



TXAM Pumps
Reliable Under Pressure

HBT Series

TXAM Solar Powered Chemical Injection Pump

Assembly and Operations Manual



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Assembly Instructions

Fixture Base, Battery Box and Solar Panel

Mounting the solar panel can be done in a variety of ways. The solar panel is shipped with mounting hardware attached to make field installation of the unit easier for the technician. The Solar Panel may be installed on any permanent object or pole at the work site or on the fixture provided by TXAM. The installer may want to leave the fixture mobile so it can easily be moved to another site or stake it into the ground.

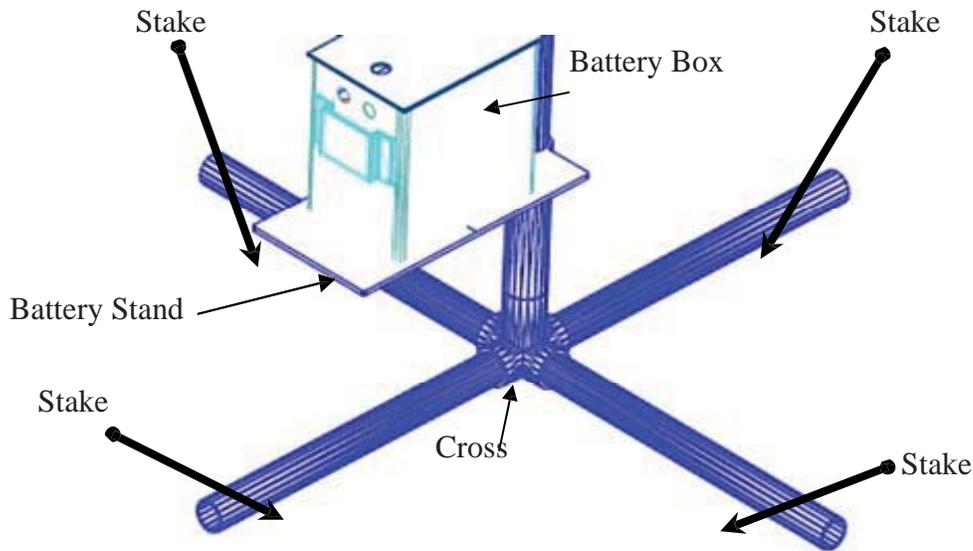


Illustration 1: Assembly of Mounting Fixture

To use the fixture provided by TXAM, you will need: 5/16" Allen wrench, adjustable wrench, and hammer. All parts of the fixture are powder-coated for durability and resistance to the elements.

Slide the four 'legs' (2 foot poles) into the cross. The hole on top of the cross should face up. One end of leg has two holes for the stake and should be pointed out. The stakes will be driven into the ground from the outside toward the inside so the holes on top should be the outer most holes. Tighten the four 5/16" set screws to hold the legs in place. Place the base you just assembled in the location you have chosen. If you want the fixture to be permanent use the four metal stakes provided to secure it to the ground. The stakes should be driven through the legs from the outside toward the inside using the holes provided. The holes will angle the stake to maximize strength.

Next, slide the four foot mounting pole into the top of the cross and tighten the set screw to hold it in place. This pole will hold the battery box and solar panel. Slide the battery stand onto the mounting pole. The battery stand does not need to be tightened until you adjust it future steps.

Slide the pipe tee onto the mounting pole so that the remaining two holes face opposite sides and tighten the set screw. The three set screws in the pipe tee should face the rear so that the solar panel does not block access to them. Now the remaining pole (the 'arm') will slide through the two holes in the pipe tee and will be used to secure the solar panel. Tighten the remaining two set screws before mounting the solar panel.

The hardware on the back of the solar panel will connect to the pole. Tighten all of the pipe clamps from the solar panel to the arm. Use care when mounting the solar panel so that the surface of the panel does not get scratched or cracked. Damage to the solar cells can render the panel useless and is not covered by warranty.

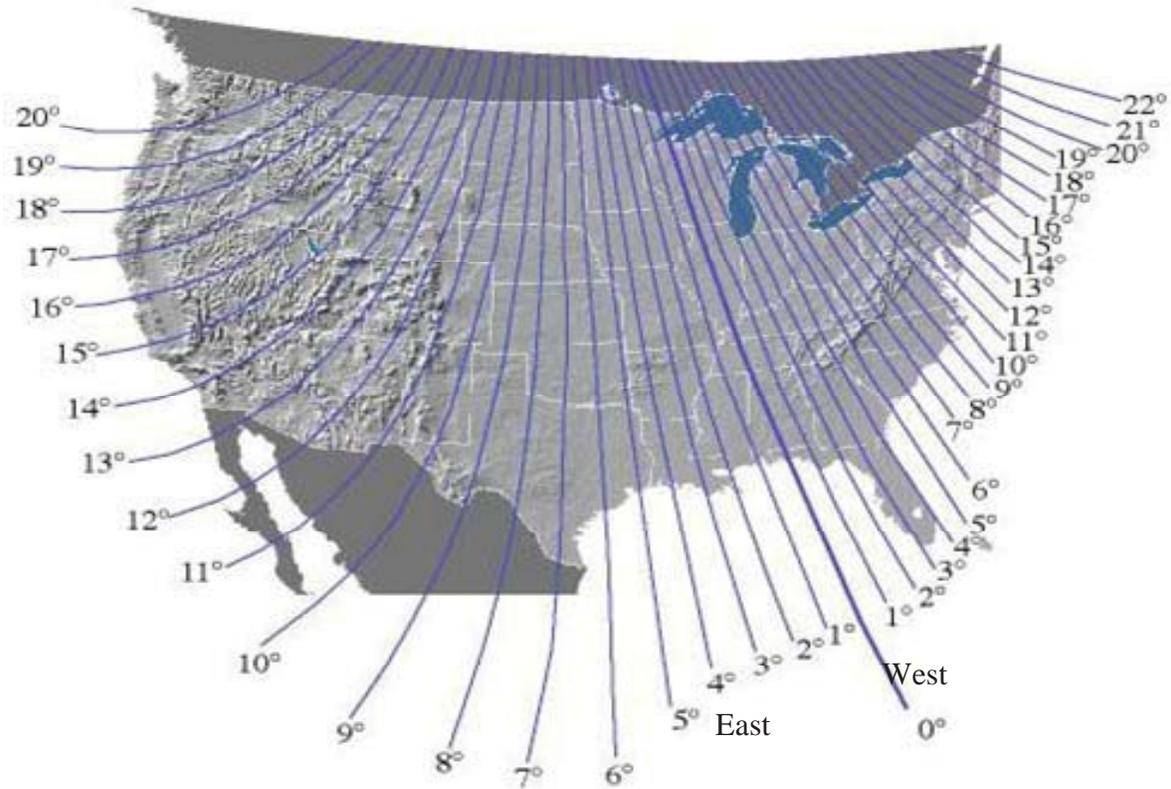
Try to adjust the battery box to a location that is shaded by the solar panel during midday and tighten the bolt to hold it in place on the mounting pole. Protecting the battery from the hottest sun of the day will help prolong battery life.

Solar Panel Orientation

Orientation of the solar panel should be set so that the maximum output is achieved. Power output of solar systems is affected by direction (azimuth) and angle (tilt) to the sun. The location of the solar panel for your system should be in an area with no obstruction of the sun. Shadows or shade will prevent the panel from properly charging the battery.

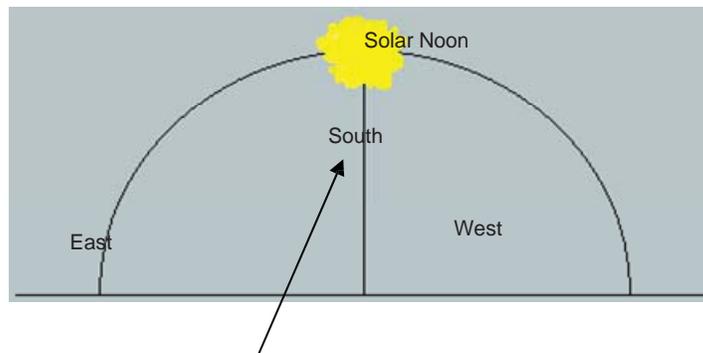
Direction (Azimuth)

The direction of the solar panel can be adjusted by loosening the **Bottom** set screw on the pipe tee. Solar arrays located in the Northern Hemisphere should always face true south **not** magnetic south. The difference between the two is called magnetic declination and depends on your geographic location. The map on the next page shows the magnetic declination for the United States.



To find true south you can use a compass but the reading must be corrected for magnetic declination. First you will find true north. Some compasses allow for magnetic declination to be set, otherwise you would need to offset the compass needle from true north by the declination angle. For example, if your panel is in Houston, Texas, your magnetic declination angle is about 5 degrees east. For true north compass bearing, rotate the compass until the needle points 5 degrees east of north on the compass bearing scale. The opposite direction (180 degrees) of true north is true south - the direction you wanted. If your declination were 5 degrees west, you would rotate until the needle was 5 degrees west of north (it would point to $360 - 5 = 355$ degrees).

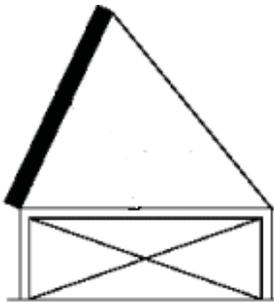
An alternate method is to adjust the solar panel to solar noon. This method uses the fact that the sun is always due south at solar noon. Solar noon is exactly half way between the sunrise and sunset time. Shadows cast by objects at solar noon run true north-south. Therefore, at solar noon, the shadow cast by any vertical edge or a plumb-bob string would determine true south.



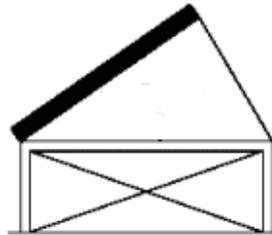
Optimum Panel Angle (Tilt)

The tilt of the solar panel can be adjusted by loosening the **Side** set screws on the pipe tee. The solar panel will produce the most power when it is pointed directly at the sun. Panels that are mounted to fixed structures should be tilted so that performance is optimized for winter months. If your system is producing adequate power in the winter months, performance should be satisfactory for the remainder of the year.

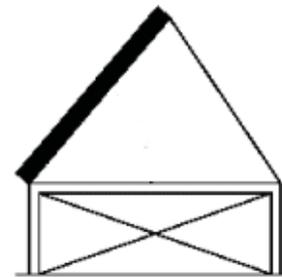
The optimized angle for winter months will seem like too much tilt but the winter sun is much lower in the sky than any other time of year. See the illustration below.



Winter



Summer



Fall & Spring

Use the reference chart on page 15 to find the optimum tilt angle for solar panels in your general area of the United States. If your city is not listed, use the city closest to your latitudinal location (a city that is not located much farther north or south of your location).

Solar Panel Maintenance

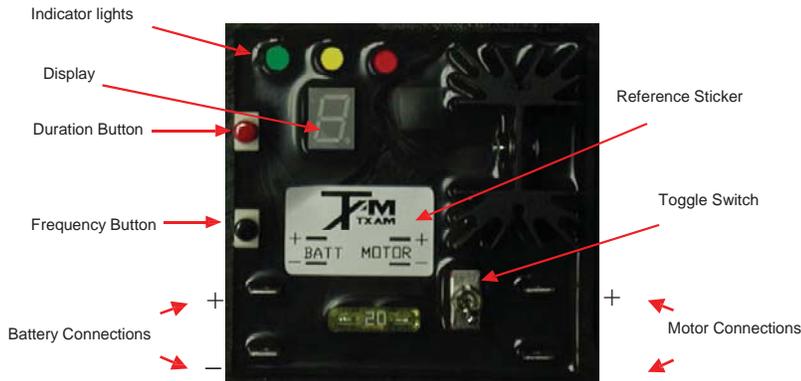
Minimal maintenance is needed to keep the solar panel operating efficiently. Charging capabilities of the panel can be maximized by keeping the panels clean. Removing dust coating and bird droppings will allow the panels to take full advantage of the sun. Use water and a soft cloth to clean the panels. Harsh chemicals or abrasive cloths may damage the surface and reduce the ability of the panels to charge the batteries.

TXAM Smart Timer Instructions

The TXAM Smart Timer is a solid state controller 12v DC solar pumps. The timer has been designed to monitor battery voltage and prevent full discharge of the battery. This feature extends battery life and allows for faster recharge. During low light / no light conditions as battery voltage drops, the timer automatically recalculates and slows the frequency of injection. A sight glass or drum gauge should be used along with the TXAM timer to insure accurate injection rates of the chemical. Many factors will affect injection rates.

Wires should be connected from the battery and the pump motor to the timer as the picture indicates below. A sticker has been placed on the relay switch of each timer for your reference. **Connecting the power incorrectly will damage the timer. Using a fuse rated higher than 20 Amps (15 Amps on earlier versions) voids the warranty on both the timer and the pump.**

The TXAM timer is turned on by moving the toggle switch to the up or on position. **After turning the timer on, allow up to one minute for the timer to begin pump operation.** When the timer is powered on it will run through a self-check process. A letter will flash on the display indicating the software version of the timer followed by flashes of the green, yellow and red indicator lights. Next the display will flash CC and five numbers. CC indicates "cycle count" and the first four numbers let you know how many times the timer has cycled the pump to the nearest thousand, rounded down. The fifth number indicates the frequency rate. For example, CC01985 tells you the timer has cycled 198,000 times and the frequency is set to 5 cycles per minute. If the timer is turned off when the pump has cycled 198,999 times, the cycle count will show CC01985 when it is powered back on and will begin counting again at 198,000, not 198,999.



Picture 1 – TXAM Smart Timer

TIMER/VOLTAGE INDICATOR LEVELS				
CYCLES PER MINUTE				
GREEN	GREEN	YELLOW	YELLOW	RED
GREEN	YELLOW	YELLOW	RED	RED
12+ V	12+ V	11.6 V	11.2 V	10.8 V
10	7	5	3	OFF
8	6	5	3	OFF
6	6	4	3	OFF
7	5	4	3	OFF
6	4	3	2	OFF
5	3	3	2	OFF
4	3	2	1	OFF
3	2	2	1	OFF
2	1	1	1	OFF
1	1	1	1	OFF

Chart 1 – Cycle Indicator

NOTE: If your pump has the adjustable stroke feature make sure you set the stroke before setting the injection rate.

The TXAM timer controls chemical injection rates in two ways: **frequency** and **duration**. Frequency refers to the times (1 to 10) the pump is turned on or cycled per minute. Duration refers to how long each cycle lasts (1 to 5 seconds) before turning off. **The timer must be between cycles to make adjustments. Turning the dial during a cycle will make changes to the next cycle.**

Frequency is set by pushing the black button shown in picture 1 and determines the number of times the pump cycles per minute. Frequency can be one time per minute up to ten times per minute. The display digit on the timer indicates the level selected (the number 10 is indicated by letter F).

Duration is set by the red button shown in picture 1 and determines how long each cycle lasts. Duration can be set for 1 second up to 5 seconds per cycle. To set the duration, push and hold down the red button. The display will scroll through numbers 1 to 5. Release the red button when the display shows the number of seconds you want.

To see the duration at any time you can push and release the red button. The display will show the duration number for five seconds after the button is pushed.

Adjustments to the timer settings will take effect after completion of the current cycle. Allow sufficient time (up to one minute) for new settings to take effect.

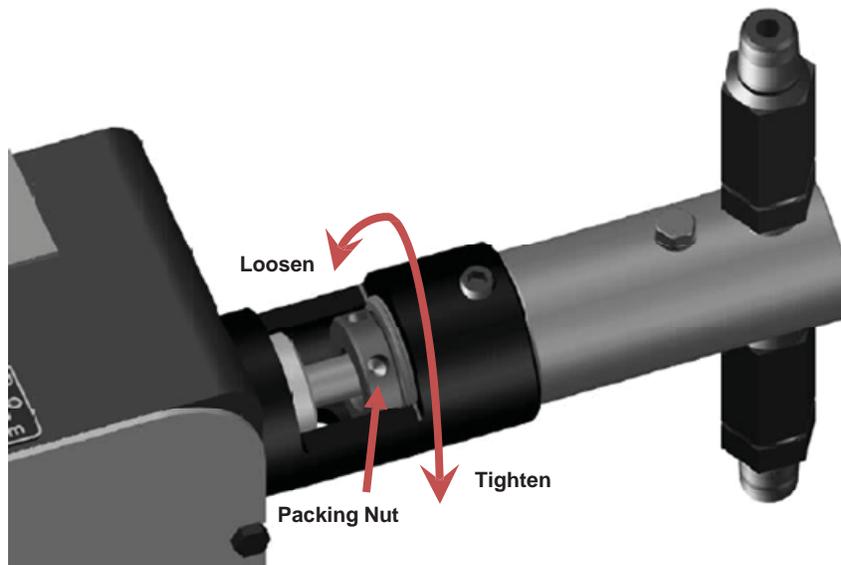
Pump Cycle and Battery Voltage

Battery voltage is shown by the indicator lights at the top of the timer which flash every ten seconds. The number of times the pump is cycled by the timer is directly affected by the voltage of the battery. Refer to Chart 1 for cycle/voltage relationships. When battery voltage reaches 12.0 or greater, the pump cycles at the selected frequency. During periods low light / no light conditions when the solar panel cannot charge the battery, the timer will lower the frequency of injections based on voltage. For example, if the user has the frequency set to 8 and the battery voltage drops to 11.8v, the timer will automatically lower the frequency from 8 to 6 (the display will continue to show 8 as the frequency).

Packing Adjustment

To adjust the packing on the HBT pump you will need a small hex key or similar tool just small enough to fit in the adjustment holes on the nut. The packing can be adjusted by tightening or loosening the packing nut as shown in the illustration below.

PACKING SHOULD ONLY BE ADJUSTED WHILE THE PUMP IS TURNED OFF



The following steps should be followed to tighten the packing:

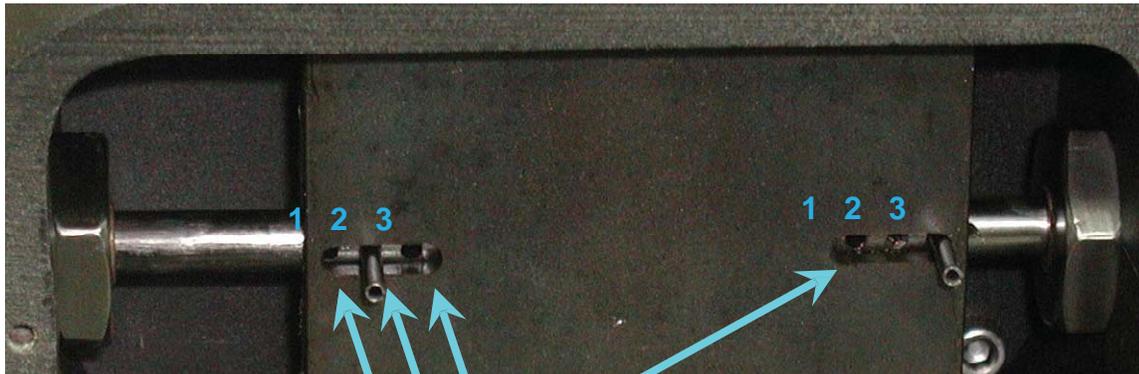
- Loosen the packing to the point the nut turns without resistance.
- Retighten the packing nut to the point that it **just** snugs- up to the packing bushing.
- Then tighten the packing nut only one more position (the distance between two holes).

Over tightening the packing will cause the pump to draw more power from the battery shortening the amount of time the battery can run the pump in low-light or no light conditions. It can also shorten the life of the battery and the packing.

Plunger Adjustment

Plunger adjustment is used to alter the amount of chemical pumped into the well. There are three settings per plunger (six possible settings for double-headed pumps).

Loosen one screw on the housing cover and remove the other so that the cover can be moved. Replace the screw you removed so that it is not lost. The plunger is adjusted by carefully removing the 1/8" stainless steel spring pin from the adjustment hole in the plunger and inserting it into another hole in the plunger. If you damage the spring pin when removing it, replace it with another from the spare parts bin. Reusing a damaged spring pin may cause it to break off in the plunger. See picture below.



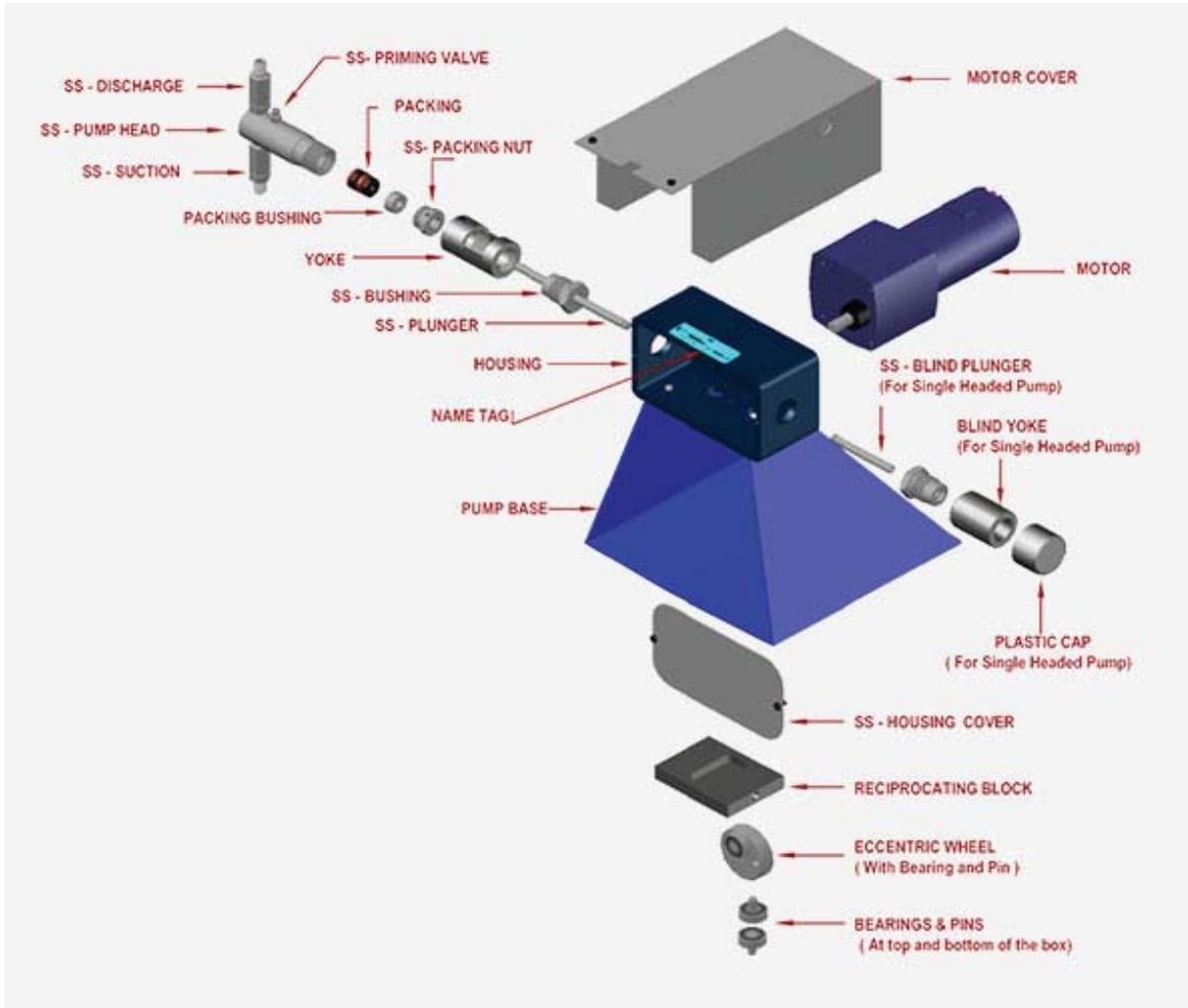
Plunger Adjustment holes

- Position 1 = 50% Stroke Length
- Position 2 = 75% Stroke Length
- Position 3 = 100% Stroke Length

Moving the pin toward the center of the block lowers the injection amount.

Only one adjustment should be made at a time. The adjustment can be dramatic and should be checked with the drum gauge before adjusting the other side.

HBT Pump- Exploded View with Nomenclature



Preventative Maintenance

Battery terminals should be checked for corrosion weekly. Anti-corrosion spray should be applied on a monthly basis to protect terminals.

Check the electrolyte level in the battery at least every 3 months in hot climates. It should be no further than 1/8" (3-4 mm) below the bottom of the vent well. If the electrolyte level is low, **add distilled water only**. Do not add acid! When electrolyte is lost under normal use, the water evaporates while the acid remains in the battery. Adding acid will, therefore, alter the chemical composition of the electrolyte and cause the battery to fail more quickly. To avoid irreparable damage, make sure the electrolyte level never drops below the top of the plates. Also, avoid over watering, which may result in electrolyte overflow.

Clean the glass on the solar panels monthly or as needed with mild soap and water. Wipe off excess water to prevent spotting. Cleaning the glass keeps the panel charging capabilities maximized.

Apply protective oil to the outer housing and yokes of the pump to prevent rust.

All parts of the chemical pump that screw together have been assembled using an anti-seize compound. TXAM recommends that anti-seize compound be used when repairs or maintenance procedures are performed.

When stainless steel parts connect to each other and carry liquid, use a stainless steel thread sealant such as Loctite 567.

Regardless of the amount of protection built into the electrical system, lightning can still cause damage. Check to ensure all systems are working after stormy weather.

Proactive measures and maintenance can prevent costly downtime.

Troubleshooting

<u>Symptom</u>	<u>Cause</u>	<u>Check for these problems:</u>
CAVITATION: - Excessive pump noise - Volume or Pressure Drop - Pump runs rough	Inadequate fluid supply	Air trapped in piping system Inlet line clogged or collapsed Inlet line too small or too long Inlet line has an air leak Inlet ball valve is closed Clogged filter screen Trash in check valve(s)
PUMP RUNS BUT NO FLUID MOVES	Too much air in heads	Bleed air off using bleeder valve
DROP IN VOLUME OR PRESSURE	Too much air in system Trash in Fluid / Chemical Worn Packing Empty Supply Tank Turbulence / Aeration In Tank	Bleed air out of heads Air leak in suction line Clogged suction line or filter Trash in check valve(s) Tighten packing nut Replace packing Refill tank Tank will settle after filling
PUMP WILL NOT POWER ON	Battery voltage at or below 11V Lighting or stray voltage	Allow batteries to charge Check electronics for damage

Repairs

ALWAYS USE EYE AND SKIN PROTECTION WHEN WORKING ON THIS PUMP

Order the replacement parts using the pump diagram and nomenclature on page 10 and the contact information on page 15. **Detailed repair instructions will be sent with the replacement parts, if requested.**

Replacing the Head Packing

--- Instructions assume you are facing the front of the pump (pump cover facing you).

1. Ensure you have replacement packing prior to disconnecting the pump. Packing should be about 1" in length and a mixture of both Viton and Teflon or anything acceptable for your chemical.
2. Disconnect the tubing from the suction and discharge check valves on the heads.
3. Loosen the packing nut if it has been tightened and the set screw at the top of the yoke. Turn the head counter-clockwise and remove it from the yoke.
4. Remove the packing nut from the head. **Do not lose the packing bushing** – it is the thick white piece of plastic just behind the packing nut. Without it, you will not be able to tighten the packing.
5. Remove the old packing and replace it.
6. Reassemble the head and the tubing. ***When reassembling the head and set screws, an anti-seize compound should be used on all threaded components.***
7. **DO NOT OVER TIGHTEN THE PACKING**. This will only shorten its life. Once you have replaced the head and tubing, you may need to tighten the packing to prevent it from leaking. Do not tighten it unless you have a leak. There are six holes on the packing nut. They are to be used to tighten the packing.