

THE DIFFERENCE IS AIRWAVE

# *VISION PULSE*

*THE ULTIMATE RECREATIONAL HANG GLIDER*

## *10 M & 11 M OWNERS' MANUAL*



# T A B L E O F C O N T E N T S

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C h a p t e r I

## I N T R O D U C T I O N

Congratulations on the purchase of your PACIFIC AIRWAVE VISION PULSE. We believe this glider to be the finest available recreational flex-wing glider in its class on the market today. It achieves exceptional performance and superb handling for many reasons. It has a sailcut that is carefully matched to the composite leading edge curve, a fully enclosed floating crosstube, a tri-laminate leading edge pocket internally reinforced with a foam sheet insert, and a carefully engineered tip panel. Drag is reduced with a faired kingpost & faired uprights (optional). These features combine to ensure a good usable glide angle, an excellent sink rate and a broad speed range making the VISION PULSE both an excellent entry-level glider and a reliable soaring wing.

The VISION PULSE incorporates some beautiful new hardware specifically developed for the Magic Series, which added to the classic existing hardware, keeps Airwave gliders clearly ahead of our competitors. The new features ease set-up and breakdown, make for easier interchanging of parts, decrease weight and parasitic drag, and advance glider tuning capability.

Please Note —

Like any high-performance machine, it has been manufactured and tuned to close tolerances and its performance and safety depend on your maintaining those tolerances. We require that you read this owner's manual thoroughly and follow its instructions to the letter when you set up the glider, fly it, break it down for storage or shipping, or perform repairs or maintenance on it. Failure to do so will compromise the safety of your glider.

**ABOUT THE  
AIRWAVE SERIES**

AIRWAVE Magic gliders have been manufactured since 1982, and are designed to be leading performance wings, with a premium placed on ease-of-flying. Innovative in sail, rigging, and hardware technology, AIRWAVE gliders quickly became a leader in the hang gliding industry. During the last seven years, Magics have in total combined to win more World, European, and National titles than any other manufacturer's wing.

The original Magic series (Magic through Magic IV) were medium aspect-ratio, high-performance double-surface hang gliders. They were perhaps best-known for offering their maximum performance with a minimum of on-going pilot input -- in other words, they climbed and cruised remarkably well without the pilot constantly trying to out-wrestle a recalcitrant glider. Other gliders of the mid-1980's may have "looked" like they should have had remarkable performance, but handling problems associated with higher aspect ratio planforms made the balanced feel of the Magics result in better overall usable performance.

The Magic FORMULA was designed to fill the pilot skill/soaring level gap between the VISION series and the top of the line Magic K2 series. With a new generation of hardware and junction fittings, coupled with the performance advantages of the KISS planform and super-easy handling/coordination, the Magic FORMULA 154 & 144 have now become the industry standard for recreational performance & X-C gliders.

The original VISION was a breakthrough in design: a high performance, double-surface glider that was appropriate for the entry-level pilot. Advances in the VISION design have always kept the needs of the Novice pilot in mind and the VISION series' progress has been phenomenal. The VISION-ECLIPSE and VISION MARK IV were leaps in engineering with the VISION PULSE now proving itself to be the ultimate recreational glider. Its lightweight frame, simple construction, quality hardware and friendly flying characteristics are added to the industry-leading service of PACIFIC AIRWAVE and offer the Novice pilot a package that's unequalled.

**GLIDER DESIGN  
OBJECTIVES**

Performance through simplicity is always a major PACIFIC AIRWAVE design criteria. The design teams at Pacific and British AIRWAVE learned a great deal more about hang glider flight behavior, turn coordination, tracking, and overall glider "feel" during the exhaustive FORMULA project. Where the original Magic KISS handled with extraordinary lightness, it required a bit more ongoing pilot input than the original Magic series did. With increased demands on the pilot, the KISS was less suitable for first-time pilots, and to a lesser extent for infrequent-flying recreational pilots. The Formula took the basic Magic KISS platform, and without sacrificing soaring performance, reduced pilot input demand significantly. The VISION PULSE was designed to incorporate the more straight-forward handling characteristics of the Formula, and additionally utilize the new hardware developed specifically for that glider.

The end result is that the VISION PULSE is a glider which performs extremely well, yet is incredibly "user friendly." It is strong, certified to a V.N.E. of 46 Mph; is cleaner, utilizing new streamlined hardware and is more tuneable, with fully adjustable Trim Tips™ at the leading edge sail mount area. Most importantly, it inspires superb confidence through a very solid feel at the hands of the glider's pilot, without sacrificing necessary quickness of response.

The VISION PULSE is well-suited to the Novice pilot, HGMA Certified for Hang 2 and above, displaying the best slow speed handling available on a double-surface glider. Its launching and landing characteristics are spectacular and its extremely lightweight frame makes ground handling a breeze.

**H.G.M.A.  
TESTING**

The VISION PULSE has undergone extensive testing and has satisfied the standards of the designers and PACIFIC AIRWAVE as a State-of-the-Art recreational ultralight glider.

The VISION PULSE has met or has exceeded the requirements for certification by the Hang Glider Manufacturers Association. The 10m was certified by that agency on Jan 28, 1992; the 11m on March 10, 1992. You should note, however, that the glider has not been tested to any state or federal airworthiness specifications.

**Stop!**

**A combination of triple stainless steel trailing edge luff lines, and carefully engineered airframe geometry provide the most effective positive pitching system known to date. Careful test vehicle pitch experimentation was necessary to determine trailing edge line lengths. Altering those overall dimensions, even to the slightest degree, may actually decrease your glider's performance, or more importantly, will reduce its pitch positiveness.**

You can verify the tested configuration of your VISION PULSE by using the HGMA compliance verification sheet found on page 26 of this manual.

## ABOUT THE COMPANY

PACIFIC AIRWAVE Ltd. is directly affiliated with AIRWAVE Gliders Ltd. of Great Britain. The two companies have been co-producing gliders since April 1987. The two companies have a combined research and development experience within the industry of 55 years, and have been building and developing hang gliders to the industry's highest standards. The products of such development has throughout this time have found favor with innumerable pilots from novices to world champions.

The professional approach to hang glider construction now led by these companies uses seamless drawn aluminum manufactured to aircraft standards, the finest Dacron sailcloth, and specially designed fittings. Every glider produced is subjected to rigorous quality control. When complete it is shipped to one of PACIFIC AIRWAVE's world-wide dealers whose knowledge and commitment to the sport guarantees continuity from manufacturer to pilot.

To complement their range of gliders, the two Airwaves also supply high quality accessories from instruments and parachutes to harnesses and clothing.

## ABOUT FLYING HANG GLIDERS

The safe operation of this or any hang glider ultimately rest with you, because hang gliding is an inherently dangerous sport and can induce injury or death, even to very good pilots flying the latest equipment in perfect conditions. Because the responsibility of flying and maintaining the glider rests entirely with you, the risks of damage or injury you may cause to others and to yourself also rest entirely with you. We believe that in order to safely practice the sport of hang gliding, you must maturely accept this responsibility, fly conservatively, and avail yourself of all safety equipment appropriate to the conditions you fly in.

## Warning !

**No glider is totally safe. It is entirely possible to push the VISION PULSE beyond its tolerances and break it. Very strong flying conditions may also cause structural failure. Acrobatic maneuvers, pitch angles beyond 30° up or down, bank angles exceeding 60°, aggressive stalls, and spins are maneuvers that should never be attempted under any circumstances.**

Your PACIFIC AIRWAVE VISION PULSE combines the best blend of high performance, rugged construction and easy handling that the art/science of hang glider design allows. Properly maintained and flown within its design limits, it will provide you many years of soaring pleasure. But, like any aircraft, its safety is directly proportional to your diligence in maintaining and repairing it properly, and to your ability to fly it intelligently and conservatively.

We hope your glider will provide you with many hours of great flying.

All of us at PACIFIC AIRWAVE would like to welcome you to the growing family of Vision pilots!

**Enjoy your beautiful VISION PULSE and....**

**SEE YOU IN THE SKY!**

Chapter I I**S E T - U P & F O L D - D O W N  
P R O C E D U R E**

Your VISION PULSE's unique components were designed to set-up in the simplest, most efficient manner.

The instructions given below provide you with the step-by-step procedure for setting up your glider. By closely following these instructions, you can assure yourself a smooth, damage-free set-up.

**SET-UP***Please Check ....*

**1. ASSEMBLE THE CONTROL FRAME.** Place the glider on the ground with its nose into the wind and with the zipper facing upward. Unzip the cover bag, remove the ribs from the nose area, undo the glider ties and assemble the control frame.

**That all the rigging is outside of the control frame and check that the bolt, speed-nut™ and split ring are fully assembled, inserted through the elbow fitting.**

**2. RIGHT THE GLIDER.** Roll the glider over so that it is the right way up and standing on the control frame (do not attach the lower front wires at this time).

**3. REMOVE BAG, SPREAD WINGS.** Remove the cover bag and all the ties, but not the tip bags. Carefully walk each wing out to its approximate flying position, clearing the top side wires and bridle lines from the keel area to insure that they do not catch.

**Stop!**

**CAUTION : At this stage it is essential to ensure that the keel and the leading edges are always in the same plane.**

The kingpost, with all top rigging attached to the top cap assembly, will be found directly over the keel tube with its base assembly on the special pocket provided at the back of the VISION PULSE's "swallowtail" area.

Install it now by placing its base pin in the hole located directly over the control bar apex -- INSURE THAT THE DOUBLE CROSS-TUBES RESTRAINT CABLE IS ROUTED ON BOTH SIDE OF THE KINGPOST AND NOT "PINCHED" UNDER THE KINGPOST BASE FITTING.

**4. INSERT RIBS #1 - #6.** White ribs to the right, black to the left. Insert the ribs from root to tip with gentle pressure, until the rib meets resistance, then lift the sail at the trailing edge and gently shake in order to billow it out. This enables the rib to be completely inserted over the crosstube.

**DO NOT FORCE!**

..... All ribs on each side are secured in position with a "double purchase" method. To secure, place the bottom loop onto the rib end fitting and pull the top loop over and into the fitting notch. Do not install the straight tip rib, nor remove the tip bags until the crosstubes have been tensioned to avoid unnecessary rib tip wear. With the crosstubes tensioned, the tips will then be pulled up off of the ground.

**5. TENSION THE CROSSTUBE.** With the wings spread fully and the nose wire detached, find the cross-tube tensioning cable and pull on it using the webbing handle. Keep well to the rear of the sail for maximum leverage. First ensuring that the cable is not twisted, pull the cables back until the shackle, which you have pre-positioned to "point" down, is inserted in its corresponding catch on top of the keel tube. The spring pin safety will lock the shackle in position.

**6. INSTALL TIP RIBS, TIP FAIRINGS.** To do so, look through the leading edge pocket at the wing tip and locate the tip hook on the top of the leading edge, located 22" from the tip. Secure the tip rib with the same "double purchase" method described above in step #4. Then, install the sail tip fairings, mating the velcro on the fairings with its counterpart on the inside of the sail at the tip.

**9. INSERT THE NOSE RIB** "tail end first" from the nose of the glider, seating the front end of the rib on the keel in front of the noseplate in its locating hole.

**10. ATTACH FRONT FLYING WIRES** to the keel with the nose latch and secure by inserting the shackle into its catch.

**11. INSPECT THE INTERIOR OF THE DOUBLE SURFACE,** performing a visual preflight of the leading edges, cross-tubes and the junctions, before zipping this area closed. Ensure that the velcro section forward of the keel pocket is secured properly.

**12. INSTALL THE NOSE SHROUD,** starting with the two top velcro tabs and gently pulling the shroud down and around the nose plate to connect the two bottom velcro tabs on the shroud to its corresponding tabs sewn on the undersurface below the noseplate.

**13. INSERT LOWER SURFACE RIBS.** There is the possibility of missing the rib pocket as the ribs enter the sail--carefully guide the rib into the rib pocket. When the rib reaches the leading edge pocket, push up on the double surface near the leading edge and finish inserting the rib until it disappears within the sail, leaving only the pull string remaining outside the pocket.

## PREFLIGHT INSPECTION

The nature of the VISION PULSE is such that many of the preflight checkpoints common to other flex wings are hidden to eliminate parasitic drag. Following the checklist below will ensure that you do not miss any critical points during this all-important procedure.

A thorough preflight procedure is mandatory with all aircraft, and the best technique is a circular walk around the glider. Start at one location, the nose plate, and check each assembly point available for inspection. **Keep in mind the three most critical set-up checkpoints are the:**

1. — **Nose catch**
2. — **Control frame basetube bolt**
3. — **Crosstube tensioner and kingpost wire**

As described in the set-up procedure, ensure that all cable catches are properly positioned.

## PREFLIGHT PROCEDURE

### Starting at the nose:

1. Sight along both leading edges, checking for similar curves.
2. Walk towards the tip, feeling for dents in the tube.
3. Pause at the wing bolts and look into the sail through the zipper inspection access. Check all side rigging terminals.
4. Continue to the tip and check the sail tip area for proper seating on the leading edge tube, and sail integrity.
5. Walk to the keel, checking the ribs to ensure that they are properly secured, with either the double-purchase bungies / strings.
6. Check the luff line attachment points, both at the kingpost and trailing edge grommets. Ensure that the luff lines are not wrapped around the rib ends.
7. Check the crosstube wire-to-keel catch connection.
8. Repeat items 2 to 7 in reverse order.
9. Check the nose catch.
10. Check the nose cone for secure attachment.
11. Check all the lower rigging for proper routing.
12. Check that the control frame uprights are straight and that the bolt is correctly assembled with Speednut™ and ring, taking care to note that the bolt passes through the elbow fitting.
13. Look inside the double surface for the proper positioning of the crosstube restraint cable, attachment of the keel pocket velcro and for the regular bolt/nut/safety inspection in general.
14. Install and set your instruments. Perform a "Hang Check" to ensure proper height off the base tube, that your harness lines and leg loops are routed properly, and that your carabiner is locked securely inside both the main and secondary suspension straps.



**FOLD-DOWN  
PROCEDURE**

To fold down your VISION PULSE, just reverse the set-up procedure steps as described in the previous section. Included below are a few guidelines to follow which will save you time and prevent wear areas on your sail.

**IMPORTANT:**

**While setting up or relieving the VISION PULSE's crosstubes and airfoil from tension, the rear of the keel must remain on the ground and the nose wire must be detached.**

1. Always try to fold the wings together symmetrically, bringing both leading edges back together at the same time. (An alternative to having help bringing in both leading edges at once, is to bring in one a bit, then the other a bit more, in three to four incremental steps.) Make sure that the X-tube tensioning lines are free to run forward.
2. Roll or fold the sail into the foam reinforced leading edge pocket. Route one sail tie over the keel just behind where the top lateral cables emerge from the sail, a second one halfway between the control frame apex and the noseplate holding the leading edge pocket overlapped, and the third sail tie about two feet inboard from the leading edge tip. Do not over-tighten your sail ties: this keeps the leading edge pockets, foam inserts, and the rest of your sail free of undue wrinkles and creases.
3. Pads connected to the cover bag are provided to eliminate wear. The bottom control frame pad should include the keel, side cables & all control bar corner fittings. This eliminates wear on the double surface.

**A Helpful Tip !**

The pad should protect the leading edges and cross-tubes from the control bar top assembly. The small baglets are used on the keel end and the base tube end that is not included in the bottom control frame pad.

- a. Remember to install the wing tip bags before releasing the crosstubes.
- b. The top control bar pad is easier to install with the velcro sail ties loosened, and using the hang strap to pull up on the keel area.

4. Generally, if anything offers you resistance during any phase of the VISION PULSE set-up or fold-down procedure, be sure to stop and investigate.

**Always remember: NEATNESS COUNTS!**

**SHIPPING  
BREAKDOWN  
ASSEMBLY /  
DISASSEMBLY**

The VISION PULSE is normally shipped in a full length "ready to fly" configuration. Simply take the glider out of its shipping tube, open the cover bag, and assemble the glider as previously described in the Set-Up Procedure section of this chapter.

The VISION PULSE is capable of being "broken down" to a 13-foot length. This is often necessary to minimize otherwise costly airfreight charges. Some airplanes simply do not have the capacity to accept the full-length glider in their cargo holds. When carrying a glider as excess baggage while traveling, it is usually necessary to break it down to the shorter length.

**ASSEMBLY FROM  
13-FOOT SHIPPING  
FORM**

If your VISION PULSE was shipped to you in the breakdown form, you can reassemble your glider to its full length by following these procedures. You will not need any tools.

1. Unpad all tubing ends. Note the 3/4" deep slots machined at the front end of each rear leading edge section. (The rear leading edge sections are symmetrical)
2. Assemble your glider's control frame (as described in the Set-Up Procedure Section of this manual), and flip the glider on its folded back control bar, laying flat on the ground. Unfold both wings and spread both leading edge front sections a foot on either side of the keel tube.
3. Insert the corresponding leading edge rear section into the double surface from the tip, ensuring in the process that you are not "pinching" or tearing the sail between the tube's extremities (especially the slotted ends).
4. Align both tubes and slide the rear section into its front sleeve until it stops, rotate the rear tube to position the tip rib hook on the top of the leading edge, push in the leading edge rear section the rest of the way (3/4"). It should then be impossible to rotate the leading edge rear tube in its front section.
5. You are now ready to mount the sail onto the leading edge. It is possible to lever the sail on to the tip fitting, using the webbing handle.

*Please Check ....*

The entire tip assembly for symmetry.

6. With all other shipping pads removed, your VISION PULSE is now ready to be fully assembled as described above in the Set-Up Procedure section of this chapter.

**BREAKDOWN FOR SHIPPING**

Carefully reverse the above procedure, padding all possible wear points. Following these helpful hints will reduce the risk of handling damages:

1. When stowing the aft leading edge sections within the rest of the glider, pay special attention to carefully padding them from being crushed or dented.
2. Pull the nose rib. Fit the ribs into an area in the mid section of the package.
3. Pad the nose plate assembly heavily. All exposed tube ends should be padded and taped.
4. When folding the foam pocket be sure to avoid heavy creasing.

**And, as always, remember: NEATNESS COUNTS!**

Chapter IIIFLYING THE VISION  
PULSE**FLIGHT  
LIMITATIONS**

Placards bearing test flight information and operating limits are located on the glider's keel behind the crosstubes pull back cable catch.

Special care should be taken to note the operating limitations which are clearly stated on the flight operation placard as follows:

**Warning !**

**FLIGHT OPERATIONS** should be limited to non-aerobatic maneuvers—those in which the pitch angle will not exceed either 30° nose up or nose down of the horizon and in which the bank angle will not exceed 60°.

**WARNING**— The owner and operator must understand that, due to the inherent risk involved in flying such a unique vehicle, no warranty is made or implied of any kind against accidents, bodily injury, or death. Operations such as aerobatic maneuvers or erratic pilot technique may ultimately produce equipment failure and are specifically excluded from the warranty.

**H.G.M.A.  
OPERATING  
LIMITS**

	PULSE 10M	PULSE 11M
<u>Wing Loading</u>		
Optimal weight range	130-185 Lbs	185-235 Lbs
Usable weight range	120-195 Lbs	160-260 Lbs
Maximum stall speed	25 Mph	25 Mph
Minimum top speed	35 Mph	35 Mph
Max speed		
Maneuvering / rough air	46 Mph	46 Mph
VNE /Speed never to exceed	46 Mph	46 Mph
Load limits Pos. @ 30°	51 Mph	51 Mph
Load limits Neg. @ 30°	37 Mph	37 Mph
<u>Recommended U.S.H.G.A. rating</u>	II - V	II - V

***Please Note !!***

Glider Class: Utility. **This glider must not:**

- a) Be flown by more than one person at a time.
- b) Exceed 30° nose up or down to the horizon.
- c) Exceed 60° bank angle left or right to the horizon.
- d) Be flown inverted or backwards.
- e) Be towed and/or flown with auxiliary power unless approved and tested by the factory. (Call Pacific Airwave for more information.)

**Warning !**

CAUTION: Speed never to exceed is 46 mph. The VISION PULSE, even when flown in its lightest wing loading, can exceed that 46 mph airspeed !!.

**NEVER FLY FASTER THAN 46 MPH.**

**FLYING  
TECHNIQUES****TAKE OFF**

The VISION PULSE is quite statically balanced and is very easy to launch in both calm and windy conditions. When you hold the glider prior to your take off run, you should have the nose slightly elevated and the wings level. Perform a "hook in check," then run hard and smoothly ease the control frame out for lift-off.

For windy conditions, the glider behaves quite reasonably due to its tight rigging, and handles soaring/cliff launches with ease.

**TURNS**

The VISION PULSE has straight-forward flight characteristics, typical for a defined airfoil flex-wing. The glider can be easily directed into a turn, even at very low flying speed. However, to obtain the best handling characteristics and fast roll rate, it is advisable to pull in for a little extra flying speed then, to enter the turn, move to one side and push out slightly. The VISION PULSE will maintain in a turn of a certain bank angle and radius until the turn is removed.

**Warning !**

**Give yourself an extra margin of safety. Do not fly your glider at the slowest possible airspeed when scratching for lift close to the terrain.**

The glider has neutral spiral stability designed into it; "hands off" in a turn, the VISION PULSE will remain at a slight to moderate bank angle. This is desirable feature in an recreational pilot's glider

**STRAIGHT  
FLIGHT**

The VISION PULSE requires relatively light pitch inputs. This means that it is quite easy to increase airspeed rapidly and the usable speed range of the glider is quite wide. Until fully familiar with the flight characteristics of the glider, care should be taken when accelerating to higher speeds since it is possible to set up a pilot induced oscillation (P.I.O.) in yaw. Over-correction can cause increased P.I.O.'s. If this occurs, slow down to normal flying speeds and all will return to normal. Practice accelerating your glider in smooth conditions until, after several hours on the glider, you will learn to compensate correctly and any initial oscillation problem will evaporate.

**THERMALING /  
SOARING**

This is also very straight-forward. The trim speed of the VISION PULSE is slightly faster than the speed that will give you the best climb rate in a thermal. Once you have centered in a thermal, push out as much as possible without stalling. Maintain anywhere from a 10° to 60° bank angle, depending on the nature and diameter of the thermal. The glider will maintain a certain bank angle and radius without further input. The VISION PULSE feels very good in turbulence and it does not get displaced very easily by even strong turbulence.

**YAW CONTROL**

Some pilots accustomed to lower aspect ratio gliders may discover a new way of controlling a hang glider: Using the control bar base tube pretty much as a "handle bar" while flying at slow speed, is possible to control your VISION PULSE's Yaw axis. You will soon learn to use this trait to your advantage in light conditions. However, for those pilots new to high performance gliders like this, they need to learn to not exacerbate the yawing characteristics by overcontrolling it; relax.

**PITCH PRESSURES**

The VISION PULSE is one of the least tiring glider on the market to fly, because of its ideal combination of light control inputs and inertia. It must be mentioned, however, that the glider exhibits lighter pitch pressures in terms of "feedback" to the pilot's input than lower aspect ratio gliders.

***Please Note!***

Because of this characteristic, the VISION PULSE will accelerate fairly rapidly with a minimum of pitch input from its pilot.

**STALLS**

When practicing stalls always make sure that you have sufficient altitude. The stall characteristics of the VISION PULSE are very straight forward. If you push out slowly, it is hardly possible to stall the glider at all and the VISION PULSE will mush without a tendency to drop a wing. The sink rate is more than doubled, if you 'fly' the glider in this mode. If you push out harder, the nose of the glider will come up a little higher. This is followed by a gentle pitch down as the glider stalls completely, and the glider will then regain flying speed. There is not a lot of altitude lost in this type of maneuver.

**Warning!**

Never stall your glider completely with the nose pitched-up very high. This is one of the most uncontrollable and dangerous maneuvers for any tailless aircraft and can result in a tailslide and severe tumble. Stalls in a coordinated turn are difficult to do by mistake. If you push out too much in a turn, the glider will turn tighter, unless you are flying very very slowly in which case you may enter a spin.

**SPINS**

The VISION PULSE is characteristically resistant to spins, but if it does enter one, pull in and the glider will recover quickly from the spin (half a turn) without entering unusual attitudes and without extreme loss of height. This is due to the glider's positive roll-yaw coupling and a neutrally balanced roll characteristic.

**LANDING**

This is a simple matter. Your final approach should be a straight glide into the wind at faster than best L/D airspeed. Bleed your speed off slowly, wings level, and ground skim onto your chosen landing spot. In light or no wind conditions a full flare is required. When it is time to flare, flare aggressively and hold the control bar uprights out and up. Do not allow the nose to rotate down!

***Please Note!***

Although it is possible to make steep approaches to a landing area or target utilizing the mush mode, this should only be done in steady, smooth winds. It is not recommended to mush the VISION PULSE all the way to the ground.

**IMPORTANT  
NOTICE**

As with any high performance aircraft, special care should be taken to note the operating limitations which have been ascertained by careful testing.

Flight operations should not exceed those laid down in the operating limits at the front of this manual.

**Warning !**

No aircraft is totally safe; there are inherent risks involved in flying a hang glider. It is quite possible to fly the VISION PULSE beyond its operating limits: **Do Not Do This !**

**YOUR SAFETY!**

The responsibility for safety rests ultimately with the pilot who must decide whether the aircraft he / she is about to fly has been properly maintained, preflight checked and is in airworthy condition.

**PLEASE NOTE !! : YOUR VISION PULSE PITCH STABILITY & AIRWORTHINESS IS DIRECTLY RELATED TO THE GLIDER'S PROPER LUFF LINES HEIGHTS.**

**IN ORDER TO VERIFY THE PROPER HEIGHT OF THE LUFF LINES OVER THE KEEL, YOU MUST STRING A VERY LIGHT CORD OR STRING BETWEEN THE TWO GROMMETS LINKING EACH CORRESPONDING LUFF LINES ON EACH WING, ENSURE ENOUGH TENSION IN THE STRING TO AVOID ANY "SAG" AND MEASURE THE PERPENDICULAR DISTANCE BETWEEN THE STRING & THE KEEL. IT SHOULD BE AS FOLLOWS:**

PULSE 10 M    INNER : 4. 1/2"  
                  CENTER: 5"  
                  OUTER : 5 1/2"

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PULSE 11M    INNER : 4 3/4"  
                  CENTER : 5 1/4 "  
                  OUTER : 5 1/2 "

Chapter IV**GLIDER CARE &  
MAINTENANCE****TRANSPORTATION  
& STORAGE**

The VISION PULSE should always be stored with the zipper facing up, especially during transportation. There are fewer potential "wear points" with the glider riding this way.

Avoid hard spots pressing on the glider during transportation or storage and have as many supports as possible; we recommend using a three-point support system, with less than four feet of unsupported glider extending off of either end.

Use rope or webbing rather than elastic to secure the glider, and tie both ends of the glider to a support or down to the ends of the vehicle in order to prevent the glider from flexing. Take care to not overly tighten the glider tie-downs, as this can crimp your foam leading edges. A good technique to use is to squeeze and compress the glider's foam, sail, and leading edges into a snug bundle when folding down. Squeeze it together again as it gets tied down, and it will not be so apt to have the foam spread out and get sharply creased as it is secured to the rack.

*Please Note!*

It is preferable to keep the glider dry. Definitely ensure that it is dry before storing for longer than just overnight. Any contact with salt water, of course, requires immediate rinsing with fresh water to prevent corrosion to hardware, rigging and tubes.

**FLIGHT  
TUNING &  
TROUBLE-  
SHOOTING**

The VISION PULSE has undergone a rigorous test-flying program in a wide range of conditions. As a result, it is precisely tuned to achieve maximum flying performance. Therefore, it should not be necessary to make any changes in your glider's tuning or configuration.

If, however, any adjustments are made on your glider, we recommend that they be noted in the Maintenance Log at the end of this manual. It is then easy to go back and trace the chronology of tuning changes.

**Stop!**

**Please bear in mind that certain adjustments, like the cross-tube sweep setting, are very critical and often create tradeoffs in handling, performance, or—more critically—adverse effects on safety.**

Of course, additional advice and the latest factory information are available through your local PACIFIC AIRWAVE dealer, or from experts at the factory.

**PITCH TRIM**

Adjustment is accomplished by moving the hang strap on the griptape. To make the glider trim faster, simply move the hang strap forward; to slow the trim speed, move the strap rearward. The difference in trim speed between having the hang strap all of the way forward on the grip tape to all of the way back should be about 5 -8 mph.

You should also understand that heavier pilots may make a glider trim slower than a smaller pilot, due to the additional sail twist created by a heavier wing loading. This understanding is particularly useful for conversing with other pilots flying the same glider, when exchanging technical glider trim information.

**Warning!**

**The main hang strap is always the shortest of the two.**



**ROLL/YAW TRIM**

Your VISION PULSE should of course be maintained in perfectly symmetrical roll/yaw trim. Through time and use, however, your glider may indeed become unbalanced. This can occur through a number of events such as: a bad landing on a wing, hard aerobatic maneuvers which heavily load one wing, or thermalling predominantly in one direction. These latter two phenomenon usually involve asymmetrical sail stretching (as opposed to frame problems), and the former may possibly as well. It is probably silly for us to caution against crashing (who deliberately crashes?), but in the interest of keeping your glider flying straight, heeding our advise about balancing your flight maneuvers from side-to-side to prevent asymmetrical sail stretch is a good idea.

If indeed for whatever reasons your sail has become asymmetrically stretched, and a serious turn has developed, you may simply have to live with it. There are a number of tuning techniques, listed below, which usually can resolve all but the nastiest of turns, be the origin found in the frame, the sail, or both.

**BEFORE TUNING OUT  
TURNS**

In order of priority, perform the following checks to ensure that a turn is not caused by something asymmetrical in the ribs or frame; then you should proceed to examine other potential problem areas. The things which you should check first are as follows:

1. Ensure that the rigging is correctly aligned about the fittings.
2. Check the ribs against the rib chart
3. Check that the rib cord tensions are the same on both sides.
4. Check that the keel is straight.
5. Check that a leech line (inside the trailing edge hem) has not been inadvertently pulled.
6. Check that the sail is mounted correctly on the leading edges.
7. Check that the leading edge tubes are straight.

**Stop!**

If you cannot find a significantly bent leading edge, it is still possible that one of the leading edges has been stressed in a hard landing and this results in asymmetrical bending characteristics of the leading edges.

**A Helpful Tip !**

A method which has been developed at the factory to check leading edge stiffness for side-to-side symmetry, is as follows:

- a. With the sail removed from the frame, support the leading edges at the crosstube junction & secure the front (nose) end of the tubes.
- b. Hang a 15 to 25 lb. weight from the aft end of the tube.
- c. Note the angle of tube deflection, and compare it with the tube from the other side.

Once having determined the side-to-side symmetry, or lack thereof, you may proceed to examine other possible problems, or correct for the tube asymmetry. (This is not always necessarily critical and the turn can be tuned out by using some of the techniques listed below). It may be necessary, given you have detected seriously asymmetrical leading edge deflection characteristics, to replace a leading edge section.

**GLIDER TURN  
REMEDY  
TECHNIQUES**

Once having determined that there still is a turn after exhausting the possibilities listed above, then it may be necessary to adopt one of the following techniques.

1. **Adjustable Tip Plugs.** These are specifically designed to accommodate twisting the sail area at the tip up (to slow the wing), or down (to speed the wing). Note also that the tip plug can be moved in or out via shims; differential leading edge does not normally effect pitch/roll trim significantly, however. Leading edge tension adjustment with the tip plugs should be primarily used to adjust handling/performance preferences, and to accommodate sail stretch over time.
2. **Differential Rib Tension.** Tightening the rib tension also has the same effect as increasing the camber. Try tensioning the ribs on the slow wing, but not beyond the outboard three ribs. Do not tension the inboard ribs--this will only serve to adversely effect the handling.
3. **Differential Rib Bending.** The only two ribs that should be changed are the outside two curved tip ribs.

***Please Note !***

If your glider has a right turn in it, the ribs on the right-hand side would require an addition of approximately 1/2" of camber to the slow wing (in this case the right wing). The camber of the corresponding ribs on the fast wing should be decreased by approximately 1/2".

**Stop!**

It should be noted that excessive cambering of the tip ribs can result in pitch stability problems. This method seems to work with some mild turns but is not as effective as it used to be with gliders of the past.

### ANOTHER CONSIDERATION

A technique for removing turns which has worked in some cases involves remounting the sail of the glider about the frame. Set-up your glider in a ready-to-fly configuration. Remove the two sail mounting screws securing the sail to the leading edge at the nose plate and "feed" a loose string through both grommets and between the two nose plates.

Fly your glider and perform quick roll reversals and a couple of moderate-G "pull-ups." The idea here is to give the sail the greatest possibility of shifting on the frame during flight loads. Is the turn now gone or greatly reduced? Now, show off your pilot skills and land perfectly, without abruptly touching any part of the glider to the ground; otherwise the landing may inadvertently shift the sail position and adversely modify your findings from during the flight.

After landing, are the sail grommets at the nose plate area still lined up with their respective holes or are they offset? If so, this indicates that the sail was previously asymmetrically loaded.

When performing this procedure, keep in mind the interplay between the leading edge tension and the position of the sail at the nose if you have asymmetrically tensioned the leading edges; i.e. tensioned one out. Tensioning in effect will want to pull the sail from symmetrical about the nose area, and further, tensioning can be more or less effective when done in conjunction with repositioning the nose sail mount location.

Note that the amount of grommet shift from the original set-screw hole at the nose area may be insufficient to allow a new set-hole to be drilled. If so, the sail shift is likely to be of little consequence, and the sail should be refastened to its original position.

Please do not hesitate to engage PACIFIC AIRWAVE, through your dealer, in clarifying this or any other maintenance procedure on your VISION PULSE.

### HANDLING / SPEED & GLIDE

The only adjustments that are permitted in order to change the handling / performance tuning of the VISION PULSE are rib tensions and leading edge tensions. Tighten the ribs for more performance, slacken the ribs for more handling. The same idea of "tightening increases performance" is true for the leading edge tension, but as with tightening the ribs, expect a deterioration in handling.

**Rib tension adjustment.** Simply retie the knots in a different position to achieve the desired result. As always, make notes of your progress in the maintenance log of this manual.

**Leading edge tension adjustment.** Any change in Leading Edge pocket tension is achieved by adding, removing or replacing Trim Tip™ shim(s). Trim Tip™ shims are available in 1/8", 1/4" and 1/2" inch increments. The number on each shim represents its length (For example: A shim labeled "2" means its length is 2 times 1/8 inch or 1/4 inch).

We recommend that changes or adjustments in leading edge pocket tension be made not to exceed 1/4 inch at the time (1/8 inch increments for higher aspect ratio gliders).

We also recommend that all changes & adjustments in leading edge pockets tension be made to both leading edges. Asymmetrical leading edge pockets tension always deteriorates more of any glider's balanced flight characteristics than it helps.

The procedure to add, remove or replace a shim is quite simple and as follows:

**Step 1 --** You must first remove the sail off the leading edge tip. This is best accomplished by having the glider resting on its control bar, with all ribs removed (including the nose rib), the wings spread about 3/4 of the way out and the washout tubes (if so equipped) folded away.

In most cases, you will be able to "pop" the tip webbing loop off the plastic Trim Tip™ fitting simply by sitting on the ground, facing the nose of the glider. You then grab the leading edge tube with one hand about 1 foot from the tip while pulling, with the other hand, the handle sewn to the tip webbing loop away from the Trim Tip™.

In some cases when the leading pocket tension is high ( too high??), a flat screwdriver or any other flat prying object may be used, much like a shoe horn, to pry the tip webbing sock off the plastic Trim Tip™ fitting. In this case, be careful not to damage the webbing or the Mylar™ reinforcement patch sewn inside the leading edge pocket tip.

Slip the sail forward about 1 foot.

**Step 2 --** With a felt pen, precisely mark the current position of the Trim Tip™ twist orientation (insure that the mark is extended past all shims and onto the main leading edge tube !!).

As a twist orientation reference line, we suggest that you project the imaginary line created by both set screws heads.

**Step 3 --** With a proper size "Phillips" screw driver, un-screw both set screws a **maximum of 4 complete turns** and sharply push the screw heads back in their recessed hole.

**Step 4 --** The whole Trim Tip™ assembly should now be able to be removed and at this time you should add, remove or replace any shim as desired.

**Step 5 --** Place the whole assembly back in its leading edge, carefully orientating it to match the reference line created in step 2.

**Step 6 --** You can now re-tighten both set screws to lock the assembly in position. **Do not over-tighten !** You should need to only re-tighten the same number of turns that you loosened plus perhaps another 1/2 turn. Once you are done, insure once again that the assembly is properly orientated and that it will not rotate.

**Step 7 --** Re-mount the sail tip webbing loop onto the Trim Tip™, ensuring that the webbing itself is properly installed in its slot. You are done.

### Tuning for turns

The tuning and twist orientation of the Trim Tips™ is done very easily and with the glider in a "ready-to-fly" configuration. In other words, unlike any other glider, it is not necessary to de-tension or remove any ribs in order to cure a turn or simply adjust the sail tip twist distribution of your glider. You can just land, remove the tip fairing and proceed as follows:

**Step 1 --** With a felt pen, precisely mark the current position of the Trim Tip™ twist orientation (insure that the mark is extended past all shims and onto the main leading edge tube !!). As a twist orientation reference line, we suggest that you project the imaginary line created by both set screws heads.

**Step 2 --** With a proper size "Phillips" screw driver, un-screw both set screws a **maximum of 4 complete turns** and sharply push the screw heads back in their recessed hole.

**Step 3 --** The whole Trim Tip™ assembly should now be free to be rotated, using a bit of force and both hands for a good grip. We caution that small rotations will have measurable effects so be progressive and adjust in small rotational increments. Pacific Airwave always refers to the INSIDE portion of the leading edge tube (the part of the leading edge tube NOT in direct contact with the sail) when recommending the Trim Tip™ assembly to be rotated UP or DOWN.

**Step 4 --** After the adjustment has been performed, You can re-tighten both set screws to lock the assembly in the new position. **Do not over-tighten !** You should need to only re-tighten the same number of turns that you loosened plus perhaps another 1/2 turn. Once you are done, insure once again that the assembly is properly orientated and that it will not rotate.

**Step 5 --** Re-install your tip fairing. At this time, you should take a few minutes to record the change in this manual. You are done.

As you have just performed a change to the tuning configuration of your glider, the flight that will follow the adjustment will be a sort of test-flight and should be treated with caution. You should also know that, in turbulent air, it is next to impossible to "feel" a glider's behavior or tendencies. We therefore recommend that you perform this test-flight in nice, even air ( ie: early morning, late evening,...).

In general, the inverse relationship between best performance and best handling requires no compromising with the VISION PULSE. Over-tightening of the ribs and/or leading edge cannot really make the glider perform significantly better than a glider in the factory-tuned configuration (trust us... we above all are after maximizing the VISION PULSE's performance!). In fact, there is usually an overall cancellation of any glider performance gain when tuning a glider very stiff--if the pilot can't steer the glider where he wants, when he wants, then in effect there is a net performance loss.

## PITCH TRIM

Pitch trim is accomplished by simply moving the hang strap on the griptape, which is on the keel. Never move the hang point more than 1/2" at a time.

### Please Note !

The main hang strap is always the shortest of the two.

## REGULAR MAINTENANCE SCHEDULE

Your VISION PULSE will require very little in the way of maintenance if you care for it properly in your day to day use. Following are some general points to follow in maintaining your new glider which will help ensure the safety of your flying and the performance retention of your glider; we suggest you follow this maintenance schedule faithfully -- **Your care will always pay off in the future.**

### EVERY 10 HOURS:

- ◊ Check all ribs against the airfoil maintenance blueprint.

### EVERY 50 HOURS:

- ◊ Inspect all cross tube support cable components: tangs, pins, nuts, bolts, crosstube plates and the cable itself.
- ◊ Inspect all rib tensioning cords.
- ◊ Check all tubing for possible wear damage which could occur during set-up, fold-down, or transportation.
- ◊ Inspect sail mounting grommets and webbing at tips.
- ◊ Inspect the cable bridles for wear and/or undue stretch. The outside bridles should place the trailing edge of the sail between 7" and 7 1/2" above top of the keel (measured stringing a line tautly from grommet hole to grommet hole at the bridle/sail junction).

### EVERY 100 HOURS:

A complete inspection of your glider is recommended. In addition to the above listed inspection points for every 50 hours, inspect the following:

- ◊ All rigging and components. Replace any worn or bent bolts or locknuts connecting two moving parts together: crosstube plate junction bolt, crosstube clamp bolt, etc.
- ◊ If badly scratched, dinged, or damaged, the control frame assembly should also be replaced.
- ◊ Critical sail tears should be mended by a professional sailmaker. (See also Sail Maintenance below.)

For inspections and repairs which require removing the sail from the frame, we recommend that you contact your PACIFIC AIRWAVE dealer for a complete and professional inspection of your glider.

## ANNUAL INSPECTION

Even if yours is the best kept VISION PULSE, you should have the glider stripped down for a complete inspection at least once a year. This can be done by yourself or preferably by one of many professional PACIFIC AIRWAVE dealers.

The only way to thoroughly and completely inspect all of the components of your glider is to completely remove the sail from the frame, to allow visual and physical access to everything. Consult the following section on "Sail Removal" for instructions on how to best perform this task if you wish to perform it yourself.

## SAIL REMOVAL

In order to best perform this operation, you must first place your glider "right side up" (control frame down) on two sawhorses located three feet from either end, with all ties removed and with the leading edges spread approximately one foot apart. (You can perform the same operation on a clean floor or lawn.)

Next, you need to flip the sail on the outside and the top of the airframe in a manner to expose the under-surface facing upwards. Your glider is equipped with crosstube/leading edge junction inspection zippers; you should open them at this time. You may want to dismount the sail at the leading edge tips and slip the sail slightly forward to provide better working access to the crosstube junction.

You will need to remove both hang straps, and also unzip the entire under-surface zipper, freeing it at both ends.

**1. REMOVE CABLES.** Disconnect the lower side cables from the control frame fitting. Disconnect the top rigging from the kingpost top.

**2. REMOVE BRIDLES.** Disconnect all four trailing edge reflex lines ball terminals from the cable loops and slip the lines off the grommets.

**3. DISMOUNT SAIL.** Remove the screws securing the sail at the keel pocket and nose plate junction. Slip all disconnected cables into their respective sail slots. At this point, we would recommend that you "coil" all free rigging into 6" rolls in order to keep the procedure organized.

**4. REMOVE REAR FLYING WIRE.** Now you must detach the lower rear rigging tang from the keel tube. The tang is fastened to the keel with an AN bolt that is also locating the crosstube cables catch. Remove the whole catch assembly itself off the keel tube.

**Stop!**

We recommend the careful handling of this assembly as it contains a spring loaded pin that can very easily be lost or eject itself once the assembly is loose. We also advise refastening the lock nut a couple of turns on the bolt after freeing the tang of the bolt.

**5. REMOVE SAIL.** You can now proceed to slip the sail off the rear of the airframe, taking great care not to catch the sail on any parts of it. Be especially careful when nearing the tip rib hooks, the cross-tube center junction, the control frame apex and the wingbolt area. You may wish to pull out the foam leading edge insert at this time, depending on the nature of the disassembly.

## INSPECTION

Check the sail for tears and abrasion. Have any damage repaired by a professional sail maker. Inspect all other parts for damage and replace anything that is suspect. Pay special attention to the luff lines, hang straps and rigging. If they show ANY signs of wear, replace them.

## GLIDER REASSEMBLY

The reassembly procedure of your VISION PULSE is best achieved by simply reversing the steps described above.

**Stop!**

Please remember that optimally locknuts should not be used twice, and that the disassembly and reassembly of your glider provides the best opportunity to give an extensive and thorough inspection to each and every component. Take advantage of it!

## SAIL MAINTENANCE

### GENERAL SAIL MAINTENANCE

If you must wash the sail, wash it with a light detergent only. Better still, wipe the sail down frequently with a soft, damp cloth and that will keep detergent washing to a minimum.

Acetone or alcohol can be used to remove stubborn stains without harming the sail. (Do not use any solvents on mylar or trilam.) Rinse very thoroughly after cleaning with any detergent or solvent.

To renew the luster of Dacron, you can use a product called 'Sail Bright' available from marine hardware stores.

Apply sail repair tape to any rips or tears in your sail. This will prevent fraying on the edges where the tear is located. However, do not worry about small tears continuing unless they are located at stress points (i.e.: Trailing edge or critical seams). Inspect the entire trailing edge seam. If any wear is noticed, investigate for cause and take preventive action.

Keep an eye on all the grommets and all areas of the sail that take extra abuse.

The best thing you can do for your sail is to always use the bag. Do not carry your glider on top of a car, even for short distances, without one.

## Warning !

**Sun and weather cause more deterioration than hours of flying. Keep your VISION PULSE covered when not in use.**

Be careful and precise when you repack your glider after each flight. Keep all the foam padding that arrived with the glider when it was new, tie everything off the same way. A few extra moments when you fold down the glider will give you many extra hours of noiseless and anxiety-free flight.

### SAIL FLUTTER OR WRINKLES

New sails should not flutter (trailing edge) at normal speeds, but it is not unusual for minor "twist wrinkles" to appear on the main body and undersurface panels.

As time goes by the glider's sail stretches, periodic tension adjustment is required. There are three tensioning devices which are at your disposal:

1. Leading edge tension via the trim tip arrangement
2. Rib tension across the entire trailing edge and tip

Logic should dictate where and how much you will adjust tension to smooth out flutters or wrinkles. However, caution is advised in regards to overzealously tensioning the leading edge, ribs, and especially the trailing edge line. The tensioning of the sail should be a balanced interplay between all of the above.

### Limits on Tensioning

**Leading edge** -> Limited by the number of shims (up to 5/8") available to use.

**Ribs** — ———>The high camber point of the rib should not protrude above the main body of the sail by more than 1/4"; painful fingers from pulling on the tensioning line is a good indication these are too tight as well.

### Please Note !

The very best thing one can do, by way of preventative sail maintenance, is to severely limit the amount of high-G maneuvers or amount of time the glider is flown very fast. The sail has a limited life-span, and in general, the faster one flies their glider, the faster their sail gets "used up." Slow down and take it easy -- your glider will last longer!

**FRAME &  
RIGGING  
MAINTENANCE****CABLES**

Your cables should be examined thoroughly for any frays or kinks -- damaged cables should be replaced immediately.

***Please Note!***

Many pilots replace their flying wires every 75 hours, regardless of wear. This is certainly worth considering. If you must constantly set your glider up and break it down in rough, rocky areas, you will need to replace your cables more frequently than someone who flies the grasslands. Use your best judgment--those cables hold the frame together.

**AIRFRAME TUBES:  
7075-T6 Tubing**

Every inspection in general of airframe components should include an examination of the tubes for dents, wear spots, corrosion and bends -- even during every preflight check. To maintain the structural integrity of the spars of your glider, always use a well-padded glider rack on your vehicle (See "Transportation and Storage").

Certain main components of your VISION PULSE airframe have been constructed with a high tensile strength tubing commonly referred to in the U.S. as "7075-T6" tubing.

***Please Note!***

The 7075-T6 alloy has been in common use in the construction of hang gliders in Europe for over fifteen years, and PACIFIC AIRWAVE was the first U.S. company to introduce the alloy in the production of its gliders in 1983.

An airframe engineered using 7075-T6 tubing offers the advantage of being five to seven pounds lighter while remaining significantly stronger than a corresponding 6061-T6 airframe of acceptable weight. (Furthermore, as is the case with the VISION PULSE, when used in the construction of the ribs, this tubing offers much greater resistance to airfoil shape deformation and, thereby gives you, its pilot, a much more trouble-free and more reliably consistent flying experience.)

However, this type of tubing requires a more stringent maintenance and inspection process than its 6061-T6 counterpart for two reasons:

1. The 7075-T6 alloy is not as corrosion-resistant as 6061-T6. This characteristic is particularly important if you fly coastal sites and/or if you store your VISION PULSE near the ocean. PACIFIC AIRWAVE has been conducting over the last couple of years a series of tests and preventive maintenance experiments on that problem and what follows is some of the resulting information.



**Please Note :**

We have found the corrosion process and time span to actually be quite identical to that of 6061-T6 as long as the moist corrosive air is not able to settle and "get trapped" in the inside of the tube, or if that same air is allowed to freely circulate through the tube (i.e.: open tubing end caps).

**We also have found that the corrosion process really accelerates when corrosive moisture "gets trapped" between two sleeves such as in the leading edge's front to rear sections, leading edge front section inner sleeves, etc.**

We therefore recommend the following:

a. Thoroughly rinse your VISION PULSE periodically with clear water when flying near or on coastal flying sites. Ensure that the water rinses effectively the inside and outside wall surface of the crosstubes and leading edge tubes. This recommendation is also a good one for the sail.

b. We have tested and approved "boiled linseed oil" (commonly found in most hardware store) as an effective coating/film to apply on the inside wall surface of the crosstubes and leading edge tubes. In the case of prolonged flying near the ocean, we recommend an annual removal and careful inspection of both crosstubes and leading edge tubes for corrosion and to combine that inspection with the re-"swabbing" of the inside wall surface of those tubes.

2. Due to its greater tensile strength, the VISION PULSE 7075-T6 airframe tubing has typically thinner wall dimensions than its 6061-T6 counterpart by approximately 25-30%. This is why the airframe is lighter.

**Warning !**

**This thinner wall diameter increases the importance of carefully inspecting your glider airframe components for scratches, dings and/or dents. This critical inspection should be an important part of your preflight procedure before each flight, as tubing damage usually occurs during transportation.**

You should consult your PACIFIC AIRWAVE dealer if you have any questions, as we will keep them posted as to the latest results of our on-going testing program in the preventive maintenance of 7075-T6 tubing.

**HARDWARE AND  
BOLTS**

For all practical purposes, PACIFIC AIRWAVE hardware exceeds all required loads in hang gliding flight applications. "AN" bolts, however, are not indestructible and bending them even in light crashes is common. Check them periodically to be safe. Discard and replace any bent bolts.

**All bolts should show exposed thread above the locknut during preflight.**

## GLIDER RETIREMENT

With proper care and maintenance, the VISION PULSE will remain for some years at a high level of airworthiness. The VISION PULSE has been tested to or beyond all currently existing airworthiness standards internationally, and these represent the best accumulated knowledge of what constitutes airworthiness in a hang glider.

### Stop!

There is much that we still don't know about hang glider longevity, such as what exactly is the effective lifetime of a hang glider before material fatigue and degradation compromise the airworthiness of that glider. We do know that there are forces in nature which can severely compromise your safety regardless of the quality of design or condition of the aircraft you are operating. Your safety is ultimately your responsibility.

However, there is one subject in particular which needs to be addressed at this point -- and this is glider retirement. There comes a time when the sail of any hang glider simply becomes too suspect to feel safe while flying it. Ultraviolet degradation has by this time greatly faded the luster of the original sail color, and probably many holes have been worn into it in various locations, inside and out, through general use over the years. Although there is no "set" amount of time that the sail becomes positively unairworthy, it is simply a function of time and exposure to degradation which will inevitably dictate the retirement of your glider. Judging when this occurs to your glider is best verified by any of the many professional PACIFIC AIRWAVE dealers.

All of us, as responsible and caring human being, owe it to one another to do the responsible thing and remove any over-used equipment from the skies. We at PACIFIC AIRWAVE abhor those whose method of dealing with a glider due for retirement consists of simply passing their problem along to an unsuspecting pilot in the used glider market place. The mature thing to do, at the appropriate time, is to destroy very old gliders to ensure that they cannot endanger an unknowing pilot.

### Stop!

Along these same lines, because gliders do change hands, we feel that it is quite important to keep accurate records of tuning changes, and especially of repairs, in the maintenance log of this manual. Please consider the needs and safety of those other pilots down the road who may stand to gain from these records.

Thank You !  
THE PACIFIC AIRWAVE TEAM

C h a p t e r V**T E C H N I C A L  
S P E C I F I C A T I O N S****H.G.M.A. COMPLIANCE VERIFICATION SHEET****Glider Model: VISION PULSE 10 meter****Manufactured by: PACIFIC AIRWAVE LTD.**

**NOTE:** These specifications are intended only as a guideline for determining whether or not a given glider conforms to current production specifications, and whether it is in a configuration as originally certified.

Be aware, however, that no set of specifications, however detailed, can guarantee the ability to determine whether a glider is the same model as was certified, or is in the same configuration in which it was certified, or has those performance, stability and structural characteristics required by the certification standards.

<b>SPECIFICATIONS</b>	<b>10M</b>	<b>11M</b>
<b>Glider Weight</b> , without coverbag	52 Lbs	58 lbs
<b>Leading Edge Tube</b>		
A. Distance from the nose plate anchor hole to:		
1. cross tube attachment hole	125.750"	142.375"
2. rear most sail attachment point	214" +/- .50"	233.750+/- .50"
B. Outside Diameter at:		
1. nose	2.047" / 52 mm	2.047"/52mm
2. crosstube	2.125"	2.125"
3. rear sail attachment point	1.968" / 50 mm	1.968"/50mm
<b>Cross-tube</b>		
A. "Pin to Pin"	109"	124.375"
B. Outside diameter	2.047" / 52 mm	2.44" /62mm
<b>Keel tube</b> - least and greatest distance from leading edge bolts to:		
A. Cross-tube Hinge pin plates; (resting on keel)	45.250" +/- .50"	54.25"+/- .50"
B. Hang strap	63" +/- 1 "	67" +/-1"
<b>Sail chord length</b>		
A. 3' from root	87.500"	87.50"
B. 3' from tip	45.250"	45.25"
<b>Total span</b>	372"	402"
<b>Placard and test flight sticker location:</b>	Behind pull-back cable catch on the keel.	
<b>Recommended pilot flying weight range:</b>	120-195 lbs.	150-250 lbs
<b>Recommended pilot proficiency level minimum:</b>	Novice (II)	Novice (II)
<b>Bridle measurements:</b>		
Inner	75.625 "	86"
Center	101.375"	101.375"
Outer	127.125"	140"
(Stainless Steel Luff Lines are measured from the center of the hole receiving both center cable loops to the center of the loop for the luff ball.)		

**GENERAL GLIDER SPECIFICATIONS**

	10M	11M
Sail area	162 sq/ft	189 sq/ft
% Double Surface	58%	60%
Nose angle (Frame)	126 degrees	126 degrees
# of Ribs (Top surface)	7 (+noesrib)	8 (+noesrib)
# of Ribs (Undersurface)	2	2
Span	31 ft	33.5 ft
Aspect Ratio	5.99	5.91

**LIMITATION OF LIABILITY****WARNING**

-- The owner and operator of this hang glider must understand that, due to the inherent risk involved in flying such a unique vehicle, no warranty is made or implied of any kind against accidents, bodily injury, or death.

Practiced even under the best of circumstances, hang gliding is a high-risk sport, and as a consequence, product liability insurance is unavailable to manufacturers. The owner and operator of this hang glider must assume complete responsibility for their use of this equipment, and specifically, agrees to release PACIFIC AIRWAVE, Inc. and/or their agents, from any and all liability.

**EXPLODED  
VIEW  
DRAWINGS**

**GENERAL ARRANGEMENT**

**CROSS TUBE CENTER**

**CROSS TUBE / LEADING EDGE JUNCTION ASSEMBLIES**

**NOSE PLATE ASSEMBLY**

**CONTROL FRAME ASSEMBLIES**

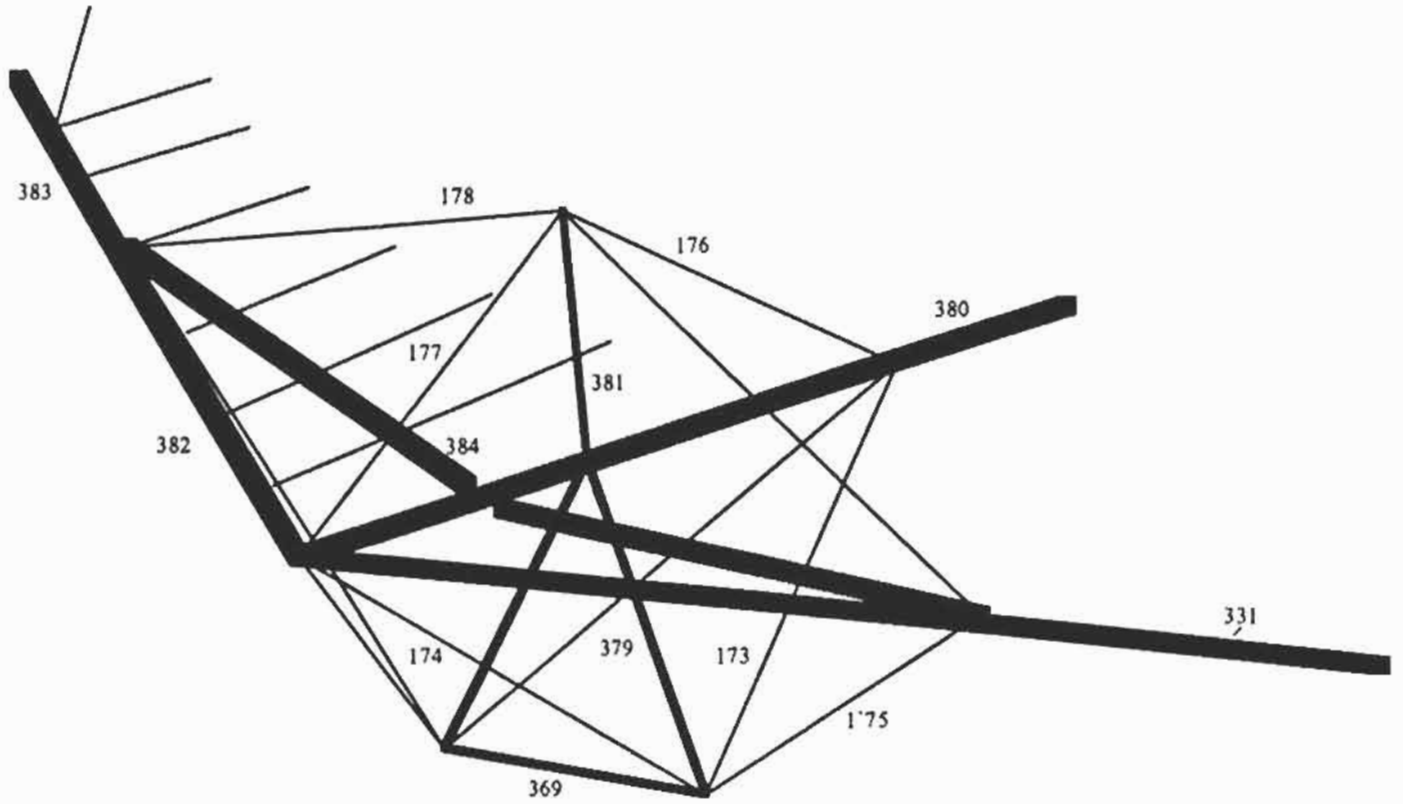
**RIGGING SPECIFICATIONS**



<b>GENERAL ARRANGEMENT</b>
--------------------------------

<b>PART DESCRIPTION</b>	<b>PART CODE</b>	<b>KEY</b>	<b>ADDITIONAL ORDER INFO</b>
FIBERGLASS SHAFT W/TIP	SPV79	121	BLACK OR WHITE
FIBERGLASS 1/2 RIB SHAFT	SPV79A	120	
NOSE RIB TIP/ FRONT	PMT3F	149	
NOSE RIB TIP/REAR	PMT3R	147	
RIB TIP/ FRONT	PMT1F	148	BLACK OR WHITE
RIB TIP/ REAR	PMT1R	151	BLACK OR WHITE
LOWER REAR RIGGING	RGVV2	173	
LOWER FRONT "	RGVV1	174	
LOWER SIDE "	RGVV3	175	1/2 SET
TOP REAR W/ LUFF LINES	RGVV6K	176	
TOP FRONT RIGGING	RGVV2T	177	
TOP SIDE "	RGVV3T	178	1/2 SET
TIP STRUT END CAP / HOOK	PM61	331	
BASE TUBE	SPVV5S	369	COMFORT BAR
UPRIGHT	SPVV4	379	ROUND / SAFEDGE
KEEL TUBE	SPVV2	380	
KINGPOST	SPVV6	381	
LEADING EDGE / FRONT	SPVV1F	382	
LEADING EDGE / REAR	SPVV1R	383	
CROSS TUBE	SPVV3	384	RIGHT/ LEFT

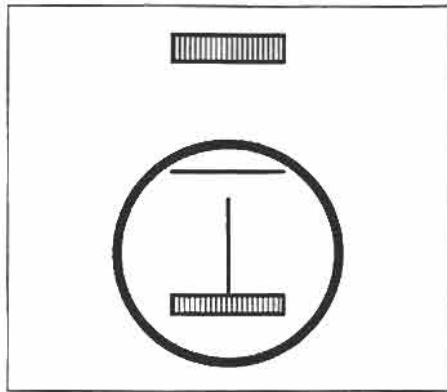
# GENERAL ARRANGEMENT





# CROSSBAR CENTER JUNCTION, VISION PULSE

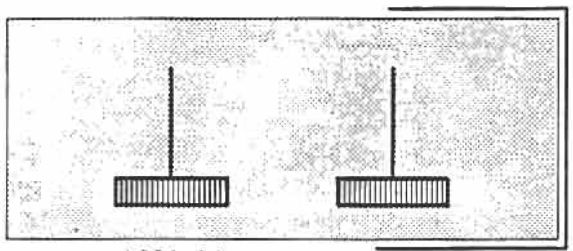
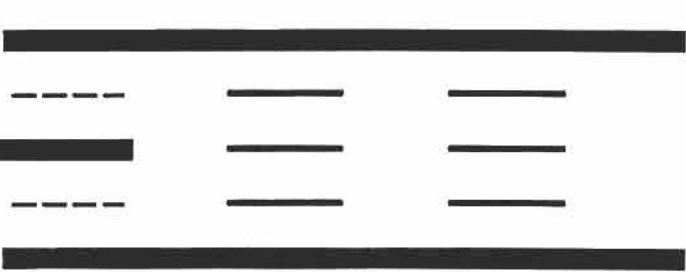
## INSIDE X-BAR DETAIL



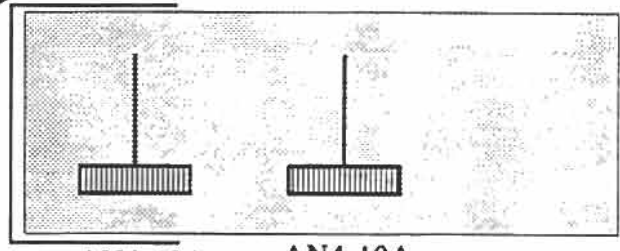
SKIFFY CAP  
AN4-10








SKIFFY WASHER





AN4-6A AN4-6A



AN4-10A AN4-10A

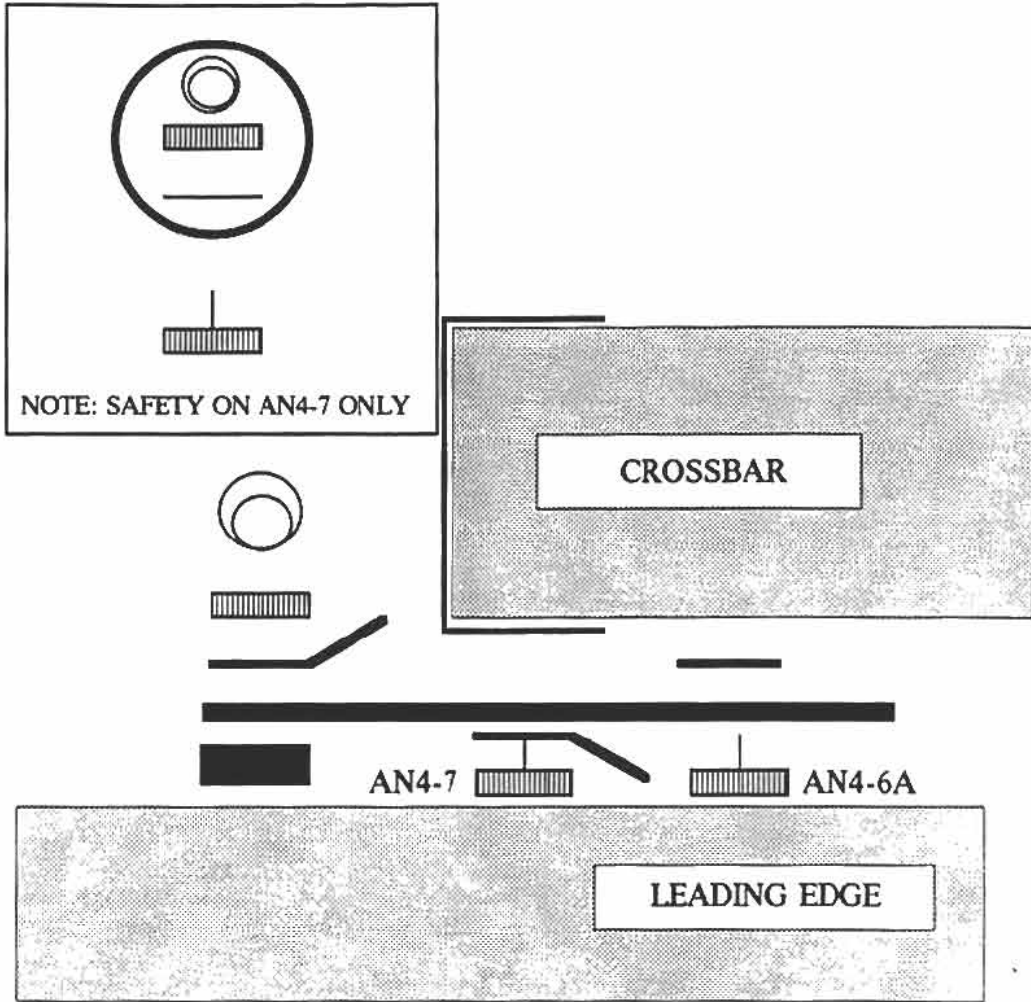
-  ANN14 NYLOCK
-  PM11 DELRIN WASHER
-  PM13 MYLAR FRICTION PAD
-  ANN14T THICK METAL WASHER
-  PM12 NYLON WASHER








 ANSW SAFETY WIRE

 RGVV4 PULLBACK CABLE

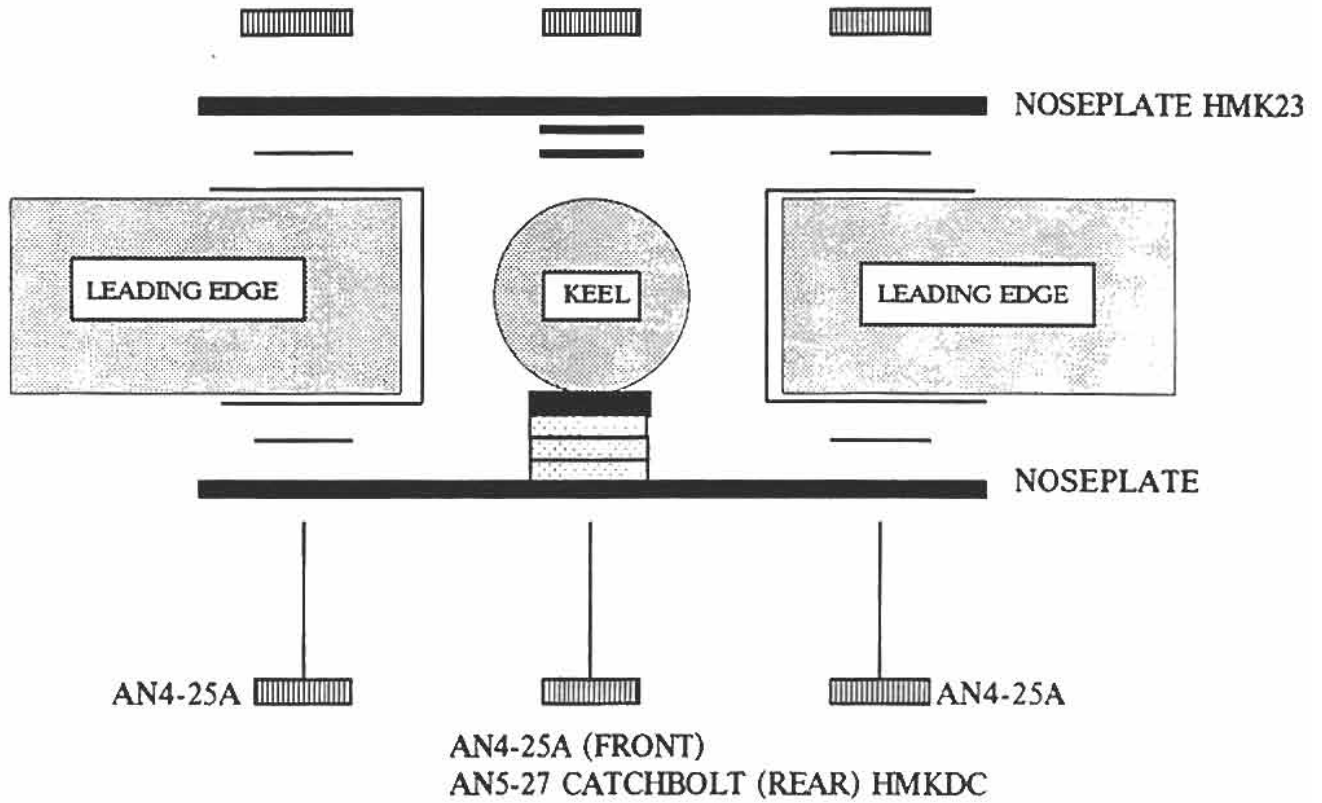
# CROSSBAR TO LEADING EDGE JUNCTION, VISION PULSE

## INSIDE CROSSBAR DETAIL



-  ANN14T THICK METAL WASHER
-  PMS4 SADDLE
-  ANN14 NYLOCK
-  RGVV3T TOP SIDE CABLE
-  RGVV3 BOTTOM SIDE CABLE
-  PM12 NYLON WASHER
-  ANSW SAFETY WIRE

# NOSEPLATE JUNCTION, VISION PULSE

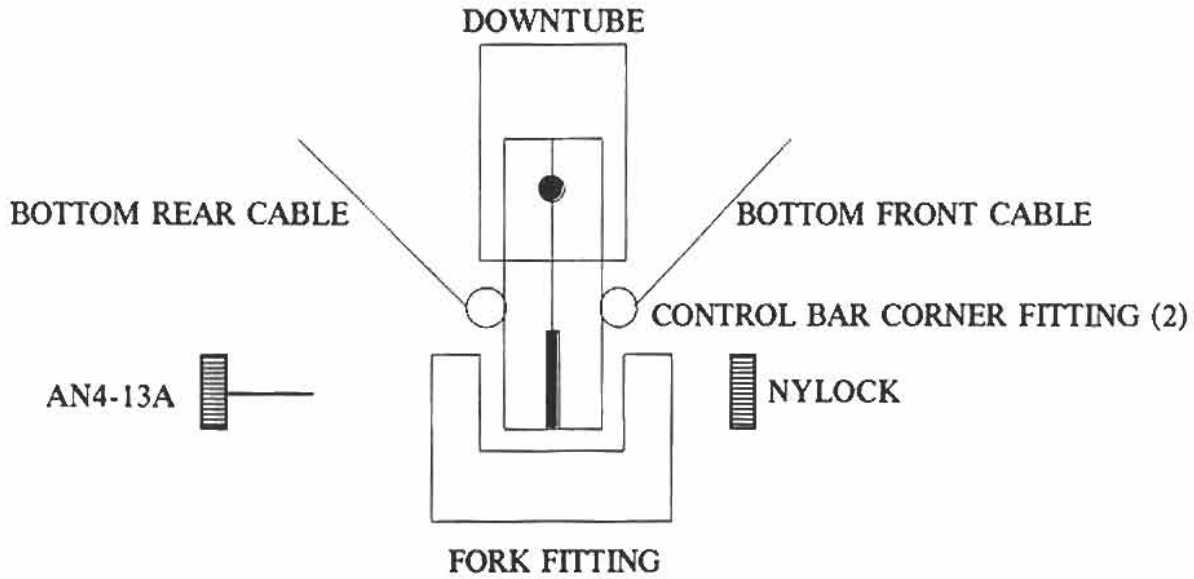
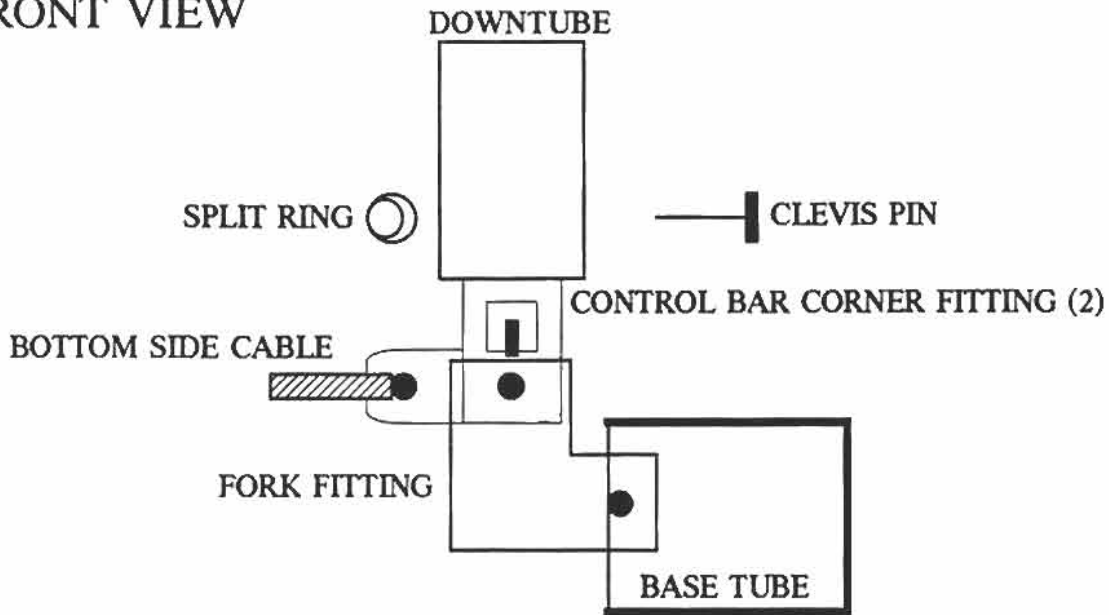


## NOTES

1. TOP FRONT CABLE IS MOUNTED TO THE AN5-27 CATCHBOLT.
2. THE NOSEPLATES ARE ANGLED DOWNWARD.

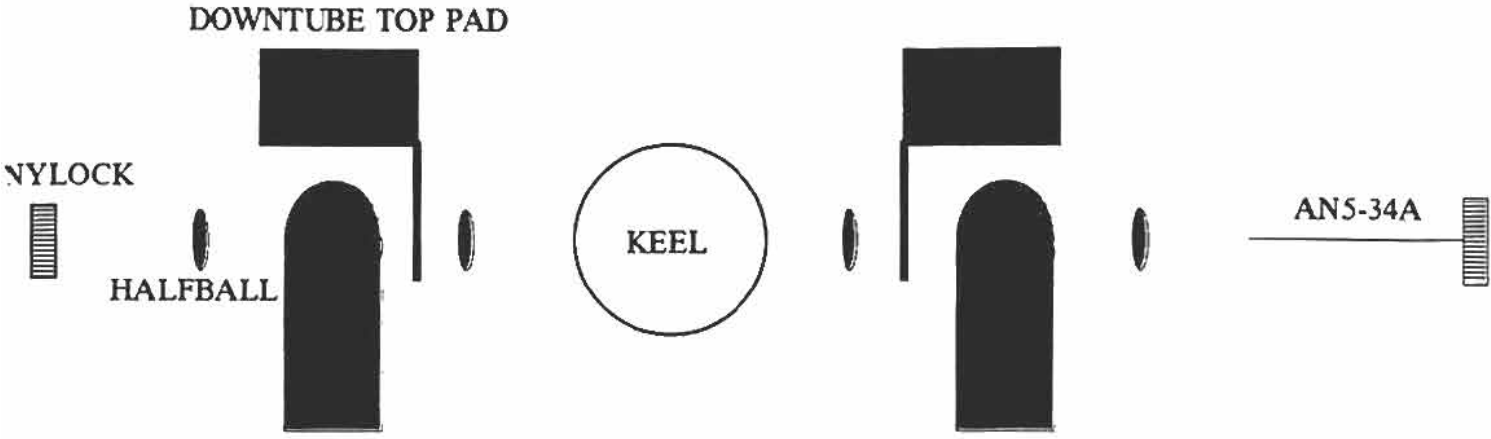
# CONTROL BAR CORNER ASSEMBLY, VISION PULSE

## FRONT VIEW



## SIDE VIEW

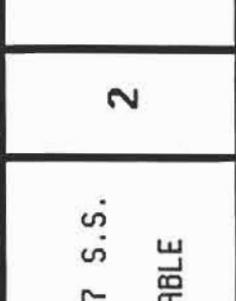
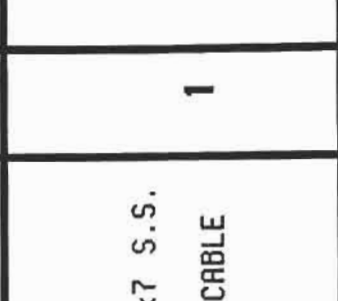

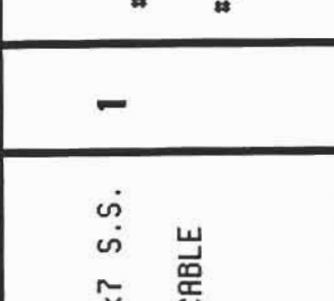
# CONTROL BAR TOP ASSEMBLY, VISION PULSE



VISION PULSE 10M  
TOP RIGGING DIMENSIONS

DATE: 28 OCT 91

MODIFIED ON: 6 JAN 92

	WIRE SIZE & TYPE	QTY.	CUT LENGTH
<p><u>TOP SIDE</u></p> 	<p>3/32" 7x7 S.S. COATED CABLE</p>	<p>2</p>	<p>133 3/4"</p>
<p><u>TOP FRONT</u></p> 	<p>3/32" 7x7 S.S. COATED CABLE</p>	<p>1</p>	<p>74"</p>
<p><u>TOP REAR</u></p> 	<p>3/32" 7x7 S.S. COATED CABLE</p>	<p>1</p>	<p>64 1/2"</p>
<p><u>LUFF LINES</u> ALL ENDS EQUIPPED WITH C, G, L</p> 	<p>3/64" 7x7 S.S. COATED CABLE</p>	<p>1</p>	<p>#1 = 168" #2 = 274"</p>

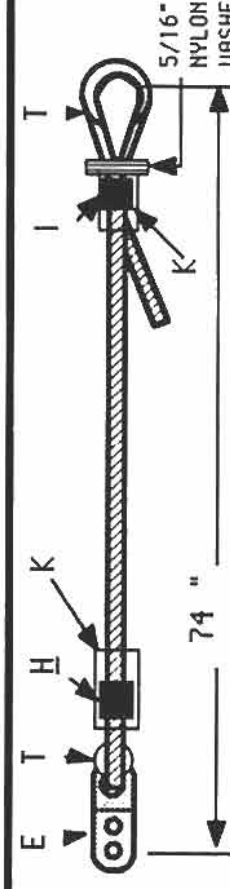
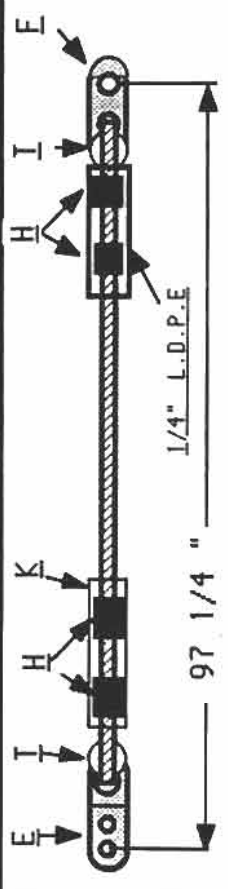
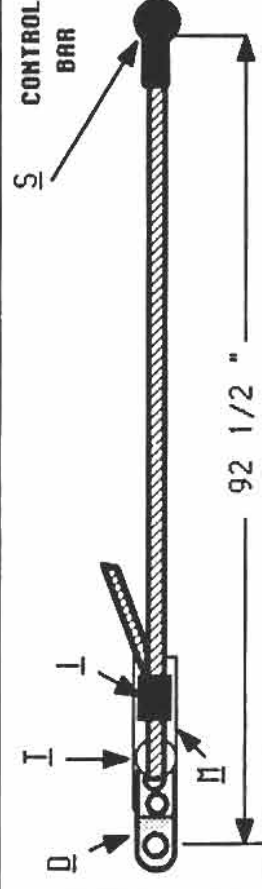
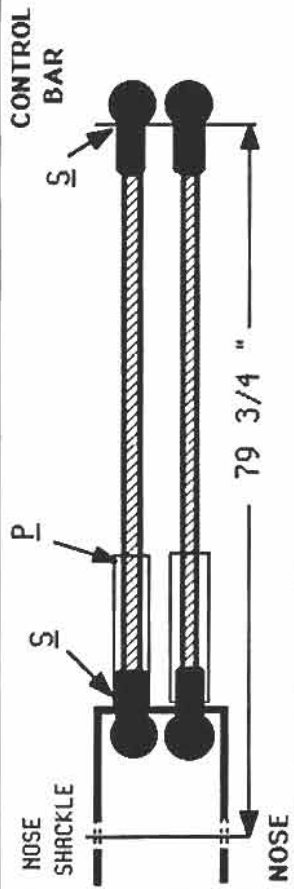
NOTES AND MATERIALS		TANGS	NICOS - RIGGING SLEEVES	THIMBALL	HEAT SHRINK
<p><u>THIMBLE</u> A</p>	<p><u>SOFT LOOP</u> FOR RIGGING PIN B</p>	<p>D :Std.-5/16"Out</p>	<p>G = 3/64"   I = 1/8"</p>	<p>T</p>	<p>K = 3/8" x 3"</p>
<p><u>SOFT LOOP</u> FOR 1/4" PIN C</p>	<p>E :Std.-1/4" Out</p>	<p>H = 3/32"   J = 1/8" STOP</p>	<p>S</p>	<p>BALL SURGE</p>	<p>L = 3/16" x 2"</p>
	<p>F :Std.Short Tang</p>				<p>RIGGING SHEATH N</p>

**VISION PULSE 10M**

**LOWER & X-TUBES CABLE RIGGING DIMENSIONS**

DATE: 28 OCT 91  
 MODIFIED ON: 6 JAN 92

	WIRE SIZE & TYPE	QTY.	CUT LENGTH
<b>LOWER FRONT</b>	3/32" 7x7 S.S. COATED CABLE	1	77"
<b>LOWER REAR</b>	3/32" 7x7 S.S. COATED CABLE	1	158 1/2"
<b>LOWER SIDE</b>	3/32" 7x7 S.S. COATED CABLE	2	114"
<b>X-TUBES RESTRAIN CABLE</b>	3/32" 7x7 S.S. COATED CABLE	1	101 3/4"



NOTES AND MATERIALS		RIGGING SLEEVES		THIMBALL	HEAT SHRINK
<b>THIMBLE</b>	<b>A</b> SOFT LOOP FOR RIGGING PIN	<b>D</b> :Std.-5/16"Out	<b>G</b> = 3/64" <b>I</b> = 1/8"	<b>T</b>	<b>K</b> = 3/8" x 3"
	<b>B</b> SOFT LOOP FOR 1/4" PIN	<b>E</b> :Std.-1/4" Out	<b>H</b> = 3/32" <b>J</b> = 1/8" STOP		<b>L</b> = 3/16" x 2"
<b>C</b>		<b>F</b> :Std.Short Tang	SINGLE BALL SURGE = <b>S</b>		<b>P</b> = 3/8" x 4"
					RIGGING SHEATH <b>N</b>

# VISION PULSE 11M

## LOWER & X-TUBES CABLE RIGGING DIMENSIONS

DATE: 28 DEC 91

MODIFIED ON:

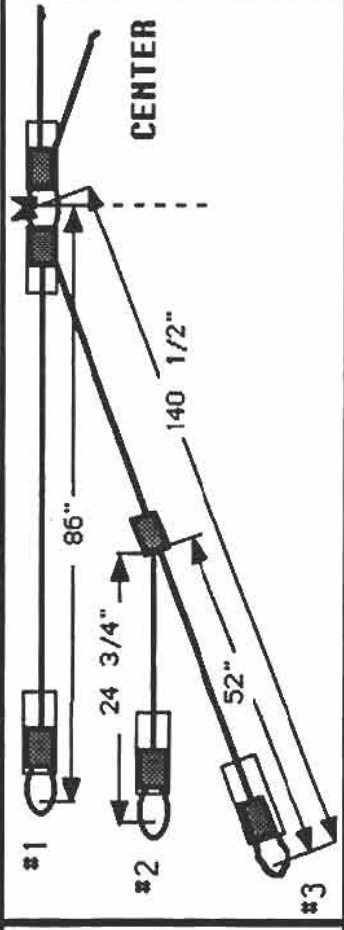
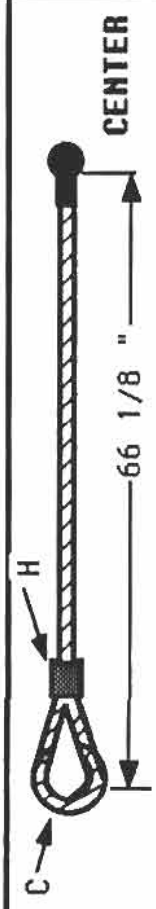
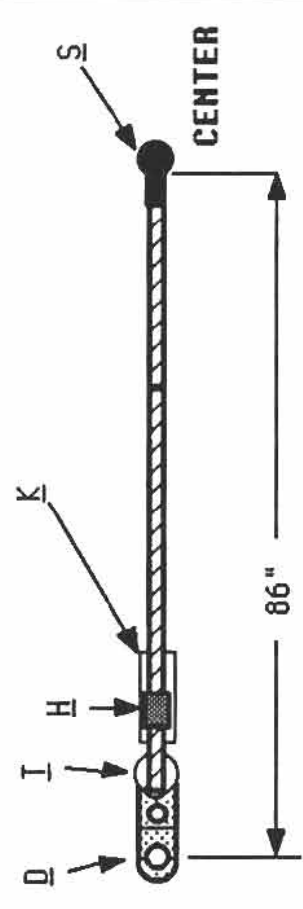
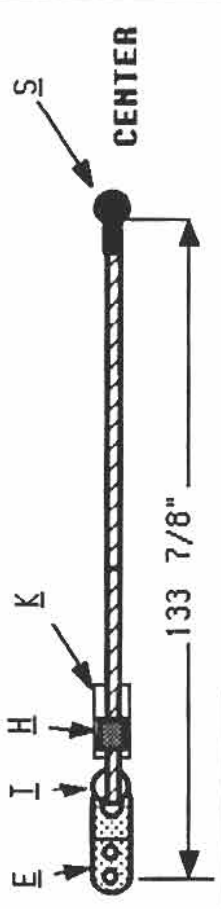
		WIRE SIZE & TYPE	QTY.	CUT LENGTH
		3/32" 7x7 S.S. COATED CABLE	1	77"
		3/32" 7x7 S.S. COATED CABLE	1	158 1/2"
		3/32" 7x7 S.S. COATED CABLE	2	114"
		3/32" 7x7 S.S. COATED CABLE	1	101 3/4"
<b>NOTES AND MATERIALS</b>		<b>THIMBALL</b> T		<b>HEAT SHRINK</b> K = 3/8" x 3" L = 3/16" x 2" P = 3/8" x 4"
<b>THIMBLE</b> A	<b>SOFT LOOP FOR RIGGING PIN</b> B	<b>SOFT LOOP FOR 1/4" PIN</b> C	<b>NICOS - RIGGING SLEEVES</b> G = 3/64" I = 1/8" H = 3/32" J = 1/8" STOP SINGLE BALL SWAGE = S	
<b>TANGS</b> D :Std.-5/16" Out E :Std.-1/4" Out F :Std. Short Tang				



DATE: 28 DEC 91  
 MODIFIED ON:

**VISION PULSE 11M  
 TOP RIGGING DIMENSIONS**

	WIRE SIZE & TYPE	QTY.	CUT LENGTH
<b>TOP SIDE</b>	3/32" 7x7 S.S. COATED CABLE	2	133 3/4"
<b>TOP FRONT</b>	3/32" 7x7 S.S. COATED CABLE	1	74"
<b>TOP REAR</b>	3/32" 7x7 S.S. COATED CABLE	1	64 1/2"
<b>LUFF LINES</b> ALL ENDS EQUIPPED WITH C, G, L	3/64" 7x7 S.S. COATED CABLE	1	#1 = 168" #2 = 274"



NOTES AND MATERIALS		TANGS		NICOS - RIGGING SLEEVES		THIMBALL	HEAT SHRINK
<b>THIMBLE</b>	<b>SOFT LOOP FOR RIGGING PIN</b>	<b>D</b> : Std. -5/16" Out	<b>G</b> = 3/64"   <b>I</b> = 1/8"	<b>K</b> = 3/8" x 3" <b>L</b> = 3/16" x 2"		T	
<b>A</b>	<b>SOFT LOOP FOR RIGGING PIN</b>	<b>E</b> : Std. -1/4" Out	<b>H</b> = 3/32"   <b>J</b> = 1/8" STOP			BALL SWAGE	
	<b>B</b>	<b>F</b> : Std. Short Tang				S	
	<b>C</b>						<b>RIGGING SHEATH</b>
							<b>N</b>