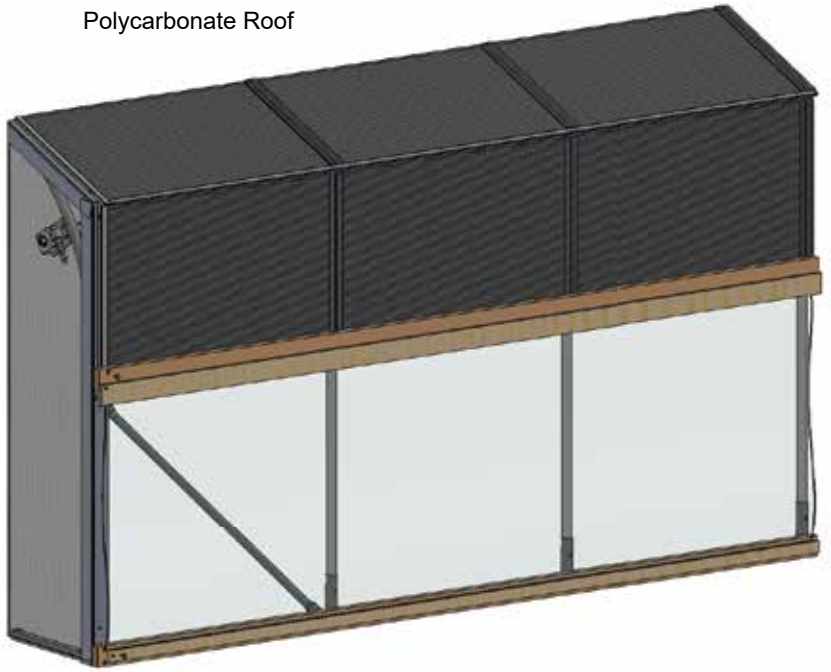
GrowSpan™
Drop-Down Side Panel Installation

Film Roof

Polycarbonate Roof



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READ THIS DOCUMENT BEFORE YOU BEGIN

These instructions include helpful hints and important information needed to safely assemble and install the drop-down side panel. Please read these instructions ***before*** you begin. If you have any questions during the assembly, contact Customer Service at 1-800-245-9881 for assistance.

SAFETY PRECAUTIONS

- Wear eye protection.
- Wear head protection.
- Wear gloves when handling metal tubes.
- Use a portable GFCI (Ground Fault Circuit Interrupter) when working with power tools and cords.
- Do not climb on greenhouse or framing during or after construction.
- Do not occupy greenhouse during high winds, tornadoes, or hurricanes.
- Provide adequate ventilation if structure is enclosed.
- Do not store hazardous materials in greenhouse.
- Provide proper ingress and egress to prevent entrapment.

REQUIRED TOOLS

The following list identifies the main tools needed for assembly. Additional tools and supports may be needed depending on structure and location.

- Tape measure or measuring device and marker to mark pipes.
- Clutched drill driver to drive Tek screws. (Cordless with extra batteries works best.) ***Do not use an impact driver to install Tek screws.***
- Saw for metal and wood cutting, Scissors (or utility knife), hammer, and gloves.
- Wrench and socket set or similar tools.
- 1-3/8" hole saw bit to cut polycarbonate end wall cladding.

PARTS FOR DROP-DOWN SIDE INSTALLATION

*Some parts are not shown.

FA4482B Tek Screw

FA4652 Wood Screws

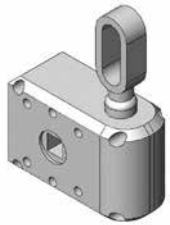
103544 Mounting Plate

102717 Gearbox Drive

AS5020 Pulley

FA1960 Eye Screw

106734 Band Clamp


103496 Gear Box

Ribbon Board Installation — Polycarbonate Roof Only

ATTENTION: IF YOUR BUILDING IS COVERED WITH TWO (2) LAYERS OF FILM CLADDING, SKIP THIS SECTION. PARTS 1 & 2 OF THE RIBBON BOARD WERE INSTALLED IN GUIDE #2. CONTINUE WITH *INSTALL DROP-DOWN SIDE PANEL AXLE SECTION* OF THIS GUIDE PAGE 7.

RIBBON BOARD — PART 2 INSTALLATION — POLYCARBONATE ROOF ONLY

Ribbon board consists of two parts: Part 1 is a 2" x 6" board attached to building frame installed in Guide #2; Part 2 is a 1" x 4" board attached to Part 1. These boards, when assembled properly, provide a channel that secures drop-down panel when it is in the up (or closed) position. Like Part 1, materials for Part 2 are *not included* and are *supplied by customer*. *The main board (Part 1) was attached to the frame in Guide #2.*

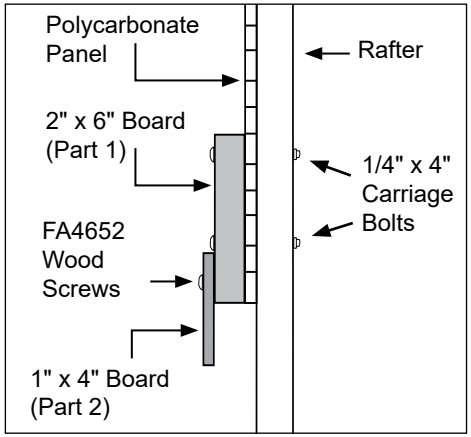
If greenhouse roof is covered with twin-wall polycarbonate panels, continue with the steps on this page to attach Part 2 of the ribbon board to Part 1. *If Part 1 of the ribbon board was not installed, return to Guide #2 to install the main board (Part 1) before you continue. See diagram below.*

Complete these steps:

1. Purchase lumber for Part 2 of ribbon board. (Recommended: 1" x 4".)
2. Align end of first board with end of installed ribbon board (Part 1) and hold, nail, or clamp in place.
3. Secure board to Part 1 of ribbon board using FA4652 wood screws ***spaced at 24" on-center.***

End View shows 2-Part ribbon board attached to rafter after installing polycarbonate panels for roof.

Evenly space FA4652 wood screws at 24" on-center.



4. Continue with baseboard installation as described on next page.

Gather parts:

- FA4652 Wood Screws
- Customer-Supplied Lumber: 1" x 4" — recommended.

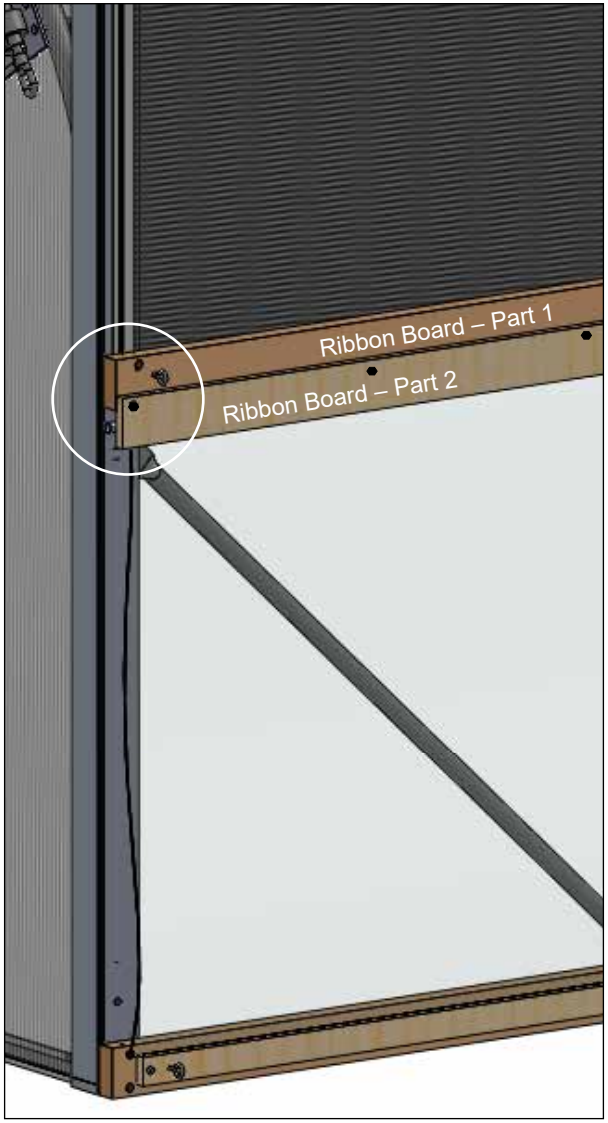


Diagram shows fully installed drop-down side panel without anti-billow ropes.

Baseboard Installation — Polycarbonate Roof Only

ATTENTION: IF YOUR GREENHOUSE IS COVERED WITH TWO (2) LAYERS OF FILM CLADDING, SKIP THIS SECTION. BASEBOARD WAS INSTALLED IN GUIDE #2. CONTINUE WITH *INSTALL DROP-DOWN SIDE PANEL AXLE* SECTION OF THIS GUIDE PAGE 7.

IF BASEBOARD WAS NOT INSTALLED AS INSTRUCTED IN GUIDE #2, CONTINUE WITH STEPS ON THIS PAGE. A BASEBOARD IS REQUIRED FOR ALL GREENHOUSES WITH DROP-DOWN SIDES.

Gather parts:

- FAH009B (1/4" x 4") Carriage Bolts
- FALB01B (1/4") Nuts
- FA4652 Wood Screws
- Customer-Supplied Lumber: 2" x 6" for baseboard (recommended).

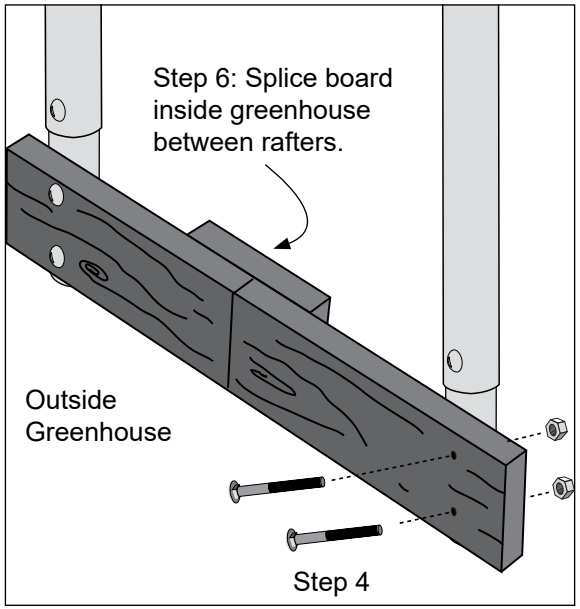
INSTALL BASEBOARD

If greenhouse roof is covered with twin-wall polycarbonate panels, or baseboard was not installed when film roof was installed (Guide #2), complete steps on this page to attach baseboard.

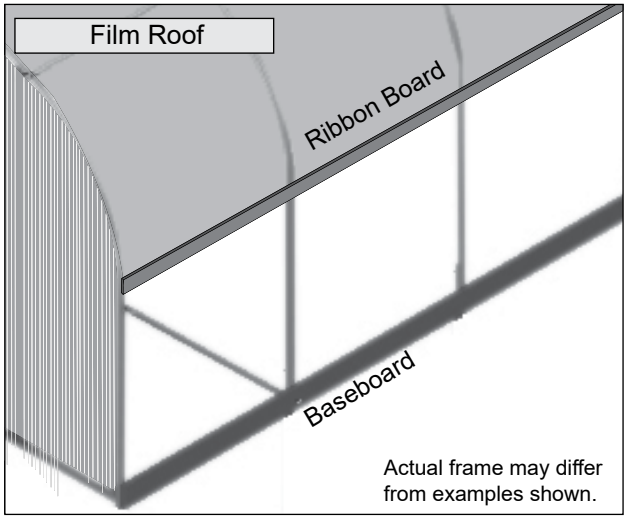
Complete these steps:

1. Purchase lumber for baseboard. (Recommended: 2" x 6".)
2. With assistance, set first board on ground along outside of frame. ***Cut boards to length or use board lengths that land between rafters. Do not connect two boards to same rafter.***

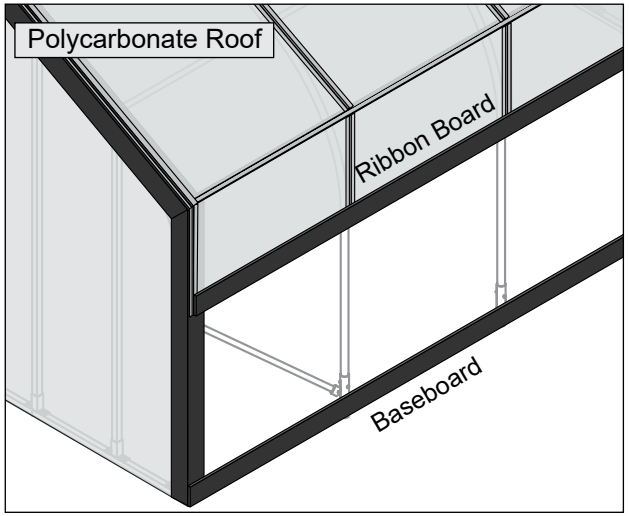
   ATTENTION: Drill mounting bolt holes through center of each ground post. Align end of board with outside edge of end wall flashing. *Board should run level throughout greenhouse length.*
3. Using a drill and 5/16" drill bit, drill two (2) holes through board and ground post (if needed) at each rafter. ***Some ground posts may include pre-drilled holes.***
4. From outside, insert 1/4" carriage bolts through holes, add nuts, and tighten. Tap bolt heads with a hammer to seat into wood and retighten until snug.
5. Set next board into position and repeat steps to secure to frame using the supplied carriage bolts and nuts.
6. Return to board splice and secure using scrap piece of lumber and FA4652 wood screws or customer-supplied nails. See diagram.
7. Continue installing boards to complete installation of baseboards for first side of frame.
8. Repeat steps to install baseboard along remaining side of frame.
9. Continue with next page.



Step 4



Actual frame may differ from examples shown.



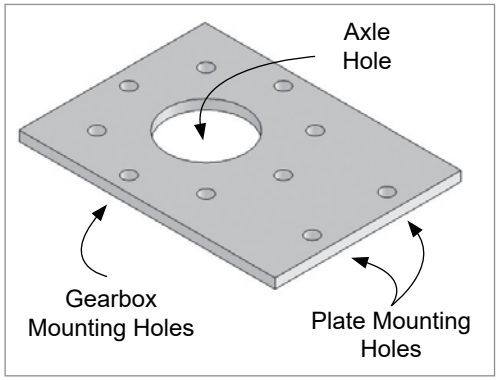
Attach Gearbox — Polycarbonate Roof Cladding

INSTALL DROP-DOWN SIDE PANEL GEARBOX AND MOUNTING PLATE — POLYCARBONATE ROOF CLADDING

ATTENTION: IF YOUR BUILDING IS COVERED WITH TWO (2) LAYERS OF FILM CLADDING, SKIP THIS SECTION; GEARBOX WAS INSTALLED DURING ROOF FILM INSTALLATION (GUIDE #2). CONTINUE WITH *INSTALL DROP-DOWN SIDE PANEL AXLE* SECTION – THIS MANUAL (PAGE 7).

If greenhouse roof is covered with twin-wall polycarbonate panels, continue with the steps below to attach gearbox for drop-down side panel.

1. Take the 103544 mounting plate (shown right) and move outside the end wall where you want to position gearbox.

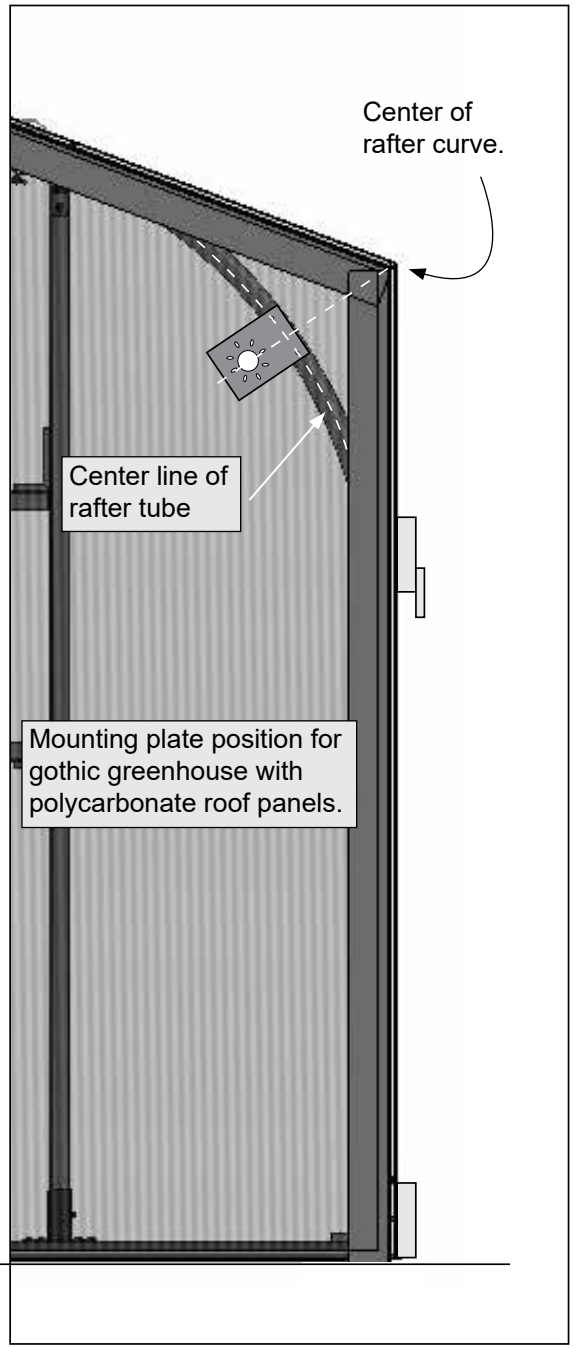


103544 Mounting Plate
Actual plate may differ from example.

2. Locate rafter tube midpoint on curve, mark plate mounting hole locations, and drill holes using a 1/4" or 5/16" drill bit. See dashed lines.

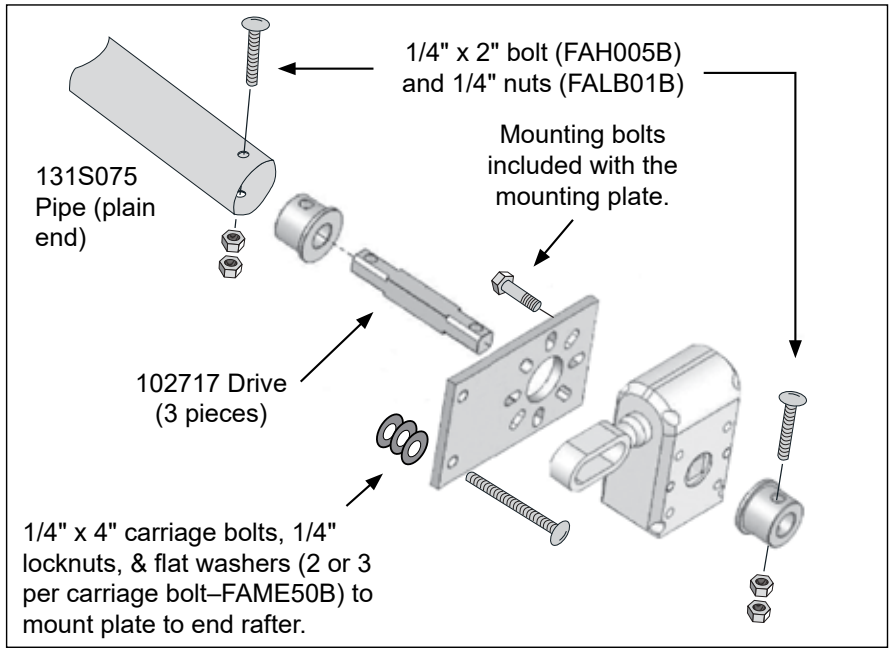
   NOTE: Do not position mounting plate in a location where purlins, clamps, or other frame components will interfere with installation of drop-down components. *Axle support band clamps are installed on underside of rafters inside frame during axle installation*.

3. Insert FAH009B (1/4" x 4") carriage bolts through plate and mounting holes in rafter to temporarily place in position. Enlarge mounting holes in mounting plate if shaft of mounting bolt does not fit.
4. Using axle hole in mounting plate as a template, mark location of axle hole on end wall polycarbonate panel.
5. Remove mounting plate and mounting bolts and cut hole in end wall cladding for axle conduit using a **1-3/8" hole saw bit**.
6. Seal open cells of polycarbonate panel using vent tape or silicone sealant.

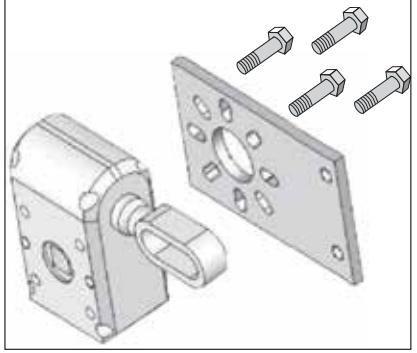


INSTALL DROP-DOWN SIDE PANEL GEARBOX AND MOUNTING PLATE — POLYCARBONATE ROOF CLADDING — continued

7. Attach gearbox to mounting plate. Install so gearbox is tilted or angled when plate is reattached to allow easier access when using crank handle. Review exploded view below for details.

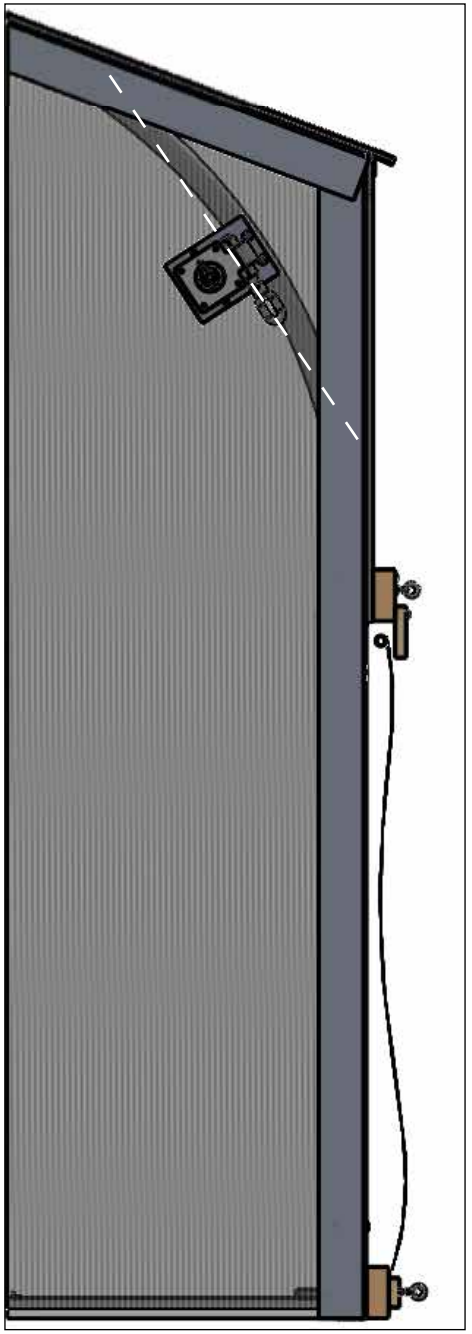


Step 6



ATTENTION: Rotate gearbox as needed *before attaching* to mounting plate to achieve desired angle when assembly is attached to end rafter.

See dashed line for suggested angle for easy operation.



8. Align plate mounting holes with mounting holes in end rafter (Step 2) and reattach mounting plate using two 1/4" x 4" carriage bolts, 1/4" lock nuts (FALF15B), and 1/4" flat washers (FAME50B).

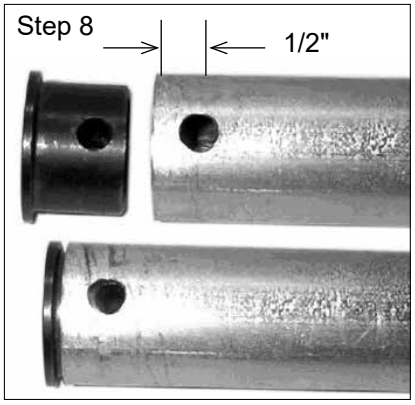
   NOTE: Place 1/4" washers as needed onto carriage bolts between mounting plate and polycarbonate end wall cladding to keep plate square with end wall cladding. Actual orientation of gearbox and plate may differ from the two examples shown. *Attach gearbox to plate to achieve desired angle for operation.*

9. Take one piece of 131S075 pipe, measure 1/2" from plain end, and drill a 5/16" hole through pipe. Insert tubing adapter from the 102717 assembly into conduit and align holes. See Step 8 photo — right.

10. Assemble the remainder of the 102717 drive and insert that through gearbox from the outside. See exploded view above.

11. Continue with procedure on next page.

Step 8

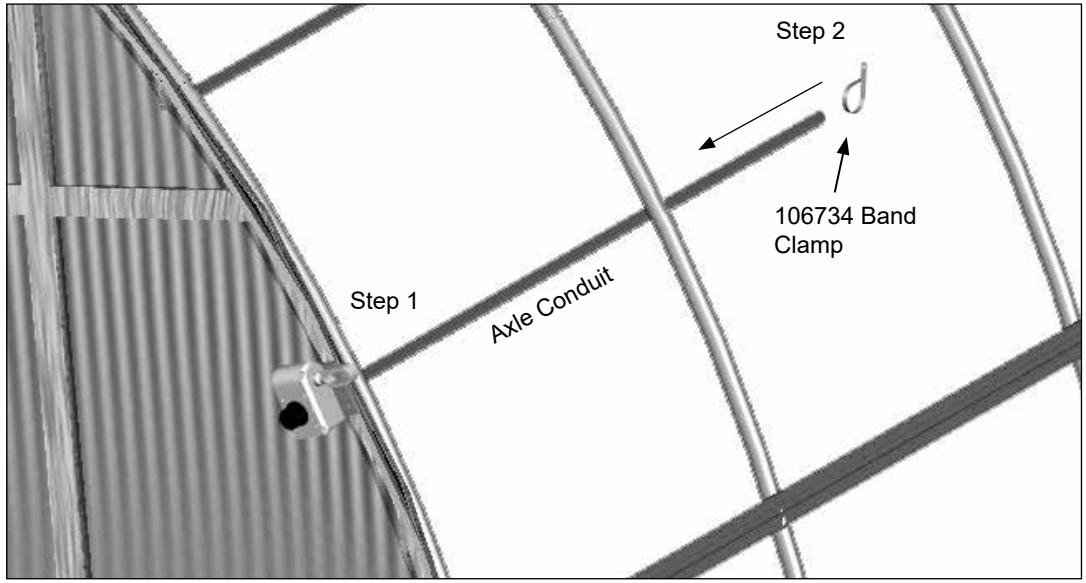


Install Drop-Down Side Panel Axle

INSTALL DROP-DOWN SIDE PANEL AXLE

Complete these steps:

1. Attach 102717 drive to gearbox and attach first section of 131S075 pipe to 102717 drive.
2. Slide a 106734 band clamp over tapered end of 131S075 pipe.



Actual rafter profile may differ. Roof polycarbonate cladding has been removed to better show axle position inside greenhouse.

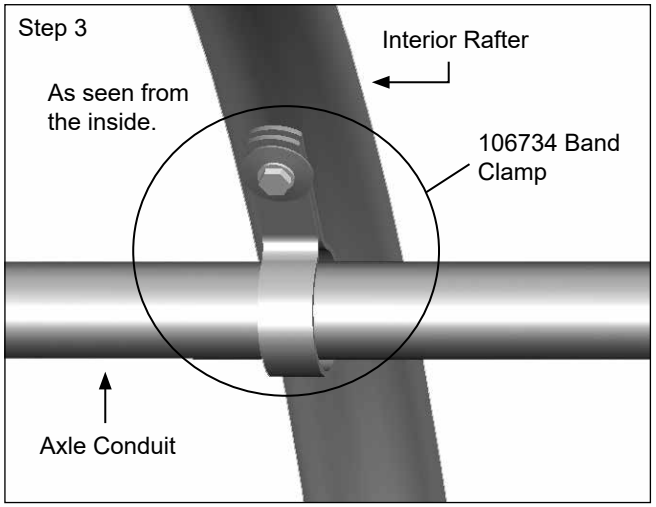
3. Verify pipe is level and secure band clamp to underside of second rafter using an FA4482 Tek screw. Pipe should remain loose in band clamp.

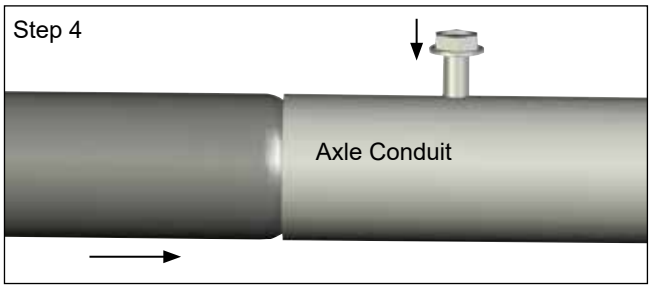
   NOTE: Band clamps support axle conduit at each rafter except end rafter where gearbox is mounted. After securing clamp to rafter, bend band clamp away from rafter if needed to keep axle aligned and level. (A customer-supplied spacer can also be installed between clamp and rafter if desired.) Reposition clamp as needed to maintain alignment.

4. Take another section of 131S075 pipe, attach it to the first, and secure pipe splice using one Tek screw.
5. Slide another band clamp onto tapered/swaged end of conduit, level the conduit, and secure band clamp to underside of next rafter.

Locate these parts to attach pulleys and drop-down axle:

- 131S075 (1.315 swaged pipe for axle) and 131P0XX (where XX represents the length needed to complete the axle assembly). The axle consists of the same pipe as the purlins. See Side Profile diagram in Quick Start section of main manual for pipe identification if needed.
- 106734 band clamps and FA4482B Tek screws (for axle conduit and band clamps)
- FAH005B (1/4" x 2" carriage bolts) and FALB01B nuts





INSTALL DROP-DOWN SIDE PANEL AXLE — continued

6. Continue adding conduit and band clamps and work toward other end of shelter. Verify axle conduit remains level throughout its length. *Attach one band clamp to the inside of each rafter.*

7. Select final section of plain pipe (131P0XX where XX represents length needed to reach end of the building.) ***See Side Profile diagrams in Quick Start section of main assembly guide for pipe identification.***

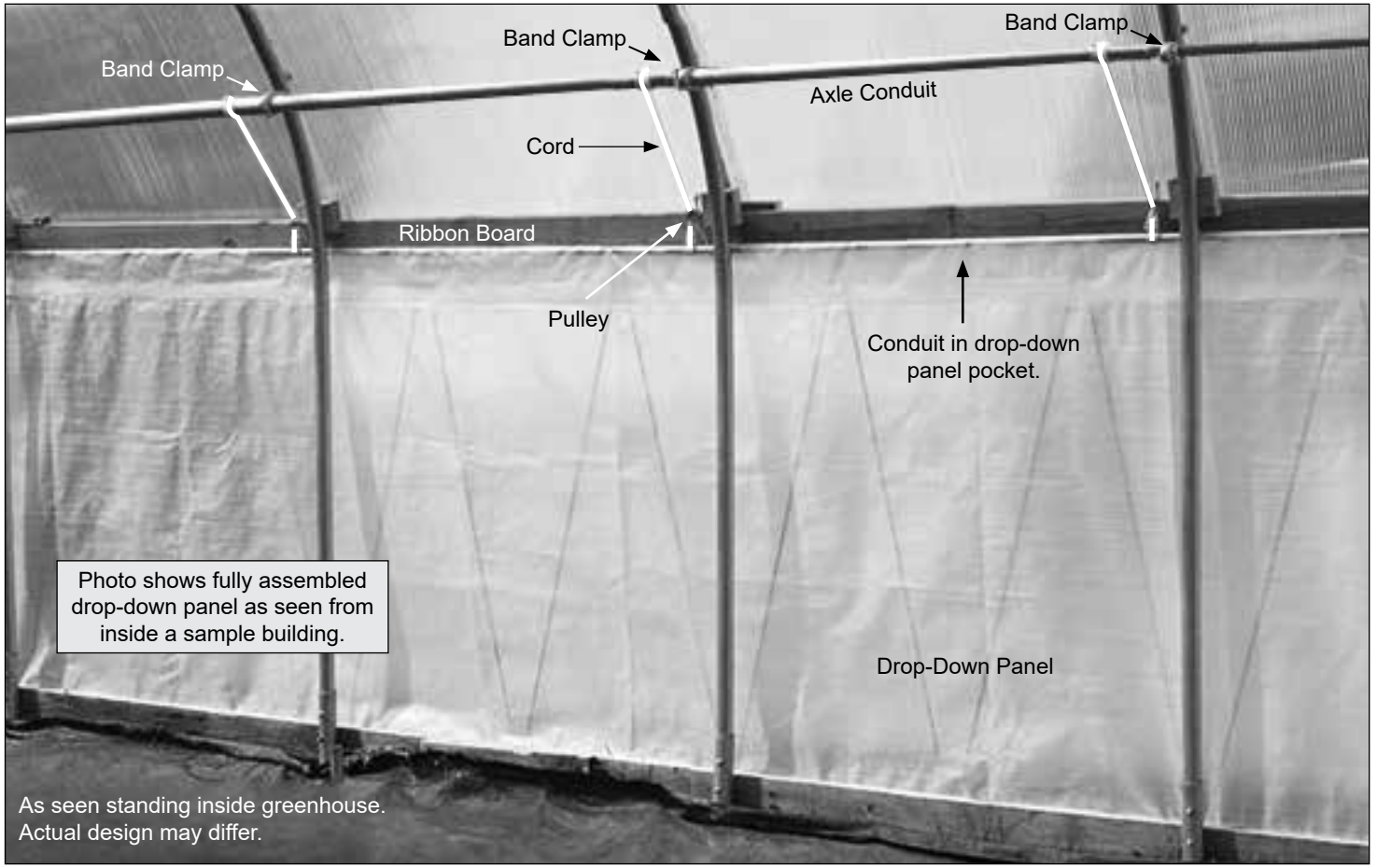
   NOTE: *Do not allow free end of axle to touch inside surface of end wall cladding. Trim pipe if needed. Axle must turn freely.*

8. After installing all sections of axle conduit for first drop-down panel assembly, verify axle is level and each conduit splice is secured with a Tek screw (Step 4).

9. Move to gearbox and test the assembly using crank handle.

   NOTE: Assembled axle conduit should turn freely throughout its length. Adjust band clamps as needed. Reposition clamps and screws if these prevent smooth operation of axle.

10. After verifying axle operation, repeat procedure to assemble and attach gearbox and axle conduit *to other side of shelter.*

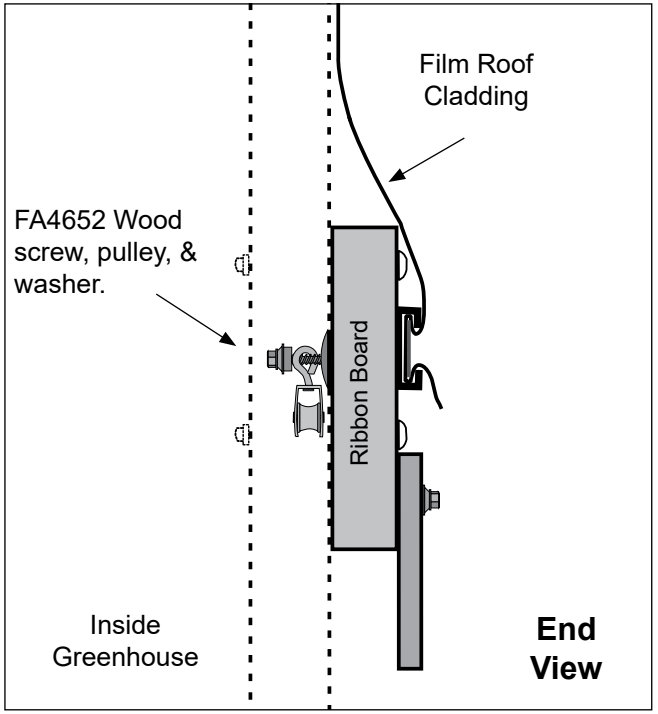


11. Continue by installing drop-down panel pulleys.

Install Drop-Down Panel Pulleys — Film Roof Cladding

INSTALL DROP-DOWN PANEL PULLEYS — FILM ROOF CLADDING

If building roof is covered using twin-wall polycarbonate panels, skip to and follow instructions on next page. If roof cladding is film, continue with steps below.



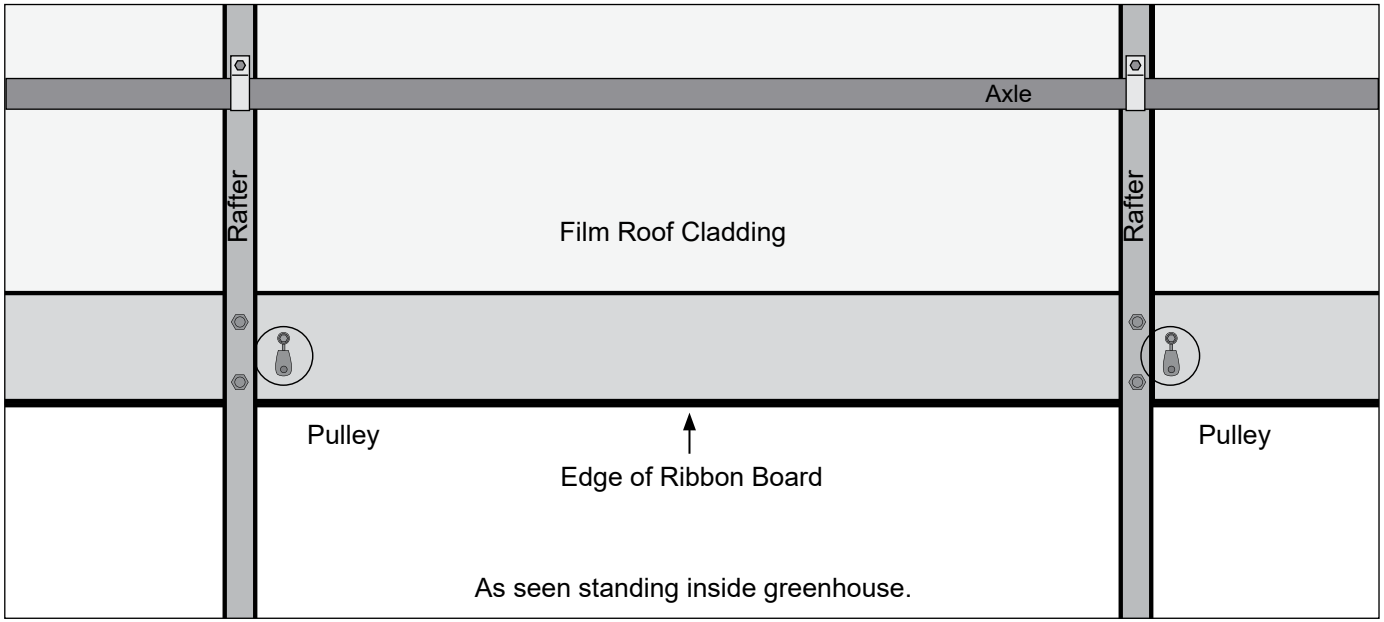
Locate these parts to install drop-down panel pulleys:

- FA4652 Wood Screws (1-1/2")
- AS5020 pulleys &102921B washers

Complete these steps:

1. Gather pulleys, 102921B washers, and FA4652 wood screws and move inside greenhouse.
2. Slide wood screw through swivel eye of pulley and add washer. Using a pliers or similar tool, pinch eyelet end closed if needed to prevent wood screw washer from pulling through.
3. Attach pulley to ribbon board next to first rafter. *Begin at an end rafter.*

   NOTE: Position pulley a few inches away from rafter on either side. Pulley should hang freely from wood screw. *Do not overtighten screw.* ***Do not damage film during installation.*** Keep pulley ends above bottom of ribbon board.
4. Move to next rafter and repeat steps to install another pulley. *Install one pulley for each rafter along each side of the frame.*
5. Continue installing pulleys into ribbon board *next to each rafter* until all pulleys are installed *along both sides of shelter*.
6. Skip next page and continue by installing panel conduit and attaching cords.



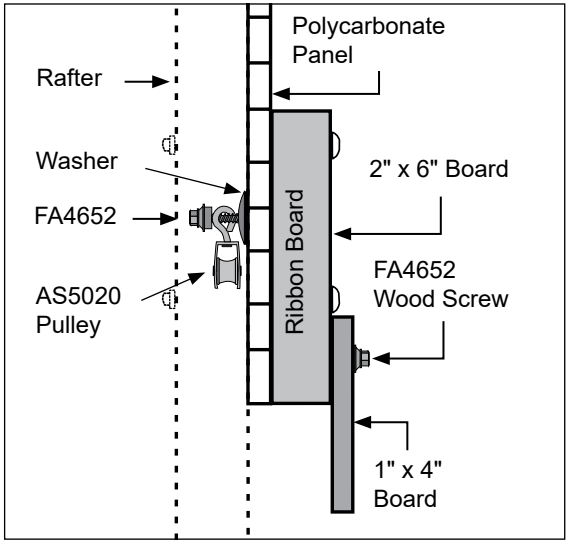
Install Pulleys — Polycarbonate Roof Cladding

INSTALL DROP-DOWN PANEL PULLEYS — TWIN-WALL POLYCARBONATE ROOF CLADDING

Locate these parts to install drop-down pulleys:

- FA4652 (1-1/2") Wood Screws
- AS5020 pulleys &102921B washers

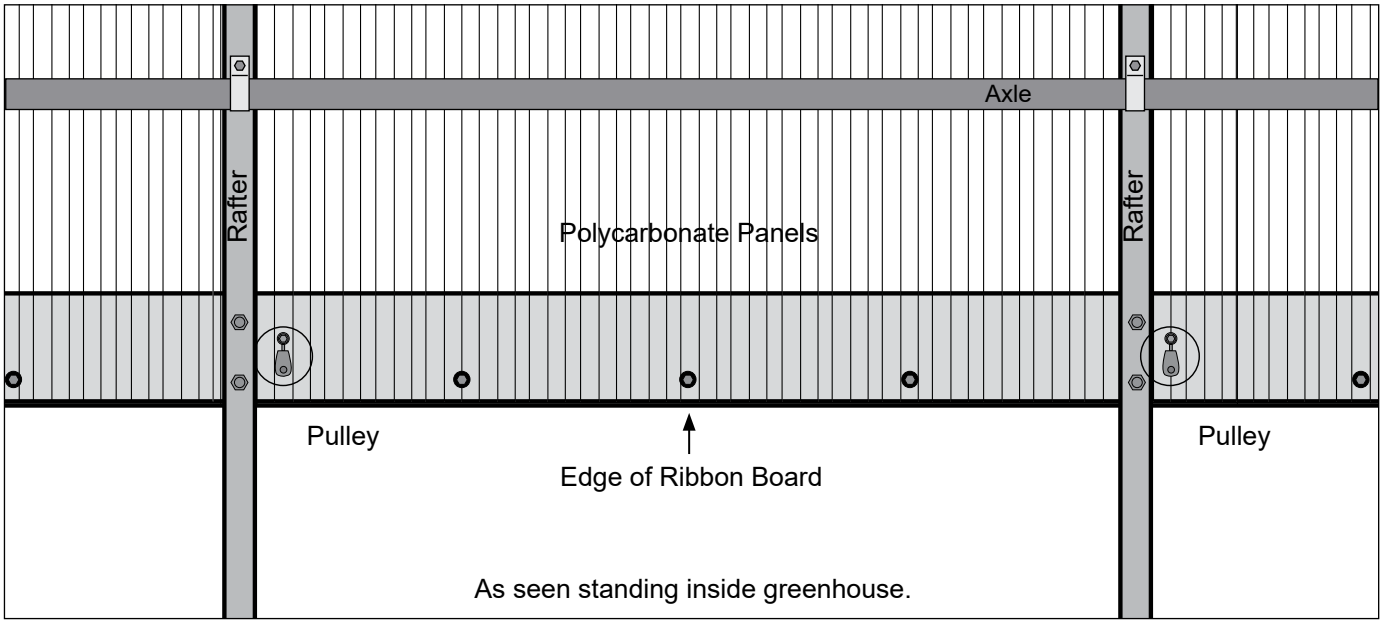
ATTENTION: Skip this page and continue with next page if greenhouse roof cover is film and you have installed drop-down panel pulleys as described in the previous procedure. If building has twin-wall polycarbonate roof panels, complete the steps below.



Continue with these steps:

1. Gather pulleys, FA4652 (1-1/2") wood screws, and 102921B washers and move inside the greenhouse.
2. Slide one pulley onto wood screw then add a washer. Using a pliers or similar tool, pinch eyelet end closed if needed to prevent wood screw washer from pulling through.
3. Beginning at first end rafter, drive wood screw through polycarbonate panel and into face of ribbon board next to rafter. ***Install pulley so it remains above bottom edge of ribbon board.***

   NOTE: Position wood screw, washer, and pulley a few inches away from rafter on either side of rafter. Pulley should hang freely from wood screw. *Do not overtighten screw.*



4. Move to next rafter and repeat steps to install another pulley. *Install one pulley for each rafter along each side of frame.*
5. Continue installing wood screws, washers, and pulleys until all pulleys are installed *along both sides*.
6. Continue by installing panel conduit and attaching cords.

Install Drop-Down Panel & Attach Cords

INSTALL DROP-DOWN PANELS AND ATTACH CORDS

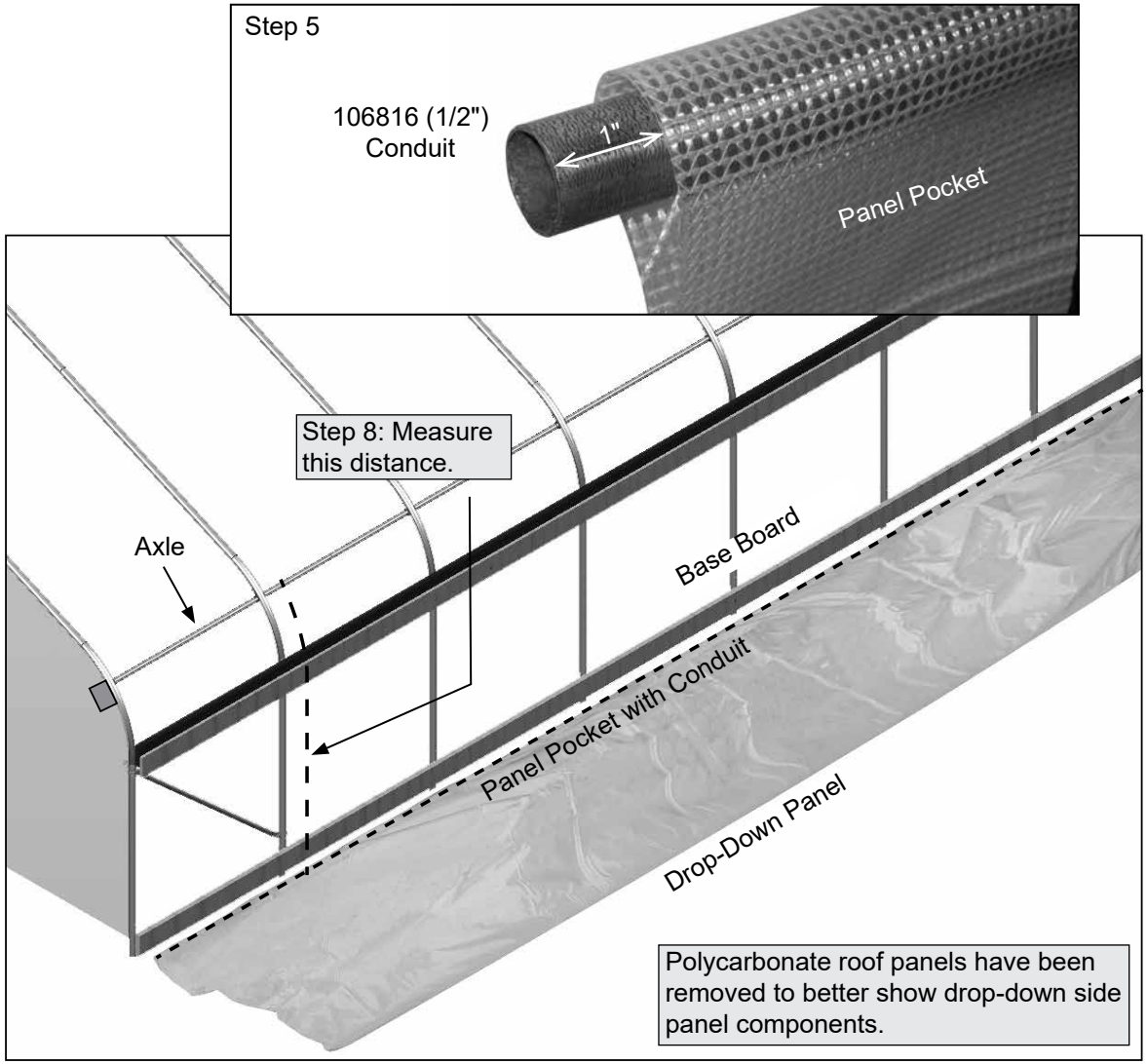
Complete these steps:

1. Unfold panel along one side and position conduit pocket along baseboard. Dashed line in diagram (lower right) shows where to position panel pocket. Roof cladding is not shown.
2. Take one 8' section of 1/2" conduit (106816) and insert plain end (not tapered end) into panel pocket.

3. With first conduit section in pocket, add another section to the first — plain end over swaged end — and tape the joint using duct tape.
4. Continue adding conduit sections and taping each joint until conduit is as long as panel.
5. Complete conduit installation by cutting conduit so it extends from panel pocket approximately 1" ***at each end***.
6. Align panel and conduit with end rafters.
7. Position conduit at baseboard along outside of frame.
8. Measure distance *from conduit up to axle* and ***add 12"*** to ensure cord length is sufficient. Diagram right shows where to measure. Roof cladding is not shown.

Locate these parts:

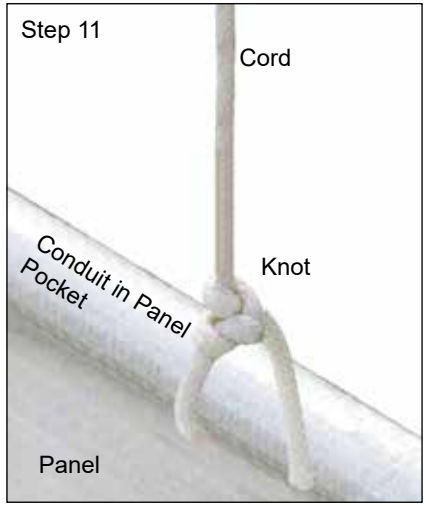
- 1/2" conduit (106816)
- 1/8" cord (CC5505), Tek screws (FA4482B), & Washers (102921B)
- Duct Tape

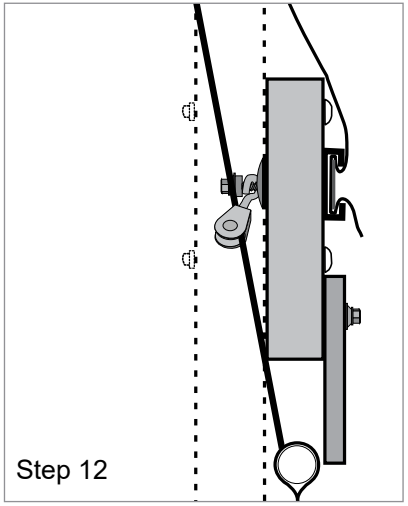


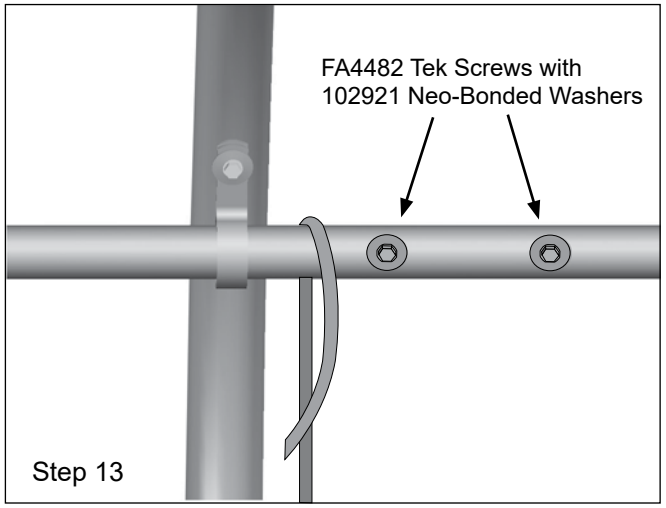
INSTALL DROP-DOWN PANELS AND ATTACH CORDS — continued

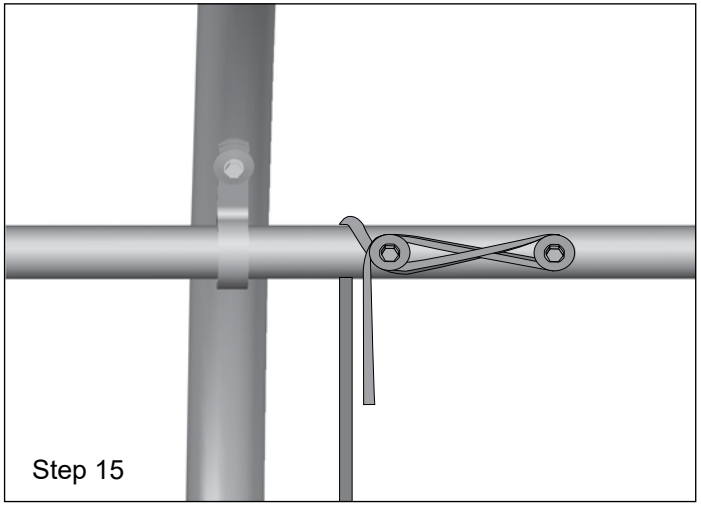
9. Cut a section of 1/8" cord (CC5505) to length determined in previous step.
10. Beginning at one end of the frame, move to conduit in pocket, and make a small cut in the material *below* the conduit and in line with a pulley.
11. Insert cord end through opening in panel and tie to conduit.
12. Take free end, thread it through pulley, *wrap it over and around axle,* and temporarily tie to axle.

    NOTE: Verify cord is properly aligned with pulley and with other end of cord tied to conduit. *Cord must remain aligned for proper panel operation.* Photo shows building with film roof cover.
13. Drive two (2) FA4482 Tek screws with neo-bonded washers (102921) into axle conduit where cord is located. *Do not fully seat Tek screws to conduit.* Allow space to remain between washer and conduit.
14. Verify conduit remains against baseboard and pull slack from cord.









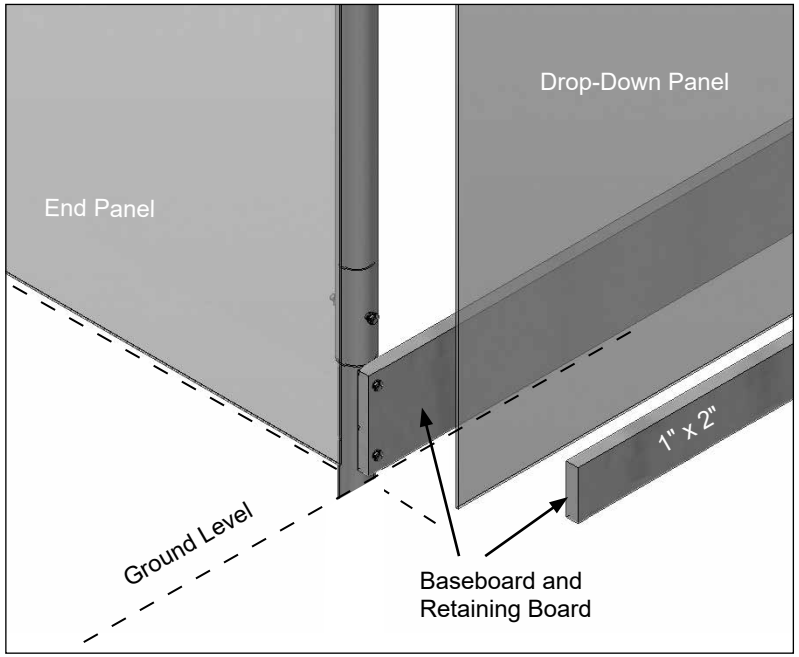
15. Weave cord around Tek screws as shown and tighten screws to secure cord to axle. Move to next pulley position and repeat steps to measure, cut, and attach another cord. To ensure panel remains level during operation, wrap additional cords around axle conduit in same direction as first cord.
16. Continue this pattern for all remaining cord-to-axle connections.
17. Repeat above steps until all cords are attached to first panel along one side.
18. Continue by attaching lower panel edge to baseboard for first panel.

Attach Drop-Down Panel to Baseboard

ATTACH DROP-DOWN PANEL TO BASEBOARD

After tying cords to panel and axle conduits for the first drop-down panel, secure panel bottom to baseboard.

Use customer-supplied dimension lumber as a retaining board to secure lower edge. Retaining board must be at least 1" x 2" to adequately secure panel. See diagram at right for an example.



CAUTION: Do not attempt to attach panel to baseboard during stormy or windy conditions or when such conditions are expected.

Complete these steps to attach lower panel edge to customer-supplied baseboard.

1. Using the supplied crank handle, operate gearbox to lift panel to within 2" of where it will seat into channel of two-piece ribbon board.

   NOTE: Verify panel is even throughout length.

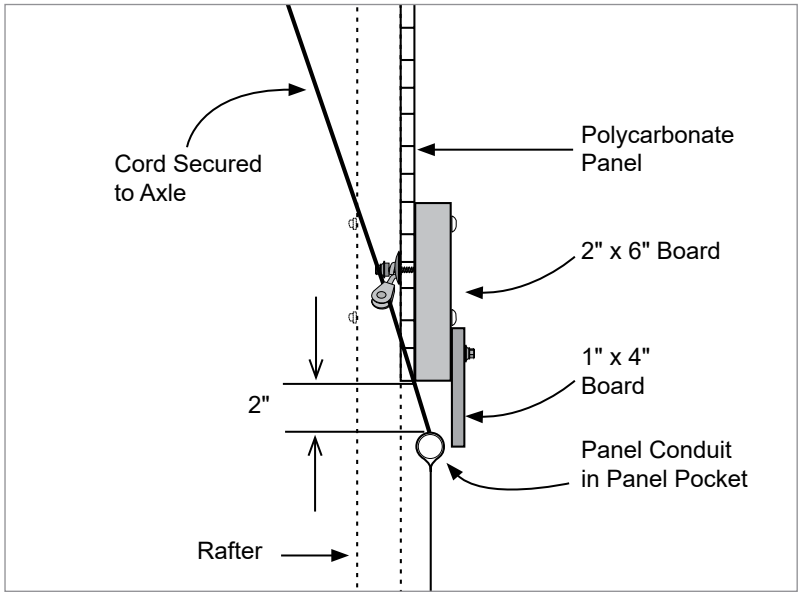


Diagram above shows example with polycarbonate roof panels.

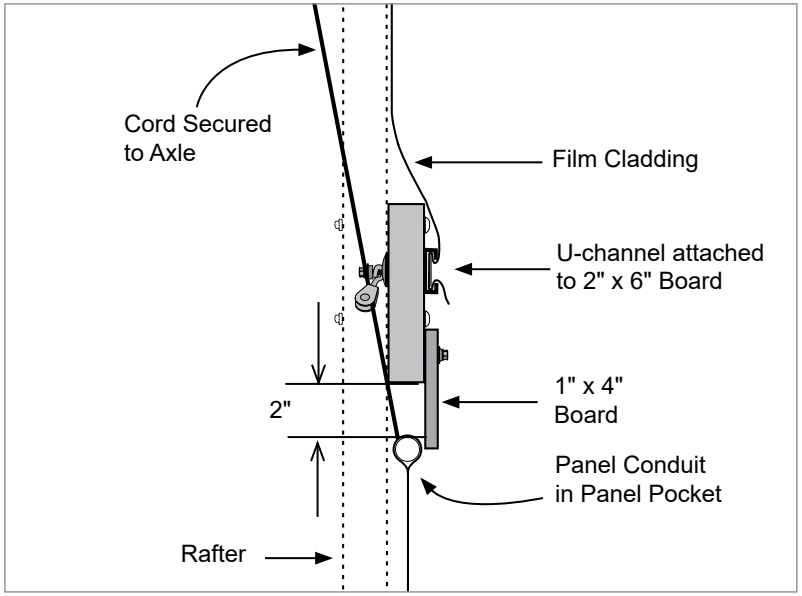
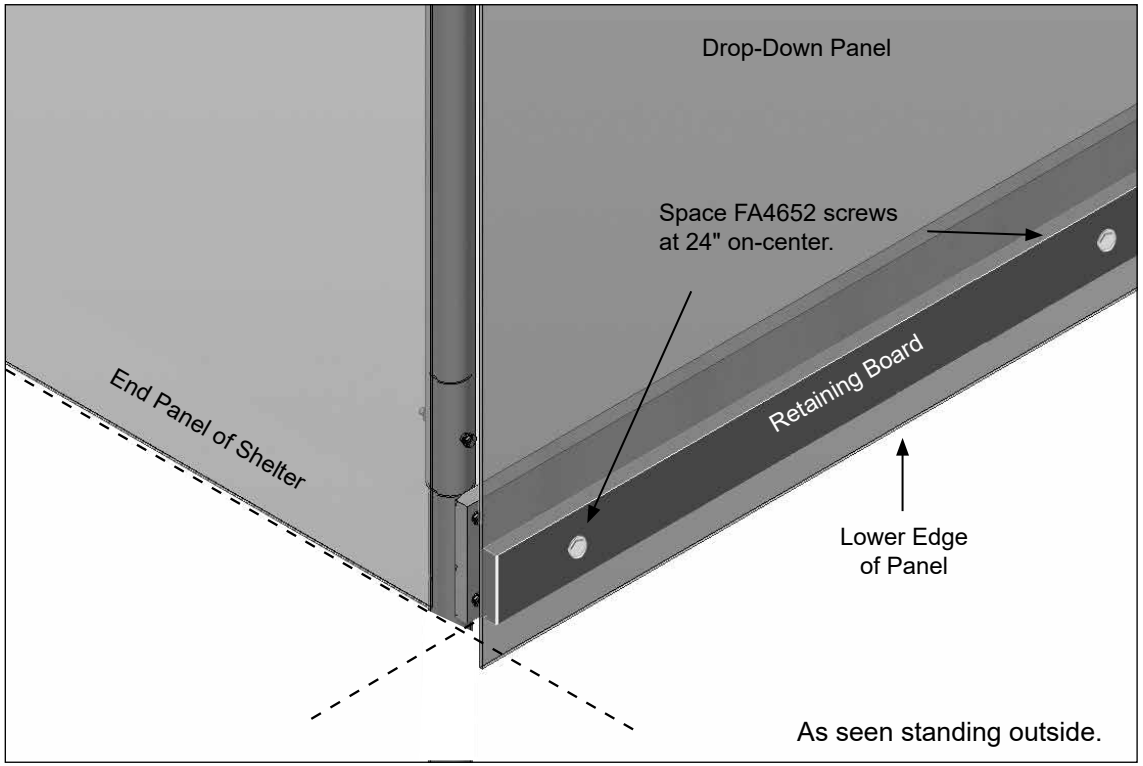


Diagram above shows example with film roof cladding.

ATTACH DROP-DOWN PANEL TO BASEBOARD — continued

2. Move to panel bottom and with assistance, evenly stretch panel downward and end-to-end along baseboard. ***If desired, tack panel in place using a few customer-supplied staples or nails. This helps with installation of retaining board.***
3. Take first section of customer-supplied retaining board and place against panel and baseboard to hold panel in position.



NOTE: Evenly and gently pull panel edge down to remove wrinkles. *Applying too much force will bend conduit.*

4. Using the supplied FA4652 wood screws, secure retaining board to baseboard as shown. ***Space screws at 24" on-center***.
5. Repeat steps to secure remaining lower edge of panel to baseboard.
6. With panel bottom secured, return to gearbox and check operation using crank handle. ***Adjust cords as needed to keep panel level.***
7. Install anti-billow ropes as described in next procedure.

Install Anti-Billow Ropes

INSTALL ANTI-BILLOW ROPES

Install anti-billow ropes outside along frame as shown. Anti-billow ropes keep panels in place when fully or partially closed. Complete steps to install anti-billow ropes.

1. Beginning at *one end rafter*, take two (2) eye screws (FA1960) and attach one to baseboard and one to ribbon board. Align bolts with each other. See circles and diagrams below.

   ATTENTION: Align eye screws with rafter center at each position. Drill an 1/8" pilot hole (or smaller) for easier installation into wood.

2. Using the photo as a guide, move to next rafter and attach eye screw to either ribbon board or baseboard, depending on desired rope pattern.
3. Continue installing eye screws until reaching other end rafter.
4. Finish installation by repeating Step 1.
5. Take one end of bulk roll of rope, thread it through eye screws, and secure at one end.
6. Determine where to end first rope and cut, allowing additional length to tie off Rope #1.

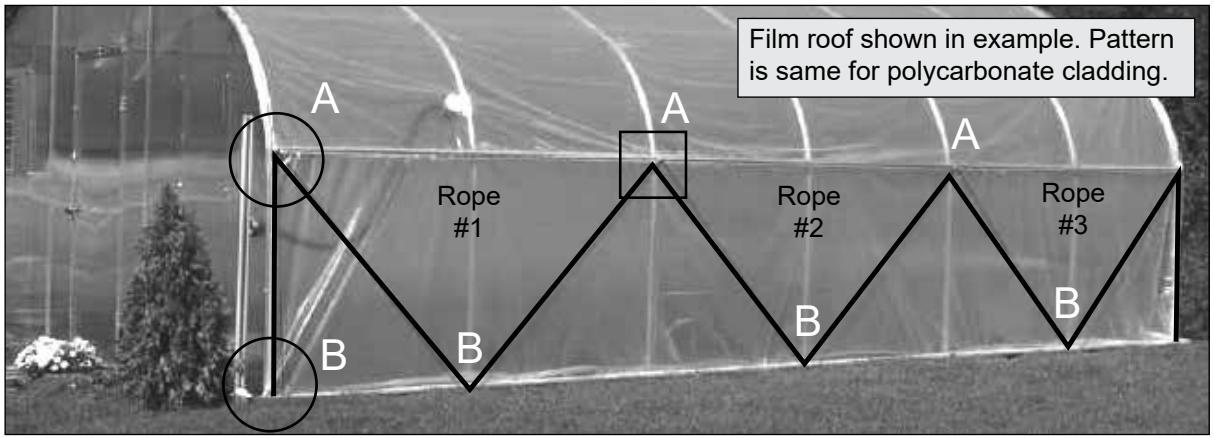
   ATTENTION: Allow extra rope length to remain so tension can be adjusted as needed. Trim rope later if desired. Rope tension should allow panel to operate freely.

7. Start second rope at end of first and repeat steps to end the second rope.
8. Continue creating and installing short sections of rope until all anti-billow ropes are in place, tensioned, and secured.
9. Test panel operation and adjust tension of ropes if these interfere with panel operation.
10. Repeat all steps as needed to install remaining drop-down panel.
11. Continue with the **Double Door Assembly Guide**.

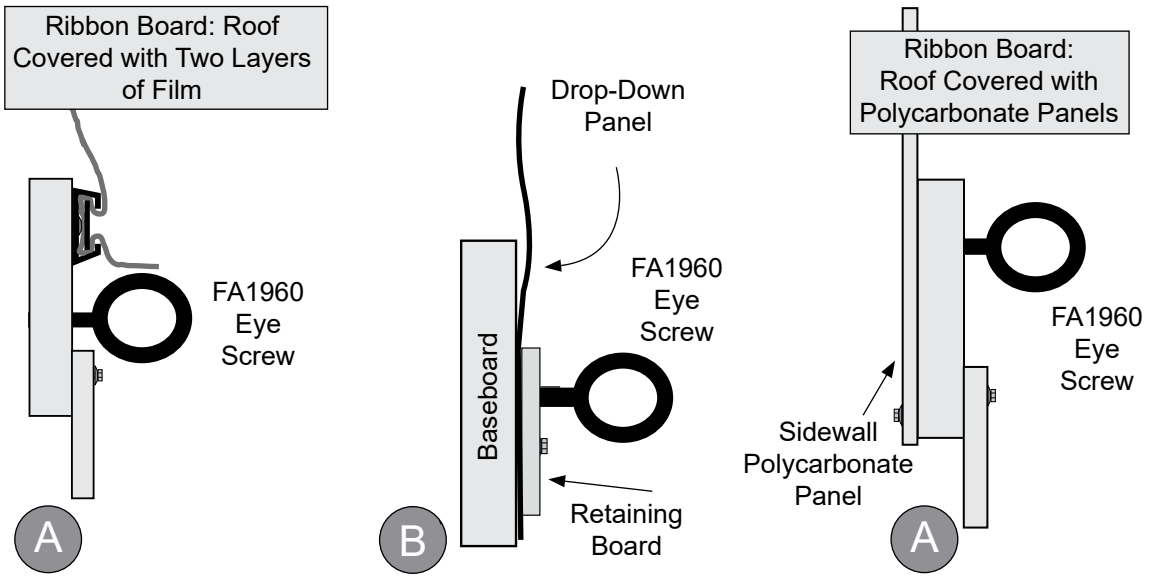
ANTI-BILLOW ROPE INSTALLATION

TO PREVENT DAMAGE AND POSSIBLE INJURY, INSTALL ANTI-BILLOW ROPES IN SHORT LENGTHS ALONG EACH FRAME SIDE.

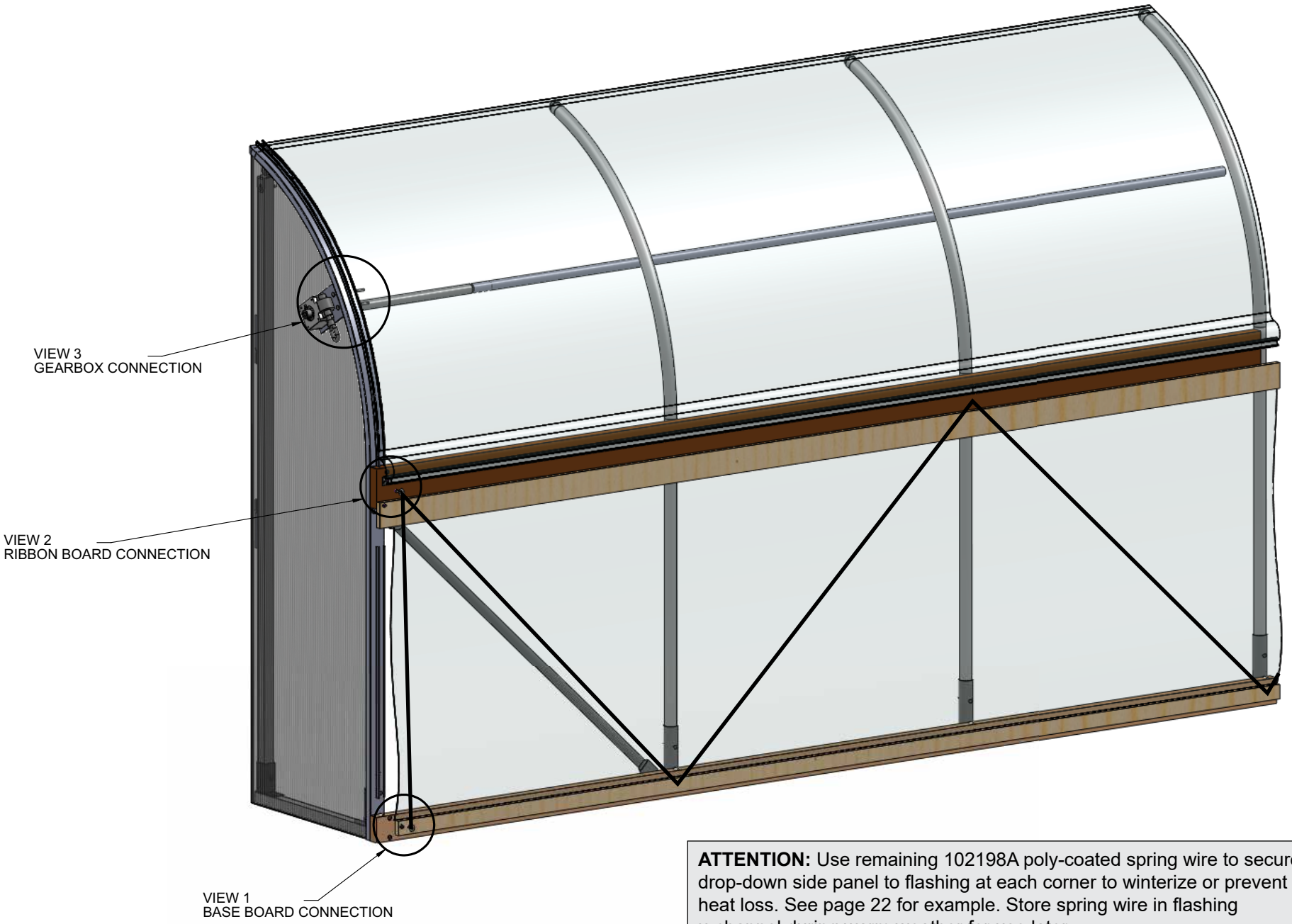
DO NOT INSTALL AS A SINGLE LENGTH TIED AT EACH END. DOING SO WILL RESULT IN A LOOSE SIDE PANEL IF SINGLE ROPE BREAKS DURING STRONG WINDS.



In this example, square identifies end of Rope #1 and beginning of Rope #2. Install ropes outside of the greenhouse.



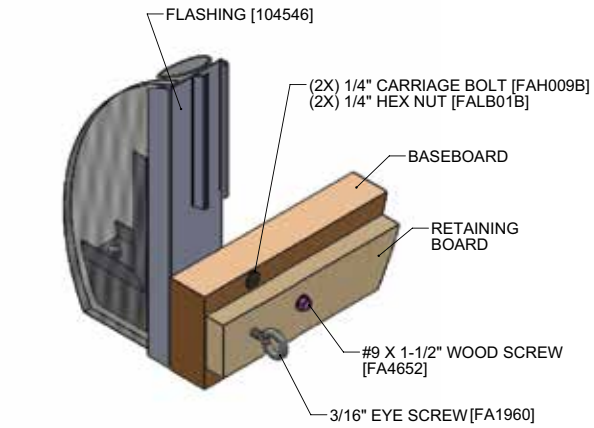
Connections — Film Roof Cladding



ATTENTION: Use remaining 102198A poly-coated spring wire to secure drop-down side panel to flashing at each corner to winterize or prevent heat loss. See page 22 for example. Store spring wire in flashing u-channel during warm weather for use later.

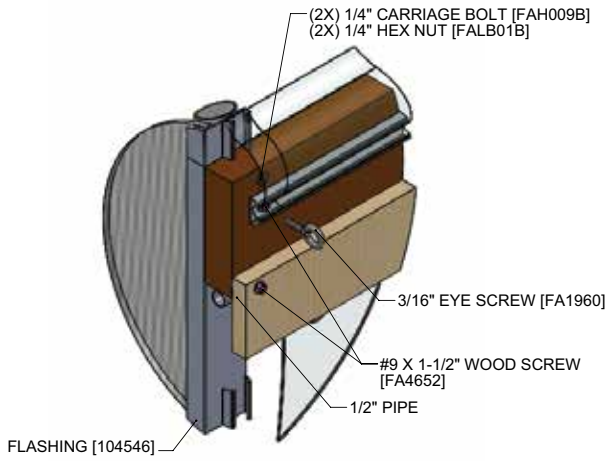
Connection Details — Film Roof Cladding

NOTE: NOTCH FLASHING U-CHANNEL TO INSTALL BASEBOARD TIGHT TO RAFTER. PANEL TO BE PLACED BETWEEN BASEBOARD AND RETAINING BOARD.



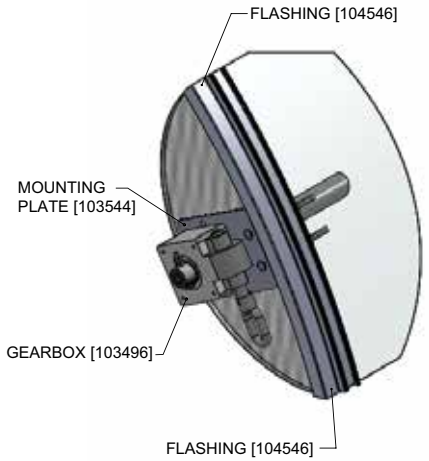
VIEW 1
BASEBOARD CONNECTION

NOTE: NOTCH FLASHING U-CHANNEL TO INSTALL RIBBON BOARD TIGHT TO RAFTER.

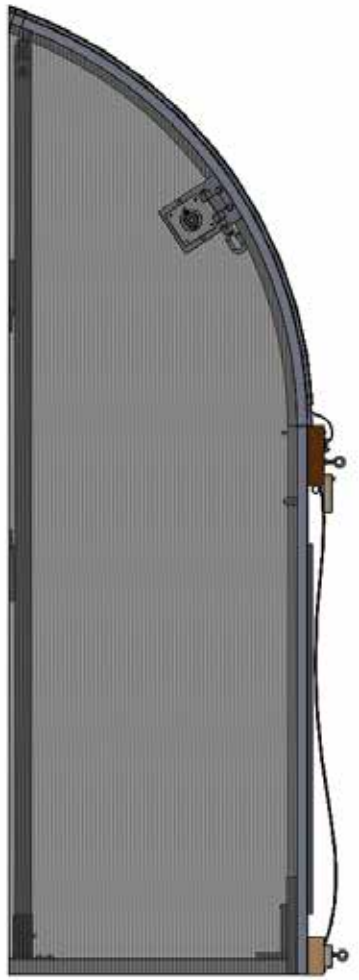


VIEW 2
RIBBON BOARD CONNECTION

NOTE: GEARBOX AND BRACKET ARE MOUNTED OUTSIDE ENDWALL CLADDING.

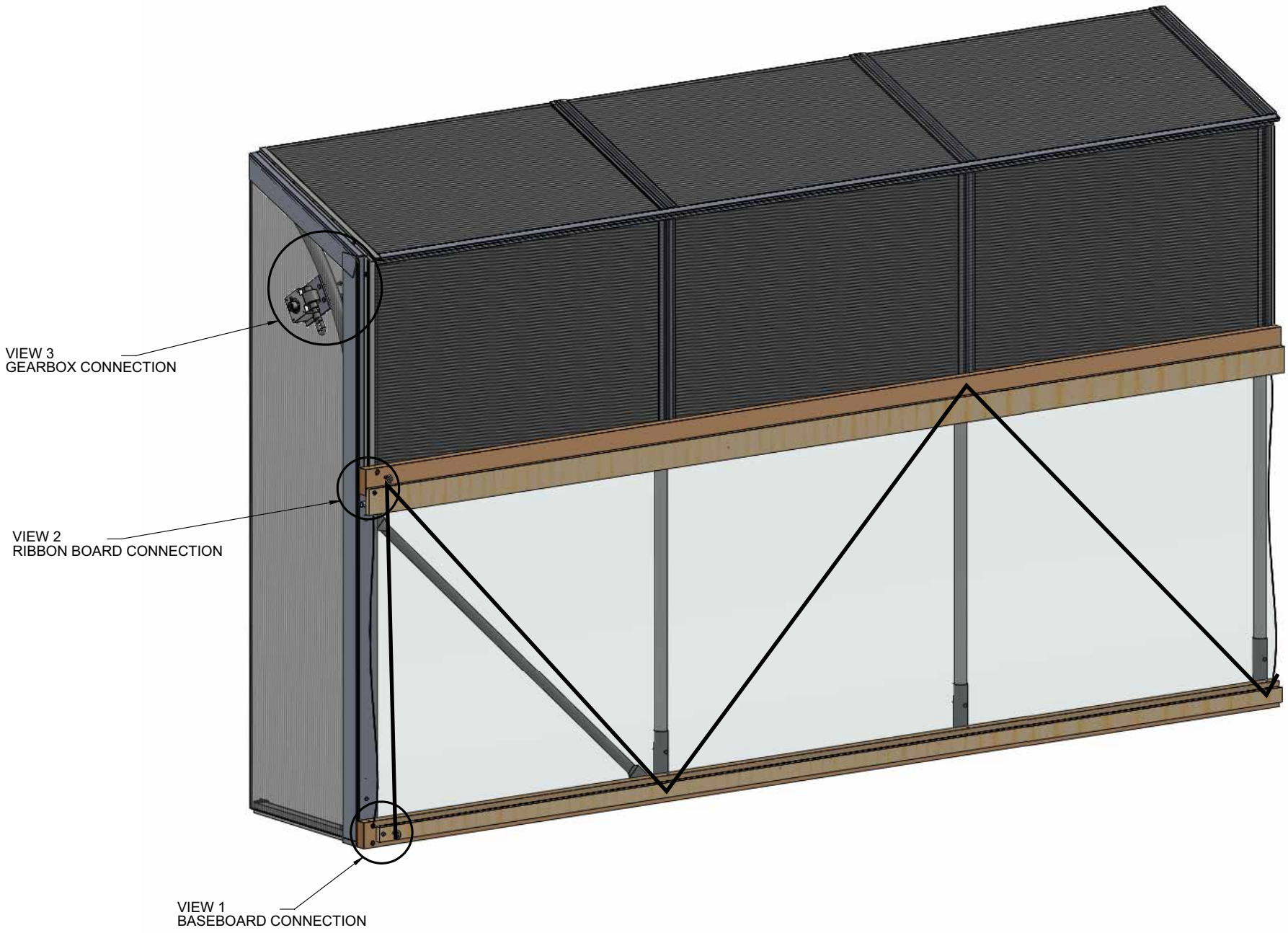


VIEW 3
GEARBOX CONNECTION



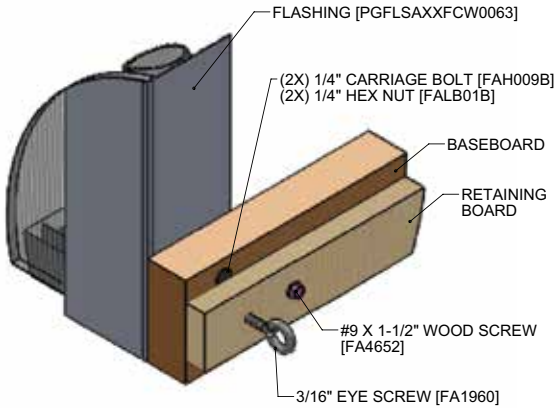
FRONT VIEW WITH INSTALLED DROP DOWN PANEL

Connections — Polycarbonate Roof Cladding



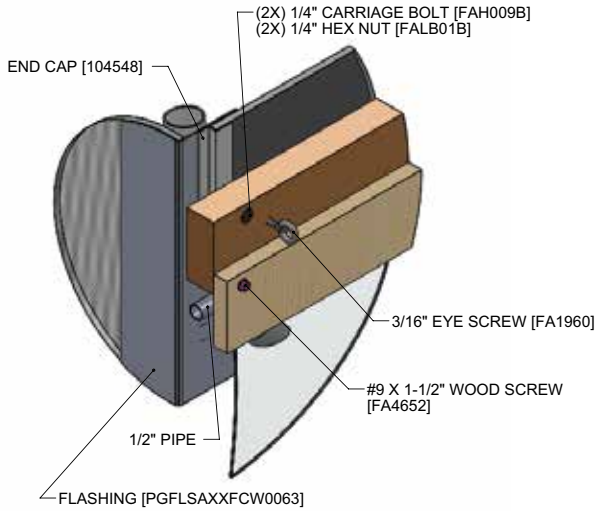
Connection Details — Polycarbonate Roof Cladding

NOTE: PANEL TO BE PLACED BETWEEN BASEBOARD AND RETAINING BOARD.



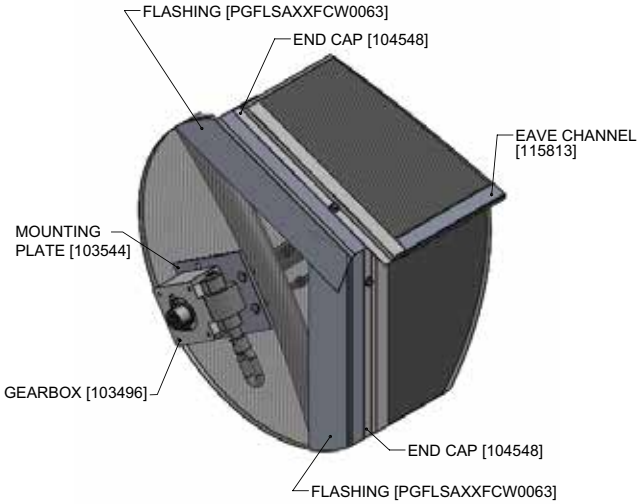
VIEW 1
BASEBOARD CONNECTION

NOTE: POLYCARB TO BE ATTACHED TO RIBBON BOARD USING WOOD SCREWS.

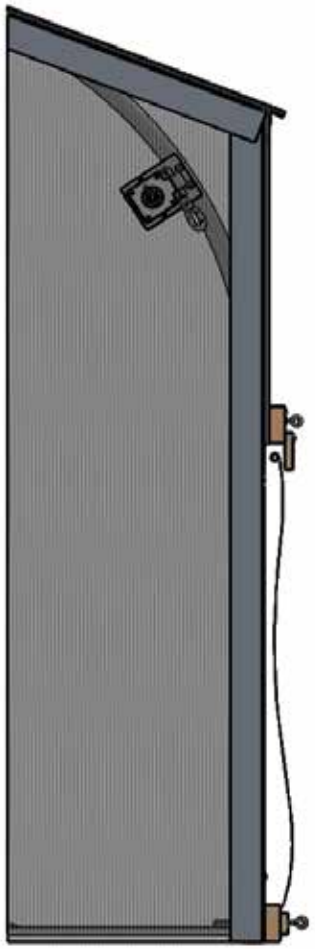


VIEW 2
RIBBON BOARD CONNECTION

NOTE: GEARBOX AND BRACKET ARE MOUNTED OUTSIDE ENDWALL CLADDING.



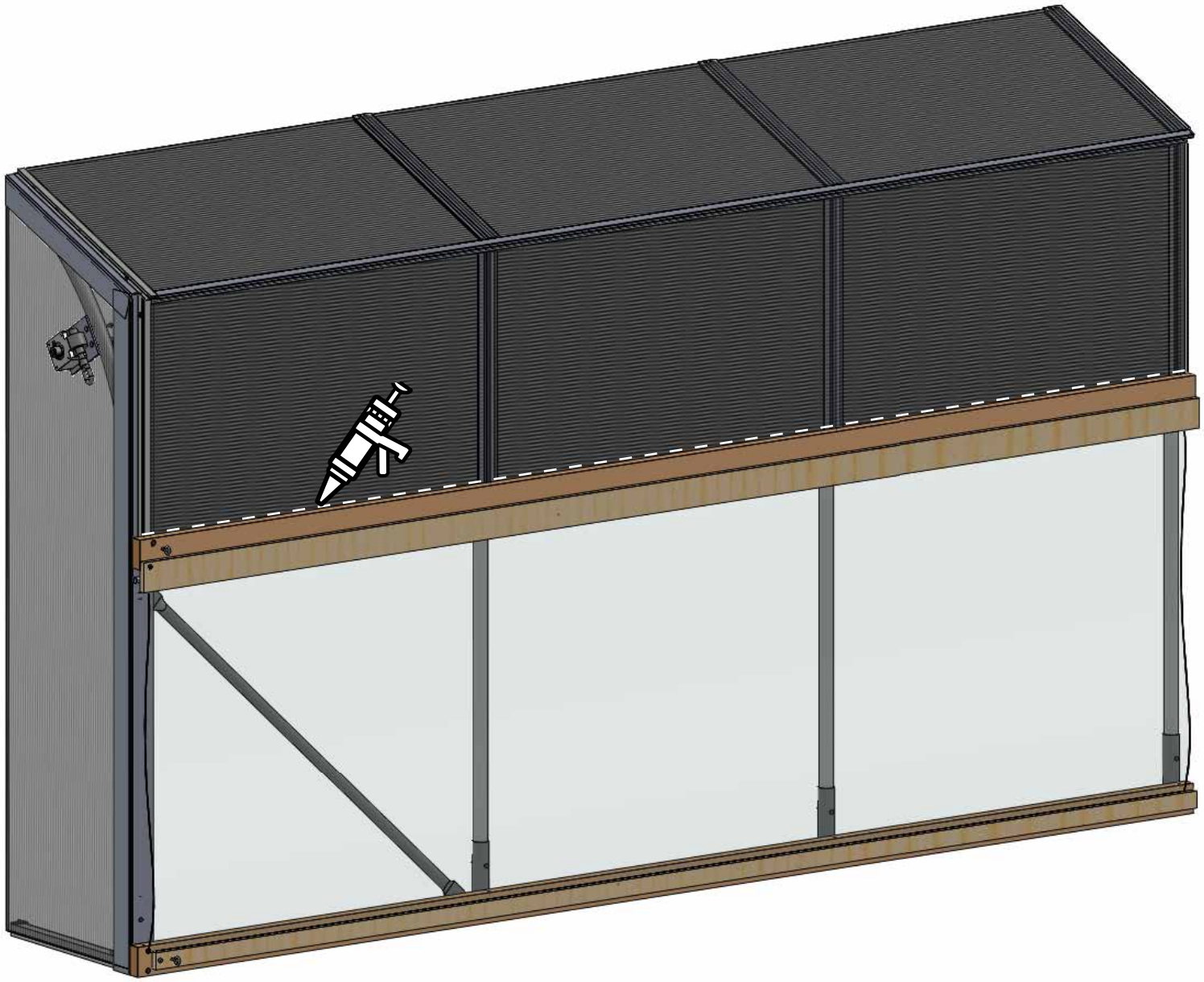
VIEW 3
GEARBOX CONNECTION



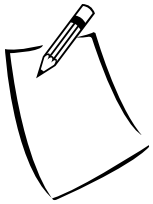
FRONT VIEW WITH INSTALLED DROP DOWN PANEL

Optional — Seal Polycarbonate & Ribbon Board

Optional Step for Greenhouses with Polycarbonate Roof Only: After installing both drop-down side panels, apply a bead of silicone sealant along the top of each ribbon board to seal polycarbonate panel joint. This helps keep water outside the drop-down panel.



Customer Notes



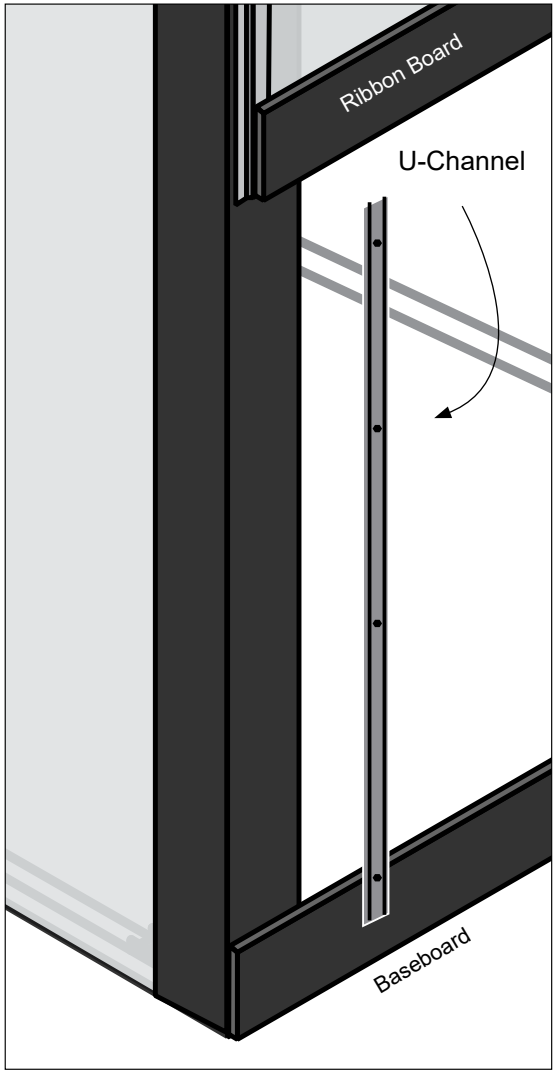
Optional — Install Polylatch U-Channel (Polycarbonate Roof)

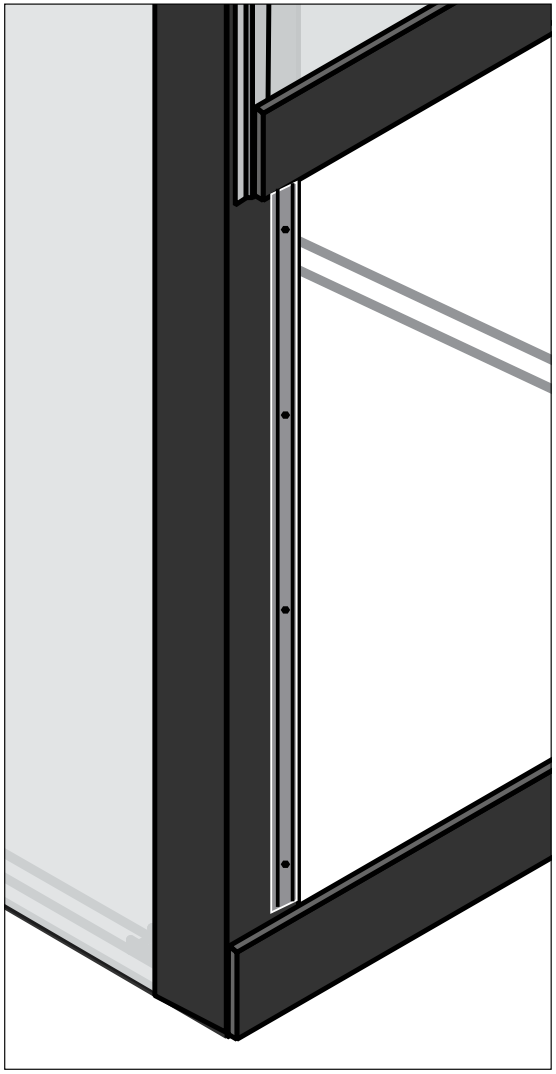
Optional Step for Drop-Down Sides: In areas where climate is colder, it may become necessary to seal the greenhouse sides to prevent heat loss or to keep snow outside after greenhouse is winterized. Polylatch u-channel (102197), 1/4" fasteners, and poly-coated spring wire (102198A) are included to help winterize the greenhouse. Follow the instructions on this page to install these components.

Complete these steps to install u-channel to secure drop-down panel along ends:

1. Cut a piece of 102197 u-channel to fit between ribbon board and baseboard at one corner.

   NOTE: Length not to exceed 48".
2. Evenly space and pre-drill four (4) 1/4" mounting holes in u-channel.
3. Align u-channel with inside edge of flashing at corner and mark hole locations on flashing.
4. Drill 1/4" mounting holes in flashing.
5. Attach u-channel to flashing using 1/4" hardware. Place flat washer on nut side to the inside of greenhouse.
6. Repeat to install remaining u-channel sections at each corner.
7. Continue with the information on the next page.





Gather these parts:

102197 U-Channel

FAG304B (1/4" x 1") Bolts

FALB01B (1/4") Nuts

FAME50B (1/4") Flat Washers

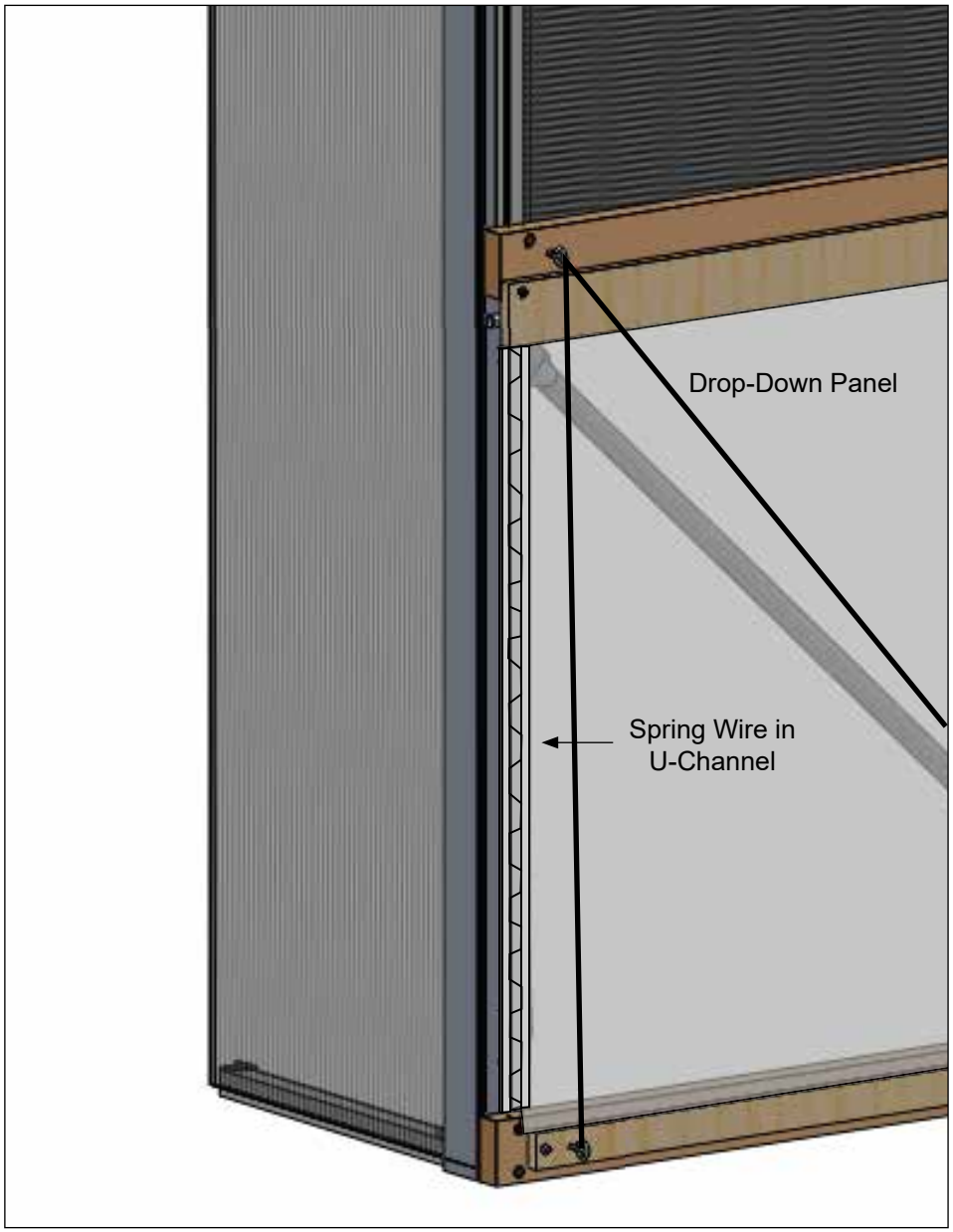
ATTENTION — FLASHING EDGE IS SHARP! If you do not plan to secure panel in u-channel, it is strongly recommended to attach the u-channel to the edge of flashing. ***Doing so will cover the exposed edge of flashing and help prevent cuts.***

HOW TO SECURE DROP-DOWN PANEL AT CORNERS

102198A Poly-Coated Spring Wire

Complete these steps to secure drop-down panel at each corner:

1. Operate gearbox to close side panel. Panel will be in the up position with conduit secured behind ribbon board (Part 2).
2. Take one section of poly-coated spring wire and cut to same length as installed u-channel.
3. Lock panel in u-channel using poly-coated spring wire.
4. Repeat for remaining corners.
5. To lower panel, remove spring wire.

NOTE: Store spring wire in u-channel for use next time.

CAUTION: **Risk of Injury**
Always wear eye protection when installing 102198 spring!