CATERPILLAR®

NEHS0785-04
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TOOL OPERATING MANUAL

Using the 170-5664 Test and Fill Machine

SMCS: 0729, 4159, 4175, 4180

Safety

Think Safety

Most accidents that involve product operation, maintenance, and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills, and tools to perform these functions properly.

Improper operation, lubrication, maintenance, or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance, or repair on this product until you have read and understood the operation, lubrication, maintenance, and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING”, or “CAUTION”. The Safety Alert “WARNING” label is shown below.

⚠ WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all-inclusive. If a tool, procedure, work method, or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job.

⚠ WARNING

When replacement parts are required for this product, Caterpillar recommends using Caterpillar replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength, and material.

Failure to heed this warning can lead to premature failures, product damage, personal injury, or death.

Safety

⚠ WARNING

To avoid personal injury or death, carefully read and understand all instructions before attempting to operate any equipment or tools. Do not operate or work on a machine unless you read and understand the instructions and warnings in this and all other applicable manuals. Contact Dealer Service Tools for replacement manuals. Proper care is your responsibility. Always follow all State and Federal health and safety laws and/or local regulations.

To prevent possible damage to your hearing, always wear ear protection when using this tool and/or working around noise generating tools.

To avoid eye injury, always wear protective glasses or face shield. Make sure no one can be injured by flying objects or debris when using tools or working on a component.


Clean up all leaked or spilled fluids immediately. Oil, fuel, or cleaning fluid leaked or spilled onto any hot surfaces or electrical components can cause a fire, resulting in personal injury or death.


Personal injury can result from slips or falls. DO NOT leave tools or components laying around the work area and clean up all spilled fluids immediately.



Personal injuries can occur as a result of using pressurized air. Maximum air pressure at the nozzle must be below 205 kPa (30 psi) for cleaning purposes. Wear protective clothing, protective glasses, and a protective face shield when using pressure air.

Always consult the Material Safety Data Sheet for chemical hazards and first aid instructions. These sheets should be available from the manufacturer/supplier of the fluid.


To prevent personal injury, keep fingers and loose clothing away from any moving parts or pinch points to prevent pinching and crushing.


Check hydraulic oil lines, tubes, and hoses carefully. DO NOT use your bare hand to check for potential leaks. Always use a board or cardboard when checking for a leak. Escaping hydraulic fluid under pressure, even a pinhole size leak, can penetrate body tissue, causing serious injury, and possible death. If fluid is injected into your skin, it must be treated immediately by a doctor familiar with this type of injury.

Always disconnect electrical power before opening an electrical control box to prevent personal injury.

Dry nitrogen is the only gas approved for use in the accumulators. The charging of oxygen gas in an accumulator will cause an explosion. An explosion can be eliminated by using nitrogen gas cylinders with standard CGA (Compressed Gas Association, Inc.) No. 580 connectors. When nitrogen gas is ordered, make sure to order the cylinders with CGA No. 580 connectors.

DO NOT rely on color codes or other methods of identification to tell the difference between nitrogen and oxygen cylinders. In any application, never use an adapter to connect the nitrogen charging group to a valve outlet used on both nitrogen, oxygen, or other gas cylinders. BE SURE TO USE DRY NITROGEN (99.8% PURITY).

Contents

NOTE: Caterpillar reserves the right to make technical changes for product improvement. This manual may contain illustrations and photographs, for demonstration purposes, which slightly deviate from the actual product design.

Introduction

This Tool Operating Manual contains the necessary information to install, operate, and maintain the 170-5664 Test and Fill Machine.

NOTICE

NEVER use the 170-5664 Test and Fill Machine to remove oil from a component. Suctioning oil from a component can fill the air lines and cause the test and fill machine to malfunction. It can also introduce contaminates into the oil, further reducing the life of any components the oil is used in.

⚠ WARNING

Read and understand the “Safety” section of this manual before operating the test and fill machine. Component damage or personal injury may result from improper operation.

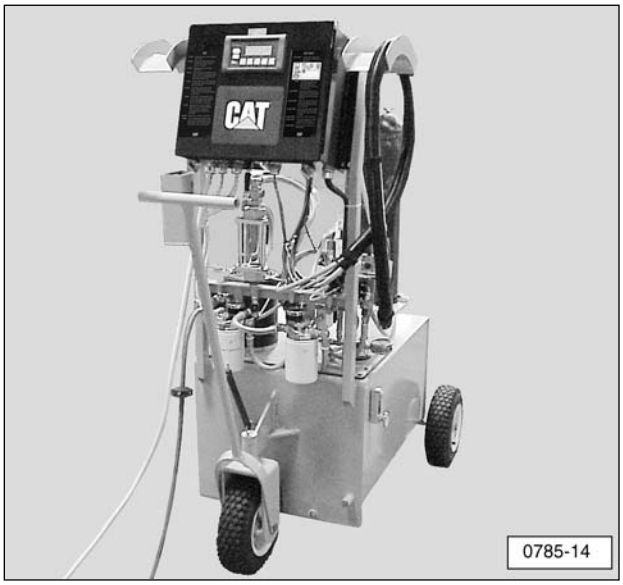


Illustration 1. 170-5664 Test And Fill Machine.

The 170-5664 Test and Fill Machine tests and fills track joints, rollers, and idlers to the recommended Caterpillar specifications. Proper testing and filling of undercarriage components (track pins, rollers, and idlers) is essential for all Caterpillar undercarriage components.

Pressure testing is the most dependable means of testing Caterpillar undercarriage components. The test and fill machine tests undercarriage components, using a nitrogen pressure test, which measures the total volume of the undercarriage component and fills it to within 80 to 90%.

The unit is equipped with an oil heater. This heater does not heat the oil in the tank, only the oil as it is being pumped into the undercarriage component.

NOTE: For additional information, a video is available, PEVN4776 Undercarriage Test and Fill Machine.

Features

- Nitrogen test vs. vacuum test. The nitrogen test is used to identify leaks and results in improved testing compared to vacuum testing.
- This unit pulls a vacuum on rollers, idlers, and track joints to evacuate the component.
- Accurately fills volumes to 80 to 90% of the total joint volume and ensures that the oil reaches the seals.
- The unit has a large 114 Liter (30 gallon) oil reservoir.
- Simple, easy to use controls are designed for one-person operation. A built-in LCD provides step-by-step instructions.
- Three-wheeled cart with pneumatic wheels is easy to move around the shop.

Specifications

NOTE: When making adjustments or repairs, tighten all connections to the recommended torque.

Specifications for the 170-5664 Test and Fill Machine	
Description	**Specification**
Voltage[1]	110/220 Volt, single phase
Frequency	50/60 Hz
Phase	Single
Electric Motor	1/3 HP
Pressure Check Period	10 seconds
System Pressure (Relief Setting)	1379 kPa (200 psi)
Oil Capacity	114 L (30 gal)
Overall Dimensions (H x D x W)	158 x 158 x 89 cm (62 x 62 x 35 in)
Weight	136 kg (300 lbs)
Oil Types	
Sealed and Lubricated Track	80W-90 EP Gear Oil
Sealed and Lubricated (arctic) Track	75W-140 EP Gear Oil
Rollers and Idlers	SAE 30W Oil

[1] All units are factory prewired to 220 Volts, single phase. Refer to the “220 to 110 Volt Conversion” section of this manual to convert the unit to 110 Volt, single phase wiring.

Controls

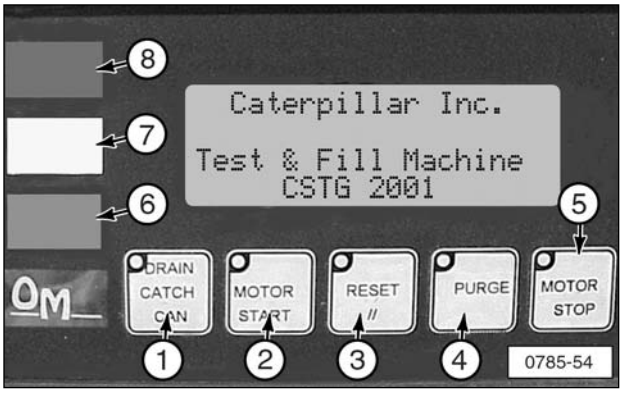


Illustration 1. OptiMate Control Panel.
(1) Drain Catch Can. (2) Motor Start. (3) Reset.
(4) Purge. (5) Motor Stop. (6) Green Indicator Light.
(7) Yellow Indicator Light. (8) Red Indicator Light.

NOTE: The keypad and LCD display on the test and fill machine may be different from the one shown in this manual. However, the operating information applies to all units.

1. Drain Catch Can button: This button causes the oil to drain from the oil separator tank into the catch can.

2. Motor Start button: This button starts the 1/3 horsepower electric motor. The motor must be turned ON during the heat cycle and the test and fill cycle.

3. Reset button: This button allows the programmable logic controller to read barometric pressure at the nozzle handle. This button prepares the machine to perform the test and fill cycle when the handle push button (start cycle) is pressed. The reset button should be pressed if the machine is left idle for any length of time.

4. Purge button: This button allows nitrogen gas to flow through the nozzle and remove any contamination. The purge cycle is also used to adjust the nitrogen back-pressure from 10 to 14 kPa (1.5 to 2 psi) [2.9 to 4.1 in/hg].

5. Motor Stop button: This button turns the electric motor OFF.

6. When the Green Light is ON, the cycle is complete.

7. When the Yellow, Green, and Red lights are ON, the pressure range is between 28 and 41 kPa (4 and 6 psi) [8.3 and 12.1 in/hg]. When all three lights flash ON and OFF in sequence, the pressure is out of range.

8. When the Red Light is ON, a major leak has been detected in the undercarriage component or the oil level in the reservoir is low. It can also indicate the oil back-pressure is not correct.

9. Handle Push button: This button is used to start the test and fill cycle.

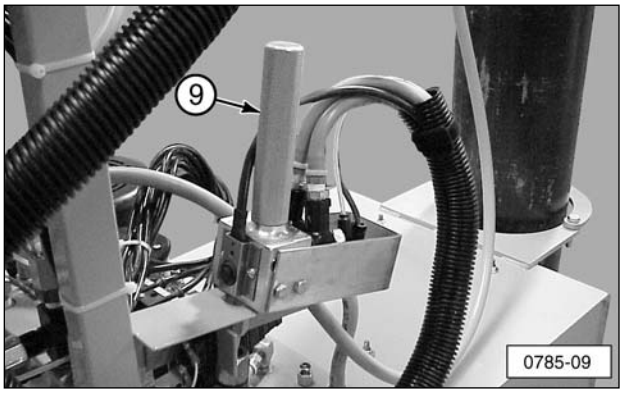


Illustration 2. Handle Push Button (9).

Machine Operation

NOTE: The nozzle must be inserted into the holder after every fill cycle or series of fill cycles. To prevent contamination (dirt) from getting into the nozzle, DO NOT place the handle on the floor.

Barometric Pressure

The first cycle of the test and fill machine is to check barometric pressure. This information is stored and used later in the fill cycle.

Heat Cycle

Oil flowing to the handle is heated at all times, except when the oil temperature in the tank is above 43°C (110°F).

Automatic Purge

During the automatic purge cycle, contamination is purged using nitrogen gas to force foreign material into the water filter element. This cycle cleans contamination from the vacuum and nitrogen lines that can occur when the nozzle is pushed into the undercarriage rubber plug. This automatic purge occurs every cycle.

NOTE: Press the Purge button to perform a nitrogen purge through the handle.

Nitrogen Pressure Test

Nitrogen fills the undercarriage joint until a pressure of 138 kPa (20 psi) [40.7 in/hg] is reached. After a predetermined time, the actual pressure reading is compared to the original 138 kPa (20 psi) [40.7 in/hg] reading. If a specific pressure drop is measured, then the undercarriage component is leaking. The red indicator light will illuminate and the display will show “Major Leak Detected.” If the component passes the test, then the machine proceeds to the vacuum cycle.

Vacuum Cycle

The vacuum cycle pulls a vacuum in the component to 15% of the original barometric pressure reading.

Fill Step

The machine automatically fills the component to within 80 to 90% of the components total volume. This results in undercarriage components being filled quickly and accurately, each and every time.

Oil Fill Times

Compare oil fill times. Similar-sized components should have similar oil fill times.

NOTE: The oil fill time is displayed at the end of the cycle, and a warning will be displayed if the oil fill time is less than 7 seconds. The cycle can be performed again on a suspected underfill if the fill time is less than half of the normal cycle.

Installation and Setup

The test and fill machine should be located between the track, idler, and roller assembly service areas. In many cases, two test and fill units will be required because track joints require 80W-90 or 75W-140 EP gear oil, and rollers and idlers require SAE 30W oil. If separate carts are not used, the cart must be completely cleaned between oil changes to prevent mixing of the two oils.

NOTICE

DO NOT use the same test and fill machine for multiple purposes requiring different types of oil. The test and fill machine must be completely cleaned between oil changes and before reuse to prevent mixing different types of oil. Mixing oil types can reduce the life span of a component.

Prior to use, complete the following start up procedure to make sure the unit is operating properly.

1. Determine the Voltage of the power supply. Each unit is factory wired for a 220 Volt power source. If a 110 Volt power supply is required, refer to the “220 to 110 Volt Conversion” section in this manual.
2. Use the sight gauge to determine how much oil is in the tank. Fill the tank at least half full (20 gallons) through the oil filler hole, but stop filling when the fluid reaches the fill line on the sight gauge.

Illustration 1. Fill Tank With Oil.

NOTICE

DO NOT overfill the 170-5664 Test and Fill Machine. If the nozzle drain is submerged in oil, the transducer may read an incorrect back-pressure, resulting in machine failure. When the maximum oil level is reached, the oil will be barely visible within the sight gauge.

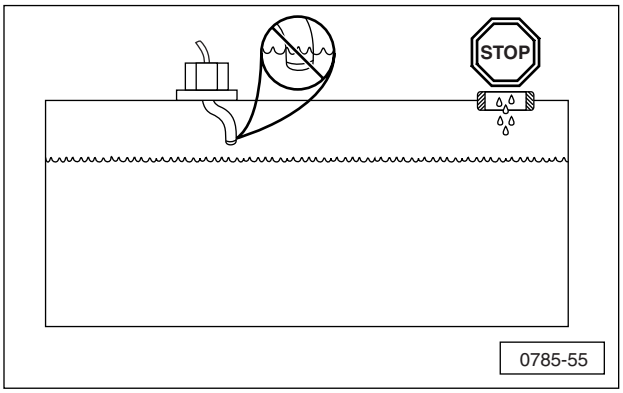


Illustration 2. Do Not Submerge Nozzle Drain.

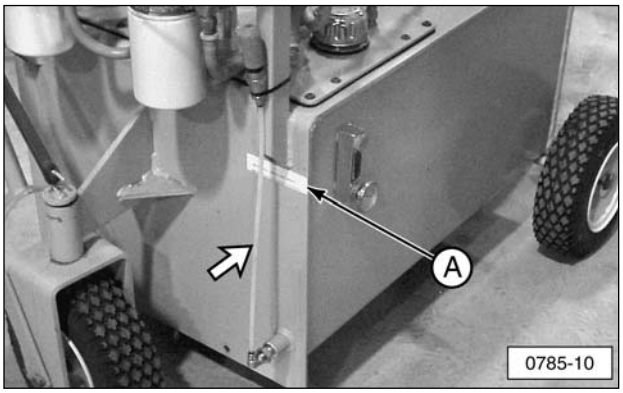


Illustration 3. Oil Sight Gauge Full Mark.
(A) Fill Line.

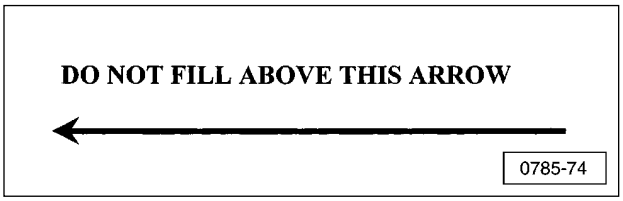


Illustration 4. Fill Line (A).

3. Connect the test and fill machine to shop air pressure between 552 and 690 kPa (80 and 100 psi).

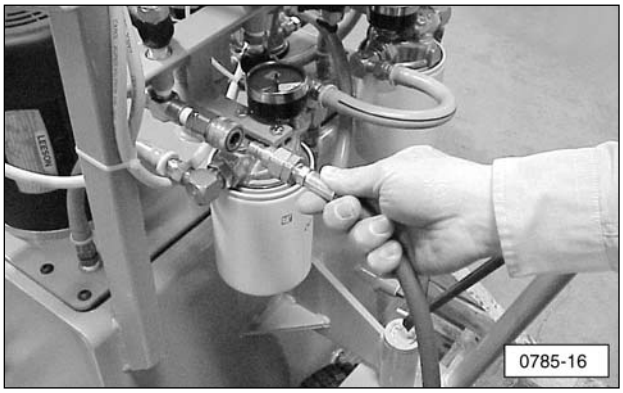


Illustration 5. Connect Shop Air Hose.

NOTICE

Use an in-line air/water filter element (4C-7042 or 4C-7043) and an air regulator (4C-7033 or 4C-7248) to provide a clean, dry air supply [between 552 to 690 kPa (80 to 100 psi)] to prevent sticking valves and/or damage to the test and fill machine. Refer to the “Service Parts” section for additional information.

4. Plug the unit into the power supply. If the power source is 220 Volt single phase, make sure the motor is running in the correct direction. Refer to the “220 to 110 Volt Conversion” section in this manual for additional instructions on changing the motor rotation (this is a one-time procedure).

5. Press the Motor Start button and wait 10 minutes to allow the built-in thermostat to heat the oil.

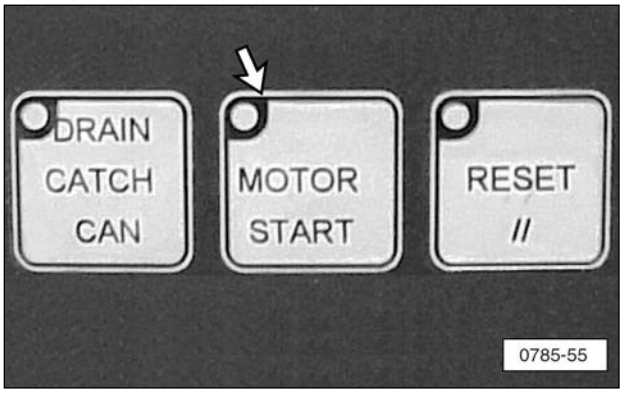


Illustration 6. Press Motor Start Button.

⚠ WARNING

Dry nitrogen is the only gas approved for use in the accumulators. The charging of oxygen gas in an accumulator will cause an explosion. An explosion can be eliminated by using nitrogen gas cylinders with standard CGA (Compressed Gas Association, Inc.) No. 580 connectors. When nitrogen gas is ordered, make sure to order the cylinders with CGA No. 580 connectors.

DO NOT rely on color codes or other methods of identification to tell the difference between nitrogen and oxygen cylinders. In any application, never use an adapter to connect the nitrogen charging group to a valve outlet used on both nitrogen, oxygen, or other gas cylinders. BE SURE TO USE DRY NITROGEN (99.8% PURITY).

6. Set the nitrogen tank onto machine platform.

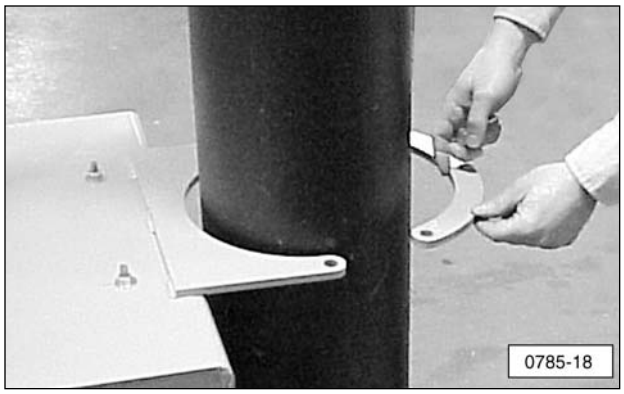


Illustration 7. Set Nitrogen Tank Onto Machine.

7. Secure the nitrogen tank to the machine using the lock bolt and nut.

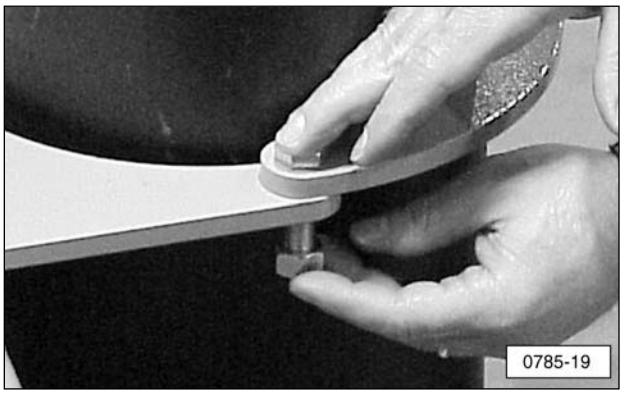


Illustration 8. Secure Nitrogen Tank To Machine.

8. Attach the regulator assembly onto the nitrogen tank and tighten to the required specification.

Illustration 9. Attach Regulator Assembly Onto Nitrogen Tank.

9. Open the main valve on the nitrogen tank.

Illustration 10. Open Main Valve On Nitrogen Tank.

10. Adjust the nitrogen pressure between 275 and 345 kPa (40 and 50 psi).

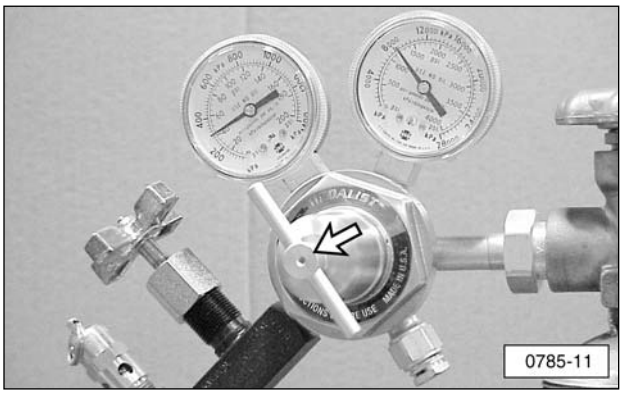


Illustration 11. Adjust Nitrogen Pressure.

NOTE: Make sure the poppet valve is working correctly. It should not allow the pressure to exceed 413 kPa (60 psi).

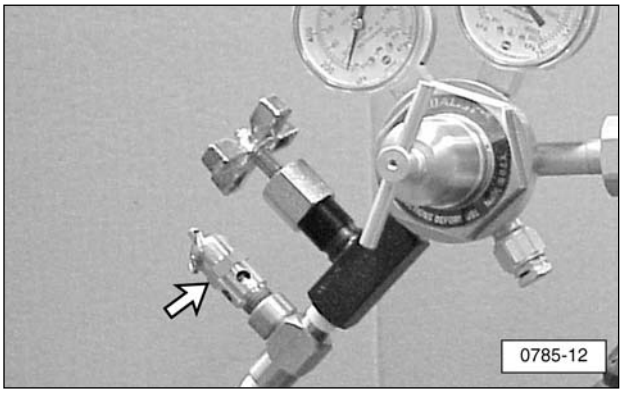


Illustration 12. Make Sure Poppet Valve Is Working.

NOTICE

If the poppet valve is not operating properly, it can allow high-pressure nitrogen into the test and fill machine, causing possible damage.

11. The unit is now ready for calibration.

NOTE: If necessary, refer to a website such as www.numberfactory.com or other resources for pressure conversions between kilopascals (kPa), pounds per square inch (psi), and inches of mercury (in/hg), as used in this manual.

Calibrating the Unit

To calibrate the test and fill machine, the oil must be heated using the heat cycle. Once the oil is heated, the oil delivery system can be calibrated. Finally, the nitrogen delivery system is calibrated and a test and fill cycle is done using one of the test tubes.

Heat Cycle and Oil Delivery Calibration

1. Insert the handle nozzle into the holder.

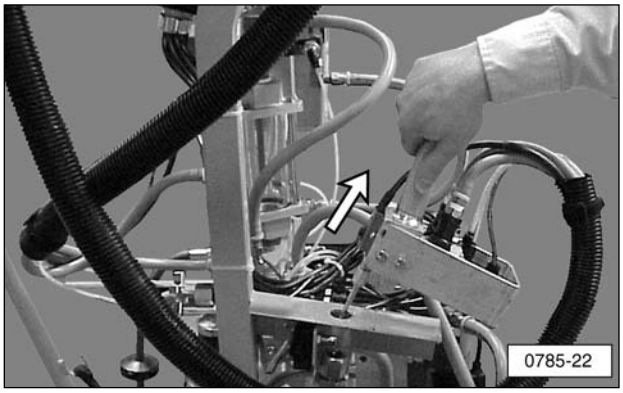


Illustration 1. Insert Handle Nozzle Into Holder.

2. Line 2 on the display should read “5 Seconds to Go”.

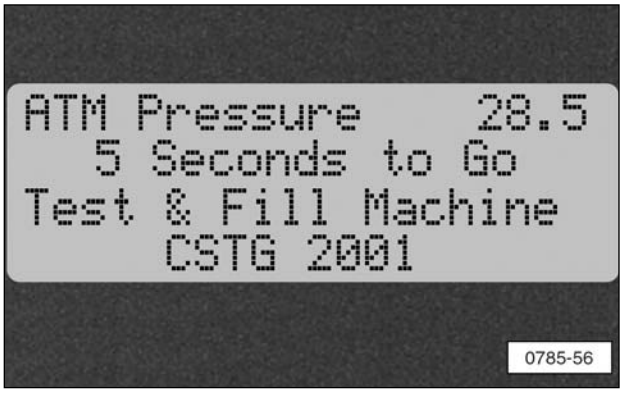


Illustration 2. LCD Display After Inserting Handle Nozzle Into Holder.

NOTE: If the atmospheric (ATM) pressure reading is approximately 30 in/hg (14.7 psi) [101.3 kPa], then a new transducer will need to be ordered. Order a new 188-5062 Transducer that will read an approximate ATM pressure of 28.5 in/mg (14 psi) [95.5 kPa]. Also, the ATM pressure readings may vary slightly due to changes in altitude and barometric pressure.

3. Remove the handle nozzle from the holder.

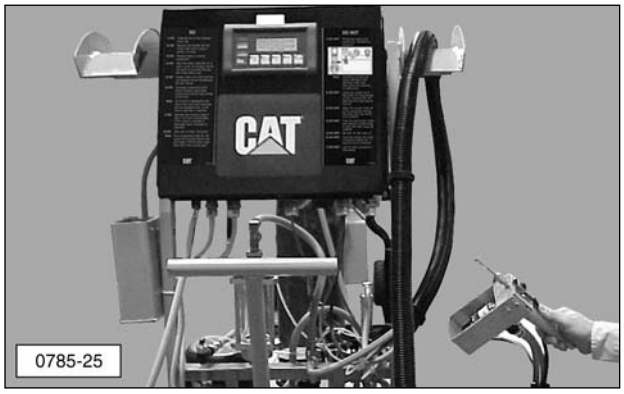


Illustration 3. Remove Handle Nozzle From Holder.

4. The display should read “Put Nozzle in Holder”.

Illustration 4. LCD Display After Removing Handle Nozzle From Holder.

5. Return the handle nozzle to the holder. Wait 10 seconds for the oil to begin pumping through the handle.

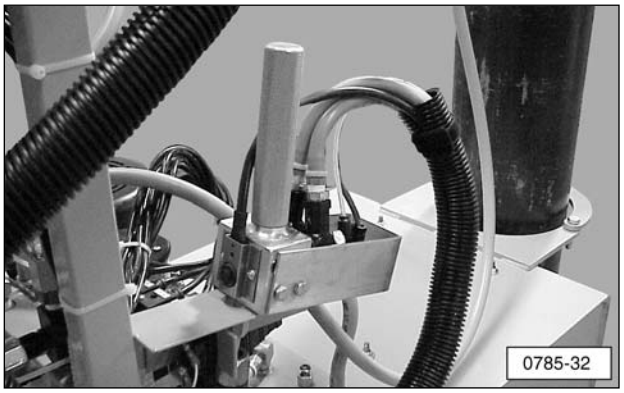


Illustration 5. Return Handle Nozzle To Holder.

6. The display should now show the actual pressure of the recirculating oil.

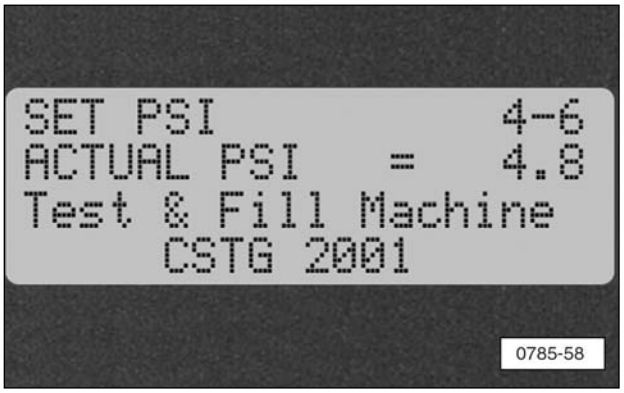


Illustration 6. LCD Display After Returning Handle Nozzle To Holder.

7. Adjust the oil pressure needle valve until a 28 to 41 kPa (4 to 6 psi) [8.3 to 12.1 in/hg] pressure reading shows on the LCD display.

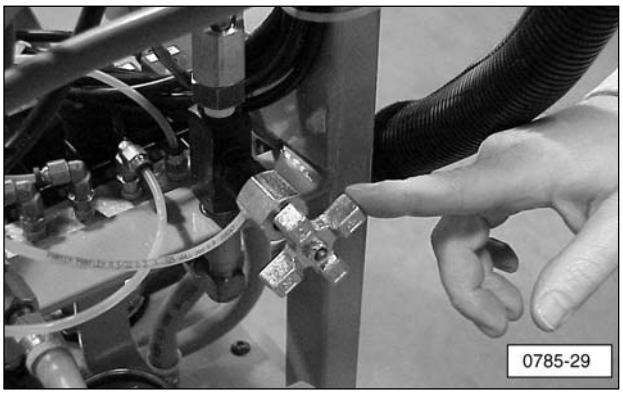


Illustration 7. Adjust Oil Pressure Needle Valve.

NOTE: The Red, Yellow, and Green indicator lights on the control panel will flash in series if the pressure is incorrect and will stay ON constantly if the pressure is correct. The machine will not perform a cycle if the pressure is out of range.

Nitrogen Delivery Calibration

1. Press the Reset button.

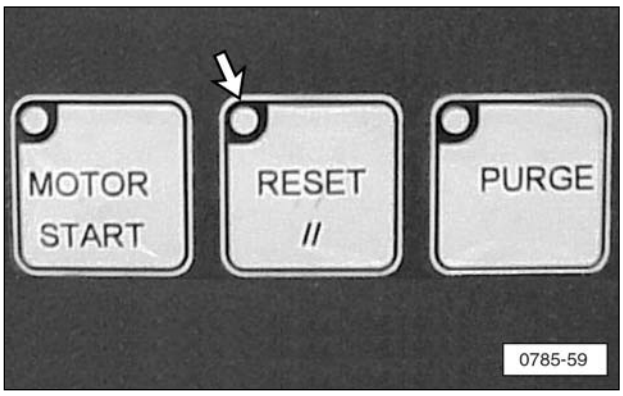


Illustration 8. Press Reset Button.

2. Line 2 on the display should read “5 Seconds to Go”.

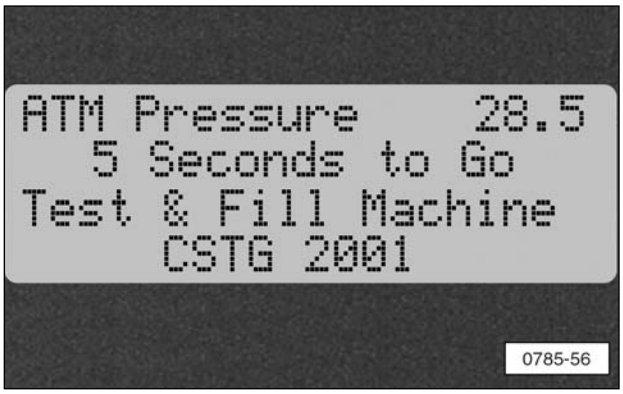


Illustration 9. LCD Display After Pressing Reset Button.

NOTE: When the test and fill machine is plugged into the power supply after being unplugged, the initial ATM (atmospheric) pressure may show a higher than normal reading. This reading will reset to normal after the completion of a cycle.

3. Remove the handle nozzle from the holder.

Illustration 10. Remove Handle Nozzle From Holder.

4. Press the Purge button when the display reads ”Press Purge Button”.

Illustration 11. LCD Display Before Pressing Purge Button.

5. After pressing the Purge button, the display should read ”Put Nozzle in Holder - Press Nozzle Button”.

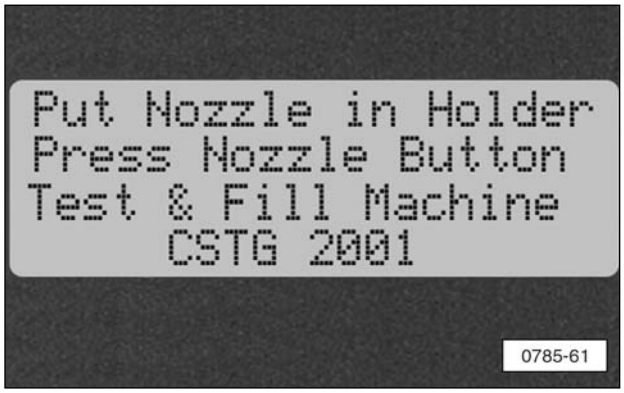


Illustration 12. LCD Display After Pressing Purge Button.

6. Insert the handle nozzle into the holder.

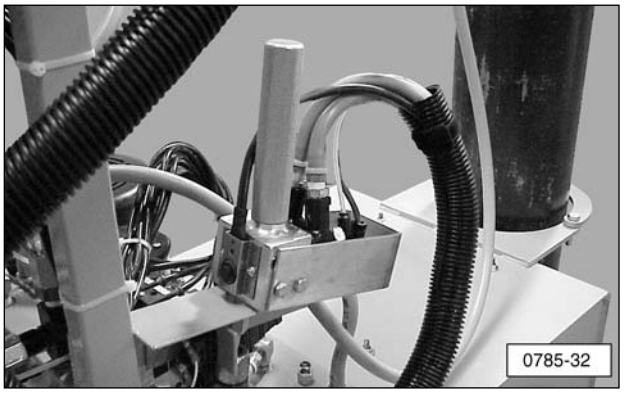


Illustration 13. Insert Handle Nozzle Into Holder.

7. With the handle nozzle in the holder, press the Handle button.

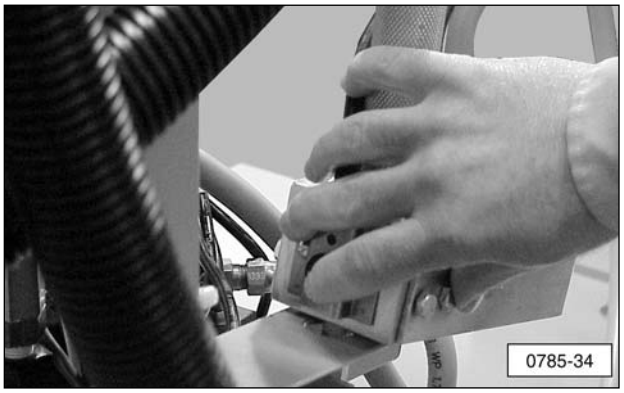


Illustration 14. Press Handle Button.

8. The display should read “Set N to 1.5 -2 PSI”.

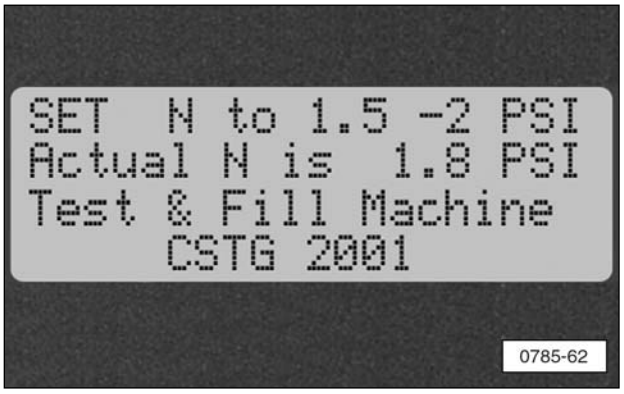


Illustration 15. LCD Display After Pressing Handle Button.

9. Adjust the nitrogen needle valve to a reading of 10 to 14 kPa (1.5 to 2 psi), as shown on the LCD display.

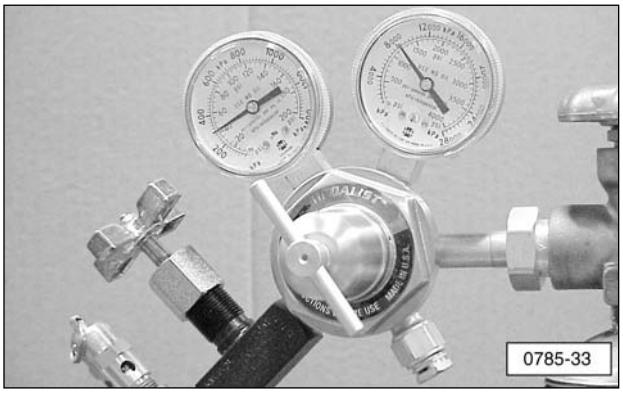


Illustration 16. Adjust Nitrogen Pressure.

NOTE: The actual pressure is displayed on the LCD display. If the pressure is adjusted above 14 kPa (2 psi) [4.1 in/hg], the red light will come ON and the message "Major Leak Detected" will be shown on the display. The unit will not perform a test and fill cycle until the nitrogen pressure is correctly adjusted and the reset button is pressed.

10. Press the Reset button.

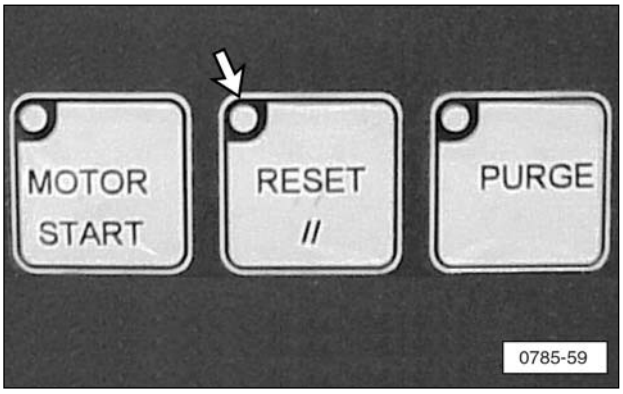


Illustration 17. Press Reset Button.

11. Wait 5 seconds while the machine measures the barometric pressure.

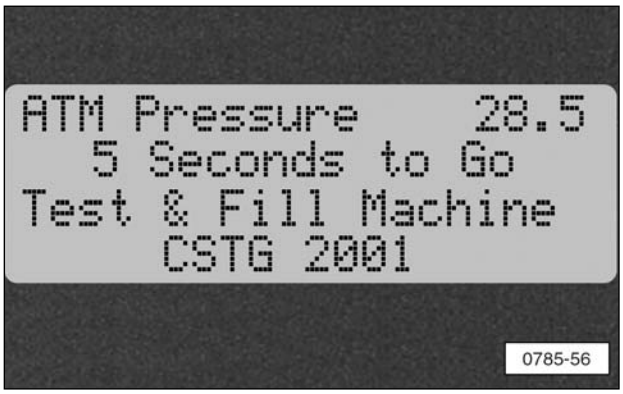


Illustration 18. LCD Display After Pressing Reset Button.

Test and Fill Cycle

The test and fill cycle is the same whether using the test tube or filling an undercarriage component.

1. Press the Reset button.

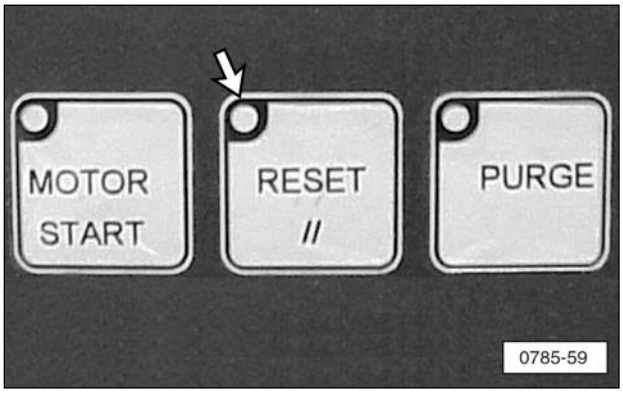


Illustration 1. Press Reset Button.

2. Wait 5 seconds while the machine measures the barometric pressure.

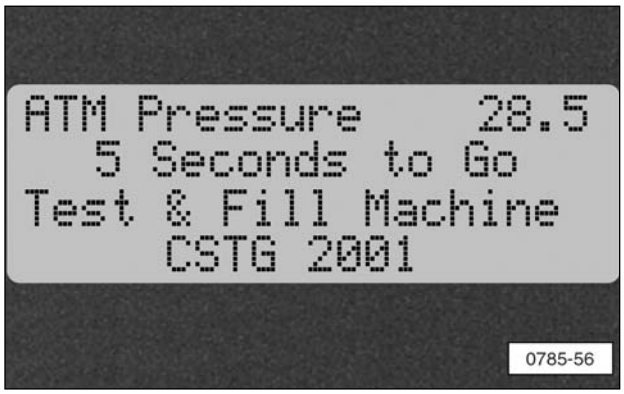


Illustration 2. LCD Display After Pressing Reset Button.

3. Remove the handle nozzle from the holder.

Illustration 3. Remove Handle Nozzle From Holder.

NOTICE

Make sure dirt and other contaminates do not get into the oil supply. Cleanliness will prolong the life of the 170-5664 Test and Fill Machine and the components it is used to fill.

Make sure the fill plug and fill plug area on the track joint, roller, or idler is clean and free of dirt, oil, grease, and other debris. Make sure the nozzle on the handle is clean. Establish a periodic maintenance schedule to disassemble and clean the nozzle as needed.

4. Insert the handle nozzle into a test tube or into the undercarriage component.

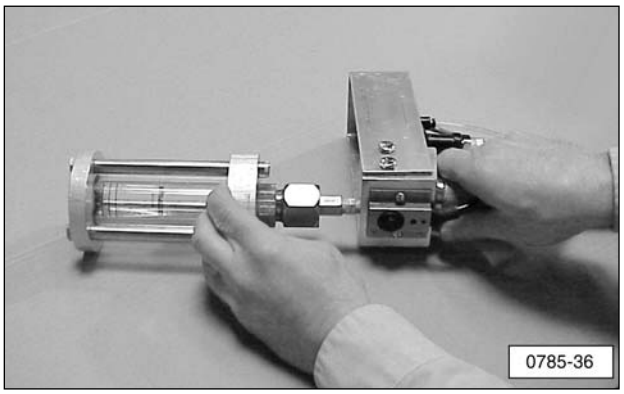


Illustration 4. Insert Handle Nozzle Into Test Tube Or Undercarriage Component.

5. Press the Handle Nozzle button.

NOTE: If the nozzle is out of the holder for more than 120 seconds, the nozzle must be reinserted into the holder. Press the Reset button and wait 5 seconds.

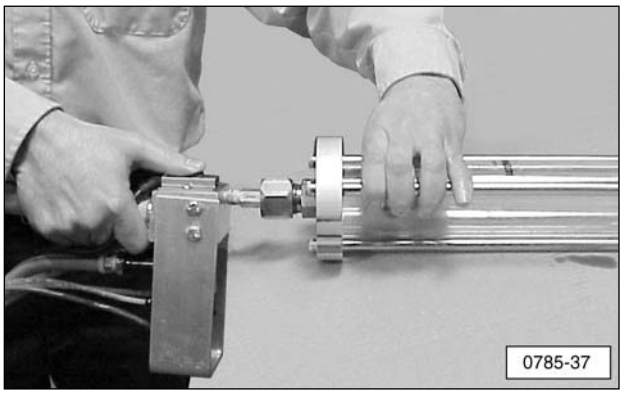


Illustration 5. Press Handle Nozzle Button.

NOTE: The 80 to 90% fill marks must be located opposite the fill end of the tube. To check the oil level, hold the tube in a vertical position with your finger covering the rubber stopper and read the oil level.

6. Allow the machine to test and fill the test tube or the undercarriage component. DO NOT allow the handle nozzle to come out of the component while the cycle is running.

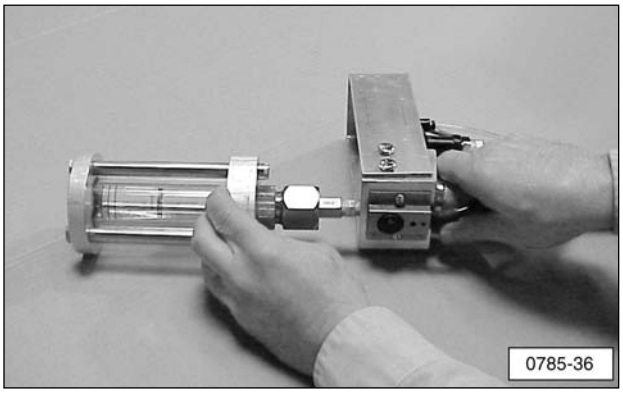


Illustration 6. Test And Fill Test Tube or Undercarriage Component.

7. The display should read “Filling N to 20.0PSI” as the machine pressure tests the undercarriage component for leaks.

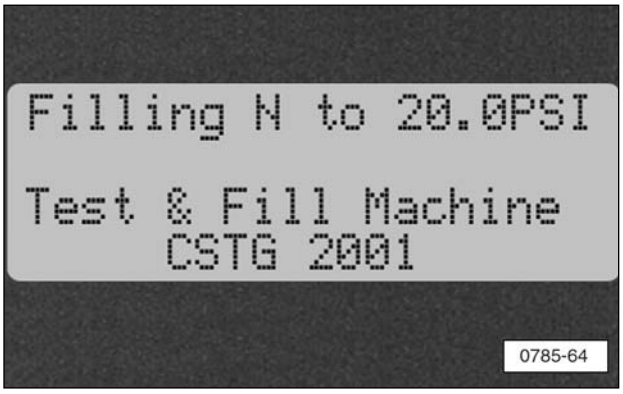


Illustration 7. LCD Display As Machine Tests For Leaks.

8. This message will be displayed as the machine pulls a vacuum inside the test tube or component.

Illustration 8. LCD Display As Machine Pulls A Vacuum.

9. This message will be displayed during the filling process.

Illustration 9. LCD Display As Machine Fills Test Tube Or Undercarriage Component.

NOTICE

Make sure the oil flow ball in sight gauge (H19) rises with the fluid, indicating oil flow from the handle nozzle to the undercarriage component. Use a dipstick to measure the oil in the undercarriage component if any doubt exists. Low oil flow may cause improper filling, which can result in undercarriage component damage.

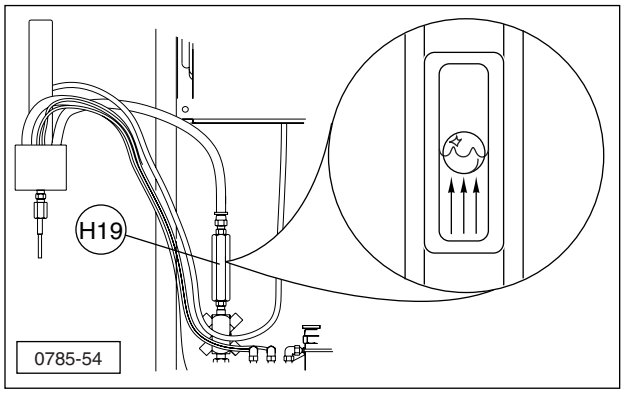


Illustration 10. Make Sure Oil Flow Ball In Sight Gauge Rises With Fluid.

10. When the test tube or undercarriage component is successfully filled with oil, the display will read “Cycle Successful”.

Illustration 11. LCD Display After Undercarriage Component Is Filled With Oil.

NOTE: The display will alternate messages after the test tube or undercarriage component is successfully filled with oil. See Illustration 12 for the alternate display.

Illustration 12. Alternate Display After Test Tube Or Undercarriage Component Is Successfully Filled With Oil.

11. When the Green indicator light illuminates, the display shows “Put Nozzle in Holder” and the handle nozzle can be removed from the container or undercarriage component.

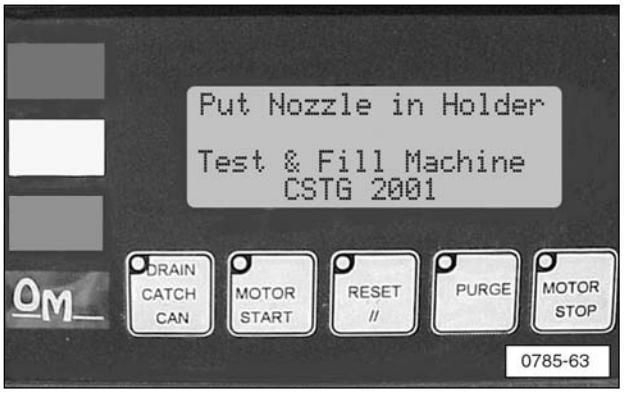


Illustration 13. Green Indicator Light Illuminates.

12. Insert the handle nozzle into the holder or the next undercarriage component.

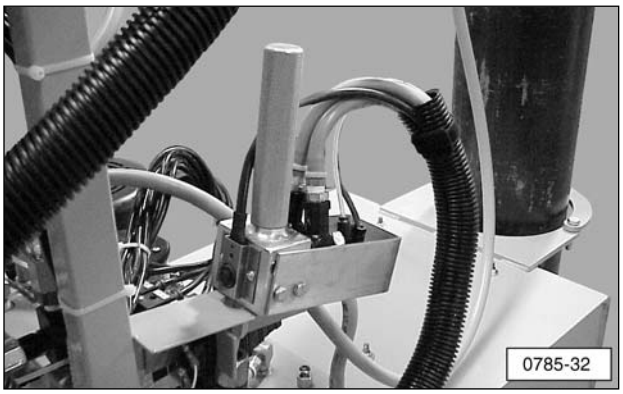


Illustration 14. Insert Handle Nozzle Into Holder Or Next Undercarriage Component.

13. For calibration testing only, fill the test tube between the 80 and 90% marks.

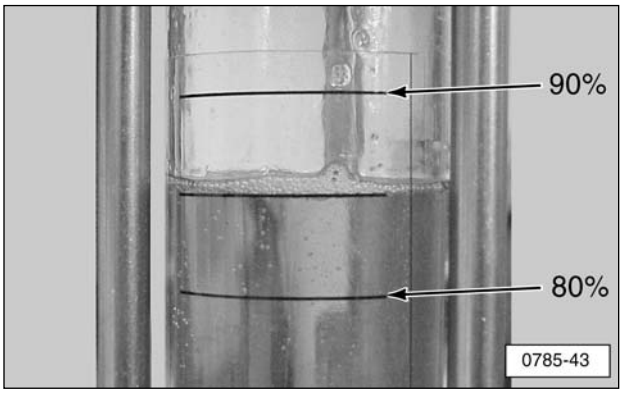


Illustration 15. Fill Test Tube Between 80 And 90%.

Underfill

It is important to be aware of oil fill times because an underfill can occur for a variety of reasons. Compare oil fill times, since similar sized components should have similar oil fill times.

NOTE: The oil fill time is displayed at the end of the cycle, and a warning will be displayed if the oil fill time is less than 7 seconds. The cycle can be performed again on a suspected underfill if the fill time is less than half of the normal cycle.

1. If the system detects a potential underfill, the display will read “Underfill Probable”.

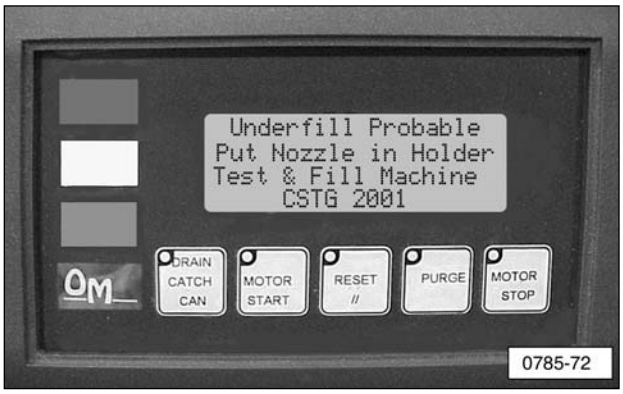


Illustration 1. LCD Display As Machine Detects A Probable Underfill.

2. When an underfill occurs:

- the motor will shut off;
- the green, yellow, and red lights will flash.

3. Place nozzle back into the holder.

4. Press the Reset button.

5. Press the Motor Start button.

220 to 110 Volt Conversion

If a 110 Volt power source is used to operate the test and fill machine, the electrical control panel, the motor, and the heater must be rewired.

⚠ WARNING

Always disconnect electrical power before opening an electrical control box to prevent personal injury.

---

1. To rewire the control panel, install a jumper between Terminals (4) and (5) (110 VAC terminals) of the 24 Volt power supply.

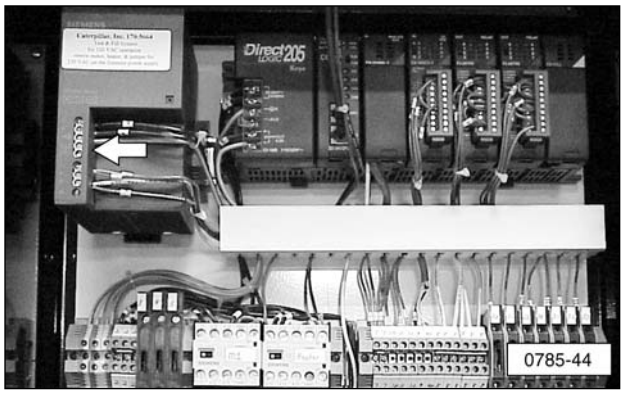


Illustration 1. Install Jumper Between Terminals 4 And 5 As Shown In Illustration 2.

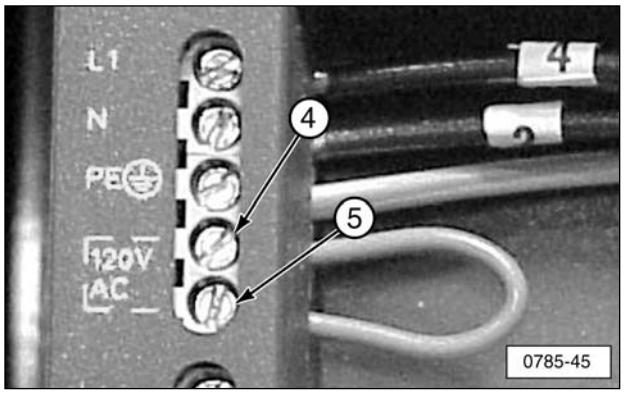


Illustration 2. Close-Up View Of Jumper.

2. To rewire the motor, locate and remove the electrical access cover from the motor.

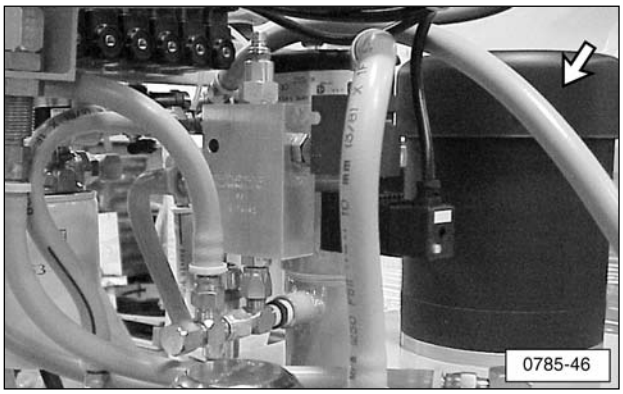


Illustration 3. Remove Electrical Access Cover From Motor.

3. Change the wiring according to the wiring diagram on the inside of the motor cover.

Illustration 4. Use Wiring Diagram On Inside Of Motor Cover.

4. Test the direction of motor rotation. If the motor is not running in the correct direction, reverse the Z5 and Z8 wires.

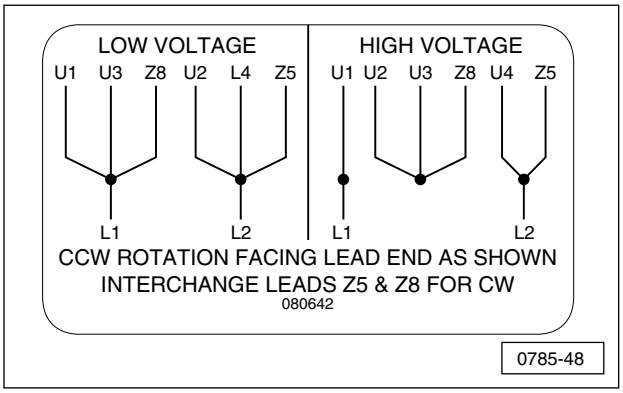


Illustration 5. Reverse Z5 And Z8 Wires To Change Motor Rotation Direction.

5. Rewire the heater. Remove the cover from the top of the heater.

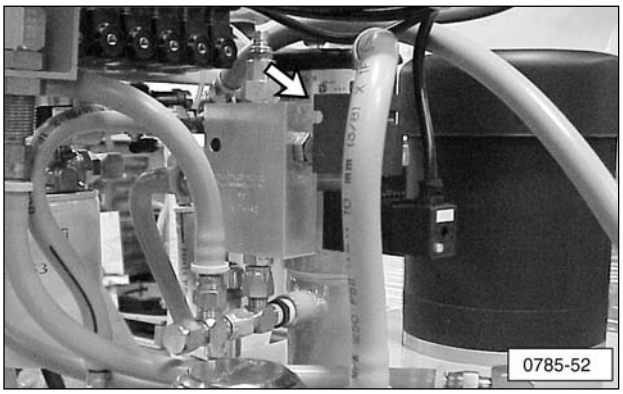


Illustration 6. Remove Cover From Heater.

6. Rewire the heater using the wiring diagram on the heater cover and the photos below.

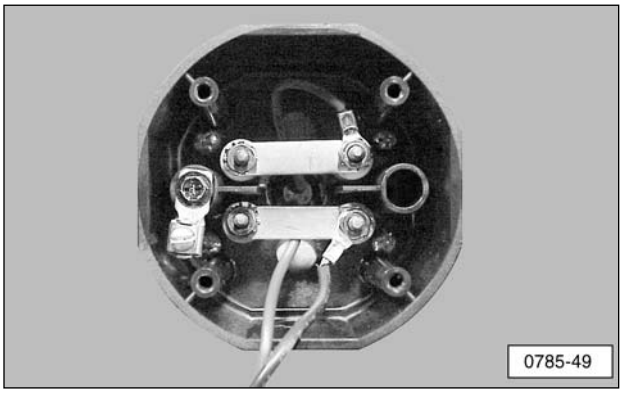


Illustration 7. 110 Volt Configuration.

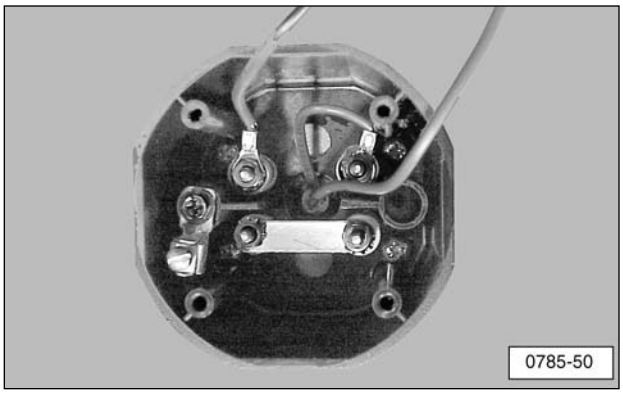


Illustration 8. 220 Volt Configuration.

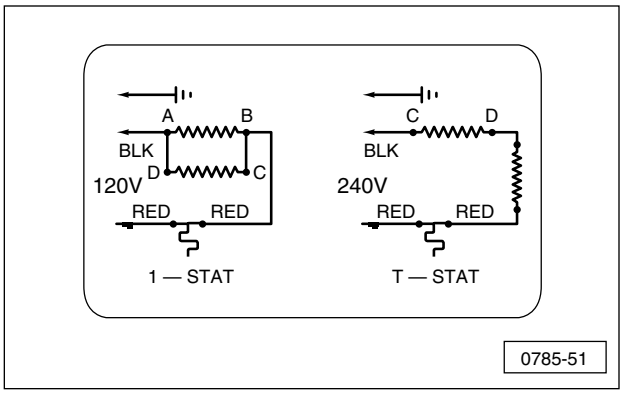


Illustration 9.

Troubleshooting

Chart A. Troubleshooting Lights	
Light Action	**Description (Check LCD Display)**
Green light is **ON**.	Cycle complete.
Red light is **ON**.	Major leak detected. Low oil level in the tank.
Red, Yellow, and Green indicator lights are flashing in series.	Incorrect oil back-pressure. Normal range should be 27.6 to 41.4 kPa (4 to 6 psi) [8.1 to 12.2 in/hg].

Chart B. Troubleshooting Chart		
Problem	**Possible Cause**	**Possible Solution**
Red light is **ON** - Major leak detected.	1. Leak A. Leak in vacuum line or valve. B. Leak in undercarriage component assembly.	1. To check if the leak is in the machine or undercarriage component, plug the tip of the nozzle and start the cycle. If the Test and Fill Machine completes the entire cycle, go to Step A (the undercarriage component is leaking). If the Test and Fill Machine does not complete the cycle, go to Step B (the Test and Fill Machine is leaking). A. Disassemble the undercarriage component, thoroughly clean the parts, check seal surfaces, and reassemble according to the proper procedures. B. Perform Steps 2 and 3.
	2. Lube tip is not inserted completely into the rubber stopper.	2. Verify complete insertion of the lube tip into the undercarriage component.
	3. Loose hoses or connections prevents vacuum from reaching the proper level.	3. Check the hose connections of all vacuum lines.
	4. Transducer is faulty.	4. Check the hose connections of all vacuum lines.
	5. Improper back-pressure adjustment for oil fill.	5. Readjust back-pressure at regulator (H10) between 27.6 to 41.4 kPa (4 to 6 psi) [8.1 to 12.2 in/hg].
	6. Improper nitrogen pressure.	6. Adjust nitrogen pressure at regulator (H10A) between 276 to 345 kPa (40 to 50 psi).
	7. Improper back-pressure adjustment for nitrogen fill.	7. Adjust nitrogen pressure at regulator (H10A) between 10.3 to 13.8 kPa (1.5 to 2.0 psi).
Vacuum cycle does not complete.	1. 8T-8031 Nozzle Tip is not completely inserted into the rubber stopper.	1. Verify complete insertion of the lube tip into the undercarriage component.
	2. Loose hoses or connections prevents vacuum.	2. Check the hose connections of all vacuum lines.
	3. Transducer is faulty.	3. Check wire connections at PLC. Replace transducer.
	4. Air flow is restricted in the vacuum generator.	4. Remove any restrictions in air flow. Check air pressure available to the machine.
The oil being pumped from the barrel makes a “spitting” sound as it is pumped through the lube tip. Air bubbles appear in the oil, and the pump makes a constant grinding noise.	1. There is a leak in the oil suction line somewhere between the oil tank and the manifold.	1. Check the hose connections between the oil tank and the manifold.
	2. There is insufficient oil in the tank, and the float switch is not providing a low oil warning.	2. Make sure the tank is full.
	3. The pump is cavitating.	3. Strainer is plugged. Clear the strainer of obstructions.
Red light is **ON** - Oil level is low.	1. The oil level is too low.	1. Fill the tank.
	2. Float switch is bad.	2. Replace float switch.
The oil being pumped from the tank barely flows out of the handle.	1. Relief pressure is set incorrectly.	1. See “Installation” section for procedure to set relief pressure.
	2. Oil is too cold.	2. Allow oil to warm up. If environment is too cold, an additional heater may be used to bring the oil temperature to 38 to 43°C (100 to 110°F).
Underfill or Overfill.	1. Oil tank level is too high.	1. Remove oil from tank.
	2. Incorrect air supply pressure.	2. Regulate air supply between 621 and 690 kPa (90 and 100 psi).
	3. Leaking handle block valve (H1).	3. Replace handle block valve (H1).
	4. Bad oil heater.	4. Replace oil heater. (Use item E24 or E25 as a replacement).

Operational Checks

Barometric Pressure

The first cycle of the Test and Fill Machine is the check of barometric pressure. This information will be stored in the PLC (Programmable Logic Controller) to be used later in the fill cycle. Transducer (E19) measures barometric pressure. No activation of the solenoids is required.

Heat Cycle

Oil flowing to the handle is heated at all times, except when the oil temperature reaches 43°C (110°F).

Automatic Purge

During the automatic purge cycle the catch can is purged by nitrogen, forcing foreign material into the water filter element. This cycle cleans the vacuum and nitrogen lines of contamination that occurs when the handle nozzle is pushed into the undercarriage rubber plug. This automatic purge occurs every cycle. Solenoids 5 and 6 are activated during this step.

NOTE: Pressing the Purge button on the display panel (E6/E7) performs a nitrogen purge through the handle nozzle. This step is performed only when the Purge button is pressed.

Nitrogen Pressure Test

First, solenoids 2 and 5 are activated. Nitrogen fills the undercarriage joint until a pressure of 138 kPa (20 psi) [40.7 in/hg] is reached.
Next, solenoids 2 and 5 are closed. After a predetermined time, the transducer reading is compared to the original 138 kPa (20 psi) [40.7 in/hg] reading. If a specific pressure drop is measured, then the undercarriage component is leaking and the LCD display will display “Major Leak Detected.” If the undercarriage component passes the test, then the machine goes to the vacuum cycle.

Vacuum Cycle

Solenoids 1, 2, and 4 are activated. The solenoids are deactivated when the pressure in the undercarriage component is at 15% of the original barometric reading.

Fill Step

During the fill step, solenoids 3 and 7 are activated. The solenoids are deactivated when the pressure reaches the barometric pressure plus the back-pressure. This fill method results in an 80 to 90% fill of the undercarriage component.

NOTE: Refer to the “Hydraulic Schematic” for the locations and identification of the solenoids described in this manual.

DO/DO NOT Label

⚠ WARNING

To avoid personal injury or death, carefully read and understand all instructions before attempting to operate any equipment. DO NOT operate or work on a machine unless you read and understand the instructions and warnings in this and all other applicable manuals. Contact Dealer Service Tools for replacement manuals. Proper care is your responsibility. Always follow all State and Federal health and safety laws and/or local regulations.

Follow the directions on the Do/Do Not Label for the safety of personnel and equipment. While these directions are a summary of steps to be followed when operating the Test and Fill Machine, these do not relieve the operator of the obligation to read and follow the directions outlined in this and other applicable instruction manuals.

DO

1) DO: Calibrate the oil and nitrogen every day.

2) DO: Reinsert the handle into the holder after every cycle or series of cycles.

3) DO: Replace faulty or broken equipment.

4) DO: Start the motor, allow the oil to warm up for 15 minutes, and let the warm oil circulate through the hoses before use.

5) DO: Supply clean air to the machine, air pressure should be between 80 and 100 psi.

6) DO: Compare component oil fill times. Similarly sized track components should have similar oil fill times.

Note: The oil fill time is displayed at the end of the cycle and a warning will be displayed if the oil fill time is less than 7 seconds.

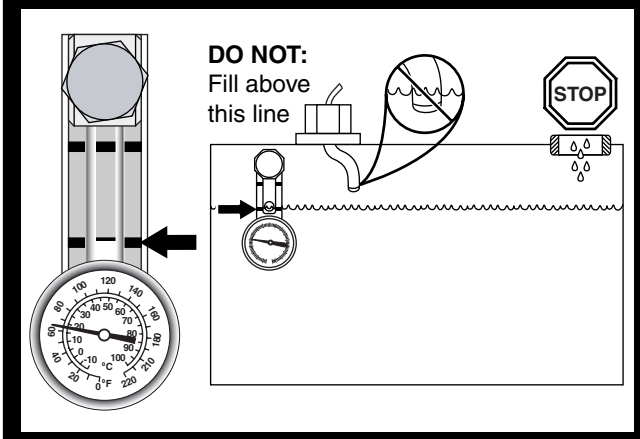
7) DO: Maintain the nozzle to keep it free of dirt and contaminates. If the nozzle is cracked or damaged have it repaired or replaced.

8) DO: Only use on clean, dry joints.

Note: For a suspected underfill, the cycle can be performed on the joint again if the fill time is less than half of the normal cycle.

DO NOT

1) DO NOT: Fill the tank above the overfill line, indicated by the arrow.



Note: Overfilling the tank will cause damage to the electrical motor and possibly cause the machine to malfunction.

2) DO NOT: Leave the nozzle out of the holder for long periods of time, because this will allow the oil in the hose to cool off.

3) DO NOT: Allow the nozzle to fall out of the component during the cycle, this may result in an underfill.

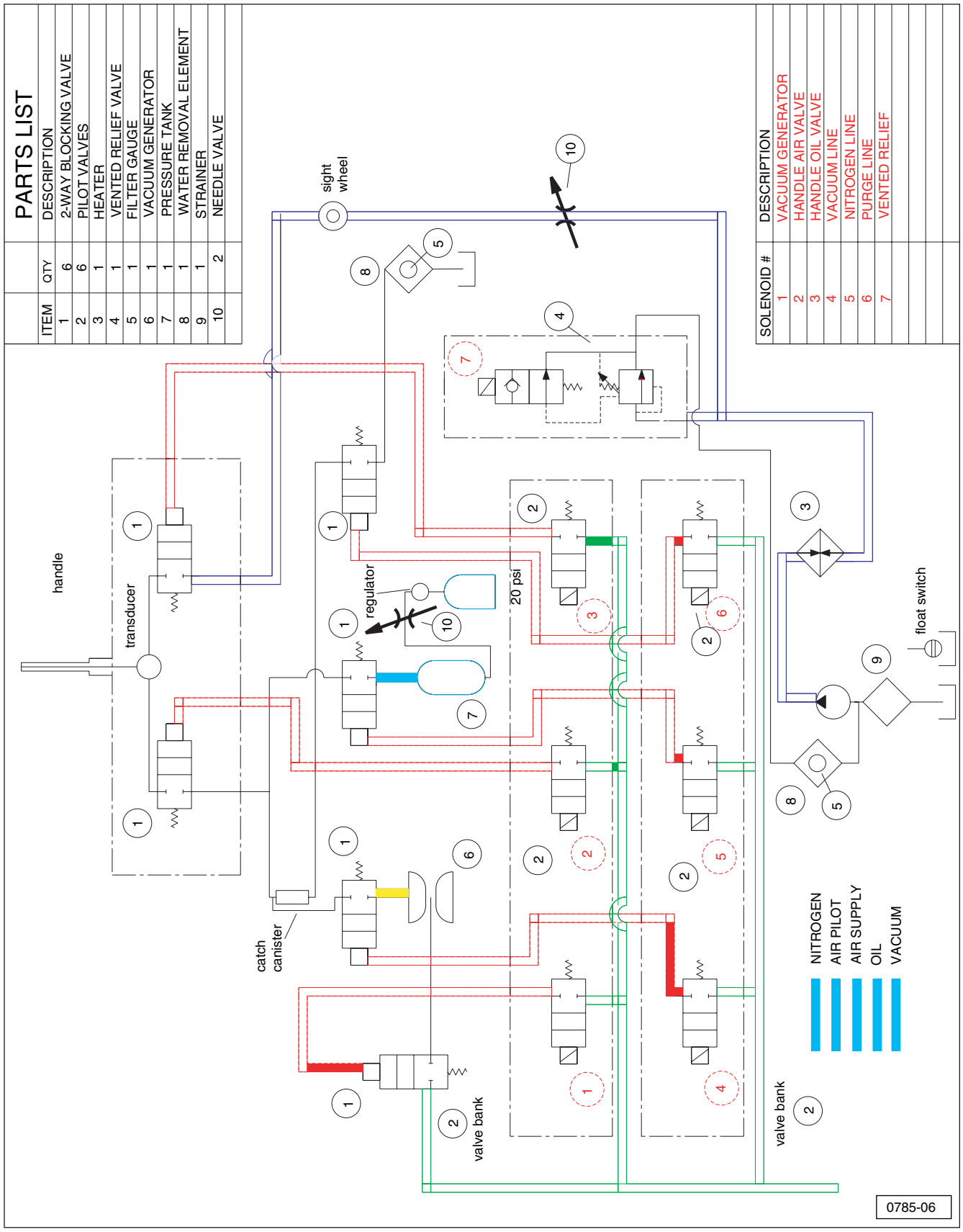
4) DO NOT: Push the start button when the machine is performing a cycle, this may cause an underfill.

5) DO NOT: Mix idler oil with track oil.

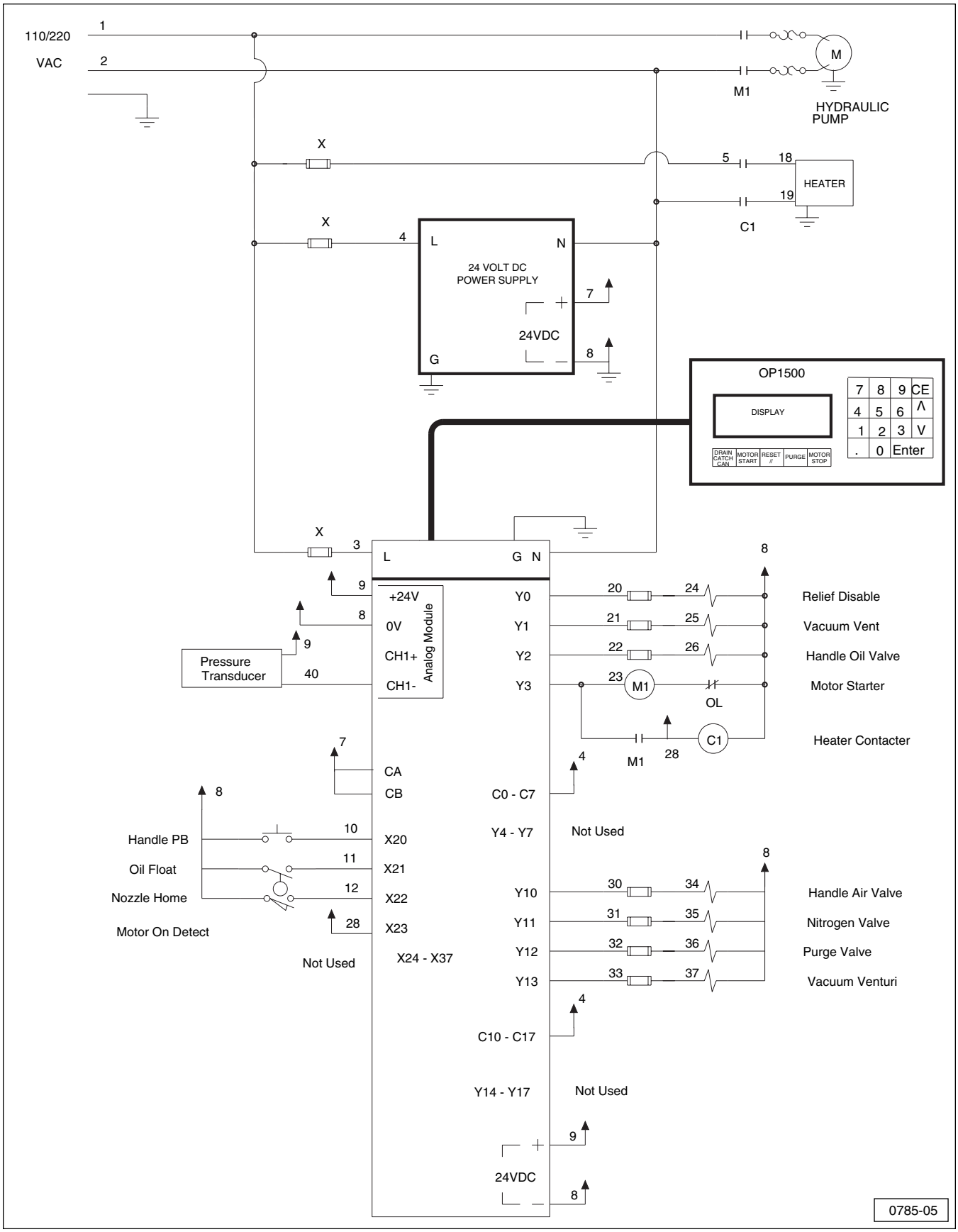
6) DO NOT: Push the nozzle into a track component before the 5 second count is finished.

7) DO NOT: Use for track component evacuating.

Hydraulic Schematic



Electrical Schematic



Service Parts

Hardware Parts List		
Item	**Part No.**	**Description**
H1	188-5058	2-Way Blocking Valve
H2	188-5059	Pilot Valves
H4	—	Vented Relief Valve
H5	—	Filter Gauge
H6	—	Vacuum Generator
H7	—	Pressure Tank
H8	180-9549	Water Removal Element
H8A	—	Filter Head
H9	—	Strainer
H10A	—	Nitrogen Needle Valve
H10	—	Needle Valve
H11	—	Pump
H12	—	Motor Pump Adapter
H13	—	Filler Breather
H14	—	Oil Separator Tank
H15	—	Nitrogen Regulator
H16	—	Air Muffler
H17	—	Hose Assembly
H18	—	Hose Assembly
H19	—	Ball Flow Indicator
H20	—	Wheel
H21	—	Bungee Cord
H22	—	Poppet Valve
H23	—	Catch Can
H24	—	Handle
H25	8T-0831	Nozzle Tip
H26	7G-4332	Stopper
H27	—	Tank Strap
H28	183-9302	Fill Tube (50 mL) Simulates Track Joints (80W-90 EP Gear Oil)
H29	183-9303	Fill Tube (1000 mL) Simulates Rollers/Idlers (SAE 30W Oil)
H30	216-2856	Fill Tube (100 mL) Simulates Cross Hole in Pin (80W-90 EP Gear Oil)

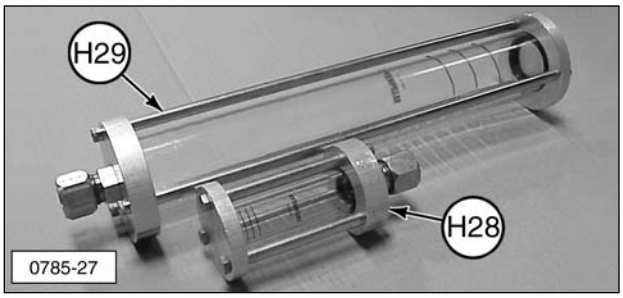


Illustration 1. Test Tubes.

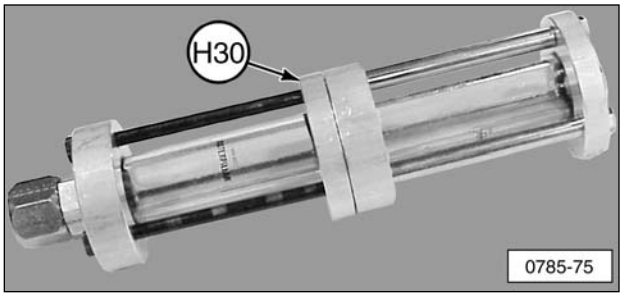


Illustration 2. Test Tube.

An in-line air/water filter element is required to make sure a clean, dry air supply is available to the Test and Fill Machine. Centrifugal action and a 40 micron filter element removes water and foreign particles from the air supply. These air filters are available as optional service parts:

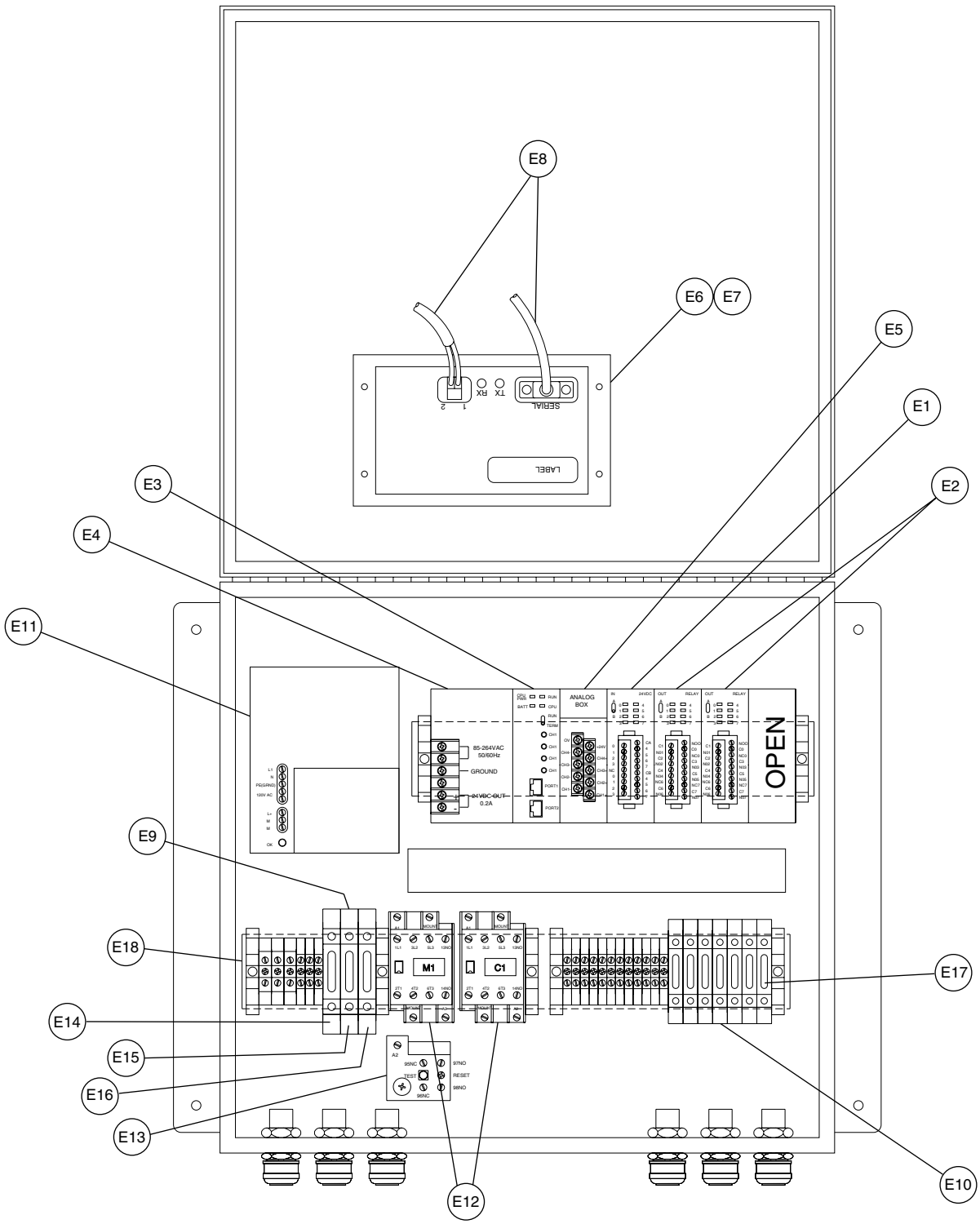
- 4C-7042 Air inlet 1/2 inch NPT
- 4C-7043 Air inlet 3/4 inch NPT

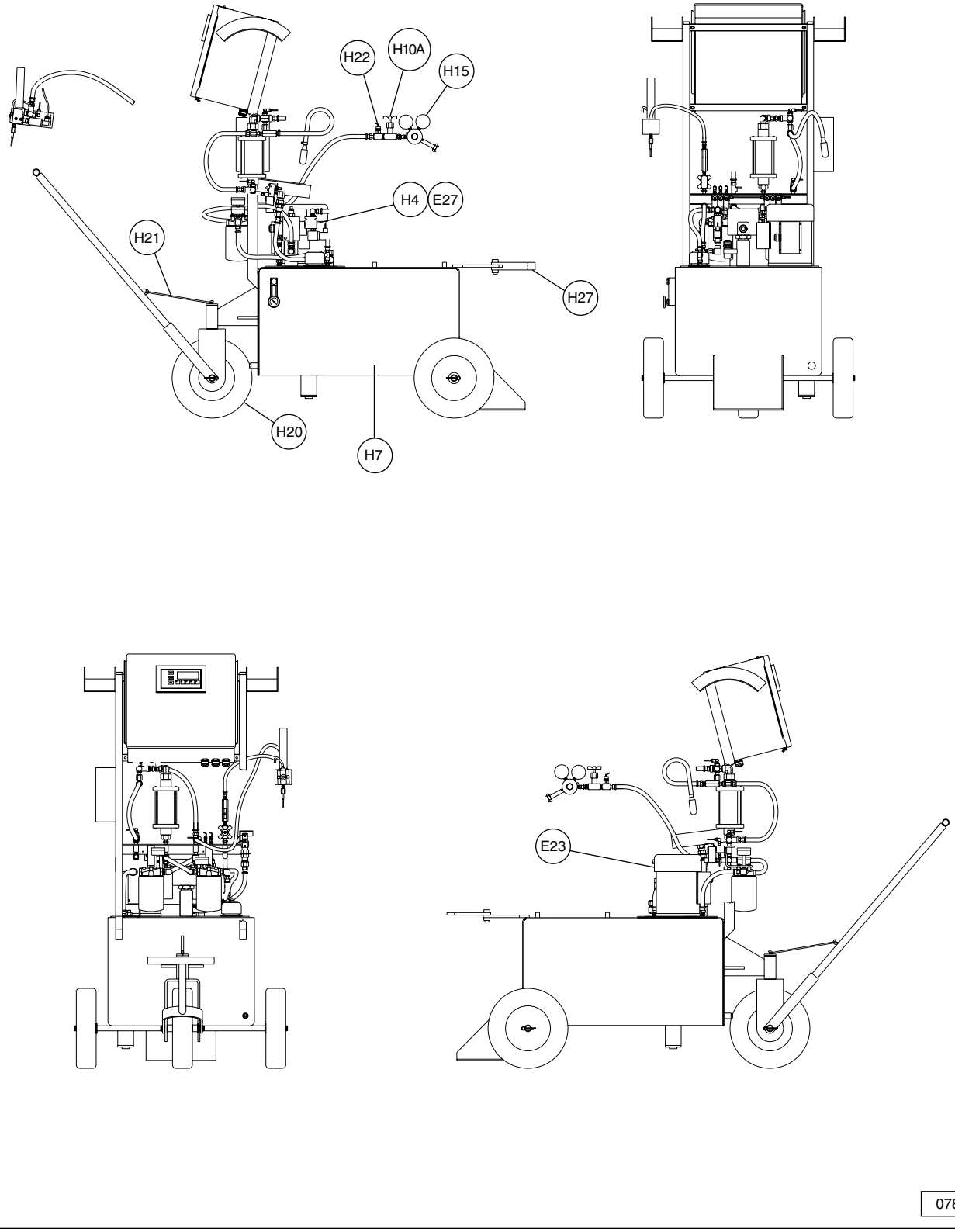
Air regulators control the air pressure to the Test and Fill Machine. These air regulators are available as optional service parts:

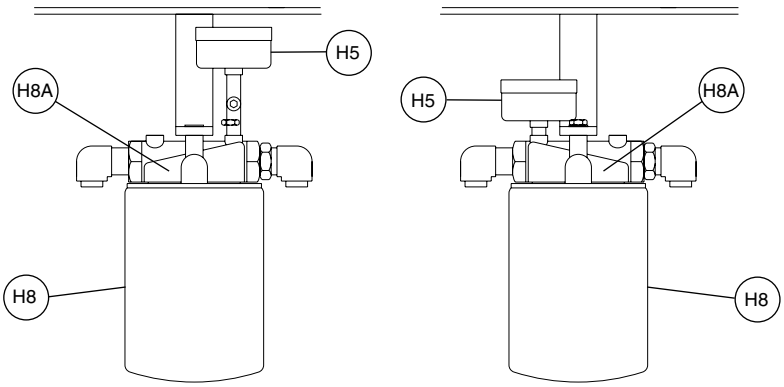
- 4C-7033 Air inlet 1/2 inch NPT
- 4C-7248 Air inlet 3/4 inch NPT

Electrical Parts List		
Item	**Part No.**	**Description**
E1	D2-16	ND3-2 DC Input
E2	F2-08	TRS RELAY Output
E3	D2240	CPU
E4	D206	BASE
E5	F204AD-1	Analog Input
Display		
E6	OP1500	OptiMate Control Panel
E7	OP640	OptiMate Control Panel
E8	OP2CBL	Cable
E9	—	Fuse Holder 110 Volt
E10	—	Fuse Holder 24 Volt
E11	—	Power Supply
E12	—	Contactor
E13	—	Overload Relay
Fuses		
E14	—	5 Amp
E15	—	1 Amp
E16	—	8 Amp
E17	—	2 Amp
E18	—	Ground Terminal
E19	188-5062	Transducer
E20	—	Limit Switch
E21	—	Hand Switch
E22	—	Float Switch
E23	—	Electric Motor
Heater		
E24[1]	—	Watlow
E25[1]	—	Kim HotStart
E26	188-5060	Solenoid
E27	188-5061	Relief Solenoid

[1]Only requires one heater.

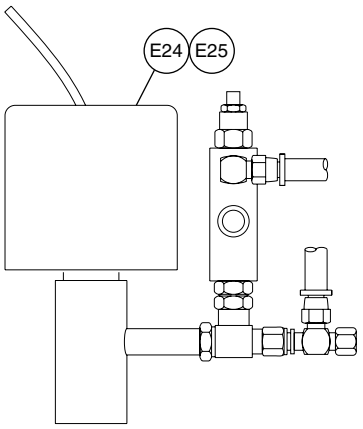

E8
E6
E7
E5
E1
E3
E2
E4
E11
E9
E18
E17
E14
E15
E16
E13
E12
E10
SERIAL
TX
RX
LABEL
ANALOG BOX
85-264VAC 50/60Hz
GROUND
24VDC OUT 0.2A
OPEN
M1
C1
0785-04

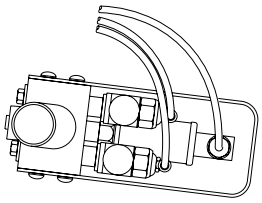

H22
H10A
H15
H4
E27
H21
H27
H20
H7
E23
0785-01

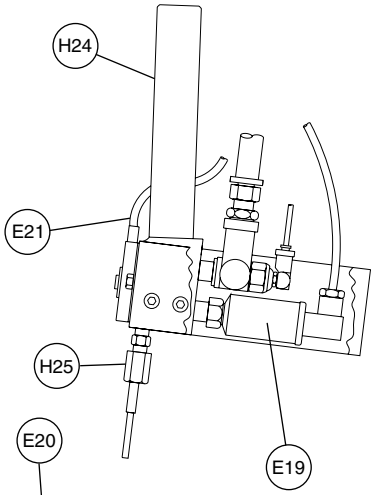


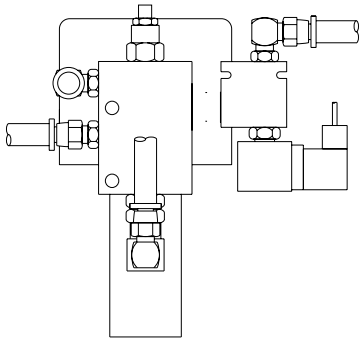
FILTER GROUP LEFT

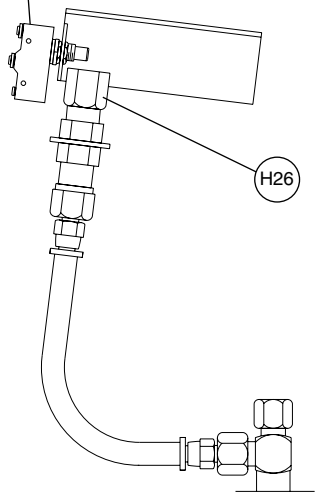
FILTER GROUP RIGHT



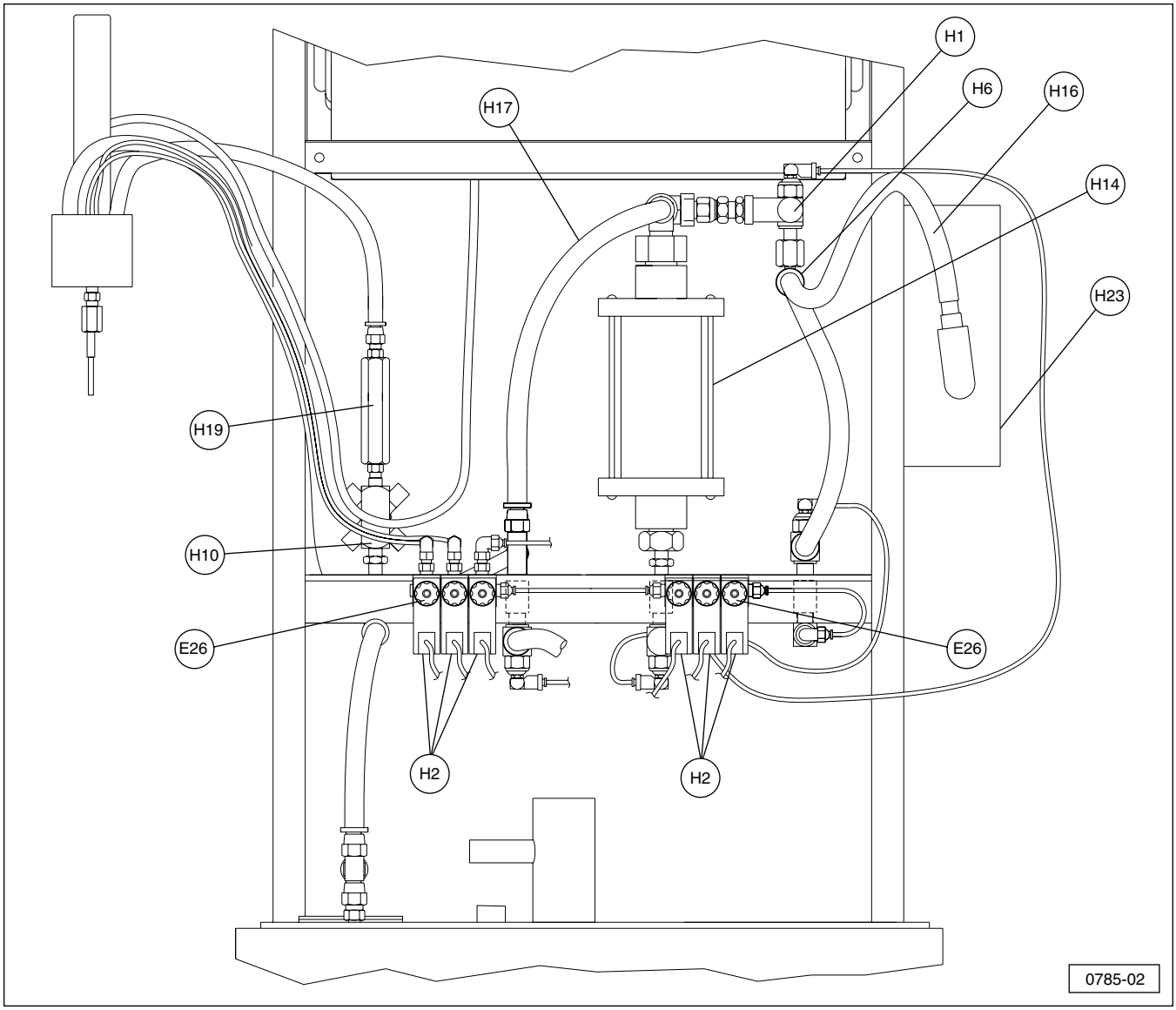


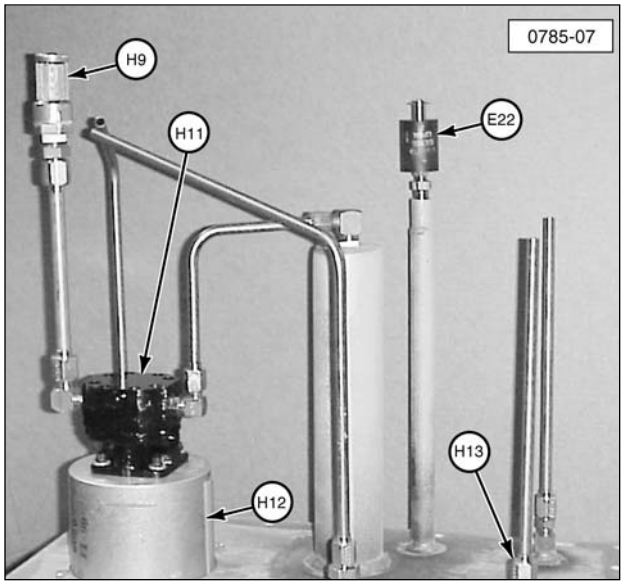






0785-03


H1
H6
H16
H17
H14
H23
H19
H10
E26
E26
H2
H2
0785-02


0785-07
H9
H11
E22
H13
H12

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- answering questions about tool repair
- resolving tool availability issues
- registering price complaints
- clarifying information in our publications
- discussing benefits or our new products
- or about our products or programs,

please call us. We are here to provide you the best service and products available.

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