INSTALLATION INSTRUCTION MANUAL

FOR

HORIZONTAL LIFELINE SYSTEM 5/8" SNATCH BLOCK

MSA Corporate Headquarters:
P.O. Box 426
Pittsburgh, PA 15230, USA

Telephone: 1-800-672-2222
Fax: 1-800-967-0398
Technical Support Line: 1-888-421-8324
In Canada: 1-888-396-1067
In Mexico (01) 5357-0852 / 5357-0853

Printed in the United States of America.

ROSE MANUFACTURING COMPANY
2250 South Tejon Street
Englewood, Colorado 80110

First Printing
January, 1989

621527 REVA

Rose Manufacturing Company

Horizontal Wire Rope Lifeline System

TABLE OF CONTENTS

1.0 Description of Horizontal Wire Rope Lifeline System

The Horizontal Wire Rope Lifeline System is suitable for handling either personnel or material. It consists of a 5/8" dia. wire rope with a min. tensile strength of 22,500 lbs. attached to a suitable anchorage and a take-up arrangement (that will permit the correct sag angle to be maintained) and snatch block containing a sheave with an integral anti-friction bearing which is securely mounted in a steel housing. A connector yoke is connected to the steel housing which provides an anchorage point for attaching fall protection equipment or material handling equipment. The snatch block provides easy mobility along the horizontal wire rope up to 560 lbs. (24 Kn). The snatch block is designed for use on 5/8" dia. wire rope only.

2.0 Applications

The personnel and material handling wire rope lifeline can be used for construction, equipment installations, maintenance, manufacturing, airlines, municipalities and warehouses, to name a few.

The wire rope lifeline is particularly useful for one person or load and can be used above or below ground.

The wire rope lifeline snatch block is a highly mobile and useful device when used in conjunction with the Dynalock, Dynevac (retractable lifeline) or Minilift (personnel/material hoist) which can be positioned anywhere along the length of the wire rope lifeline.

The user should always consult with the factory or a qualified engineer to determine if the horizontal wire rope system is suitable for the intended use and application prior to placing it in service.

3.0 Inspection

The horizontal wire rope and snatch blocks are inspected and tested under controlled conditions at the factory before shipment. However, user inspection and maintenance of the wire rope, snatch block and all connections to the anchorages take on added importance once they are subjected to potentially severe environmental or workplace conditions.

3.1 Detailed Inspection of Wire Rope

Before each use the user should carefully inspect the wire rope, snatch block and all connections

by following the inspection instructions on the installation and warning label attached to the snatch block, P/N 621525.

3.1.1 Refer to Figure 3.1 and 3.2 to get the basic terminology pertaining to this section. Wear gloves during inspection to prevent cuts and slivers when running hands over the wire rope. The following inspection must be performed over the entire length of wire rope, starting from the thimble.

3.1.2 Check for broken wires. (See Figure 3.5) Flexing the wire rope can reveal hidden breaks. Remove broken wire ends as soon as possible by bending them back and forth (with fingers if possible) in the direction of the cable length. (See Figure 3.3) In this way the wire will usually break inside the cable and will not leave a sharp end jutting out. Do not tug on broken wire ends with pliers, as this will leave jagged ends and can cause damage elsewhere to the strand.

3.1.3 Remove the product from use if:

i. there are six or more randomly distributed broken wires in one cable lay, or three or more broken wires in one strand in one lay. (A cable lay is the length along the cable in which one strand makes a complete revolution around the cable. (See Figures 3.1 and 3.2)

ii. there are any broken wires within 1.0" (25 mm) of the two pressed metal sleeves or the thimble.

3.1.4 Check for worn or abraded wires. These areas are caused by friction and are usually brighter in appearance. Remove the product from use if any surface wires in one area are worn by 1/3 or more of their diameter.

3.1.5 Check for bulges or reduction of cable diameter. This is an indication of serious internal cable damage. An increase or decrease in cable diameter of 0.05" (1.3 mm) in any area is cause

for removing the product from use. (See Figure 3.6)

3.1.6 Check for corrosion characterized by discoloration of the wires. There is no simple way to tell when corrosion has excessively weakened the cable. The inspection personnel must keep in mind that corrosion will usually develop inside the cable before evidence is visible on the surface. The judgement of a competent person or a qualified engineer should be sought when signs of corrosion are evident. Pitting is a particularly serious sign of advanced corrosion. The presence of rust along with broken wires in a given area (particularly in the vicinity of end fittings) is cause for removal of the product from use.

3.1.7 Check for insufficient lubrication and excessive contamination in the grooves between strands of the cable. Packed grease, dirt, paint or other contaminants in these grooves keeps the lubricant from penetrating to prevent internal friction and corrosion. (See 4.2 on Cable Maintenance.)

3.1.8 Check for snagged wires and crushed or flattened strands. (See Figure 3.7) Remove the product from use if any of these conditions exist.

3.1.9 Check for unlaying and bird-caging of strands. (See Figures 3.8 and 3.9) This condition is characterized by the formation of gaps, loops, and excessive clearance between strands. Remove the product from use if any of these conditions are detected.

3.1.10 Check for kinks and bends in the cable. (See Figures 3.10 and 3.11) Once a kink has been made by improper handling (allowing slack), the damage is permanent. A bend is evidence that a kink was once formed. Remove the product from use if this is detected.

3.1.11 Check for heat damage, torch burns and electric arc strikes. If any evidence of these conditions exists, remove the product from use.

Figure 3.1 Composition of Wire Rope (Cable)

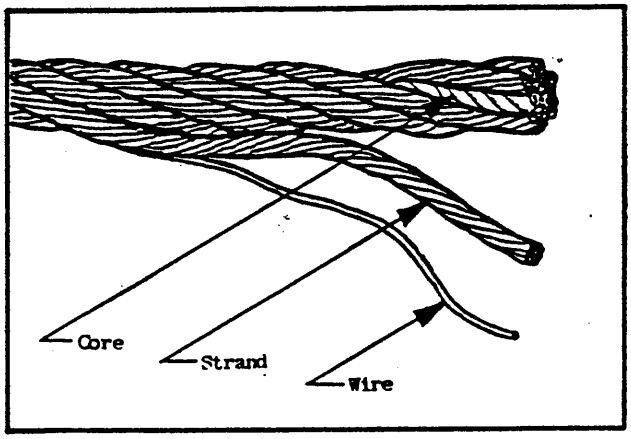


Figure 3.2 Measurement of Lay Length

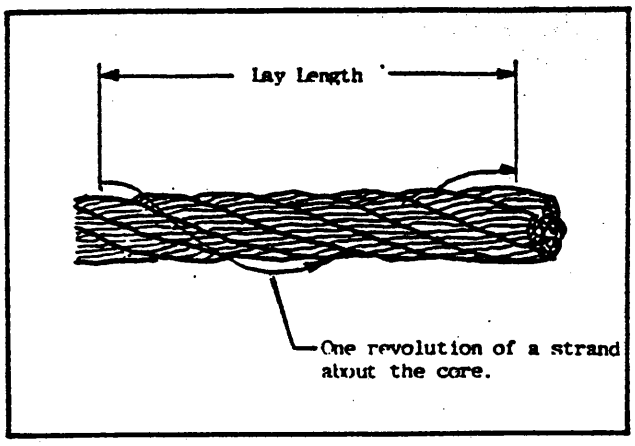


Figure 3.3 Correct Way to Remove Broken Wires

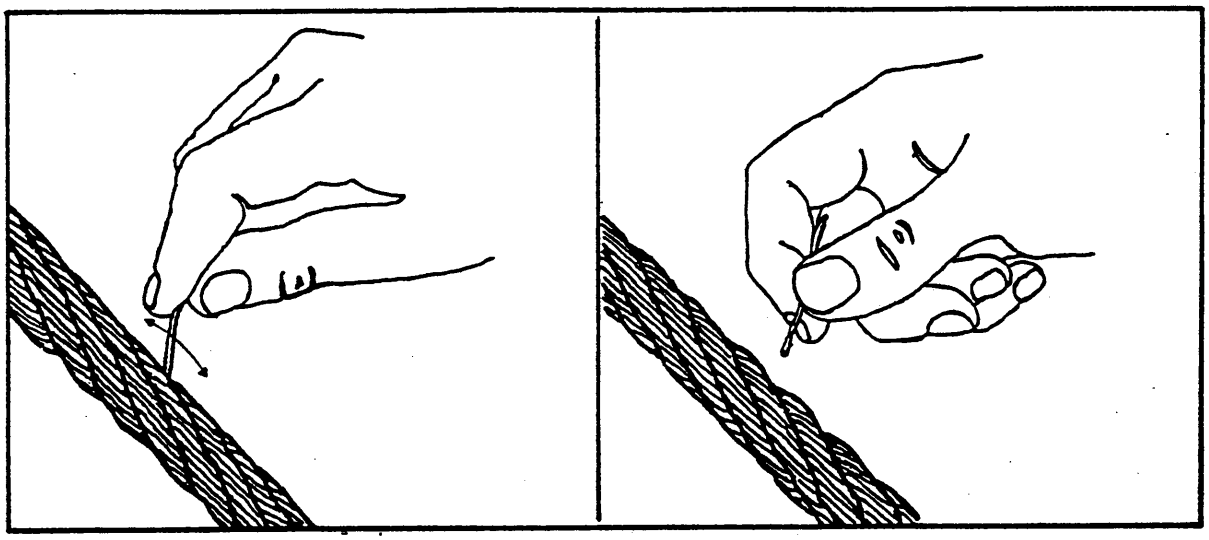


Figure 3.4 Assessment of Broken Wires

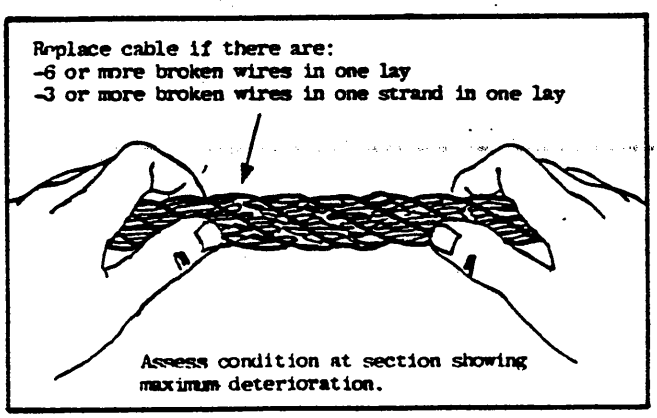


Figure 3.5 Flex Cable During Inspection

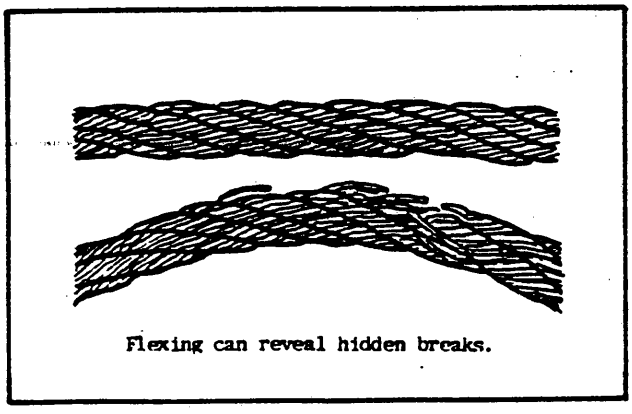


Figure 3.6 Change in Cable Diameter

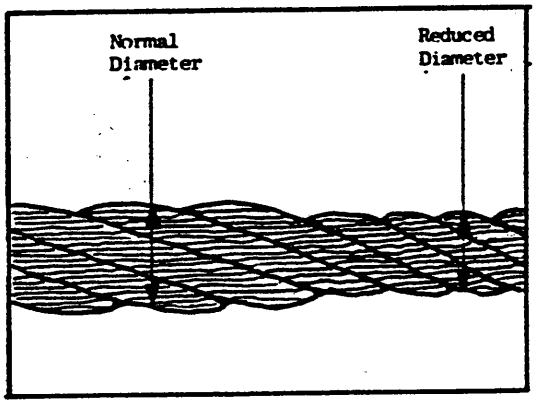


Figure 3.7 Crushed Cable

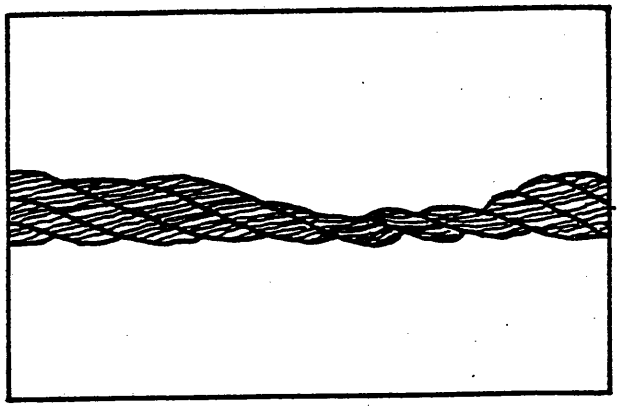


Figure 3.8 Unlaying

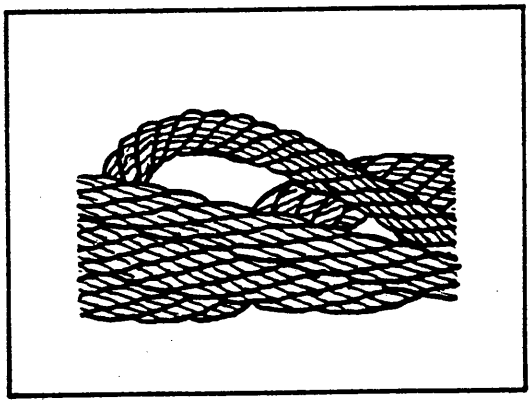


Figure 3.9 Bird-Caging

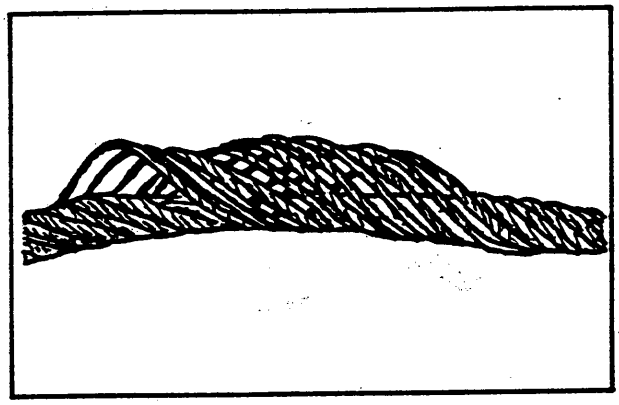


Figure 3.10 Kinked Cable

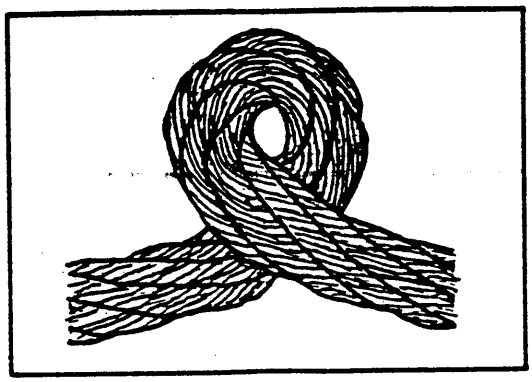
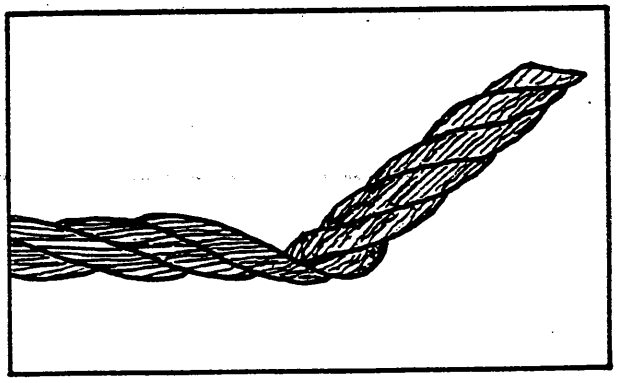


Figure 3.11 Bent Cable



4.0 Care and Maintenance

Proper functioning and length of useful life of the snatch block and wire rope depends on the user's proper care and maintenance of the product.

4.1 Care of Product

Do not drop the snatch block assembly, as it may damage the sheave, bearing or housing.

If dropped, return the unit to Rose Manufacturing Company for inspection. The area below must be kept clear of persons and objects while installing horizontal wire rope system.

4.2 Maintenance

Proper maintenance of the horizontal wire rope system is both preventative and corrective in nature.

Routine maintenance is necessary on the wire rope which must be kept clean at all times. (See 3.1) Snatch block sheave must be clean and sheave bearing must rotate freely. Snatch block bearing is sealed for life and requires no lubrication. Replace if necessary; do not attempt to repair.

Before each use inspect all cable clamp nuts and turn buckle nuts to see that they are tight. Check to be sure yoke pins and cotter pins are in place. (See drawing 970121)

Inspect wire rope before each use (see 3.1 - Detailed Inspection of Wire Rope). Check for correct sag angle (see 5.4.2.1 and 5.2).

5.0 Installation Instructions

5.1 Precautions to observe when installing horizontal wire rope lifeline are as follows:

5.1.1 Selection of Installation Site

Before beginning installation, it is important to carefully analyze factors in the workplace area which may affect the use and function of the horizontal wire rope lifeline. These factors include

workplace geometry, environmental considerations, the location and nature of hazards, the location and strength of wire rope anchorage and the work space intended by the horizontal lifeline user. (Note: Attach hardware of 5,400 lbs. (24 Kn) minimum capacity required to connect to the snatch block.)

Develop a user rescue plan before making a final decision on where to install the horizontal lifeline system.

Other factors may exist which cannot be foreseen by the horizontal lifeline and snatch block manufacturer, but may become evident to the competent person or qualified engineer who supervises the installation at the workplace. Take time to consider all foreseeable possibilities and formulate an installation plan.

This device should be installed above the workplace sufficiently high so as to minimize the effects of a swing fall. For quick reference, the horizontal lifeline wire rope height should be greater than the width of the work area.

Pay careful attention to all directions of possible horizontal movements of the user at different elevations. It is this horizontal movement which will introduce swing fall hazards. Never install the snatch block where it will be exposed to a swing fall that might cause injury if an obstacle or hazard comes into the path of the swing.

In the extreme, never install the horizontal lifeline at such a low elevation that the wire rope will make an angle greater that 30 degrees with the vertical by virtue of the expected horizontal movement of the user.

Carefully consider the potential location of the entire length of the horizontal lifeline snatch block system. As the user moves about, it should not pass over, under or in the path of other workers, moving equipment or materials. If necessary, use safety barriers and signs to prevent equipment, materials, or other objects from interfering with its path. Travel stops (P/N 621185) should not be placed on the wire rope where the user could over-travel the 30 degree fall limit.

Avoid installing at sites where debris or objects falling from above could lay on or over the wire rope and limit snatch block movement. Never install the horizontal lifeline system where it can encounter an electrical hazard. Consider the location and nature of the space around and below the user as he moves. Consider the possible fall path of the user and select an installation site that acceptably controls or minimizes the user's exposure to these hazards in the event of a fall.

Be extremely careful when considering the use of the horizontal lifeline for fall protection of a user where a swing fall may take a worker over a hazardous area such as chemical or acid baths. The use of a quick rescue or a travel stop should first be considered for such applications.

Do not install the horizontal lifeline for such applications if there is any question as to whether it will expose the user to any environmental or physical hazard.

5.1.2 Making the Installation

An installation plan is not complete until a method is devised for transporting the horizontal wire rope lifeline, snatch block and fall arrest equipment to the anchorage location. Because of the weight and bulk of the items, it is recommended that material handling equipment be used to move and support the snatch block and fall arrest equipment until it is secured to the wire rope. If material handling equipment is not available, it is preferable to use two persons to affect the installation - one to steady the snatch block and fall arrestor while the other makes the connections. The installers must always use an appropriate fall arrest system when installing the horizontal lifeline. The horizontal lifeline and snatch block linkage and tools must be secured against falling while installation is being performed. CAUTION: Use installation hardware provided by the manufacturer. Any deviation from the specified hardware and methods presented in these instructions must be approved by Rose Manufacturing Company.

5.2 Anchorage

The horizontal lifeline wire rope anchorage is the most important element of the fall arrest system. Requirements in the United States state that the anchorage must support 5,400 lbs. (24 Kn) weight centrally located on the wire rope span. Horizontal wire rope used as an anchorage presents an additional hazard due to load amplification of the horizontal component of the fall arresting force (of a fall) transmitted to the points where the horizontal wire rope is attached to the structure. This amplification is a function of the angle of sag and is most severe at small angles. The manufacturer recommends sag angles of no less than 7.5 degrees to satisfy the load requirements for wire rope strength. Greater sag angles would give reduced anchorage loading but may increase rolling resistance of the snatch block pulley. When in question, consult the manufacturer or a qualified engineer. For example: with a sag angle of 1 degree, the horizontal force on the points of wire rope anchorage will be seven times greater than they would be at 7.5 degrees. To aid installation, sag angle can be measured in terms of sag ratio. Sag ratio n = f/s, where f = sag height and s = total span length (see 5.4.3). A sag angle of 7.5 degrees is equal to a sag ratio of .066 or 6.6%. CAUTION: A horizontal lifeline wire rope must never be attached to a building structure unless the induced horizontal and vertical loads have been analyzed by a qualified engineer to determine if the loads can be supported safely (see 5.4.2).

References

1) Personal Fall Protection Systems (29 CFR 1910.120, 1910.130, 1935.001, 1935.611, 1935.612) (Draft 16). This is the proposed new OSHA regulation. As of this date, 08/28/86, this draft's proposed regulations has not been published in the Federal Register. It is anticipated that it (or a similar re-draft) will become law in 1986/1987.

2) Requirements for Safety Belts, Harnesses, Lanyard Lifelines and Drop Lines for Construction and Industrial Use (ANSI A10.14, 1975). American National Standards Institute. This has been the U. S. standard

for personal fall protection systems, but was withdrawn on 06/16/86. It is currently undergoing revision with the American Society of Safety Engineers serving as sponsor.

5.3 Pre-Installation Inspection

Prior to installation, inspect horizontal lifeline wire rope to be sure it is free from cracks, corrosion, or other defects. (See 5.6 - Detailed Inspection of Cable)

Inspect attachment hardware for cracks, corrosion, or shipping damage. Be sure all anchorage pins and lock pins are accounted for. Inspect snatch block sheave for ease of rotation.

5.4 Installation (See Dwg. 970121 and Figures 3.13, 3.14 and 3.15)

Installation is complete when the horizontal lifeline wire rope is securely attached to its anchorage (with proper sag angle) and the snatch block and fall arrest device are secured in place and in compliance with Dwg. 970121 and warning labels.

5.4.1 Specified Wire Rope Size

The horizontal wire rope lifeline and snatch block system is designed and built for one size of wire rope only. The wire rope size and strength, 5/8" dia. with minimum breaking strength of 22,500 lbs., is shown on the snatch block label (see Dwg. 621525 CAUTION: Do not install the snatch block on wire rope of different size or weight.

5.4.2 Eye Bolt

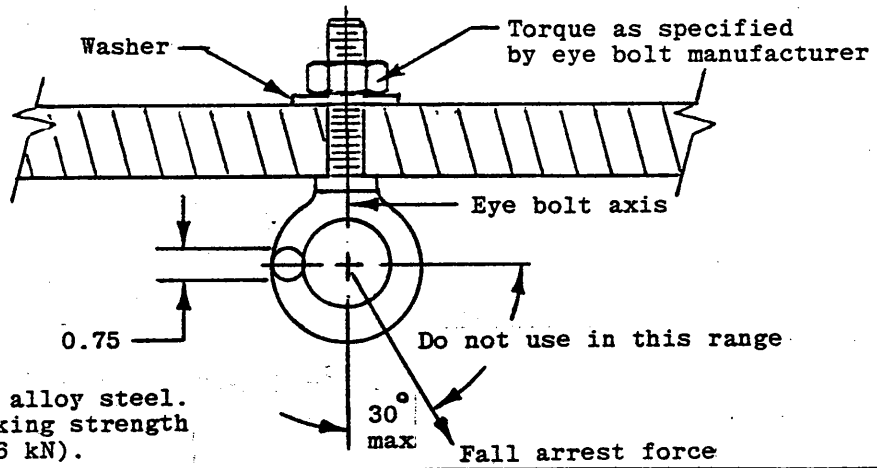
If an eye bolt is needed in an installation linkage, use one that is of weldless forged alloy steel construction with a shoulder pattern and threaded shank for a nut. A shoulder pattern is necessary because any load applied at an angle to the eye bolt axis subjects the eye bolt to bending and the load it can carry is thereby severely reduced. This is true for all eye bolts but it is more severe for shoulderless eye bolts.

Select an eye bolt with a shank length suitable for the installation, allowing for anchorage thickness, washers, and proper capture of nut threads. It is recommended that an eye bolt

with a nominal size of at least 3/4 inch (1.9 cm) be used. Eye bolts are sized by the diameter of the cross section of the metal forming the eye. (See Figure 3.13) The eye bolt must have an axial breaking strength of at least 26,000 lbs. (116 kN), and a strength reduction factor of not more than 54 percent when a load is applied 30 degrees off-axis. It is recognized that the strength of the recommended eye bolt is more than required for loads applied along the eye bolt axis. However, the possibility of off-axis loading necessitates this strength rating.

When installed, the eye bolt shoulder must be perpendicular to the axis of the receiving hole and the shoulder must be fully and firmly in contact with the anchorage surface. The eye bolt nut must be torqued to the level specified by the eye bolt manufacturer. An appropriate washer should be used under the eye bolt nut and the eye bolt threads must fully engage all threads on the nut. The axis of the eye bolt shaft must be oriented such that no fall arrest forces are ever imposed at an angle greater than 30 degrees with the eye bolt axis.

Figure 3.13
Eye Bolt



5.4.3 Installation Procedure

Before the 5/8" dia. horizontal wire rope lifeline is attached to the anchorage, be sure that building structure and anchorage will support at least 26,000 lbs. in the horizontal direction. (See Dwg. 970121)

5.4.3.1 Wire Rope Installation

1) Determine required height of horizontal wire rope lifeline and attach anchorages at same elevation so wire rope will hang level.

2) Measure true length between anchorages (use measuring tape and plumb lines to floor).

3) Using a sag ratio of 6.6%, calculate sag height and true length of wire rope using Pythagorean Theorum. (See Fig. 5.4.4)

4) Arrange wire rope with turnbuckle and open wedge sockets and cable clamps laying flat on the floor. (See Dwg. 970121)

5) Adjust the turnbuckle in until 4" of travel are left.

6) Pull wire rope through the open wedge sockets until the true length, including the turnbuckle, of wire rope is reached. (See Figure 3.15)

7) Assemble three (3) cable clamps on each end 6 inches apart. Tighten to 5-7 ft. lbs. (See Dwg. 970121)

8) To set wedge sockets, drive lightly against the cable clamps. (CAUTION: Do not drive against wire rope and wedge socket - wire rope damage will result.)

9) On innermost cable clamp on turnbuckle end, assemble pulling eye, P/N 621199. (See Dwg. 970121 and Figure 3.16)

10) Adjust the turnbuckle all the way out. (See Figure 3.13)

11) Attach wire rope to wall anchorage at end opposite the pulling eye.

12) Using a 2 ton hand winch, hook one end of winch to wire rope pulling eye and the other end to anchorage. Pull wire rope into place and insert pin through anchorage in the turnbuckle jaw end. (See Dwg. 970121 and Figure 3.17)

13) Measure floor to anchorage height and subtract desired sag height. (See 5.4.3)

14) Apply man weight to center of span and measure wire rope height. Adjust turnbuckle until correct sag height is achieved.

15) After snatch block is installed, load with 700 lbs. at center of wire rope span to set wedge sockets. Inspect and readjust if necessary.

16) Tighten lock nuts on turnbuckle.

17) Check to see that cotter pins are in place and secure.

5.4.2.2 Snatch Block Installation
(See Dwg. 970121)

1) Remove connector yoke bolt from snatch block. (See Dwg. 970121 and label P/N 621525)

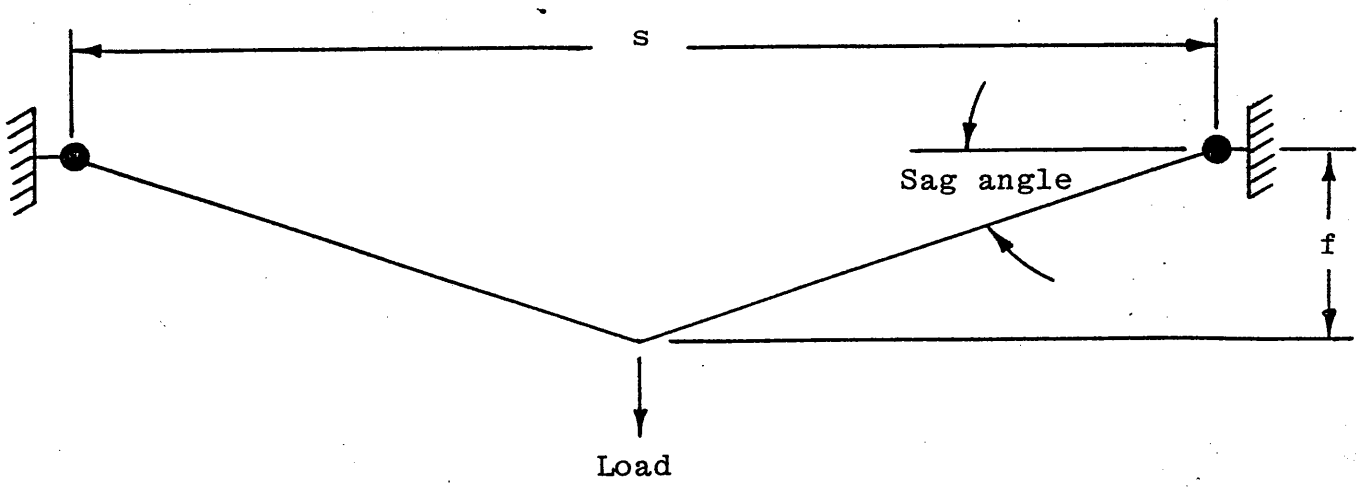
2) Slip connector yoke over fall arrestor handle and lift into place with snatch block on the wire rope. Consult manufacturer or qualified engineer if other components are used.

3) Re-install connector yoke bolt, nut and cotter pin. CAUTION: Do not over-tighten nut.

4) Check to be sure connector yoke is not bound and has freedon to swing.

5) Check snatch block to be sure sheave runs smoothly on wire rope.

5.4.4 Calculation of Minimum Sag Height



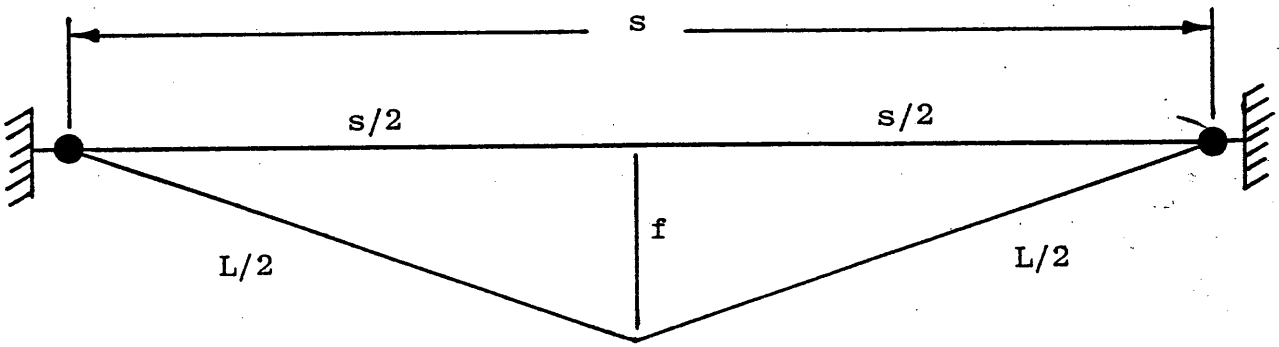
Sag ratio n = f/s = 6.6% minimum

Wire rope sag height = f

Wire rope span = s

CAUTION: Do not use sag ratio of less than 6.6%. 6.6% sag ratio = 7.5 degrees sag angle. (See Section 5.4.2.1)

5.4.5 Calculation of True Length of Wire Rope Using Pythagorean Theorum

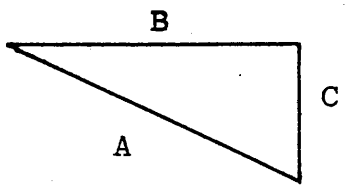


Sag height = f

Span length = s

True wire rope length = L

Pythagorean Theorum



$A^2 = B^2 + C^2$ for all right triangles (one internal angle is 90 degrees)

$$(L/2)^2 = (s/2)^2 + f^2$$

$$L^2 = s^2 + 4f^2$$

$$L = \sqrt{s^2 + 4f^2}$$ = True wire rope length to give correct sag height for span "s".

5.5 Travel Stop Installation

Travel stops must be installed prior to snatch block/fall arrestor installation. (See 5.1.1; Dwg. 970121; Figure 3.15)

Cable clamps are used for travel stops. Do not tighten bolts tighter than 5 ft. lbs. Be sure 1/2 lock washers are in place. Wire rope can be weakened by over-tight cable clamps. Care must be taken to install travel stops at correct location. (See 5.1.1 and Dwg. 970121)

5.6 Before each use, inspect and repair or replace any worn or defective part. Check snatch block housing for cracks and loose or worn bolts. Check for damage to sheave.

Be sure sheave turns freely and is not bound by contaminants or debris. Be sure all cotter pins are in place. Inspect all parts for excessive wear or corrosion.

If in doubt on any subject of the installation, consult manufacturer or qualified engineer.

Figure 3.14 Turnbuckle Installation

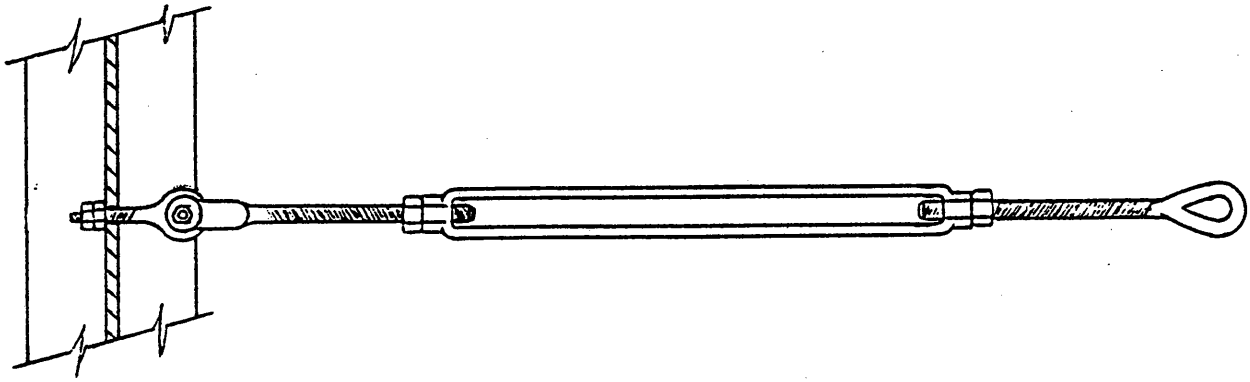


Figure 3.15 Wedge Socket Assembly

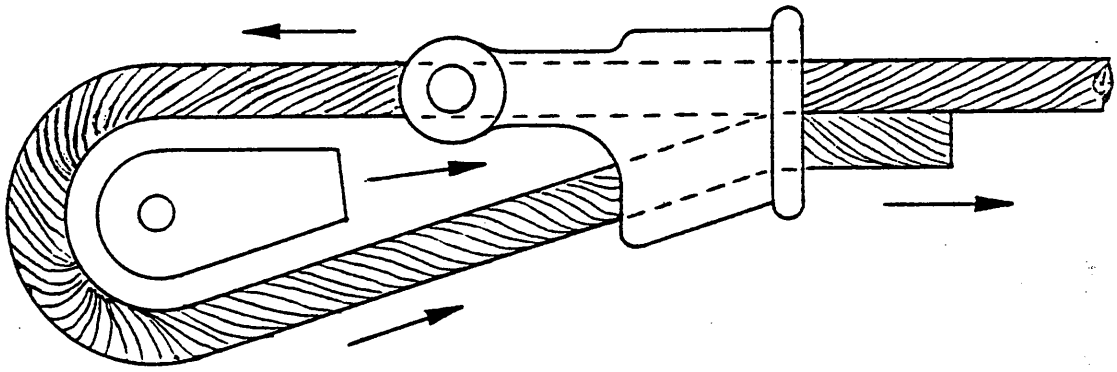


Figure 3.16 Pulling Eye Installation

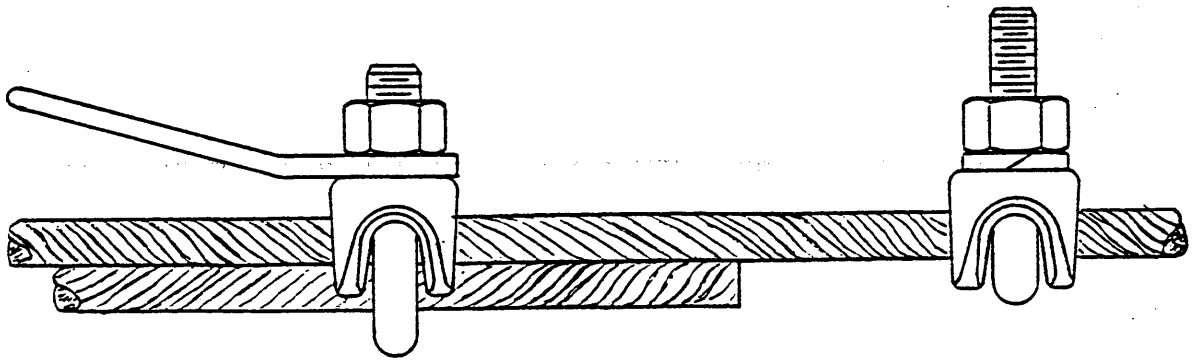
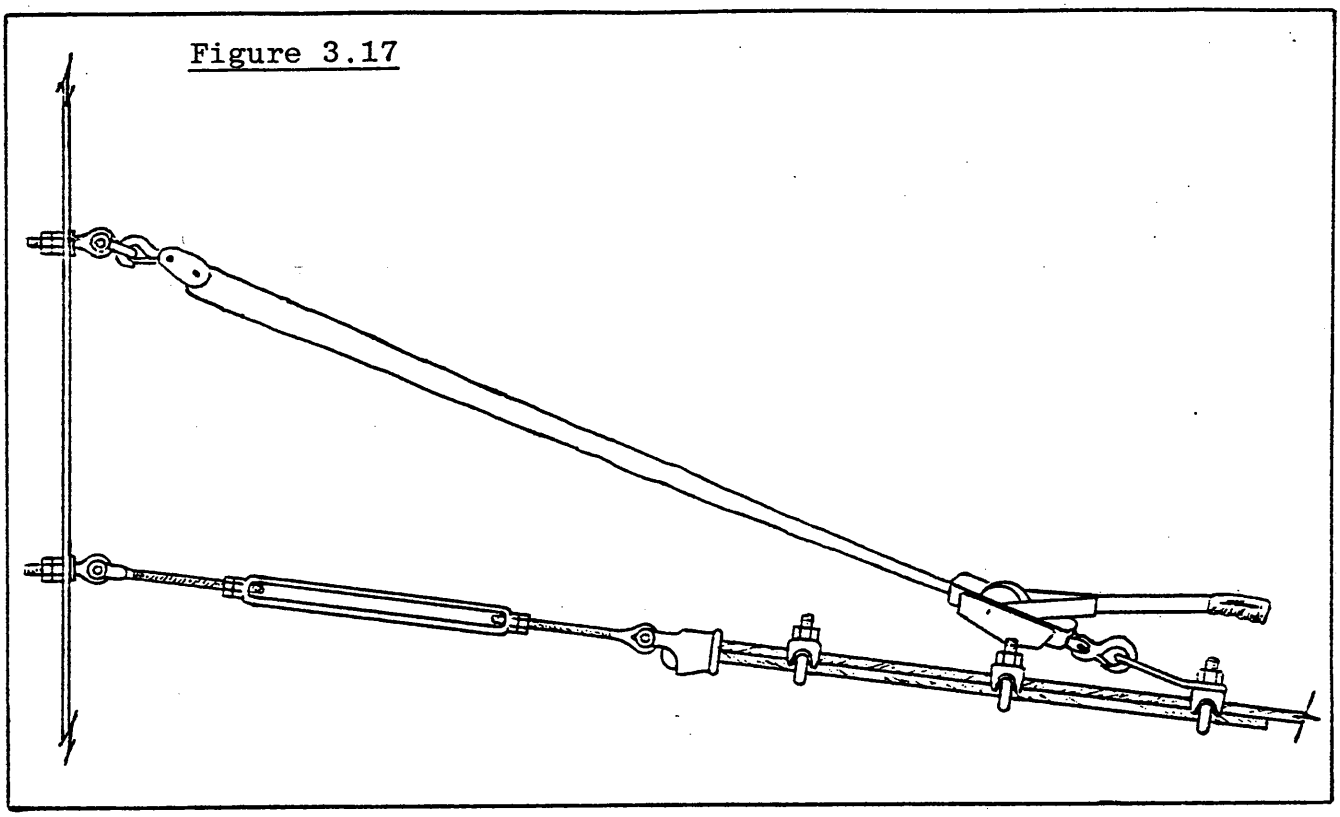
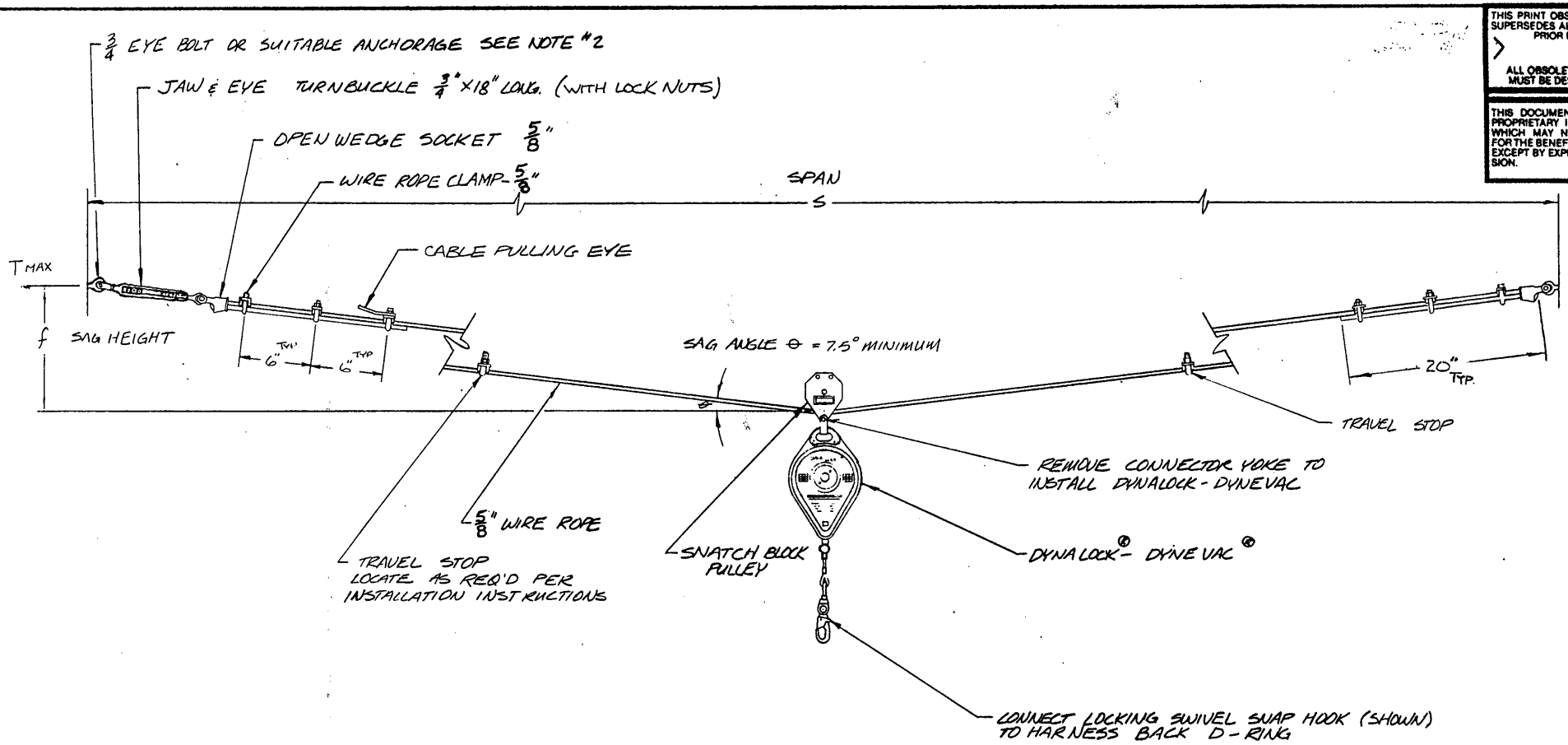


Figure 3.17





THIS PRINT OBSOLETES AND SUPERSEDES ALL PRINTS OF PRIOR DATE

ALL OBSOLETE PRINTS MUST BE DESTROYED.

NOTES

1) SAG RATIO = $\frac{f}{S}$
MINIMUM SAG RATIO = 6.5%
MIN. SAG ANGLE Θ = 7.5°

2) WALL ANCHORAGE MUST SUPPORT 26,000 LB. MIN. HORIZONTALLY & 5400 LB. VERTICALLY AS REQD. BY OSHA STDS.

3) SAG HEIGHT DETERMINED WITH CABLE LOADED AT CENTER FROM WALL ANCHORAGES.

DET. REQ.	NAME/DESCRIPTION	MATL.	PART NO.	DWG. SIZE

REVISIONS

LTR	ENGR CHANGE NO.	DATE	APPR.
I	NPR 86-042	7/3/86	JCH

rose manufacturing co.
ENGLEWOOD, COLORADO

GENERAL TOLERANCES
FRACTION ±
DECIMAL XX± XXX±
ANGLE ±2°

DRAWING SHEET SIZE
A | B | C | D | R | SPEC.

PART DESCRIPTION:
HORIZONTAL LIFE LINE
5/8" WIRE ROPE

NEXT ASSEMBLY

REF. NO.

DSGN	DATE	CHKD.	DATE	APPR.	DATE	SCALE	DRAWING NUMBER	REV.	SHEET
SFC	7/1/86	DJK	9/8/86	JCH	9/23/86	N/A	970121	—	

C