LiftTiltTruk®

Owner's Manual

- Assembly
- ❑ Operation
- ❑ Service
- ❑ Troubleshooting
- ❑ Parts Listings

- Model B
- Model C
- Model D
- Confectioner's Model

SAVAGE BROS. CO.
SINCE 1855

WARNINGS

The Lif*TILT*ruk is designed and manufactured to be a dependable, predictable and safe tool when used by a **SAFE OPERATOR**. Savage Bros. Co. cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety measures in this manual and on the Lif*TILT*ruk may not include all possible safety cautions. Clearly, no matter how safe we make the Lif*TILT*ruk, there are ways to use it unsafely. This can lead to expensive accidents which could cause serious injury OR EVEN DEATH, possibly YOUR death! To lessen the chance of breakage, expense, injury or death, we urge you to read, understand, and work continually with the following cautions in mind:

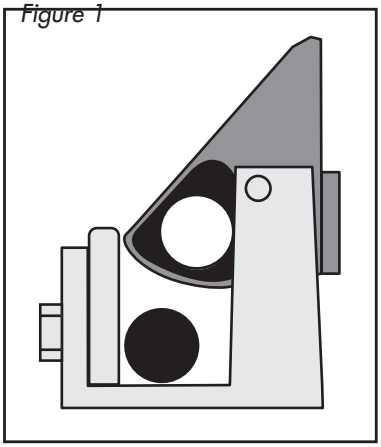
• Read and understand this entire manual thoroughly before operating or servicing the Lif*TILT*ruk.

• Improper operation and maintenance can be hazardous and could result in serious injury or even death.

• Never modify the Lif*TILT*ruk to lift any other type of load, or for any other reason.

• Be sure the handles of the load are securely locked in the lift arms. About 80% of all problems or accidents happen because the operator failed to be certain the handles were securely locked by the lock mechanism. There is only one right way for the handles to be captured, as shown in Figure 1.

Figure 1



• Go slowly. The faster things happen, the less control you have over the outcome, especially when you are transporting a load, or adjusting the position of a load which has been lifted to its pouring height. GO SLOWLY.

• Never transport a load unless it has been lowered to its lowest position. You greatly decrease the possibility of accidents, injury and DEATH if you lower the load completely before moving it.

• Use extra caution when moving Lif*TILT*ruk over uneven floors.

• Never use the Lif*TILT*ruk for any job for which it was not designed.
The Lif*TILT*ruk should be used only to lift Savage Bros. Co. kettles, or kettles or containers of other manufacture which USE A SAVAGE BROS. CO. ADAPTER STRAP. Only Savage kettles or Savage adapter straps are designed to provide support for the loads for which the Lif*TILT*ruk was designed.

• Never use the Lif*TILT*ruk on the job unless the operator has:
a. Read the manual section on *Operating the* Lif*TILT*ruk.
b. Read and understands all of the cautions in this section.
c. Practice WITHOUT A LOAD before using with an actual load.

• Don't stand under raised Lif*TILT*ruk arms at any time!

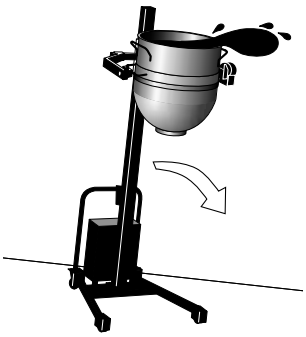
• Keep visitors out of the work area when raising, lowering or moving loads.

• It is your responsibility to be sure you and others can do the procedures and actions outlined in this manual safely and without damaging the Lif*TILT*ruk. If you are unsure about the safety of some procedures, contact Savage Bros. Co. at 847/981-3000.

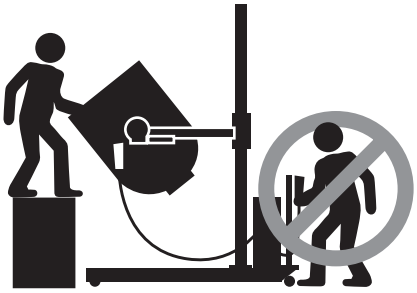
SEE BATTERY WARNINGS (Page 4)

DO NOT WALK UNDER LIFTED ARMS

DO NOT STAND ON ARMS



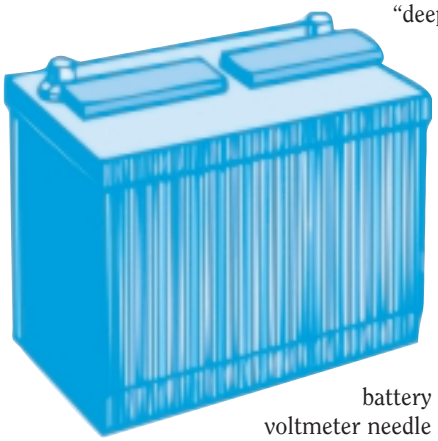
DO NOT MOVE WITH ARMS UP OR ON ANGLED SURFACE



ONLY ONE PERSON OPERATION

About Batteries

Each time the battery is discharged then recharged, it goes through a "cycle." The chemistry in your Lif*TILT*ruk battery works when it enjoys very "deep cycles."



You can lengthen the Lif*TILT*ruk battery's effective life by discharging it to the deepest working level, then recharging it completely before returning it to service.

The voltmeter on the front of the cabinet tells you "how the battery is doing." Keeping the voltmeter needle ***in the green*** makes a healthy battery in a good state of charge.

At some point in the working day the needle may dip down into the yellow zone on the voltmeter when you do a lift or tilt. As long as the needle goes no further than the bottom of the yellow zone, the battery is still charged enough to continue working.

When the needle will start to dip into the RED ZONE during lifting, THE BATTERY NEEDS TO BE RECHARGED.

It takes approximately 9 hours to recharge the deep cycle battery used on the Lif*TILT*ruk. To most people this will mean "over night recharging." Batteries don't usually get into the red conveniently on the last lift of the day. They usually require charging before or after this moment. Therefore, most businesses usually have a spare battery fully charged, ready for use when the on-board battery goes into the red.

Working with a spare battery

The spare battery should be of the same size and type as the one delivered with your Lif*TILT*ruk. Handling a spare battery requires the same level of caution and professionalism outlined in our warnings for working with the original battery delivered with your Lif*TILT*ruk. Attach the positive cable first when installing a replacement battery, followed by the negative cable. Avoid short-circuiting the battery terminals through accidental contact with tools or other metal objects across the terminals.

BE SURE YOU ARE DOING THINGS SAFELY.

When replacing the battery specify a deep cycle or marine deep cycle battery with a minimum reserve capacity of 160 minutes.

Specific Cautions when Servicing the Lif*TILT*ruk

- **Unplug** the Lif*TILT*ruk from the outside power source. When plugged in for charging, SERIOUS INJURY OR DEATH BY ELECTROCUTION CAN RESULT!!
- **Always wear eye protection** – a face mask or goggles equal to ANSI Z87.1 specifications when opening the electrical cabinet. The battery is an EXPLOSION HAZARD!
- **Remove rings** or other jewelry when servicing the inside of the electrical cabinet. Severe burns result from metal touching the battery posts or other exposed electric parts.
- **Disconnect the battery (–) cable** from the battery when performing service inside the cabinet or when servicing the battery.
- **Avoid sparks** or open flame when servicing inside the cabinet. Remember, the battery is an EXPLOSION HAZARD.
- Perform all service in a **well-ventilated area**. Ideally, a fan should be used to provide positive ventilation to avoid the EXPLOSION HAZARD of hydrogen gas accumulation when opening the cabinet to service the battery or any other component inside the electrical cabinet.
- **Do not tip or drop the battery.** The battery contains sulphuric acid which can burn holes in skin and clothing and cause SEVERE INJURY to anyone contacting the acid.
- **Battery Acid** will burn skin and clothing, and it will cause blindness if splashed into the eyes. If battery acid is contacted, flush liberally with lots of water and get medical attention immediately. If swallowed, drink a large quantity of water or milk mixed with beaten egg white or vegetable oil. Call a doctor or poison control center immediately.
- Take care when near the column slider and the chain to **keep fingers out of the chain slot.**

HAZARD WARNINGS

Acid burn potential	Deadly fumes	Wear eye protection

Safety Management

General

Rotating and moving machinery of any type presents a risk of injury. The Lif*TILT*ruk lifts, tilts and rolls which means the operator (one trained person at a time only) must be alert at all times. Ideally, everyone who will have any contact with the Lif*TILT*ruk should be trained in its function, operation, care and respect – as with all tools and machines.

Safety Rules

• Do not operate the Lif*TILT*ruk or other machinery if you are fatigued, if you have been drinking alcohol or have taken any medication which can make you sleepy.

• When carrying out operation, inspection or maintenance of the Lif*TILT*ruk, always follow all work shop rules, safety regulations and precautions.

• Do not overload. Do not exceed the weight limitation as seen on the model plate on top of the control pendant.

• Always pay attention to safety and be careful of other people, equipment and surrounding conditions.

• Do not use the Lif*TILT*ruk for anything other than the intended purposes.

• Use tools that are suitable for inspection and maintenance. It is extremely dangerous to use broken tools or tools designed for another purpose.

• SAFETY IS UP TO YOU.

Operation Manual and Safety Decals

• **Read** the instructions in this manual and the safety labels attached to various parts of the Lif*TILT*ruk. Make sure you understand and follow all the instructions for assembly, operation and maintenance. If you do not understand or do not follow the instructions, this will lead to improper operation which may result in your personal injury, damage or death.

• **Understand** the proper method of using the Lif*TILT*ruk and the procedure for carrying out maintenance inspections, and ensure that they are carried out safely.

• **Read** this manual and safety labels again from time to time to refresh your memory of the operational procedures.

• **Replace** this manual or safety labels which have been lost or become dirty and cannot be read. Obtain replacements from Savage Bros. Co. and apply the safety labels in the specified positions.

Operating Qualifications

• **Operation** of the Lif*TILT*ruk should only be done by qualified personnel. Be sure you have proper qualifications before operating the Lif*TILT*ruk.

• **One** qualified individual only should operate the Lif*TILT*ruk. This includes raising, lowering, attaching the kettles and other movements which, if more than one person is involved, could cause injury or damage to persons or property.

• **Previous** experience with other types of lift trucks does not qualify a person for operating the Lif*TILT*ruk. Obtain training instruction from an authorized person who has experience in operating the Lif*TILT*ruk.

Clothing and Personal Protective Items

• **Avoid** loose clothing, jewelry and loose long hair when operating the Lif*TILT*ruk. These and other items can catch on controls or in moving parts and cause serious injury or death.

• **Hard hat and safety boots** are highly suggested when operating or around the Lif*TILT*ruk to prevent personal injury.

• **Other** safety equipment, in addition to the hard hat and safety boots, should be worn as working conditions dictate.

SEE BATTERY WARNINGS (Page 4)

Unauthorized Modification

• **Modifications** of any type to the Lif*TILT*ruk without specific written authorization from Savage Bros. Co. can create unknown hazards.

• **Before** making any modification, consult the manufacturer. Savage Bros. Co. will not be responsible for any injury or damage caused by any unauthorized modification.

• **Obstruction** or limitation of movement and/or operator view can result if unauthorized equipment or parts are added to the Lif*TILT*ruk.

Moving Parts

• **GENERAL:** Rotating and moving machinery of any type presents a risk of injury. The Lif*TILT*ruk lifts, tilts and rolls which means the operator (one trained person at a time only) must be alert at all times. Ideally, everyone who will have any contact with the Lif*TILT*ruk should be trained in its function, operation, care and respect – as with all tools and machines.

• **Column Slide** moves over the chain slot in the column. Make sure all fingers, tools and other objects are kept away from this area to prevent serious injury or damage to the Lif*TILT*ruk.

• **The entire Column** must be kept clear of all objects of all types. Not only will this prevent injury or damage from pinching under the slide but it will help keep the Lif*TILT*ruk operating in good form for many years.

• **Kettle/Bowl Handles** must be fully seated in the locks before lifting or lowering the arms, or before moving the Lif*TILT*ruk. If handles and locks do not appear as in Figure 1 (page 3), injury or damage may result from the bowl falling off the arms or spilling its contents. When seating the handles, keep fingers and other objects out from being pinched between the handles and the locks.

Moving the Lif*TILT*ruk

• **Arms Down** – With or without a load, lower the arms. The higher the arms are, especially with increased weight, the greater the risk of spillage or tipping the Lif*TILT*ruk over.

• **Kettle Handle Locked** – Whenever a load for which the Lif*TILT*ruk was designed is to be lifted, poured or moved, the handles must be locked in position as shown in Figure 1 and elsewhere in this manual.

• **Floor Surface** – Clean floors allow the Lif*TILT*ruk's wheels to roll smoothly. Objects on the floor can cause the Lif*TILT*ruk to stop suddenly which can make a load spill. If the load is carried high, or rolling speed too fast, the Lif*TILT*ruk and the load could tip over more easily.

• **Floor Level** – Flat, level surfaces are ideal for moving the Lif*TILT*ruk. If the floor is slanted in any way, greater care must be taken to prevent spilling and tipping over as above. Use wheel chocks to prevent unwanted rolling on uneven surfaces.

• **Moving Liquids** – Great care must be taken to prevent spilling anything. Move slowly and carefully. Hot liquids can burn skin, exposed or otherwise.

• **Steering** – Control the direction of movement by only using the operator handle. The wheels below the handle swivel for steering. Moving by pushing or pulling from any other direction can be difficult and dangerous.

• **Vision** – Always be aware of everything that is around you and the Lif*TILT*ruk to prevent damage and injury. If a load obstructs your vision, STOP! Look around to see where you will be going or ask another experienced Lif*TILT*ruk operator to help guide you.

• **Manual Only** – Do not use any motorized device to move the Lif*TILT*ruk. Move only by hand.

SEE BATTERY WARNINGS (Page 4)

Step 1. Be certain you have everything you need for the job.

• Check the shipped contents carefully.

Savage Bros.Co. typically ships two pallets with two cartons for B-size and larger Lif*TILT*ruks. Carton 1 contains the tilt and idler arms. Carton 2 contains two mixing bowl adapter straps if ordered. Pallet 1 contains the base unit. Pallet 2 holds the lift column and slide mechanism. The base unit and column are secured to their pallets with rope tie-downs.

• Tools required, not supplied by Savage:

- Hammer
- Pry bar
- Saw
- Knife
- 1-1/16 inch socket wrench with torque wrench (suggested) or a ratchet wrench or handle for the 1-1/16 inch socket
- Hex wrenches
- 4-inch span C-clamp
- #2 Phillips screw driver
- Various box, open end or adjustable wrenches.
- Teflon thread tape

• Tool supplied by Savage:

- Allen wrench to open electrical cabinet.

• Read and understand the whole manual:

Step 2: Prepare the base unit for assembly

1. Disassemble the crate until the base unit looks like the illustration below. (Figure 3)

2. Move the base unit, on its pallet, to a site where the column can be safely hoisted vertically over it for assembly.

3. Remove the four nuts from the base support plate (Figure 4).

DO NOT REMOVE THE ROPE TIE-DOWNS ON THE BASE UNIT YET. Assembly should be done with the base unit secured to the pallet.

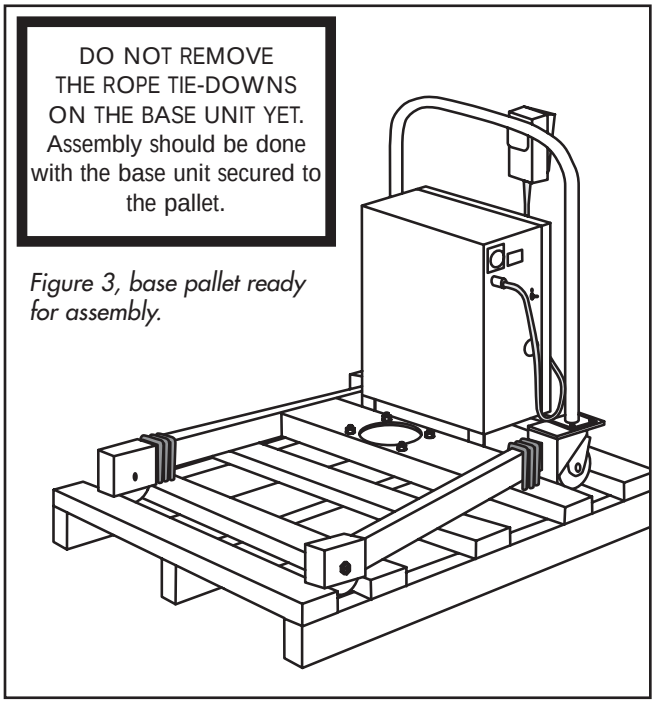


Figure 3, base pallet ready for assembly.

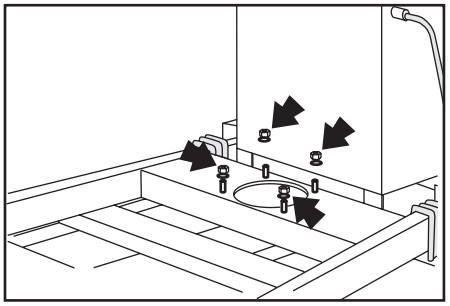


Figure 4
Remove 4 nuts.

Step 3:
Prepare the column for assembly

1. 1. Disassemble the crate until the base unit looks like the illustration below. (Figure 5)

2. Pry off the two 2x4 blocks (Figure 6) which keep the slide mechanism from moving during shipment.

3. Install a C-clamp on the column as shown (Figure 7) to prevent the slide assembly from moving during assembly.

4. Locate the right-angle hydraulic fitting in the base of the column. (Figure 8) Remove the protective cap from the fitting.

5. Cut and remove the rope tie-downs used to hold the column on its shipping pallet.

6. Open the electrical cabinet door by removing the two allen head screws with the tool provided. (Figure 9)

7. Locate the hydraulic fuse "stored" in the end of the hydraulic line inside the cabinet. (Figure 10)

8. Remove hydraulic fuse from the end of the hydraulic hose.

9. Remove the protective cap from the fuse.
NOTE: the fuse has an arrow on it. This arrow should point toward the column when the fuse is installed.

10. Put Teflon™ thread sealing tape on the fuse threads. The tape should be wound at least one thread above the bottom thread of the threads. (Figure 11)

11. Install the hydraulic fuse in the right angle fitting on the end of the column (Figure 8); tighten the fuse. Check later for leaks, and if necessary, tighten enough to prevent leaks when the system is under pressure.

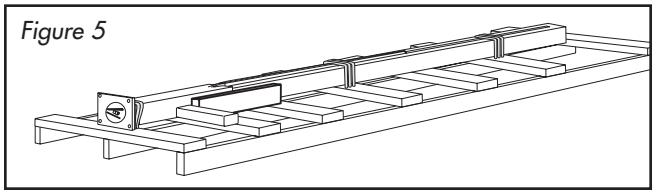


Figure 5

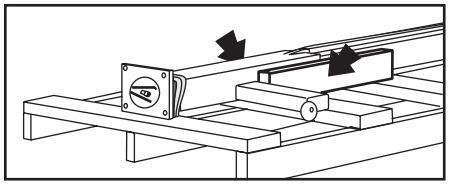


Figure 6
Remove both 2x4 shipping blocks.

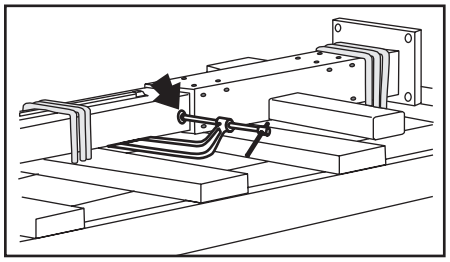


Figure 7
Attach C-clamp to column.
KEEP SLIDER FROM MOVING DURING ASSEMBLY.

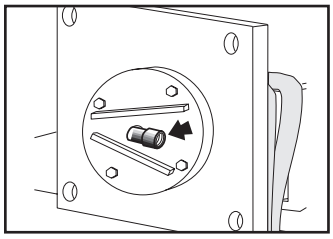


Figure 8
Remove plastic cap from hydraulic fitting on base of column.

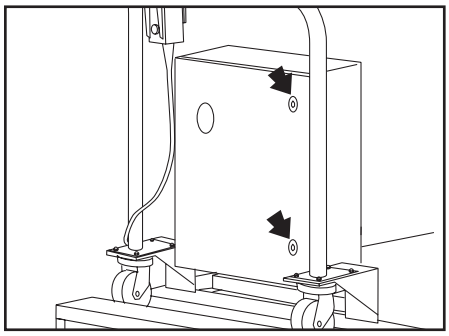


Figure 9
Open electrical cabinet door.

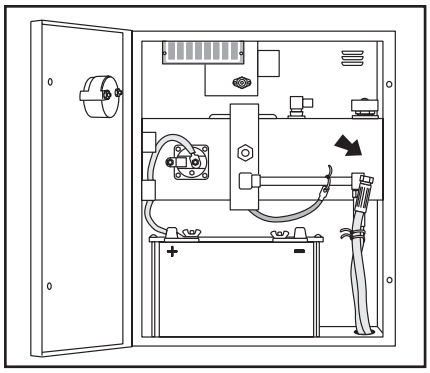


Figure 10
Locate hydraulic "fuse."

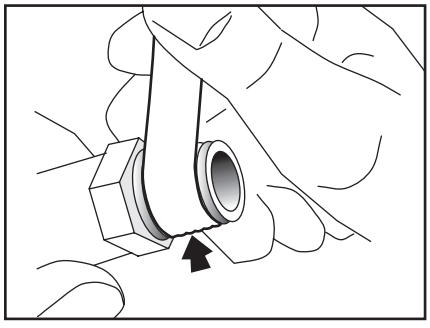


Figure 11
Wrap fuse thread with Teflon tape.

Step 4: Lift the Column over the Base

1. Install a sling system to allow lifting and positioning the column safely. For the sling, use web strapping in good condition, minimum strength of 1,000 lbs. (450Kg). Loop the webbing under the arms of the slide assembly, tie securely, then loop the strap near the top of the column. Support the column along its entire length when it is lifted to vertical. (Figure 12)

2. Lift the column to position it over the base according to one of the following methods.

Method One: (Recommended.)

Use an **overhead crane** or other mechanical lifting device to lift and support the column during assembly. (Figure 13a)

Method Two: (Recommended.)

Use a **fork lift truck** to lift and support the column during assembly. (Figure 13b)

Method Three: (Minimum safe assembly method.)

This method (Figure 13c) requires the use of THREE PERSONS. Any fewer than three persons creates a dangerous situation which could result in damage to the Lif*TILT*ruk components or worse, injury to the persons assembling the unit.

Loop the free length of the web strap used in the sling system over a girder or beam located above the base unit. With one person pulling on the strap to take up slack, two persons should lift the column to an upright position. With the C-clamp in position on the column, the arms of the slide assembly can be used to lift and maneuver the mounting plate on the column into position on the base studs.

Lifting of the column to the base can be done without the sling system if the three persons doing the job are very strong and very careful. Doing this task without a positive lifting and stabilizing method is not at all recommended.

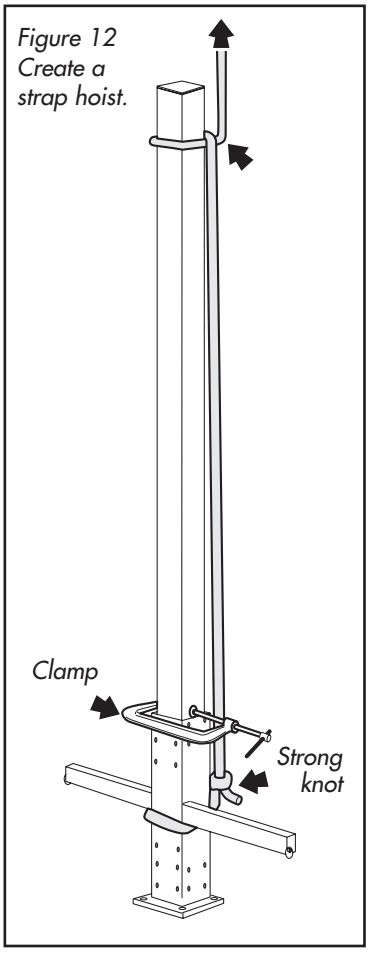


Figure 12
Create a strap hoist.

Step 5: Bolt the Column to the Base.

1. With the column supported above the base unit, put the plastic hydraulic return tubing through the hole in the base as shown. (Figure 14). Be sure to ease the tubing out of the way as you lower the column onto its studs so it is not damaged during column assembly.

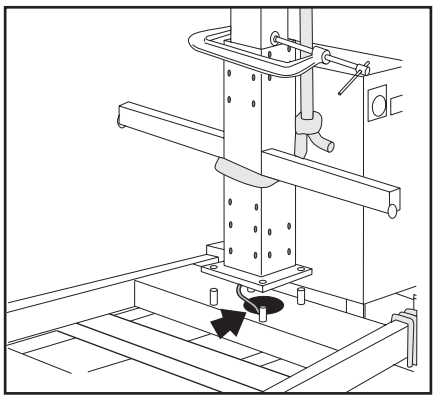


Figure 14

Column mounting holes will only line up with studs on base when chain is facing electrical cabinet.

2. Install and tighten the column-to-base nuts, about as tight as you might tighten wheel lug nuts on an automobile.

NOTE: The column chain goes toward the back of the base against the electrical cabinet. This is the only way the holes on the column mounting plate will line up with the studs on the base.

Figure 13a
Overhead crane

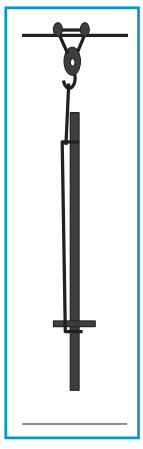


Figure 13b
Forklift Truck

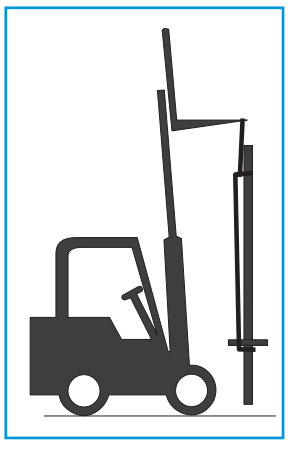
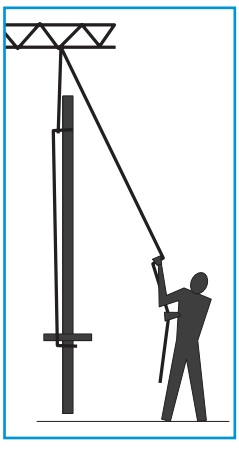


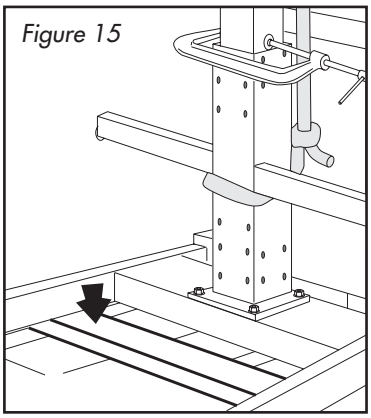
Figure 13c
Manually, 3-person minimum crew



Step 6: Hydraulic Hose Connection

1. Remove the wood cross-tie on the pallet which is located just in front of the column. (Figure 15)

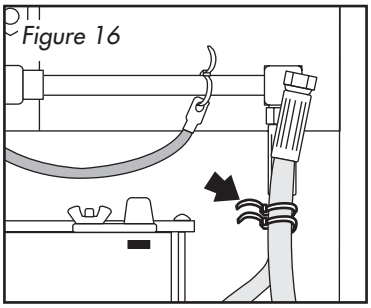
Figure 15



Cut and pry as necessary to remove the cross-tie. This clears room for you to use a wrench to attach the hydraulic cable to the fuse at the bottom of the column.

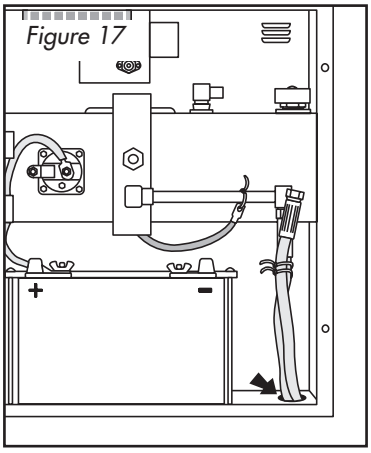
2. Clip the two tie-wraps that secure the hydraulic line inside the electrical cabinet. (Figure 16)

Figure 16



3. Put some shop rags under the electrical cabinet and base to absorb any hydraulic fluid which might spill during the next step. By working quickly, any loss of hydraulic fluid can be minimized.

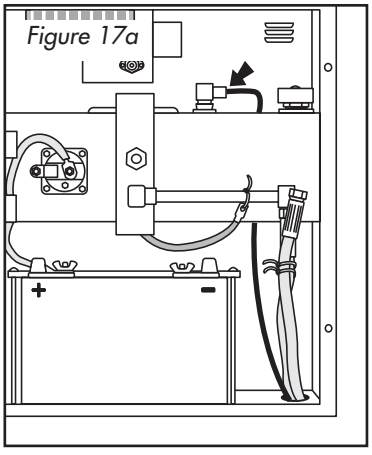
Figure 17



4. Route the hydraulic cable through the hole in the base of the electrical cabinet and attach it to the fuse (Figure 17).

No joint tape is used for this attachment. No torque value is given for this connection. However, it must be made tight enough to prevent hydraulic fluid loss during system operation. This will be checked during a later step.

Figure 17a

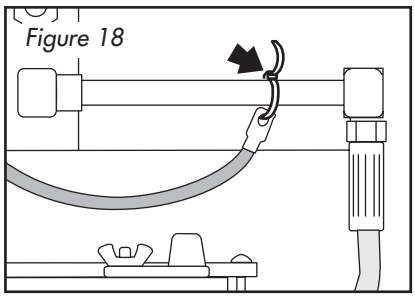


5. Route the hydraulic return tubing through the hole in the base of the electrical cabinet and attach it to the fitting on top of the hydraulic reservoir. Push the tubing into the fitting until it seats. (Fig. 17a)

Step 7: Major Electrical Connections

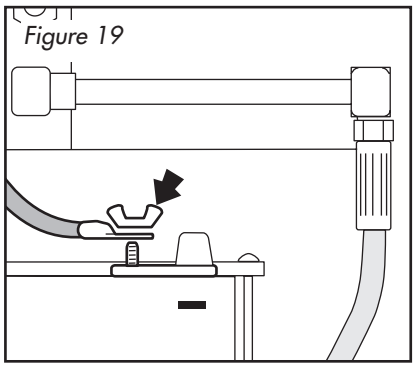
1. Connect the RED cable to the positive battery terminal. The terminal wing-nut should be tightened "finger tight" and should not be easily loosened.

Figure 18



2. Clip the tie-wraps which hold the battery ground cable to the hydraulic pipe assembly. (Figure 18) Attach the cable to the ground (negative) terminal of the battery. (Figure 19)

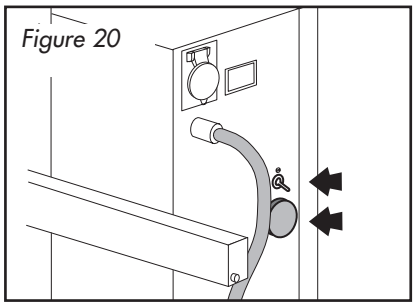
Figure 19



3. Inspect all main connections, and see that the battery has enough of charge to perform the remaining system tests.

4. On the left side of the electrical cabinet you will find the red emergency stop button. Pushing the knob in disconnects battery power. Above the knob is an on-off switch that operates the Control Circuit Breaker. (Figure 20)

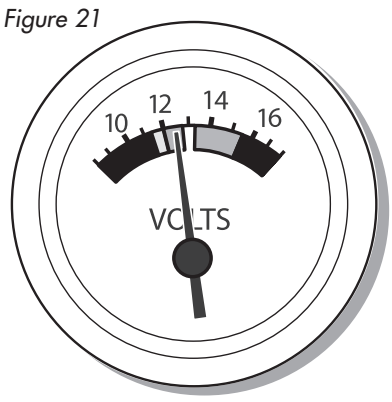
Figure 20



Pull Stop Button out and move circuit breaker switch to the up position.

5. The voltmeter on the electrical cabinet door should show "in the green." (Figure 21) If not in the green, the battery must be charged before further testing.

Figure 21



See the *About Batteries* (page 4) and *Battery Service* (page 16) for help in battery system trouble-shooting.

Step 8: Perform the initial hydraulic system check

1. Remove the C-clamp from the column.

2. Using the operator control, (Figure 22) press the UP button until the slide assembly is about half-way up the column.

3. If nothing happens when you press the UP button, including no motor or pump sound, then check the emergency stop button and on-off circuit breaker switch (Figure 21). It may be in the off position

To RESET the circuit breaker, first press it down, then pull it up until the switch lever stays up.

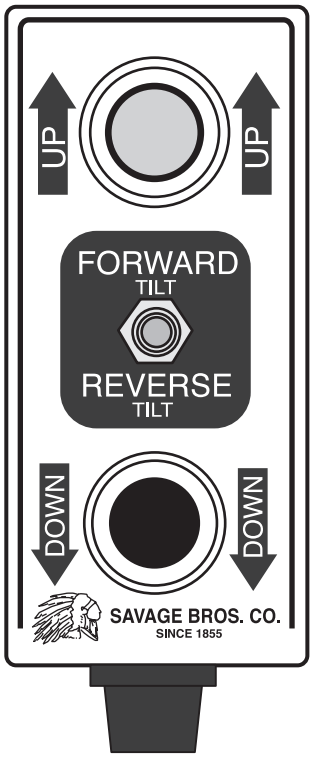


Figure 22

4. Check all hydraulic connections, both under the column and inside the electrical cabinet, for leaks. Tighten hoses and fittings, if required, to stop leaking. If you don't see any leaks, repeat the UP/DOWN lifting sequence several more times and check for leaks, again. When you are satisfied that all hydraulic connections are tight enough for operations, go on to the next steps.

5. Close the electrical cabinet door. Lock with allen wrench.

6. Lower the slide to the bottom of the column and re-install the C-clamp above the slider to keep it from moving on the column.

Note: If you press the UP button and you hear the motor and pump running but the slide assembly does not move up on the column, STOP!!! Either you have forgotten to remove the C-clamp or THERE IS NO HYDRAULIC FLUID IN THE PUMP RESERVOIR. Every Lif*TILT*ruk is run at the factory before shipment, so you can be certain it does work. However, at some point in shipment hydraulic fluid may have been lost. So if the slide assembly does not go up, check for fluid according to instructions in the Service section of this operating manuals.

Caution: Continued operation with the C-clamp on the column, or without enough hydraulic fluid, will damage or destroy the pump, electrical components, etc.

Step 9: Remove the Lif*TILT*ruk from the pallet

1. Cut the tie-down ropes holding the Lif*TILT*ruk to the pallet. (Figure 23)

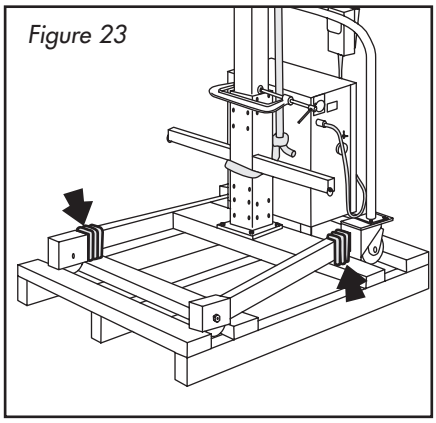


Figure 23

2. If you are using Method One (overhead crane) or Method Two (fork lift truck), use the overhead crane or forklift to lift the base assembly off the pallet, then remove the pallet.

USE CAUTION. Keep hands or feet from under the raised unit.

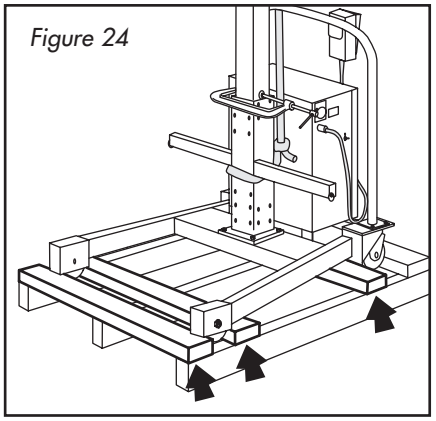


Figure 24

3. If you are using Method Three, remove the Lif*TILT*ruk as follows: (Keep tension on the web strap at all times).

4. Remove the pallet cross-ties. (Figure 24)

Cut the wood ties and use a pry-bar as required to remove them.

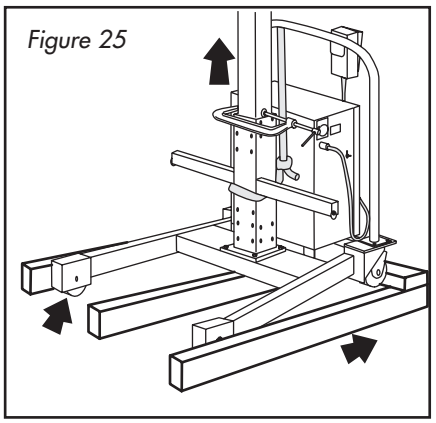


Figure 25

5. Lift the back of the unit with the sling system. Lift to keep the rear supported and place the front wheels on the floor. (Figure 25)

Carefully remove the rest of the pallet from underneath the Lif*TILT*ruk and lower the unit to the floor.

USE CAUTION. Do not put hands or feet under the raised Lif*TILT*ruk. Carefully slide the pallet from under the unit.

6. Remove the C-clamp and sling system.

Step 10: Install the lifting arms

1. Remove the screws, washers and retainer plates from the end of the right slider arm. (Figure 26)

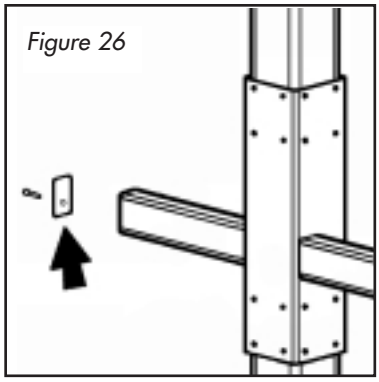
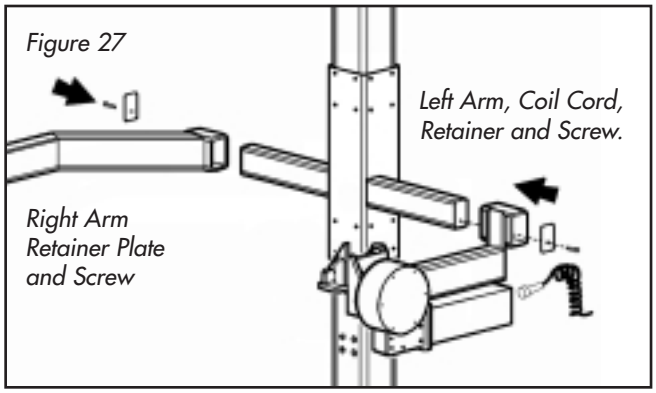


Figure 26

2. Locate the right and left arms. Slide them on the slider arms. (Fig. 27)

3. Install the retainer plate, washer and screw onto the end of the right slider arm. (Figure 27)

4. Install the retainer plate attached to the coil cord on the end of the left slider arm. Secure with washer and screw.



Step 11: Connect the tilt motor cable
(if equipped with Power Tilt)

Attach the connector plug on the coil cord to the tilt motor socket on the rear of the tilt motor housing. A keyway must be aligned before the connector will seat. (Figure 28) Tighten the threaded ring on the cable termination so the connector is securely joined.

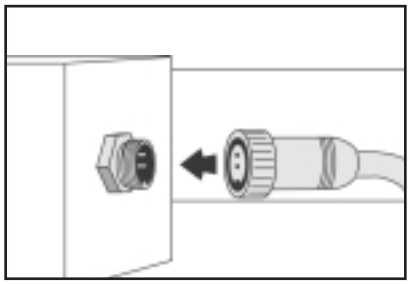


Figure 28

Step 12: Test the completed Lif*TILT*ruk

Use the operator control to raise the slide assembly to the top and bottom of the column and to tilt the tilt mechanism.

Do not continue pressing the UP button when the slider is at the top of the column. Continued pump operation with the slider at a stopped position can result in damage to the Lif*TILT*ruk hydraulic or electrical systems.

Installing adapter strap

Savage Bros. Co. containers are correctly designed for use with the Lif*TILT*ruk. If you are lifting other make containers, you will need adapter straps for lifting. If your Lif*TILT*ruk was shipped with bowl adapter straps, you should install the strap(s) at this time. (Figure 29)

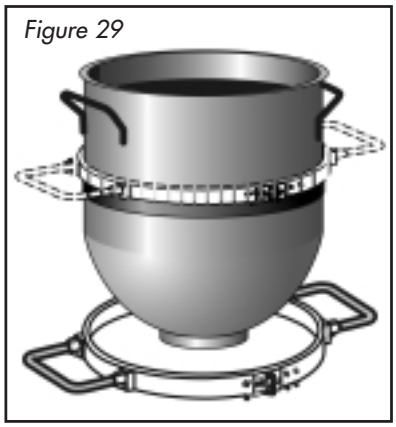


Figure 29

Savage Bros.Co. typically ships adapter straps for use with Hobart bowls and the instructions below are appropriate to those bowl types but would be similar for other manufacturer bowls.

Step-by-step:

1. Place the adapter strap above the mounting ring of the Hobart bowl.

2. Use the fasteners supplied to pull the strap tight against the bowl.

Note: While Hobart bowl adapters are usually required, there are other types, sizes and shapes of containers which require other configurations of adapter straps. The use of adapter straps may seem like a trivial matter, and in many cases you might be tempted to use the existing handles of your containers for lifting. IN MOST CASES, HANDLE PLACEMENT WILL NOT BE CORRECT FOR USE WITH THIS EQUIPMENT.

Handle placement:

Savage designs its adapters and specifies installation to establish the tilt axis close to the center-of-gravity of the container being used and the typical load lifted. Most container designs place the "normal" handles high on the container side, which means they are often far off the center-of-gravity axis. This puts enormous strain on the tilt system and can result in premature failure of the gears or the motor, making early replacement of these components necessary.

Ask for assistance

If you need adapter straps for special container sizes, types and loads, please call Savage Bros.Co. for assistance.

Our phone, fax and www numbers and addresses are on the back cover of this manual.

LifTILTruk Safety and Operation Decals

The LifTILTruk decals are important for personnel safety and as reminders for operator usage. They are not a replacement for reading and understanding the Owner's Manual.

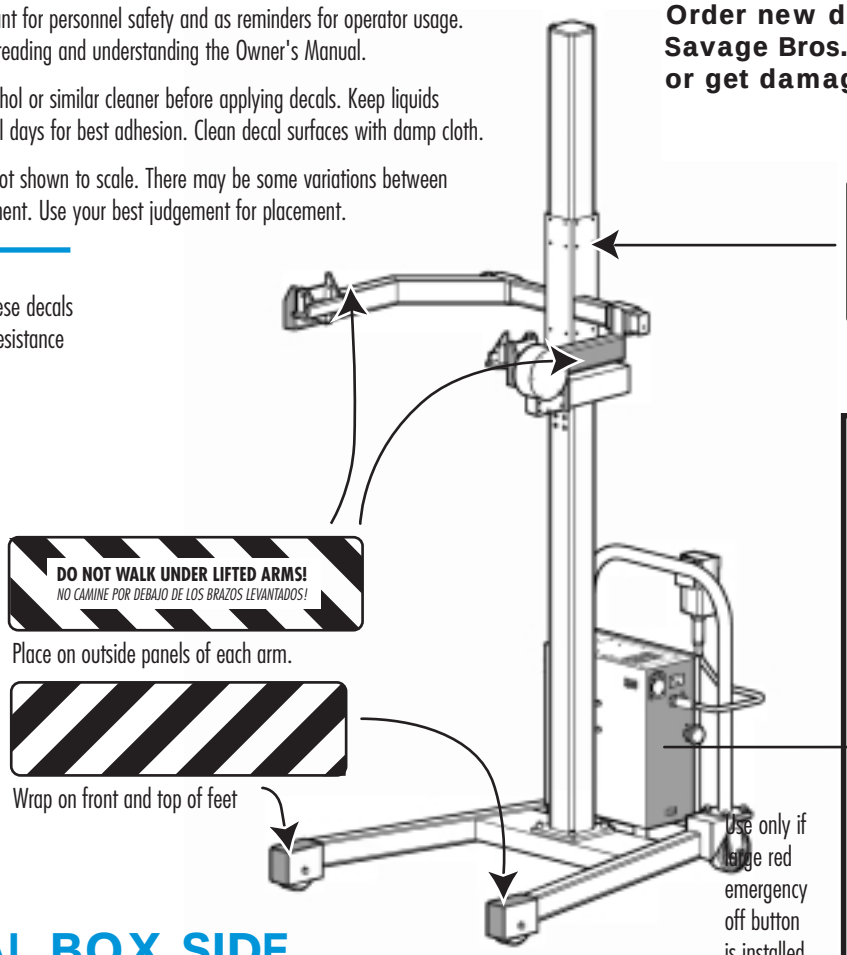
Clean surfaces with rubbing alcohol or similar cleaner before applying decals. Keep liquids away from the decals for several days for best adhesion. Clean decal surfaces with damp cloth.

Decals and LifTILTruk parts are not shown to scale. There may be some variations between these drawings and your equipment. Use your best judgement for placement.

Order new decal sheets from Savage Bros. Co. if yours wear out or get damaged.

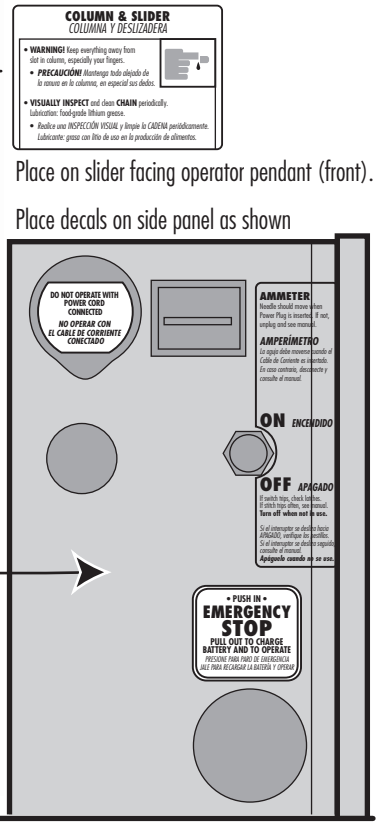
APPLY CAREFULLY

Permanent adhesive used on these decals is very strong for long life and resistance to abuse. Think before applying.



Place on outside panels of each arm.

Wrap on front and top of feet



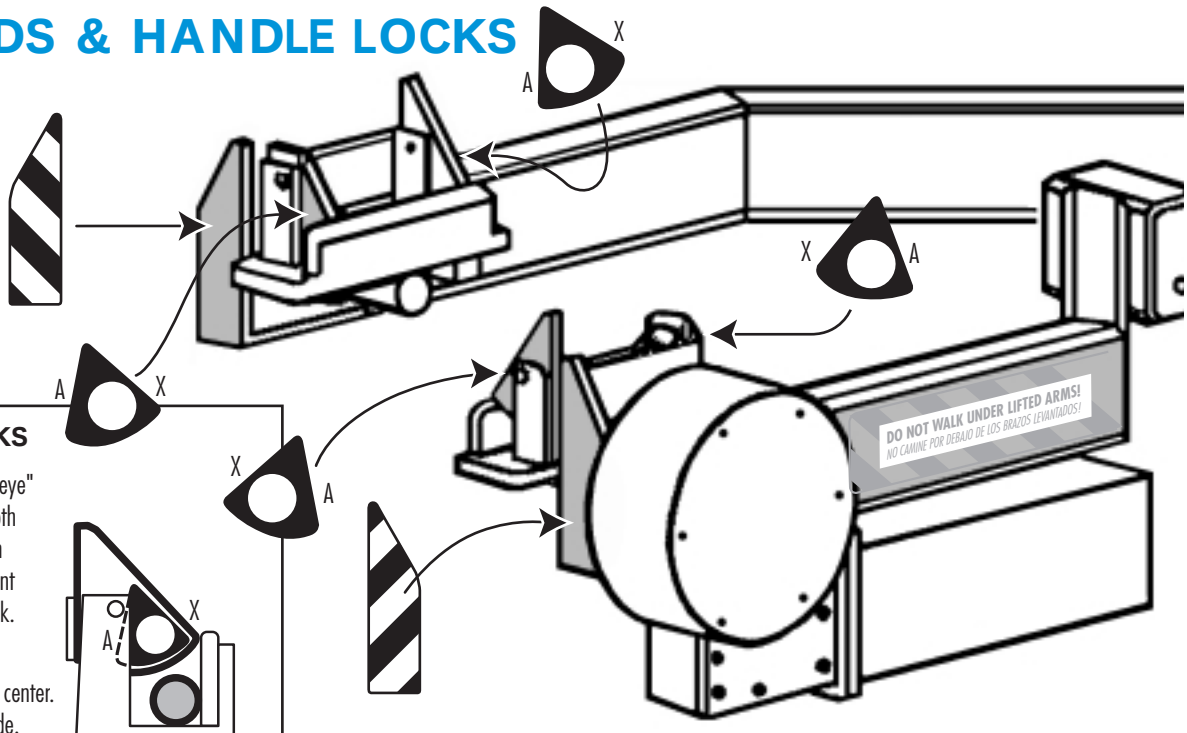
Place on slider facing operator pendant (front).

Place decals on side panel as shown

Use only if large red emergency off button is installed.

FRAME & ELECTRICAL BOX SIDE

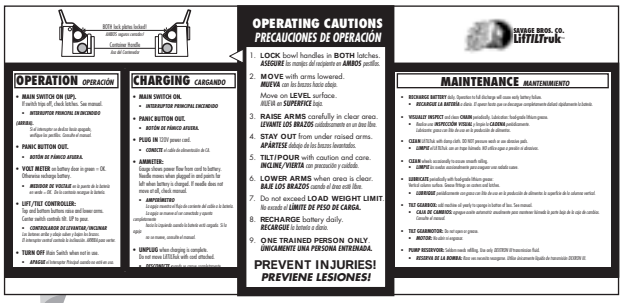
ARM ENDS & HANDLE LOCKS



HANDLE LOCKS

Put one red and white "eye" on each outer side of both handle locks so they can be viewed from both front and back of the LifTILTruk.

(See label sheet)
Place "X" corner toward center.
Tuck "A" under frame side.

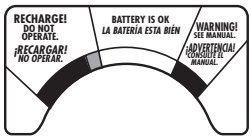


A B

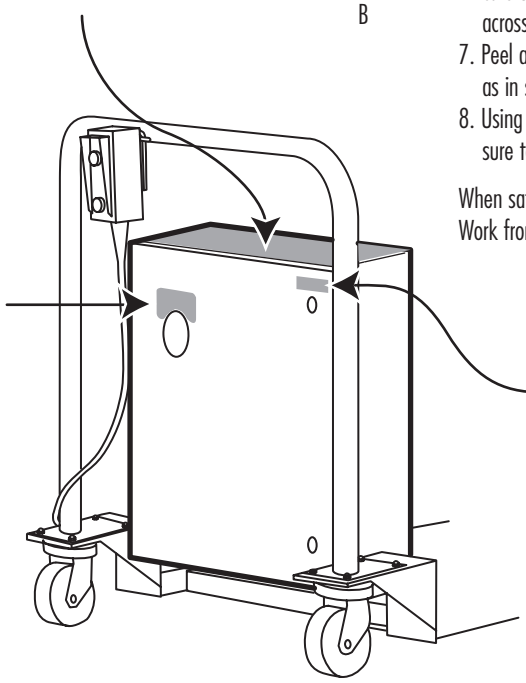
TOP OF CABINET

1. Cut entire label, with its backing, away from sheet.
2. Peel backing at (A) about 1 to 2 inches and, with adhesive up, crease backing paper.
3. Align right side of decal on top of battery box (B).
4. Smooth decal in place with light hand pressure moving from B to A.
5. Carefully apply adhesive at A starting in the center and working outward. Do not press down hard. This will hinder repositioning if it's necessary.
6. Lift lightly at B and peel backing to no more than half-way. Crease backing and carefully apply decal using light pressure with the outside of your hand moving across the center and gradually outward.
7. Peel almost all the backing off, leaving some for a hand grip. Smooth decal as in step 4 then peel remainder of backing and complete the application.
8. Using the outside of your hand, slowly spread outward from the center making sure to gradually work air bubbles toward the edges.

When satisfied the decal is flat and smooth, rub moderately with the side of your fist. Work from the center outward.



Place above volt meter, if so equipped.



BEFORE OPENING DOOR ***ANTES DE ABRIR LA PUERTA***

- **UNPLUG** AC power cord. • **DESCONECTE** *el cable de alimentación de CA.*
- **TURN OFF** circuit breaker. • **APAGUE** *el interruptor del circuito.*
- **Remove all jewelry.** • ***Quítese todas sus joy as.***

AFTER OPENING DOOR ***DESPUÉS DE ABRIR LA PUERTA***

- **READ** caution label on door. • **LEA** *la etiqueta de precaución en la puerta.*
- FOLLOW repair procedures in manual. • *SIGA los procedimientos de reparación en el manual.*

Place in upper right corner of battery box door.

ELECTRICAL BOX, TOP & FRONT

ELECTRICAL BOX, INSIDE

BATTERY HANDLING PRECAUTIONS ***PRECAUCIONES AL MANEJAR LA BATERIA***

The battery contains **sulfuric acid**.
Contact with eyes or skin can cause injury.
➤ **Always wash hands** after handling battery.
➤ If contact with acid, **FLUSH LIBERALLY** with **WATER.**
➤ Call doctor if irritation persists.

- Do not smoke around battery. Fumes can be flamable.
- Do not expose battery to open flame.
- WEAR SAFETY GLASSES.
- Follow instructions in manual when moving battery.
- Do not drop or tip battery. Call doctor if irritation persists.

La batería contiene ***ácido sulfúrico****.*
El contacto con sus ojos o piel puede causer lesiones.
➤ ***Siempre lávese las manos*** *después de tocar la batería.*
➤ *Si hay contacto con el ácido,* ***ENJUAGE ABUNDANTEMENTE*** *con* ***AGUA.***
➤ *Llame al médico si la irritación persiste.*

- *No fume cerca de la batería. Los vapores pueden ser inflamables.*
- *No exponer la batería al fuego directo.*
- *USE GAFAS DE SEGURIDAD.*
- *Siga las instrucciones en el manual al mover la batería.*
- *No deje caer ni incline la batería.*

Place on top inside of door.

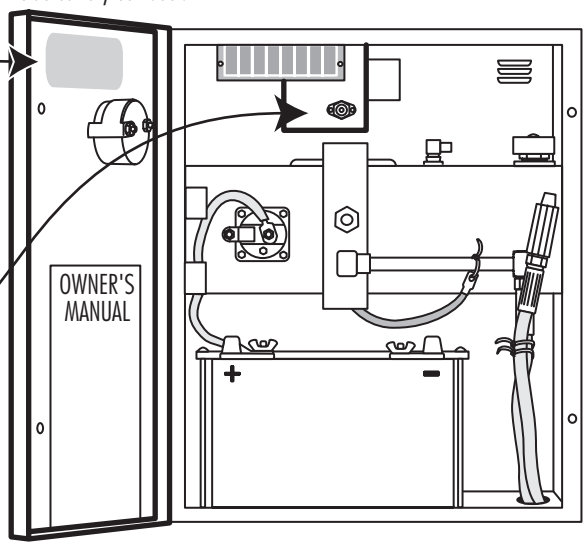
FUSE
FWA15A10F
FAST-BLO
32 VOLT
15AMP

AND

WARNING! ***PRECAUCIÓN!***
FOR CONTINUED PROTECTION AGAINST FIRE AND ELECTRIC SHOCK, REPLACE WITH SAME RATING AND TYPE OF FUSE.
PARA UNA PROTECCIÓN CONSTANTE CONTRA FUEGO Y ELECTROCUCIÓN REMPLACE CON UN FUSIBLE DEL MISMO CALIBRE Y TIPO.

Place on fuse panel.

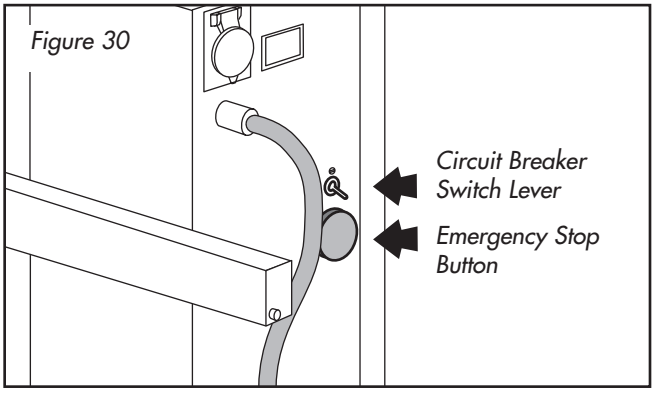
Inside battery box door.



Resetting the circuit breaker

NOTE: If the tilt button is not released when the tilt mechanism is at either end of its travel, the circuit breaker will trip to prevent damage to the tilt motor. In this case it is necessary to reset the circuit breaker.

Pull the circuit breaker switch lever up. The circuit breaker is now reset. (Figure 30).



Raising the Lif*TILT*ruk arms

1. Remove the operator's control pendant from the handle on the rear of the Lif*TILT*ruk.

2. Press the UP button to raise the slide on the column.

3. Release the UP button if the slide is at the top of the column. Holding the UP button down at this lift point will overheat the hydraulic pump. This will cause excessive wear on the hydraulic pump/motor unit.

Lowering the arms

1. Be certain there is nothing underneath the arms or the container which might keep the device from lowering safely. Keep hands away from chain and column slide.

2. Remove the operator's control from the handle on the rear of the Lif*TILT*ruk.

3. Press the DOWN button on the control. This releases hydraulic pressure and allows the slide to lower.

4. Release the DOWN button at any time to stop lowering further.

Note: Holding the DOWN button down after the slide is completely lowered has no effect on the system.

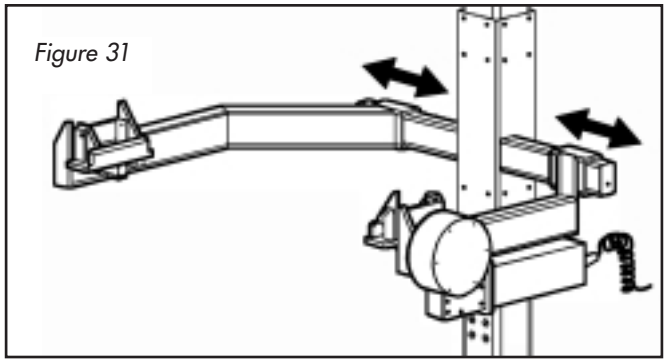
Adjusting the span of the lift arms

WARNING: the lift arms are free to move on the slide arms but are prevented from sliding off by a plate at either end of the slide arms. Be sure this plate is in place before adjusting the arms.

1. Determine the span of the arm spread you require.

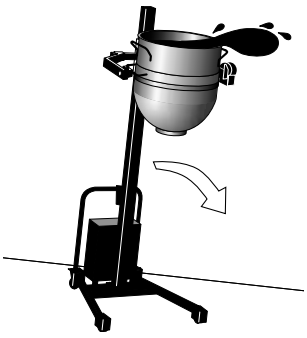
2. Wiggle and pull on the arm(s) as necessary to achieve the required span. The arms will stay in place at the point to which they are moved. (Figure 31)

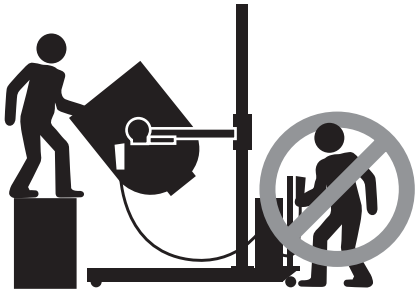
3. Move the arms so that both are the same distance from the column. This will keep your load centered and balanced. Moving a load which is off-center, especially if the arms are raised, could increase the possibility of the Lif*TILT*ruk tipping over.




DO NOT WALK UNDER LIFTED ARMS


DO NOT STAND ON ARMS


DO NOT MOVE WITH ARMS UP OR ON ANGLED SURFACE


ONLY ONE PERSON OPERATION

Lifting a container

WARNING: The lifted container can be any container, of any configuration, AS LONG AS IT IS EITHER A SAVAGE CONTAINER, OR ONE USING A SAVAGE ADAPTER STRAP. No other container, of any manufacture, should be lifted by a Lif*TILT*ruk.

1. Adjust the span of the arms on the slide cross so the latch mechanisms are directly under the container handles.

2. Adjust the spacing of the latch slide plates so the handle will be securely kept in place during any tilting operations.

3. Position the latches DIRECTLY UNDER EACH CONTAINER HANDLE.

4. Use the UP button on the operator's control to lift the latch mechanisms upward, until the latch lock plates have swung into position above BOTH HANDLES.

WARNING: Note the position of the latch locks in Figure 32. Each container handle must be ON its support and UNDER its latch lock plate. Any other condition is UNSAFE and can result in accidents or SERIOUS INJURY during tilting operations. Take the time to LOOK at both handles and be CERTAIN the handles are locked securely under the latch plates.

5. Use the operator's control UP button just enough to lift the container off of its mixer/stand or other device.

6. Use the rear handle to pull the Lif*TILT*ruk far enough from the stand or other device so the container is clear of the device.

7. Use the DOWN button on the operator's control to lower the slide, arms and container to the bottom of its travel before transporting the container to any other shop location.

WARNING: NEVER TRANSPORT A CONTAINER UNLESS THE LIF*TILT*RUK COLUMN SLIDE IS IN THE FULL DOWN POSITION.

Pouring from a container

1. Make certain handles are locked in latches. (Figure 22)

2. Position lifted bowl so that lip of bowl is approximately centered above the receptacle to prevent mispouring outside of receptacle.

3. Use the toggle switch on the operator control pendant (or the hand crank if so equipped) to rotate the lifted bowl forward. Smoothly pour the contents of the bowl making sure to prevent spilling. When pouring is complete, return bowl to upright position using the toggle switch or hand crank.

Removing a container from the Lif*TILT*ruk

1. Raise the container until it is positioned directly over the equipment, dolly or other support required.

2. Tip the latch lock plates upward to the position shown in Figure 33. The latch lock plates are balanced to stay in this position until the container is freed from the latch mechanisms.

3. Use the operator's control DOWN button to SLOWLY lower the container onto its support.

4. Keep pressing the DOWN button so the Lif*TILT*ruk slide and arms "clear" the container handles.

5. Pull the rear handle of the Lif*TILT*ruk to move away from the container.

Figure 32

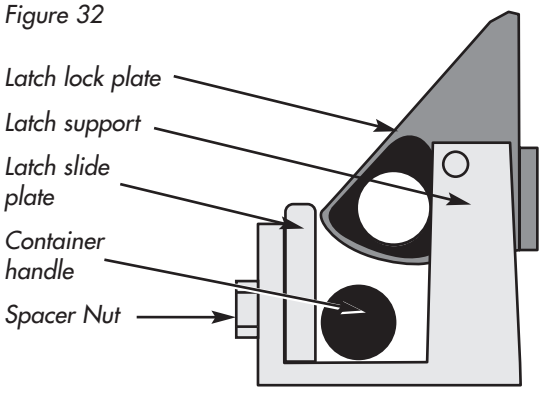
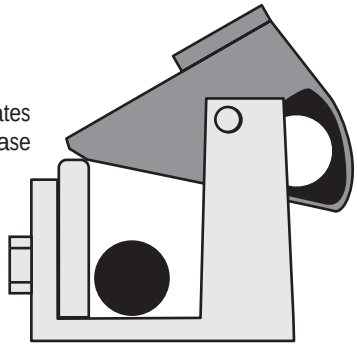


Figure 33

Tip both latch lock plates to this position to release container handles.



WARNING

Unsafe use of the Lif*TILT*ruk may cause serious injury or death. Operators and maintenance personnel must read this manual and be sure they understand its contents before operating, inspecting or carrying out maintenance to the Lif*TILT*ruk. This manual should be kept near the Lif*TILT*ruk for reference and be periodically reviewed by all personnel who come into contact with the Lif*TILT*ruk.

Warranty

Savage Bros.Co. warrants the Lif*TILT*ruk™ for a period of one year from delivery of equipment, for all parts and labor performed in our shop.

This warranty does not include the electrical storage battery shipped with the unit. When replacing the battery, specify a deep cycle or marine battery which can withstand repeated deep discharging.

Warranty claim procedure

1. Notify Savage Bros.Co. of part required.

2. Savage Bros.Co. will invoice and ship the part to the customer based on the customer's established credit terms with us (i.e. net 30 or COD). Savage will absorb the cost of standard ground transportation. If priority transportation is requested, the customer shall be responsible for the cost difference.

3. The customer shall return the failed part to Savage Bros. Co.

4. Upon inspection of the failed part, Savage will either issue full credit for the replacement part under the terms of the warranty, or will advise the customer as to the reason the warranty cannot be honored.

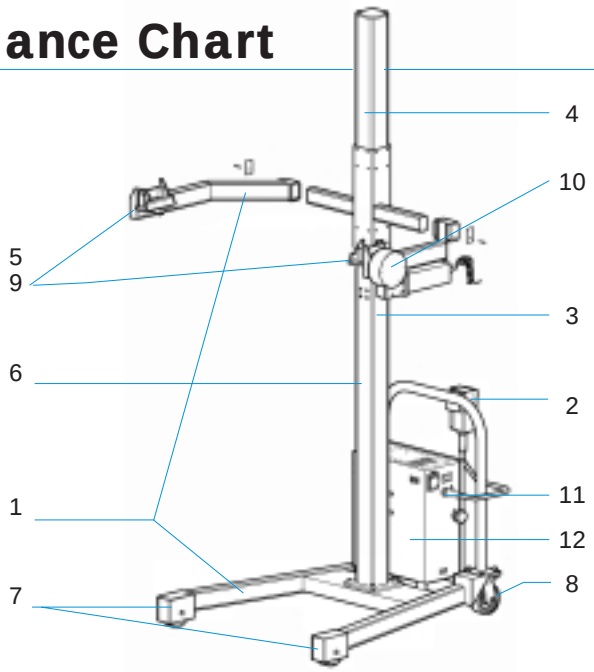
5. Any acquisition of parts or labor directly by the customer will not be honored under the terms of this warranty unless approved in advance by Savage Bros. Co.

Savage Bros.Co. reserves the right to make modifications, improvements and other changes in their machines. The information in this manual represents correct information for machines in manufacture at the time the manual was written. The manual is NOT intended for use with Savage machines made prior to the production run indicated by the date of manufacture on the front cover of this manual.

For machines made prior to this date, the manuals provided with those machines should be considered primary reference material.

When ordering parts or requesting service information, please have this manual at hand so you can give us the date of manufacture and serial number of the machine associated with this manual.

Periodic Maintenance Chart



No.	Item	Service action	Interval
1	Painted and plated surfaces	Wipe with damp cloth to keep clean	Daily
2	Operator's control and switch covers	Wipe with damp cloth to keep clean	Daily
3	Chain	Check for looseness, rust or corrosion	Daily
		Lubricate	Weekly
4	Chain idler wheel (inside column, guiding chain)	Check for looseness or wobble (indicates worn or damaged bearing)	Daily
5	Latch mechanisms	Check for free movement	Daily
6	Column	Coat lightly with grease**	Weekly
7	Wheels	Lube with grease gun**	Monthly
8	Caster locks	Lube with grease gun**	Monthly
9	Tilt latch pivots	Lube with grease gun**	Monthly
10	Tilt gearbox	Check and refill as needed with 10W30 oil	Annually or more frequently
11	Battery terminals	Wire brush to clean bright surface*	When changing battery
12	Battery cable ends	Wire brush to clean bright surface*	When changing battery

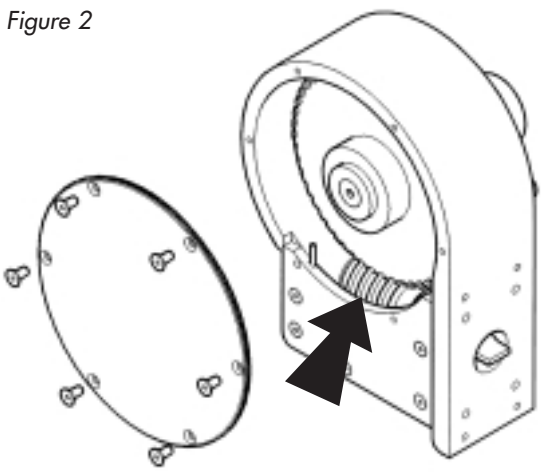
* Follow specific instructions in Battery Service section of this manual, pages 18-19.
** Any food grade lithium grease is acceptable. Do not use any type of grease other than lithium grease -- other greases will be too sticky.

NOTE: Do not "wash down" the Lif*TILT*ruk at any time. Early failure of the chain, idler mechanism and electrical components can result. ONLY WIPE CLEAN with a damp rag.

Tilt Gearbox Lubrication

1. Remove the four screws holding the gearbox cover on the gearcase.
2. Check to be sure that worm gear makes contact with oiled sponge. Add 10W30 (or 10W40) motor oil and/or replace sponge as necessary.
3. Use a brush or other applicator to put food grade lithium grease on the worm ring and pinion gears where they mesh. (Figure 2)
4. Replace the gearbox cover, seal with silicone caulk or similar, replace and tighten the four screws holding it to the gearcase.

Figure 2



Battery charging - inside the cabinet

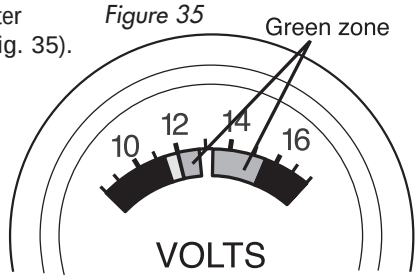
1. Plug in a common heavy-duty 3-wire extension cord from a 110-volt 60Hz service outlet (or to other voltage source if listed on plate on side of cabinet) to the charging socket on the Lif*TILT*ruk cabinet.

2. Observe the ammeter on the side of the cabinet. (Fig. 34) The needle should rise to indicate that current is being delivered from the on-board battery charger. The red button (emergency stop) must be pulled out to charge the battery.

Figure 34

3. Observe the voltmeter on the cabinet door (Fig. 35). The needle should be moving into the green zone, indicating that charging voltage is being delivered from the charger to the battery. The on-off circuit breaker switch must be in the up position for the voltmeter to function. If the above conditions are not met, continue reading in this section to determine possible reasons for the lack of charge.

Figure 35



Battery charging - outside the cabinet

1. Remove the battery from the electrical cabinet using the instructions in *Replacing the Battery* (page 19).

2. Clean the battery terminals using a wire brush until clean, bright metal is exposed.

3. Use the instructions supplied with your charger to hook up the charging cables and set the correct charging rates for the battery.

4. Check the voltmeter on the charger to be sure it is reading above 14 volts and below 16 volts. If this condition is met then the battery is being charged correctly. If outside of these values, either the charger is at fault or the battery requires replacement. Check the testing and service sections of this manual to determine the correct action to take.

Note: Use the *Battery Charging Time* chart (Figure 36) to determine the approximate length of time required to charge a deeply discharged battery.

Servicing the Battery

Testing the Battery

As long as the Lif*TILT*ruk seems to be "working OK" – it does the work you expect it to do and in a reasonable amount of time between chargings, there is no reason to test the battery.

However, if it seems as though the battery doesn't have the power you expect, or if it seems to require frequent recharging, then you should test the battery for its ability to take and keep a charge.

Determining the state of charge of the Battery

Measure the battery voltage across the terminals using a digital voltmeter capable of reading to 1/100th of a volt. The state-of-charge chart (Figure 37) tells you the actual state-of-charge of the battery.

Conclusions: If the battery is between 90 and 100% state-of-charge per the chart and you believe your lift times are getting longer, or the battery seems to require frequent recharging, then the battery is probably being "overworked." Perhaps the load you are lifting is excessive for the size Lif*TILT*ruk you are using or there is excessive friction between the column and slide. Be especially certain the column is properly lubricated to extend battery life.

If the battery is below 90% state-of-charge, the battery must be recharged before any conclusions can be reached.

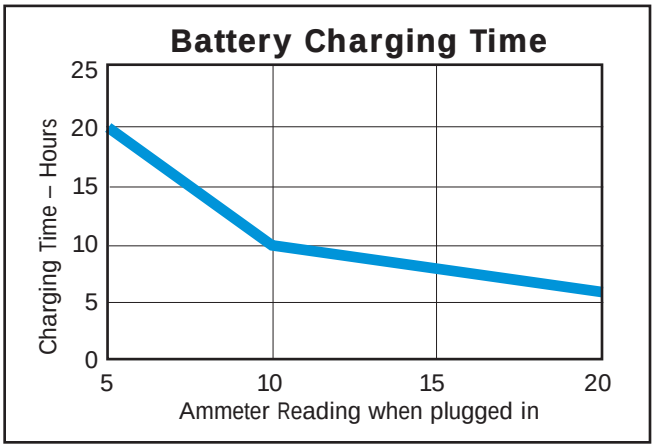


Figure 36

WORK SMART
WORK ALERT

CAUTION – only a qualified electrical technician should perform all electrical checking, repairs or replacement.

Replacing the Battery

1. Be sure the charging cable is NOT plugged into the charging socket on the electrical cabinet.

2. Push the circuit breaker switch so it is in the down position to turn off current flow in the Lif*TILT*ruk circuits.

3. Push in the red emergency button.

4. Put on Z87.1 specification full coverage safety goggles or face shield.

5. Use the allen wrench to open the electrical cabinet door.

6. Remove the wing nut from the negative terminal of the battery. Tuck the cable out of the way so it cannot touch the negative battery terminal.

7. Remove the wing nut from the positive terminal of the battery. Tuck the cable out of the way so it cannot touch the positive battery terminal.

8. Remove the long bolts holding the battery holddown to the top of the battery. Remove the battery holddown.

9. Lift the battery upward slightly, then out of the electrical cabinet.

10. Replacement of the battery is a reversal of the above steps.

Determining the ability of the Battery to take a charge

1. Give the battery a "normal, overnight charge" of nine (9) hours or more using the charger on-board the Lif*TILT*ruk.

2. Measure the battery voltage using a digital voltmeter capable of reading to 1/100th of a volt .

After comparing with the state-of-charge chart (Figure 37) and the battery is not between 90 and 100% state-of-charge, then one of two conditions is possible:

a. The battery is getting near to the point of replacement.

b. The battery charger may be at fault.

3. Check the charger for efficiency using instructions in *Testing the Battery Charger* at right.

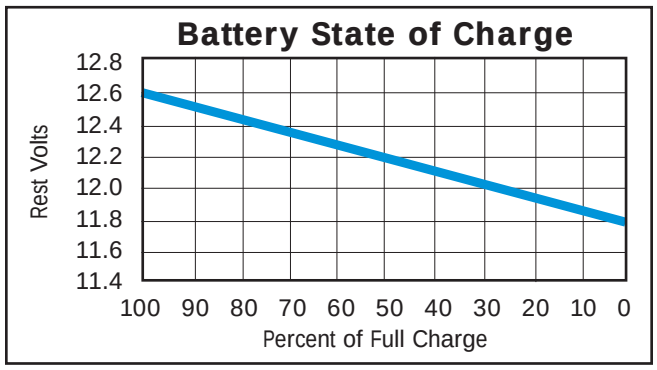


Figure 37

Servicing the Battery Charger

Testing the Battery Charger

1. Install a fully charged battery into the Lif*TILT*ruk. (See *Replacing the Battery* at left.) It must be a new or nearly new battery which has been charged overnight using an external charger, not the one on the Lif*TILT*ruk.

2. Measure the battery voltage on this fully charged battery using your digital voltmeter reading to 1/100ths of a volt. In other words, be certain it is indeed, fully charged.

3. Look at the voltmeter on the electrical cabinet door to be certain it is in the green. If it does not show in the green, reset the circuit breaker (see *Resetting the Circuit Breaker*, page 11) and/or pull out the emergency stop button.

If you have a fully charged new battery installed and you cannot get a green reading on the voltmeter, then either the voltmeter is at fault or some other part of the circuitry is at fault. The system will have to be diagnosed by a qualified electrician.

4. If the voltmeter is in the green, attach the power cord to the charger socket on the Lif*TILT*ruk.

5. With the battery now on charge, touch the leads of your digital voltmeter to the terminals of the battery. The digital voltmeter should register more than the battery voltage measured in step 2 above. If it does not register above measured battery voltage, the system needs to be checked by a qualified electrician.

6. If the digital voltmeter shows sufficient charging voltage as in step 5 above, unplug the charging cord from the charging socket.

7. Remove the battery using instructions in *Replacing the Battery* at left.

8. Install a battery which is deeply discharged or almost at that point. (You want a battery which *really* needs a charge.)

9. Plug the charging cord back into its socket .

10. Measure the voltage across the battery terminals. The voltage should be above 12 volts, indicating that the battery is on charge.

11. Look at the ammeter on the side of the electrical cabinet. It should show a charging rate of approximately 10 to 15 amperes.

Conclusions: If the battery charger shows that it can provide 15 volts of charging power on a charged battery, and 10 to 15 amps of current flow on a discharged battery, then the charger is performing correctly. If the battery you are testing cannot be charged by this charger, then the battery is at fault and needs replacing. Dispose of old batteries properly.

The following tests should be performed and interpreted by a **qualified electrical technician**.

Replacing the battery charger

Required tools

- 5/16" Allen wrench.
- Medium flat blade screwdriver.
- 7/16" socket with 3" extension or combination wrench.
- 1/2" and 9/16" wrench.
- Pencil and paper to make notes about disassembly.

Prepare to remove old charger

1. Unplug the power supply cord.

2. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

3. Open the electrical cabinet door using the allen wrench.

4. Remove the battery: Disconnect the battery negative (–) cable and tuck safely out of the way so it cannot accidentally touch the (+) terminal. Disconnect the positive cable from the battery. Remove the battery hold down bracket. Hold the screws from the top and remove the nuts and washers from the screws on the bottom of the cabinet.

5. The negative (black) wire from the battery charger is connected to the (–) battery cable connection screw on the bottom of the pump housing. Disconnect it.

6. Remove the 4 screws holding the power inlet to the side of the cabinet. Pull the inlet far enough out to gain access to the screw terminals where the black and white wires are secured. Note placement of these wires for reconnection. Disconnect the wires. It is not necessary to remove the green grounding wire.

7. Locate the ammeter, the rectangular shaped meter next to the power inlet on the side of the cabinet. Inside the cabinet, the ammeter has plastic tabs on its sides. Squeeze these tabs inward while pushing the bottom of the ammeter outward. Disconnect only the orange wire from ammeter to the charger.

Remove the battery charger assembly

1. Remove the 2 corner mounting screws holding the terminal strip to the front of the charger bracket. Let the strip hang by its wires. Do not remove any wires from the terminal strip.

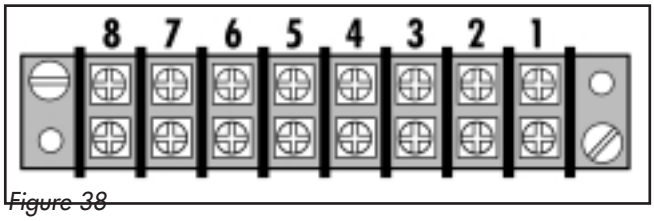


Figure 38

2. Remove the 4 nuts that fasten the charger bracket to the top of the cabinet. One of the nuts (back left) holds green ground wires. The nuts and wire(s) will need to be reinstalled when installing the new charger. The nut in the back by the power inlet can be accessed through the hole of the power inlet.

3. It should not be necessary to remove the hydraulic pump.

Install the replacement charger

1. Mount the replacement charger. Attach the green ground wires. Secure the 4 nuts that fasten it to the top of the cabinet.

2. Mount the terminal strip to the front of the charger bracket.

3. Connect the charger wires (120 Volt = black/white, 230 Volt = black/red) to the terminals of the power inlet. Tighten all connections. Replace the power inlet into the round hole and attach screws.

4. Connect the orange wire to the ammeter terminal. Replace the ammeter into the rectangular hole and snap in place.

5. Connect both the negative (black) battery power cable and the charger negative (black) wire together to the battery cable connection screw on the bottom of the pump housing.

6. Install the battery, negative (–) terminal to the right. Install the battery hold down bracket; do not over tighten. Connect the power cables to the battery, **positive cable first**. Be careful not to touch the negative cable to the positive terminal as it could create a spark and cause burns or an explosion.

7. Close and secure the door of the electrical cabinet before plugging the unit in.

Servicing the Voltmeter

Testing the Voltmeter:

1. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

2. Open the electrical cabinet door using the allen wrench.

3. Use a DC digital voltmeter to determine if there is voltage between the two voltmeter terminals:

   If the measured voltage is **10 volts or more**, but the meter still continues to point to the far left, replace the voltmeter.

4. If **no measured voltage** between the terminals, put the negative test probe onto the negative (–) battery terminal and test with positive probe for voltage greater than 10 volts on:

   4a ...positive (+) battery terminal. If yes, proceed to 4b. If no, the battery is discharged or failed. Try recharging it.

   4b ...back terminal of emergency stop switch. If yes, proceed to 4c. If no, disconnected (+) battery cable.

   4c ...front terminal of emergency stop switch. If yes, proceed to 4d. If no, emergency stop switch is not pulled out.

   4d ...right solenoid power post. If yes, proceed to 4e. If no, disconnected emergency stop switch cable.

   4e ...terminal #4 on the terminal strip (Figure 38). If yes, proceed to 4f. If no, disconnected or broken wire from the right solenoid post to terminal #4.

   4f ...top terminal on the circuit breaker. If yes, proceed to 4g. If no, circuit breaker is off or faulty. Reset the circuit breaker and test again.

4g ...terminal #3 on the terminal strip.
If yes, proceed to 4h. If no, disconnected or broken wire from the top terminal on the circuit breaker to terminal #3.

4h ...positive voltmeter terminal. If yes, go to Step 5.
If no, disconnected or broken wire between terminal #3 on strip and positive voltmeter terminal.

5. Put the positive test probe onto the positive battery terminal. Test with negative probe for voltage greater than 10 volts on:

5a ...the bare metal mounting strap of the solenoid.
If yes, proceed to 5b. If no, disconnected or bad connection at the battery negative cable. (Check both ends of cable for tightness, etc.)

5b ...terminal #8 on the terminal strip.
If yes, go to 5c. If no, disconnected or broken wire from the negative battery cable terminal at the pump base to terminal #8 on the strip.

5c ...disconnected or broken wire to terminal #8 on the strip to the negative voltmeter terminal.

Replacing the Voltmeter

1. After performing the above tests and determining that the voltmeter requires replacement, remove the wing nut from the negative battery terminal.

2. Remove the cable from the battery negative terminal and tuck them safely out of the way so they cannot accidentally touch the battery terminal.

3. Remove the two nuts which hold the voltmeter clamps to the electrical cabinet door.

4. Remove the two nuts which hold the voltmeter to the leads to the voltmeter.

5. Remove the voltmeter from the electrical cabinet door.

6. Installation is a reversal of the above procedure, with the caution that the voltmeter wires must be installed on the correct terminals of the voltmeter (if the voltmeter reads reverse voltage... the terminal connectors should be reversed.)

Servicing the Circuit Breaker

Testing the Circuit Breaker

1. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

2. Open the electrical cabinet door using the allen wrench.

3. Remove the wing nut from the negative battery terminal.

4. Remove the cable from the battery negative terminal and tuck safely out of the way so it cannot accidentally touch the battery terminal.

5. Attach a continuity tester or ohmmeter to the circuit breaker terminals.

6. Push the toggle switch of the circuit breaker down to reset. No continuity: raise the toggle to the full up position. Verify continuity. Resistance less than 0.3 ohms.

If the circuit breaker does not need replacement (that is, it tests OK) then a qualified electrician will have to do a circuit trace using the electrical diagram to determine which circuit in the system is open or otherwise defective.

Replacing the Circuit Breaker

1. If the circuit breaker is tested as above, and requires replacement, remove the battery following instructions in *Replacing the Battery* (page 19). (With battery removed, servicing the circuit breaker is much easier).

2. Remove the wires from the circuit breaker terminals.

3. On the outside of the electrical cabinet, remove the nut and screw holding the unit in place.

4. Remove the circuit breaker.

5. Replacement is a reversal of the above four steps.

Servicing the Ammeter

Testing the Ammeter

1. If the ammeter is suspected to be faulty, install a discharged battery in the Lif*TILT*ruk using the instructions in *Replacing the Battery* (page 19).

2. Connect the battery charging cable to the socket on the electrical cabinet so the battery is being charged.

3. Look at the ammeter and its charge rate to determine if the meter is faulty and should be replaced.

Replacing the Ammeter.

1. Remove the charging cable from the charging socket.

2. Turn the circuit breaker to OFF position (DOWN).

3. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

4. Open the electrical cabinet door using the allen wrench.

5. Remove the wing nut from the negative battery terminal.

6. Remove the cable and wire from the battery negative terminal and tuck them safely out of the way so they cannot accidentally touch the battery terminal.

7. The ammeter is retained in the electrical cabinet by two tabs on either side of the meter. Squeeze these tabs with your fingers and tilt the meter out of the cabinet.

8. Pull the ammeter clear of the cabinet and remove the wires from their terminals.

9. Put the wires onto a new ammeter, being certain the wires are installed in the identical locations from which they were removed.

10. Tilt the meter back through the hold in the cabinet and push it into place until the tabs lock it securely into the cabinet.

11. Reverse steps 1 though 6, above, to complete the installation of the meter and return the Lif*TILT*ruk to service.

SERVICING the Lif*TILT*ruk

Servicing the Inline Fuse

If your Lif*TILT*ruk has an inline fuse, it should be checked whenever the battery charger does not move the voltmeter needle into the green charging zone when the battery is on charge.

1. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

2. Open the electrical cabinet door using the allen wrench.

3. Locate fuse holder on the top center of the battery charger plate, and remove the fuse.

4. If the fuse is not blown, have a qualified electrician perform any tests required to troubleshoot the charging system.

5. If the fuse is blown, replace it with a new fuse.

6. If the fuse blows frequently in service, a qualified electrician should check the system circuits to locate the source of any electrical trouble.

Raising and Lowering the Lif*TILT*ruk for Service

The Lif*TILT*ruk must be raised and blocked off the floor before any service can be performed on the wheels or casters, or the column and related hydraulic systems.

1. Use an overhead crane or fork lift truck to first lift the rear of the Lif*TILT*ruk, the electrical cabinet side.

2. With the Lif*TILT*ruk lifted and tilting forward, put a 4"x4" or 6"x6" block of wood underneath the frame. The block must be long enough to support BOTH LEGS OF THE FRAME.

3. Tilt the Lif*TILT*ruk backwards and slide another block, identical to the rear block, under the front of the frame legs. Servicing to the wheels, casters, column or associated hydraulic parts can now be performed.

4. Reverse steps above to remove the Lif*TILT*ruk from its blocked-up position, front wheels first then rear casters, and return the unit to the floor.

Replacing Pendant Switches and Switch Components

Replacing the Up/Down Pushbuttons

1. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

2. Open the electrical cabinet door using the allen wrench.

3. Remove ground cable from the battery.

4. Unscrew the protective plastic cover from front of the button.

5. Loosen the lock ring holding the button to the pendant case.

6. Remove screws from the cover of the pendant case and remove the cover.

7. Remove the brass screw holding the contact block to the back of the push-button.

8. If replacing the contact block, transfer the wires from the old contact block to the new one.

9. Remove the lock ring from the front of the pushbutton and remove the pushbutton.

10. Reassembly is a reversal of the above procedure.

Replacing the Toggle switch

1. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

2. Open the electrical cabinet door using the allen wrench.

3. Remove ground cable from the battery.

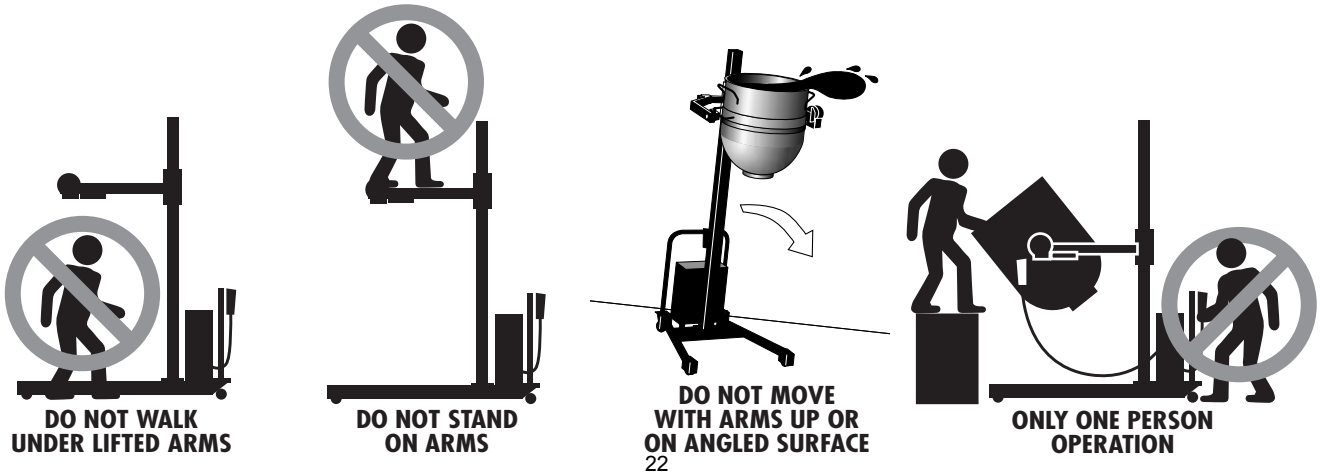
4. Loosen the locknut on the toggle switch that holds it in the face of the pendant.

5. Remove screws from the cover of the pendant case and remove the cover.

6. Transfer the wires from the old toggle switch to the new one.

7. Remove the locknut from the front of the toggle switch and remove the old toggle switch from the pendant.

8. Reassembly is a reversal of the above procedure.



Checking or Adding Hydraulic Fluid

1. Lower the slide assembly to the bottom of the column.

2. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

3. Open the electrical cabinet door using the allen wrench.

4. Locate the hydraulic reservoir filler cap in the top of the motor/pump assembly (Figure 39). Remove the cap.

5. Use a mirror to look down into the filler hole of the reservoir The hydraulic fluid should be at the level of the baffle plate inside the filler hole. If the fluid is not at this level, fill the reservoir to that level using **MOBIL DTE FM 32** Food Grade Hydraulic Fluid. A non-food grade equivalent fluid may be substituted. (An "old-fashioned oil can" with a thumb-style pumping device is probably the handiest way to put fluid into the reservoir.)

DO NOT USE AUTOMOBILE TRANSMISSION FLUID!

6. Reverse steps 1-5 above to complete the filling operation.

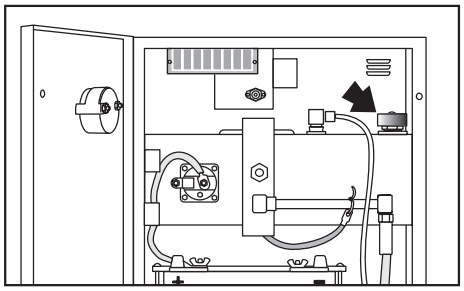


Figure 39

Removing and Replacing the Column

Removal of column

1. Block the Lif*TILT*ruk up according to instructions in *Raising and Lowering the* Lif*TILT*ruk *for Service* (page 22). Make sure the column slider is lowered all the way before continuing.

2. Press the DOWN control button while pulling outward on the lift chain. This will force the hydraulic piston to the very bottom of the cylinder. Press the button only as needed.

3. Put the circuit breaker switch into the OFF position.

4. Open the electrical cabinet door using the allen wrench.

5. Remove the wing nut from the negative battery terminal.

6. Remove the cable from the terminal and tuck it safely out of the way so it cannot accidentally touch the battery terminal.

7. Remove the hydraulic return tubing from its fitting on top of the reservoir. To disconnect, push in the tubing and the ring, hold pressure on the ring and pull the tubing out. Pull the tubing through the hole in the electrical cabinet until it is free, underneath the frame.

8. Put something under the column to catch fluid which might spill out when you remove the hydraulic hose and fuse.

9. Remove the hose end from the hydraulic fuse.

10. Pull the hydraulic hose up into the electrical cabinet and put the end of the hose above the top of the pump. This will keep hydraulic fluid from continuing to leak from the hose.

11. Remove the hydraulic fuse from its fitting on the end of the cylinder in the column.

12. Take up slack in the sling system so the column is fully supported by the web strap.

13. Remove the four nuts which hold the column to the base in the frame.

14. Using an appropriate sling and lifting system, pull the column upward, free of the base, while carefully leading the hydraulic return tubing out of the hole in the base.

The column is now free from the base. Service on the chain, or hydraulic components can now be performed.

Replacement of column

15. Reverse steps 13 and 14 above to put the column back on the base and tighten the nuts on the column studs.

16. Put Teflon® hydraulic system sealing tape on the hydraulic fuse. Be sure the arrow on the fuse points toward the right angle fitting.

17. Install the fuse into the right angle fitting on the end of the hydraulic cylinder. Tighten the fitting snugly. (No torque value is given for this fitting. It must be tight enough to prevent leaks. You will check for leaks at a later step.)

18. Bring the hydraulic hose out of the cabinet, through its hole and under the base.

19. Attach the hose fitting to the hydraulic fuse. Tighten it snugly. You will check for leaks at a later step.

20. Attach the hydraulic return tubing to the fitting on the reservoir inside the electrical cabinet.

21. Remove the filler cap from the hydraulic reservoir.

22. Add enough Dexron II or Dexron III hydraulic fluid to the reservoir to bring the fluid level to within 1/2" (13mm) of the top of the reservoir. (See instructions, below.)

23. Replace the filler cap, finger tight.

24. Reattach the negative battery cable and wire to the negative terminal of the battery.

25. Install the negative battery terminal wing nut finger tight.

26. Pull the circuit breaker switch into the up (ON) position.

27. Use the UP and DOWN buttons on the pendant to move the slide its full travel, up and down on the column, several times.

28. Look at the joints between the right angle fitting, the hydraulic fuse and the hydraulic hose to see if any joints are leaking. If any leak, tighten them. Repeat these steps until you are satisfied that the full travel of the slide is OK and that no leaks are in the system.

29. Lower the slide all of the way to the bottom of its travel.

30. Remove the filler cap to the hydraulic reservoir and check the level of the fluid. If required, add to the reservoir until the fluid is at the correct level.

31. Replace the filler cap, finger tight.

Reverse steps as required to put the Lif*TILT*ruk back on the floor, now ready for use.

Replacing the Hydraulic Cylinder Seal

Refer to Figure 40.

1. Before the hydraulic cylinder can be serviced the column must be removed from the base. Use the instructions in *Removing the Column* (page 23).

2. Lay the column with the CHAIN SIDE UP on a clean surface with enough clearance at the base of the column to allow removal of the hydraulic assembly.

3. Remove the two screws and the retaining plate.

4. Remove the two upper cylinder support screws which secure the top of the hydraulic cylinder to the column. (Note: Very early models of the Lif*TILT*ruk may not have this retainer and screws.)

5. Unscrew the four base screws holding the hydraulic cylinder inside the column. (NOTE: There may, or may not, be shims between the column and cylinder base. If there are any shims, NOTE THEIR LOCATION AND REPLACE THEM IN EXACTLY THE SAME POSITION AS THEY WERE ORIGINALLY INSTALLED.)

6. Remove the cylinder and take it to a clean bench or other clean work area. Be careful not to pinch the hydraulic return tubing when pulling the cylinder out of the column.

7. Remove the large top nut from the cylinder.

8. Slide the piston assembly from the cylinder.

9. Remove the bottom nut from the piston shaft. A pipe wrench can be used to prevent the piston rod from turning BUT BE CERTAIN THE WRENCH IS USED ONLY ON THE TOP THREE INCHES OF THE PISTON ROD IN THE POSITION SHOWN BELOW. Marks left by the wrench only in this area will not damage any seals.

16. Remove the bottom seal system from the piston rod.

17. Remove the old O-ring from the rod and replace it with the new O-ring in the repair kit.

18. Remove the old lip seal from its support flange and insert the flange in the new seal provided in the repair kit. Note that the blue portion of the seal is on the up-side of the assembly, and the black (lip) portion is on the down-side of the assembly.

19. Remove the black band (with the slit) from the spool and replace it with the new black band in the repair kit.

20. Put the complete seal assembly back onto the bottom of the piston rod and reinstall the bottom nut. Use a wrench to make the nut tight. If using a pipe wrench on the piston rod, be sure to keep it in the upper 3 inches, as shown at right.

21. Slide the stop tube and top locator bushing from the piston rod and remove the large nut from the rod.

22. Remove the old wiper from the inside of the large nut and replace it with the new wiper in the *Seal Kit* (see page 40). Put the large nut, locator bushing and stop tube back onto the piston rod assembly and slide the rod assembly into the hydraulic cylinder.

23. Slide the upper cylinder support (if your Lif*TILT*ruk has one) to the top of the hydraulic cylinder and slide the hydraulic cylinder assembly into the column. When the holes in the support match up with the holes in the column, insert the screws and tighten them securely.

24. The rest of the reassembly procedure involves reversing the disassembly steps, 1 through 11 above, while observing the cautions and instructions provided in the Assembly Guide at the beginning of this manual.

25. When the Lif*TILT*ruk is fully assembled and back on the floor, check the reservoir on the hydraulic pump for fluid level. Add Dexron II or Dexron III hydraulic fluid or its equivalent to the reservoir, if needed, to bring the level to within 1/2 inch (13mm) of the top of the reservoir. Replace the cap on the reservoir.

NOTE: when the column is disassembled, there is no better time to check and, if necessary, replace the idler wheel and bearing assembly. Refer to the parts diagram on page 41, and you can see that removing the set-screw and dowel allows fast replacement of this component.

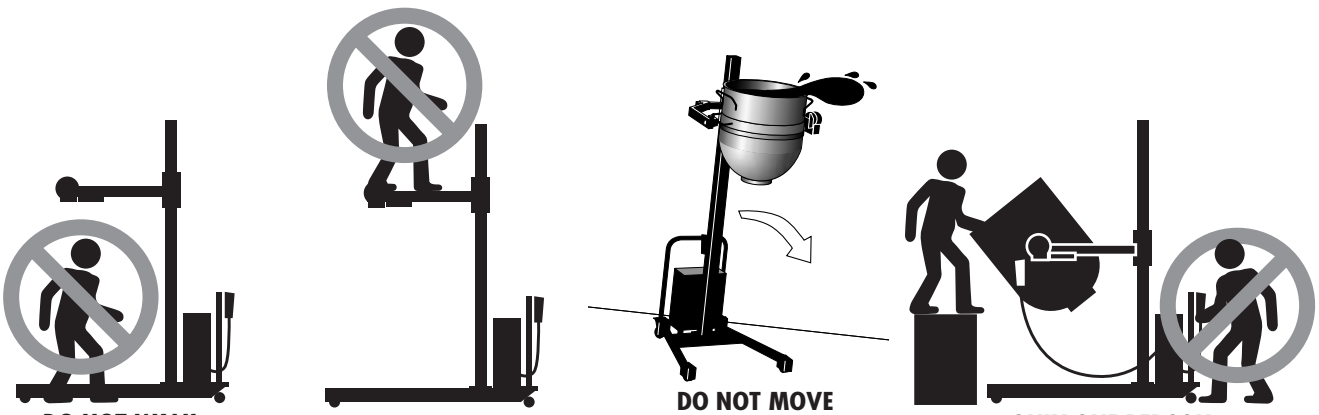
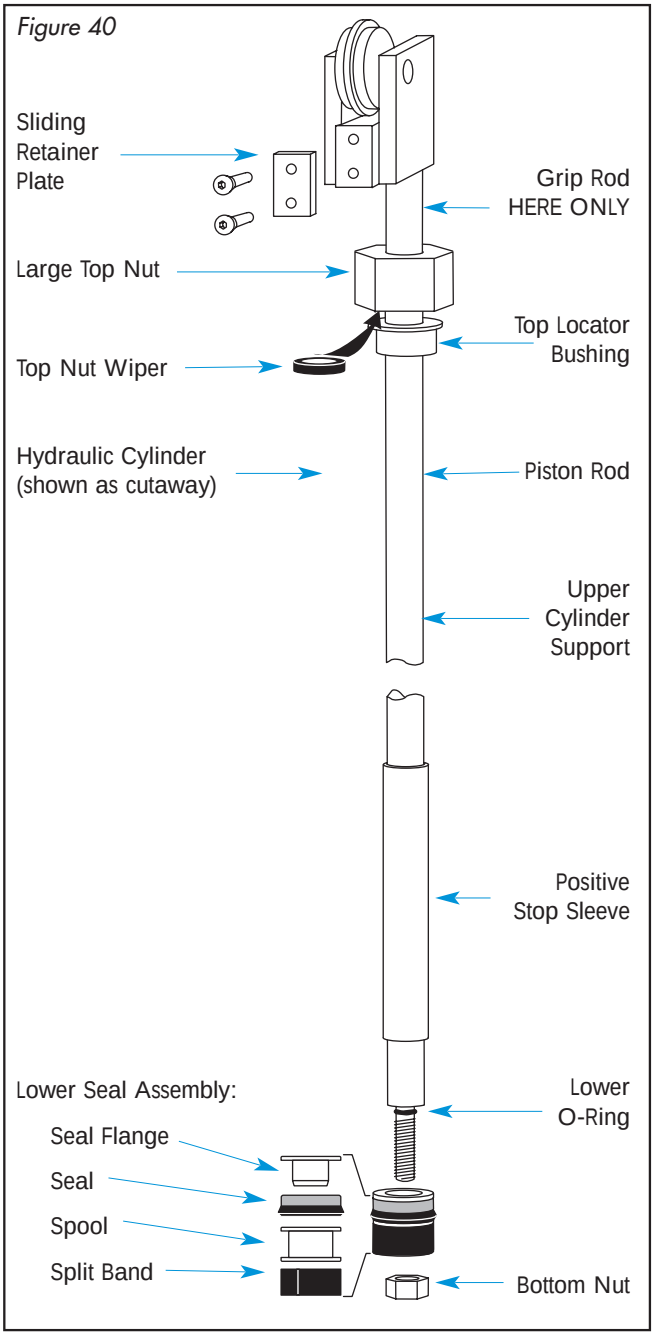


Figure 40



Replacing the Chain and Idler Wheel

1. Follow all instructions in *Removing the Column* (page 23) until the column is free from the base.

2. Follow steps 2 through 6 in *Replacing the Hydraulic Cylinder Seal* (page 24).

3. Remove the four screws that hold the chain retainer inside the column and pull the chain out.

4. Use a chain breaking tool to remove the pins from the chain retainer slide assembly plate and column chain retainer.

5. Install a new chain, retaining it by using the chain breaker replacement mechanism to drive the retainer pins back into their bosses.

6. Reassembly is a reversal of steps 1- 3 above.

NOTE: When the column is disassembled, there is no better time to check and, if necessary, replace the idler wheel and bearing assembly. Refer to the parts diagram on page 41, and you can see that removing the set-screw and dowel allows fast replacement of this component.

NOTE: If you do not own a professional quality chain breaker tool, or if you do not have experience working with this tool, Savage Bros.Co. urgently recommends that you employ the services of a professional repair person who is experienced in this operation. A poor chain replacement job can result in failure of the chain retaining mechanism with serious injury or DEATH resulting from loss of the lifting chain.

WORK SMART
WORK ALERT

Replacement of Tilt Motor Coil Cord and Connector.

1. Put on safety goggles or face shield meeting ANSI Z878.1 specifications.

2. Open the electrical cabinet door using the allen wrench.

3. Disconnect the battery ground cable from the battery. Push the cable out of the way so that it will not accidentally make contact with the battery negative terminal.

4. Disconnect the coil cord plug connector from the tilt motor receptacle. (Figure 41)

3. Remove and save the screw and washer that holds the coil cord support plate to the end of the arm slide.

4. Remove the four screws that hold the 115 VAC power inlet receptacle from the side of the electric-hydraulic box. Carefully pull the power inlet receptacle out of the box. Do not disconnect it, let the power inlet receptacle hang by its wires.

5. Disconnect the old coil cord wire connectors from the terminal strip – terminals #1 & #2 (Figure 42)

Figure 41

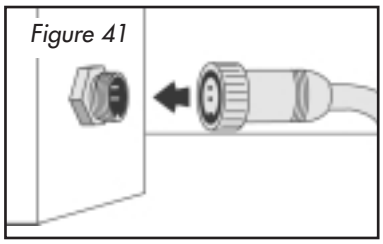
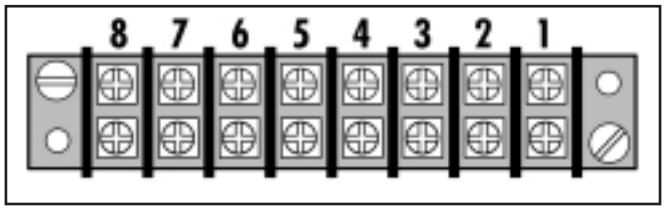
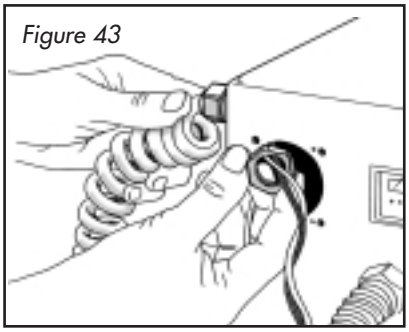


Figure 42



6. Unscrew the cord grip from the back of the box using an adjustable wrench. You will need to hold the locknut inside the box with a screwdriver or pliers. Access the locknut through the power receptacle hole. (Figure 43)

Figure 43



7. Pull the old coil cord out and remove the locknut.

8. Install the new coil cord wires into the mounting hole. Feed the wires through the locknut. Screw the cord grip into the locknut. Hold the locknut with a screwdriver or a pair of pliers while tightening the cord grip on the outside. Do not over tighten.

9. Connect the coil cord wire connectors to the terminal strip. The black wire connects to terminal #1. Connect the white wire to terminal #2. (Fig. 42)

10. Carefully push the power inlet receptacle back into the box. Replace the four screws that hold the 115 VAC power inlet receptacle to the side of the electric-hydraulic box.

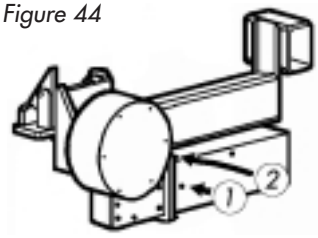
11. Attach the coil cord support plate to the end of the arm slide. Tighten the screw and washer.

12. Connect the plug connector to the tilt motor receptacle.

13. Connect the battery negative power cable to the battery negative terminal. Use approved safety precautions.

Replacing the Tilt Motor Drive

Figure 44



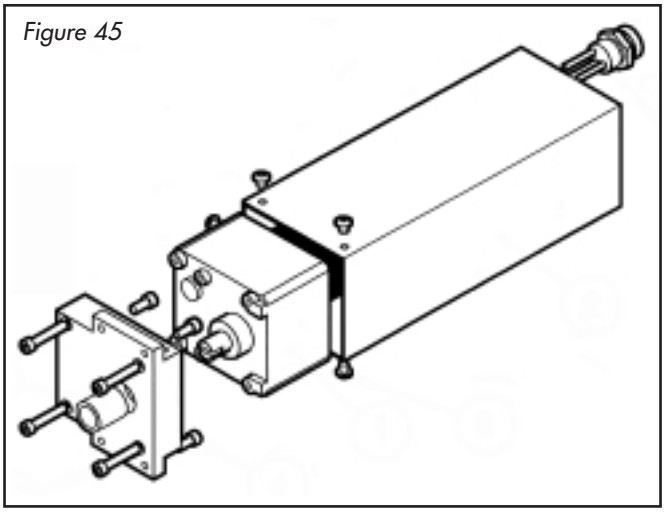
1. Remove the three screws holding cover over tilt gear motor (Figure 44, item 1); remove the cover.

2. Cut the motor lead wires at the crimp connectors.

3. Remove the four cap screws (Figure 44, item 2) holding the motor mounting plate to the tilt gearbox and pull the motor and mount away from the gearbox.

4. Remove the four cap screws that fasten the motor to the plate. (Figure 45)

Figure 45



5. Install the new motor in reverse order of the above procedure. Be certain you use insulated crimp connectors when reconnecting the motor lead wires.

There is no better time to re-oil and/or replace the sponge for the worm gear assembly than right now, as you re-install the system. (see Page 5)

WORK SMART
WORK ALERT

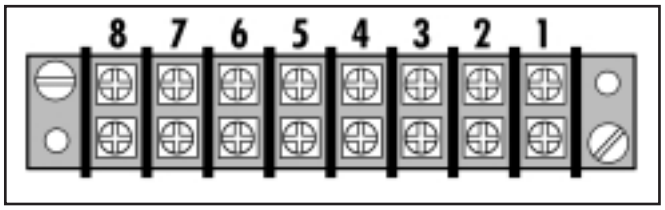
Lubricating the Column

Spray WD-40 on a rag and wipe the column from top to bottom. If WD-40 is not an acceptable lubricant, such as in food preparation areas, use a food-grade silicone spray. Do not use vegetable-based lubricant as it will gum up the column slide.

How to check the Down Solenoid Valve

Temporarily disconnect the Down Solenoid lead wire from the terminal strip, 6th terminal from the right. Then, assuming that the voltmeter on the cabinet door is pointing to 12 volts or more, momentarily touch the down solenoid wire to the terminal strip where wire number 4 is connected, 4th terminal from the right. (Figure 42)

Figure 42



A faint click sound should be heard from the pump and the column slide should come down. The resistance across the coil, as measured with an ohmmeter, should be approximately 8-9 ohms.

To remove the down solenoid valve for inspection, cleaning or replacement, the column slide needs to be lowered all the way down. If the column slide cannot be lowered due to a defective down solenoid, it will be necessary to remove any load, bowl and arms to reduce the pressure on the hydraulic hose, and put a 6" c-clamp on the column under the column slide to prevent the slide from coming down when the hydraulic oil pressure is relieved.

When the column slide is lowered or secured in a stationary position, follow the procedures for removing the battery on page 19. Put a pan under the control cabinet and hydraulic hose to catch any hydraulic fluid that will come out when the hydraulic hose fitting is loosened. Use paper towels or rags to wipe up spills.

Wear eye protection.

Using a 9/16" wrench, loosen the hydraulic hose's swivel fitting nearer to the pump. Do not loosen more than 1/2 a turn to allow oil and oil pressure to be released.

Once the flow slows and only seeps out, re-tighten the hose fitting.

Remove the down solenoid coil.

Remove the down solenoid valve cartridge from the pump body. Some hydraulic fluid will come out of the port on the pump, keep your paper towels or rags handy to sop up the seepage.

How to check the Up Solenoid Relay

Make sure the battery connections are clean and tight. Temporarily disconnect the Up Solenoid lead wire from the terminal strip, 5th terminal from the right.

CAUTION, this test may startle you if the lift motor starts. Then, assuming that the voltmeter on the cabinet door is pointing to 12 volts or more, momentarily touch the Up Solenoid lead wire to the terminal strip where wire number 4 is connected, 4th terminal from the right. If the lift motor starts, there is no problem with the up solenoid relay. If there is no click, the solenoid relay needs to be replaced. If there is repeated clicking and the voltmeter on the door of the cabinet points to the left, the battery needs a charge or replacement. See "*Servicing The Battery*" on page 18. If there is a single click and the motor does not start, continue to energize the solenoid, and check the voltage drop with a voltmeter, measuring between the large power terminals on the left and right sides of the solenoid relay. If it shows more than 0.5 volts, the solenoid needs to be replaced. When the solenoid is de-energized the voltage will read the same as battery voltage.

How to check the Hydraulic Pump Motor

Make sure the battery connections are clean and tight. While holding the UP button, and hearing the solenoid click in, check the voltage drop with a voltmeter, measuring between the large power terminal on the left side of the pump's motor and the unpainted body of the pump. If it shows 12 volts and the motor doesn't start, the pump and motor unit needs to be repaired or replaced. Call the factory.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION	PAGE
Bowl handles do not fit into supports on Lif*TILT*ruk arms:	Bowl adapter strap not installed.	Install bowl adapter strap. Native bowl handles are not designed for lifting and tilting.	13
	Bowl adapter strap not properly installed.	Check strap installation.	13
	Lifting arms are too close or too far apart to easily engage handles.	Adjust the span of the lifting arms to match the handles.	16
Latches on handle support won't swing open:	Handle support not rotated all the way up to allow latch to open.	Tilt the handle support all the way upright.	
	Handle support rotated into the back stop causing holder to bend and jam.	Tilt the handle support slightly forward to take the strain off of the handle support.	
	Latch and/or latch support is bent and jammed.	Straighten the bent metal to allow the latch to open easily.	
Bowl will not rise when UP button is pushed, and no sound is coming from electrical cabinet:	Emergency stop button is not pulled out.	Pull out the emergency stop button.	11
	The control circuit breaker switch lever is not in the up position	Put circuit breaker switch lever in the up position.	11
	Battery is dead. Voltmeter on the cabinet door points to the left.	Check the battery state of charge.	19
	DOWN button has not fully sprung back out. Rubber boot is acting like a suction cup.	Allow DOWN button to return to normal position. If persistent, put a small slit in the bead of the rubber boot.	
	Rubber boot missing or damaged. The DOWN button has not fully sprung back out. Button jammed by deposits or dirt.	Clean or replace button operator. Install or replace the rubber boot to protect the button.	22
	Up solenoid relay not working.	See *How To Test Up Solenoid Relay*.	27
	The black control cord has a broken wire from excessive stretching or flexing.	Perform a continuity check on the six-conductor cable. Refer to the electrical circuit diagrams.	32-34
	UP and/or DOWN contact blocks worn out and not making contact.	See *Replacing Pendant Switches and Switch Components*.	22
Bowl will not rise when UP button is pushed, and chattering sound is coming from electrical cabinet:	Battery is low; not enough charge to start the motor.	Check the battery state of charge. Recharge the battery.	19
Bowl will not rise when UP button is pushed, and the lift motor sounds like it's running:	Not enough hydraulic fluid in the pump reservoir. Pumping air.	Add hydraulic fluid.	23
	Load is too heavy to lift. Internal pressure relief valve is preventing over pressure.	Do not load beyond the rating indicated on the top of the operator control.	

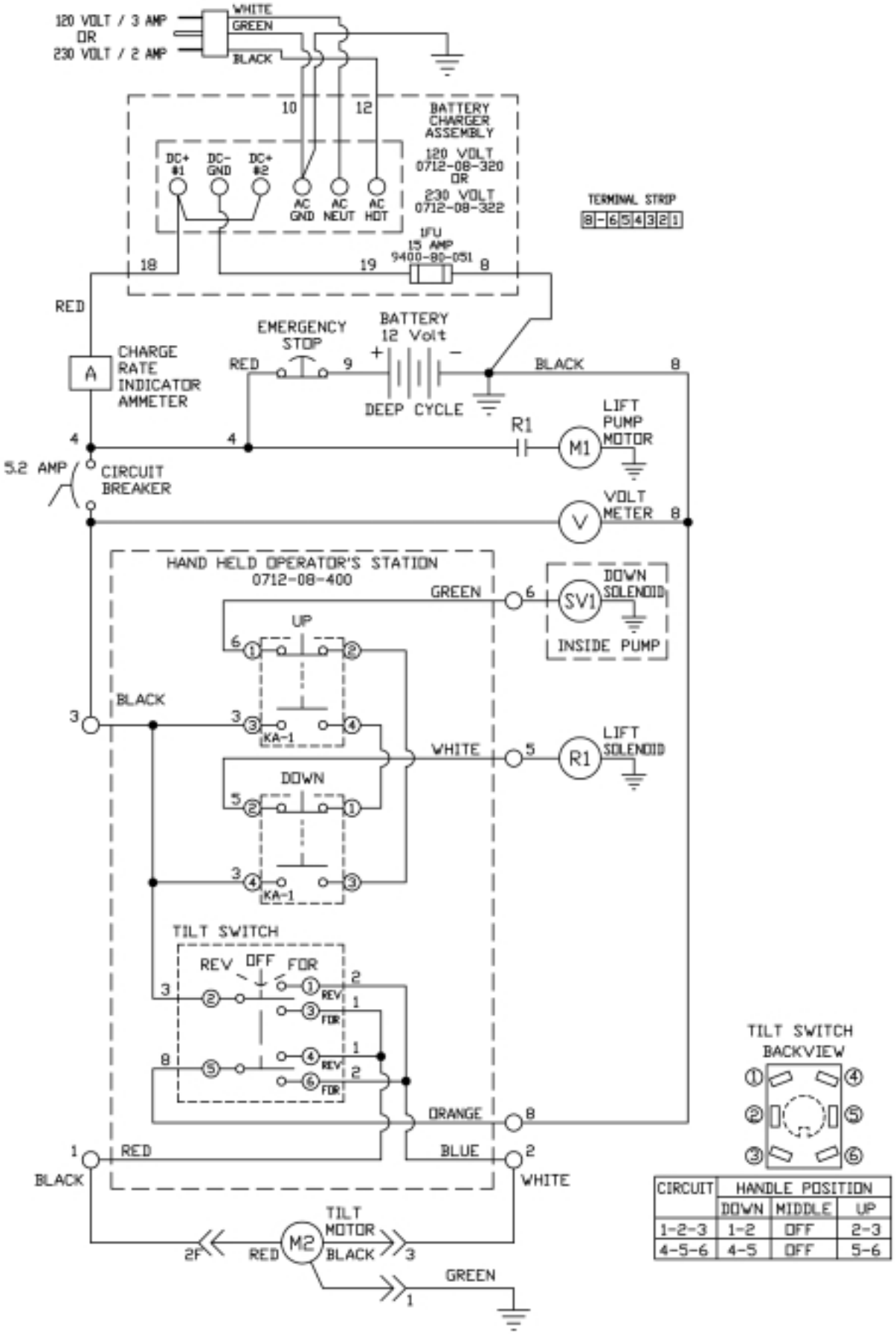
TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION	PAGE
Bowl will not come down when Down button is pushed:	Emergency stop button is not pulled out.	Pull out the emergency stop button.	11
	The control circuit breaker switch lever is not in the up position	Put circuit breaker switch lever in the up position.	11
	Battery is dead. Voltmeter on the cabinet door points to the left.	Check the battery state of charge.	19
	The column is sticky or gummy. Slide is sticking.	Clean and lubricate the column.	27
	The UP button has not fully sprung back out. Rubber boot is acting like a suction cup.	Allow the UP button to return to normal position. If persistent, put a small slit in the bead of the rubber boot.	
	Rubber boot missing or damaged. The UP button has not fully sprung back out. Button jammed by gunk stuck in it.	Clean or replace button operator. Install or replace the rubber boot to protect the button.	22
	The down solenoid valve is not working.	See *How To Check The Down Solenoid Valve.*	27
	The black control cord has a broken wire from excessive stretching or flexing.	Perform a continuity check on the six-conductor cable. Refer to the electrical circuit diagram.	28, 30
	UP and/or DOWN contact blocks worn out and not making contact.	See *Replacing Pendant Switches and Switch Components*.	22
Bowl will not rise all the way to the top of the column:	Not enough hydraulic fluid in the pump reservoir. Pumping air.	Add hydraulic fluid.	23
	The column is sticky or gummy. Slide is sticking.	Clean and lubricate the column.	27
	Load is too heavy to lift. Internal pressure relief valve is preventing over pressure.	Do not load beyond the rating indicated on the top of the operator control.	
Bowl rises OK But does not hold position and slides down the column:	Hydraulic oil is leaking past the piston in the cylinder. Red fluid is observed returning to the reservoir in the white return tubing when the bowl is up.	Replace the piston seal in the hydraulic cylinder.	24
	The down solenoid coil is always energized.	Temporarily disconnect the down solenoid's lead wire and see if the problem continues. If problem stops, troubleshoot Down Control Circuit. Check circuit diagram and test operator control and cable for short circuits.	32-34
	The down solenoid valve is not working. Valve is stuck open.	Clean or replace the down solenoid valve.	27, 33
Bowl slides down the column with a jerky movement:	The column is sticky or gummy. Slide is sticking.	Clean and lubricate the column.	27
	Not enough hydraulic fluid in the pump reservoir. Air is in the cylinder.	Lower the arms all the way down. Check the hydraulic fluid level in the reservoir. Add hydraulic fluid if level is low.	23

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION	PAGE
Bowl will not tilt forward or reverse when the TILT toggle switch is pushed. Lift up and down are working:	Coil cord or its plug connector have broken wire.	Check the continuity of the coil cord.	26
	Tilt motor has power but motor is not turning.	Check the operation of the tilt motor.	12, 26
Bowl will not reverse after a forward tilt:	The control circuit breaker switch lever is not in the up position	Put circuit breaker switch lever in the up position.	11
	Tilt toggle switch broken or the black control cord has a broken wire from excessive stretching or flexing.	Check the function of the tilt toggle switch or continuity of the control cord.	12
Bowl tilts with a jerky movement, or the bowl tilts and trips the control circuit breaker frequently:	Lifting arms are too close or too far apart to easily engage handles.	Adjust the span of the lifting arms to match the handles.	16
	Bowl adapter strap not properly installed	Check strap installation.	13
	Worm gears in tilt gearbox are dry.	Open tilt gearbox cover and check for sufficient oil in lubricating sponge.	26
	Worm gears in tilt gearbox are worn.	Open tilt gearbox cover and check and replace worn parts.	38
	Tilt motor shaft is broken.	Check the operation of the tilt motor..	12, 26
Battery does not hold a charge or drains prematurely:	The control circuit breaker switch lever is left in the up position for extended periods of time. Small current drain of voltmeter slowly discharges battery.	Turn the circuit breaker switch lever off when not in use. The circuit breaker switch does not need to be on to charge the battery.	
	Battery charger not functioning.	Check battery and charger.	18-19
	Battery drained beyond rechargeable condition. End of battery's useful life.	Check battery and charger.	18-19
Voltmeter needle does not move when battery charger is plugged into electrical outlet:	Emergency stop button is not pulled out.	Pull out the emergency stop button.	11
	The control circuit breaker switch lever is not in the up position	Put circuit breaker switch lever in the up position.	11
	Battery charger not functioning.	Check battery and charger.	18-19
Hydraulic fluid puddles appear under the unit when lifting or when not in use:	Hydraulic return tubing has not been connected to the top of the pump reservoir.	Check hydraulic return tubing connection.	11
	Hydraulic hose fitting(s) are loose. Determine where leak is coming from.	Check and tighten hydraulic fittings.	
	Hydraulic return tubing has been pinched and the tubing has a leak.	Check tubing for leak.	23

Wiring Diagram



CIRCUIT	HANDLE POSITION		
	DOWN	MIDDLE	UP
1-2-3	1-2	OFF	2-3
4-5-6	4-5	OFF	5-6

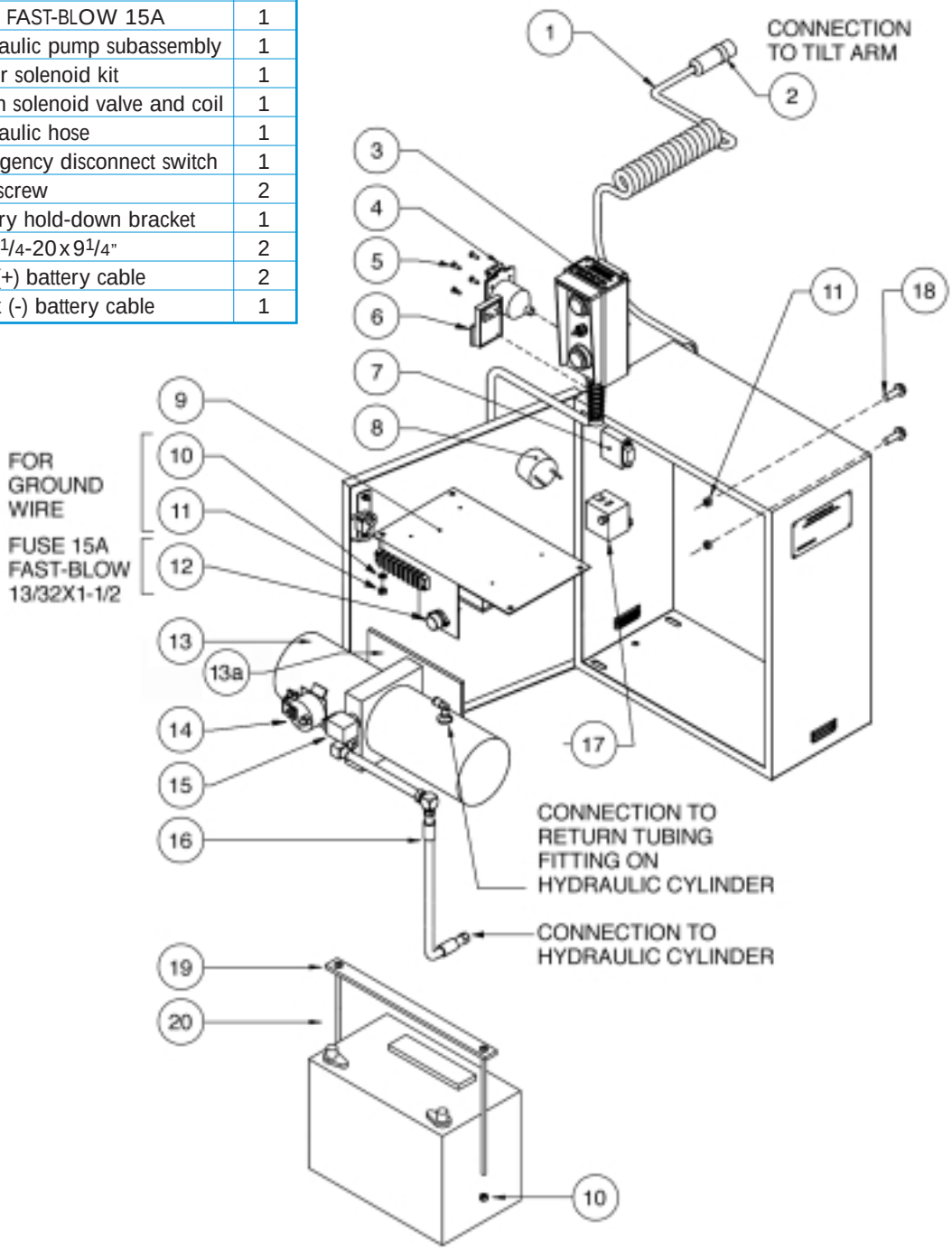
Parts Listing

Electrical Cabinet

Item	Part No.	Description	Qty
1	0712-08-520	Coil cord assembly	1
2	9400-10-096	Coil cord connector only	1
3	0712-08-400	Control pendant assembly	1
4	9400-10-008	AC power inlet	1
5	9200-10-403	Pan screw, 8-32x1/4"	4
6	9400-22-001	Ammeter	1
7	9400-30-050	Circuit breaker	1
8	9400-22-002	Voltmeter	1
9	0712-08-320	Battery charger, fused, 120V	1
10	9200-20-302	Lockwasher, , 1/4"	6
11	9200-00-201	Hex nut, 1/4-20	6
12	9400-80-051	Fuse, FAST-BLOW 15A	1
13	0712-08-200	Hydraulic pump subassembly	1
14	0712-08-202	Motor solenoid kit	1
15	9800-10-107	Down solenoid valve and coil	1
16	9800-50-004	Hydraulic hose	1
17	9400-30-315	Emergency disconnect switch	1
18	9200-10-101	Hex screw	2
19	0708-08-009	Battery hold-down bracket	1
20	9200-40-101	Bolt, 1/4-20 x 9 1/4"	2
	9400-50-008	Red (+) battery cable	2
	9400-50-007	Black (-) battery cable	1

Battery Specifications:
160-180 reserve minutes or 80-100 amp-hours

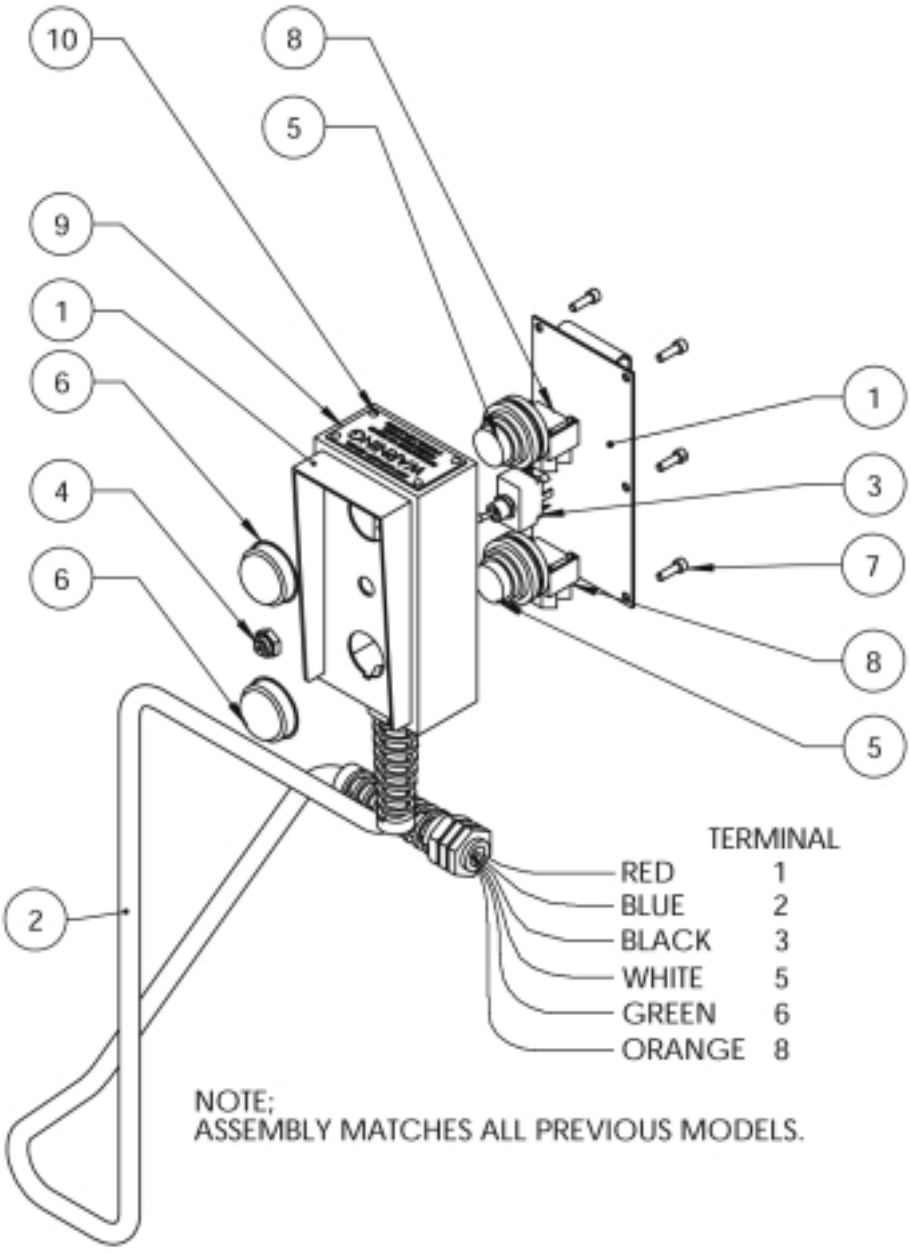
Purchase battery locally.



Parts Listing

Control Pendant Assembly

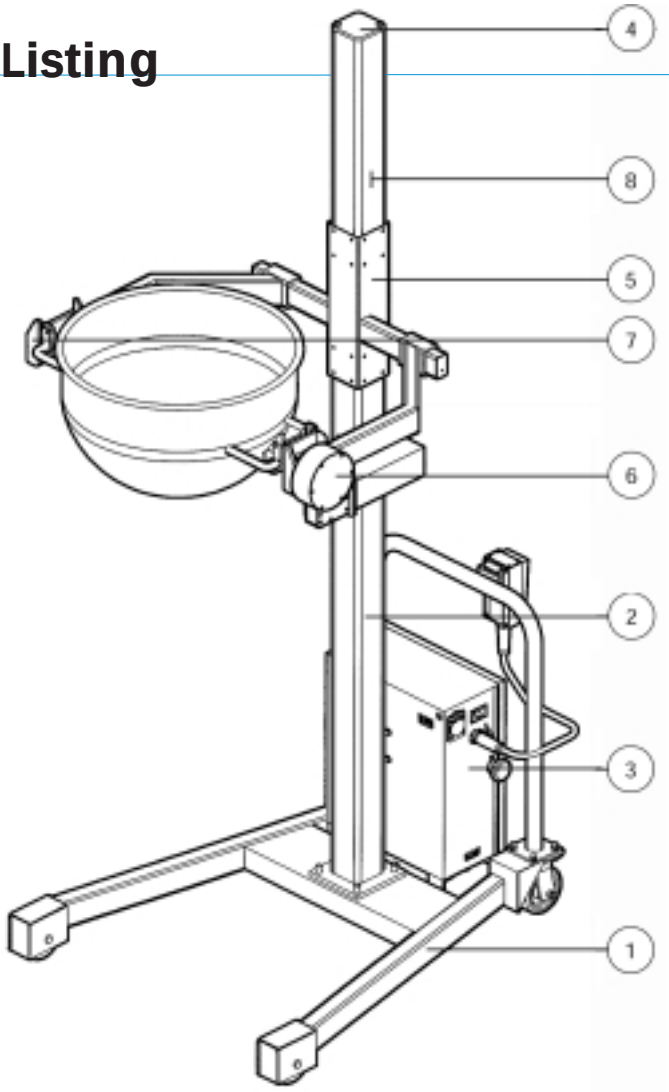
Item	Part No.	Description	Qty
1	0712-11-001	Control pendant box	1
2	0712-11-006	Pendant cable and grips	1
3	9400-30-004	Toggle switch, 3 pos, DPDT	1
4	9400-30-077	Toggle switch rubber boot	1
5	9400-30-008	Push button	2
6	9400-30-079	Push button rubber boot	2
7	9200-10-308	Socket cap screw 10-32x5/8	6
8	9400-40-002	Contact block	2
9	9400-90-005	Legend plate	1
10	9200-50-003	Rivets	4



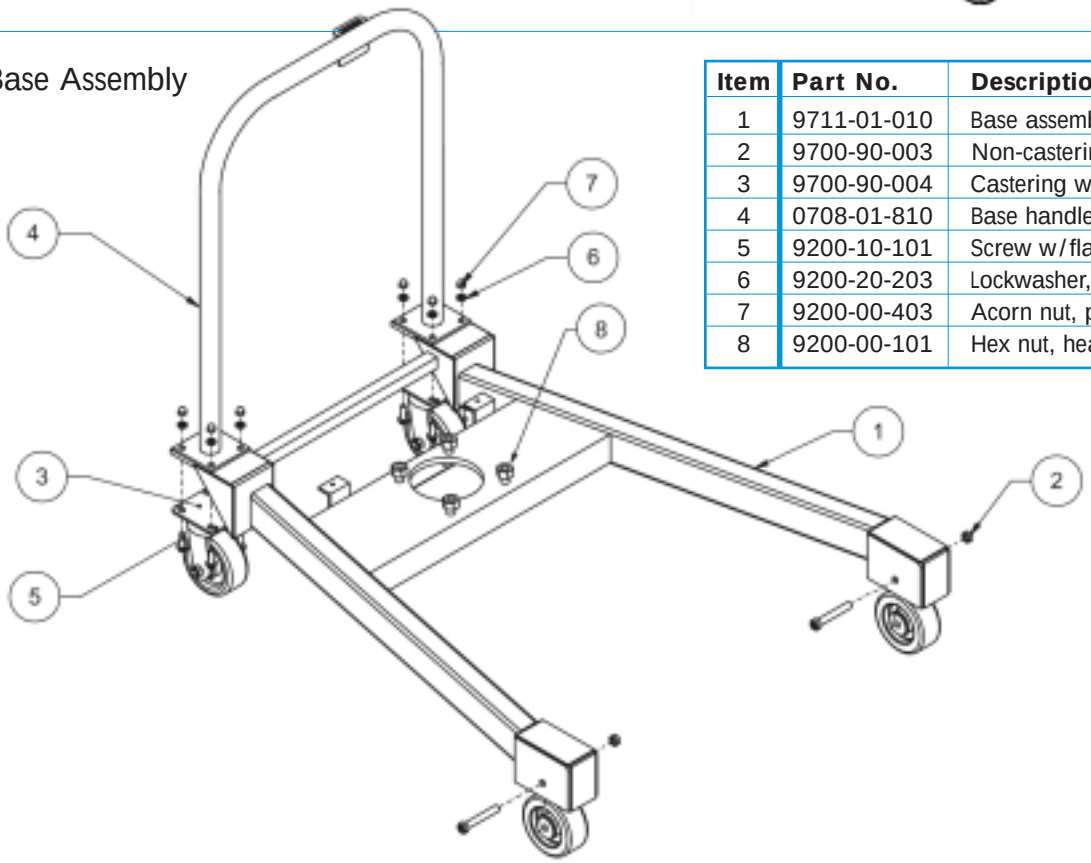
Parts Listing

Basic Mechanical Units

Item	Part No.	Description	Qty
1	0711-01	Base assembly. Model C	1
2	0712-02-610	Column subassembly	1
3	0712-08	Electric-hydraulic cabinet	1
4	0708-02-001	Column Cap	1
5	0712-02-633	Slide column subassembly	1
6	0712-03-600	Tilt assembly, standard	1
	0712-03-900	Tilt assembly, hi-torque	1
7	0711-03-610	Idler mechanism ass'y	1
8	0712-02-621	Hydraulic cylinder, Model C	1
	0712-08-520	Autotilt coil cord assembly	1
	9200-10-316	5/16-18x1 SS cap screw	2
	9200-20-202	5/16 ZP split lockwasher	2
	9200-10-121	1/4-20 x 3/4 FH machine screw	6
	0516	24 x 16 Copper kettle shown	1



Base Assembly

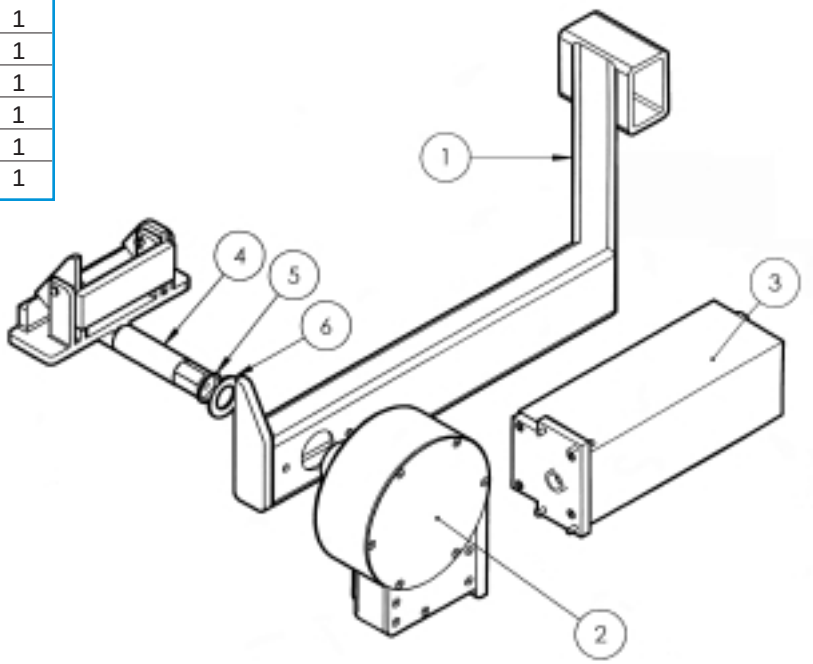


Item	Part No.	Description	Qty
1	9711-01-010	Base assembly, Model C	1
2	9700-90-003	Non-castering wheel/axle	2
3	9700-90-004	Castering wheel assembly	2
4	0708-01-810	Base handle assembly	1
5	9200-10-101	Screw w/flange, 3/8-16x1 1/4"	8
6	9200-20-203	Lockwasher, plated, 3/8"	8
7	9200-00-403	Acorn nut, plated, 3/8-16	8
8	9200-00-101	Hex nut, heavy duty, 5/8-11	4

Parts Listing

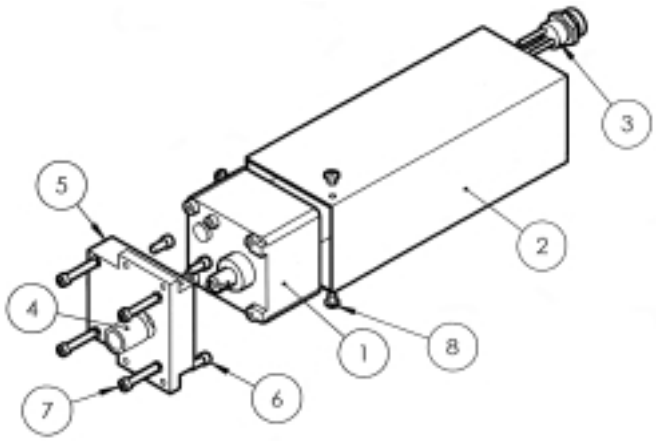
Left Arm Assembly

Item	Part No.	Description	Qty
	0712-03-600	Tilt arm assembly	
1	0711-03-606	Left arm, Models B-C	1
2	0712-04-630	Standard gearbox assembly	1
3	0712-03-665	Tilt motor assembly	1
4	0711-03-821	Tilt mechanism assembly	1
5	9700-20-125	1" ID ring	1
6	9700-10-074	1x.06" thrust washer	1



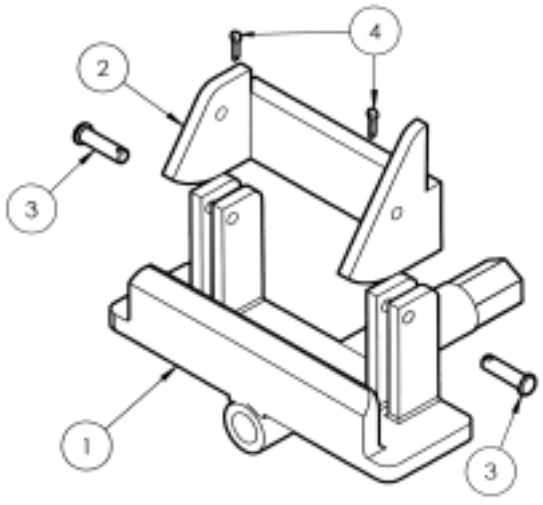
Tilt Motor Assembly

Item	Part No.	Description	Qty
	0712-03-665	Tilt motor assembly	
1	9400-00-029	Standard 12V LTT motor	1
2	0712-03-010	Motor cover	1
3	9400-10-095	3-pin coil cord plug	1
4	9700-10-077	.625 x 1 Oilite bearing	1
5	0712-04-053	Gearmount adapter plate	1
6	9200-10-385	10-24 x 1/2" screw	4
7	9200-10-351	10-32 x 1-1/4" screw	4
8	9200-10-388	10-32 x 1/4" screw	3



Tilt Mechanism Assembly

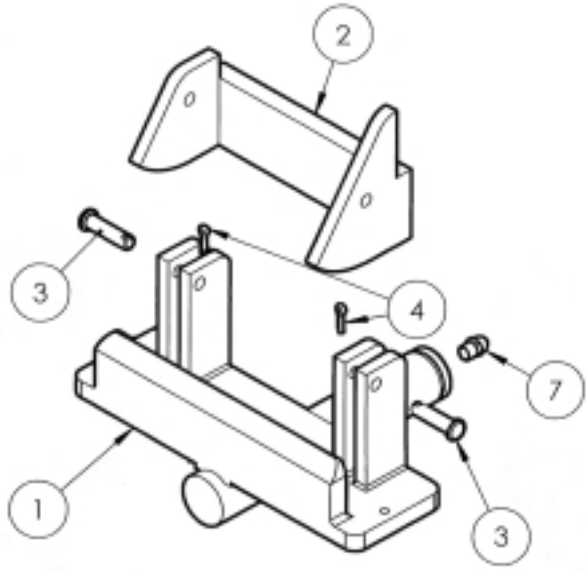
Item	Part No.	Description	Qty
	0711-03-821	Tilt mechanism assembly	
1	0711-03-641	Tilt arm holder weldment	1
2	0708-03-024	Tilt-Idler Lock	1
3	9200-60-103	Clevis pin, 1/4 x 1", zinc	2
4	9200-60-104	Rue ring for clevis pin	2



Parts Listing

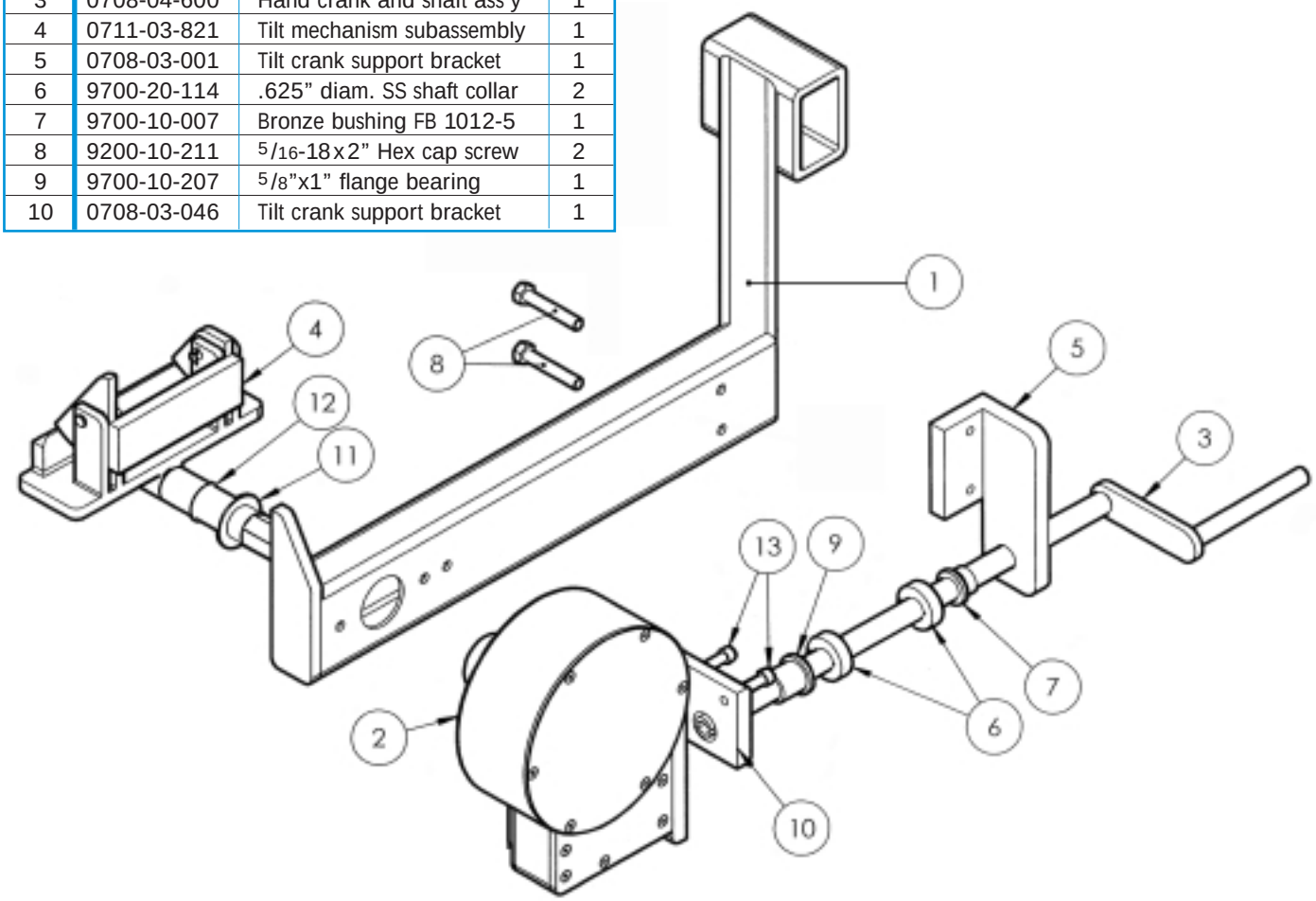
Idler Mechanism Assembly

Item	Part No.	Description	Qty
	0711-03-830	Idler mechanism assembly	
1	0711-03-660	Idler drive, cast	1
2	0708-03-024	Tilt-Idler lock	1
3	9200-60-103	Clevis pin, 1/4 x 1", zinc	2
4	9200-60-104	Rue ring for clevis pin	2
5	9200-60-004	Roller catch	1
6	9200-10-226	10-32 x 1/4 socket screw	2
7	9700-60-101	.25-28 grease zerk fitting	1



Hand Crank Assembly

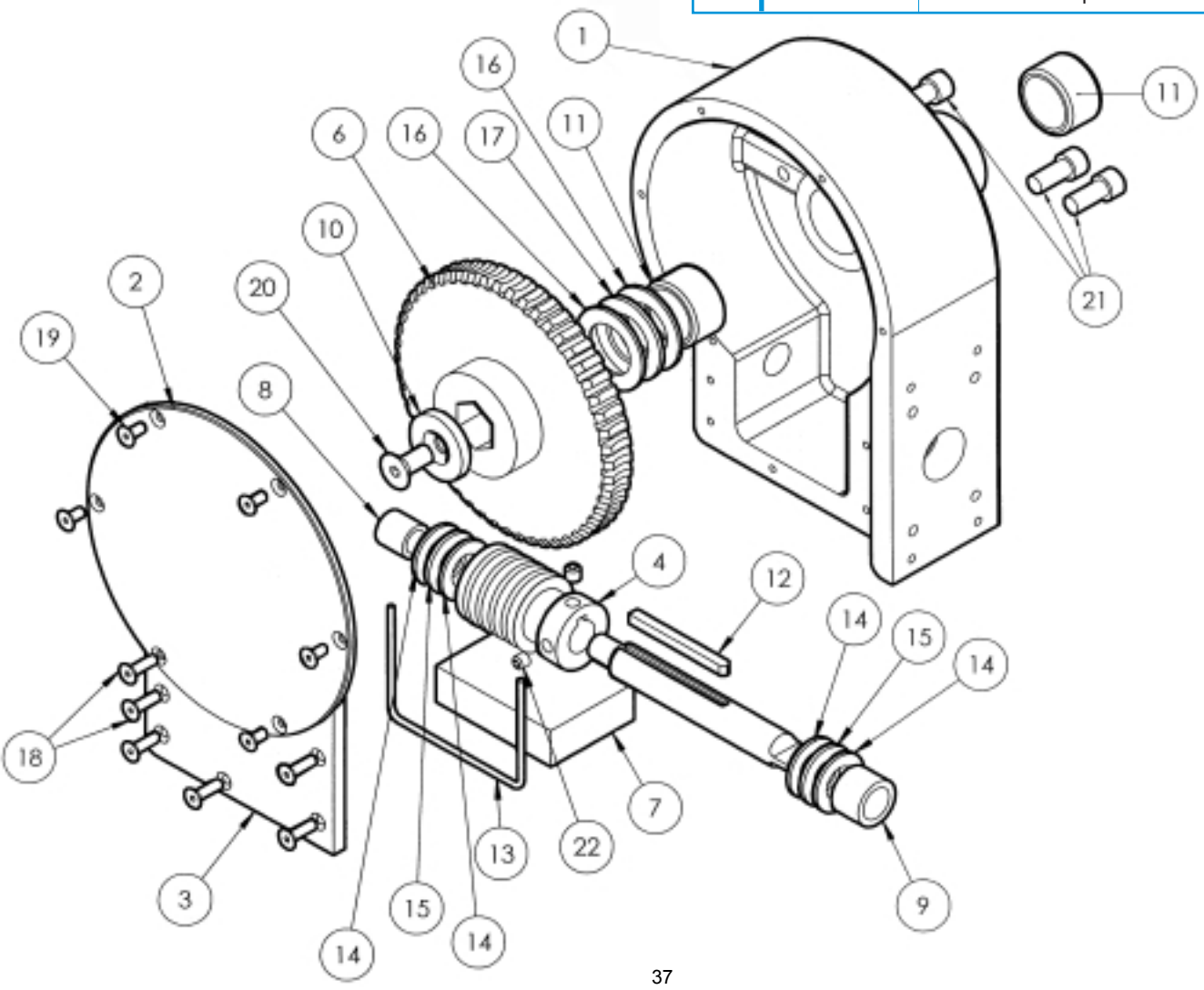
Item	Part No.	Description	Qty
	0711-03-600	Hand Crank Assembly	1
1	0711-03-606	Lift arm, left, Models B-C	1
2	0712-04-630	Standard gearbox assembly	1
3	0708-04-600	Hand crank and shaft ass'y	1
4	0711-03-821	Tilt mechanism subassembly	1
5	0708-03-001	Tilt crank support bracket	1
6	9700-20-114	.625" diam. SS shaft collar	2
7	9700-10-007	Bronze bushing FB 1012-5	1
8	9200-10-211	5/16-18 x 2" Hex cap screw	2
9	9700-10-207	5/8"x1" flange bearing	1
10	0708-03-046	Tilt crank support bracket	1



Parts Listing

Standard Gearbox Assembly

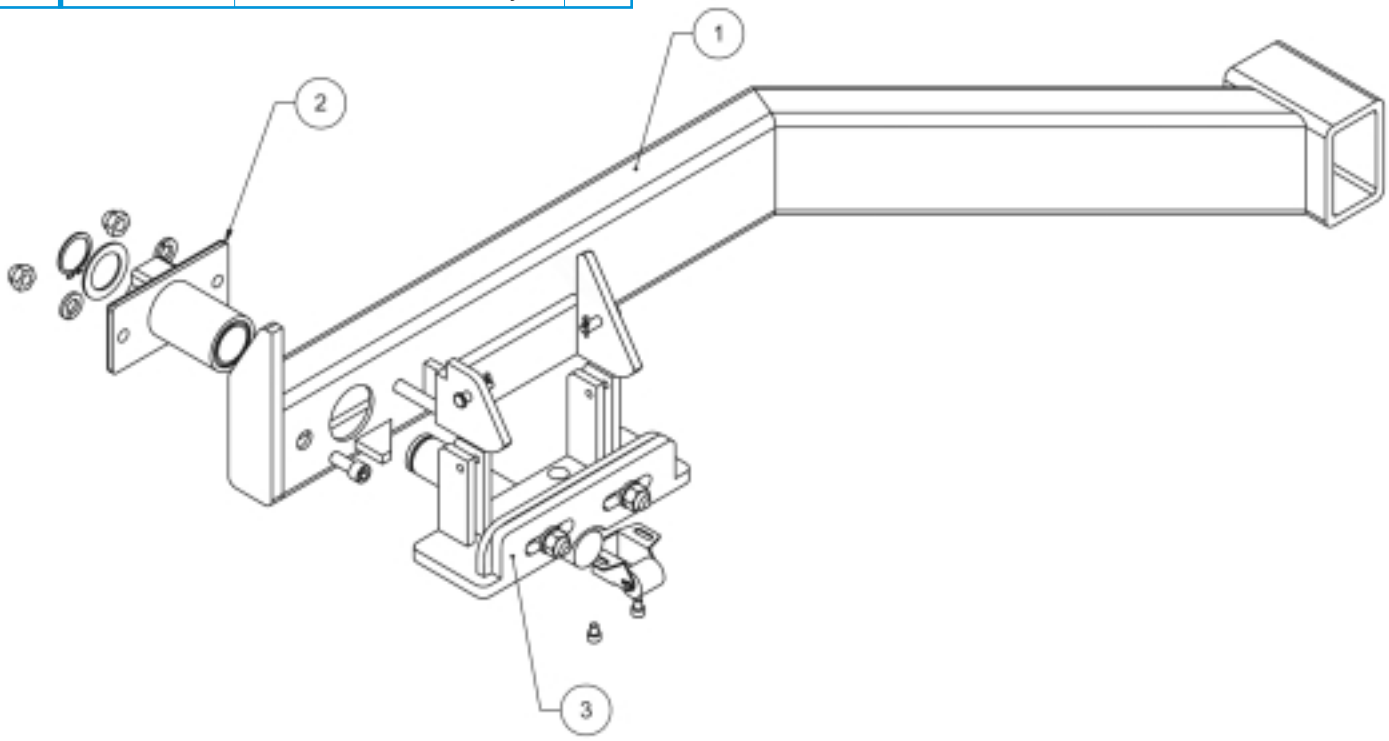
Item	Part No.	Description	Qty
	0712-04-630	Standard gearbox assembly	
1	0712-90-050	Gearbox housing	1
2	0712-04-052	Gearbox main cover	1
3	0712-04-054	Gearbox lower cover	1
4	9700-00-002	Helical worm gear	1
5	0712-04-051	Autotilt worm shaft	1
6	9700-00-001	Worm gear	1
7	0712-04-002	3/4"x2 3/4"x2" sponge	1
8	9700-10-075	.437"x.62" needle bearing	1
9	9700-10-076	.625"x.75" needle bearing	1
10	0712-04-057	Gearbox button	1
11	9700-10-009	Needle bearing	2
12	0712-04-058	Woodruff key	1
13	0712-04-055	O-ring -227 Viton	1
14	9700-10-052	Thrust washer TRB 1018	4
15	9700-10-051	Thrust bearing .625"	2
16	9700-10-074	Thrust washer #1x.06"	2
17	9700-10-073	Thrust bearing 1.00"	1
18	9200-10-387	8-32x5/8" screw	6
19	9200-10-383	8-32x3/8" screw	5
20	9200-10-121	1/4-20x3/4" machine screw	1
21	9200-10-217	5/16-18x3/4" screw	3
22	9200-10-116	1/4-20x1/4" cut point set screw	2



Parts Listing

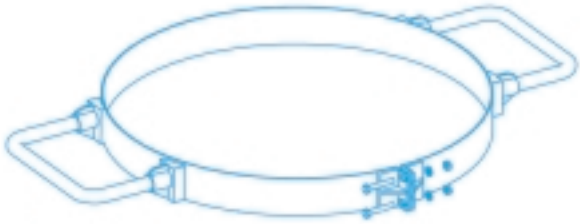
Right Arm Assembly

Item	Part No.	Description	Qty
	0711-03-610	Left arm (Idler) assembly	
1	0711-03-605	Lift arm frame, Model B-C	1
2	0712-90-006	Bearing housing assembly	1
3	0711-03-830	Idler mechanism assembly	1



Bowl Strap

Bowl Adapter shown as sample.
If ordering, specify:
- Your bowl type
- Your bowl size or diameter
- Bowl manufacturer
- Particular shape



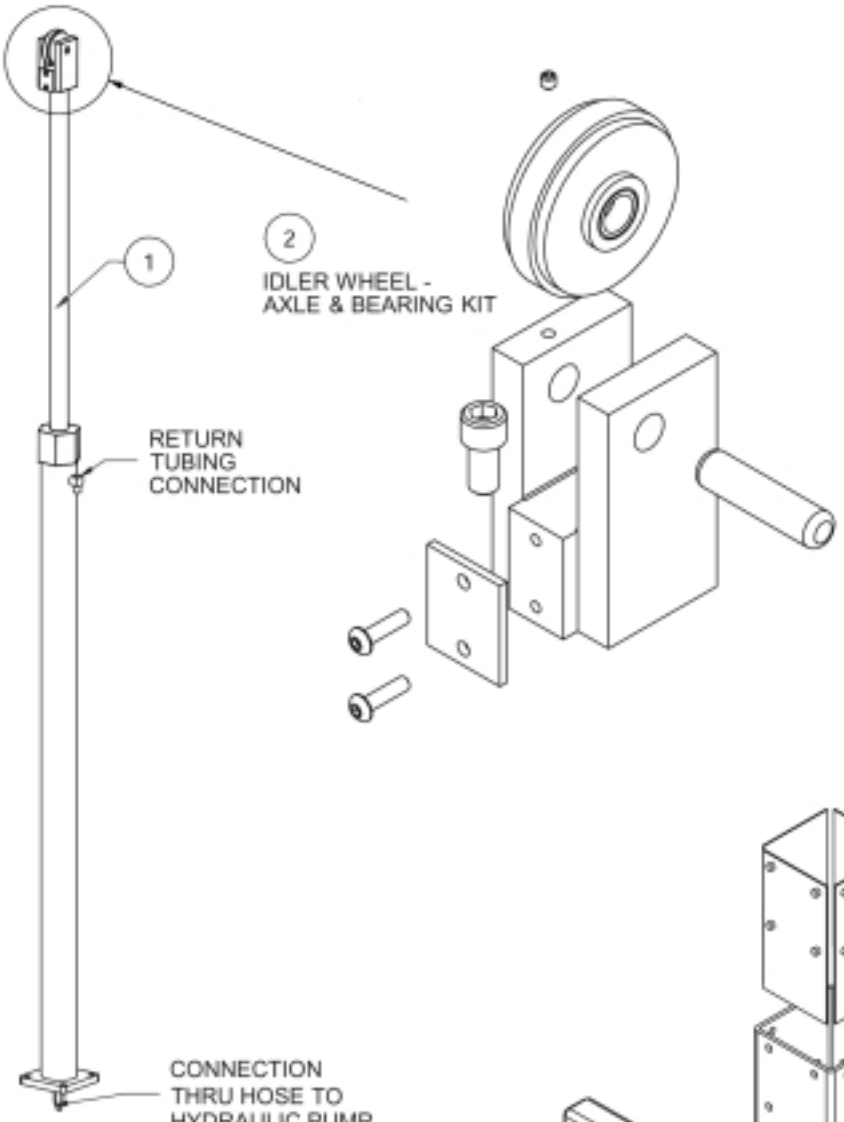
Savage Kettles

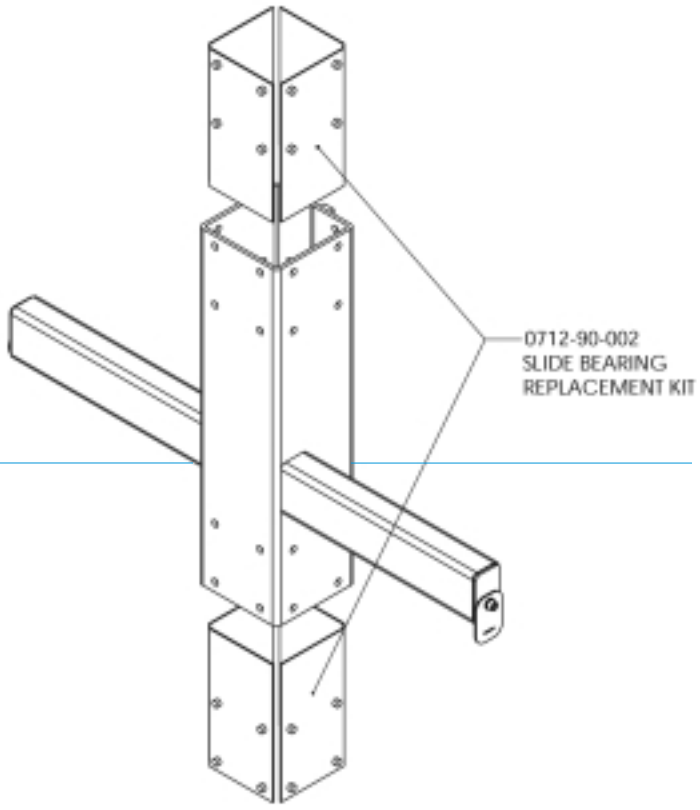
Kettles are shown as samples. If ordering, specify bowl size and material (copper or stainless steel)

Parts Listing

Idler Mechanism Assembly

Item	Part No.	Description	Qty
	0712-02-620	Hydraulic cylinder assembly	
1	0708-02-101	Idler wheel, axle, bearing kit	1
2	0712-90-001	Idler wheel only	1





Slide Column Assembly

Item	Part No.	Description	Qty
	9700-10-201	Single replacement bearing	1
	0712-90-002	Slide bearing replacement kit Each kit contains 8 bearings	1

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