

AUTOTHERM[®] & AUTOVENT[®]

NO IDLE TRUCK CAB INTERIOR HEATING AND VENTILATING SYSTEM

MODEL T & A-2500-S & D

CONDENSED ILLUSTRATED GENERAL INSTALLATION
INSTRUCTIONS FOR

LIGHT & MEDIUM DUTY & HYBRID TRUCKS VANS, PICKUPS, POLICE CARS, TAXIS AND LIMOUSINES

INTRODUCTION TO PRODUCT

The AUTOTHERM[®] System is the most cost effective and Greenest energy efficient, no idle interior heating and ventilating system available. It burns no fuel and emits no pollution. The System is less than one quarter of a cubic foot in total volume and weight less than four pounds. AUTOTHERM[®] functions by enabling the existing vehicle heater to operate with the engine off and recover the waste heat energy, generated and paid for while the vehicle was driven.

When the dashboard switch turns the AUTOTHERM[®] System on at the beginning of the heating season, the heater automatically continues to operate each time the engine is turned off, giving hours of no idle interior heating. The driver can occupy or leave the vehicle safely locked and return later to a warm interior with windows free of ice and snow and ready to drive.

The length of heater operation depends on the size of the engine (cooling system capacity) and outdoor temperatures and usually exceeds most day cab operational needs. A small pickup truck at freezing temperatures will run one to one and a half hours before shutting off; a large class eight truck may run three and a half to four hours before automatic termination occurs because coolant temperature has dropped to 95° F.

Idling is a very costly, energy inefficient and environmentally unfriendly way to keep a vehicle interior warm because it uses a 200 to 500 horse power engine to pump an average of 3 gallons of engine coolant a minute to the heater. This uses up to a gallon or more of fuel for each hour of idling and can significantly decrease engine life and increase the frequency of costly service intervals. The AUTOTHERM[®] System in contrast, uses a 1/100th of one horse power magnetically coupled pump to circulate the same amount of hot coolant to the heater as the idling engine does! Using the AUTOTHERM[®] System in place of idling is an energy efficiency increase of thousands of times.

INTRODUCTION TO INSTALLATION INSTRUCTIONS

This new, and redesigned AUTOTHERM[®] System consists of three easy to install components; a pump installed in the hose supplying hot water from the top of the engine to the heater core inlet, an indicator panel - System on/off switch, installed on the dash and a new, easy to connect to Micro Central Control Unit [referred to as the CCU] which installs under the dash. Connections to the three components and the vehicle are made by way of easy to use, fool proof, plug-in cable harnesses. Only five connections are made to the vehicle, B+, ground, two to the heater and one to any circuit that goes on and off with the ignition.

It is highly recommended that even the most experienced installer read and thoroughly understand, frequently consult and follow the instructions that cover the following four critical areas: 1) Pump must be installed in the supply hose - from engine to heater - not in the return hose. Install in return hose only as a last resort and only if supply hose is totally inaccessible. Installation in the return hose will shorten available run time. 2) Pump must be installed so as to move coolant in the same direction it flows when the engine is running *i.e.*, from the top of the engine to the heater inlet. Arrow on pump indicates flow direction when pump is running. 3) Hose must come from the top [or top side] of the engine. If the vehicle is equipped with an oil cooler and the heater hose is connected there, it must be relocated to top of the engine otherwise heating (run) time will be unacceptably short. 4) When connecting to the heater, follow the location, wire numbers and color designations precisely based on the model year of the International Truck the System is being installed on. Especially **NOTE:** the yellow wire in the heater [fan] harness always connects to the load [heater / fan] side of the cut and the orange wire to the supply [battery plus] side of the cut. Connection diagrams also appear in the International ISIS System. Reversal of these critical connections can cause system damage or malfunction.

Failure to read and thoroughly understand how to properly make the connection to the heater, can result in damage to the Central Control Unit, vehicle on board systems, start a fire or result in failure of the system to function properly or function at all. The installer should read and understand the installation process prior to beginning the install. If the installer still has questions, call the AUTOTHERM[®] HOT line at 847-726-1717 and ask for **INSTALLATION HELP** or check on line at autothermusa.com.

SECTION I

INSTALLATION OF PUMP

CAUTION DO NOT INSTALL PUMP ON A HOT ENGINE

1.0 SELECT CORRECT HOSE FOR PUMP INSTALLATION – FIG. 1

INSTALL *PUMP* IN HEATER INLET (SUPPLY) HOSE. ORIENT *PUMP* SO FLOW DIRECTION IS SAME AS WHEN ENGINE IS RUNNING; FROM TOP OF ENGINE TO INLET [TOP] OF HEATER. ARROW ON *PUMP* POINTS IN DIRECTION OF FLOW WHEN *PUMP* IS RUNNING. IF VEHICLE IS EQUIPPED WITH AN OIL COOLER AND THE SUPPLY [INLET] HOSE TO THE VEHICLE HEATER COMES FROM THE OIL COOLER, HOSE MUST BE RELOCATED TO TOP REAR OF ENGINE. SEE FIG. 1. FAILURE TO RELOCATE MAY SIGNIFICANTLY REDUCE HEATING TIME TO UNACCEPTABLE LEVELS.



FIG. 1

1.1 LOCATE POINT OF INSTALLATION ON HOSE

LOCATE *PUMP* WITHIN 12" OF A HOSE SUPPORT AND AT LEAST 8" – 12" FROM EXHAUST MANIFOLDS OR TURBO. MARK INSTALLATION POINT ON HOSE.

1.2 CLAMP HOSE PRIOR TO CUTTING – FIG. 2

CLAMP OFF HOSE A FOOT OR MORE ON EACH SIDE OF CUT MARK USING VICE GRIPS OR CLAMPS. IF SPACE IS LIMITED USE ONLY ONE CLAMP, CLAMP OFF SUPPLY SIDE AND DO NOT OPEN RADIATOR CAP. *PUMP* MUST BE LOCATED BELOW LOWEST POINT IN COOLING SYSTEM AND BE WET [FILLED WITH LIQUID] AT ALL TIMES. *PUMP* IS NOT A SUCTION TYPE PUMP

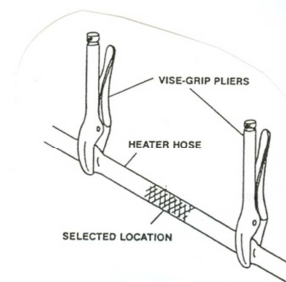


FIG. 2

1.3 CUTTING HOSE – FIG. 3

CUT HOSE SQUARE - USE A HOSE CUTTER. REMOVE LENGTH SUGGESTED IN FIG. 3 BASED ON I.D. OF HEATER HOSE. DO NOT CUT TOO SHORT. HOSE SHOULD HAVE SOME DRAPE OR SAG. LONGER IS BETTER THAN SHORT.

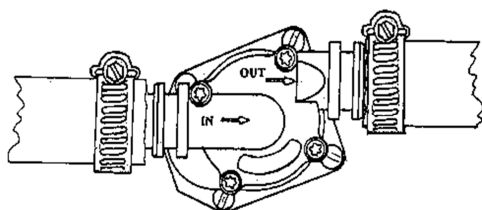
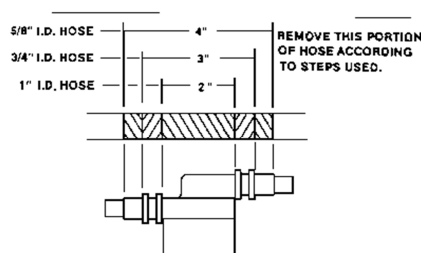


FIG. 3



REMOVE FOR 3/4" I.D. HOSE

REMOVE FOR 1" I.D. HOSE

FIG. 4

1.4 OPTIONAL - PUMP PREPARATION PRIOR TO INSTALLATION – FIG. 4

SMALLER, UNUSED INLET / OUTLET *PUMP* NIPPLES MAY BE LEFT IN PLACE OR REMOVED. IF REMOVED, USE A HACKSAW, CUT SQUARE AND REMOVE FLASH AND DUST FROM INLET AND OUTLET. THE DUST IS VERY ABRASIVE.

- 1.5 ORIENTATION OF PUMP FOR CORRECT FLOW DIRECTION – FIG. 5**
SEE PARAGRAPH 1.0. ORIENT PUMP IN HOSE SO COOLANT FLOWS FROM ENGINE TO THE HEATER. SEE FIG. 5.

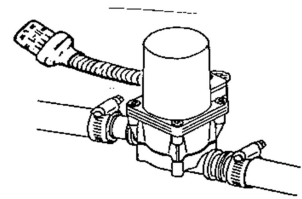


FIG. 5

- 1.6 CORRECT PLACEMENT OF HOSE CLAMP - FIG. 6**

1.61 SLIP STAINLESS STEEL *PROTECTIVE CLAMPS* [PROVIDED] ON HOSE WITH *CLAMP* ORIENTED SO SCREW FACES INSTALLER FOR EASY TIGHTENING. HOSE END MUST BE SQUARE AND FREE OF FLASH. PUSH HOSE ONTO EQUIVALENT SIZED *PUMP NIPPLE* UNTIL EDGE OF HOSE IS FLUSH AND AGAINST *NIPPLE STOP*. SEE FIG. 6. SLIP *CLAMP* TO EDGE OF HOSE AND SNUG *CLAMP*. DO NOT TIGHTEN YET.

1.62 INSTALL SECOND *CLAMP* IN SIMILAR MANNER AND SNUG. *PUMP* MAY BE ROTATED WITHIN *CLAMP* TO ANY POSITION WITH HORIZONTAL POSITION PREFERRED. MAKE CERTAIN HOSE EDGE IS BUTTED AGAINST STOP AND *CLAMP* IS AT EDGE OF HOSE. TIGHTEN FIRST *CLAMP* TO HOLD POSITION THEN TORQUE BOTH TO 33 IN. LBS. [3.75 FT. LB. OR .4 Kgm] USING A TORQUE WRENCH. CORRECT TORQUE IS IMPORTANT ESPECIALLY ON SILICONE HOSE. DO NOT OVER TIGHTEN.

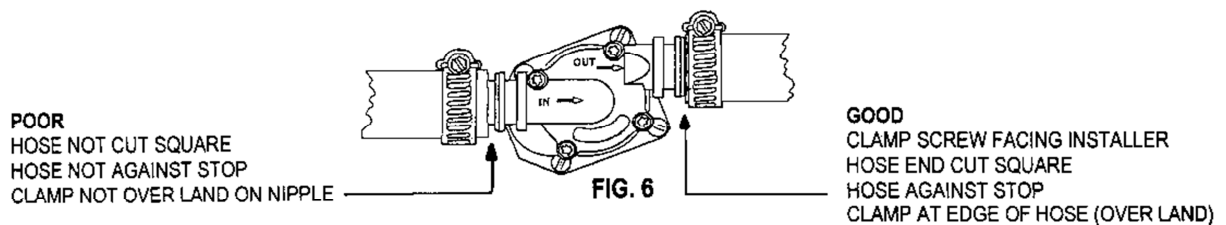


FIG. 6

FIG. 6 SECTION II LOCATE MICRO CCU FOR EASY PLUG-IN WIRING

- 2.0 LOCATE CENTRAL CONTROL UNIT IN CAB**

REMOVE OPEN STORAGE BOX FROM TOP CENTER OF DASH. *CCU* IS SMALL ENOUGH TO BE LOCATED IN SPACE BEHIND THIS BOX. BRING ALL WIRE HARNESS WITH THE CONNECTOR END TOWARD AND INTO THIS SPACE. SEE FIG. 7 AND FIG. 8 PHOTOS. DELAY PLUGGING THE HARNESSES INTO *CCU* UNTIL INSTRUCTED TO DO SO



FIG. 7

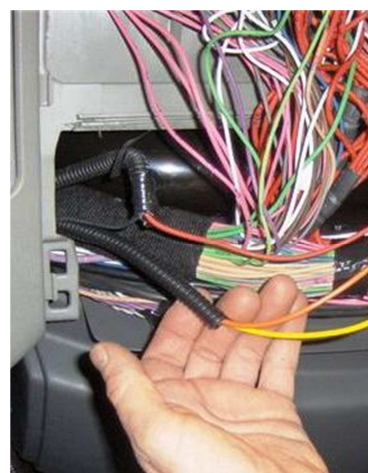


FIG. 8

SECTION III

INSTALLING ON/OFF SWITCH AND/OR HOUR METER ON DASH PANEL

3.0 LOCATION OF PANEL ON DASHBOARD – FIG. 9

FIG. 9 PHOTO SHOWS LOCATION OF AUTOTHERM® SYSTEM ON/OFF SWITCH ON REMOVABLE DASH PANEL. **NOTE:** IF THE KIT YOU'RE INSTALLING IS THE DELUXE KIT WITH AN HOUR METER, MOUNT IT HERE AS WELL.

3.01 REMOVE PANEL AND USING TEMPLATES IN FIG. 10 BELOW, LAYOUT SWITCH AND HOUR METER ON PANEL AND FASTEN WITH TAPE. DRILL HOLES IN PANEL AS INDICATED AND ENLARGE EACH AS FOLLOWS.

3.02 ENLARGE SWITCH HOLE IN TWO OR THREE STEPS USING PROGRESSIVELY LARGER DRILLS.



FIG. 9

A STEP DRILL, A TAPER REAMER OR A ROUND FILE. ENLARGE TO 7/8" MIN. TO 1" MAX. SEE FIG. 9 PHOTO. BE SURE TO REMOVE ALL BURRS, FLASH AND DUST.

3.1 PREPARING HOUR METER OPENING - SEE FIG. 9

USING HOUR METER TEMPLATE FIG. 10 OR SCRIBED MARKS, DRILL FOUR HOLES 1/8TH" DIA. OR SMALLER WITHIN EACH CORNER. THEN DRILL ANY NUMBER OF LARGER HOLES WITHIN THE SCRIBED LINES UNTIL A LARGE FLAT FILE CAN ENTER. ENLARGE THE HOLE BY FILING. FILE EACH SIDE FLAT AND SQUARE WITH ADJACENT SIDE. CAUTION: DO NOT MAKE RECTANGULAR OPENING LARGER THAN SPECIFIED SINCE METER SNAPS IN AND WILL NOT HOLD UNDER VEHICLE VIBRATION IF HOLE I.D. IS OVERSIZE.

3.2 MOUNTING ON/OFF SWITCH – FIG. 9

CLEAN GREASE FROM PANEL AROUND SWITCH ENTRY HOLE WITH APPROPRIATE SOLVENT FOR GOOD ADHESION. USE PLASTIC COMPATIBLE SOLVENT. INSERT SWITCH PLUG IN PANEL HOLE. LAY SWITCH PANEL FLAT AGAINST DASH PANEL. ALL FOUR SIDES OF SWITCH PANEL SHOULD LIE WITHIN PERIMETER OF DASH PANEL. PEEL PAPER FROM PANEL, PLACE SQUARE AND ALIGN BEFORE PRESSING SWITCH PANEL TO DASH PANEL. CAUTION: ADHESIVE IS PERMANENT AND CANNOT BE REPOSITIONED ONCE PLACED AND PRESSED. PRESS ALL SWITCH PANEL SURFACES TIGHTLY AGAINST DASH PANEL TO SET ADHESIVE.

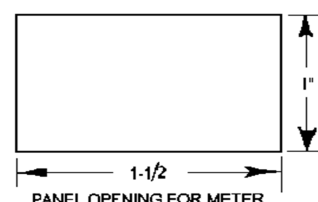


FIG. 10

3.3 MOUNTING HOUR METER – FIG. 11

SNAP HOUR METER INTO DASH PANEL RIGHT SIDE UP (SEE PROTECTIVE METER COVER FOR ORIENTATION) AND CONNECT HOUR METER HARNESS 3E139-T WIRES TO CORRECT METER TERMINAL ACCORDING TO FIG 11, RED TO TERM. P, ORANGE TO TERM. I AND BLACK TO TERM. N. NO CONNECTION TO TERMINAL R. DRESS METER AND SWITCH HARNESS WIRES THROUGH PANEL OPENING TOWARD CCU LOCATION [SEE FIG. 9 PHOTO]. REINSTALL DASH PANEL. SWITCH AND METER MOUNTING AND PANEL INSTALLATION ARE NOW COMPLETE.

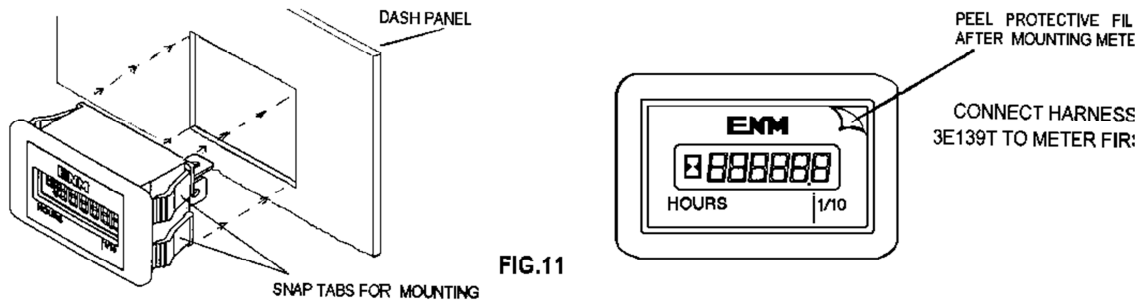


FIG. 11

PLUGGING HOUR METER AND ON/OFF SWITCH INTO CCU. SEE FIG. 7 & 12

DRESS HOUR METER AND ON/OFF SWITCH HARNESSES TOWARD CCU STORAGE SPACE AND OUT THROUGH OPENING. PLUG HOUR METER PLUG INTO CCU PLUG MARKED ON CCU LABEL AS HOUR METER AND PLUG ON/OFF SWITCH INTO CCU PLUG MARKED ON CCU LABEL AS ON/OFF SWITCH. **NOTE: HARNESS AND CCU PLUGS ARE DESIGNED SO THEY CANNOT BE INCORRECTLY PLUGGED INTO THE WRONG PLUG.** CONNECTIONS OF HOUR METER AND ON/OFF SWITCH ARE NOW COMPLETE.

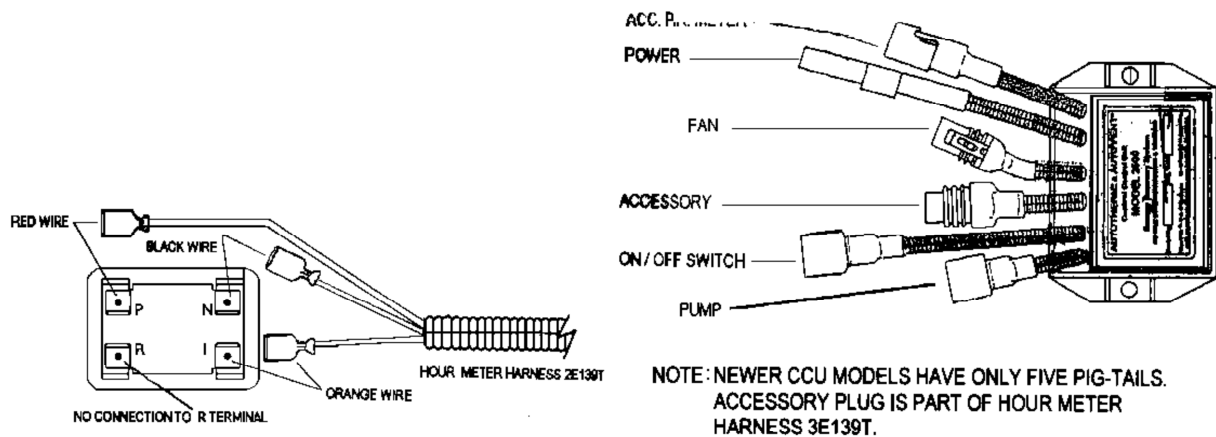


FIG. 12

SECTION IV INSTALLING PUMP HARNESS & CONNECTING PUMP TO CCU

4.0 INSTALLING PUMP HARNESS – PUMP HALF 1E116T

THE PUMP HARNESS HAS TWO HALVES, THE PUMP HALF AND THE CCU HALF ALLOWING THE CABLE TO ENTER THROUGH THE VEHICLE FIREWALL. TAKE HARNESS 1E116T MARKED **PUMP HALF** AND LIGHTLY TAPE LOOSE WIRES INTO A POINT. FIND AN UNUSED WIRE ENTRY AND DRILL OPEN OR FIND ANOTHER ENTRY OPENING AND PASS HARNESS THROUGH FIREWALL TO VEHICLE INTERIOR. THIS IS BEST DONE BY TWO PERSONS, ONE PUSHING THE OTHER PULLING THE HARNESS INTO THE CAB. AT THIS TIME PULL ONLY 18 TO 24 INCHES INTO CAB.

4.01 PLUG HARNESS RECEPTACLE INTO PUMP PLUG AND DRESS AND FASTEN WITH WIRE TIES ALONG ANY EXISTING CABLE RUN. KEEP CLEAR OF WINDSHIELD WIPER ARMS AND LEVERS. LEAVE SUFFICIENT SLACK OR DRAPE AT PUMP TO PREVENT WIRE BREAKAGE.

4.02 PULL BALANCE OF HARNESS INTO CAB AND LEAVE LOOSE FOR CONNECTION TO CCU HALF HARNESS.

4.03 LOCATE HARNESS 2E116T MARKED **CCU HALF**. INSERT LOOSE WIRE END THROUGH DASH OPENING WHERE CCU WILL BE LOCATED AND SNAKE HARNESS THROUGH BACK OF DASH TOWARD PUMP HALF HARNESS PREVIOUSLY INSERTED IN 4.02 ABOVE.

4.1 FASTENING TOGETHER CCU HALF AND PUMP HALF - FIG. 13

NOTICE: EACH WIRE COLOR IS STAGGERED IN EACH HARNESS HALF TO MATCH THE CORRESPONDINGLY COLORED WIRE IN THE OTHER HARNESS. SLIP SHRINK TUBING OVER EITHER CABLE BEFORE BEGINNING THE CONNECTION PROCESS.

4.11 SEE FIG. 13 AND INSERT BARE WIRE END OF A GIVEN COLOR IN THE PUMP HARNESS HALF INTO THE BUTT CONNECTOR OF THE EQUIVALENT WIRE COLOR IN THE CCU HARNESS HALF AND CRIMP WITH THE PROPER TOOL. CONNECT ALL FOUR WIRES. **CAUTION:** IN POOR LIGHTING OR UNDER MERCURY SHOP LIGHTING, MAKE CERTAIN COLORS ARE NOT ACCIDENTALLY INTERCHANGED (ONE REASON FOR THE STAGGERED WIRES). NOTE THAT LATER HARNESSES MAY HAVE SOLDER TYPE BUTT CONNECTORS. CRIMP AND SOLDER THESE WITH MINI TORCH BEFORE DOING 4.12 BELOW.

4.12 SLIP SHRINK TUBING OVER BUTT CONNECTORS AND SPAN CORRUGATED HARNESS COVERS IN BOTH HARNESSES. USE A HEAT GUN TO CAREFULLY SHRINK TUBING EVENLY, COVERING BOTH CORRUGATED COVERS AND WIRE CONNECTIONS.

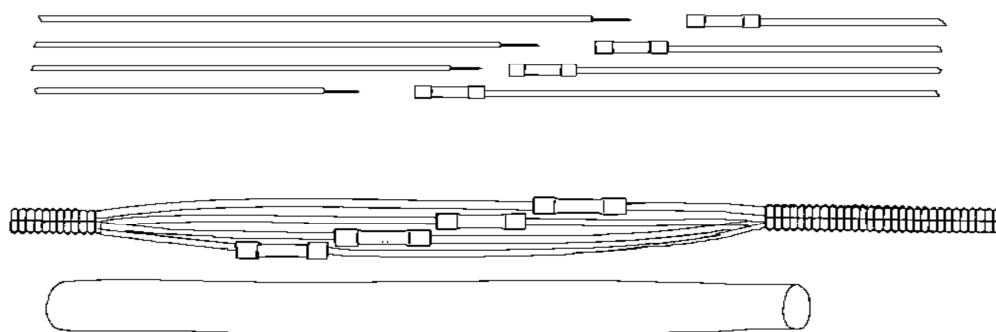


FIG. 13

4.2 CONNECTING PUMP TO CCU – FIG 7

PLUG CCU HARNESS 2E116T PLUG INTO THE CCU RECEPTACLE MARKED ON CCU BOX LABEL AS PUMP. DRESS AND ROLL EXCESS HARNESS LENGTH INTO A CIRCLE AND WIRE TIE TO EXISTING CABLES IN BACK OF DASH. LEAVE ENOUGH LENGTH FOR HARNESS TO REACH CCU OUTSIDE OF FINAL DASH STORAGE AREA. **NOTE:** PLUGS CANNOT BE INCORRECTLY CONNECTED. CONNECTION OF PUMP TO CCU IS NOW COMPLETE.

SECTION V CONNECTING CCU TO HEATER 2008 AND FORWARD MODELS

5.0 CONNECTING TO HEATER WIRES--HARNESS 2E141T OR NAV-2E141T - FIG. 14

REMOVE POWER DISTRIBUTION BOX COVER FROM RIGHT SIDE OF UPPER DASH. SNAKE LOOSE WIRE END OF HARNESS FROM CCU AREA TOWARD AND INTO POWER DISTRIBUTION AREA. SEE FIG 8.

5.01 LOCATE WIRES A73A AT FUSE F4-L AND A75B AT FUSE F4-M AND CUT WIRES 2" TO 3" FROM FUSE PANEL. FOLD AND TAPE WIRE A75B ON FUSE F4-M SIDE OF CUT.

5.02 STRIP ¼" FROM REMAINING THREE WIRES.

5.03 INSERT STRIPPED END OF WIRE A73A FROM FUSE F4-L INTO BUTT CONNECTOR OF ORANGE WIRE IN HARNESS AND CRIMP.

5.04 TWIST TOGETHER STRIPPED WIRES ON LOAD (HEATER) SIDE OF CUT A73A AND A75B, INSERT BOTH INTO BUTT CONNECTOR ON YELLOW WIRE IN HARNESS AND CRIMP. **NOTE:** ON SOME LATER AUTOTHERM® KITS, BUTT CONNECTORS MAY BE OF THE SOLDER TYPE. CRIMP, SOLDER AND SHRINK THESE TO COMPLETE CONNECTION.

5.05 ENGAGE HARNESS PLUG WITH CCU PIG-TAIL RECEPTACLE LABELED HEATER FAN. CONNECTION TO VEHICLE HEATER IS NOW COMPLETE.

5.1 PREPARING HEATER [FAN] HARNESS 2E141T FOR CONNECTION- FIG.14

5.11 IF THE INSTALLATION IS BEING MADE ON A NON MULTIPLEXED HEATER [OLDER VEHICLE MODELS], CUT THE MAXI FUSE ADAPTER AND FUSE HOLDER IF PRESENT, FROM THE HARNESS AND STRIP ¼" FROM THE YELLOW AND ORANGE WIRES AND APPLY A AWG 14 TO 18 STEP-DOWN BUTT CONNECTOR [AWG 14 SIDE] TO EACH HARNESS WIRE.

5.12 IF THE INSTALLATION IS BEING MADE ON A MULTIPLEXED HEATER, CUT MAXI FUSE AND FUSE HOLDER IF PRESENT, AND STRIP 1/4" FROM YELLOW AND ORANGE WIRE AND APPLY STEP-DOWN AWG 14 / 18 BUTT CONNECTOR TO EACH WIRE. SPLICE NO. 18 JUMPER PAIR TO HARNESS – YELLOW TO YELLOW AND ORANGE TO ORANGE.

5.2 SPLICING TO HEATER – FIG.14

5.21 SEE FIG.14 – USING BUTT CONNECTORS, CRIMP THE ORANGE WIRE IN HARNESS TO SUPPLY [FUSE] SIDE OF CUT AND YELLOW WIRE TO LOAD [HEATER / FAN] SIDE OF CUT.

5.22 PLUG HARNESS INTO CCU PLUG MARKED HEATER / FAN. CONNECTIONS TO HEATER / FAN ARE COMPLETE

FIG. 14 – PRE OCTOBER 2002 MODELS

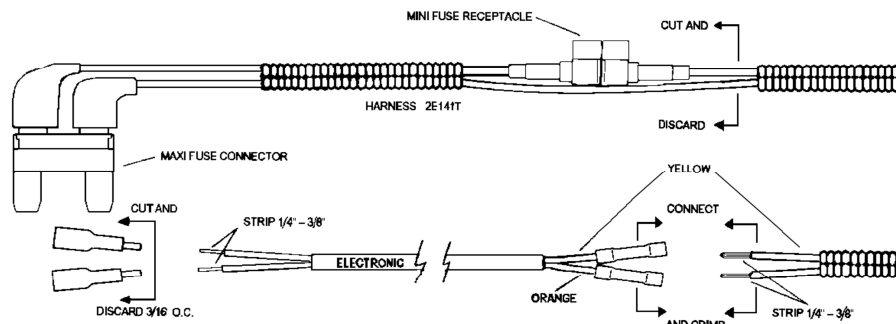


FIG.14

2008 AND FORWARD INTERNATIONAL TRUCKS

5.3 CONNECTING TO HEATER WIRES—HARNESS 2E141T OR NAV-2E141T – SEE FIG. 15/16

REMOVE POWER DISTRIBUTION BOX COVER FROM RIGHT SIDE OF UPPER DASH. SNAKE LOOSE WIRE END OF HARNESS 2E141T AS PREPARED IN 5.12 OR HARNESS NAV-2E141T FROM CCU AREA TOWARD AND INTO POWER DISTRIBUTION AREA. SEE FIG 8.

5.01 LOCATE WIRES A73A AT FUSE F4-L AND A75B AT FUSE F4-M AND CUT WIRES 2" TO 3" FROM FUSE PANEL. FOLD AND TAPE WIRE A75B ON FUSE F4-M SIDE OF CUT.

5.02 STRIP 1/4" FROM REMAINING THREE WIRES.

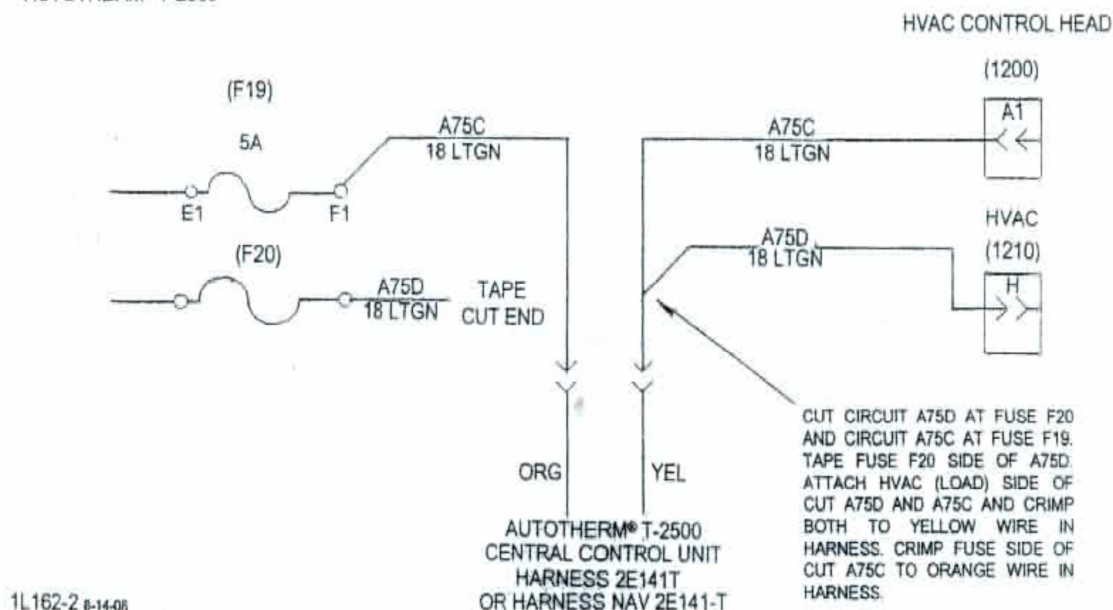
5.03 INSERT STRIPPED END OF WIRE A73A FROM FUSE F4-L INTO BUTT CONNECTOR OF ORANGE WIRE IN HARNESS AND CRIMP.

5.04 TWIST TOGETHER STRIPPED WIRES ON LOAD (HEATER) SIDE OF CUT A73A AND A75B, INSERT BOTH INTO BUTT CONNECTOR ON YELLOW WIRE IN HARNESS AND CRIMP. **NOTE: ON SOME LATER AUTOTHERM® KITS, BUTT CONNECTORS MAY BE OF THE SOLDER TYPE. CRIMP, SOLDER AND SHRINK THESE TO COMPLETE CONNECTION.**

5.05 ENGAGE HARNESS PLUG WITH CCU PIG-TAIL RECEPTACLE LABELED HEATER FAN. CONNECTION TO VEHICLE HEATER IS NOW COMPLETE.

FIG. 15 – AFTER OCTOBER 2002 MODELS

AFTER OCTOBER 2002 MODELS
AUTOTHERM® T-2500



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FIG. 15

FIG. 16 – 2008 MODLES FORWARD

2008 MODELS FORWARD
AUTOTHERM® T-2500

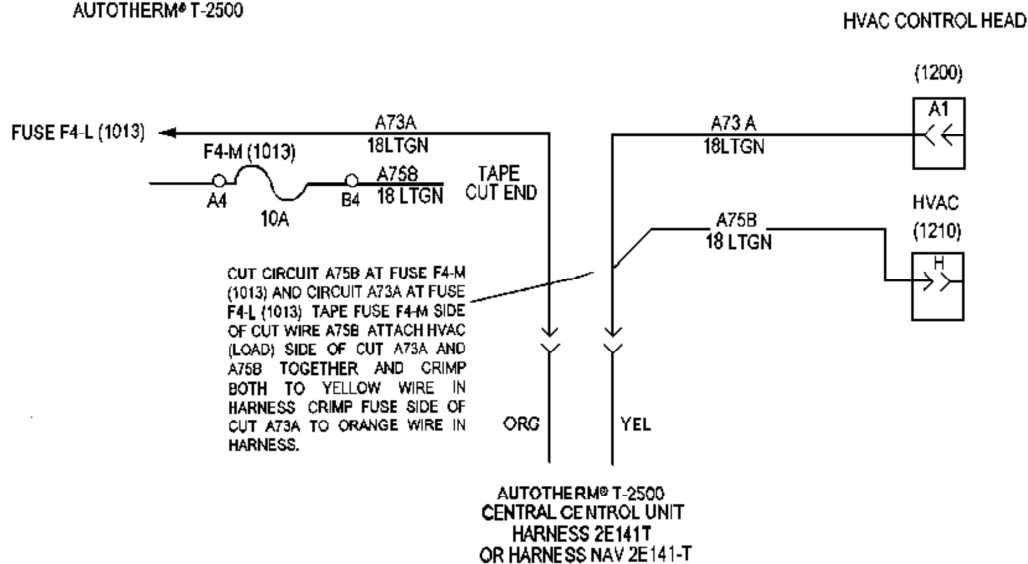


FIG. 16

SECTION VI CONNECTING CCU TO POWER

6.0 CONNECTING AUTOTHERM® CCU TO POWER - HARNESS 2E140T - FIG. 17

SNAKE POWER HARNESS FROM CCU LOCATION TOWARD POWER DISTRIBUTION BOX ON UPPER RIGHT OF DASH. DO NOT PLUG HARNESS INTO CCU AT THIS TIME. LOCATE AN UNUSED FUSE AREA AND POWER THE FUSE RECEPTACLE AND INSERT AN INTERNATIONAL TRUCK SUPPLIED 10 AMP MANUAL RESET MINI CIRCUIT BREAKER. CONNECT RED WIRE FROM HARNESS TO THE OUTPUT OF THIS CIRCUIT BREAKER. IF AN ACCESSORY IS GOING TO BE POWERED THROUGH THE CCU, INSTALL A 15 AMP BREAKER.

6.01 LOCATE A GOOD GROUND AND CONNECT THE BLACK WIRE TO GROUND, **NOTE:** A GOOD GROUND IS AS IMPORTANT AS A GOOD BATTERY + CONNECTION.

6.02 FIND ANY CIRCUIT THAT GOES ON AND OFF WITH THE IGNITION AND CONNECT THE WHITE WIRE TO IT. WHITE WIRE DRAWS ONLY 40 MILLIE AMPERES AND CAN BE CONNECTED TO ANY CIRCUIT. WHITE WIRE INDICATES ENGINE ON/OFF STATE TO CCU.

6.03 NOTE: WHITE WIRE MUST BE CONNECTED TO A SPECIAL LOCATION ON HYBRID VEHICLES AND A COMPUTER PROGRAM DOWN LOADED. SEE INTERNATIONAL TRUCK ISIS OR CALL 260-428-3625 FOR SPECIFIC INFORMATION.

6.04 PLUG POWER HARNESS PLUG INTO CCU RECEPTACLE LABELED CCU POWER. CONNECTION TO POWER IS NOW COMPLETE.

NOTE: GREEN LED LOCATED ON ON/OFF SWITCH WILL BEGIN TO FLASH WHETHER THE SWITCH IS ON OR OFF. THIS IS NORMAL; LOW VOLTAGE SENSOR WILL RESET ONCE ENGINE IS STARTED AND WILL FLASH AGAIN ONLY WHEN SYSTEM IS DISCONNECTED FROM BATTERY OR WHENEVER IT AGAIN ENCOUNTERS LOW BATTERY VOLTAGE.

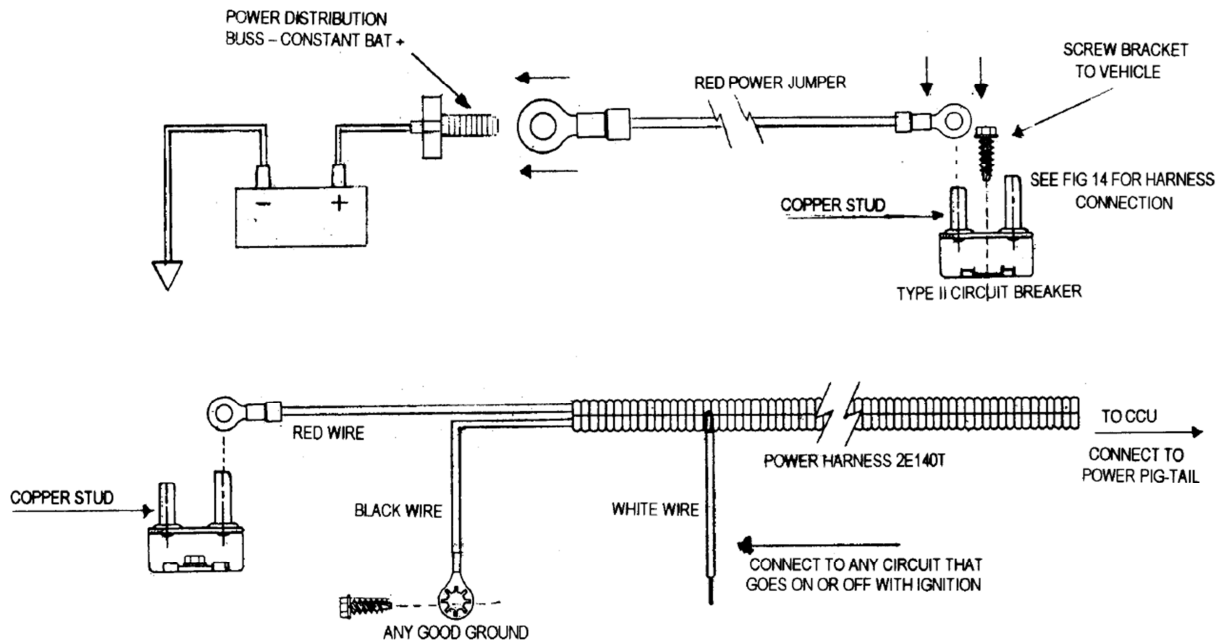


FIG. 17

SECTION VII INSTALLATION OF ACCESSORY POWER

7.0 SELECTION OF ACCESSORY

ANY ACCESSORY DRAWING 10 AMPS OR LESS MAY BE OPERATED AND TERMINATED USING THE ACCESSORY POWER FEATURE INCLUDED IN THE DELUXE AUTOTHERM® SYSTEM. MOST OFTEN SELECTED ARE COMMUNICATION RADIOS, OR THE AM / FM RADIO AND / OR A POWER OUTLET LIKE A CIGAR LIGHTER [IF AVAILABLE] FOR CHARGING OR POWERING A CELL PHONE WITH THE ENGINE OFF. USING FIELD WIRING, TWO OR MORE ACCESSORIES CAN BE SIMULTANEOUSLY POWERED AS LONG AS TOTAL AMPERAGE DRAW DOES NOT EXCEED 10 AMPERES.

NOTE: A DRAW OF 10 AMPERES ADDED TO THE DRAW OF THE OPERATING AUTOTHERM® SYSTEM MAY OVER HOURS, DRAW DOWN THE BATTERY VOLTAGE ENOUGH TO CAUSE THE LOW VOLTAGE SENSOR TO TURN THE SYSTEM OFF. SELECT AND USE THESE ACCESSORIES JUDICIOUSLY.

7.14 INSERT WIRE ON SUPPLY [BATTERY] SIDE OF CUT INTO BUTT CONNECTOR ON ORANGE WIRE IN HARNESS 2E146T AND CRIMP. CONNECT LOAD [ACCESSORY] SIDE TO YELLOW WIRE IN HARNESS. CAUTION: DO NOT REVERSE THESE WIRES. REVERSING WILL CAUSE ACCESSORY NOT TO FUNCTION AND MAY CAUSE DAMAGE. CONNECTION TO ACCESSORY IS NOW COMPLETE.



SECTION VIII

RUN-UP AND TEST

NOTE: IF YOU ALREADY KNOW HOW THE SYSTEM FUNCTIONS, SKIP TO SECTION 8.2

8.0 REQUIREMENTS FOR SYSTEM TO OPERATE

The following four things must occur in any sequence before the System will function: 1) the system on/off switch must be on, 2) vehicle battery voltage as measured by the voltage monitor in the CCU, must be above 12.0 volts [green LED not flashing], 3) the water temperature sensor in the pump must sense engine coolant temperatures as being above 140°F. This means the vehicle has to have been driven recently with the heater on and operating [hot water to have flowed through the pump and the vehicle heater] before the pump sensor closes the circuit, 4) the ignition switch [key] must be in the off position [ignition key may be removed or left in place]. Once engine has reached operating temperature, the system turns on and off automatically with the ignition key; on when the key is turned off and off when the ignition key is turned on. **NOTE:** *system will not function with key in accessory position.*

8.1 HOW SYSTEM OPERATES

The battery voltage monitor located in the CCU, monitors vehicle battery voltage 24/7 with the engine [ignition] and Autotherm® system on or off. It indicates a low battery voltage [50% discharged] by flashing the indicator light located in the switch. If the Autotherm® is on, it terminates System operation and flashes the green LED indicating to driver that operation has terminated because of low vehicle battery voltage. Driver should not ignore low battery signal; monitor is more accurate than voltmeter on dash!

8.11 The Autotherm® on/off switch can be turned on at the beginning of the heating season and left on. This automatically continues heater operation whenever the ignition is turned off maintaining the same comfort level as if the vehicle were being driven or the engine idled. The driver can occupy a warm vehicle interior for an extended period or leave it and return at a later time to a warm interior with the exterior free of snow and ice and ready to drive.

8.12 The length of heating depends on two factors, the ambient temperature and the size of the vehicle's cooling system. A medium duty truck cab interior can stay warm if it was first driven under load, for two hours at freezing. At the end of the heating cycle, the System automatically turns off when engine coolant drops to 95°F not the ambient temperature. At the end of day cab operations however, when an extremely cold night is anticipated, the on/off switch should be turned off to conserve battery power for a cold morning start.

8.13 Fan speed should always be set at lowest speed setting capable of maintaining a comfortable interior but never higher than low – medium. Higher speeds significantly shorten the heating times and higher speeds cause a more rapid battery drain that may trigger low voltage battery shutoff as noted by flashing green indicator light. Always increase or decrease heating needs using the temperature setting control and not by increasing fan speed. Fan speed set higher than medium will cause the primary battery voltage protector to prematurely and quickly terminate system operation even before the battery voltage monitor does. If this primary protector functions, there will be no flashing green light [green light will be off]. Turn on/off switch off and wait for five or ten minutes for the switch to cool and reset.

8.14 Long term occupation of a vehicle not equipped with an automatic temperature control heater, may require the driver to periodically and manually adjust upward the temperature control setting in order to maintain interior comfort as the engine coolant cools down toward the automatic shut-off temperature of 95°F.

8.2 TESTING SYSTEM AFTER INSTALLATION.

After installation, check that all harnesses are plugged into CCU. Do not place CCU and harnesses into final space behind storage bin. Start engine and preferably drive or idle at high idle to warm engine.

8.21 During warm-up, turn the Autotherm® switch to on, set heater to max heat and low or low medium fan speed. Hot engine coolant must flow through pump to turn sensor in pump on when water reaches 140°F. Dependant how cold the vehicle engine was at start-up, warming the pump sensor may take 30 to 45 minutes. We recommend driving to shorten warm-up period.

8.22 Note: upon engine start-up, green led should have stopped flashing. Indicator LED in switch remains dark when engine runs unless there is a low battery voltage condition. If LED continues to flash with engine on, see trouble shooting guide.

8.23 When thoroughly warmed, turn engine off. Green LED comes on and heater fan continues to operate maintaining interior warmth wherever it was set. Fan should operate at any speed. Do not leave fan speed on high setting for more than a few seconds or primary overload protector will shut system off because of high current draw. Slowly adjust temperature setting from coldest to warmest and back. Note change from little or no heat to full warmth. Run through mode settings. All should function as if engine were running.

8.24 Turn Autotherm® Switch off. Green LED should go out and heater should stop working. Again turn Autotherm® switch on. Green LED should come on and heater and fan should operate normally.

8.25 Turn ignition [engine] on. Green LED in on/off switch should go off and heater should operate normally. Run through fan speed settings, temperature settings and mode selector. All heater functions should operate normally.

8.26 If vehicle is more than a year old, check battery terminals for corrosion. Clean and protect terminals and check the condition of the battery using a load tester. Charge or replace it if it does not meet minimal standards. Note: the Autotherm® System draws about one Ampere from the battery while operating. Most of the current is drawn by the heater fan typically between 6 and 10 Amperes at low or low medium speeds. For each hour of operation this adds up to a draw of 6 to 10 amp-hours for each hour of operation. This is a miniscule draw from a well maintained battery. Most well maintained truck batteries will easily supply this low current draw for many, many hours without lowering battery voltage to the point of shut-off at 12 Volts.

8.3 COMPLETING INSTALLATION

Use wire ties to secure all harnesses to existing vehicle cables and move CCU with plugged-in harnesses toward rear of opening. Leave enough slack to bring CCU forward again for possible future access. Secure CCU against bounce and vibration using wire ties, Velcro or screws if practical. Replace storage box and reinstall all other dash panels and fittings. Installation and testing is complete. Clean-up debris and remove tools.

8.31 Autotherm® requires no periodic service or maintenance and should last the life of the vehicle. The magnetically coupled pump is seal-less and is guaranteed not to leak [except at the hose connections]. However, after long term use, motor brushes may wear out requiring eventual pump replacement. See warranty for details.

8.32 Place driver's instructions for operating the System so driver can find it. Place installation and product warranty with vehicle papers.

LIMITED NEW VEHICLE PRODUCT WARRANTY

AUTOTHERM Division, Enthel Systems, Inc. through International Truck and Engine Corporation and its Authorized Dealers, warrants the **AUTOTHERM**® System to be free of component defects in material and workmanship for two years from date of delivery of the new vehicle on which it is factory installed. It further warrants the circulating pump not to leak engine coolant [excluding hose connections] for the life of the original installation. Claims must include return of defective item, date of vehicle purchase, vehicle model and model year and VIN number. Customer claims made through International Truck Dealers may substitute serial number of component, vehicle model, model year and VIN number. Claims for installation workmanship are covered under International Truck and Engine Corporation factory warranties on new vehicles and by the installing Dealer on aftermarket installations.

All warranties assume the installation is performed essentially as directed in the detailed installation instructions on vehicles where the System is aftermarket installed. Improper System functioning or damage to vehicle or product due to misinterpretation of instructions, failure to follow directions, or other defects determined to be caused by neglect to follow installation directions or cautions, are not covered by this warranty. The sole judges determining the nature or cause of defects, and the decision to repair or replace, shall be made by the company's engineers, officers or empowered representatives. No decision shall be deemed precedent setting or obligate the company to do likewise under similar circumstances.

Return of components or systems under this warranty must have prior authorization in the form of a return goods authorization number obtained by phone or FAX. Collect shipments will not be accepted and repaired or replaced items will be returned shipping prepaid by Company.

No claim is made by **AUTOTHERM** Division of Enthel Systems, Inc. as to fitness or merchantability of the **AUTOTHERM**® system for any purpose or function other than when properly installed, to continue the operation of the vehicle's existing heater when installed in a vehicle powered by a water cooled engine, by automatically powering and terminating the heater's operation while continuing the flow of hot engine coolant to the heater with the engine [ignition] off.

This written warranty is the sole remedy for all **AUTOTHERM**® Post Vehicle Operation, No Idle Heating System claims and may not be modified verbally or in writing without the written consent of one of its officers. Defects caused by improper or negligent installation or the installer's failure to understand or follow the attached instructions is beyond the control of the company and is not covered under this warranty.

Remedies provided for in the above express warranty are the sole and exclusive remedies made or implied. Therefore, no other express or implied warranties are made by **AUTOTHERM** Division, of Enthel Systems, Inc. and the company shall not be liable for indirect, incidental or consequential damages, even if previously advised of such damages or the likelihood thereof.

Additional product information and Product Return Authorization may be obtained by phone at 847-726-1717, FAX at 847-726-1414, by e-mail to dboyer@autothermusa.com. Additional information can be had by checking the Companies web-site @ www.autothermusa.com.

CONDENSED INSTALLATION INSTRUCTIONS

SECTION I - INSTALLATION OF PUMP

- 1.0 CLAMP HOSE ON ENGINE SIDE OF HOSE LOCATION WHERE PUMP WILL BE INSTALLED. **SEE FIG. 2.**
- 1.1 INSTALL PUMP IN HOSE FROM TOP OF ENGINE TO HEATER INLET. INSTALL WITHIN 8" – 12" FROM A HOSE SUPPORT.
- 1.2 SEE FLOW DIRECTION ARROW ON PUMP. INSTALL PUMP IN HOSE SO ARROW POINTS TOWARD HEATER. **SEE FIG. 2**
- 1.3 CUT HOSE SQUARE. SLIP CLAMPS ON HOSE WITH SCREW FACING INSTALLER. BUTT HOSE TO STOP ON PUMP NIPPLE.
- 1.4 ORIENT PUMP IN HOSE HORIZONTALLY, UP VERTICAL OR DOWN VERTICAL. PUMP CAN BE PLACED IN ANY POSITION.
- 1.5 PLACE EDGE OF CLAMPS OVER CUT EDGE OF EACH HOSE AND TIGHTEN TO 30 TO 35 IN. LBS. TORQUE.
- 1.6 PLUG HARNESS [E116T PUMP HALF] INTO PUMP AND SNAKE HARNESS THROUGH A PASS-THRU IN FIREWALL LOCATED ON DRIVER'S SIDE. SECURE HARNESS WITH WIRE TIES IN ENGINE COMPARTMENT. AVOID WIPER ARMS.

SECTION II

LOCATE MICRO CCU FOR EASY PLUG-IN WIRING

- 2.0 REMOVE OPEN BOX IN CENTER OF DASH BOARD.
- 2.1 LOCATE CCU HERE AND DIRECT PLUG END OF ALL HARNESS TOWARD THIS LOCATION. **SEE FIG. 7**

SECTION III

INSTALLING ON/OFF SWITCH AND/OR HOUR METER ON DASH PANEL

- 3.0 REMOVE DASH PANEL **FIG. 9** & USING **FIG. 10** TEMPLATE, DRILL FOUR 1/8" HOLES WITHIN FOUR CORNERS OF TEMPLATE.
- 3.1 DRILL LARGER HOLES WITHIN RECTANGLE. INSERT FLAT FILE. FILE FOUR STRAIGHT SIDES TO MAKE 1" X 1-1/2" OPENING.
- 3.2 LOCATE CENTER OF ON/OFF SWITCH HOLE. LEAVE ROOM FOR SWITCH PANEL BELOW HOUR METER IF METER IS USED.
- 3.3 DRILL PILOT HOLE. ENLARGE IN STEPS OR WITH STEP DRILL TO MIN 7/8" MAX 1".
- 3.4 CONNECT WIRES IN [HARNESS 2E139T HOUR METER] –RED TO TERM. **N**, BLACK TO TERM. **N**, ORANGE TO TERM. **I**. **FIG. 12.**
- 3.5 PASS HARNESS PLUG INTO METER OPENING AND SNAP HOUR METER CORRECT SIDE UP, INTO RECTANGULAR HOLE.
- 3.6 PASS ON/OFF SWITCH PLUG THRU SWITCH HOLE. PEEL ADHESIVE COVERING FROM PLATE, ALIGN SQUARE AND PLACE.
- 3.7 PRESS ALL EDGES OF ON/OFF SWITCH PLATE TO PANEL AND PEEL BLUE COVERING FROM HOUR METER AND DISCARD.

SECTION IV

INSTALLING CCU HALF OF PUMP HARNESS TO PUMP HALF

- 4.0 SNAKE [HARNESS1E116T CCU HALF] FROM CCU LOCATION ALONG BACK OF DASH TOWARD PUMP HALF ON LEFT SIDE.
- 4.1 SLIP SHRINK TUB OVER ONE OF THE HARNESSES AND BEGIN CONNECTING STAGGERED WIRES. **SEE FIG. 13.**
- 4.3 CRIMP COLORS IN ONE HARNESS TO SAME COLORS IN OTHER. WIRES ARE STAGGERED FOR EASY FIT. **SEE FIG. 13.**
- 4.4 SLIP SHRINK TUBING OVER CONNECTION AND SHRINK EVENLY WITH HEAT GUN.
- 4.5 DRESS AND FASTEN PUMP HARNESS BEHIND DASH AND INSERT PLUG INTO CCU RECEPTACLE.

SECTION V

CONNECTING CCU TO HEATER

2008 AND FORWARD MODELS

- 5.0 SNAKE [HARNESS 2E141-T OR NAV2E141-T] FROM CCU LOCATION TOWARD POWER DISTRIBUTION BOX ON RIGHT DASH.
- 5.1 LOCATE WIRE A73A AT FUSE F4-L AND CUT 3" FROM FUSE AND STRIP BOTH SIDES OF CUT 1/4". **SEE FIG. 14 & FIG. 8.**
- 5.2 LOCATE WIRE A75B AT FUSE F4-M AND CUT 3" FROM FUSE. FOLD FUSE END AND TAPE. STRIP 1/4" FROM OTHER END.
- 5.3 CRIMP WIRE A73A ON FUSE F4-L SIDE OF CUT TO ORANGE WIRE IN [FAN / HEATER HARNESS 2E141T OR NAV2E141T].
- 5.4 TWIST TOGETHER WIRES A73A & A75B ON LOAD [HEATER] SIDE OF CUT AND CRIMP TO YELLOW WIRE IN SAME HARNESS.

SECTION VI

CONNECTING CCU TO POWER

- 6.0 SNAKE POWER [HARNESS 2E140-T] FROM CCU LOCATION TOWARD POWER DISTRIBUTION BOX ON UPPER RIGHT DASH.
- 6.1 LOCATE AN EMPTY FUSE SPACE AND PREPARE IT FOR A MANUAL RESET MINI CIRCUIT BREAKER. **SEE FIG. 15**
- 6.2 PLUG IN 10 AMP BREAKER IF NO ACCESSORY CONNECTION IS MADE OR 15 AMP IF AN ACCESSORY WILL BE POWERED.
- 6.3 CONNECT RED WIRE IN [POWER HARNESS 2E140-T] TO OUTPUT SIDE OF ABOVE CIRCUIT BREAKER.
- 6.4 CONNECT BLACK WIRE IN [HARNESS 2E140-T] TO A GOOD GROUND.

- 6.5 ON NON HYBRID VEHICLES, CONNECT WHITE WIRE TO ANY CIRCUIT THAT GOES ON AND OFF WITH IGNITION.
- 6.6 ON HYBRID VEHICLES, WHITE WIRE MUST BE LOCATED TO A SPECIAL POSITION AND COMPUTER DATA DOWN LOADED.
- 6.7 FOR MORE INFORMATION CALL 260-428-3625.

SECTION VII INSTALLATION OF ACCESSORY POWER

- 7.0 LOCATE RELAY SOCKET OF **ACCESSORY POWER HARNESS 2E146-T & 3E146-T** IN CCU AREA AND PLUG IN RELAY.
- 7.1 SNAKE **2E146-T** SECTION FROM CCU LOCATION TOWARD SELECTED ACCESSORY. **SEE FIG. 16.**
- 7.2 LOCATE POWER SUPPLY TO ACCESSORY AND CUT AT ACCESSIBLE LOCATION AND STRIP CUT ENDS OF WIRES.
- 7.3 CRIMP YELLOW WIRE IN **HARNESS 2E146-T** TO ACCESSORY [LOAD] SIDE OF CUT, ORANGE TO SUPPLY [BATTERY] SIDE.
- 7.4 PLACE 10 AMP FUSE IN MINI FUSE HOLDER IN RED WIRE AND CONNECT TO CONSTANT ON BATTERY SOURCE.
- 7.5 LOCATE FUSE IN AN ACCESSIBLE LOCATION.
- 7.6 ALTERNATE CONNECTION LOCATION CAN BE MADE AT POWER DISTRIBUTION BOX BY PREPARING A FUSE CONNECTION.
- 7.7 INSERT 10 AMP FUSE, CUT FUSE OFF RED WIRE AND CONNECT REMAINING WIRE TO POWER DISTRIBUTION BOX FUSE.
- 7.8 INSERT PLUG ON **HARNESS 3E146-T** INTO PIGTAIL ON HOUR METER **HARNESS 3E139-T** OR CCU HOUR METER PLUG.

SECTION VIII RUN-UP AND TEST

- 8.0 REPLACE DASH PANEL ON WHICH SWITCH / HOUR METER ARE MOUNTED AND FASTEN PANEL TO DASH.
- 8.1 PLUG ALL CONNECTORS INTO CCU FIRST AND **POWER HARNESS 2E140-T** LAST. GREEN LED SHOULD LIGHT AND BLINK.
- 8.2 TURN ON/OFF SWITCH ON; SYSTEM SHOULD NOT RUN AND LED SHOULD BLINK WITH SWITCH IN EITHER POSITION.
- 8.3 START ENGINE. GREEN LED SHOULD STOP BLINKING. TURN SYSTEM SWITCH ON AND OFF. LED SHOULD NOT LIGHT.
- 8.4 TURN HEATER FAN ON LOW OR MEDIUM AND SET HEAT CONTROL TO MAX. RUN ENGINE UNTIL FULLY WARMED.
- 8.5 WITH AUTOTHERM® SWITCH ON, TURN IGNITION OFF. GREEN LED SHOULD COME ON AND HEATER SHOULD OPERATE.
- 8.6 TURN SYSTEM SWITCH OFF. HEATER SHOULD STOP OPERATING AND GREEN LED SHOULD TURN OFF.
- 8.7 TURN SYSTEM SWITCH ON AND LET HEATER RUN WITH FAN ON LOW OR LOW MEDIUM SPEED.
- 8.8 HEATER WILL STOP OPERATING AUTOMATICALLY WHEN ENGINE COOLANT REACHES 95°F.
- 8.9 TUCK HARNESSES & FASTEN CCU AT REAR OF OPENING. REINSTALL & FASTEN BOX AND TRIM & CLEAN UP DEBRIS.
- 8.10 LEAVE INSTALLATION INSTRUCTIONS WITH VEHICLE PAPERS & DRIVER'S INSTRUCTIONS SO HE HAS READY ACCESS.

TROUBLE SHOOTING GUIDE

TROUBLE DESCRIPTION AND SYMPTOM	CORRECTIVE ACTION
JUST FINISHED AN INSTALLATION, GREEN LED FLASHES WITH ON/OFF SWITCH ON OR OFF.	When an installation is completed and power [battery+] is connected to CCU, the LED flashes until the system [battery] voltage is elevated to the reset voltage by the alternator upon starting the engine..
STARTED ENGINE TO RESET THE VOLTAGE SENSOR THEN SHUT ENGINE OFF AND TURNED AUTOTHERM SWITCH ON; HEATER [FAN] AND PUMP STILL DO NOT WORK.	System will not operate until engine coolant is thoroughly warmed up and the heater has been operated [hot water flowing through the pump]. Pump must sense 140°F or hotter to turn Autotherm® on. Run engine [drive vehicle] with heater on until engine is thoroughly warmed.
AUTOTHERM® FUNCTIONS FINE BUT TURNS OFF AND STAYS OFF SHORTLY AFTER THE ENGINE IS TURNED OFF AND THE LOW VOLTAGE LED ISN'T FLASHING LOW VOLTAGE SHUT OFF. WHAT'S HAPPENING?	Primary protector against high fan speeds, the type II circuit breaker, is turning System off because fan speed is set too high. Turn System off at switch or start engine and circuit breaker will reset in a few minutes. High fan speeds significantly shorten Autotherm® run times and may reduce battery voltage and trigger a Low battery Voltage shutoff. When interior becomes comfortable during driving turn fan speed to low medium
AUTOTHERM® WAS RETROFITTED ONTO AN OLDER MODEL VEHICLE. WHEN THE IGNITION IS TURNED OFF, SYSTEM RUNS FOR A SHORT TIME THEN TURNS OFF AND THE GREEN LED FLASHES.	This is a low battery voltage shut-off. Check for good ground and measure voltage at battery+ connection of red wire in POWER HARNESS 2E140-T. If low relocate to another B+ buss closer to battery. Check battery terminals for corrosion and clean. Check battery condition using a load type tester. Replace all batteries if tested defective or marginal.
AUTOTHERM® IS INSTALLED ON A NEW VEHICLE AND ENGINE IS THOROUGHLY WARM. HEATER IS WORKING FINE WHEN ENGINE IS RUNNING. WHEN ENGINE IS TURNED OFF, INSTRUMENT PANEL LIGHTS AND OTHER SYSTEMS COME ON INSTEAD OF AUTOTHERM®.	Check CCU's connection to heater [fan]. Heater [fan] HARNESS 2E141-T OR HARNESS NAV-2E141-T yellow and orange wires are reversed. Orange wire goes to supply [B+ (fuse)] side of cut and yellow wire to load {heater (fan)} side of cut. See Section VI FIG. 14.
THIS IS A NEW INSTALLATION; EVERYTHING FUNCTIONS WITH ENGINE RUNNING OR OFF AND ENGINE COOLANT IS HOT AND CAB IS WARM WHEN IDLING. A FEW MINUTES AFTER IGNITION IS TURNED OFF, COLD AIR BEGINS TO BLOW FROM HEATER. PUMP IS RUNNING BUT HOSE FROM ENGINE TO PUMP IS GETTING COOL.	Check location and elevation of pump in heater hose. Pump must be <u>BELOW</u> the lowest level engine coolant is expected to drop to in normal operation. Pump is not a suction type pump and must be wet [below the top of the coolant] at all times. <i>Lower the level of pump in the hose [also put a slight dip in the hose] so pump is below lowest level in radiator or overflow tank.</i>
PUMP RUNS EVEN WHEN THE ENGINE [IGNITION] IS ON AND GREEN LED IS ALWAYS ON. BOTH TURN OFF THOUGH WHEN THE AUTOTHERM® DASH ON/OFF SWITCH IS TURNED OFF.	Check white wire's connection in POWER HARNESS 2E140-T to ignition on/off source. White wire has no power and system is always on unless it is turned off manually. Relocate white wire to any source that goes <u>ON</u> with ignition and <u>OFF</u> when ignition is turned off.
ON A NEW INSTALLATION. HEATER WORKS FINE WHEN ENGINE IS RUNNING BUT AUTOTHERM® SYSTEM DOES NOT WORK EVEN WHEN ENGINE IS HOT AND IGNITION IS TURNED OFF. NOTHING HAPPENS WHEN AUTOTHERM® SWITCH IS TURNED ON OR OFF. GREEN LED NEVER COMES ON.	Check white wire's connection in POWER HARNESS 2E140-T to ignition on/off source. White wire is connected to a constant on power source which indicates to CCU that ignition is always on. Relocate white wire to any source that goes <u>ON</u> with ignition and <u>OFF</u> when ignition is turned off.
SYSTEM WORKS FINE EXCEPT WHEN I TURN IGNITION KEY TO ACCESSORY TO LISTEN TO RADIO. THEN AUTOTHERM® SYSTEM TURNS OFF TOO.	Ignition key must be off for Autotherm® System to work. Install accessory kit HARNESS 3E146-T to power up any accessory drawing 10 amps or less. Accessory operation terminates when Autotherm® operation terminates but operates normally when engine is running. Plug accessory harness into HOUR METER PIGTAIL on CCU.
AUTOTHERM® HAD BEEN OPERATING FINE UNTIL WE HAD TO REPLACE THE OLD BATTERIES. WHEN THE NEW BATTERIES WERE CONNECTED, THE LOW VOLTAGE LED BEGAN TO FLASH AGAIN AS IT HAD WITH THE OLD BATTERIES.	Each time the CCU is disconnected from battery, the engine must be started so the engine alternator can elevate the vehicle's electrical system to the Voltage Sensor's reset voltage. This happens each time a low voltage shut-off occurs or battery is disconnected from vehicle.
ON A NEW INSTALLATION, AUTOTHERM® SYSTEM OPERATES FINE FOR 10 -15 MINUTES THEN SHUTS OFF.	Check point at which white wire in POWER SUPPLY HARNESS 2E140-T is located. It is connected to a timed vehicle circuit which permits operation of vehicle accessories like power windows, power seats and radios for a timed period after ignition is off. Relocate white wire to any source that goes <u>ON</u> with ignition and <u>OFF</u> when ignition is turned off.