

**SKYLINE  
CORPORATION  
MANUFACTURED  
HOME  
INSTALLATION  
MANUAL**

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1997

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**SKYLINE**

BRINGING AMERICA HOME. BRINGING AMERICA FUN.

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## WARNING

**ONLY EXPERIENCED PERSONS KNOWLEDGEABLE OF MANUFACTURED HOME SET-UP PROCEDURES SHOULD SET UP THIS HOME.**

**NOTE: THIS MANUAL IS INTENDED TO INSTRUCT AND TO ASSIST ALREADY QUALIFIED PERSONNEL IN PROPER INSTALLATION OF SKYLINE MANUFACTURED HOMES. IT IS NOT INTENDED TO ENABLE SOMEONE UNFAMILIAR WITH MANUFACTURED HOME INSTALLATION TO PERFORM THE INSTALLATION.**

**SET-UP SHOULD BE DONE ONLY BY QUALIFIED PEOPLE. WHOEVER DOES THE SET-UP SHOULD GUARANTEE THEIR WORK IN WRITING FOR A REASONABLE TIME AND SHOULD, IF NECESSARY, AGREE TO RELEVEL THE HOME WITHIN 90 DAYS AFTER THE INITIAL SET-UP.**

# CHAPTER 1

# INTRODUCTION

## PLEASE READ ALL INSTRUCTIONS PRIOR TO SET-UP!

This Skyline home was engineered, constructed and inspected for conformance to the Federal Manufactured Home Construction and Safety Standards in effect on the date of manufacture. This National Standard sets forth comprehensive requirements for design construction, fire safety, plumbing, heating systems and electrical systems for manufactured homes designed to be used as dwellings.

This manual contains detailed installation instructions, including specifications and procedures for erection and hookup of your manufactured home. It has been written in an objective and easy-to-understand manner so it can be understood by people without extensive technical training. It discusses the set-up of the home from preparing the site through final inspection. It includes many tables and figures giving important data for proper set-up. Careful adherence to this manual by the homeowner and installation crew, and consultation with a registered professional or structural engineer in those unusual circumstances it does not cover, will assure you of a quality, safe and affordable home for many years to come.

Prior to locating or relocating your home, contact the local authority having jurisdiction for installation to see if permits for such procedures as blocking, anchoring, or utility connections are required. Inspections may be required during installation. On private property, zoning or development covenants may apply and should be taken into consideration. **NOTE: Preparations of the site, when accomplished by others than the home installer, may not be in accordance with these instructions.**

**THE IMPORTANCE OF CORRECT SET-UP CANNOT BE OVEREMPHASIZED.** Correct set-up is absolutely essential to homeowner satisfaction. If you are not absolutely certain of the proper procedure or you encounter unusual conditions, please contact your factory service representative.

**THE INSTRUCTIONS CONTAINED HEREIN ARE MINIMUM REQUIREMENTS, APPLICABLE LOCAL OR STATE LAW MAY HAVE OTHER OR GREATER REQUIREMENTS WHICH MUST BE COMPLIED WITH TO**

**OBTAIN OR REGAIN THE RIGHT TO OCCUPY THE HOME.**

The recommended procedures contained in this manual are intended to assist in proper installation of this home. Field experience may justify alternate acceptable procedures which, when completed, result in performance at least equal to that which will result from conformance to the details and specifications herein. For example, on double wide installation you may find it advantageous, due to local conditions, to bolt the floors together prior to bolting roof halves together, or vice versa. Either method is acceptable as long as the bolting schedule is adhered to.

**NOTE: A MANUFACTURED HOME SET UP IN THE WRONG STRUCTURAL ZONE DOES NOT MEET THE REQUIREMENTS OF THE FEDERAL MANUFACTURED HOME CONSTRUCTION AND SAFETY STANDARDS. BEFORE COMMENCING SET-UP, SEE CONSTRUCTION INFORMATION, LOCATED IN FURNACE AREA, FOR DESIGNATION OF ZONE FOR WHICH THE HOME WAS CONSTRUCTED.**

**SPECIAL CONSTRUCTION SUCH AS EXPANDO UNITS, TRIPLE WIDE UNITS, AND PERIMETER BLOCKED UNITS WILL BE COVERED IN SUPPLEMENTS TO THIS MANUAL. CONTACT YOUR FACTORY OR DEALER IF THIS HOME HAS ANY SUCH FEATURES AND YOU DO NOT HAVE THE APPLICABLE SUPPLEMENTS.**

**WARNING:** Only trained crews should install the home. Installers should follow the safety instructions provided in this manual.

### THIS HOME WEIGHS SEVERAL TONS

**USE ENOUGH TEMPORARY WOOD BLOCKING TO SUPPORT THE HOME DURING SET-UP.**

No one should be allowed under the home unless it is securely in place, even if it is not moving.

REVIEWED BY ENGINEERING DEPT.  
ISSUED BY FOLLOW-UP SERVICES DEPT.

**MAY 1, 1997**

UNDERWRITERS'  
LABORATORIES, INC.

The technical content of this Installation Manual has been reviewed by Underwriters' Laboratories, Inc. and found to be in accordance with the Federal Manufactured Home Construction and Safety Standards.

## CHAPTER 2

# DEFINITIONS

**ANCHORING EQUIPMENT:** Straps, cables, turnbuckles and chains, including tensioning devices, that are used with ties to secure a manufactured home to ground anchors.

**ANCHORING SYSTEM:** A combination of ties, anchoring equipment, and ground anchors that will, when properly designed and installed, resist the wind's overturning the home or moving it sideways.

**FOOTING:** That part of the support system that sits directly on the ground at, below or partly below grade to support the piers.

**PERIMETER SUPPORT:** The portion of a support system that supports the sidewalls at the floor line.

**PIER:** That portion of the support system between the footing and the manufactured home, exclusive of caps and shims. Types of piers include, but are not limited to, the following:

1. Manufactured Steel Stands
2. Manufactured Concrete Stands, and
3. Concrete Blocks

**SITE, MANUFACTURED HOME:** A parcel of land designed and designated for the location of one manufactured home, its accessory buildings or structures, and accessory equipment for exclusive use of the home's occupants.

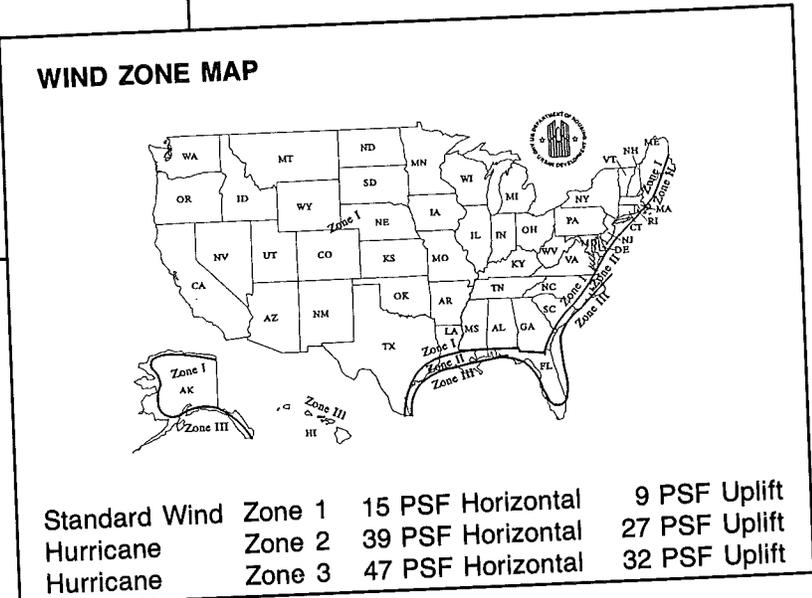
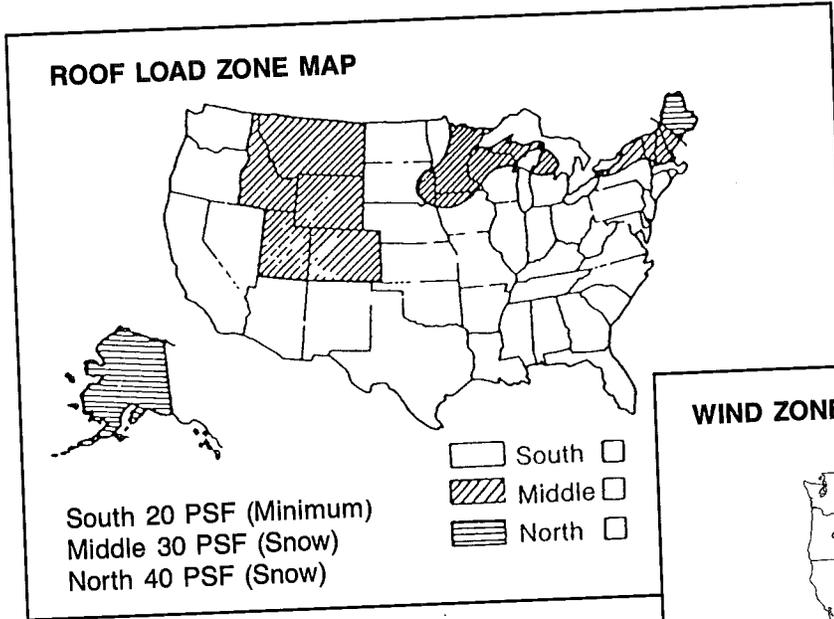
**STABILIZING SYSTEM:** A COMBINATION OF PROPERLY INSTALLED ANCHORING AND SUPPORT SYSTEM.

**STAND, MANUFACTURED HOME:** That area of a manufactured home site which has been reserved for placement of a manufactured home.

**SUPPORT SYSTEM:** A combination of footings, piers, caps and shims that will, when properly installed, support the manufactured home.

# CHAPTER 3

# STRUCTURAL ZONE MAPS, SITE PREPARATION



## SITE PREPARATION

The importance of site preparation for a problem-free installation cannot be overstated. The manufactured home site must be scraped clean, properly graded and sloped to provide for storm drainage runoff. In particular, the area under the home must be graded to prevent water accumulation. Skyline Corp. recommends the home site slope 10' in all directions away from the home. If the home is sited on sloping terrain or a hillside, the soil must be graded on all sides to channel storm runoff around the home and not under it.

### THE AREA UNDER AND AROUND THE HOME MUST BE SLOPED TO PREVENT WATER ACCUMULATION.

If the home is to be perimeter skirted or "pit-set", ventilation of the under-floor area is required to minimize the effect of moisture under the home. Ventilation openings must be provided in the under-floor enclosure or skirted on at least three sides (preferable on all sides) with a net

area of at least one square foot per 150 square feet of floor area. The required ventilators are to be approximately equally spaced around the perimeter of the home with a ventilation opening within three feet of each corner.

Proper support of the manufactured home must allow for soil conditions in the immediate area. Pier footing must be placed on firm undisturbed soil (not loose fill) or soil which has been compacted to at least 90 percent of its maximum relative density. Support piers may also be placed directly on concrete slabs designed for manufactured home placement as found in manufactured home parks.

After completion of grading and filling (if necessary), the bearing capacity of the soil at the depth of the footings should be determined. A pocket penetrometer (available from engineering supply houses) or other methods acceptable to local jurisdictions may be used. If the soil can not be tested but the type can be identified, use the foundation bearing pressures shown in Figure 3-1 as a guide. If the soil cannot be identified, use the lowest value,

(Continued)

## SITE PREPARATION (Continued)

1,000 PSF. Under unusual conditions, or if the soil appears to be peat or uncompacted soil, consult a local geologist or professional engineer for aid.

Climatic conditions must also be taken into account. If footings are placed on a frost-susceptible soil such as clay or silt, heaving or settling may occur. Therefore, in areas where temperatures go below freezing, the following should be considered when the home is anchored with a tie down system:

1. Construct the tie-down system with adjustable devices in order that the strap tension may be periodically adjusted to compensate for heaving or settling, or

2. Place the home on a properly designed raft foundation (slab), or
3. Have the foundation designed so that it is not susceptible to frost action, and
4. Consult with the building officials in your area to determine location of the frost line.

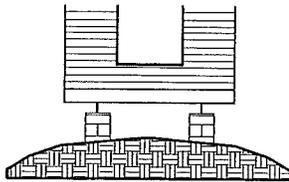
### CAUTION

**EXCESSIVE WATER IN THE SOIL UNDER THE HOME WILL CAUSE UNNECESSARY DETERIORATION TO THE HOME AND AFFECT THE COMFORT LEVEL IN THE HOME. CONTINUOUS STANDING WATER BENEATH THE HOME CAN CAUSE CONDENSATION PROBLEMS AND AFFECT THE HOME'S WARRANTY.**

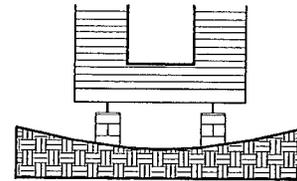
## PREVENTION OF WATER BENEATH THE HOME

### SINGLE SECTIONAL

**DO CROWN AND GRADE SITE TO SLOPE AWAY FROM HOME**

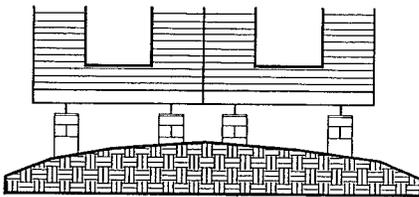


**DON'T GRADE SITE SO THAT WATER COLLECTS BENEATH THE HOME**

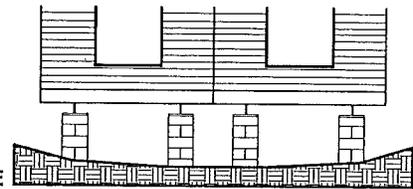


### DOUBLE SECTIONAL

**DO CROWN AND GRADE SITE TO SLOPE AWAY FROM HOME**

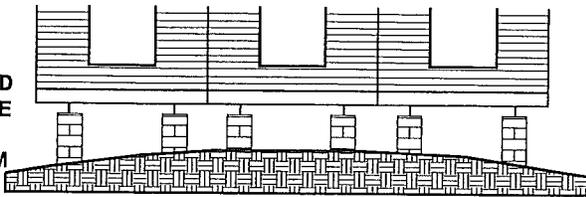


**DON'T GRADE SITE SO THAT WATER COLLECTS BENEATH THE HOME**

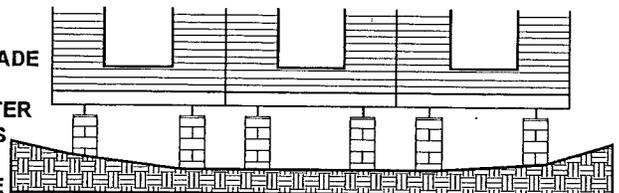


### TRIPLE SECTIONAL

**DO CROWN AND GRADE SITE TO SLOPE AWAY FROM HOME**



**DON'T GRADE SITE SO THAT WATER COLLECTS BENEATH THE HOME**



### GROUND BARRIER

There is a strong tendency for ground moisture to be drawn into the home, greatly complicating efforts to control humidity and condensation.

A ground moisture-vapor retarder of 6 mil. rated polyethylene plastic, vinyl or similar material laid on the ground surface under the home is recommended to assist in controlling the humidity in the home.

## SITE PREPARATION (Continued)

<b>General Description of Soils</b>	
Soil Type Based on the Unified Classification System	Allowable Pressure (Pounds Per Square Foot) <small>No allowances made for overburden pressure, embedment depth, water table height, or settlement problems.</small>
Rock or Hard Pan	4,000 and up
Sandy Gravel and Gravel	2,000
Sand, Silty Sand, Clayey Sand, Silty Gravel, or Clayey Gravel	1,500
Clay, Sandy Clay, Silty Clay, or Clayey Silt	1,000
Uncommitted Fill	Special Analysis is Required
Peat or Organic Clays	Special Analysis is Required
<p><b>NOTE:</b></p> <p>To be used only when none of the following is available:</p> <ol style="list-style-type: none"> <li>a. Soils investigation and analysis of the site.</li> <li>b. Compliance with the local building code.</li> <li>c. Competent opinion by a local engineer or building official.</li> <li>d. If the soil bearing capacity is less than 1,000 PSF, consult a professional engineer for foundation system requirements.</li> </ol>	

**Fig. 3-1**

## CHAPTER 4

# FOUNDATION AND SUPPORT REQUIREMENTS

**NOTE:** This chapter covers only foundations. Page 8 summarizes the usual types. Set-up procedures and methods for securing the home to its foundation are discussed in Chapter 5.

## PIERS

**Importance.** Incorrect size, location or spacing of piers may cause serious structural damage to the home. It is important to install piers around the perimeter if required for the home. Failure to do so may lead to sagging floors, walls and roofs.

**Acceptable Types.** Piers may be concrete blocks or pressure-treated wood, capped and shimmed with wedges, or adjustable manufactured metal or concrete devices (See Figure 4-2). Manufactured piers should be listed and labeled for the required load capacity.

## DESIGN REQUIREMENTS

**Load-Bearing Capacity.** The load that each pier must carry depends on factors such as the dimensions of the home, the roof live load, the spacing of the piers, and the way they are used to support the home. Center beam/marriage wall blocking is required for multisection homes.

See tables 1 and 2 for pier capacities. Manufactured piers must be rated at at least these capacities, and locally-constructed piers must be designed to transmit these loads safely.

**Configuration.** Figure 4-2 shows the recommended arrangement of concrete block piers constructed on-site. Concrete blocks should have nominal dimensions of at least 8" x 16". They must be stacked with their hollow cells aligned vertically. When piers are constructed of blocks stacked side-by-side, every layer should be at right angles to the previous one (See Figure 4-2).

Cap hollow block piers as shown in Figure 4-2 to distribute the structural load evenly across them. Caps may be of solid masonry or hard wood, and of the same length and width as the piers they rest upon. Avoid plywood, as it may lead to unwanted settling or movement.

Use 4" x 6" hardwood shims (wedges) to level the home and fill any gaps between the base of the I-beam and the top of the pier cap. Always use shims in pairs (See Figure 4-2). Drive them in tightly so they do not occupy more than 1" of vertical space. When the space to be shimmed is less than the minimum thickness of available caps or concrete blocks, dimension lumber may be used under the caps.

Select manufactured pier heights so that their adjustable risers do not extend more than 3" when finally positioned.

**All piers must rest on footings that either extend below the frost line or are otherwise protected from frost effects, and are placed on either undisturbed soil or compacted fill.**

## DESIGN PROCEDURES

**Piers Less Than 36" High.** Construct piers less than 36" high out of single, open or closed-cell concrete blocks, 8" x 8" x 16". Install them so that the long side is at right angles to the supported I-beam (See Figure 4-2). Position open cells at right angles to the footers. Horizontal offsets should not exceed 1/2" top to bottom. Mortar is not normally required. Manufactured piers should be listed and labeled. Do not extend their adjusting studs beyond the limits specified by the manufacturer.

**Piers 36" to 80" High.** Construct all piers between 36" and 80" high, and all corner piers over three blocks high, out of double, interlocked concrete blocks (See Figure 4-2). Mortar will not normally be required.

**Piers Over 80" High.** Where permitted by local codes, lay them in concrete mortar with steel reinforcing bars inserted in the block cells and fill the cells with concrete. Where such construction is not permitted by local codes, have piers over 80" high designed by a registered professional or structural engineer.

**Location and Spacing.** The location and spacing of piers depend upon the dimensions and weight of the home, the roof load zone, size and type of construction, of the footings.

Other factors such as the locations of doors or other openings and heavy pieces of furniture are also important. In general locate piers no more than 2' from either end, and not over 10' o.c.

**Single-Section Homes.** Figure 5-2 shows the recommended locations and spacing of piers for single-section homes.

**Multi-Section Homes.** Figure 5-3 shows the recommended location and spacing of piers for multi-section homes.

**Under Doors and Heavy Furniture.** Place additional piers on both sides of exterior doors, side-wall openings wider than 4' (such as sliding glass doors), under porch posts, wood stoves, and under the expected locations of heavy pieces of furniture such as pianos, organs, waterbeds, etc.

# FOUNDATION AND SUPPORT REQUIREMENTS (Continued)

## DESIGN PROCEDURES (Continued)

**Footings.** Support every pier with a properly designed footing, as follows.

### ACCEPTABLE TYPES OF FOOTINGS.

**Concrete.** Footings may consist of precast or poured-in-place concrete, pads slabs, or ribbons at least 3½" thick with a 28-day compressive strength at least 3,000 psi. Footing size in no case shall be less than 144 sq. in. or smaller than the pier supports.

**Pressure-Treated Permanent Wood.** Two layers of 2" thick pressure-treated wood planks, with the long dimension of the second layer placed perpendicular to that of the first, fastened and with cut edges painted or retreated, may also be used.

**Other Materials.** You may also use other materials approved for this use by local authorities if they provide equal load-bearing capacity and resistance to decay.

### PLACEMENT IN FREEZING CLIMATES.

**Conventional Footings.** For frost-susceptible soils, to preclude the harmful effects of ground frost heave, footings should usually be placed below the frost line. Consult local authorities to determine frost penetration. In the absence of a local code, use the frost penetration map as a guide.

**Floating Slab System.** When properly engineered by a registered professional engineer, compatible with the anchorage requirements of Chapter 5, and acceptable to the local authority having jurisdiction, a "floating slab system" may be used above the frost line.

**Insulated Foundations.** Footings may also be placed above the frost line when the home is provided with a perimeter foundation or skirting having insulation properties sufficient to prevent freezing of the soil under or adjacent to every load-bearing component of the foundation and acceptable for this purpose by the local authority having jurisdiction. Useful design guidelines may be found in references at the end of this chapter. Insulation systems should be compatible with the requirement to cross ventilate the entire space under the home.

**Proper Sizing of Footings.** Proper sizing of footings depends upon the load-carrying capacity of both the piers and the soil. See Table 4 for recommended footing sizes.

**Permanent Foundations.** Check local building codes and regulations and consult a registered professional or structural engineer when you are setting your home on a permanent foundation (such as a full basement, crawl space or load-bearing perimeter foundation). A permanent foundation design, which meets most local codes, may be available from Skyline Corporation. Please contact the Skyline division which manufactured the home or Skyline's National Director of Consumer Relations.

**Flood-Prone Areas.** Skyline Corporation does not recommend locating homes in river or coastal flood-prone areas.

Special elevation and anchoring techniques are required when locating in a flood-prone area. Consult a registered professional or structural engineer to make sure that home design and construction conform to applicable federal, state and local codes and regulations. The FEMA publication listed below contains design and construction recommendations.

**Severe Wind Areas.** Special foundation and anchoring techniques are required when locating in a severe wind area is unavoidable. Consult a registered professional or structural engineer. The HUD foundations design guide referenced herein contains recommendations for designing foundations and anchoring systems. Do not place your home in a wind zone more severe than the one indicated on the data plate located by your home's main electrical panel.

**Special Snow Load Conditions.** Homes designed for and located in heavy snowfall areas or subject to other extreme loading conditions may require special piers or footings. See tables and/or special manufacturer's instructions provided with your home.

### IMPORTANT REFERENCE DOCUMENTS

- Foundation plans available from manufacturer.
- ANSI/NCSBCS A225.1-1987, "Manufactured Home Installations," NCSBCS, 505 Huntmar Park Drive, Herndon, VA 22070, (703) 437-0100.
- ANSI A58.1-1982, "Minimum Design Loads for Buildings and Other Structures", ANSI, 1430 Broadway, New York, NY 10018.
- FEMA 85, "Manufactured Home Installation in Flood Hazard Areas", FEMA, Washington, DC 20472, (202) 646-2708, September, 1985.
- HUD Handbook 4930.3 (1989), "Permanent Foundations Guide for Manufactured Housing," HUD, 415 7th Street, S.W., Washington, DC 20410.
- "All-Weather Wood Foundation Systems Manual," National Forest Products Association, 1619 Massachusetts Ave., N.W., Washington, DC 20036, June, 1976.
- "Frost-Free Shallow Foundation Design Guidelines", *Energy Design Update*, March, 1988.
- "Building Foundation Design Guidebook," Document No. DE 88013350, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

## FOUNDATION AND SUPPORT REQUIREMENTS (Continued)

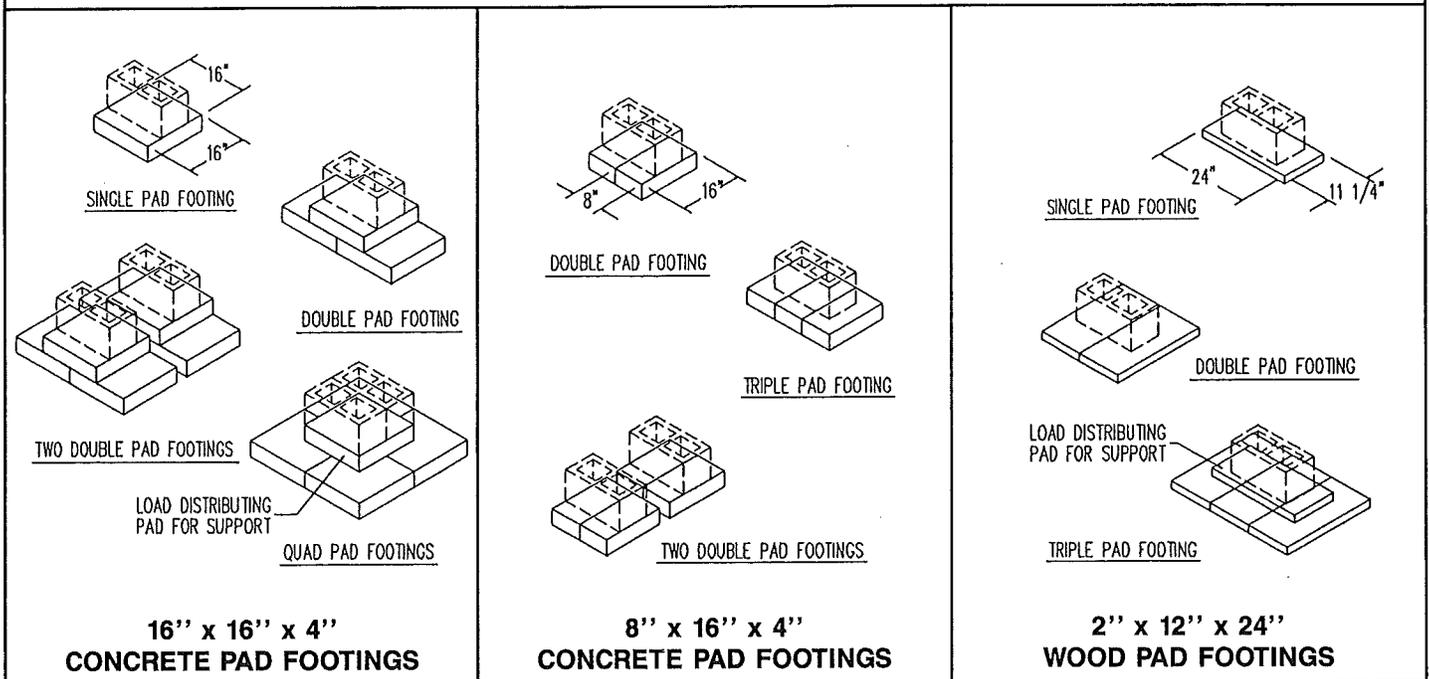
### MANUFACTURED HOME INSTALLATIONS SINGLE OR MULTI-SECTION HOMES TYPES OF FOUNDATION SYSTEM — MAIN COMPONENTS(\*)

- Piers-Ground Anchors.** Home rests on piers of concrete block, formed-in-place concrete, permanent wood or steel pedestals on permanent wood, crushed stone or concrete footers. Ground anchors in soil angled to resist straps or embedded in concrete deadmen in soil. Straps tied to the frame, with or without over-the-top straps.
- Concrete Slab or Continuous Footing.** Home rests on a concrete slab or ribbons of concrete. Straps tied between frame and perimeter footers or concrete slab. Skyline Corp. recommends installing earth anchors prior to pouring concrete slab. Concrete slab should be sloped to prevent water accumulation under home.
- Pile/Post System.** Home rests on piles/posts placed sufficiently deep in the ground to resist all wind, snow, front heave and earthquake forces. Straps fasten home to the piles/posts or caps placed thereon.
- Concrete or Concrete Block Load-Bearing Perimeter Walls. (Basement or Crawl Space)** Home rests on exterior load-bearing walls which sit on concrete footings of sufficient weight to resist all external forces. The floor connection to foundation resists external forces.

\*For Skyline multi-section homes, the mating walls are supported by piers or support walls with straps and ground anchors, providing resistance to downward and uplift forces.

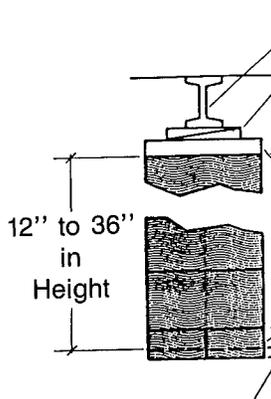
### TYPICAL FOOTING PADS

FIG. 4-1



# FOUNDATION AND SUPPORT REQUIREMENTS (Continued)

## TYPICAL PIER CONSTRUCTION



I-BEAM FRAME

GAP BETWEEN TOP OF PIER AND MAIN FRAME MAY BE HARDWOOD PLATE (NOT EXCEEDING 2" IN THICKNESS) AND SHIMS (NOT EXCEEDING 1" IN THICKNESS). SHIMS SHALL BE AT LEAST 4" WIDE AND 6" LONG, FITTED AND DRIVEN TIGHT BETWEEN WOOD PLATE OR PIER AND MAIN FRAME. 2" OR 4" SOLID CONCRETE BLOCK MAY FILL REMAINDER OF GAP.

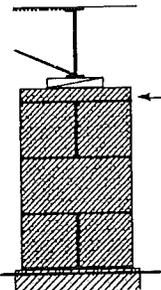
CAP — WOOD OR CONCRETE, 2" x 8" x 16" WITH LONG DIMENSION PERPENDICULAR TO BEAM.

SINGLE OPEN OR CLOSED CELL CONCRETE BLOCKS 8" x 8" x 16" (OPEN CELLS PLACED VERTICALLY UPON FOOTER) INSTALLED WITH 16" DIMENSION PERPENDICULAR TO THE I-BEAM FRAME.

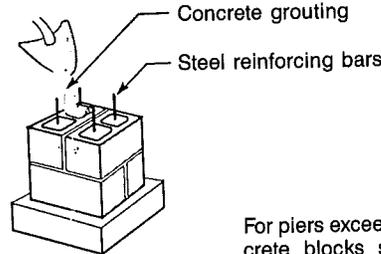
FOOTING — SOLID CONCRETE OR OTHER PRODUCT APPROVED FOR THE PURPOSE. SIZE ACCORDING TO TABLE 4.

GROUND LEVEL

FOOTING BELOW FROST LINE WHEN SUBJECT TO FROST HEAVING.



Cap—Solid Concrete Block or Equivalent 4" x 16" x 16"



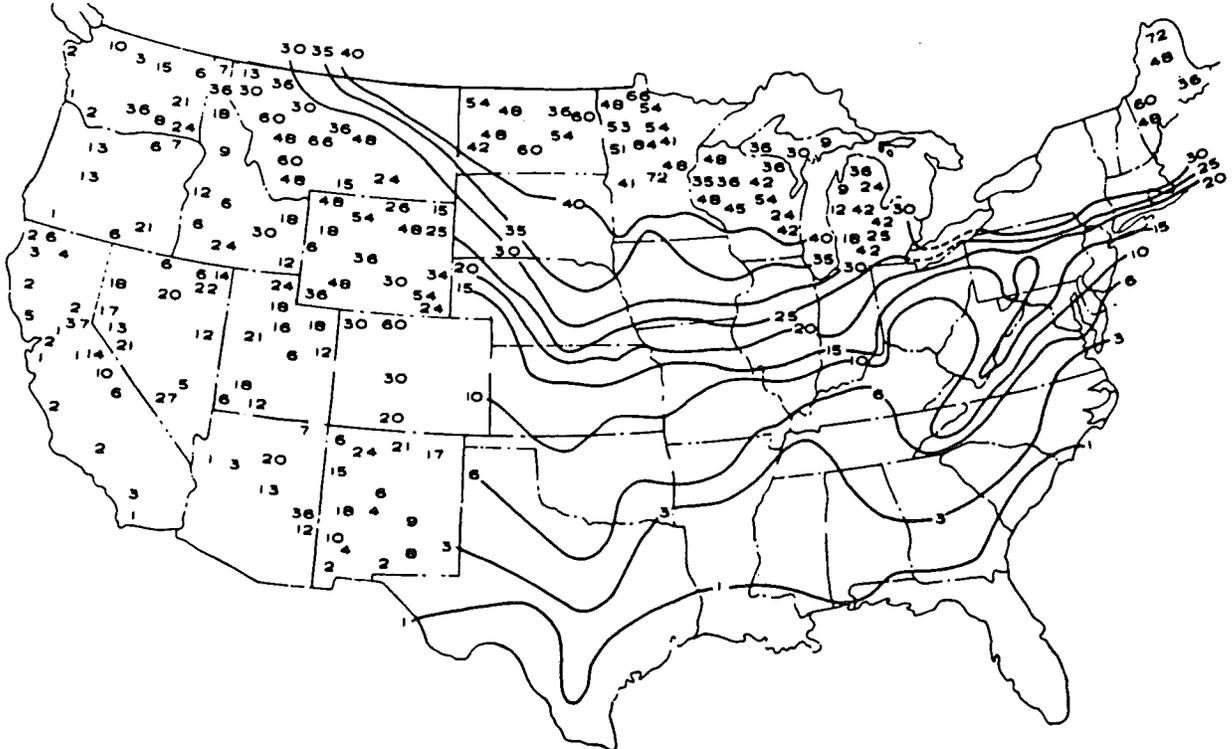
Concrete grouting

Steel reinforcing bars

*Nader Tomasbi*  
JUN 16 1993

Double Interlocked Blocks  
Max. Height is 80 inches.

Footing placed on firm undisturbed soil or in controlled fill free of grass and organic materials compacted to a minimum loadbearing capacity of 1000 PSF.



AVERAGE DEPTH OF FROST PENETRATION — IN INCHES

SOURCE: U.S. Dept. of Commerce Weather Bureau

FIG. 4-2

# FOUNDATION AND SUPPORT REQUIREMENTS (Continued)

## SUPPORT REQUIREMENTS

The design loads and minimum footing sizes used in the selection of the support structure are set forth in Table 4. The loads and footing sizes are the minimum values to be used for the support structure and are based on the indicated roof live load and a floor live load of 40 Psf.

All load bearing supports and footings may be subject to approval by the local Enforcement Agency.

The support requirements for homes designed for 60 PSF and higher roof load (and those specifically indicated middle and north zone homes) are found in the Supplement accompanying this manual entitled "Manufactured Home Installation for Perimeter Blocking".

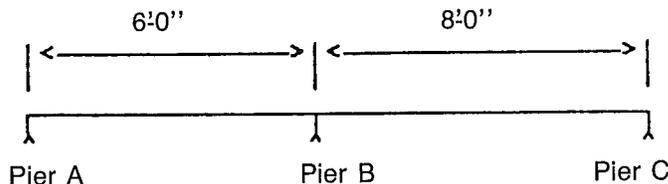
Contact the Skyline division that built the home for more information concerning perimeter blocking.

**TABLE 1  
PIER LOADING UNDER MAIN I-BEAMS  
SINGLE-WIDE HOMES**

Pier Spacing Under Main I-Beams (Ft)	12' WIDE HOMES			14' WIDE HOMES			16' WIDE HOMES		
	Pier Load (Lbs) 20 PSF Roof Zone	Pier Load (Lbs) 30 PSF Roof Zone	Pier Load (Lbs) 40 PSF Roof Zone	Pier Load (Lbs) 20 PSF Roof Zone	Pier Load (Lbs) 30 PSF Roof Zone	Pier Load (Lbs) 40 PSF Roof Zone	Pier Load (Lbs) 20 PSF Roof Zone	Pier Load (Lbs) 30 PSF Roof Zone	Pier Load (Lbs) 40 PSF Roof Zone
4	2130	2420	2560	2410	2740	2940	2700	3060	3320
5	2660	3020	3190	3020	3420	3670	3370	3830	4150
6	3190	3620	3830	3620	4110	4410	4050	4590	4980
7	3720	4230	4470	4220	4790	5140	4720	5360	5810
8	4250	4830	5110	4820	5480	5880	5400	6120	6640
9	4780	5440	5750	5430	6160	6610	6070	6890	7470
10	5320	6040	6380	6030	6850	7340	6750	7650	8300
Wt. Per Foot See Note 4	532	604	638	603	685	734	675	765	830

**NOTES:**

1. See Table 4 for minimum footing sizes based on pier loads and allowable soil bearing capacities. The footing sizes and pier loads are minimums required for the applicable conditions. The footing shall not be smaller than the pier it supports or 144 square inches.
2. The maximum spacing of supports is not to exceed 10 feet.
3. Where it is impractical to maintain spacing, such as in the axle area, the average of the distance to each adjacent support may be used to determine support requirements: for example: if the distances to the adjacent supports were 6'-0" and 8'-0", the average spacing would be 7'-0".



The average spacing for pier B would be  $(6 + 8) / 2 = 7$  ft., therefore, pier B would be designed for 7 ft. pier spacing.



4. The last line in the above Table is the weight per foot each main I-beam is carrying. Multiply this number by the span a pier is carrying to determine the required capacity of that pier.

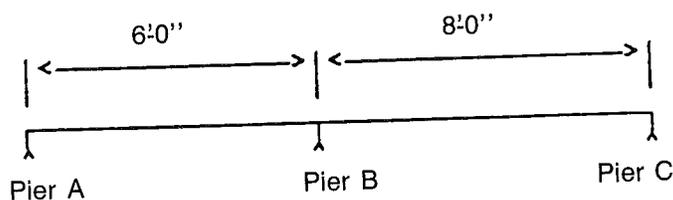
# FOUNDATION AND SUPPORT REQUIREMENTS (Continued)

## TABLE 2 PIER LOADING UNDER MAIN I-BEAMS DOUBLE-WIDE HOMES

Pier Spacing Under Main I-Beams (Ft.)	20' WIDE HOMES			24' WIDE HOMES			26' & 28' WIDE HOMES			32' WIDE HOMES		
	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone
4	1810	2060	2170	2100	2390	2560	2360	2630	2940	2680	3000	3320
5	2270	2580	2710	2630	2980	3190	2950	3350	3670	3350	3750	4150
6	2720	3100	3260	3150	3580	3830	3540	4020	4410	4020	4500	4980
7	3170	3610	3800	3680	4180	4470	4130	4690	5140	4690	5250	5810
8	3630	4130	4340	4200	4770	5110	4720	5360	5880	5360	6000	6640
9	4080	4640	4880	4730	5370	5750	5310	6030	6610	6030	6750	7470
10	4540	5160	5420	5250	5970	6380	5900	6700	7340	6700	7500	8300
Wt. Per Foot See Note 5	454	516	542	525	597	638	590	670	734	670	750	830

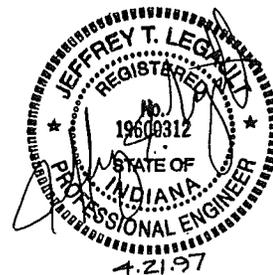
### NOTES:

- See Table 4 for minimum footing sizes based on pier loads and allowable soil bearing capacities. The footing sizes and pier loads are minimums required for the applicable conditions. The footing shall not be smaller than the pier it supports or 144 square inches.
- The maximum spacing of supports is not to exceed 10 feet.
- Where it is impractical to maintain spacing, such as in the axle area, the average of the distance to each adjacent support may be used to determine support requirements: for example: if the distances to the adjacent supports were 6'-0" and 8'-0", the average spacing would be 7'-0".



The average spacing for pier B would be  $(6 + 8) / 2 = 7$  ft., therefore, pier B would be designed for 7 ft. pier spacing.

- Concentrated loads at marriage line (see Table 3).
- The last line in the above Table is the weight per foot each main I-beam is carrying. Multiply this number by the span a pier is carrying to determine the required capacity of that pier.



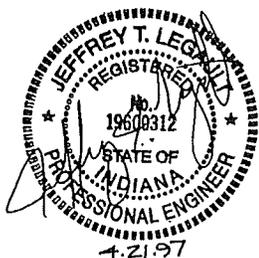
# FOUNDATION AND SUPPORT REQUIREMENTS (Continued)

**TABLE 3  
PIER LOADING UNDER CENTERLINE BEAM  
DOUBLE-WIDE HOMES**

Span Between Columns (FT.) See Note 1	20' WIDE HOMES			24' WIDE HOMES			26' & 28' WIDE HOMES			32' WIDE HOMES		
	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone	Pier load (Lbs) 20 PSF Roof Zone	Pier load (Lbs) 30 PSF Roof Zone	Pier load (Lbs) 40 PSF Roof Zone
6	900	1200	1500	1080	1440	1800	1260	1680	2100	1350	1800	2250
10	1500	2000	2500	1800	2400	3000	2100	2800	3500	2250	3000	3750
12	1800	2400	3000	2160	2880	3600	2520	3360	4200	2700	3600	4500
14	2100	2800	3500	2520	3360	4320	2940	3920	4900	3150	4200	5250
16	2400	3200	4000	2880	3840	4800	3360	4480	5600	3600	4800	6000
18	2700	3600	4500	3240	4320	5400	3780	5040	6300	4050	5400	6750
20	3000	4000	5000	3600	4800	6000	4200	5600	7000	4500	6000	7500
24	3600	4800	6000	4320	5760	7200	5040	6720	8400	5400	7200	9000

**NOTES:**

1. Where a column is located between two openings, sum the loads for each opening to obtain the required pier load.
2. See Table 4 for minimum footing sizes based on pier loads and allowable soil bearing capacities.
3. The concentrated loads consists of roof loads only.
4. Pier locations at the marriage wall are marked with paint or metal indicator straps.
5. Piers used side by side to obtain the required load is permissible (See Figure 5-4).



# FOUNDATION AND SUPPORT REQUIREMENTS (Continued)

## TABLE 4 FOOTING SIZES

REQUIRED PIER LOAD CAPACITY (POUNDS)	FOOTINGS SIZES (IN x IN) OR EQUAL AREAS (SQ. IN.)											
	ALLOWABLE SOIL BEARING VALUE											
	1000 PSF		1500 PSF		2000 PSF		3000 PSF		4000 PSF		6000 PSF	
	REQUIRED AREA (SQ. IN.)	TYPICAL SIZES (IN.xIN.)	REQUIRED AREA (SQ. IN.)	TYPICAL SIZES (IN.xIN.)	REQUIRED AREA (SQ. IN.)	TYPICAL SIZES (IN.xIN.)	REQUIRED AREA (SQ. IN.)	TYPICAL SIZES (IN.xIN.)	REQUIRED AREA (SQ. IN.)	TYPICAL SIZES (IN.xIN.)	REQUIRED AREA (SQ. IN.)	TYPICAL SIZES (IN.xIN.)
1500	216	12x20	144	12x20								
2000	288	16x20	192	12x20	144	12x20	144	12x20	144	12x20	144	12x20
2500	360	18x20	240	12x20	180	12x20	144	12x20	144	12x20	144	12x20
3000	432	20x22	288	16x20	216	12x20	144	12x20	144	12x20	144	12x20
3500	504	22x24	336	18x20	252	14x20	168	12x20	144	12x20	144	12x20
4000	576	24x24	384	20x20	288	16x20	192	12x20	144	12x20	144	12x20
4500	648	26x26	432	20x22	324	18x20	216	12x20	162	12x20	144	12x20
5000	720	26x28	480	22x22	360	18x20	240	12x20	180	12x20	144	12x20
5500	792	28x30	528	22x24	396	20x20	264	14x20	198	12x20	144	12x20
6000	864	30x30	576	24x24	432	20x22	288	16x20	216	12x20	144	12x20
6500	936	30x32	624	24x26	468	22x22	312	16x20	234	12x20	156	12x20
7000	1008	32x32	672	26x26	504	22x24	336	18x20	252	14x20	168	12x20
7500	1080	32x34	720	26x28	540	24x24	360	18x20	270	14x20	180	12x20
8000	1152	34x34	768	28x28	576	24x24	384	20x20	288	16x20	192	12x20
8500	1224	34x36	816	28x30	612	24x26	408	20x22	306	16x20	204	12x20
9000	1296	36x36	864	30x30	648	26x26	432	20x22	324	18x20	216	12x20
9500	1368	36x38	912	30x32	684	26x28	456	22x22	342	18x20	228	12x20
10000	1440	38x38	960	30x32	720	26x28	480	22x22	360	18x20	240	12x20



*John A. Mikel*  
5-6-93

## CHAPTER 5

# SET-UP PROCEDURES

### **WARNING: WHEN SETTING UP THIS HOME, THE FOLLOWING PRECAUTIONS REGARDING JACKING MUST BE FOLLOWED:**

**Moving Home To Location:** Make sure the following items are completed before placing the home:

- The site is properly prepared. See Chapter 3.
- All concrete work necessary to setting the home is finished.
- Utilities are installed or available.
- Any trenching, for crossover drain lines or for wheels that will be left in place, is complete.
- Items that could be difficult to install after the home is sited (such as anchors and ground moisture retarders) are in their proper locations.

**CAUTION: THE HOME WEIGHS SEVERAL TONS. USE ADEQUATE TEMPORARY SUPPORT BLOCKING TO SAFEGUARD WORKERS. SKYLINE CORP. RECOMMENDS WOOD BLOCKING.**

**Positioning Home.** When not placing the home on a concrete slab or poured-in-place footings, mark the corners of the home and lay out footings, and support devices close to where they will be used. Then move the home or first section into position.

#### **Leveling and Blocking — Single-Wide Homes.**

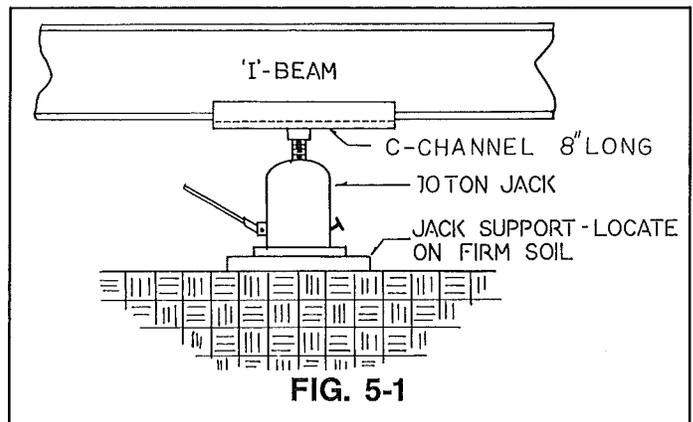
1. Before doing any jacking, place support piers for the home in the locations under the home as specified in the home installation instructions.
2. Use a minimum of two jacks, each with a rating of at least ten tons.
3. Jack only on the main chassis I-beam. Locate the jack directly under the vertical web of the I-beam. Do not jack on the seam (joint between flanges) of a twin I-beam.
4. Use a large 3/8 inch thick steel plate, C-channel or other equivalent plate between the main chassis I-beam and the jack head to distribute the load.
5. The jack base, and any blocking must be located on firm ground.
6. Do not operate the jacks while you are under the main I-beams of the home.
7. Use jacks only for raising the home. Do not rely on the jacks to support the home.
8. Place 4" x 6" x 48" min. safety timbers between the I-beams and ground in case of jack failure. Timber should be hardwood.
9. Raise the home in small increments and provide additional blocking between the home and the piers and safety piers as the home is raised.

10. Do not go under the home while it is supported on the jacks.

**FAILURE TO FOLLOW THESE WARNINGS MAY RESULT IN SERIOUS INJURY OR DEATH.**

Reminders before jacking . . .

1. Use only jacks in good condition with a minimum rating of 10 tons.
2. Use a minute man C-Channel jacking plate or equivalent between jack and steel "I" beam to distribute the concentrated loads. (See Figure 5-1)
3. Use a firm support under the jack base to prevent tipping or settling of the jack. Skyline recommends a 12" x 12" or larger pad.
4. Always follow the sequence of jacking outlined below to avoid overstressing structural members.



## SET-UP PROCEDURES (Continued)

The jacking procedure is as follows:

1. After the home is located in its final position, you can preliminarily level it by using the hitch jack but only after adequately wheel blocking the home so it does not roll.
  2. Jack up one side of the home by placing one jack just forward of the front spring hanger and the other just behind the rear spring hanger. These two jacks must be operated simultaneously to raise the home. Jack low side of the home first. Install footings and piers; one just forward of the front jack and another just behind the rear jack (taking care not to exceed the correct spacing selected from Table 1 or 2).
  3. Next, jack the main "I" beam at the front and position a pier within 2'0" of the end of the "I" beam. At the completion of this step, this side of the home should be approximately level.
  4. Repeat Steps 2 and 3 for the other side of the home. At the completion of this step, the home should be roughly level from front to rear and from side to side.
  5. Place the remaining pier supports under the main "I" beam on each side taking care to maintain a maximum distance of no more than the spacing determined from Tables 1 or 2 with piers located with 2'0" of each end of each "I" beam. (See Figs. 5-2)
  6. Level the home within reasonable tolerances, using a 6 foot carpenter's level, water level, or similar equipment. The final height adjustment is obtained by jacking the "I" beam and placing hardwood shims between the piers and "I" beam, or other approved methods such as adjustable piers. THIS LEVELING PROCESS IS IMPORTANT FOR APPEARANCE AND IS ESSENTIAL FOR THE PROPER OPERATION OF DOORS, WINDOWS, AND THE DRAINAGE SYSTEM.
  7. Place additional supports at each side of sidewall openings over 4'0" wide and each side of exterior doors.
  8. Within 90 days after initial set-up, the home should be releveled, if necessary, to compensate for any pier settlement. Follow the procedure in Item 6 above.
- NOTE: DURING THE LEVELING OR RELEVELING PROCESS, LOOSEN FRAME TIES AND OVER-THE-ROOF TIES (IF PROVIDED) PRIOR TO JACKING HOME.**

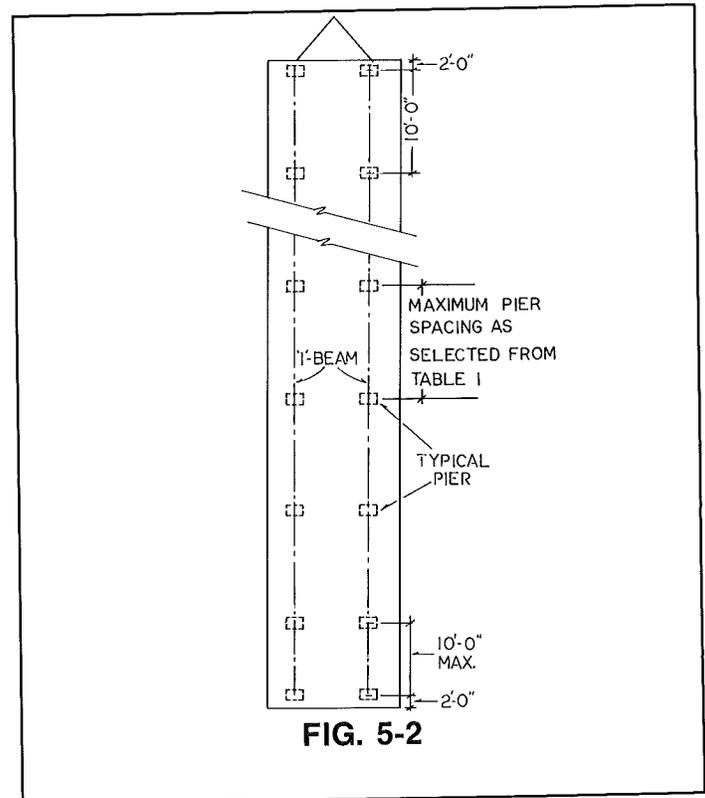


FIG. 5-2

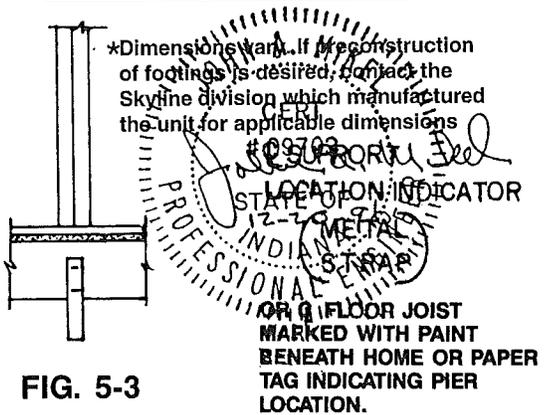
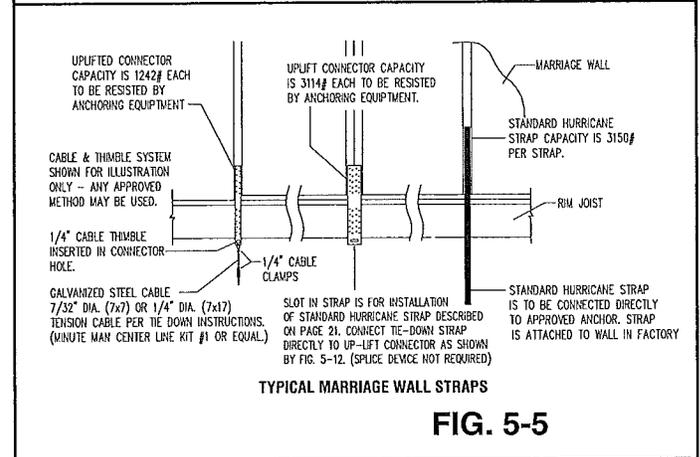
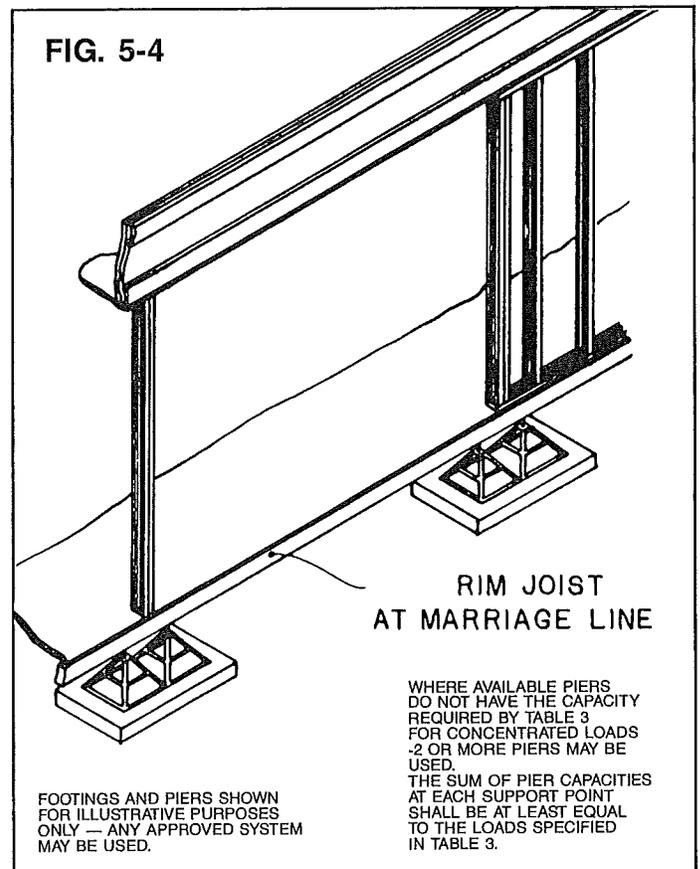
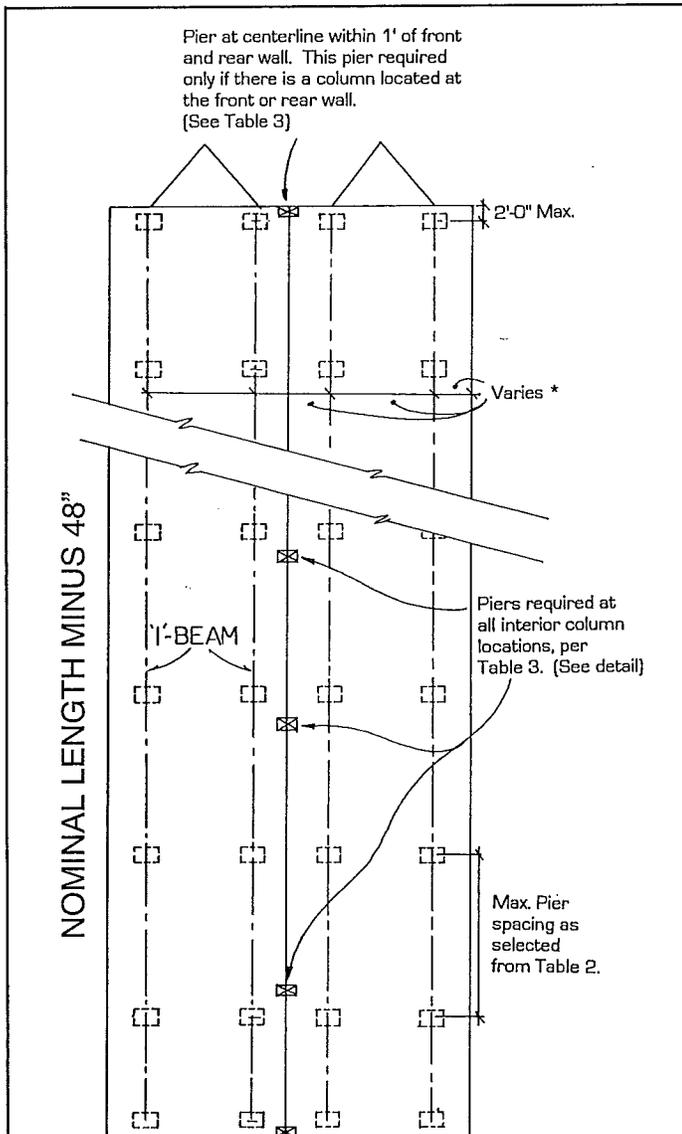
# SET-UP PROCEDURES (Continued)

## LEVELING AND BLOCKING, DOUBLE-WIDE HOMES

With the exception of the requirement for support under the marriage wall of double-wide units, leveling and blocking procedures are the same as for single-wide units. The site must be prepared as previously described. Special consideration must be given to the footings and pier construction required by (1) local soil conditions, (2) depth of frost

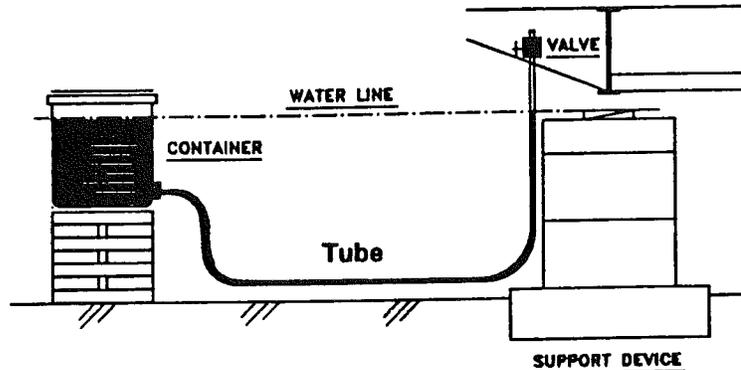
line and (3) special requirements for local jurisdictions. It may be desirable to construct the footings and piers (to grade height) prior to moving the home to its final location. Pre-construction of the footings and piers to grade may be accomplished by referring to the pier location diagram, Figure 5-4, making special note of the additional piers required at centerline beam supports. If there are questions regarding pier locations, please contact the division for aid. Piers located at the centerline may carry much higher loads than other pier locations.

### PROPER BLOCKING OF THE CENTERLINE BEAM IS VITAL TO THE PERFORMANCE OF A DOUBLE-WIDE HOME.



## SET-UP PROCEDURES (Continued)

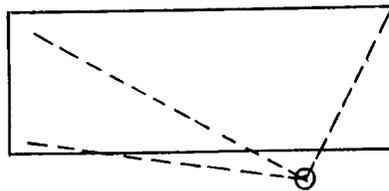
FIG. 5-6  
USE OF WATER LEVEL



### MATERIAL TO MAKE LEVEL

- Five Gallon Pail with Lid
- Plastic Tubing — 100 feet x 3/8" or 1/2"
- Cork — 1-1/2"
- Male Barbed Fitting — 3/8" x 3/4"
- Steel Washer — 7/8"
- Nut — 3/4"
- Female Barbed Fitting — 3/8" x 1/2"
- Male Valve — 1/2"
- Pipe Sealant
- Cake Coloring — 8 oz.
- Use RV Solvent in Cold Weather

### “HOW TO USE A WATER LEVEL”



### PLACE AT ANY POINT AROUND HOME

**Unroll Tubing:** Position level where it is to be used. Take care not to have kinks in it, step on it or lay anything on it.

**Check for Air Bubbles:** To remove any; lower valve below bottom of container and open. Close valve when they are out.

**Container Location:** Located so valve can reach all areas of home. Build up container so water line in valve end of tubing is at the predetermined height support devices will be set.

**Leveling of Support Device:** Secure valve above determined height and open. Adjust device as needed. Close valve and move to next support device.

**NOTE:** Level all support devices before lowering home.

## SET-UP PROCEDURES (Continued)

### DOUBLE-WIDE INTERCONNECTION

The procedure for connecting the homes is as follows:

**NOTE: WHEN REQUIRED TO WALK ON METAL ROOFS DURING ASSEMBLY, WALK ONLY ON TRUSSES OR RAFTERS.**

1. Remove the temporary closure materials (polyethylene and batten strips) and position the halves as close together as possible in the final desired location. Do not remove temporary beam supports until Step 4 is completed. It will be necessary to slide the halves together with rolling and jacking equipment. Care must be exercised during any rolling or jacking operations to avoid overstressing structural members.
2. Bring the roof ridge beam halves together. Deflate the inside tires of light half if necessary.
3. Align ceiling material joints and the top corners of ceilings at the end walls.

#### ROOF ACCESS FOR BOLTING:

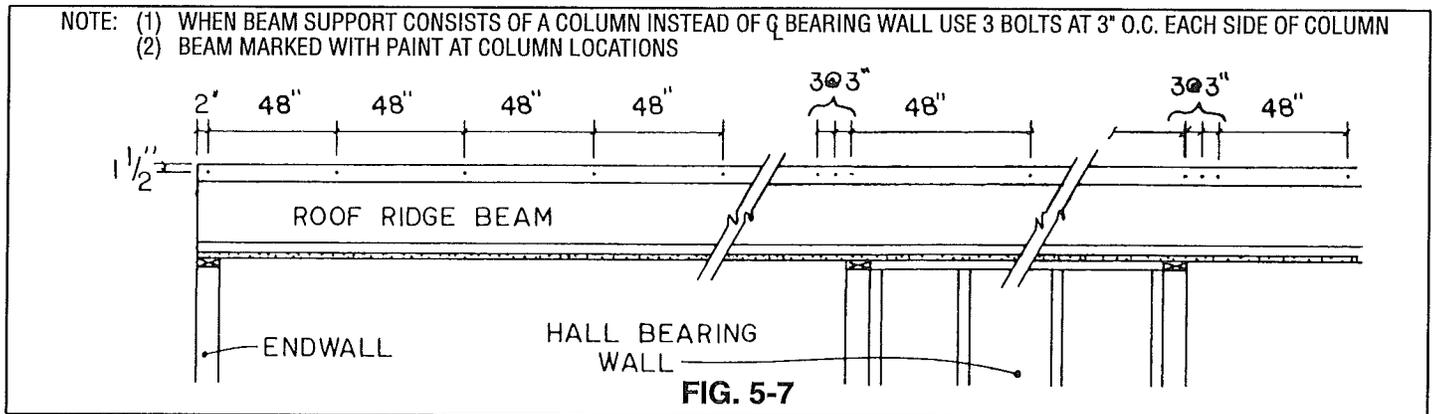
For metal roof units access for bolting the ridge beams together is obtained by a 6" space provided on both sides of the ridge beam (optional roof sheathing may be folded back or temporarily removed). For shingle roof units refer to section "Installation of Shingled Roof". Secure beam halves with 3/8" x 4-1/2" bolts at front and rear ends only. Bolts located above a cathedral ceiling must be 3/8" x 8" long.

4. Level ceiling edges by jacking at the inside main "I"-beam on light half of the home. Install 'Owens-Corning' Fiber-glass Sil-Sealer, Form Sealer or equivalent insulating material between bottom flanges of ridge beam to limit air infiltration. When the ceiling joint is flush, complete the bolting operation using the 3/8" x 4-1/2" (8" @ a cathedral ceiling) bolts at 48 inches on center with 3 additional bolts at 3 inches on center over beam supports (See Fig. 5-7).

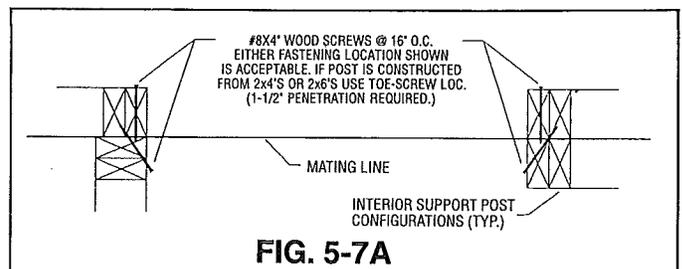
As an alternate to the bolts the beam halves may be secured together by screwing with 3/8" x 4-1/2" (3/8" x 6" @ cathedral ceilings) lag screws at 24" o.c. (max.) alternating each side of beam and 6 additional lag screws at 3" o.c. alternating each side over interior beam supports. Pre-drill 1/4" pilot holes for the lag screws at 1-1/2" down from the top of the beam and with a maximum offset from the horizontal of 45°.

For units with ridge beam access on one half on unit only, lag screw beam halves together as described above except, lags screws do not have to be alternated each side. Size and spacing of lags is to remain the same. Bolting cannot be used with this option.

**NOTE: WHERE OPTIONAL OVER-THE-ROOF STRAPS ARE PROVIDED SPLICE THE STRAPS TOGETHER AT THE RIDGE BEAM WITH AN A.B. CHANCE SPLICE DEVICE AND STRAP SEALS (NOT PROVIDED). SEE FIG. 5-12.**



5. Line up end walls by moving either floor forward or back as necessary. Install 'Owens-Corning' Fiberglass Sill-Sealer or equivalent between centerline endwall studs to limit air infiltration. Toenail the end walls together using 16d nails at 10" O.C.
6. Level the floors by jacking on the main "I" beams (inside beam on either half). Install 'Owens-Corning' Fiberglass Sill-Sealer, Foam Sealer or equivalent, between centerline header joists to limit air infiltration. The center line header joists should be lag screwed together with 3/8" x 2-1/2" lag screws @ 8'0" O.C. Remember to use safety timber when jacking the home.
7. Level home and install piers following the procedure outlined on page 16. Tables 2 and 3 are to be used to determine pier and footing capacities for the selected spacing and loads.
8. Place additional supports at the centerline of each end wall, each end of the hall wall, sidewall openings greater than 4'0", each side of exterior doors and beam support columns at locations marked with indicator strap or paint (See Figs. 5-3 and 5-4 and Table 3).
9. Install a 2" wide bottom board patching tape at the floor joint of two halves for the entire length of home.
10. If home has double mating walls, then fasten the mating wall columns together with #8 x 4" screws 16" O.C. (See Fig. 5-7A).



## SET-UP PROCEDURES (Continued)

### MANUFACTURED HOME TIE-DOWN INSTRUCTIONS

The support system must also resist lifting, sliding, and overturning force resulting from side winds. A method used is to install ground anchors and tie-down straps in addition to the piers.

Because of local sheltered conditions, authorities may permit installation of the home without tie-downs. However, tie-downs as described are the minimum necessary if the home is to withstand its design wind load without dislocation. On multi-sectional homes, sections must be fastened together and level before tie-down straps are installed.

#### WARNING

**BEFORE INSTALLING A SUPPORT SYSTEM WITHOUT TIE-DOWNS, BE SURE THAT SUCH A METHOD IS ADEQUATE FOR THE AREA AND IS PERMITTED BY THE APPLICABLE LOCAL JURISDICTION.**

**BEFORE GROUND ANCHOR INSTALLATION, DETERMINE THAT THE ANCHOR LOCATIONS AROUND THE HOME WILL NOT BE CLOSE TO ANY UNDERGROUND ELECTRICAL CABLES, WATER LINES OR SEWER PIPING. FAILURE TO DETERMINE THE LOCATION OF UNDERGROUND ELECTRICAL CABLES MAY RESULT IN SERIOUS PERSONAL INJURY AND EVEN DEATH.**

#### FRAME TIE-DOWN PROCEDURE

All homes are equipped with tie-down attachment provisions on the main "I"-beams (See Figs. 5-8 and 5-9). Over-the-roof straps are optional for Wind Zone I designated homes.

**NOTE: IN THE TIE-DOWN SYSTEM, IT IS IMPORTANT TO USE MATERIALS OF PROPER DESIGN AND OF ADEQUATE QUALITY. THE MATERIAL SPECIFICATIONS CONTAINED HEREIN SHOULD BE CONSIDERED AS MINIMUM REQUIREMENTS.**

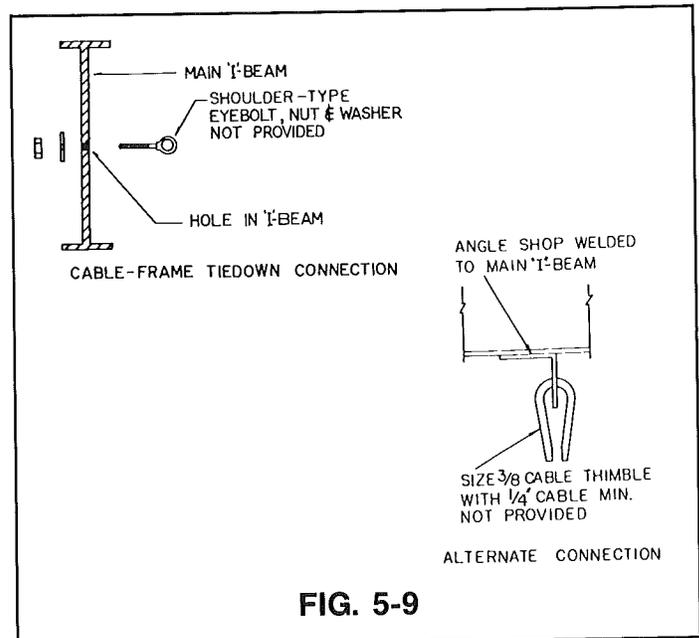


FIG. 5-9

Materials not furnished with the home which will be necessary to complete the tie-down system must meet the requirements set forth below. Such materials would include:

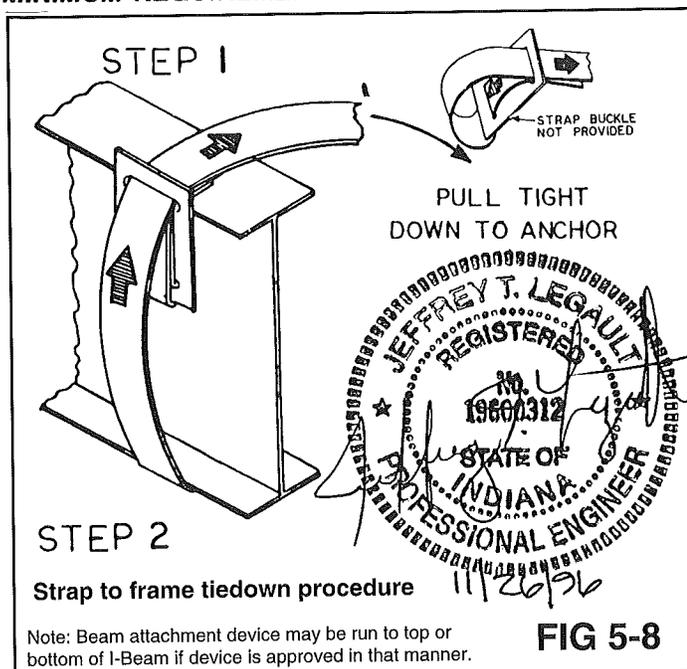
1. Cable or steel strap with a breaking strength of at least 4,725 pounds, e.g. galvanized aircraft cable at least 1/4" inch in diameter or Type 1, Finish B Grade 1 steel strapping, 1 1/4" inches wide and 0.035 inches thick, conforming with F.S. QQ-S-781-H.
2. Galvanized connection devices such as turnbuckles, eyebolts, strap buckles, and cable clamps should be rated at 3,150 working load minimum.
3. Ground anchors — capable of withstanding at least a 4,725 pound pull. Anchors must be installed as specified by the anchor manufacturer. Stabilizers or concrete collars may be required by anchor manufacturer.

**THE HOME MUST BE IN ITS FINAL LEVEL POSITION PRIOR TO TYING IT DOWN.**

The procedure for tying down the manufactured home is as follows:

1. Position and install the ground anchors under exterior walls so that the final strap angle and height (H) will be within the limits shown in Tables 5A and 6A.
2. Connect the straps to the frame and ground anchors (See Figs. 5-8, 5-9 and 5-10).
3. Tighten the straps using the tensioning device provided with the ground anchors. Use caution to avoid over-tensioning the straps which might pull the home off the piers. It is recommended that all straps be tightened only enough to remove the slack. Then, after all straps are installed and the slack removed, tension the straps.
4. The strap tension should be rechecked at frequent intervals until all pier settlement has stopped.

**CAUTION. DURING THE RELEVELING PROCESS, DO NOT JACK THE HOME AGAINST TIGHT STRAPS.**

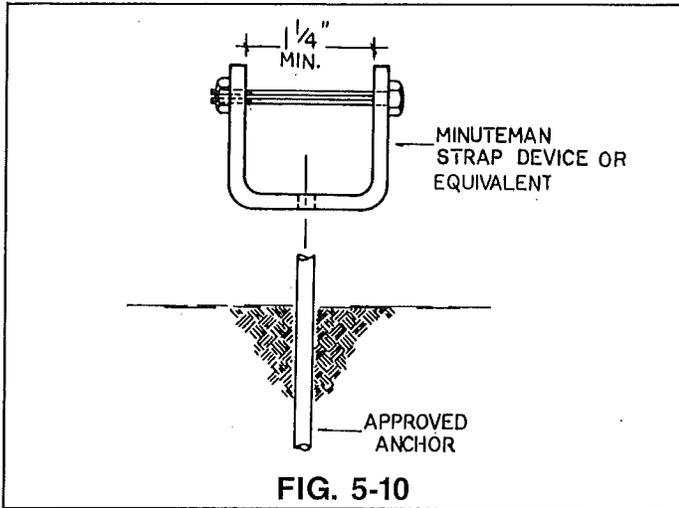


# SET-UP PROCEDURES (Continued)

## MANUFACTURED HOME TIE-DOWN INSTRUCTIONS (Continued)

### OPTIONAL OVER-THE-ROOF STRAP PROCEDURE

If over-the-roof straps are provided (optional on all homes) they may be connected to ground anchors as specified in the following procedure in order to achieve additional stability in extreme winds. Note that the frame tie-down procedure on page 19 is still mandatory.



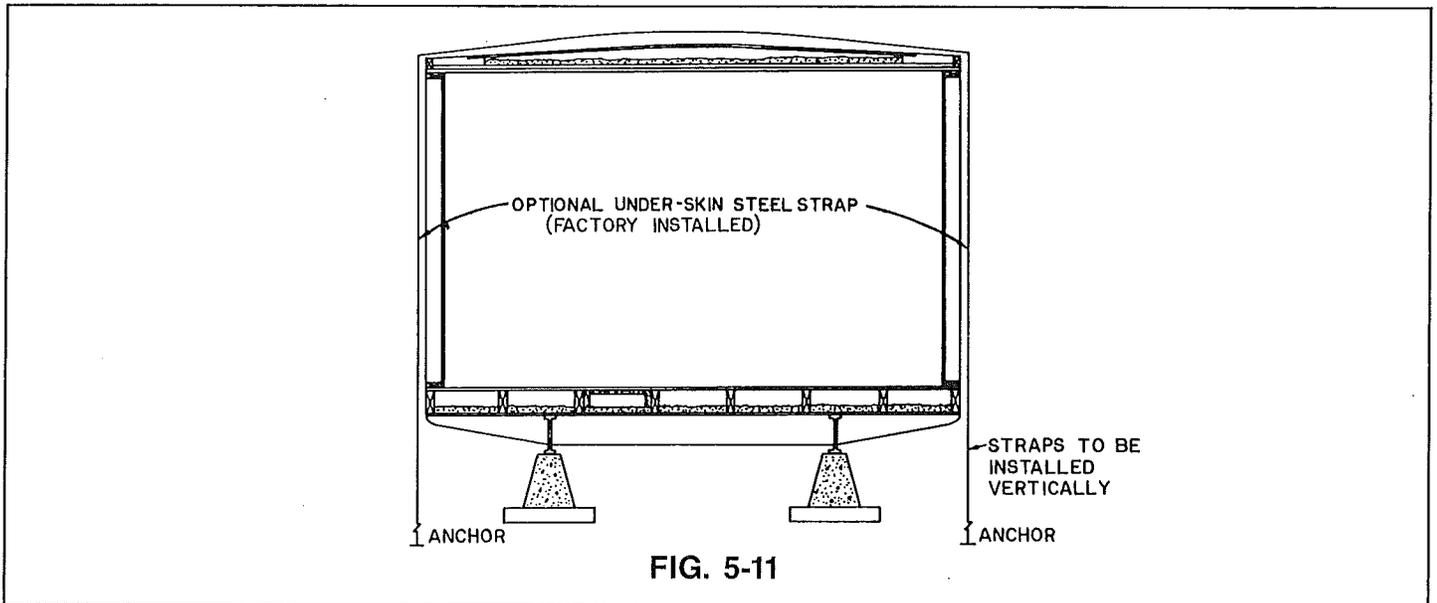
Materials not furnished with the home which will be necessary to properly connect the over-the-roof straps are:

1. Ground anchors capable of withstanding at least a 4,750 pound pull when installed in the soil at the site.
2. Strap end connection devices (See Fig. 5-10).

**THE HOME MUST BE IN ITS FINAL LEVEL POSITION WITH FRAME TIES INSTALLED BEFORE CONNECTING THE OVER-THE-ROOF STRAPS.**

The procedure for over-the-roof strap installation is as follows:

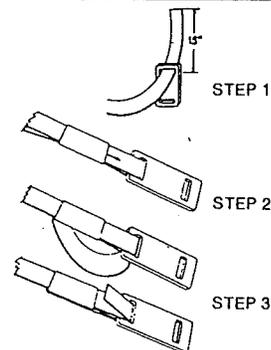
1. Position and install the ground anchors so that the strap will be vertical after attachment to the anchor. The anchor may be installed slightly beneath the home to avoid interference with skirting (See Fig. 5-10).
2. Insert the minuteman connector yoke through the eye in the anchor and insert slotted bolt through the yoke.
3. Place end of strap through slotted bolt and remove slack by turning bolt. **DO NOT TENSION UNTIL BOTH ENDS OF STRAP ARE CONNECTED.**
4. Tension and lock minutemen connector in position; consult instructions furnished with connectors.
5. Check strap tension (See Step 4 under frame tie-down procedure).
6. For double-wide homes See Fig. 5-12 for the splice connection at the centerline.



1. Insert end of the strap through the slot on the splice device, allowing 15" of strap to extend through the device.
2. Make a 180 degree bend in the strap and slide a strap seal over the double thickness of strap, positioning the strap seal as close to the splice device as possible. Compress the strap seal on the strap with a pair of vise grip pliers or hammer, or crimp strap seal with an A-B Chance crimping tool. (Make all bends in the strap as sharp as possible by crimping with vise grip or larger pliers).
3. Bend strap back over the seal and insert back through the slot on the splice device. Flatten bend with vise grip pliers or hammer.
4. Repeat steps 1 through 3 with the mating strap. Draw the completed assembly down to the ridge beam by tensioning the strap in the ground anchor.

### DOUBLEWIDE OPTIONAL OVER-THE-ROOF STRAPS

- STRAP SEAL
- SPLICE DEVICE



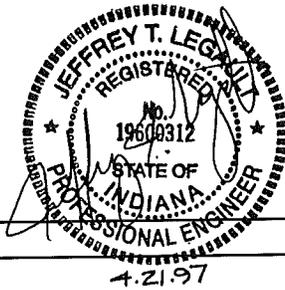
**FIG. 5-12**

**TABLE 5  
STRAP ANGLE TABLE FOR STANDARD HEIGHT PIERS  
SINGLE-WIDES – WIND ZONE I**

	WIND ZONE I	
	ANCHORS/STRAPS 12' O.C.	ANCHORS/STRAPS 14' O.C.
MIN. STRAP ANGLE	18 DEGREES	22 DEGREES
MAX. STRAP ANGLE	47 DEGREES	37 DEGREES

**DOUBLE-WIDES**

MIN. STRAP ANGLE	8 Degrees, 10.5 Degrees for 32' Wides	8 Degrees, 12.5 Degrees for 32' Wides
MAX. STRAP ANGLE	43 Degrees, 54.5 Degrees for 32' Wides	33 Degrees, 47 Degrees for 32' Wides



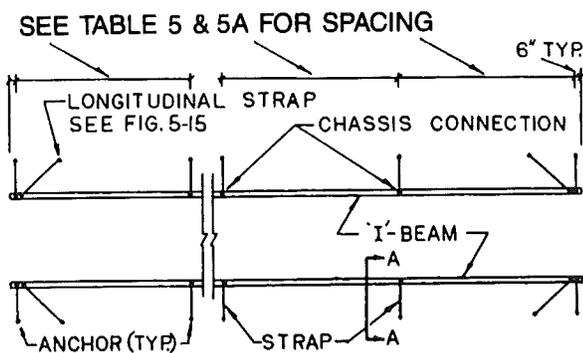
**TABLE 5A  
MAX./MIN. PIER HEIGHTS FOR STANDARD HEIGHT PIERS  
SINGLES-WIDES – WIND ZONE I**

		WIND ZONE I					
		ANCHORS/STRAPS 12' O.C.			ANCHORS/STRAPS 14' O.C.		
MAIN I-BEAM SPACING (in)		75.5	82	99.5	75.5	82	99.5
12 ft WIDES	H MIN (in)	12	12	12	13	12	12
	H MAX (in)	36	32	23	25	34	16
14 ft WIDES	H MIN (in)	14	12	12	17	13	12
	H MAX (in)	48	44	35	34	31	25
16 ft WIDES	H MIN (in)	16	13	12	19	15	12
	H MAX (in)	60	56	47	42	40	33
18 ft WIDES	H MIN (in)	–	–	12	–	–	–
	H MAX (in)	–	–	58	–	–	–

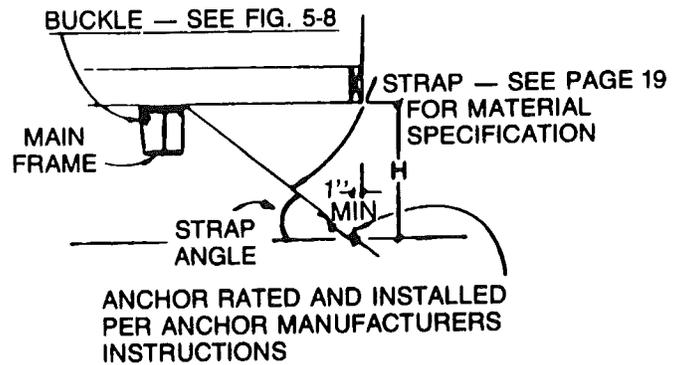
**DOUBLE-WIDES**

20 ft WIDES	H MIN (in)	12	–	–	12	–	–
	H MAX (in)	23	–	–	14	–	–
24 ft WIDES	H MIN (in)	12	12	12	12	12	12
	H MAX (in)	36	32	23	22	19	14
26 ft WIDES	H MIN (in)	12	12	12	12	12	12
	H MAX (in)	42	39	30	25	23	18
28 ft WIDES	H MIN (in)	12	12	12	12	12	12
	H MAX (in)	48	45	35	29	27	21
32 ft WIDES	H MIN (in)	–	–	12	–	–	12
	H MAX (in)	–	–	56	–	–	43

For Double-wides with 8' ceiling height and Wind Zone I, subtract 5" from max. pier height and 5 degrees from max. strap angle.



ANCHOR TIE DOWN DETAIL FIG. 5-13



ANCHOR RATED AND INSTALLED PER ANCHOR MANUFACTURERS INSTRUCTIONS

**SECTION A-A**

**TABLE 6**  
**STRAP ANGLE TABLE FOR HIGHER THAN STANDARD PIERS**  
**SINGLES-WIDES – WIND ZONE I**

	WIND ZONE I	
	ANCHORS/STRAPS 8' O.C.	ANCHORS/STRAPS 6' O.C.
MIN. STRAP ANGLE	18 DEGREES	–
MAX. STRAP ANGLE	63 DEGREES	–

**DOUBLE-WIDES**

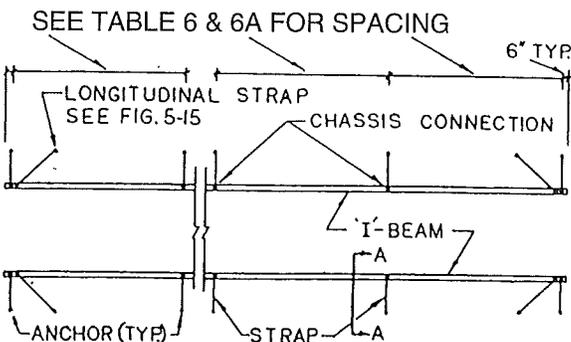
MIN. STRAP ANGLE	6 Degrees, 7 Degrees for 32' Wides	4 Degrees, 5.5 Degrees for 32' Wides
MAX. STRAP ANGLE	63 Degrees, 67 Degrees for 32' Wides	70 Degrees, 73 Degrees for 32' Wides

**TABLE 6A**  
**MAX./MIN. PIER HEIGHTS FOR HIGHER THAN STANDARD PIERS**  
**SINGLES-WIDES - WIND ZONE I**

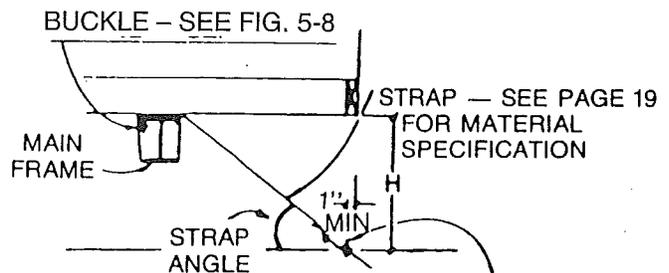
		WIND ZONE I					
		ANCHORS/STRAPS 8' O.C.			ANCHORS/STRAPS 6' O.C.		
MAIN I-BEAM SPACING (in)		75.5	82	99.5	75.5	82.9	99.5
12 ft WIDES	H MIN (in)	12	12	12	–	–	–
	H MAX (in)	66	59	42	–	–	–
14 ft WIDES	H MIN (in)	14	13	12	–	–	–
	H MAX (in)	72	72	64	–	–	–
16 ft WIDES	H MIN (in)	18	17	14	–	–	–
	H MAX (in)	72	72	72	–	–	–
18 ft WIDES	H MIN (in)	–	–	18	–	–	–
	H MAX (in)	–	–	72	–	–	–

**DOUBLE-WIDES**

20ft WIDES	H MIN (in)	12	-	-	12	-	-
	H MAX (in)	42	-	-	60	-	-
24 ft WIDES	H MIN (in)	12	12	12	12	12	12
	H MAX (in)	67	60	43	72	72	60
26 ft WIDES	H MIN (in)	12	12	12	12	12	12
	H MAX (in)	72	72	55	72	72	72
28 ft WIDES	H MIN (in)	12	12	12	12	12	12
	H MAX (in)	72	72	65	72	72	72
32 ft WIDES	H MIN (in)	-	-	12	-	-	12
	H MAX (in)	-	-	72	-	-	72



ANCHOR TIE DOWN DETAIL FIG. 5-14

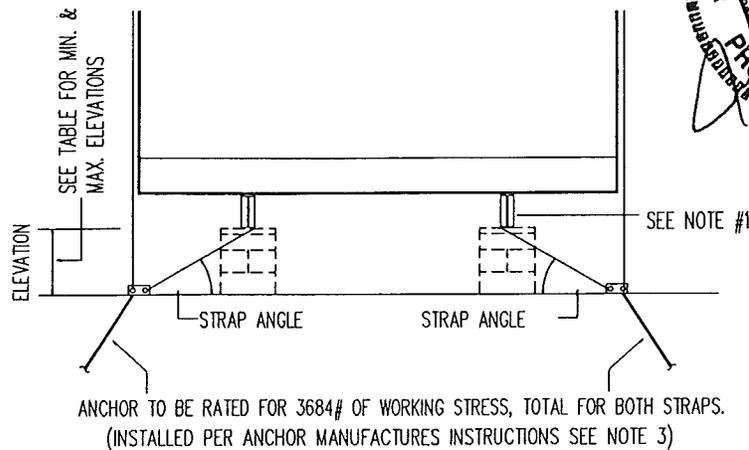


ANCHOR RATED AND INSTALLED PER ANCHOR MANUFACTURERS INSTRUCTIONS

SECTION A-A

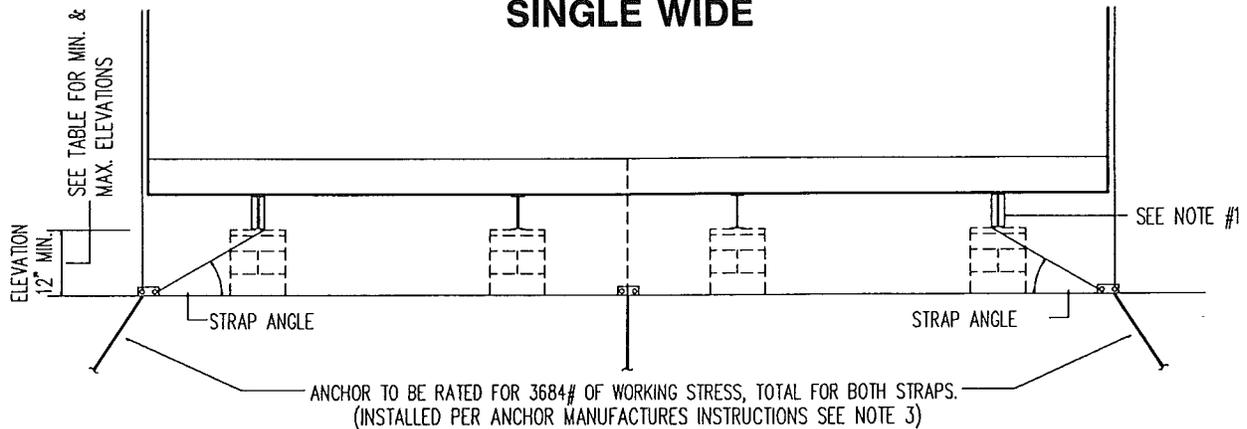
# SET-UP PROCEDURES (Continued)

## STANDARD TIE DOWN DETAILS



**INSTALL STRAP & ANCHORS**  
**6'-8" @ ZONE II**  
**&**  
**5'-4" @ ZONE III**  
 SEE TABLE FOR ELEVATION & STRAP ANGLE LIMITATIONS

## SINGLE WIDE



\*USE 24' WIDE RESULTS FOR 12' HALF OF 22' WIDE DOUBLE WIDES.

## DOUBLE-WIDE

\* : USE 24' WIDE RESULTS FOR 12' HALF OF 22' WIDE DOUBLE WIDES

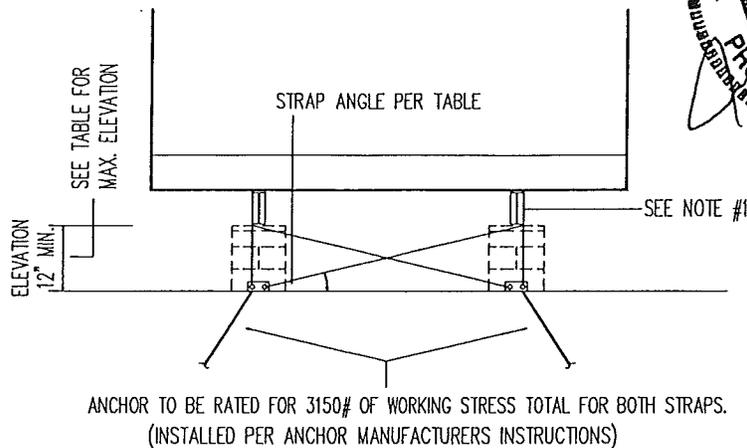
WIDTH	WIND ZONE II		WIDE ZONE III	
	MIN. & MAX ELEVATION	MIN. & MAX DIAGONAL STRAP ANGLE	MIN. & MAX ELEVATION	MIN. & MAX DIAGONAL STRAP ANGLE
12'	14" TO 25"	25° TO 40°	14" TO 26"	25° TO 41°
14'	12" TO 27"	20.5° TO 40°	12" TO 28"	20.5° TO 41°
16'	16" TO 36"	20.5° TO 40°	15.5" TO 38"	19.5° TO 41°
18'	20" TO 44"	20.5° TO 40°	19" TO 47"	19.5° TO 41°
20' OR 22'*	12" TO 15"	34° TO 40°	12" TO 16"	34° TO 42°
24'	12" TO 22"	24.5° TO 40°	12" TO 23.5"	24.5° TO 42°
28'	12" TO 23.5"	23° TO 40°	12" TO 25.5"	23° TO 42°
32'	12" TO 33"	16.6° TO 39.3°	12" TO 36"	16.6° TO 41.8°

### NOTES:

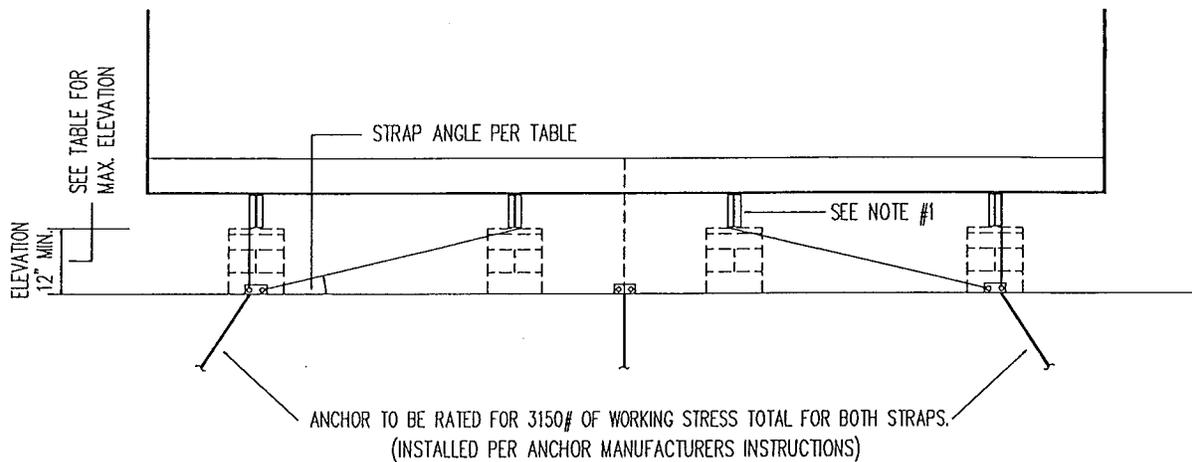
- For strap material specification, connection to frame I-beam and other setup information, refer to Skyline Installation Manual.
- For anchoring systems, the instructions shall indicate: A) The minimum anchor capacity required; B) Anchors should be certified by professional engineer, architect, or a nationally recognized testing laboratory as to their resistance, based on the maximum angle of diagonal tie and/or vertical tie loading and angle of anchor installation, and type of soil in which the anchor is to be installed; C) Ground anchors should be embedded below the frost line and be at least 12 inches above the water table; D) Ground anchors should be installed to their full depth, and stabilizer plates should be installed to provide added resistance to overturning or sliding forces; E) Anchoring equipment should be certified by a professional engineer or architect to resist these specified forces in accordance with testing procedures in ASTM Standard Specification for strapping, flat steel and seals.
- Anchors rated @ 3150# of working stress total for both straps, may be used if strap and anchor spacing is reduced to 5'-8" @ Wind Zone II and 4'-6" @ Wind Zone III.
- The A-B chance strap seal device depicted by Fig. 5-12 may be used as directed for attaching the required doublewide centerline straps to ground anchors.

# SET-UP PROCEDURES (Continued)

## ALT. TIE DOWN DETAILS



### SINGLE WIDE



### DOUBLE-WIDE

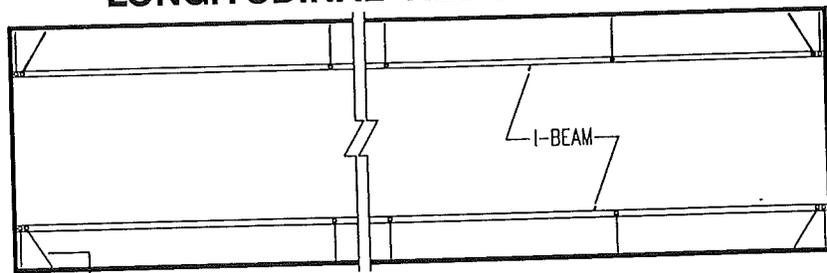
WIDTH	WIND ZONE II			WIDE ZONE III		
	MAX & MIN. ELEVATION	MAX & MIN. DIAGONAL STRAP ANGLE	STRAP SPACING	MAX & MIN. ELEVATION	MAX & MIN. DIAGONAL STRAP ANGLE	STRAP SPACING
12'	12" TO 32"	6° TO 16°	6' O.C.	12" TO 26"	6° TO 13°	5' O.C.
14', 16' & 18'	33" TO 50"	17° TO 24°	5'-6" O.C.	27" TO 50"	13° TO 24°	4'-6" O.C.
20' THROUGH 28'	12" TO 50"	5° TO 21°	6' O.C.	12" TO 50"	5° TO 21°	4'-10" O.C.
32'	12" TO 50"	5° TO 26.5°	6'-4" O.C.	12" TO 50"	6.5° TO 26.5°	5'-2" O.C.
		5° TO 19.7°	6-10" O.C.	12" TO 50"	5° TO 19.7°	5-6" O.C.

#### NOTES:

- For strap material specification, connection to frame I-beam and other setup information, refer to Skyline Installation Manual.
- For anchoring systems, the instructions shall indicate: A) The minimum anchor capacity required; B) Anchors should be certified by professional engineer, architect, or a nationally recognized testing laboratory as to their resistance, based on the maximum angle of diagonal tie and/or vertical tie loading and angle of anchor installation, and type of soil in which the anchor is to be installed; C) Ground anchors should be embedded below the frost line and be at least 12 inches above the water table; D) Ground anchors should be installed to their full depth, and stabilizer plates should be installed to provide added resistance to overturning or sliding forces; E) Anchoring equipment should be certified by a professional engineer or architect to resist these specified forces in accordance with testing procedures in ASTM Standard Specification for strapping, flat steel and seals.
- The A-B chance strap seal device depicted by Fig. 5-12 may be used as directed for attaching the required doublewide centerline straps to ground anchors.

# SET-UP PROCEDURES (Continued)

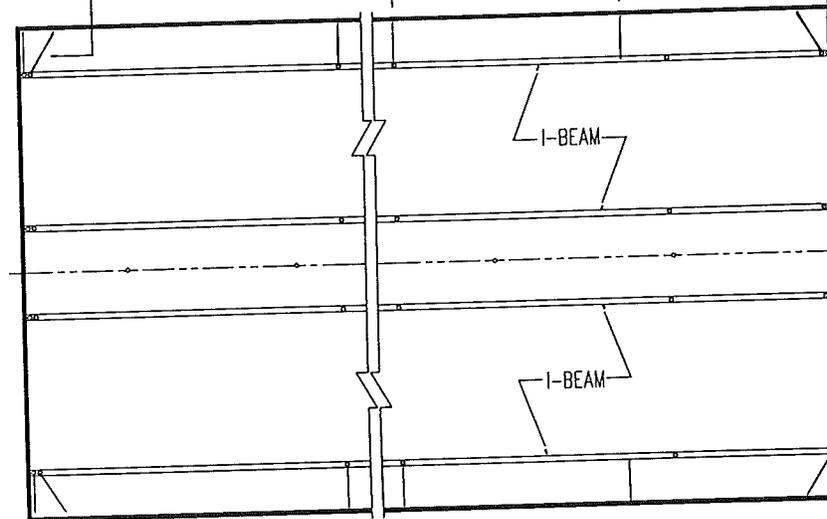
## LONGITUDINAL TIEDOWN DETAILS



LONGITUDINAL STRAPS  
SEE BELOW FOR REQUIREMENTS

### SINGLE WIDE

SEE STANDARD TIEDOWN  
DETAILS FOR SPACING  
6" (TYP.)

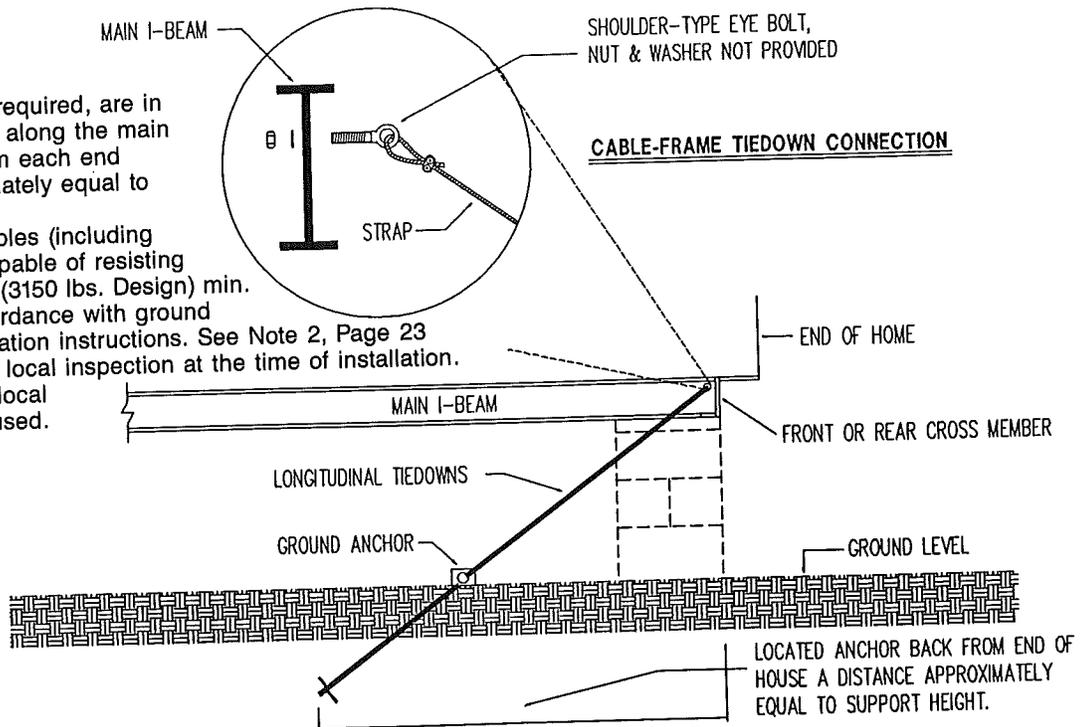


### DOUBLE WIDE



#### NOTES:

1. Longitudinal tiedowns, when required, are in addition to diagonal tiedowns along the main rails. Locate anchor back from each end of house a distance approximately equal to support height.
2. Ground anchors, straps & cables (including eyebolt, nut, etc.) shall be capable of resisting an ultimate load of 4725 lbs. (3150 lbs. Design) min. install ground anchor in accordance with ground anchor manufacturer's installation instructions. See Note 2, Page 23
3. Anchorage system subject to local inspection at the time of installation.
4. Other methods approved by local building authorities may be used.



#### LONGITUDINAL TIEDOWN REQUIREMENTS:

Single Wides, Double Wides & Tag Sections (3rd Section)

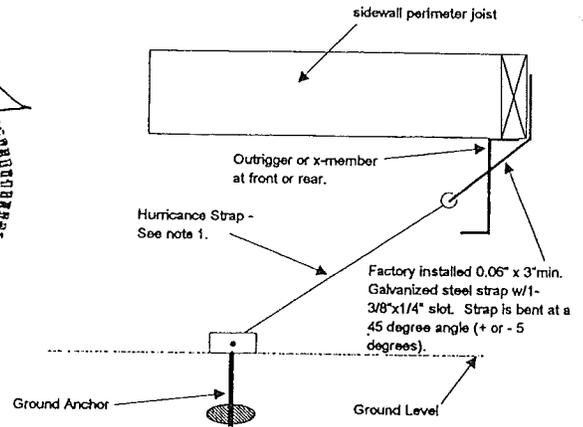
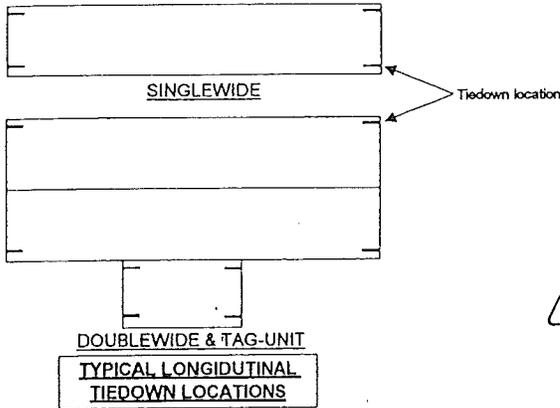
Wind Zone I — Longitudinal tiedowns not required.

Wind Zone II — Homes less than 50' long, 2 tiedowns in front, 2 tiedowns in rear. Homes 50' or longer no tiedowns required. See Note 1.

Wind Zone III — Install 2 tiedowns in front, 2 tiedowns in rear for all single & double wide homes. See Note 1.

# SET-UP PROCEDURES (Continued)

## ALTERNATE LONGITUDINAL TIEDOWN DETAILS



### NOTES:

- 1) Hurricane strap is to be Type 1, Finish B Grade 1 steel strapping, 1-1/4" wide and 0.035" thick, conforming ASTM D3953-91 with a breaking strength of at least 4725 lbs.
- 2) Galvanized connection devices such as turnbuckles, eyebolts, strap buckles and cable clamps should be rated at 3150 lbs working load minimum.
- 3) Ground anchors shall be capable of withstanding a pull force equal to amount listed in table.
- 4) If optional longitudinal tiedown connectors are used, then they are required on the following box length homes:  
 Singlewides - Wind Zone II - less than 36 feet.  
 Singlewides - Wind Zone III - less than 44 feet.  
 Doublewides - Wind Zone II - less than 40 feet.  
 Doublewides - Wind Zone III - less than 48 feet.  
 Tag Units - Wind Zone II - all box lengths.  
 Tag Units - Wind Zone III - all box lengths.

### Load (lbs) to be resisted by Ground Anchor.

UNIT WIDTH	Box Lengths, greater than or equal to listed length (feet)					
	Wind Zone II		Wind Zone III			
	32	36	32	36	40	44
12'	173	NA	806	488	169	NA
14'	296	NA	1026	664	302	NA
16'	384	NA	1212	801	390	NA
18'	463	NA	1380	925	470	NA
20'	658	132	1806	1280	754	229
24'	999	376	2376	1753	1130	507
26'	1169	498	2661	1990	1318	646
28'	1347	652	2915	2220	1530	829
32'	1315	465	3055	2204	1354	504
<b>TAGS</b>	1506 all lengths		2208 all lengths			

NOTE: Alternate longitudinal tiedowns are optional. Check with the division that built your home to determine if they are included on your home.

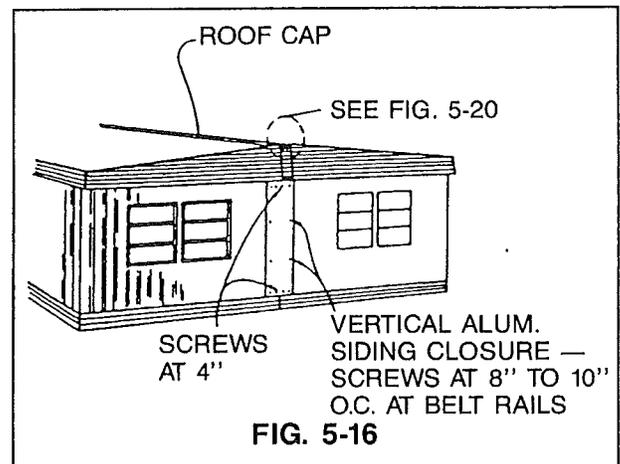
## DOUBLE-WIDE EXTERIOR CLOSURE

### DOUBLE-WIDE EXTERIOR CLOSURE

PRIOR TO THE INSTALLATION OF THE CLOSURE METAL OR MASONITE ON THE ENDWALLS, THE ELECTRICAL CROSSOVER MUST BE COMPLETE.

### VERTICAL METAL SIDING:

1. Install bottom starter.
2. Install endwall metal by snapping both sides into "S"-lock; attach with provided metal screws (Fig. 5-16).
3. Attach closure metal to front and rear hoods.
4. Install interior trim, moldings, carpet, etc., as required.



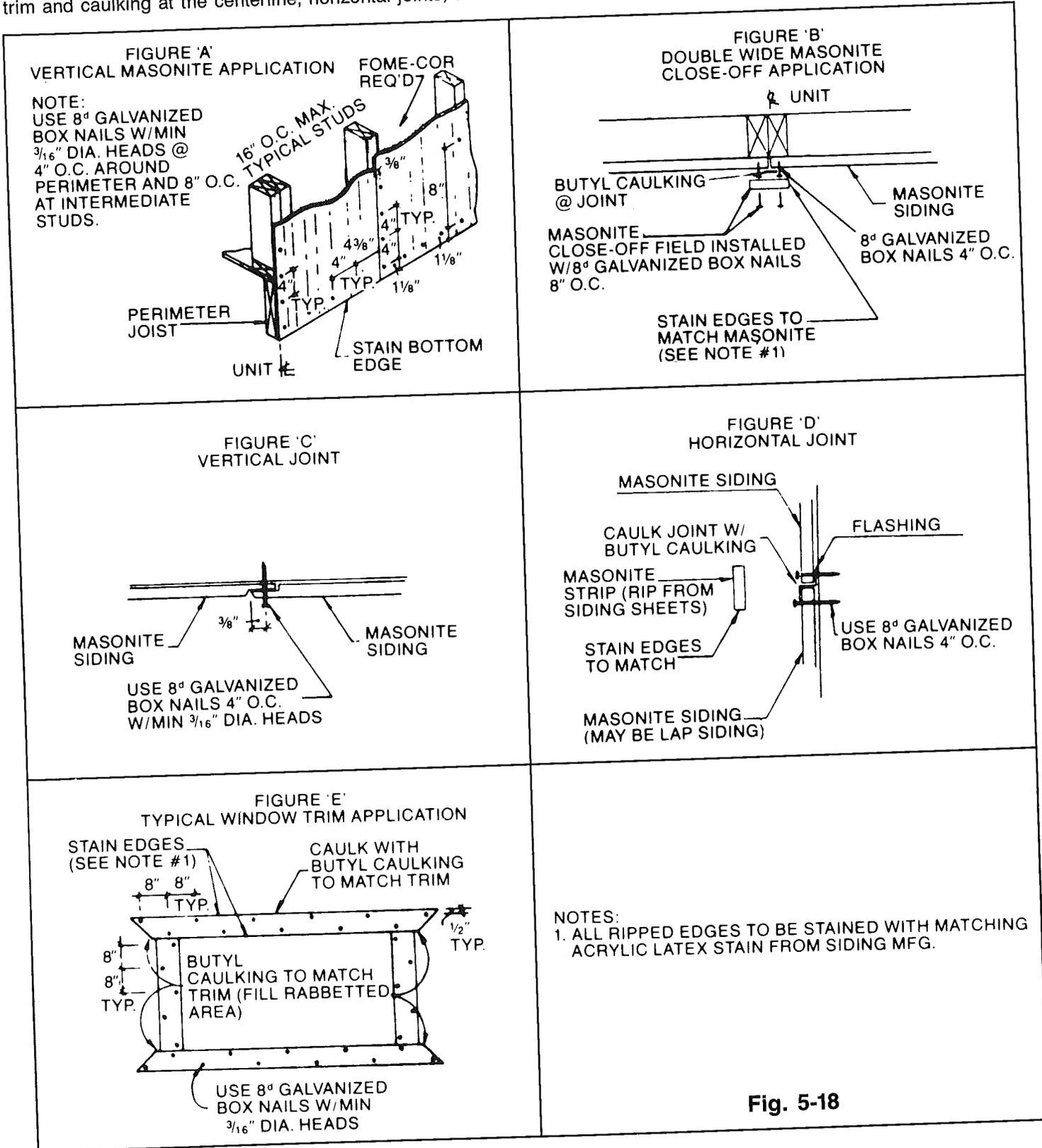
# SET-UP PROCEDURES (Continued)

## DOUBLE-WIDE EXTERIOR CLOSURE

### HARDBOARD SIDING:

Fasten the pre-cut strip of masonite with 8d galvanized nails (head should be painted to match the siding) 4" o.c. around the perimeter and 8" o.c. on the intermediate studs. Apply trim and caulking at the centerline, horizontal joints, and

around windows (if required) as illustrated by the details in Figure 5-18B. (In cases where the masonite has to be cut to fit in the field, the ripped edges should be stained to match the siding with acrylic latex stain.)



# SET-UP PROCEDURES (Continued)

## DOUBLE-WIDE EXTERIOR CLOSURE

### VINYL LAP SIDING

Apply a 2" wide strip of duct tape at the marriage joint of the endwalls for the entire height of the walls. Apply the duct tape directly over the sheathing.

The siding panels should be attached using galvanized steel or aluminum 16 ga. 1/2 by 1" staples. (6d galvanized nails may also be used). Staples should be driven so that there is a 1/32" clearance between the siding and staple crown to allow some lateral movement. Fasten every 16" at the stud location. See Figure 5-19 Detail A for proper fastening.

Snap the bottom course of siding into the starter strip and fasten to the wall. Leave a 1/4" space at corner posts and 'J' channels around window and door openings to allow for expansion. Do not fasten within 4" of an accessory. Vertical butt joints in panels should overlap 1". Do not fasten the panel within 4" of the joint. Install vinyl, aluminum, felt or other suitable material for flashing at bottom corners of doors and windows per Detail E. Apply caulk around siding and light blocks, water faucets, or other small penetrations.

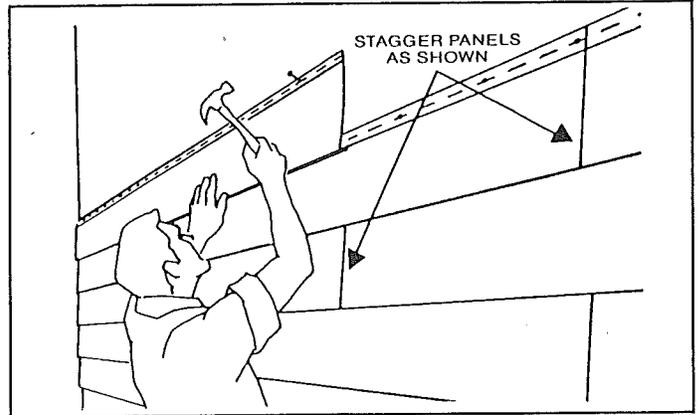
Install successive courses similarly to the first. Butt joints in adjacent courses should be offset by at least 24". Joints in alternate courses should be aligned vertically (see Figure 5-19 Detail B).

Panels will have to be cut at headers and sills. A single panel should extend without joints across the width of the opening. When cutting a panel at a sill, measure the distance between the bottom of the opening and the top lock of the lower course, then deduct 1/4" (See Fig. 5-19 Detail C).

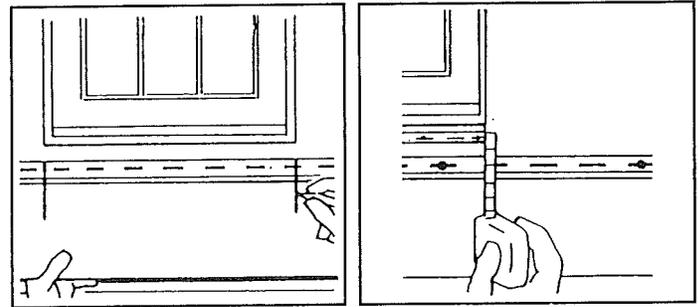
Slide the cut panel into the undersill trim and install. Note that the undersill trim piece may have to be firred to maintain the proper pitch of the siding.

Measure and cut the header panel in the same manner as indicated above.

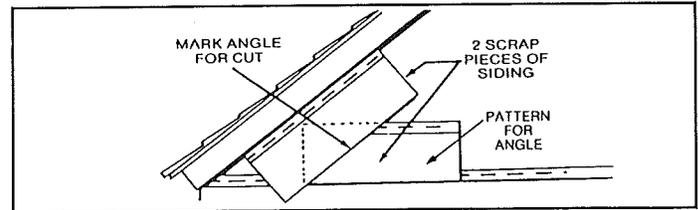
The top sections at the gable will need to be angle cut. Use two scrap pieces of siding to make a pattern (See Fig. 5-19 Detail D). Interlock one piece with the siding panel below. Hold the other piece on top against the gable. Mark a line on the bottom piece and cut. Use this piece as a pattern for cutting gable pieces. Install the gable pieces by interlocking with the lower course, sliding into the gable 'J' rail and fastening.



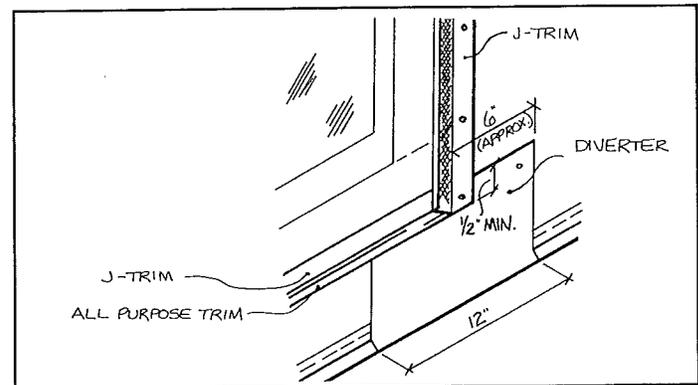
DETAIL B



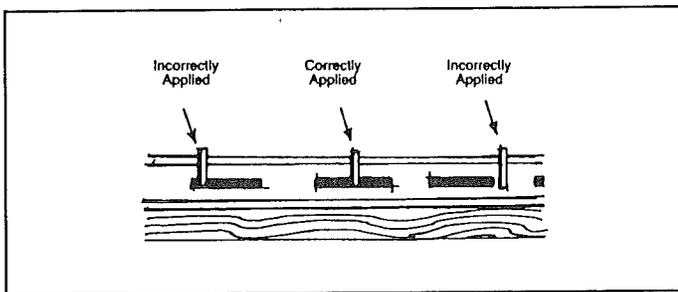
DETAIL C



DETAIL D



DETAIL E



DETAIL A

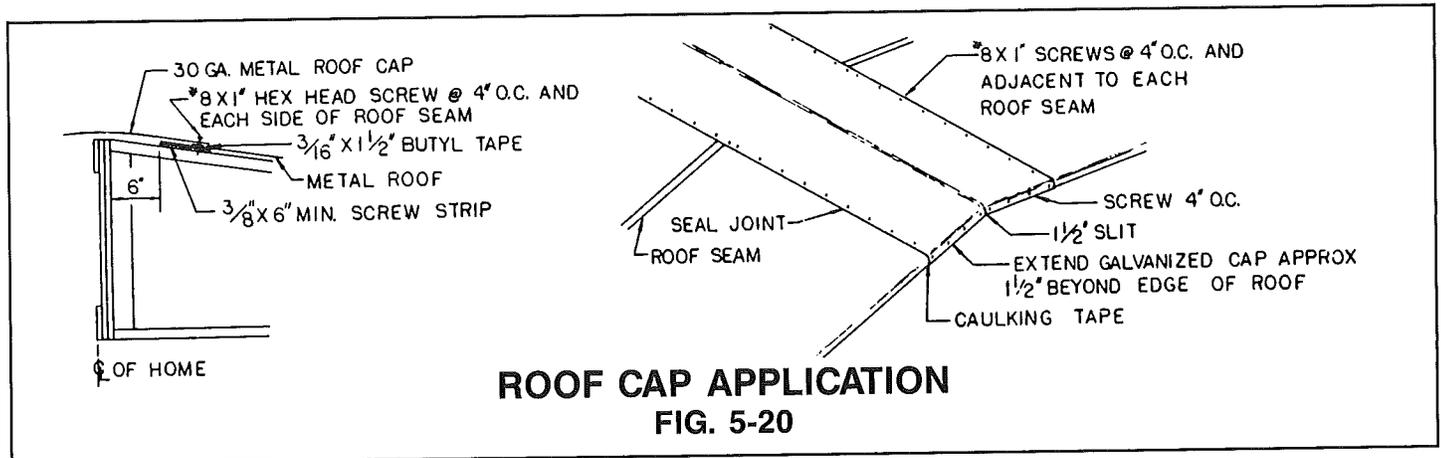
FIG. 5-19

### INSTALLATION OF METAL ROOF:

After bolting the units together according to the procedure on page 18, complete the metal roof closure by applying 3/16" x 1-1/2" butyl tape (provided) to each edge of the provided 30 ga. metal roof cap. With the roof cap centered over the beam screw each edge to the roof with #8x1" hex head screws at 4" o.c. and at each side of each roof seam. At the ends of the roof fold 1-1/2" of the roof cap over the end and screw to the fascia at 4" o.c. See Fig. 5-20.

## SET-UP PROCEDURES (Continued)

### DOUBLE-WIDE — METAL ROOF CLOSURE



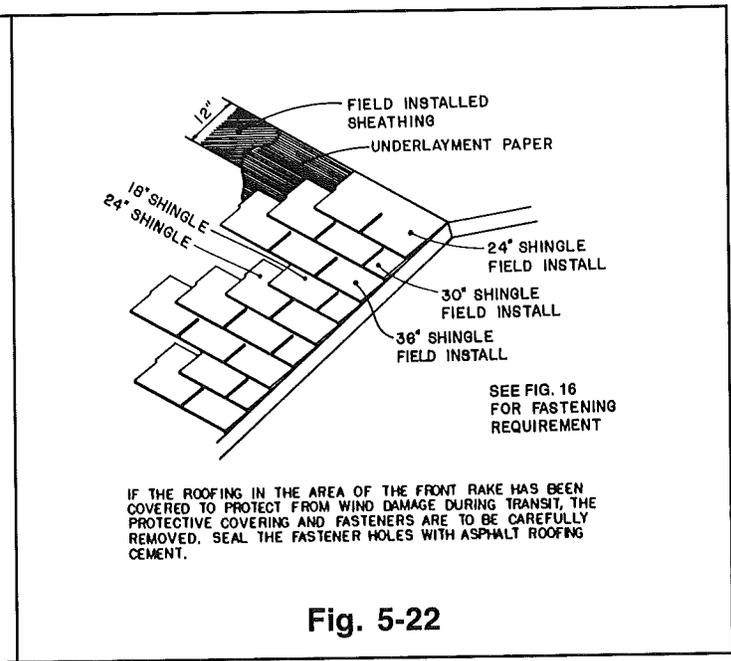
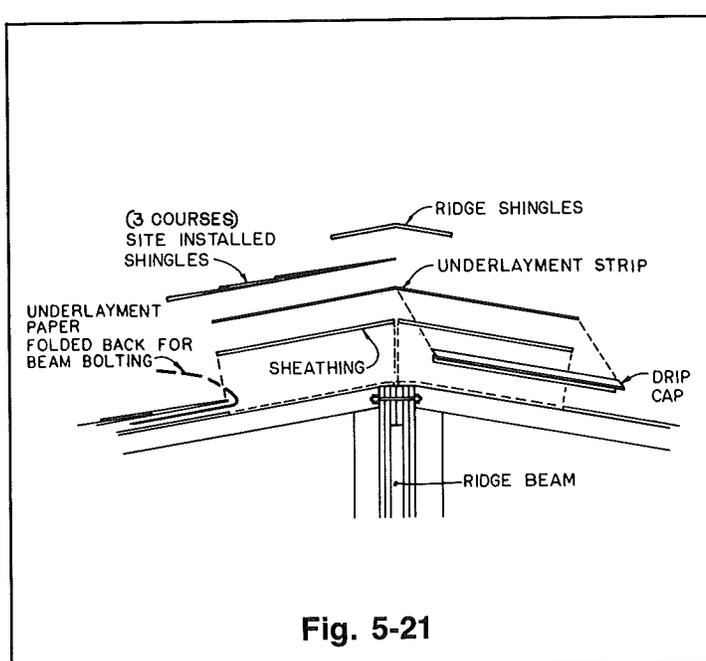
### SHINGLE ROOF CLOSURE

#### INSTALLATION OF SHINGLED ROOF:

1. Fold back underlayment paper.
2. Remove the 12 inch wide sheathing at the ridge beam of each half which was temporarily secured to the roof at the factory.
3. Bolt the ridge beam together as outlined on page 18. For models with heat ducts in the roof cavity make the interconnection of two units by running the provided flexible duct through the access hole in the ridge beam. After the mechanical connection is made, tape the joint with 2 inch wide duct tape.
4. See Fig. 5-21. Reinstall the 3/8" x 12" wide sheathing using 16 gauge x 7/16" x 1-1/2" staples or 8d twist nails 4 inches on center at butt joints and 3 fasteners at each truss between joints.
5. If home is to be set in a Wind Zone II or III area, then apply a 6" wide strip asphalt roof cement to the roof decking on both halves of home, directly adjacent to the roof peak.
6. Tack roof underlayment paper back in place.
7. Staple additional underlayment paper back in place.
8. Fasten drip cap to sheathing at roof edge (above felt).
9. Complete installation of shingles (Fig. 5-22).
10. Cut shingles for ridge cap and install as shown in Figures 5-25 and 5-24.

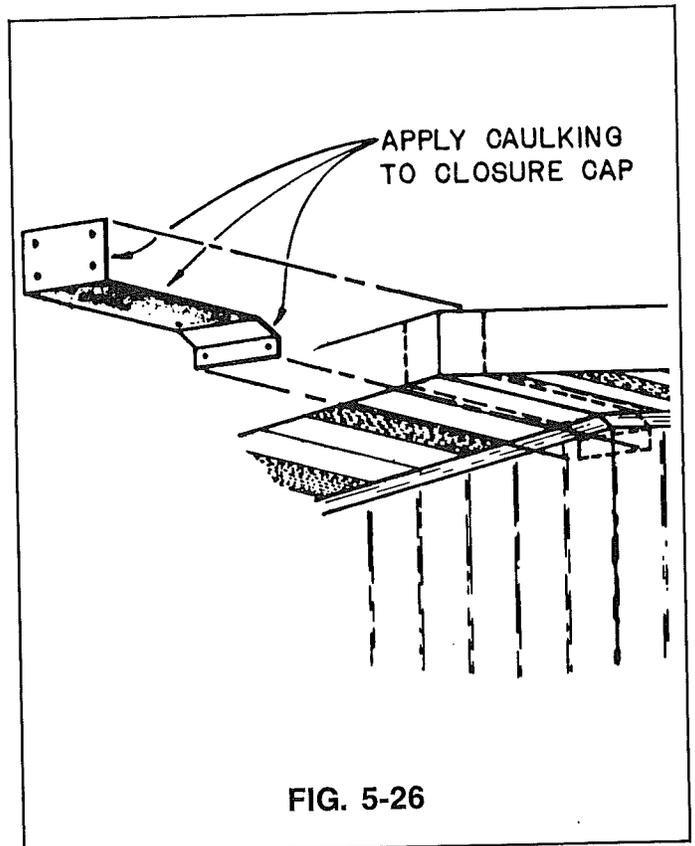
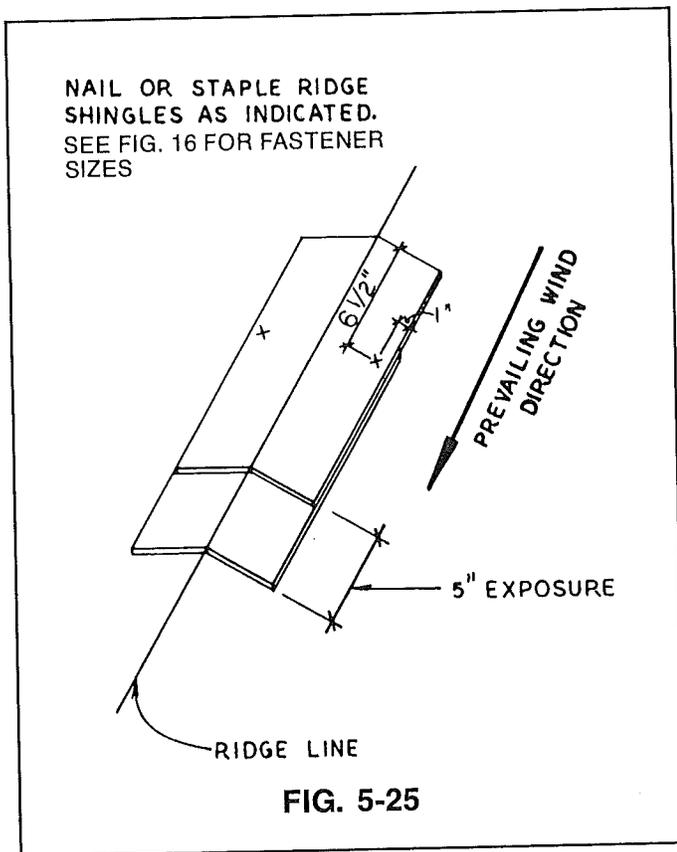
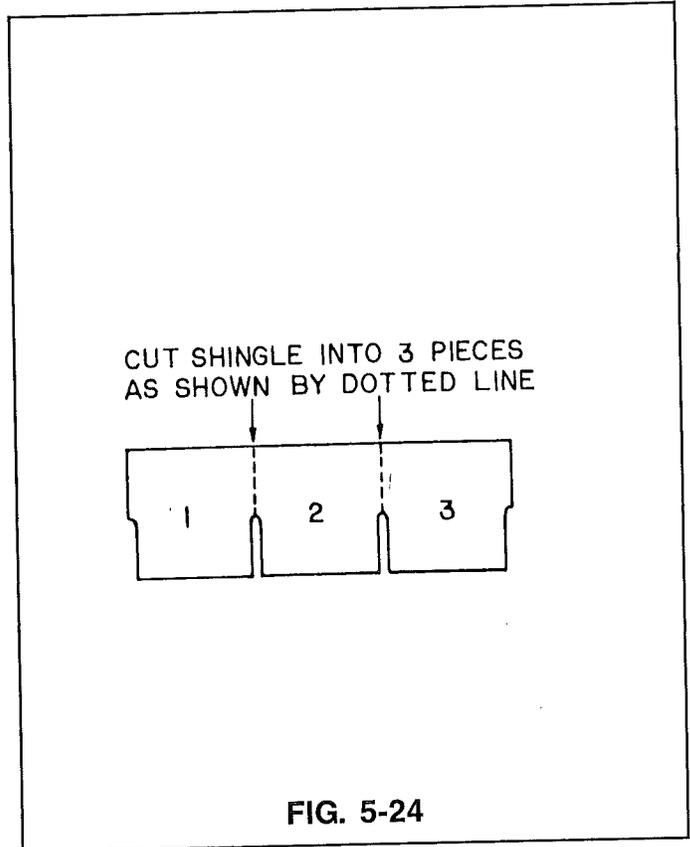
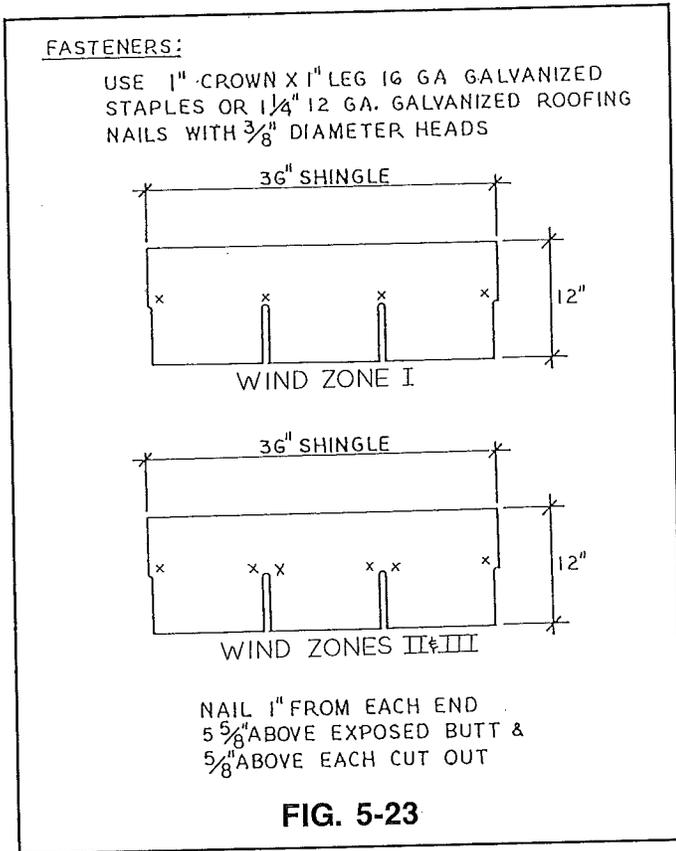
**NOTE: TO PREVENT WIND LIFTING AND POSSIBLE LEAKAGE, THE RIDGE CAP SHINGLES SHOULD BE ORIENTED WITH RESPECT TO PREVAILING WINDS AS INDICATED IN FIG. 5-25.**

11. Install closure cap at eave joint (See Fig. 5-26).
12. See Supplement for ridge vent if applicable.



# SET-UP PROCEDURES (Continued)

## DOUBLE-WIDE SHINGLED ROOF



# SET-UP PROCEDURES (Continued)

## UTILITY INTERCONNECTION

### ELECTRICAL INTERCONNECTIONS OF DOUBLE-WIDES

#### Bonding

Chassis halves floor joist construction are to be boned together with the provided bonding wire and lugs (See Page 43).

#### Electrical Crossover

**NOTE: ALL ON-SITE ELECTRICAL WORK MUST BE PERFORMED BY QUALIFIED PERSONNEL. BEFORE CONNECTING ELECTRICAL CROSSOVER ASSURE THAT POWER HAS NOT YET BEEN CONNECTED.**

#### Endwall Crossover

The procedure for this interconnection is as follows:

1. Feed wires from side B through metallic wire protectors into junction box or Sub-Panel in side A (See Fig. 5-27).
2. Staple wires within 8 inches of junction box or Sub Panel to side of stud at centerline of stud.
3. Remove cover from junction box inside home; cut wires to length allowing a minimum of 4 inches of free wire extending from box.
4. Strip approximately 1 inch of wire and connect like circuit numbers (white to white, black to black, ground to ground, red to red on multi-circuits and 240V circuits with the provided wire nuts).
5. Push wires into box and replace cover.

**NOTE: SOME MODELS MAY HAVE ELECTRICAL CROSSOVERS AT FRONT AND REAR.**

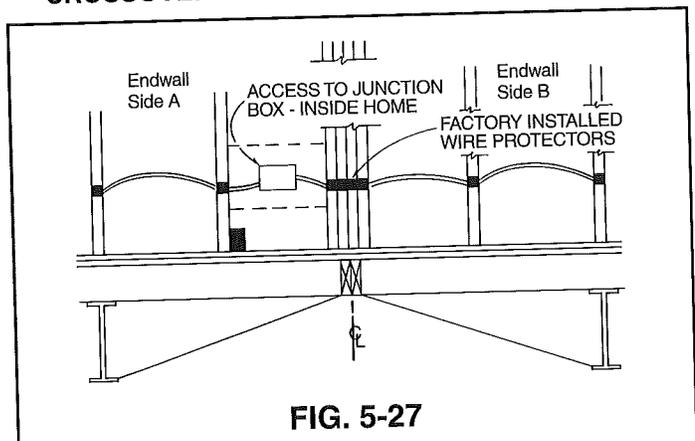


FIG. 5-27

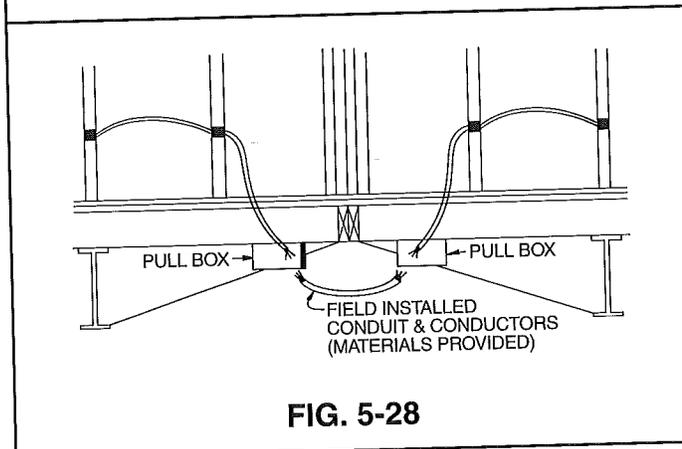


FIG. 5-28

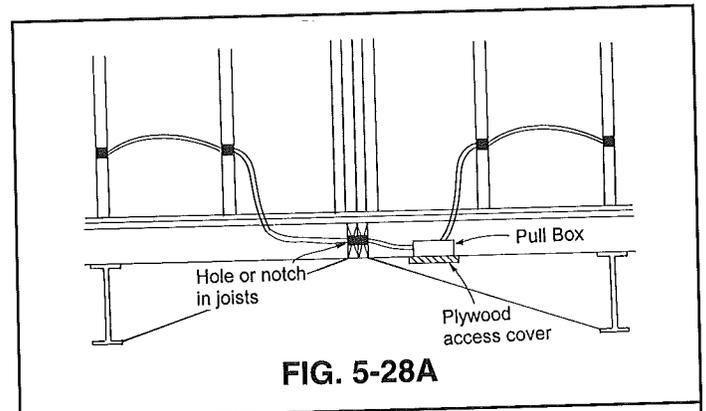


FIG. 5-28A

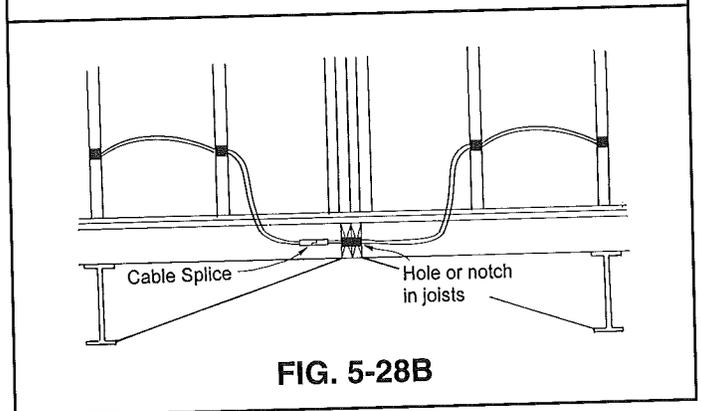


FIG. 5-28B

#### Below Floor Crossover

The correct procedure is as follows:

1. Remove the pull box covers and install the provided conduit and conductors between the boxes (See Fig. 5-28).
2. Using the provided wire connectors, connect like circuit numbers (white to white, black to black, ground to ground, red to red on multi-circuits and 240V circuits).
3. Push wires into boxes and replace covers.

#### In Floor Crossovers

##### In Floor Pull Box.

The correct procedure is as follows:

1. Remove plywood access cover to pull box and cut bottom board on opposite half for access to wires (See Fig. 5-28A).
2. Feed wires through hole or notch in joists into junction box.
3. Attach wires as described in steps 3 and 4 for endwall crossover.
4. Replace access cover and tape bottom with provided tape.

##### In Floor Cable Splice

The correct procedure is as follows:

1. Remove bottom board access covers (See Fig. 5-28B).
2. Feed cable through hole or notch in joists.
3. Connect cable splice together.

## SET-UP PROCEDURES (Continued)

4. Replace access covers with provided bottom board tape.

Note: If unit has multiple cable splices the circuits will be identified by the attached code markers.

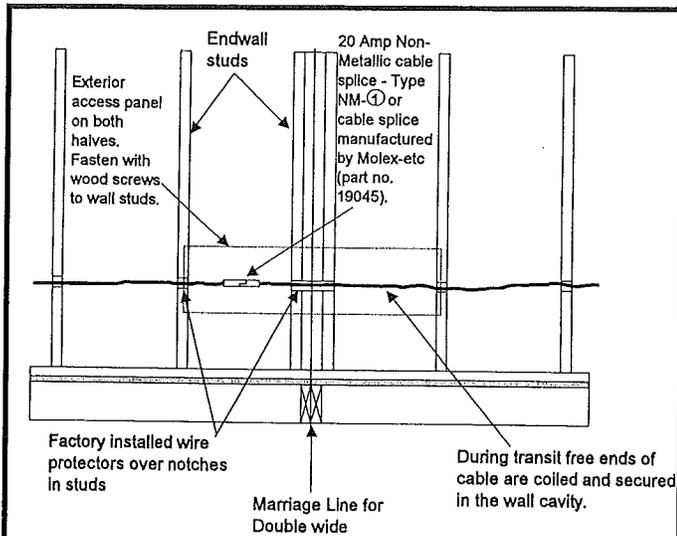
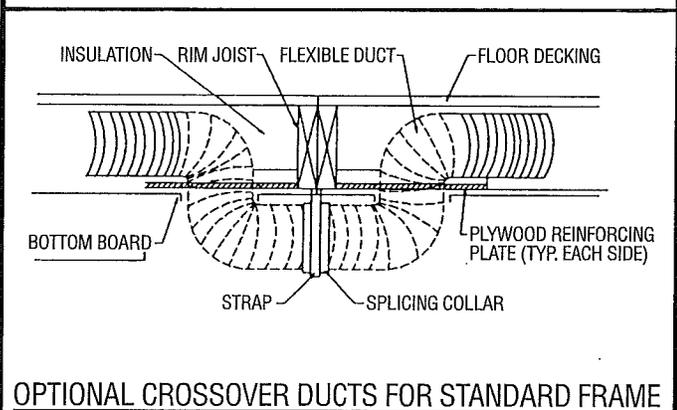
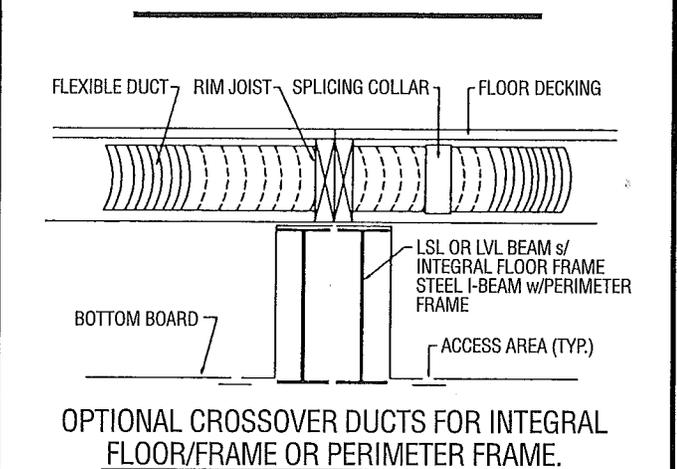


FIG. 5-28C



OPTIONAL CROSSOVER DUCTS FOR STANDARD FRAME



OPTIONAL CROSSOVER DUCTS FOR INTEGRAL FLOOR/FRAME OR PERIMETER FRAME.

FIG. 5-29A

## ENDWALL CABLE SPLICE

The correct procedure is as follows:

1. Remove access panels on exterior side of endwall (see Fig. 5-28C).
2. Uncoil wire located inside endwall.
3. Connect cable splice halves together.
4. Reinstall access panels.

Note: If unit has multiple cable splices the circuits will be identified by the attached code markers.

## Heating Crossover

There are two basic hookup procedures for all designs. The first procedure is the standard design and is a single 12" diameter flexible duct. The second procedure is an optional design that includes a varying number of 5" or 6" crossover ducts that are installed in the floor.

The method of installation for the standard design is as follows:

1. Connect each end of the provided insulated 12" diameter flexible duct to the metal duct connector on each half of the home by sliding duct over metal tabs on duct connector.
2. After mechanical connections are made, tape each connection with 2-inch wide duct tape to ensure an air-tight seal.
3. Permanently secure the crossover duct with straps as shown in Fig. 5-29. Do not allow duct to rest on the ground. Maintain at least a 4-inch clearance between duct and the ground.

The method of installation for the optional design with standard frame is as follows:

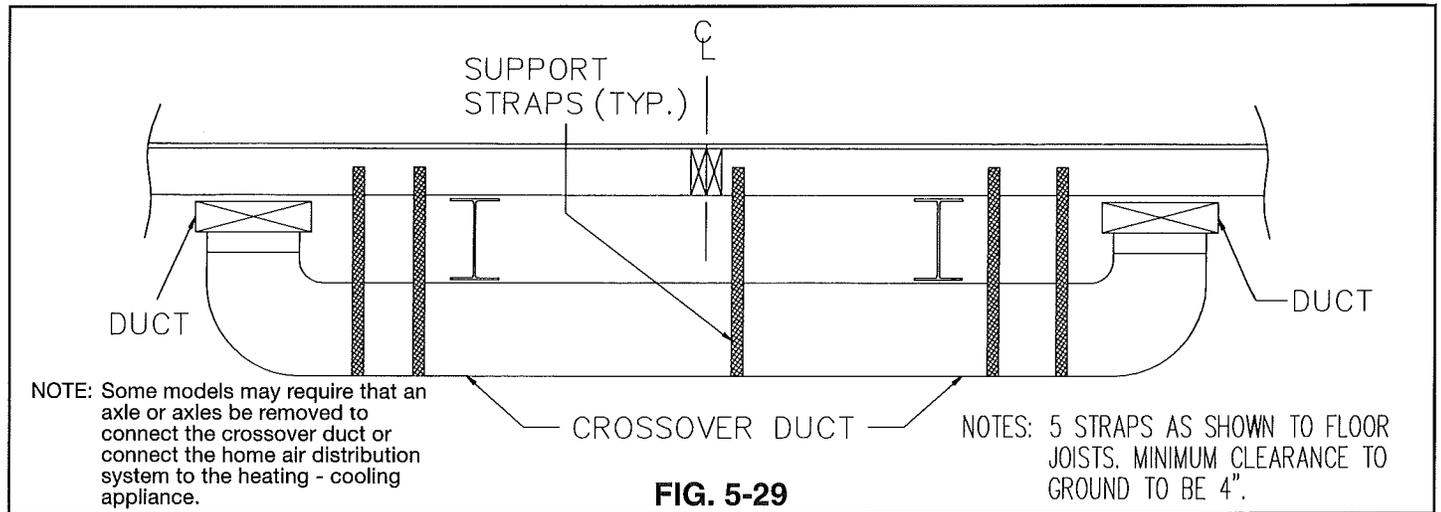
1. Remove access panels at crossover ducts. The access panels are located below the floor.
2. Cross cut bottom board at 8" holes in reinforcing plates.
3. Extend the flexible ducts from each half through the access holes. See Fig. 5-29A.
4. Connect the flexible ducts together per the provided manufacturer instructions using the splicing collar provided.
5. Install a strap around duct and attach to the rim joists.
6. Tape bottom board closed with provided tape.

The method of installation for the optional design with Integral floor/frame or Perimeter frame is as follows:

1. Locate crossover locations as indicated by spray paint on rim joists and bottom board.
2. Cut out bottom board at rim joists for crossover connections.
3. Cut the bottom board below floor for access to flexible ducts. See Fig. 5-29A.
4. Extend the flexible ducts through the cutouts in the rim joist from the half with the furnace to the other half.
5. Connect the flexible ducts together per the provided manufacturer instructions using the splicing collar provided.
6. Push the floor insulation against rim joist and tape bottom board closed with provided tape.

## SET-UP PROCEDURES (Continued)

### DOUBLE-WIDE UTILITY INTERCONNECTION



#### Gasline Crossover

Applicable only to models with gas appliances on both halves. The listed flexible connector supplied with the home must be used to make the connection. This connection will be located beneath the home.

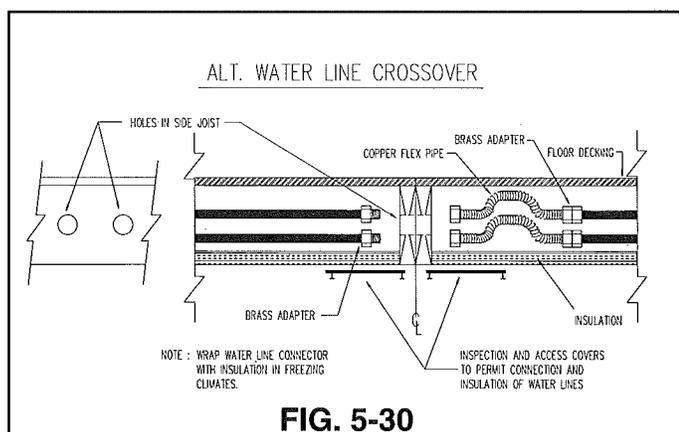
**NOTE: DO NOT USE TOOLS TO CONNECT OR REMOVE FLEXIBLE CONNECTOR QUICK DISCONNECT.**

1. Remove protective caps from the connector.
2. Connect the quick disconnect fitting.
3. Test for leaks with soapy water.

#### Waterline Cross Connect

Applicable only to models with plumbing on both halves (Fig. 5-30 & 5-31).

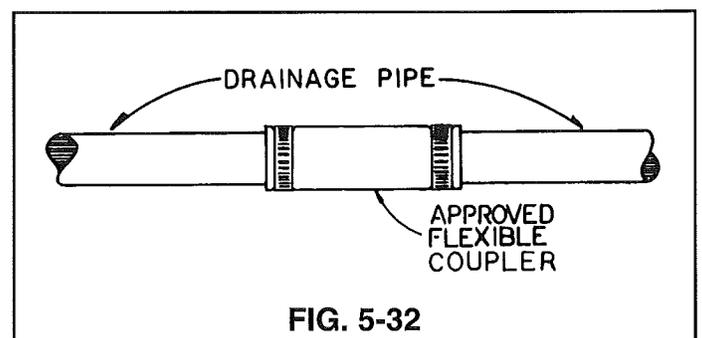
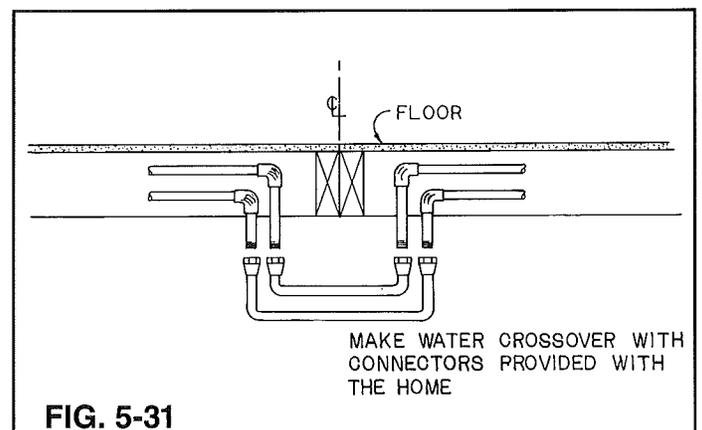
1. Remove the shipping caps from water lines and install provided connector.
2. Check for leaks.
3. In areas where exposed, piping is subject to freezing. Protect exposed piping with heat tapes listed for use on manufactured homes, and insulation. It is recommended that only U.L. listed heat tapes be used and installed in accordance with their listing.



#### Drainage Line Cross Connect

Applicable only to models with plumbing on both halves. The connection may be made with field assembly of factory supplied parts (Refer to drainage of 2 bath models, page 40), or when the below floor plumbing is factory installed, a flexible coupler is used as follows: Use only the approved flexible coupler provided (1½ inch, 2 inch or 3 inch, as required). See Fig. 5-32.

1. Slip the flexible coupler over one end of the drainage line.
2. Align the pipes and center the coupler over the joint.
3. Tighten the clamps and check for leakage.



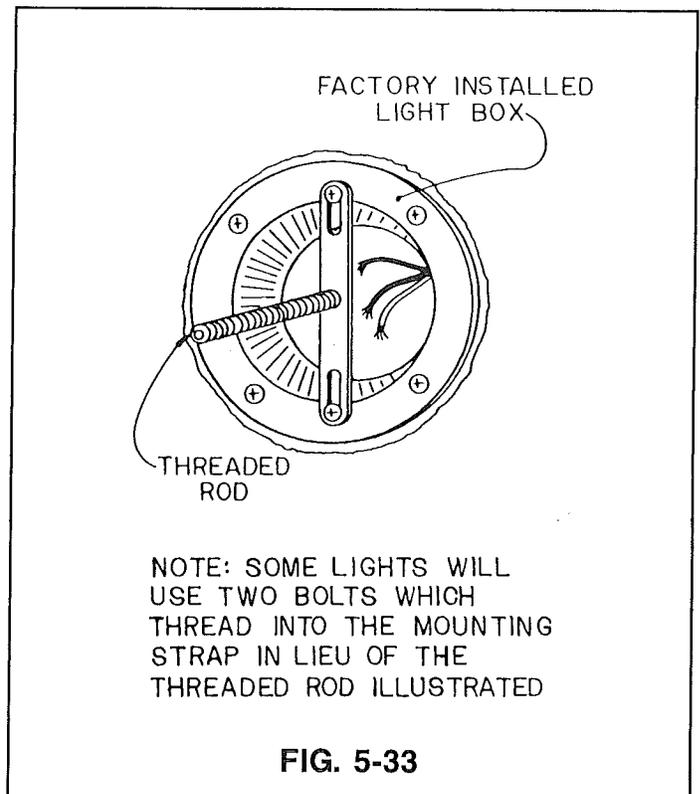
## SET-UP PROCEDURES (Continued)

### INSTALLATION OF EXTERIOR LIGHT FIXTURES

**ELECTRICAL CONNECTIONS SHOULD BE MADE ONLY BY QUALIFIED PERSONNEL. MAKE SURE POWER IS OFF BEFORE INSTALLING LIGHT.**

The correct procedure is as follows:

1. Install threaded tube in the strap secured to the fixture outlet box as shown in Fig. 5-33.
2. Apply caulking around base of light fixture to insure a water tight seal to side wall. (NOTE: On units with masonite siding, make certain the flashing ring is installed around outlet box.)
3. Connect wires, black to black, white to white, and ground to ground, using wire nuts.
4. Push wires into box and secure fixture in position using the nut provided on the threaded tube. Install the bulb.



### VENTILATION OF SKIRTING AND CRAWL SPACE ENCLOSURE

Skirting or other crawl space enclosures, such as foundations, not only add to the appearance of the home but also provide important benefits in the reduction of heat loss. Enclosures also aid in reducing the danger and inconvenience of damaged plumbing through freeze-up.

Skyline Corporation recommends enclosing the underside of the home; however, it is very important that any

enclosure be adequately ventilated. Ventilation openings need to be provided in the foundation or skirting along at least the two long walls of the home. The total area of ventilation openings should be at least 1 ft<sup>2</sup> for each 150 ft<sup>2</sup> of crawlspace area. An opening should be located within 3 ft. of each corner.

### PORCHES AND DECKS

Some Skyline manufactured homes are constructed with factory-built porches or decks along the front, rear or main entry door side of the home. Porches and decks may be constructed with pressure treated wood floors which readily permit the passage of rain and/or snow through the floor. *The area under porches or decks constructed with pressure treated decking lumber must be separated from the crawl space enclosure of the remainder of the home.* Excessive moisture in the crawl space can be the cause of window or ceiling condensation and other problems associated with high moisture levels in the home.

### METAL ROOF TIGHTENING

Metal roofs may be tightened by the use of bonded washers secured to the roof rafter with #8 x 1¼" screws, placed in rows of four across with width of the roof and spaced at approximately 48" O.C. along the length of the roof. Care must be taken to assure that the screws are placed to penetrate the rafter. After application the screw heads and washers are to be sealed with a roof sealant material.

## CHAPTER 6

# INSTALLATION OF OPTIONAL FEATURES

### ELECTRIC DRYER VENTING

Homes factory equipped with an electric dryer receptacle will also have the moisture-lint exhaust system roughed-in. To complete the moisture-lint exhaust system the following must be performed:

1. Remove the covers over the vent hole in the floor.
2. Push the duct through the hole provided in the floor and connect to the dryer in accordance with the dryer manufacturer's instructions.

**NOTE: Some dryer manufacturers require that metallic duct be connected to the dryer and routed through floors and/or sidewalls.**

3. Secure the termination fitting at the outside edge of the floor.

**NOTE: The termination fitting must be installed such that the dryer does not exhaust beneath the home. This may be accomplished by attaching the fitting to a piece of exterior grade plywood or, if the home is skirted, directly to the skirting.**

4. Secure the flexible duct to the termination fitting with the provided clamp. (Do not use sheet metal screws or other devices which extend into the interior of the duct.
5. Seal the duct penetration through the floor with a good grade of caulking.

**CAUTION: MATERIALS WHICH MAY BE PROVIDED FOR THE MOISTURE-LINT EXHAUST SYSTEM ARE NOT ACCEPTABLE FOR INSTALLATION OF GAS DRYERS.**

### GAS DRYER INSTALLATION

Homes factory equipped with a gas dryer will also have the moisture-lint exhaust duct and termination fitting provided. To complete a roughed-in system follow steps 1-5 under Electric Dryer Venting.

Homes with "stubbed-in" gas service will also have the moisture-lint exhaust system roughed-in. However, the exhaust duct and termination fitting are not provided. Such termination fittings should be supplied with the dryer at time of installation. The gas connection and completion of the moisture-lint exhaust system must be made by qualified personnel in accordance with the dryer manufacturer's installation instructions. The gas connection must be tested (See Utility Hook-up and Testing) prior to use of the appliance. To complete the moisture-lint exhaust system, follow steps 1-5 under Electric Dryer Venting.

### GRILL / RANGE VENTING

When a home is provided with a combination range (cook top)/grill that contains its own exhaust system, the exhaust must be routed such that it does not terminate beneath the home. To complete the exhaust system the following must be performed:

1. Remove the cover on the factory installed exhaust pipe protruding from beneath the floor in the vicinity of the range.
2. Secure the provided termination fitting at the outside edge of the floor.
3. Run the provided flexible metallic duct between the elbow protruding from the floor and the termination fitting. Support the duct and make the connections per the manufacturer's installation instructions provided with the grill/range.

## INSTALLATION OF OPTIONAL FEATURES (Continued)

### PADDLE FAN INSTALLATION FOR DOUBLE-WIDE HOMES WIRED FOR MOUNTING ON CENTER BEAM

#### A. FLUSH RIDGE BEAM

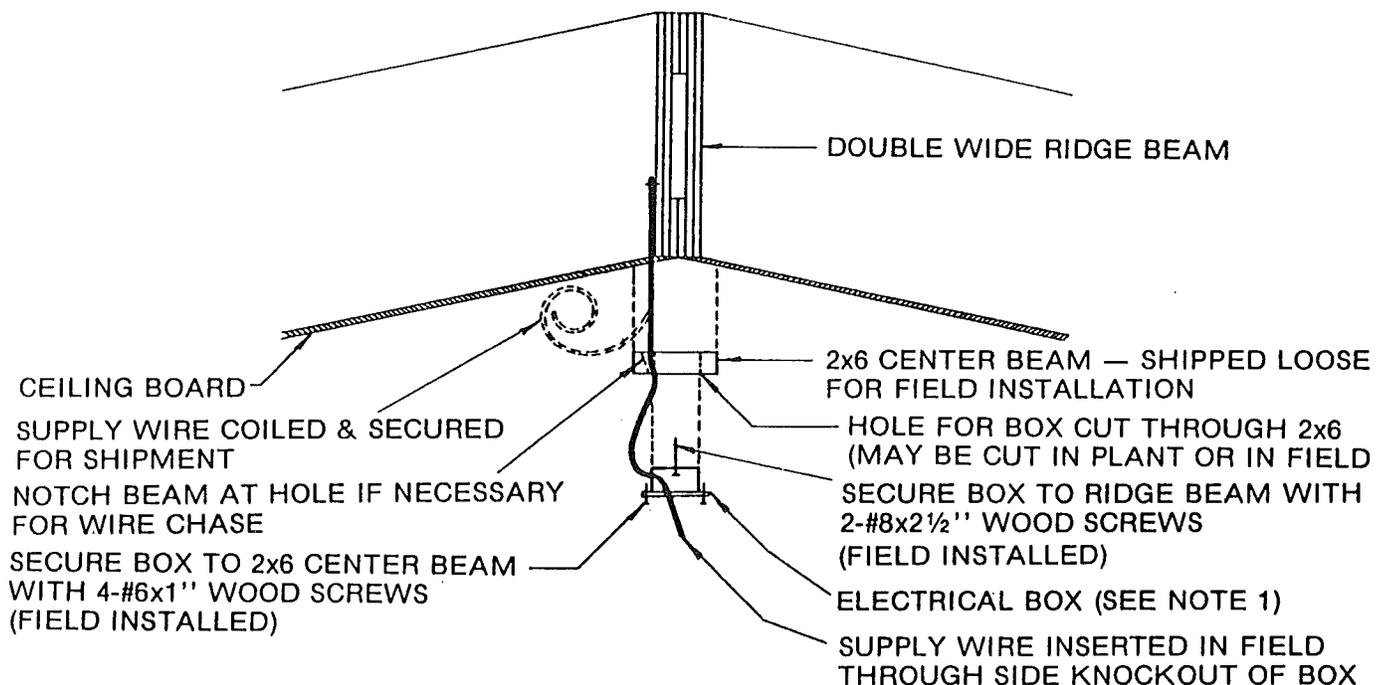
For proper ceiling fan installation, an electric outlet box and the decorative center beam to contain the box have been provided for attachment to the ridge beam at the unit centerline.

**CAUTION: BEFORE FOLLOWING THE STEP-BY-STEP PROCEDURE, BE SURE THAT POWER TO FAN WIRE IS OFF.**

1. Remove the fan manufacturer's installation instructions from the package and determine the method of fan attachment to the beam. (Also see Fig. 6-1 below.)
2. If the center beam (shipped loose) does not contain a precut hole for the electrical box, cut a hole with a hole saw approximately  $\frac{1}{4}$ " larger than the box diameter at the proper location (center line of hole should line up with location of supply wire through ceiling) and centered in the width of the beam.
3. Install the box in the hole and secure flange (Plastic box only) to the center beam with 4 - #6 x 1" screws.
4. a. Insert the ceiling wire through a knock out hole in the side of the electrical box. **NOTE:** It may be necessary to cut a notch from the top on the supply wire side of the center beam hole to allow the supply

wire to be inserted in electrical box without binding against center beam during installation.

- b. Leave approximately 4" of wire free in the box.
5. Secure the center beam in place over the center line joint. Be sure that fan supply wire is not pinched or penetrated with beam fasteners.
6. Secure electrical box to ridge beam with #8 x  $2\frac{1}{2}$ " wood screws through the two holes in the top of the box.
7. Strip about  $\frac{3}{4}$ " of insulation from the white and black conductor ends.
8. Position the non-combustible flash ring (provided) over the electrical box so that finished surface (adjacent to electric box) which is to be covered by fan canopy is not exposed.
9. Follow the manufacturer's installation instructions for mounting the fan assembly to the box and for electrical wiring of the fan. Use provided electrical connectors for splicing wire. Be certain that fan is grounded as specified in manufacturer's instructions and that wires are connected properly (white to white and black to black).



NOTE: APPLICABLE TO U.L. LISTED PADDLE FAN WITH A SWIVEL TYPE MOUNTING BRACKET.

FIG. 6-1

## INSTALLATION OF OPTIONAL FEATURES (Continued)

### B. PROTRUDING RIDGE BEAM

For proper ceiling fan installation, a prefabricated box has been provided and includes the electrical box for containment of the spliced wires with their connectors.

The prefab box is also designed to conceal the wire which is run through the ceiling where the fan is to be located. **CAUTION: BEFORE FOLLOWING THE STEP-BY-STEP PROCEDURE, BE SURE THAT POWER TO FAN WIRE IS OFF.**

1. Remove the fan manufacturer's installation instructions from the package and determine the method of fan attachment to the beam.
2. Insert the ceiling wire through a side knock out hole in the electrical box. Secure the wire in the electrical box clamp at a point approximately 4" from its end.
3. Place the prefab box in its final position on the beam and secure the box to the beam with #6 x 2" wood screws (provided) in the metal corner braces.
4. Strip about 3/4" of insulation from the white and black conductor ends.
5. Position the non-combustible flash ring (provided) over the electrical box so that finished surface (adjacent to electrical box) which is to be covered by fan canopy is not exposed.
6. Follow the manufacturer's installation instructions for mounting the fan assembly to the box and for electrical wiring of the fan. Use provided electrical connectors for splicing wires. Be certain that fan is grounded as specified in manufacturer's instructions and that wires are connected properly (white to white and black to black).

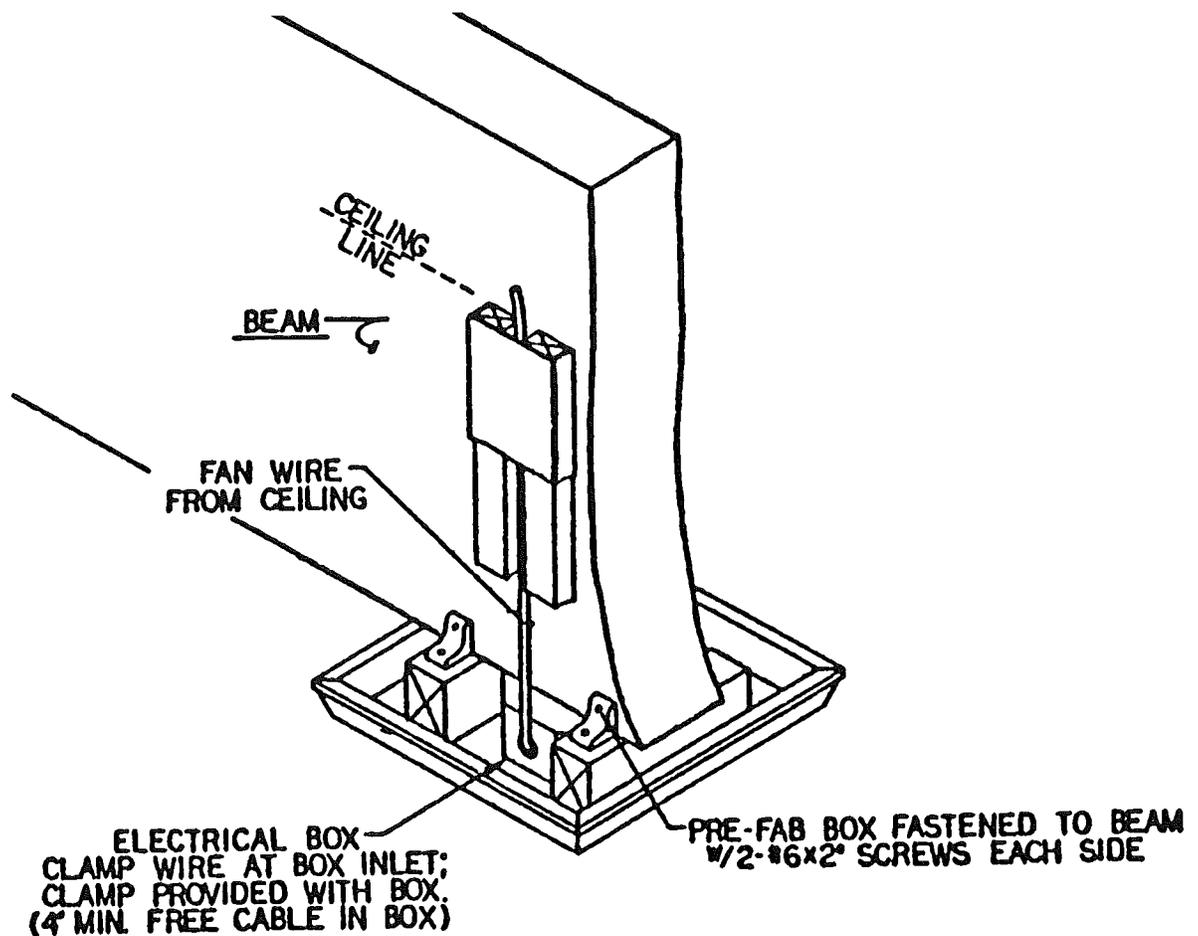


FIG. 6-2

# INSTALLATION OF OPTIONAL FEATURES (Continued)

## AIR CONDITIONING ELECTRICAL CONNECTION (Factory Provided Circuits)

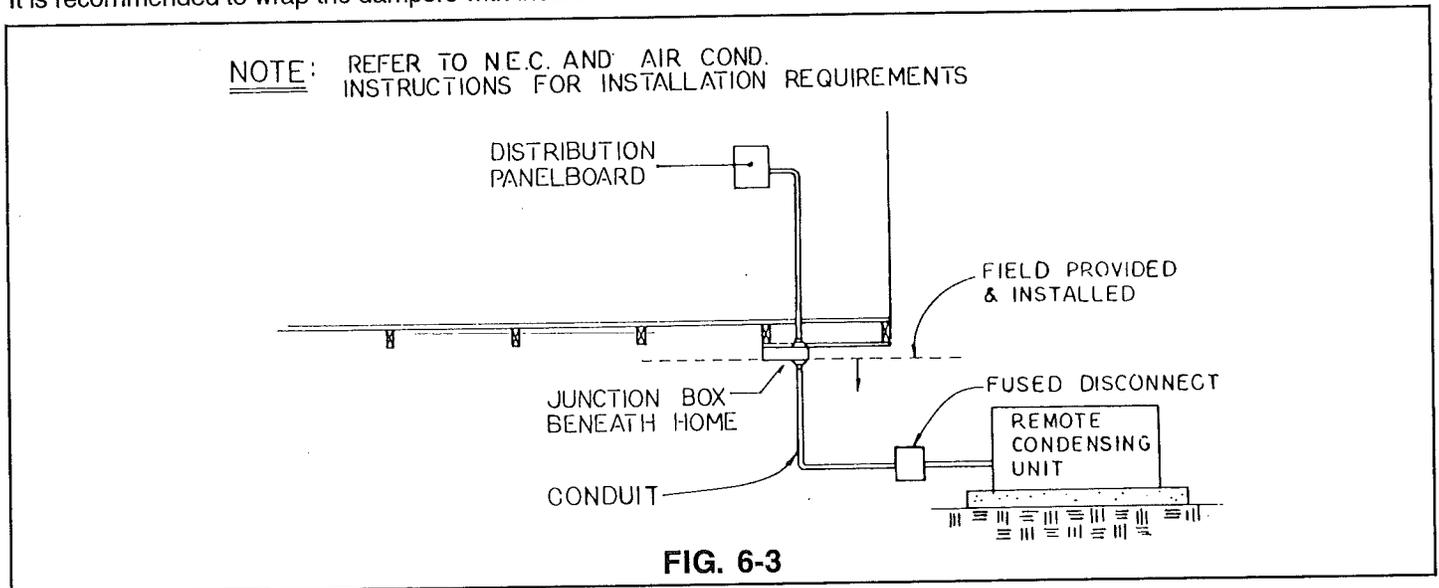
THE ELECTRICAL CONNECTION SHOULD BE MADE ONLY BY QUALIFIED PERSONNEL. THE COMPLETED INSTALLATION MUST CONFORM TO ARTICLE 440 OF THE NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES.

Factory installed branch circuits for air conditioning are indicated on the data plate under the heading "Rating of Factory Installed Circuit." The maximum full load ampere draw for the desired air conditioning unit must not exceed the indicated branch circuit rating. "A" coil air conditioning units installed must be listed for use with the furnace in this home; for air conditioning installation, see the instructions shipped with the air conditioner. If a self-contained air conditioner is to be installed and connected to the heating supply duct the installation must include a damper beneath the furnace to prevent cool air from "backing-up" into the furnace during the cooling mode and a damper at the air conditioner supply to prevent heated air from "backing-up" into the air conditioner during the heating mode. It is recommended to wrap the dampers with insulation.

The electrical connection is via a branch circuit terminating in a junction box beneath the home (See Fig. 6-3). The field installation wiring beyond the junction box, must incorporate a fused disconnect (sized in accordance with NEC Article 440) located within sight of the condensing unit. The maximum fuse size to be used with the fused disconnect is marked on the condenser data plate. The acceptability of the air conditioning equipment, rating the location of disconnect means, fuse type branch circuit protection, and connections to the equipment are to be determined by the local inspection authority.

For some models the electrical connection is made to the home via a separate rigid conduit. The conduit is 1" and is run from the panelboard and terminates below the bottom board. A PVC cap is cemented to the end of the conduit and this must be cut off to provide access to the panel board. Wiring is then installed from the panelboard to the air conditioner per all applicable NEC & local codes and all requirements listed above.

Condensation should not be allowed to drain under home.



**NOTE: THE ELECTRICAL CONNECTION SHOULD BE MADE ONLY BY QUALIFIED PERSONNEL.**

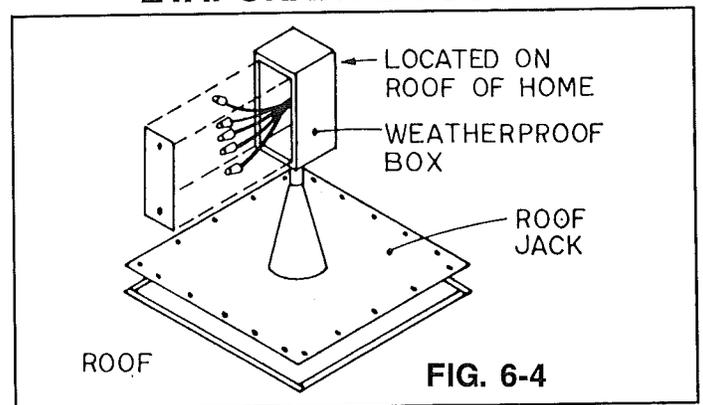
1. On models equipped for installation of optional evaporative cooler, install the roof-mounted cooler according to the instructions with the cooler. For coolers without an integral air duct the cooler box shall be lined with .016 in. metal. The factory installed branch circuit for the cooler is sized for a maximum cooler electrical load of 12 amperes. 120 V. AC, 60 Hz.
2. Remove the cover from the roof-mounted junction box and make the connection of the color-coded wires using the provided wire nuts. The electrical portion of the installation is now complete (See Fig. 6-4).

### COLOR CODE

WHITE ..... Neutral  
YELLOW ..... Pump

BLACK ..... High Fan  
RED ..... Low Fan  
GREEN ..... Ground

### EVAPORATIVE COOLER



## INSTALLATION OF OPTIONAL FEATURES (Continued)

### EXPANDING ROOMS, SLIDE-OUTS, ETC.

Where optional expanding rooms, slide-outs, tip-outs, etc. are provided, specific instructions and directions are

provided for proper installation and set-up.

### INSTALLATION OF SITE INSTALLED ATTACHED STRUCTURES

All site installed attached structures, including garages, porches, steps, stairways and landing *must be designed and constructed to support all of their own dead load and all of the live load to which it will be subjected*. Attached structures should be constructed in accordance with the manu-

facturer's installation instructions and all applicable local codes. In particular, attached garages generally require fire protection and GFI electrical circuit protection as required by local code.

### HINGED ROOFS AND EAVES

Where optional hinged roof and/or hinged or prefabricated field installed eaves are provided, supple-

mental installation instructions are provided.

### CEILING (PADDLE) FANS

Site provided and installed ceiling fans are to be installed in accordance with the manufacturer's installation instructions. To reduce the risk of injury, the minimum dimen-

sion from the trailing edge of the fan blade to the floor must be in accordance with the manufacturer's requirements.

### TELEPHONE AND CABLE TV

Careless installation of telephone and cable television lines may be hazardous. Electrical circuits, plumbing and duct work are contained in the floor and walls of the home. Avoid contact with these systems when drilling into and plac-

ing cables in these cavities. **FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

### FIREPLACE INSTALLATION

Because of transportation restrictions, fireplaces require on-site installation of additional section(s) of approved, listed chimney pipe, a spark arrestor and a rain cap assembly.

The fireplace manufacturer's installation instructions and all required components for proper installation are included in each home with a fireplace.

## CHAPTER 7

# UTILITY SYSTEM CONNECTION AND TESTING

Many local jurisdictions have special requirements for utility connections and on-site inspection of these connections. Consult with the proper authorities prior to utility connection. Only qualified service personnel, familiar with local codes and licensed where required.

The drainage and water systems were tested for leaks prior to shipment from the factory. It is essential that they be rechecked by qualified personnel for leaks that may have been caused by vibration during transportation.

### WATER

The water system has been designed for an inlet water pressure of 80 psi. If the manufactured home is installed in areas where the water pressure exceeds 80 psi, a pressure reducing valve should be installed. The water system may be connected to any safe, potable water source. The connection is via a single  $\frac{3}{4}$  inch inlet beneath the home. A master shut-off full flow valve must be installed in the water supply line adjacent to the home; this valve should be a full port gate or ball valve with threaded or solder joints. After removing the aerators from all the faucets, open all the faucet valves and allow the water to run for 15 minutes. This should remove any foreign particles left in the line that might cause an unpleasant taste or become lodged at faucet washers and cause dripping faucets. All exposed water piping subject to freezing should be protected by insulation and electric heat tapes (with an integral thermostat) listed for use with manufactured homes. It is recommended that only UL listed heat tapes be used and installed in accordance with their installation instructions.

### DRAINAGE — SINGLE BATH

The drainage connection is made at the 3-inch main drain outlet. Care should be exercised to slope and support the drain line from the home to the site sewage system ( $\frac{1}{4}$ " per foot slope).

**DANGER: IMPROPER OR INADEQUATE TESTING, CONNECTION OR MODIFICATION OF ANY PART OF GAS OR ELECTRICAL SYSTEMS, ESPECIALLY BY UNQUALIFIED PERSONNEL, MAY BE EXTREMELY DANGEROUS AND MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

### DRAINAGE — 1½, 1¾ & 2 BATH

When applicable the parts required to bring all drain lines to a single point are provided as follows:

1. Pipe and fittings.
2.  $\frac{1}{4}$  pint of ABS solvent cement.
3. 10 feet of  $\frac{3}{4}$ " x 28 gauge plumbing strap.
4. Ten  $\frac{1}{4}$ " x 1" stove bolts.

The procedure for bringing all drain lines to a single point is as follows:

1. Remove caps on drain outlets and connect supplied parts together as shown by the drain line schematic shipped with the house. (Do not apply cement.)
2. Check to be sure that the assembly has the proper  $\frac{1}{4}$  inch drop per foot.
3. Mark each joint to aid in reassembly. Start at outlet end of system and remove, cement and reassemble each slip joint one at a time. Be sure to apply the cement on both male and female ends with a good even coating.
4. Using the  $\frac{3}{4}$ " x 28 gauge strapping, strap the drain line to the center crossmembers of the frame placing a strap at each member (4 feet apart). Use a  $\frac{1}{4}$ " x 1" stove bolt to secure strap in place.
5. Connect home drain to site sewage system as for single bath previously discussed.
6. Check completed system for leaks.

**GAS** — The gas piping system was designed for a range of 7 to 10½" of water column for natural gas and 11 to 14" of water column for LP gas. The manufactured home gas supply pressure must be within this range for safe and efficient operation of the gas piping system.

## UTILITY SYSTEM CONNECTION AND TESTING (Continued)

The gas piping system was pressure tested for leaks prior to shipment; however, it is essential that the system be retested by qualified personnel for leaks prior to use. (Many utility companies require this on-site test.) The instructions printed on the tag near the gas supply connection must be followed (See Fig. 7-1).

In some localities, utility companies and/or building inspectors may require additional tests as follows:

1. Isolate all appliances with appliance shut-off valves. **PRESSURE SHALL BE MEASURED WITH A MERCURY MANOMETER OR SLOPE GAUGE CALIBRATED IN INCREMENTS OF NOT GREATER THAN 1/10 POUND.**
2. Pressurize the system to 3 psi and isolate the source of pressure from the gas piping.

3. Check the gauge after 10 minutes; there should be no drop in pressure.
4. Check the piping to appliances by pressurizing to at least 10 inches but no more than 14 inches water column and applying a bubble solution to all joints and flexible connectors.

**CAUTION: DO NOT PRESSURIZE THE SYSTEM ABOVE THE PRESSURES STATED ABOVE.**

The connection to the gas supply should be made only by authorized representatives of the utility.

**NOTE: BEFORE A TEST IS BEGUN, THE TEMPERATURE OF THE AMBIENT AIR AND OF THE PIPING SHOULD BE APPROXIMATELY THE SAME — CONDUCT THE TEST AT SUCH A TIME DURING THE DAY WHEN AIR TEMPERATURES WILL REMAIN CONSTANT.**

### Combination LP—Gas and Natural Gas System

This gas piping system is designed for use of either liquefied petroleum gas or natural gas.

**NOTICE: BEFORE TURNING ON GAS BE CERTAIN APPLIANCES ARE DESIGNED FOR THE GAS CONNECTED AND ARE EQUIPPED WITH CORRECT ORIFICES. SECURELY CAP THIS INLET WHEN NOT CONNECTED FOR USE.**

When connecting to lot outlet, use a listed gas supply connector for manufactured homes rated at  100,000 Btuh or more.  
 250,000 Btuh

Before turning on gas, make certain all gas connections have been made tight, all appliance valves are turned off, and any unconnected outlets are capped.

After turning on gas, test gas piping and connections to appliances for leakage with soapy water or bubble solution, and light all pilots.

**Fig. 7-1**

**NOTE: DO NOT BUBBLE CHECK BRASS GAS LINE FITTINGS WITH SOLUTIONS CONTAINING AMMONIA.**

## UTILITY SYSTEM CONNECTION AND TESTING (Continued)

### ELECTRICAL

ALL ELECTRICAL WORK SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONNEL. The electrical supply connection to the manufactured home may be made by any of the following methods depending on the manufactured home construction and electrical service:

- a. Listed 50 ampere manufactured home power supply cord. (50 amp service only)
- b. Permanent feeder connected to a factory installed mast weatherhead assembly. The routing, connection and support of the service drop is to be in accordance with local codes.
- c. Permanent feeder routed to the distribution panel through the factory installed feeder raceway which terminates beneath the manufactured home. A junction box or approved fitting must be used to connect the manufactured home feeder raceway to the supply raceway beneath the manufactured home. The proper feeder conductor sizes and the required junction box sizes are given in Table 7.

After the connection has been made, the following tests should be conducted using approved test equipment:

1. Continuity test of circuit conductors
2. Polarity test
3. Continuity test of electrical grounding system

### OUTSIDE DISTRIBUTION PANEL BOARD

Accessibility to distribution panel board, and the use of unit switches as disconnect means, is subject to the requirements of the local inspection authority.

### ELECTRICAL SYSTEM TEST

With approved testing equipment, the following tests should be performed before connecting to the power source:

- Continuity Test of Circuit Conductors  
A continuity test with all branch circuit breakers and switches controlling individual outlets in the "on" position should be conducted. There should be no evidence of connection between any of the supply conductors (including neutral) and the grounding circuit.
- Continuity Test of Electrical Grounding System  
All noncurrent carrying metal parts of the electrical system including fixtures, appliances and the chassis of the home should be tested for continuity with the grounding circuit.

The following test should be conducted after connecting and energizing the electrical system.

- Polarity and Grounding Tests of 15 and 20 AMP Receptacle Outlets  
With circuits and lighting circuits energized, use a receptacle polarity tester to check polarity and grounding of each receptacle outlet.

## MANUFACTURED HOME ELECTRICAL SUPPLY REQUIREMENTS

MAXIMUM LOAD & MAIN BREAKER SIZE (AMP)	CONDUCTOR SIZE <sup>1</sup> (AWG) (TWO LINE AND ONE NEUTRAL)	GROUNDING CONDUCTOR SIZE (AWG)	FACTORY INSTALLED FEEDER RACEWAY <sup>1</sup> TRADE SIZE (IN.)	MINIMUM JUNCTION BOX SIZE
50	6	#10	1"	6" x 6" x 4"
100	3	#8	1 1/4"	8" x 8" x 4"
125	1	#6	1 1/2"	10" x 10" x 4"
150	1/0	#6	1 1/2"	10" x 10" x 4"
200	3/0	#6	2"	12" x 12" x 4"

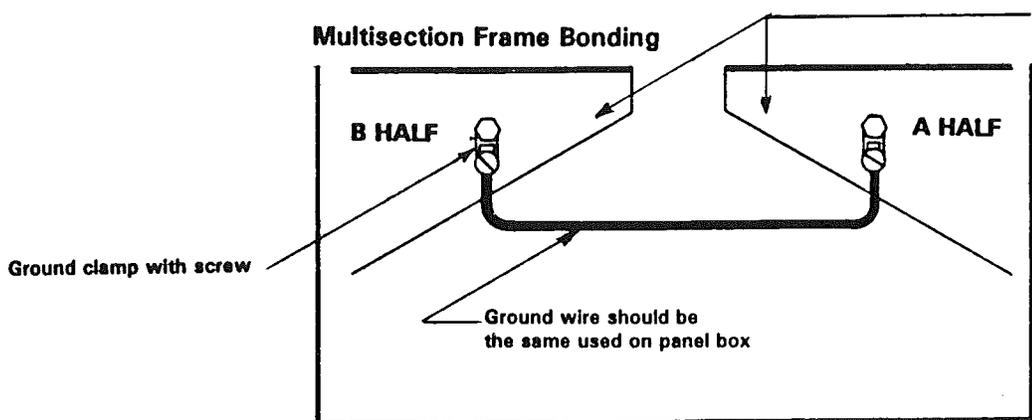
<sup>1</sup>Conductor size and feeder raceway sized for copper. 75°C rated conductors, types RH, RHH, RHW without outer covering. THW or XHHW.

## WARNING

CARELESS INSTALLATION OF TELEPHONE AND CABLE TELEVISION LINES MAY BE HAZARDOUS. The manufactured home walls contain electrical circuits and the floor section may contain electrical circuits, plumbing or duct work. Extreme care must be exercised during drilling

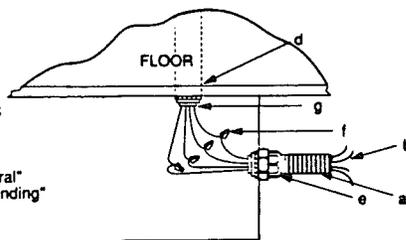
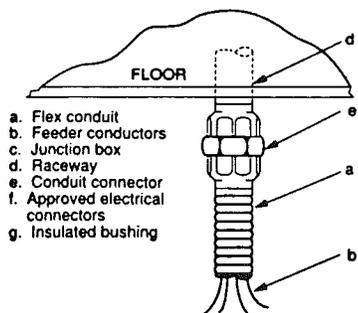
through and placing of communication cables within these cavities, to avoid contact with these home systems. Such work should be performed only by qualified personnel. **FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY OR DEATH.**

# UTILITY SYSTEM CONNECTION AND TESTING (Continued)

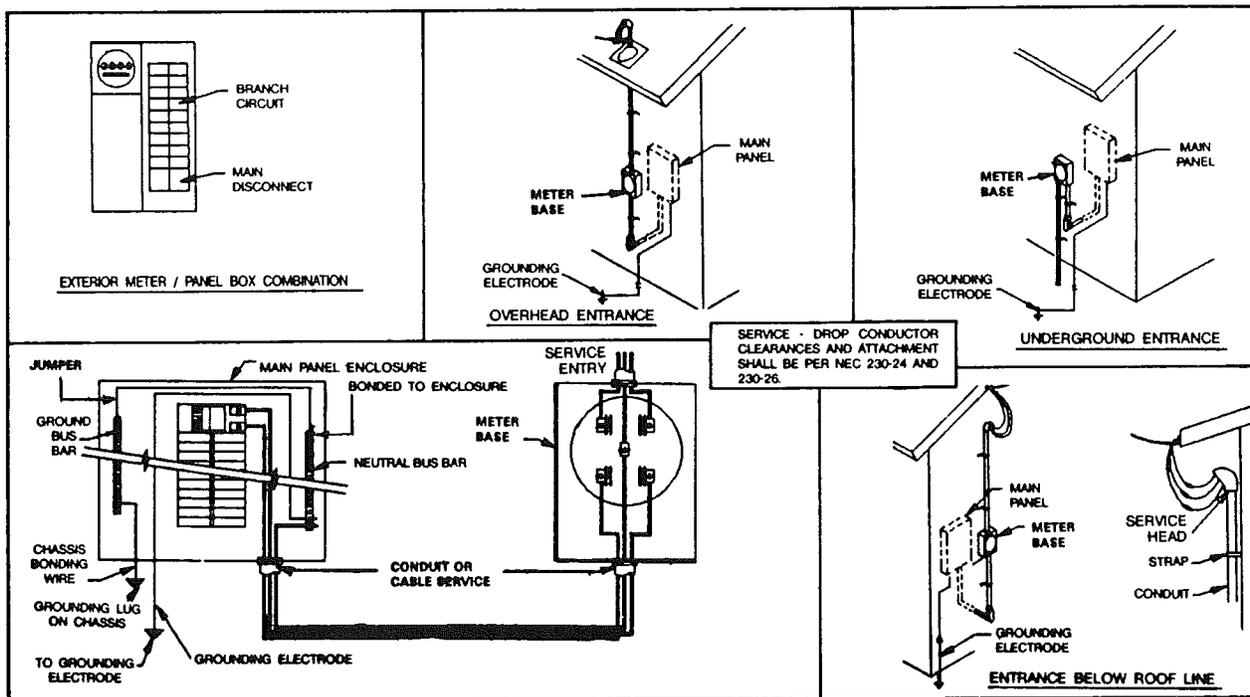


Front or rear crossmembers or any set of outriggers on opposite halves

## Typical Under Chassis Feed Connections



## Typical Meter Base Installations and Grounding



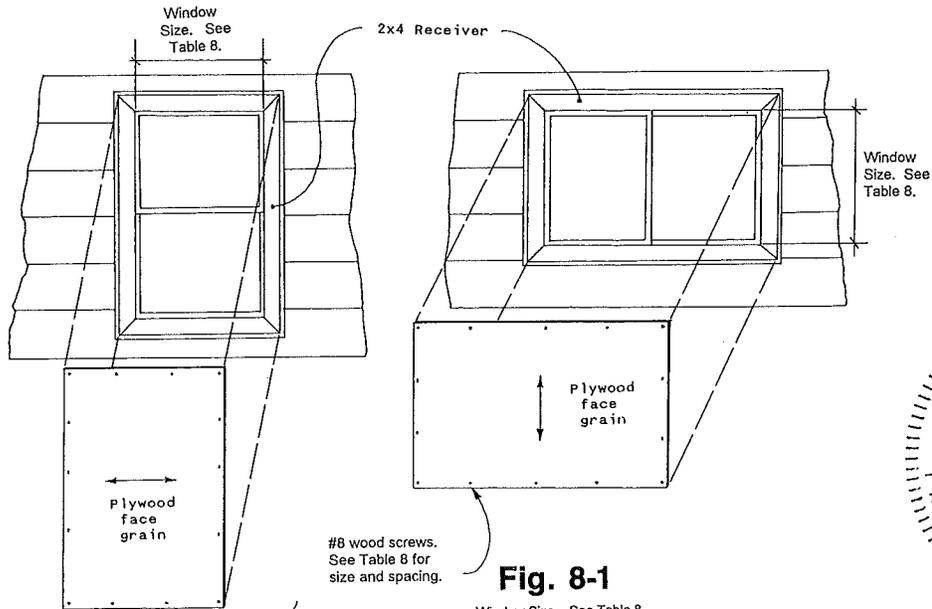
# CHAPTER 8

# PROTECTIVE WINDOW COVERINGS

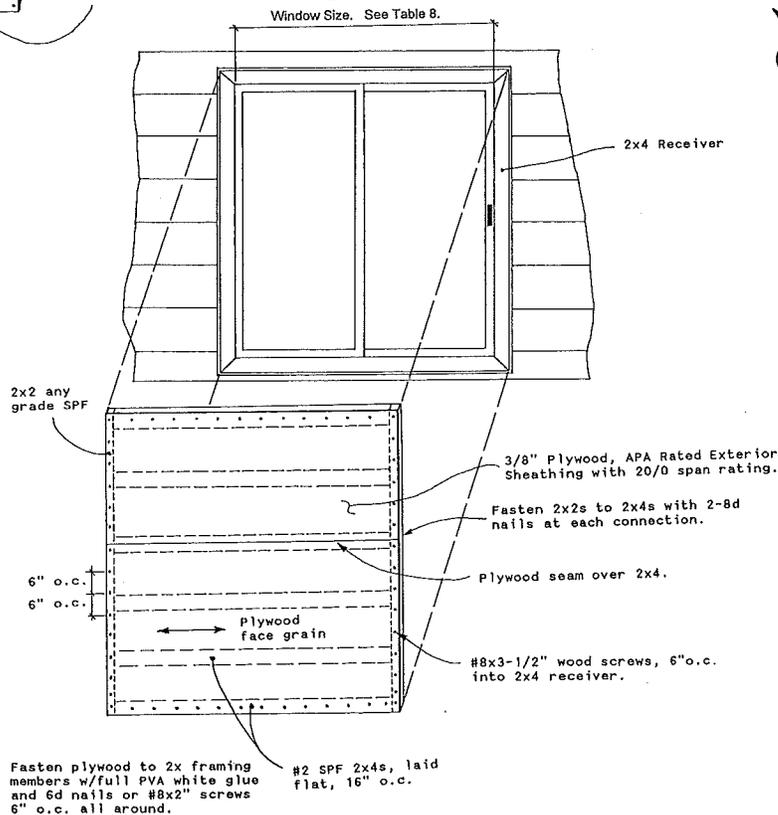
If your home is destined to be set in Wind Zones II or III, then it has been designed to install protective window and door coverings, in the event of a wind storm. Two different types of protective coverings are available. Your home may have either, or both of these types.

The first type of protective window covering is to attach plywood to a 2x4 member that has been installed around window and door openings. The plywood is attached to the 2x4 members with #8 wood screws. The type of plywood, screw length, and screw spacing will vary with the window or door size. See Table 8 for these requirements. Note that the window sizes listed in Table 8 are the small dimension of the window or door (See Figure 8-1).

Large openings (such as sliding glass doors) are required to be covered with a plywood and lumber frame assembly. See Table 8 to determine when this is required, and Figure 8-2 for frame construction.



**Fig. 8-1**



**Fig. 8-2**



# PROTECTIVE WINDOW COVERINGS (Continued)

Table 8

MAXIMUM WINDOW SIZE	PLYWOOD TYPE REQUIREMENTS				WOOD SCREW SPACING
	WIND ZONE II		WIND ZONE III		
	STANDARD WALL AREA	WALL AREA WITHIN 3' OF CORNER	STANDARD WALL AREA	WALL AREA WITHIN 3' OF CORNER	
14.5''	1	1	1	1	16'' O.C.
24.5''	2	3	3	4	16'' O.C.
30.5''	4	5	5	7	16'' O.C.
36.5''	6	7	6	8	12'' O.C.
40''	7	8	8	9	12'' O.C.
46.5''	8	10	10	10	10'' O.C.
72''	10	10	10	10	6'' O.C.

All plywood for protective window coverings is APA rated exterior sheathing. Thickness and span ratings will vary with window or door size. Plywood listed below, with a higher number than is required by Table 8, may be substituted for a lower numbered plywood.

1. 3/8'' with 20/0 span rating. Fasten to receiver w/#8 x 2'' wood screws.
2. 1/2'' with 24/0 span rating. Fasten to receiver w/#8 x 2'' wood screws.
3. 3/8'' with 24/0 span rating. Fasten to receiver w/#8 x 2'' wood screws.
4. 1/2'' with 32/16 span rating. Fasten to receiver w/#8 x 2'' wood screws.
5. 5/8'' with 32/16 span rating. Fasten to receiver w/#8 x 2 1/4'' wood screws.
6. 3/4'' with 40/20 span rating. Fasten to receiver w/#8 x 2 1/4'' wood screws.
7. 5/8'' with 40/20 span rating. Fasten to receiver w/#8 x 2 1/4'' wood screws.
8. 7/8'' with 48/24 span rating. Fasten to receiver w/#8 x 2 1/2'' wood screws.
9. 3/4'' with 48/24 span rating. Fasten to receiver w/#8 x 2 1/4'' wood screws.
10. Plywood with wood frame required.

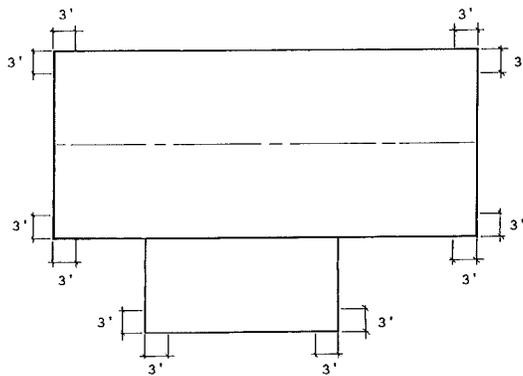


FIG. 8-3

In the event of a wind storm, the corners of this home will sustain higher wind pressure than the rest of the home. Therefore, it is required that windows and doors located within 3 feet of any corner be designed to withstand these higher pressures. Figure 8-3 shows the typical locations of the corners. Table 8 has separate columns indicating the plywood requirements for standard wall area and wall area that is within 3 feet of a corner.

After the wind storm is over and the plywood has been removed, all holes made by the screws in the 2x4s should be filled with a weather resistant caulk.



## PROTECTIVE WINDOW COVERINGS (Continued)

The second type of protective covering is to attach 3/4" plywood directly to the window frame. The plywood is attached to the window frame with #8 screws around the windows frame (top, bottom and sides). The specific instructions for each window manufacturer are shown below and on the next page.

**DANGER: STORM SHUTTERS CANNOT WITHSTAND SEVERE STORMS. TO AVOID PERSONAL INJURY OR DEATH, CONTACT LOCAL EMERGENCY SERVICES NOW TO IDENTIFY EMERGENCY SHELTER IN THE EVENT OF SEVERE WEATHER.**

This direct fastening application was designed and tested for use on Philips Products series #22, 23 and 24 lap windows. Do not use on any other products.

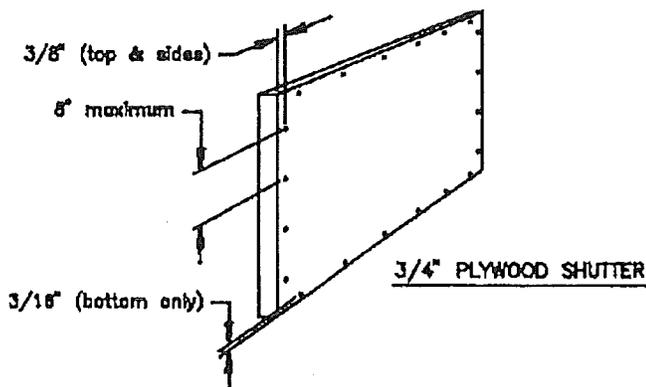
DUE TO THE LIMITED TIME BETWEEN WHEN A STORM WARNING IS ISSUED AND WHEN THE STORM COULD HIT AT YOUR LOCATION, WE RECOMMEND YOU DO THE FOLLOWING BEFORE A STORM WARNING IS ISSUED:

1. Purchase #8x1" sheet metal screws (enough for all the windows).
2. Buy shutters and get them cut to size, and marked. The shutters must be 3/4" thick plywood.
3. Store shutters and screws together in a dry place where they will be accessible.

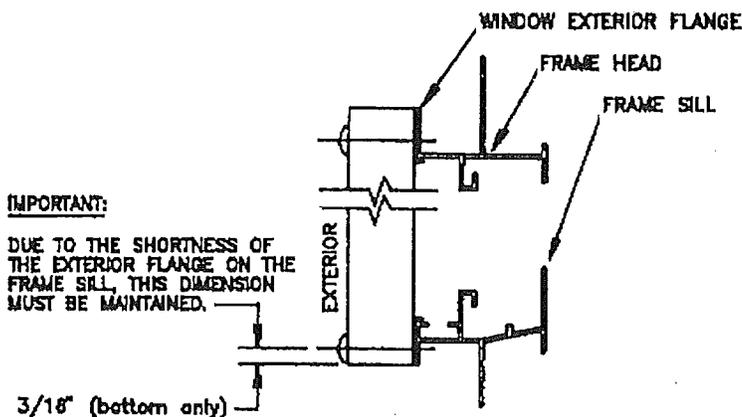
INSTRUCTIONS FOR INSTALLING SHUTTERS ONTO A PHILIPS PRODUCTS LAP MOUNTED ALUMINUM WINDOW.

1. For each window size, measure the width and height of the exterior flange of the window. (These become the shutter dimensions.)
2. Determine how many shutters of this size are needed and get them cut to the proper dimensions.
3. Mark each shutter as to where on the home it goes, as well as marking which end goes up.
4. Mark the screw locations on the shutter (as shown below).
5. With the help of an assistant, lift the shutter up to the window and center it on the window.
6. Position the shutter so that the bottom edge of the plywood is even with the bottom of the exterior flange of the frame sill.
7. Fasten the shutter to the window with #8 x 1" sheet metal screws. Make certain the shutter does not shift out of position.

### SCREW LOCATION DETAIL



### VERTICAL CROSSSECTION OF SHUTTER ATTACHED TO FRAME HEAD AND SILL



### HORIZONTAL CROSSSECTION OF A TYPICAL ALUMINUM WINDOW INSTALLATION WITH AN ATTACHED STORM SHUTTER

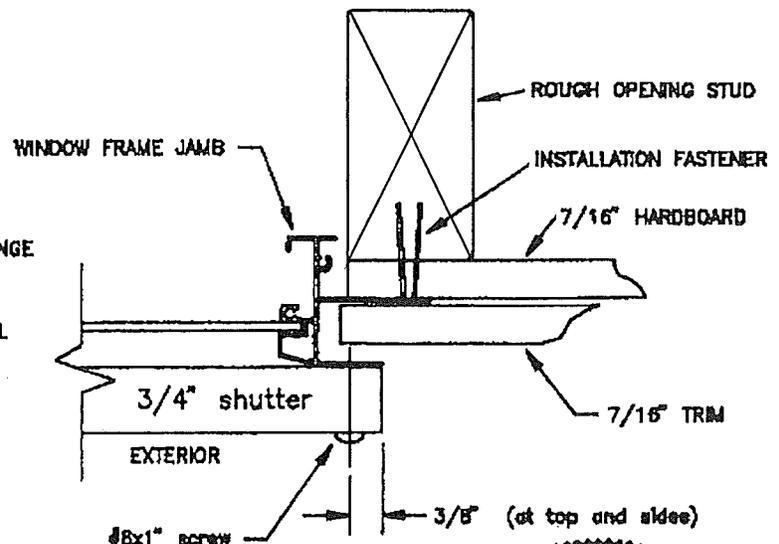


Fig. 8-4



# PROTECTIVE WINDOW COVERINGS (Continued)



500 AIRPORT DR. MANSFIELD, TEXAS 76063 (817) 473-4421

## INSTALLATION OF PROTECTIVE COVERING AS REQUIRED BY H.U.D. FOR ZONE II AND III

The following pages illustrate the application of an exterior window protection in the event of storms (such as hurricanes) as required by H.U.D.

**Please Note:** Installation of protective coverings (such as those listed below) will Negate Egress of the window. Homes with protective coverings (such as those listed below) can not be occupied while the coverings are in place.

- Parts Required: 1. 3/4" plywood — enough for each window in the home.  
2. #8 x 1" wood screws or longer (see below for quantity).

The installation steps apply to both the vertical and horizontal sides of windows. The size of the window will affect the number of fasteners needed.

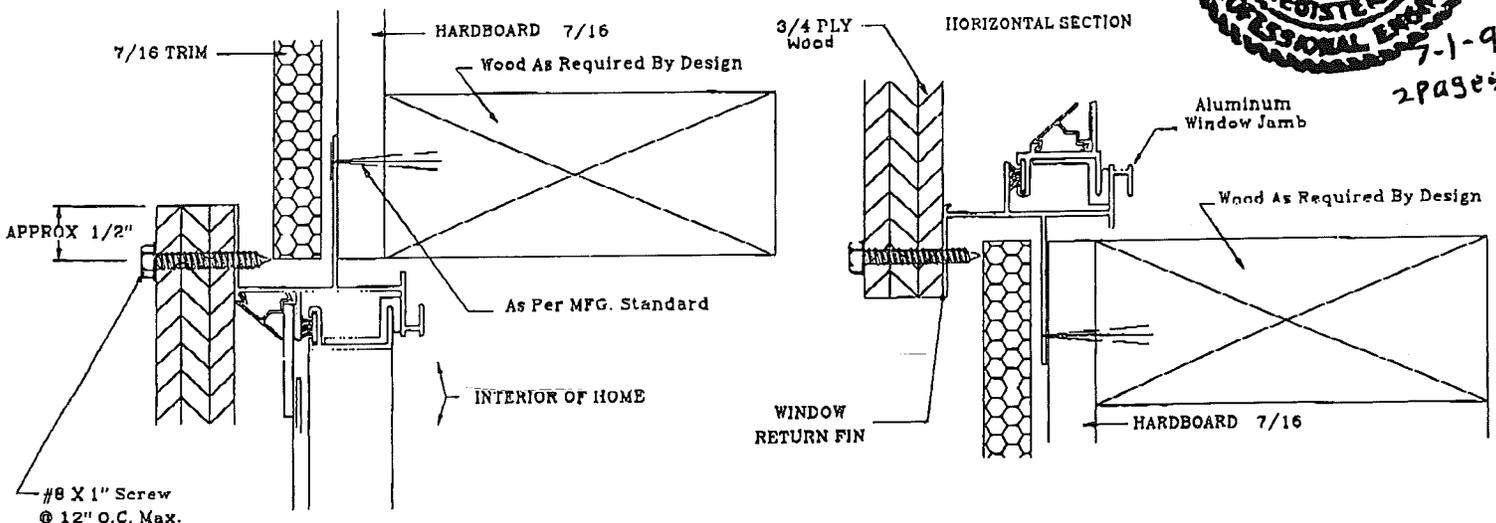
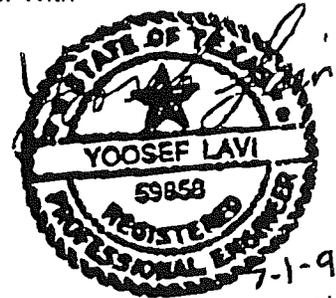
For windows with a face measurement of 30" wide by 30" high (or any smaller size), install 3 fasteners, spaced eight (8) to twelve (12) inches apart on the head and on the sill. Install four (4) fasteners, spaced eight (8) to twelve (12) inches apart on both the left and right frame sides.

For windows larger than 30" x 30" with 46" x 60" being the Maximum size, add one fastener to each side for each additional eight (8) to twelve (12) inches in width and height.

To determine the plywood size, (use 3/4" thick plywood) measure the width and height of the outside (exposed) return fin (edge to edge).

Position plywood over the window. With plywood supported, drive one fastener through the plywood and window return fin near center of the window sill. Repeat this procedure for the other required sill fasteners. With covering attached at sill, continue driving fasteners around perimeter of the plywood using the above spacing formula.

After the storm has passed, reverse the above procedure to remove the covering. Store materials for future use.



## SET-UP PROCEDURES (Continued)

# KINRO

500 AIRPORT DR. MANSFIELD, TEXAS 76063 (817) 473-4421

Installation of Protective Covering  
as Required by H.U.D. for Zone II and III

The following pages illustrate the application of an exterior window protection in the event of storms (such as hurricanes) as required by HUD.

Please note: Installation of protective coverings (such as those listed below) will Negate Egress of the window. Homes with protective coverings (such as those listed below) can not be occupied while the coverings are in place.

Parts required: 1.  $\frac{3}{4}$ " plywood – enough for each window in the home.

2. #8 x  $1\frac{1}{4}$ " OR  $1\frac{1}{2}$ " wood screws  
(see below for quantity).

The installation steps apply to both the vertical and horizontal sides of windows. The size of the window will effect the number of fasteners needed.

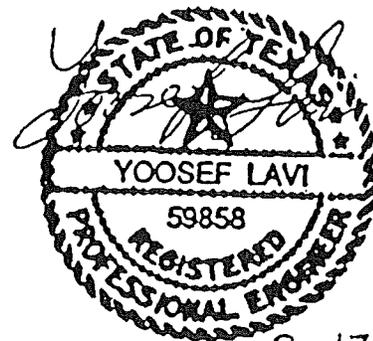
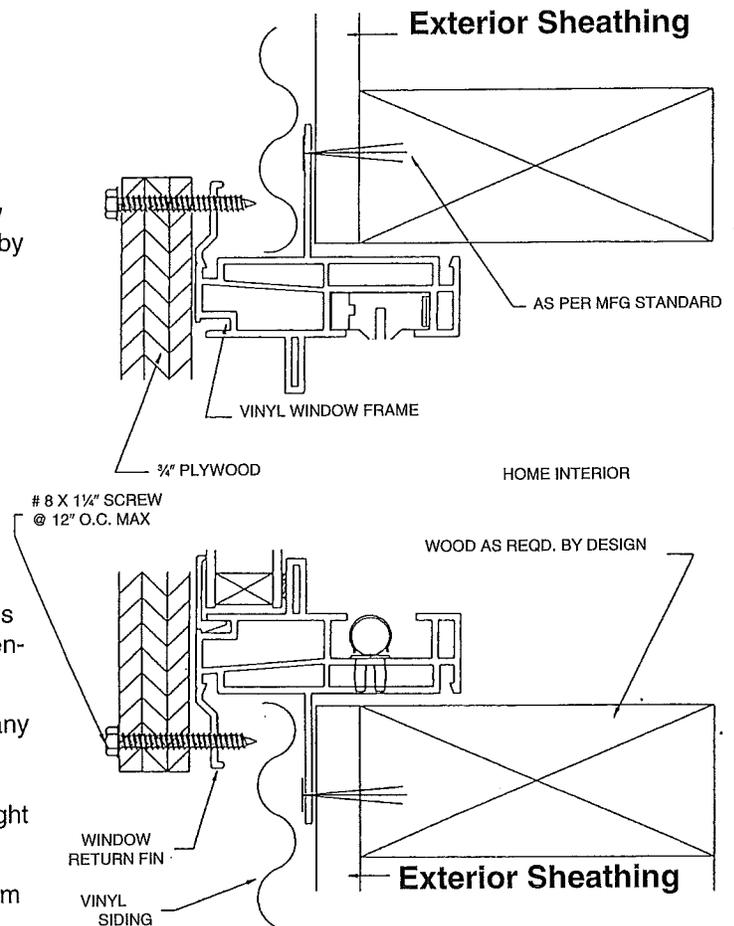
For windows with a face measurement of 30" wide x 30" high (or any smaller size), install 3 fasteners, spaced eight (8) to twelve (12) inches apart on the head and on the sill. Install for (4) fasteners, spaced eight (8) to twelve (12) inches apart on both the left and right frame sides

For windows larger than 30" x 30" with 46" x 60" being the Maximum size, add one fastener to each side for each additional eight (8) to twelve (12) inches in width and height.

To determine the plywood size, (use  $\frac{3}{4}$ " thick plywood) measure the width and height of the return fin (edge to edge).

Position plywood over the window. With plywood supported, drive one fastener through the plywood and window nailing fin near center of window sill. Repeat this procedure for the other required sill fasteners. with covering attached at sill, continue driving fasteners around perimeter of the plywood using the above spacing formula.

After the storm has passed, reverse the above procedure to remove the covering. Store materials for future use. Be sure to fill all holes left by the removal of the screws with a suitable silicone type sealant. Material should have a long life rating. This will prevent water and air from entering the home.



8-17-92

## PROTECTIVE WINDOW COVERINGS (Continued)

Protective coverings may also be installed over doors and sliding glass doors in a different manner than described previously. First, remove the mounting screws holding the door frame to the exterior wall. Then place the plywood (or wood frame) from Table 8 over the door opening and fasten the plywood and door frame back into the wall studs through the same holes in the door frame. Use #8 x 3" wood screws 12" o.c. for doors. Use #8 x 4" wood screws 6" o.c. for sliding glass doors. See Figure 8-6 for a typical application of this type of protective covering.

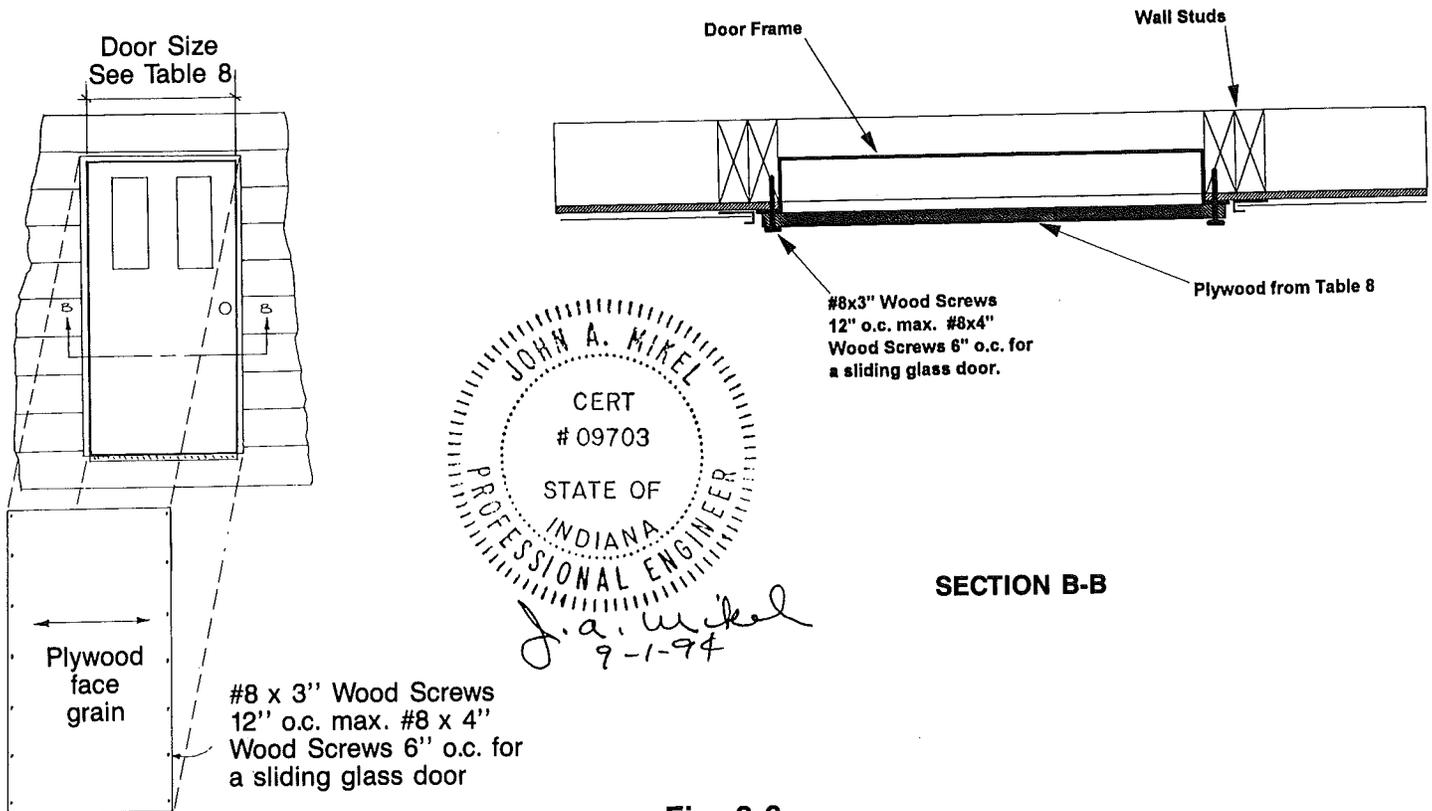


Fig. 8-6

Due to the limited time between when a storm warning is issued and when the storm could hit at your location, Skyline recommends that the items necessary for the protective coverings be purchased and prepared before a storm warning is issued. Cut plywood to size and mark it relative to window/door location. Store plywood and fasteners together in a dry place where it will be accessible. Once the protective coverings have been installed, the home should not be occupied.

## CHAPTER 9

# FINAL INSPECTION

Make a final inspection when home installation is complete to make sure that no items have been overlooked and that all work was done properly. Place special emphasis on the following "checklist" items:

**Water and Drain System.** All water and drain systems work properly and do not leak.

**Appliance Function and Operation.** All fixtures and appliances have been tested and work properly.

**Windows, Doors and Drawers.** All windows, doors and drawers work properly.

**Egress Windows.** One window in each bedroom is designated as a secondary exit to be used in case of emergency. Each exit window is labeled as such with operating instructions. All shipping hardware should be removed, and the window should operate as explained in the window manufacturer's instructions.

**Exterior Siding and Trim.** There are no gaps, voids, or missing fasteners, and all seams are sealed.

**Stack Heads and Vent Pipe Flashings on Roof.** All stack head or vent pipe flashings are properly attached and sealed.

**Composition Roof.** All shingles are properly attached, none are loose or missing, and all holes are filled.

**Skirting Ventilation.** The skirting around the home has non-closing vents, located at or near each corner as high as possible to cross-ventilate the entire space under the home. The free area of these vents must be equal to at least

one-square foot for every 150 square feet of floor area of the home. The vent size must be increased to allow for insect screens, slats, louvers, etc., used over the open vent area.

**Low-Hanging Trees and Bushes.** If there are any low-hanging trees or bushes near the home, trim or cut them. Think about the plants' possible movement during windy conditions or when covered by snow or ice.

**Exhaust Fan Operation and Air Flow.** Check all exhaust fans for proper operation and air flow.

**Bottomboard.** Carefully inspect the bottom covering of the home for loosening or tears from installation of pipes or wires. Seal openings around the floor perimeter, pipes or pipe hangers and splits or tears with weather-resistant tape.

**Anchors and Straps.** Be sure the correct number of anchors have been installed at the proper angle, and that all straps have been tightened.

**Interior Details.** Inspect for, and correct, all interior finishing details, such as loose moulding, carpet seams, etc. The retailers' representative should inspect the home with the homeowner, give the home owner a copy of the Homeowner's Manual, and brief the homeowner about maintaining the home.

# INSTALLATION INSPECTION CHECKLIST

TO ENSURE PROPER HOME INSTALLATION AND HOMEOWNER SATISFACTION, THE FOLLOWING ITEMS SHOULD BE CHECKED DURING OR PROMPTLY AFTER THE INSTALLATION AND BEFORE THE HOMEOWNER TAKES POSSESSION:

## INSTALLATION / PLACEMENT:

- Alignment/Close-Off DW
- Level
- Foundation
- Tie Downs

## UTILITY CONNECTIONS

- Fuel
- Water
- Electric
- Sewage
- Cross-Over Duct

## EXTERIOR

- Doors
- Windows
- Roof
- Siding/Trim

## INTERIOR

- Ceiling
- Trim
- Electrical Systems/Fixtures
- Cabinets
- Furniture
- Keys
- All Warranties
- Paneling
- Floor Covering/Drapes
- Doors
- Plumbing
- Appliances
- All Manuals

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