

CW-501
A-018
RED

FRONT SPAR

This section of the front spar spans from RBL 66.65 to LBL 26.00. CW-512, CW-513 and CW-514 connect to this section on the right side, and CW-502 on the left side. The upper and lower connections separated along the radius of the upper/lower skin/spar chords. The sides separated by a tearing action.

The web right side is torn vertically, in steps, from RBL 66.65 to RBL 44.77. The torn web edges are curled forward at RBL 44.77. All the stiffeners remained attached to the front spar web and suffered severe impact damage on the back side. There is long hole in the web 6" to the right of BL0 (between BL0 and RBL 9.10). This hole is about 36" long and about 5" wide. The web around the hole is curled in forward direction. There are some 360 degree web curls in the lower portion of the hole. There is another long hole 44" long on the left side of BL0 (between BL0 and LBL 9.10). The upper end of the hole has a horizontal tear 6" wide and the lower end of the hole has a horizontal tear of 2.5" wide. The majority of the web torn around the hole has curled in a forward direction. There are numerous small holes on the web which exhibit evidence of forward and aft curling, and a detail documentation of the direction of the curls is documented in a diagram. The stiffener on this section of the front spar remained attached and suffered severe impact damage.

All the stiffeners suffered 3" wide impact damage about 11"-14" below the upper shear ties. This damage is consistent horizontally in all the stiffeners of this section. The aft flanges are crushed forward at this location. For some of the stiffeners, the web is also crushed at this location. The left corner of the aft flange of RBL 9.10 stiffener exhibited several impact damage marks consistent with metal gouging. These impact marks, typically, are 1.5" apart and have a slight black color signature. The web forward of the aft flange (which has a 36" long hole) had black color gouge marks. These black color gouge marks are from top to bottom at about a 45 degree angle approximately 1.5" apart (typical). The impact marks on the aft flange of the stiffener and the gouge mark on the web is aligned 45 degrees from a horizontal line going down and forward. The stiffeners separated from the upper chord with their shear tie attached. The "L" shaped lower chord fractured at the radius, and the lower shear ties separated from the stiffeners.

There is a piece of plastic embedded between the stiffener at LBL 9.10 and the front spar web.

The direction of failure of upper and lower shear ties are documented in the shear tie study which determined that the stiffeners of this section of the front spar moved in forward direction.

There is no evidence of any pre-existing cracking or corrosion to this section of the front spar.

There are spike tooth fractures located in the web between the stiffeners at BBL 0 and RBL 11, at RBL 26 and 33, and at RBL 33 and 41.

REF. TO F&E NOTES FOR DETAIL.

SD GREEN ALPA

12-06-96

W. M. ... 12-6-96 TWA

Stephen F. Clapach, Sr.

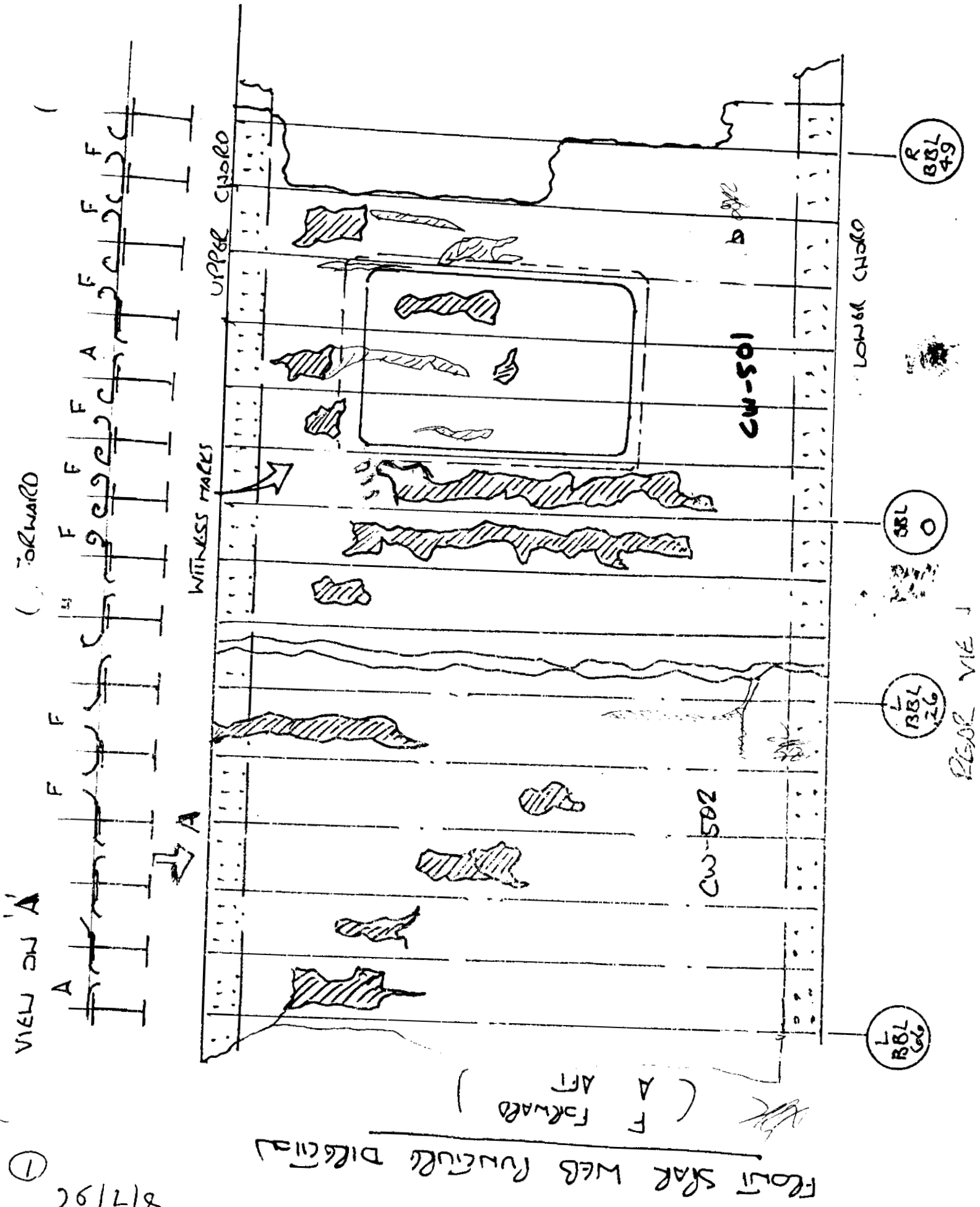
Fwy 12-06-96

R. Guackith TAM 12-6-96

W. A. Reimer, BOEING 12/7/96

01

8/7/90
①

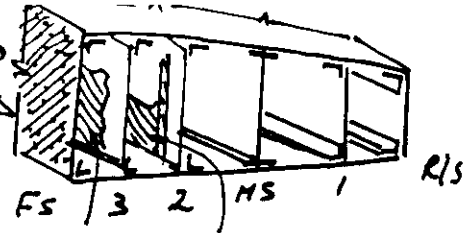


FRONT STAR WEG RUNCIGLE DIRECTION
(F FORWARD)
(A AFT)

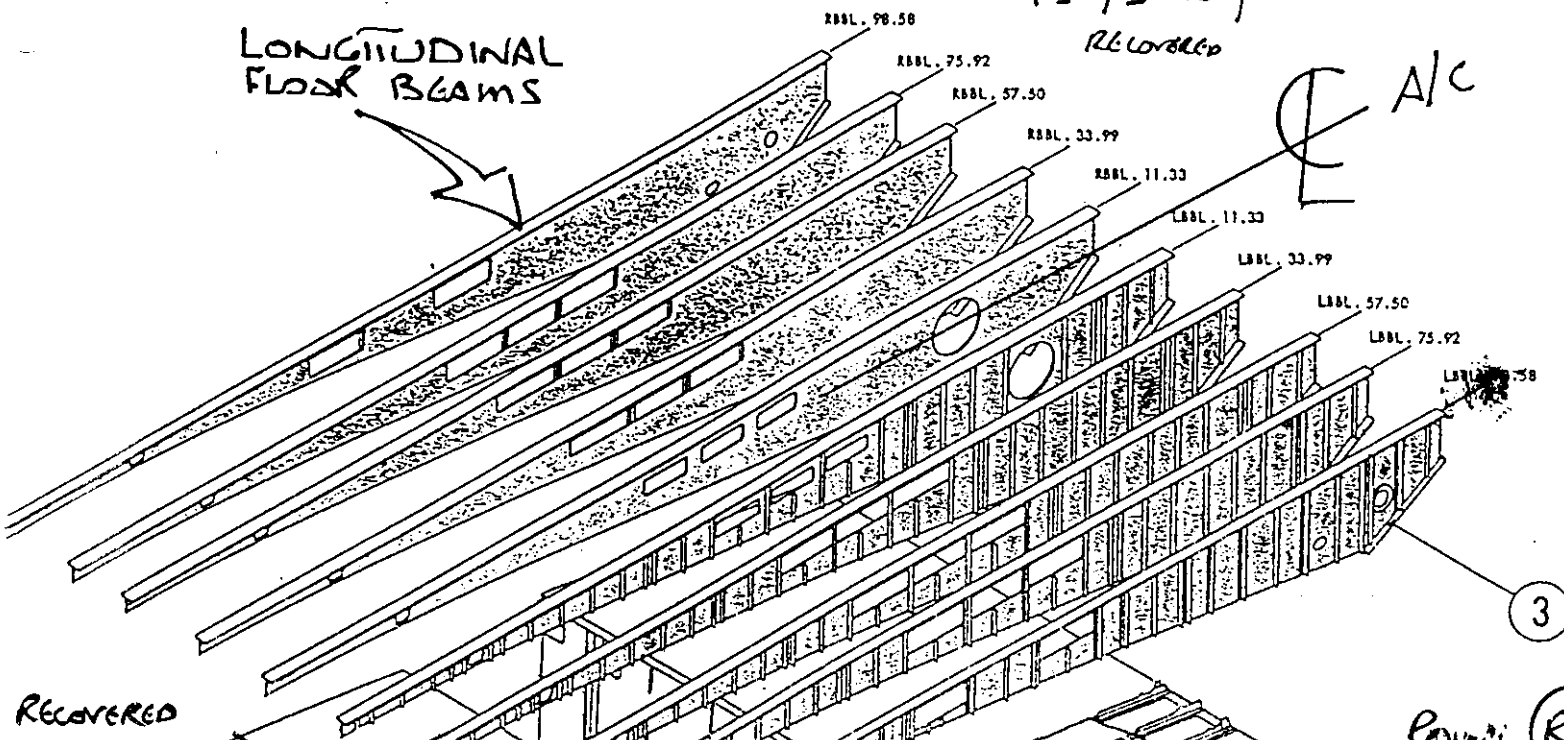
SECTION 11

WING CENTER SECTION

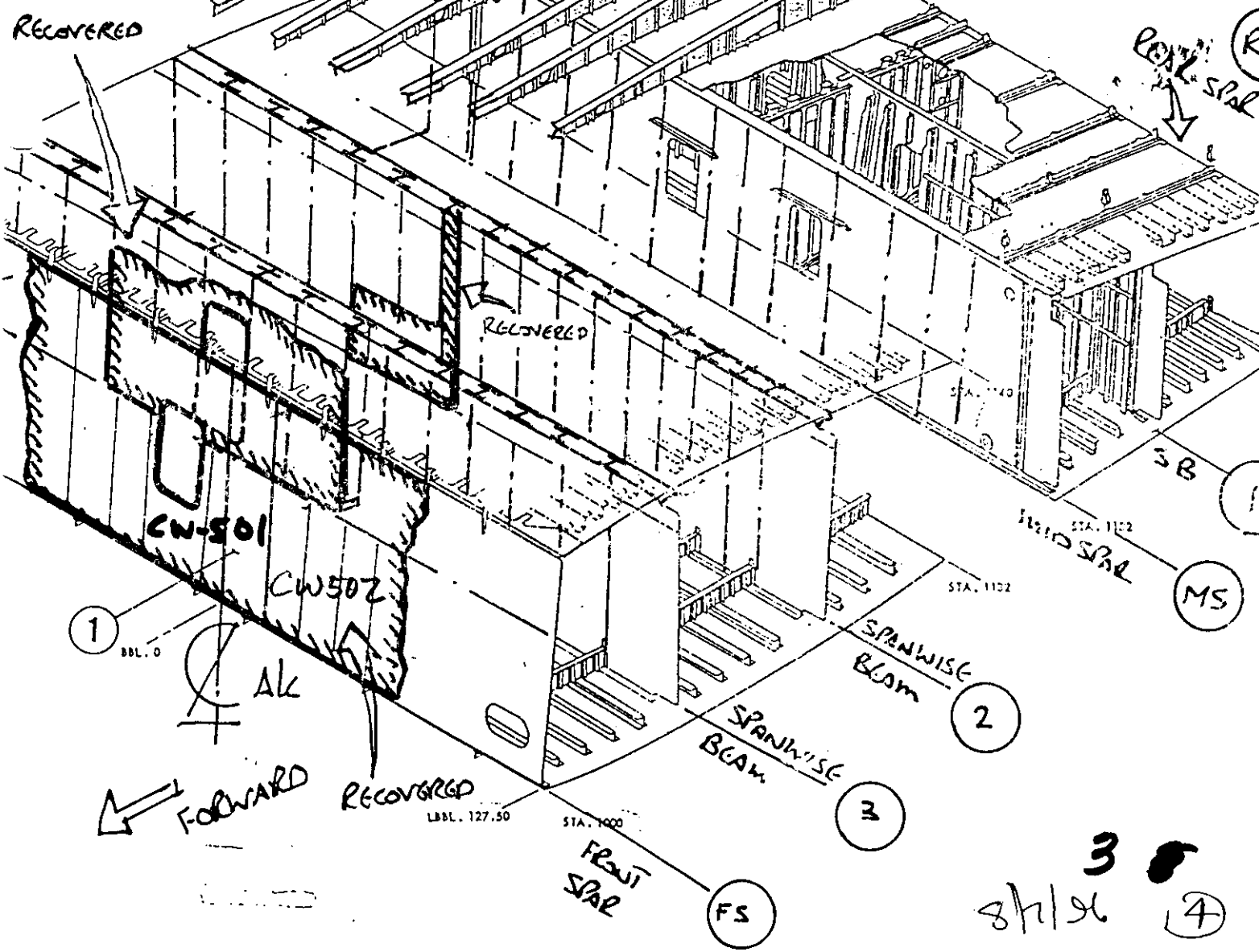
RECOVERED



LONGITUDINAL FLOOR BEAMS



RECOVERED

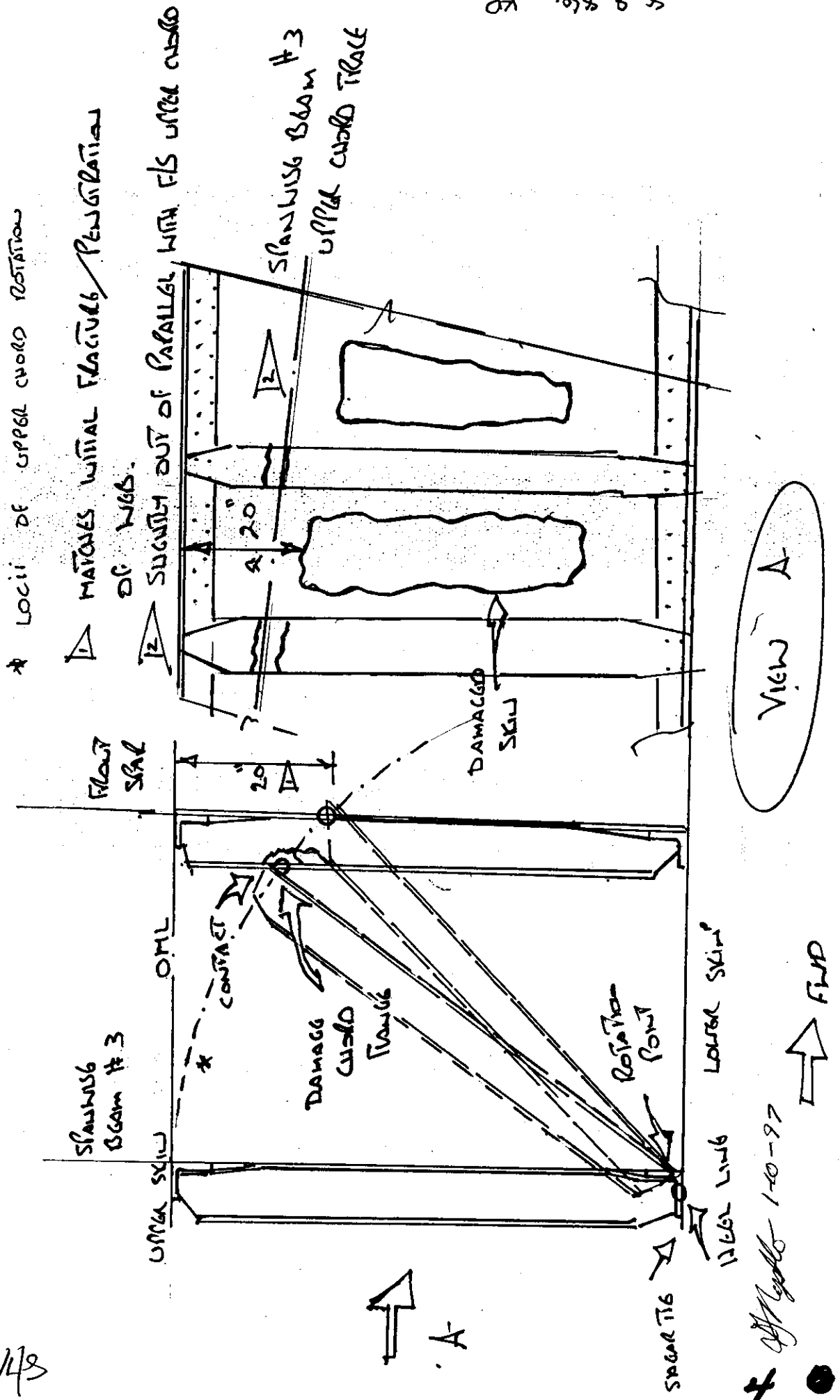


FORWARD

3
8/1/96
4

ANALOGY SCENARIO OF DAMAGE TO FRONT SKIN CENTER SECTION NGB.

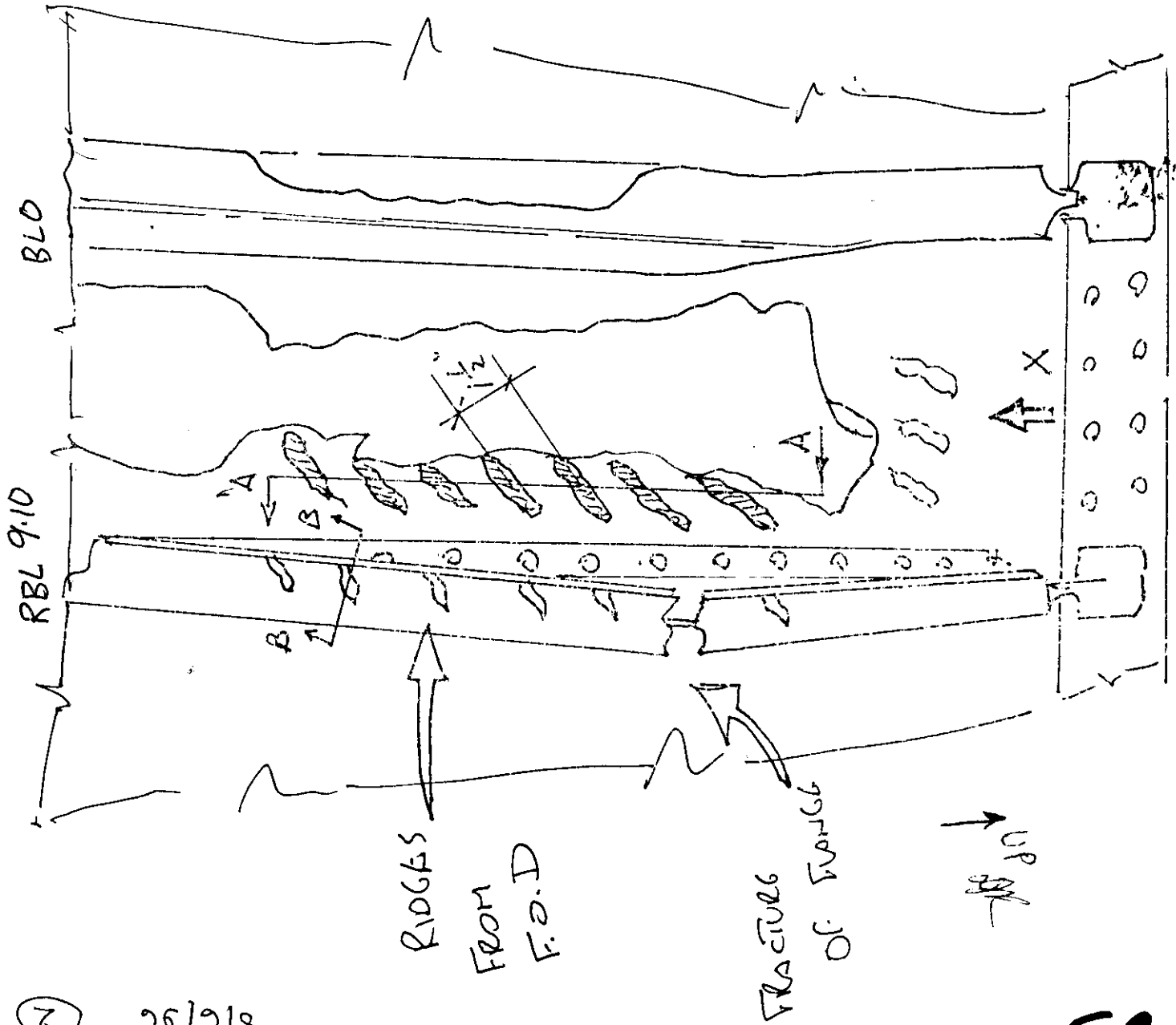
② 8/1/86



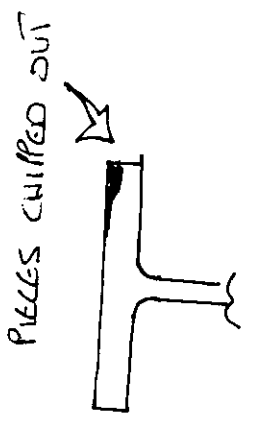
8.9.86. 40

1-10-97

8/6/96 (2)



DAMAGE TO L16B

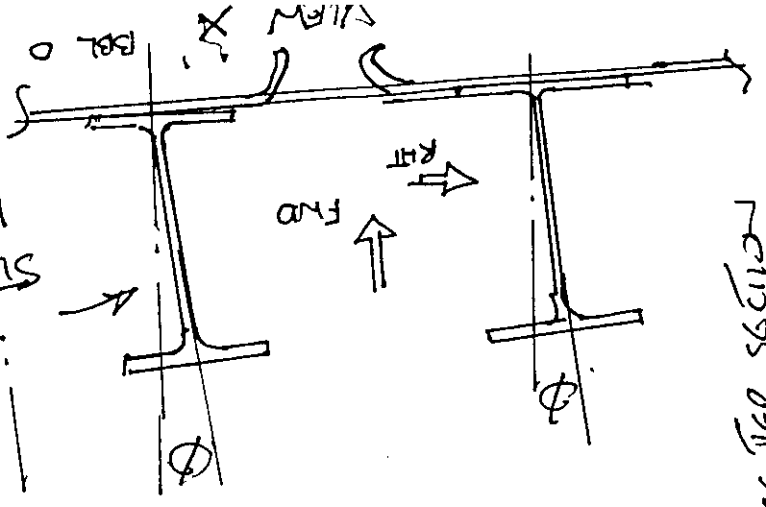


B.B



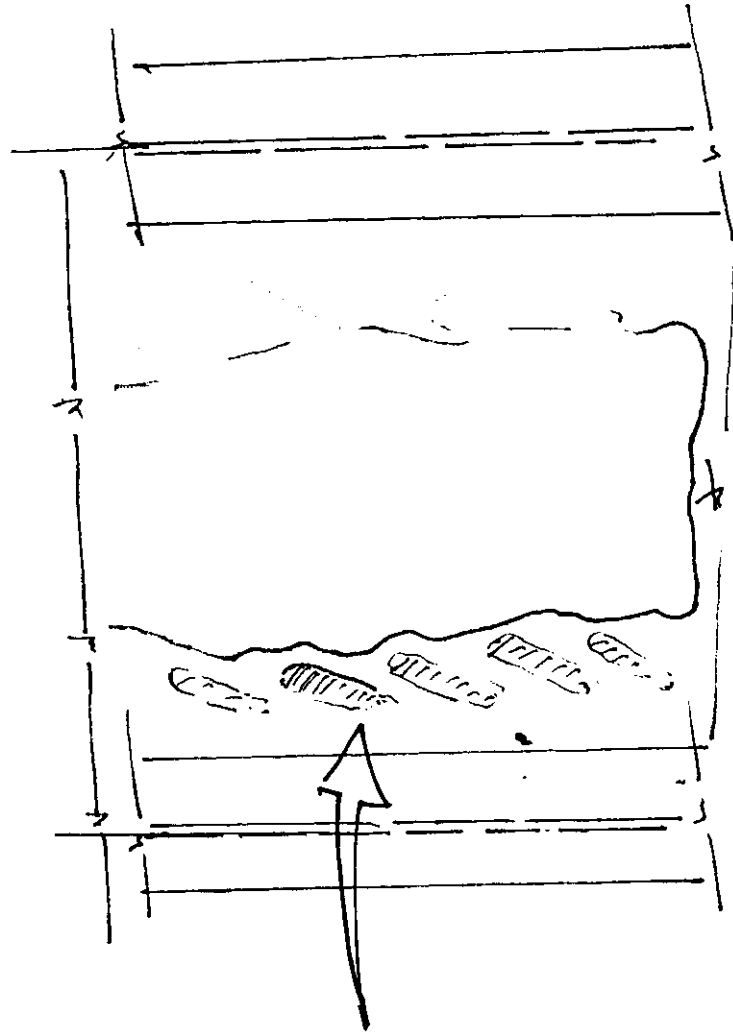
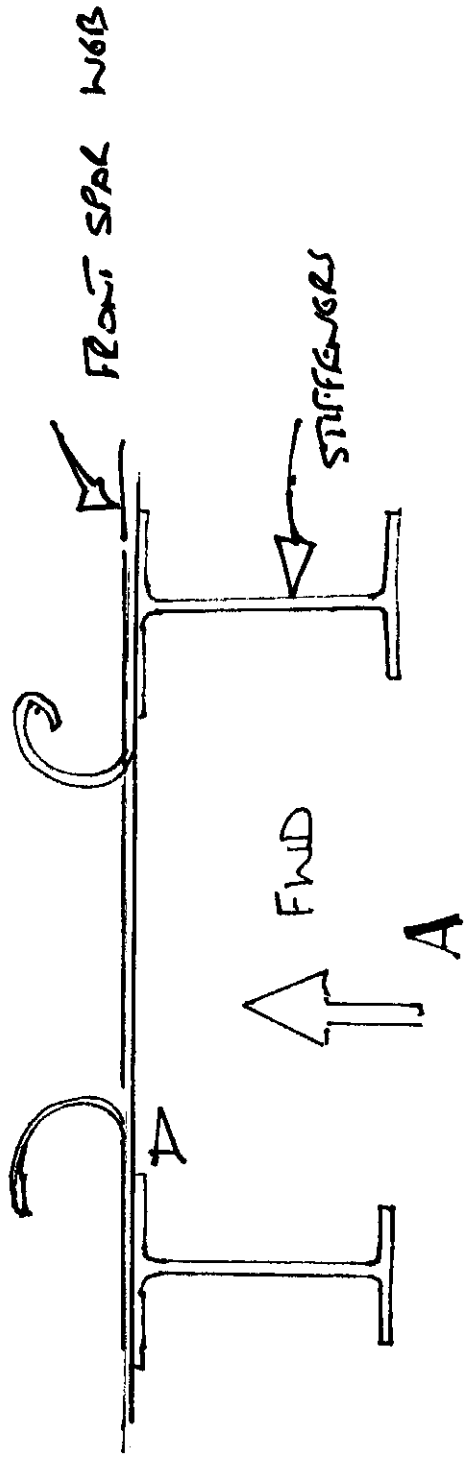
A-A

STIFF ENDS MARKED 20°



5

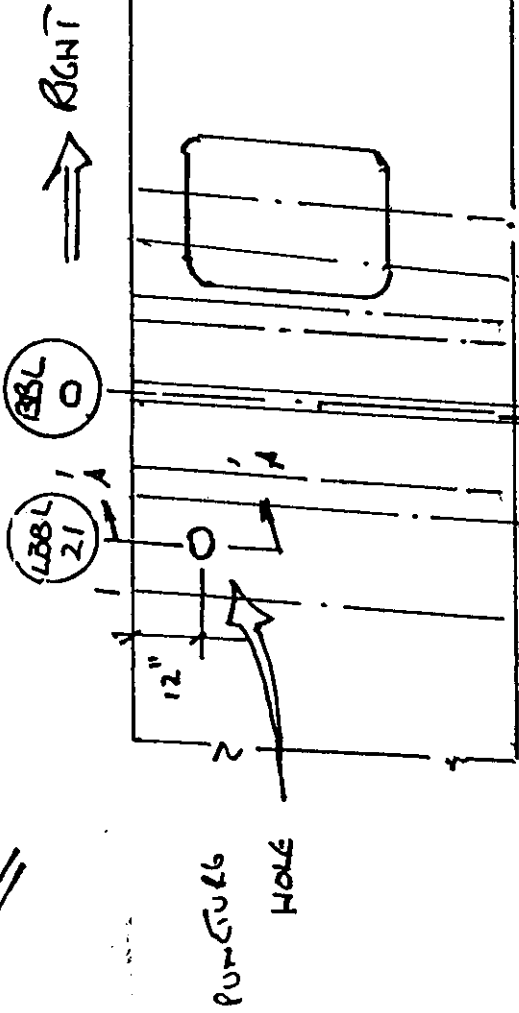
SKIN RUPTURE



WITNESS MARKS ALONG AFT EDGE

CENTER SECTION FRONT SPAR SECTION

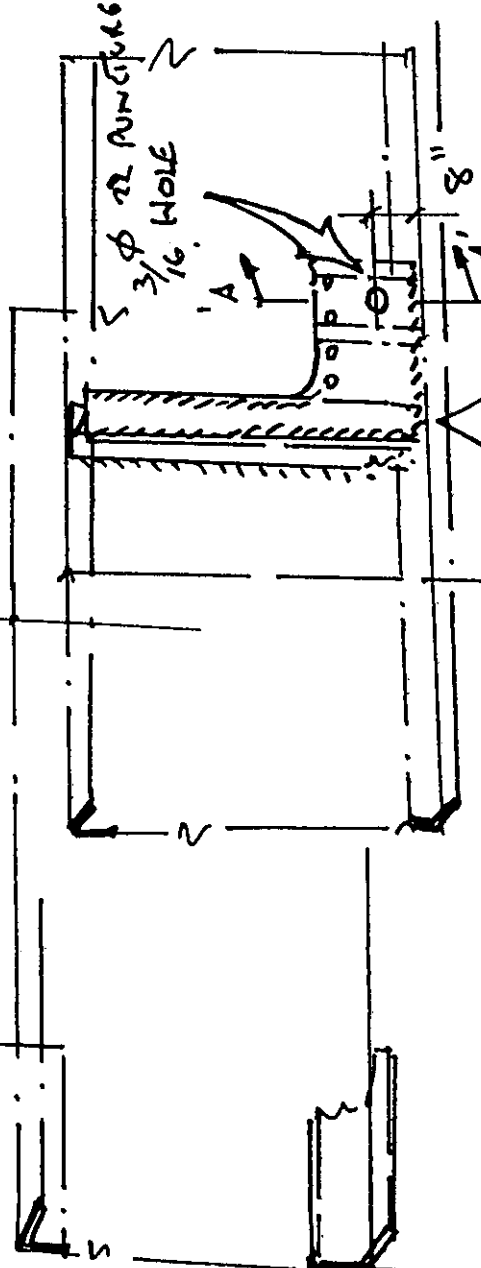
FWD



FRONT SPAR SECTION RECOVERED

SPANNING BEAM # 3

NOT RECOVERED



SPANNING BEAM # 2

RECOVERED

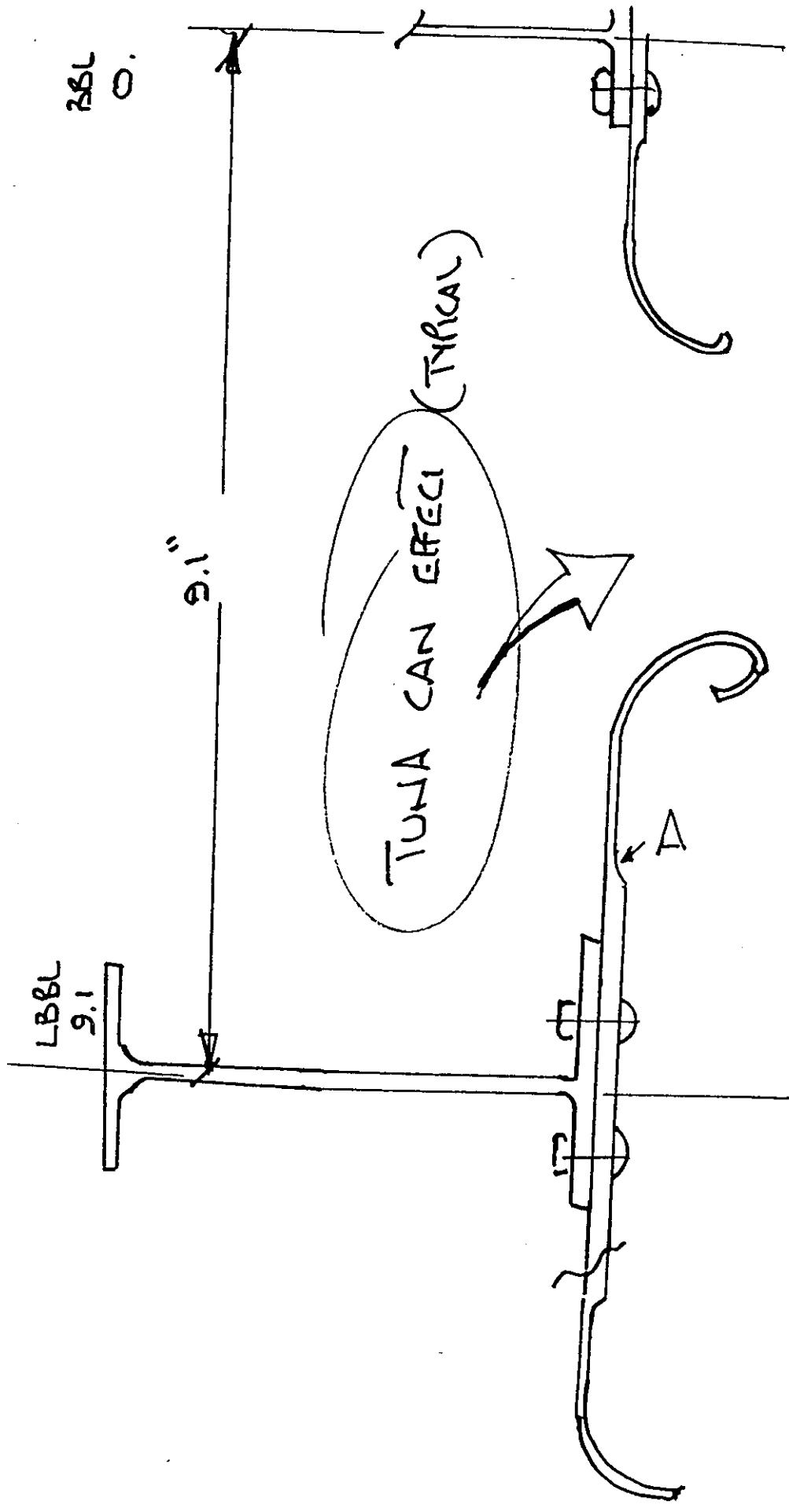
STIFFENING & WGS SECTION

SPANNING BEAM NO 2

A-A

FWD

1)



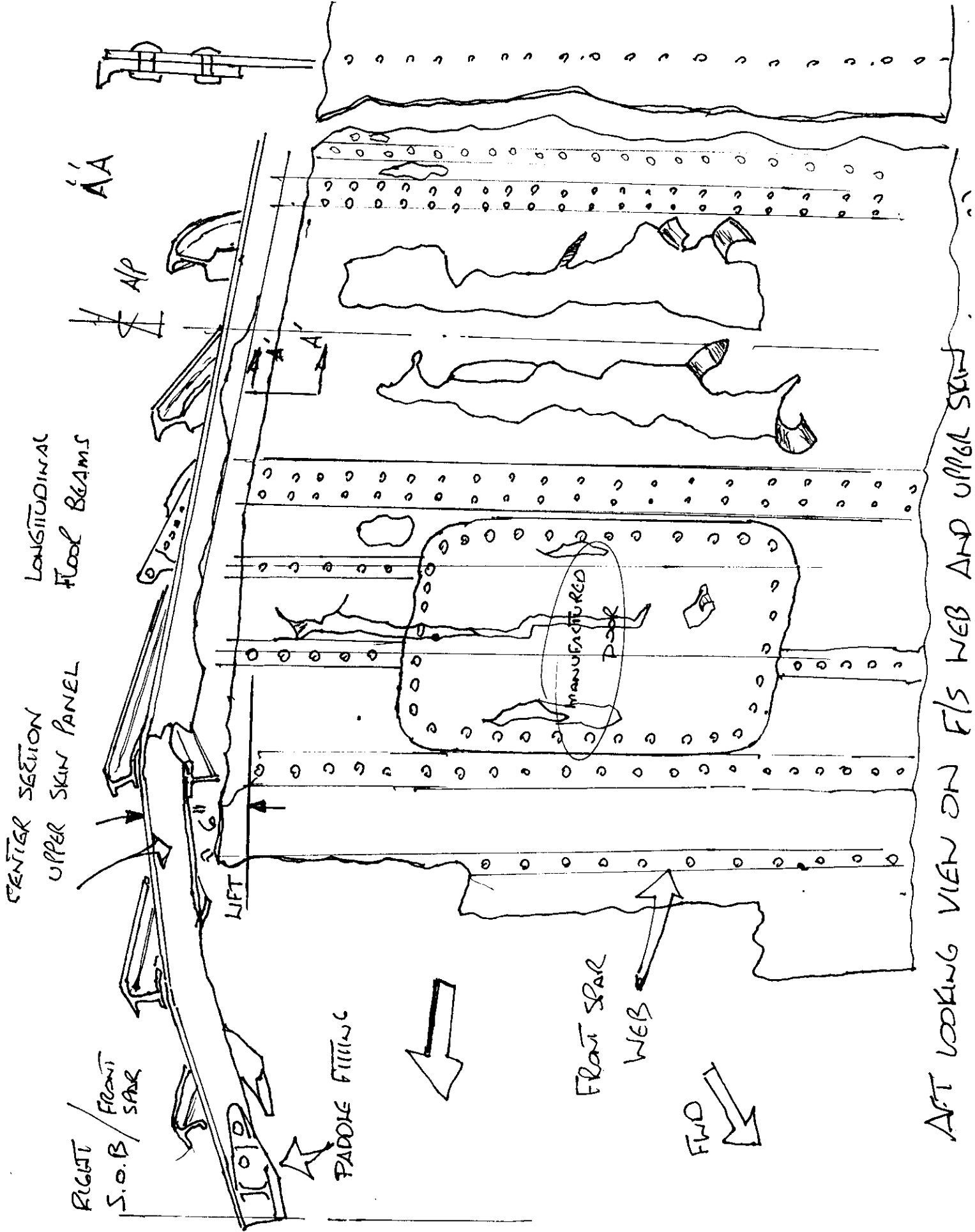
TUNJA CAN EFFECT (TYPICAL)

FWD

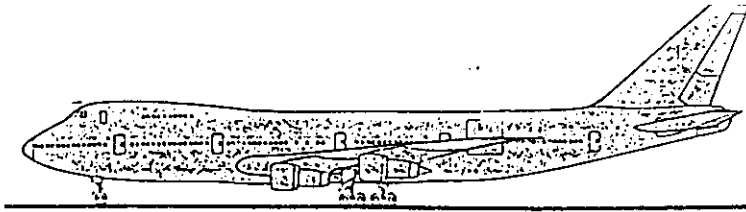
SECTION A-A

▷ LINES OF FRACTURE EXTENDS INTO FILLET RADIUS IN SOME AREAS.

FRONT SPAL SECTION OF WEB



AFT LOOKING VIEW ON F/S WEB AND UPPER SKIN



LOG # CW-501
 TARGET # LLS 52 (A018)
 COORD: LAT 40 38 38.54
 LONG 072 39 08.71

~~WING FRONT SPAR~~
**WING FRONT SPAR
 CENTER SECTION**

DEBRIS FIELD # 3 (RED)

CW-501

8/6/96
 J. TRZIN



A018

ABOUT 9 MARKS
 1"-2" SPACING
 METAL-TO-METAL
 CONTACT ON
 STIFFENER
 P = PENETRATION

AFT SIDE
 LOOKING
 FWD
 SHEAR TIES
 PARTS PULLED
 OFF (TP)

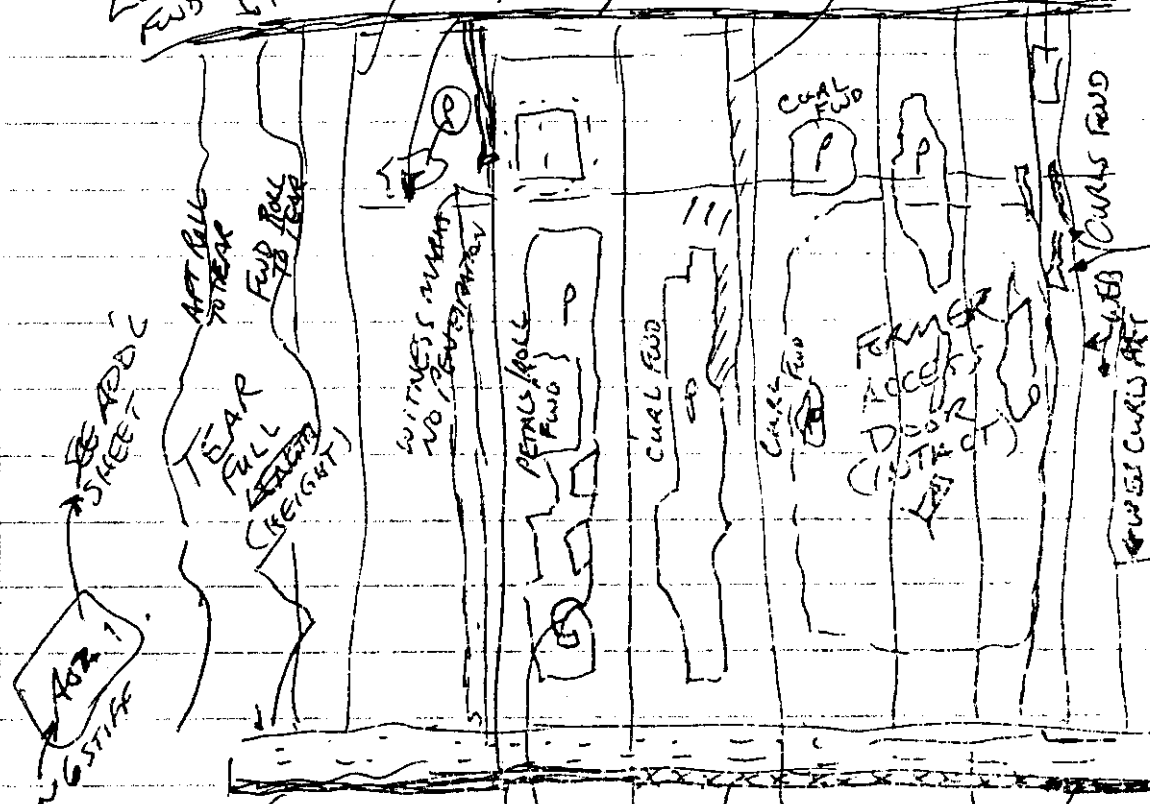
STIFFENED
 BACK LOG
 IMPACTOR
 ~ 14/16" FROM
 TOP CHORD

AFT FLANGE
 DUCTILE
 RUPTURE
 LWR CHORD

L8 STIFF

* C ALONG
 TOP CHORD
 (SOME #W
 AT SHEAR
 TIES)

SOME #B
 AT KNIFE-
 LIKE CUTS



LWR CHORD
 LWR
 FLANGE
 DUCTILE
 RUPTURE

CURL
 ~ 270
 KEEL
 BEAM
 SPACE

AFT FLANGE
 DUCTILE
 RUPTURE
 LWR CHORD

FASTENERS
 SHEARED
 @ STIFFENER
 FWD SIDE
 LWR FLANGE
 DUCTILE
 RUPTURE
 LWR
 CHORD

* C - CLEAN,
 FRESH
 B - BLACKENED/
 SOOT
 W - WHITE,
 SALTWATER
 CORROSION
 DEPOSIT