



# SUPER ANCHOR SAFETY®

## CRA Horizontal Lifeline/HLL Rigging Manual 02-2021

**!WARNING TO USER!**  
You are required to read and use the Instruction/ Specification manual supplied at the time this device was shipped. Improper use and installation can result in serious injury or death. Follow inspection requirements before each use.

ENGLISH VERSION

### HLL End Termination Orientations

SAS factory engineered HLL system components are specified for A-end and B-end installation using this manual as a guide. The A-end is installed with a **TB** (Turnbuckle), **EA** (energy absorber) and field swaged eye splice as shown at Fig.4. The B-end is installed with a factory swaged eye thimble shown at Fig.2. Components are linked using SAS supplied couplers. In order to provide cable adjustment using the A-end **TB**, the B-end is usually rigged first.

### HLL Cable ( Wire Rope) Specifications

3/8" HDG or SST 7x19 cable is supplied from SAS as follows:

- 1) Bulk cable cut to length on site, requiring field swaged eye splices on both ends.
- 2) Pre-cut lengths with a factory swaged eye thimble on one end.  
**WARNING! Cut ends of wire rope can cause puncture and laceration injuries. Wear gloves when handling cable and wrap cut ends with tape.**

### Standard Rigging Procedure B-end First

**Factory Swaged:** Shown at Fig.2 attach the wide end of coupler 1081-S to CRA loop top or 4-Way with a 5/8"x2-1/4" bolt. Attach eye thimble to the narrow end of the coupler with a 5/8"x2.0" bolt. Tighten lock nuts. Bolt threads should penetrate the lock nut a min. of 1/8". See Fig.6.

### Field Swaging Instructions:

- 1) Shown at Fig.3,4,5, bolt coupler No.1081-S wide end to the loop top or 4-Way. Bolt coupler narrow end through the 3/8" eye thimble and tighten lock nuts. Insert 4 ea No. 1050-SM O-Rings onto cable as shown at Fig.3.
- 2) With cable clamp nuts very loose, attach 3 clamps onto the cable end and feed the cable live side through the top side of the eye thimble as shown at Fig.3.
- 3) Feed cable dead side through cable clamps. Saddles MUST be on the live side only. Extend dead side of cable 10" from eye thimble end. Using a vise-grip, as shown at Fig.4, clamp both sides of the cable against the eye thimble to prevent movement when attaching the cable clamps.
- 4) Position clamp #1 as close to the eye thimble end as possible as shown at Fig.4, and hand tighten to prevent movement.
- 5) Position clamps #2 and #3 on 4" centers with approx. 2.0" of dead side cable extending past clamp #3 and hand tighten.
- 6) Using a 3/4" socket or open end wrench, alternately tighten the clamp bolts until secure as shown at Fig.7.
- 7) Finish bolt clamps by applying 45 ft/lb of torque to each bolt head as shown at Fig.8.

### Compliance

All components specified in this manual comply with:  
ANSI Z359.1-07  
OSHA 1926.502

7x19  
No. 1055 HDG  
No. 1055-S SST

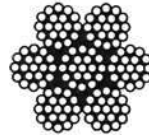


Fig.1

No. 1081-S Wire Rope Coupler  
11ga. 304sst

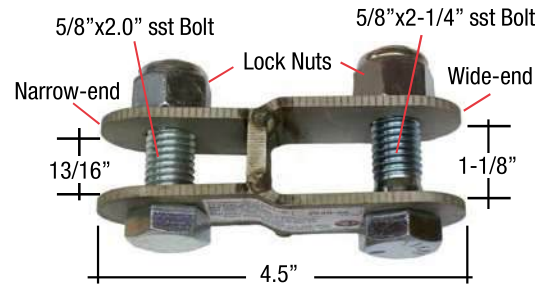


Fig.2

HLL B-End Rigging  
Factory Swaged Eye Thimble

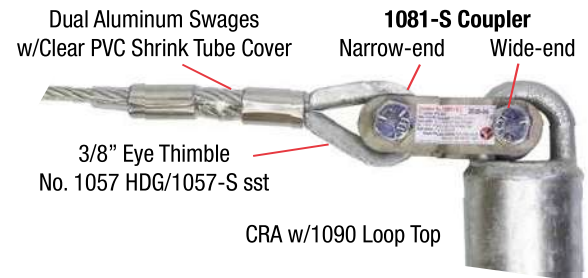


Fig.3 Field Swage

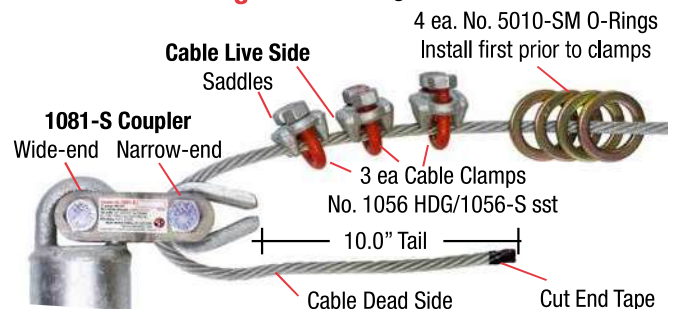


Fig.4 Field Swage Cable Clamps

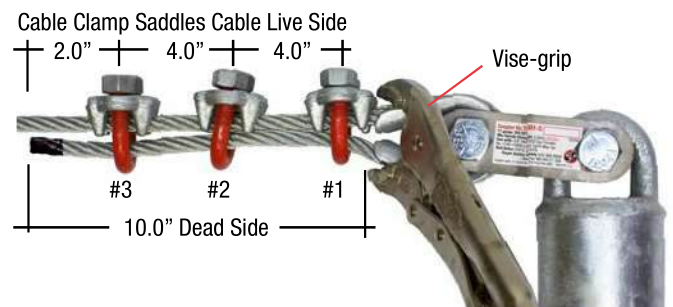


Fig.5

HLL B-end w/4-Way Top  
Field Swaged Eye Thimble

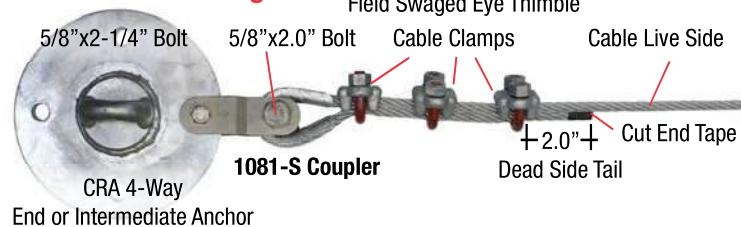


Fig.6

Bolt Thread Penetration



Fig.7

Cable Clamp Tightening



Alternately tighten each side evenly

Fig.8

Cable Clamp Torque



Apply 45 ft/lb torque to each nut.

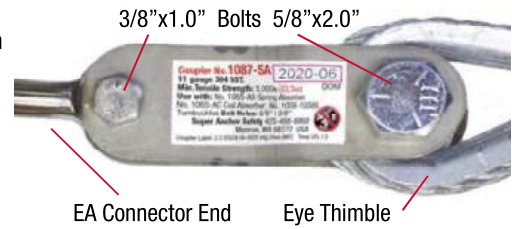
### Standard HLL Rigging

SAS engineered HLL systems specify the B-end factory swaged cable end to be rigged first as shown at Fig.9.1, allowing cable tension adjustment from the A-end turnbuckle (TB). The "A" end cable shown at Fig.9 is field swaged see pg.1, and is connected to the energy absorber (EA) allowing the TB adjustment and EA tension to be monitored during installation as shown at Fig.10 and 13. HLL systems supplied with bulk cable will require A and B end field swaging. Surplus cable should be cut off leaving approx. 2.0" of tail extending from cable clamp #3. **O-Rings** must be installed on to the cable prior to field swaging. **Options:** Installations using SAS components may be specified by a qualified or competent person\*.

### Coupler 1087-SC

Fig.9.2

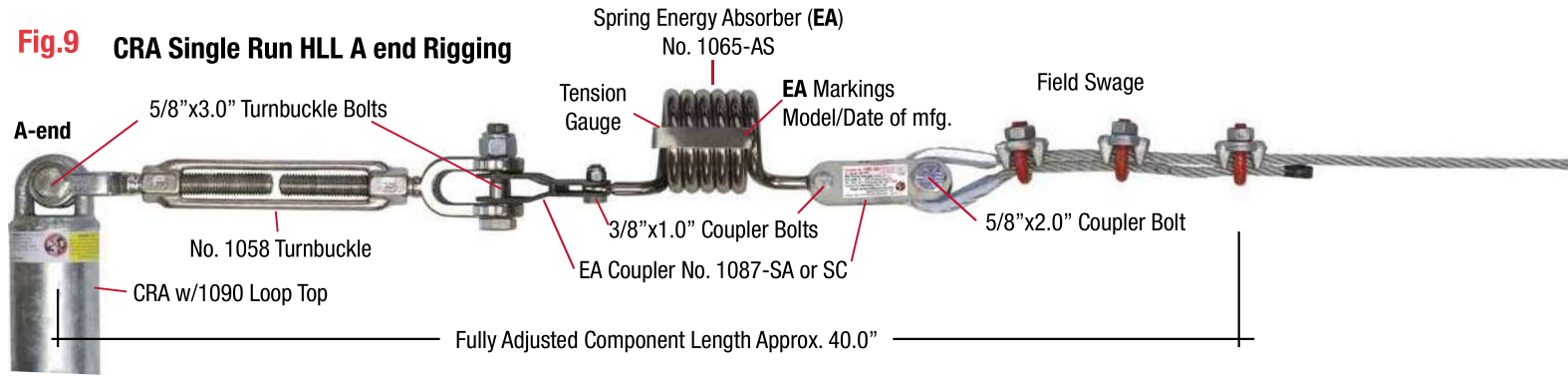
Connects 3/8" eye thimbles with Spring energy absorber (EA) No. 1065-AS



### Single/Multiple Run HLL's

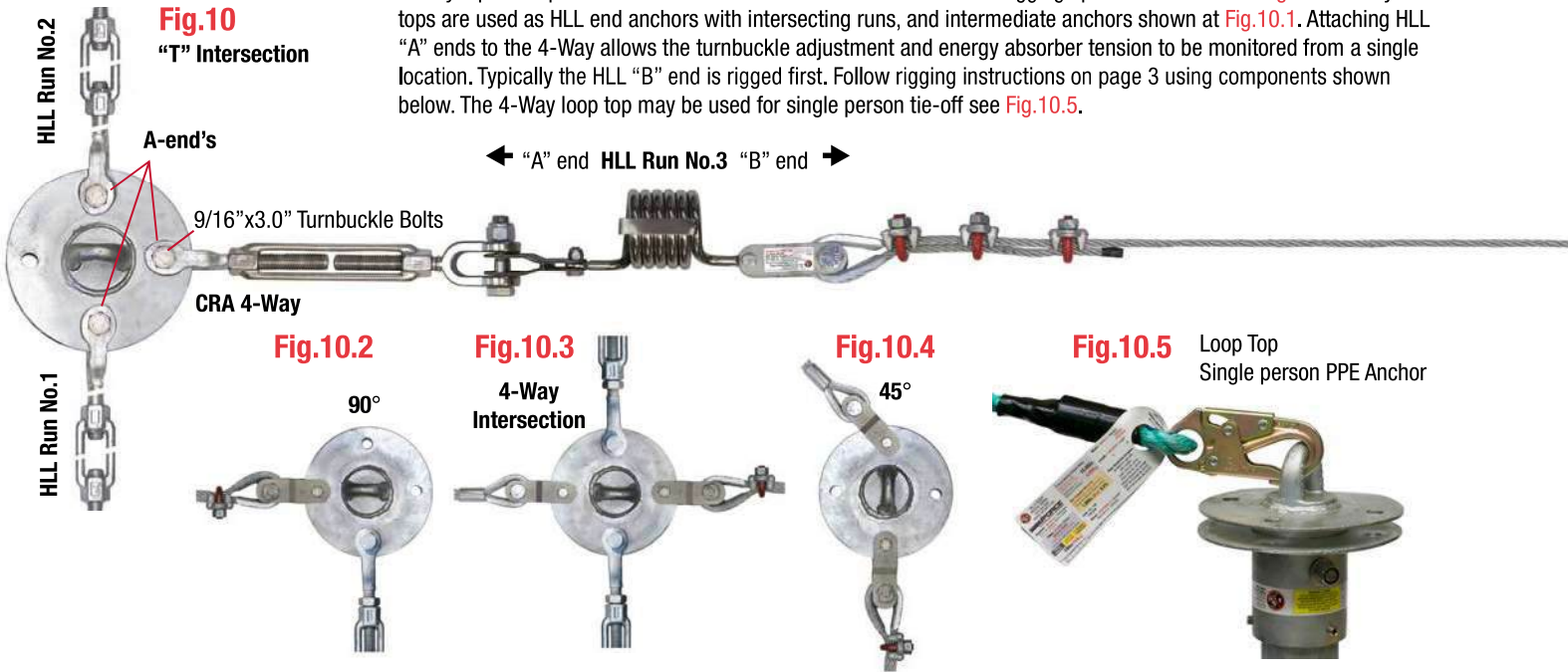
- 1) **Single Run:** CRA loop top end anchors with PT intermediate anchors. Max. anchor spacing 25ft.
- 2) **Multiple Run:** 4-Way intermediate anchors to form T, 90°, 45° and 4 way run intersections.

Fig.9 CRA Single Run HLL A end Rigging



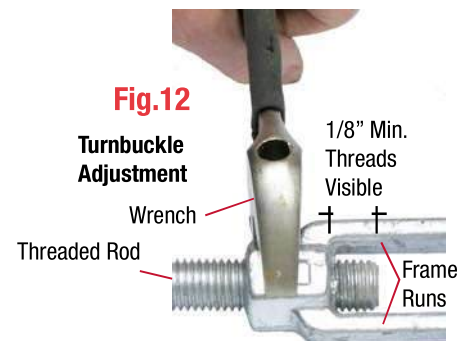
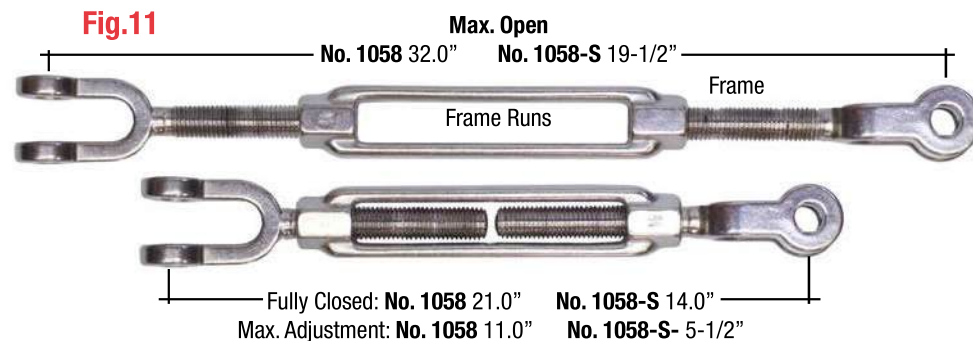
### 4-Way Top Multiple HLL Run Intersections

4-Way tops are specified for a maximum of 4 HLL run attachments. Rigging options are shown at Figs.10. 4-Way tops are used as HLL end anchors with intersecting runs, and intermediate anchors shown at Fig.10.1. Attaching HLL "A" ends to the 4-Way allows the turnbuckle adjustment and energy absorber tension to be monitored from a single location. Typically the HLL "B" end is rigged first. Follow rigging instructions on page 3 using components shown below. The 4-Way loop top may be used for single person tie-off see Fig.10.5.



### Max. HLL Run Length Turnbuckle Specifications

One TB is required for each HLL run provided the cable slack can be removed during field swaging. If slack cannot be removed a second TB is required on the HLL B end. See Fig.17.



### Single Run HLL Rigging Instructions

Some components supplied pre-assembled as shown at Fig. 9, 9.1.

Tighten all lock nuts and confirm thread penetration, Fig.6

- 1) Attach HLL B end factory swaged cable to No. 1081-S coupler narrow end and bolt wide end to CRA loop top. Fig.9.1.
- 2) Feed cable through all PT anchors as shown at Fig.9.1.  
Option: remove slack by clamping cable at all PT tops. Fig.9.3
- 3) Open TB Jaws fully, Fig.11, bolt to A end loop top and attach components shown at Fig.9.
- 4) Field swage A-end coupler No. 1081-S as shown on pg. 1. Insert all cable clamps and feed live side cable through top side of eye thimble. Pull cable as tightly as possible and clamp to the eye thimble to hold position.
- 5) Feed cable dead side through clamps. Clamp cable to eye thimble as shown at Fig.4 and secure clamp #1 as close to thimble end as possible and tighten.

- 6) Measure dead side 10.0" from thimble end and cut off surplus cable\*. To prevent puncture wounds wrap the dead end with a durable exterior grade tape or apply shrink tubing. Attach clamps #2 and #3 and space 4.0" between all clamps. Tighten clamp bolts as shown at Fig.7, and torque each clamp nut to 45 ft/lb. Fig.8
  - 7) Prior to adjusting the turnbuckle remove any PT cable clamps. Tighten TB length using a wrench, Fig.12 until the EA tension gauge is deployed as shown at Fig.13.1. If the tension gauge is deployed fully and line slack remains follow #8 instructions.
  - 8) Clamp cable at all PT tops. Open TB fully. Loosen cable clamps. Perform field swage a second time. If a second TB is required see Fig.17 and follow instructions above.
- \*Use a hand held grinder w/thin metal abrasive blade or other tool suitable for cutting wire rope. Wear eye protection.

Fig.9.1 CRA Single Run HLL B end Rigging

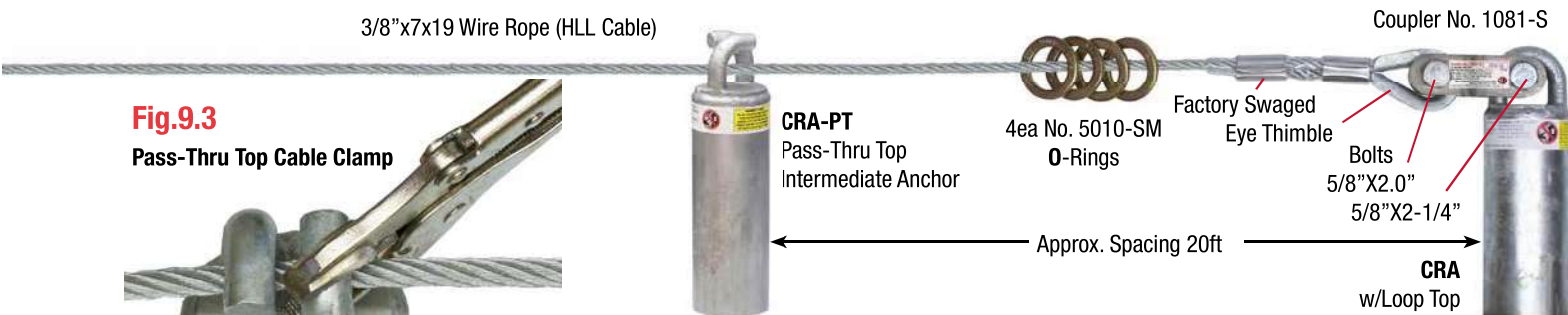


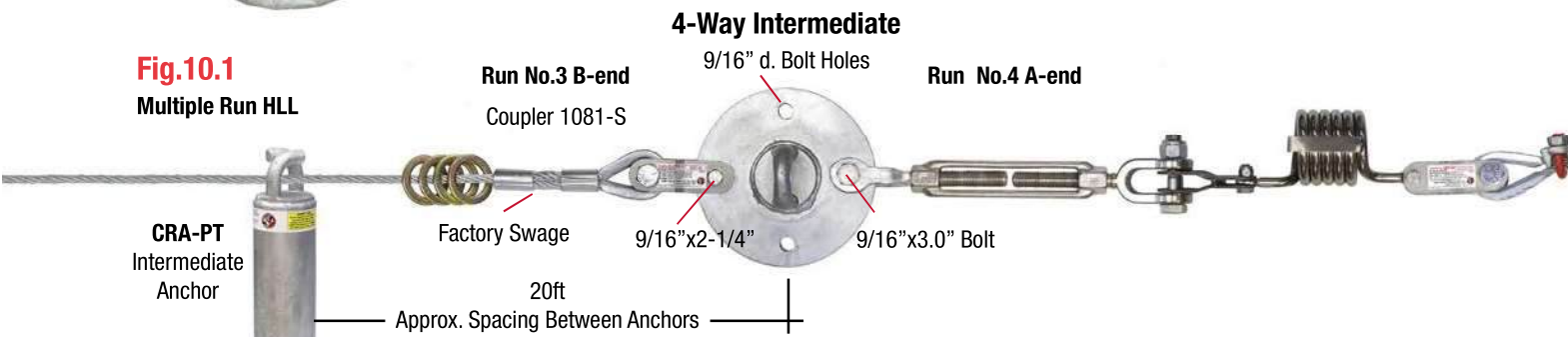
Fig.9.3

Pass-Thru Top Cable Clamp



Fig.10.1

Multiple Run HLL



Spring Energy Absorber (EA) No. 1065-AS

Fig.13

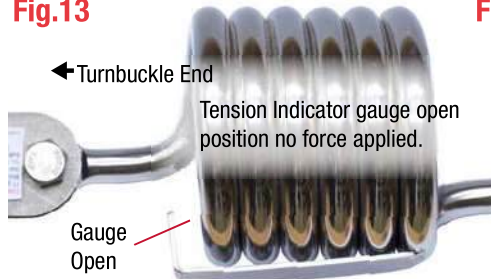


Fig.13.1



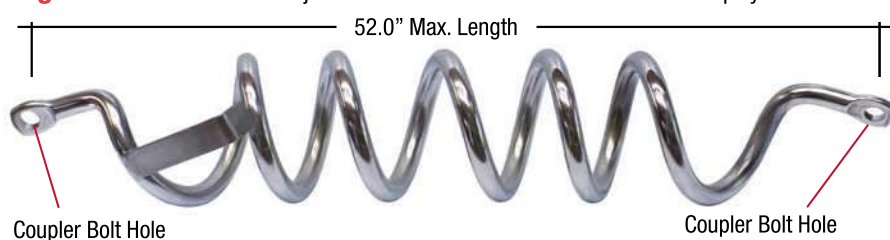
### HLL System Free Fall

All workers attached to a HLL are required to wear a personal energy absorber or use an SRL with an internal EA function. In the event the HLLS is subjected to a free fall, it must be removed from service and tagged **DO NOT USE**. All components must be inspected by a qualified or competent person\* before the system can be returned to service. Consult SAS anchor and component instruction manuals.

Fig.13.2

### Energy Absorber Deployment

When subjected to a free fall or other force the EA will deploy as shown here.

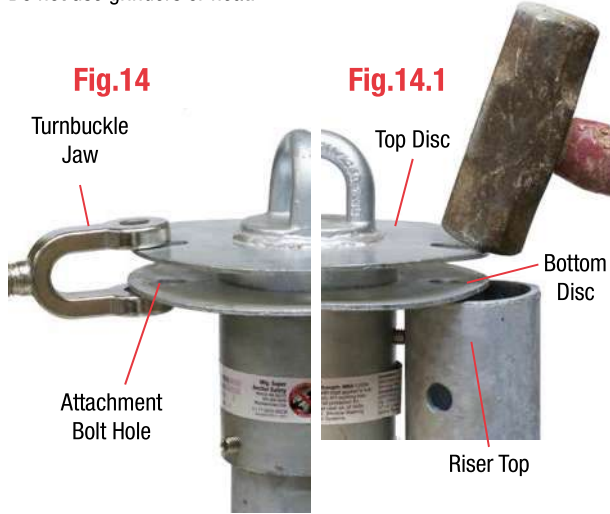


### Performance Specifications:

- Fall Arrest: 2 persons per ea. HLL run
- Fall Restraint: 4 persons ea. HLL run
- User Wt: 310lb
- Max. Free Fall: 6ft Avg. Peak Force: 1,200lb
- Max. Deployment Length: 52.0"
- Material: 316sst. Length: 9.0"
- Min. Tensile Strength: 5,000lb

## Connecting Turnbuckle to 4-Way

The top and bottom 4-Way disc o.d. may require a minor adjustment to fit narrower turnbuckle jaws as shown at Fig.14. Position the bottom disc bolt hole on top of the 4-Way riser as shown at 14.1, and gently tap the top disc with a hammer to reduce the o.d. dimension enough to fit the turnbuckle jaw. Do not reduce the o.d. more than necessary. Do not use grinders or heat.



## Attaching 4-Way to the Riser.

Set the 4-Way Top onto the riser, align the attachment bolt holes and insert SAS supplied 1/2"x4-1/2" attachment bolt. Seal washers are required on both ends of the attachment bolt as shown at Fig.15. To prevent 4-Way movement tighten all 3 set screws evenly as shown at 15.1. Tighten attachment bolt using 3/4" wrenches as shown at 15.2 until seal washers are firmly set against the riser wall. Do not over tighten. Attach 4-Way HLL components.

Fig.15

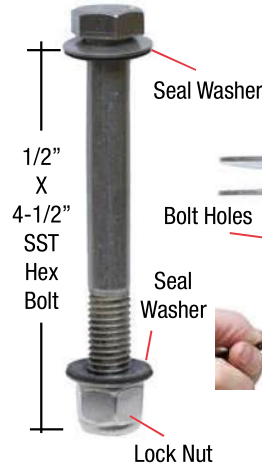
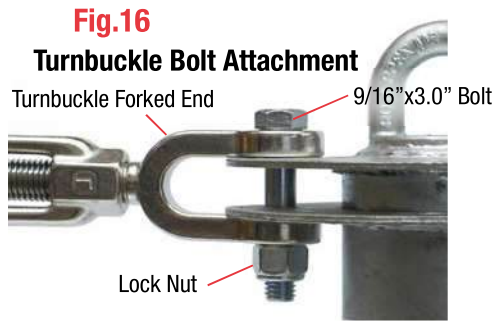
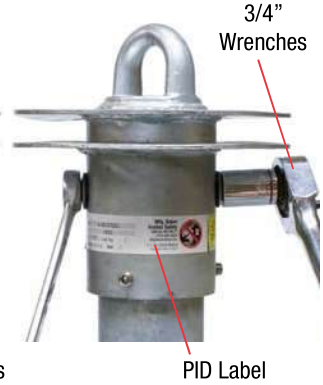


Fig.15.1

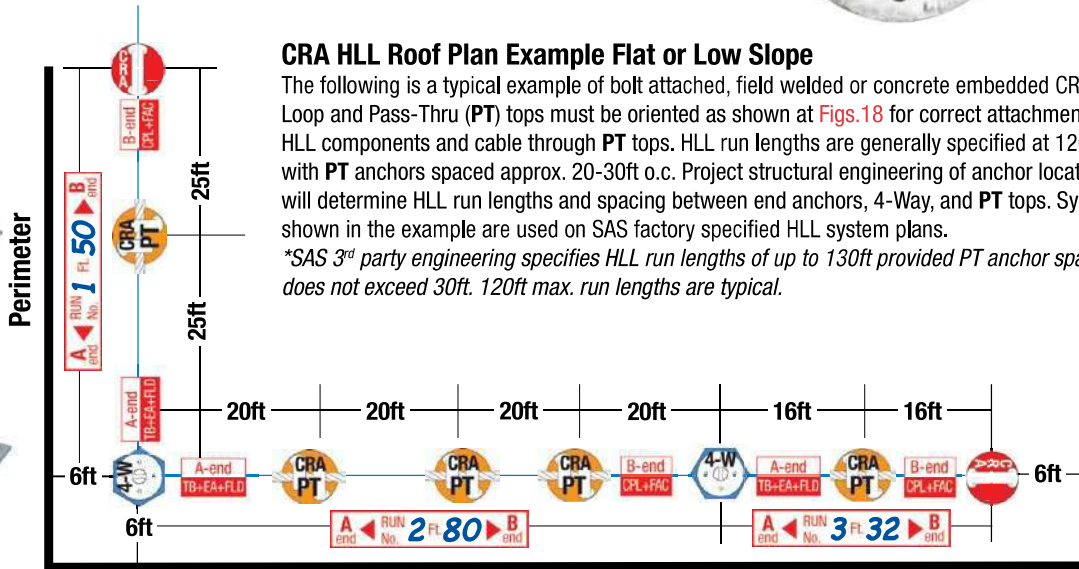
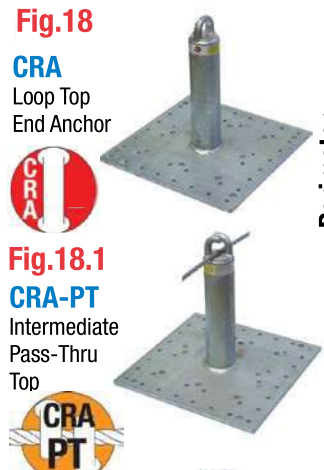
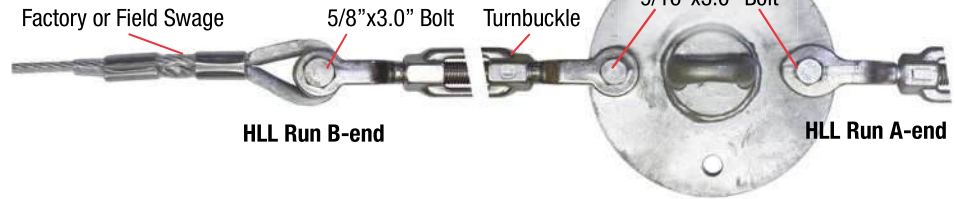


Fig.15.2



## 2nd Turnbuckle B-end

When a HLL run requires a second TB, attach to the B-end CRA loop top or 4-Way. Open jaws fully, and bolt attach swaged end. The A end field swage will require a second adjustment. Follow instructions on page 3.



## CRA HLL Roof Plan Example Flat or Low Slope

The following is a typical example of bolt attached, field welded or concrete embedded CRA's. Loop and Pass-Thru (PT) tops must be oriented as shown at Figs.18 for correct attachment of HLL components and cable through PT tops. HLL run lengths are generally specified at 120ft\* with PT anchors spaced approx. 20-30ft o.c. Project structural engineering of anchor locations will determine HLL run lengths and spacing between end anchors, 4-Way, and PT tops. Symbols shown in the example are used on SAS factory specified HLL system plans. \*SAS 3rd party engineering specifies HLL run lengths of up to 130ft provided PT anchor spacing does not exceed 30ft. 120ft max. run lengths are typical.

