



# Ministry of Defence

Army Equipment Support Publication

## OPERATING INFORMATION

**SHELTER, GENERAL PURPOSE  
7.3 M x 5.5 M (24 FT x 18 FT) MK 4  
NSN 8340-99-891-0224/8340-99-421-2154**

8340-C-114-101

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**PREFACE**

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**INTRODUCTION**

1. Service users should forward any comments on this publication through the channels prescribed in AESP 0100-P-011-013. An AESP Form 10 is provided at the end of the preliminary pages; it should be photocopied and used for forwarding comments on this AESP.
2. AESPs are issued under Defence Council authority and where AESPs specify action to be taken, the AESP will of itself be sufficient authority for such action and also for the demanding of the necessary stores, subject to the provisions of Para 3 below.
3. The subject matter of this publication may be affected by Defence Instruction Notices (DINs), Standard Operating Procedures (SOPs) or by local regulations. When any such Instruction, Order or Regulation contradicts any portion of this publication it is to be taken as the overriding authority.

**RELATED AND ASSOCIATED PUBLICATIONS****Related publications**

4. The octad for the subject equipment consists of all the categories shown in Table 1. All references are prefixed with the first eight digits of this publication. The availability of the publications can be checked by reference to the relevant Group Index in AESP 0100-A-001-013.

Category/Sub-Category		Information Level				
		1 User/Operator	2 Unit Maintenance	3 Field Maintenance	4 Base Maintenance	
1	0	Purpose and Planning Information	101	101	101	101
	1	Equipment Support Policy Directives	*	*	*	*
2	0	Operating Information	*	*	*	*
	1	Aide Memoire	201	*	*	*
	2	Training Aids	*	*	*	*
3		Technical Description	*	*	*	*
4	1	Installation Instructions	*	*	*	*
	2	Preparation for Special Environments	*	*	*	*
5	1	Failure Diagnosis	*	*	*	*
	2	Repair Instructions	201	*	201	*
	3	Inspection Standards	201	*	*	*
	4	Calibration Procedures	*	*	*	*
6		Maintenance Schedules	201	*	*	*
7	1	Illustrated Parts Catalogues	711	711	711	711
	2	Commercial Parts Lists	*	*	*	*
	3	Complete Equipment Schedule, Production	*	*	*	*
	4	Complete Equipment Schedule, Service Edition (Simple Equipment)	741	741	741	741
	5	Complete Equipment Schedule, Service Edition (Complex Equipment)	*	*	*	*
8	1	Modification Instructions	*	*	*	*
	2	General Instructions, Special Technical Instructions and Servicing Instructions	*	*	*	*
	3	Service Engineered Modification Instructions (RAF only)	*	*	*	*

\* Category/Sub-category not published.

**Table 1: Related Publications**



**Associated publications**

5. There are no associated publications applicable to this equipment.

**ABBREVIATIONS**

6. The following abbreviations are used in this AESP.

<u>Abbreviation</u>	<u>Nomenclature</u>
AESP	Army Equipment Support Publication
AFG	Army Form General
CES	Complete Equipment Schedule
DIN	Defence Instruction Notices
Fig	Figure
ft.	feet (foot)
ft <sup>3</sup>	feet cubed
in.	inch
IPC	Illustrated Parts Catalogue
kg	kilogram
lb	pound
m	metre
m <sup>2</sup>	metres squared
m <sup>3</sup>	metres cubed
mm	millimetres
NATO	North Atlantic Treaty Organisation
NI	Not Illustrated
NIV	Not in Vocabulary
NSCM	NATO Supply Code for Manufacturers
NSN	NATO Stock Number
Para	Paragraph
PPE	Personal Protective Equipment
RLC	Royal Logistics Corp
SOP	Standard Operating Procedures
TSP	Training Support Plan

**WARNINGS AND CAUTIONS****HAZARDOUS SUBSTANCES**

7. Before using any hazardous substances or material, the user must be conversant with the safety precautions and first aid instructions:
- 7.1. On the label of the container it was supplied in.
  - 7.2. On the material Safety Data Sheet.
  - 7.3. In local Safety Orders and Regulations.

**WARNINGS**

- (1) **PERSONNEL INJURY/EQUIPMENT DAMAGE. SUFFICIENT PERSONNEL ARE REQUIRED WHEN LIFTING THE ASSEMBLED ROOF, THE MINIMUM IS ONE PERSON PER LEG.**
- (2) **PERSONNEL INJURY/CRUSH HAZARD. EXERCISE CAUTION WHEN ASSEMBLING POLES AND BRACKETS DUE TO THE RISK OF CRUSH INJURY TO FINGERS.**
- (3) **PERSONNEL INJURY. WHEN POLES ARE CURVED UNDER TENSION THERE IS A HIGH RISK THAT THEY MAY SLIP AND SPRING BACK TO THEIR STRAIGHT RELAXED POSITION. PERSONNEL SHOULD NOT POSITION THEMSELVES DIRECTLY IN FRONT OF THE POLES.**
- (4) **PERSONNEL INJURY/HEAVY WEIGHT. MINIMUM PERSONNEL NUMBERS REQUIRED TO LIFT OR MOVE THE SHELTER SHOULD BE OBSERVED.**
- (5) **PERSONNEL INJURY/BURN HAZARD. WHEN BURNING WEBBING TO PREVENT FRAYING, THE WEBBING WILL BECOME EXTREMELY HOT AND MELT.**
- (6) **PERSONNEL INJURY, WHEN FITTING OR RELEASING THE INSULATION TENSIONERS THERE IS A HIGH RISK THAT UNDER TENSION THEY MAY SLIP AND SPRING BACK AT PERSONNEL.**
- (7) **IT IS ESSENTIAL THAT THE BASE RESTRAINT STRAPS AND THE FRAME RESTRAINT STRAPS ARE FITTED TO THE FRAME BEFORE INSTALLING THE PVC COVERS. THIS ENSURES THAT THE FRAME IS RIDGID AND ENHANCES THE WIND RESISTANCE OF THE SHELTER AS WELL AS MAKING IT EASIER TO FIT THE COVERS.**
- (8) **WHEN REPAIRING PVC COVERS, THE TEXTILE NEEDS TO BE ABRAIDED. PVC DUST IS TOXIC AND SHOULD NOT BE INHALED. WEAR THE APPROPRIATE PPE.**
- (9) **WHEN REPAIRING PVC COVERS, A CONTACT ADHESIVE IS UTILISED. FOLLOW SAFETY DATA SHEET SUPPLIED WITH THE CONTACT ADHESIVE.**

**CAUTIONS**

- (1) **EQUIPMENT DAMAGE.** The shelter is to be pitched on firm level ground and it is essential that adequate anchorage or ballast be placed on the coated fabric sod cloths at the bottom of the wall and ends of the shelter. The listed tent pins or spoil from drainage trenches is suitable for this purpose and may be used in sandbags or other flexible containers, if available. Guy lines are also provided to give additional stability under high wind conditions.
- (2) **EQUIPMENT DAMAGE.** Wet textile should never be folded or packed unless circumstances render this unavoidable. Shelters should therefore be left to dry thoroughly before they are struck. If the shelter is not completely dry the officer in charge of the campsite or receiving unit is to be informed.
- (3) **EQUIPMENT DAMAGE.** All insulation panels can be added after the shelter has been erected **EXCEPT** the roof panel that must be attached to the frame prior to the covers.
- (4) **EQUIPMENT DAMAGE.** When lifting the roof, the supervisor must ensure that the lift is even along the length of the frame, thus avoiding distortion of the brackets and poles.
- (5) **EQUIPMENT DAMAGE.** The sunshade when fitted is to be erected prior to the shelter if possible or alternatively moved into position over the tent after assembly with the base restraint straps being added after it is in its final position. The ratchet straps should not be over tightened and never used if damaged.
- (6) **EQUIPMENT DAMAGE.** The shelter is to be erected on firm level ground, which has been cleared of any large stones or rubble.
- (7) **EQUIPMENT DAMAGE.** A power washer may be used at low pressure with warm water. Use judgement and caution regarding water pressure and temperature.
- (8) **EQUIPMENT DAMAGE.** Do not use solvents or detergents to clean the shelter as they will dissolve the protective coating on the fabric.
- (9) **EQUIPMENT DAMAGE.** Rips and tears must be repaired immediately to maintain the insulation integrity.
- (10) **EQUIPMENT DAMAGE.** The PVC covers are different from the cotton canvas covers in that they do not stretch. Fitting the end gables requires the frame to be in the correct position to fit the PVC cover spigots over the frame extensions using the appropriate straps. Do not under any circumstances force the canvas into position or use frame parts to level the canvas into position.

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OPERATING INFORMATION

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DESCRIPTION



**Figure 1: Shelter, general purpose 7.3 m x 5.5 m (24 ft. x 18 ft.) Mk 4**

1. This AESP provides operation and maintenance information for SHELTER, GENERAL PURPOSE 7.3 M X 5.5 M (24 FT X 18 FT) MK 4. The shelter is available in two variants: -
  - 1.1. NATO Stock no 8340-99-891-0224 for the basic shelter
  - 1.2. NATO Stock no 8340-99-421-2154 for the shelter including insulation
2. When installing installation read Chapter 2 in combination with Chapter 1. In summary the roof insulation is applied before the main PVC cover. The wall insulation is installed after the full tent erection.
3. The MK 4 version utilises flame resistant PVC coated polyethylene in place of cotton canvas. All PVC parts are interchangeable with cotton canvas parts by attachment using Dutch lacing. The MK 4 PVC tent also has the option of quick connection using keder rails.
4. The shelter (Fig 1) consists of a metal frame supporting a PVC textile cover. The frame is constructed of light alloy tubular members that are connected by brackets.
5. The frame is built from five different tubular components.
  - 5.1. Aluminium members 1.8 m long Outside Diameter (51 mm).
  - 5.2. Aluminium members 0.9 m long Outside Diameter (51 mm).
  - 5.3. 4-way cast light alloy brackets for connecting the members at the eaves and ridge.
  - 5.4. 4-way cross-shaped, light alloy brackets for connecting the long members and the short members to the purlins.
  - 5.5. T-brackets for connecting the members at ground level to the wall members.

The fabric from which the cover is made is a Polymer of polyethylene coated on both sides with PVC and is 700g/m<sup>2</sup>, this has replaced the woven cotton covered polyester core yarn. The PVC material is waterproof and does not require water resistance treatments through life. For the avoidance of doubt the two materials will be referred to in the AESP as "PVC Covers" and "cotton canvas".

6. The cover is made up of two separate roof sections and two end panels. There are two methods of connecting the panels together. Firstly, the traditional Dutch lacing, this enables the new PVC covers and old cotton canvas panels to be connected together or roof sections to be pre-connected prior to deployment. Secondly there is a fast erect keder rail system when connecting two PVC covers together. The two end sections each have a personnel entrance fitted with slide fasteners, toggles and loops, which can be also rolled up and secured with toggles and loops.

7. Two windows are incorporated into each sidewall section. The apertures are fitted with mosquito netting, uncoloured plastic sheeting and a PVC textile flap. The plastic sheeting and/or the PVC textile flap can be fastened in either the open or closed positions, whereas the mosquito netting is stitched closed at all times.

8. The sidewall has a snood incorporated into it to allow electric cables and environmental control ducts to enter the interior. This snood can then be secured around the cable/hose or closed off to ensure a closed environment within the shelter.

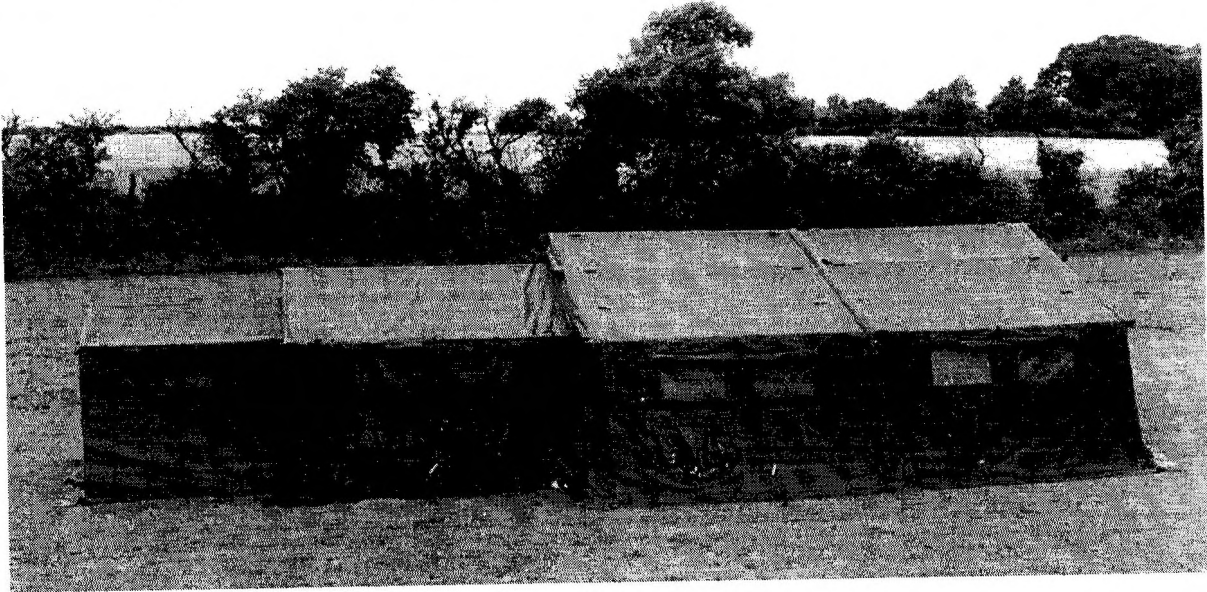
The sod cloth is made from Polymer of polyethylene coated on both sides with PVC and is 900g/m<sup>2</sup> that ensures ample strength and rot resistance.

9. The shelter is designed to be extendable in length by multiples of 3.6 m (12 ft.) by using additional frame roof and wall components. The shelter can be attached to a porch, 12 ft. passageway, 4-way connector or directly to a 3.6 m x 3.6 m (12 ft. x 12 ft.) shelter by means of the alternative dual attachment end section.



## DEPLOYMENT

11. It is possible to link many of the GS types of shelters together, and to extend in length by 12 ft. increments, the 12-ft. x 12 ft. and 18 ft. x 24 ft. shelters to make composite arrangements such as headquarters layouts, cooking/dining rooms, field hospitals and other specific to requirement temporary shelter facilities. It is also possible to link shelters together Fig 2.



**Figure 2: 24 x 18 Connected to 12 x 12 and Passageway**

12. The PVC canvas panels are designed to allow the tent to be configured in various lengths and with attachments as detailed above. The tent has Roof and Wall panels (J11/NSN 8340-99-680-0615) and two (2) types of end panel:

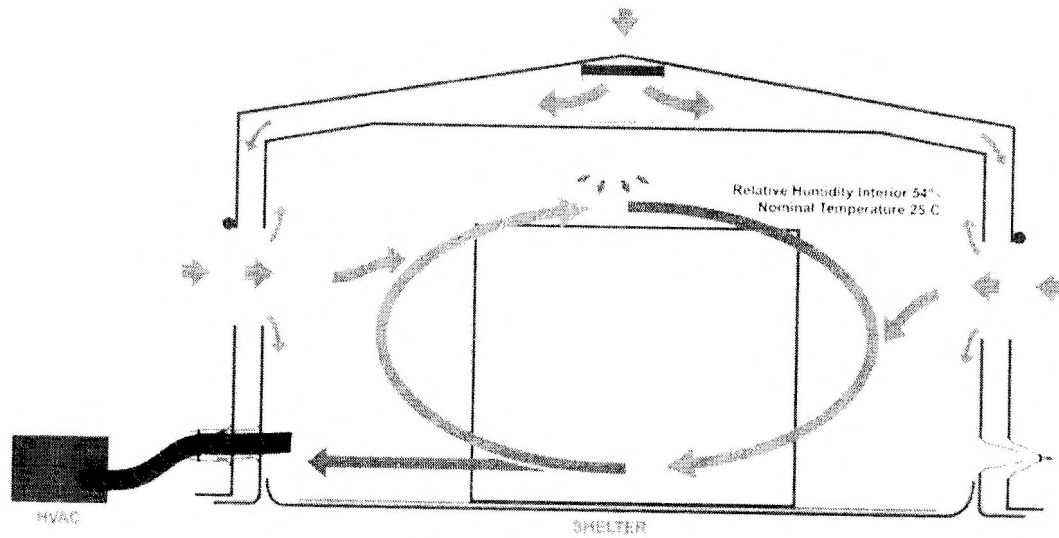
- 12.1. End Section Mk 4 (J11/NSN 8340-99-155-6628) is profiled end with a doorway
- 12.2. Design PVC 24ft x 18ft MK4 (J11/NSN 8340-99-155-6628) is a duel end including attachments for the 12 x12 tent, porch or passageway.

13. The shelter is manufactured from PVC coated polyethylene which is completely waterproof. It is not breathable and thus whilst there will be a level of air movement when the tent doors are open permanent ventilation ducts are provided at the eaves of the shelter walls. Further to this the HVAC ducts and windows can be used as air vents as required.

14. With respect to addressing potential condensation issues where the shelters are deployed in high humidity environments (above 50RH which includes most of Europe in the mid-summer) there is a risk of condensation inside the shelters. This is caused by the temperature differential between day time and night time operations and the small differences between dry bulb and wet bulb temperatures in very high humidity areas. There are a number of possible strategies to avoid this effect, which to some degree will depend on the specific air conditions. Ultimately the wet bulb temperature is very close to the dew point temperature so keeping the shelter internal temperature above the wet bulb temperature will negate the formation of condensation. For instance, for an external temperature of 78°C at an RH of 80% gives a wet bulb temperature of 71.37°C and a dew point of 71.34°C. If the internal temperature is maintained above the wet bulb temperature by maintaining a low level of cooling mixed with fresh air or for unoccupied or unconditioned shelters where temperature conditions are not critical ensuring that the internal and external temperatures are normalised by providing natural or forced ventilation.

**Humidity**

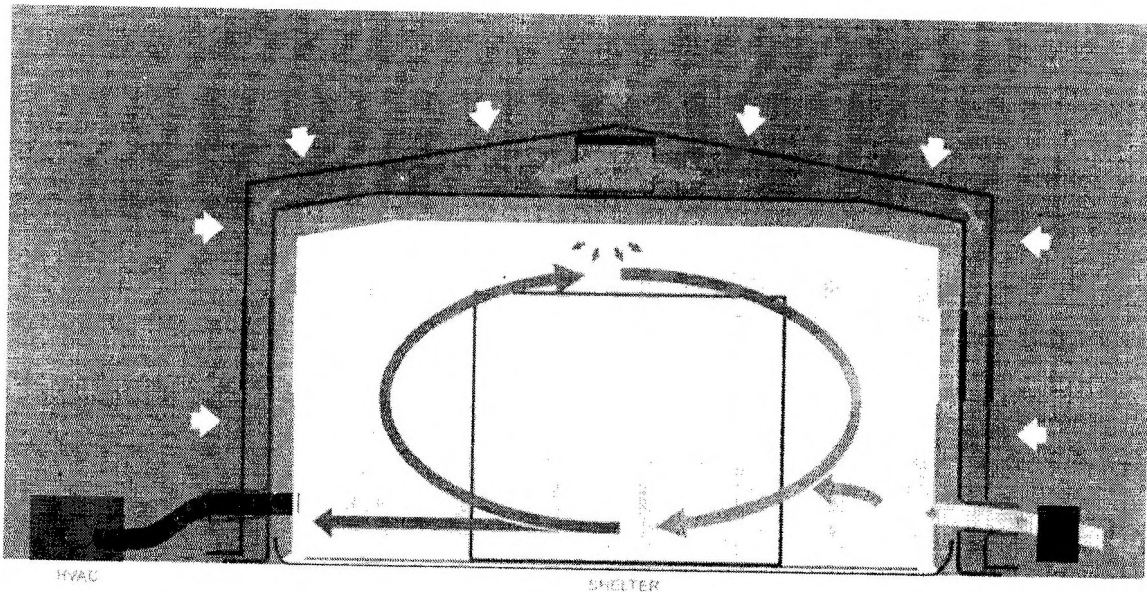
Ambient Relative Humidity 52%  
Ambient Outdoor Temperature 28°C



**Figure 3: Normal Ventilation**

15. Under normal conditions with the HVAC running and the ventilation duct open there should not be any condensation issues, opening windows will aid ventilation.

**NOTE:** On shelters that are not in use opening the window shutters to let in natural light will also reduce the risk on mould growth and mould spores will not grow if exposed to UV light.



**Figure 4: Closed down shelters**

16. Fig 4 shows a shelter that is closed down and has the highest risk of condensation particularly if it has been occupied during the day and is closed up at night. To reduce this risk there are a number of mitigation strategies that can be employed, listed as follows: -

- 16.1. Cool with HVAC for 15 minutes to remove condensate from the air then briefly heat to above ambient temperature.
- 16.2. Open or partially open window vents.
- 16.3. Open thermal fly vent.
- 16.4. Open window shutters to let in natural light during the day
- 16.5. Run the HVAC or provide forced ventilation.
- 16.6. Fit Shelter insulation

17. When installing insulation read Chapter 2 in combination with Chapter 1. In summary the roof insulation is applied before the main PVC cover. The wall insulation is installed after the full tent erection.

### SITING

18. To site shelters, proceed as follows:

- 18.1. The ground should be as level as possible, avoiding hollows where water would collect during heavy rain. Dry river beds or wadis, must be avoided as heavy rainfall or flash floods, however infrequent, can jeopardise the integrity of the shelter.
- 18.2. The ground should also be firm thus ensuring stability for pins and poles.
- 18.3. The site should be clear from obstacles such as rocks, trees and bushes to avoid the risk of tears in the PVC covers or ground cloth.
- 18.4. Drainage may be achieved by cutting channels around each shelter when the gradient and composition of the ground allows it.
- 18.5. Alternatively, the ground should be broken up between the tent pins and tent walls and a small bank of earth built on the inside of the tent wall.
- 18.6. Attention should be paid to the direction of the prevailing wind so that the tent is erected with its entrance located on the side facing away from the wind. Consideration should also be given towards minimising the area exposed to the wind, as this will gradually loosen the over straps and guy lines.
- 18.7. To prevent the propagation of fire between shelters, wherever possible, a spacing of 6m between shelters or shelter complexes is to be maintained.

### PITCHING

### WARNING

**PERSONNEL INJURY. SUFFICIENT PERSONNEL ARE REQUIRED WHEN LIFTING THE ASSEMBLED ROOF, THE MINIMUM IS ONE PERSON PER SHELTER LEG.**

### CAUTIONS

- (1) **EQUIPMENT DAMAGE.** The shelter is to be pitched on firm level ground and it is essential that adequate anchorage or ballast be placed on the coated fabric sod cloths at the bottom of the wall and ends of the shelter. The listed tent pins or spoil from drainage trenches is suitable for this purpose and may be used in sandbags or other flexible containers, if available. Guy lines are also provided to give additional stability under high wind conditions.
- (2) **EQUIPMENT DAMAGE.** The PVC Covers are manufactures from polyethylene covered PVC, this is a stronger and more waterproof material than the old cotton canvas but it is not flexible and does not stretch. The end gable strap must be installed before the gable cover is fitted to ensure the frame spigots are correctly located.
- (3) **EQUIPMENT DAMAGE.** All insulation panels can be added after the shelter has been erected EXCEPT the roof panel that must be attached to the frame prior to the covers.
- (4) **EQUIPMENT DAMAGE.** When lifting the roof, the supervisor must ensure that the lift is even along the length of the frame, thus avoiding distortion of the brackets and poles.

**General**

19. The pitching space should be marked out in accordance with the ground plan provided

**NOTE: Pitching party is to comprise of five personnel and a supervisor.**

**NOTE: The angle of the upright poles is critical if the covers are to fit correctly, base restraint straps are to be fitted to ensure the correct spacing.**

20. The valise or bundle containing the tent cover should be carried as near as possible to the pitching site.

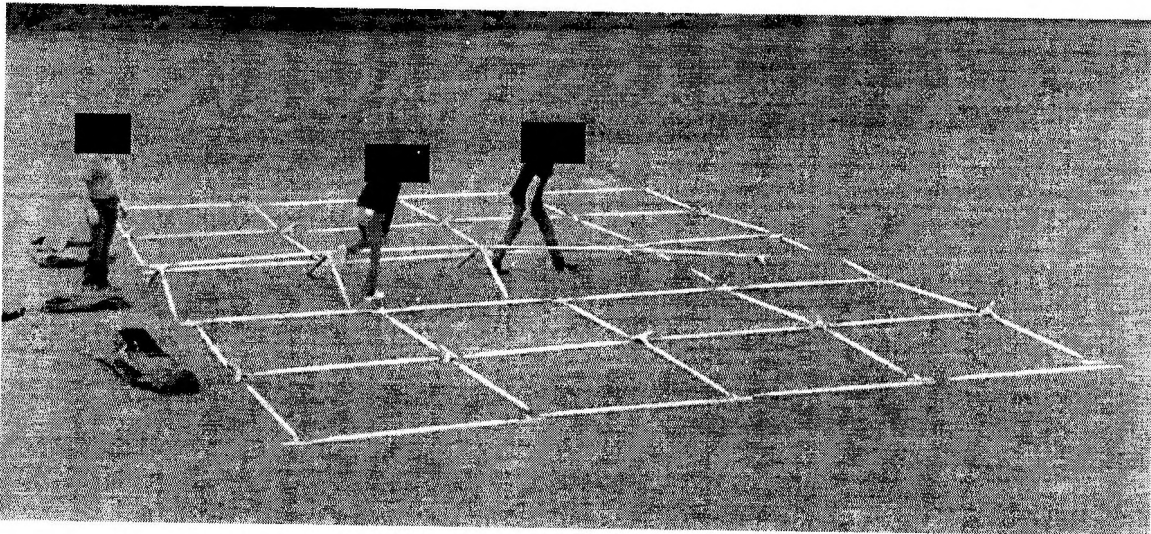
20.1. To prepare the cover, proceed as follows:

20.2. Open covers and lay out with inside uppermost.

20.3. Follow the assembly instructions

21. With the MK4 shelter system there are options for assembly. The tent can be erected using keder rails or the roof and wall sections can be pre-laced together as detailed in Fig 27 to 34. If the tent is being erected using a combination of MK 4 and earlier cotton canvas panels then you can utilise a combination of the two or just dutch lacing.

22. The frame should be laid out as detailed in Fig 5 & 6.



**Figure 5: Frame Layout**

23. Tent poles should be fitted together to produce the roof framework with roof restraint straps attached. The frame should be assembled from one end and the poles inserted in sequence, this minimises stress on the frame.

24. Fit strap, adjustable roof restraint (J11/8340-99-339-5439) (qty 2) Fig 7 to 16 and situate the strap as detailed in Fig 15. Ensure the straps are not twisted and the buckles are on the inside of the roof.

25. Fit the buckle end of the strap first passing the webbing through the buckle Fig 7, over and through the other side Fig 8 and back over itself Fig 9. Arrange the buckle to be under the frame so that it does not chafe the PVC covers Fig 16.

26. Tension roof restraint strap at other end of frame as detailed in Fig 10.

27. Secure through rings as detailed in Figs 11, 12 & 13.

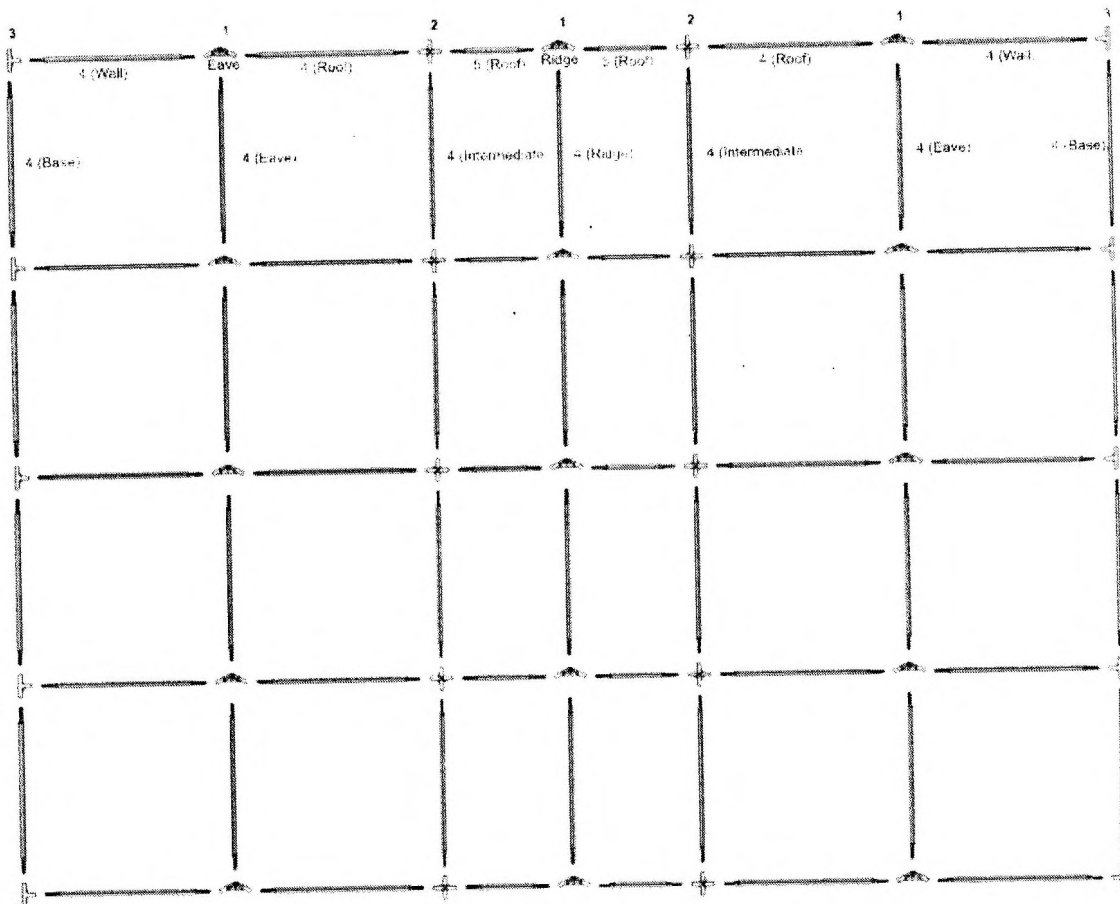
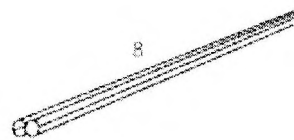


Figure 6: Frame Layout

24x18 Frame Components List  
& Assembly Layout

- 1 Universal Bracket (Qty 15)  
8340-99-132-0008
- 2 Cross Bracket (Qty 10)  
8340-99-132-0009
- 3 Base T Bracket (Qty 10)  
8340-99-132-0010
- 4 Universal Member Pole (Qty 48)  
8340-99-132-0006
- 5 Roof Member Pole (Qty 10)  
8340-99-132-0007
- 6 Strap, Roof Restraint (Qty 2)  
8340-99-973-9022
- 7 Strap, Base Restraint (Qty 5)  
8340-99-326-5994
- 8 Keder Rail (Qty 50)



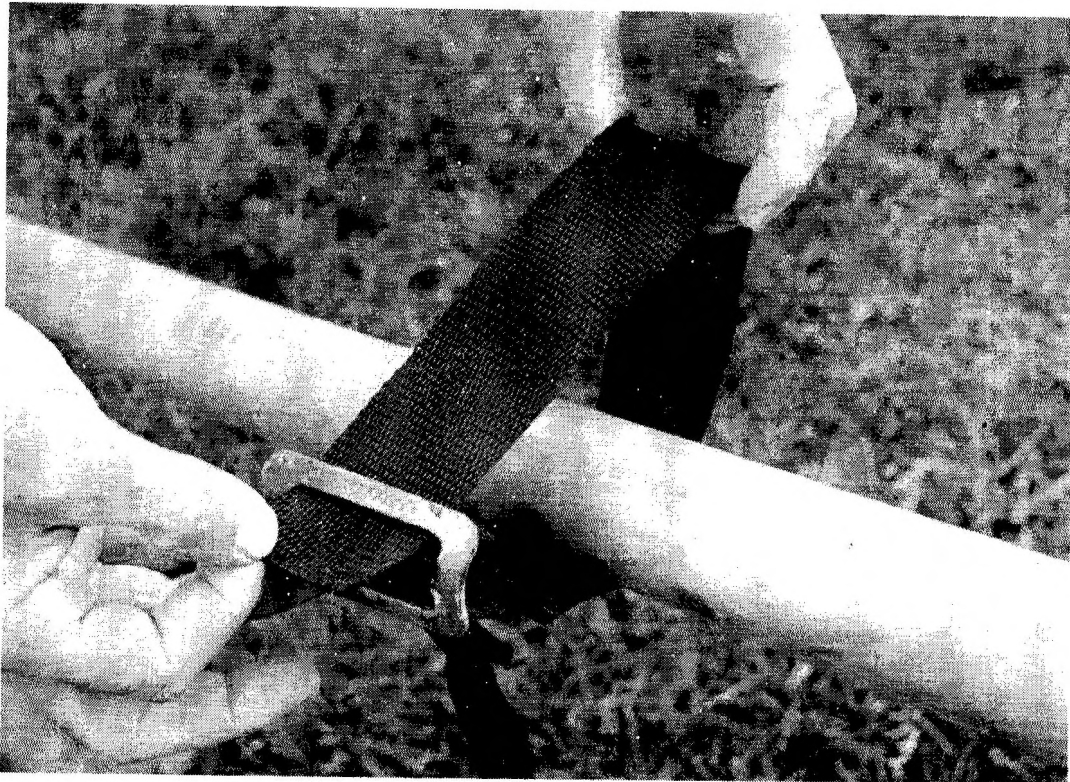


Figure 7: Buckle Connection 1

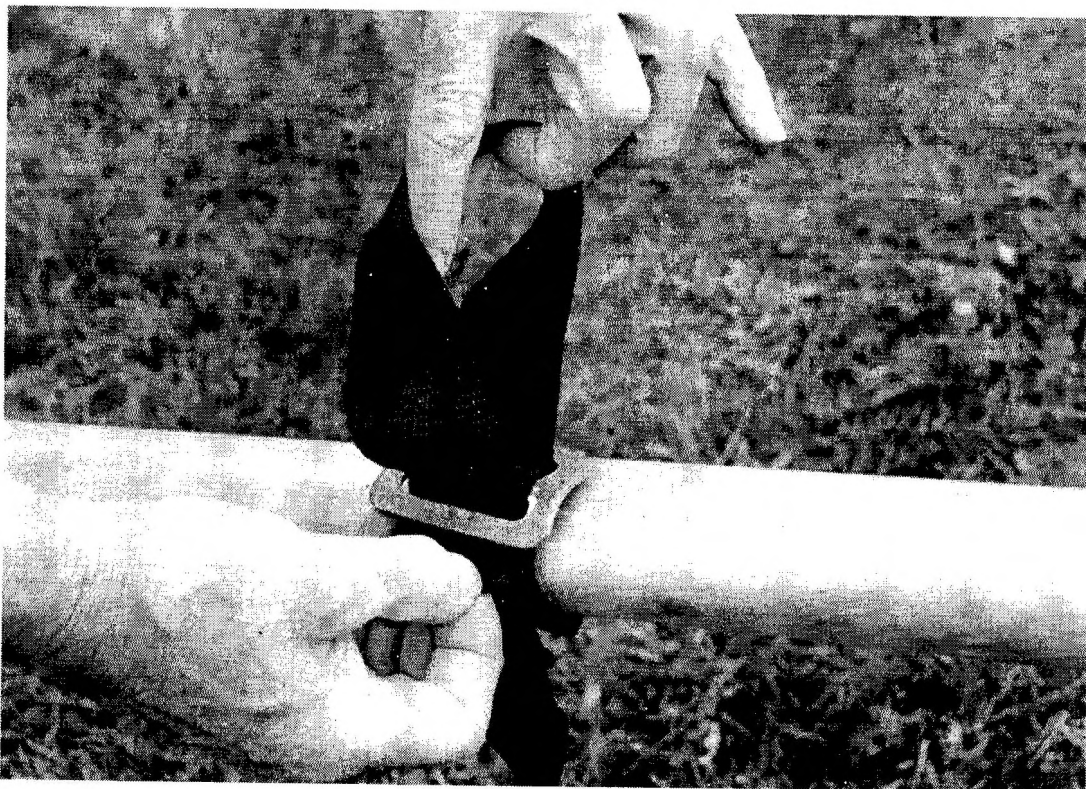


Figure 8: Buckle Connection 2

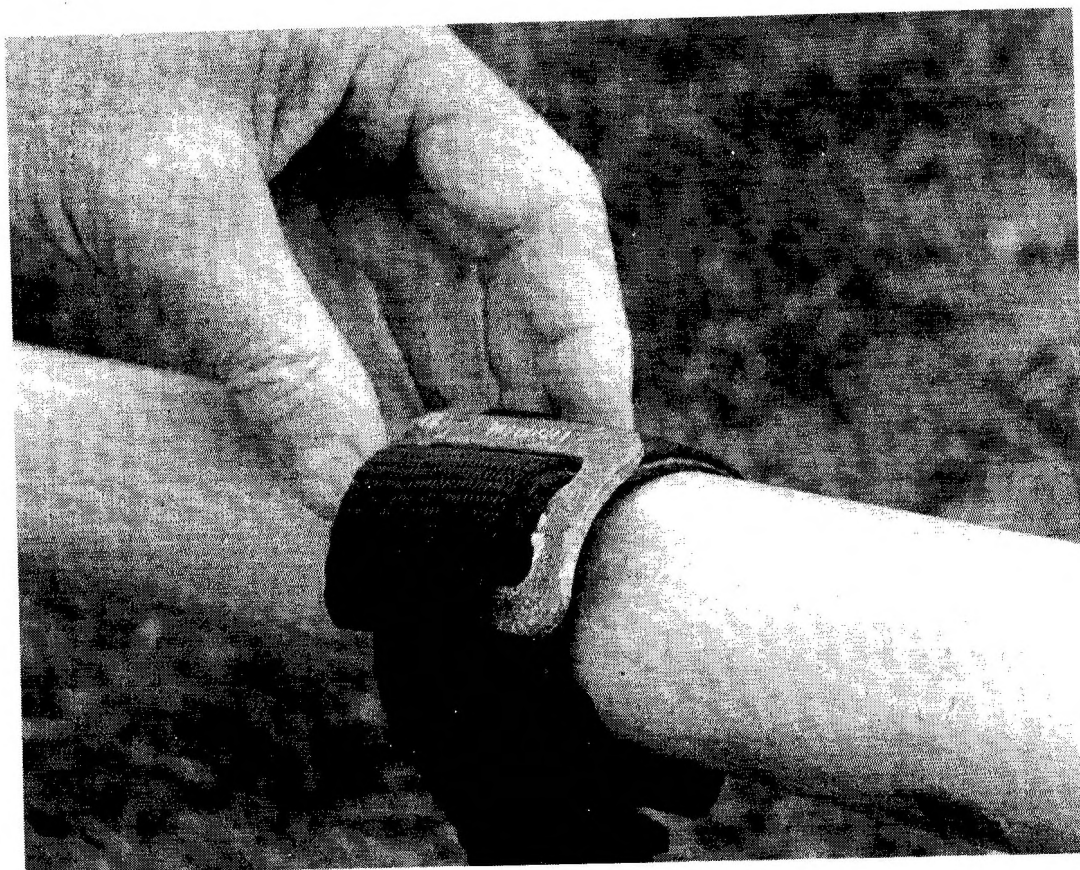


Figure 9: Buckle Connection 3

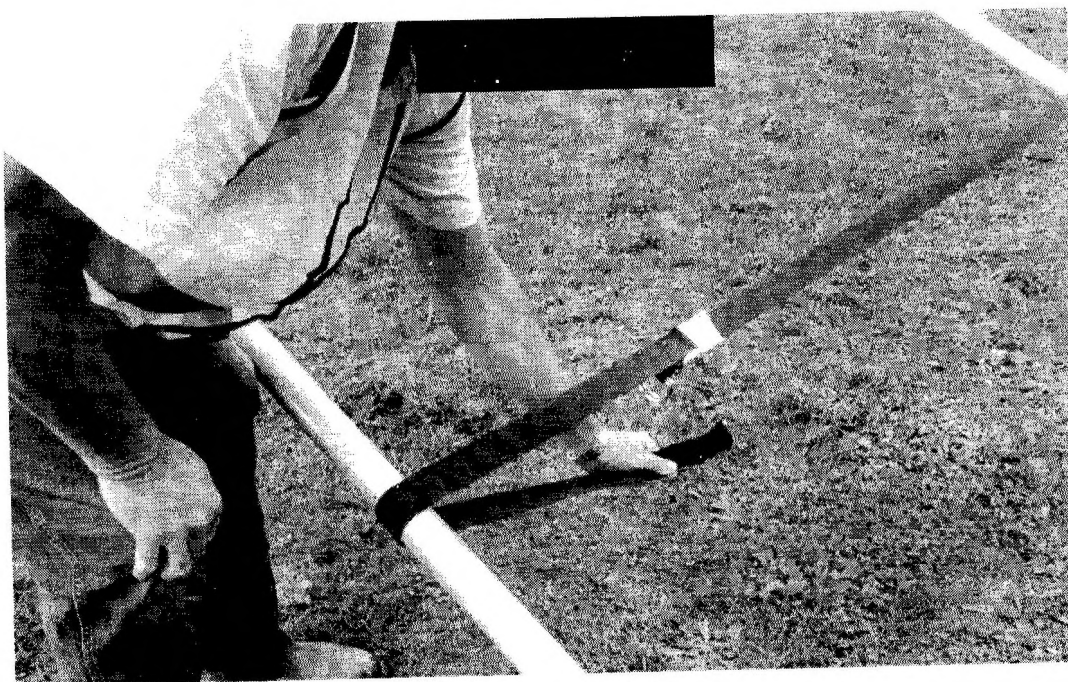


Figure 10: Tensioning Roof Restraint

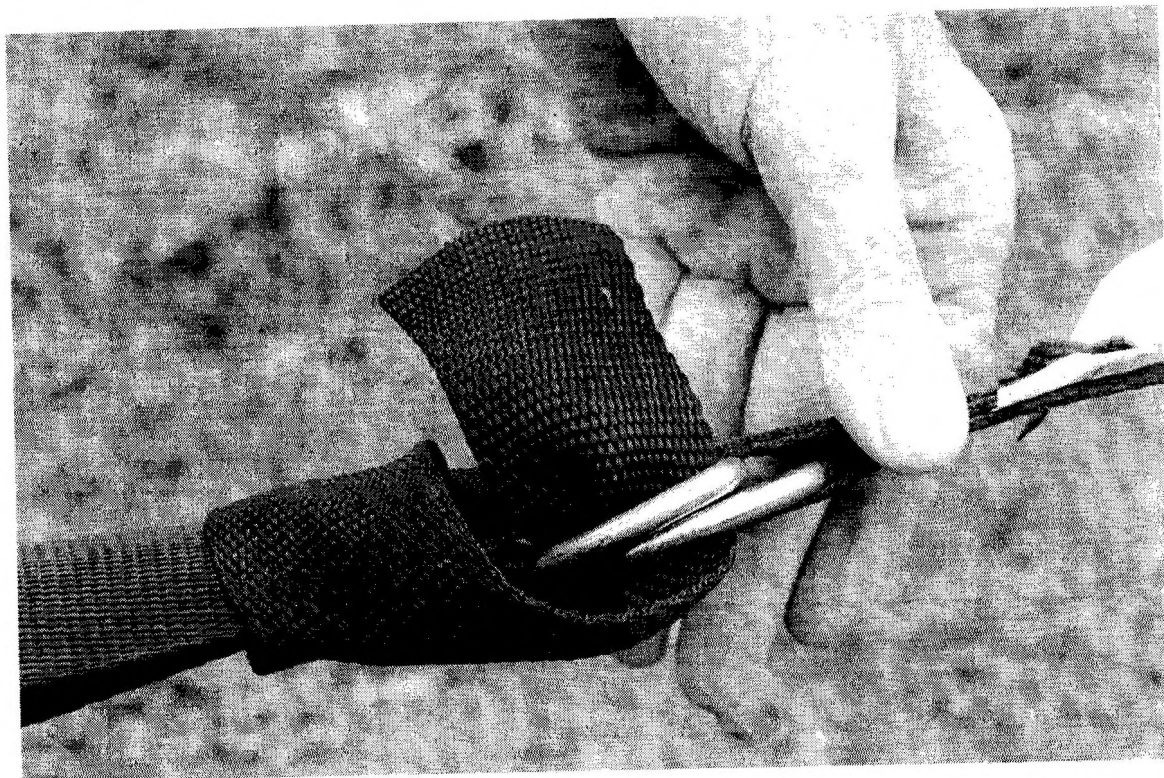


Figure 11: Secure Roof Restraint Strap through rings 1

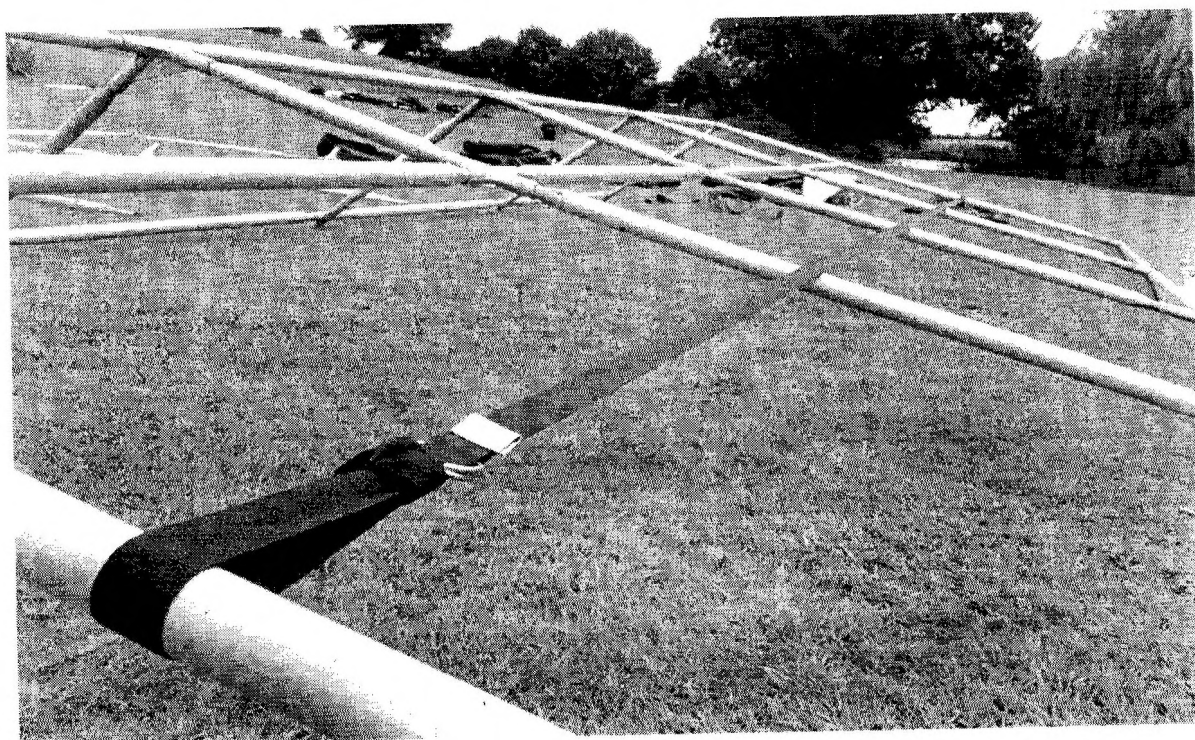


Figure 12: Secure Roof Restraint Strap through rings 2





**Figure 13: Secure Roof Restraint Strap through rings 3**



**Figure 14: Roof Restraint Straps fitted as frame roof is assembled**

28. Tent poles should be fitted together to produce the roof framework with roof restraint straps attached

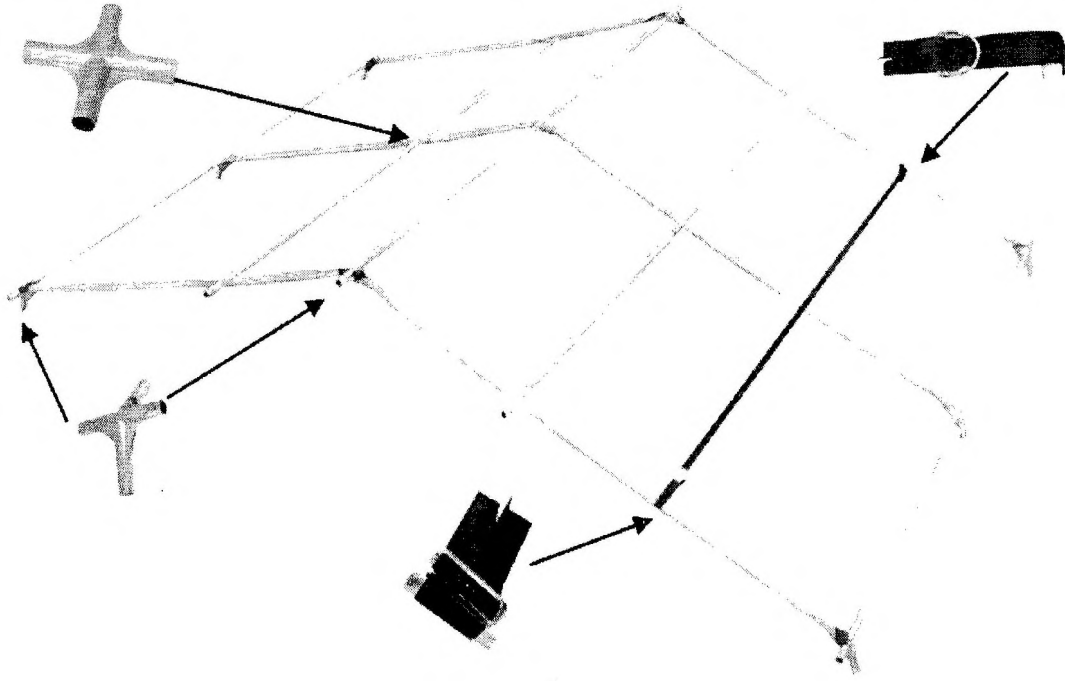


Figure 15: Complete Roof Section (Only half of the frame shown for clarity)

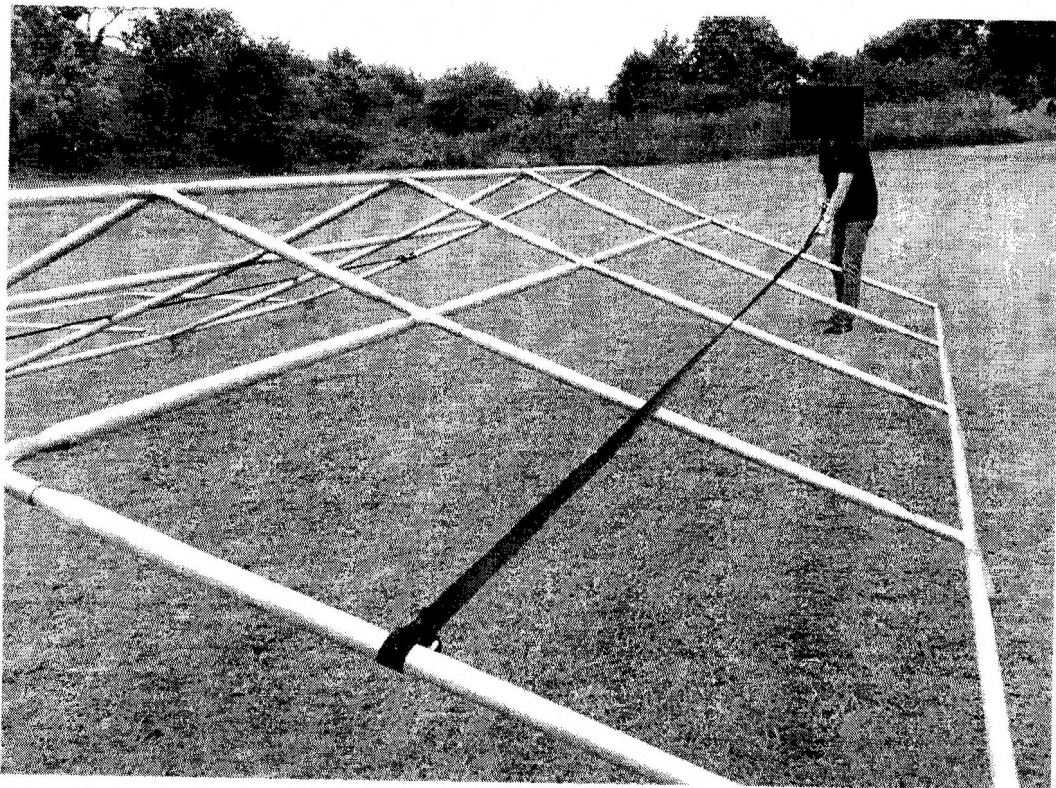
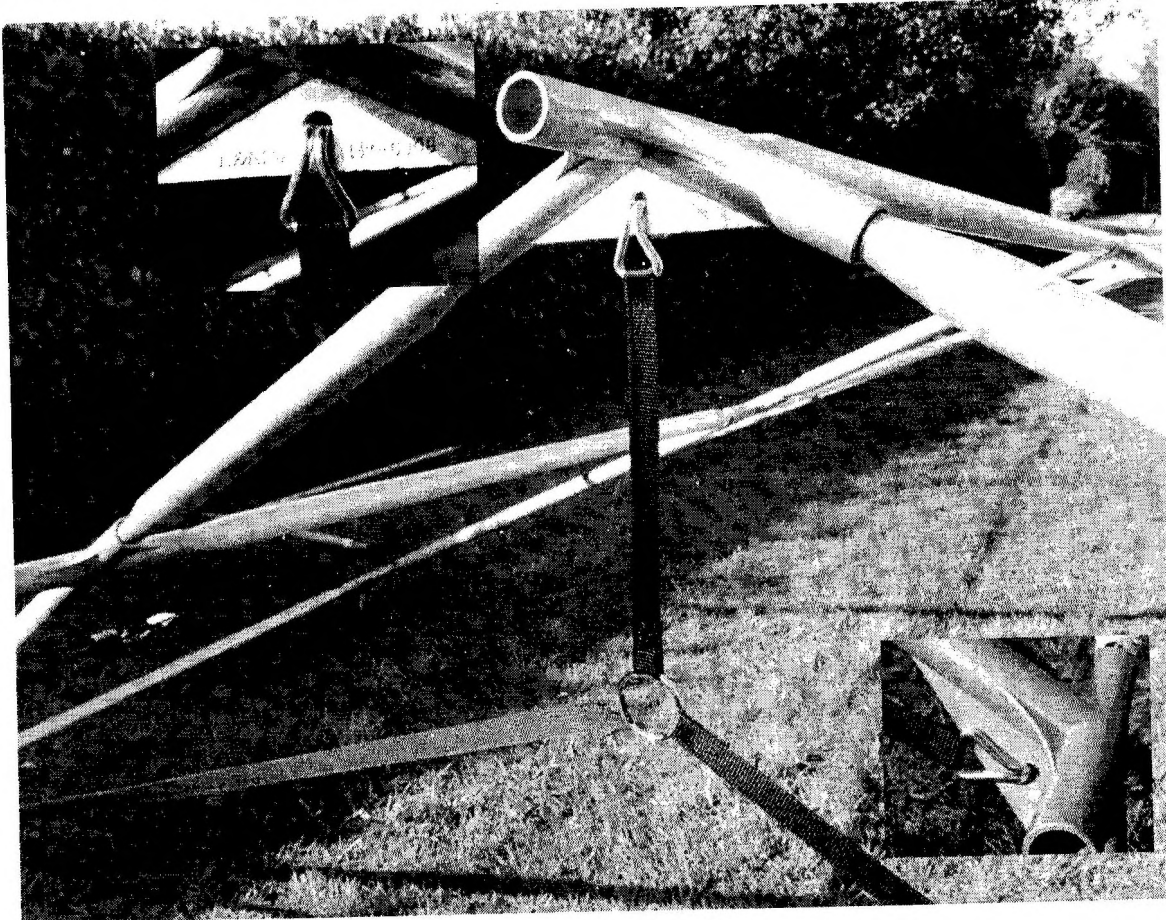


Figure 16: Roof frame complete

**CAUTION**

The PVC Covers are manufactured from polyethylene covered PVC, this is a stronger and more waterproof material than the old cotton canvas but it is not flexible and does not stretch. The end gable strap must be installed before the gable cover is fitted to ensure the frame spigots are correctly located.

29. Install the end gable strap (Qty 2) Fig 17, this holds the frame eaves in place to enable the end gable cover to be fitted without stressing the material. It also increases the snow and wind loading characteristics of the tent structure. The strap is a pre-set size and attaches to the holes in the web of the apex bracket and the eaves brackets of the frame at the gable ends. Attach the hook to the apex bracket first and then using 2 persons push the frame together at the eaves brackets to enable the strap to be attached.



**Figure 17: Installation of end gable strap with insets of hook connection**

30. The end gable is then laid out ready to be fitted to the roof section of the frame Fig 18, this should be completed at both ends before moving onto the roof and wall.

31. The gable PVC cover should then be fitted over the frame spigots as detailed in Fig 19 & 20.

**CAUTION**

**Do not attempt to stretch the PVC cover using frame parts as a lever, they should fit without any force. If they do not fit re check the end gable strap is attached correctly.**

32. Once the gable is fitted over all 5 spigots at each end the spigot covers should be sealed with the Velcro seal and ties off using a double knot Fig 20 Inset.

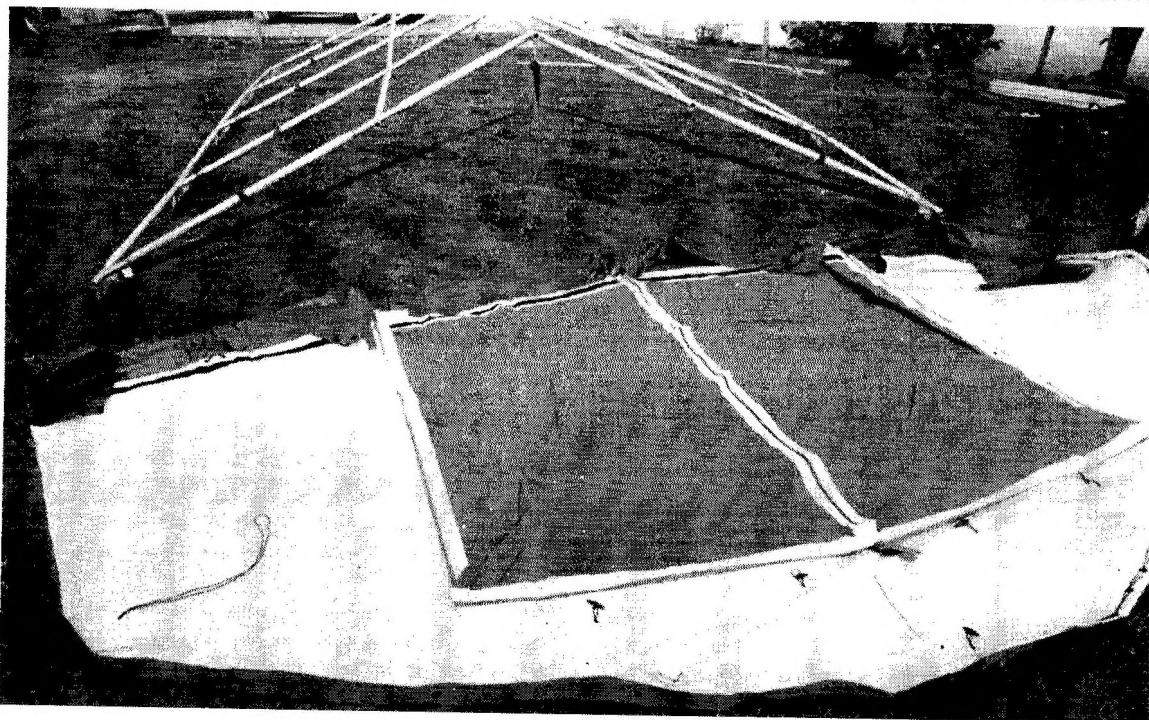
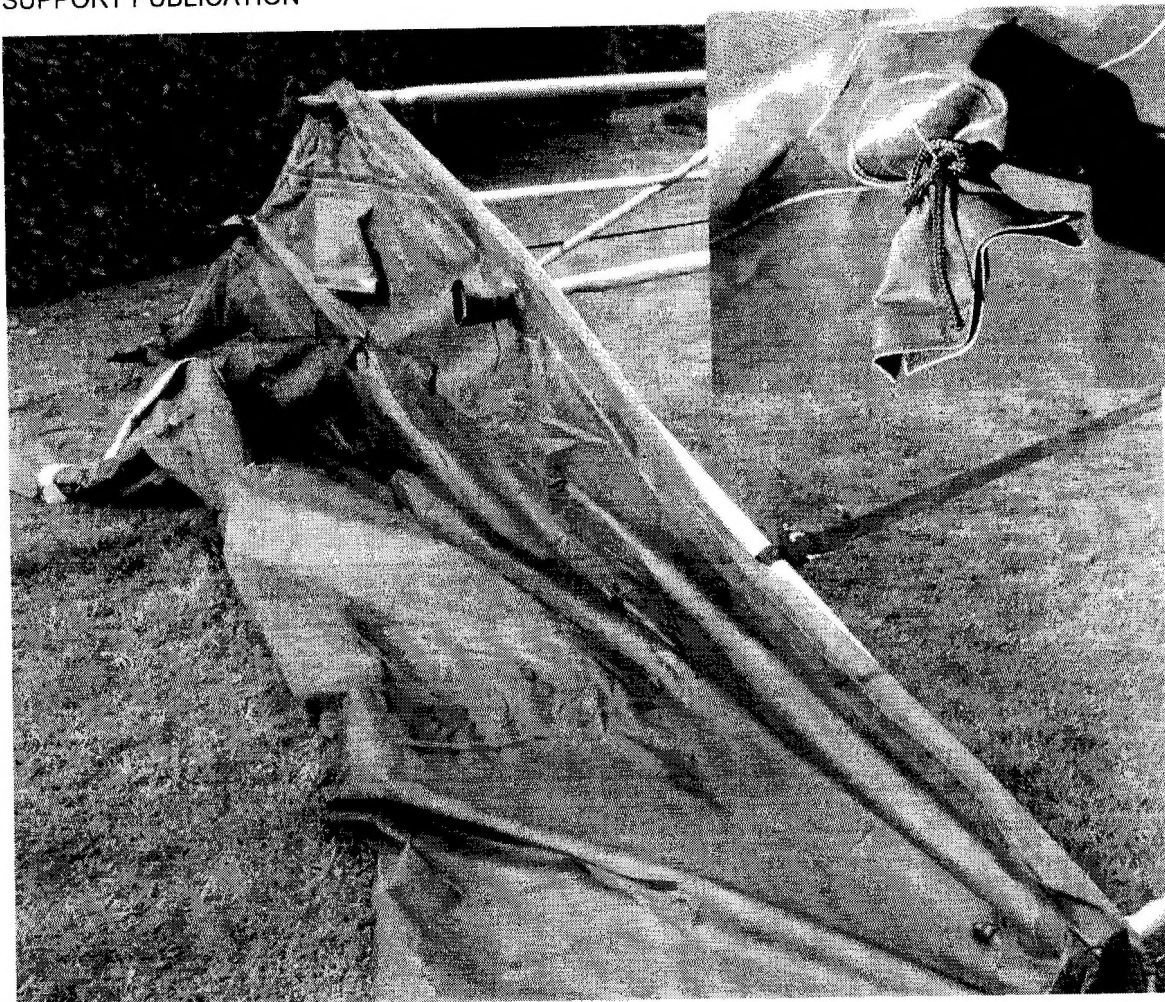


Figure 18: PVC Cover laid out ready to install



Figure 19: Fit covers over frame spigots



**Figure 20: End gable cover in place**

33. The tent is assembled from one end attaching the first roof and wall to an end wall. The two roof sections are joined and finally the second end wall is attached as follows:

**CAUTION**

**Protective gloves must be worn when inserting the keder rail to avoid potentially nipping fingers while pushing the rail into position.**

34. The roof and wall cover should be placed over the roof framework at one end. It is easier to fold the cover to position for connection with the end wall, this eases access to the keder rail or the dutch lacing as shown in Fig 21.

35. At the joints between the end wall and the roof and wall covers there are a number of flaps. This is due to the combination of the keder rail and dutch lacing combination. The flaps should be interlinked as detailed in Fig 22 and closed together as inset to aid the joining of the keder rail. Note on the right-hand side of the roof looking on the end of the tent the eyelets will be directly under the keder, on the left-hand side there will be a plane flap Fig 23.

36. Inserting the keder rail is a two (2) person operation, insert the rail from above (see Fig 24 below) whilst a second person holds the keder beads together, this allows the rail to slide freely. Keder rails are fitted to each side of the roof (J11/8340-99-477-5695) (Qty 6 in each roof section, total 18 in the roof), one after the other and pushed into place so that they are just short of the eave and apex positions Fig 25.

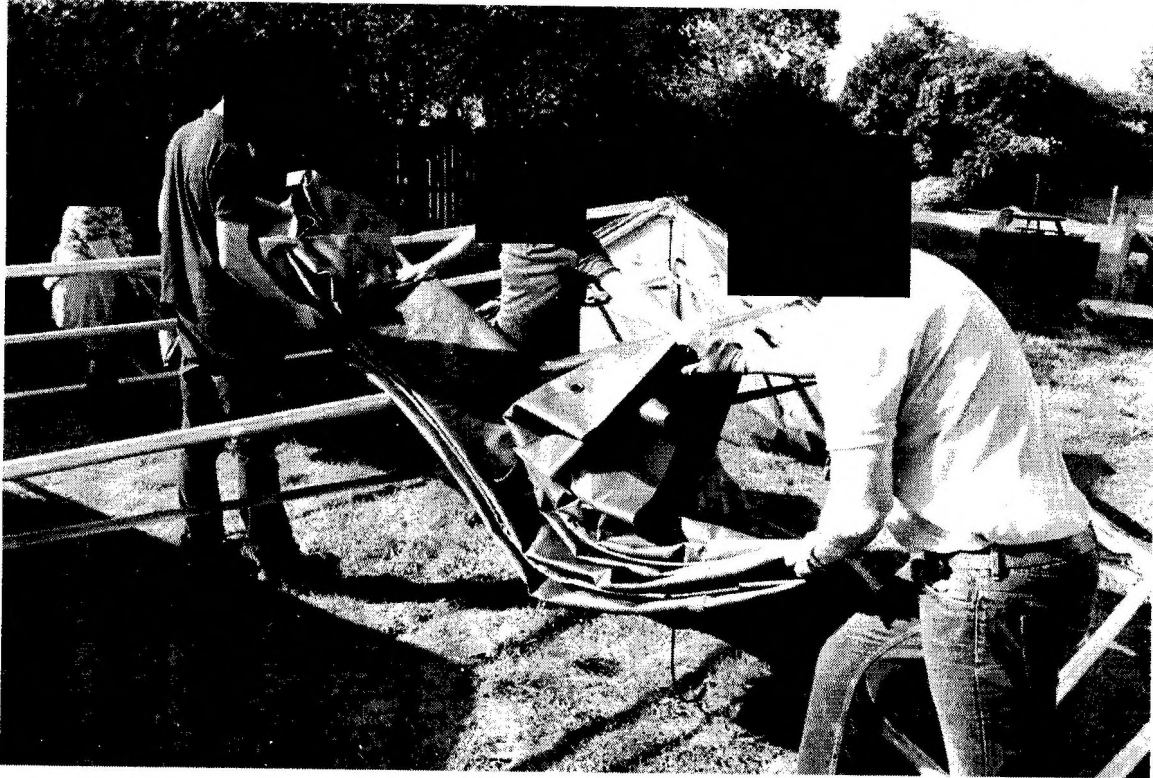


Figure 21: Pull PVC cover into place

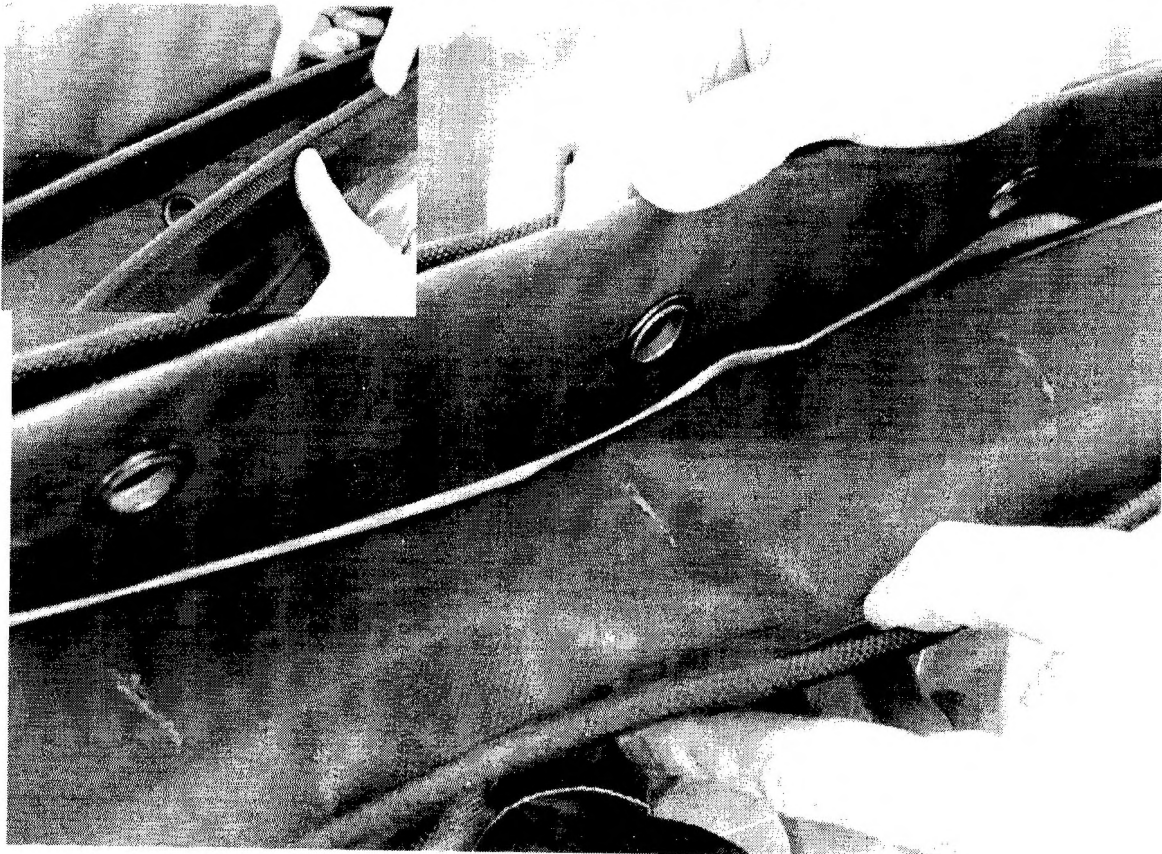


Figure 22: Adjusting flap positions at joints Right Hand Side

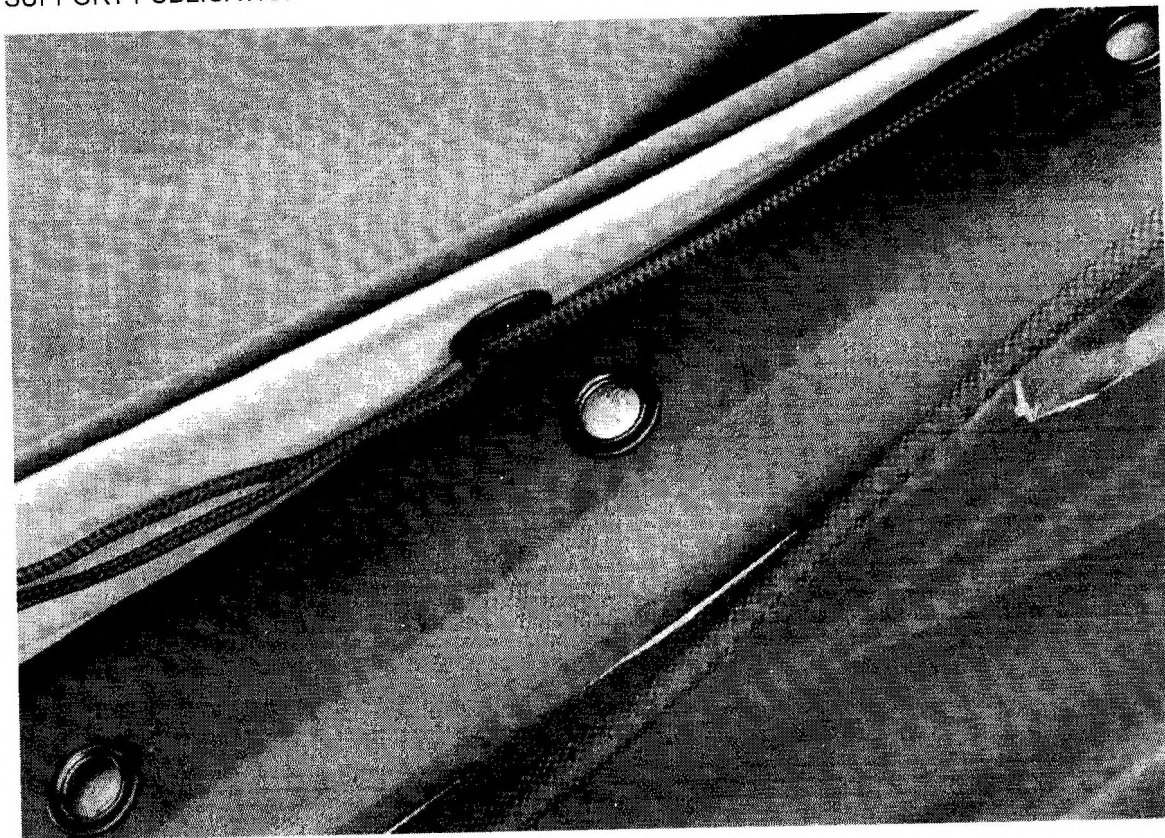


Figure 23: Adjusting flap positions at joints Right Hand Side

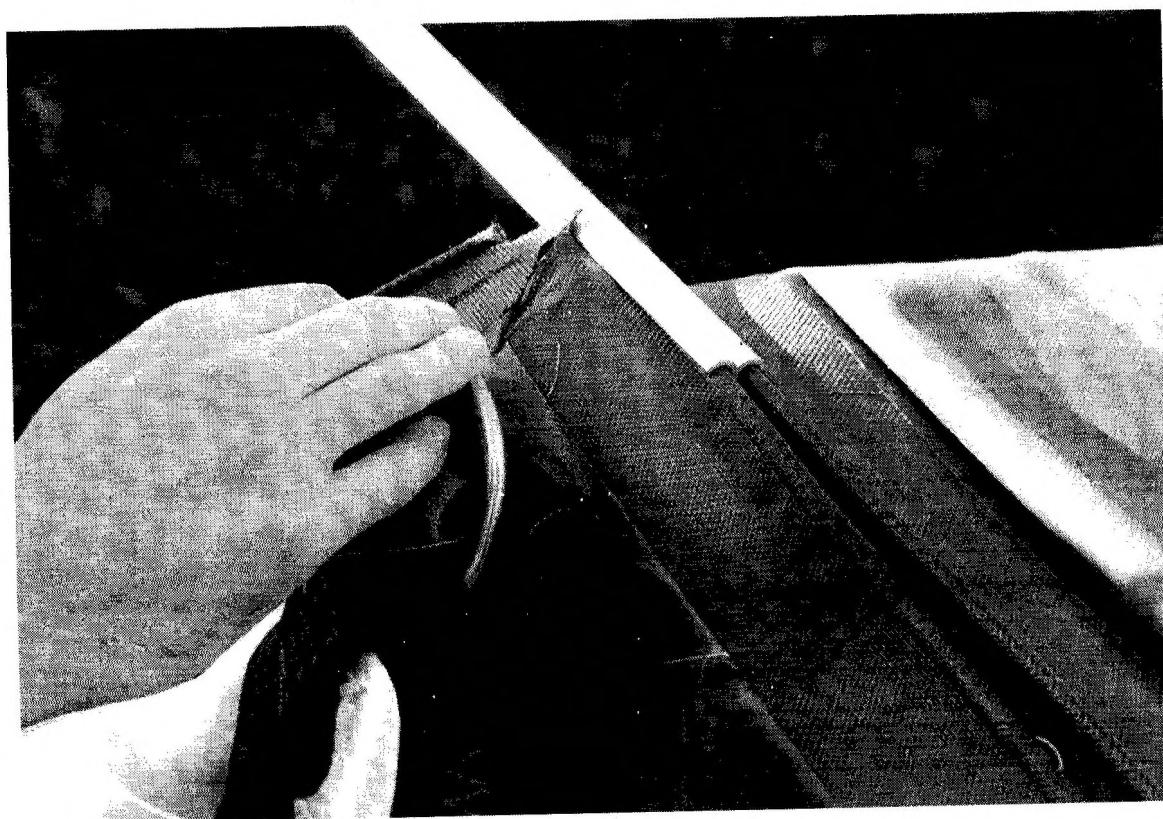


Figure 24: Adjusting flap positions at joints

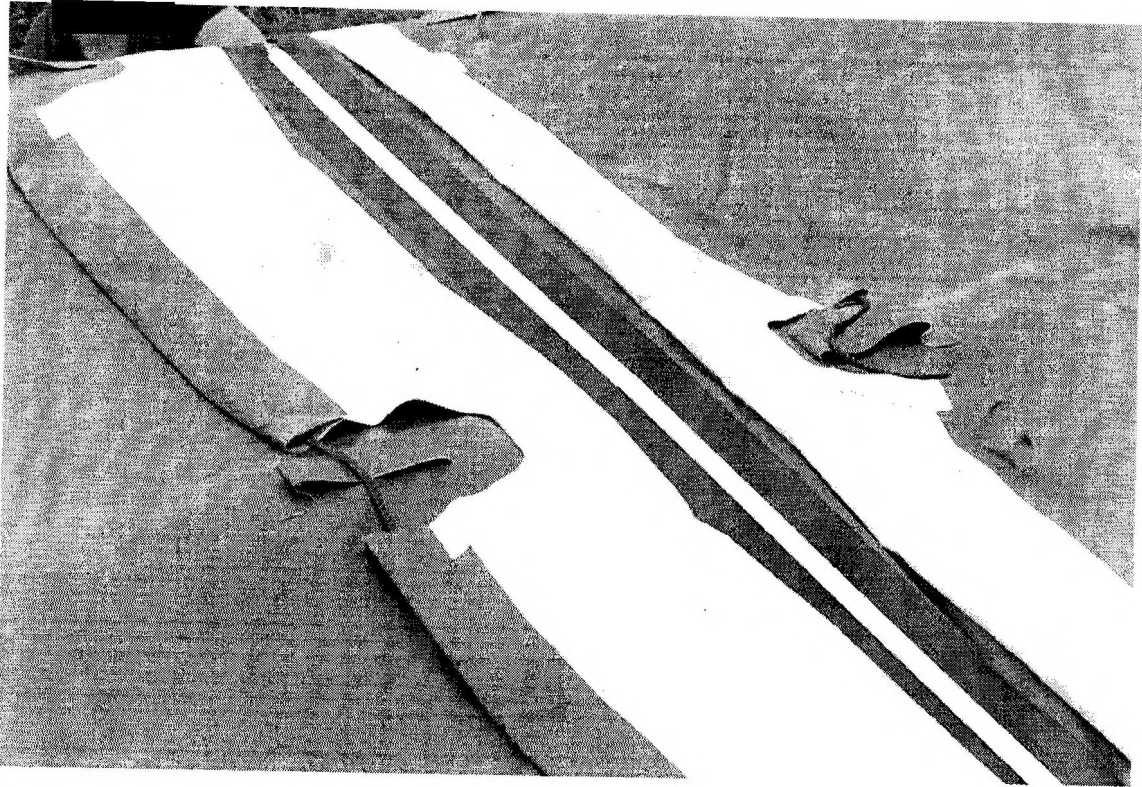


Figure 25: Keder Rail Installation

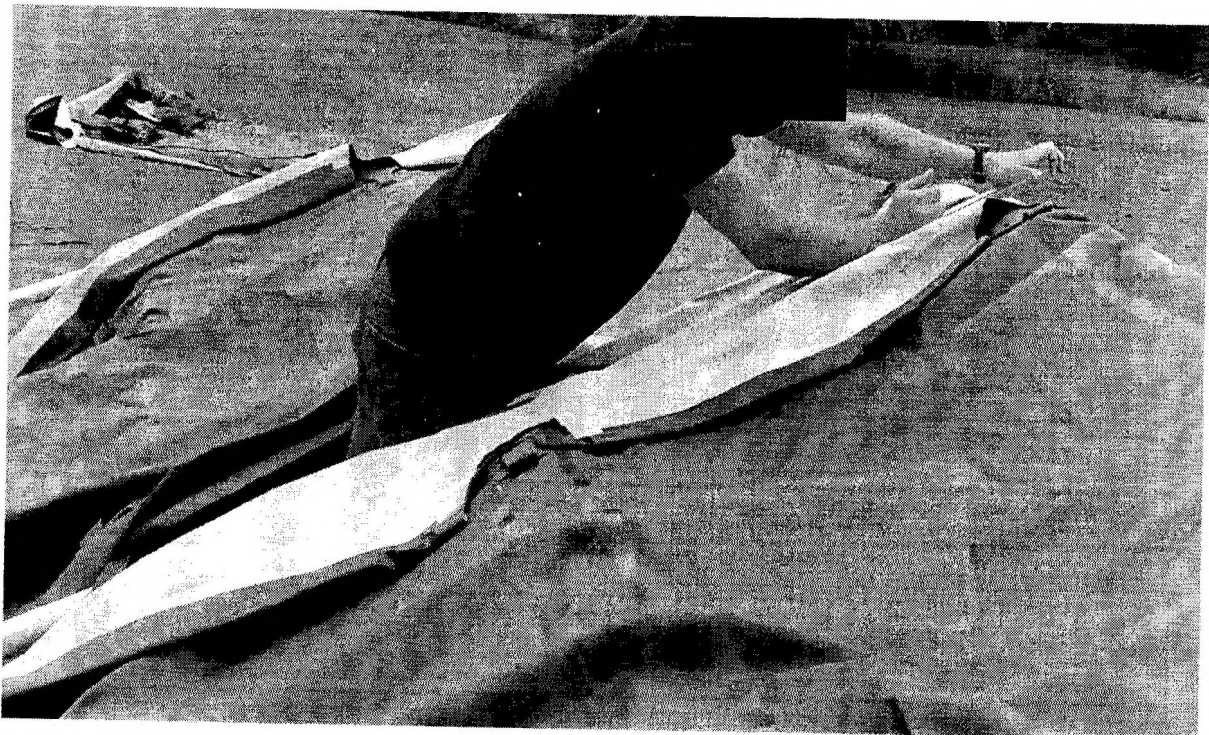


Figure 26: Install Keder, joining the roof



37. Carry out the same procedure for connecting the two roof and wall sections in the centre of the tent, inserting the keder rails in the same way as the end wall and finally the second end wall to the roof and wall.

### Dutch Lacing

38. The PVC covers are designed to be compatible with the existing cotton canvas covers and are fitted with dutch lacing, this enables older cover designs to remain in service.

39. The dutch lacing is installed by aligning the eyelets as detailed in Fig 27. Then passing the loops through the eyelets Fig 28. The top loop is them looped over the next loop down Fig 30. Finally, the bottom loop is secured by a toggle or tie Fig 33.

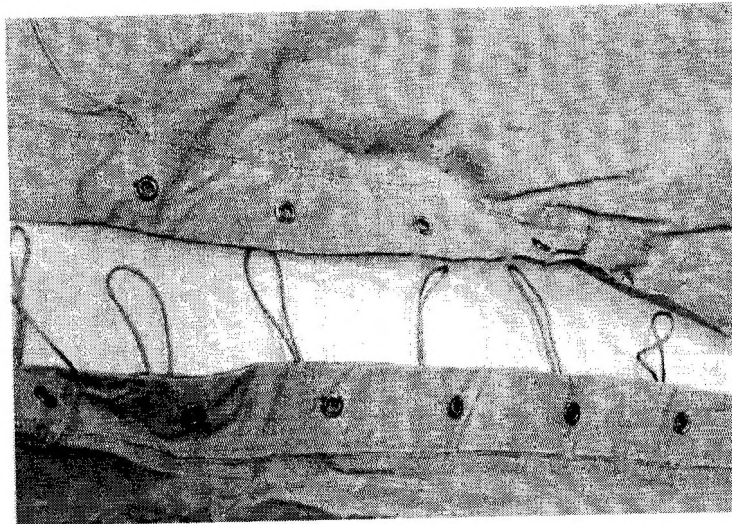


Figure 27: Lacing cover sections (1)

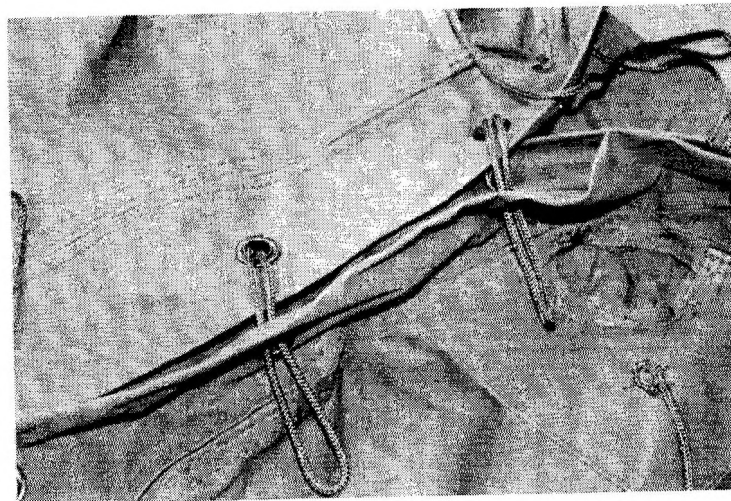


Figure 28: Lacing cover sections (2)

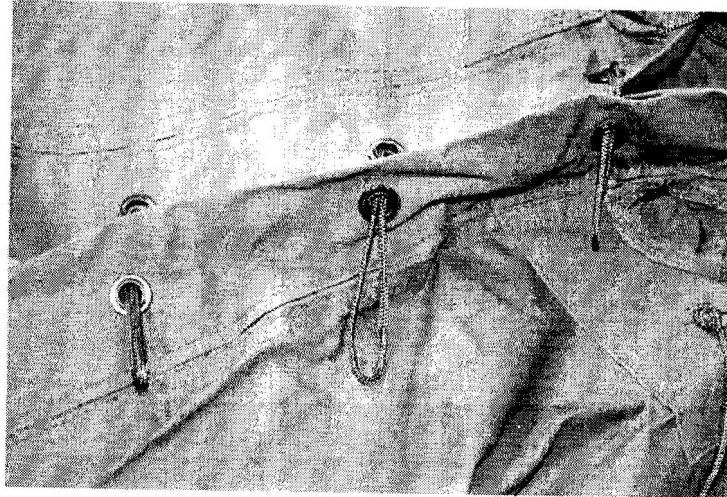


Figure 29: Lacing cover sections (3)

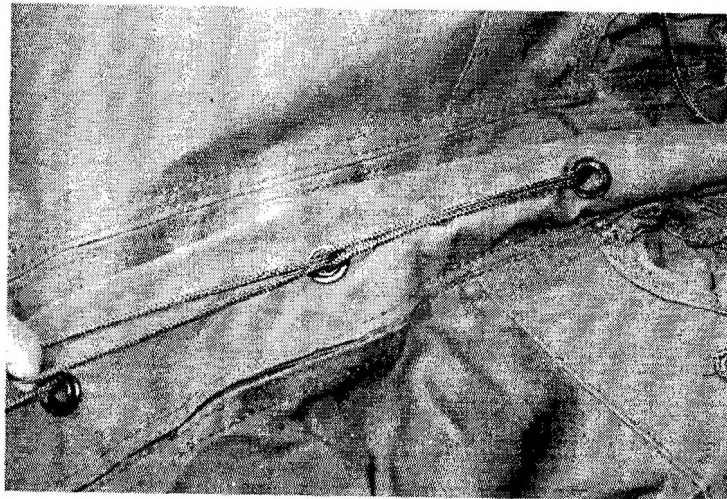


Figure 30: Lacing cover sections (4)

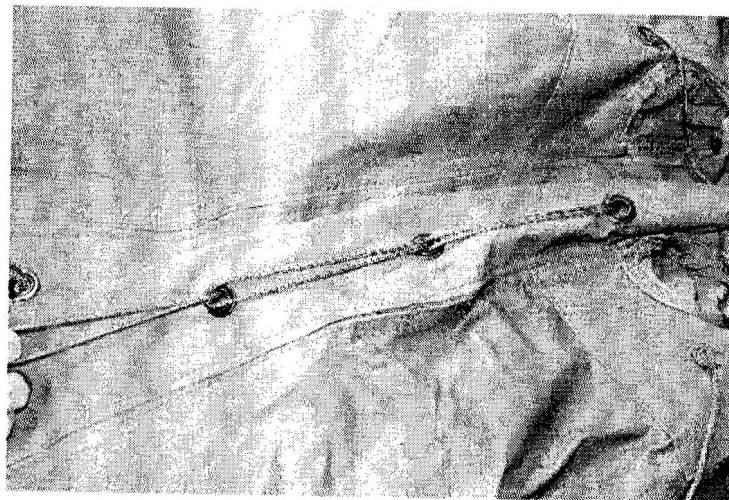


Figure 31: Lacing cover sections (5)