CARAVAN
Cast-iron modular boilers for commercial heating applications

LOWER FIRST COST.
SIGNIFICANT FUEL SAVINGS.
SIMPLIFIED FLEXIBLE INSTALLATION.
BUILT-IN STANDBY.

Slant/Fin is an ISO 9001:2000 Certified Company
Caravan modular boilers — the smart way to heat your building

CARAVAN CAST-IRON MODULAR BOILER SYSTEMS

280,000 to multi-million Btuh input
Hot water and steam
Gas, oil, power gas and dual-fuel
Working pressure to 100 psi
Combustion efficiency to 83.0% for gas; 85.9% for oil

APPLICATIONS
• Space heating
• Domestic hot water
• Snow melting
• Closed loop process applications

TYPICAL INSTALLATIONS
• Office buildings
• Apartments
• Hospitals
• Schools
• Municipal buildings
• Industrial facilities

Caravan modular boilers provide reliable heating in thousands of commercial, institutional and residential buildings. They are chosen by mechanical engineers, heating contractors and building owners for their fuel savings, ease of installation, long life, built-in backup and low maintenance requirements. A Caravan system, consisting of two or more compact boilers installed in series, offers significant advantages over single input boilers. A Caravan system can be designed to meet needs for hot water or steam space heating, domestic hot water, snow melting or process applications. It can provide heating for in-floor radiant systems as well as traditional fin-tube or standing radiators.

Why engineers, building owners and heating professionals choose Caravan modular boilers
• Step-firing saves fuel — boiler “size” changes to closely match boiler output to heating demand
• Boiler modules may be installed virtually anywhere in your building -- even on the roof
• Lower installed cost, easier to service, than large single input boilers
• Cast-iron heat exchangers provide long life, reliable performance
• Built-in standby
• Advanced microprocessor controls optimize energy savings
• Slant/Fin technical support is just a phone call away; specification details available online

Caravan modular boilers — the smart way to heat your building

CARAVAN
America’s modular boiler leader.
• Better technology
• Stronger support
Caravan modular boilers “step-fire” to use less fuel than a single big boiler.

- Step firing matches boiler output to load
- Reduces fuel bills by 20 to 40%
- Microprocessor controls monitor conditions, determine Caravan firing mode
- Wasteful “short cycling” eliminated

Why “step-firing” saves fuel
A boiler operates most efficiently when its capacity is being fully utilized to provide heat or hot water. Just as a car attains the best fuel economy cruising, rather than stop and go, a large boiler wastes fuel when it repeatedly starts and stops to meet a load smaller than its capacity. “Short cycling” repeatedly uses wasteful start-up fuel to heat up the entire boiler mass just to run for a short period of time.

A typical single boiler’s full output is generally needed for less than 10% of the year, when the coldest weather occurs. The rest of the time it wastes fuel because it fires at full capacity to meet a partial load. For much of the year, a single large boiler operates at less than 50% efficiency.

Assembled in banks of two to ten, Caravan modules are step-fired, one at a time, as needed. As energy demands vary day to day and season to season, Caravan modulates system output to provide just the right amount of heat to meet the demand, reducing fuel bills by 20 to 40%. Each module’s full capacity is utilized, and run time maximized, before the next module is energized. Running at full load maximizes efficiency because there is longer “on” time, eliminating fuel wasting short cycling.

Advanced controls optimize energy savings, maintain better comfort.
Caravan microprocessor system controls monitor the outside air temperature and the temperature of the water circulating through the building’s heating system. As the outside temperature rises or falls, the Caravan system responds by lowering or increasing the system’s water temperature. It automatically fires additional modules to meet demand or turns them off as demand decreases. A more constant water temperature is maintained throughout the heating system, providing a better, more consistent level of comfort for the occupants. Additional information about Caravan control packages appears on page 8.
Caravan systems are simple to install; keep costs low

- Modules can be hand trucked through existing doors
- Lower floor load per square foot
- Heating plant may be located virtually anywhere
- Fewer components for on-site assembly
- Meets redundancy requirements

Reduced installation logistics save time and money

For old or new buildings, fully assembled Caravan modules can be hand trucked through normal doorways, right into the boiler room. No cranes or special rigging are required.

For new buildings there is no need to plan construction around early installation of your boiler or purchase equipment before it’s necessary. For replacements, it’s often not even necessary to remove the old boiler.

The load per square foot of Caravan modules is less and the boiler room’s overall dimensions, including ceiling height can be smaller. With Caravan, your heating plant may be located virtually anywhere, even on the roof. And no special sound absorbing materials are required.

Caravan modular boilers meet redundancy requirements with significant savings. When single input boilers are chosen for these installations, code will typically require two boilers, each with capacity equal to 70% of the load. Caravan modular boiler systems meet requirements for boiler redundancy without the cost and “wasted” over-capacity of installing an additional single input boiler for back-up purposes. Having built-in backup, just the right number of Caravan modules can be installed to total 100% of the load, not 140% or more, as with single input boilers.

Modular boilers leave fewer components for on-site assembly

Because each Caravan module is fully assembled at the factory, less labor is required for installation. When a large single input boiler is installed in an existing building, it is usually supplied “knocked down” and must be assembled on site. There may be numerous parts: push nipples, draw rods, controls, nuts, bolts, etc. With Caravan, there’s much less risk of missing pieces or complications.

Typical layouts for gas-fired Caravan module systems
Building managers appreciate Caravan’s big boiler heating capacity, small boiler simplicity

- Simple, conventional controls
- Easy service access
- Specialized service technicians not required
- Operating engineer is not required
- By its nature, a redundant system, with built-in backup

**Servicing is convenient and economical**

Caravan modules utilize simple, conventional controls proven reliable in hundreds of thousands of installations. Most heating contractors are familiar with Caravan’s uncomplicated combustion technology. Gas models utilize simple atmospheric burners that are reliable and virtually maintenance free. Oil models use heavy-duty residential type burners. Heating contractors can easily install and service Caravan modular boiler systems. Unlike boilers that require sophisticated service technicians and expensive service contracts, Caravan systems don’t require specialized servicing or hard to get replacement parts. You save money and reduce the risk of down time.

Individually jacketed modules have easy service access. Rear access is not required. For oil modules, virtually 100% of the heat exchanger surfaces are accessible for flue brush cleaning from the top of the boiler.

**Maintenance costs are reduced**

A Caravan modular boiler system will save you many costs associated with owning a single input boiler: contracts for service by highly skilled technicians; costly proprietary parts that may need to be shipped from the manufacturer; more complex routine maintenance. Caravan’s operating costs are lower, too, because an on-site operating engineer is not required.

**Factory warranty**

Each Caravan water boiler module is protected under a factory five year limited warranty. Steam boilers carry a one year warranty.

**Built-in backup**

Heating specifications for schools, nursing homes and hospitals often require boiler redundancy to ensure uninterrupted heating in the event of equipment failure. A Caravan modular system is by its nature, a redundant system. If one boiler module should develop a problem, the others will continue to operate and meet most, if not all, of the required load.

**Less down time for emergency replacements of old boilers**

Many Slant/Fin boiler wholesalers keep Caravan modules in stock, ready for emergency replacements. A Caravan modular boiler system permits the fastest restoration of building heat. Factory assembled boiler modules with prefabricated headers can be installed and piped in hours.

**As quiet as it is economical**

The burners in individual Caravan modules are much smaller and quieter than a large boiler’s power burner. Acoustical insulation is not required. Your boiler room will be quieter and your building’s occupants happier.
Robust design for long life in demanding commercial applications

- Long life cast-iron heat exchangers
- Reliable metal push nipples join boiler sections
- Wet base design for oil, power gas and dual-fuel models
- Repetitive factory testing
- ISO 9001: 2000 certified manufacturing

Designed for high performance

All Caravan boilers are manufactured with quality cast-iron heat exchangers. Cast iron is recognized for its long life and durability compared to boilers made of steel, copper tube or other less durable materials. Oil, power gas and dual-fuel models are optimized for their specialized service with long lasting wet base sections, not dry base chambers which are prone to burn out. Individual Caravan boiler modules are designed and manufactured to provide years of trouble-free, heavy-duty service. Hot water models are available for working pressure to 100 psi to meet high rise and other large system requirements.

Advanced design cast-iron heat exchangers are both efficient and robust. The pattern of specially tapered thermal pins and consistent casting wall thickness ensure uniform heat transfer, reduced thermal strain and prolonged casting life.

Caravan outperforms other modular boiler brands

Compared with other modular boiler brands, Caravan's design and selection offer more ways to keep costs down and improve performance.
- 399 MBH gas module provides maximum output under modular boiler classification.
- Smaller footprint per modular boiler system. Takes less floor space.
- Fewer modules for most installations.
- Vertical section heat exchanger design for best performance.
- Individual designs for gas and oil modules.
- Lower draft hood height
- More standard accessories, including control header, spill switch and factory installed rollout switch.
- Greater system design freedom
- Limited 5-year warranty

Extensive documentation and system design information, including diagrams in pdf and CAD format, are available for download on the Slant/Fin website, www.slantfin.com.
Built for heavy duty heating applications

Cast-iron heat exchanger sections are machined by computer controlled equipment to extremely fine tolerances (measured in the thousandths of an inch). Individual sections are pressure tested at 2 1/2 times rated working pressure and are joined with all metal push nipples that expand and contract with the individual boiler sections that they join. (The rubber gaskets used in ordinary boilers are subject to deterioration and leaks, especially when anti-freeze or other chemicals are added to the boiler water.) The Caravan fully assembled heat exchanger is again pressure tested at 1-1/2 times rated working pressure. Separate factory quality tests ensure the reliability of each module’s electrical system, valves, wiring and accessories. Even the boiler jackets are extra heavy gauge, finished with a tough epoxy enamel finish to help keep the completed installation neat and attractive.

Only the finest commercial duty components go into each boiler. All Caravan systems include a prefabricated control header and may be customized with system-enhancing options such as advanced microprocessor control packages, supply and return headers, external tankless coil heaters, brazed plate heat exchangers and indirect fired storage water heaters.

Manufacturing is performed under strict quality control standards that have earned Slant/Fin prestigious ISO 9001: 2000 certification.

Caravan oil-fired, power gas and dual-fuel models meet unique demands

Caravan LD-Series modules are uniquely engineered to optimize performance in oil-fired, power gas and dual fuel applications. They are designed to perform reliably and minimize the time required for routine maintenance.

Reliable wet base design
Boiler sections are filled with water, including the sides, bottom and back of the combustion area. Combustion is safe, efficient and stable.

Low draft loss for more robust operation
LD-Series’ extra wide flue passage design ensures very low draft loss and uniform heat transfer. Push nipple ports are offset to leave an unobstructed flue path. Setup is easier and performance is protected against changes in operating conditions, such as colder oil, freezing air and fluctuating draft.

Simple to clean
A labor saving split-top jacket and easy-off flue collector provide wide open access to all heat exchanger surfaces. With no interference from push nipple ports, short, 10-inch flue brush strokes reach virtually all flue passageways for easy cleaning. A swing-open burner door provides wide access for vacuum cleaning.

Installer friendly
Burners are all combustion-tested at the factory. Only minimal field adjustments are required to attain optimal combustion. Up front supply and return tappings provide easy access for installation and service. With no rear clearance required for piping, the boilers can be located closer to the wall.

Slant/Fin Caravan — longer lasting, safer and more reliable by design

Dry base design VS. Slant/Fin Wet base design

- Combustion chamber is made of refractory material and sheet metal.
- Chamber door is lightweight steel plate held with 4 bolts.
- Heat escapes through the thin steel combustion area wall.
- Worn out combustion chamber is a fire hazard.
- Water content: under 8 gal.

- Boiler sections are filled with water, including the sides, bottom and back of the combustion area.
- Burner door is cast iron, weighs 32 lbs., and has a heavy refractory lining; swings open.
- Heat transfer area on top, bottom, sides and rear of flame.
- Safe, stable combustion
- Vertical sections are easy to clean
- Water content: 22.6 gal.
Controls and accessories for Caravan modular boiler systems

SYSTEM CONTROLS

SC-Series controls for Caravan modular boilers optimize performance and save energy for small or large systems.

Slant/Fin SC-Series microprocessor controls maximize fuel savings of your Caravan modular boiler system while optimizing building comfort. The SC controls apply sophisticated computer logic to finely tune modular boiler operation to use the least amount of fuel and provide a more constant comfort level in the living areas of your building. Yet, they are easy to install and maintain.

Not only do these "smart" SC-Series controls adjust supply water temperature based on outdoor and indoor air temperature, they actually anticipate future needs through computer logic. The controller then fires the right number of modules to maintain building comfort. The SC-Series controllers are designed for use in a broad range of modular boiler applications.

“Installer friendly”. You enter simple parameters; the controller makes the calculations.

By simply entering job parameters, the controller automatically calculates setpoint, reset ratio and control band. Programming options include outdoor reset, setpoint operation and warm weather shutdown. The firing sequence mode may be selected for equal run time rotation, fixed lead or fixed last.

Slant/Fin supports you with detailed documentation and technical services.

Local Slant/Fin representatives and distributors, plus the factory’s own technical services staff, are available to assist you with equipment selection and system specification, application guidance and troubleshooting advice.

SC-Series control features

- Step-fire boiler modules using computer logic
- Maximize fuel savings
- Monitor outdoor conditions to determine boiler water temperature
- Integrate control of space heating and domestic hot water
- Interface with building automation system
- Designed specifically for Slant/Fin Caravan gas, oil-fired or dual-fuel modular boiler systems
- Lead/lag equalizes equipment wear
- Easy to program
- Detailed, user-friendly documentation and high calibre factory support

Model SC-3 Three stage operation. Space heating only.
Model SC-9 Nine stage operation. Space heating, domestic water or combination
Virtually any domestic hot water requirement can be met with Caravan modular boilers. Just as with space heating, individual modules can be step fired to economically match output to load. Hotels, for instance, which experience periods of peak demand for hot water, benefit by being able to produce ample hot water most of the day utilizing less than full capacity.

When a facility's boiler is providing both space heating and domestic hot water, significant summertime savings are realized with Caravan modular boilers. A large single input boiler is oversized and wastes fuel when it is fired up just to meet the domestic water load.

Caravan's supply water may be directed to a variety of hot water generators, including indirect fired units and external tankless heaters. Slant/Fin's BP Series brazed plate heat exchangers offer significant advantages:

- A fraction of the size and cost of shell and tube heat exchangers or separately fired water heaters.
- Up to 1232 gallons per hour, 450 psig working pressure.
- Lower installed cost.
- Just 25% the size and half the pressure drop of copper coil heaters.

DOMESTIC HOT WATER HEAT EXCHANGERS

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TYPICAL CARAVAN MODULAR BOILER SYSTEM WITH TWO MODULES FOR DOMESTIC HOT WATER

PREFabricated headers speed hot water supply and return piping. Error compensating design, including telescopic sections and flex-joint couplings, helps compensate for misalignment problems.

- Available in 2 and 3-module lengths. Use in combination to serve a full bank of modules.
- Latch and hinge couplings. One-wrench installation.
- Set includes separate supply and return header sections plus all nipples, couplings, fittings and unions needed to connect headers to boilers.
### Gas-Fired Hot Water Models

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* Specify gas by name, “Natural” or “Propane”.
† Net ratings are based on a piping and pick-up allowance of 1.15 for hot water and various IBR pick-up and piping allowances for steam. Slant/Fin should be consulted before selecting a boiler for installations having unusual piping and pick-up requirements. Ratings must be reduced by 4% at 2,000 feet elevation and an additional 4% for every additional 1,000 feet elevation over 2,000 feet.
‡ Net ratings in square feet based on emission rate of 150 Btuh/sq.ft.
§ Based on 240 Btuh per square foot E.D.R. at 215°F steam temperature.
¢ For use with natural gas. For Propane (L.P.) gas consult factory.
NOTES:
1. Many state and local codes require intermittent ignition devices for gas boilers. Please specify if necessary.
2. FOR LARGER SIZES, USE MULTIPLES OF THE ABOVE. Modules in excess of those shown above should be piped in parallel in two or more batteries.
FOR COMPLETE SPECIFICATIONS, REFER TO CARAVAN APPLICATION GUIDES AND ENGINEERING BULLETINS.
# SPECIFICATIONS

## Oil-Fired Hot Water Models

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Firing Rate (GPH)*</th>
<th>Input (MBH)</th>
<th>Gross Output (MBH)</th>
<th>Net Output (MBH)</th>
<th>E.D.R (Sq. Ft.)</th>
<th>Heating Modules</th>
<th>I=B=R Combust. Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZD-600-2-5</td>
<td>4.30</td>
<td>60.0</td>
<td>500</td>
<td>435</td>
<td>2900</td>
<td>2</td>
<td>85.9</td>
</tr>
<tr>
<td>LZD-750-2-6</td>
<td>5.20</td>
<td>72.0</td>
<td>596</td>
<td>518</td>
<td>3453</td>
<td>2</td>
<td>85.9</td>
</tr>
<tr>
<td>LZD-850-2-7</td>
<td>6.00</td>
<td>84.0</td>
<td>684</td>
<td>595</td>
<td>3967</td>
<td>2</td>
<td>85.5</td>
</tr>
<tr>
<td>LZO-900-3-5</td>
<td>6.40</td>
<td>89.6</td>
<td>750</td>
<td>652</td>
<td>4347</td>
<td>3</td>
<td>85.9</td>
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<tr>
<td>LZO-1100-3-6</td>
<td>7.80</td>
<td>109.2</td>
<td>894</td>
<td>777</td>
<td>5180</td>
<td>3</td>
<td>85.8</td>
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<tr>
<td>LZO-1300-3-7</td>
<td>9.00</td>
<td>126.0</td>
<td>1026</td>
<td>892</td>
<td>5947</td>
<td>3</td>
<td>85.5</td>
</tr>
<tr>
<td>LZO-1700-4-7</td>
<td>12.00</td>
<td>168.0</td>
<td>1368</td>
<td>1190</td>
<td>7933</td>
<td>4</td>
<td>85.5</td>
</tr>
<tr>
<td>LZO-2100-5-7</td>
<td>15.00</td>
<td>210.0</td>
<td>1710</td>
<td>1487</td>
<td>9913</td>
<td>5</td>
<td>85.5</td>
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<tr>
<td>LZO-2500-6-7</td>
<td>18.00</td>
<td>252.0</td>
<td>2052</td>
<td>1784</td>
<td>11893</td>
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<tr>
<td>LZO-2900-7-7</td>
<td>21.00</td>
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<td>2394</td>
<td>2082</td>
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<td>LZO-3400-8-7</td>
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<td>85.5</td>
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</table>

## Dual Fuel Hot Water Models

<table>
<thead>
<tr>
<th>Model No.</th>
<th>No. of Htg. Mods.</th>
<th>I=B=R GAS</th>
<th>I=B=R OIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LWD-600-2-5</td>
<td>2</td>
<td>620</td>
<td>500</td>
</tr>
<tr>
<td>LWD-750-2-6</td>
<td>2</td>
<td>750</td>
<td>596</td>
</tr>
<tr>
<td>LWD-850-2-7</td>
<td>2</td>
<td>800</td>
<td>684</td>
</tr>
<tr>
<td>LWD-900-3-5</td>
<td>3</td>
<td>930</td>
<td>750</td>
</tr>
<tr>
<td>LWD-1100-3-6</td>
<td>3</td>
<td>1125</td>
<td>894</td>
</tr>
<tr>
<td>LWD-1300-3-7</td>
<td>3</td>
<td>1200</td>
<td>933</td>
</tr>
<tr>
<td>LWD-1700-4-7</td>
<td>4</td>
<td>1600</td>
<td>1368</td>
</tr>
<tr>
<td>LWD-2100-5-7</td>
<td>5</td>
<td>2100</td>
<td>1710</td>
</tr>
</tbody>
</table>

## Dual Fuel Steam Models

<table>
<thead>
<tr>
<th>Model No.</th>
<th>No. of Htg. Mods.</th>
<th>I=B=R GAS</th>
<th>I=B=R OIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZD-600-2-5</td>
<td>2</td>
<td>620</td>
<td>500</td>
</tr>
<tr>
<td>LZD-750-2-6</td>
<td>2</td>
<td>750</td>
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<td>LZD-850-2-7</td>
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<td>LZD-900-3-5</td>
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<td>1368</td>
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<tr>
<td>LWD-2100-5-7</td>
<td>5</td>
<td>2100</td>
<td>1710</td>
</tr>
</tbody>
</table>

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- * Light oil, 140,000 Btu per gallon.
- † Net ratings are based on a piping and pick-up allowance of 1.15 for hot water and various IBR pick-up and piping allowances for steam. Slant/Fin should be consulted before selecting a boiler for installations having unusual piping and pick-up requirements.
- § Based on 150 Btu per square foot E.D.R at 170°F water temperature.
- ‡ Based on 240 Btu per square foot E.D.R at 215°F steam temperature.

**NOTES:**
1. Many state and local codes require intermittent ignition devices for gas boilers. Please specify if necessary.
2. FOR LARGER SIZES, USE MULTIPLES OF THE ABOVE. Modules in excess of those listed should be piped in parallel in two or more batteries.

FOR COMPLETE SPECIFICATIONS, REFER TO CARAVAN APPLICATION GUIDES AND ENGINEERING BULLETINS.
We'll help you make the right design choices, accelerate job planning and speed job completion.

With the experience of thousands of modular boiler installations, Slant/Fin sales and technical service representatives can help you make the optimal choices in system design and product specification. And our knowledge doesn’t stop with the boilers. As a leading multi-product hydronic heating manufacturer, you benefit from our “total system” perspective. We can help you develop a fully integrated system that can include modular boilers, fin-tube, baseboard, fan coils, radiant heating, snow melting and domestic hot water.

Contact your Slant/Fin rep early in your planning process. They can assist in developing the best specifications, securing the equipment and coordinating each step of the job through to a successful start-up.

Our documentation supports your job planning

When you know the system that’s right for you, we can help you generate detailed job documentation, including:
- Boiler room layout
- Water piping diagrams
- Gas pipe specification and diagram
- Breaching configuration
- Control package descriptions
- Wiring diagrams

Specifier resources online

A comprehensive library of ratings information, piping diagrams and wiring schematics are available at the Slant/Fin website. Go to www.slantfin.com