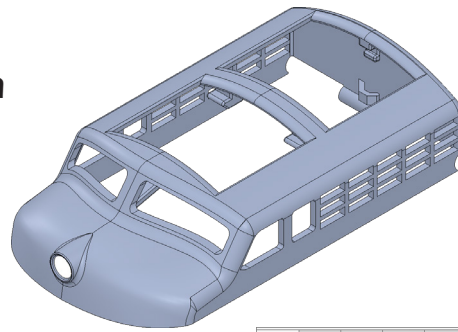


Solar Train Hatch



A. Extrude1 Sketch1 Hinge.

Step 1. Open your **Hatch** part file.

Step 2. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 1**.

Step 3. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

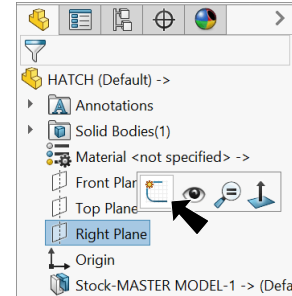
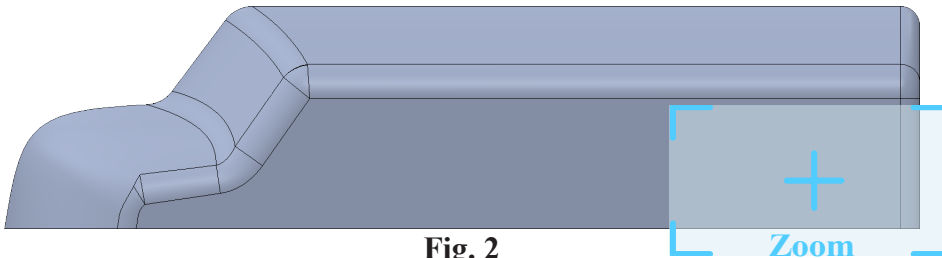


Fig. 1

Step 4. Zoom on rear of body, **Fig. 2**.

Step 5. Click **Circle**  (S) on the Sketch toolbar.

Step 6. Sketch circle on just inside bottom rear, **Fig. 3**.

Step 7. **Unselect Circle tool**. To unselect, right click graphics area and click **Select**  from menu.

Step 8. **Ctrl click circle and bottom edge of body** to select both. Release Ctrl key and click **Make Tangent**  on the context toolbar, **Fig. 4**.

Step 9. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 10. Add dimensions, **Fig. 5**.

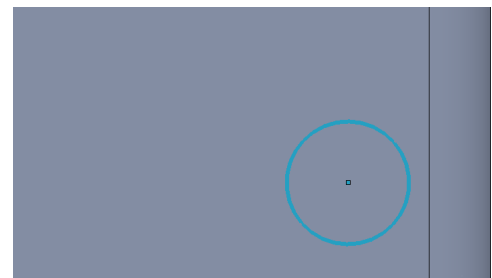


Fig. 3

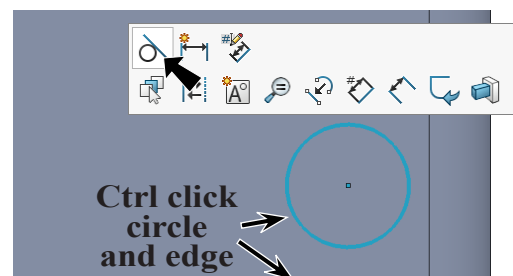


Fig. 4

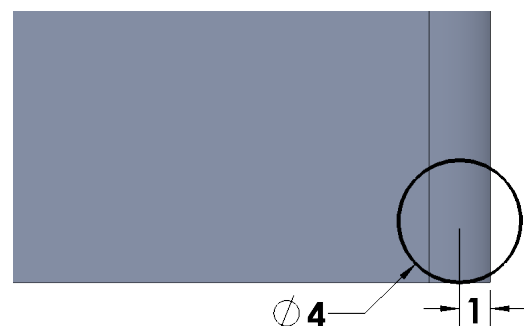
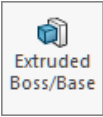


Fig. 5

Step 11. Rotate view to **hinge**, **Fig. 8**. Use **Left Arrow key**  **once** and **Up Arrow key**  **once**.

Step 12. Click **Features**  on the Command Manager toolbar.

Step 13. Click **Extruded Boss/Base**  on the Features toolbar.

Step 14. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 7**
End Condition **Mid Plane**

Depth  **18**
click OK  .

Step 15. Save  (**Ctrl-S**).

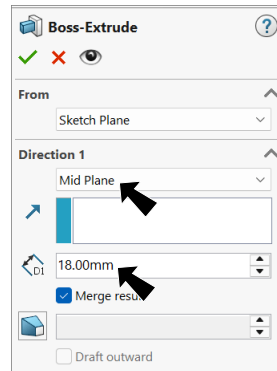


Fig. 6

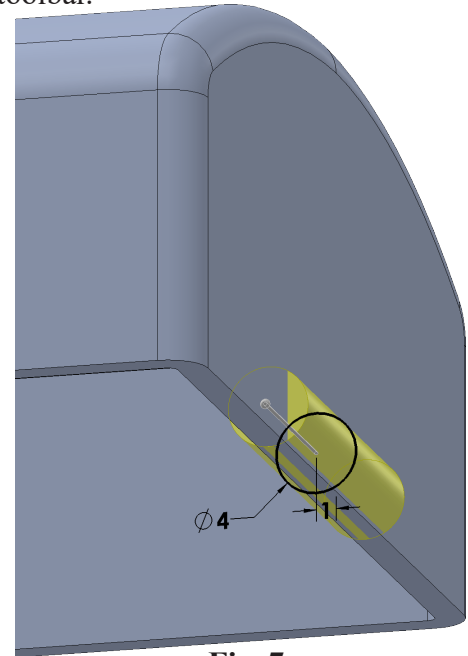


Fig. 7

B. Extruded Cut1 Sketch2 Hinge.

Step 1. Click the **side face of hinge Extrude1** and click **Sketch**  on the context toolbar, **Fig. 8**.

Step 2. Click **Circle**  (S) on the Sketch toolbar.

Step 3. Sketch **circle at centerpoint of hinge Extrude**, **Fig. 9**. To wake up centerpoint, hover cursor over circular edge.

Step 4. Click **Smart Dimension**

 (S)
on the Sketch
toolbar.

Step 5. Add **offset
dimension .3
from circular
edge**,
Fig. 10.

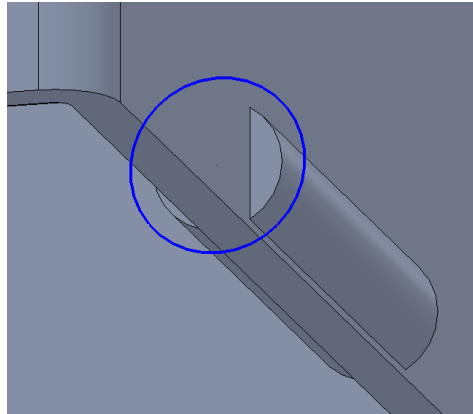


Fig. 9

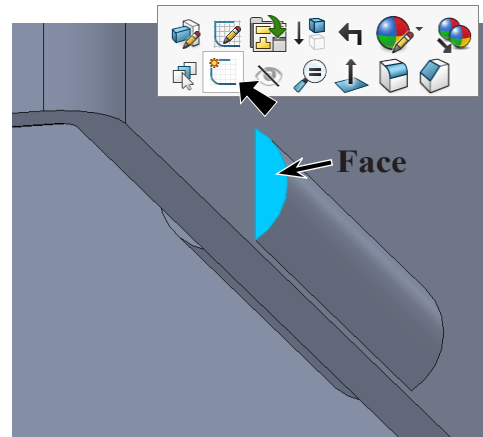


Fig. 8

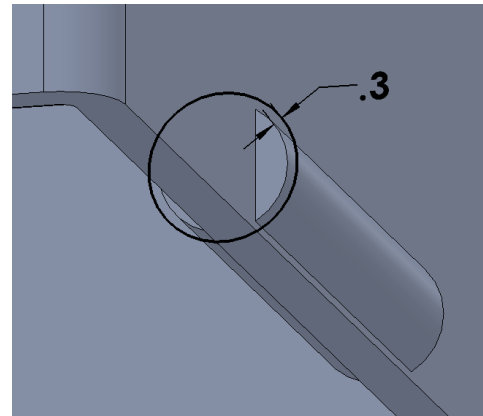
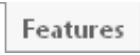
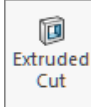


Fig. 10

Step 6. Click **Features**  on the Command Manager toolbar.

Step 7. Click **Extruded Cut**  on the Features toolbar.

Step 8. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 11**

Reverse Direction 
End Condition **Up To Next**
click OK .

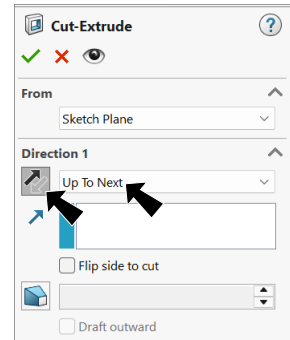


Fig. 11

Step 9. Save  (Ctrl-S).

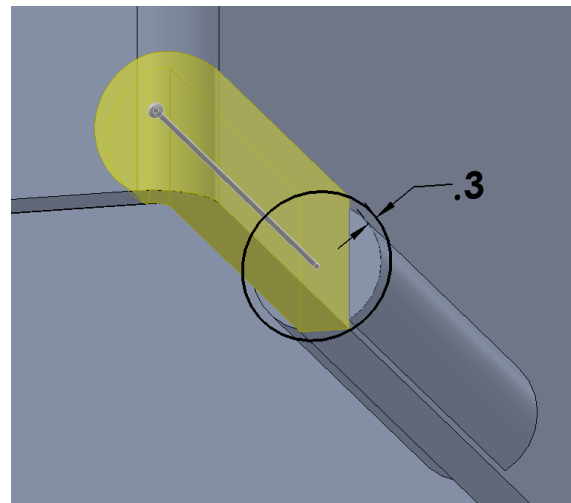
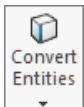


Fig. 12

C. Extruded Cut2 Sketch3 Hinge.

Step 1. Click the **side face of hinge** and click **Sketch**  on the context toolbar, **Fig. 13**.

Step 2. With the face still selected, click **Convert Entities**  on the Sketch toolbar, **Fig. 14**.

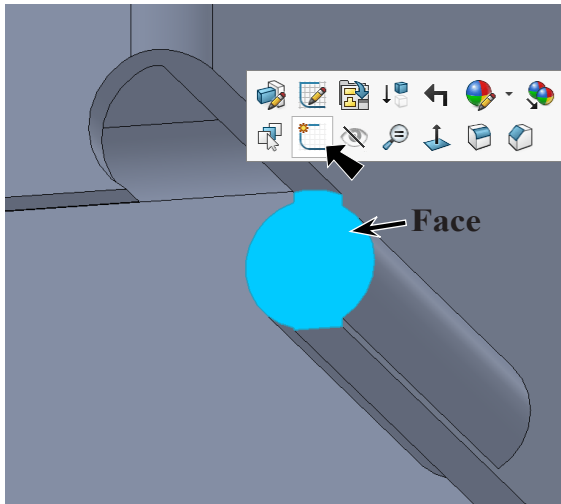


Fig. 13

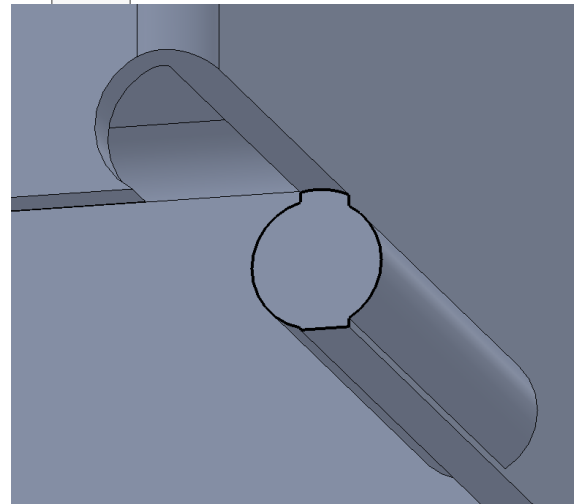


Fig. 14

Step 3. Click **Ex-
tend Entities**  in the **Trim Enti-
ties flyout**  **(S)** on the **Sketch** toolbar.

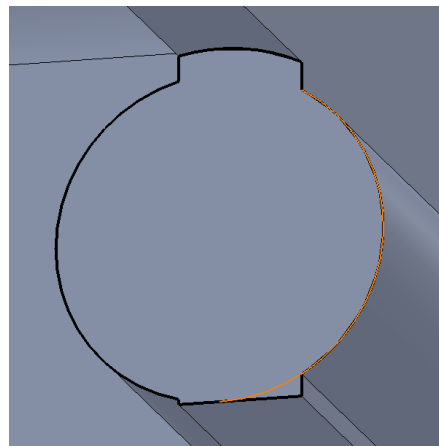


Fig. 15

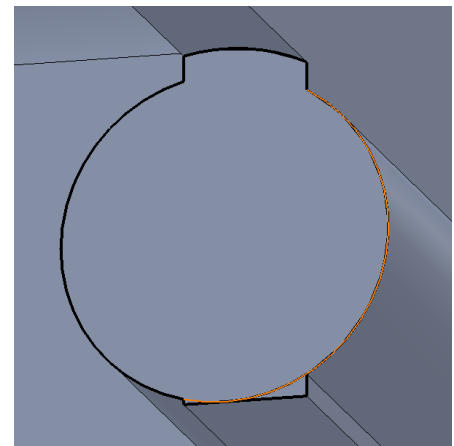
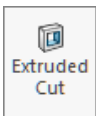


Fig. 16

Step 4. Extend the con-
verted arc twice to
close up the circle,
Fig. 15.

Step 5. Click **Features**  on the Command Manager toolbar.

Step 6. Click **Extruded Cut**  on the Features toolbar.

Step 7. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 17**
End Condition **Through All**
under Selected Contours
click the **two contours**, **Fig. 18**
click OK .

Step 8. Save  (Ctrl-S).

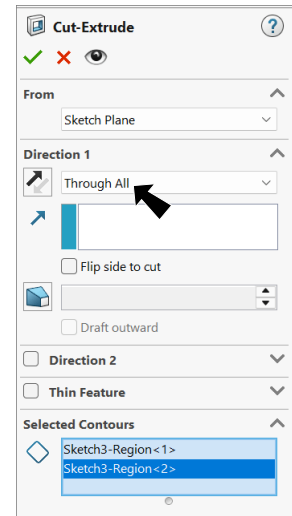


Fig. 17

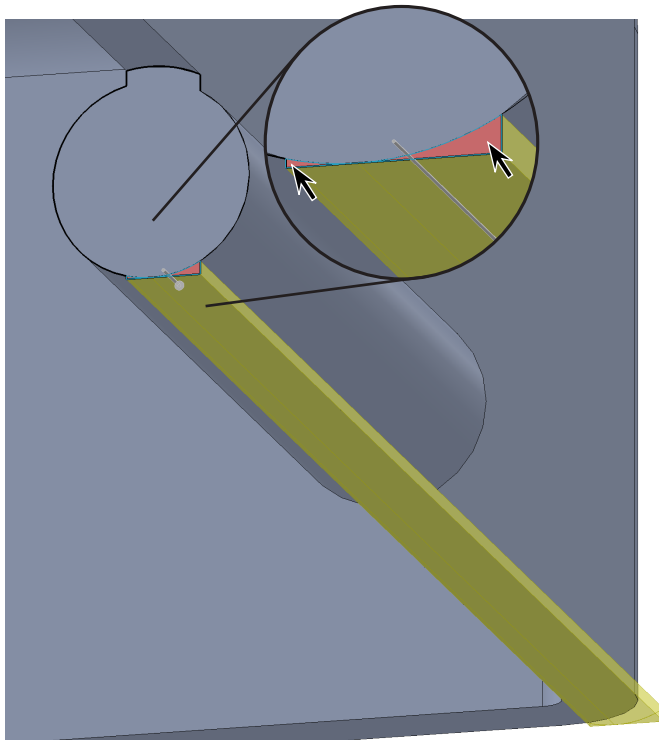


Fig. 18

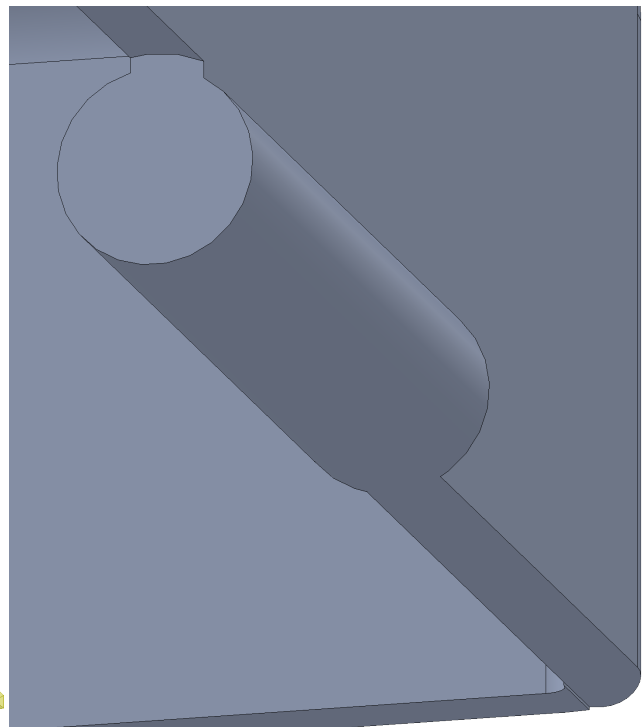


Fig. 19

D. Split Line and Dome Sketch4 Hinge.

Step 1. Click the **side face of hinge** and click **Sketch**  on the context toolbar, **Fig. 20**.

Step 2. Click **Circle**  (S) on the Sketch toolbar.

Step 3. **Sketch circle at centerpoint of cut, Fig. 21.** To wake up centerpoint, hover cursor over circular edge of cut.

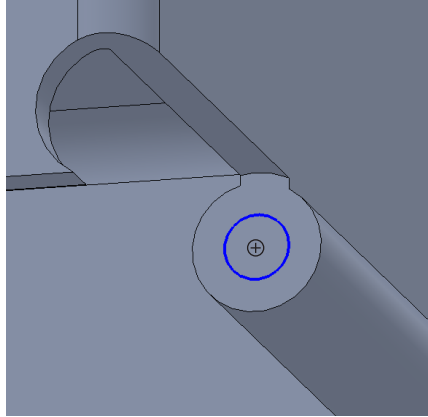


Fig. 21

Step 4. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 5. Dimension **diameter 2**, **Fig. 22**.

Step 6. Click Insert Menu > Curve > Split Line.

Step 7. In the Split Line Property Manager set:

under Type of Split, **Fig. 23**
select **Projection**

under Selections 
Sketch is selected

in Faces to Split field 
click **side face**, **Fig. 24**
click OK .

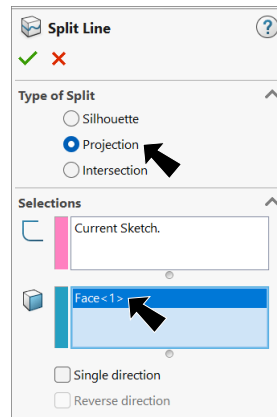
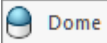


Fig. 23

Step 8. Click **Dome**  on the Features toolbar.

Step 9. In the Dome Property Manager:
under Parameters, **Fig. 25**
click **split line face**, **Fig. 26**
Distance .7
click OK .

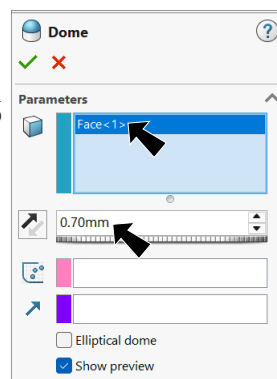


Fig. 25

Step 10. Save  (Ctrl-S).

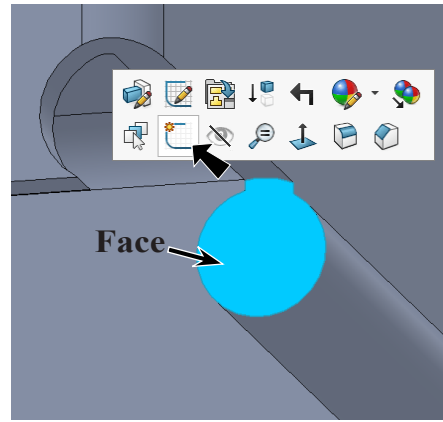


Fig. 20

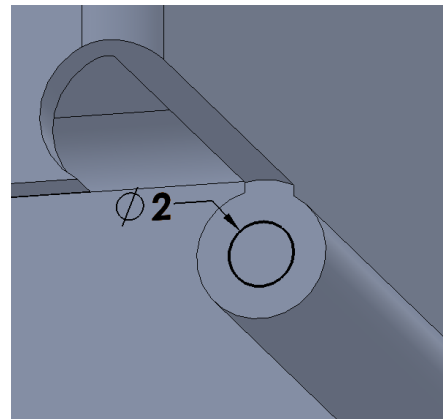


Fig. 22

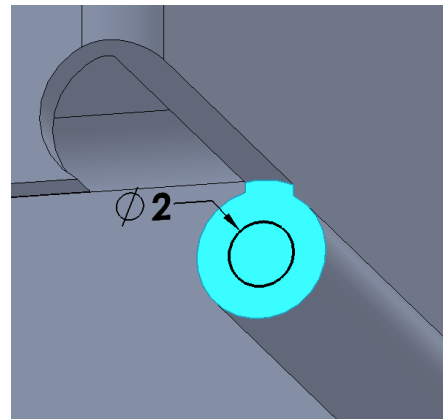


Fig. 24

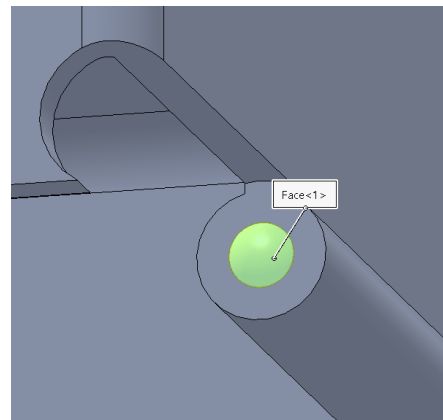


Fig. 26

E. Mirror1 Hinge.

Step 1. Ctrl click **Right Plane**  and **Cut-Extrude1**  feature to select plane and feature, **Fig. 27**.

Step 2. Click **Mirror**  on the Features toolbar.

Step 3. In the Mirror Property Manager click OK .

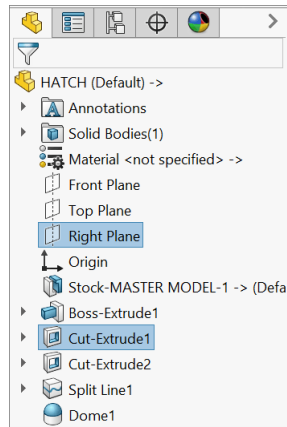


Fig. 27

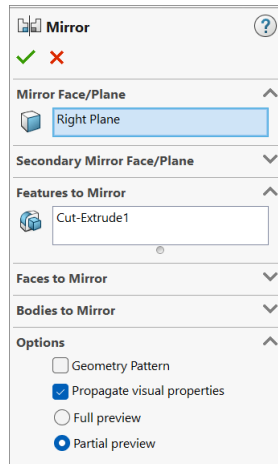


Fig. 28

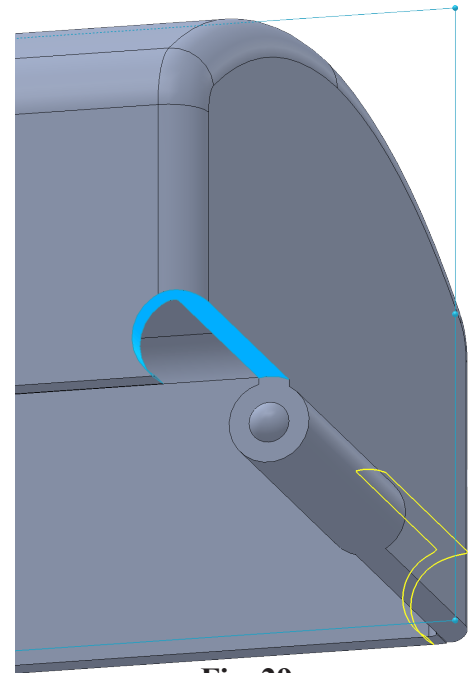


Fig. 29

F. Mirror2 Dome.

Step 1. Ctrl click **Right Plane**  and **Dome1**  feature to select plane and feature, **Fig. 30**.

Step 2. Click **Mirror**  on the Features toolbar.

Step 3. In the Mirror Property Manager set:
under Options, **Fig. 31**
check **Geometry Pattern**
click OK .

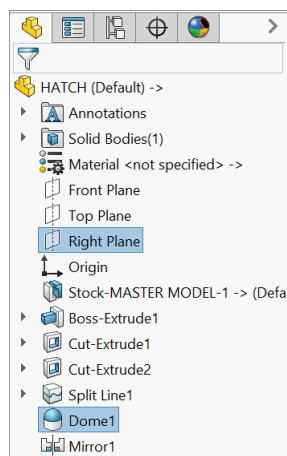


Fig. 30

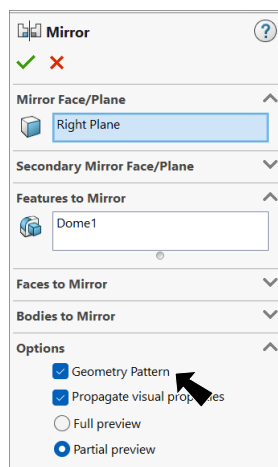


Fig. 31

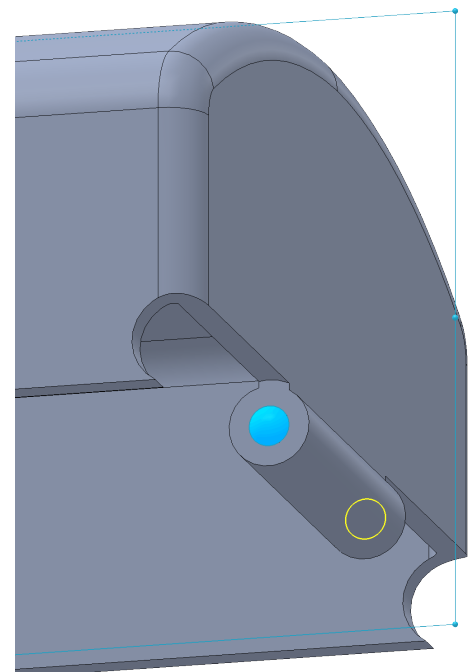


Fig. 32

Step 4. Save  (Ctrl-S).

G. Extruded Cut3 Sketch5 Windshield.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 33**.

Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. Click **Centerline**  in the **Line flyout**  on the Sketch toolbar.

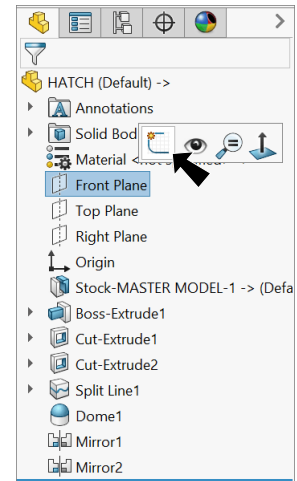
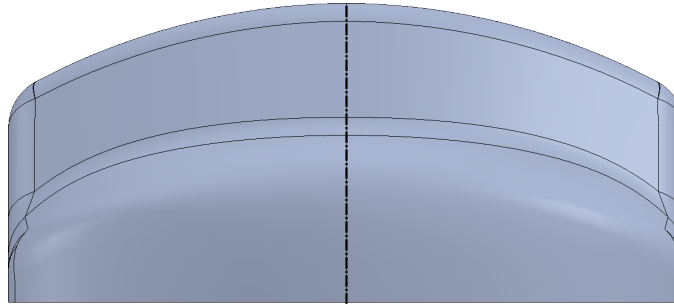


Fig. 33

Step 4. Sketch **vertical centerline** from **Origin**  , **Fig. 34**.

Fig. 34

Step 5. Click **Offset Entities**  on the Sketch toolbar.

Step 6. In the Offset Entities Property Manager set:

click **Keep Visible**  , **Fig. 35**

under Parameters

Distance  **2**

check **Reverse**

uncheck **Bi-directional**

click **top edge of windshield and centerline**, **Fig. 36**

click **OK**  . The Push Pin  on allows selection of another offset.

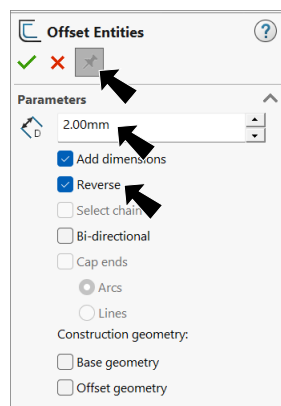


Fig. 35

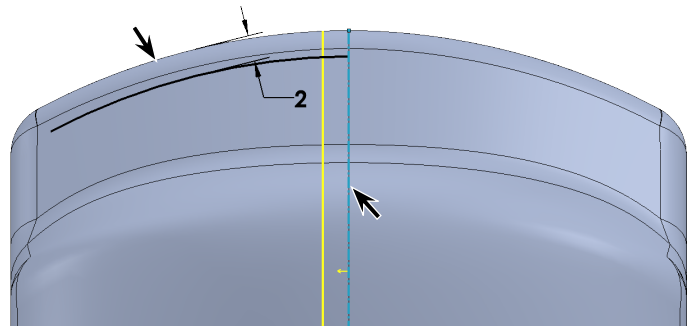


Fig. 36

Still in the Offset Entities Property Manager set:
under Parameters, **Fig. 37**

Distance  **.6**

uncheck **Reverse**

click **top edge of bottom fillet of windshield**, **Fig. 38**

click OK 

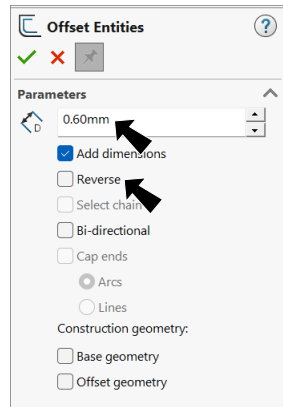


Fig. 37

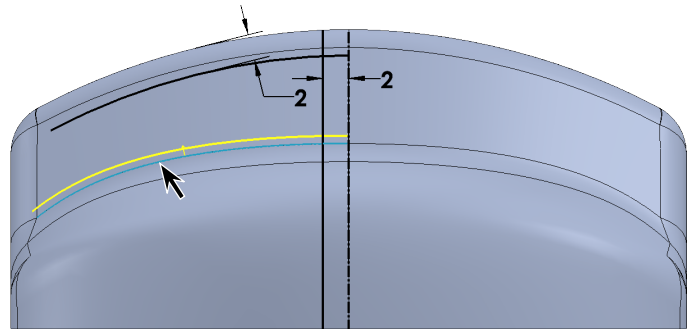


Fig. 38

under Parameters, **Fig. 39**

Distance  **3**

check **Reverse**

click **left edge of body**, **Fig. 40**

click OK  **twice.**

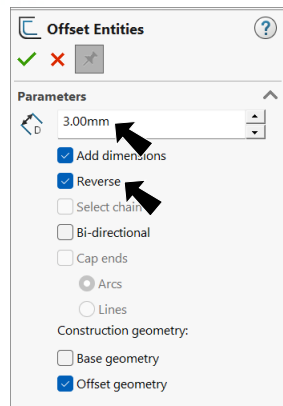


Fig. 39

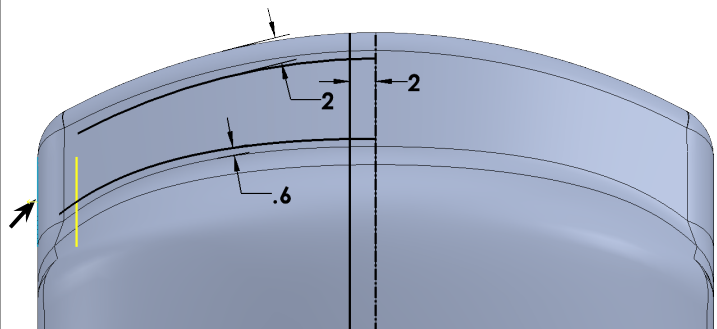


Fig. 40

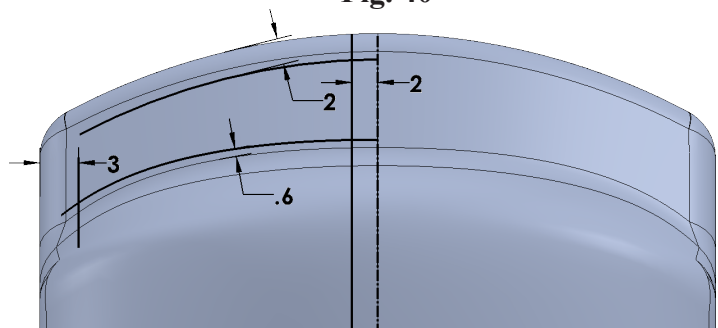


Fig. 41

Step 7. Click **Sketch Fillet**  on the Sketch toolbar.

Step 8. In the Sketch Fillet Property Manager set:
under Fillet Parameters, **Fig. 42**

click **Keep Visible** 

Radius  **1.3**

click **both sets of right corner entities**, **Fig. 43**

click OK 

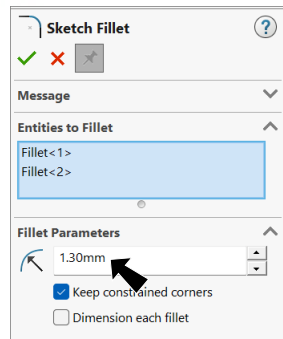


Fig. 42

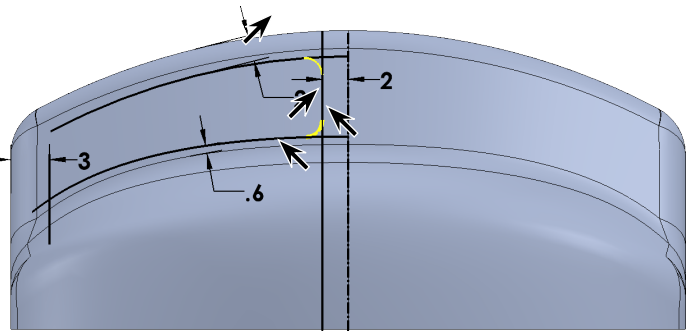


Fig. 43

Radius  **.8**, **Fig. 44**

click **bottom left corner entities**, **Fig. 45**

click OK 

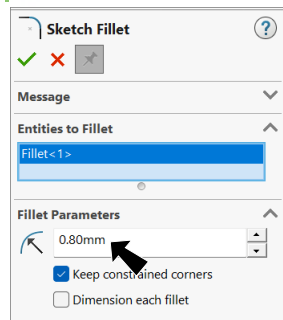


Fig. 44

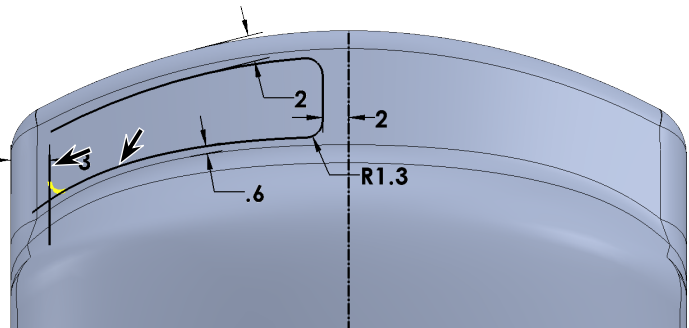


Fig. 45

Radius  **2.2**, **Fig. 46**

click **top left corner entities**, **Fig. 47**

click OK  **twice.**

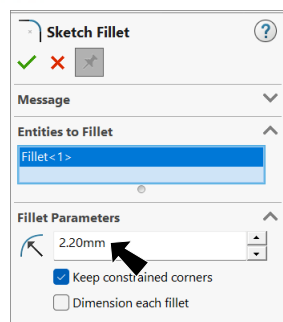


Fig. 46

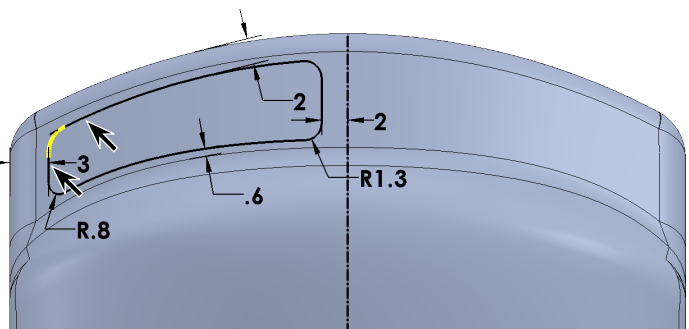
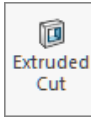


Fig. 47

Step 9. Click **Isometric**  on the Standard Views toolbar.

Step 10. Click **Features**  on the Command Manager toolbar.

Step 11. Click **Extruded Cut**  on the Features toolbar.

Step 12. In Cut-Extrude Property Manager:
under Direction 1, **Fig. 48**
End Condition **Up To Next**
click OK .

Step 13. Save 
(Ctrl-S).

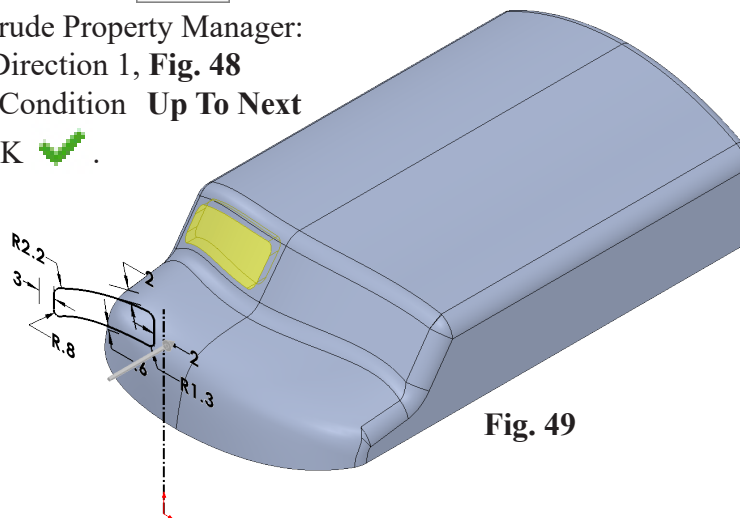


Fig. 49

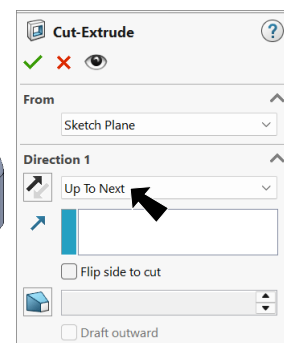


Fig. 48

H. Mirror3 Windshield.

Step 1. Ctrl click **Right Plane**  and **Cut-Extrude3**  feature to select plane and feature, **Fig. 50**.

Step 2. Click **Mirror**  on the Features toolbar.

Step 3. In the Mirror Property Manager click OK .

Step 4. Save 
(Ctrl-S).

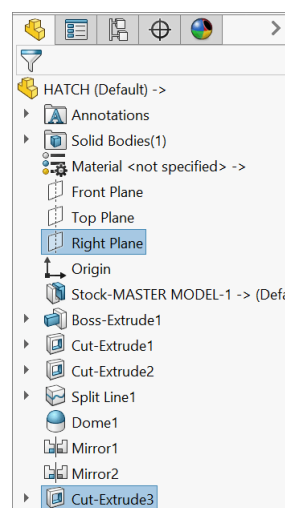


Fig. 50

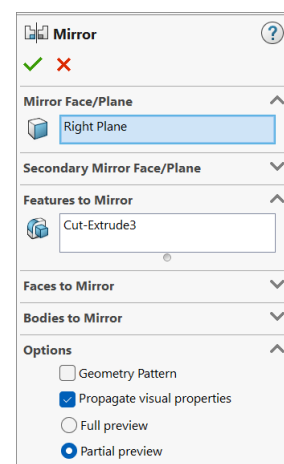


Fig. 51

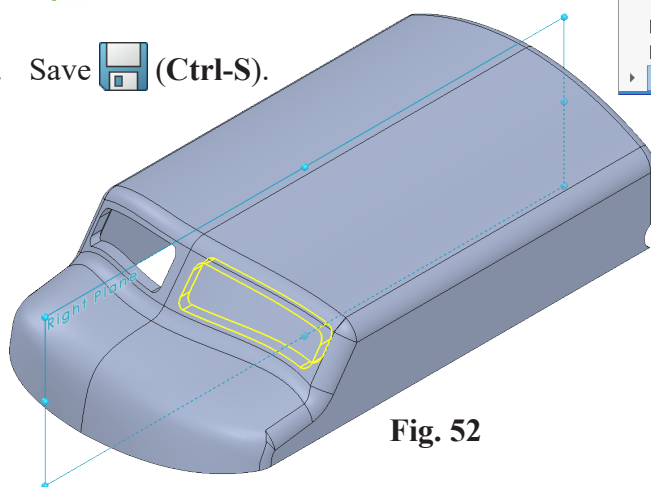


Fig. 52

I. Extruded Cut4 Sketch6 Side Window.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**



on the context toolbar, **Fig. 53**.

Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. Click **Line**  (**L**) on the Sketch toolbar.

Step 4. Just rear of the front pillar towards bottom, start sketch. Sketch 4 lines. Autotransition to Tangent Arc tool and sketch arc back to starting endpoint, **Fig. 54**. To autotransition to arc, after sketching endpoint of line, move cursor away and back. The preview shows a tangent arc. Click to place the arc.

Tip: Toggle between line and arc without returning to the endpoint, use **A** key.

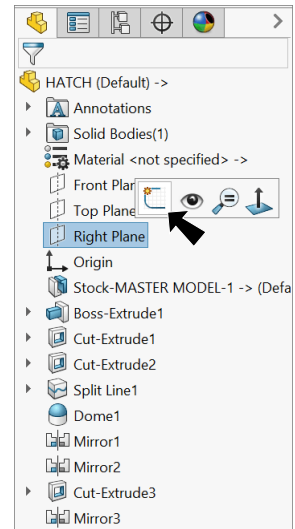


Fig. 53

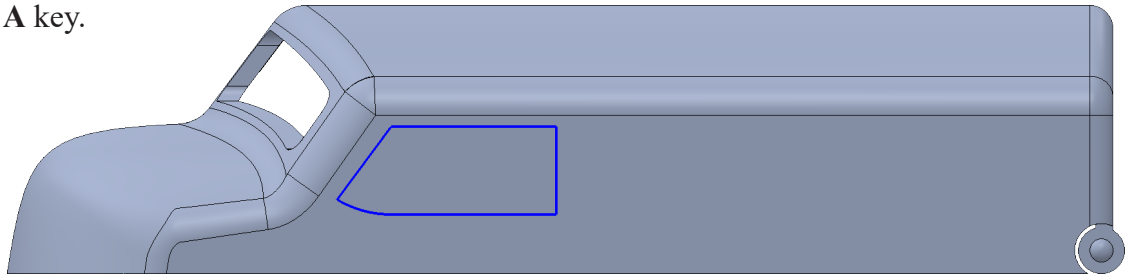


Fig. 54

Step 5. Sketch 2 vertical lines between, **Fig. 55**.

Step 6. Click **Trim Entities**  (**S**) on the Sketch toolbar.

Step 7. In the Trim Property Manger:

select **Trim to closest** , **Fig. 56**

check **Keep trimmed entities as construction geometry**

Trim the segment between vertical lines, **Fig. 57**.

Click segments to trim.

Results shown in **Fig. 58**.

Click OK  when done.

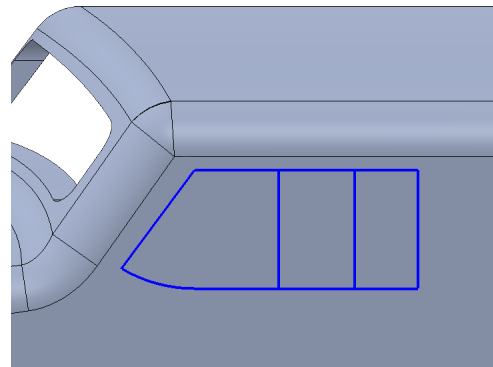


Fig. 55

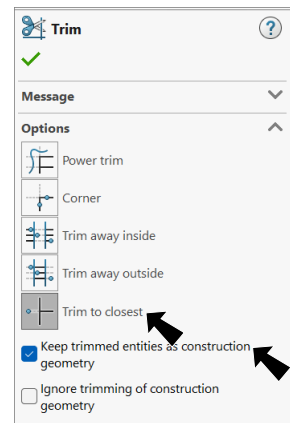


Fig. 56

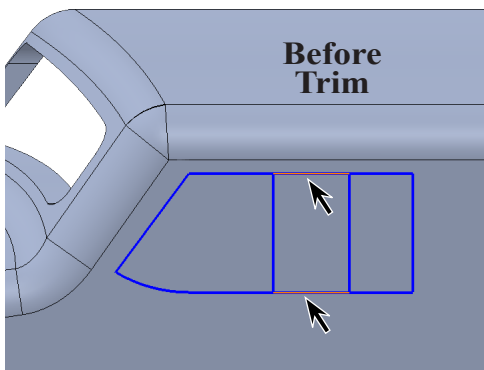


Fig. 57

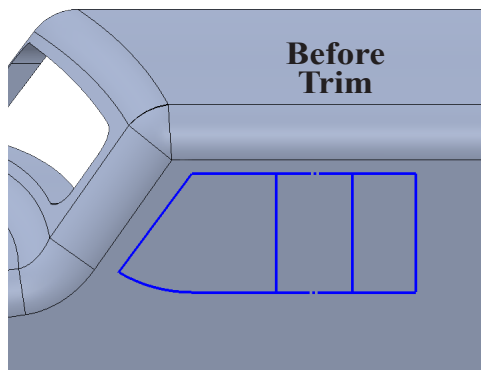
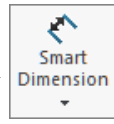


Fig. 58

Step 8. Click **Smart Dimension** (S) on the Sketch toolbar.



Step 9. Add dimensions, **Fig. 59**. To dimension angle to imaginary line, click line and bottom endpoint, then click the **right horizontal crosshair** and place dimension.

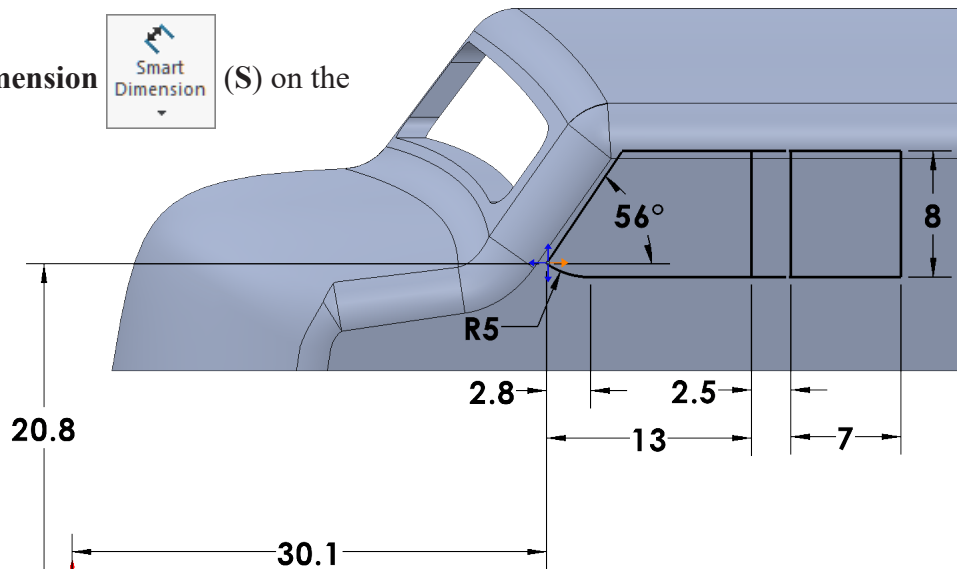


Fig. 59

Step 10. Click **Sketch Fillet** on the Sketch toolbar.



Step 11. In the Sketch Fillet Property Manager set: under Fillet Parameters, **Fig. 60**

Radius $\curvearrowright$.8
drag a selection
to left to selection
6 corners, Fig. 61
click OK ✓

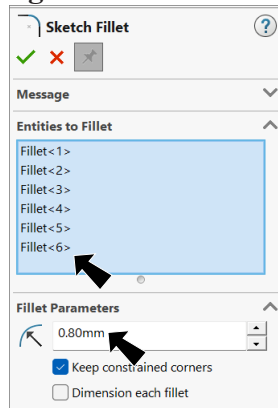


Fig. 60

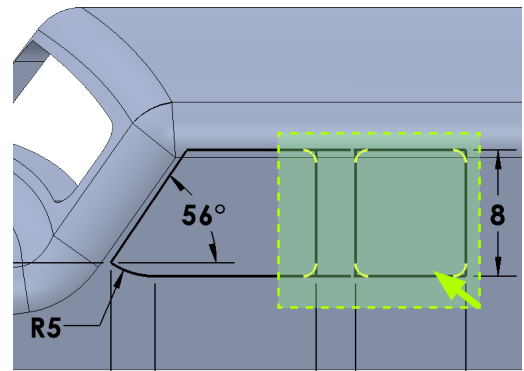


Fig. 61

Radius $\curvearrowright$ 2.8,
Fig. 62
click left top
corner, Fig. 63
click OK ✓ twice.

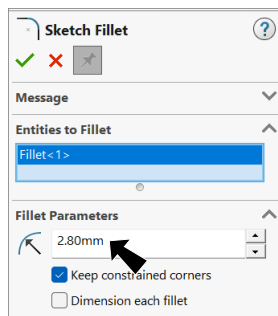


Fig. 62

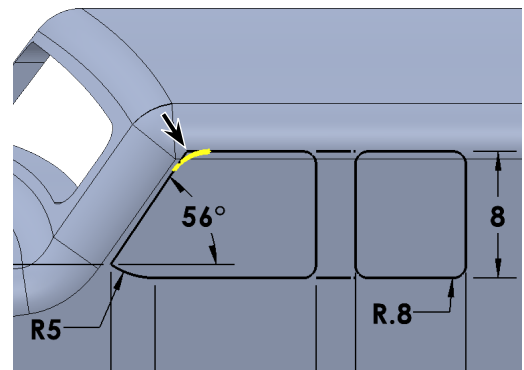


Fig. 63

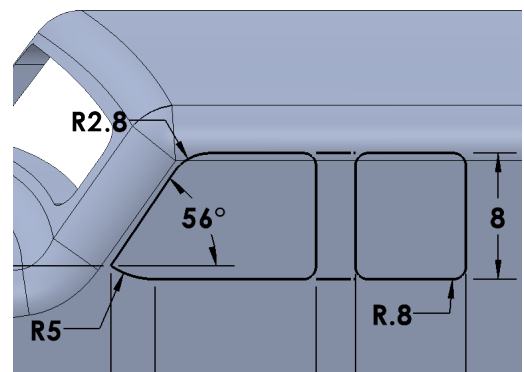
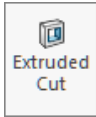


Fig. 64

Step 12. Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

Step 13. Click **Features**  on the Command Manager toolbar.

Step 14. Click **Extruded Cut**  on the Features toolbar.

Step 15. In Cut-Extrude Property Manager:
under Direction 1, **Fig. 65**
End Condition **Through All - Both**
click OK .

Step 16. Save  (Ctrl-S).

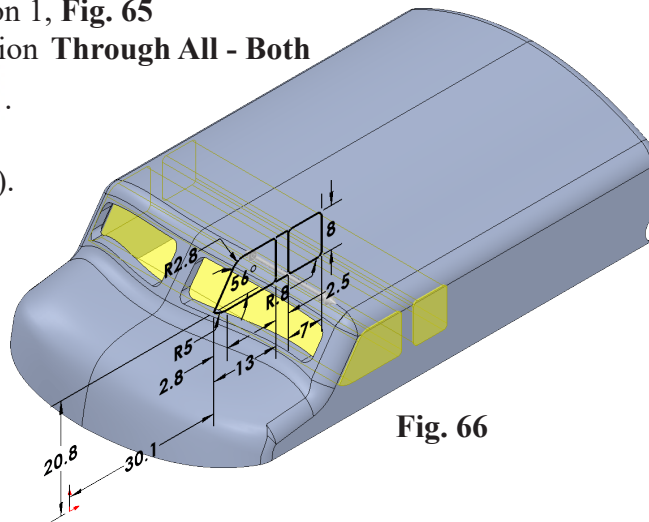


Fig. 66

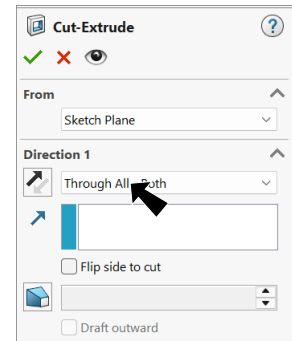


Fig. 65

J. Extruded Cut5 Sketch7 Side Vents.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, Fig. 67.

Step 2. Click **Normal To**  on the Standard Views toolbar. (Ctrl-8)

Step 3. Click **Corner Rectangle**  in the **Rectangle flyout**  on the Sketch toolbar.

Step 4. Sketch corner rectangle to rear of windows, Fig. 68.

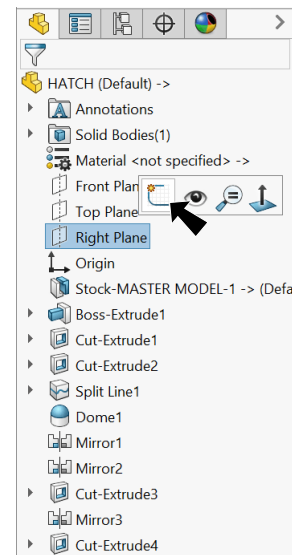


Fig. 67

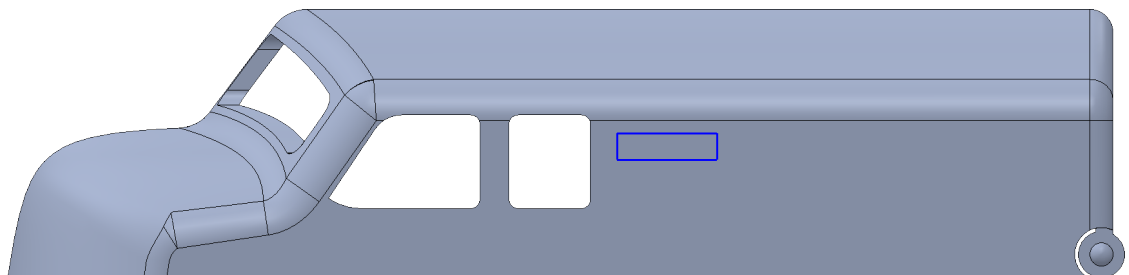


Fig. 68

Step 5. **Unselect Rectangle tool.** To unselect, right click graphics area and click **Select** from menu.

Step 6. **Ctrl click top edge of window and top line of rectangle** to select both. Release Ctrl key and click **Make Collinear**  on the context toolbar, **Fig. 69**.

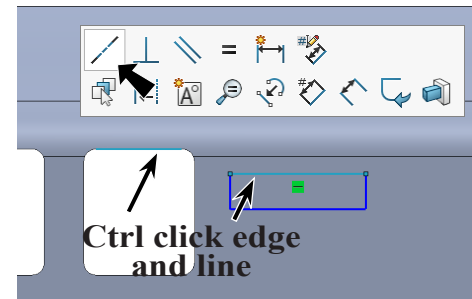


Fig. 69

Step 7. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 8. Add dimensions, **Fig. 70**.

Step 9. Click **Linear Sketch Pattern**  **Linear Sketch Pattern** on the Sketch toolbar.

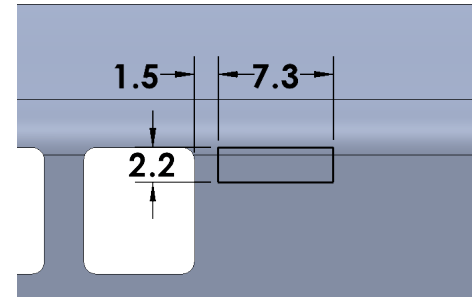


Fig. 70

Step 10. In the Linear Pattern Property Manager set:

under Entities to Pattern, **Fig. 71**

click in  box

click **lines of rectangle**, **Fig. 72**

under Direction 1

Direction **X-axis**

Spacing  **8.5**

uncheck **Dimension X spacing**

Number of Instances  **5**

uncheck **Display instance count**

under Direction 2

Direction **Y-axis**

Spacing  **3.2**

Number of Instances  **3**

uncheck **Display instance count**

Angle  **270°**

click OK .

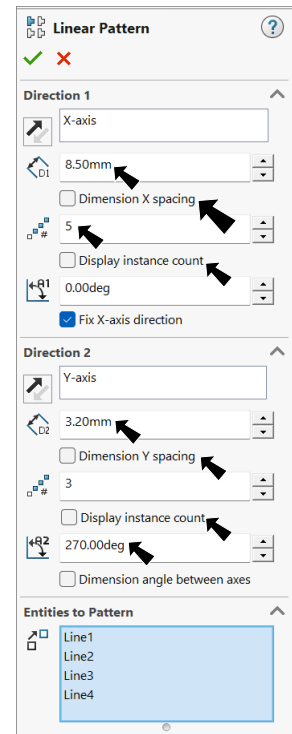


Fig. 71

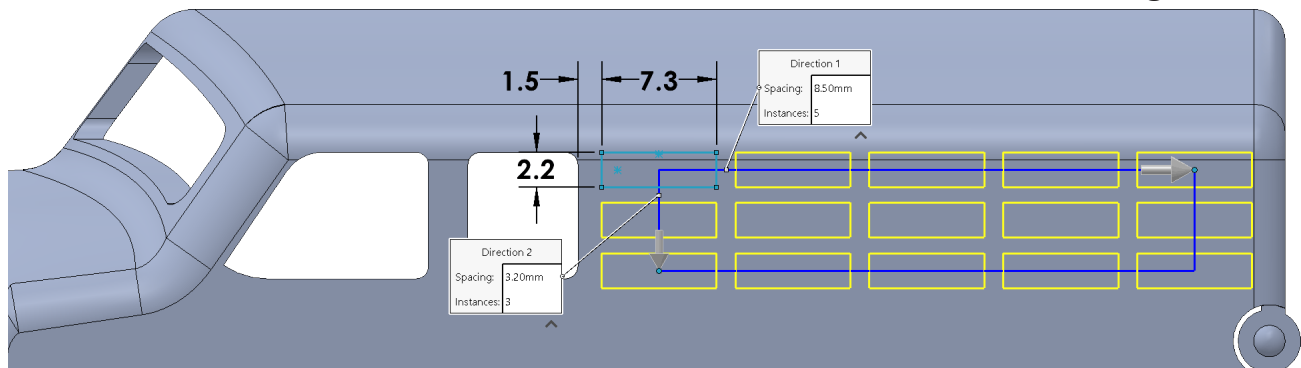
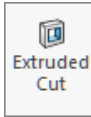


Fig. 72

Step 11. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-I**)

Step 12. Click **Features**  on the Command Manager toolbar.

Step 13. Click **Extruded Cut**  on the Features toolbar.

Step 14. In Cut-Extrude Property Manager:
under Direction 1, **Fig. 73**
End Condition **Through All - Both**
click OK .

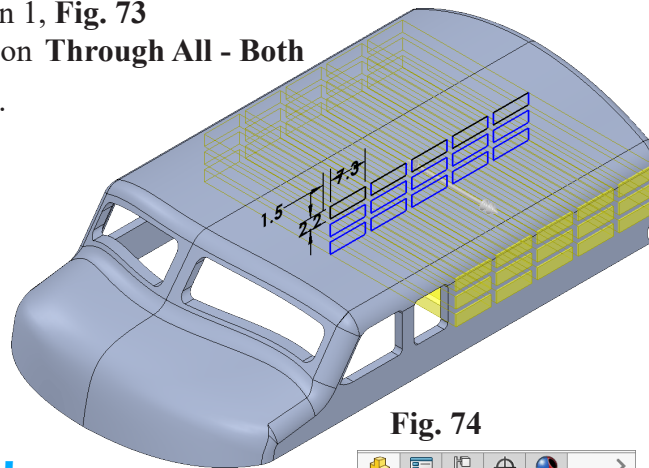


Fig. 74

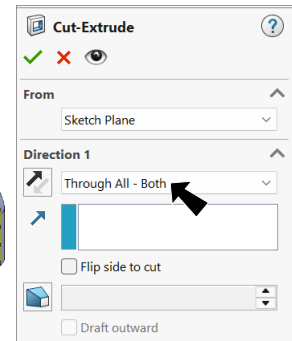


Fig. 73

K. Create Plane1.

Step 1. Click **Front Plane**  in Feature Manager to display Plane in graphics area, **Fig. 75**.

Step 2. In graphics area **Ctrl drag Front plane to rear** and release, **Fig. 76**.

Step 3. In the Plane Property Manager set:
under First Reference, **Fig. 16**

Distance  **63.7**
and press **ENTER**.

The new plane should be to rear, **Fig. 77**.

Click OK .

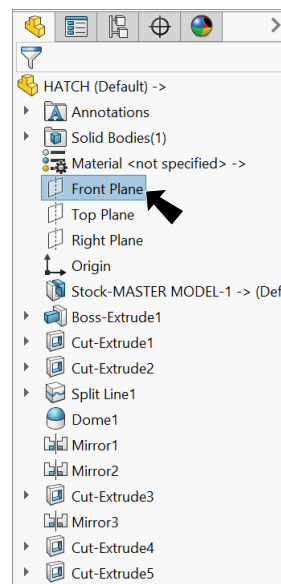


Fig. 75

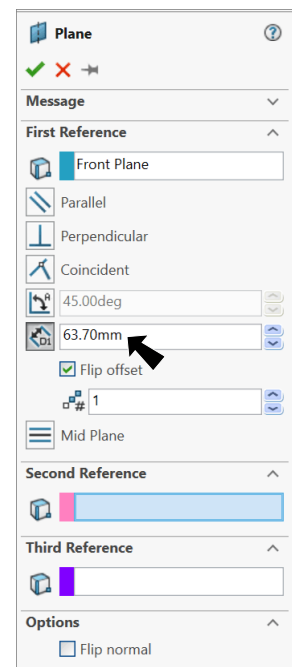


Fig. 77

Hold down Ctrl
drag plane towards rear
Set distance 63.7

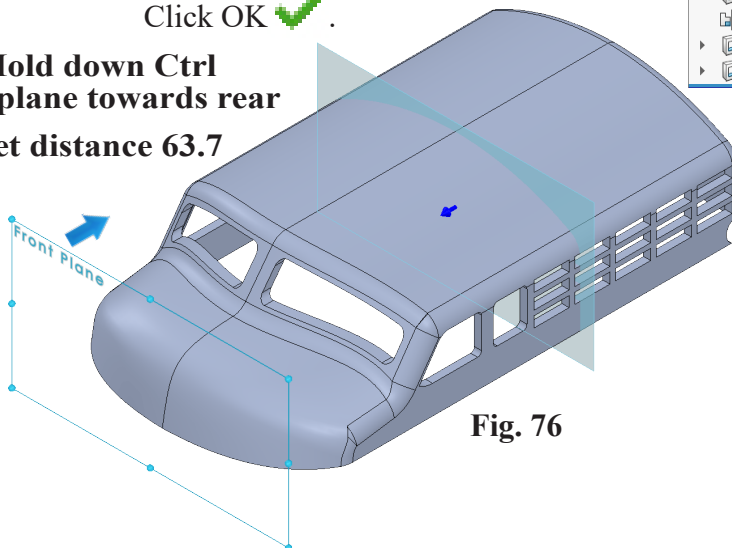


Fig. 76

L. Cut-Extrude6 Sketch8 Solar Panel Openings.

- Step 1. Click **Top Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 78**.
- Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)
- Step 3. Click **Center Rectangle**  in the **Rectangle** flyout  on the Sketch toolbar.
- Step 4. Sketch a **centerpoint rectangle**, **Fig. 79**.

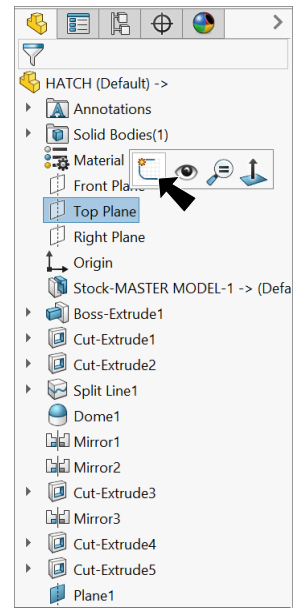


Fig. 78

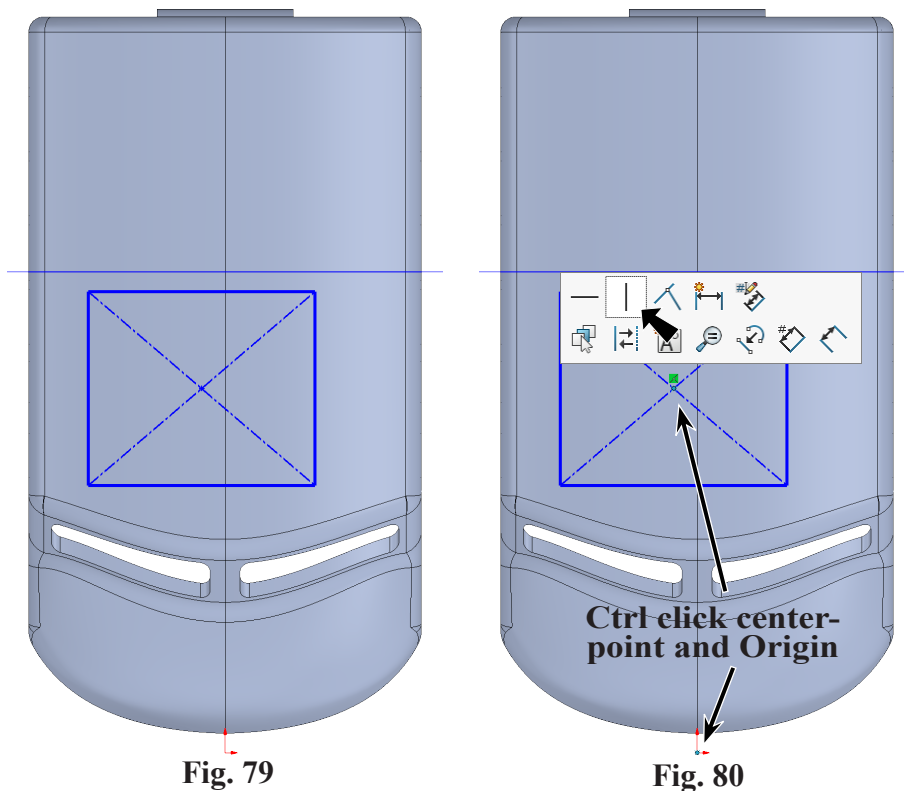


Fig. 79

Fig. 80

- Step 5. **Unselect Rectangle tool.** To unselect, right click graphics area and click **Select**  from menu.
- Step 6. **Ctrl click centerpoint of rectangle and Origin**  to select both. Release Ctrl key and click **Make Vertical**  on the context toolbar, **Fig. 80**.

- Step 7. Click **Smart Dimension**  (S) on the Sketch toolbar.

- Step 8. Add dimensions, **Fig. 81**.

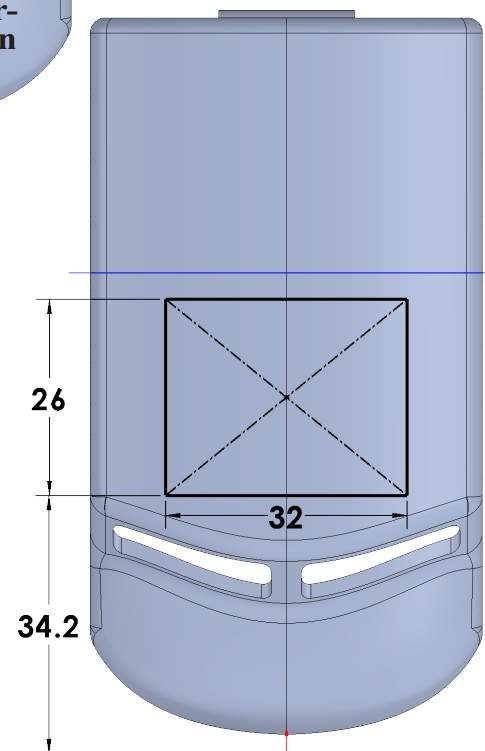


Fig. 81

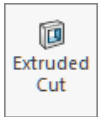
Step 9. **Unselect Smart Dimension.** To unselect, right click graphics area and click Select  from menu.

Step 10. **Drag a selection to select rectangle and Ctrl click Plane1** , Fig. 82.

Step 11. Click **Mirror Entities**  on the Sketch toolbar, Fig. 81.

Step 12. Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

Step 13. Click **Features**  on the Command Manager toolbar.

Step 14. Click **Extruded Cut**  on the Features toolbar.

Step 15. In the Cut-Extrude Property Manager set:
under Direction 1, Fig. 84
End Condition **Through All**
click OK .

Step 16. Save  (Ctrl-S).

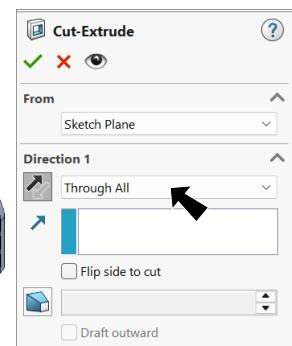
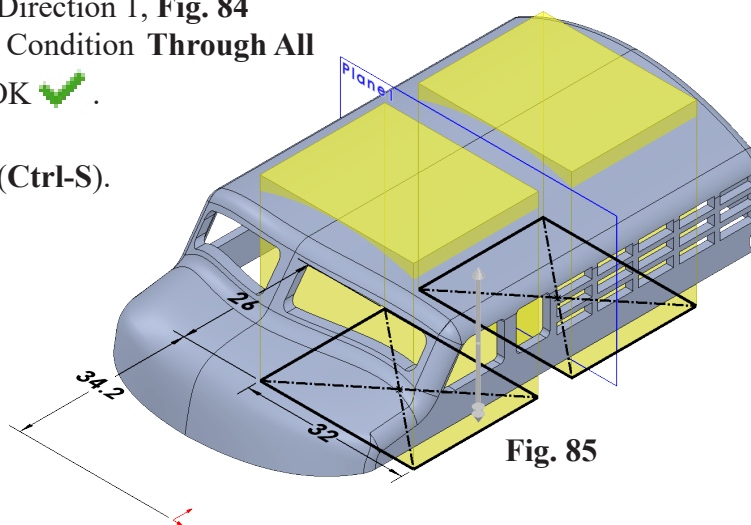
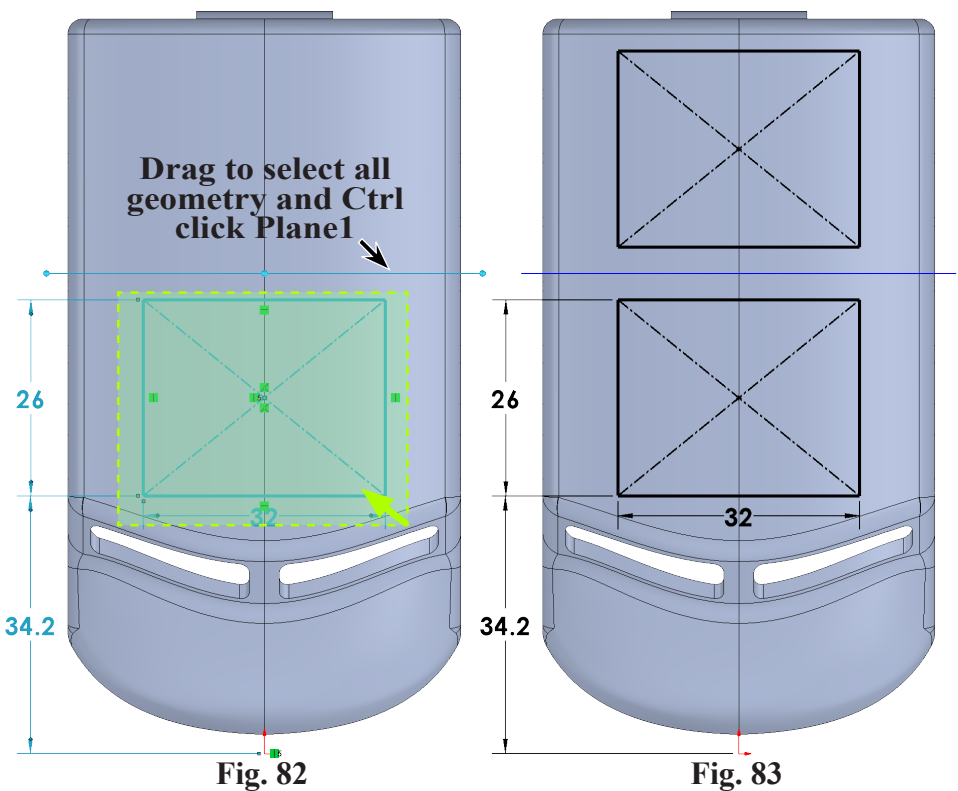


Fig. 84

M. Fillet1 Asymmetric.

Step 1. Click **Fillet**  on the Features toolbar.

Step 2. In the Fillet Property Manager set:
select **Manual**, **Fig. 86**
under Fillet Type

select **Constant Size Fillet** 
under Fillet Parameters
Fillet Method **Asymmetric**

Distance 1  **1.2**

Distance 2  **2.1**

under Items To Fillet

click **edges at front and rear of solar panel cuts (8)**, **Fig. 87**

Direction should be OK. Can confirm in side view.

click OK .

Step 3. Save  (Ctrl-S).

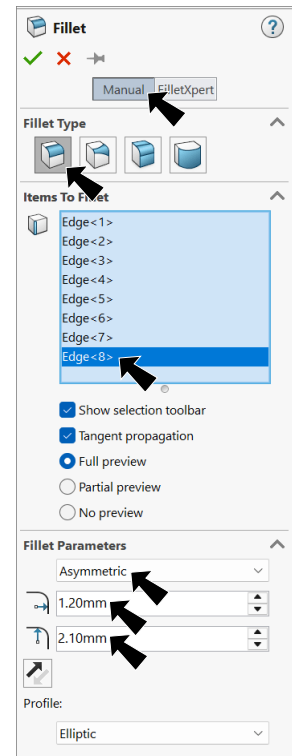


Fig. 86

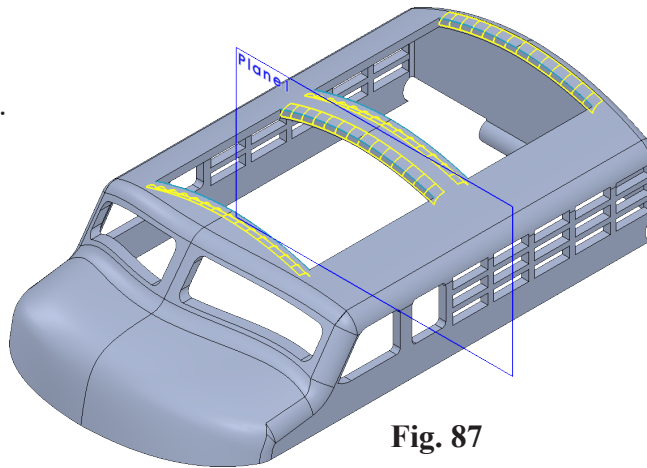


Fig. 87

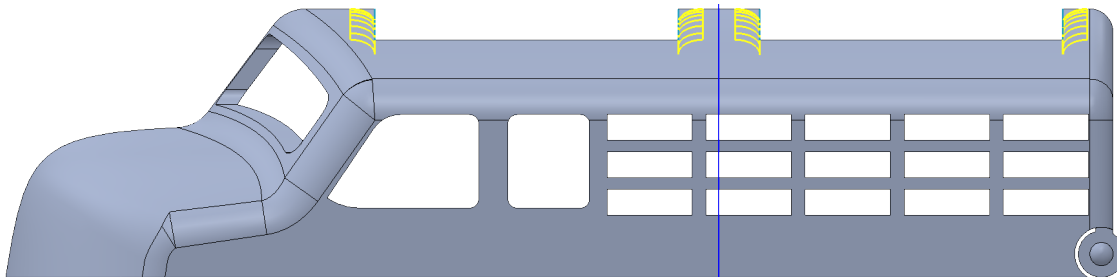


Fig. 88

N. Extrude2 Sketch9 Center Solar Panel Mount.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**



on the context toolbar, **Fig. 89**.

Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. **Zoom in on center**, **Fig. 90**.

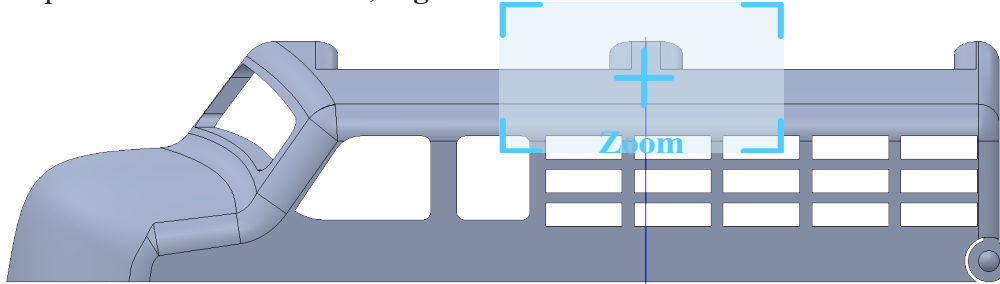


Fig. 90

Step 4. Click **Line**  (**L**) on the Sketch toolbar.

Step 5. Sketch **5 lines starting from Plane1**, **Fig. 91**.

Step 6. **Unselect Line tool**. To unselect, right click graphics area and click **Select** from menu.

Step 7. **Ctrl drag** a selection to **select lines and Ctrl click Plane1**, **Fig. 92**.

Step 8. Click **Mirror Entities**  **Mirror Entities** on the Sketch toolbar.

Step 9. Click **Smart Dimension**  (**S**) on the Sketch toolbar.

Step 10. Add dimensions, **Fig. 93**.

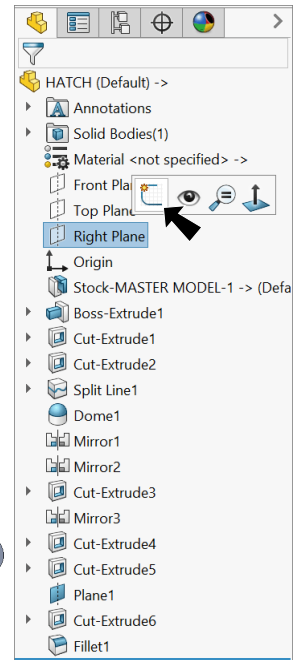


Fig. 89

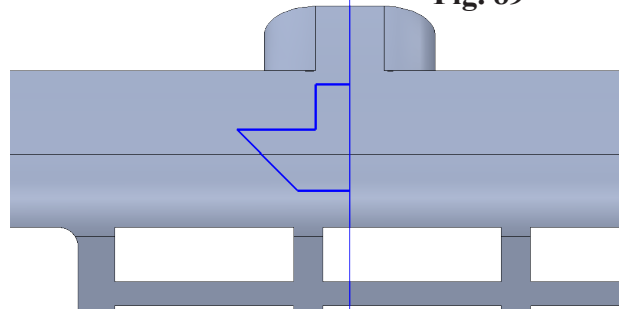


Fig. 91

Drag to select all geometry and Ctrl click Plane1

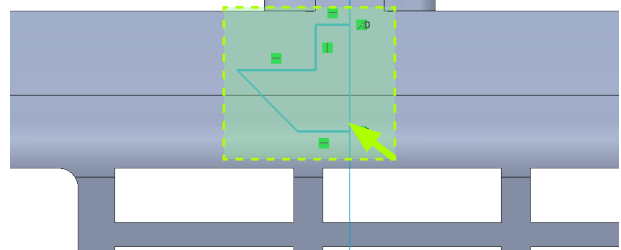


Fig. 92

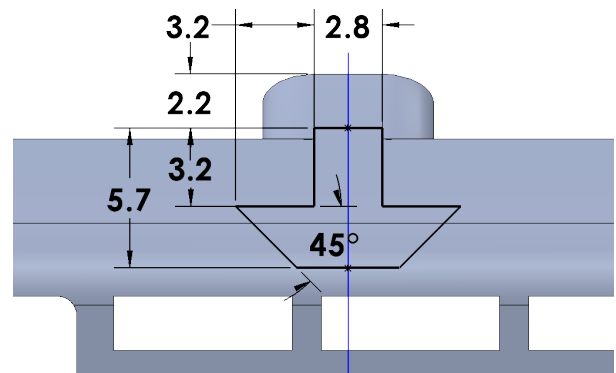


Fig. 93



Features



Extruded
Boss/Base

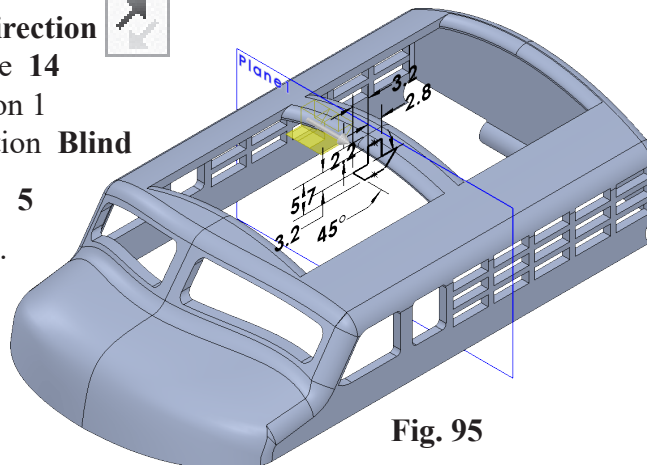


Fig. 95

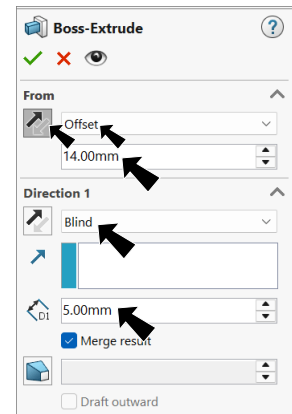


Fig. 94

O. Mirror4 Center Solar Panel Mount.

Pla

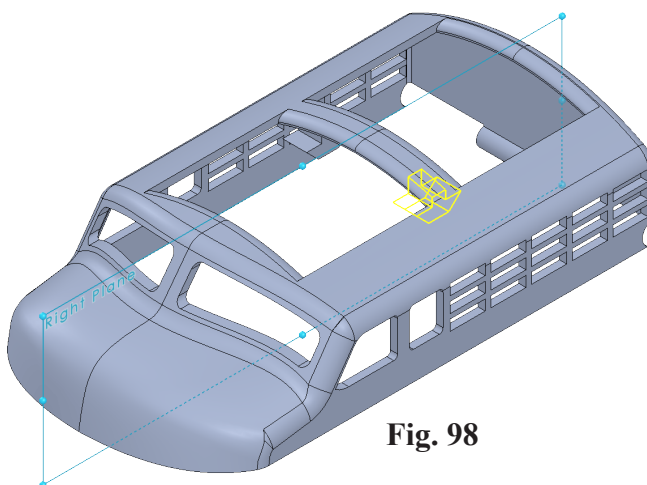
 Mirror

Fig. 98

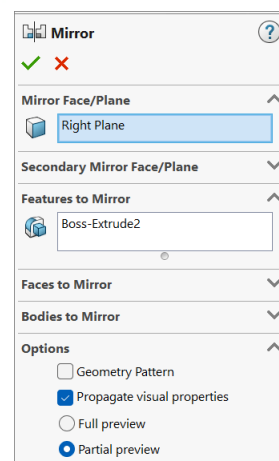


Fig. 97

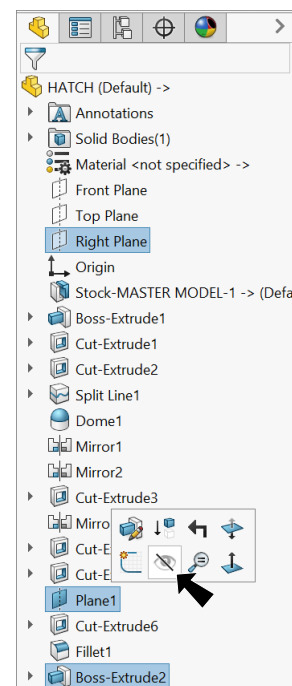


Fig. 96

P. Extrude3 Sketch 10 Front Solar Panel Catch.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**



on the context toolbar, **Fig. 99**.

Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. Zoom in on windshield area, **Fig. 100**.

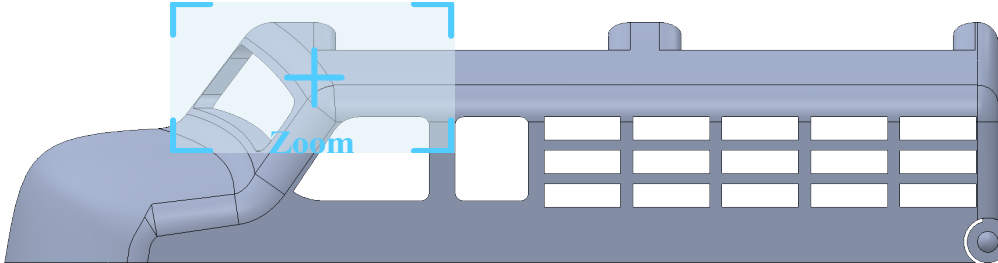


Fig. 100

Step 4. Click **Wireframe**  on the View toolbar.

Step 5. Click **Line**  (L) on the Sketch toolbar.

Step 6. Start at the **top rear inside roof edge** and sketch 8 lines, **Fig. 101**. **Rear vertical line** coresident with vertex.

Step 7. **Unselect Line tool**. To unselect, right click graphics area and click **Select**  from menu.

Step 8. **Ctrl click horizontal line and top edge of center panel mount** to select both. Release Ctrl key and click

Make Collinear  on the context toolbar, **Fig. 102**.

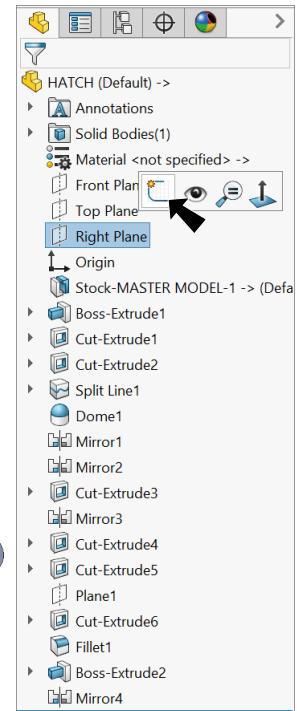


Fig. 99

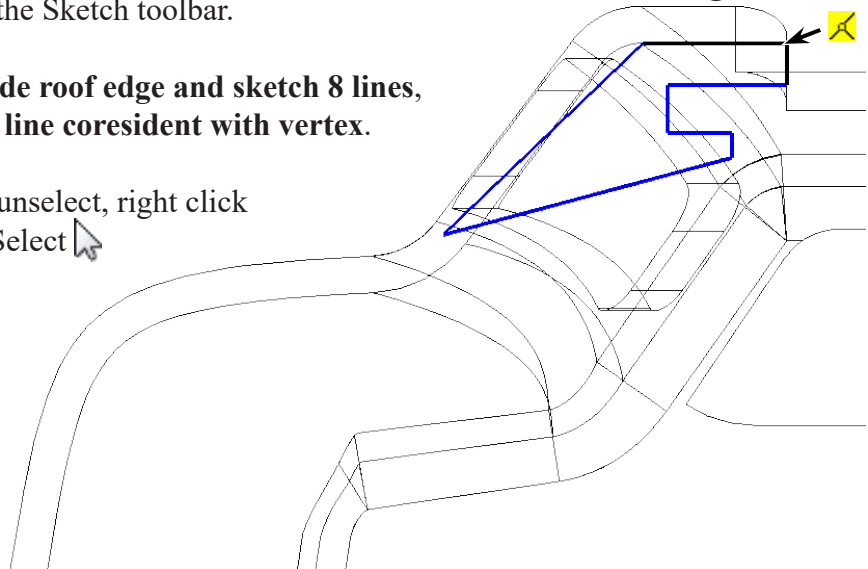


Fig. 101

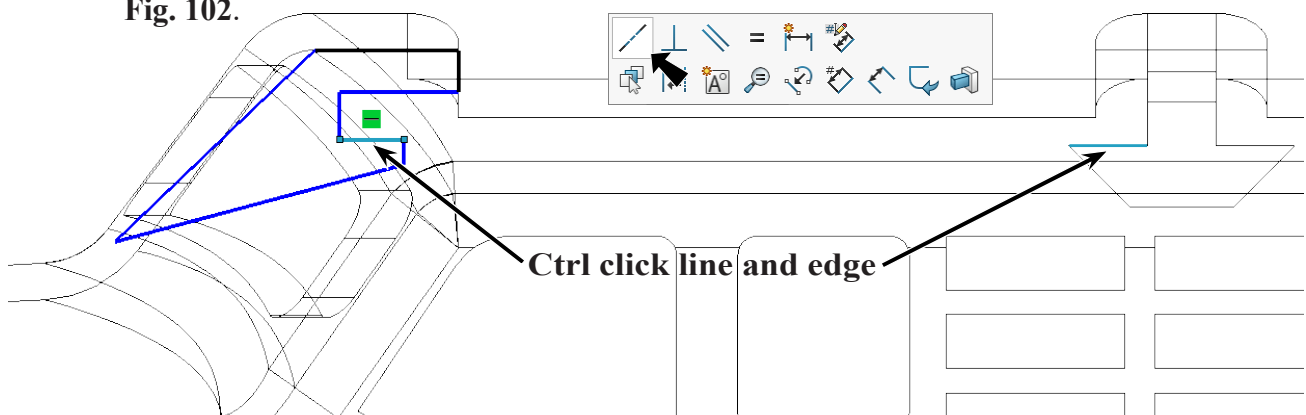
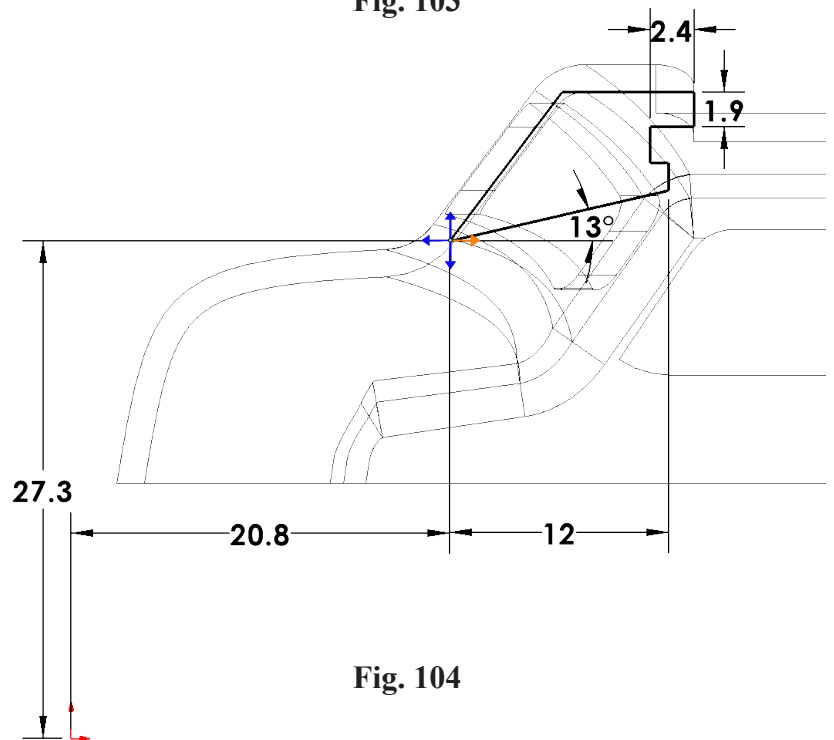
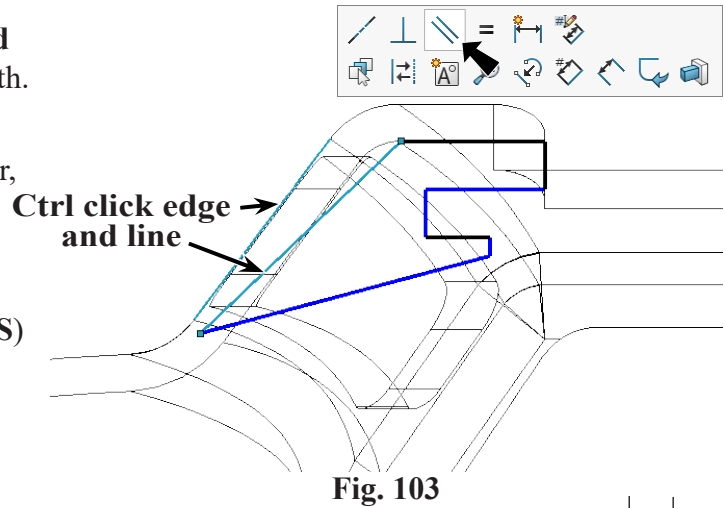


Fig. 102

Step 9. **Ctrl click front edge of windshield and line at windshield** to select both.
Release Ctrl key and click **Make Parallel**  on the context toolbar,
Fig. 103.

Step 10. Click **Smart Dimension** (S) on the Sketch toolbar.

Step 11. Add dimensions, **Fig. 104.**



Step 12. Click **Offset Entities**  on the Sketch toolbar.

Step 13. In the Offset Entities Property Manager set:
under Parameters, **Fig. 105**

Distance  **1.8**
uncheck **Reverse**
uncheck **Select chain**
click the **3 lines**; **top, right**
and bottom, **Fig. 106**

click OK .

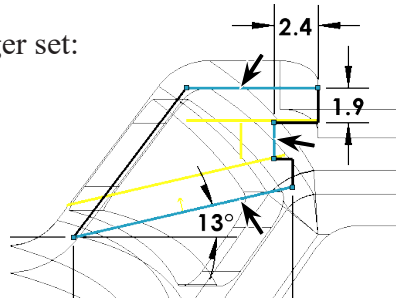


Fig. 106

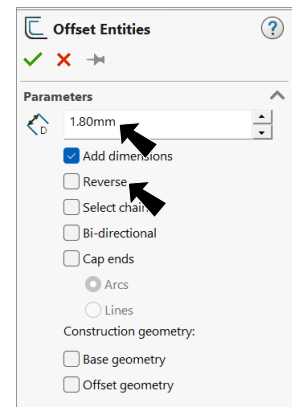
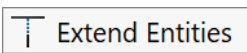
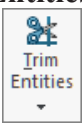


Fig. 105

Step 14. Click **Extend Entities**  in the **Trim**

Entities flyout  (S) on the Sketch toolbar.

Step 15. Extend vertical offset both direction and horizontal offset to the left, **Fig. 107**.

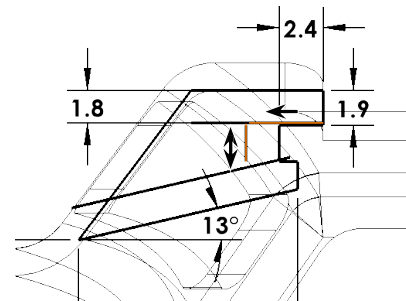


Fig. 107

Step 16. Click **Shaded With Edges**  on the View toolbar.

Step 17. To rotate view, in **Isometric** , **Shift click the Y**  **axis**
of the Reference Triad . And then **Shift click the Z**  **axis of the Reference Triad twice.**

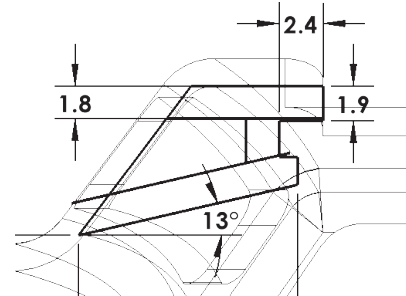
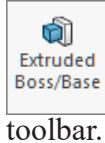


Fig. 108

Step 18. Click **Features**  on the Command Manager toolbar.

Step 19. Click **Extruded Boss/Base**



on the Features toolbar.

Step 20. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 109**
End Condition **Mid Plane**

Depth  **3.5**
uncheck **Merge result**
under Selected Contours
click the **3 contours**, **Fig. 110**
click OK .

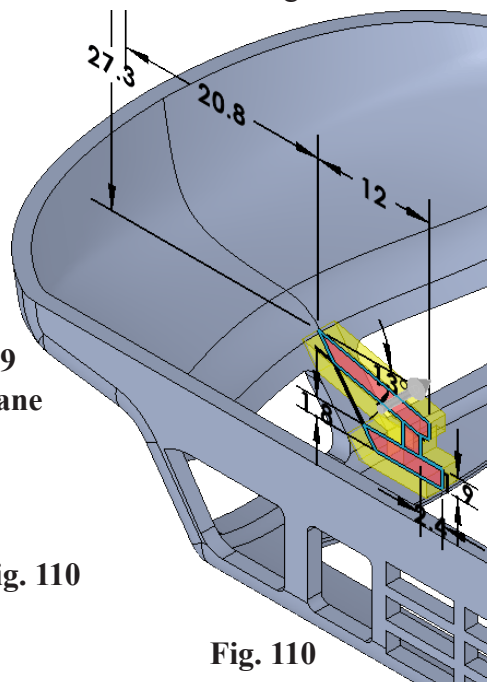


Fig. 110

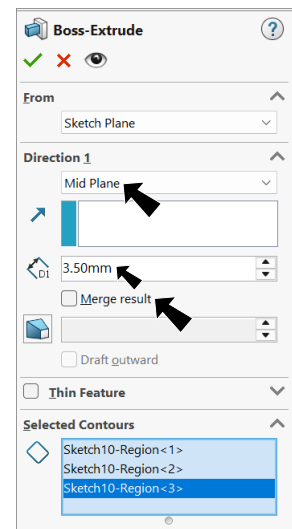


Fig. 109

Q. Extruded Cut7 Sketch11 Catch.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 111**.

Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. Zoom in on front, **Fig. 112**.

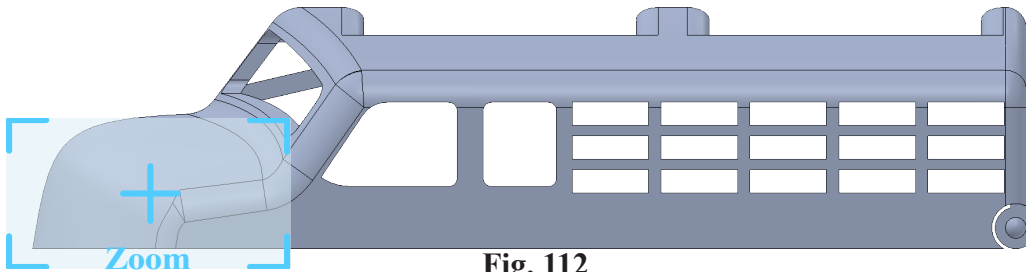


Fig. 112

Step 4. Click **Circle**  (S) on the Sketch toolbar.

Step 5. Sketch a circle slightly inside bottom front corner, **Fig. 113**.

Step 6. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 7. Add dimensions, **Fig. 113**.

Step 8. Rotate view to cut, **Fig. 119**. Use **Left Arrow** key  once and **Up Arrow** key  once.

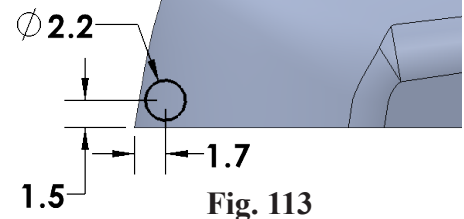
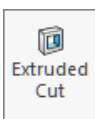


Fig. 113

Step 9. Click **Features**  on the Command Manager toolbar.

Step 10. Click **Extruded Cut**  on the Features toolbar.

Step 11. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 114**
End Condition **Mid Plane**

Depth  **5.2**
click OK .

Step 12. Save  (**Ctrl-S**).

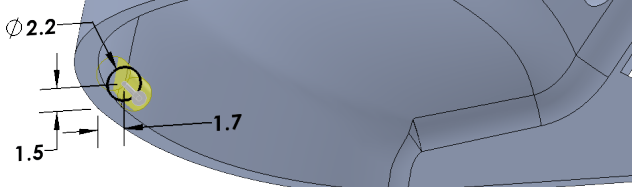


Fig. 115

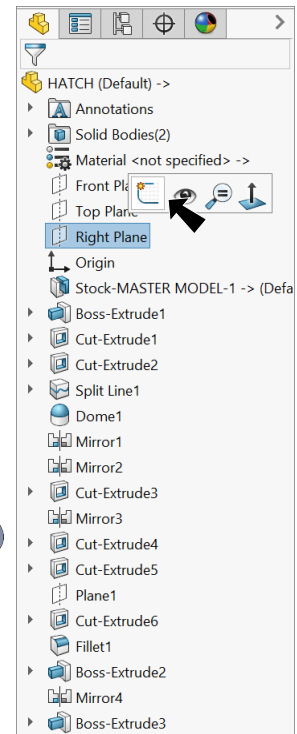


Fig. 111

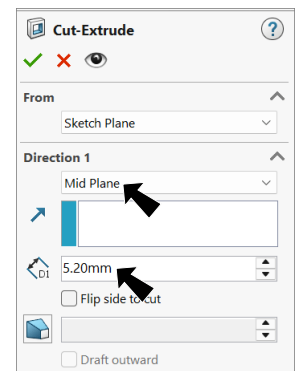


Fig. 114

R. Extrude4 Sketch12 Headlight.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 116**.

Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. Click **Circle**  (S) on the Sketch toolbar.

Step 4. Sketch **circle**, **Fig. 117**.

Step 5. **Unselect Circle tool.**
To unselect, right click graphics area and click **Select**  from menu.

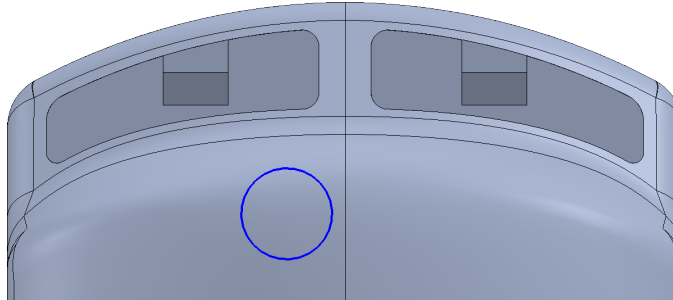


Fig. 117

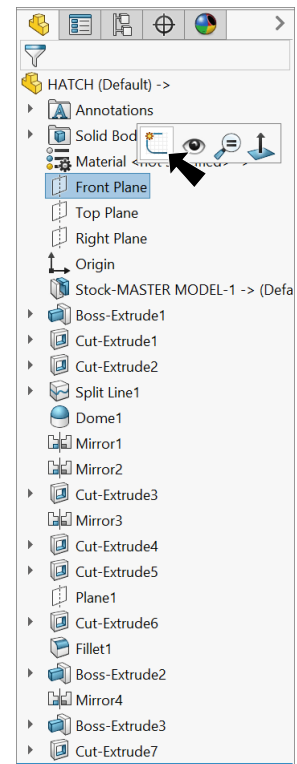
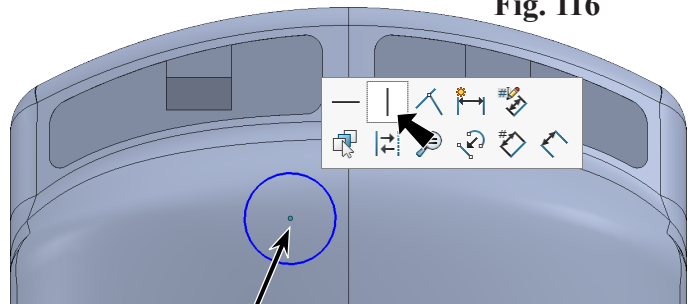


Fig. 116

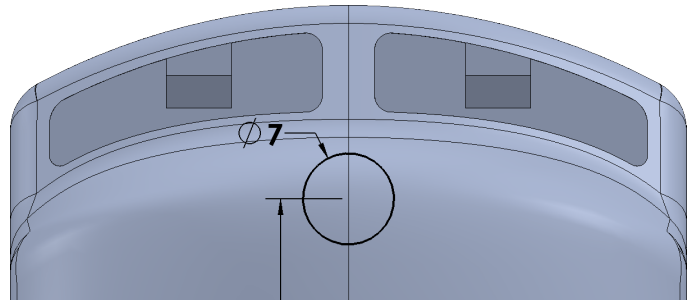
Step 6. **Ctrl click centerpoint of circle and Origin**  to select both. Release Ctrl key and click **Make Vertical**  on the context toolbar, **Fig. 118**.



Ctrl click centerpoint and Origin

Step 7. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 8. Add dimensions, **Fig. 119**.

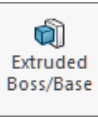


22.1

Fig. 119

Step 9. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 10. Click **Features**  on the Command Manager toolbar.

Step 11. Click **Extruded Boss/Base**  on the Features toolbar.

Step 12. In the Boss-Extrude Property Manager set:

under From, **Fig. 120**

Start Condition **Offset**

Reverse Direction 

Offset Value **2.6**

under Direction 1

End Condition **Blind**

then

Reverse Direction 

and finally

End Condition **Up To Next**

click **Draft**  **5°**

check **Draft outward**

click OK .

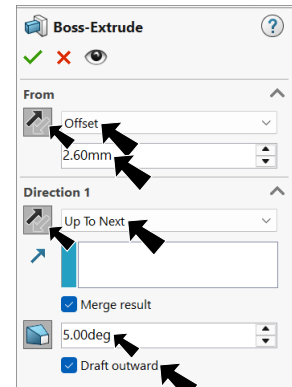


Fig. 120

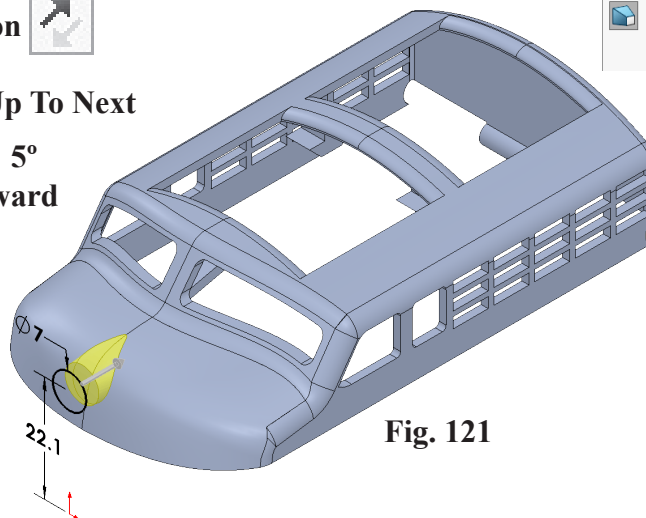


Fig. 121

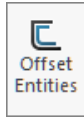
S. Extruded Cut8 Sketch13 Headlight.

Step 1. Click the **headlight front face** and click **Sketch**



on the context toolbar, **Fig. 122**.

Step 2. With the face still selected, click **Offset Entities**



on the Sketch toolbar,.

Step 3. In the Offset Entities Property Manager set:
under Parameters, **Fig. 124**

Distance **.6**
check **Reverse**
click **OK** .

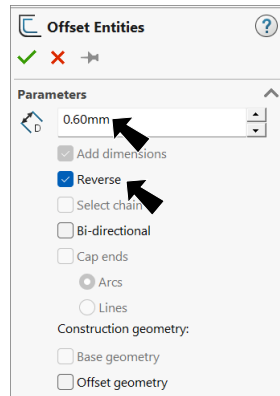
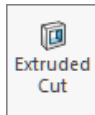


Fig. 123

Step 4. Click **Features** on the Command Manager toolbar.

Step 5. Click **Extruded Cut**



on the Features toolbar.

Step 6. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 126**

End Condition **Blind**

Depth **.5**
click **OK** .

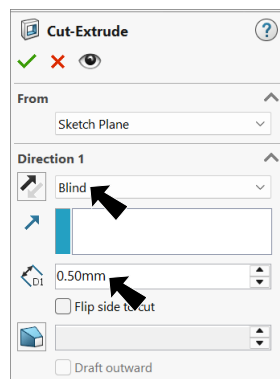


Fig. 125

Step 7. Save (Ctrl-S).

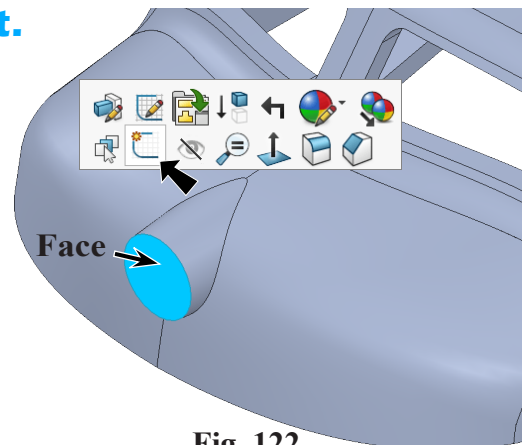


Fig. 122

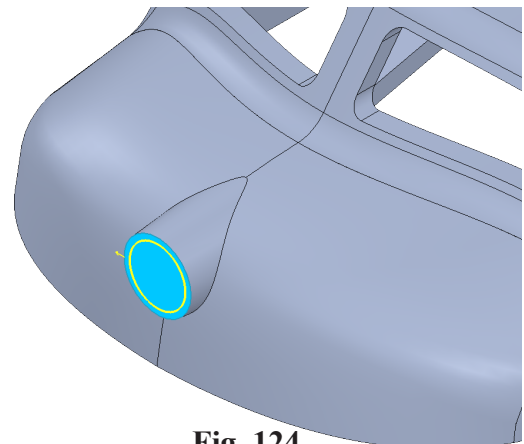


Fig. 124

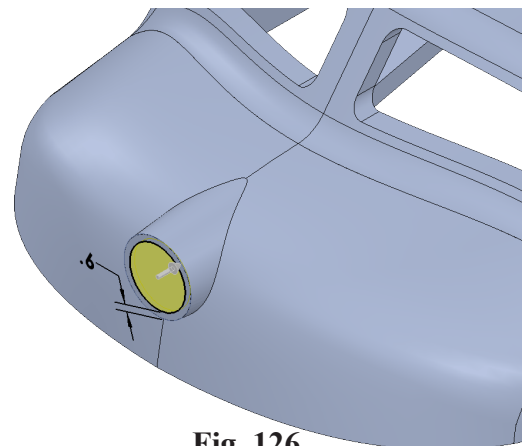


Fig. 126

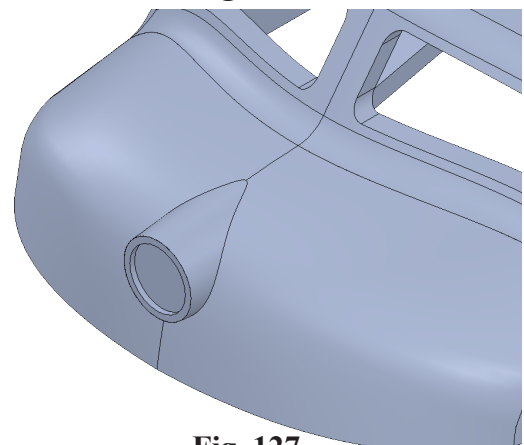
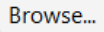


Fig. 127

T. Insert Wire Run Part into Part.

Step 1. Click Insert Menu > Part.

Step 2. In the Insert part Property Manger set:
click **Browse** button , **Fig. 128**
select your **WIRE RUN** and Open
under Transfer
check **Solid bodies**
under Locate Part
check **Locate with Move/Copy feature**
under Visual Properties
check **Propagate from original part**
click OK .

Step 3. In the Locate Part Property Manger set:
under Translate, **Fig. 130**
Delta Y 21
Delta Z 96
click **Reverse Direction** 
click OK .

Step 4. Save  (Ctrl-S).

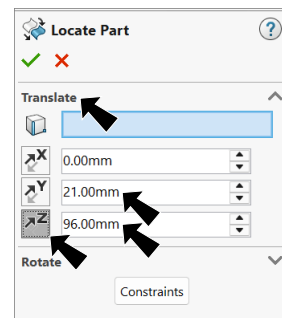


Fig. 129

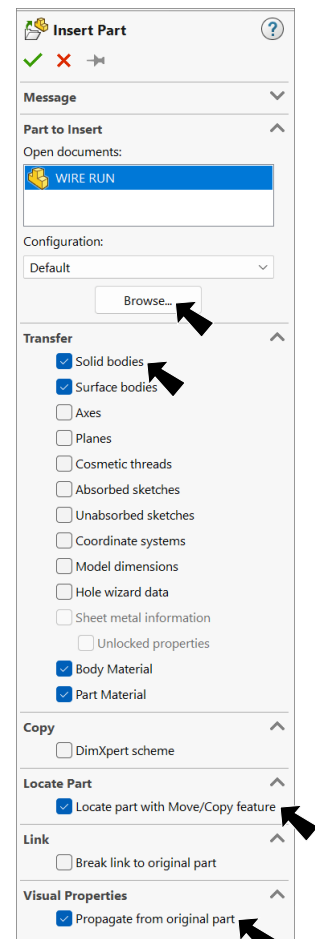


Fig. 128

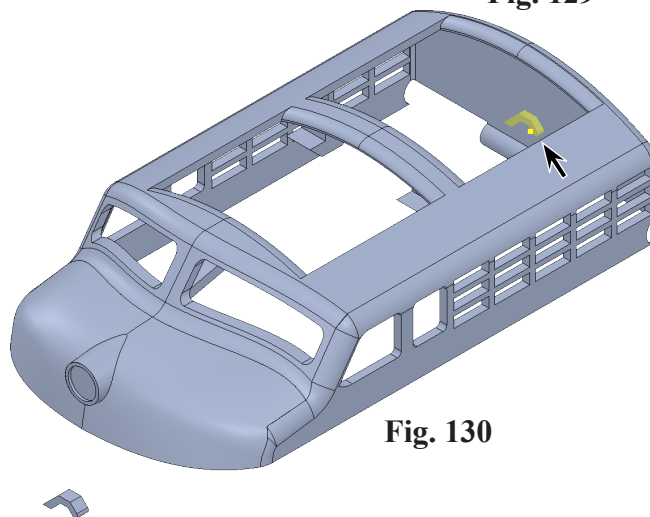


Fig. 130

U. Move Copy Body.

Step 1. Expand Solid Bodies folder in the Feature Manager and click **Wire Run** body to select, **Fig. 131**.

Step 2. Click Insert Menu > Features > Move/ Copy.

Step 3. In the Move/Copy Body Property Manager:
under Bodies to Move/Copy, **Fig. 132**
body was preselected
uncheck **Copy**
under Rotate

Y Rotation Origin 21
X Rotation Angle 90°

click OK ✓.

Step 4. Save (Ctrl-S).

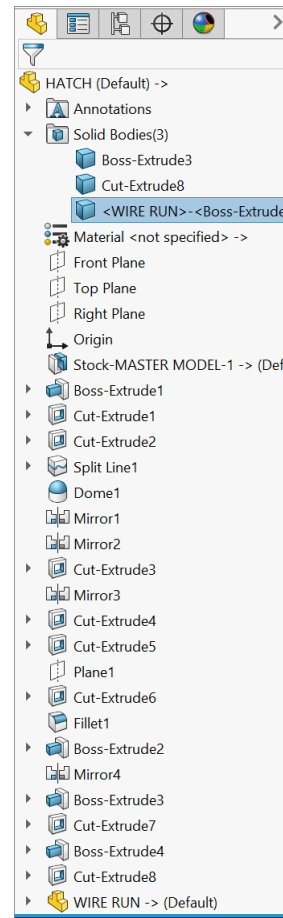


Fig. 131

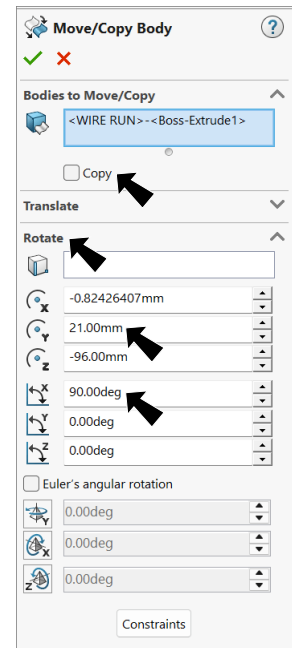


Fig. 132

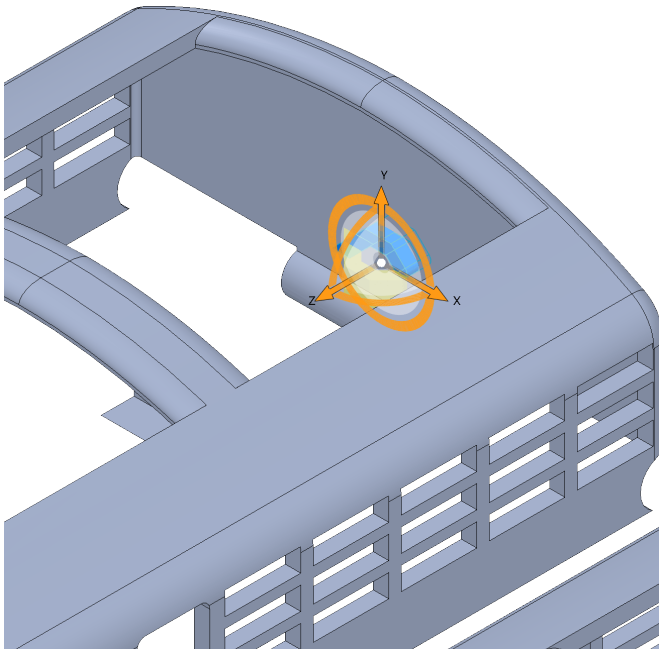


Fig. 133

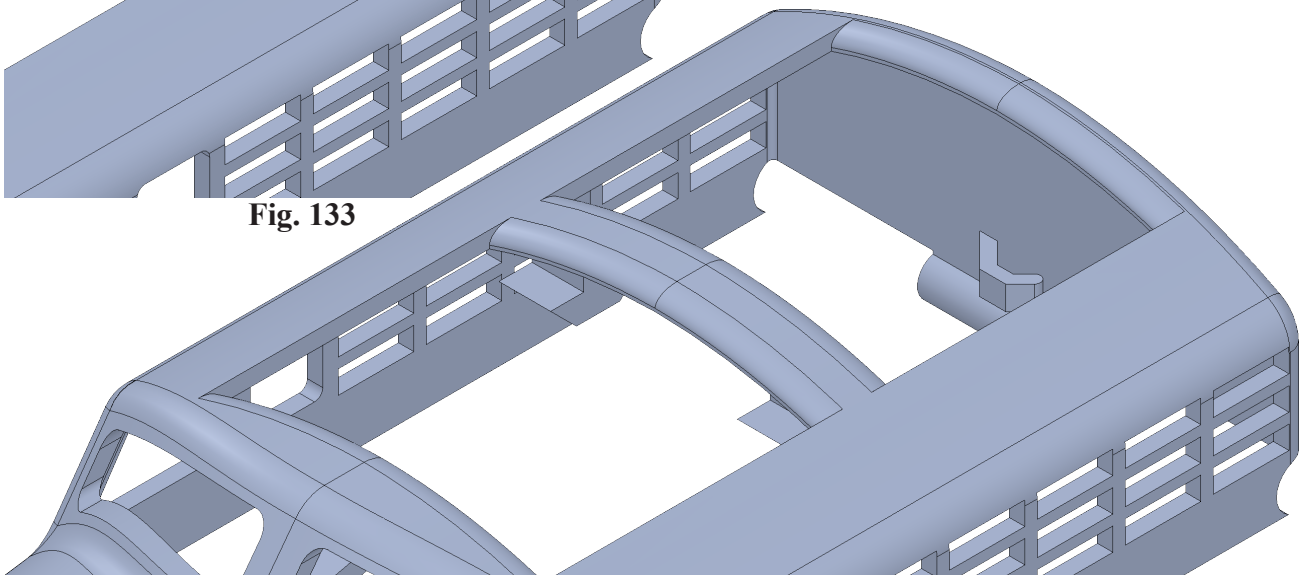
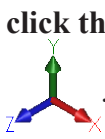


Fig. 134

V. Mirror Body Front Solar Panel Catch.

Step 1. Rotate view to view rear, **Fig. 137**. To rotate view, in **Isometric**  view, **Shift** click the **Y**  axis of the Reference Triad



Step 2. Expand Solid Bodies  folder in the Feature Manager. **Ctrl click** **Boss-Extrude3**  body and **Plane1**  to select body and plane, **Fig. 135**.

Step 3. Click **Features**  on the Command Manager toolbar.

Step 4. Click **Mirror**  on the Features toolbar.

Step 5. In the Mirror Property Manager click OK .

Step 6. Save  (**Ctrl-S**).

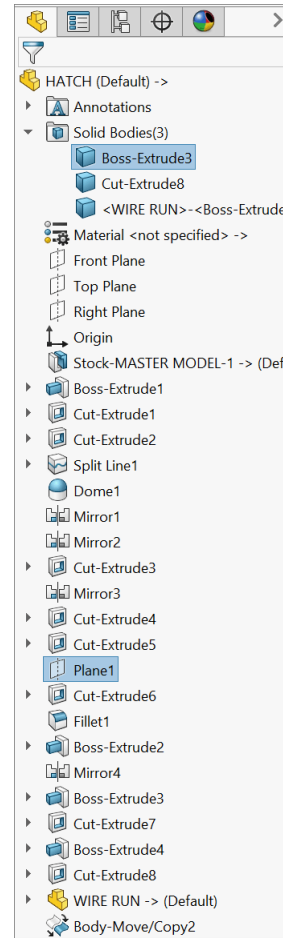


Fig. 135

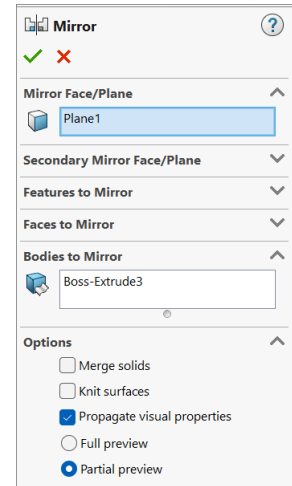


Fig. 136

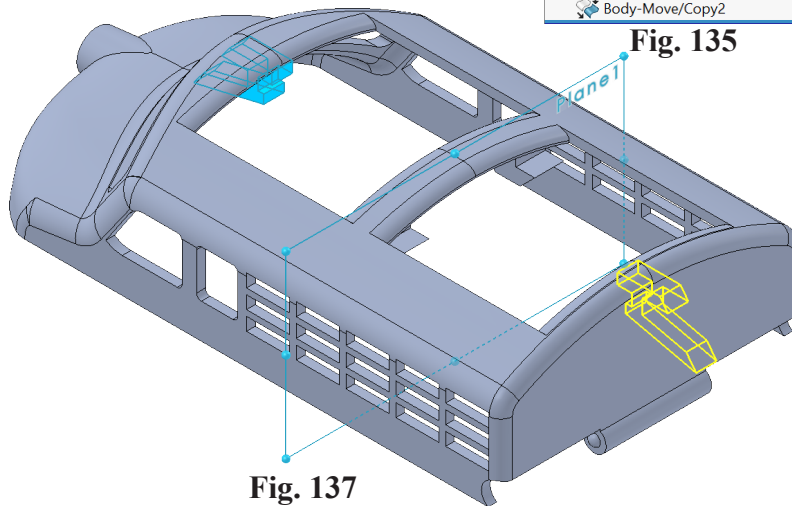


Fig. 137

W. Combine Bodies.

Step 1. Click Insert Menu > Features > Combine.

Step 2. In the Combine Property Manager:
under Operation Type, **Fig. 138**
select **Add**
use **Ctrl-A** to **select all (4)**, **Fig. 139**
click OK ✓.

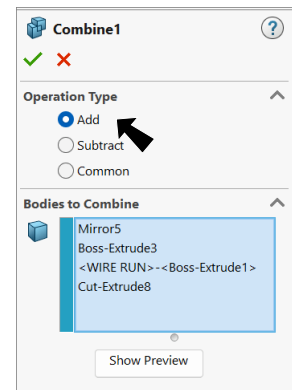


Fig. 138

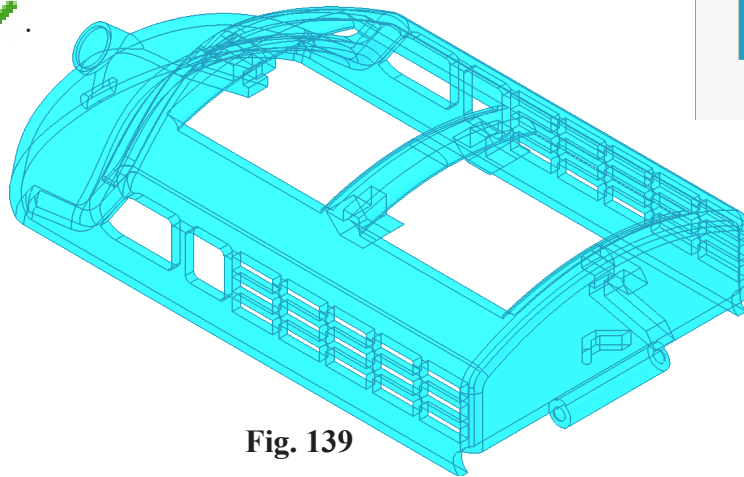
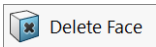


Fig. 139

X. Delete Faces.

Step 1. Click **Surfaces**  on the Command Manager toolbar.

Step 2. Click **Delete Face**  on the Surfaces toolbar.

Step 3. In the Delete Face Property Manager:
under Selections, **Fig. 140**
click **all face extending out the rear (10)**, **Fig. 141**
you'll have to rotate view to select the back side faces
under Options
Delete and Patch
click OK ✓.

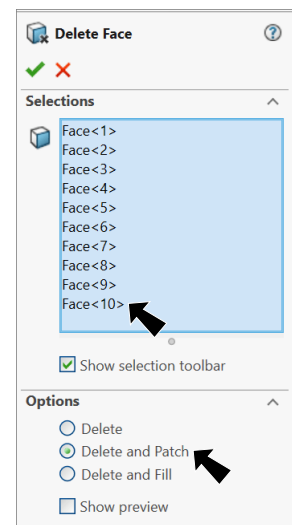


Fig. 140

Step 4. Save  (**Ctrl-S**).

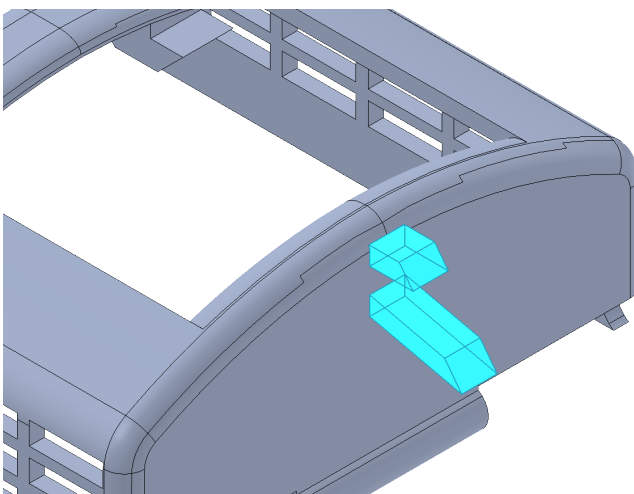


Fig. 141

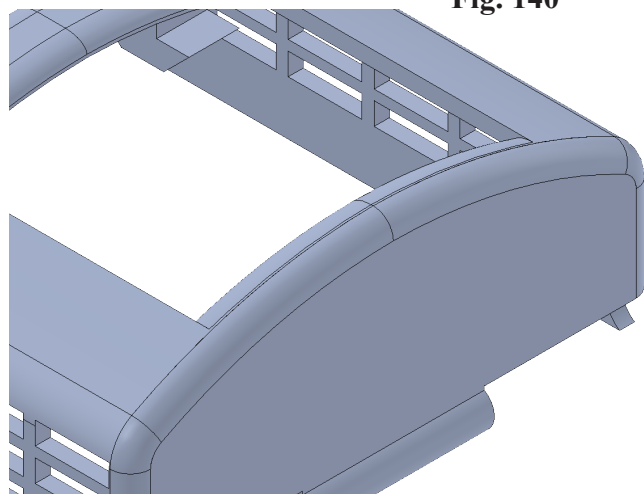


Fig. 142

Y. Fillets 2-11.

Step 1. Click **Fillet**  on the Features toolbar.

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, Fig. 143
uncheck **Tangent propagation**

② Radius  .2

click edges bottom rear at hinge (2), Fig. 144

click **Apply**

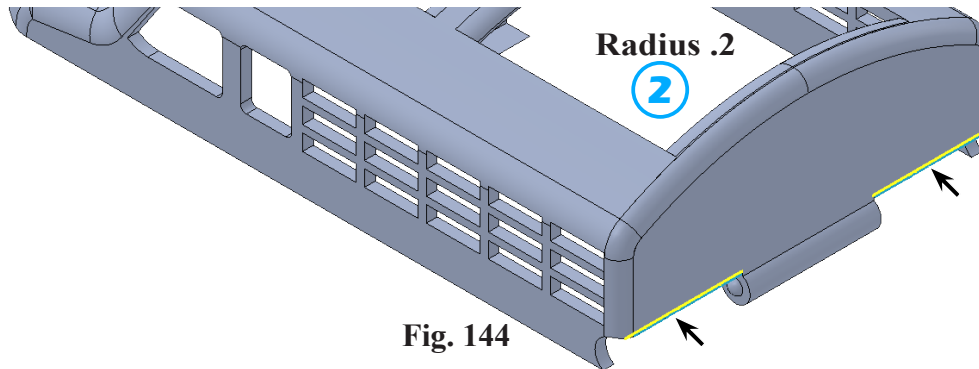


Fig. 144

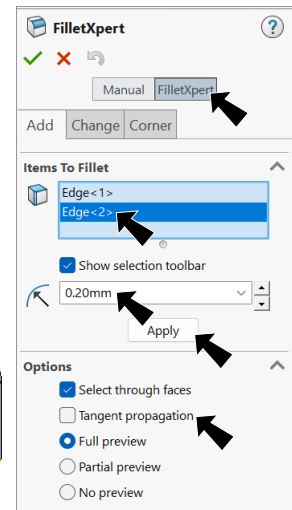


Fig. 143

check **Tangent propagation**, Fig. 145

③ Radius  .15

click horizontal edges hinge cut (2), Fig. 146

click **Apply**

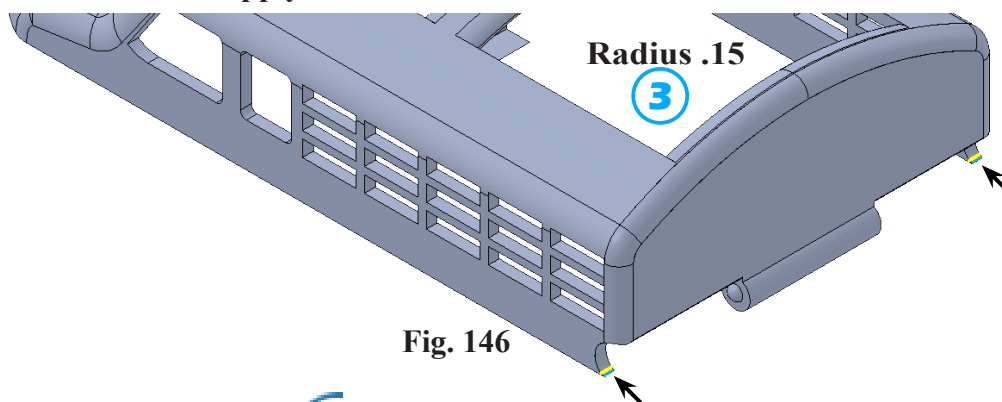


Fig. 146

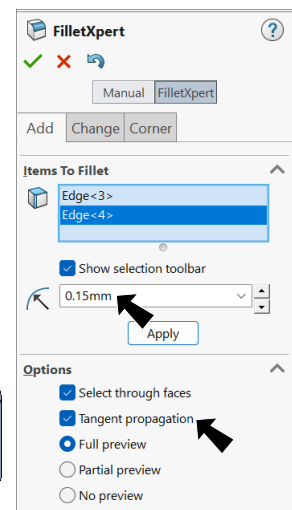


Fig. 145

④ Radius  1.2

click edge top of hinge (1), Fig. 147

click **Apply**

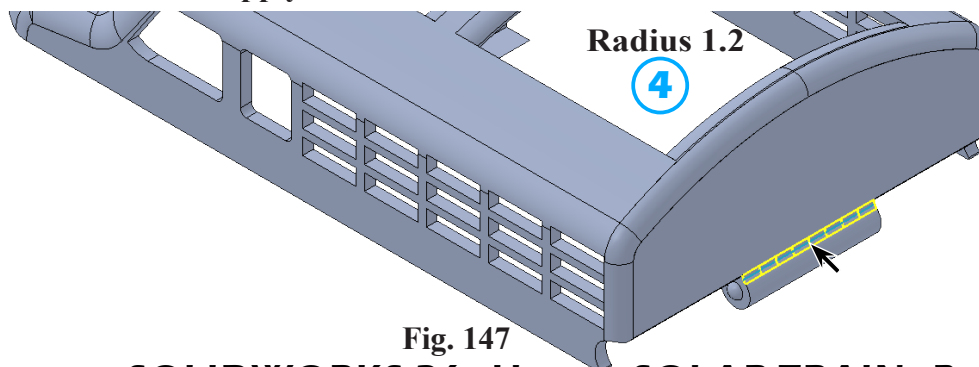


Fig. 147

Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

- ⑤ **Radius**  .4
click side edges of panel cuts (4), Fig. 148
click Apply

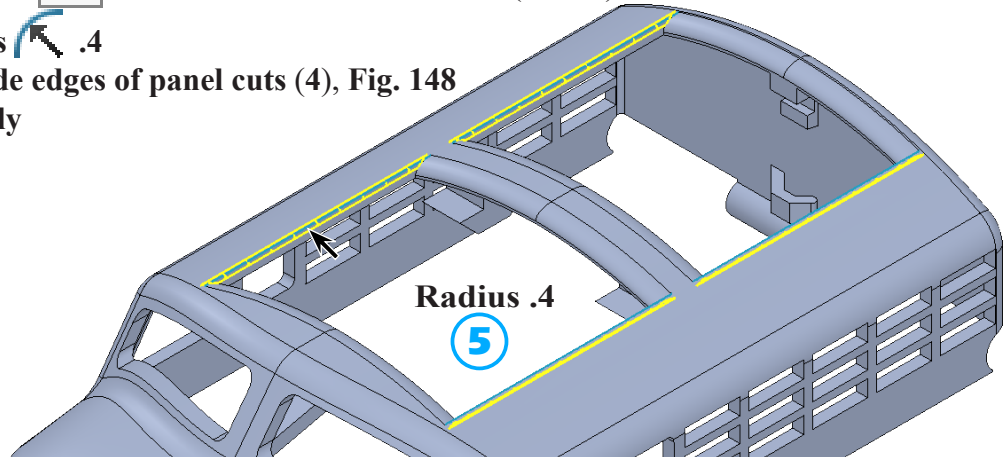


Fig. 148

- ⑥ **Radius**  .6
click horizontal edges of both center solar panel mounts (4), Fig. 149
click Apply

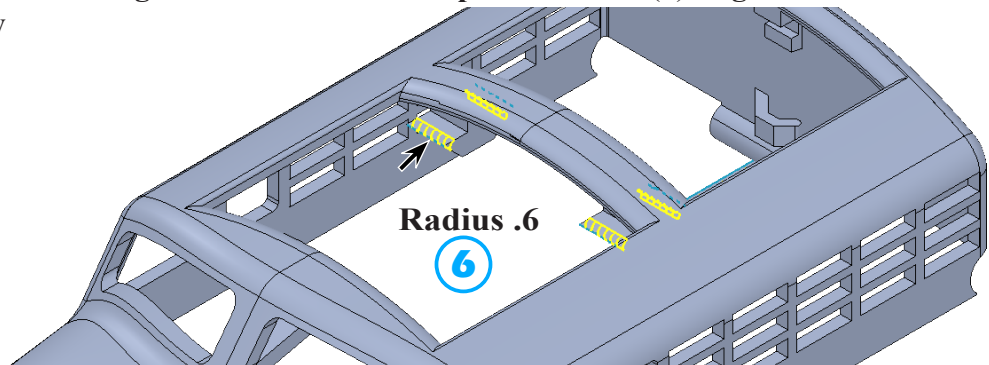


Fig. 149

- ⑦ **Radius**  .4
click side faces of both center solar panel mounts (4), Fig. 150
click Apply

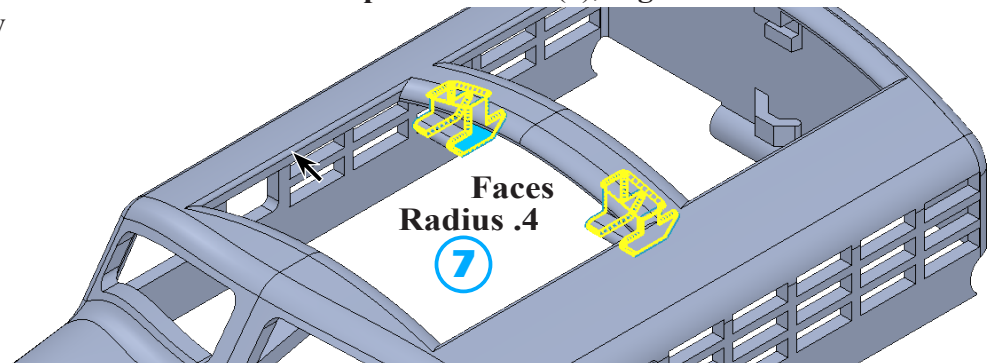


Fig. 150

- ⑧ **Radius**  1.1
click edges of headlight at Hatch (2), Fig. 151
click Apply

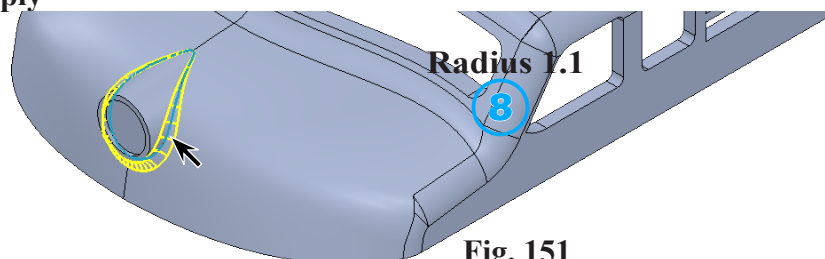


Fig. 151

- ⑨ Radius  .25
click circular edges of headlight (3), Fig. 152
click Apply

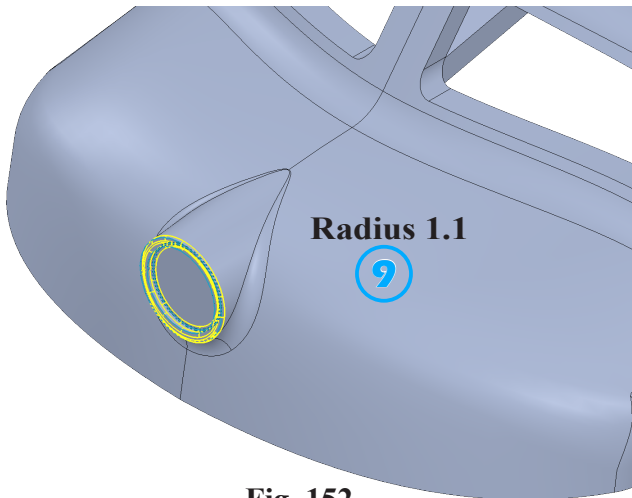


Fig. 152

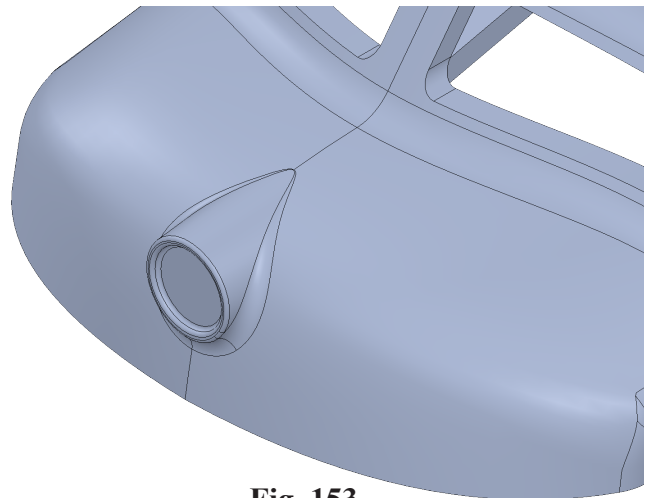


Fig. 153

- ⑩ Radius  .5
click both rear horizontal edges of rear panel catch (2), Fig. 154
click Apply

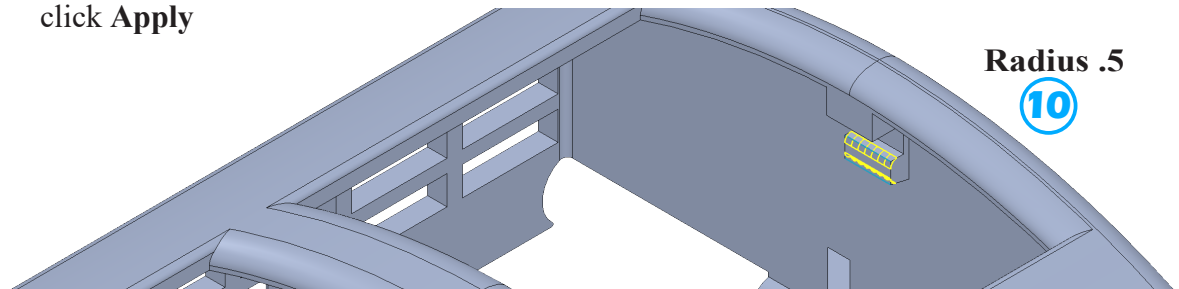


Fig. 154

- ⑪ Radius  .4
click side edges of rear panel catch (9), Fig. 155
click OK .

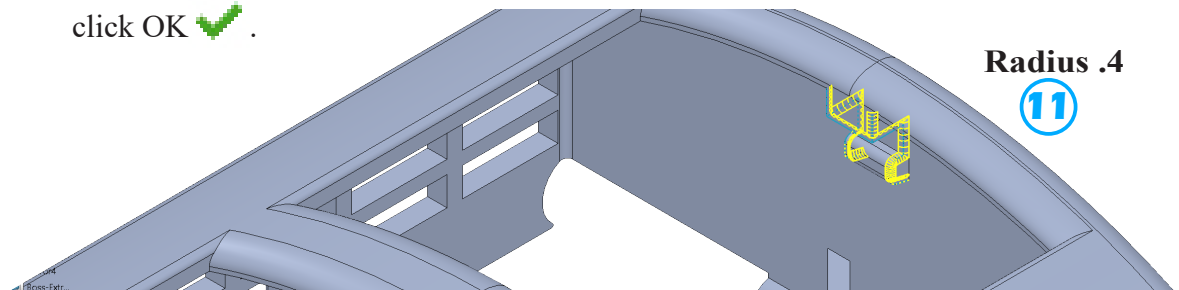


Fig. 155

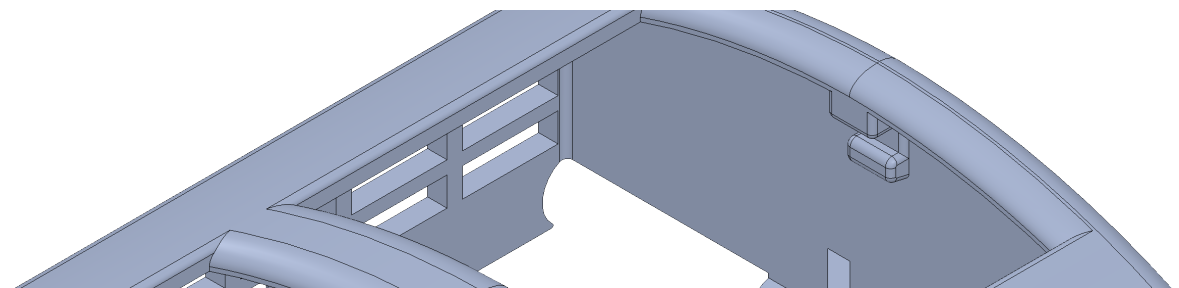


Fig. 156

Z. Section View.

Step 1. Rotate view to view front solar panel catch, **Fig. 157**. To rotate view, in **Isometric**

click the  , Shift click the **Y** axis of the **Reference Triad** . And then Shift click the **Z** axis of the **Reference Triad** twice.

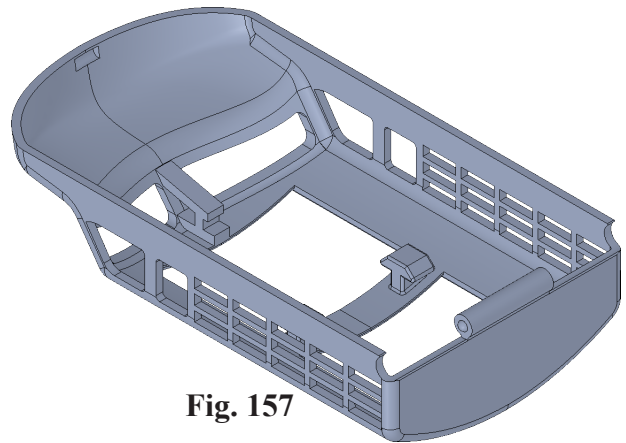


Fig. 157

Step 2. Click **Section View**  in View toolbar. Or View > Display > Section View.

Step 3. In the Section View Property Manager set: under Section 1, **Fig. 158**

click **Top Plane** 
Offset Distance  20
Reverse Direction 
 under Section 2
 click **Right Plane** 
Offset Distance  -5
Reverse Direction 
 under Section 3
 click **Right Plane** 
Offset Distance  5
 click **Save**  button.

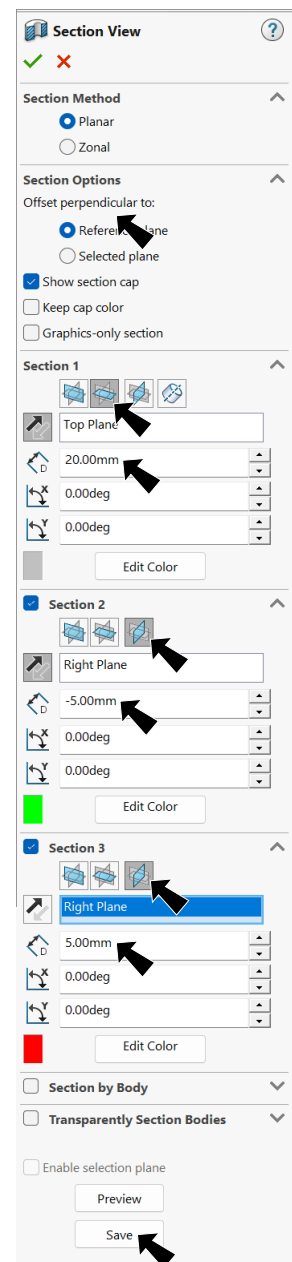


Fig. 158

Step 4. In Save As dialog box View name **SectionView**, **Fig. 159** click **Save**.

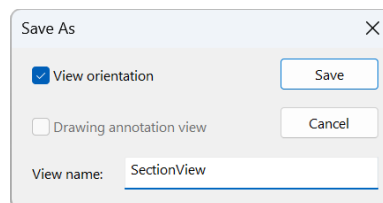


Fig. 159

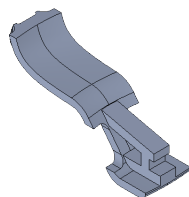
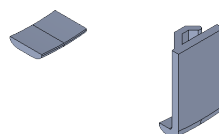


Fig. 160



AA. Fillets 12-17.

Step 1. Click **Fillet**  on the Features toolbar.

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, Fig. 161

⑫ **Radius**  .5

click **both rear edges catch (2)**, Fig. 162
click **Apply**

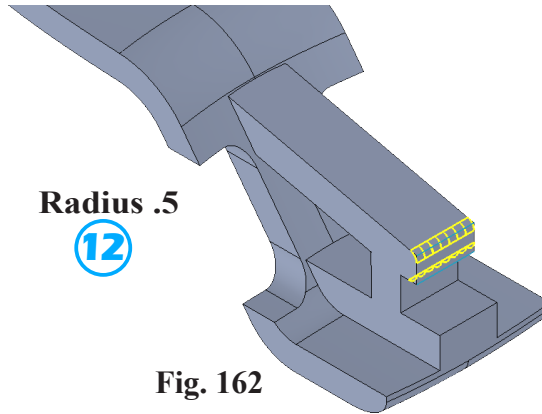


Fig. 162

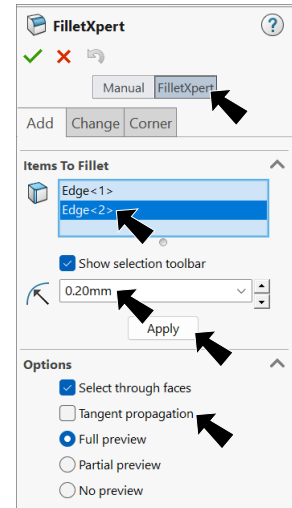


Fig. 161

⑬ **Radius**  .3

click **edge under catch and inside frame (3)**, Fig. 163
click **Apply**

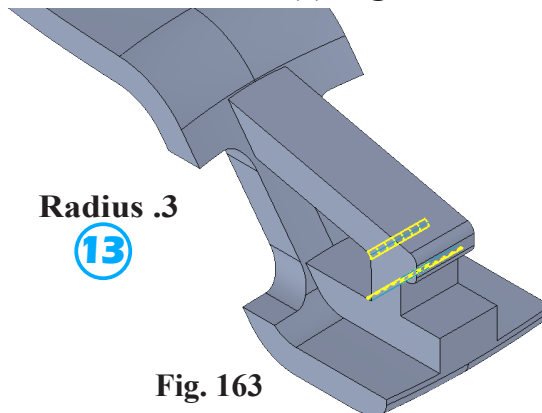


Fig. 163

⑭ **Radius**  1

click **edge of support (1)**, Fig. 164
click **Apply**

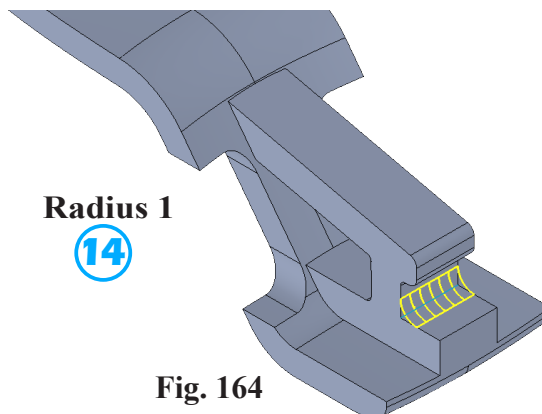


Fig. 164

- ⑮ Radius  1.5
click edge top (1), Fig. 165
click Apply

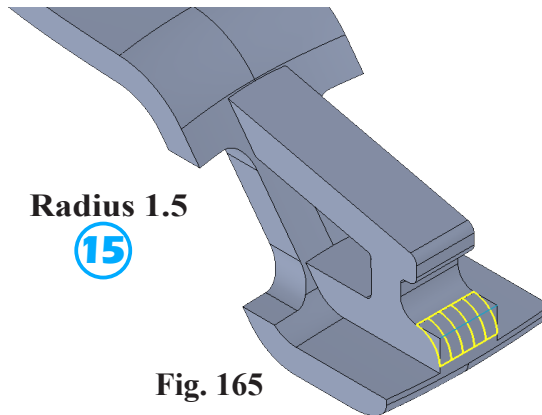


Fig. 165

- ⑯ Radius  .4
click side edges on outside (2), Fig. 166
click Apply

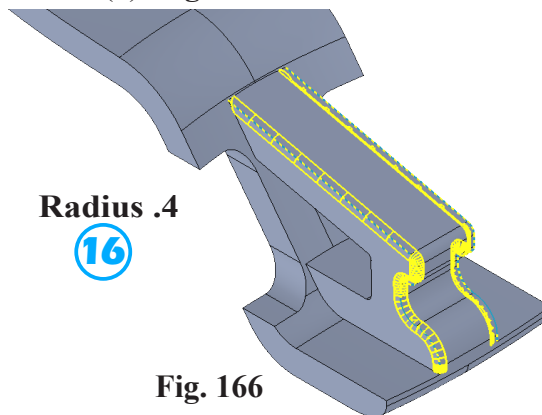


Fig. 166

- ⑰ Radius  .4
click side edges inside (2), Fig. 167
click OK .

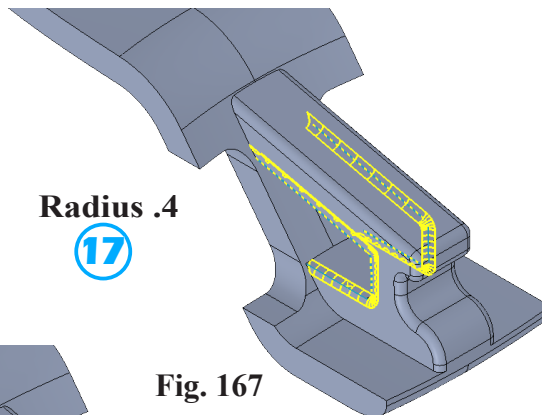


Fig. 167

Step 3. Turn off Section View
 in View toolbar. Or
View > Display > Section View.

Step 4. Save  (Ctrl-S).

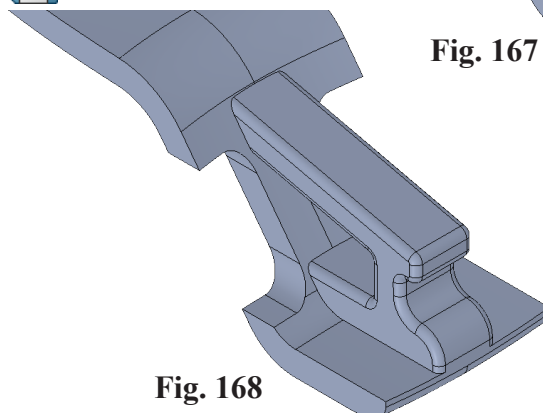


Fig. 168

BB. Headlight Face Appearance: White LED.

Step 1. Click **Isometric**  on the Standard Views toolbar.

Step 2. Click the Headlight circular face to select, click **Appearance Callout**  on the Context toolbar and click **Face 1** , **Fig. 169**.

Step 3. In the Appearances Task pane, expand **Lights**, click **LED** and in the lower pane select **White LED**, **Fig. 170**.

Step 4. Click OK  in the Property Manager.

Step 5. Save  (Ctrl-S).

Note: The Hatch part is not complete. In the Assembly file, we will add Indent features using the Solar Panels. **Do not print** until after this feature is added in the Assembly file.

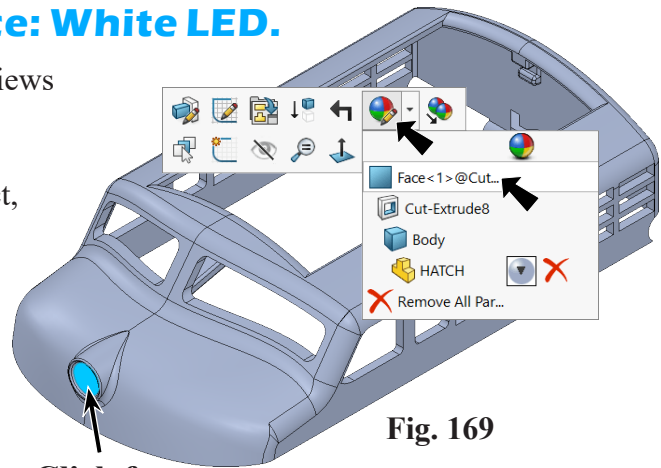


Fig. 169

Click face

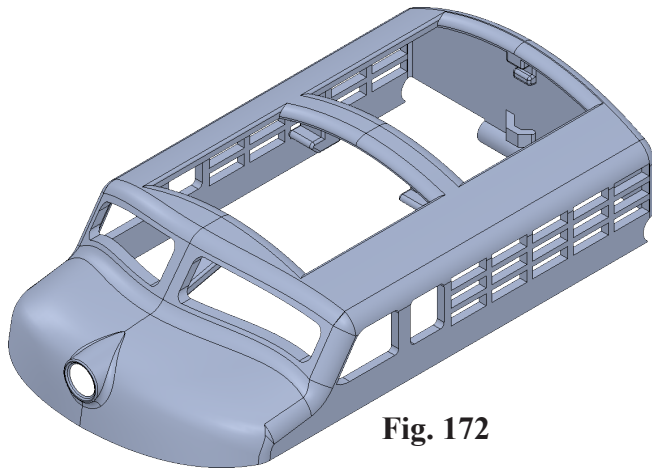


Fig. 172

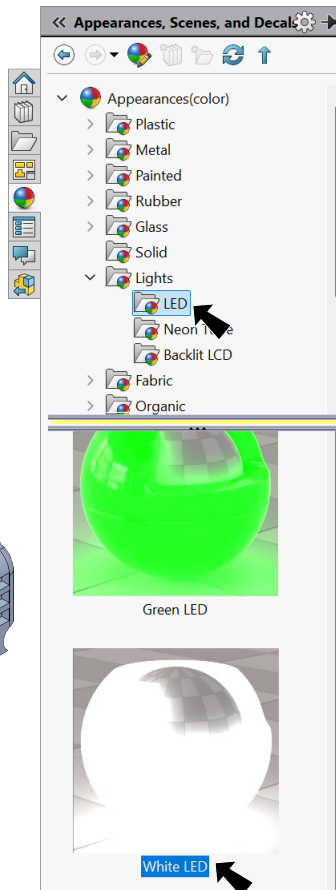


Fig. 170

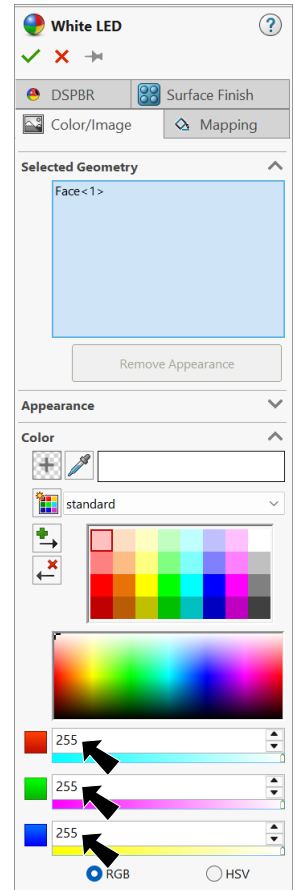


Fig. 171