



INSTRUCTION MAUAL IM-164

For Steam Turbine Tensioned Studs and Nuts

Applicable Equipment

Steam Turbine to 109FB Coupling and
109FB Coupling to 450H Generator

FOR GE 382A6118P001,
382A6118P002

Steam Turbine to Load Coupling and
Load Coupling to 450H Generator

FOR GE 389A6185P001

CUSTOMER'S INFORMATION BOX

CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE Power & Water		GENERAL ELECTRIC COMPANY	
<u>VENDOR SUPPLIED</u>			
GE NOT TO REVISE. GE REVISION LEVEL IS SHOWN ON THIS APPLIQUE. THIS DOCUMENT IS FILED UNDER THE GE DRAWING NUMBER.			
THIS DOCUMENT SHALL BE REVISED IN ITS ENTIRETY. ALL SHEETS OF THIS DOCUMENT ARE THE SAME REVISION LEVEL AS INDICATED IN THIS VENDOR SUPPLIED DRAWING APPLIQUE.			
MLI:		___ OF ___	
GE SIGNATURES	DATE	GE DRAWING NUMBER	REV
CHECKED:		373A4011	
ISSUED:			

The Riverhawk Company reserves the right to make changes updating this document without dissemination or notice. The latest revision level may be obtained by contacting Riverhawk Company directly or visit our website at www.riverhawk.com



Repairs – Rentals
Field Service

215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

Table of Contents

Section	Description	Page Number
1.0	Cautions and Safety Warnings	3
2.0	Scope	3
3.0	Quick Check-List	4
4.0	General Preparations	7
5.0	Hardware Set Preparations	8
6.0	Stud and Nut Assembly	11
7.0	Assembly of Hydraulic Tensioner Equipment	12
8.0	Assembly of Tensioner on Stud	18
9.0	Stud Pulling and Tensioning	17
10.0	Thread Locking	18
11.0	Stud/Nut Removal	19
12.0	Storage Instructions	21
13.0	Frequently Asked Questions	23
14.0	Revision History	25
Appendix A1	EC Declaration of Conformity	26
Appendix A2	UKCA Declaration of Conformity	27



215 Clinton Road
 New Hartford, NY 13413
 Tel: +1 315 768 4855
 Fax: +1 315 768 4941
 Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
 CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

1.0 Cautions and Safety Warnings

WARNING

TO AVOID FAILURE, ENSURE SAFETY AND PROPER OPERATION THE TENSIONER ASSEMBLY MUST BE MOUNTED ON THE STUD BEFORE BLEEDING THE SYSTEM AND TENSIONING BEGINS. DO NOT USE THE TENSIONER ASSEMBLY AT ANY PRESSURE UNLESS THE TOOL IS MOUNTED ON THE STUD.

CAUTION

Personal injury and equipment damage can occur if the puller screw is not securely engaged with the tapered thread of the stud. Proper engagement is achieved when the puller screw is tight in the stud and the Tensioner Assembly is free to rotate.

WARNING

The safety cage MUST be in place and hands kept out of designated areas at all times when the tensioner is pressurized otherwise personal injury can occur.

CAUTION

DO NOT EXCEED THE MAXIMUM PRESSURE VIBROSCRIBED ON THE PULLER BODY. Excessive pressure can damage the stud and the puller screw.

WARNING

Fire Hazard! DO NOT heat when the puller assembly is in place. Personal injury or equipment damage may occur. Use of an Oxy-Acetylene torch is not recommended.

CAUTION

DO NOT EXCEED THE MAXIMUM PRESSURE VIBROSCRIBED ON THE PULLER BODY. Excessive pressure can damage the stud and puller screw

Note: Before threading the puller screw into the stud, carefully check the cleanliness of both the stud's and the puller screw's conical threads. Apply a light coat of clean turbine oil or a spray lubricant to the puller screw. Do not use "Never Seize" on the conical threads. This procedure will ease assembly and assure positive mating of the threads before tightening.

2.0 Scope

This document describes the steps to install a set of hardware containing the studs and nuts supplied by Riverhawk Company in the load coupling flanges at the turbine to coupling and coupling to generator connections.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 3 of 34

This hardware set is shown on the following drawing. This drawing as well as the installation tooling drawing form a part of this manual.

GE Purchasing Ordering Part Number	GE Hardware Set Drawing Number	Riverhawk Hardware Set Part Number	Description
382A6118P001# 382A6118P002	359B2549	HF-2658	1-1/8" Hardware Set for Steam Turbine to Coupling to Generator (both ends of load coupling)
389A6185P001	359B2549	HF-2658	1-1/8" Hardware Set for Steam Turbine to Coupling to Generator (both ends of load coupling)

denotes GE part numbers that include installation tooling

3.0 Quick Checklist

The following checklist is intended as a summary of the steps needed to use the Riverhawk-supplied equipment. New personnel or those experienced personnel who have not used the Riverhawk equipment recently are encouraged to read the entire manual.

EQUIPMENT INSPECTION

- Check oil level in hydraulic pump.
- Check air pressure at 80 psi [5.5 bar] minimum. (For air-driven pumps)
- Check hydraulic hose for damage.
- Test pump.
- Inspect tensioner for any damage.



215 Clinton Road
 New Hartford, NY 13413
 Tel: +1 315 768 4855
 Fax: +1 315 768 4941
 Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
 CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

NUT AND STUD PREPARATION

- Inspect stud and nuts for any damage.
- Measure stud length.
- Clean the studs and nuts.
- Install studs and nuts (off-center) into the flange.
- Set stick-out dimension on the coupling side of the flange.
- Hand tighten all studs.
- Verify stick-out measurement (VERY IMPORTANT)

Tensioning (Bolt installation)

- Match the tensioner setup to the flange joint.
- Apply a light coat of clean turbine oil or spray lubricant to the puller screw. **DO NOT USE "NEVER SEIZE" ON THE CONICAL THREADS.**
- Slide spanner ring over the puller screw.
- Mount the tensioner on the stud in flange and install spanner ring onto nut.
- Insert 1/2" hex Allen wrench into the back side of the stud.
- Tighten the puller screw. Then back off puller screw 1/2 a turn.
- Retighten the puller screw and leave tight. **DO NOT BACK OFF PULLER SCREW.**
- Tighten puller nut and then back nut off two flats or 120 degrees to allow for stud stretch.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

- Bleed the tensioner. **Do NOT bleed tensioner off of a stud! Damage to the tool will result!**
- Tension to 50%. Consult manual for correct pressure.
- Use the pin wrench in spanner ring to tighten nut.
- Release pressure, move to next stud in pattern.
- Repeat above steps at final pressure.
- Measure final stud length and record on stretch datasheets. Calculate stretch.
- Torque nuts' set screws.

Detensioning (Stud removal)

- Loosen nuts' set screws
- Inspect and clean studs' conical threads. **Do not continue until ALL debris is removed from the threads! Do not try to use the tensioner to remove a damaged stud!**
- Apply a light coat of clean turbine oil or spray lubricant to the puller screw. **DO NOT USE "NEVER SEIZE" ON THE CONICAL THREADS.**
- Slide spanner ring over the puller screw.
- Mount the tensioner on the stud.
- Install spanner ring into nut.
- Tighten the puller screw. Then back off puller screw 1/2 a turn.
- Retighten the puller screw and leave tight. **DO NOT BACK OFF PULLER SCREW.**
- Tighten puller nut and then back nut off two flats or 120 degrees to allow for stud stretch.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

- Bleed the tensioner. **Do NOT bleed tensioner off of a stud! Damage to the tool will result!**
- Apply final pressure.
- Loosen nut with the spanner ring and pin wrench.
- Move to next stud in pattern

4.0 General Preparations

Read and understand all instructions before installing and tensioning studs.

This equipment produces very high hydraulic pressures and very high forces. Operators must exercise caution and wear personal protective equipment (PPE) when using this equipment.

High-pressure fluid from the Hydraulic Pressure Kit system pressurizes the tensioner which generates a stretching force that actually stretches the stud. As the stud is stretched the nut lifts off the flange. The nut is then resealed into position on the flange by turning a nut driver by hand. When the nut is tight against the flange, the pressure in the tensioner is released leaving the stud loaded to its predetermined value.

4.1 Machine Preparation

The flange to be tensioned must be fully closed prior to positioning of studs in the flanges. Turning the shafts of the turbine and the generator are not required, but may be useful. Also, it will be advantageous to remove as many obstructions as possible from the flange area, such as speed probes, shipping plates, and conduit.

4.2 Hardware – Balance

- Hardware is supplied in weight balanced sets
- Studs and Nuts are interchangeable within sets
- Do not mix with other sets
- Save weight certification data supplied with each set for purchase of spares



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 7 of 34

4.3 Tensioner – Care and Handling

- When not in use, the tensioner shall be maintained in a clean environment and all caps and plugs for hydraulic openings and fittings must be in place.
- When in use, the tensioner shall be protected from sand and grit.
- Long term storage – coat tensioner with oil, return to original container, seal container and protect from moisture.
- Shipment – coat tensioner with oil and ship in original container.

4.4 Hand Tools

Several hand wrenches and micrometers will be required to perform installation and measurement of the studs:

5/8" wrench
15/16" wrench
1" wrench
A set of Allen Wrenches
3' – 4' Breaker Bar [3m]
5" to 6" micrometer [100mm – 200mm]

4.5 Special Tools

Hydraulic Tensioner Kit: HT-2569 Hydraulic Tensioner, 1-1/8"
(recommended)
(reference GE 359B2548)

Hydraulic Pump Kit: AP-0532 Air-Operated Hydraulic Pump
(recommended)
(reference GE 359B2502)

MP-0130 Manual Hand-Operated
Hydraulic Pump
(reference GE 359B2506)

5.0 Hardware Set Preparations



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

5.1 Nut Preparation



Sample Picture of a Riverhawk Locknut

If there is any visible damage on a nut, do not use the nut and contact the Riverhawk Company for a replacement nut. Please be prepared to supply the turbine number, weight certification, and digital photographs for evaluation.

5.1.1 Nut Cleaning - New Installations

For new installations, the nuts should come sealed from the factory and will need no cleaning.

5.1.2 Nut Cleaning - Old Installations

Previously installed nuts require cleaning as follows: Wire brush using a petroleum based solvent to remove any foreign material on the external surfaces and threads.

5.2 Stud Preparation

Check the stud for any visible damage. If there is any visible damage, do not use the stud and contact the Riverhawk Company for a replacement stud. Please be prepared to supply the turbine number, weight certification, and digital photographs for evaluation.

The conical threads of each stud must be clean before installation or removal. This ensures the proper seating of the puller screw.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 9 of 34

5.2.1 Stud Cleaning - New Installations

For new installations, the studs should come sealed from the factory and will need no cleaning.

5.2.2 Stud Cleaning - Old Installations

Previously installed studs may require cleaning. Clean conical threads should have a bright and shiny appearance.

If cleaning is required, follow these steps:

1. Blow out the threads with compressed air to remove loose debris and dry conical threads. Do not apply a solvent or other cleaning solution to the threads as this may chemically attack the stud.
2. Use Stud Cleaning Kit, GT-4354 or a similar 1/2" diameter Brass power brush.



Picture of Brass Power Brush

3. Insert the brush into an electric drill and set drill to run in a counterclockwise direction at high speed.
4. Work the drill in a circular motion while moving the brush in and out to clean all of the threads. Try not to hold the brush in one place too long, so as not to remove the stud's protective coating.
5. Blow out the threads with compressed air to remove loosened debris.
6. Visually inspect threads for cleanliness. Threads should be bright and shiny.
7. Repeat if any dirt can be seen in the threads.
8. Inspect threads for any damage that may have been caused by previous installation.

Do not apply thread lubricants to the threads.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 10 of 34

Finish the cleaning process by rinsing in a volatile solvent such as acetone and allow to dry.

5.3 Stud Length Measurement

Measure and record the initial length of the studs. The following suggestions will improve your results:

- Plan to start and finish any flange in the same day.
- Studs and flange must be at the same temperature
- Number each stud with a marker.
- Mark the location of the measurement on stud end with a permanent marker.
- Measure each stud to nearest 0.001 inch.
- Record each measurement on the supplied charts.
- Do not allow the measuring instruments to set in the sun.

6.0 Stud and Nut Assembly

Refer to the Hardware Assembly Drawing (HF-2658) listed in Section 2.0 of this manual.

1. Assemble the nut to the conical thread end (Tensioning End) of the stud.
2. Slide the stud and nut assembly into the flange from the coupling side as shown in Figure 1. Then install the other nut on the backside of the flange.
3. Adjust the stud/nut assembly so that the stud sticks out from the face of the nut the amount shown on the hardware set drawing. If you don't have a hardware set drawing, it can be found in the GE Vendocs system or contact Riverhawk Company. (See section 2)

SETTING THE STICK-OUT LENGTH IS CRITICAL FOR THE HYDRAULIC TENSIONER TO WORK CORRECTLY.

THE STICK-OUT LENGTH IS ALWAYS SET FROM THE COUPLING SIDE OF THE FLANGE.

4. Hand-tighten the assembly to a snug fit.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX

CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 11 of 34

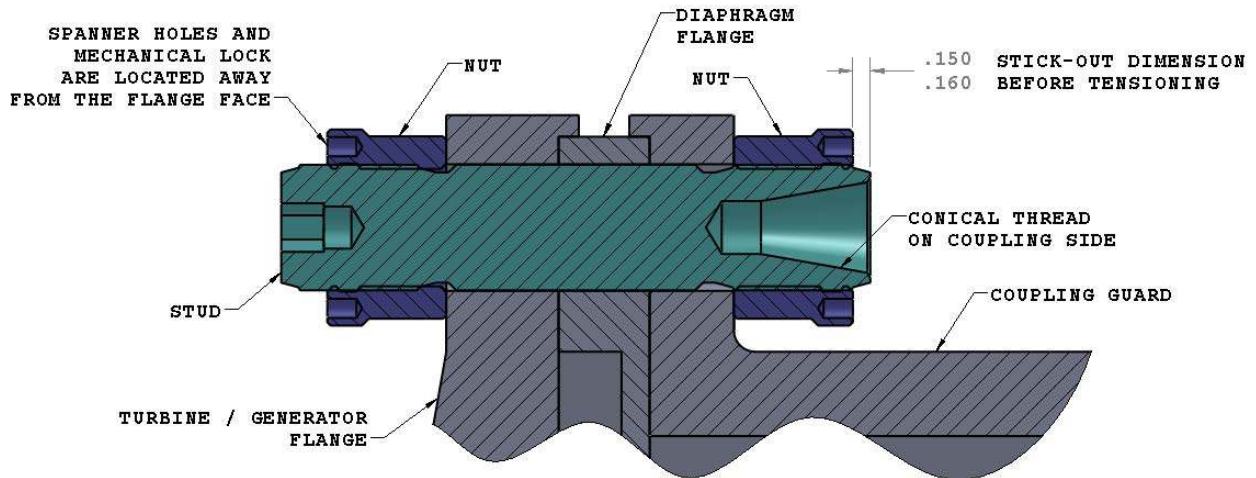


Figure 1 – Section View of a Hardware Set

7.0 Assembly of Hydraulic Tensioner Equipment

7.1 Kit Assembly

Assemble the hydraulic pump with its hose to the puller tool and bleed the system of air per following instructions.

Clean puller screw and check for any debris and dents.

Puller screw should be free to rotate and move back and forth.

Inspect tensioner guard for any signs of damage. Bent guards should be replaced.



215 Clinton Road
 New Hartford, NY 13413
 Tel: +1 315 768 4855
 Fax: +1 315 768 4941
 Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
 CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

7.1.1 Hydraulic Fittings

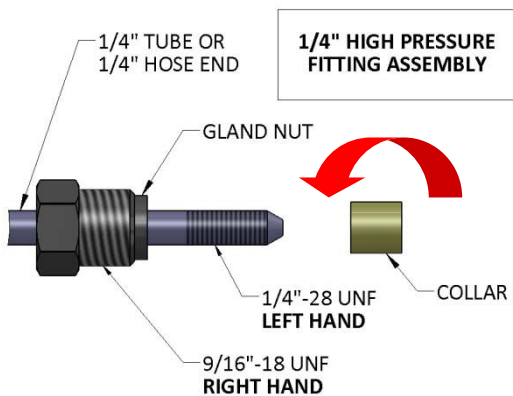


Illustration 1

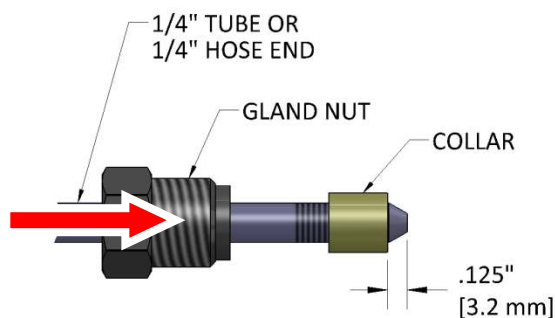


Illustration 2

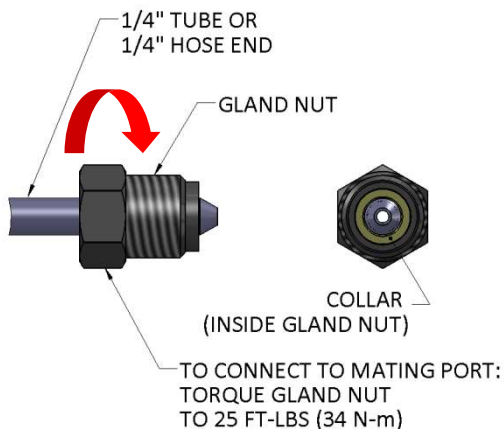


Illustration 3

The Riverhawk hydraulic hose may use a 1/4" High Pressure Fitting to connect to a tensioner. The hose connector is made from a three piece assembly: a gland nut, a collar, and a 1/4" tube or 1/4" hose end. (See Illustration 1)

To assembly the fitting, slide the gland nut over the 1/4" tube or 1/4" hose end. Turn the collar counter-clockwise (**left hand** thread) on to the tube or hose end as shown in Illustration 1.

The collar should be placed .125" (3.2 mm) from the tip of the cone. (See Illustration 2) It may be necessary to adjust this collar with a set of vise-grip pliers. Be careful to not strip the threads off the tube or hose end.

Slide the gland nut down over the collar. (See Illustration 3) Insert the 1/4" tube or 1/4" hose end into tensioner or hydraulic pump. While firmly holding the tube or hose end to stop it from rotating, turn the gland nut clockwise (**right hand** thread) and torque the gland nut to 25 FT-LBS (34 N-m).

Tips:

- Make sure all parts are clean and free from debris.
- Protect the cone on the end of the 1/4" tube or 1/4" hose end from scratches as this is the sealing surface.
- Replace red plastic caps when finished to protect the threads and cone.



215 Clinton Road
 New Hartford, NY 13413
 Tel: +1 315 768 4855
 Fax: +1 315 768 4941
 Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
 CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

7.2 Check Hydraulic Pump Kit

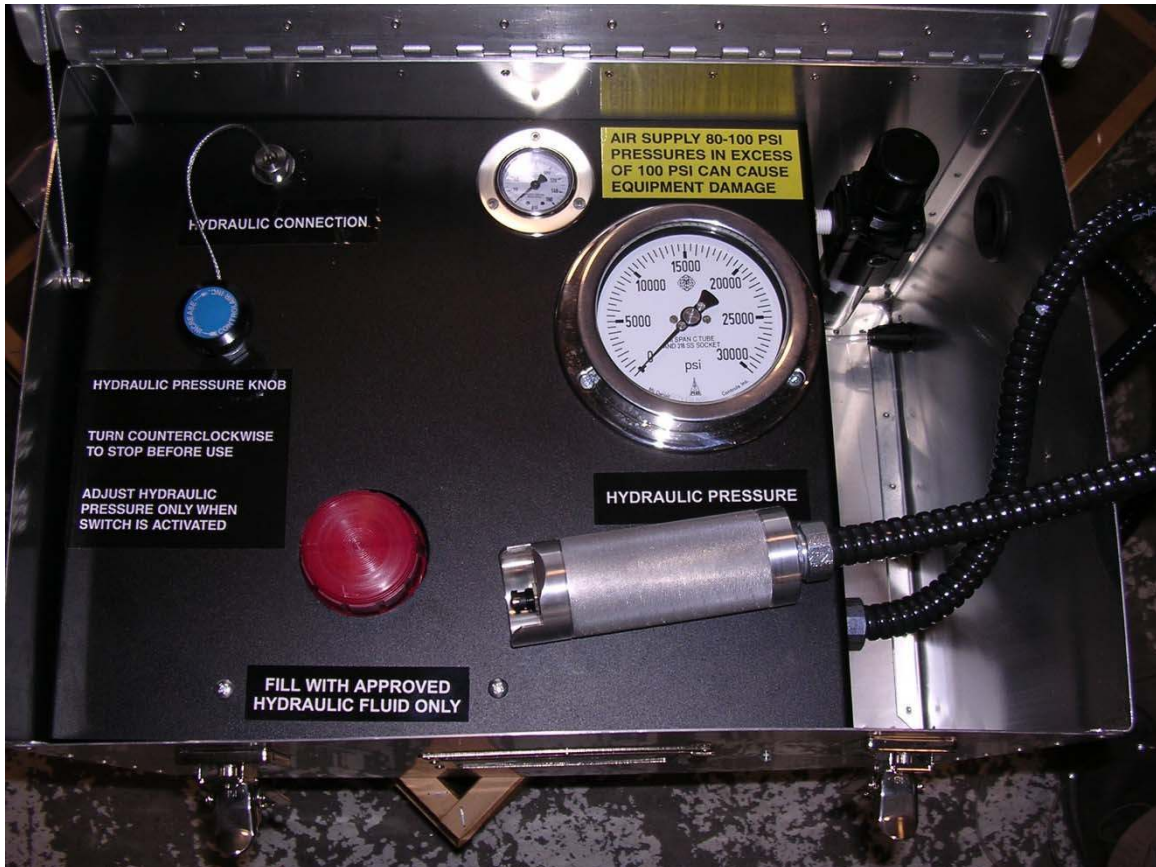
The pump kit is shipped full of hydraulic oil. The pump reservoir cap is sealed for shipment.

Replace the grey shipping knob cap with the red plastic reservoir cap.

To use the pump, turn cap to the vent position and follow the operating instructions on the inside cover.

To prevent oil spillage, close cap when not in use. Lost oil should be replaced with Enerpac Hydraulic Oil. ISO 32 or equivalent hydraulic oil may be substituted.

Test pump by dead-heading (leave port plug in place) and run pump – should hold steady pressure.



Sample Picture of AP-0532 Hydraulic Pump with hydraulic connection plugged for testing



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

7.3 Bleeding Hydraulic System

Follow the tensioner assembly instructions of Section 8.0.

WARNING

TO AVOID FAILURE, ENSURE SAFETY AND PROPER OPERATION THE TENSIONER ASSEMBLY MUST BE MOUNTED ON THE STUD BEFORE BLEEDING THE SYSTEM AND TENSIONING BEGINS. DO NOT USE THE TENSIONER ASSEMBLY AT ANY PRESSURE UNLESS THE TOOL IS MOUNTED ON THE STUD.

1. Mount tensioner on a stud per the assembly instructions of Section 8.0. Make sure the pump is situated below the tensioner assembly.
2. The tensioner assembly has two ports, one for pressurizing and one for bleeding the system. These ports service a common chamber and therefore may be treated interchangeability. The bleed port must always be oriented in the uppermost position.
3. The puller tool is shipped with a 5/8 in. [16 mm] hex coned stem bleeder fitting installed. With this fitting loosened, stroke the pump repeatedly until the stream of oil exiting the tool is free of air then retighten the fitting.

Note: The hose is stiff; use of this tooling can be simplified by temporarily mounting the puller tool on one stud prior to final tightening of fittings. This will reduce the tendency for the fittings to loosen during use.

8.0 Assembly of Tensioner on Stud

All tensioning (pulling) will be performed from the tapered thread end of the stud with orientation of the stud to the flange as shown in Figure 1.

8.1 Assembly of Tensioner with Integral Safety Cage

Refer to Tensioner Assembly drawing and Figure 7 (at the end of this manual) for tensioner to flange mounting. This assembly has the following features which should make stud tensioning safer and easier.

The safety cage is integral (bolted) to the puller tool

- The hydraulic piston is spring loaded to retract
- The puller screw is a 2-piece design. This requires that the operator tighten the puller screw into the stud and then install a puller nut.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX

CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 15 of 34

Assembly sequence is as follows:

1. Open the hydraulic return valve on the pump to allow hydraulic fluid to be pushed back from the puller tool into the pump reservoir. (This is automatic on the air-operated hydraulic pump)
2. Place the spanner ring on the puller side cylindrical nut.
3. Apply a light coat of clean turbine oil or a spray lubricant to the puller screw. Do not use "Never Seize" on the conical threads.
4. Place and hold the puller tool over the end to be tightened.
5. Insert the puller screw through the puller tool into the tapered thread of the stud and tighten.
6. **Be sure not to cross-thread the assembly.**
7. Tighten the puller screw using Allen wrenches on the puller screw and the stud. DO NOT wrench on the Hex nut opposite the puller tool.
8. Install the puller nut until it seats snugly on the piston and then back-off 2 flats. This is particularly important for removal because the stud shortens during disassembly and the tensioner may then bind.
9. At this point the Tensioner Assembly **MUST BE FREE TO ROTATE**, the puller screw is tight in the stud and the puller nut has been backed-off the 2 flats.

Note: If the tool is not free to rotate it is most likely that the nuts must be repositioned so that the stud may be shifted slightly to the puller tool side of the flange. This can be accomplished as follows:

1. Back off the puller nut and slightly loosen the puller screw.
2. Back off the Hex nut opposite the puller tool about 1 /2 turn.
3. Tighten the puller screw side cylindrical nut to take up the slack
4. Retighten the puller screw per above and check for tool looseness

Caution: Do not over extend the stud. Over extension can cause the piston to lose its seal and leak oil.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 16 of 34

CAUTION

Personal injury and equipment damage can occur if the puller screw is not securely engaged with the tapered threads of the stud. Proper engagement is achieved when the puller screw is tight in the stud and the tensioner assembly is free to turn.

9.0 Stud Pulling and Tensioning

The studs will be tensioned in two steps, at approximately 50% pressure and at final pressure. Follow the tensioning sequence for each flange joint as defined on the data sheets found at the end of this manual.

Note: Before threading the puller screw into the stud, carefully check the cleanliness of both the stud's and the puller screw's conical threads. Apply a light coat of clean turbine oil or a spray lubricant to the puller screw. Do not use "Never Seize" on the conical threads. This procedure will ease assembly and assure positive mating of the threads before tightening.

WARNING

The safety cage **MUST** be in place and hands kept out of designated areas at all times when the puller tool is pressurized otherwise personal injury can occur.

9.1 Tensioning at 50% pressure

After the tensioner is properly installed apply hydraulic pressure to the tool. Bring the pressure to the 50% level in accordance with the following table.

<u>Flange Position</u>	<u>Stud Size</u>	<u>50% Pressure</u>	<u>50% Stretch</u>
Turbine to Coupling	1-1/8" [29 mm]	9000 psi [620 bar]	Do not measure Do not use
Coupling to Generator	1-1/8" [29 mm]	9000 psi [620 bar]	Do not measure Do not use

9.1.1 Tightening of 1 1/8" Nuts

Tighten the cylindrical nuts hand tight using the pin wrench and spanner ring, ref. Figure 7.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

9.2 Removing the Tensioner from an Installed Stud

Puller tool removal is to be accomplished as follows:

1. Release the puller tool pressure by opening the valve on the pump. Leave valve open. (This is automatic on the air-operated hydraulic pump)
2. Unscrew the puller screw using a wrench.
3. Tapping the wrench with a hammer may be necessary to loosen the puller screw.
4. Move the tool to the next stud/nut assembly to be tensioned, following the sequence/pattern as defined on the supplied data sheets.

9.3 Tensioning at Final Pressure

Repeat the pulling and tightening procedure stated above at full pressure. Measures the length of the studs after all have been tensioned. The final pressure and required stretch values are listed in the following table

<u>Flange Position</u>	<u>Stud Size</u>	<u>Final Pressure</u>	<u>Final Stretch</u>
Turbine to Coupling	1-1/8" [29 mm]	18000 psi [1250 bar]	0.009" - 0.011" [0.23 mm - 0.28 mm]
Coupling to Generator	1-1/8" [29 mm]	18000 psi [1250 bar]	0.009" - 0.011" [0.23 mm - 0.28 mm]

CAUTION

DO NOT EXCEED THE MAXIMUM PRESSURE VIBROSCRIBED ON THE PULLER BODY. Excessive pressure can damage the stud and puller screw.

Excessive stretch variations or low stretch values can be corrected by retensioning all or selected studs to the pressure values stated in the above table. Have final stretch values approved by the supervisor responsible for the installation.

10.0 Thread Locking

Once pulling and tensioning is completed all stud nuts must be locked in position



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

10.1 Thread Locking Using a Mechanical Locking Device.



Sample Picture of a Riverhawk Locknut

Mechanical lock nuts have two set screws located in the top face, see picture. Before threading the nut onto the stud check to be certain the set screws are free to turn. Once the nut is seated torque the set screws to the values specified in the following table. When seated and torqued to the values specified the load created by the set screw displaces the thread of the nut in the area of the web creating the desired locking action.

<u>Stud Size</u>	<u>Set Screw Size</u>	<u>Torque</u>
1-1/8" [29 mm]	#10-32 UN	30 in·lbs - 36 in·lbs [3.4 N·m – 4.1 N·m]

11.0 Stud/Nut Removal

Section 12.1 describes the procedures to be followed in removing nuts that have been locked with mechanical locking feature.

11.1 Removal of Assemblies with Mechanical Locknuts

For those assemblies which have been locked with the liquid locking compound, removal is accomplished as follows:



215 Clinton Road
 New Hartford, NY 13413
 Tel: +1 315 768 4855
 Fax: +1 315 768 4941
 Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
 CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

1. Using a wire brush and shop air clean the internal tapered thread of the stud to remove any debris/deposits that may have accumulated during service. (see section 5.2.2)
2. Install the appropriate puller tool to the stud as described in Section. 8.0.
3. Apply hydraulic pressure per the following table and without using unreasonable force attempt to loosen the nut using the spanner ring and spanner wrench as shown in Figure 7.

<u>Flange Position</u>	<u>Stud Size</u>	<u>Final Pressure</u>
Turbine to Coupling	1-1/8" [29 mm]	18000 psi [1250 bar]
Coupling to Generator	1-1/8" [29 mm]	18000 psi [1250 bar]

CAUTION

DO NOT EXCEED THE MAXIMUM PRESSURE VIBROSCRIBED ON THE PULLER BODY. Excessive pressure can damage the stud and the puller screw.

11.2 Removal of Assemblies with Mechanical Locknuts

For those assemblies which have been locked using mechanical lock nuts, removal is accomplished as follows:

1. Using a wire brush and shop air clean the internal tapered thread of the stud to remove any debris/deposits which may have accumulated during service. (see section 5.2.2)
With an Allen-wrench loosen the two locking set screws but do not remove from nut.



Sample Picture of the loosening of a nut's set screws



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

2. Install the appropriate puller tool to the stud as described in Section 8.0.
3. Apply hydraulic pressure per the following table and without using unreasonable force attempt to loosen the nut using the spanner ring and spanner wrench as shown in Figure 7.

<u>Flange Position</u>	<u>Stud Size</u>	<u>Final Pressure</u>
Turbine to Coupling	1-1/8" [29 mm]	18000 psi [1250 bar]
Coupling to Generator	1-1/8" [29 mm]	18000 psi [1250 bar]

CAUTION

DO NOT EXCEED THE MAXIMUM PRESSURE VIBROSCRIBED ON THE PULLER BODY. Excessive pressure can damage the stud and the puller screw.

12.0 Storage Instructions

Follow these directions to properly store your hydraulic tensioner and hydraulic pump kit for long term storage and shipment.

If any damage is observed, contact the Riverhawk Company to schedule a maintenance inspection.

12.1 Hydraulic Pump Kit Storage

12.1.1 MP-0130 Manual hydraulic pump

Plug the pump’s hydraulic port with the pump’s metal plug
Secure the grey vent plug on the reservoir with a 3/8” (10mm) hex Allen key.

Check the hydraulic hose for any damage including bent hose ends and split outer lining. If any damaged is found, replace the hose immediately by contacting the Riverhawk Company.

Place red plastic end caps on the hose ends to protect the hose ends from damage.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Wind the hydraulic hose around the pump and secure in place with the hose clamps.

Place the hydraulic pump kit into the original shipping container.

12.1.2 AP-0532 Air-Driven hydraulic pump

Plug the pump's hydraulic port with the pump's metal plug.

The red oil reservoir cap should be removed and stored inside the pump with the extra air hose fittings.

Place the grey and black storage cap into the oil reservoir opening and tighten to secure the oil from spillage.

Check the hydraulic hose for any damage including bent hose ends and split outer lining. If any damaged is found, replace the hose immediately by contacting the Riverhawk Company.

Place red plastic end caps on the hose ends to protect the hose ends from damage.

Wind the hydraulic hose into a circle no smaller than 14" (360mm) and place into the original shipping container.

Place the hydraulic pump kit into the original shipping container.

12.2 Hydraulic Tensioner Storage

Check the tensioner for any damage

1. Clean puller screw and check for any debris and dents.
2. Puller screw should be free to rotate and move back and forth.
3. Seam between the cylinder and its end cap is closed tightly.
4. Inspect tensioner guard for any signs of damage. Bent guards should be replaced.

If any damage is observed, contact the Riverhawk Company to schedule a maintenance inspection.

Place protective red plastic cap into the hydraulic port.

Coat the hydraulic tensioner with a light coat of oil and place the tensioner into the original shipping container.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

12.3 Store shipping container

Secure the hydraulic pump and hydraulic tensioner into the original shipping containers using the supplied wood braces.

Seal the original shipping container and store under shelter and protected from moisture, sand, and grit.

13.0 Frequently Asked Questions

This section contains some frequently asked questions and problems. If the steps listed here do not solve your problem, contact the Riverhawk Company thru our website, email, or phone call.

- Q:** A tensioner has pulled itself out of the stud's conical threads. Can I continue using a tensioner on this stud?
- A:** No. Both the tensioner and the stud may have been damaged. If the stud is tensioned, a Nut Buster repair kit, from Riverhawk, must be used to remove the damaged stud by drilling out the nut. Riverhawk can supply a replacement stud and nut based on the initial weight certification supplied with the hardware set (see section 4.2). The damaged tensioner should also be returned to Riverhawk for inspection and repair.
- Q:** The hydraulic tensioner has been taken up to its final pressure. The final stretch length is short of the final stretch target. What is the next step?
- A:** Do not increase the hydraulic pressure. Check if the hydraulic pump is set to the right pressure. Install the tensioner and re-pressurize the tensioner to the final pressure then recheck the stretch measurement. If the stretch value is still short, remove the stud from the hole and re-measure the stud's initial length then try to install the stud again.
- Q:** The hydraulic tensioner has been taken up to its final pressure. The final stretch length is larger than the final stretch target. What is the next step?
- A:** Remove the stud from the bolt hole. Check if the hydraulic pump is set to the right pressure. Re-measure the stud's initial length then try to install the stud again.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

- Q:** Is there an easier way to support or move the tensioner around the coupling shaft?
- A:** Use two straps. One around the coupling shaft and the other attach to any overhead support. Straps must be slack during mounting tensioner to stud and during tensioning.
- Q:** The tensioner is at its final pressure, but the nut cannot be loosen.
- A:** If the nuts cannot be loosened at the final pressure, continually increasing the pressure will not help and can be dangerous and in some cases make it harder to remove the nut. Check the nut to see if its set screws have been loosened. Check for and remove any corrosion around the nut's threads.
- Q:** How do I clean the conical threads on a stud?
- A:** The conical threads are best cleaned using a spiral wound brass brush in a drill as described in section 5.2.2
- Q:** During the initial steps of removing a tensioned stud, the stick-out length is found to be wrong.
- A:** Do not proceed. Contact Riverhawk for assistance. With the wrong stick-out length, the hydraulic tensioner has a limited stroke and may not work properly and can be damaged.
- Q:** The hydraulic pump appears to be leaking.
- A:** Check the hose connection to the hydraulic pump. If the 1/4" high pressure fitting is not assembled correctly, it may look like the pump is leaking. If the problem continues, it may be necessary to open the pump kit. Contact Riverhawk for guidance.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

- Q:** The hydraulic hose has a collar on it that can't be moved by hand
- A:** The collar is sometimes held in place with a thread locking compound. This prevents the collar from moving too easily. It may be necessary to adjust this collar with a set of vise-grip pliers. Be careful to not strip the threads off the tube or hose end.

14.0 Revision History

Revision Letter	Effective Date	Description
C	May 17, 2022	Added EC Declaration of Conformity and UKCA Declaration of Conformity
B	Dec 2, 2009	Added 389A6185P001 to title page and section 2.0
A	Nov 13, 2009	Added sections 3.0 and 13.0; Added turbine oil and removed "Never Seize" from sections 1.0, 3.0, 8.1, 8.2, and 9.0; Revised section 4.5; revise title on page 1, revised sections 4.4, 5.1, 7.1.1, 11.1, 11.2, 12.2; Reformatted to current practice
-	Sept 28, 2004	Released



215 Clinton Road
 New Hartford, NY 13413
 Tel: +1 315 768 4855
 Fax: +1 315 768 4941
 Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
 CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Appendix A1

EC Declaration of Conformity

Manufacturer: Riverhawk Company
Address: 215 Clinton Road
New Hartford, NY 13413, USA

The hydraulic pump and bolt tensioning tool described in this manual are used for installing and applying tension to large bolts that are specifically designed by Riverhawk Company to be tensioned hydraulically.

All applicable sections of European Directive 2006/42/EC for machinery have been applied and fulfilled in the design and manufacture of the hydraulic pump and bolt tensioning tool described in this manual. Reference also ISO 12100:2010, ISO 4413:2010, and ISO 4414:2010.

Furthermore, this equipment has been manufactured under the Riverhawk quality system per EN ISO 9001:2015

Consult the Declaration of Conformance included with the shipment of this equipment that identifies the authorized Riverhawk representative, applicable serial numbers, and appropriate signature.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV.
373A4011	

Revision C
Page 26 of 34

Appendix A2

UKCA Declaration of Conformity

Manufacturer: Riverhawk Company
Address: 215 Clinton Road
New Hartford, NY 13413, USA

The hydraulic pump and bolt tensioning tool described in this manual are used for installing and applying tension to large bolts that are specifically designed by Riverhawk Company to be tensioned hydraulically.

All applicable sections of Supply of Machinery (Safety) 2008 have been applied and fulfilled in the design and manufacture of the hydraulic pump and bolt tensioning tool described in this manual. Reference also ISO 12100:2010, ISO 4413:2010, and ISO 4414:2010.

Furthermore, this equipment has been manufactured under the Riverhawk quality system per EN ISO 9001:2015

Consult the Declaration of Conformance included with the shipment of this equipment that identifies the authorized Riverhawk representative, applicable serial numbers, and appropriate signature.



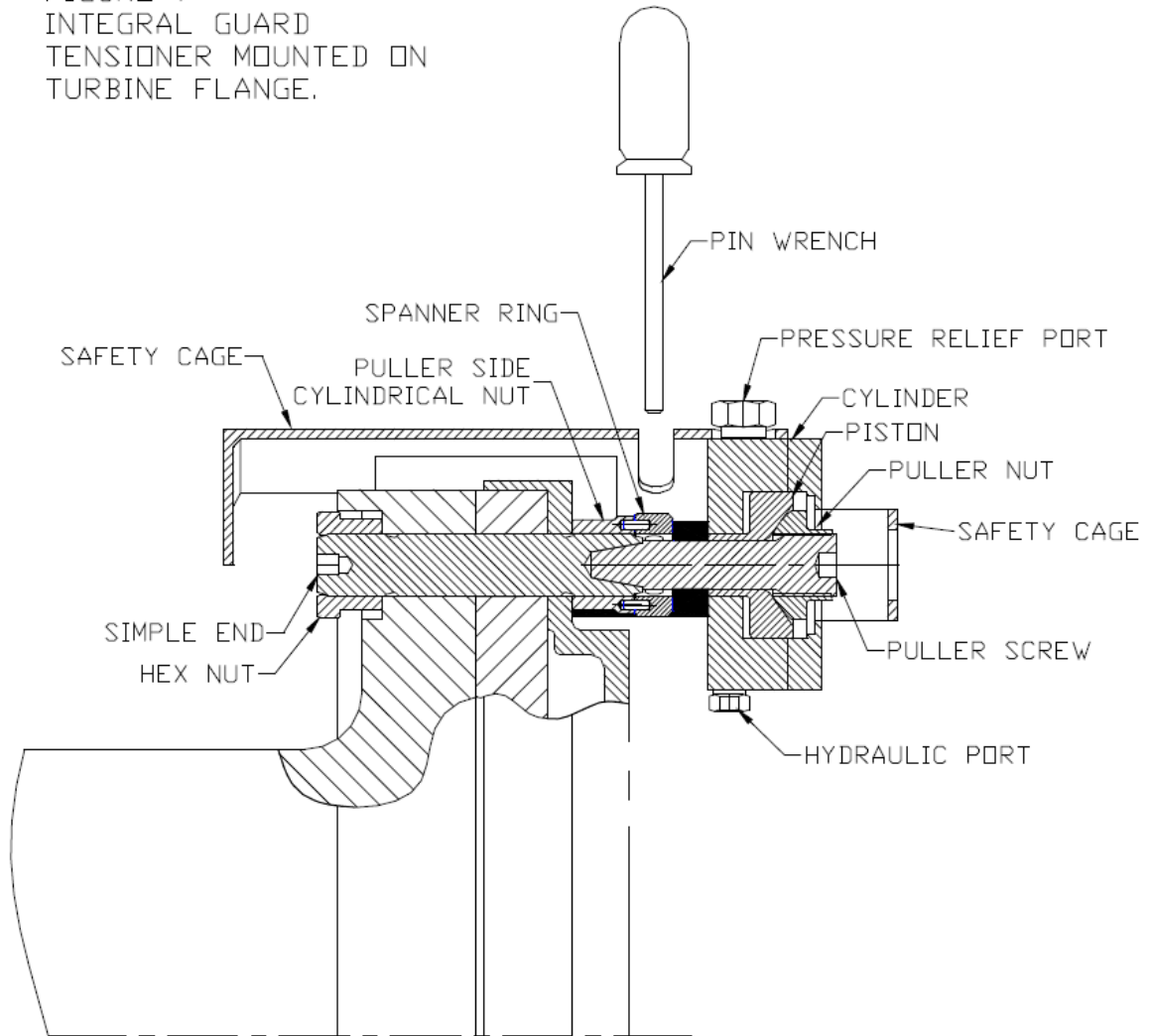
215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 27 of 34

FIGURE 7
INTEGRAL GUARD
TENSIONER MOUNTED ON
TURBINE FLANGE.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

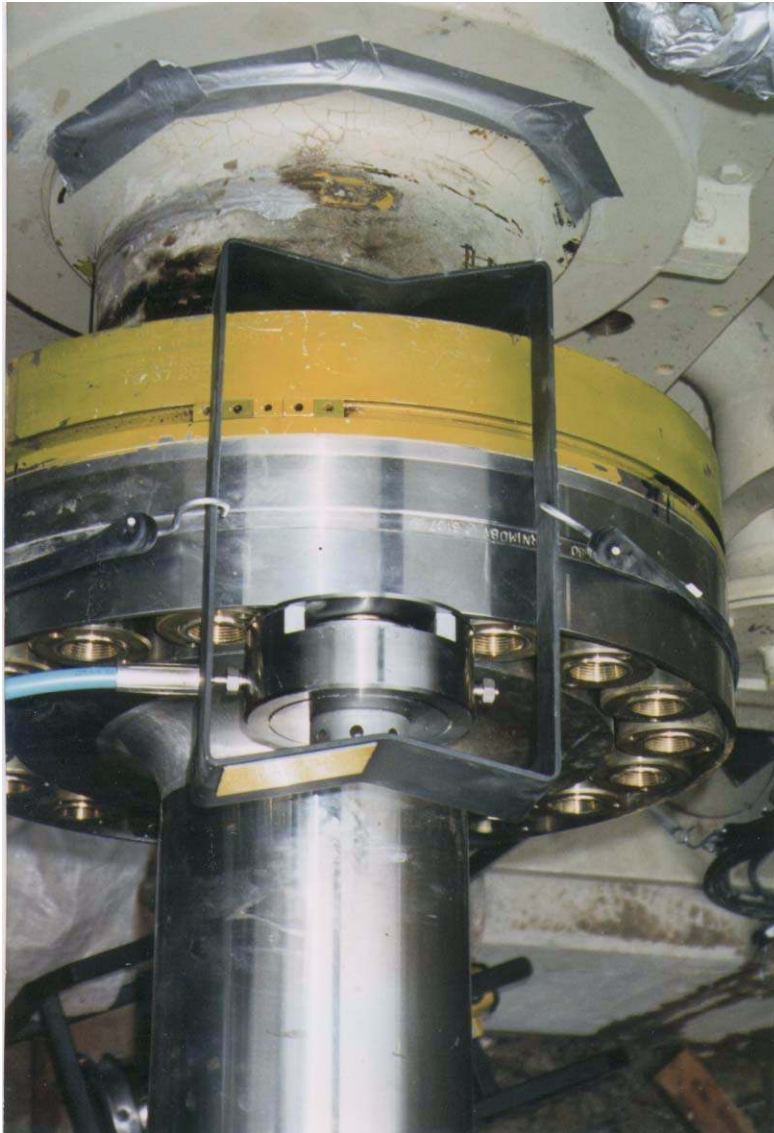


Photo 1
Looking down on gear to generator flange of 6FA machine.
Shows 2" puller tool mounted with safety cage in place.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

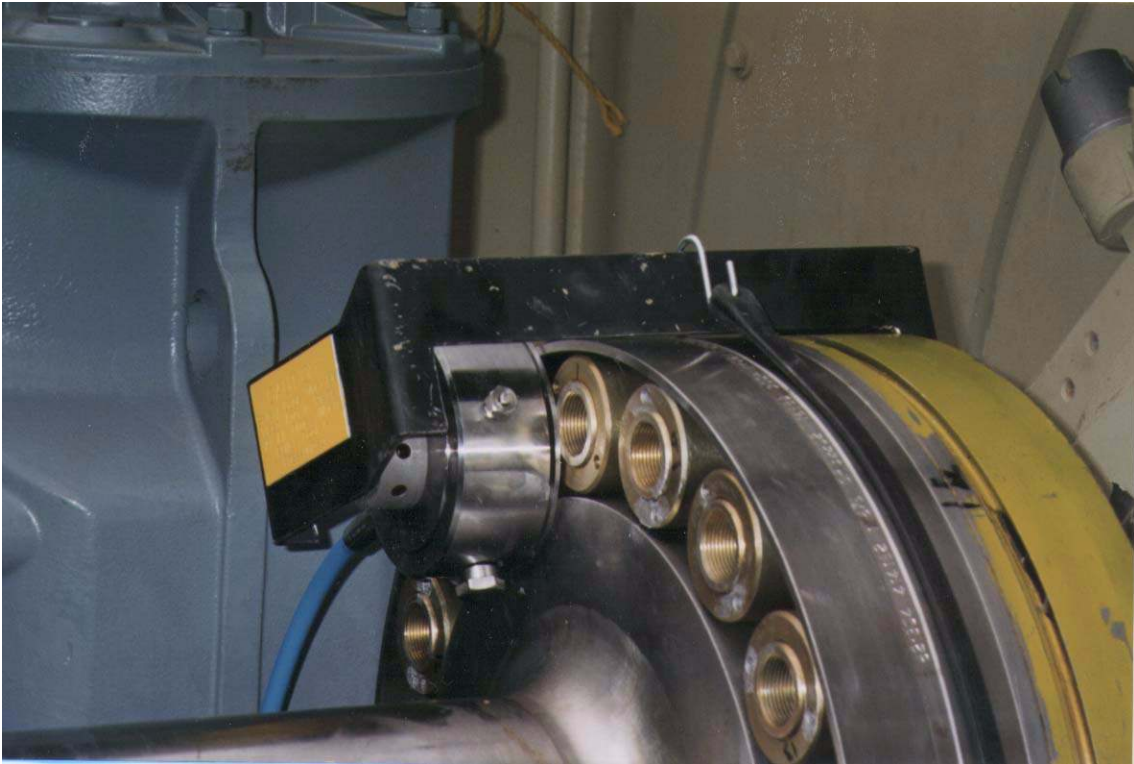


Photo 2
Side view of 2" puller tool and safety cage on 6FA machine.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

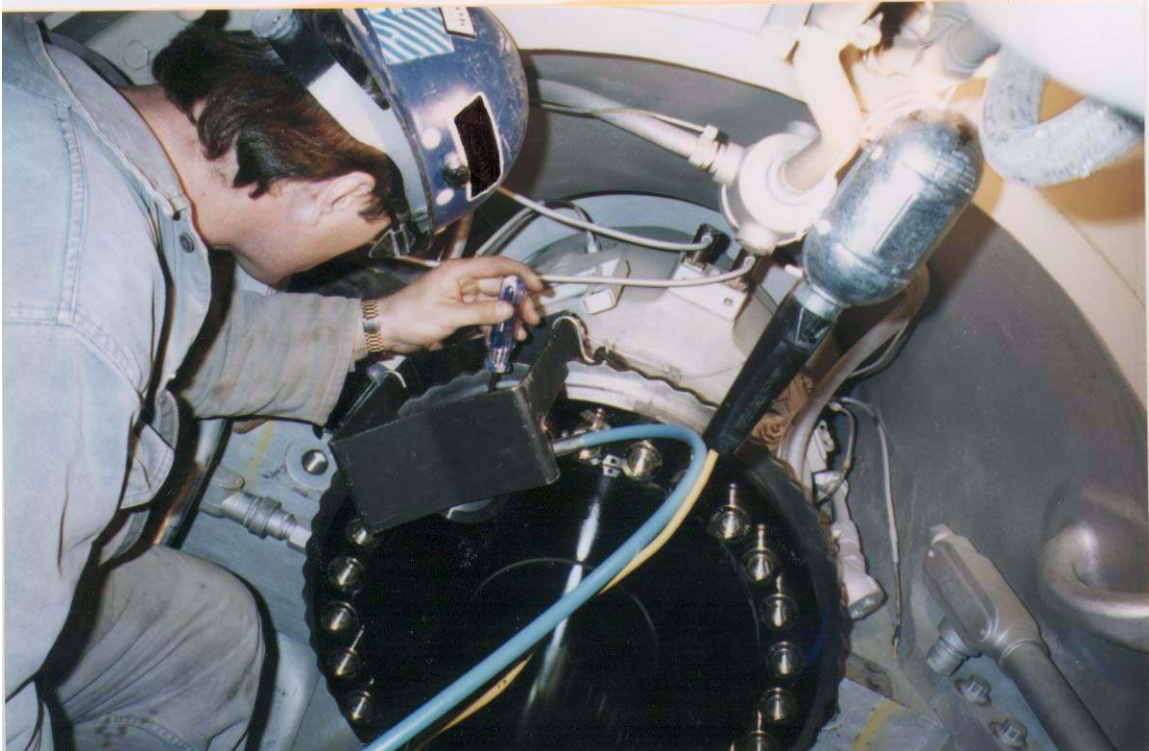


Photo 3

Top view of 1-1/8" puller tool and safety cage in place. Tool is mounted on coupling to gear flange of 6FA machine.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 31 of 34



Photo 4

View of 1 1/8 puller tool and safety cage mounted on turbine to coupling flange of 6FA machine. Tool is pressurized and millwright is tightening nut.



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX
CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	

Revision C
Page 32 of 34

Instruction Manual IM-164

TIGHTENING PATTERN NUMBER SEQUENTIALLY 1 THRU 40, TIGHTEN IN THE SEQUENCE LISTED BELOW:

STUD LOCATION	INITIAL LENGTH	LENGTH AFTER FINAL PULL	STRETCH
1			
21			
2			
22			
3			
23			
4			
24			
5			
25			
6			
26			
7			
27			
8			
28			
9			
29			
10			
30			
11			
31			
12			
32			
13			
33			
14			
34			
15			
35			
16			
36			
17			
37			
18			
38			
19			
39			
20			
40			

CUSTOMER'S INFORMATION BOX

CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	



215 Clinton Road
 New Hartford, NY 13413
 Tel: +1 315 768 4855
 Fax: +1 315 768 4941
 Email: info@riverhawk.com



215 Clinton Road
New Hartford, NY 13413
Tel: +1 315 768 4855
Fax: +1 315 768 4941
Email: info@riverhawk.com

CUSTOMER'S INFORMATION BOX

CONTENTS ARE INDEPENDENT OF RIVERHAWK DOCUMENT CONTROL

GE DRAWING NUMBER	REV
373A4011	