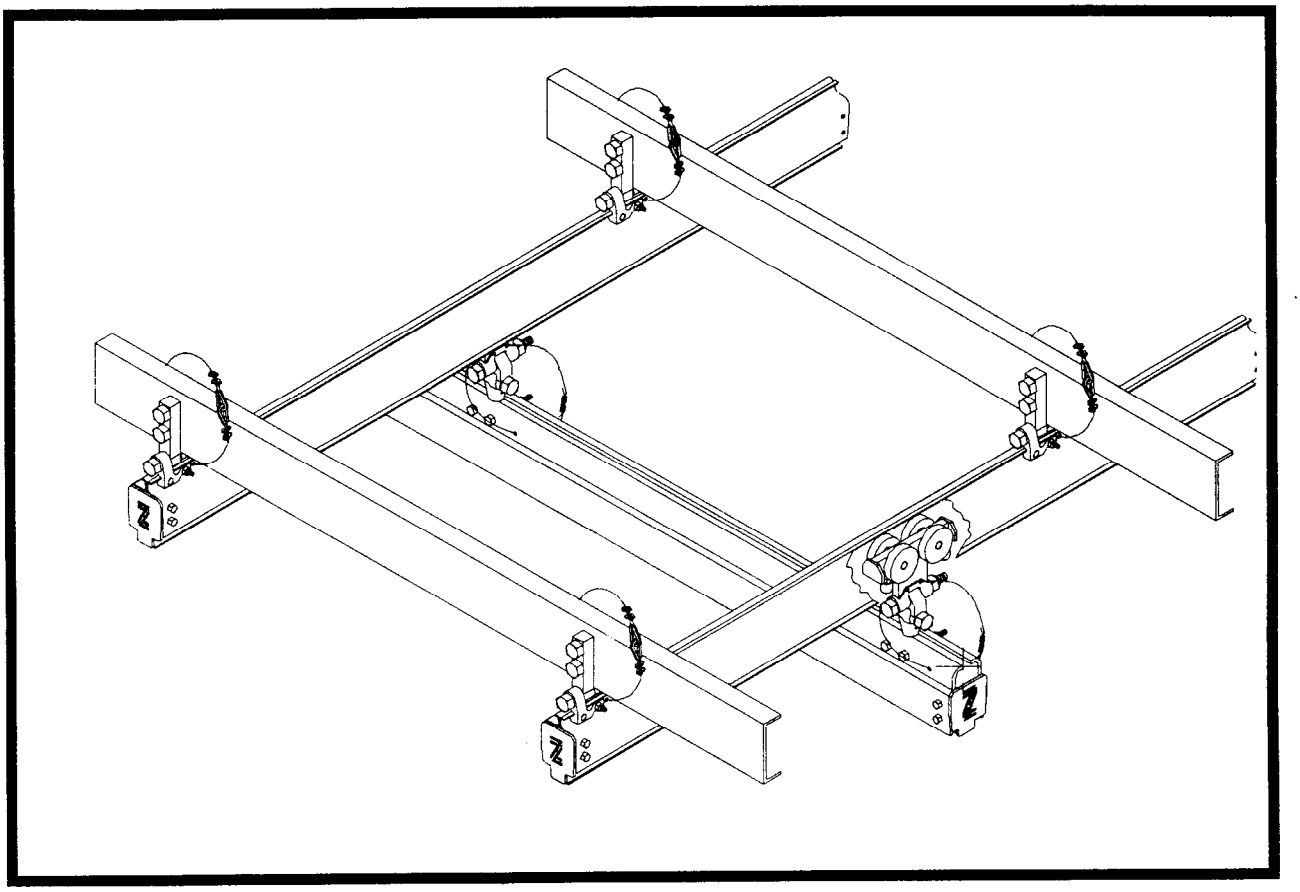
ZRA and ZRS
ENCLOSED RAIL SYSTEMS
Installation & Maintenance Instructions



IMPORTANT - CAUTION

This manual contains important information for the correct installation, operation and maintenance of the equipment described herein. All persons involved in such installation, operation and maintenance should be thoroughly familiar with the contents. To safeguard against the possibility of personal injury or property damage, follow the recommendations and instructions of this manual and keep it for future reference.

WARNING

THE EQUIPMENT SHOWN IN THIS MANUAL IS INTENDED FOR INDUSTRIAL USE AND SHOULD NOT BE USED TO LIFT, SUPPORT OR OTHERWISE TRANSPORT PEOPLE.

WARNING

USE ONLY ZIMMERMAN COMPONENTS IN INSTALLATION. ALL ZIMMERMAN COMPONENTS ARE TESTED AND CERTIFIED TO ALL APPLICABLE SAFETY STANDARDS.

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1-800-347-7047

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ZRA and ZRS
ENCLOSED RAIL SYSTEMS
Installation & Maintenance Instructions

System Order Number: _____

Installation Drawing Number(s): _____

Installation Date: _____

Location: _____

Application: _____

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1. INTRODUCTION

Zimmerman ZRA and ZRS rail system packages can be custom-designed and feature easy, rapid, do-it-yourself installation.

The rail used in Zimmerman systems as shown in Figure 1 (aluminum) and 2 (steel) can be used as runway or bridges. Runway rails are suspended from the customer's building structure or free standing support structures, bridges are suspended from either Zimmerman runways or existing runways.

Zimmerman designed runways are available in four sizes and manufactured from rolled steel to enhance smooth and quite operation. The aluminum rails are extruded from a high strength aluminum alloy, which provides a lighter alternative to steel rails while maintaining both smooth and quiet operation.

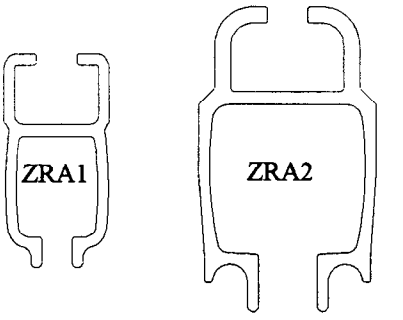
Trolleys for both rail systems are equipped with smooth, acetal-resin-molded wheels which resist flattening and feature sealed ball bearings and side-guide rollers. The rail suspension hardware allows the rails to swing reducing the effort required for bridge beam movement. Safety cables are supplied and are to be installed at all suspension points.

Maintenance requirements for this system are minimal, but preventive maintenance must be preformed according to the proposed maintenance schedule in Section 4 of this manual.

A Parts list is provided in Sec. 5
It should be used when ordering spare, replacement or additional parts. Providing the original rail system order number along with the part number will speed up the delivery of any parts ordered. Proper and safe installation of this rail system is only possible if all drawings and application manuals are supplied to the installer.

The installation information contained in this manual applies to indiviual components as well as complete rail sytems.

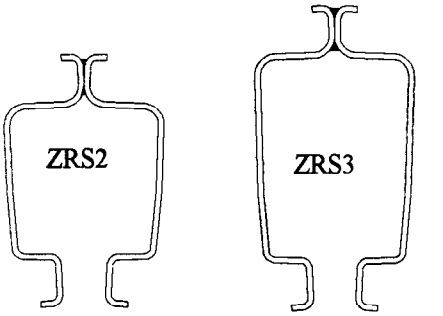
Aluminum Rail



Part No. 30200 Part No. 30000

Figure 1

Steel Rail



Part No. 30500 Part No. 30550

Figure 2

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2. SAFETY

All Zimmerman runway rails, trolleys and bridge crane beam conform to OSHA Safety Standards and Federal Regulations, July 1, 1984 revision.

Load ratings are marked on both sides of bridge beams so that they are clearly visible to the operator (figure 3) These ratings are determined by Zimmerman International Corp., based on tests performed at independent laboratories.

These tests involve:

* Load carring capacities of each trolley wheel.
* Load deflection of rails.
* Individual, static-load test of all components that make up a Zimmerman rail system.

THE TOTAL WEIGHT OF THE SUSPENDED LOAD MUST INCLUDE ALL HOISTS, HANDLING DEVICES, BUCKETS, HOOKS, EXT.

⚠ WARNING

THE TOTAL WEIGHT OF THE SUSPENDED LOAD MUST NOT EXCEED 100% OF THE INDICATED LOAD RATING. FAILURE TO COMPLY WITH THIS WARNING MAY RESULT IN PERSONAL INJURY, PROPERTY DAMAGE AND/OR DEATH.

UNDER NO CONDITION SHALL A HOIST BE INSTALLED ON A SUPPORT STRUCTURE WHICH HAS A RATED LOAD CAPACITY THAT IS LESS THAN THE RATED LOAD CAPACITY OF THE HOIST AND ALL ATTACHMENTS.

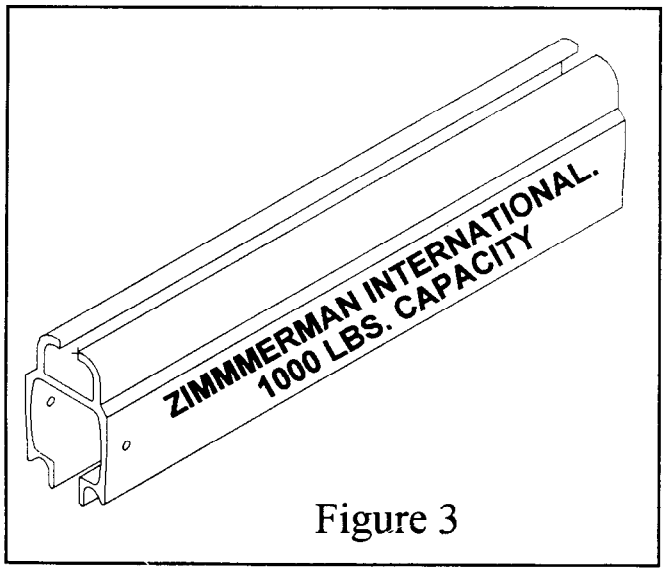

Figure 3

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* Safety Cables must be properly installed.
* Loads, load attachment device and lifting equipment must be suspended in a manner that does not restrict trolley movement.
* Never attempt to lift a load that is not directly under the lifting unit.
* **DO NOT SUSPENDED OR TRANSPORT PEOPLE FROM THE RAIL SYSTEM.**
* DO NOT use end stops to position a load. Continous collisions with end stops can cause excessive wear of suspension components. Hand-pushed loads must be kept under control at all times to avoid impacting the end stops.
* Before each use, the operator should preform an inspection of the lifting device, support structure and mounting hardware to identify potential weaknesses. All potential weak points must be corrected to ensure safe operation of the rail system.

3. INSTALLATION

3.1 General Guidelines

CAUTION

IT IS THE CUSTOMER'S RESPONSIBILITY TO ENSURE THAT THE SUPPORT STRUCTURE IS ADEQUATE FOR THE RAIL SYSTEM AND ANY LOADS WITHIN THE SYSTEM RATING.

The following should be adhered to during installation.
* All track suspension hardware and splices must be accessible for safety checks and inspection after installation.
* All bolted connections must be completely tightened and torqued to specifications as shown in the Torque Specification Table.

DO NOT replace self-locking nuts with standard nuts and lock washers. **DO NOT** re-use self-locking nuts. All fasteners for rail systems must be grade 5 or better.

Torque Specification Table	
SAE Grade 5 Nut Size	Torque lb.-ft. [N*m]
1/4-20	6[8]
5/16-18	11[15]
3/8-16	17[23]
1/2-13	50[68]
5/8-11	82[120]
NOTE: These are dry torque values.	

3.2 Runway Rails

Runway rails, either steel or aluminum, are attached to the support structure. They can be used individually, or installed in pairs to support a bridge crane beam (see Section 3.4 for additional information about bridge rails).

3.2.1 Standard Suspension Hardware

Vertical suspension hardware is used to connect rails to I-beams. Figures 4 through 7 and 13 through 16(aluminum) and 8, 9, 17 and 18 (steel). show close hanger kit assemblies for rail systems requiring only minor adjustment. Figures 10 and 11 (aluminum) and 12 (steel) show hanger kits assemblies which provide adjustment between runway rails and I-beams.

When clamping suspension hardware to the I-beam or support, the attaching bolts must pass vertically through the beam clamp bracket into the toe clamp. Torque the bolts to the specification shown in Section 3, ensuring that a square washer lies flat to create a snug even fit.

If the I-beam or support for the rail system is level, a rigid-mount hanger kit(Figure 13 through 18) can be used.

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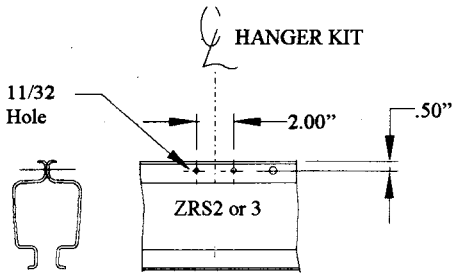
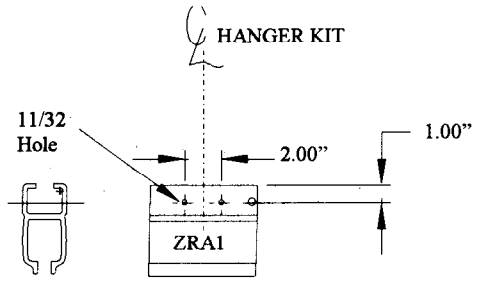
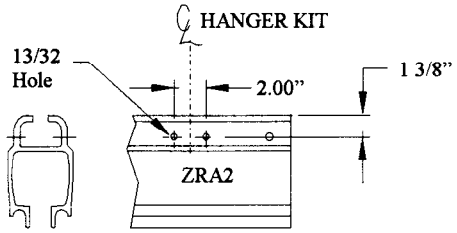


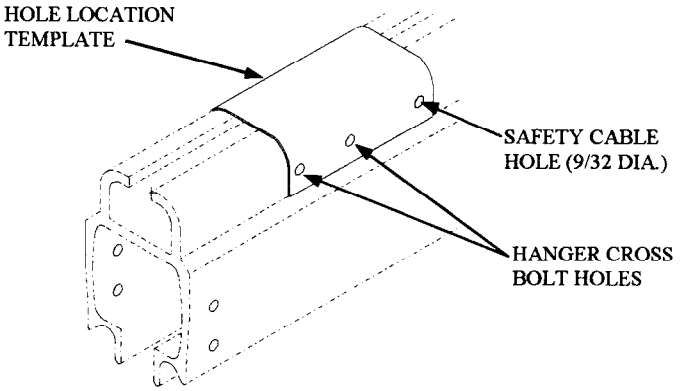




We have provided dimensions and hole sizes to locate runway suspension hardware.

In your ZRA1 and ZRA2 rail systems you will find a template to allow you to locate the holes for the runway suspension hardware and holes for safety cables.

If you are using ZRS2 or ZRS3 rail simply use one of the hanger brackets (part no. 30188) to locate the holes for the suspension hardware and locate the 9/32 dia .safety cable hole 3.00" to the right of left of the holes for the suspension hardware.



Runway Connection Kits

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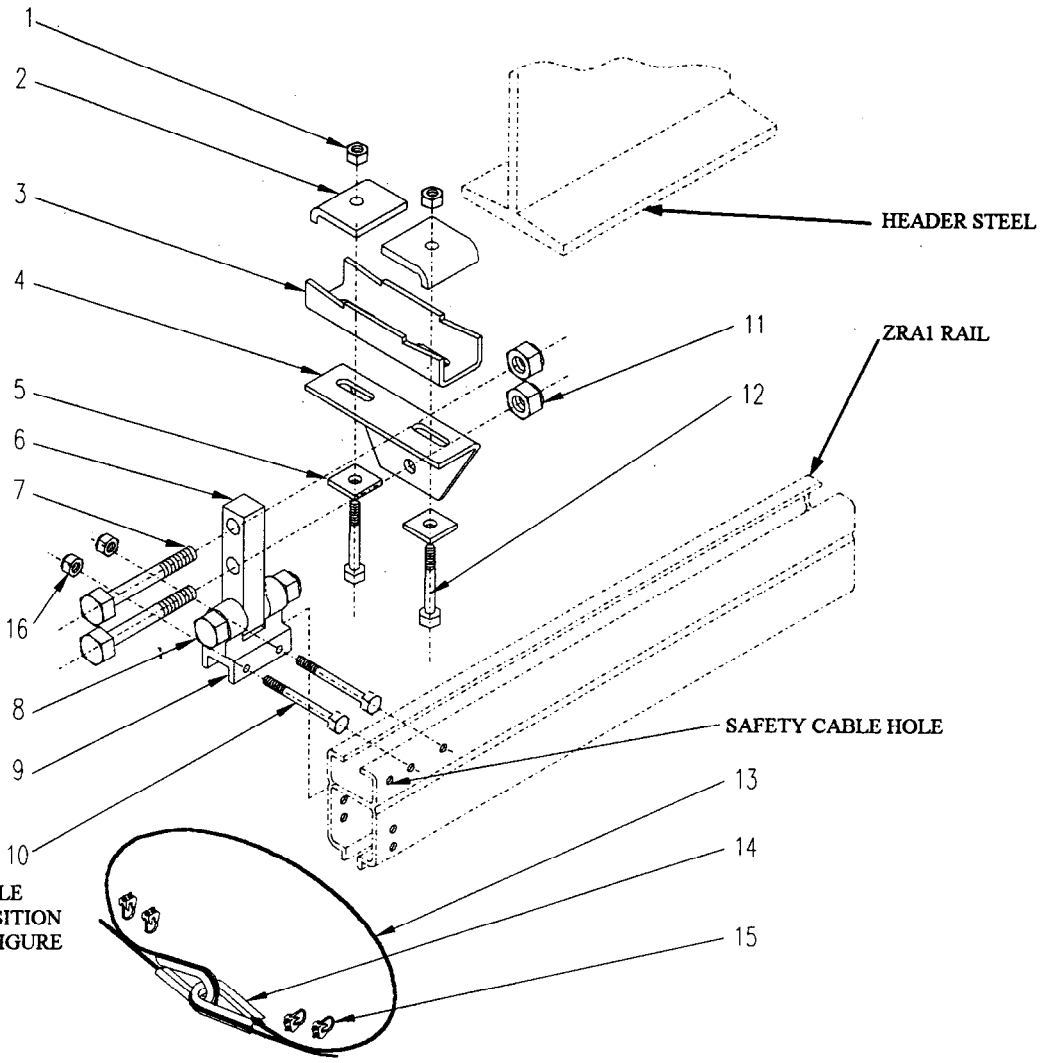
ZRA1 RUNWAY PARRALLEL TO HEADER STEEL



NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY SEE FIGURE 22 FOR CORRECT INSTALLATION.

FIGURE 4 - HANGER KIT NUMBER 30290

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30162	HANGER	1
7	72626	5/8-11 X 3.25" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	30267	RUNWAY SUSPENSION BRACKET	1
10	75582	5/16-18 X 3.25" BOLT	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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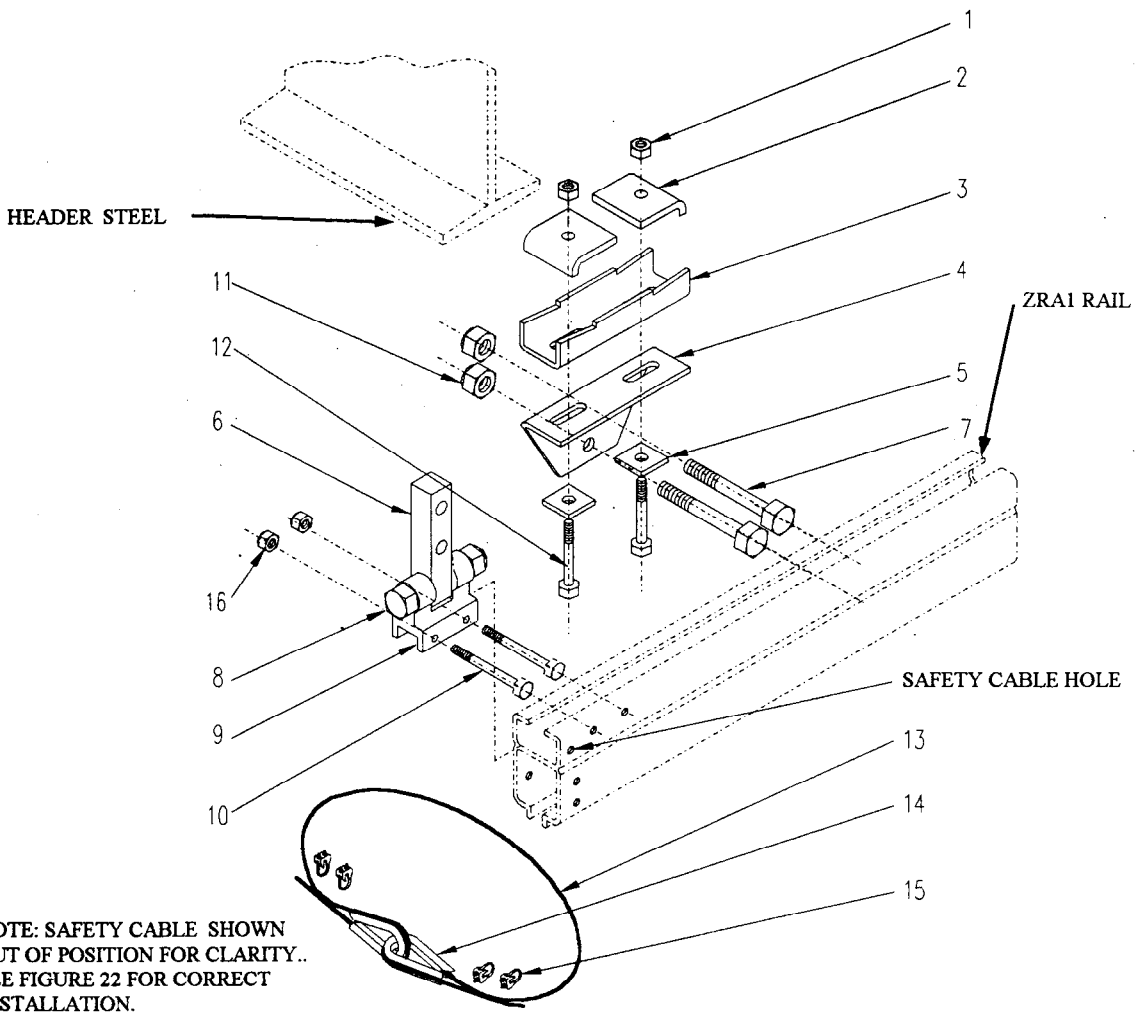
ZRA1 RUNWAY PERPENDICULAR TO HEADER STEEL



NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY.. SEE FIGURE 22 FOR CORRECT INSTALLATION.

FIGURE 5 - HANGER KIT NUMBER 30292

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30197	HANGER	1
7	72626	5/8-11 X 3" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	30267	RUNWAY SUSPENSION BRACKET	1
10	75582	5/16-18 X 3.25" BOLT	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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ZRA2 RUNWAY PARALLEL TO HEADER STEEL

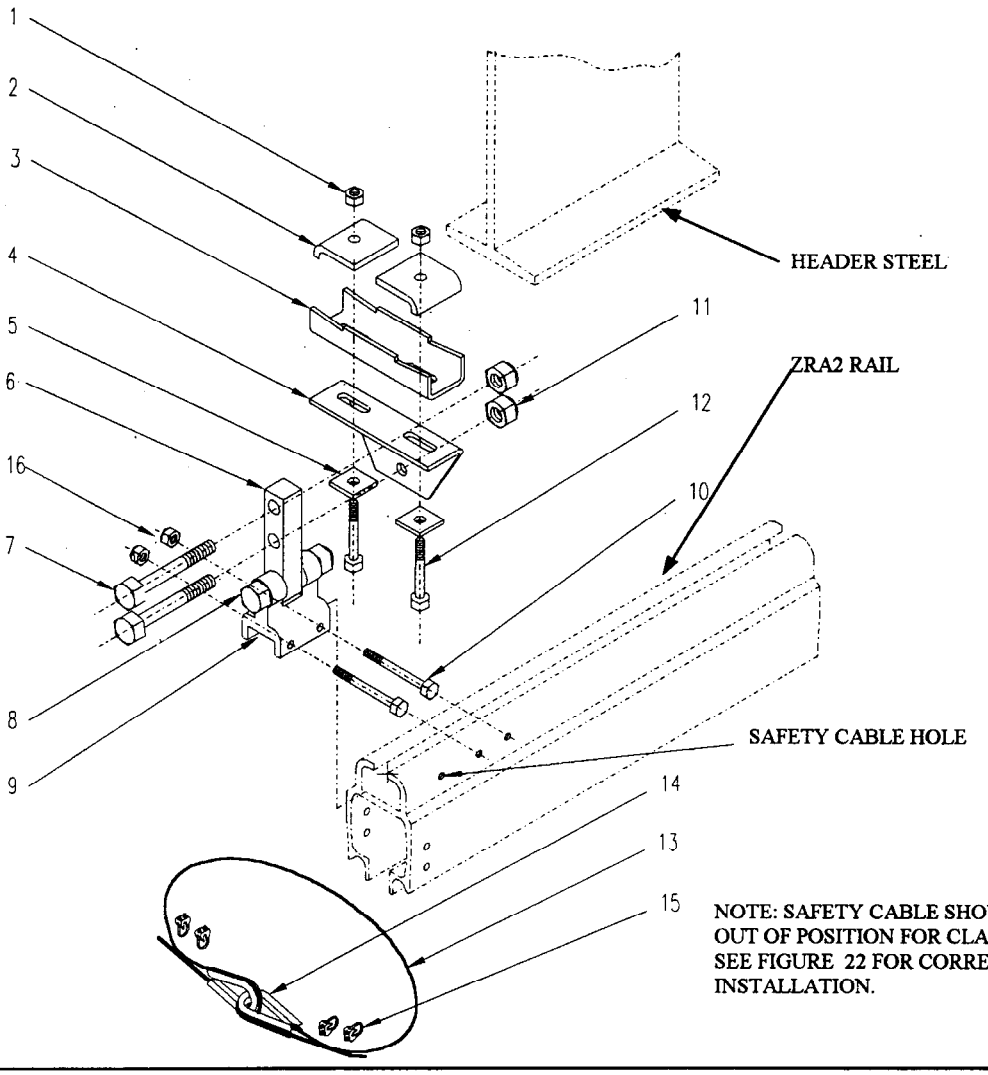

FIGURE 6 - HANGER KIT NUMBER 30199

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30162	HANGER	1
7	72626	5/8-11 X 3" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	30165	RUNWAY SUSPENSION BRACKET	1
10	71481	3/8-16 X 4 1/2" BOLT	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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ZRA2 RAIL PERPENDICULAR TO HEADER STEEL

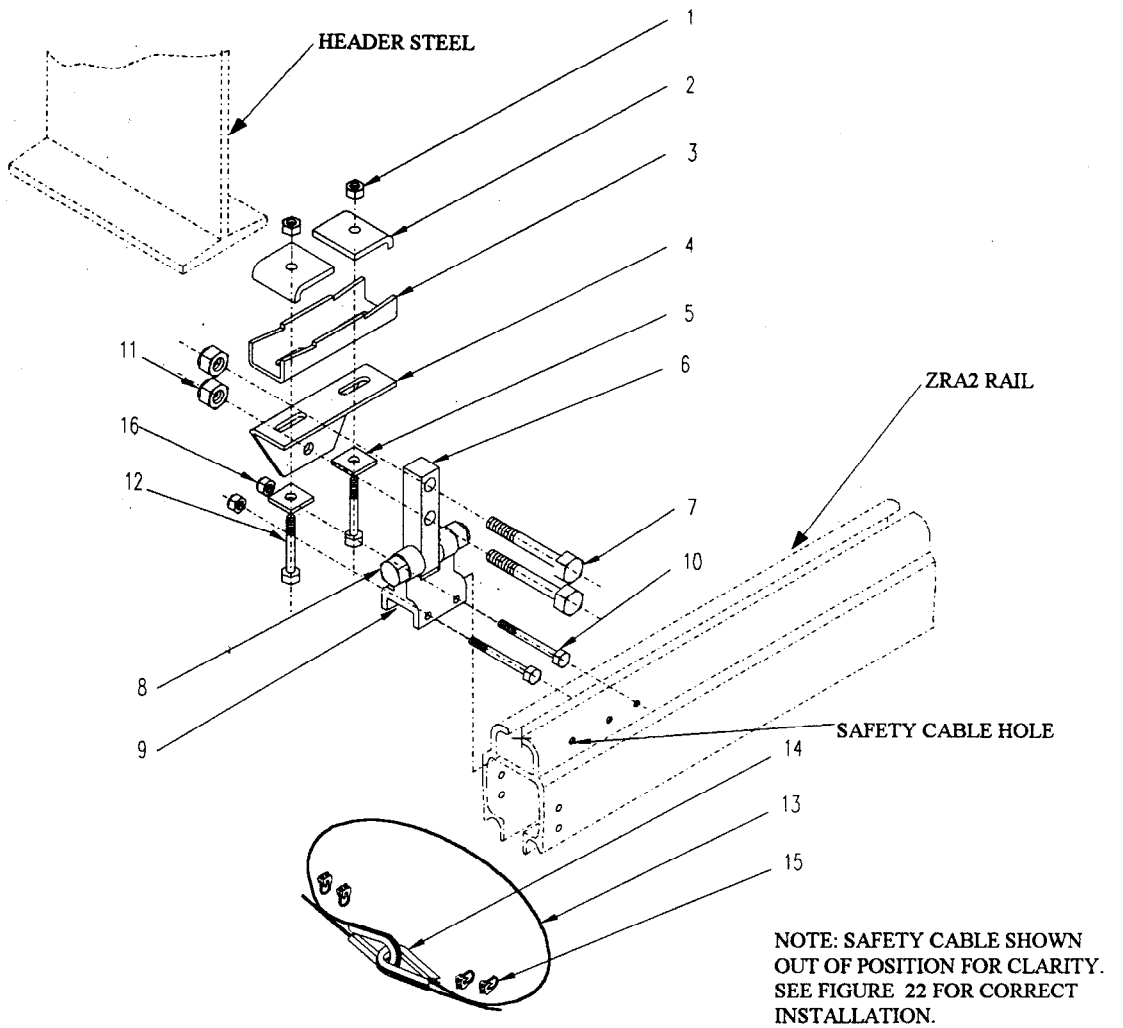

FIGURE 7- HANGER KIT NUMBER 30901

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30197	HANGER	1
7	72626	5/8-11 X 3" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	30165	RUNWAY SUSPENSION BRACKET	1
10	71481	3/8-16 X 4 1/2" BOLT	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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ZRS2 OR 3 RUNWAY PARALLEL TO HEADER STEEL

NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

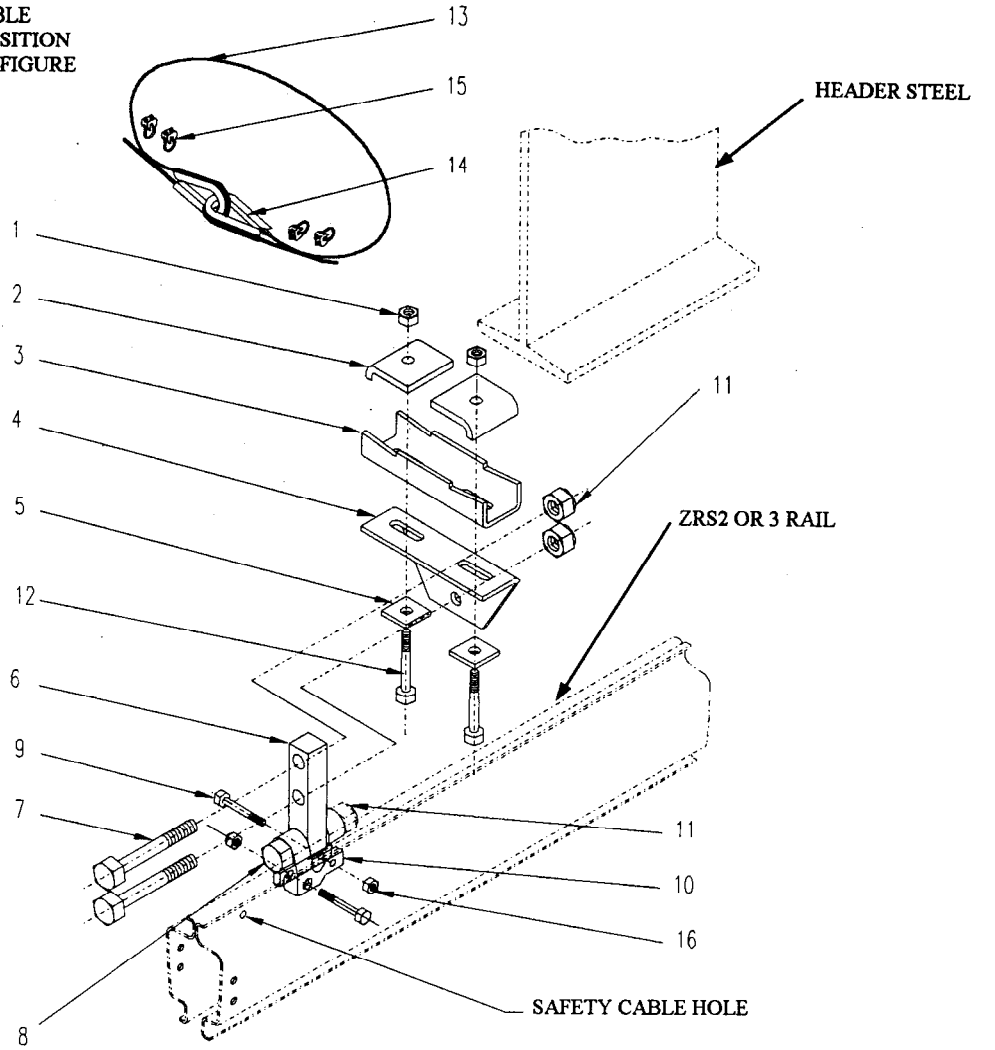

FIGURE 8 - HANGER KIT NUMBER 30817

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30162	HANGER	1
7	72626	5/8-11 X 3.25" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	70967	5/6-18 X 2 1/4" BOLT	2
10	30801	HANGER BRACKET	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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ZRS2 OR3 RUNWAY PERPENDICULAR TO HEADER STEEL

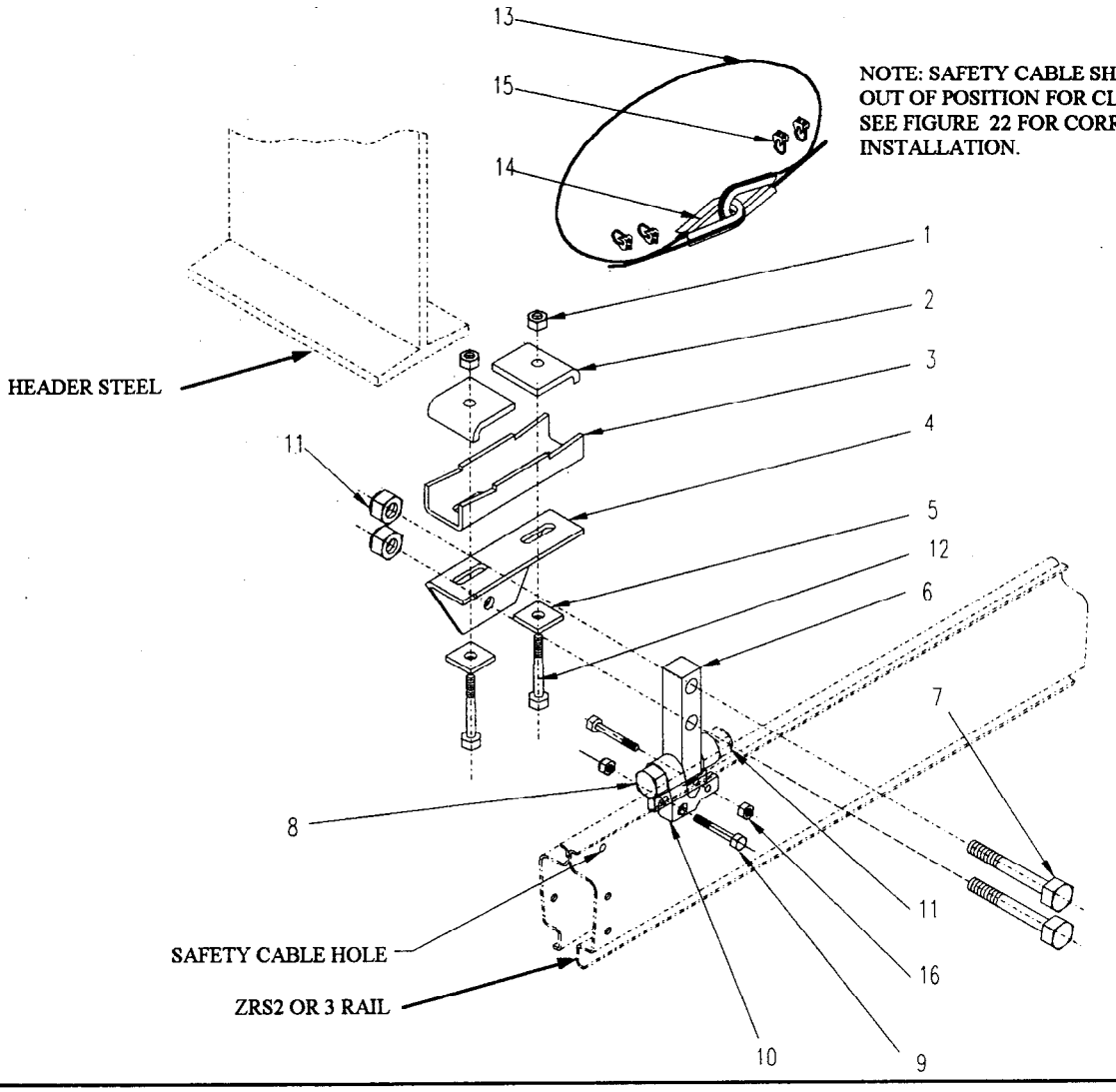

FIGURE 9 - HANGER KIT NUMBER 30819

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30197	HANGER	1
7	72626	5/8-11 X 3.25" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	70967	5/6-18 X 2 1/4" BOLT	2
10	30801	HANGER BRACKET	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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ZRA1 RUNWAY , ADJUSTABLE HANGER KIT

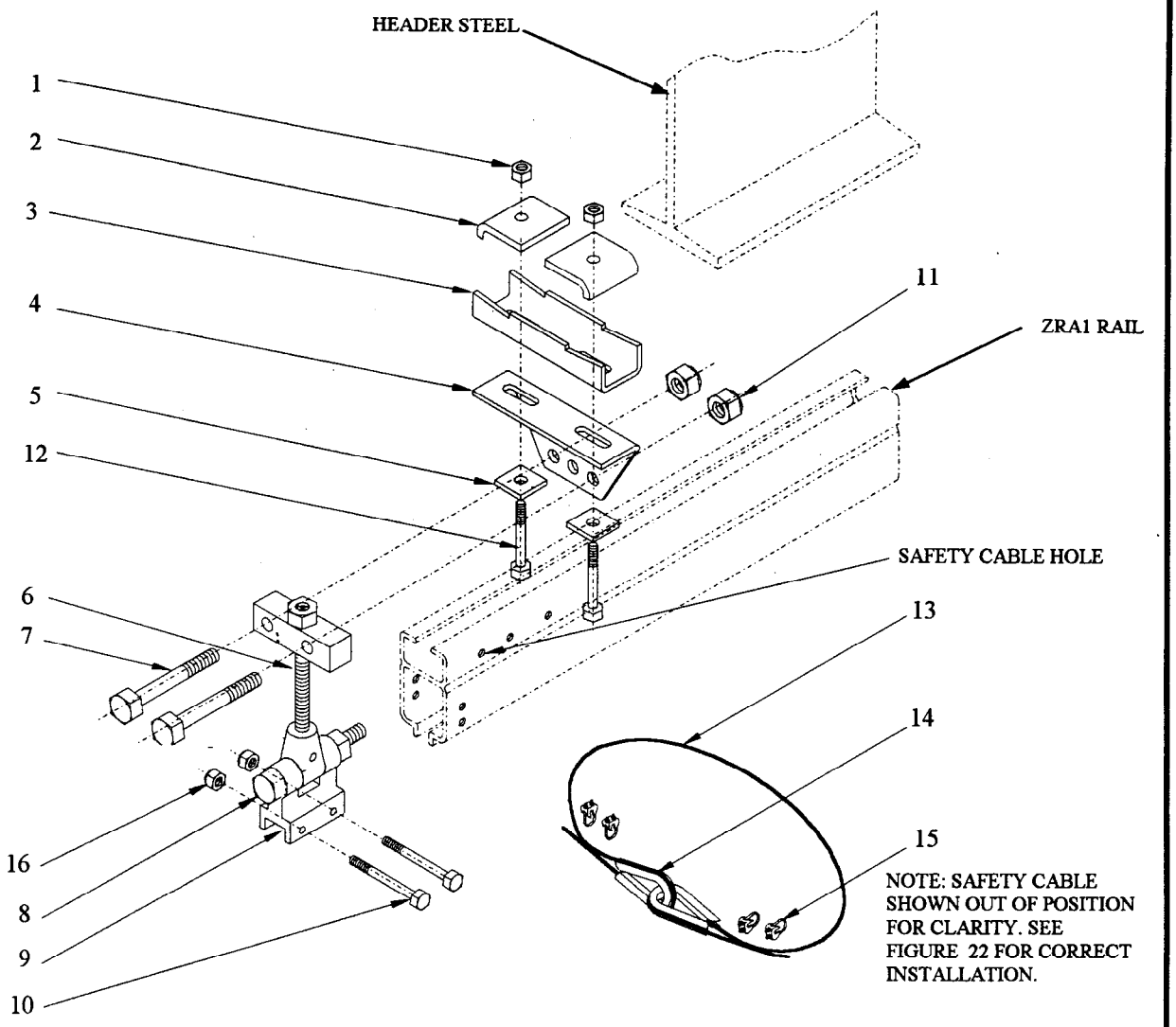

FIGURE 10 - HANGER KIT NUMBER 30287

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30190	ADJUSTMENT BLOCK ASS'Y.	1
7	72646	5/8-11 X 3 1/4" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	30267	RUNWAY SUSPENSION BRACKET	1
10	70967	5/16-18 X 3 1/4 BOLT	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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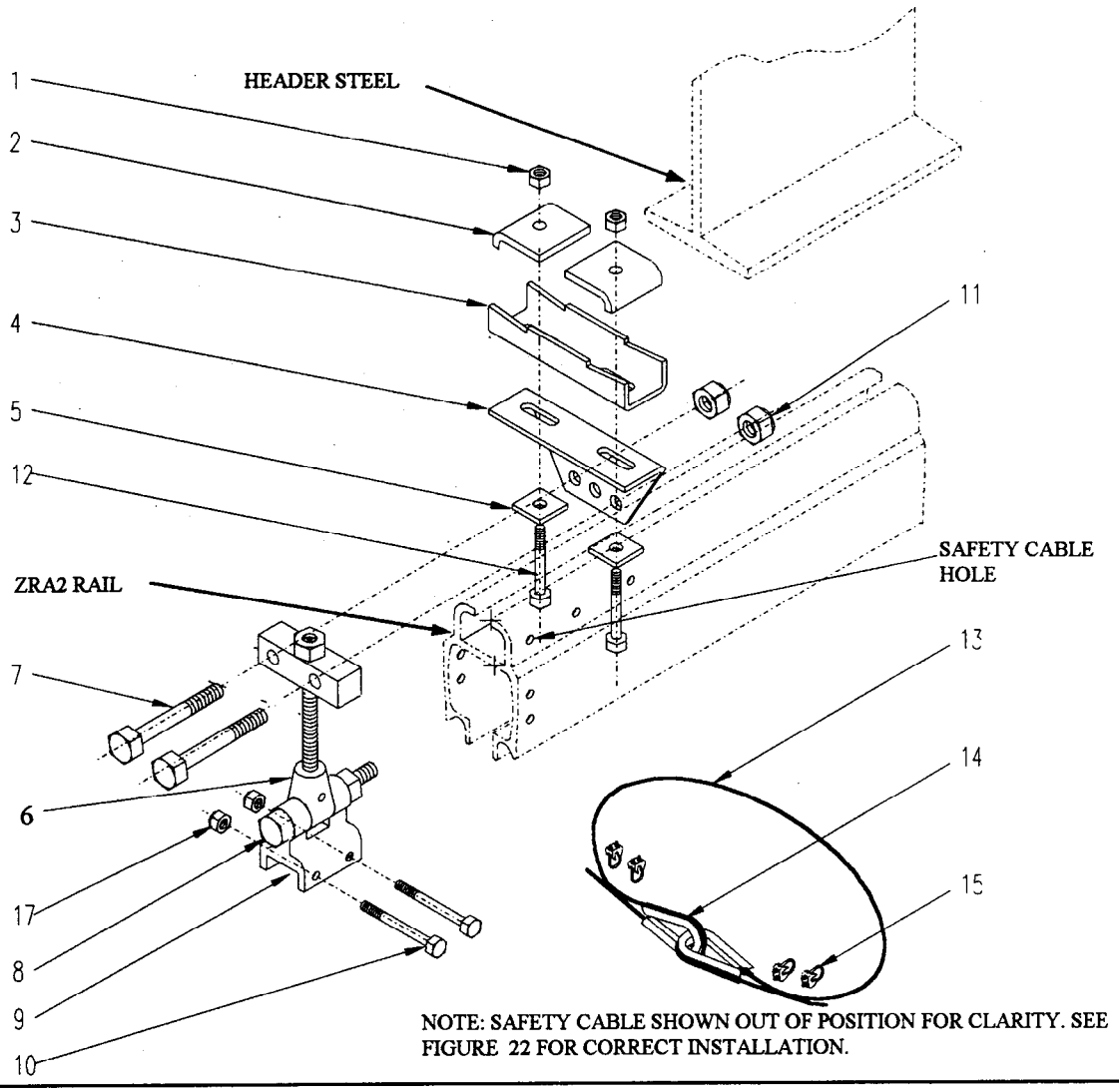
ZRA2 RUNWAY, ADJUSTABLE HANGER KIT



NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

FIGURE 11 - HANGER KIT NUMBER 30195

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30190	ADJUSTMENT BLOCK ASS'Y.	1
7	72646	5/8-11 X 3 1/4" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	30165	RUNWAY SUSPENSION BRACKET	1
10	70967	5/16-18 X 3 1/4 BOLT	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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ZRS2 OR 3 RUNWAY, ADJUSTABLE HANGER KIT

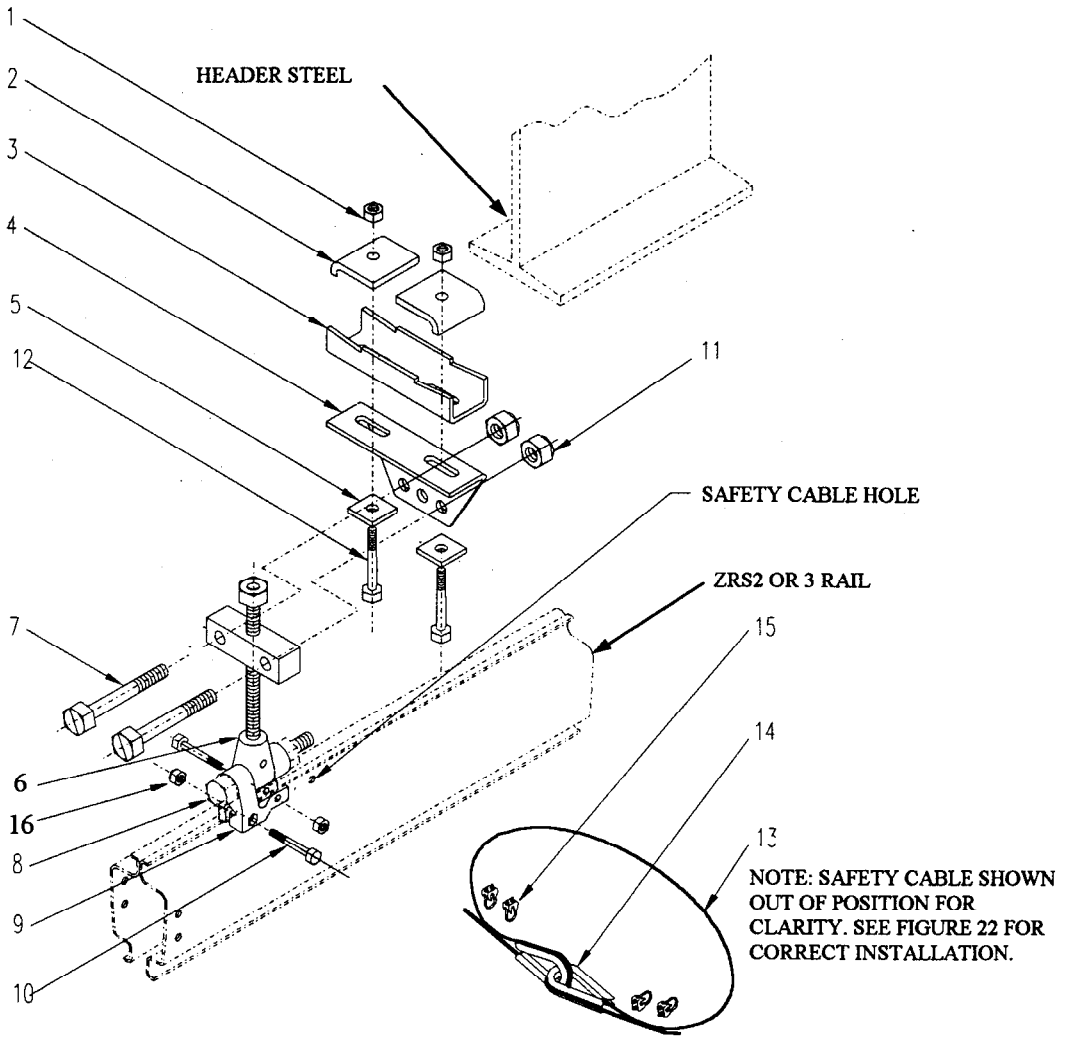

FIGURE 12 - HANGER KIT NUMBER 30814

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30091	BEAM CLAMP	1
4	30188	HANGER BRACKET	1
5	30094	SQ. WASHER	2
6	30190	ADJUSTMENT BLOCK ASS'Y.	1
7	72646	5/8-11 X 3 1/4" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	30801	RUNWAY HANGER BRACKET	2
10	70967	5/16-18 X 3 1/4 BOLT	2
11	75587	5/8-11 LOCK NUT	3
12	72047	1/2-13 X 4" BOLT	2
13	10099	1/4" WIRE ROPE	1
14	10212	THIMBLE	2
15	10235	WIRE ROPE CLAMP	4
16	75582	5/16-18 LOCK NUT	2

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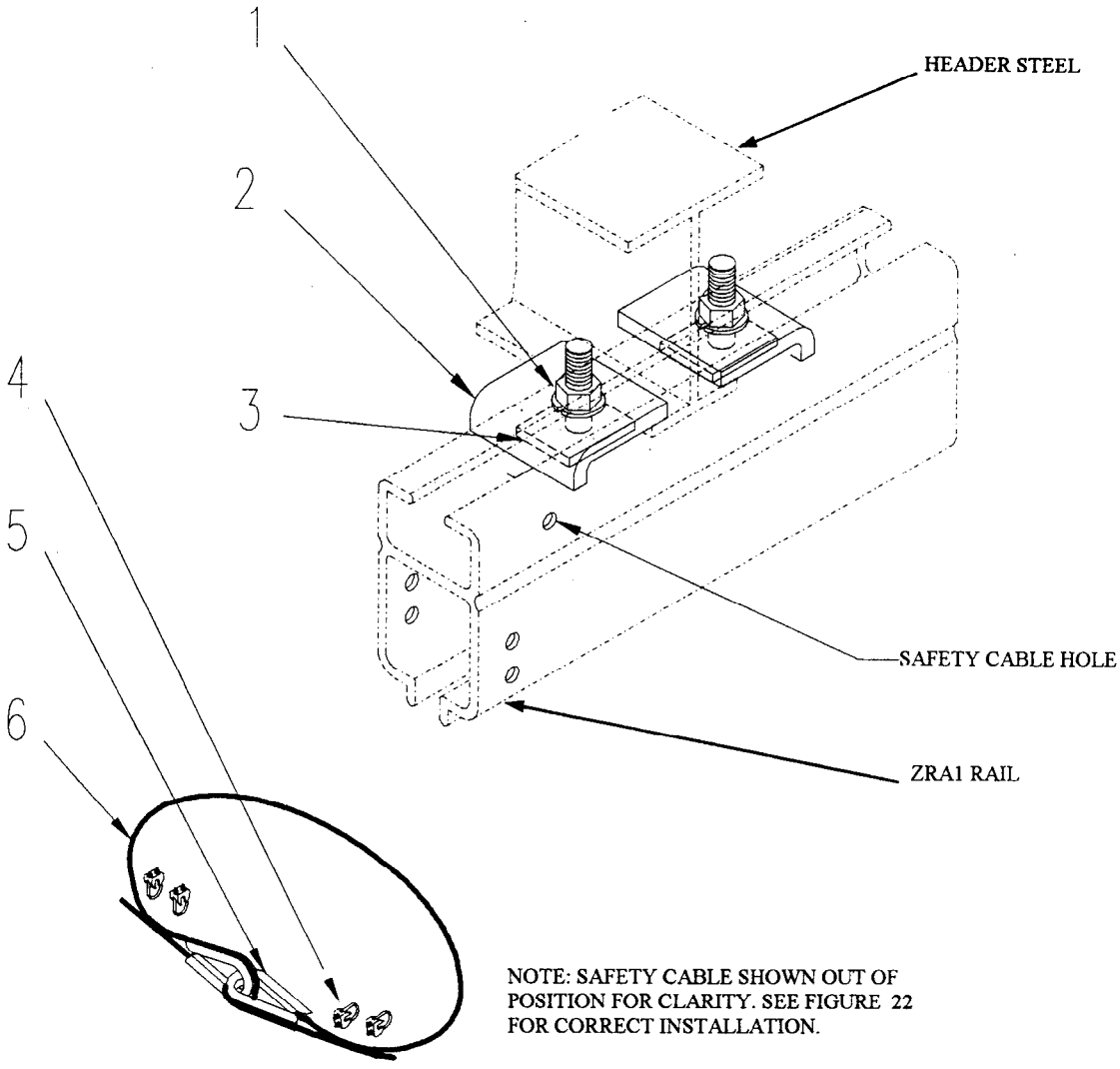
ZRA1 RUNWAY, RIGID MOUNT HANGER KIT



NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

FIGURE 13 - RIGID MOUNT HANGER KIT NUMBER 30227

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED LOCK NUT	2
2	30062	TOE CLAMP	2
3	30218	SUSPENSION PLATE ASS'Y.	2
4	10235	WIRE ROPE CLAMP	4
5	10212	THIMBLE	2
6	10099	1/4" WIRE ROPE	1

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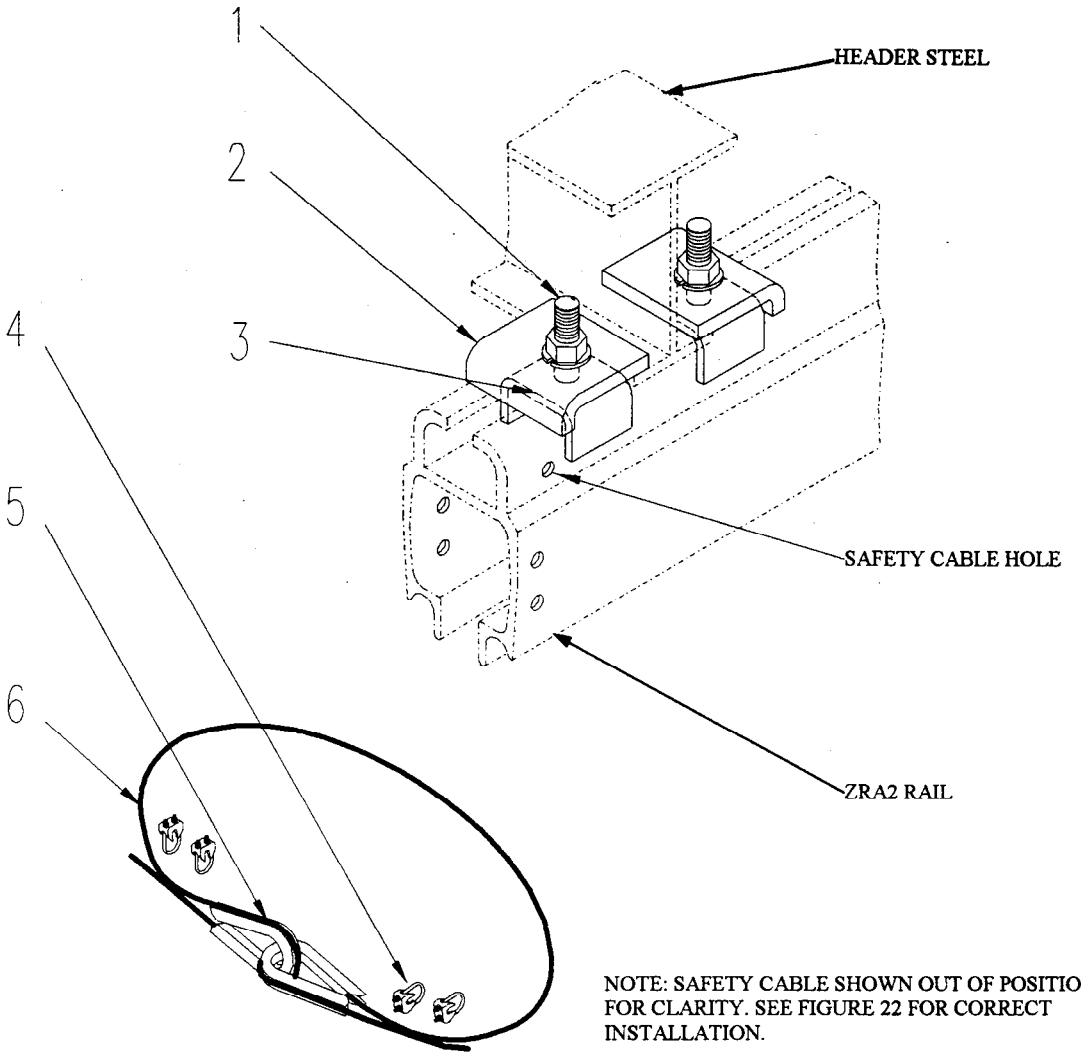
ZRA2 RUNWAY, RIGID MOUNT HANGER KIT



NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

FIGURE 14 - RIGID MOUNT HANGER KIT NUMBER 30052

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	75589	1/2-13 FLANGED NUT	2
2	30062	TOE CLAMP	2
3	30109	SUSPENSION PLATE ASS'Y.	2
4	10235	WIRE ROPE CLAMP	4
5	10212	THIMBLE	2
6	10099	1/4" WIRE ROPE	1

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ZRA2 RUNWAY HANGER KIT (PERPENDICULAR)

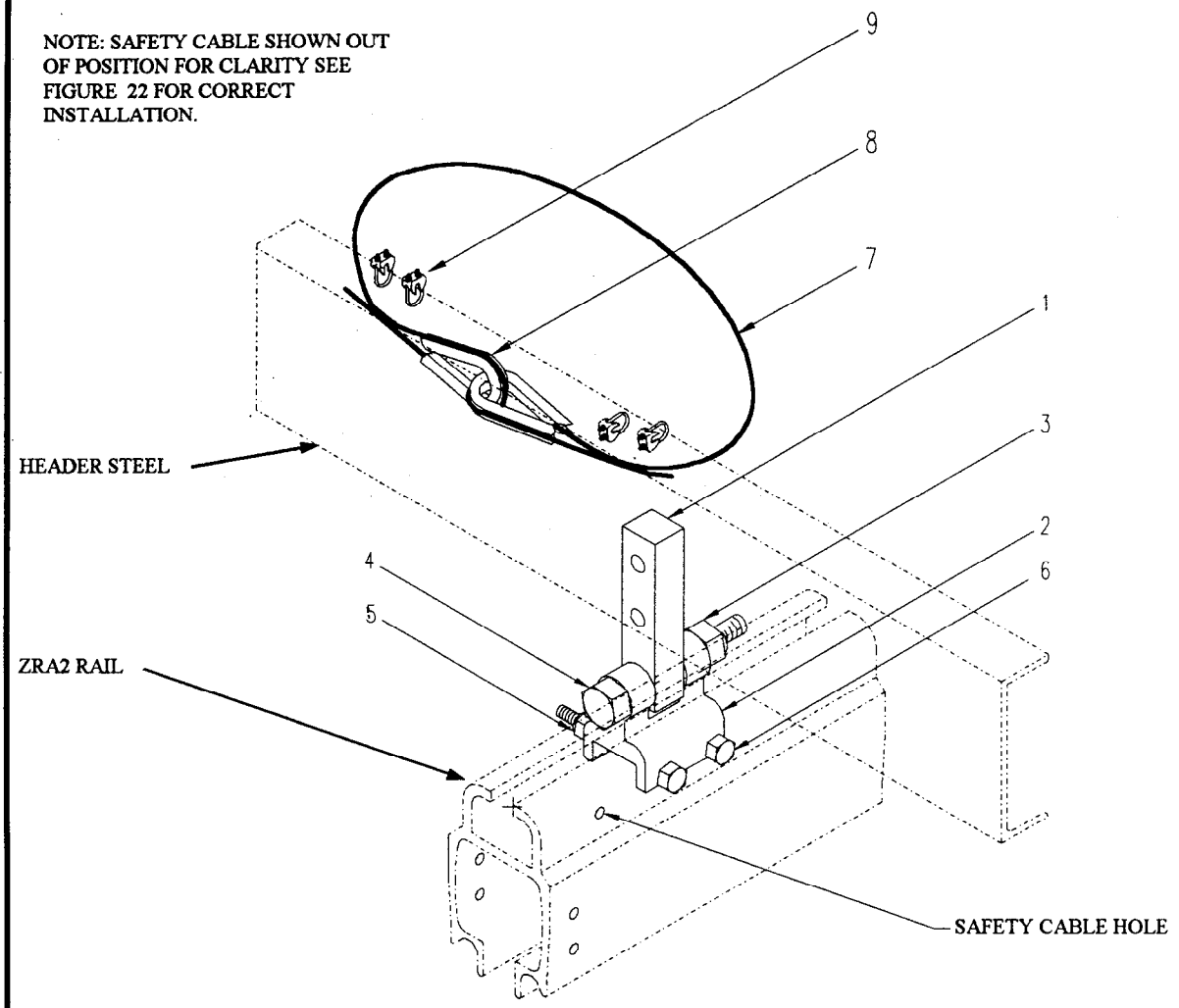

FIGURE 15 - RIGID MOUNT HANGER -NO. 30193

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30162	HANGER	1
2	30165	HANGER BRACKET	1
3	75587	5/8-11 LOCK NUT	1
4	72623	5/8-11 X 5" BOLT	1
5	75583	3/8-16 LOCK NUT	2
6	71481	3/8-16 X 4.50" BOLT	2
7	10099	1/4" WIRE ROPE	1
8	10212	THIMBLE	2
9	10235	WIRE ROPE CLAMP	4

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ZRA2 RUNWAY HANGER KIT (PARALLEL)

NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

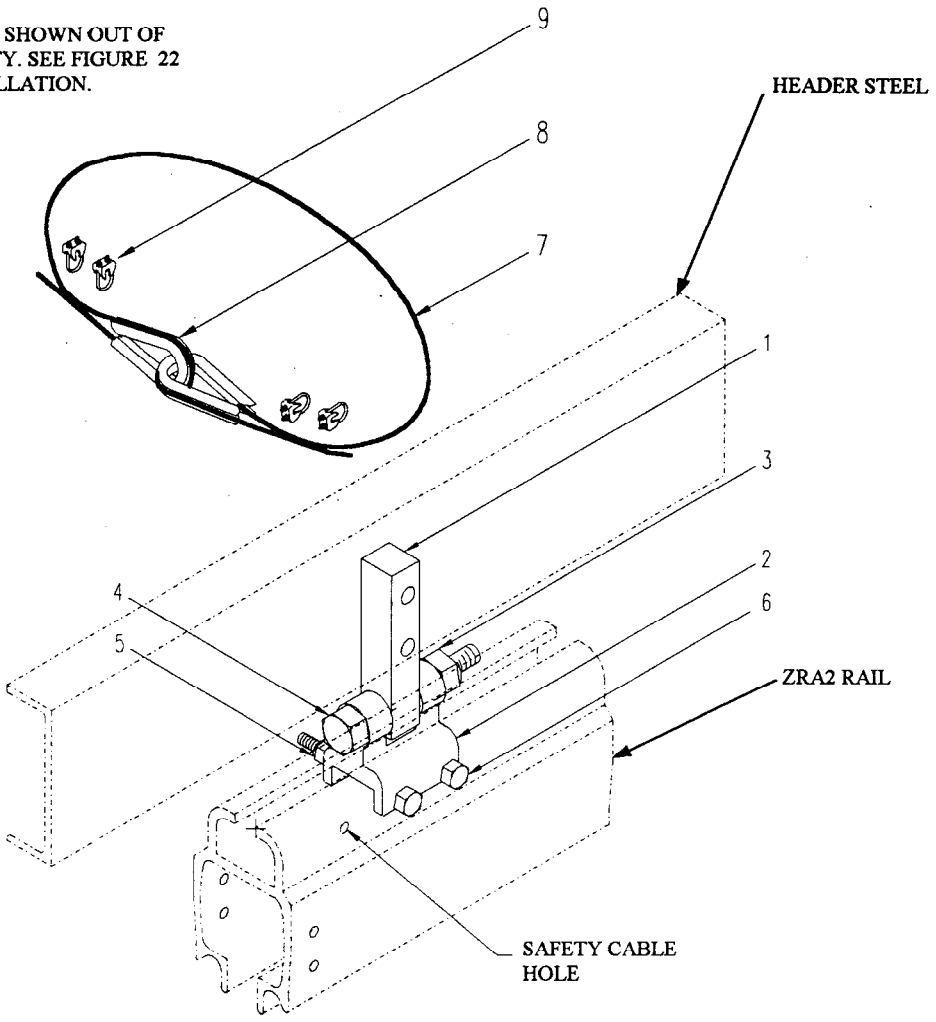

FIGURE 16 - RIGID MOUNT HANGER -NO. 30198

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30197	HANGER	1
2	30165	HANGER BRACKET	1
3	75587	5/8-11 LOCK NUT	1
4	72623	5/8-11 X 5" BOLT	1
5	75583	3/8-16 LOCK NUT	2
6	71481	3/8-16 X 4.50" BOLT	2
7	10099	1/4" WIRE ROPE	1
8	10212	THIMBLE	2
9	10235	WIRE ROPE CLAMP	4

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ZRS2 OR 3 RUNWAY (PERPENDICULAR)

NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

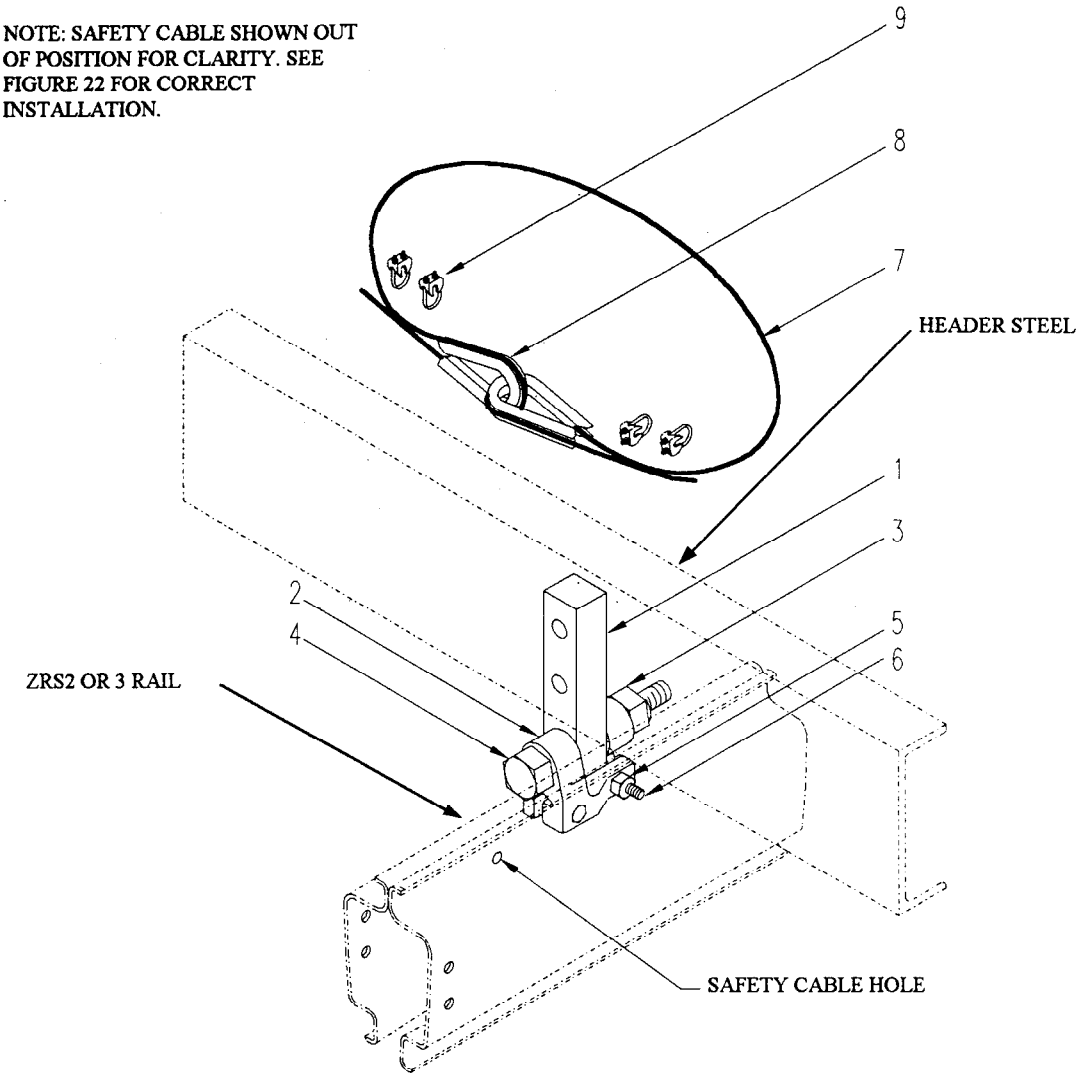

FIGURE 17 - RIGID MOUNT HANGER -NO. 30813

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30162	HANGER	1
2	30801	HANGER BRACKET	2
3	75587	5/8-11 LOCK NUT	1
4	72623	5/8-11 X 5" BOLT	1
5	75582	5/16-18 LOCK NUT	2
6	70967	5/16-18 X 2.25" BOLT	2
7	10099	1/4" WIRE ROPE	1
8	10212	THIMBLE	2
9	10235	WIRE ROPE CLAMP	4

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ZRS2 OR 3 RUNWAY (PARALLEL)

NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

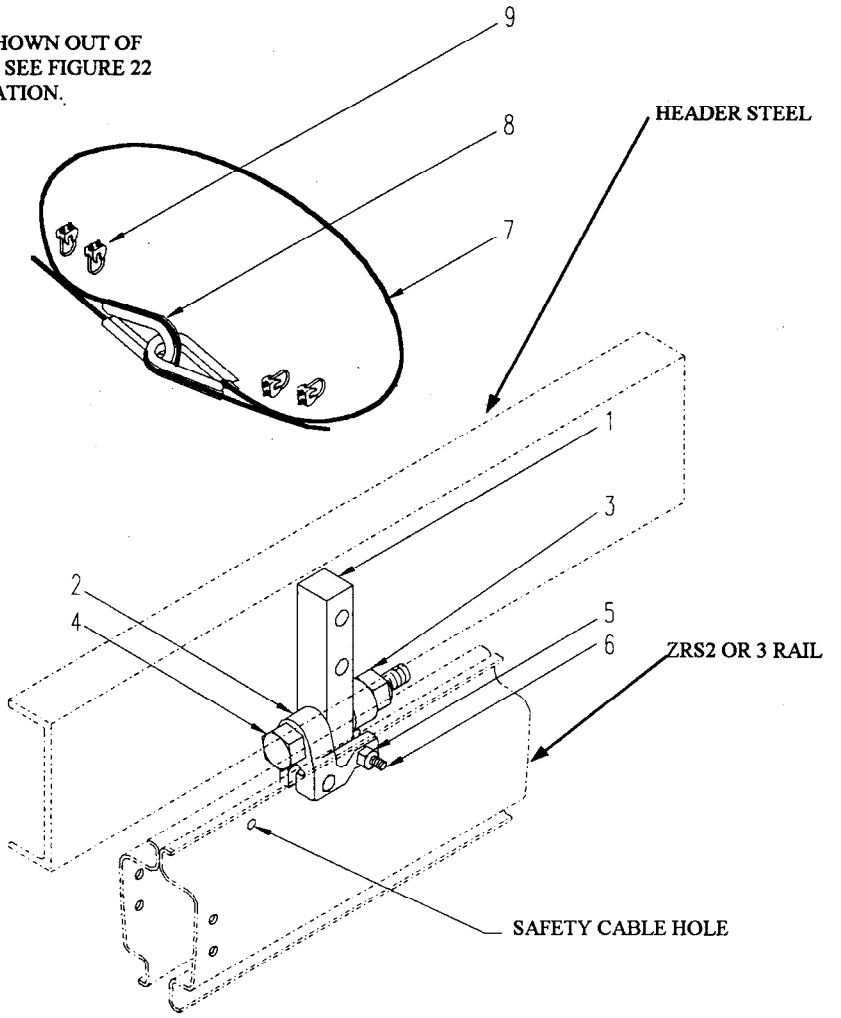

FIGURE 18 - RIGID MOUNT HANGER -NO. 30816

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30197	HANGER	1
2	30801	HANGER BRACKET	2
3	75587	5/8-11 LOCK NUT	1
4	72623	5/8-11 X 5" BOLT	1
5	75582	5/16-18 LOCK NUT	2
6	70967	5/16-18X 2.25" BOLT	2
7	10099	1/4" WIRE ROPE	1
8	10212	THIMBLE	2
9	10235	WIRE ROPE CLAMP	4

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After the suspension hardware is properly attached and securely bolted into place, safety cables must be installed. Route the wire rope through the hole in the rail and around the header steel as shown in Figure 22. Use the two thimbles to make interlocked connection and route the wire rope around the thimbles, then apply the first clamp one width from the dead end of the wire rope Snug the nuts, but do not tighten. Apply the second clamp adjacent to the thimble. Snug the nuts but, do not tighten. For maximum holding power they should be installed 6 to 7 times the dia. of the wire rope apart. Take up the slack buy applying tension to the thimble and cable, then tighten all nuts to the recommend torque. Safety cables will be installed to allow free movement of the hanger kit, yet provide minimum free drop of components if the primary support should fail. Figure 20, 21 and 22 show typical safety cable installations. **Cables must pass through hole in rail. (9/32 Dia. hole)**

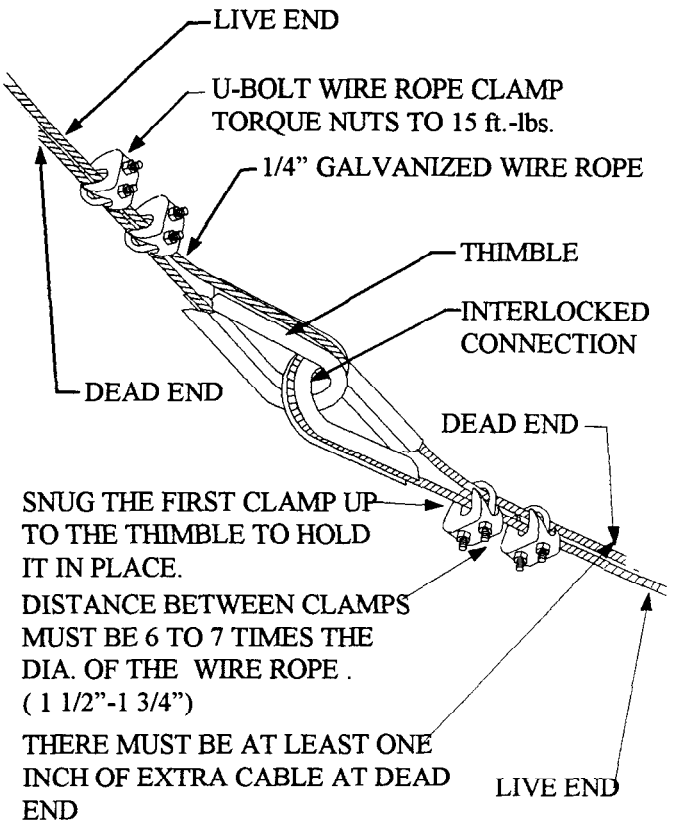

Figure # 19

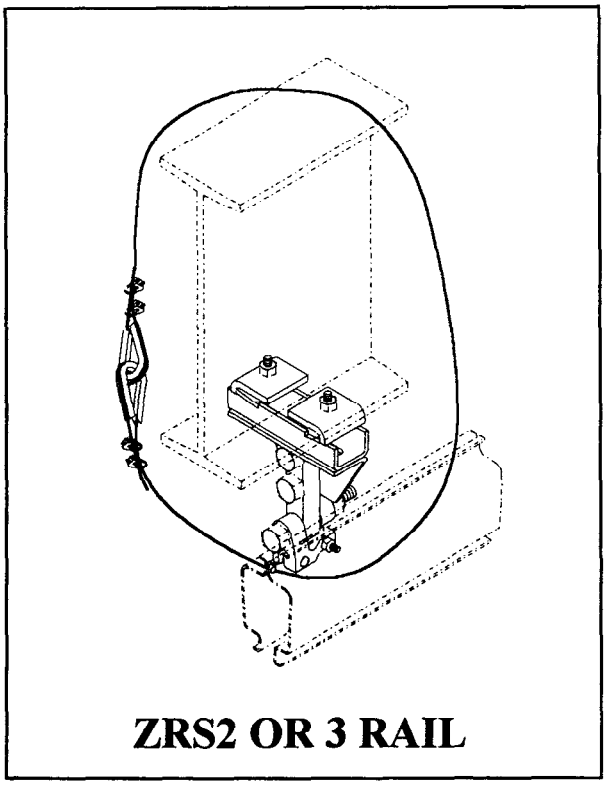

Figure # 21

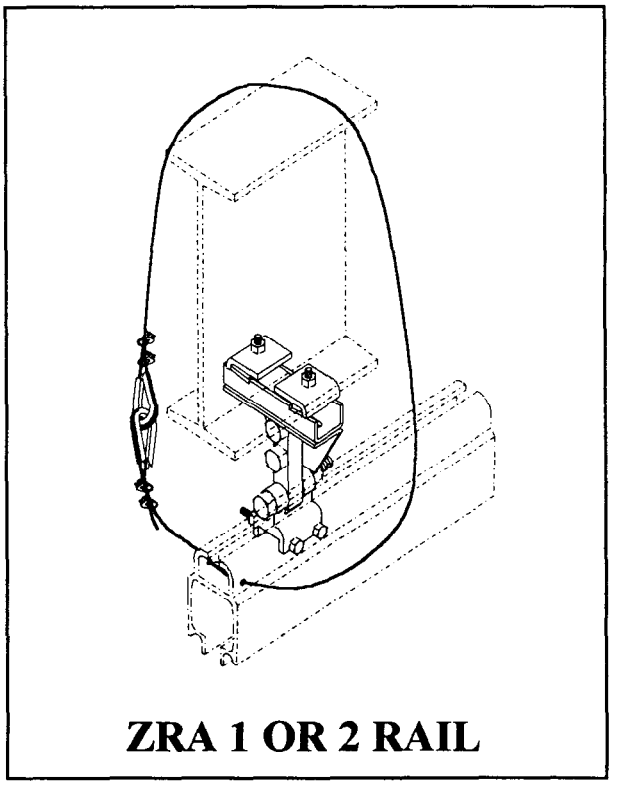

Figure # 20

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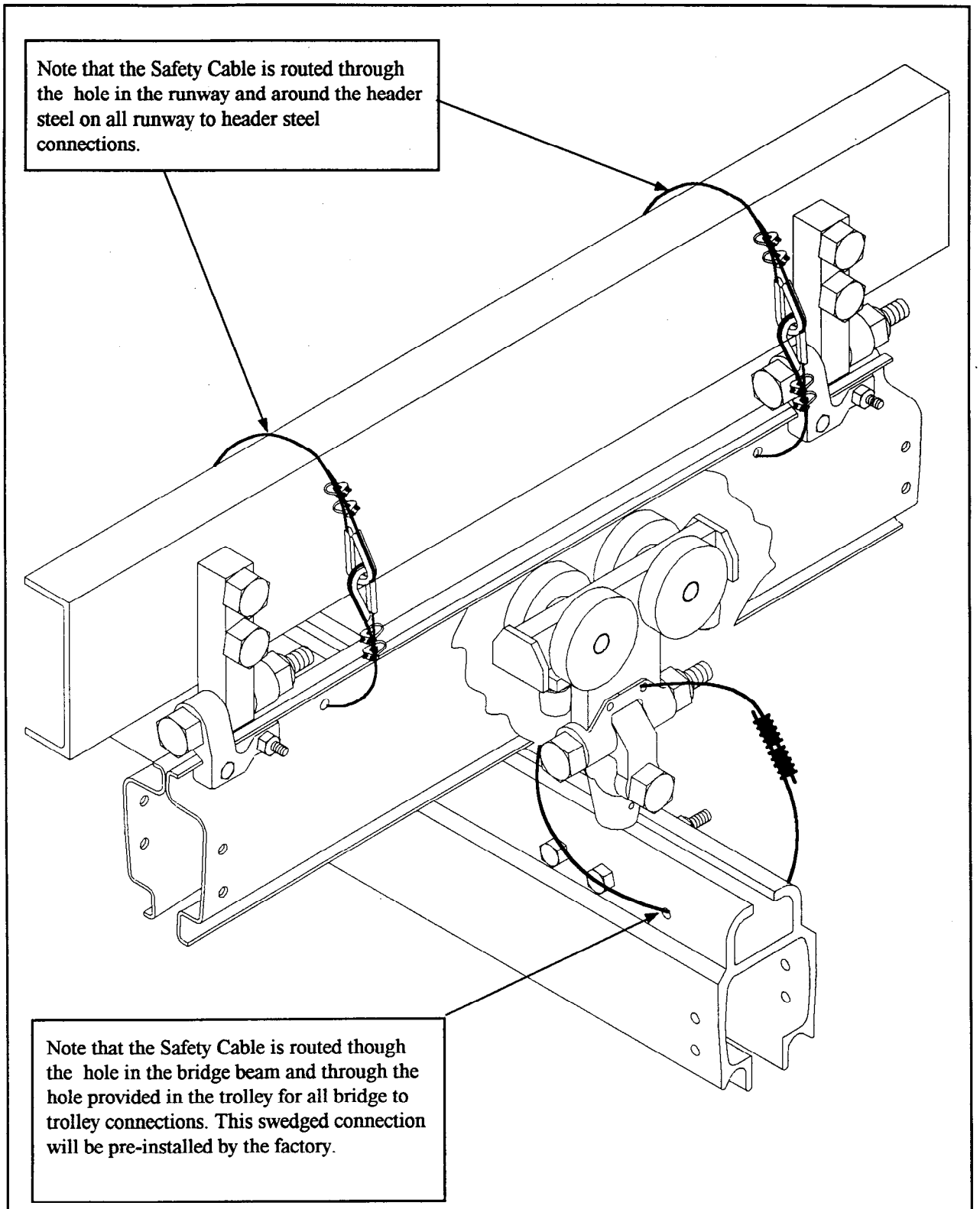

Figure # 22 Typical Safety Cable Installation

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3.2.2 Suspension Hardware with Cross Bracing

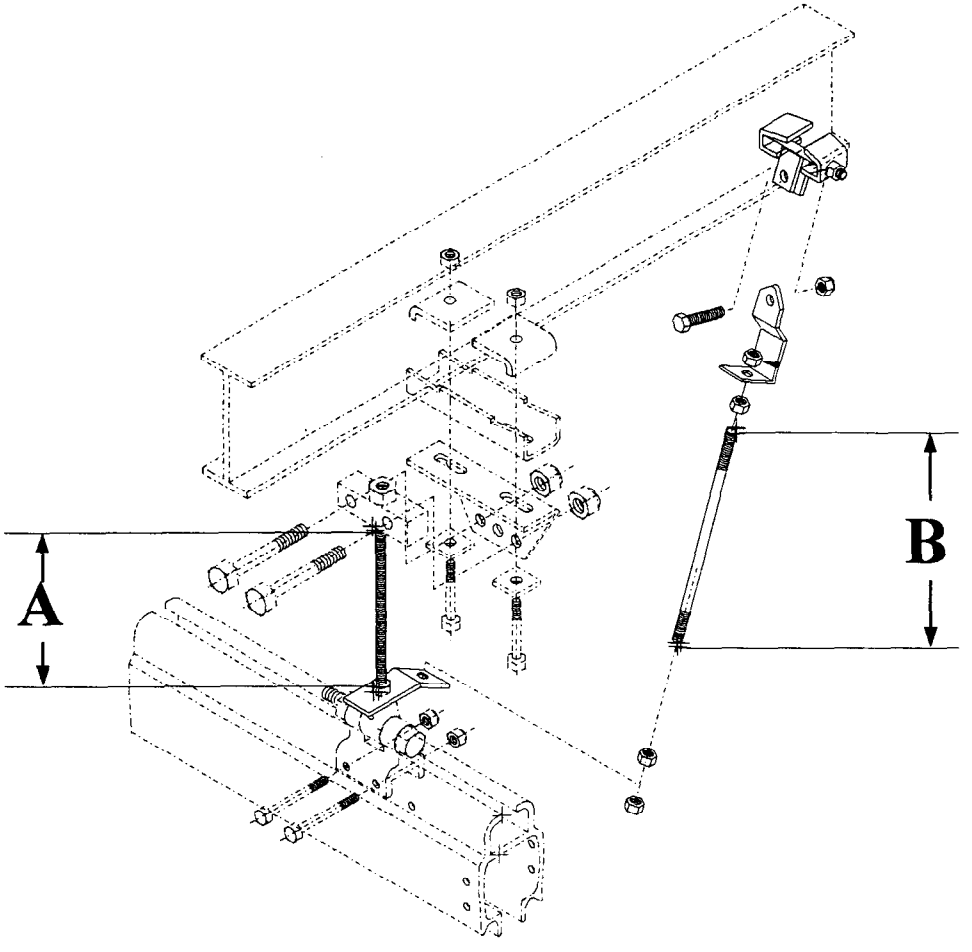

Figure 23

To eliminate sway in the rail system, suspension hardware with cross bracing (Figure 23) is required. This type of suspension hardware must be installed in opposing pairs because cross bracing can only absorb tensile loads. The cross bracing rod length is determined from vertical threaded rod length using the Suspension Cross Bracing table.

Suspension Cross Bracing Table

"A" Rod Length		"B" Rod Length	
in.	cm	in.	cm
24	61.0	32 1/8	81.6
30	76.2	40 1/4	102.2
36	91.4	48 5/16	122.7
48	121.9	64 7/16	163.7
60	152.4	80 9/16	204.6
72	182.8	96 11/16	245.6

NOTE :

Cross bracing is recommened when using vertical threaded rods that are 24 in. [61 cm] or greater in length.

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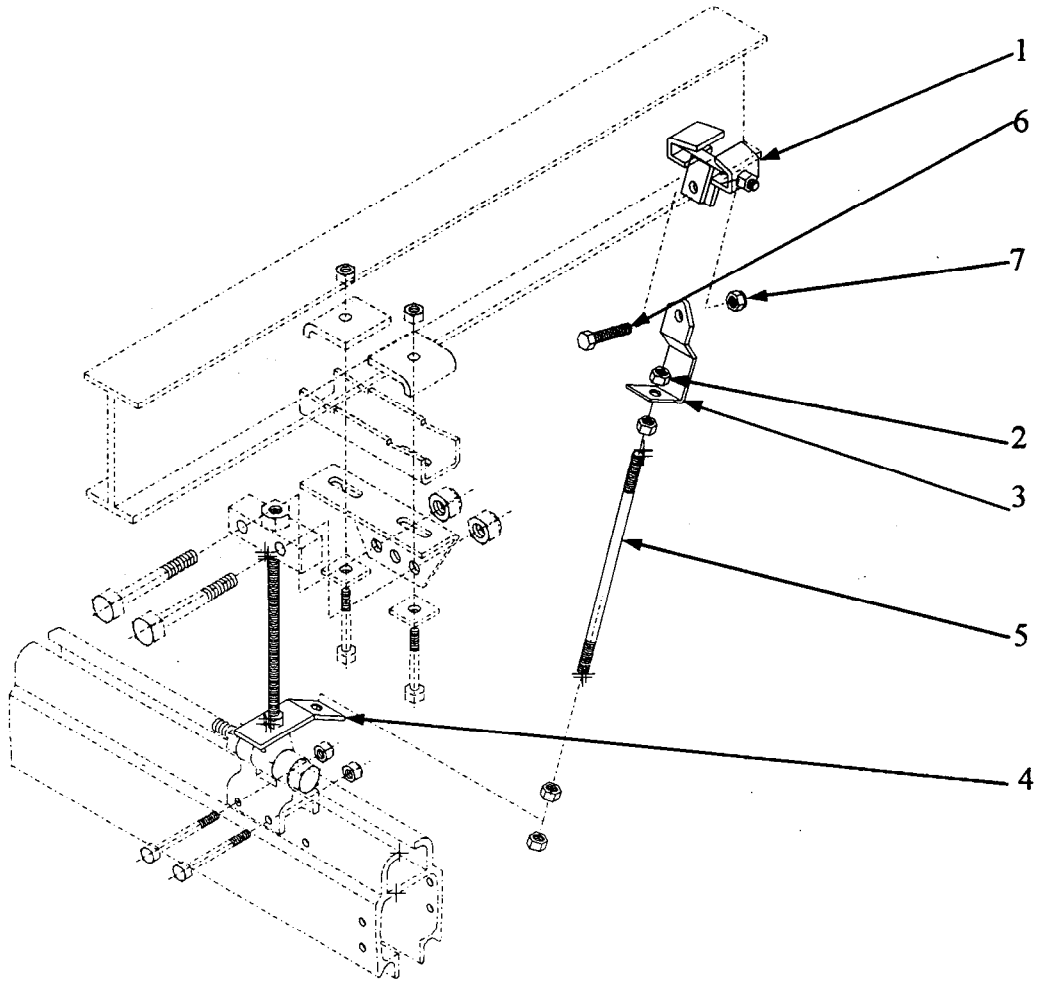


FIGURE 24 - CROSS BRACE KIT NUMBER 30081-(length)

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30098	BEAM CLAMP ASS'Y.	1
2	75558	1/2-13 JAM NUT	4
3	30099	HANGER BRACKET	1
4	30097	BRACING CONNECTOR	1
5	30522-3200	1/2-13 THREADED ROD - 32 1/8" lg.	1
-	30522-4000	1/2-13 THREADED ROD - 40 1/4" lg.	1
-	30522-4800	1/2-13 THREADED ROD - 48 5/16" lg.	1
-	30522-6400	1/2-13 THREADED ROD - 64 7/16" lg.	1
-	30522-8000	1/2-13 THREADED ROD - 80 9/16" lg.	1
-	30522-9600	1/2-13 THREADED ROD - 96 11/16" lg.	1
6	72021	1/2-13 X 1 3/4" BOLT	1
7	75512	1/2-13 LOCK NUT	1

3.2.3 Splice Lugs

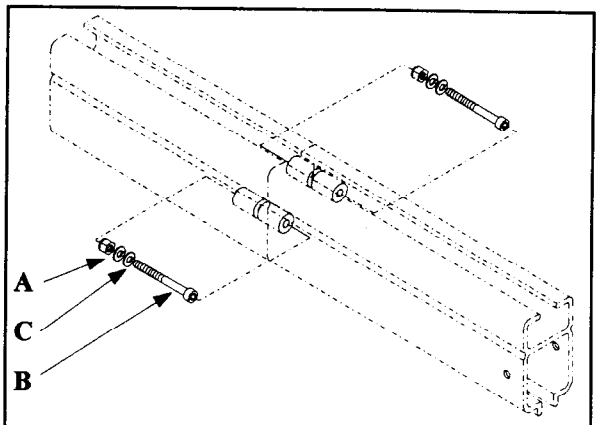
To extend a runway rail, splice lugs as shown in Figures 25, 26(aluminum) and 27 (steel) are used to connect two or more runways . Before connecting the rails with splice lugs, suspension locations must be determined for the extension rail and the hardware installed on the I-beam or support structure. Loosely install the suspension clamps in the corresponding positions on the rail(s). The runway can now be raised into position and attached to the I-beam or overhead structure.

⚠ WARNING

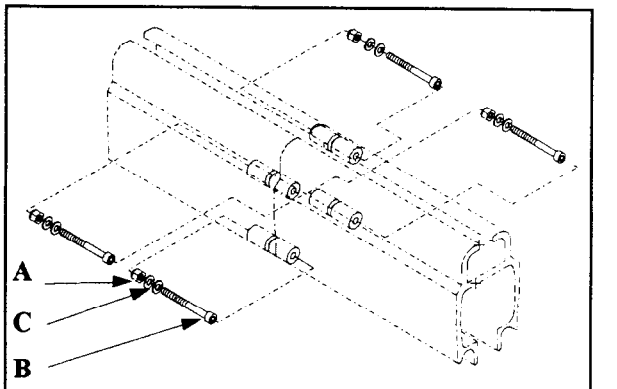
THERE MUST BE SUSPENSION CLAMP AND HANGER TO SUSPORT THE RAIL WITHIN 12 IN. [305 mm] OF THE SPLICE JOINT ON THE RUNWAY.

Butt the ends of the rail sections together and install bolts through the splice lugs. Securely tighten the splice bolts and lock nuts and ensure that the runway rails properly butt up against each other.

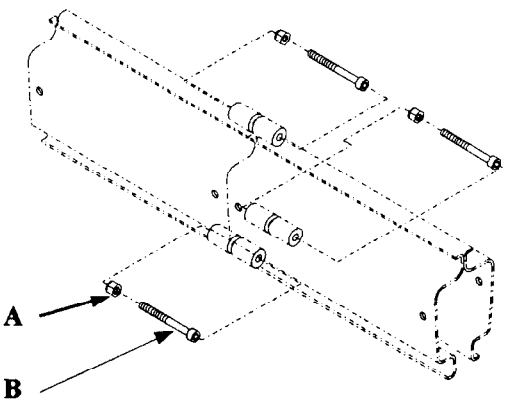
NOTE: Consult the factory if modifications need to be made to splice joints that require welding of splice lugs.



ZRA1 RAIL
Figure 25



ZRA2 RAIL
Figure 26



ZRS2 OR 3 RAIL
Figure 27

No.	Part Description	Qty.
	FIGURE 25	
A-75518	5/16-18 LOCK NUT	2
B-70926	5/16-18 X 3 1/2 S.H.C.S.	2
C-74505	5/16 FLAT WASHER	4
	FIGURE 26	
A-75518	5/16-18 LOCK NUT	4
B-70926	5/16-18 X 3 1/2 S.H.C.S.	4
C-74505	5/16 FLAT WASHER	8
	FIGURE 27	
A-75532	7/16-14 LOCK NUT	3
B-71910	7/16-14 x 4 S.H.C.S.	3

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3.2.4 End Stops

End stops (Figure 28) are attached to the ends of runway rail and bridge crane beams. They are held in place by two bolts through the side of rail, and secured on the opposite side by a self-locking nut. Tighten nuts until they contact the rail.

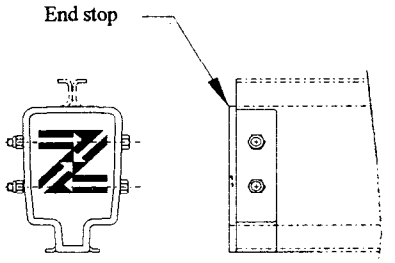

Figure 28

CAUTION

DO NOT USE END STOPS TO POSITION A LOAD. CONTINUOUS COLLISIONS WITH END STOPS CAN CAUSE EXCESSIVE WEAR OF SUSPENSION COMPONENTS. KEEP HAND-PUSHED LOADS UNDER CONTROL AT ALL TIMES TO AVOID IMPACTING THE END STOPS.

Also available for the rail systems are redundant end stops as shown in Figure 29. This creates an end stop for rail systems requiring more safety precautions.

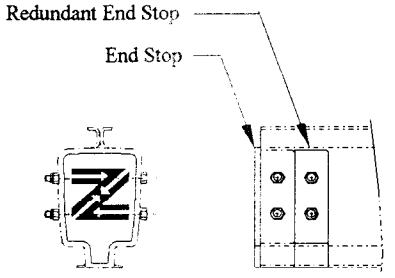

Figure 29

PART NO.	DESCRIPTION
	STEEL RAIL
30804	ZRS2 END STOP
30806	ZRS2 REDUNDANT END STOP
30808	ZRS3 END STOP
30810	ZRS3 REDUNDANT END STOP
	ALUMINUM RAIL
30275	ZRA1 END STOP
30277	ZRA1 REDUNDANT END STOP
30183	ZRA2 END STOP
30185	ZRA2 REDUNDANT END STOP

3.3 Alignment

Zimmerman International Corp. Rail Systems must be installed level and parallel - as described in these instructions. Failure to comply with these specifications voids the warranty and will usually result in accelerated component wear and possibly complete component failure.

A. Longitudinal leveling, systems with multiple runways and single rail systems shall be level to within 0.250" in overall length. The maximum rate of change shall be no more than 0.1250" on 20' centers.

B. Elevation (runway to runway), bridge systems shall be level to within 0.250" in span of the bridge. The maximum rate of change shall be no more than 0.1250" on 20' rail centers.

C. Centering runway to runway shall be within 0.250" in overall length of the system. The maximum rate of change shall be no more than 0.1250" on 20' rail centers.

D. Centering for single rail, systems which are parallel to a conveyor or work station shall be centered to the parallel delivery system to within +or - 0.500" in overall length of the monorail system. The maximum rate of change shall be no more than 0.125" on 20' centers.

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3.4 Bridge Crane End Truck Assembly (single girder)

Suspension hardware is pre-assembled at the factory and safety cables will be installed on all trolley to bridge connections. Exploded views are provided for clarity.

End Truck Connection Kits

Kit number	Page number	Figure number	Description
30283	27	30	Single trolley ZRA1 bridge on ZRA1 runway
30176	28	31	Single trolley ZRA2 bridge on ZRA2 runway
30597	29	32	Single trolley ZRS2 bridge on ZRS2 runway
30822	30	33	Single trolley ZRA1 bridge on ZRS2 runway
30824	31	34	Single trolley ZRA2 bridge on ZRS2 runway
30286	32	35	Dual trolley ZRA1 bridge on ZRA1 runway
30177	33	36	Dual trolley ZRA2 bridge on ZRA2 runway
30599	34	37	Dual trolley ZRS2 bridge on ZRS2 runway
30826	35	38	Dual trolley ZRA1 bridge on ZRS2 runway
30828	36	39	Dual trolley ZRA2 bridge on ZRS2 runway

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SINGLE TROLLEY ZRA1 BRIDGE ON ZRA1 RUNWAY

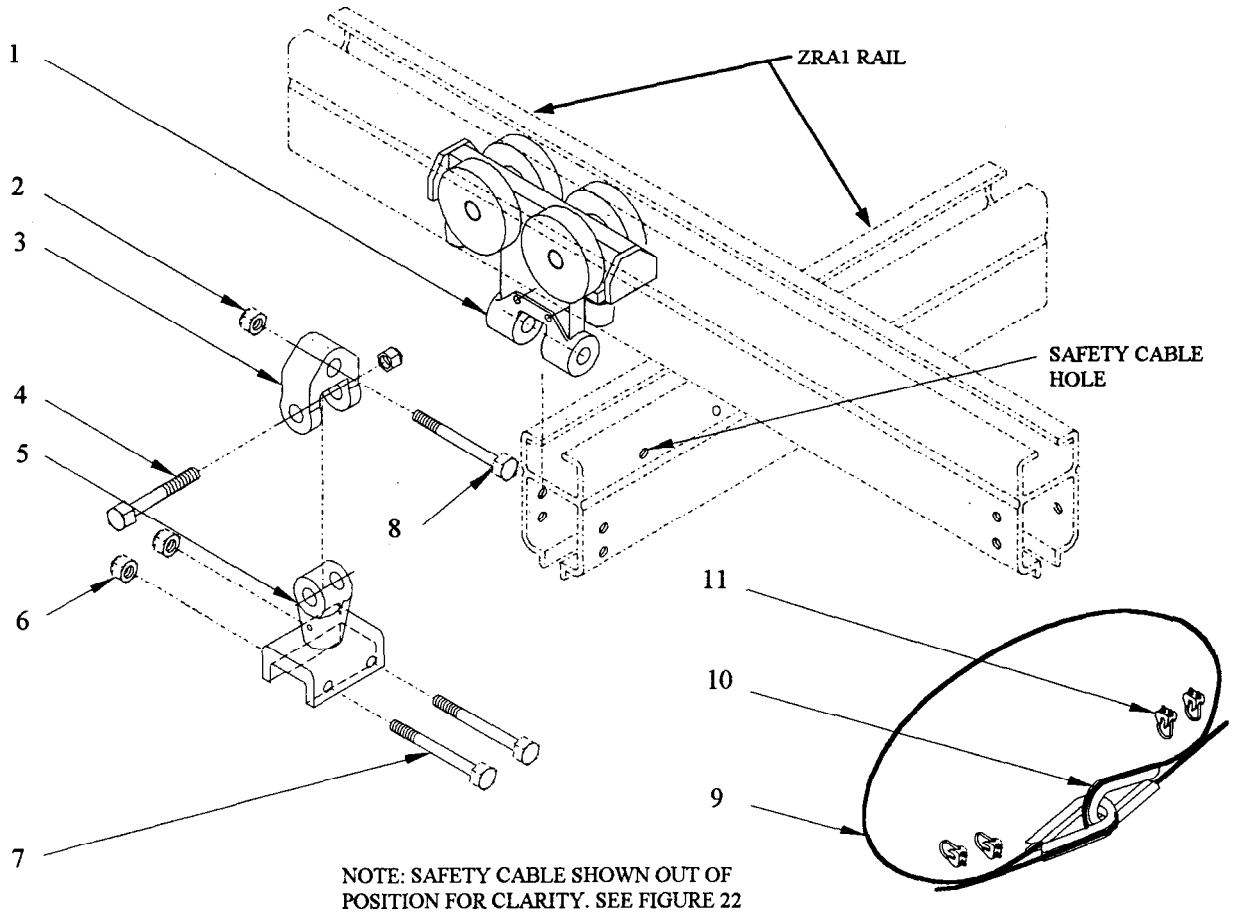

FIGURE 30 - SINGLE END TRUCK -NUMBER 30283

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30281	ZRA1 TROLLEY	1
2	75587	5/8-11 LOCK NUT	2
3	30166	FEMALE CLEVIS	1
4	72644	5/8-11 X 4" BOLT	1
5	30282	BRIDGE SUSPENSION ASS'Y	1
6	75582	5/16-18 LOCK NUT	2
7	70968	5/16-18 X 3.25" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	10099	1/4" WIRE ROPE	1
10	10212	THIMBLE	2
11	10235	WIRE ROPE CLAMP	4

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SINGLE TROLLEY ZRA2 BRIDGE ON ZRA2 RUNWAY

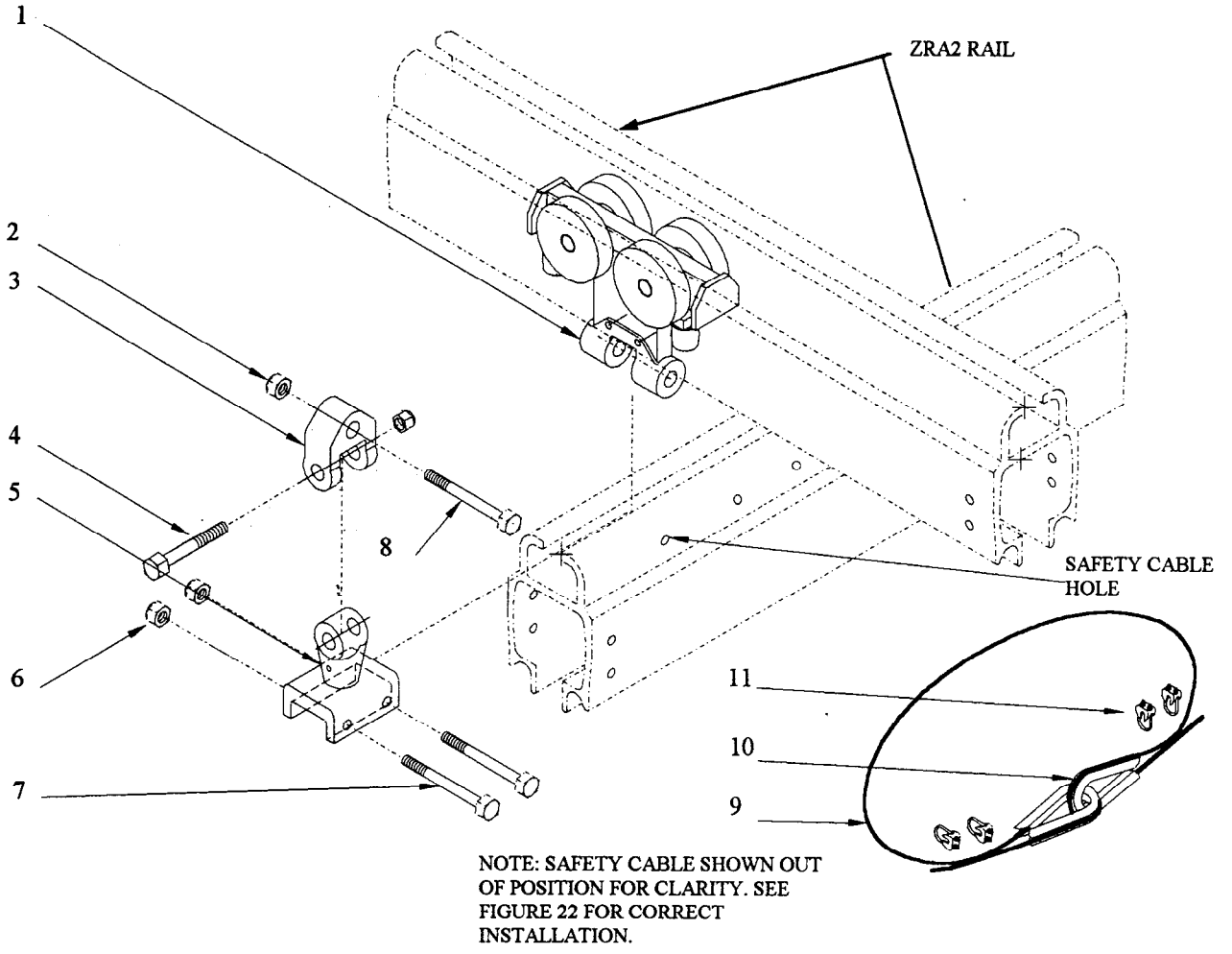

FIGURE 31 - SINGLE END TRUCK -NUMBER 30176

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30172	ZRA2 TROLLEY	1
2	75587	5/8-11 LOCK NUT	2
3	30166	FEMALE CLEVIS	1
4	72644	5/8-11 X 4" BOLT	1
5	30175	BRIDGE SUSPENSION ASS'Y	1
6	75582	5/16-18 LOCK NUT	2
7	71481	3/8-16 X 4 .50" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	10099	1/4" WIRE ROPE	1
10	10212	THIMBLE	2
11	10235	WIRE ROPE CLAMP	4

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SINGLE TROLLEY ZRS2 BRIDGE ON ZRS2 RUNWAY

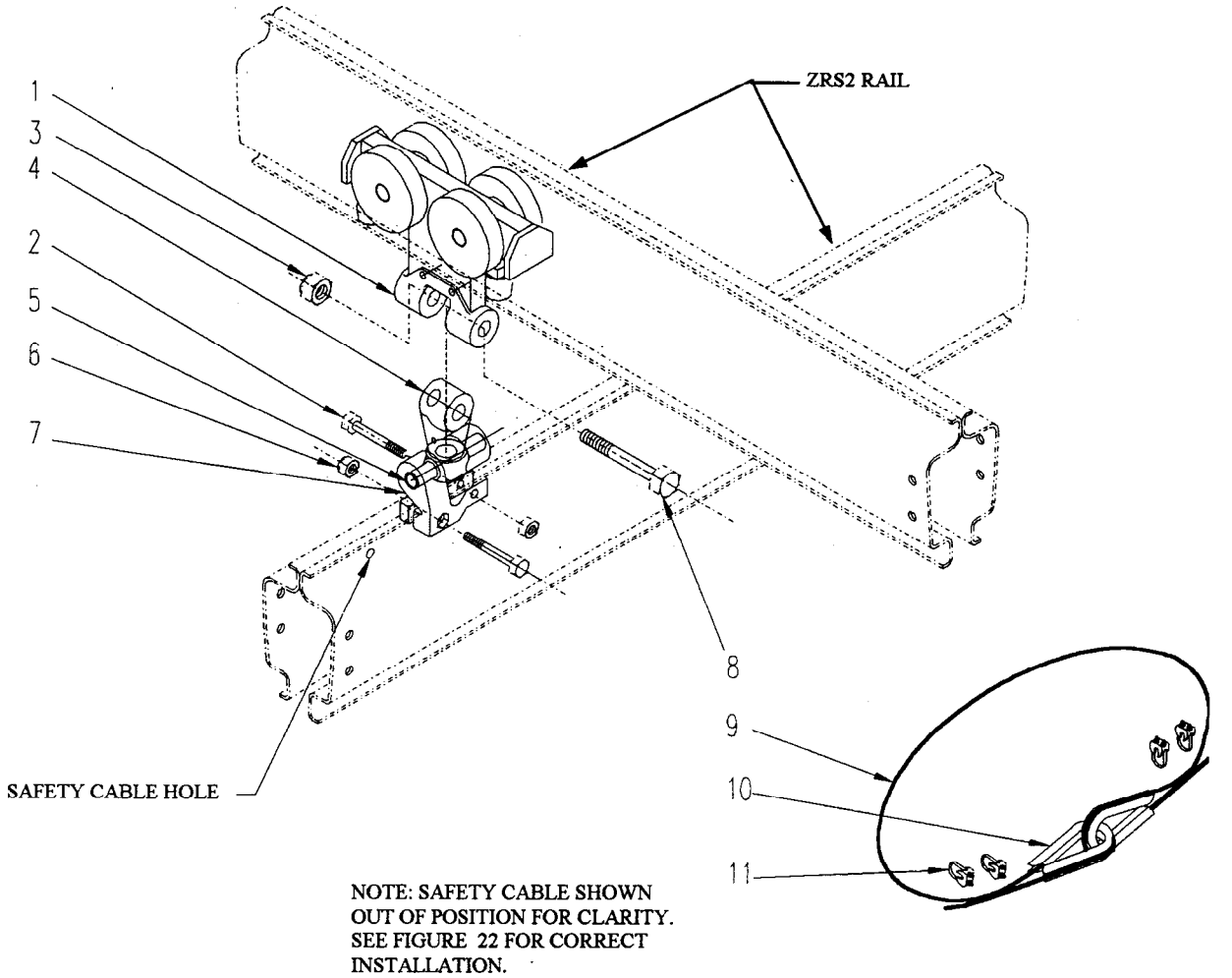

FIGURE 32 - SINGLE END TRUCK -NUMBER 30597

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30821	ZRS2 TROLLEY	1
2	72623	5/16-18 X 2.25" BOLT	2
3	75587	5/8-11 LOCK NUT	1
4	30163	MALE CLEVIS	1
5	30802	GIMBAL	1
6	75582	5/16-18 LOCK NUT	2
7	30801	HANGER BRACKET	2
8	72623	5/8-11 X 5" BOLT	1
9	10099	1/4" WIRE ROPE	1
10	10212	THIMBLE	2
11	10235	WIRE ROPE CLAMP	4

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SINGLE TROLLEY ZRA1 BRIDGE ON ZRS2 RUNWAY

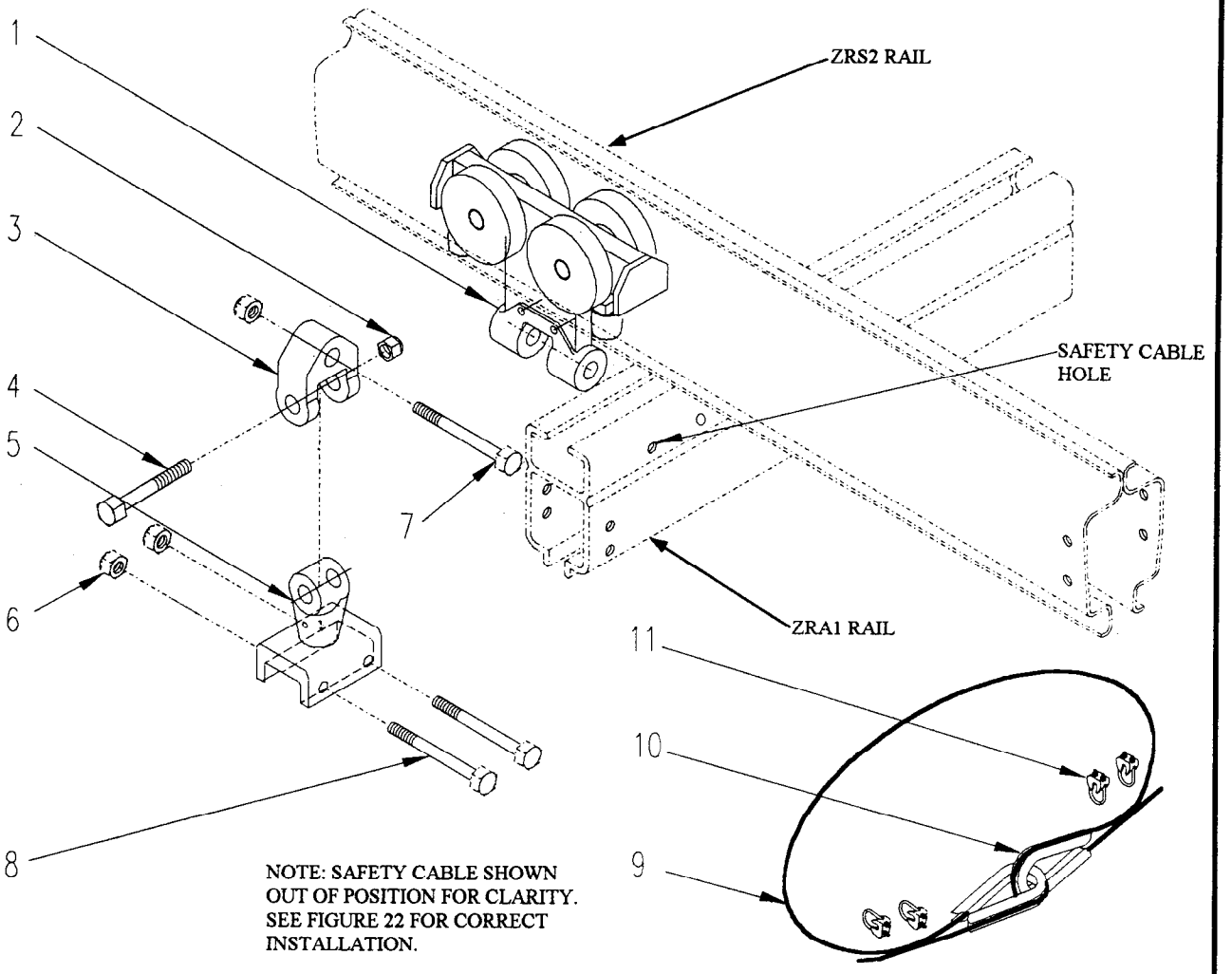

FIGURE 33 - SINGLE END TRUCK -NUMBER 30822

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30821	ZRS2 TROLLEY	1
2	75587	5/8-11 LOCK NUT	2
3	30166	FEMALE CLEVIS	1
4	72644	5/8-11 X 4" BOLT	1
5	30282	BRIDGE SUSPENSION ASS'Y.	1
6	75582	5/16-18 LOCK NUT	2
7	72623	5/8-11 X 5.00" BOLT	1
8	72644	5/16-18 X 4.00" BOLT	2
9	10099	1/4" WIRE ROPE	1
10	10212	THIMBLE	2
11	10235	WIRE ROPE CLAMP	4

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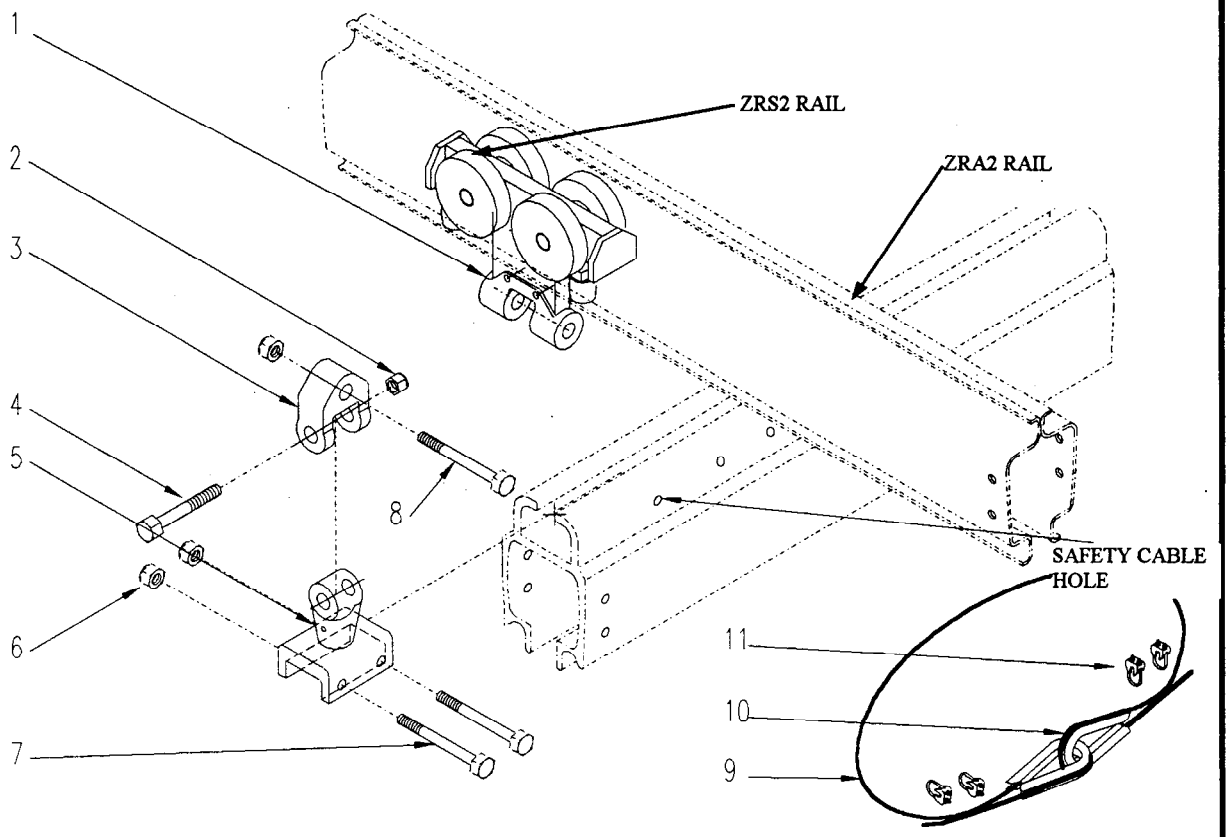
SINGLE TROLLEY ZRA2 BRIDGE ON ZRS2 RUNWAY



NOTE: SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

FIGURE 34 - SINGLE END TRUCK -NUMBER 30824

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30821	ZRS2 TROLLEY	1
2	75587	5/8-11 LOCK NUT	2
3	30166	FEMALE CLEVIS	1
4	72644	5/8-11 X 4" BOLT	1
5	30175	BRIDGE SUSPENSION ASS'Y	1
6	75582	5/16-18 LOCK NUT	2
7	70968	5/16-18 X 3.25" BOLT	2
8	72623	5/8-11 X 5" BOLT	1
9	10099	1/4" WIRE ROPE	1
10	10212	THIMBLE	2
11	10235	WIRE ROPE CLAMP	4

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DUAL TROLLEY ZRA1 BRIDGE ON ZRA1 RUNWAY

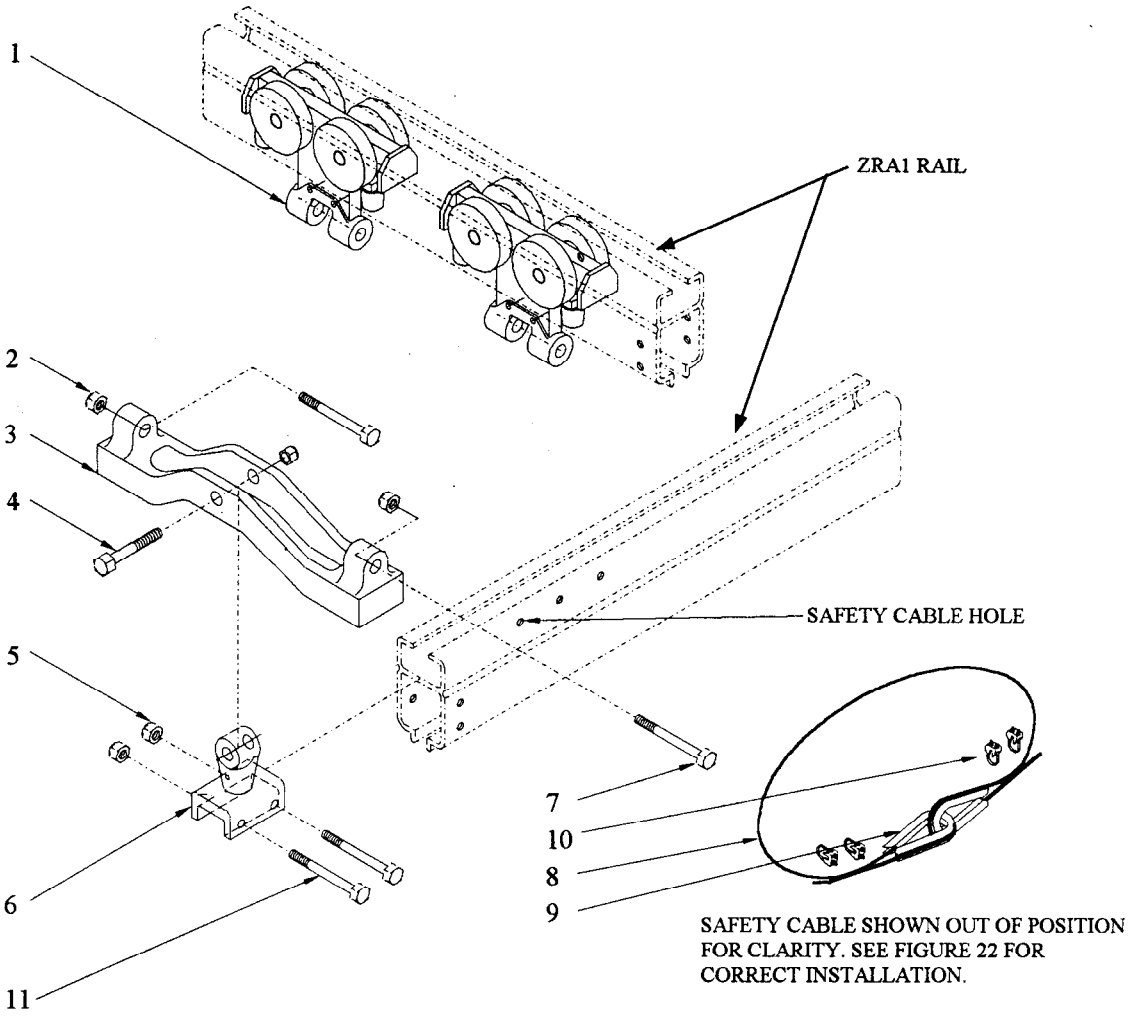

FIGURE 35 - DUAL END TRUCK -NUMBER 30286

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30281	ZRA1 TROLLEY	2
2	75587	5/8-11 LOCK NUT	3
3	30173	DUAL TROLLEY TIE BAR	1
4	72644	5/8-11 X 4" BOLT	1
5	75582	5/16-18 LOCK NUT	2
6	30282	BRIDGE SUSPENSION ASS'Y.	1
7	72623	5/8-11 X 5" BOLT	2
8	10099	1/4" WIRE ROPE	1
9	10212	THIMBLE	2
10	10235	WIRE ROPE CLAMP	4
11	70968	5/16-18 X 3.25" BOLT	2

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DUAL TROLLEY ZRA2 BRIDGE ON ZRA2 RUNWAY

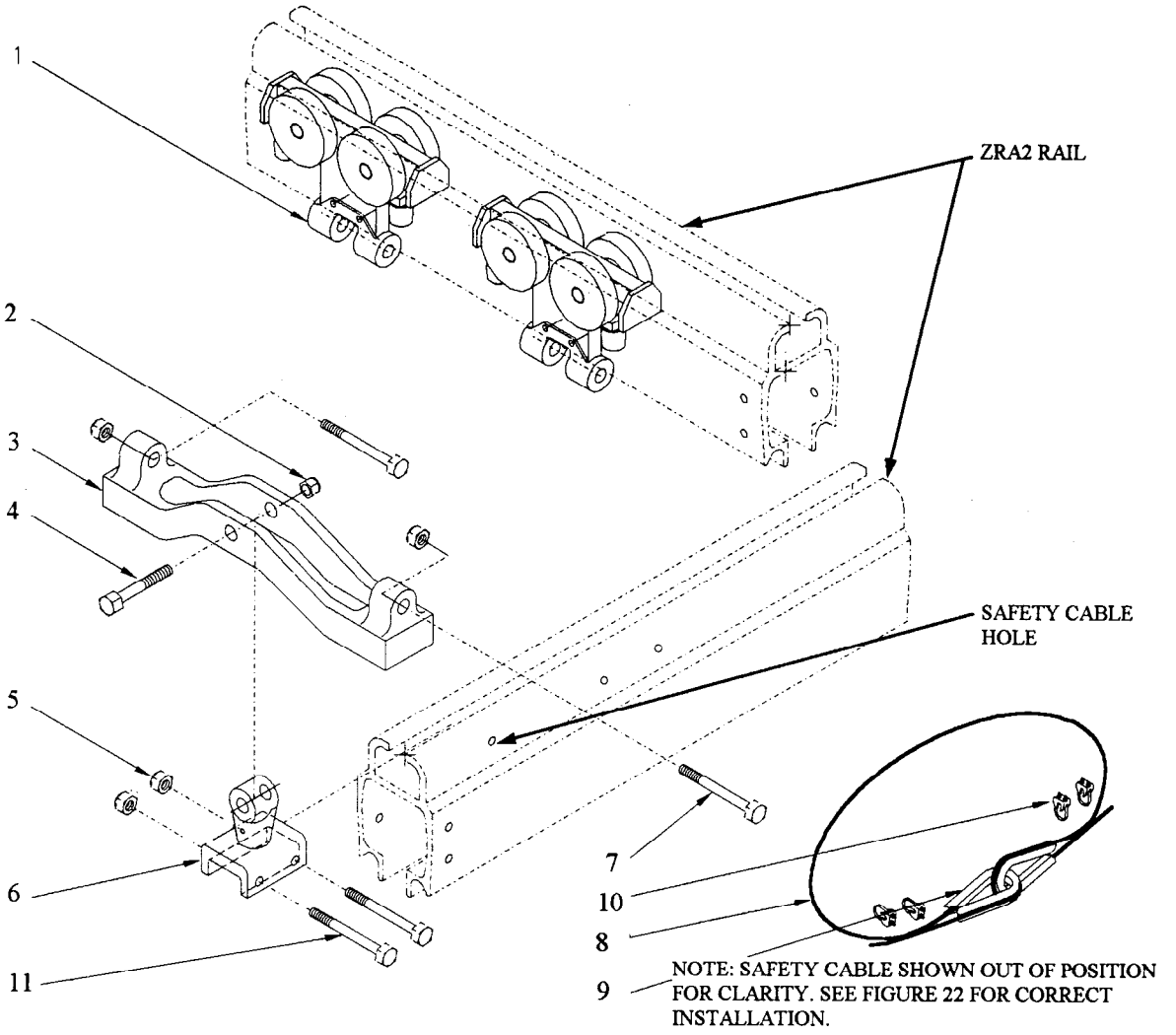

FIGURE 36 - DUAL END TRUCK -NUMBER 30177

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30172	ZRA2 TROLLEY	2
2	75587	5/8-11 LOCK NUT	3
3	30173	DUAL TROLLEY TIE BAR	1
4	72644	5/8-11 X 4" BOLT	1
5	75582	5/16-18 LOCK NUT	2
6	30175	BRIDGE SUSPENSION ASS'Y.	1
7	72623	5/8-11 X 5" BOLT	2
8	10099	1/4" WIRE ROPE	1
9	10212	THIMBLE	2
10	10235	WIRE ROPE CLAMP	4
11	70968	5/16-18 X 3.25" BOLT	2

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DUAL TROLLEY ZRS2 BRIDGE ON ZRS2 RUNWAY

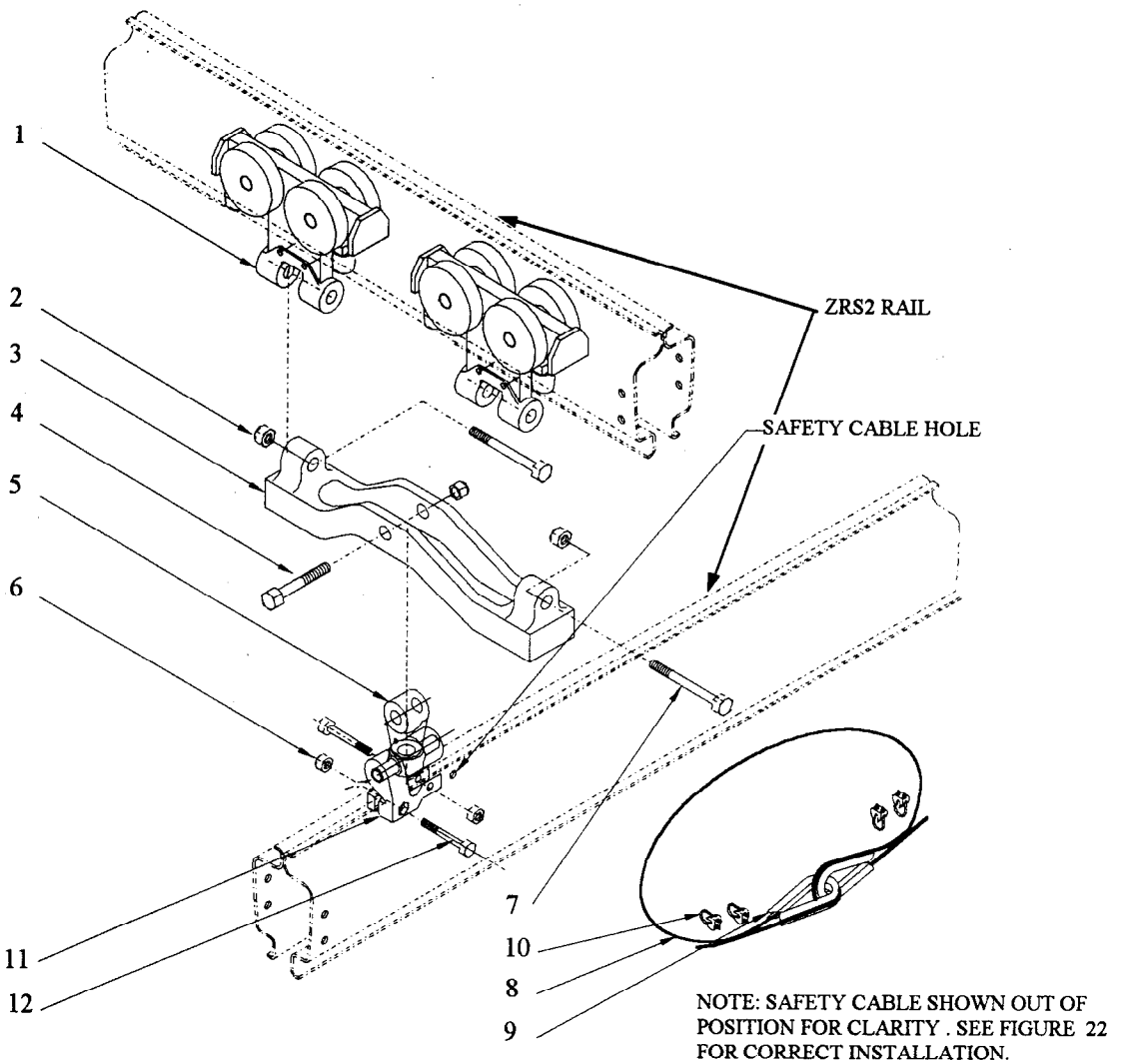

FIGURE 37 - DUAL END TRUCK -NUMBER 30599

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30821	ZRS2 TROLLEY	2
2	75587	5/8-11 LOCK NUT	3
3	30173	DUAL TROLLEY TIE BAR	1
4	72644	5/8-11 X 4" BOLT	1
5	30596	BRIDGE SUSPENSION ASS'Y.	1
6	75582	5/16-18 LOCK NUT	2
7	72623	5/8-11 X 5" BOLT	2
8	10099	1/4" WIRE ROPE	1
9	10212	THIMBLE	2
10	10235	WIRE ROPE CLAMP	4
11	30801	HANGER BRACKET	2
12	70967	5/16-18 X 2.25" BOLT	2

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DUAL TROLLEY ZRA1 BRIDGE ON ZRS2 RUNWAY

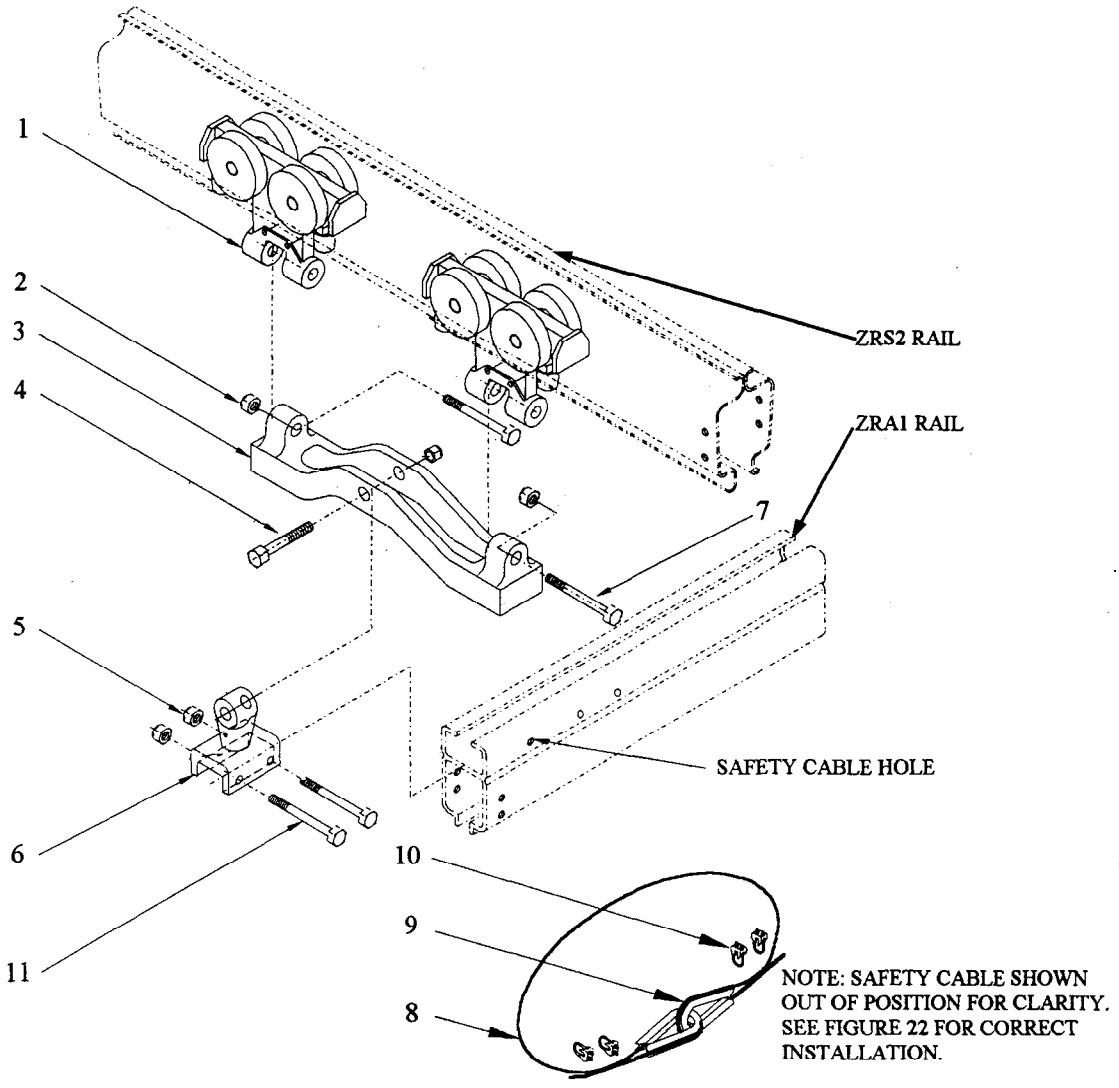

FIGURE 38 - DUAL END TRUCK -NUMBER 30826

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30821	ZRS2 TROLLEY	2
2	75587	5/8-11 LOCK NUT	2
3	30173	DUAL TROLLEY TIE BAR	1
4	72644	5/8-11 X 4" BOLT	1
5	75582	5/16-18 LOCK NUT	2
6	30282	BRIDGE SUSPENSION ASS'Y.	1
7	72623	5/8-11 X 5" BOLT	2
8	10099	1/4" WIRE ROPE	1
9	10212	THIMBLE	2
10	10235	WIRE ROPE CLAMP	4
11	70968	5/16-18 X 3.25" BOLT	2

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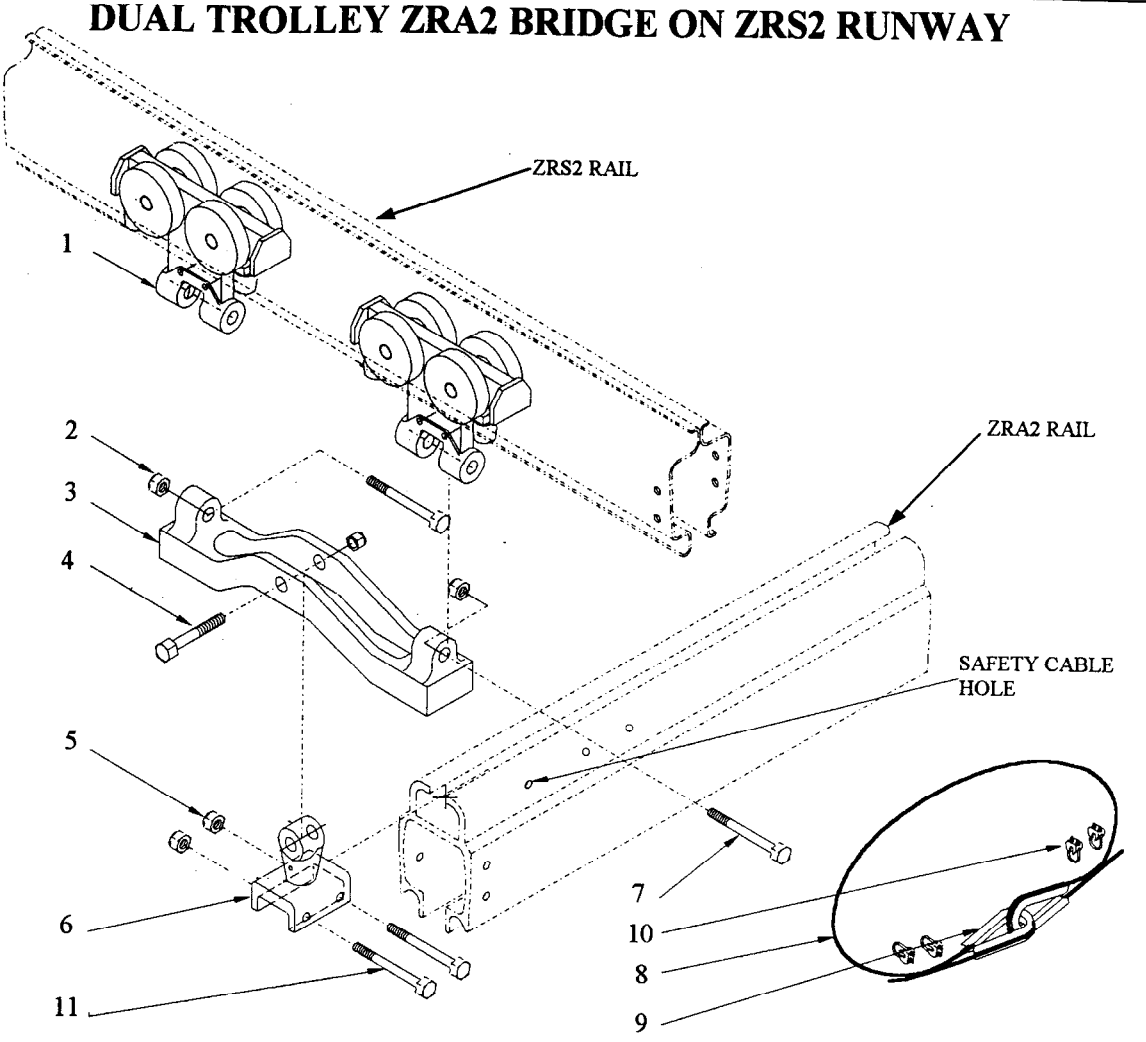
DUAL TROLLEY ZRA2 BRIDGE ON ZRS2 RUNWAY



SAFETY CABLE SHOWN OUT OF POSITION FOR CLARITY. SEE FIGURE 22 FOR CORRECT INSTALLATION.

FIGURE 39 - DUAL END TRUCK -NUMBER 30828

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30821	ZRS2 TROLLEY	2
2	75587	5/8-11 LOCK NUT	3
3	30173	DUAL TROLLEY TIE BAR	1
4	72644	5/8-11 X 4" BOLT	1
5	75582	5/16-18 LOCK NUT	2
6	30175	BRIDGE SUSPENSION ASS'Y.	1
7	72623	5/8-11 X 5" BOLT	2
8	10099	1/4" WIRE ROPE	1
9	10212	THIMBLE	2
10	10235	WIRE ROPE CLAMP	4
11	70968	5/16-18 X 3.25" BOLT	2

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3.4.1 Bridge Crane End Truck Assembly (Double Girder)

Suspension hardware is pre-assembled at our factory and safety cables will be installed on all trolley to bridge connections.
Cross bracing hardware will be provided by factory.

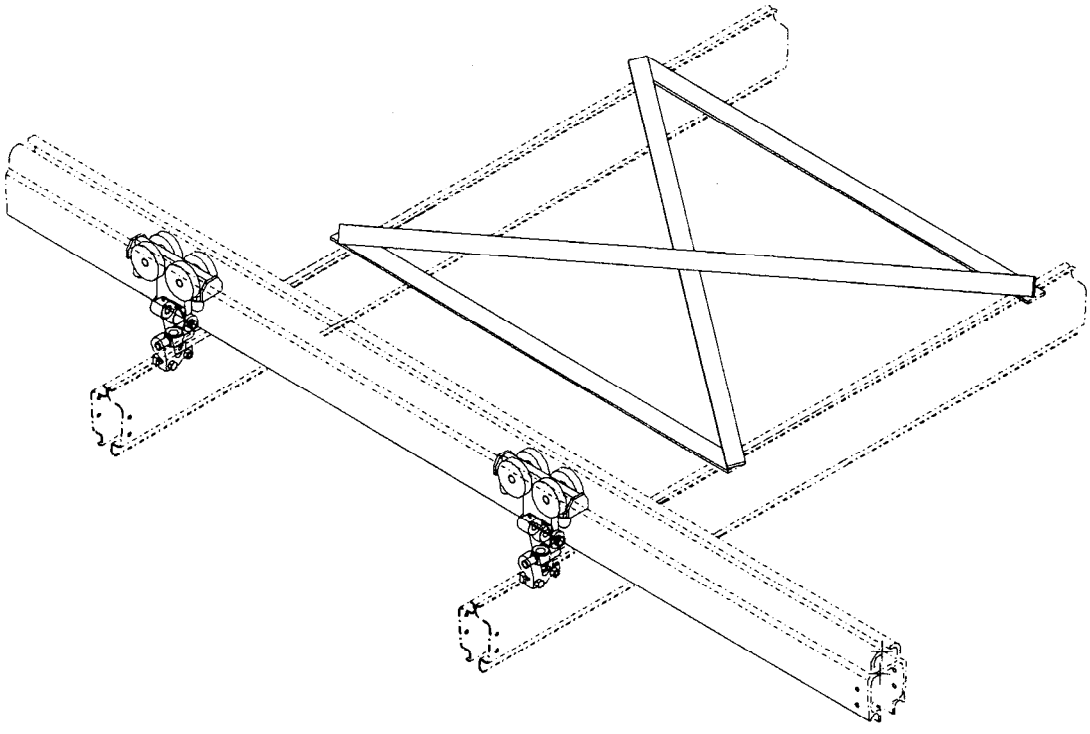

Figure # 40

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3.5 Air and Electric Supply Lines

Air supply lines on a rail system are typically installed as shown in figure 41 through 43. The supply lines are made of either "precoil" plastic tubing or flexible rubber hose. Figure 41 shows a standard center feed bridge air supply. When using flexible hose, the airline is festooned using small hanging trolleys that guide it along the tag line that is parallel to the axis of the runway rail or bridge (Figure 42). Precoil airline does not require these hanging trolleys and simply extends and retracts along the wire tagline (Figure 43).

Note: See your installation drawings supplied with your Air Supply Package

Electrification kits (Firure 44) have a flat jacketed cable on a tag line assembly festooned using small hanging trolleys that guide it along the tag line that is parallel to the axis of the runway rail or bridge as in (Figure 42).

NOTE: Detailed assembly drawings are provided with each Zimmerman kit.

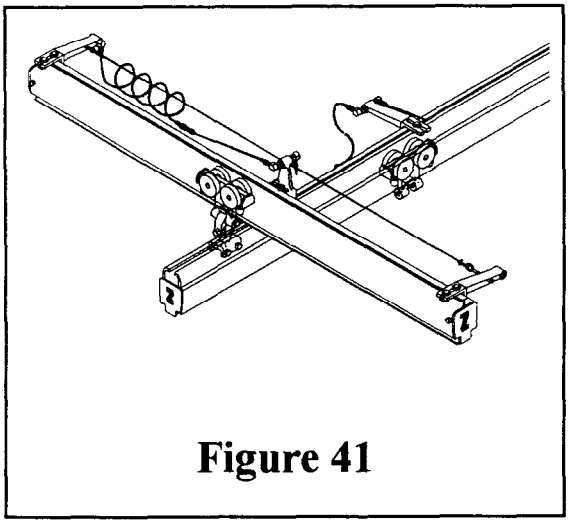

Figure 41

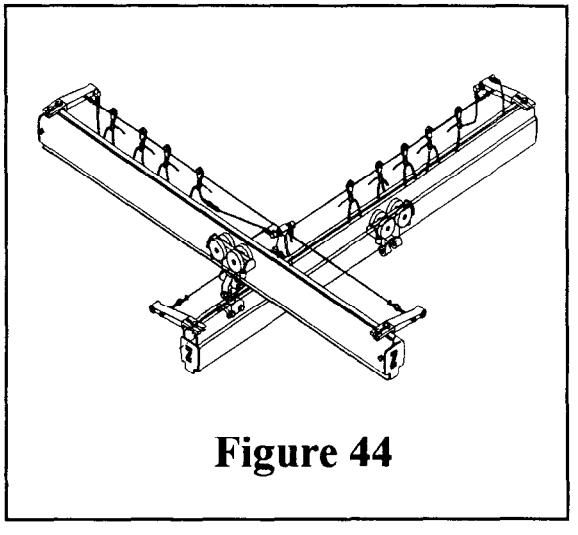

Figure 44

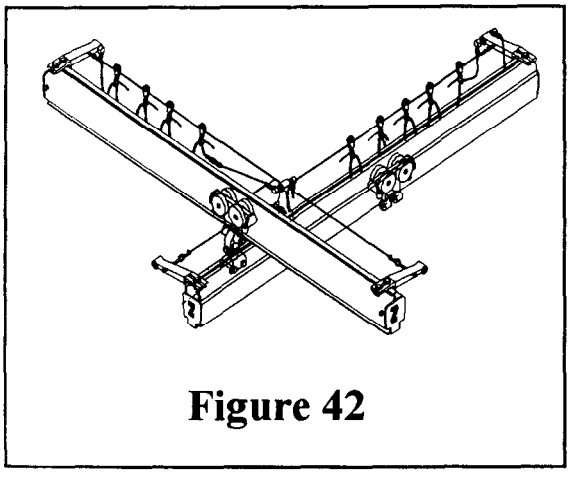

Figure 42

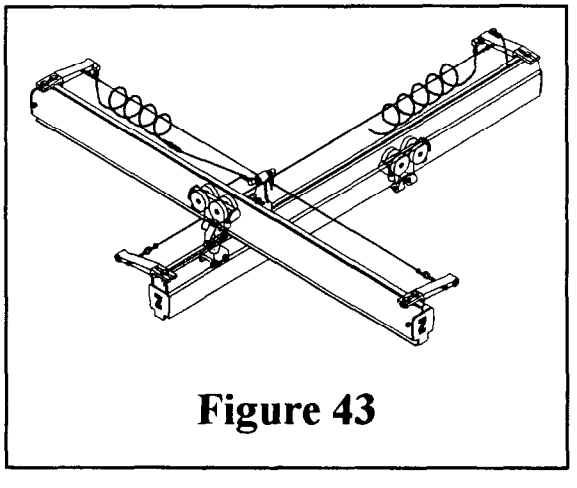

Figure 43

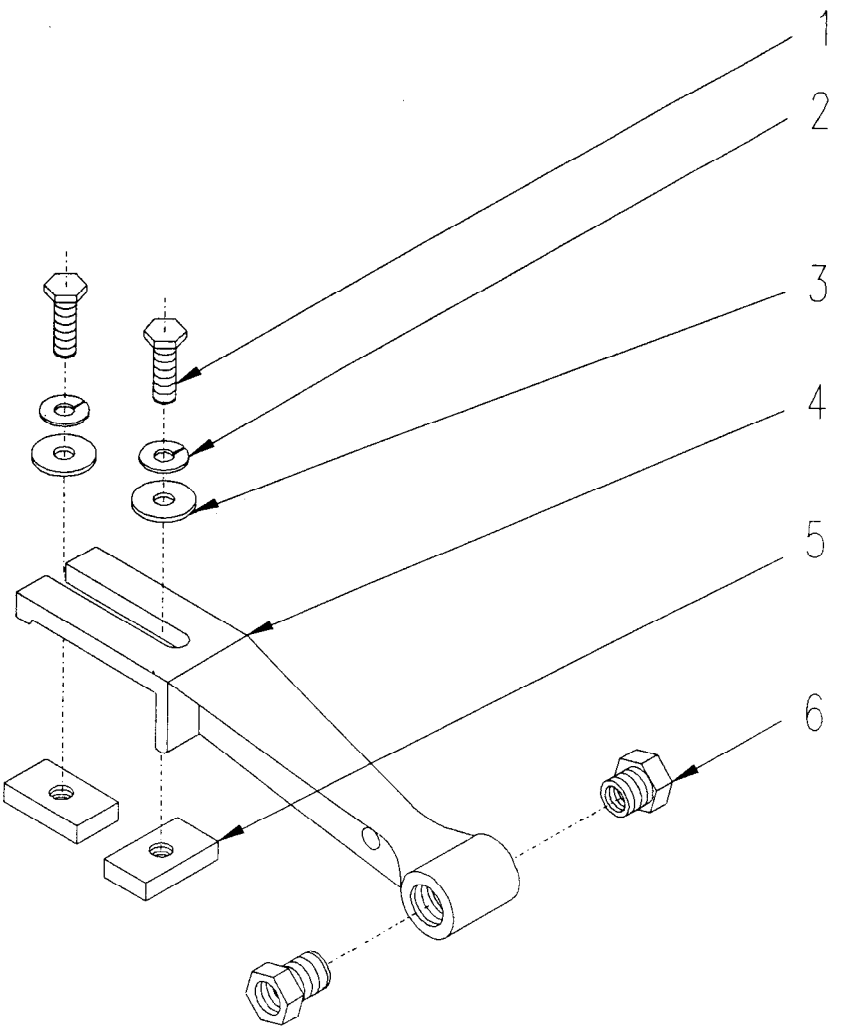

FIGURE 45 - AIR BRACKET -NUMBER 30517

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	71480	3/8-24 X 1.50: BOLT	2
2	74507	3/8 LOCK WASHER	2
3	74540	3/8 FLAT WASHER	2
4	30114	AIR BRACKET	1
5	30038	3/8 X 1 X 1.50 C.R.S. NUT	2
6	10744	1/2 - 3/8 BRASS REDUCER	2

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CAUTION
If wheel is replaced be certain the retaining ring (no. 5) is seated in the grove on the axle.
Larger diameter of wheel goes toward trolley body.

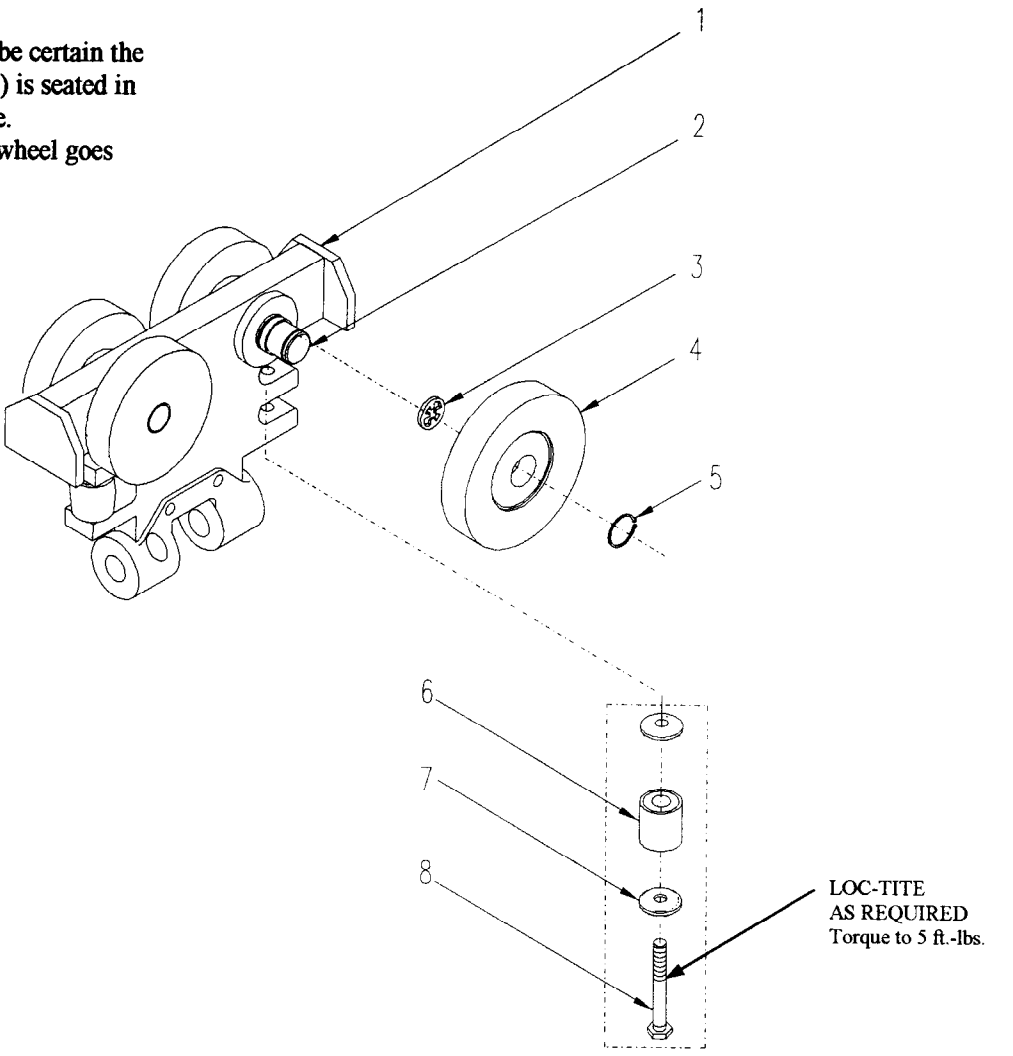

FIGURE 47 - TROLLEY (ZRA1) -NO. 30281

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30280	ZRA1 TROLLEY BRACKET	1
2	30203	AXLE	2
3	99026	RETAINING RING	4
4	30208	TROLLEY WHEEL	4
5	99026	RETAINING RING	4
6	30223	SIDE GUIDE ROLLER	2
7	74504	FLAT WASHER	4
8	70484	1/4-20 X 2" BOLT	2
9	N/A	LOC-TITE #242	AS REQ.

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CAUTION
If wheel is replaced, be certain the retaining (no. 5) is seated in the grove on the axle.
Larger diameter of wheel goes toward the trolley body.

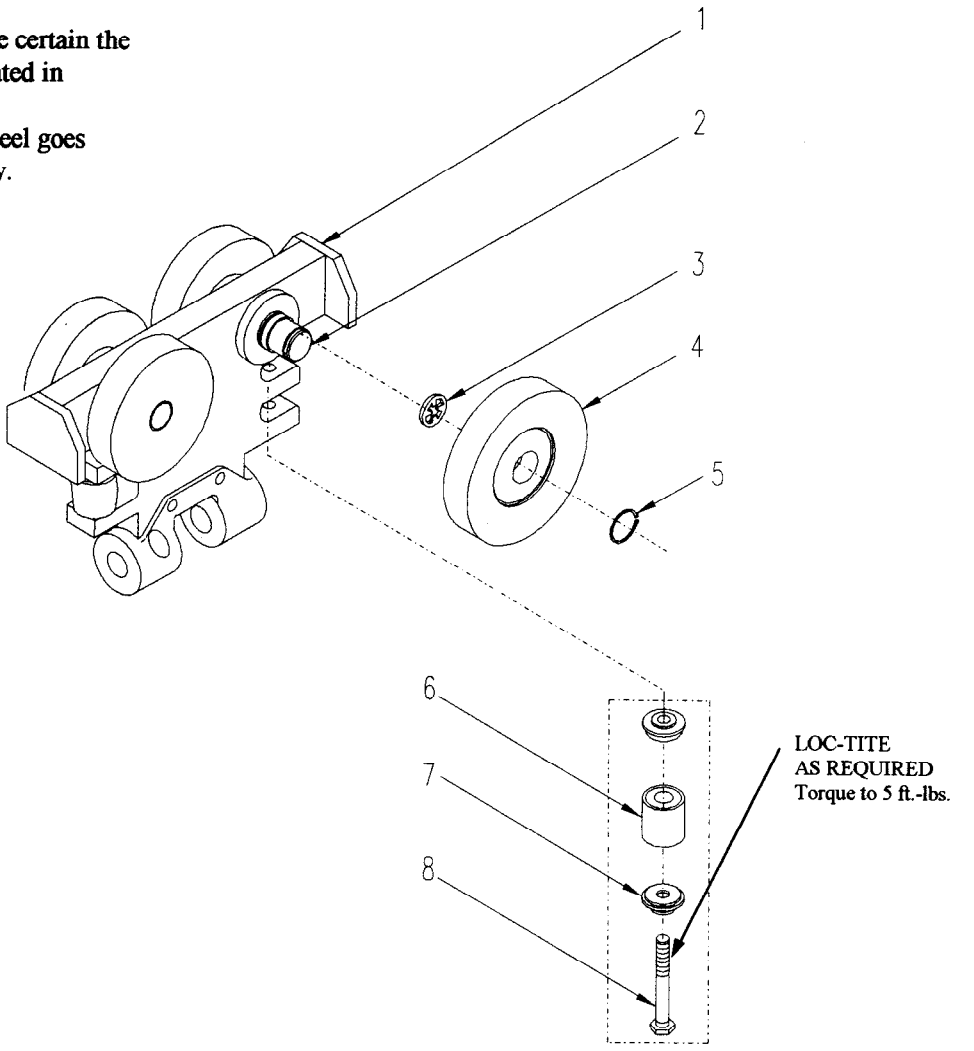

FIGURE 49 - TROLLEY (ZRA2) -NO. 30172

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30171	ZRA2 TROLLEY BRACKET	1
2	93934	AXLE	2
3	93938	RETAINING RING	4
4	30056	TROLLEY WHEEL	4
5	93939	RETAINING RING	4
6	93935	SIDE GUIDE ROLLER	2
7	65038	BEARING	4
8	70484	1/4-20 X 2" BOLT	2
9	N/A	LOC-TITE #242	AS REQ.

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CAUTION
If wheel is replaced be certain the retaining ring (no. 5) is seated in the grove on the axle.
Larger diameter of wheel goes toward the trolley body.

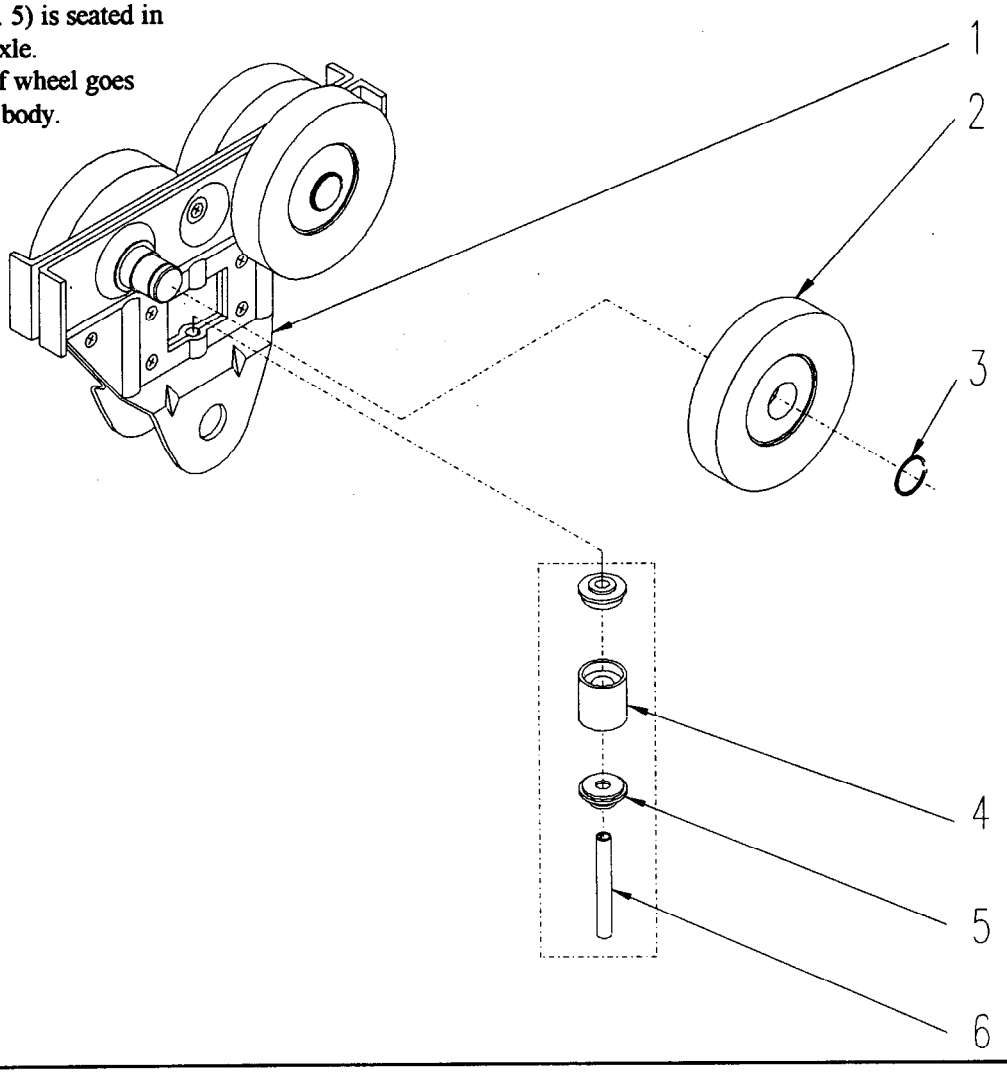

FIGURE 50 - TROLLEY (ZRS2)-NO. 30561

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30125	ZRS2 TROLLEY BRACKET	1
2	30056	TROLLEY WHEEL	4
3	93939	RETAINING RING	4
4	93936	SIDE GUIDE ROLLER	1
5	65038	BEARING	2
6	77062	PIN SPRING 6mm X 55mm	1

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CAUTION
If wheel is replaced be certain the retaining ring (no. 5) is seated in the grove on the axle.
Larger diameter of wheel goes toward trolley body.

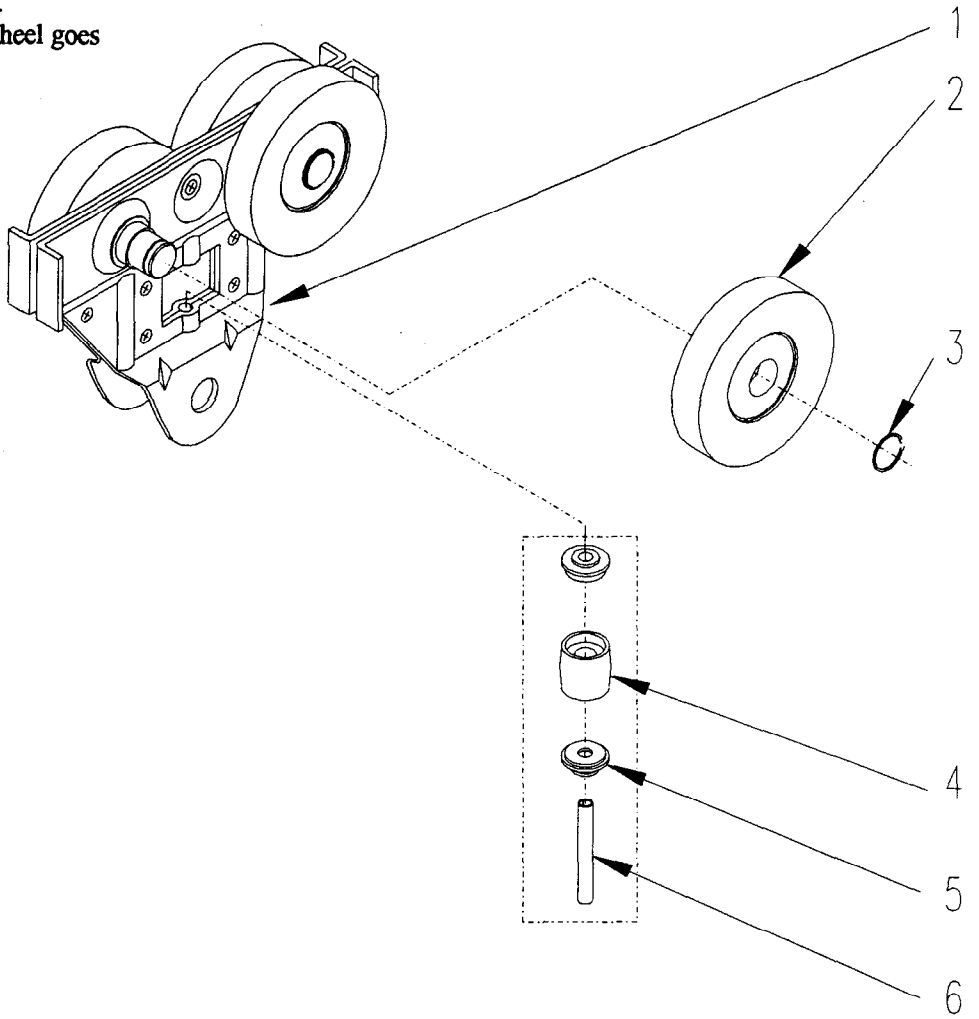

FIGURE 51 - TROLLEY (ZRA2)-NO. 30126

NO.	ZIMMERMAN NO.	DESCRIPTION	QTY.
1	30125	ZRA2 TROLLEY BRACKET	1
2	30056	TROLLEY WHEEL	4
3	93939	RETAINING RING	4
4	93935	SIDE GUIDE ROLLER	1
5	65038	BEARING	4
6	77062	PIN SPRING 6mm X 55mm	1

4 MAINTENANCE

The minimum maintenance required for a rail system requires inspection of suspension hardware and all bolted connections for safety reasons.

⚠ CAUTION

ANY OPERATING PROBLEMS SUCH AS A CHANGE IN ROLLING EFFORT OR UNUSUAL NOISES - MUST BE IDENTIFIED AND CORRECTED IMMEDIATELY.

NOTE:

Retighten all bolt connections (suspension hardware, trollys attaching hardware, etc.) two weeks after installation, and again after two months of operation, to ensure safe operation of the system.

The following maintenance schedule is provided to prevent failures and identify component wear. This chart should be used based on system use and/or local requirements for safe operation. This schedule does not contain daily inspections that may be required by local regulations.

If there are problems with the rail system (worn or damaged components), and replacement is required, use the parts list in Section 5 to order replacements. Some components can only be ordered as complete assemblies. If they are worn or damaged, the complete assembly must be replaced not just the worn parts.

The trolley wheels have anti-friction bearings which are lubricated for life and only require replacement under extreme conditions. If these wheels must be replaced, they can be ordered separately - there is no need to replace the entire assembly.

There are two types of trolleys: single-point Aluminum (Figure 47-49), and Steel (Figure 50 and 51).

Maintenance Schedule

Component	Inspect for	Interval	
		6 mo.	12 mo.
Complete rail system	1. General condition (roll resistance, rough operation). 2. Operator problems.	x x	
Rail system suspension	1. Loose mountings, wear or damage. 2. Loose bolted connections.		x x
Runway rails and bridge rails.	1. Loose bolted clamp connections. 2. Loose bolted rail clamping connections. 3. Suspension wear. 4. Loose connections.		x x x x
Rail system splices and end stops	1. Loose bolted connections. 2. Improper joint aligment.		x x

We have provided a maintenance check list on the next two page. Post this book and the maintenance check list on a column near the installation and fill it out accordingly.

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HOIST AND BRIDGE CRANE MAINTENANCE CHECK LIST

COMPONENT LOCATION		INSPECTION INTERVAL			CONDITION						CORRECTIVE NOTES
	COMPONENT	WEEKLY	MOUNTHLY	SEMI-ANNUAL	O.K.	ADJUST	REPAIR	REPLACE	LUBRICATE	CLEAN	DESCRIBE, INITIAL AND DATE WHEN INSPECTED OR CORRECTED
BRIDGE	BALANCERS										
	BOLTED CONNECTIONS										
	BRAKE										
	BUMPERS										
	CONTROL OPERATIONS										
	FILTER / REGULATOR										
	GUARDS / COVERS										
	INTERMEDIATE STOPS										
	LUBRICATION										
	PRIMARY STOPS										
	SECONDARY STOPS										
	SAFETY LUGS										
	SAFETY CABLES										
	SAFETY CHAINS										
	TRACK ALIGNMENT										
	TRACK WEAR										
	TROLLEYS										
	END TRUCKS										
	WHEEL BEARINGS										

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MONORAIL AND RUNWAY MAINTENANCE CHECK LIST

COMPONENT LOCATION		INSPECTION INTERVAL			CONDITION						CORRECTIVE NOTES
	COMPONENT	WEEKLY	MOUNTHLY	SEMI/ANNUAL	O.K.	ADJUST	REPAIR	REPLACE	LUBRICATE	CLEAN	DESCRIBE, INITIAL AND DATE WHEN INSPECTED OR CORRECTED
MONORAIL AND RUNWAY	BALANCERS										
	BOLTED CONNECTIONS										
	CARRIERS										
	RUNWAY JOINTS										
	RUNWAY RAIL(S) WEAR										
	FILTER / REGULATOR										
	GUARDS / COVERS										
	INTERMEDIATE STOPS										
	LUBRICATION										
	PRIMARY STOPS										
	SECONDARY STOPS										
	RUNWAY SPAN / LEVEL										
	SAFETY CABLES										
	SAFETY CHAINS										
	TRACK ALIGNMENT										
	TRACK WEAR										
	TROLLEYS										
	END TRUCKS										

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5 PARTS LIST

The following is a spare parts list of the parts not described in the preceeding pages. This list should be used when replacement or additional parts are needed. To ensure that the proper parts are obtained, use the part numbers shown in this list and include the orginal rail system order number.

For safety and efficiency reasons, Zimmerman International recommends replacing of worn parts as assemblies, not individual parts.

Item No.	Component	ZRA1 30200 Part No.	ZRA2 30000 Part No.	ZRS2 30500 Part No.	ZRS3 30550 Part No.
1	Runway Rail - Aluminum - ZRA1				
	5ft. [152.4 cm]	30200-050-2	-	-	-
	10ft. [304.6 cm]	30200-100-2	-	-	-
	15 ft.[457.2 cm]	30200-150-2	-	-	-
	20 ft.[609.6 cm]	30200-200-2	-	-	-
	Runway Rail - Aluminum - ZRA2				
	8ft. [243.8 cm]	-	30000-080-2	-	-
	12ft. [365.8 cm]	-	30000-120-2	-	-
	16 ft.[487.7 cm]	-	30000-160-2	-	-
	20 ft.[609.6 cm]	-	30000-200-2	-	-
	24 ft.[731.5 cm]	-	30000-240-2	-	-
2	Runway Rail - Steel				
	5ft. [152.4 cm]	-	-	30500-050-2	30550-050-2
	10ft. [304.6 cm]	-	-	30500-100-2	30550-100-2
	15 ft.[457.2 cm]	-	-	30500-150-2	30550-150-2
	21 ft.[640.1 cm]	-	-	30500-210-2	30550-210-2
3	Bridge Crane Beams				
	6ft. [182.9 cm]	ZRA10604	ZRA20604	ZRS20604	ZRS20604
	8ft. [243.8 cm]	ZRA10806	ZRA20806	ZRS20806	ZRS20806
	10 ft.[304.8 cm]	ZRA11008	ZRA21008	ZRS21008	ZRS21008
	12 ft.[365.8 cm]	ZRA11210	ZRA21210	ZRS21210	ZRS21210
	14 ft.[426.6 cm]	ZRA11412	ZRA21410	ZRS21412	ZRS21412
	16 ft.[487.7 cm]	ZRA11614	ZRA21614	ZRS21614	ZRS21612
	18 ft.[548.6 cm]	ZRA11816	ZRA21816	ZRS21816	ZRS21816
	20 ft.[609.9 cm]	ZRA12018	ZRA22018	ZRS22018	ZRS22018
	21 ft.[600.1 cm]	-	-	ZRS22119	ZRS22119
	22 ft.[670.6 cm]	-	ZRA22220	-	-
	24 ft.[731.5 cm]	-	ZRA22422	-	-
4	End Stop Assembly	30275	30183	30804	30808
5	Redundant End Stop Assembly	30227	30185	30806	30810
6	Splice Bolt Kit	30231	30057	30515	30515
7	Splice Lug	-	-	30526	30526

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Iten No.	Component	ZRA1 30200 Part No.	ZRA2 30000 Part No.	ZRS2 30500 Part No.	ZRS3 30550 Part No.
8	Air Supply Package - Rail Systems				
	3/8 in. x 50 ft. [1 cm x 15.2 m]	90000-1	90000-1	90000-1	90000-1
	3/8 in. x 75 ft. [1 cm x 22.8 m]	90000-2	90000-2	90000-2	90000-2
	3/8 in x 100 ft. [1 cm x 30.5 m]	90000-3	90000-3	90000-3	90000-3
	1/2 in. x 50 ft. [1.3 cm x 15.2 m]	90001-1	90001-1	90001-1	90001-1
	1/2 in. x 75 ft. [1.3 cm x 22.8 m]	90001-2	90001-2	90001-2	90001-2
	1/2 in x 100 ft. [1.3 cm x 30.5 m]	90001-3	90001-3	90001-3	90001-3
9	Air Supply Package - Bridges				
	3/8 in. x 5-8 ft. [1 cm x 1.5 - 2.4 m]	90020-1	90020-1	90020-1	90020-1
	3/8 in. x 9-11 ft. [1 cm x 2.7 - 3.4 m]	90020-2	90020-2	90020-2	90020-2
	3/8 in x 12-14 ft. [1 cm x 3.7 - 4.3 m]	90020-3	90020-3	90020-3	90020-3
	3/8 in. x 15-24 ft. [1 cm x 4.6 - 5.5 m]	90020-4	90020-4	90020-4	90020-4
	3/8 in. x 19-24 ft. [1 cm x 5.8 - 7.3 m]	90020-5	90020-5	90020-5	90020-5
	1/2 in. x 5-8 ft. [1 cm x 1.5 - 2.4 m]	90021-1	90021-1	90021-1	90021-1
	1/2 in. x 9-11 ft. [1 cm x 2.7 - 3.4 m]	90021-2	90021-2	90021-2	90021-2
	1/2 in x 12-14 ft. [1 cm x 3.7 - 4.3 m]	90021-3	90021-3	90021-3	90021-3
	1/2 in. x 15-24 ft. [1 cm x 4.6 - 5.5 m]	90021-4	90021-4	90021-4	90021-4
	1/2 in. x 19-24 ft. [1 cm x 5.8 - 7.3 m]	90021-5	90021-5	90021-5	90021-5
10	Adapter Hose Assembly - Air Supply Package				
	3/8 in.	30075-036	30075-036	30075-036	30075-036
	3/8 in.	30075-054	30075-054	30075-054	30075-054
	3/8 in.	30075-072	30075-072	30075-072	30075-072
	1/2 in.	30076-036	30076-036	30076-036	30076-036
	1/2 in.	30076-054	30076-054	30076-054	30076-054
	1/2 in.	30076-072	30076-072	30076-072	30076-072
11	Cross Brace Kit				
	32 in. [81.3 cm] Brace Rod	30081-3200	30081-3200	30081-3200	30081-3200
	48 in. [121.9 cm] Brace Rod	30081-4800	30081-4800	30081-4800	30081-4800
	64 in. [162.6 cm] Brace Rod	30081-6400	30081-6400	30081-6400	30081-6400
	80 in. [203.2 cm] Brace Rod	30081-8000	30081-8000	30081-8000	30081-8000
	96 in. [243.8 cm] Brace Rod]	30081-9600	30081-9600	30081-9600	30081-9600

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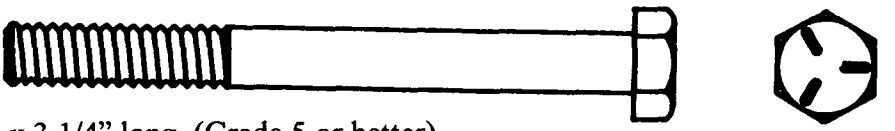
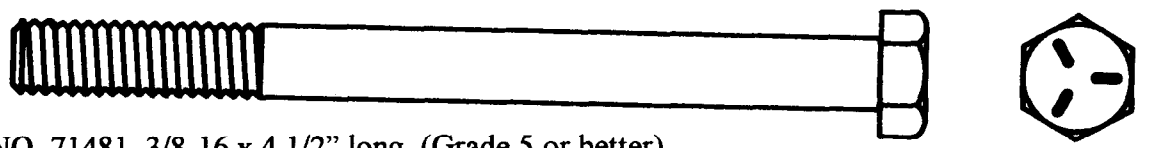
6. Fastener (size and torque specifications)

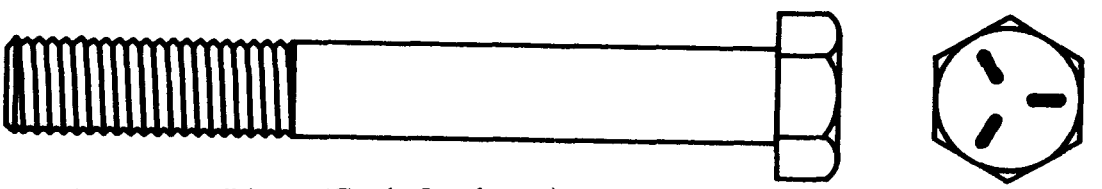
PART NO. 70967 5/16-18 x 2 1/4" long. (Grade 5 or better)



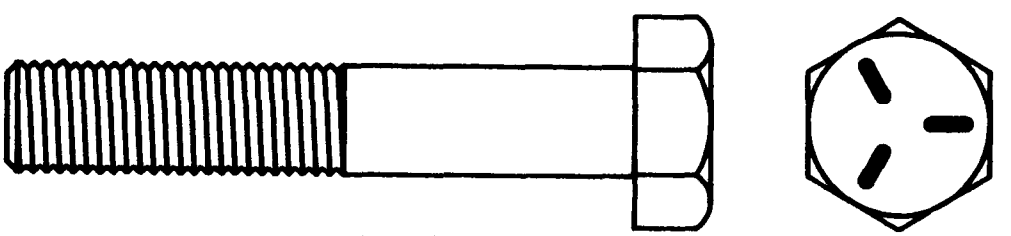
PART NO. 70968 5/16-18 x 3 1/4" long. (Grade 5 or better)



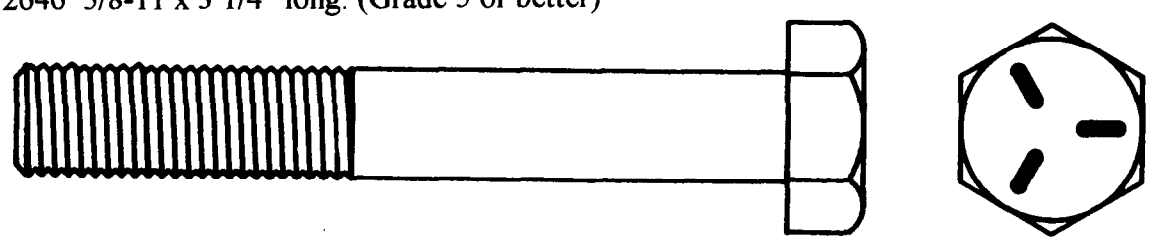
PART NO. 71481 3/8-16 x 4 1/2" long. (Grade 5 or better)



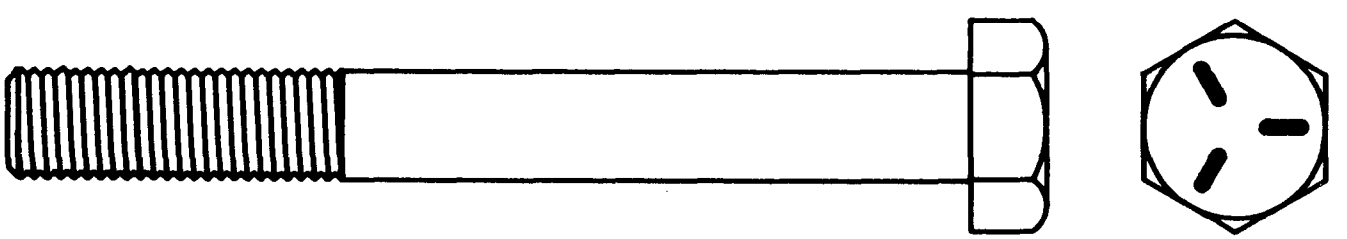
PART NO. 72037 1/2-13 x 4.00" long. (Grade 5 or better)



PART NO. 72646 5/8-11 x 3 1/4" long. (Grade 5 or better)



PART NO. 72644 5/8-11 x 4.00" long. (Grade 5 or better) No torque applied (pivot point)



PART NO. 72623 5/8-11 x 5.00" long. (Grade 5 or better) No torque applied (pivot point)

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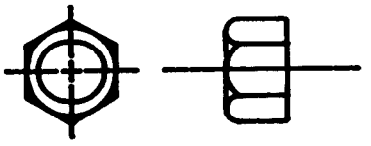
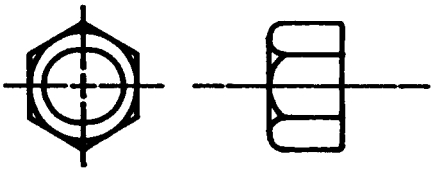
Fastener (size and torque specifications)

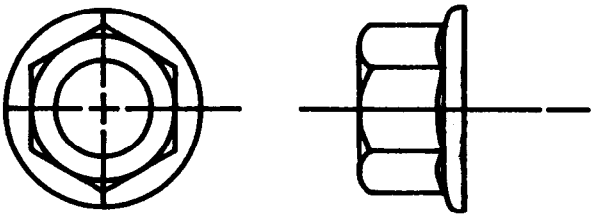
NOTE:
For correct torque readings, hold the head of the bolt and torque the nut to the torque specification.



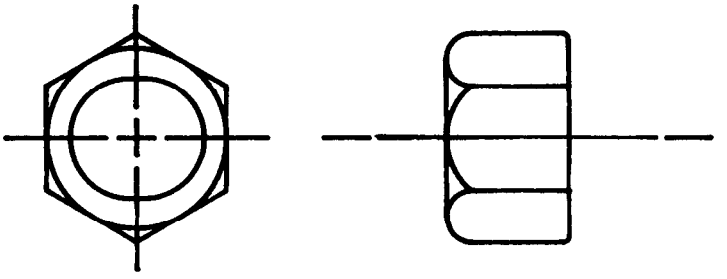
PART NO. 75582 5/16-18 Lock Nut (Torque to 11 ft.-lbs.)



PART NO. 75583 3/8-16 Lock Nut (Torque to 17 ft.-lbs.)



PART NO. 75589 1/2-13 Lock Flange Nut (Torque to 50 ft.-lbs.)



PART NO. 75587 5/8-11 Lock Nut Torque to 82 ft.-lbs.)

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INGERSOLL-RAND
MATERIAL HANDLING

ZIMMERMAN

ZIMMERMAN HANDLING SYSTEMS

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