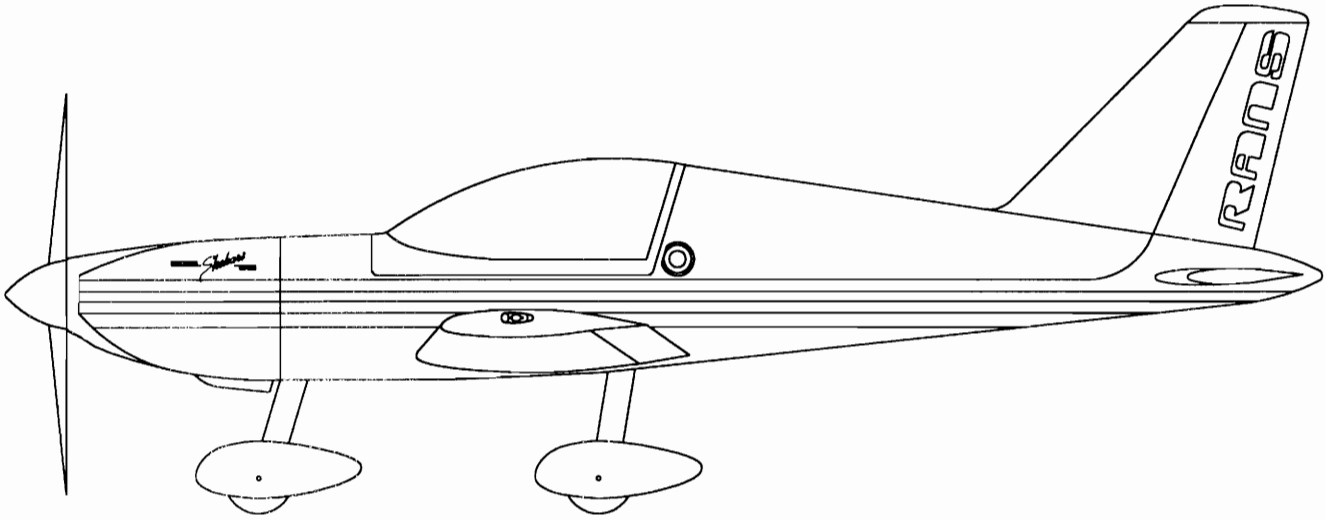
RANS Shekari S-16



RANS S-16 SHEKARI
FIGURE DRAWINGS

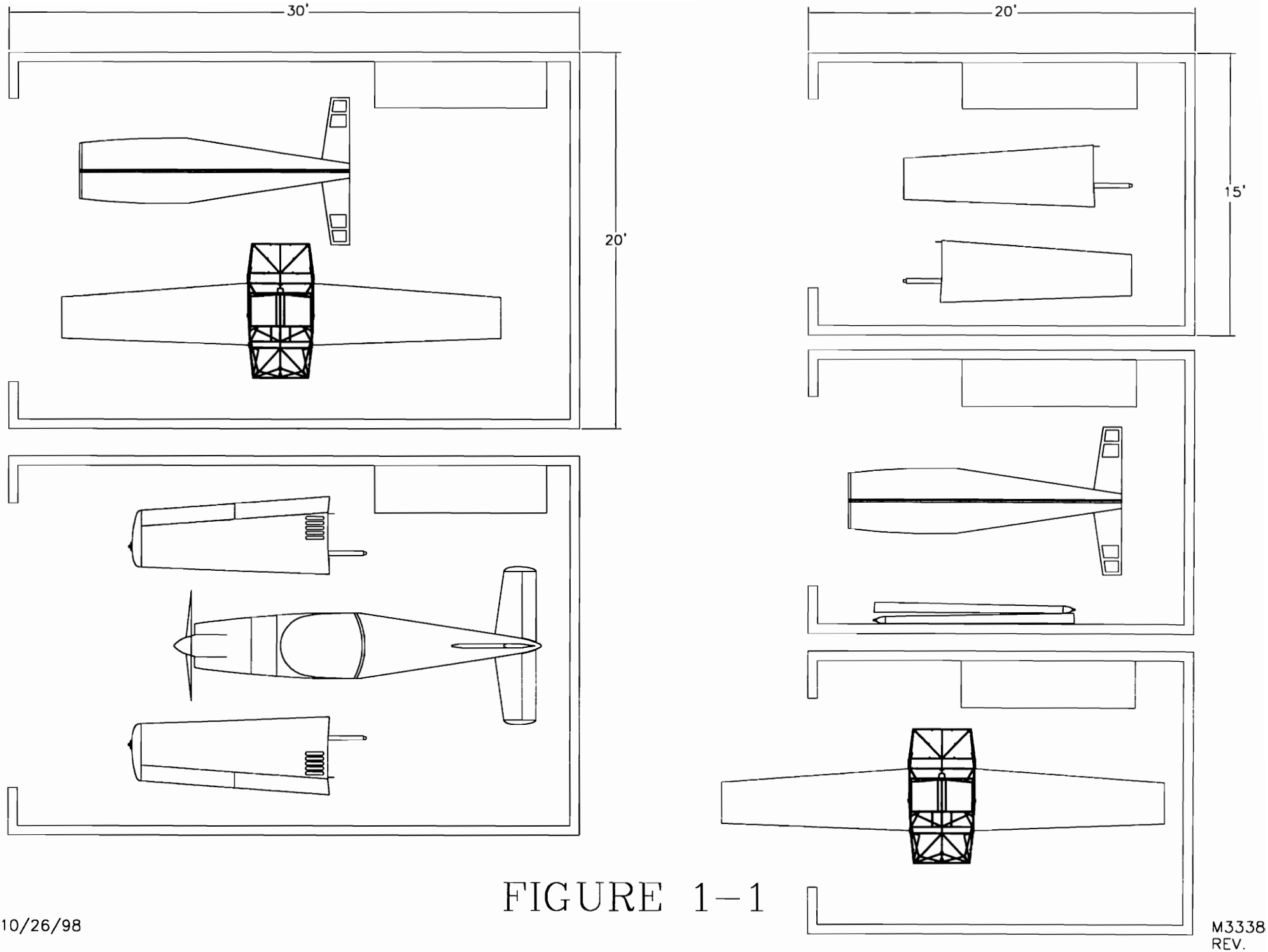


FIGURE 1-1

10/26/98

M3338
REV.

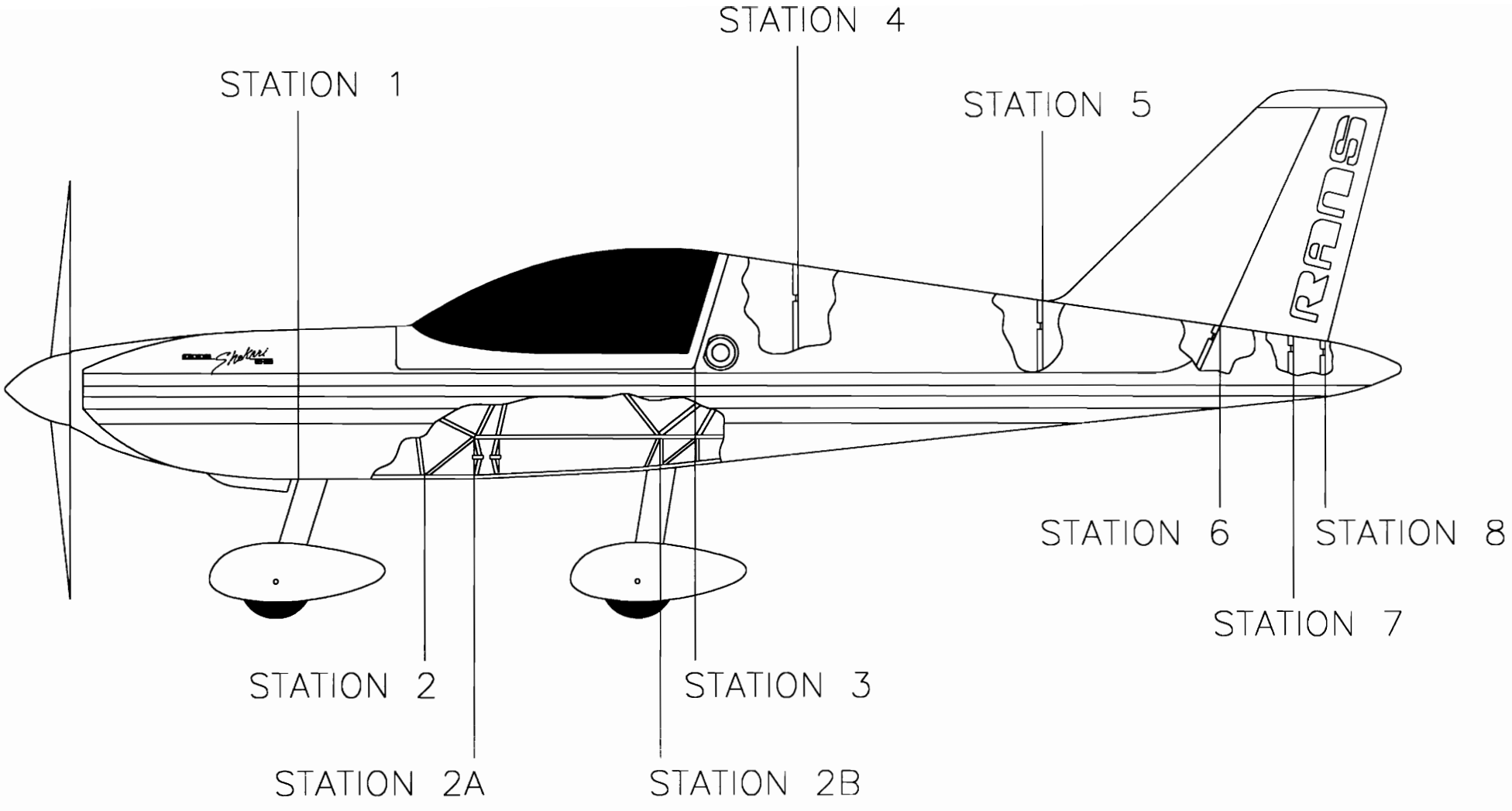

STATION 4
STATION 1
STATION 5
STATION 6
STATION 8
STATION 7
STATION 2
STATION 3
STATION 2A
STATION 2B

FIGURE 1-2

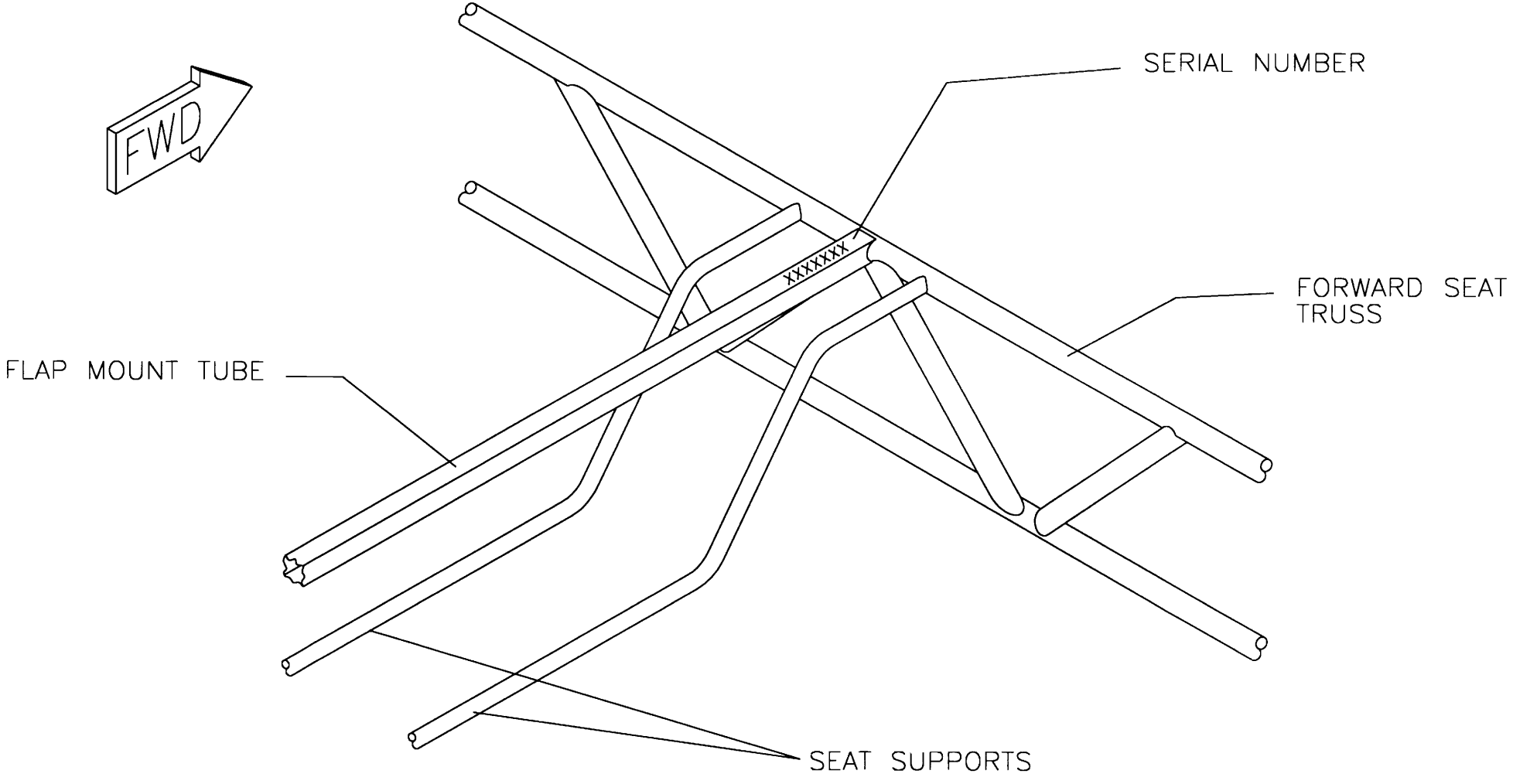
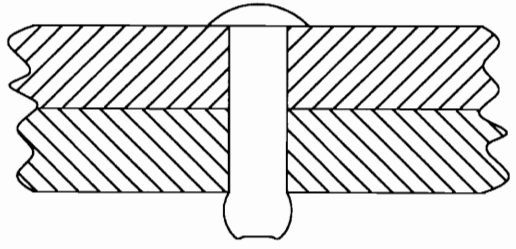
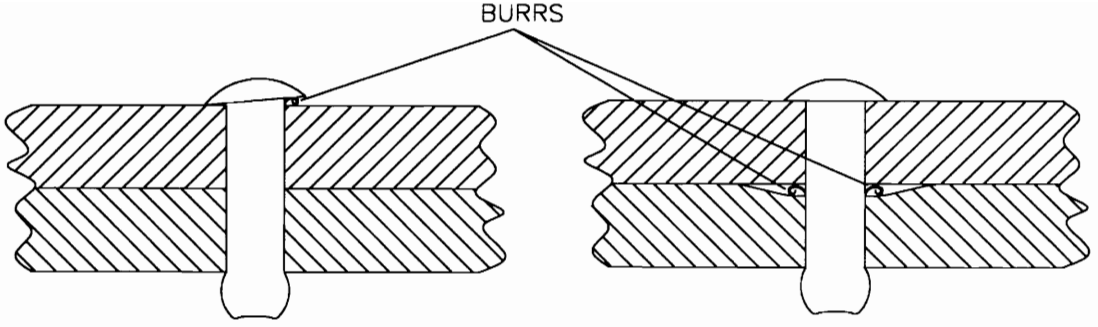

FWD
SERIAL NUMBER
XXXXXXX
FORWARD SEAT TRUSS
FLAP MOUNT TUBE
SEAT SUPPORTS

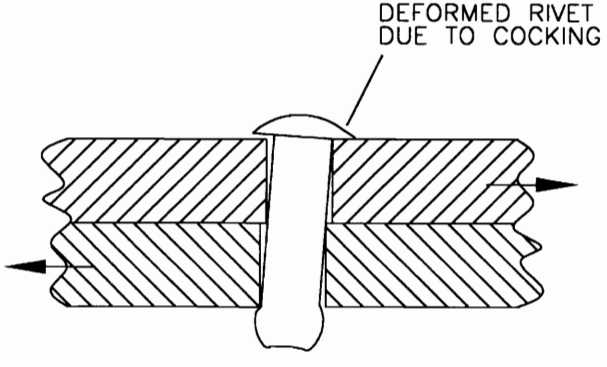
FIGURE 1-3



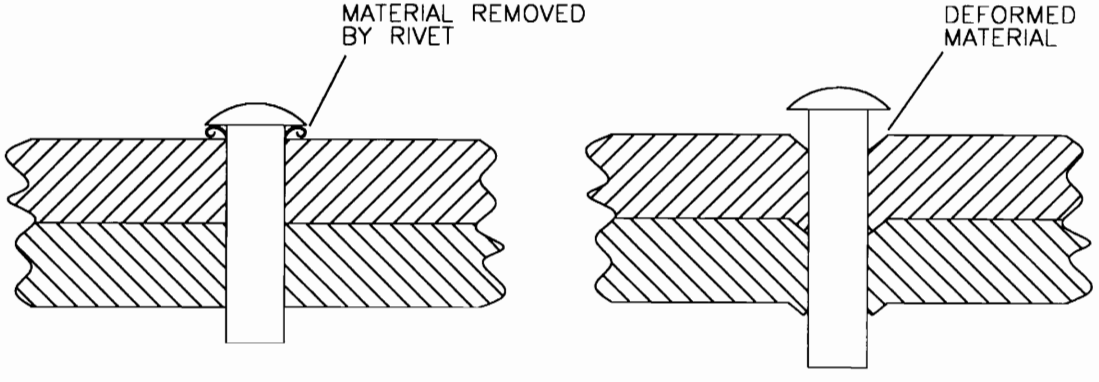
CORRECTLY INSTALLED RIVET



THE EFFECTS OF IMPROPER DE-BURRING



THE EFFECTS OF RIVETING THROUGH AN
OVERRSIZED HOLE



THE EFFECTS OF FORCING A RIVET THROUGH AN
UNDERSIZED HOLE

FIGURE 1-4

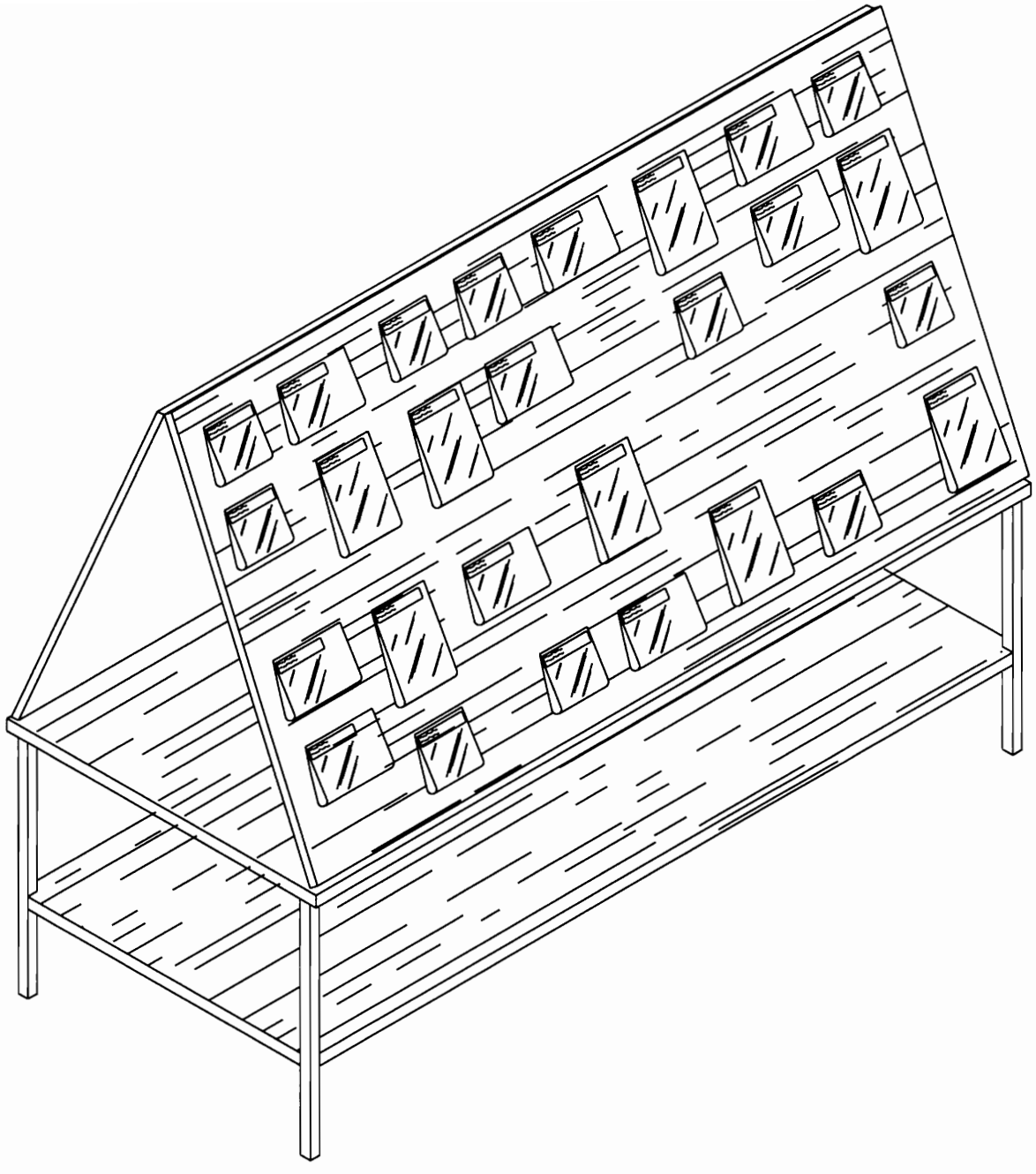


FIGURE 1–5

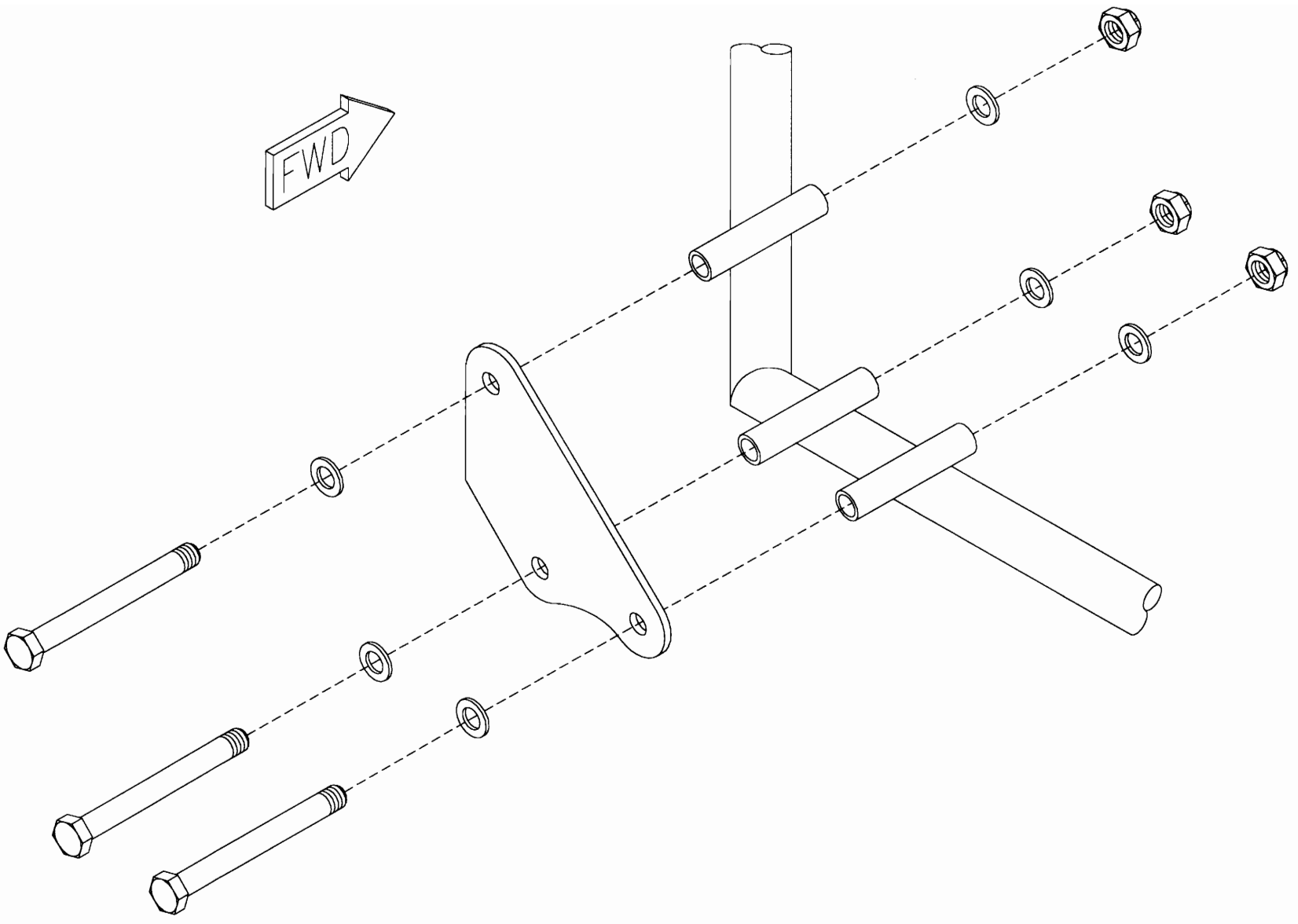


FIGURE 2-1

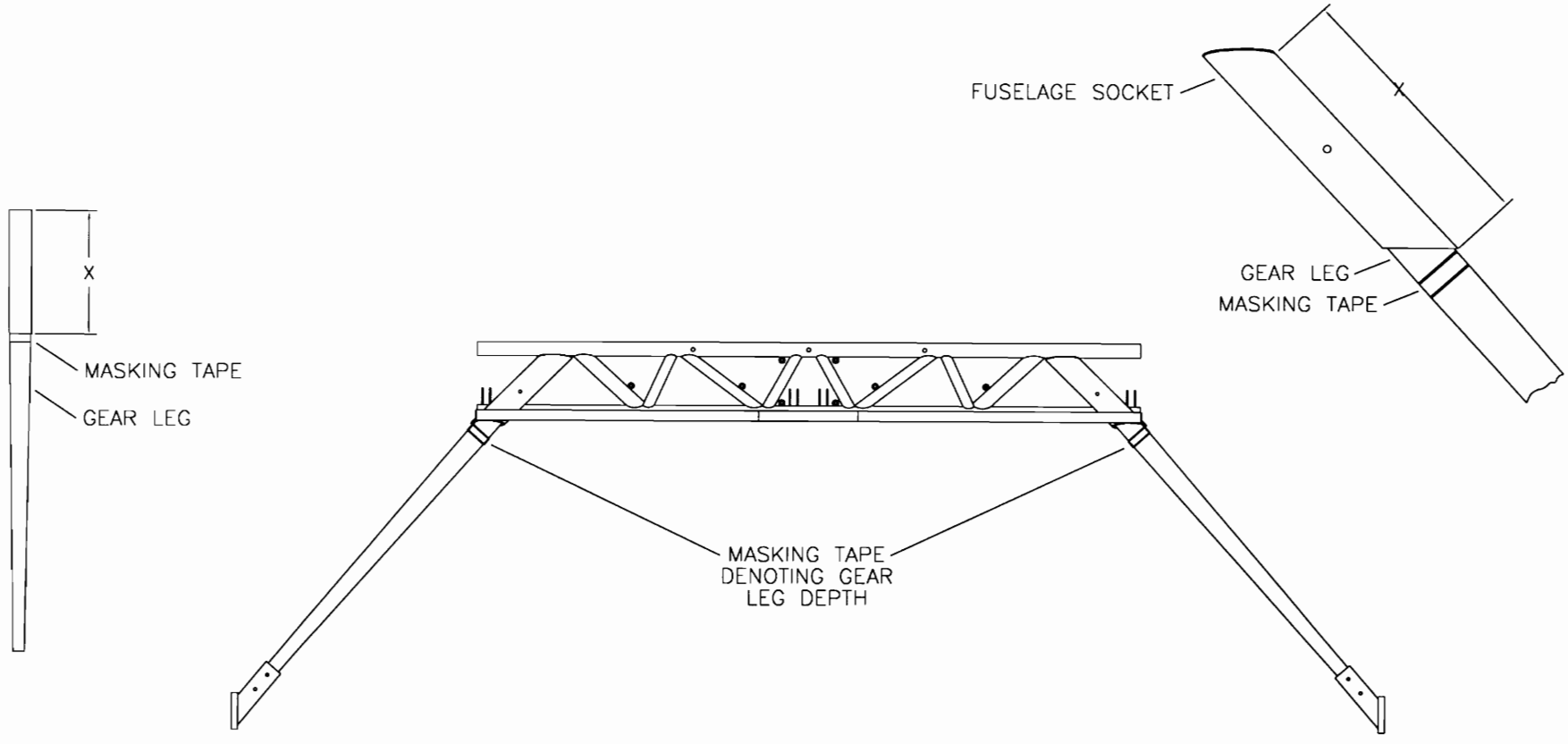
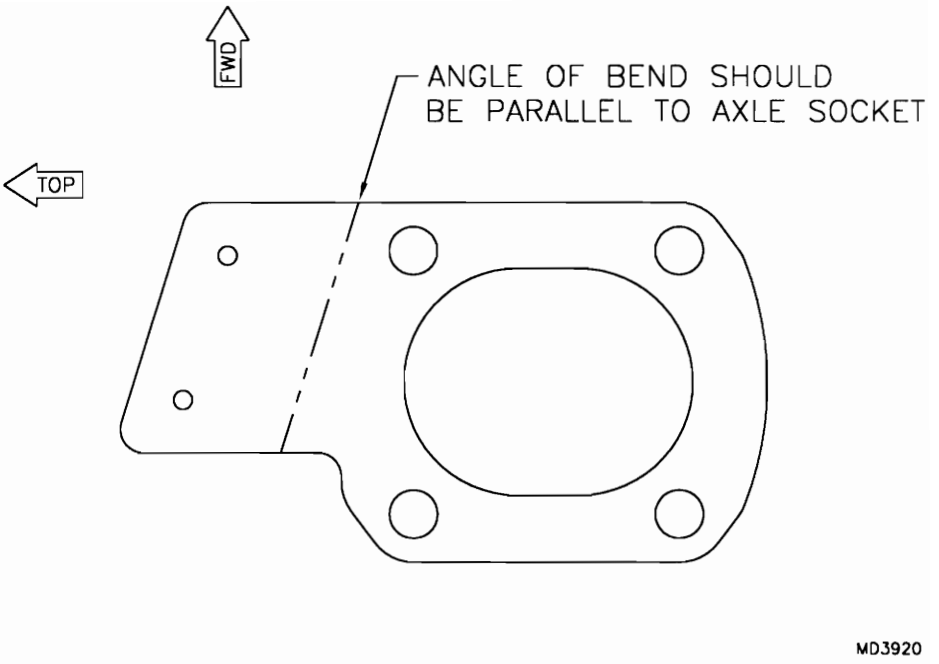
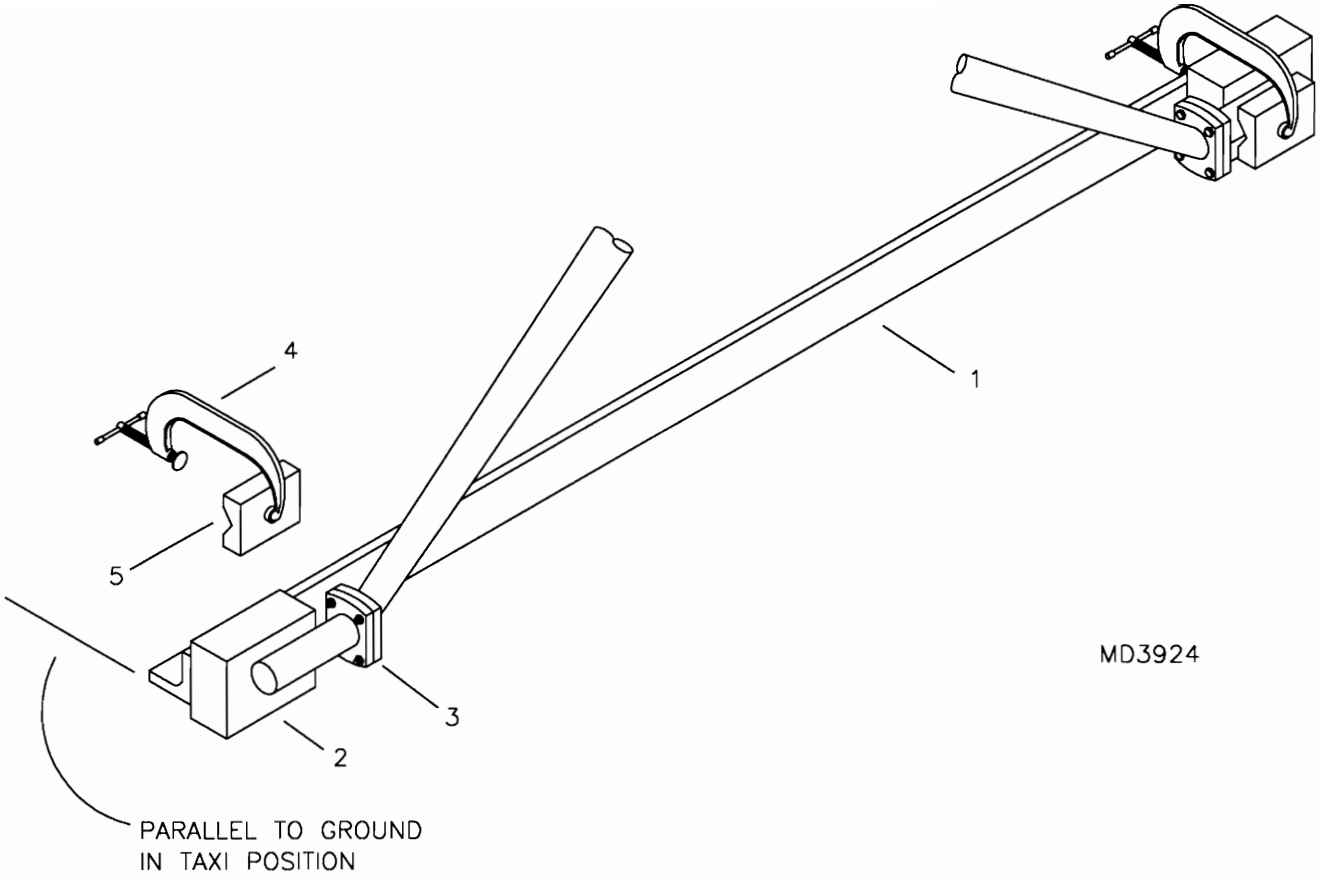

FUSELAGE SOCKET
X
GEAR LEG
MASKING TAPE
X
MASKING TAPE
GEAR LEG
MASKING TAPE
DENOTING GEAR
LEG DEPTH

FIGURE 2-2



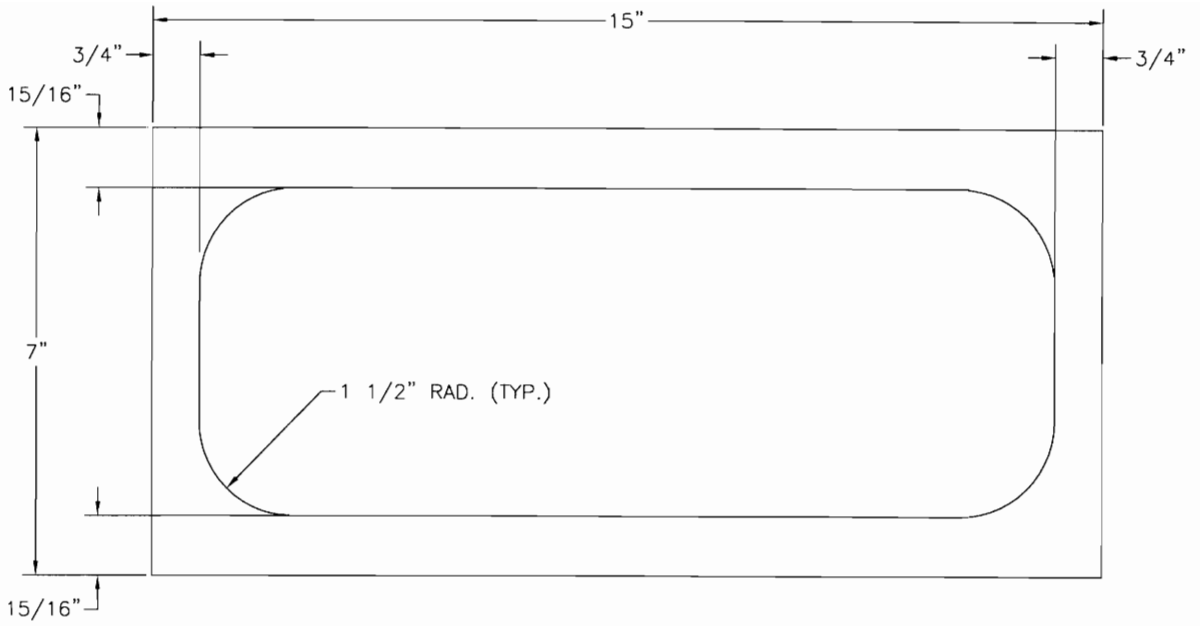
BEND LEFT AND RIGHT

FIGURE 2-2a



1. STRAIGHT ANGLE OR BOARD (MAKE SURE IT IS STRAIGHT!)
2. SPACER BLOCK
3. BOLT AXLES TO GEAR LEGS
4. CLAMPS
5. VEE-BLOCK FOR CLAMPING AXLE

FIGURE 2-3
S-16 SHEKARI



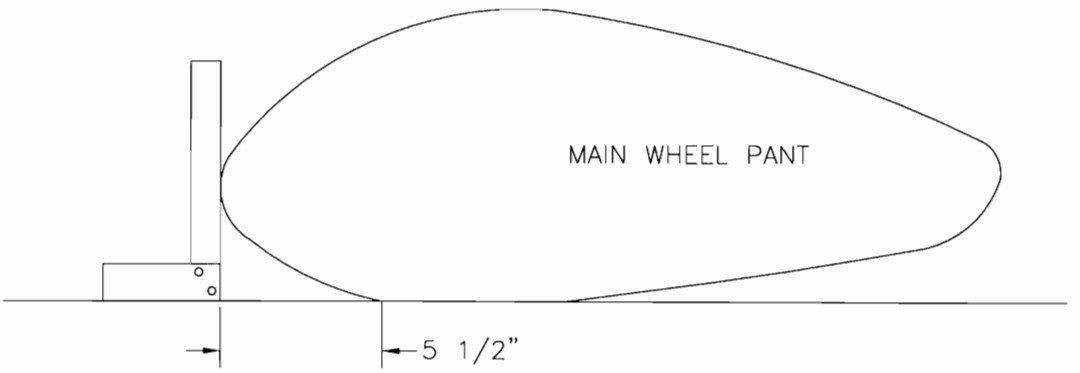


FIGURE 2-4

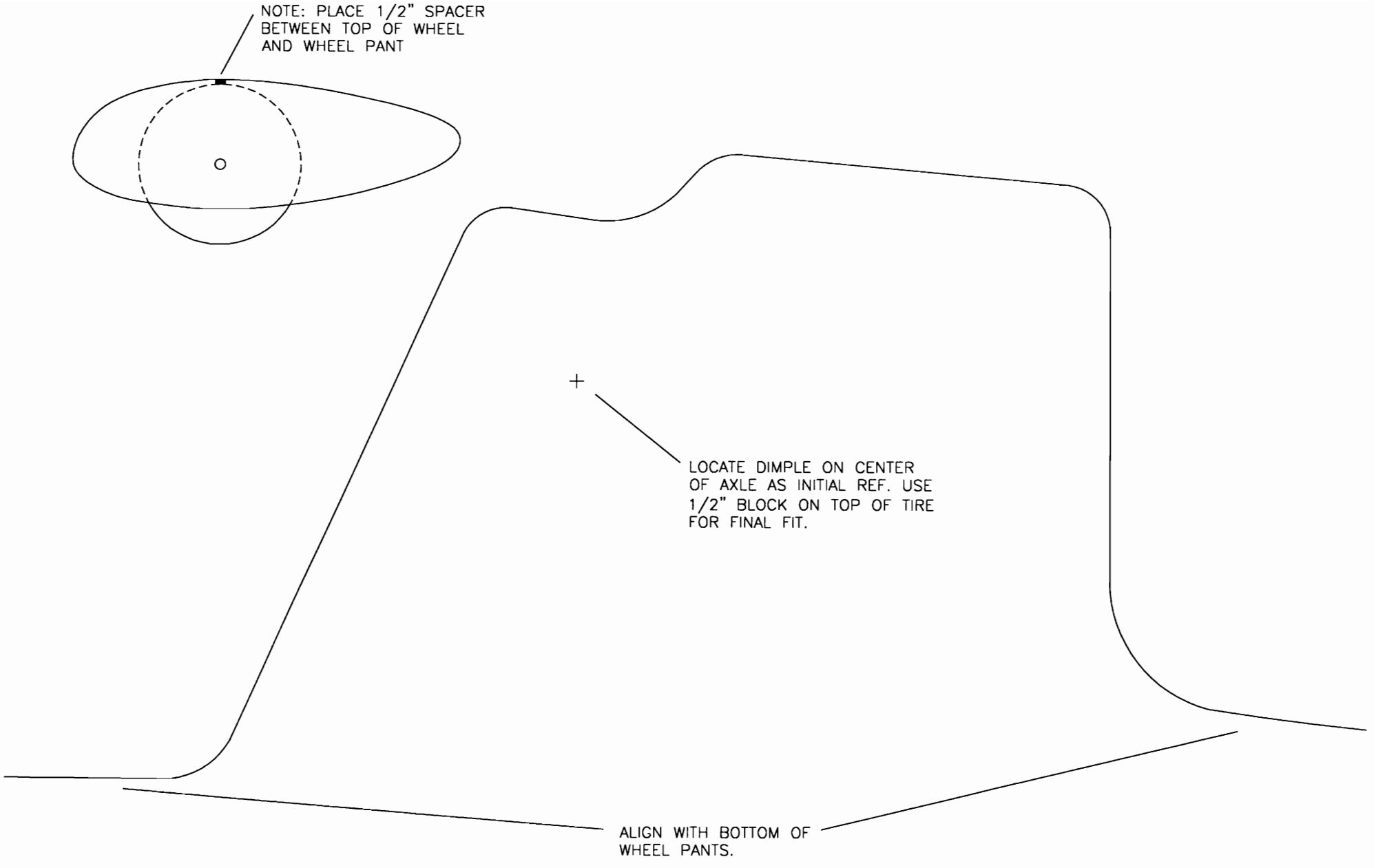
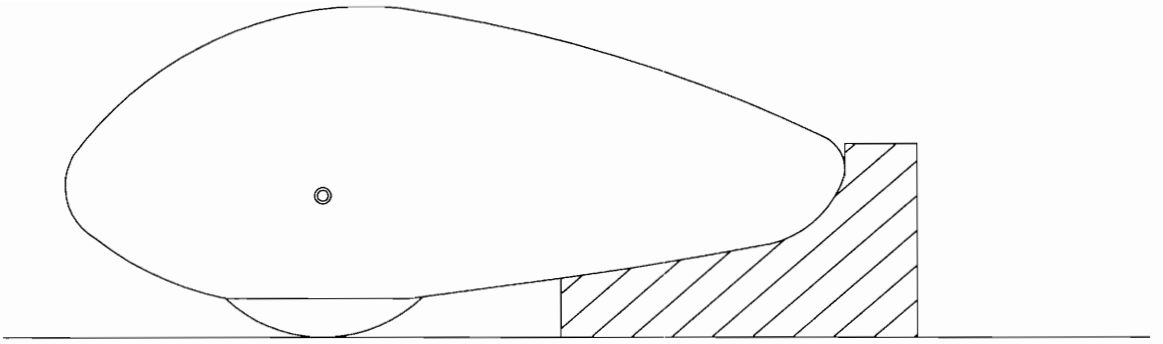


FIGURE 2-5
S-16 SHEKARI

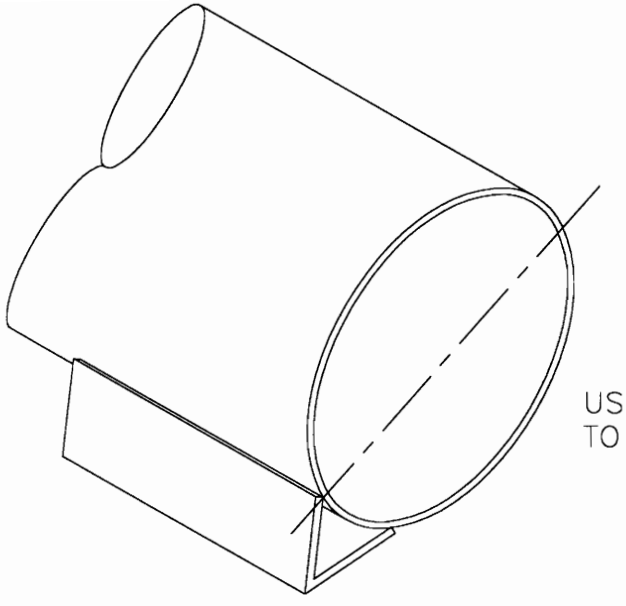
5/15/01

MD4091



CARDBOARD OR WOOD CUT OUT,
PLACE UNDER MAIN WHEEL PANTS
TO SET PARALLEL WITH NOSE PANT.

FIGURE 2-7



USE ANGLE TO DRAW LINE PARALLEL
TO CENTER LINE OF TUBE

FIGURE 2-7A

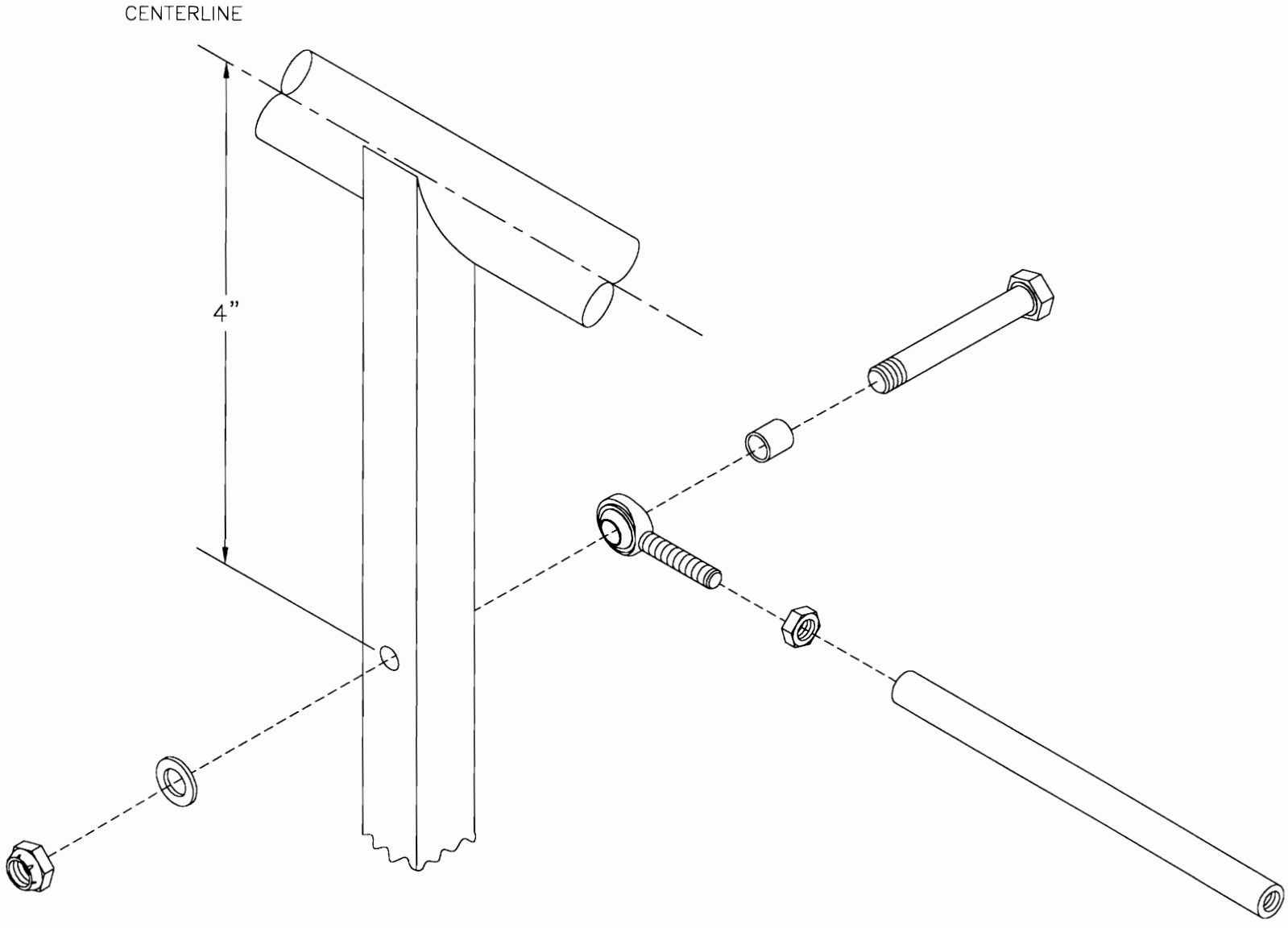


FIGURE 2–7B

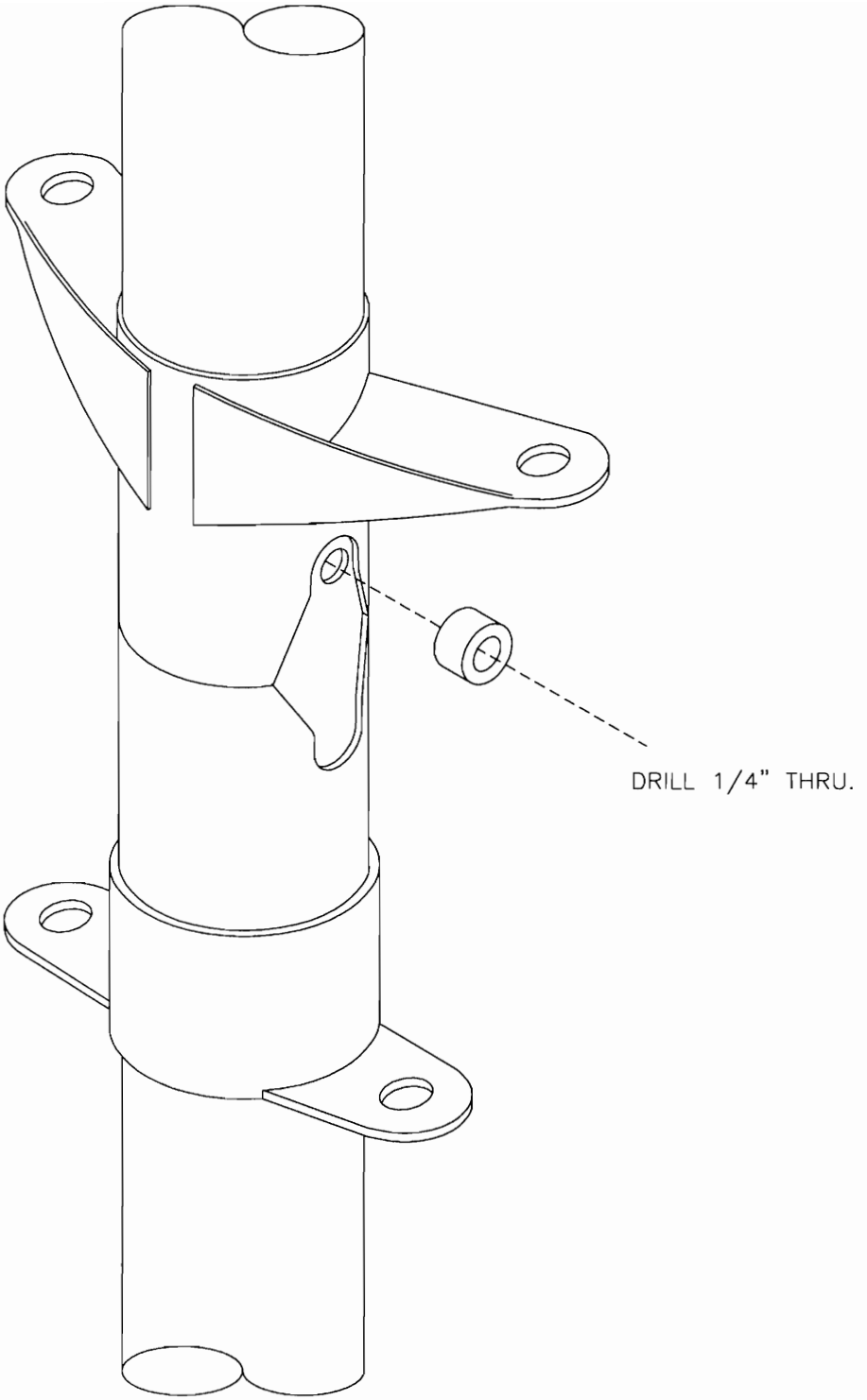


FIGURE 2-8
S-16 SHEKARI

05/11/01

MD3453
REV.

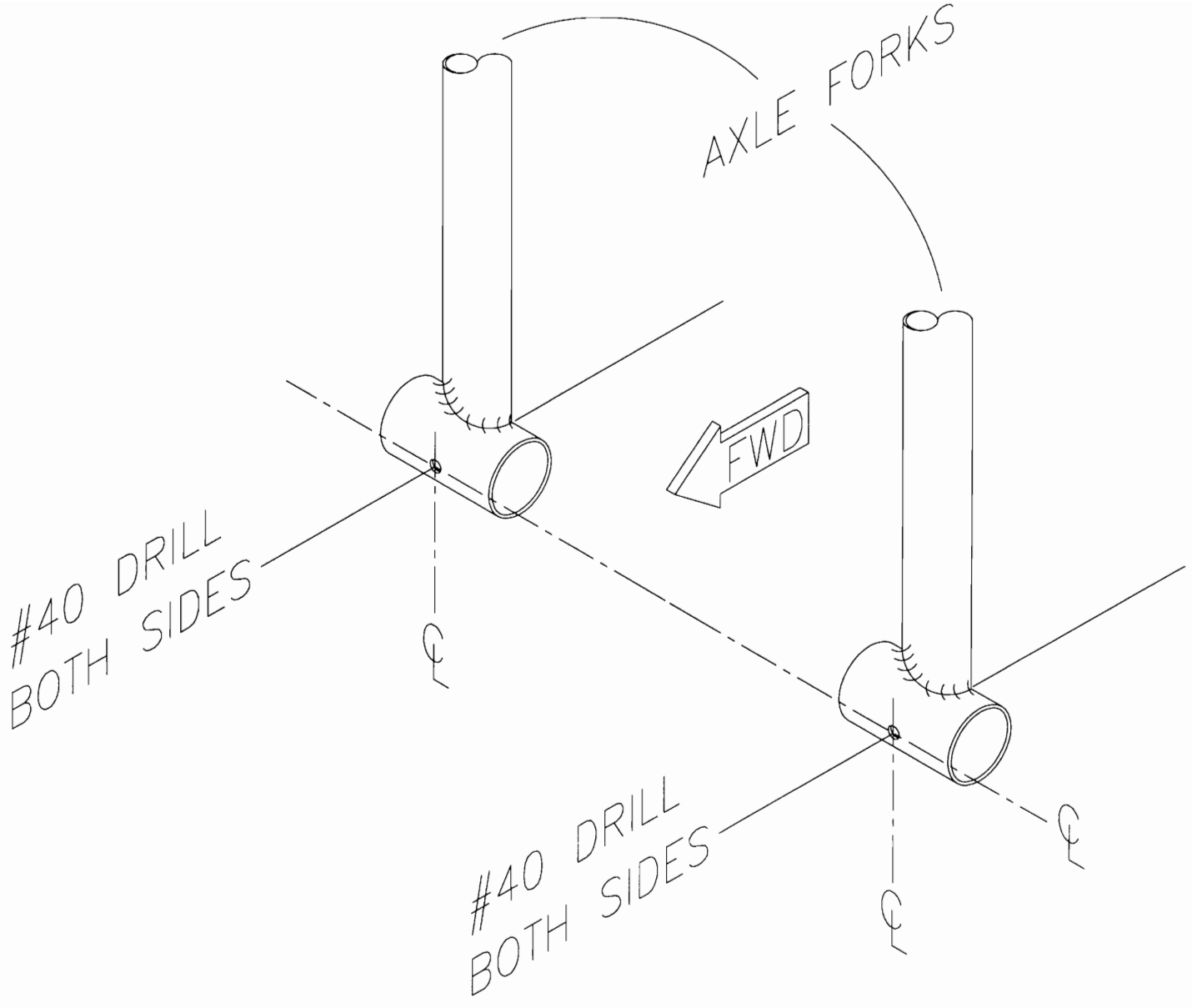


FIGURE 2-9

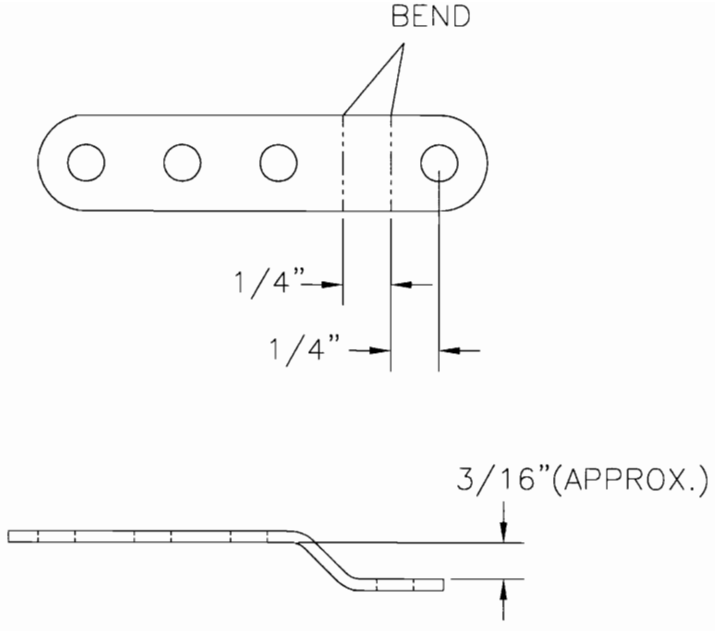
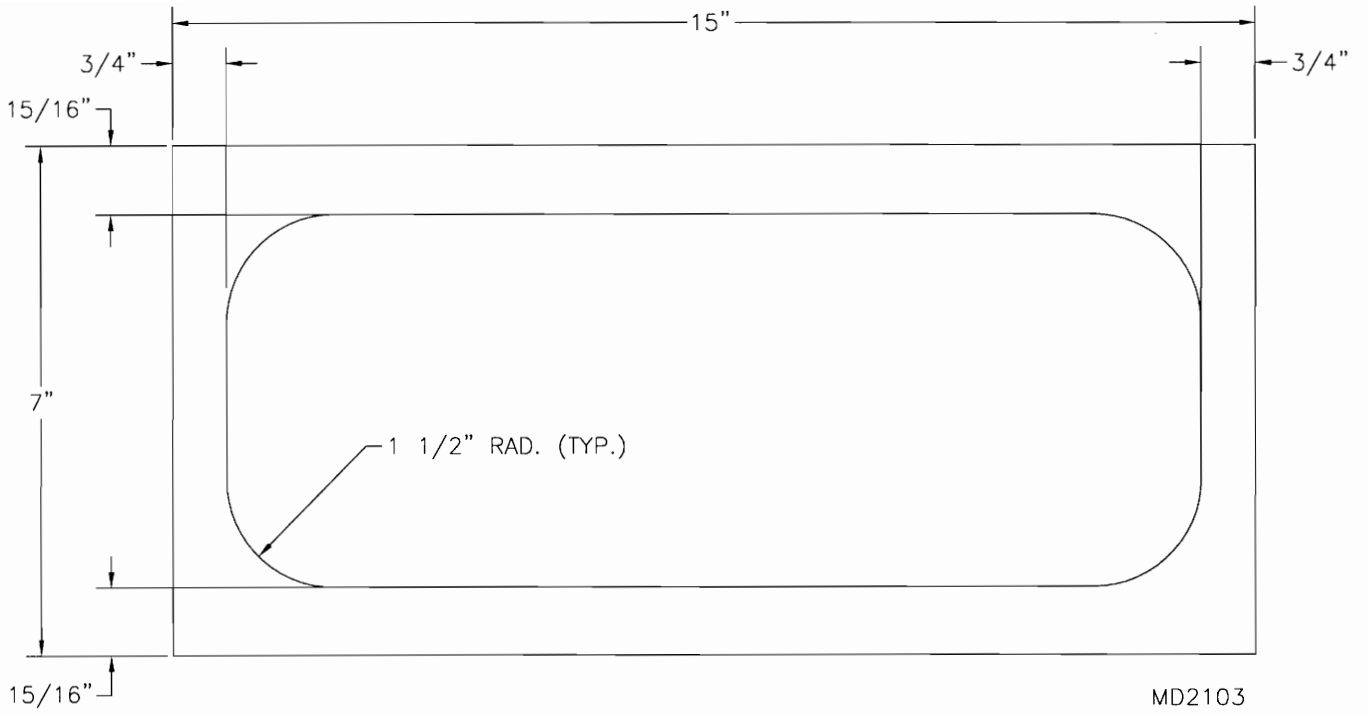


FIGURE 2–10


15"
3/4"
3/4"
15/16"
7"
1 1/2" RAD. (TYP.)
15/16"
MD2103

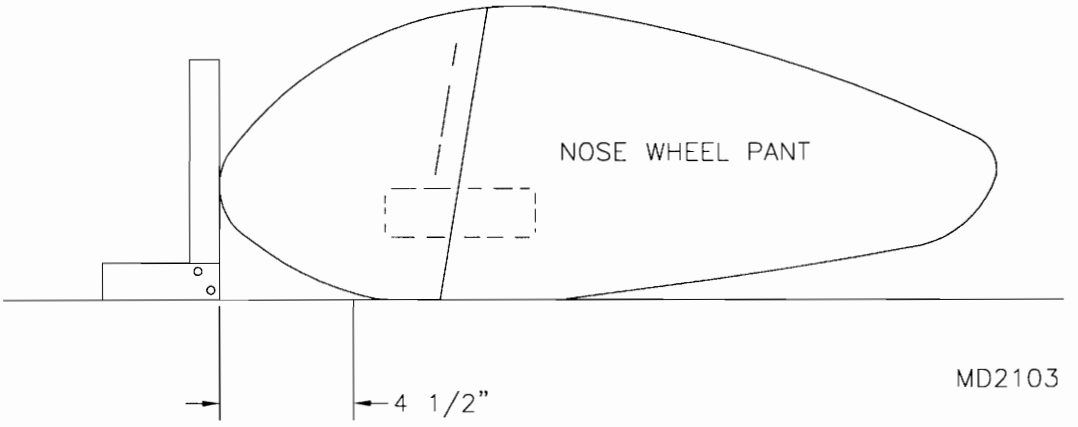

NOSE WHEEL PANT
MD2103
4 1/2"

FIGURE 2-11

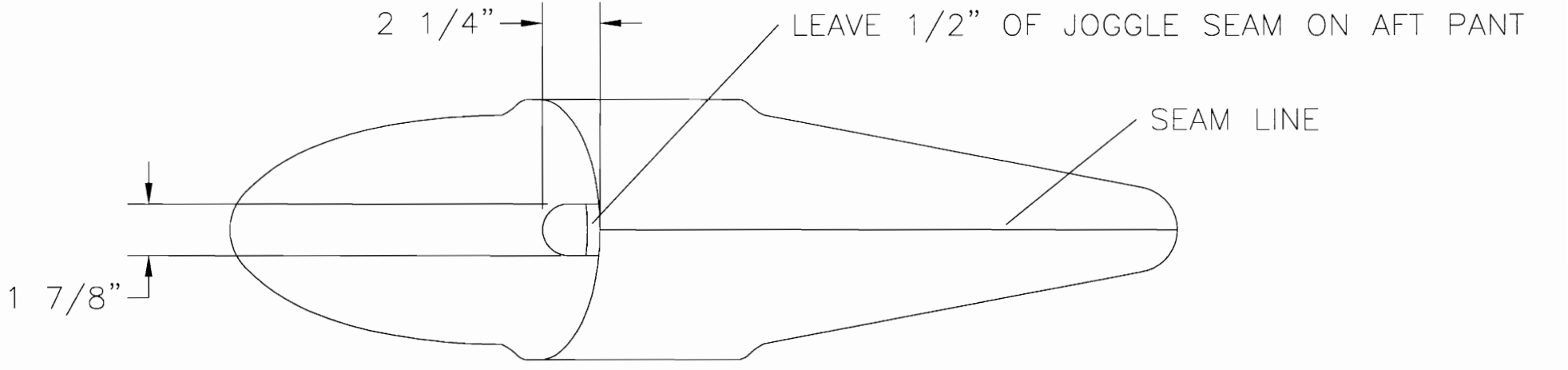


FIGURE 2-12

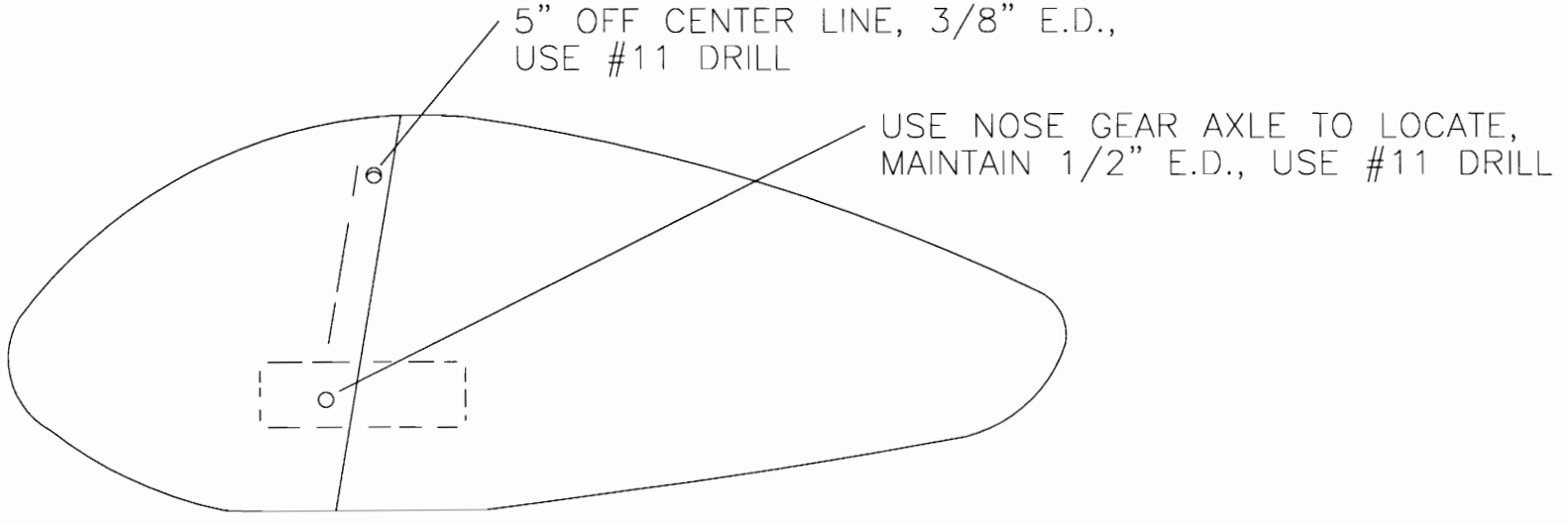

5" OFF CENTER LINE, 3/8" E.D.,
USE #11 DRILL
USE NOSE GEAR AXLE TO LOCATE,
MAINTAIN 1/2" E.D., USE #11 DRILL

FIGURE 2-13

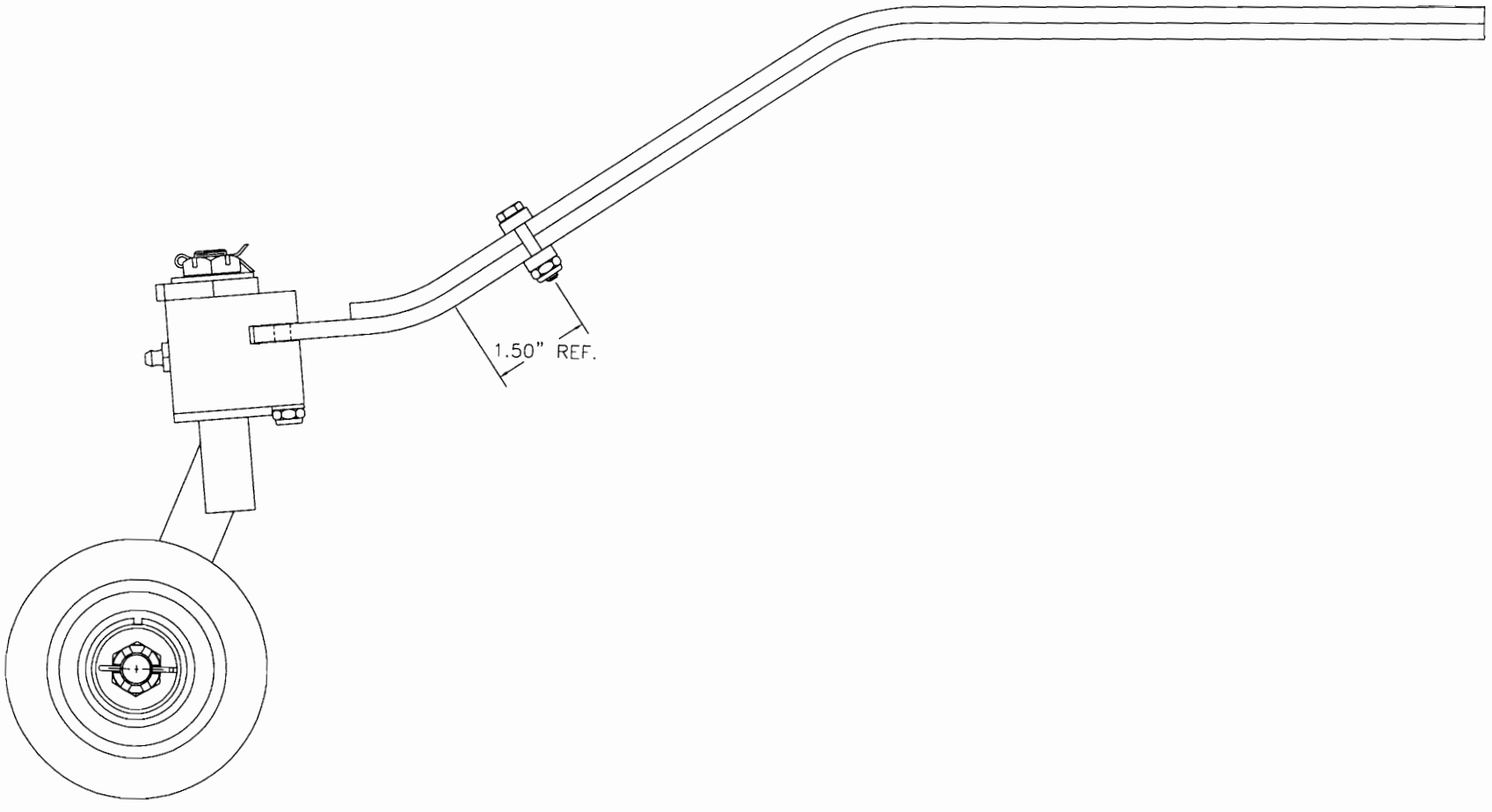


FIGURE 2-14

01/04/99

MD3372
REV.

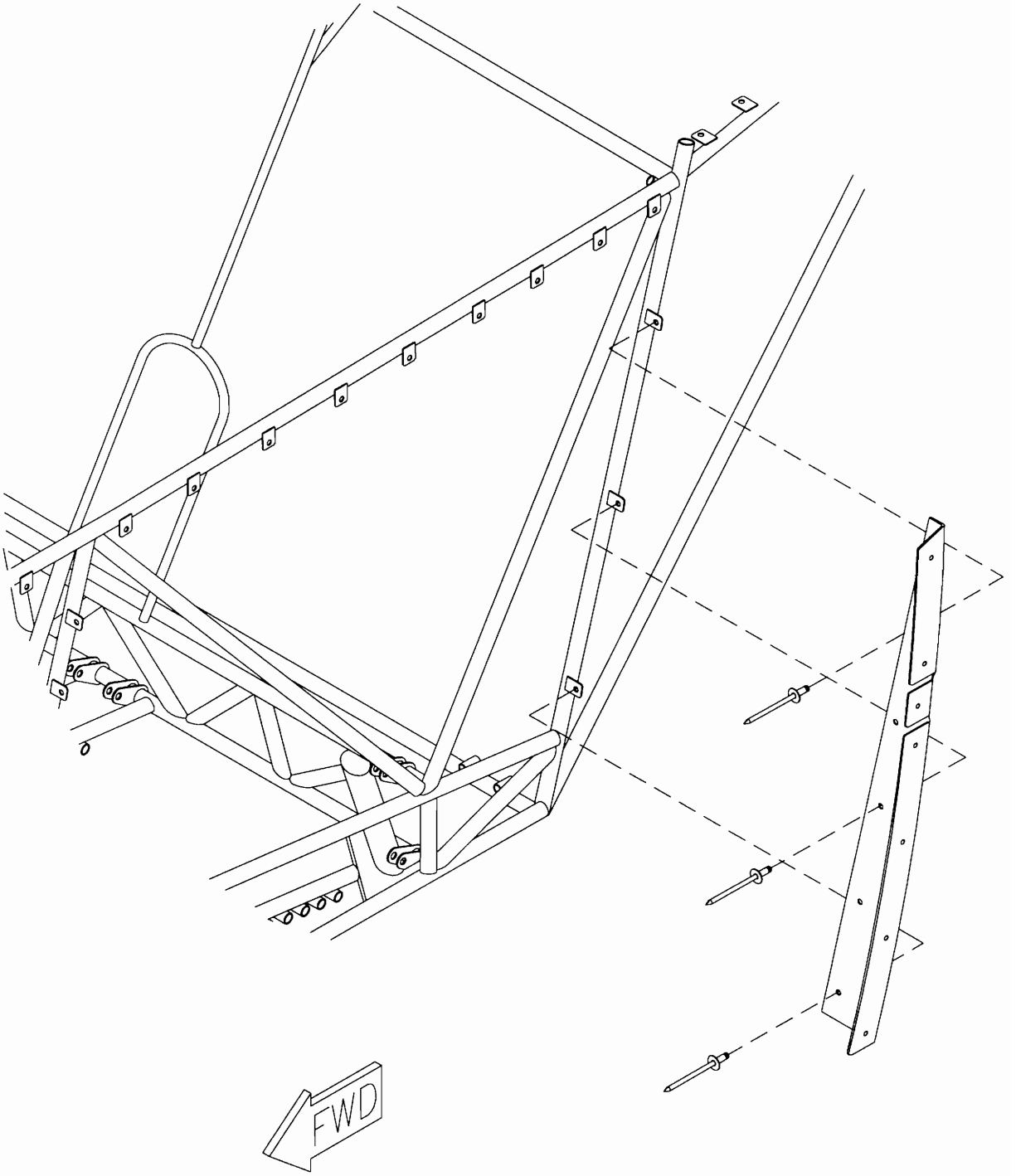


FIGURE 2-15

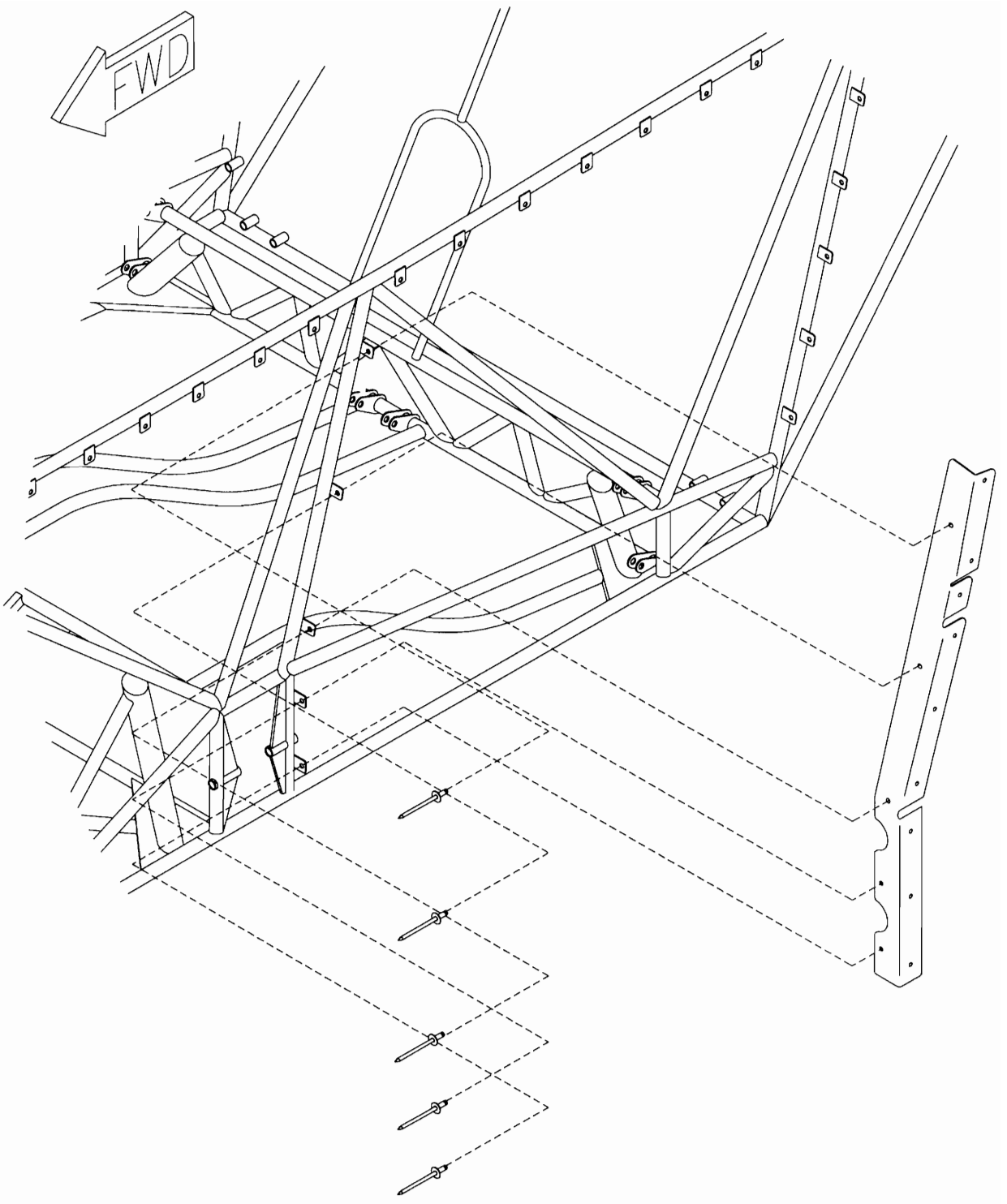


FIGURE 2–16

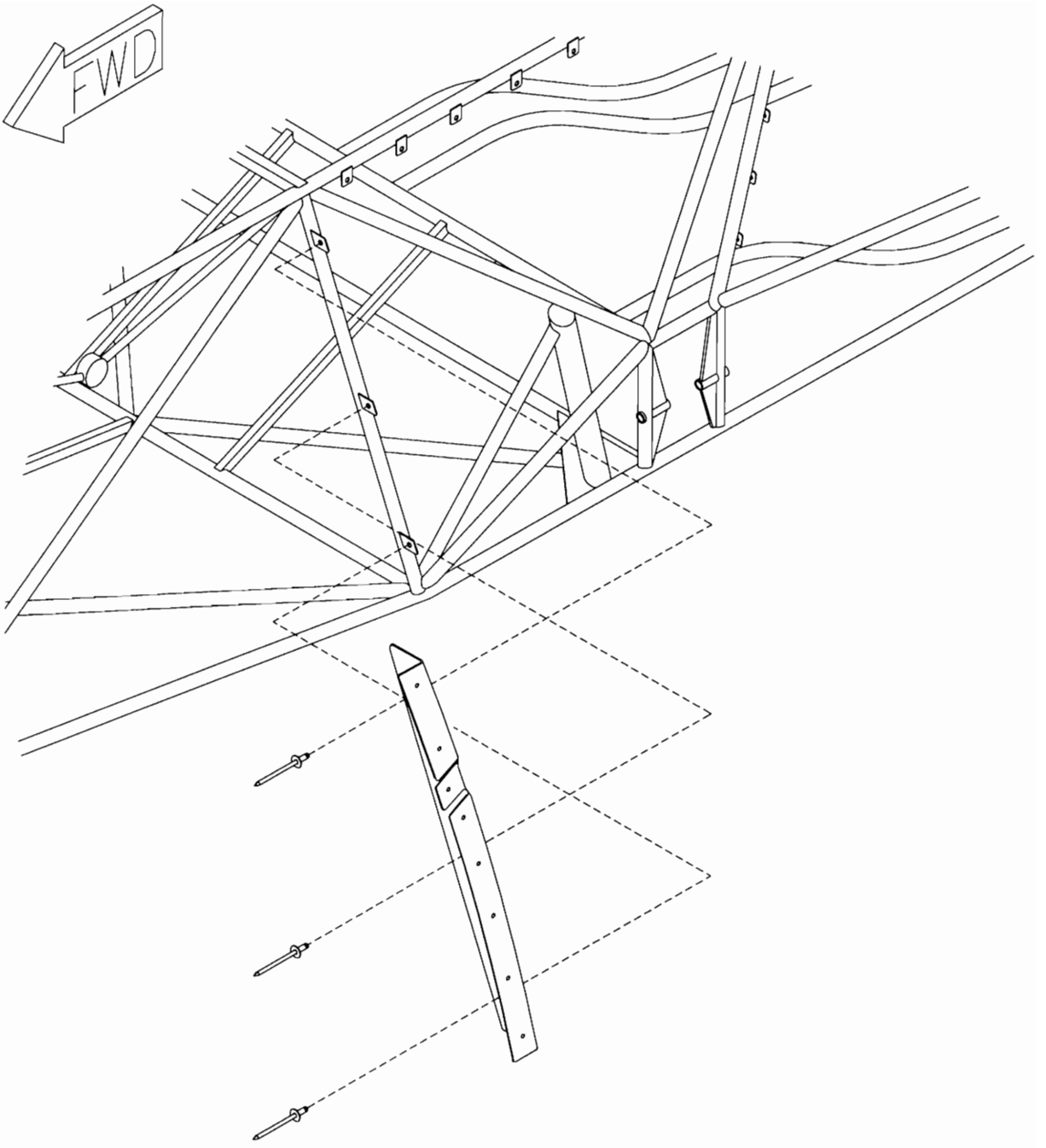
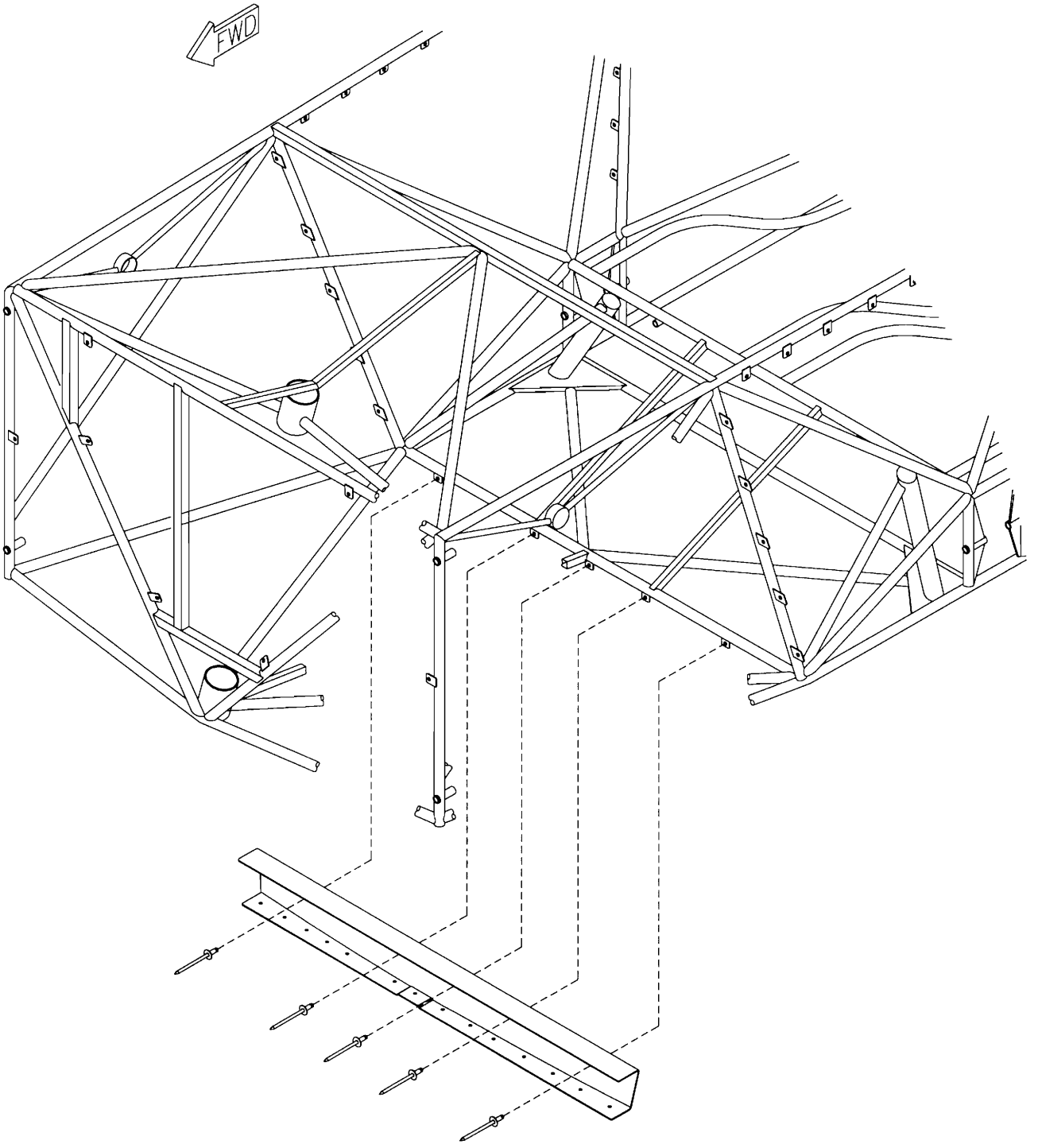


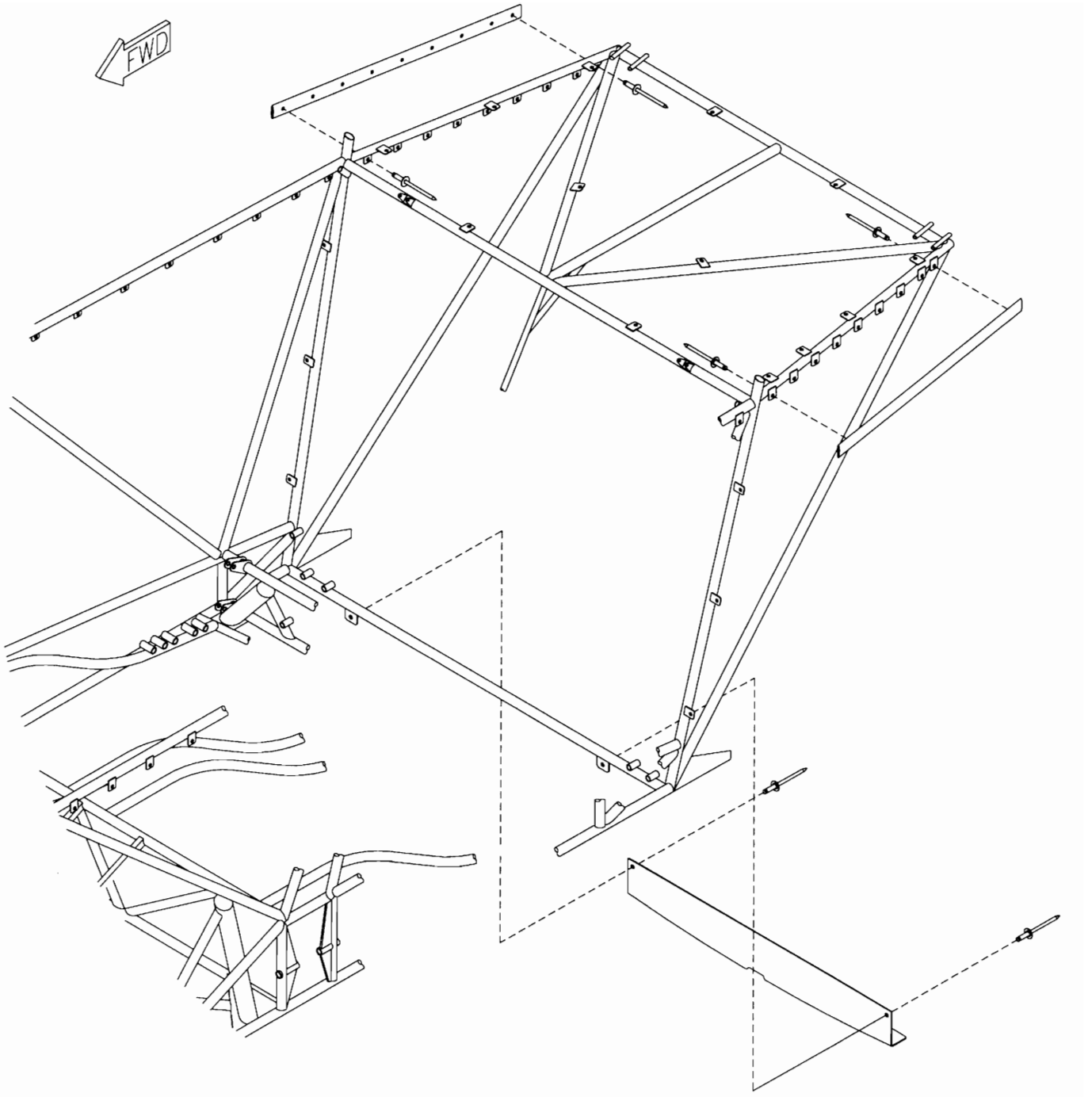
FIGURE 2-17



01/04/99

FIGURE 2-18

MD3330
REV.



01/04/99

FIGURE 2–19

MD3331
REV.

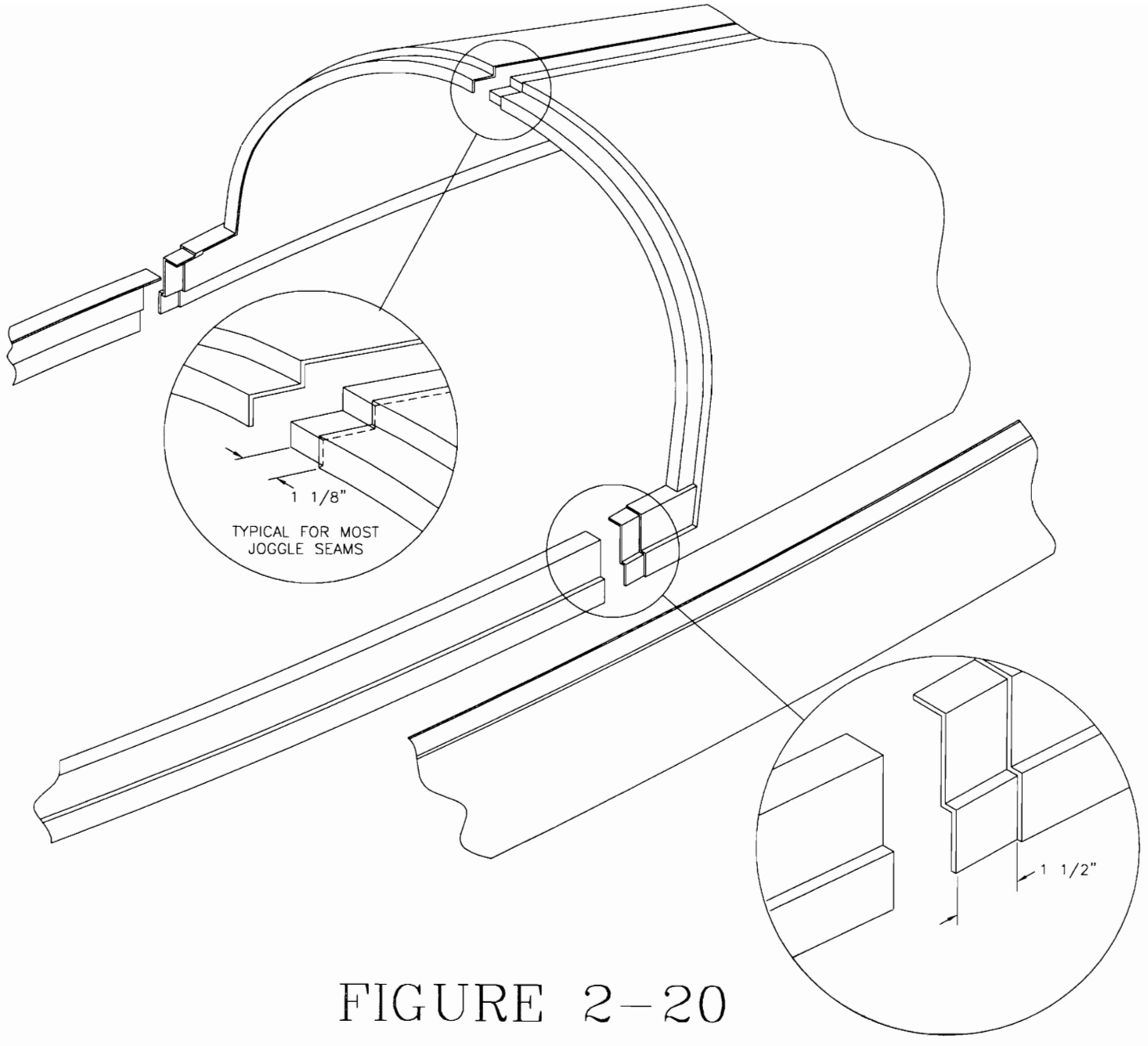


FIGURE 2-20

01/04/99

MD3377
REV.

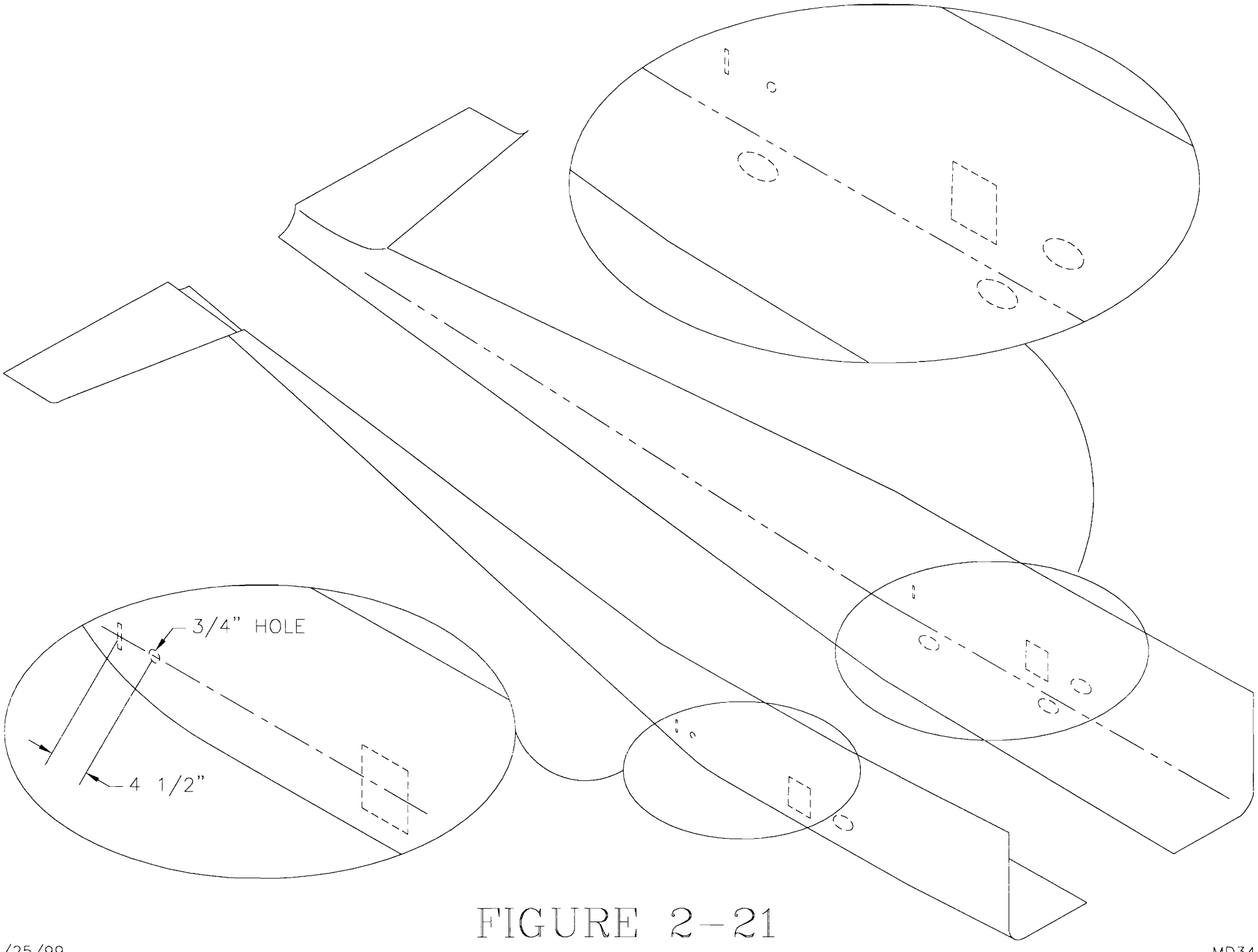


FIGURE 2-21

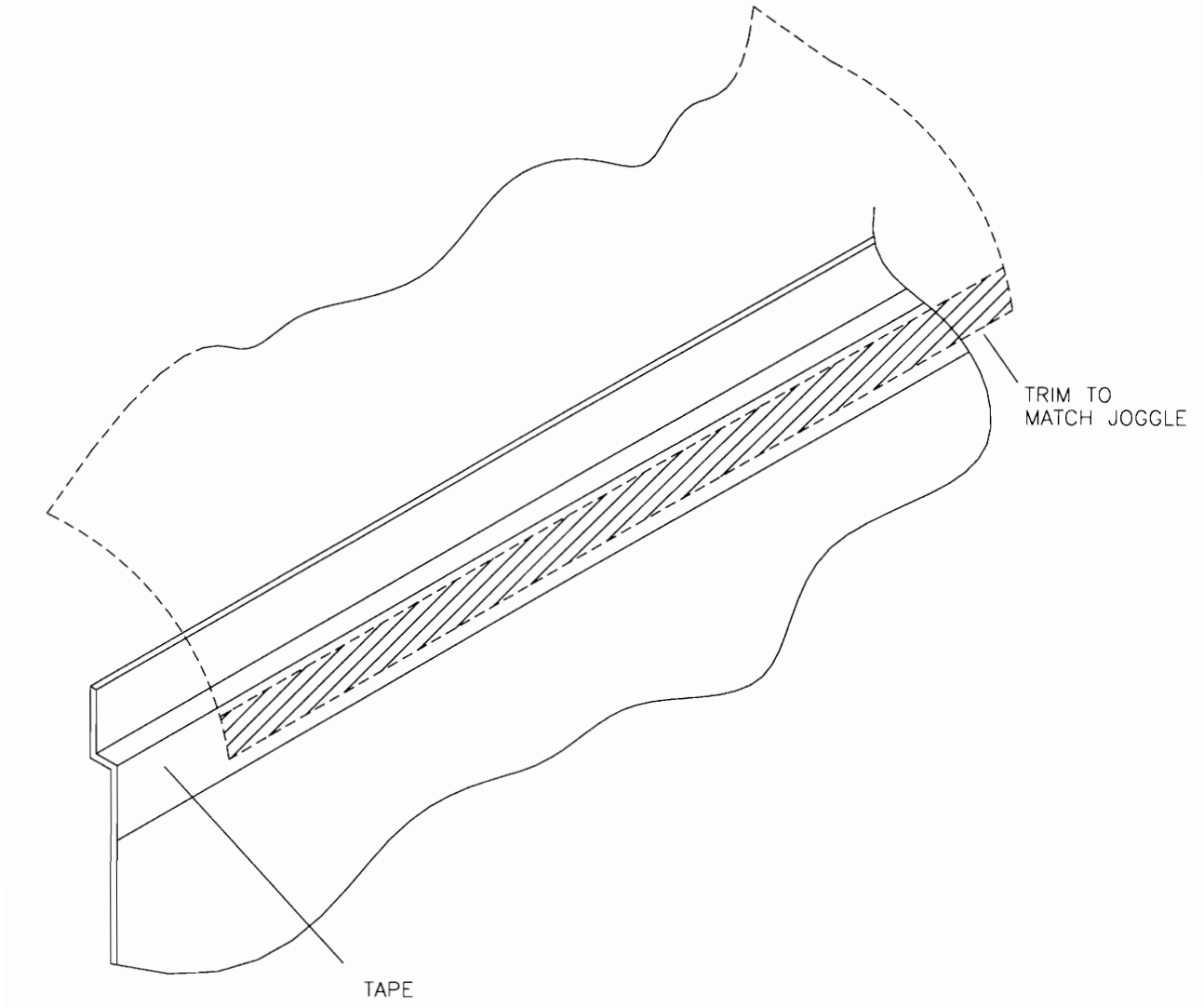


FIGURE 2-21A

MD4104

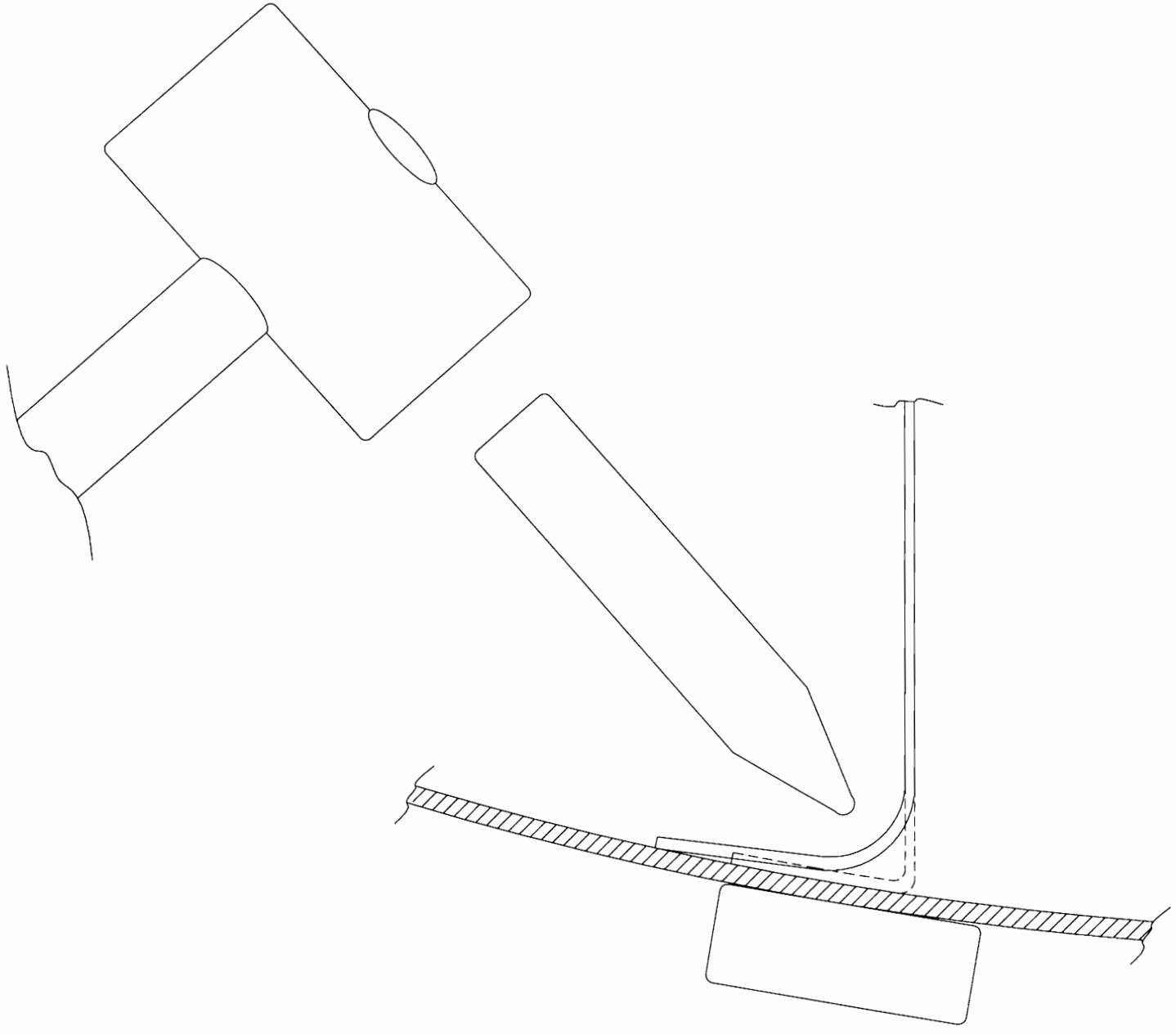
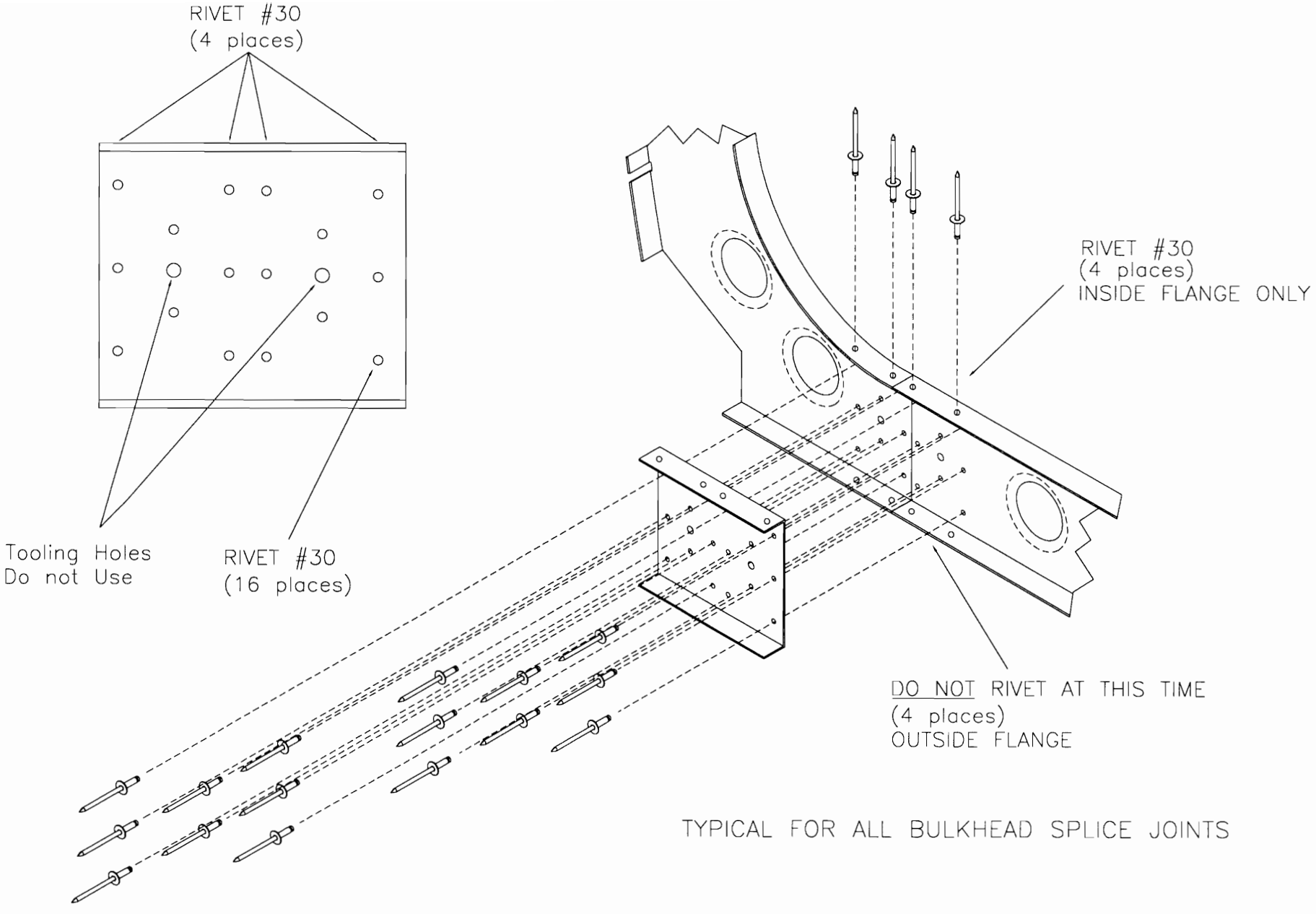


FIGURE 2-22



TYPICAL FOR ALL BULKHEAD SPLICE JOINTS

FIGURE 2-23

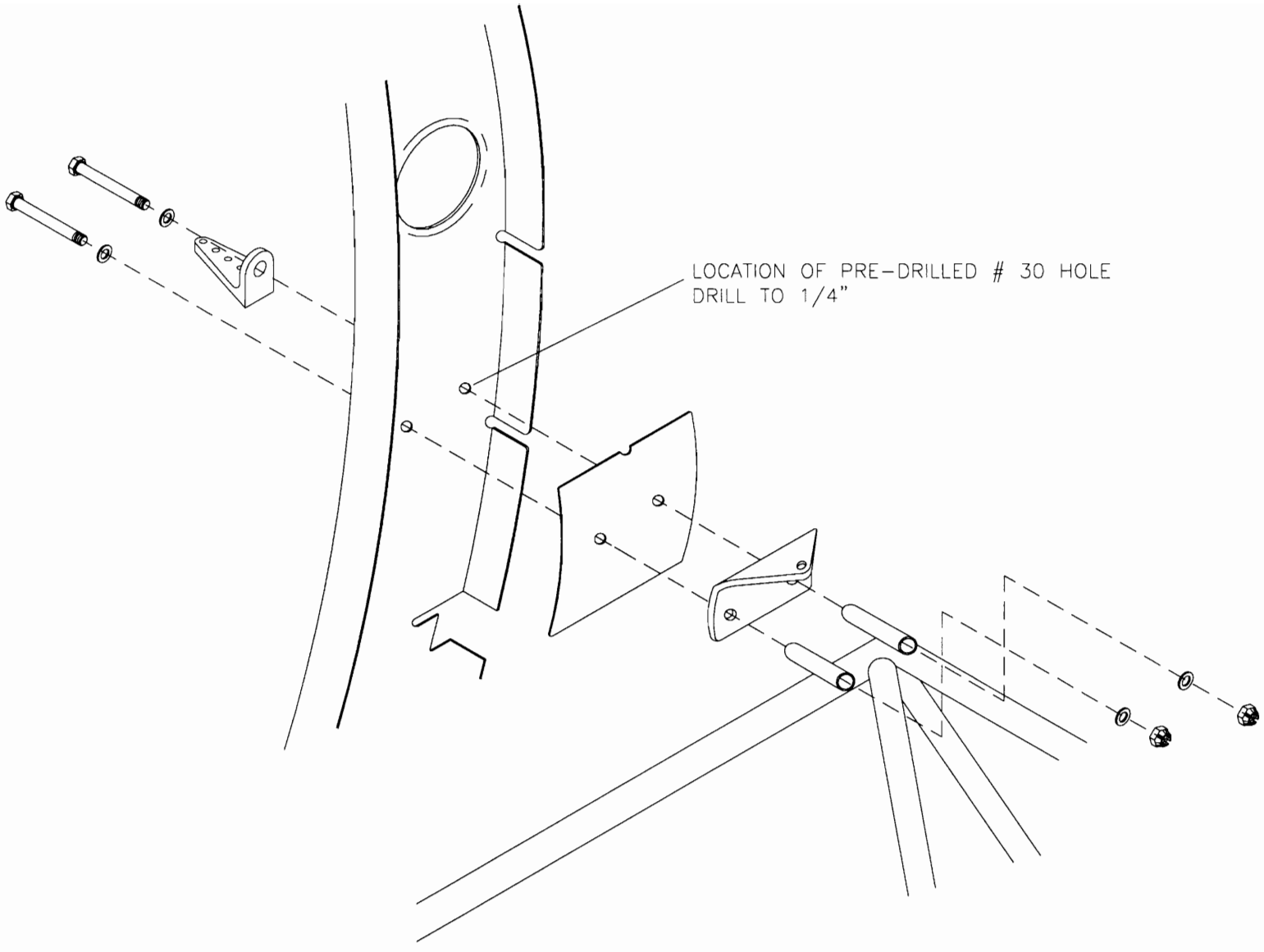


FIGURE 2-24

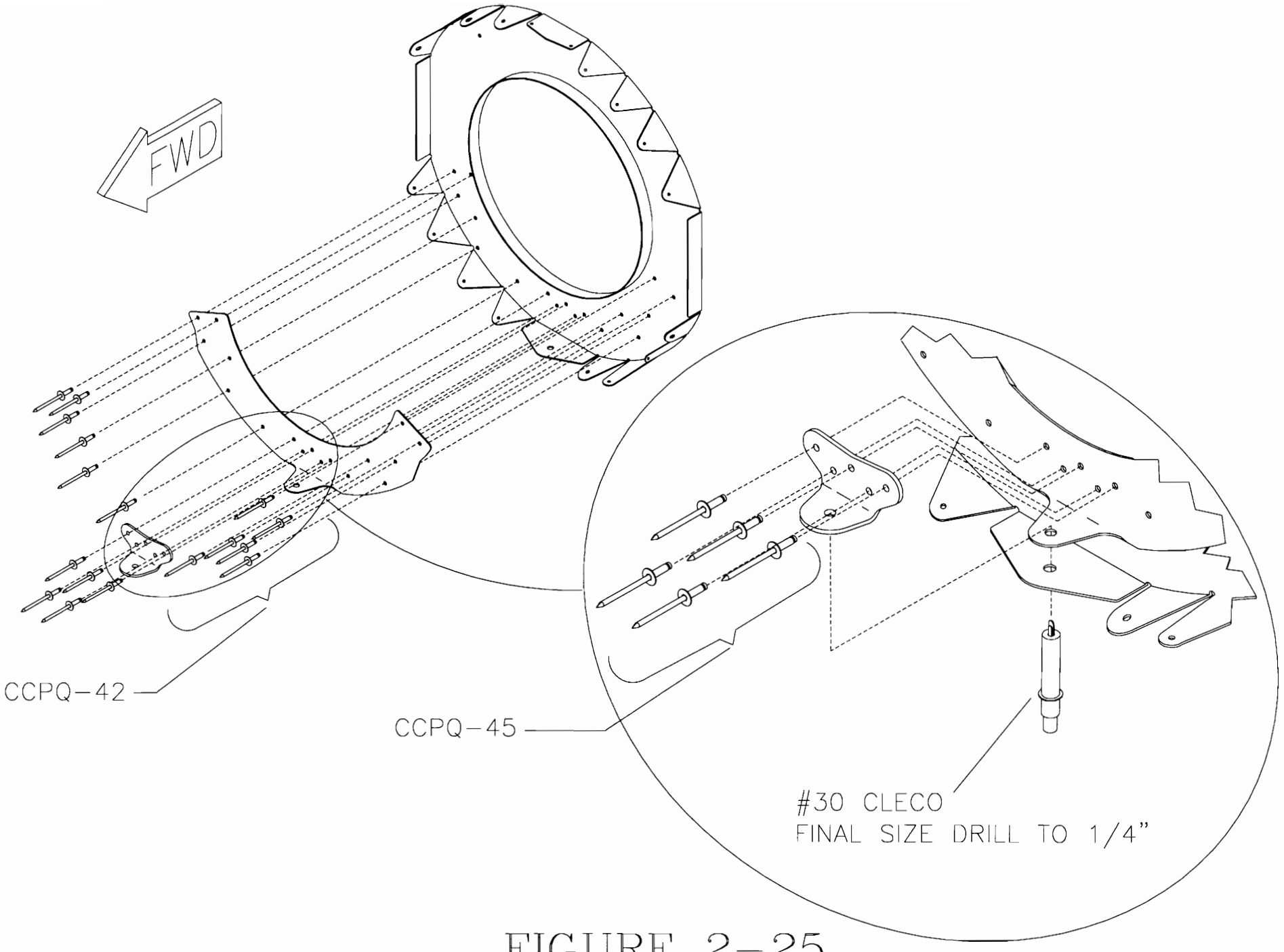


FIGURE 2-25

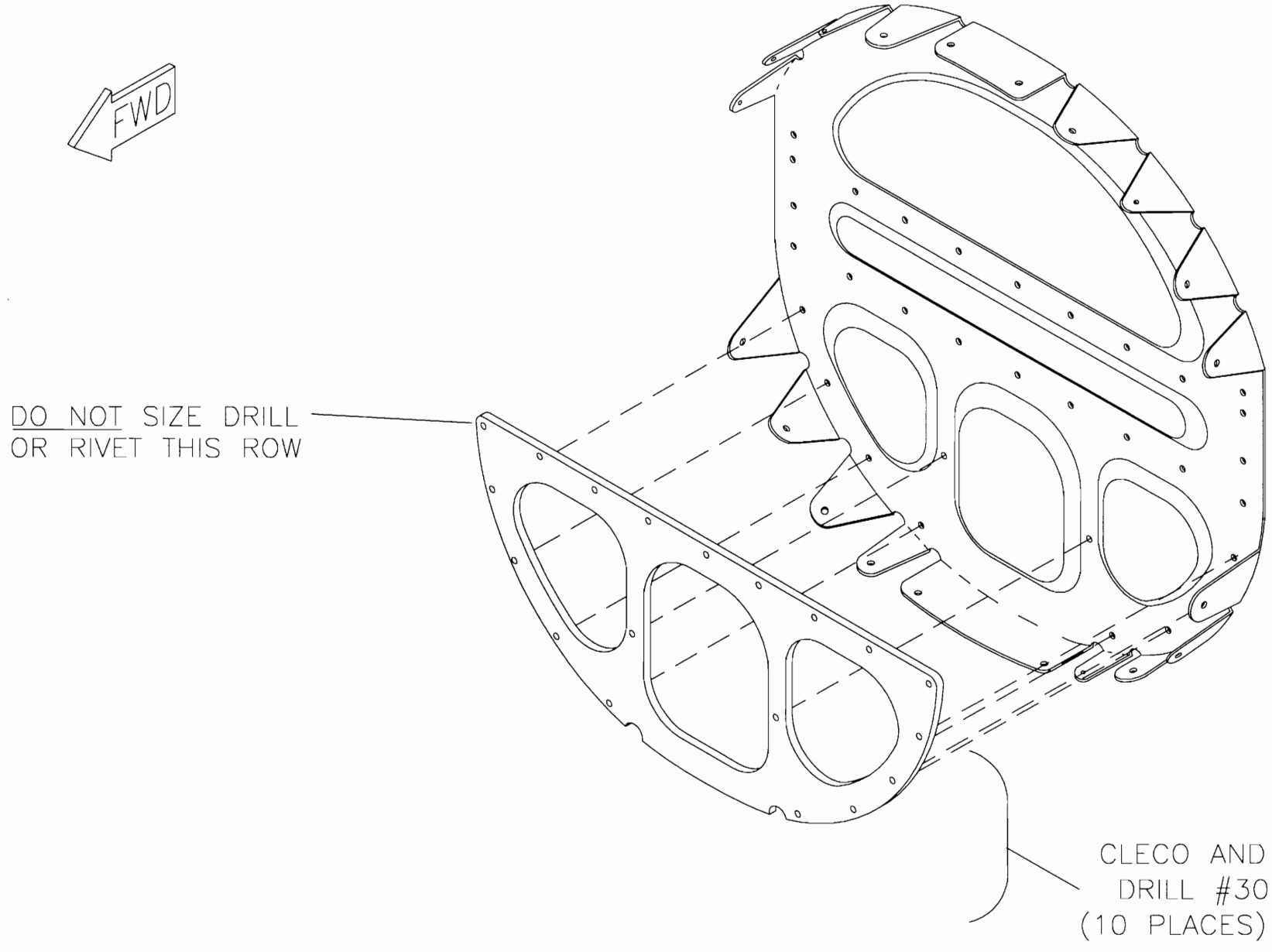

FWD
DO NOT SIZE DRILL
OR RIVET THIS ROW
CLECO AND
DRILL #30
(10 PLACES)

FIGURE 2-26

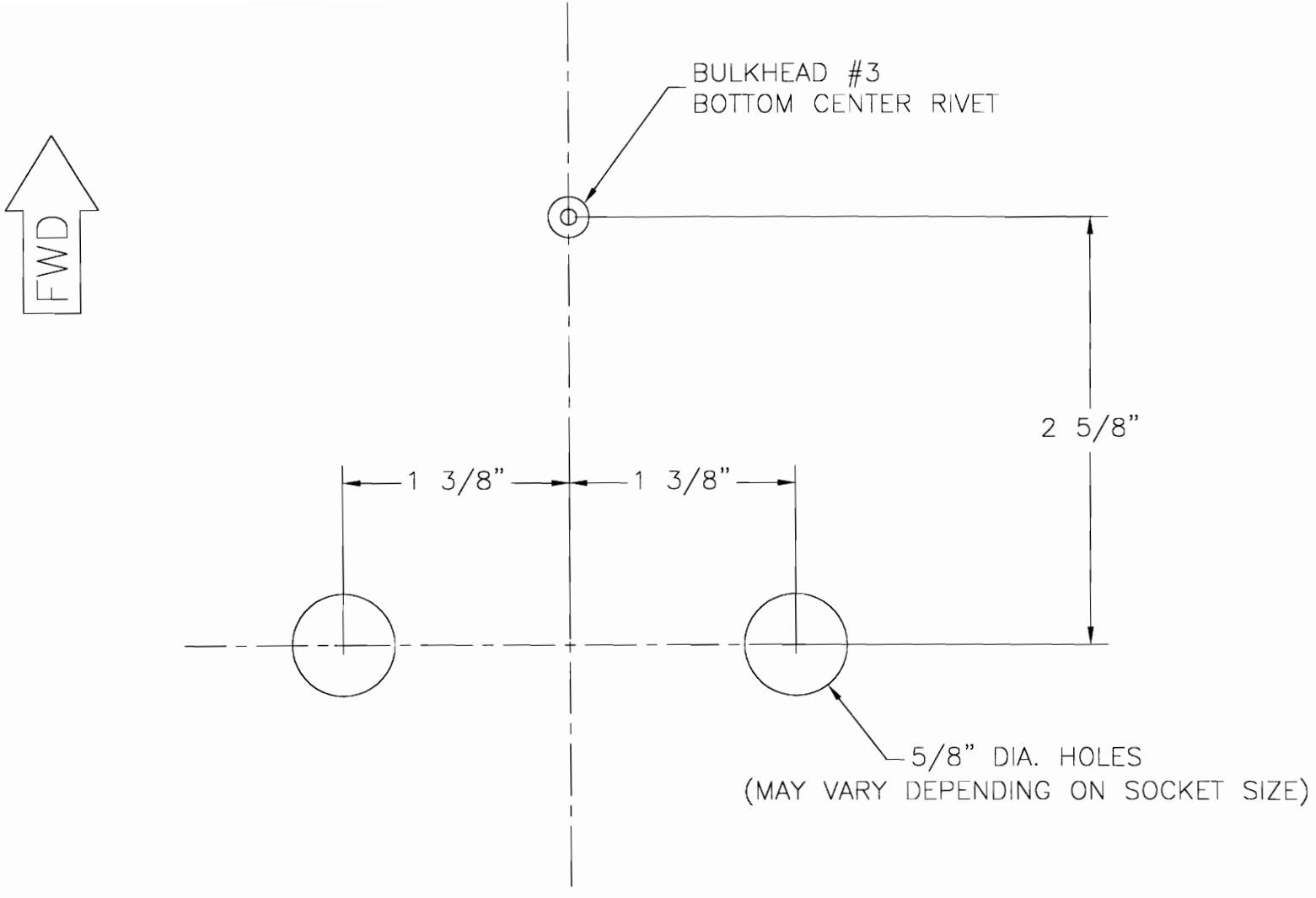
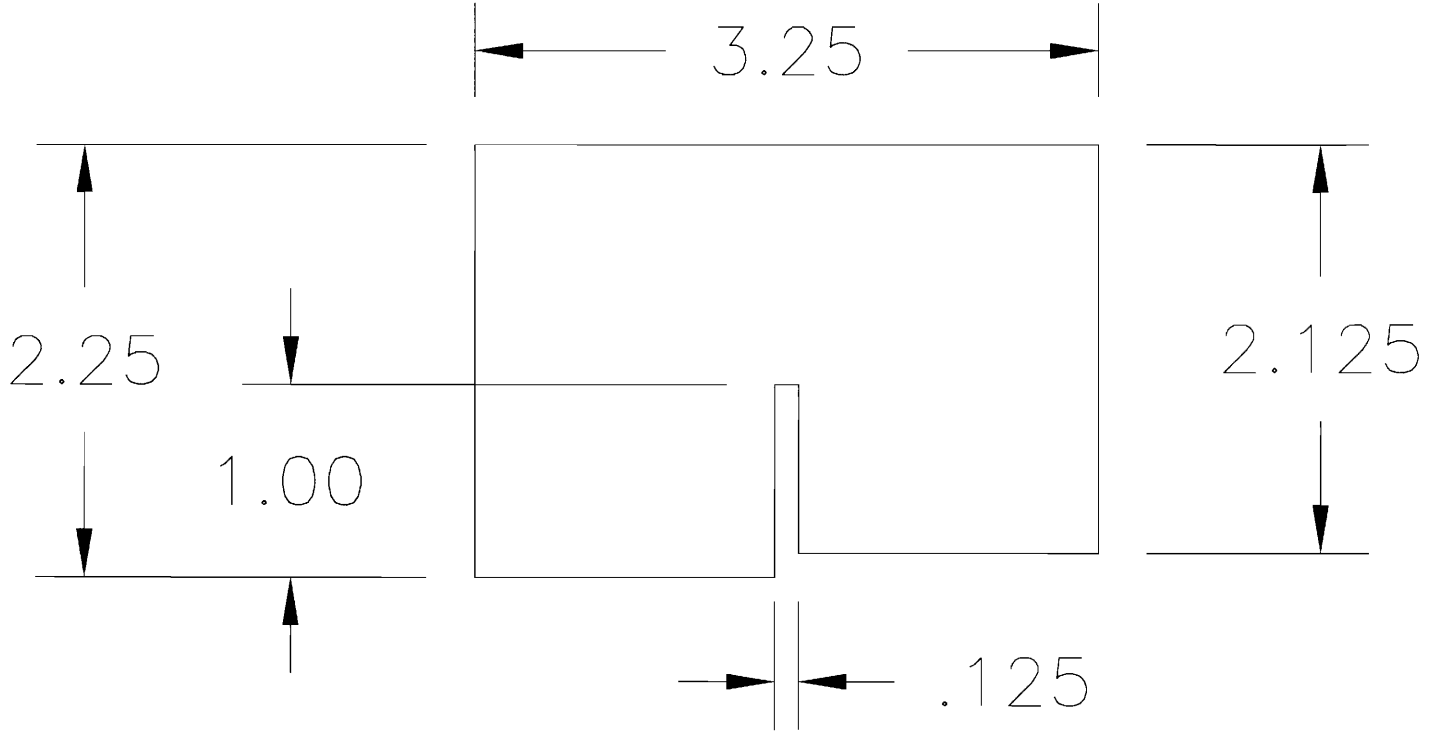

FWD
BULKHEAD #3
BOTTOM CENTER RIVET
2 5/8"
1 3/8"
1 3/8"
5/8" DIA. HOLES
(MAY VARY DEPENDING ON SOCKET SIZE)

FIGURE 2-26A



FABRICATE FROM .080 ALUMINUM RAW STOCK

FIGURE 2-27

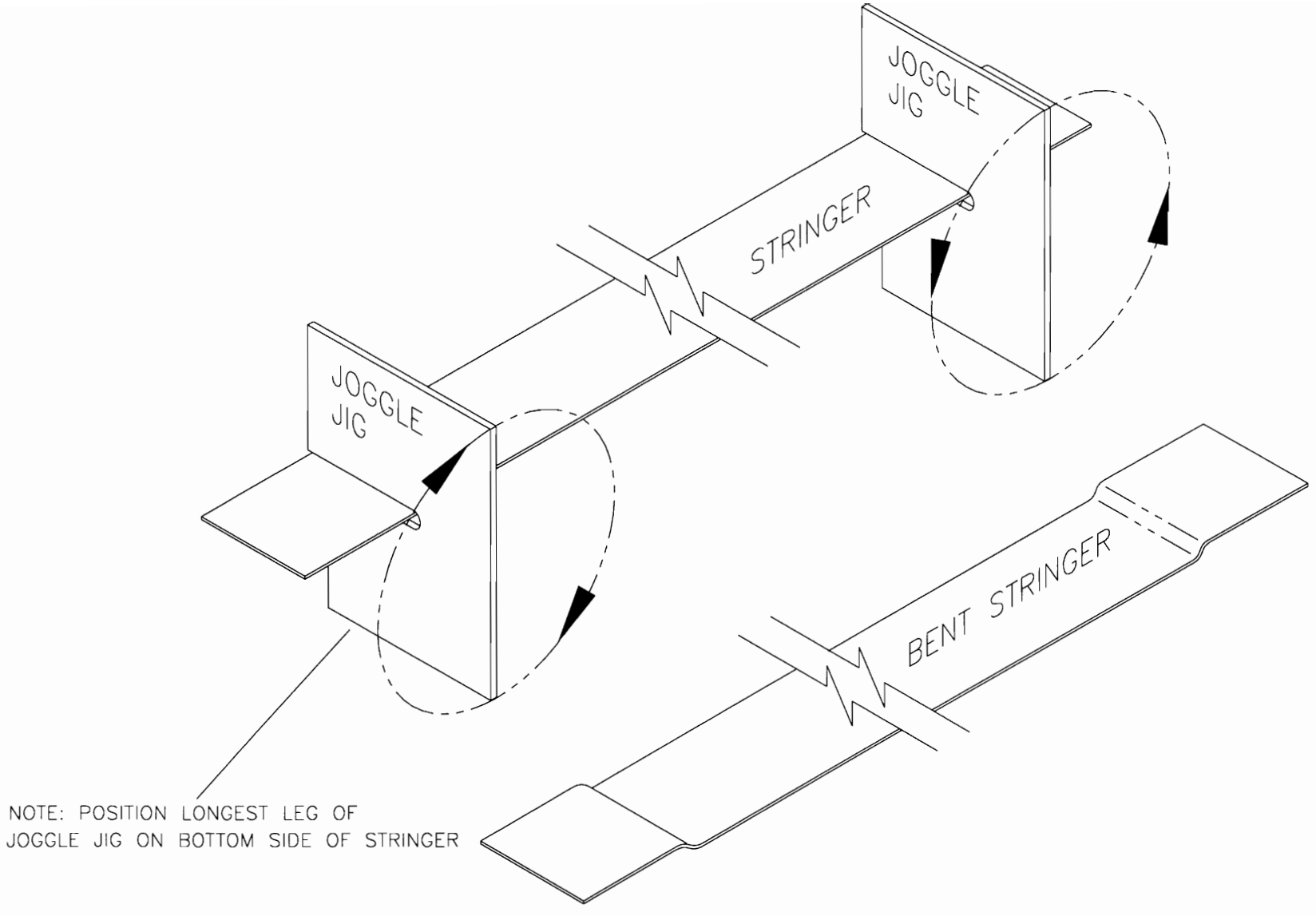

JOGGLE JIG
STRINGER
JOGGLE JIG
BENT STRINGER
NOTE: POSITION LONGEST LEG OF
JOGGLE JIG ON BOTTOM SIDE OF STRINGER

FIGURE 2-28

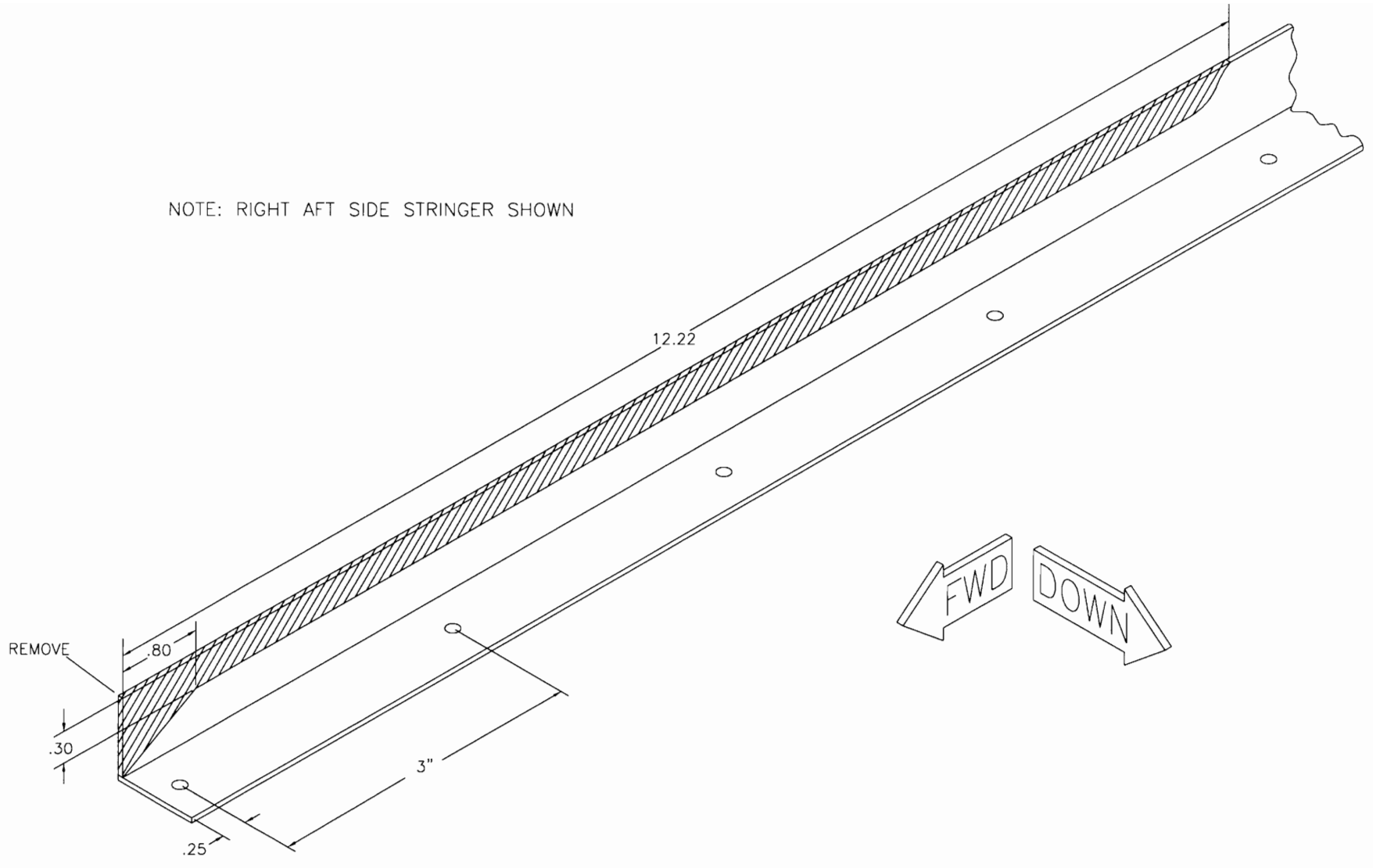

NOTE: RIGHT AFT SIDE STRINGER SHOWN
12.22
REMOVE
.80
.30
3"
.25
FWD
DOWN

FIGURE 2-29

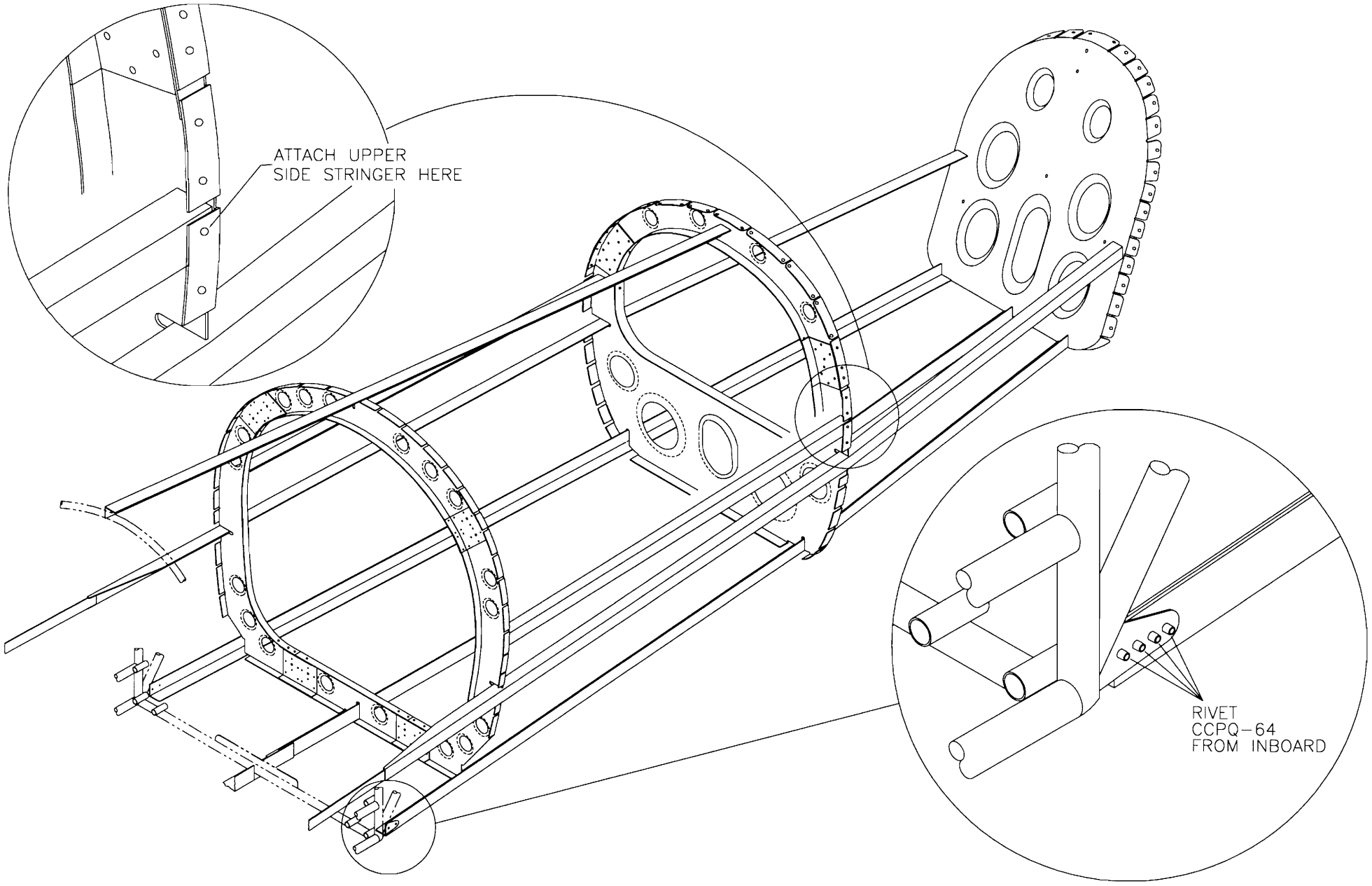


FIGURE 2-30

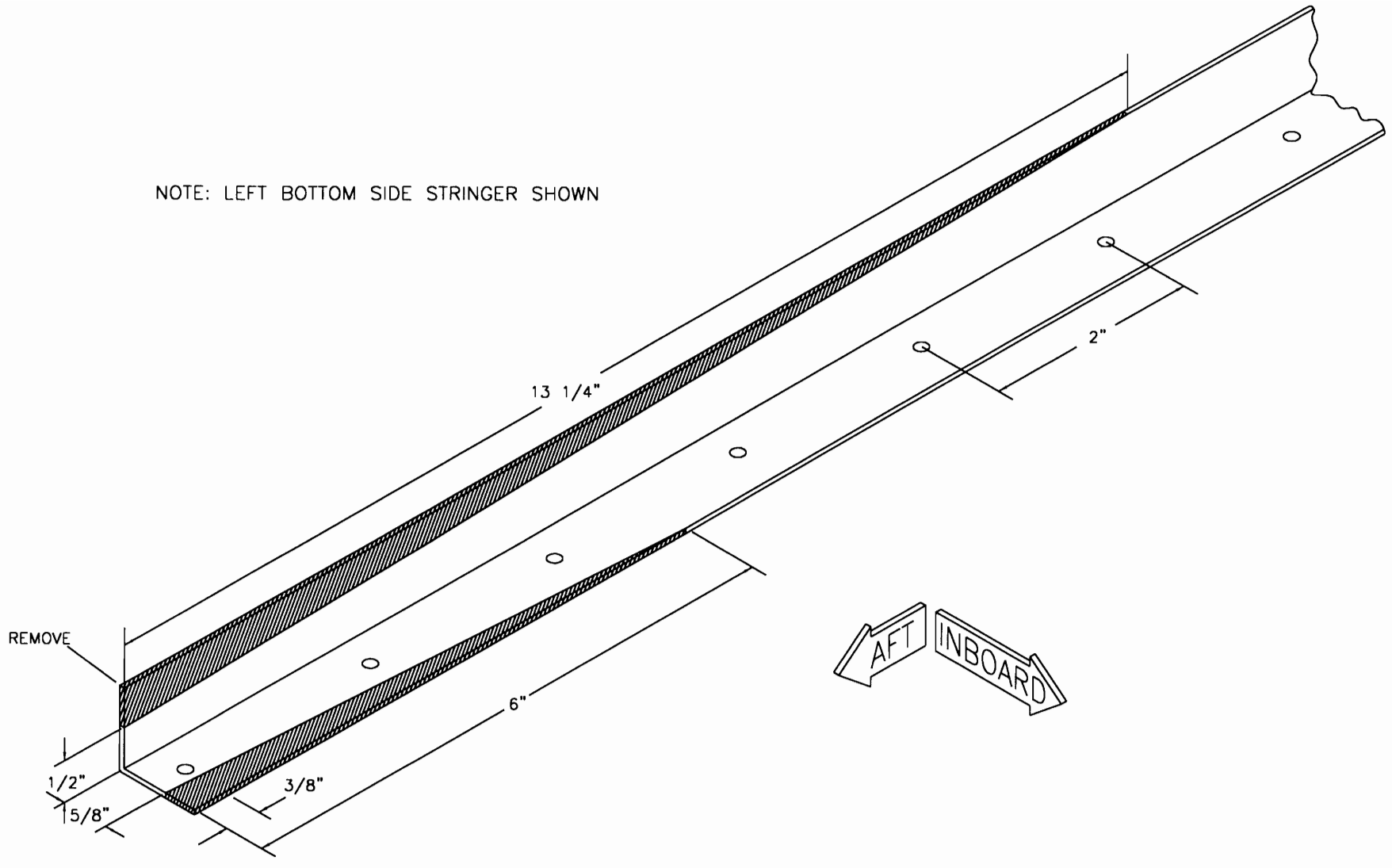

NOTE: LEFT BOTTOM SIDE STRINGER SHOWN
13 1/4"
2"
REMOVE
6"
1/2"
5/8"
3/8"
AFT
INBOARD

FIGURE 2-31

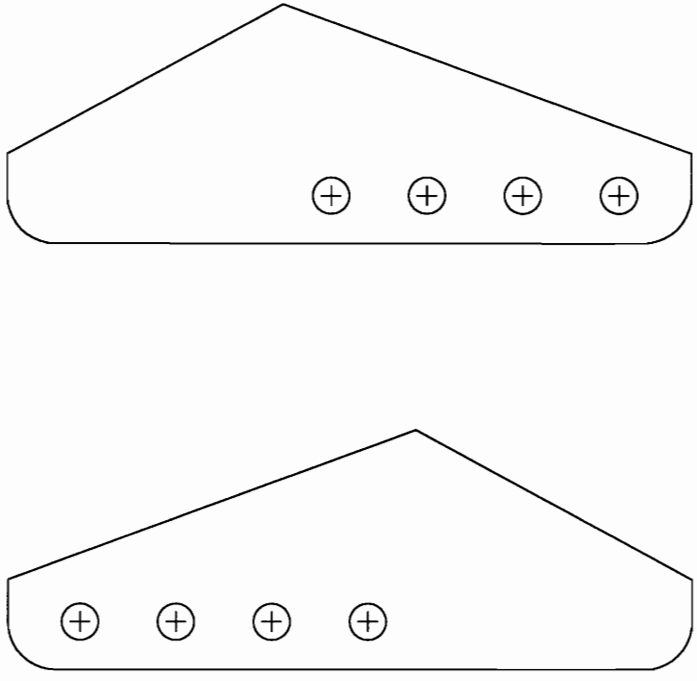


FIGURE 2-32

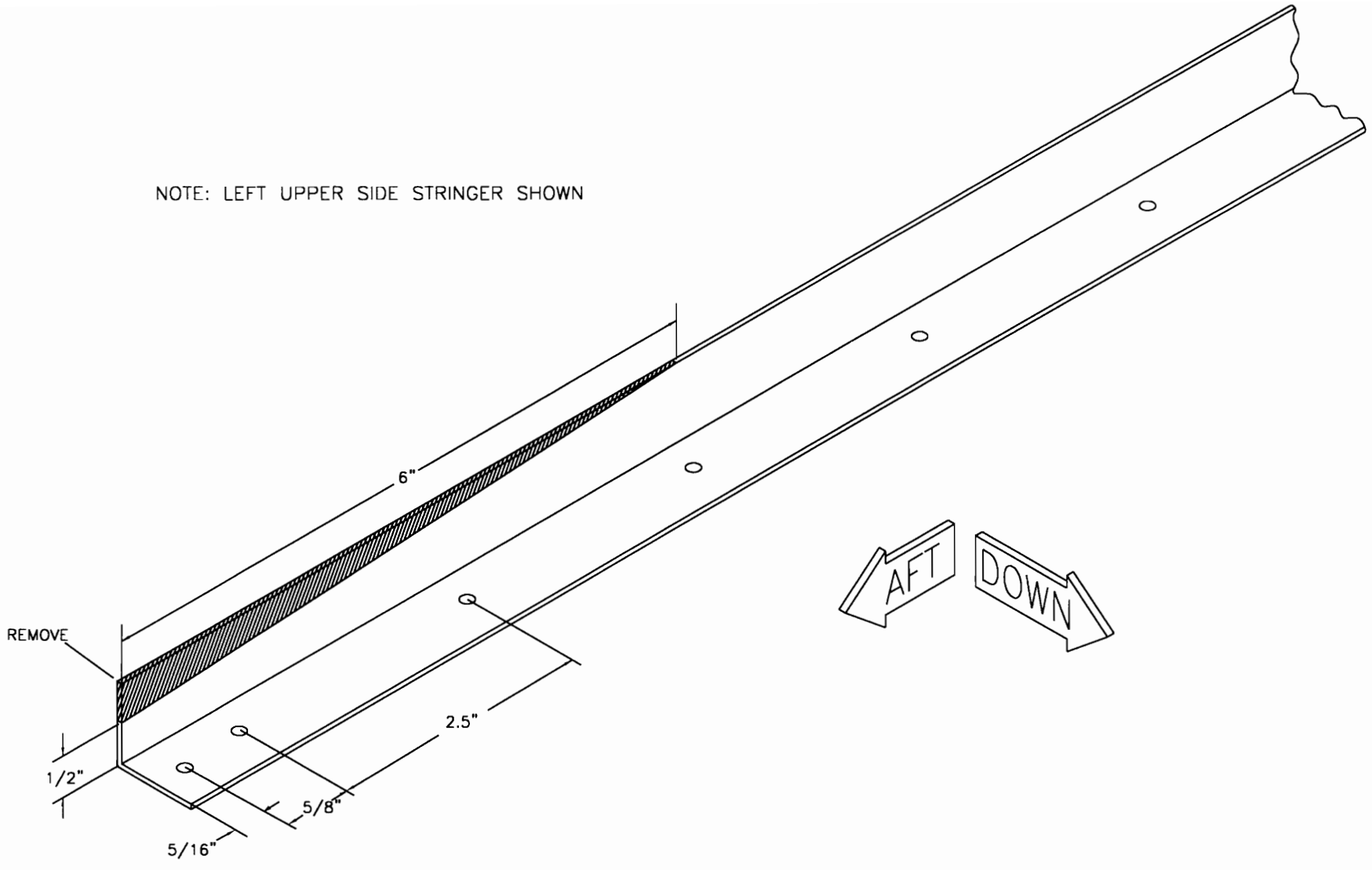

NOTE: LEFT UPPER SIDE STRINGER SHOWN
6"
REMOVE
2.5"
1/2"
5/8"
5/16"
AFT
DOWN

FIGURE 2-33

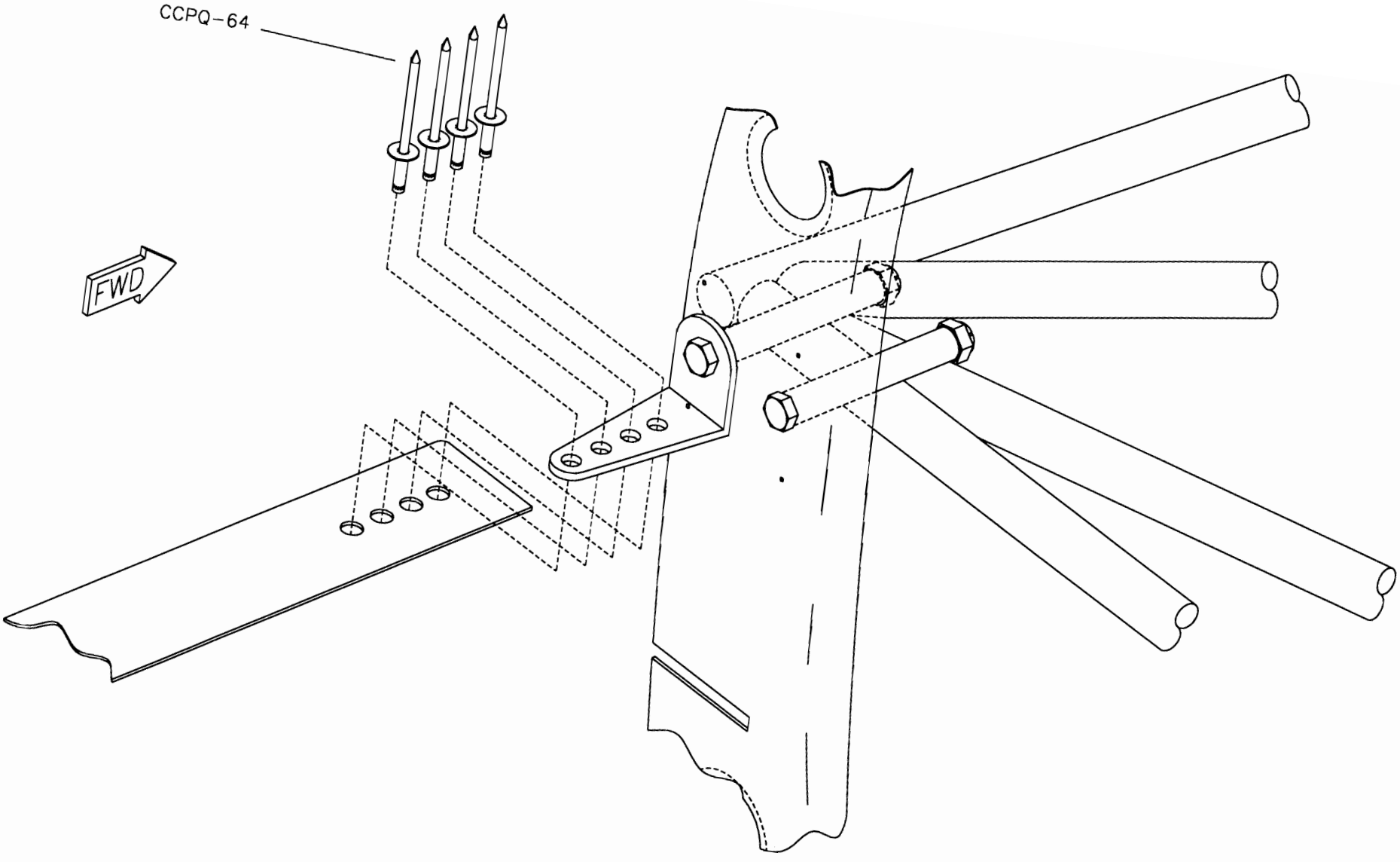


FIGURE 2-34

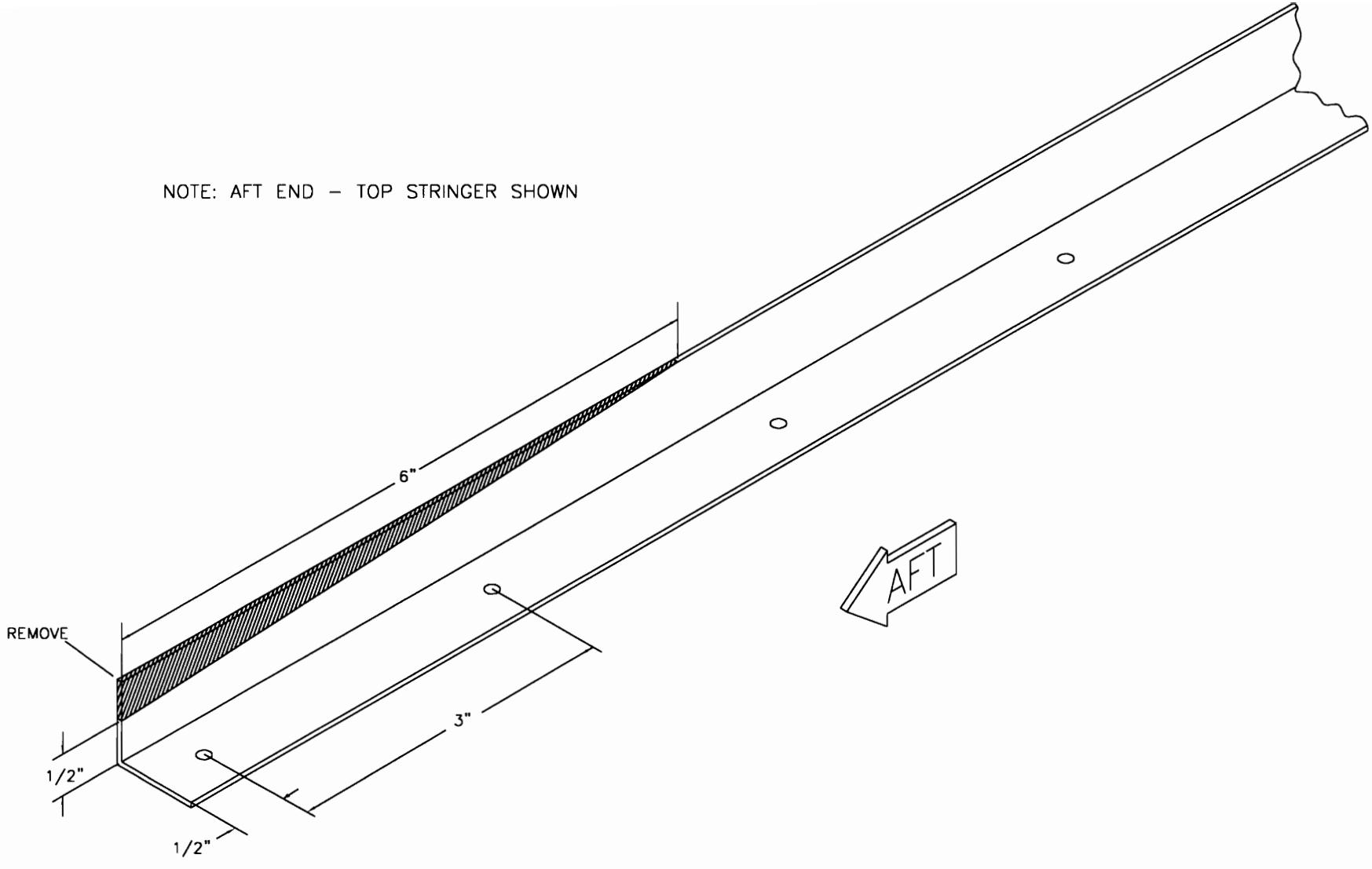


FIGURE 2–35

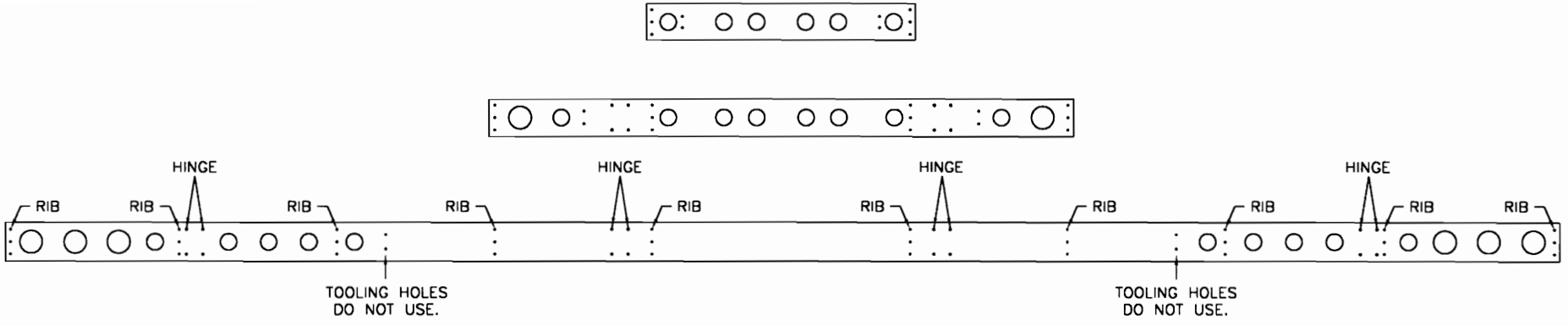

HINGE
HINGE
HINGE
HINGE
RIB
RIB
RIB
RIB
RIB
RIB
RIB
RIB
RIB
RIB
TOOLING HOLES
DO NOT USE.
TOOLING HOLES
DO NOT USE.

FIGURE 2-36

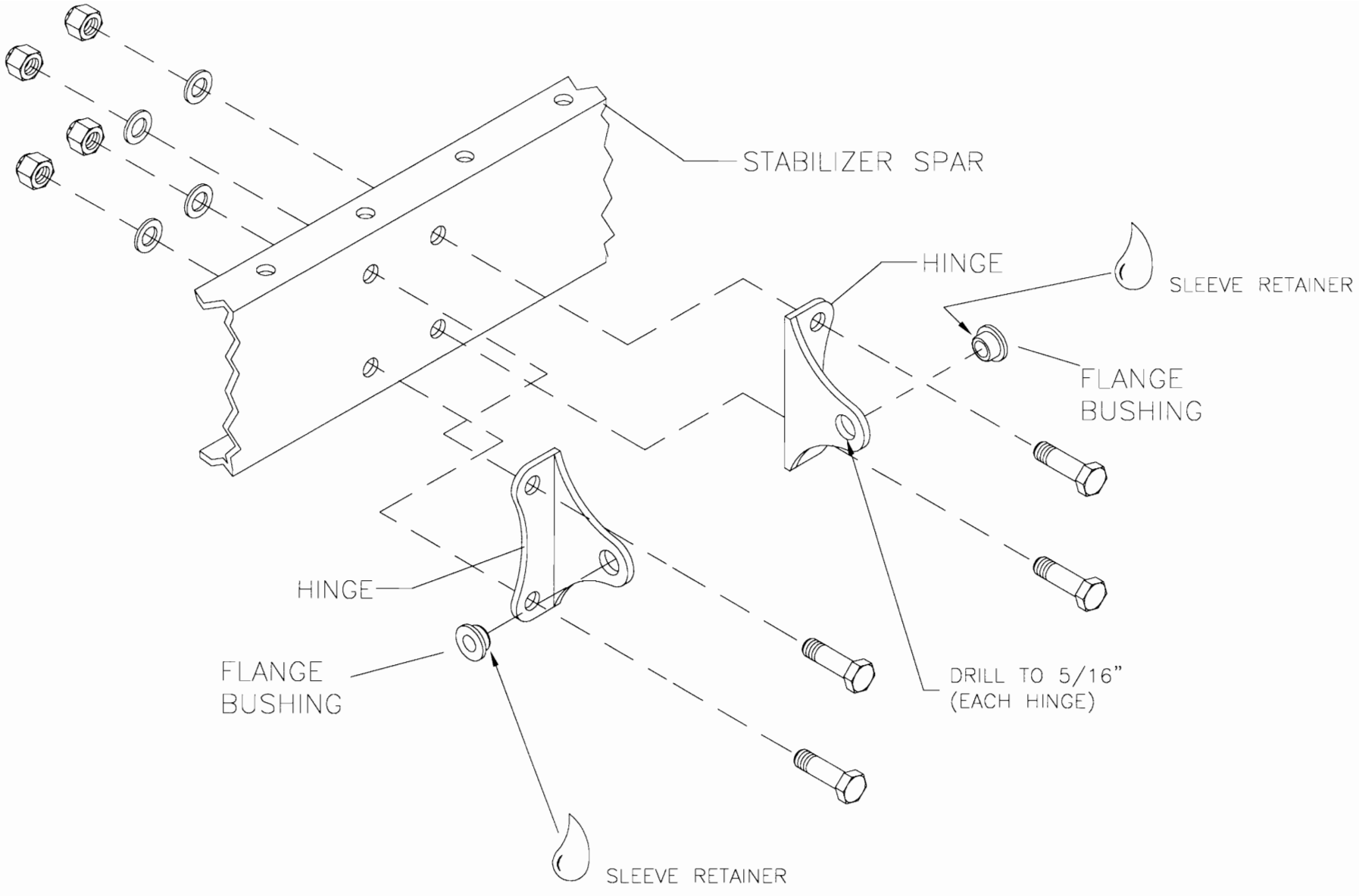

STABILIZER SPAR
HINGE
SLEEVE RETAINER
FLANGE
BUSHING
HINGE
FLANGE
BUSHING
DRILL TO 5/16"
(EACH HINGE)
SLEEVE RETAINER

FIGURE 2-37

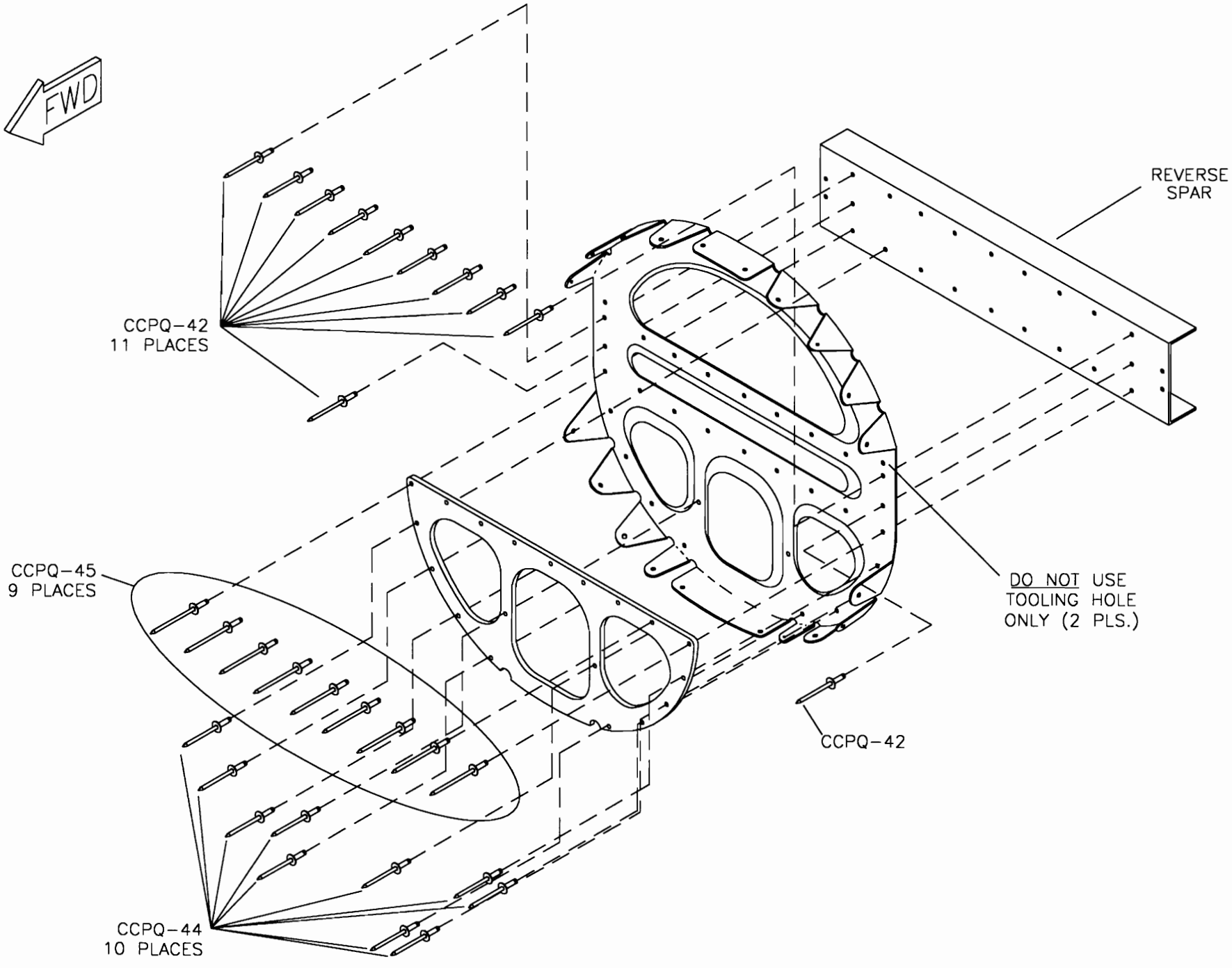

FWD
REVERSE SPAR
CCPQ-42
11 PLACES
CCPQ-45
9 PLACES
DO NOT USE
TOOLING HOLE
ONLY (2 PLS.)
CCPQ-42
CCPQ-44
10 PLACES

FIGURE 2-38

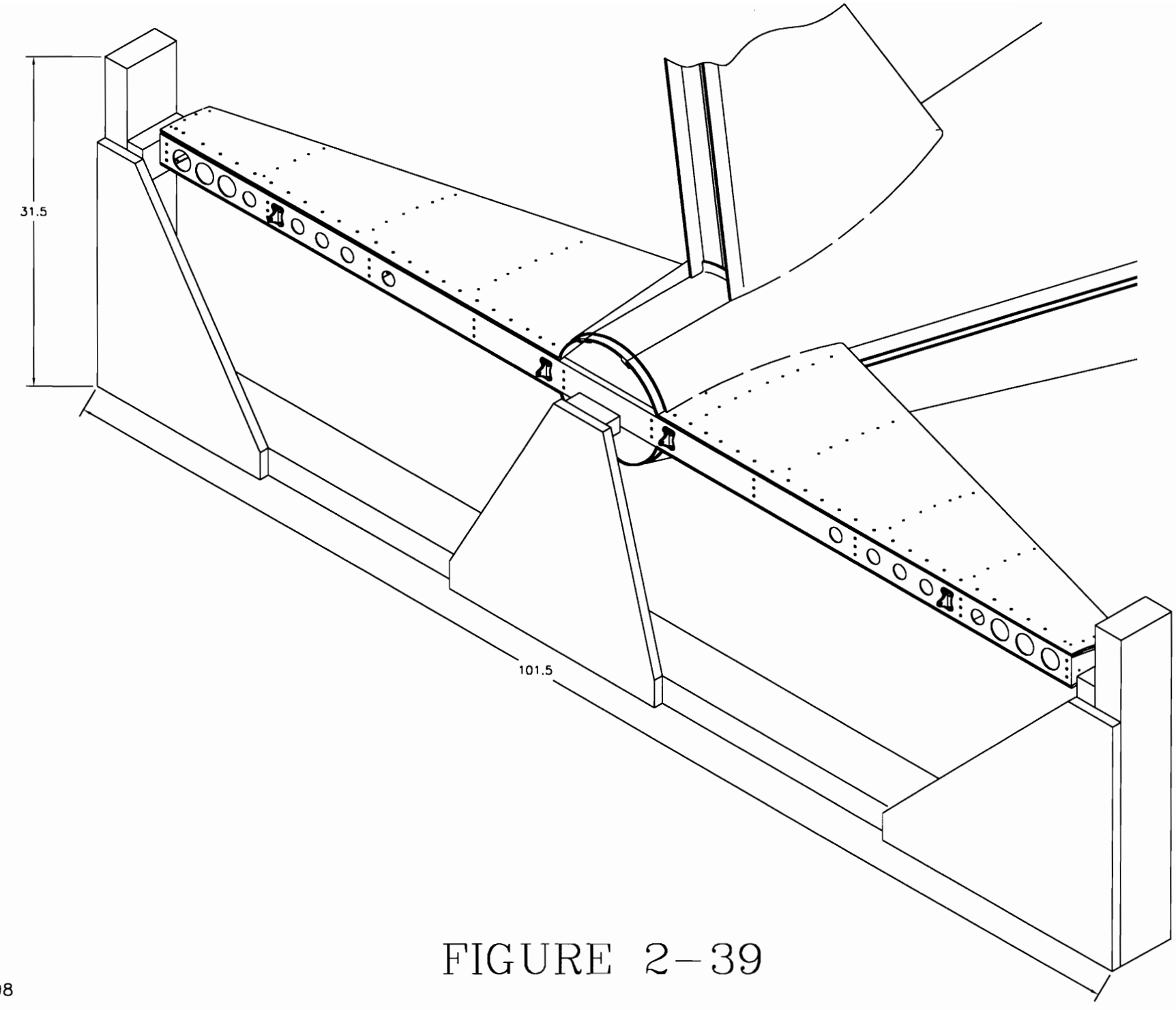


FIGURE 2-39

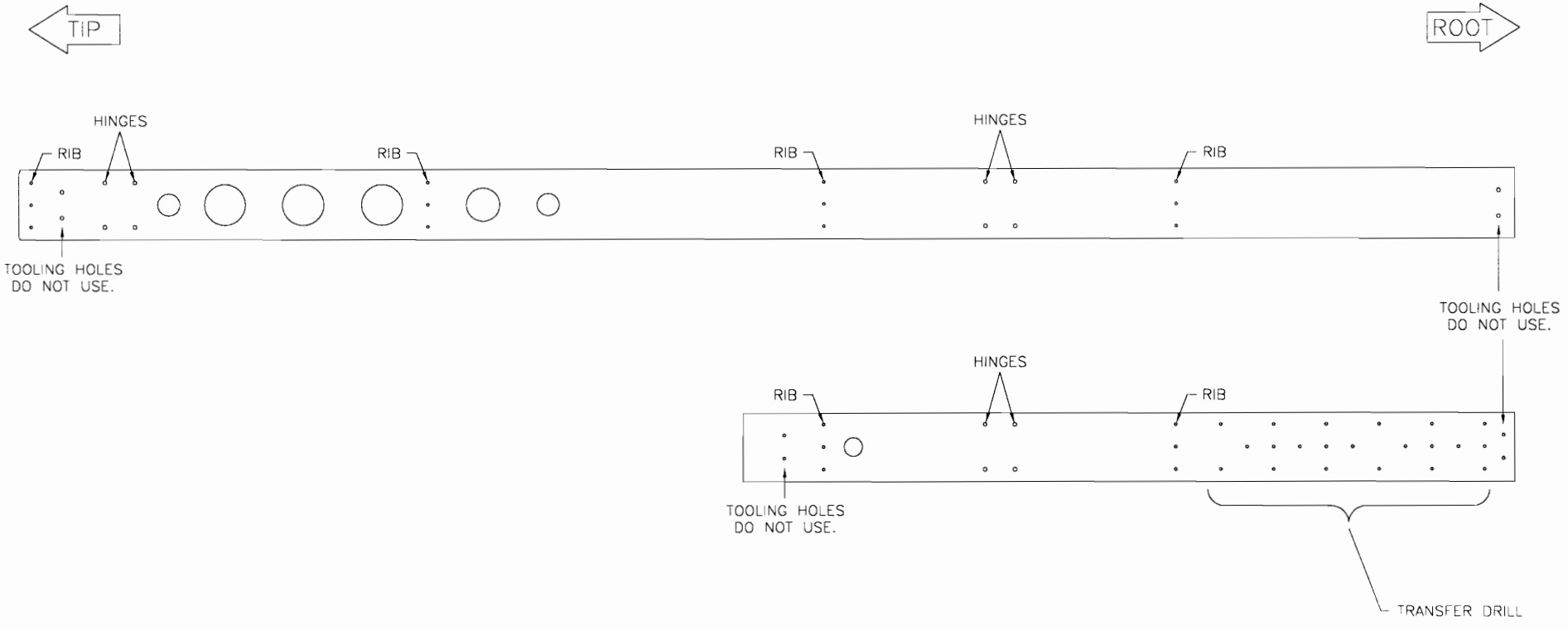

TIP
ROOT
HINGES
RIB
RIB
RIB
HINGES
RIB
TOOLING HOLES
DO NOT USE.
TOOLING HOLES
DO NOT USE.
HINGES
RIB
RIB
TOOLING HOLES
DO NOT USE.
TRANSFER DRILL

FIGURE 2-40

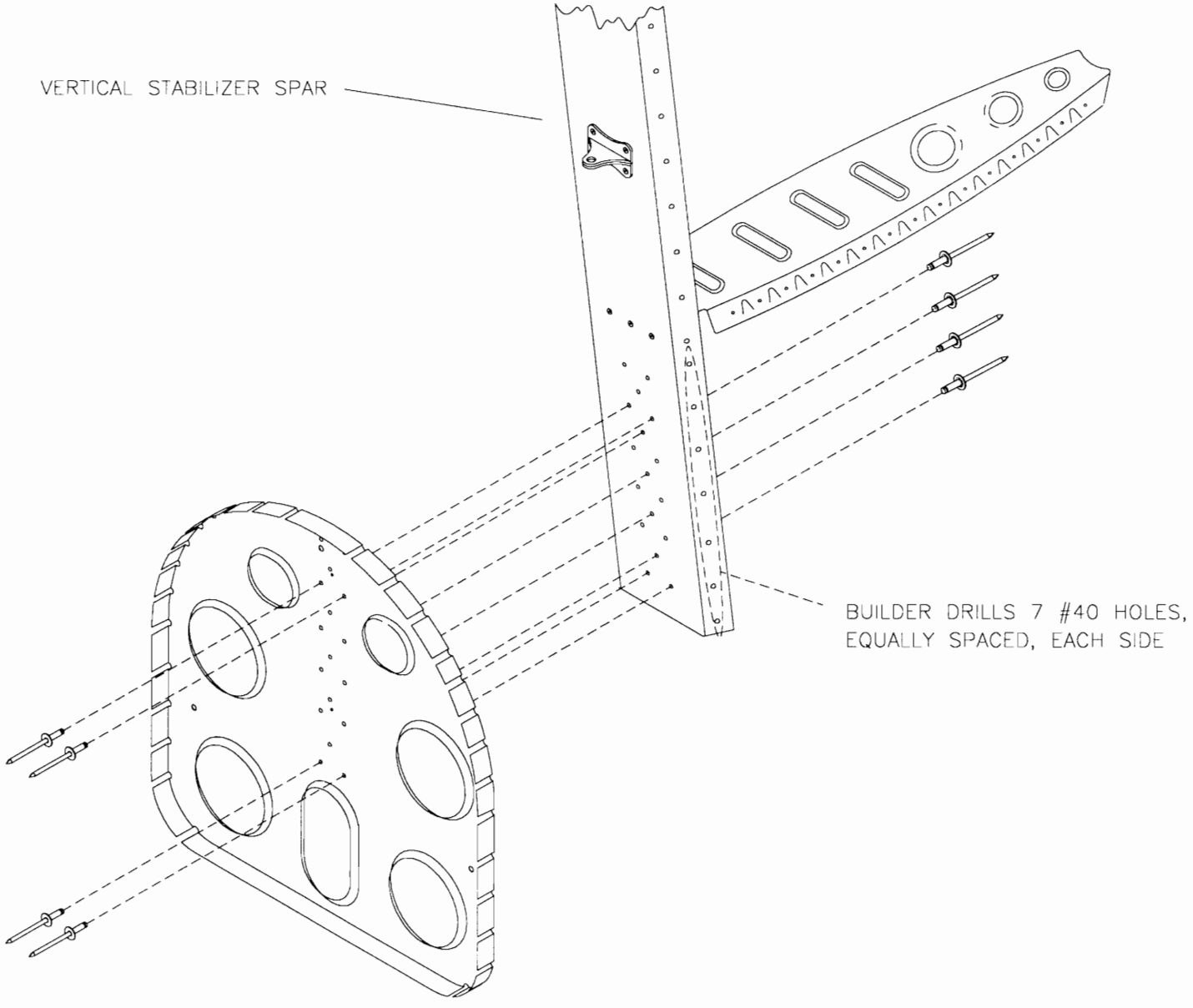

VERTICAL STABILIZER SPAR
BUILDER DRILLS 7 #40 HOLES,
EQUALLY SPACED, EACH SIDE

FIGURE 2-41

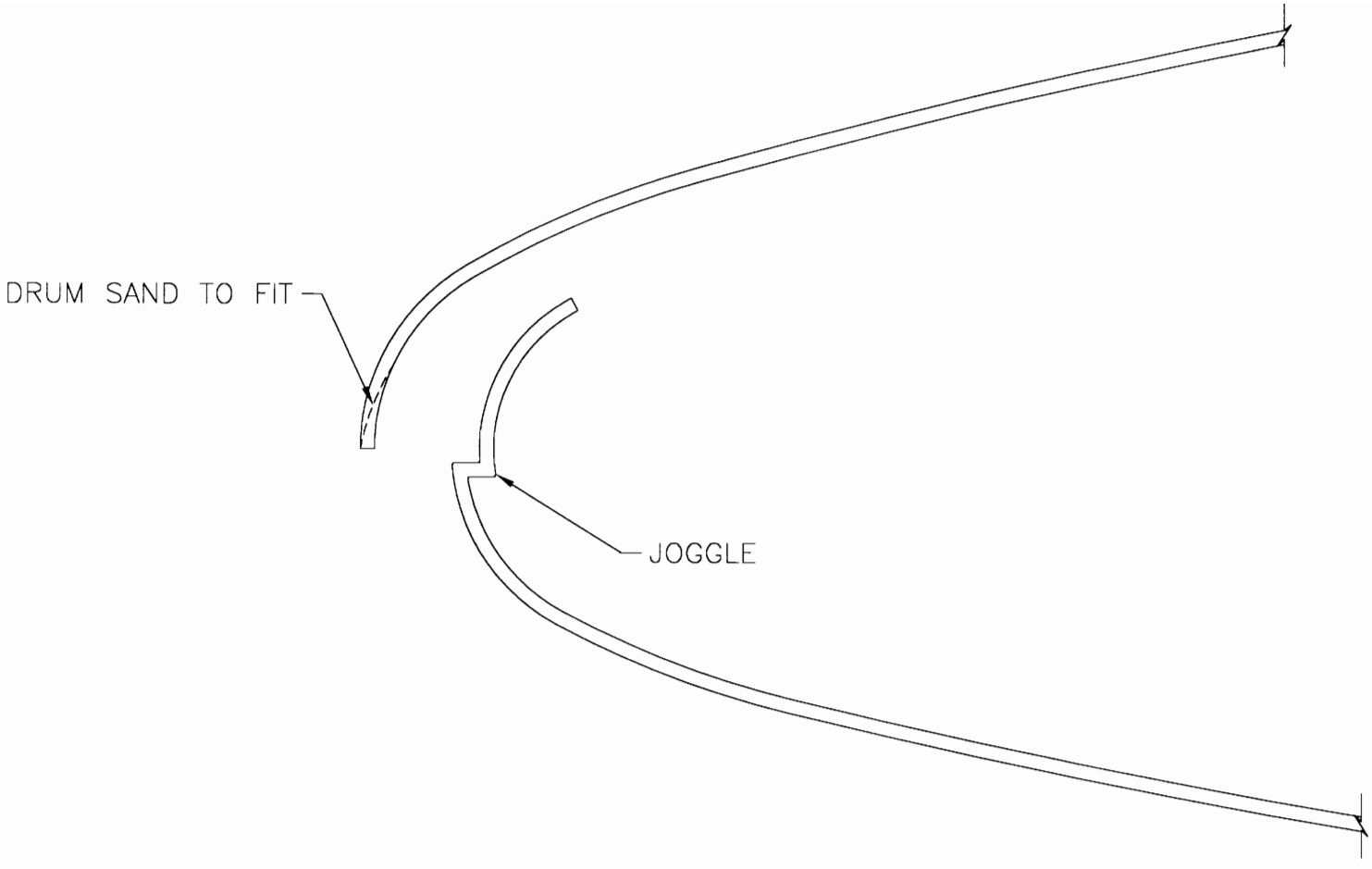


FIGURE 2-42

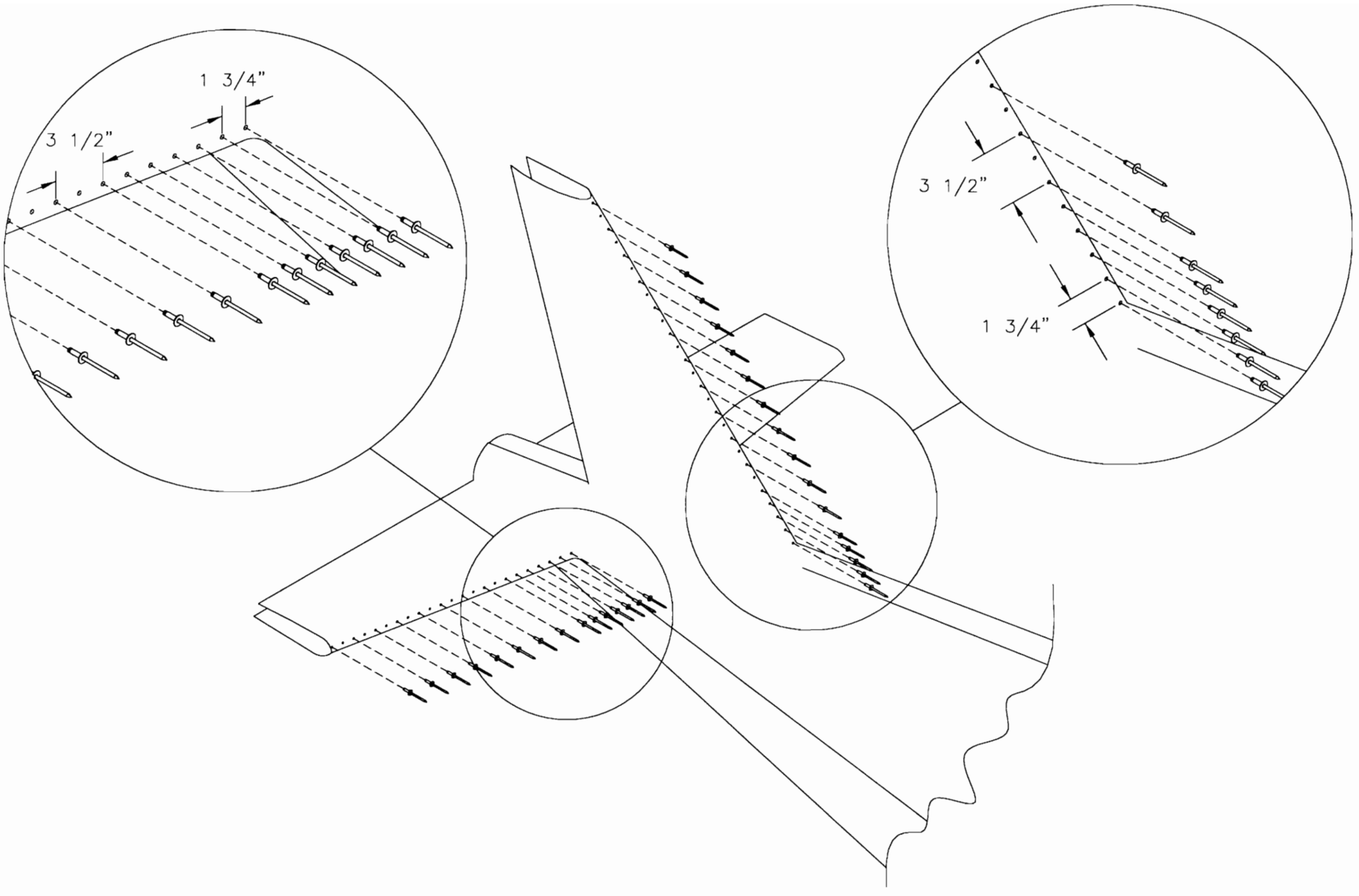


FIGURE 2-43

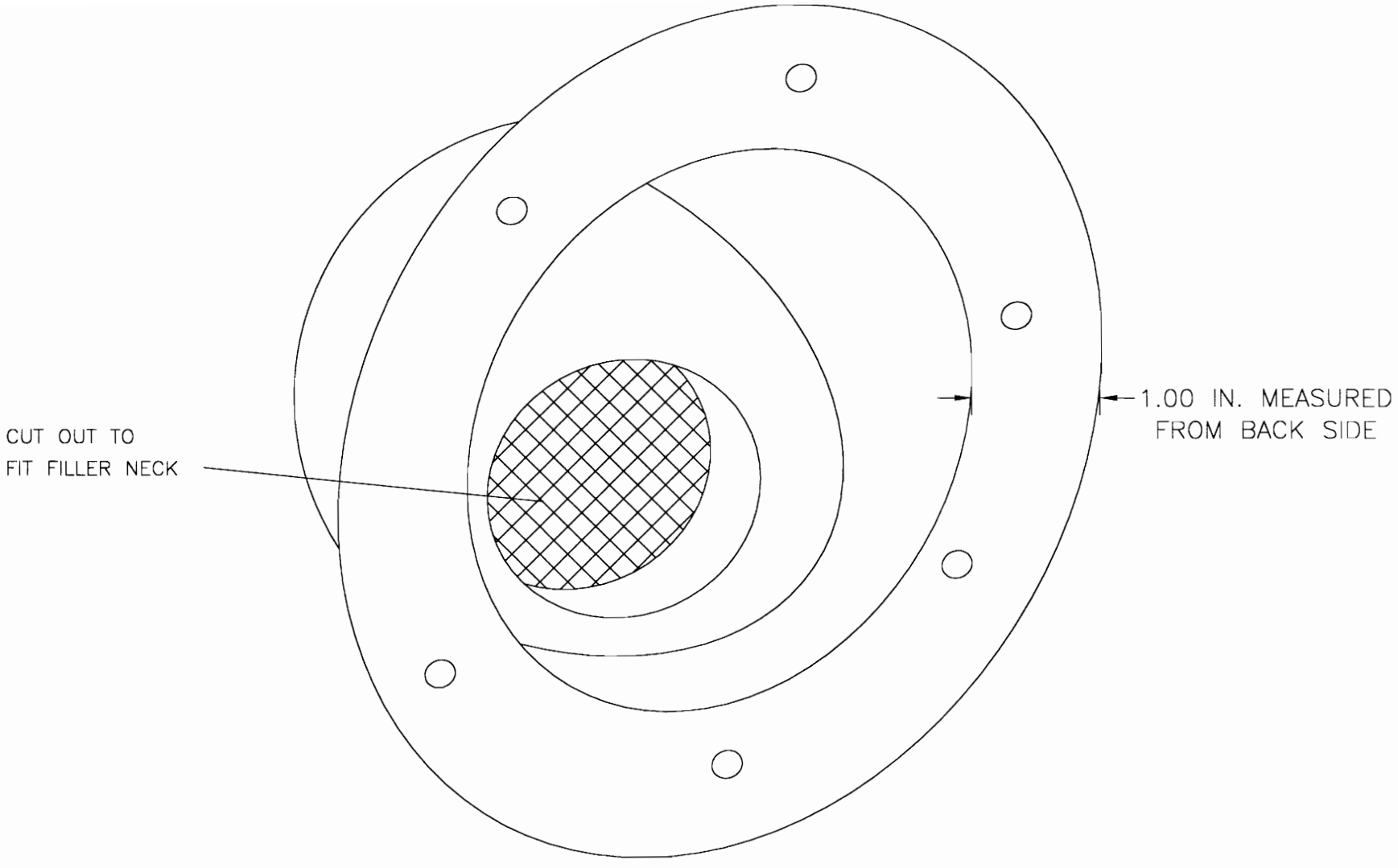
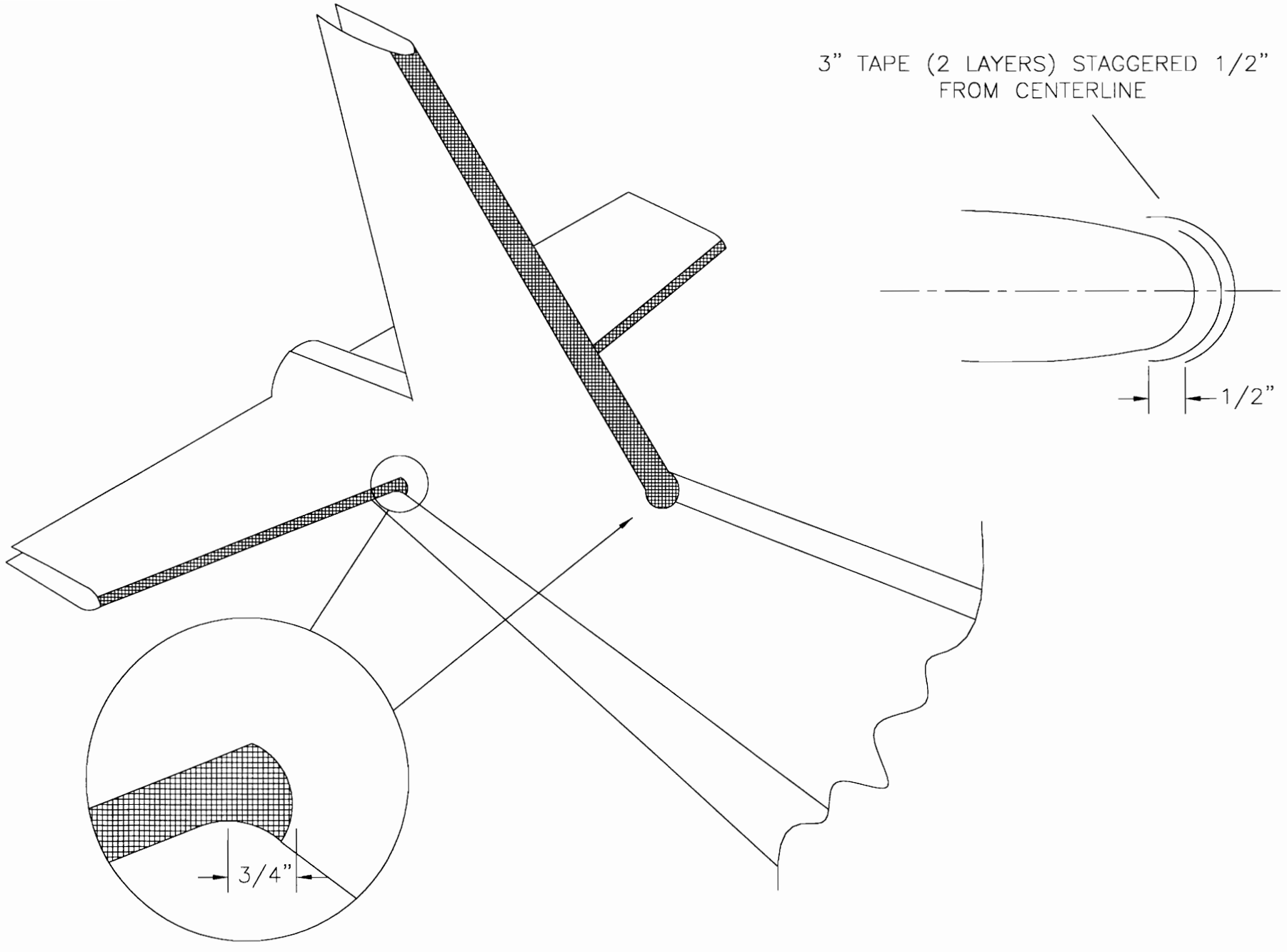


FIGURE 2-44



3/4" AROUND CORNER

FIGURE 2-45

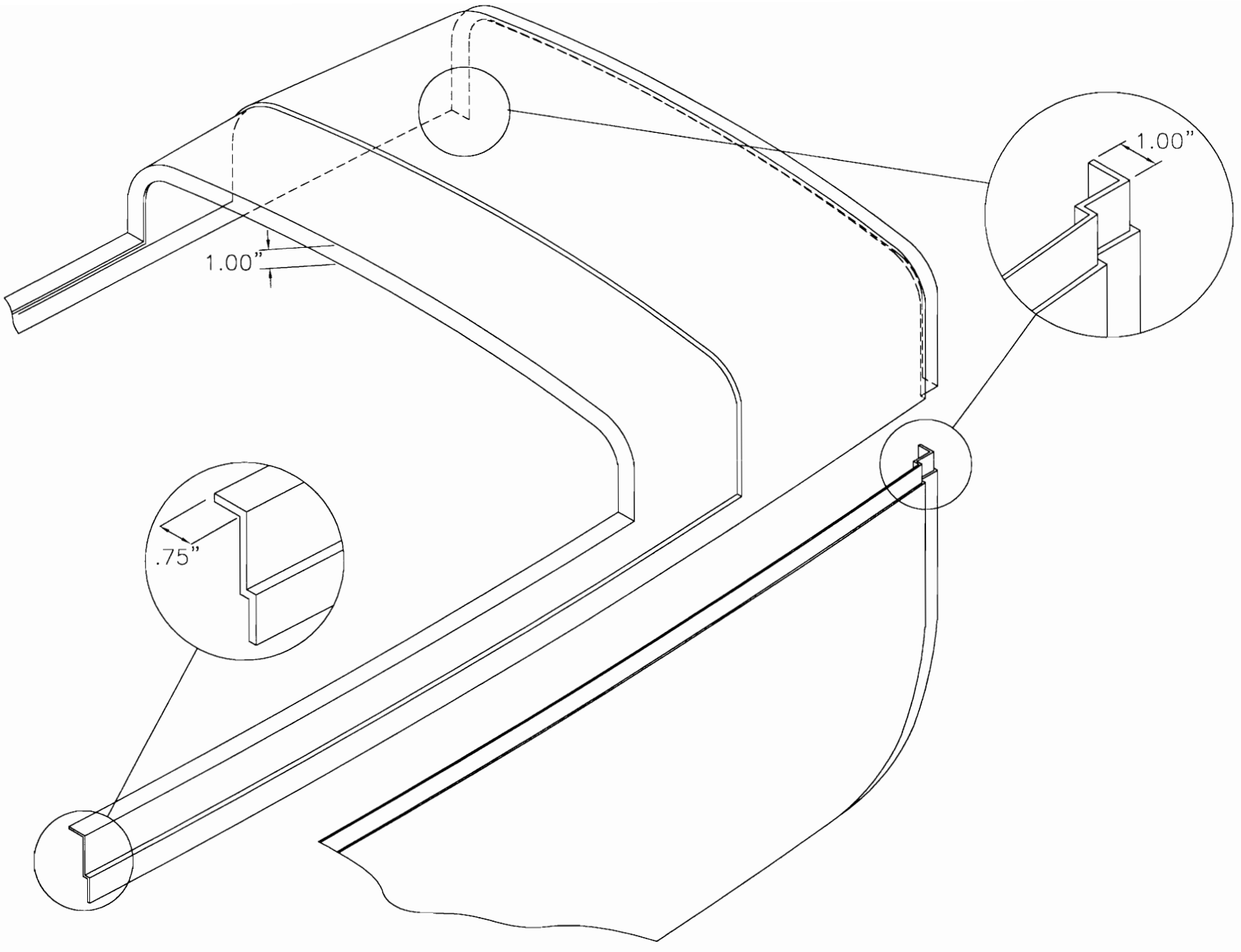


FIGURE 2-46

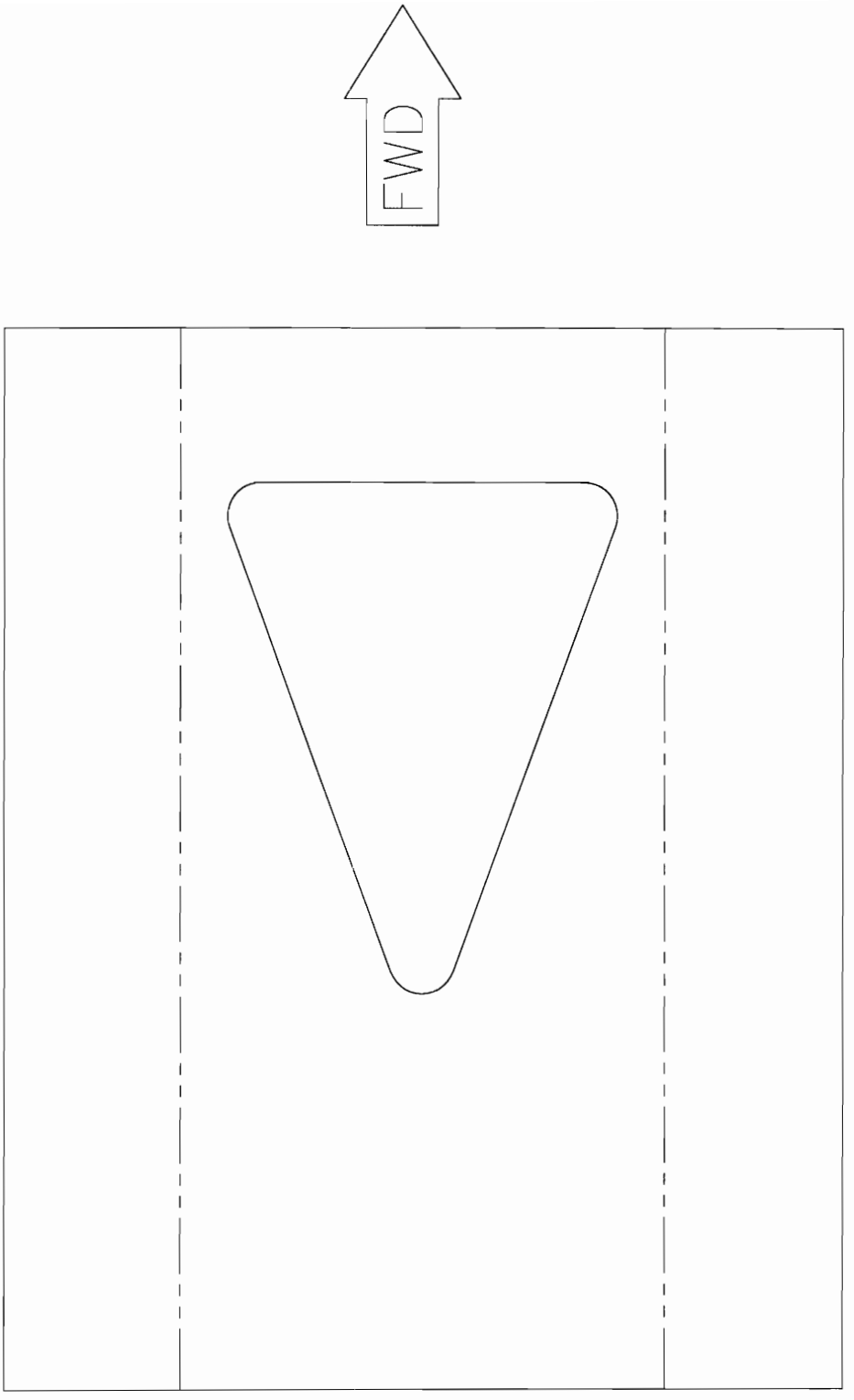


FIGURE 2-47

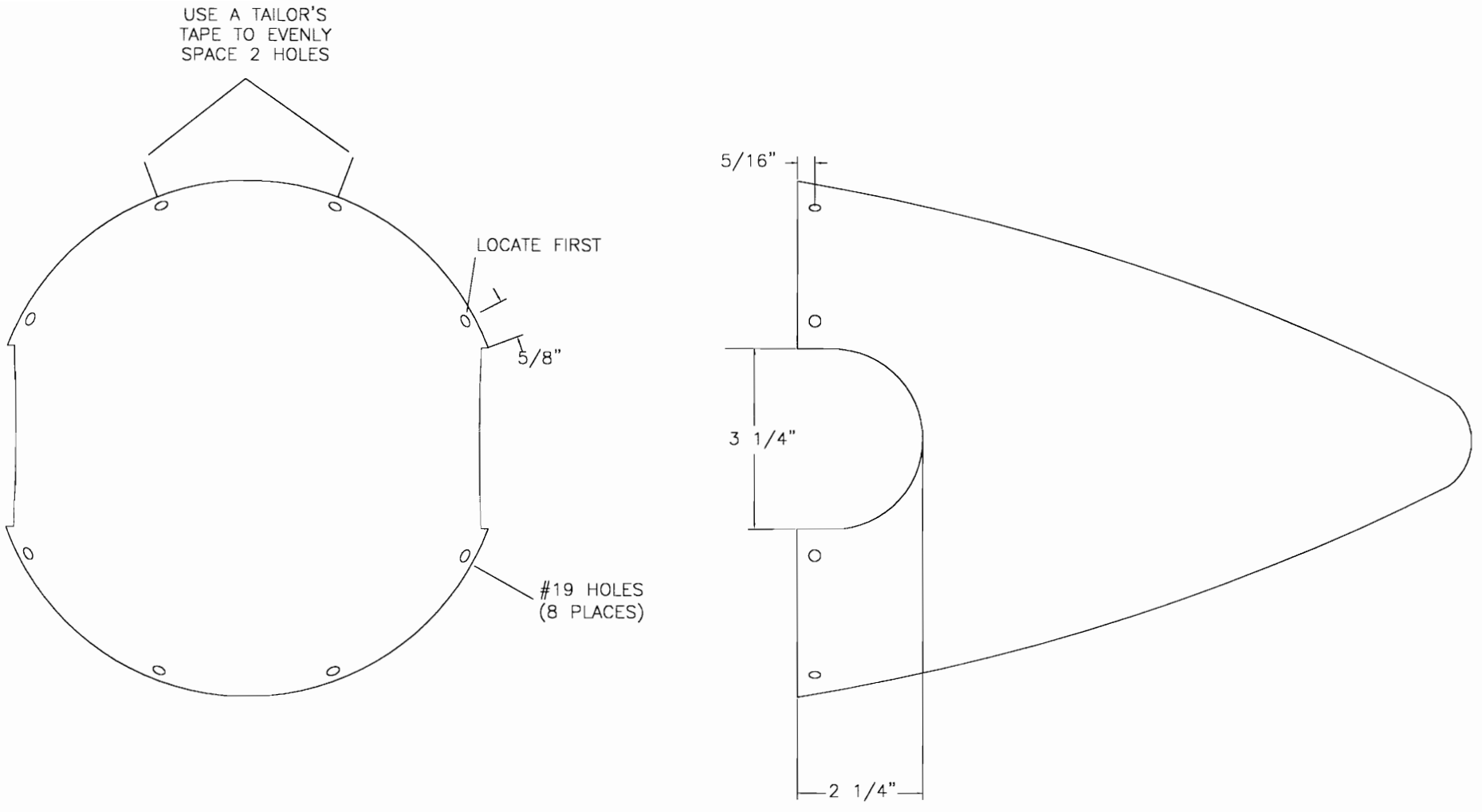

USE A TAILOR'S
TAPE TO EVENLY
SPACE 2 HOLES
LOCATE FIRST
5/8"
#19 HOLES
(8 PLACES)
5/16"
3 1/4"
2 1/4"

FIGURE 2-48

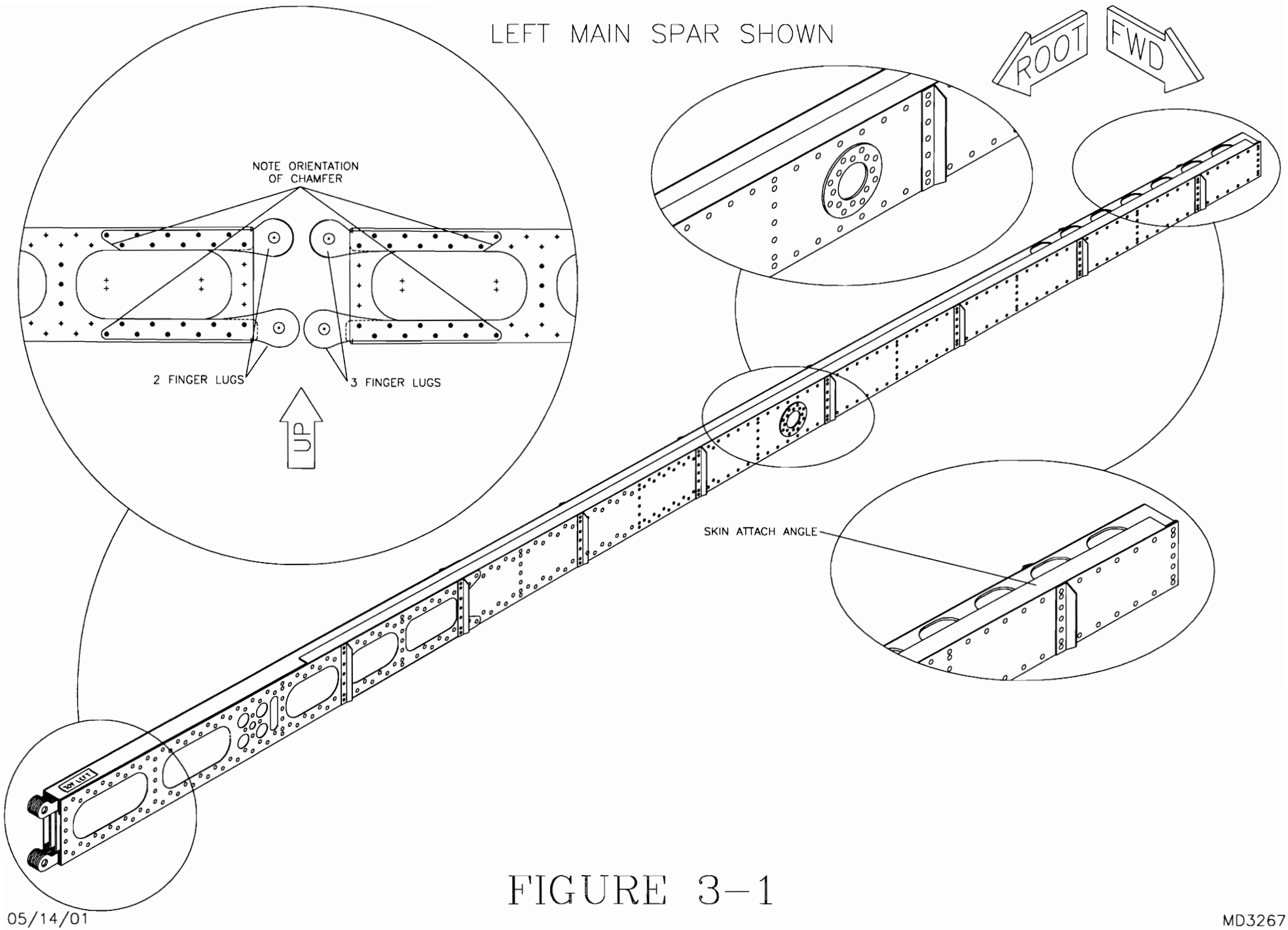


FIGURE 3-1

05/14/01

MD3267
REV.

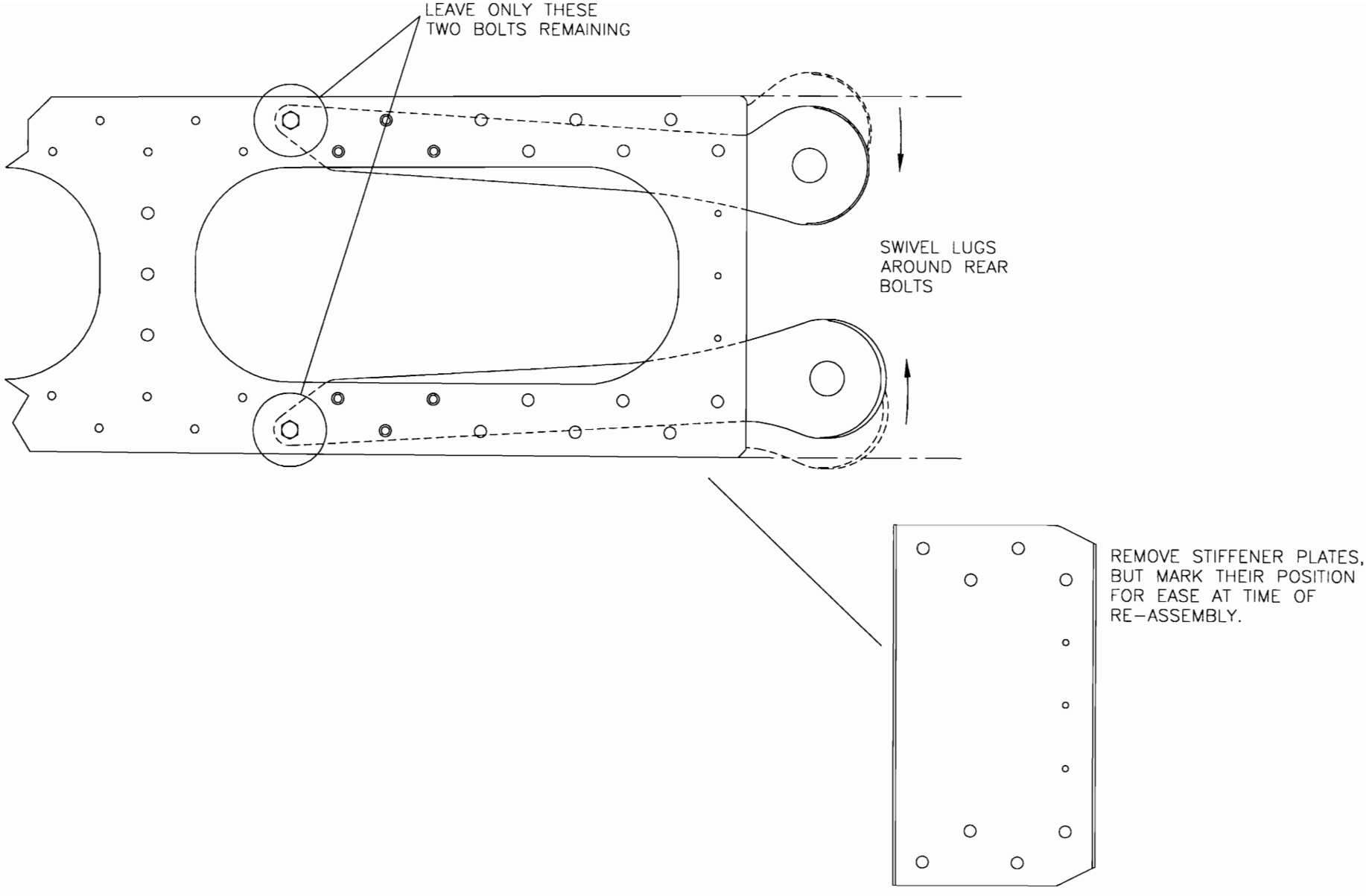

LEAVE ONLY THESE
TWO BOLTS REMAINING
SWIVEL LUGS
AROUND REAR
BOLTS
REMOVE STIFFENER PLATES,
BUT MARK THEIR POSITION
FOR EASE AT TIME OF
RE-ASSEMBLY.

FIGURE 3-2

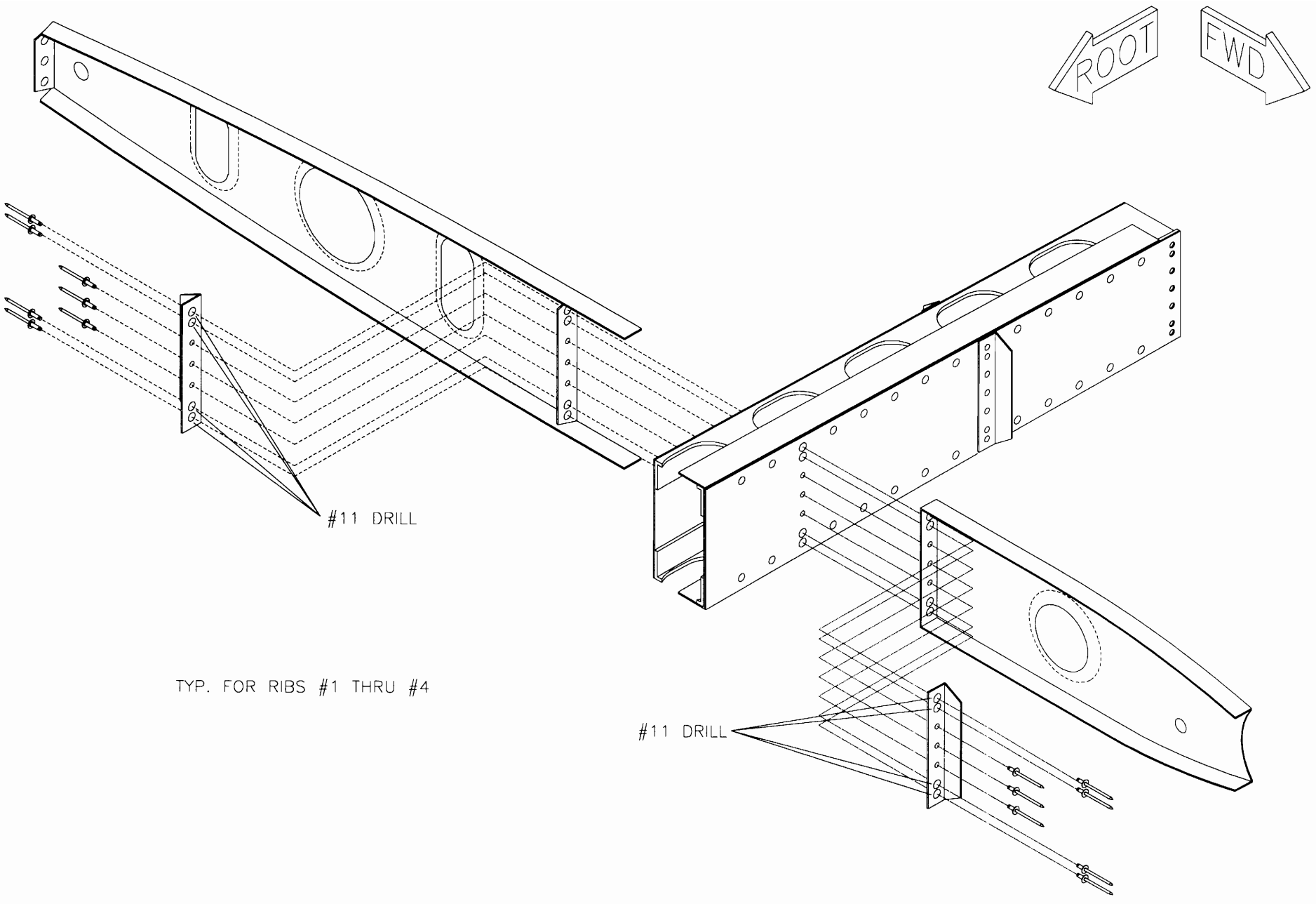


FIGURE 3-3

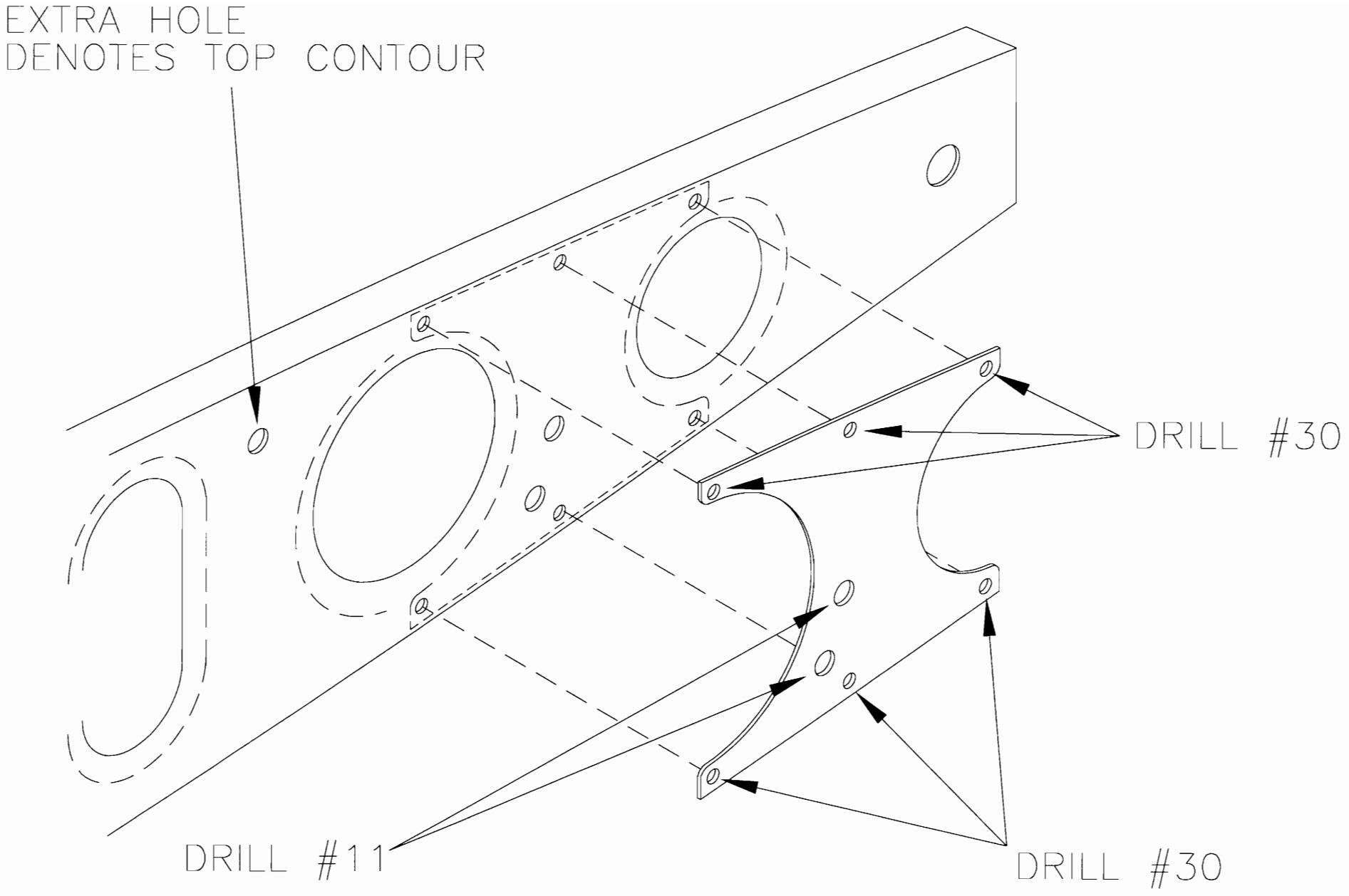


FIGURE 3-4

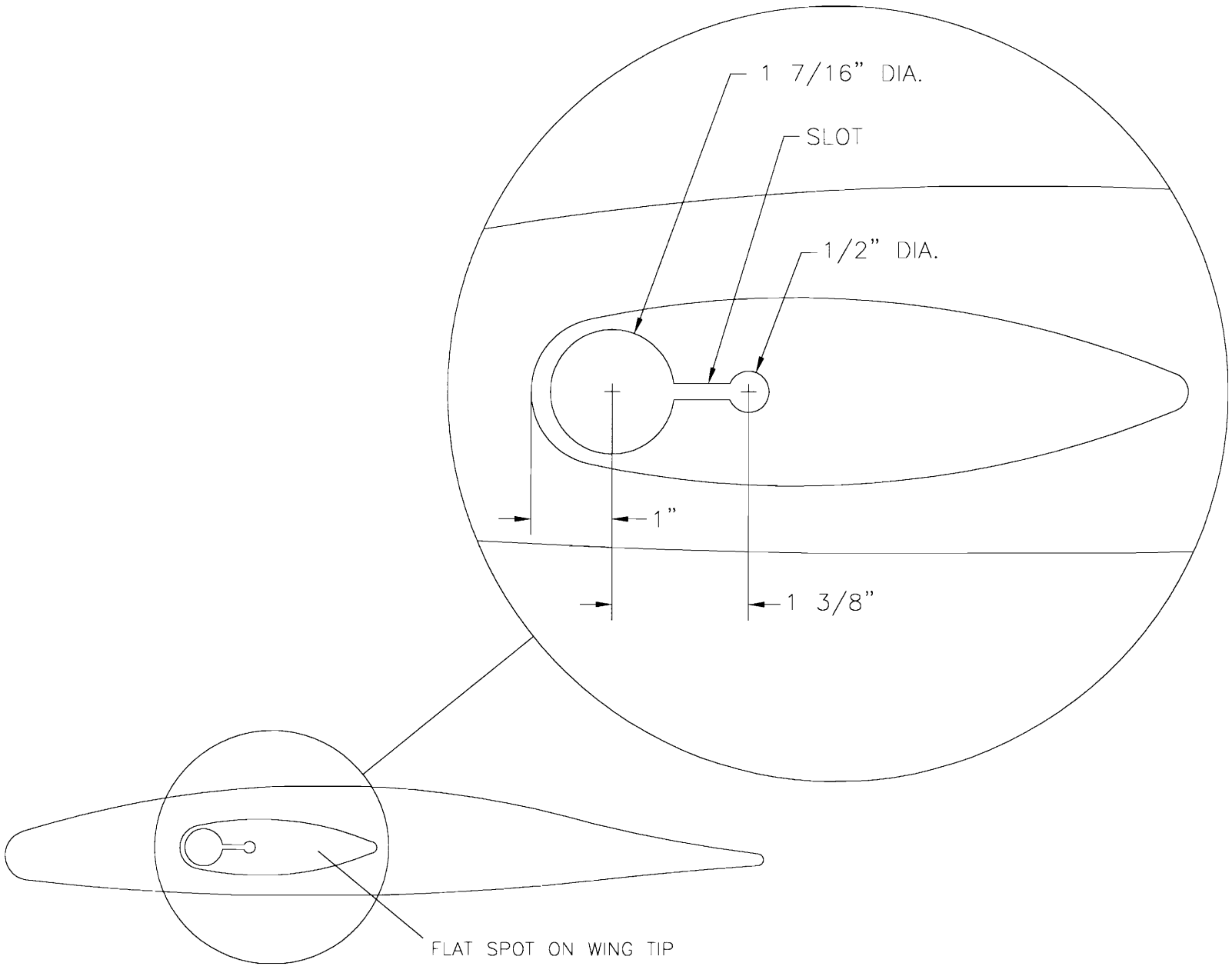


FIGURE 3-4A

LEFT TRAILING EDGE SPAR
AFT. VIEW

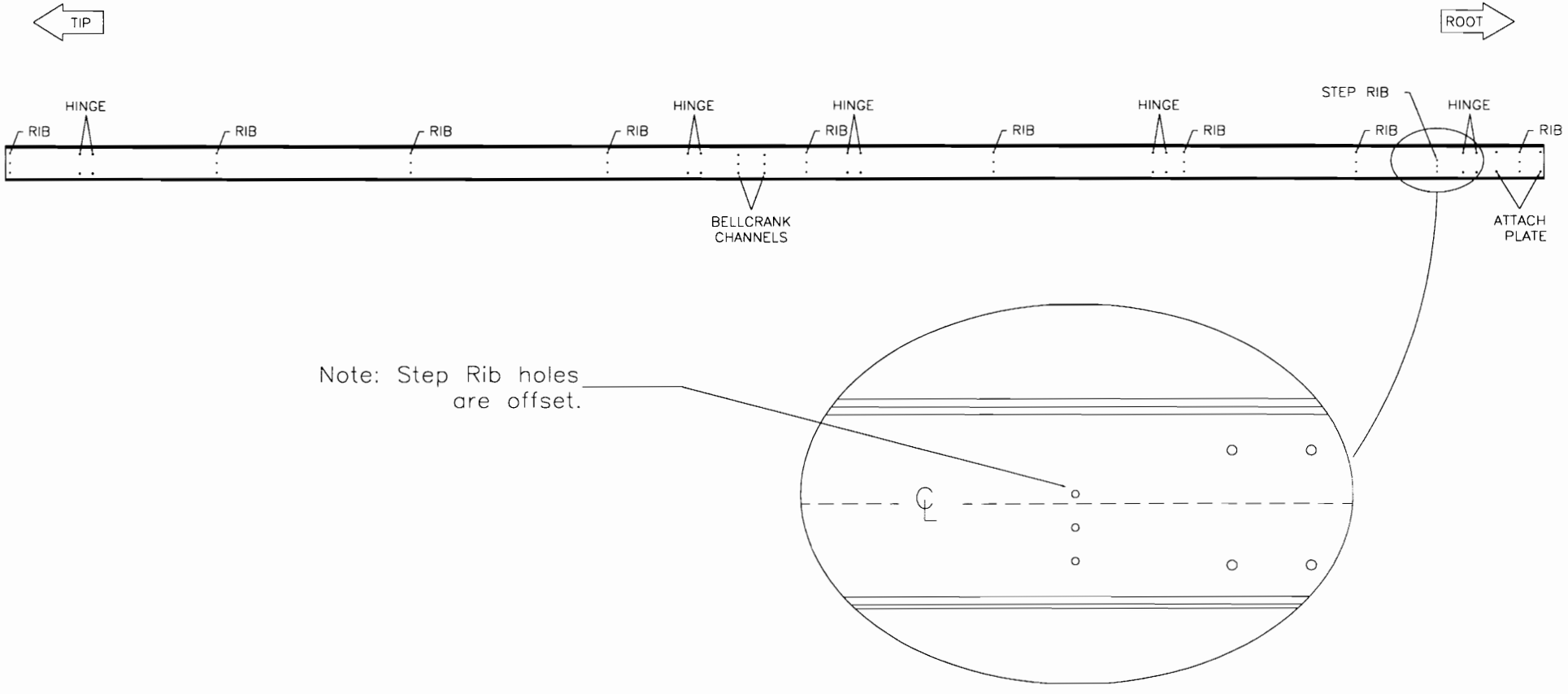


FIGURE 3–5

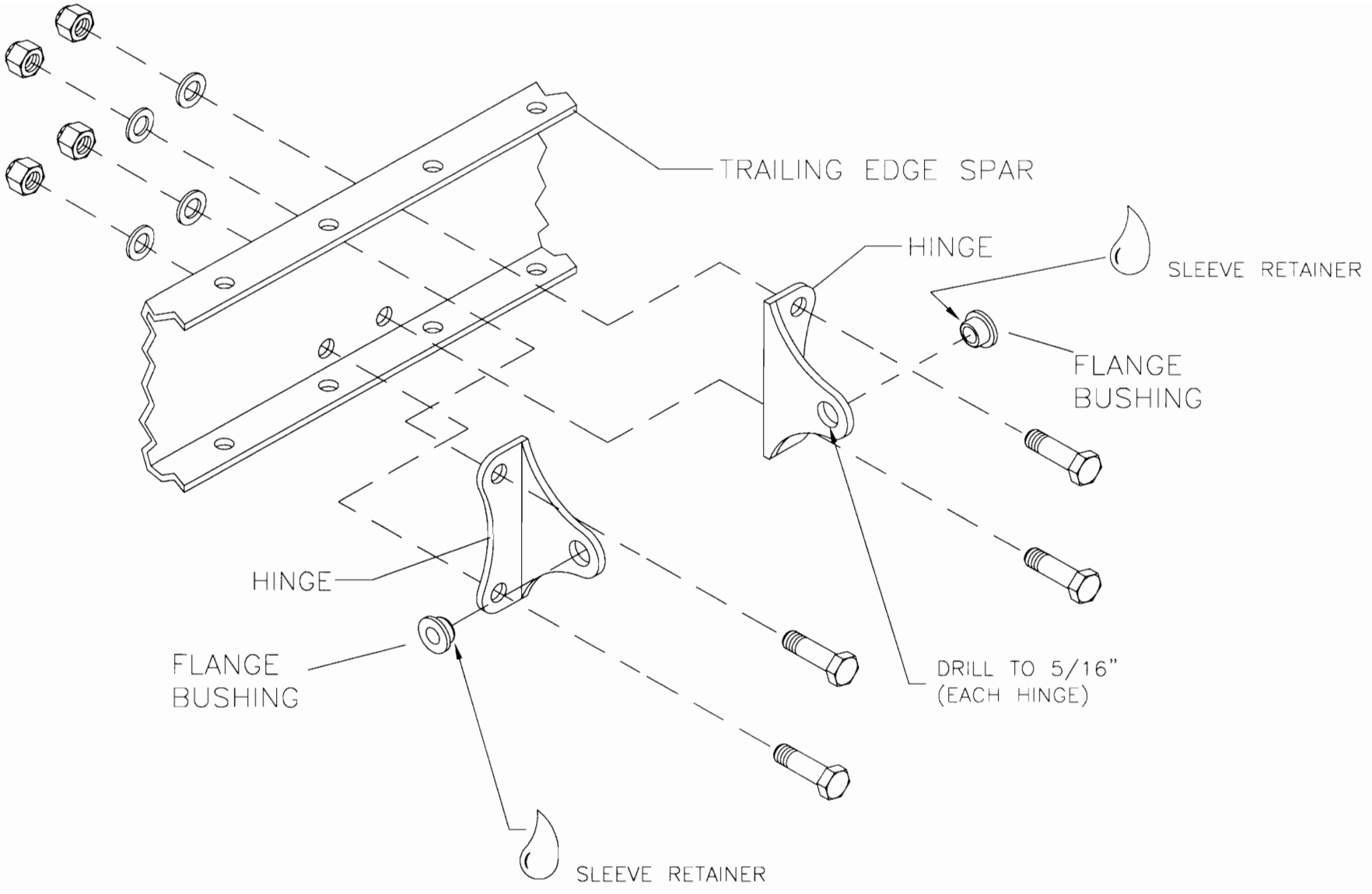

TRAILING EDGE SPAR
HINGE
SLEEVE RETAINER
FLANGE
BUSHING
HINGE
FLANGE
BUSHING
DRILL TO 5/16"
(EACH HINGE)
SLEEVE RETAINER

FIGURE 3-6

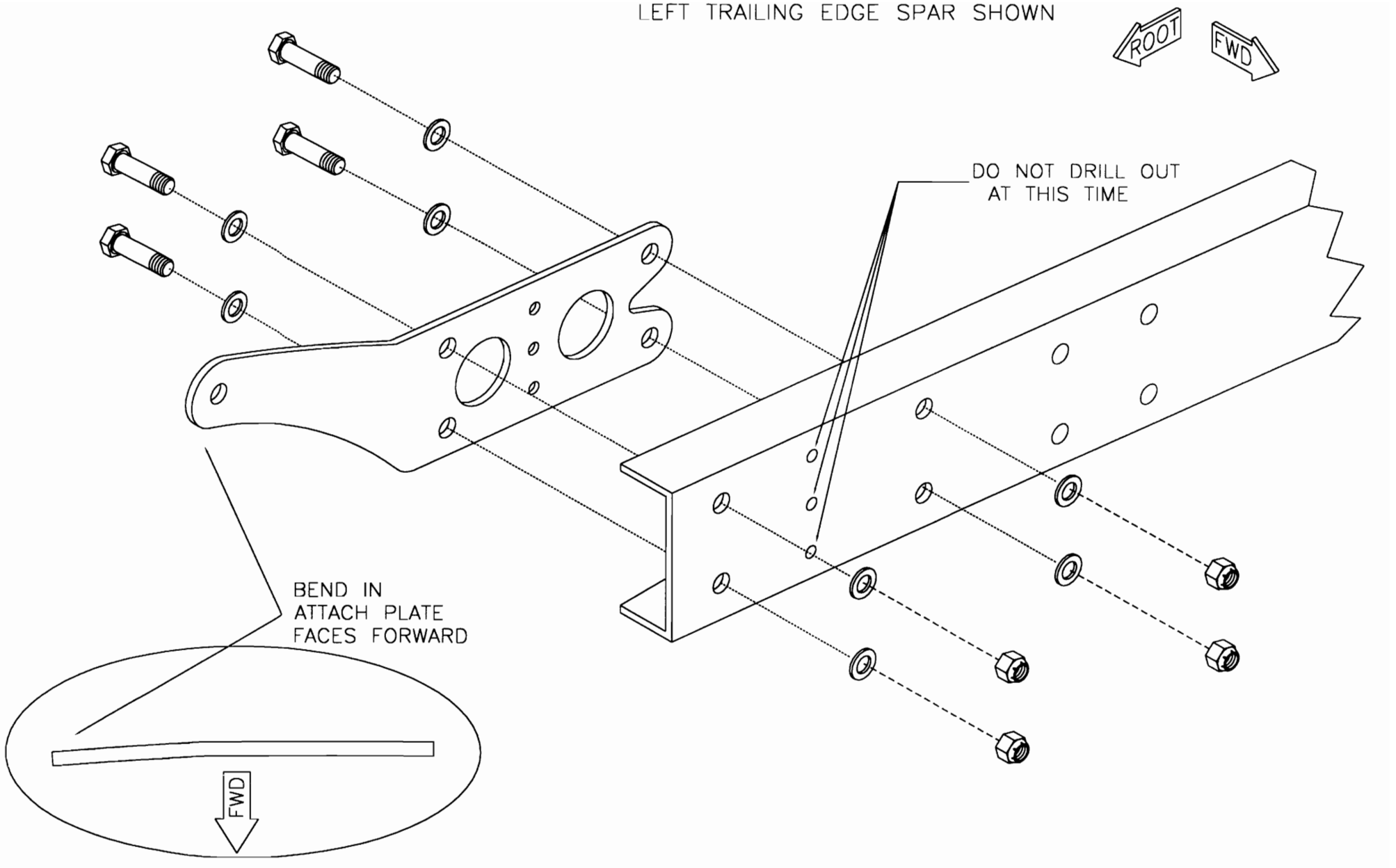
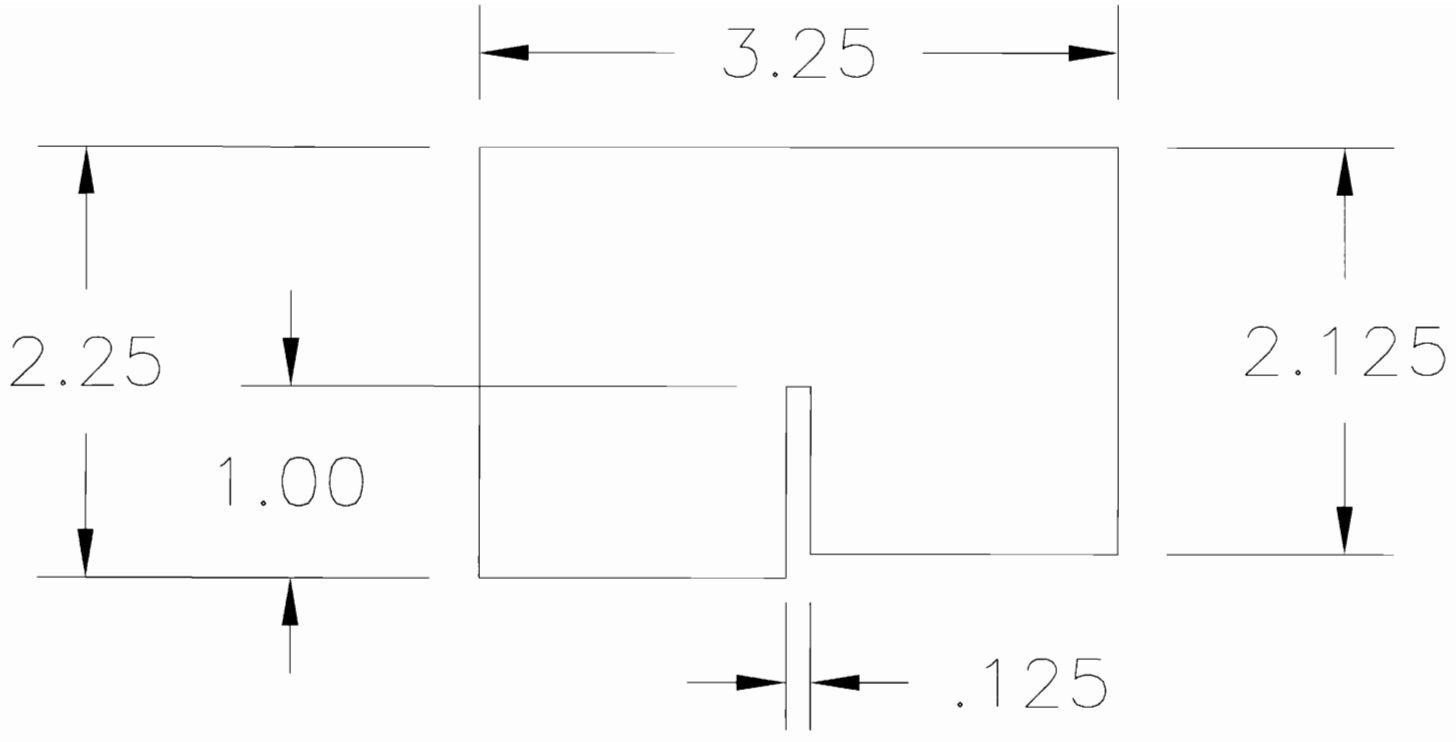

LEFT TRAILING EDGE SPAR SHOWN
ROOT
FWD
DO NOT DRILL OUT
AT THIS TIME
BEND IN
ATTACH PLATE
FACES FORWARD
FWD

FIGURE 3-7



FABRICATE FROM .080 ALUMINUM RAW STOCK

FIGURE 3-8

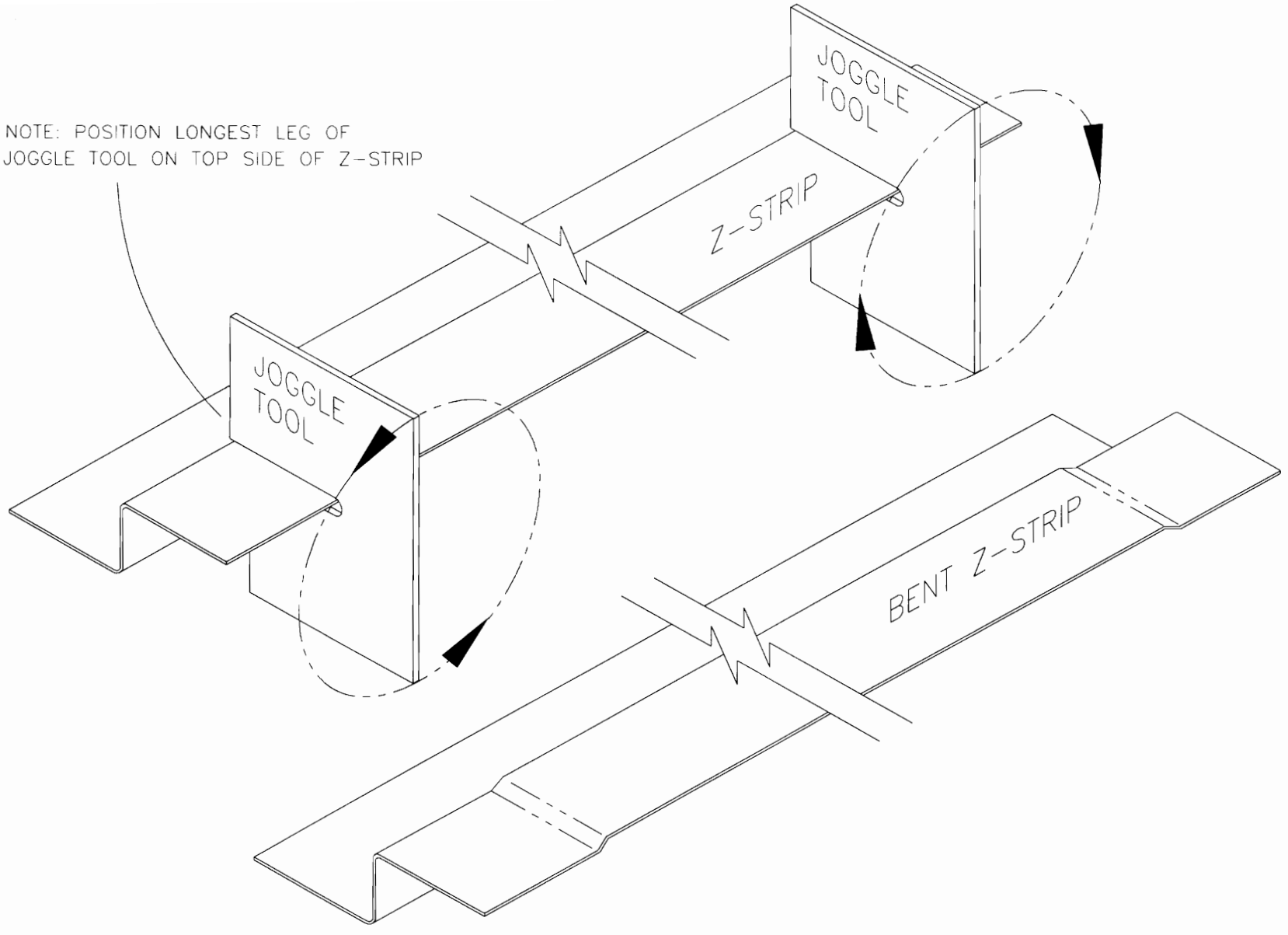

NOTE: POSITION LONGEST LEG OF
JOGGLE TOOL ON TOP SIDE OF Z-STRIP
JOGGLE TOOL
Z-STRIP
JOGGLE TOOL
BENT Z-STRIP

FIGURE 3-9

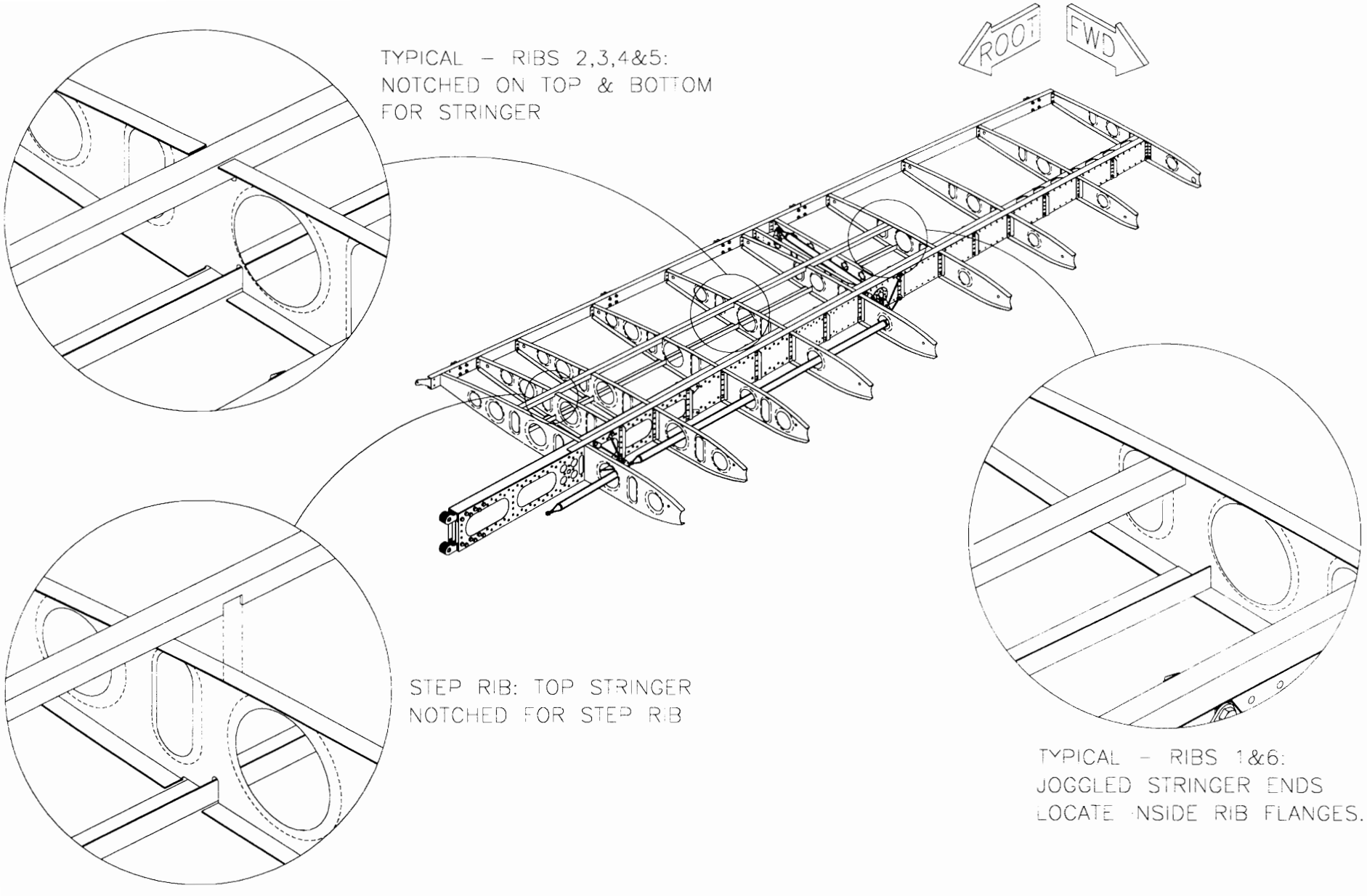
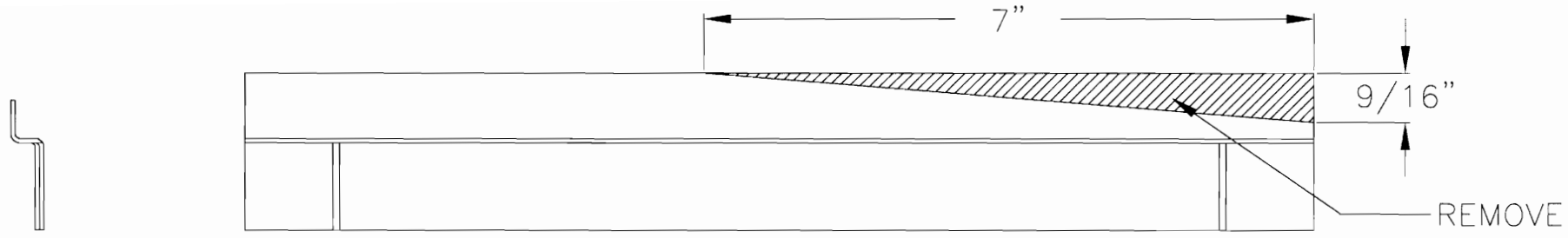
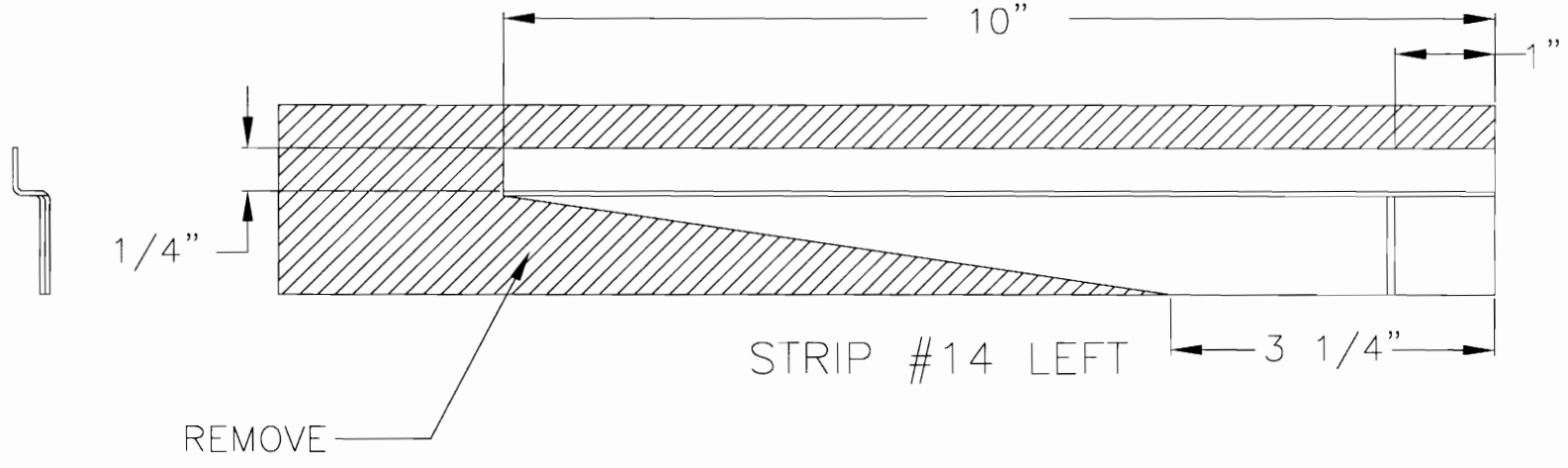

ROOT
FWD
TYPICAL – RIBS 2,3,4&5:
NOTCHED ON TOP & BOTTOM
FOR STRINGER
STEP RIB: TOP STRINGER
NOTCHED FOR STEP RIB
TYPICAL – RIBS 1&6:
JOGGLED STRINGER ENDS
LOCATE INSIDE RIB FLANGES.

FIGURE 3-10

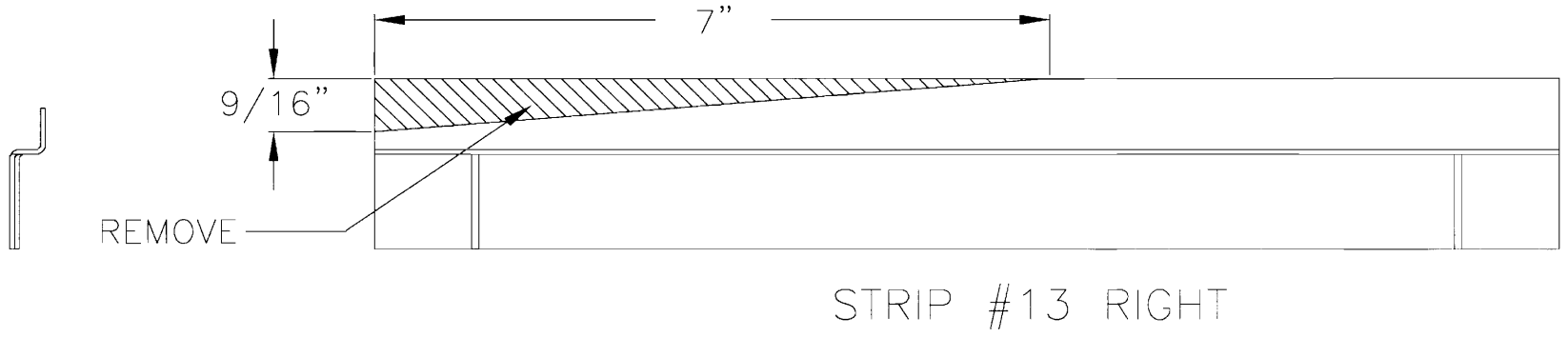


STRIP #13 LEFT

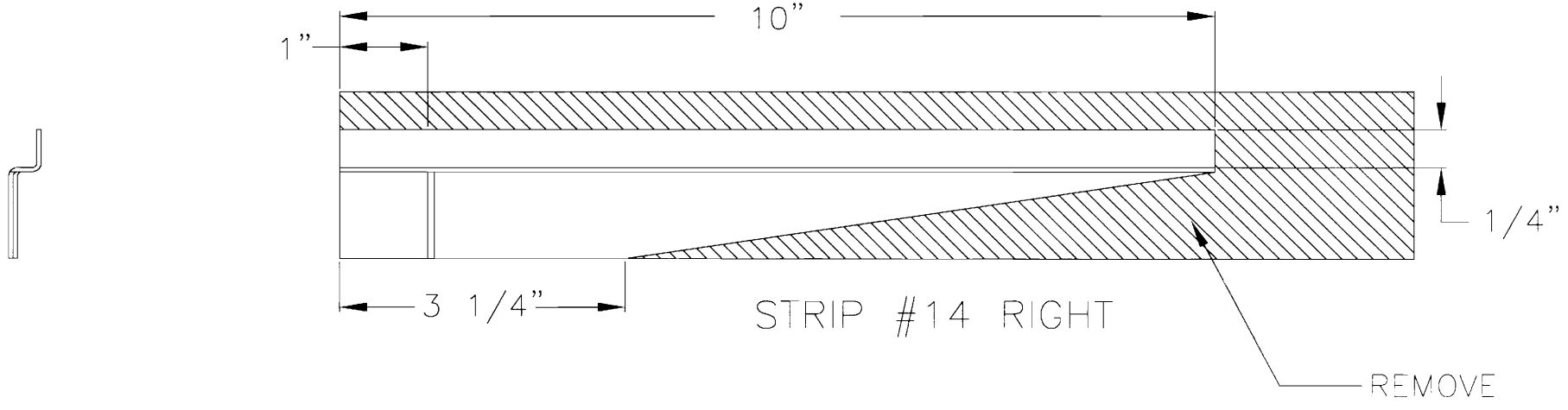


STRIP #14 LEFT

FIGURE 3–11



STRIP #13 RIGHT



STRIP #14 RIGHT

FIGURE 3-12

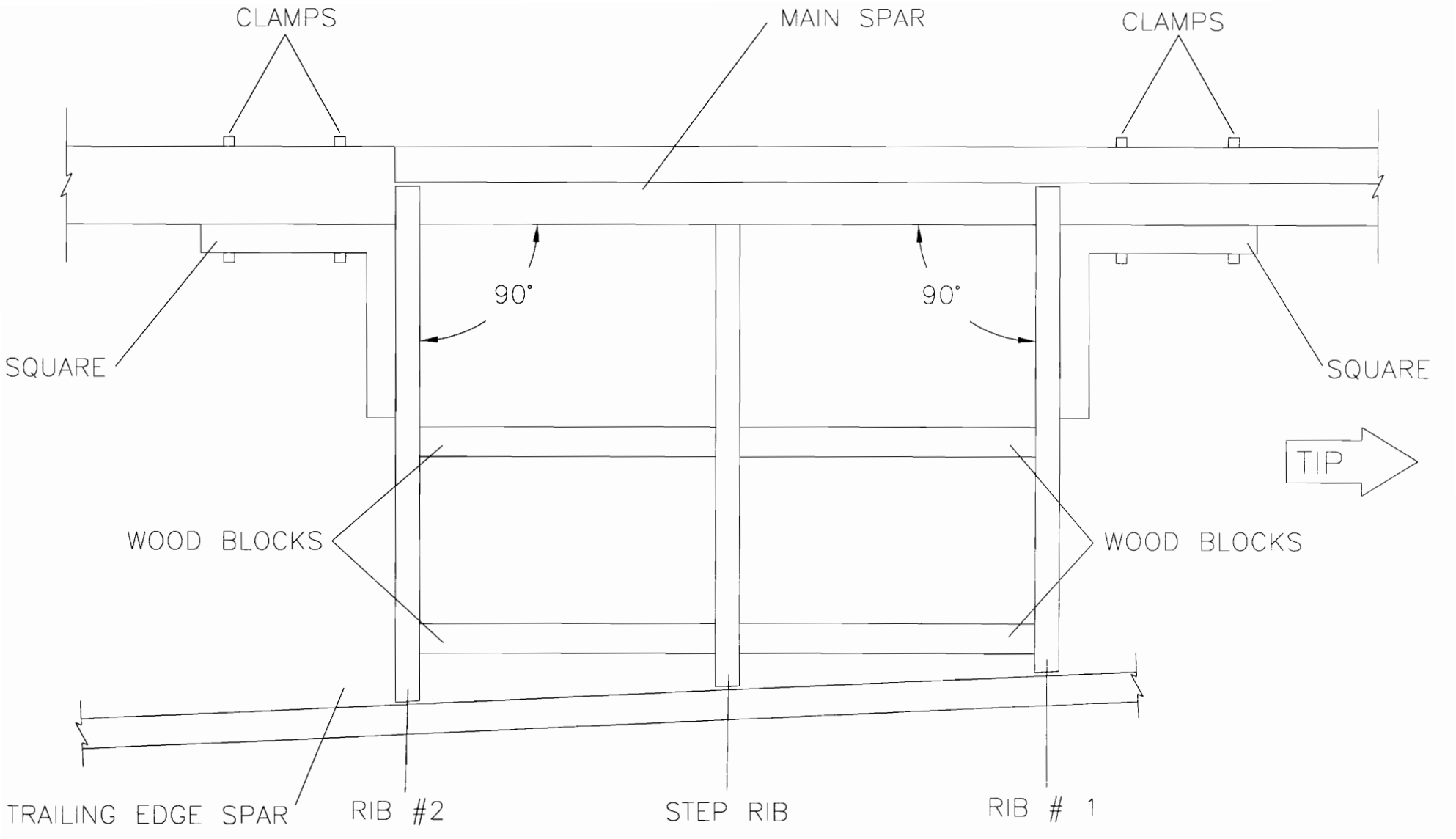

CLAMPS
MAIN SPAR
CLAMPS
90°
90°
SQUARE
SQUARE
TIP
WOOD BLOCKS
WOOD BLOCKS
TRAILING EDGE SPAR
RIB #2
STEP RIB
RIB # 1

FIGURE 3-13

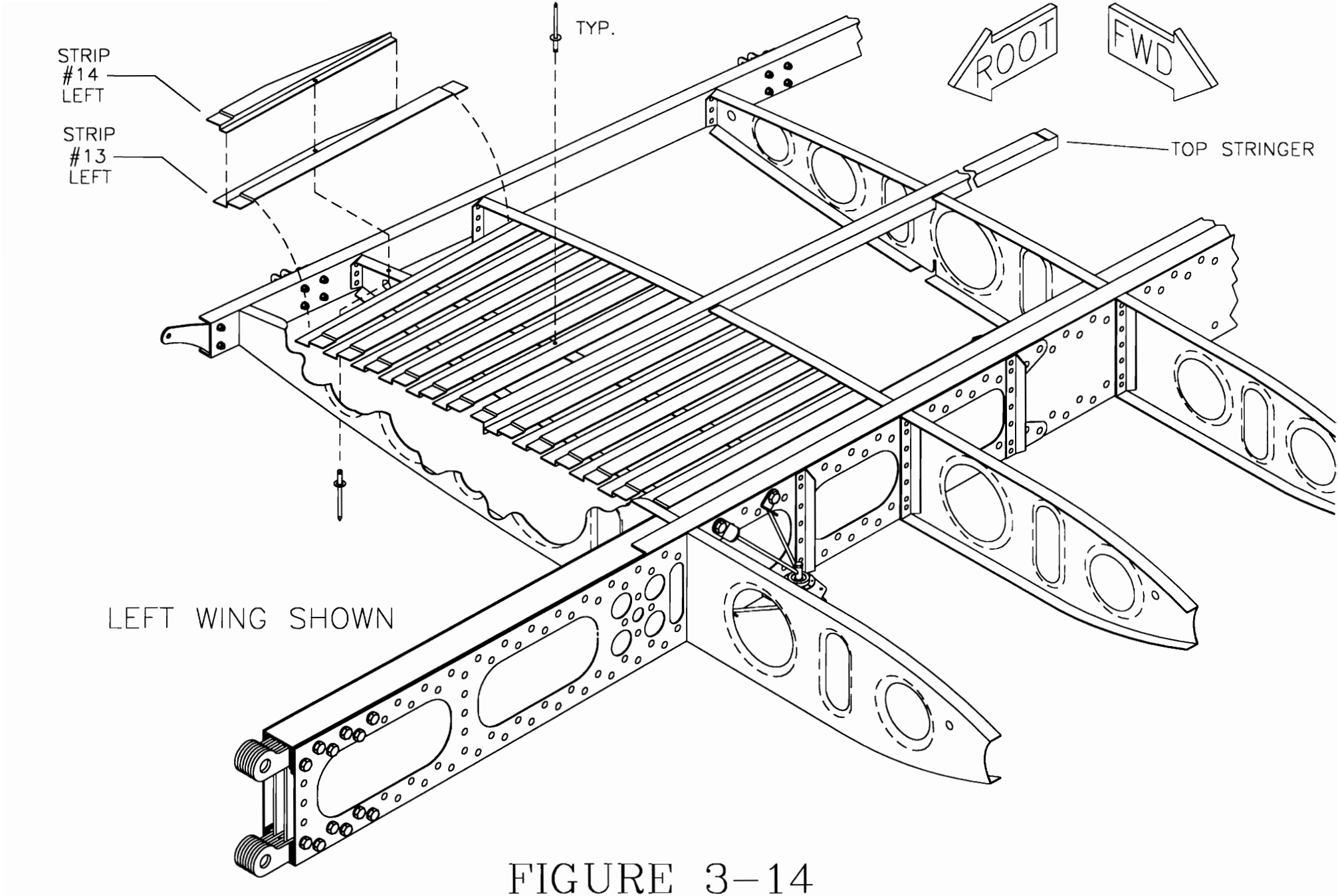

STRIP
#14
LEFT
STRIP
#13
LEFT
TYP.
ROOT
FWD
TOP STRINGER
LEFT WING SHOWN

FIGURE 3-14

TYPICAL FOR ALL
BELLCRANK
ASSEMBLIES

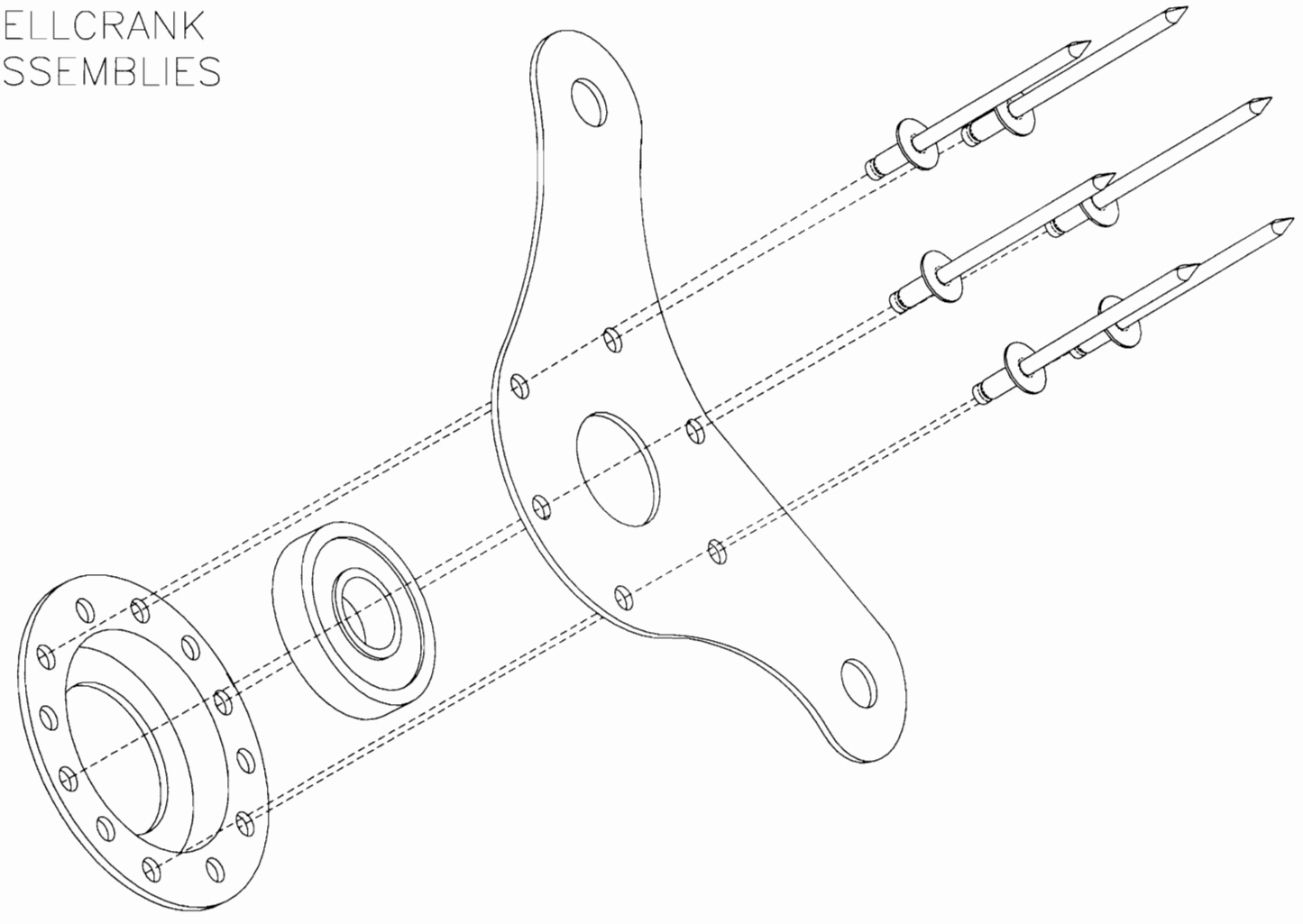


FIGURE 3–15

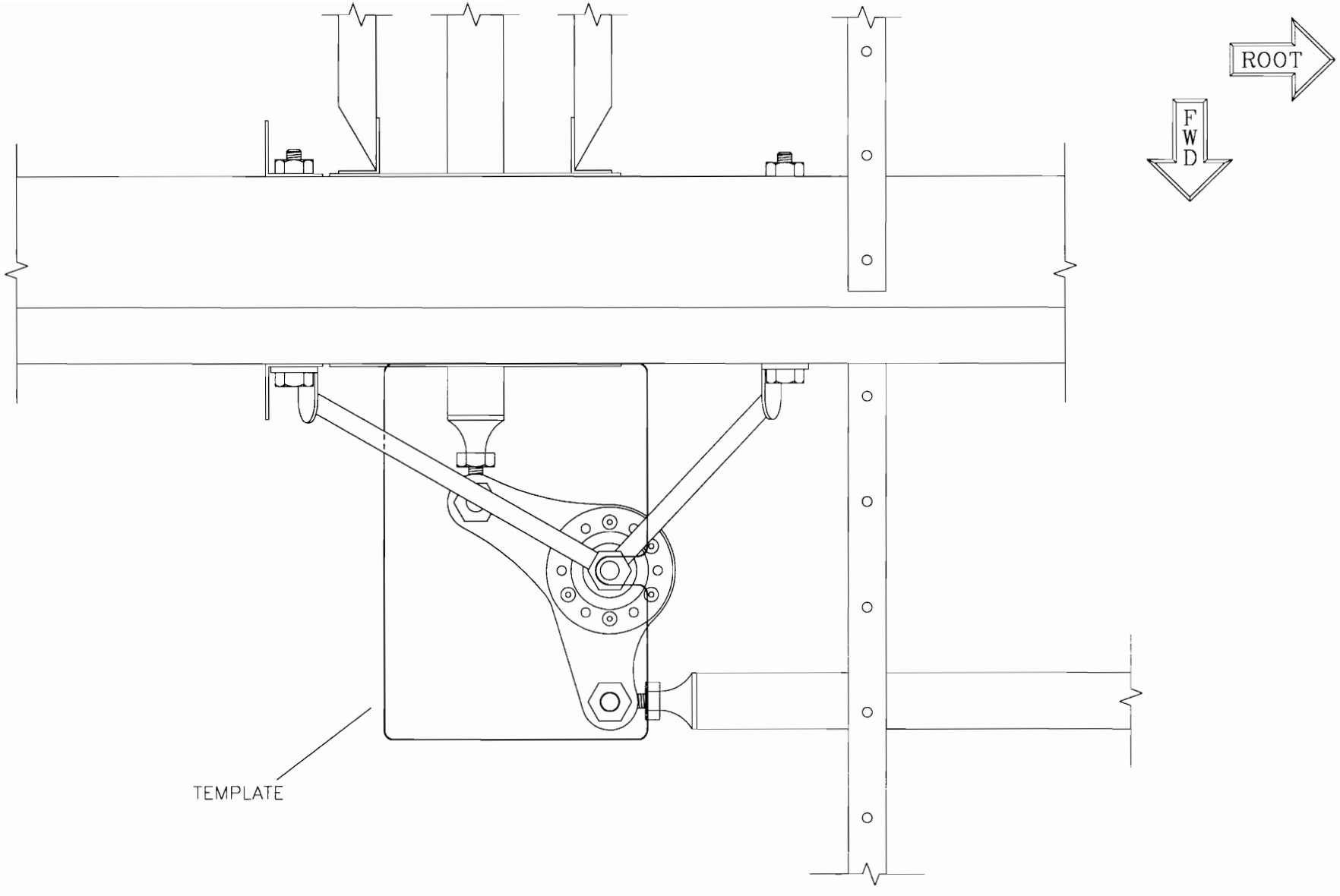


FIGURE 3–16

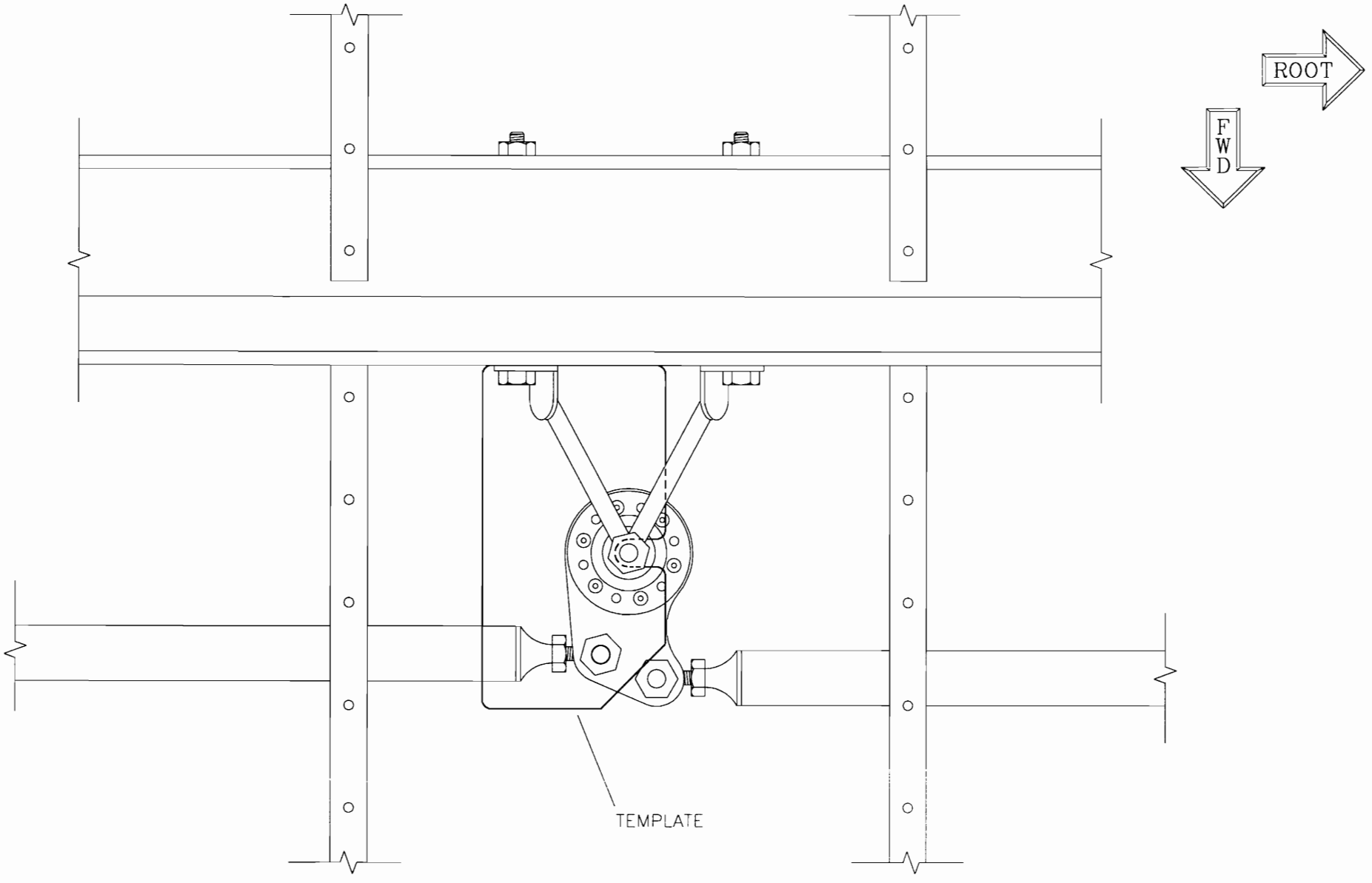


FIGURE 3–17

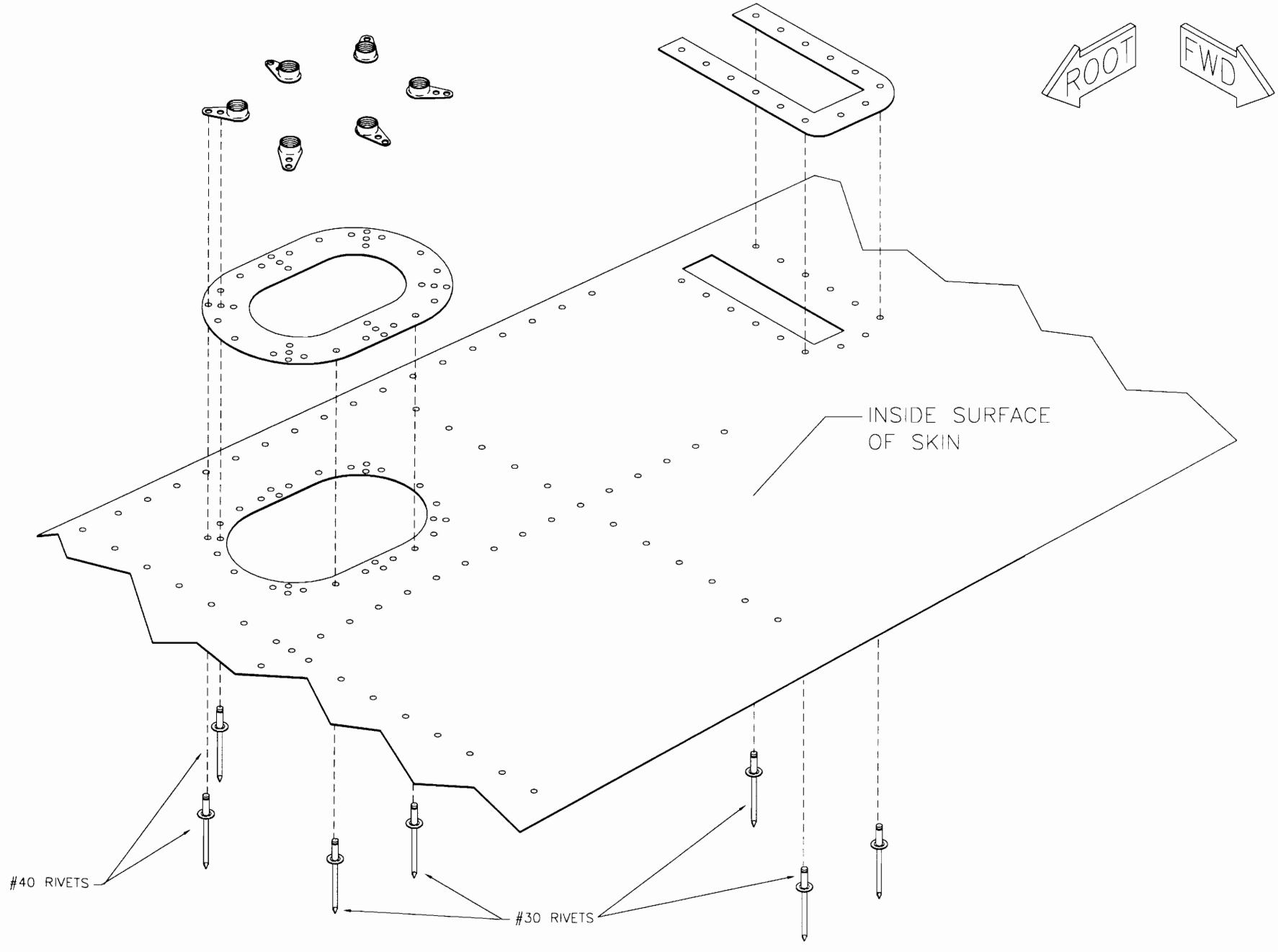


FIGURE 3-18

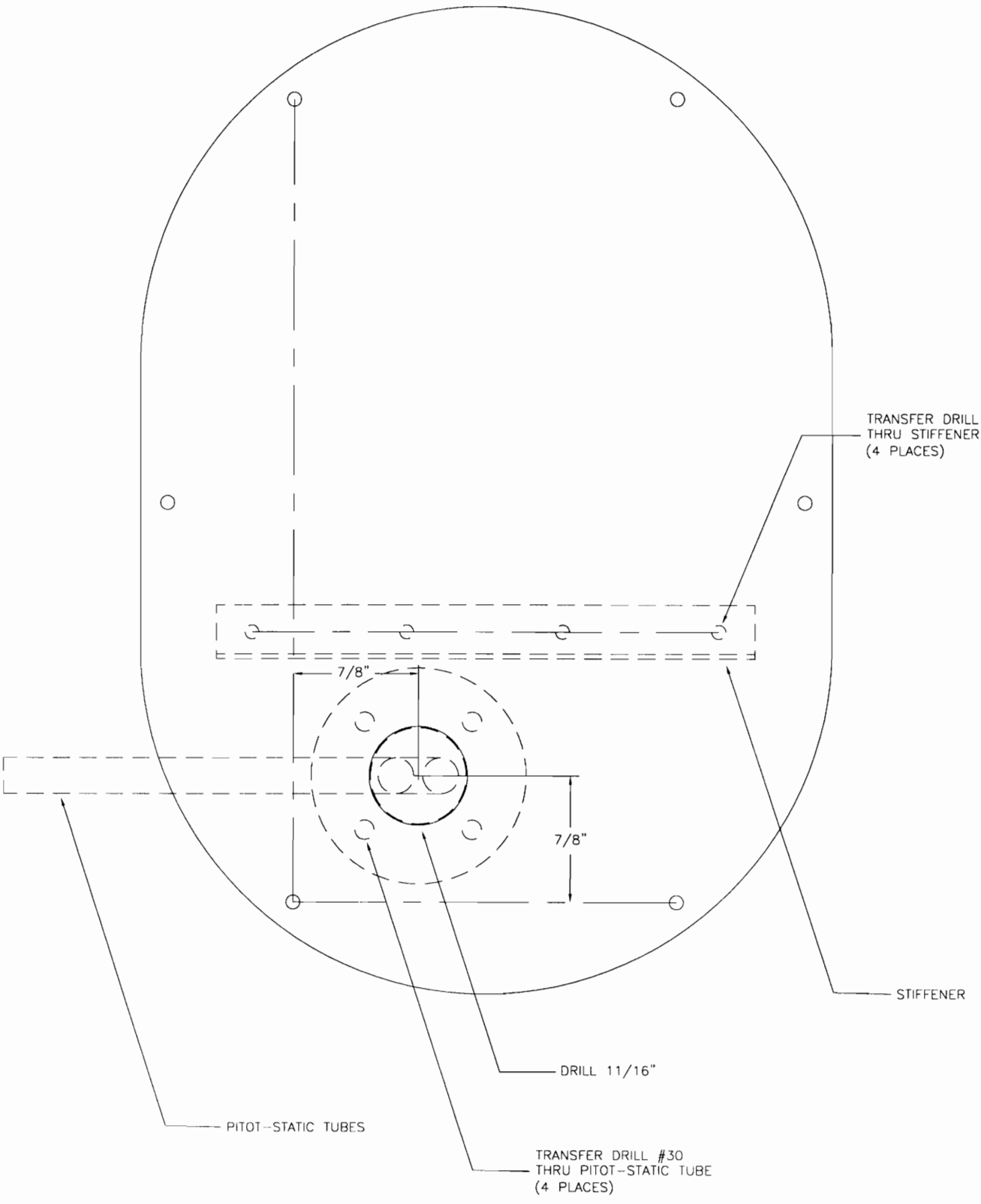

TRANSFER DRILL #40
THRU STIFFENER
(4 PLACES)
7/8"
7/8"
STIFFENER
DRILL 11/16"
PITOT-STATIC TUBES
TRANSFER DRILL #30
THRU PITOT-STATIC TUBE
(4 PLACES)

FIGURE 3-19

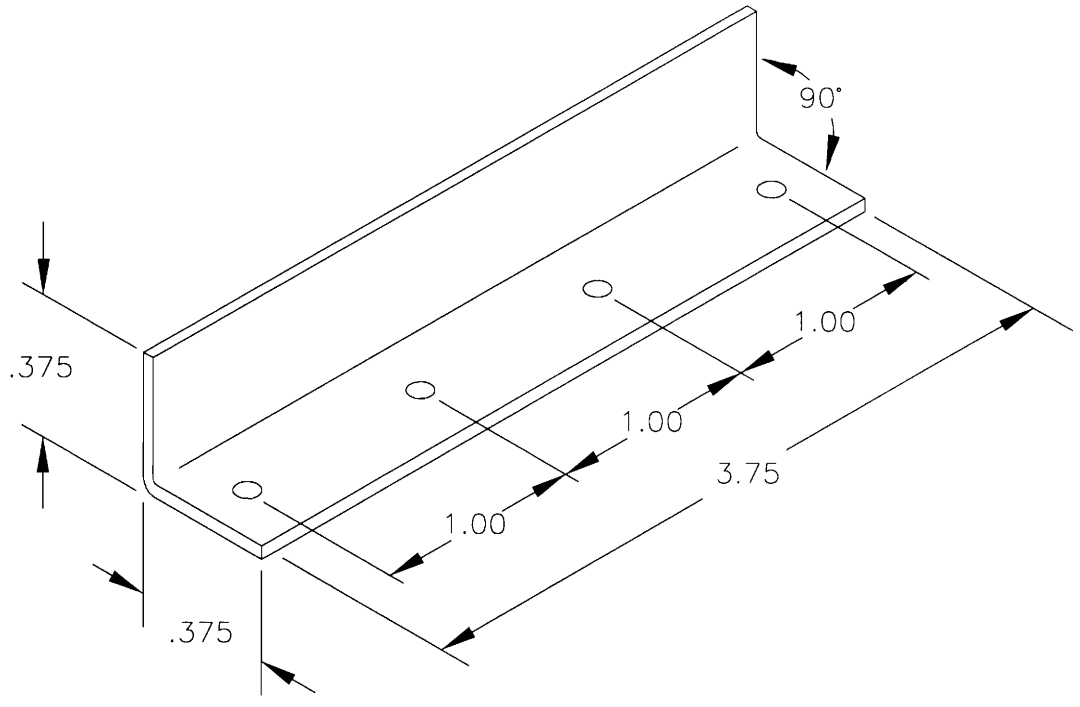


FIGURE 3–20

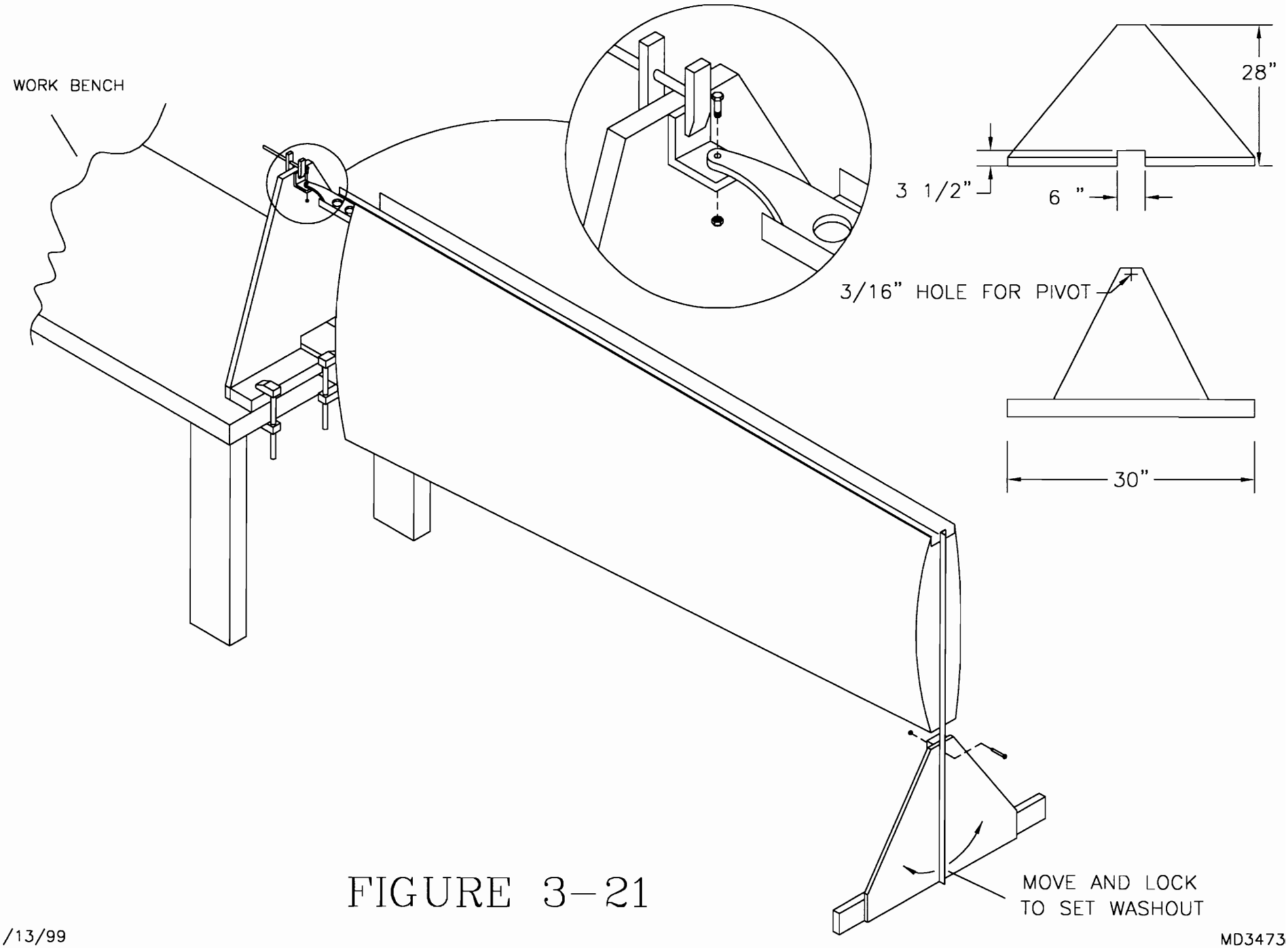


FIGURE 3-21

01/13/99

MD3473
REV.

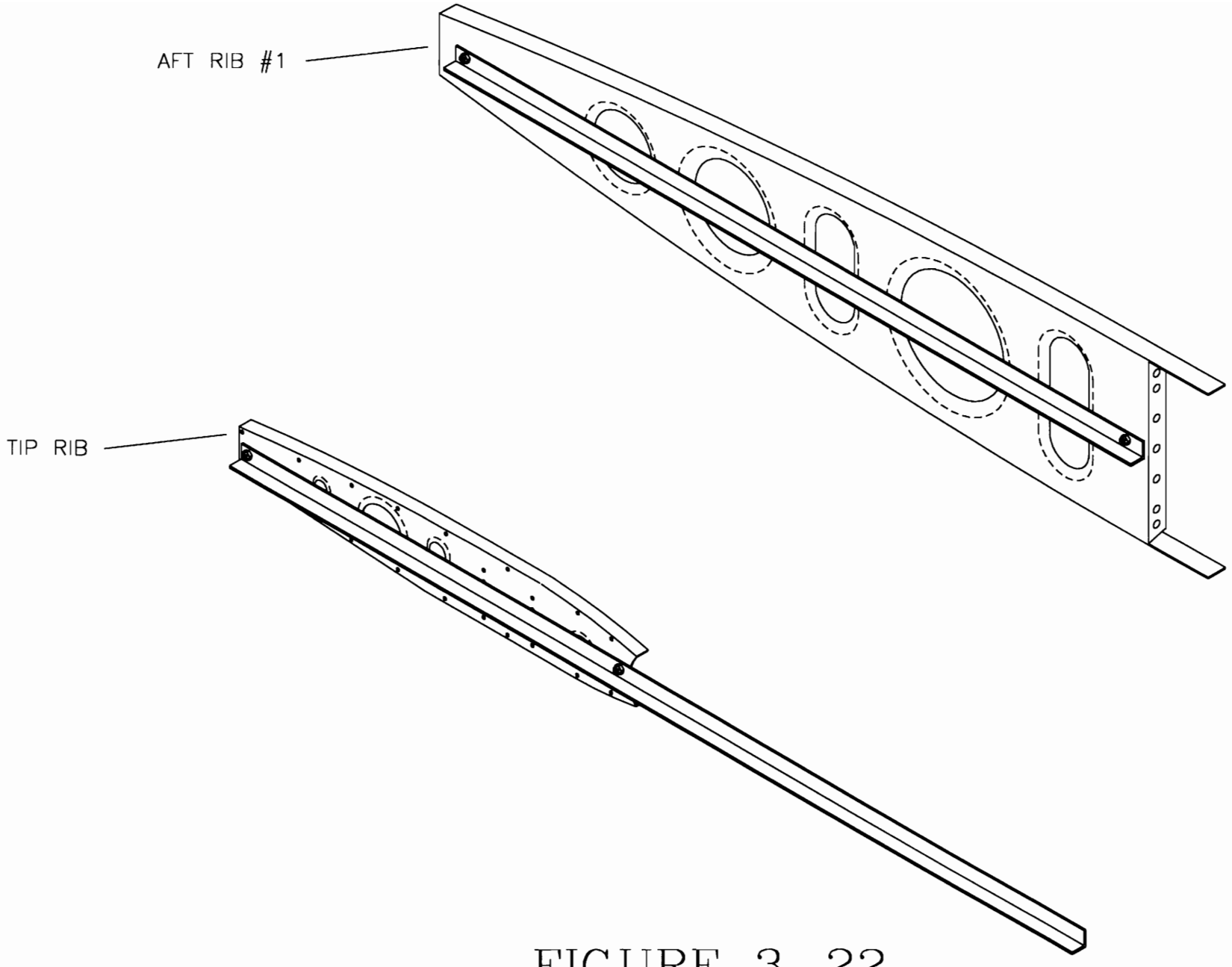


FIGURE 3-22

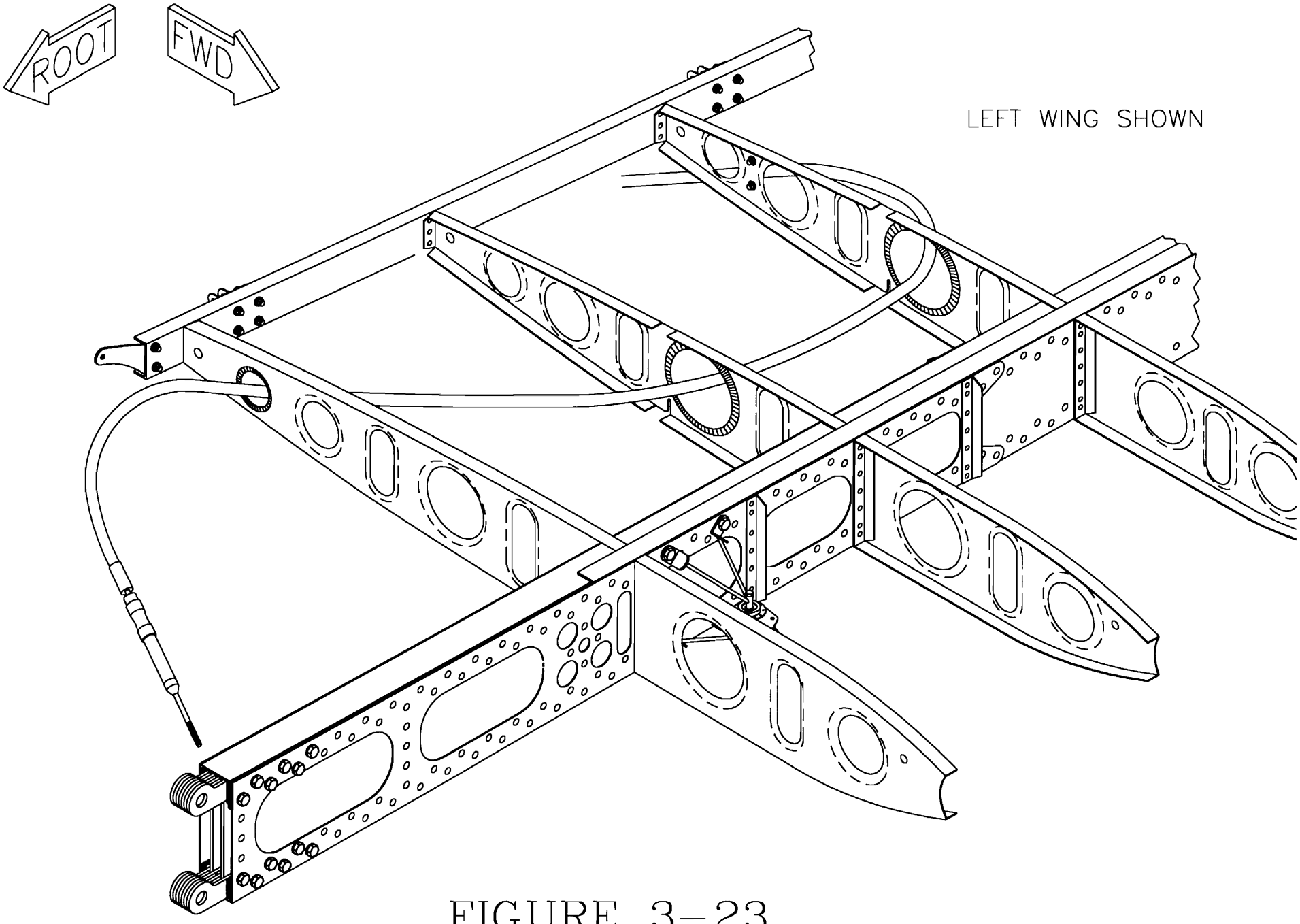


FIGURE 3-23

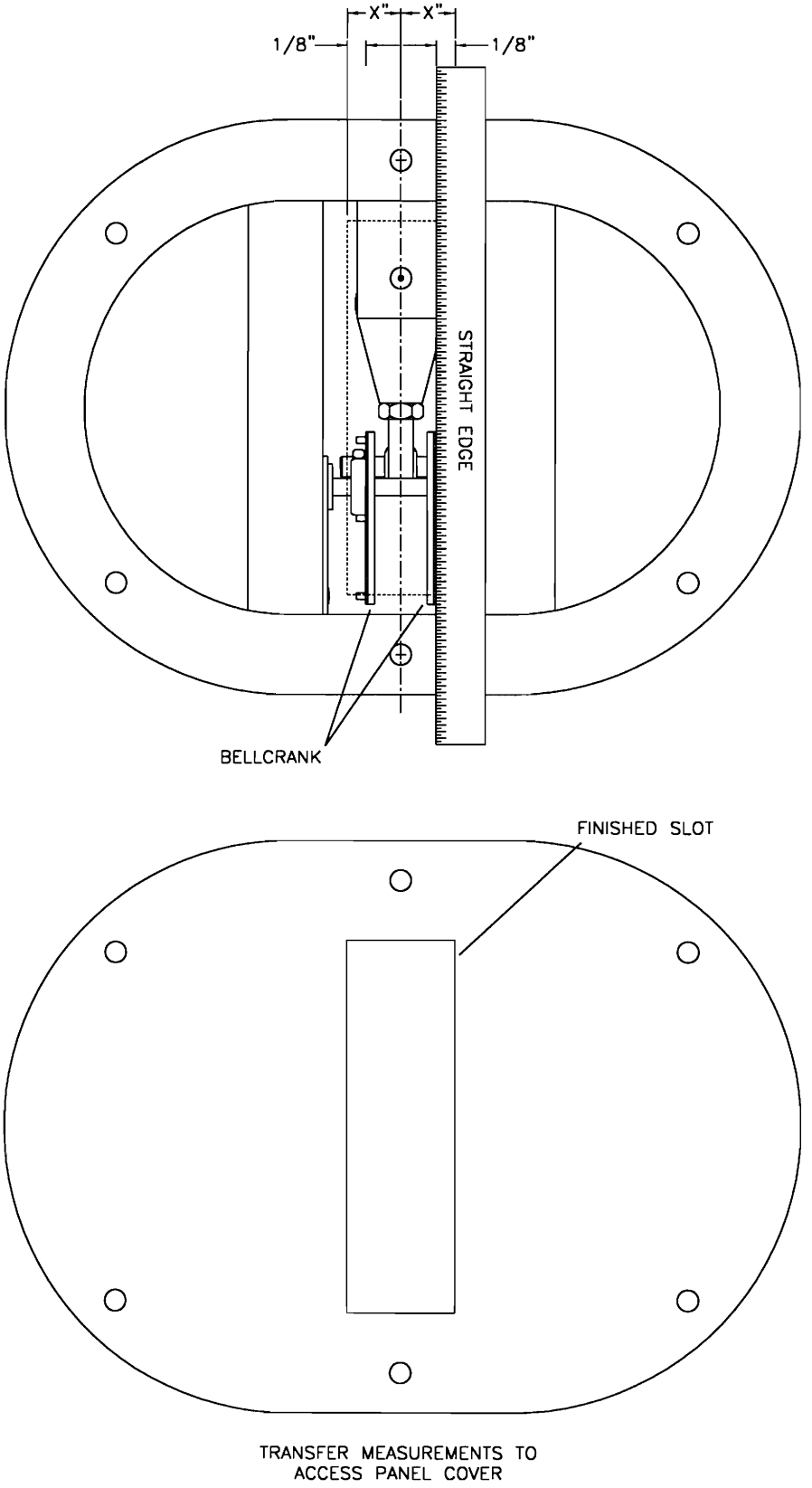

X"
X"
1/8"
1/8"
STRAIGHT EDGE
BELLCRANK
FINISHED SLOT
TRANSFER MEASUREMENTS TO
ACCESS PANEL COVER

FIGURE 3-24

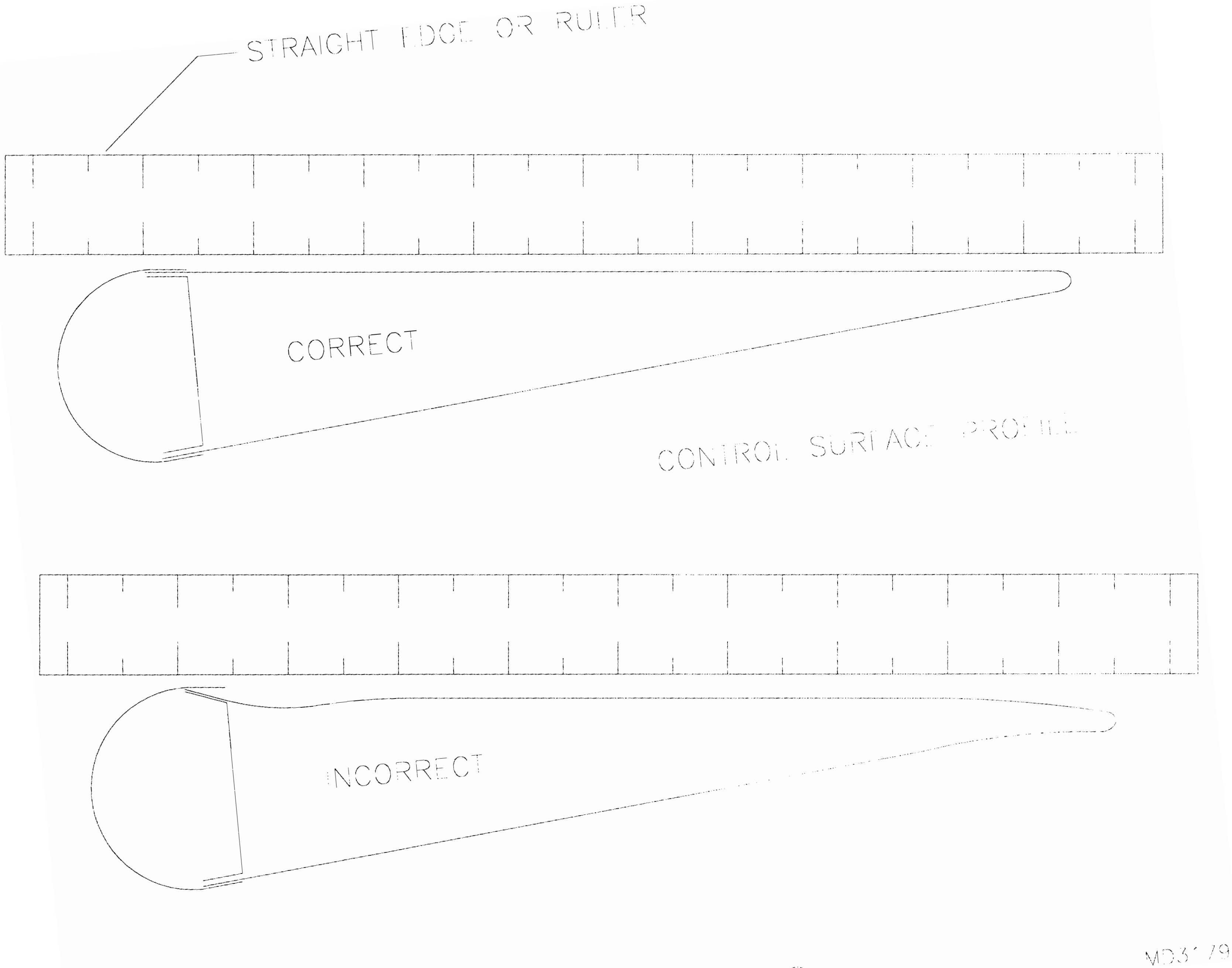

STRAIGHT EDGE OR RULER
CORRECT
CONTROL SURFACE PROFILE
INCORRECT
MD31/79

FIGURE 4-0

THIS

PAGE

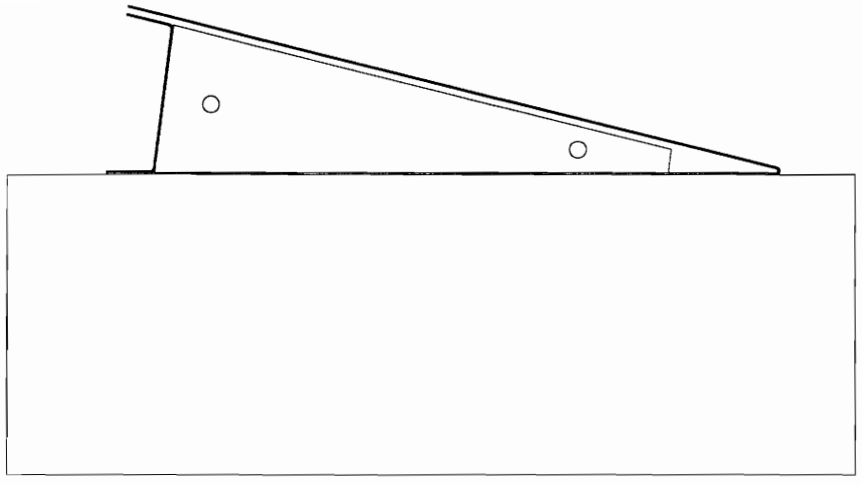
INTENTIONALLY

LEFT

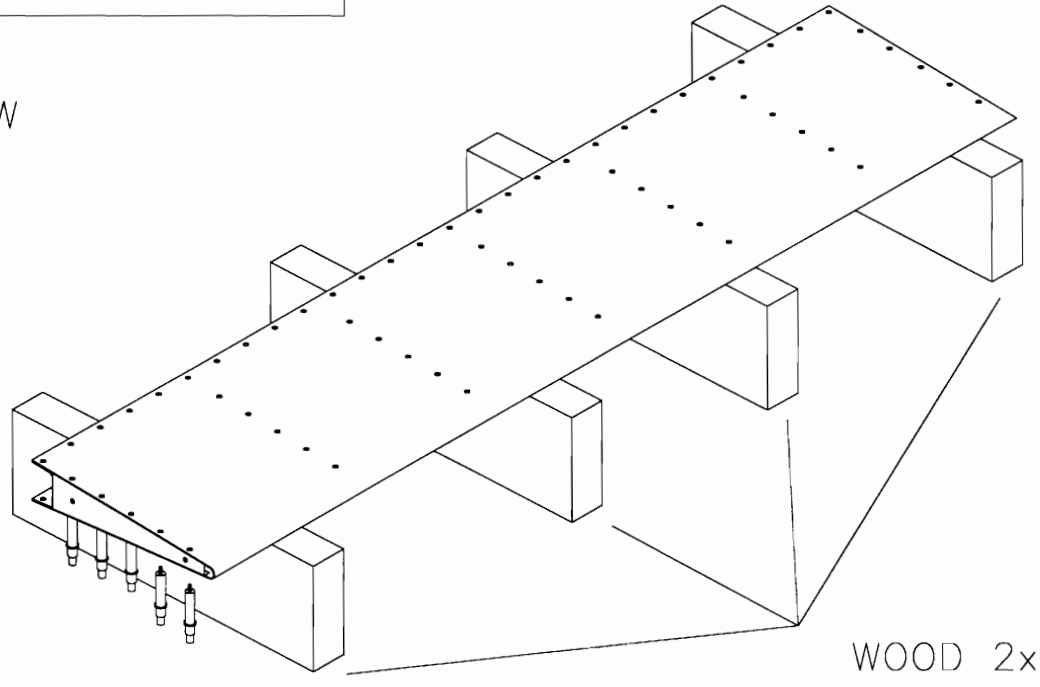
BLANK.

FIGURE 4-1

MD3240



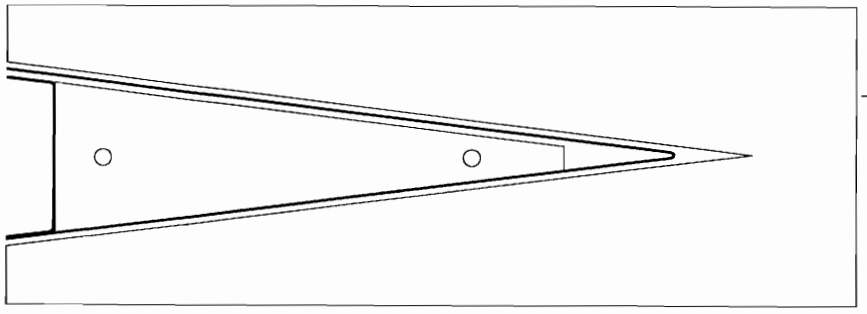
END VIEW



WOOD 2x6 BLOCKS

NOTE: LUMBER DIMENSIONS ARE NOT CRITICAL

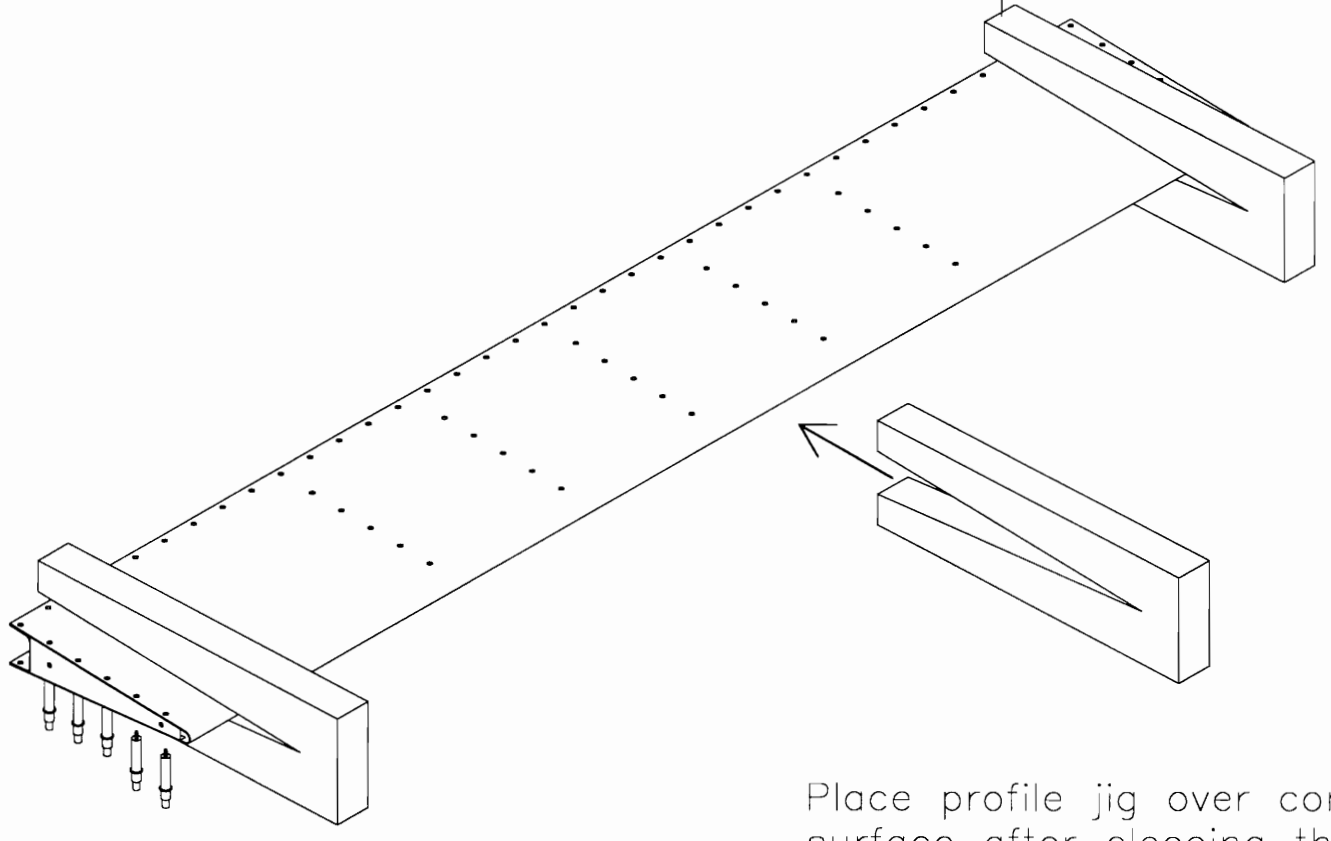
FIGURE 4-2



END VIEW

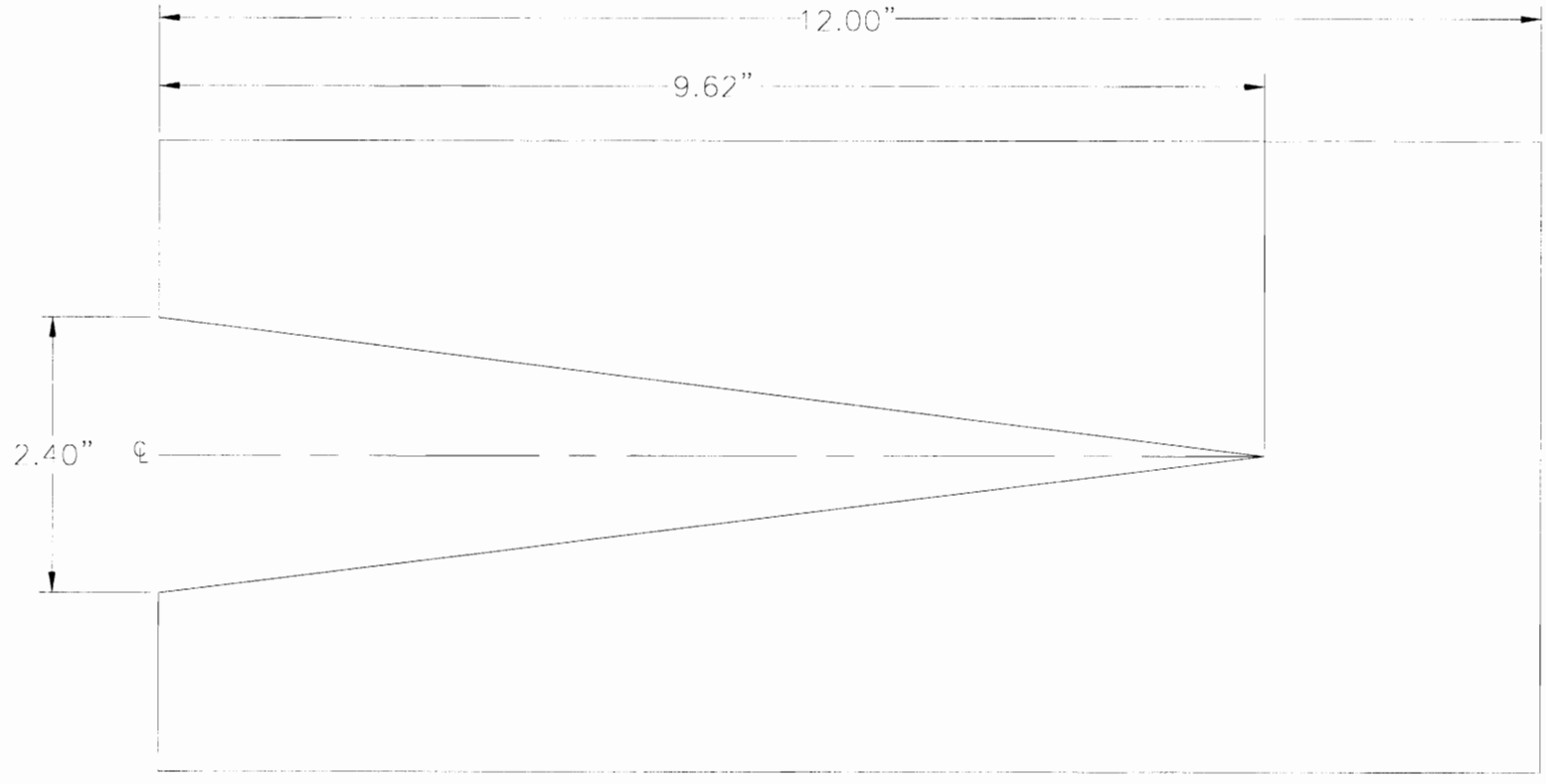
WOOD 2x6 PROFILE JIG

NOTE: LUMBER DIMENSIONS ARE NOT CRITICAL



Place profile jig over control surface after clecoing the bottom side of the skin to ribs.

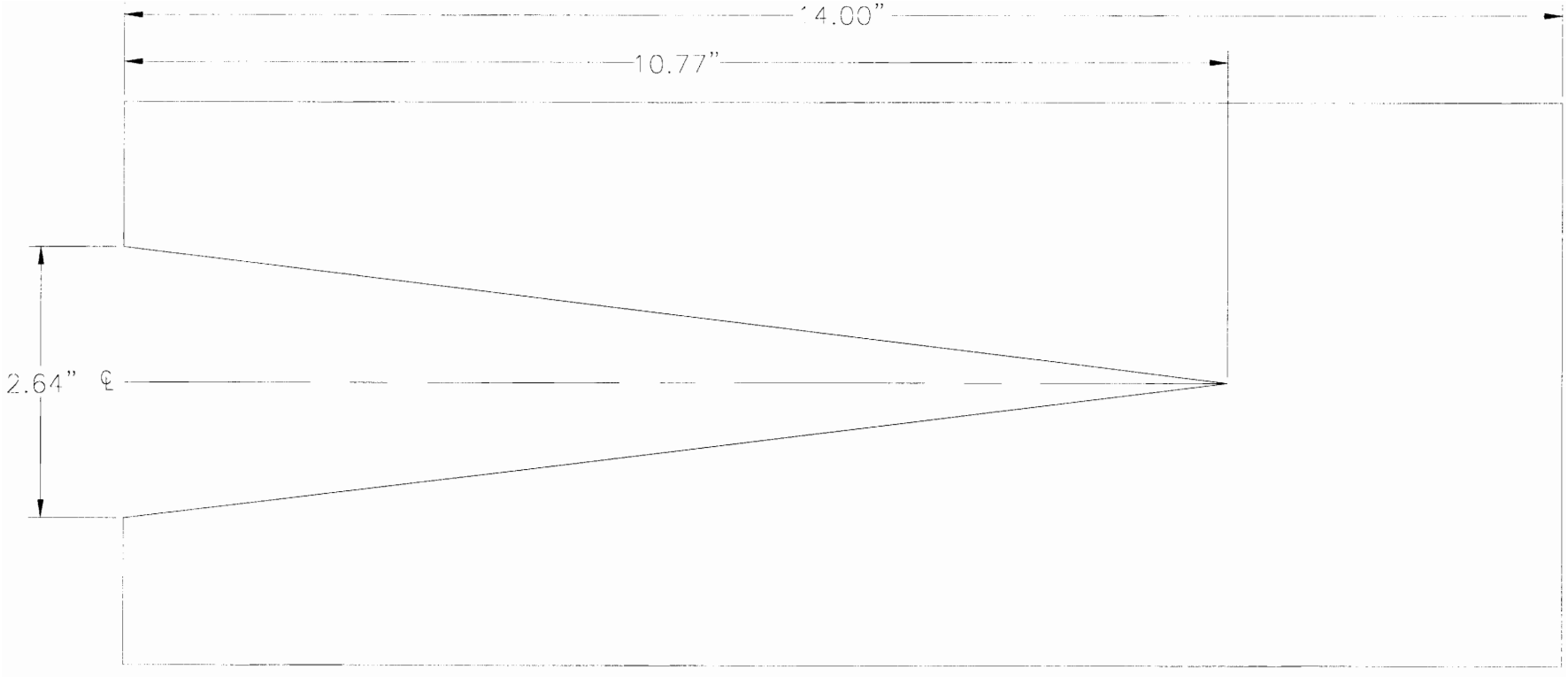
FIGURE 4-3



CONTROL SURFACE PROFILE JIG -- AILERON

FIGURE 4-4

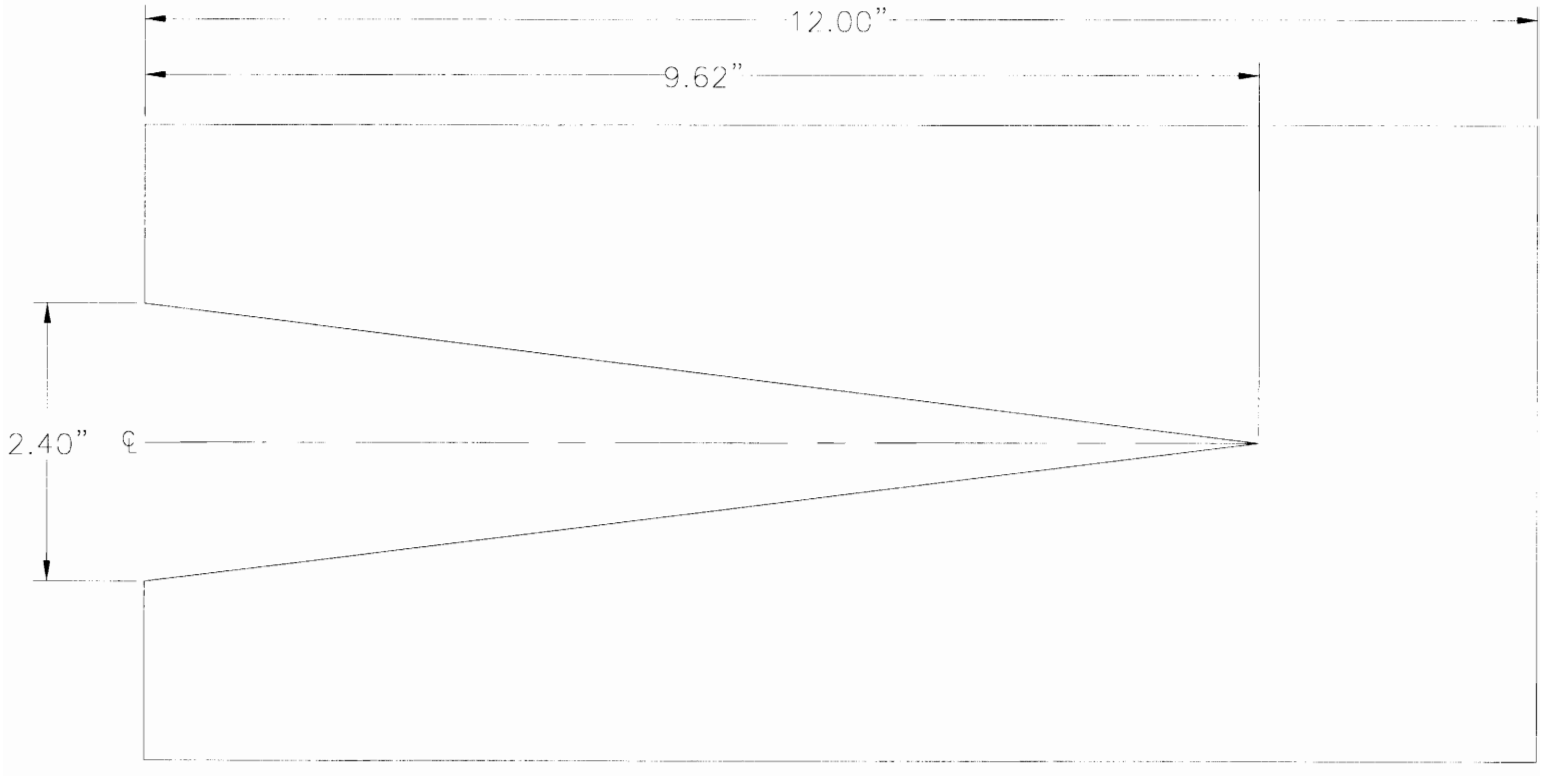
MD3183



CONTROL SURFACE PROFILE JIG – ELEVATOR

FIGURE 4–5

MD3184



CONTROL SURFACE PROFILE JIG – FLAP

FIGURE 4–6

MD3182

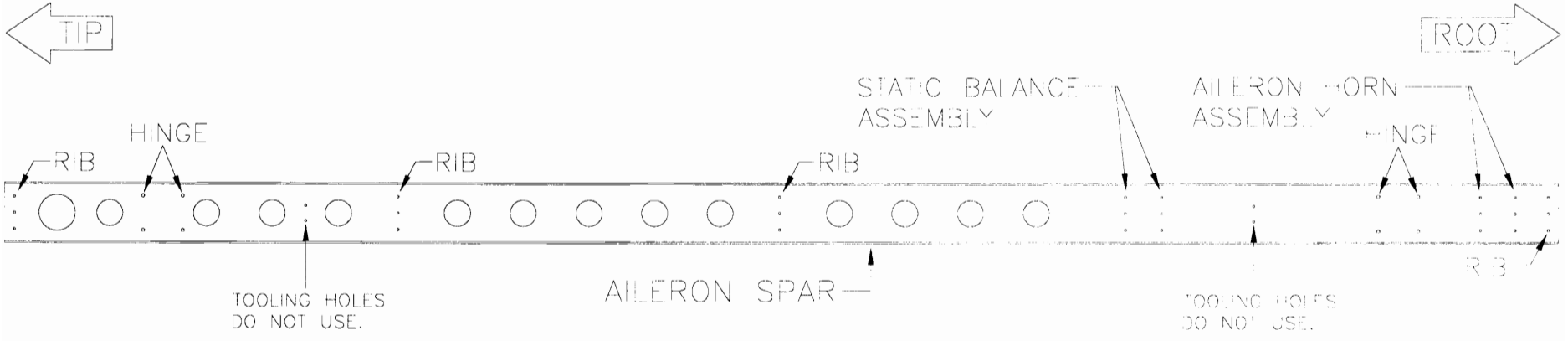


FIGURE 4-7

MD31136

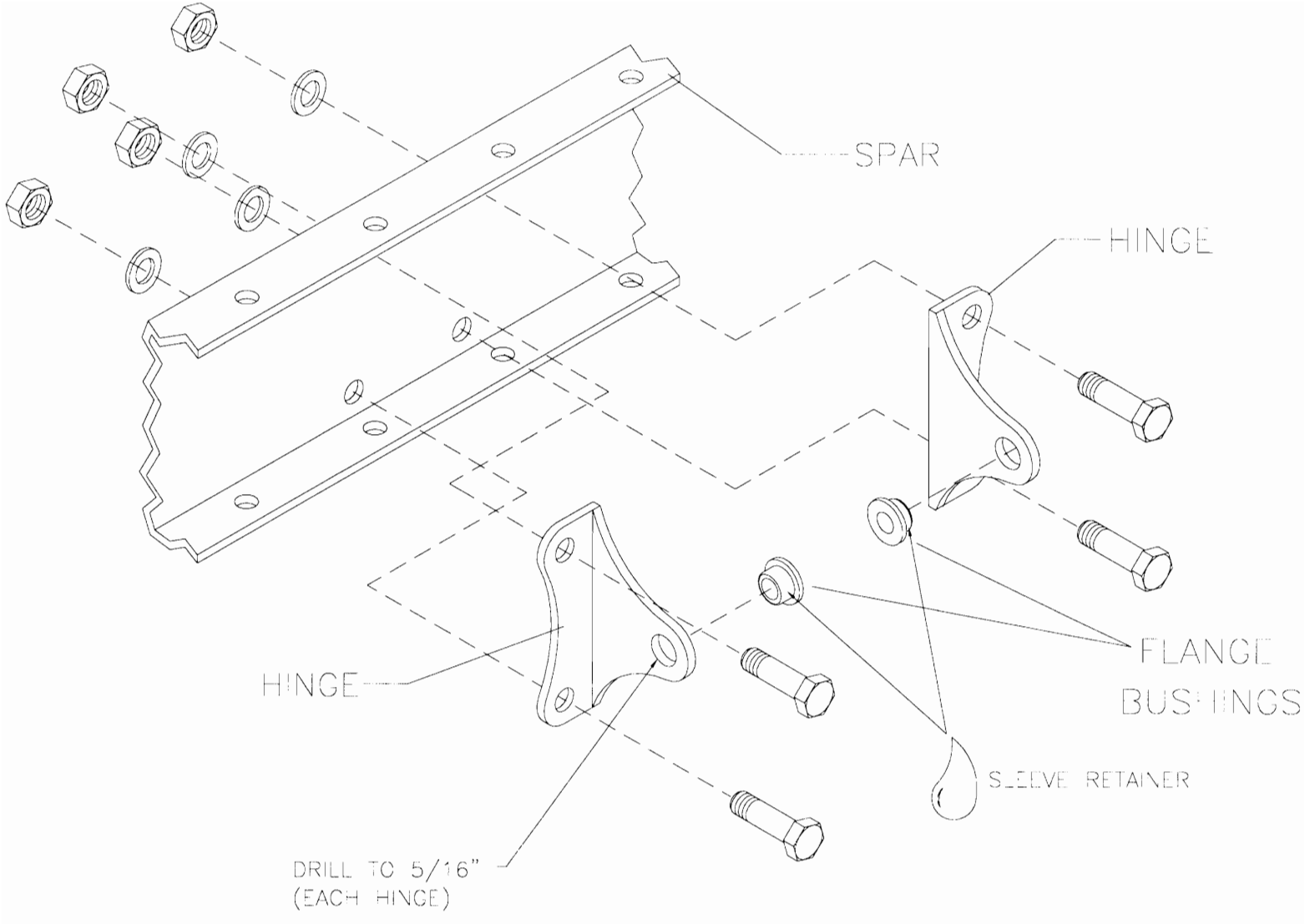


FIGURE 4-8

MD3126

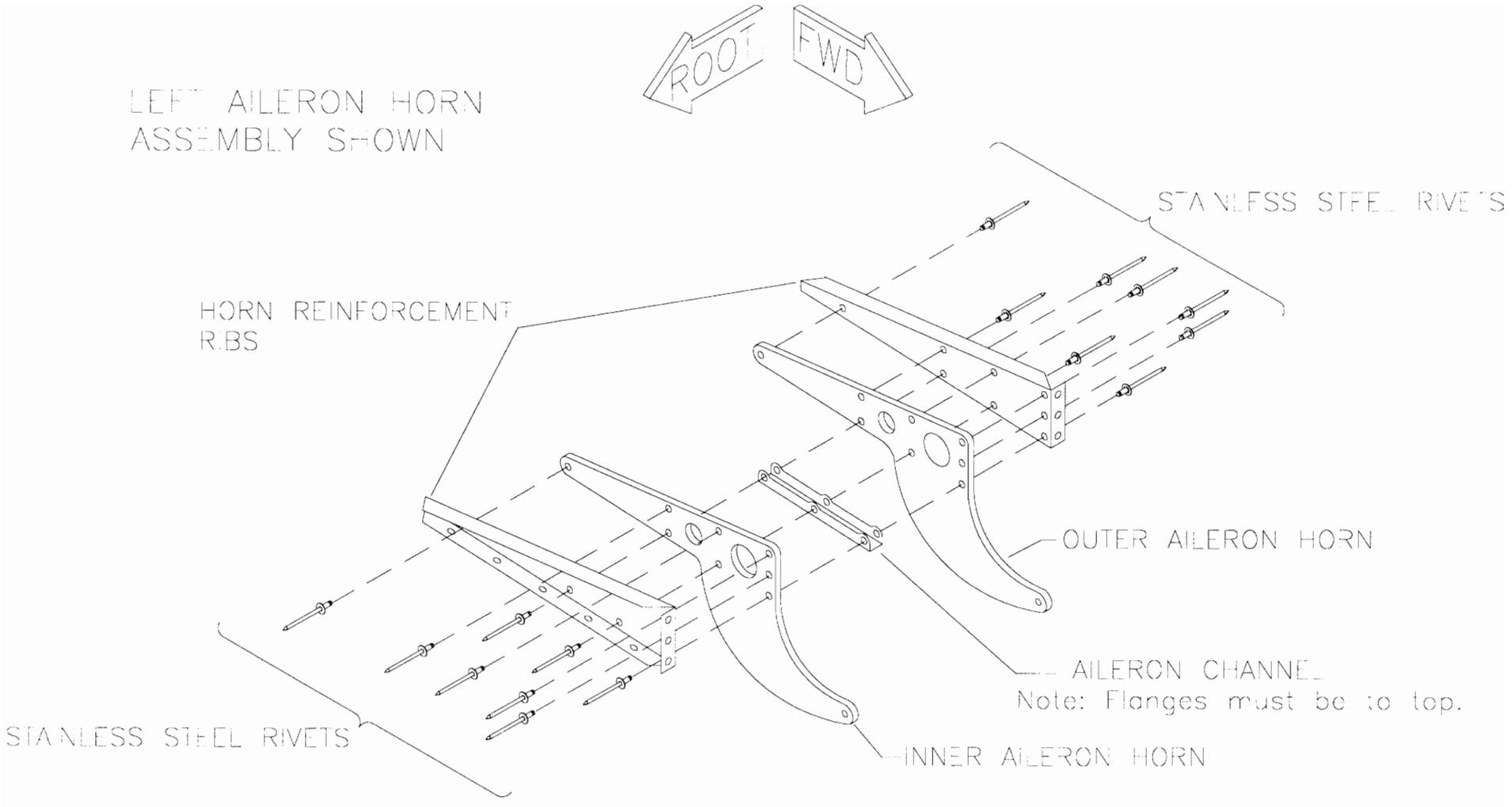


FIGURE 4-9

MD3147

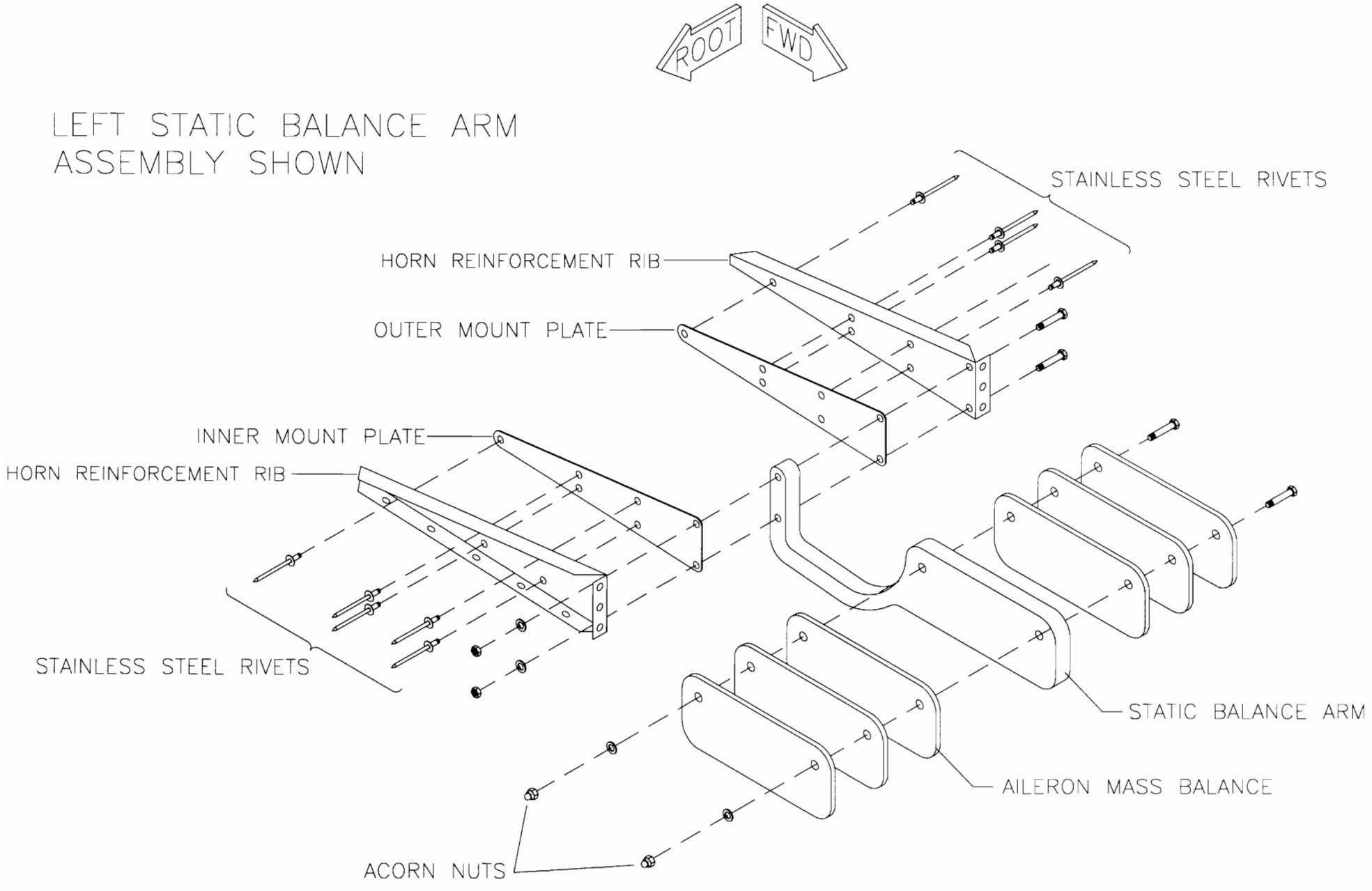

ROOT
FWD
LEFT STATIC BALANCE ARM
ASSEMBLY SHOWN
STAINLESS STEEL RIVETS
HORN REINFORCEMENT RIB
OUTER MOUNT PLATE
INNER MOUNT PLATE
HORN REINFORCEMENT RIB
STAINLESS STEEL RIVETS
STATIC BALANCE ARM
AILERON MASS BALANCE
ACORN NUTS

FIGURE 4-10

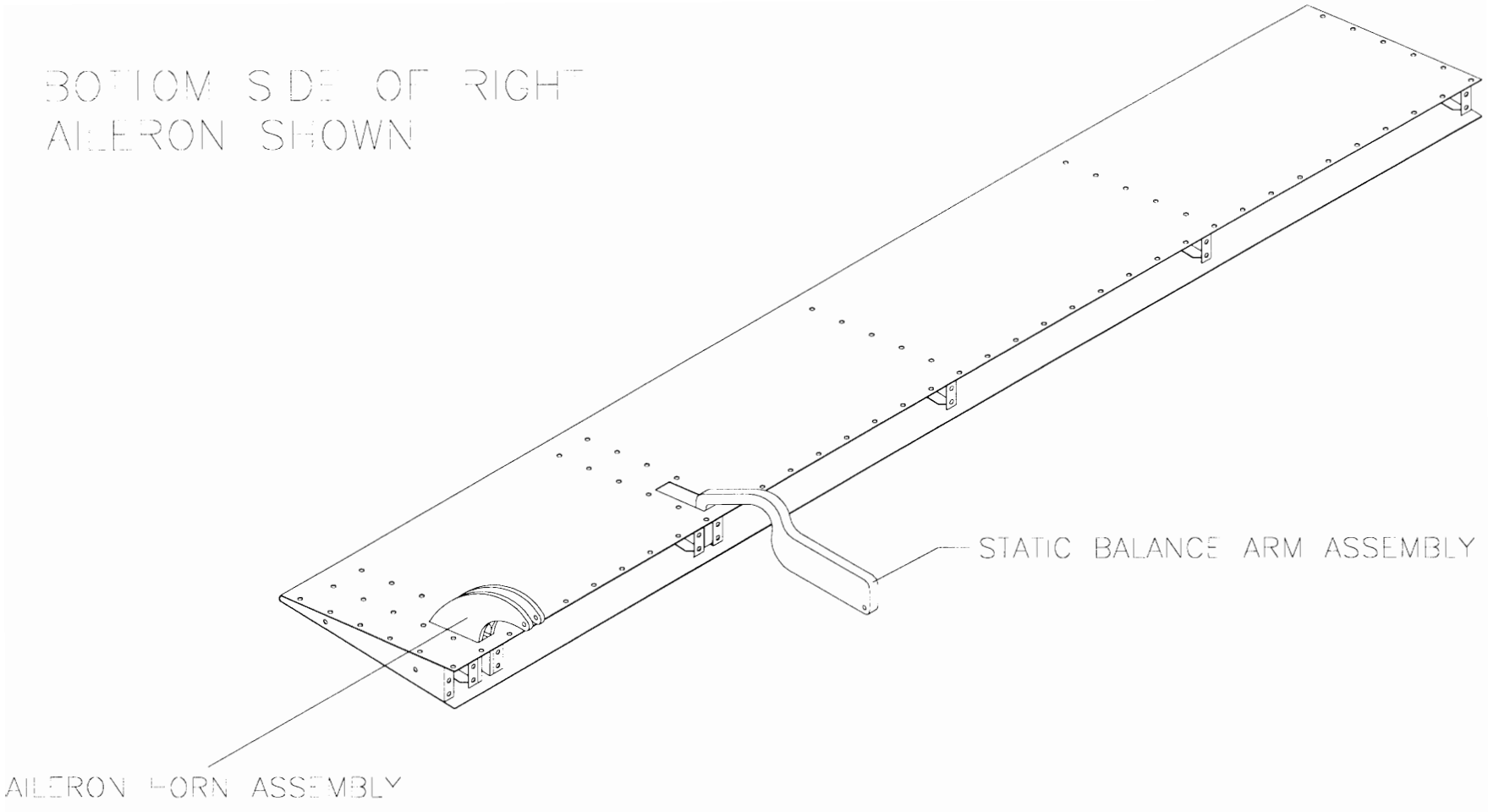


FIGURE 4-11

MD3149

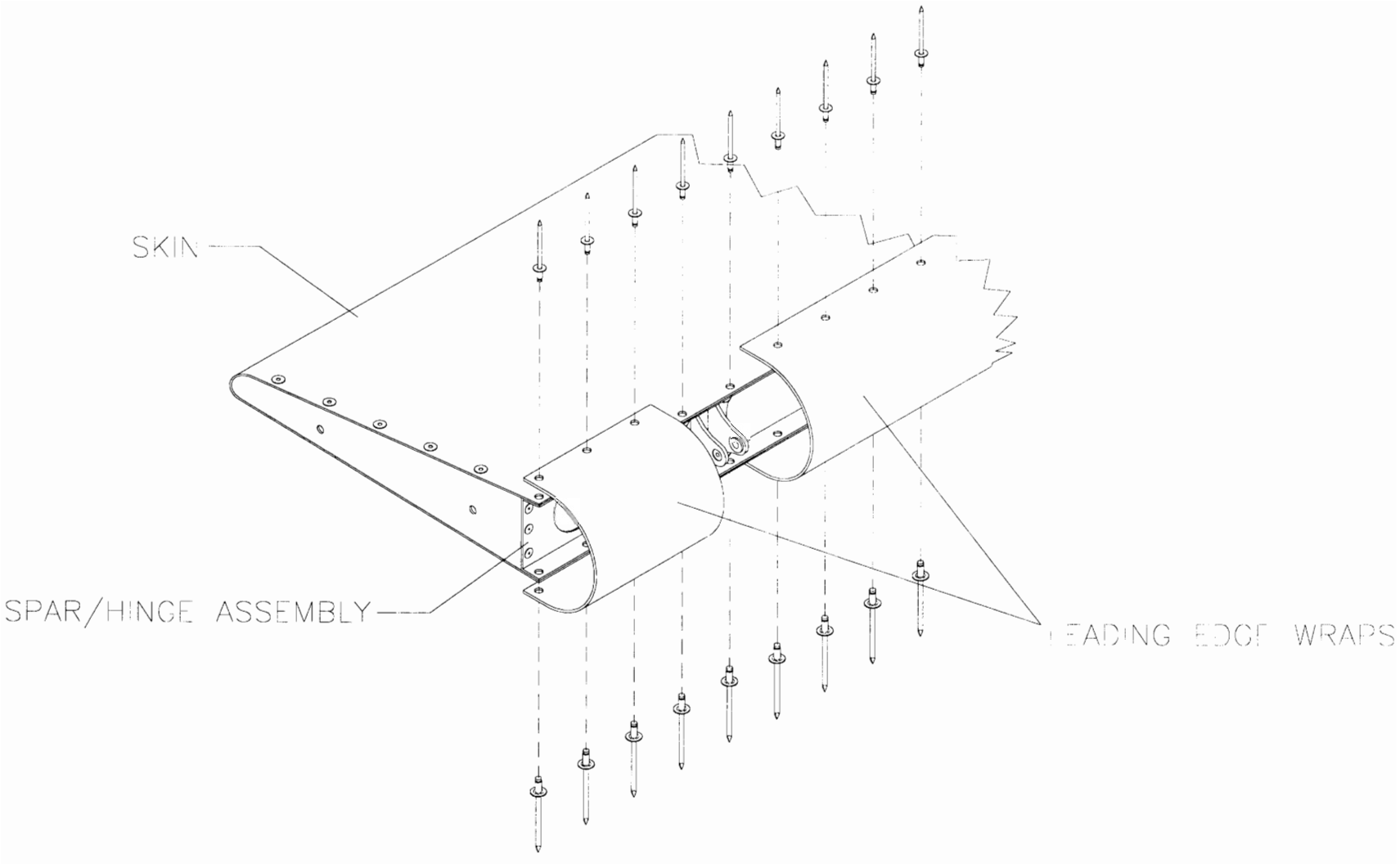


FIGURE 4-12

VB3127

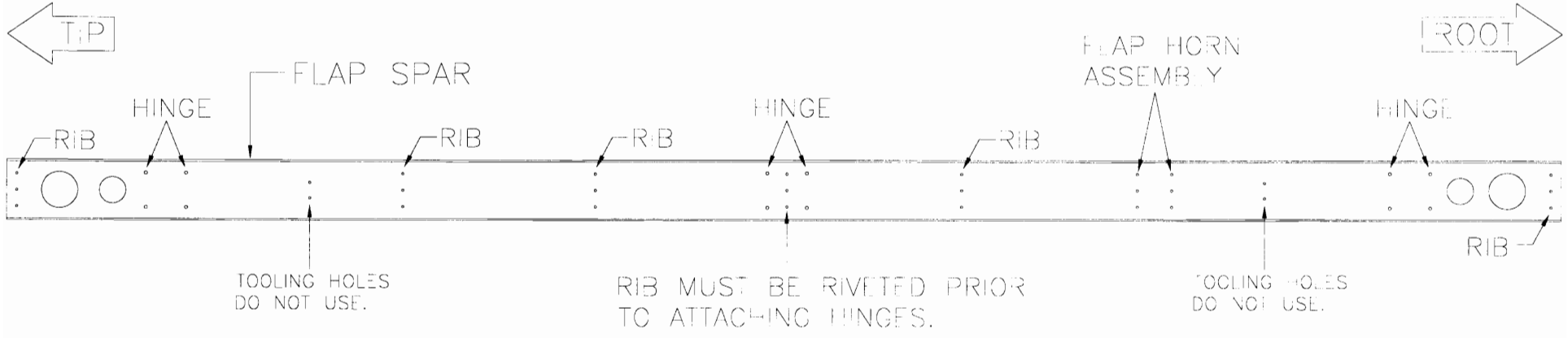


FIGURE 4-13

MD3137

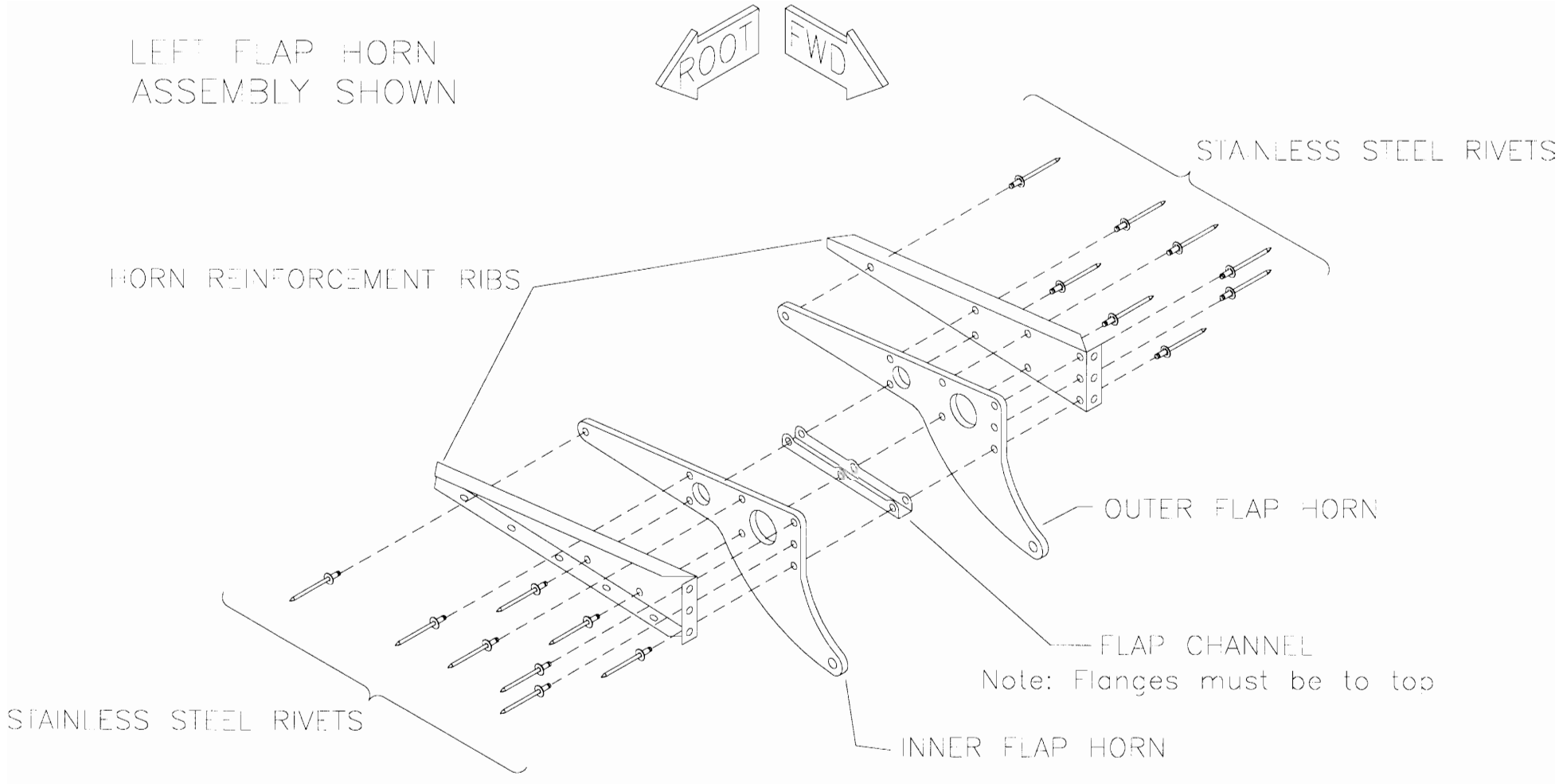


FIGURE 4-14

MD3151

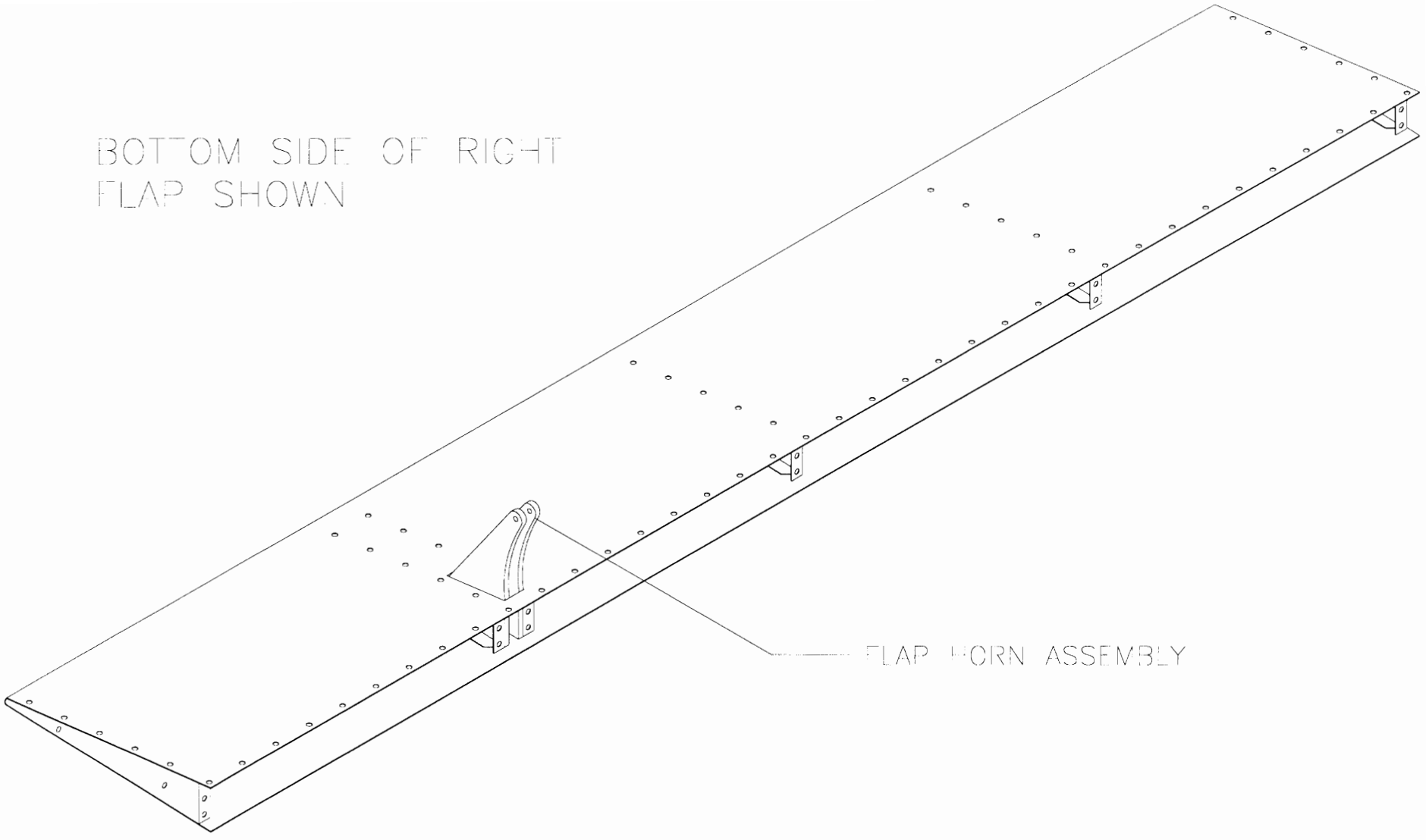


FIGURE 4-15

VD3150

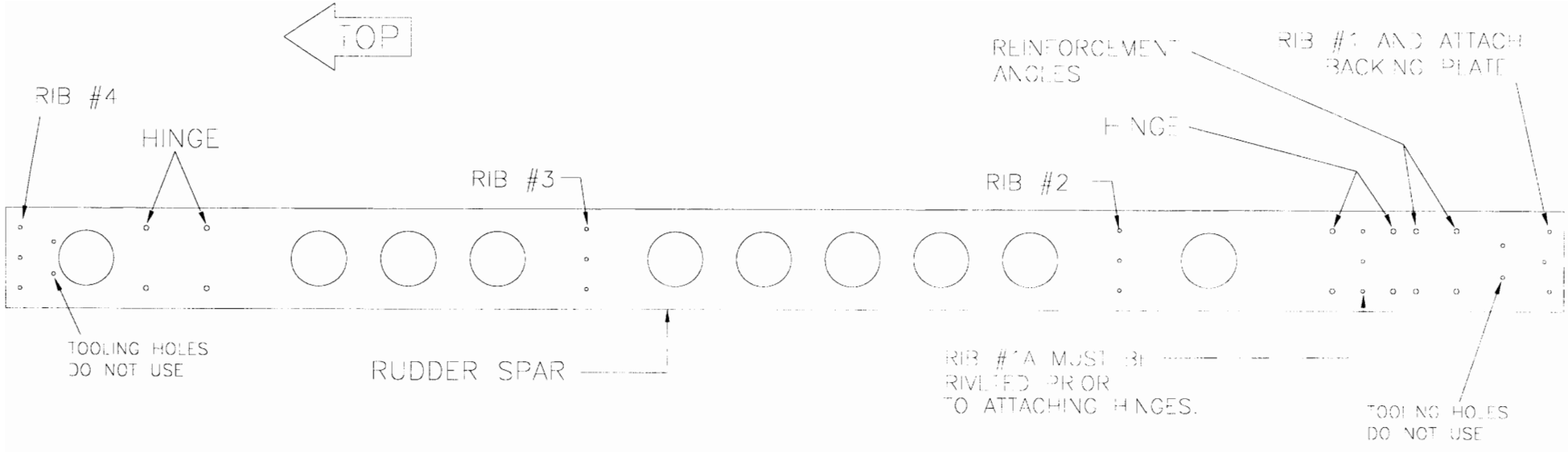


FIGURE 4-16

M03138

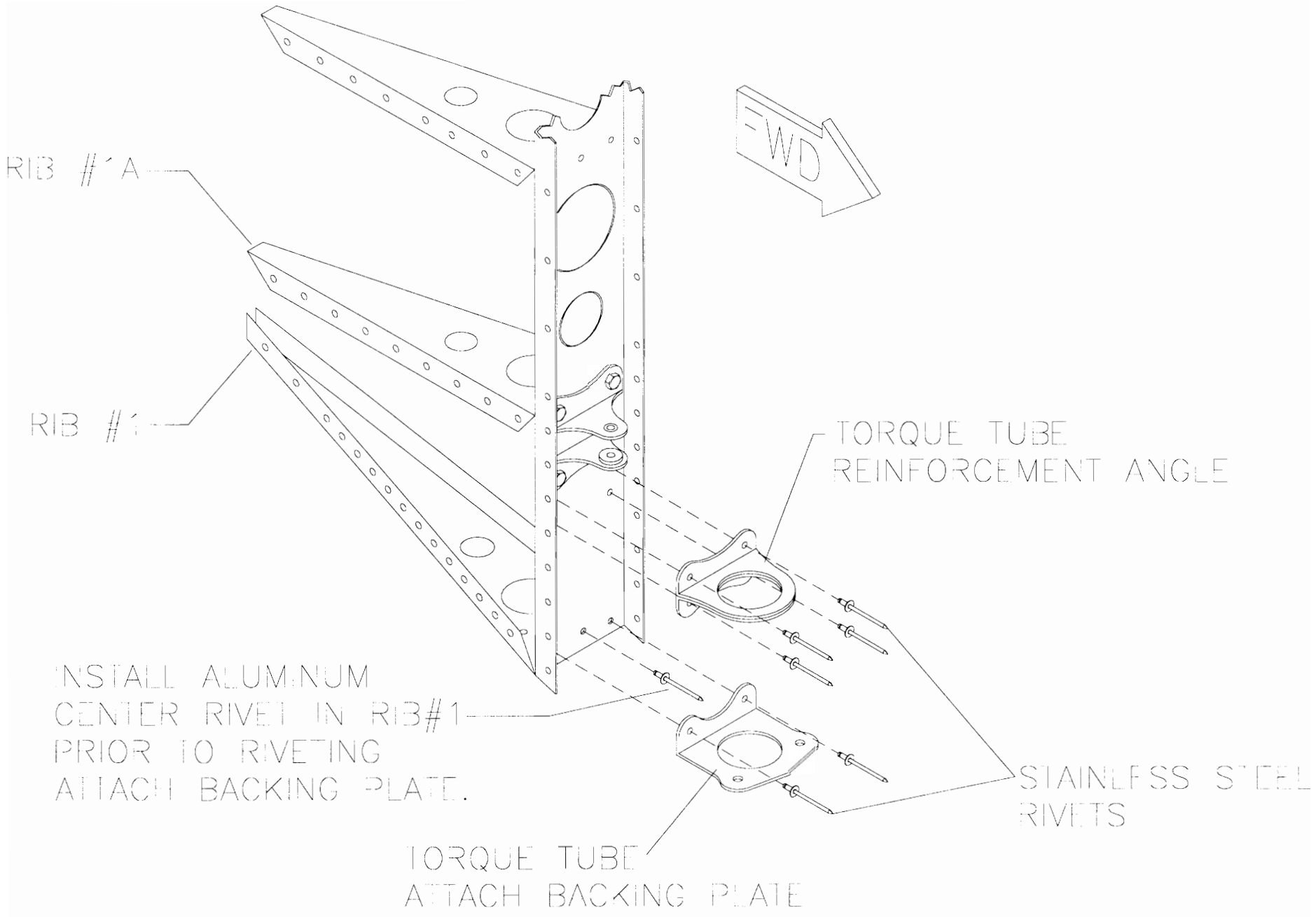


FIGURE 4-17

MD3143

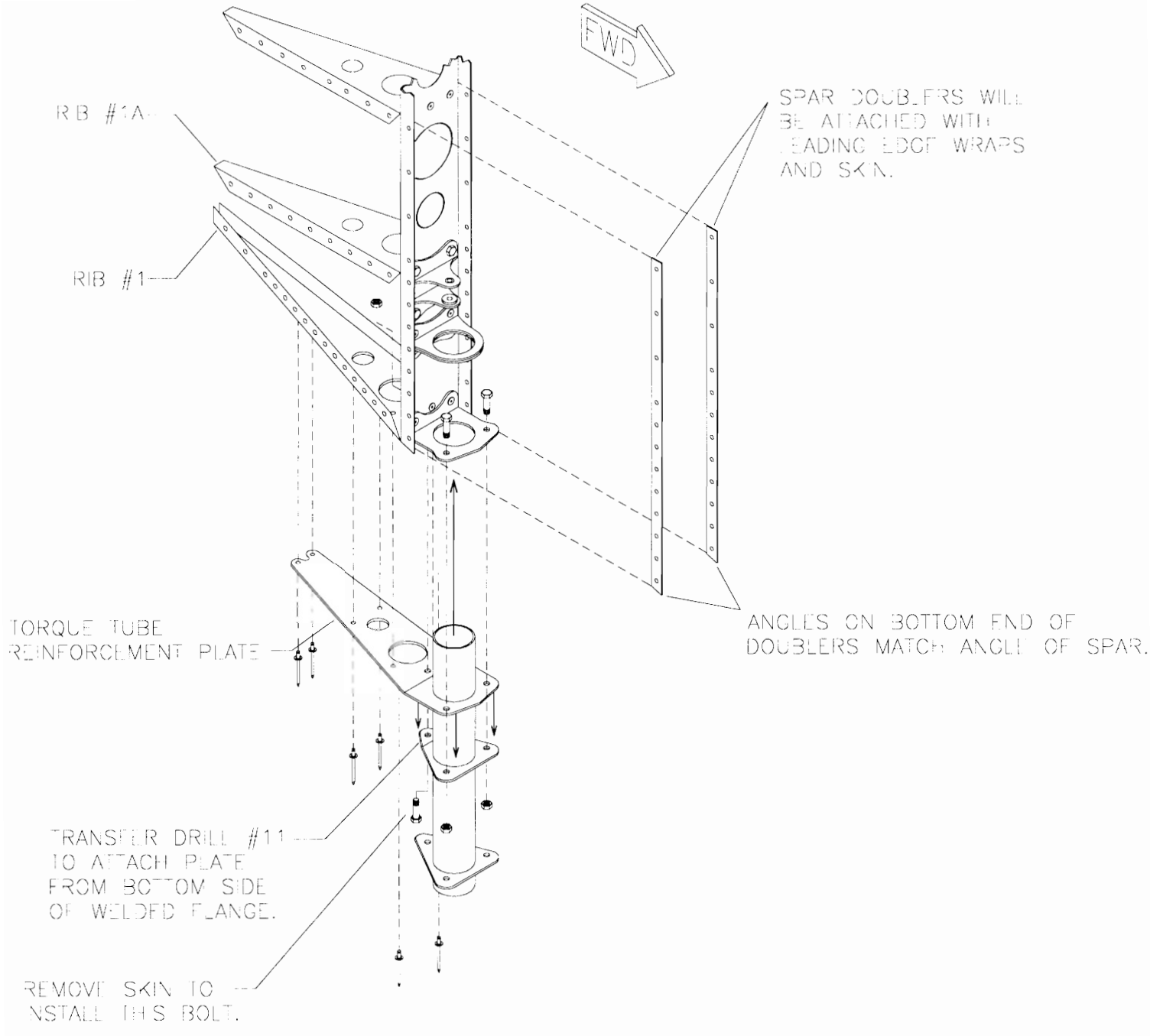


FIGURE 4-18

MD3107

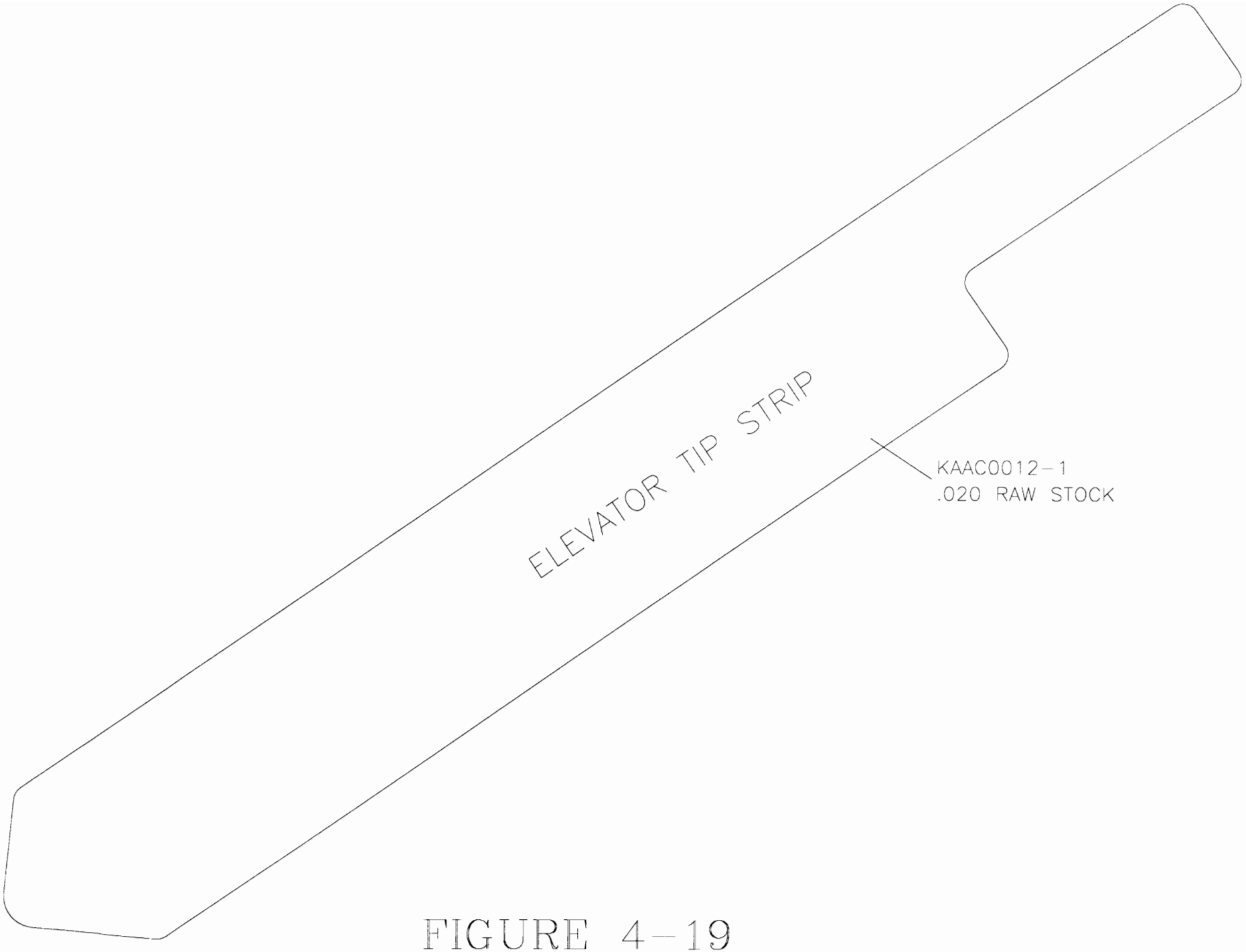


FIGURE 4-19

09/18/98

MD3213
REV.

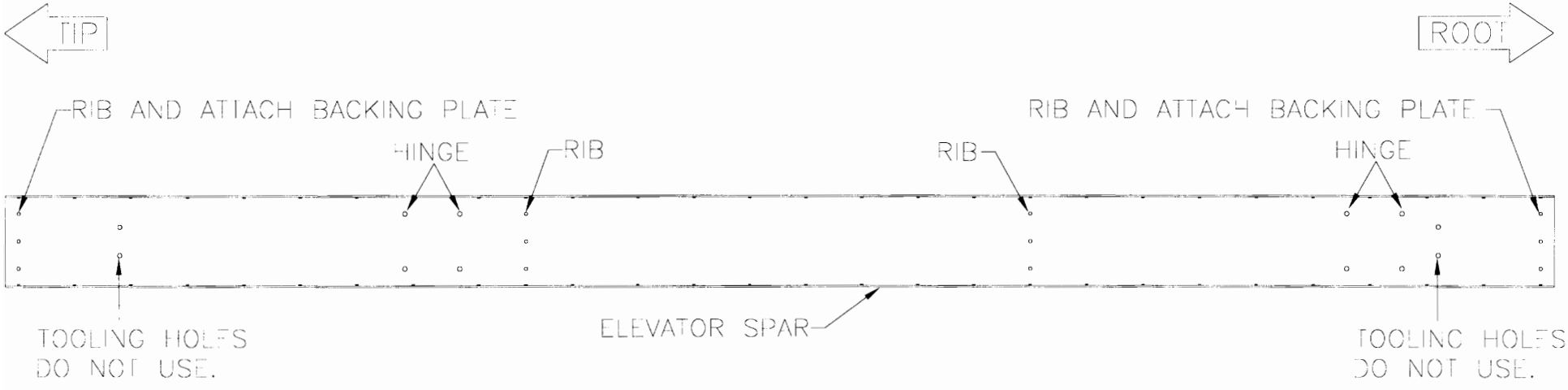


FIGURE 4-20

MD3214

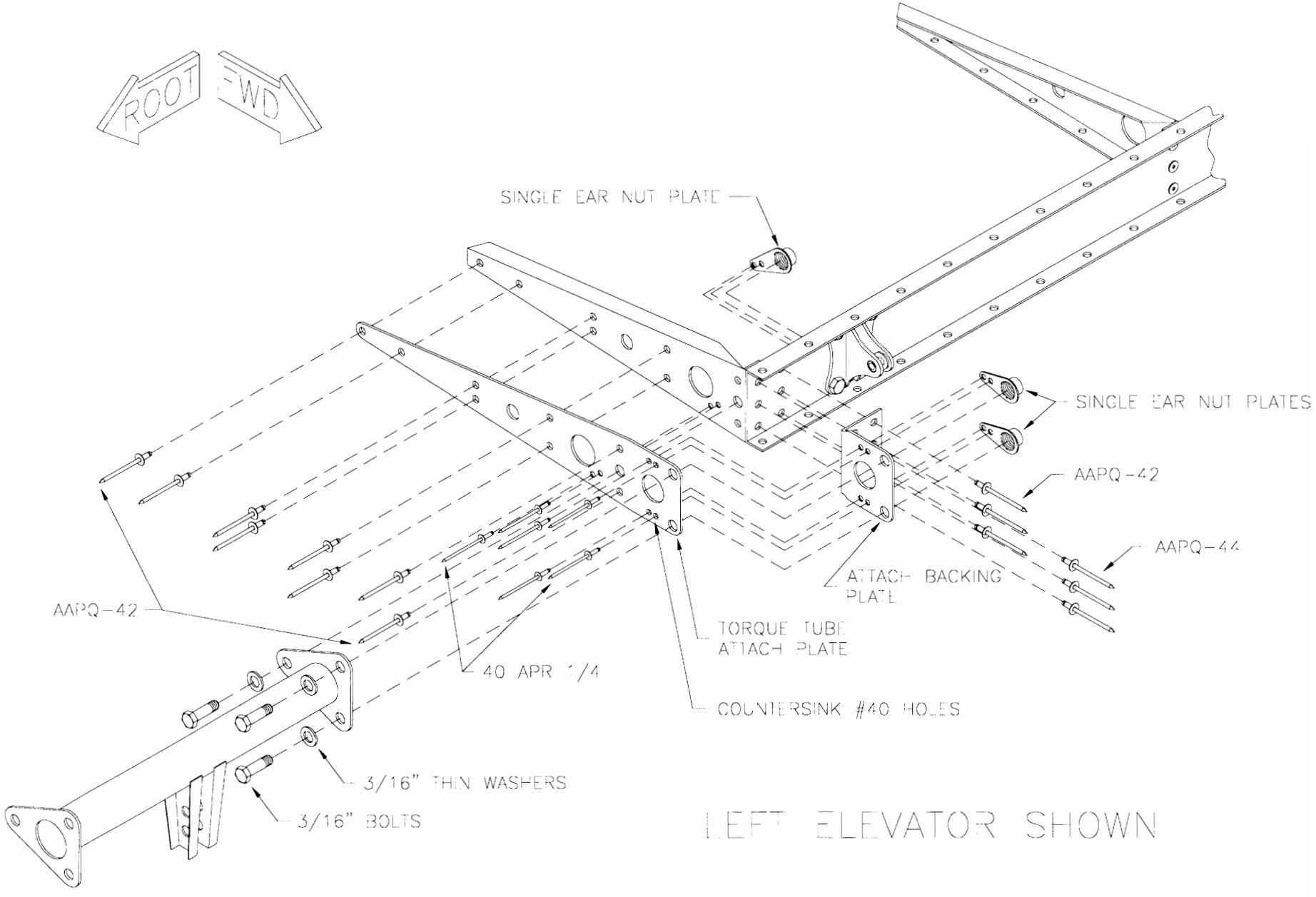


FIGURE 4-21

MD3099

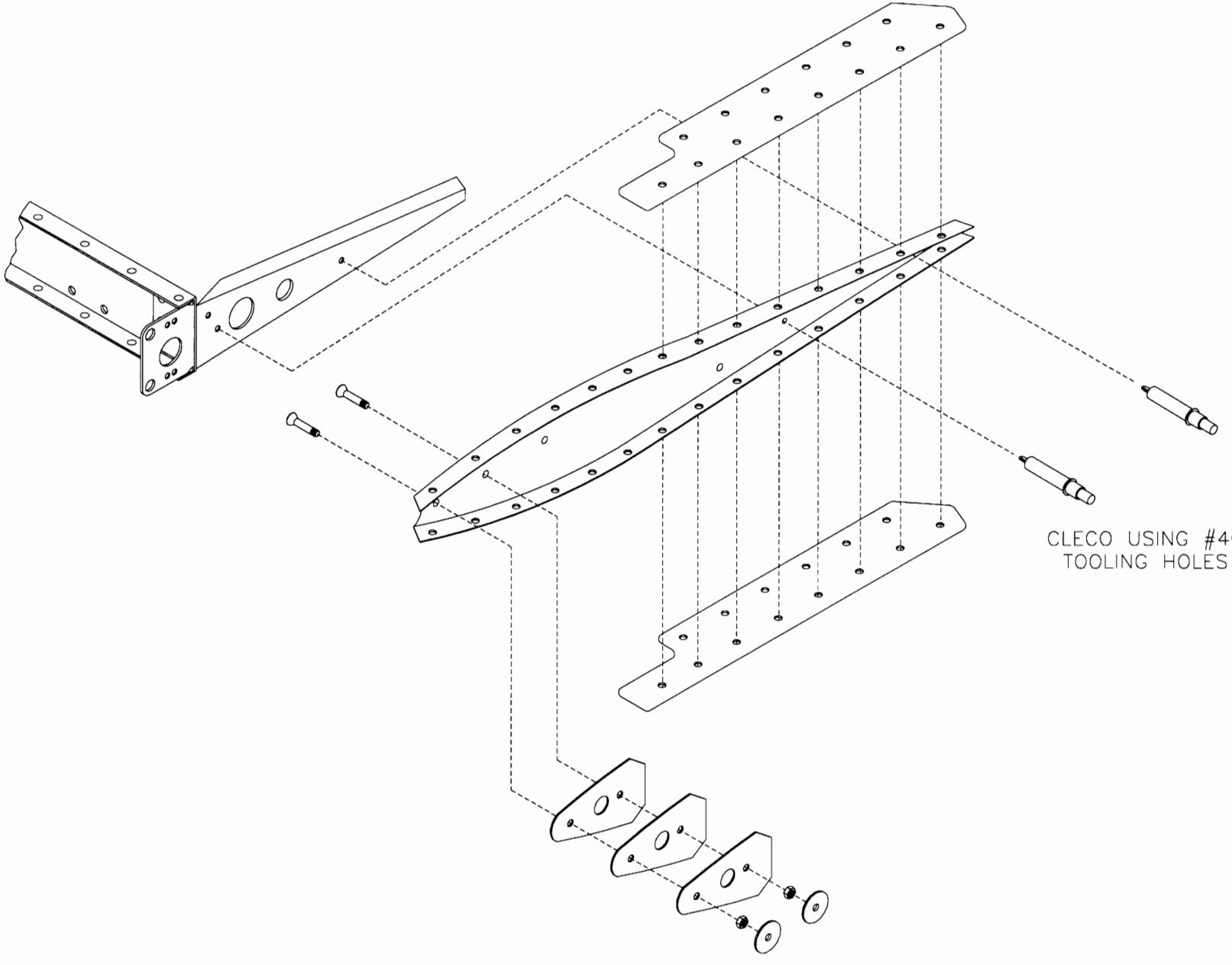
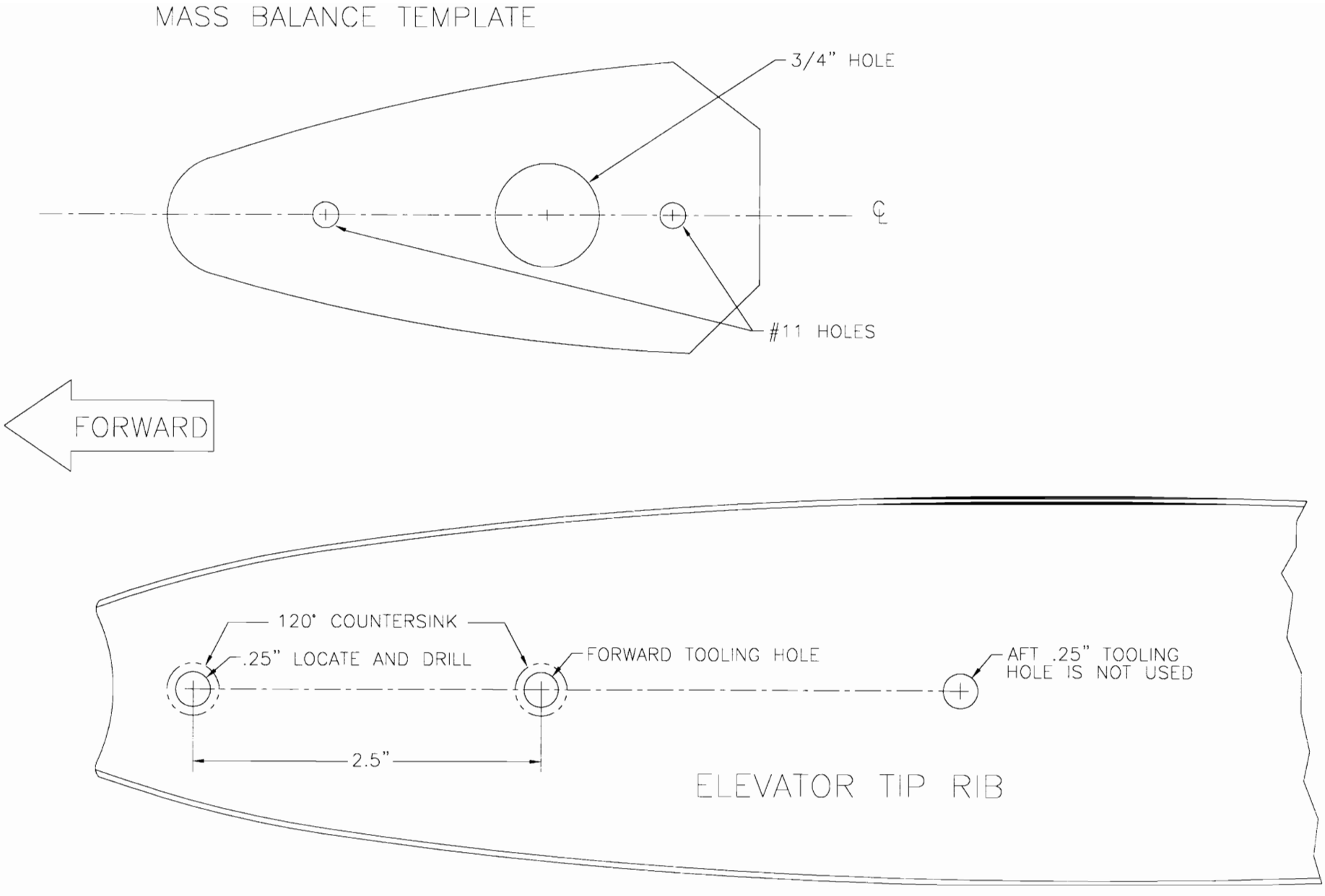


FIGURE 4-22



01/12/99

FIGURE 4-23

MD3216

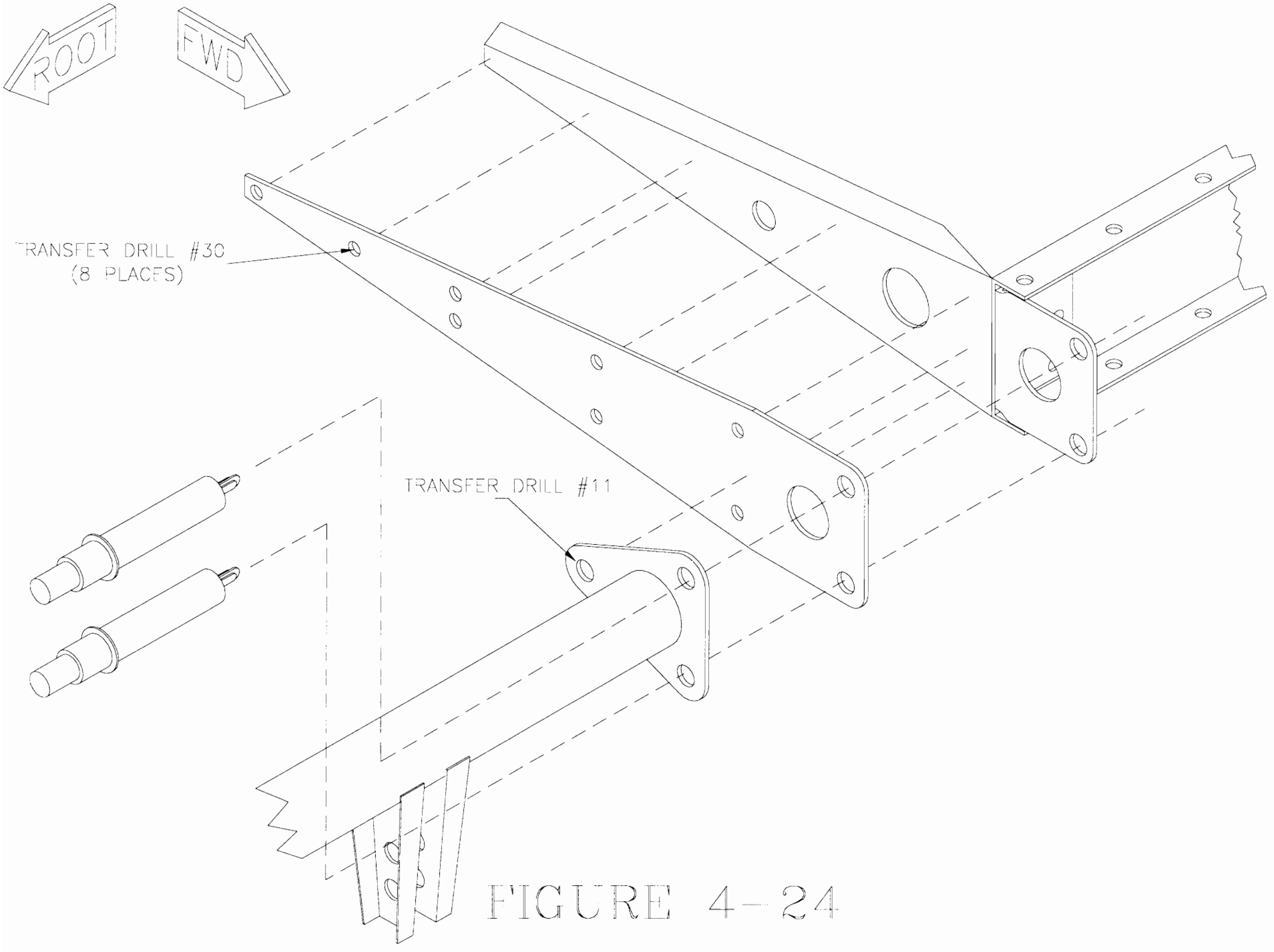


FIGURE 4-24

MD3217

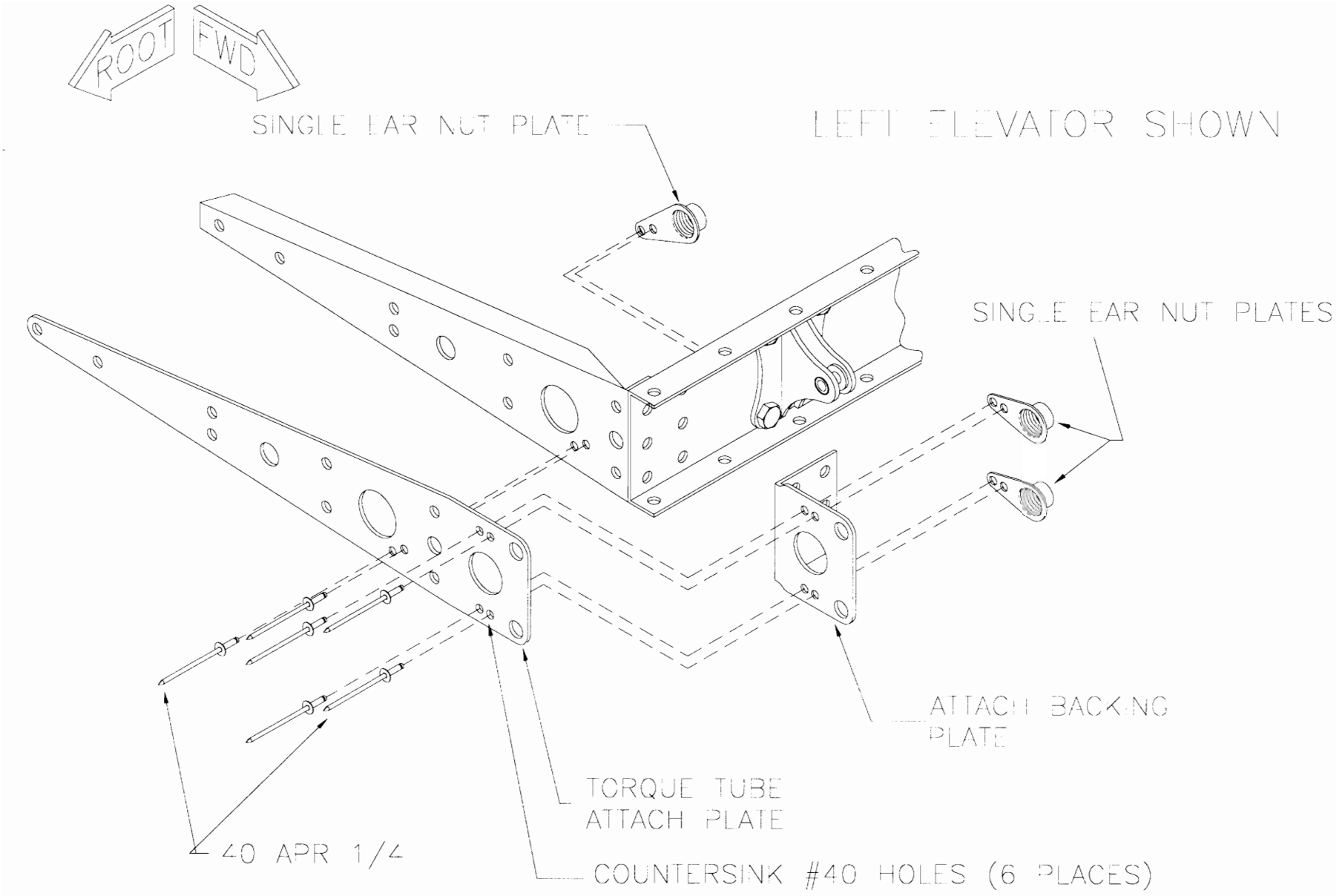


FIGURE 4-25

MD3099

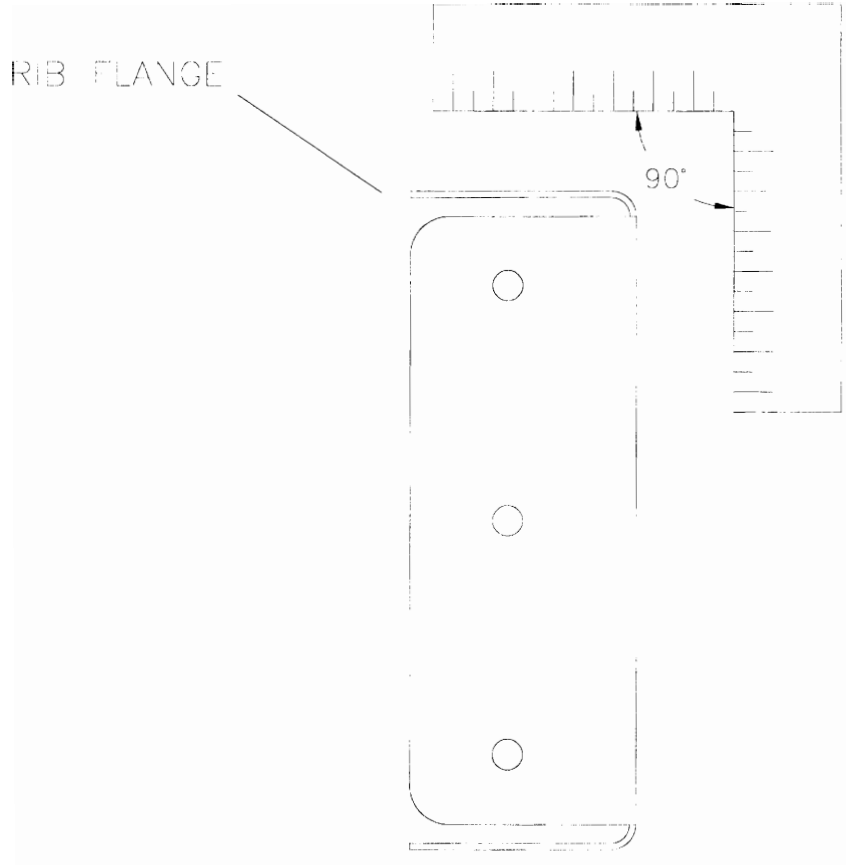
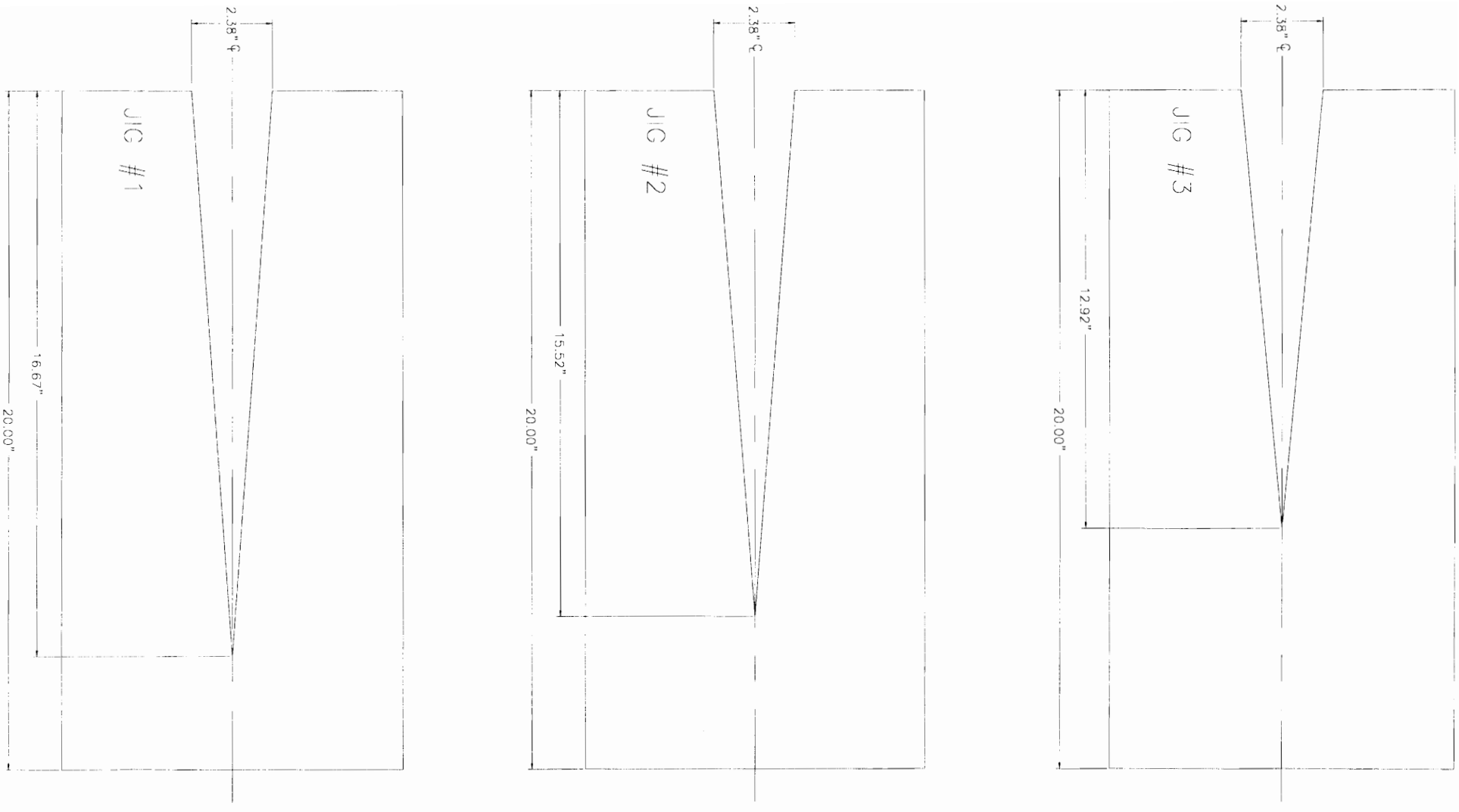


FIGURE 4 - 26



08/20/98

FIGURE 4-27

MD3245

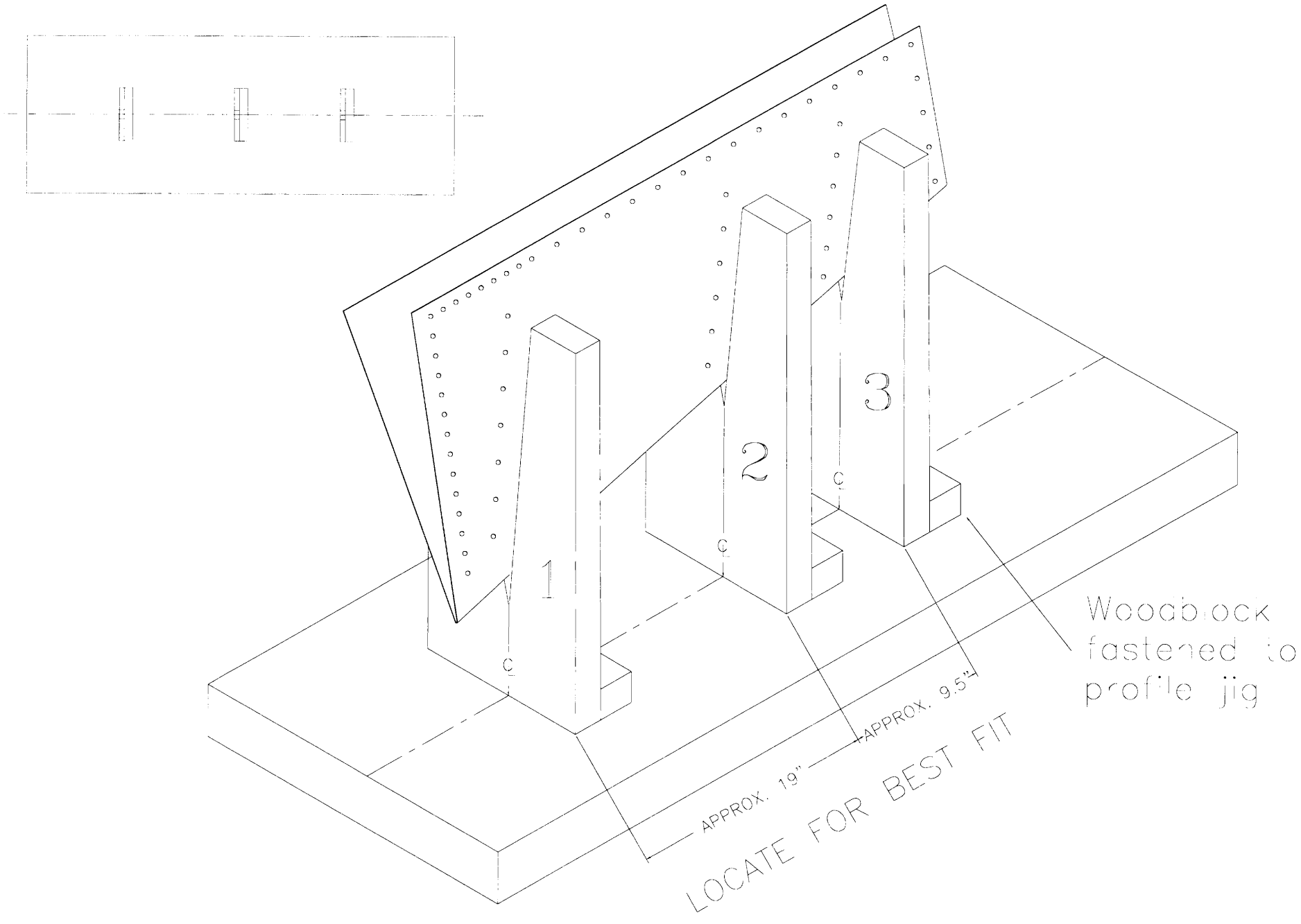


FIGURE 4-28

08/17/98

MD3246

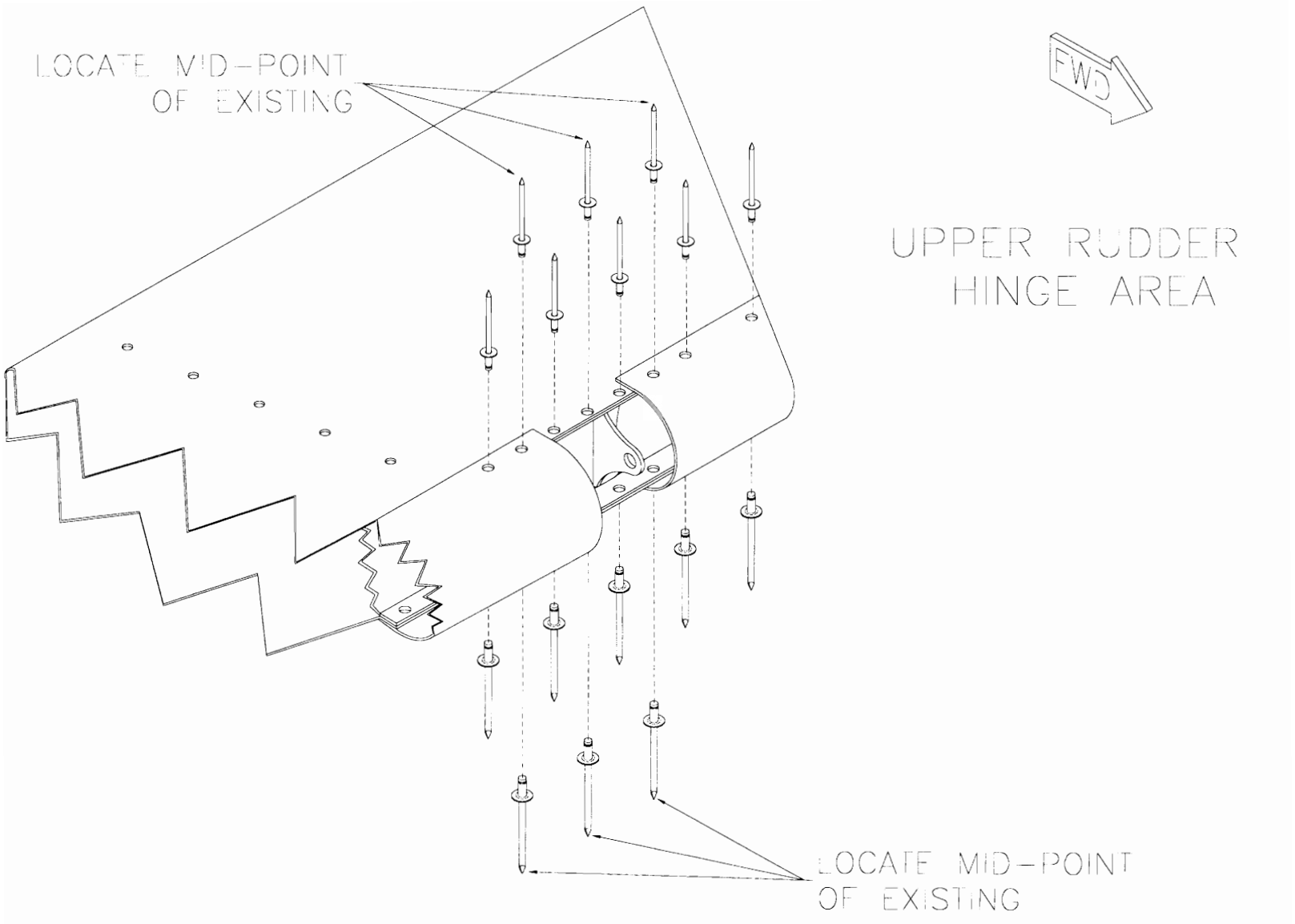


FIGURE 4-29

MD3242

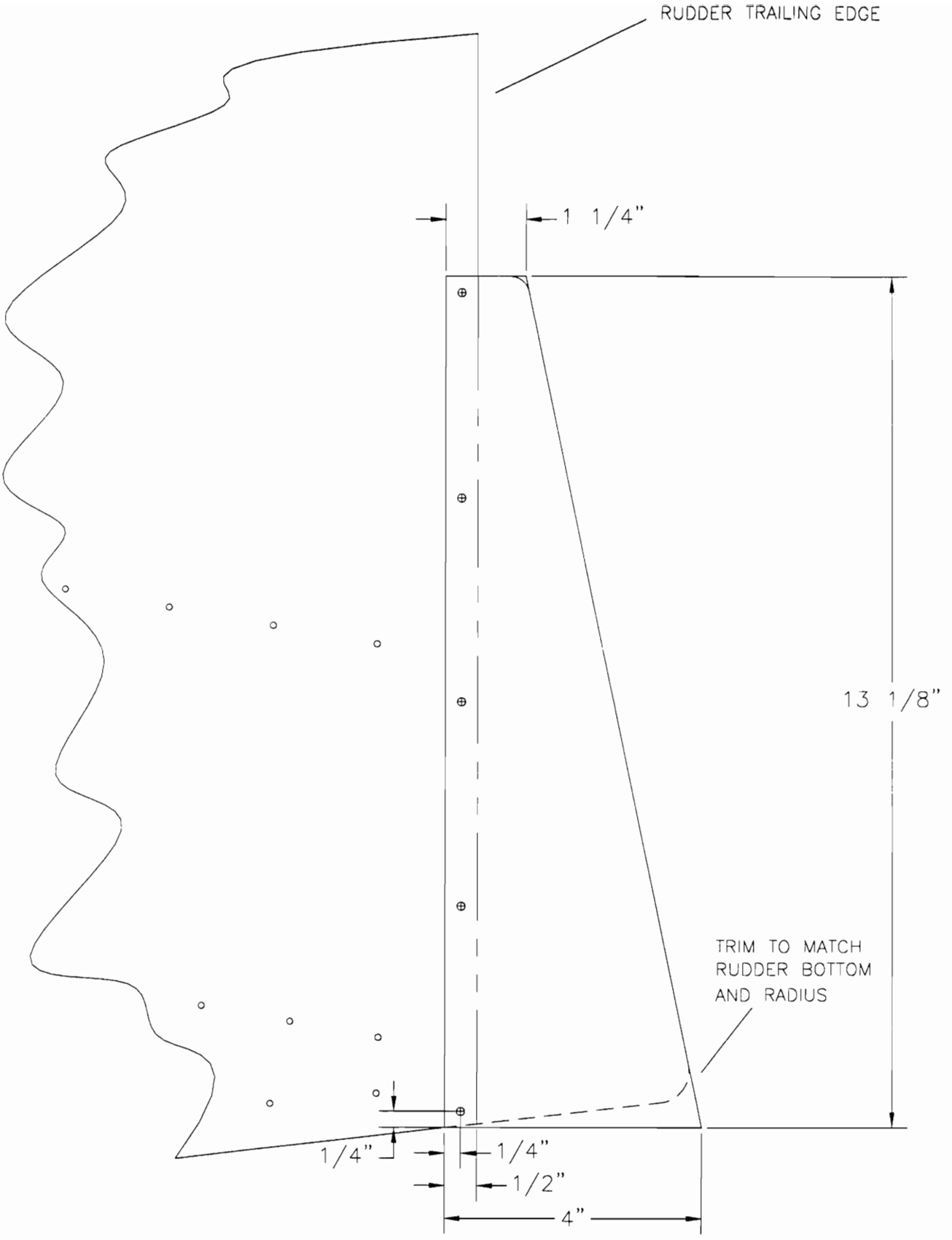

RUDDER TRAILING EDGE
1 1/4"
13 1/8"
TRIM TO MATCH
RUDDER BOTTOM
AND RADIUS
1/4"
1/4"
1/2"
4"

FIGURE 4-30

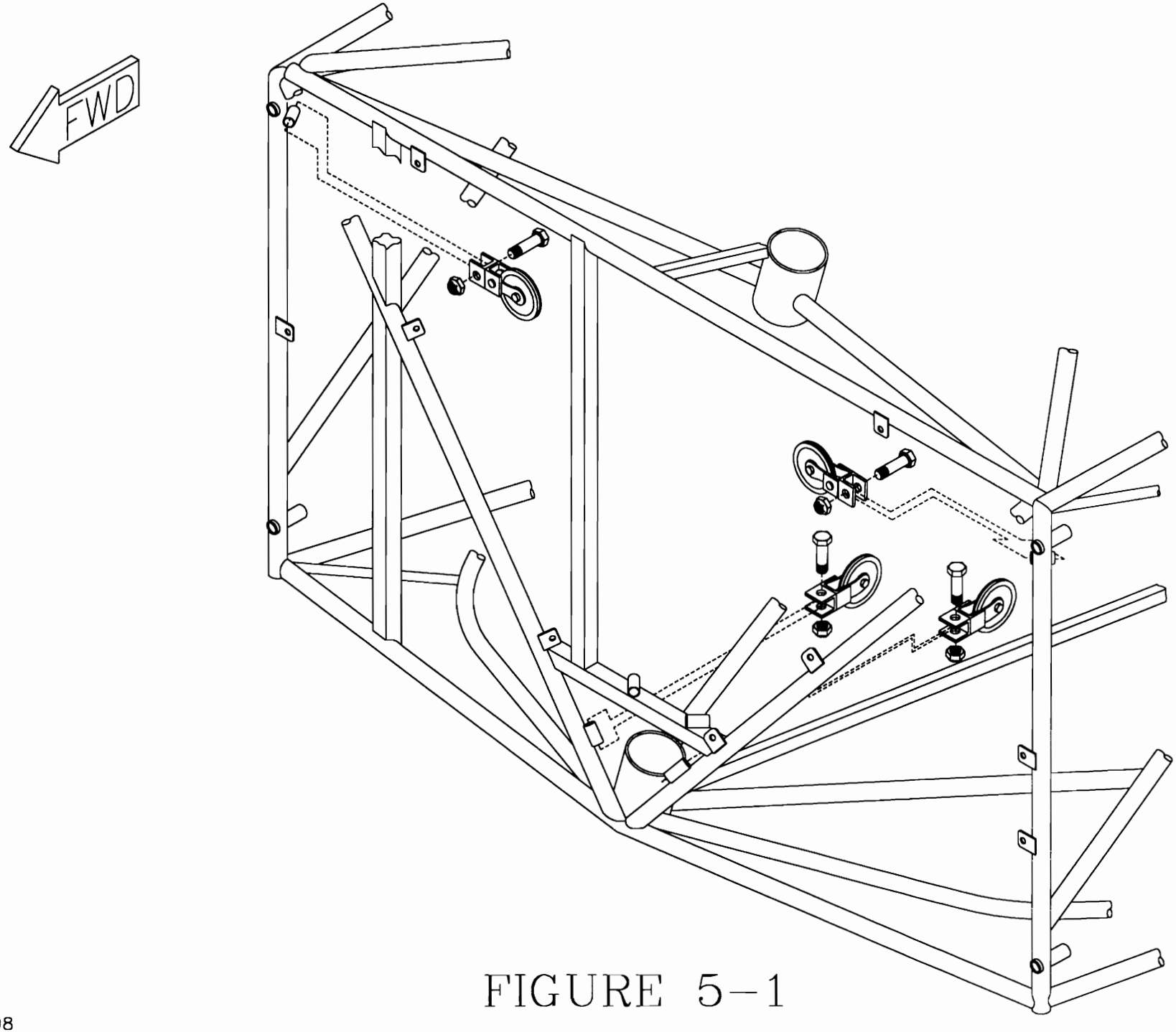


FIGURE 5-1

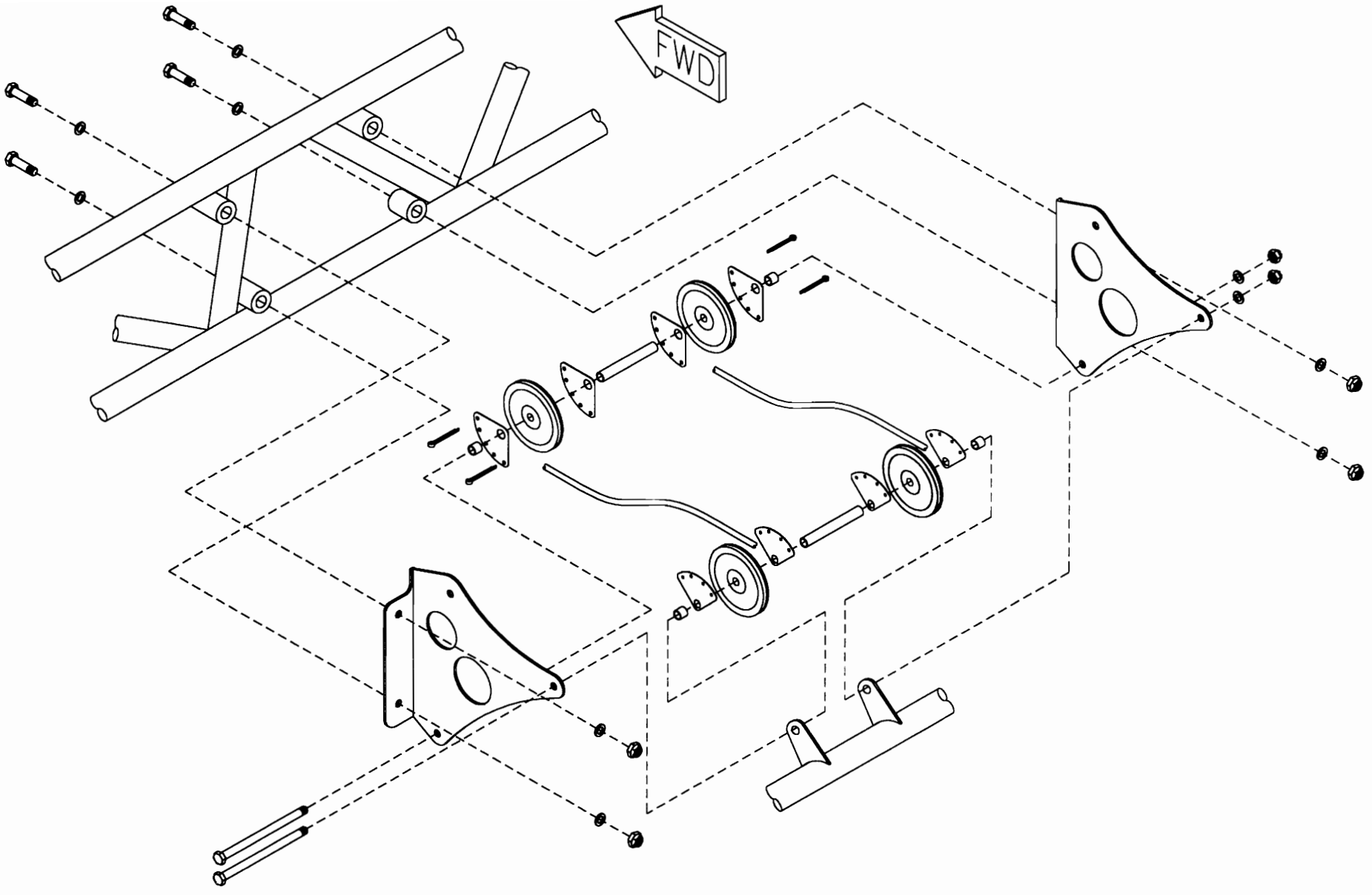


FIGURE 5-2

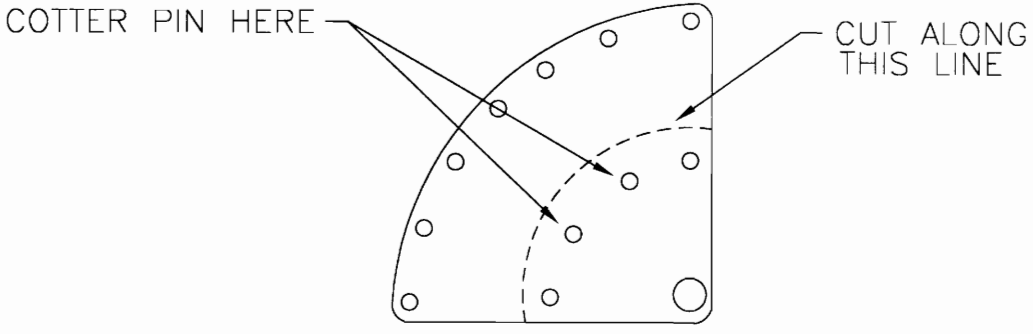


FIGURE 5-3

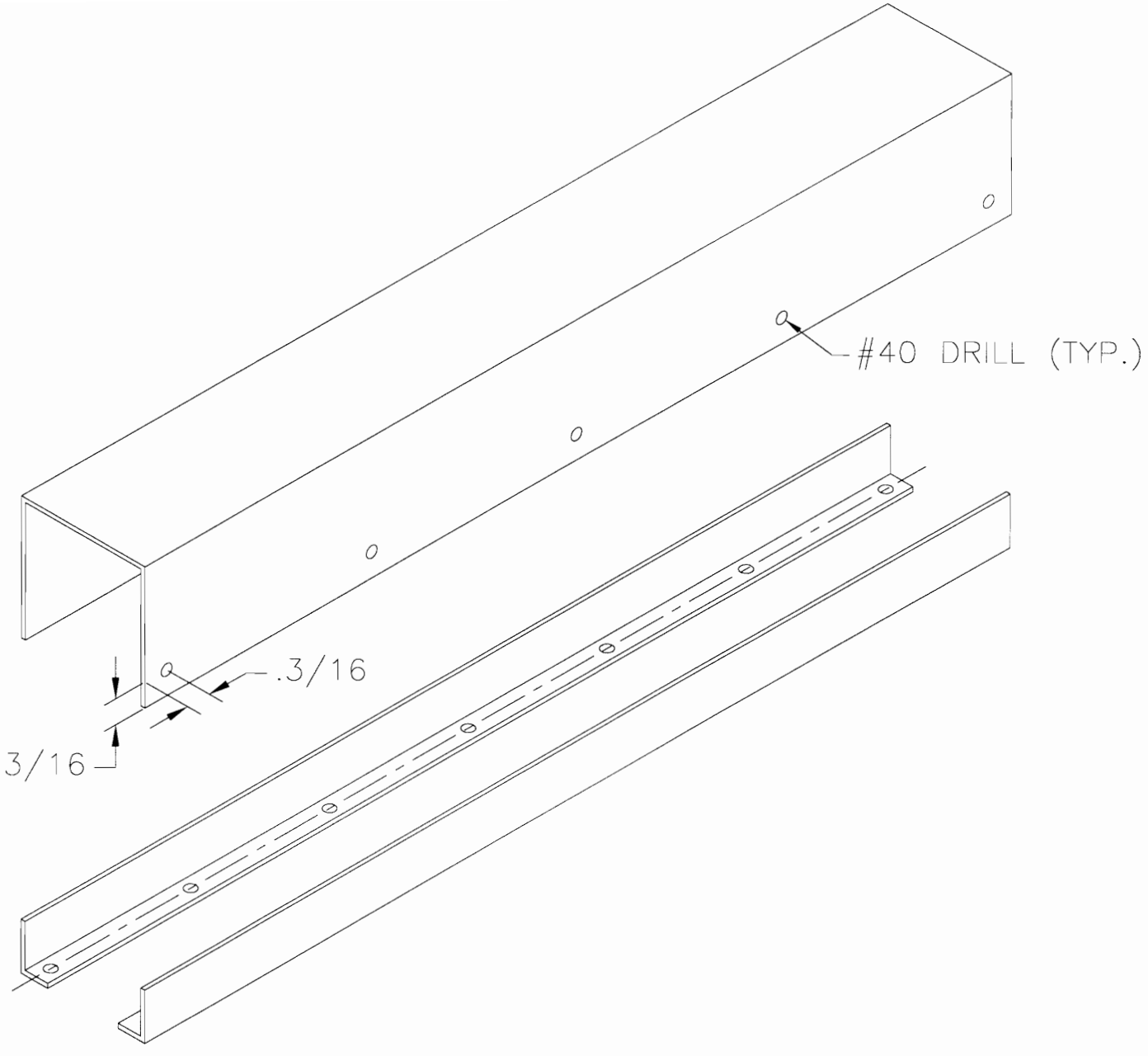


FIGURE 5-3A

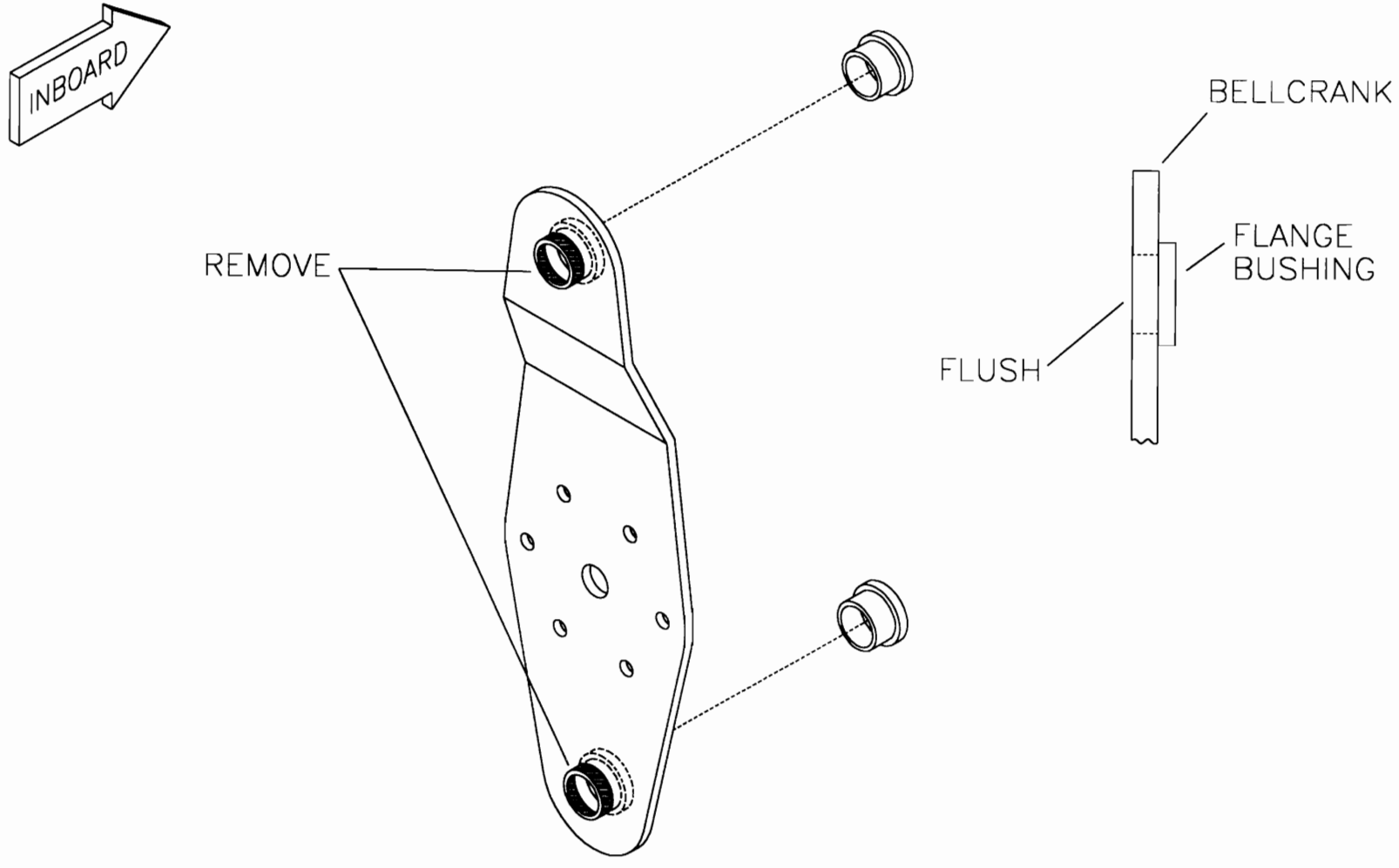
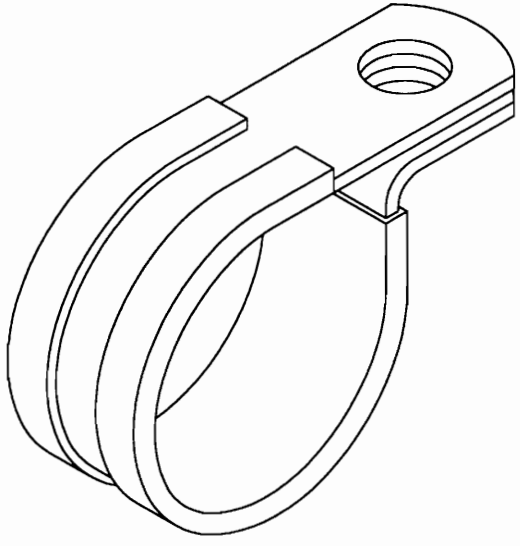


FIGURE 5-4

BEFORE



AFTER

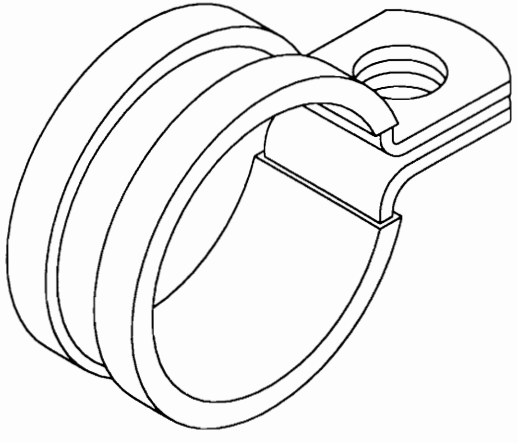


FIGURE 5-5

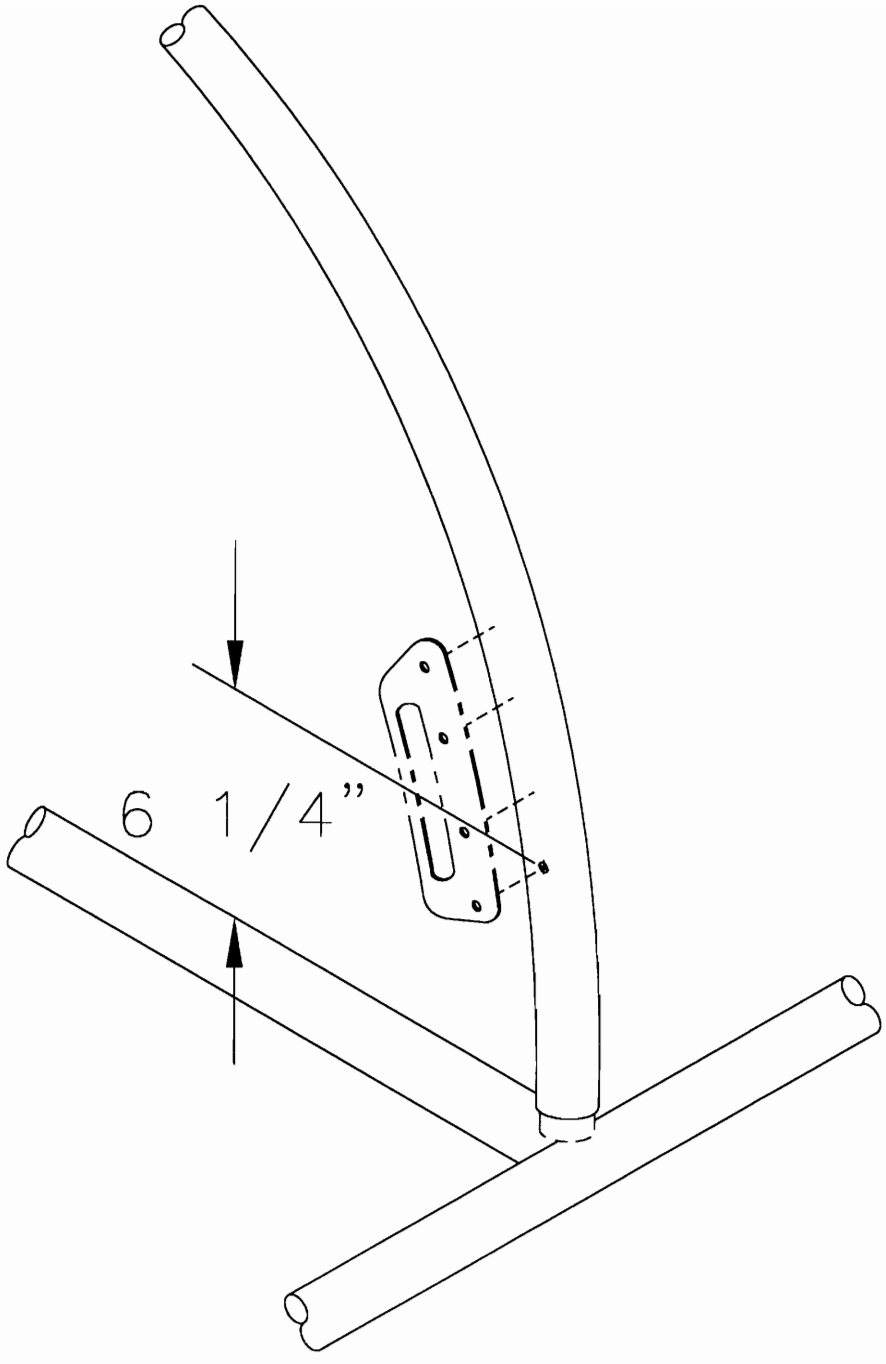


FIGURE 5-6

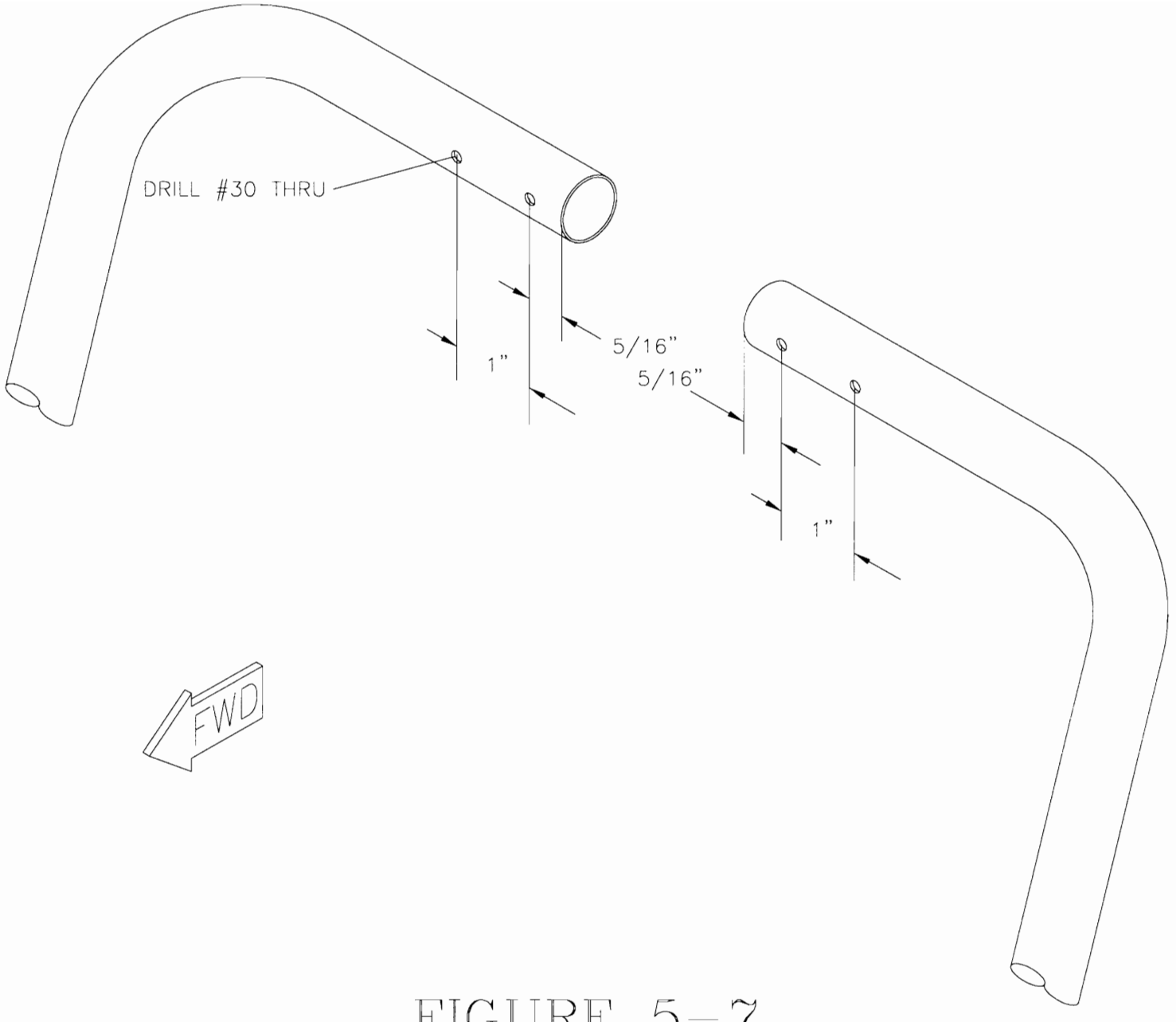


FIGURE 5-7

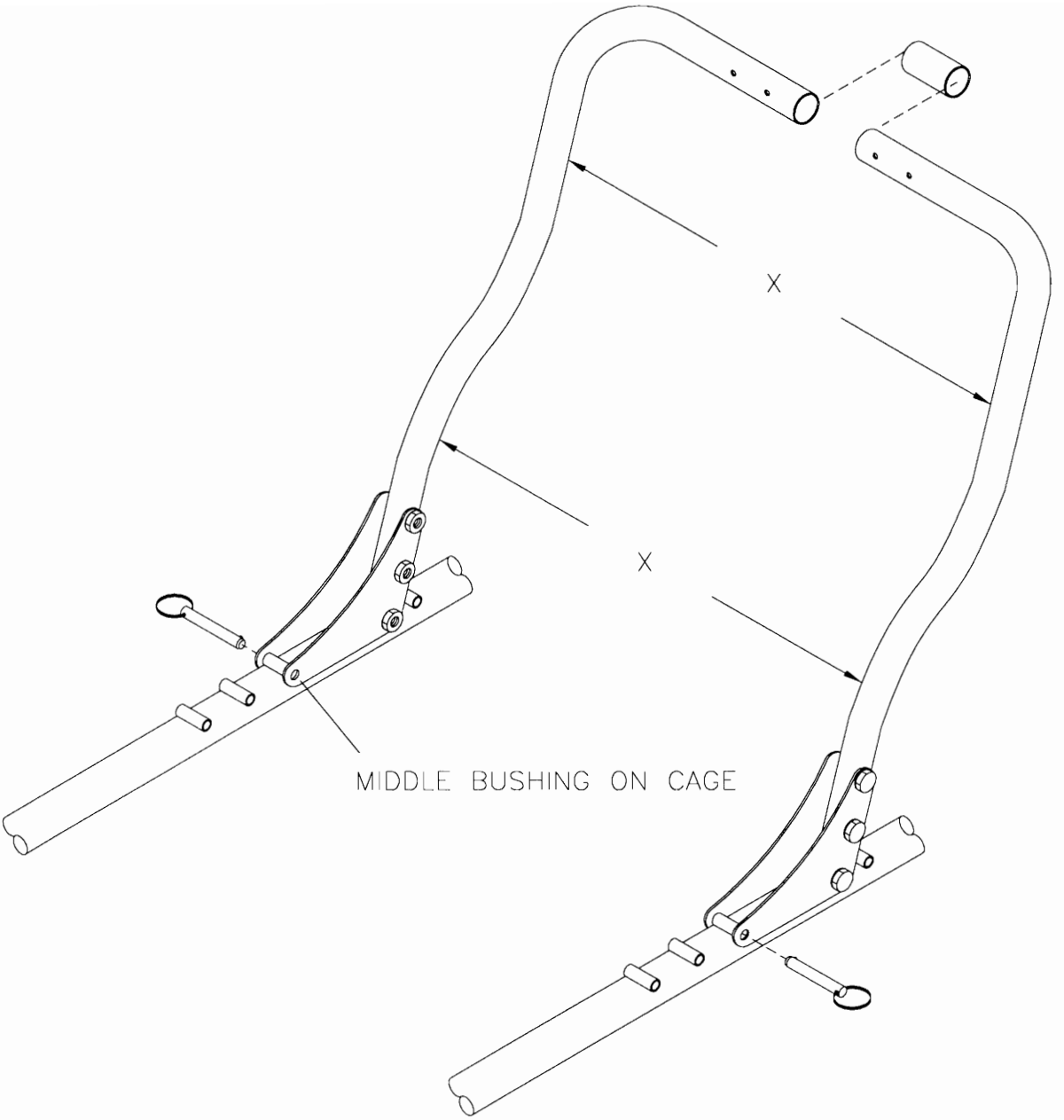


FIGURE 5-8

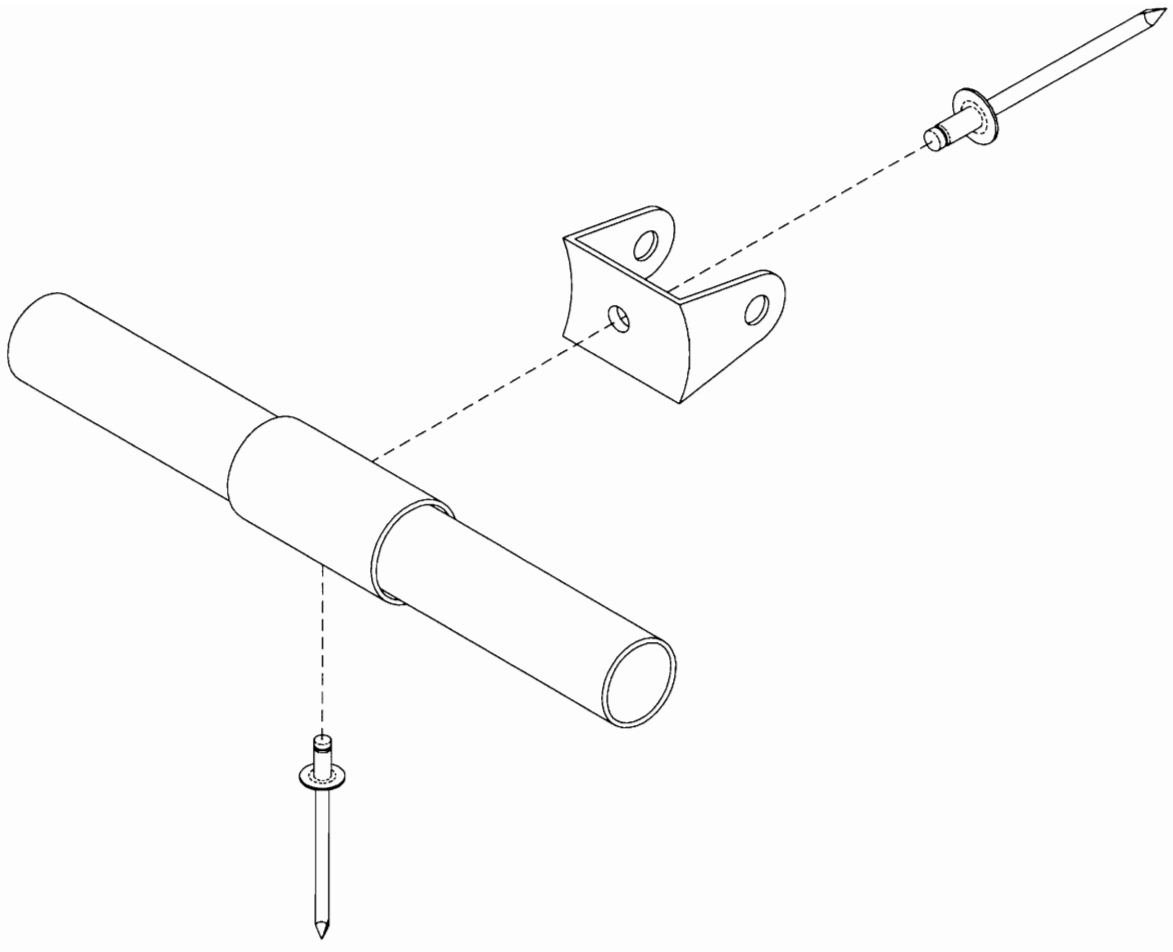


FIGURE 5–9

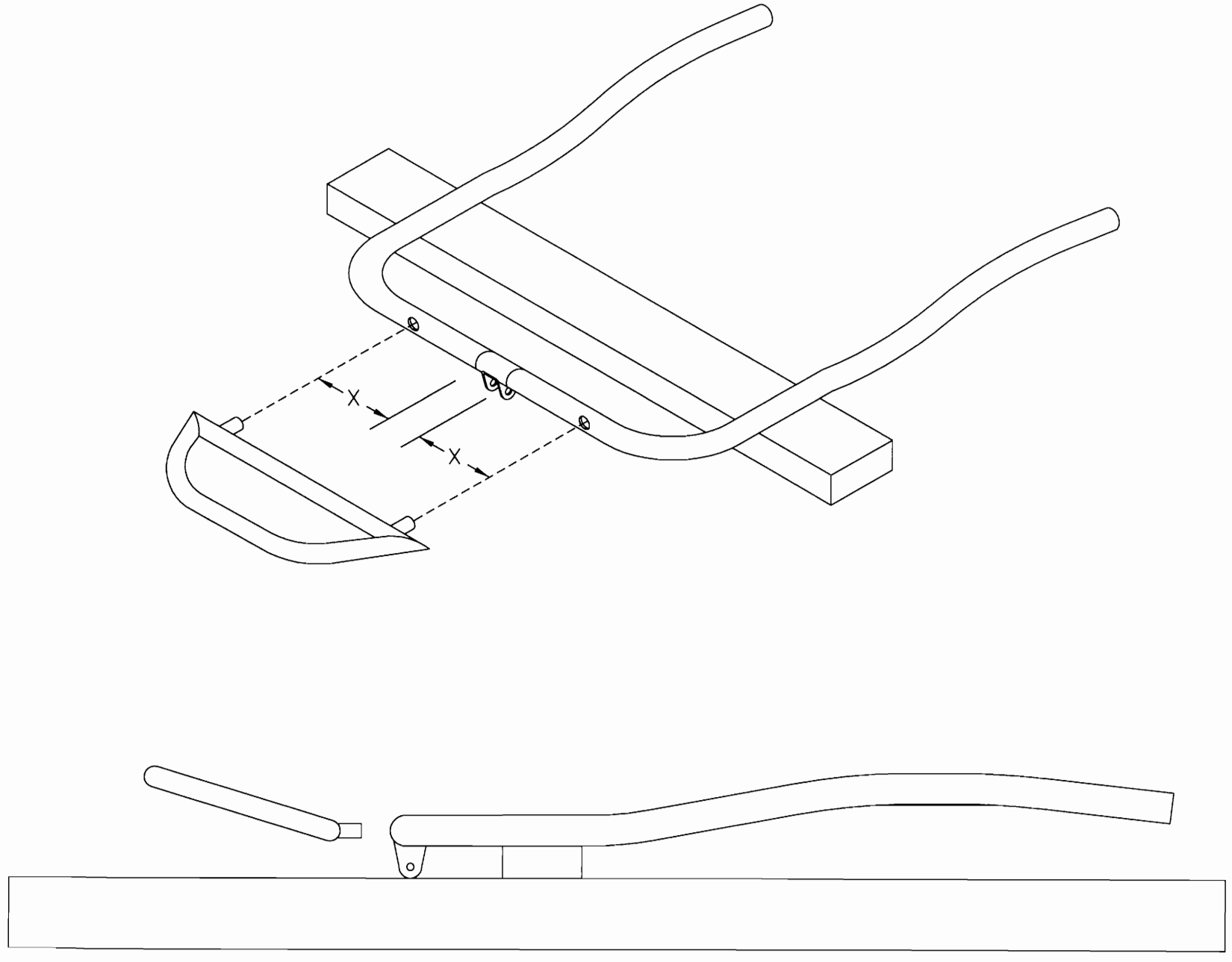


FIGURE 5–10

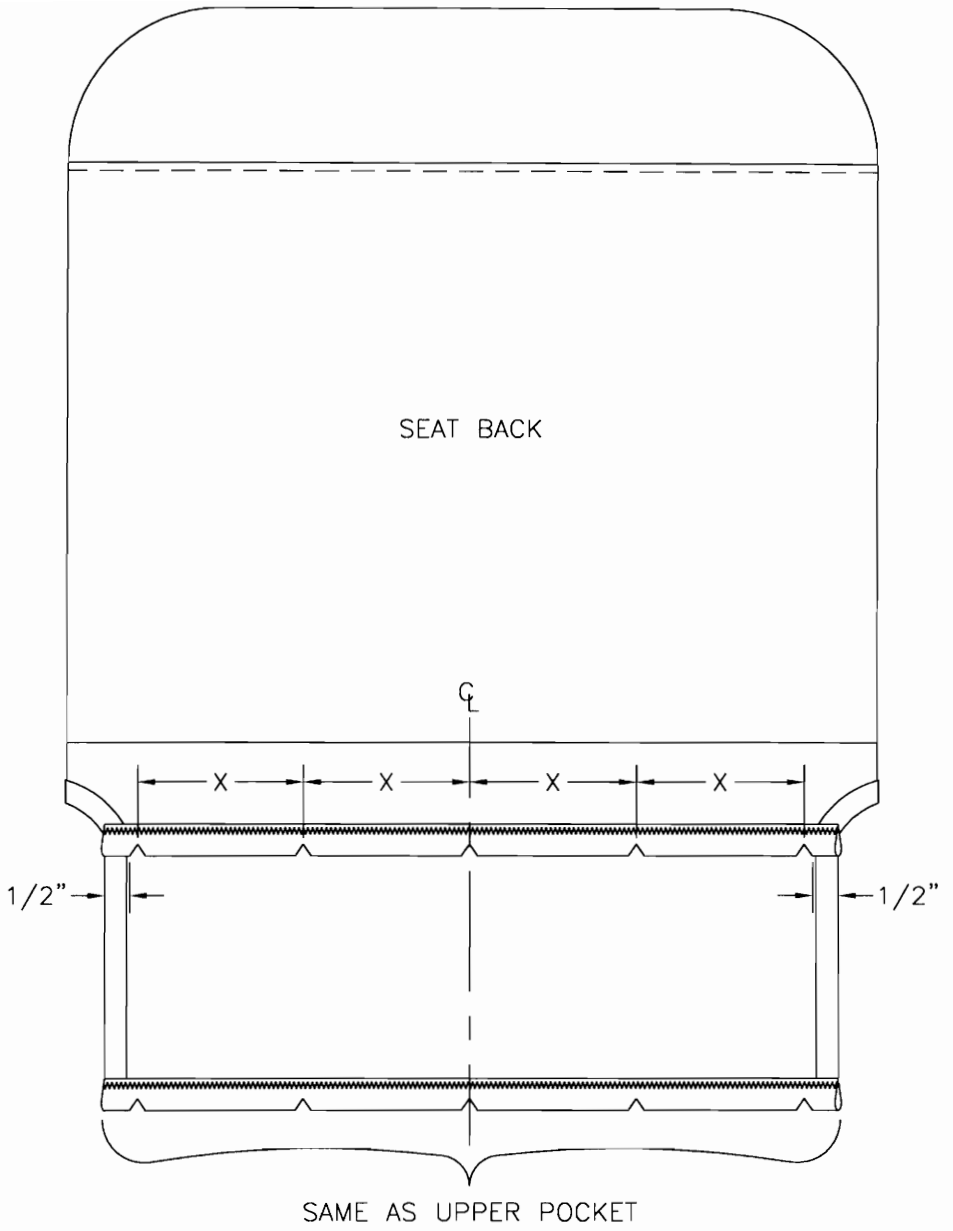


FIGURE 5-11

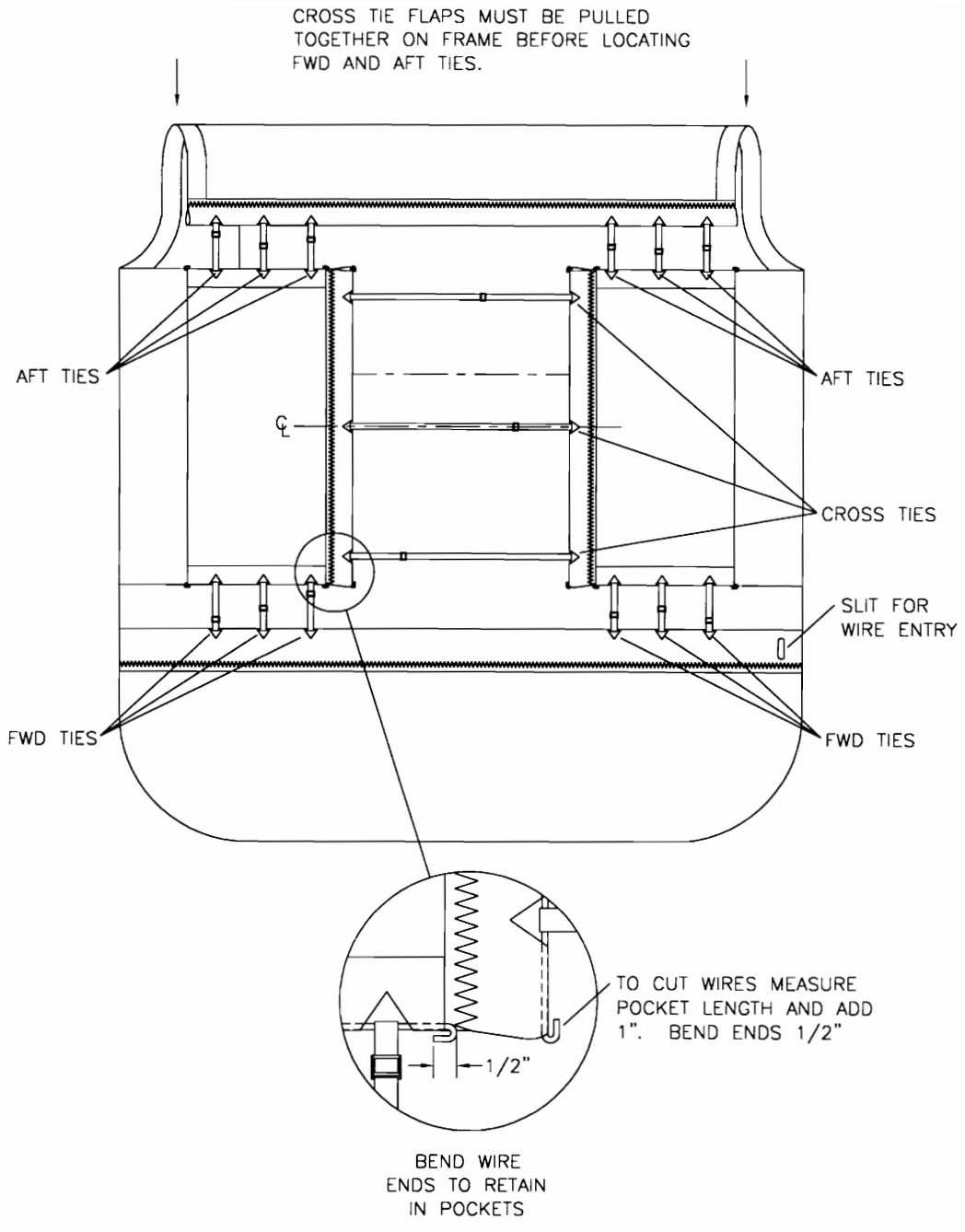

CROSS TIE FLAPS MUST BE PULLED TOGETHER ON FRAME BEFORE LOCATING FWD AND AFT TIES.
AFT TIES
AFT TIES
℄
CROSS TIES
SLIT FOR WIRE ENTRY
FWD TIES
FWD TIES
TO CUT WIRES MEASURE POCKET LENGTH AND ADD 1". BEND ENDS 1/2"
1/2"
BEND WIRE ENDS TO RETAIN IN POCKETS

FIGURE 5-12

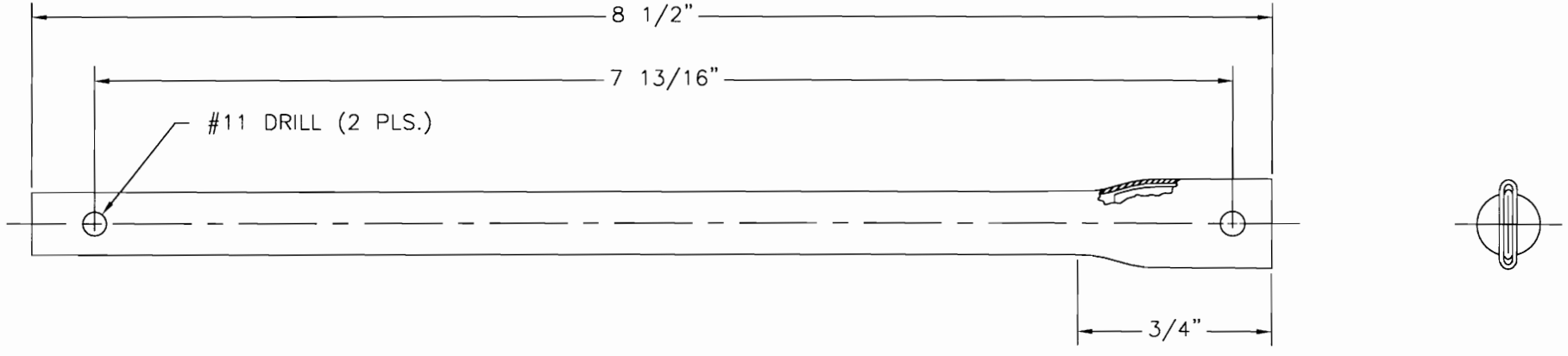


FIGURE 5-13

12/15/98

MD3382
REV.

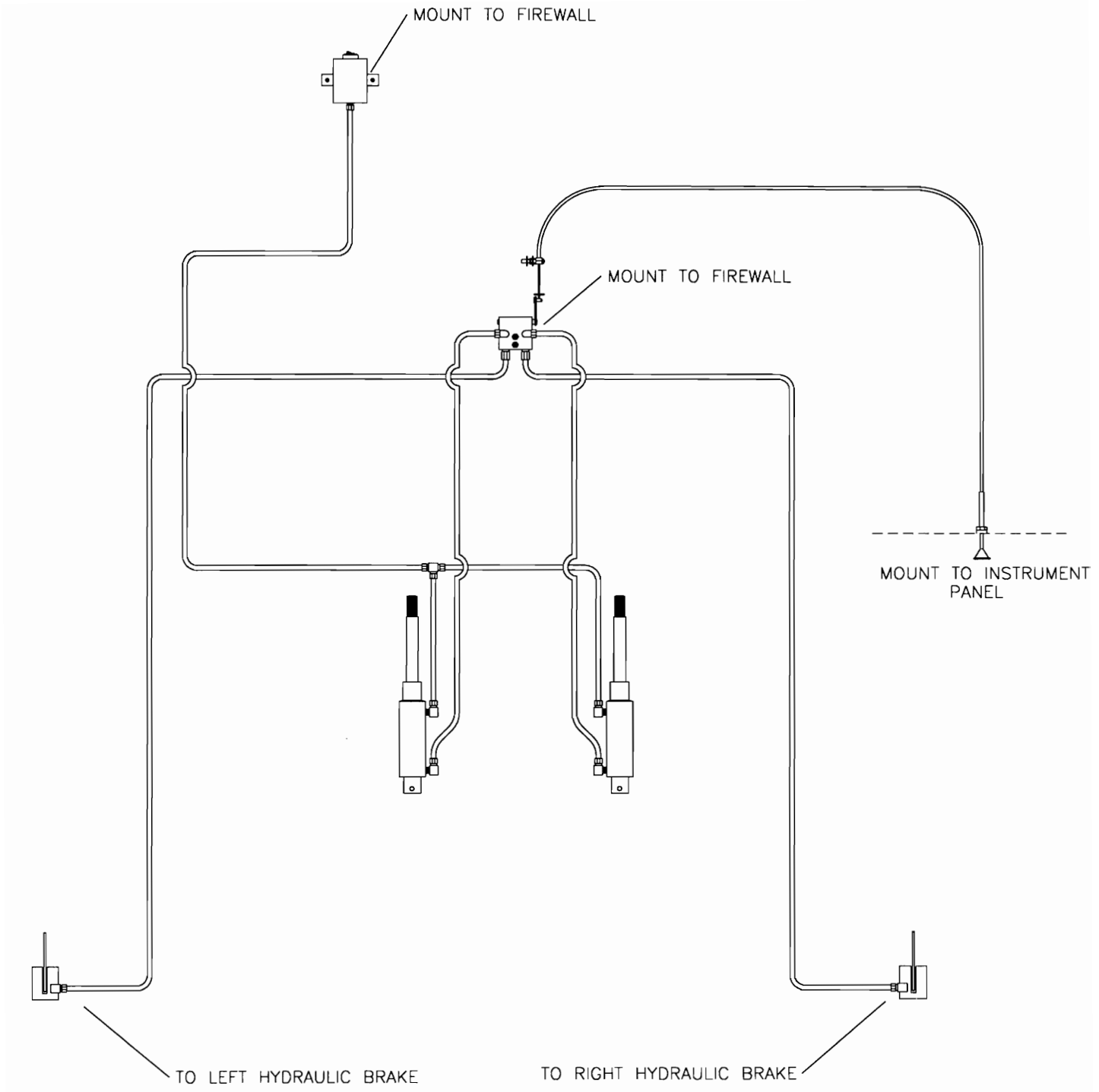

MOUNT TO FIREWALL
MOUNT TO FIREWALL
MOUNT TO INSTRUMENT PANEL
TO LEFT HYDRAULIC BRAKE
TO RIGHT HYDRAULIC BRAKE

FIGURE 5-14

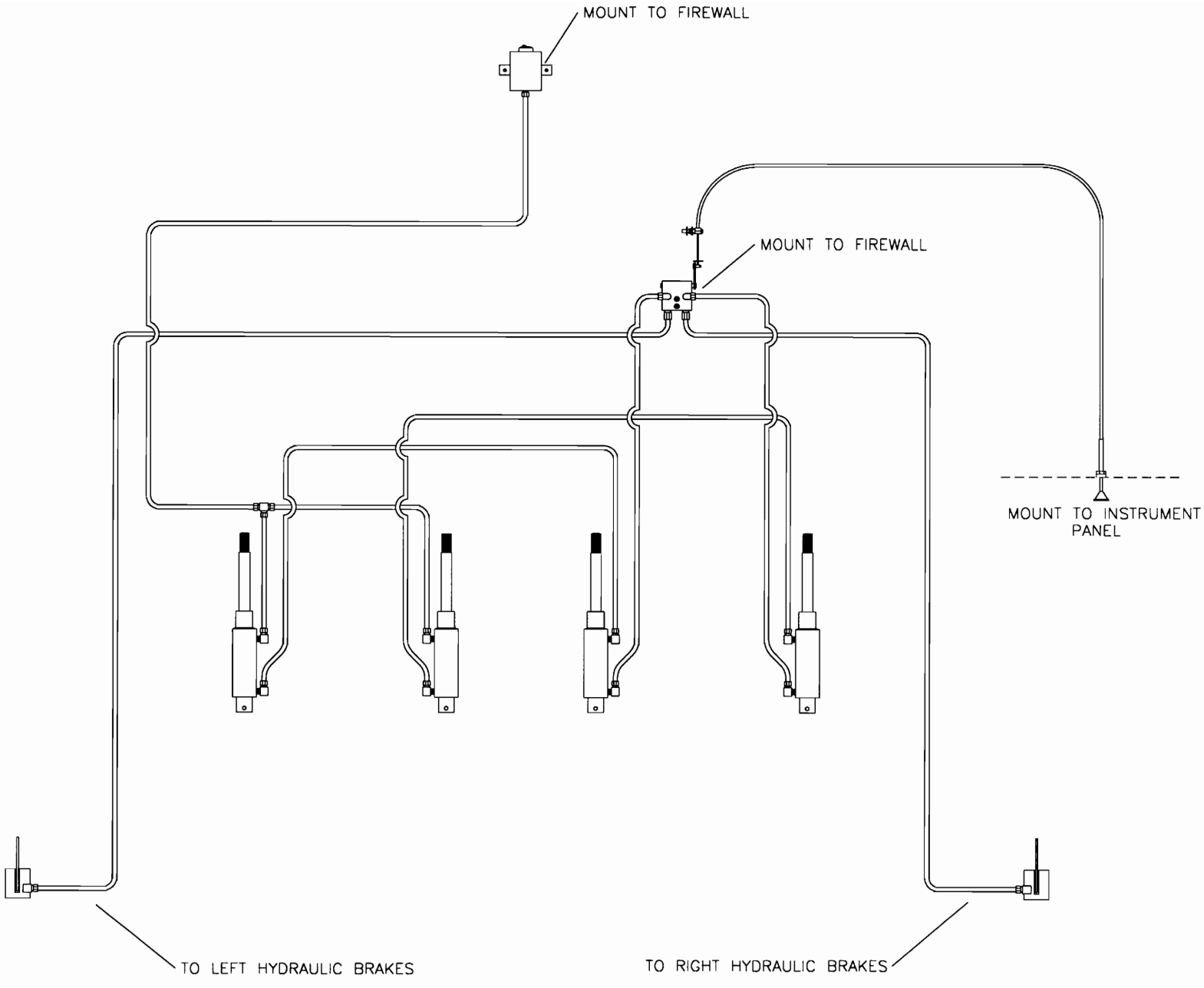

MOUNT TO FIREWALL
MOUNT TO FIREWALL
MOUNT TO INSTRUMENT PANEL
TO LEFT HYDRAULIC BRAKES
TO RIGHT HYDRAULIC BRAKES

FIGURE 5-15

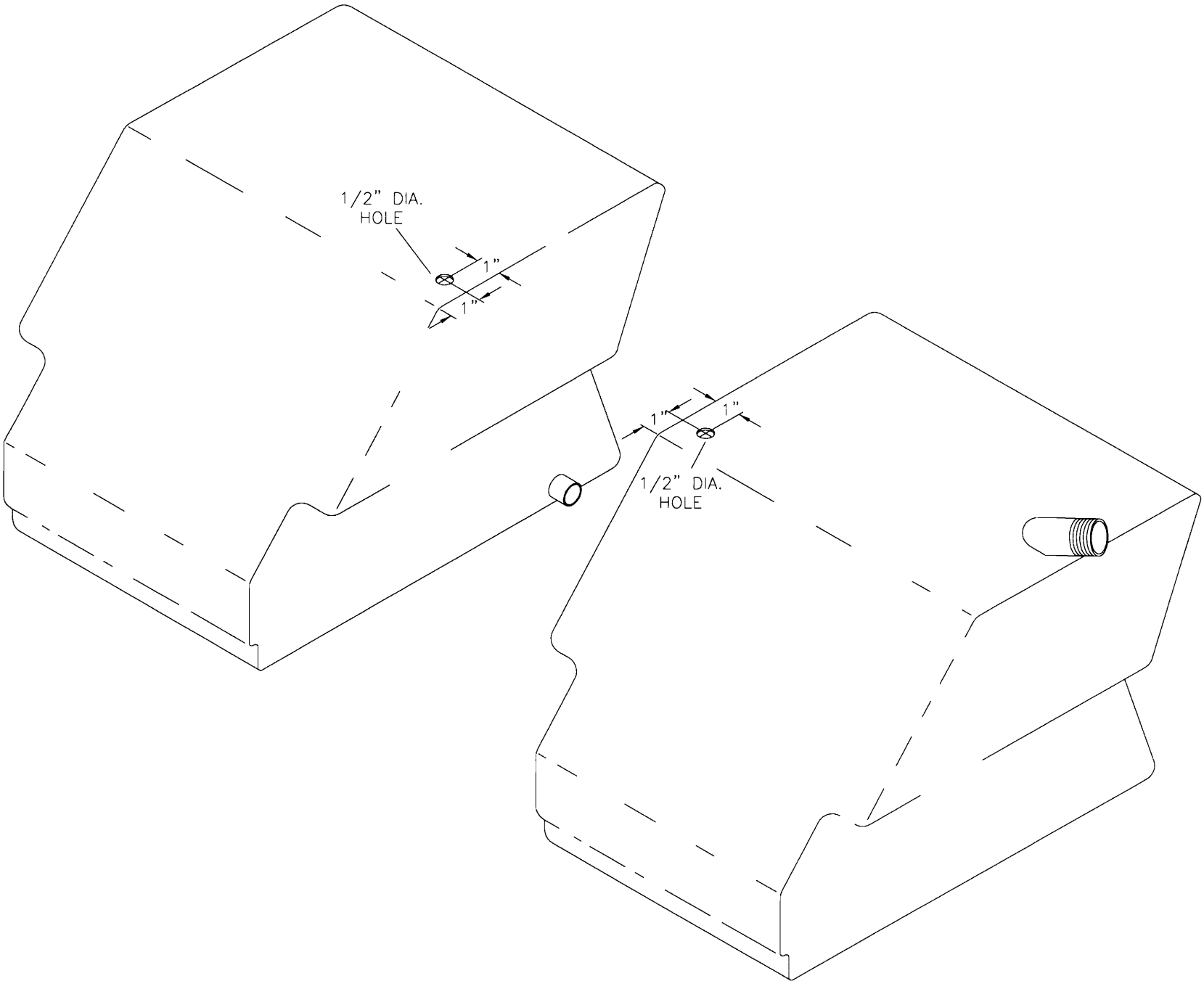
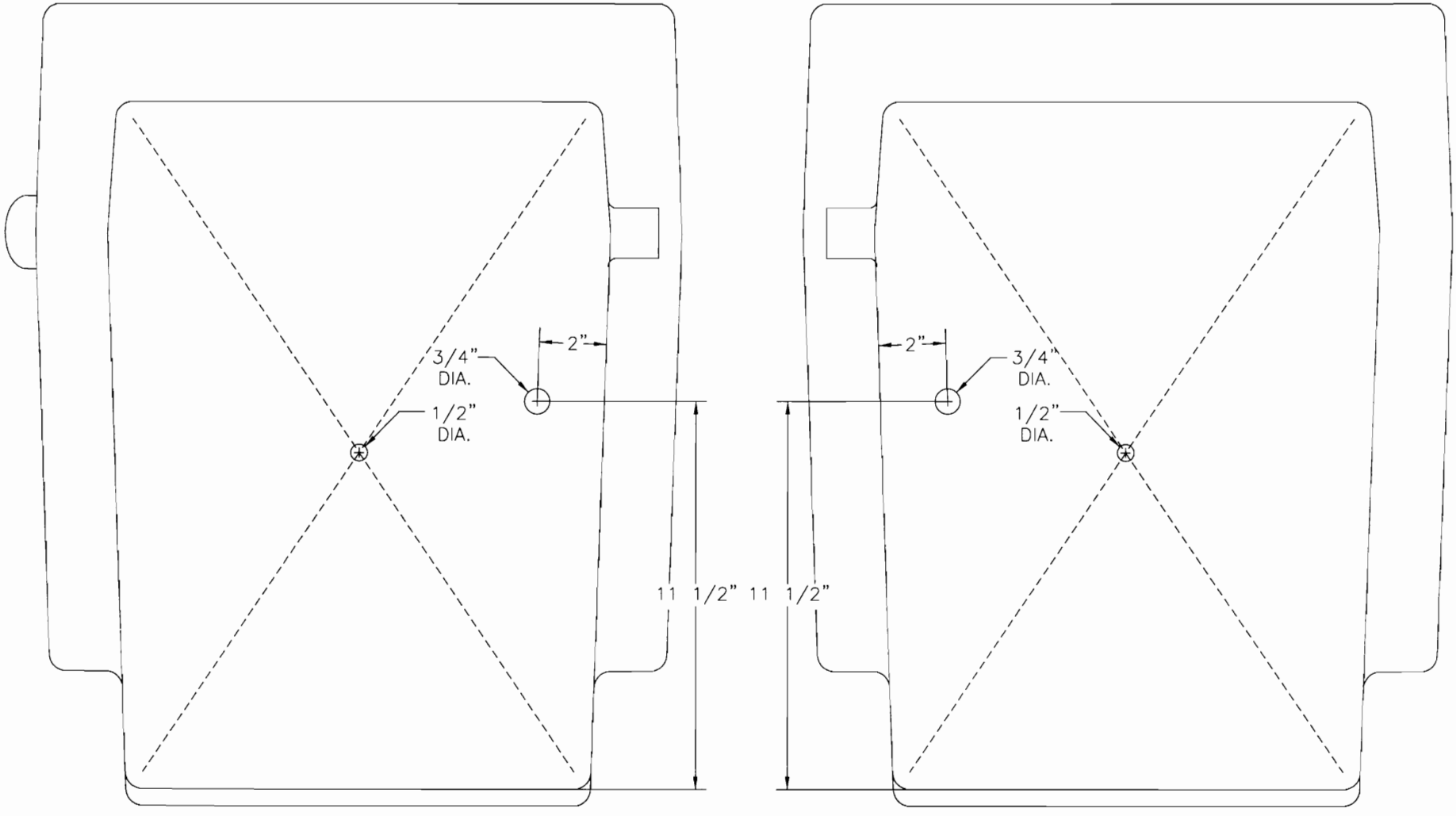
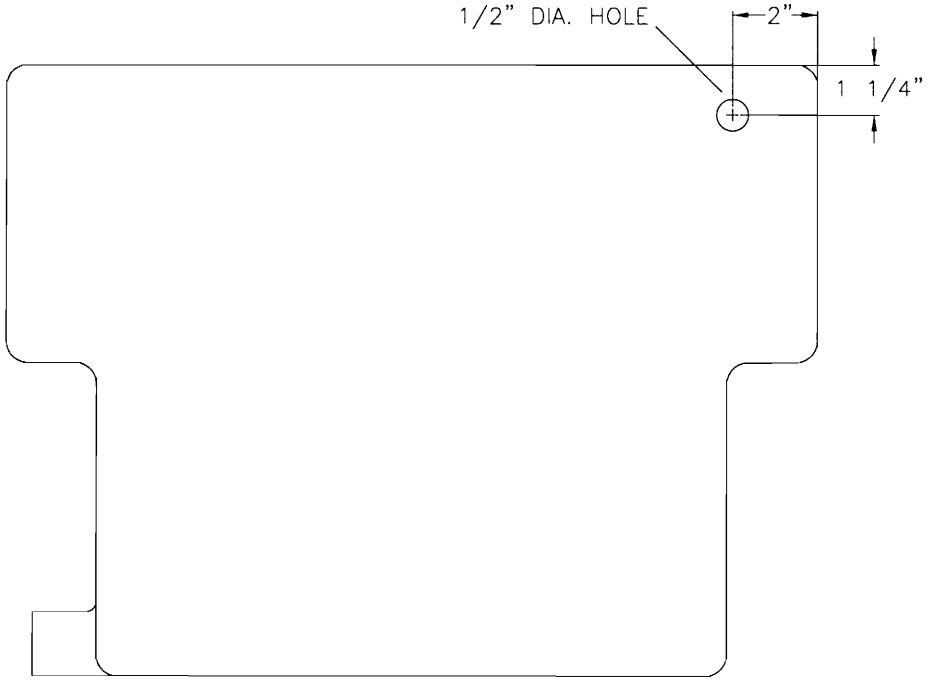


FIGURE 5–16



FUEL TANKS VIEWED FROM BOTTOM SIDE

FIGURE 5-17



RIGHT FUEL TANK ONLY
VIEWED FROM AFT SIDE

FIGURE 5-18

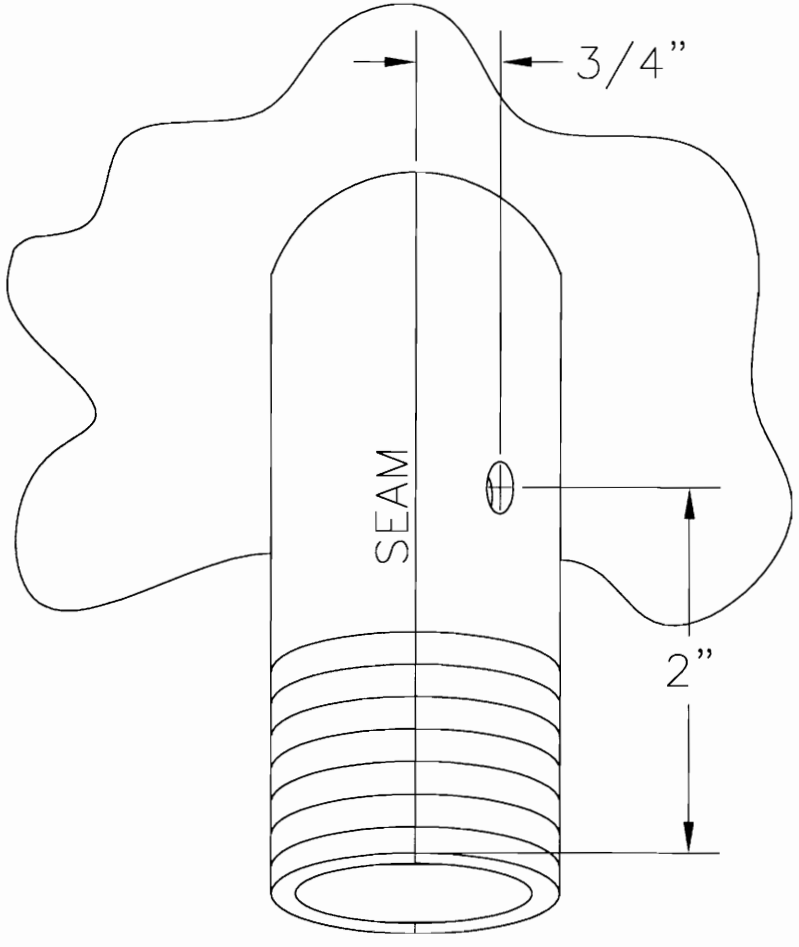


FIGURE 5-19

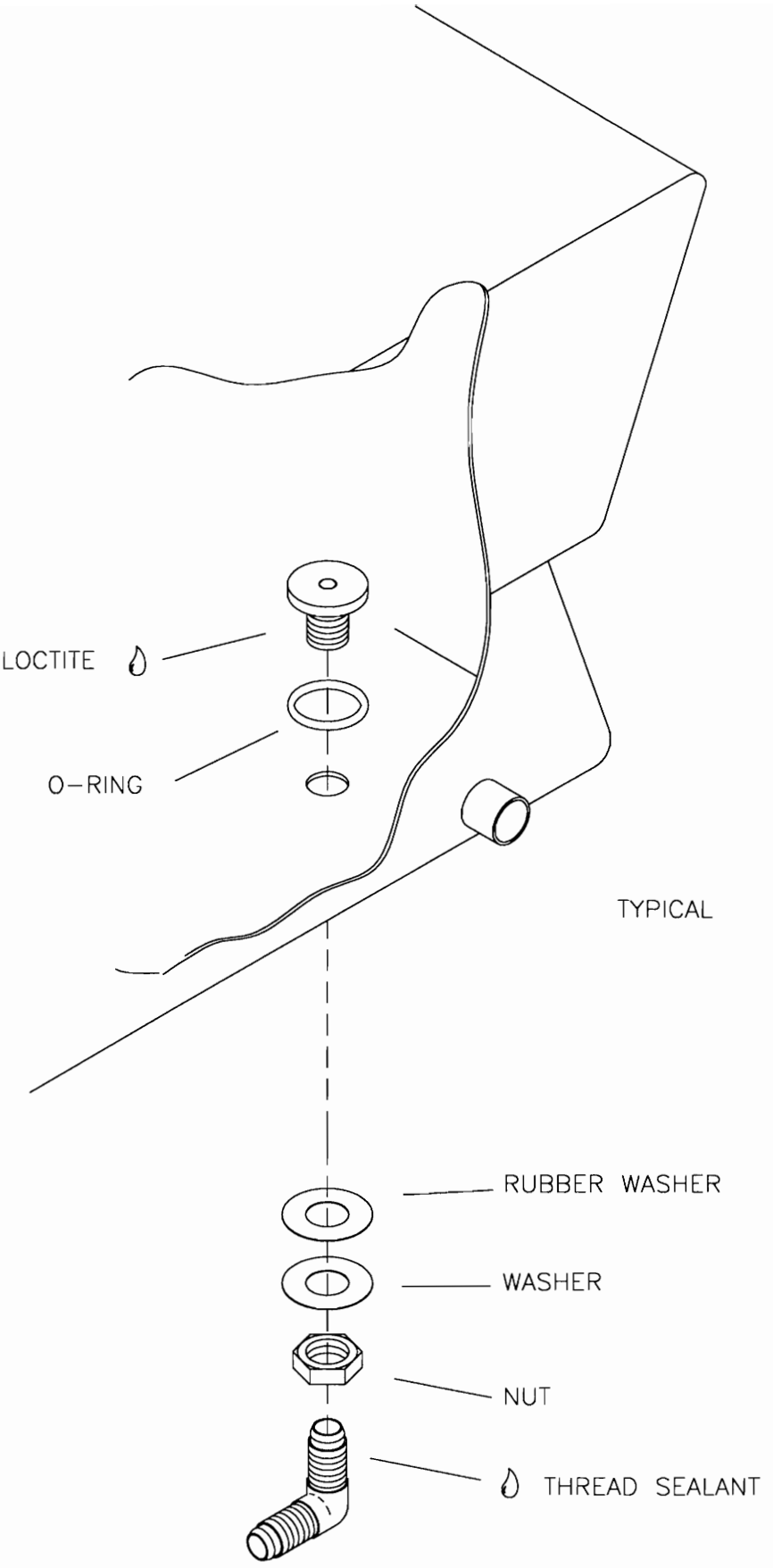

LOCTITE
O-RING
TYPICAL
RUBBER WASHER
WASHER
NUT
THREAD SEALANT

FIGURE 5-20

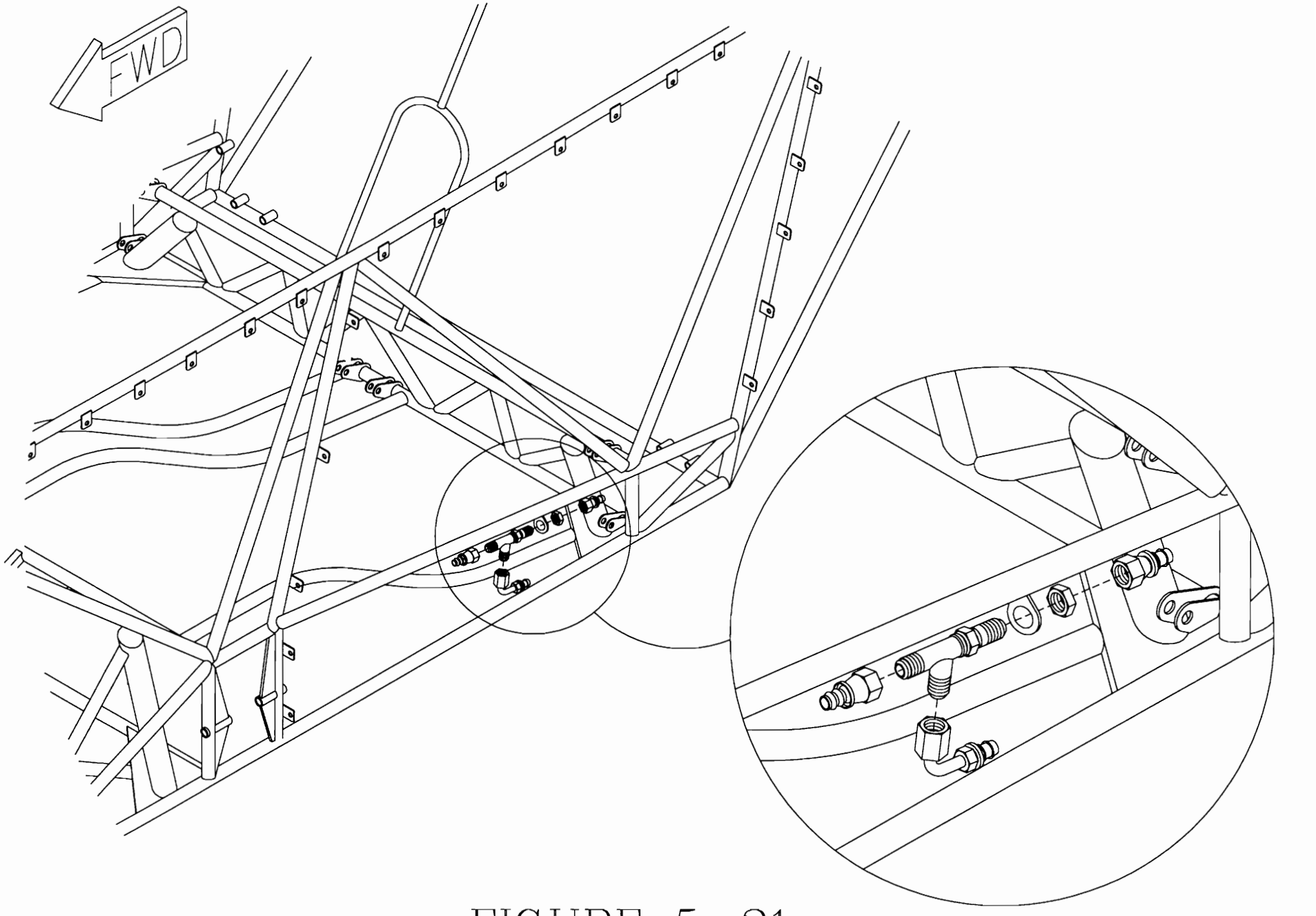


FIGURE 5-21

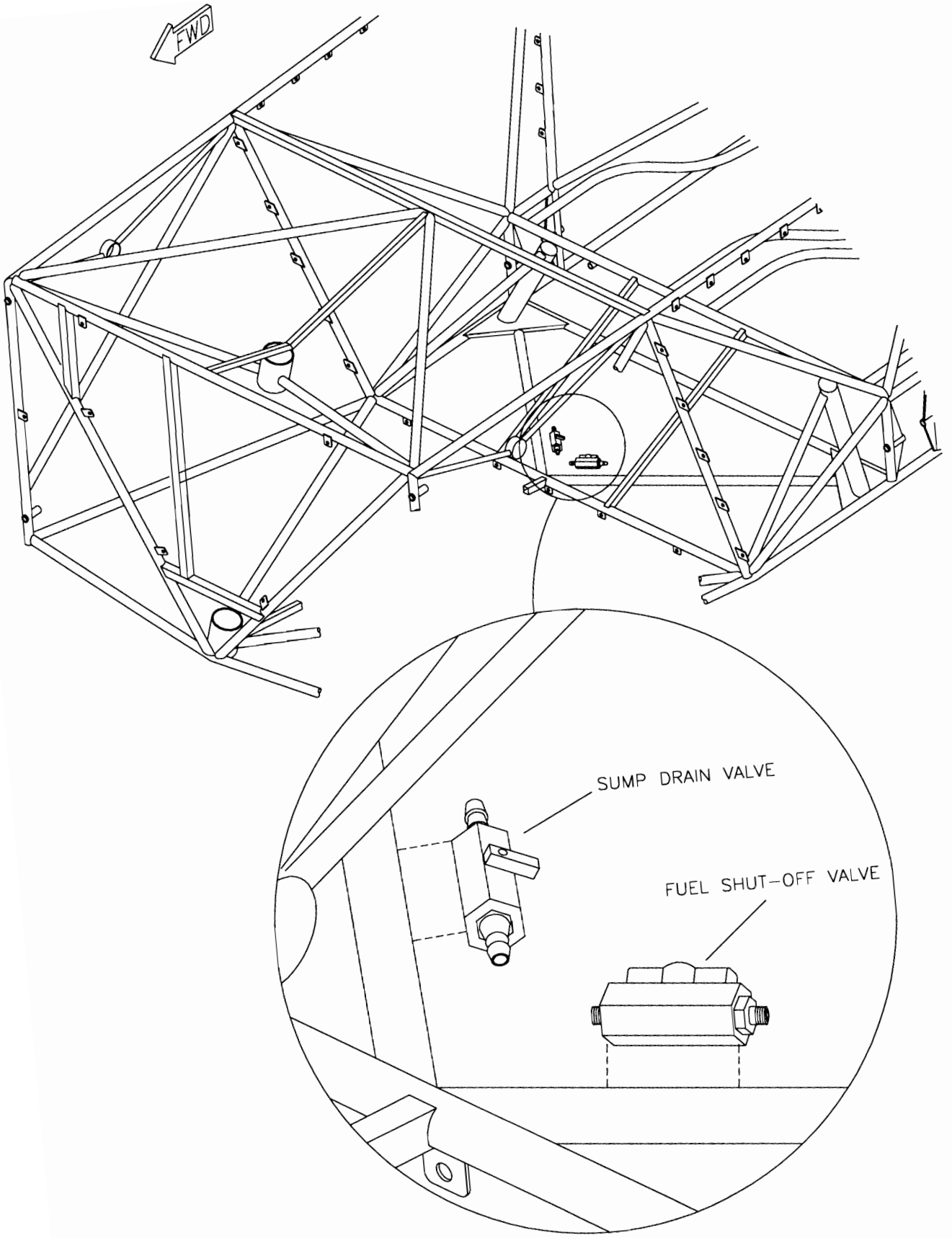


FIGURE 5-22

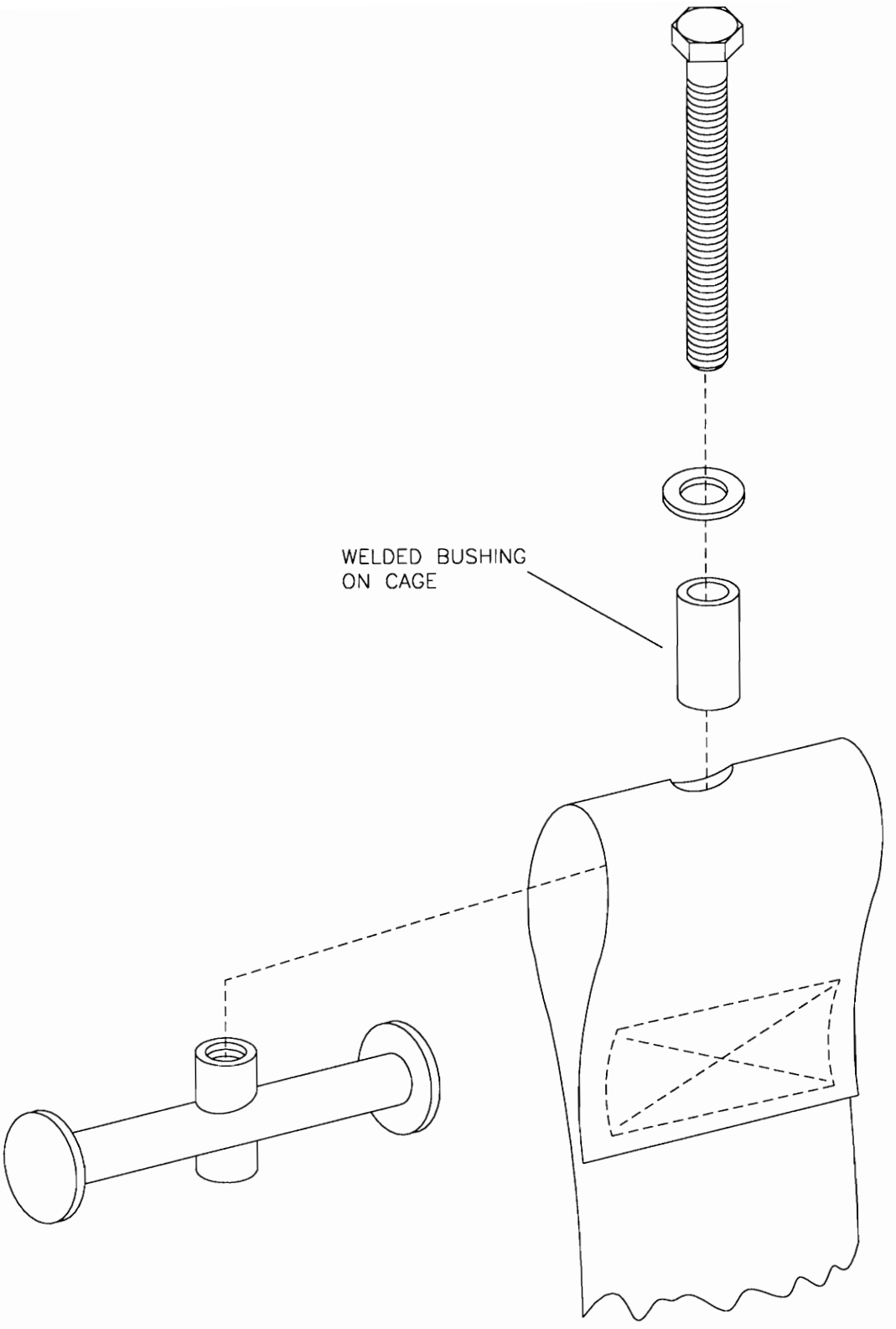


FIGURE 5-23

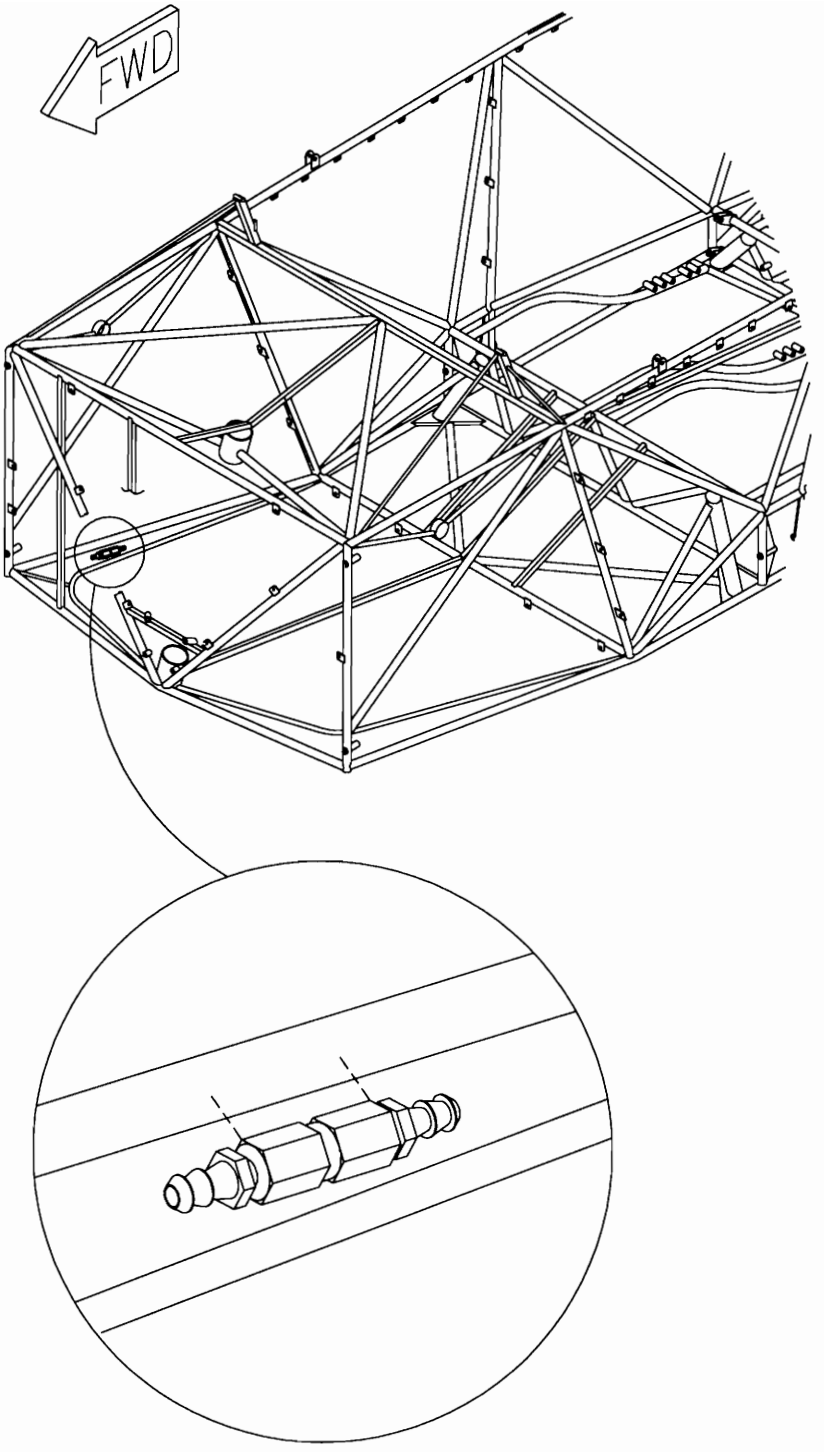


FIGURE 5-24

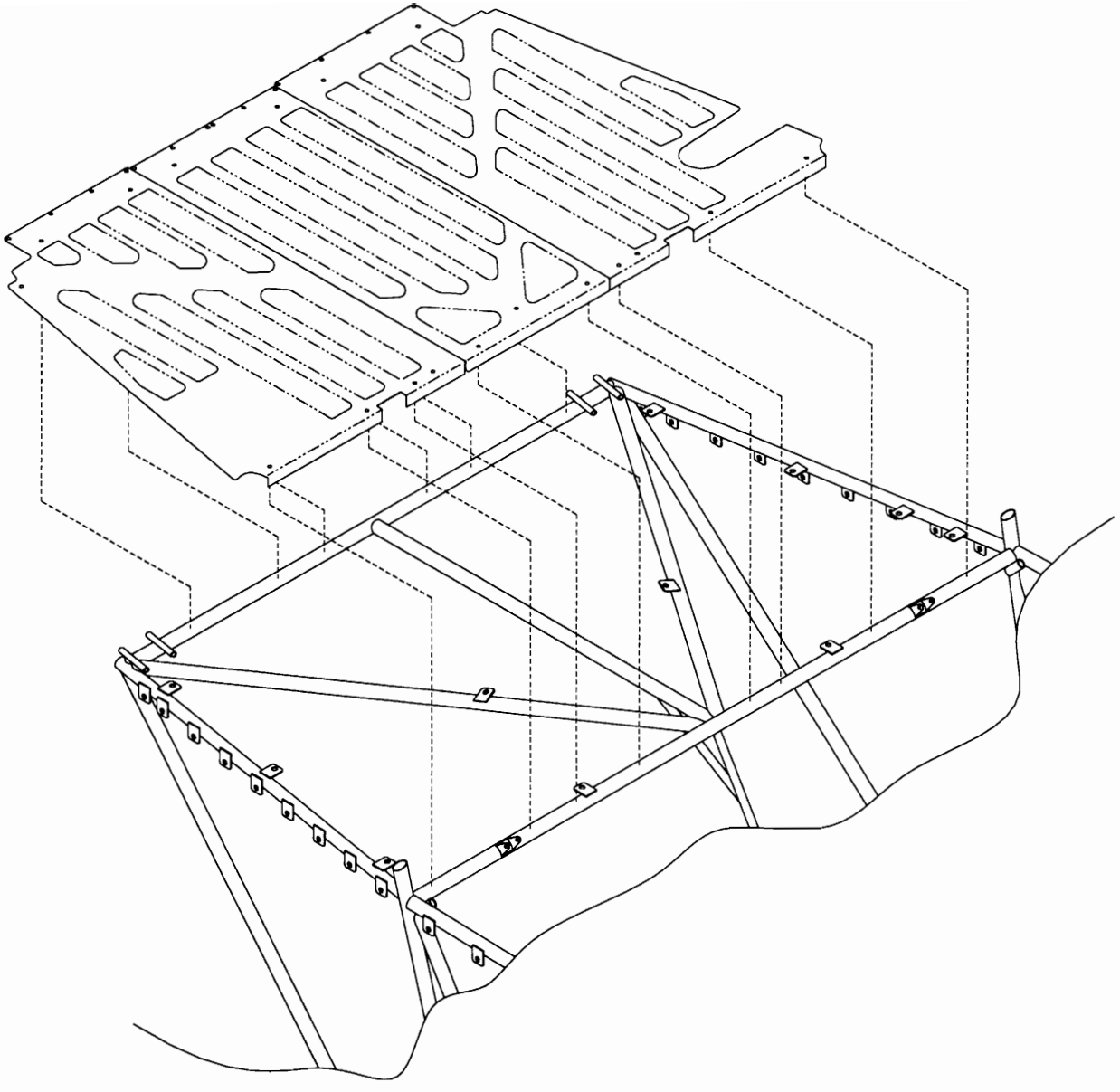


FIGURE 5-25

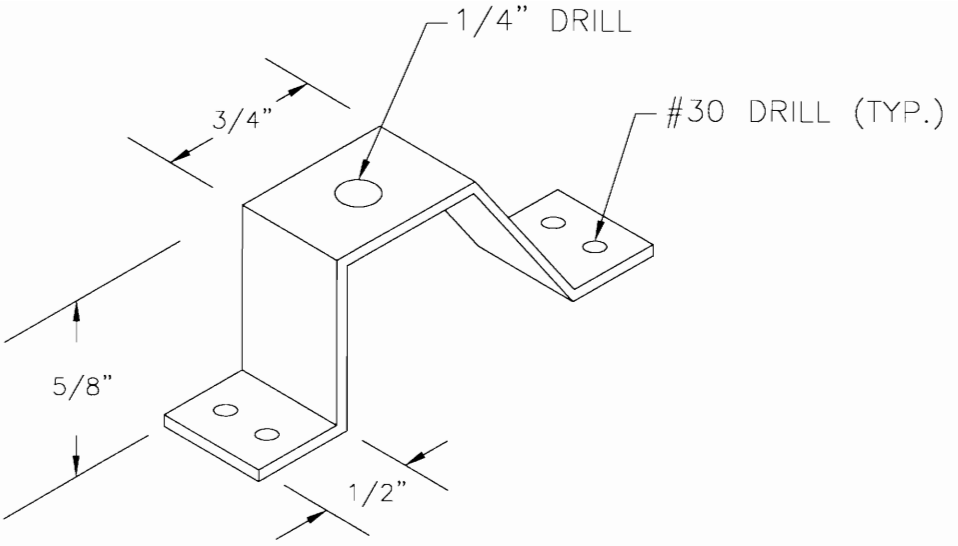


FIGURE 5-26

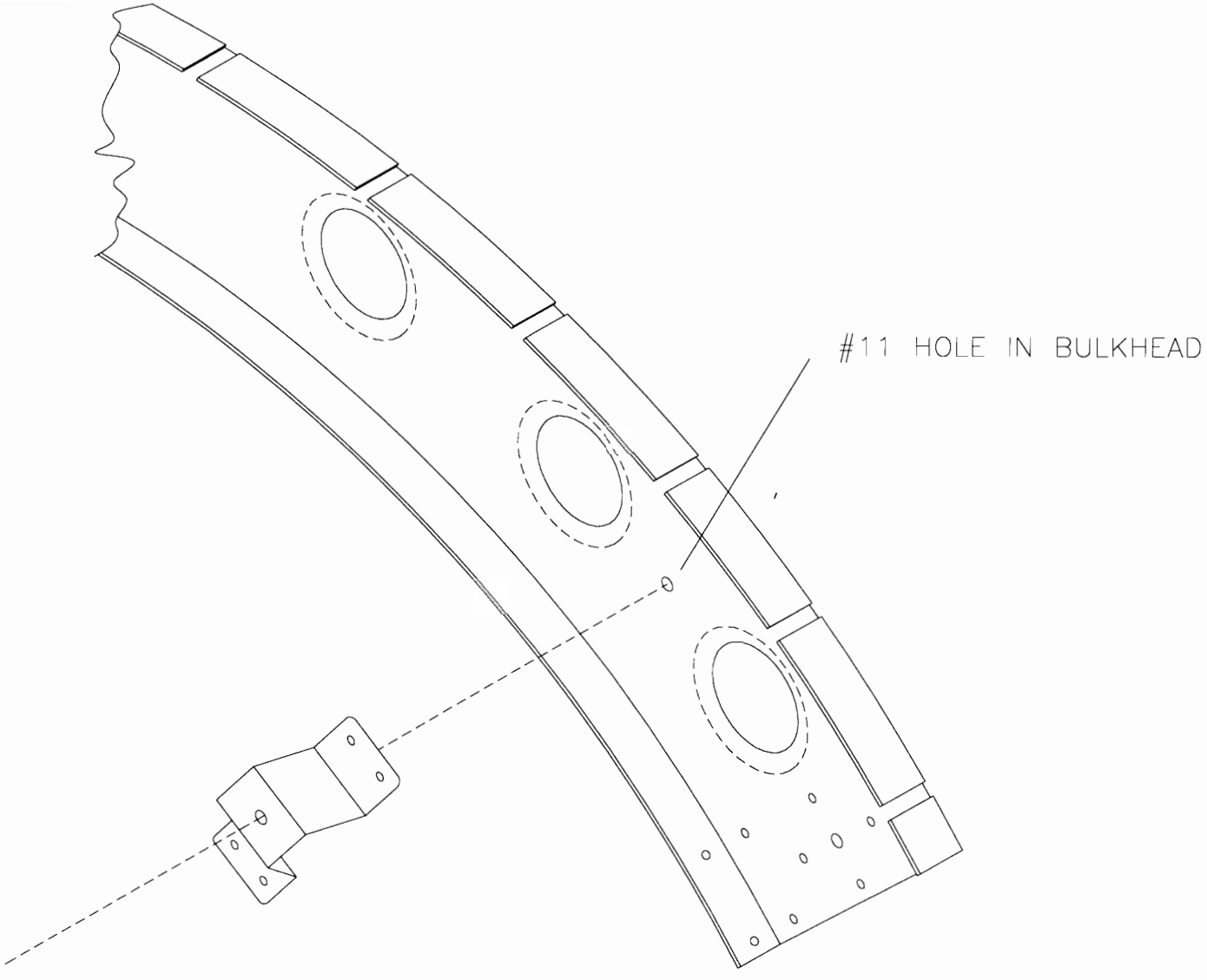


FIGURE 5-27

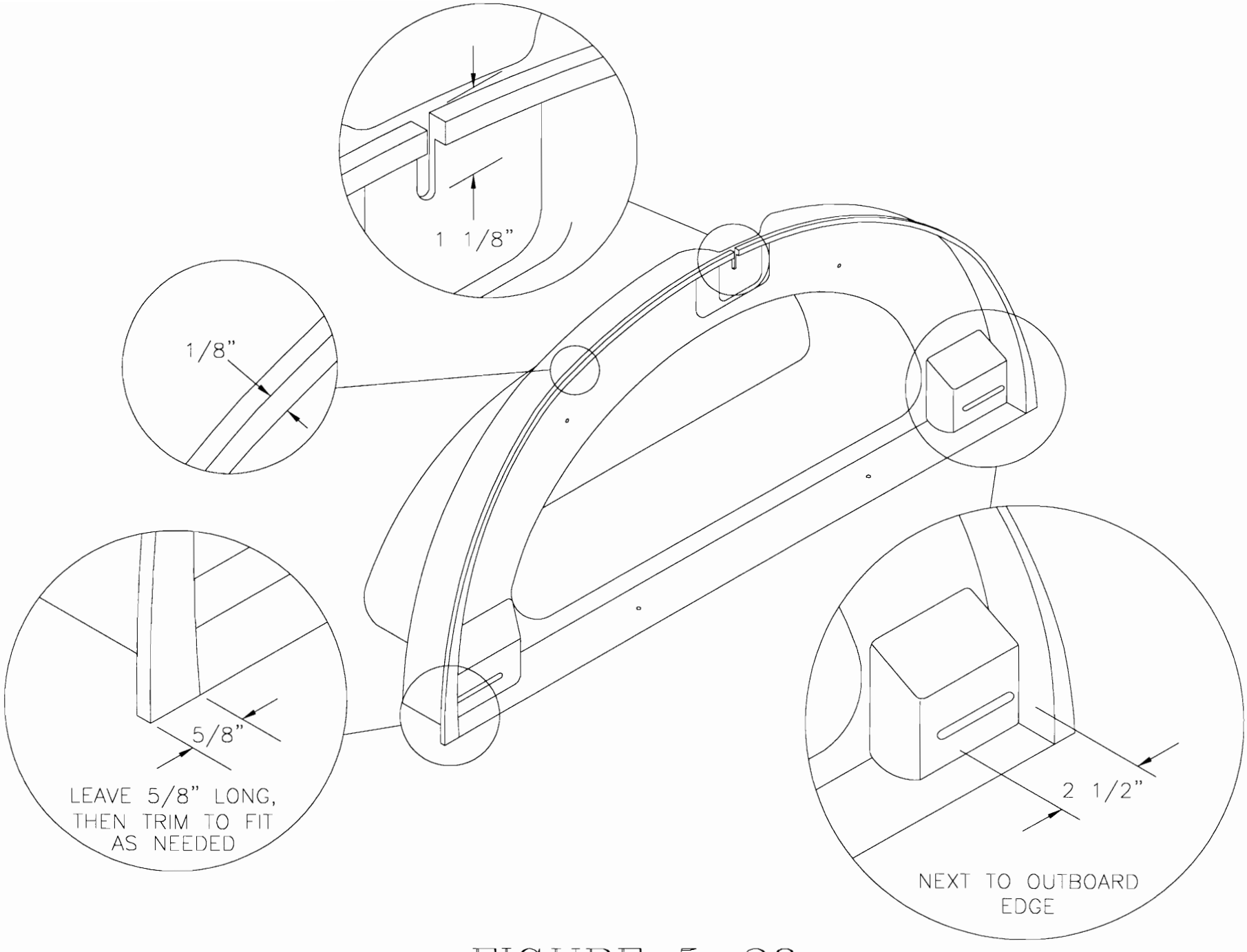

1 1/8"
1/8"
5/8"
LEAVE 5/8" LONG,
THEN TRIM TO FIT
AS NEEDED
2 1/2"
NEXT TO OUTBOARD
EDGE

FIGURE 5-28

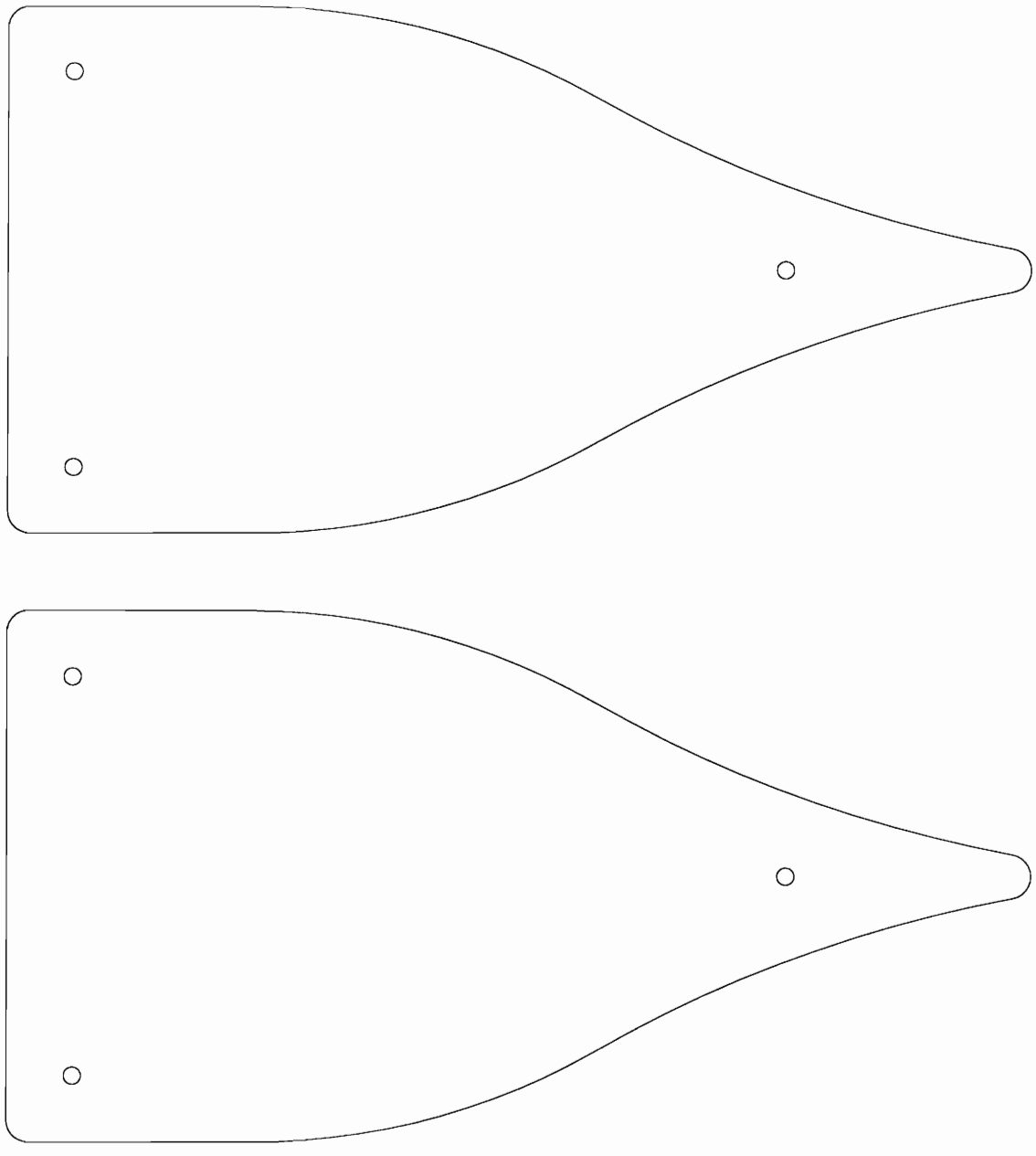


FIGURE 5-29

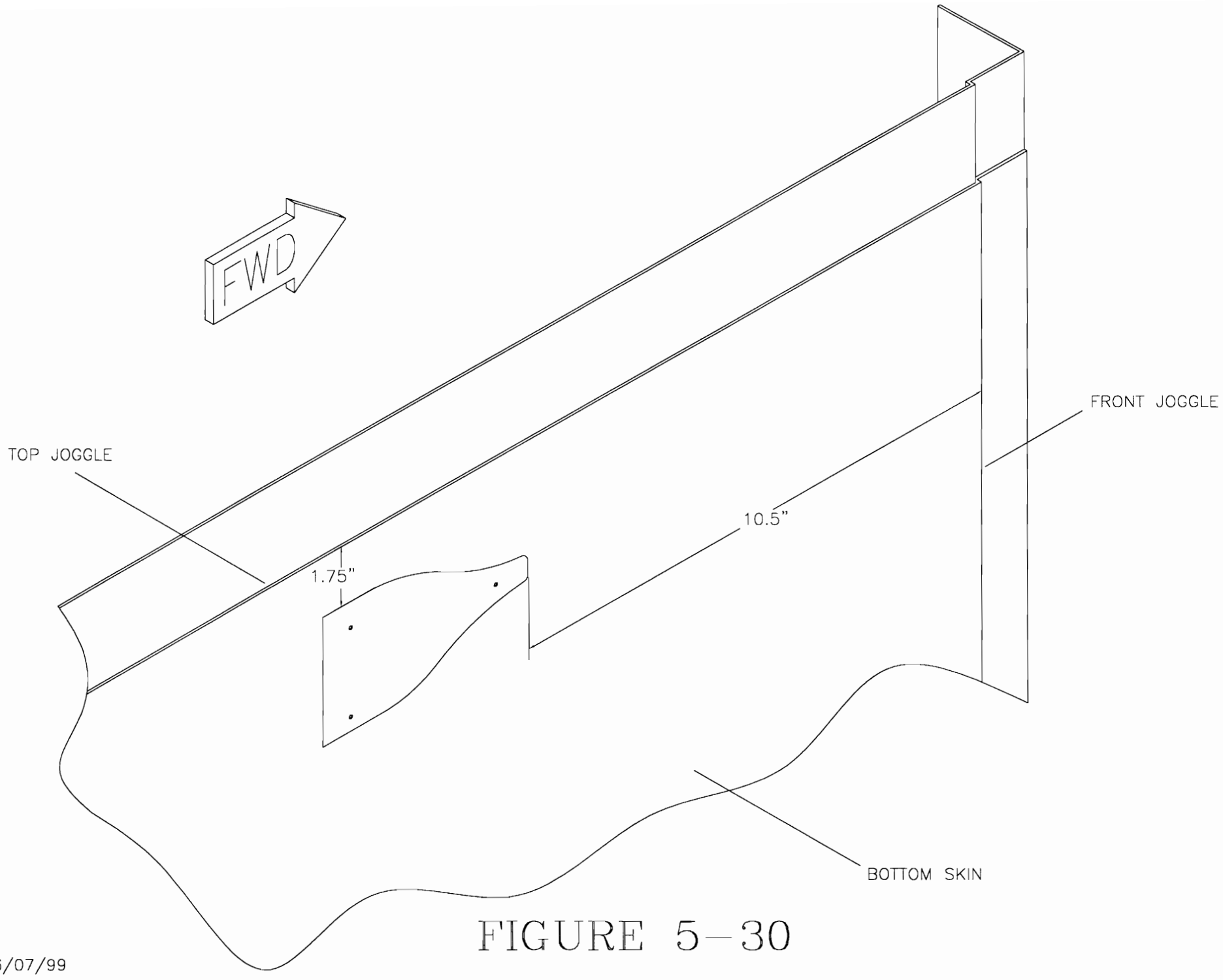


FIGURE 5-30

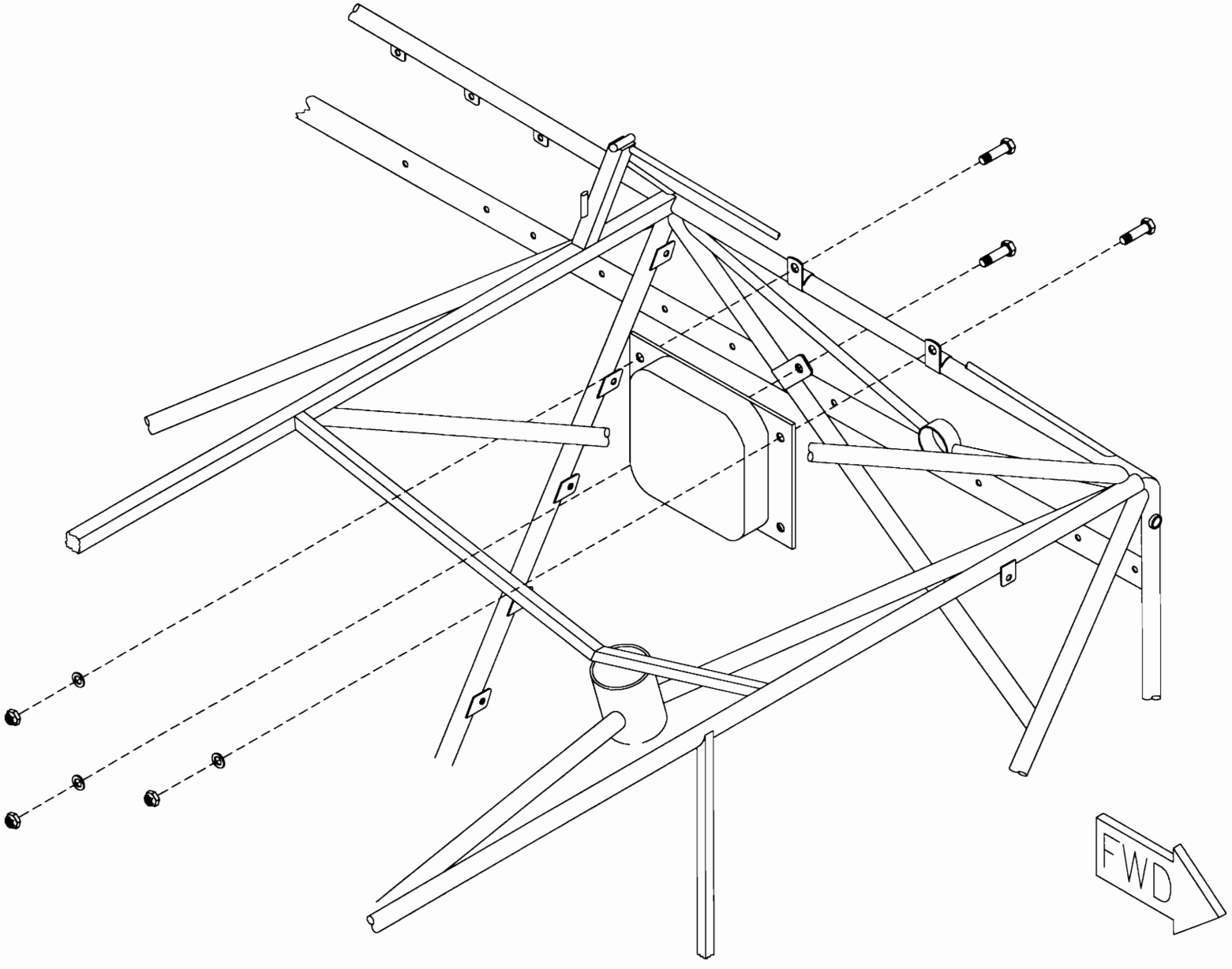


FIGURE 5-31

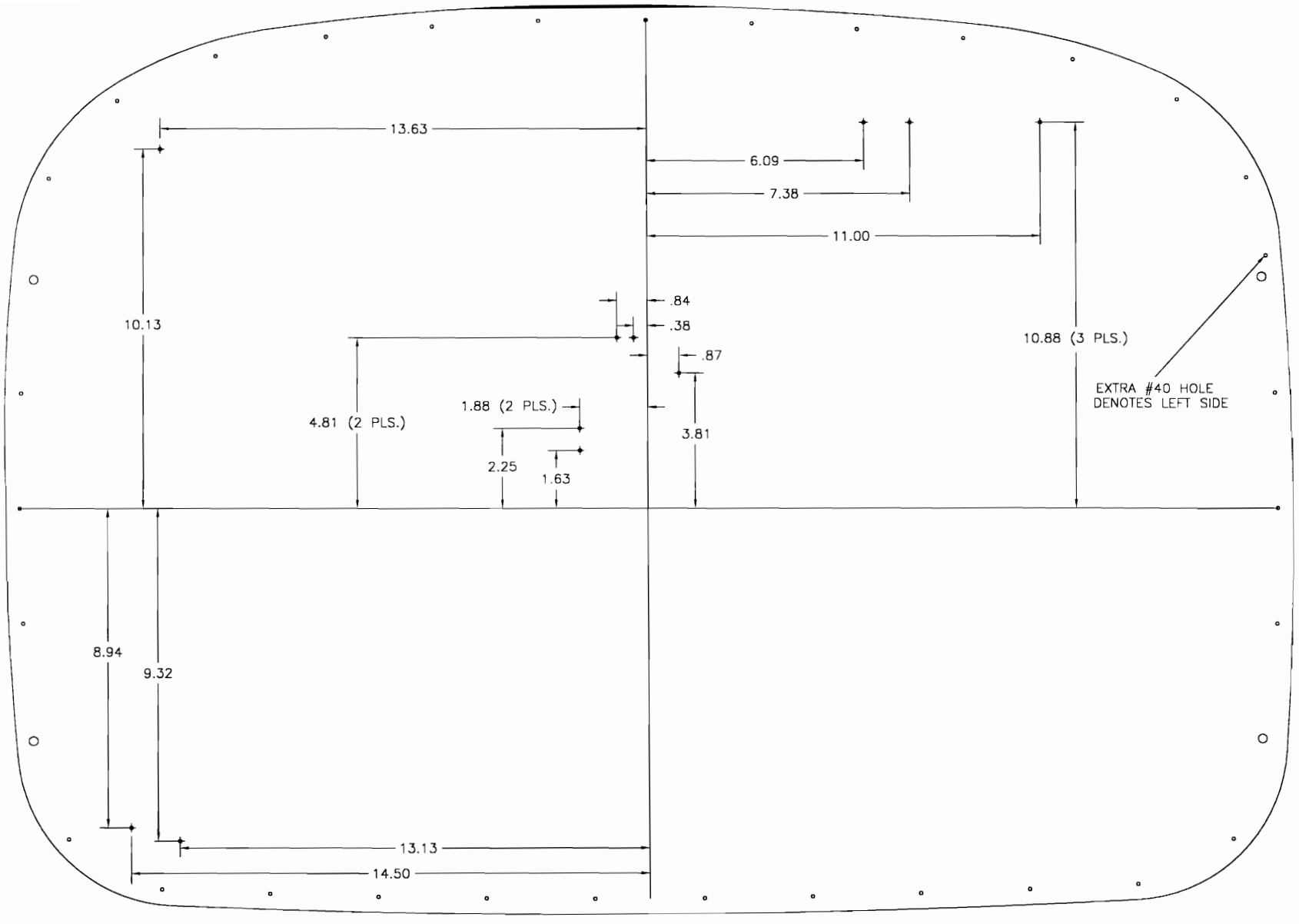

13.63
6.09
7.38
11.00
10.13
.84
.38
.87
10.88 (3 PLS.)
EXTRA #40 HOLE
DENOTES LEFT SIDE
4.81 (2 PLS.)
1.88 (2 PLS.)
3.81
2.25
1.63
8.94
9.32
13.13
14.50

FIGURE 6–1

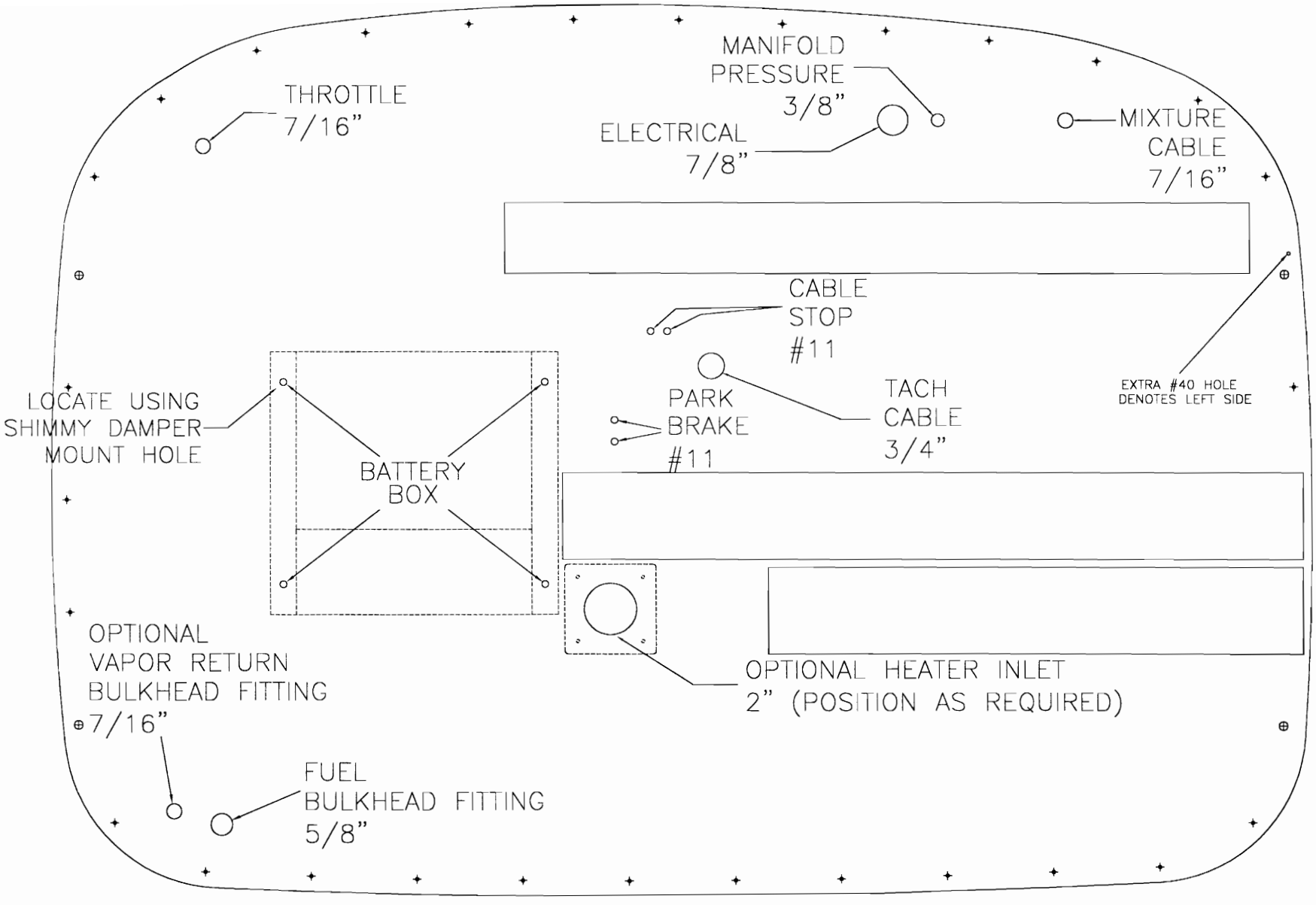

THROTTLE
7/16"
MANIFOLD
PRESSURE
3/8"
ELECTRICAL
7/8"
MIXTURE
CABLE
7/16"
CABLE
STOP
#11
EXTRA #40 HOLE
DENOTES LEFT SIDE
LOCATE USING
SHIMMY DAMPER
MOUNT HOLE
BATTERY
BOX
PARK
BRAKE
#11
TACH
CABLE
3/4"
OPTIONAL
VAPOR RETURN
BULKHEAD FITTING
7/16"
OPTIONAL HEATER INLET
2" (POSITION AS REQUIRED)
FUEL
BULKHEAD FITTING
5/8"

FIGURE 6-2

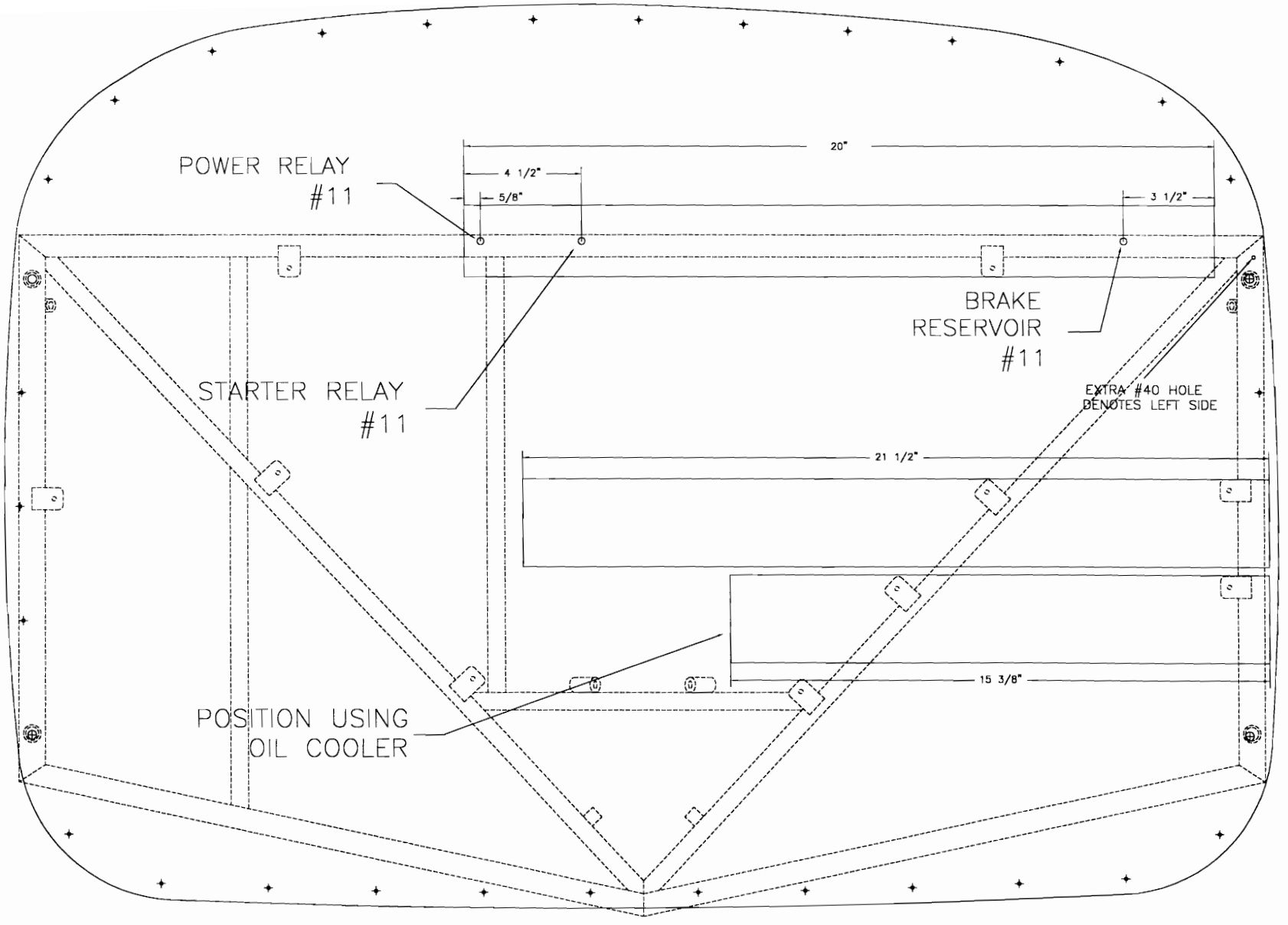

POWER RELAY
#11
20"
4 1/2"
5/8"
3 1/2"
BRAKE
RESERVOIR
#11
STARTER RELAY
#11
EXTRA #40 HOLE
DENOTES LEFT SIDE
21 1/2"
15 3/8"
POSITION USING
OIL COOLER

FIGURE 6-3

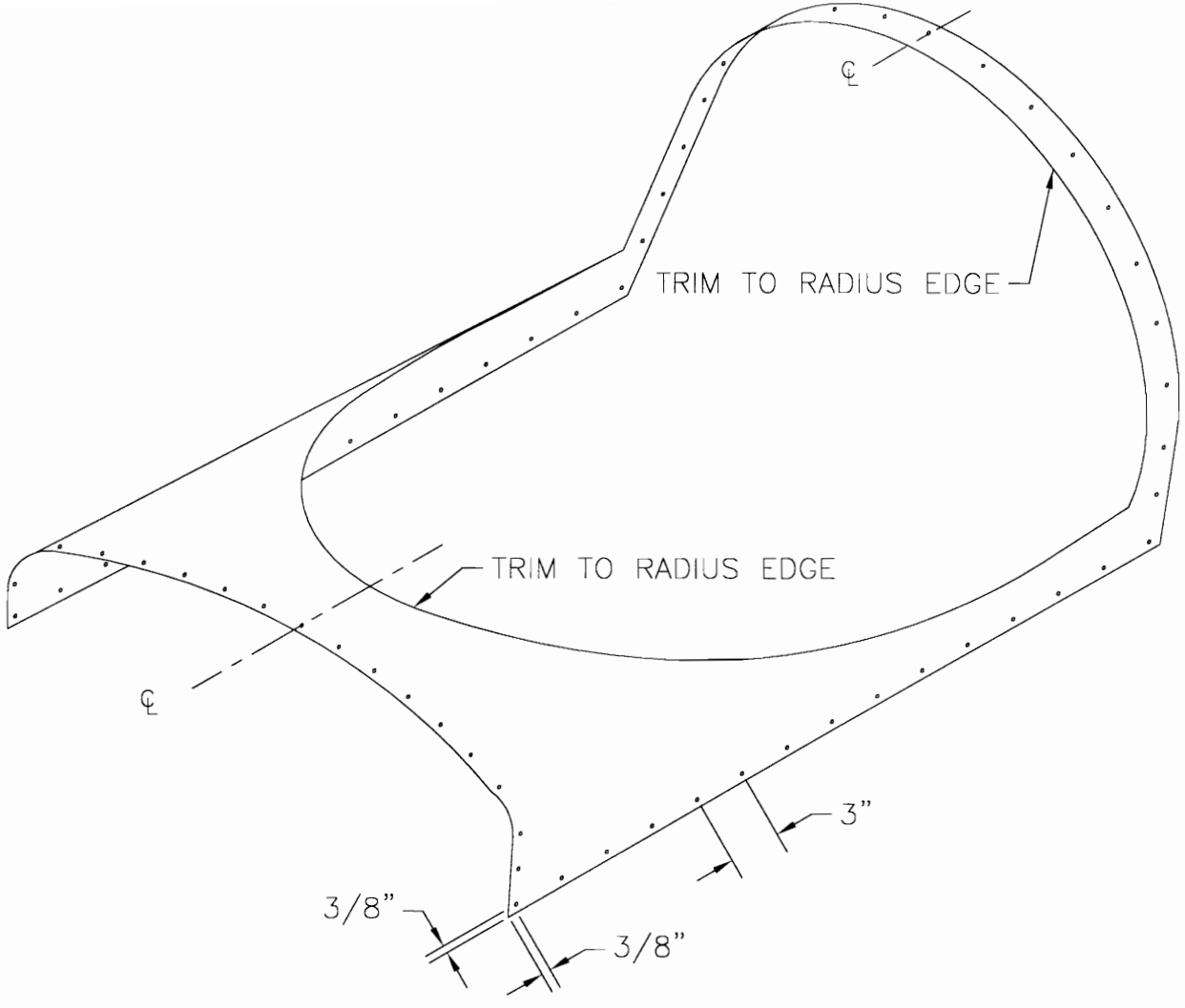


FIGURE 7–1

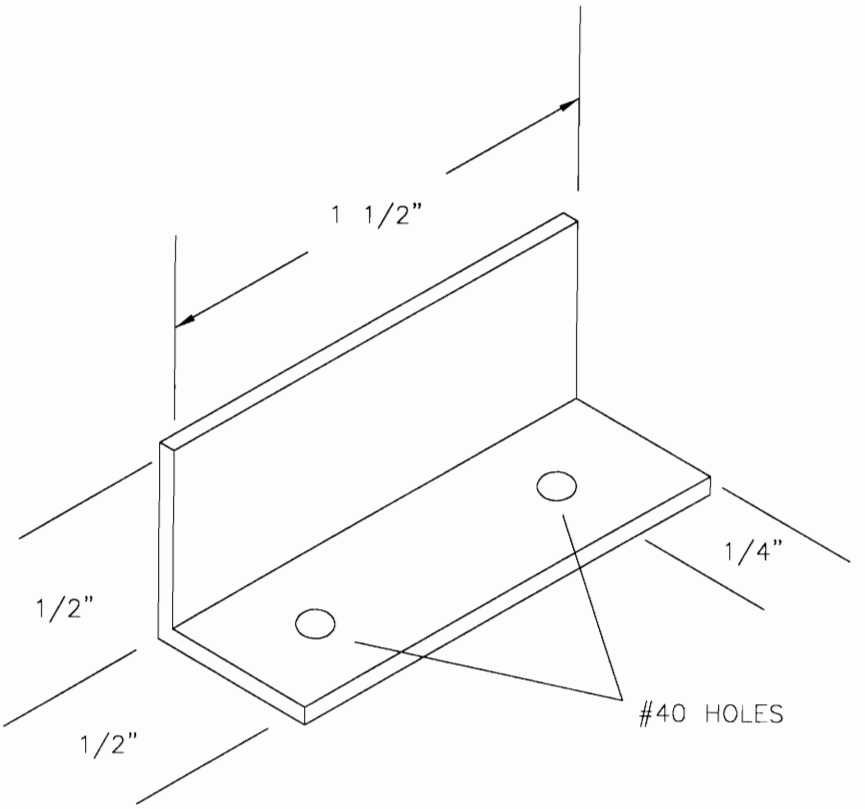


FIGURE 7-2

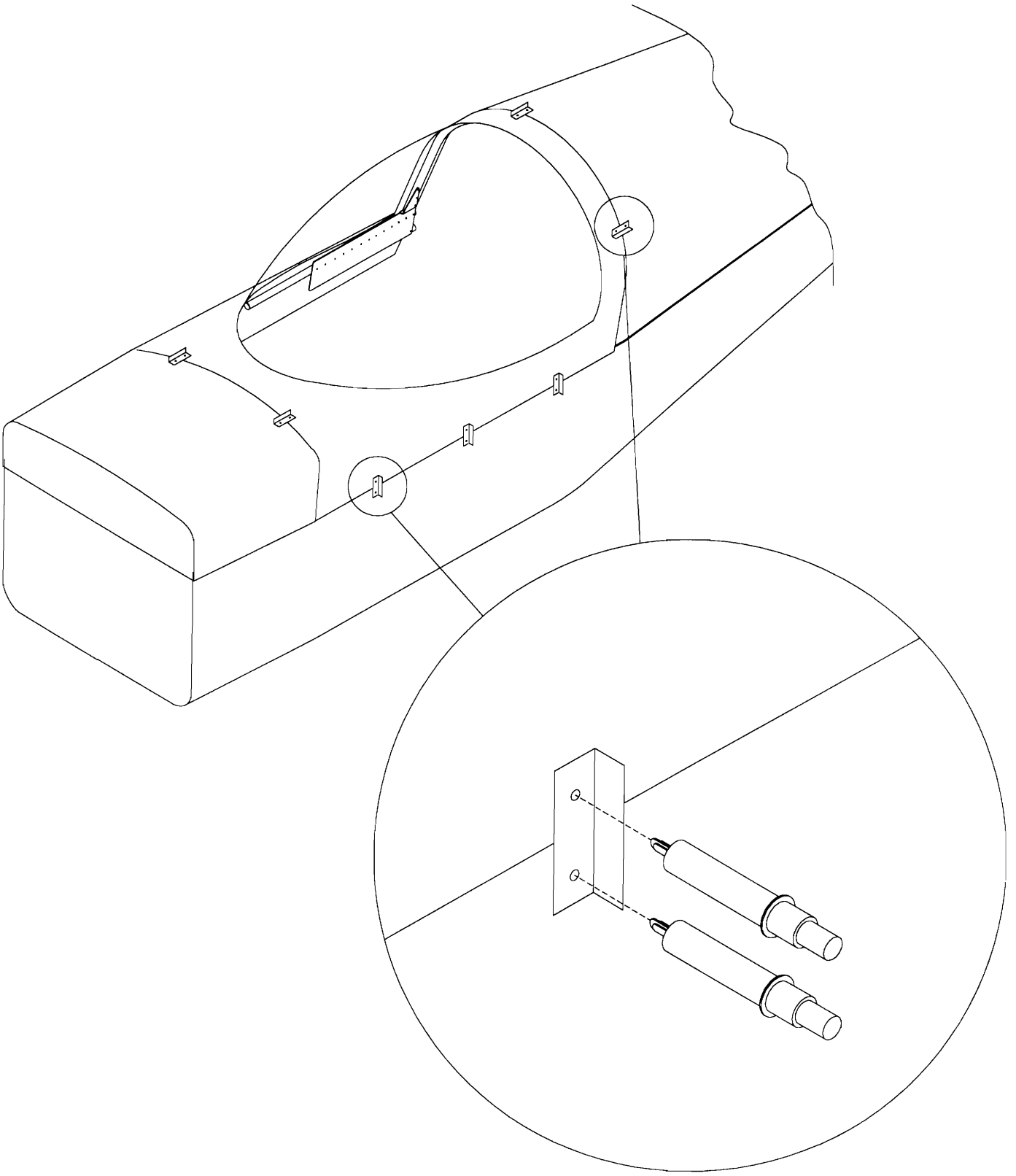


FIGURE 7-3

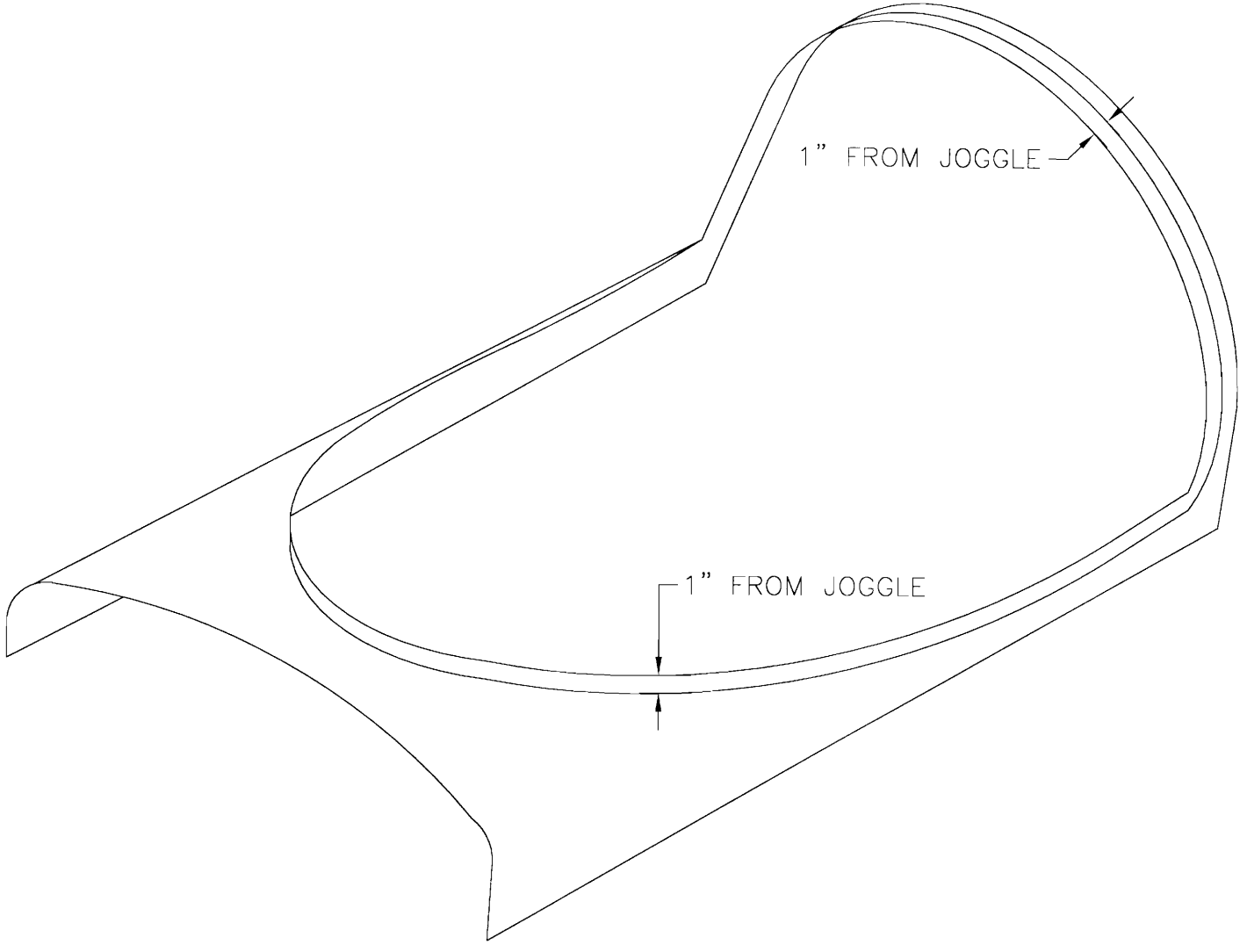


FIGURE 7–4

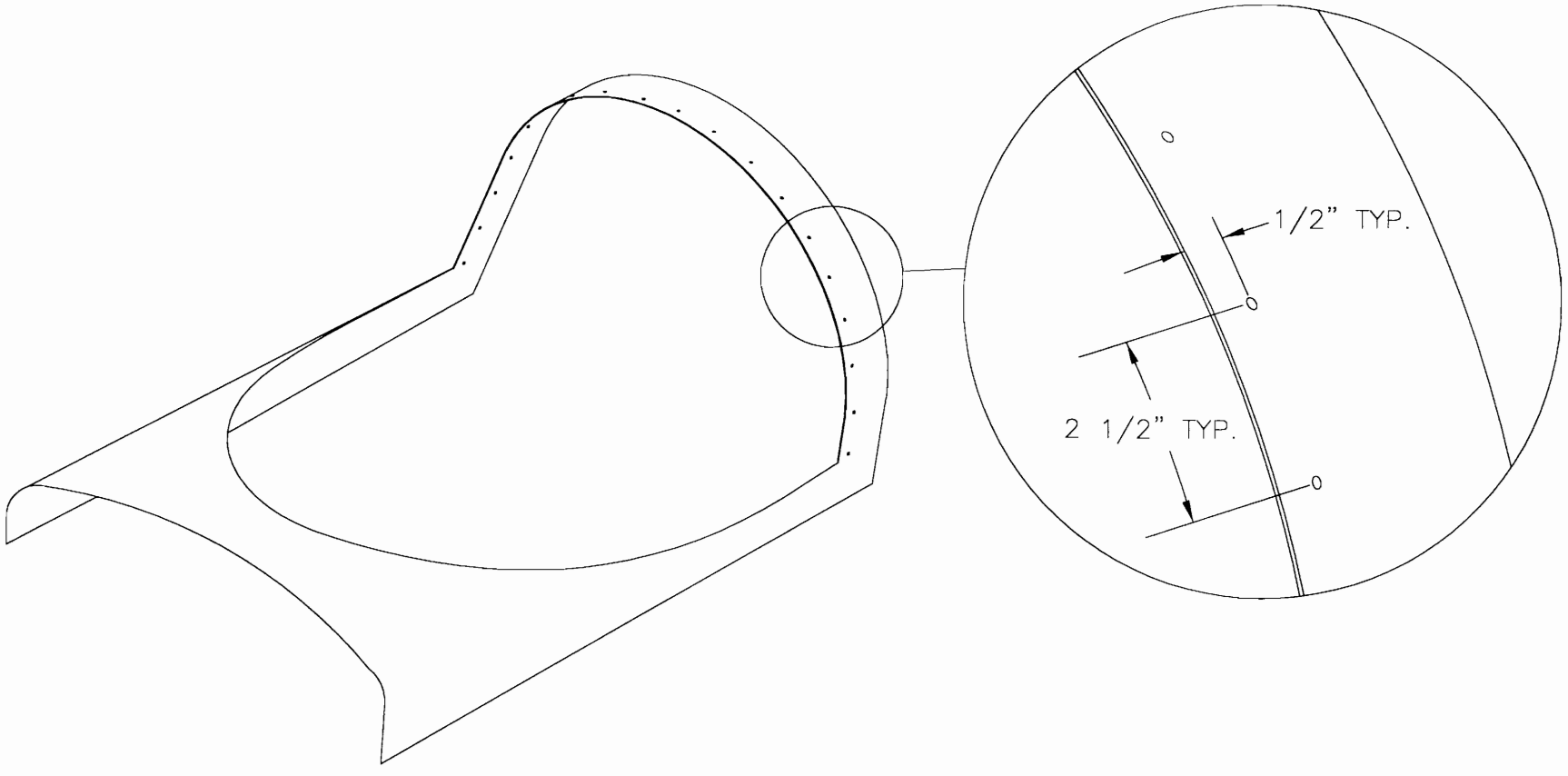


FIGURE 7–5

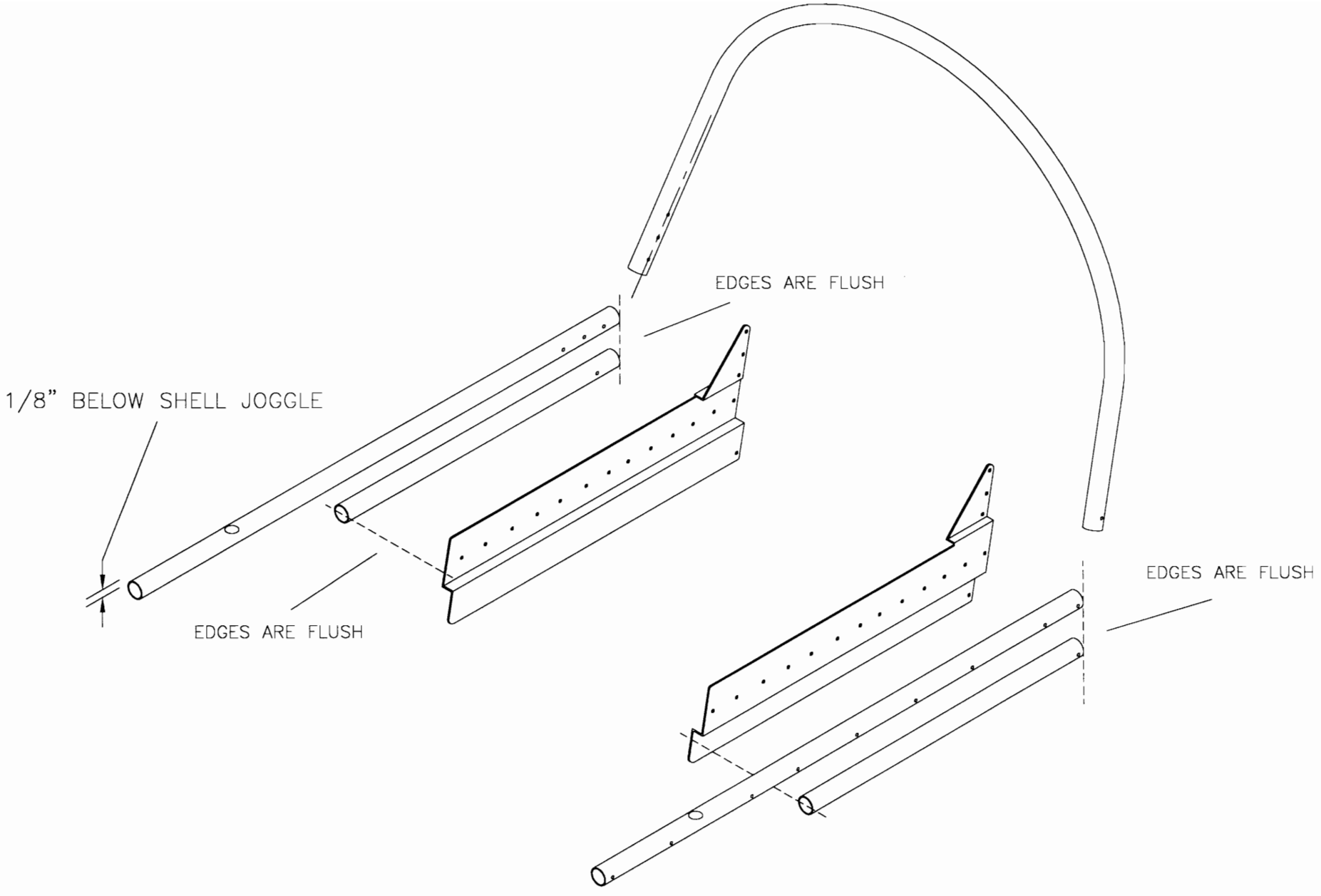

EDGES ARE FLUSH
1/8" BELOW SHELL JOGGLE
EDGES ARE FLUSH
EDGES ARE FLUSH

FIGURE 7-6

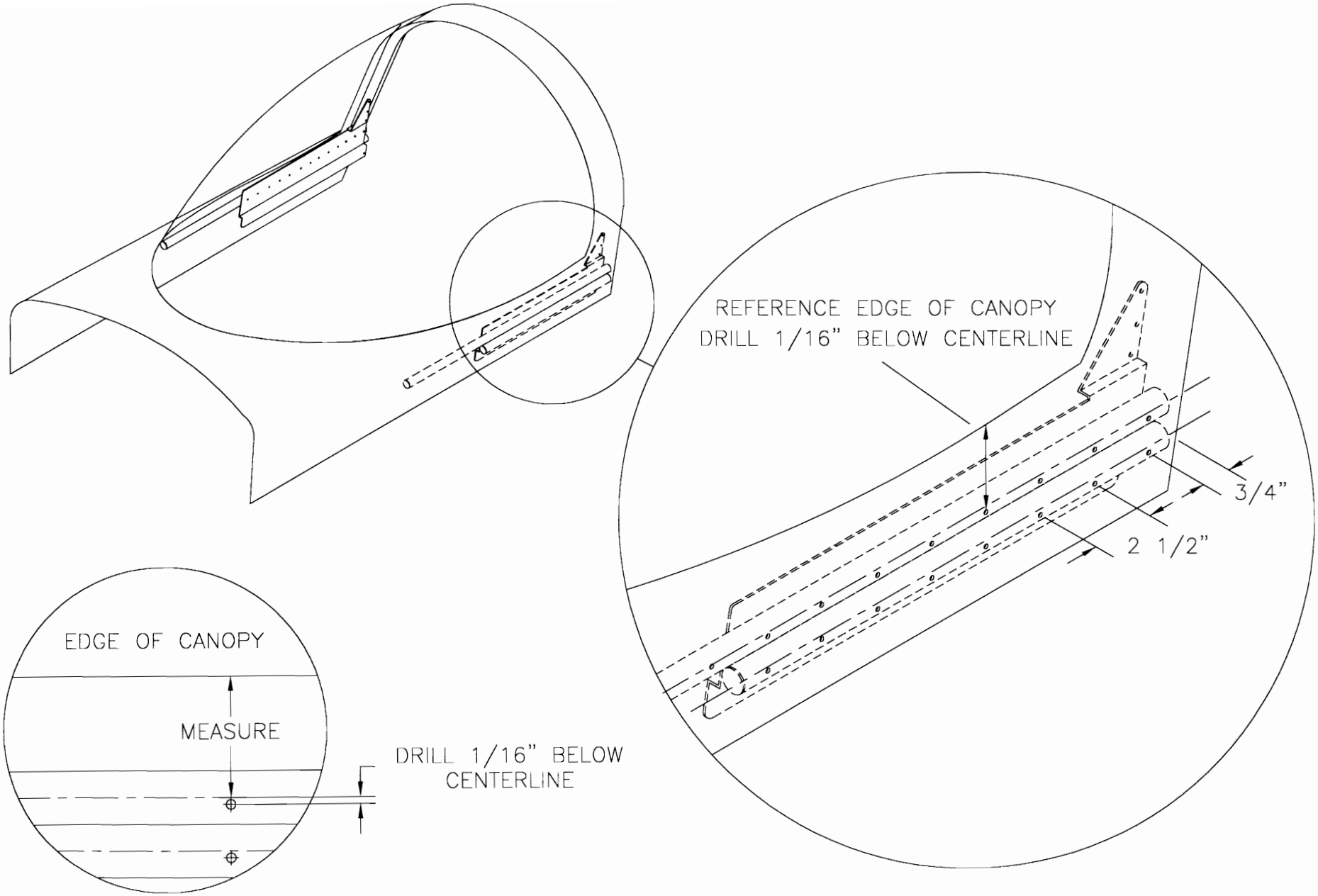

REFERENCE EDGE OF CANOPY
DRILL 1/16" BELOW CENTERLINE
3/4"
2 1/2"
EDGE OF CANOPY
MEASURE
DRILL 1/16" BELOW
CENTERLINE

FIGURE 7-7

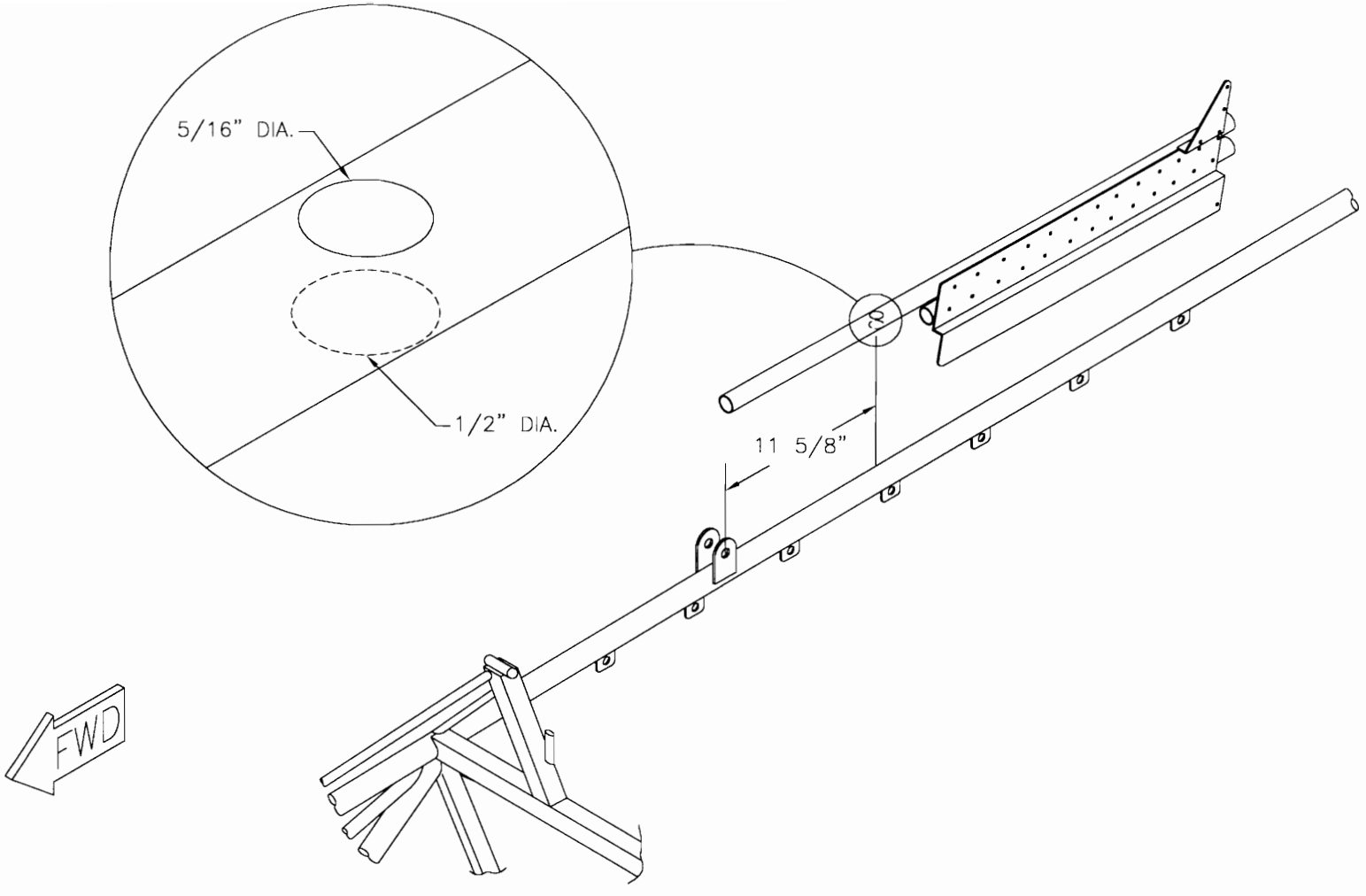


FIGURE 7-8

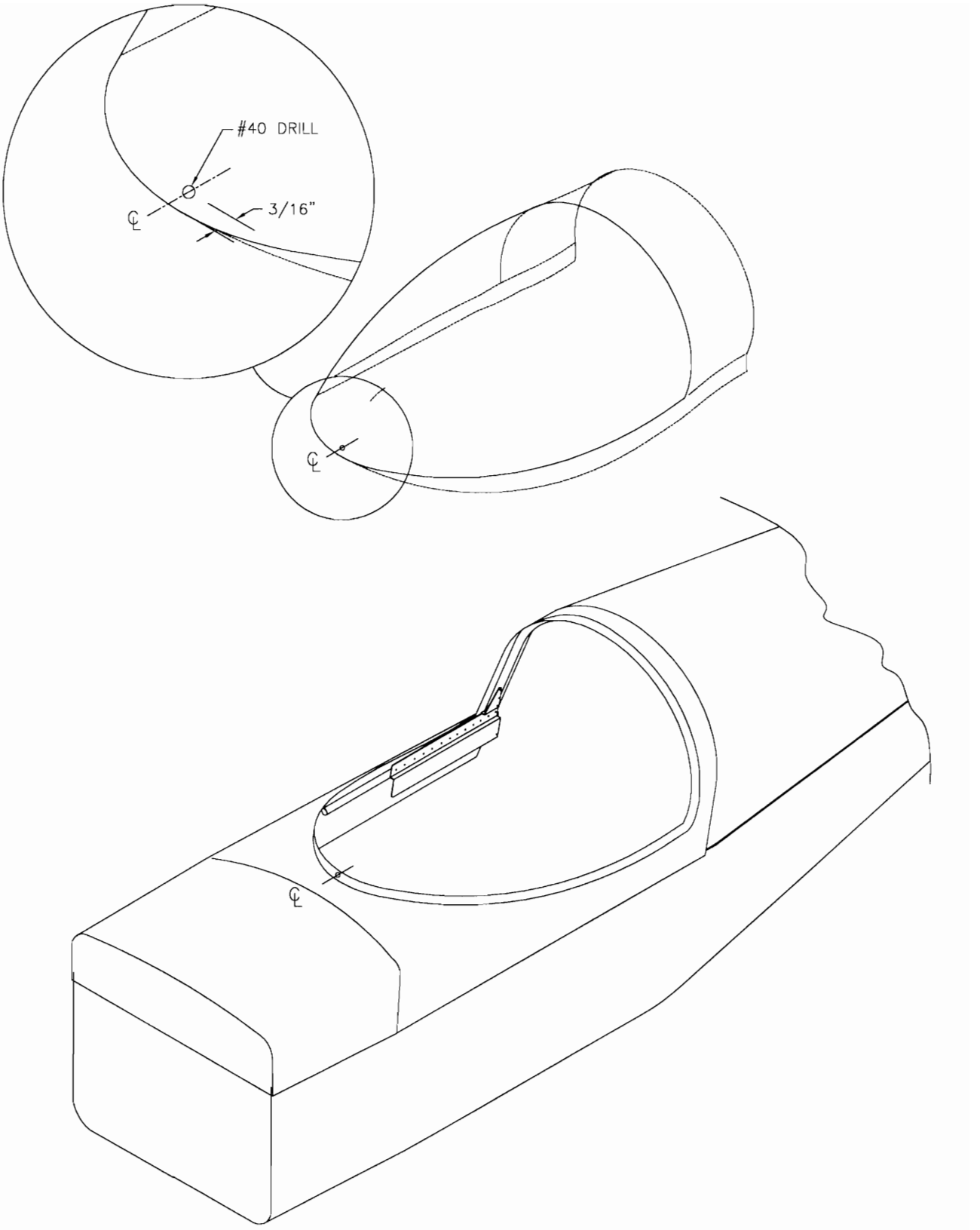


FIGURE 7–9

01/21/99

MD3472
REV.

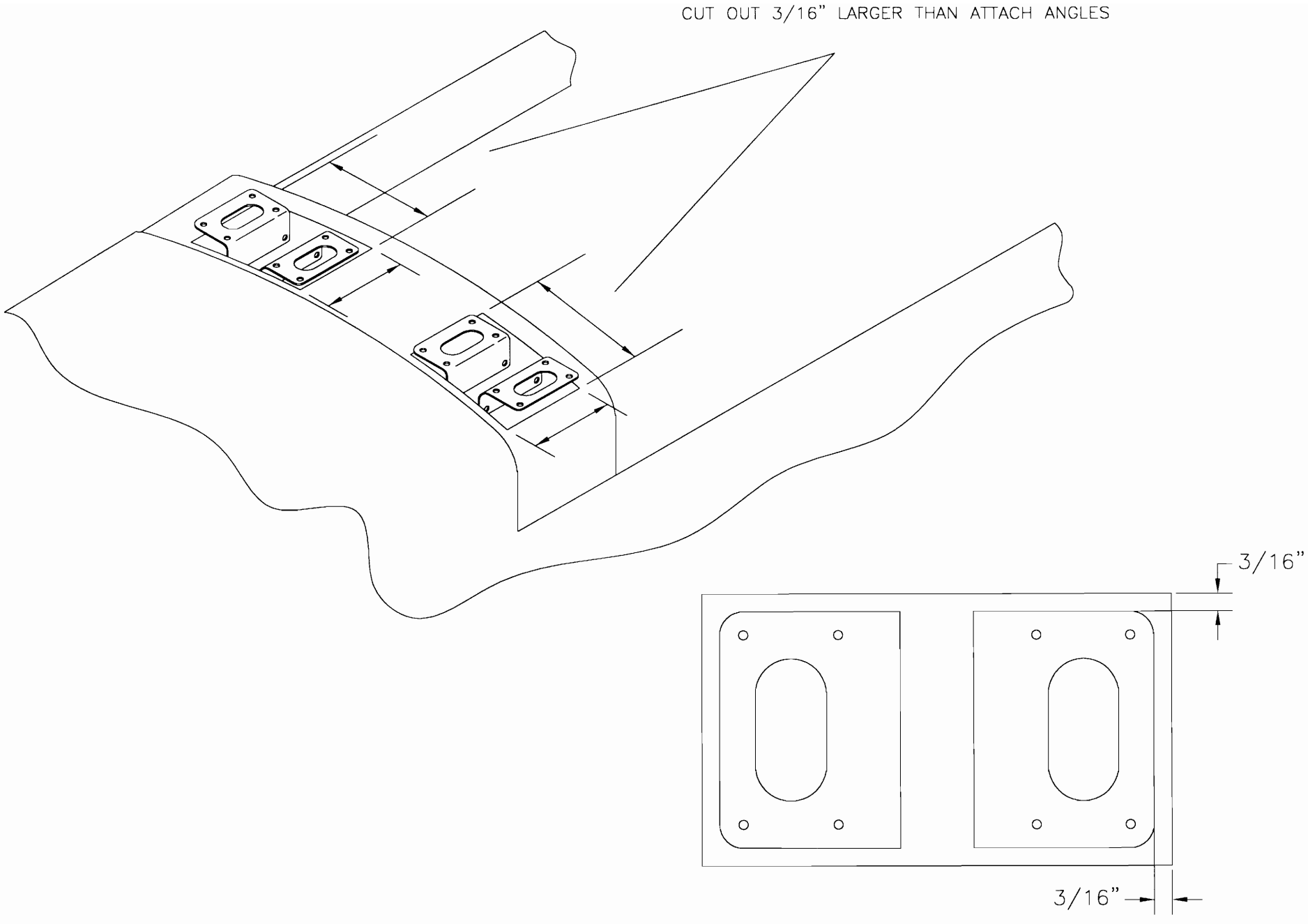


FIGURE 7-10

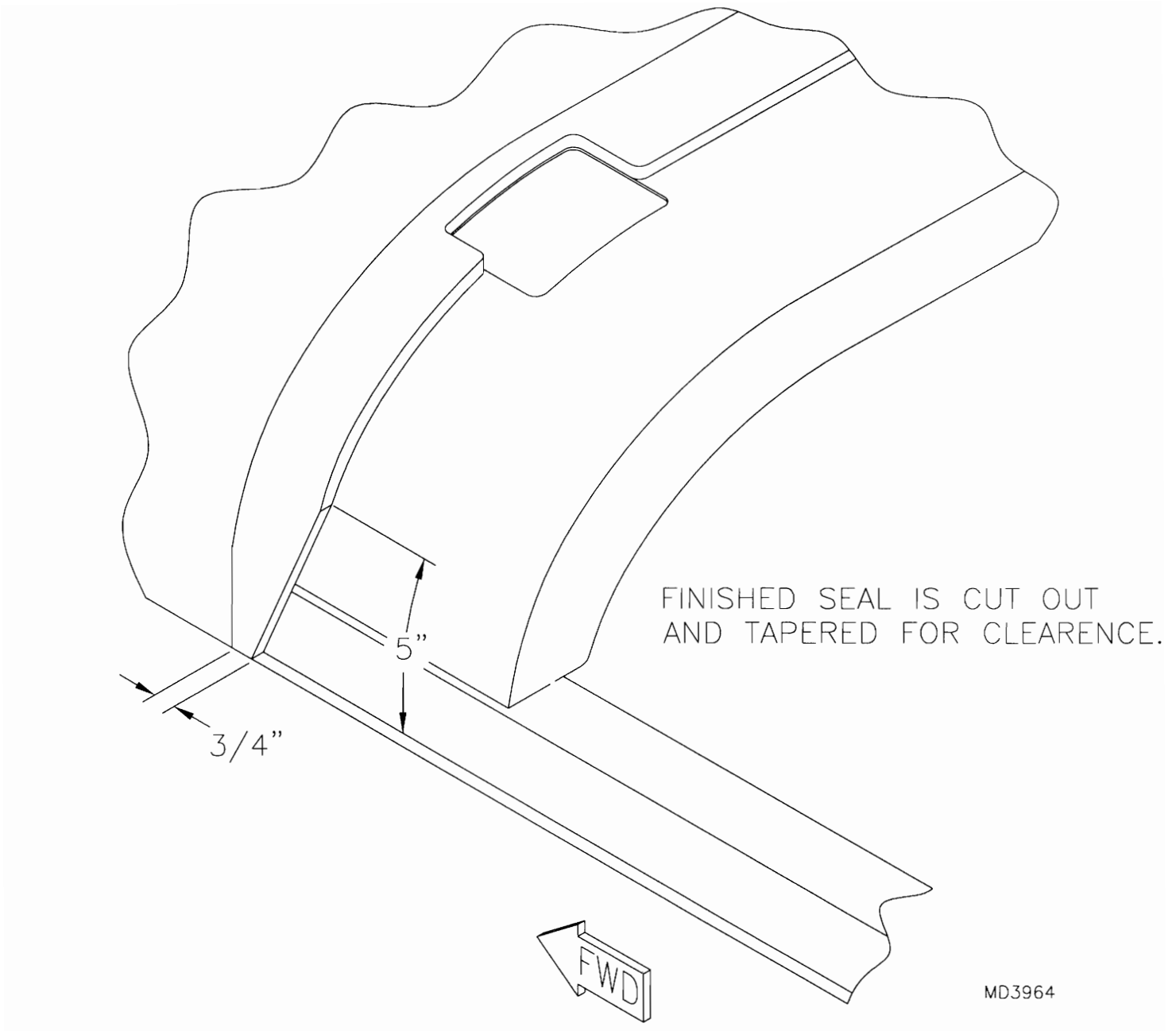

FINISHED SEAL IS CUT OUT
AND TAPERED FOR CLEARENCE.
5"
3/4"
FWD
MD3964

FIGURE 7-11

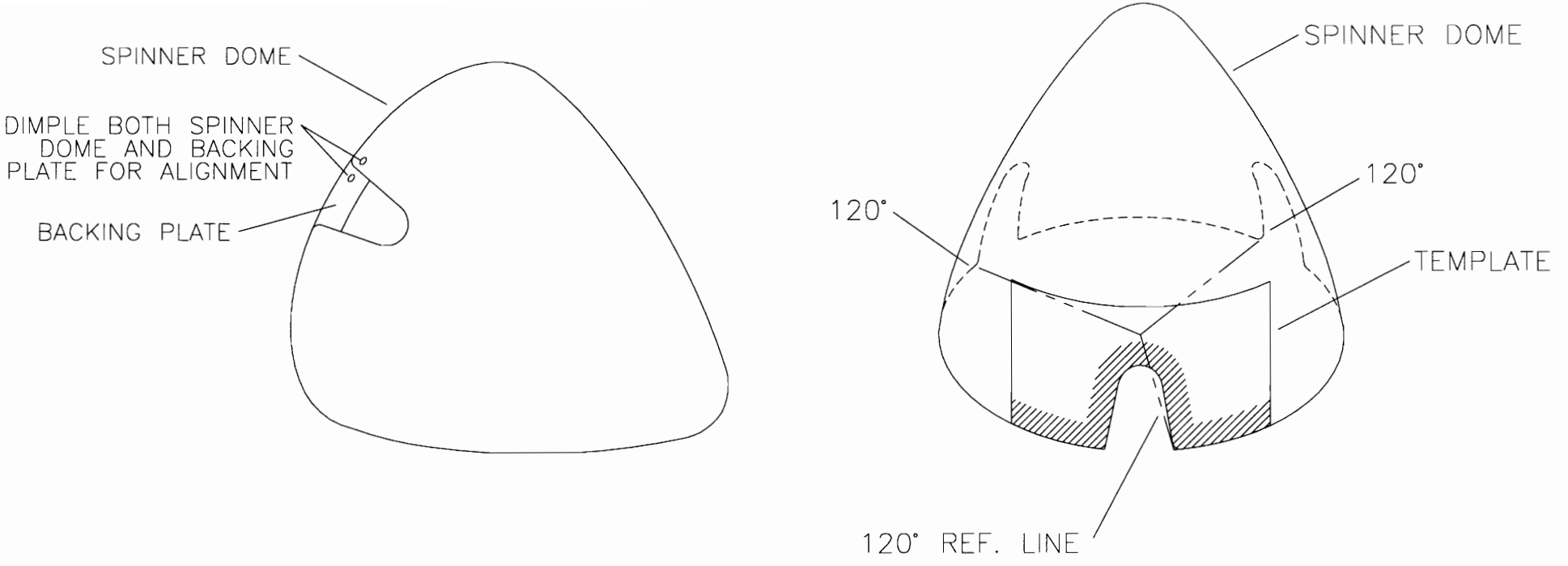
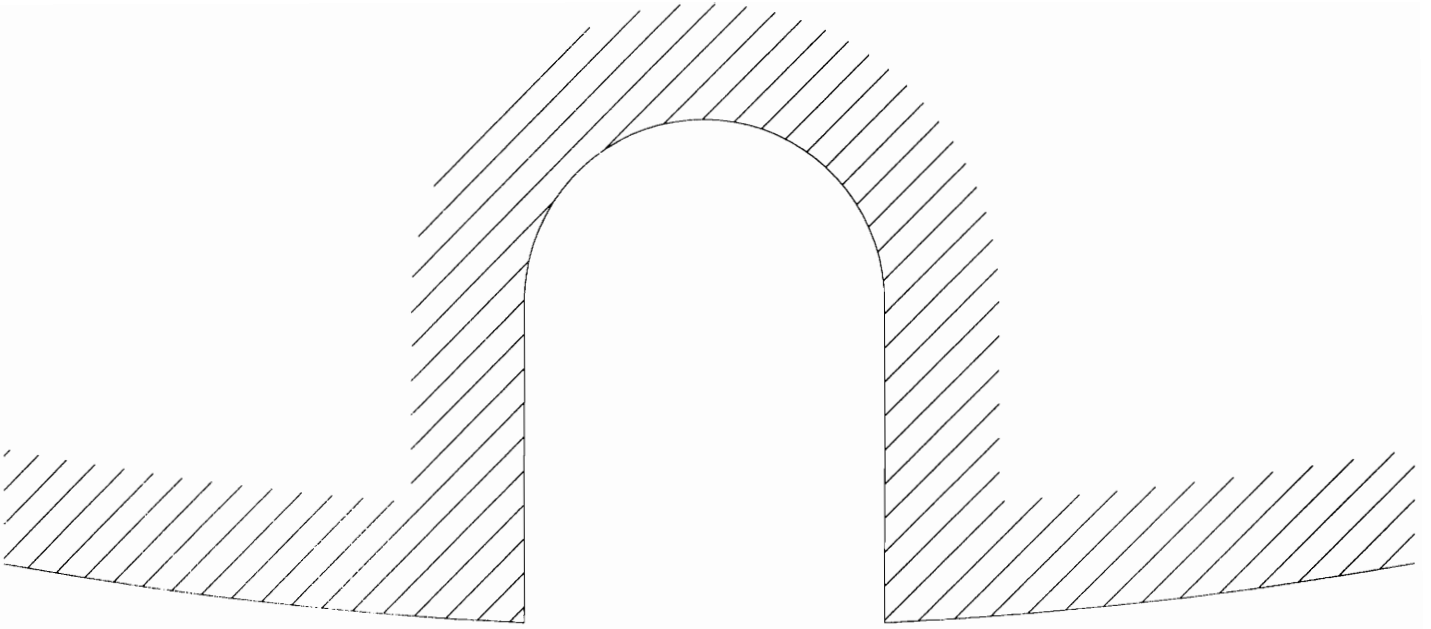
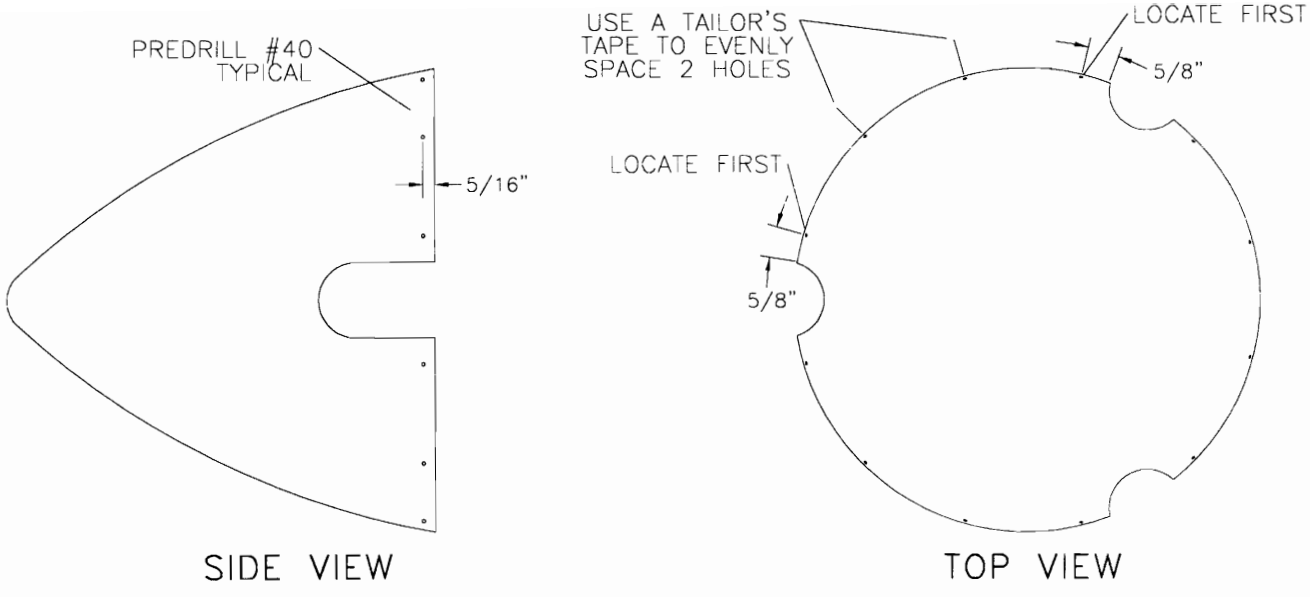

SPINNER DOME
DIMPLE BOTH SPINNER DOME AND BACKING PLATE FOR ALIGNMENT
BACKING PLATE
SPINNER DOME
120°
120°
TEMPLATE
120° REF. LINE

FIGURE 8–1



WARP DRIVE
13" SPINNER TEMPLATE

FIGURE 8-2



THREE BLADE PROP HOLE SPACING

FIGURE 8-3

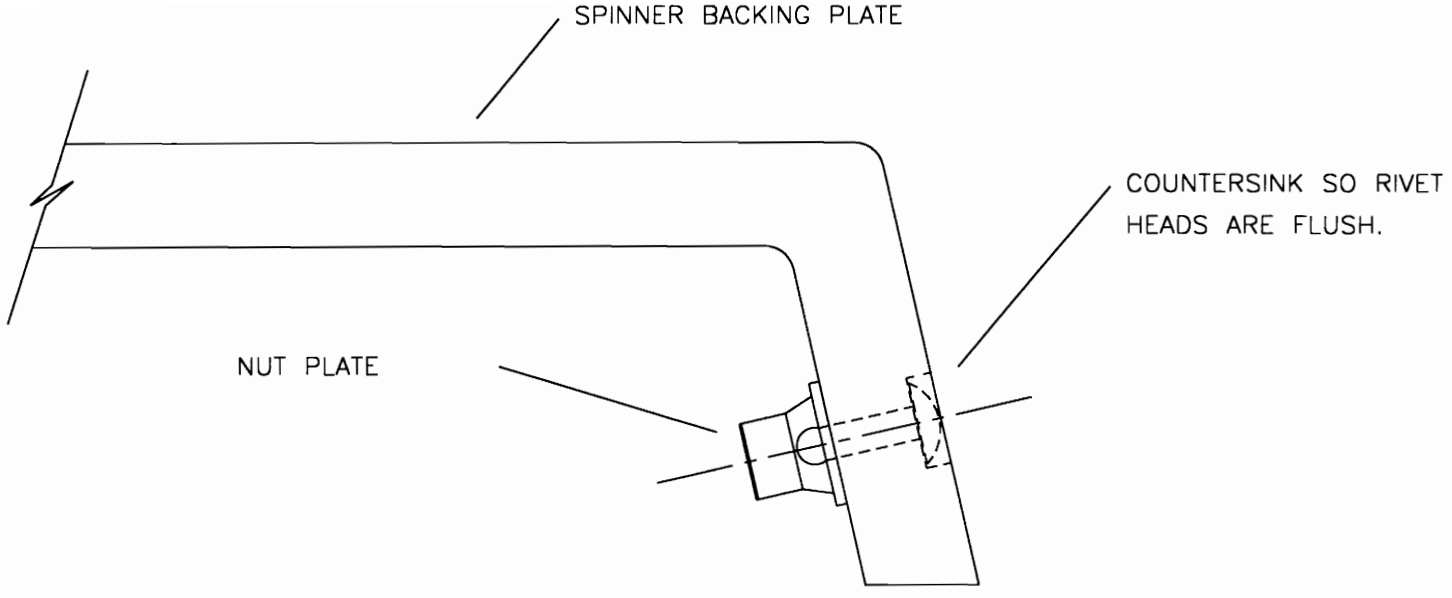

SPINNER BACKING PLATE
COUNTERSINK SO RIVET
HEADS ARE FLUSH.
NUT PLATE

FIGURE 8-4

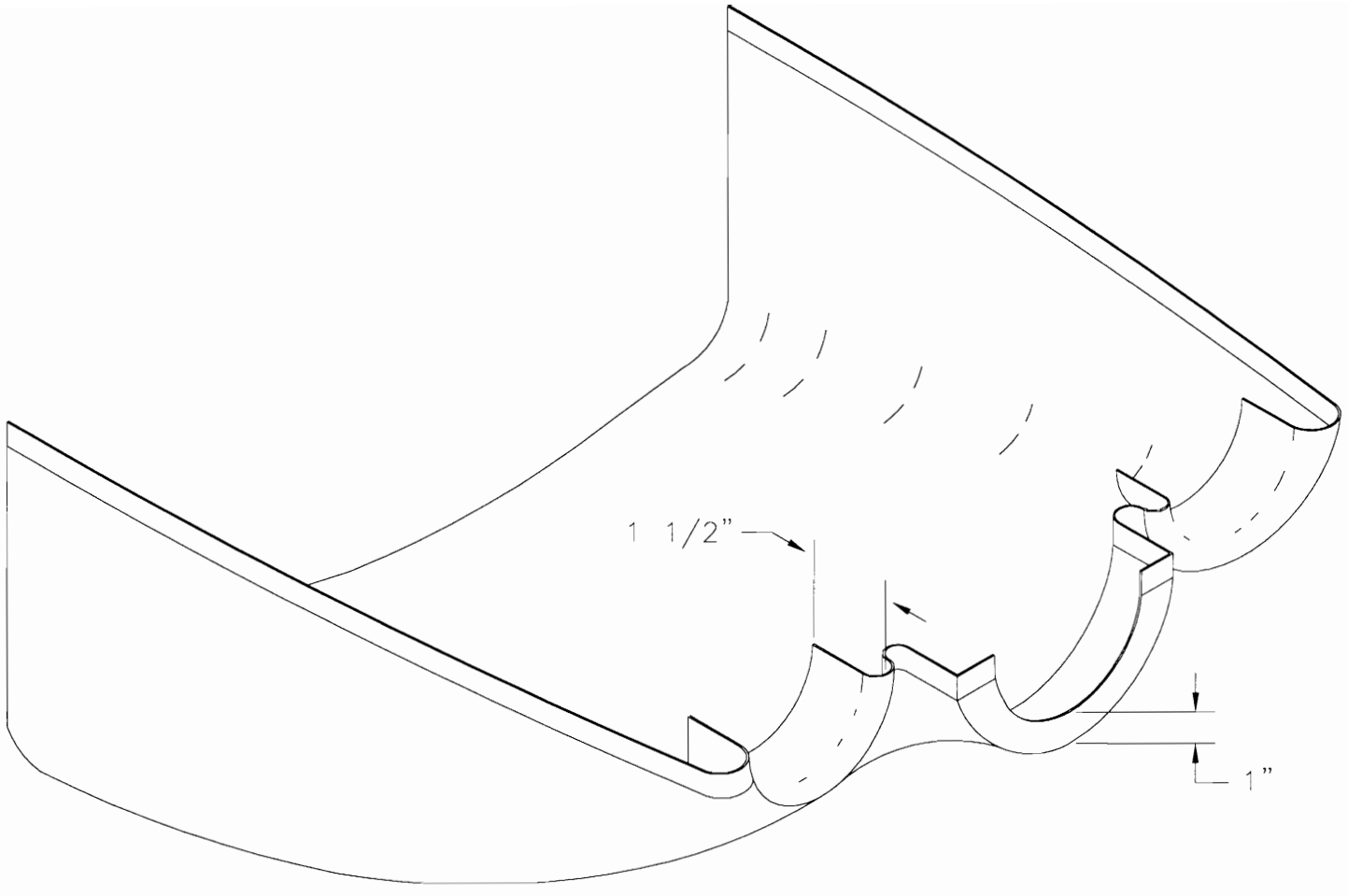


FIGURE 8-5

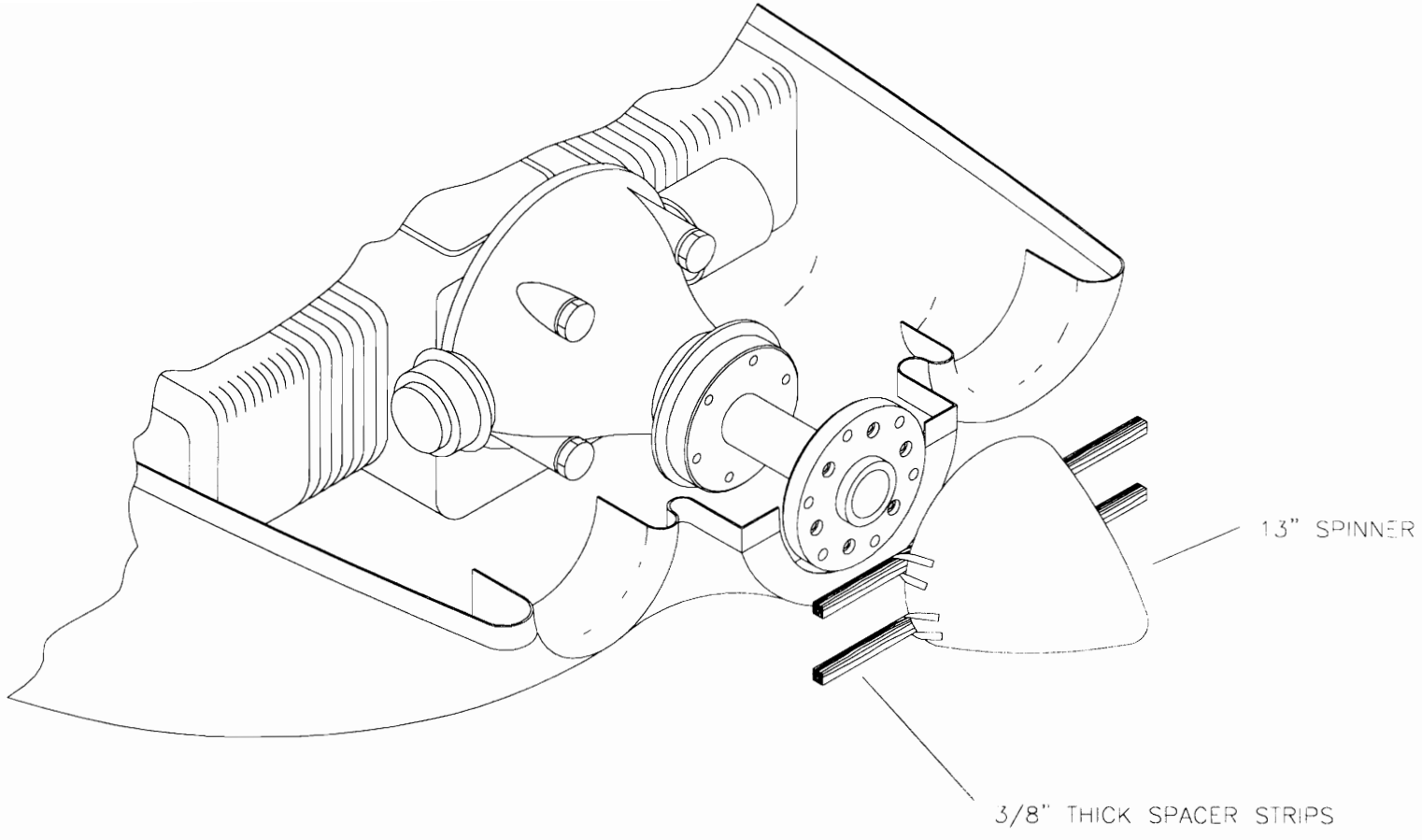


FIGURE 8-6

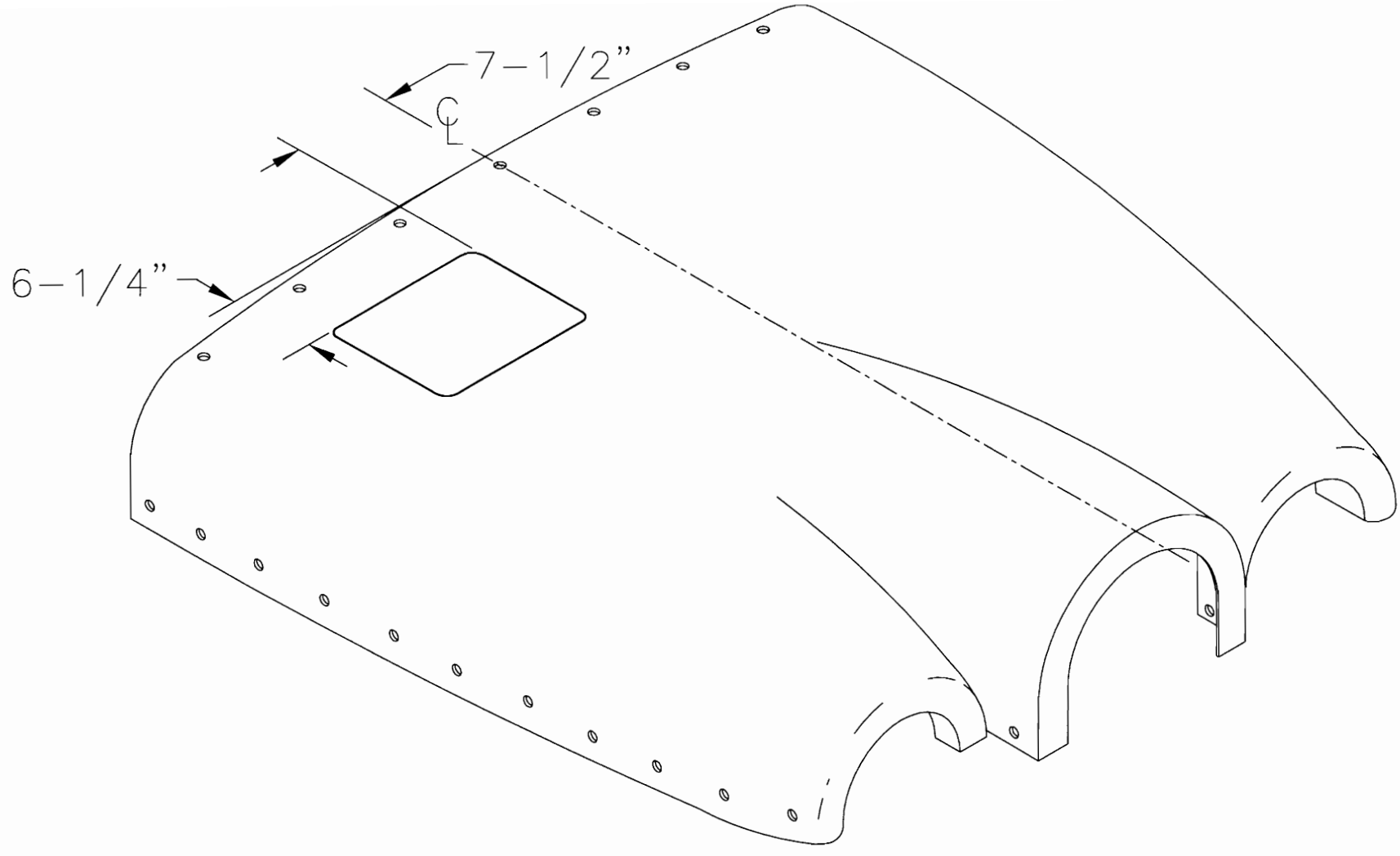


FIGURE 8-6A
S-16 SHEKARI

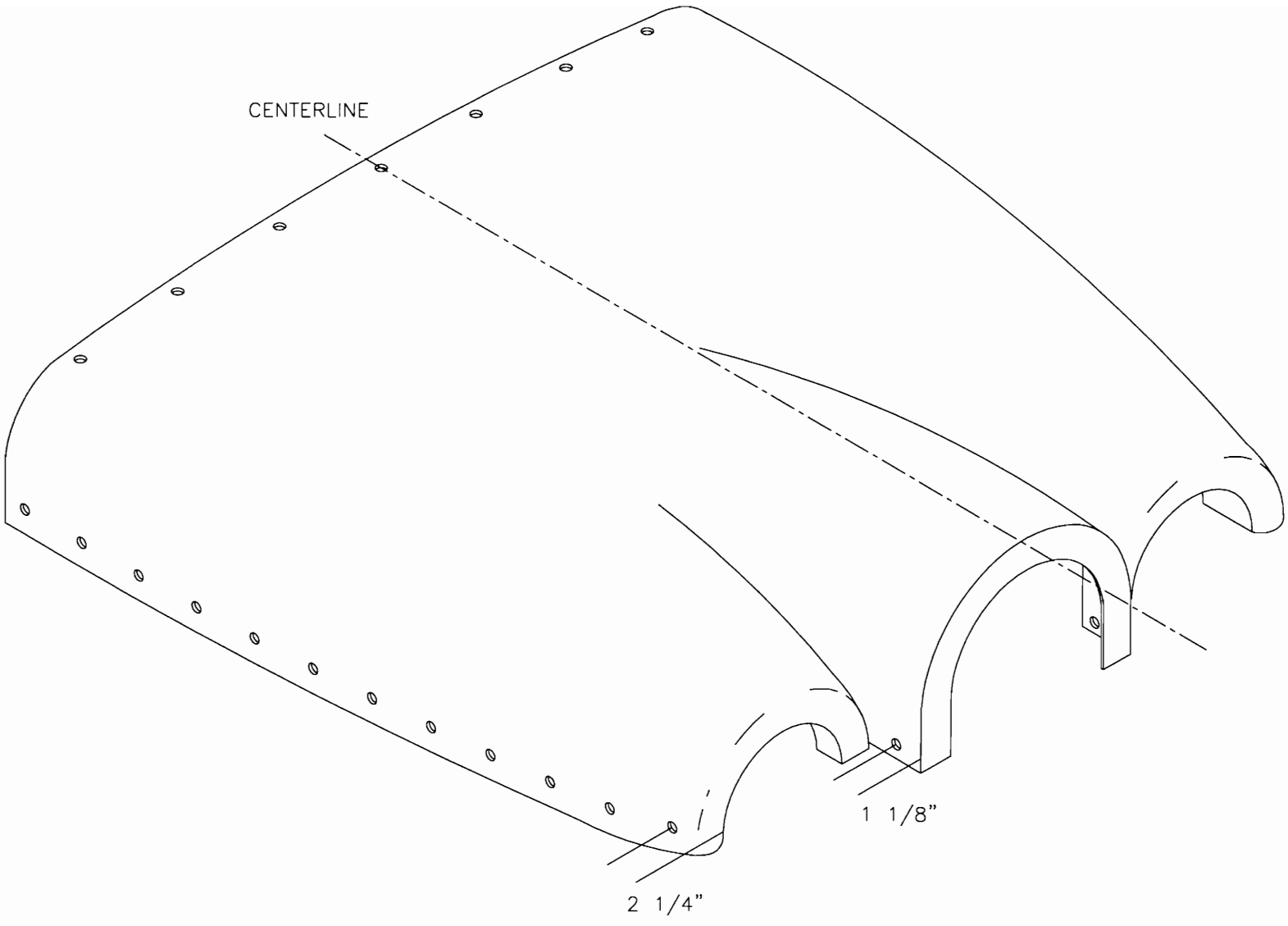


FIGURE 8-7

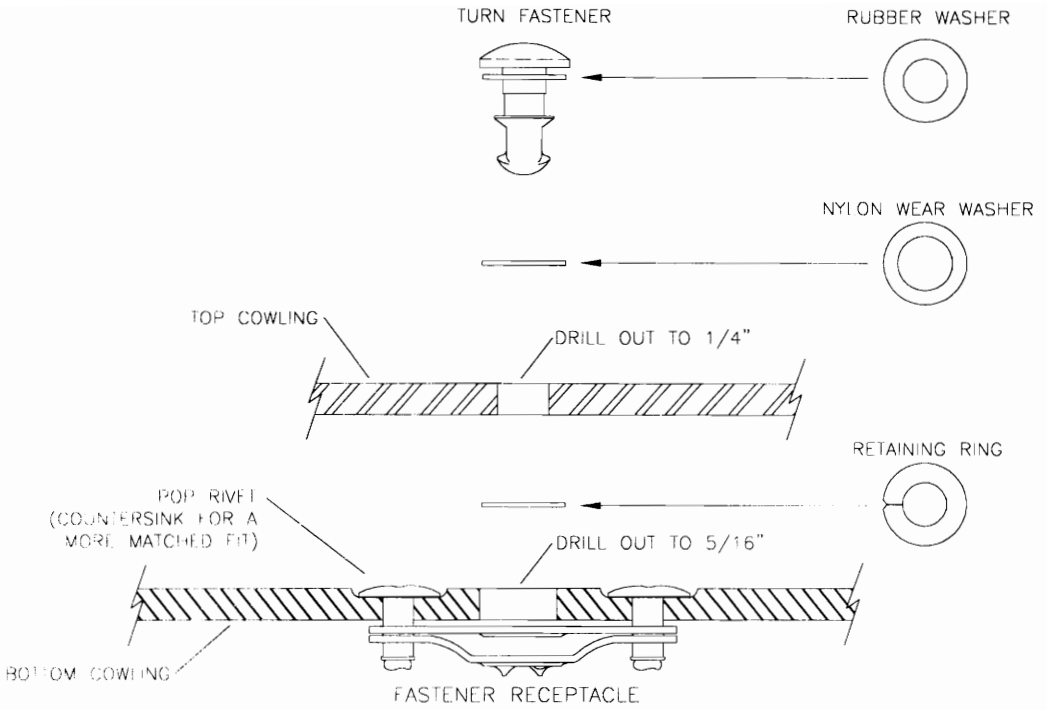
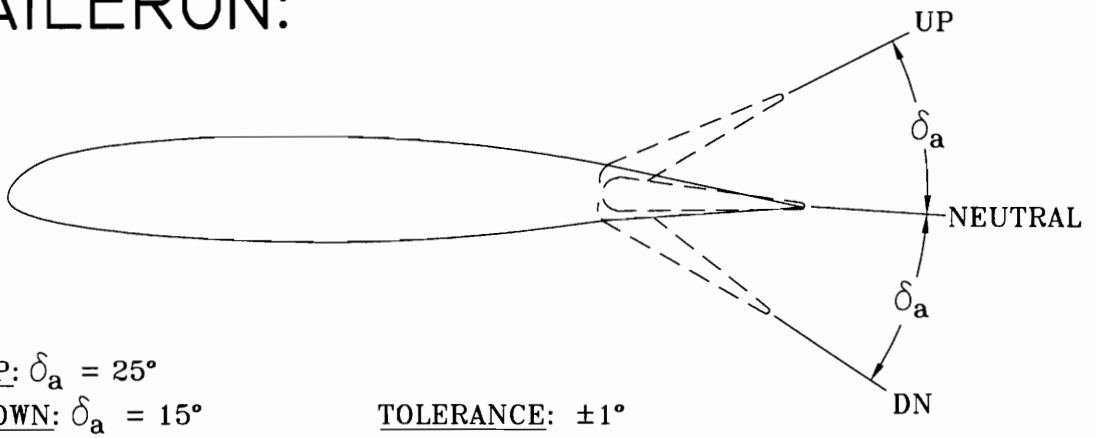

TURN FASTENER
RUBBER WASHER
NYLON WEAR WASHER
TOP COWLING
DRILL OUT TO 1/4"
RETAINING RING
POP RIVET
(COUNTERSINK FOR A
MORE MATCHED FIT)
DRILL OUT TO 5/16"
BOTTOM COWLING
FASTENER RECEPTACLE

FIGURE 8-8

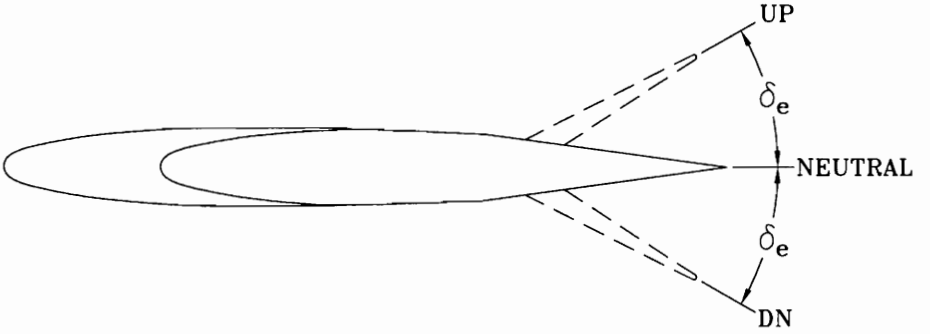
AILERON:



UP: δ_a = 25°
DOWN: δ_a = 15°

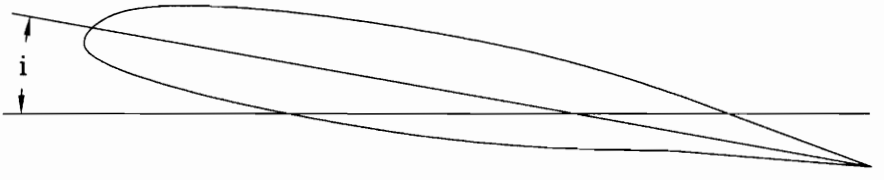
TOLERANCE: ±1°

ELEVATOR:



UP: δ_e = 30°
DOWN: δ_e = 20°

WING INCIDENCE:

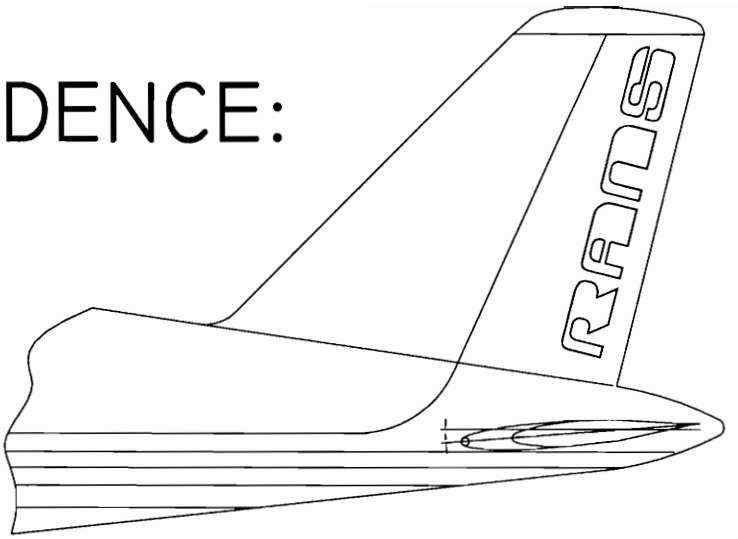


i: = 1°

MD3450

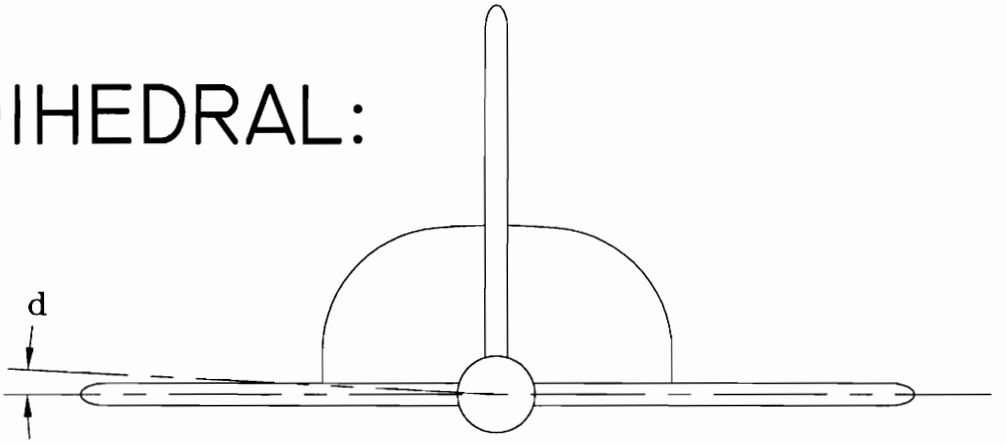
FIGURE 9-1
(PAGE 1 OF 5)
S-16 SHEKARI

TAIL INCIDENCE:



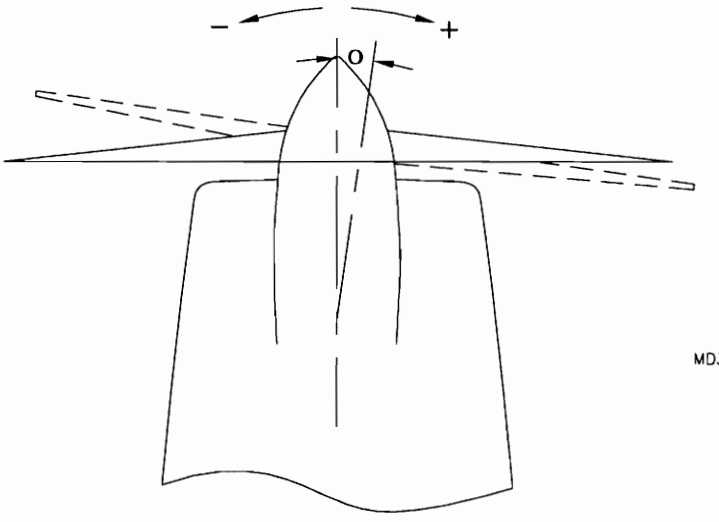
i: = −1°

TAIL DIHEDRAL:



d: = 0°

ENGINE (TRACTOR):

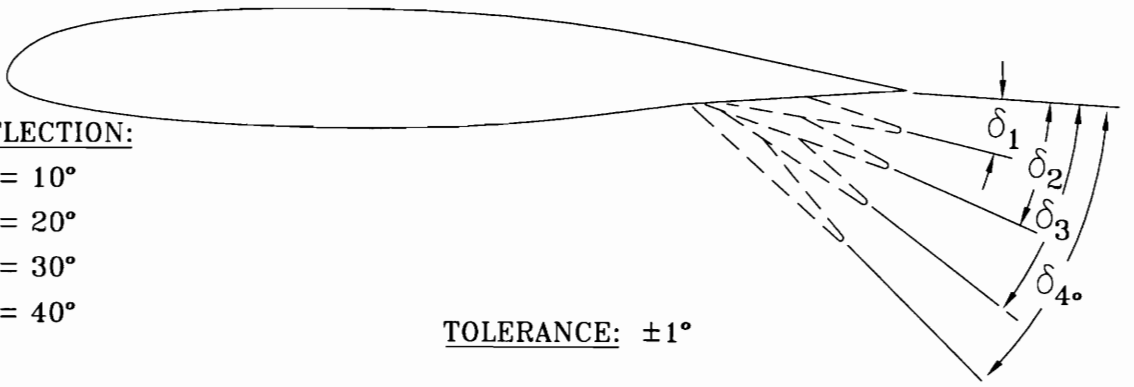


= +0.0° (IO−240B)

MD3450

FIGURE 9-1
(PAGE 2 OF 5)
S-16 SHEKARI

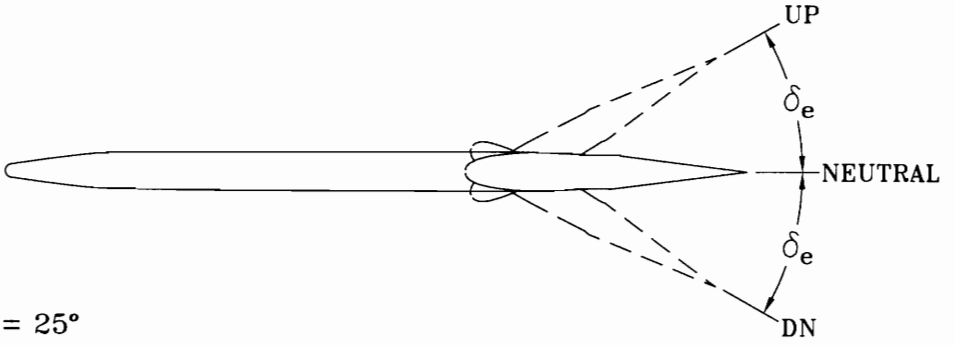
FLAP:



DEFLECTION:
δ_1 = 10°
δ_2 = 20°
δ_3 = 30°
δ_4 = 40°

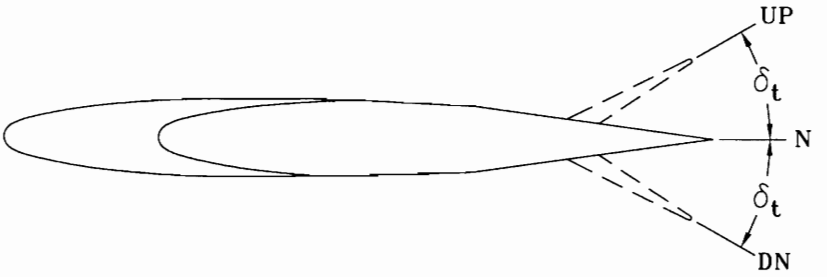
TOLERANCE: ±1°

RUDDER:



RIGHT: δ_r = 25°
LEFT: δ_r = 25°

TRIM TAB:

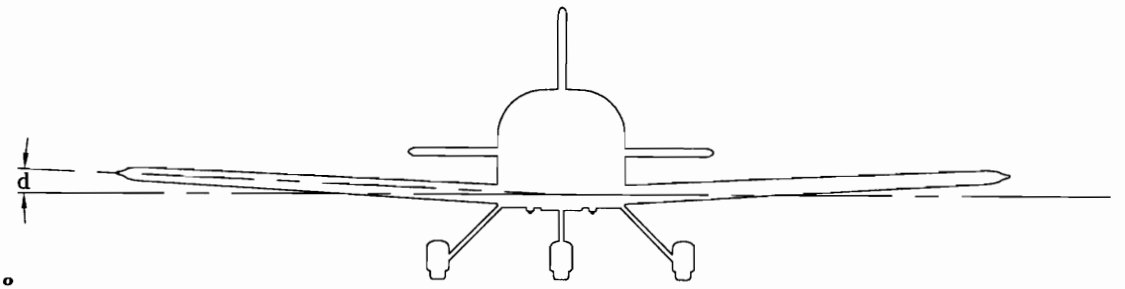


UP: δ_t = N/A
DOWN: δ_t = N/A

MD3450

FIGURE 9-1
(PAGE 3 OF 5)
S-16 SHEKARI

WING DIHEDRAL:

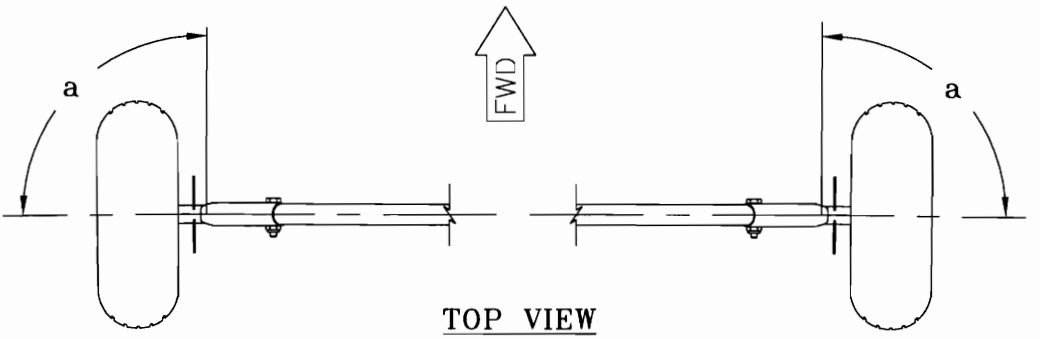


d: = 3°

WING WASH-OUT:

w: = 0.5°

LANDING GEAR TOE-OUT:



a: = 90.0°

MD3450

FIGURE 9-1
(PAGE 4 OF 5)
S-16 SHEKARI

THRUST LINE

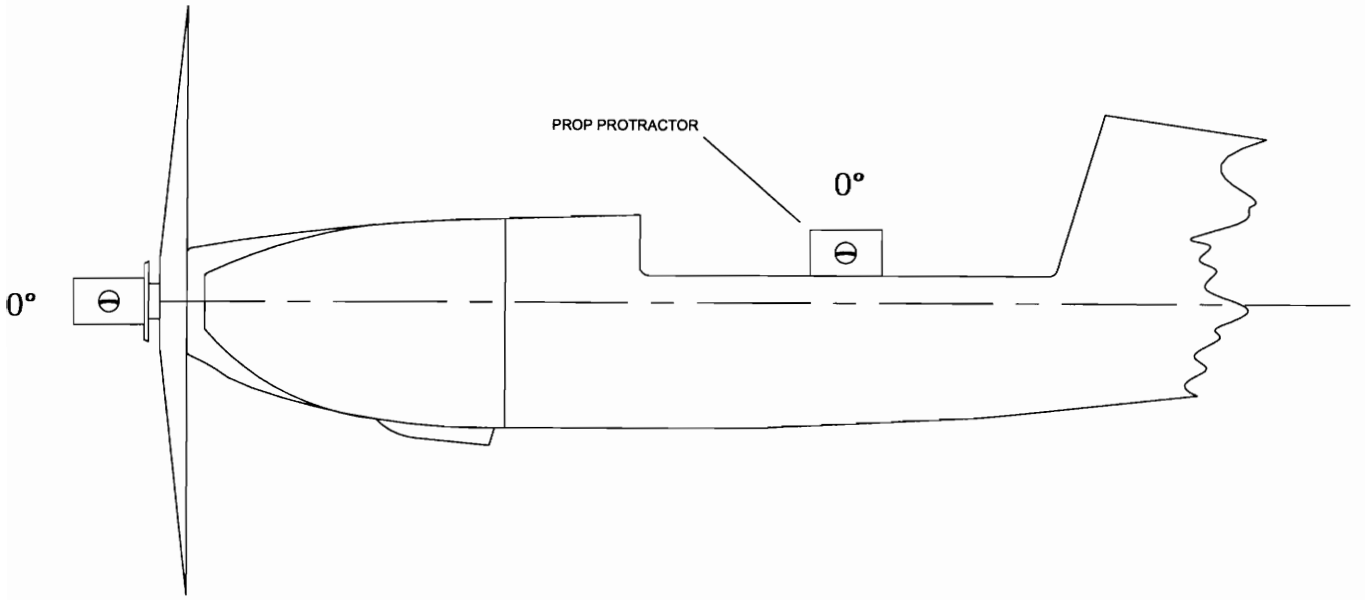


FIGURE 9-1
(PAGE 5 OF 5)
S-16 SHEKARI

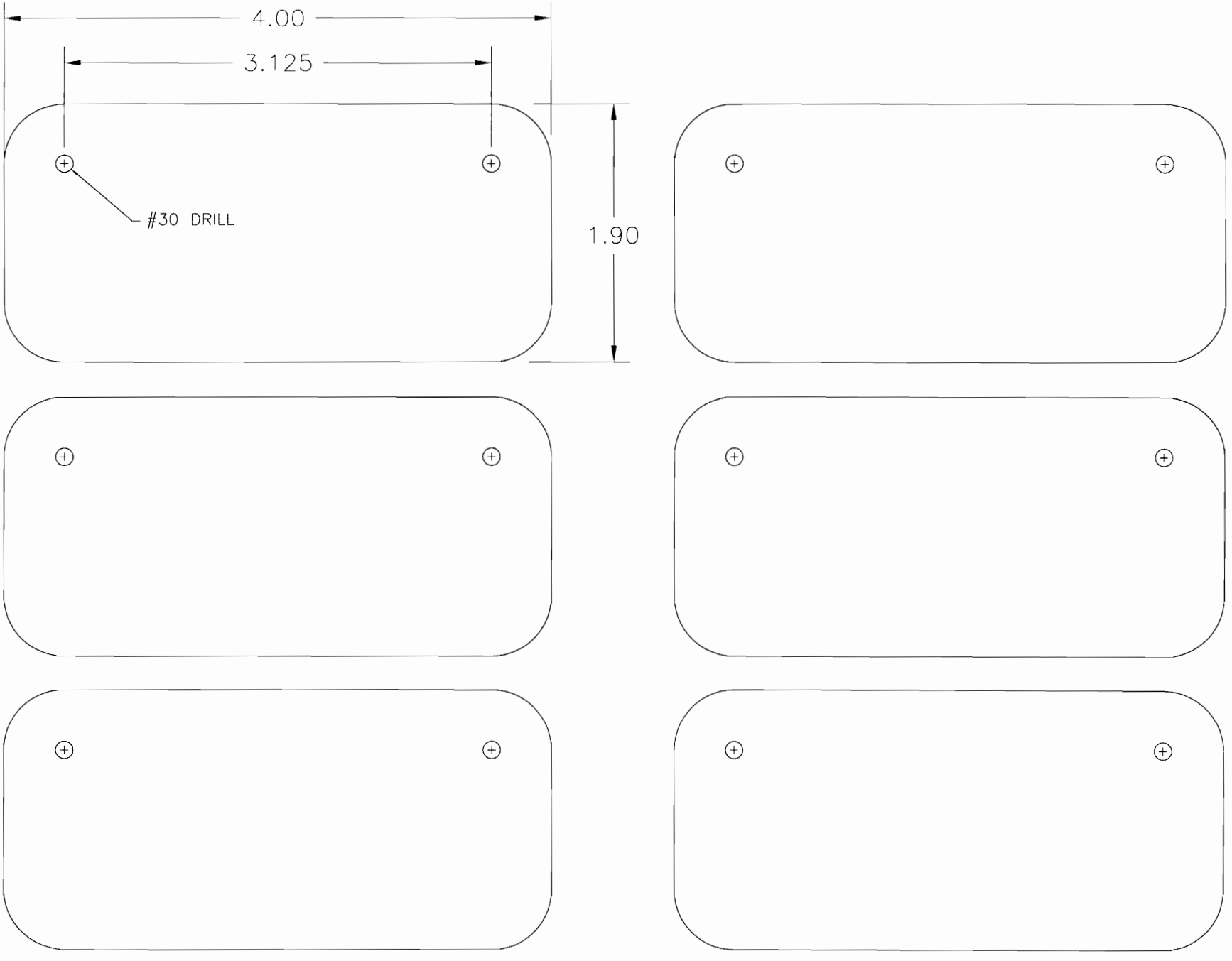


FIGURE 9–2

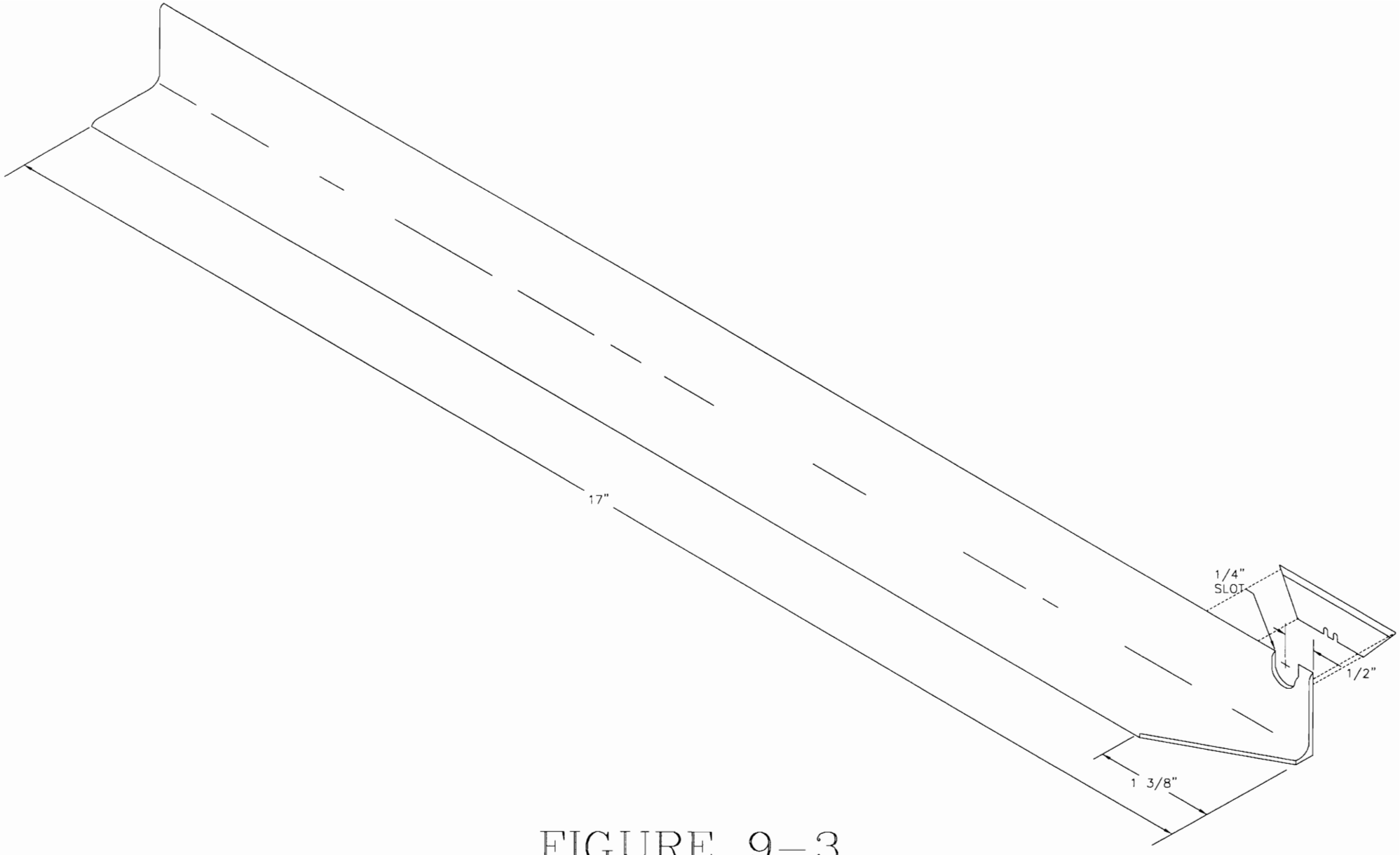


FIGURE 9–3

01/22/99

MD3323
REV.

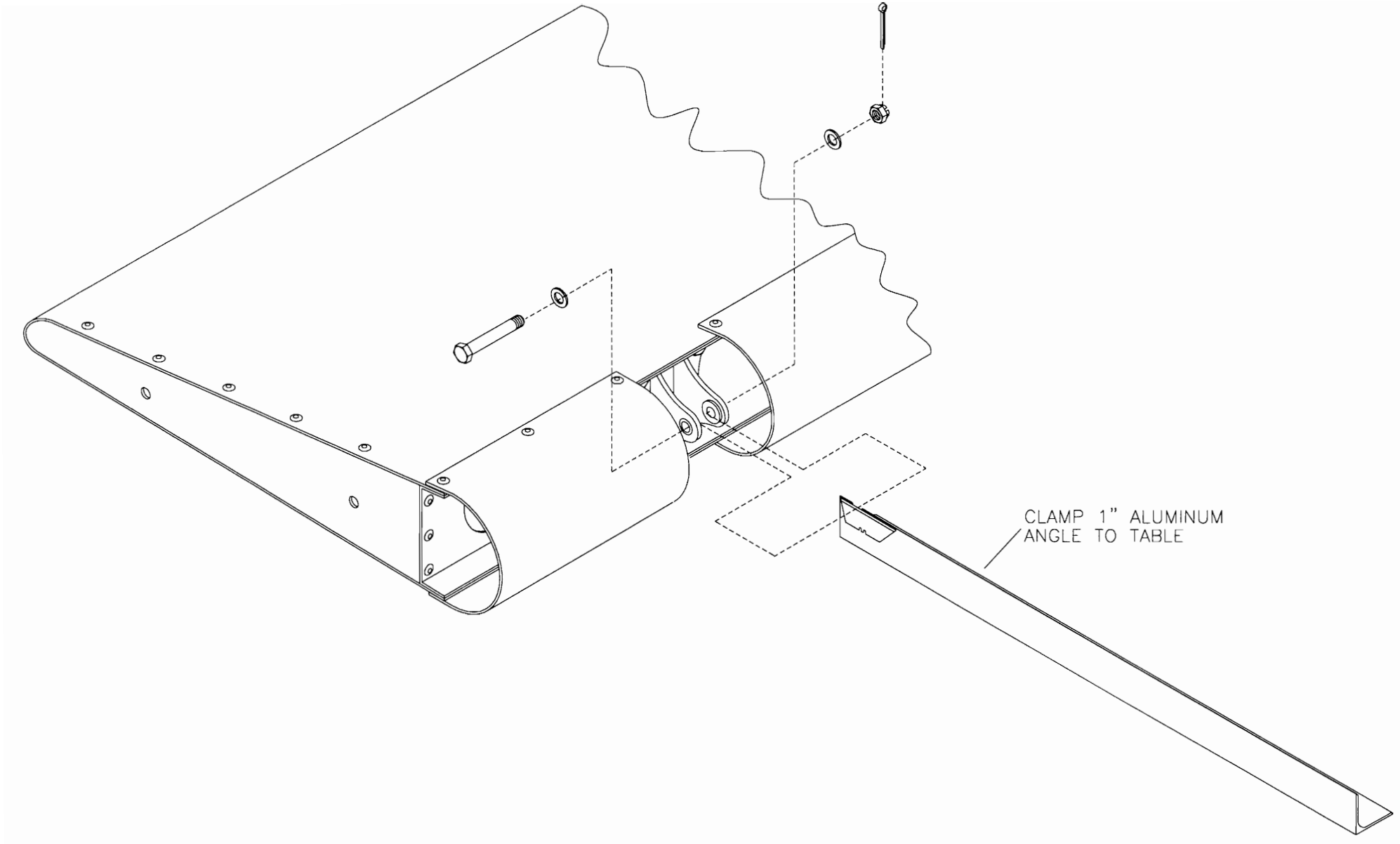


FIGURE 9–4

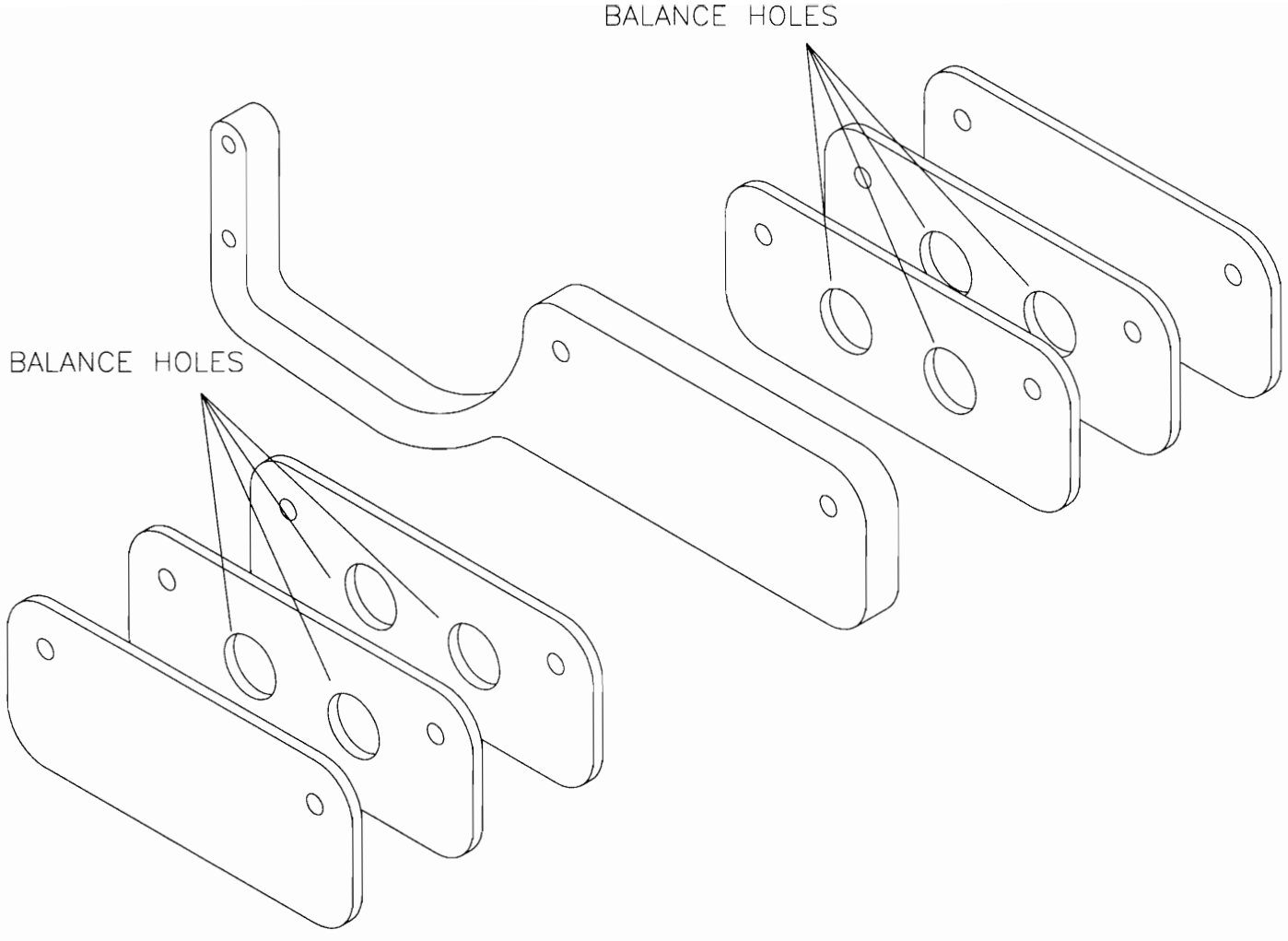
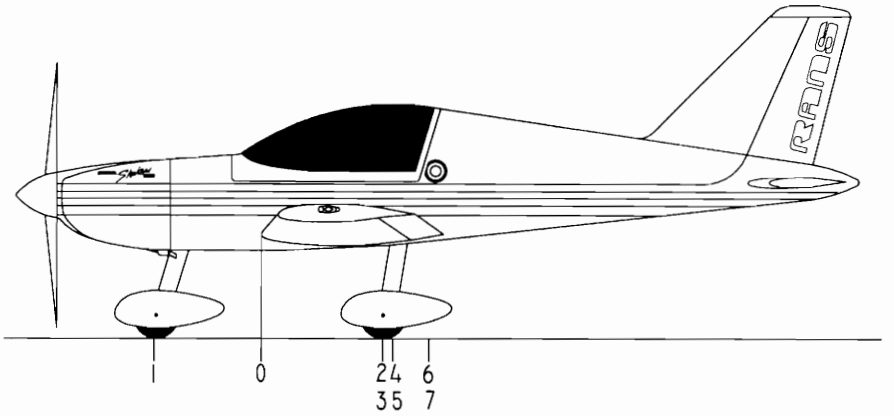


FIGURE 9-5



N_____	
DATE WEIGHED	
ENGINE TYPE	IO-240B
C.G. CONDITION	
EMPTY WEIGHT	
GROSS WT.	1450 LBS.

RANS S-16 SHEKARI
WEIGHT AND BALANCE

ACCEPTABLE C.G. 8.7" TO 15.6" FROM DATUM 0.
DATUM = LEADING EDGE OF WING AT FUSELAGE INTERSECTION
LEVEL ATTITUDE. (LEVEL REFERENCE TO
CANOPY UPPER LONGERON)

#	ITEM	WEIGHT	ARM	MOMENT
1	NOSEWHEEL	353	-27.25	-9619
2	MAIN LH	301	24	7224
3	MAIN RH	293	24	7032
4	PILOT	185	24.5	4532
5	PASSENGER	185	24.5	4532
6	FUEL	100	45	4500
7	BAGGAGE	30	45	1350
	TOTAL=	1447	TOTAL=	19551

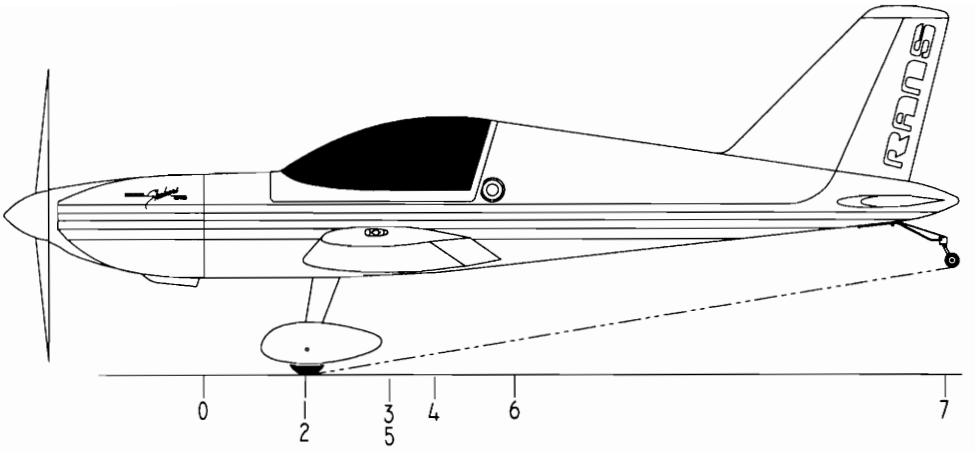
$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.} \quad \frac{19551}{1447} \; 13.51 \quad \frac{(\text{CG}-1.7)}{44.3} \; *100 = \%\text{MAC}$$

#	ITEM	WEIGHT	ARM	MOMENT
1	NOSEWHEEL		-27.25	(-)
2	MAIN LH		24	
3	MAIN RH		24	
4	PILOT		24.5	
5	PASSENGER		24.5	
6	FUEL		45	
7	BAGGAGE		45	
	TOTAL=		TOTAL=	

$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.} \qquad \_\_\_\_\_ =$$

* 50 LBS. MAXIMUM BAGGAGE

FIGURE 11-1



N_____	
DATE WEIGHED	
ENGINE TYPE	IO-240B
C.G. CONDITION	
EMPTY WEIGHT	
GROSS WT.	1500 LBS.
ACRO WT.	1300 LBS.

RANS S-16A SHEKARI
WEIGHT AND BALANCE

ACCEPTABLE C.G. FOR AEROBATICS IS 32.2" TO 38.0" FROM DATUM 0.
ACCEPTABLE C.G. FOR NORMAL CAT. IS 32.2" TO 40.90" FROM DATUM 0.
DATUM = FIREWALL
LEVEL ATTITUDE. (LEVEL REFERENCE TO CANOPY UPPER LONGERON)

#	ITEM	WEIGHT	ARM	MOMENT
1	MAIN RH	467	26.8	12515
2	MAIN LH	462	26.8	12381
3	PILOT	170	48.5	8245
4	FUEL	170	69.1	11747
5	PASSENGER	170	48.5	8245
6	BAGGAGE*	50	69.1	3455
7	TAIL WHEEL	11	183	2013
	TOTAL=	1500	TOTAL=	58601

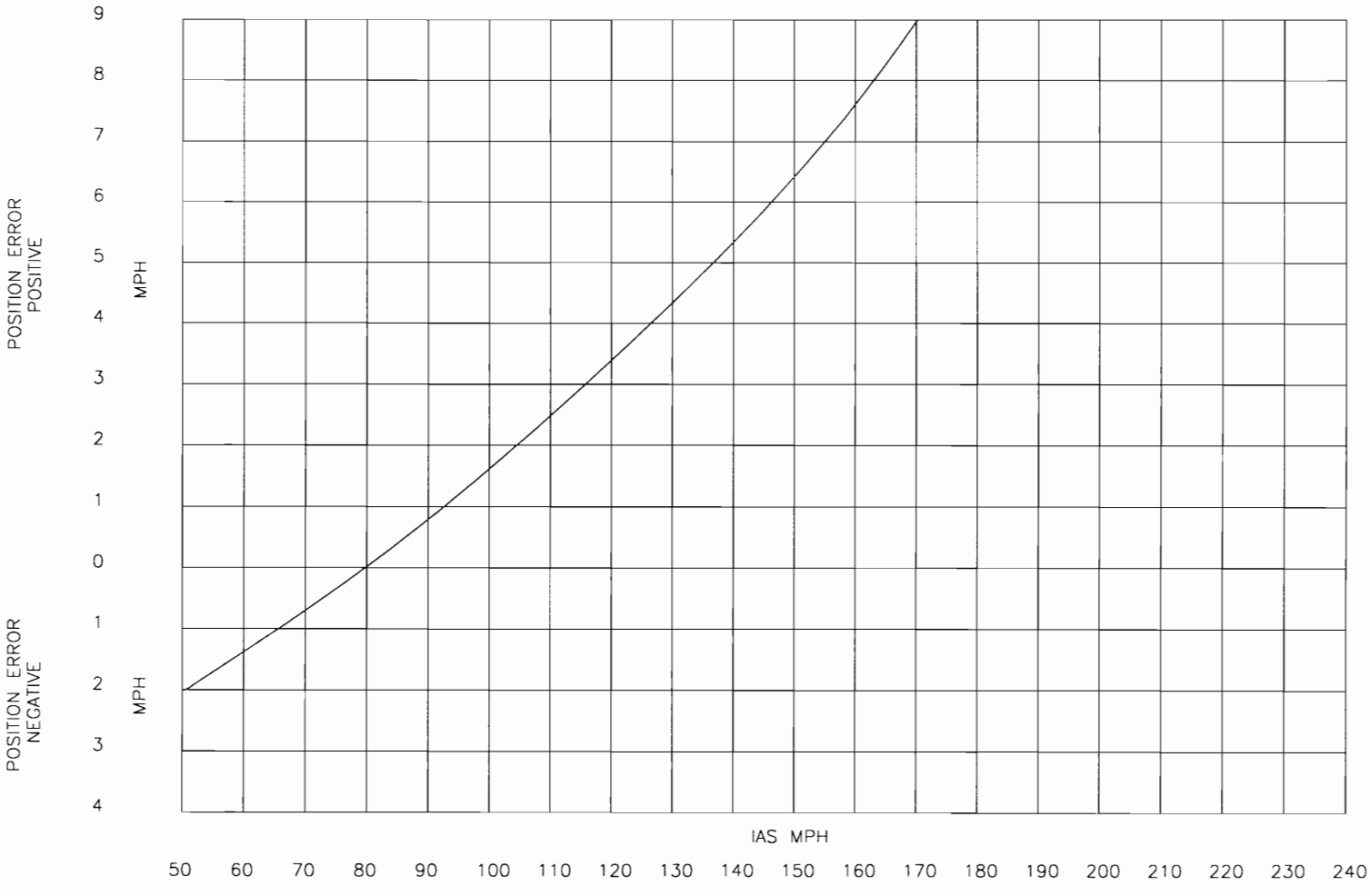
$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.} \qquad \frac{58601}{1500} = 39.0"$$

#	ITEM	WEIGHT	ARM	MOMENT
1	MAIN RH		26.8	
2	MAIN LH		26.8	
3	PILOT		48.5	
4	FUEL		69.1	
5	PASSENGER		48.5	
6	BAGGAGE*		69.1	
7	TAIL WHEEL		183	
	TOTAL=		TOTAL=	

$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.} \qquad \text{_____} =$$

* 50 LBS. MAXIMUM BAGGAGE

FIGURE 11-2



S-16 AIRSPEED INDICATOR CALIBRATION
ALL SPEEDS IN MPH
DEC 15 98

CAS=IAS-POSITION ERROR

EF-97 REV N/A
12/17/98

FIGURE 11-3

Vn DIAGRAM BASED ON IAS

WHITE ARC	56 MPH – 80 MPH	FLAPS 40°
BLUE ARC	80MPH – 90 MPH	FLAPS 0° – 30°
GREEN ARC	64 MPH – 140 MPH	(CONSERVATIVE)
YELLOW ARC	140 MPH – 220 MPH	
RED LINE	220 MPH *	*(PENDING DIVE AND FLUTTER TESTING) *(CURRENTLY 180 MPH MAX. IAS ALLOWABLE)

OPERATING LIMITS

MAXIMUM TAKEOFF WEIGHT	1500 lbs.	
MAXIMUM AEROBATIC WEIGHT	1300 lbs.	GREEN ARC BASED ON ACRO WEIGHT OF 1300 lbs
MAXIMUM LANDING WEIGHT	1450 lbs.	

ERECT AND INVERTED SPINS – PROHIBITED

NEGATIVE G WITH IO–240 – NOT RECOMMENDED

FLIGHT WITH CANOPY OPEN – PROHIBITED

FIGURE 11–4