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# TM-7 Truck Mounted Valve Operator User's Manual



E.H. Wachs Part No. 17-MAN-00 Rev. 6-0309, March 2009

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# Chapter 1 About This Manual

# PURPOSE OF THIS MANUAL

This manual explains how to operate and maintain the TM-7 truck mounted valve operator. It includes instructions for set-up, operation, and maintenance. It also contains parts lists, diagrams, and service information to help you order replacement parts and perform user-serviceable repairs.

Before operating the TM-7, you should read through this manual and become familiar with all instructions. At a minimum, make sure you read and understand the following chapters:

- Chapter 1, About This Manual
- Chapter 2, Safety
- Chapter 3, Introduction to the Equipment
- Chapter 5, Operating Instructions
- Chapter 9, Accessories

If you will be performing service or repairs, make sure you read and understand these chapters:

- Chapter 1, About This Manual
- Chapter 4, Assembly and Disassembly
- Chapter 6, Routine Maintenance
- Chapter 7, Service and Repair.

#### In This Chapter

PURPOSE OF THIS MANUAL

HOW TO USE THE MANUAL

SYMBOLS AND WARNINGS

MANUAL UPDATES AND REVISION TRACKING Throughout this manual, refer to this column for warnings, cautions, and notices with supplementary information.



A WARNING alert with the safety alert symbol indicates a potentially hazardous situation that **could** result in **serious injury or death**.



A CAUTION alert with the safety alert symbol indicates a potentially hazardous situation that **could** result in **minor or moderate injury**.

You will also want to refer to Chapter 8, Parts Lists and Drawings.

# HOW TO USE THE MANUAL

This manual is organized to help you quickly find the information you need. Each chapter describes a specific topic on using or maintaining your equipment.

Each page is designed with two columns. This large column on the inside of the page contains instructions and illustrations. Use these instructions to operate and maintain the equipment.

The narrower column on the outside contains additional information such as warnings, special notes, and definitions. Refer to it for safety notes and other information.

# SYMBOLS AND WARNINGS

The following symbols are used throughout this manual to indicate special notes and warnings. They appear in the outside column of the page, next to the section they refer to. Make sure you understand what each symbol means, and follow all instructions for cautions and warnings.



This is the **safety alert symbol**. It is used to alert you to **potential personal injury hazards**. Obey all safety messages that follow this symbol to avoid possible injury or death. This is the **equipment damage alert symbol**. It is used to alert you to **potential equipment damage situations**. Obey all messages that follow this symbol to avoid damaging the equipment or workpiece on which it is operating.





A CAUTION alert with the damage alert symbol indicates a situation that **will** result in **damage to the equipment**.



An IMPORTANT alert with the damage alert symbol indicates a situation that **may** result in **damage to the equipment**.



A NOTE provides supplementary information or operating tips.



This symbol indicates a user note. **Notes** provide additional information to supplement the instructions, or tips for easier operation.



# MANUAL UPDATES AND REVISION TRACKING

Occasionally, we will update manuals with improved operation or maintenance procedures, or with corrections if necessary. When a manual is revised, we will update the revision history on the title page.

You may have factory service or upgrades performed on the equipment. If this service changes any technical data or operation and maintenance procedures, we will include a revised manual when we return the equipment to you. Current versions of E.H. Wachs manuals are also available in PDF format. You can request an electronic copy of this manual by emailing customer service at <u>sales@wachsco.com</u>.

# Chapter 2 Safety

The E.H. Wachs takes great pride in designing and manufacturing safe, high-quality products. We make user safety a top priority in the design of all our products.

Read this chapter carefully before operating the TM-7. It contains important safety instructions and recommendations.

# **OPERATOR SAFETY**

Follow these guidelines for safe operation of the equipment.

- **<u>READ THE OPERATING MANUAL.</u>** Make sure you understand all setup and operating instructions before you begin.
- **INSPECT MACHINE AND ACCESSORIES.** Before starting the machine, look for loose bolts or nuts, leaking lubricant, rusted components, and any other physical conditions that may affect operation. Properly maintaining the machine can greatly decrease the chances for injury.
- <u>ALWAYS READ PLACARDS AND LABELS.</u> Make sure all placards, labels, and stickers are clearly legible and in good condition. You can purchase replacement labels from E.H. Wachs.
- <u>KEEP CLEAR OF MOVING PARTS.</u> Keep hands, arms, and fingers clear of all rotating or moving parts.

## In This Chapter

OPERATOR SAFETY SAFETY LABELS



Look for this symbol throughout the manual. It indicates a personal injury hazard. Always turn machine off before doing any adjustments or service.

- <u>SECURE LOOSE CLOTHING AND JEWELRY.</u> Secure or remove loose-fitting clothing and jewelry, and securely bind long hair, to prevent them from getting caught in moving parts of the machine.
- **KEEP WORK AREA CLEAR.** Keep all clutter and nonessential materials out of the work area. Only people directly involved with the work being performed should have access to the area.

### Safety Symbols



This icon is displayed with any safety alert that indicates a personal injury hazard.

# \land WARNING

This safety alert indicates a potentially hazardous situation that, if not avoided, **could** result in **death or serious injury**.

# 

This safety alert, with the personal injury hazard symbol, indicates a potentially hazardous situation that, if not avoided, **could** result in **minor or moderate injury**.

## Protective Equipment Requirements



### WARNING

Always wear impact resistant eye protection while operating or working near this equipment.

For additional information on eye and face protection, refer to Federal OSHA regulations, 29 Code of Federal Regulations, Section 1910.133., Eye and Face Protection and American National Standards Institute, ANSI Z87.1, Occupational and Educational Eye and Face Protection. Z87.1 is available from the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.



### CAUTION

Personal hearing protection is recommended when operating or working near this tool.

Hearing protectors are required in high noise areas, 85 dBA or greater. The operation of other tools and equipment in the area, reflective surfaces, process noises, and resonant structures can increase the noise level in the area. For additional information on hearing protection, refer to Federal OSHA regulations, 29 Code of Federal Regulations, Section 1910.95, Occupational Noise Exposure and ANSI S12.6 Hearing Protectors.

## SAFETY LABELS

The following safety labels are on TM-7 units mounted on swivel trailers or vehicles.



Figure 2-1. The rotation clamps on the swivel rail must be tightened securely before operating the TM-7.



*Figure 2-2. Keep hands clear of the swivel rail when positioning the TM-7.* 

# Chapter 3 Introduction to the Equipment

The E.H. Wachs TM-7, truck mounted valve operator is a permanently mounted, heavy duty, hydraulic valve turner designed to operate 6" through 96" valves. It is designed to make valve turning easy for all utilities and assures maximum valve protection.

The TM-7 allows computer-controlled or manual exercising of valve. Computer control is provided with the Wachs Vitals Recon controller, which can store valve activity data and transfer it to the Vitals Desktop program on your PC for analysis.

# TM-7 CONFIGURATIONS

TM-7 Standard Duty-Mechanical Controls (PN: 17-000-01):

Wachs Model TM-7 Truck Mounted Valve operator, complete with standard duty (1500 lb-ft torque) hydraulic drive system, manual control for torque and direction of rotation, electronic revolution counter, an integral auxiliary hydraulic circuit, 8' long valve key with 2" universal socket, operating manual and installation instructions.

# TM-7 Standard Duty-Microprocessor Control (PN: 17-000-02):

Wachs Model TM-7 Truck Mounted Valve operator, complete with standard duty (1500 ft. lb. torque) hydraulic

### In This Chapter

TM-7 Configurations Equipment Description TM-7 Controller

SPECIFICATIONS AND DIMENSIONS

drive system, microprocessor control for torque and direction of rotation, electronic revolution counter, an integral auxiliary hydraulic circuit, 8' long valve key with 2" universal socket, operating manual and installation instructions.

# TM-7 Heavy Duty-Mechanical Controls (PN: 17-000-03):

Wachs Model TM-7 Truck Mounted Valve operator, complete with heavy duty (2500 ft. lb. torque) hydraulic drive system, manual control for torque and direction of rotation, electronic revolution counter, an integral auxiliary hydraulic circuit, 8' long valve key with 2" universal socket, operating manual and installation instructions.

# TM-7 Heavy Duty-Microprocessor Control (PN: 17-000-04):

Wachs Model TM-7 Truck Mounted Valve operator, complete with heavy duty (2500 ft. lb. torque) hydraulic drive system, microprocessor control for torque and direction of rotation, electronic revolution counter, an integral auxiliary hydraulic circuit, 8' long valve key with 2" universal socket, operating manual and installation instructions.

# **EQUIPMENT DESCRIPTION**

Figure 3-1and Figure 3-2 illustrate the major components of the TM-7 valve operator. Figure 3-4 shows the control panel features. The following sections describe the available configurations.



Figure 3-2. The photo shows the TM-7 configured with a gas engine. (Shown with TM-7 hoses disconnected from side hydraulic ports.)



Figure 3-3. The photo shows the panel controls.



*Figure 3-4. The photo shows the front panel engine controls.* 

#### **Base Machine**

The following items are included with all configurations.

- Valve turning power head on extension slide.
- 10 gallon hydraulic reservoir.
- Manual or computerized torque control.
- Power head position locking lever.
- Auxiliary hydraulic circuit for operating other tools, with switchover control.

- Integrated microswitch for automated power on/off.
- Panel indicator for hydraulic oil level and temperature.
- System pressure gauge.

#### **PTO Drive Option**

The TM-7 is provided with components described in the "Base Machine" section above.

Customer must supply power take-off and throttle control.

#### **Gas Engine Option**

The gas engine option includes all components described in the "Base Machine" section above, plus the following:

- 15 HP (standard) or 20 HP (heavy duty) gasoline engine.
- Panel controls for engine (Off/Run/Start), throttle speed, and choke.

Operating and maintenance manuals are provided with the engine. Before using the TM-7, read these manuals to familiarize yourself with the engine's features and operation.

#### **Control Options**

The standard control option for the TM-7 is the Vitals Recon controller, a hand-held computer for machine control and valve activity data storage. Manual machine control is available as an option.

#### Vitals Recon Computer Control

For units equipped with the Vitals Recon computer controller, all machine controls and settings are performed using the Vitals Mobile program on the controller. The next section describes the control features of Vitals Mobile.

#### Manual Control

Manually controlled units offer the following controls.

Directional Control Valve

Off (center position)—oil bypasses motor, machine head does not turn.

Clockwise (lever left)-head rotates clockwise.

Counter-clockwise (lever right)—head rotates counter-clockwise.

• Torque Control Adjustment Increase torque by turning the adjustment knob in (clockwise)

Decrease torque by turning the adjustment knob out (counterclockwise).

• Torque Gauge

The torque gauge indicates torque output in lb-ft at the power head.

• Revolution Counter

The revolution counter counts in hundredths of a turn. A reading of 100 on the counter equals 1 complete revolution of a valve.

When changing valve rotation direction, the counter will automatically reverse the count. To zero the counter, press the reset button on the counter face.

# TM-7 CONTROLLER

The TM-7 is operated using the Vitals Recon controller. The controller is a rugged, handheld computer running the Windows Mobile operating system. It features a touchscreen interface for data entry and machine control



Figure 3-5. The Vitals Recon controller is used to operate the TM-7 and other E.H. Wachs valve operators. The controller stores valve exercising data for valve logging and analysis using the Vitals Desktop software program.

The controller runs the Vitals Mobile software for managing valve activity data and operating the TM-7. Figure 3-6 shows the interface of the Wachs Controller program, used for valve operator control.



See the detailed instructions for using Vitals Mobile in the *Vitals Help File*, provided on the Vitals software disk.

	Vitals Mobile Tap to connect GPS				I imit—Displays current torque
Torque—Displays current	Torque	Highest O		Limit	limit. Touch to change torque limit.
operating torque. Touch to change torque limit	0			200	<b>Direction</b> —Displays current turn-
Highest—Displays maxi-					direction.
mum torque during current activity	Count 0.0	Directio ?	n	Mode EXER	<b>Mode</b> —Displays current operat- ing mode (Exercise or Manual).
<b>Count</b> —Displays valve rota- tions during current activity.					
<b>START/STOP</b> —Touch to	CTA	CTART		Jog LH	Jog LH— louch and hold to jog left-hand (counter-clockwise).
ciser. (Displays <b>STOP</b> if the exerciser is operating.)	START			Jog RH	Jog RH—Touch and hold to jog right-hand (clockwise).
Back—Touch to return to			L		Settings—Touch to change valve
Vitals Mobile program. <b>Reset</b> —Touch to start a new	Back	Reset		Settings	<i>Operating settings.</i> Waiting to connect—Displays
activity.	Waiting to connect			current operating status (reads Connected to TM-7 when startup is complete).	

*Figure 3-6. The illustration describes the features of the Wachs Controller program.* 

### **Connecting the Controller**

The Vitals Recon controller is connected to the TM-7 with a specialized cable.



Figure 3-7. The photo shows the controller cable.



*Figure 3-8. The Vitals Recon controller connections are shown.* 



Figure 3-9. To connect the controller cable to the TM-7, unscrew the connector cap and then screw on the cable connector.

### **SPECIFICATIONS AND DIMENSIONS**

#### Table 1: TM-7 Physical Specifications

Feature	Specification
Head extension	27" (686 mm)
Misalignment capability	15°
Hydraulic reservoir	10 gallons (37.8 l)
Drive system	Single hydraulic motor
Controls	Computerized or manual (computerized systems have manual override capability)
Auxiliary circuit	Standard Class II (cooler option available)
Hydraulic oil filtration	10 micron canister
Door clearance	Width: 19" (483 mm). Height: 13" (330 mm)
Frame	3" (76 mm) square tube module design
Mounting methods	Wachs trailer mount; customer vehicle mount to bed or across bed side panels.
Finish	Powder coated white
Weight	370 lb (170 kg) base unit

#### **Table 2: TM-7 Performance Specifications**

Configuration	Standard Duty Drive	Heavy Duty Drive	
PTO	1500 lb-ft at 2000 psi	2500 lb-ft at 2000 psi	
	6-68 rpm at 2-20 gpm	4-62 rpm at 2-30 gpm	
	27 rpm at 8 gpm	25 rpm at 13 gpm	
Gas engine	15 HP	20 HP	
	1500 lb-ft at 2000 psi	2500 lb-ft at 2000 psi	
	4-27 rpm at 600-3600 engine rpm	23 rpm at 13 gpm	
	4 hour fuel endurance at 300 lb-ft and 2800 rpm	8 hour fuel endurance at 450 lb-ft and 2600 rpm	
With cooler	8 gpm at 2000 psi at 120° F	12 gpm at 2000 psi at 120° F	





# Chapter 4

# Assembly, Disassembly, and Storage

This chapter includes instructions for unpacking the TM-7 for first-time use, preparing the TM-7 for storage, and installing the TM-7 on a customer-supplied vehicle.

# **PREPARING FOR USE**

Follow these guidelines to put the TM-7 in service.

- **1**. Remove all wrapping and packaging from the unit.
- **2.** If installing the TM-7 on your own vehicle, install it according to the directions later in this chapter.
- **3.** Fill the hydraulic reservoir using Mobile DTE or equivalent hydraulic oil. The reservoir holds approximately 10 gallons.
- **4.** Lubricate the unit according to the instructions in Chapter 6.
- **5**. Check the engine oil level. (Units with gas engine.)
- 6. Check the engine coolant level. (Units with gas engine.)
- **7.** Fill the engine fuel tank. Use a standard automotive gasoline. (Units with gas engine.)
- **8.** Connect the battery to the cables. The TM-7 is provided with a maintenance-free battery, which does not require you to fill the battery or perform other service.

#### In This Chapter

PREPARING FOR USE

STORAGE

INSTALLATION ON CUSTOMER EQUIPMENT



If you are storing the machine in cold weather, you may want to remove the battery and store it indoors.



Do not operate the pump until you have filled the system with hydraulic oil.

# STORAGE

Prepare the TM-7 for storage by following this procedure.

- **1.** Lubricate the unit according to the instructions in Chapter 6.
- **2.** Drain the fuel tank and close the fuel shut-off valve. (Units with gas engine.)
- **3.** If storing in sub-freezing weather, make sure the engine coolant has the appropriate antifreeze mix. (Units with gas engine.)
- **4.** Disconnect the cables from the battery.(Units with gas engine.)
- **5.** Disconnect the Vitals Recon controller and store it in its case. Screw the cap on the connector on the TM-7 control box.
- 6. An optional weatherproof cover is available for the TM-7. If you have the cover, put it over the unit and secure it with the provided straps. The cover is highly recommended for long-term, outdoor storage.

# INSTALLATION ON CUSTOMER EQUIPMENT

### **Bed Mount Installation**

Follow the instructions below for either a PTO-driven TM-7, or for a unit with its own gasoline engine.

#### PTO Powered Option

The most satisfactory installation for the TM-7 pump is direct flange mounted onto the PTO, which eliminates universal joints and drive shafts from the PTO to the pump. The pump must be capable of producing 10 gpm at 2000 PSI, running at 1200 RPM.

Most truck body and equipment installers are familiar with installations of the type described in this section. This includes PTO, pump, hose lines and throttle controls. If a door is cut in side of truck body for access to the TM-7, make it at least 19" wide and 13" high to allow the power head to slide in and out.

#### Hose and Fitting Guidelines.

- The high pressure hose should be 1" two wire braid capable of at least 2000 PSI working pressure.
- The return hose should be 1-1/4" rayon braid capable of at least 300 PSI working pressure.
- Hose ends should be SAE 37 degree swivel.
- We recommend the use of 1" heavy wall pipe and 1-1/4" standard wall pipe for all connections through bed of truck. Pipe should extend under truck bed far enough to allow straight hose connections.
- A swivel connection is necessary at one end of each hose.
- **1.** Install a power takeoff on the truck transmission. See manufacturer's instructions included with power takeoff. Be certain that the rotation of the power takeoff shaft matches the rotation of the TM-7 hydraulic pump, as indicated by arrow on pump. It is recommended that the PTO be installed on the right (passenger) side of transmission unless specified otherwise.
- 2. Set the TM-7 in the truck bed at the desired location. Keep it as close as possible to the side of the truck body, for maximum extension of the power head.
- **3.** Lay out and drill eight (8) 9/16" mounting holes in the truck bed for securing the TM-7 to the truck frame.
- **4.** Layout and cut two access holes in bed of truck: a 1-3/ 8" access hole for 3/4" high pressure line, and a 2" access hole for 1" low pressure return line. Cut where clearance is available. Extra piping from access holes to connecting points may be needed.
- **5.** Bolt the TM-7 to the truck bed using 1/2" bolts through mounting holes. If mounting bolts do not electrically ground the TM-7 to the frame of the truck, connect a ground strap from one bolt to the frame.
- 6. Install piping and hoses assembled in Step 5. Use pipe joint compound on all NPT connections. Use one to three hose clips to secure hose to underside of truck.

NOTE

Purchase and install a hand throttle if the truck is not equipped with one.



Do not cut access holes beneath connecting points of the machine frame because of rotating head slide path interference.



Use minimum 14 gauge wire to connect the TM-7. A 10 A fuse is recommended at the positive battery terminal.



Make sure the fuel line does not contact the exhaust system or any sharp objects.

- 7. Connect the **white** wire from the TM-7 control box directly to the **positive** terminal of the battery.
- **8.** Connect the **black** wire from the TM-7 control box directly to the **negative** terminal of the battery.
- **9.** Fill the hydraulic reservoir to full mark on gauge (approximately 10 gallons). Use Mobil, DTE light, or equivalent hydraulic oil.
- **10.** Test the system by engaging the PTO. Allow the truck to idle for several minutes to purge air from the hydraulic system and check for hydraulic oil leaks.
- **11.** Refill the hydraulic reservoir. Read the Operating Instructions (Chapter 5) before proceeding with operation.

#### Gas Engine Option

- Set valve operator in truck bed at desired location. Keep TM-7 as close as possible to side of truck body to assure maximum reach of power head when extended.
- **2.** Lay out and drill eight (8) 9/16" mounting holes in truck bed for securing unit to the truck frame.
- **3.** Bolt the TM-7 to the truck bed using 1/2" bolts through mounting holes cut in Step 1. If mounting bolts do not ground operator to frame of truck, connect ground strap from one bolt to frame.
- **4.** The gas tank should be mounted to the bed of truck.Using the universal anchors supplied, drill a 3/4" hole in two locations approximately 14" apart. Install the anchors and secure.
- **5.** Place the tank between the anchors. Attach the spring cord through the tank handle and to the anchors.
- **6.** Attach the quick disconnect fuel line and fill.

## Top-Mounted Installation (Gas Engine Only)

Have the frame extension, angle brackets, and installation hardware ready before you begin installation. These items are ordered and shipped separately from the TM-7 unit.

See the illustration on the next page.

- **1**. Measure the width of the truck bed.
- 2. Slide the frame extension into the TM-7 main frame from the rear. The frame extension has been drilled for multiple mounting locations.
- **3.** Align the mounting holes that allow the overall length of the frame and extension be equal to or slightly longer than the outside maximum width of your truck bed walls.
- **4.** Using the supplied four 1/2-13 x 4" HHCS, 8 flat washers, and four 1/2 13 hex nuts, secure the extension to the TM-7 frame.
- **5.** Lift the TM-7 into the pickup bed and position it at the desired location.
- 6. Install the adjustable angle brackets. They require two 1/2-13 x 1-1/2" HHCS, four flat washers, two lock washers & two 1/2 13 hex nuts each, which are supplied.
- **7.** Butt the adjustable angle brackets against the bed wall lip and tighten the fasteners.
- **8.** Install the two rear (engine side) "J" hooks and snug with two flat washers, two lock washers and two 3/8-16 hex nuts.
- **9** Install the two forward "J" hooks and snug fasteners.
- **10.** Tighten all four "J" hooks equally until unit is firmly secured to bed.
- **11.** Using the angle bracket as a template, mark inside of truck bed, for mounting hole locations.
- **12.** Drill through truck bed inside wall and bolt angle bracket to truck bed. (Fasteners not included.)



After the first operation of the TM-7, recheck the tightness of the "J" hooks. Check their tightness every month.



The "J" hooks mount on the adjust able angle brackets. They clamp to the upper wall between the inside lip and the outside wall of the pickup bed.





E.H. Wachs

# Chapter 5 Operating Instructions

# SETTING UP THE VALVE OPERATOR

Follow all safety guidelines for parking and positioning the vehicle to perform a valve operation.

- **1.** Park the vehicle so that the TM-7 extension slide can reach over the valve. (The power head can be extended up to 27"[686 mm] from the TM-7 frame.)
- 2. If you are using the TM-7 on a swivel trailer, release the swivel clamps and move the TM-7 to the required orientation. Re-tighten the swivel clamps.



*Figure 5-1. For a swivel-mounted TM-7, loosen the swivel clamps (one each side) to position the TM-7.* 

#### In This Chapter

SETTING UP THE VALVE OPERATOR

PERFORMING THE VALVE OPERATION

OPERATING AUXILIARY EQUIPMENT

CHARGING OR JUMP-STARTING THE BATTERY



The head does not have to be perfectly positioned over the valve. The valve key attachment swivels to allow off-center operation. **3.** Release the latch lever holding the extension slide.



*Figure 5-2. Pull the locking lever to release the extension slide.* 

- **4.** Pull the slide out to position the power head over the valve. Lock the latch lever holding the slide.
- **5.** Insert the valve key adapter through the head.



*Figure 5-3. Insert the valve key adapter through the power head.* 

- 6. Install the socket on the bottom of the key and insert the pin.
- 7. Lower the valve key down into the valve vault and position the socket end of the key on the valve nut.

## Starting the Engine

Use the following procedure for a TM-7 equipped with the gas engine.

- **1.** Check that there is enough fuel in the gas tank for the job you are performing.
- **2**. Open the fuel valve on the engine fuel line.
- **3.** Pull the throttle halfway out.
- **4**. If the engine is cold, pull the choke out.
- **5.** Turn the keyswitch on the front panel to START. When the engine starts, release the keyswitch back to the ON position.
- 6. Allow the engine to run for a minute or so to warm up. Push the choke back in.

# PERFORMING THE VALVE OPERATION

#### TM-7 with Vitals Recon Controller

When you perform the valve operation, you can operate the TM-7 only in controller mode (without logging valve data), or you can use the Vitals data logging program to record valve operating information.

#### Intelligent "Reverse and Turn" Valve Exercising

When you run the valve operator using the Vitals Recon controller in **EXER** mode, it uses the Intelligent "Reverse and Turn" exercising protocol to determine direction of valve rotation.

The valve operator starts with a "break-loose" procedure. It turns in one direction, stopping if it meets resistance of 50



Use short starting cycles with the keyswitch. Prolonged cranking (more than 15 seconds) can damage the starter motor. lb-ft of torque. It reverses direction, again trying to turn the valve with 50 lb-ft. If unsuccessful, it will reverse again and increase torque to 100 lb-ft.

The operator will continue this back-and-forth procedure (increasing torque in 50 lb-ft increments up to the torque limit) until it finds the valve's free-turning direction. At this point, the **Direction** button will change to **RH** or **LH**. The controller will lower the torque limit to the minimum required to keep the valve turning.

When the valve operator meets resistance and reaches the torque limit, it stops and reverses a few rotations, then tries to rotate forward again. If it can't turn, the controller displays **Insufficient Torque**. Check the **Count** button to see if you have reached the valve's expected end of travel. If you think the valve should turn further, increase the torque limit and tap the **START** button again. See if the valve turns any further. You may have to increase the torque limit additional steps.

#### Starting the Valve Activity

- **1.** Set the TM-7 up at the valve location as described above in "Setting Up the Valve Operator".
- **2.** If your TM-7 is equipped with a gas engine, start the engine as described above in "Starting the Engine".
- **3.** Adjust the engine throttle to operating speed. For PTO-driven configurations, engage the PTO.
- **4.** Make sure the pressure relief knob on the hydraulic manifold is set to **maximum**. Turn it all the way clockwise for the maximum setting.



Use the maximum setting only when operating the TM-7 with the Vitals Recon controller. For manual operation, see "Operating the TM-7 with Manual Override Controls" later in this chapter.



Figure 5-4. Turn the pressure relief knob all the way clockwise for maximum pressure when operating the TM-7 using the Vitals Recon controller.

**5.** Press the switch on the TM-7 control box to the ON position. The power indicator on the switch will light.



*Figure 5-5. Push the switch on the control box to the "ON" position.* 

6. Take the Vitals Recon controller out of its storage cradle and press the power button to turn it on. The Windows Mobile screen will come up.



Make sure the controller is connected to the control box before turning on the switch.



*Figure 5-6. Press the power button to turn on the Vitals Recon controller.* 

**7.** On the controller touch screen, press the **Start** menu button and then press **Vitals Mobile** to start the program. The Vitals Mobile startup screen appears.



Figure 5-7. From the Vitals Mobile startup screen, you can start a new activity, list saved activities, or review and change program settings.

**8.** To start a new valve exercising activity, touch the **New Activity** button.



Remove the stylus from the back of the controller and use it to tap the touch-screen controls.
- **9.** You will be prompted to select an existing valve, or enter a new valve. Refer to the *Vitals Help File* on the Vitals disk for detailed instructions on using the Vitals Mobile software.
- **10.** Once you have selected or entered the required valve information, refer to the next section to use the valve exerciser controller program.

#### Running the Wachs Controller Program

This section briefly describes the operating features of the Wachs Controller program. Refer to the *Vitals Help File* on the Vitals disk for detailed instructions on using the Vitals Mobile software.

Vitals Mobile Tap to connect GPS						
Torque		Highes	t	Limit		
0		0		200		
Count		Directio	n	Mode		
0.0		?		EXER		
ST	. • •	рт		Jog LH		
51	AI	NI -		Jog RH		
Back		Reset	:	Settings		

Figure 5-8. Touch the buttons on the controller program screen to change settings and operate the valve exerciser.

- **1.** Set the torque limit by touching the Limit button and then touching the up or down arrow. The arrows change the torque limit in increments of 50.
- If you know the direction the valve needs to be turned, touch the Direction button until either LH (left hand) or RH (right hand) is displayed.



If you don't know the valve direction, leave the **Direction** set to **?**. The valve exercising program will attempt to determine the freely turning direction.

- **3.** Press the **Start** button. The button will turn red and will display **Stop**. Press the button again if you need to stop the valve operation.
- **4.** The valve operator head will turn the valve until the torque limit is reached.
- When the torque limit is reached, the head will stop and the controller will increment the limit up by 50 lbft. The head will reverse and turn until it reaches the new limit.
- 6. Once the valve operator finds the free direction of rotation, it will turn the valve all the way to the end of travel. It will stop when the torque limit is reached.
- 7. If you do not want the valve operator to exceed a certain torque (for example, if you know the valve may be damaged by a high torque), touch the **Mode** button to change the mode to **MAN** (manual). You will then have to set the direction, and manually reverse the direction and increase the torque limit.
- **8.** When the valve operation is complete, you can touch the **Back** button to return to the Vitals Mobile program if you are logging data.
- **9.** If you are not logging data, you can touch the **Reset** button to clear the screen to start another valve operation.

### **Operating the TM-7 with Manual Override Controls**

If the Vitals Recon controller or the TM-7 electronics fail, you can still operate valves using the manual override controls. Turn off the switch on the control box before operating manually.

- **1.** Set the valve operator up as described at the beginning of this chapter.
- **2.** Start the engine and set the throttle to operating speed. For PTO-driven configurations, engage the PTO.
- **3.** Make sure the pressure relief knob on the hydraulic manifold is set to **minimum**. Turn it all the way counter-clockwise for the minimum setting.



Figure 5-9. Turn the pressure relief knob all the way counter-clockwise to start at minimum pressure when operating the TM-7 using the manual controls.

**4.** To turn the valve operator in the left-hand (counterclockwise) direction, press in on the left flow control.



Figure 5-10. Press in the *left* flow control to turn the valve *counter-clockwise*.

**5.** To turn the valve operator in the right-hand (clock-wise) direction, press in on the right flow control.



**Do not** increase the torque while holding the flow control open.



Figure 5-11. Press in the **right** flow control to turn the valve **clockwise**.

6. Try to turn the valve at the minimum pressure setting. If the valve will not turn, release the flow control and increase the torque by turning the pressure knob one turn clockwise.



Figure 5-12. To increase the torque, turn the pressure knob clockwise. Each turn increases the torque by approximately 250 lb-ft. Do not increase the pressure more than one turn at a time.

**7.** Try to turn the valve again by pressing in the flow control. If it will not turn, increase the torque by one turn of the pressure knob.

**8.** Once you have started the valve turning, release the flow control and reduce the torque to the minimum required to keep the valve turning. You may have to stop and adjust the torque several times.

## TM-7 with Manual Controls

- **1.** Set the TM-7 up at the valve location as described above in "Setting Up the Valve Operator".
- **2.** If your TM-7 is equipped with a gas engine, start the engine as described above in "Starting the Engine".
- **3.** Adjust the engine throttle to operating speed. For PTO-driven configurations, engage the PTO.
- **4.** Reset the counter to zero. Always use counter to determine the number of rotations the valve has turned.
- **5.** Make sure the pressure relief knob on the hydraulic manifold is set to **minimum**. Turn it all the way counter-clockwise for the minimum setting.



Figure 5-13. Turn the pressure relief knob all the way counter-clockwise to start at minimum pressure when operating the TM-7 using the manual controls.

- **6.** Engage the directional control lever. If the valve does not turn, stop and reverse the direction.
- 7. If the valve doesn't turn in either direction, return the valve handle to the neutral position.



It is important to operate the valve at the minimum torque required. If you reach the end of travel using high torque setting, you may damage the valve.



It is impossible to know before operating a valve the amount of torque that the valve stem can withstand before breaking. Size, age, condition, tuberculation and period of time since last operation all affect this. Therefore, recommended procedure for operating a valve is to start with the torque control at the lowest setting.



**Do not** increase the torque while holding the directional control lever open.



It is important to operate the valve at the minimum torque required. If you reach the end of travel using high torque setting, you may damage the valve. **8.** Increase the torque setting by turning the pressure relief knob 1/2 turn clockwise.



Figure 5-14. To increase the torque, turn the pressure knob clockwise. Each turn increases the torque by approximately 250 lb-ft. Do not increase the pressure more than 1/2 turn at a time.

- **9.** Try to turn the valve again by engaging the directional control lever. If the valve will not turn in either direction, increase the torque again by 1/2 turn of the pressure knob.
- **10.** Once you have started the valve turning, release the directional control lever and reduce the torque to the minimum required to keep the valve turning. You may have to stop and adjust the torque several times.
- **11.** If the power head stops rotating before the valve is seated, there may be corrosion or dirt on the valve stem and slides. Reverse the machine 3 to 5 turns to clear any debris, then continue operating.
- **12.** When you have finished exercising the valve, log the valve location, the normal gate position, right or left hand thread, and the number of turns to open or close the valve.

# **OPERATING AUXILIARY EQUIPMENT**

You can use the TM-7's hydraulic system as a power unit to operate other hydraulic tools. If you will be operating Class II tools, you should have the optional hydraulic cooler installed.

**1.** Connect the hydraulic hoses to the auxiliary circuit ports on the front of the TM-7.



*Figure 5-15. Connect the hydraulic hoses to the front connectors on the TM-7.* 



**2.** Pull the port selector knob on the front panel **out**.

Figure 5-16. Pull out the port selector knob to operate the auxiliary circuit.



There is no flow control provided for the auxiliary circuit, other than setting the engine speed. You will have to provide external flow control if your tool requires it.



Charging or jump-starting the battery with the control box powered on will damage the TM-7's electronic components.

- **3.** Connect the other ends of the hoses to the tool you are operating.
- **4.** Start the engine and set the throttle to operating speed. If using a PTO drive configuration, engage the PTO.
- 5. When you are finished using the auxiliary circuit, shut down the TM-7. Press the port selector knob back in.



Figure 5-17. Push the port selector knob back in when you are finished using the auxiliary circuit.

# CHARGING OR JUMP-STARTING THE BATTERY

**CAUTION:** Make sure the power switch on the control box is OFF before jump-starting. It is recommended that you disconnect the control box before you connect charging or jumper cables to the battery.



*Figure 5-18. Disconnect the cable to the control box before charging or jump-starting the battery.* 

**1.** Remove the battery compartment cover on the side of the TM-7 enclosure.



Figure 5-19. Remove the battery cover on the side of the TM-7 enclosure.

- **2.** To charge the battery, disconnect the TM-7 cables from the battery, then connect the charger cables.
- **3.** To jump-start the TM-7 engine, leave the TM-7 cables connected to the battery. Connect the jumper cables to the battery posts and start the engine with the switch.

# Chapter 6 Routine Maintenance

In addition to the procedures described in this chapter, perform the following checks on your TM-7 periodically:

- Check all bolts and fasteners for tightness and integrity.
- Check all electrical connections and components for integrity, corrosion, and insulation where appropriate.
- Inspect the extension slide and rails for wear.

# LUBRICATION

There are 4 grease fittings on the TM-7: one on each extension rail, and two on the power head. Apply grease to all 4 fittings each time you use the machine.



*Figure 6-1. Grease the fittings on the side rails. There is one fitting on each side (one side shown).* 

## In This Chapter

LUBRICATION Engine Hydraulic System



Figure 6-2. Grease the 2 fittings on the power head.

# ENGINE

Check the oil and coolant levels in the engine each time you operate the TM-7.

Refer to the manual supplied with the engine for maintenance schedules and procedures.

# HYDRAULIC SYSTEM

Perform the following checks each time you use the TM-7.

• Check the oil level in the hydraulic oil gauge. Add oil if necessary, using Mobile DTE Light or equivalent.



*Figure 6-3. Check the oil level in the hydraulic oil gauge. The gauge also indicates temperature.* 

- While the TM-7 is operating, check the hydraulic oil temperature to make sure it does not exceed 180° F (82° C). Temperatures above 180° F will break down the oil, leading to hydraulic pump damage. If the oil temperature exceeds 180° F, change the hydraulic oil. You should also consider installing a Wachs cooling unit.
- If your TM-7 has a cooler installed, make sure it is functioning properly.

# Oil and Filter

• Change the hydraulic oil filter every year. You can order the filter from E.H. Wachs.



Figure 6-4. The hydraulic oil filter is accessible through the side of the TM-7 enclosure. (The filter will be easier to replace if you disconnect and move the hoses.)

• Change the hydraulic oil every two years. Use Mobile DTE Light or equivalent. If the oil temperature ever exceeds 180° F (82° C), change it immediately to prevent damage to the hydraulic pump.



*Figure 6-5. The hydraulic reservoir drain plug is accessible through the back of the TM-7 enclosure.* 

# Chapter 7 Service and Repair

# REPLACING THE COUNTER PROXIMITY SENSOR

The counter proximity sensor is accessible from beneath the power head. The sensor may wear out or malfunction and need to be replaced.

- **1.** Make sure the power switch on the control box is turned OFF.
- **2.** Release the extension latch lever and pull the extension slide out.
- **3.** From beneath the power head, remove the proximity sensor and disconnect the electrical cable.



*Figure 7-1. Remove the proximity sensor and disconnect the cable.* 

## In This Chapter

REPLACING THE COUNTER PROXIMITY SENSOR

REPLACING THE TRANSDUCER

CONTROL BOX SEAL KIT

**4.** Screw the new sensor into the power head and connect the cable.

# **REPLACING THE TRANSDUCER**

The transducer is mounted on the hydraulic manifold. The transducer may wear out or malfunction and need to be replaced.

- **1.** Make sure the system is turned off and is not under pressure.
- **2.** Remove the transducer from the manifold. The transducer is threaded into its port.



*Figure 7-2. Remove the transducer from the hydraulic manifold and disconnect the cable.* 

- **3.** Disconnect the cable to the transducer.
- **4.** Thread the new transducer into the manifold and connect the cable.

# CONTROL BOX SEAL KIT

If you will be using the TM-7 where the control box is repeatedly exposed to the elements or water spray, you should install the seal kit (part number 17-027-SK). The following pages describe the procedure.

# TM-7 Power Board Enclosure Seal Kit Installation Guide Seal Kit Part Number: 17-027-SK

This seal kit helps protect against water entry into the TM-7 Power Board enclosure. It should be installed when extended exposure to the elements (i.e. outdoor storage) is expected, repeated exposure to water spray or anytime moisture or standing water is found inside the enclosure.

High pressure water should never be directed at the enclosure, whether sealed or not. This seal kit only provides protection from exposure to weather and low pressure water spray.

Expected Time Requirement: Less than 1 hour

#### **Tools Required:**

The tools listed are for work on the enclosure only, tools needed to access the TM-7, disconnect electrical power and other related work will differ by installation

- #3 Phillips head screwdriver
- Medium flat head screwdriver
- 2mm Precision/Jeweler's flathead screwdriver
- Wrenches for  ${}^{3}/{}_{4}{}''$ ,  ${}^{13}/{}_{16}{}''$ ,  ${}^{7}/{}_{8}{}''$ ,  ${}^{15}/{}_{16}{}''$  and  $1 {}^{1}/{}_{16}{}''$ hex nuts or suitable adjustable

- $\frac{3}{8}$  NPT Tap and driver
- Paper and pen/pencil to note wire positions and color

Read through these directions before beginning. Because multiple wires of the same color are used, work on one fitting at a time to avoid wiring mistakes. Note wire color and position at the connector BEFORE removing. Some terminals are not used, note these positions as "OPEN" to ensure correct wire placement in the connector when reassembling.

#### Disconnect 12 volt power to the TM-7.

#### Access and remove the lid from the enclosure.

If moisture or standing water is found inside the enclosure, make sure all components are dry before reassembly. Verify that water is not entering from the directional control valve conduit. If this situation is found, install repair kit part number 17-416-00 to correct.

#### Evaluate the condition of the lid seal.

If necessary, replace with new seal. When installing the lid



seal locate the joint in the middle of a straight section of the groove. Lightly press the seal into the groove without stretching or bunching. Work away from the joint in both directions finishing on the opposite side of the lid. At this point, the seal should not need to be bunched or stretched to fit. If required, remove the seal and re-insert.

#### Remove the connectors from the circuit board.

Pull ONLY on the connector body, not the wires. Do NOT remove any wires from the connectors at this time. Only remove the wires of the fitting being sealed and re-connect as each fitting is completed.

#### **Special Instructions**

The replacement fitting, part number 17-033-00 is provided as replacement for the fitting installed in the threaded hole (as indicated in the figure on page 1). The threads of the old fitting may be damaged and the fitting should be discarded. Before removing the old fitting note whether the body hex contacts the enclosure. For proper sealing, the hex must be within 1 turn of the enclosure wall. If more than one thread is exposed, then chasing of the threads is required. Use a 3/8 NPT pipe tap to enlarge the thread to obtain the correct offset. Chasing of the threads will produce metal chips that must be removed. These chips will damage the circuit board if not removed. If a lock nut is used at this location, either the new or original fitting may be used, but an o-ring must be installed.

Removal of the fitting located in the bottom of the enclosure requires removal of the circuit board for access to the lock nut. It is recommended that this fitting be sealed before replacing the 17-033-00 fitting. Leave the circuit board removed until any thread cutting is completed to prevent metal chips from collecting on the circuit board. In some installations, removal of the 17-033-00 fitting may ease removal of the circuit board. If required, loosen the grip nut to prevent twisting of the cable, then remove the fitting by turning the body hex counter-clockwise.



#### FOR EACH FITTING

#### Loosen the grip nut of the fitting.

This is the outer, rounded hex on each fitting. Loosening this will prevent twisting of the cable during removal of the fitting. To keep internal rubber sealing rings in place, the grip nut should not be removed from the fitting body.

#### Remove the fitting from the enclosure.

Using the proper size wrench, remove the fitting from the enclosure by turning the body hex counter-clockwise. On fittings with a lock nut, restraint of the lock nut is required. Remove the fitting from the enclosure.

#### Remove wires from connector.

Only for the cable passing through the removed fitting, carefully note the color and position of the wires in the connector. Using the 2mm flat screwdriver, turn the clamping screws in the connector body counter-clockwise to release the wire end. Remove the cable from the enclosure.

#### Install Seal.

Each fitting has a small groove to accept an o-ring seal. This groove is located on the flat face of the body hex opposite the grip nut. Inspect this groove and the mating surface on the enclosure for anything that might affect the ability to obtain a seal. Select and install the appropriate seal, as indicated in the figure on page 1. Avoid twisting or excessive stretching of the seal during installation. The seal ring (p/n 17-132-01) fits loosely on the fitting.

#### Install fitting and reconnect wires to connector.

Install fitting in enclosure with lock nut where required, tighten by rotating body hex clockwise sufficiently to compress seal. Referring to noted locations, insert wire ends in connector. Tighten by turning the clamping screws clockwise. Verify a good connection by pulling lightly on the wire.

#### Tighten Grip Nut.

The grip nut contains a rubber seal that is compressed by tightening the grip nut. The grip nut must be tightened to ensure adequate sealing of the enclosure. Position the cable so a different section of the jacket is compressed by the grip nut.

#### **Reconnect Power and Replace Lid.**

Reconnect connectors to the cicuit board. Verify operation of the machine after completing task.

# Chapter 8 Parts Lists and Drawings

The following pages include parts lists and drawings for components of the TM-7. Refer to the drawings for identi-fying and ordering replacement parts.

# MANUAL CONTROL ASSEMBLY

REF. NO.	ITEM NO.	DESCRIPTION	
142	07-142-00	Cord Power 12"	1
004	11-004-00	Connector	1
018	17-018-00	Retaining Ring	1
004	17-004-00	Pinion Gear	1
024	17-024-00	Manifold	1
079	17-079-00	Valve, Direction Control	1
080	17-080-00	Valve, Torque Control	1
081	17-081-00	Switch, Counter	1
082	17-082-00	Roller Actuator	1
083	17-083-00	Bracket, Switch	1
084	17-084-00	Enclosure	1
085	17-085-50	Counter	1
086	17-086-00	Grip, Cable	1
1	90-018-50	Plug, SAE-8 ORB	1
2	90-050-05	SHCS, 1/4-20 x 1/2	1
3	90-050-07	SHCS, 1/4-20 x 3/4	4
4	90-058-54	Adapter, 1/4 M-F 45	1
5	90-059-62	Plug, 1/4 NPT	1
6	90-060-30	SHCS, 5/16-18-3	4
7	90-128-93	Adapter, ORB-JIC 3/4 MPL	1
8	90-238-56	Adapter, 1" JIC-3/4 ORB	1
141	58-141-00	Standard Duty Torque Gauge	1
087	07-087-00	Heavy Duty Torque Gauge	1
305	17-305-00	Switch Assembly	1



TM-7 MANUAL CONTROL ASSEMBLY

	TM7 SLIDE	AND CONTROL COMPONENTS	
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	17-006-00	SLIDE FRAME	1
2	17-136-02	ENCLOSURE, MODIFIED, TM7 W/RECON	1
3	17-136-01	ENCLOSURE COVER, MODIFIED, TM7	1
4	79-333-00	CABLE GRIP, 90 DEG.	1
5	17-091-00	NUT, 3/8" NPT, NYLON	4
6	79-039-00	BALL, CRADLE SWIVEL	1
7	17-136-03	MOUNT, CRADLE BALL, TM7 W/RECON	1
8	17-136-04	BRACKET, TM7 W/RECON ENCLOSURE MOUNTING	1
9	79-333-01	SEAL RING, 3/8" NPT CABLE GRIP	4
10	17-136-05	STAND-OFF, #8-32 3/4" BODY LENGTH	4
11	79-301-00	CONTROL BOARD	1
12	79-309-00	CAP, 4 PIN PANEL CONNECTOR	1
13	17-324-00	CABLE ASSEMBLY, PANEL CONNECTOR	1
14	17-316-00	CABLE ASSEMBLY, PROXIMITY SWITCH	1
15	17-318-00	CABLE ASSEMBLY, PRESSURE TRANSDUCER	1
16	17-320-00	CABLE ASSEMBLY, DIRECTIONAL VALVE	1
17	17-109-00	SWITCH, TOGGLE SPST ILLUMINATED	1
18	17-109-02	BOOT, TOGGLE SWITCH	1
19	17-322-00	CABLE ASSEMBLY, POWER	1
20	90-001-05	SHCS #6-32 x .500	2
21	90-060-15	SHCS .3125-18 x 1.500	1
22	90-050-05	SHCS .250-20 x .500	3
23	90-020-05	SHCS #8-32 x .500	2
24	17-136-08	MOUNTING SCREW, CIRCUIT BOARD	4
25	17-317-00	SENSOR ASSEMBLY, PROXIMITY SWITCH	1
26	17-319-00	SENSOR ASSEMBLY, PRESSURE TRANSDUCER	1
27	17-323-00	CABLE ASSEMBLY, POWER FEED	1
28	07-170-00	SOLENOID VALVE	1
29	11-004-00	CORD CONNECTOR	1
30	90-238-56	1" JIC-3/4" ORB ADAPTER	2
31	07-018-00	RETAINING RING	1
32	17-004-00	PINION GEAR	1
33	17-022-00 17-023-00	STANDARD DUTY HYDRAULIC MOTOR HEAVY DUTY HYDRAULIC MOTOR	1
34	17-080-00	TORQUE CONTROL VALVE	1
35	17-024-00	MANIFOLD BLOCK	1



# TM7 CONTROL COMPONENTS RUGGEDIZED CONTROL EQUIPED UNITS 10/15/08

																											1
	1	1	1	1	4	-	-	-	4	4	-	1	1	1	-	-	1	1	1	2	1	3	2	4	1	1	-
DESCRIPTION	SLIDE FRAME	enclosure, modified, tm7 w/recon	ENCLOSURE COVER, MODIFIED, TM7 W/RECON	CABLE GRIP, 90 DEG.	NUT, 3/8" NPT, NYLON	BALL, CRADLE SWIVEL	MOUNT, CRADLE BALL, TM7 W/RECON	BRACKET, TM7 W/RECON ENCLOSURE MOUNTING	SEAL RING, 3/8" NPT CABLE GRIP	STAND-OFF, #8-32 3/4" BODY LENGTH	CONTROL BOARD	CAP, 4 PIN PANEL CONNECTOR	CABLE ASSEMBLY, PANEL CONNECTOR	CABLE ASSEMBLY, PROXIMITY SWITCH	CABLE ASSEMBLY, PRESSURE TRANSDUCER	CABLE ASSEMBLY, DIRECTIONAL VALVE	SWITCH, TOGGLE SPST ILLUMINATED	BOOT, TOGGLE SWITCH	CABLE ASSEMBLY, POWER	SHCS #6-32 x .500	SHCS .3125-18 × 1.500	SHCS .250-20 × .500	SHCS #8-32 x .500	MOUNTING SCREW, CIRCUIT BOARD	SENSOR ASSEMBLY, PROXIMITY SWITCH	SENSOR ASSEMBLY, PRESSURE TRANSDUCER	CABLE ASSEMBLY, POWER FEED
PART NUMBER	17-006-00	17-136-02	17-136-01	79-333-00	17-091-00	79-039-00	17-136-03	17-136-04	79-333-01	17-136-05	79-301-00	79-309-00	17-324-00	17-316-00	17-318-00	17-320-00	17-109-00	17-109-02	17-322-00	90-001-05	90-060-15	90-050-05	90-020-05	17-136-08	17-317-00	17-319-00	17-323-00
ITEM NO.	-	2	Э	4	5	9	7	ω	6																		



# 15HP GAS ENGINE ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	QUANTITY
136	14-136-00	9AL Battery	1
054	17-054-00	15HP Gas Engine	1
055	17-055-00	15HP Engine Muffler	1
056	17-056-00	Muffler Guard	1
057	17-057-00	Exhaust Deflector	1
058	17-058-00	Wiring Harness	1
059	17-059-00	PTO Adapter	1
060	17-060-00	Hydraulic Pump	1
061	17-061-00	Drive Coupling	1
062	17-062-00	Pump Hose	1
063	17-063-00	Tank Hose	1
064	17-064-00	Choke Cable	1
065	17-065-00	Throttle Cable	1
066	17-066-00	14" Tie Down Strap	1
078	90-078-11	Nipple, 3/8 x 6"	1
59-060	59-060-00	Terminal Cover	1
035	59-035-00	Tach/Hourmeter	1
093	59-093-00	Fuse Holder	1
204	67-204-00	7.5 AMP Fuse	1
1	90-055-15	1/4-20 Wing Nut	1
2	90-057-00	1/4" Sg. x 1" Key	1
3	90-059-37	1/4-20 x 3/4" CRG-Bolt	1
4	90-065-06	5/16-18 Wing Nut	2
5	90-069-37	5/16-18 x 3/4" CRG Bolt	2
6	90-071-10	3/8-16 x 1" HHCS	4
7	90-071-12	3/8-16 x 1-1/4" HHCS	6
8	90-075-52	3/8" Lockwasher	10
9	90-218-95	ORB x JIC 3/4" M90° Adapter	1
10	90-238-60	ORB x JIC 1" EL	1
	90-501-06	1/4" Male Terminal*	1
	90-501-15	3/8" Yellow Ring Terminal*	2
	90-501-32	6 Ga. 1/4" Terminal*	2
	90-501-33	6 Ga. 3/8" Ring Terminal*	3
	90-501-42	16 Ga. Bullet-M Terminal*	2
	90-501-43	16 Ga. Bullet-F Terminal*	2
	90-900-60	Loop Clamp*	1
	90-901-06	14 Ga. Black Wire*	3'
	90-901-07	6 Ga. Red Wire*	3'
	90-901-08	6 Ga. Black Wire*	1.5'
	90-901-09	18 Ga. Whire Wire*	1.5'
	90-901-10	14 Ga. Yellow Wire*	3'



# 20HP GAS ENGINE ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	QUANTITY
106	14 126 00	QAL Botton	4
130	14-130-00 50.022.01	SAL Dallery Kobler CH208	1
033	59-033-01	Kohler CH203 Kohler CH20 Muffler	1
034	59-034-00	Tooh/Hourmotor	1
033	59-033-00	Muffler Guard	1
071	59-071-00	Fybruat Deflector	1
072	17 069 00	Coble Clemp	2
000	17-000-00	Clamp Serour	2
069	17-069-00		2
036	17-056-00	Willing Hamess	1
071	17-071-00	PTO Adapter	1
072	17-072-00	Hydraulic Pump	1
073	17-073-00		
062	17-062-00		
063	17-063-00	lank Hose	1
064	17-064-00	Choke Gable	1
065	17-065-00		1
066	17-066-00	Tie Down 14" Strap	1
0067	17-067-00	Tie Down 19" Strap	1
070	17-070-00	Tie Down Anchor	2
036	59-036-00	Fuel lank	1
060	59-060-00	Terminal Cover	1
093	59-093-00	Fuse Holder	1
204	67-204-00	7.5 AMP Fuse	1
078	59-078-00	1/4" Fuel Hose	3
079	59-079-00	1/2" Hose Clamp	2
1	90-057-10	1/4" Sq. x 1 Key	1
2	90-065-06	5/16-18 Wing Nut	2
3	90-069-37	CRG 5/16-18 x 3/4" Bolt	2
4	90-071-15	3/8-16 x 1-1/2" HHCS	4
5	90-075-06	3/8-16 Flange Nut	4
6	90-078-11	3/8" x 6" LP Nipple	1
7	90-078-16	3/8" HP Coupling	1
8	90-081-17	7/16-14 x 1-3/4" HHCS	4
9	90-218-95	ORB x JIC 3/4" M90° Adapter	1
10	90-238-60	ORB-JIC 1" EL	1
11	90-085-51	7/16 Lock Washer	4
12	90-075-52	3/8 Lock Washer	2
13	90-071-12	3/8-16-1-1/4 HHCS	2
	90-501-06	1/4" Male Terminal*	1
	90-501-15	3/8" YEL Ring Terminal*	2
	90-501-45	6-Ga. 7/16" Ring Terminal*	1
	90-501-33	6 Ga. 3/8" Ring Terminal*	3
	90-501-42	16 Ga, Bullet-M Terminal*	2
	90-501-43	16 Ga. Bullet-F Terminal*	2
	90-900-60	Loop Clamp*	1
	90-901-06	14 Ga. Black Wire*	3'
	90-901-07	6 Ga. Red Wire*	3'
	90-901-08	6 Ga. Black Wire*	1.5'
	90-901-09	18 Ga. White Wire*	1.5'
	90-901-10	14 Ga. Yellow Wire*	4'



# AUXILLIARY COOLER ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	QUANTITY
051	17-051-00	Oil Cooler	1
052	17-052-00	Thermostat Switch	1
053	17-053-00	Cooler Hose	1
1	90-238-57	1" NPT-1"JIC Male EL	1
2	90-238-59	NPT-JIC 1" Adapter	1
3	90-501-42	16 Ga. Bullet-M Terminal*	1
4	90-501-43	16 Ga. Bullet-F Terminal*	1



# TM-7 AUXILLIARY COOLER ASSEMBLY

# HEAD FRAME ASSEMBLY

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REF. NO.	PART NO.	DESCRIPTION	QUANTITY
001	17-001-00	Knuckle	1
002	17-002-00	Hub Gear	1
003	17-003-00	Lock Ring	1
005	17-005-00	Bearing	2
006	17-006-00	Upper Housing	1
007	17-007-00	Lower Housing	1
800	17-008-00	.75 Dia Drive Ball	6
009	17-009-00	Micro Switch	1
010	17-010-00	Frame Weldmount	1
011	17-011-00	Rail	2
012	17-012-00	Slide Bearing	2
013	17-013-00	Clamp-Locking Lever	1
006	07-006-01	Upper Thrust Washer	2
046	58-046-00	Proximity Switch	1
1	90-050-05	1/4-20 x 1/2" SHCS	8
2	90-056-03	1/4" x 3/8" Dowel Pin	4
3	90-060-22	5/16-18 x 2-1/4" SHCS	1
4	90-065-01	5/16-18 Hex Nut	1
5	90-070-05	3/8-16 x 1/2" SHCS	1
6	90-070-15	3/8-16 x 1-1/2 SHCS	7
7	90-500-05	1/4-28 Straight Grease Fitting	2
8	90-500-07	1/4-28 x 90° Grease Fitting	2
	90-901-20	22 Ga. 2 Condensor Wire	1'



# RAIL EXTENSION ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	QUANTITY
037	17-037-00	Slide Weldmount	1
038	17-038-00	Adjustable Bracket	2
023	58-023-00	J Bolt	4
1	90-075-01	3/8-16 Hex Nut	4
2	90-075-53	3/8" Flat Washer	4
3	90-091-15	1/2-13 x 1-1/2" HHCS	4
5	90-091-40	1/2-13 x 4" HHCS	4
6	90-095-01	1/2-13 Hex Nut	8
7	90-095-52	1/2" Flat Washer	16
8	90-095-58	1/2 Lock Washer	8
9	90-075-52	3/8 Lock Washer	4



# TANK ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	QUANTITY
042	17-042-00	Tank Assembly	1
044	17-044-00	Label	1
045	17-045-00	Manifold	1
046	17-046-00	Relief Valve	1
047	17-047-00	Auxilliary Valve	1
043	17-043-00	Pressure Gauge	1
014	17-014-00	Grommet Strip	7"
048	17-048-00	Pressure Hose	1
048	17-049-00	Supply Hose	1
050	17-050-00	Return Hose	1
029	17-029-00	Filter Assembly	1
1	90-075-17	3/8-16 x 1-3/4" Coupling	1
2	90-058-04	1/4" Galvanized LP Coupling	1
3	90-058-58	1/4" Hex HD Nipple	1
4	90-059-62	NPT 1/4" Plug	1
5	90-061-17	5/16-18 x 1-3/4" HHCS	1
6	90-065-01	5/16-18 Hex Nut	1
7	90-065-51	5/16" Split Ring Lockwasher	1
8	90-065-52	5/16" Flat Washer	2
9	90-071-08	3/8-16 x 7/8" HHCS	2
10	90-075-52	3/8" Lockwasher	2
11	90-075-65	3/8-16 x 1-1/2" SSS	2
14	90-218-93	ORB-JIC 3/4" MAL Adapter	3
15	90-218-94	M-ORB x F-NPT 3/4" Adapter	1
16	90-218-97	ORB-JIC SWVL 3/4" Adapter	1
17	90-218-96	Bulkhead 3/4" JIC M Adapter	1
19	90-238-52	W/SWVL 1-90° ST. EL	1
20	90-238-57	1" NPT-1"JIC Male EL	1
21	90-238-58	1" NPT Male-Female Tee	1
23	90-900-50	BL 3/8-16 x 1-3/8" Knob	1
24	90-075-05	3/8-16 Nylock nut	1
25	90-238-61	Adpt-Orb-nptf 90	1
18	90-098-65	Elbow, Male 1/2 HP*	1
22	90-098-58	Hex Nipple, 1/2 HP*	1
12	09-025-00	Disconnect, FML-Htma*	1
13	09-026-00	Disconnect, ML-Htma*	1
26	90-098-75	Bushing, Red. 1/2" x 1"	1




### TM-7 Wiring Diagram (Manual Controller)



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### **TM-7 Truck Mounted Valve Operator**



WIRING DIAGRAM

0107DIA4

## Chapter 9 Accessories and Spare Parts

#### In This Chapter

#### ACCESSORIES

### ACCESSORIES

Part Number	Description
17-418-00	TM-7 Refurbish
17-415-00	Cover, TM-7 Vinyl
17-310-00	TM-7 Manual Override for units manufactured prior to 1/1/04.
17-401-00	Hydraulic Cooler, required to add Class 2 Circuit.
17-402-00	15 HP Gas Engine Hydraulic Power Supply (for standard duty drive only).
17-403-00	20 HP Gas Engine Hydraulic Power Supply.
17-412-00	Heavy duty hose reel for remote operation of accessory hydraulic tools. Hose reel is auto retract and includes 45 ft. 1/2". High pressure 2000 PSI hose with stop collar dimensions are 25" High 15" wide and 26 1/2" long.
17-404-00	High Mount Frame Rail Extension (for standard duty drive only).
17-109-10	Switch Kit, Toggle, TM7 Power Board Control. Replaces micro switch on TM-7 machines manu- factured prior to 8/1/08.
17-027-SK	Kit, Seal Non-Recon TM7 Enclosures
07-406-04	4' Steel Valve Key.

Part Number	Description
07-406-06	6' Steel Valve Key.
07-406-08	8' Steel Valve Key.
07-406-10	10' Steel Valve Key.
07-406-12	12' Steel Valve Key.
07-409-04	4' Aluminum Valve Key.
07-409-06	6' Aluminum Valve Key.
07-409-08	8' Aluminum Valve Key.
07-409-10	10' Aluminum Valve Key.
07-409-12	12' Aluminum Valve Key.
07-412-00	Valve Key Adaptor, 2" to 1".
07-407-00	Key Adaptor - male union for joining keys with detent pins.
07-408-00	Universal 2" Socket to fit standard A.W.W.A. nut.
17-078-00	Adapter, Drive
17-074-02	2' Low Clearance Valve Key.
17-074-04	3-1/2' Low Clearance Valve Key.
17-074-06	5-1/2' Low Clearance Valve Key.
17-074-08	7-1/2' Low Clearance Valve Key.
17-MAN-00	TM/7 Manual.

Table 1: TM-7 Accessories

# Chapter 10 Ordering Information

To place an order, request service, or get more detailed information on any E.H. Wachs products, call us at one of the following numbers:

U.S. 800-323-8185 International: 847-537-8800

You can also visit our Web site at:

www.ehwachs.com

### ORDERING REPLACEMENT PARTS

When ordering parts, refer to the parts lists in this chapter. Please provide the part description and part number for all parts you are ordering.

### **REPAIR INFORMATION**

Please call us for an authorization number before returning any equipment for repair or factory service. We will advise you of shipping and handling. When you send the equipment, please include the following information:

- Your name/company name
- Your address
- Your phone number
- A description of the problem or the work to be done.

#### In This Chapter

Before we perform any repair, we will estimate the work and inform you of the cost and the time to complete it.

### WARRANTY INFORMATION

Enclosed with the manual is a warranty card. Please fill out the registration card and return to E.H. Wachs. Retain the owner's registration record and warranty card for your information.

### **RETURN GOODS ADDRESS**

Return equipment for repair to the following address.

E.H. Wachs 600 Knightsbridge Parkway Lincolnshire, Illinois 60069 USA



E.H. Wachs

600 Knightsbridge Parkway • Lincolnshire, IL 60069 847-537-8800 • www.ehwachs.com