REVISION LETTER	GE ALTERATION NOTICE NUMBER

INSTRUCTION MANUAL IM-114
For Gas Turbine Tensioned Studs and Nuts

Fr.9FA Turbine to 324GE Generator GE358A7202P003, P013, P028, P029, P033

Fr. 9FA Turbine to Load Coupling GE358A7202P037, P038

Steam Turbine to 324GE Generator GE358A7202P019, P021

GE Power Generation

GENERAL ELECTRIC COMPANY
Schenectady, NY

VENDOR SUPPLIED DRAWING

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1.0 Cautions and Safety Warnings

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.

NOTICE

Do not use more thread locking compound than specified or the nut may be VERY difficult to remove at disassembly.

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 procedure to be used to install studs and nuts supplied by Riverhawk Company in the flanges at the turbine/coupling and coupling/generator connections. This hardware is depicted on the following drawings. These drawings as well as Tooling drawings form a part of this manual.

Hardware Sets:

HF-0373 HF-0374 HF-0770

HF-0772 HF-0962 HF-2578

Hydraulic Tensioners:

HT-0445 HT-2579 HT-5173

Special Note: HT-3235 for Turbine Number 298578 and 298579 ONLY

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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.

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)

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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.
- ☐ • Install spanner ring onto nut.
- ☐ • Insert 1/2" hex Allen wrench into the back side of the stud.
- ☐ • Tighten the puller screw.
- ☐ • Back off puller screw 1/2 turn.
- ☐ • Retighten the puller screw and leave tight. **DO NOT BACK OFF PULLER SCREW.**
- ☐ • 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.

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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.
- ☐ • Back off puller screw 1/2 a turn.
- ☐ • Retighten the puller screw and leave tight. **DO NOT BACK OFF PULLER SCREW.**
- ☐ • 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

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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, wear safety glasses and hard hats 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 reseated 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** the studs in the flanges. Also, it will be advantageous to remove as many obstructions as possible from the flange area, such as speed probes and conduit.

4.2 Hardware – Balance

- Hardware is supplied as weight balanced sets
- Studs and nuts are interchangeable within sets
- Do not intermix with other sets
- Save weight certification supplied with each set for the purchase of spare parts

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. **DO NOT STORE OUTSIDE**
- 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
1" wrench
1″ Socket and Impact Wrench
A set of Allen Wrenches
3′ – 4′ Breaker Bar
12″ to 13″ micrometer or caliper

4.5 Special Tools

Hydraulic Tensioner Kit:

HT-0445 Hydraulic Tensioner
(reference GE 359B2507)

HT-2579 Hydraulic Tensioner
(reference GE 359B2546)

HT-3235 Hydraulic Tensioner
(reference GE 359B2581)

HT-5173 Hydraulic Tensioner
(reference GE 269B8694)

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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

5.1 Nut Preparation

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

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

Do not apply thread lubricants to the threads.

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

5.2 Stud Preparation

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

5.2.1 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-4253 or a similar 1" 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.

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

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5.3 Stud Length Measurement

Stud measurement will require a micrometer or caliper, which will measure 12” (304.8 mm) to 13” (330.2 mm).

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 measurement on stud end with a permanent marker.**
- **Measure each stud to nearest 0.001” (.02 mm).**
- **Record each measurement on the supplied charts.**
- **Do not allow the micrometer to set in the sun.**

6.0 Stud and Nut Assembly

Refer to Hardware Assembly Drawing (HF-) listed in Section 2.0 of this manual. Assemble cylindrical nut to the tapered thread end (Pull End) of the stud. Before threading the nut onto the stud check to be certain that the set screws are free to turn. Slide the stud and cylindrical nut assembly into the flange from the coupling side as shown in Figures 1 & 2, then install the Hex nut on the back side. **Adjust the nut/stud assembly so that the stud protrudes from the face of the cylindrical nut by the amount depicted on the hardware drawing (HF-) and also shown in Figures 1 & 2. SETTING THIS PROTRUSION OF STUD TO NUT IS CRITICAL FOR PROPER TENSIONER OPERATION. A metal stickout gage is provided with the tensioner to assist the operator in setting the protrusion dimension (See Fig. 6). Hand tighten the assembly to a snug fit.** See Photos 1 & 2 for a view of the assembly of studs and nuts in the flange prior to tensioning.

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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 when mounted on a stud

Clean puller screw and check for any debris and dents.

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

Seam between cylinders closed tightly.

Inspect tensioner guard for any signs of damage. Bent guards should be replaced. Also, be sure the rubber pad is in place on the end of the guard, if missing, replace.

7.1.1 Fittings

Make sure both male and female parts are clean and free of debris; see Figure 3 for fitting configuration. Hold female part securely when tightening so as to prevent damage to adjacent tubing. If fitting leaks, first try retightening as needed. If leaking continues then disassemble and check for scratches or debris on the seating conical surfaces. Clean as required. Replace plastic protective caps when finished with tool.

7.2 Pump

Pump kit is shipped full of hydraulic oil. The pump reservoir cap is sealed for shipment. To use turn cap to the vent position. To prevent oil spillage close cap when not in use, during storage and shipment. Lost oil should be replaced with Enerpac Hydraulic Oil. ISO 32. Mineral Oil may be substituted if necessary.

7.3 Bleeding Hydraulic System

Follow the tensioner assembly instructions of Section 8.0.

TO AVOID A FAILURE, ENSURE SAFETY AND PROPER OPERATION THE TENSIONER ASSEMBLY MUST BE MOUNTED ON THE STUD, IN THE FLANGE WITH BOTH NUTS INSTALLED BEFORE BLEEDING THE SYSTEM AND TENSIONING BEGINS

The tensioner has four ports see Fig. 5, one for pressurizing, two for bleeding the system and a fourth pressure relief port.

To facilitate bleeding, start by first mounting the tensioner at either the 3 o'clock or 9 o'clock stud position depending on which will critically place the bleed ports in their uppermost position. In addition, make sure that the pump is situated below the tensioner assembly.

The puller tool is equipped with 5/8 in. [16 mm]Hex coned stem bleeder fittings installed in the bleeder ports. With these two fittings loosened simultaneously, stroke the pump repeatedly until streams of oil exiting the tool from each port are free of air, then retighten the fittings.

Providing the hose is not is not disconnected or loosened in the process of tensioning all the studs, bleeding the assembly once at the first position should suffice to fill the assembly and preclude the need to repeat the bleeding.

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 will be performed from the tapered thread end of the stud with orientation of the stud to the flange as shown in Figures 1 & 2.

Refer to Tensioner assembly drawing and Figure 5 for tensioner to flange mounting. This assembly has the following features, which should make stud tensioning safe and easy.

The safety cage is integral (bolted) to the puller tool.
The hydraulic piston is spring loaded to retract.

Assembly sequence is as follows:

Note: The cylindrical nut is locked in place at the factory and is not adjustable.

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.

1. Open the hydraulic return valve on the hand pump to allow the hydraulic fluid to be pushed back from the puller tool into the pump reservoir (This is automatic with the air-operated hydraulic pump).
2. Place the spanner ring over the puller screw on the tensioner.
3. Place and hold the tensioner assembly over the end of the stud to be tightened. See Photos 3, 4, & 5.
4. Slide the puller screw into the tapered thread of the stud and hand tighten. **Be sure not to cross thread the assembly.**
5. **TENSIONER MUST BE HELD IN LINE WITH STUD THE ENTIRE TIME THAT THE PULLER SCREW IS INSTALLED. RESTING THE TOOL ON THE COUPLING WILL RESULT IN CROSS THREADING THE TOOL AND THREAD FAILURE DURING INSTALLATION**
6. Place the spanner ring on the puller side cylindrical nut located on the stud.
7. Hold the stud steady with a 1/2 in. [12.7 mm] hex key wrench and lightly tighten the puller screw into the thread with a wrench. **DO NOT** wrench on the nut opposite the puller tool.
8. At this point the Tensioner Assembly **MUST BE FREE TO ROTATE** and the puller screw must be tight in the stud.

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Note: If the tool is not free to contact Riverhawk Engineering to resolve the problem.

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

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 is free to rotate.

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 supplied at the end of this manual.

CAUTION

Do not tighten the nut while the tool is coming up to pressure, wait until pressure is achieved before attempting to tighten the nut with the spanner ring. If the tool is cross threaded or not fully installed, the tool could jump off the stud while coming up to pressure.

WARNING

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

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.

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.

Flange Position	Stud Size	50% Pressure	50% Stretch
Turbine to Coupling	2-3/4" [71 mm]	10000 psi [690 bar]	Do not measure Do not use
Coupling to Generator	2-3/4" [71 mm]	10000 psi [690 bar]	Do not measure Do not use
Steam Turbine to Generator	2-3/4" [71 mm]	10000 psi [690 bar]	Do not measure Do not use

9.1.1 Tightening of Turbine/Coupling and Coupling/Generator Nuts

Tighten the cylindrical nuts hand tight using the pinwrench and spanner ring as depicted in Figure 5. Turn the nut until it bottoms on the flange

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 the valve open. On the air driven unit simply release the hand-switch button.
2. Attempt to rotate the tensioner with your hands after the pressure is released. When the foot is no longer touching the flange, (i.e. you can rotate the tool), Unscrew the puller tool using a wrench. If the tool is still tight on the flange when you attempt to remove the puller screw it will be difficult to do and may damage the tool.
3. Tapping the wrench with a hammer or extending the wrench (pipe or cheater bar) 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

Flange Position	Stud Size	Final Pressure	Final Stretch
Turbine to Coupling	2-3/4" [71 mm]	17000 psi [1170 bar]	0.022" - 0.024" [0.56 mm - 0.61 mm]
Coupling to Generator	2-3/4" [71 mm]	19000 psi [1310 bar]	0.025" - 0.027" [0.64 mm - 0.69 mm]
Steam Turbine to Generator	2-3/4" [71 mm]	19000 psi [1310 bar]	0.025" - 0.027" [0.64 mm - 0.69 mm]

CAUTION

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

10.0 Retensioning

For the procedures of Section 9.3 excessive stretch variations or low stretch values can be corrected by retensioning all or selected studs to the pressure value stated in the above table. Have final stretch values approved by the supervisor responsible for the installation. Typically a variation of 0.001 (.03 mm) low to 0.001 (.03 mm) over is acceptable provided the average stretch values for the flange are within tolerance.

11.0 Thread Locking

After tensioning is complete it is necessary to lock the nuts in place. Mechanical lock nuts have two set screws located in the top face, see Figure 4. Before threading the nut onto the stud check to be certain that 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.

Flange Position	Stud Size	Set Screw Size	Torque
Turbine to Coupling	2-3/4" [71 mm]	3/8"-24 UN	200 in·lbs - 250 in·lbs [22.6 N·m – 28.2 N·m]
Coupling to Generator	2-3/4" [71 mm]	3/8"-24 UN	200 in·lbs - 250 in·lbs [22.6 N·m - 28.2 N·m]
Steam Turbine to Generator	2-3/4" [71 mm]	3/8"-24 UN	200 in·lbs - 250 in·lbs [22.6 N·m – 28.2 N·m]

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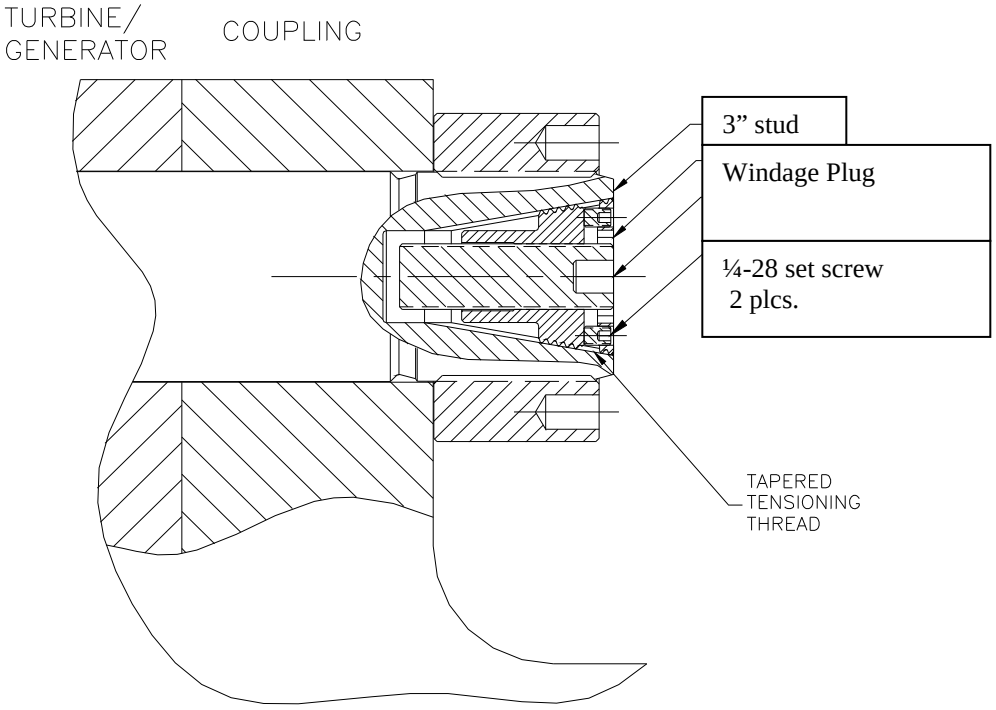
12.0 Windage Plug Installation

WINDAGE PLUG 9F



1. Insert Windage Plug Fully, Tighten to 200-250 in-lbs [22.6 Nm to 28.2 Nm] Torque
2. Tighten Set Screws to 60-70 in-lbs [6.8 Nm-7.9 Nm] Torque
3. Caution Plug must rest a minimum of .06” (1.5 mm) below the face of the stud

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13.0 Stud/Nut Removal

Section 13.1 describes nuts with the mechanical locking feature.

CAUTION

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

13.1 Removal of Assemblies with Mechanical Lock Nut

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 that may have accumulated during service. (see section 5.2.1)
2. With an Allen wrench loosen the two locking set screws but do not remove from nut see Figure 4.
3. Install the appropriate puller tool to the stud as described in Section 8.0
4. Apply the appropriate hydraulic pressure per the table of Section 9.3. Using the spanner wrench and spanner ring shown in Figure 5 loosen the nut. Then release the pressure and remove the puller tool.

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14.0 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.

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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 5.2.1

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.

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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.

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15.0 Revision History

Revision Letter	Effective Date	Description
S	Jun 3, 2011	Added HT-5173 to sections 2.0 and 4.5
R	Jan 10, 2011	Added 358A7202P037, P038 to Title Page
Q	Jun 10, 2009	Added turbine oil and removed "Never Seize" from sections 1.0, 3.0, 8.0, and 9.0
P	Mar 25, 2009	Added sections 3 and 14
O		
N	Apr 03, 2008	Added dual units [metric]
M	Jun 07, 2007	Added windage plugs and special reference to HT-3235
L		
K	Aug 11, 2004	Removed references to obsolete designs
J	Apr 18, 2002	Page 1 revised, Page 4 para 4.0, Page 10 para 11.0 deleted, Page 11, Page 20 deleted
H	Oct 02, 2001	Added GE Title block to all pages
G	Jul 06, 2001	Page 4 para 4.0, added Figure 6
F	May 31, 2000	Page 2 para 2.0, Page 4 para 4.0 & 5.3, Page 5 para 6.0, Page 7 para 7.2, Page 9 para 10.1 & 10.1.1
E	Jan 05, 2000	Page 1, Figure 2
D	July 19, 1999	
C	May 12, 1999	
B	Apr 05, 1999	
A	Feb 01, 1999	

Revision Letter	Effective Date	Description
-	Jun 18, 1998	Released

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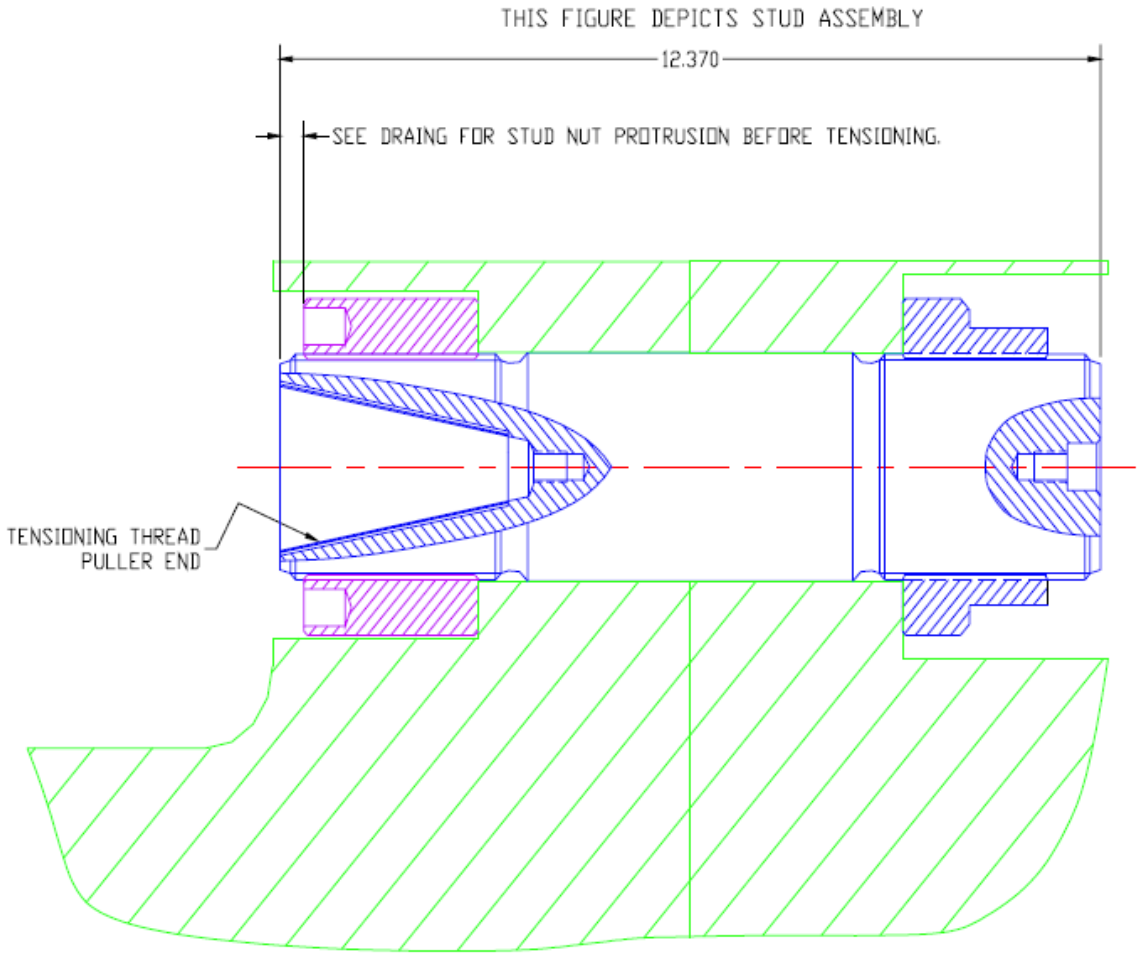

VIEW HARDWARE MOUNTED IN GENERATOR
TO COUPLING FLANGE CONNECTION.

NOTE: GENERATOR STUD IS LARGER THAN TURBINE STUD.
DO NOT SWITCH.

FIGURE 1

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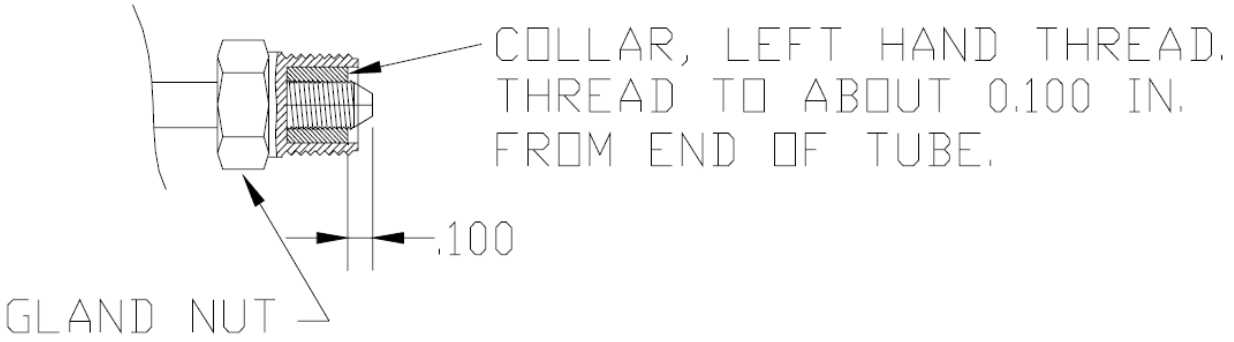
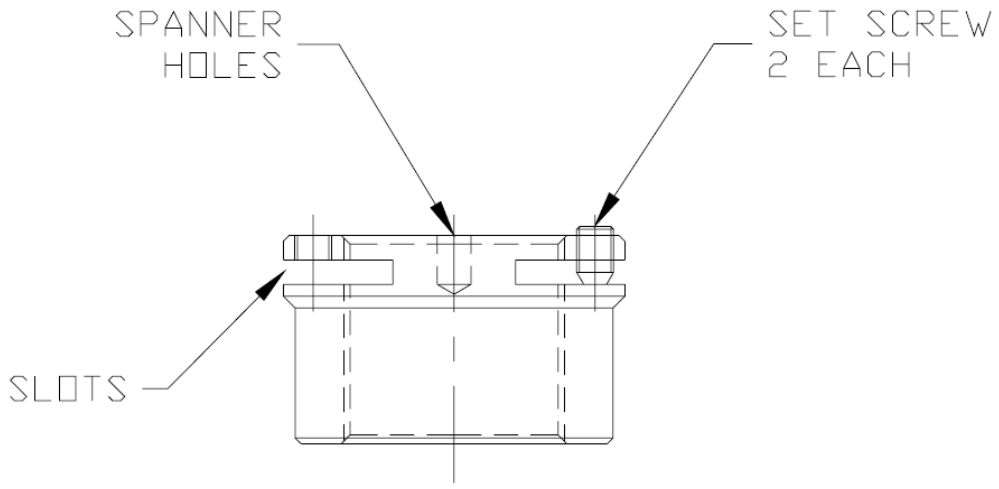
FIGURE 3 PRESURE PORT





TYPICAL STUD LOCKNUT
FIGURE 4

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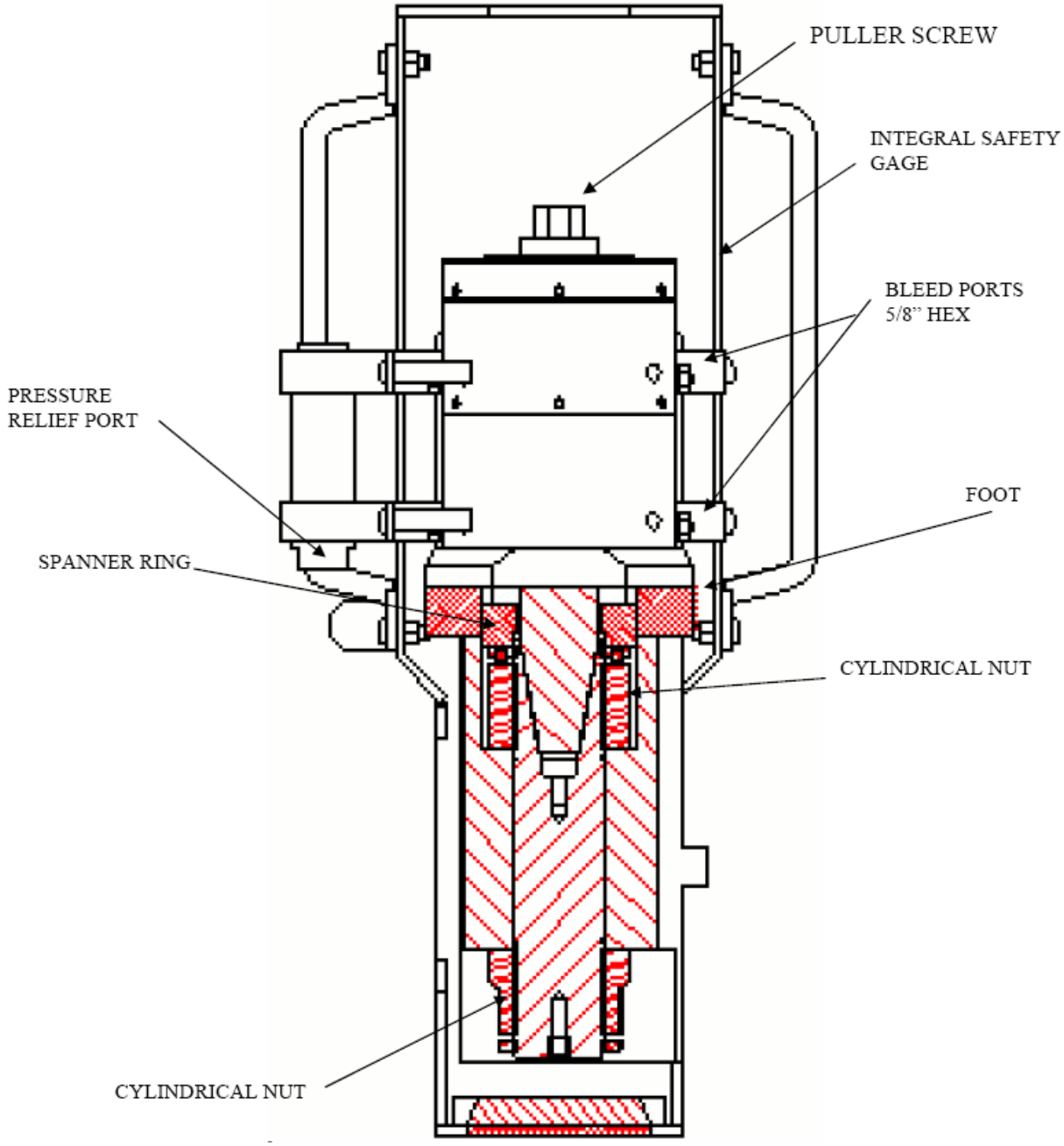
FIGURE 5



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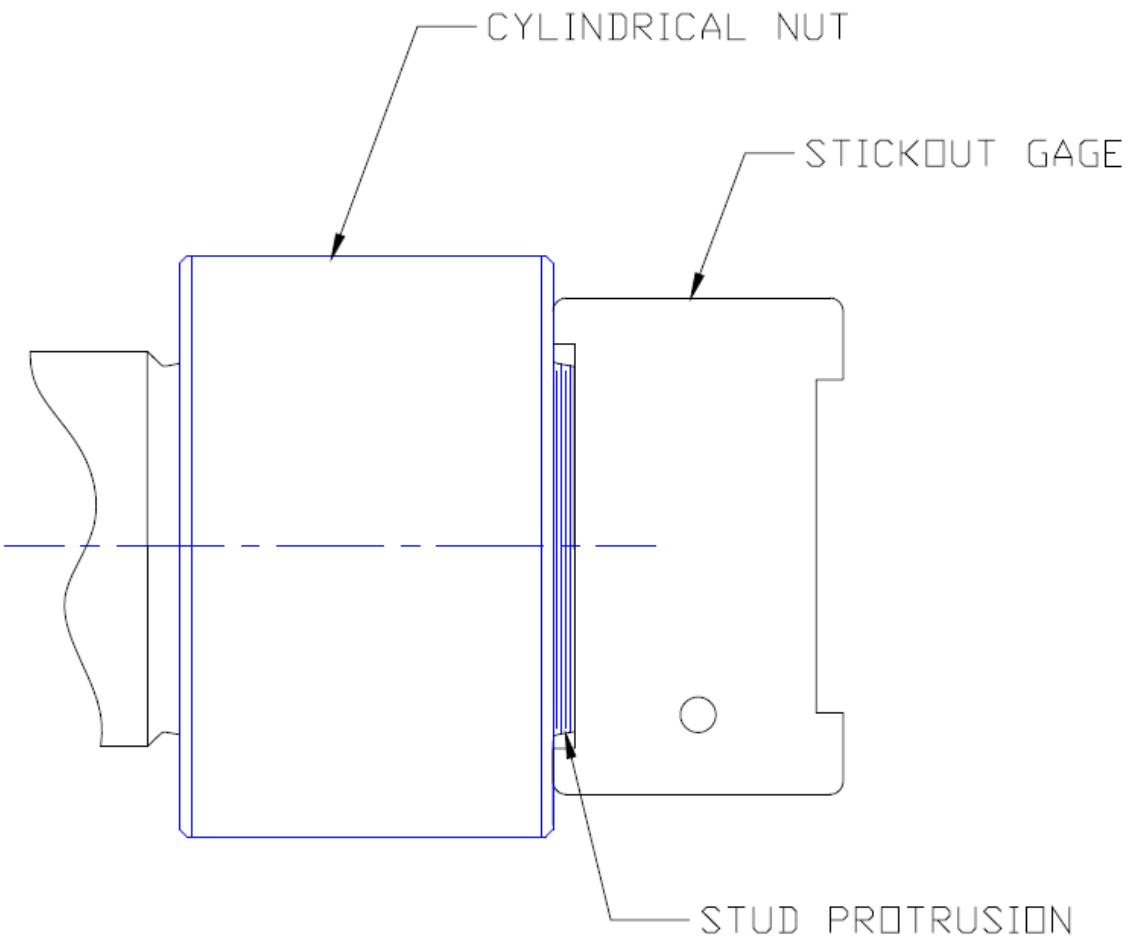

FIGURE 6

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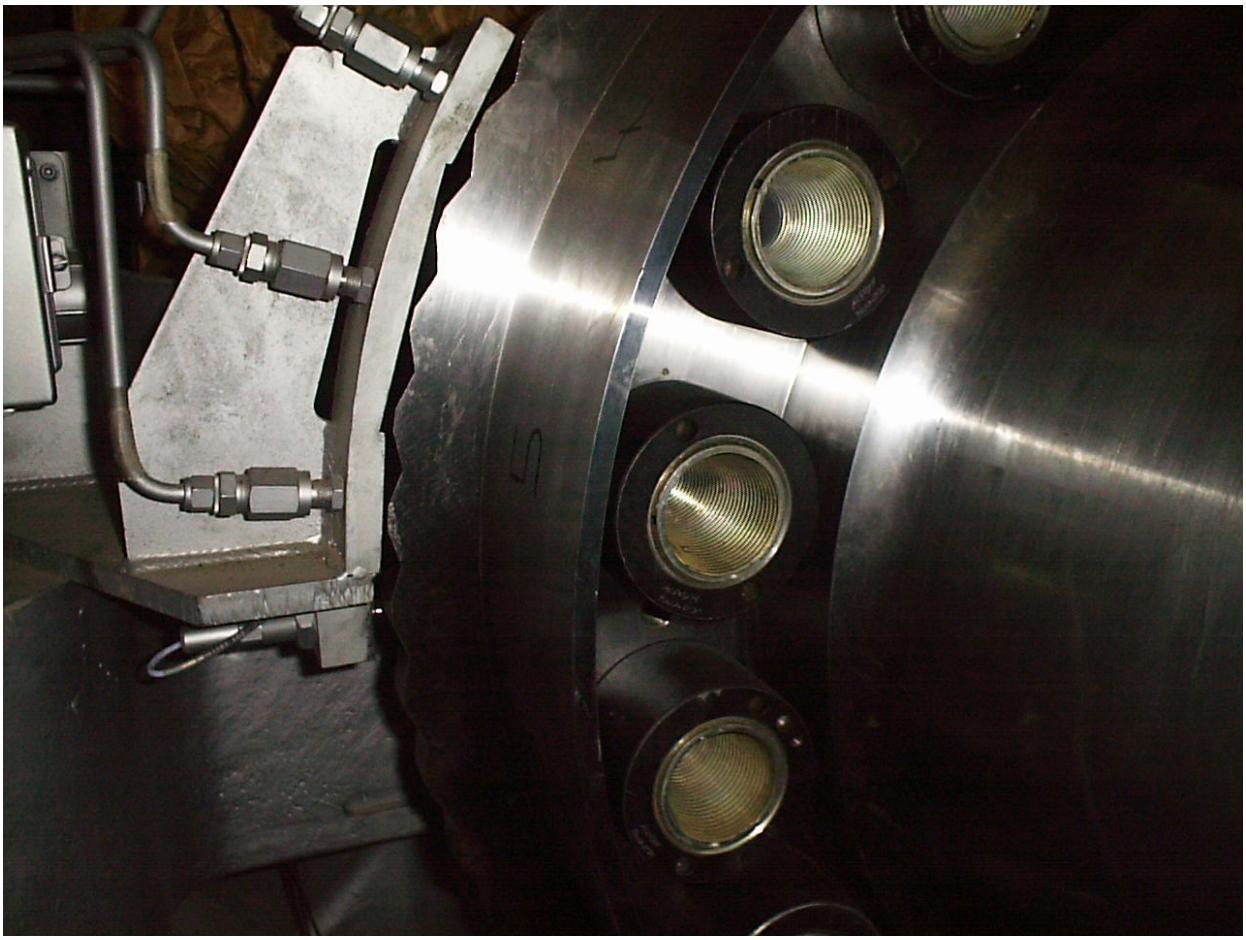

Photo 1
Section of 9FA turbine flange with studs in place prior to tensioning.

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Photo 2
Back Side of 9FA turbine flange showing studs and nuts in place

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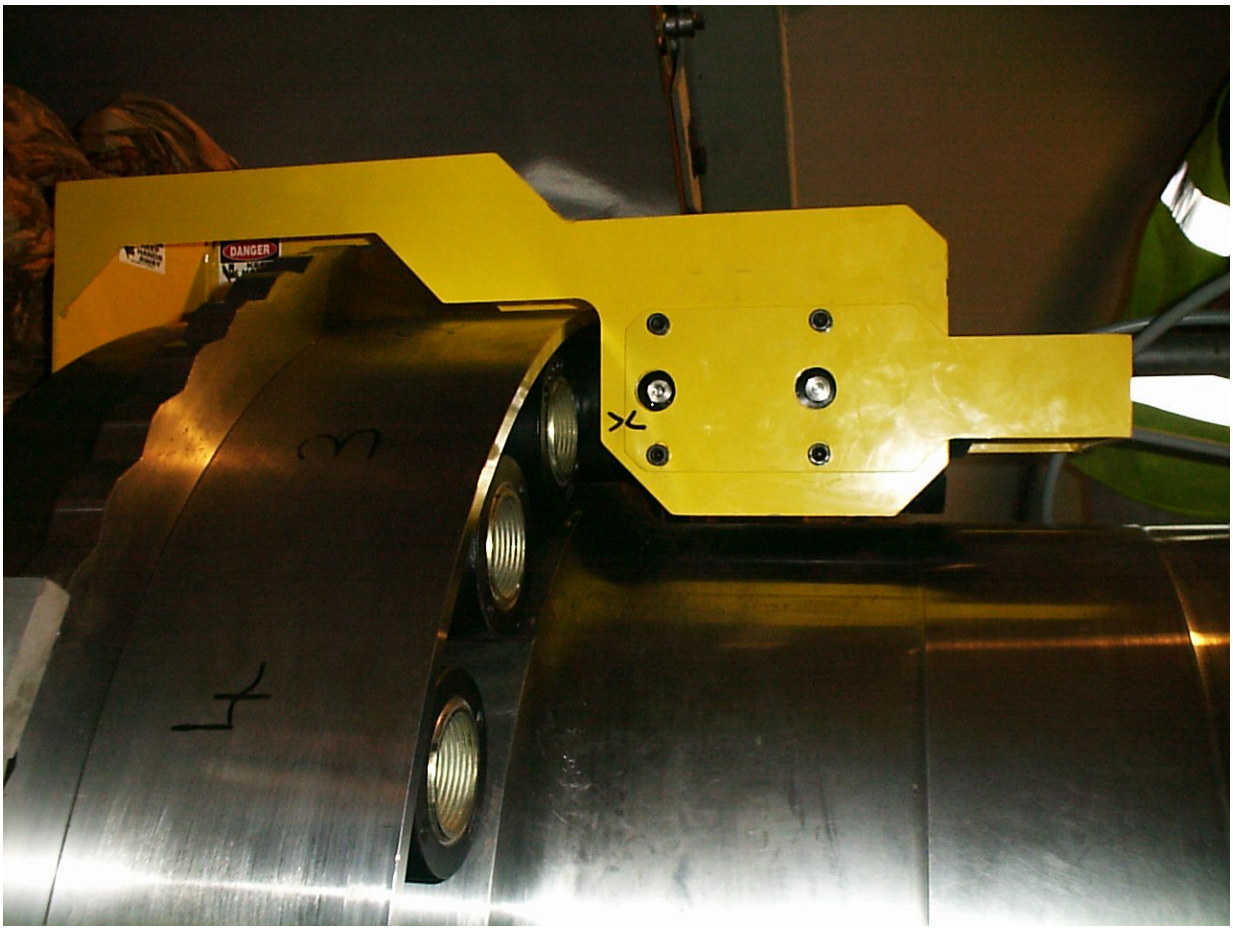

Photo 3
Side view of tensioner mounted on 9FA turbine flange.

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Photo 4
Tensioner in operation while mounted on 9FA turbine flange.

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Photo 5
Tensioner during operation.
Note pin wrench and control handle of pressure kit.

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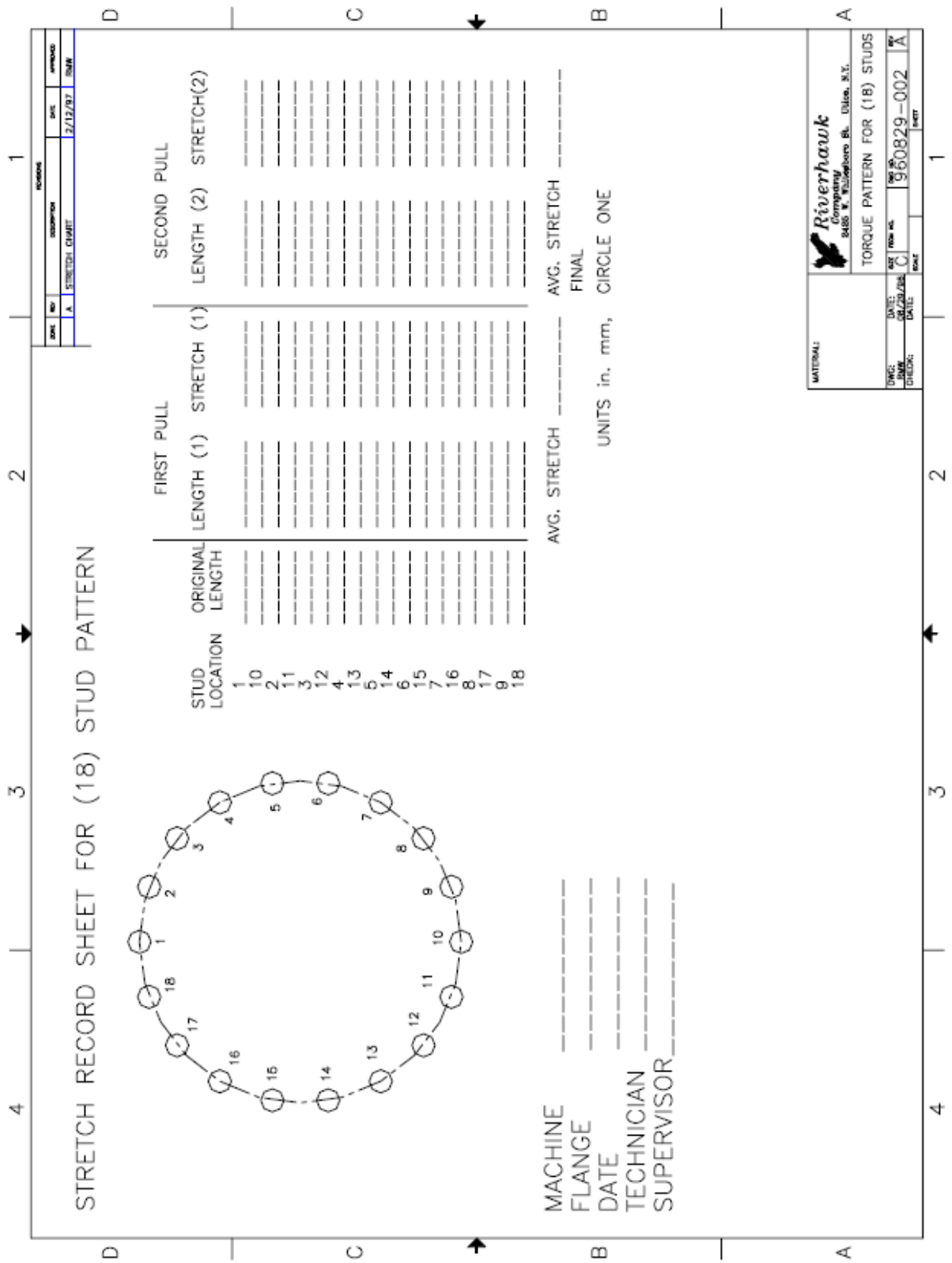

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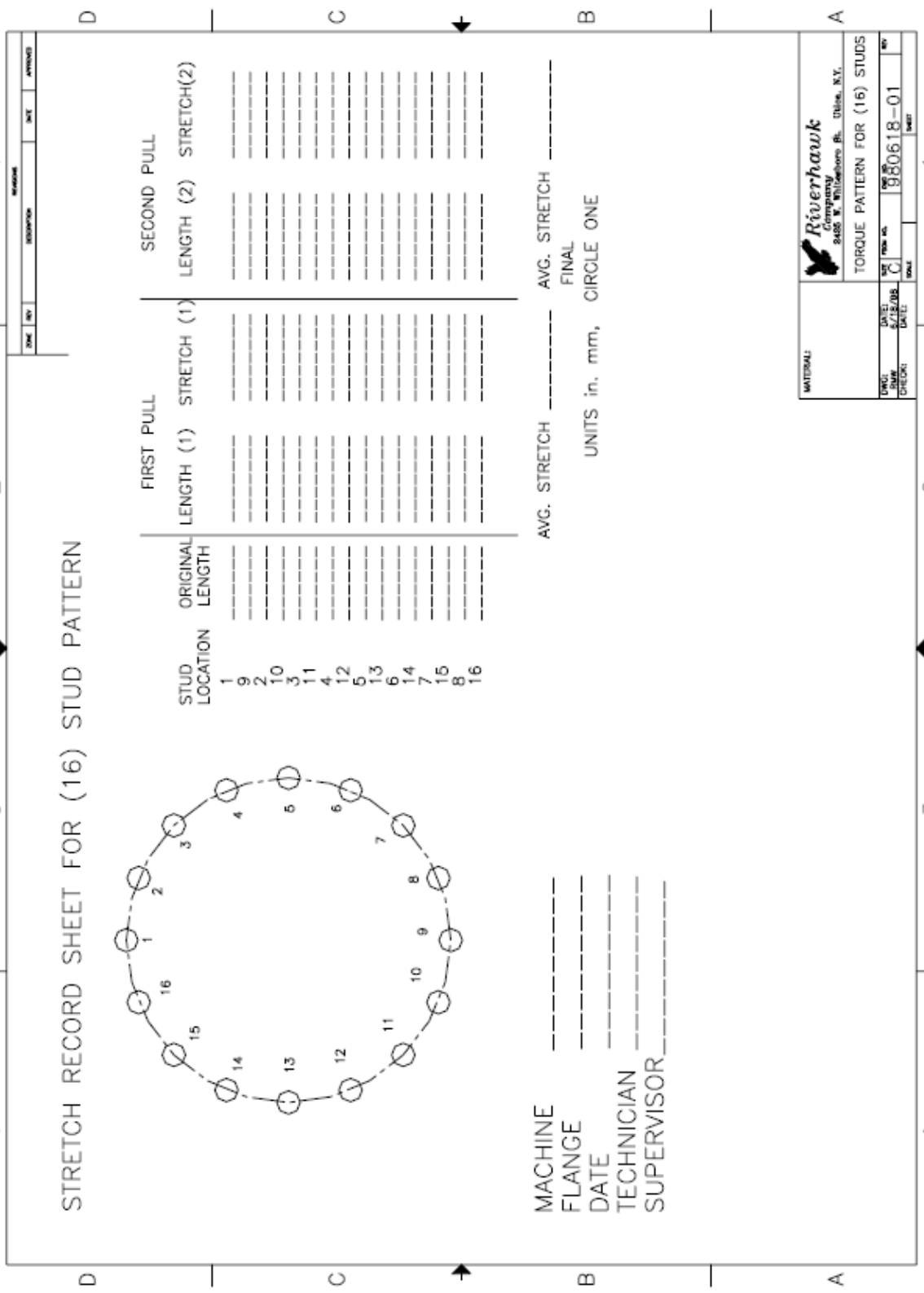

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