SUNSTRIP
INTERNATIONAL, INC.

PARAGRAPHE 3

PAGE 10

LE CONTRÔLE DTT 84 EST PRÉ-RÉGLÉ EN USINE.

S.V.P. NE PAS Y TOUCHER

NE PAS TENIR COMPTE DES INFORMATIONS CONTENUES DANS CE MANUEL.

PARAGRAPH 3

PAGE 9

THE CONTROL DTT 84 IS PRE-SET AT THE PLANT

PLEASE DO NOT TOUCH

DO NOT TAKE INTO CONSIDERATION THE INFORMATION GIVEN IN THIS MANUAL.

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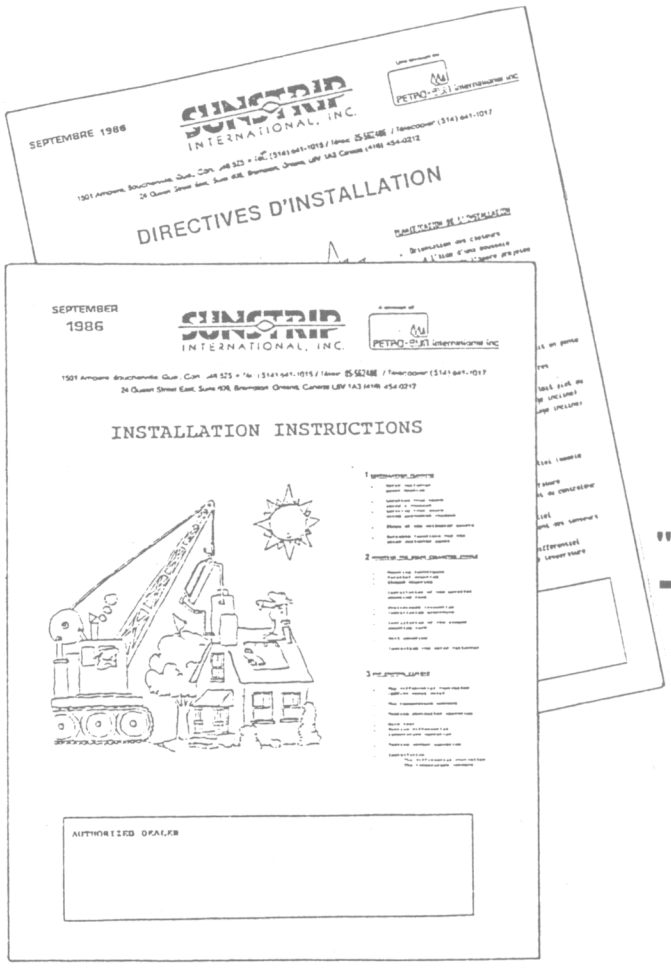
MARS 1987
MARCH

«ATTENTION»!!



MODIFICATIONS IMPORTANTES CONCERNANT LES "DIRECTIVES D'INSTALLATION"

IMPORTANT MODIFICATIONS TO THE "INSTALLATION INSTRUCTIONS"

In order to optimise and simplify the installation of the Micro-Flo system several modifications have been made.

The modifications are:

* An improved mounting technique for solar collectors has been developed which changes figures 13, 18, 19, 20, 21, 24 and the text on pages 5, 6 and 7.

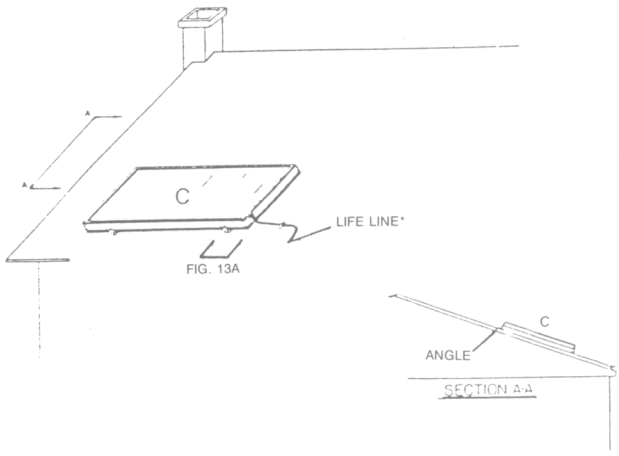
* The figure 32 and the text concerning the setting of switch #4 in the Delta T differential controller.

Afin de faciliter et d'optimiser l'installation du système Micro-Flo certaines modifications y ont été apportées.

Les principales modifications sont les suivantes:

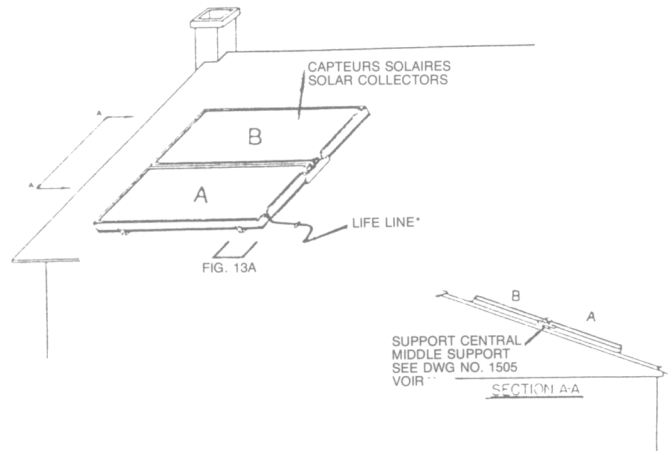
* Les figures 13, 18, 19, 20, 21, 24 de même que les textes aux pages 6, 7 et 8 sont modifiés afin de s'ajuster aux nouveaux profilés dont les capteurs sont fabriqués et aux nouvelles techniques de montage.

* La figure 32 de même que le texte de l'interrupteur #4 est modifié.



ONE COLLECTOR SYSTEM

SYSTEME À UN CAPTEUR



SYSTEME À DEUX CAPTEURS

TWO COLLECTORS SYSTEMS

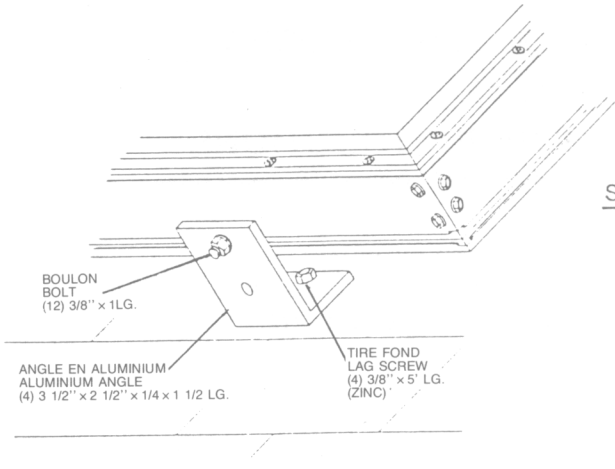


fig. 13A - Détails de l'installation des angles de montages. Installation d'un montage parallèle.

Installation details of the mounting angles for parallel mounting rack.

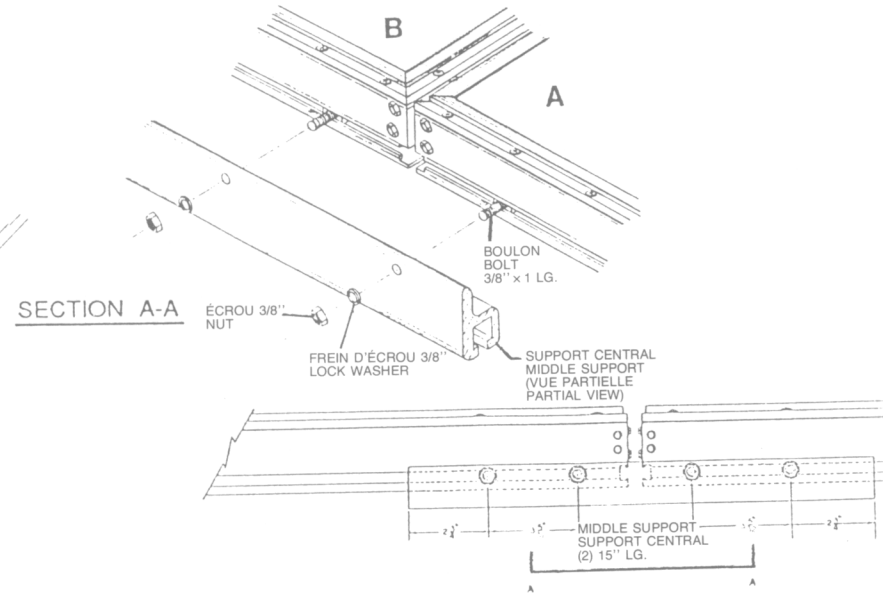


fig. 13B - Détails de l'installation des supports centrals pour les systèmes avec deux capteurs.

Installation details for the two middle supports for two collectors systems.

INSTALLATION DU BATI POUR TOITS EN PENTE (MONTAGE PARALLELE)

Après avoir fait un croquis détaillé de la position exacte de l'ensemble des capteurs solaires sur le toît, disposer les sections d'angles de montage de façon à avoir toujours les pattes orientées vers le haut du toît. Voir fig. 13A. Débuter par les sections inférieures. Percer des trous pilotes au centre des chevrons présélectionnés; appliquer généreusement du silicone sur la surface du toît sur laquelle chaque angles sera installé ainsi que dans les trous pratiqués dans les chevrons. Installer les angles inférieurs avec les tire-fonds.

Si le système comporte deux capteurs, un A et un B, prendre le capteur A et l'appuyer sur les angles inférieurs puis y superposer le B. Si par contre le système comporte un seul capteur C, prendre celui-ci et l'accoter sur les cornières inférieures.

Procéder à l'installation des profilés de soutiens si le système comporte deux capteurs, de chaque côté de ceux-ci. Voir la fig. 13B. Quatre boulons sont nécessaire afin de solidariser les deux capteurs de chaque côtés.

Maintenant procéder à la fixation de l'ensemble aux angles inférieurs à l'aide des écrous et boulons. Installer les deux angles de montage supérieurs dans les chevrons à l'aide des tire-fonds. Fixer les angles de montages sur le boitier des capteurs à l'aide des écrous et boulons.

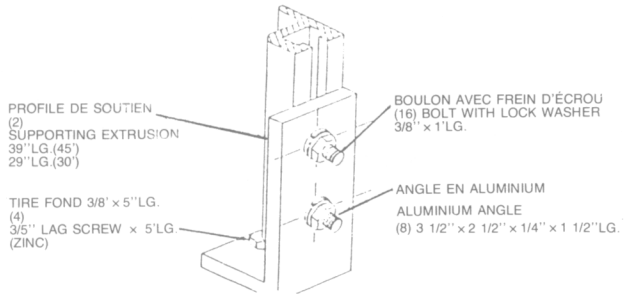


fig. 21 - Détails d'installation du kit de montage incliné.

Installation details for the sloped mounting kit.

INSTALLATION OF THE PARALLEL MOUNTING RACK

Draw a detailed layout of the exact location of solar collector array on the roof. Place the mounting angles so that the lag bolts are hidden under the collector. See fig. 13A. Start by the lower angles. Drill holes through the rafters. Put silicone and in the holes on the roof where each bracket is to be installed. With the lag bolts, secure the two lower mounting angles into the rafters. If the array consists of two collectors, lean the first one, the A collector, against the lower mounting angles and then place the B collector above. If the collector consist of one collector, the C, lean it against the mounting angles. If fig 13B. Eight nuts and bolts are to secure the two collector together. Now fix the collector array to the lower mounting angles with nuts and bolts. Install the upper mounting angles. With lag bolts secure the upper mounting angles to the rafters, and then to the collector frame with nuts and bolts.

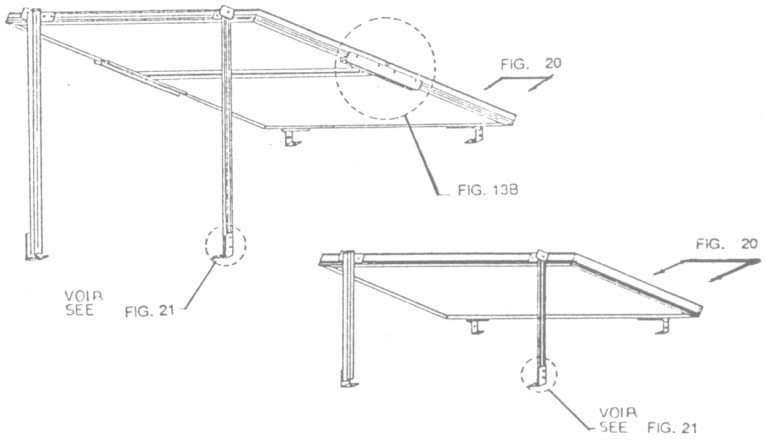


fig. 19 - Détails de montage du bâti pour toît plat ou légèrement incliné (montage incliné).

Installation details for flat or slightly sloped roofs.

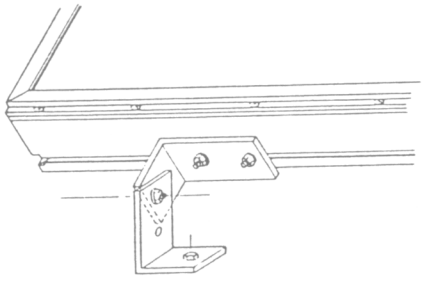


fig. 20 - Détails d'installation du bâti de support pour toît plat ou légèrement incliné (montage incliné).

Installation details for flat or slightly sloped roofs.

INSTALLATION DU BATI POUR TOIT PLAT OU FAIBLEMENT INCLINE (MONTAGE INCLINE)

Si le système comporte deux capteurs, un A et un B, solidariser les deux panneaux par les supports centrals. Voir fig. 13B. Installer les angles de montages à l'avant de l'ensemble des capteurs (banc) comme illustré à la figure 20. On utilise ici quatre angles afin de permettre au banc de pivoter. A l'arrière utiliser les longeurs de profilés de soutiens et les installer comme illustré aux figures 19 et 21. Ces longueur de profilés de soutiens peuvent être coupés afin de donner l'angle de rendement optimum sur un toît à faible inclinaison. Il est maintenant possible, grâce à ce type de montage, de modifier de façon saisonnière l'inclinaison des capteurs.

INSTALLATION OF THE SLOPED MOUNTING RACK

If the collector array consists of two collectors, an A and a B, bolt them together with the two middle supports. See fig. 13B. Install the front mounting angle of the array. See fig. 20. We used four mounting angles to permit the rotation of the array. At the back, use the length of supporting extrusion and install as illustrated in fig. 19 and 21. With this extrusion and the rack design, the collectors may be adjusted to the proper slope every season

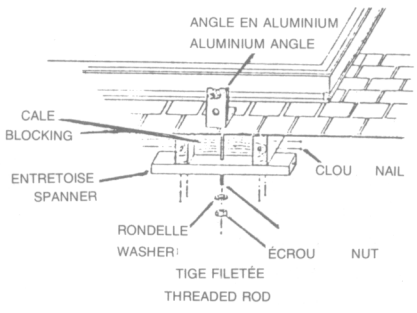
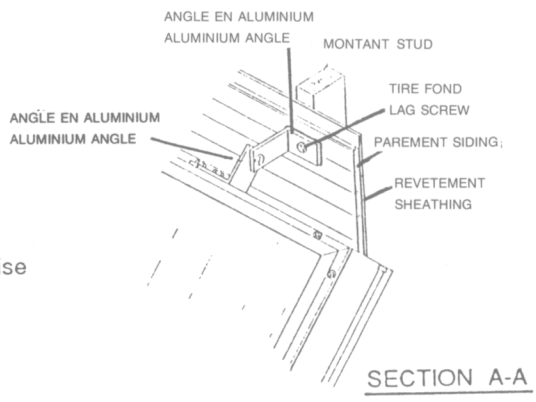


fig. 18 - Installation à l'aide d'entretoise rapportée.

Spanner mount.



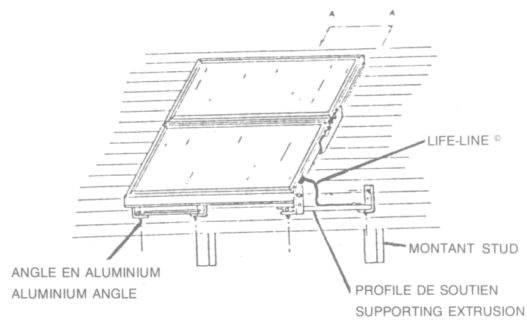


fig. 24 - Détail du montage d'une cornière de fixation d'une installation murale.

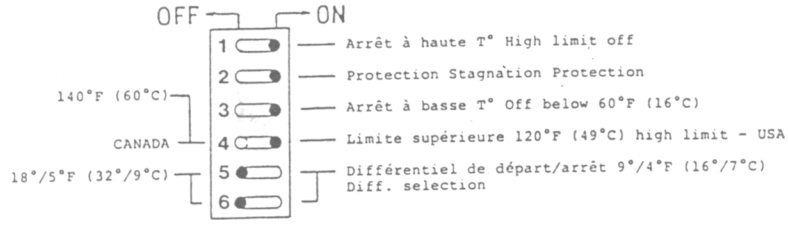
Mounting detail of wall mounted installation.

Interrupteur No. 4 si à la position "ON", le système sera en position d'arrêt si le senseur de stockage détecte une température de plus de 120° F (50° C). Sinon, la température maximale sera de 140° F (60° C). (Réglé à l'usine à la position "OFF").

Switch number 4: "ON" position: the system will stop when the solar tank temperature exceeds 120° F (50° C); otherwise the solar tank temperature shut-off limit is 140° F (60° C). Factory setting: "OFF".

fig. 32 - Détail des interrupteurs de sélection e positions normales d'opération.

Detail of the dip switches and pre-set operating positions.



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SSI-B 208/B/02/87-04

SEPTEMBER
1986

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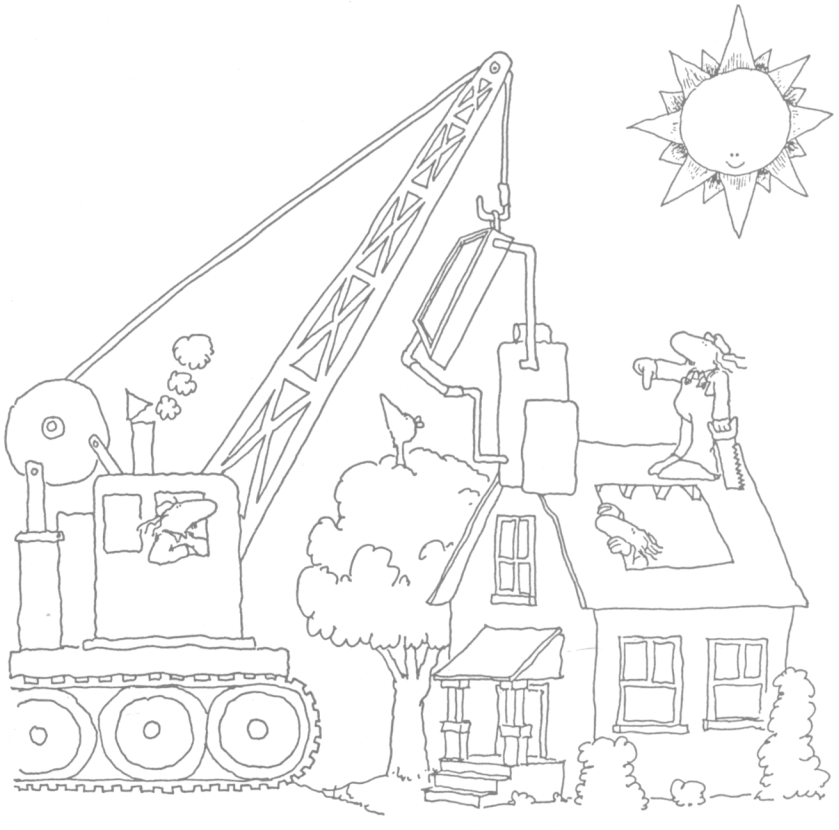
INSTALLATION INSTRUCTIONS



AUTHORIZED DEALER

1 INSTALLATION PLANNING

Collector panel bearing

For best performance, the solar collector panels should be installed facing true (geographic, not magnetic) south. A bearing offset of up to 30° eastward and up to 30° westward results in a system efficiency loss of at most 10%, allowing a wide margin for ease of installation. (As shown in Fig.5)
The bearing of the house should be measured to ascertain whether or not it is within the acceptable range using one of the two following procedures:

Locating true south using a compass

The magnetic south bearing given by a precision compass requires a correction factor to convert to the proper true south bearing. This correction factor can be obtained from a magnetic declination map as shown in figure 6.

This type of map corrects the magnetic declination with respect to true north. For instance, if the declination is 15° westward, the true north bearing will be 15° eastward from the magnetic north bearing. The true south bearing would then be 15° westward from the south bearing given by the compass (refer to figure 7).

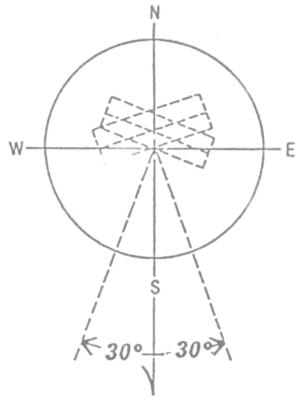


Fig. 5- PRACTICAL RANGE OF COLLECTOR BEARINGS

Locating true south using projected shadows

The angle of projected shadows at solar noon with respect to the house provides a convenient way to accurately locate the true south bearing. Solar noon is exactly mid-point between sunrise and sunset, corresponding to 13:00 daylight saving time and 12:00 eastern standard time.

Simply place a sheet of paper on a corner on the roof of the house and draw the angle formed between the shadow of the house (at solar noon) and the house itself. Refer to figure 8.

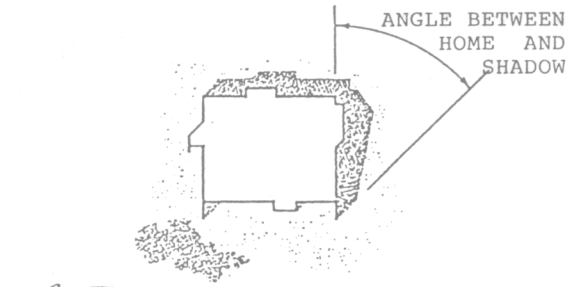


Fig 8- FINDING THE BEARING OF A HOUSE USING PROJECTED SHADOWS

Slope of the collector panels

In SDHW systems, the optimium slope of the collector panels with respect to horizon should be equivalent to the lattitude. An offset within up to + 20° and up to - 25° results in a system efficiency loss not exceeding 10%; refer to figure 9. Collector panels sloped towards the vertical will be more efficient during winter while sloping towards horizon results in better efficiency during summer. Refer to figure 9A to find out the slope of a 12 foot roof using the ratio of the vertical to the horizontal sides of the triangle formed by the roof.

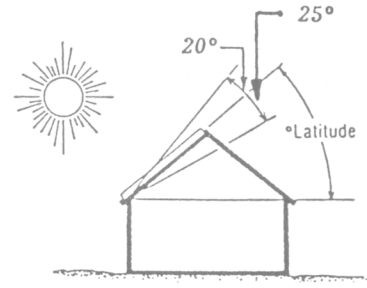


Fig 9- OPTIMUM SLOPE FOR THE COLLECTORS OF A SOLAR DOMESTIC HOT WATER SYSTEM

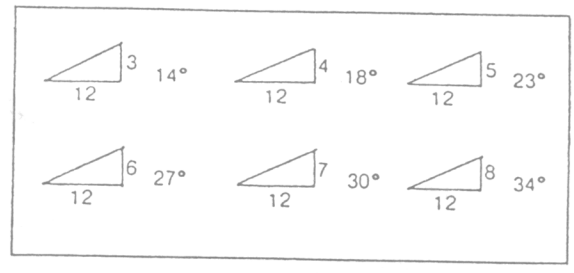
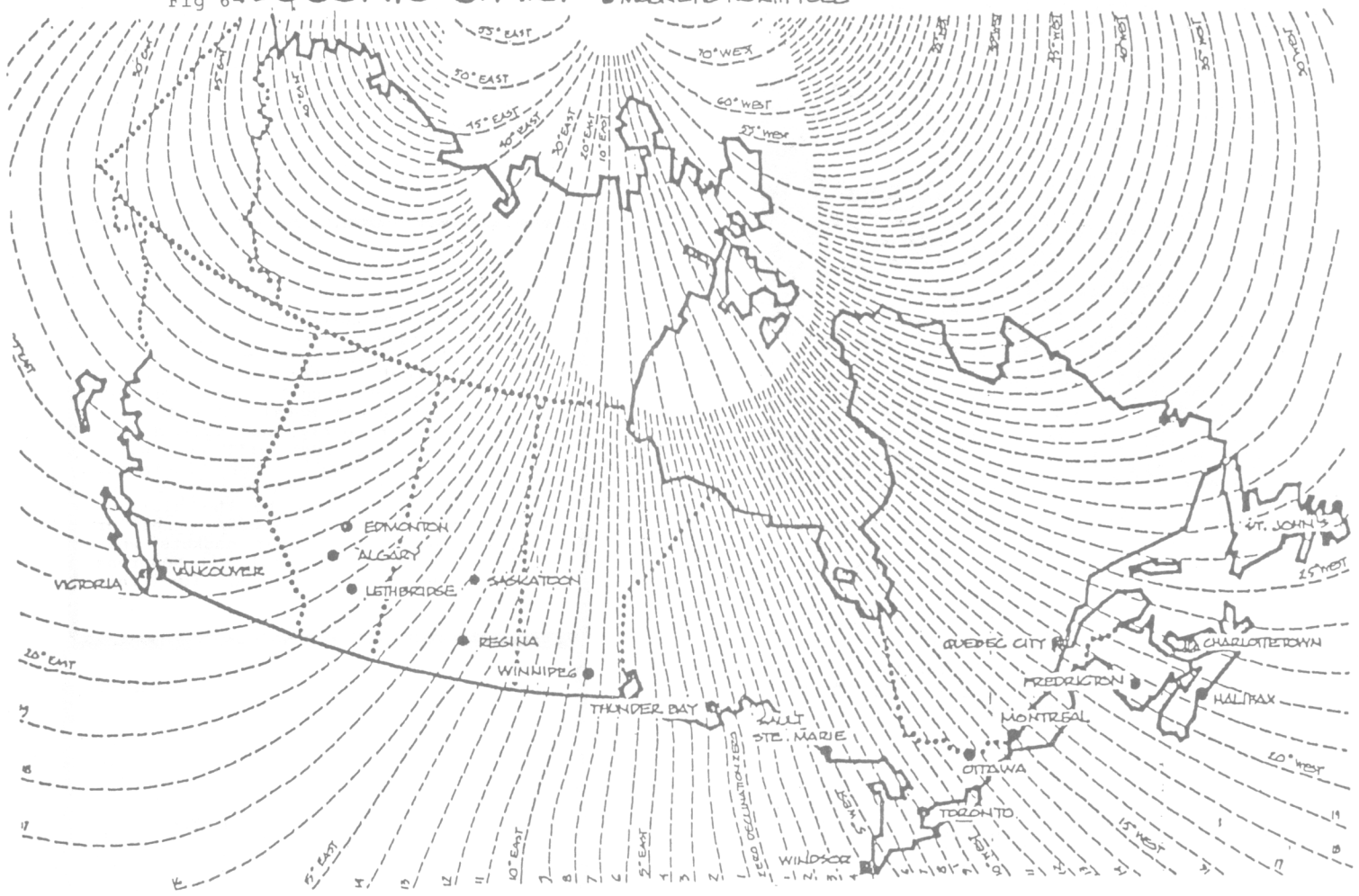


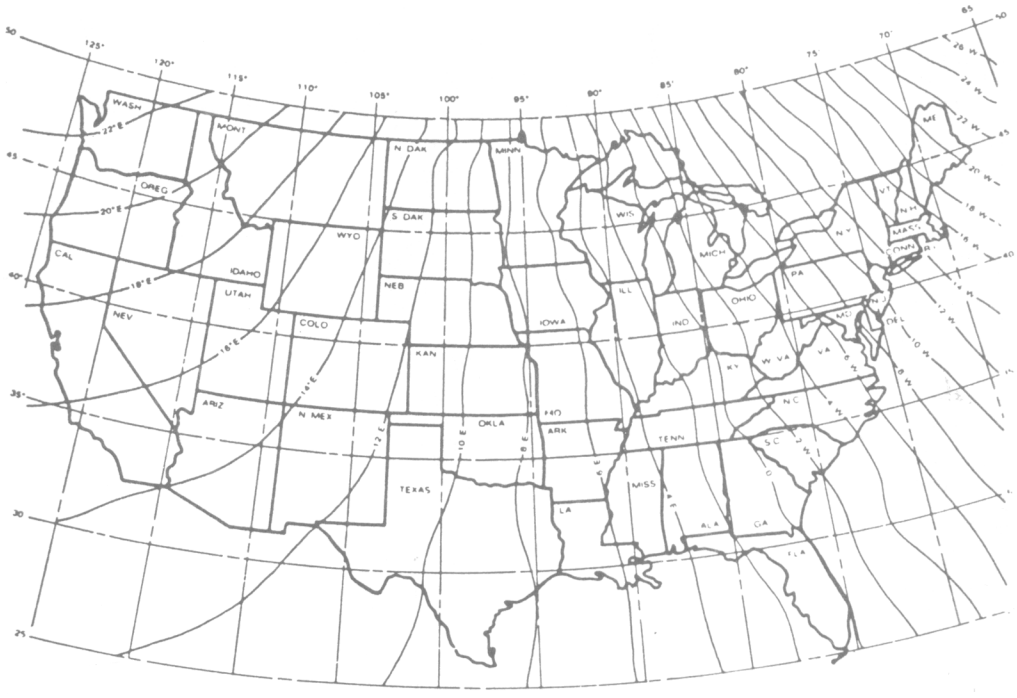
Fig 9A- ROOF SLOPES

Suitable locations for the solar collector panels

Variouos locations can be considered for the solar collector panels, as long as the lowest level of the collector panel array is above the level of the solar tank.

Fig 6 ISOGONIC CHART • MAGNETIC NORTH POLE





ISOGONIC CHART OF THE U.S.

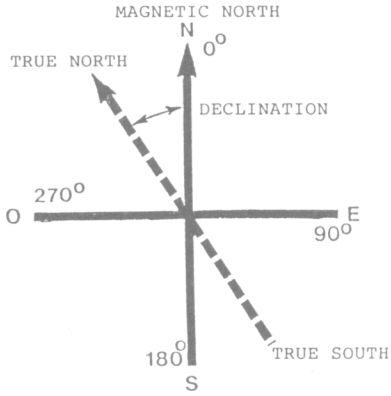


Fig 7A- EASTERN DECLINATION

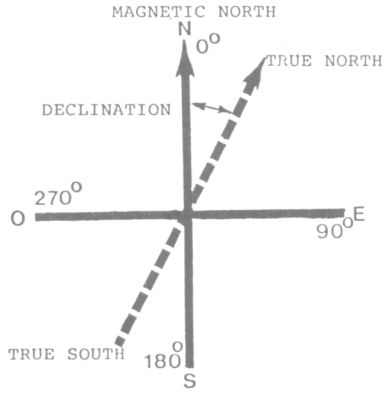


Fig 7B- WESTERN DECLINATION

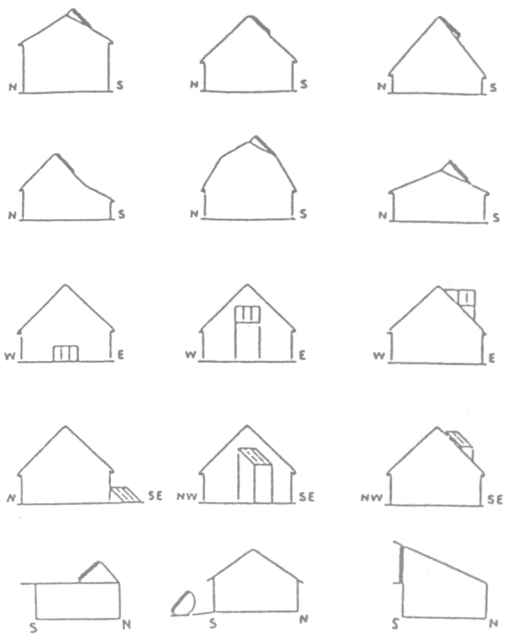


Fig 12- EXAMPLES OF SUITABLE LOCATIONS FOR COLLECTORS AROUND THE HOME

The installation of the rack over flat roofs must be in accordance with the Canadian Building Code or local codes requirements. Retain the services of an experienced roofer. This type of mounting is used for flat or lightly sloped roofs and also allows installation on a vertical wall.

IMPORTANT

All the mounting hardware (bolts, screws, washers, stands, etc.) exposed to the weather conditions must be made of rust-proof materials. Aluminum and galvanized steel are proper. Moreover, different metals should never be assembled directly one against the other; otherwise, rust will eventually destroy the joint. For instance, galvanized mounting hardware is not to be bolted directly to the aluminum frame of a solar collector panel or copper pipe. Use proper gaskets when joining different metals. Neoprene gaskets are usually used for this purpose.

2 MOUNTING THE SOLAR COLLECTOR PANELS

Mounting techniques

The Sunstrip solar collector panels are equipped with a mounting channel all around the sides of the collector which can be inserted inside a retaining strut. The retaining strut may be fixed anywhere along the mounting channel to allow easy installation over any type of structural supports.

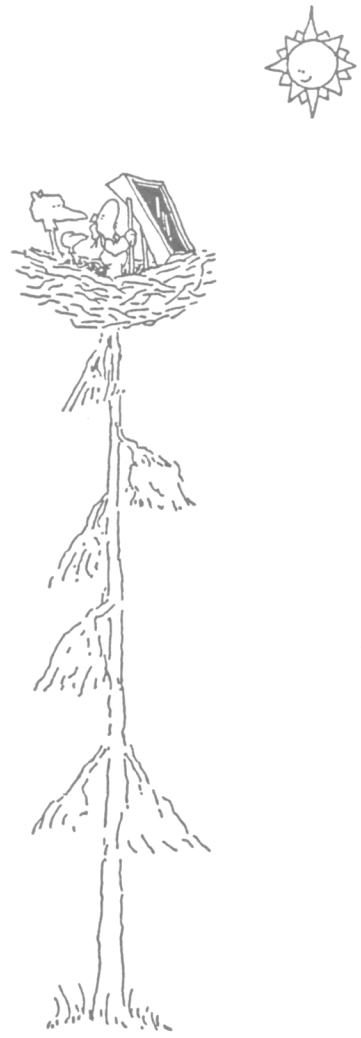
Two types of mounting are usually used to install the solar collector panels: parallel and sloped (or raised) mounting with respect to the roof.

Parallel mounting

A mounting rack design for parallel mounting allows to install the solar collector panels directly on a sloped roof. The rack raises the panels slightly above the roof to prevent the accumulation of water, snow or leaves and to prevent the asphalt shingles from rotting. This type of mounting is used when the slope of the roof is within the acceptable range shown in figure 9.

Sloped mounting

A rack designed for the sloped mounting of the solar collector panels allows to raise the front or the back of the panel at a specific angle with respect to the roof.



Installation of the parallel mounting rack

Preliminary inspection

Inspect the roof surface; if it is in poor shape, it should be repaired. Should the homeowner prefer not to repair the entire roof, the section of the roof over which the solar collector panels are to be installed will have to be fixed prior to installing the panels. It will prove to be exceedingly difficult to repair this section of the roof after the solar collector panels are installed.

It is also very important to check the roof structure. The solar collector panels unit weight is approximately 20 kg/m^2 (4 lb per square foot). When installed directly to the roof, the panels constitite a slight additional load on the roof structure. In any case the homeowner must check whether or not the rafters and the roof frame are in proper shape prior to installing the panels.

IMPORTANT

The rack parts mentioned in this manual are those making up the installation kits sold by SUNSTRIP as optional equipment for the Micro-flo system.

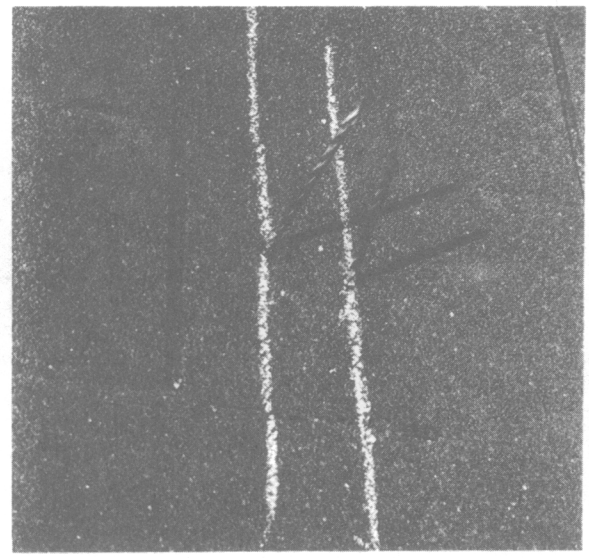
However, any other mounting equipment may be used as long as the main following concerns are addressed:

- **resistance to rust and weather conditions;**
- **panel spacing from the roof;**
- **mechanical resistance with respect to wind, snow, ice, etc.**

Installation procedure

Draw an approximate layout of the solar collector panel array over the roof. If the internal surface of the roof is within convenient reach, locate a rafter near the middle of the array and drive a small nail through the roof on both sides of the rafter, near the top level of the array. These two nails will indicate the exact location of the rafter when working on the roof, as shown in the photograph given below.

Using a chalk line, make the center line of the rafter on the roof. Remove the nails and seal the holes with silicon to prevent leaks. From the inside of the roof, measure the exact distance from the selected rafter to the next rafter. Make the measurement both at the top and bottom level of the collector panel array as the rafters might not be parallel. Mark the outer roof surface with the center line of the second rafter using a chalk line. Repeat this procedure to mark the location of any other rafter to be used for the installation of the panels.

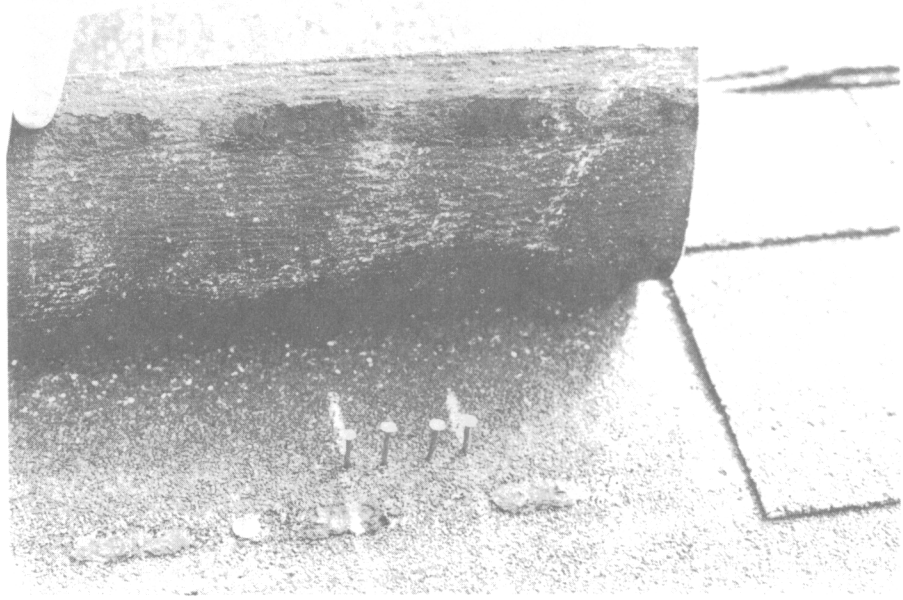


FINDING THE LOCATION OF THE RAFTERS FROM THE INSIDE OF THE ROOF USING TWO NAILS.

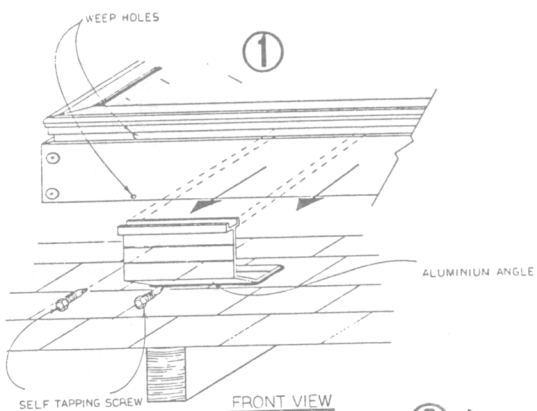
If the internal surface of the roof cannot be reached, as in the case of a cathedral-type ceiling, a trial and error procedure is called for. Lightly tap the top of the roof with a hammer to find the approximate location of the rafters. Then drive a few nails under the shingles to find the exact location of the center of those rafters. Repeat this procedure to find the location of each rafter required for the installation of the solar collector panel array, both at the top and bottom levels of the array. It is unnecessary to remove the nails after the center line of the rafters have been found; simply drive the nails through their entire length, apply a generous amount of silicone over the nails and put the shingle back into place over the nails. Refer to photograph shown below.

Draw a detailed layout of the exact location of solar collector array on the roof. Place the mounting brackets so that the lag bolt is hidden under the collector. Start by the lower sections. Drill holes through the preselect rafters. Place silicone over the roof where each bracket is to be installed as well as in the rafter holes. With the lag bolt, secure the two lower mounting brackets in the rafters. With a rotation movement, slide the collector "A" into the mounting brackets. Insert the middle mounting bracket into the mounting channel of the collector "A" then secure it into the roof. Repeat the two last operations for the collector "B". Fix the mounting bracket onto the collector frame with the self-drilling screws. Please refer to figure 13.

The mounting struts may be attached between rafters as shown in figure 18. Simply drill a 12.5mm (½") hole through the roof and roof frame at the required location. Install a 50 X 150mm (2 X 6") wood board below the internal roof surface, across two rafters beneath the hole; nail or screw that piece of wood to the rafters. Two wood spacer blocks of at least 50 mm (2") thick and of the same height as that of the rafters are required on either side of the hole. Nail the spacer blocks to the wood board. Drill a 12.5 mm (½") hole through the wood board in line with the hole in the roof.



FINDING THE LOCATION OF THE RAFTERS FROM THE OUTSIDE OF THE ROOF USING SEVERAL NAILS WHEN THE INTERNAL SURFACE OF THE ROOF CANNOT BE REACHED



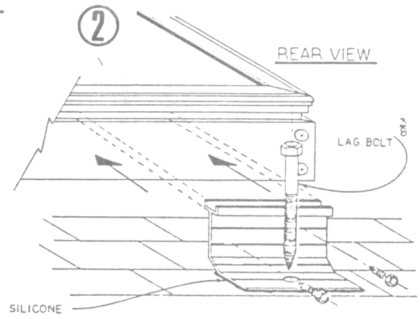


Fig 13- INSTALLATION DETAILS OF THE MOUNTING STRUTS

Place a generous amount of silicone caulking compound around the bolt of the mounting strut.

Place a flat galvanized steel washer and a neoprene washer over a 12.5 mm (½") bolt of proper length. Insert bolt in the hole drilled through the wood board under the rafters. From the inside of the roof place a large galvanized steel washer and screw on two nuts.

Fig 18- BLOCKING INSTALLATION

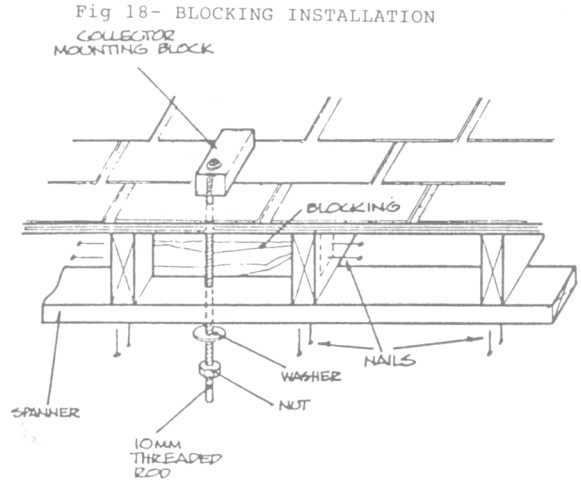
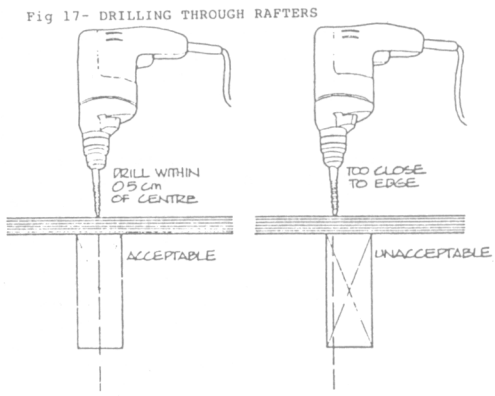


Fig 17- DRILLING THROUGH RAFTERS



Installation of the sloped mountain rack

The sloped mounting installation kit sold separately by SUNSTRIP provides a rack intended to install the solar collector panels at a 30° angle with respect to horizontal on flat or slightly sloped roofs.

Refer to figures 19 through 21, secure 150mm (6") rectangular sections of mounting struts to the roof.

Do not forget the installation of a mounting bracket in the front of the rack only. Refer to figure 20. Attach the rear sections of the rack to the mounting struts secured to the roof; these rear sections are to be installed at a right angle with respect to the roof, not to the collector nor to the ground. Refer to figure 21. Install the main support. Refer to figures 19 through 21. After that, proceed as described in the previous section for the installation of the collectors with the mounting brackets. Refer to figure 21.

The rack is now complete.

Please note that wind loading will be much more severe in the case of sloped mounting. Use extra care in securing the rack to the roof rafters to prevent accidents.

Fig 19- INSTALLATION DETAILS FOR FLAT OR SLIGHTLY SLOPED ROOF RACK

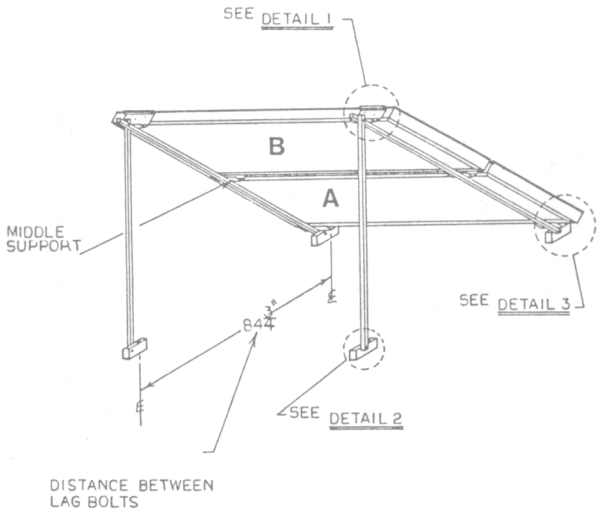


Fig 20- INSTALLATION DETAILS FOR FLAT OR SLIGHTLY SLOPED ROOF RACK

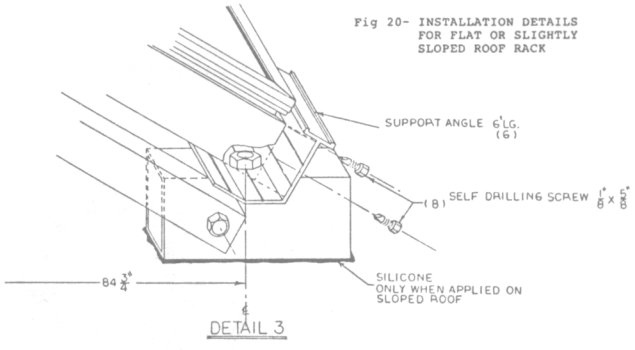
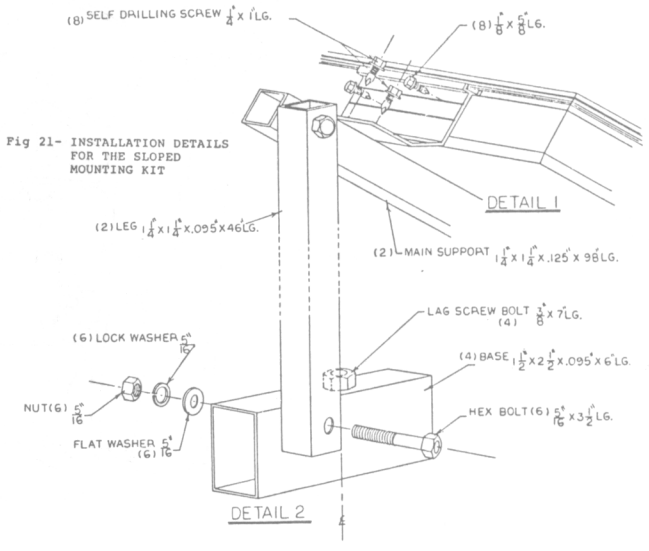
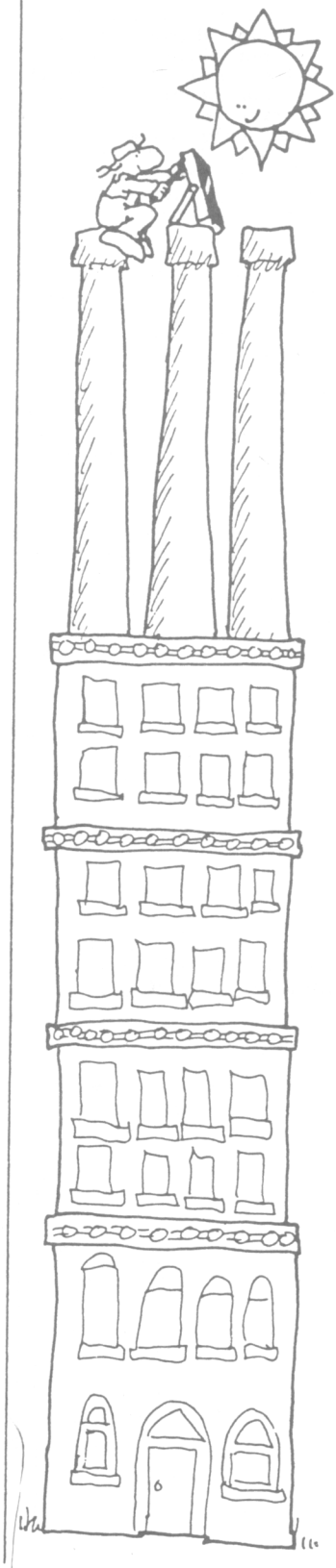


Fig 21- INSTALLATION DETAILS FOR THE SLOPED MOUNTING KIT





Wall mounting

The solar collector panels may be mounted on a vertical wall using the same rack as used for roof mounting, allowing sloping of the panels with respect to the wall. In some cases, it may be more convenient to use a rack supported by both a wall and the ground.

For direct installation on a wall, ascertain whether or not the wall is in proper shape and effect any necessary repairs prior to installing the solar collector panels. In the case of stone or brick walls we strongly recommend to use only a rack for roof or ground mounting. The lower level of the solar collector panel array must be above the average level of snow (1 to 1.5 meters in Canada) and above the solar tank.

Find the approximate location of the rafters by taping the wall with a hammer or by looking for nails driven through them. Find the exact location of the rafters by driving nails 90 mm (3½") each side of the estimated location of the rafter. Perform this under an overhang in as much as possible to prevent humidity seepage. (verify the position of pipes and electrical wires beforehand.)

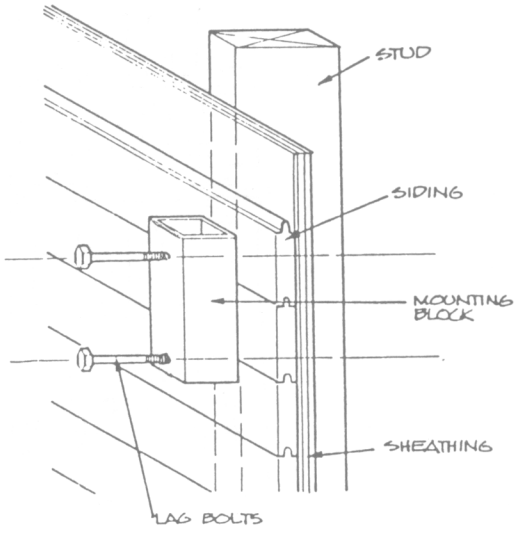
Locate the centerline of the rafters within 10 mm (½") both at the top and at the bottom. Make no assumptions about the rafter being plumb, parallel nor regularly spaced.

Mark the centerline of the rafters where the mounting struts will be installed. Seal the holes with silicone.

Place 150 mm (6") sections of mounting strut exactly on the rafter centerline and drill pilot holes within 5 mm (1/4") of this line to avoid splitting of the rafter.

Fig 24-

WALL MOUNTED INSTALLATION

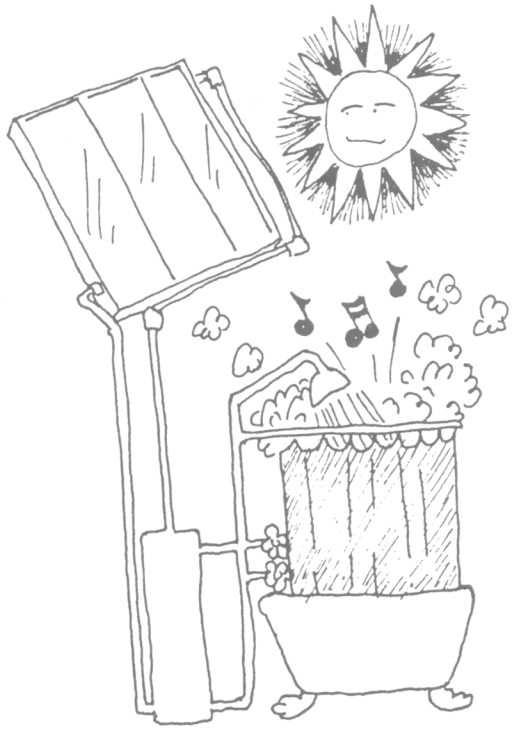


The pilot holes are to be filled with silicone caulking compound prior to installing the anchoring bolts. Also place silicone on the bottom of the entire length of mounting strut sections (refer to figure 24). Suitable anchoring bolts shall be 11 mm (3/8") in diameter and 100 mm (4") in length and are to be driven at least 75 mm (3") inside the rafters. Place a generous amount of silicone on each bolt head and around the mounting struts secured to the wall. Attach the rear sections of the rack to the base of the mounting struts. Those rear sections must be at a right angle with respect to the wall. The solar collector panels may now be installed on the rack.

Installing the solar collector

Use a ladder and a rope to raise the solar collector panels on the roof under best safety conditions. The solar collector panel will be pulled with the rope and will slide over the ladder. Two persons are usually required, one pulling the rope and the other pushing the panel along the ladder. Once on the roof, the panels are to be placed over the mounting struts.

Secure the panels to the mounting struts using galvanized lag screws, which must be driven at least 75 mm (3") through the rafter center. Use a lot of silicone for a waterproof installation. Refer to figure 13.



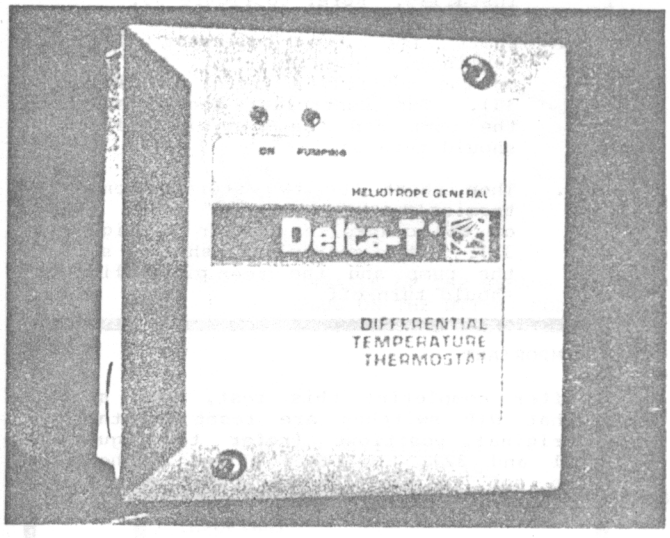
3 THE CONTROL CIRCUIT

The control circuit is the most important part of the solar domestic hot water system; this is the "brains" of the entire system and therefore requires extra care. The slightest omission during installation is likely to result in expensive repair costs for the homeowner.

The control circuit comprises three key elements

- a differential controller
- two (2) temperature sensors

HELIOTROPE DTT-84 MODEL "DELTA-T" DIFFERENTIAL CONTROLLER



The differential controller

(DDT - 84 model only)

The differential controller compares the solar collector panel temperature with the solar tank temperature on a continuous basis and activates the pump(s) according to available solar energy. When the temperature of the solar collector panels is 10°C (18°F) above that of the solar tank, the differential controller starts the pump(s). When the temperature difference drops to 1.5°C (2.5°F), the differential controller stops the pump(s).

In addition to the control circuit, the differential controller is also part of a dual protection circuit. When the solar tank temperature reaches 140°F (60°C), the differential controller stops the pump(s). When the solar tank temperature drops below 15°C (60°F) the controller starts the pump(s).

IMPORTANT

The "ON" position of the "ON/OFF/AUTO" switch has been permanently disabled to ensure against freezing as might occur if the switch was left on the "ON" position by mistake instead of the "AUTO" position.

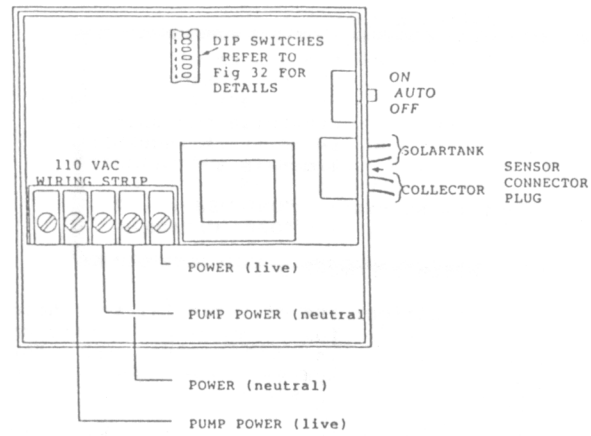


Fig 31- INTERNAL DETAILS OF THE DTT-84 DELTA-T DIFFERENTIAL CONTROLLER

The DDT -84 model differential controller can be programmed through six small "Dual In-line Package" (DIP) switches located at the upper center of the electronic circuit inside the housing. Refer to figures 31 and 32.

Each of these DIP switches has a specific function (refer to figure 32):

- Switch number 1 :

"ON" position: the high temperature system cut-off is given priority over the temperature differential system turn-on/turn-off (refer to switches 5 and 6)

factory setting: "ON"

- Switch number 2 :

"ON" position: triggers the stagnation off process when the solar collector panel sensor report a temperature of 100°C (210°F)

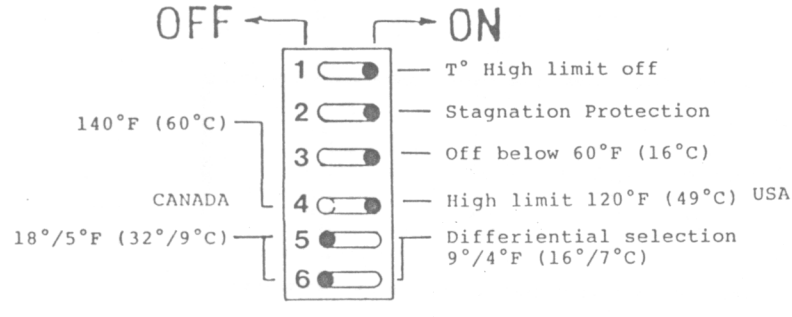
factory setting: "ON"

- Switch number 3 :

"ON" position: the system will stop when the solar collector panel temperature drops below 15°C (60°F). If switch number 2 is set to the "ON" position, the latter overrides switch 3.

factory setting: "ON"

Fig 32- DETAILS OF THE DIP SWITCHES AND PRE-SET OPERATING POSITIONS



- Switch number 4 :

"ON" position: the system will stop when the solar tank temperature exceeds 71°C (120°F); otherwise the solar tank temperature shut-off limit is 82°C (140°F)

factory setting: "ON" USA
"OFF" CANADA

- Switches number 5 & 6 :

"ON" position: the differential threshold for system start-up is 5°C (9°F) and for system turn-off 1.5°C (2.5°F)

"OFF" position: the differential threshold for system start-up is 10°C (18°F) and for system turn-off 1.5°C (2.5°F)

factory setting: "OFF"

The temperature sensors

Two sensors are included in the system:

- The storage sensor (also used for maximum temperature limit);
- The solar sensor (also used as low temperature sensor for freeze protection).

These two sensors are identical and are of thermistor type. Their electrical resistance decreases as the temperature increases. At 25°C, the resistance is 10 000 ohms (10 k ohms). Refer to table 7. Each thermistor has two black wires.

IMPORTANT

It is necessary to verify the temperature sensors with an ohmeter prior to system installation. Compare the measurements with the resistance-temperature chart given in table 7.

Table 7- RESISTANCE / TEMPERATURE CHART

10,000 ohm at 25°C

Tolerance: + or - 1.5°C

°F	°C	Résistance (Ω)	°F	°C	Résistance (Ω)
32	0.0	32,660	100	38.0	5,827
41	5.0	25,400	101	38.5	5,696
50	10.0	19,900	102	39.0	5,570
59	15.0	15,700	103	39.5	5,446
68	20.0	12,494	104	40.0	5,325
69	20.5	12,185	105	40.5	5,208
70	21.0	11,884	106	41.0	5,093
71	21.5	11,592	107	41.5	4,981
72	22.0	11,308	108	42.0	4,873
73	23.0	11,031	109	42.5	4,767
74	23.5	10,763	110	43.0	4,663
75	24.0	10,502	111	44.0	4,562
76	24.5	10,248	112	44.5	4,463
77	25.0	10,000	113	45.0	4,367
78	25.5	9,760	114	45.5	4,274
79	26.0	9,526	115	46.0	4,182
80	26.5	9,299	116	46.5	4,093
81	27.0	9,077	117	47.0	4,006
82	28.0	8,862	118	48.0	3,921
89	31.0	7,507	119	48.5	3,838
90	32.0	7,333	120	49.0	3,757
91	33.0	7,164	121	49.5	3,678
92	33.5	6,999	122	50.0	3,601
93	34.0	6,839	131	55.0	2,990
94	34.5	6,683	140	60.0	2,500
95	35.0	6,531	149	65.0	2,100
96	35.5	6,382	158	70.0	1,750
97	36.0	6,238	176	80.0	1,250
98	36.5	6,097	194	90.0	920
99	37.0	5,960	212	100.0	700

Testing controller operation

The Delta - T model DDT-84 differential controller is relatively simple and troublefree. Most problems can be pinpointed thru simple tests.

Main test

IMPORTANT *Set all of the DIP switches exept the first one to the "OFF" position prior to performing this test. Refer to figures 31 & 32.*

1. Plug in suitable power. The red pilot light should turn-on. Check with a voltmeter.
2. Slide the main selector switch to the "AUTO" position.
3. Unplug the sensor wire connector from the controller if already installed. Refer to figure 35.
4. Short the two collector panel terminals labelled "1" and "2" on the controller (refer to figure 35). THe controller should start the pump and the green pilot light should turn-on.
5. Then short the two storage sensor terminals labelled "3" and "4" on the controller (refer to figure 35). The controller should stop the pump and the green pilot light should turn-off.

IMPORTANT

After completing this test, make sure that DIP switches are reset to their original positions (refer to figures 31 and 32). Switches 1 and 3 should be set to the "ON" position and all others to the "OFF" position.

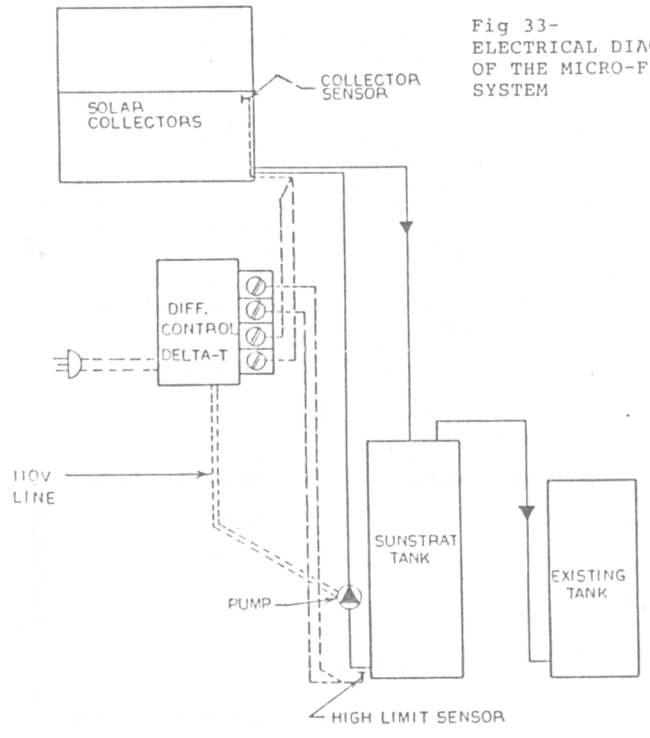
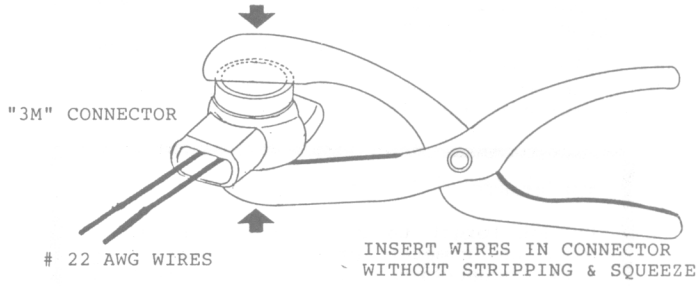


Fig 33- ELECTRICAL DIAG OF THE MICRO-FI SYSTEM

Fig 34- INSTALLATION OF THE "3M" ELECTRICAL CONNECTOR



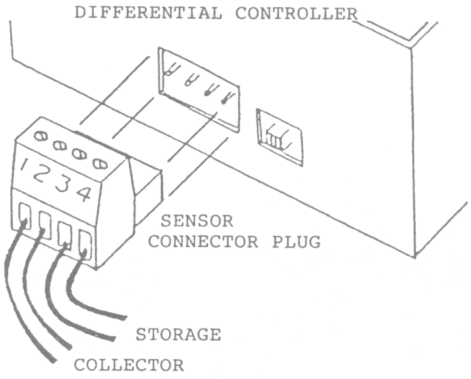


Fig 35- DETAILS OF THE SENSOR CONNECTOR PLUG ON THE DTT-84 MODEL DIFFERENTIAL CONTROLLER

Testing differential temperature operation

IMPORTANT

Set all of the DIP switches to the "OFF" position prior to performing this test (refer to figures 31 and 32)

This test requires the use of the TDT-2 test set available from SUNSTRIP (refer to figure 36).

1. Plug in suitable power. The red pilot light should turn-on. Check with a voltmeter.
2. Slide the main selector switch to the "AUTO" position.
3. Unplug the sensor wire connector from the controller (refer to figure 35).
4. Plug the TDT-2 test set connector in the sensor connection plug of the differential controller. (Refer to figure 36).
5. Turn the TDT-2 test set knob to the 18°F temperature mark. The controller should start the pump and the green pilot light should turn-on.
6. Place the TDT-2 test set knob to the 2.5°F temperature mark. THe controller should stop the pump and thegreenpilot light should turn off.

IMPORTANT

After completing this test, make sure that DIP switches are reset to their original positions (refer to figures 31 and 32). Switches 1 and 3 should be set to the "ON" position and all others to the "OFF" position.

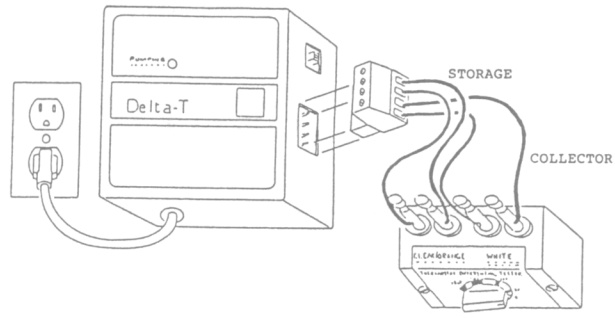


Fig 36- CONNECTION OF THE TDT-2 DIFFERENTIAL TEST UNIT

Testing sensor operation

The thermistors can be checked with an ohmeter and their resistance should follow the resistance-temperature chart given in table 7.

The resistance should be measured at the connector intended for plugging-in the controller **BUT THE CONNECTOR SHOULD BE UNPLUGGED FIRST.**(Refer to figure 35).

In case of trouble, measure the resistance directly at the sensor leads and check for continuity with an ohmeter set to the 20 000 ohms (20 k ohms) scale. Most problems occur as a result of open or short circuits in the sensor wiring. Make sure to adjust the ohmeter for proper zero in order to obtain accurate resistance readings. Large variations from the resistance-temperature chart values may occur as a result of humidity inside the sensor enveloppe.

Installation

It is imperative that extreme care be exercised during the installation of the control circuit. Most cases of faulty operation of the solar domestic hot water system involve improper installation of the various components of the control circuit.

The differential controller

The differential controller is factory installed with the pump. All 110 V AC wiring is already installed. A standard 110 V AC power outlet is required.

The only connections to be performed are those of the sensor wires.

IMPORTANT

It is important that the control circuit be protected from water and humidity which may cause rusting of the connections, causing a sensor fault. Corrosion can also cause damage and false indications.

The temperature sensors

Connect the solar collector panel sensor to the #22 AWG pair using the "3M" connectors as shown in figure 34. These connectors are small, transparent red tipped connectors. Simply insert the wires into the connector without stripping and squeeze the red tip using pliers. These connectors are designed exclusively for 22 AWG wire and are coated inside with a silicone-based compound intended to prevent corrosion.

Insert the other end of the twisted pair into the sensor connector plug mating the controller connector plug (refer to figures 33 and 35). The solar collector panel sensor wires are to be inserted into the plug terminals labelled "1" and "2" and the storage sensor wires into the plug terminals labelled "3" and "4".

IMPORTANT

Do not forget to check sensor operation with an ohmeter prior to making the last connection to the differential controller.

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