

# TARM 900 SERIES

OIL-FIRED STEEL  
HOT-WATER BOILER



Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_

Bought from \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_ Zip \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_

Date of Installation \_\_\_\_\_ Today's Date \_\_\_\_\_

Installed by  
(if different from above) \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_ Zip \_\_\_\_\_ Phone (\_\_\_\_) \_\_\_\_\_



## HS • TARM

### Installation and Operation Manual

# TARM 900 SERIES

OIL-FIRED STEEL  
HOT-WATER BOILER

**SAVE THESE INSTRUCTIONS!**



DEAR CUSTOMER:

We congratulate you on your choice of an HS TARM boiler for your home. Your boiler was manufactured in Denmark, and conforms to traditionally high Danish standards for quality and reliability. If properly cared for, your boiler should give you years of trouble-free service.

Your central heating system is one of the most important appliances in your home. The information in this manual gives valuable information about the operation of your new HS TARM 900 Series oil boiler. By reading it, you will not only become more familiar with your new boiler and heating system, you will also learn how to keep your boiler operating efficiently and reliably for years to come. Reading the manual could also save you needless service expense, should a problem arise that you can solve with the information provided here.

DEAR INSTALLER;

This manual provides you with complete installation instructions for the TARM 900 Series boilers. Please read the entire manual before installing the boiler. When installation is complete, please fill in the blanks on the cover and leave the manual with the homeowner. If you would like additional copies of this manual for your own use, they are available free of charge from your HS TARM distributor.

Sincerely,

HS TARM/ TEKTON CORPORATION

# IMPORTANT INFORMATION

## PLEASE READ THIS SECTION CAREFULLY

This boiler has a limited warranty, which appears on the inside back cover of this manual. To validate your warranty, detach the prepaid postcard, fill in the information requested and return the card to Tekton Corporation. You will find the boiler Model number and Serial number on top of the boiler body, under the top jacket panel.

### General Information

Please read the literature enclosed by the manufacturer with the various accessory devices. These devices are warranted by the manufacturer, NOT by Tekton Corporation. These accessory devices must be installed and used according to the recommendations of the manufacturer.

All boilers must be installed in accordance with national, state and local plumbing, heating and electrical codes and the regulations of the serving electric, water and gas utilities.

All systems should be designed by competent contractors, and only persons knowledgeable in the layout and installation of heating systems should attempt installation of any boiler.

It is the responsibility of the installing contractor to see that all controls are installed correctly and operating properly when installation is completed.

If the TARM 900 is to be shut down for any extended period of time, the procedures under Section IX, "SUMMER OPERATION", must be followed to maintain your boiler's warranty!

### Installation Information

The boiler must be connected to a tile-lined masonry flue or other approved chimney. In some areas, codes require that no other appliance be connected to this flue. Consult your local building inspector for chimney requirements, and install the boiler in accordance with all applicable codes.

The boiler requires adequate fresh air supply for efficient and safe operation. For more information refer to NFPA standard #31, and page 6 of this manual.

Boiler must be positioned to provide minimum clearances from combustibles or combustible surfaces as follows: LEFT SIDE - 6"; RIGHT SIDE - 6"; TOP AND REAR - 18"; FRONT - 36".

There must be a minimum clearance of 18" between smoke pipe and all combustible surfaces.

Clearance to hot water pipes is zero inches.

The boiler must not be installed or operated in a "cold-start" manner. Failure to observe this requirement will void the warranty.

# SPECIFICATIONS

The TARM 900 Series is available in three different configurations:

1. "Knocked-down"— includes boiler body on skid, boxed jacket, ASME Pressure Relief Valve, Theraltimeter;
2. "Knocked-down" Package — includes above plus Beckett AFG Flame-Retention Burner w/air inlet damper, Honeywell Master Hot-Water Control, Nozzle Kit covering most popular outputs and Boiler Drain;
3. Preassembled Package— includes all the above completely assembled, jacketed and crated.

**OPTIONAL EQUIPMENT:** Circulator package (includes Grundfos 2042 circulator and Honeywell thermostat) - supplied separately with "Knock-down" Package or prewired and mounted with Preassembled Package

All TARM 900 Series boilers are supplied with a 5 gpm Tankless Coil installed.

## OUTPUT RATINGS:

Model/Output #	IBR Heating Cap MBH	IBR Net Output MBH	Nozzel Size and Type	Steady State Efficiency	Seasonal Efficiency
T902/80	80	69.3	.65/80° B	87.54	86.80
T902/91	91	79.3	.75/80° B	86.87	86.26
T902/104	104	90.1	.85/80° B	87.04	86.34
T902/121	121	105.0	1.00/80° B	86.22	85.94
T903	135-176	117-153	1.1-1.6	*	*

\*Tests in progress. T903 available fall 1984.

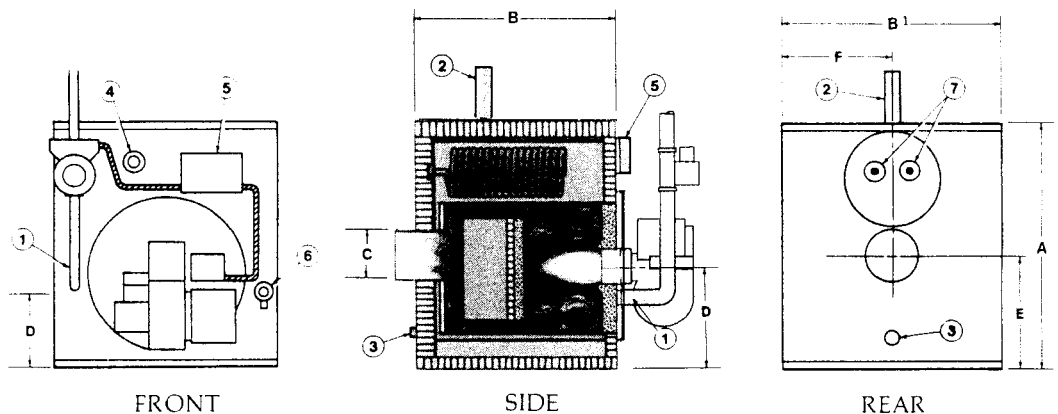
Tankless coil capacity is maximum 5 gpm at 100° F temp. rise. To calculate the maximum domestic water output in gpm available at a given firing rate, divide heating capacity by 50 MBH.

## DIMENSIONS AND SPECIFICATIONS

Model Number	A Height (Inches)	B Depth (Inches)	B' Width (Inches)	C Smoke Pipe Diameter (Inches)	D Height To Center of Oil Burner (Inches)	E Distance From Floor of Boiler to Center Line of Flue (Inches)	F Center Line of Boiler (Inches)	Recommended Minimum Chimney Size	Ship Weight (Pounds)
T902	29 $\frac{3}{8}$	24 $\frac{1}{4}$	26	6	12 $\frac{1}{8}$	14 $\frac{1}{2}$	13	8" x 8" x 15'	490
T903	29 $\frac{3}{8}$	32	26	6	12 $\frac{1}{8}$	14 $\frac{1}{2}$	13	8" x 8" x 15'	630

Specifications subject to change without notice.

1. Return- 1 $\frac{1}{4}$ " NPT
2. Supply- 1 $\frac{1}{4}$ " NPT
3. Drain- 1" NPT
4. Theraltimeter-  $\frac{1}{2}$ " NPT
5. Master Hot Water Control-  $\frac{3}{4}$ " NPT
6. Boiler Pressure Relief Valve-  $\frac{3}{4}$ " NPT
7. Tankless Heater



## PACKING LIST

The TARM 900 Series is supplied from the factory in three different configurations:

- \* Knocked down (KD) - bare boiler with jacket boxed separately
- \* Knocked down (KP) - includes all of the above plus burner and controls
- \* Packaged (PC) - boiler assembled and prewired w/burner, circulator and controls

Check to see that all items listed below for the model supplied are present. If anything is missing, please contact your HS TARM distributor immediately.

### KD Boiler:

\*Boiler Body with 5 gpm tankless coil installed

\*Jacket Box with 5 jacket sections and connecting strips

\*Padded Envelope:

- \_\_\_ Boiler manual
- \_\_\_ 30 PSI boiler pressure relief valve (Watts 374A or Equiv.)
- \_\_\_ Theraltimeter (Ametek PTA 1088SS or Equiv.)

### KP Boiler:

\*Same packing list as KD, plus:

- \_\_\_ Flame Retention Burner w/nozzle installed (Beckett AFG)  
(.85 gph - TARM 902; 1.25 gph - TARM 903)
- \_\_\_ Master Hot Water Control (Honeywell # L8124C)
- \_\_\_ 1/2" Boiler Drain (Watts #BD-1)
- \_\_\_ extra nozzles for burner (.75 and 1.00 gph - TARM 902)  
packed in envelope (1.10 and 1.50 gph - TARM 903)

### PC Boiler

\*Same packing list as KP plus:

- \_\_\_ Burner and controls mounted and prewired.
- \_\_\_ Circulator, mounted and wired (Grundfos # UPS15-42)
- \_\_\_ Thermostat (HONEYWELL T87F or equiv.) packed in padded envelope.

Tekton Corporation reserves the right to substitute equivalent components for any of the items listed above.

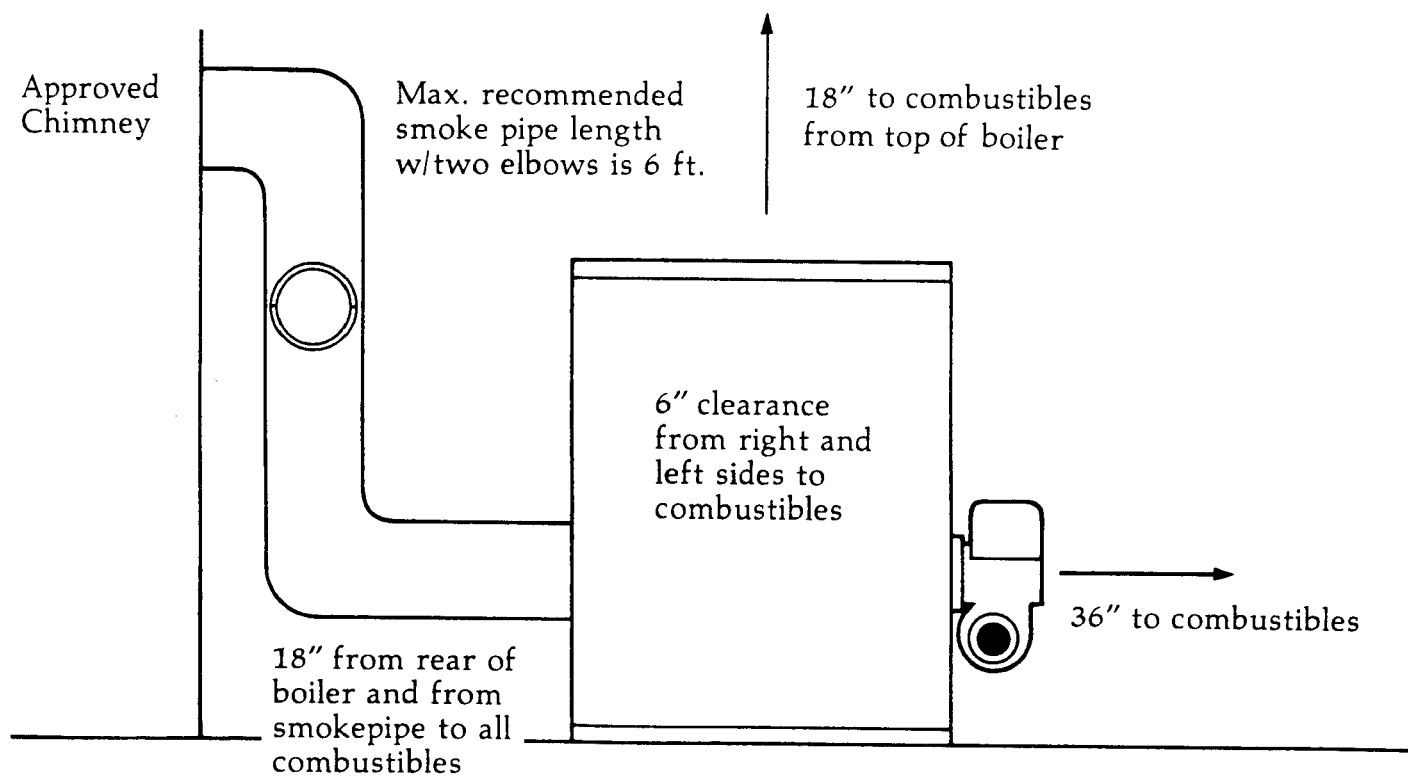
## BOILER INSTALLATION

### I. BOILER LOCATION

The boiler should be located as close as possible to the chimney. Minimum fire clearances to combustibles (shown in the accompanying diagram) must be observed! The longer the smokepipe, the greater the chimney draft required for proper operation. We recommend a total length of no more than 6 ft., with no more than two 90 deg. elbows.

The boiler must be located on a concrete slab or other stable and level noncombustible surface. A dirt floor is not suitable. If pouring a concrete slab for the boiler, the slab must be at least 4" thick and 6" longer and wider than the boiler itself. If the floor in the boiler area is prone to dampness, the boiler should be raised off the floor at least 2" to protect against corrosion.

For efficient combustion, the boiler must be provided with an adequate supply of fresh air for combustion. Many modern houses are too airtight to provide enough oxygen for proper combustion. Combustion air may be admitted through a simple grille in an exterior wall, or by a duct connected to the outside and terminating near the burner. The opening in duct or grille must have a minimum of 150 square inches of area for each GPH of burner firing rate.



INSTALL ON NON-COMBUSTIBLE FLOOR ONLY!

## II. BOILER ASSEMBLY

Your TARM 900 boiler is either a KD, KP or PC model. (The models are described under "Packing List.") If your boiler is a KD or KP begin with Section A, "Jacket Assembly". If your boiler is a PC model, go to Section III, "Chimney Connection".

### A. JACKET ASSEMBLY

1. Being careful not to damage the refractory liner, remove burner plate from boiler by removing the four (4) wing nuts.
2. Check combustion chamber to make sure that:
  - Turbulators are securely in place (for correct placement, please refer to section VIII, #5).
  - Burner target has not been damaged in shipping.
  - Soft insulation is firmly in place against rear of target (accessible through flue outlet).
  - Combustion chamber front edge is flush with front edge of U-shaped channels.
3. Cut out insulation on front jacket panel for aquastat well and theraltimeter fittings. Position panel on front of boiler.
4. Replace burner plate and washers and hand tighten wing nuts.
5. The left and right side panel are identical. Position them with the small holes up and attach to front panel with zip strips.
6. Attach back panel with zip strips.
7. Install top panel. Cut out insulation for supply tapping.
8. Place piece of cardboard or clean rag on top of boiler to avoid scratching jacket during assembly.

### B. CONTROL AND FITTING CHECKLIST

NOTE: Use pipe dope or teflon tape on all fittings.

You will need:

- 30 psi Pressure relief valve (WATTS 374A).\*\*
- One 3/4" iron close nipple.
- Circulator with 1-1/4" flanges.
- One 1 1/4" x 4" iron nipple.
- One 1 1/4" iron street el.
- Master Hot Water Control (Honeywell #L8124C or equiv.).\*\*
- One 3/4" immersion well (this may be supplied with the Master Hot Water Control).\*\*
- Theraltimeter (pressure-temperature gauge).\*
- One 1/2" x 1/4" iron bushing (required only on early models where tapping #4 is 1/2".)
- One 1/2" Boiler Drain (Watts #BD-1 or equiv.)\*\*

\*Supplied with all TARM 900 boilers.

\*\*Supplied with TARM 900 'KP' models only.

C. Boiler Pressure Relief Valve      WATTS 374A, 30 psi      Tapping #6

Connect WATTS 374A Pressure Relief Valve, 30 psi, (supplied with boiler) to tapping #6 using a 3/4" iron close nipple. THIS VALVE MUST BE INSTALLED TO INSURE SAFE OPERATION OF THE BOILER AND FOR PROTECTION OF THE HEATING SYSTEM! Pipe the 3/4" discharge line from this valve to within 6" of the floor with no reduction in pipe size! When this valve operates, hot water will be discharged.

D. Boiler Drain 1/2"      WATTS BD-1 or equiv.      Tapping #3

Install 1/2" boiler drain in tapping #3 in rear of boiler.

E. Circulator Assembly      GRUNDFOS UPS15-42 or equiv.      Tapping #1

1. Thread 1-1/4" x 4" iron nipple into tapping # 1.
2. Thread 1-1/4" iron street el onto nipple, ending with nipple pointed up.
3. Thread on one 1-1/4" circulator flange on the male end of the street el.
4. Using gaskets supplied with the circulator flanges, bolt circulator on flange with flow arrow pointing down.

F. Theraltimeter      AMETEK PTA 1088SS or equiv.      Tapping #4

If theraltimeter tapping #4 is 1/2", thread into a 1/2" x 1/4" bushing and thread assembly into tapping #4. If tapping is 1/4" dope and thread theraltimeter directly into tapping #4.

G. Master Hot Water Control      HONEYWELL L8124C      Tapping #5

1. Install 3/4" immersion well in tapping #5
2. Mount Master Hot Water Control on well.

H. OIL BURNER INSTALLATION

NOTE: The oil burner currently specified for use with the TARM 900 Series boilers is a Beckett AFG flame-retention burner (supplied with KP models). If you plan to use a different make or model of burner with the boiler, you must consult your HS TARM Distributor to insure that the burner is compatible with the boiler.

The correct insertion depth for the oil burner is 3-5/8", measured from the outside of the burner plate to the end of the burner air tube. Firing rates are listed on the specification page. BECKETT AFG Burners are spec'ed with a 80 degree solid pattern nozzle. You must consult your HS TARM distributor for nozzle spec's on other makes of burners.

More information on burner set-up is given on page 17.

1. With burner flange gasket in place, mount burner assembly to boiler and tighten nuts. Washers must be used under nuts.



## I. WIRING SUBASSEMBLY

The following wiring section is step-by-step instructions for assembling wiring harnesses with a GRUNDFOS UPS15-42 circulator and BECKETT AFG oil burner. If another brand of circulator or burner is used, the length of the wiring harnesses may be different.

You will need:

- One 3/8" straight Greenfield clamp
- Three 3/8" x 90 deg. Greenfield clamps
- 3 ft. x 3/8" Greenfield cable
- 4 ft. each black and white 14 gauge THHN (solid or stranded)
- 4 wire nuts (Buchanan B-1 or equiv.)

1. Remove cover from L8124C and remove lower right knockout and lower left knockout.
2. Install angle Greenfield fitting on right side knockout and straight Greenfield fitting on lower left knockout.
3. Cut Greenfield to length:
  - one piece at 12 1/2" (for burner harness)
  - one piece at 18 1/2" (for circulator harness)
4. Cut two 24" lengths each of black and white THHN wire.
5. Strip one end of each wire 3/4" and the other end 1/2".
6. Slide one black and one white wire into each length of Greenfield.
7. Attach angle Greenfield fitting to each end of burner harness.
8. Attach one angle and one straight fitting to ends of circulator harness.

## J. WIRING

### Burner to Aquastat

1. Install end of burner harness with longer wire strip length in lower right aquastat knockout.
2. Remove primary control from burner.
3. Remove rearmost knockout on angle of burner junction box and install remaining end of burner harness.
4. Bring out white and black burner wires to box. Wires are located under transformer. Lift transformer by removing two screws and pass black and white leads out right side of burner housing through knockout. Plug hole with ball of sealing compound stuck to inside of housing and replace transformer.
5. Connect black to black and white to white in burner junction box with wire nuts.
6. Connect black wire in aquastat to B1, white to B2.
7. Jump "T" terminals on burner primary with small piece of THHN wire.

### Circulator to Aquastat

1. Remove cover from circulator junction box.
2. Connect straight fitting end of circualtor harness to lower left knockout on aquastat.
3. Connect angle-fitting end of harness to circulator.
4. Connect black to red and white to blue in circulator with wire nuts.
5. Replace cardboard spacer inside circulator junction box and cover.
6. Wire black to C1, white to C2 in aquastat.
7. Replace cover of aquastat. Tighten cover retaining screw.

### III. CHIMNEY AND CHIMNEY CONNECTION

**NOTE:** If your TARM 900 Series boiler is prepackaged and assembled from the factory go back to Section II; C. and D. and install boiler Drain and discharge line for Boiler Pressure Relief Valve.

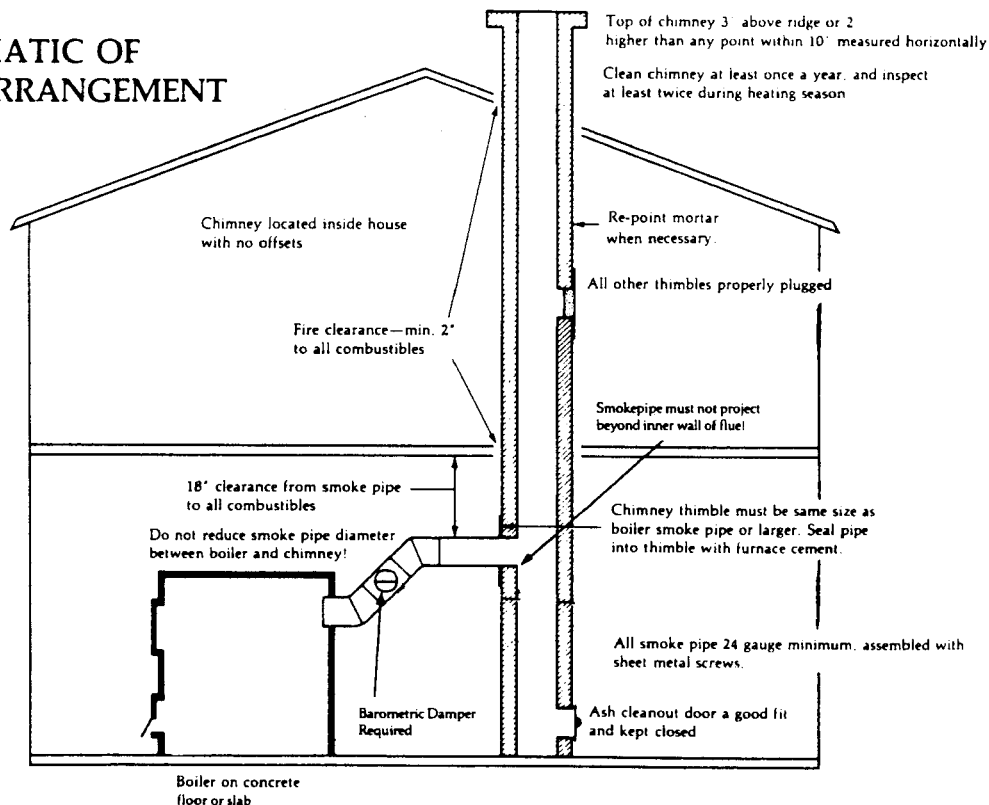
For the TARM 900 boiler to operate safely and efficiently, it must be connected to a chimney in good repair which meets the requirements set forth in this section. The diagram shows proper connection of boiler to chimney, proper installation of the barometric damper in the smoke pipe, and shows how to evaluate the chimney for soundness.

Boiler to Chimney Connection: Connect the boiler to the chimney with the shortest possible length of pipe. To allow easy access to the tankless coil, a horizontal section of pipe at least 12" long should be connected to the boiler breech before an elbow is installed. All smoke pipe must be 24 gauge minimum thickness. You must install a barometric damper in the smoke pipe. A manual damper must never be used! In horizontal sections, the pipe must slope upwards at least 1/4" per foot of run, and all sections should be joined with at least two sheet metal screws. Every second section should be supported with a hanger, as well. **REMEMBER:** the minimum clearance from smoke pipe to combustibles is 18".

Chimney Size: The following chart shows minimum requirements for the TARM 900 Series at sea level. If the home is located at higher altitudes, a taller chimney is required.

<u>Model #</u>	<u>Min. Height</u>	<u>Min. Flue Size</u>	<u>Min. Draft in/WG</u>
TARM 902	15 ft.	8" x 8"	.04
TARM 903	15 ft	8" x 8"	.04

**SCHEMATIC OF CHIMNEY ARRANGEMENT**



#### IV. POTABLE WATER CONNECTIONS

##### A. DOMESTIC HOT WATER COIL

You will need:

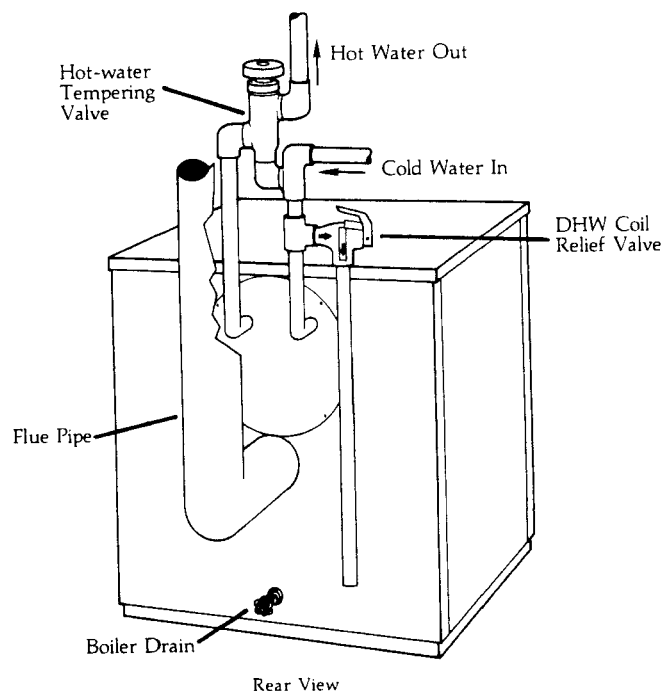
- one 125 P.S.I. coil pressure relief valve (Watts 3L or equiv.)
- one 1/2" tempering valve (Watts 70A or equiv.)

1. Pipe cold and hot water to tappings #7 It is desirable to install unions external to the boiler in both the cold and hot water lines.

NOTE: If a separate hot water heater will be used to heat domestic water during the warmer months, please follow precautions for preventing corrosion, described in Section IX of this manual, "SUMMER OPERATION". Cold water must be piped separately to the electric water heater, not through the coil in the TARM boiler. COLD WATER MUST NOT FLOW THROUGH THE TARM DOMESTIC COIL IF THE TARM BOILER IS UNHEATED!!!

2. Install a Pressure Relief Valve (WATTS 3L, 125 psi) in a tee on the cold water supply to the tankless coil. There must be no shut-off valve or check valve between the relief valve and the tankless coil. THE RELIEF VALVE DISCHARGE LINE MUST BE PIPED TO WITHIN 6" OF THE FLOOR NEAR A DRAIN, AND MUST BE 3/4" PIPE WITH NO REDUCTION. IF THIS VALVE OPERATES, HOT WATER WILL BE DISCHARGED. IT SHOULD BE PIPED TO AN OPEN DRAIN, SO THAT THIS WATER WILL NOT DAMAGE THE ROOM IN WHICH THE BOILER IS LOCATED.

NOTE: TO PREVENT THE POSSIBILITY OF A PERSON SUSTAINING SERIOUS BURNS FROM DOMESTIC HOT WATER, A TEMPERING VALVE (WATTS 70A or equiv.) MUST BE INSTALLED TO PROTECT AGAINST DANGEROUSLY HIGH DOMESTIC WATER TEMPERATURES. Install this valve according to the manufacturer's instructions.



NOTE: In certain areas, existing water supplies may have a high mineral content. This will lead to liming of the coil over time, depending on the mineral content of the water and the amount of water passing through the coil. Coils should be cleaned as soon as there is any indication that the hot water supply is being restricted. Coils are cleaned with hydrochloric acid -- CLEANING THE COIL IS A DANGEROUS PROCEDURE THAT SHOULD BE ATTEMPTED ONLY BY A QUALIFIED AND EXPERIENCED PERSON.

## B. BOILER COLD-WATER FEED

You will need:

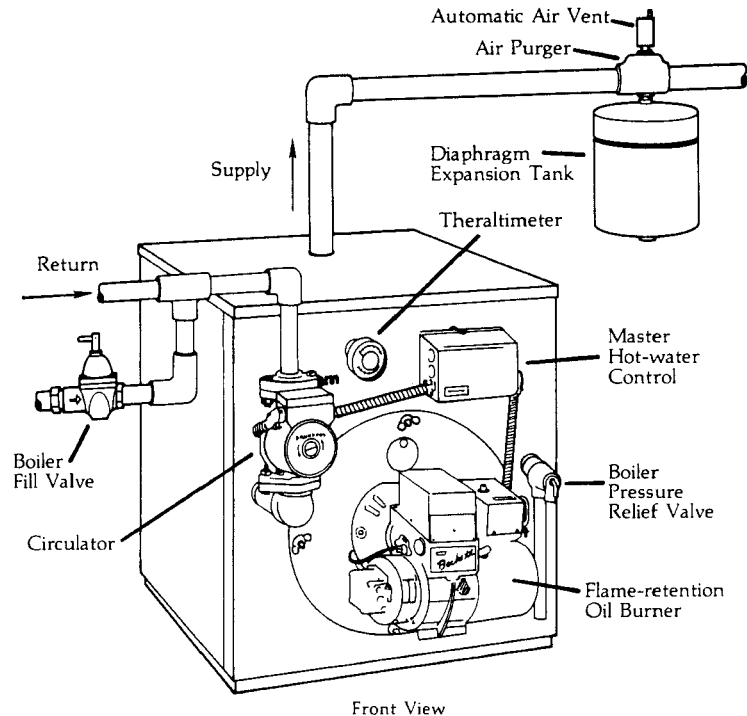
-Boiler fill valve (Watts S1156F x 1/2" or equiv.)

The boiler is filled initially and makeup water provided later when necessary by an automatic fill valve. This valve is set to fill the boiler to 12 psi when cold. Should the boiler later drop below this pressure at any time, the valve will automatically admit water as necessary to maintain 12 psi. NOTE: Because water expands when heated, the boiler pressure is normally above 12 psi (approx 20 psi at a boiler temp. of 180 deg F) when the boiler is in use.

The fill valve may be installed in the boiler return or supply line. If in the return line, plan on using a tee as close as possible to the return tapping; if on the supply line, air purgers are available with extra tappings to accommodate the fill line.

1. Pipe cold water through the fill valve to the boiler supply or return line.

NOTE: In some areas, a backflow preventer (Watts 9D or equiv.) is required by code. This valve must be installed on the cold-water side of the fill-valve, and not between fill valve and boiler.



Front View

## V. CONNECTION TO HEATING RADIATION

The TARM 900 Series boilers are compatible with any standard hydronic (forced hot water) heating system. They are designed for a maximum working pressure of 30 psi, making them suitable for use in buildings up to four stories high (with the boiler located in the basement).

Water returning from the heating system should be connected to the boiler at tapping #1, and tapping #2 supplies hot water to the system.

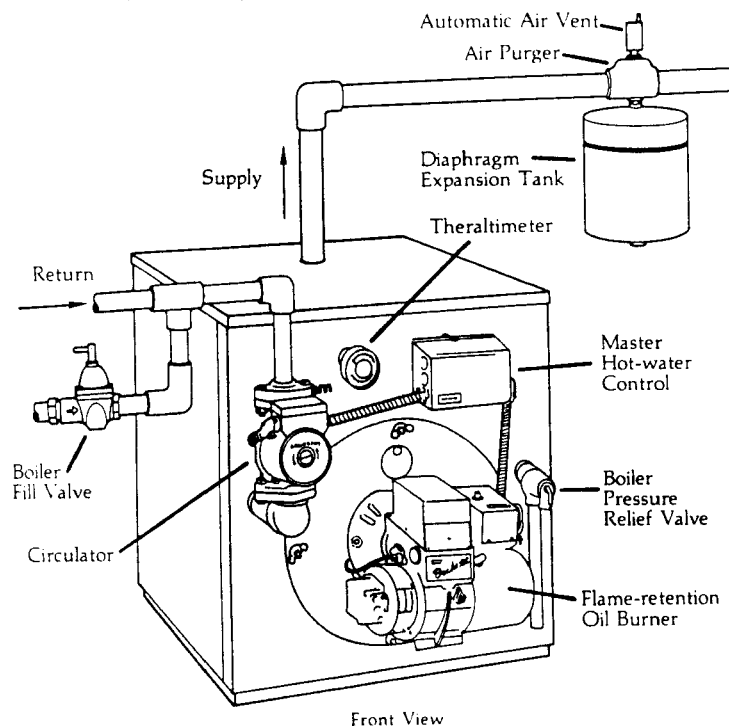
A. Air Purging and Venting - All installations should be equipped with an air purger/air vent combination installed horizontally in the supply line between boiler and all heating zones. The purger continuously removes air from the system, and the vent automatically releases this air from the purger.

B. Expansion - All hot-water heating systems require some method of compensating for the expansion of the water in the system as it is heated. The best of these is the modern diaphragm expansion tank, which, in comparison to the older overhead tanks, takes up less space, is easier to install, and does not require periodic draining to maintain its capacity. Air purgers are supplied with tappings on the bottom for easy mounting of diaphragm expansion tanks.

The table on the next page shows how to choose the correct expansion tank for a given heating system.

C. Circulator - When ordered with circulator, TARM 900 boilers are equipped with a Grundfos 15-42 three-speed pump. This pump has the same capacity as conventional circulators, yet uses as little as one-seventh the power. In addition, it may be set to run at three different speeds. The lower the speed, the lower the power consumption. Speed is set by the knob on one end of the junction box on the pump. The position marked by three lines is the fastest speed. For most one- and two-story installations in modern homes, the lower speeds will provide adequate circulation.

If the circulator is to be supplied from another source, we recommend the use of the Grundfos 15-42 as well.



# DETERMINING THE WATER CONTENT OF A RESIDENTIAL HYDRONIC SYSTEM (Not for use with commercial systems)

## Approximate Gallons of Water Per MBH Net Rating In Various Types of Systems

	Fin Tube Baseboard or Radiant Panels	Convectors or Unit Heaters	Large Cast Iron Radiators	Thin Tube Cast Iron Radiators	Cast Iron Baseboard
Series Loop	40	—	—	—	80
One Pipe	45	50	95	65	85
Two Pipe*	55	60	1.05	.75	95

Multiply the net MBH rating of the boiler by the appropriate factor above to get the **approximate** total gallon content of the system - which includes the boiler, the radiation and the **normal run** of piping. For extra-long runs of piping, use the table below to determine the water volume of these long runs. Then add this total to the water volume obtained using the table above.

The size of the expansion tank may be determined readily by knowing the gallon content, maximum design temperature, fill and relief pressures of the system as covered by the simplified sizing procedure that appears in Bulletin 117-E.

### Volume of Water in Pipe and Type L Tubing — Gallons Per Lineal Foot

SIZE	½	¾	1	1¼	1½	2	2½	3	4	5	6	8	10	12
Copper Tube	0.12	0.25	0.43	0.65	0.92	1.61	2.50	3.57	6.25	1.00	1.40	2.43	3.78	5.40
Steel Pipe	0.16	0.28	0.45	0.78	1.05	1.72	2.50	3.85	6.67	1.00	1.50	2.63	4.20	5.90

Please Note: This is presented as a guide only. There is no substitute for determining the actual volumes. When in doubt, the next larger size EXTROL\* will provide some cushion.

## SELECTION DATA

**EXTROL SIZING TABLE**  
FILL PRESS. 12 PSI      RELIEF PRESS. 30 PSI  
AVERAGE SYSTEM TEMP. 200°F

BOILER NET OUTPUT IN 1000's OF BTU/HR	TYPE OF RADIATION			
	Finned Tube Baseboard or Radiant Panel	Convectors or Unit Heaters	Radiators — Cast Iron	Baseboard Cast Iron
	25	15	15	15
50	15	15	30	30
75	30	30	30	60
100	30	30	60	60
125	30	60	60	90
150	30	60	90	90
175	60	60	SX-30	SX-30
200	60	60	SX-30	SX-30
250	60	90	SX-30	SX-40
300	90	SX-30	SX-30	SX-40
350	SX-30	SX-30	SX-40	SX-60
400	SX-30	SX-40	SX-40	SX-60

**EXTROL CAPACITY AT VARIOUS SYSTEM OPERATING TEMPERATURES**  
RELIEF PRESSURE 30° P.S.I. FILL TEMP. 40-70°  
AND FILL PRESSURE 12 P.S.I.

Average System Temp. °F	SYSTEM CONTENT IN GALLONS				
	Extrol Model 15	Extrol Model 30	Extrol Model 60	Extrol Model 90	Extrol Model SX-30
100	138	305	500	734	1102
110	101	232	380	557	835
120	80	183	300	440	660
130	65	149	244	358	537
140	54	125	204	298	447
150	47	106	174	256	384
160	40	92	150	220	330
170	34	78	128	187	280
180	30	68	111	163	245
190	26	60	98	144	216
200	23	52	86	126	189
210	21	48	78	114	171
220	19	43	71	103	155
230	17	39	64	94	141
240	16	35	58	86	129

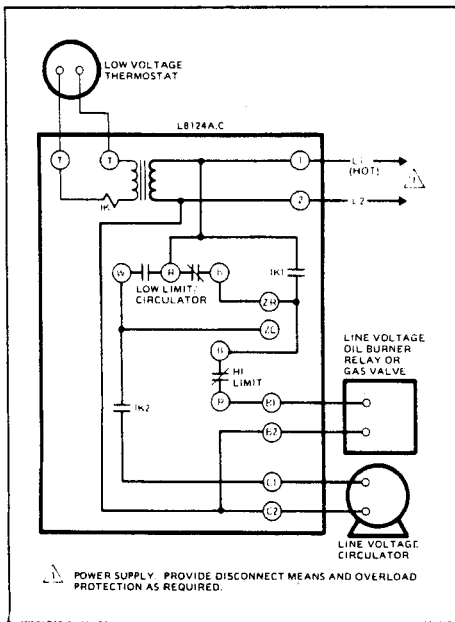
**VI. EXTERNAL WIRING**

All electrical work must conform with all local codes plus the requirements of the National Electrical Code. A separate 110 VAC 60 Hz 15 Amp circuit must be provided for the heating system, using fourteen gauge wire or larger. Power for the boiler itself is connected to L1 (hot) and L2 (neutral) on the Master Hot-Water Control.

For single zone systems, the only other wiring required is connection of the thermostat to T1 and T2 in the Master Hot-Water Control. For multi-zone systems, additional thermostats, relays and zone valves or circulators are required. The electrical schematic on the following page shows how additional zone relays are interconnected with the Master Hot-Water Control.

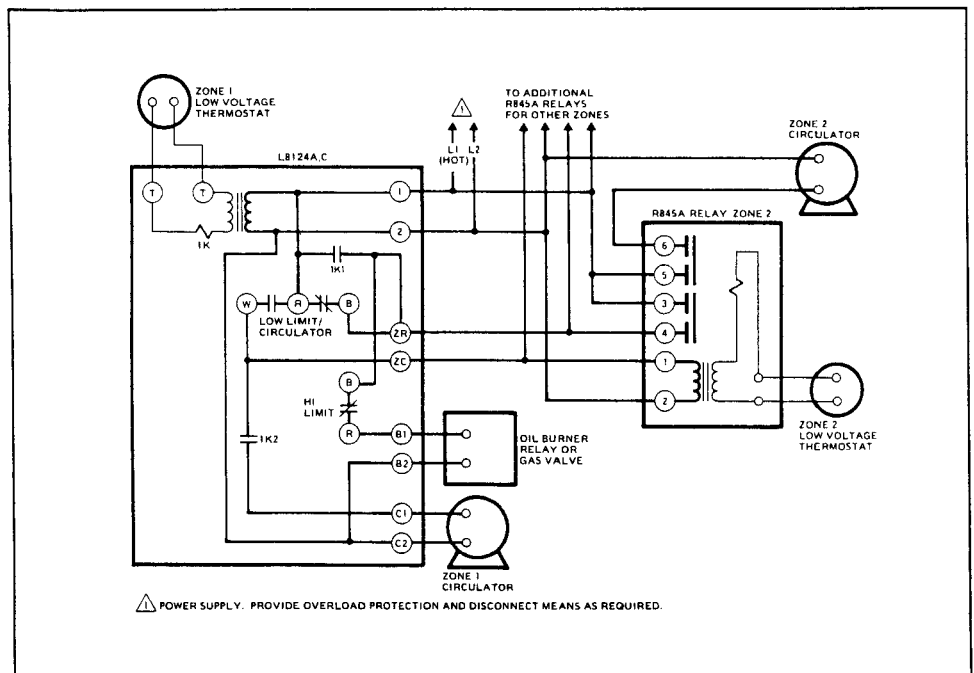
The master Hot-Water Control should be set as follows:

- HIGH LIMIT - 200 degrees F.
- LOW LIMIT - 180 degrees F.
- DIFFERENTIAL - 15 degrees F.



L8124A,C single zone connections and internal schematic.

**SINGLE ZONE**



L8124A,C multizone system with circulator connections and internal schematic.

**MULTI-ZONE**



VII. OIL BURNER

A. OIL SUPPLY

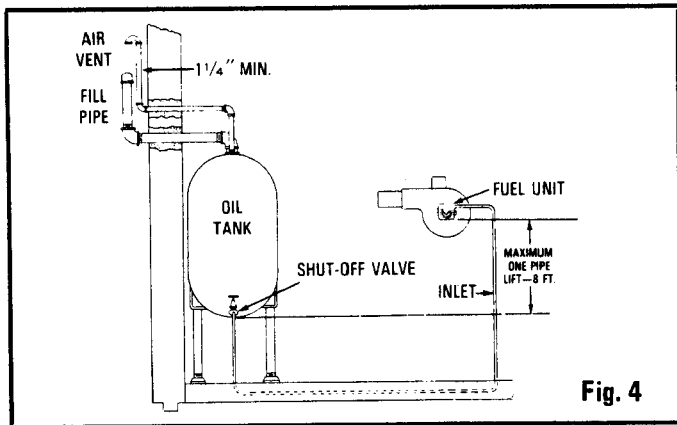
The Beckett AFG burner supplied with the boiler is equipped with a single-stage oil pump. This pump will handle the majority of tank installations. The pump is set up to operate with a one-pipe system. For two-pipe systems, follow the directions with the pump for conversion. The plug required for conversion is contained in a small plastic bag attached to the pump. The diagrams below show requirements for both one- and two-pipe systems.

B. ADJUSTMENT

To obtain the high combustion efficiencies possible with the TARM 900 boilers and to ensure stable operation, the burner must be adjusted by a qualified heating contractor with the use of Bacharach, Lynn, or other test equipment. At zero or a trace of smoke, the CO<sub>2</sub> should be between 12% and 13%. Stack temperature should be no lower than 250 deg. F net.

NOTE: If stack temperatures are below 250 deg. F net, check draft reading. If draft is .04 in/WG or better you can increase stack temperature by removing a few turbulators around the stainless steel combustion chamber. **STACK TEMPERATURES BELOW 250 DEGREES F NET CAN CAUSE CONDENSATION AND RESULT IN SERIOUS CORROSION OF THE BOILER VESSEL.**

**ONE-PIPE SYSTEM (Model A)**



The SUNDSTRAND MODEL "A"-70 FUEL UNIT may be installed ONE-PIPE with Gravity Feed or Lift.

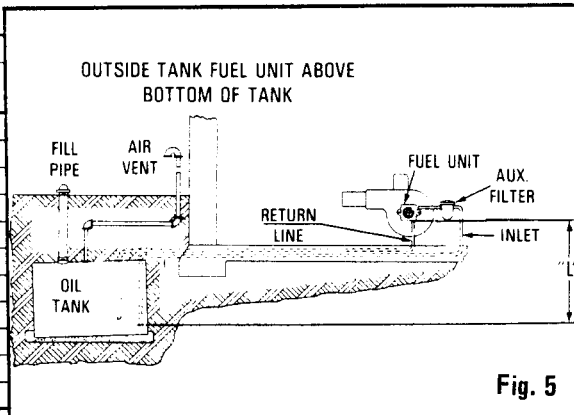
The maximum allowable lift is 8 ft. - See Figure 4.

**IMPORTANT:** One-pipe installations must be absolutely air tight or leaks or loss of prime may result. Bleed line and fuel unit completely. **Bleed for 15 seconds after last air is seen from easy flow to be certain lines are air free.**

**TWO-PIPE SYSTEM (Model A and B)**

**A SINGLE STAGE**

Lift "L" Fig 5	1725 RPM		3450 RPM	
	3/8" OD Tubing	1/2" OD Tubing	3/8" OD Tubing	1/2" OD Tubing
0'	65'	100'	53'	100'
1'	60'	100'	49'	100'
2'	54'	100'	45'	100'
3'	50'	100'	41'	100'
4'	45'	100'	37'	100'
5'	40'	100'	33'	100'
6'	35'	100'	29'	100'
7'	30'	100'	25'	99'
8'	25'	100'	21'	83'
9'	20'	83'	17'	68'
10'	16'	64'	13'	52'



**B TWO STAGE**

Lift "L" Fig 5	1725 RPM		3450 RPM	
	3/8" OD Tubing	1/2" OD Tubing	3/8" OD Tubing	1/2" OD Tubing
0'	100'	100'	68'	100'
2'	92'	100'	63'	100'
4'	85'	100'	58'	100'
6'	78'	100'	53'	100'
8'	70'	100'	48'	100'
10'	63'	100'	42'	100'
12'	56'	100'	37'	100'
14'	48'	100'	32'	100'
16'	40'	100'	27'	100'
18'	33'	100'	22'	88'

**ALWAYS TERMINATE RETURN LINE AS SHOWN IN FIG. 5  
LINE LENGTHS INCLUDE BOTH VERTICAL & HORIZONTAL LENGTHS**

## VIII. YEARLY CLEANING AND SERVICE

Your TARM 900 boiler should be cleaned and serviced on a yearly basis, preferably in late summer before the heating season. At this time, the burner nozzle should be replaced, the burner efficiency checked and the burner adjusted if necessary, and the boiler cleaned.

### A. Boiler Cleaning

1. Remove burner plate from boiler, taking care not to damage refractory liner or gasket. Removal of the oil line and the wiring harness from the burner will greatly facilitate removal.
2. Note the position of the turbulators around the heat exchanger. Slide combustion chamber from boiler and remove all turbulators from heat exchanger.
3. Brush down combustion chamber, turbulators, and the interior of the boiler. Remove soot with vacuum.
4. Remove smoke pipe and brush down.
5. Replace combustion chamber and reinstall turbulators. The turbulators are installed between, not within, the U-shaped sections welded to the inside of the heat exchanger. They should be pushed fully to the rear, and the tab on the visible end should cover the end of the adjacent U-shaped section. If the turbulators do not slide easily in between the combustion chamber and boiler, they must be installed before the chamber is replaced. If too loose to stay unsupported between the U-shaped sections, increase the amount of the bends in the turbulators.
6. Replace burner plate and reconnect oil line and wiring to burner.

## IX. SUMMER OPERATION - IMPORTANT INFORMATION for boilers to be shut down during warmer months or for any significant period of time!

In most installations, the TARM 900 boiler is used to provide hot water throughout the summer months. If, however, the boiler will be shut down and a separate water heater used to provide hot water, certain precautions must be taken to protect the boiler from corrosion during the humid summer months. These same precautions must be taken if the boiler is to be shut down for any other reason for any substantial period of time. This is because combustion of fuel oil invariably produces sulphur deposits in the boiler. When combined with moisture, these deposits produce sulphuric acid and other corrosive substances, which will corrode and drastically shorten the life of the boiler. Since summertime humidity will promote condensation, the following steps must be taken to minimize the formation of these corrosive acids:

At the end of the heating season, clean the boiler as described in Section VIII above. Do not replace the smoke pipe, but instead block it with newspaper; do not reconnect the smoke pipe to the boiler until the heating season begins in the fall. Then, to keep condensation from forming in the boiler, either suspend a 40W bulb inside the boiler (it can be dropped through the flue outlet) OR have the boiler drained for the summer. Boilers should be drained and refilled ONLY by a qualified plumber or heating contractor.

**BECAUSE FAILURE TO TAKE THESE STEPS CAN CAUSE PREMATURE CORROSION IN YOUR BOILER, YOU MUST FOLLOW THE ABOVE PROCEDURE OR YOUR WARRANTY WILL BE VOIDED!**

## X. TROUBLESHOOTING

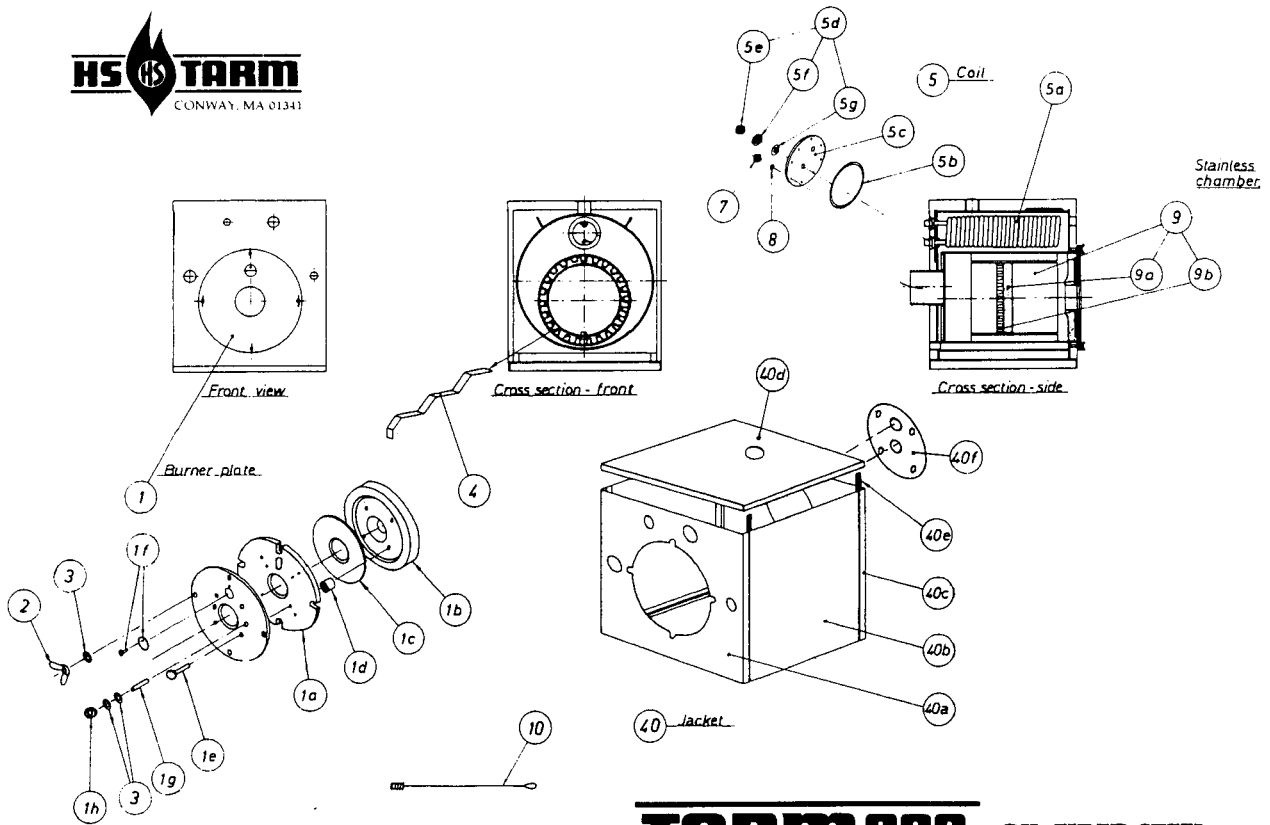
Although many heating system repairs are beyond the ability of the average homeowner to diagnose and correct, the LARGEST number of service calls are due to simple and easy-to-correct problems. The following information concerns diagnosing and fixing these problems.

### A. No heat in house.

First, check the temperature gauge on your boiler to see if the boiler is at 160 deg F or greater. If not, proceed to "B", below. If so, then check to see if your thermostats are turned up. If they are, you need a serviceman.

### B. Boiler not up to temperature.

- Is there oil in your tank? If you are out of oil, have the delivery man restart the burner for you when he comes to fill the tank.
- Is your heating system emergency switch turned on? (This is generally located at the top of the basement stairs, and has a red switchplate.)
- Is the main circuit breaker for the heating system turned on? If not, reset the breaker. If it pops open again, do not reset again, and call an electrician.
- Is the service switch on the boiler turned on?
- If none of the above, the burner primary control may be locked out on reset. This control shuts down the burner if the burner flame goes out for any reason during operation. Try pressing the red button on top of the oil burner. If the burner attempts to start, and then, after one minute, turns off again, call a serviceman and do not press button again! If the burner starts and stays on, get the burner checked and adjusted by a serviceman as soon as possible.



# TARM 900 SERIES

## OIL-FIRED STEEL HOT-WATER BOILER

### TARM 900 SERIES OIL-FIRED BOILER SPARE PARTS LIST

DIAG. REF.#	ORDER #	DESCRIPTION	QUANTITY PER MODEL	
			902	903
1	21.3209	BURNER PLATE COMPLETE (T900)	1	1
1a	07.0140	BURNER PLATE GASKET (T900)	1	1
1b	06.1017	BURNER PLATE REFRACTORY (T900)	1	1
1c	09.0052	BURNER PLATE INSULATION (T900)	1	1
1d	04.0014	BURNER PLATE SPACER (T900)	4	4
1e	05.1015	BURNER PLATE SET SCREW (T900)	4	4
1f	15.0013	OBSERVATION PLATE W/SCREW (T900)	1	1
1g	05.3030	STUD M10X30	2	2
1h	05.6005	NUT M10	2	2
2	05.6025	WING NUT M10	4	4
3	05.7005	WASHER M10	8	8
4	03.7032	TURBULATOR (T902)	23	
4	03.7033	TURBULATOR (T903)		46
5	21.9612	COIL COMPLETE (T900)	1	1
5a	21.9600	TANKLESS COIL ONLY (T900)	1	1
5b	07.0025	COIL PLATE GASKET O.D=7.5	1	1
5c	21.9613	COIL PLATE (T900)	1	1
5d	21.9604	COIL FITTING ASSMBY COMP. P=3	2	2
5e	04.0096	NUT 3/4" FOR COIL	2	2
5f	04.0097	BEVELED WASHER FOR COIL	2	2
5g	04.0098	O-RING F/COIL ASSMBLY	2	2
7	05.6007	NUT M12	8	8
8	15.0018	WASHER FOR COIL PLATE (T900)	8	8
9	21.8750	S.S. COMBUSTION CHAMBER COMP. (T902)	1	
9	21.8751	S.S. COMBUSTION CHAMBER COMP. (T903)		1
9a	21.8866	BURNER TARGET (T900)	1	1
9b	09.0053	BURNER TARGET INSULATION	1	1
10	21.0215	CLEANING BRUSH (T900)	1	1
40	21.3696	JACKET COMPLETE (T902)	1	
40	21.3695	JACKET COMPLETE (T903)		1
40a	21.3697	JACKET FRONT PANEL (T900)	1	1
40b	21.3698	JACKET SIDE PANEL (T902)	2	
40b	21.3694	JACKET SIDE PANEL (T903)		2
40c	21.3699	JACKET REAR PANEL (T900)	1	1
40d	21.3700	JACKET TOP PANEL (T902)	1	
40d	21.3693	JACKET TOP PANEL (T903)		1
40e	03.0352	JACKET ZIP STRIP (T900)	4	4
40f	21.3701	JACKET COIL PLATE (T900)	1	1

DP4:900SPL.DPS