

# Specifications

## ENGINE SPECIFICATIONS

Engine	TK 3.66
Type of Fuel	No. 2 Diesel fuel under normal conditions No. 1 Diesel fuel is acceptable cold weather fuel
Oil Capacity: Crankcase & oil filter	10 quarts (9.5 liters)
Fill to full mark on dipstick.	
Oil Type	API Type CD-SD
Oil Viscosity*	Above 80 F (27 C): SAE 40 50 to 90 F (10 to 32 C): SAE 30 20 to 70 F (7 to 21 C) SAE 20-20W -15 to 40 F (-26 to 4 C) SAE 10W Below 0 F (-18 C) continuously SAE 5W
Engine rpm: High Speed	2350-2450 rpm
Low Speed	1550-1650 rpm
Engine Oil Pressure	35-60 psi (241-414 kPa)
Intake Valve Clearance	.0079 in. (0.20 mm)
Exhaust Valve Clearance	.0079 in. (0.20 mm)
Valve Setting Temperature	Room temperature
Timing Injection Pump	14° BTDC
Injection Nozzle Pressure	1700 psi (11722 kPa)
Low Oil Pressure Switch (normally closed)	10 ± 3 psi (69 ± 21 kPa)
High Coolant Temperature Switch	Opens: 205 F (96 C) min. Closes: 235 ± 5 F (112.8 ± 2.8 C)
Engine Thermostat	180 F (82.2 C)
Cooling System Capacity	4 quarts (3.78 litre) with overflow tank
Radiator Cap	7 psi (48 kPa)

*\*Multi-viscosity weight oil with the recommended API classification may be used based on the ambient temperature and straight weight viscosity recommendations above. The above recommendations are written for mineral oil based lubricants.*

## REFRIGERATION SPECIFICATIONS R-12 REFRIGERATION SYSTEM

Compressor	D214
Refrigerant Charge	9.0 lb (4.09 kg) R-12
Compressor Oil Charge	66 oz (1.95 litre)
Compressor Oil Type	Synthetic type 67-404
Suction Pressure Regulator Setting	18 psi (124 kPa)
Heat/Defrost Method — Engine operation	Hot gas
Electric operation	Hot gas (model 25) Hot gas & electric heater strips (model 50)
High Pressure: Cutout	300 to 325 psi (2068 to 2241 kPa)
Cutin	180 to 220 psi (1241 to 1517 kPa)
Defrost Termination Switch	Opens: 49 F (9.4 C) Closes: 37 F (2.8 C)



Electric Heater Strips:	
Number	3
Watts (each)	750
High Temperature Cutout Switch	Opens 150 $\pm$ 5 F (66 $\pm$ 3 C)
	Closes 120 $\pm$ 5 F (49 $\pm$ 3 C)
Unit Full Load Amps	24.2 amps @230V
	12.1 amps @460V

**STANDBY POWER REQUIREMENTS**

Supply Circuit Breaker	30 amp/230V
	20 amp/460V
Extension Cord Size	Up to 50 ft - 12 gauge
	75 ft - 10 gauge

**AIR SWITCH**

Air Switch Setting	0.65 to 0.75 in. (15.51 to 19.05 mm) water
Defrost Timer	Standard 4 hr. interval

**THERMOSTAT**

Type	Solid state THERMOGUARD IV thermostat
Dial Range	-20 to +80 F (-27 to +27 C)
Heat Lockout: Continuous Run Operation	High Speed Heat locked out below 15 $\pm$ 3 F (-9.5 $\pm$ 1.7 C)
	All heat locked out below 15 $\pm$ 3 F (-9.5 $\pm$ 1.7 C)
CYCLE-SENTRY Operation (optional equipment)	All heat locked out below 15 $\pm$ 3 F (-9.5 $\pm$ 1.7 C)
Electric Standby Operation (optional equipment)	All heat locked out below 15 $\pm$ 3 F (-9.5 $\pm$ 1.7 C)

# Unit Description

The MD-II is a one-piece, diesel powered, temperature control unit designed especially for straight trucks. The unit mounts on the front of a truck with the evaporator portion protruding into the box. There are three basic models:

- MD-II 25: Cooling and hot gas heating on engine operation and electric standby
- MD-II 30: Cooling and hot gas heating on engine operation
- MD-II 50: Cooling and hot gas heating on engine operation and electric standby, plus electric evaporator heaters on electric standby

Power is provided by the TK 3.66 3-cylinder, water-cooled, diesel engine rated at 11.2 continuous horsepower at 2400 rpm. A belt drive system transfers energy to the compressor, unit fans and alternator.

Electric standby power (models 25 & 50) is provided by a 5 horsepower electric motor. A clutch mounted on the diesel engine isolates the engine during electric standby operation.

The clutch engages fully at  $450 \pm 50$  rpm on engine operation, constantly turning the compressor and fans during high and low speed.

## Thermo King D214 Compressor

The MD-II unit features a Thermo King D214, two-cylinder compressor with  $13.92 \text{ in.}^3$  ( $228 \text{ cm}^3$ ) displacement.

## THERMOGUARD IV Solid State Thermostat

Accurate temperature control of the cargo area is provided by a solid state electronic thermostat with a return air sensor. When the thermostat is set below  $15 \pm 3 \text{ F}$  ( $-10 \pm 1.5 \text{ C}$ ), the thermostat locks out High Speed Heat.

## CYCLE-SENTRY IV Start/Stop Controls (Optional)

The MD-II is available with an optional CYCLE-SENTRY IV Start/Stop fuel saving system to provide optimum operating economy.

**WARNING:** *With the selector switch in the Auto Start/Stop position and unit On/Off switch in the On position, the unit may start at any time without prior warning.*

**NOTE:** *A buzzer sounds when the unit is automatically preheating.*

The CYCLE-SENTRY IV system automatically starts the unit on thermostat demand and shuts down the unit when the box temperature reaches the thermostat set point. The CYCLE-SENTRY IV system automatically maintains engine temperature in cold ambients by restarting the unit if the engine block temperature drops to  $65 \text{ F}$  ( $18 \text{ C}$ ). When the unit starts because of low engine block temperature, it will run in the operating mode called for by the unit thermostat until the battery is fully charged and the engine block temperature reaches  $120 \text{ F}$  ( $49 \text{ C}$ ).

Features of the CYCLE-SENTRY IV system are:

- Auto Start/Stop or Continuous Run operation
- Thermostat all season temperature control
- Block Temperature Thermostat for low ambient operation
- Battery Sentry to keep batteries fully charged during unit operation
- Preheat Indicator Buzzer

## SEQUENCE OF OPERATION

### Engine Operation

#### Continuous-Run Operation

The MD-II uses a THERMOGUARD solid state thermostat for operational control of the unit. When the unit is started with the box temperature higher than  $3.4 \text{ F}$  ( $1.9 \text{ C}$ ) above thermostat setpoint, the unit will run on High Speed Cool.

When the temperature drops to  $3.4 \text{ F}$  ( $1.9 \text{ C}$ ) above setpoint, the thermostat de-energizes the High Speed engine solenoid circuit, placing the unit on Low Speed Cool.

When the box temperature reaches thermostat set point, the pilot solenoid is energized. The 3-way valve shifts to the Heat position, placing the unit on Low Speed Heat.

If the temperature continues to fall, the thermostat will shift the unit to High Speed Heat at  $3.4 \text{ F}$  ( $1.9 \text{ C}$ ) below set point. The unit will remain on High Speed Heat until the box temperature rises to  $1.7 \text{ F}$  ( $0.9 \text{ C}$ ) below set point.

If the temperature continues to rise to  $1.7 \text{ F}$  ( $0.9 \text{ C}$ ) above set point, the thermostat de-energizes the pilot solenoid. The 3-way valve shifts back to the Cool position, placing the unit on Low Speed Cool.

If the temperature continues to rise to 5.1 F (2.8 C) above set point, the thermostat will energize the engine solenoid high speed circuit, placing the unit on High Speed Cool.

#### **Optional CYCLE-SENTRY IV Start/Stop Operation**

**WARNING:** *With the selector switch in the Auto Start/Stop position and unit On/Off switch in the On position, the unit may start at any time without prior warning.*

With the Auto Start/Stop-Continuous Run switch in the Auto Start/Stop position, the CYCLE-SENTRY IV system starts the unit on thermostat demand and shuts down the unit when the box temperature reaches the thermostat set point.

On CYCLE-SENTRY IV equipped units, unit start-ups may also be initiated by defrost cycle initiation or engine block temperature thermostat demand. In cold ambients, the CYCLE-SENTRY IV system demand automatically maintains engine temperature by restarting the unit if the engine block temperature drops to 65 F (18.3 C). When the unit starts because of low engine block temperature, it will run in the operating mode called for by the unit thermostat until the battery is fully charged and the engine block temperature reaches 120 F (48.9 C).

After the unit starts, a Battery Sentry module monitors the voltage across the field of the alternator and will keep the unit running if the battery is not sufficiently recharged. The THERMOGUARD thermostat controls the unit operating mode to maintain the box temperature at thermostat set point.

#### **Defrost**

The defrost mode can be initiated any time the evaporator coil temperature is below 37 F (2.8 C). Defrost is initiated automatically by the defrost air switch and defrost timer (optional) or manually by pressing the manual defrost switch.

When a defrost cycle is initiated, the defrost relay energizes the damper solenoid and pilot solenoid.

**NOTE:** *If the unit is in null mode on CYCLE-SENTRY IV operation, pressing the manual defrost switch will cause the unit to start and operate in the defrost mode.*

The unit remains on defrost until the evaporator coil temperature rises to 49 F (9.4 C), causing the defrost termination switch to open. When the defrost termination switch opens, the unit may shift back to the cooling or heating mode, or the null mode (optional Start/Stop operation).

If the thermostat calls for the null mode (optional Start/Stop operation) while the unit is defrosting, the unit

will continue to run until defrosting is complete. Then the unit will stop.

#### **Electric Operation (Models 25 & 50)**

The THERMOGUARD solid state thermostat controls the unit on electric standby operation. When the unit switch is turned on with the box temperature higher than 3.4 F (1.9 C) above thermostat setpoint, the unit will run on Cool.

When the temperature drops to 3.4 F (1.9 C) above setpoint, the thermostat de-energizes the electric motor contactor, placing the unit on Null.

If the box temperature continues to fall, the thermostat energizes both the electric motor contactor and the heat contactor to place the unit on Heat at 3.4 F (1.9 C) below set point. The unit will remain on Heat until the box temperature rises to 1.7 F (0.9 C) below set point. The thermostat will then de-energize the electric motor contactor and heat contactor, placing the unit on Null.

If the temperature continues to rise to 5.1 F (2.8 C) above set point, the thermostat will energize the electric motor contactor, placing the unit on Cool.

#### **Defrost**

During electric operation, the defrost mode can be initiated any time the evaporator coil temperature is below 37 F (2.8 C) with the unit operating on Cool. Defrost is initiated automatically by the defrost air switch and defrost timer (optional) or manually by pressing the manual defrost switch.

When a defrost cycle is initiated, the defrost relay energizes the damper solenoid, pilot solenoid and electric heaters (Model 50 only). The unit remains on defrost until the evaporator coil temperature rises to 49 F (9.4 C), causing the defrost termination switch to open.

**NOTE:** *Model 25 units DO NOT have electric heaters and 4 heater contactors.*

### **OPERATING MODES**

#### **Engine Operation**

##### **Continuous-Run Operation**

On temperature drop, unit operating modes are:

- **High Speed Cool**  
Box temperatures over 3.4 F (1.9 C) above set point.
- **Low Speed Cool**  
Box temperatures from approximately 3.4 F (1.9 C) above set point down to set point.

- **Low Speed Heat**

Box temperatures from set point down to 3.4 F (1.9 C) below set point.

*NOTE: The unit will cycle between Low Speed Cool and Low Speed Heat as long as the temperature remains between 3.4 F (1.9 C) below set point and 5.1 F (2.8 C) above set point.*

- **High Speed Heat**

Box temperatures lower than 3.4 F (1.9 C) below set point.

*NOTE: The thermostat locks out High Speed Heat at set points below 15 ± 3 F (-9.4 ± 1.7 C).*

On temperature rise, unit operating modes are:

- **High Speed Heat**

Box temperatures up to 1.7 F (0.9 C) below set point.

*NOTE: The thermostat locks out High Speed Heat at set points below 15 ± 3 F (-9.4 ± 1.7 C).*

- **Low Speed Heat**

Box temperatures 1.7 F (0.9 C) below set point up to 1.7 F (0.9 C) above set point.

- **Low Speed Cool**

Box temperatures from 1.7 F (0.9 C) above set point up to 5.1 (2.8 C) above set point.

*NOTE: The unit will cycle between Low Speed Heat and Low Speed Cool as long as the temperature remains between 3.4 F (1.9 C) below set point and 5.1 F (2.8 C) above set point.*

- **High Speed Cool**

Box temperatures higher than 5.1 F (2.8 C) above set point.

### **CYCLE-SENTRY IV Operation**

On temperature drop, unit operating modes are:

- **High Speed Cool**

Box temperatures over 3.4 F (1.9 C) above set point.

- **Low Speed Cool**

Box temperatures from approximately 3.4 F (1.9 C) above set point down to set point.

- **Null (Engine Off)**

Box temperatures from set point down to 3.4 F (1.9 C) below set point.

- **High Speed Heat**

Box temperatures lower than 3.4 F (1.9 C) below set point.

*NOTE: The thermostat locks out all Heat operation at set points below 15 ± 3 F (-9.4 ± 1.7 C) on Auto Start/Stop operation.*

On temperature rise, unit operating modes are:

- **High Speed Heat**

Box temperatures up to 1.7 F (0.9 C) below set point.

*NOTE: The thermostat locks out all Heat operation at set points below 15 ± 3 F (-9.4 ± 1.7 C) on Auto Start/Stop operation.*

- **Null (Engine Off)**

Box temperatures approximately 1.7 F (0.9 C) below set point up to 5.1 F (2.8 C) above set point.

- **High Speed Cool**

Box temperatures higher than 5.1 F (2.8 C) above set point.

### **Electric Operation (Models 25 & 50)**

On temperature drop, unit operating modes are:

- **Cool**

Box temperatures over 3.4 F (1.9 C) above set point.

- **Null**

Box temperatures from approximately 3.4 F (1.9 C) above set point down to 3.4 F (1.9 C) below set point.

- **Heat**

Box temperatures lower than 3.4 F (1.9 C) below set point.

*NOTE: The thermostat locks out Heat at set points below 15 ± 3 F (-10 ± 1.5 C).*

On temperature rise, unit operating modes are:

- **Heat**

Box temperatures up to 1.7 F (0.9 C) below set point.

*NOTE: The thermostat locks out Heat at set points below 15 ± 3 F (-10 ± 1.5 C).*

- **Null**

Box temperatures 1.7 F (0.9 C) below set point up to 5.1 (2.8 C) above set point.

- **Cool**

Box temperatures higher than 5.1 F (2.8 C) above set point.

## UNIT FEATURES

- Water Heated Accumulator Tank
- TK 3.66 Diesel Engine
- D214 Compressor
- THERMOGUARD IV Solid State Thermostat
- Tapered Roller Bearing Fanshaft & Jackshaft
- EPDM Coolant Hoses
- Heavy Duty Oil Bath Air Cleaner
- 3-way Valve Refrigeration System
- One Piece Main Wiring Harness
- Spin-On Fuel Filter
- Fuel Sediment Bowl
- Spin-On Full Flow Oil Filter
- Electric Fuel Pump
- Coolant Expansion Tank with gauge
- 23 amp Alternator
- Defrost Timer (solid state)
- Electronic Engine Hourmeter
- Dial Thermometer
- Alternator Discharge Warning Light
- TherMax™ Defrost/Heating System

## UNIT OPTIONS

- Electric standby motor (models 25 & 50)
- CYCLE-SENTRY IV Start/Stop controls
- Remote Control Box, In-Cab
- Electric Heater Strips (Model 50)
- Remote Control Box, Truck-Body-Mount
- R-502 Refrigerant
- Hourmeter, electric operation (models 25 & 50)
- Dry-type air cleaner
- Bypass Oil Filter
- Fuel heater
- Ammeter
- Compound Gauge
- Digital Thermometer
- Oil Pressure Gauge
- Remote indicator lights
- Top Screen
- Silicone Hoses
- Coolant Temperature Gauge

## PROTECTION DEVICES

- Engine High Coolant Temperature Switch
- Engine Low Oil Pressure Switch
- Evaporator High Temperature Cutout Switch (model 50 only)
- Refrigerant High Pressure Cutout Switch
- Refrigerant High Pressure Relief Valve
- 15 amp Circuit Breaker in Control Circuit
- 12V Fuse Link (50 amp) (Current Limiter)
- Overload relay protection for electric standby motor (models 25 & 50)
- 35 amp Circuit Breaker in Starting Circuit Pre-September 89
- 40 amp Circuit Breaker in Starting Circuit Post-September 89

*NOTE: 40 amp will be the amperage used in the discussions throughout this manual.*

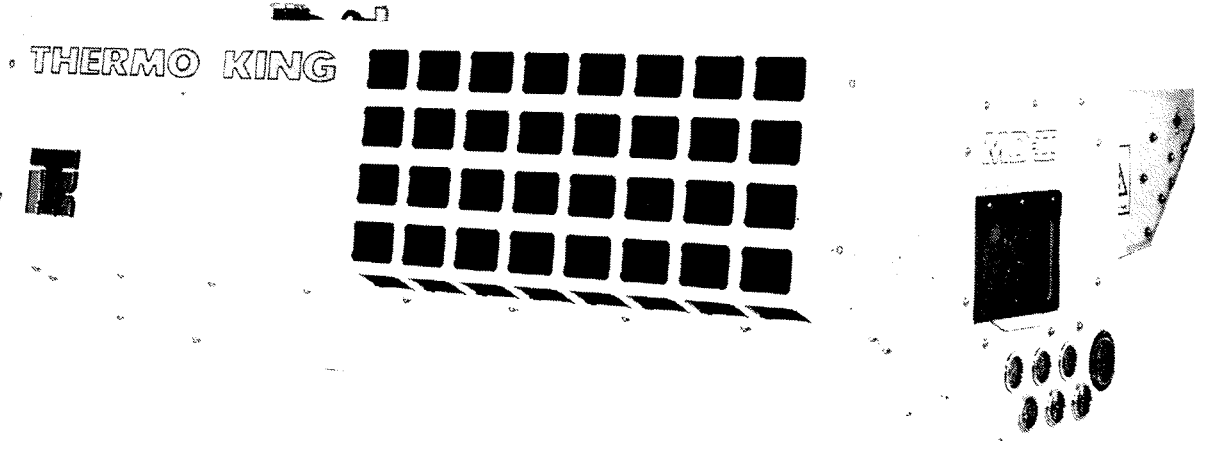
## SERIAL NUMBER LOCATIONS

Unit: Nameplate on top of roadside of unit frame above the switch panel.

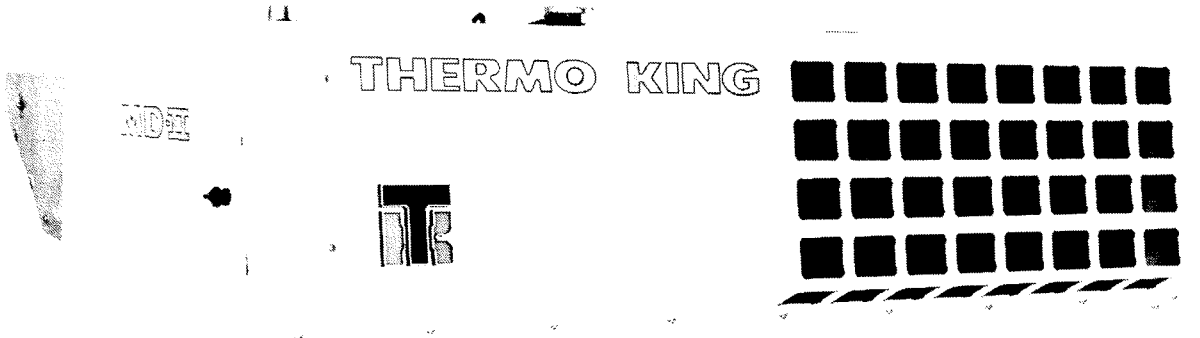
Engine: Nameplate on top of rocker arm cover.

Compressor: Stamped on side below sight glass.

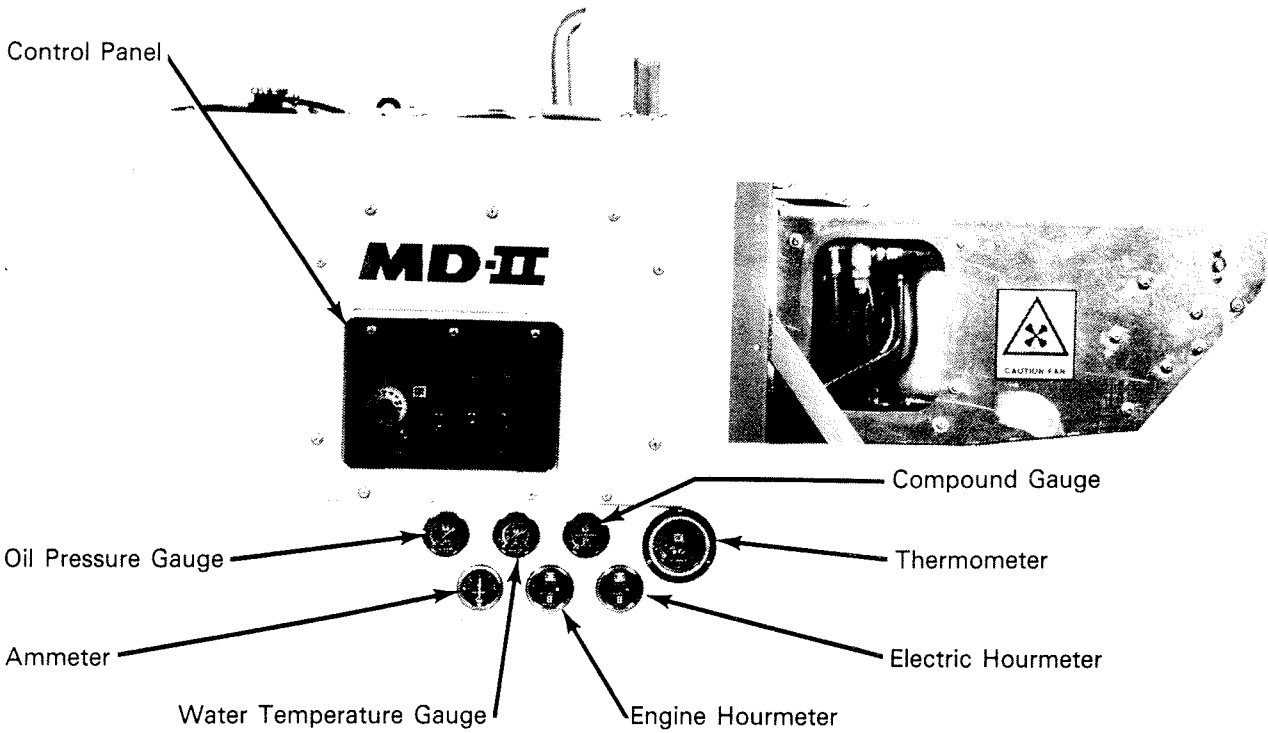
Electric Motor: Nameplate attached to motor housing.



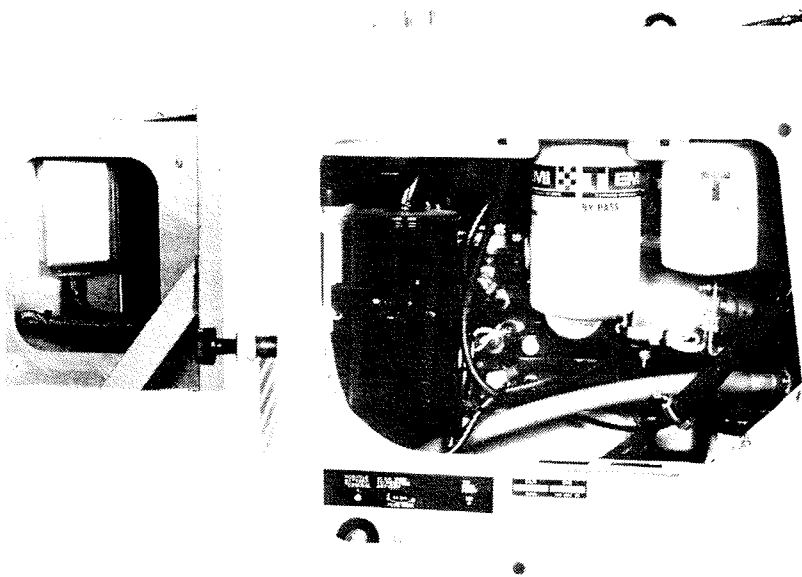
**FRONT VIEW — Road Side**  
**Style Before S/N 099XXXXX**



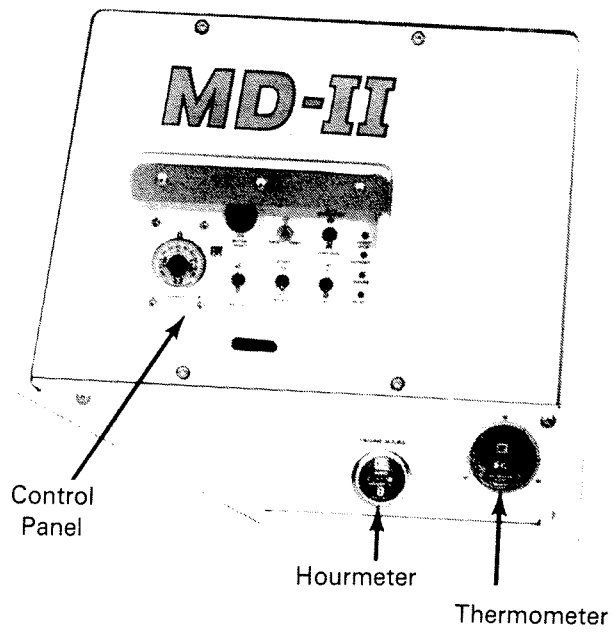
**FRONT VIEW — Curb Side**  
**Style Before S/N 099XXXXX**



**ROAD SIDE VIEW**  
**Style Before S/N 099XXXXX**



**CURB SIDE VIEW**  
**Style Before S/N 099XXXXX**

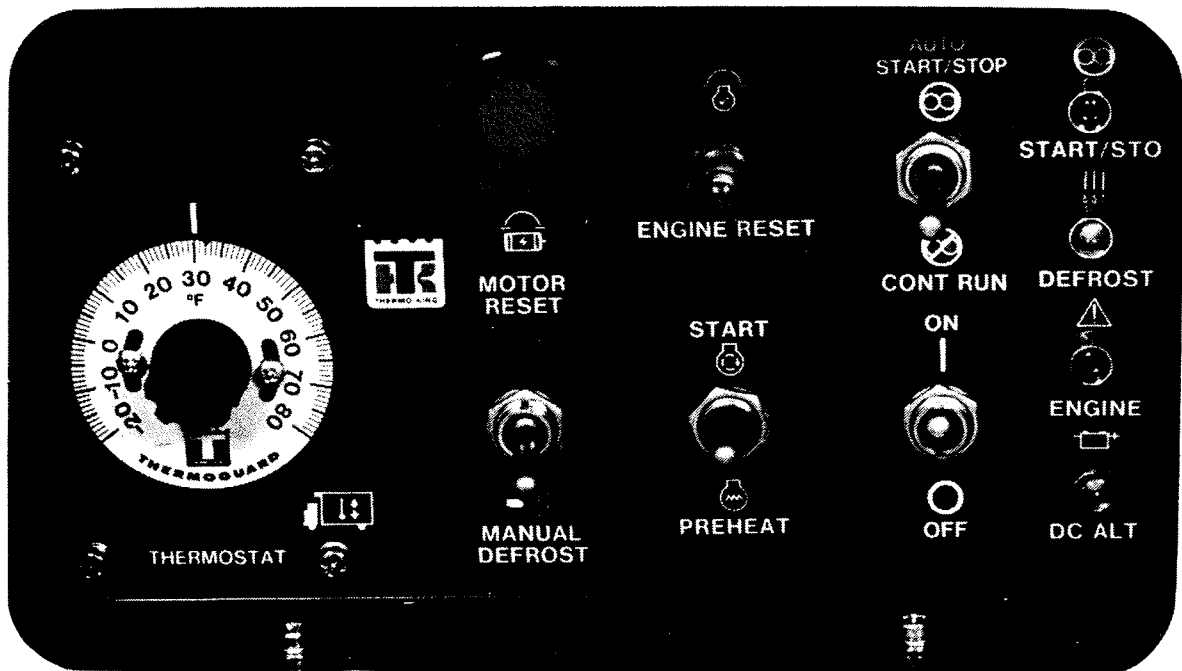


**Road Side View**  
**Style Starting with S/N 099XXXXX**

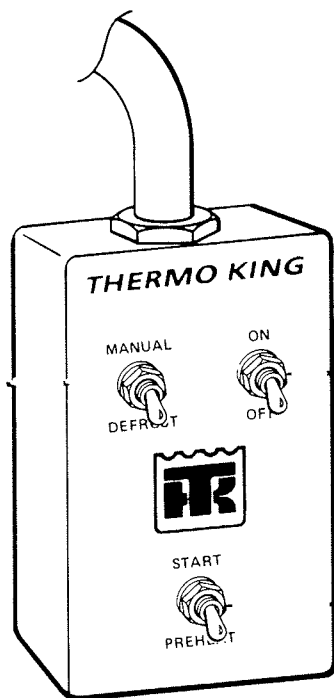
# Operating Instructions

## UNIT CONTROLS

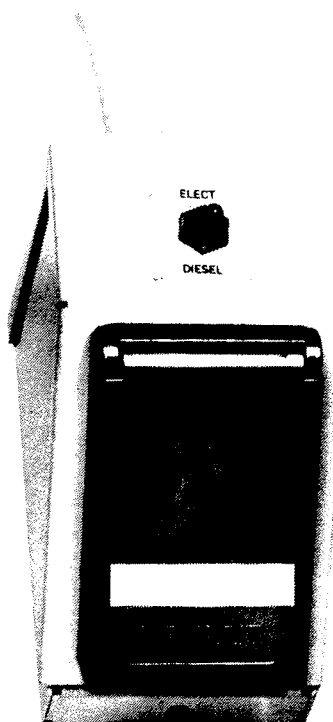
1. **ON-OFF SWITCH.** This switch energizes the electrical system of the unit.
  - a. ON position. Unit will operate in response to the thermostat setting and the trailer air temperature.
  - b. OFF position. The fuel solenoid that controls the supply of fuel is de-energized to stop the engine. Unit will not operate.
2. **PRE-HEAT/START SWITCH.** When positioned in PRE-HEAT, the Pre-Heat/Start Switch energizes only the glow plugs to aid in starting the diesel engine. When positioned in START, the Pre-Heat/Start Switch energizes both the glow plugs and starting motor. Hold switch on START until the engine starts to fire and pick up speed. **DO NOT** release the switch from the START position prematurely when engine is extremely cold.
3. **DIESEL-ELECTRIC SWITCH** (models 25 & 50 only). The diesel-electric switch disconnects the engine controls and engine protection devices from the electrical system when placed in the "Electric" position. The switch is mounted in the remote control and power connector box.
4. **MANUAL DEFROST SWITCH.** The unit can be placed on defrost by pushing the Manual Defrost Switch. The evaporator coil temperature must be below 37 F (2.7 C) before the unit will defrost.
5. **THERMOSTAT.** A modular solid state THERMO-GUARD thermostat controls unit operation to maintain the box temperature at set point.  
Set the thermostat at the required temperature. Setting the dial lower than required will not make the unit cool faster.  
*NOTE: Thermoguard thermostats have low voltage and open circuit protection. If there is no power from the battery to the thermostat or if the battery leads to the thermostat are reversed, the thermostat switches the unit to Low Speed Cool. If the sensor circuit is open, the unit switches to Low Speed Cool. If the battery voltage drops below 6V dc the unit will shift to Low Speed Cool.*
6. **DEFROST AIR SWITCH.** The defrost air switch senses the air pressure difference between the evaporator coil inlet and outlet. The switch automatically places the unit on defrost when the evaporator temperature is below 37 F (2.7 C) and frost builds upon the coil to a point where the airflow across the coil is restricted.
7. **DEFROST TIMER.** A solid state defrost timer automatically places the unit on Defrost every 4, 8, or 12 hours. Intervals may be determined by moving the jumper on the relay board.



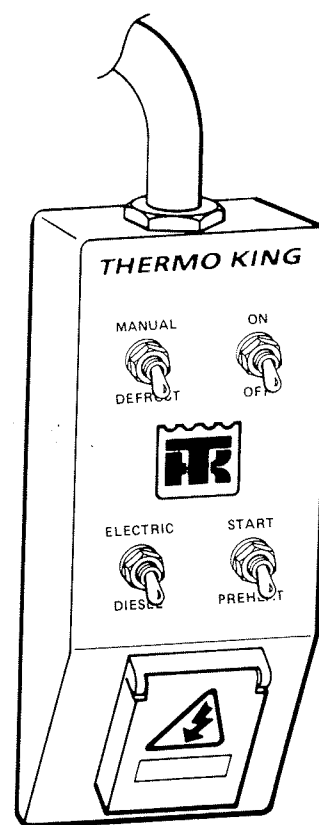
Control Panel — MD-II 25 & 50 w/Cycle-Sentry



**MD-II 30 Remote Control Box (Optional)**



**MD-II 25 & 50 Power Receptacle Box**



**MD-II 25 & 50 Remote Control Box (Optional)**

8. **DEFROST TERMINATION SWITCH.** The electronic defrost termination switch uses solid state components to control the defrost circuit. The switch has short circuit protection and solid state reliability. The switch is mounted in the evaporator and controls the defrost cycle in response to the evaporator coil temperature. The switch is closed when the evaporator coil temperature is below 37 F (2.7 C) completing the defrost circuit to ground and preparing the electrical system for the defrost cycle.
9. **AUTO START/STOP-CONTINUOUS RUN SWITCH (Optional).** This switch selects continuous run operation or automatic Start/Stop operation.
  - a. **CONTINUOUS RUN position.** Unit must be started manually with the Unit On/Off switch and Pre-heat/Start switch. After startup, unit operates continuously until unit On/Off switch is turned off or a unit reset switch protection circuit shutdown occurs due to a malfunction in the fuel, engine oil, engine coolant or unit refrigeration system.
  - b. **AUTO START/STOP position.** All unit starting operations are performed automatically on ther-

mostat demand. Starting functions such as throttle solenoid control, preheat, and cranking are performed automatically.

Unit operation is controlled automatically by unit thermostats, engine block temperature thermostat, Battery Sentry and defrost controls.

The engine starts automatically whenever the thermostat calls for cooling or heating, the defrost timer initiates defrost, or the engine block temperature drops to  $65 \pm 10$  F ( $18.3 \pm 5.6$  C). The engine is automatically stopped by the CYCLE-SENTRY IV control module when the thermostat demand is satisfied, the battery is fully charged, and the block temperature reaches  $120 \pm 10$  F ( $48.9 \pm 5.6$  C).

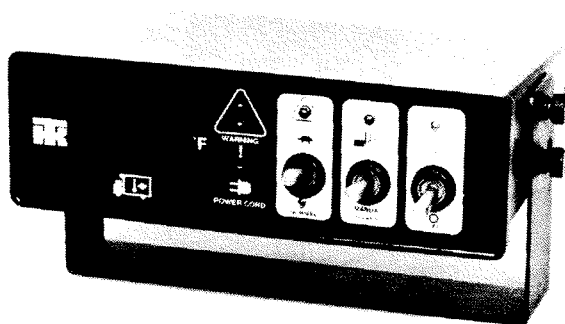
**CAUTION:** *With the selector switch in AUTO START/STOP position and unit ON/OFF switch in ON position, the unit may start at any time without prior warning.*

10. **REMOTE CONTROL BOX (Outside) (Optional).** The Remote Control Box mounts on the truck body beneath the unit to offer easier accessibility to unit controls. This box features the following functions:

- a. **PRE-HEAT/START SWITCH.** When pressed to pre-heat, the switch energizes the glow plugs to aid in starting. When pressed to Start, it energizes both the glow plugs and the Starter Motor.
- b. **ON-OFF SWITCH.** The On-Off Switch energizes the "On" relay, activating the unit electrical system. The control panel On-Off switch and the remote On-Off switch must both be on in order for the unit to operate. Either switch can stop the unit.
- c. **MANUAL DEFROST.** Pressing the manual defrost switch will initiate a defrost cycle if the evaporator coil temperature is below 37 F (2.7 C).
- d. **DIESEL-ELECTRIC SWITCH (Models 25 and 50 only).** Switches unit to electric motor standby power when placed in **ELECTRIC** position and power cord is connected to box.



**In-Cab Control Box  
(Optional)  
Before S/N 050xxxxx**



**In-Cab Control Box  
(Optional)  
After S/N 050xxxxx**

- 11. **IN-CAB REMOTE CONTROL BOX (Optional).** The in-cab remote control box provides the driver with convenient over-the-road unit control.

The remote control box can provide the following functions:

- a. **POWER CORD.** This indicator light tells the driver that the Diesel/Electric switch is in the Electric position and the power cord is plugged in.
- b. **WARNING.** This indicator light (RED) lets the driver know that the reset switch has opened and the engine is not running. If YELLOW, it indicates the alternator is not charging. This light may also glow YELLOW if unit is connected to the truck battery and the truck alternator is charging at a higher voltage.
- c. **Unit ON.** This indicator light tells the driver the unit is operating.
- d. **DEFROST.** This indicator light lets the driver know when the unit is defrosting.
- e. **TEMPERATURE.** This is a digital thermometer that reads the temperature of the return air.
- f. **PRE-HEAT/START switch.** When pressed to Pre-heat, the switch energizes the glow plugs to aid in starting. When pressed to **START**, it energizes both the glow plugs and the starter motor.
- g. **ON-OFF switch.** The On-Off switch energizes the "on relay" activating the unit electrical system. The control panel on-off switch and the remote on-off switch must both be on in order for the unit to operate. Either switch can stop the unit.
- h. **MANUAL DEFROST.** Pressing the manual defrost switch will initiate a defrost cycle if the evaporator coil temperature is below 37 F (2.7 C).

*NOTE: In October of 1989 the cab control box used in the MD-II was changed. The new control box is now equipped with military type switches that have a center pivot pin. The new PC board, and control boxes and switches have new part numbers. See Thermo King Service Bulletin No. 373 for further information.*

## UNIT INSTRUMENTS

- 1. **AMMETER (Optional).** The ammeter indicates battery charging and discharge amperage during engine operation. The charging amperage varies according to the needs of the battery. The ammeter also indicates the amount of current draw by the glow plugs during pre-heat.

2. **HOURMETER-ENGINE.** The engine hourmeter records the total hours the engine is in operation so proper maintenance can be scheduled.
3. **HOURMETER-ELECTRIC STANDBY** (optional). The electric standby hourmeter records the total hours of unit operation on electric standby power.
4. **HOURMETER — TOTAL** (Optional). This hourmeter records the total number of hours the unit switch is turned on.
5. **SIGNAL LIGHTS.** The control panel lights indicate the following:  
**RED**—Engine — indicates that the reset switch is open.  
**YELLOW**—Alternator — indicates no alternator output.  
**GREEN**—Start/Stop — indicates the unit is operating in the Cycle-Sentry Start/Stop mode of operation.  
**ORANGE**—Defrost — indicates the unit is operating in the defrost mode.
6. **DIGITAL THERMOMETER.** A digital thermometer indicates the temperature of the air returning to the evaporator within the load area.
7. **OIL PRESSURE GAUGE** (Optional). The oil pressure gauge indicates engine oil pressure. Engine oil pressure should rise immediately on starting. A low pressure switch will trip the reset switch and stop the engine if oil pressure drops below  $10 \pm 3$  psi ( $69 \pm 21$  kPa) for 30 to 50 seconds.
8. **WATER TEMPERATURE GAUGE** (Optional). The engine coolant temperature gauge indicates the temperature of the engine coolant in the engine block.
9. **COMPOUND PRESSURE GAUGE** (Optional). The compound gauge indicates the pressure in the compressor crankcase.

#### D214 Compressor and R12

When the unit is on cooling, the compound gauge will read approximately 10-18 psi (69-124 kPa) when the box temperature is above 23 F (-5 C). When the unit is heating or defrosting, the throttling valve limits compressor suction pressure to 18 psi (124 kPa).

With a 0 F (-18 C) return air temperature, the suction pressure should be 0-3 psi (0-21 kPa).

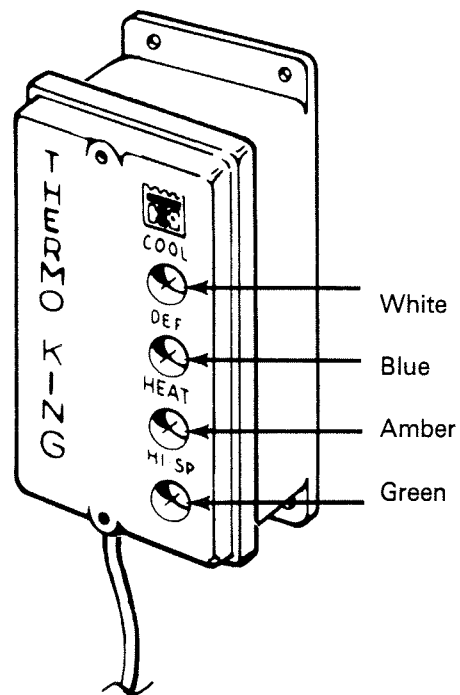
When the return air temperature is below 0 F (-18 C), the suction pressure should indicate a vacuum.

#### D214 Compressor and R502

When the unit is on cooling with an evaporator return air temperature of 35 F (1.6 C), the suction pressure should not exceed 18 psi (124 kPa). With an evaporator return air temperature of 0 F (-18 C), the suction pressure should not exceed 18 psi (124 kPa).

When the evaporator return air temperature is below 0 F (-18 C), the suction pressure should be 5-13 psi (34-90 kPa).

10. **RECEIVER TANK SIGHT GLASS.** The receiver tank sight glass indicates the level of refrigerant in the receiver tank for checking the refrigerant charge.
11. **COMPRESSOR OIL SIGHT GLASS.** The compressor oil sight glass indicates the level of compressor oil in the compressor sump.
12. **REMOTE LIGHT INDICATORS** (optional). Remote indicator lights in a box that can be mounted on the truck beneath the unit feature these signals:  
**WHITE**—system is in cooling cycle  
**BLUE**—system is in defrost cycle  
**AMBER**—system is in heat cycle  
**GREEN**—system is in high speed heat or cool



**Remote Indicator Light Box**

## CONVERTIBLE TRUCK UNIT CONVERSIONS FROM R12 TO R502

Since November of 1988 the MD-II has been manufactured as a convertible unit. This unit is supplied with R12 and can be converted to R502 with only a few modifications.

Convertibles with R12 have components which are compatible with R502, such as suction vibrasorbers, pilot solenoid lines, accumulator tanks, throttling valve boots, etc. When replacing these parts on a convertible unit, the correct parts manual must be used to retain all of the convertible features.

**NOTE 1:** *The R502 compatible accumulator tanks are now black instead of lavender colored since both R12 and R502 now use the same accumulator tank.*

**NOTE 2:** *Since the nameplates are the primary method of identifying the proper refrigerant, it is extremely important to change the nameplates when a unit is converted. If the type of refrigerant is in question or the nameplates are suspected of being improper, the expansion valve element must be inspected. To determine the correct refrigerant to use in the unit, the nameplates MUST agree with the expansion valve nameplate.*

**NOTE 3:** *A clutch is recommended on the MD-II 30 models to aid in starting.*

**NOTE 4:** *Each unit has four nameplates listing the type of refrigerant in the unit. These nameplates must be changed when the unit is converted to indicate the correct refrigerant.*

**NOTE 5:** *MD-II units built before 099XXXXX use switch 44-5508.*

A convertible unit can be changed to R502 by changing the following components.

	<b>B/M No.</b>	<b>R-502 Charge LB (Kg)</b>	<b>R-502 Expansion Valve (Note 2)</b>	<b>R-502 HPCO Switch (Note 5)</b>	<b>R-502 Nameplates (Note 4)</b>	<b>Engine Clutch (Note 3)</b>
MD-II 30	054687	7.5 (3.4)	66-5016	44-8064	99-3247	107-183
MD-II 25	054688	7.5 (3.4)	66-5016	44-8064	99-3247	
MD-II 50	054670	7.5 (3.4)	66-5016	44-8064	99-3247	

*NOTE: The early convertible truck units do not have both the R12 and the R502 refrigerant charges shown on the serial number plates. When converting one of these early units to R502, stamp the R502 charge weight on the serial number plate.*

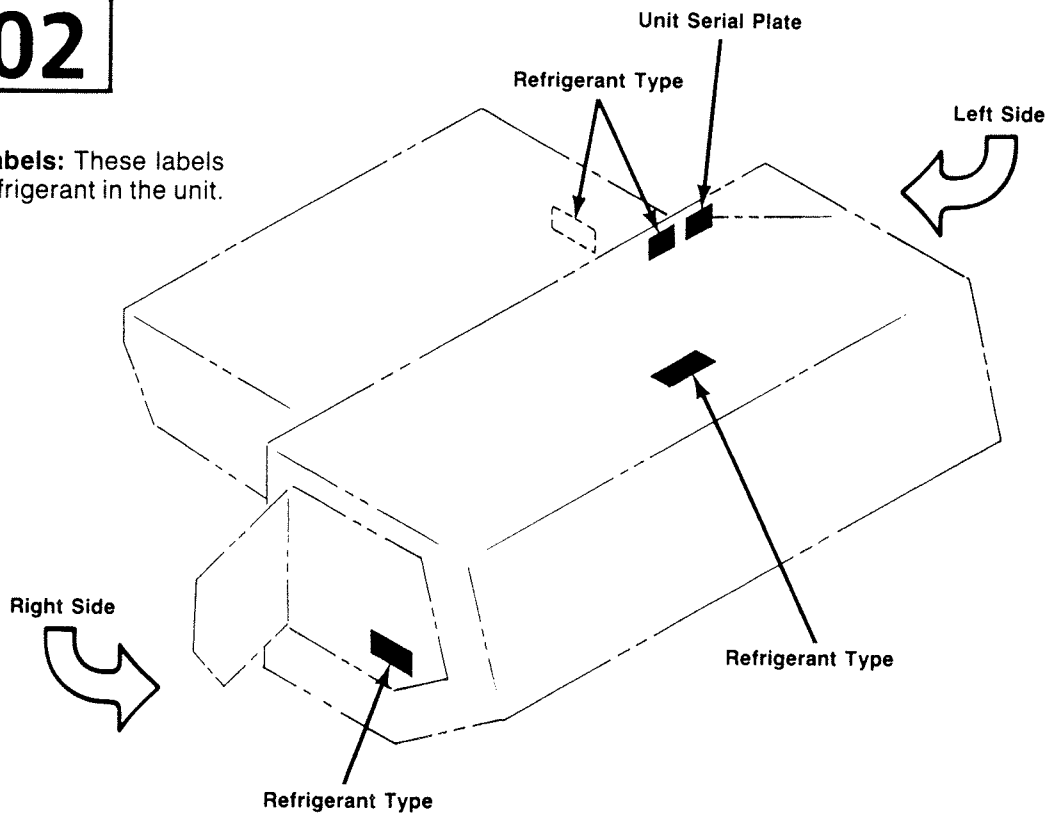
*NOTE: Beginning in September of 1989 the convertible units will have new serial number plates attached to them. The new serial number plates will identify the units as a convertibles because the refrigerant charges for both R12 and R502 are shown on the new plates.*

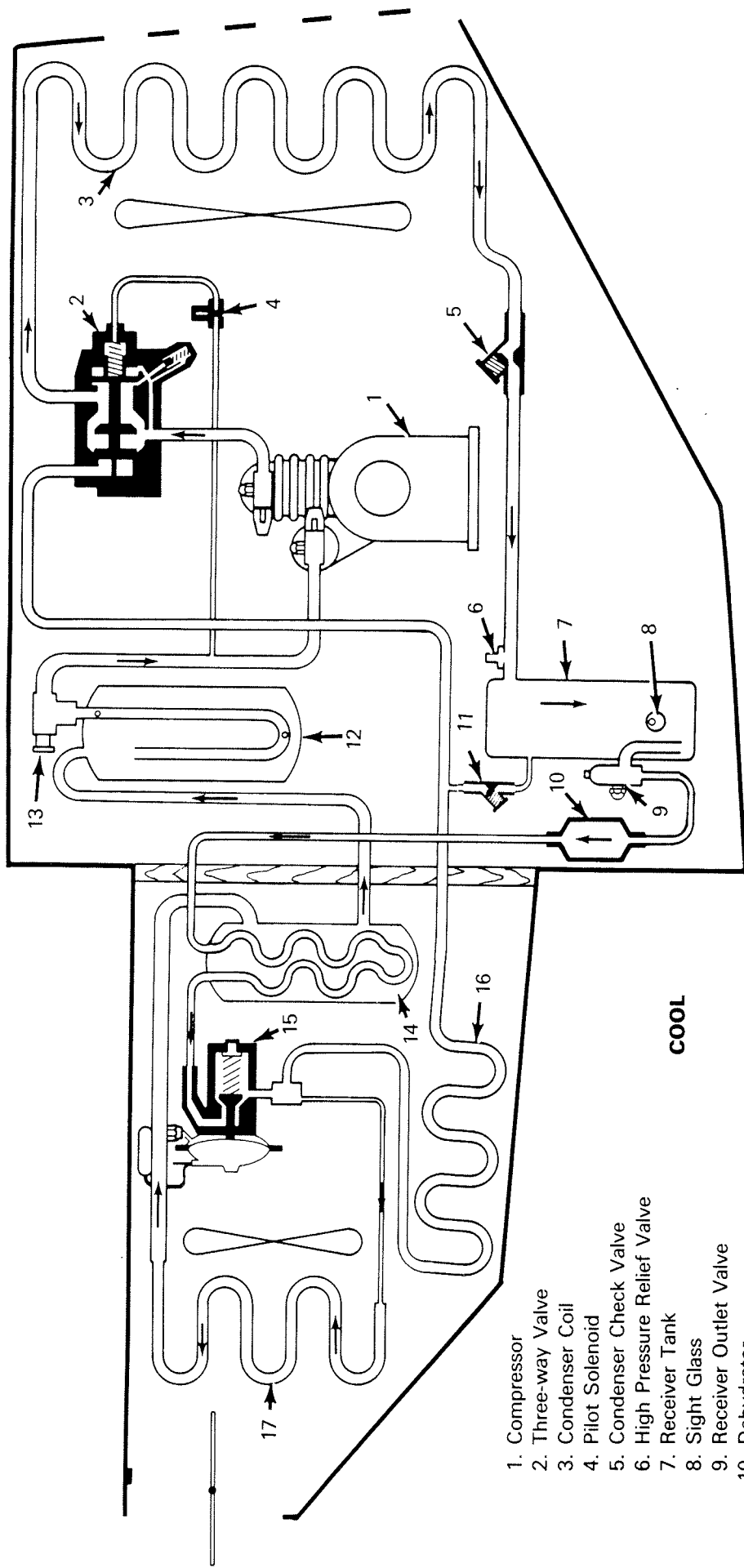
MODEL	_____
B/M NO.	_____
SERIAL NO.	_____
REF	_____
VOLTS	_____ AMPS _____
PHASE	_____ CYCLES _____
THERMO KING CORPORATION MINNEAPOLIS, MINNESOTA	

**R12**

**R502**

**Refrigerant Type Labels:** These labels identify the type of refrigerant in the unit.

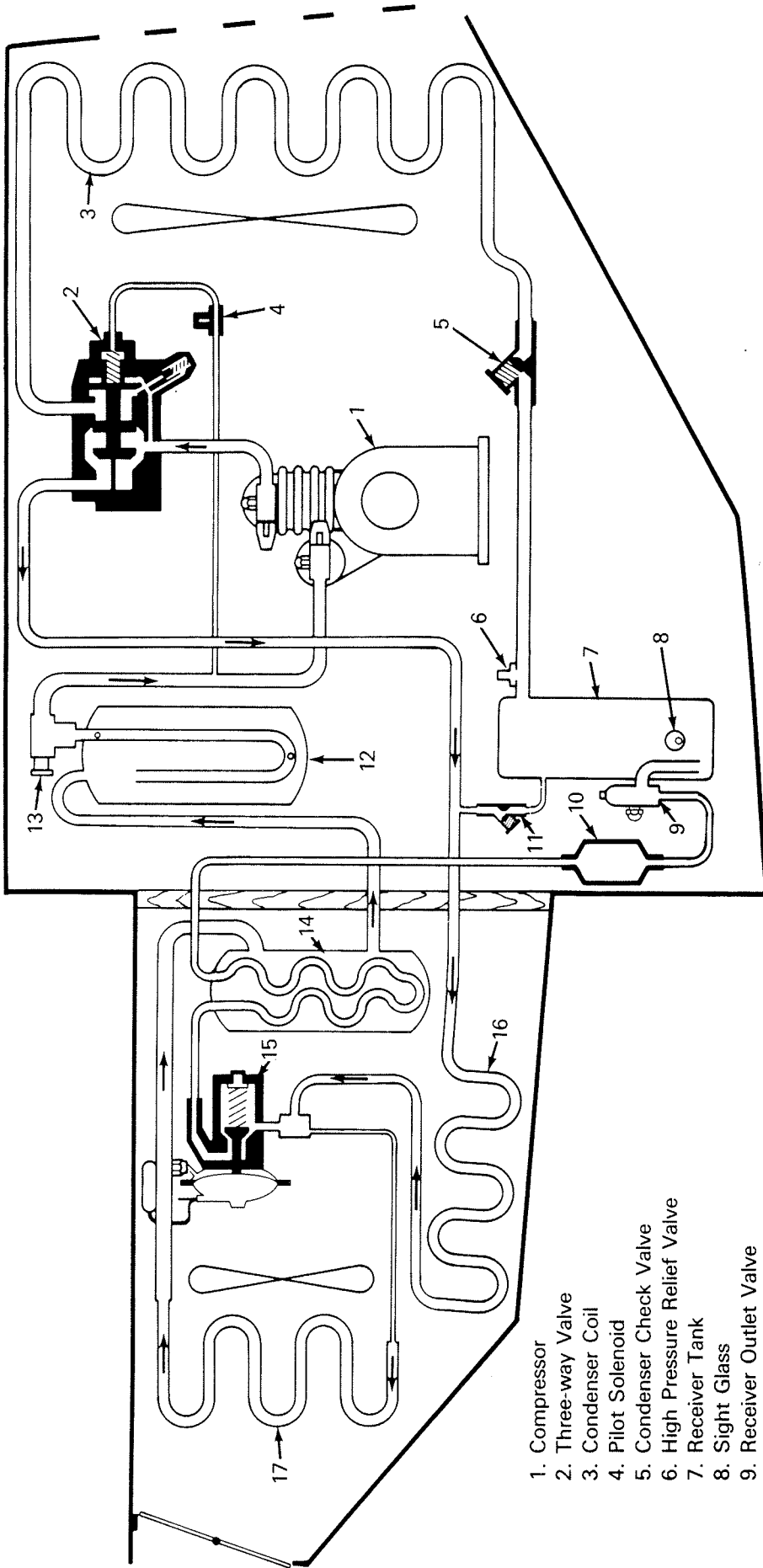




1. Compressor
2. Three-way Valve
3. Condenser Coil
4. Pilot Solenoid
5. Condenser Check Valve
6. High Pressure Relief Valve
7. Receiver Tank
8. Sight Glass
9. Receiver Outlet Valve
10. Dehydrator
11. Bypass Check Valve
12. Accumulator Tank
13. Suction Pressure Regulator
14. Heat Exchanger
15. Expansion Valve
16. Drip Pan Heater
17. Evaporator Coil

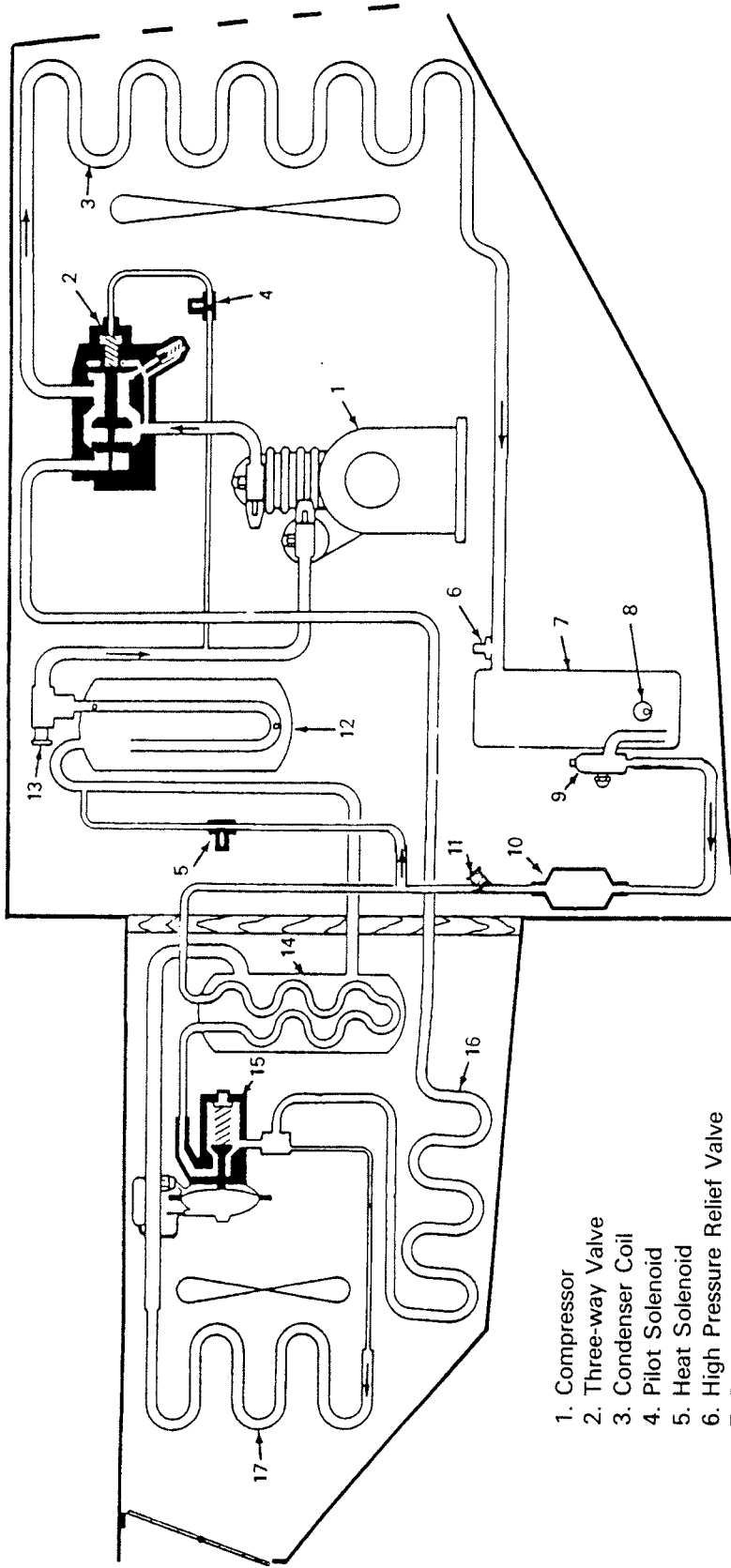
**COOL**

**Refrigeration Cycle**

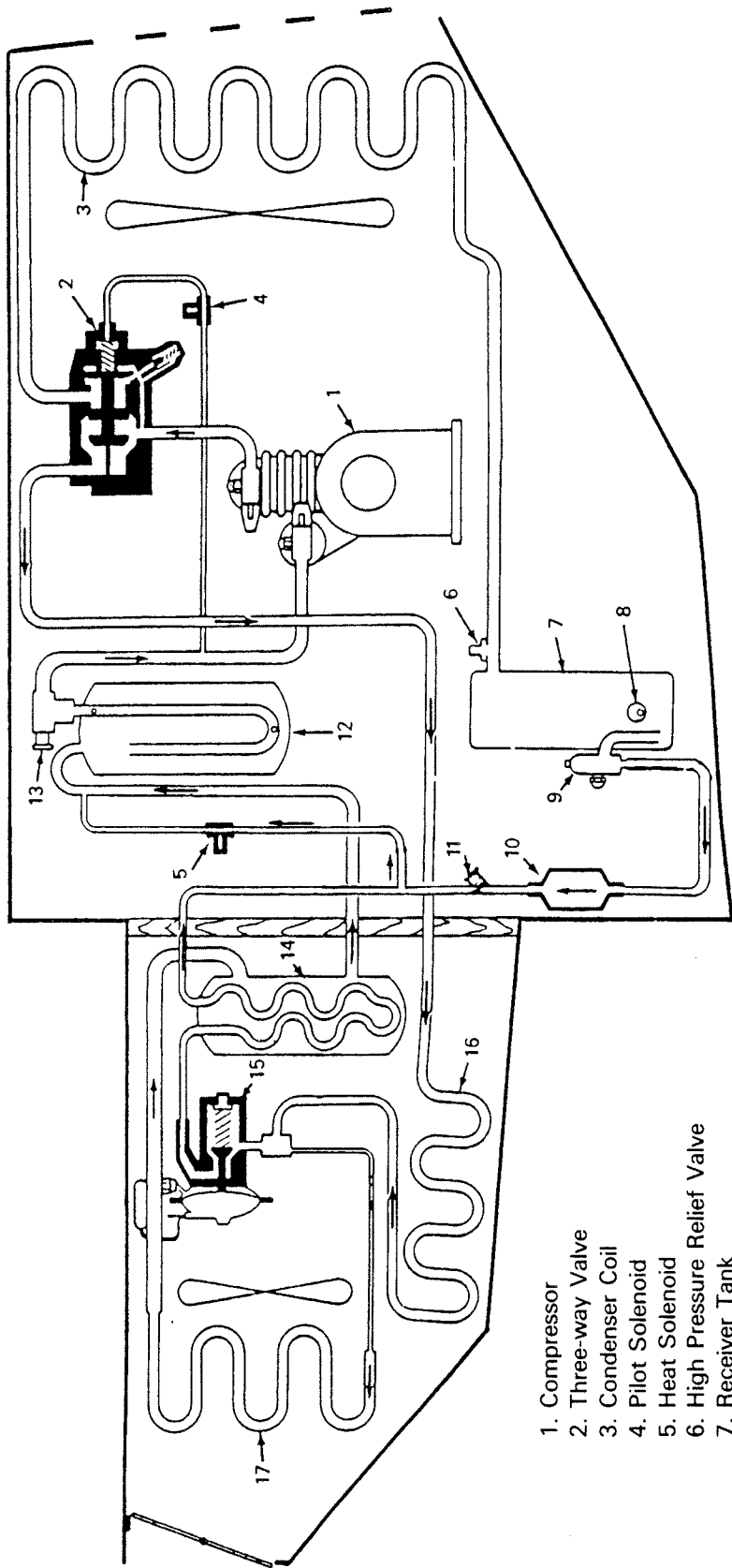


1. Compressor
2. Three-way Valve
3. Condenser Coil
4. Pilot Solenoid
5. Condenser Check Valve
6. High Pressure Relief Valve
7. Receiver Tank
8. Sight Glass
9. Receiver Outlet Valve
10. Dehydrator
11. Bypass Check Valve
12. Accumulator Tank
13. Suction Pressure Regulator
14. Heat Exchanger
15. Expansion Valve
16. Drip Pan Heater
17. Evaporator Coil

## Heat and Defrost Cycle



1. Compressor
2. Three-way Valve
3. Condenser Coil
4. Pilot Solenoid
5. Heat Solenoid
6. High Pressure Relief Valve
7. Receiver Tank
8. Sight Glass
9. Receiver Outlet Valve
10. Dehydrator
11. Receiver Outlet Check Valve
12. Accumulator Tank
13. Suction Pressure Regulator
14. Heat Exchanger
15. Expansion Valve
16. Pan Heater
17. Evaporator Coil



1. Compressor
2. Three-way Valve
3. Condenser Coil
4. Pilot Solenoid
5. Heat Solenoid
6. High Pressure Relief Valve
7. Receiver Tank
8. Sight Glass
9. Receiver Outlet Valve
10. Dehydrator
11. Receiver Outlet Check Valve
12. Accumulator Tank
13. Suction Pressure Regulator
14. Heat Exchanger
15. Expansion Valve
16. Pan Heater
17. Evaporator Coil

**Heat and Defrost Cycle — KD-II with Improved Heating**