BenchMark Wireline Products
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P. O. BOX 850
Simonton,Texas 77476
Phone: 281.346.4300
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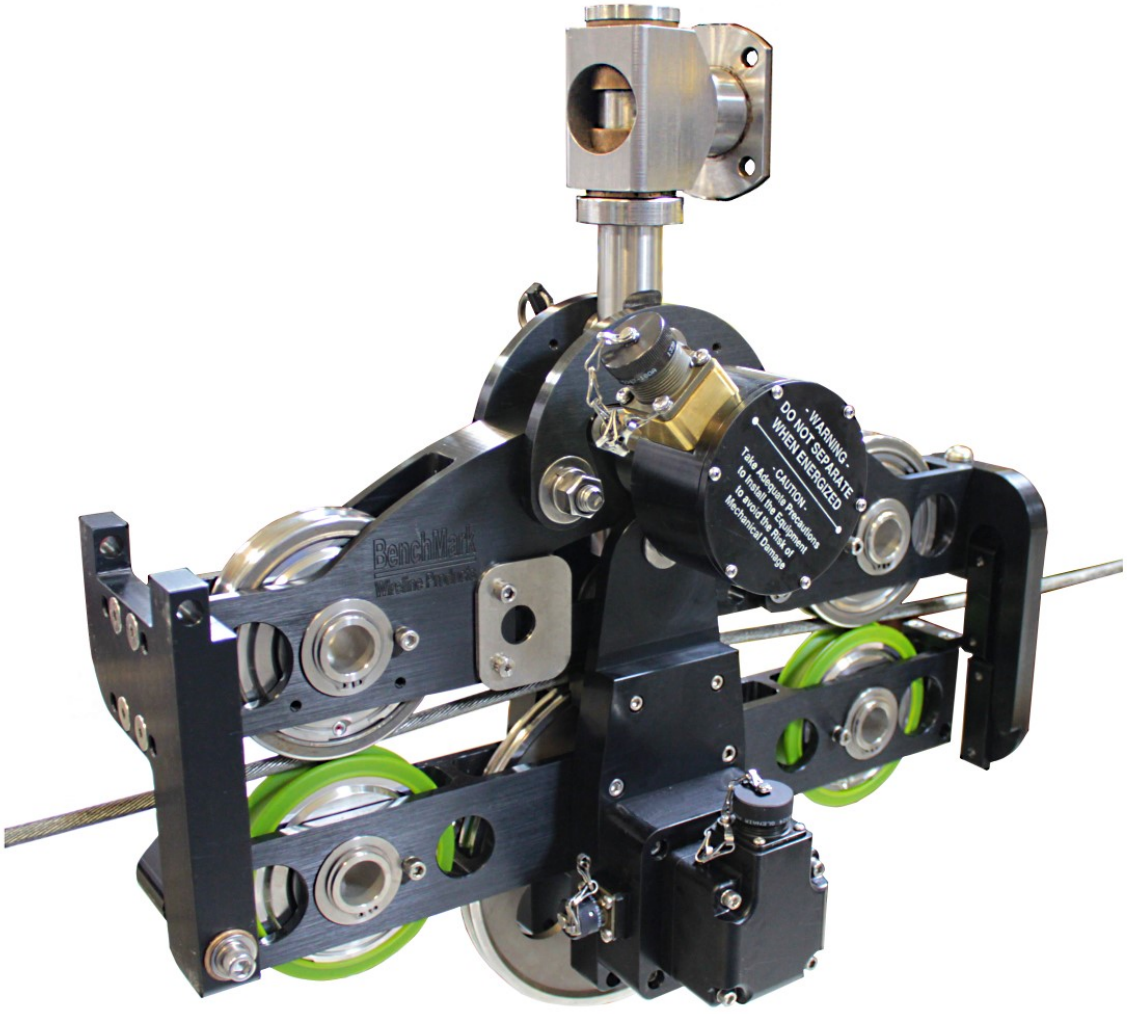
benchmarkwireline.com

AM3K
COMBINED DEPTH/TENSION MEASUREMENT DEVICE
WITH DIFFERENTIAL TENSION AMPLIFIER



CONTENTS

SAFETY WARNINGS

This apparatus is suitable for use in ATEX Zone 2 Locations.

This apparatus is suitable for use in Class I, Division 2, Groups A, B, C, & D Hazardous (Classified) or Unclassified Locations.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR ATEX Zone 2 LOCATIONS.

AVERTISSEMENT – RISQUE D'EXPLOSION – LA SUBSTITUTION DE COMPOSANT PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES ATEX Zone 2 LOCALES.

WARNING - EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;

AVERTISSEMENT - RISQUE D'EXPLOSION – LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOW TO BE NON-HAZAROUS;

AVERTISSEMENT – RISQUE D'EXPLOSION – AVANT DE DECONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.

WARNING - PROTECTION MAY BE IMPAIRED IF THIS DEVICE IS USED IN AN APPLICATION OR MANNER NOT SPECIFIED IN THE MANUAL

NOTE – The safe ambient temperature operating range for this equipment is -20 to 40C or -4 to 104F.

BenchMark measuring equipment will frequently be operated in hazardous environments. Appropriate safety precautions need to be taken.

Training - Operators shall be trained in the proper and safe use of the device.

Do not exceed the tension limit specified for this device in this manual.

SAFETY WARNINGS continued

Flammable Substances - Flammable and explosive substances are often found in the proximity of the equipment operations. Proper venting should take place where practicable. Avoid open flames, sparks and other ignition sources.

Electric Shock – Depending on the equipment being used, both AC and DC current may be present. Frequently in wellsite operations conductive fluids and chemicals are used. Use extra caution when working with BenchMark equipment and follow manufacturer warnings to avoid electric shock.

Do not separate any electrical connector, while powered, in a hazardous area. Separate only when power is removed, and/or in a safe area.

Safe Operating Temperatures – BenchMark Wireline equipment is designed to operate safely within these temperature ranges. Do not try to operate this equipment in conditions that outside these temperature limits.

The safe ambient temperature operating range for this equipment is -20 to 50C or -4 to 122F.

Hazardous Equipment Marking - See General Assembly drawings for hazardous equipment marking.

ALL WARNING LABELS ON THE EQUIPMENT MUST BE OBSERVED AND FOLLOWED.

Installation Instructions - Install measuring device onto the spooling mechanism per the unit manufacturer instructions. Take care to avoid pinching or cutting of electrical cables when the measuring device moves during the spooling operation.

Take care to thread the wire through the device properly to prevent the wire from rubbing the frame during operation. The Table of Contents of this manual will list where the threading procedure is located.

Rotating Equipment – BenchMark Wireline measuring equipment is often attached to rotating industrial machinery. This may include winches, pulleys, rigging, rotating drums plus moving cable and wire. Though BenchMark's measuring equipment does not normally present a safety hazard when in operation provided it is used within the design parameters of the equipment, the heavy equipment used in this type of work in proximity to BenchMark's equipment may. Never attempt to use BenchMark equipment in any way or for any other purpose than for which it was designed.

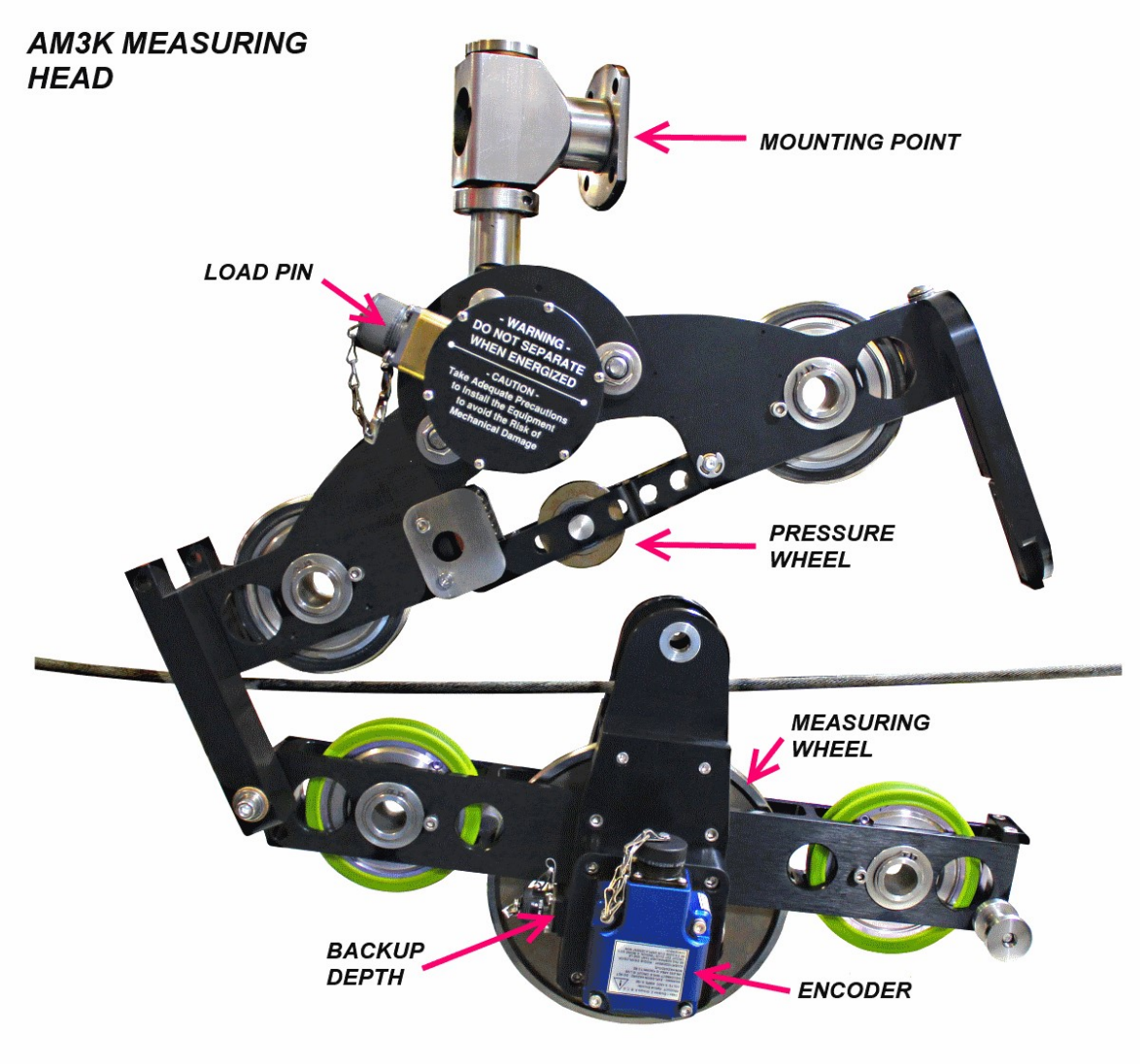
Use every precaution to keep a safe distance from dangerous equipment when it is in operation. Never approach the measuring device while the cable drum is turning.

1.0 QUICK START GUIDE

Determine wireline size to be used – 3/16” to 3/8”

Since the wireline wraps around the depth wheel, the circumference of the depth wheel will change with a change in wire size. The wheel size setting needs to be set to match the wireline size in order to accurately measure depth.

These corrections are automatically made in the BenchMark hoistman's panel by selecting the proper cable size using the menu. If a different panel is used, the wheel size will need to be entered at this time.



Equipment Installation Procedure

This equipment is to be installed only by personnel who are suitably trained and qualified to local/national codes.

1. Install the measuring head on the wireline equipment.
   Bolt the mounting bracket to the wireline equipment
   Connect the measuring head to the mounting bracket

2. Connect the cables for to the encoder, backup and load pin to the measuring head.

Equipment Setup Procedure

1. Power up the panel connected to the measuring head and verify it is working properly.

2. Set depth to zero “0” to enable line size selection and tension calibration.

3. Verify the panel is configured to match the system.
   - Line size
   - Measurement units
   - Encoder settings

4. Install the line in measuring head and set the line size parameter on the panel.
   Note – see Proper Wire Threading Path on next page.

5. Set Tension Alarm value.

6. Set depth adjust value if necessary.

7. Rig up through sheaves, install tool, and slack off weight.

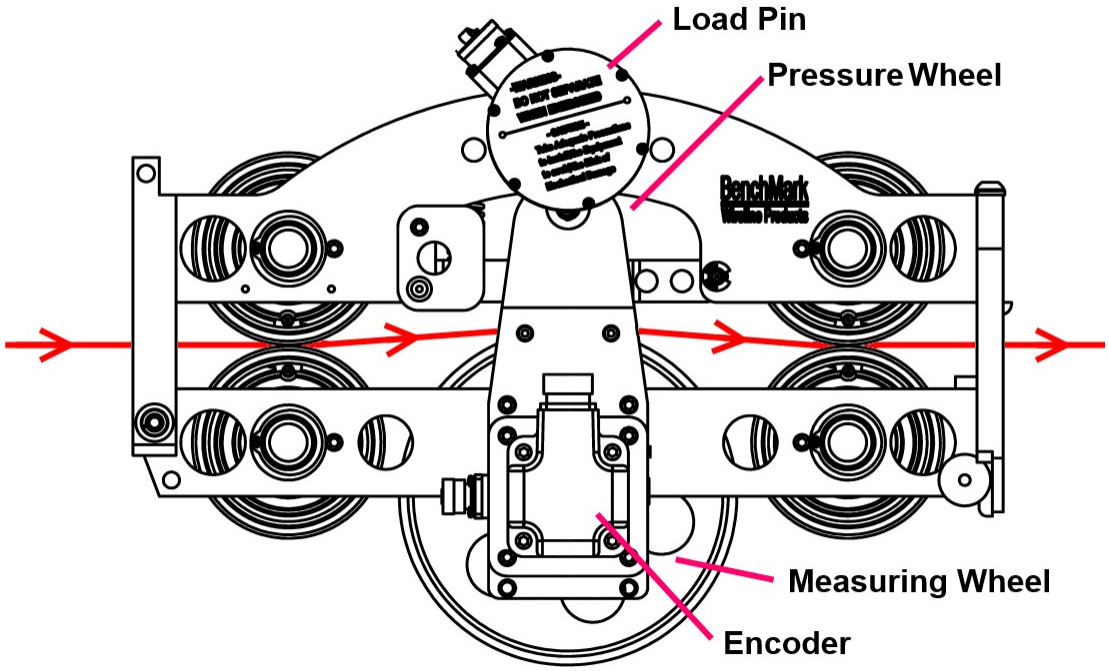
8. Set depth to zero.

9. Press T-Zero to set tension to zero. Press T-CAL and verify that panel tension reads correctly (depending on type of measuring head selected).

10. Pull tool to depth 0 position. Press D-Zero to reset the panel depth to 0.

Proper Wire Threading Path

AM3K WIRE PATH



Obtaining Technical Assistance

Call BenchMark Wireline Products Inc. at +1 281 346 4300
Or contact by email mail@benchmarkwireline.com
Or fax in request at +1 281 346 4301

Information is also available on website www.benchmarkwireline.com

Parts can be ordered by email, phone, or fax.

Equipment can be returned for repair and maintenance.
Please notify us by Phone, email, or fax before sending any equipment.

To return equipment to BenchMark, ship it to:
BenchMark Wireline Products
36220 FM 1093
Simonton, Texas 77476
U.S.A.

Note – For better response, please have the Part Number available.

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RECOMMENDED SPARE PARTS - AM3K

It is recommended that the following parts be kept on hand in the indicated quantities **QTY**.

ITEM	P/N	DESCRIPTION	QTY
RECOMMENDED SPARE PARTS FOR ALL LOCATIONS			
22	AM3KA195	ROLLER ASSY PRS 3/8 GROOVE	1
32	AM5KA055	ASSY ENCODER BACKUP MAGNETIC	1
53	AMS1P003	BEARING BALL 20MM ID MOD	2
55	AM3KM002	BEARING BALL 10MM ID MOD	1
58	AMS1P009	PIN QUICK REL 1/2 OD X 2-1/2	1
60	AM3KM050	COUPLING ENCDR W/BKUP MAGNETS	1
61	40109	INSERT CPLG OLDHAM BLK	1
ADDITIONAL RECOMMENDED SPARE PARTS FOR REMOTE LOCATIONS			
19	AM5KA364	ASSY WHEEL TENSN FIXD 35MM BRG	2
20	AM3KA310	WHEEL MEASURING 2' 3/8 GRV KEY	1
23	AM5KA247	ASSY WHEEL GUIDE PLAS 35MM BRG	2

NOTE - ONLY STOCK THE LOAD AXLE AND ENCODER USED IN YOUR MEASURING HEAD. A COMPLETE LIST IS FOUND IN THE BILL OF MATERIALS

2.0 GENERAL DESCRIPTION & SPECIFICATIONS

The AM3K Measuring Device combines in one compact, lightweight unit, both depth measurement and line tension measurement capabilities.

The wireline runs across three steel wheels which create a force on the load axle normal to the axis of the wireline. The center wheel is a hardened 2.0000 ft. (609.600 mm) circumference wheel with a 3/8" groove. This wheel is slightly offset from the other two which creates a slight bend in the cable. As wireline tension increases the small offset creates a corresponding bending force on the strain-gauged load axle. An electronic signal is transmitted via an electrical cable to the hoistman's panel and/or logging computer representing wireline tension. A calibration resistor is included in the load pin to send out a signal to calibrate the computer system.

The measuring wheel is coupled to an optical encoder that transmits electrical signals via an electrical cable to the hoistman's panel and/or logging computer representing cable depth and speed.

An independently powered encoder and display panel are used for back up depth indication. It uses a magnetic sensor to eliminate the need for a mechanical drive cable and mechanical counter.

A spring mounted tension roller is used to hold the measuring wheel in contact with the wireline to prevent cable slippage under low tension conditions. The two steel guide rollers properly hold the cable in line with the measuring wheel. Two composite guide rollers are provided to keep the wireline in the head under no load conditions.

Wear blocks are used to prohibit cable contact with the frame members. The head is resistant to corrosion by anodized all aluminum parts and using SST or plated steel parts. All the bearings are SST and greaseable to increase their useful life.

2.1 DEPTH MEASUREMENT

The AM3K uses a single measuring wheel to measure the amount of wireline moving to and from the borehole. The measuring wheel is coupled to an encoder that transmits electrical signals via a cable to the hoistman's panel and/or logging computer representing cable travel. An independently powered encoder and display panel is used for back up depth indication.

The hardened measuring wheel has a 2.0000 ft. (609.600 mm) circumference with a 3/8" groove. A spring mounted tension roller is used to hold the measuring wheel in contact with the wireline.

Two guide rollers are used to properly hold the cable in line with the measuring wheel. Wear blocks are also used to guide the cable and prohibit cable contact with the frame members. The frame members are anodized 6061-T6 aluminum.

2.2 TENSION MEASUREMENT

The AM3K uses an electronic load axle on the measuring wheel to measure line tension. Three wheels are used to create a force on the load axle normal to the axis of the wireline. To generate this force the wheel mounted on the load axle is offset from the other two slightly. This offset creates a slight bend in the cable.

As wireline tension increases the small offset creates a corresponding bending force on the strain-gauged load axle. An electronic signal is transmitted via cable to the hoistman's panel and/or logging computer representing wireline tension. A calibrate resistor is included in the load pin to send out a signal to calibrate the computer system.

2.3 GENERAL SPECIFICATIONS

WEIGHT:	30 lbs	13.6kg
LENGTH:	19.6”	500 mm
HEIGHT:	13.5”	343 mm
WIDTH:	8.2”	208 mm
CABLE BEND OVER TENSION WHEEL:	< 10 Degrees	
MAXIMUM LINE TENSION:	10,000 lbs	4538 kg
MEASURING WHEEL CIRCUMFERENCE	24.000”	609.60 mm

MEASURING WHEEL CIRCUMFERENCE WITH CABLE INSTALLED

3/16”`cable – 2.015 ft.

7/32" cable - 2.017 ft.

1/4” cable – 2.020 ft.

9/32" cable – 2.023 ft.

5/16" cable - 2.026 ft.

3/8" cable – 2.031 ft.

2.4 TENSION SPECIFICATIONS

Power Requirements: +/-15 vdc power

Signal Output: Strain gauged load pin which outputs a voltage related to the line tension.

Temperature stability: <= .015% full scale / deg F on zero

<= .02% full scale / deg F on output

Accuracy: Within 150 lbs or 3% of actual, whichever is greater

Maximum load: 10,000 lbs 7,258 kg

Load Pin Tension Multipliers

3/16” cable – 1.44

7/32" cable – 1.38

1/4” cable – 1.22

9/32" cable – 1.08

5/16" cable – 1.00

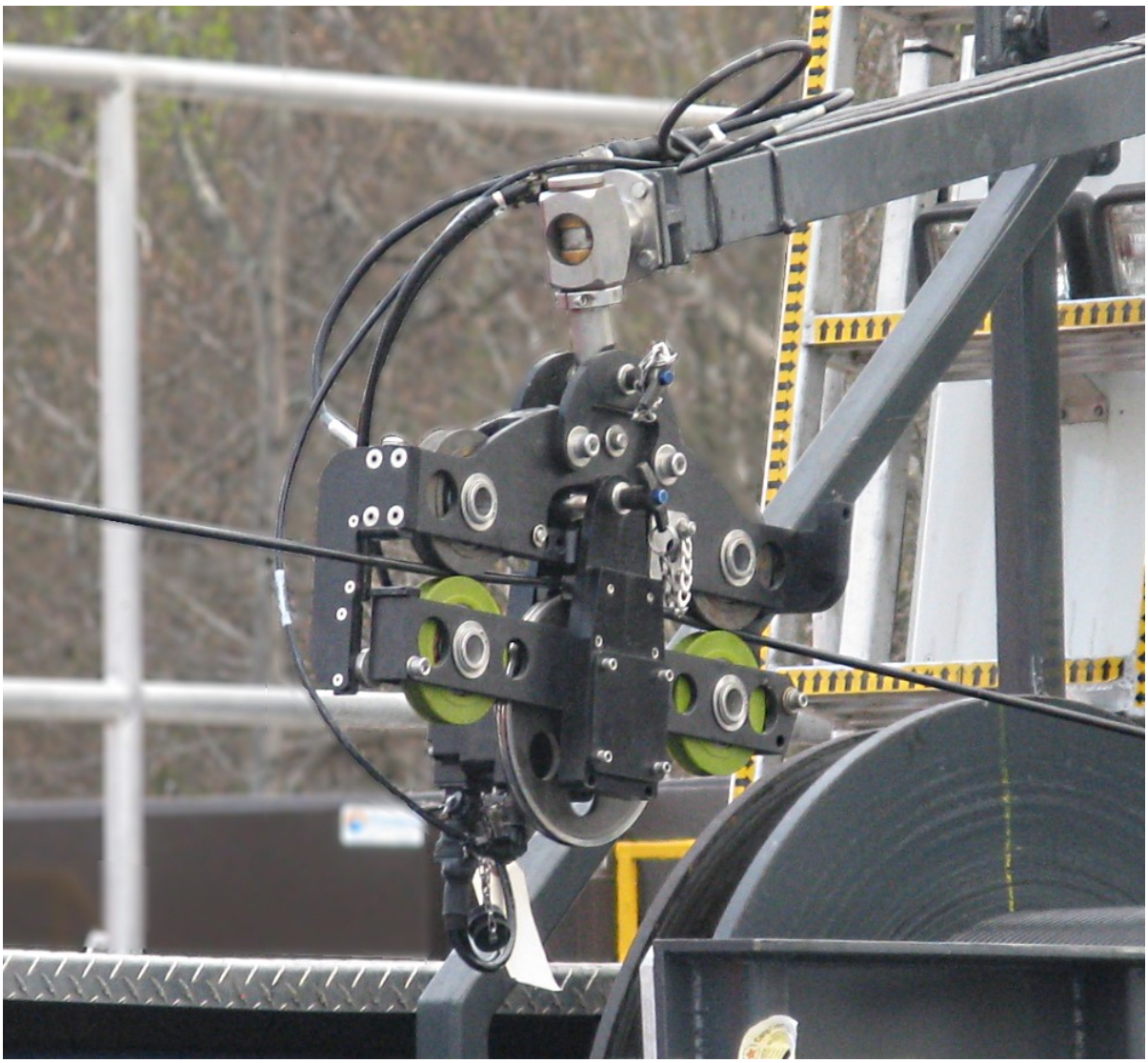
3/8" cable – .85

3.0 INSTALLATION & OPERATIONS

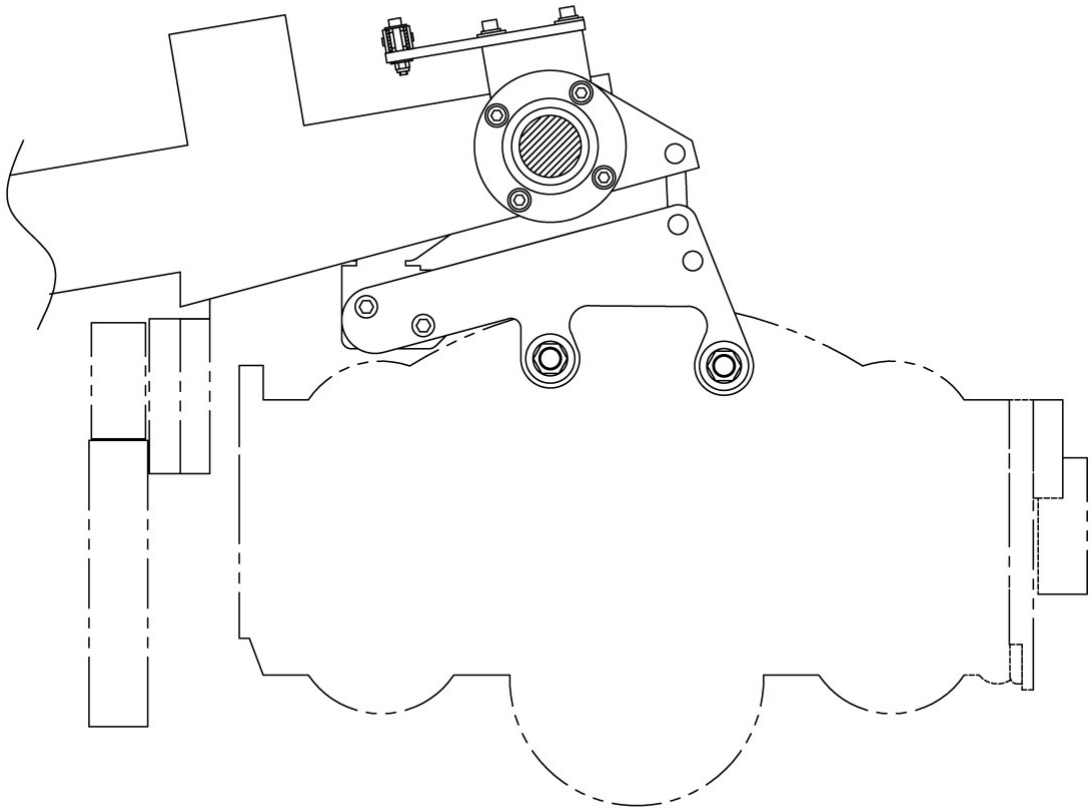
3.1 SPOOLING ARM INSTALLATION

Install the measuring head on to the spooling arm by using either the top adapter mount assembly to mount to an overhead spooling arm or the lower yoke floor mount assembly to mount to a floor mounted pedestal.

Following are some of the mount options:



3.1.1 AM3KA243 OVERHEAD MOUNT FOR 40MM SINGLE BAR (ASEP SPOOLER)



AM3KA243 PARTS LIST

ITEM	P/N	DESCRIPTION	QTY
1	AM3KM124	HOUSING BRG FLANGE 40MM ASEP	2
2	AM3KM138	HUB GUIDE ASEP OH ARM	1
3	AM3KM139	HUB GUIDE INNER ASEP OH ARM	2
4	AM3KM140	SPACER GUIDE ASEP OH ARM	1
5	AM3KM155	PLATE SIDE PIVOT ASEP OH ARM	2
6	AM3KM141	PLATE CHAIN GUIDE ASEP OH ARM	1
7	AM3KM143	ADAPTER AUTO SPOOL ASEP OH ARM	2
10	AM3KM144	BEARING FLANGE 2 IN ID MOD	2
12	AMSLP088	BEARING LINEAR 40MMID X 50MMOD	2
15	AM3KP044	SCREW 1/2-13 X 3.25 SOC HD SST	2

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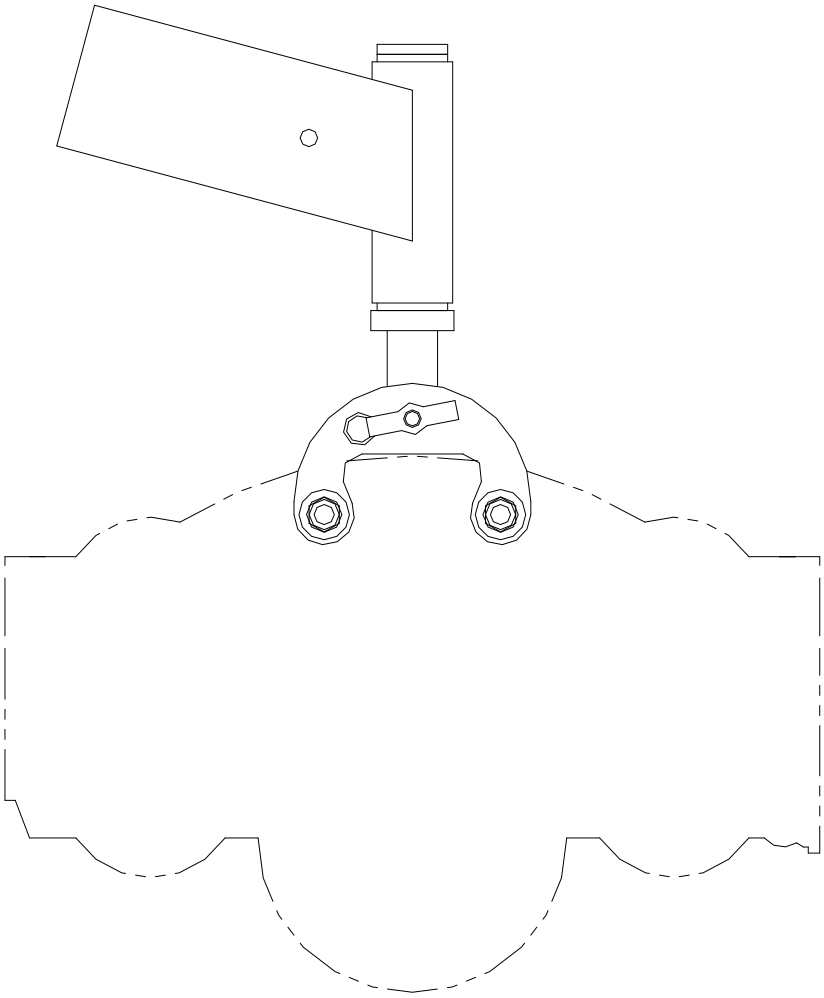
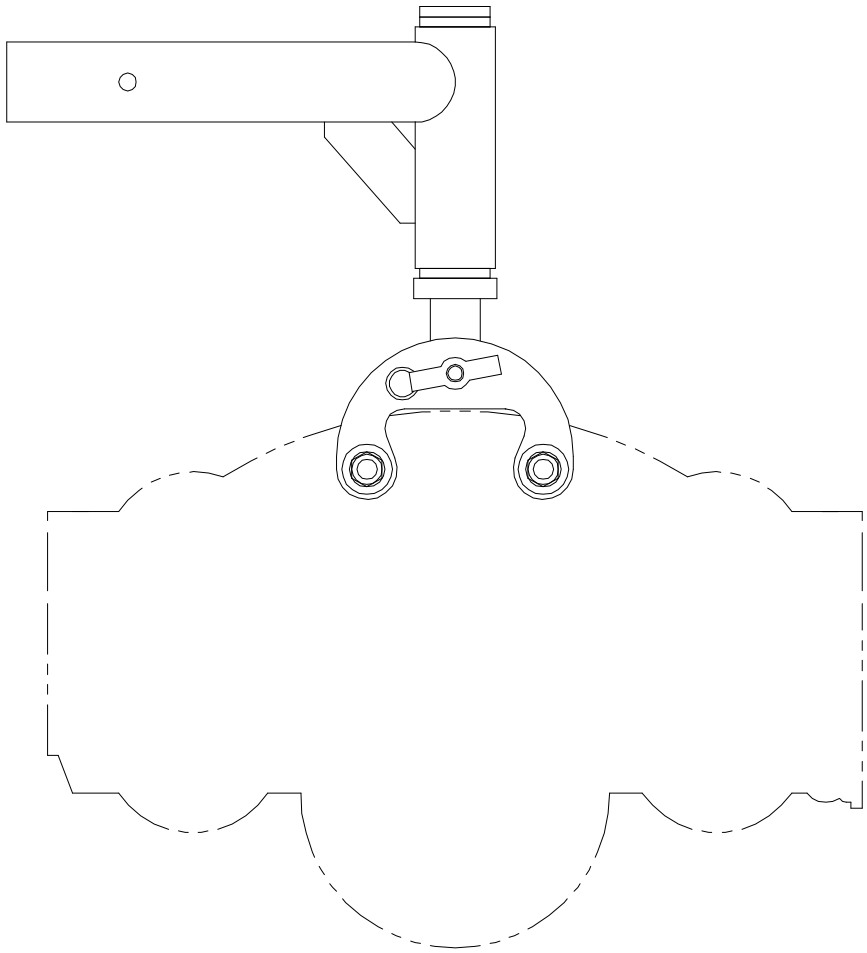
AM3KA243 PARTS LIST continued

ITEM	P/N	DESCRIPTION	QTY
16	AM5KP042	SCREW 1/2-13 X 3/4 SOC HD SST	6
17	AM5KP080	SCREW 3/8-16 X 3/4 SOC HD SST	4
18	AMS1P046	SCREW 5/16-18 X 1 SHCS SST	8
19	AM3KP057	SCREW 5/16-18 X 1-1/4 SOC HD	2
20	AMS1P049	SCREW 1/4-20 X 2-1/4 SOC HD SS	2
21	AM3KP058	SCREW 10-24 X 1-1/4 SHCS SST	3
23	AMS1P065	NUT 1/2"-13 SS	2
24	AM3KP059	NUT 10-24 ELASTIC STOP SST	3
25	C276P037	WASHER 1/2 FLAT SST	4
26	AMS1P047	WASHER 5/16 LOCK SS	8
27	AMS1P066	WASHER 1/2 LOCK SS	2
28	C276P036	WASHER 1/4 LOCK SS	2
29	ACMU2P31	WASHER 1/4 FLAT SS	2
30	AMS1P054	WASHER #10 FLAT SS	6

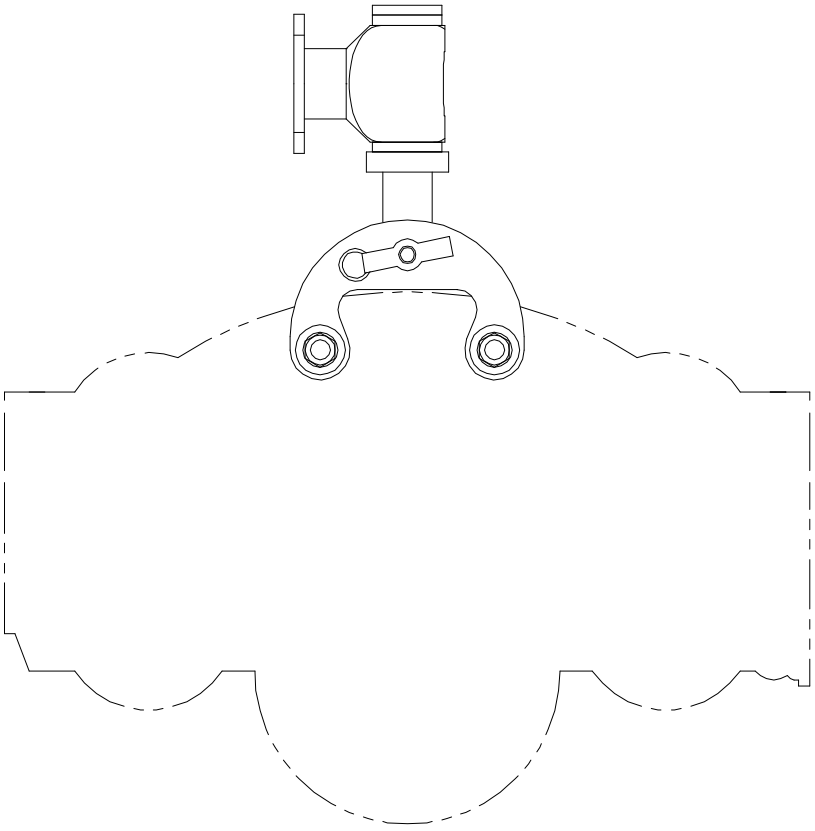
3.1.2 AM3KA241 OVERHEAD MOUNT USING 2X3 RECTANGULAR TUBING



3.1.3 AM3KA242 OVERHEAD MOUNT USING 2" ROUND TUBING



3.1.4 AM3KA244 OVERHEAD FLANGE MOUNT



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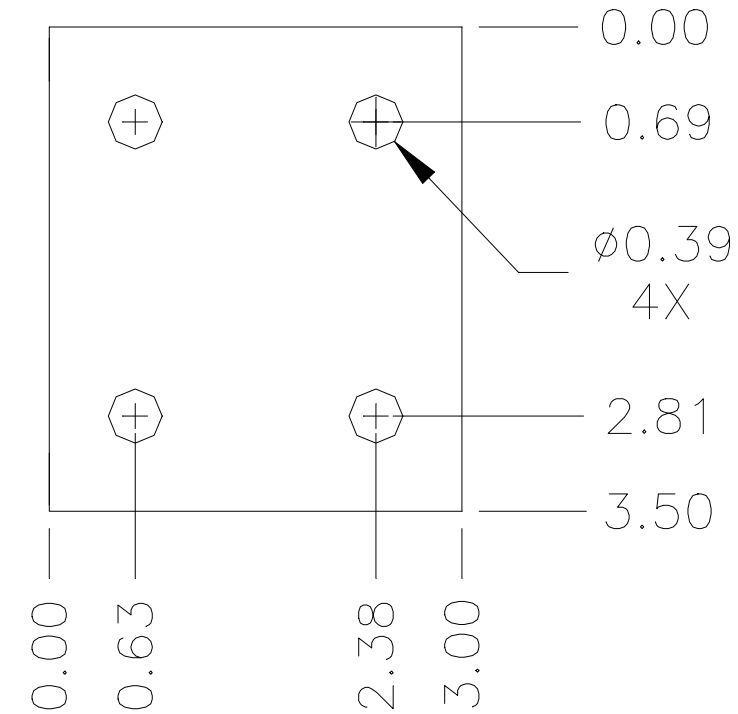
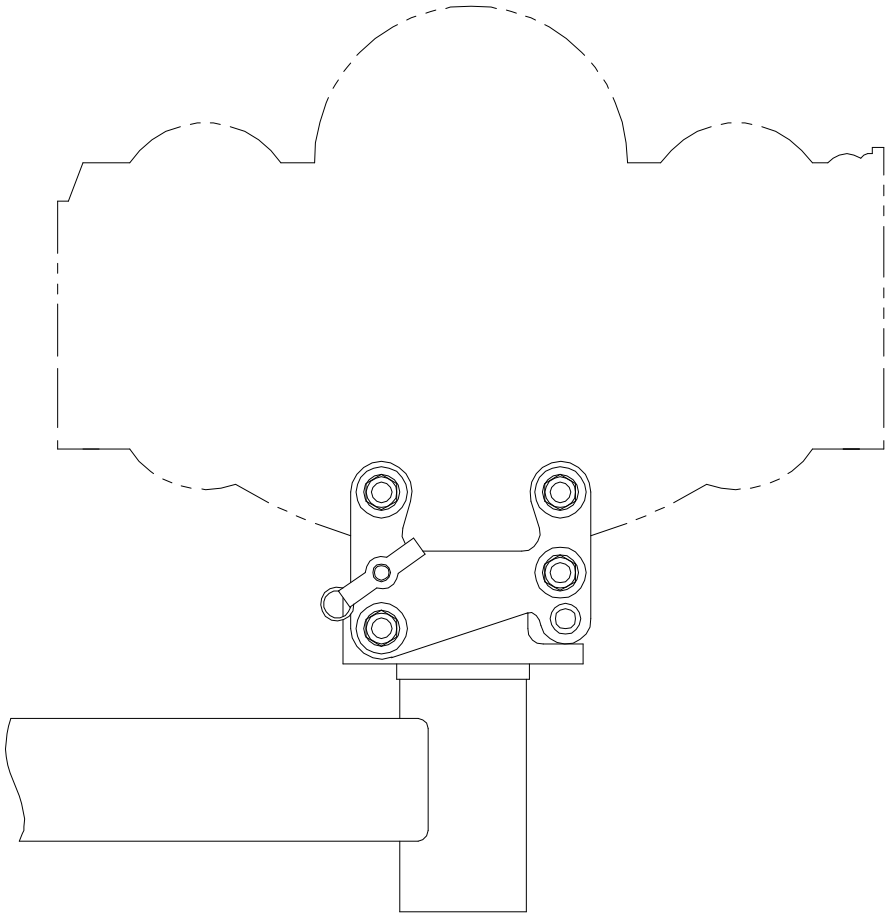


MOUNTING PLATE DETAIL

3.1.5 AM3KA240 BOTTOM PEDESTAL MOUNT

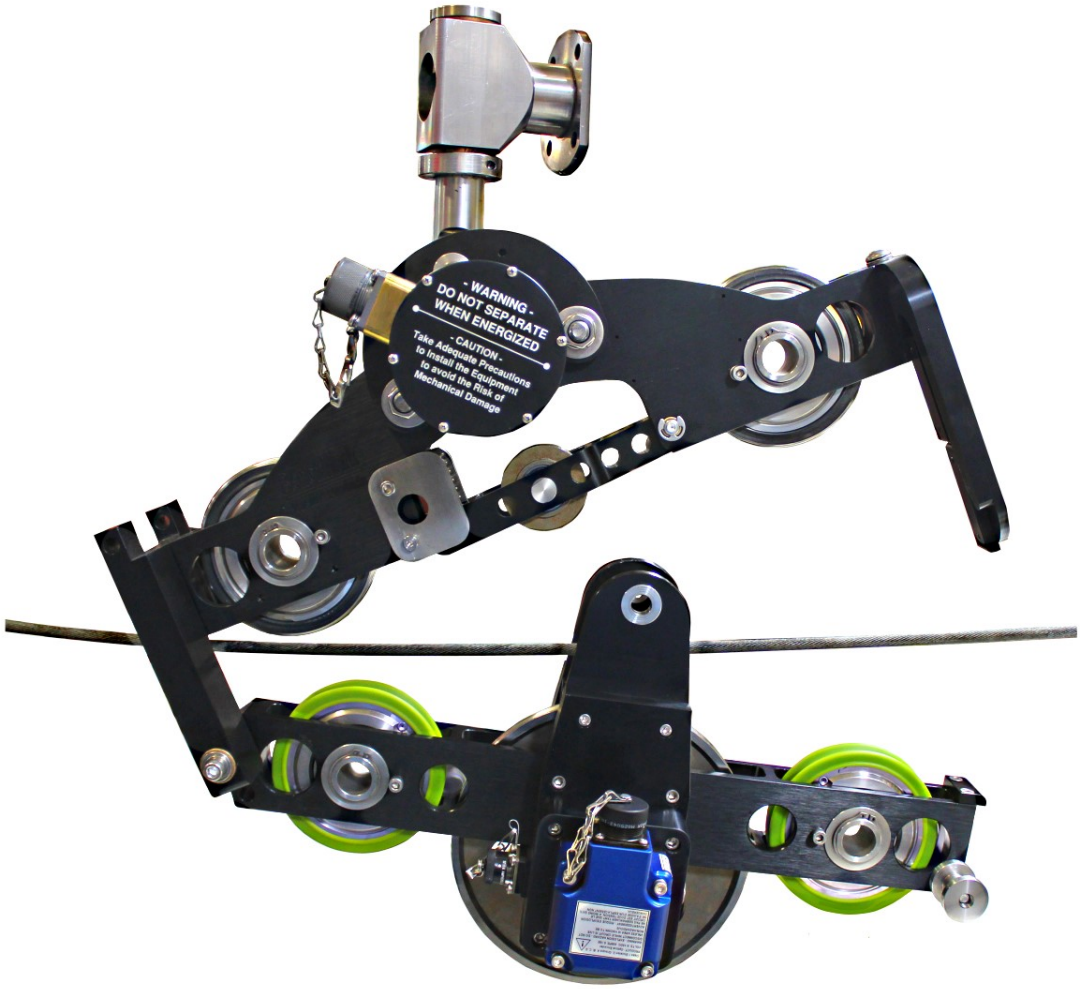


3.2 CABLE INSTALLATION

To install cable, remove the push pin, and hinge the head open. Next insert the cable, swing the head closed and reinsert the pin. Refer to picture.

Make sure that the head can freely sit on the wireline. If the mounting arrangement will not let the head travel up and down freely and if the cable puts a upward or downward force on the measuring head, this force will cause an offset to the tension measurement which will result in an incorrect tension reading.

HEAD OPENED FOR CABLE INSTALLATION AND REMOVAL



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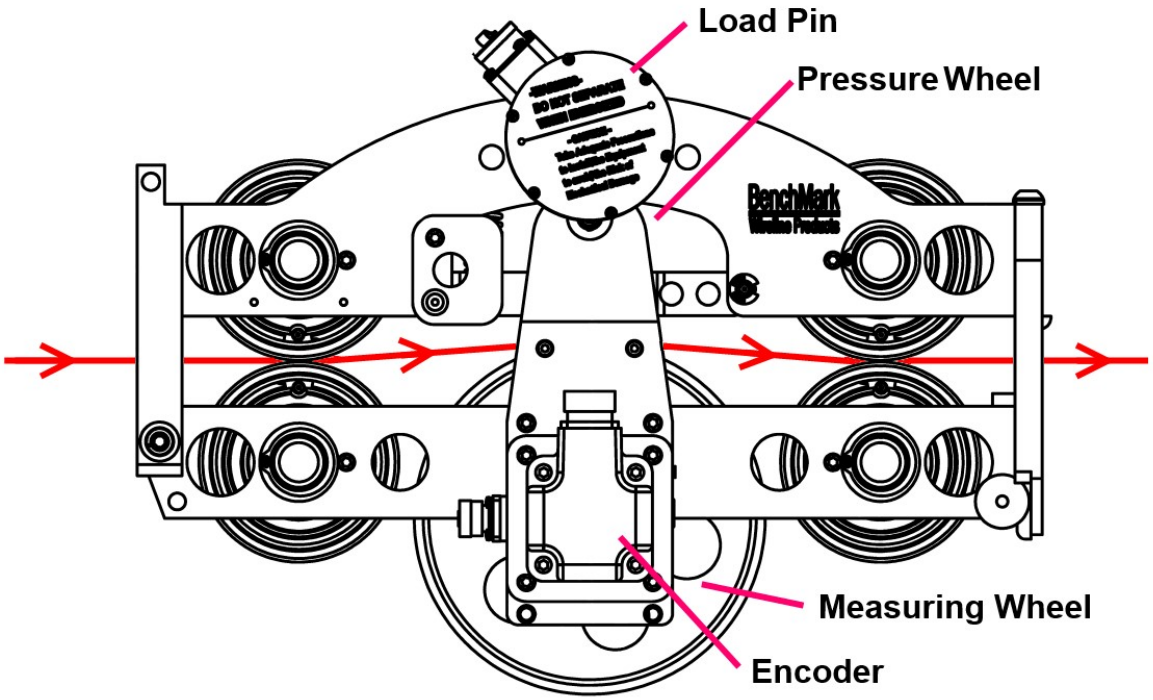
AM3K WIRE PATH



3.3 SYSTEM OPERATION

3.3.1 Determine cable size to be used – **3/16" to 3/8"**

Since the wireline cable actually bends around the measuring wheel, the circumference of the wheel is affected by the size of the cable. To accurately measure depth, this needs to be taken into account by increasing the size of the wheel. The bend radius of the wireline cable also affects the tension measurement.

These corrections are automatically made in the BenchMark Hoist Panel by selecting the proper cable size using the menu.

To enter wheel size corrections directly, use one of the wheel circumferences listed here.

CABLE SIZE	WHEEL CIRCUMFERENCE
7/16	2.0360
3/8	2.0310
5/16	2.0260
9/32	2.0230
1/4	2.0200
7/32 WSI	2.0190
7/32	2.0170
3/16	2.0140

3.3.2 Install line in measuring head (refer to section 2.2).

3.3.3 Make sure line is laying slack and head is free to move and hanging level. Press the Ten Zero Cal button and tension value should read 0.

3.3.4 Press the Ten Cal button and tension should read 5000 lbs.

3.3.5 Press the Zero Depth button to set the depth to zero when the tool is hanging at the zero point.

3.3.6 At this point, the system is ready to log.

4.0 MAINTENANCE & REPAIR

4.1 PRE-JOB CHECK

Each time the system is used perform the following steps:

Verify that the AM3K is properly and securely attached to the spooling arm. Several different mounting kits are available for different types of spooling arms.

Verify that the depth measuring wheels are clean and that no groove has been worn into the measuring wheel surface. Check the measuring and guide wheels for looseness, play, out-of-roundness, worn or rough sounding bearings, or other mechanical conditions that could affect measurement accuracy. Ensure that the wheel bearings inner race is not spinning on the shaft and that the shaft is not spinning in the bushings.

Verify that all fasteners are tight and that the ball lock pushpin is secure. Verify that the encoder, electronic load pin, and backup counter cable are installed and properly routed. Verify that the depth system is working by turning the wheel and observing the hoistman’s panel and backup display unit to indicate cable movement. The hoistman's panel and backup display should measure approximately 2' for each rotation of the wheel.

4.2 POST-JOB MAINTENANCE

At the completion of each job, thoroughly clean and dry the device as soon as possible. This avoids problems caused from borehole residues transferred from the wireline onto the measuring device. Borehole residues should be washed from the device with a cleaning solvent such as Varsol or an equivalent type. Rinse the device with water, dry, and wipe down with an oily rag.

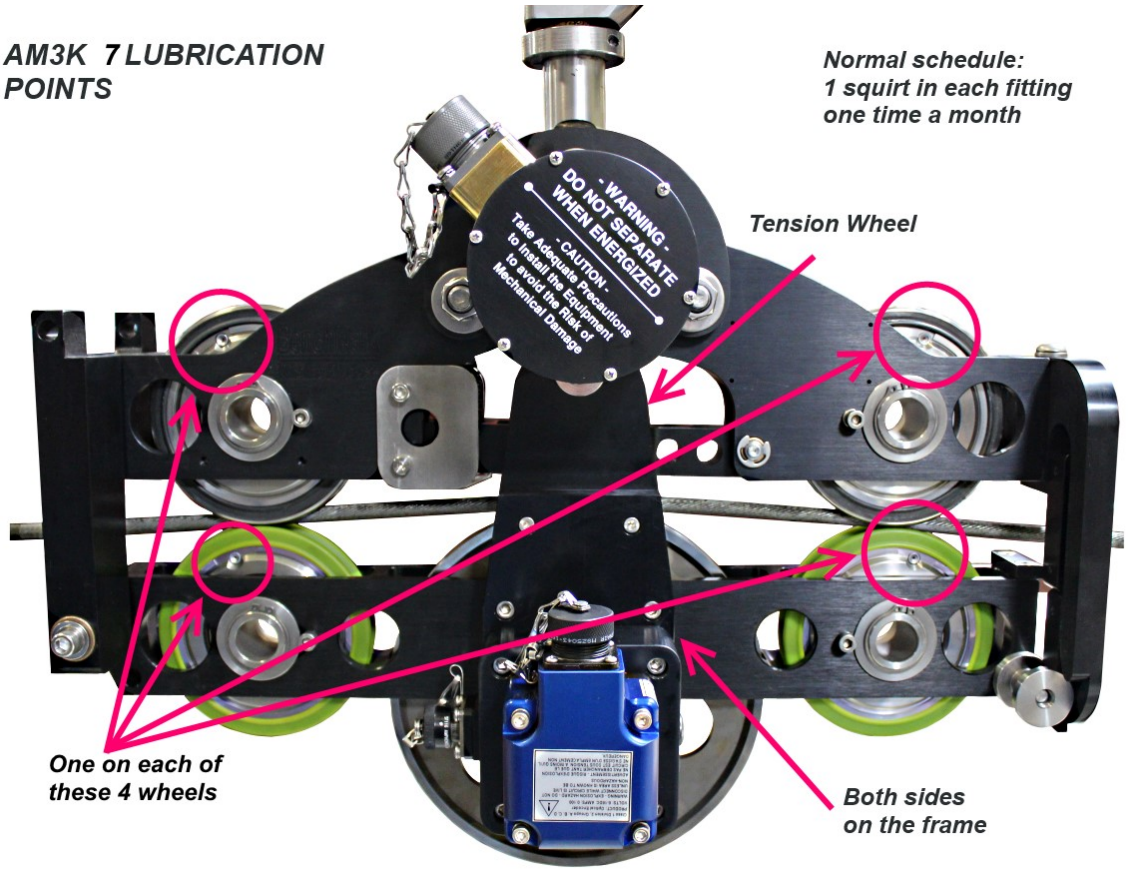
Do not pressure wash

4.3 MONTHLY MAINTENANCE

Visually inspect the interiors of the electrical connectors for the encoders and electronic load axle for dirt and evidence of insulation breakdown. Clean or replace as necessary. Install dust caps on the connectors if the cables are removed.

Manually rotate each wheel by hand to verify its condition. Inspect the depth measuring wheels for signs of abnormal wear, diameter changes, or shaft/bearing play that can affect measurement accuracy. The wheel should be replaced if it is grooved more than .005". The wheel should be 7.639 / 7.640" (194 mm) in diameter with a 24" circumference (609.6 mm). Inspect the two grooved guide wheels on either side of the tension wheel. They should be 4" (101.6 mm) in diameter (bottom of groove).

Grease all the wheels and bearings that are fitted with a grease fitting (see following diagram). Use a water proof, marine grade grease. An inverted grease nozzle (p/n AM5KP130) is supplied with each head. This nozzle will fit any standard grease gun.



4.4 ASSEMBLY / DISASSEMBLY PROCEDURES

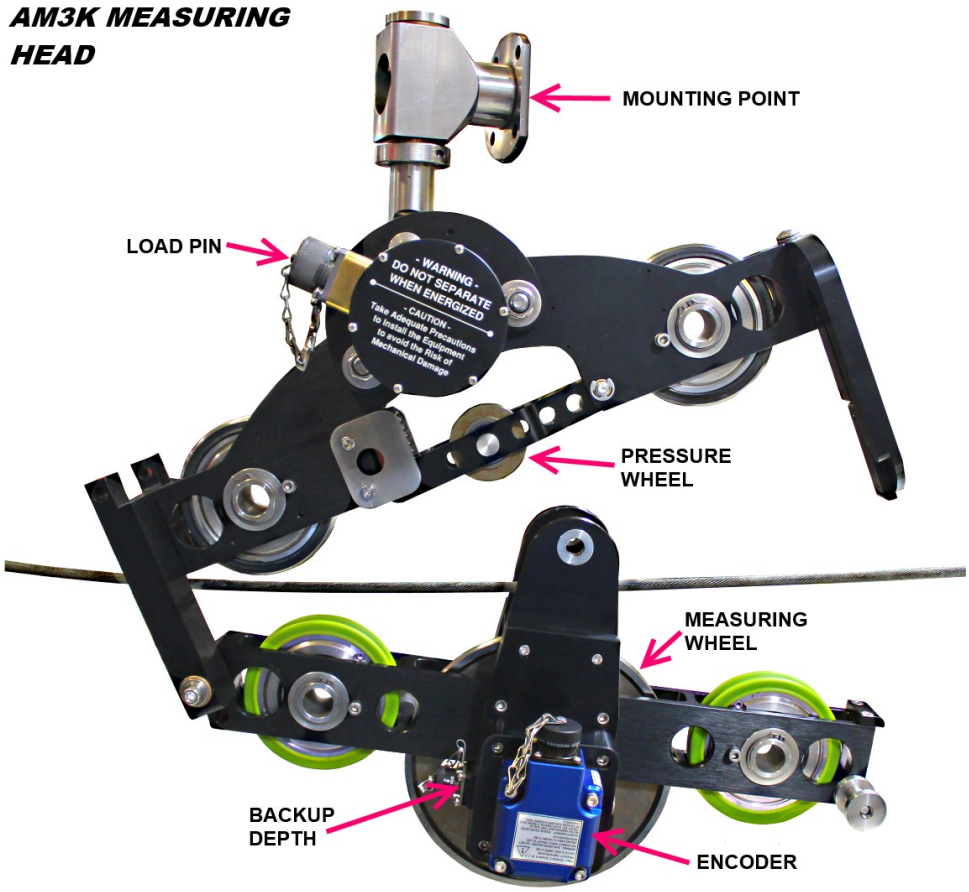
FIELD MAINTENANCE PROCEDURES

PRESSURE WHEEL MAINTENANCE

There are 4 field maintenance procedures for the Pressure Wheel and Load Cell.

- Load Pin Replacement – 4.5
- Pressure Wheel Replacement – 4.6
- Encoder Replacement – 4.7
- Wheel Replacement – 4.8
- Backup Depth Pickup Replacement – 4.9
- Bearing Replacement – 4.10

Note - It is recommended that you make some blocks to rest the AM3K on while you're working on it. This allows the load pin and encoder to hang down and still provide a lever work surface. Simple wooden 2x4's work well.



4.5 LOAD PIN REPLACEMENT

The electronic load pin is held in place by one retaining ring on the outer end of its shaft. Remove the retaining ring. The load pin can then be removed from the mounting frame.

Remove the spiral lock which holds the pin in the frame. If the lock is not damaged it can be used again to secure the load pin.

4.5 LOAD PIN REPLACEMENT continued

Squeeze the spring loaded frame together as shown in the photo. This will take the tension of the pin and it can then be removed from the frame.

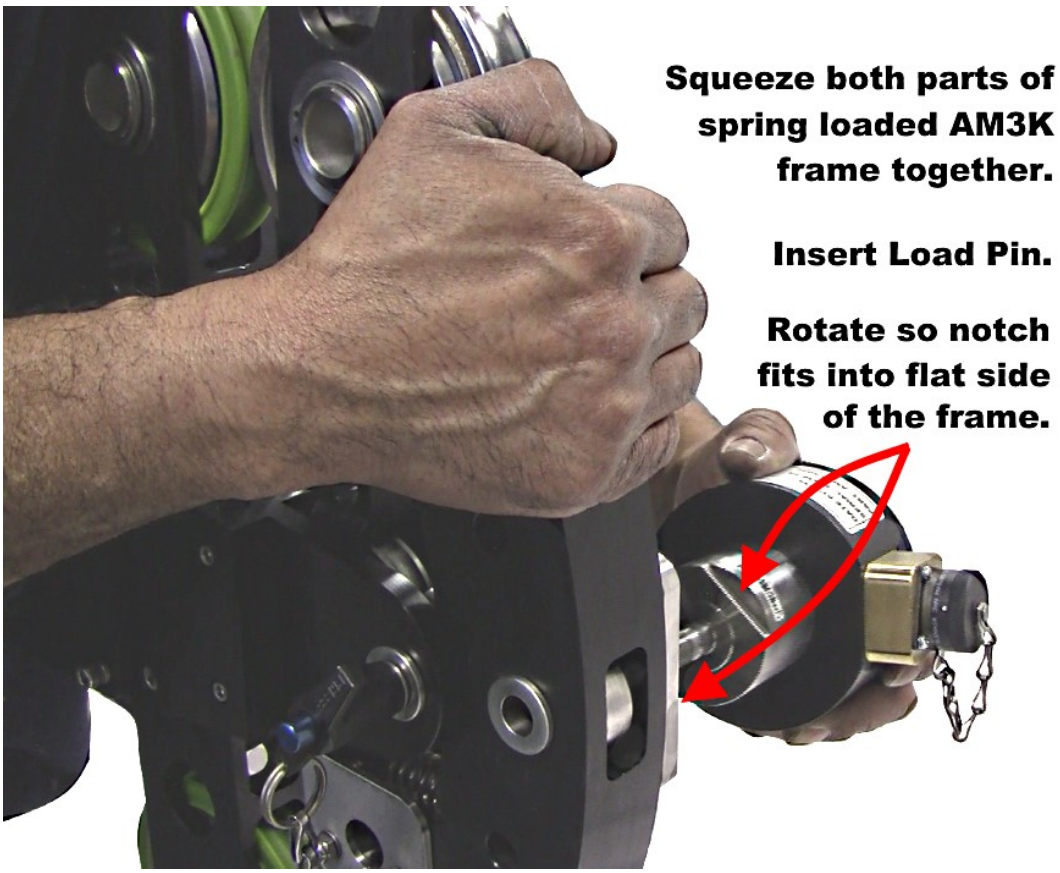
Load Cell Replacement – to replace the load pin repeat these steps in this order.

Compress the spring loaded frame together.

Insert the new load pin in the hole in the frame.

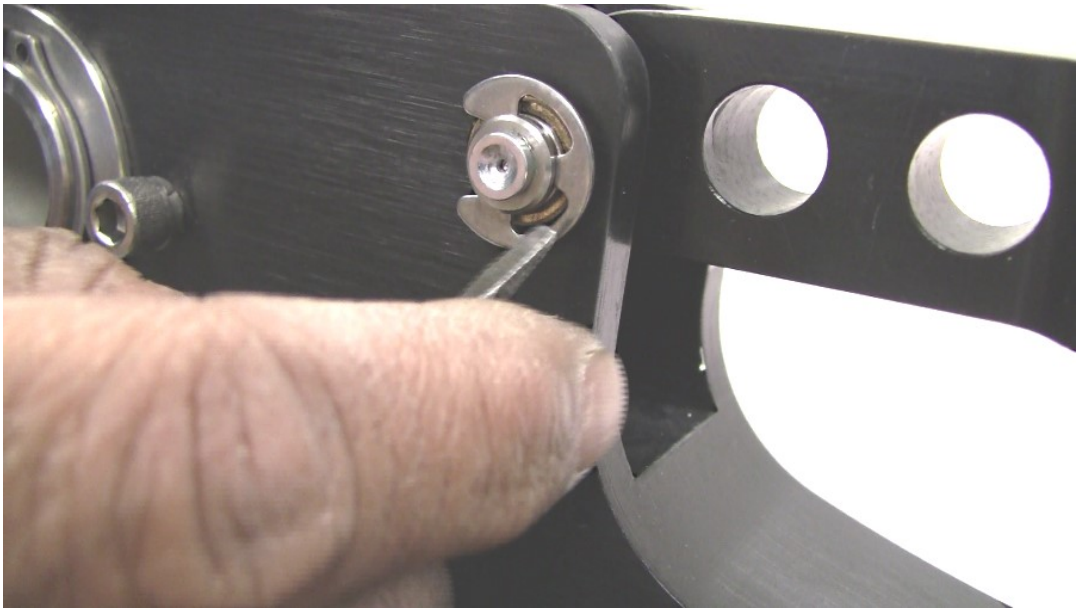
Rotate the pin so that the notch in the pin matches up with the flat side on the frame.

After the load pin is properly inserted, release pressure on the frame. Replace the spiral lock on the shaft of the load pin.

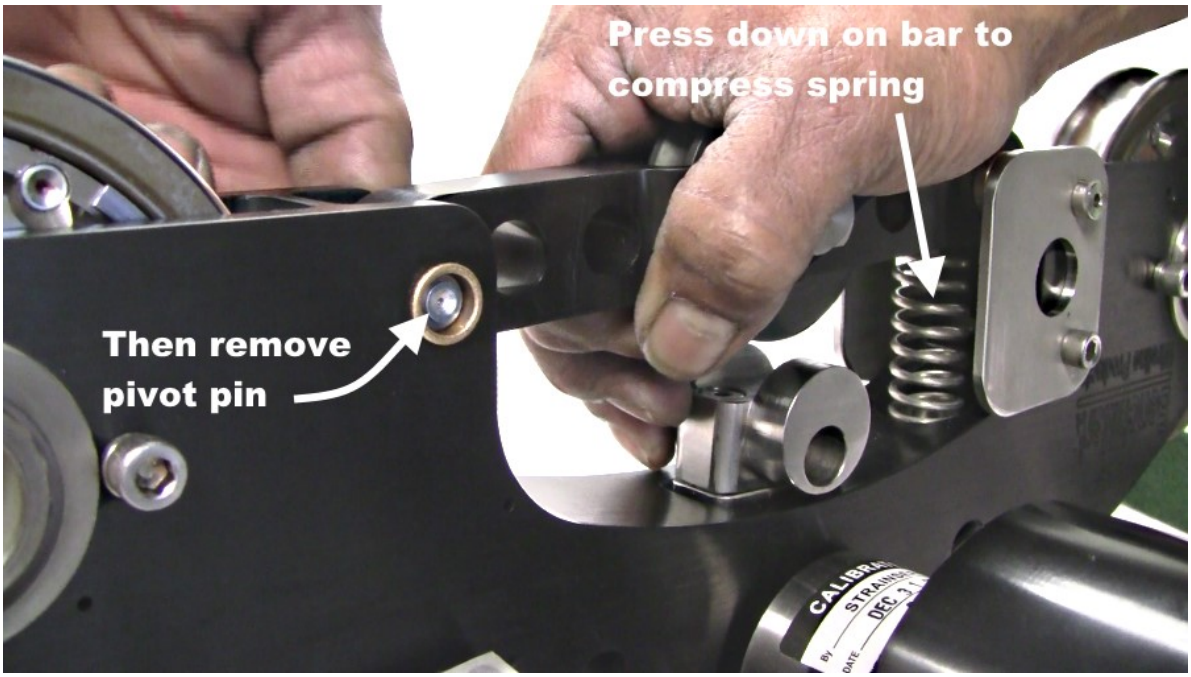


4.6 PRESSURE WHEEL REPLACEMENT

Remove the “C” clip which keeps the pivot pin in place.

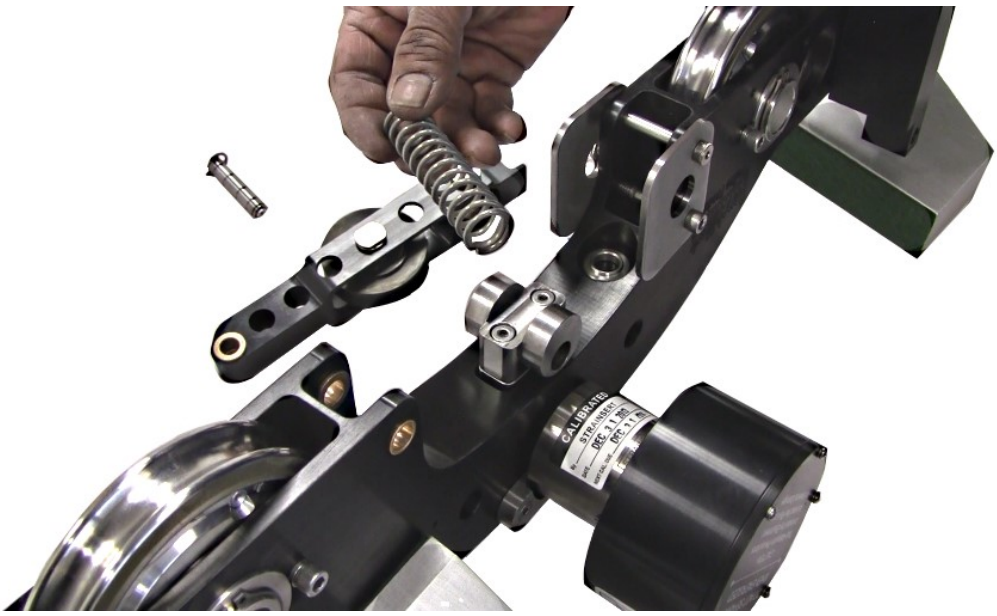


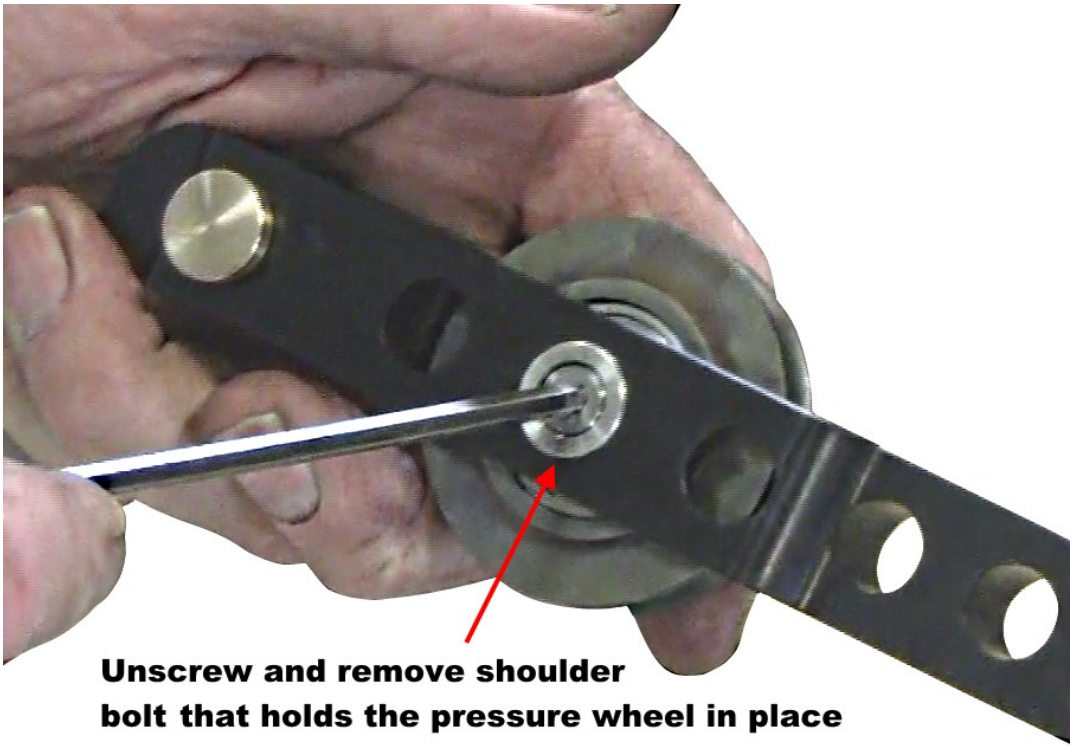
Now remove the pivot pin. You’ll have to press down on the spring end of the bar to allow the pin to come free.



4.6 PRESSURE WHEEL REPLACEMENT continued

Now remove the bar while keeping control of the spring and the spring caps.

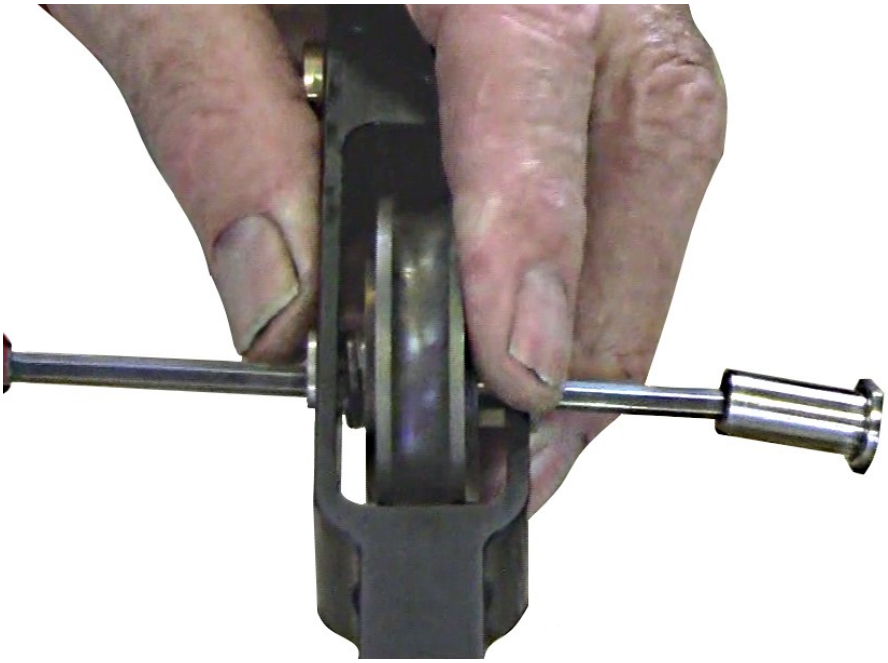




4.6 PRESSURE WHEEL REPLACEMENT continued

Loosen and remove the shoulder bolt.

Through the wheel center, push the other half of shoulder bolt out.

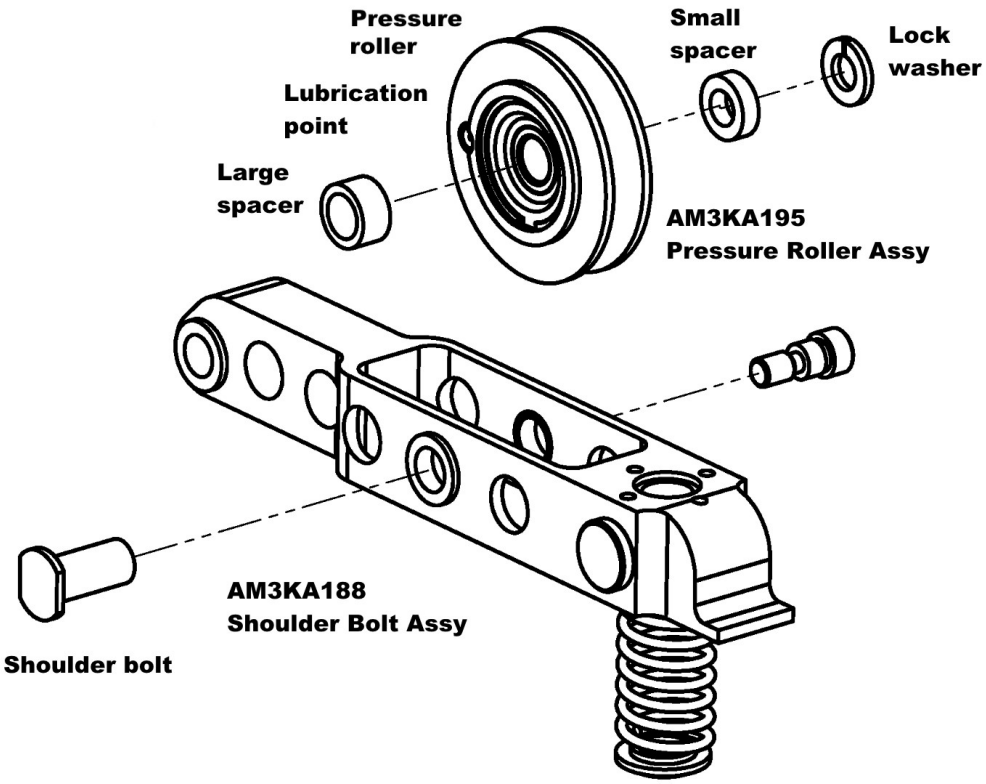


4.6 PRESSURE WHEEL REPLACEMENT continued

Pull the wheel and related hardware out of the upper bar.

4.6 PRESSURE WHEEL REPLACEMENT continued

AM3K - Pressure Roller Assembly



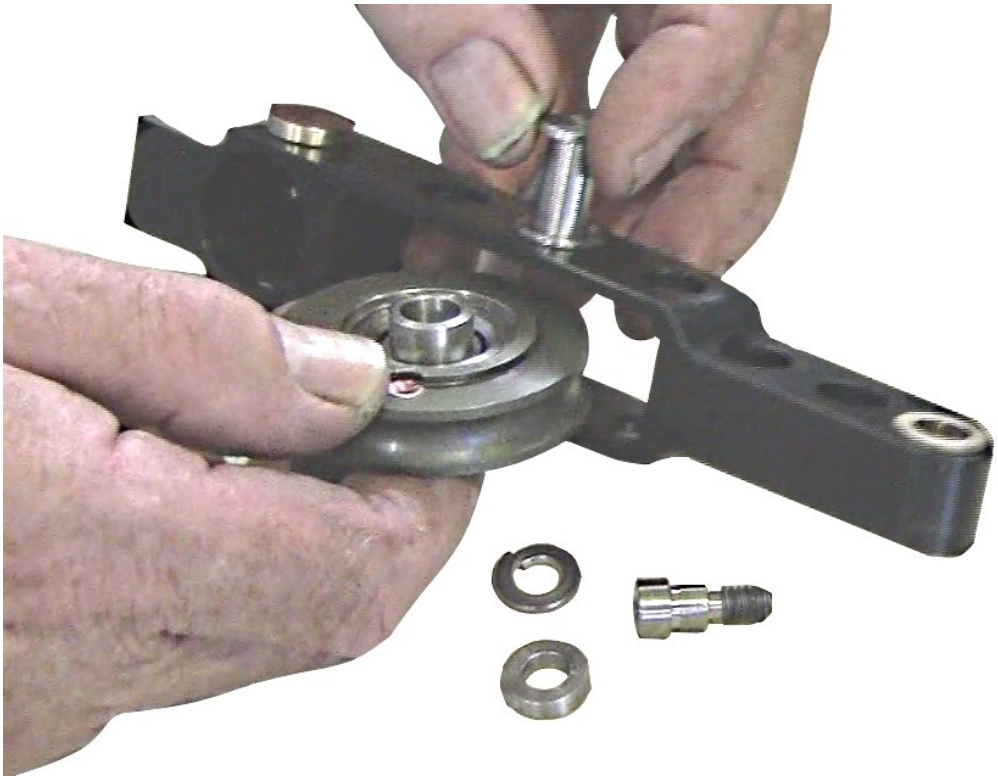
These are the major components of the pressure roller assembly.

Put the shoulder bolt part way into the center hole in the bar.
Put the large spacer over the end of the shoulder bolt inside the frame.
Slide the pressure wheel over the bolt with the lubrication point towards the bolt.

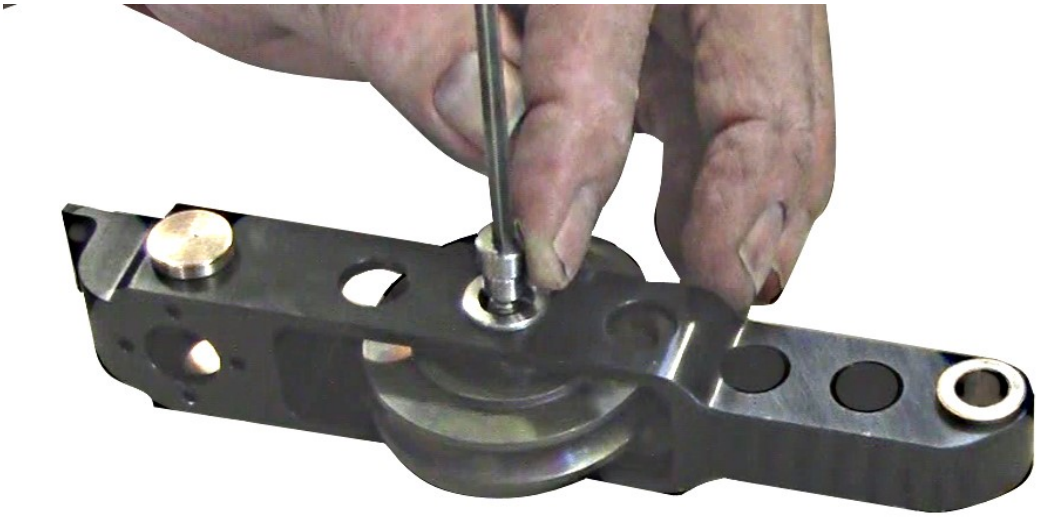
Next slide the small spacer on the bolt inside the bar.
Then slide the lock washer on the bolt also inside the bar.
Lay the bar on its side with the shoulder bolt side down.
With a small probe center the spacers, wheel and washer on the bolt.
Insert the screw into the bolt.

4.6 PRESSURE WHEEL REPLACEMENT continued

Make sure the lubrication point on the wheel is facing towards the encoder side of the machine.



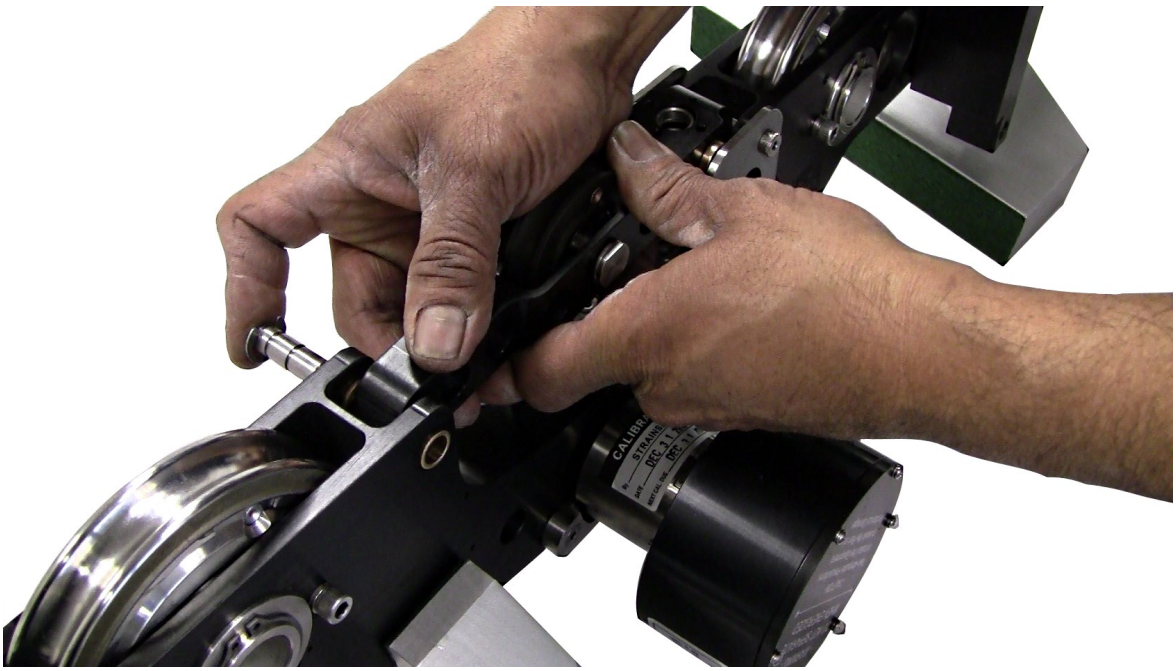
Some adjustment and pressure may be necessary as the lock washer must fit into notch in the wheel. Tighten the screw firmly.



4.6 PRESSURE WHEEL REPLACEMENT continued

Position the lower spring cab in the frame, add the spring and then the upper spring cap.

Position the bar as shown in the picture first with the tail of the beam inserted under the metal bar on the right. Then push down on the beam so the pivot pin on the left can be passed through bar and frame.



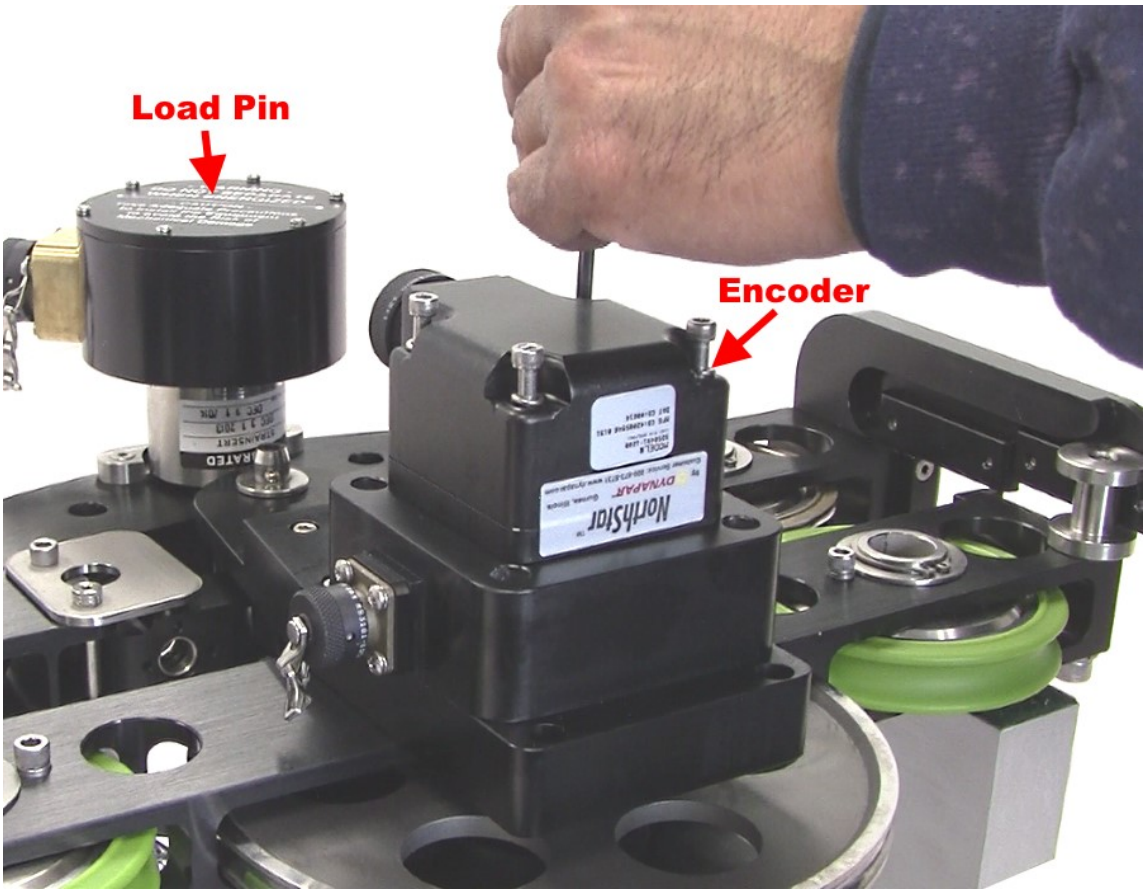
4.6 PRESSURE WHEEL REPLACEMENT continued

Now place the “C” clip on the end of the pivot pin to lock it firmly in place.

4.7 ENCODER REPLACEMENT

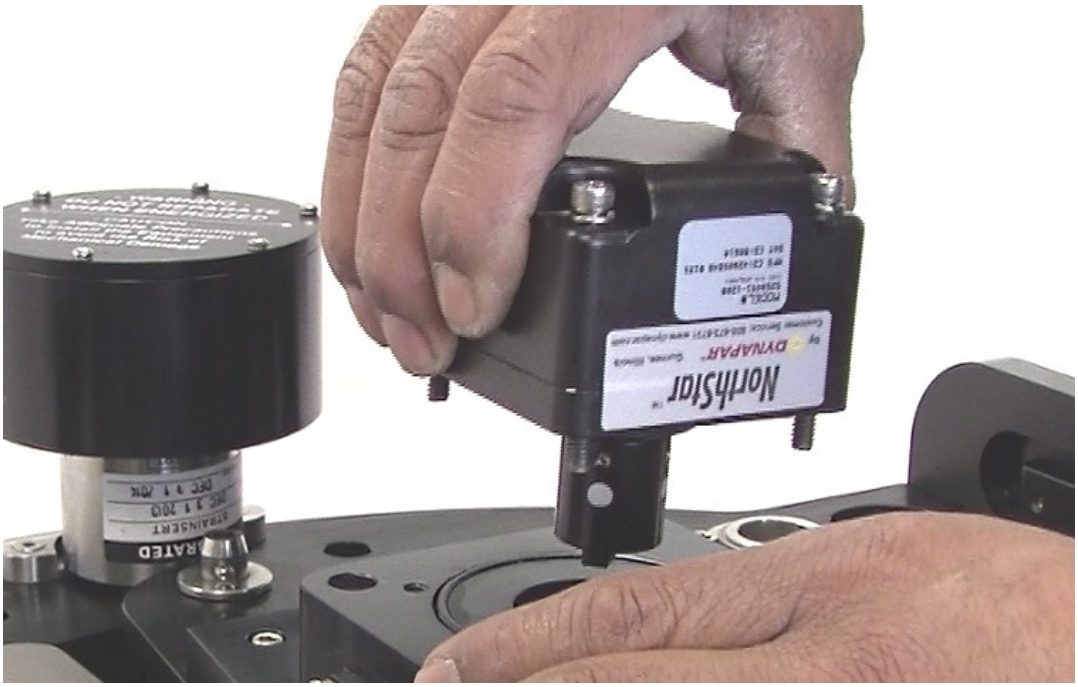
Lay the measuring head in the blocks encoder side up.

Remove the four screws holding the encoder in place

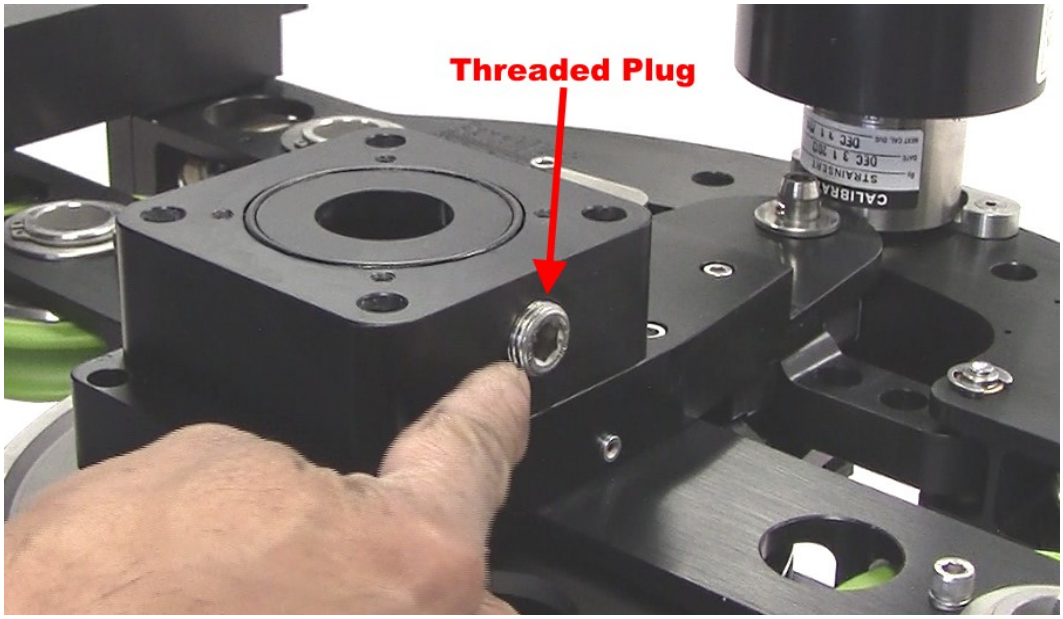


4.7 ENCODER REPLACEMENT continued

Gently pull the encoder straight up out of the adapter body. Be careful to not impact the plastic adapter on head. Lay the encoder to the side.



Remove the plug on the encoder adapter body. This may take a big wrench.



4.7 ENCODER REPLACEMENT continued

If the plastic coupling is attached to the coupling stack, remove it.
If it is still inside the adapter body, with a pair of needle nose pliers, reach in and extract it.

*Note - If you drop the plastic coupling inside the adapter, you may have to remove the adapter to retrieve it.

Note the size of the gap between the coupling and the encoder body.

4.7 ENCODER REPLACEMENT continued

With the small Allen wrench, loosen the 2 set screws that hold the coupling on the shaft of the encoder.

Remove the coupling stack from the shaft.

4.7 ENCODER REPLACEMENT continued

Replace the existing coupling stack on the shaft of the new encoder.
Note that the shaft has a flat side. Place the coupling on the shaft so that the tangs on the coupling and one set screw are aligned to the flat side of the shaft.

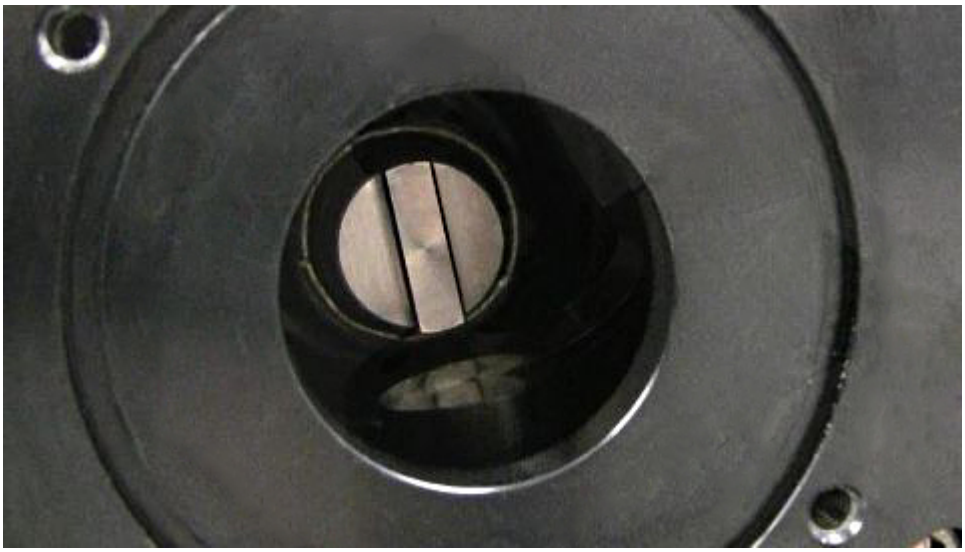
When tightening, leave the same gap on the shaft between the coupling and the encoder. Snug up but DO NOT fully tighten the set screw on the flat side of the shaft.

4.7 ENCODER REPLACEMENT continued

Use DC111 or equivalent and apply a thin layer to the plastic coupling. Press the plastic on top of the coupling stack. The DC111 will temporarily hold it in place.

The top of the encoder has the OEM labels. Rotate the coupling stack so that the slot on the top of the plastic coupling is oriented vertically.

Look through the hole in the adapter body and you will see the coupling half. Rotate the measuring wheel so that the tang on the coupling half is vertical.



4.7 ENCODER REPLACEMENT continued

Carefully replace the encoder watching to not jar the coupling stack. Hold it against the adapter body.

Using a flashlight look in the hole to verify that the plastic coupling has engaged the tang on the measuring wheel.

4.7 ENCODER REPLACEMENT continued

Temporarily replace the 2 screws to hold the encoder and coupling in place.

Place the Allen wrench in a set screw hole and exerting force, lever the encoder stack away from you towards the measuring wheel, snug up the set screw.

4.7 ENCODER REPLACEMENT continued

Remove the temporary screws remembering to hold on to the encoder. Carefully remove the encoder taking care to not jar the encoder stack.

Firmly tighten the 2 set crews on the coupling.

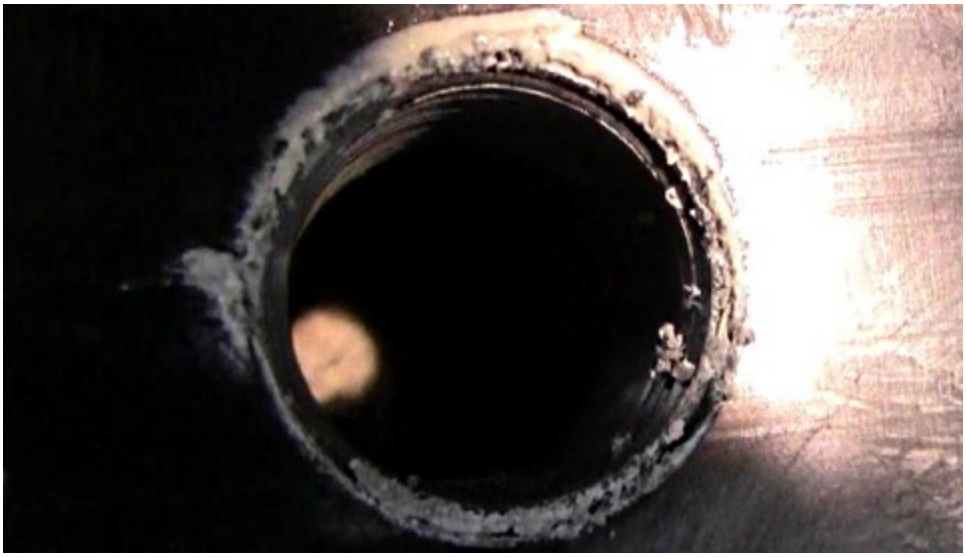
Lubricate the O ring using the DC111 and carefully replace the O ring in the adapter body.

4.7 ENCODER REPLACEMENT continued

Position the coupling on the encoder so that the slot is vertical.

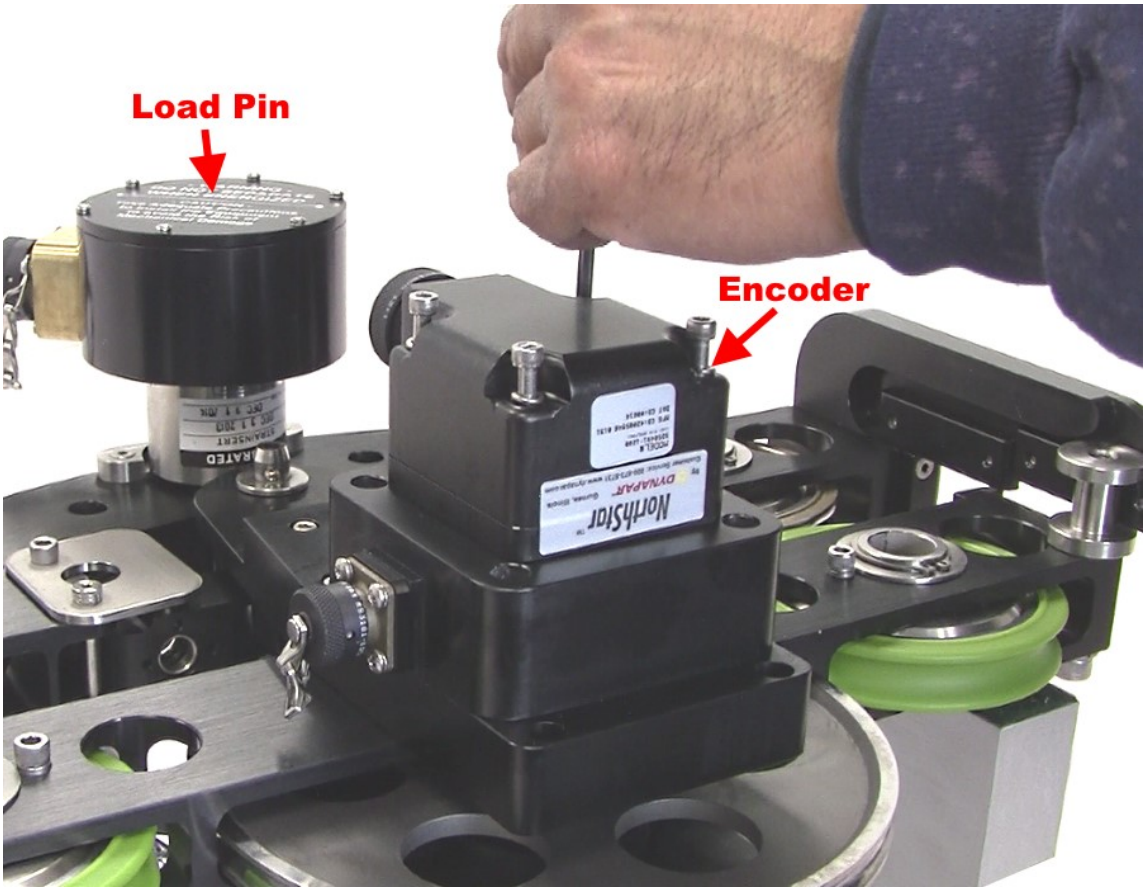
Carefully position the encoder in the adapter body.

Holding the encoder firmly in place, Rotate the measuring wheel and if properly engaged, as you look down through the plug hole, you should see the white dots on the coupling stack move as the coupling spins.



4.7 ENCODER REPLACEMENT continued

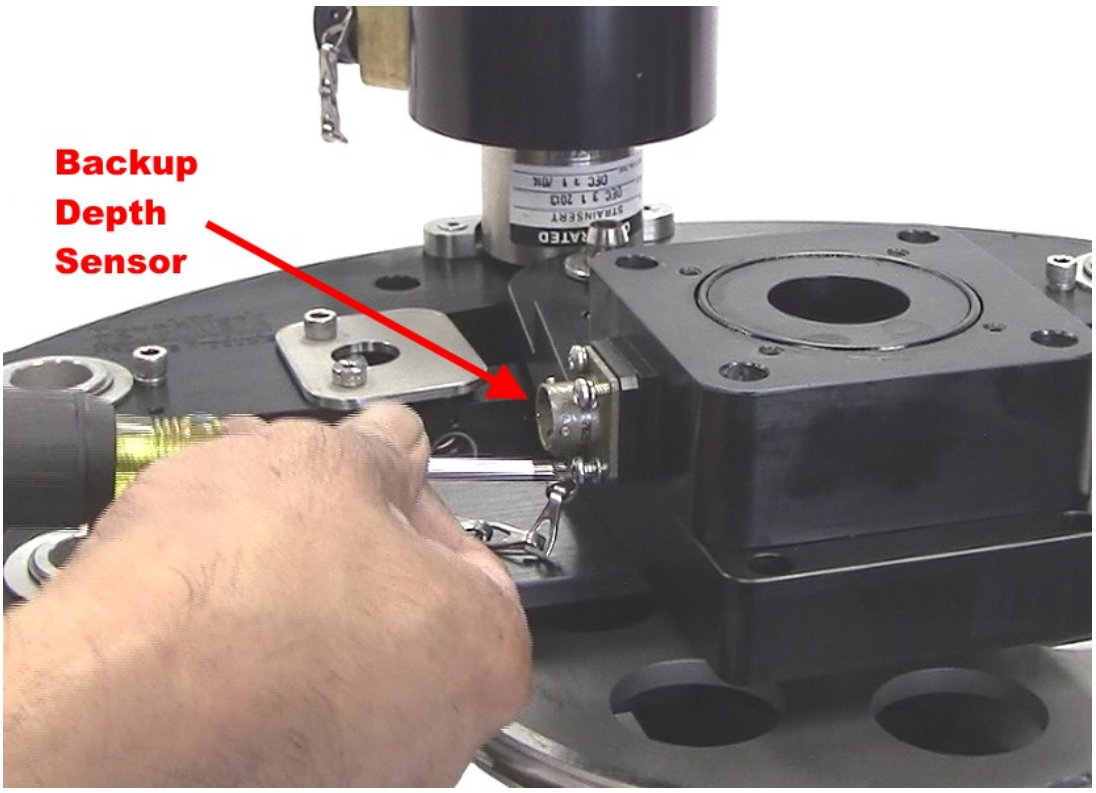
Reinstall the 4 screws that hold the encoder and tighten firmly.



4.8 MEASURING WHEEL REPLACEMENT

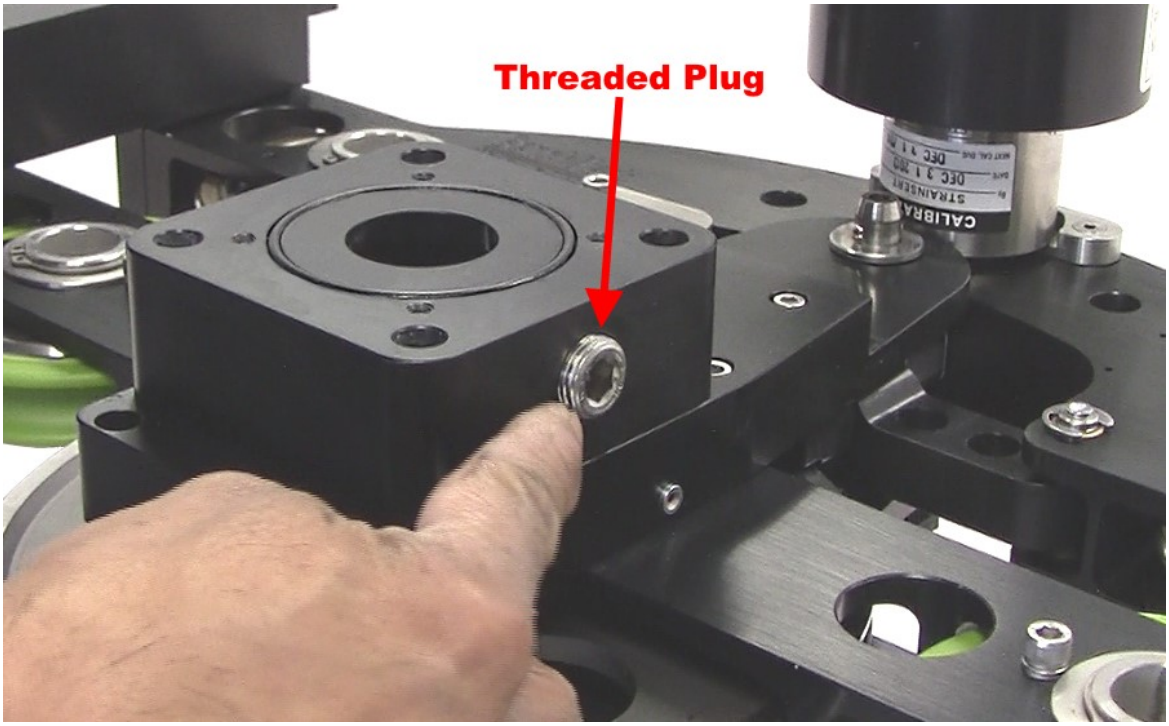
First remove the encoder as described in section 4.7

Now remove the backup counter by taking out the four screws that hold it in place. Pull out the backup depth sensor and put it off to the side.



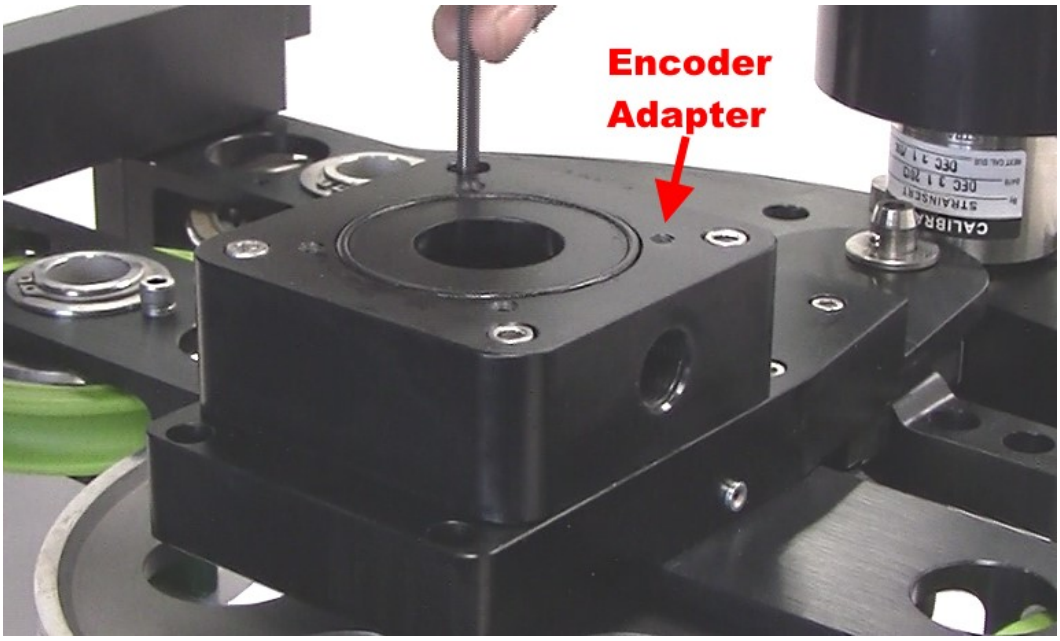
4.8 MEASURING WHEEL REPLACEMENT continued

Remove the plug on the encoder adapter body. This may take a big wrench.



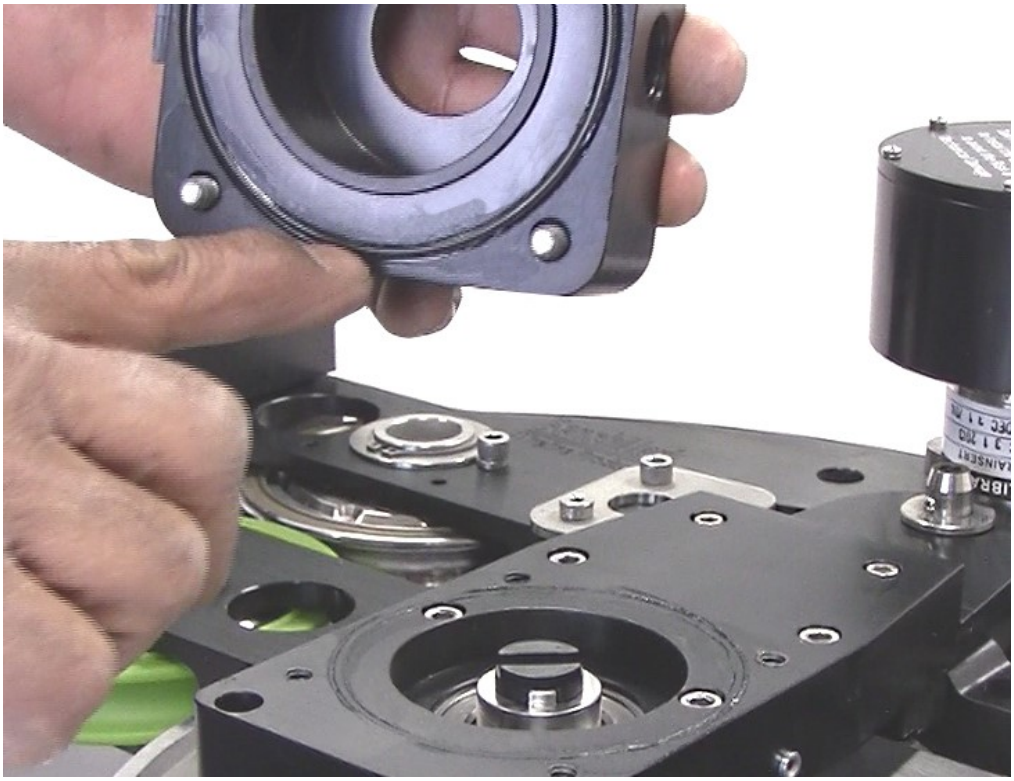
4.8 MEASURING WHEEL REPLACEMENT continued

Remove the four screws in the encoder adapter. Remove the adapter



4.8 MEASURING WHEEL REPLACEMENT continued

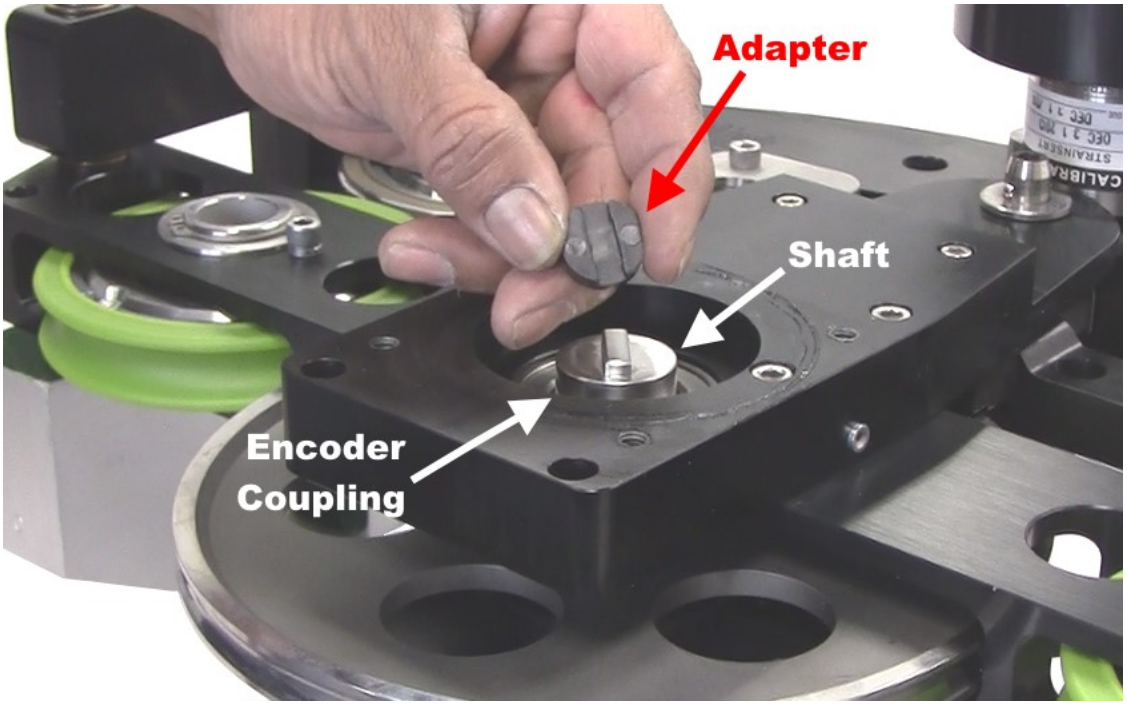
Check to make sure that the two soft seals on the top and bottom of the adapter are in good condition.



4.8 MEASURING WHEEL REPLACEMENT continued

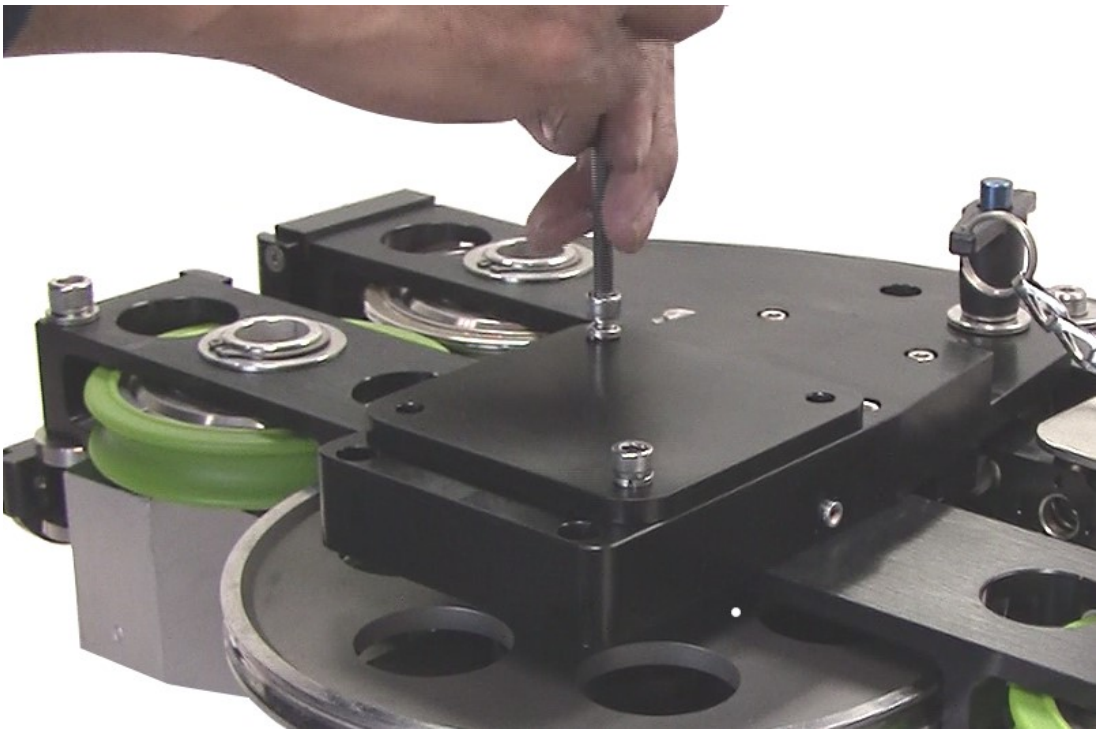
Remove the plastic adapter from the top of the shaft.

Now turn the head over and set it on the blocks encoder side down.



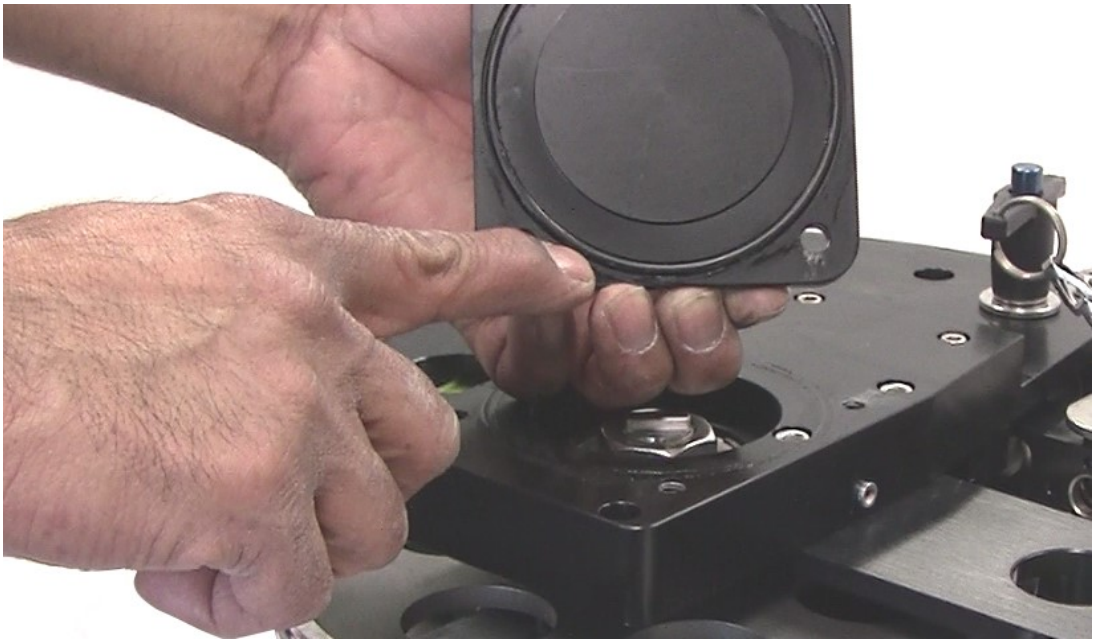
4.8 MEASURING WHEEL REPLACEMENT continued

Remove the four screws holding the adapter cover in place.



4.8 MEASURING WHEEL REPLACEMENT continued

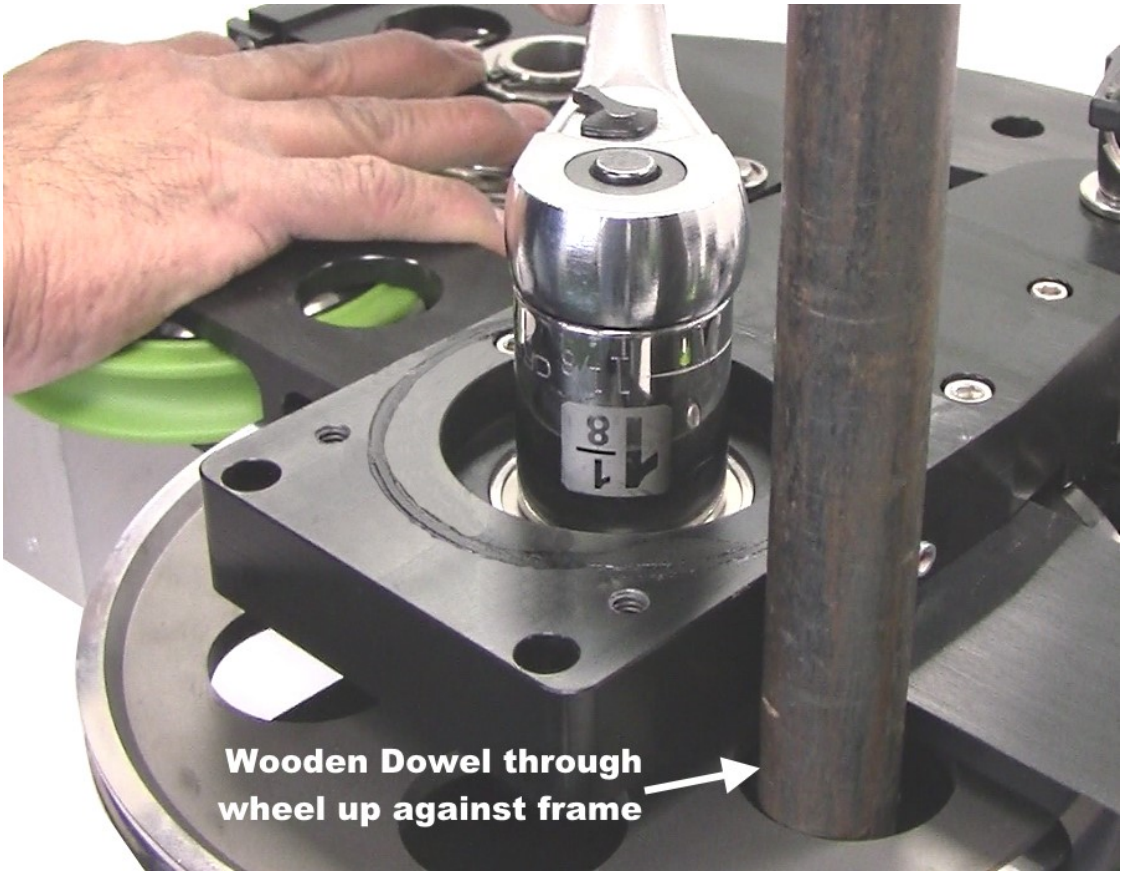
Remove the cover checking that the soft seal on the underside is in good condition.



4.8 MEASURING WHEEL REPLACEMENT continued

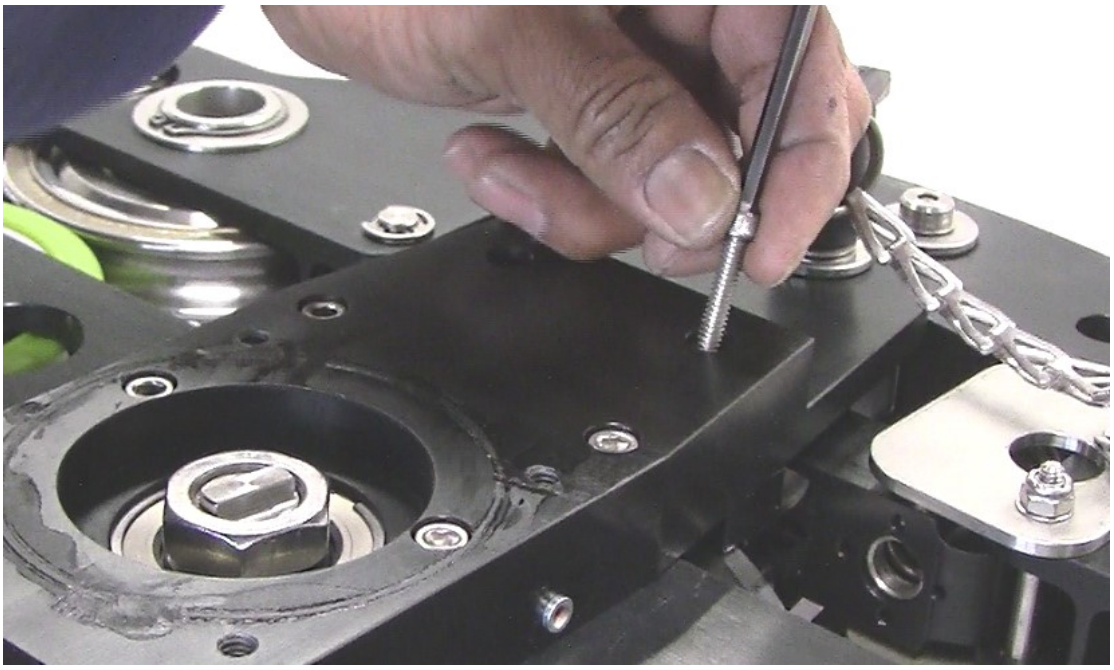
Next we will loosen, but not remove, the nut that holds the shaft in place. The nut should be very tight so use a suitable large 1 1/8”wrench.

Place a large wooden dowel though a hole in the wheel. Take a large wrench and break the nut loose firmly holding on to the head. Once the dowel buts up against the frame you will be able to loosen the nut.



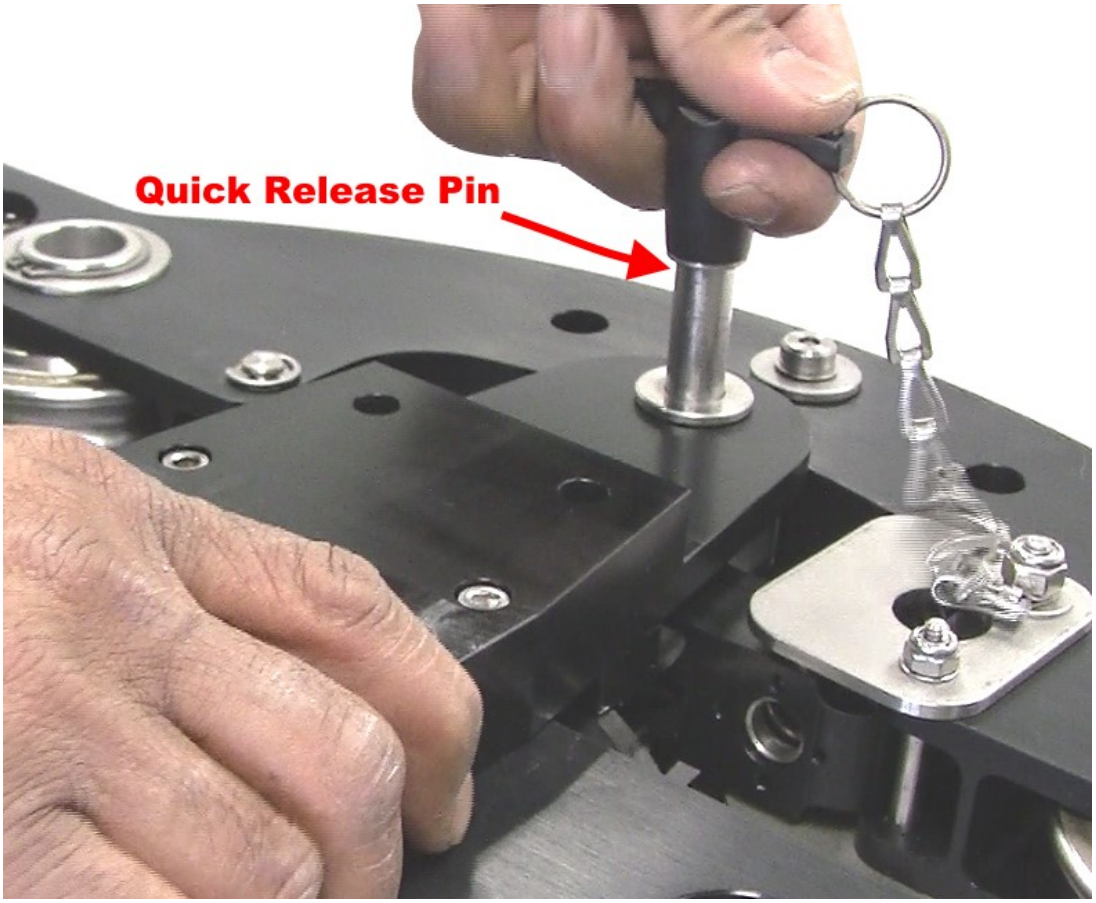
4.8 MEASURING WHEEL REPLACEMENT continued

Now remove the wear blocks. Remove the two screws that hold them in place



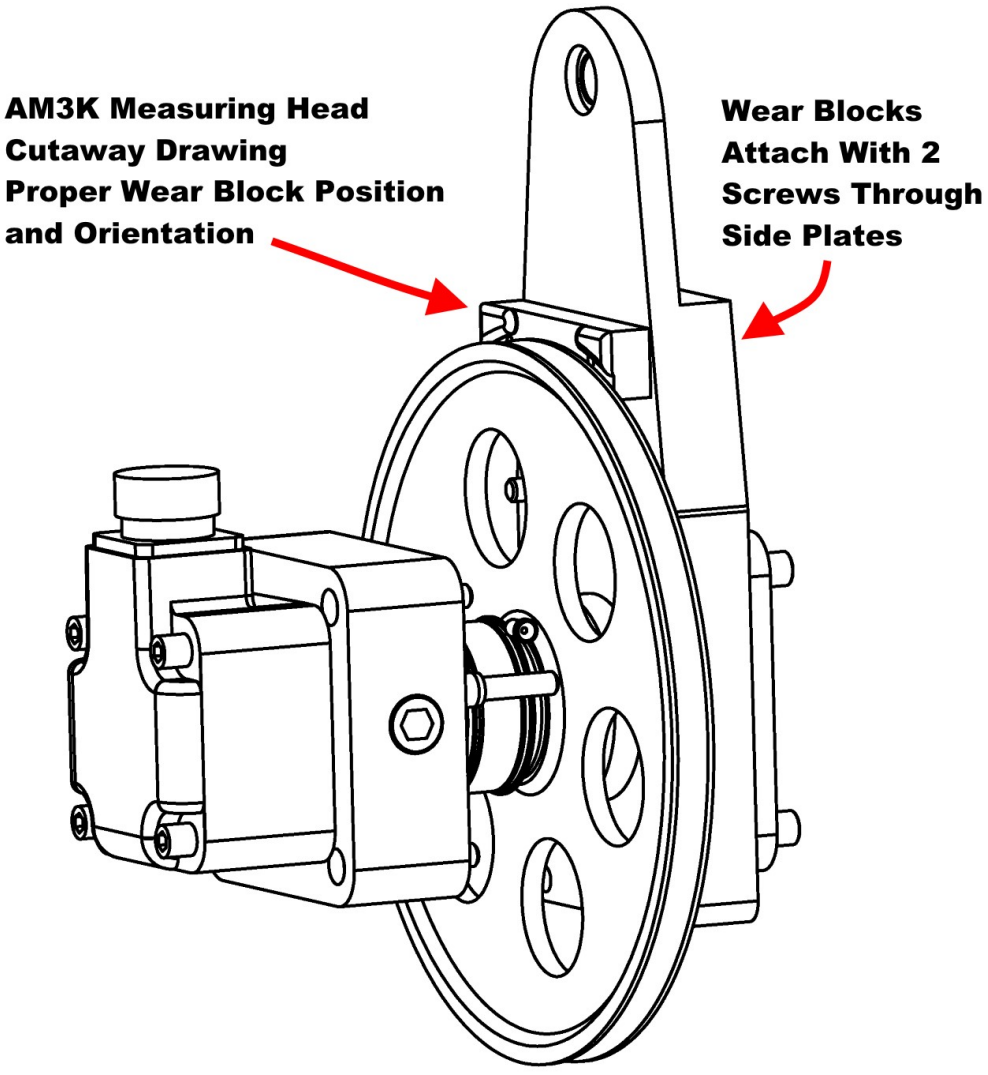
4.8 MEASURING WHEEL REPLACEMENT continued

Remove the quick release pin and spread the head open.



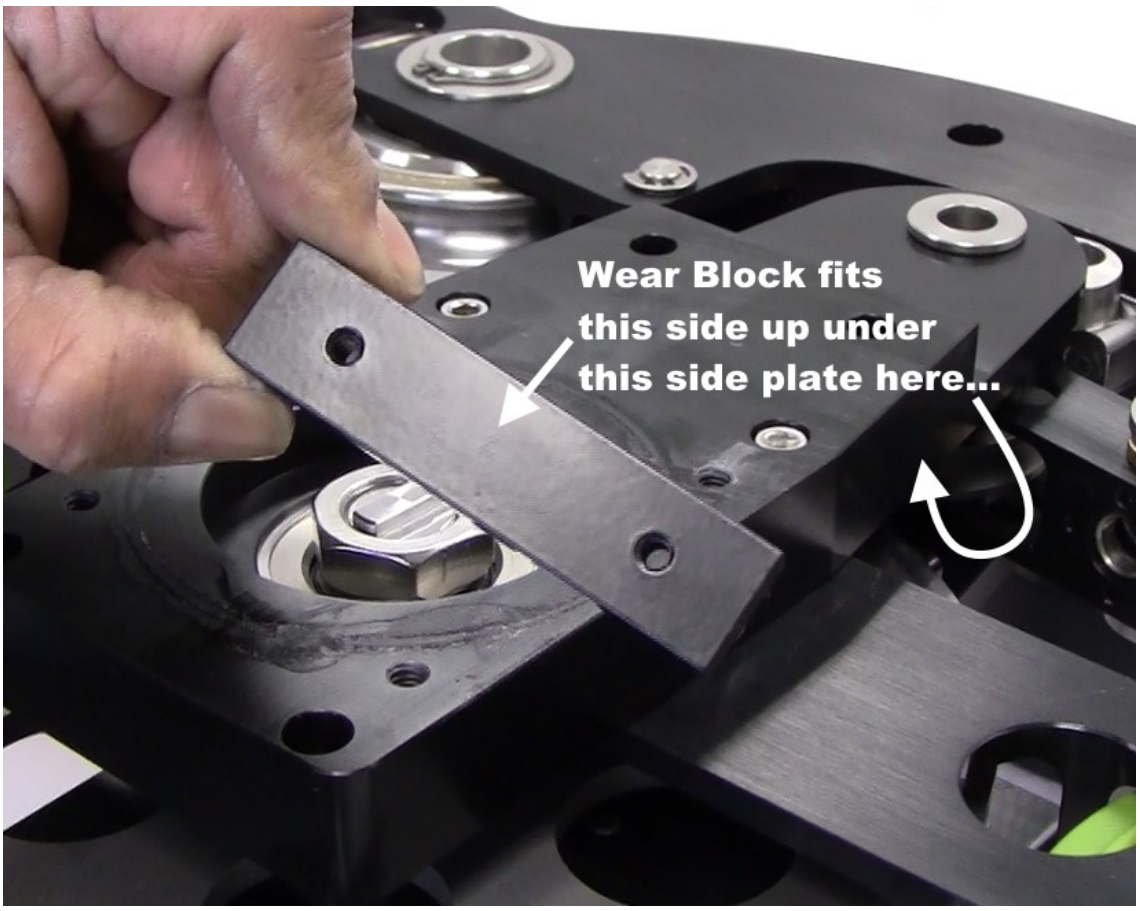
4.8 MEASURING WHEEL REPLACEMENT continued

You cannot see the wear blocks when they are removed and reinstalled, This drawing shows their relative placement under the side plate and over the wheel.



4.8 MEASURING WHEEL REPLACEMENT continued

Reach below the side plate and remove the wear block.

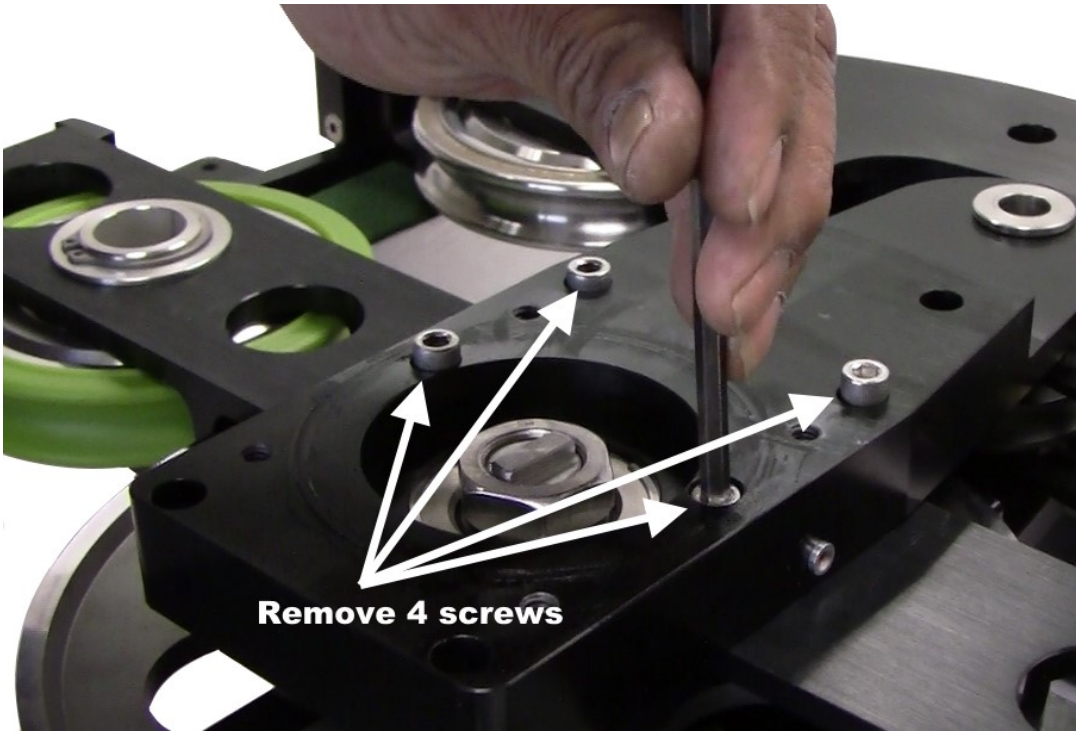


4.8 MEASURING WHEEL REPLACEMENT continued

Loosen but do not remove the four additional screws in the side plate. This will keep the machine together when it is flipped on its other side.

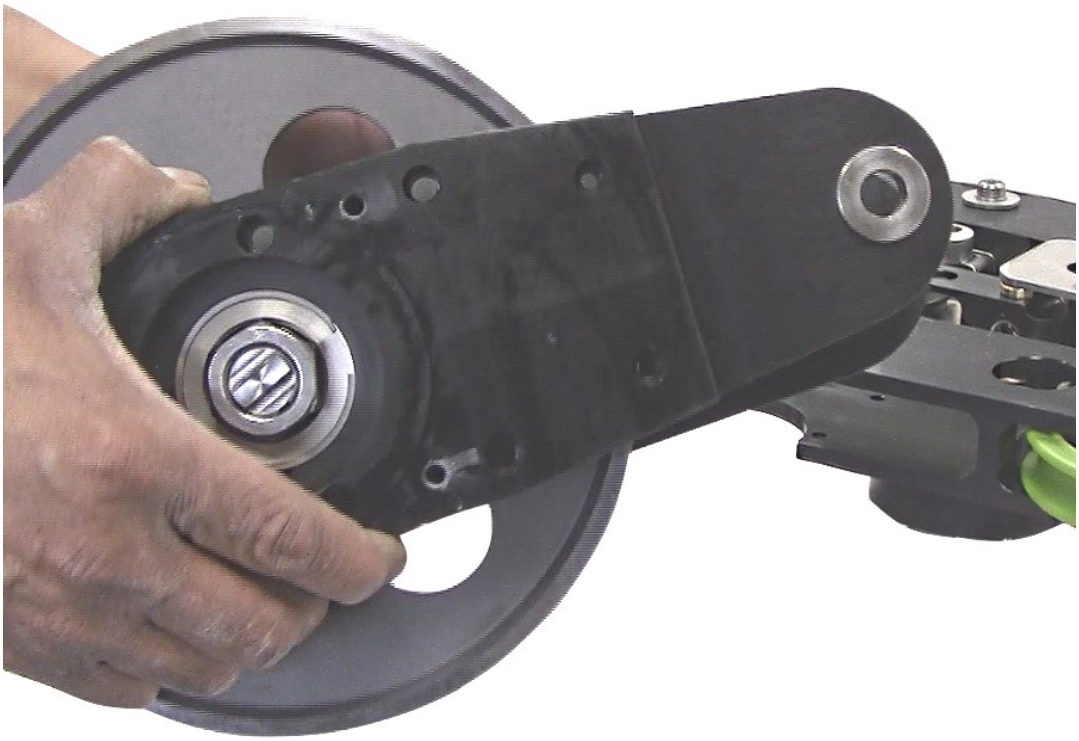
Turn the head over and remove the wear block screws and the wear blocks. They are identical to the one previously removed.

Now remove the screws from this side plate.



4.8 MEASURING WHEEL REPLACEMENT continued

Now holding all the pieces together turn the machine back over again and remove the remaining four screws from the side plate that were left loose previously. Slide the wheel with the attached side plates off of the frame.



4.8 MEASURING WHEEL REPLACEMENT continued

The wheel is on a shaft that goes through both side plates. Take the loosened nut off the shaft. Note that the flat side of the nut goes down.

4.8 MEASURING WHEEL REPLACEMENT continued

Slide this side plate off the shaft. Each side plate houses a bearing that the shaft and wheel run on. The flanges on each side of the wheel are different from each other.

4.8 MEASURING WHEEL REPLACEMENT continued

Now lift the wheel off the shaft by pulling up on the wheel edges and pressing down on the shaft.

4.8 MEASURING WHEEL REPLACEMENT continued

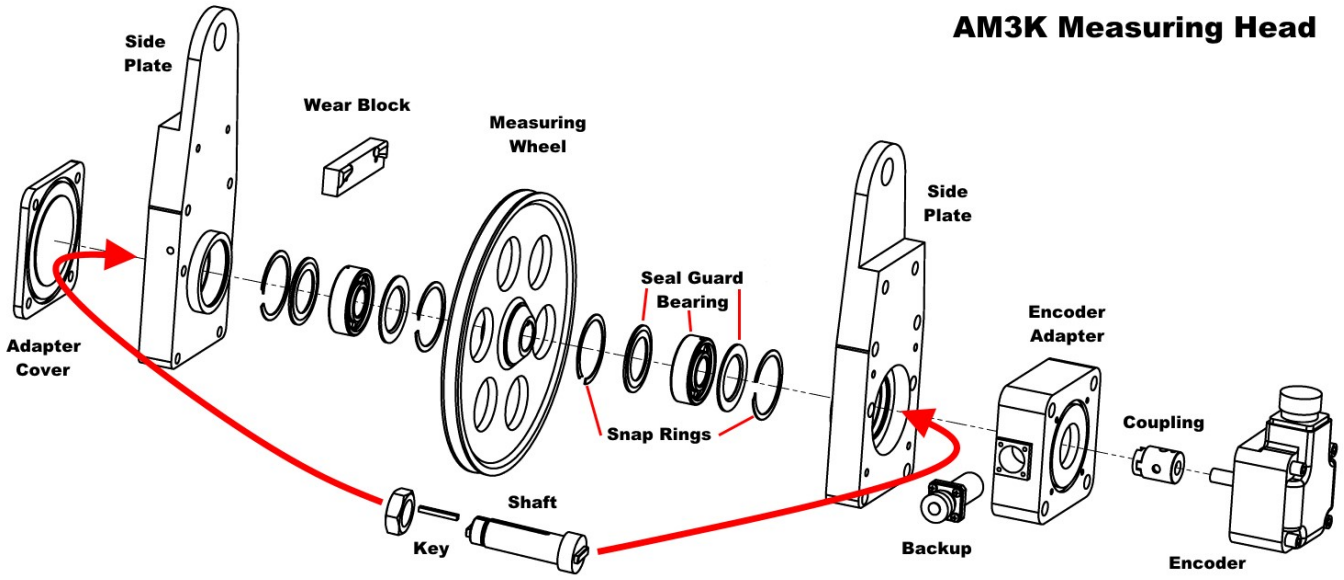
Notice that there is a key that keeps the wheel and shaft in place.

4.8 MEASURING WHEEL REPLACEMENT continued

Here are components of the shaft and side plates in order.

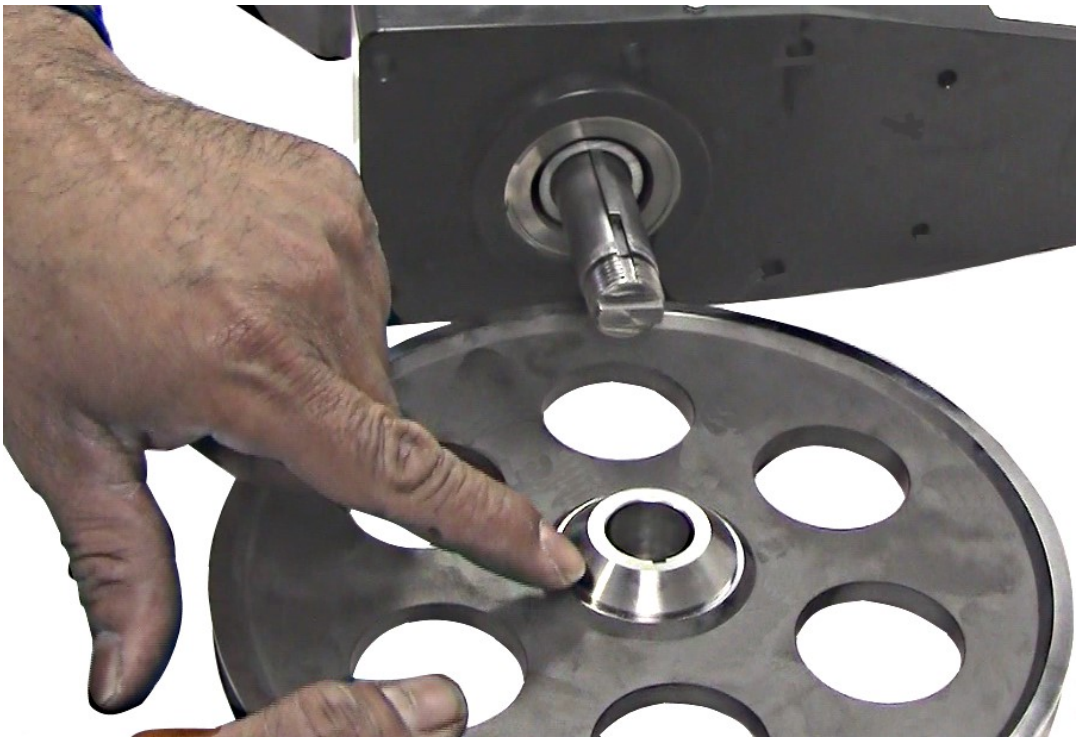
The replacement of the bearings in the two side plates is not demonstrated here.

See section 4.10 for that process.



4.8 MEASURING WHEEL REPLACEMENT continued

To reassemble put the new wheel on the shaft as shown with the dome side of the wheel hub towards this side plate. Put the key in the keyway. Then put the wheel on the shaft matched up with the key.

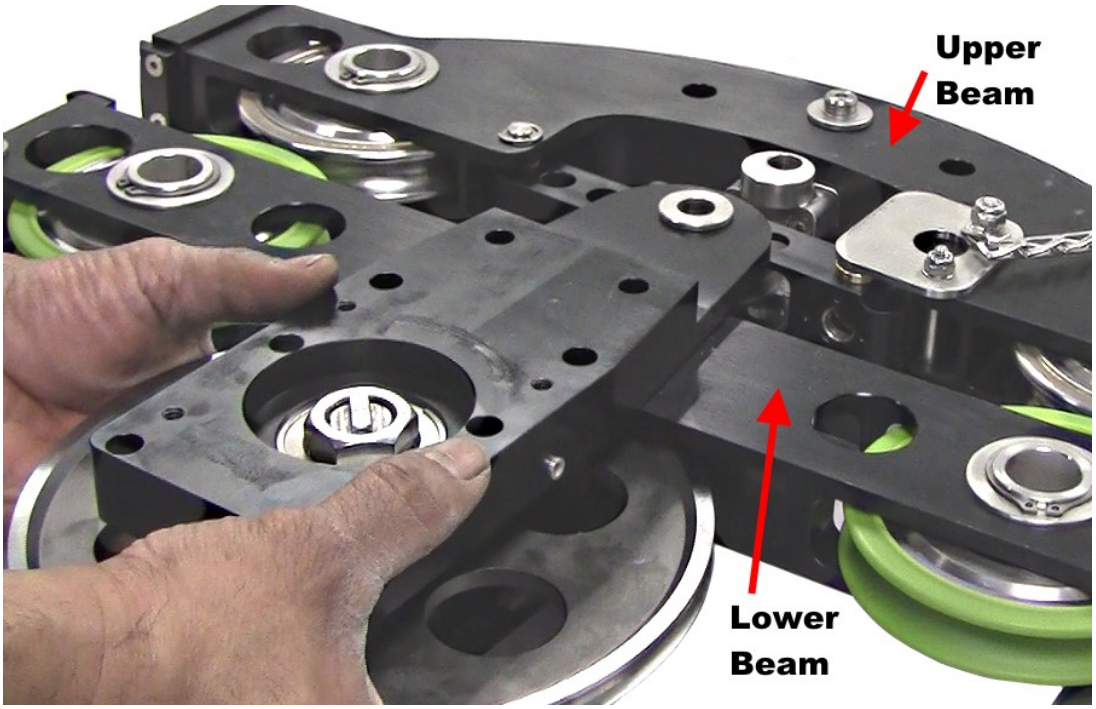


4.8 MEASURING WHEEL REPLACEMENT continued

Now slide the other side plate on the shaft.

Put locktite on the nut making sure that the flat side of the nut is down. Hand tighten the nut.

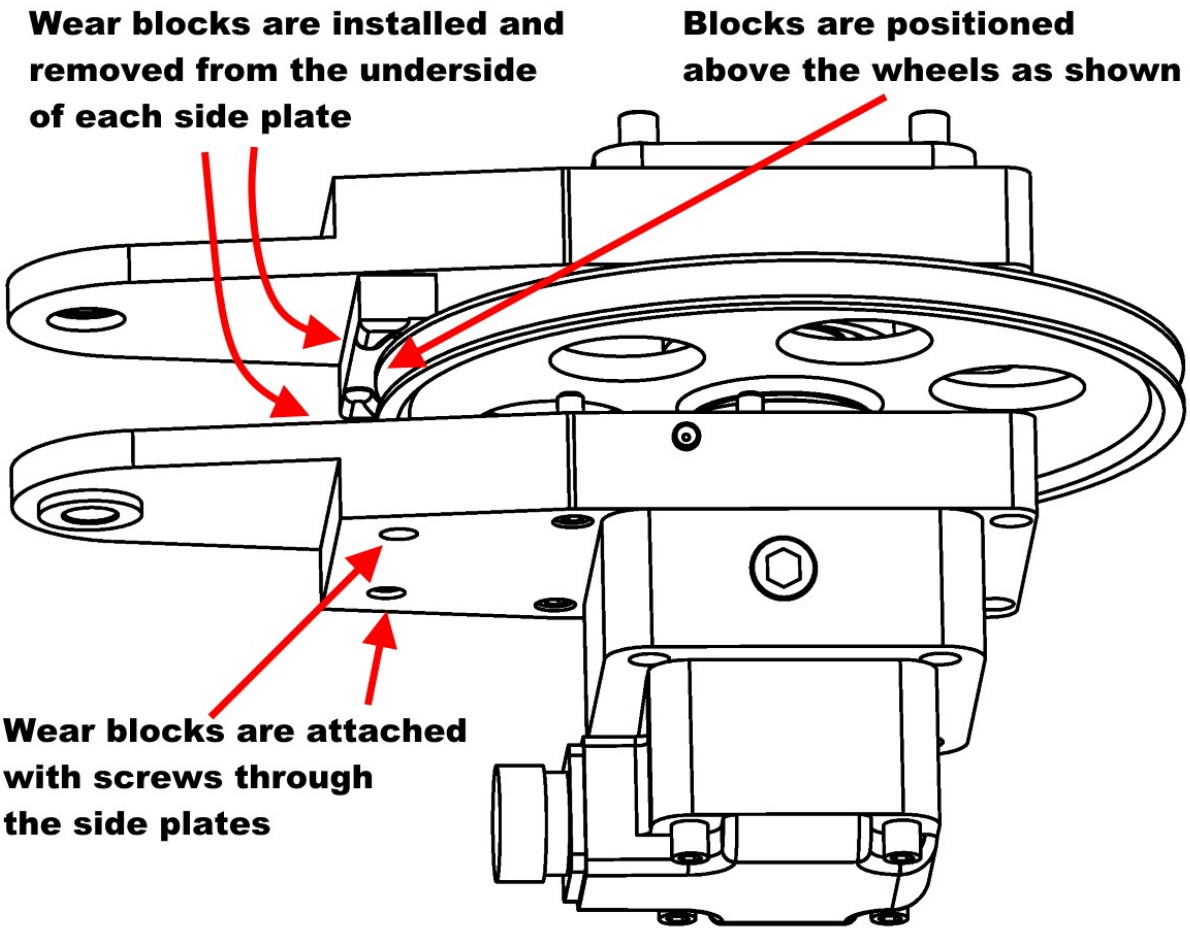
4.8 MEASURING WHEEL REPLACEMENT continued



Slide the side panel/wheel assembly with the nut side up, back onto the measuring head frame which should be positioned encoder side down.

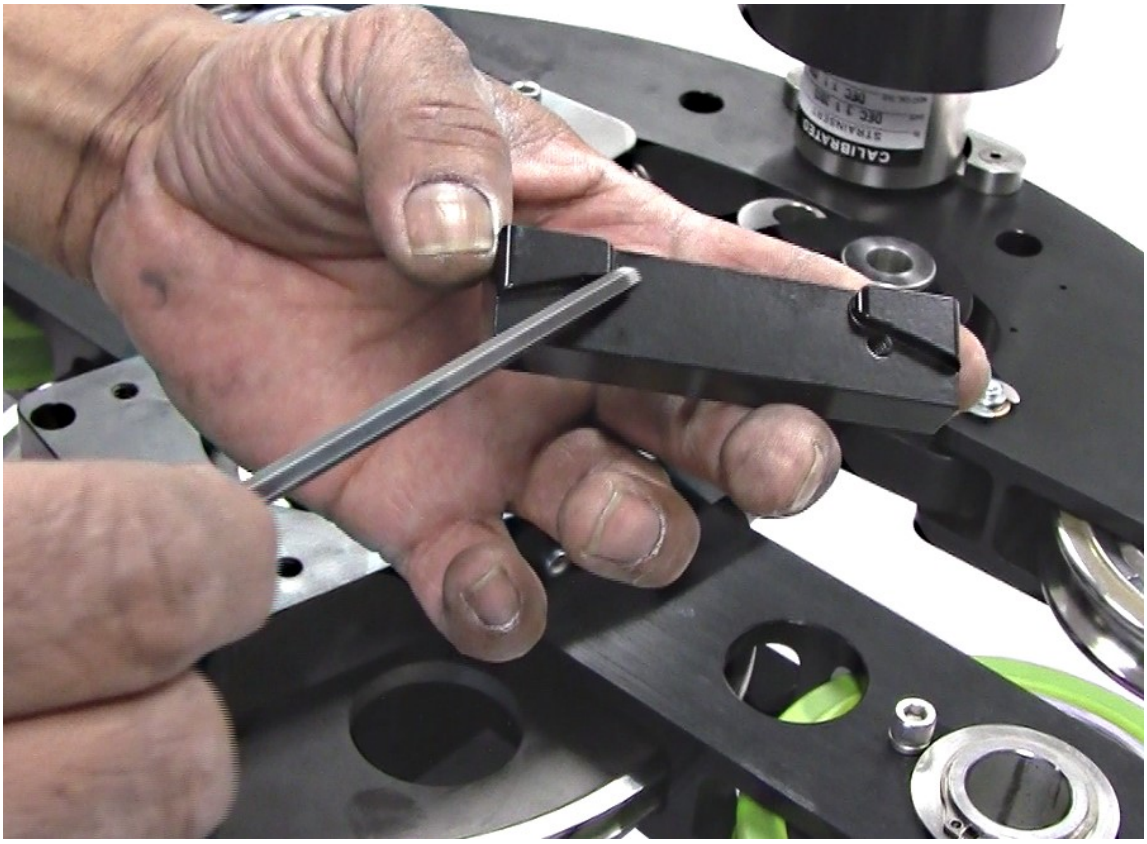
4.8 MEASURING WHEEL REPLACEMENT continued

AM3K



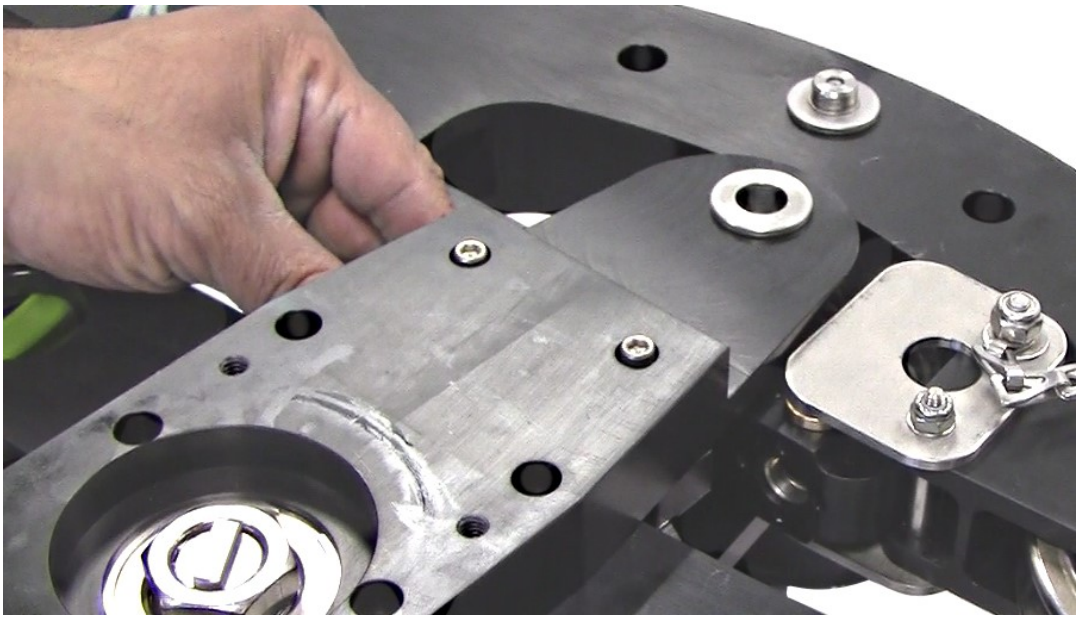
4.8 MEASURING WHEEL REPLACEMENT continued

Make sure the wear bars are positioned with the notches facing towards the top of the machine towards the load pin.



4.8 MEASURING WHEEL REPLACEMENT continued

Now screw the wear blocks in place and tighten firmly.

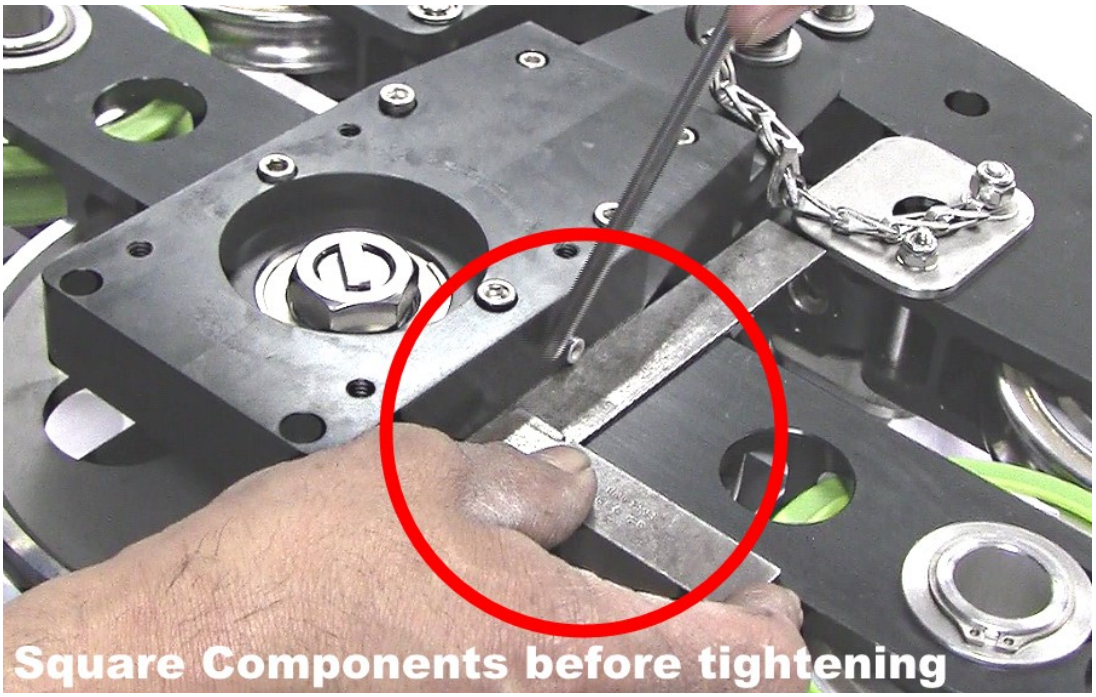


4.8 MEASURING WHEEL REPLACEMENT continued

Squeeze the two sides of the machine together and re-insert the quick release pin.

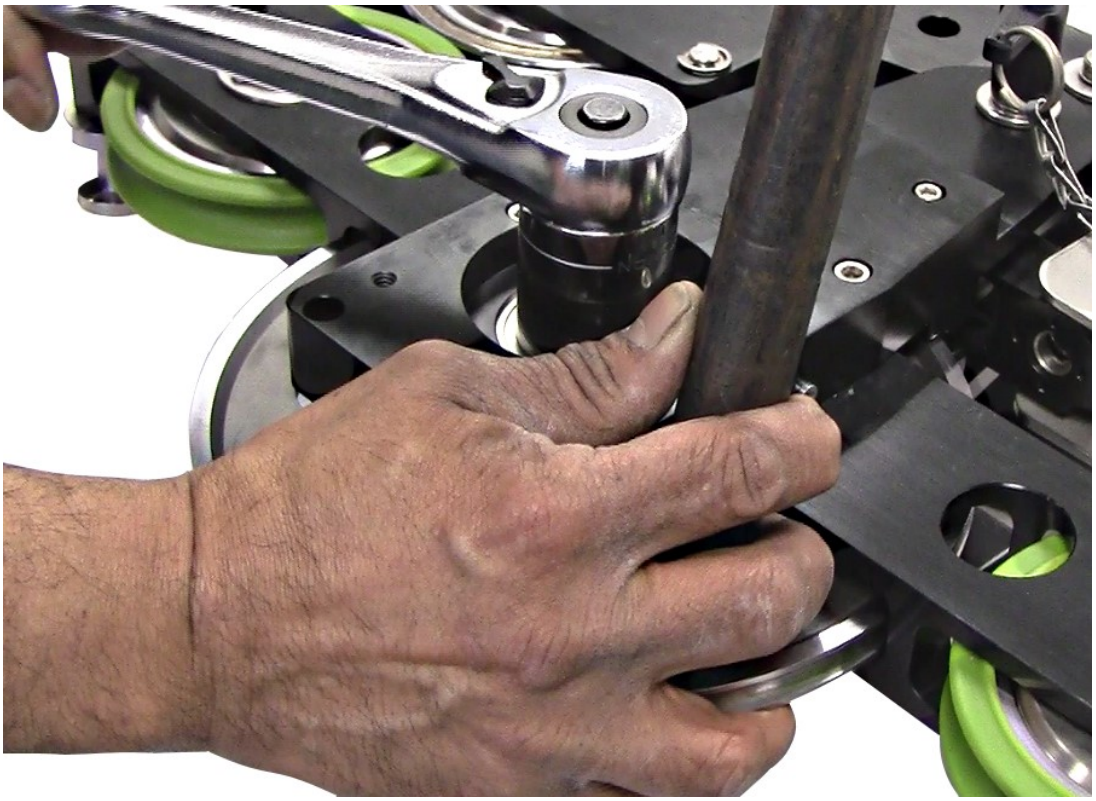
4.8 MEASURING WHEEL REPLACEMENT continued

Before tightening the components together, square up the machine as shown.



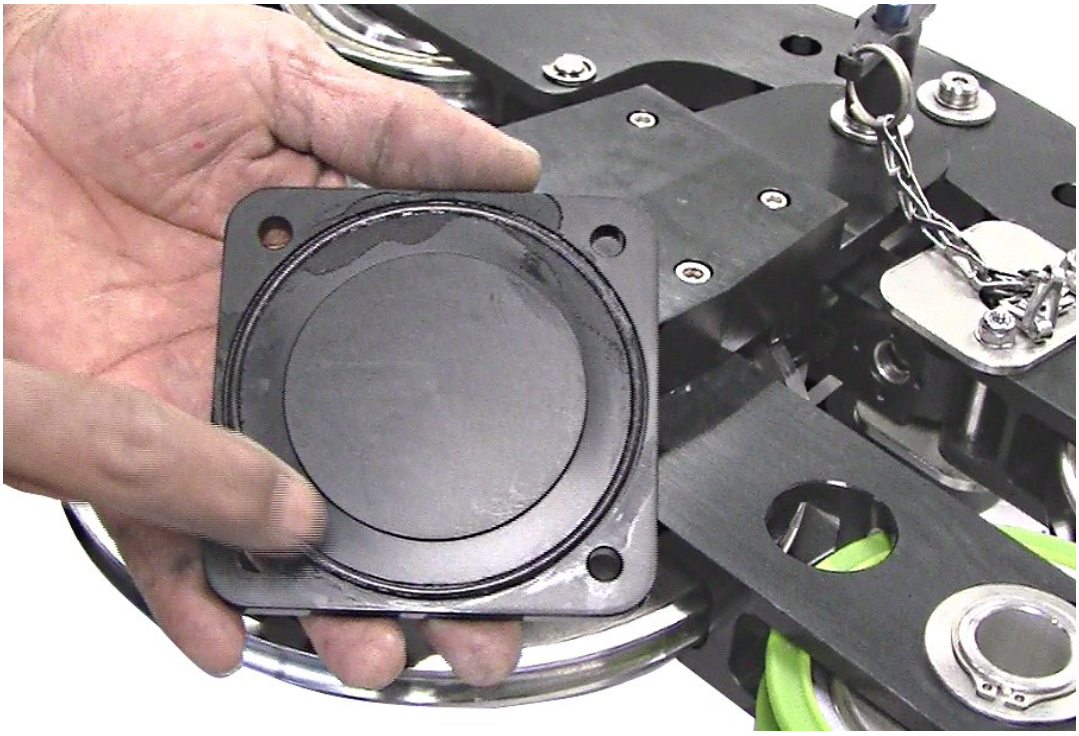
4.8 MEASURING WHEEL REPLACEMENT continued

Now put the dowel though one of the holes in the wheel and this time rotate the wheel in the other direction until the dowel buts up against the opposite side of the frame. Firmly tighten the nut.



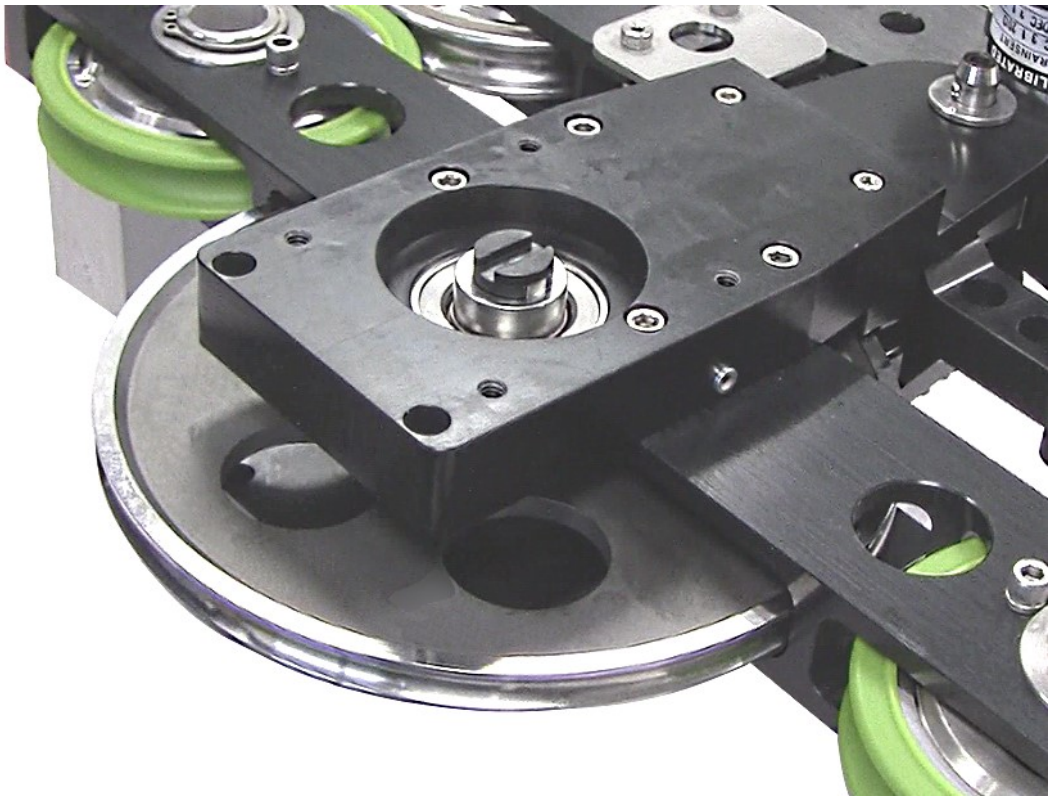
4.8 MEASURING WHEEL REPLACEMENT continued

Verify that the seal on this side plate is in good condition or replace it. Then reinstall it and screw it firmly in place.



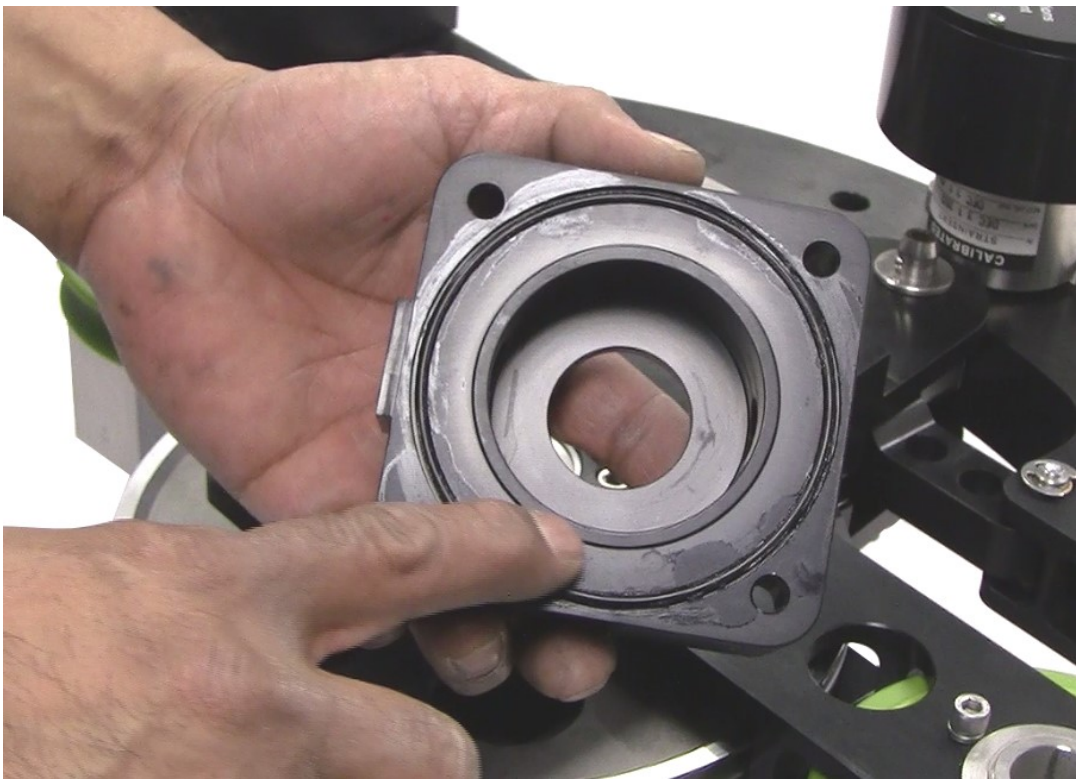
4.8 MEASURING WHEEL REPLACEMENT continued

Now flip the machine over with the encoder side up.



4.8 MEASURING WHEEL REPLACEMENT continued

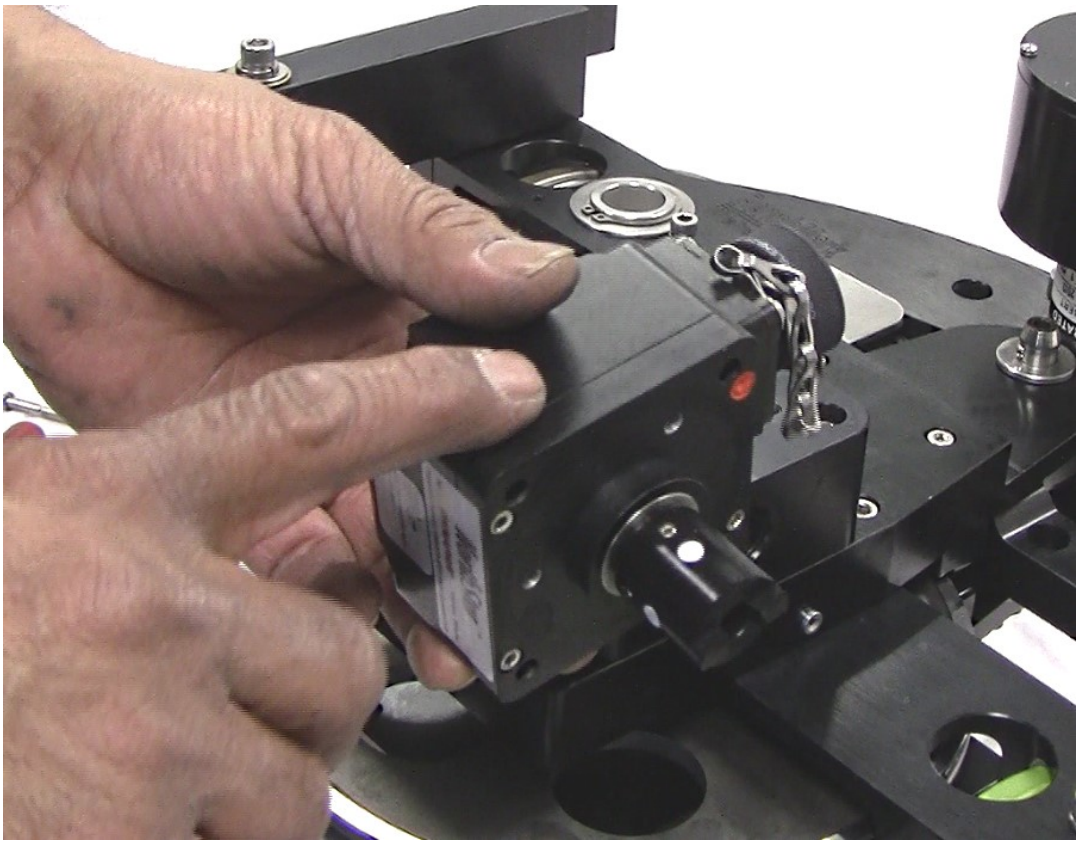
Verify that both seals on the encoder adapter are in good condition or replace them. Then reinstall it with the larger center hole down. While looking at the load pin, make sure that the backup is on the left and the plug on the right side of the adapter. Insert the 4 screws firmly them.



4.8 MEASURING WHEEL REPLACEMENT continued

If you are using the same encoder, visually align the plastic encoder coupler on the shaft with the coupling on the encoder. Gently drop the encoder into the adapter body. While looking in the plug hole, rotate the wheel until you're sure the encoder and the shaft are connected.

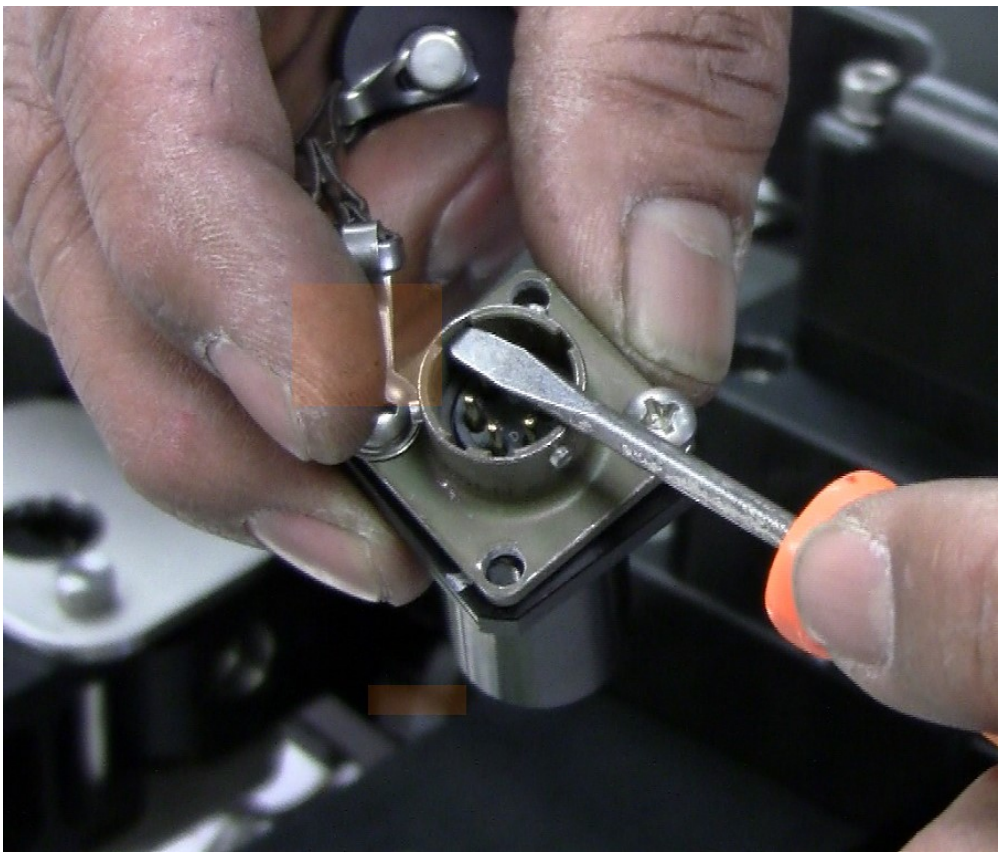
If you're using a new encoder, refer to 4.7 for the process of adding a new coupling stack on the encoder and then use this installation process.



4.8 MEASURING WHEEL REPLACEMENT continued

The pickup must be properly oriented to work correctly. The slot should be oriented to the top. The top side is the encoder side. Ensure that an o-ring is inserted between the plastic housing and the mount. An additional o-ring is used between the connector and the housing to keep moisture out.

If the backup display is counting backward (i.e. counting negative when going downhole), simply rotate the pickup 180 degrees to change the direction.



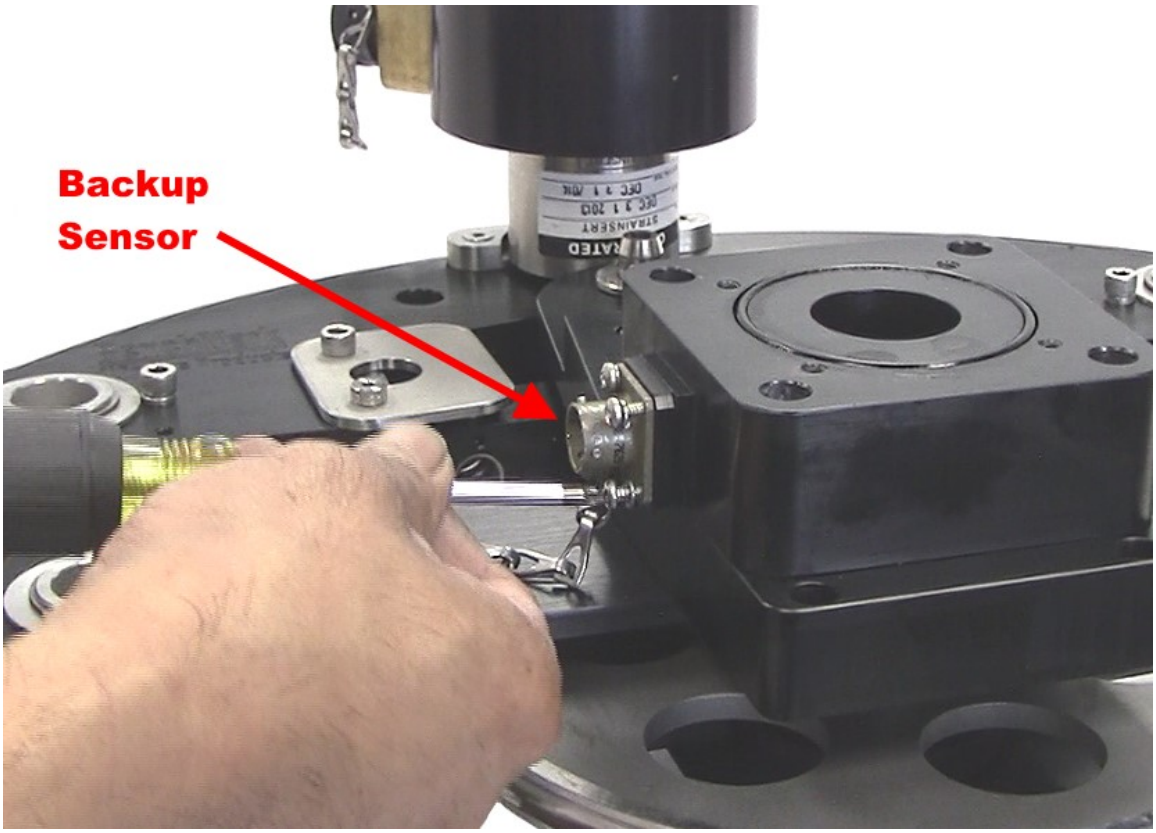
4.8 MEASURING WHEEL REPLACEMENT continued

Replace the plug in the encoder adapter. Use Teflon tread tape and tighten the plug firmly.

4.9 BACKUP DEPTH SENSOR REMOVAL & INSTALLATION

The backup depth magnetic sensor is mounted to the encoder adapter. It is held in place by four screws. Remove the screws and the pickup can then be removed.

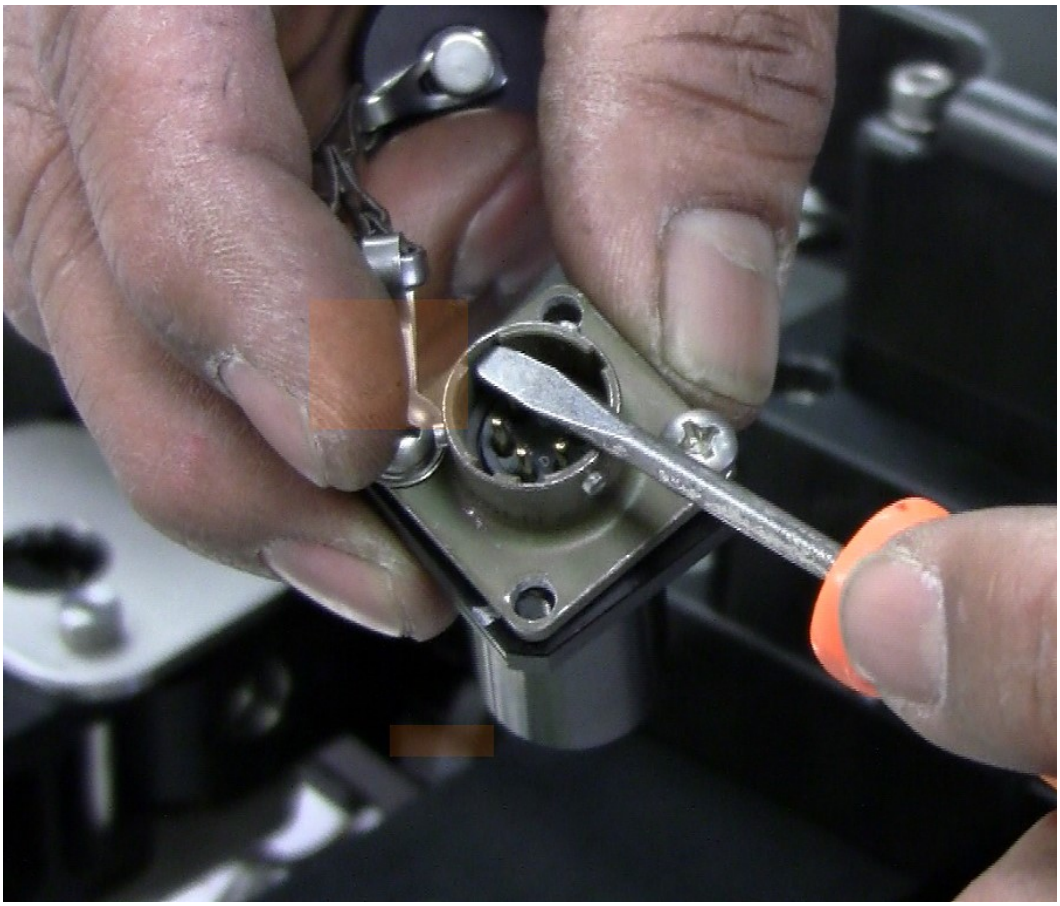
There is no need to remove the encoder if you're just replacing the backup.



4.9 BACKUP DEPTH SENSOR REMOVAL AND INSTALLATION continued

The pickup must be properly oriented to work correctly. The slot should be oriented to the top. The top side is the encoder side. Ensure that an o-ring is inserted between the plastic housing and the mount. An additional o-ring is used between the connector and the housing to keep moisture out.

If the backup display is counting backward (i.e. counting negative when going downhole), simply rotate the pickup 180 degrees to change the direction.



4.10 BEARING REPLACEMENT

The process of changing bearings on wheels in the AM3K is very similar.

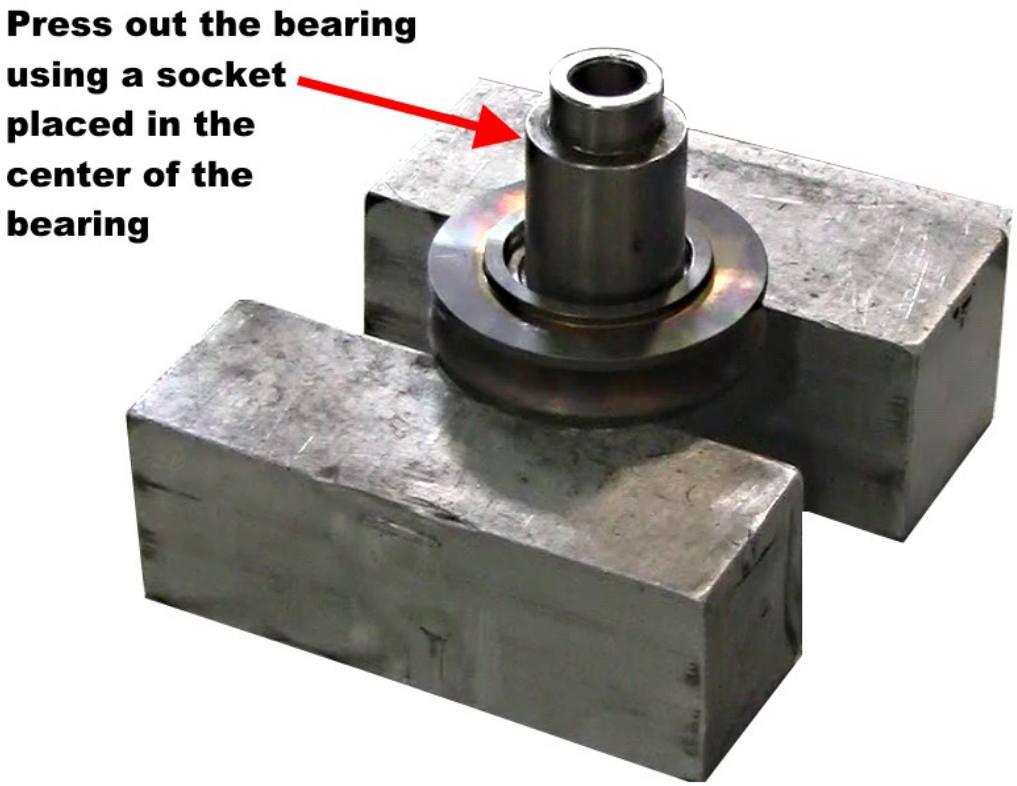
First remove the snap ring.
Next remove the seal guard.

Then turn the bearing over and remove the snap ring and seal guard on that side also.

4.10 BEARING REPLACEMENT continued

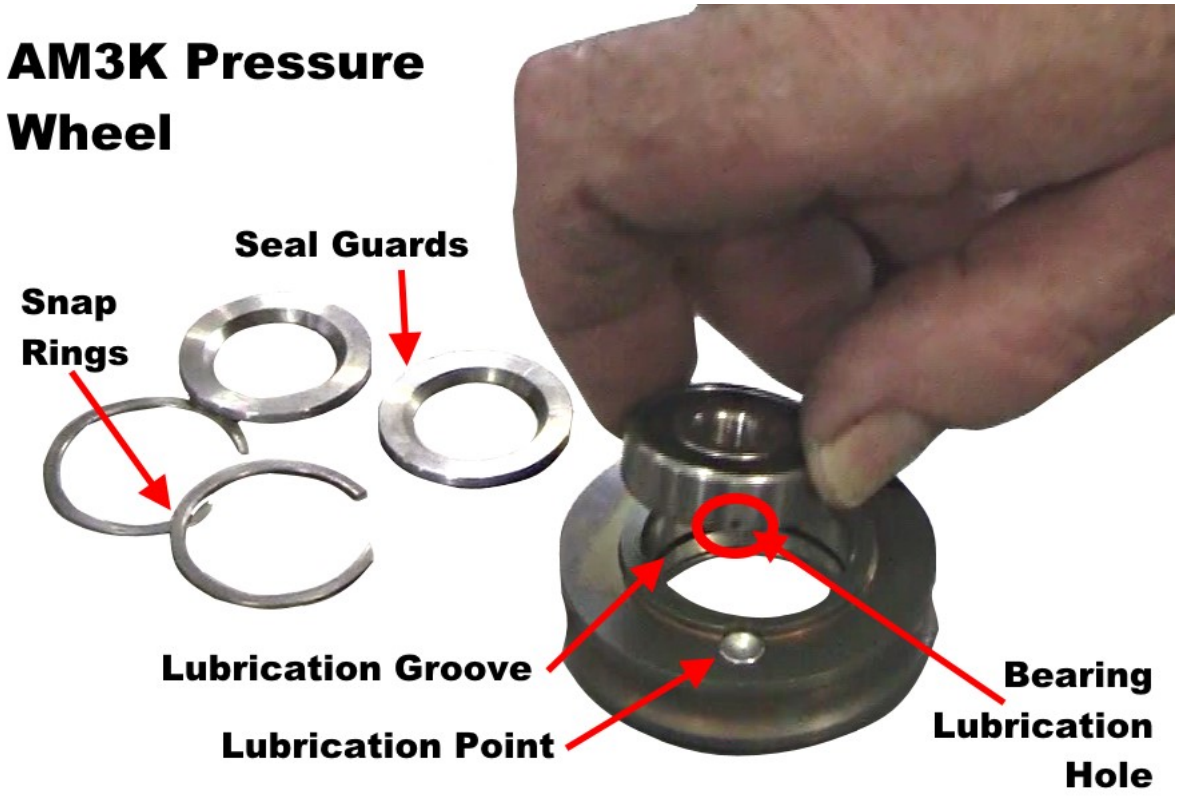
You will now press the bearing out of the wheel.
Set up the press where the wheel is resting between two blocks with space below for the bearing can be pressed out the bottom of the wheel.

Place a socket or other fixture that can be pressed on to push the bearing out of the wheel without pressing directly on the wheel.



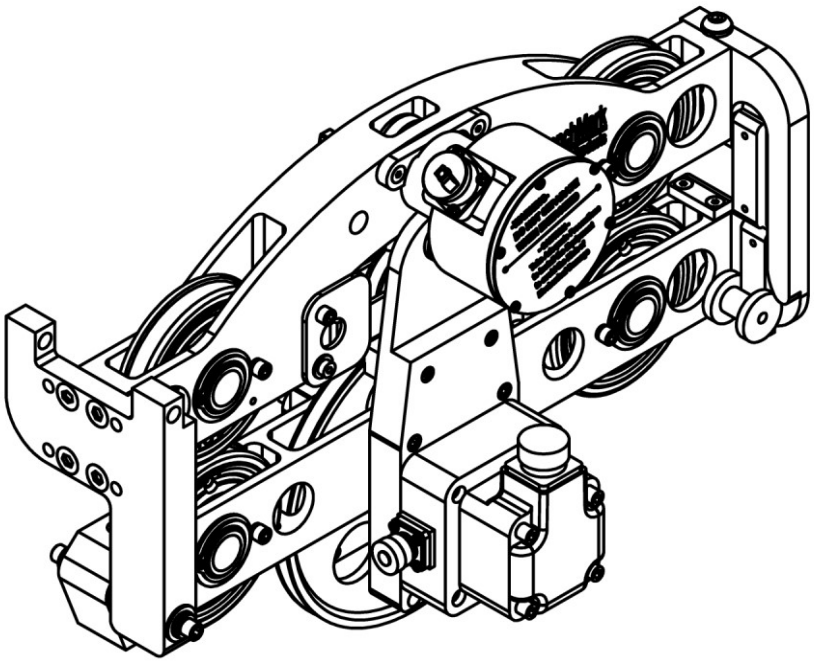
4.10 BEARING REPLACEMENT continued

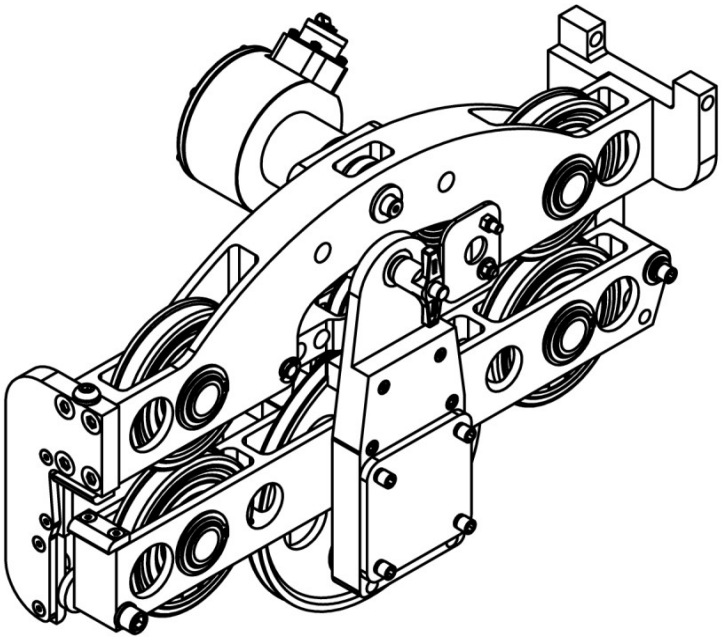
You will now press the new bearing into the wheel.
There is a small lubrication hole on the outside bearing race.
The wheel has a lubrication point.
Inside the wheel there is a groove cut that distributes lubricant from the lubrication point into the bearing through the small hole.
Make sure to have wheel oriented as shown and the bearing with the small lubrication hole on the bottom edge.
Press the bearing into the wheels.
You'll know when the bearing is pressed deep enough in the wheel when the seal guards and snap rings fit snuggly on both the top and bottom of the wheel.



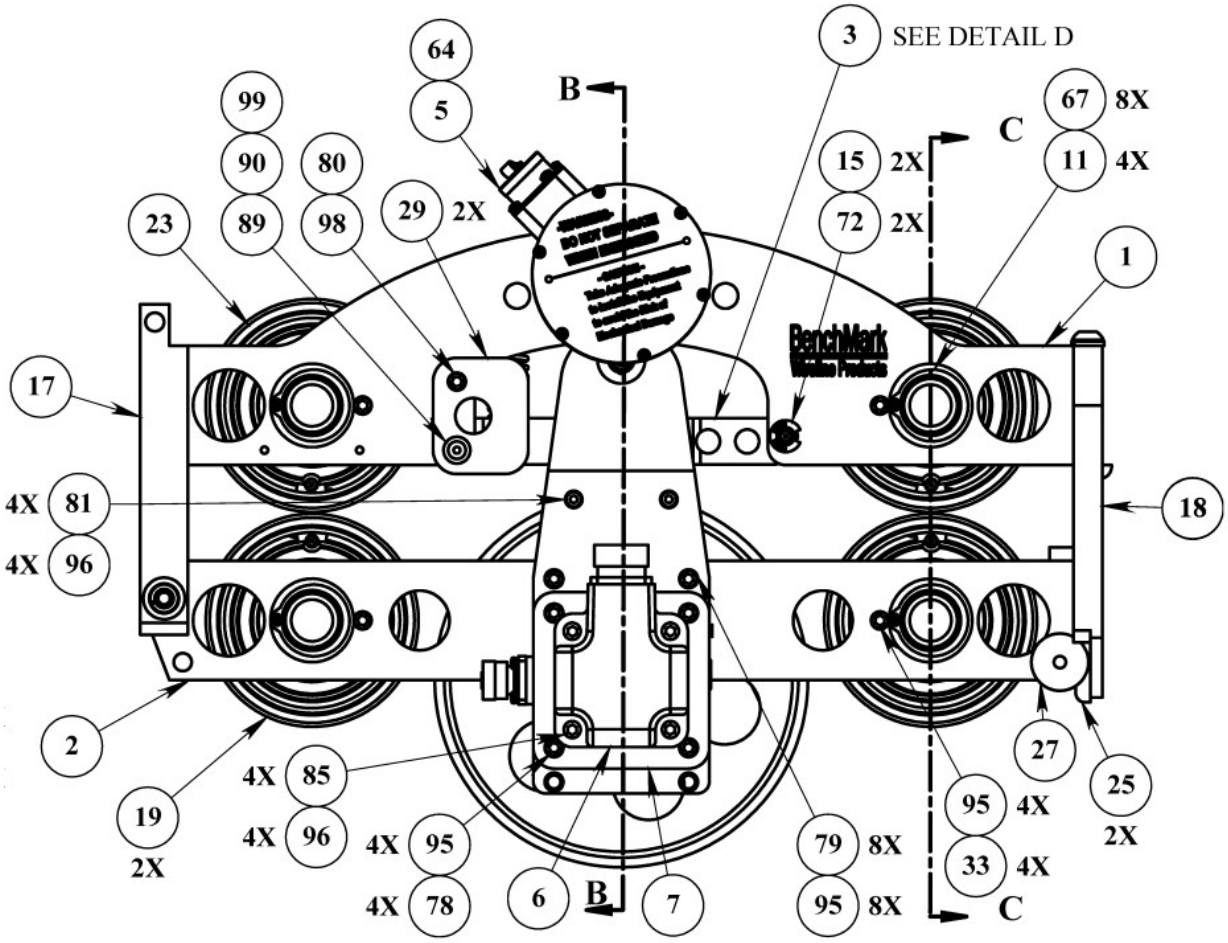
5.0 DRAWINGS

5.1 AM3K DRAWINGS – 3D VIEW

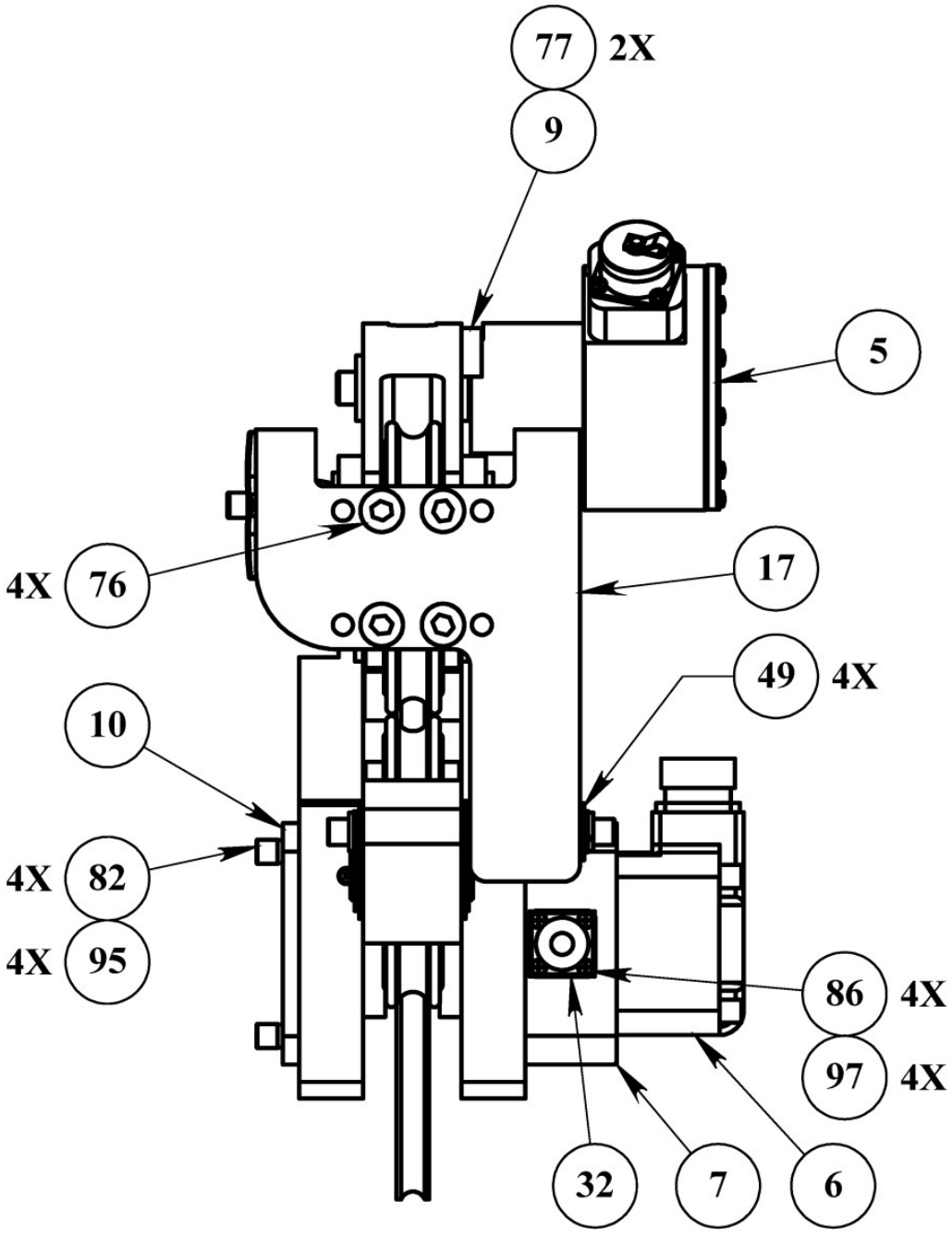




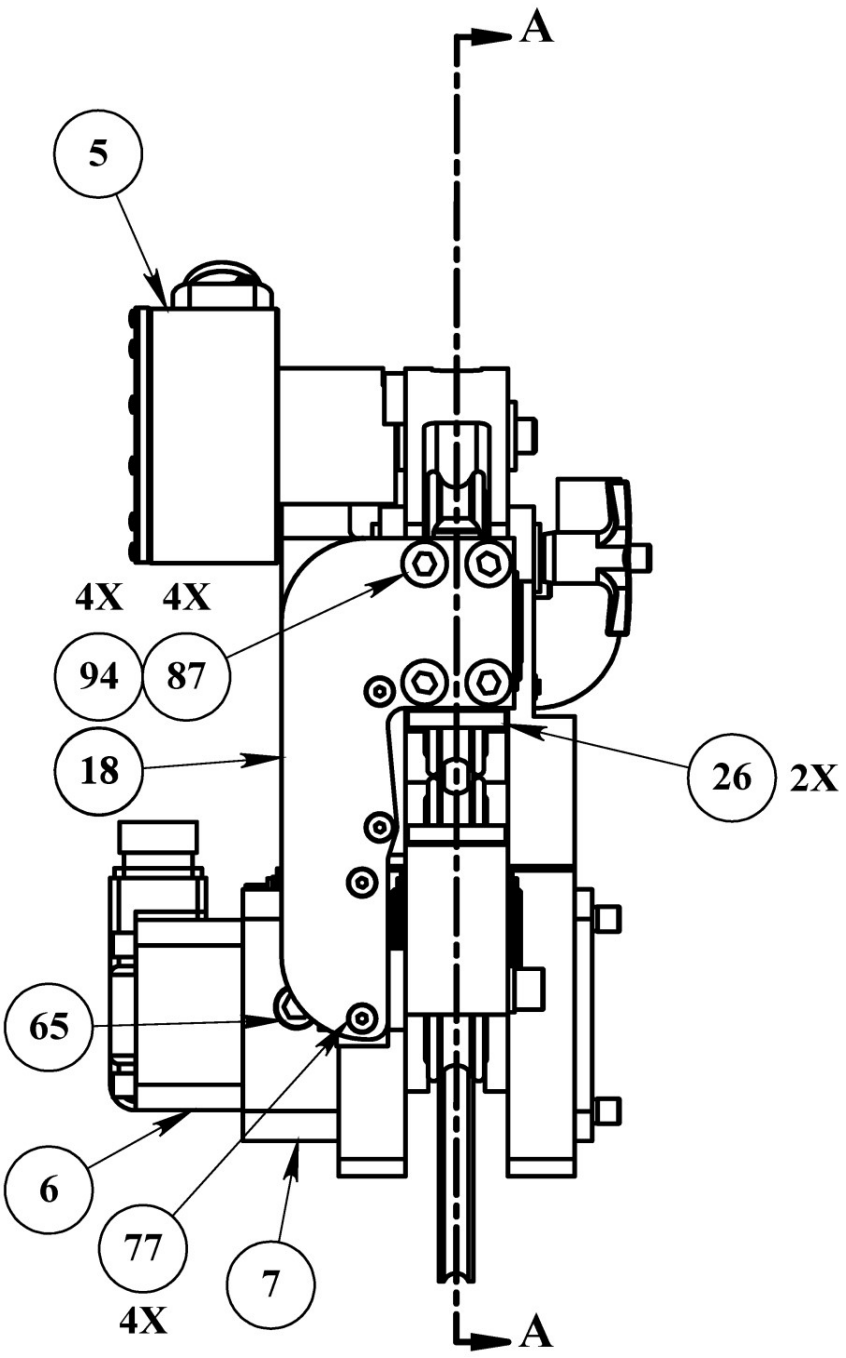
5.1 AM3K DRAWINGS – SIDE VIEW



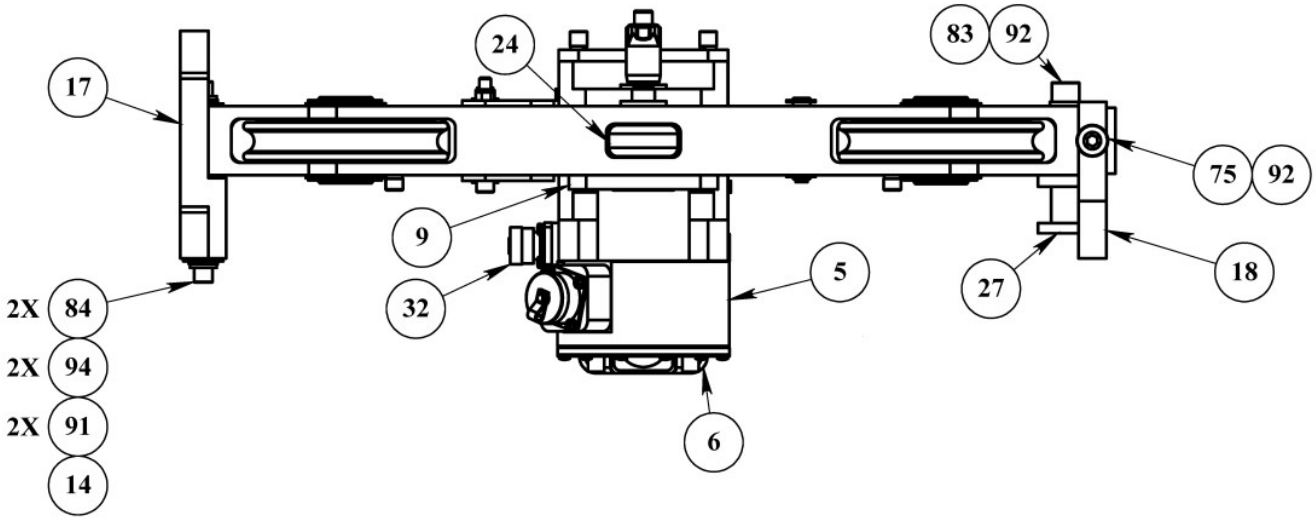
5.1 AM3K DRAWINGS - DRUM END VIEW



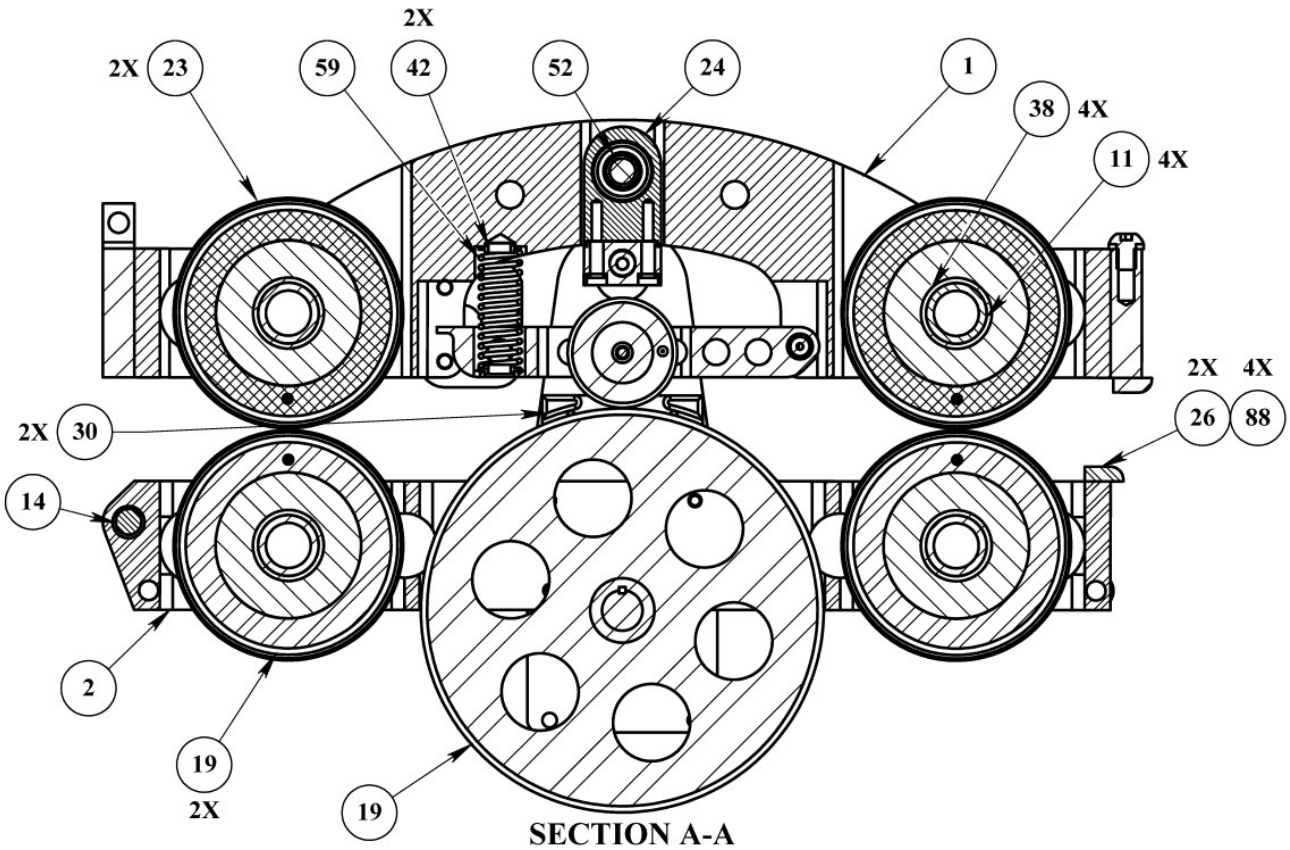
5.1 AM3K DRAWINGS - WELL END VIEW



5.1 AM3K DRAWINGS - VIEW TOP VIEW

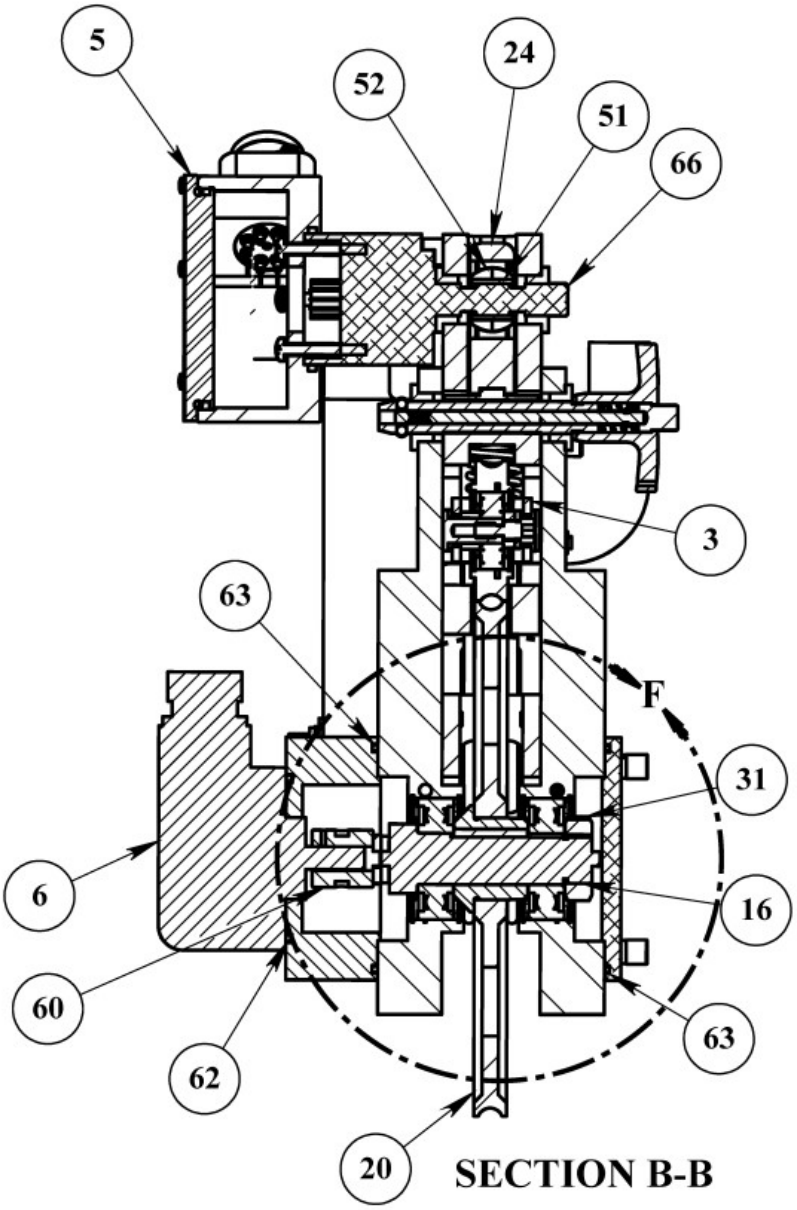


5.1 AM3K DRAWINGS - SECTION A



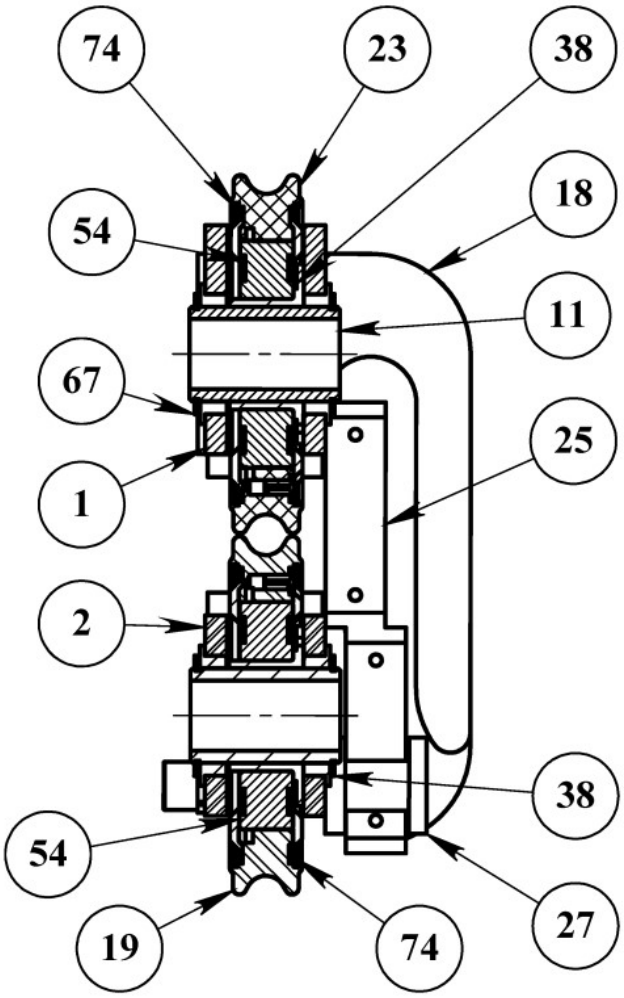
SECTION A-A

5.1 AM3K DRAWINGS - SECTION B



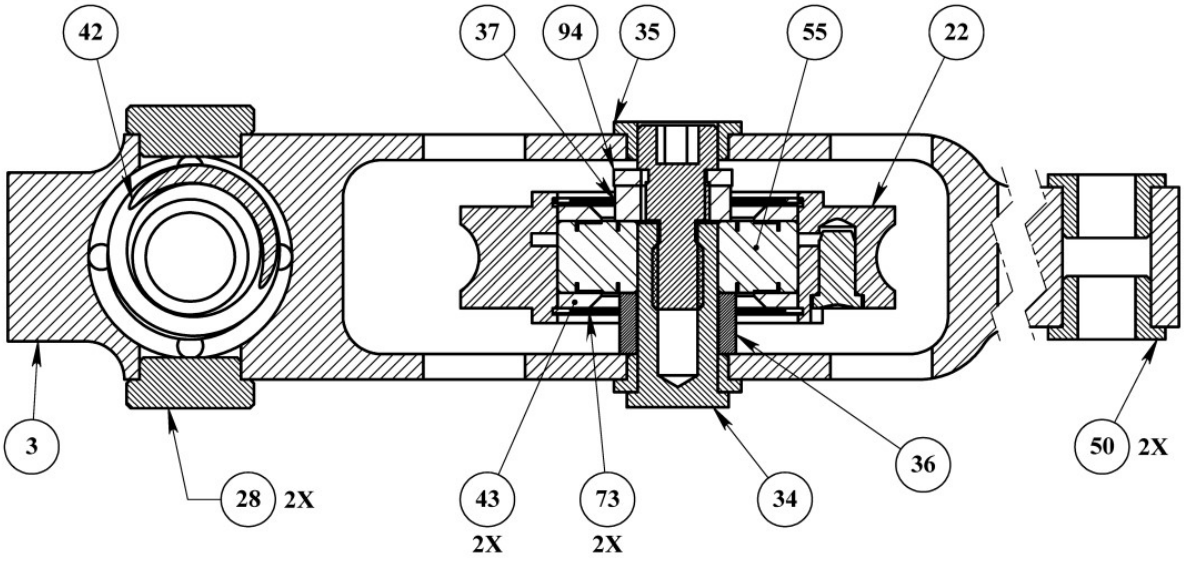
SECTION B-B

5.1 AM3K DRAWINGS - SECTION C



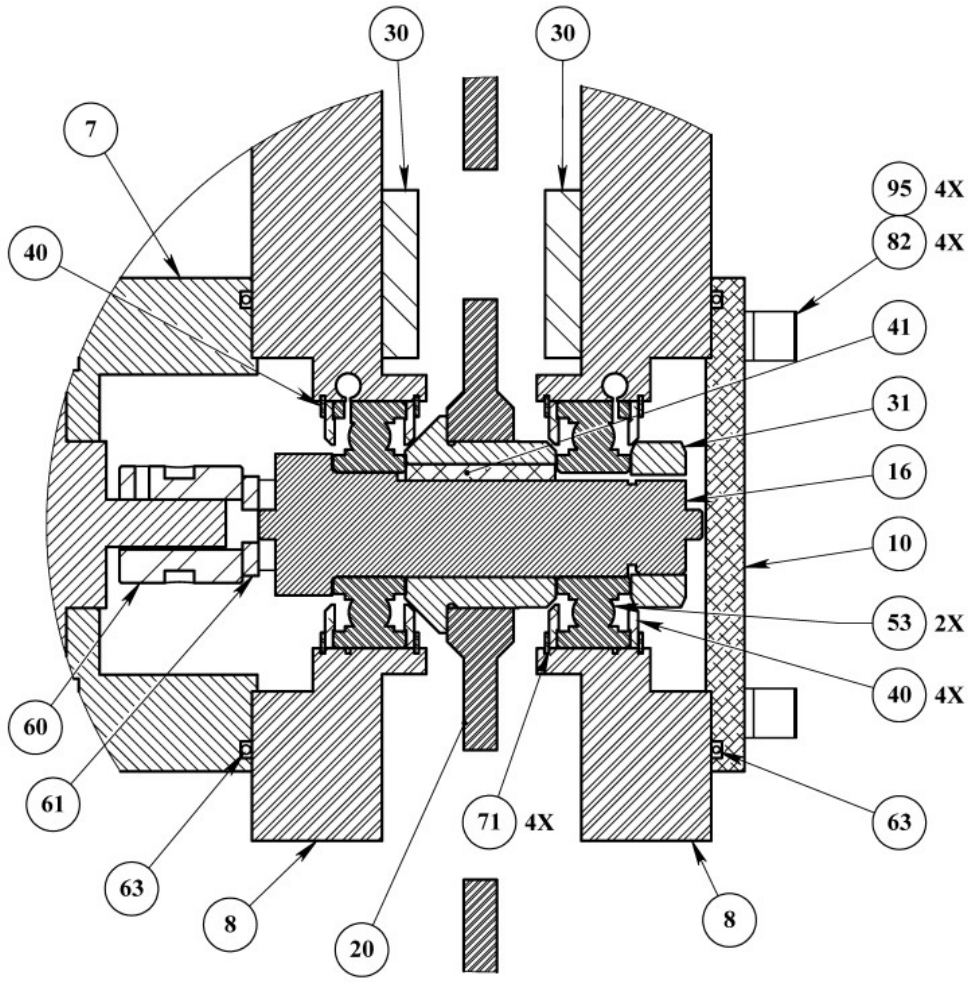
SECTION C-C

5.1 AM3K DRAWINGS - SECTION D



SECTION D-D

5.1 AM3K DRAWINGS - SECTION F



SECTION F-F

6.0 PARTS LISTS & BILL OF MATERIALS

6.1 AM3K BILL OF MATERIALS

ITEM	P/N	DESCRIPTION	QTY	REF
Base	AM3KA500	DEVICE CABLE MSRMT 2FT CRCMFRN		
1	AM3KA131	FRAME ASSY UPPER 3 WHEEL	1	
2	AM3KA132	FRAME ASSY LOWER 3 WHEEL GEN 2	1	
3	AM3KA148	ASSY PIVOT PRESS WHEEL W/GIDE	1	
4	AM3KA242	KIT MOUNTING AM3K OVERHEAD ARM	0	OPTION
4	AM3KA241	KIT MOUNTING AM3K OVERHEAD ARM	0	OPTION
4	AM3KA240	KIT MOUNTING AM3K FLOOR	0	OPTION
5	AMTKA022	ASSY LOAD AXLE 0-1.5V 1/2 DIA	0	OPTION
6	AMSLP061	ENCODER S25HA-37F-1200-ABZC-69	0	OPTION
6	AM3KP161	ENCODER S25-HA-37F-SS-120-AB	0	OPTION
7	AM3KM040	ADAPTER ENCODER H25D/H20 MAG	1	
7	AM5KM057	ADAPTER ENCODER H37C/H25D	0	OPTION
8	AM3KA121	PLATE SIDE ASSY W/PRESSURE WHL	0	OBSOLETE
8	AM3KA221	PLATE SIDE ASSY W/PRESSURE WHL	2	
9	AM3KM135	PLATE ORIENTATION LOAD PIN	1	
10	AM5KM058	COVER ENCODER ADAPTER	1	
11	AM5KM011	SHAFT TENSION ROLLER 30MM SST	4	
14	AM5KM023	SHAFT PIVOT HORIZONTAL 1/2 SST	1	
15	AM3KM023	SHAFT PIVOT PRESS ROLR 3/8 SST	1	
16	AM3KM214	SHAFT WHEEL GROOVED MSRG	1	
17	AM3KA125	MOUNT ASSY PIVOT W/TIEDOWN 3K	1	
18	AM3KM156	GUIDE REAR 3 WHEEL	1	
19	AM5KA137	ASSY WHEEL GUIDE PLAS 35MM BRG	0	OBSOLETE
19	AM5KA247	ASSY WHEEL TENSN FIXD 35MM BRG	2	
20	AM3KA110	WHEEL MEASURING 2' GRV W/AXLE	0	OBSOLETE
20	AM3KK310	WHEEL MEASURING 2' 3/8 GRV KEY	1	
22	AM3KA187	ROLLER ASSY PRS 3/8 GR *OBS	0	OBS - USE AM3KA195
22	AM3KA195	ROLLER ASSY PRS 3/8 GROOVE	1	
23	AM5KA164	ASSY WHEEL TENSN FIXD 35MM BRG	0	OBSOLETE
23	AM5KA364	ASSY WHEEL GUIDE PLAS 35MM BRG	2	
24	AM3KA336	LINK ASSY LP W/SPHER BRG ADJ	1	OLD AM3KA236
25	AM3KM234	BLOCK WEAR 0.75 X 2.50 TOOLSTL	2	
26	AM3KM064	PLATE WEAR 3/8 X 3/4 X 1-1/2	2	
27	AM3KM154	SPOOL GUIDE REAR 3 WHEEL	1	
28	AM3KM153	BUTTON GUIDE PRESS WHL PIVOT	0	
29	AM3KM152	PLATE GUIDE PRESS WHL PIVOT	2	
30	AM3KM115	BLOCK WEAR 0.75 X 0.62 X 3.12	2	
31	AM3KM269	NUT 3/4-16 MOD SST	1	
32	AM5KA055	ASSY ENCODER BACKUP MAGNETIC	0	OPTION

6.1 AM3K BILL OF MATERIALS continued

ITEM	P/N	DESCRIPTION	QTY	REF
33	AM5KM084	SCREW ANTI-ROTATION TENS WHEEL	4	
34	AM3KM052	BOLT SHOULDER 10MM OD SST	1	
35	AM3KM053	BOLT SHOULDER 5/16 X 1/4 MOD	1	
36	AM3KM043	SPACER 10MMID X 0.57OD X 0.30W	1	
37	AM3KM044	SPACER .31ID X 0.57OD X 0.175W	1	
38	AM5KM155	BUSHING 35MM BRG W/ANTI-ROTATN	0	
39	AM5KM039	SPACER 20MMID X 1.00OD X .197W	0	
40	AM3KM204	RING SEAL RETAINER 20MM M WHL	4	
41	AM5KP128	KEY 1/8 SQUARE SST	1.125 inch	
42	AM3KM049	GUIDE SPRING PRESS WHEEL 3 WHL	2	
43	AM3KM196	RING SEAL RETAINER 10MM P WHL	0	REF
49	AM5KP019	BEARING BRZ FLANGED 1/2" ID	0	
50	AM3KP009	BEARING BRZ FLANGED 3/8" ID	0	
51	AM3KP032	BEARING BRZ .50ID X .625OD X	0	LOAD PIN LINK BRG
52	AM3KP039	BEARING SPHERICAL 5/8" ID	0	LOAD PIN LINK
53	AMS1P003	BEARING BALL 20MM ID MOD	2	
54	AM5KM157	BEARING BALL 35MM ID MOD	0	REF
55	AM3KM002	BEARING BALL 10MM ID MOD	0	REF
57	AM5KP075	CHAIN SASH #35 SST	6 inch	
58	AMS1P009	PIN QUICK REL 1/2 OD X 2-1/2	1	
59	AM3KP014	SPRING COMP 3-1/8 OAL 3/4 DIA	1	
60	AM3KM050	COUPLING ENCDR W/BKUP MAGNETS	0	OPTION
61	AMS1P090	COUPLING OLDHAM ENCODER	0	
61	40109	INSERT CPLG OLDHAM BLK	1	
62	AM5KP071	O-RING 2-141 BUNA N H25 ENCDR	1	
63	AMS1P014	O-RING 2-152 BUNA N ENC ADPTR	2	
64	ACMU2P09	DUST CAP MS25043-18DA RECEPT	0	
65	AMS1P072	PLUG 3/8 NPT SS	1	
66	AM5KP033	RING RETNG EXT 0.500 SHAFT SST	1	
67	AM3KP018	RING RETNG EXT 1.188 SHAFT SST	8	
68	AM3KP017	RING RETNG EXT 0.781 SHAFT SST	0	REF
71	AMS1P006	RING RETNG INT UR187S	4	
72	AM3KP048	RING RETNG EXT 0.375 E-RING	2	
73	AM3KP015	RING RETNG INT UR-118S SST	0	
74	AM5KP168	RING RETNG INT 2.875 LT DUTY	0	OBSOLETE - WHLS W/O SEAL RTNRS
74	40037	RING RETNG INT UR-368S SPIROLX	0	WHLS W/SEAL RETAINERS

6.1 AM3K BILL OF MATERIALS continued

ITEM	P/N	DESCRIPTION	QTY	REF
75	AM5KP043	SCREW 3/8-16 X 1/2 BUTTON HD	1	
76	AM5KP038	SCREW 5/16-18 X 7/8 FH SOC SS	4	
77	AM5KP045	SCREW 10-24 X 1/2 FH SOC SST	6	
78	C276P031	SCREW 1/4-20 X 1-1/4 SOC HD SS	4	
79	AMSLP025	SCREW 1/4-20 X 1 SOC HD SST	8	
80	AMS1P049	SCREW 1/4-20 X 2-1/4 SOC HD SS	1	
81	AM3KP054	SCREW 10-24 X 1 SHCS SST	4	
82	AMS1P048	SCREW 1/4-20 X 3/4 SOC HD SST	4	
83	AMSLP060	SCREW 3/8-16 X 2-3/4 SOC HD SS	1	
84	AM3KP028	SCREW 5/16-18 X 1/2 SHCS SST	2	
85	AMS1P052	SCREW 10-24 X 5/8 SOC HD SST	4	
85	AMS1P053	SCREW 10-24 X 2 SHCS SST	4	
86	C276P331	SCREW 6-32 X 1/2 PHIL PAN SST	4	
87	AMS1P046	SCREW 5/16-18 X 1 SHCS SST	4	
88	AM3KP070	SCREW 10-24 X 5/8 FH SOC SST	4	
89	AM3KP066	BOLT SHOULDER 1/4 X 1-3/4 SST	1	
90	AMS1P054	WASHER #10 FLAT SS	1	
91	C276P039	WASHER 5/16 FLAT SST	2	
92	AMS1P058	WASHER 3/8 LOCK SS	2	
94	AMS1P047	WASHER 5/16 LOCK SS	7	
95	AM5KP144	WASHER 1/4 LOCK SS HIGH COLLAR	20	
96	C276P035	WASHER #10 LOCK SS	8	
97	C276P046	WASHER #6 LOCK SS	4	
98	AM5KP048	NUT 1/4-20 ELASTIC STOP SST	1	
99	AM3KP059	NUT 10-24 ELASTIC STOP SST	1	
100	AM5KP130	NOZZLE GREASE FITTNG FLUSH	1	
102	AM5KM621	LABEL MEASURING HEAD	1	
103	C276P190	SCREW 2 X 3/16 U-DRIVE SST	4	

6.2 AM3K RECOMMENDED SPARE PARTS

It is recommended that the following parts be kept on hand in the indicated quantities **QTY**.

ITEM	P/N	DESCRIPTION	QTY
RECOMMENDED SPARE PARTS FOR ALL LOCATIONS			
22	AM3KA195	ROLLER ASSY PRS 3/8 GROOVE	1
32	AM5KA055	ASSY ENCODER BACKUP MAGNETIC	1
53	AMS1P003	BEARING BALL 20MM ID MOD	2
55	AM3KM002	BEARING BALL 10MM ID MOD	1
58	AMS1P009	PIN QUICK REL 1/2 OD X 2-1/2	1
60	AM3KM050	COUPLING ENCDR W/BKUP MAGNETS	1
61	40109	INSERT CPLG OLDHAM BLK	1
ADDITIONAL RECOMMENDED SPARE PARTS FOR REMOTE LOCATIONS			
19	AM5KA364	ASSY WHEEL TENSN FIXD 35MM BRG	2
20	AM3KA310	WHEEL MEASURING 2' 3/8 GRV KEY	1
23	AM5KA247	ASSY WHEEL GUIDE PLAS 35MM BRG	2

NOTE - ONLY STOCK THE LOAD AXLE AND ENCODER USED IN YOUR MEASURING HEAD. A COMPLETE LIST IS FOUND IN THE BILL OF MATERIALS

7.0 OPTIONS & ACCESSORIES

7.1 SHIPPING CASE AM3KP198

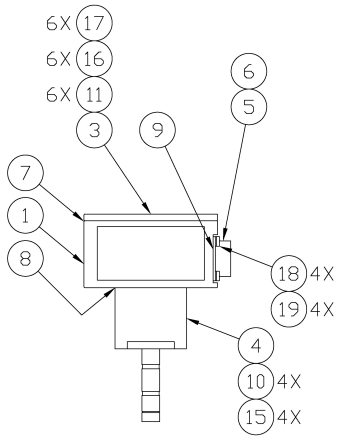
This case is designed to help easily and securely transport and store the measuring head.

CUSTOM FOAM LINED FOR AM3K
RETRACTABLE HANDLE
ROLLER WHEELS
OUTSIDE DIMENSIONS: 31.5L X 22.88W X 19.48

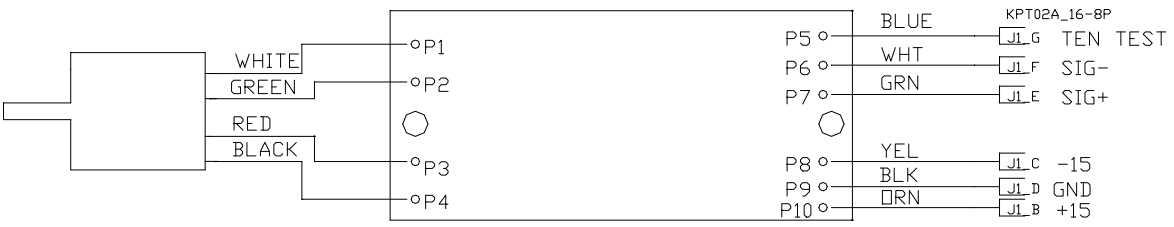
7.1 SHIPPING CASE AM3KP198 continued

7.2 LOAD PINS

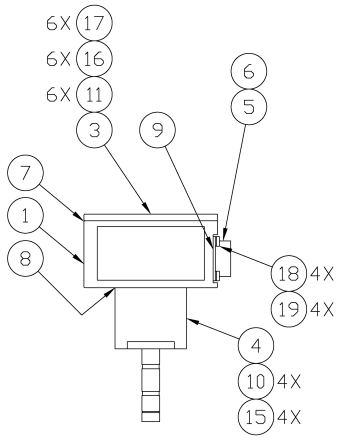
7.2.1 LOAD PIN - 1.5 V DIFFERENTIAL - AMTKA022



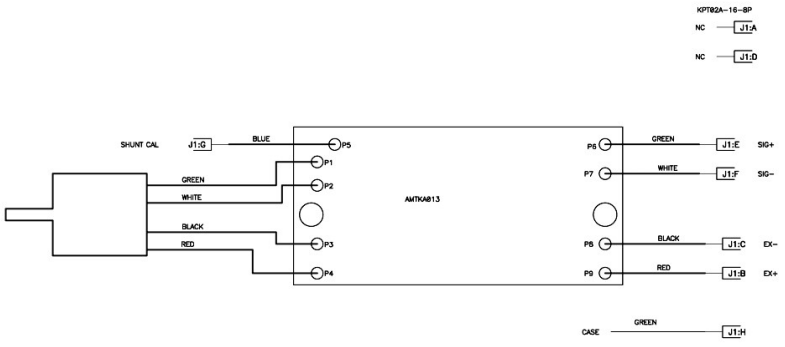
ITEM	P/N	DESCRIPTION	QTY
1	AMS8M010	HOUSING LOAD PIN AMS80	1
	AMTKA021B	PCB ASSY 0-1.5V DIFF LP AM3K AMPLIFIER	1
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 4 TERMINALS 10VDC EXC	1
7	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN SST	4
11	ALS6P032	SCREW 4-40 X 3/8 FH PHIL SST	6
	AM5KP228	STANDOFF 4-40 X 1/2 M/F HEX NYLON	2
15	C276P035	WASHER #10 LOCK SS	4
16	AMS8P036	WASHER #4 LOCK SST	10
17	AMS8P090	WASHER #4 FLAT SST	6
18	AM5KA320	KIT RFI FILTER TRAP 16 CONN	1



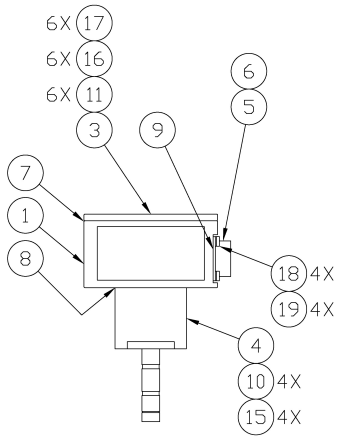
7.2.2 LOAD PIN – 2mV/V - AM3KA013



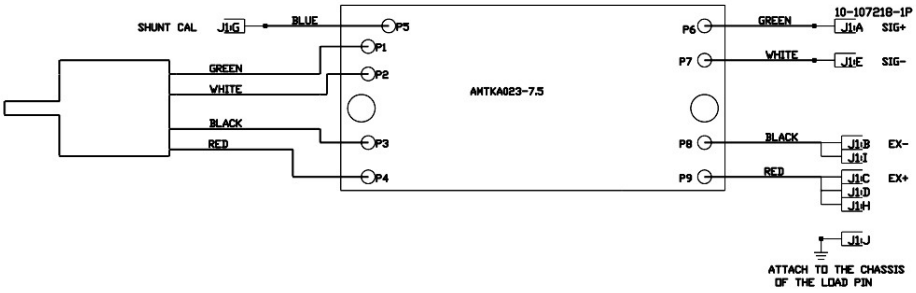
ITEM	P/N	DESCRIPTION	QTY
1	AMS8M010	HOUSING LOAD PIN AMS80	1
	AMTKA023	ASSY PCB LOW LEVEL TENSION AMPLIFIER	1
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 4 TERMINALS 10VDC EXC	1
7	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN SST	4
11	ALS6P032	SCREW 4-40 X 3/8 FH PHIL SST	6
	AM5KP228	STANDOFF 4-40 X 1/2 M/F HEX NYLON	2
15	C276P035	WASHER #10 LOCK SS	4
16	AMS8P036	WASHER #4 LOCK SST	6
17	AMS8P090	WASHER #4 FLAT SST	6
19	AMS1P056	WASHER #8 LOCK SST	4



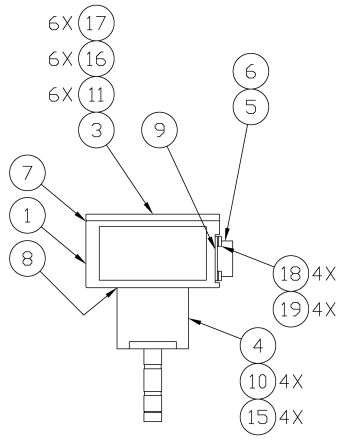
7.2.3 LOAD PIN – 3mV/V - AM3KA013-7.5



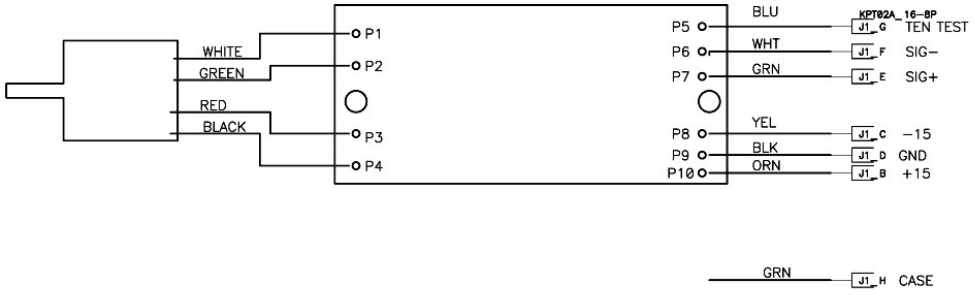
ITEM	P/N	DESCRIPTION	QTY
1	AMS8M010	HOUSING LOAD PIN AMS80	1
	AMTKA023-7.5	ASSY PCB LOW LEVEL TEN 7.5V AMPLIFIER	1
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 4 TERMINALS 10VDC EXC	1
7	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN SST	4
11	AMS8P034	SCREW 4-40 X 3/8 SOC HD SST	6
	AM5KP228	STANDOFF 4-40 X 1/2 M/F HEX NYLON	2
15	C276P035	WASHER #10 LOCK SS	4
16	AMS8P036	WASHER #4 LOCK SST	6
17	AMS8P090	WASHER #4 FLAT SST	6
18	C276P142	SCREW 8-32 X 1/2 PHIL PAN SST	4
19	AMS1P056	WASHER #8 LOCK SST	4



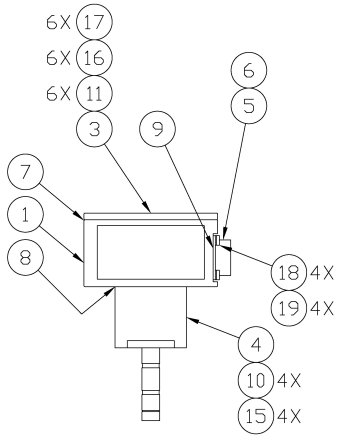
7.2.4 LOAD PIN - 1.5V DIFF - AM3KA015



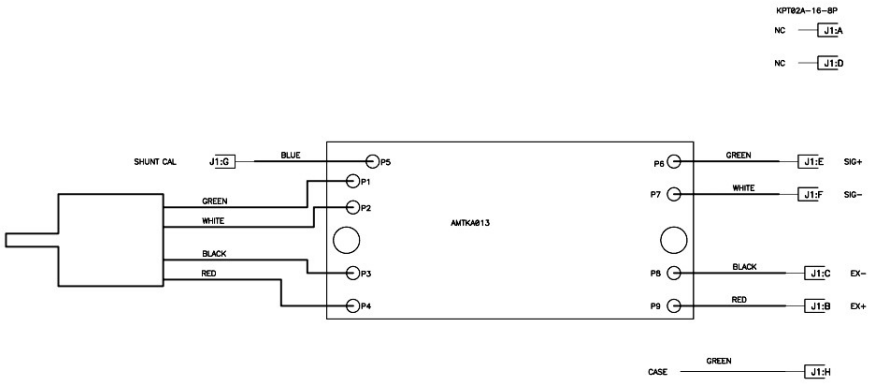
ITEM	P/N	DESCRIPTION	QTY
1	AMS8M010	HOUSING LOAD PIN AMS80	1
	AM3KA016	PCB ASSY 0-1.5V DIFF LP AM3K AMPLIFIER	1
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 4 TERMINALS 10VDC EXC	1
7	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN SST	4
11	AMS8P034	SCREW 4-40 X 3/8 SOC HD SST	6
	AM5KP228	STANDOFF 4-40 X 1/2 M/F HEX NYLON	2
15	C276P035	WASHER #10 LOCK SS	4
16	AMS8P036	WASHER #4 LOCK SST	6
17	AMS8P090	WASHER #4 FLAT SST	6
18	AM5KA320	KIT RFI FILTER TRAP 16 CONN	1



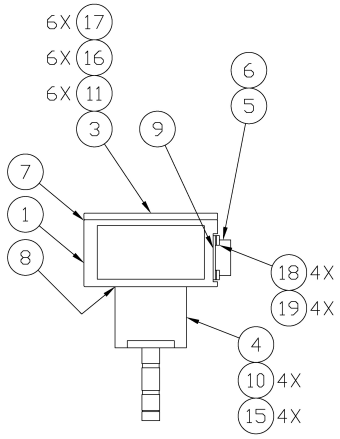
7.2.5 LOAD PIN – 2mV/V - AM3KA313



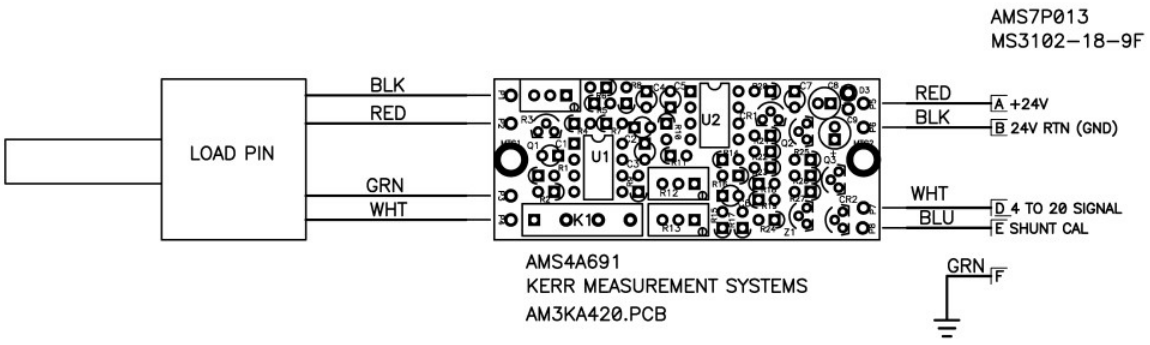
ITEM	P/N	DESCRIPTION	QTY
1	AMS8M010	HOUSING LOAD PIN AMS80	1
	AMTKA023	ASSY PCB LOW LEVEL TENSION AMPLIFIER	1
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 4 TERMINALS 10VDC EXC	1
7	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN SST	4
11	AMS8P034	SCREW 4-40 X 3/8 SOC HD SST	6
	AM5KP228	STANDOFF 4-40 X 1/2 M/F HEX NYLON	2
15	C276P035	WASHER #10 LOCK SS	4
16	AMS8P036	WASHER #4 LOCK SST	10
17	AMS8P090	WASHER #4 FLAT SST	6



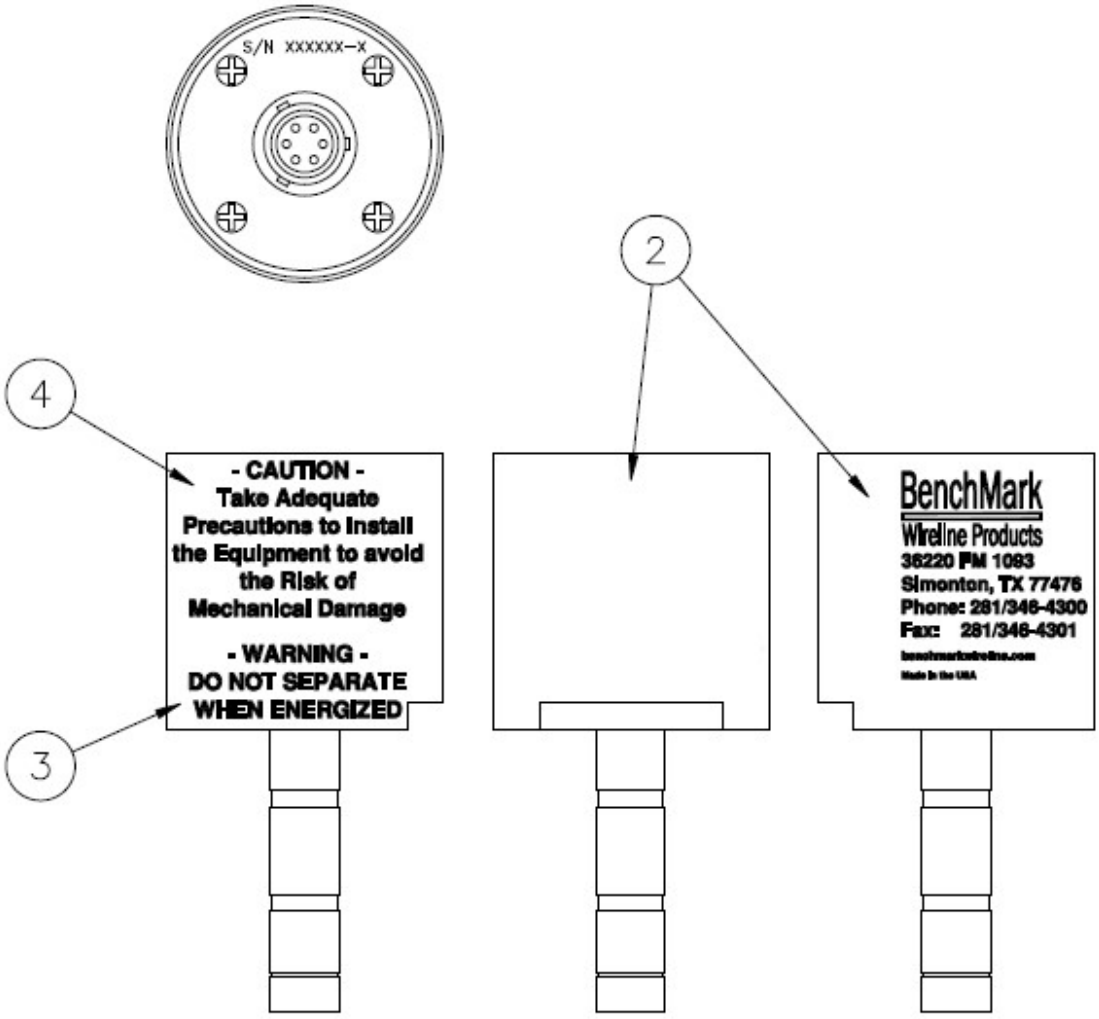
7.2.6 LOAD PIN - 4-20mA - AM3KA420



ITEM	P/N	DESCRIPTION	QTY
1	AMS8M010	HOUSING LOAD PIN AMS80	1
	AMS4A691	PCB ASSY 4 20MA LC 3WIRE 3K	1
4	AM5KP104	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 4 TERMINALS 10VDC EXC	1
7	C276P040	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1
8	AMS8P066	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1
10	AM5KP041	SCREW 10-24 X 1-1/4 PHIL PAN SST	4
11	AMS8P034	SCREW 4-40 X 3/8 SOC HD SST	6
3	AM5KM262	LID LOAD PIN HSG BLACK WARNING	1
15	AMS1P054	WASHER #10 FLAT SS	4
16	AMS8P036	WASHER #4 LOCK SST	6
17	AMS8P090	WASHER #4 FLAT SST	6
	C276P052	STANDOFF 4-40 X 1/4 M/F HEX	2
19	AM3KA318	KIT RFI FILTER TRAP 18 MS CONN	1

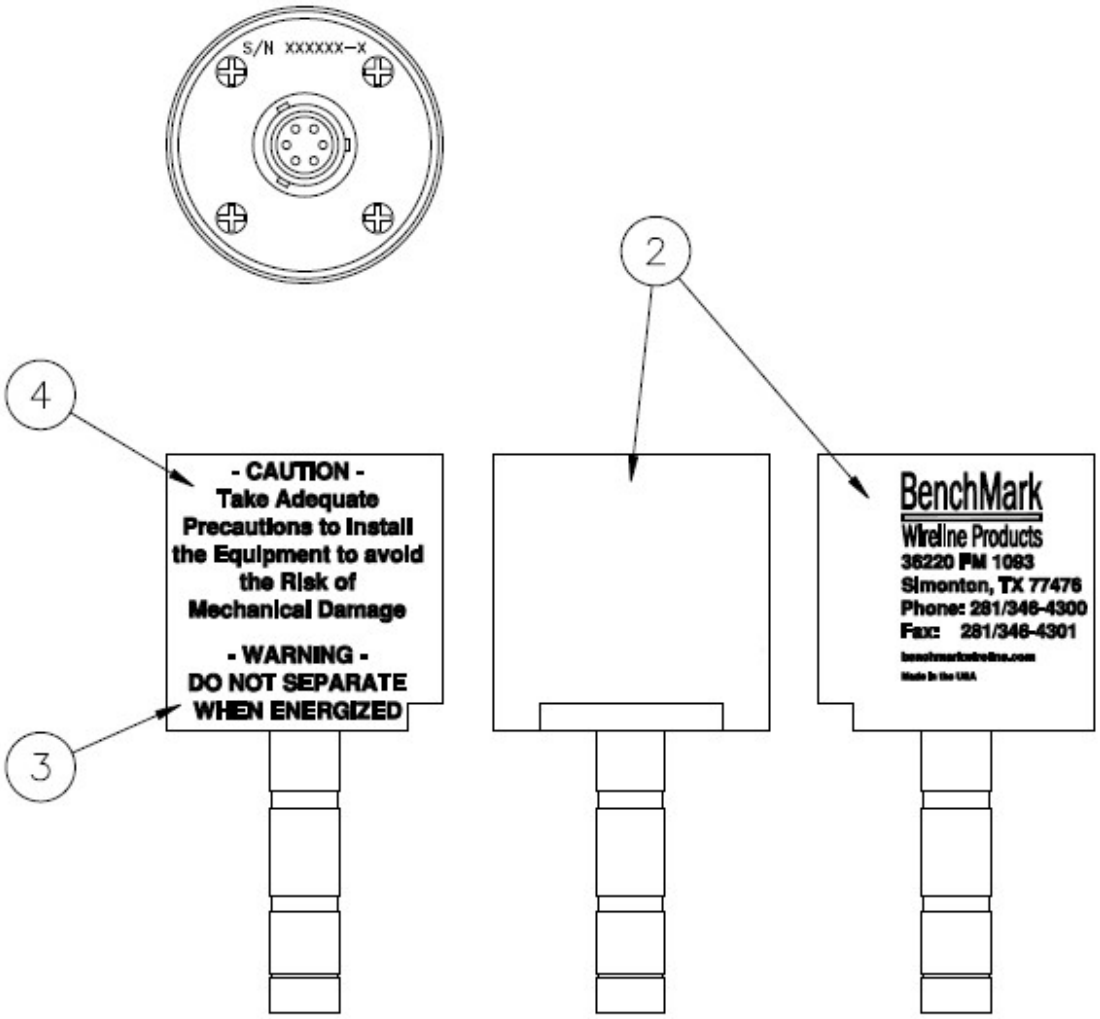


7.2.7 LOAD PIN - 2mV/V - AM3KP203



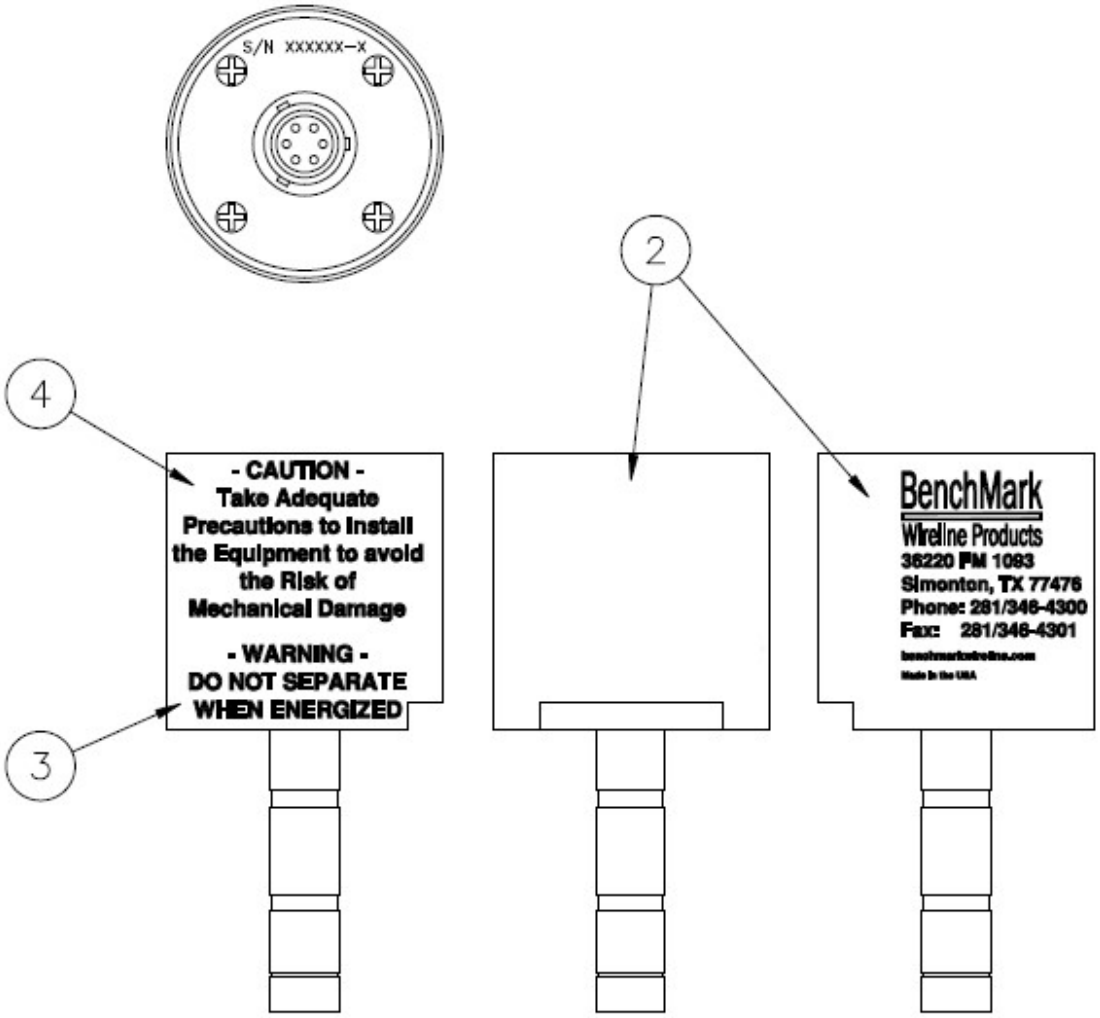
ITEM	P/N	DESCRIPTION	QTY
1	AM5KP103	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 6 PIN TYPE C W/SHUNT	1
2	AM5KP034	DUST CAP KPT8110C RECEPT MS3181-10CA	1

7.2.8 LOAD PIN - 2mV/V - AM3KF103



ITEM	P/N	DESCRIPTION	QTY
1	AM5KP103	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 6 PIN TYPE C W/SHUNT	1
2	AM5KP034	DUST CAP KPT8110C RECEPT MS3181-10CA	1

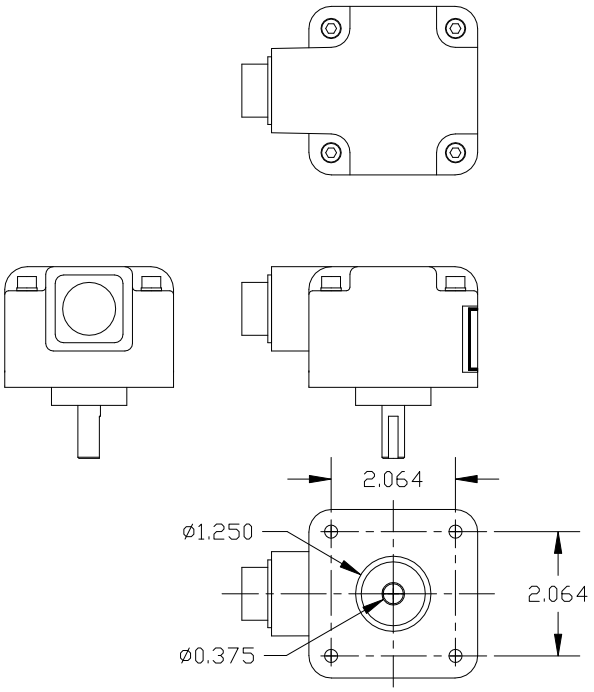
7.2.9 LOAD PIN - 2mV/V - AM3KA226



ITEM	P/N	DESCRIPTION	QTY
1	AM5KP103	PIN LOAD 3000# 1/2 OD 2.0 MV/V 350 OHM 6 PIN TYPE C W/SHUNT	1
2	AM5KP034	DUST CAP KPT8110C RECEPT MS3181-10CA	1

7.3 ENCODERS

7.3.1 ENCODER - AM3KP161



P/N	DESCRIPTION	QTY	UNIT
AM3KP161	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

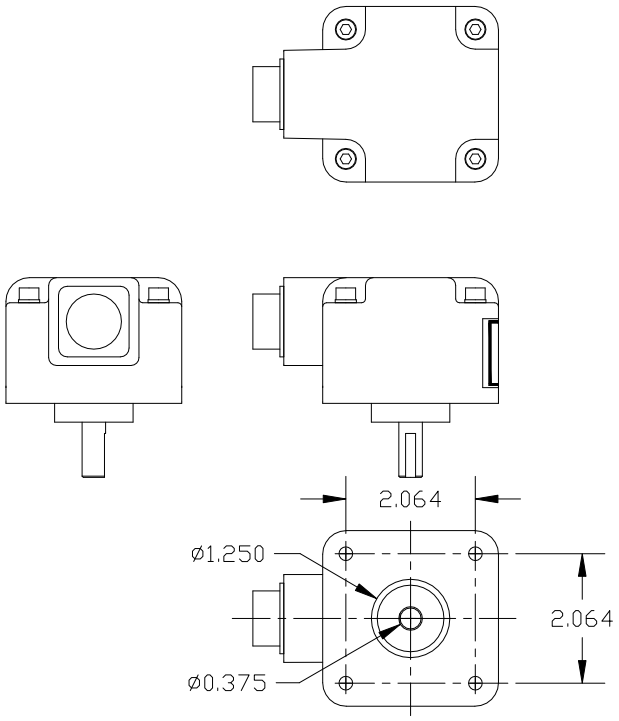
Specifications

120 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
C - A
B - B
E - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.2 ENCODER - HI RESOLUTION - AM5KA068B



P/N	DESCRIPTION	QTY	UNIT
AM5KP161	ENCODER H25D-SS-1200-ABC-4469 EEx nA	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

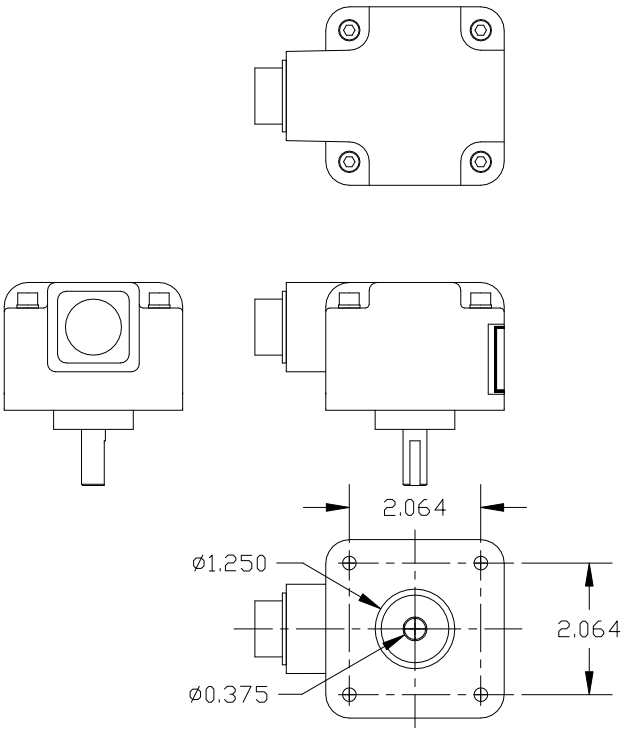
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

E - A
C - A
G - B
D - B
A - +5 to +15 vdc
B - Gnd
F - Case

7.3.3 ENCODER - HI RESOLUTION - AM5KA070B



P/N	DESCRIPTION	QTY	UNIT
AM5KP163	ENCODER H25D-SS-1200-ABC-4469 EEx nA	2	EA
AMS1P071	DUST CAP MS25043-18DA	2	EA

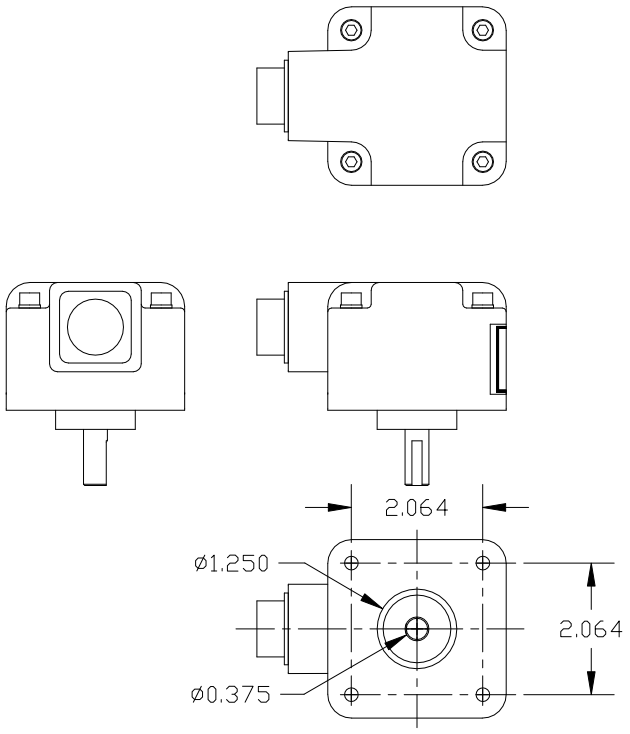
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
C - A
B - B
E - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.4 ENCODER - HI RESOLUTION - AM5KA074B



P/N	DESCRIPTION	QTY	UNIT
AMSLP061	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

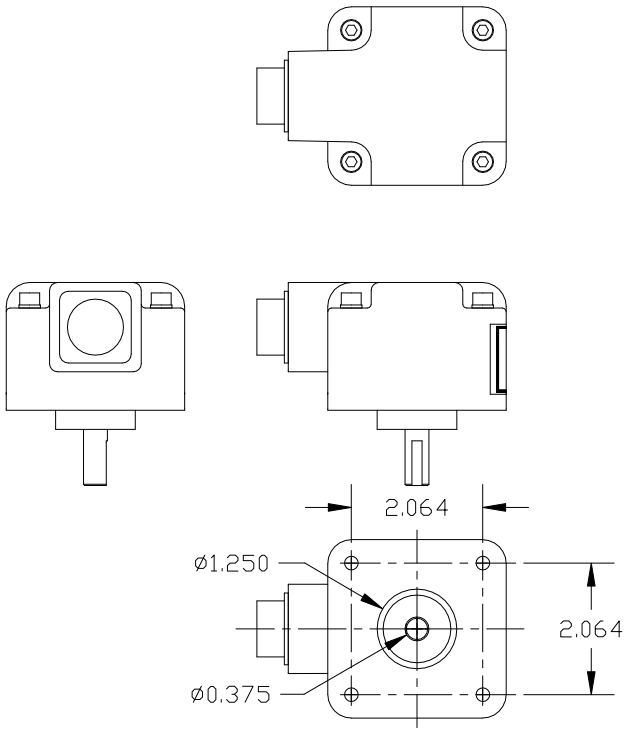
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
H - A
B - B
I - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.5 ENCODER - HI RESOLUTION - AM5KA079



P/N	DESCRIPTION	QTY	UNIT
AM5KP188	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

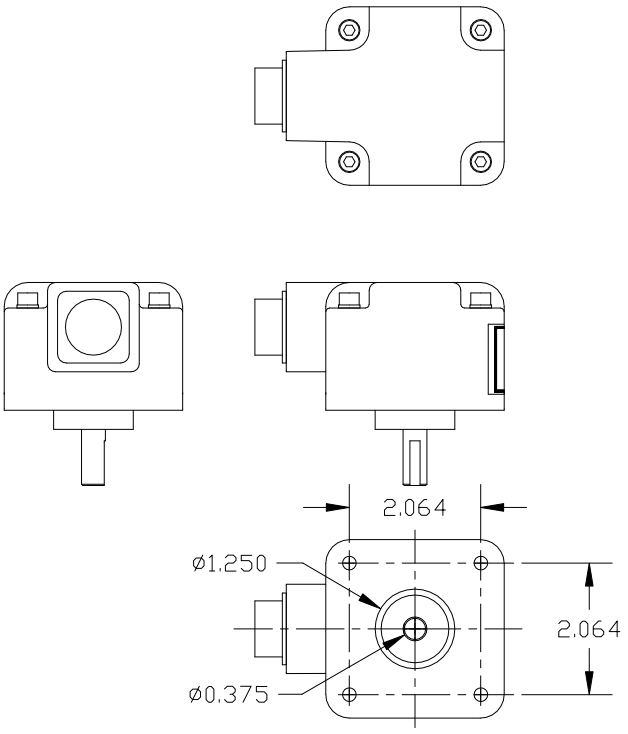
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

E - A
C - A
G - B
D - B
A - +5 to +15 vdc
B - Gnd
F - Case

7.3.6 ENCODER - HI RESOLUTION - AM5KA080



P/N	DESCRIPTION	QTY	UNIT
AM5KP192	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

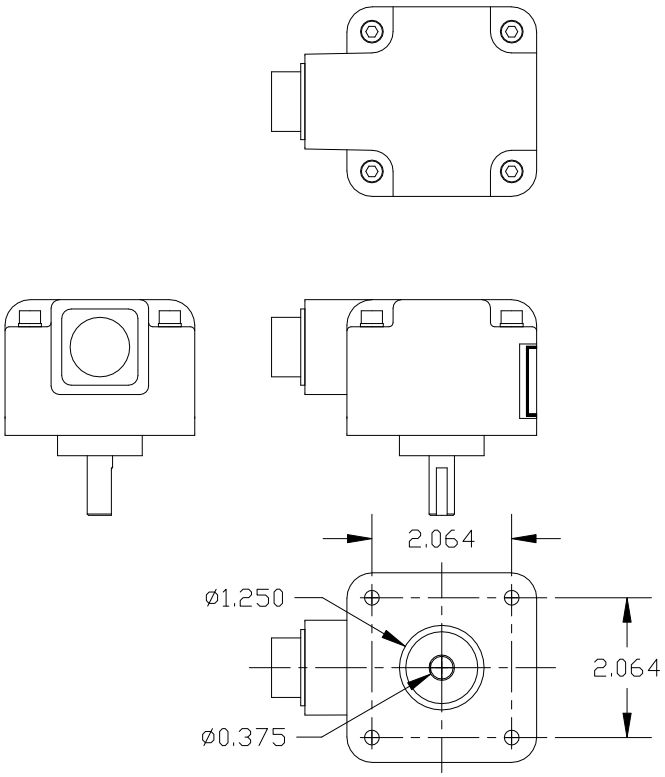
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
C - A
B - B
E - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.7 ENCODER - AM5KP161



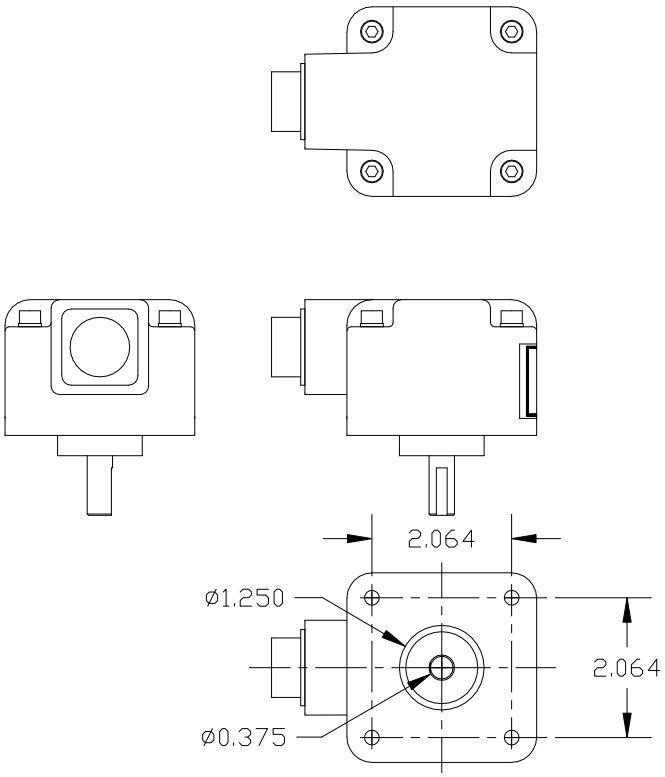
P/N	DESCRIPTION	QTY	UNIT
AM5KP161	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out
E - A
C - A
G - B
D - B
A - +5 to +15 vdc
B - Gnd
F - Case

7.3.8 ENCODER - AM5KP163



P/N	DESCRIPTION	QTY	UNIT
AM5KP163	ENCODER H25D-SS-1200-ABC-4469	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA
AMS1P053	10-24 X 2" SOCKET HEAD CAP SCREWS SST ENCODER MOUNTING	4	EA

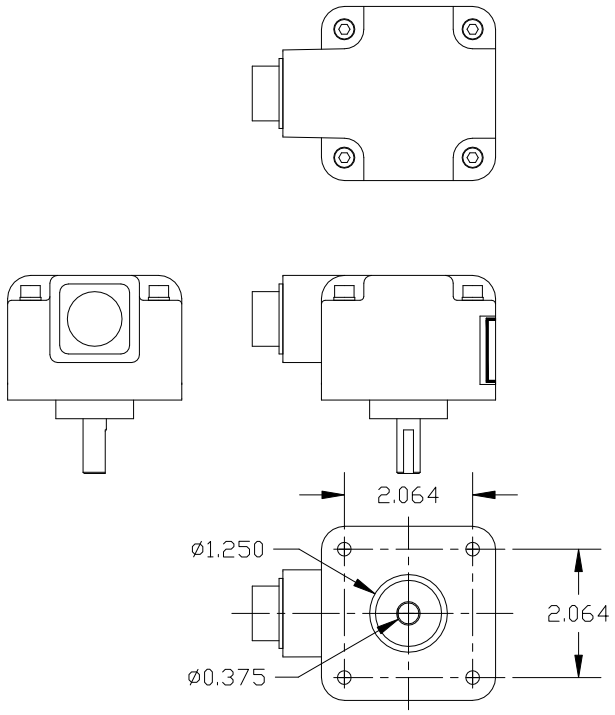
Specifications

512-780 Pulses per revolution – Dual Resolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
C - A
B - B
E - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.9 ENCODER - AM5KP164



P/N	DESCRIPTION	QTY	UNIT
AM5KP164	ENCODER IS25-HA-37F-1200-ABC-69-S-16-15 ATEX EEx ia IIB T4	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA
AMS1P053	10-24 X 2" SOCKET HEAD CAP SCREWS SST ENCODER MOUNTING	4	EA

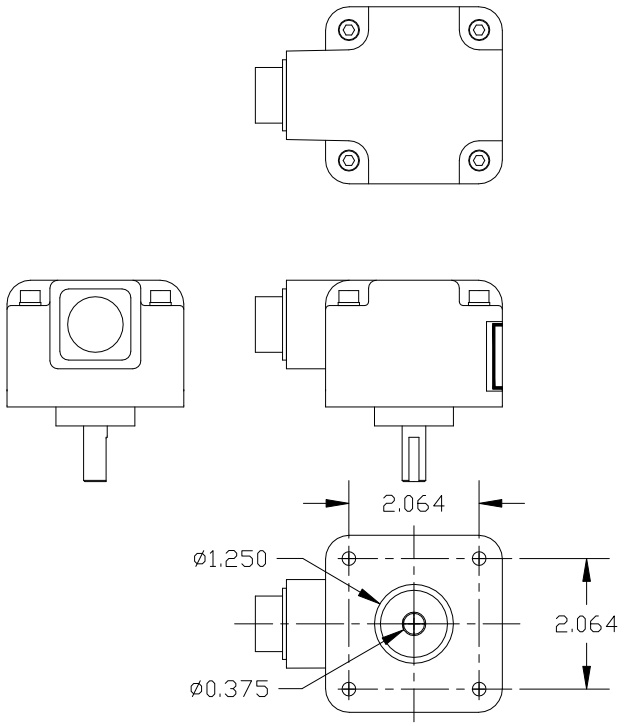
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
H - A
B - B
I - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.10 ENCODER - AM5KP188



P/N	DESCRIPTION	QTY	UNIT
AM5KP188	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

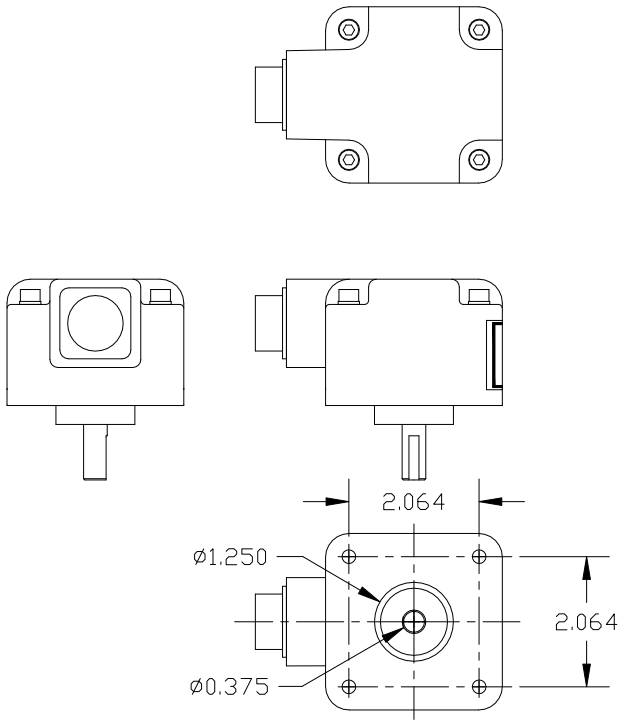
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
C - A
B - B
E - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.11 ENCODER - AM5KP189



P/N	DESCRIPTION	QTY	UNIT
AM5IP189	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

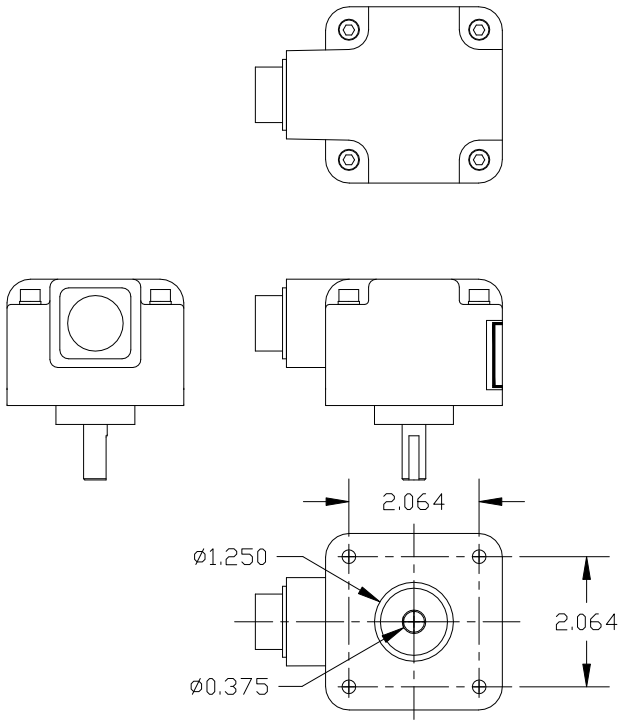
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
C - A
B - B
E - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.12 ENCODER - AM5KP192



P/N	DESCRIPTION	QTY	UNIT
AM5KP192	ENCODER H25D-SS-1200-ABC-4469	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

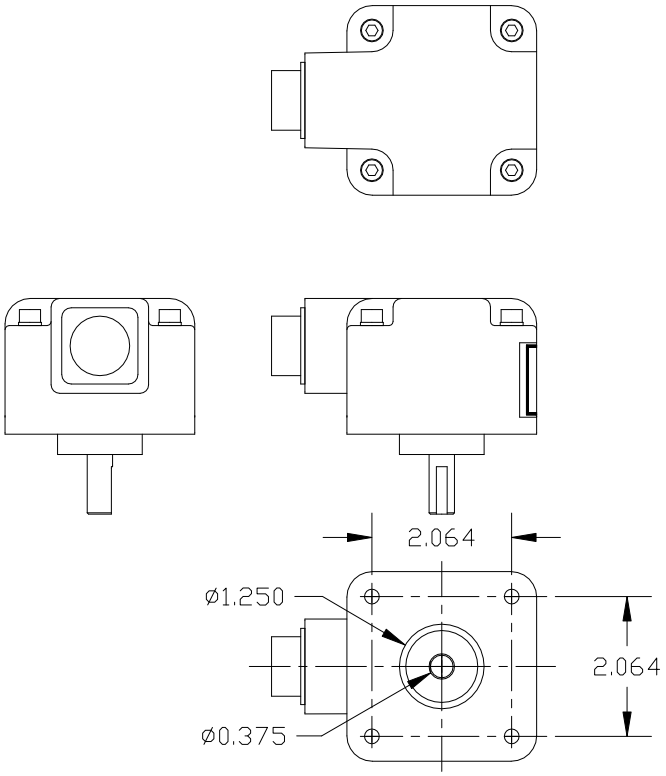
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A - A
C - A
B - B
E - B
D - +5 to +15 vdc
F - Gnd
G - Case

7.3.13 ENCODER - AMS7P131



P/N	DESCRIPTION	QTY	UNIT
AM5KP131	ENCODER H25D-SS-1200-ABC-4469	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA

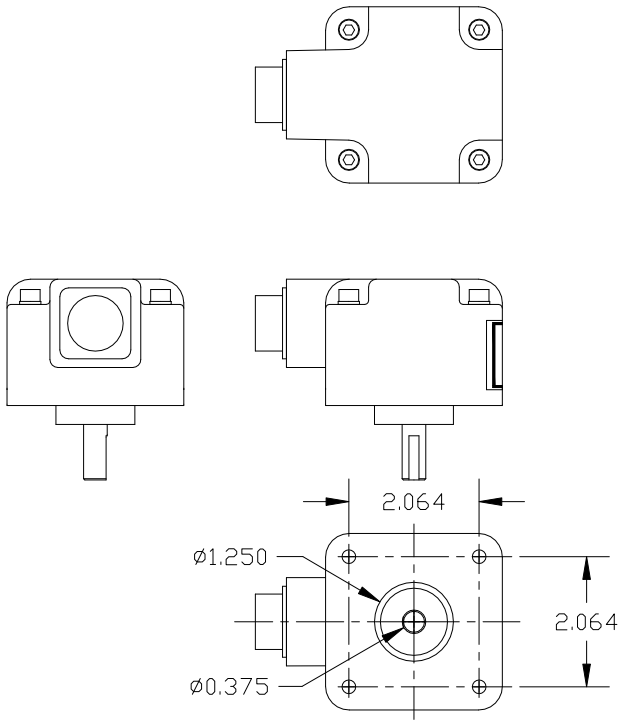
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A	**-**	**A**
H	**-**	**A**
B	**-**	**B**
I	**-**	**B**
D	**-**	**+5 to +15 vdc**
F	**-**	**Gnd**
G	**-**	**Case**

7.3.14 ENCODER - AMS7P191



P/N	DESCRIPTION	QTY	UNIT
AM5KP191	ENCODER H25D-SS-1200-ABC-4469 ATEX EEx ia IIB T4	2	EA
AMS1P071	DUST CAP MS25043-16DA	2	EA

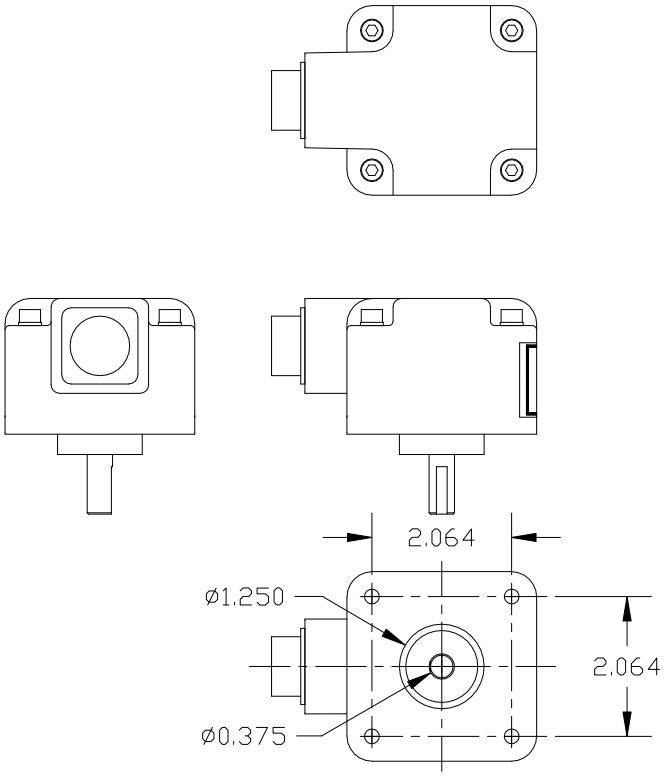
Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

E - A
C - A
G - B
D - B
A - +5 to +15 vdc
B - Gnd
F - Case

7.3.15 ENCODER – AMSLP061



P/N	DESCRIPTION	QTY	UNIT
AM5KP061	ENCODER H25D-SS-1200-ABC-4469	2	EA
ACMU2P09	DUST CAP MS25043-18DA	2	EA

Specifications

1200 Pulses per revolution
+5 to +15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

A	**-**	**A**
H	**-**	**A**
B	**-**	**B**
I	**-**	**B**
D	**-**	**+5 to +15 vdc**
F	**-**	**Gnd**
G	**-**	**Case**