875 DIA x .058 W 2024-T3 Tubing
CF 32	Guide Flap Actuator	2	BD-5-M-0175	1.0 x 1.0 2024-T351 AL AL Bar
CF 33	Stud, Flap Torque Tube	2	BD-5-M-0176	.75 DIA 4130 Cond "N" Stl Bar
CF 34	Abrasion Shield	1	BD-5-M-0100	Shink Tubing
CF 35	Arm, Outer Actuation	2	BD-5-M-0111	.040 4130 "N" Stl Sht
A 14	Bearing Shim	2	BD-5-M-0068	.75 O.D. x .058 W 2024-T3 AL Tube

(CONTINUED ON THE BACK SIDE OF PAGE 732)

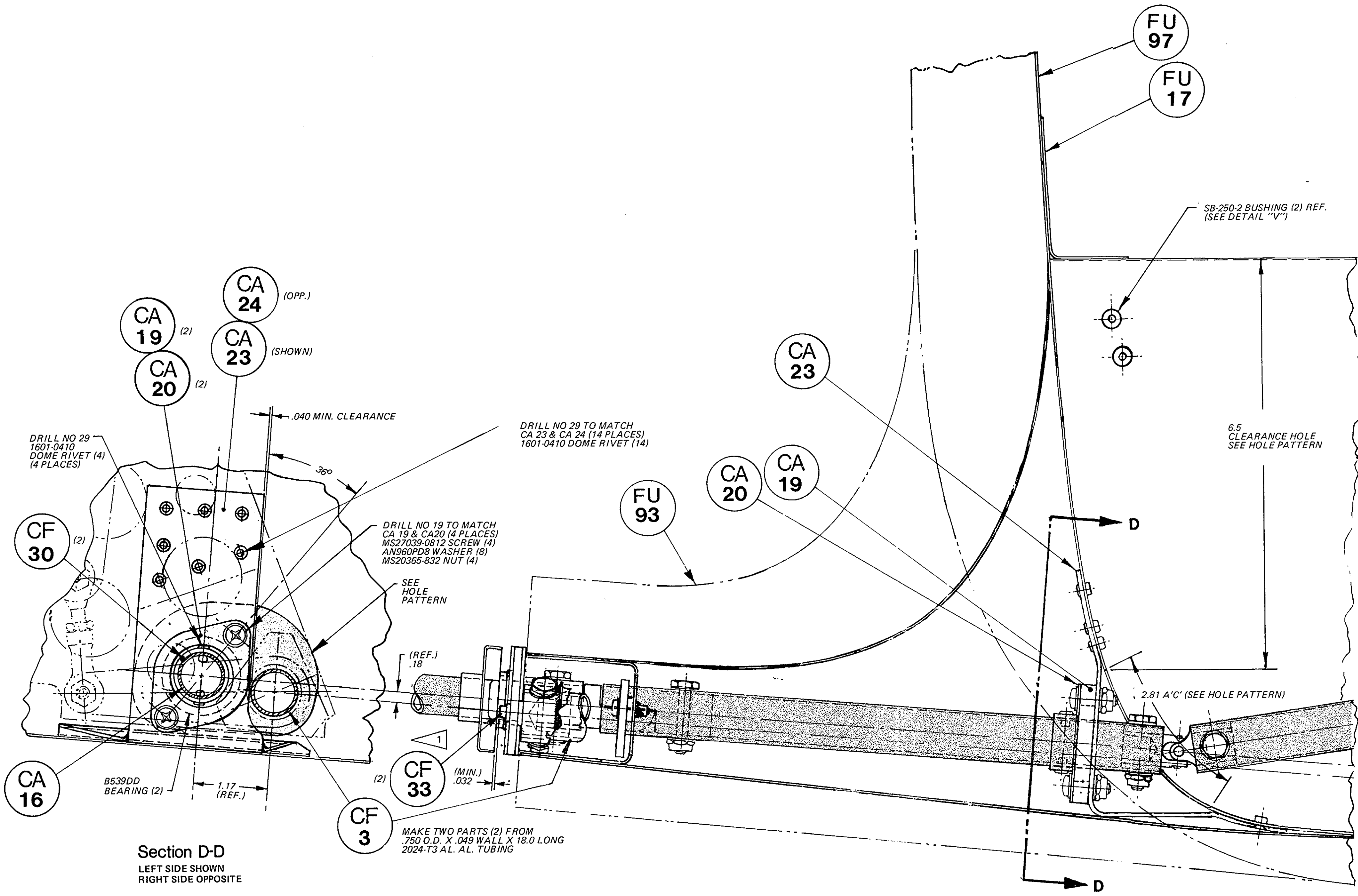


**DETAIL
A**

Section C-C

VIEW XX

**DETAIL
B**

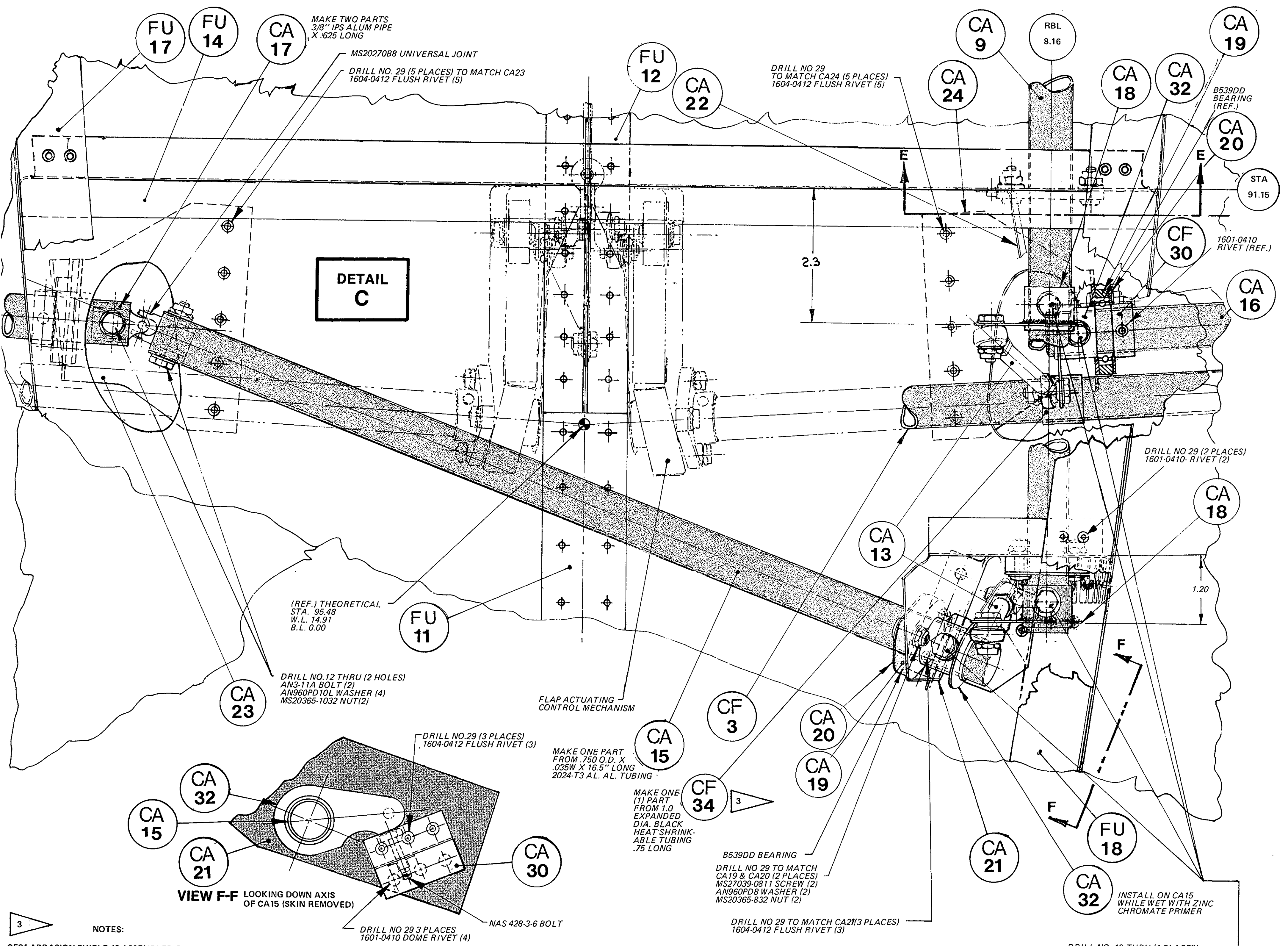


Section D-D
LEFT SIDE SHOWN
RIGHT SIDE OPPOSITE

NOTES:

1 THE PIN (.186/.185 DIA) OF CF33 STUD MAY REQUIRE SHORTENING TO MAINTAIN INDICATED CLEARANCE FROM F9 FLAP NOSE RIB. MAINTAIN INDICATED RADIUS SHOWN ON CF33 DETAIL. ENTRY HOLE OF FF-313-1 B'R'G MAY REQUIRE A CHAMFER TO EASE INSTALLATION OF CF33 STUD INTO BEARING AT WING INSTALLATION.

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**DETAIL
C**

(REF.) THEORETICAL
STA. 95.48
W.L. 14.91
B.L. 0.00

VIEW F-F LOOKING DOWN AXIS
OF CA15 (SKIN REMOVED)

NOTES:
 CF34 ABRASION SHIELD IS ASSEMBLED ON CF3 TORQUE TUBE (RH SIDE ONLY)
 IN THE SAME MANNER AS PER ASSEMBLY OF A18 ABRASION SHIELD ON THE
 ALERON TORQUE TUBE. SEE PAGE 4.

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DRILL NO.40 (12 PLACES)

CA 23

CA 24

MAKE ONE (1) PART CA24 (SHOWN) AND ONE (1) PART CA23 (OPP.) FROM .063" 2024-T3 ALUMINUM SHEET

.100" DIA. HOLE

IML - BEND DOWN 94° x .22" R.

IML BEND UP 15° APPROX x .22" R. TAB TO MATCH FUSELAGE CONTOUR

IML - BEND UP 14° x .22" R.

CA 30

FLAT PATTERN MAKE ONE (1) PART FROM .032 2024-T3 ALCLAD SHEET

IML-BEND UP 90° X.12" R

.03" x 45° CHAMFER (TYP)

CA 13

MAKE TWO (2) PARTS FROM .312 DIA. x .075" WALL 4130 COND "N" STEEL TUBING

COUNTERSINK 100° x .190" DIA. TAP 10-32 UNF-3B BOTH ENDS

IML - BEND UP 80° x .09" R. (2 PLACES)

CA 22

MAKE ONE PART FROM THIS FLAT PATTERN FROM .032" 2024-T3 ALUMINUM SHEET

DRILL No. 12 NAS697A3 NUTPLATE DRILL No. 40 (2 PLACES) CCR274SS-3-2 RIVET (2)

IML-BEND DOWN 85° X.12 R

DETAIL D

DRILL NO.12 NAS697A3 NUTPLATE DRILL NO.40 (2 PLACES) CCR274SS 3-2 RIVET (2)

IML BEND DOWN 100° x .09" R.

DRILL NO.40 (7 PLACES)

RBL 8.16

BD-0036-3 ROD END (2)

AN315-3R NUT (2)

Ø OF CA9

CA 13 (2)

TRUE LENGTH OF CONTROL ROD ASSY: 5.640"

28°

17°

CA 35

STA 92.6

2.90

W.L. 17

2.81 A.C.

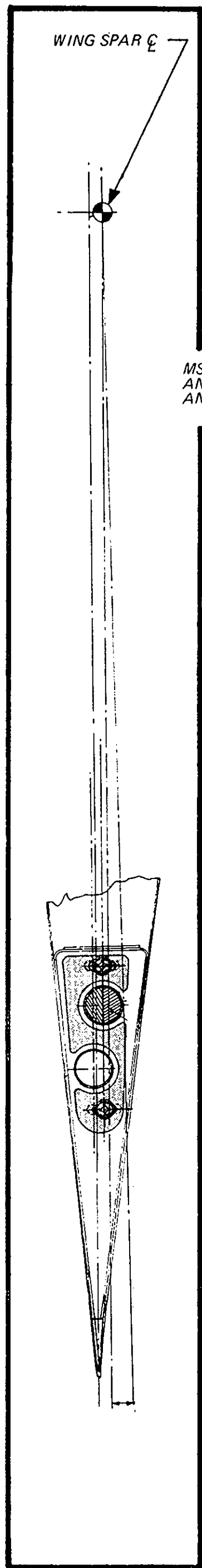
1.25 R. (TYP.)

FU 97 (SHOWN)

FU 98 (OPP.)

.75R (TYP.)

HOLE PATTERN CLEARANCE HOLE FOR AILERON & FLAP TORQUE TUBES (TYP. 2 PLACES) ADDITIONAL TRIM MAY BE NECESSARY FOR PROPER CLEARANCE



.125 (REF.)
.18 (REF.)

DETAIL E

MS27039-0808 SCREW (4)
AN960PD8 WASHER (4)
AN960PD8L WASHER (4)

CF 7 (2)

CA 3 (2)

CF 3 (2)

(SHOWN)
FU 141
FU 142
(OPP.)

WING CHORD LINE (REF.)
THEORETICAL WATER LINE
(REF.) .25
1° ANGLE OF INCIDENCE (REF.)

Section B-B

A 17

CA 16

CA 2 (2)

W 50 (REF.)

DRILL NO 12 THRU (4 PLACES)
AN3-11A BOLT (4)
AN960PD10L WASHER (8)
MS20365-1032 NUT (4)

F 1

CF 32 (2)

F 10

DRILL NO 29 TO C PLANE OF CF32 GUIDE
1604-0412 FLUSH RIVET (TYP. BOTH FLAPS)

A 14 (2)

A ←

CF 27

INSTALL ON CF3 TORQUE TUBE WHILE WET WITH ZINC CHROMATE PRIMER (2 PLACES)

(FILLET)
B.L. 17.999

(WING)
BL 18.021

FU 141

CF 3

C OF CF27 ACTUATION ARM ASSY

FU 93

Section A-A

DRILL NO 36 (4 PLACES)
TAP6-32 UNC-2A (4)
MS24693-526 SCREW (4)

DRILL NO 29 (4 PLACES)
1604-0412 FLUSH RIVET (4)

CF 33

MAKE TWO (2) PARTS FROM .750 O.D. X .035 WALL X 9" LONG 2024-T3 AL. AL. TUBING

CA 3 (2)

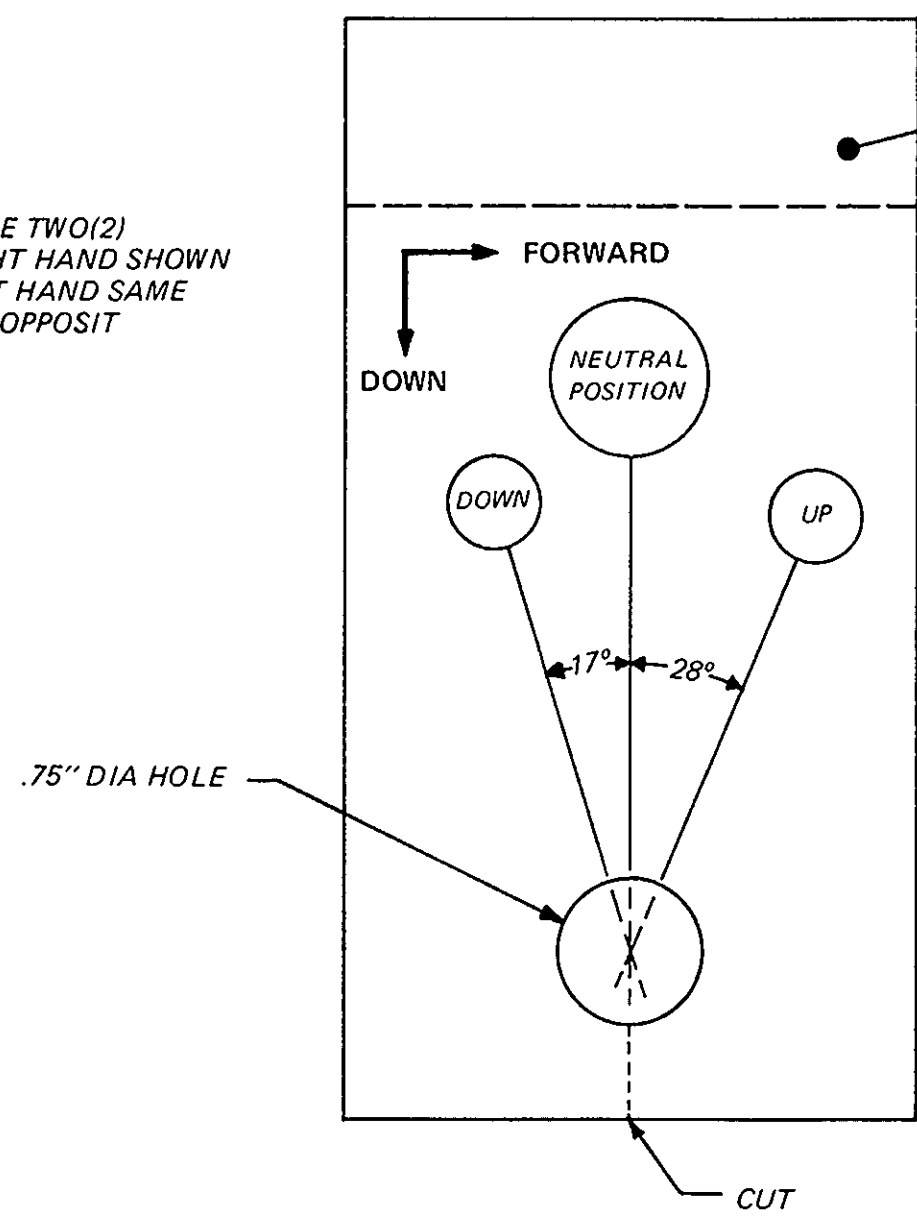
CA 2 (2)

CA 16

CF 27

AILERON PROTRACTOR

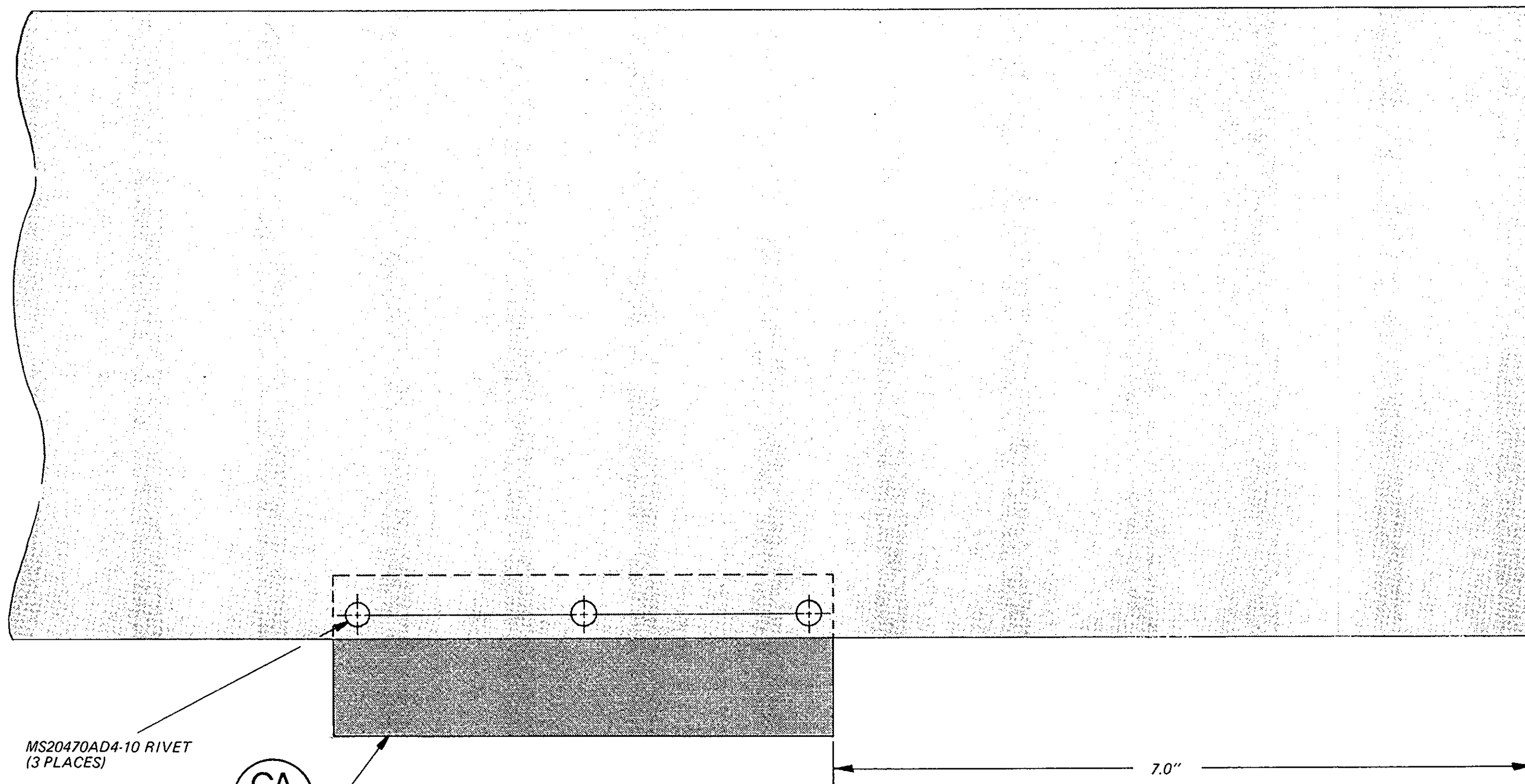
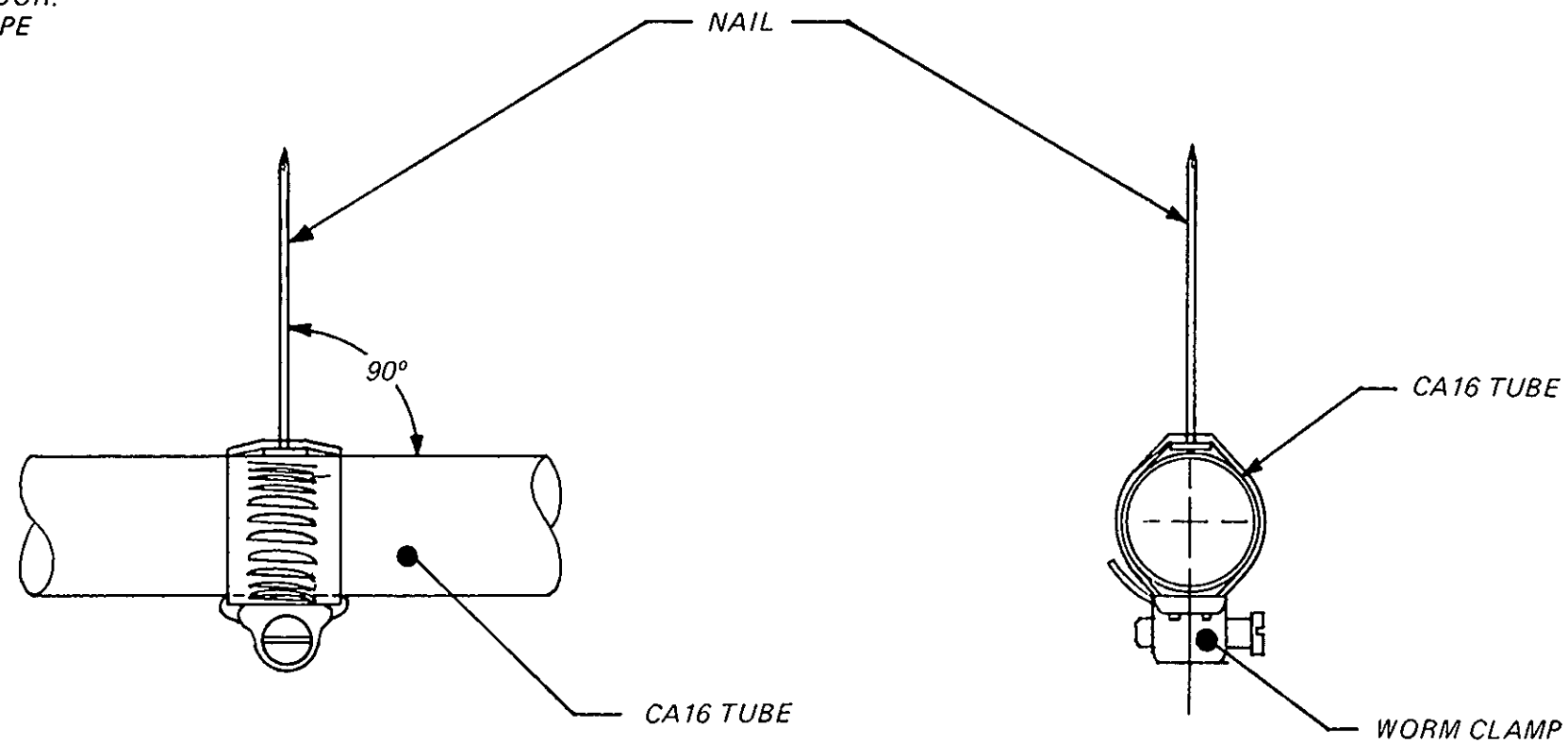
MAKE TWO(2)
RIGHT HAND SHOWN
LEFT HAND SAME
BUT OPPOSIT



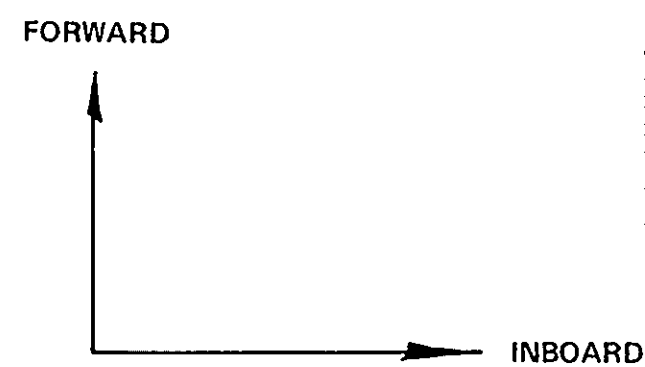
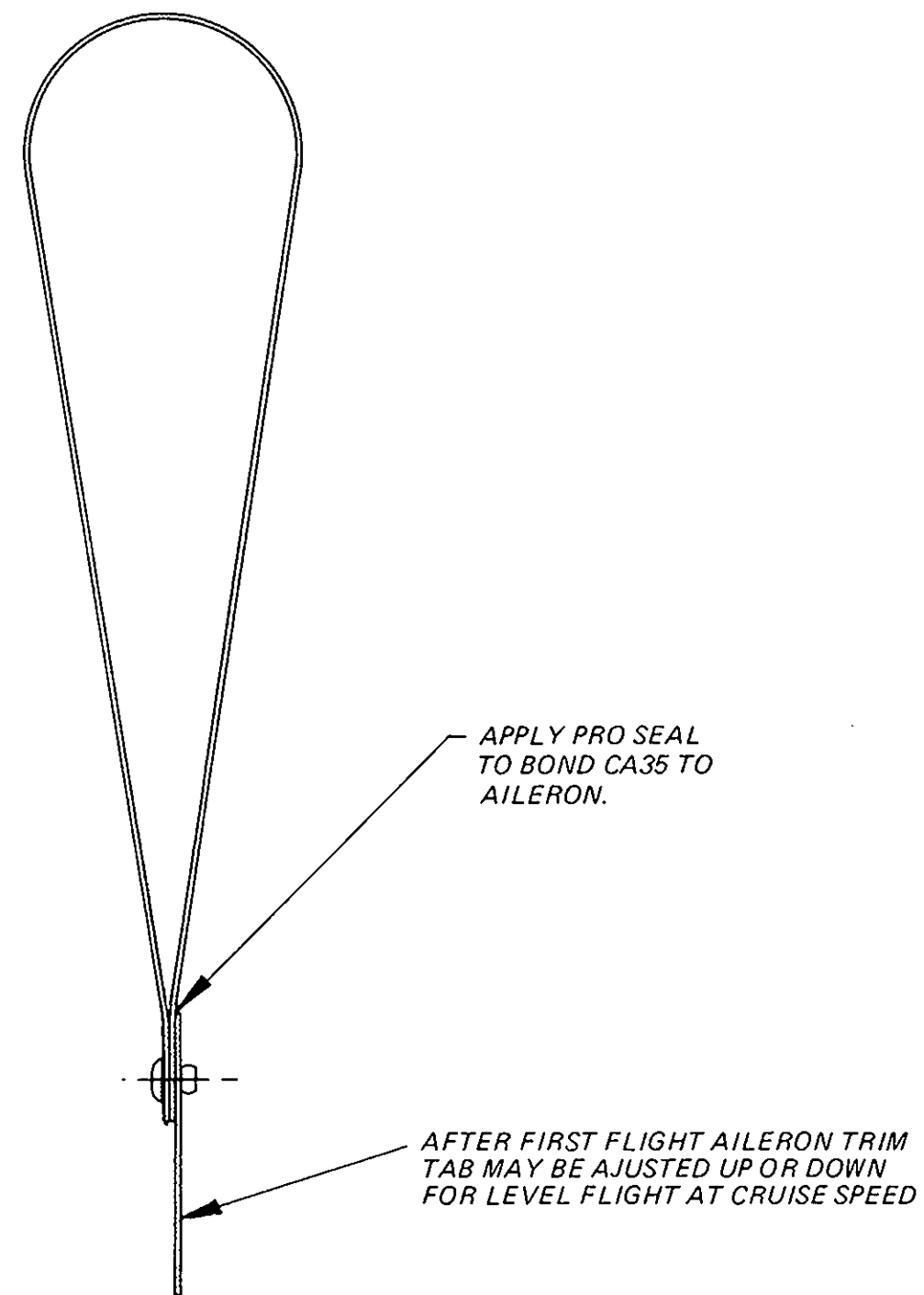
HEAVY CARDBOARD
OR LIGHT GAUGE SHEETMETAL

BEND TAB TO MATCH
FUSELAGE CONTOUR.
AND GLUE OR TAPE
TO FUSELAGE

**DETAIL
F**



MAKE ONE PART FROM .025"
2024-T3



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MS20392-2C11 PIN
 AN960-10L WASHER (2) (UNDER COTTER PIN)
 AN960-10 WASHER (2) (ONE ON EACH SIDE OF
 CF12 BETWEEN CLEVIS)
 MS24665-132 COTTER PIN

MS21251-A3S TURNBUCKLE BODY
 MS21252-3RS CLEVIS END
 .032 SAFETY WIRE

MS21255-3LS EYE END (REF.)

DRILL NO.29 (12 PLACES)
 TO MATCH CF13 AND CF14
 1604-0412 FLUSH RIVET (12)

B.L.
 0.00

FU
 14

STA
 91.15

FU
 17

CF
 31

4.20"
 (REF.)

W.L.
 23.5

CF
 29

CF
 12

AN3-4 BOLT
 AN960PD10L WASHER (UNDER BOLT HEAD)
 AN960-10L WASHER (BETWEEN CF12 AND CF29)
 AN960PD10 WASHER (BETWEEN CF29, AND NUT) (2)
 AN310-3 NUT OR AN320-3
 MS24665-132 COTTER PIN

CF
 6

CF
 15

TO DETAIL "K"

MAX. FLAP
 ACTUATION
 AVAILABLE
 PROVIDES 45°
 MAX. FLAP

DETAIL
 G

CF
 11

BD-0082 SPRING

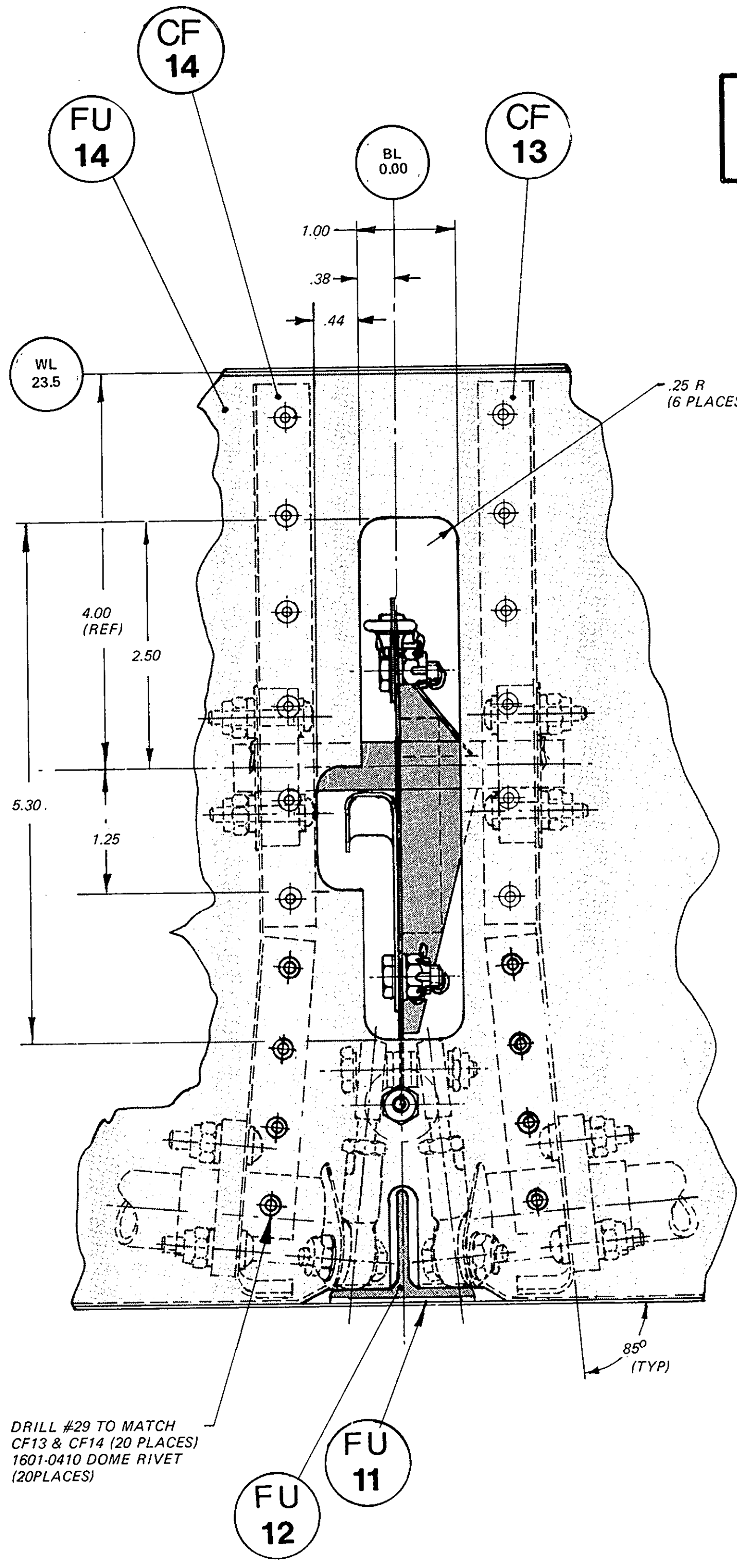
CF
 25

DRILL NO.19
 MS24694-S9 SCREW
 AN960PD8 WASHER
 MS20365-832 NUT

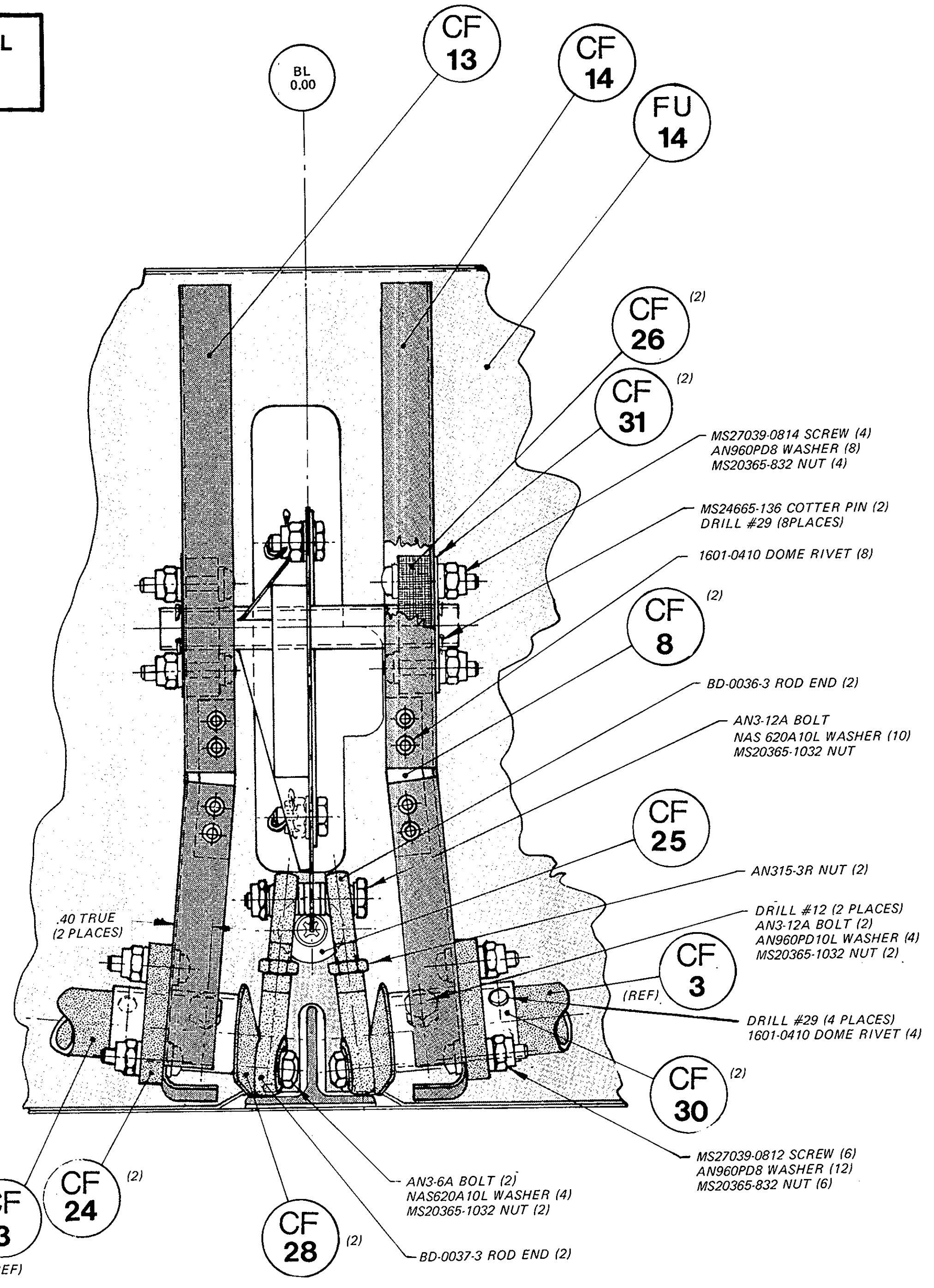
AN3-4 BOLT (2)
 AN960PD10L WASHER (2) (UNDER HEAD)
 AN960-10L WASHER (2) (ONE BETWEEN
 CF15 AND CF29 AND ONE BETWEEN CF15 AND CF11)
 AN960PD10 WASHER (4) (UNDER NUT)
 AN310-3 NUT (2) OR AN320-3
 MS24665-132 COTTER PIN (2)

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DETAIL H



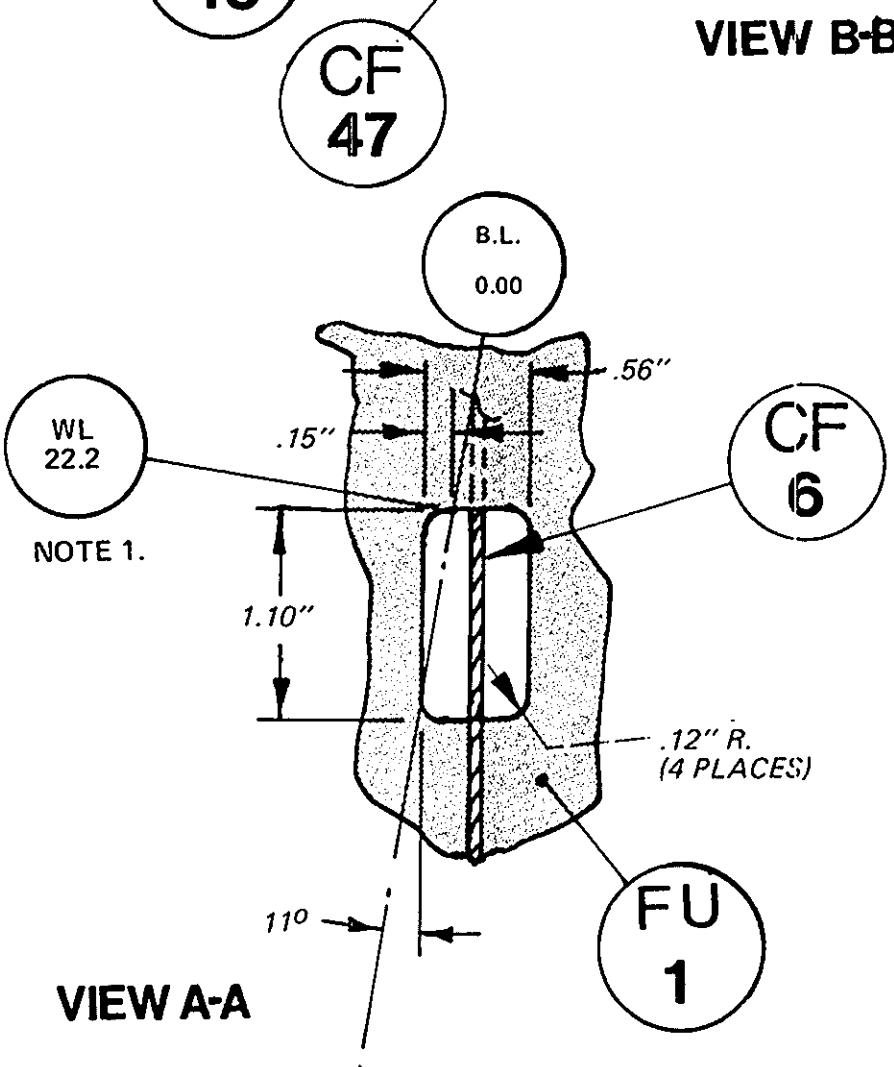
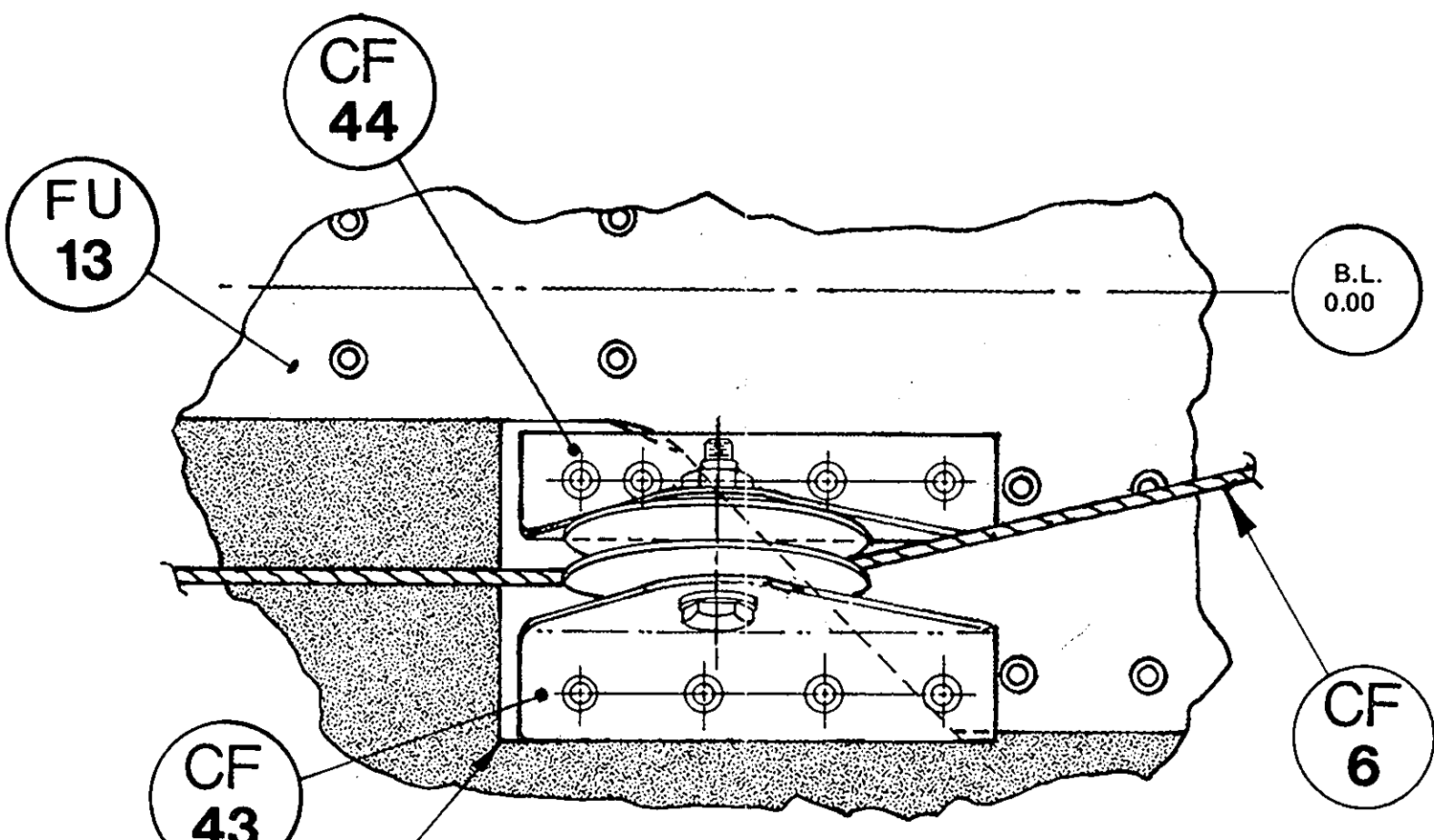
VIEW A-A



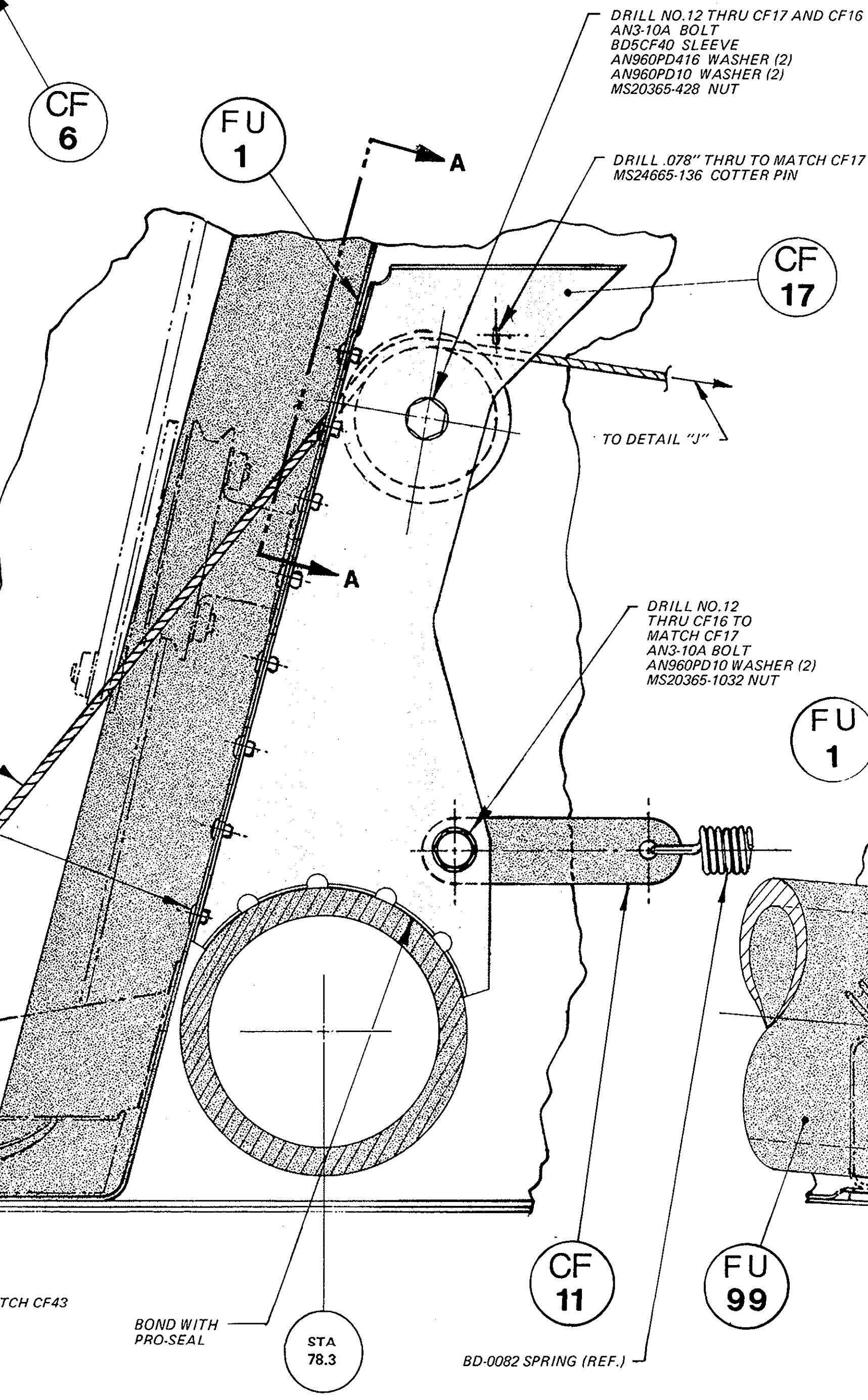
WITH SKIN REMOVED AFT OF STA 91.15

VIEW B-B

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NOTES:
 1. CUT SLOT FOR FLAP CABLE. MAINTAIN MIN. .12" CLEARANCE BETWEEN CF6 CABLE AND FU1 BULKHEAD. IF SLOT CUT TOO LONG, RIVET .032" x .5" x 1.5" 2024-T3 SHEET ACROSS SLOT WHILE MAINTAINING MIN. .12" CLEARANCE.



DRILL NO.12 THRU CF17 AND CF16 TO MATCH CF17
 AN3-10A BOLT
 BD5CF40 SLEEVE
 AN960PD416 WASHER (2)
 AN960PD10 WASHER (2)
 MS20365-428 NUT

DRILL .078" THRU TO MATCH CF17
 MS24665-136 COTTER PIN

DRILL NO.12 THRU CF16 TO MATCH CF17
 AN3-10A BOLT
 AN960PD10 WASHER (2)
 MS20365-1032 NUT

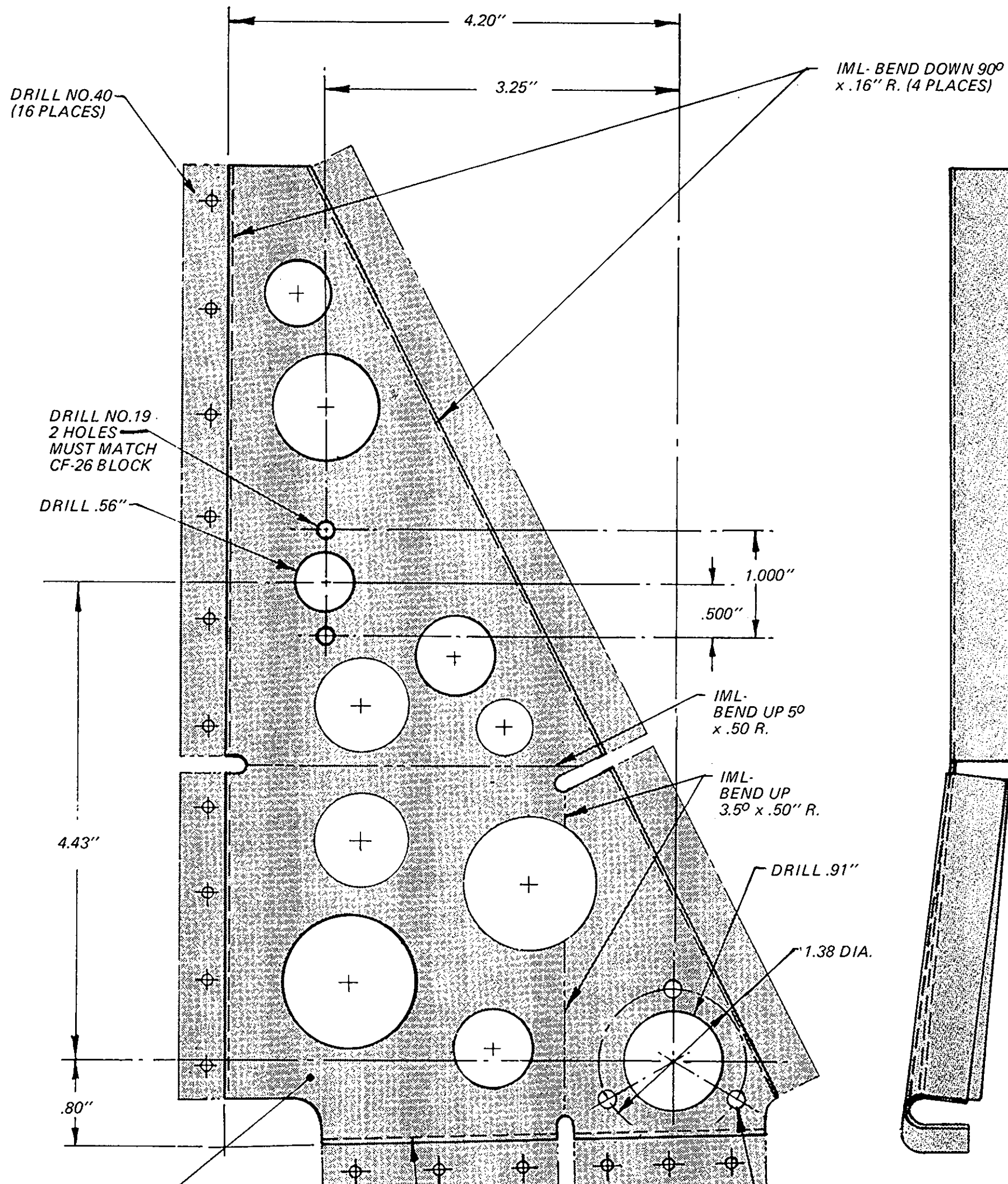
DRILL NO.29 (16 PLACES)
 1601-0410 DOME RIVET (16)

DRILL NO.29 (8 HOLES)
 1604-0412 RIVET (FLUSH) (8)

DRILL NO.12 THRU CF44 TO MATCH CF43
 AN3-10A BOLT
 BD5CF40 SLEEVE
 AN960PD416 WASHER (2)
 AN960PD10 WASHER (2)
 MS20365-428 NUT

MAKE THREE (3) PARTS FROM .25" O.D. x .028" WALL x .41" +/- .01" LG 2024-T3 ALUMINUM TUBING

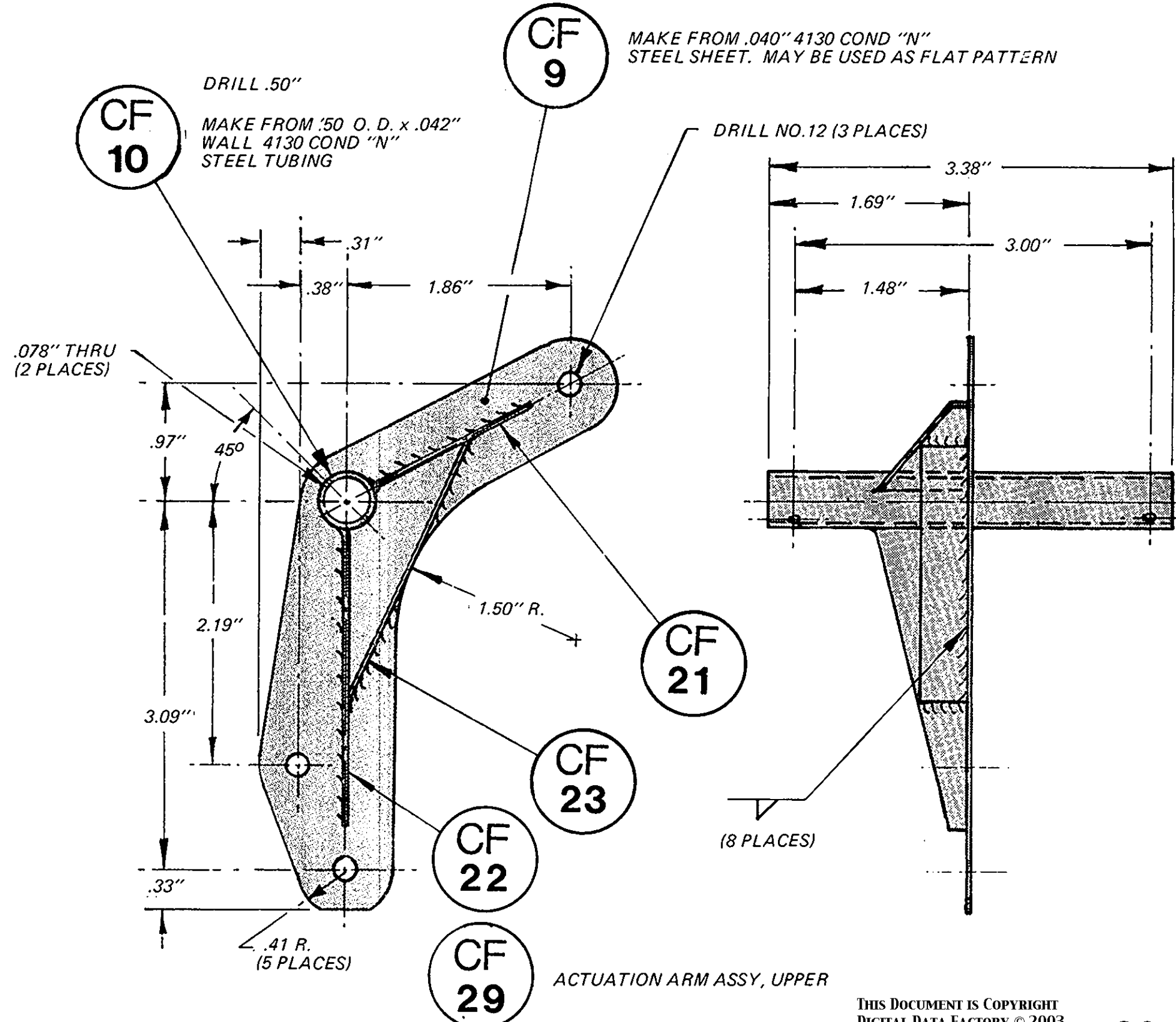
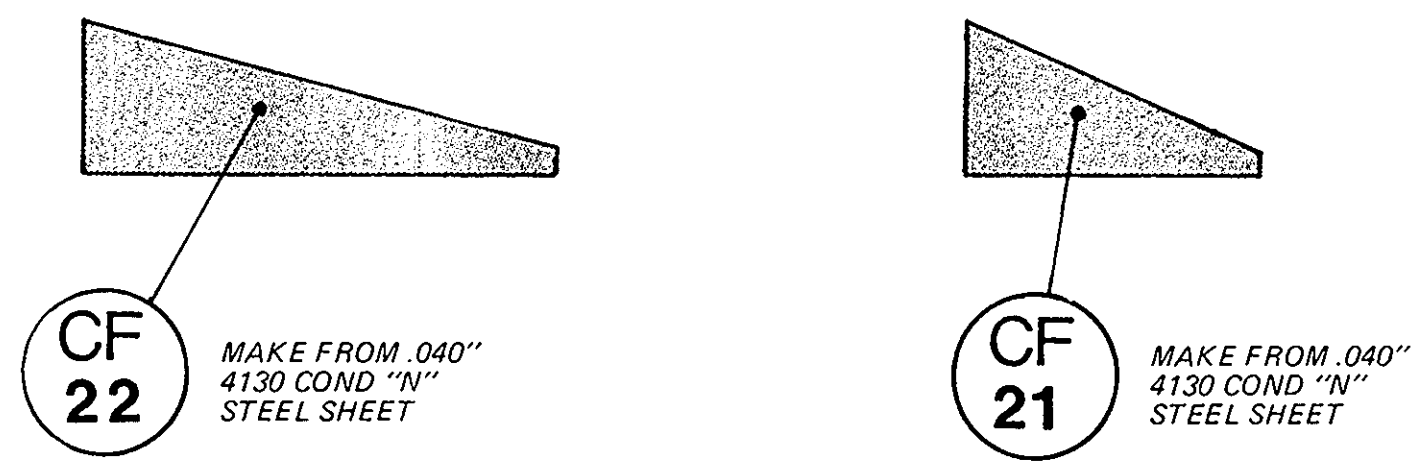
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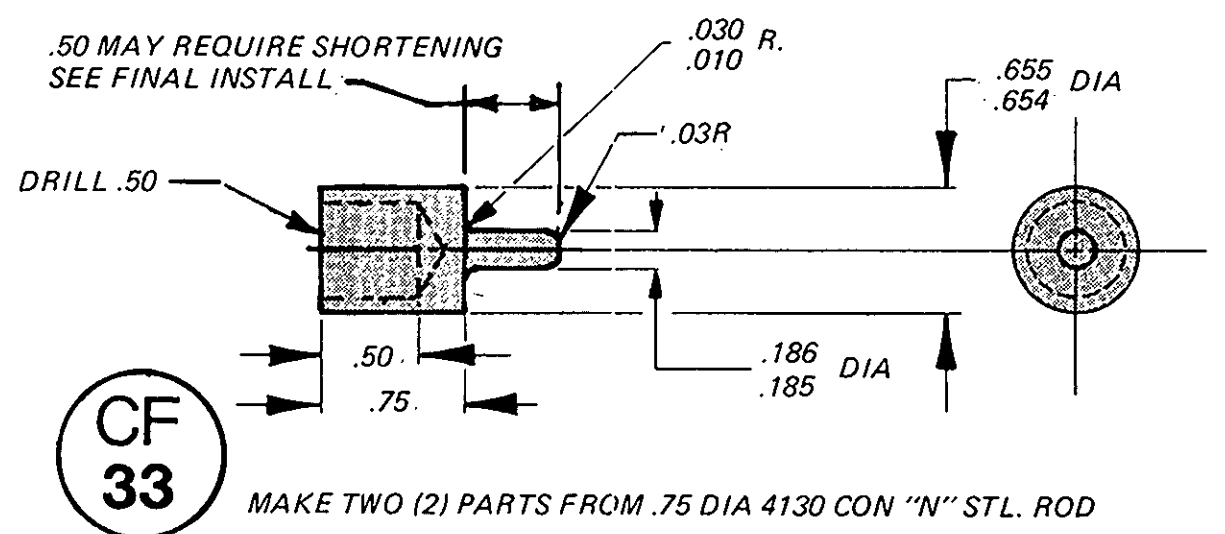
CF 13 SHOWN
CF 14 OPP.
 MAKE ONE EACH FROM THIS FLAT PATTERN FROM .040" 2024-T3 ALUMINUM SHEET

IML - BEND DOWN 95° x .16" R. (2 PLACES)

DRILL NO.19 3 HOLES EQUALLY SPACES MUST MATCH CF24 BLOCK

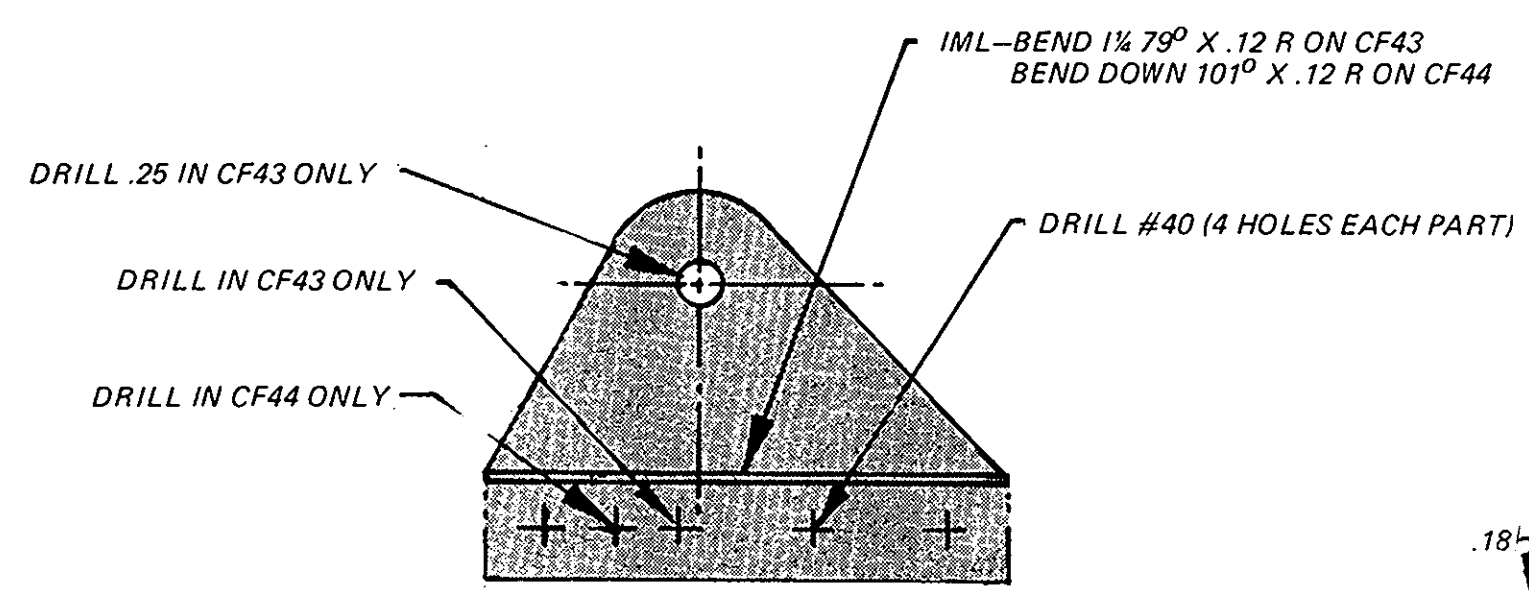


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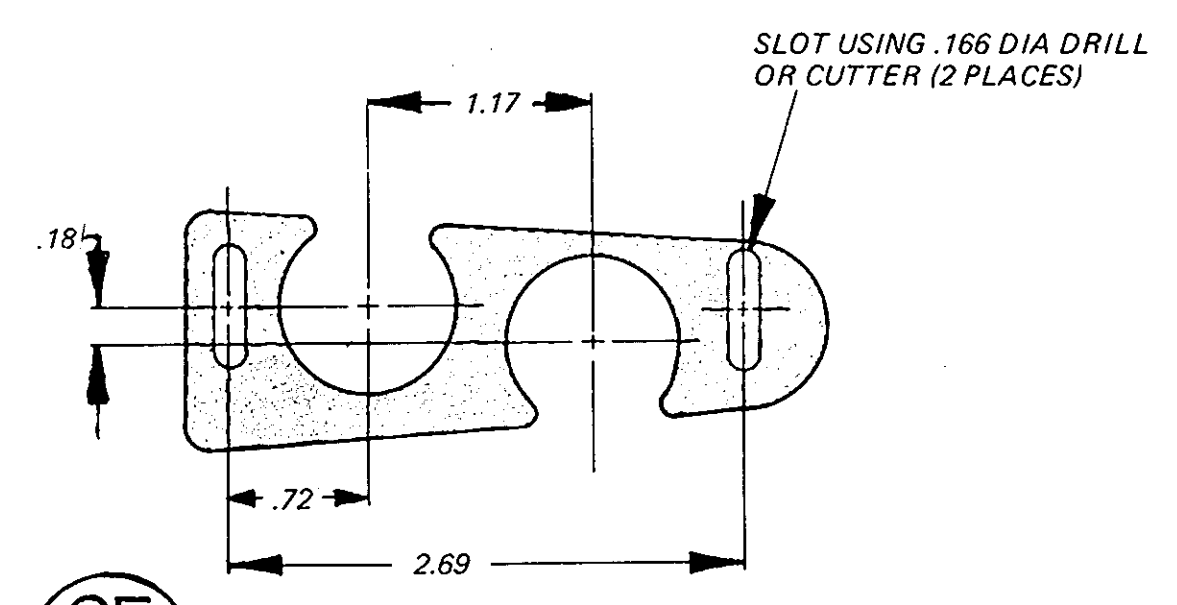
CF 33

MAKE TWO (2) PARTS FROM .75 DIA 4130 CON "N" STL. ROD



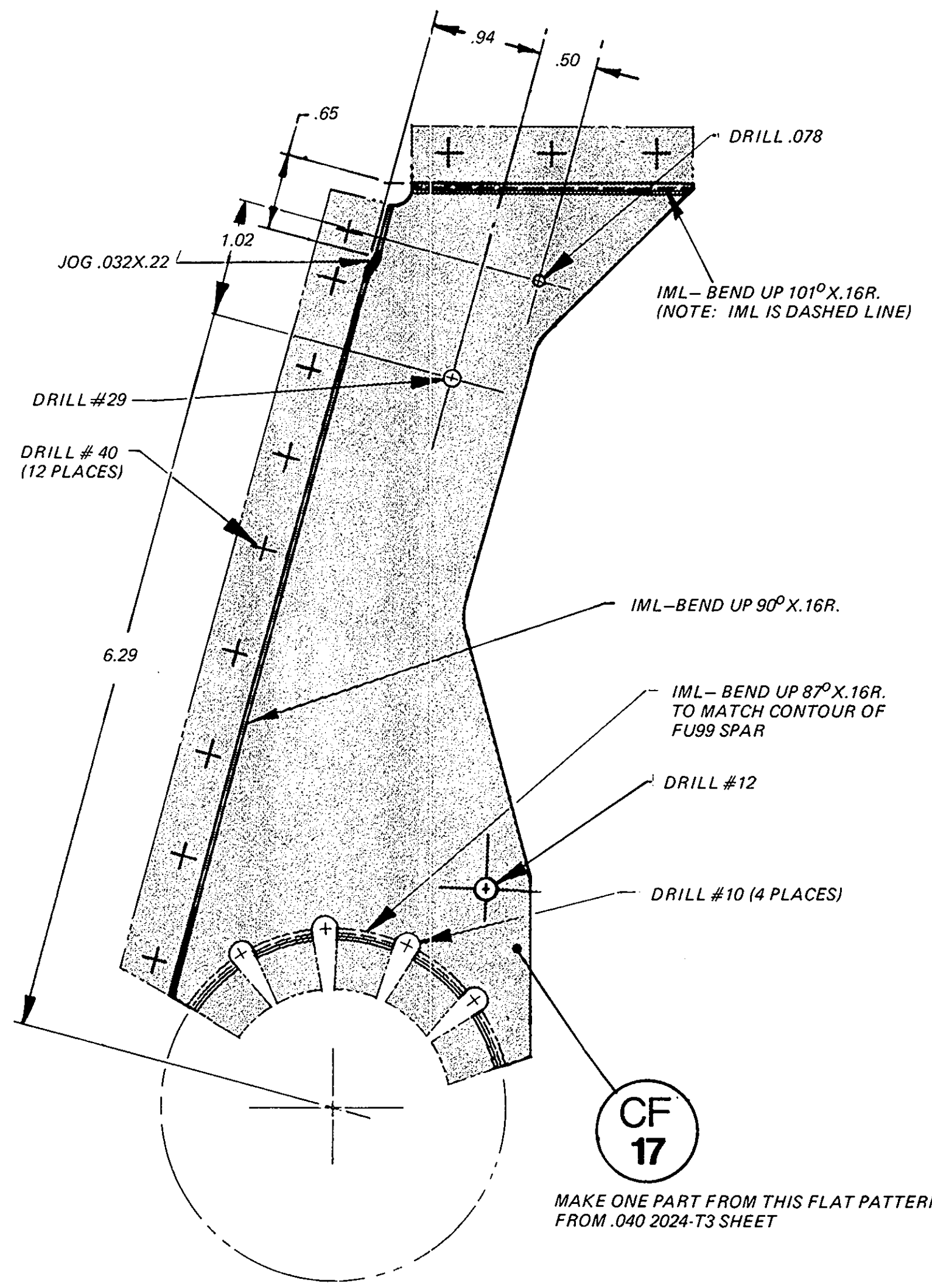
CF 43
CF 44

MAKE ONE OF EACH FROM THIS FLAT PATTERN FROM .032 2024-T3 SHEET



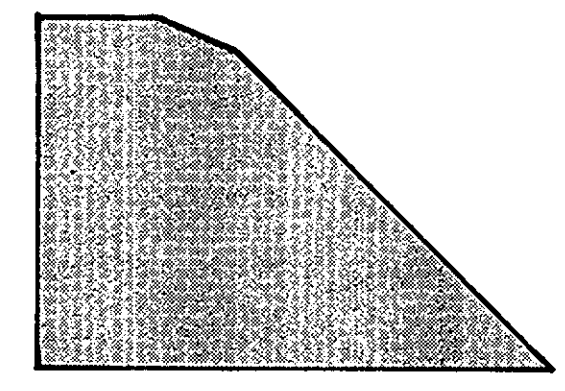
CF 7

MAKE TWO (2) PARTS FROM THIS FLAT PATTERN FROM .125 NYLON STRIP



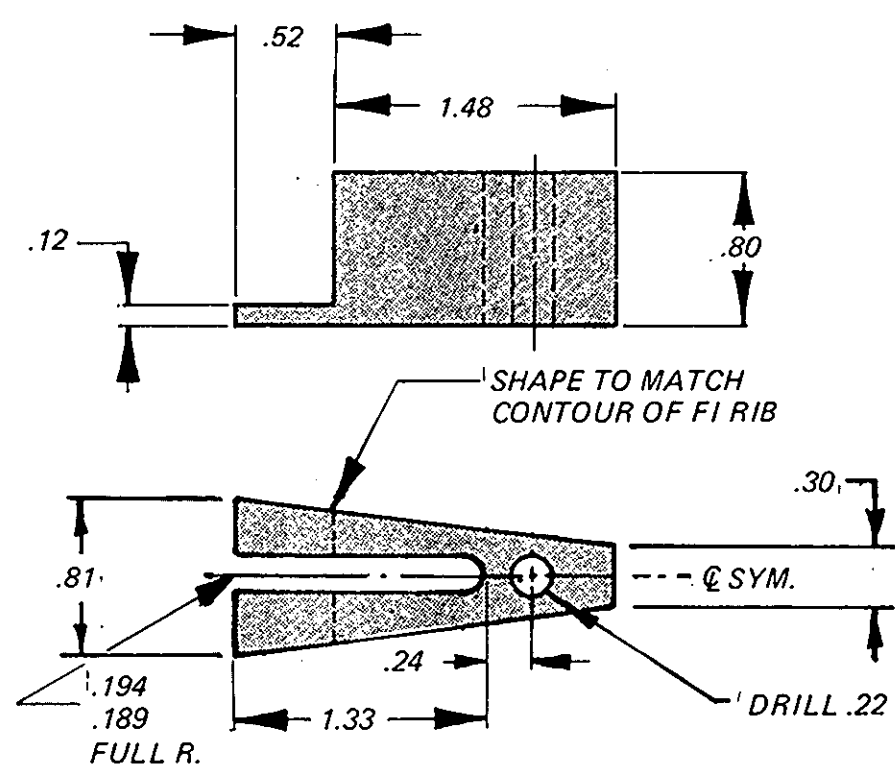
CF 17

MAKE ONE PART FROM THIS FLAT PATTERN FROM .040 2024-T3 SHEET



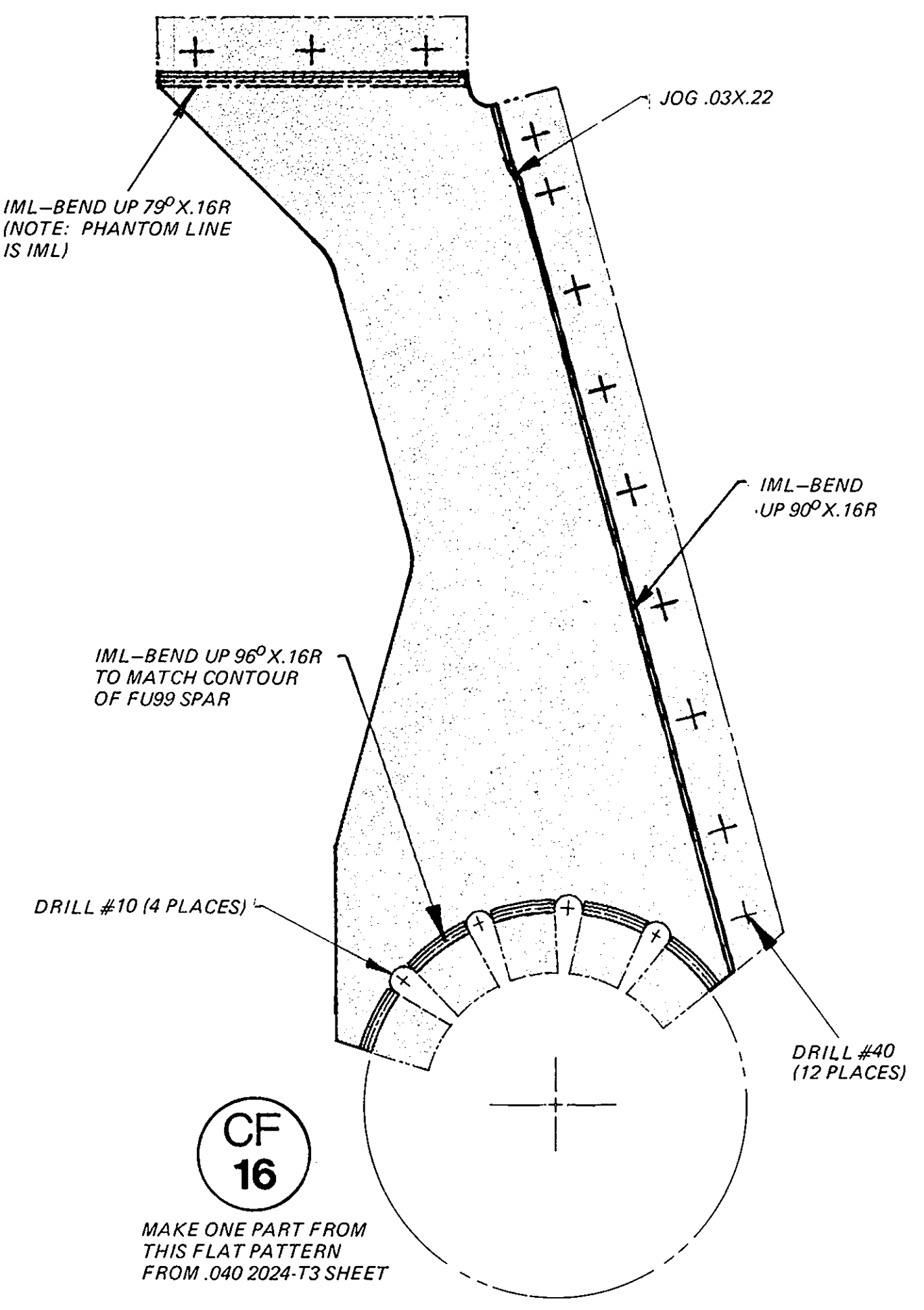
CF 47

MAKE ONE FROM THIS FLAT PATTERN FROM .063 2024-T3 SHEET



CF 32

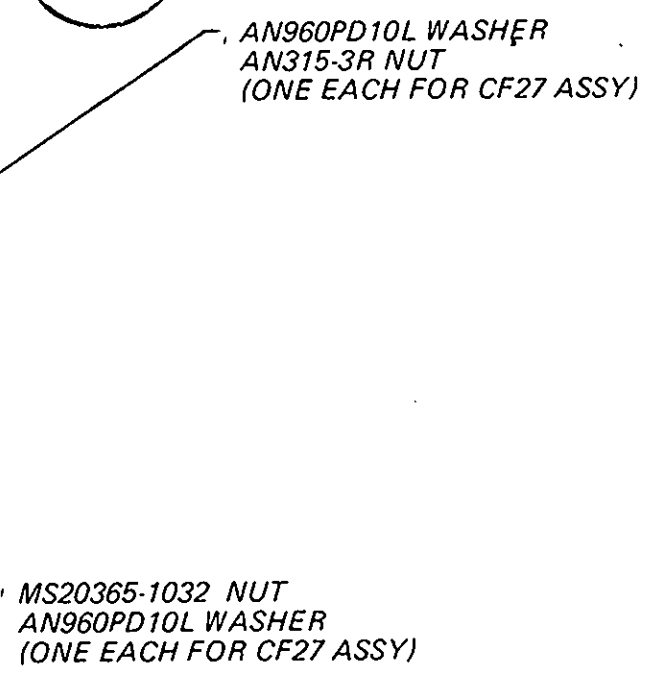
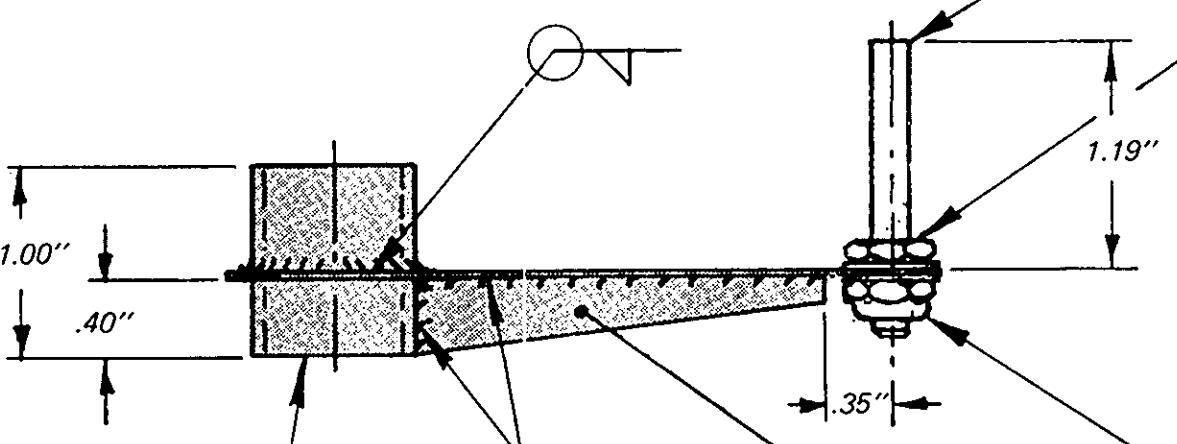
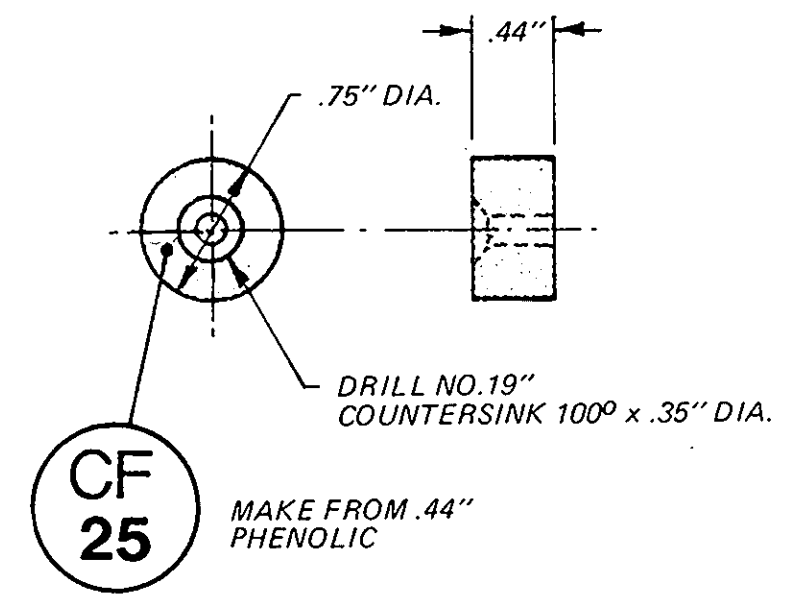
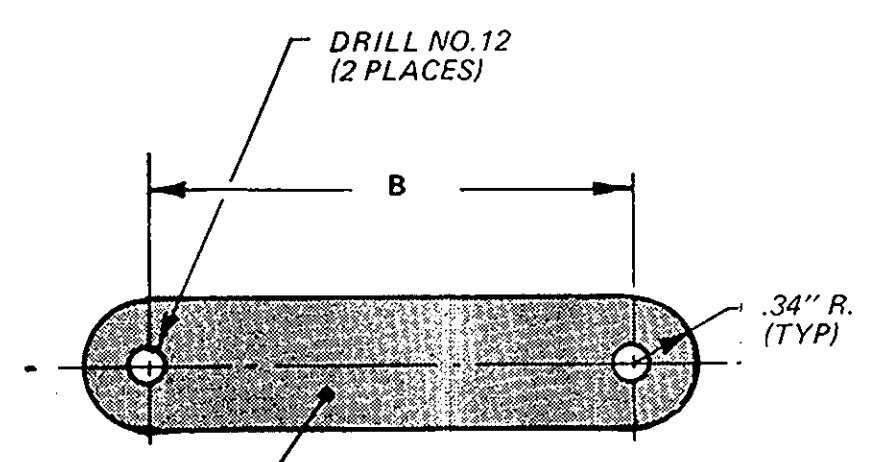
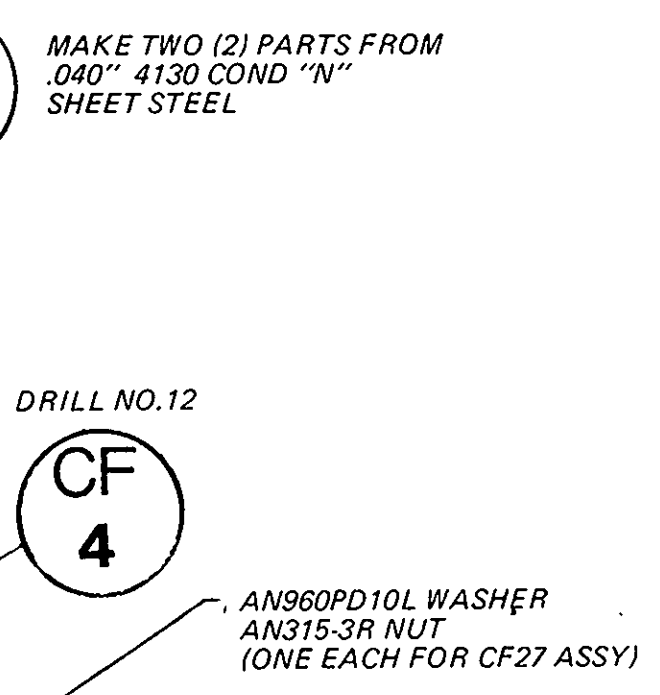
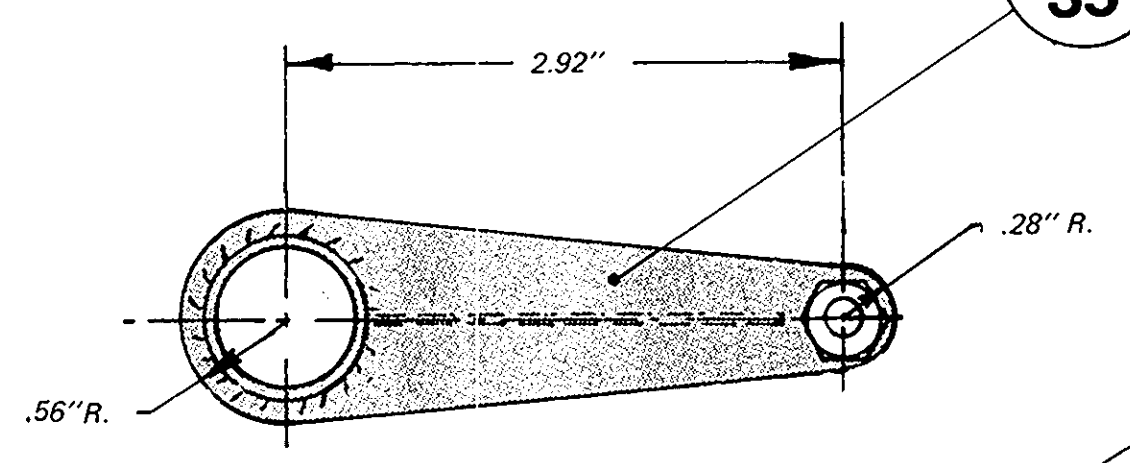
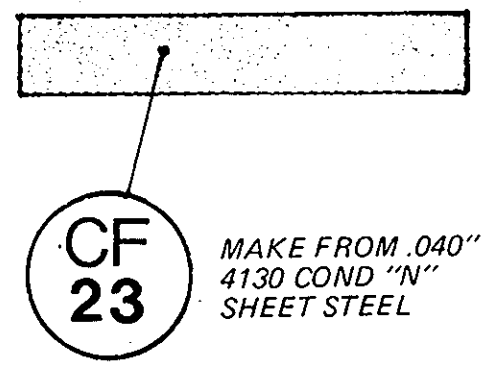
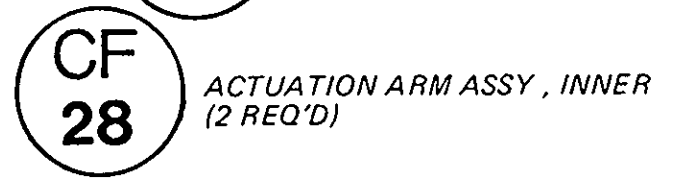
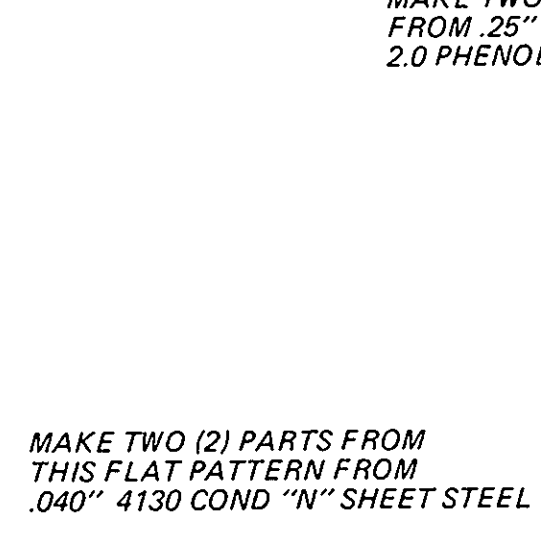
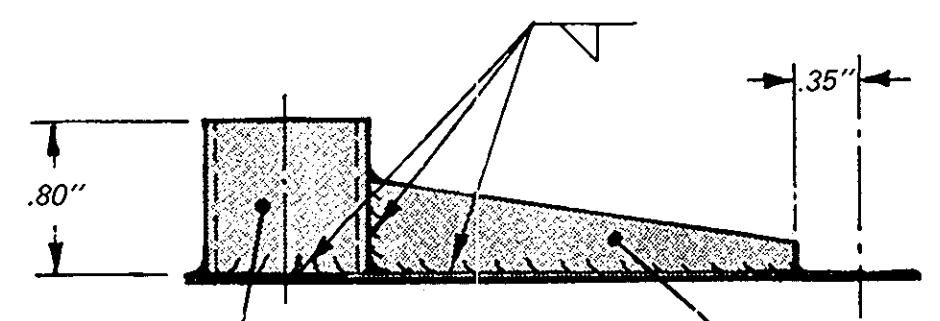
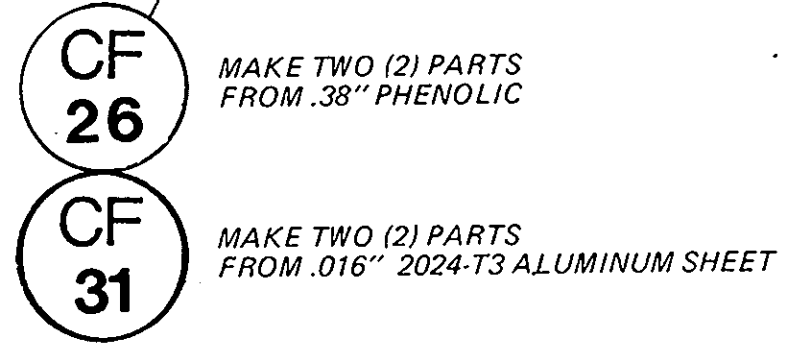
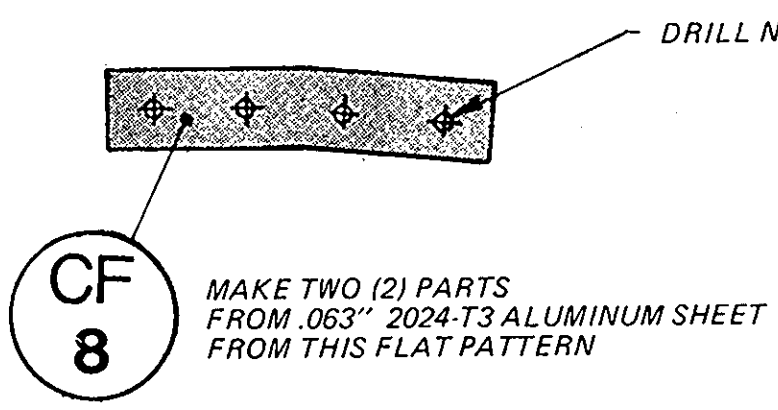
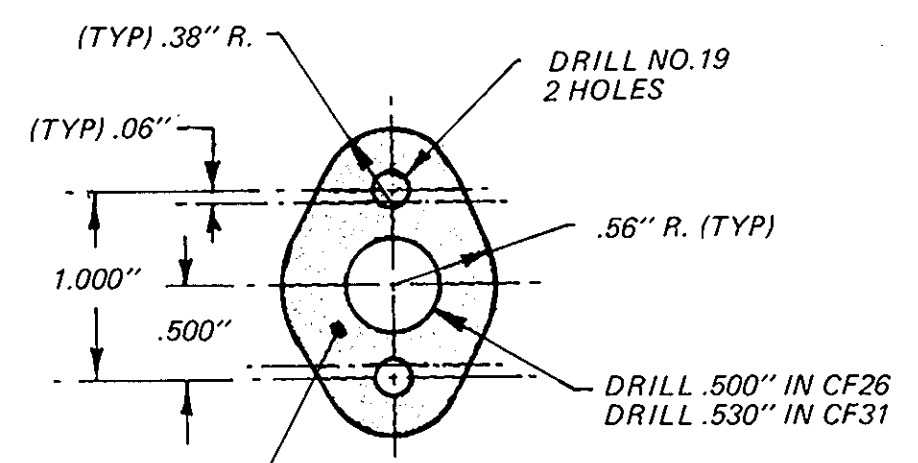
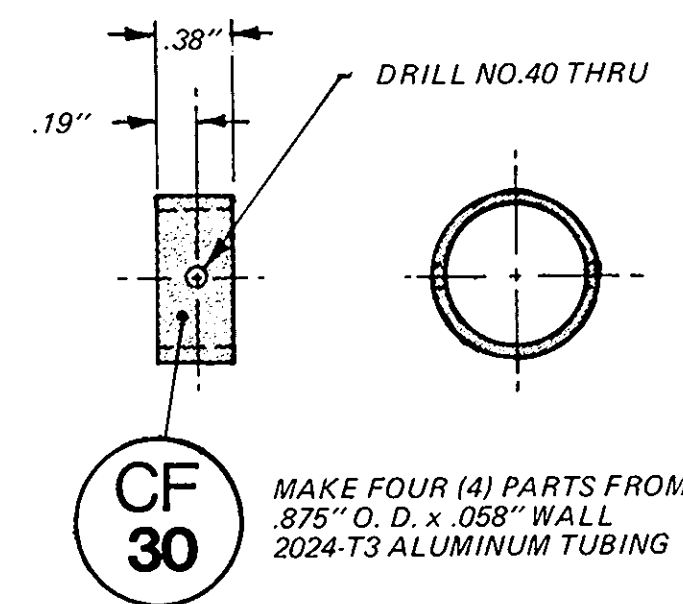
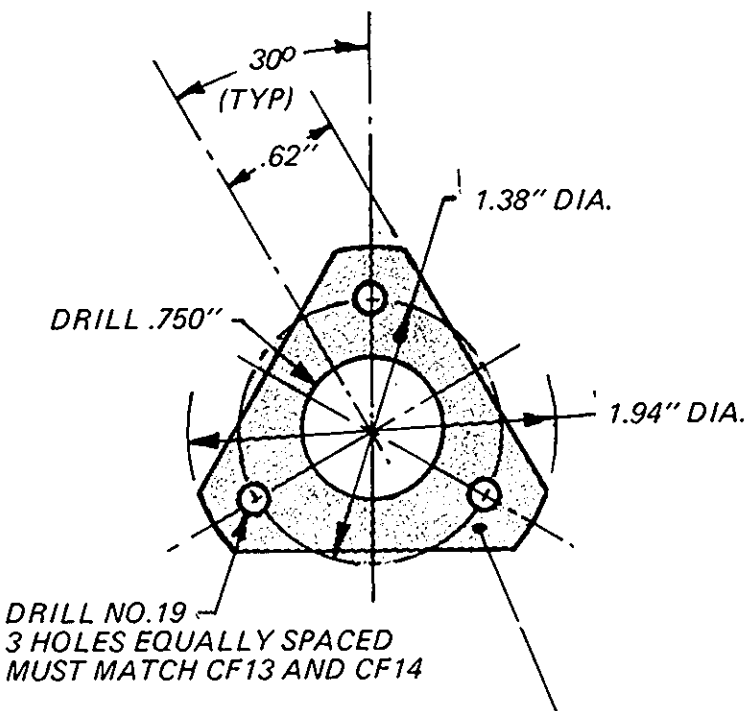
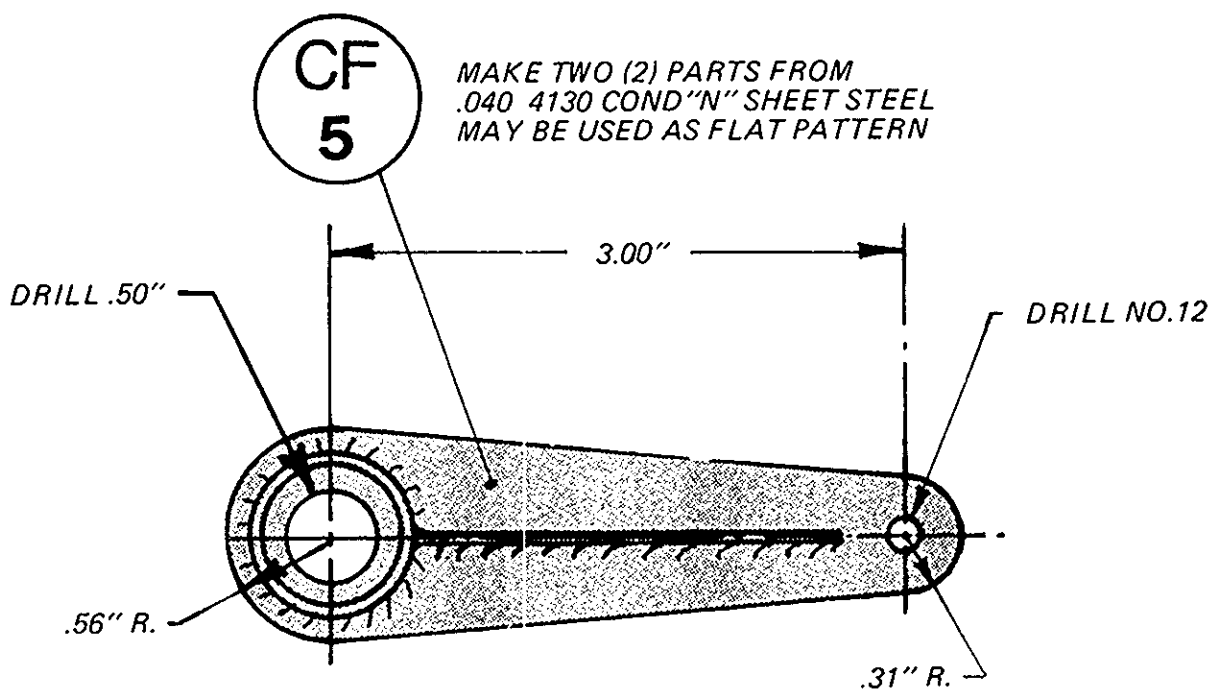
MAKE TWO (2) PARTS FROM 1X1 2024-T351 AL AL BAR



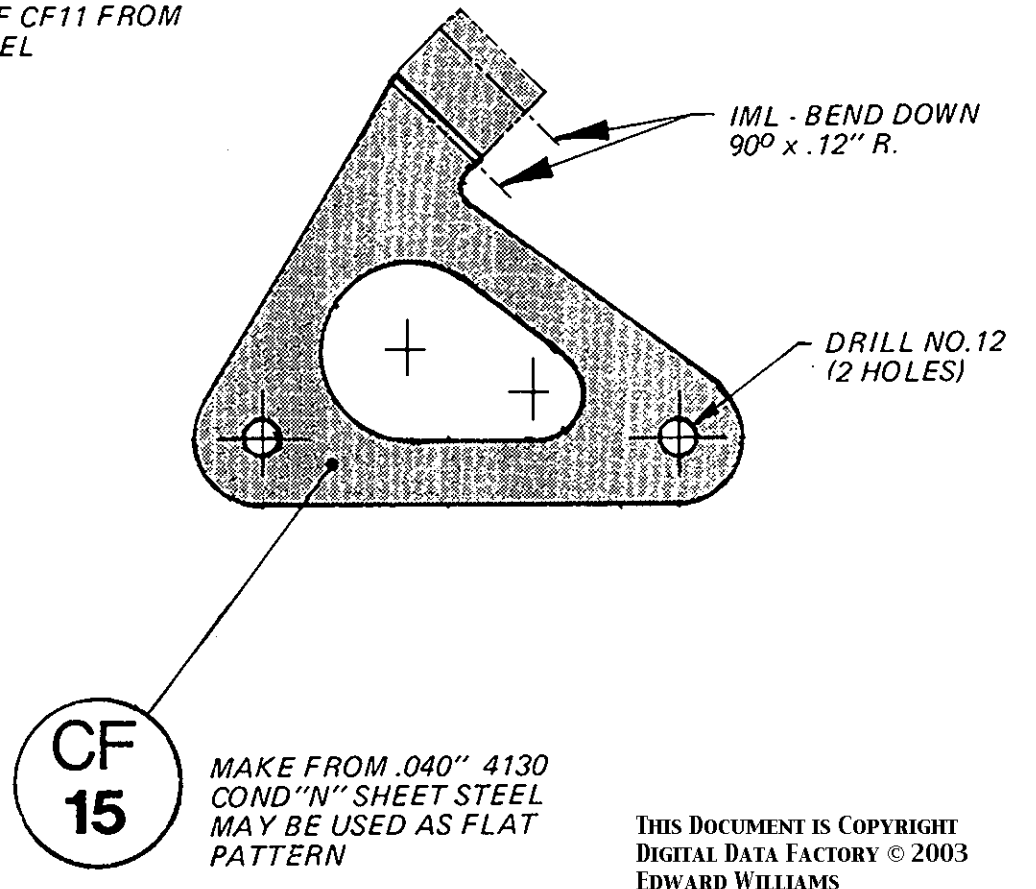
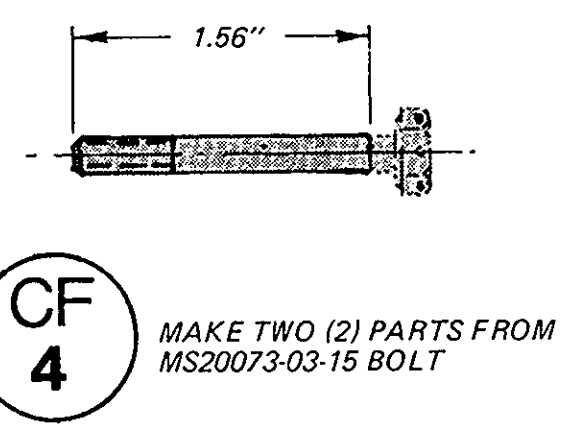
CF 16

MAKE ONE PART FROM THIS FLAT PATTERN FROM .040 2024-T3 SHEET

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PART NO	DIM "B"
CF12	2.50"
CF11	2.00"



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PARTS & MATERIALS CALL OUT

(CONTINUED FROM FROM PAGE 720)

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CF 5	Arm, Inner Actuation	2	BD-5-M-0111	.040 4130 Cond N Sheet Steel
CF 8	Splice	2	BD-5-M-0030	.063 2024-T3 AL Sheet
CF 9	Arm, Upper Actuation	1	BD-5-M-0111	.040 4130 Cond N
CF 10	Mount Tube, Upper Arm	1	BD-5-M-0144	.500 Dia x .042 W 4130 Cond N Steel Tubing
CF 11	Link, Spring	2	BD-5-M-0111	.040 4130 Cond "N"
CF 12	Link, Cable	1	BD-5-M-0111	.040 4130 Cond "N"
CF 13	Bracket, L. H.	1	BD-5-M-0088	.040 2024-T3
CF 14	Bracket, R. H.	1	BD-5-M-0088	.040 2024-T3
CF 15	Cam Spring Link	1	BD-5-M-0111	.040 4130 Cond "N"
CF 16	Bracket, Pulley Support R.H.	1	BD-5-M-0088	.040 2024-T3
CF 17	Bracket, Pulley Support L.H.	1	BD-5-M-0088	.040 2024-T3
CF 19	Web, Inner Arm	2	BD-5-M-0111	.040 4130 Cond "N"
CF 20	Mount Tube, Inner Arm	2	BD-5-M-0155	.875 O.D. x .058W 4130 Cond "N" Steel Tubing
CF 21	Web, Upper Center Arm	1	BD-5-M-0111	.040 4130 Cond "N"
CF 22	Web, Lower Center Arm	1	BD-5-M-0111	.040 4130 Cond "N"
CF 23	Web, Center Arm	1	BD-5-M-0111	.040 4130 Cond "N"
CF 24	Housing, Lower B'R'G	2	BD-5-M-0140	.25 Phenolic Plate
CF 25	Stop	1	BD-5-M-0146	.44 Phenolic Plate
CF 26	Housing, Upper B'R'G	2	BD-5-M-0122	.38 Phenolic Plate
CF 28	Actuation Arm Assy, Inner	2		Consists of CF5, CF19, & CF20
CF 29	Actuation Arm Assy, Upper	1		Consists of CF9, CF10, CF21 CF22 & CF23
CF 30	Retainer, Lower	2	BD-5-M-0134 & BD-5-M-0172	.875 O.D. x .058 W 2024-T3 Tubing
CF 31	Cover, Upper B'R'G	2	BD-5-M-0025	.016 2024-T3
CF 40	Spacer	3	BD-5-M-0123	.25 DIA x .028 W 2024-T3 Tubing
CF 43	Bracket, Keel, L.H.	1	BD-5-M-0101	.032 2024 T3
CF 44	Bracket, Keel R.H.	1	BD-5-M-0101	.032 2024-T3
CF 47	Doubler	1	BD-5-M-0008	.063 2024-T3

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HORIZONTAL STAB CONTROL

Pages 7-34 through 7-38 show the cable routing and controls for the Horizontal Stabilizer. No text is supplied as the drawings are sufficiently noted.

Before Beginning Construction, Note The Following:

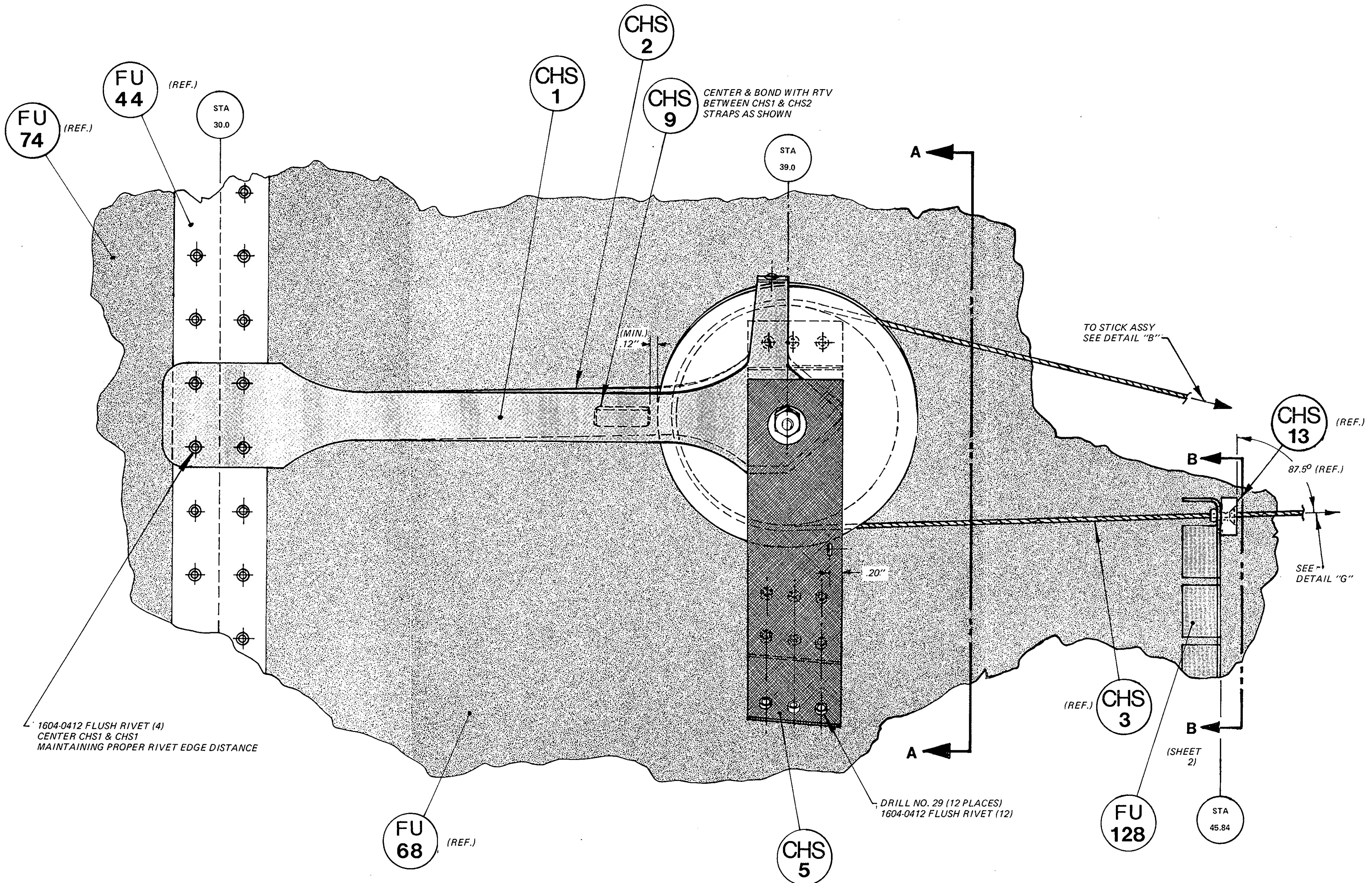
Be sure to place the horizontal stabilizer and control stick both in the neutral position when cutting cables to length and tensioning.

Do not allow the cables to rub against or interfere with the aileron control arms and rods.

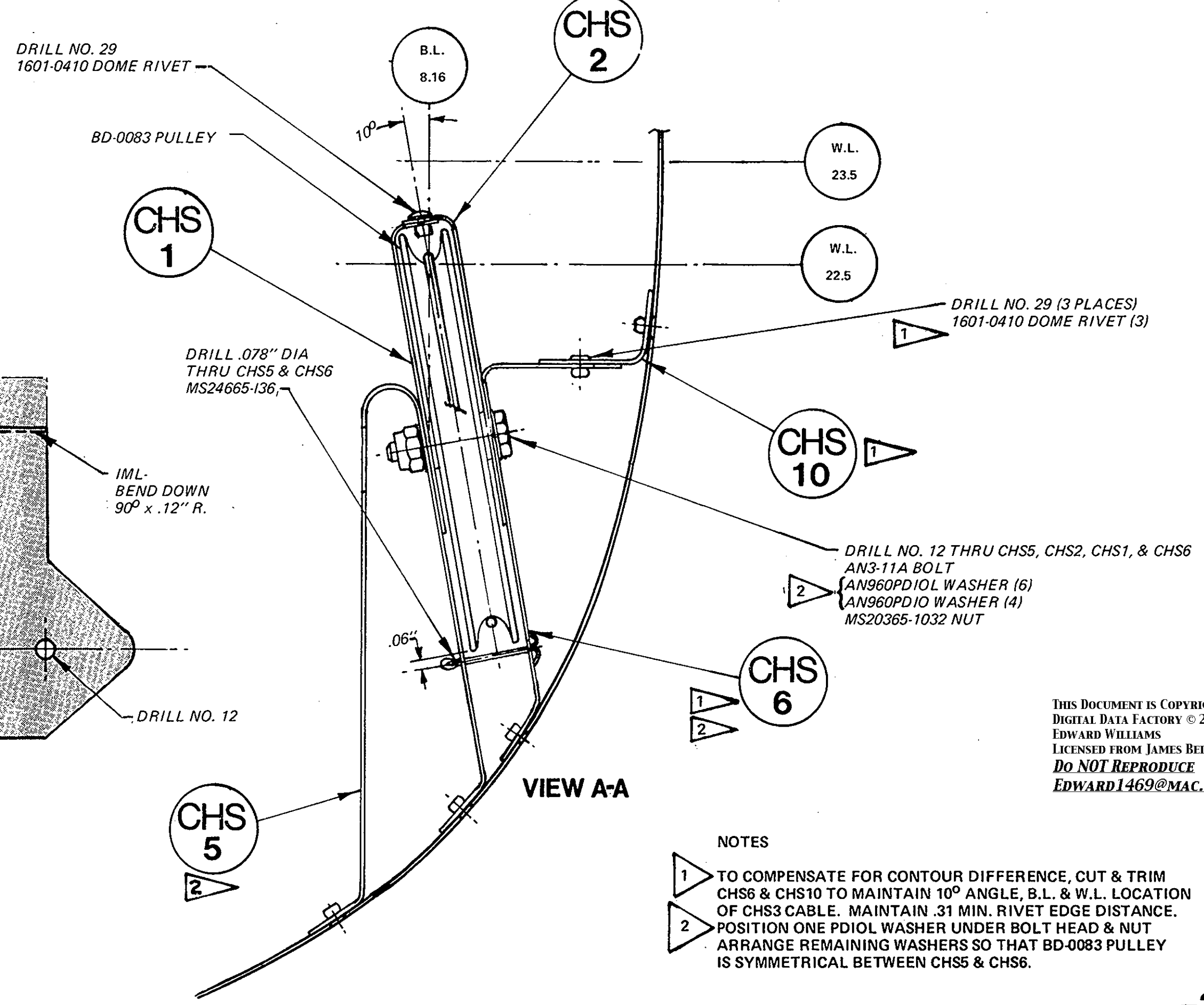
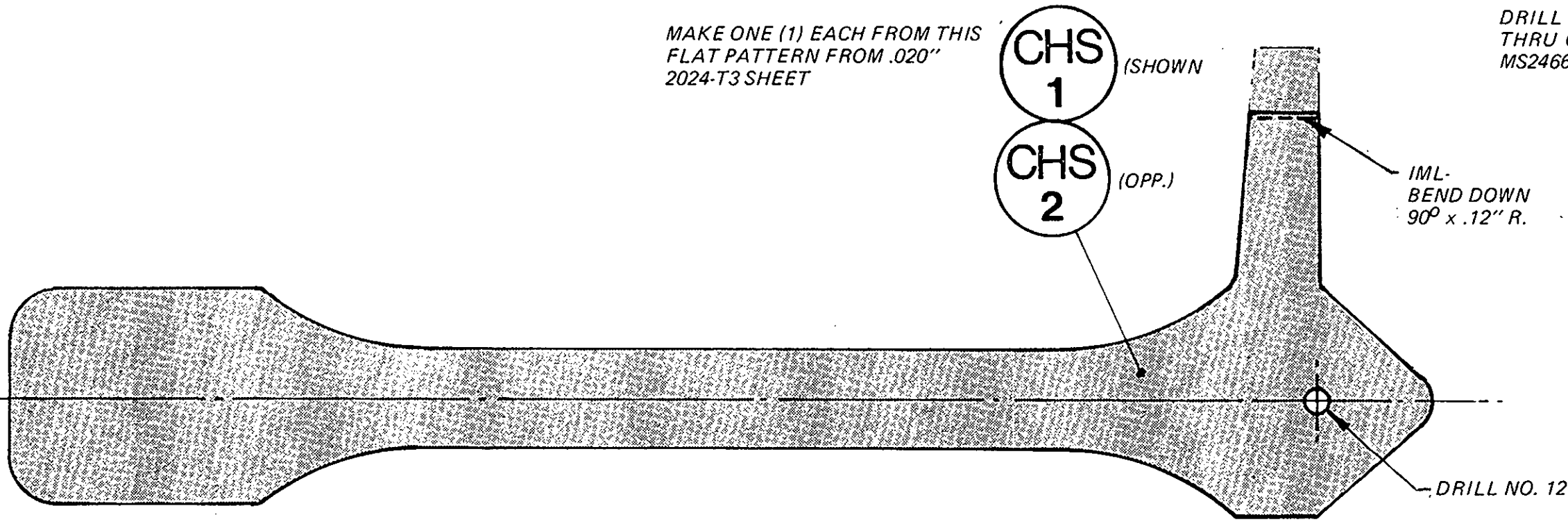
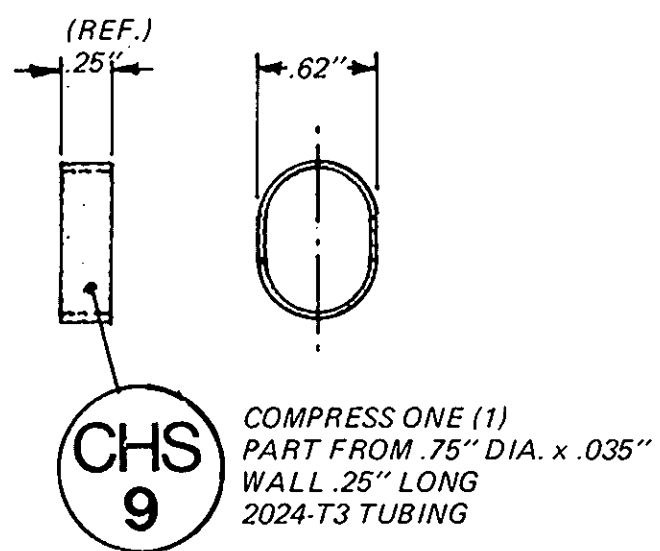
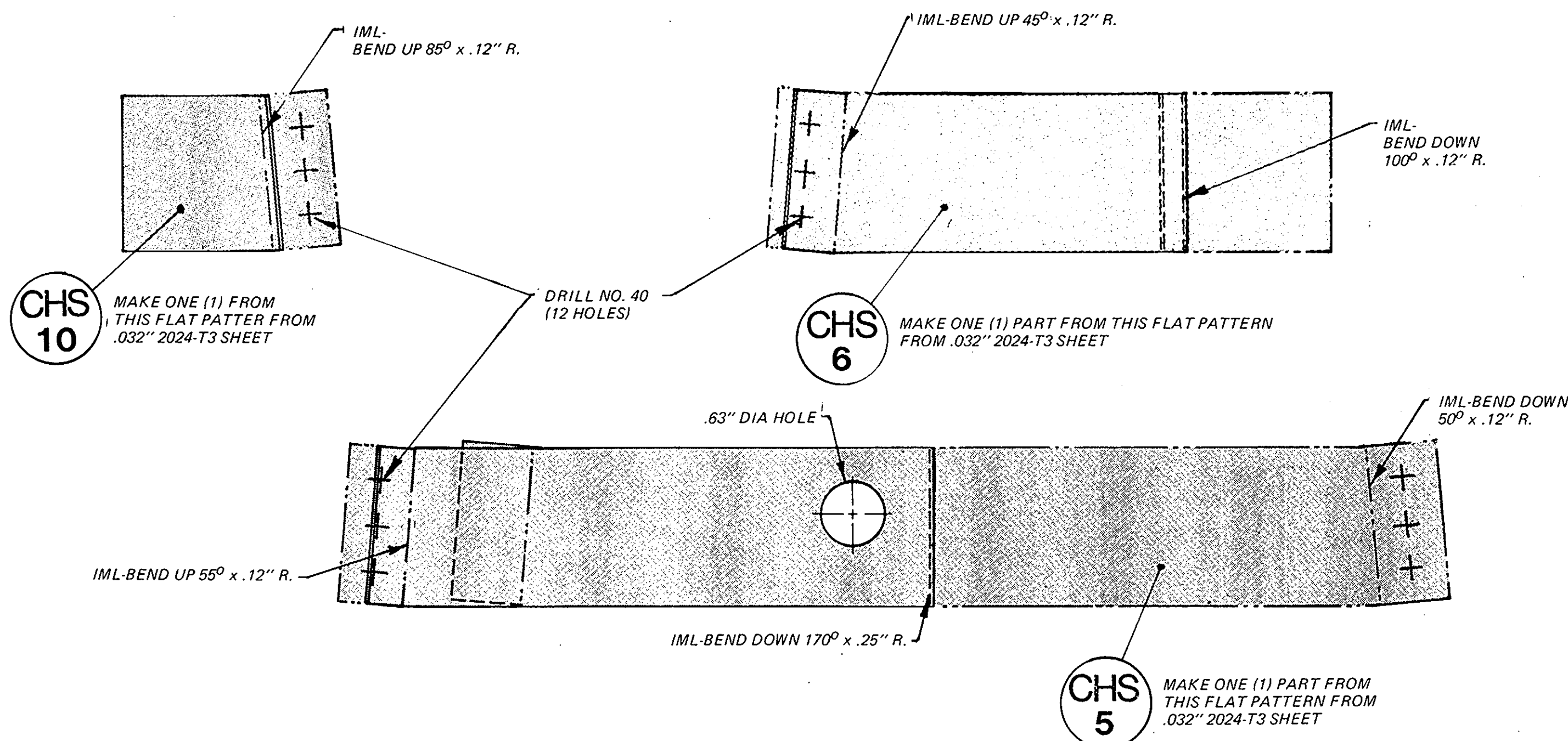
Be sure all fairleads and bushings are in place before swedging nicopress sleeves on ends of cable. The swedging operations must be performed with cables in place in aircraft.

PARTS & MATERIALS CALL OUT

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CHS 1	Front Strap, L.H.	1	BD-5-M-0026	.020 2024-T3
CHS 2	Front Strap, R.H.	1	BD-5-M-0026	.020 2024-T3
CHS 5	Bracket, Inb'd pulley	1	BD-5-M-0028	.032 2024-T3
CHS 6	Bracket, Outb'd Pulley	1	BD-5-M-0028	.032 2024-T3
CHS 7	Horn, Upper Control	1	BD-5-M-0110	.125 2024-T3
CHS 8	Horn, Lower Control	1	BD-5-M-0110	.125 2024-T3
CHS 9	Spacer, Front Strap	1	BD-5-M-0036	.75 O.D. x .035 Wall 2024-T3 Tubing
CHS 10	Angle, Outb'd Pulley	1	BD-5-M-0028	.032 2024-T3
CHS 11	Bracket, Aft Inb'd Pulley	1	BD-5-M-0101	.032 2024-T3
CHS 12	Bracket, Aft Outb'd Pulley	1	BD-5-M-0101	.032 2024-T3
CHS 13	Fairlead, FWD	1	BD-5-M-0140	.25 Phenolic
CHS 14	Fairlead, Aft	1	BD-5-M-0140	.25 Phenolic



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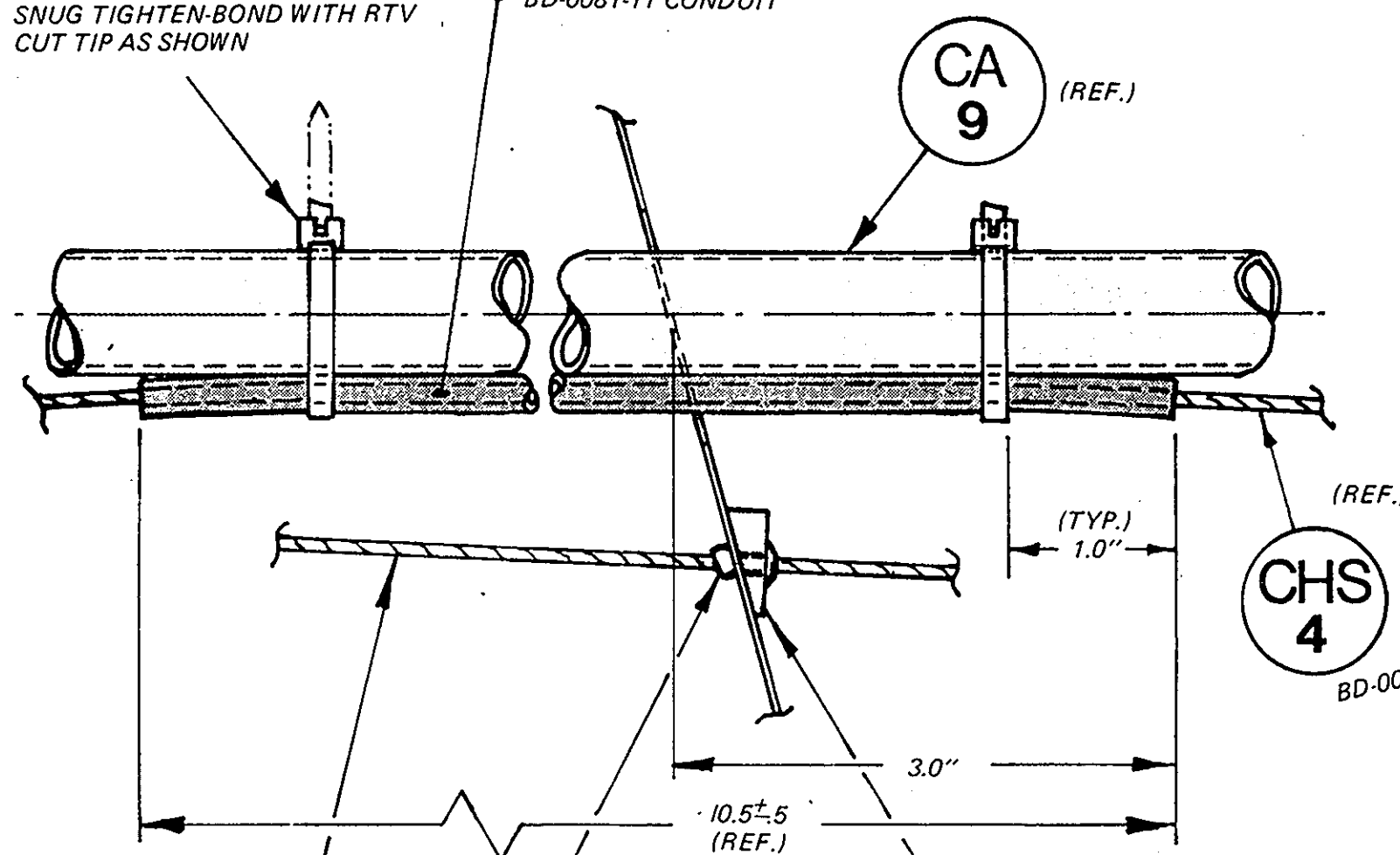


- NOTES
- 1 TO COMPENSATE FOR CONTOUR DIFFERENCE, CUT & TRIM CHS6 & CHS10 TO MAINTAIN 10° ANGLE, B.L. & W.L. LOCATION OF CHS3 CABLE. MAINTAIN .31 MIN. RIVET EDGE DISTANCE.
 - 2 POSITION ONE PDIOL WASHER UNDER BOLT HEAD & NUT ARRANGE REMAINING WASHERS SO THAT BD-0083 PULLEY IS SYMMETRICAL BETWEEN CHS5 & CHS6.

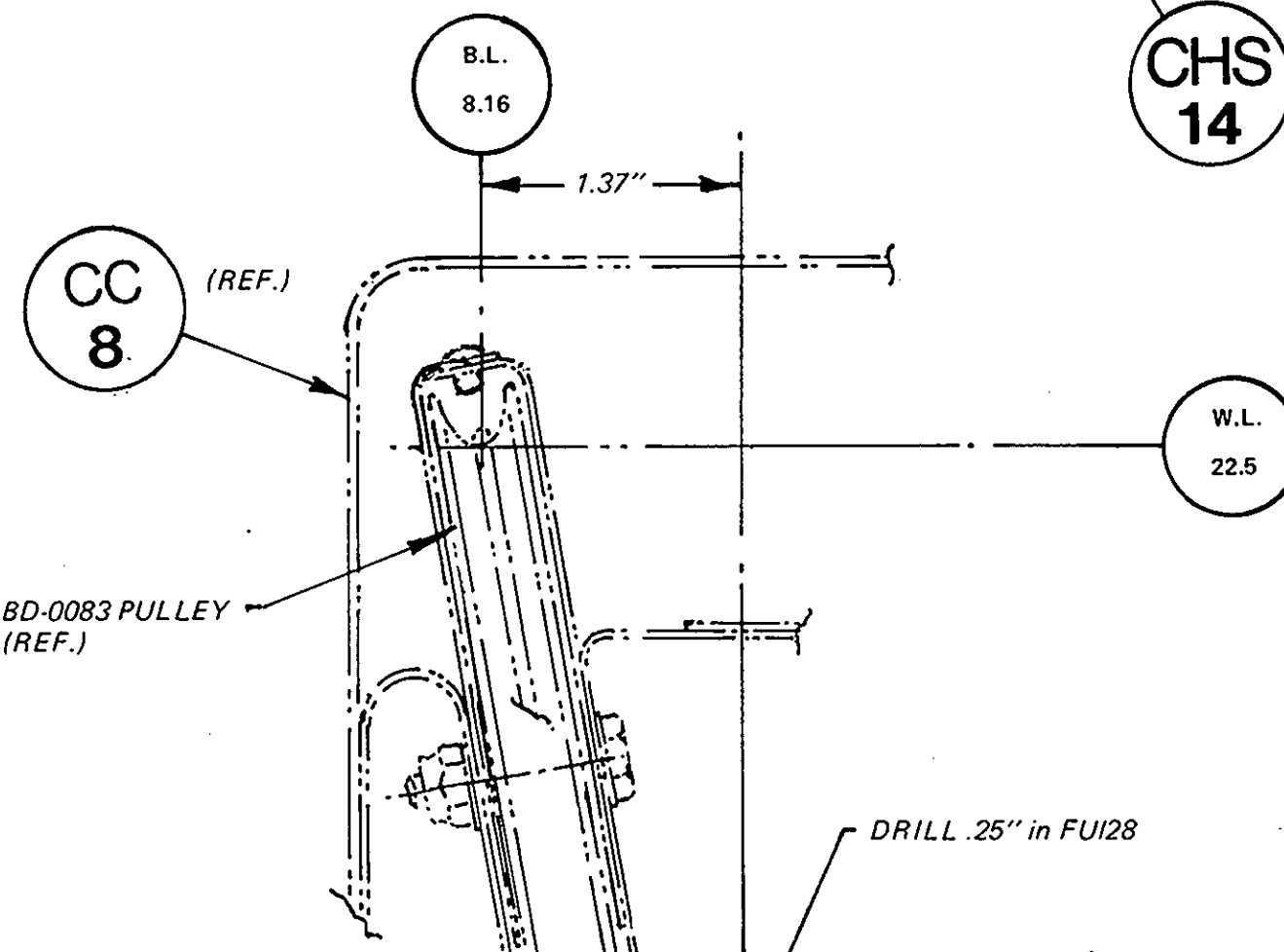
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MS3367-5-9 STRAP (2)
SNUG TIGHTEN-BOND WITH RTV
CUT TIP AS SHOWN

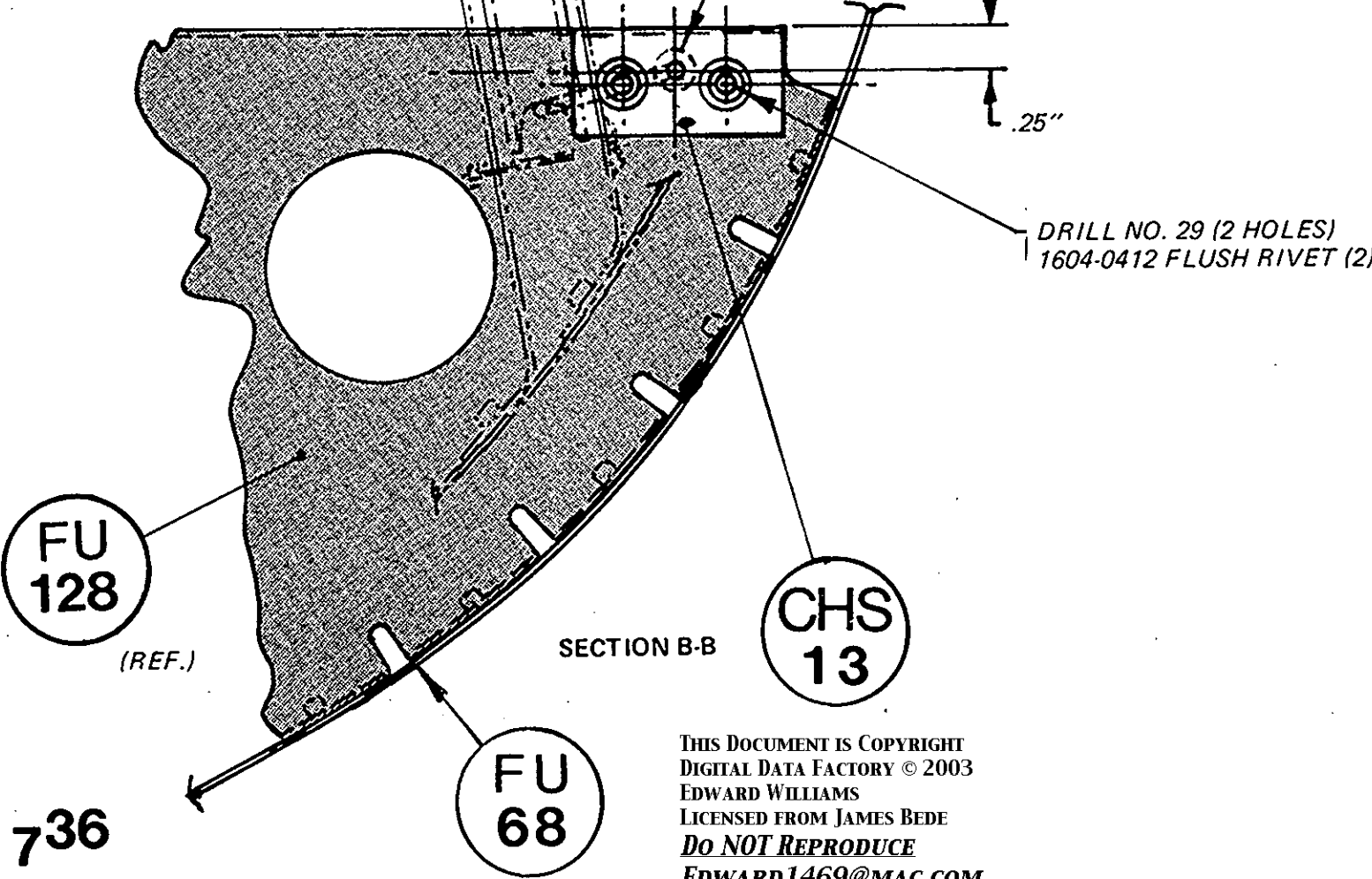
BD-0081-11 CONDUIT



DRILL NO. 29 (2 HOLES)
1601-0410 DOME RIVET (2)



DRILL .25" in FU28

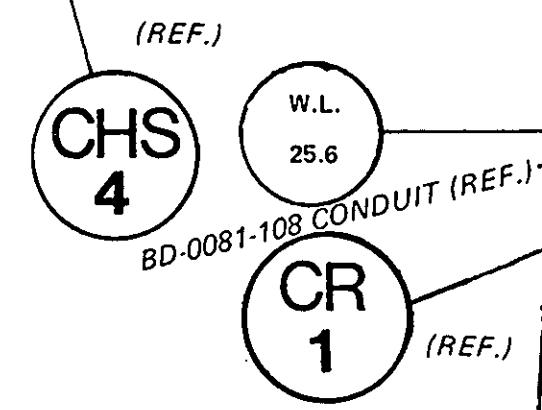


SECTION B-B

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DRILL .62"
MS35489-5 GROMMET

2.32"

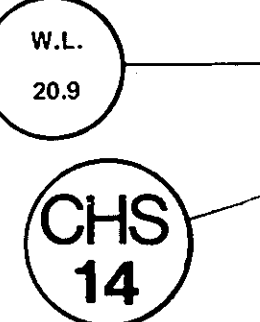


ORIGINAL 1.2" DIA
HOLE IN FU1

(REF.) .08"

.20"

1/4" DIA.



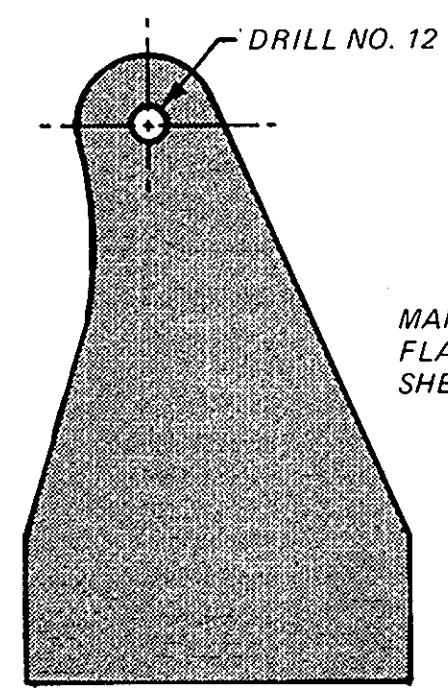
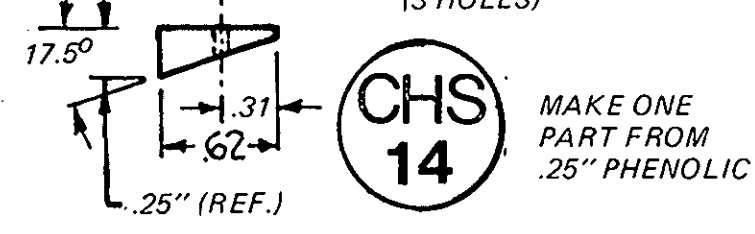
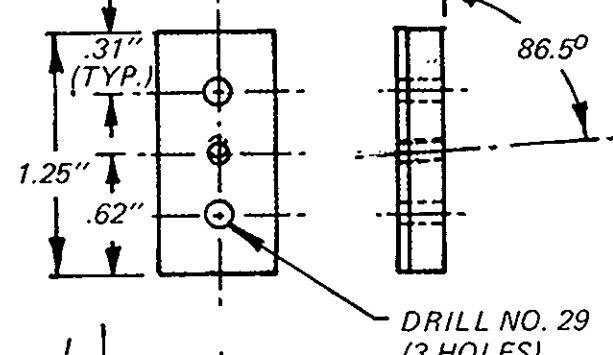
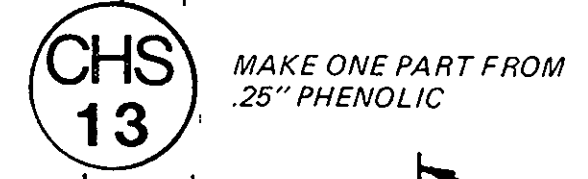
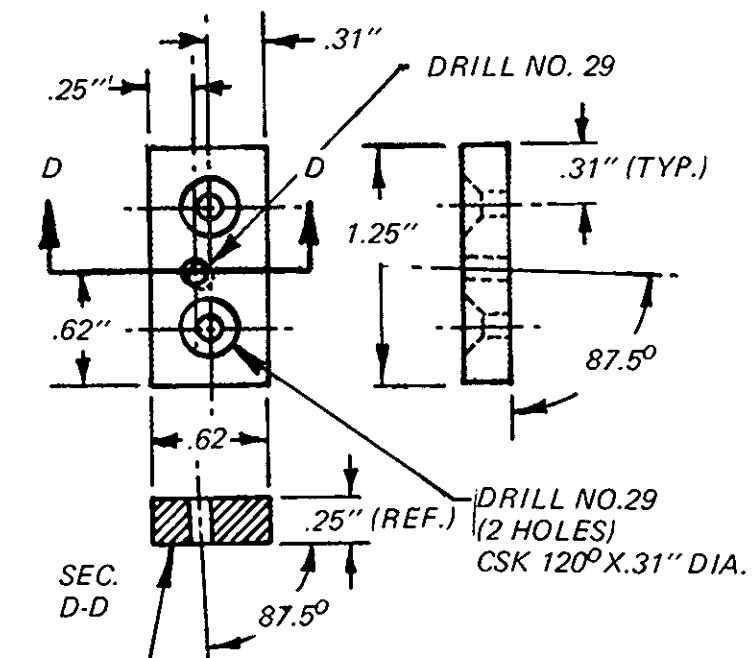
DRILL NO. 29



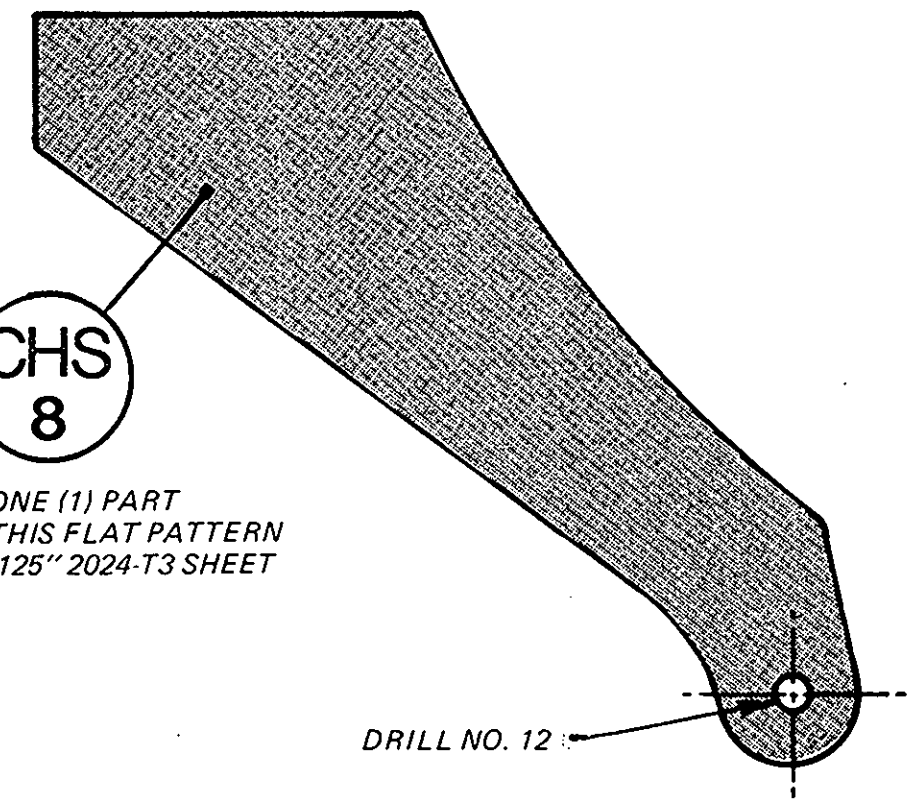
B.L. 9.90

FU1 CANTED BULKHEAD
VIEW LOOKING AFT

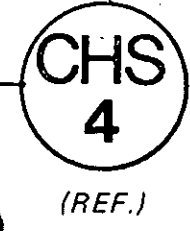
B.L. 8.16

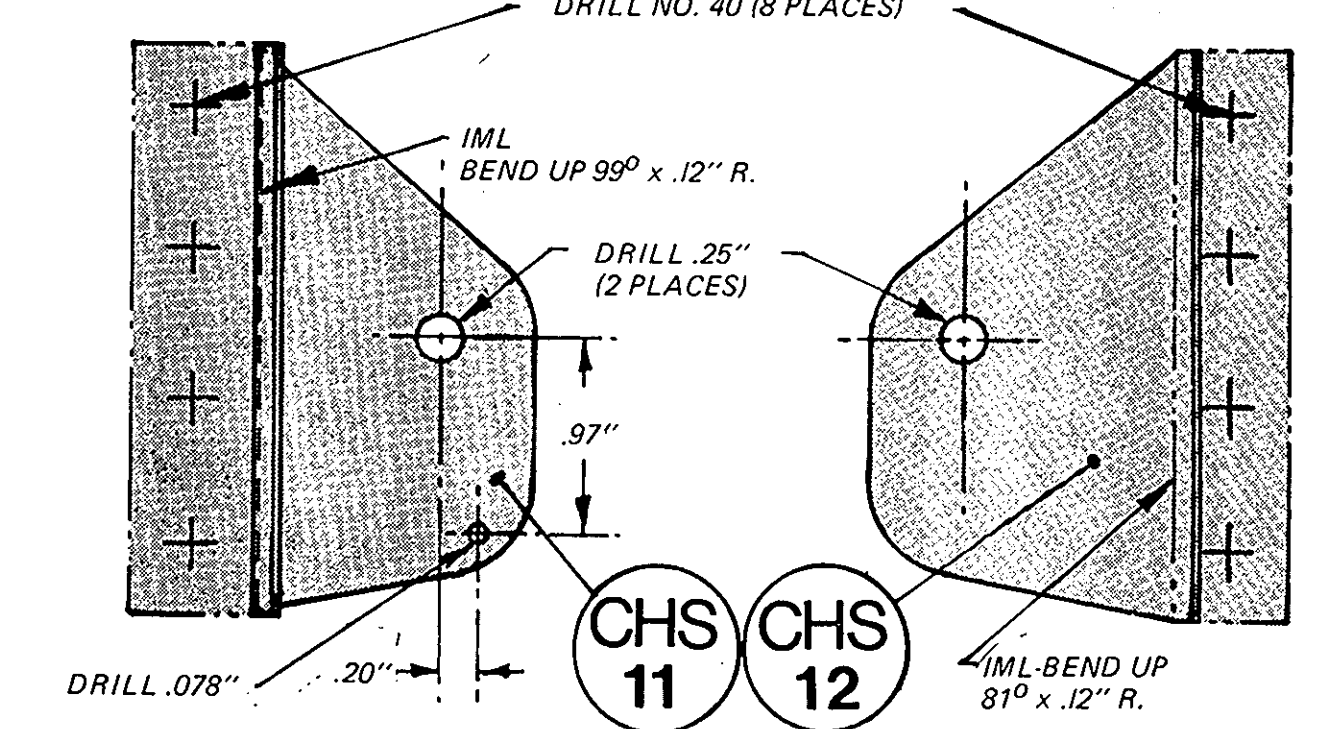
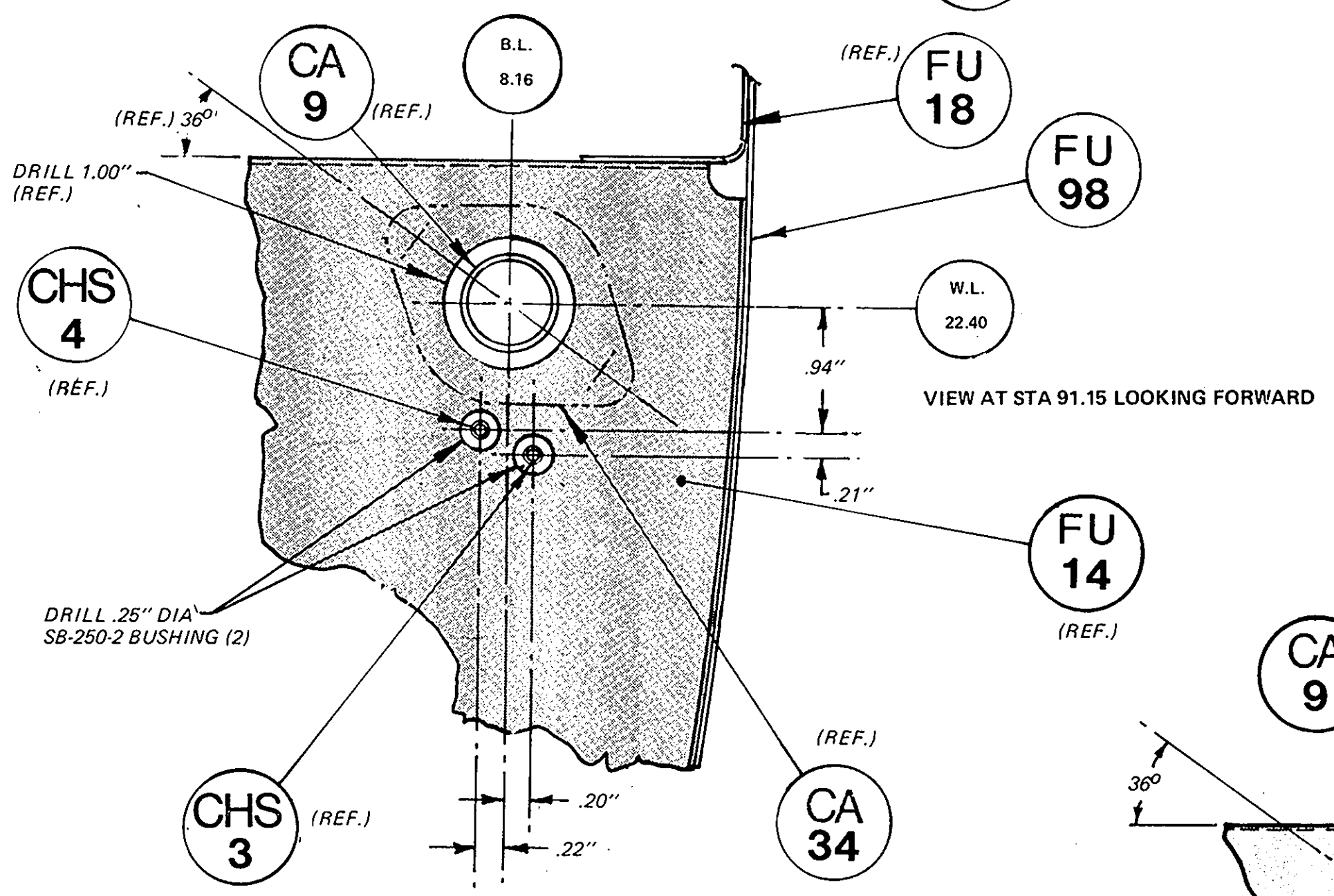
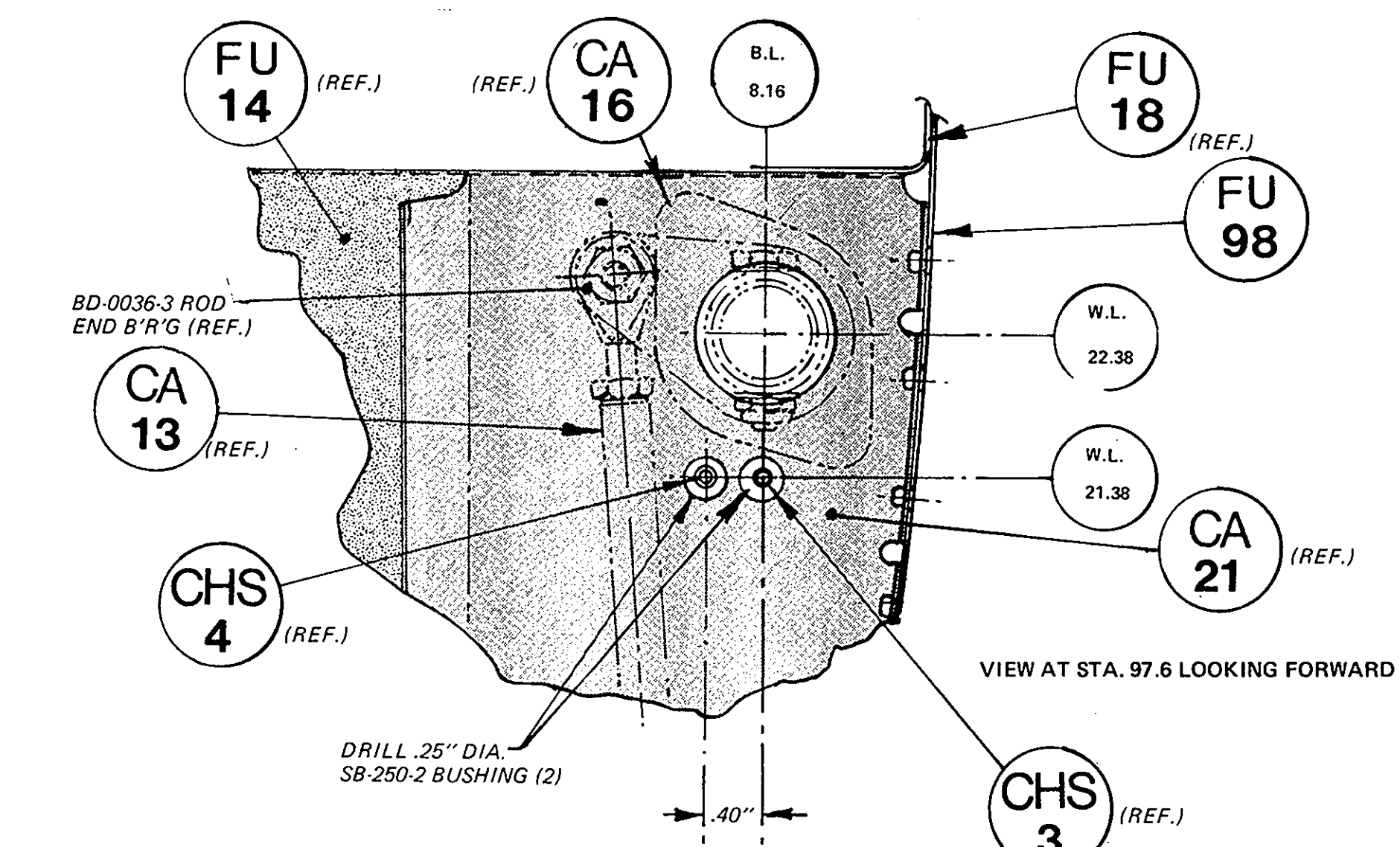


MAKE ONE (1) PART FROM THIS
FLAT PATTERN FROM .125" 2024-T3
SHEET

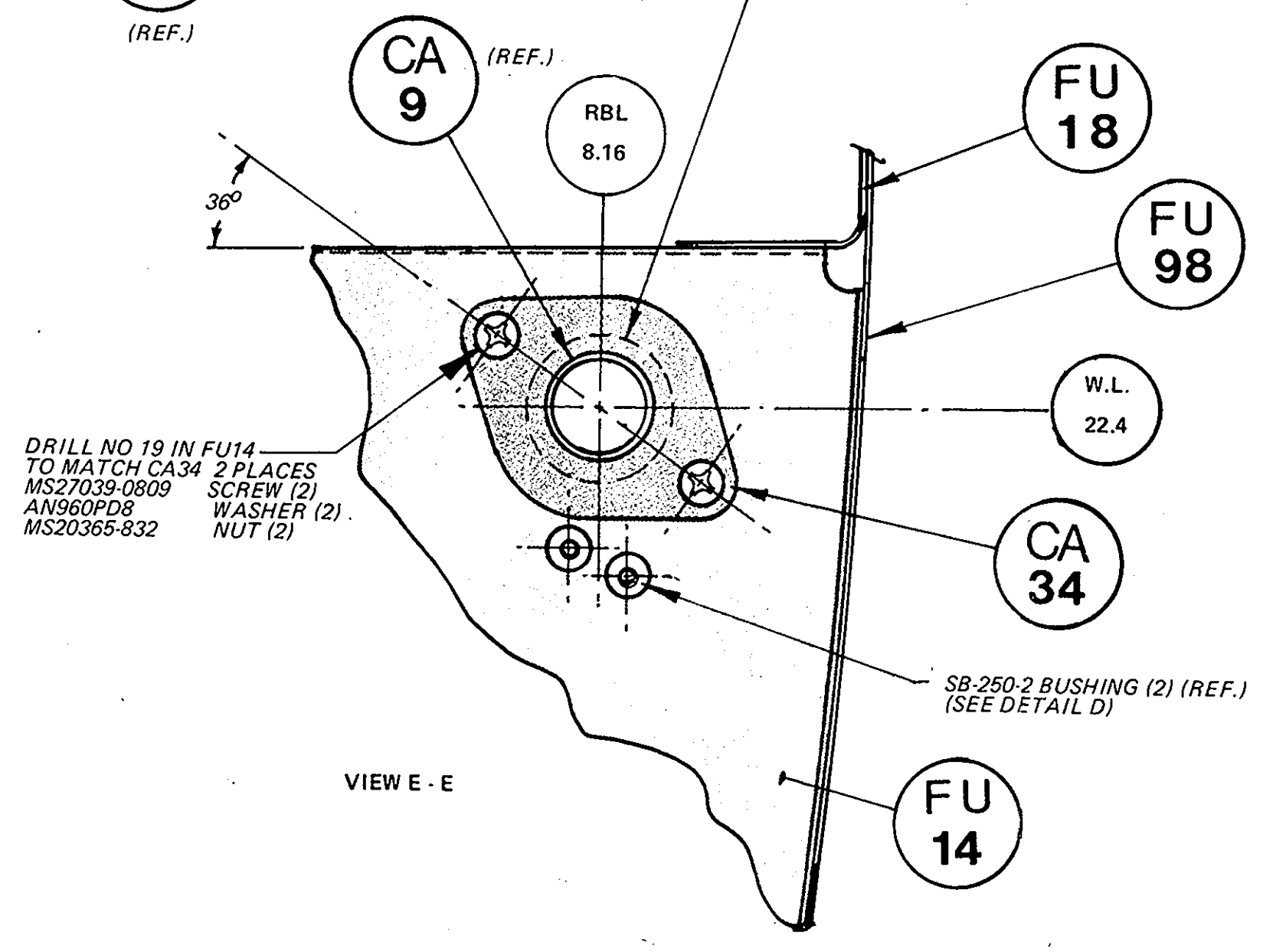
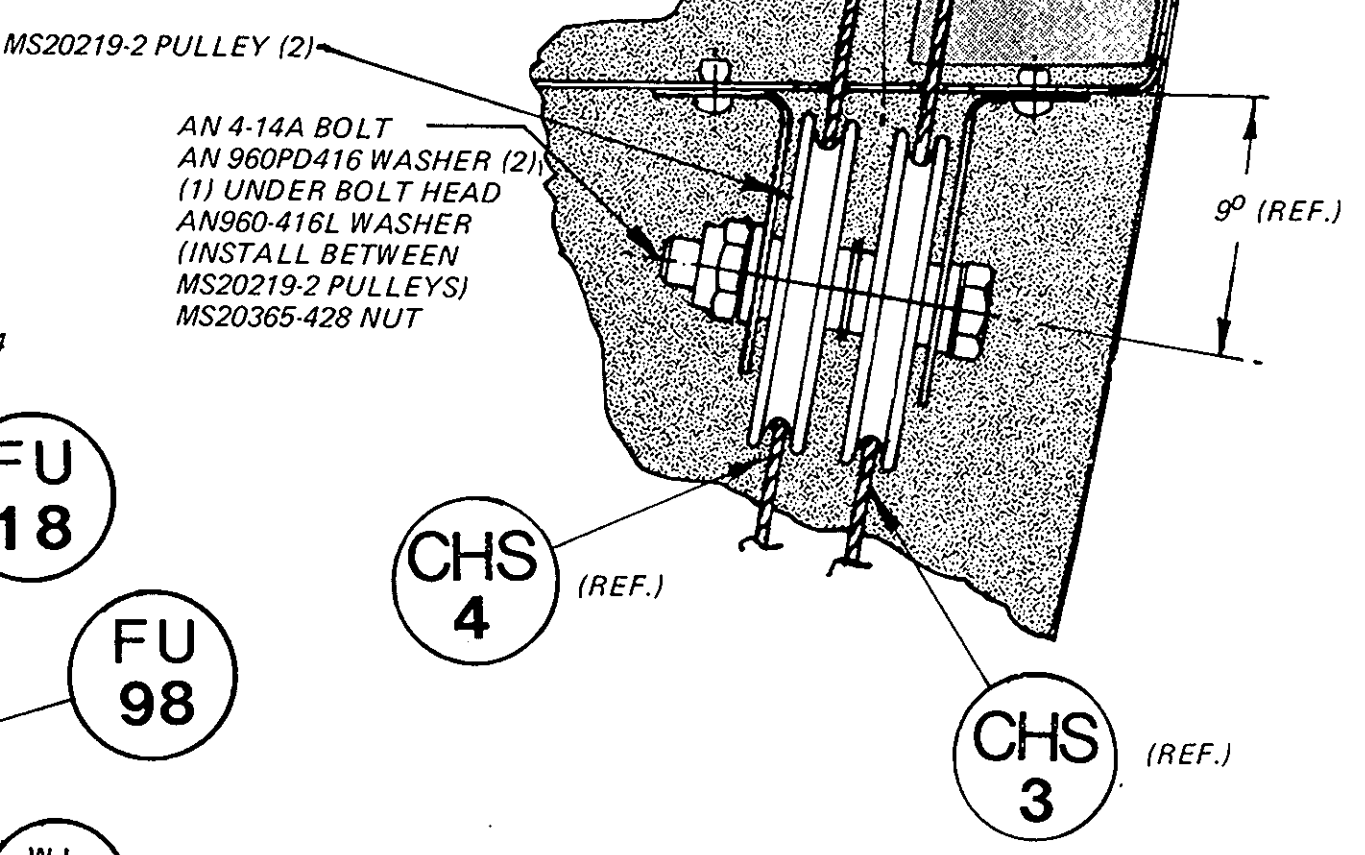
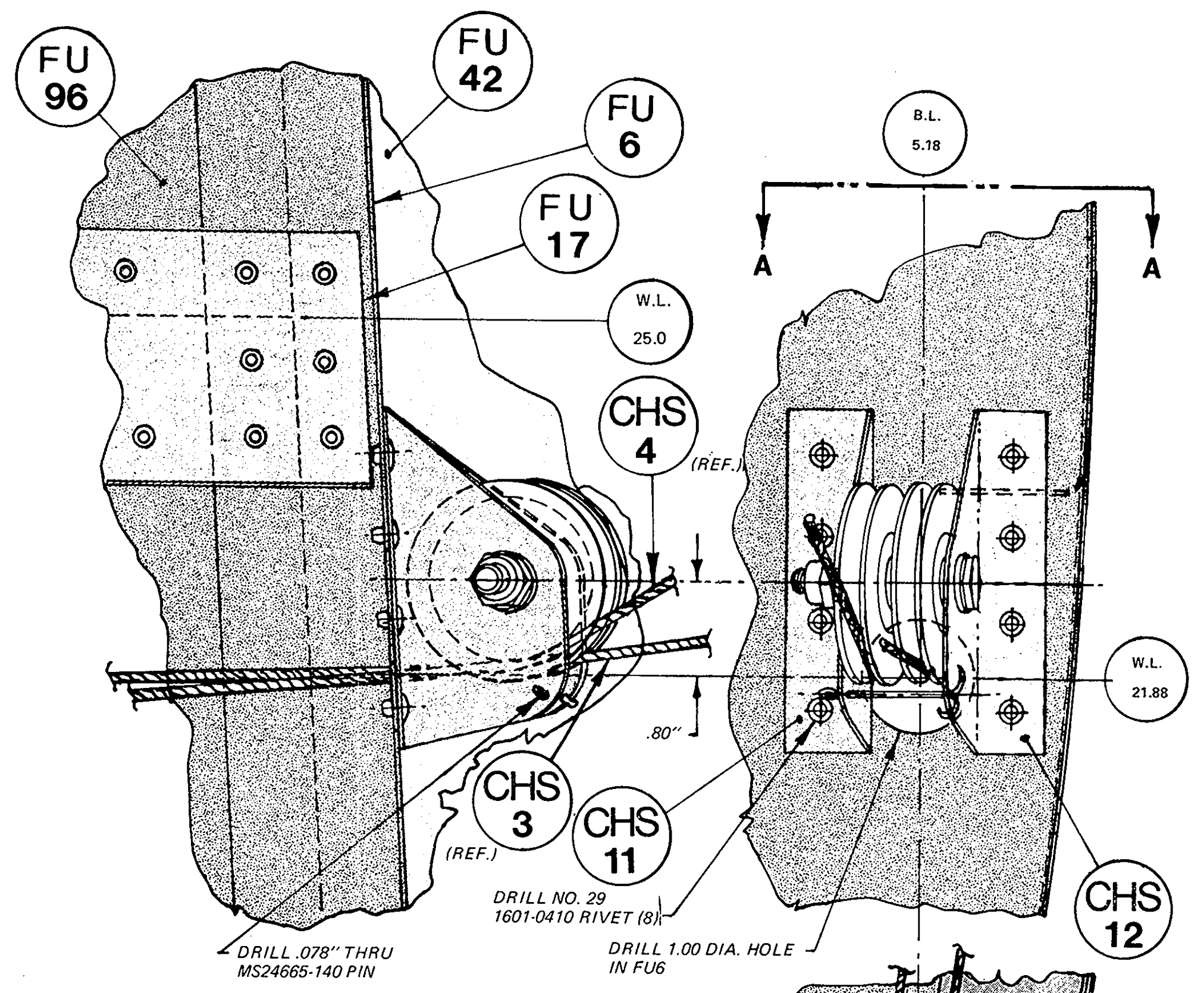


MAKE ONE (1) PART
FROM THIS FLAT PATTERN
FROM .125" 2024-T3 SHEET



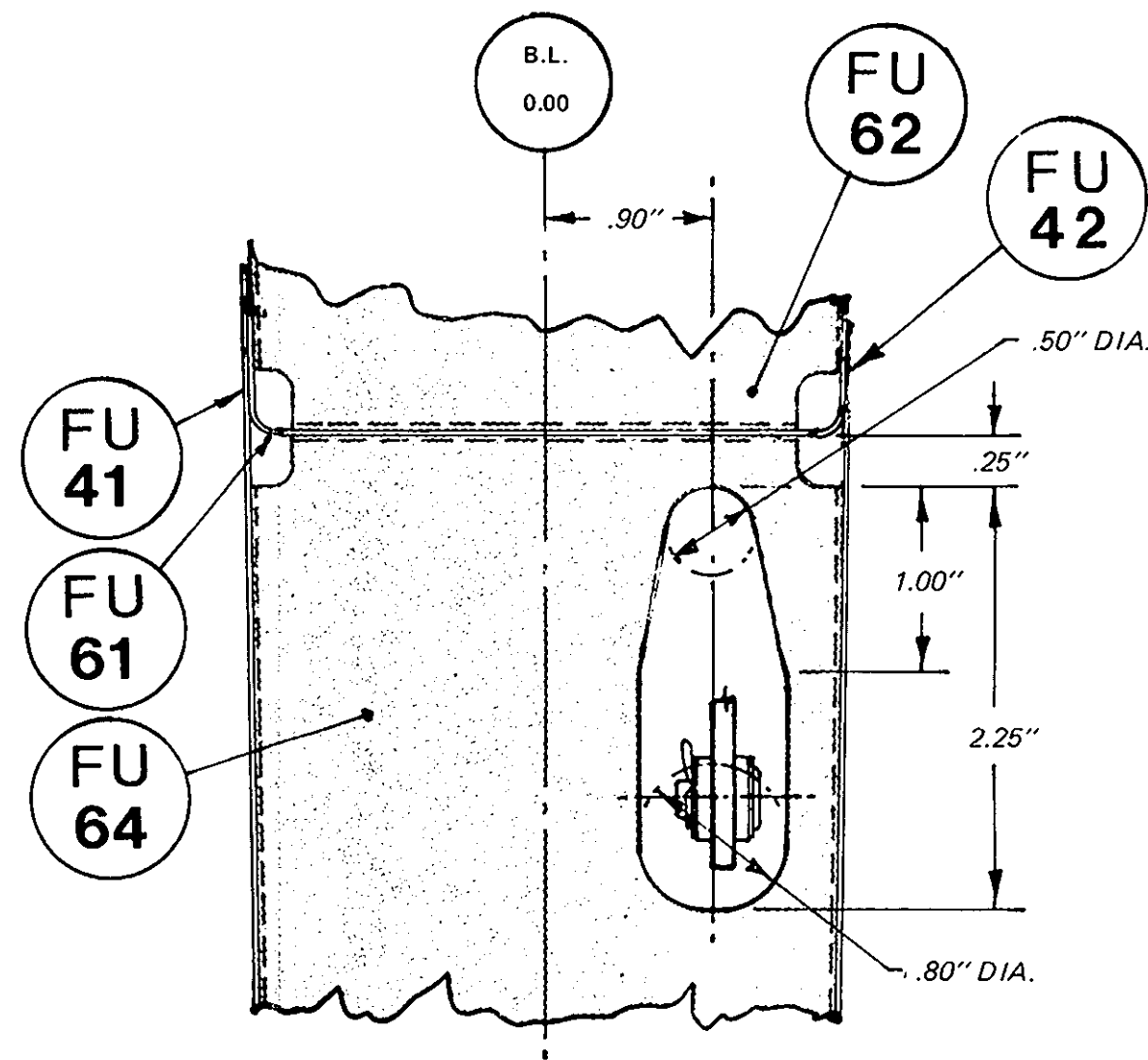
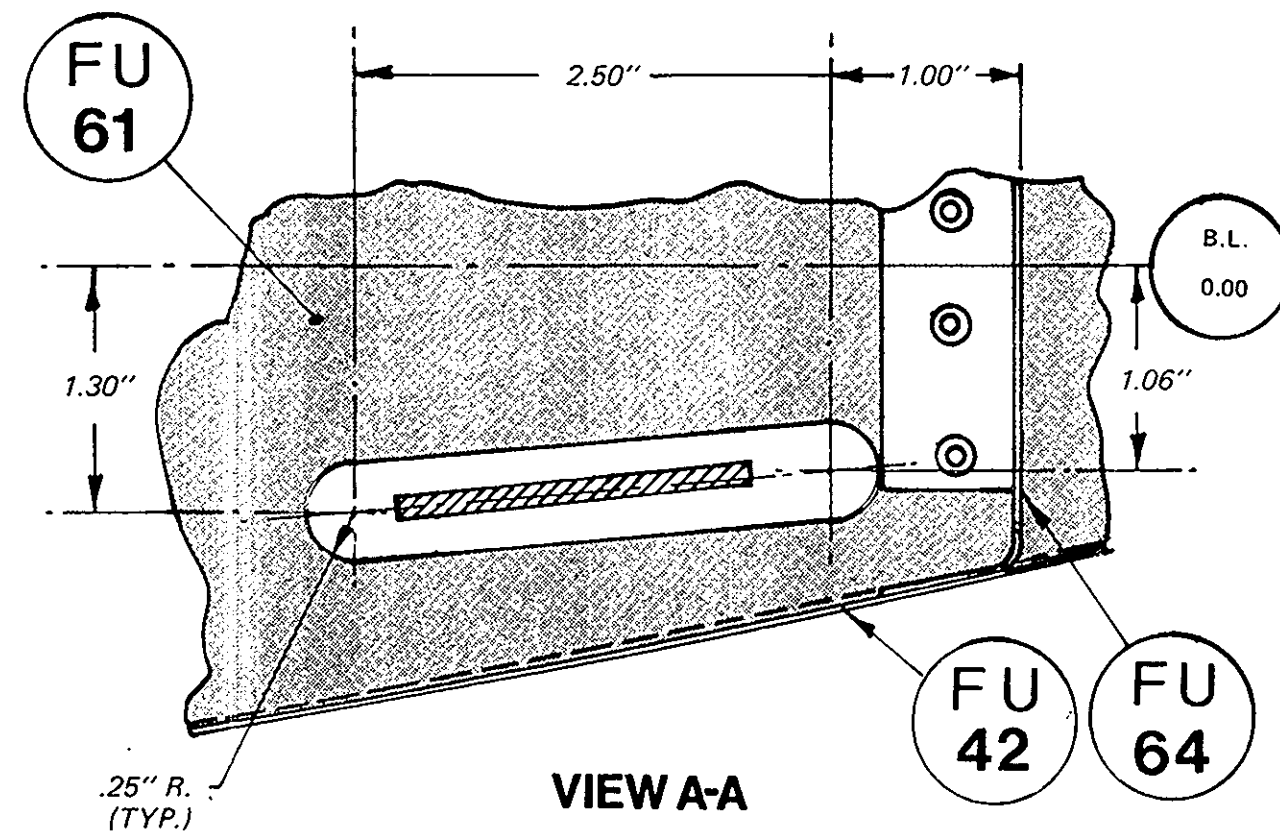
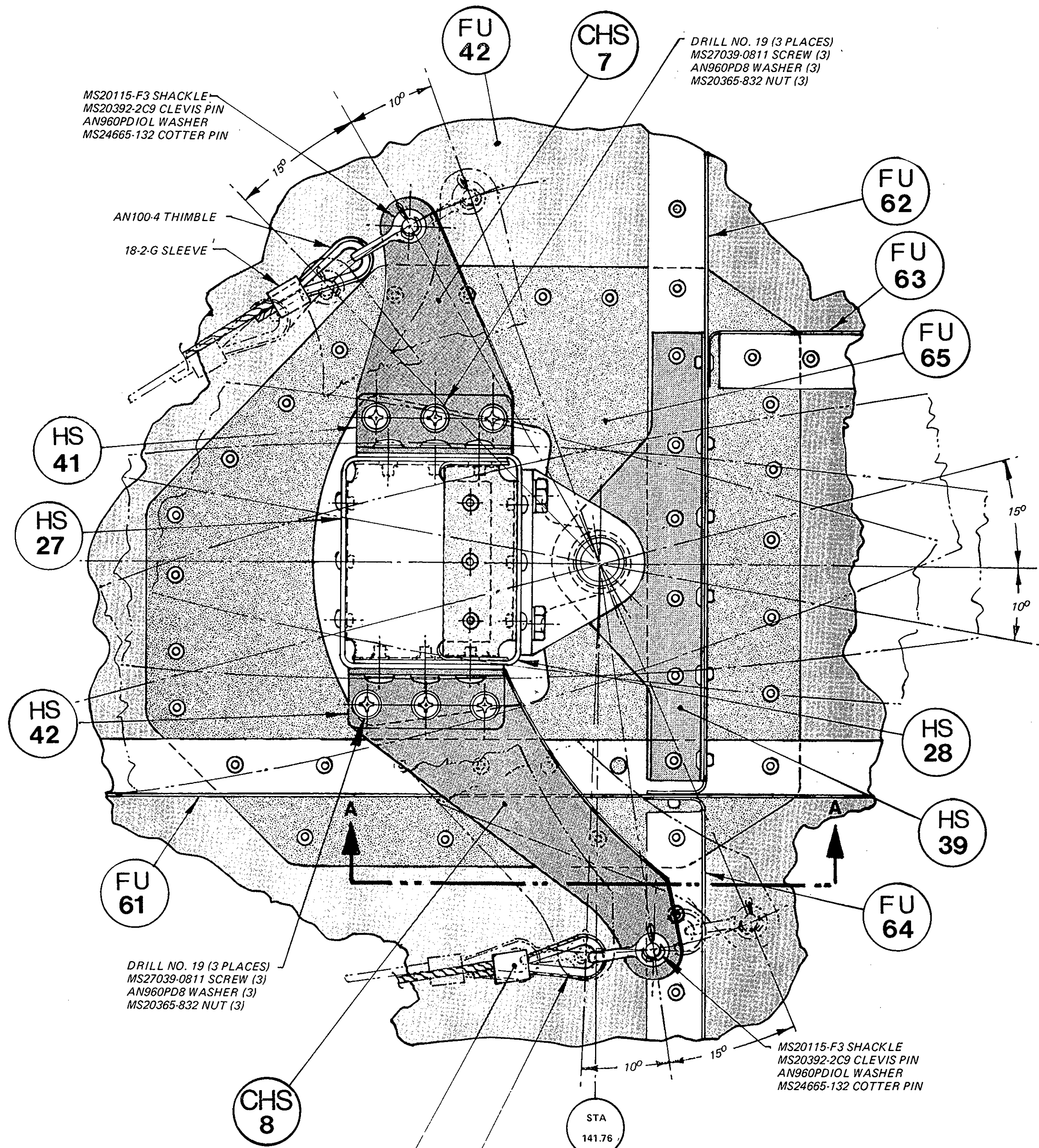


MAKE ONE (1) EACH FROM THESE
FLAT PATTERNS FROM .032\"/>



VIEW A-A

VIEW E - E



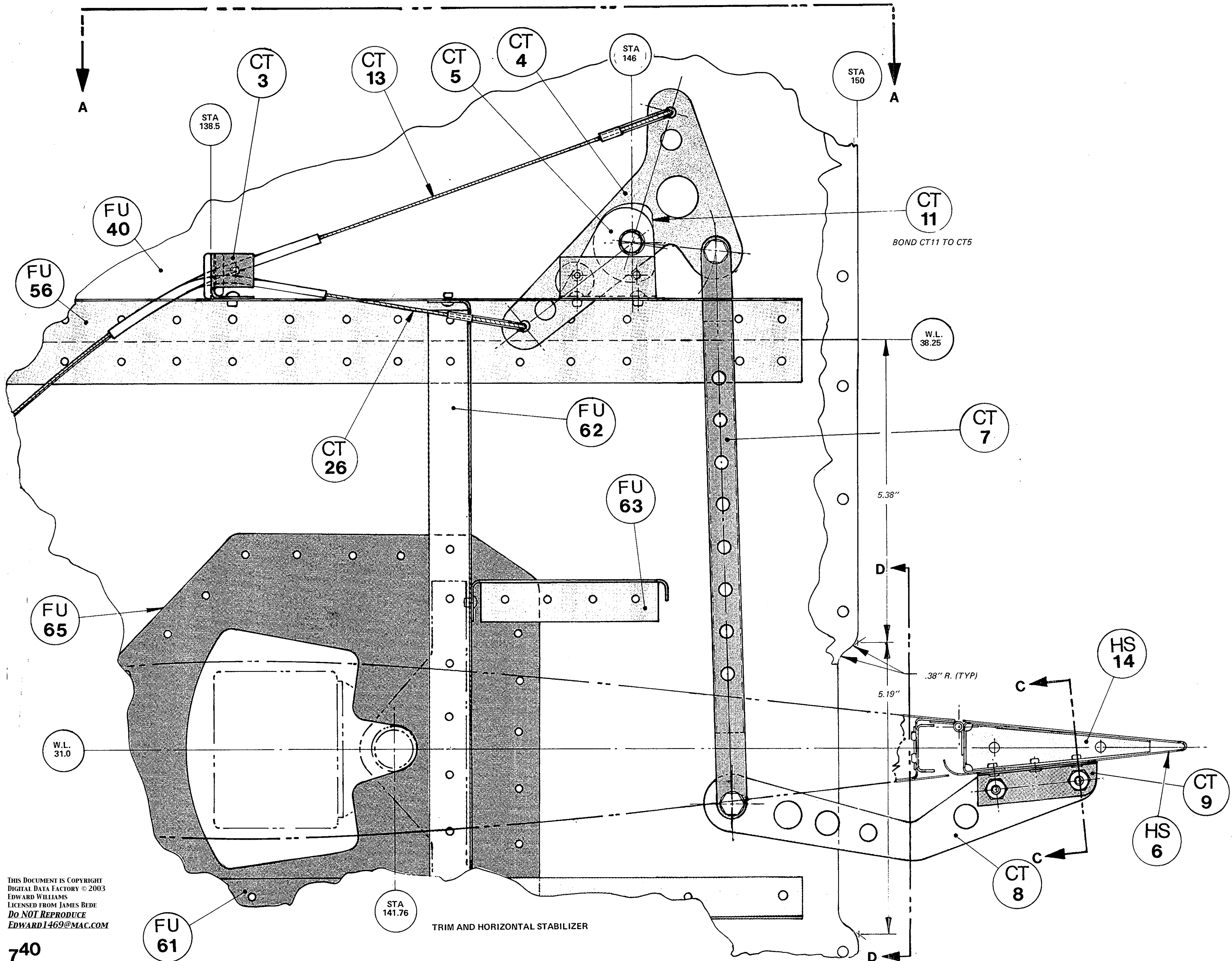
HORIZONTAL STAB TRIM CONTROL

Beginning Construction

- 1 Fabricate and install all parts in fuselage. (Do not install cables and do not fasten CT8 arm and CT9 angles to trim tab.) Ref. pages 7-40 through 7-47. Make fuselage trim to clear CT8 arm as shown on page 7-40.
- 2 Level the aircraft (See Fuselage leveling procedure)
- 3 Position HS43 on the R.H. Horizontal Stabilizer and place level on top of HS43. Level the Horizontal Stabilizer. This will be the neutral position.
- 4 Drill a No. 40 hole in the Fuselage at the forward tip of the Horizontal Stabilizer. This will permanently mark the neutral position of the Horizontal Stabilizer.
- 5 Tape H.S. 44 to the fuselage with 0° mark lined up with the No. 40 hole. The inside arc of HS 44 should approximately match the arc the tip of the Horizontal Stabilizer makes when it rotates.
- 6 Tape stabilizer tip to fuselage to secure it in the neutral position.
- 7 Align the trim tab centerline with the horizontal stabilizer centerline as shown on page 7-40 and secure it in place with tape along the trailing edge at each end of the trim tab.
- 8 Position the CT4 actuating arm as shown on page 7-40 and tighten the friction adjustment around CT4 so that the coils of the spring are just touching. Ref. page 7-41.
- 9 Without changing the position of the CT4 arm, locate and install the CT8 arm and CT9 angles on the trim tab. Ref page 7-40 and Section CC page 7-41. Note: stabilizer and trim tab should still be in neutral position.
- 10 Position the CT1 cockpit trim lever in the neutral position as shown on page 7-45 and secure it from movement.
- 11 Rig cables with all parts held in their neutral position. Install CC7 console.
- 12 Remove tape from trim tab and stabilizer and place the stabilizer tip at the 5° leading edge down "take off" position.
- 13 Tape the stabilizer tip to the fuselage in the take off position and position the trim tab so that the centerlines of the stabilizer and trim tab are again aligned. This will change the position of the CT4 actuating arm and CT1 cockpit trim lever.
- 14 Mark the position of CT1 on the CT24 guide plate and mark this position "take off".
- 15 Set the horizontal stabilizer tip at the 3° mark on HS 44. Keeping the horizontal stabilizer tip at the 3° mark (+2° - 5°) move the trim tab so that its center line lines up with the centerline of the horizontal stabilizer. Moving the trim tab should move the trim control lever to the forward stop position. Set the forward trim control stop (CT-23) at this position.
- 16 Set the horizontal stabilizer tip at the 9° (+3-1°) mark on HS44, and holding the horizontal stabilizer at the 9° mark, move the trim tab until the centerline of the tab is in line with the centerline of the horizontal stabilizer. This should move the trim lever to the aft stop position. Set the aft trim control stop (CT-23) at this position.

PARTS & MATERIALS CALL OUT

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CT 1	Handle, Trim	1	BD-5-M-0112	.090 2024-T3
CT 2	Fairlead	4	BD-5-M-0082	33 NSR NYLO Seal Tubing
CT 3	Bracket, Fairlead	1	BD-5-M-0101	.032 2024-T3
CT 4	Bellcrank	1	BD-5-M-0112	.090 2024-T3
CT 5	Bracket, LH, Bellcrank	1	BD-5-M-0029	.050 2024-T3
CT 6	Bracket, RH, Bellcrank	1	BD-5-M-0029	.050 2024-T3
CT 7	Rod, Push-Pull	1	BD-5-M-0094	.50SQx.058W Tube 6061-T651
CT 8	Arm, Tab Actuation	1	BD-5-M-0112	.090 2024-T3
CT 9	Angle LH Tab	1	BD-0002	.032 2024-T3
CT 10	Angle, RH, Tab	1	BD 0002	.032 2024-T3
CT 11	Washer, Cork	2	BD-5-M-0159	.063 Cork
CT 12	Doubler	2	BD-5-M-02	
CT 12	Doubler	2	BD-5-M-0101	.032 2024-T3
CT 13	Cable	1		Consists of 7 x 7 1/2" cable, thimble, nicodress & MS2125S-2LS Eye End
CT 14	Plate, Console	1	BD-5-M-0101	.032 2024-T3
CT 15	Bracket, Throttle Quadrant	1	BD-5-M-0101	.032 2024-T3
CT 16	Handle Throttle	1	BD-5-M-0110	.125 2024-T3
CT 17	Spacer, Axle	2	BD-5-M-0157	.25 O.D. x .028 W 4130 Cond "N" Tube
CT 18	Grip, Throttle	1	Procure Locally	.75 Hardwood
CT 19	Axle, Throttle Quadrant	1	AN 3-22A	Steel Bolt
CT 20	Spacer	3	BD-5-M-0030	.063 2024-T3
CT 21	Spacer, Tube	1	BD-5-M-0157	.25 O.D. x .028 W 4130 Cond "N" Tube
CT 22	Grip, Trim	1	BD-5-M-0125	Mahogany
CT 23	Stop	4	BD-5-M-0101	.032 2024-T3
CT 24	Plate	1	BD-5-M-0126	1/16 nylon strip
P 18	Swivel, Rod	1	BD-5-M-0177	.44 DIA 4130 Cond "D4" .063 Cork
CT 25	Washer, Cork	4	BD-5-M-0159	.063 Cork
CT 26	Cable	1		Consists of 7x7x1/16 cable, thimble, nicopress & MS21255 Eye End
CT 27	Bushing	2	BD-0140	.4375 O.D. x .250 ID (O-lite) Bushing
CT 28	Sleeve	2	BD-M-0182	.250 O.D. x .180 ID 1015-1018 Steel Tubing
CT 29	Bushing	1	BD-0151	.1885 ID, .3145, 3 1/16 Bushing (O-lite)



TRIM AND HORIZONTAL STABILIZER

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ROUGHEN SURFACE OF CT2 FAIRLEAD IN AREA WHERE CT2 PASSES THROUGH GROMMET (MS35489-9). APPLY SUFFICIENT AMOUNT OF RTV TO CT2, GROMMET AND BRACKET TO HOLD CT2 FIRMLY IN PLACE.

MAKE TWO (2) PARTS FROM 33NSR NYLO SEAL TUBING x 4.0" LONG

DRILL NO.29 (6 HOLES)
1601-0410 RIVET (6)

CT 9

CT 10

CT 8

DRILL NO.19 (2 HOLES)
MS27039-0809 SCREW (2)
AN960PD8 WASHER (4)
MS20365-832 NUT (2)

Section C-C

MS35489-9 GROMMET

CT 2

CT 26

18-1-C SLEEVE (REF.)

DRILL NO.29 (4 PLACES)
1604-0412 FLUSH RIVET (4)

AN3-10 BOLT
AN960PD10 WASHER (3)
BD-0034 SPRING
AN320-3 NUT
MS24665-132 COTTER PIN

AN100-3 THIMBLE (REF.)

CT 4

CT 6

CT 11 (2)

CT 7

.25"

B.L.
0.00

.38" R. (TYP)

NOTE: SLOT WIDTH MAY BE INCREASED LOCALLY, IF AND AS REQ.D TO PREVENT INTERFERENCE. BUT CAUTION MUST BE USED SO AS NOT TO ALLOW BOLT RETAINING CT8 AND CT7 TO BIND IN SKINS OR WITHIN SLOT!

CT 7

CT 8

VIEW D-D

FU 56

DRILL No. 29 (6 HOLES)
1601-0410 RIVET (6)

CT 3

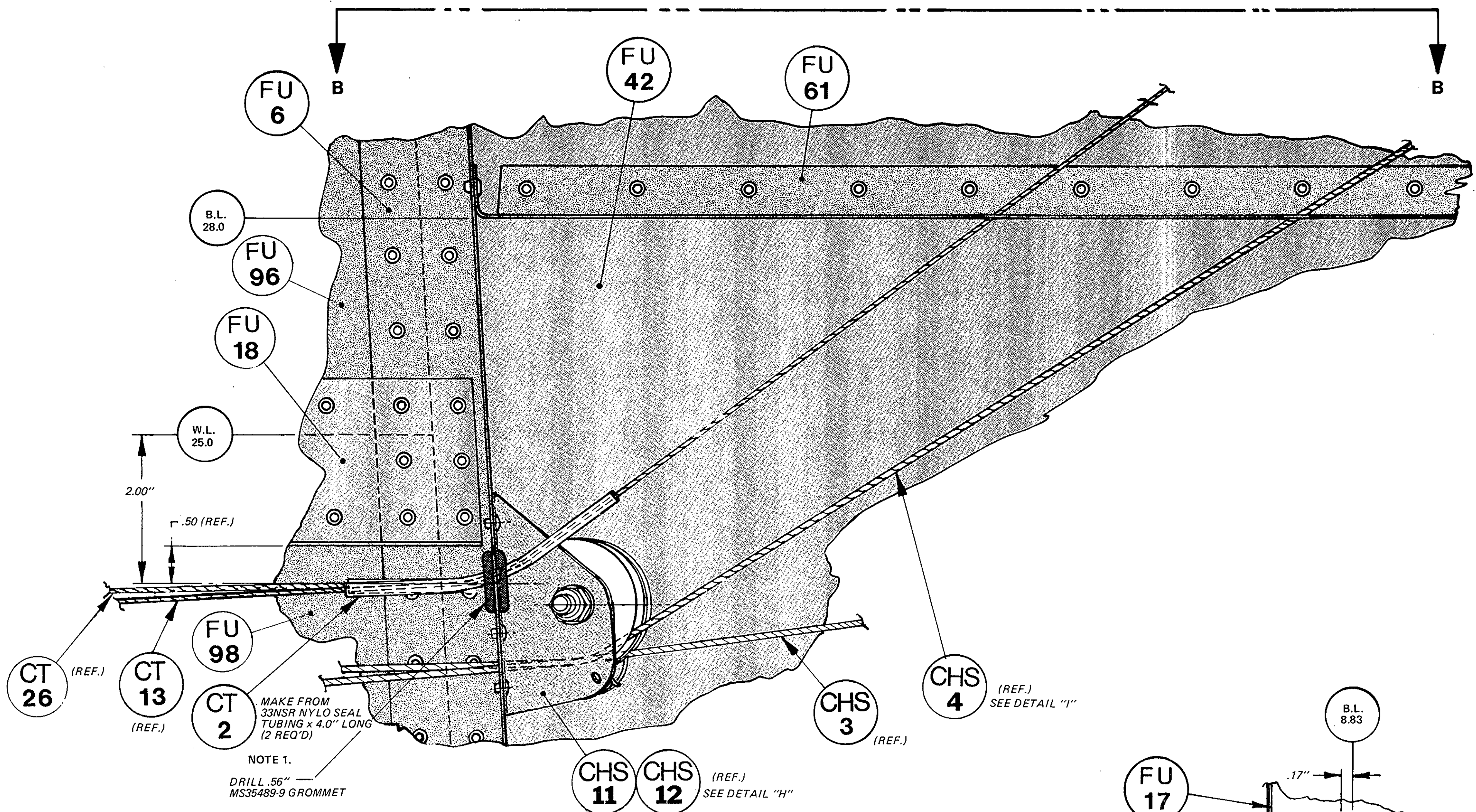
CT 5

AN3-6 BOLT
AN960PD WASHER (2)
AN100-3 THIMBLE (2)
CT28 SLEEVE
AN320-3 NUT
MS24665-132 COTTER PIN (2 PLACES)

DRILL No. 29 (6 PLACES)
1601-0410 RIVET (6)

IF REQ'D CUT OUT ADDITIONAL MATERIAL AS SHOWN ON FU56 TO PROVIDE CLEARANCE FOR CT4, CT7, AND AN3-6A BOLT.

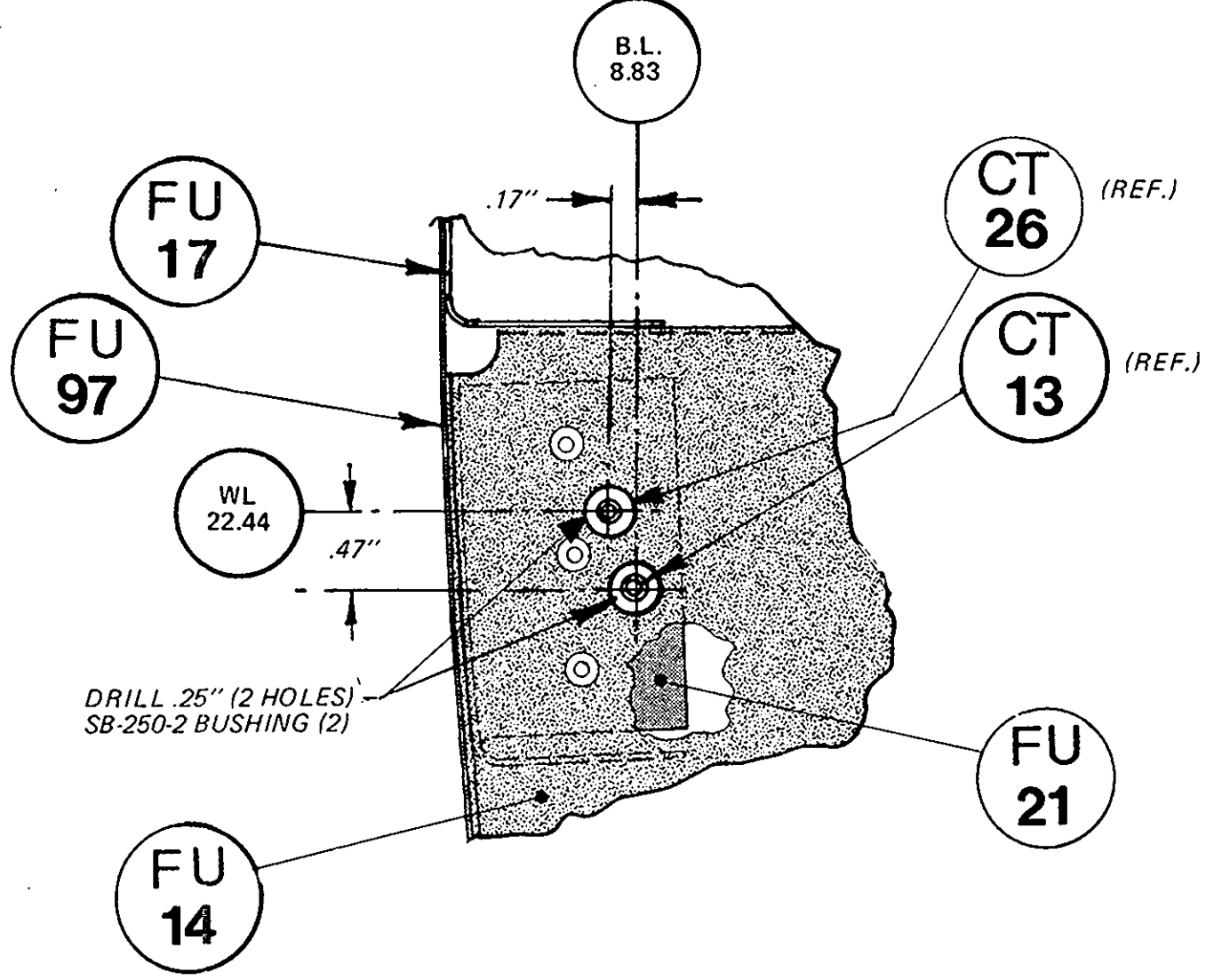
VIEW A-A



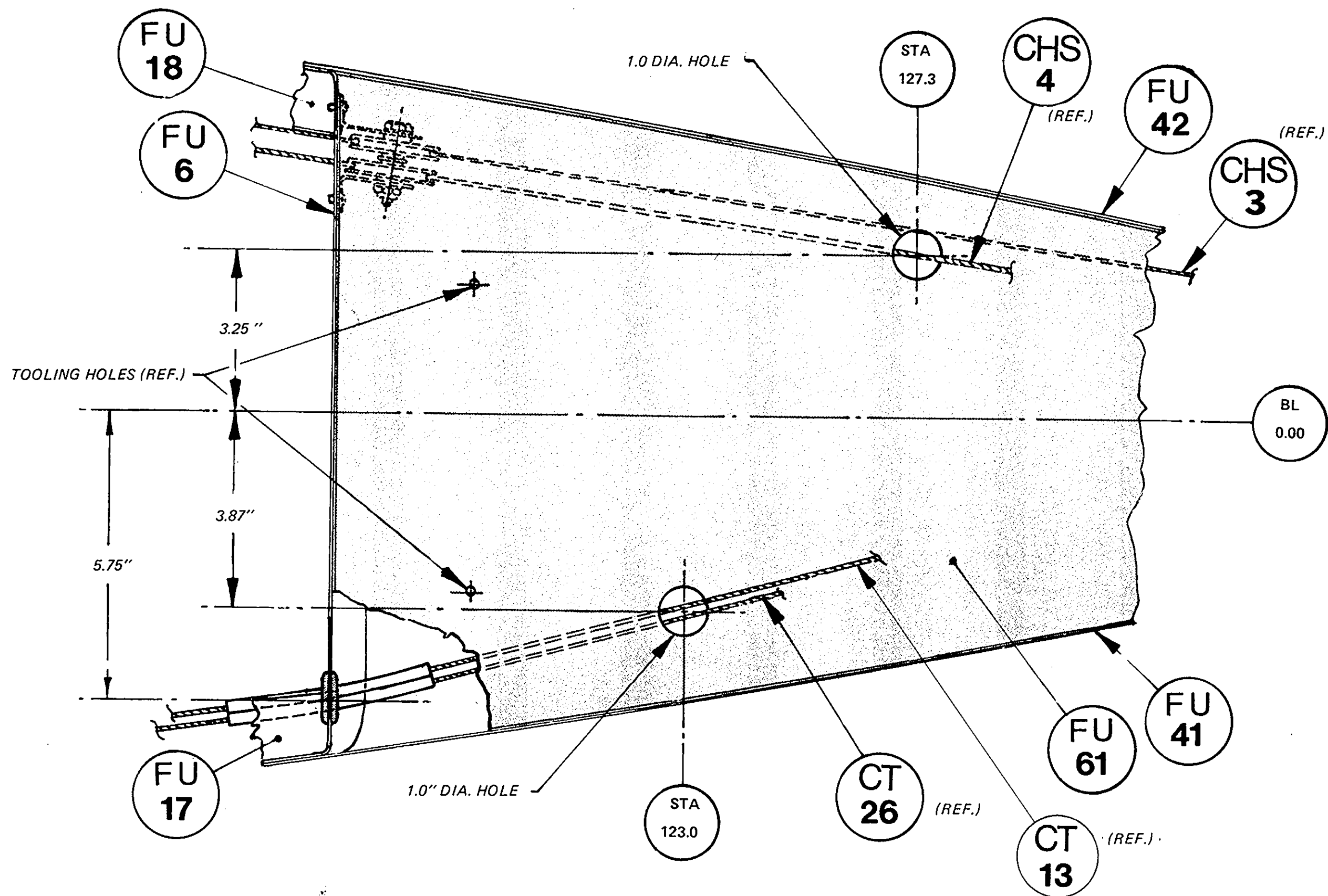
MAKE FROM
33NSR NYLO SEAL
TUBING x 4.0" LONG
(2 REQ'D)

NOTE 1.
DRILL .56" —
MS35489-9 GROMMET

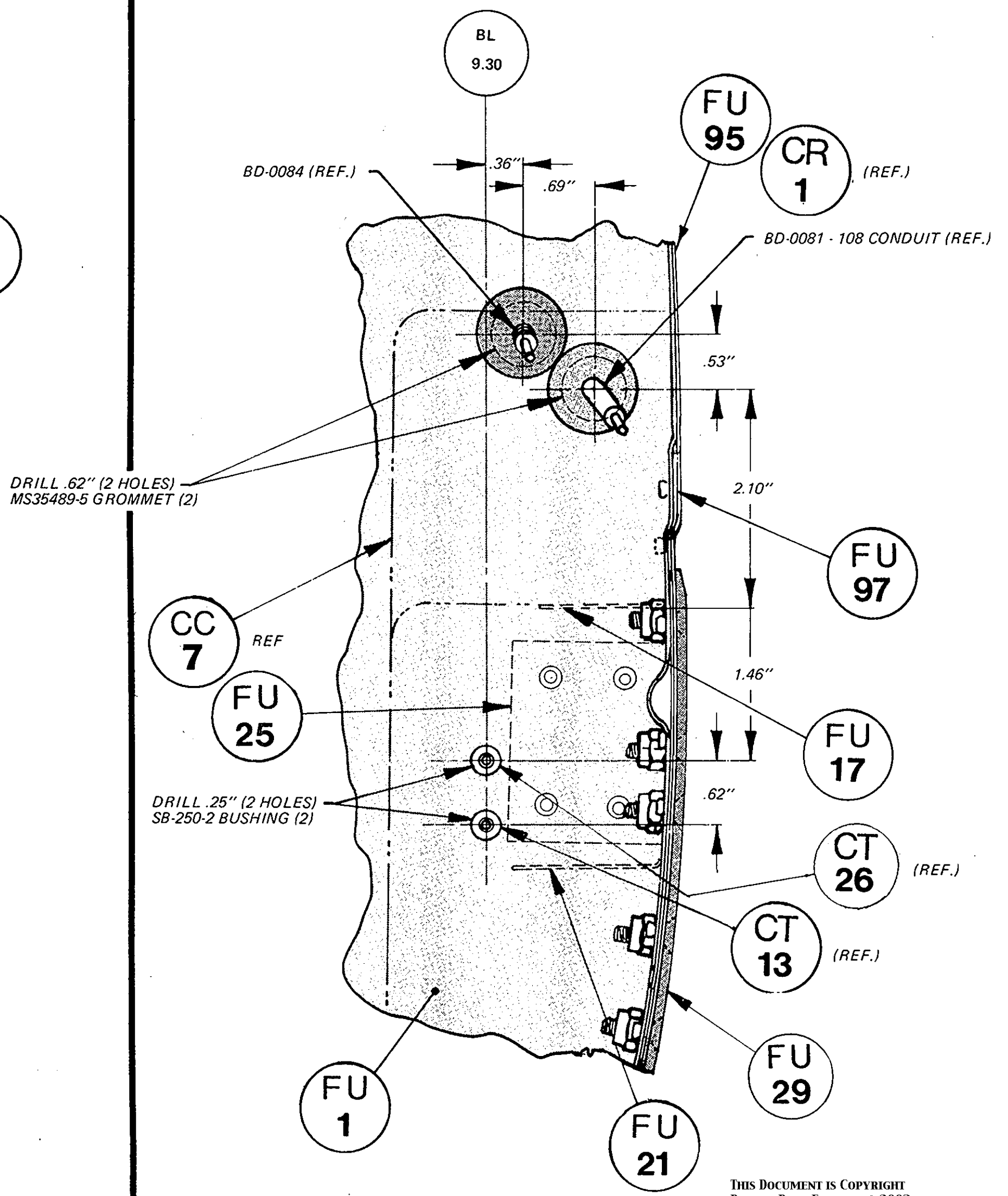
NOTE:
1. ROUGHEN SURFACE OF CT2 FAIRLEAD IN AREA WHERE CT2
PASSES THROUGH GROMMET (MS35489-9). APPLY SUFFICIENT
AMOUNT OF RTV TO CT2, GROMMET AND BULKHEAD TO HOLD
CT2 FIRMLY IN PLACE.



VIEW AT STA 91.15 LOOKING FORWARD



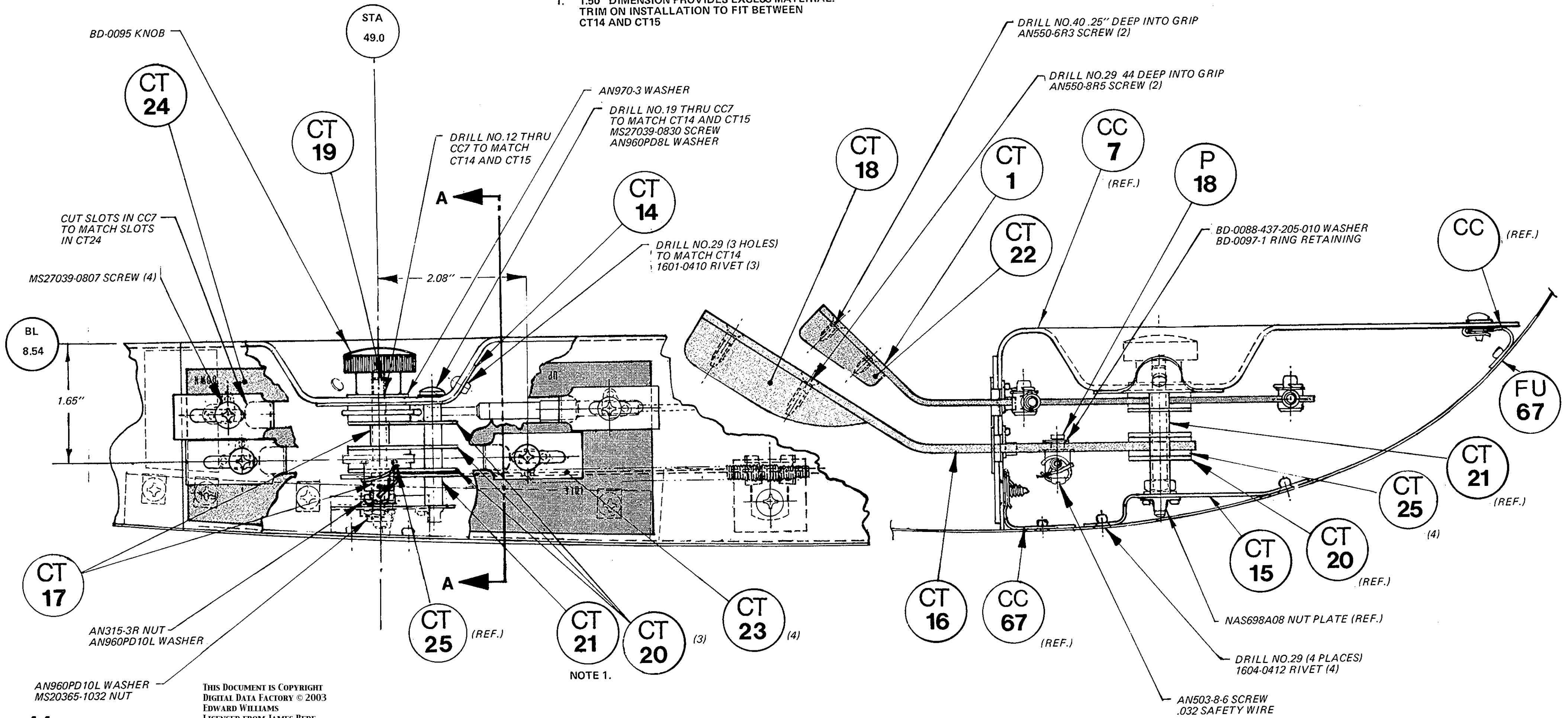
NO SCALE
VIEW B-B



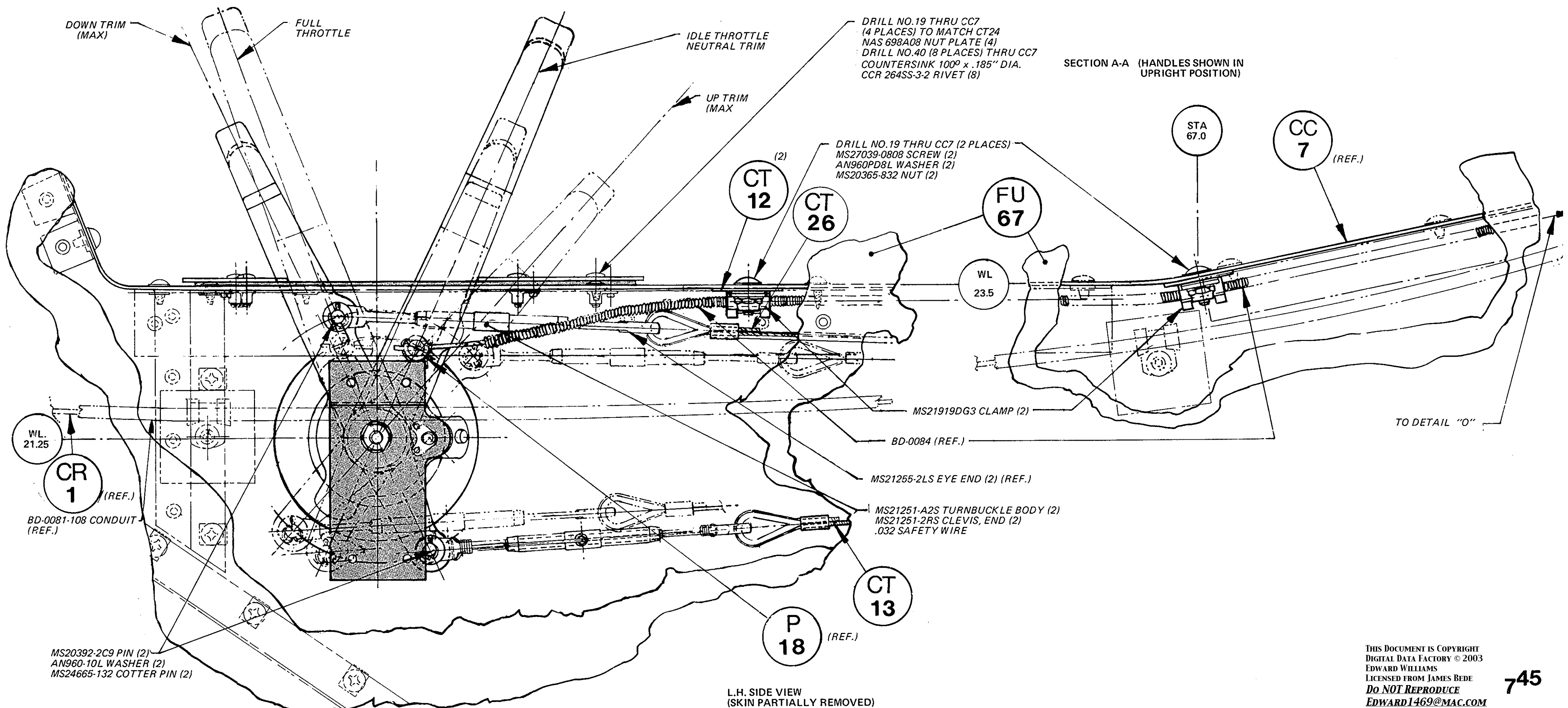
VIEW LOOKING AFT - L.H. SIDE
FU1 CANTED BULKHEAD

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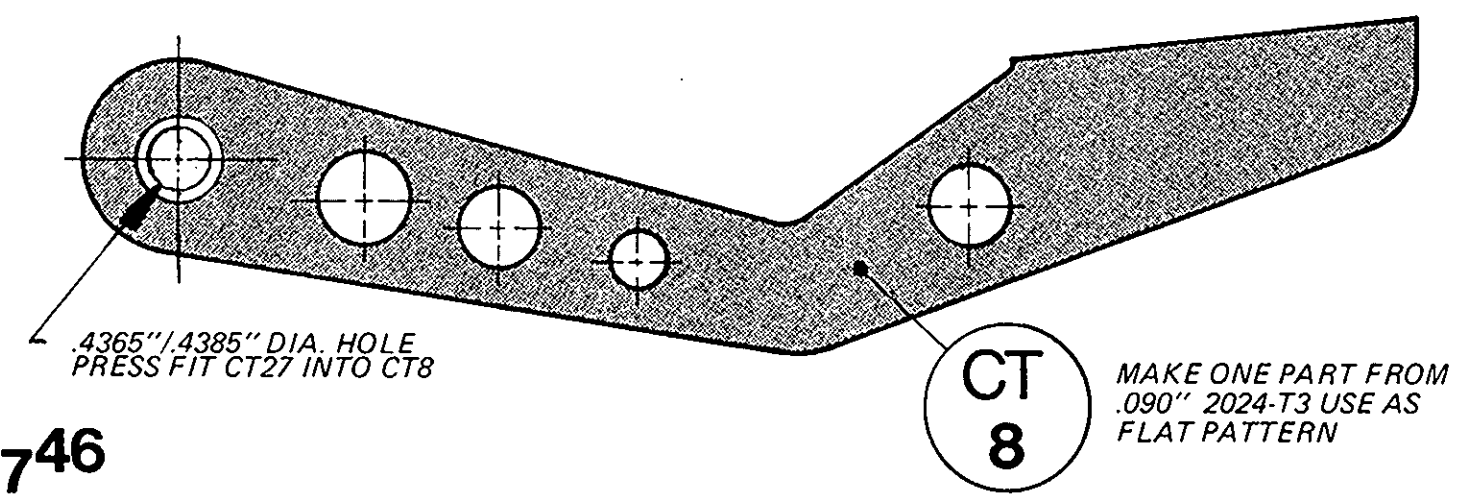
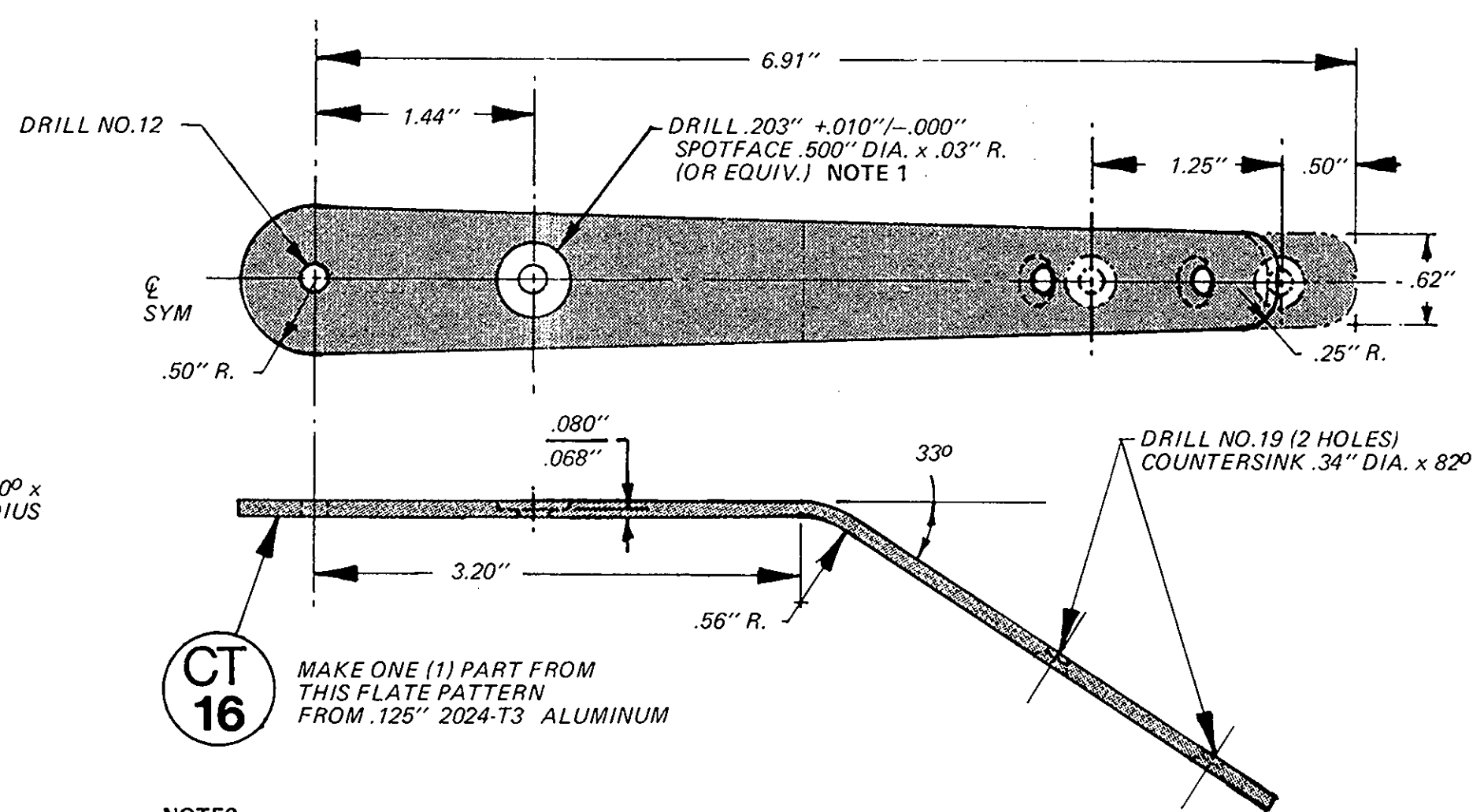
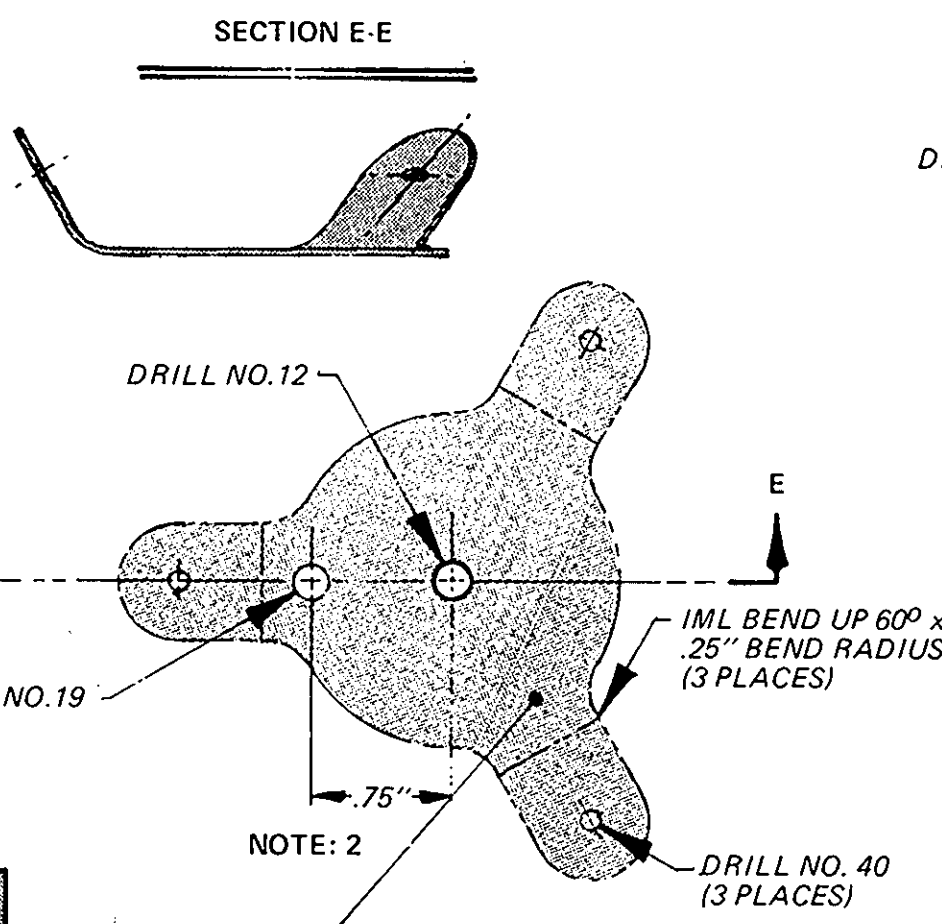
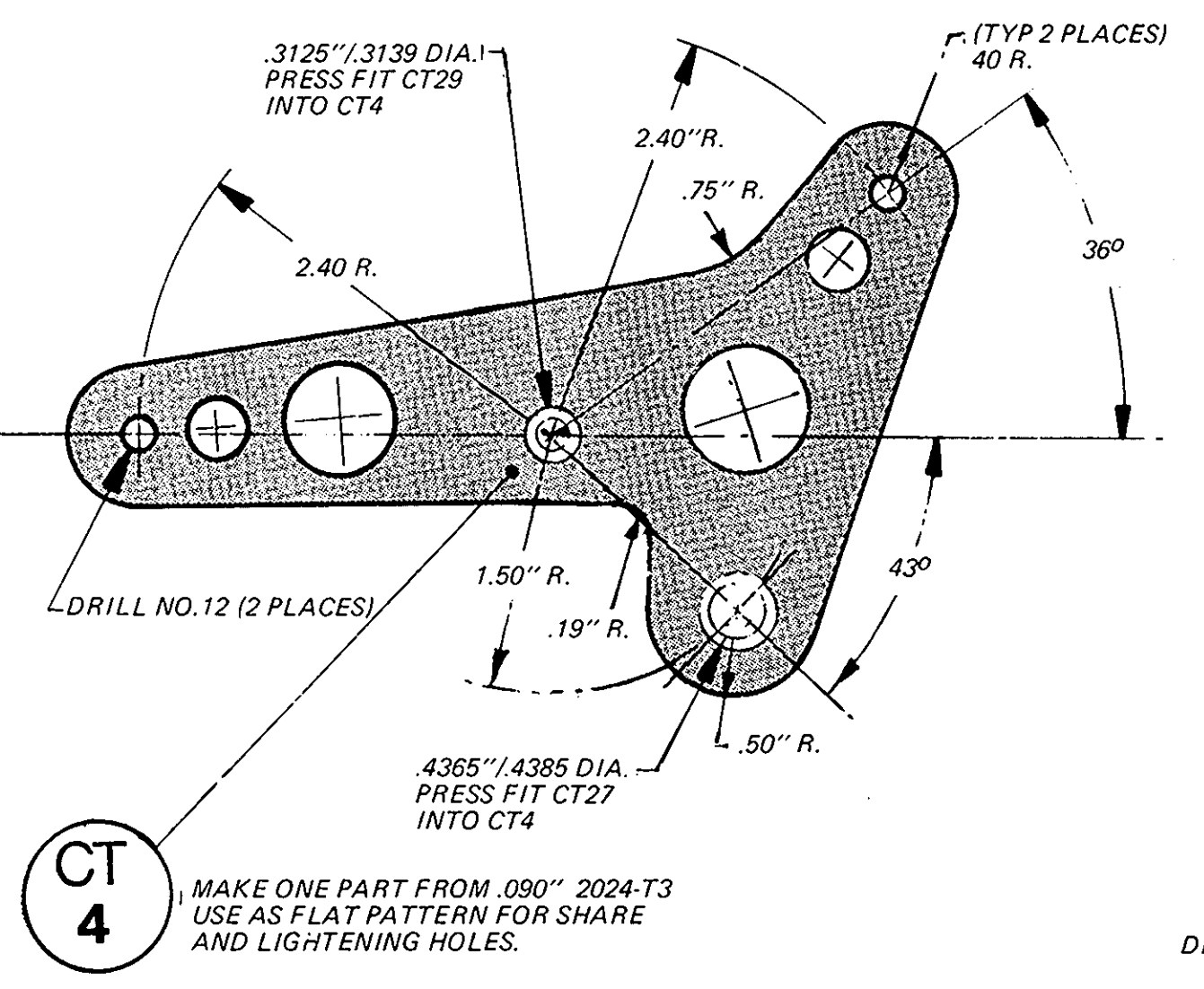
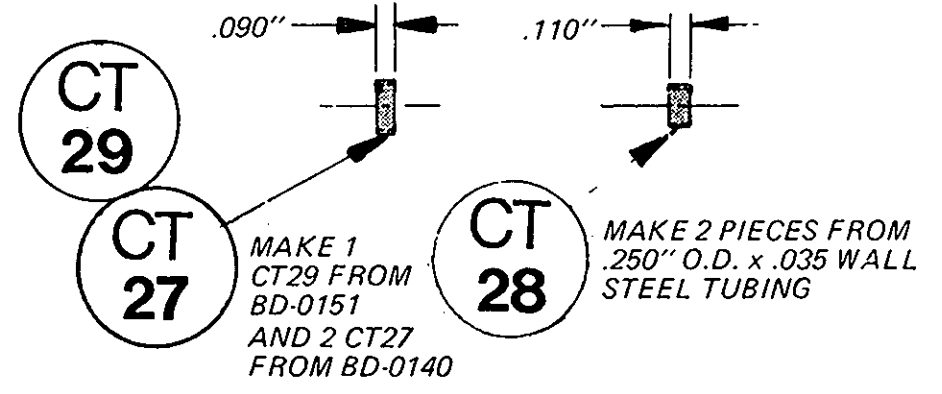
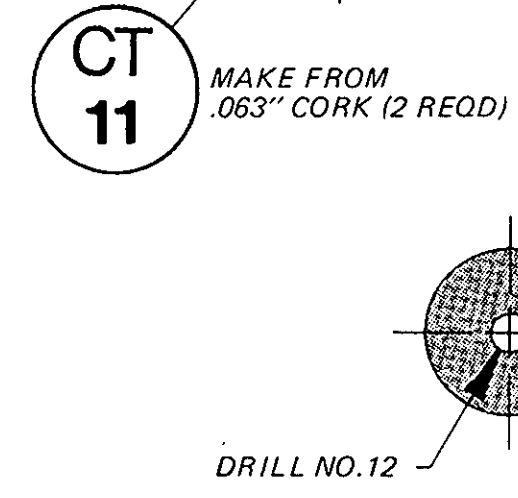
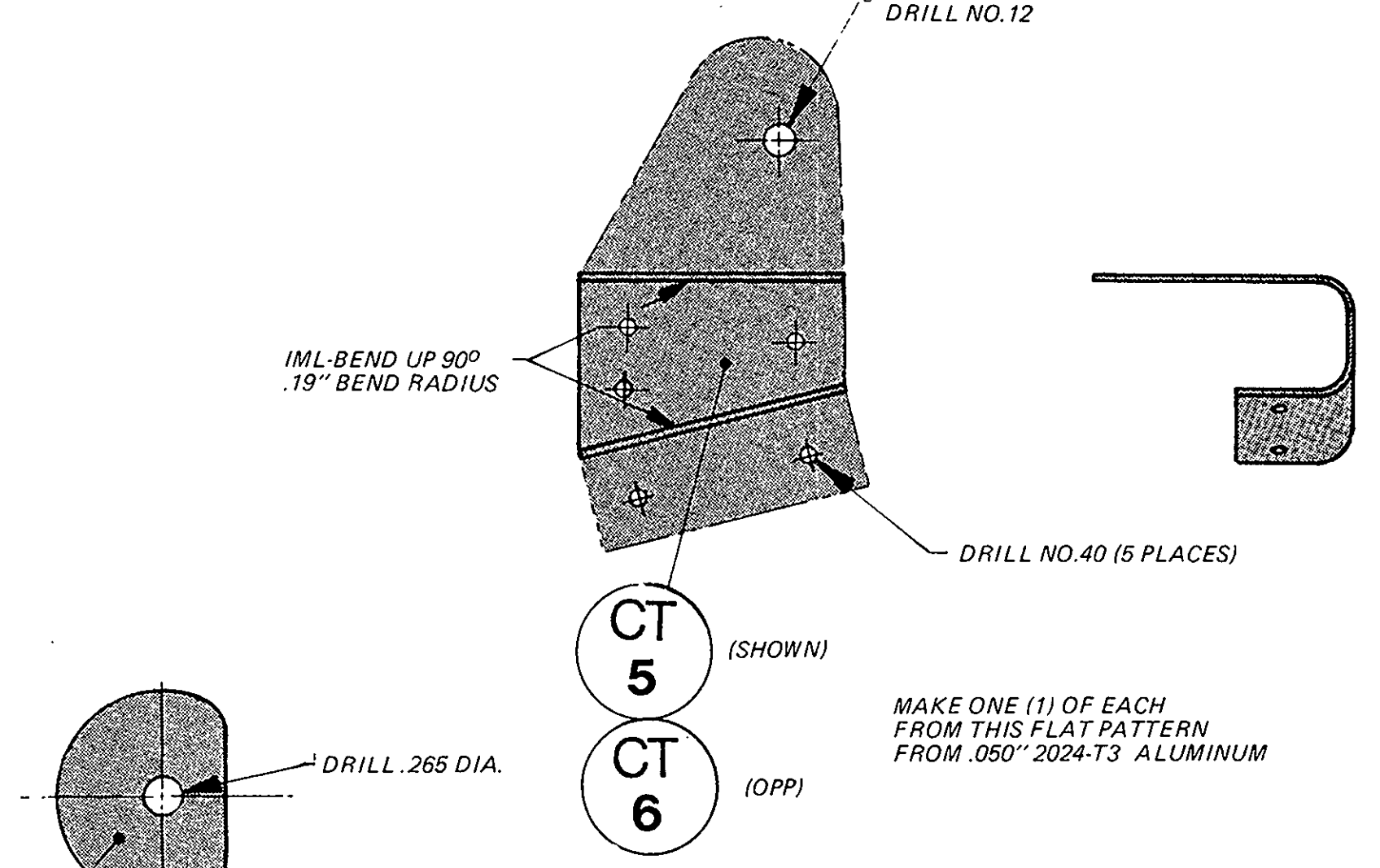
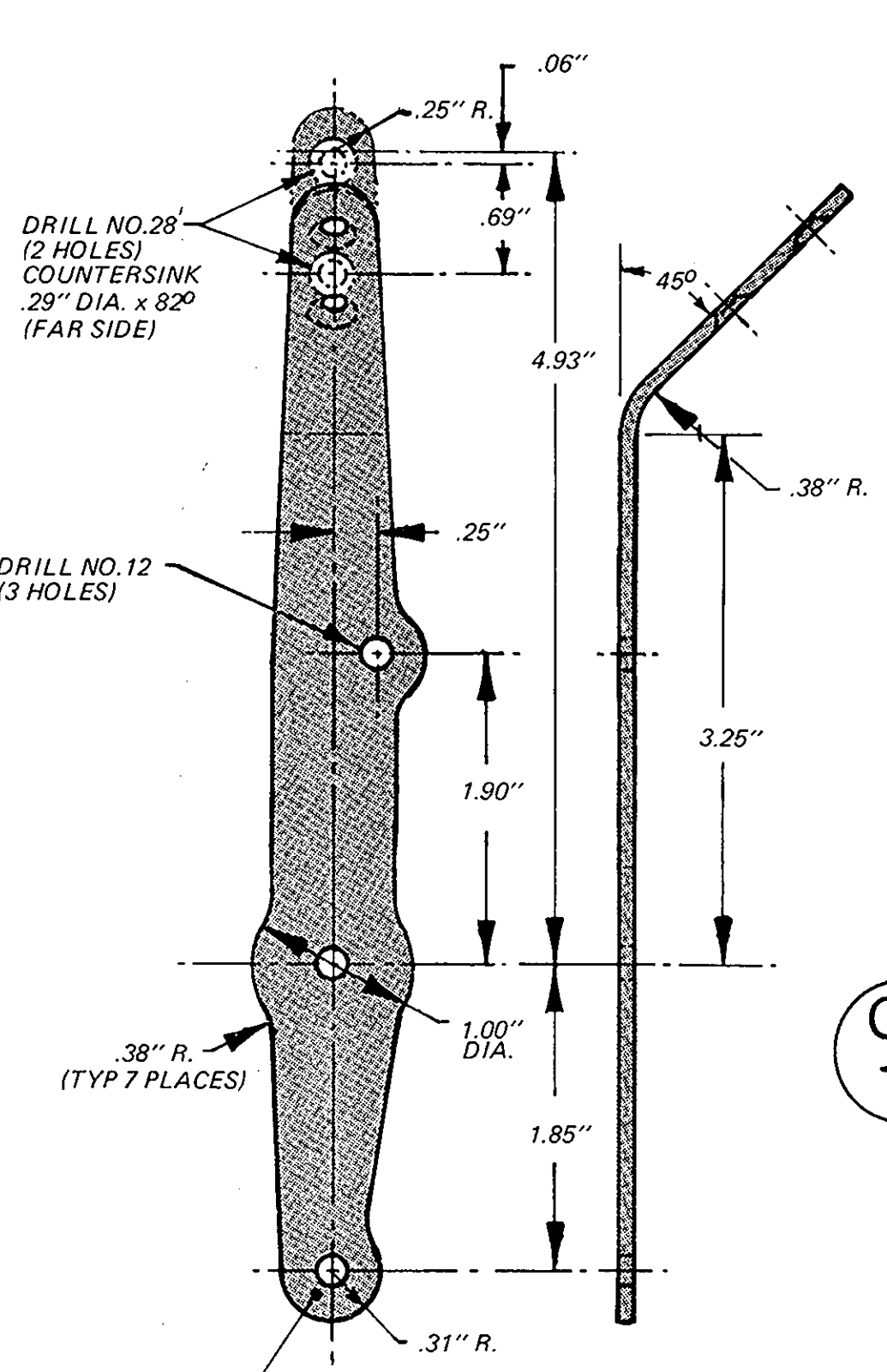
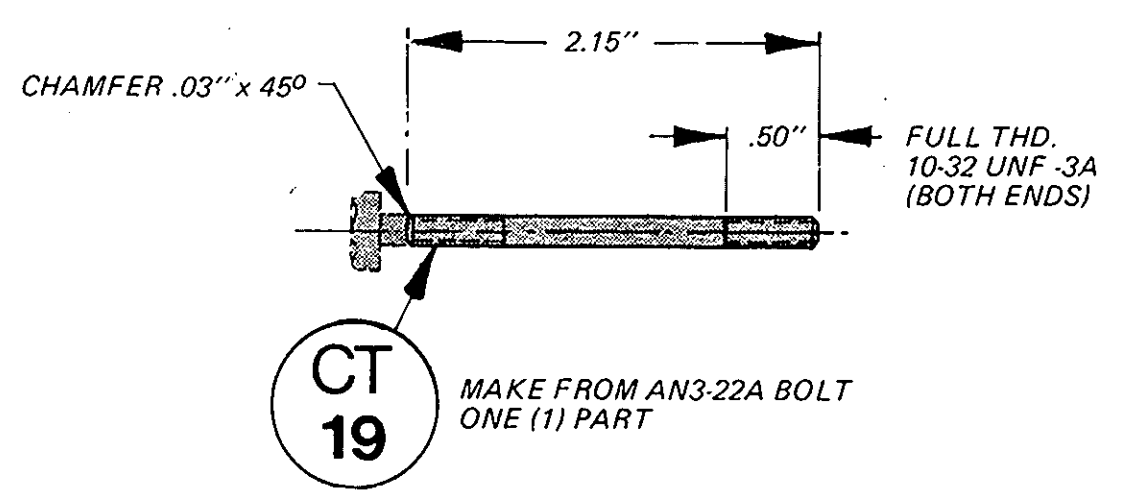
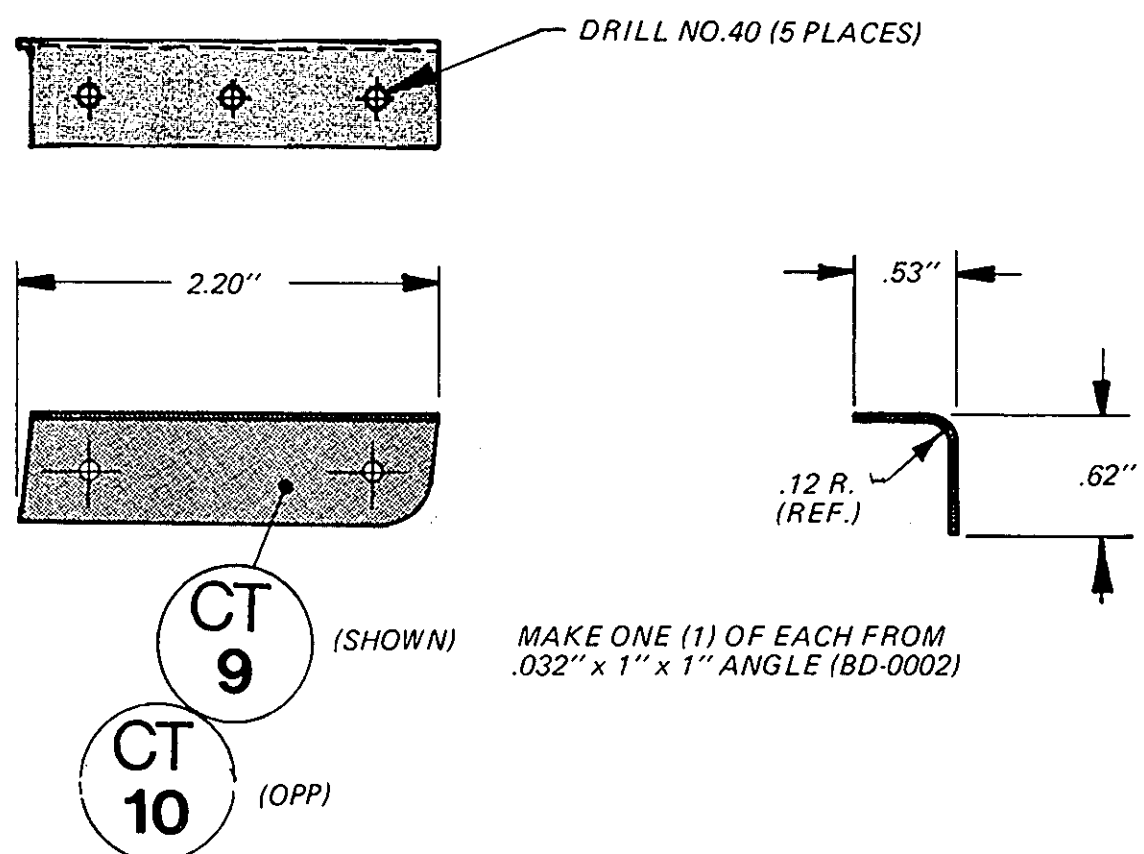
NOTES:
 1. 1.50" DIMENSION PROVIDES EXCESS MATERIAL.
 TRIM ON INSTALLATION TO FIT BETWEEN
 CT14 AND CT15



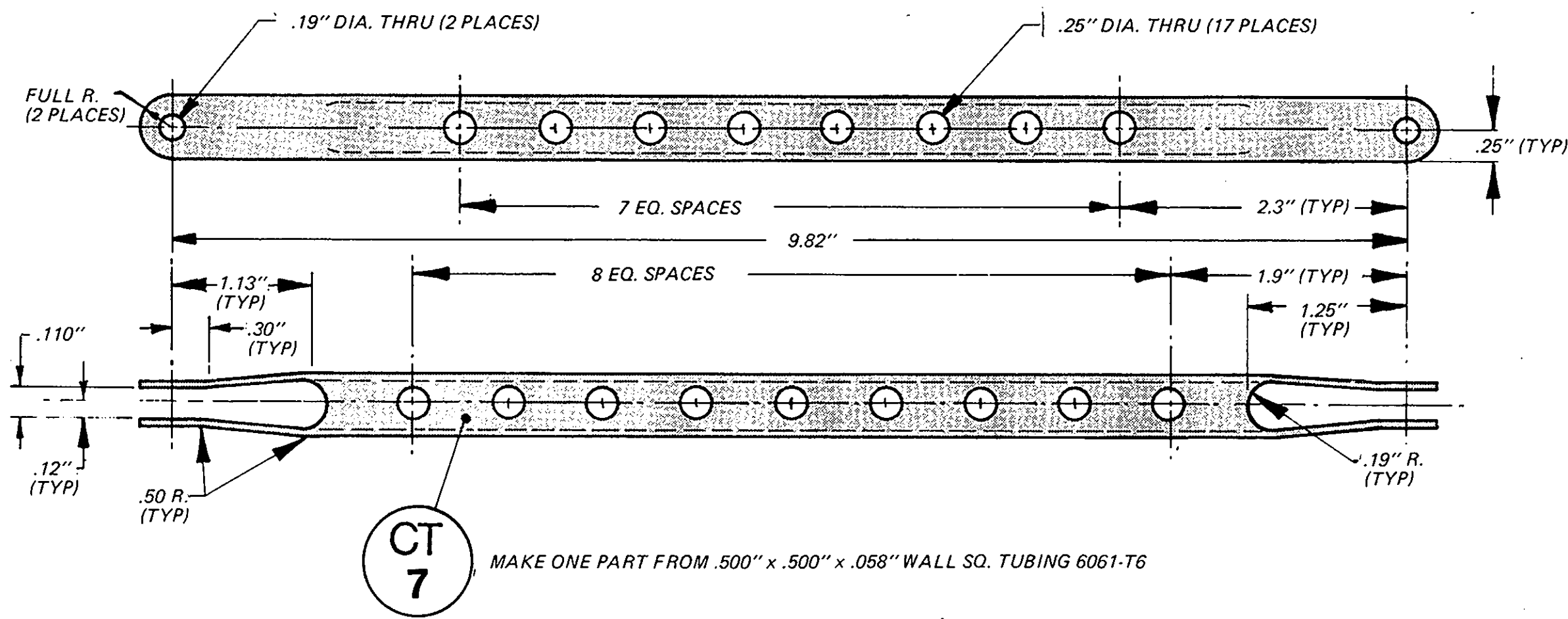
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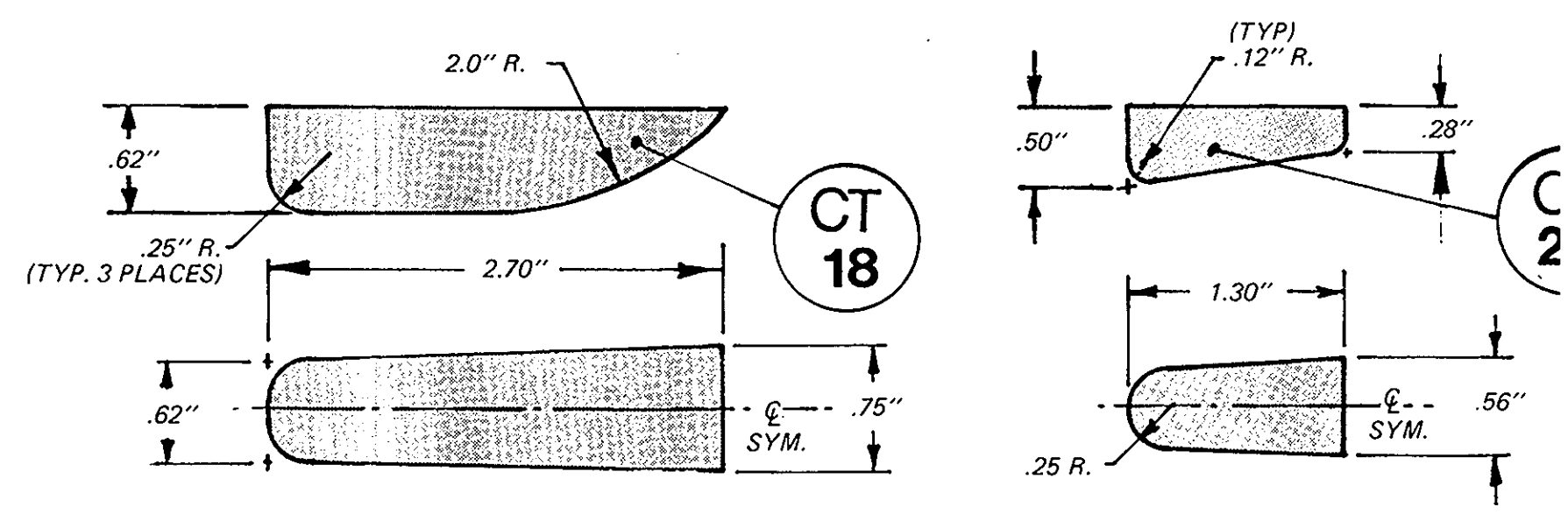
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- NOTES:
- SPOTFACE DEPTH TO BE LIMITED TO CONDITION SNUG FIT WHEN BD5P18 SWIVEL, BD-0088-437-205-010 WASHER, AND BD-0097-1 RING, RETAINING ARE ASSEMBLED. SEE DETAIL "S", TRIM AND THROTTLE CONTROL INSTL, STA49.
 - LOCATION OF HOLES IN CT14, CT15, AND CT20 MUST MATCH.

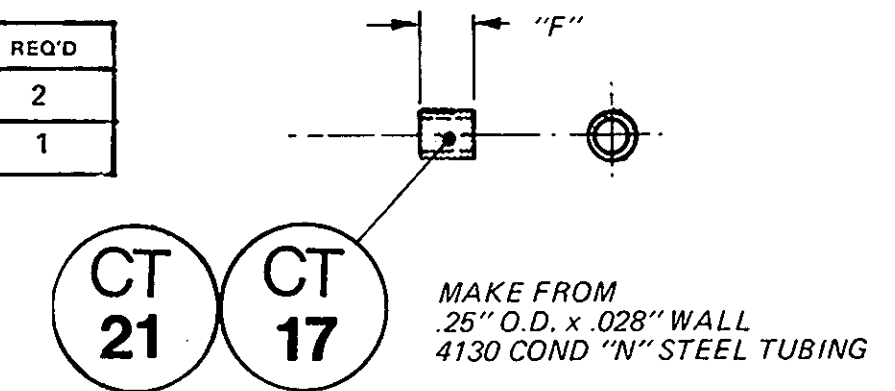


CT 7 MAKE ONE PART FROM .500" x .500" x .058" WALL SQ. TUBING 6061-T6

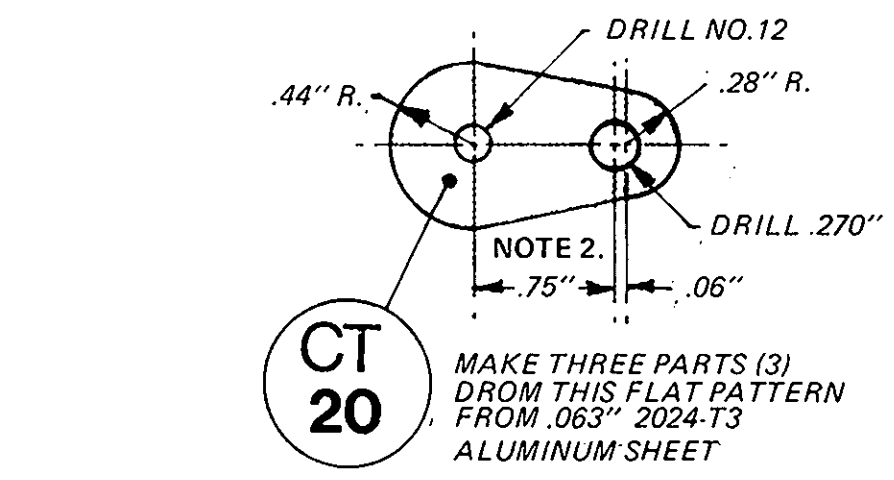


MAKE ONE EACH FROM NAHOGANY
MAY BE USED AS FLAT PATTERN
SAND ALL SHARP EDGES

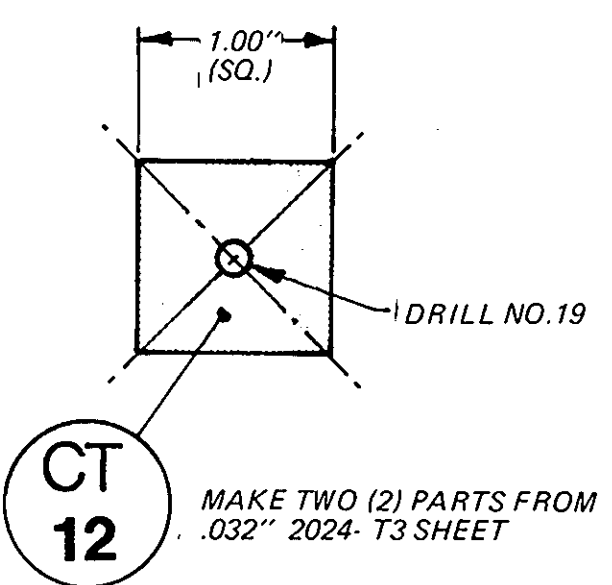
PART NO	DIM "F"	REQ'D
CT17	.281"	2
CT21	1.500"	1



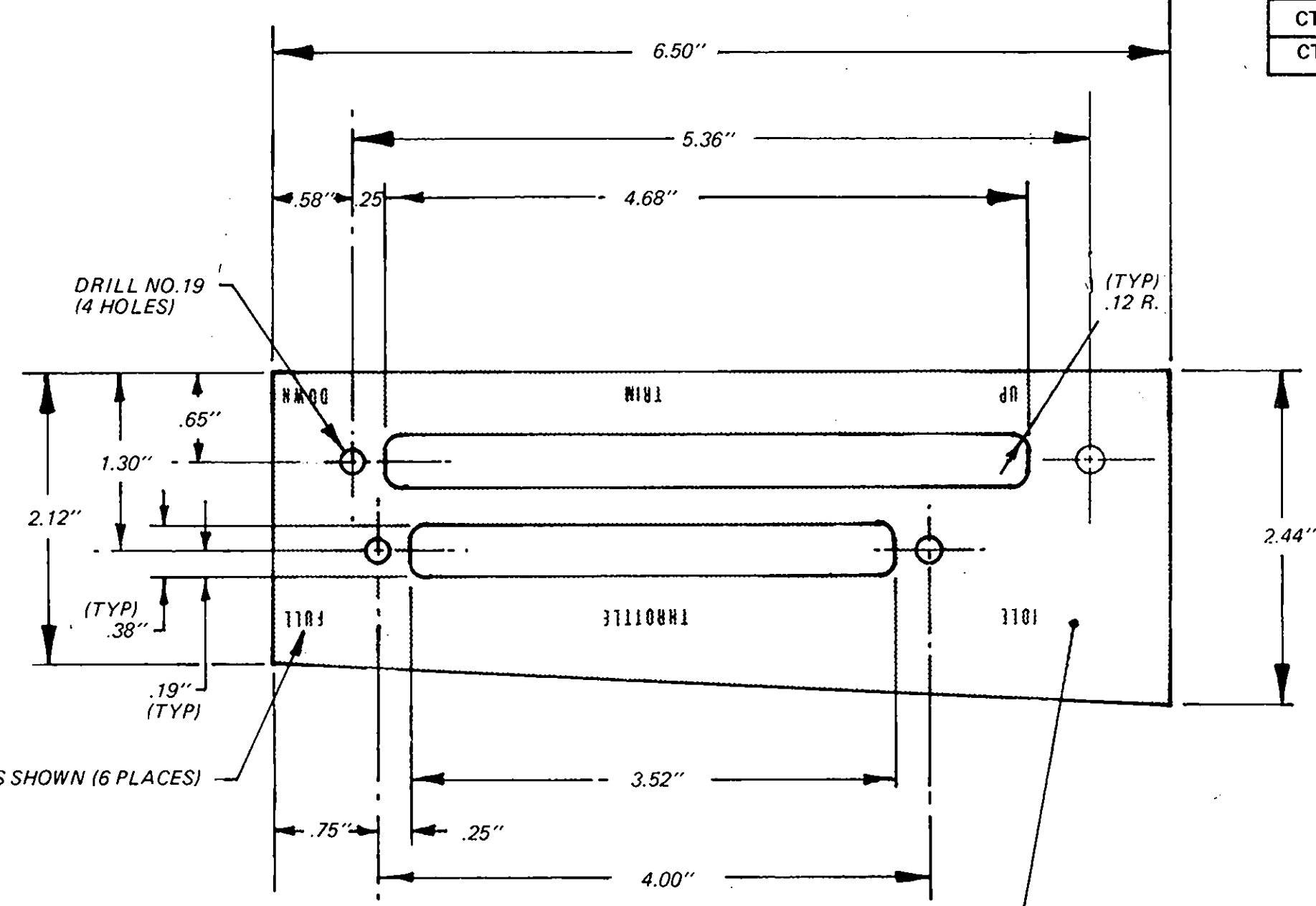
MAKE FROM
.25" O.D. x .028" WALL
4130 COND "N" STEEL TUBING



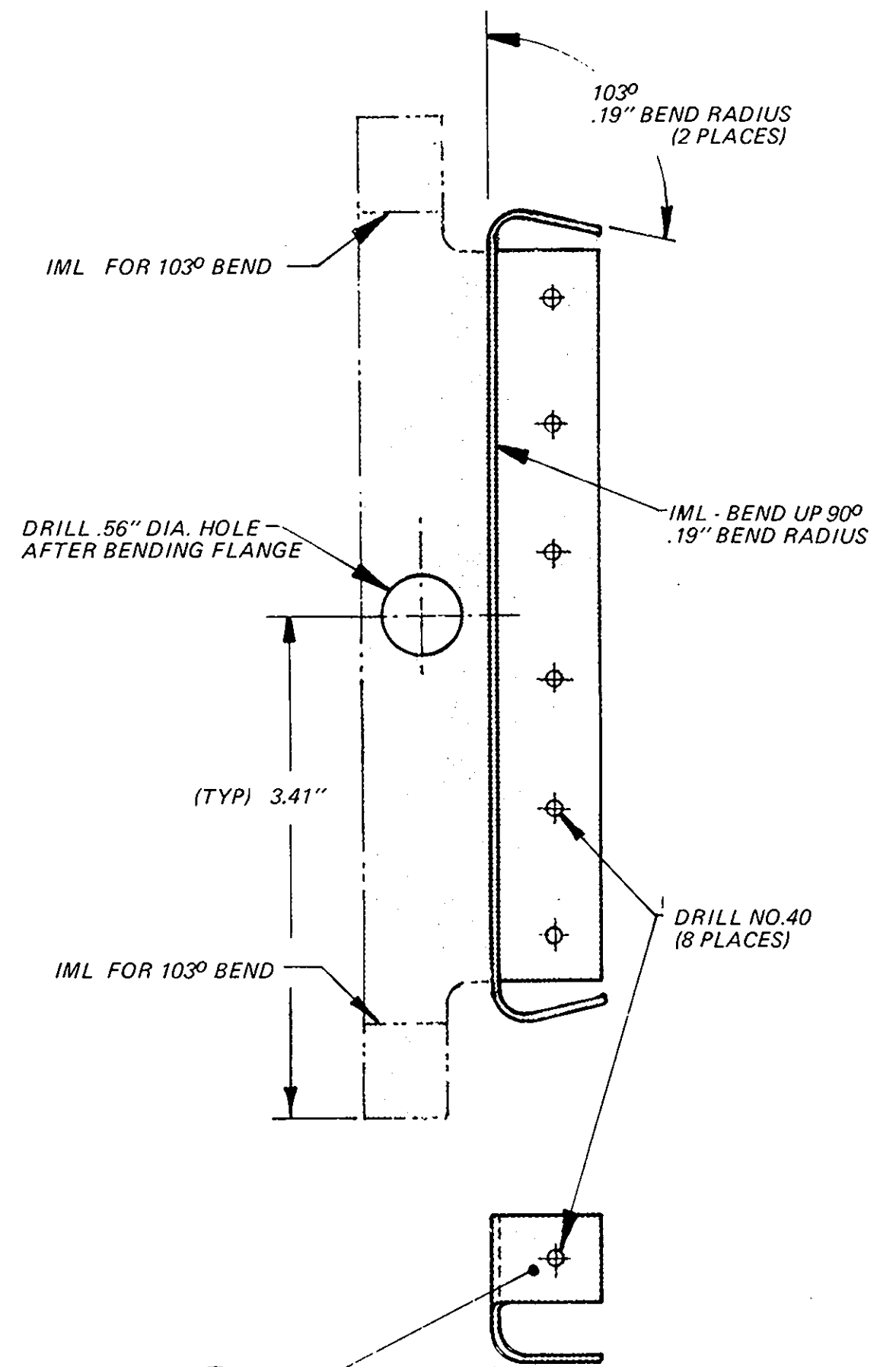
CT 20 MAKE THREE PARTS (3)
FROM THIS FLAT PATTERN
FROM .063" 2024-T3
ALUMINUM SHEET



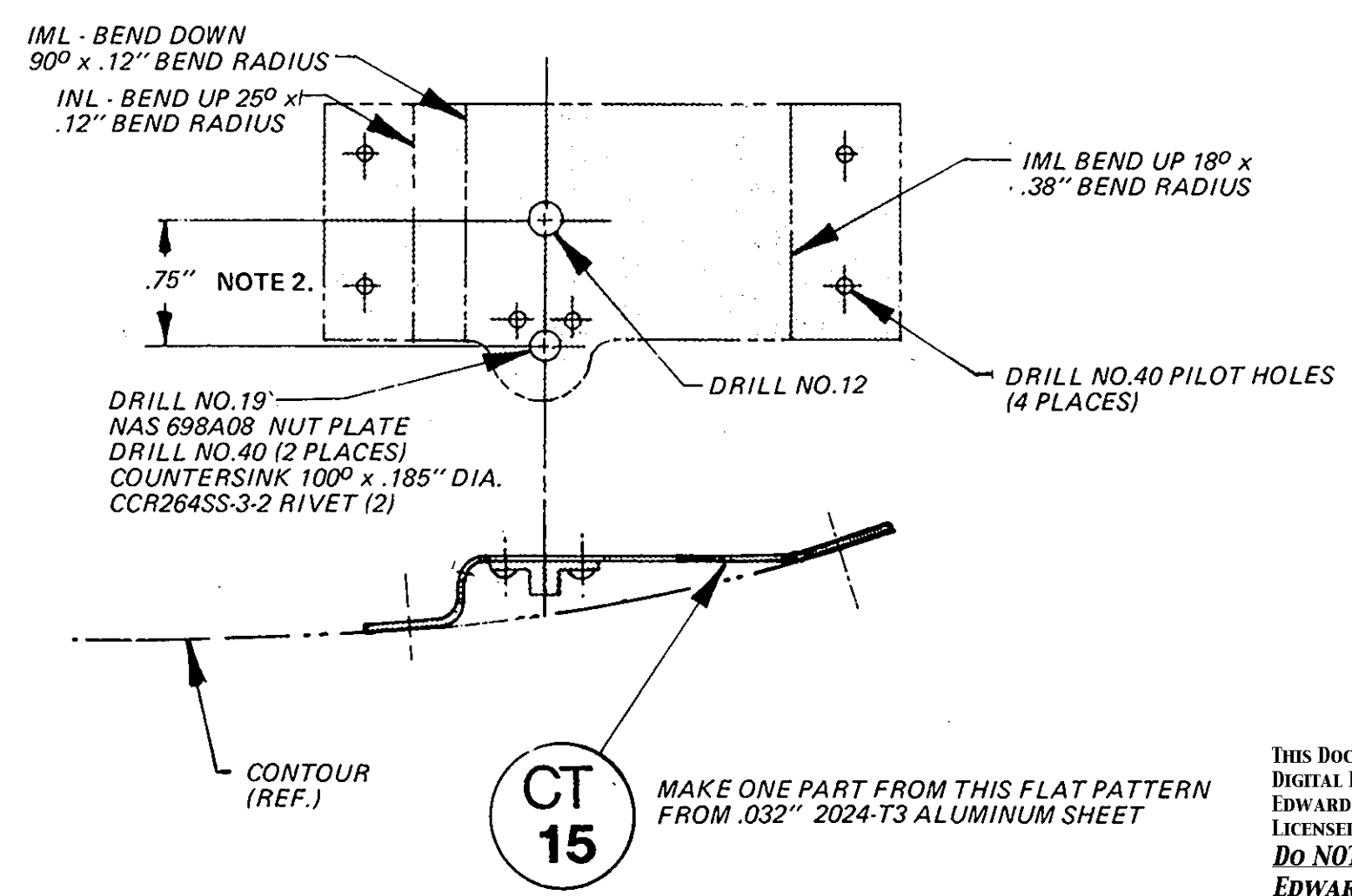
CT 12 MAKE TWO (2) PARTS FROM
.032" 2024-T3 SHEET



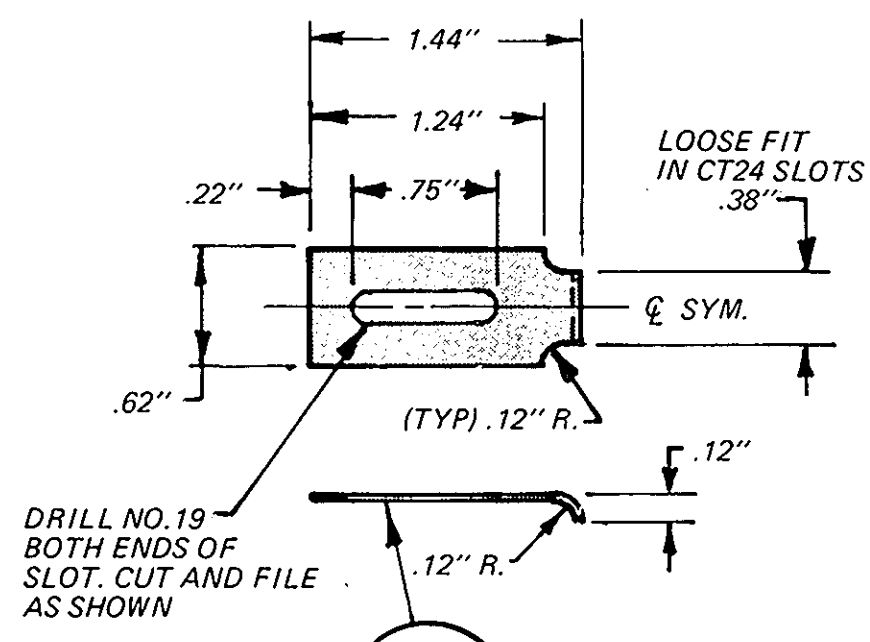
MAKE ONE PART FROM .063" NYLON
MAY BE USED AS A FLAT PATTERN



CT 3 MAKE ONE PART FROM .032" 2024-T3
USE AS FLAT PATTERN



CT 15 MAKE ONE PART FROM THIS FLAT PATTERN
FROM .032" 2024-T3 ALUMINUM SHEET



CT 23 MAKE FOUR (4) PARTS
FROM .032" 2024-T3
SHEET

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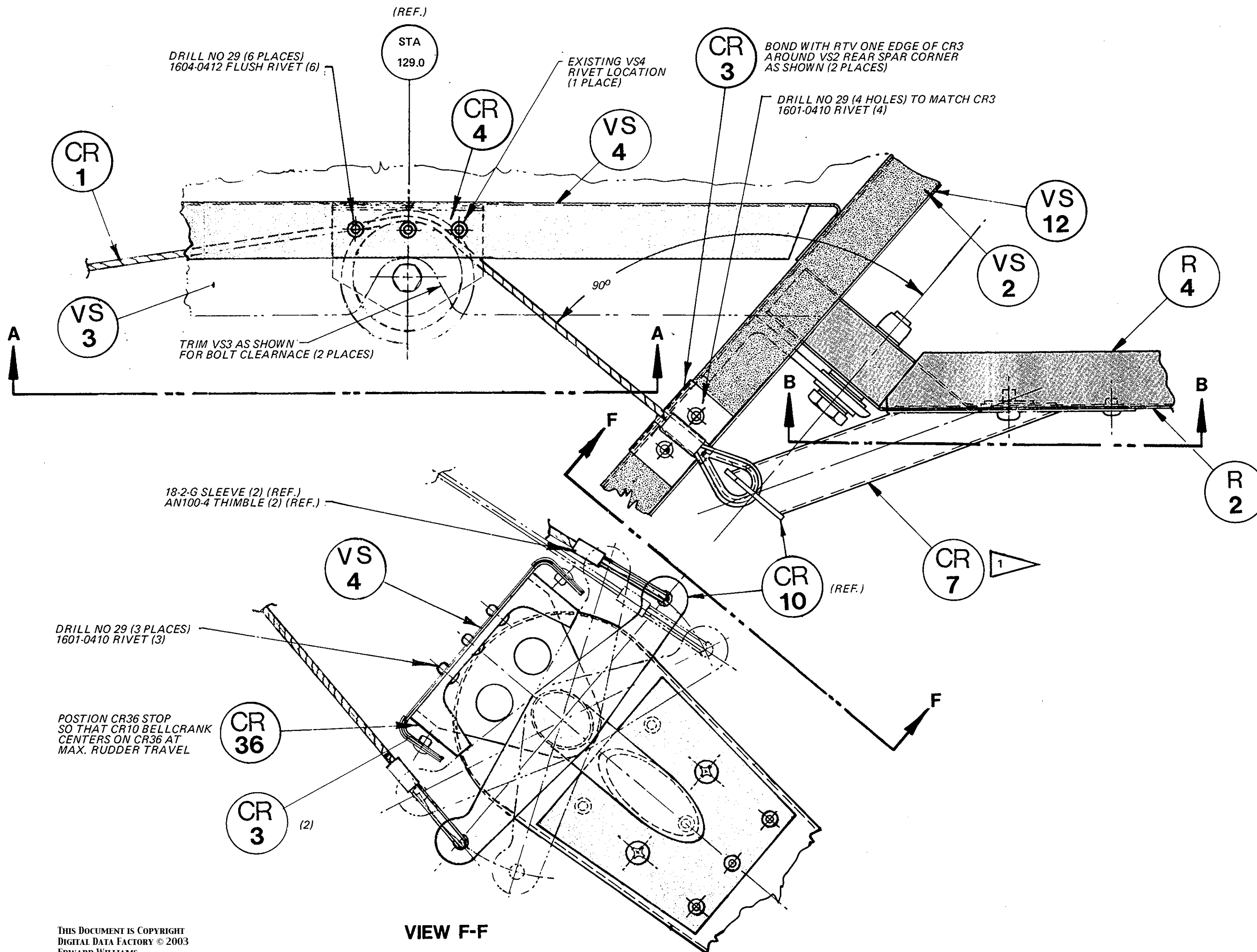
RUDDER CABLE & CONTROL HORN

Beginning Construction

- 1 Rig rudder cables with rudder and reder pedals secured in the neutral position.
- 2 Adjust rudder pedal stops so that the rudder rotates right and left an equal amount. Correct rotation is established when the aft, bottom tip of the rudder travels 5.00" right and left of BLO.00" measured perpindicular to BLO.00".
- 3 File legs of CR36 so that a space of .05" exists between CR36 and CR10 when the rudder pedals are firmly against their stops.

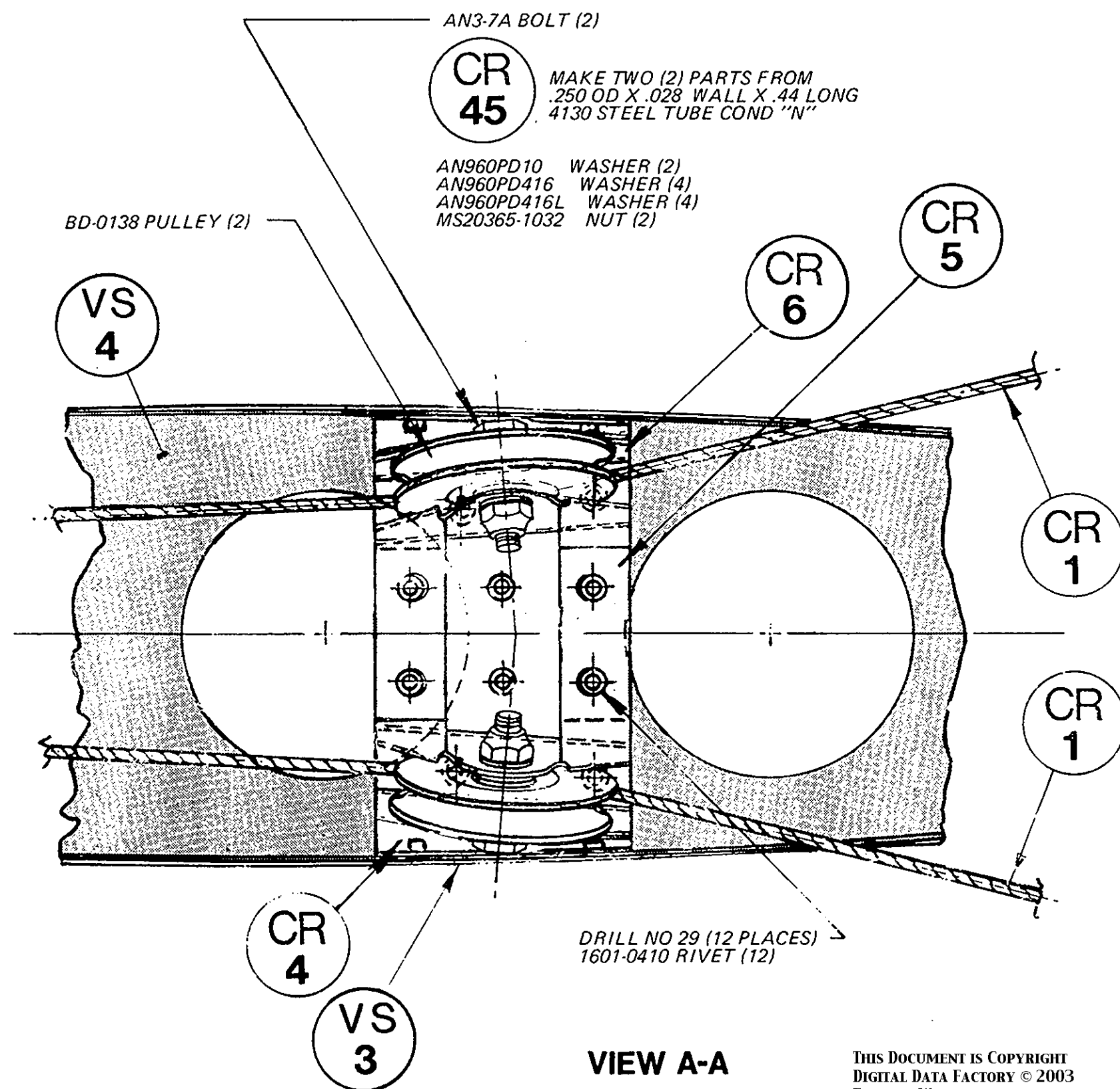
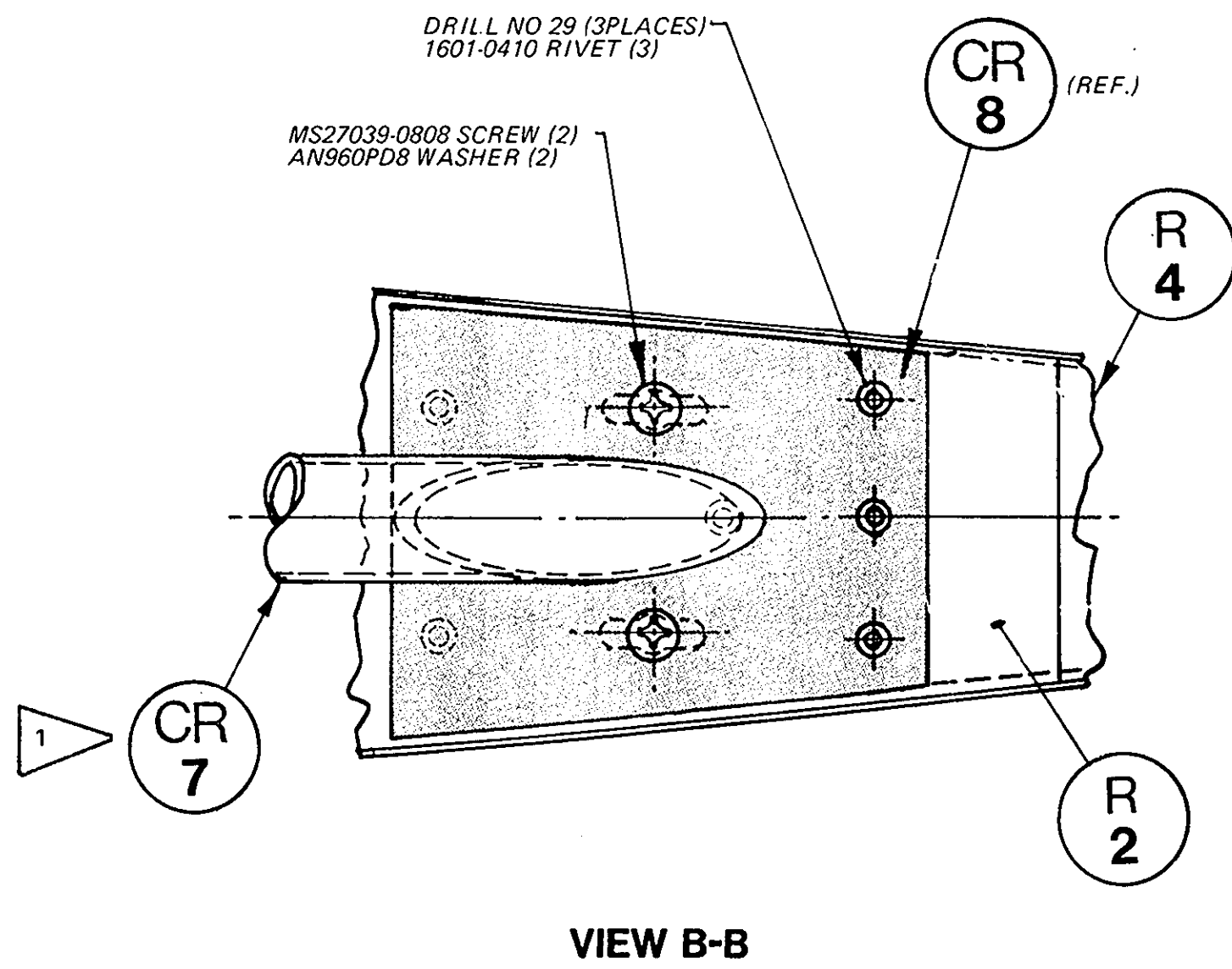
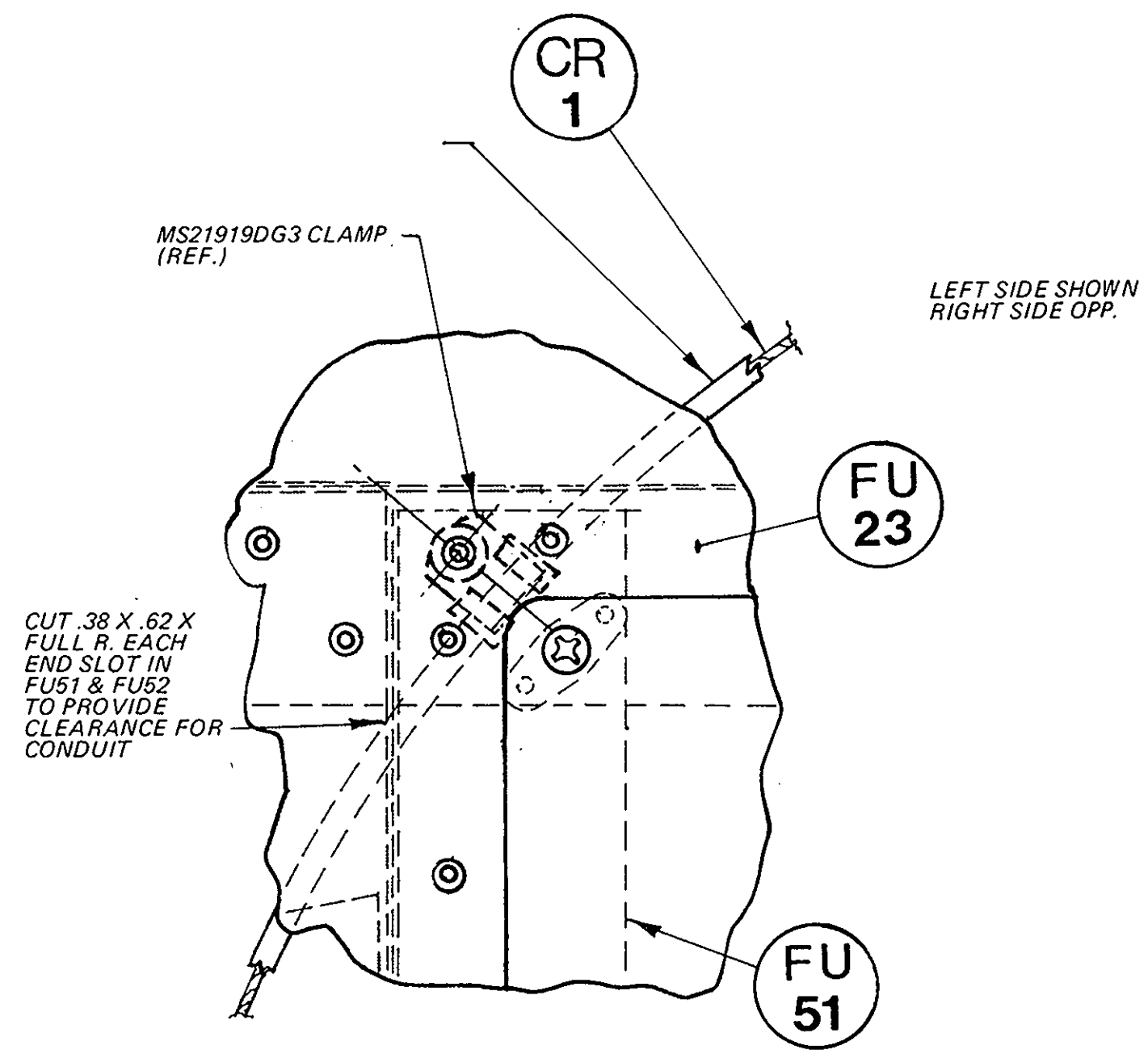
PARTS & MATERIALS CALL OUT

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
CR 1	Cable	2		Consists of Cable & Fittings
CR 2	Doubler	6	BD-5-M-0101	.032 2024-T3 *
CR 3	Cap Rub	2	BD-5-M-0127	.015 Nylon Film 101 *
CR 4	Retainer	1	BD-5-M-0101	.032 2024-T3
CR 5	Bracket, Inner Channel	1	BD-5-M-0101	.032 2024-T3
CR 6	Bracket, Outer Channel	1	BD-5-M-0101	.032 2024-T3
CR 7	Horn Weldment	1		Consists of CR8, CR9 & CR10 *
CR 8	Base Plate	1	BD-5-M-0111	.040 4130, Cond "N"
CR 9	Torque Tube	1	BD-5-M-0051	.75 O.D. x .035 wall 4130 Cond "N" Tube
CR 10	Bellcrank	1	BD-5-M-0105	.050 4130 Cond "N"
CR 11	Retainer, Conduit	4	BD-5-M-0178	.375 DIA 2024-T4 Rod
CR 12	Bracket, Conduit, Fwd	4	BD-5-M-0029	.050 2024-T3
CR 13	Bracket, Conduit, Aft	1	BD-0089	.12 x .78 x 1 2024-T3 511 angle
CR 36	Stop, Bell Crank	1	BD-5-M-0140	.25 Phenolic
CR 45	Sleeve	2	BD-5-M-0157	.25 O.D. x .028 W 4130 Stl Tube

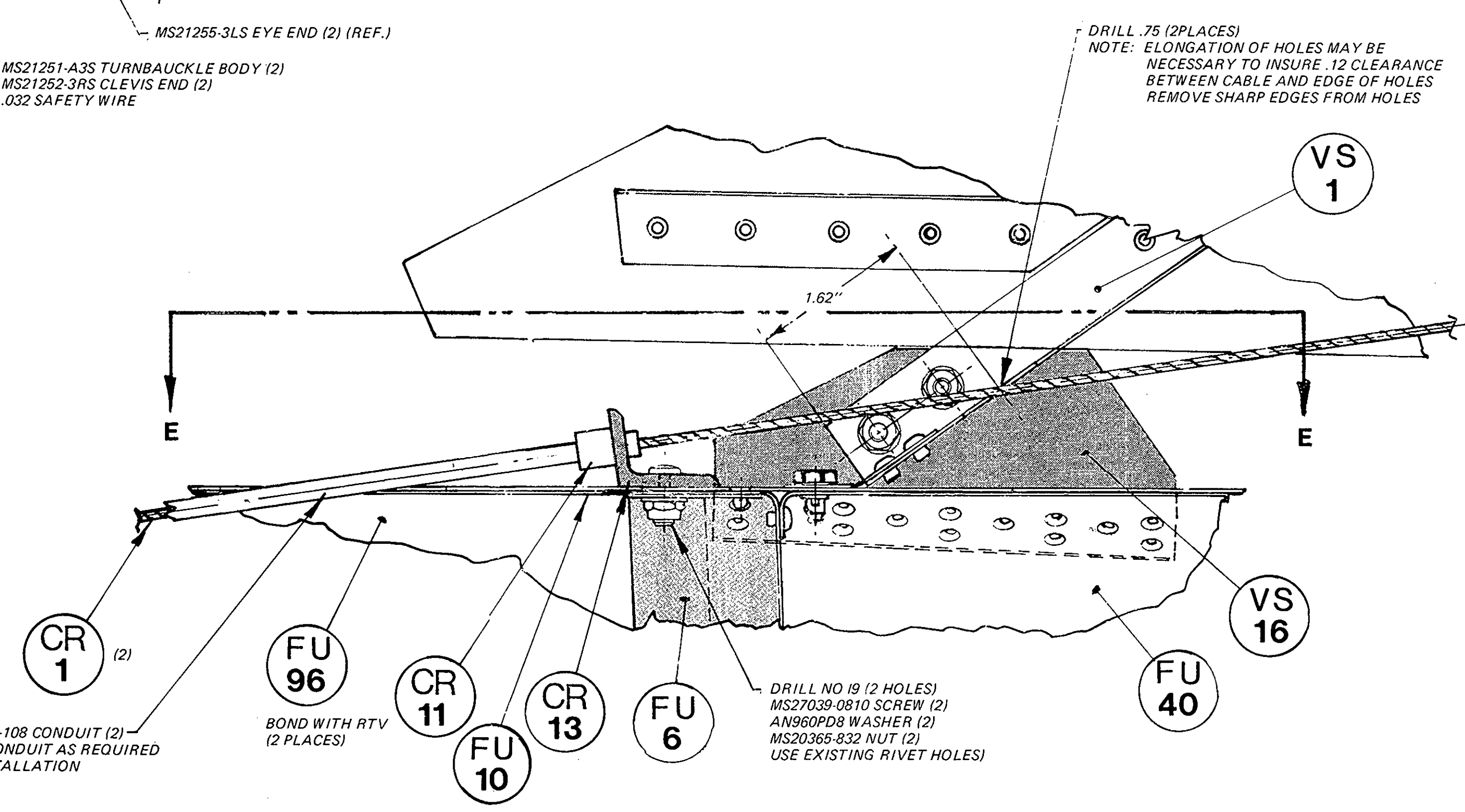
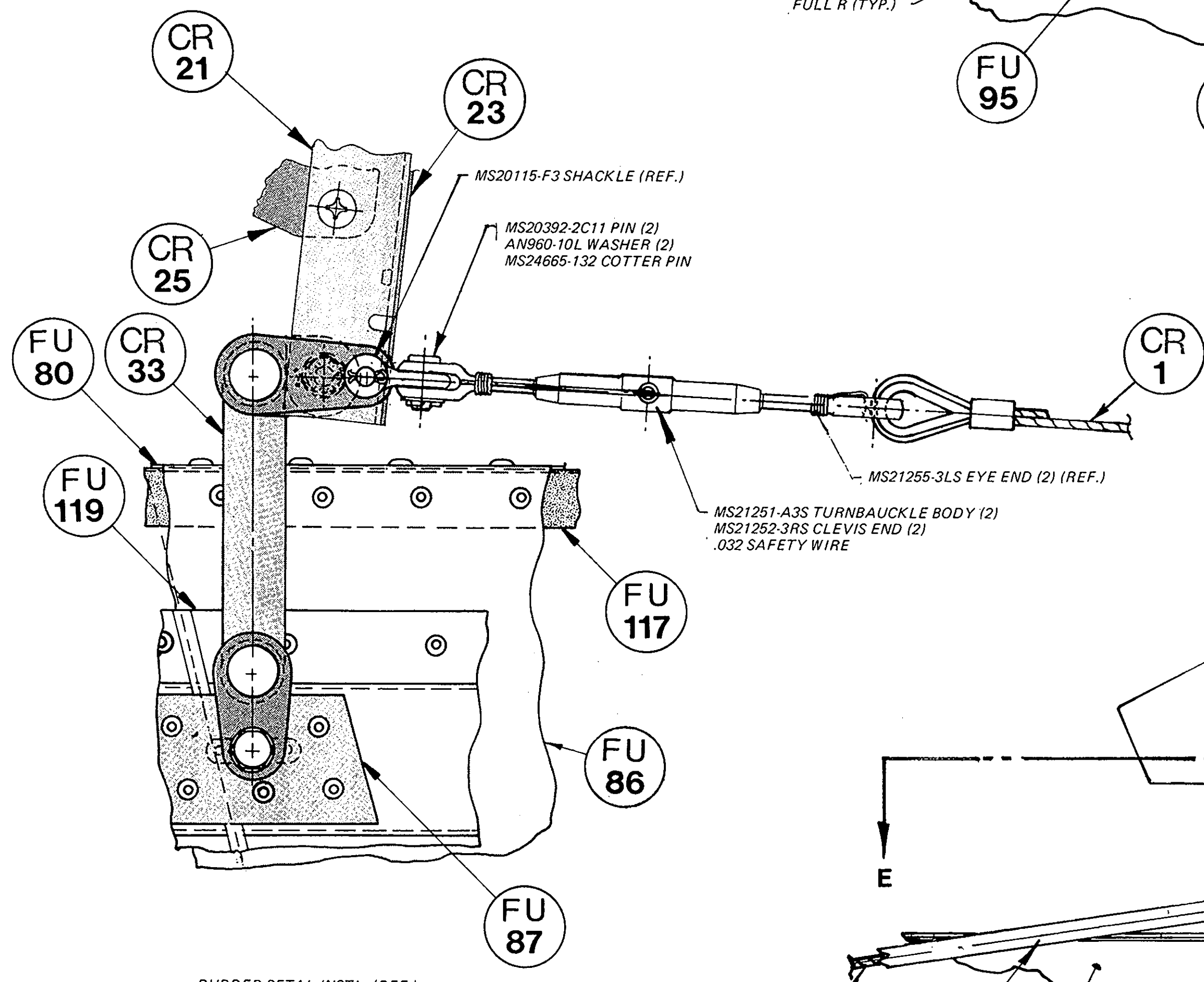
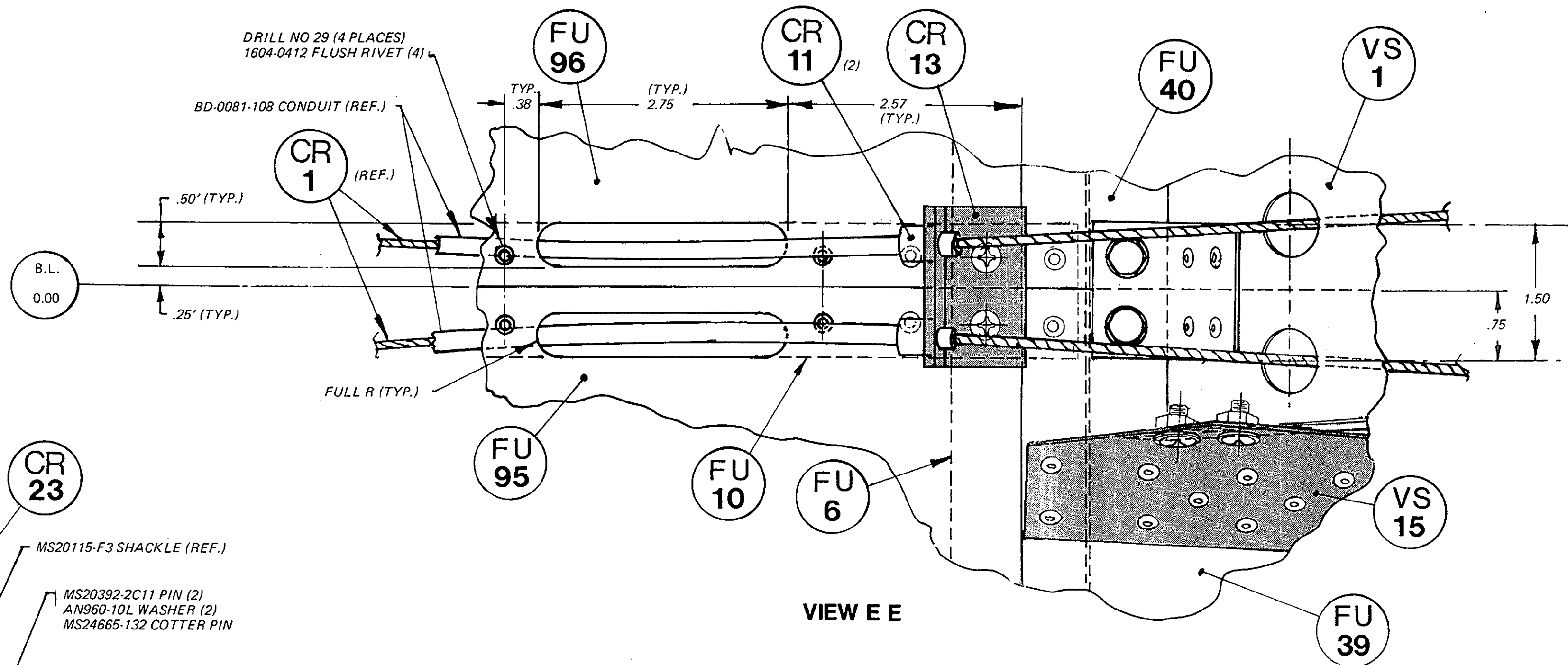


VIEW F-F

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1 POSITION CR7 HORN WELDMENT SO THAT BOTH HOLES IN CR10 BELLCRANK ARE IN LINE WITH RUDDER AXIS OF ROTATION.

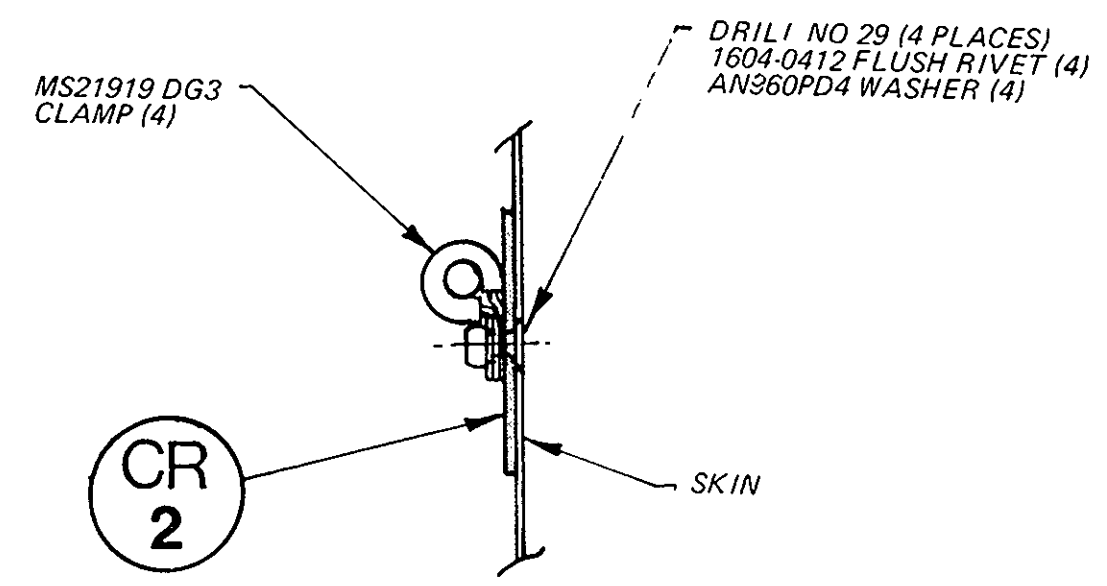


DRILL .75 (2 PLACES)
NOTE: ELONGATION OF HOLES MAY BE NECESSARY TO INSURE .12 CLEARANCE BETWEEN CABLE AND EDGE OF HOLES
REMOVE SHARP EDGES FROM HOLES

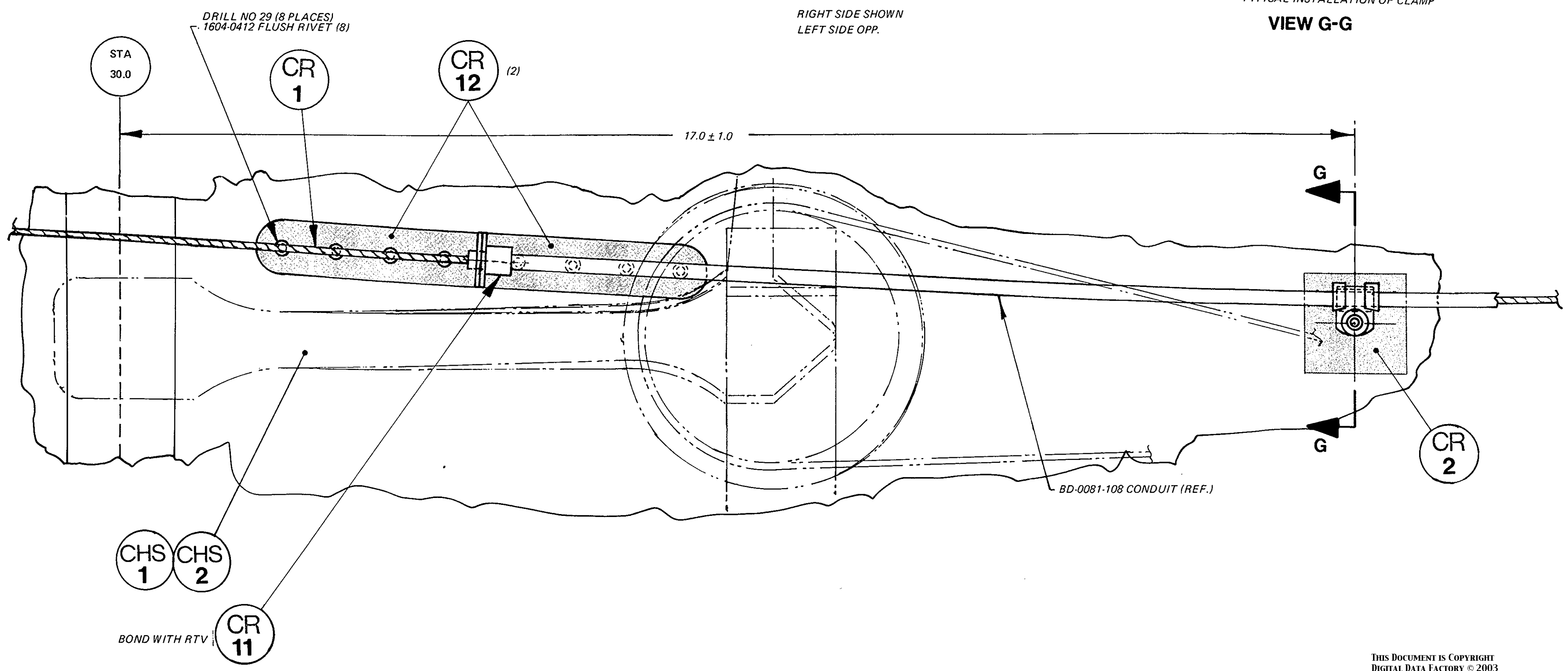
DRILL NO 19 (2 HOLES)
MS27039-0810 SCREW (2)
AN960PD8 WASHER (2)
MS20365-832 NUT (2)
USE EXISTING RIVET HOLES

BD-0081-108 CONDUIT (2)
TRIM CONDUIT AS REQUIRED ON INSTALLATION

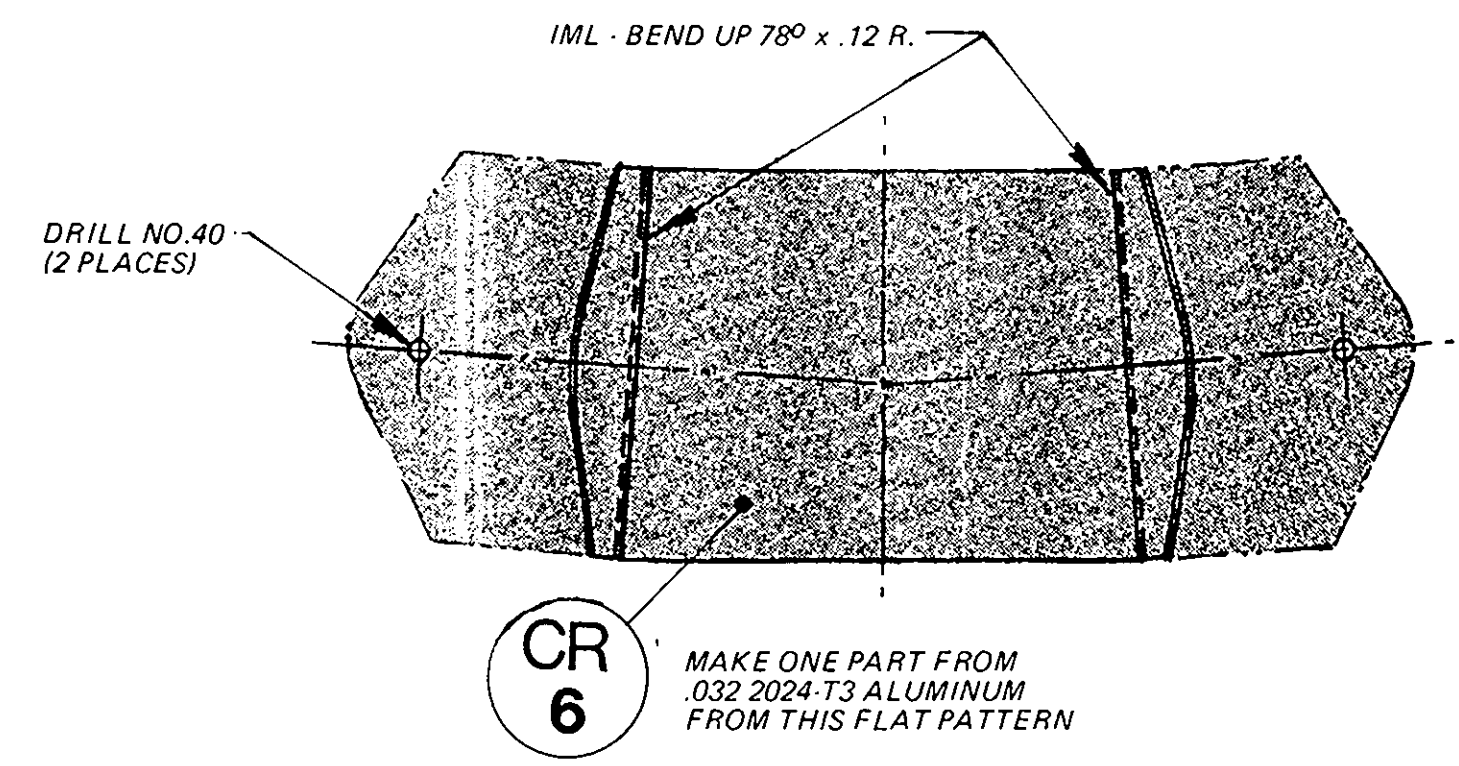
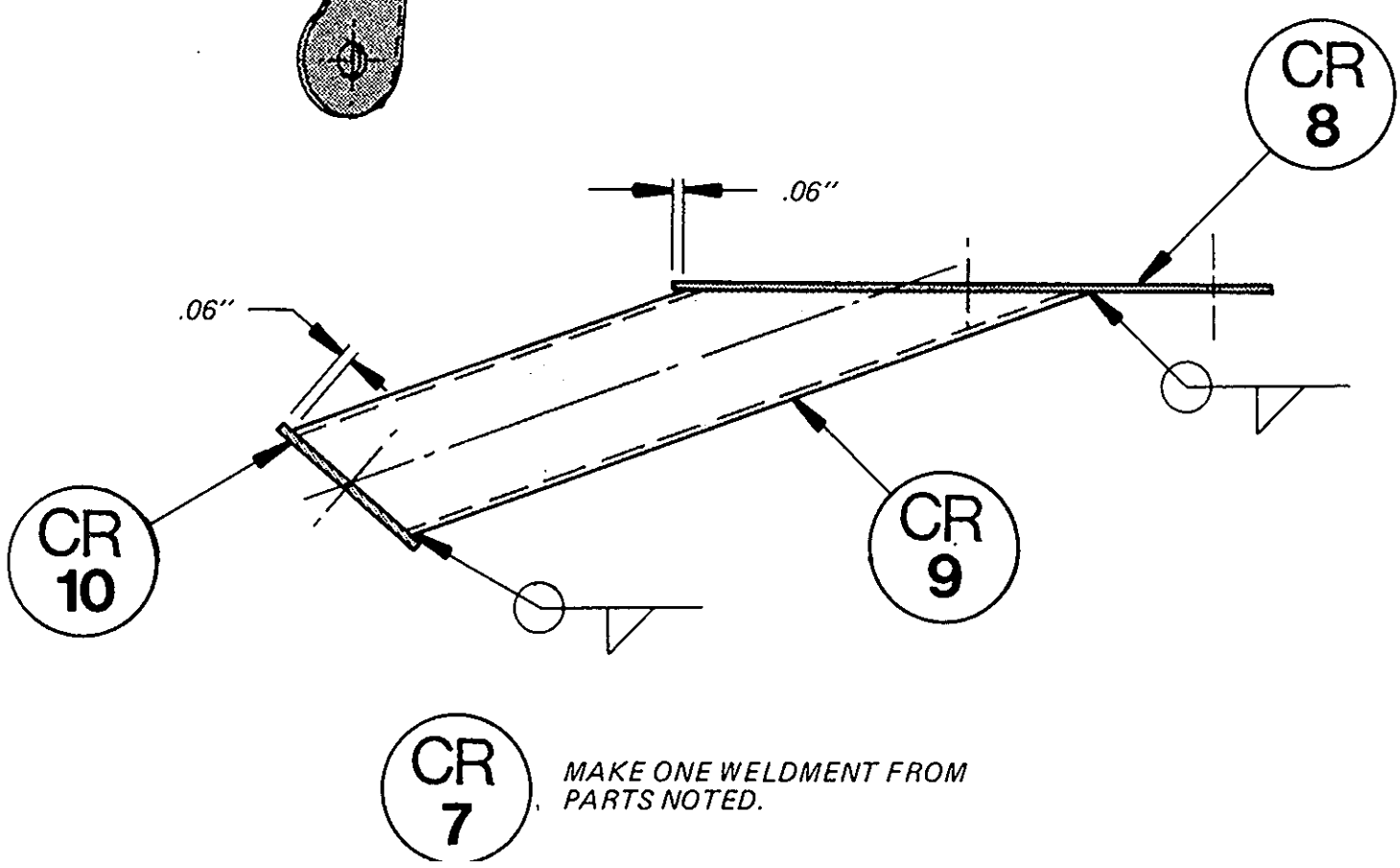
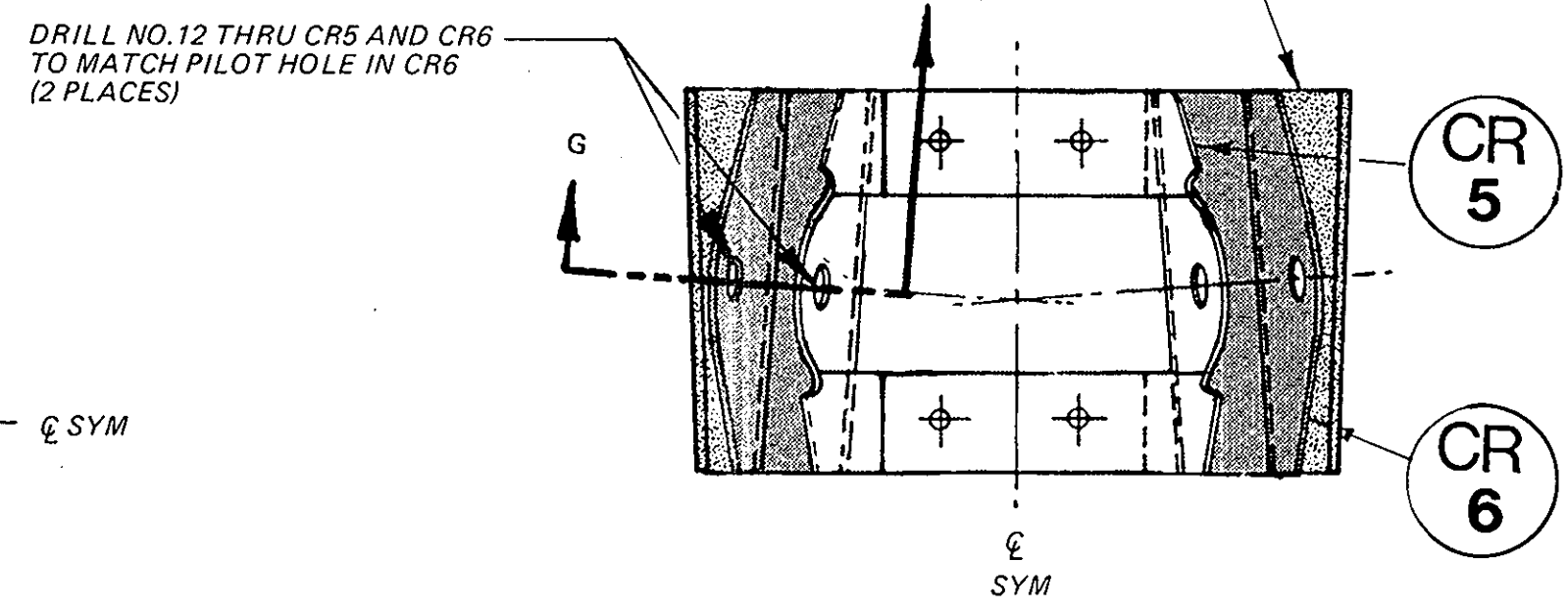
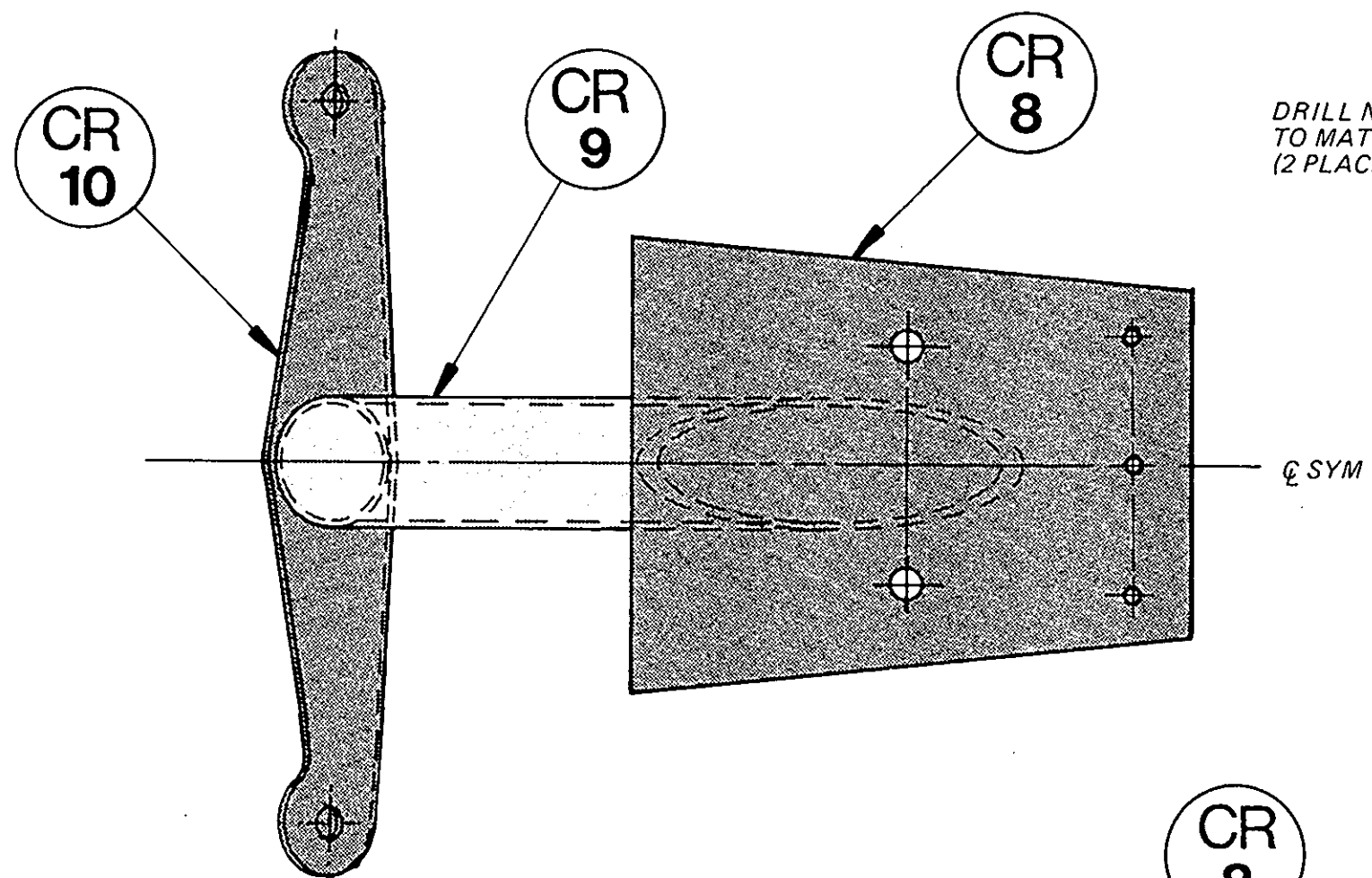
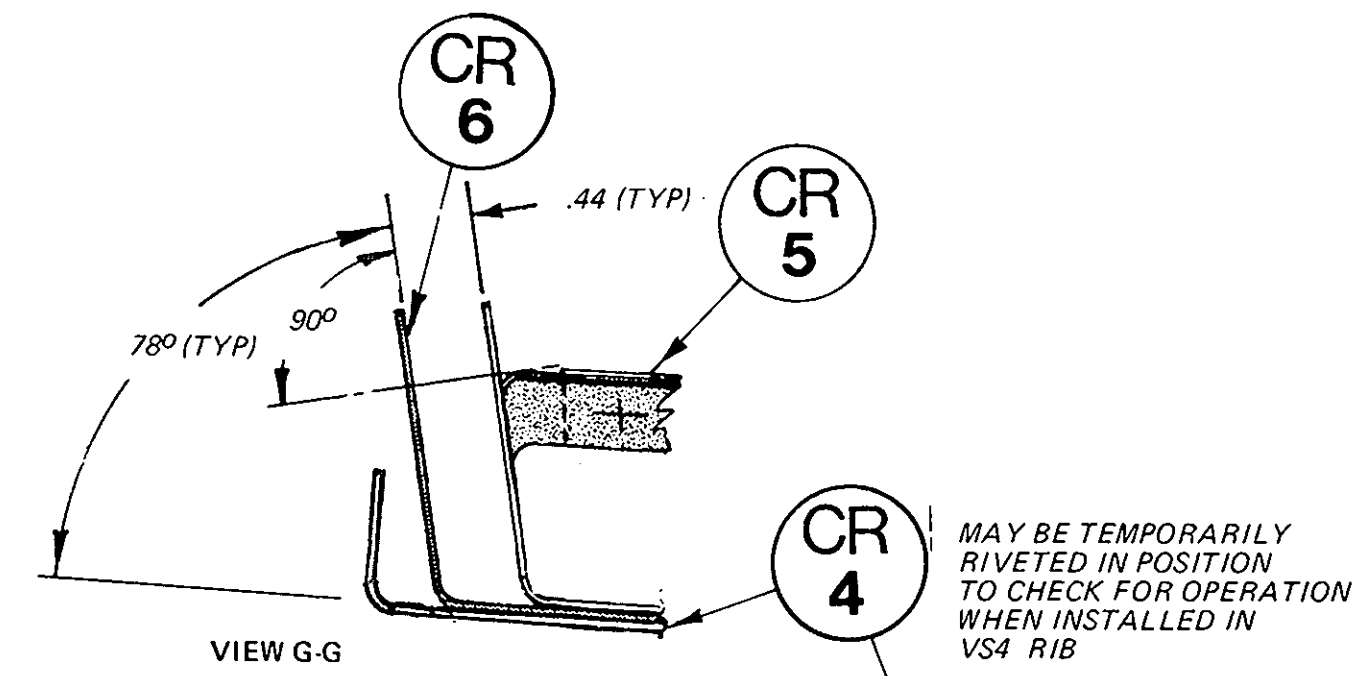
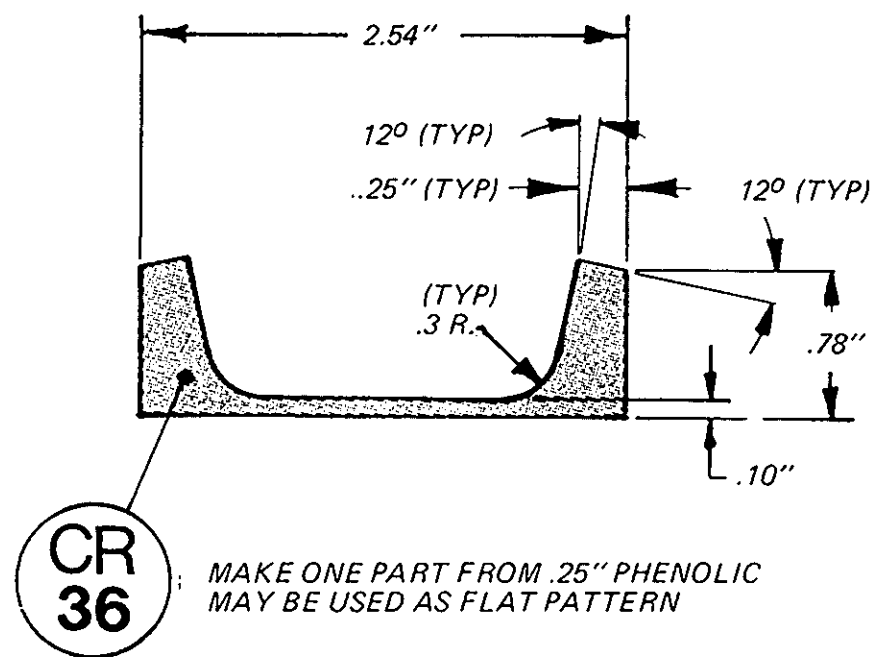
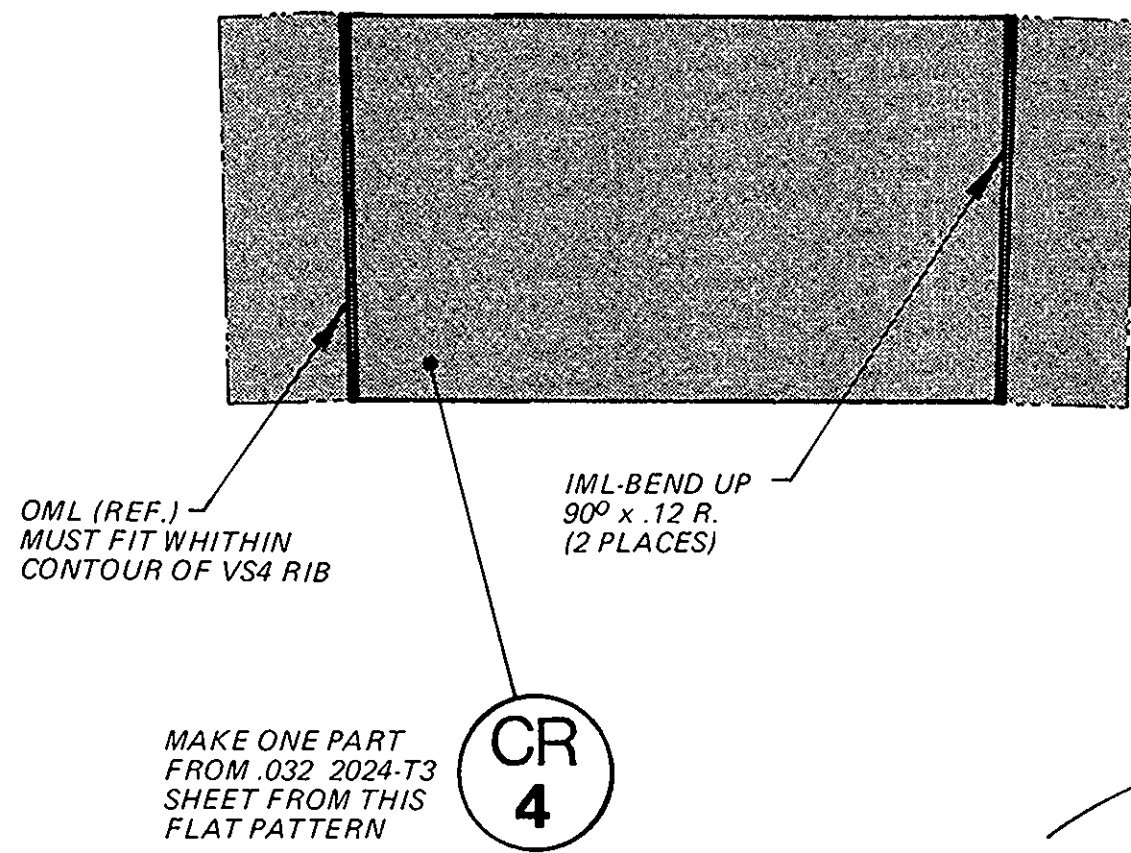
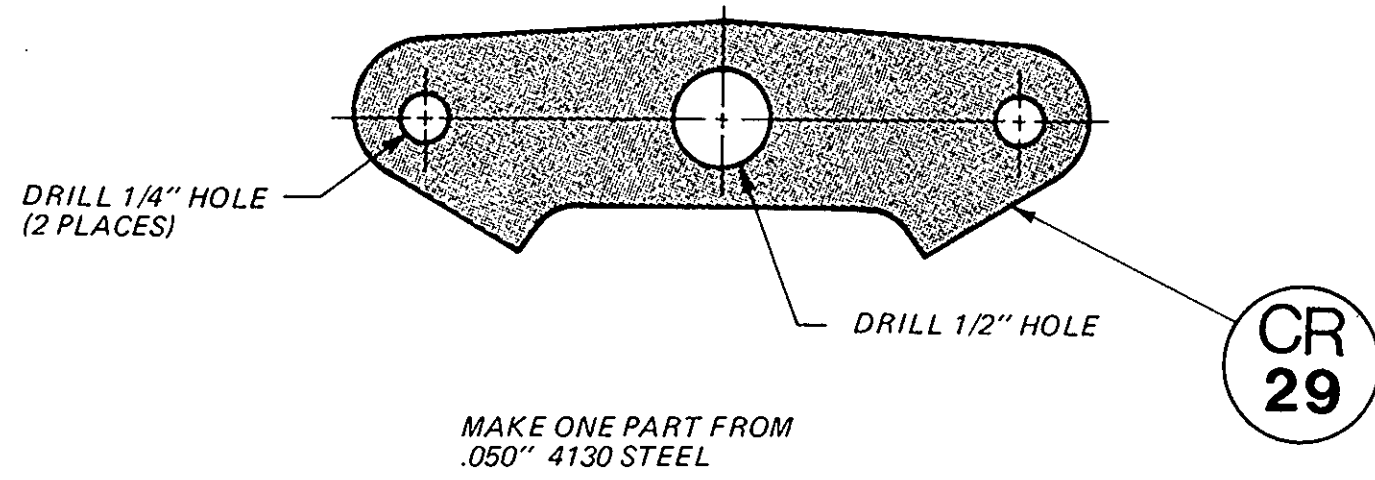
BOND WITH RTV (2 PLACES)

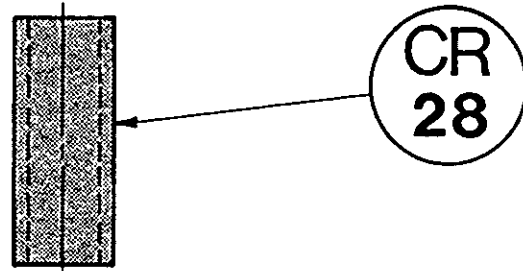


TYPICAL INSTALLATION OF CLAMP
VIEW G-G



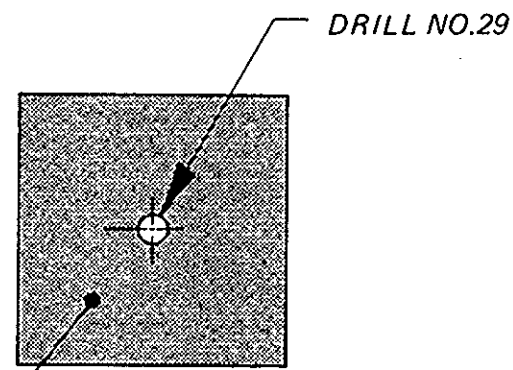
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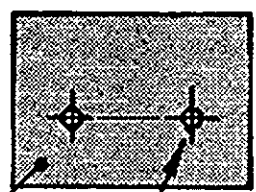


CR 28

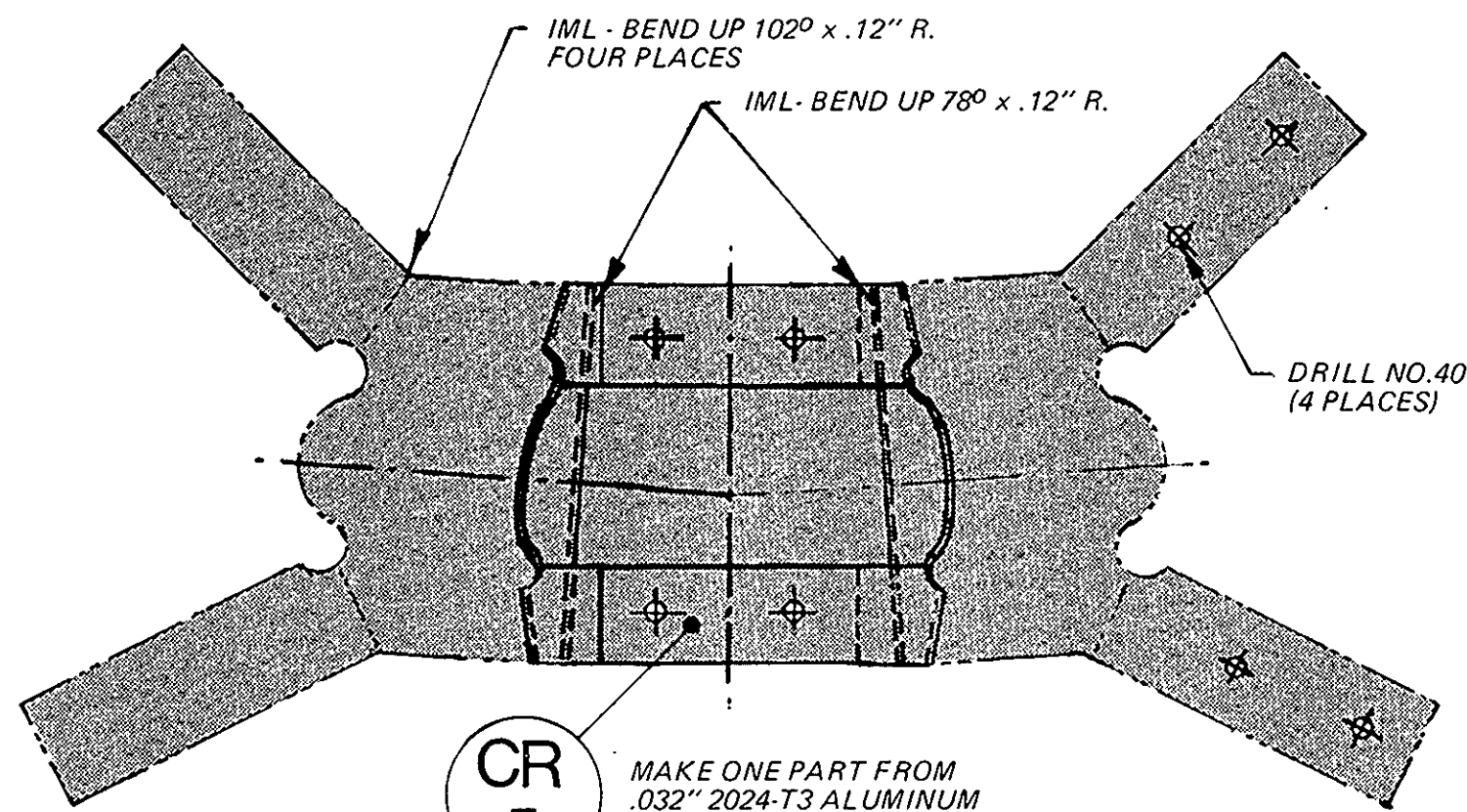
MAKE ONE PART FROM
.50" O.D. x .058" WALL x 1.28" L.
4130 STEEL TUBING



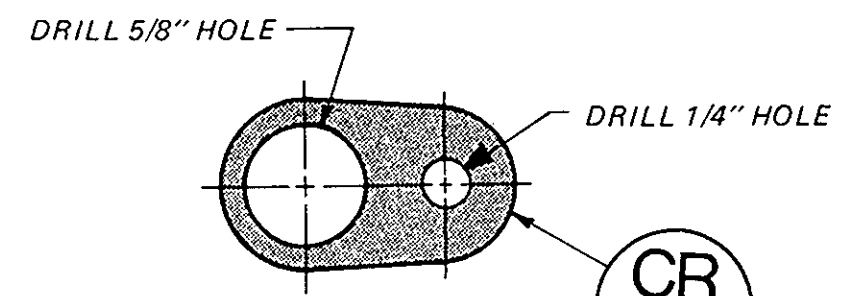
CR 2 MAKE SIX (6) PARTS FROM
.032" 2024-T3 ALUMINUM
FROM THIS FLAT PATTERN



CR 3 MAKE TWO (2) PARTS
FROM .015" NYLON 101 STRIP
FROM THIS FLAT PATTERN

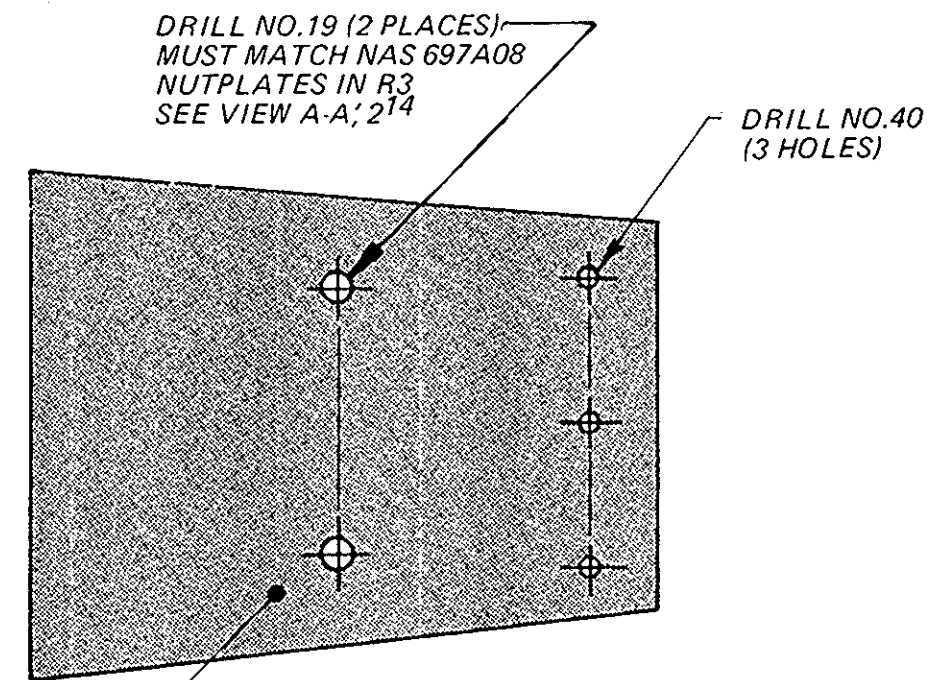


CR 5 MAKE ONE PART FROM
.032" 2024-T3 ALUMINUM
FROM THIS FLAT PATTERN

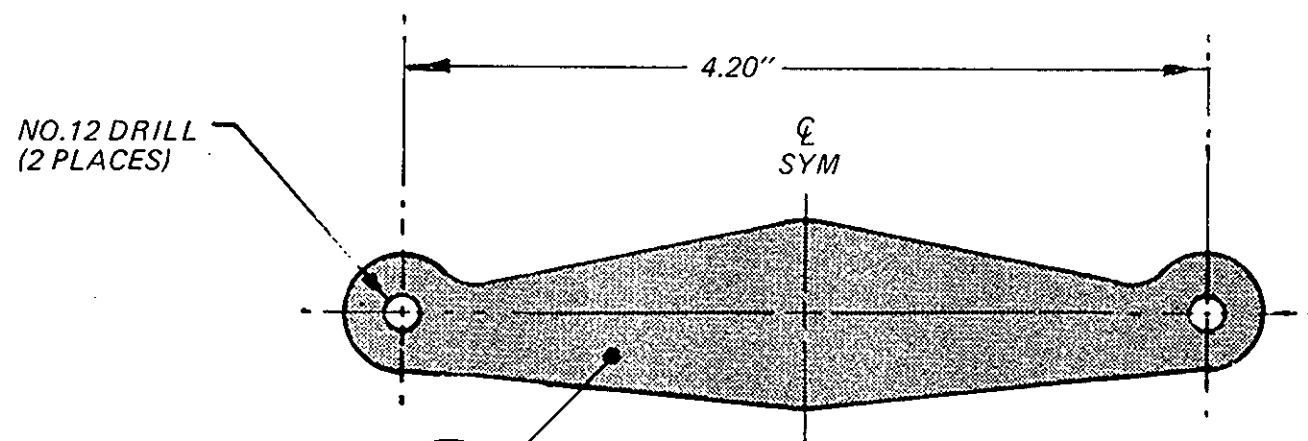


CR 16

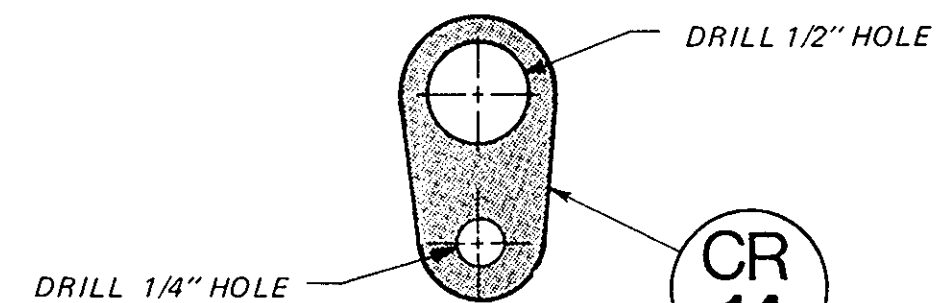
MAKE TWO PARTS
FROM .050" 4130 STEEL



CR 8 MAKE ONE PART FROM
.040" 4130 STEEL COND "N"
FROM THIS FLAT PATTERN

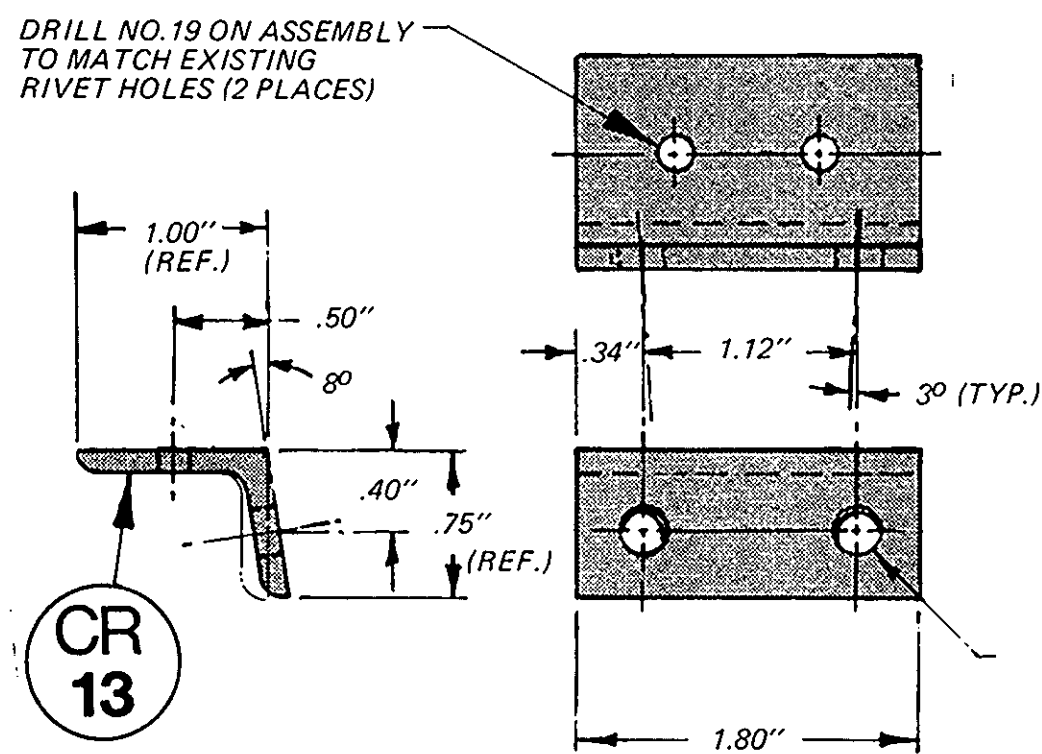


CR 10 MAKE ONE PART FROM
.050" 4130 STEEL COND "N"
FROM THIS FLAT PATTERN



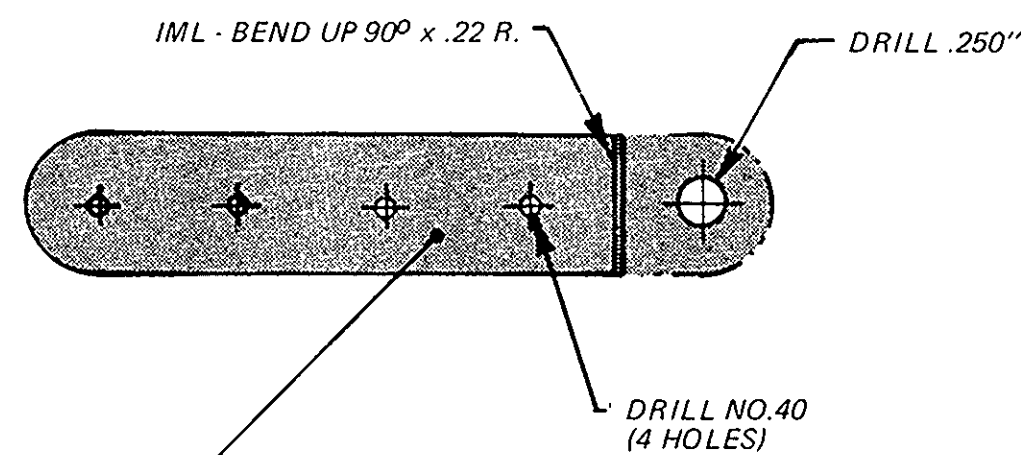
CR 14

MAKE FOUR PARTS
FROM .050" 4130 STEEL

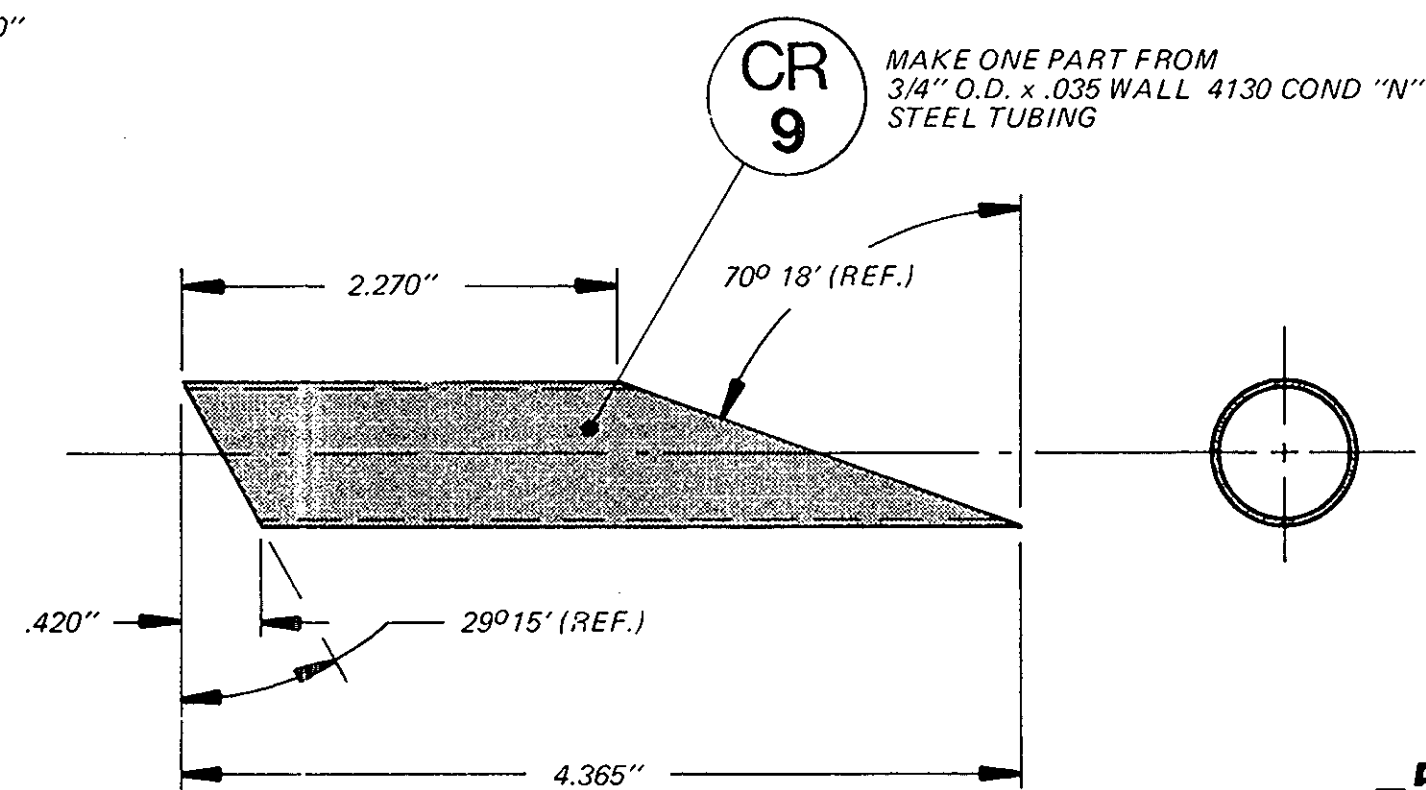


CR 13

MAKE ONE PART
FROM BD-0089



CR 12 MAKE FOUR (4) PARTS FROM
.050" 2024-T3 ALUMINUM SHEET
FROM THIS FLAT PATTERN



CR 9

MAKE ONE PART FROM
3/4" O.D. x .035 WALL 4130 COND "N"
STEEL TUBING

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BRAKE SYSTEM

Beginning Construction

BRAKE MASTER CYLINDER REMOVAL AND INSTALLATION.

- A. Loosen bleed gauge at each wheel cylinder and drain hydraulic fluid from system.
- B. Remove windshield and instrument cover from aircraft.
- C. Disconnect master cylinders from rudder pedals and lower attach points.
- D. Disconnect hydraulic lines to prevent entry of foreign matter.

BRAKE MASTER CYLINDER REPAIR.

Repair is limited to installation of new parts and cleaning. Use clean hydraulic fluid as a lubricant during assembly of the cylinders.

BRAKE LINES

Hydraulic brake lines are of flexible tubing used through out the system. The tubing does not have to be flared, the sleeves inside the fittings will wedge the tubing to a sealed condition. Check sleeve inside fitting for correct installations, it could be installed backwards, tapped end should face outward.

WHEEL BRAKE REMOVAL AND INSTALLATION

Wheel brake assembly can be removed by first removing the wheel. Now disconnect the hydraulic line from the master cylinder. Finally, remove the 4 bolts attaching the cylinder to the strut. Reverse procedure to install wheel cylinder.

WHEEL BRAKE INSPECTION AND REPAIR

- A. Clean all parts except brake linings and O-rings in clean solvent and dry thoroughly.
- B. New O-rings are usually installed at each overhaul. If O-rings are reused it is necessary to wipe them with a clean cloth soaked in hydraulic fluid and inspected for damage.

NOTE - Cleaning is very important. Dirt and metal particles are the greatest single cause of malfunctions in the hydraulic system.

- C. Check brake lining for deterioration and maximum permissible wear. New lining should be installed after present lining are worn to .350.
- D. Inspect brake cylinder bore for scoring. A scored cylinder will leak or cause rapid O-ring wear. Install new brake cylinder.
- E. Inspect brake disc for scoring or cracks. If brake disc is cracked install new part.
- F. Lubricate all brake cylinder parts with cleaning hydraulic fluid and assemble components with care to prevent damage to O-rings.

BRAKE BLEEDING.

- A. Standard bleeding, with a clean hydraulic pressure service connected to the wheel cylinder bleeder, is recommended.
- B. Place a clean container under the over flow tube located in the nose wheel well to save hydraulic fluid.
- C. As fluid is pumped into the system, observe the fluid being pumped in the over flow container. When the fluid is pumping out in a stream with out air mixed in, check the pedal feel, it feels spongy, continue to bleed until pedal feels solid.
- D. Bleed both wheel cylinders following this procedure.

PARTS & MATERIALS CALL OUT

DRAWING REF. NO.	DESCRIPTION	QUANTITY	MATERIAL IDENTIFICATION NO.	MATERIAL DESCRIPTION
FU35	Bracket	1		.032 2024T3 AL
	Brake Lines		BD0082	Flexible Tube
	Master Cylinder	2	A-110-4	
	Fluid Reservoir	1	A-315	
	Union "Tee"	1	BD0047	
	Male Elbow Ftg.	9	BD0045	
	Grommet	1	MS-35489-A	
	Bleed Valve	2	A-1480	
	Clamp	5	BD0077-3	

SERVICING

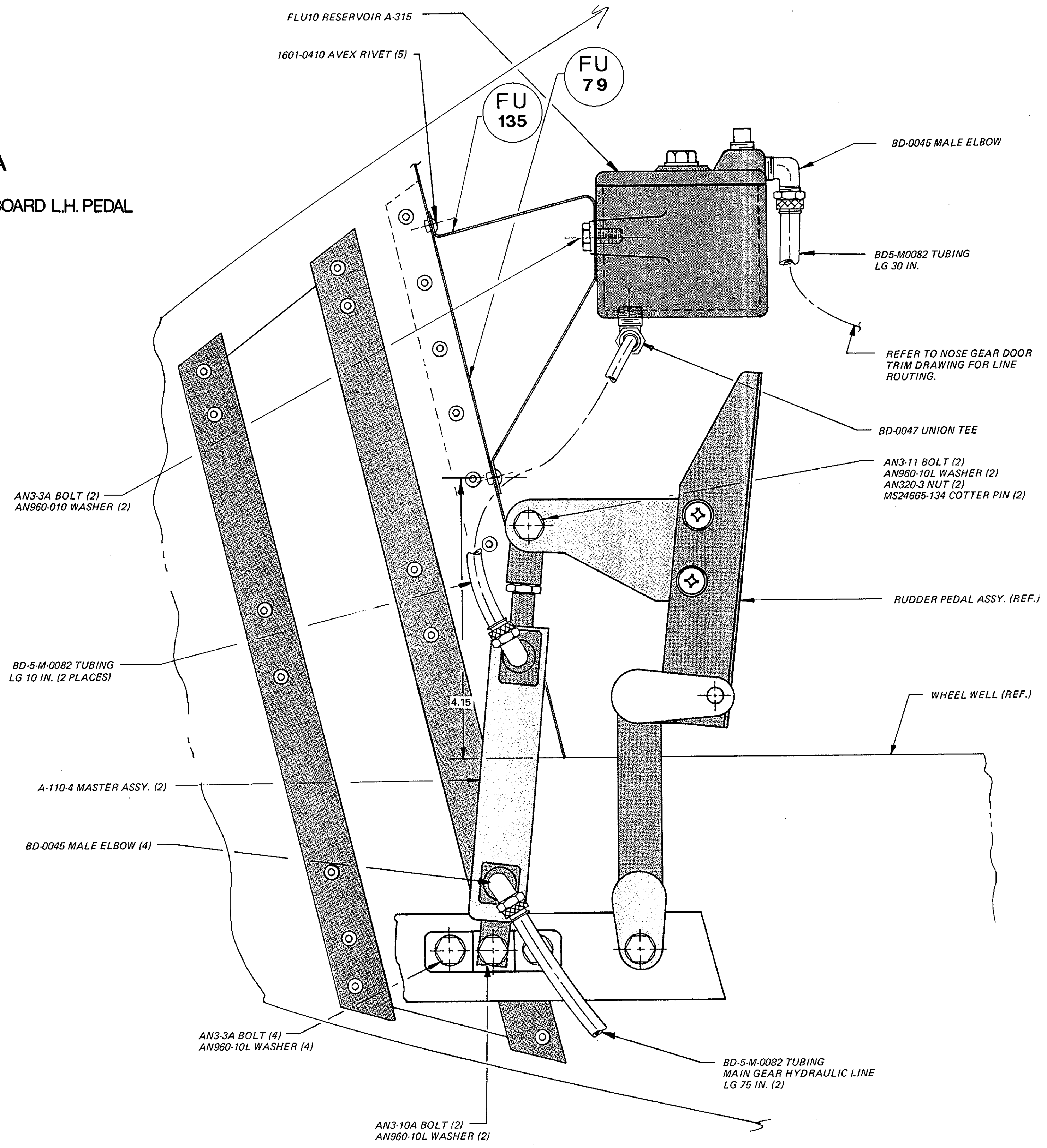
The hydraulic brake system consists of fluid reservoir located just above the nose wheel well area between the rudder pedals with hydraulic lines connected to each master cylinder. One master cylinder is attached to the front of each rudder pedal with brake lines connecting each master cylinder with the corresponding wheel cylinder on the disc brake system.

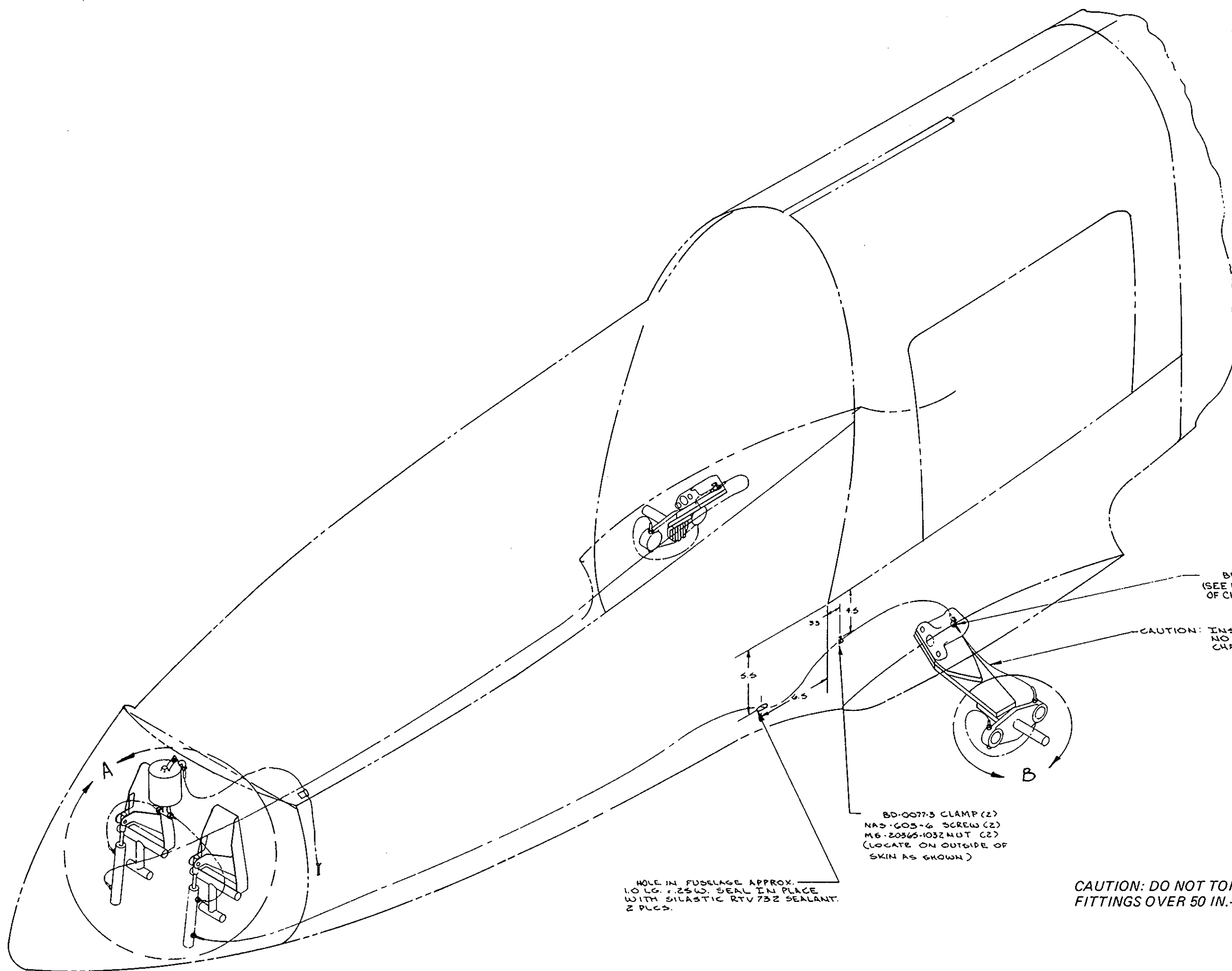
There are two general categories into which brake troubles fall. Either the brake system does not operate or the brakes drag.

<u>Problem</u>	<u>Probable Cause</u>	<u>Repair</u>
<u>Dragging Brakes</u>	1. Rotating joints to tight or to loose.	1. Check fasteners
	2. Master cylinder springs, piston.	2. Disassemble and replace damaged parts.
	3. Restricted lines, dirt accumulated in lines, wheel cylinder, or master cylinder.	3. First drain lines and blow thru them with clean compressed air. If that fails to make them operative, the master cylinder or wheel cylinder will have to be disassembled and cleaned.
	4. Brake disc worn scored or warped.	4. Check visually. Replace if necessary.
<u>Brakes Fail To Operate</u>	1. Leak in system.	1. Check all fittings.
	2. Fluid level.	2. Check reservoir.
	3. Air in system.	3. Bleed system.

DETAIL A

FORWARD VIEW LOOKING INBOARD L.H. PEDAL





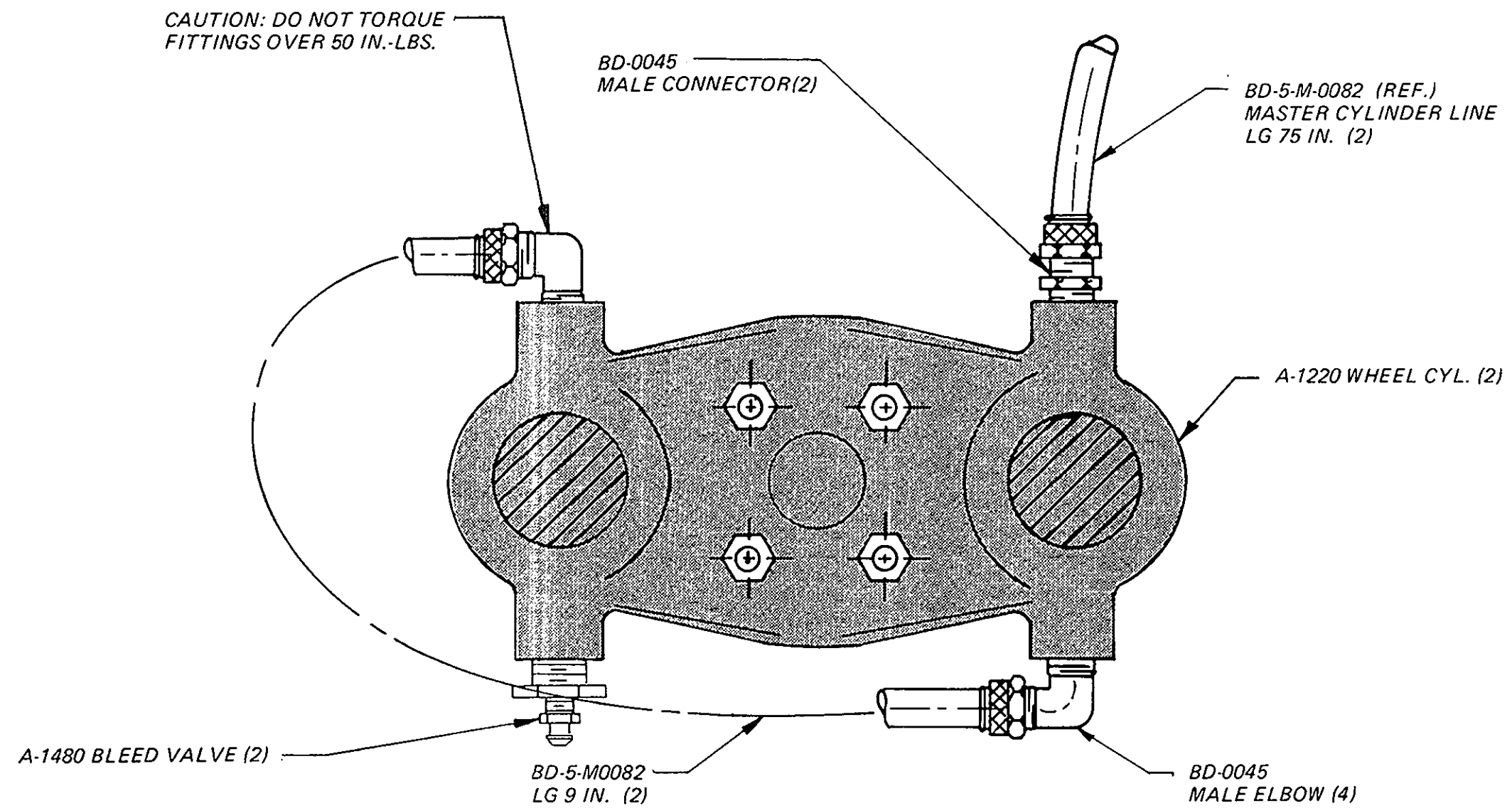
HOLE IN FUSELAGE APPROX.
1.0 LG. x .254 D. SEAL IN PLACE
WITH SILASTIC RTV 752 SEALANT.
2 PLCS.

BD-0077-3 CLAMP (2)
NAS-6037-6 SCREW (2)
M6-20565-1032 NUT (2)
(LOCATE ON OUTSIDE OF
SKIN AS SHOWN)

BD-0077-3 CLAMP (2) (REF
(SEE M.L.C. ASSY. FOR INSTALLATION
OF CLAMP)

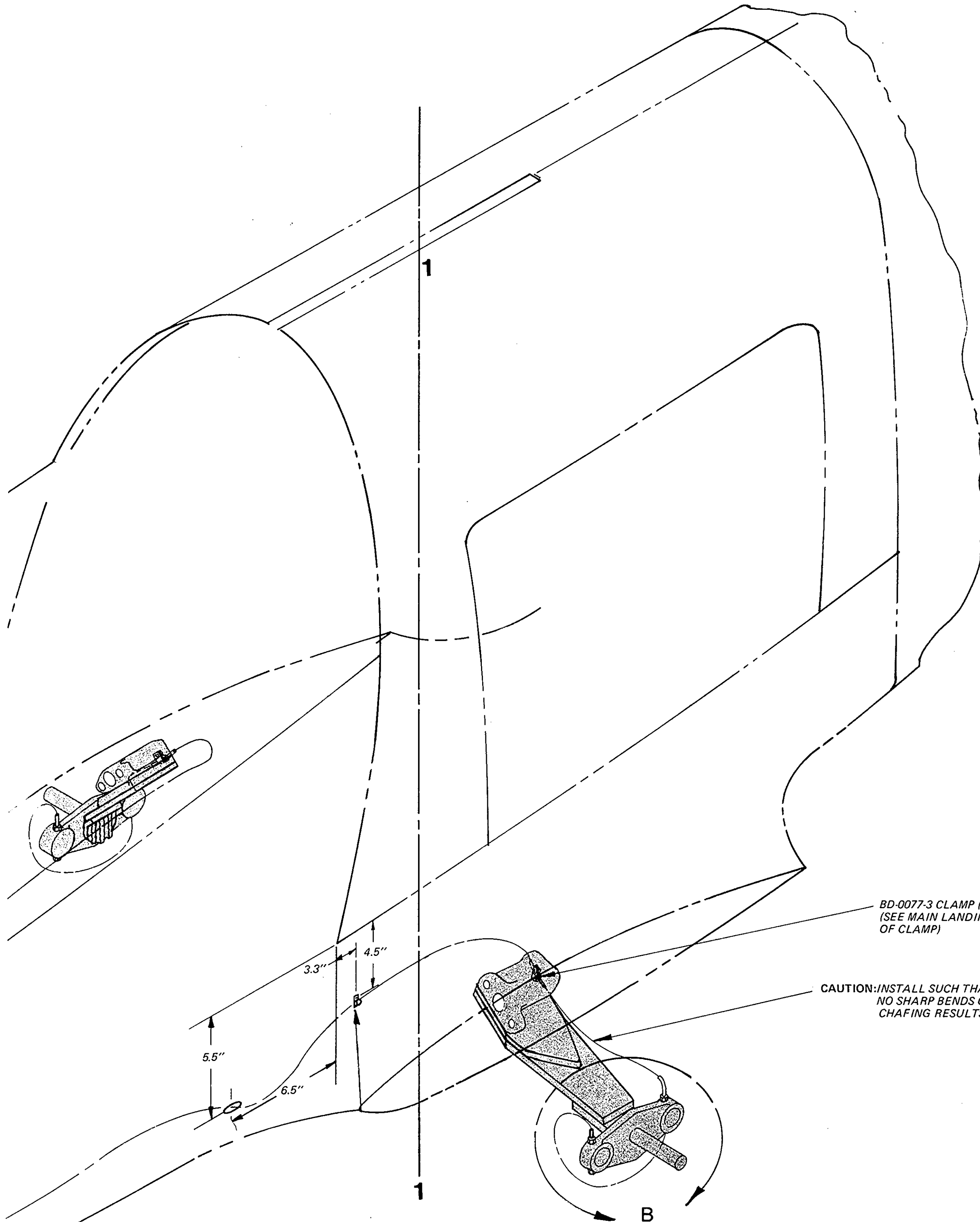
CAUTION: INSTALL SUCH THAT
NO SHARP BENDS OR
CHAFING RESULTS.

CAUTION: DO NOT TORQUE
FITTINGS OVER 50 IN.-LBS.

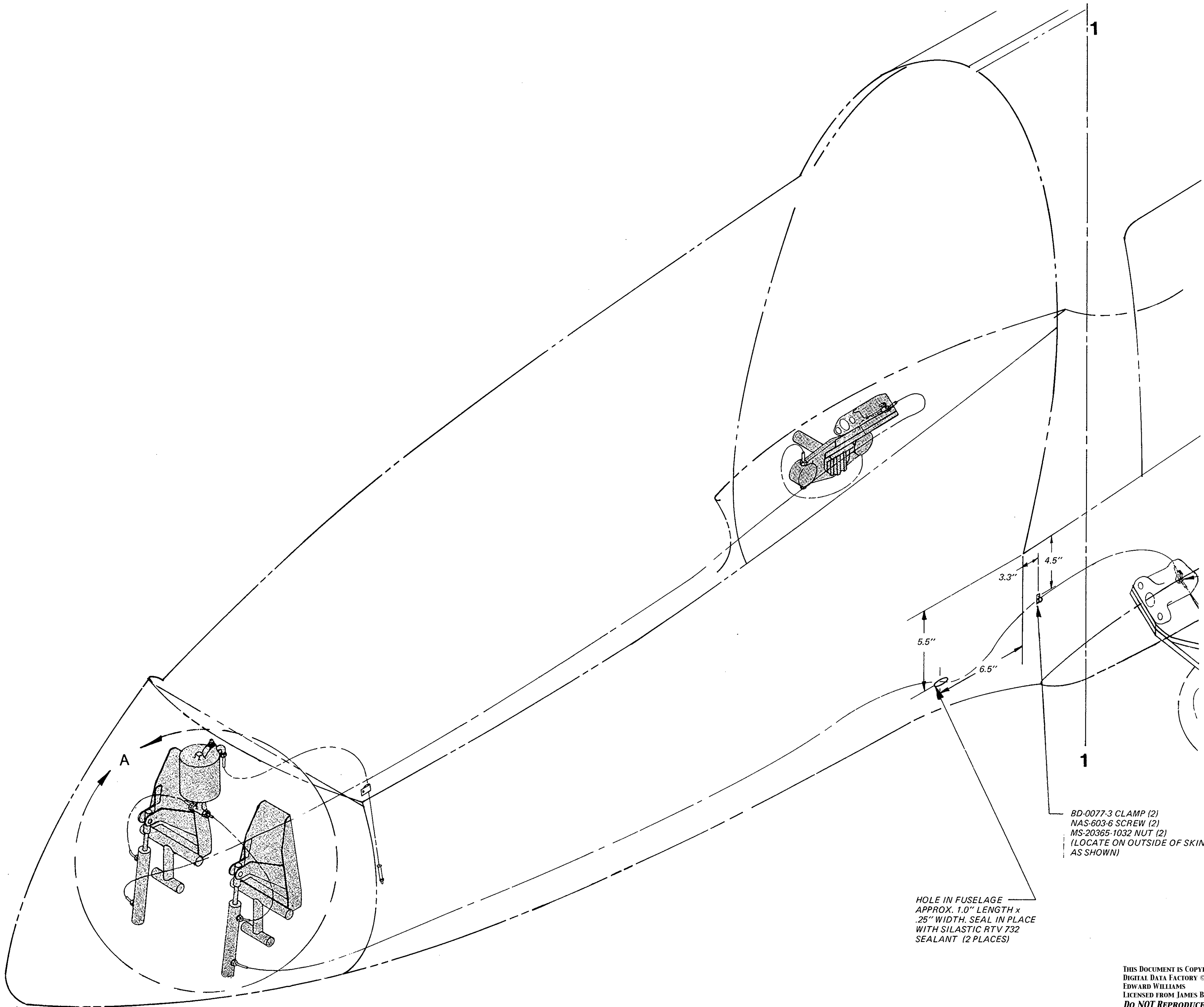


DETAIL-B

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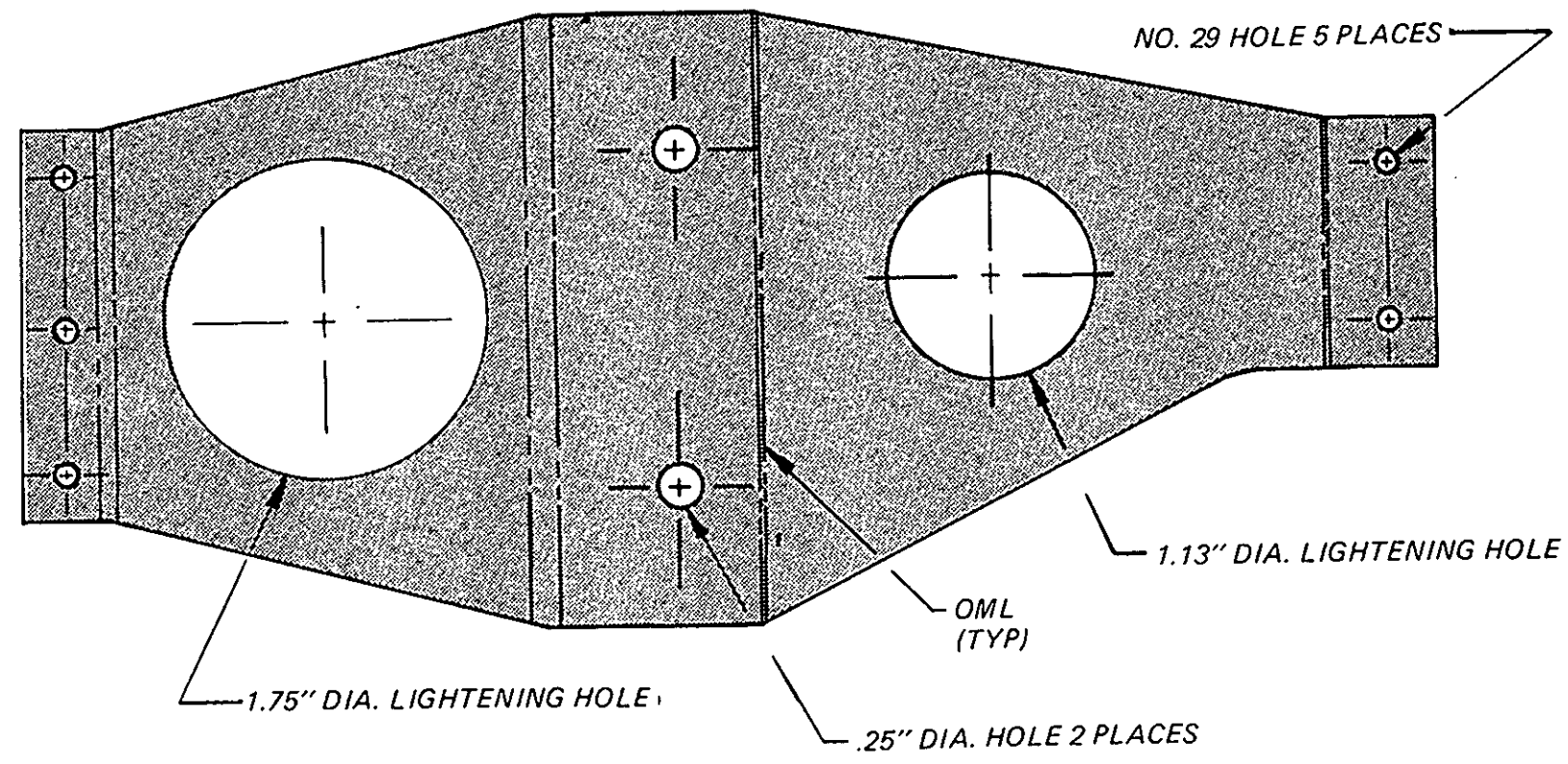


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HOLE IN FUSELAGE
 APPROX. 1.0" LENGTH x
 .25" WIDTH. SEAL IN PLACE
 WITH SILASTIC RTV 732
 SEALANT (2 PLACES)

BD-0077-3 CLAMP (2)
 NAS-603-6 SCREW (2)
 MS-20365-1032 NUT (2)
 (LOCATE ON OUTSIDE OF SKIN
 AS SHOWN)



DRILL NO. 19 HOLE
 NAS-602-6 SCREW
 MS20365-832 NUT
 AN960-8L WASHER
 BD-0077-3 CLAMP

FWD ←
 UP ↑

FU 81

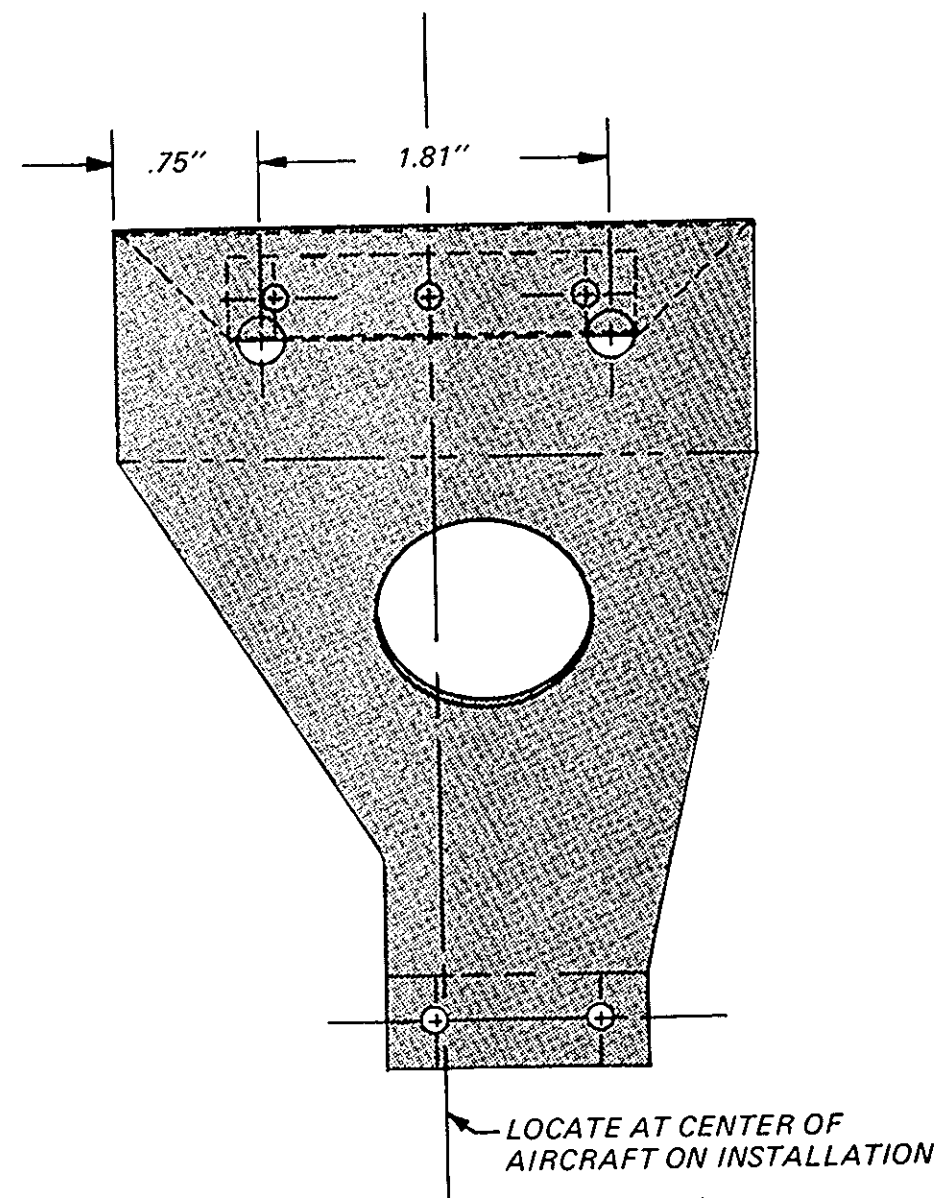
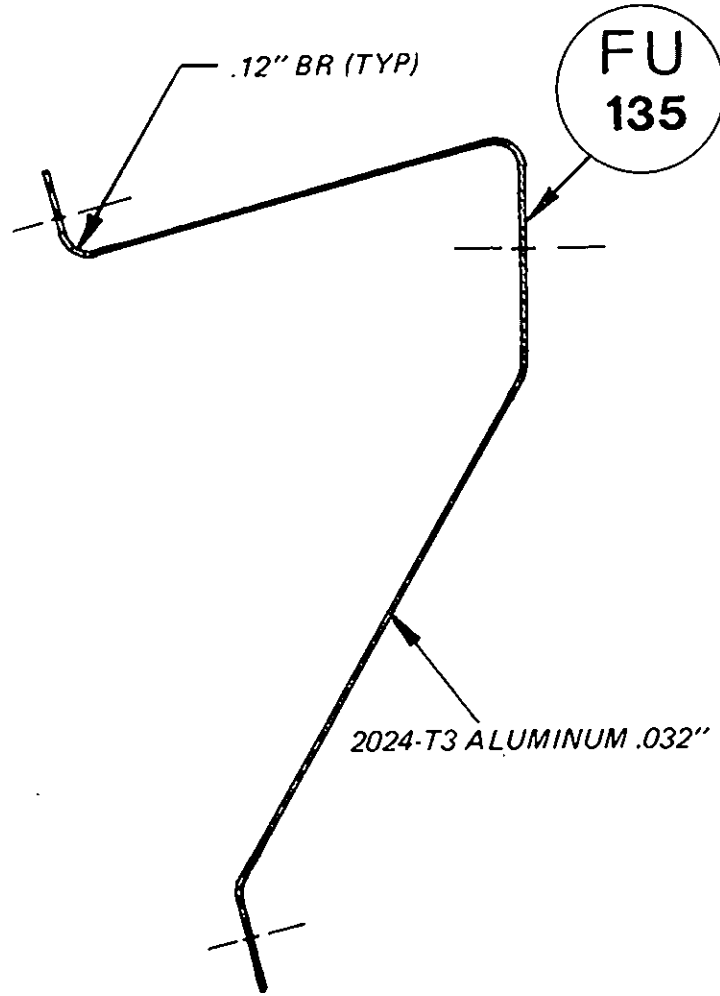
BRAKE FLUID OVERFLOW LINE (REF.)

DRILL 5/16 DIA. HOLE
 MS35489-A GROMMET

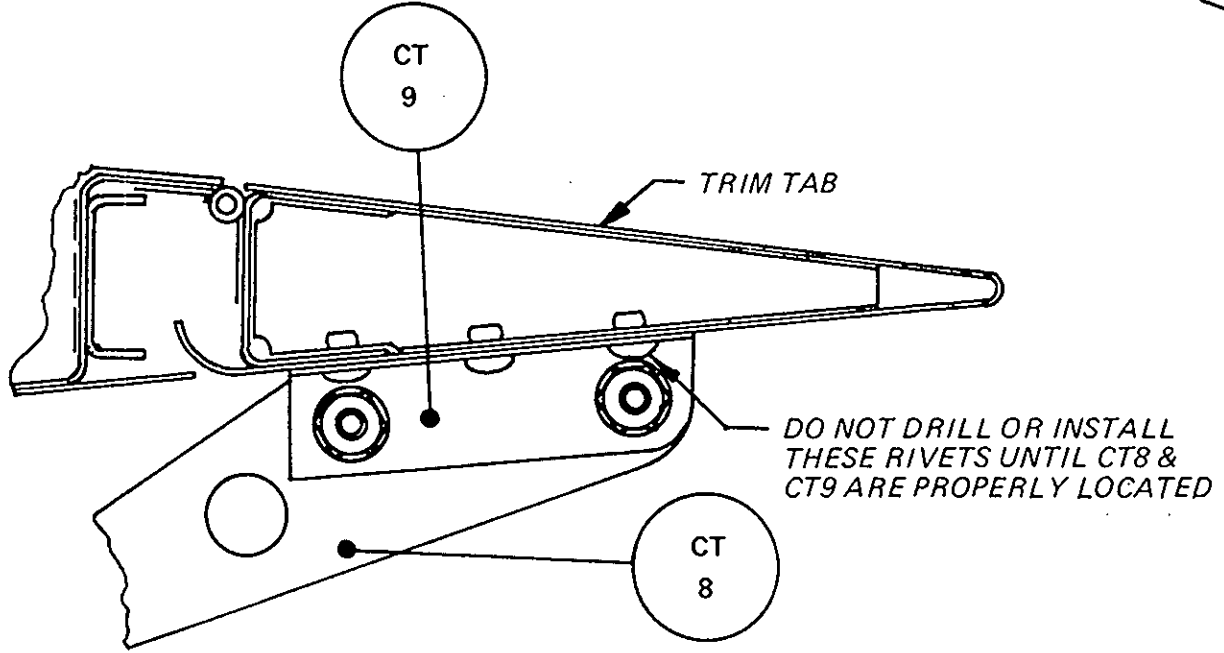
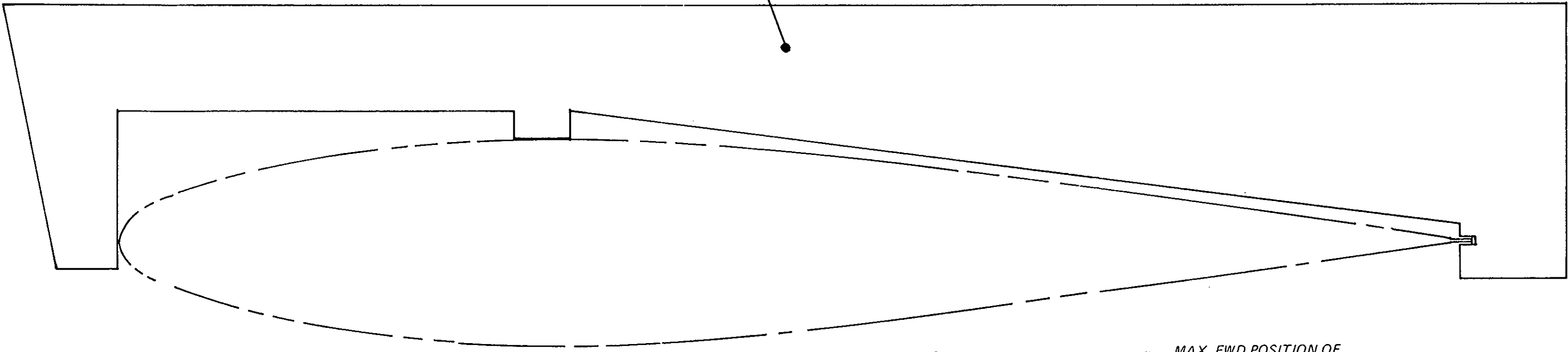
FU 68 SKIN (REF.)

B.L.
 0.00

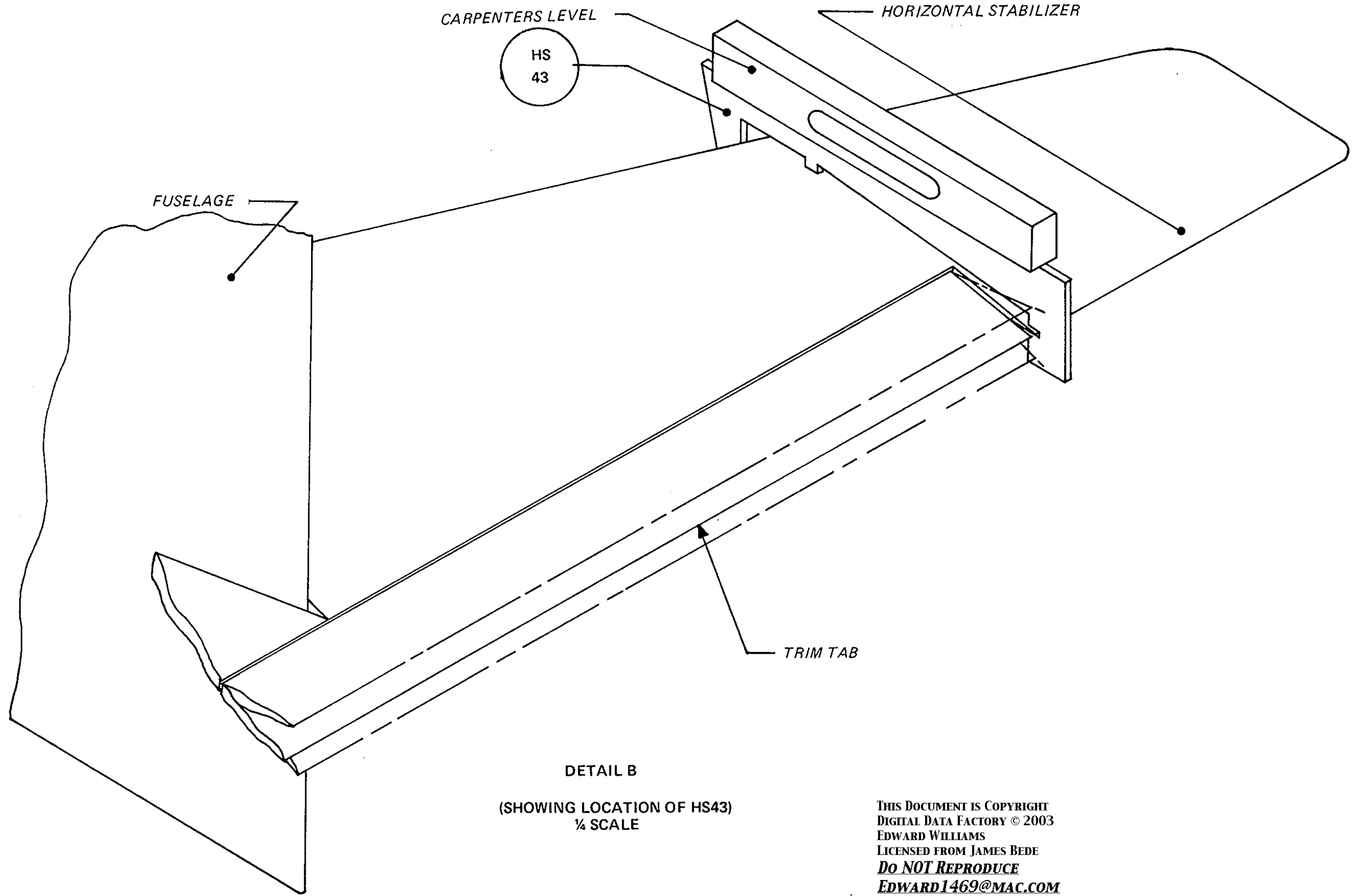
FWD ←
 OUTBD (RH SIDE) ↓



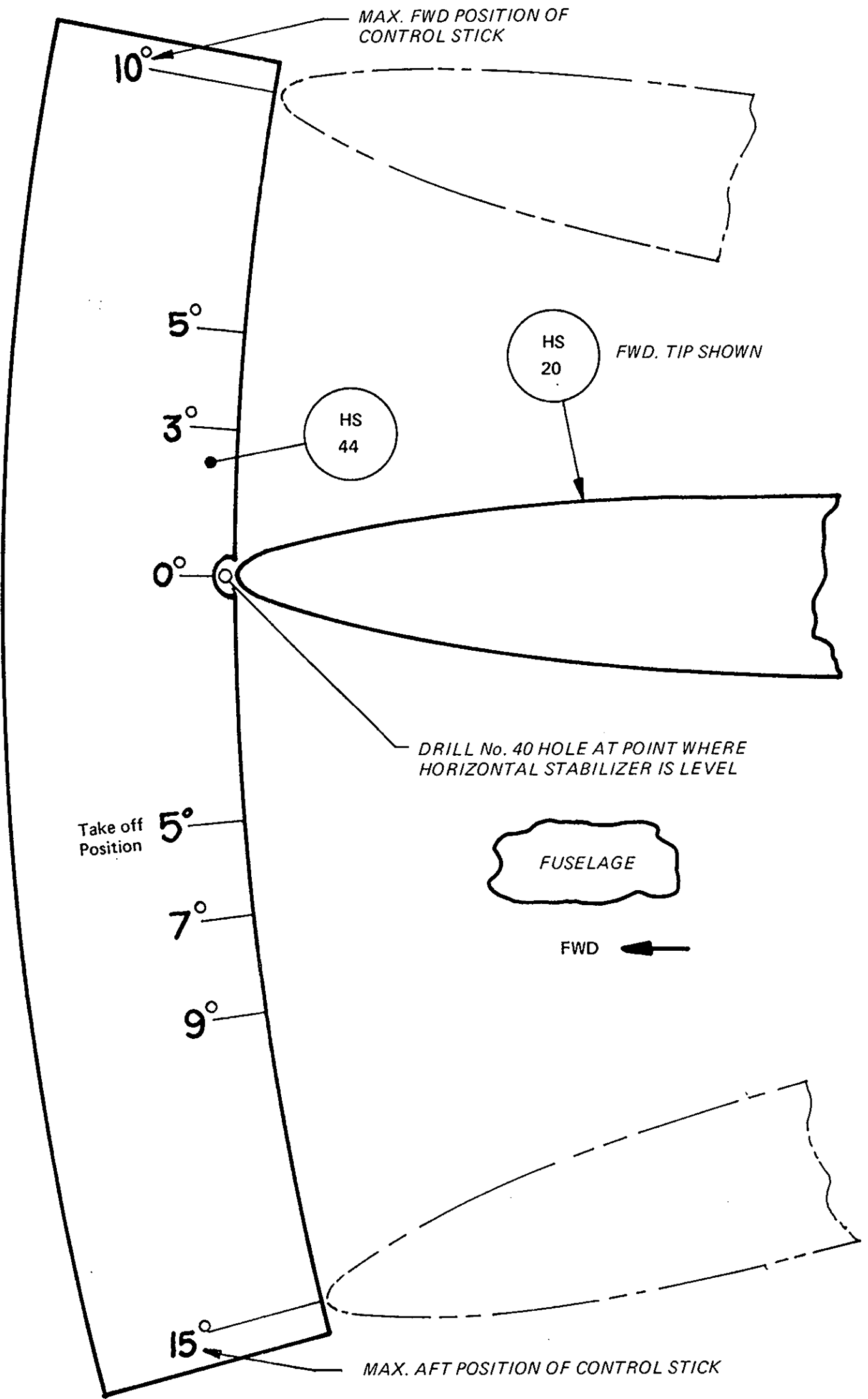
HS 43 MAKE ONE PART FROM .25"X5.0"X17.0" PLYWOOD



DETAIL A



DETAIL B
(SHOWING LOCATION OF HS43)
1/4 SCALE



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