MICRO-FLO® TNT

SEPTEMBER 1986

Solar Domestic Hot Water System

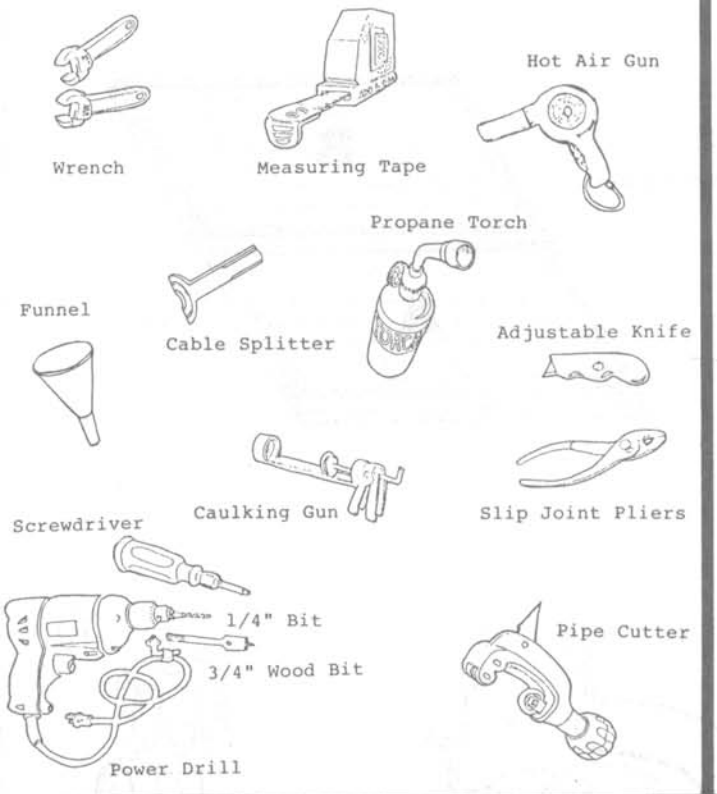
Guide for Easy, Trouble-free Installation

Sunstrip International Inc. MICRO-FLO system is an entirely new concept in the field of solar heating systems

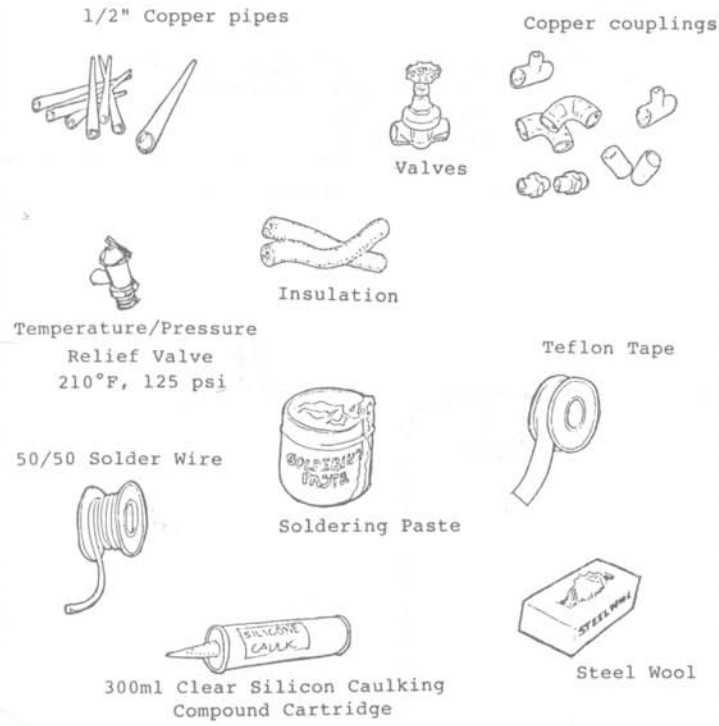
The entire system, down to each of its components, has been specifically designed for simplified installation resulting in significantly decreased installation costs. This manual outlines everything you need to know to successfully complete the installation of your MICRO-FLO system. If you take the time to follow the clear description and illustrations you should be able to perform a first rate installation job.

NOTE: We recommend that you study this manual prior to starting installation work in order to avoid frequent interruptions to your work due to the lack of required materials or knowledge.

NECESSARY TOOLS



NECESSARY INSTALLATION HARDWARE



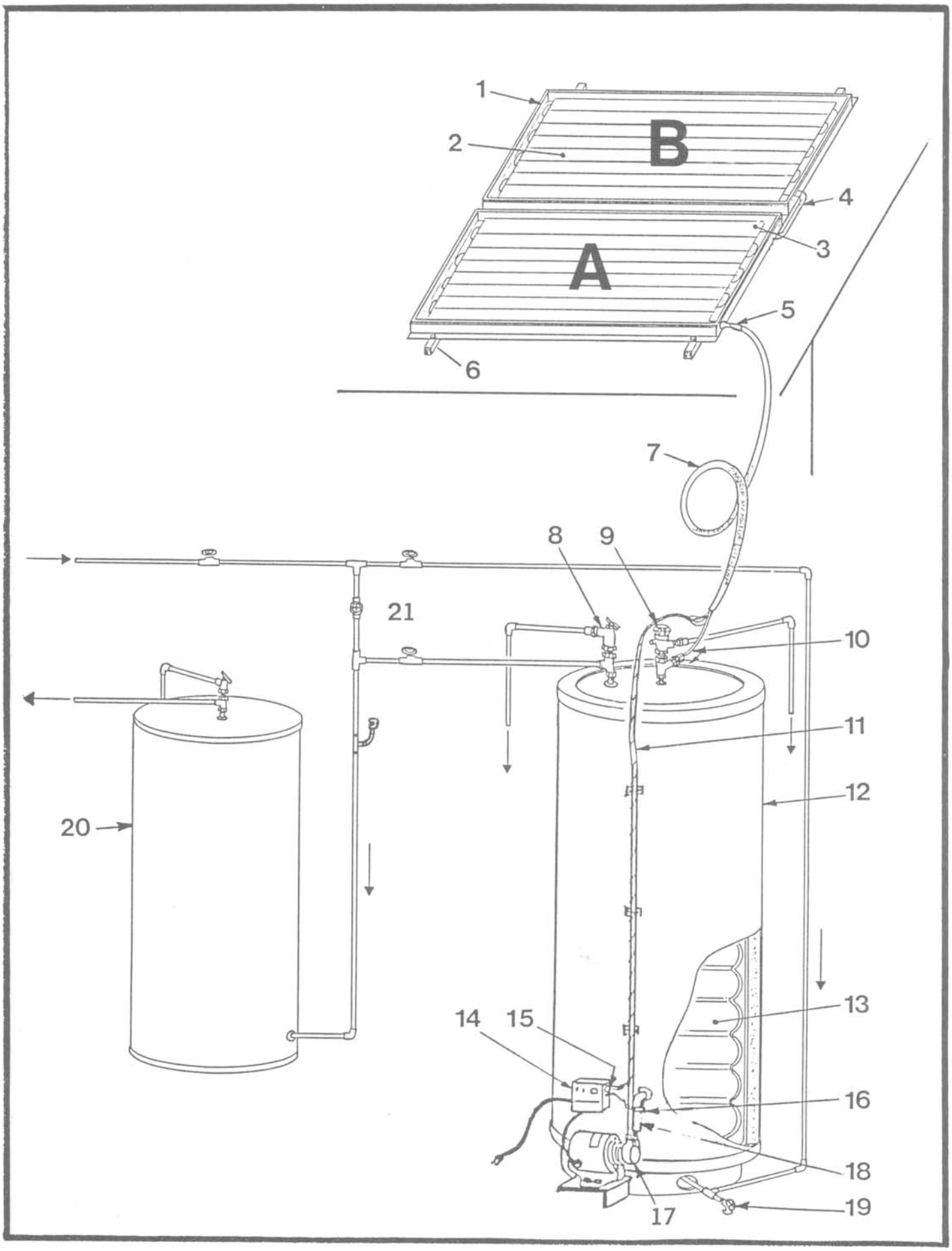
AUTHORIZED DEALER

SUNSTRIP INTERNATIONAL, INC.

UNE DIVISION DE A WHOLLY OWNED SUBSIDIARY OF PETRO-SUN international inc

LEGEND

1. MICRO-FLO COLLECTORS
2. SUNSTRIP'S MICRO-FLO ABSORBER PLATE
3. COLLECTOR SENSOR
4. MICRO-FLO COLLECTOR INTERCONNECTIONS
5. LIFE-LINE PIPING CONNECTIONS
6. SUPPORTING STRUTS
7. INSULATED AND COLOR CODED LIFE-LINE HOSE SET
8. INNER TANK TEMPERATURE/PRESSURE RELIEF VALVE (125 PSI, 210 DEG. F)
9. OUTER TANK PRESSURE RELIEF VALVE (15 PSI)
10. LIFE-LINE COLLECTOR RETURN HOSE (RED HOSE)
11. LIFE-LINE COLLECTOR SUPPLY HOSE (BLUE HOSE)
12. SUNSTRAT SOLAR TANK/HEAT EXCHANGER
13. INNER TANK (PRESSURIZED DOMESTIC WATER)
14. DIFFERENTIAL CONTROLLER
15. SENSOR WIRE CONNECTIONS TO CONTROLLER
16. STORAGE SENSOR
17. HIGH PRESSURE CIRCULATOR PUMP
18. SOLAR LOOP ISOLATING VALVE
19. DOMESTIC WATER DRAIN VALVE
20. EXISTING WATER HEATER
21. ISOLATION AND BYPASS VALVES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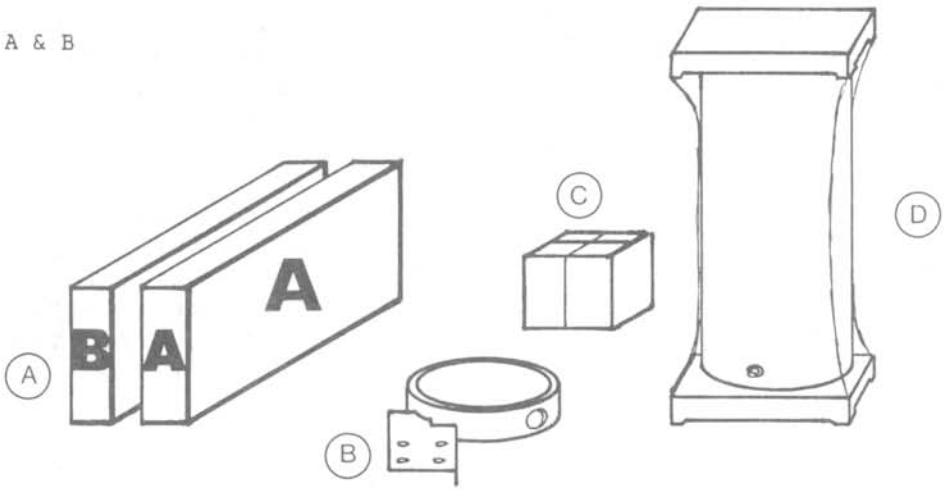
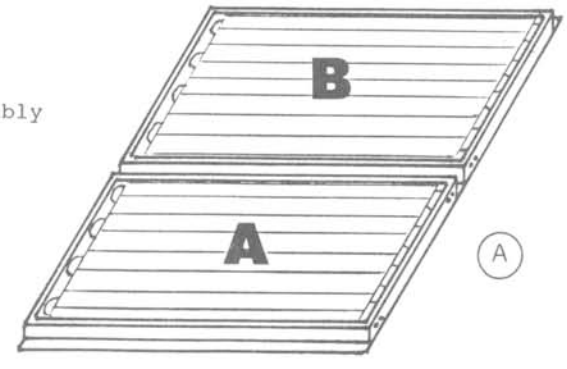
1 VERIFY THAT NONE OF THE FOLLOWING IS MISSING AND CHECK FOR OBVIOUS DAMAGE

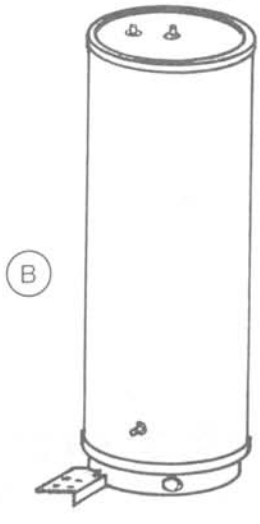
A. 2 collector boxes A & B
B. 1 solar tank base
C. 1 accessories kit
D. 1 solar tank

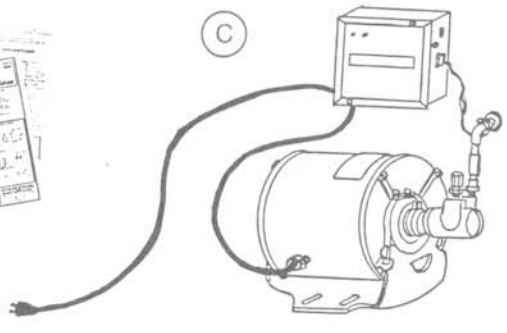


2 NOW OPEN THE BOXES AND VERIFY THAT YOUR SYSTEM CONTAINS THE FOLLOWING COMPONENTS

A. 2 MICRO-FLO solar collectors A & B
B. 1 SUNSTRAT solar tank and base
C. 1 Pump/controller set
D. 4 bolts, washers and nuts
E. 1 Pressure relief valve & collector return assembly
F. 2 Installation and maintenance manuals.







3 OPTIONAL ACCESSORY KITS

no. 1053 PARALLEL MOUNTING HARDWARE KIT FOR MICRO-FLO COLLECTORS

This kit is required for installing the collectors directly on a sloped roof. This type of installation is used when the slope of the roof is within the acceptable 20 deg. to 65 deg. range.

No. 1054 INCLINED MOUNTING HARDWARE KIT FOR MICRO-FLO COLLECTORS

This kit is required for installing the front or rear of the collectors at a specific distance from the roof. This type of installation is used with flat or gently sloped roofs.

No. 1047 MICRO-FLO SYSTEM INSTALLATION KIT

This kit is required for proper installation of the various components to the solar tank and collectors.

4 PLANNING OF SYSTEM INSTALLATION

System installation planning is important and must be done prior to starting any installation work. The key points are:

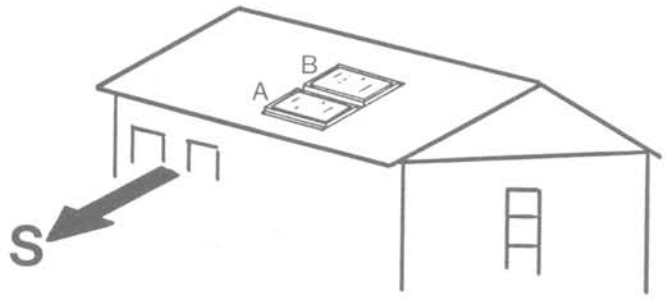
. the location of the solar collectors
. the location of the solar tank
. the routing of the system hose

A

THE MICRO-FLO SOLAR COLLECTORS

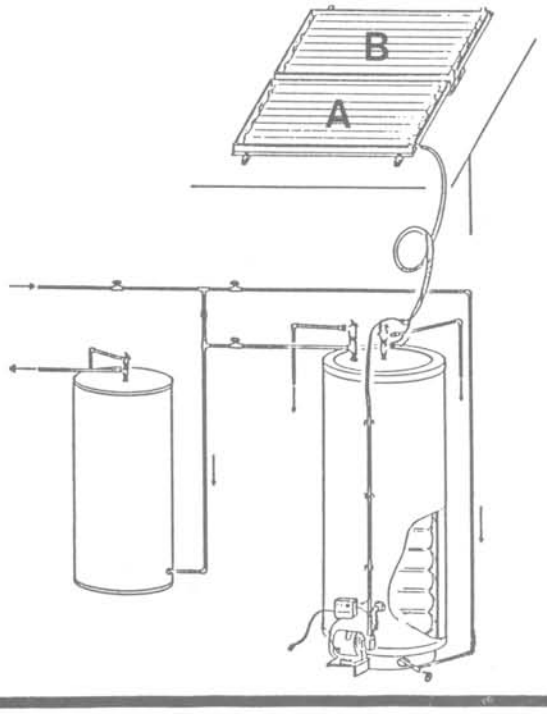
The solar collectors are each to be installed horizontally one above the other. The required space must be adequate for all day exposure to the sun.

True geographic south is the ideal bearing but a plus or minus 30 deg. deviation from this bearing is acceptable. Refer to the solar collector installation manual for more detailed information regarding collector installation.



B

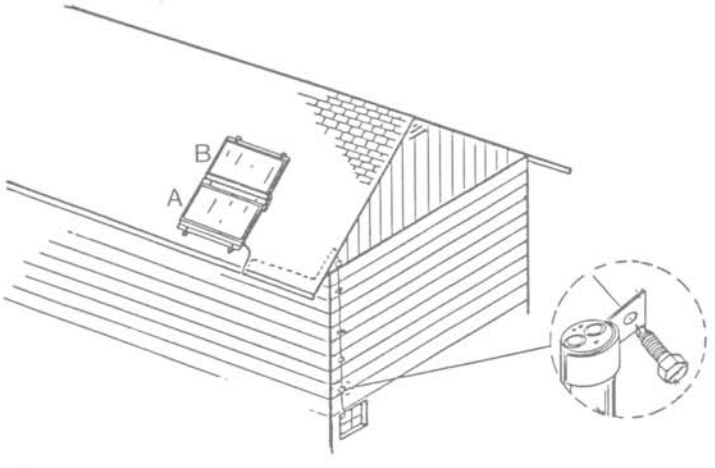
The SUNSTRAT solar tank should be located as close as possible to the existing water heater in order to reduce heat loss and copper piping interconnections (refer to steps 11 and 12). Free access to the front of the solar tank is required to allow installation of the controller/pump assembly.



C

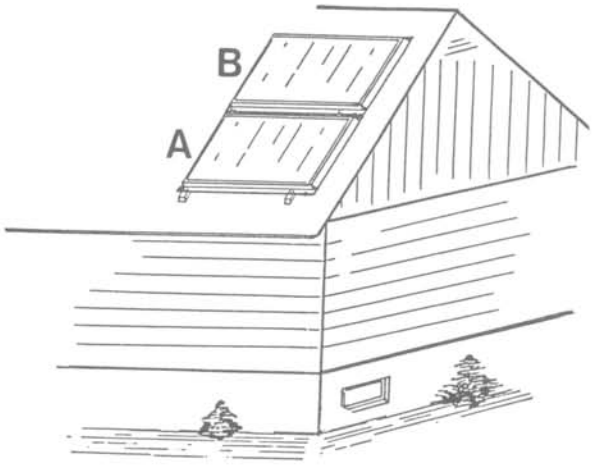
THE LIFE-LINE FLEXIBLE HOSE

The shortest routing between the collectors and the solar tank is best. Avoid horizontal routing along the roof and reverse slopes as much as possible in order to aid vacuum drainage of the solar circuit fluid.



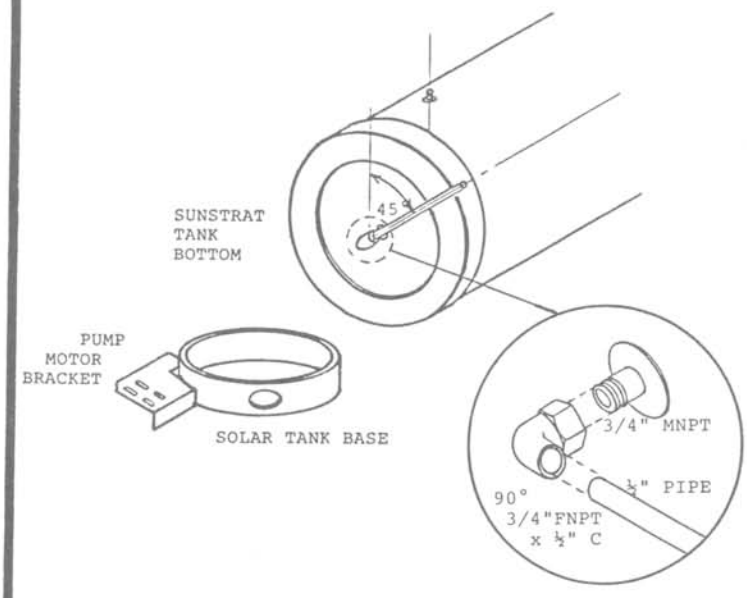
5 WE CAN NOW PROCEED WITH THE ACTUAL INSTALLATION WORK ! PLACE THE SOLAR COLLECTORS ON THE ROOF AND ATTACH THEM TO THE ROOF.

The MICRO-FLO solar collectors have been designed for horizontal installation. Refer to the solar collector installation manual for more detailed information regarding installation of the collectors.



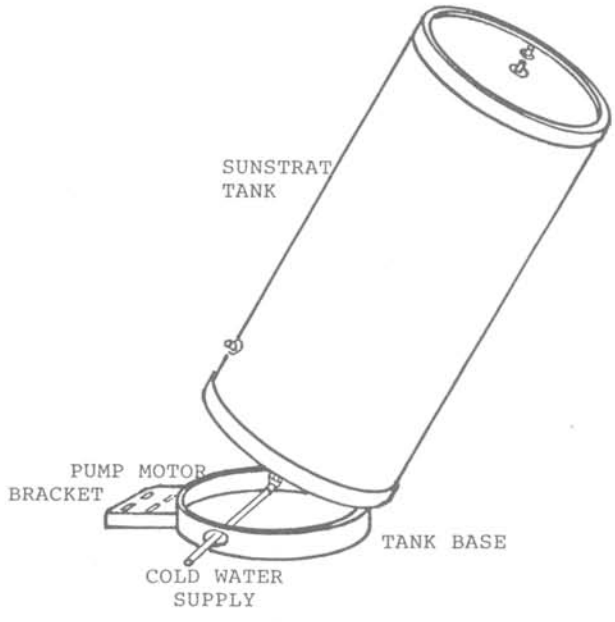
6 PLACE THE SOLAR TANK ON ITS SIDE NEAR ITS PLANNED LOCATION

Lay the solar tank on its side and connect the cold water pipe below the bottom of the solar tank. A drain valve must be installed to allow drainage of the internal pressurized tank (19). The hole in the base of the solar tank which is located at a 45 deg. angle at to the pump motor bracket is intended for the cold water pipe and ensures proper positioning of the bracket.



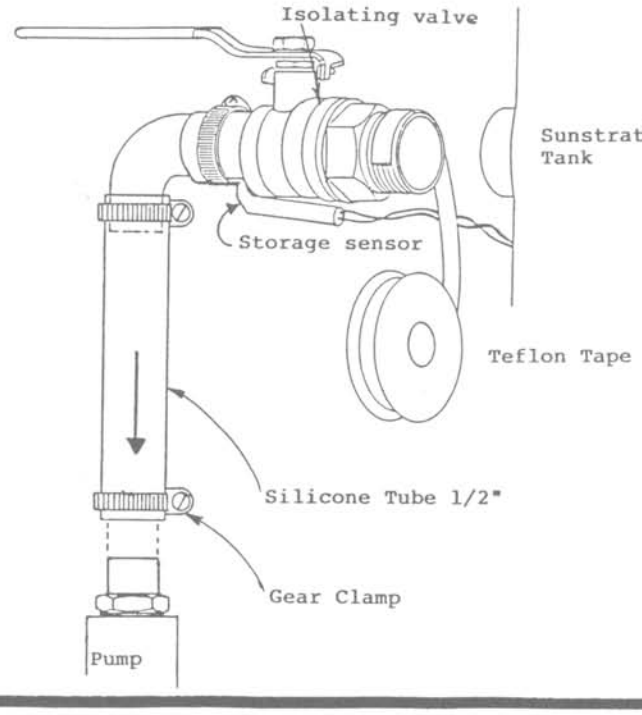
7 INSTALL THE SOLAR TANK IN THE VERTICAL POSITION ON ITS BASE AT THE REQUIRED LOCATION

Insert the cold water supply pipe in the tank base hole located on the right side of the front of the solar tank at a 45 deg. angle and place the solar tank on its base.



8 WE ARE NOW READY TO INSTALL THE PUMP/CONTROLLER ASSEMBLY

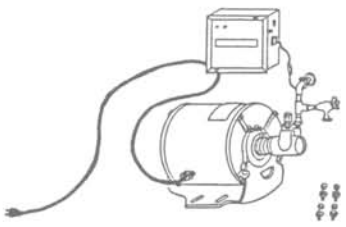
Screw directly the male portion of the isolating valve to the ½" female connection of the Sunstrat tank. Place teflon tape on the treads, prior to screwing onto the solar tank.

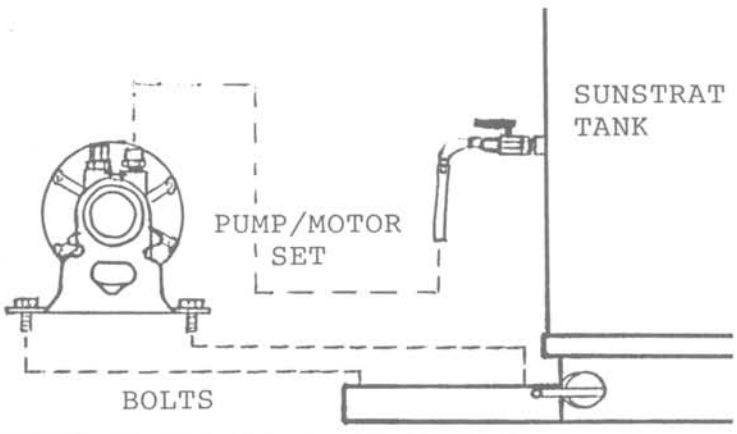


9 INSTALL THE PUMP ON ITS BRACKET

Install the motor/pump assembly on the tank base, cut the silicone hose at the right dimension, fix this hose on the inlet of the pump and screw the hose clamp.

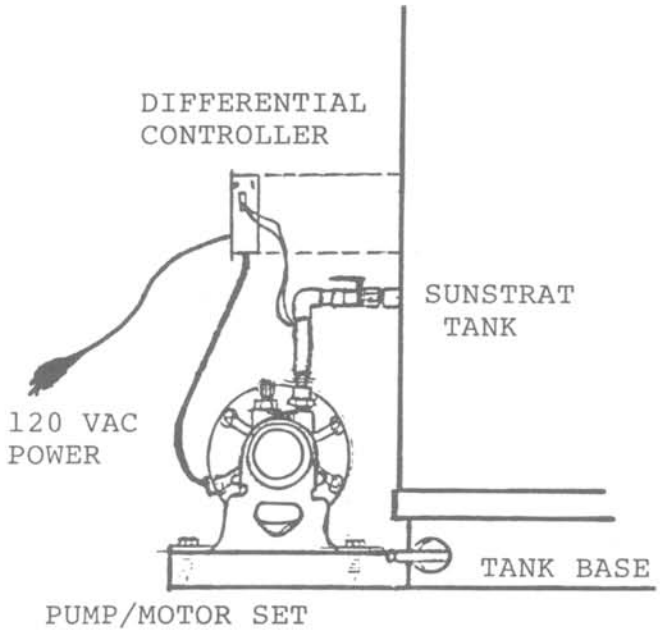
Install the pump on its bracket on the solar tank base using the four bolt washer and screws.



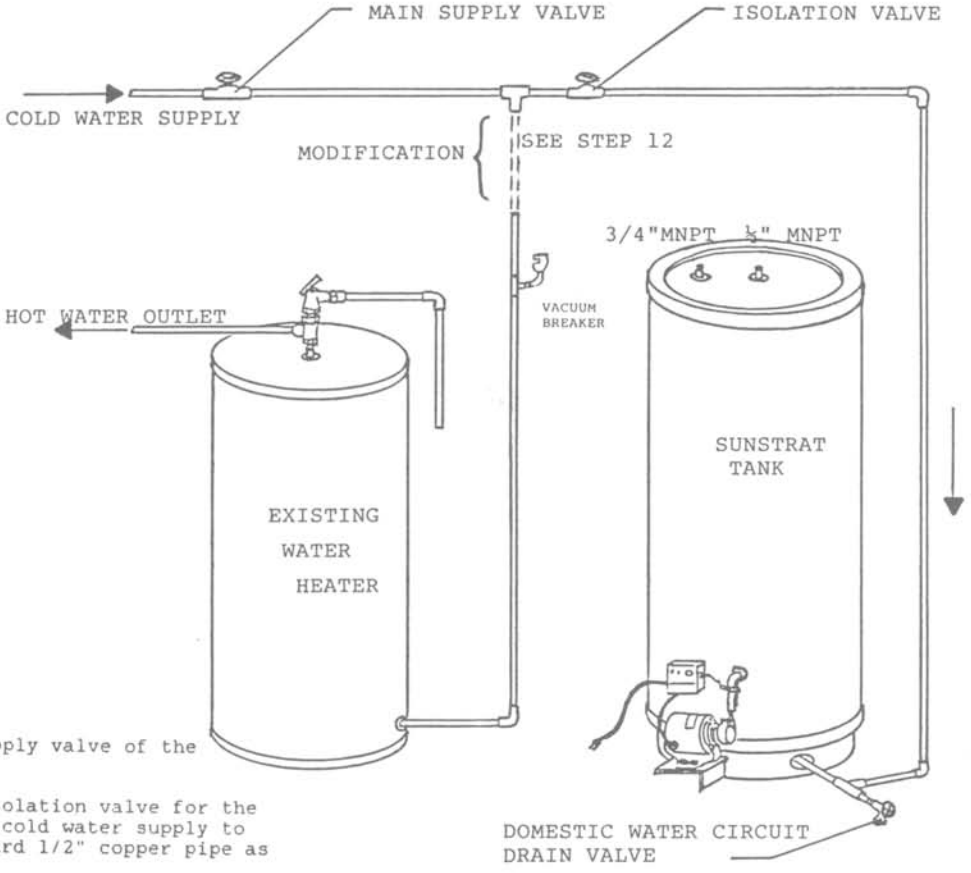


10 INSTALL THE DIFFERENTIAL CONTROLLER ON THE SOLAR TANK

Peel off the protective paper from the adhesive tape on the back of the controller and press the back of the controller to the solar tank.



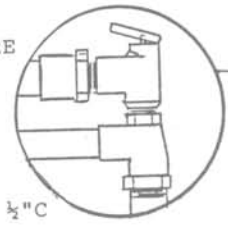
11 NOW CONNECT THE COLD WATER SUPPLY TO THE DOMESTIC WATER CIRCUIT OF THE SYSTEM



First, close the main cold water supply valve of the existing water heater.

Then install a T connector and an isolation valve for the solar heater system and connect the cold water supply to the SUNSTRAT solar tank using standard 1/2" copper pipe as shown.

12 CONNECT THE SUNSTRAT TANK TO THE COLD WATER PIPING OF THE EXISTING WATER HEATER

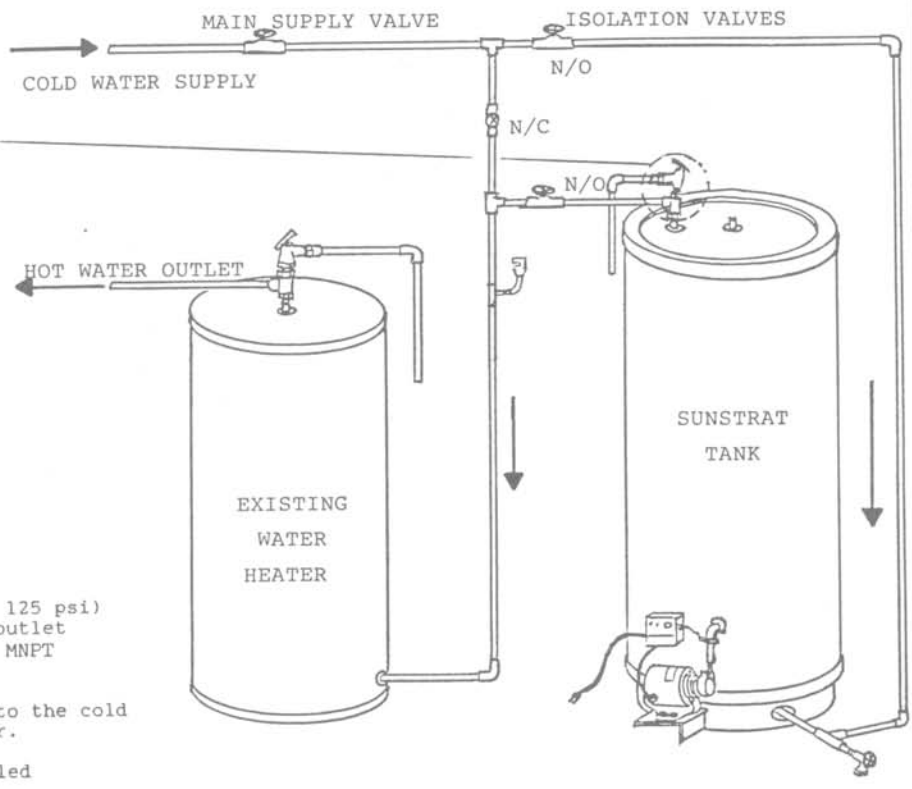


TEMPERATURE AND PRESSURE RELIEF VALVE (210°F, 125 psi)

TEE 3/4"FNPT x ½"FNPT x ½"C
+ WATTS 1XL ½"MNPT

OR

TEE 3/4"FNPT x 3/4"FNPT
x ½" C
+ WATTS 100XL 3/4" MNPT



A temperature/pressure relief valve (210 deg.F, 125 psi) must be installed at the pressurized hot water outlet connector of the SUNSTRAT solar tank (left 3/4" MNPT convection).

Connect the hot water outlet of the solar tank to the cold water supply piping of the existing water heater.

Isolation and bypass valves (21) must be installed

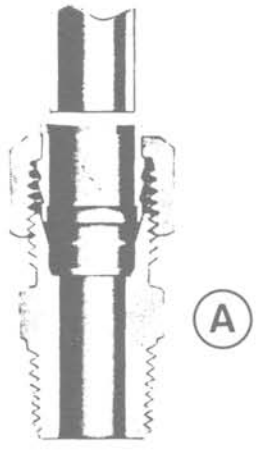
It is imperative that all local plumbing codes be observed for a safe installation.

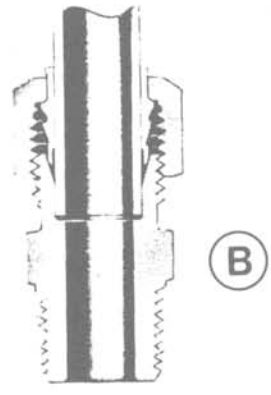
13 LETS BRIEFLY DISCUSS THE CONNECTORS OF THE SOLAR FLUID CIRCUIT LIFE-LINE HOSE

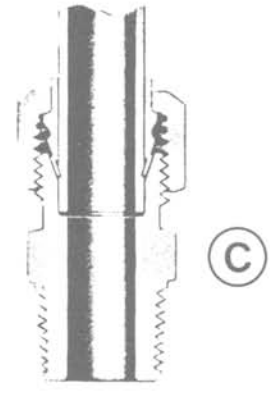
The mechanical connectors are designed to allow the nylon tubing to be inserted without removing the nut and bushing (A).

The Life-Line tubing is simply cut at a right angle and inserted through the nut and bushing until the bottom of the connector is reached (B)

The nut is then hand-tightened and beyond this point the nut is tightened for a SINGLE COMPLETE TURN using two wrenches. (C).





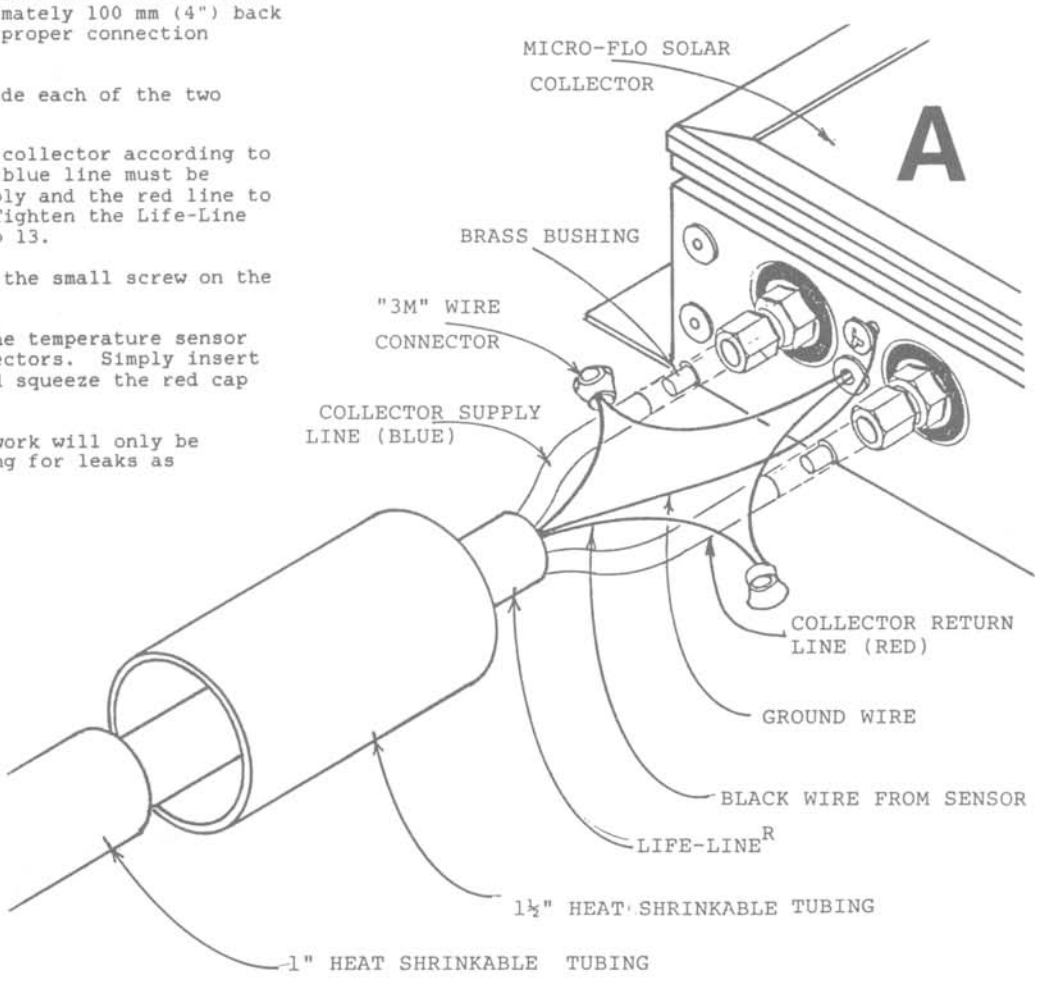


DO NOT OVERTIGHTEN

Overtightening can cause permanent connector and hose damage

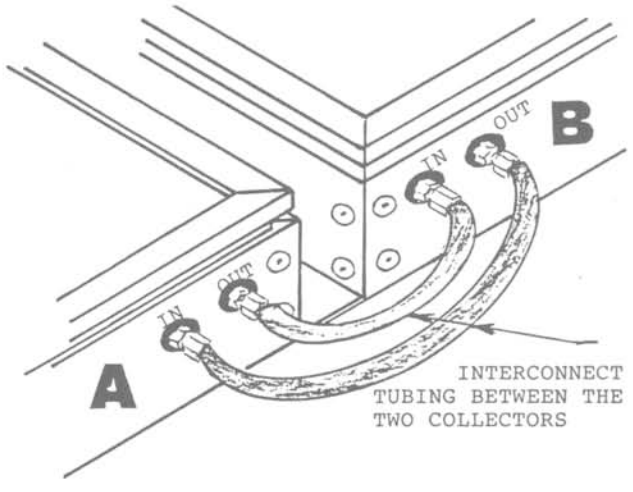
14 RETURNING TO THE ROOF, LETS CONNECT THE LIFE-LINE HOSE TO THE BOTTOM OF THE LOWER COLLECTOR

1. Slip the two heat shrinkable tubes over the Life-Line hose and strip the hose approximately 100 mm (4") back from the end of the hose for a proper connection (refer to step 16).
2. Slip a small brass bushing inside each of the two nylon collector lines
3. Connect the nylon lines to the collector according to the following color code: the blue line must be connected to the collector supply and the red line to the collector return outlet. Tighten the Life-Line connectors as indicated in step 13.
4. Wrap the grounding wire around the small screw on the frame of the collector.
5. Connect the black wires from the temperature sensor using the red 3M pressure connectors. Simply insert the wires without stripping and squeeze the red cap with pliers.
6. This part of the installation work will only be completed AFTER pressure testing for leaks as described in step 23.



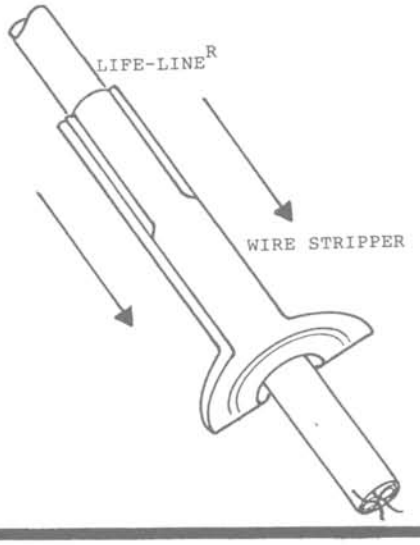
15 INTERCONNECTING THE TWO MICRO-FLO COLLECTORS

Connect the 1/4" copper tubing as shown. Tighten the connectors as specified in step 13, without overtightening.

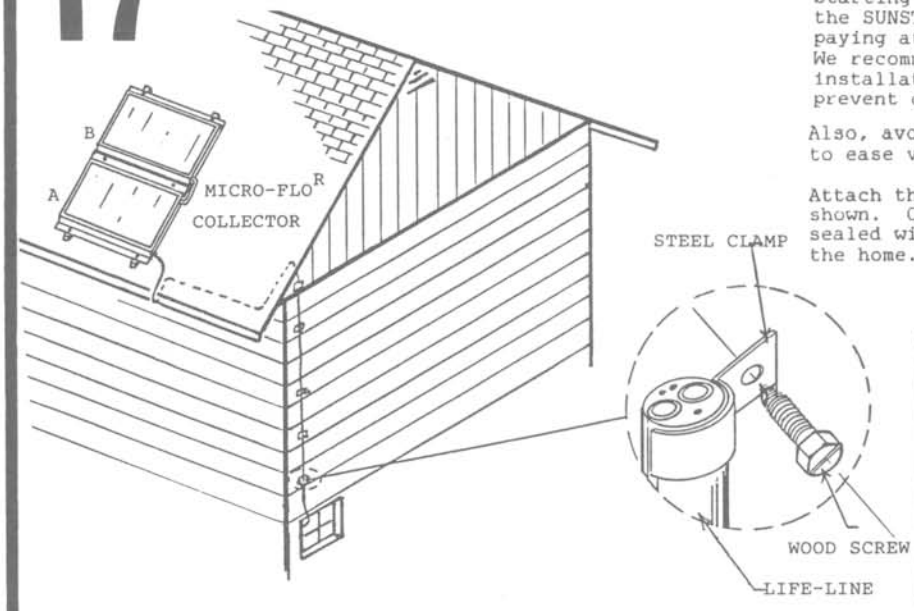


16 THE LIFE-LINE HOSE IS EASY TO STRIP

Use a wire stripper to make a longitudinal cut in the Life-Line hose as you would strip Lumex type electrical wire in order to free the supply and return lines as well as the electrical wire. Remove excess hose insulation material with a knife.



17 INSTALLATION OF THE LIFE-LINE HOSE

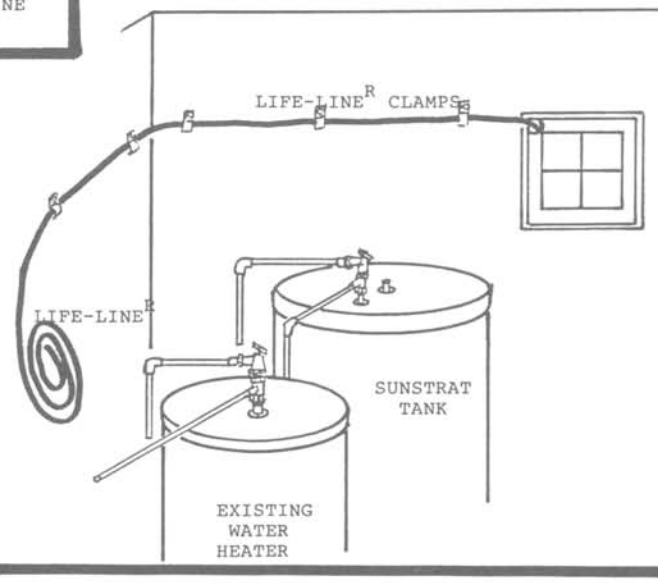


Starting from the collectors, route the flexible hose to the SUNSTRAT solar tank using the shortest path while paying attention to the aesthetic appearance of the home. We recommend using an outside path for a simplified installation. Avoid horizontal lengths along the roof to prevent obstructing the flow of water, snow and ice.

Also, avoid droops and snags as much as possible in order to ease vacuum drainage of the solar fluid circuit.

Attach the hose using the steel clamps and wood screws as shown. Clamps attached to the roof must be properly sealed with a silicon compound to avoid water leakage into the home. Use a clamp every metre (39").

18 INSTALLING THE LIFE-LINE HOSE INSIDE THE HOME

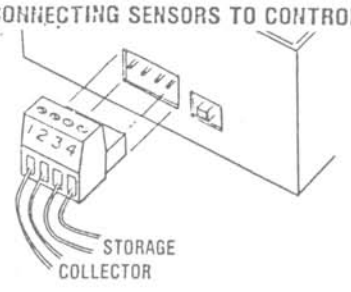


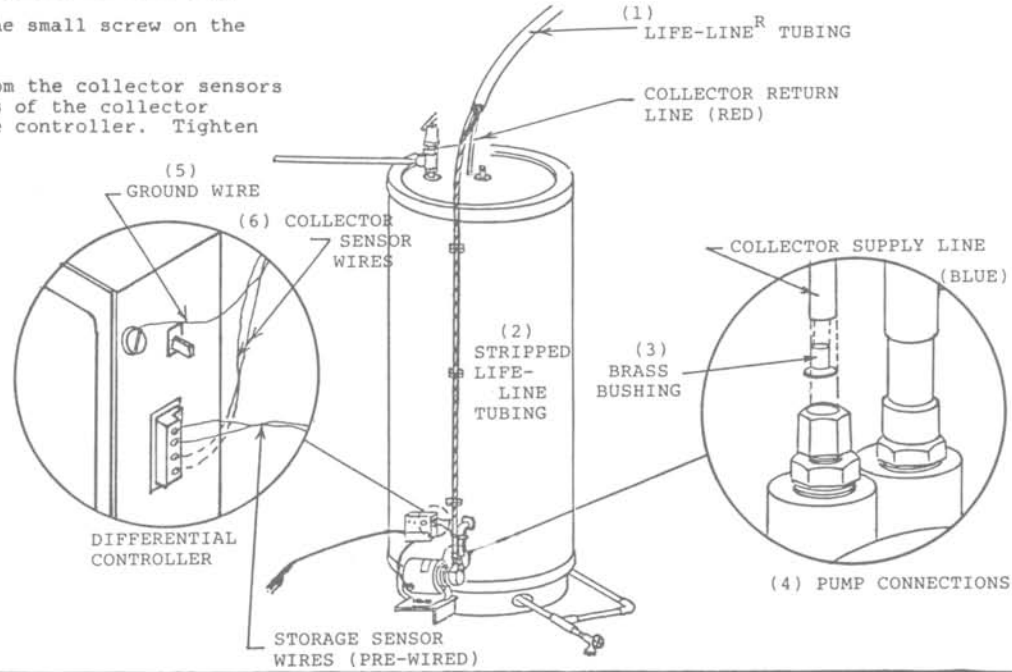
A basement window frame provides a convenient way to route the Life-Line hose inside the house. A 3/4" wood bit is sufficient for a proper hole through the window frame. Carefully seal the entrance with silicone. Route the hose up to the SUNSTRAT solar tank.

19 CONNECTION OF THE COLLECTOR SUPPLY LINE (BLUE TUBE) TO THE SUNSTRAT TANK

1. Leave a sufficient amount of Life-Line hose to allow reaching the bottom of the tank before cutting. Leave some extra length.
2. Strip approximately 1,5 metre (5 ft) of the end of the Line-Line hose as shown in step 16.
3. Insert a small brass bushing into the blue line.
4. Connect the blue line to the top of the pump using a mechanical pressure connector (refer to step 13).
5. Wrap the ground wire around the small screw on the controller housing.
6. Insert the two black wires from the collector sensors inside the two lower terminals of the collector sensor plug on the side of the controller. Tighten the terminal screws.

CONNECTING SENSORS TO CONTROL





20 IT IS NOW TIME TO FILL THE SOLAR FLUID CIRCUIT WITH THE SOLAR FLUID. THIS STEP IS VERY IMPORTANT

The solar fluid circuit and the outer tank of the SUNSTRAT solar tank are to be filled with the special solar fluid. There is no contact between this fluid and the domestic water in the inner tank. This fluid is non-toxic and completely inert and there are no handling hazards (its use has been approved by various Departments of Agriculture).

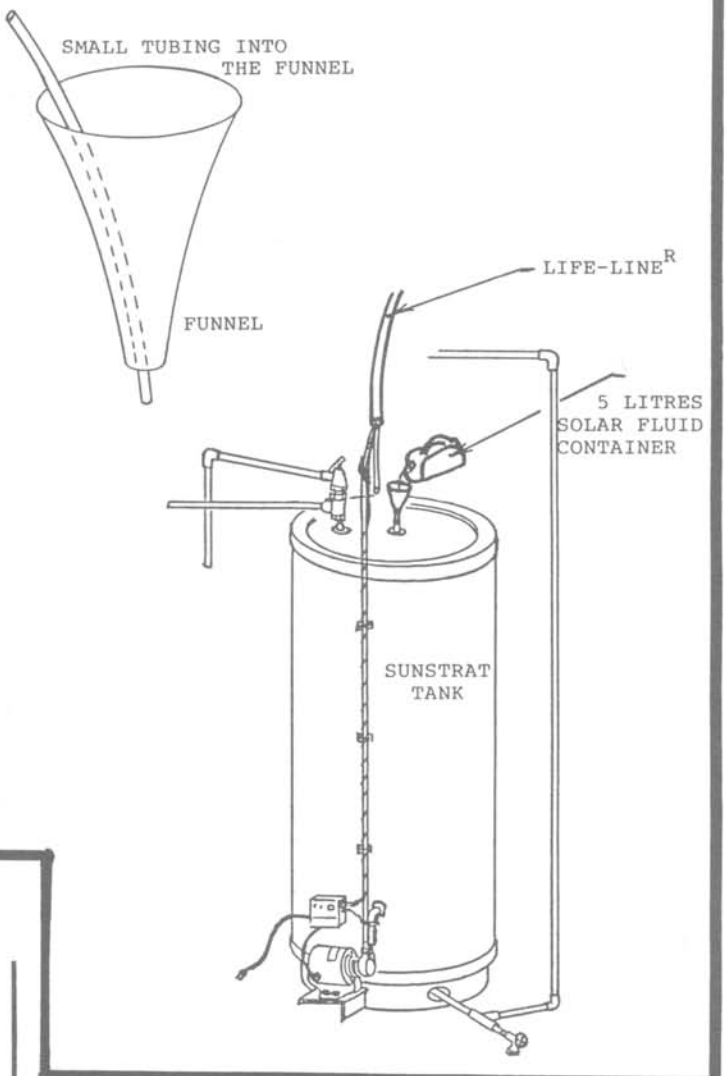
In order to allow vacuum drainage of the system, there must be no more than 20 litres of solar fluid in the outer tank when the system is in the "OFF" state. 8 litres of pure solar fluid are included in the two 5 litre containers supplied as part of installation kit No. 1047.

1. Place a funnel over the collector return line connector located on the center of the top of the solar tank.
2. Top each of the two 5 litre solar fluid containers with demineralized water and pour contents in the solar tank.
3. Fill each of these containers with distilled water and pour into solar tank.

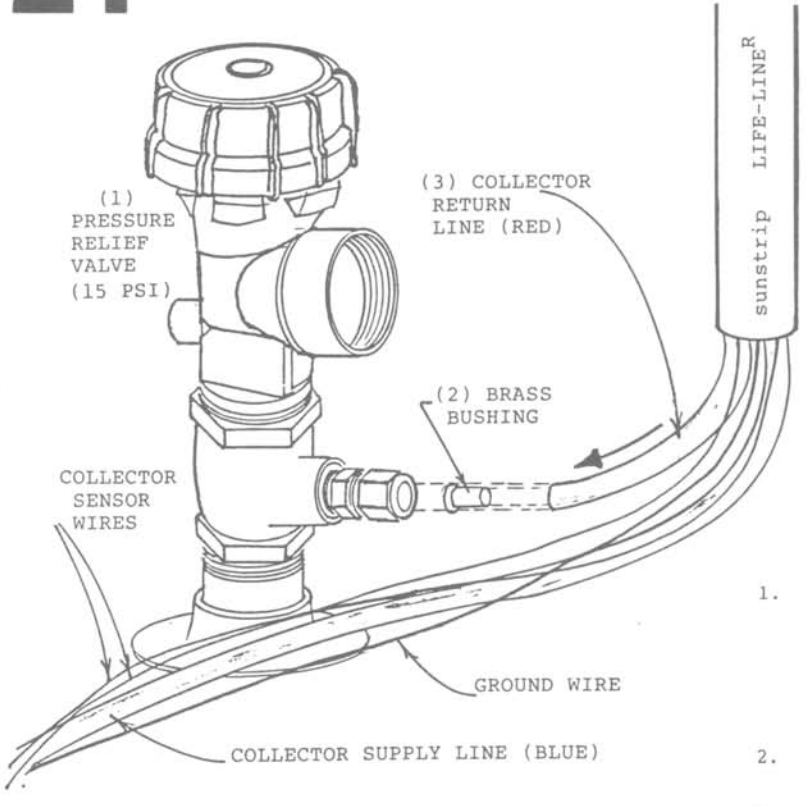
IMPORTANT

Use of any other solar fluid than specified by Sunstrip will void warranty. Use only demineralized water, not tap water.

Should any problem arise, contact your Sunstrip dealer. The solar fluid is a water/propylene glycol mixture.



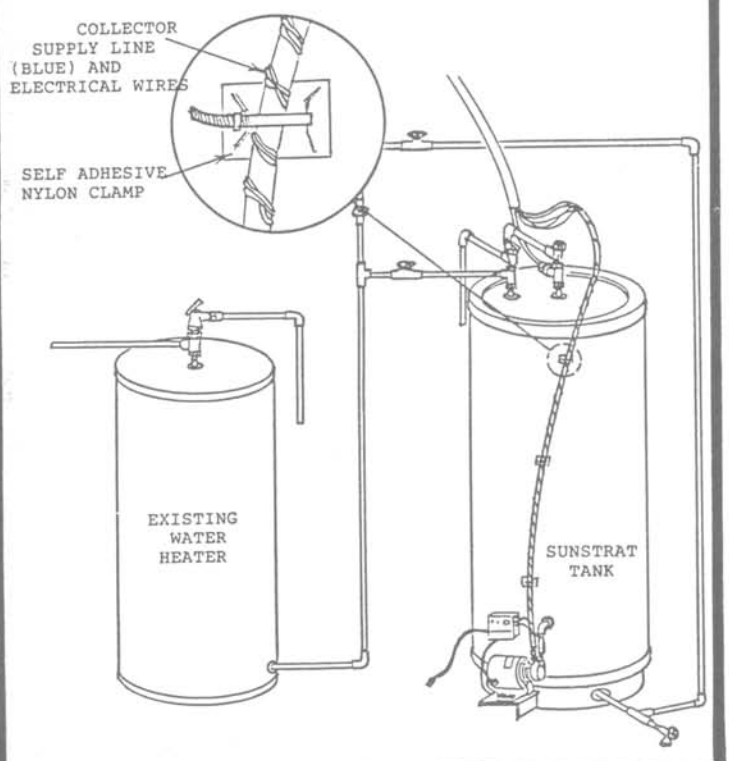
21 THE LAST CONNECTION



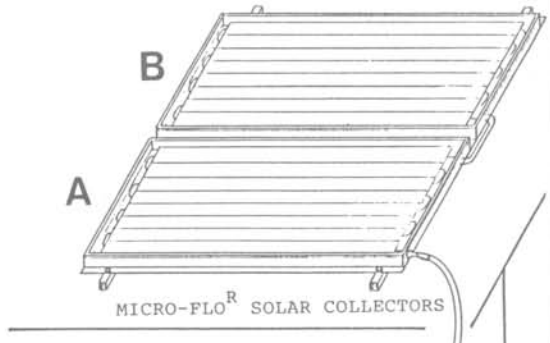
1. Screw the pressure relief valve assembly (30 psi) on the collector return line connector located on the solar tank. Do not forget to apply teflon tape on the threads. We recommend that the mechanical pressure connector be positioned towards the rear of the solar tank in order to avoid bending of the Life-Line hose.
2. Cut the red collector return line to proper length and insert a small brass bushing.
3. Connect the collector return line, with a mechanical pressure connector (refer to step 13).

22

NOW ATTACH THE BLUE COLLECTOR SUPPLY LINE AND ELECTRICAL WIRES TO THE SOLAR TANK USING THE SELF ADHESIVE NYLON CLAMPS

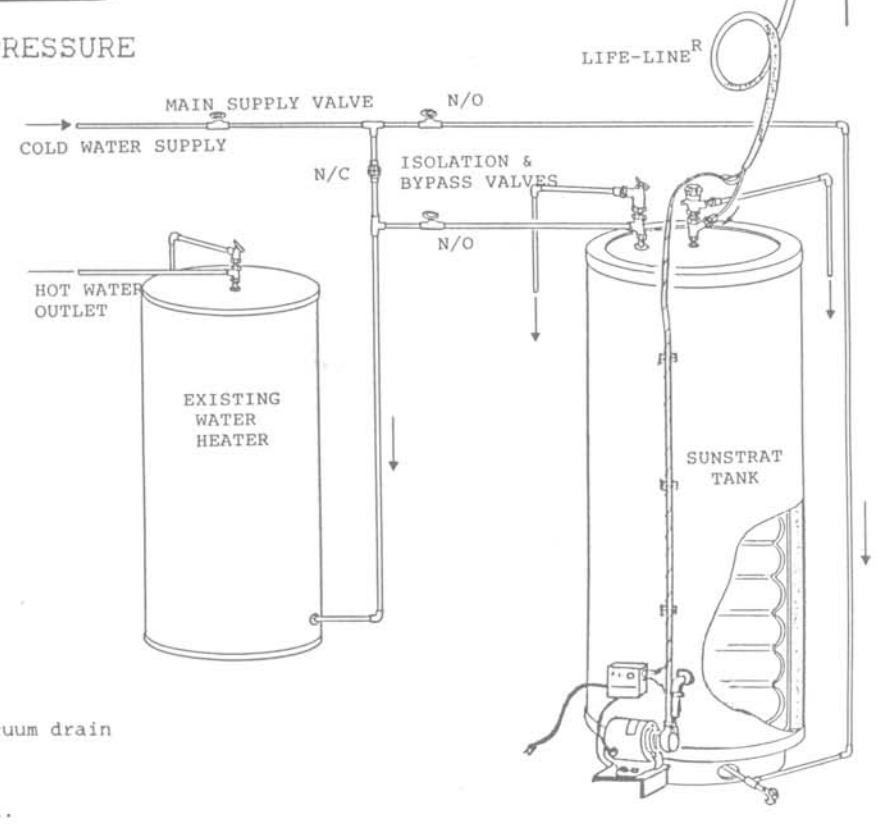


1. Open the main cold water supply valve and one hot water tap in the house.
2. Allow the inner tank of the SUNSTRAT tank to fill with domestic water until all air inside the tank is eliminated. Close the hot water tap.
3. Check for leaks on the copper piping and repair as required.
4. Plug the differential controller plug in standard 120 VAC outlet.
5. The "ON" function of the controller has been permanently disabled to prevent system operation during nighttime. Place the controller switch to the "AUTO" position. If there is not enough solar energy to allow operation of the system, you may short the two terminals intended for the collector sensor wires on the plug located on the side of the controller to test the system.
6. Check for leaks at every mechanical pressure connector and tighten slightly if required.
7. Nothing to correct ! Good work.



23

WE ARE NOW READY FOR PRESSURE TESTING OF THE SYSTEM



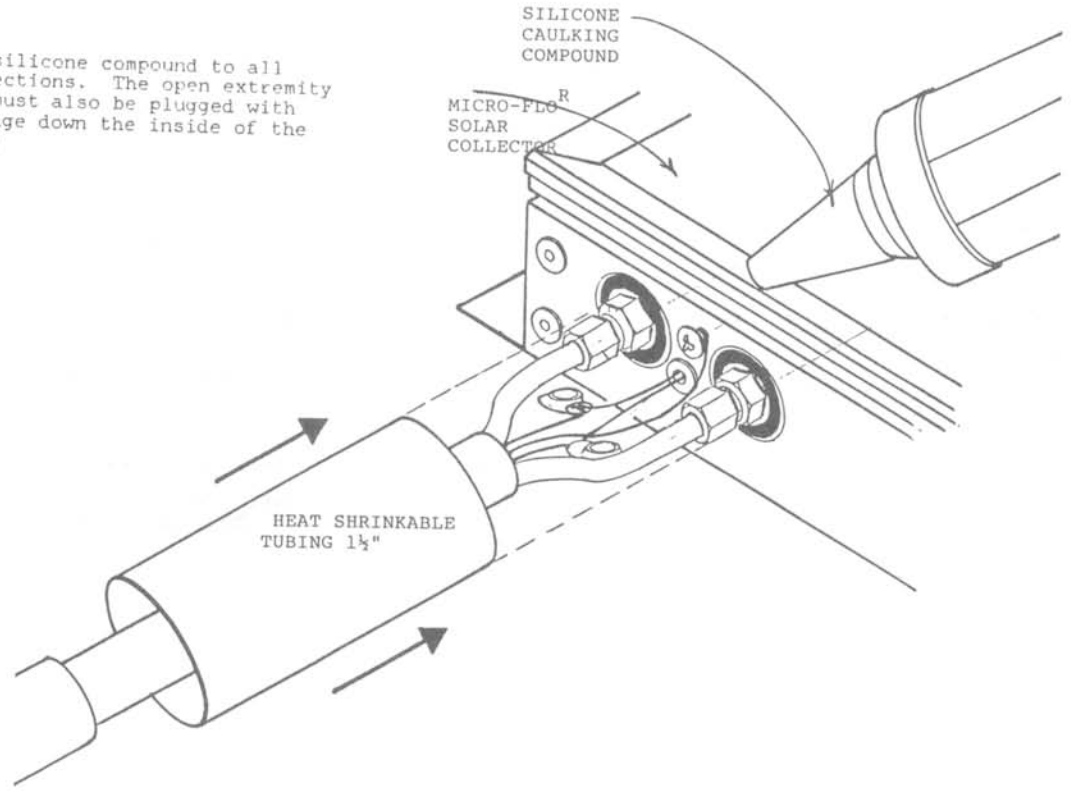
IMPORTANT

When the system stops, the solar fluid must vacuum drain inside the solar tank within one hour.

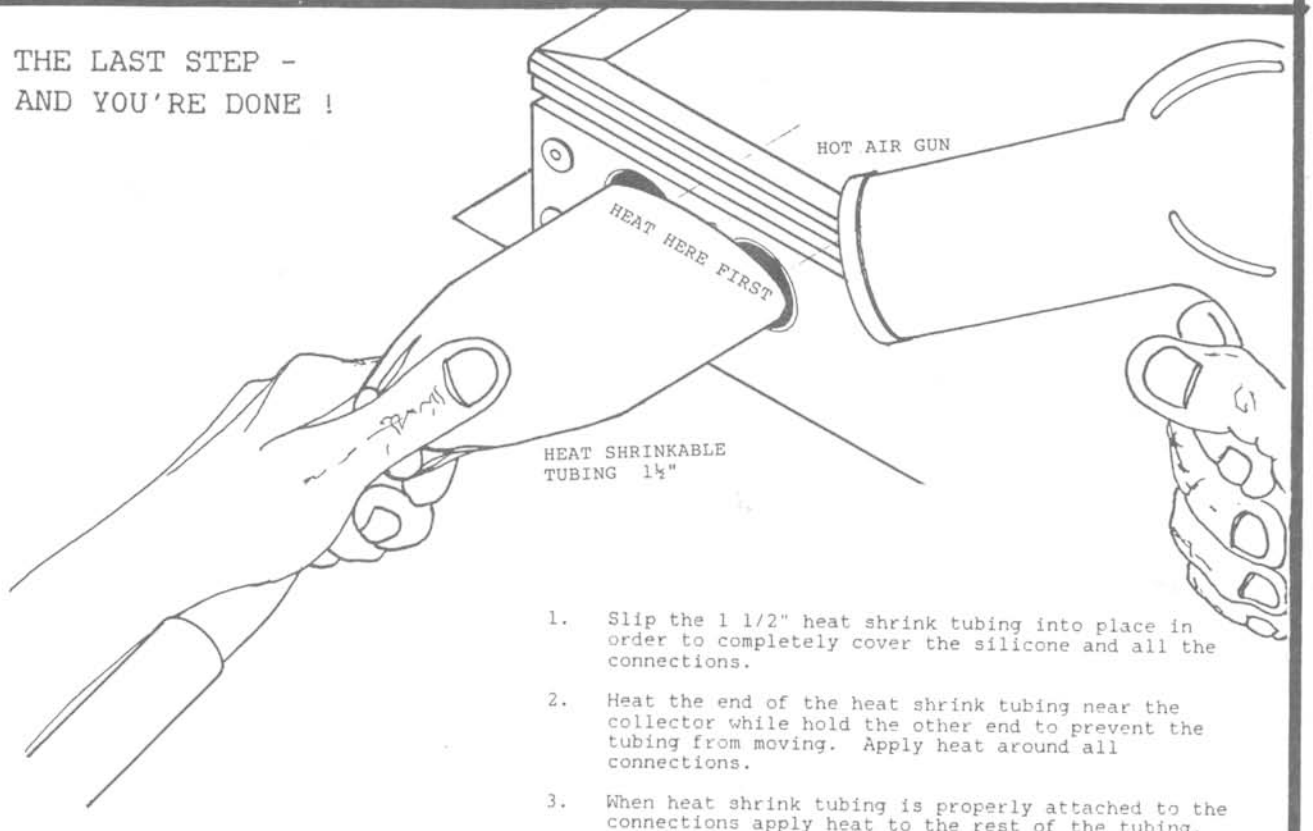
In case of incorrect system operation refer to troubleshooting tips at the back of this manual.

24 NOW COMPLETE DE SEALING OF THE LIFE-LINE CONNECTION AT THE COLLECTOR

Apply an abundant quantity of silicone compound to all electrical and mechanical connections. The open extremity of the Life-Line outer jacket must also be plugged with silicone to prevent water seapage down the inside of the Life-Line hose to the basement.



25 THE LAST STEP - AND YOU'RE DONE !



1. Slip the 1 1/2" heat shrink tubing into place in order to completely cover the silicone and all the connections.
2. Heat the end of the heat shrink tubing near the collector while hold the other end to prevent the tubing from moving. Apply heat around all connections.
3. When heat shrink tubing is properly attached to the connections apply heat to the rest of the tubing.
4. Slip the second heat shrink tubing (1" tube) over the first tube and apply heat again.
5. Silicone caulking compound should ooze out the shrinked tubing for complete watertightness. Add silicone caulking if there is not enough.

IMPORTANT

Do not overheat the heat shrink tubing to avoid serious damage to internal components

OPERATING RESTRICTIONS, SYSTEM MAINTENANCE AND REPAIRS

Operating Restrictions

In order to prevent voiding the warranty, the following operating restrictions must be observed:

1. Do not use the MICRO-FLO system to heat directly pool water or any other system using treated water.
2. Ensure that the pH of the domestic water remains between 6.5 and 8.0.
3. Use proper quantity and mixture of water/propylene glycol for protection against freezing.

System Maintenance

In most areas of the country, the glass plate of the collectors must be cleaned once a year with an industrial glass cleaning products. In areas where pollution is severe, more frequent cleaning may be required.

The acidity and the freeze protection of the solar fluid will be checked after a period of five years.

The pump should normally not require any maintenance and should provide years of trouble free operation.

Repairs

Two types of repairs can be performed on the collectors without removing them from the roof: replacement of the glass plate and plugging of leaks. However, no repair is to be performed without written authorization from Sunstrip.

In the case of a broken glass plate, we recommend use of an industrial vacuum cleaner to remove all glass fragments from the collectors and their surroundings. Cover at once the collector with a sheet of plywood to protect the absorber fins.

Use a pre-cut sheet of tempered glass of the same thickness as of the original sheet. Unscrew the collector glass plate mounting brackets and remove it from the collector. Place the gasket around the glass plate and place the latter on the collector frame. Apply silicone at the corners to ensure watertightness and replace the glass plate mounting brackets starting from the bottom. Tighten the screws as much as possible.

A leak in collector may often be fixed on the spot. Contact your Sunstrip dealer for authorization prior to performing repairs. When a leak is not within convenient access, it may be necessary to replace the collector.

The SUNSTRAT solar tank cannot be repaired on the spot. Should the tank leak, contact your Sunstrip dealer for authorization prior to replacement of the solar tank.

Regarding other components such as the pump, the differential controller and temperature sensors, consult the troubleshooting procedures outlined below before calling your Sunstrip dealer.

TROUBLESHOOTING PROCEDURES

SYMPTOM	COMPONENT	PROBLEM	SOLUTION
System stays "off"	Differential controller	Open collector sensor circuit	Check connection and look for damage
		Defective sensors	Submit the sensors to various temperatures and check the resistance value against the temperature/resistance table
		Wrong switch setting	Verify switch setting and correct as required.
		Sensor wires	Check for open circuit
System always "on"	Differential Controller	Defective sensors	Submit the sensors to various temperatures and check the resistance value against the temperature/resistance table.
		Wrong switch setting	Verify switch setting and correct as required
		Collector sensor short circuit	Verify sensor wires and check for damaged or bent outer jacket
Leaks	Collectors	Leaky connect-ions	Tighten connections
		Internal leaks	Contact your installer or dealer
	Temperature/ pressure relief valve	Inadequate calibration	Adjust calibration or replace valve
		Does not close	Clean or replace valve
		Excessive water supply pressure	Install a reducing valve at the cold water supply
Noisy operation	Plumbing	Water hammering	Install dampers
		Plumbing locat-ion	Pipes installed along air conduits. Insulate or re-route pipes.
	Pump(s)	Air clogging	Remove air from inside of pump
No circulation of solar fluid	Pump	Open relief valve	Clogged flexible hose
		Air clogging	Remove air from inside of pump
	Differential controller	No AC power	Check fuses or circuit breakers
Decreased performance	Existing water heater	Defective sensors	Check sensor resistance value against temperature/resistance table
		Defective relay	Check relay contact closure Caution do not short live and ground
		Improper electrical connections	Check electrical wiring diagram
		Inadequate plumbing	Check plumbing diagram
		High heat Losses	Check insulation and location of tank
	Pipes	High heat losses	Check insulation
	Collectors	Increased shading	Eliminate shading or relocate collectors
		Dirty glass plate	Clean regularly
		Degradation of selective absorber coating	Contact your installer or dealer
	Tank	Accumulation of residues	Drain Tank
Inadequate hot water supply	Collectors	Improper bear-ring	Check bearing and correct for due south bearing
		Improper slope	Check slope and correct for slope equal to latitude or latitude - 10 deg.
		Partially shaded	Eliminate shading or relocate collectors
	Differential Controller	Loose or faulty electrical connection	Check electrical wiring diagram for proper connections and check connection tightness

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