



SHE SUCTION OIL HEATER ELECTRIC TYPE



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

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	Required Reference: Appropriate System Schematic	
	SHE 15B, 20B, 25B – Y7366	
	SHE 30B, 35B, 40B, 45B, 50B, 55B, 60B, 70B – Y7298	
	SHE 80B, 90B – Y7367	
	SHE 100B, 110B – Y7368	
	SHE 120B, 130B – Y7369	
	SHE 140B, 160B, 200B – Y7370	

These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

Heavy, waste, or recycled fuel oils require some means of viscosity control. A Hauck SHE Electric Oil Suction Heater installed in the fuel storage tank is a perfect solution to the viscosity problem. Tank agitation is recommended (recirculation pump, paddle or propeller) to prevent oil separation and settling. Heat tracing is recommended and may be required, especially in cold climates, to prevent excessive heat loss and promote economical operation. Installation of weather tight insulation is necessary over the heat tracing to maximize its benefits and promote economical operation.

Proper sizing of the burner oil supply pump is crucial to system operation. Size the pump to deliver 125 – 150% of the burner's maximum fuel usage at the recommended supply pressure. Locate the pump close to the tank to minimize the length of the supply piping from the tank to the pump inlet, and install a filter or strainer to remove any foreign objects that could damage the pump or clog the metering system and burner oil nozzle. Various strainer types are available for adequate oil filtration. Double basket strainers conveniently allow the baskets to be cleaned without shutting down the burner.

B. RECEIVING & INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. CAPACITIES

Model Number	KW Rating	Oil Temperature Rise (°F)									
		40	50	60	70	80	90	100	110	120	130
		Oil Capacity (gph)									
SHE 15B	15	287	230	191	164	144	128	115	104	96	88
SHE 20B	20	383	306	255	219	191	170	153	139	128	118
SHE 25B	25	479	383	319	274	239	213	191	174	160	147
SHE 30B	30	574	460	383	328	287	255	230	209	191	177
SHE 35B	35	670	536	447	383	335	298	268	244	223	206
SHE 40B	40	766	613	511	438	383	340	306	279	255	236
SHE 45B	45	862	689	574	492	431	383	345	313	287	265
SHE 50B	50	957	766	638	547	479	426	383	348	319	295
SHE 55B	55	1053	843	702	602	527	468	421	383	351	324
SHE 60B	60	1149	919	766	657	574	511	460	418	383	354
SHE 70B	70	1340	1072	894	766	670	596	536	487	447	412
SHE 80B	80	1532	1225	1021	875	766	681	613	557	511	471
SHE 90B	90	1723	1379	1149	985	862	766	689	627	574	530
SHE 100B	100	1915	1532	1277	1094	957	851	766	696	638	589
SHE 110B	110	2106	1685	1404	1204	1053	936	843	766	702	648
SHE 120B	120	2298	1838	1532	1313	1149	1021	919	836	766	707
SHE 130B	130	2489	1991	1660	1422	1245	1106	996	905	830	766
SHE 140B	140	2681	2145	1787	1532	1340	1191	1072	975	894	825
SHE 160B	160	3064	2451	2042	1751	1532	1362	1225	1114	1021	943
SHE 200B	200	3830	3064	2553	2188	1915	1702	1532	1393	1277	1178

NOTES:

1. Oil Capacities based on No. 6 fuel oil exiting the oil suction heater at a viscosity of 2000 SSU and includes a 20% safety factor.
2. Maximum oil flow rate to actuate flow switch for SHE 15-25 is adjustable from 3 to 45 gph; for SHE 30-35 is 90 gph; for SHE 40-50 is 120 gph; SHE 55-120 is 180 gph; for SHE 130-200 is 360 gph.
3. Standard supply voltage is 480V/3Ph/60Hz unless otherwise specified on order.

Table 1. Capacities

C. CAPACITIES (Continued)

Model Number	KW Rating	Oil Temperature Rise (°C)									
		4.4	10	15.6	21.1	26.7	32.2	37.8	43.3	48.9	54.4
		Oil Capacity (lph)									
SHE 15B	15	1086	871	723	621	545	484	435	394	363	333
SHE 20B	20	1450	1158	965	829	723	643	579	526	484	447
SHE 25B	25	1813	1450	1207	1037	905	806	723	659	606	556
SHE 30B	30	2173	1741	1450	1241	1086	965	871	791	723	670
SHE 35B	35	2536	2029	1692	1450	1268	1128	1014	924	844	780
SHE 40B	40	2899	2320	1934	1658	1450	1287	1158	1056	965	893
SHE 45B	45	3263	2608	2173	1862	1631	1450	1306	1185	1086	1003
SHE 50B	50	3622	2899	2415	2070	1813	1612	1450	1317	1207	1117
SHE 55B	55	3986	3191	2657	2279	1995	1771	1593	1450	1329	1226
SHE 60B	60	4349	3478	2899	2487	2173	1934	1741	1582	1450	1340
SHE 70B	70	5072	4058	3384	2899	2536	2256	2029	1843	1692	1559
SHE 80B	80	5799	4637	3864	3312	2899	2578	2320	2108	1934	1783
SHE 90B	90	6522	5220	4349	3728	3263	2899	2608	2373	2173	2006
SHE 100B	100	7248	5799	4833	4141	3622	3221	2899	2634	2415	2229
SHE 110B	110	7971	6378	5314	4557	3986	3543	3191	2899	2657	2453
SHE 120B	120	8698	6957	5799	4970	4349	3864	3478	3164	2899	2676
SHE 130B	130	9421	7536	6283	5382	4712	4186	3770	3425	3142	2899
SHE 140B	140	10150	8119	6764	5799	5072	4508	4058	3690	3384	3123
SHE 160B	160	11600	9277	7729	6628	5799	5155	4637	4217	3864	3569
SHE 200B	200	14500	11600	9663	8282	7248	6442	5799	5273	4833	4459

NOTES:

1. Oil Capacities based on No. 6 fuel oil exiting the oil suction heater at a viscosity of $4.3 \times 10^{-4} \text{ m}^2/\text{sec}$ and includes a 20% safety factor.
2. Minimum oil flow rate to actuate flow switch for SHE 15-25 is adjustable from 11 to 170 lph; for SHE 30-35 is 340 lph; for SHE 40-50 is 454 lph; SHE 55-120 is 681 lph; for SHE 130-200 is 1362 lph.
3. Standard supply voltage 480V/3Ph/60Hz unless otherwise specified on order.

Table 2. Metric Capacities

D. DIMENSIONS

See appropriate Dimension sheet for detailed dimensional information.

E. INSTALLATION

The Hauck SHE is designed to be installed horizontally through the side wall or head of the fuel storage tank. Cut an opening near the bottom of the tank (leaving clearance for connections), insert the SHE body and seal weld it to the tank. The back end of the SHE needs to be supported off the tank bottom. The heater discharge is plumbed into the pump suction. The by-pass line from the burner by-pass relief valve must return to the fitting at the bottom of the SHE, (See Figure 1 & 2). This is to avoid overheating the pump and to minimize turbulence that can contribute to pump cavitation.

IMPORTANT

Ensure that the oil supply system is adequately sized to satisfy the minimum oil flow requirement to the flow switch at low fire, i.e., adjustable from 3 to 45 gph (11 to 170 lph) for SHE 15-25, 90 gph (340 lph) for SHE 30-35, 120 gph (454 lph) for SHE 40-50, 180 gph (681 lph) for SHE 55-120 and 360 gph (1362 lph) for SHE 130-200. If this minimum flow rate is not achieved, the flow switch will not actuate power to the heater elements and the oil will not be heated.

The oil return connection is on the bottom of the SHE, and the oil outlet is at the top.

CAUTION

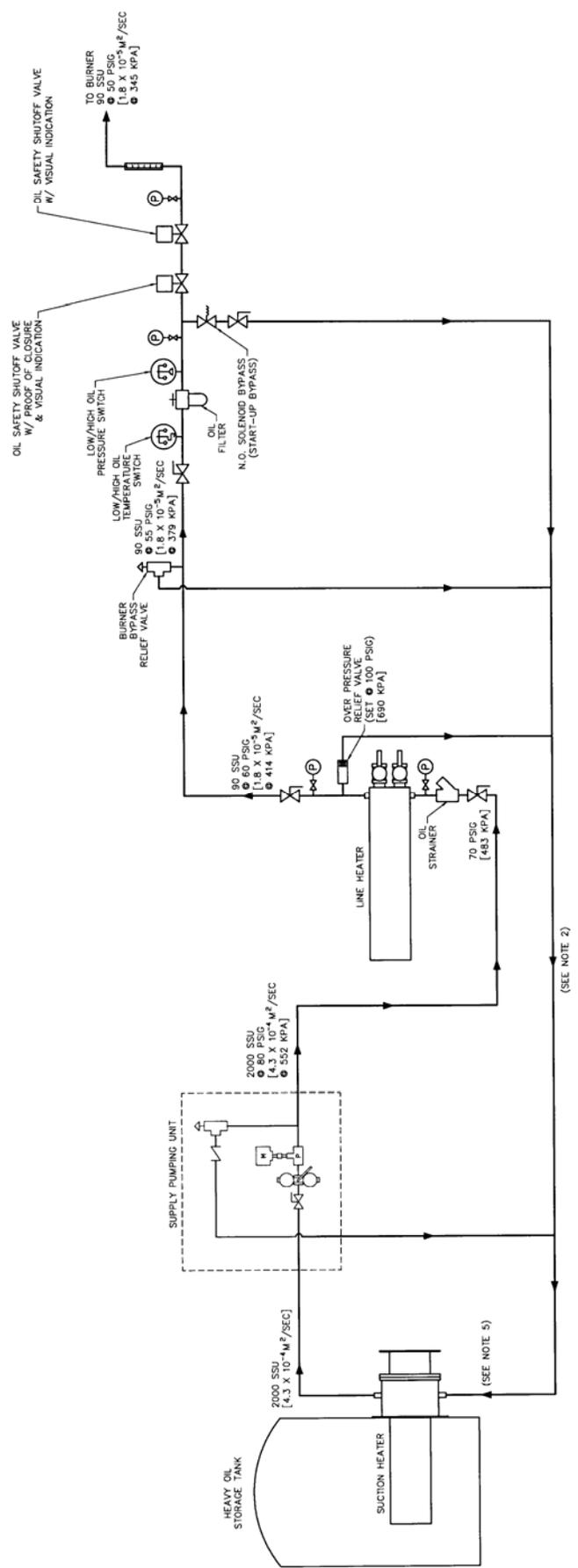
Return and outlet connections to the SHE must be adhered to in order to maintain temperature control and operate safely.

Connection fittings are all standard pipe thread. Proper fit and a high quality thread sealant with teflon (Loctite 565 or equal) are recommended - **do not use teflon tape**. Unions may be used at connection points to allow the SHE to be removed for cleaning.

The electrical control panel is mounted and pre-wired to the SHE. Therefore, Hauck SHE's only require wiring of a main service line (460V/3Ph/60Hz for standard SHE's) to the line side lugs on the main circuit interrupter. Properly sized conduit enclosed conductors should be used. See label inside control panel for voltage, phase and current ratings.

Thermocouples for both the high limit and main temperature control are installed in the SHE. The main control sensor is inserted in the discharge, and the high limit sensor is installed in the heater vessel body. Sensors are connected to the terminal block in the control panel. Please note and maintain thermocouple polarity if servicing.

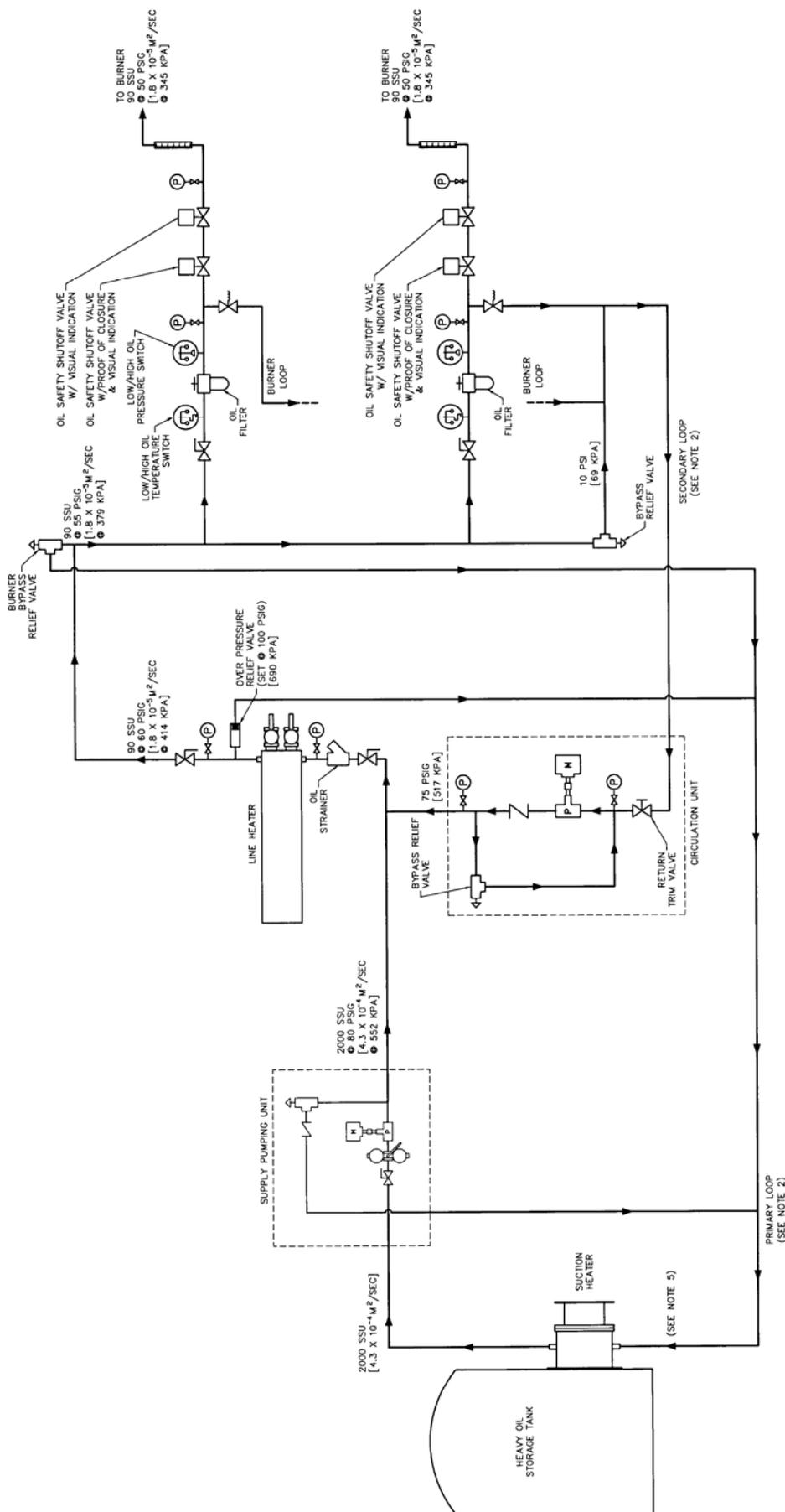
All wiring should be done by a licensed electrician and meet all NEC and local codes.



- NOTES:
1. PIPING SCHEMATIC SHOWS TYPICAL COMPONENTS AND NOMINAL VISCOSITIES AND PRESSURES FOR HEAVY FUEL OIL SUPPLY; ACTUAL REQUIREMENTS ARE DEPENDENT UPON THE SPECIFIC BURNER SYSTEM (CONSULT HAUCK).
 2. OIL RETURN LINES TO BE SIZED ACCORDING TO DISTANCE TO PUMP -- MINIMUM SIZE EQUAL TO TWO PIPE SIZES LARGER THAN OIL SUPPLY LINE (SEE GL88 FOR MINIMUM LINE SIZES FOR HAUCK SUPPLY PUMPING OIL UNITS).
 3. FOR ALL HEAVY OIL APPLICATIONS, OIL PIPING MUST BE HEAT TRACED (ELECTRIC OR STEAM) AND INSULATED. SELF-REGULATING HEAT TRACING IS RECOMMENDED TO MAINTAIN THE DESIRED TEMPERATURE OF A GIVEN FUEL OIL TO ACHIEVE 90 SSU (1.8 X 10⁻⁵ M²/SEC) OR LESS AT THE BURNER. ELECTRICAL HEAT TRACING WITH A NOMINAL RATING OF 12 W/FT (34W/M) COVERED WITH A NOMINAL 2" (50MM) FIBERGLASS TYPE INSULATION IS SUFFICIENT FOR MOST APPLICATIONS.
 4. IF USING NO. 6 FUEL OIL AND THE PIPING BETWEEN THE SUPPLY PUMPING UNIT AND THE HEAVY OIL MANIFOLD IS GREATER THAN 50 FT (15 M), AN ADDITIONAL BYPASS RELIEF VALVE MAY BE REQUIRED IN THE SUPPLY PIPING TO ACCOMMODATE COLD SYSTEM START UP (CONSULT HAUCK).
 5. IF SUCTION HEATER IS NOT UTILIZED, OIL RETURN LINE SHOULD BE PIPED TO THE OIL STORAGE TANK.

Y7514
(NOT TO SCALE)

Figure 1. Typical Heavy Oil Piping – Single Burner System



- NOTES:
1. PIPING SCHEMATIC SHOWS TYPICAL COMPONENTS AND NOMINAL VISCOSITIES AND PRESSURES FOR HEAVY FUEL OIL SUPPLY; ACTUAL REQUIREMENTS ARE DEPENDENT UPON THE SPECIFIC BURNER SYSTEM (CONSULT HAUCK).
 2. OIL RETURN LINES TO BE SIZED ACCORDING TO DISTANCE TO PUMP - MINIMUM SIZE EQUAL TO TWO PIPE SIZES LARGER THAN OIL SUPPLY LINE (SEE GL8B FOR MINIMUM LINE SIZES FOR HAUCK SUPPLY PUMPING OIL UNITS).
 3. FOR ALL HEAVY OIL APPLICATIONS, OIL PIPING MUST BE HEAT TRACED (ELECTRIC OR STEAM) AND INSULATED. SELF-REGULATING HEAT TRACING IS RECOMMENDED TO MAINTAIN THE DESIRED TEMPERATURE OF A GIVEN FUEL OIL TO ACHIEVE 90 SSU (1.8 X 10⁻⁵ M²/SEC) OR LESS AT THE BURNER. ELECTRICAL HEAT TRACING WITH A NOMINAL RATING OF 12 W/FT (34W/M) COVERED WITH A NOMINAL 2" (50MM) FIBERGLASS TYPE INSULATION IS SUFFICIENT FOR MOST APPLICATIONS.
 4. IF USING NO. 6 FUEL OIL AND THE PIPING BETWEEN THE SUPPLY PUMPING UNIT AND THE HEAVY OIL MANIFOLD IS GREATER THAN 50 FT (15 M), AN ADDITIONAL BYPASS RELIEF VALVE MAY BE REQUIRED IN THE SUPPLY PIPING TO ACCOMMODATE COLD SYSTEM START UP (CONSULT HAUCK).
 5. IF SUCTION HEATER IS NOT UTILIZED, OIL RETURN LINE SHOULD BE PIPED TO THE OIL STORAGE TANK.

Y7123
(NOT TO SCALE)

Figure 2. Typical Heavy Oil Piping – Multiple Burner System

F. OPERATION



WARNING

The heater should not be operated unless the unit is full of oil and the pump is running.

IMPORTANT

The High Oil Temperature Limit controller, located inside the panel, should have the trip setpoint approximately 20°F (11°C) higher than the Oil Temperature controller setpoint.

1. Move the heater disconnect switch to the "ON" position.
 - a. The Oil Temperature controller will energize and initiate its self-check.
 - b. The High Oil Temperature Limit controller will energize.
 - c. The Over Temperature Latch Relay, R1, will energize.
2. Momentarily press the illuminated "RESET" push-button.
 - a. The Over Temperature Latch Relay, R1, will de-energize.
3. Ensure that the Setpoint Temperature for the oil is correct (Press the up or down arrow on the instrument for the desired oil temperature).
4. With the oil pump running, the Oil Flow switch should close and allow the controller to energize the Line Heater Contactor for the desired oil temperature.

FAULT OPERATION

1. If the measured oil temperature exceeds the High Oil Temperature Limit controller's setpoint:
 - a. The "RESET" illuminated push-button will light.
 - b. The Over Temperature Latch Relay, R1, will energize.
 - c. Power to the Output Contact (Heat) of the Oil Temperature Controller will be removed.
 - d. The Line Heater Contact will de-energize and open, and power to the heating elements will be disconnected.
2. When the measured oil temperature drops below the High Oil Temperature Limit controller's setpoint:
 - a. Power to the Output Contact (Heat) of the Oil Temperature Controller will be supplied, and the Oil Temperature Controller will be able to energize the Line Heater Contactor.
3. The "RESET" illuminated push-button will remain lit to indicate an over-temperature condition had occurred.
4. If the measured oil temperature has dropped below the High Oil Temperature controller's setpoint:
 - a. The Over Temperature Latch Relay, R1, will de-energize.
 - b. The illuminated "RESET" push-button will de-energize.

G. MAINTENANCE

Hauck SHE's are fully automatic and will require very little maintenance. Cleaning inside the SHE, as mentioned previously, is important and should not be neglected. A proper cleaning schedule must be set up to ensure optimum SHE performance. After emptying the tank, cleaning can be accomplished by breaking apart the flange behind the SHE terminal box and pulling the heating elements out of the tank. The heater tubes can be cleaned by any combination of pressure wash, steam and manual scraping. Use care and avoid damage to the heater tubes. Length of interval between cleaning will vary with use and oil type.

To replace a heater element, remove the back cover from the SHE terminal box and disconnect wiring from the old heater element. Remove old heater element by slowly sliding out heater element. Install new heater element by slowly sliding in heater element. Reconnect wiring to new heater element and replace back cover on the SHE terminal box.

Periodically checking and tightening of any loose electrical connections will assure years of trouble free control panel operation.

H. RECOMMENDED SPARE PARTS LIST

Item	Qty.	Part Number	Description
1	1	See Parts List	Heater Element
2	1	300710	Temperature Controller
3	1	See Parts List	Load Fuse

Table 3. Recommended Spare Parts List

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