



ASSEMBLY MANUAL
for the
LONG BUBBLEBARN

supplied by

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This symbol means WARNING and particular attention should be made to the note.

Basic description, Long BubbleBarn

BubbleBarns are substantial structures able to withstand heavy snowfall loads and high winds. Virtually the only limiting factor in extreme wind conditions is the efficiency of the ground fixings.

The long BubbleBarn is made up of eleven or more frames in the shape of hoops which are fixed at their ends to base plates either staked or preferably bolted to concrete pads in the ground.

Frames are numbered 1 (on the ground at the back) to 5 (vertical). There are then the centre section frames, each called 5T. The Opening end frames are numbered 6 (vertical) to 10 (on the ground when closed).

There are four main base plates each with 5 frames, (1-5 and 6-10) and one or more vertical centre section frames (5T) fixed to smaller 'Type T' base plates. The centre bracket of each end frame, 1 & 10 is fixed to End base plates.

Each frame is made of 5 curved tubes, 2 type A's, 2 type B's and one Type C in the middle.

Frames 4, 5, 5T, 6 and 7 are reinforced with stays and each permanently fixed frame is separated by one or more compression tubes.

A cable and webbing strap runs from a manual winch set at the back around the crown of the BubbleBarn to open and close the door.

The cover is made from PVC coated polyester material of the type which sees extreme service conditions compared to a BubbleBarn on the sides of "curtainsider" lorry trailers. It is UV treated to give a long and reliable service life.

Although a BubbleBarn can be erected by one person it is much easier with two and at least three are needed to get the cover on the frame.

Site

For temporary use this BubbleBarn can be pitched in the ground using stakes however it is strongly recommended it is at least set on concrete pads as per the foundations plan. It is also possible to bolt it to a concrete platform provided it is at least 25 - 30 cm thick.

The site needs to be flat, but not necessarily perfectly level, a slope of up to 2% is tolerable. Flatness is important because you want to avoid gaps around the rim when the BubbleBarn is complete.

One whole end of a BubbleBarn opens up and it is very important to try and site your BubbleBarn in a sheltered location with the mouth away from the prevailing wind. This is because there is an absolute wind limitation of 25 MPH with the door open face on to the wind.

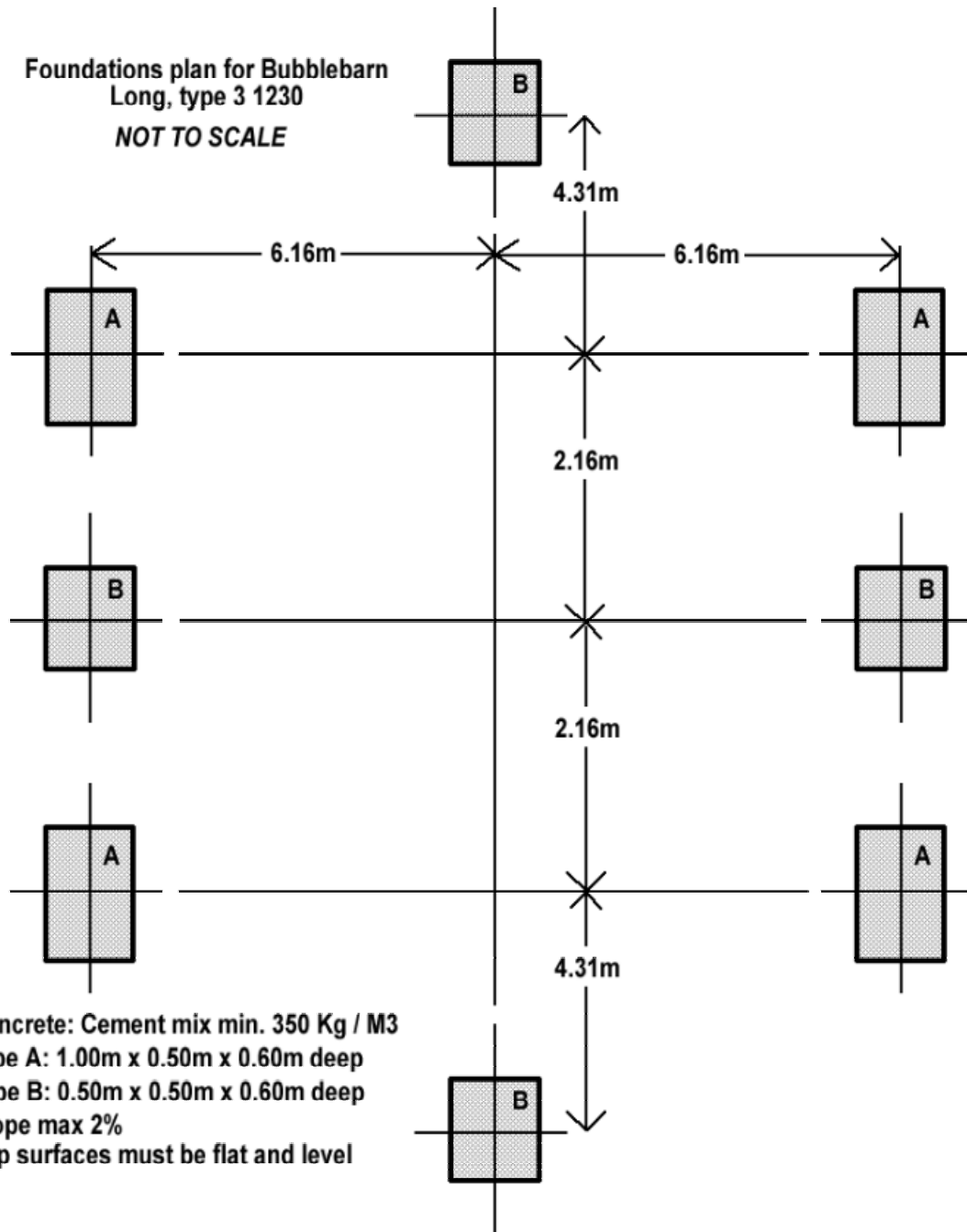
It does not matter how close, in terms of easy installation, you have the sides of the BubbleBarn from an obstruction, but it does make things easier if you have a bit of space around it to maneuver vehicles during erection.



Site your BubbleBarn on a flat surface with no more than 2% slope.

Orient it with the main door opening away from the prevailing wind.

Foundations plan for Bubblebarn
Long, type 3 1230
NOT TO SCALE



Concrete: Cement mix min. 350 Kg / M3
Type A: 1.00m x 0.50m x 0.60m deep
Type B: 0.50m x 0.50m x 0.60m deep
Slope max 2%
Top surfaces must be flat and level

Tools

- 2 x 17mm spanners
- 2 x 13mm spanners
- 1 x 10mm spanner
- 1 x large sledge hammer
- 1 x 2lb lump hammer.
- 1 x 4.2M ladder, this is the most convenient length.
- 2 x 15 metre lengths of good quality 10mm rope.
- 1 x 20 metre length of 5 or 8 mm rope.
- 1 x Stanley knife.
- 1 x long tape measure, preferably at least 20 M long.

A socket set and a good cordless drill with a ½ inch drive in the chuck certainly speeds the process up a lot.

Parts list

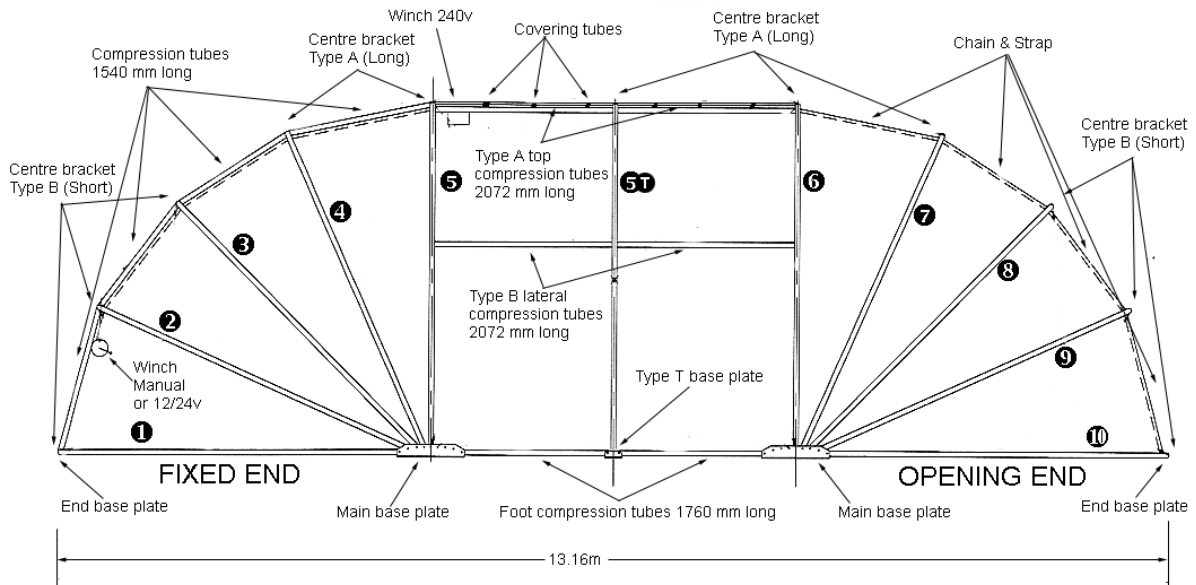
For Long BubbleBarn with one 5T central frame

Quantity	Part No.	Description
4	MBP	Main base plates
2	TBP	Type T base plates
2	EBP	End base plates
22	ArcA	Arc, type A (r 2800) fits to base plates
22	ArcB	Arc, type B (r 8340 with 13mm hole at 1700mm)
11	ArcC	Arc, type C (top of arch)
6	CBA	Centre bracket, Type A (short)
5	CBB	Centre bracket, Type B (long)
4	CT	Compression tubes 1540 mm long
6	CTA	Type A top compression tubes, 2072 mm long
4	CTB	Type B lateral compression tubes, 2072 mm long
4	CTF	Foot compression tubes 1760 mm long (go between MBP and TPB)
20	STP	Stay tension plates
10	STT	Stay tension tubes type C
10	STC	Stay tension cables, 8mm x 2610 mm
10	STB	Stay turnbuckles
22	STM	Stay maillons, 8 mm
33	CTX	Compression tube brackets
6	CTT	Covering tubes
1		Galvanized chain 6500 mm long
1		Manual winch
1		Winch support plate & fixings
1		Winch cable, 8 mm x 14000 mm
13		Winch rollers
5		Bolts, m8 x 50 mm + nyloc nuts
21		Bolts, m10 x 30 mm + nyloc nuts
38		Bolts, m10 x 70 mm + nyloc nuts
81		Bolts, m10 x 80 mm + nyloc nuts
30		Bolts, m10 x 90 mm + nyloc nuts
25		Bolts, m12 x 100 mm + nyloc nuts
16		Bolts, m14 x 160 mm + nyloc nuts
20		Coachbolts m8 x 100 + Nyloc nuts
18		Rawlbolts 20 mm x 85 mm (For MBP)
18		Rawlbolts 12 mm x 75 mm (For TBP)
18		Large washers for Rawlbolts
1		Cover
1		Door opening strap, 11000 mm

Erection



Before starting erection of a BubbleBarn read and understand this entire section. Although all the frames are identical in principle, most differ in detail and it is very difficult and time-consuming to 'go back' and fit omitted parts. This applies particularly to the correct placing of compression tube brackets.



Some work during the erection process may be done at some height. Make sure you employ suitable safety arrangements to prevent falls of personnel or heavy objects.

The first thing to do is to lay out your base plates. It is crucial that they are positioned exactly right, once you start building the structure becomes very heavy and there is no way that you can move them.

Select the Main base plates and Type T base plates and bolt them together in 2 lines with 1760 mm Foot compression tubes approximately centered on the concrete pads.

Take a long tape measure the space between the 2 rows of base plates so they are parallel at exactly 12,320 mm centres, and then measure diagonally to make sure everything is square.



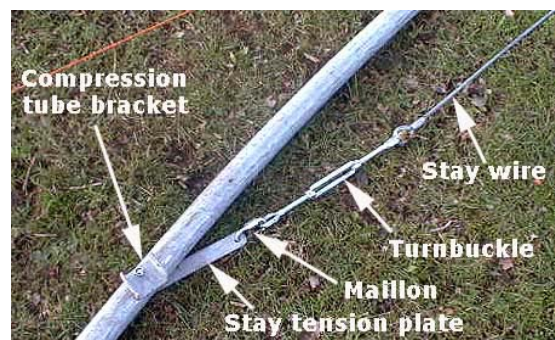
Time spent getting the layout accurate at this stage will save much grief later on!

Drill and set the Rawlbolts with large washers so each plate is fixed.

The assembly of the BubbleBarn begins at the back. (the end which does not open).

All the frames are in principle identical but most differ in detail.

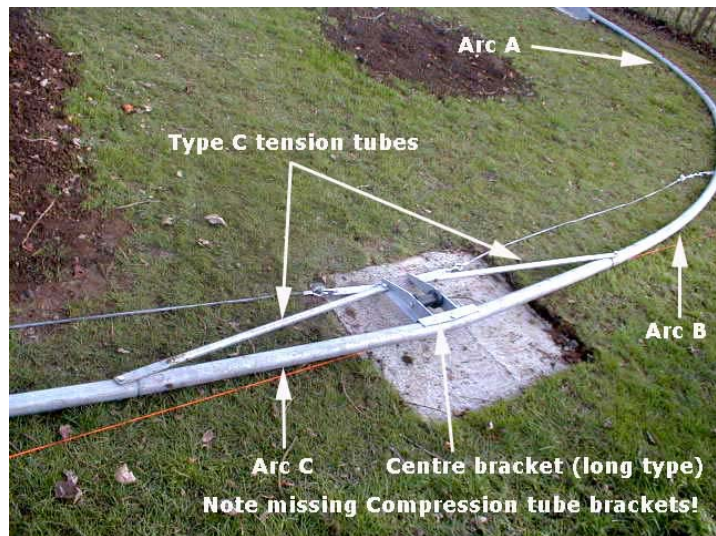
It can sometimes be a bit of a struggle to fit the tension reinforcements to frames 4, 5, 5T 6 & 7 and it may seem the parts are simply not the right size. Please be assured the parts are the right size, the frames just needs a bit of hefty manipulation to fit them.



Frame number 5

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type B (long)
- 2 type C tension tubes,
- 4 stay tension plates,
- 2 wire stays,
- 2 turnbuckles
- 4 maillons
- 6 Compression tube brackets
- 1 winch roller
- 3 m10 x 90 bolts,
- 2 m10 x 80 bolts,
- 2 m10 x 30 bolts.



Assemble one pair of tension stays. These (from the centre outwards) consist of: stay tension plate – maillon – wire stay – turnbuckle – maillon - stay tension plate.

Assemble the frame on the ground. As you insert the bolts bear in mind where the Compression tube brackets should be fitted as later there will be one 1544 mm long from the centre going to frame 4 and five type A or type B 2072 mm long going to frame 5T.

Fit the winch roller to the lower of the two possible positions, avoid over tightening the bolt so much that the roller doesn't roll.

When the frame is assembled and fixed to the main base plates, secure at least two strong ropes to the centre of the frame to act as stays and lift it vertical.



Fix the ropes **VERY SECURELY** to fixed objects eg another base plate, a tree or a heavy vehicle parked sideways. It does not need much effort to support the frame vertically at this stage but it will get **MUCH HEAVIER** as further frames are added to the structure.

Frame number 4

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type B (long)
- 2 type C tension tubes,
- 4 stay tension plates,
- 2 wire stays,
- 2 turnbuckles
- 4 maillons
- 2 Compression tube brackets
- 1 winch roller
- 1 m10 x 90 bolts,
- 4 m10 x 80 bolts,
- 3 m10 x 30 bolts.



Assemble the frame on the ground as before, bearing in mind that the Compression tube brackets should be fitted to the centre bracket so there will be one central 1544 mm Compression tube going to frame 5 and one to frame 3.

Lift the frame and connect it to the Compression tube bracket you fitted on frame 5 with the Compression tube 1540 mm.

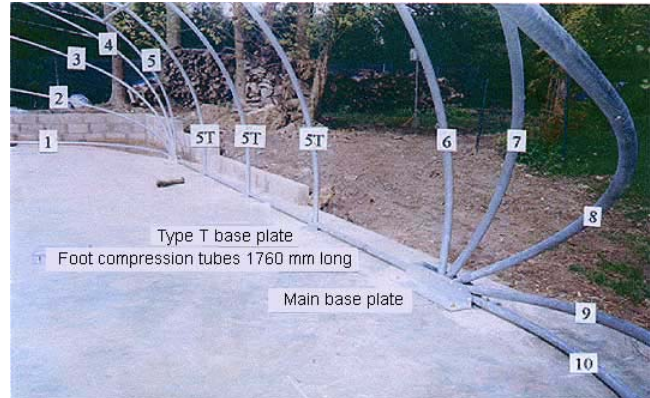


When done you will notice an appreciable increase in strain on the ropes supporting frame 5. **DOUBLE CHECK THEM NOW** as the weight will increase much more with the addition of frames 3 & 2.

Frame numbers 3 & 2

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type A (short)
- 2 Compression tube brackets
- 1 winch roller & Bolt
- 4 m10 x 70 bolts,
- 1 m10 x 90 bolt



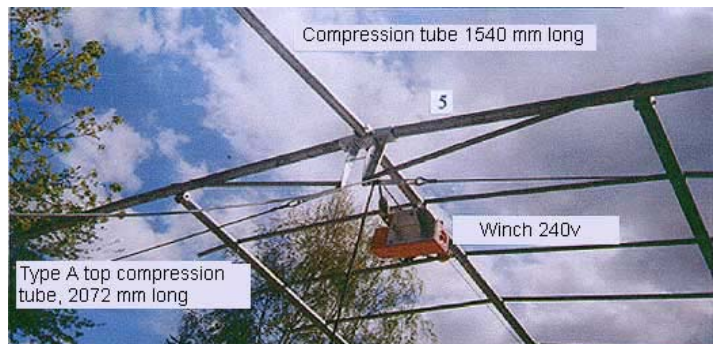
These are simpler frames without the reinforcements. Assemble the frame on the ground as before, bearing in mind that the Compression tube brackets should be fitted to the centre bracket so there will be one central 1544 mm Compression tube going to the frames either side.

Lift them into place as they are completed.

Frame number 1

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type A (short)
- 1 Compression tube bracket
- 4 m10 x 70 bolts,
- 1 m10 x 90 bolt



This is the same as frames 2 & 3 but only needs one Compression tube bracket which takes the 1540 mm Compression tube which goes to frame 2. It also doesn't need a roller.

Position the end base plate on the concrete pad so it connects to the short top bracket with a m14 x 150 bolt. Rawlbolt the end base plate to the concrete pad.

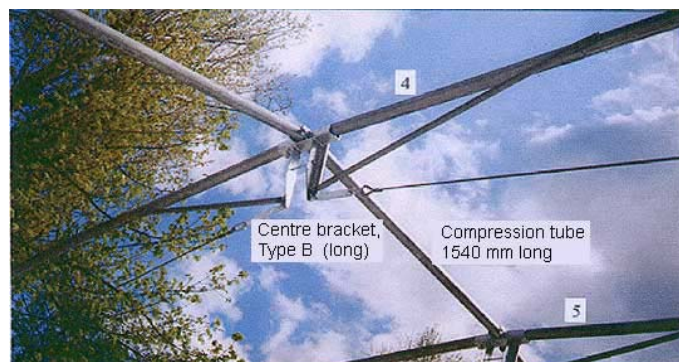
Fit the 1540 mm Compression tube between frames 1 & 2. The manual winch is clamped to this tube at a convenient height.

At this stage the back half of the BubbleBarn should be free-standing and you can remove the ropes which were supporting frame 5.

Frame(s) number 5T

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type B (long)
- 2 type C tension tubes,
- 4 stay tension plates,
- 2 wire stays,



- 2 turnbuckles
- 4 maillons
- 10 Compression tube brackets
- 1 winch roller
- 5 m10 x 90 bolts,
- 2 m10 x 80 bolts,
- 2 m10 x 30 bolts.

These centre frames are assembled very like frame 5 except you must bear in mind there will be three type A 2072 mm compression tubes and two Type B 2072 mm compression tubes going to frame 5 (or another 5T) and the same number on the other side going to frame 6 (or another 5T).

Fix the frame to the 5T Base plates, raise it to the vertical and connect it to frame 5 (or another 5T) with the compression tubes.

Fit three Covering tubes with the coachbolts (head up so as not to wear a hole in the cover) across each set of type A 2072 mm compression tubes.

These prevent puddles forming at the very top of the BubbleBarn.



If you have more than one 5T frame, diagonal wire braces should be fitted.

Note that at this stage the 'vertical' frames 5 & 5T may not be very vertical. This is normal. The structure is quite flexible and it should stabilize once you have fitted frames 6 – 10.

At this stage the lower frames, especially frames 2 & 3 will have a pronounced 'sag' to them. This is normal and is corrected when the cover is fitted. The weight of these frames helps to keep the cover taut.

The main opening



Before proceeding with frames 6 – 10, check frame 1 is securely attached to the end base plate and the end base plate is securely bolted to the concrete pad. If it is not, there is a risk the entire structure can 'tip' on it's face as the weight of frames 6 – 10 is added.

Instead of the 1544 mm Compression tubes used in the rigid back half of the BubbleBarn, a chain is used so the door can concertina open. It is important that the top brackets on frames 6 – 10 are all fitted the same way round so that the chain is always on the same side.

Frame number 6

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type B (long)
- 2 type C tension tubes,
- 4 stay tension plates,
- 2 wire stays,
- 2 turnbuckles
- 4 maillons
- 5 Compression tube brackets
- 1 winch roller



- 5 m10 x 80 bolts,
- 2 m10 x 30 bolts.

This frame is assembled very like frame 5 except you must bear in mind there will be three type A 2072 mm compression tubes and two Type B 2072 mm compression tubes going to frame 5T but none on the other side going to frame 7, a chain is used instead.

Fix the frame to the main base plates in a mirror image of the same hole as you fitted frame 5 to its base plate, raise it to the vertical and connect it to frame 5T with the 2072 mm compression tubes.

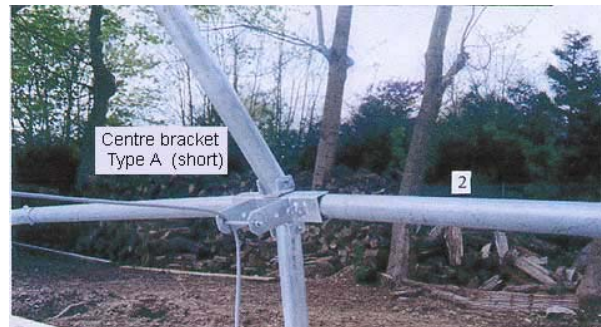
Fit three Covering tubes with the coachbolts (head up so as not to wear a hole in the cover) across each set of type A 2072 mm compression tubes. These prevent puddles forming at the very top of the BubbleBarn.

Fit the chain to the top bracket with a small bolt through the hole provided.

Frame number 7

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type B (long)
- 2 type C tension tubes,
- 4 stay tension plates,
- 2 wire stays,
- 2 turnbuckles
- 4 maillons
- 2 winch rollers
- 5 m10 x 80 bolts,
- 2 m10 x 30 bolts.



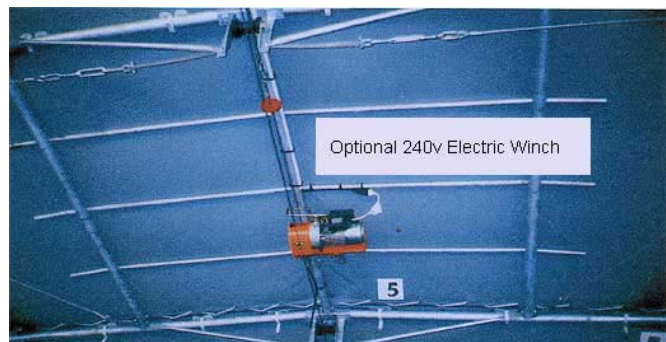
Assemble the frame on the ground as before, no compression tube brackets should be fitted.

Lift the frame and connect it to the chain you fixed on frame 6 with a small bolt. The length should be approximately 1540 mm so it mirrors the position of frame 4.

Frame numbers 8 & 9

Assemble the following components:

- 2 type A Arcs,
- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type A (short)
- 2 winch rollers & Bolt
- 1 m10 x 80 bolt,
- 4 m10 x 70 bolts



These are simpler frames without the tension reinforcements, the same as frames 3, 2 & 1 except they all have 2 winch rollers. Assemble the frame on the ground as before, bearing in mind that the top brackets should be the same orientation as you fitted on frames 6 & 7 so the chain is always on the same side.

Lift them into place and connect the chain to the top bracket with a small bolt as they are completed.

Frame number 10

Assemble the following components:

- 2 type A Arcs,

- 2 type B Arcs,
- 1 type C Arc,
- 1 Centre bracket, Type A (short)
- 1 winch roller & Bolt
- 1 m10 x 80 bolt,
- 4 m10 x 70 bolts

These are simpler frames without the tension reinforcements, the same as frames 8 & 9 but with one winch roller. Assemble the frame on the ground as before, bearing in mind that the top brackets should be the same orientation as you fitted on frames 6 & 7 so the chain is always on the same side.



Fit the end base plate so it connects with the centre bracket of frame 10. Rawlbolt to the concrete pad. Frame 10 is secured with a chain and a padlock may optionally be fitted.

Manual or 12/24v winch opening

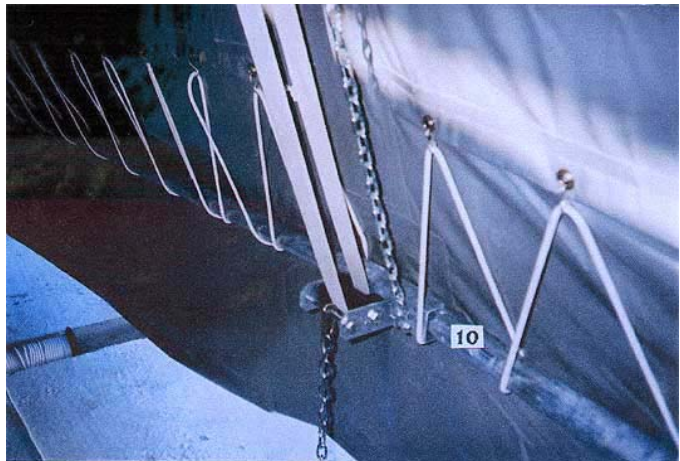
Fix the end of the 11000 mm door opening strap with a long bolt through the upper roller hole of frame 6. The strap should lead through the upper rollers of frames 7, 8 & 9, around the roller of frame 10 and back through the lower rollers of frames 9, 8 & 7. It should be fixed to the winch cable which should lead through all the remaining rollers to the winch.

Fitting the cover

Before fitting the cover, carefully inspect the frame for any sharp edges which could cause the cover to rip or chafe. Look particularly at every compression tube bracket, it may be necessary to dress sharp edges with an angle grinder, hacksaw or file.

The covering is made up of three components, two identical 'oval' tarpaulins and one rectangular tarpaulin for the centre section.

Covering begins with the laying of the back 'oval' part. The side with the Velcro strip is located at the top. Secure the cover on frame 5 making sure that the central support band is properly secured and the tarp is tightly pulled from the top to the bottom of the arch.



Repeat this procedure on the front opening 'oval' part.

Finally, fit the centre rectangular part, making sure all the Velcro joints are securely fastened. This part has a small access door and it may be positioned either side.

All the frames should be fixed to the tarpaulins from the inside. Sometimes some 'manipulation' of the frames is required to get them to fit properly. Note in particular that when the main opening is closed the chain should be slack and the entire weight of the frames should 'hang' on the tarpaulin. This serves to keep it taut.

Finally, loop the bungee straps around the bottom tubes of the entire circumference of the BubbleBarn so that the cover is tight.

That is it, your BubbleBarn is ready for use. It might be of interest that our record speed so far is 6 hours for putting up a BubbleBarn. We would be greatly interested to know how long it took you, what problems you had and any brilliant ideas you might have to improve either the structure, the method of erection or indeed these instructions.

We would also be interested as to the different types and numbers of aircraft you have managed to fit in your BubbleBarn, most particularly we are interested in any you have NOT managed to fit in it.

Floor

Ideally the floor should be concrete, however if this is not possible it is important to install some sort of damp proof membrane or in certain weather conditions there is a risk of an excessive build-up of condensation on the inside of the cover derived from a damp floor.

A simple solution is to lay a large sheet of 'visqueen' polythene or a pool liner on a smooth earthen floor and then cover it with a layer of pea-shingle. If one or more sheets are used, make sure there is a substantial overlap oriented correctly with any slope so water cannot seep through the joint.

Operation

Wind

There is a limitation of about 25 MPH wind blowing directly into the open door of a BubbleBarn. This may be alleviated by siting the BubbleBarn in a sheltered location facing away from the prevailing wind direction.



Do not open the main door in a headwind of more than 25 MPH

Never leave the bubblebarn open in high winds.

Snow



Snow removal is mandatory above 10 cm of snow.

Only open main door after snow is removed.

Repairs

The cover is the only thing likely to sustain any serious damage and this is permanently repairable by welding, however, depending on the severity of the damage, it may be necessary to remove the cover from the frame for repair.

Superglue and a patch will make a lasting repair, ensure all surfaces are absolutely clean before applying.

Most types of adhesive tapes will not last long.