

# Penn State **Extension**

## Home Greenhouses and Cold Frames

Agricultural and Biological Engineering

[abe.psu.edu](http://abe.psu.edu)

### No. IP 822-34

This Idea Plan is intended to provide educational information and ideas concerning various methods for building gates, stiles, passages, and cattle guards for use with fences. The following attached drawings are based on historical plans and may not meet design and construction standards for your area:

Sash Greenhouse (USDA 5189)  
Greenhouse Cold Frame (USDA 5941)  
Portable Plastic Greenhouse (USDA 5946)  
Hotbed and Propagating Frame (USDA 5971)  
Greenhouse Framing for Plastic Covering (USDA 6029)  
Home Greenhouse 10' x 12' (USDA 6181)

If you decide to build a facility similar to any of these plans, be sure to check building requirements for your area. Your local building inspector, engineer, building supplier, or building contractor can help you determine what is a safe and legal facility for housing rabbits in your area. In addition to the rules and regulations covering design and construction of buildings, be sure to consider how you will handle the manure and potential nuisance problems for neighbors, including flies, odor, and noise.

The Department of Agricultural and Biological Engineering at Penn State has a variety of educational material available related to agricultural and biological engineering. This material is intended to help Pennsylvania farmers and others develop buildings and facilities for modern, environmentally-compatible farm facilities. The material can be used in conjunction with county extension staff, builders, suppliers, consulting engineers, the Natural Resources Conservation Service, financial management advisors, farm lenders, veterinarians, and others to assemble a facilities plan suitable for local conditions.

Publications are available in the areas of agricultural safety and health, animal housing systems, building and farmstead planning, crops and greenhouses, machinery systems and tractors, residential housing, soil and water resources, and solid waste management. Contact your county Penn State Extension Office for more information on these subjects. You can also obtain an index of publications concerning the above areas by calling, writing, faxing or e-mailing:

Department of Agricultural and Biological Engineering  
246 Agricultural Engineering Building  
University Park, PA, 16802-1909  
Telephone: 814-865-7685  
Fax: 814-863-1031  
Email: [agbioeng@psu.edu](mailto:agbioeng@psu.edu)

For more information, the following comprehensive handbook covering design and construction of larger greenhouses suitable for commercial use is available:

NRAES-33-Greenhouse Engineering (1989) \$30.00 212 pages (Contact NRAES below for further information)

NRAES, Cooperative Extension  
PO Box 4557  
Ithaca, NY 14852-4557  
Telephone: (607)255-7654 Fax: (607)254-8770  
Email: [NRAES@cornell.edu](mailto:NRAES@cornell.edu)

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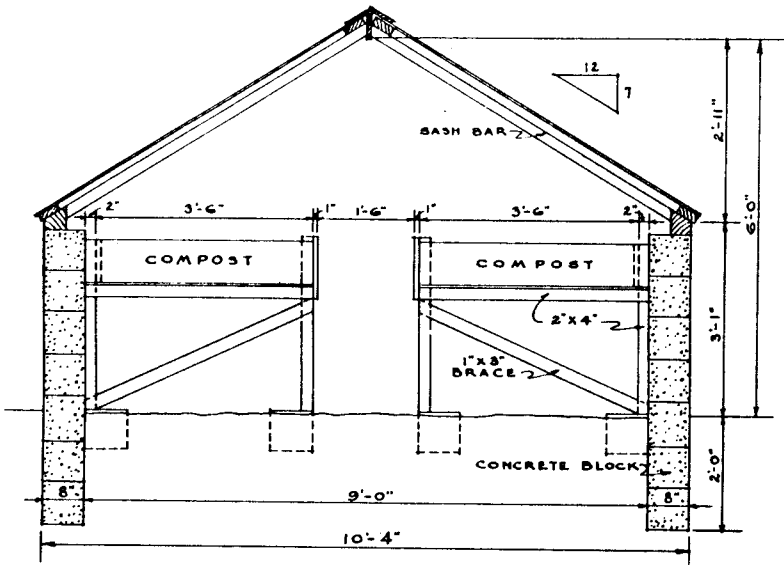
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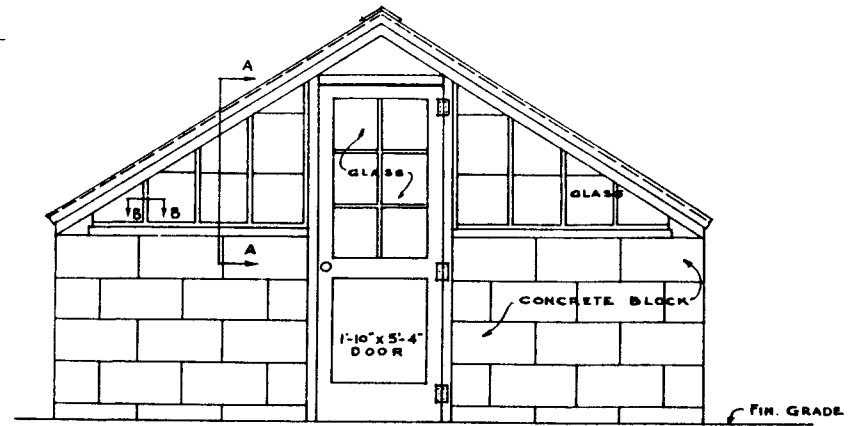
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This publication is available in alternative media on request.

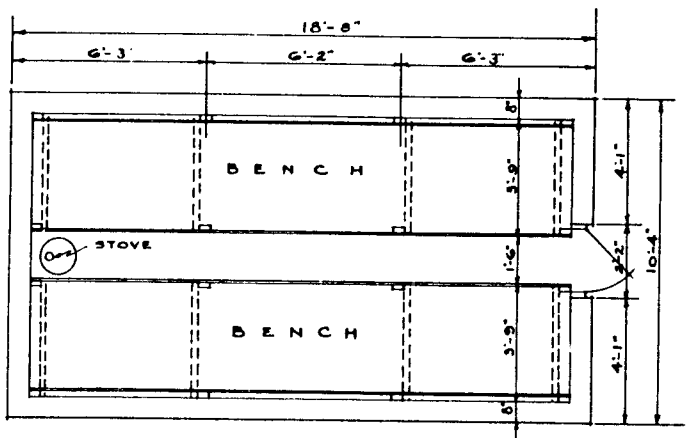
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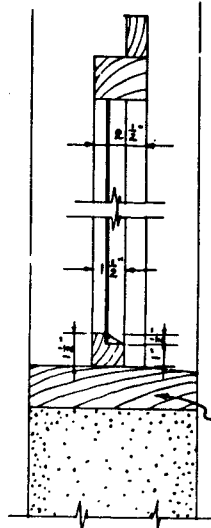
END SECTION



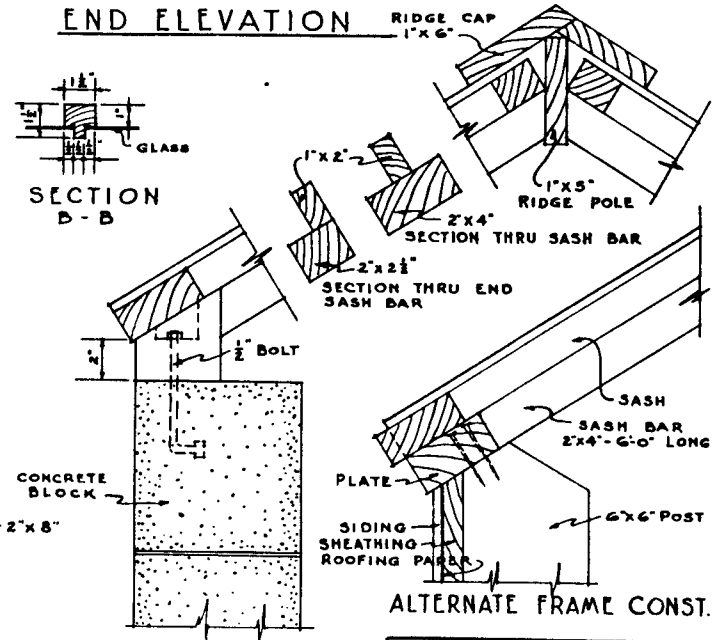
END ELEVATION



PLAN  
SHOWING ARRANGMENT OF BENCHES



SECTION A-A



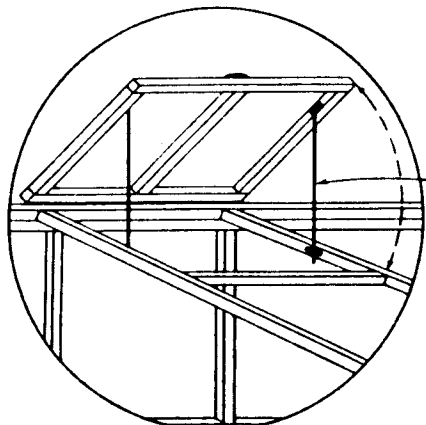
DETAILS OF  
EAVE & RIDGE  
CONSTRUCTION

ALTERNATE FRAME CONST.

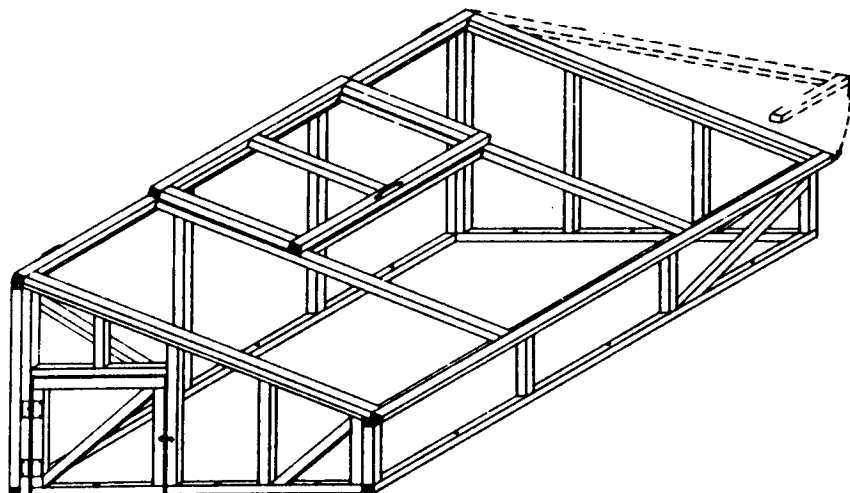
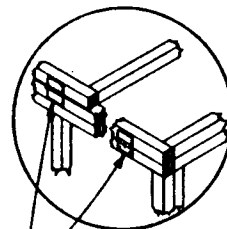
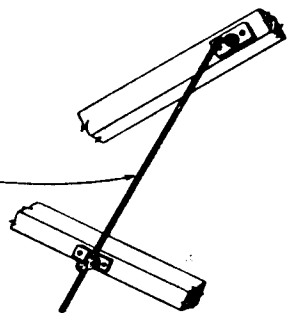
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SASH GREENHOUSE

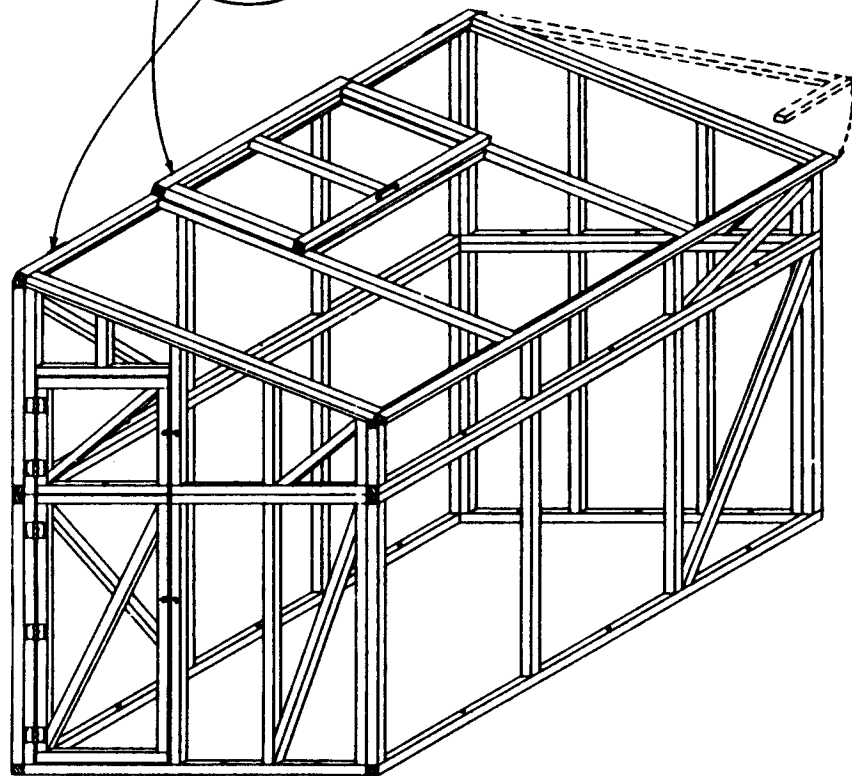
N. J. '35 EX 922-5188 SHEET 1 OF 1



VENT OPEN

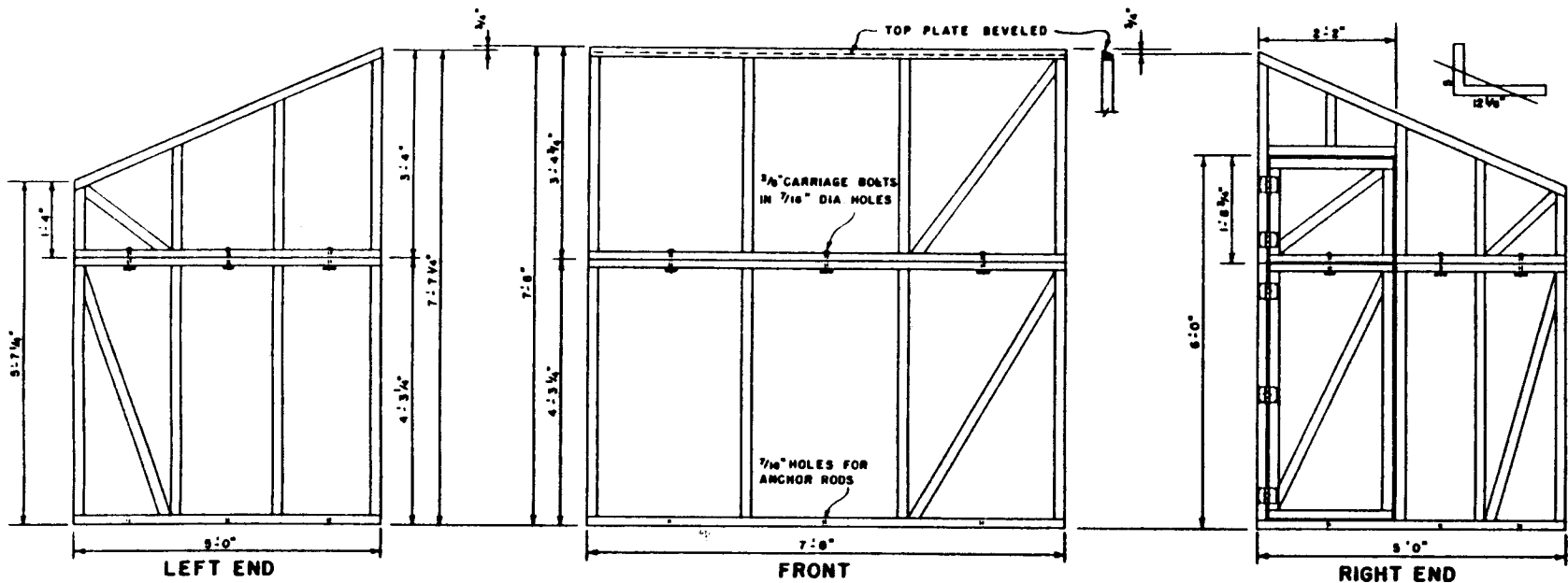


COLDFRAME UNIT



GREENHOUSE ASSEMBLY

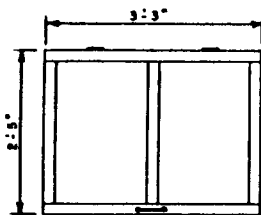
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 PLASTIC COVERED  
**GREENHOUSE COLDFRAME**  
 ORE 62 EX 5941 SHEET 1 OF 2  
 ORDER NO 822 5941



LEFT END

FRONT

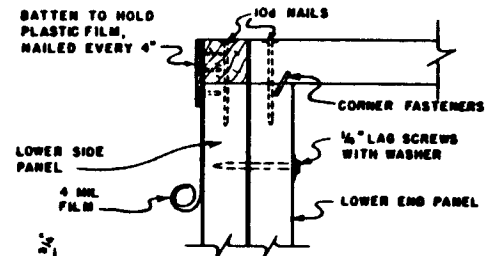
RIGHT END



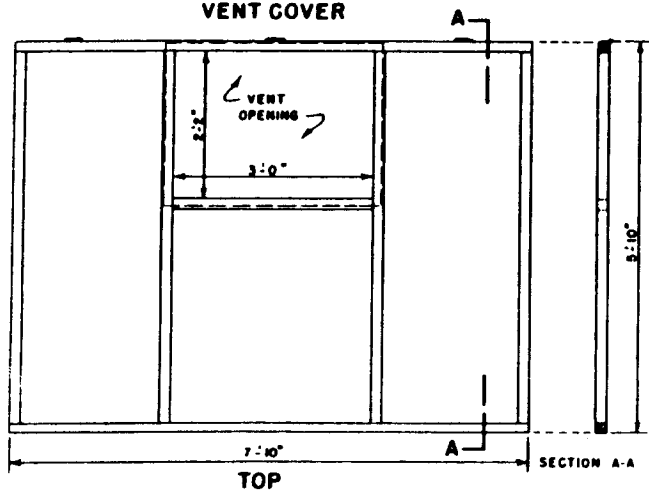
VENT COVER

**PANEL FRAMING DETAILS**

ALL FRAMING MEMBERS ARE 2" x 2", TREATED WITH PRESERVATIVE AFTER CUTTING.  
 CHECK ALL DIMENSIONS ON THE JOB.  
 ANCHOR TO GROUND WITH 3/8" x 18" STEEL RODS WITH TOP 2" BENT 90°  
 3 PAIR 3" x 3" LOOSE-PIN BUTT HINGES ARE REQ'D.

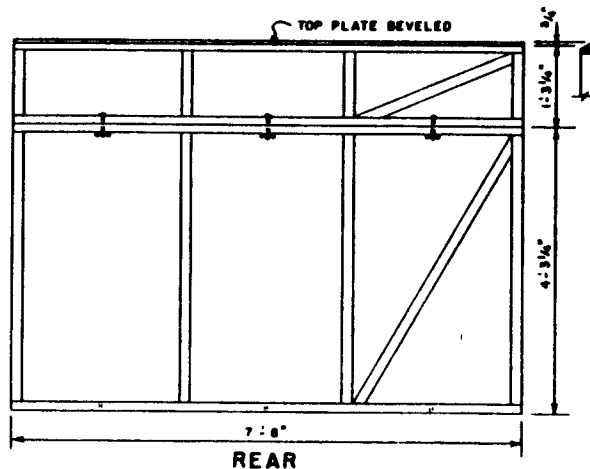


FASTENING DETAIL



TOP

SECTION A-A



REAR

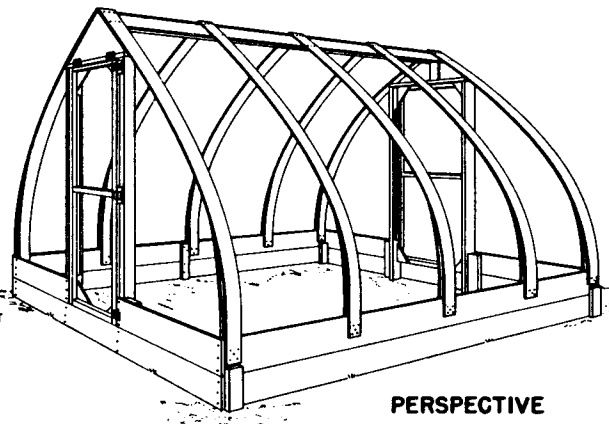
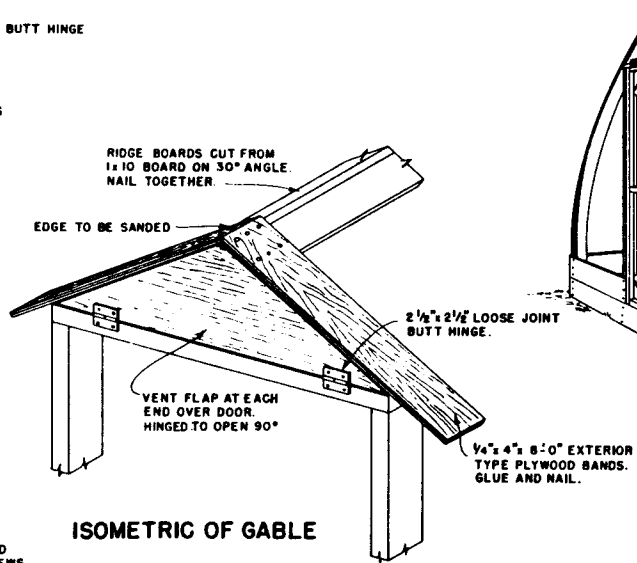
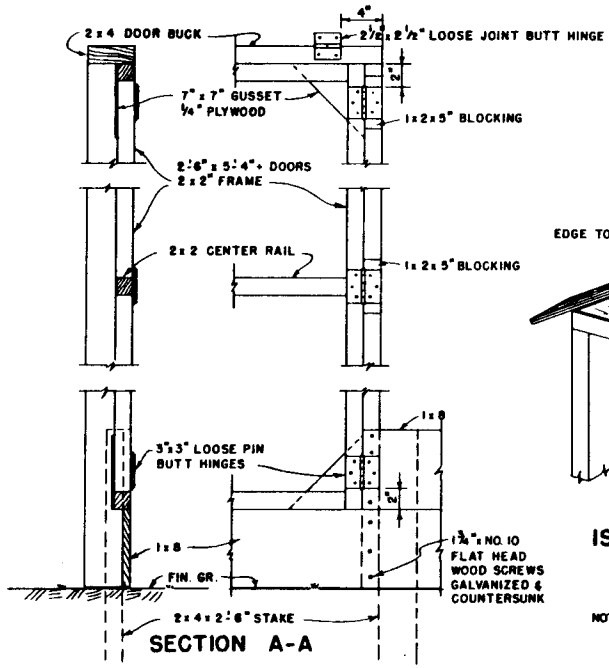
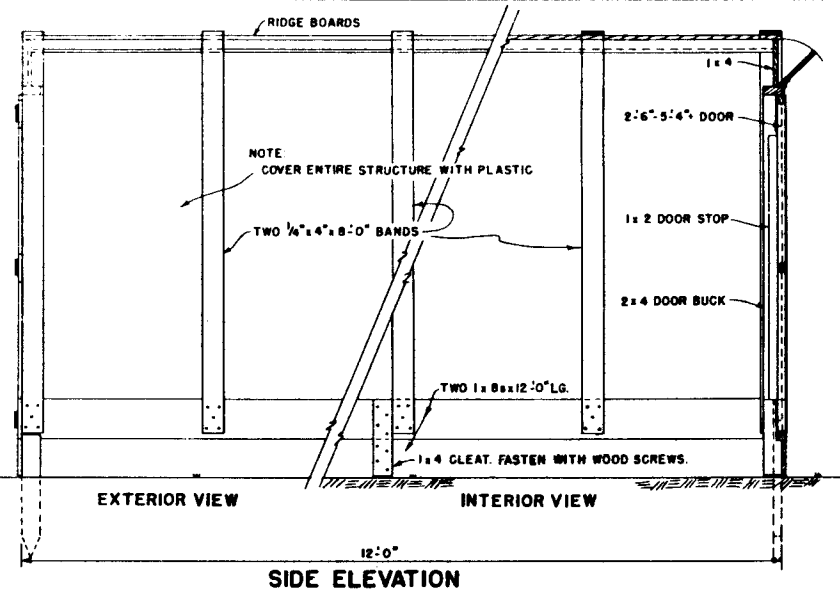
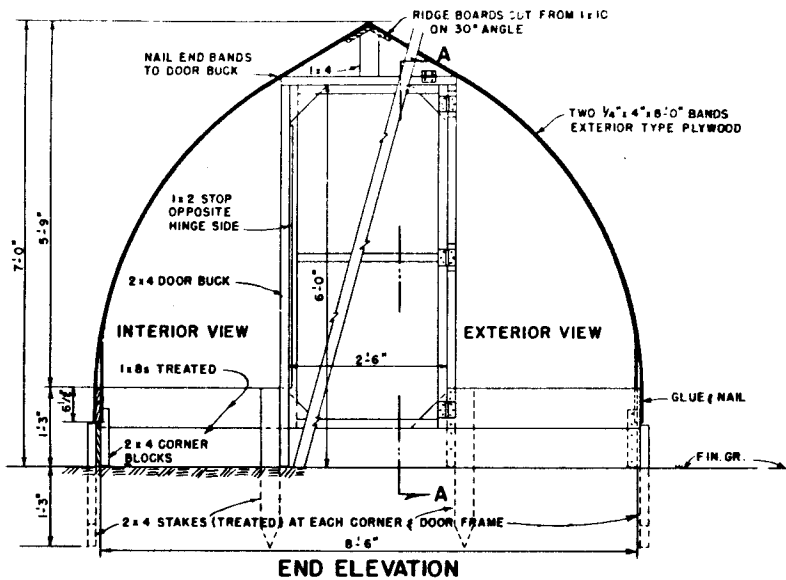
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PLASTIC COVERED  
**GREENHOUSE - COLDFRAME**

ORE '62 EX 5941 SHEET 2 OF

ORDER NO 822 -5941



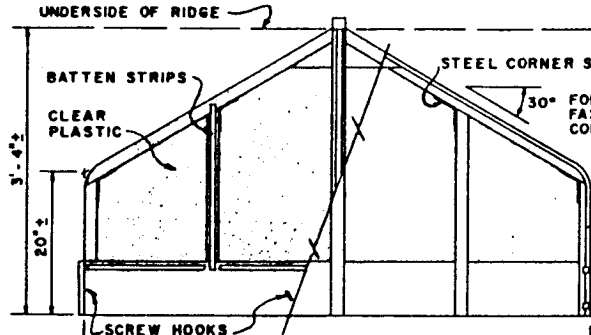
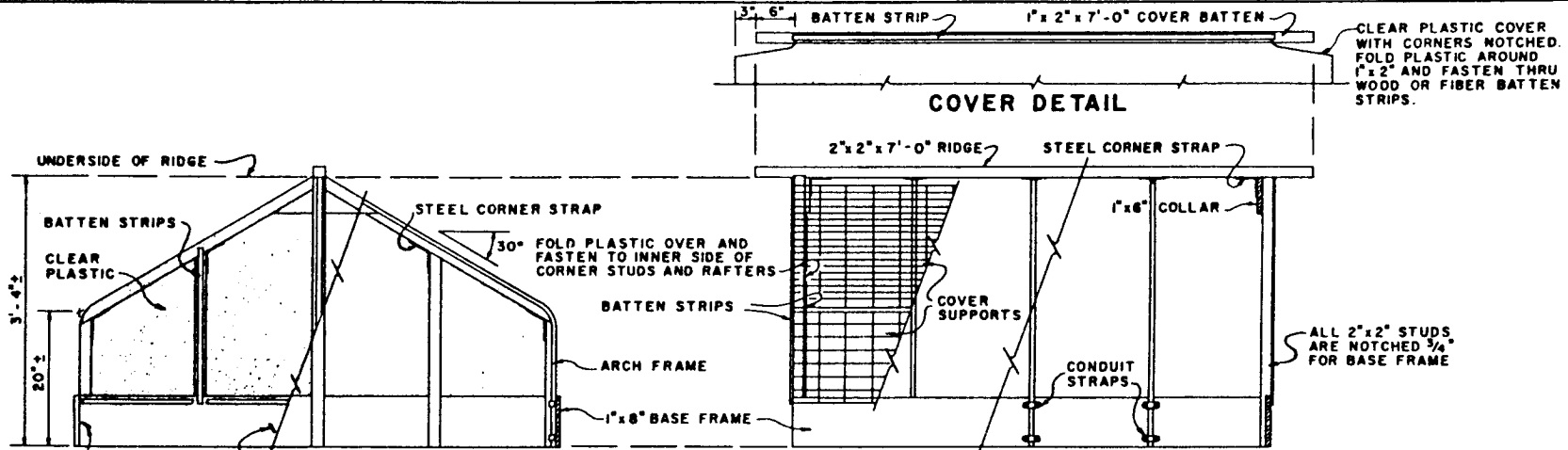
NOTE: COVER DOOR WITH PLASTIC. FASTEN ENTIRE STRUCTURE TOGETHER WITH WOOD SCREWS UNLESS OTHERWISE NOTED. ALL SCREWS TO BE GALVANIZED

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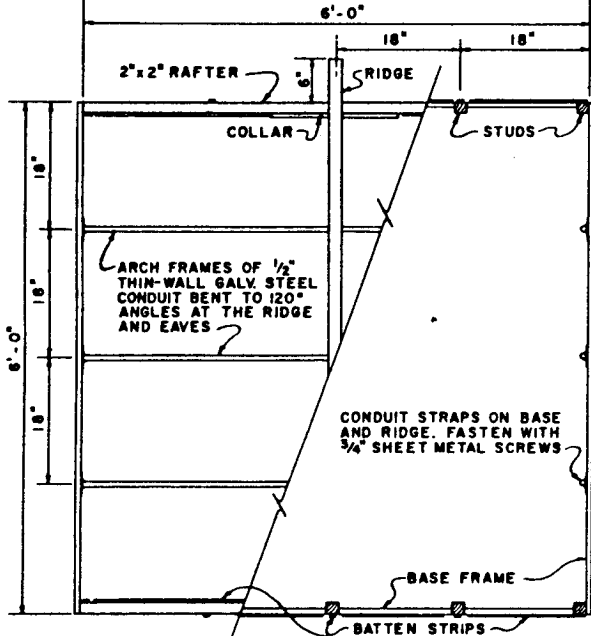
**PORTABLE PLASTIC GREENHOUSE**

USDA '63 EX. 5946 SHEET 1 OF 1

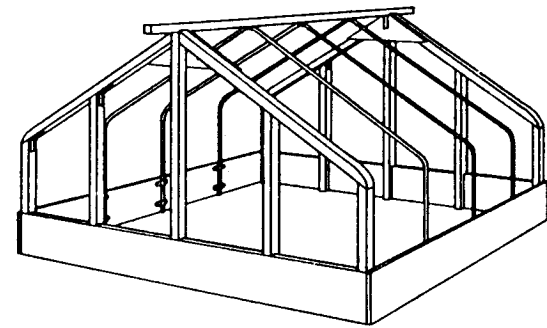
ORDER NO. 822 - 5946



**END VIEW  
CUT AWAY**



**TOP VIEW  
CUT AWAY TO SHOW CONSTRUCTION**



**PERSPECTIVE VIEW  
FRAMING ONLY**

**MATERIAL LIST**

ITEM	QUANTITY	SIZE
BASE FRAME	4 PCS	1 1/2" x 8" - 6'-0" LONG
COLLARS	1	1" x 6" - 2'-8"
RIDGE	1	2" x 2" - 7'-0"
RAFTERS	4	3'-6"
STUDS (CENTER)	2	3'-4"
(OTHER)	4	4'-0"
COVER BATTENS	4	1" x 2" - 7'-0"
ARCH FRAMES	3	1/2" DIA. 10'-0"
CONDUIT STRAPS	15	1/2"
CORNER STRAPS	10	1/8" x 1" x 6"
PLASTIC (ENDS)	2	3'-0" x 6'-6"
(COVERS)	2	6'-0" x 7'-6"
COVER SUPPORTS	2	3'-0" x 6'-0"
	2	1'-4" x 6'-0"
BATTEN STRIPS		62'-0"
SCREW HOOKS	8	
FASTENINGS	SEE NOTES	
SOIL HEATING CABLE	1	360 W. - 120'-0"

DUE TO POSSIBLE VARIATIONS IN ANGLES WHEN THE CONDUIT IS BENT FOR ARCH FRAMES, CHECK THE HEIGHTS SHOWN USING AN ARCH FRAME AS A TEMPLATE.

ALL WOOD SHOULD BE TREATED WITH PRESERVATIVE AFTER CUTTING AND BEFORE ASSEMBLY.

METAL PARTS AND FASTENINGS TO BE GALVANIZED OR OTHERWISE RESISTANT TO CORROSION.

METAL PARTS TO BE FASTENED WITH SCREWS.

WOOD PARTS MAY BE FASTENED WITH SCREWS OR WITH NAILS, CLINCHED WHERE POSSIBLE.

PLASTIC MAY BE FASTENED THRU THE BATTEN STRIPS WITH NAILS, SCREWS OR STAPLES.

SIDE AND TOP COVER SUPPORTS ARE 2 x 4 INCH WELDED WIRE MESH, HOOKED TOGETHER IN PAIRS AND HINGED LOOSELY TO THE RIDGE WITH STRONG CORD.

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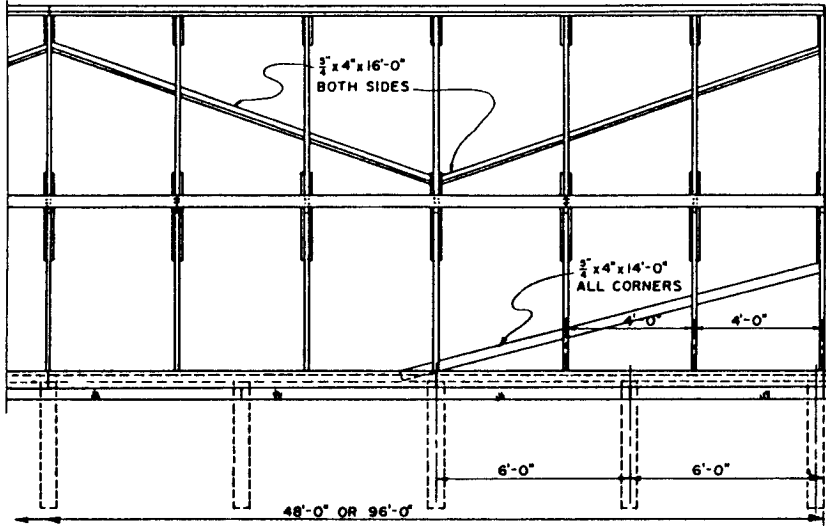
THE PENNSYLVANIA STATE UNIVERSITY

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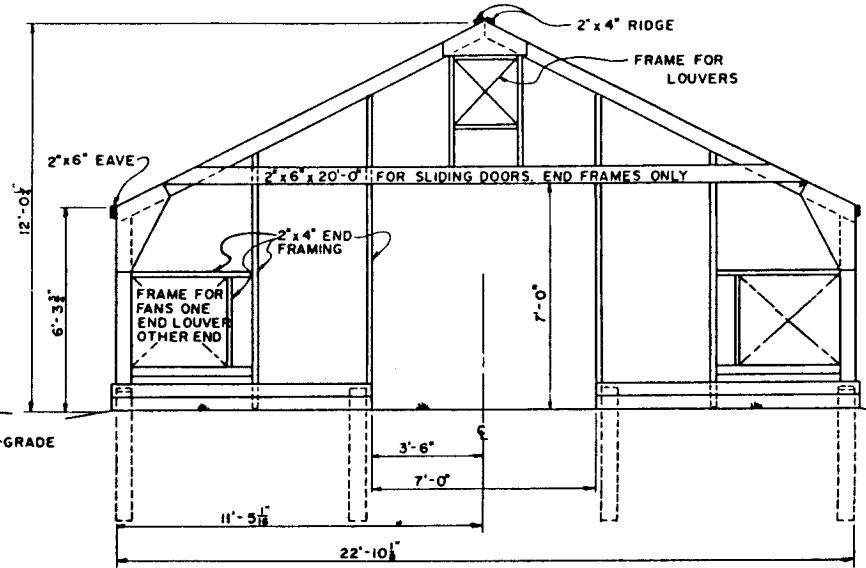
**HOTBED & PROPAGATING FRAME**

USDA '64 EX. 5971 SHEET 1 OF 1

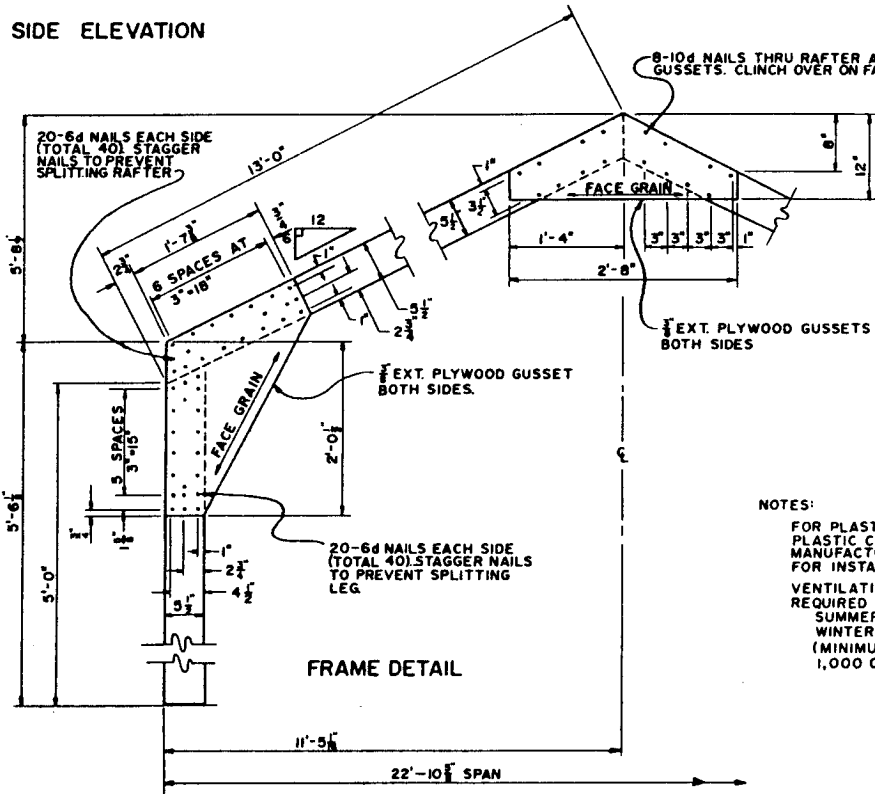
ORDER NO. 822 - 5971



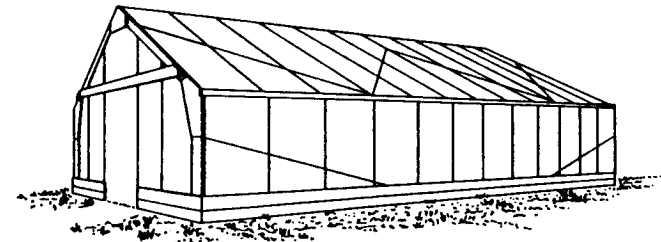
SIDE ELEVATION



END ELEVATION



FRAME DETAIL



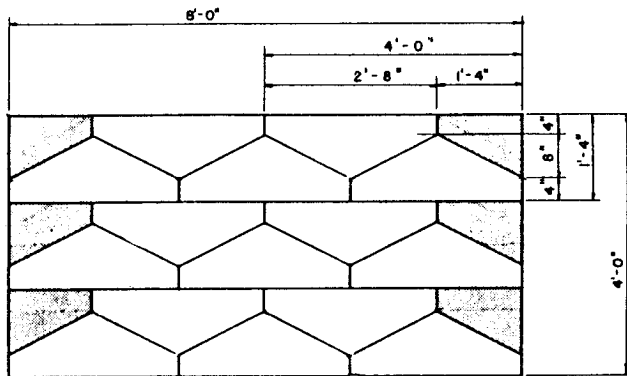
PERSPECTIVE

NOTES:  
 FOR PLASTIC FILM AND RIGID PLASTIC COVERING FOLLOW MANUFACTURER'S DIRECTIONS FOR INSTALLATION.  
 VENTILATION AND HEATING REQUIRED FOR 23' x 48' HOUSE:  
 SUMMER VENTILATION - 10,000 CFM  
 WINTER VENTILATION - 660 CFM  
 (MINIMUM AIR INTAKE - ONE SQ. FT. PER 1,000 CFM)

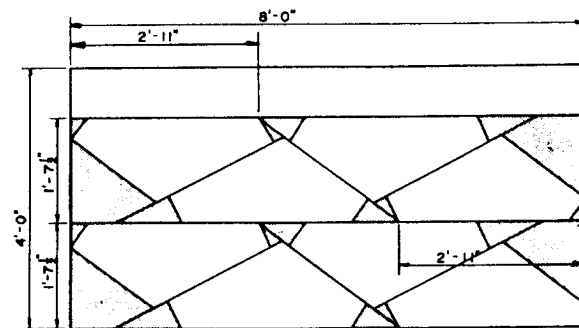
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GREENHOUSE FRAMING		
N.J. - '67	EX. 6029	SHEET 1 OF 2
ORDER NO. 822-6029		

NOTE: BASED ON N.J. PLAN NO 139



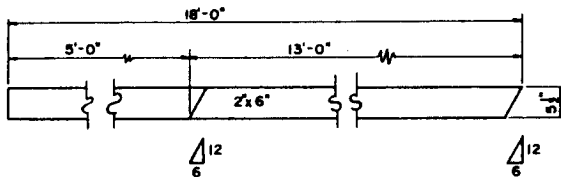


CROWN GUSSET CUTTING DIAGRAM

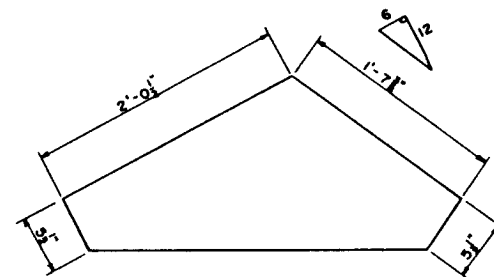


$\frac{3}{8}$  EXTERIOR-TYPE PLYWOOD, GRADE C-C

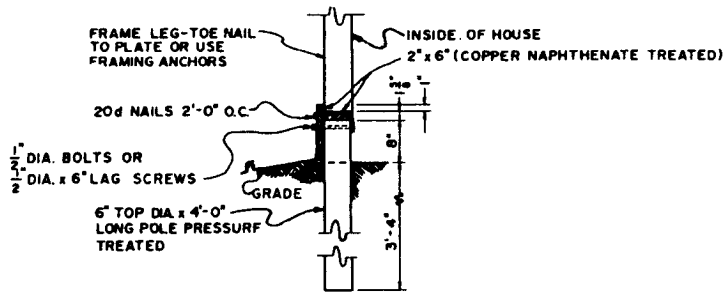
EAVE GUSSET CUTTING DIAGRAM



LEG AND RAFTER DETAIL



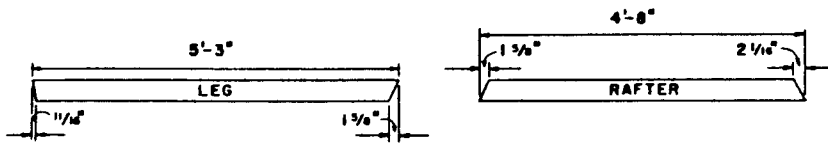
EAVE GUSSET TEMPLATE



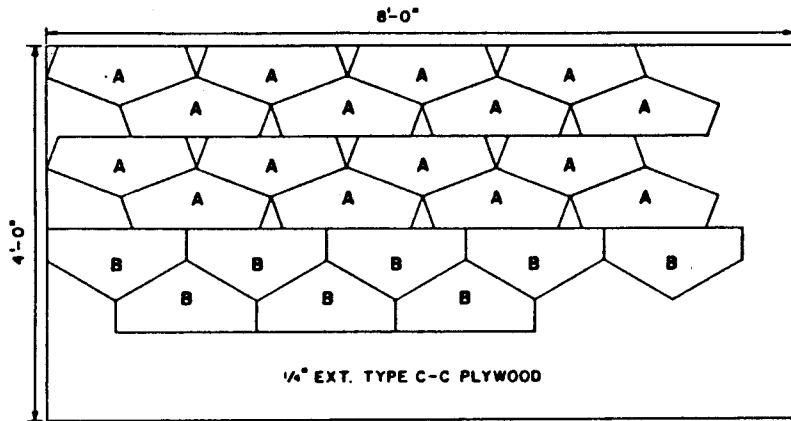
POLE FOUNDATION

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GREENHOUSE FRAMING		
N. J. - '67	EX. 6029	SHEET 2 OF 2
822-6029		





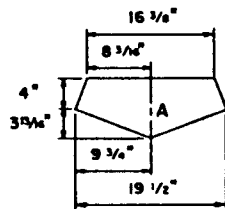
FRAME CUTTING LAYOUT (CUT FROM (8) 2x4x10')



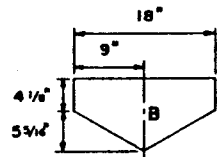
PLYWOOD SHEET CUTTING DIAGRAM

### BILL OF MATERIALS

- CORRUGATED FIBERGLASS REINFORCED PANELS (F.R.P.) \*  
5 OZ. COATING:
- ROOF PANELS (6) 2x10' CUT IN HALF  
SIDE PANELS (5) 2x12', 2 SHEETS EACH SIDE  
5 TH SHEET CUT LENGTHWISE  
END PANELS (9) 2x8' OF WHICH 5 ARE LOCATED  
AT END WITH NO DOOR  
RIDGE ROLL (1) 12' LENGTH
- LUMBER:
- (8) 2x4x10' TO MAKE FRAMES  
(2) 2x4x10' SILL AT ENDS (P.T. COPPER NAPHTHENATE)  
(2) 2x4x12' SILL AT SIDES (P.T. COPPER NAPHTHENATE)  
(2) 2x4x16' END FRAMING  
BENCH SUPPORTS NOT INCLUDED  
(8) 3/4x4x12' FOR PURLINS & DOOR  
(2) 4x4x16' P.T. POST FOR FOOTINGS  
(2) 1x12x12' & (2) 1x12x10' REDWOOD BOARDS  
(1) 4x8x1/4" EXTERIOR TYPE CC PLYWOOD SHEET FOR  
PLYWOOD GUSSETS. SEE CUTTING DIAGRAM.
- \* CHECK WITH FIBERGLASS SUPPLIER FOR NECESSARY  
RELATED HARDWARE & COVERING INSTRUCTIONS.  
NAILS, HINGES & LATCH.

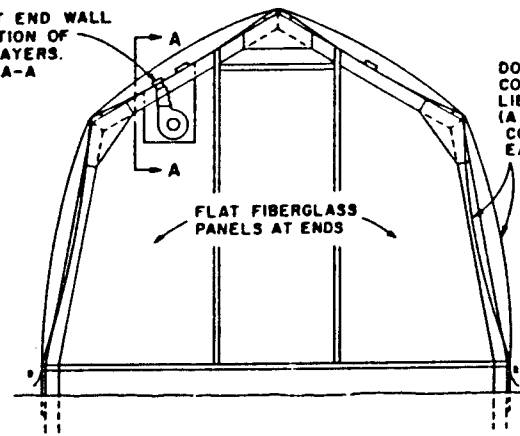


SIDE GUSSETS  
16 REQ'D

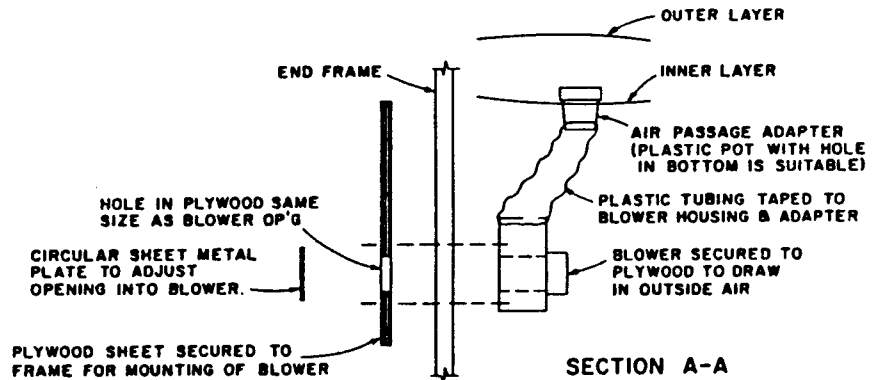


HEAD GUSSETS  
8 REQ'D

BLOWER AT END WALL  
FOR INFLATION OF  
PLASTIC LAYERS.  
SEE SECT. A-A



ALTERNATE CROSS SECTION



SECTION A-A

### ENVIRONMENTAL CONTROL

- HEATING:  
TO MAINTAIN A TEMPERATURE DIFFERENCE OF 60°  
BETWEEN INSIDE & OUTSIDE  
30,000 BTU/HR. SINGLE COVERING  
20,000 BTU/HR. DOUBLE COVERING  
CONNECTION TO HOME HEATING SYSTEM IS MOST  
DESIRABLE. IF NOT POSSIBLE, USE GAS OR OIL  
HEATER VENTED TO THE OUTSIDE. ELECTRIC  
HEATERS ARE EASY TO INSTALL, CLEAN, BUT  
EXPENSIVE TO OPERATE. WHEN USING OIL OR  
GAS, BE SURE TO PROVIDE A FRESH AIR SUPPLY  
DIRECTLY TO THE HEATER TO SUPPLY OXYGEN  
FOR COMBUSTION.
- VENTILATING:  
REQUIRE A TWO SPEED FAN RATED AT 1000 CFM.  
AN AUTOMATIC AIR INLET OF 2 SQ. FT. IS  
REQUIRED. THE FAN CAN BE MOUNTED IN ONE  
GABLE END AND AIR INLET IN THE OTHER. BOTH  
SHOULD BE CONTROLLED BY A THERMOSTAT  
FOR MORE INFORMATION SEE USDA BULLETIN  
NUMBER 357 "BUILDING HOBBY GREENHOUSES."

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HOME GREENHOUSE		
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