

# Chief S21M

For Series 20 / Series 30 Models

## USERS MANUAL





## **CHIEF'S LIMITED ONE-YEAR WARRANTY & LIABILITY**

Chief Automotive Technologies, Inc. warrants for one year from date of installation and/or purchase any of its products which do not perform satisfactorily due to defect caused by faulty material or workmanship. Chief's obligation under this warranty is limited to the repair or replacement of products which are defective and which have not been misused, carelessly handled, or defaced by repair or repairs made or attempted by others.

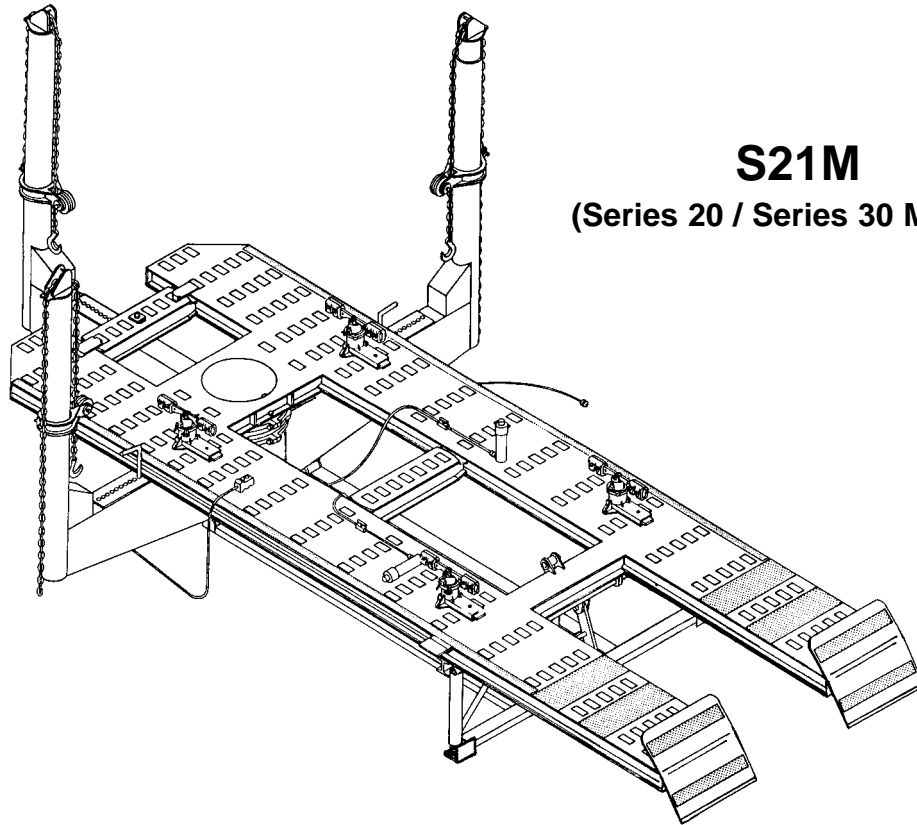
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## IMPORTANT SAFETY INSTRUCTIONS

When using your garage equipment, basic safety precautions should always be followed, including the following:

1. Read all instructions.
2. Care must be taken as burns can occur from touching hot parts.
3. Do not operate equipment with a damaged cord or if the equipment has been dropped or damaged - until it has been examined by a qualified service person.
4. Do not let a cord hang over the ledge of the table, bench, or counter or come in contact with hot manifolds or moving fan blades.
5. If an extension cord is necessary, a cord with a current rating equal to or more than that of the equipment should be used. Cords rated for less current than the equipment may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.
6. Always unplug equipment from electrical outlet when not in use. Never use the cord to pull the plug from the outlet. Grasp plug and pull to disconnect.
7. Let equipment cool completely before putting away. Loop cord loosely around equipment when storing.
8. To reduce the risk of fire, do not operate equipment in the vicinity of open containers of flammable liquids (gasoline).
9. Keep hair, loose clothing, fingers and all parts of the body away from moving parts.
10. To reduce the risk of electric shock, do not use on wet surfaces or expose to rain.
11. Use only as described in this manual. Use only manufacturer's recommended attachments.
12. ALWAYS WEAR SAFETY GLASSES. Everyday eyeglasses only have impact resistant lenses, they are not safety glasses.

**SAVE THESE INSTRUCTIONS**



## S21M

(Series 20 / Series 30 Models)

This owners manual is written to familiarize operators with the safe and efficient operation of the S21M System. The S21M machine features a unique multiple/simultaneous pulling method to return the vehicle's damaged structure and sheet metal to its original position.

The S21M is available in Series 30 or Series 20 formats. Series 30 systems feature three towers at the front and up to two optional towers at the rear. Series 20 systems feature two towers at the front and up to two optional towers at the rear. The addition of rear towers to either system provides 360 degree access to the vehicle. Both systems tilt hydraulically for either drive on or winch positioning of the vehicle.

The S21M is Chief's "millennium" edition. Like the S21 system, each tower features a 10 ton hydraulic cylinder with a 10 inch stroke. The cylinders in the S21M system; however, feature a larger diameter piston.

**NOTE:** Illustrations shown in this manual may vary slightly from actual product.

This manual is not intended to replace Chief Automotive Training. For information concerning Training, contact Chief Automotive Technologies

### IMPORTANT:

1. DO NOT attempt to operate the S21M without first reading this entire manual.
2. Complete safety information is highlighted throughout this manual and is identified by:



This safety alert symbol identifies safety information. Operator injury could result if these CAUTION notes are not followed.

3. Qualified service personnel must check operational capacity of the S21M system prior to its initial use and at intervals of no more than one year. Contact Chief Automotive Technologies contact your authorized Chief Automotive Technologies representative.
4. Persons operating the S21M repair system must be at least 18 years of age, must be trained in the operation of the S21M system, and must have demonstrated their qualifications to the employer. They must also be specifically assigned to operate the S21M system by the employer and this assignment must be made in writing.

## HYDRAULIC SYSTEM COMPONENTS

The S21M is powered by an electrically operated hydraulic pump which is operated by a remote control switch. The components of the system are identified in Figures 1a, and 1b. Figure 1a shows a Series 30 system.

Hydraulic pressure is distributed to tower rams, auxiliary rams, and lift ram. The flow of hydraulic fluid to these rams is controlled by a valve. Hydraulic pressure is monitored by pressure gauges mounted on the machine's front towers. To exert hydraulic pressure, press 'up' button on hand-held switch and to release hydraulic pressure, press 'down' button.

**NOTE:** Although the S21M is a low pressure system, it builds hydraulic pressure quickly. Be aware of this quick reaction when making pulls or lifting vehicle.

**IMPORTANT:** Tower rams and auxiliary rams can be operated either simultaneously (with equal hydraulic pressure) or individually. The lift ram must be operated individually. Whenever using the hydraulic system, close all valves where hydraulic pressure is not required.

### Basic Components

- |                            |  |
|----------------------------|--|
| 1. Pedestal                | 11. Tower Ram                            |
| 2. Removable Loading Ramps | 12. Auxiliary Ram Line Valve             |
| 3. Drain Plug              | 13. Lift Ram Valve                       |
| 4. Control Valve           | 14. Lift Ram                             |
| 5. Joy Cord                | 15. Pressure Gauge                       |
| 6. Control Switch          | 16. Auxiliary Ram/Quick Coupler Assembly |
| 7. Control Switch Assembly | 17. Emergency Stop                       |
| 8. Reservoir               | 18. Up Button                            |
| 9. Motor                   | 19. Down Button                          |
| 10. Tower Valve (S21M)     |  |

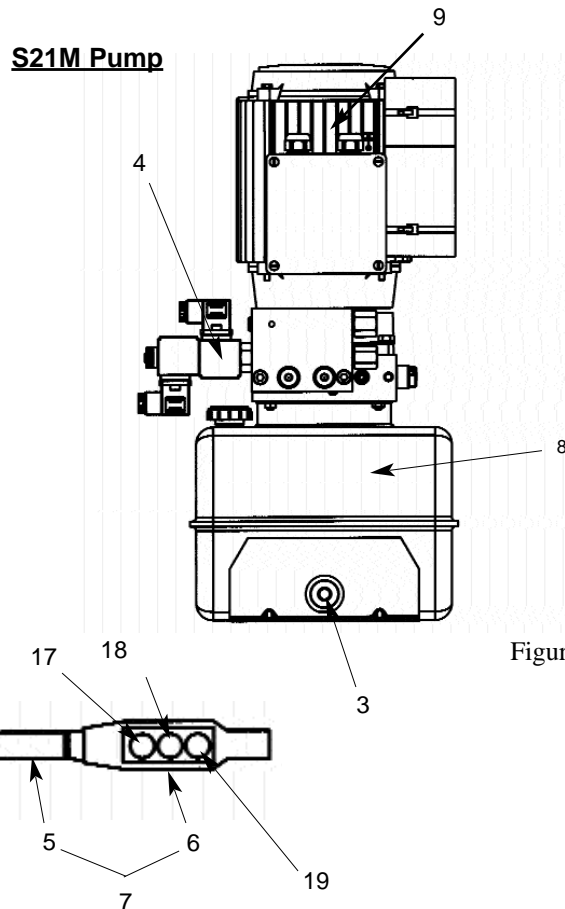


Figure 1b

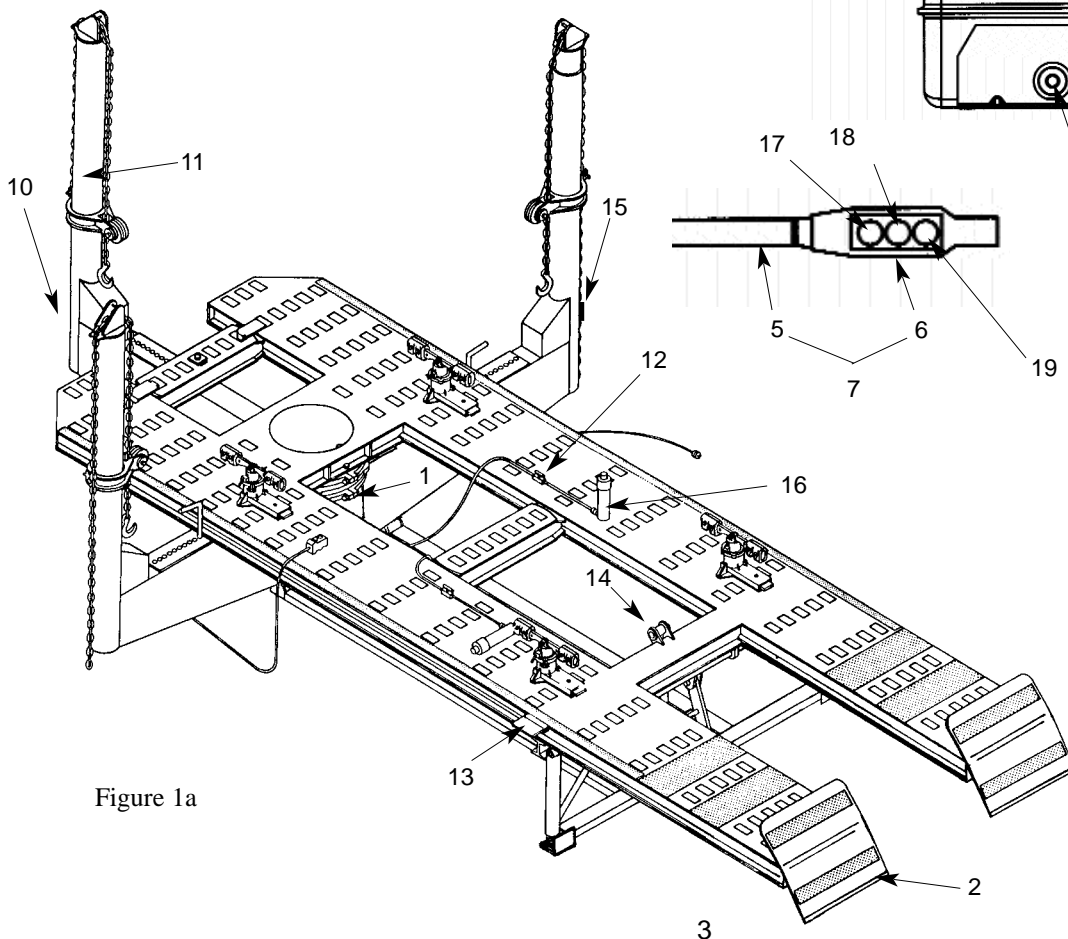
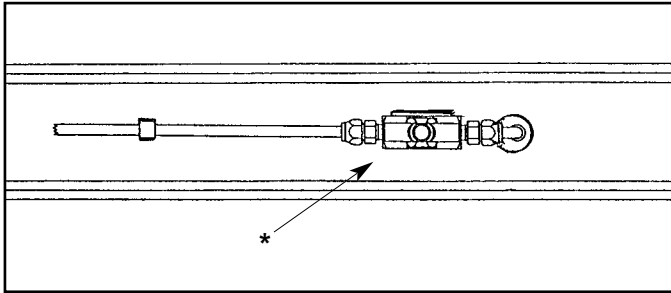


Figure 1a



\* S21M Lift Valve

Figure 2

To operate hydraulic system:

1. Open valves to the hydraulic ram(s) to be used. Close valves to all other hydraulic rams. (See Figures 2-4.)

**NOTE:** To open, turn valve 1/2 turn to left (counterclockwise). To close, turn valve to right (clockwise). **DO NOT** overtighten. Over-tightening can damage valve's needle and seat.

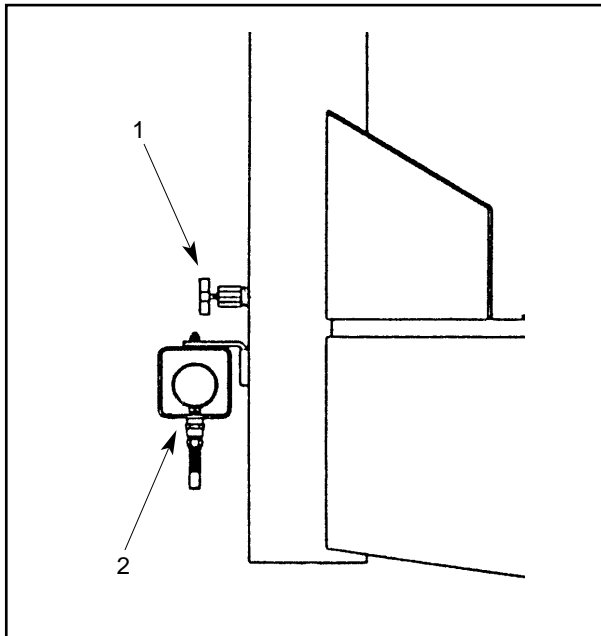
**IMPORTANT:** When using lift valve, observe caution label on lift valve cover.



**CAUTION**

Do NOT Open This Valve Unless:

1. ALL TOWERS ARE PROPERLY PINNED TO THE MACHINE.
2. VEHICLE'S WHEELS ARE BLOCKED, AND EMERGENCY BRAKE IS SET.



1. S21M Tower Valve (side view)
2. Pressure Gauge

Figure 3

2. Press **up** button on remote control switch to exert hydraulic pressure and press **down** button to release hydraulic pressure. (See Figure 1 — Page 2.)

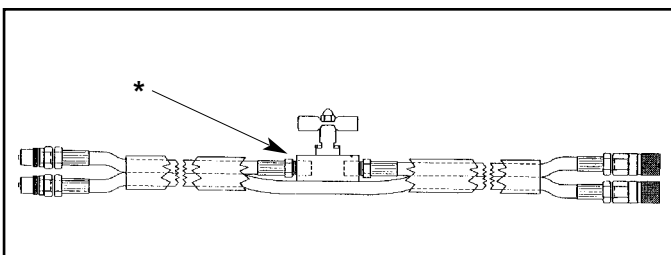
**NOTE:** Hold remote control switch so its cord is in a downward position. This positioning reduces stress in this area of the cord.

3. Monitor pressure gauge whenever exerting hydraulic pressure. S21M readings represent tons or kilo Newtons (kN).

**NOTE:**

- 1) Pressure gauge readings represent amount of pressure each ram applies to its respective chain (and vehicle). Each ram in use exerts the same amount of pressure. The S21M pressure gauge displays pressure readings in tons or kilo Newtons (kN).
- 2) Although the S21M is a low pressure system, it builds hydraulic pressure quickly. Be aware of this quick reaction when making pulls or lifting the vehicle.

**IMPORTANT:** Monitor pressure gauge continually during repair. Even though the S21M is capable of making strong pulls, most repairs can be made at low pressure by using multiple pulls and proper stress relieving of work hardened metal.



\* S21M Auxiliary Ram Line Valve

Figure 4

## MOVABLE CROSSMEMBERS

The S21M system features two movable crossmembers that mount to the channels on the inner edges of the mainframe. They can be used in front, center or rear sections of machine. Illustration on Page 1 shows normal location of crossmembers.

The primary use of movable crossmembers is to support and secure towers at ends of machine. They can also be used as a base for making hydraulic pulls or pushes when auxiliary rams are positioned perpendicular (90 degrees) with top or bottom of crossmember.

To remove crossmember from machine, hold crossmember secure while turning it counterclockwise. (See Figure 5.) To reinstall crossmember, reverse the procedure making sure it engages the channels on the inner edges of the mainframe.

When movable crossmembers are used in front or rear sections of machine, crossmember locks (see Figure 6) must be used to prevent unintentional movement.

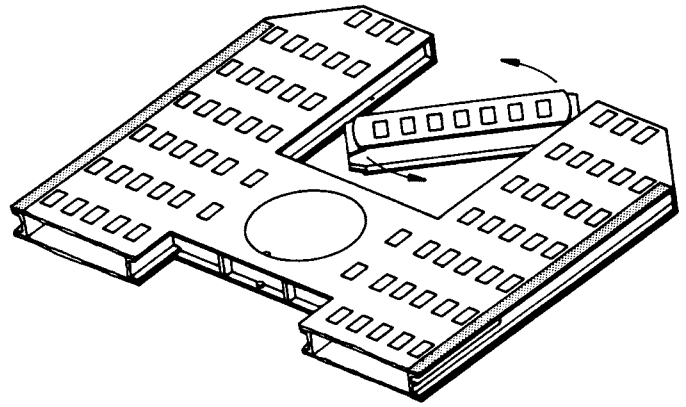
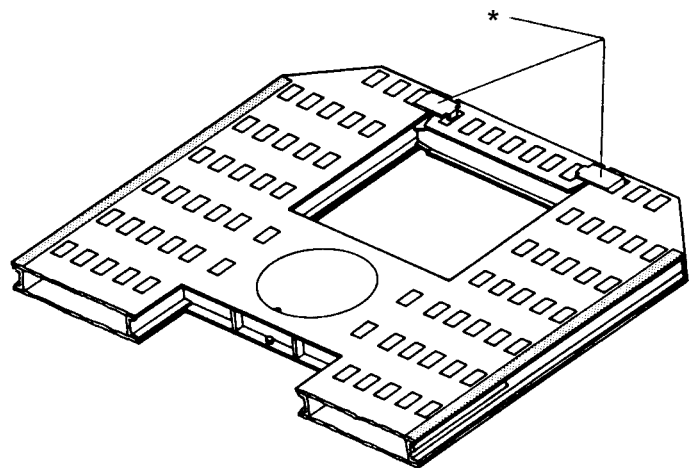


Figure 5

### CAUTION:

1. Do not use movable crossmembers as a step.
2. Do not use movable crossmembers as a base to make a hydraulic pull or push unless auxiliary ram is positioned perpendicular (90 degrees) with top or bottom of crossmember.
3. During removal and installation:
  - a. Hold crossmember secure.
  - b. Install crossmember locks to prevent unintentional movement. Crossmember locks are not designed to secure crossmember as a base for hydraulic pulling/pushing.



\* Movable Crossmember Locks

Figure 6

## TOWERS

The S21M System is equipped with pulling towers at front of machine. Optional rear towers are also available. Multiple pulls can be set up quickly and are controlled by a hand-held remote control switch. Lateral and elevated pulling angles can be made or changed in just a fraction of a minute.

### ⚠ CAUTION:

1. The 1/2 inch (13mm) tower chain is proof tested to 28,000 lbs.
2. The 3/8 inch (10mm) tie down chain is proof tested to 20,000 lbs.

**IMPORTANT:** The following information on towers relates to front towers only! Although much of this information is applicable to **rear towers**, refer to **Auxiliary Tower Users Manual** (Part No. 693883) or **Portable Tower Users Manual** (Part No. 601480) for specific instructions.

### To operate front towers:

**NOTE:** Tower operation requires use of tower pins or tower tie bolts. The following procedure references use of tower pins. Tower tie bolt applications appear on Page 7.

1. Swing tower to desired lateral pulling angle and pin it to mainframe or movable crossmember. (See Figure 7.) Tower pin can be used in any tie down hole or along edge of machine. (See Figure 8.) **DO NOT** position tower pin in front of or at rear of movable crossmember as it will apply excessive stress to crossmember locks. Instead, install tower pin through crossmember tie down hole. (See Figure 7.) Tower pin must be fully seated in lower pinning hole to avoid damage to top pinning hole. (See Figure 9.)
2. To adjust slack in tower chain, grip chain on each side of tower. (See Figure 10.) Lift out on tail of chain until it is approximately 45 degrees from tower. Then disengage chain from tower head and pull chain to either increase or decrease amount of slack.

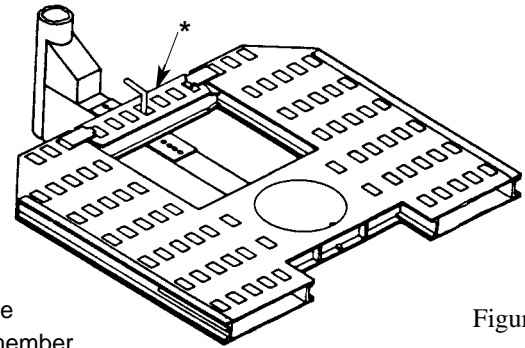


Figure 7

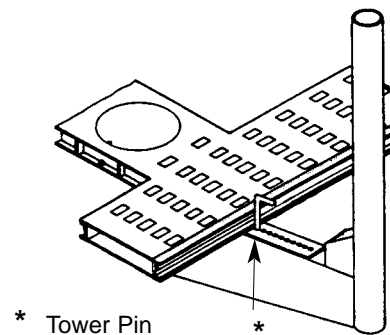


Figure 8

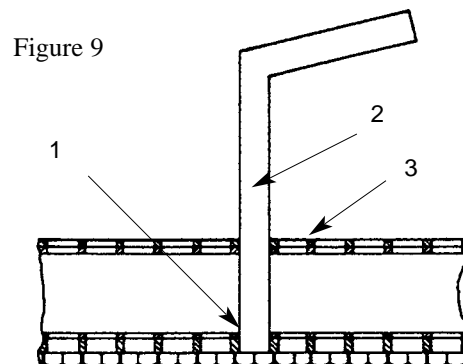
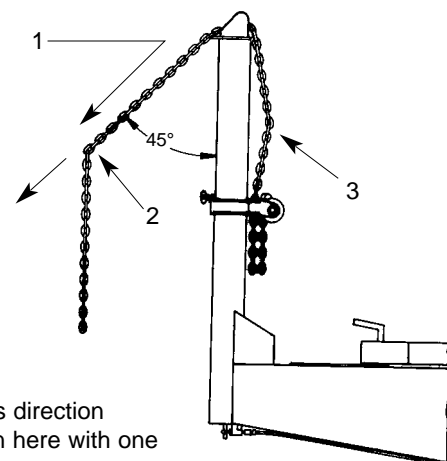


Figure 9

1. Pin must be seated in this Lower Pinning Hole.
2. Tower Pin
3. Pinning Plate



1. Pull in this direction
2. Grip chain here with one hand
3. Grip chain here with opposite hand.

Figure 10

- Support collar with one hand while loosening collar locking knob with opposite hand. Then position collar approximately 3 inches (75 mm) above desired pulling height and retighten collar locking knob. (See Figure 11.)

**NOTE:** Make sure there is enough slack in chain before loosening collar. After loosening locking knob, it might be necessary to turn collar slightly to disengage it from tower pipe.

- Let tower chain hang free momentarily to remove twist. Then, without twisting chain, attach hook to vehicle. Pull on tail end of chain to remove slack and then lower collar. (See Figure 12.)

**IMPORTANT:** Remove twist from chain before lowering collar. Make sure that chain links between collar roller and hook align.

- Open tower valve. Then press up button to exert pressure and down button to release pressure.

**CAUTION:** Observe following WARNING label which appears on tower.

**WARNING!**

**DO NOT** position yourself close to, or in line with, chains, clamps, or other accessories while pressure is applied to this system. Failure to observe this warning could result in operator injury due to the possibility of a chain or accessory disengaging or failing while pressure is applied to this system.

**IMPORTANT:** DO NOT tighten collar locking knob while pressure is applied to system because it will be impossible to loosen the knob without pressure on the system. If it has been tightened by error while pressure is on the system, reapply pressure and loosen the knob.

- When tower is no longer needed, close tower valve, disengage tower chain hook, and store collar using one of the three methods shown in Figure 13.

**CAUTION:**

- Collar locking knob must be tightened before removing tower chain from vehicle.
- Collar locking knob must be tight when collar is not in use.
- Store collar at bottom of tower pipe or support collar with tower chain.

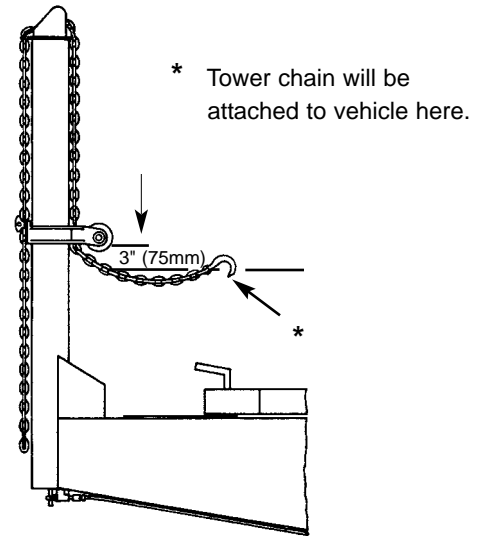


Figure 11

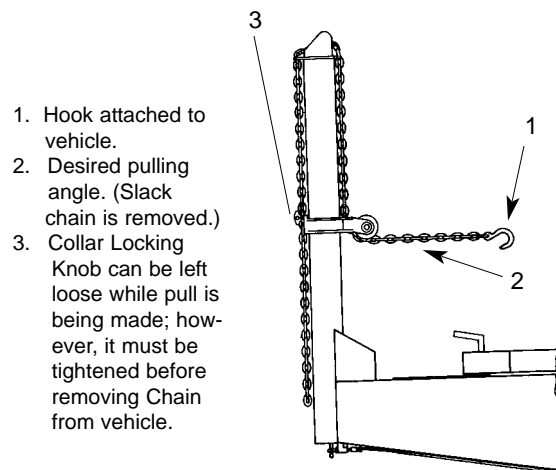


Figure 12

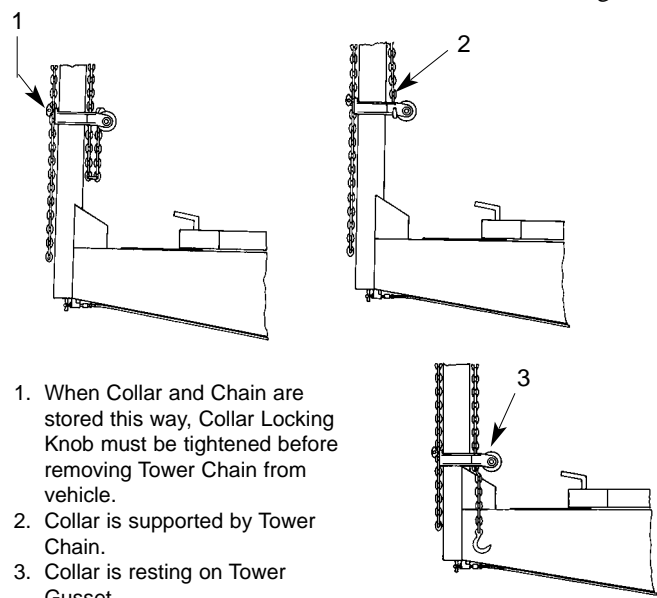


Figure 13

## TOWER TIE BOLT APPLICATIONS

Certain pulling and/or pushing situations necessitate use of tower tie bolts in place of tower pins. Tower tie bolts must be inserted through one of the outer tie down holes on mainframe (or movable crossmembers) and be threaded into one of the pinning holes on tower gusset. Tower tie bolts must be tightened to between 120-150 foot pounds (160 -200 Nm) of torque.

Tower tie bolts must be installed when the following situations exist:

1. Tower does not lift up firmly against underside of mainframe when making a pull, for example: when pulling upward at 45 degree angle or less. (See Figure 14.)

**NOTE:** Tower will not lift in this situation and will be forced down if tower tie bolt is not installed.

2. Auxiliary ram is used to push from tower to vehicle. (See Figure 15.) Tower will be forced down in this situation unless tower tie bolt is installed.

**CAUTION:** DO NOT attempt this setup without reading Auxiliary Ram Owners Manual.

3. Pull from side of tower exceeds 45 degree angle from tower base. (See Figure 16.) This situation does not necessarily force tower up or down, but instead causes tower pedestal rings to twist.

**NOTE:** The higher collar is on tower, the more severe the twisting action.

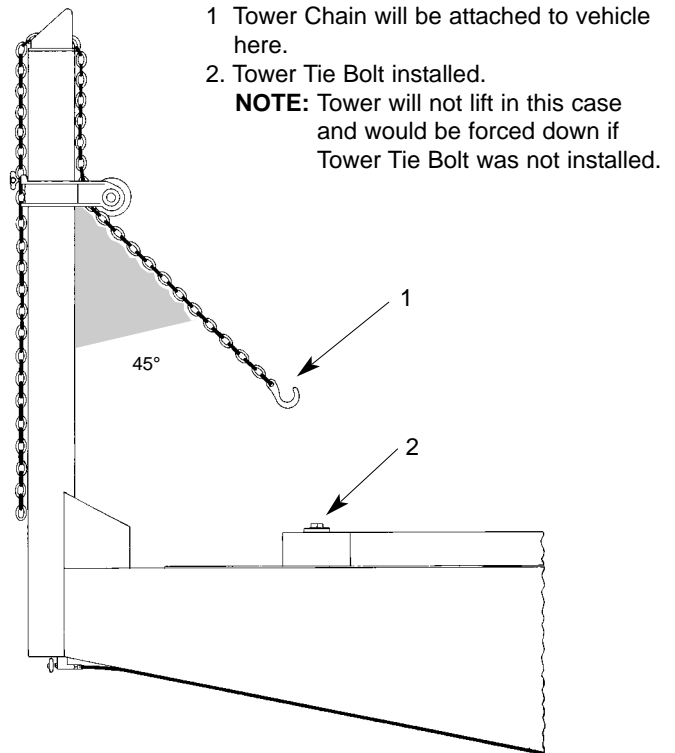
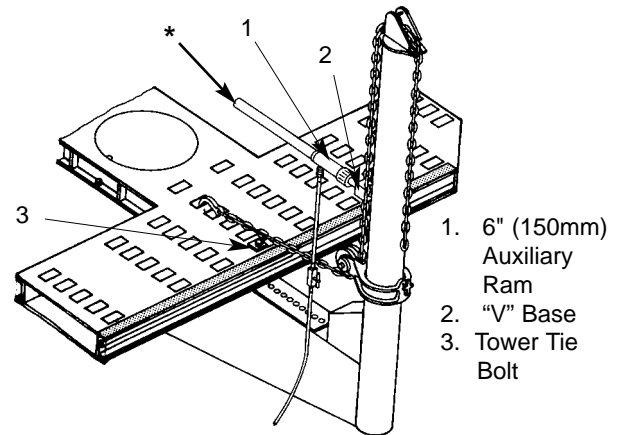


Figure 14



\* Use additional attachment here to protect Extension Tubing while pushing on vehicle.

Figure 15

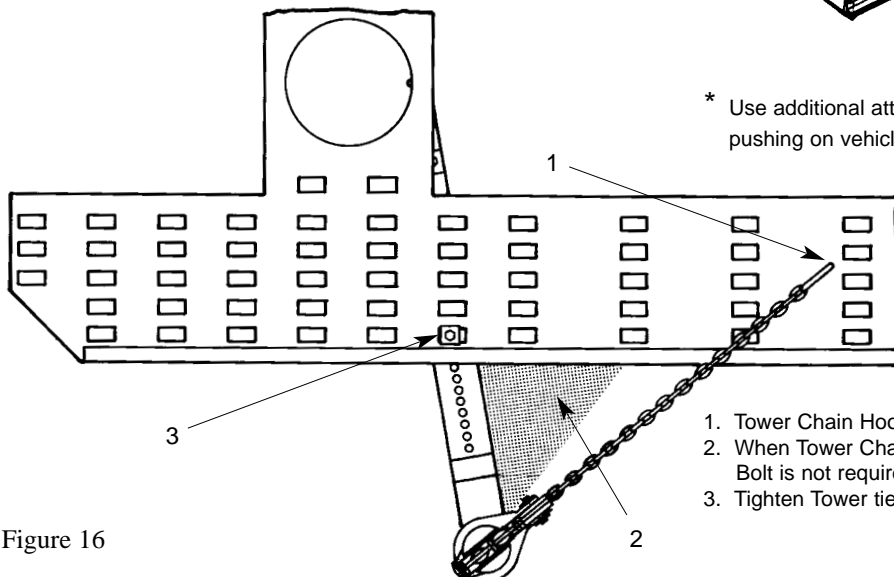


Figure 16

## LOWERING/RAISING MACHINE

When lowering or raising a machine with a vehicle aboard observe the following precautions.

### ⚠ CAUTION:

1. When driving or winching vehicle on or off machine, use helper to guide you. If vehicle's brakes are inoperable, use a Chief Winch and refer to instructions packaged with that accessory.
2. Immediately after positioning vehicle on mainframe, put vehicle in park (if automatic transmission), apply vehicles emergency brake, and have helper block vehicles wheels.
3. Prior to lowering machine, slowly roll vehicle to rear of machine, put vehicle in park (if automatic transmission), apply vehicles emergency brake, and block vehicles wheels. Then install loading ramps at rear of machine.
4. Keep vehicles wheels blocked during raising and lowering procedures and whenever vehicle is not anchored to mainframe.
5. When raising or lowering machine with vehicle aboard, DO NOT walk behind machine.

### TO LOWER MACHINE

**IMPORTANT:** Observe preceding precautions when lowering machine with vehicle aboard.

1. Position towers at front of machine and secure them to front movable crossmember using tower pins.  
**NOTE:** If Chief S21M is equipped with auxiliary towers, bolt these towers to sides of machine using outermost tie down holes in fifth row of tie down holes from rear of machine. (See Auxiliary Tower Owners Manual.)
2. Install loading ramps at rear of machine.
3. Raise lift valve cover and open lift valve half turn to left. Then close all other ram valves.
4. Press 'up' button on remote control switch to lift machine until there is no weight on stiff legs. Then swing stiff legs forward until they are at 30 degree angle from their vertical position. (See Figure 17.)

### ⚠ CAUTION:

1. Clear all obstacles from under and around machine.
2. DO NOT allow anyone or anything to ride on machine or be under machine during lowering procedures.
5. Press 'down' button on remote control switch to lower rear of machine to floor.  
**NOTE:** DO NOT lay remote control switch on machine.

### ⚠ CAUTION

Do NOT Open This Valve Unless:

1. ALL TOWERS ARE PROPERLY PINNED TO THE MACHINE.
2. VEHICLE'S WHEELS ARE BLOCKED, AND EMERGENCY BRAKE IS SET.

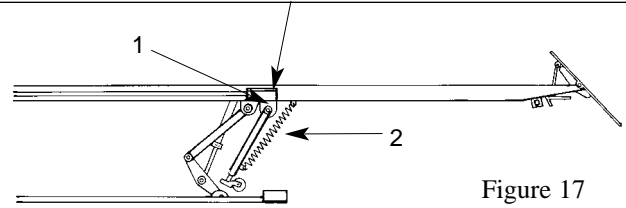


Figure 17

1. Open Lift Valve and raise machine until there is no weight on its Stiff Legs.
2. Swing Stiff Legs forward until they are at 30 degree angle from their upright position.

### To Raise Machine

**IMPORTANT:** Observe preceding precautions when raising machine with vehicle aboard.

1. Check location of towers making sure they are secured to machine as noted in Step 1 — To Lower Machine.
2. Raise lift valve cover and open lift valve half turn to left. Then close all other ram valves.
3. Press 'up' button on remote control switch to lift machine until stiff legs are in upright position. Then press 'down' button to lower stiff legs into their respective stiff leg catch. (See Figure 18.)

### ⚠ CAUTION:

1. Clear all obstacles from under and around machine.
2. DO NOT allow anyone or anything to ride on machine or be under machine during raising procedures.  
**NOTE:** When mainframe lifts off floor, safety ramps automatically pivot into position.
4. Close lift valve and lower lift valve cover.

**IMPORTANT:** Lift valve must be closed when using any towers or rams.

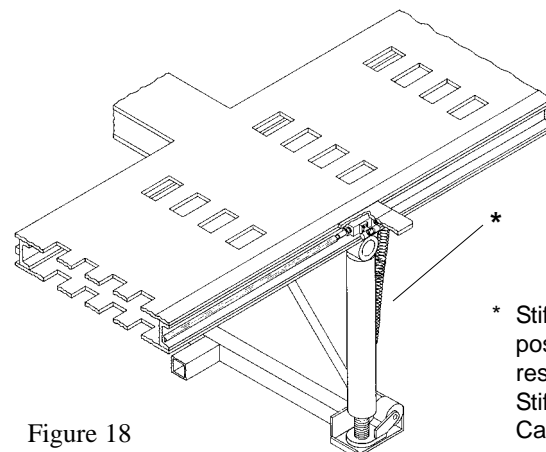


Figure 18

\* Stiff Leg is in position and resting within Stiff Leg Catch.

## MACHINE MAINTENANCE

### Check And Inspect

These components should be checked 'monthly' and anytime a problem is suspected.

### **Tower Chains, Tie-Down Chains**

The tower chains/hooks and tie down chains/hooks supplied with the Chief S21M are high quality, high strength chains/hooks. If replacement is required, purchase only the original Chief product from an authorized Chief Automotive Technologies representative.



#### **CAUTION:**

1. DO NOT heat chain or hook while repairing vehicle — 600F (316C) of heat on chain will weaken it.
2. DO NOT tip load chain hook. Tip loading chain hook will stress hook beyond its designed capability and could cause hook to fail.
3. DO NOT pull with twisted chain links. Pulling with twisted chain links will stress chain links beyond their designed capability and could cause chain to fail.

Tower chains must be inspected for wear, nicks, gouges, stretched and bent links. If found, replace chain.

Tower chain hooks must be inspected for twist and stretched openings. If found, replace chain.

### **Safety Ramp**

Inspect safety ramps making sure they lift into position each time the machine is raised. Lubricate hinges and other moving parts with oil if they do not lift into position.

### **Pedestal Bolts**

Remove pump lid and check mainframe to pedestal bolts/ nuts for looseness.

### **Power and Control Cords**

Inspect power and control cords for worn insulation or other damage. If found, replace cord(s).

### **Tower To Mainframe Gap**

Measure gap between top of tower gusset and bottom of mainframe. If gap measures between 5/16 inch (8mm) and 7/16 inch (11mm), see Tower Tie Bolt Usage, Page 7. If gap exceeds 7/16 inch (11mm), see Troubleshooting Section — Tower To Mainframe Gap, Page 16.

### Cleaning and Lubricating

These components should be cleaned and lubricated as specified for trouble free and extended service. When lubricating use the following:

Oil — Use 30 weight motor oil for all components requiring oil.

Grease — Use a SUS750 Lithium type grease such as lubricate #630-2 for all components requiring grease.

### **Tower Heads**

Grease tower heads every six months.

1. Remove tower chain from tower head.
2. Remove tower head from tower pipe.
3. Clean dirt from tower head pipe and where tower head pipe rubs on inside of tower pipe.
4. Apply grease to tower head pipe and inside of tower pipe.
5. Reinstall tower head and tower chain.

### **Collars**

Clean and lubricate collars monthly.

1. Use compressed air to blow out dirt or dust that collects between collar ears and rollers.



**CAUTION:** Wear safety glasses while using compressed air to blow out dirt and dust.

2. Place a few drops of oil on roller pin between roller and collar ears (each side). Then turn roller a few times. Roller must turn freely.

### **Lift Jack**

Grease lift jack every six months.

1. Clean dirt and excess grease from lift jack's pivot points.
2. Using grease gun, apply grease to grease fittings of each lift jack pivot point.

## Stiff Leg Assembly

Oil stiff leg assembly pivot points and rollers every two months.

1. Clean dirt from pivot points.
2. Place a few drops of oil at each pivot point and on roller pins.

## Tower Rings

Grease tower rings every six months. Dirt and plastic dust can accumulate on rings and pedestal ring grooves causing towers to turn hard. Developing a bead of grease between rings and pedestal ring grooves seals out much of the dirt and plastic dust.


1. Wipe old grease and dirt from rings and pedestal ring grooves.
2. Swing towers to one side of machine and position against mainframe.
3. Use grease gun to apply grease to each grease fitting (2 per ring) on rear half of each ring. Apply enough grease so a small bead of grease develops between ring and pedestal ring groove.
4. Swing towers to opposite side of machine and position against mainframe. Then repeat Step 3.
5. Swing towers several times to work grease around rings and pedestal ring grooves. If more grease is needed, repeat the procedure.

**NOTE:** If tower still swings hard, see Troubleshooting Section — Towers Swing Hard, Page 16; or, see following segment on Cleaning Pedestal Ring Grooves.

## Cleaning Pedestal Ring Grooves

If preceding procedures will not correct tower(s) that swing hard, thoroughly clean pedestal ring grooves.

1. Swing towers to one side of machine and bolt towers to mainframe using tower tie bolts.


 **CAUTION:** Failure to properly bolt towers to mainframe could result in operator injury as well as damage machine.

2. Remove upper and lower rear halves of tower ring.

**IMPORTANT:** Mark each ring's location before removing and note number and location of shims that are between front and rear halves of rings. Rings and shims must be reinstalled in their original locations.

3. Wipe dirt and grease from rings and pedestal ring grooves. Then wipe ring grooves with a solvent soaked rag and wipe dry.
4. Apply grease to pedestal ring grooves.

5. Replace upper rear halves of rings and secure bolts — snug only.
6. Remove tower tie bolts, swing towers to opposite side of machine and reinstall tower tie bolts securing towers to mainframe.

 **CAUTION:** Failure to properly bolt towers to mainframe could result in operator injury as well as damage to machine.


7. Remove upper rear halves of rings and repeat Step 3 on this side of machine.
8. Apply grease to pedestal ring grooves and to rear halves of rings.
9. Replace upper and lower rear halves of tower rings and tighten ring bolts.  
**IMPORTANT:** Rings and shims must be reinstalled in their original position.
10. Apply a small bead of grease between rings and pedestal ring grooves to keep much of the dirt and plastic dust out of the ring area. See preceding information on Tower Rings.

## Eliminating Air In Hydraulic System


All air has been removed from hydraulic system at the factory, but if hydraulic system is opened to replace a system component, it is necessary to bleed air from system prior to using it.

### Bleeding Air In System At Quick Coupler

1. Separate quick coupler.
2. Place male end of quick coupler in container and hold rag over container and quick coupler.

 **CAUTION:** Wear safety glasses to protect eyes from hydraulic oil in the event it squirts out of container and past the rag.

3. Depress ball check at end of quick coupler against bottom of container.

 **CAUTION:** DO NOT have any pressure on the system when pressing ball check on quick coupler.

4. Press up button on control switch to pump air out of system and continue until only hydraulic oil is being pumped out.
5. Reconnect quick coupler.
6. Refill hydraulic fluid reservoir to within 1" (25mm) of top with SUS215 viscosity 100 degrees F (38 C) 10W hydraulic oil with all other rams or towers fully retracted.

### Bleeding Air From System Beyond Quick Coupler

Contact an authorized Chief Automotive Technologies Service representative.

## HYDRAULIC PUMP REMOVAL/INSTALLATION

### Pump Removal

1. Disconnect power supply cord from power supply and pull cord out through top of pedestal opening.
2. Coil remote control switch cord and position it on top of motor.

or

Disconnect remote control switch cord from motor and pull it out through bottom of pedestal.

3. Lift pump out of pedestal.

**NOTE:** If bolts securing pump to base of pedestal have not previously been removed, remove them. The bolts are only necessary for transporting the S21M.

### Pump Installation

1. Set pump into pedestal.

**NOTE:** It may be necessary to pull up slightly on hose that attaches pump to hose block to prevent it from being pinched under pump.

2. If remote control switch cord is coiled and positioned on top of motor, route hand-held control unit out through bottom of pedestal.


If remote control switch cord is disconnected, reroute cord at top of pedestal through to bottom of pedestal and reconnect it to motor.

3. Insert power supply cord at top of pedestal, route it through to bottom of pedestal, and plug it into power supply.

**IMPORTANT:** Following installation, check position of all hydraulic and electrical lines to be sure they are not pinched under pump.

## TROUBLESHOOTING

PROBLEM	CAUSE	POSSIBLE SOLUTION
<b>Pump Will Not:</b>		
Run	<p>Bad square D switch.</p> <p>Bad motor starting relay.</p> <p>Power cord disconnected.</p> <p>Poor electrical connector.</p> <p>No power to motor.</p> <p>Circuit breaker tripped or blown fuse.</p> <p>Broken wires in control cord.</p> <p>Bad motor.</p> <p>Bad power cord and/or switch.</p>	<p>Replace square D switch. Contact Chief Automotive Technologies Service Representative.</p> <p>Replace motor starting relay. Contact Chief Automotive Technologies Service Representative.</p> <p>Plug in power cord.</p> <p>Replace plug or receptacle.</p> <p>Check circuit.</p> <p>Reset circuit breaker or replace fuse.</p> <p>Replace control cord or repair it.</p> <p>Replace motor/pump assembly.</p> <p>Replace power cord and/or switch.</p>
Build pressure or builds pressure slowly.	<p>Hydraulic fluid is low.</p> <p>Bad pin and piston kit or bad low pressure spring.</p> <p>Quick Coupler at shut off valve is loose.</p> <p>Release valve open all the time.</p>	<p>Fill fluid reservoir to within 1" (25mm) of top with SUS215 Viscosity @ 100°F (38C) 10W hydraulic oil with all rams down and machine sitting level.</p> <p>Replace pin and piston kit or low pressure spring. Contact Chief Automotive Technologies Service Representative. Tighten Quick Coupler. Contact Chief Automotive Technologies Service Representative.</p>
Hold pressure	<p>Contamination in valve.</p> <p>Valve bleeding pressure.</p> <p>Hydraulic oil leak.</p> <p>Faulty check valves.</p>	<p>Operate pump and release pressure several times to flush valve.</p> <p>Flush valve or replace.</p> <p>Check hoses, fittings, and quick couplers, and tighten or replace.</p> <p>Replace internal check valves. Contact Chief Automotive Technologies Service Representative.</p>
Operate efficiently under pressure	<p>Extension cord is too long or wire gauge is too small.</p> <p><b>IMPORTANT:</b> Extension cord usage is not recommended. If used, extension cords must meet standards (listed at right) and be used on a short term basis only.</p> <p>Facility wiring is inadequate.</p>	<p>Use extension cord rated for 25 amps at 120 volts with ground wire up to 25 feet (7.5m) long, or use extension cord rated for 16 amps at 220 volts with ground wire up to 25 feet (7.5m) long.</p> <p>Rewire facility to comply with local electric code. Add dedicated line with 30 amp breaker.</p>
<b>Ram Will:</b>		
Jump	Air in hydraulic system.	Bleed air from system. See Machine Maintenance, Page 10.
Not Extend	<p>Valve not open.</p> <p>Loose quick coupler.</p> <p>Pump will not build pressure.</p>	<p>Open valve one turn.</p> <p>Tighten quick coupler.</p> <p>See Pump Problems above.</p>
Not Retract	<p>Loose quick coupler.</p> <p>Dirt in quick coupler.</p> <p>Ram piston is bent.</p>	<p>Tighten quick coupler.</p> <p>Disconnect quick coupler and clean male and female halves.</p> <p>Replace ram.</p>
<b>Hydraulic Oil Leakage:</b>	<p>Hose leaking.</p> <p>Loose quick coupler.</p> <p>Loose fitting.</p> <p>Inadequate sealant in pipe threads.</p> <p>Overfilled pump reservoir.</p>	<p>Replace hose.</p> <p>Tighten.</p> <p>Tighten.</p> <p>Apply teflon tape to pipe threads after properly cleaning and retighten.</p> <p>Drain oil to 2" (50mm) below fill cap.</p>

PROBLEM	CAUSE	POSSIBLE SOLUTION
<b>Machine Will Not:</b>		
Lift valve not open.	Open lift valve one turn. Loose quick coupler on lift ram. Other valves open. Too much weight at rear of machine. Vehicle weight exceeds 6,500 lbs. (2925 kg.) capacity. Inadequate hydraulic pressure.  Object under pedestal.	Tighten. Close all other valves. Move vehicle forward on machine. Do not attempt to load vehicle.  Check pressure gauge to see if 2.5 ton of hydraulic pressure is being used, and increase pressure if it is not. Lower machine and remove object.
Lower	Lift valve not open. Loose quick coupler on lift ram.  Restrictor valve spring has lost some of its strength.   Object under lift mechanism. Dirt in restrictor swivel orifice.	Open lift valve one turn. Tighten.  Remove restrictor valve spring located in block next to lift valve, and stretch it slightly. Reinsert spring and try again.   <b>CAUTION:</b> Machine must be supported by machine's stiff legs before removing restrictor valve spring.  Raise machine and remove object. Disassemble and clean.
<b>Towers:</b>		
Swing Hard	Ring grooves are dirty.  Bent tower rings.  Crushed ring bearings.	Clean and regrease. See Machine Maintenance, Page 9.  Repair or replace. Contact Chief Automotive Technologies Service Representative.  Replace bearings. Contact Chief Automotive Technologies Service Rep.
Jump When Swung	Pedestal is dented.	Repair or replace pedestal. Contact Chief Automotive Technologies Service Rep.
To Mainframe Gap Exceeds 7/16 inch (11mm)	Improper use.	Readjust tower. Straighten tower ring. Contact Chief Automotive Technologies Service Representative.
<b>Collars Jump:</b>		
Under Load	Improper fit between collar and tower pipe.	Refit collar. Contact Chief Automotive Technologies Service Representative.
When Pressure Is Released	Defective surge valve.  Improper fit between collar and tower pipe.	Replace surge valve. Contact Chief Automotive Technologies Service Representative.  Refit collar. Contact Chief Automotive Technologies Service Representative.

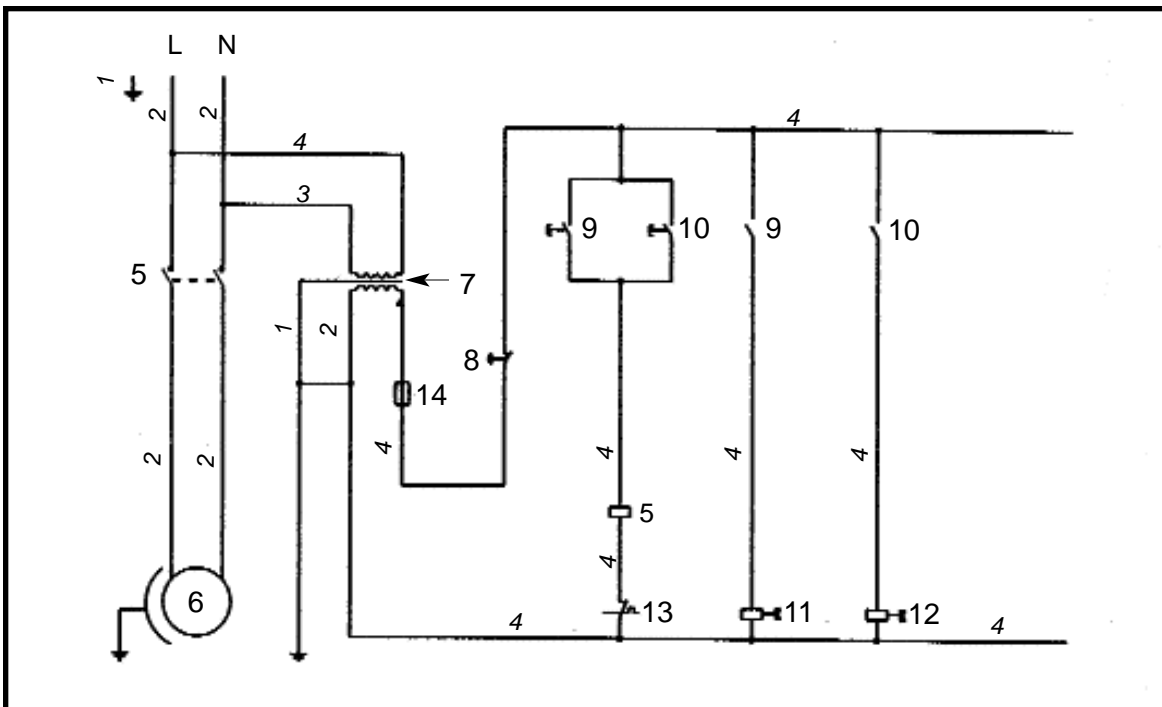
FOR ADDITIONAL TROUBLESHOOTING INFORMATION OR A SERVICE ENGINEER, CONTACT CHIEF AUTOMOTIVE TECHNOLOGIES, 1-800-445-9262 (TOLL FREE).

### S21M Specifications

(Series 30 / Series 20 Models)

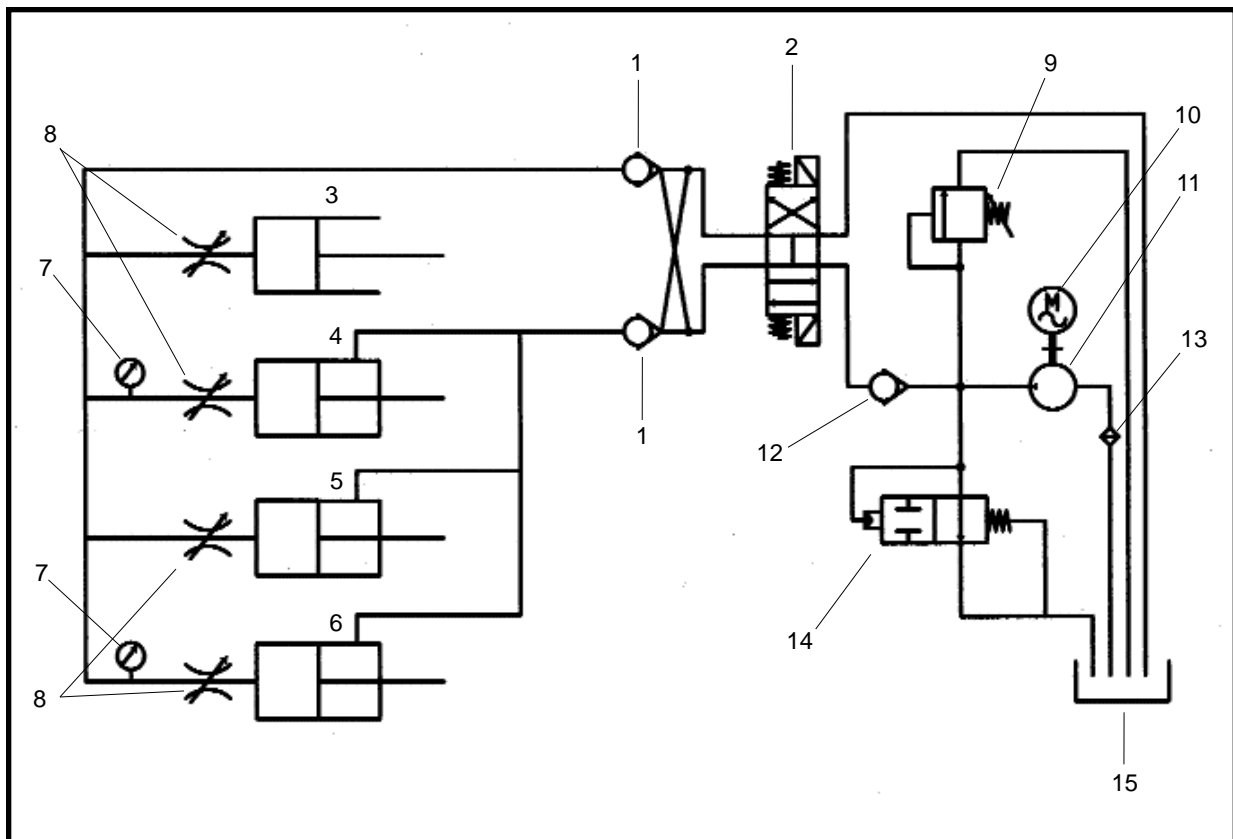
Weight (30 Series).....	7,000 lbs. (3,175 kg)
Weight (31 Series).....	7,650 lbs. (3,470 kg)
Weight (32 Series).....	8,100 lbs. (3,674 kg)
Weight (20 Series).....	5,400 lbs. (2,450 kg)
Weight (21 Series).....	6,050 lbs. (2,744 kg)
Weight (22 Series).....	6,500 lbs. (4,948 kg)
Power Required.....	120v, 20 amp, 60 hz. 220v, 10 amp, 50 hz
Hydraulic Power.....	10 tons per tower (89 kN)
Hydraulic Fluid.....	9.5L SUS215 Viscosity, 100° F (38C), 10W
Controls.....	One hand-held unit on 25' (7.6m) of cord
Length.....	21' 8" (6.6m) (safety ramps included) 23' 1" (7m) maximum length with front towers extended 24' 3" (7.39m) with front and rear towers extended
Width.....	7'4" (2.23m) 12' 10" (3.9m) with front towers extended to both sides 14' 4" (4.4m) with front and rear towers extended to both sides
Height.....	8'5" (2.56m) 9'3" (2.82m) with tower rams extended up
Clearance.....	2' (.6m) recommended on all sides
Working Height.....	31" (.79m) from floor to top of mainframe
Tie Down Openings.....	250
Lift Capacity.....	10,000 lbs. (4,530 kg)
Sound Pressure Level at Control Position.....	81 dB(A)

## S21M Electrical Circuit



- |   |                         |    |                                  |
|---|-------------------------|----|----------------------------------|
| 1 | Yellow/Green Wire       | 8  | Emergency Button                 |
| 2 | Red Wire                | 9  | Push Up Button                   |
| 3 | Blue Wire               | 10 | Push Down Button                 |
| 4 | Black Wire              | 11 | Solenoid Valve Up                |
| 5 | Contactar               | 12 | Solenoid Valve Down              |
| 6 | 1 Phase Motor           | 13 | Thermal Protection (150 degrees) |
| 7 | Transformer 24 Volts AC | 14 | Fuse 2 Amp                       |

## S21M Hydraulic Schematic



- |   |                                |    |                       |
|---|--------------------------------|----|-----------------------|
| 1 | Pilot Operated Check Valves    | 9  | Pressure Relief Valve |
| 2 | 3-Position 4-Way Control Valve | 10 | Motor                 |
| 3 | Lift Cylinder                  | 11 | Pump                  |
| 4 | Cylinder Tower 1               | 12 | Check Valve           |
| 5 | Cylinder Tower 2               | 13 | Filter                |
| 6 | Cylinder Tower 3               | 14 | Start Up Valve        |
| 7 | Pressure Gauge                 | 15 | Tank                  |
| 8 | Needle Valve                   |    |                       |



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**Chief reserves the right to alter product specifications  
and/or package components without notice.**