

# ARROW BOARD STAND ASSEMBLY INSTRUCTIONS

## GENERAL

The TTMA-100 can be outfitted with an optional stand for mounting of an arrow board to increase the conspicuity of the Trailer TMA as well as the shadow vehicle. Figures 1 through 4 present schematics of the optional arrow board stand attached to the A-frame of the trailer.

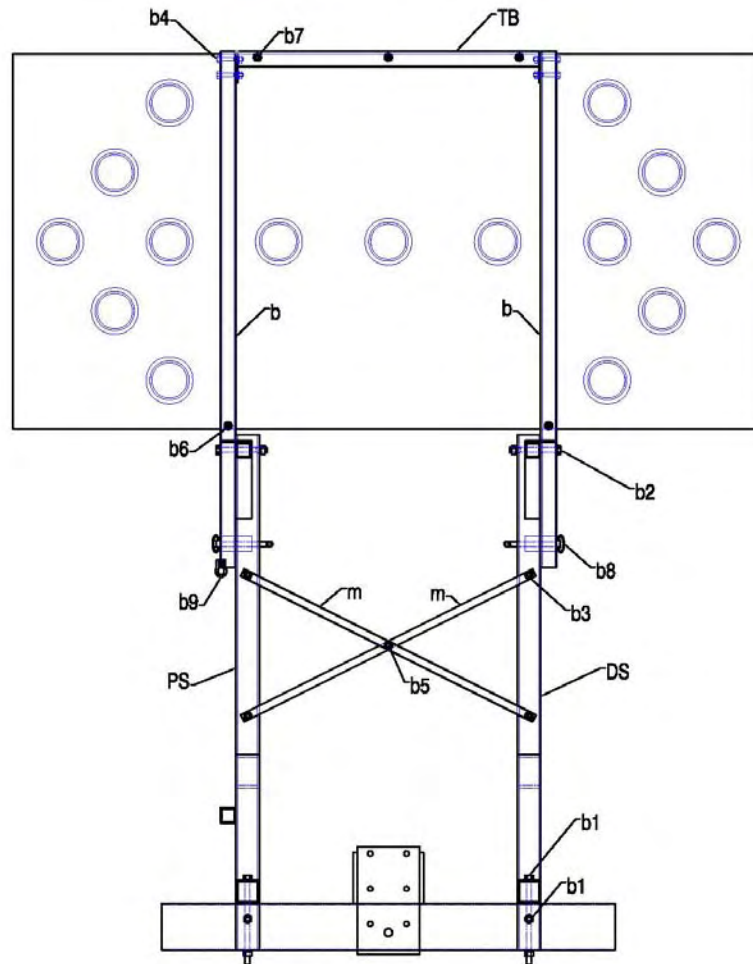
The major components of the arrow board stand are as follows:

- Upper sign supports attached to the arrow board.
- Upper brace connected to the arrow board and the upper sign support tubes.
- Lower sign supports that attach to the upper sign support tubes and provide a pivot point for folding the sign down during transport.
- Cross braces between the two lower sign support tubes.
- Winch assembly.

The following hardware items are packaged with each arrow board stand for assembly of the stand and winch assembly:

- Upper brace:
  - 3 – 3/8” x 4” grade 5 bolts, nuts, washers, and lock washers.
  - 2 – 5/8” x 1/16” x 2-5/8” long sign mounting sleeves.
- Upper sign supports:
  - 4 – 1/2” x 3” grade 5 bolts, nuts, washers, and lock washers.
  - 2 – 3/8” x 6” grade 5 bolts, nuts, washers, and lock washers.
  - 2 – 5/8” x 1/16” x 2-5/8” long sign mounting sleeves.
- Lower sign supports:
  - 4 – 5/8” x 10-1/2” grade 5 bolts, nuts, washers, and lock washers.
- Cross braces:
  - 4 – 1/2” x 4” grade 5 bolts, nuts, washers, and lock washers.
  - 1 – 1/2” x 1” grade 5 bolt, nut, washer, and lock washer.
- Winch:
  - 2 – 5/16” diameter grade 5 bolts, nuts, washers, and lock washers.
  - 8 ft of 1/4” cable.
  - 1 – 1/4” thimble.
  - 1 - 5/16” screw-pin anchor shackle.
  - 6 – 1/4” cable clamps.
  - 2 - 1/4” rubberized metal clamps.
  - 2 - hitch pins, retaining clips and 1/8” cable and cable clamps

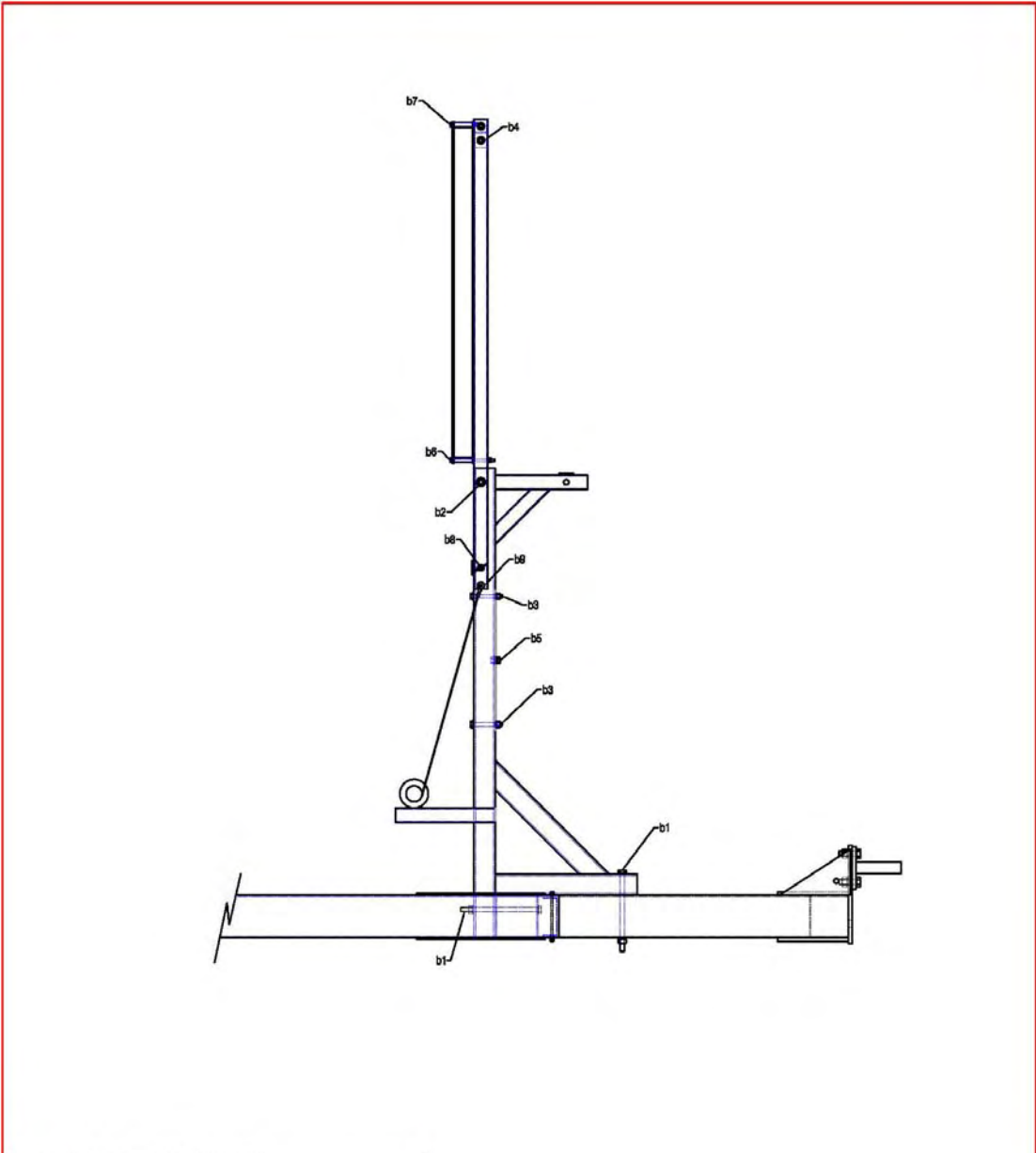
The arrow board stand is typically shipped unassembled. This manual provides step-by-step instructions on how to assemble the arrow board stand and attach it to the trailer A-frame.



ITEM	QTY	DESCRIPTION
b1	4	5/8" X 10 1/2" Grade 5 w/Washer, Nut and Lock Washer
b2	2	5/8" X 6" Grade 5 w/Washer, Nut and Lock Washer
b3	4	1/2" X 4" Grade 5 w/Washer, Nut and Lock Washer
b4	4	1/2" X 3" Grade 5 w/Washer, Nut and Lock Washer
b5	1	1/2" X 1" Grade 5 w/Washer, Nut and Lock Washer
b6	2	3/8" X 6" Grade 5 w/Washer, Nut and Lock Washer
b7	3	3/8" X 4" Grade 5 w/Washer, Nut and Lock Washer
b8	2	5/8" X 7" Hitch Pin and Clip
b9	1	5/16" Screw Pin Anchor Shackles (CM)

 <b>Safety Trailers, Inc.</b> Steamboat Springs, CO Phone: 970 818 1740	<b>Safety Trailers, Inc.</b> <b>Trailer TMA</b> <b>Assembly Front View</b>	Sheet: <b>104</b>
	Drawing Name: STI FOLDING ARROW BOARD STAND 082107	Scale: NONE

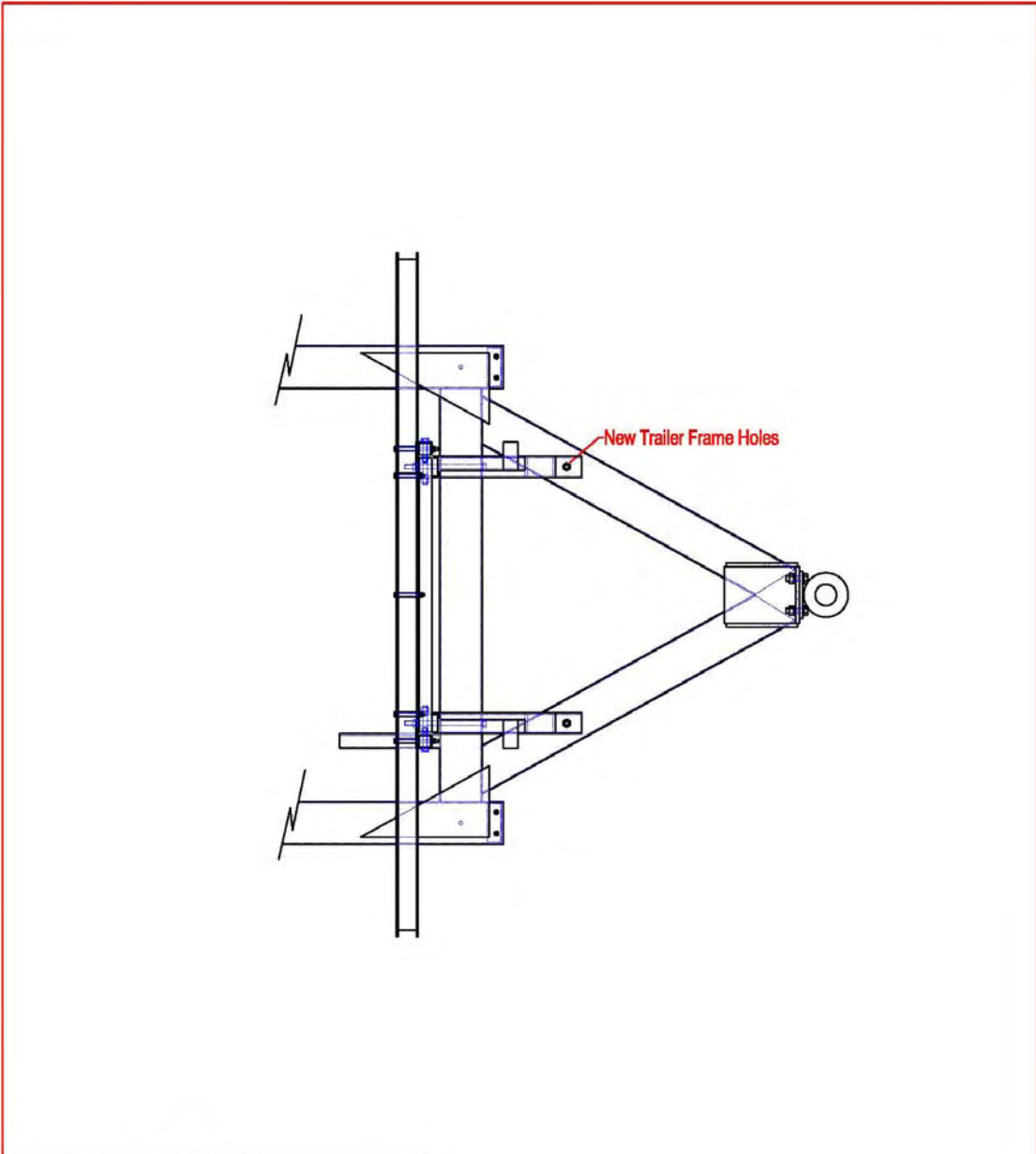
Figure 1 Front view of sign stand in vertical position.



ITEM	QTY	DESCRIPTION
b1	4	5/8" X 10 1/2" Grade 5 w/Washer, Nut and Lock Washer
b2	2	5/8" X 6" Grade 5 w/Washer, Nut and Lock Washer
b3	4	1/2" X 4" Grade 5 w/Washer, Nut and Lock Washer
b4	4	1/2" X 3" Grade 5 w/Washer, Nut and Lock Washer
b5	1	1/2" X 1" Grade 5 w/Washer, Nut and Lock Washer
b6	2	3/8" X 6" Grade 5 w/Washer, Nut and Lock Washer
b7	3	3/8" X 4" Grade 5 w/Washer, Nut and Lock Washer
b8	2	3/8" X 6" Grade 5 Pin and Clip
b9	1	5/16" Screw Pin Anchor Shackle (CM)

 <b>Safety Trailers, Inc.</b> Steamboat Springs, CO Phone: 970 819 1740	<b>Safety Trailers, Inc.</b> <b>Trailer TMA</b> <b>Assembly Side View</b>	Sheet: <b>105</b>
		Date: 08/20/07
Drawing Name: STI FOLDING ARROW BOARD STAND 082107	Scale: NONE	By: JRR

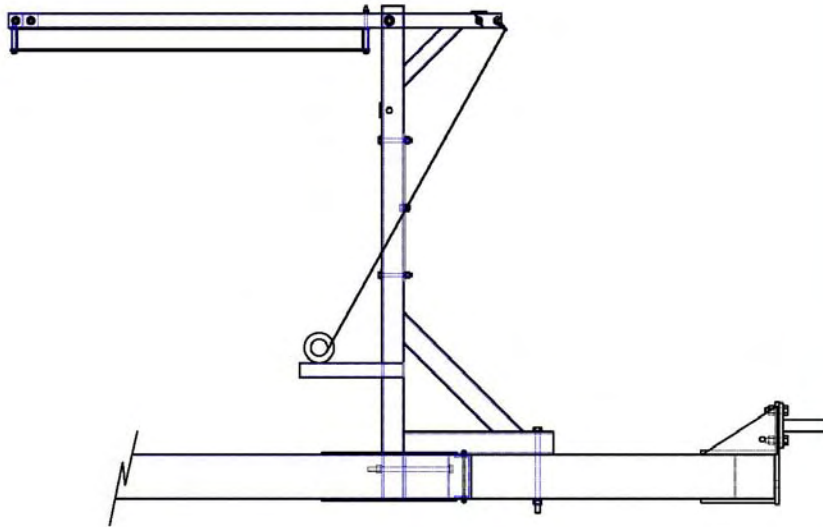
Figure 2 Side view of sign stand in vertical position.



ITEM	QTY	DESCRIPTION
b1	4	5/8" X 10 1/2" Grade 5 w/Washer, Nut and Lock Washer
b2	2	5/8" X 6" Grade 5 w/Washer, Nut and Lock Washer
b3	4	1/2" X 4" Grade 5 w/Washer, Nut and Lock Washer
b4	4	1/2" X 3" Grade 5 w/Washer, Nut and Lock Washer
b5	1	1/2" X 1" Grade 5 w/Washer, Nut and Lock Washer
b6	2	3/8" X 6" Grade 5 w/Washer, Nut and Lock Washer
b7	3	3/8" X 4" Grade 5 w/Washer, Nut and Lock Washer
b8	2	3/8" X 6" Grade 5 Pin and Clip
b9	1	5/16" Screw Pin Anchor Shackle (CM)

 <b>Safety Trailers, Inc.</b> Steamboat Springs, CO Phone: 970 818 1740	<b>Safety Trailers, Inc.</b> <b>Trailer TMA</b>	Sheet: <b>106</b>
	<b>Assembly Top View</b>	Date: 08/20/07
Drawing Name: STI FOLDING ARROW BOARD STAND 082107	Scale: NONE	By: JRR

Figure 3 Top view of sign stand in vertical position.



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	Drawing Name: STI FOLDING ARROW BOARD STAND 082107	Scale: NONE

Figure 4 Side view of sign stand in folded position.

## TOOLS REQUIRED

The following tools are recommended for the assembly of the arrow board stand:

- Electric drill with 3/16", 3/8", 7/16", 11/16", 3/4", and 7/8" bits.
- Wrenches.
- Open end wrenches.

## ASSEMBLY INSTRUCTIONS

The major steps in the assembly of the arrow board stand are as follows:

1. Attach upper brace to top of arrow board.
2. Attach upper sign supports to back of arrow board.
3. Attach lower sign supports to trailer A-frame.
4. Attach upper sign supports to lower sign supports.
5. Install winch assembly.
6. Connect sign to power supply.

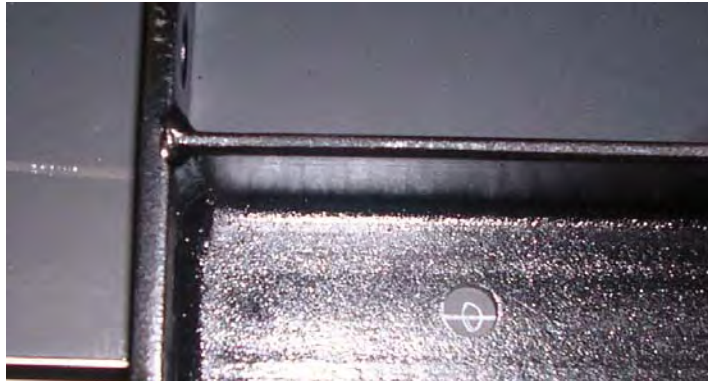
Detailed descriptions of the step-by-step instructions are presented in the following sections.

### Attach Upper Brace to Arrow Board

- a. Place the top brace (3'-2" long, 2"x2"x3/16" angle) on the back of the arrow panel and center it.



- b. Mark the horizontal locations for all three bolt holes.



- c. Mark the vertical position to place the edge of the bolt hole as close as practical to the bottom of the channel on the outside of the arrow board.





- d. Center punch the hole positions and drill three  $7/16$ " diameter holes in the arrow board, extending through both legs of the channel. Be careful to align the two holes in the channel legs.



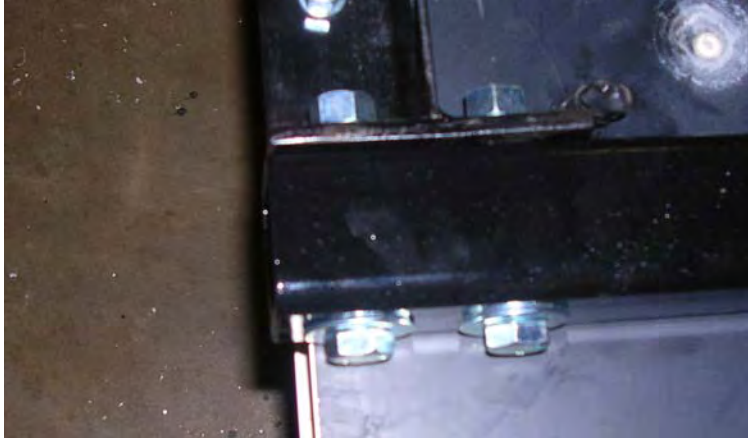
- e. Attach the top brace to the back of the sign using three  $3/8$ "x4" grade 5 bolts, nut, washer, lock washer, and 2- $5/8$ " long,  $5/8$ "x $1/16$ " sign mounting sleeve.



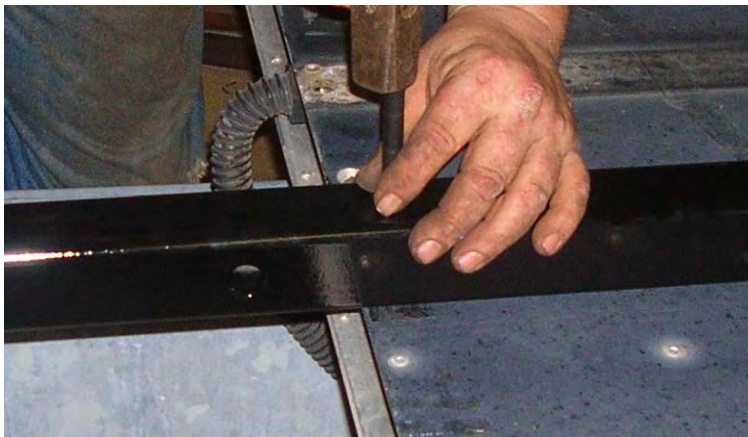


### Attach Upper Sign Support to Back of Arrow Board

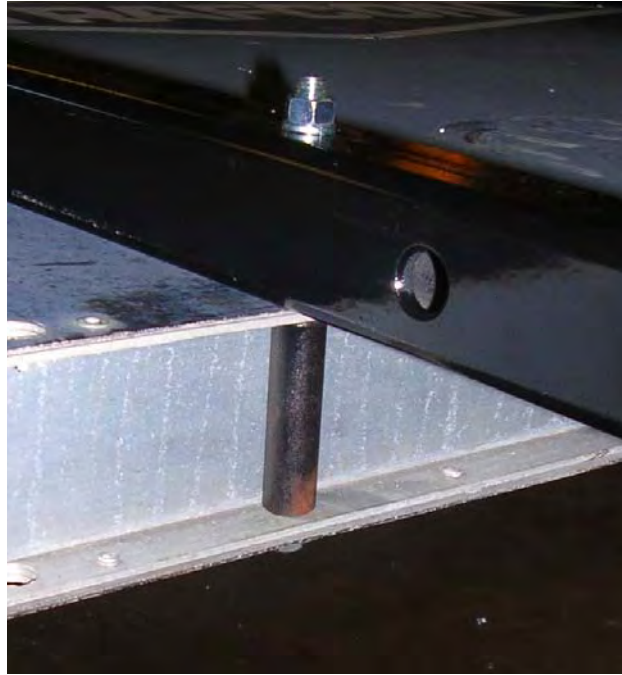
- a. Place the upper sign support tubes (5'-6" long, 2x2x3/16" tubes) on the back of the sign. Attach the top of the support tubes to the upper brace using two 1/2"x3" grade 5 bolts, nuts, washers & lock washers on each tube. Do not tighten. Align both tubes to be parallel to the edge of the sign.



- b. Mark the bolt hole locations on the bottom of the sign panel with a center punch. Drill one 7/16" hole in the base of the sign panel to attach each support tube. Make sure the hole in the bottom flange of the sign is aligned with the hole in the top flange.



- c. Attach the bottom of each support tube with a 3/8"x6" grade 5 bolt, nut, washer, lock washer, and 2-5/8" long, 5/8"x1/16" sign mounting sleeve.



- d. Identify if sign stand mounting holes are present in trailer A-frame. Four 3/4" diameter holes in the trailer are required for mounting the sign stand. Two of the holes should be in the base of the A-frame, 11 inches from the inside of each burster tube. The other two holes should be in the top of the two upper A-frame tubes, approximately 17-7/8" from the base of the A-frame.



- e. If the holes are present, skip to the next step. Otherwise, drill the missing holes. Place the lower sign support tubes on the trailer A-frame tongue. The centerline of each tube should be placed 11 in. from the inside of the adjacent burster tube. This positioning should place the centerlines of the two supports 36" apart. Make sure that the horizontal brace is perpendicular to the base of the A-frame. Mark the locations for the holes in the tubes.



- f. Project the hole locations to the opposite sides of the tubes. Make sure the holes are aligned and drill 7/8" diameter holes from each side of the tube.



## Attach Lower Sign Supports And Braces To The Trailer

- a. Place the lower sign support tubes onto the trailer tongue. Attach with 5/8"x10 1/2" grade 5 bolt, nut, washer, and lock washer.



- b. Attach cross braces (1"x1"x1/8" straps) between the lower sign support tubes using four 1/2"x4" grade 5 bolts, nuts, washers, and lock washers. Connect the two cross braces to each other using a 1/2"x1" grade 5 bolt, nut, washer, and lock washer.





- c. Attach sign board to sign stand. Using proper lifting technique, raise the arrow board with the upper sign support tubes into position. Place the ends of the upper sign support tubes under the two stop plates welded to the lower sign support tubes. Align the 11/16" diameter holes at the top of the lower support tubes with the 11/16" diameter holes in the upper support tube near the bottom of the sign. Connect the upper and lower sign support tubes using two, 5/8"x6" grade 5 bolts, nuts, washer, and lock washer. Insert two 5/8"x7" hitch pins into the holes at the base of the upper sign support tubes to lock the sign in the down position. Secure the pins with clips.



### **Install Winch Assembly**

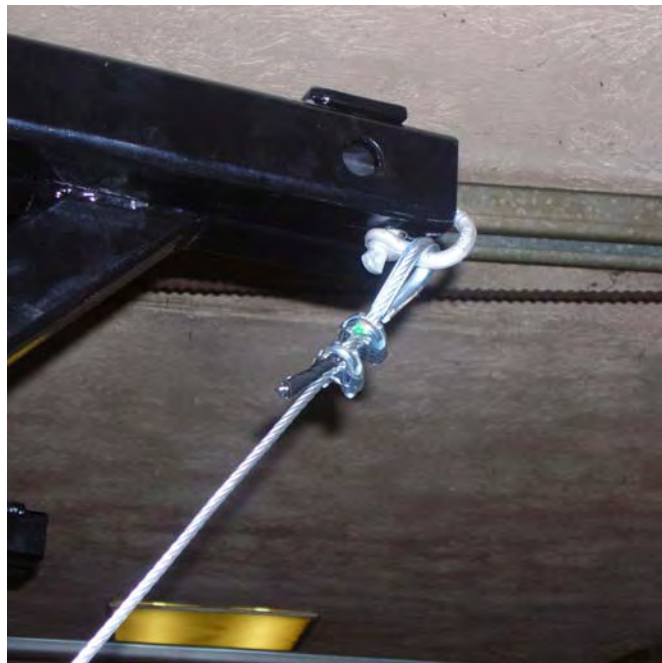
- a. Locate the Shelby 5831 winch and the winch mount bar on the passenger side of the lower sign support tube. If not present, drill two holes in the winch mount bar to match the mounting holes for the winch. Align the winch with the handle on the outboard side of the winch mount. Attach winch with two, 3/8" diameter, grade 5 bolts, nuts, washers and lock washers.



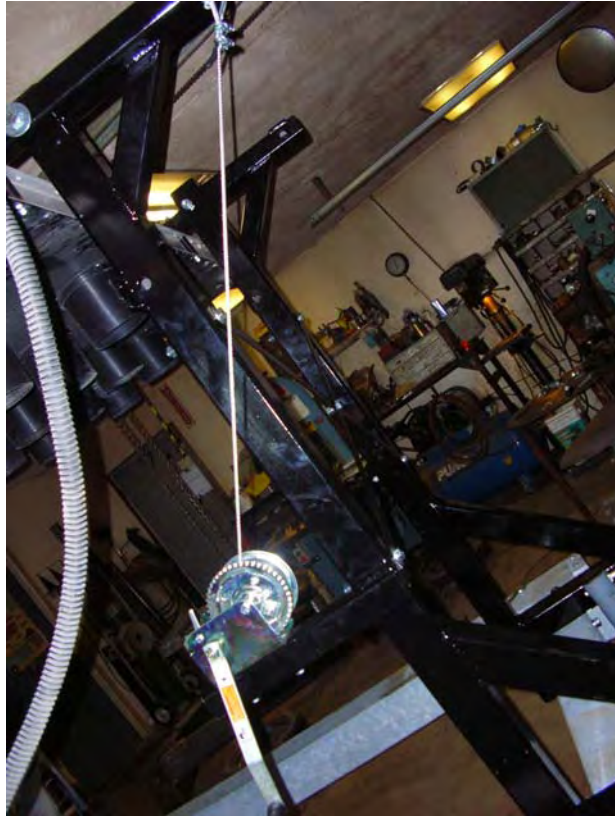
- b. Unwind approximately 8 ft of  $\frac{1}{4}$ " diameter galvanized cable from the reel supplied. Cut the cable. Place one end of the cable through one of the access holes in the cable reel. Tape a small loop in the end of the cable. Secure the loop to the outside of the cable reel using the bolt and clamp supplied.



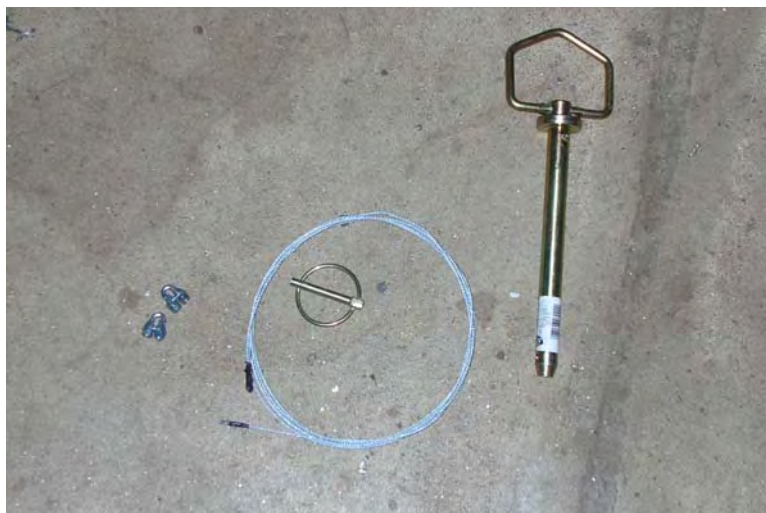
- c. On the other end of the cable, place a loop around a  $\frac{1}{4}$ " cable thimble and secure it with two,  $\frac{1}{4}$ " cable clamps. Identify the hole in the bottom of the passenger side upper sign support used for attaching the winch cable to the upper part of the sign. If the hole is not present, drill a  $\frac{7}{16}$ " diameter hole,  $\frac{11}{16}$ " from the end of the tube. Place the cable loop through a  $\frac{5}{16}$ " screw pin anchor shackle and connect the shackle to the hole.



- d. Secure the winch handle to the winch. Keep tension on the cable and wind up the available slack.



- e. Locate the hitch pins, retaining clips, and 1/8" diameter cable and cable clamps.





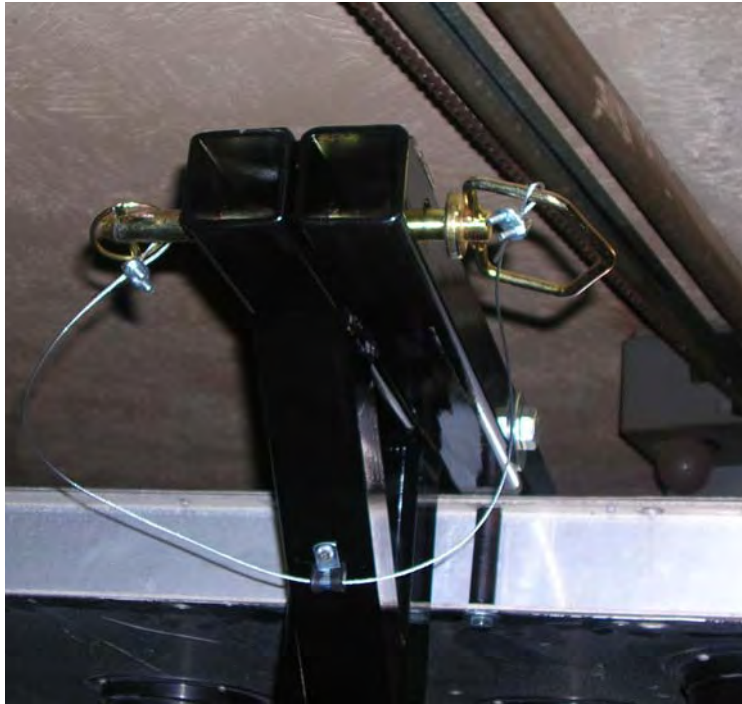
- f. Identify the location for the clamp used to retain the hitch pin and clip. It is recommended that the clamp be placed midway on the diagonal brace at the top of the lower sign support tube. Drill a 3/16" diameter hole in the tube at this location.



- g. Select a length for the retaining cable that will allow it to reach the hitch pin and clip in both the lower and upper position. Cut the cable and attach one end to the pin and the other to the clip using cable clamps.

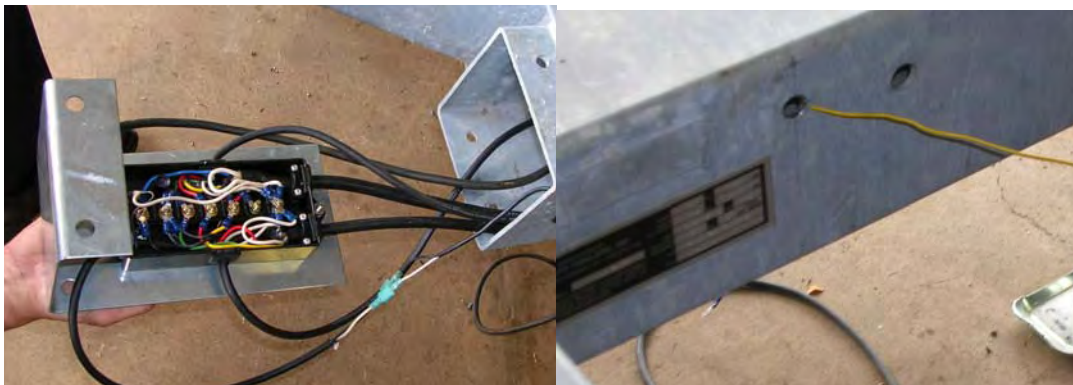


- h. Using a pop rivet or metal screw attach the retaining pin using a ¼” clamp.

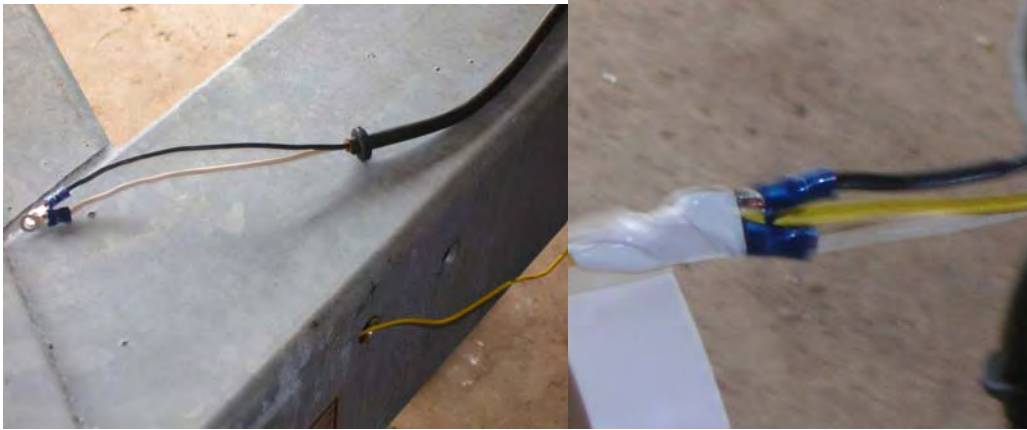


### Connect to Power Supply

- a. Locate power lead on the arrow board or variable message sign (VMS) and look for a 7/16” diameter hole on back of cross member at the rear of the trailer tongue. The hole could be on the right or left side of the tube, approximately 1½” from the top. This hole may not exist and, if not, will need to be drilled. (If needed, drill a 7/16” hole in the A-frame base tube. The hole should be approximately 8 in. from the burster tube on the same side as the arrow board or VMS sign power lead. Place the hole approximately 1½” from the top of the tube. Remove the burster tube end cap, pull out the electrical junction box, and remove the lid. Fish a flat snake through the hole and into the driver’s side burster tube. Pull a string or wire back through the tube.



- b. Push a 7/16" OD x 1/4" ID x 3/16" groove grommet onto the sign lead. Tape the string or wire to the conductor and pull it through to the burster tube.



- c. Remove the rubber wire seal from the front of the junction box. Put a single slit in the wire seal.

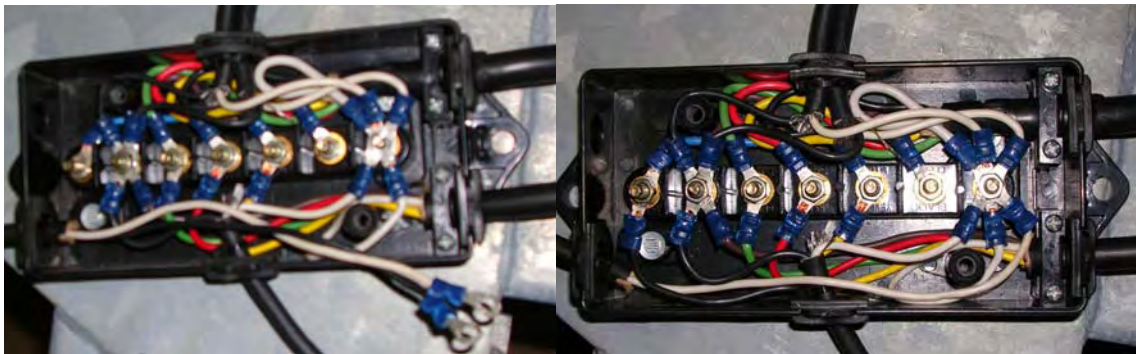




- d. Push the lead through the seal. It is best to push one wire through the seal at a time. Push the seal onto the insulated portion of the wire. Make sure the ground wire is long enough to reach the pole at the back of the junction box. Place a small wire tie on the conductor to provide some strain relief at the rubber seal. Trim the wire tie as short as possible.



- e. Place the conductor in the box with the seal in its seat. Connect the hot wire to the blue pole, the pole at the front of the box. Connect the ground wire to the white pole on the rear of the box. Make sure wires do not obstruct the screw sockets used to attach the top of the junction box. Replace the wire nuts.



- f. Check to see if there is power to the sign and replace the junction box lid and the end cap.
- g. Tighten all bolts on the sign stand.