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# Gravij2

MANUAL

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Congratulations on buying your  
**GRAVIS2**  
and welcome to the family  
of ICARO - pilots!

Before you get to know your glider please read the manual, there is important information inside.

**Your GRAVIS2 is pattern tested in B.**

Therefore, the glider is a “paragliders are with good passive safety and forgiving flying characteristics and fairly resistant to abnormal behaviour at flight. It is suitable for all pilots including pilots of all levels”.

***The flight maneuvers during the certification process should not be overrated. Certification results provide only little information when you flying in thermically active and turbulent air because the glider classifications serve to inform solely with regard to the performance of a paraglider during extreme flight manoeuvres in stable air conditions.***

The use of this paraglider is entirely at your own risk. It may be only used for those purposes described in this manual.

***It is strictly prohibited to fly the GRAVIS2***

- ***under the influence of drugs or alcohol,***
- ***in insufficient experience or training of pilots,***
- ***without guilty license,***
- ***beyond the minimum and maximum recommended Take Off- Weight,***
- ***with damaged glider, lines, risers or harness***
- ***in the rain, in snow, in the clouds and fog and in turbulent weather conditions,***
- ***with motor drive,***
- ***tandem- flying and***
- ***Aerobatics.***

If you cannot keep your glider under control use the rescue system in good time. Always pay attention to ground distance.

Our products are made with great care and state of the art. Each glider before it is delivered to the dealer or flight school is checked by ICARO paragliders (incoming test). This date is entered in the identification plate and as well guarantee as the first 2-year-check period starts. The incoming test must also be documented in the manual. Test flights are made only on a random basis.

On that score an approved ICARO dealer or teacher of the flight school must inflate a new ICARO paraglider in the wind or should carry out the first flight before the wing is handed over to you.

This date is entered in the identification plate and as well guarantee as the first 2-year-check period starts. If this seal is missing, it must be assumed that this glider is not identical in construction with the model tested at the specification center.

The use of this paraglider is entirely at your own risk. Every pilot bears the responsibility of his/her own safety.

In order to get to know your glider, we recommend that you practice with your glider on the ground. Pulling up in flat gradients is great practice for fine tuning your launch techniques. Here you can get to learn the reactions of your glider without any stress and hectic. Ground practice pays off in the air.

All technical data and instructions were drawn up with great care. ICARO paragliders cannot be made responsible for any possible errors in this manual.

Important information in this manual is written in ***fat cursive writing***.

Any important changes to this manual will be published in our homepage ([www.icaro-paragliders.de](http://www.icaro-paragliders.de)).

Should you decide to sell this glider at a later date, please pass on this manual to the new owner.

Each alteration of the glider (lines, canopy, and riser) is dangerous and reactions of the glider are not predictable. Your glider will lose its pattern test result and guarantee.

You can only fly your glider with a valid flying license and in accordance with local rules and regulations.

The manufacturer or distributor assumes no responsibility for accidents occurring while using it.

Every pilot must ensure that the glider is properly checked at regular intervals.

Many countries have specific regulations or laws regarding paragliding activity. It's your responsibility to know and observe the regulations of the region where you fly.

### **Environmental aspects:**

The materials of which a paraglider is made require a special waste disposal. So please send disused gliders back to us. We will care about a professional waste disposal without costing for you. Please do our nature-near sport in a way which does not stress nature and environment! Please do not walk beside the marked ways, do not leave your litter, do not make unnecessary loud noises and respect the sensitive balance in the mountains.

## **Especially at the launch site consideration is needed!**

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## To get to know your **GRAVIS2**

Allowed for training	no
Certified / allowed for flying with passengers	no/ no
Certified / allowed for towing	yes/ yes
Certified / allowed for aerobatics	no/ no
Certified / allowed for flying with motor drive	no / no

Technical data		XS	S	M	ML
Categorie EN / LTF		B	B	B	B
Number of cells		42+40	42+40	42+40	42+40
Number of risers		3+1	3+1	3+1	3+1
Length of risers	mm	520	520	520	520
Weight of the glider	kg	3,9	4,1	4,2	4,4
Wing Area flat	m <sup>2</sup>	22	24	26	28
Wing Area projected	m <sup>2</sup>	18,75	20,45	22,15	23,85
Wing Span flat	m	10,9	11,4	11,9	12,3
Wing Span projected	m	8,5	8,9	9,3	9,8
Aspect Ratio		5,4	5,4	5,4	5,4
Aspect Ratio projected		3,9	3,9	3,9	3,9
Standard take off weight	kg	60-75	70-85	80-95	90-105
Extended take off weight	kg	75-85	85-90	95-105	105-115
Certified take of weight.	kg	60-85	70-90	80-105	90-115
Trimmer		no	no	no	no
Maximum way of the accelerator	mm	120	120	120	120
Recommended storage temp.	Celsius	+ 5 <sup>0</sup> bis + 30 <sup>0</sup>			
Recommended storage humidity	% rel. LF	55% bis 75%			
Check interval	24 months or 150 operating hours, depending on what occurs sooner.				

The GRAVIS2 is a single-seated paraglider with a maximum of passive safety and a forgiving flight behavior. It is a symbiosis of safety, performance and dynamics, making it ideal for stress-free flying. He is neither suitable for aerobatics nor pattern tested.

The modern internal structure and the new high-performance material minimize the weight, making the GRAVIS 2 also ideal for hike and fly.

With the GRAVIS2, the profile and sail tension have been fundamentally reworked, resulting in a high pitch stability and directional stability. The modern internal construction minimizes the weight, the additional miniribs in the front edge double the number of cells in the flow-critical area.

In terms of performance and safety, the GRAVIS2 is the most balanced paraglider in the ICARO range. Especially in accelerated flight, it convinces by a manageable extreme flight behavior and an exceptional gliding for this class.

The GRAVIS2 has been pattern tested in all sizes in an extended weight range, allowing a seamless transition from one size to another for each body weight.

In the recommended weight range established by us on many flights, the GRAVIS2 has the optimum ratio of speed, ascent, safety and overall performance in all flight conditions.

### **Canopy**

Sharknose profile, miniribs at the trailing edge and the rods in the profile nose are nothing new.

However, what differentiates the GRAVIS2 from its predecessor are the cloth material used, which reduces the weight even further, the optimized suspension points on the A-level, a completely new calculated performance profile and a further improved wind up and flair behavior. The openings on both sides of the canopy facilitate cleaning the cap inside.

The advantages that result from this profile for the pilot are:

- The glider will stall later and gives the pilot greater control leash area,
- in high speed flight profile has a higher dimensional stability than the conventional profiles and
- the reduced air resistance also brings a better gliding and climbing performance.

### **Lines**

The entire line system is formed from individual lines, which are sewn and looped at both ends. The lines and stitching are subject to rigorous production controls, to ensure high and consistent manufacturing quality.

The end control of all line lengths is documented for all paragliders produced by ICARO paragliders. The complete geometry of the lines and the lengths is shown on the single line plan, which you find in the annex of the manual.

***The GRAVIS2 is delivered from the factory with the best brake position for most pilots. But tall or short pilots, or those with a harness with non-standard attachment points might consider it necessary to change the position of the brake handles.***

***If the brakes are to be shortened, it is extremely important to avoid the adjustment affecting the glider's trim speed. There must always be some slack in the brakes when they are fully released. This can be checked with the glider inflated above the pilot's head. There should be a noticeable bow in the brake lines, and the brakes should be having no effect on the shape of the trailing edge. If the brake lines are to be lengthened, it is important to ensure that the pilot can still stall the canopy (i.e. during extreme manoeuvres or landing) without the need to take wraps. If you need to change the brake line lengths, do it maximum 5 cm at a time, and check it at an easy training hill. Check especially that both lines are the same length, as any asymmetry will lead to tiring and possible dangerous flying characteristics.***

### **Risers**

The Glider has 3 fold risers with separated A-risers an acceleration system which will be activated with a foot bar. The risers are signified. The main break line comes through a return pulley; the handle of the main break line is mounted on the C- riser. The acceleration system is mounted on the A- riser.

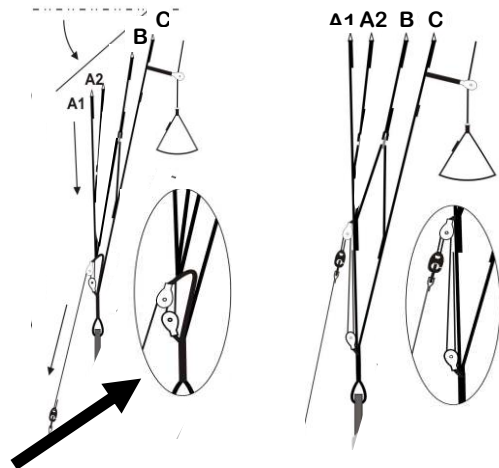
To fix it with the foot bar you must connect the brummel hooks of the foot bar with the brummel hook of the acceleration system.

### Acceleration system

When flying normal all risers have the same length. When using the accelerator system the risers are shortened by a constructive exactly defined length.

Therefore the angle of attack of the canopy is smaller and speed increases.

**The length of the accelerator is adjusted to the left and right of the foot pedal so that when your leg is fully extended, then the acceleration is at maximum – both rollers are touching.**



**Please pay attention that the glider will not be pre-accelerated, while the accelerator is loosened, when the acceleration ropes are set too short.**

**Assembling the accelerator is reliant upon the harness, e.g. numbers of return pulleys, rope guide ...**

**The more turbulent the weather conditions and when near the ground, the less acceleration should be used.**

**Do not use the acceleration system and brakes at the same time! It is very dangerous to use both simultaneously as it can result in serious collapses.**

### Harness

The GRAVIS2 is certified for use with harnesses GH type. Practically all modern harnesses are GH type harnesses. Older harnesses with fixed cross belts (GX type) are not certified and should not be used.

The adjustment of the harness chest strap controls the distance between karabiners and affects the handling and stability of the glider. Excessive tightening the chest strap increases stability but also the risk of twists following glider collapse, and it also increases the frequency of getting collapses due to poor feedback from the glider.

The risk of twisting is also strongly affected by the seating position of pilot. Flying in a laid back (reclined) position makes it much more difficult to react in time to prevent riser twisting.

With the chest strap in a more closed position the glider also has more tendency to maintain a stable spiral, lengthening of the chest strap gives more feedback from the glider but decreases stability.

ICARO paragliders recommends following settings:

Take-off weight	< 80kg	80 kg -100 kg	> 100kg
Horizontal distance of the main karabiners	38 cm – 42 cm	42 cm – 46 cm	46 cm – 50 cm

## Flying with the **GRAVIS2**

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### **Flight preparation**

- When choosing an area to lay out the glider before launching, try to find somewhere that is relatively free of stones and sharp rocks. Pay particular attention to the top surface, where the canopy touches the ground.
- Never step on your glider – stepping on it will weaken the cloth.
- We recommend keeping an eye on other pilots, spectators and smoking people near of the glider. Many of them do not appreciate the fragility of the lines and cloth.
- Whilst unfolding your paraglider check the canopy and cell walls for damage. Always take into consideration that the paraglider may have become damaged during transportation.
- Make sure that no sand, stones or snow get inside the canopy as the extra weight collected in the trailing edge may slow down or even stall the glider. Sharp edges damage the canopy.
- Check the lines for knots, twisting and damage, the brake lines for knots, kinks and their symmetric. Loose or incorrect brake knots can cause serious accidents through loss of the steering of the glider!
- Separate the line groups carefully and bring the risers in order. All lines must run freely from harness to canopy. It is equally important that the lines are unhindered and cannot get caught up during the launch.
- There should not be any lines underneath the canopy. If the lines wrap around the canopy, this can result in injury or death!
- Check the rescue system (handle's pins fixed in the loops and the closed cover of your harness).
- Check your harness and make sure that all connections to pilot are correctly closed. Check that all karabiners are closed and can not be opened accidentally in flight and the risers are not twisted.
- Check canopy (all cells are open), wind direction and airspace.

***Do not launch if there are any defects!!!***

### **Launch preparations**

Before every launch you should carry out the standard 5-point checking procedure. Do the checks following the same sequence every time.

- Helmet, harness, carbines closed?
- Lines, risers and accelerator/ trimmer ok?
- Leading edge open?
- Wind direction and strength ok?
- Airspace and start area ok?

### **Launch**

**The most important thing during the take-off is, like at all other gliders too, not the force but the constancy of the pull.**



At the start advice to fix the accelerator with the Velcro which is attached at the front of the sitting board, in order to avoid tripping while pulling up the glider or when starting up.

Hold only the middle A risers and the handles of the brakes. When you pull on the A-risers, the lines in the middle of the wing should be under tension before the lines on the wing ends. This ensures an even easier start.

Use progressive pressure on the A risers and the energy of our own bodies weight until the wing is fully inflated overhead. The canopy is inflated quickly due to the super short lines. When there is no pull from the lines and the wing is overhead, use slight pressure on the brake.

Look up and make sure that the canopy is fully inflated. After a few accelerating steps and at the same time let go of the brakes gently, you will take off. Then use slight pressure again on the brakes to fly at a speed with minimal sink rate.

When there is strong wind the reverse launch technique is recommended. Holding the brakes, turn around to face the wing passing one set of risers over your head as you turn. We suggest building a "wall" by partially inflating your glider on the ground, thus sorting out the lines thoroughly.

## **Towing**

By towing by winch there are no special techniques needed.

***Avoid large brake inputs until you are reasonably high if course correction is necessary close to the ground.***

***Do not try to climb steeply during the first part of the tow.***

## **Active flying**

Active flying in normal flight means that the wing is always kept at a safe angle of attack and, if at all possible, vertically above the pilot. The moving air affecting the wing often changes the angle of attack in an unwanted way. When flying into an upwind the paraglider often bucks, the wing drops back, the angle of attack increases, getting closer to a stall. In upwind the canopy pitches forward, the angle of attack is reduced and there is the risk of a collapse. Both can occur symmetrically, on both sides or asymmetrically, on one side only. It is impossible to control the angle of attack by looking to the canopy. Look in the direction you are flying, changes in the horizon inform the pilot about the canopy's movements.

Braking is also an absolute must! If the canopy pitches forward, the angle of attack decreases. In the case of strong forward pitching there is a risk of the canopy collapsing due to its insufficient angle of attack. The pilot must therefore prevent the canopy from pitching forward by pulling the controls down on both sides. Inversely, the angle of attack increases if the wing drops back behind the pilot, e.g. when entering into a thermal. The canopy is closer to stalling.

In these flight situations a significant braking movement by the pilot can lead to a spin or a stall. When the wing drops back, the pilot therefore must not brake and/or if the pilot is already holding the controls low, he must release them accordingly.

Any change in the angle of attack immediately transfers in to a change in the control pressure of the brakes. The control pressure presents the pilot with immediate information on the angle of attack and on what the canopy is doing or about to do.

## **Flying with accelerator**

When using the accelerator, be careful. The accelerator should be employed, in order to compensate for high angles of attack and the associated potential risk of a stall. Do not step too quickly because your glider will dive down from the strong change in angle of attack.

Put equal pressure on the speed bar with your feet until the pulley touches the A-riser and the glider will quickly gain speed and the sink speed remains very moderate from beginning up to full speed.

***The more turbulent the weather conditions and when near the ground, the less acceleration should be used. Using the accelerator decreases the angle of attack and can make the glider more prone to collapse.***

***Do not use the acceleration system and brakes at the same time! It is very dangerous to use both simultaneously as it can result in serious collapses.***

## **Turning**

A combined steering technique is suitable for every situation. The glider is agile and reacts to steering impulses quickly and directly. Strong, one sided pulling of the brakes brings the glider into an obvious side angle and the glider flies fast steep curves until spiral dive begins.

***If the brake lines are pulled too fast or too far the glider will be stalled!***

A one-sided stall is signaled clearly by: The curves inner side of the wing is getting soft, and nearly stops. In this case you have to release the brake lines!

## **Landing**

Always stand up in the harness in the landing position very early in order to be able to react as fast as possible to sudden events.

Set up your final landing leg to face into the wind to minimize groundspeed. If you leave the inflated leading edge bang on the ground, this can cause the cell walls to burst!

***Do not brake too much, to avoid a stall of the glider in this very low altitude! Do not reduce height by "pumping" with the brakes.***

## Descent techniques

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- ***Training of descent techniques and simulation of flight incidents (SFI) should only take place at professional safety training seminars with professional trainer and only while flying over water.***
- ***Before inducing any exercise control the airspace beneath.***
- ***During the exercises stay in contact with the canopy.***
- ***If the glider is out of control, use your reserve parachute.***

### **Big & Small Ears**

The aim of this exercise is to descend in strong thermals. Only take the outer lines of the A-risers in your hand, without releasing the brakes and pull down leaving it run through your hands (use gloves!). Sink rate increases but not the forward speed. If you use the acceleration system then higher sink speeds can be achieved.

Reopen the wing by pushing up with your hands and if necessary then pump the brakes with short symmetric movements. For directional control while using the big ears, you should use weight shift.

***Never attempt tight turns or spirals with Big Ears, as the A-lines will be overstressed.***

### **B-Line-Stall**

B-Line-Stall is not so effective, furthermore stresses the material of the glider and reduces operating life of the canopy. ICARO doesn't commend the B-stall.

If you want to fly a B-stall anyhow pay attention.

***It is very dangerous performing a B-line-stall incorrectly and following errors must be avoided:***

- ***pulling too far on the B-line-stall aid, so that the A-lines are pulled too,***
- ***exit is too slow,***
- ***releasing the B-line-stall aid without simultaneously pushing up with your hands,***
- ***using brakes during or directly after exiting,***
- ***Brakes must not be shortened by twisting around your hand during the exercise.***

### **Spiral Dive**

In a controlled spiral dive, the pilot applies an active flying technique in the same way as when circling in thermals. The strong centrifugal forces in a spiral dive, however, change the control pressure. It increases by a multiple of the force.

Even in moderate spirals, the pilot reaches double acceleration of gravity (2G). Subsequently, the control pressure also doubles.

To initiate a spiral dive, look in the direction you want to go, roll your body weight in that direction and at the same time smoothly pull down on the inside brake. The GRAVIS2 will start to turn, and then drop into a spiral.

In the spiral dive an uncontrolled acceleration of the canopy must be prevented. As the canopy always accelerates via the outside of the wing, the spiral speed is controlled via the outside brake by applying the active flying technique.

If the speed increases in an unwanted manner, pull the brakes further to slow down. If the wing becomes too slow, it can be speeded up by releasing the outside control.

***If you pull abruptly and too far on the brakes, the canopy may enter a negative spin. When entering a spiral dive keep the brake on the outer curve released.***

The glider does not have a tendency for stable spiral dive.

If under certain conditions, it should go into a stable spiral dive then actively exit the maneuver by bringing your weight into a neutral position, release the brakes of the inner curve side and brake gently on the outer curve side until you notice that the wing starts to level out. Then gently brake on the inside curve for several turns until normal flights returns.

### **Wingover**

The **GRAVIS2** is an agile glider, and it is quite easy to get to an excessively high angle of bank in just a few turns. Practice wingovers gently at first, as there is a chance of quite large collapses at high bank angles.

## **What happens when it happens?**

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### **Knots and tangles**

The best way to avoid knots and tangles is to inspect the lines before you inflate the wing for take-off. If you notice a knot before take-off, immediately stop running and do not take-off.

If you have taken-off with a knot you will have to correct the drift by leaning on the opposite side of the knot and gently apply the brake line on that side too. You can gently try to pull on the brake line to see if the knot becomes unfastened or try to identify the line with the knot in it. Try to pull the identified line to see if the knot releases. If the knot is too tight and you cannot remove it, carefully and safely fly to the nearest landing place.

***Be very careful when trying to remove a knot. When there are knots in the lines or when they are tangled, do not pull too hard on the brake lines, there is an increased risk of the wing to stalling or negative turn being initiated.***

### **Deep / Parachute Stall**

Your glider has been carefully designed to resist entering deep stall.

Before exiting a deep stall please ensure that the brakes are fully released. Actively exit the deep stall by reaching up and push forward with both palms on the A-risers or pull on them. Avoid flying in very humid air or in rain. A wet canopy may have very unpredictable flying characteristics, one of which is a radically increased risk of deep stall.

***Never pull the brake-lines during a parachute stall, because the glider would go into a full stall immediately. If you find yourself flying in unavoidable rain we strongly recommend that you avoid any sudden movements or radical***

***brake line input, that you do not pull Big Ears or B-Line-Stall, and that you steer clear of turbulence and avoid a deep flare on landing.***

### **Asymmetric Collapse**

While flying in turbulent conditions it may occur that a portion of your glider deflates. However, just like in flying in turbulences, please pull gently on both brakes. Re-inflation is speeded up by counteracting the turning movement of the canopy until normal forward flight return. Then pump the brake line on the collapsed side.

If the canopy is in front of the pilot after an asymmetrical collapse, the pilot must immediately and decisively brake down the open side to prevent an uncontrolled rotation. The same rule applies here: If the wing is ahead, braking is a must. Sometimes, however, the angle of attack on the open, not-collapsed side is relatively high and the wing is behind the pilot. Then a significant control movement would definitely cause a stall and its potentially extreme reactions.

***If the collapsed part of the canopy is very big, you have to brake the open side very dosed (not too much!) to avoid a stall.***

### **Symmetric Collapse**

Your **GRAVIS2** normally re-inflates promptly in a symmetric collapse without pilot input.

Applying the brakes symmetrically will speed things up.

### **Emergency Steering**

Should it no longer be possible to steer your glider, for example due to a broken line, the glider may be steered by gently pulling on either rear riser.

***By steering this way airspeed is reduced hardly. Therefore, for landing you must change to the rear risers to control your glider. Handling will be more direct so being careful not to pull too hard.***

### **Negative Spin**

If the pilot abruptly applies full brake to one side of the glider while the other side is at zero brake, the faster side may fly around the braked and stalled side resulting in a spin. Alternatively, if flying very slowly with almost full brakes on both sides, if one hand releases one brake suddenly, while the other continues with full brake, the glider may enter a negative spin. To exit a spin just do "hands up" to release the brakes and the glider will return to normal flight.

***If you do not have control over your glider and you are running out of altitude, immediately deploy your reserve parachute.***

### **Front stall**

After a front stall of the canopy, the wing moves backwards while the pilot with his higher mass moves further ahead. Wing behind, pilot ahead, significantly high angle of attack – there is only one thing to do:

***Do not brake or you run the risk of a dangerous stall.***

***The pilot must not pull the control lines before the canopy is at least above him again. If the canopy then shoots forward dynamically, it is absolutely vital to stop the motion in a consistent and decisive manner via the brakes.***

## Full Stall

***Spin and full stall are both dangerous and somewhat unpredictable exercises. Do not stall or spin your paraglider on purpose.***

To initiate a full stable stall, apply both brakes to maximum arm extension. If possible grasp the seat of your harness to assist keeping your arms locked. The pilot will swing back under the canopy and finally the canopy will stabilize to a full stall. Once in a stable stall, the exercise can be completed. Release the brakes just a little and let the glider fill until it regains shape. Then release the brakes fully and your glider will return to normal flight.

***It is imperative that the pilot fully completes this exercise and holds on, as a premature release while the glider is still falling back may cause the glider to rapidly dive ahead past the pilot. There is a possibility of the pilot landing in or entangling in the glider.***

## Care instructions, repairs, inspection

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### Care Instructions

- A new wing supplied from the factory is often compressed hard. The compression serves to reduce shipping costs but should not be repeated once the wing has been unpacked and flown for the first time.
- Note that the glider bag should not be used as a seat.
- Even with good care and maintenance, just like any item exposed to the elements, your glider can wear out after a certain amount of use. This can change flight behavior and safety. We recommend a regular safety inspection of the canopy and all lines.
- If you clean your glider it is best to use warm water and a soft sponge.
- Store your glider in a dry and dark place, ideally between 5° and 30° Celsius and humidity between 55 and 65%. Do not store it near chemicals or petrol.
- If you will not fly for longer period, store the glider releasing all compression straps and take it out of its backpack so that the fabric is not compressed, creased or stretched.
- Avoid storing your glider for days at a time in a hot car.
- Unpack your paraglider shortly before launch and pack away immediately after landing to avoid any unnecessary UV exposure.
- When unfolding the paraglider insure that neither the canopy nor the lines become too dirty. Dirt particles can damage the material and lines.
- Never use chemical cleaning agents, brushes or hard sponges on the material, as these destroy the coating and affect the strength of the cloth. The canopy will become porous and will loose structural strength.
- Never attempt to clean your paraglider in a washing machine. Even without using detergents the simple mechanical abrasion will quickly finish the canopy and render it useless.
- If you are flying near the sea most the wing may age faster because the air is humid and salty. In this case we suggest you have it checked more often than prescribed in this manual.

- Also avoid dipping it in a swimming pool; the chlorine will damage the cloth.
- If you must rinse or clean your glider do so with fresh water. Frequent cleaning will accelerate the ageing process.
- If the glider has become wet, lay it out so that air can get to all areas of the fabric.
- After landings in trees or on water you should check the length of the lines and the canopy.
- Flying all the descent or acrobatic exercises will not normally pose a structural problem but freestyle training accelerates the ageing process dramatically.
- There is no special method packing your glider. ICARO paragliders commends the "Cell to Cell-method bag because the reinforcements of the leading edge stay flex-free on top of each other and do not fold.
- When folding your glider make sure that there are no insects inside the canopy. Many insect species contain acids that could damage the cloth. Grasshoppers gnaw their way out of a folded canopy, making it full of holes in the process.
- When you did not fly for a longer period ICARO commends to check the glider (e.g. mildew stains, splice of the lines, corrosion of the shackles and carabines). If you are not convinced of the gliders airworthiness please send your glider to an authorized ICARO dealer to check your glider. The same is commended for harnesses.

## Repairs

***Only use original ICARO parts for repairing your glider. If you don't you lose the warranty for your glider.***

Small holes in the canopy (max. 20x20 mm) can be repaired by the pilot by using self-adhesive sailcloth on both sides of the perforation.

Damage to the lines or any other repairs should only be carried out at an authorized ICARO center.

If your glider needs to be repaired, please contact your local ICARO paragliders dealer.

## Inspection

It is important to have your glider inspected by a trained ICARO technician but it is also allowed to check your glider for yourself.

In the annex you find the regulations for checks of certified gliders and items in order to perform a paraglider inspection you need.

## Inspection interval

**24 months or 150 operating hours, depending on what occurs sooner.**

***Without regular certified inspections, your glider will lose its pattern test result and warranty.***

ICARO recommends having wings that are often used for training of descent exercises, acrobatics or flying in salty ore sandy conditions subjected to checkups all 100 operating hours or 12 months.

It is also important, that ground handling also will be considered. All gliders, especially gliders manufactured with light and thin material are mechanically more stressed than other gliders. Therefore, ICARO recommends multiplying ground handling time with the factor 1, 5.

Not only gliders have a recurrent inspection interval. Airworthiness of harnesses and rescue systems must also be verified.

Generally, it is recommended to change aluminum snap hooks after 24 months or 200 operating hours.

According to German and Austrian aeronautical legislation the owner of a glider can check the airworthiness by his own or order a third person (for example manufacturer/importer) to do this.

To perform your own airworthiness check, ICARO paragliders must give you a briefing. Should you decide to check the wing by yourself you must make sure that our guidelines are adhered to. Failing to do so will void the certification.

ICARO paragliders highly recommend that you let the manufacturer or authorized supplier/ person do the check of airworthiness.

***All inspections and repairs must be documented (manual page 2).***

## Terms of the warranty

ICARO warranty covers the cost of materials and workmanship on gliders accepted by ICARO paragliders to fall under the warranty.

Paragliders: **24** month or **150** operating hours, depending on what is first

Harnesses and rescue systems: **24** months

***Warranty is only valid for ICARO products  
with LTF/ EN certification.***

### **What is covered by the warranty?**

Provided that ICARO paragliders accept the fault the warranty contains all necessary spare parts related to the replacement or repair of defective parts and working time.

ICARO paragliders accept no freight costs (outbound and return transportation).

### **What are the conditions of the warranty?**

Provided that ICARO paragliders accept the fault the warranty contains all necessary spare parts related to the replacement or repair of defective parts and working time.

- ICARO paragliders needs to be informed immediately after the discovery of a defect and the defective product must be sent to us for testing.
- The glider/ harness/ rescue system was used in normal circumstances and maintained according to the instructions. This includes in particular the careful drying, cleaning and storage.
- The glider/ harness/ rescue system were used only within the applicable guidelines and all rules have been complied with all times.
- All flights must be accounted for within the flight book.
- There were only original spare parts used and checks, exchange and / or repairs were conducted by an authorized dealer or by ICARO paragliders company / person and properly documented.



- The online form on [www.icaro-paragliders.com](http://www.icaro-paragliders.com) must be sent at least 6 weeks after buying to ICARO paragliders.

### **What is excluded from warranty?**

- Gliders and harnesses that are used for training purposes, Acro or other official competitions,
- Gliders / harnesses who were involved in an accident,
- Rescue equipment, which has been thrown for a emergency,
- Gliders / harnesses and rescue equipment, which have been changed by yourself,
- Gliders / harnesses and rescue equipment that were not purchased from an authorized dealer / flight school,
- Gliders / harnesses and rescue equipment where the required inspection intervals were not met and the verification of the glider was not conducted by a ICARO paragliders authorized operation / person
- Damage which has occurred due to improper treatment (i.e. storage in humidity, heat or direct sunlight)
- Parts that need to be replaced due to normal wear and tear,
- Discoloration of the cloth material used,
- Damage caused by solvents, salt water, insects, sun, sand, humidity or “debag-jumps”.
- Damage caused by force majeure.
- Damage caused by the motor (Oil, fuel, damage in cause of the prop) and towing by winch.

***In case of a concluded claim the period of warranty carries on. The period of warranty and the connected claim are not prolonged and are only valid until the original date of expiry. The freight costs (transport to and from) are not paid by ICARO paragliders.***

## **Annex**

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### **Warrenty Card**

Please fill in the guarantee card which you find on our homepage [www.icaro-paragliders.com](http://www.icaro-paragliders.com) and send it.

### **Users needs for Inspections**

You will need the following items in order to perform a paraglider inspection:

- Standardized inspection report
- Porosity meter
- Spring scale
- Equipment for measuring line lengths
- Equipment for line strength testing
- Sewing machine
- Big, clean and bright room

Technical specifications about your glider (type, serial number, size and year of production). Please call ICARO Paragliders for information.

A three-week course at ICARO Paragliders, specified to a glider type together with a legal flight license is the necessary prerequisites for permission to inspect ICARO Paragliders.

### **Inspection Instructions**

#### **Record Information**

Spread out your paraglider in a big bright room and make a note of information such as model, type and serial number.

#### **Porosity Test**

Use your porosity meter to perform porosity checks at 4 different places of the canopy. The results are recorded in the inspection protocol and are to be evaluated according to the internal guidelines of the workshop.

#### **Visual Control of the Canopy**

Hang up the canopy so that you can do a visual check of your canopy. Check for perforations in the upper and lower sailcloth, damaged stitching between the cells, and damage to the leading/trailing edge reinforcements.

Each cell must be checked.

#### **Visual Control of the Risers and Lines**

Check the risers, the trimmers, the stitching at each line loop, the brake lines, all seams and line contact points. Each line must be measured and inspected for kinks.

#### **Strength test of the lines**

One complete A- and B- line must be removed, measured and submitted to a strength test. The measured value of each individual line must be noted in the inspection protocol.

#### **Measurement of the lines**

Measure every single line while stressing it with defined tractive force (5daN). The results are recorded in the inspection protocol and are to be evaluated according to the internal guidelines of the workshop. For all information about the lines

(single length, total length, mechanical strength) please call ICARO paragliders, [office@icaro-paragliders.com](mailto:office@icaro-paragliders.com)

### **Assessment**

The measurements of all procedures are noted in the inspection protocol. When all facts have been recorded, the technician must make a general assessment. Check the backpack for damage to the zips, seams and straps and repair if necessary with a sewing machine.

### **General Remarks**

Any other repairs, corrections etc. to the general condition of the paraglider must be evaluated. A copy of the results of each inspection must be sent on to ICARO Paragliders. The technician must report any unusual faults to ICARO Paragliders within 3 days.

### **Inspection Reference**

Only an authorized technician who has been trained by ICARO Paragliders is authorized to sign and date the glider type label and sign the manual.

### **Part list**

#### **STÜCKLISTE alle Größen**

#### **GRAVIS2**

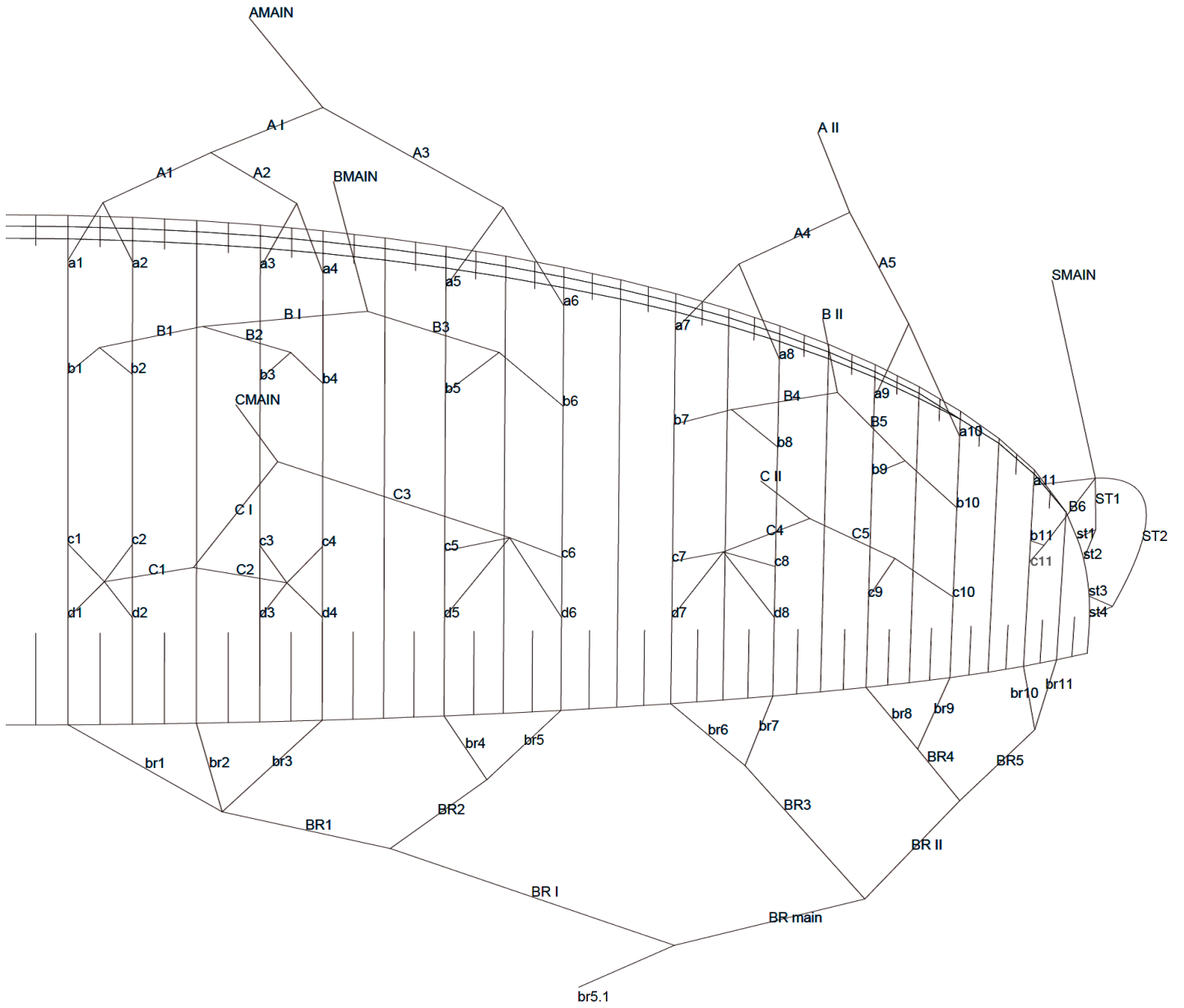
<b>BEZEICHNUNG</b>	<b>TYPE</b>	<b>WERKSTOFF</b>	<b>OBERFLÄCHE</b>	<b>ABMESSUNG</b>	<b>HERSTELLER</b>
STAMMLEINEN	PPSL 275 / PPSL 200	Dyneema	ummantelt	Ø 1,9 mm / 1,42 mm	Liros
MITTELLEINEN	PPSL 200 / PPSL 160 PPSL 120 / DSL 70	Dyneema	ummantelt	Ø 1,42 mm / 1,4 mm 1,15 mm / 0,95 mm	Liros
GALLERIELEINEN	DSL 70	Dyneema	ummantelt	Ø 0,95 mm	Liros
HAUPTBREMSLEINE	DSL 350	Dyneema	ummantelt	Ø 2 mm	Liros
BREMSMITTELLEINEN	TSL 140 / DSL 70	Aramid	ummantelt	Ø 1,3 mm / 0,95 mm	Liros
BREMSGALLERIELEINEN	DSL 70	Dyneema	ummantelt	Ø 0,95 mm	Liros
LEINENSCHLÖSSER	Triangle	Edelstahl	Edelstahl	Ø 3,5 mm	Maillon
LEINENSAMMLER	Clip	Kunststoff			
TRAGEGURTE	Schiffchenware	Nylon		12,5 mm	Schmahl
FADEN TRAGEGURTE	Tex 138				A&E
TUCH OBERSEGEL	STA 15	Nylon	beschichtet		Techfiber
TUCH UNTERSEGEL	STA 15	Nylon	beschichtet		Techfiber
TUCH INNENAUFBAU	Skytex 32 hard	Nylon	beschichtet		Porcher Sport
PROFILVERSTÄRKUNG	Nylon Webbing	Nylon		Ø 2,7 mm	
FADEN SEGEL	Tex 45				A&E
EINFASSBAND	NCV 20 mmm Mylar Tape	Mylar	90 g	20 mm	Porcher Sport

ICARO Paragliders  
83126 Flintsbach, Hochriesstraße 1  
GERMANY

Flintsbach, 05.01.2020

Wolfgang KAISER, e.h.

# Line plan all over (all sizes)



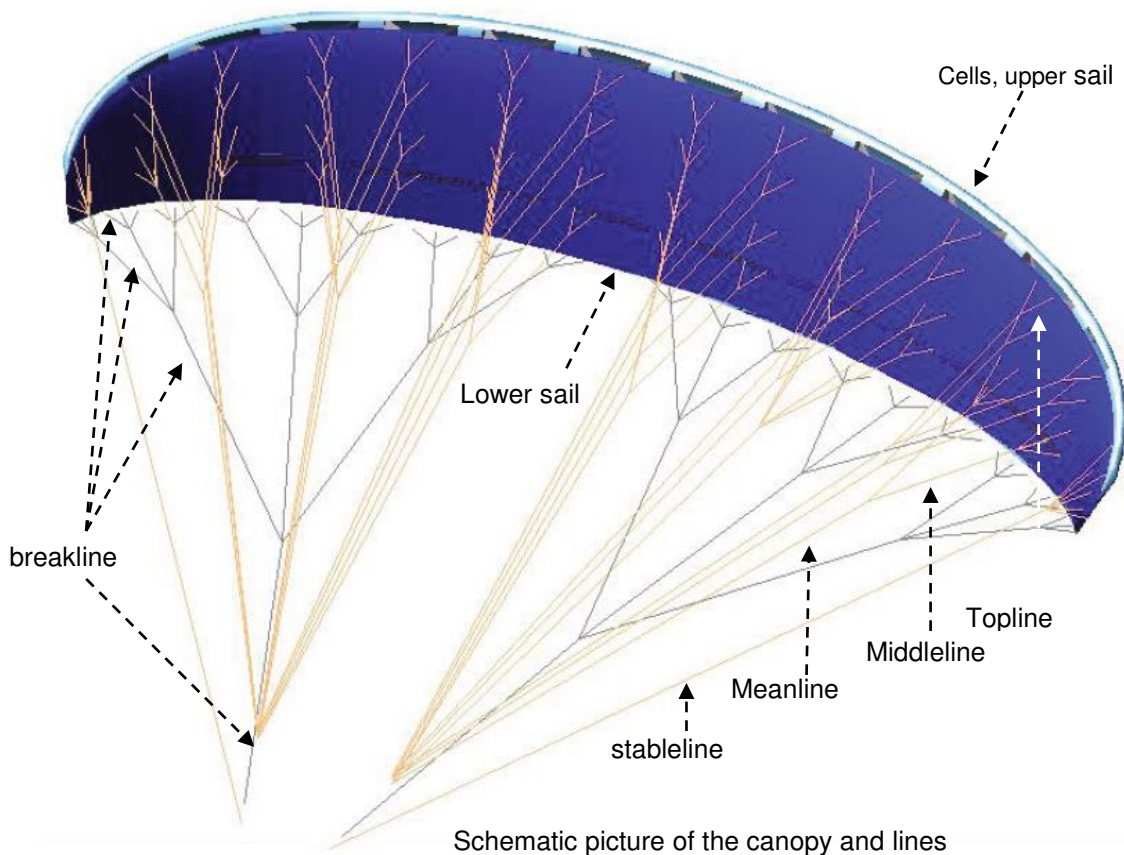
## Description of the risers



TG- Length	XS	S	M	ML
Not accelerated	520	520	520	520
accelerated				
A, A1	400	400	400	400
B	490	490	490	490
C	520	520	520	520

- ① Brummelhook
- ② Pulley brakeline
- ③ Handle
- ④ Accelerator
- ⑤ Center loop

## Description of the canopy



Schematic picture of the canopy and lines

# Linelength, type and notation

## Size XS

**Line LENGTH**

A - LINES				
Rib	Total	Total	Total	Total
1				
2	612			
3	565	1647	1978	
5	562			
6	591	1802		2367
8	1380	2728		
10	1412			
12	1304	1975		
14	1221		3104	
16	1065	2024		
18	990			
20	1279			
22	188	965		

Checking

6669
6520
6472
6499
6445
6475
6359
6274
6187
6090
5874
5743

**Line TYPE**

Rib	A - LINES			
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 160	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 275
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70			
22	DSL 70	DSL 70		

**Line Name**

Rib	A - LINES			
2	a1			
3	a2	A1	AI	
5	a3			
6	a4	A2		amain
8	a5	A3		
10	a6			
12	a7	A4		
14	a8		All	
16	a9	A5		
18	a10			
20	a11			
22	st1	ST1		

B - LINES				
Rib	Total	Total	Total	Total
1				
2	543			
3	496	1647	1978	
5	492			
6	523	1802		2364
8	1312	2728		
10	1351			
12	1252	1975		
14	1183		3104	
16	1046	2024		
18	978			
20	143	1130	4610	
22	180			

Checking

6600
6451
6402
6431
6377
6414
6307
6236
6148
6078
5884
5733

Rib	B - LINES			
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 120	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 200
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70	DSL 70	PPSL 120	
22	DSL 70			

Rib	B - LINES			
2	b1			
3	b2	B1	BI	
5	b3			
6	b4	B2		bmain
8	b5	B3		
10	b6			
12	b7	B4		
14	b8		BII	
16	b9	B5		
18	b10			
20	b11	B6	STI	
22	st2			

C - LINES				
Rib	Total	Total	Total	Total
1				
2	781			
3	724	1508	1970	
5	699			
6	725	1480		2364
8	995	3132		
10	1029			
12	983	2324		
14	901		3104	
16	910	2238		
18	831			
20	156			
22	128	1039		

Checking

6597
6538
6487
6511
6464
6496
6367
6303
6224
6143
5877
5755

Rib	C - LINES			
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 120	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 200
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70			
22	DSL 70	DSL 70		

Rib	C - LINES			
2	c1			
3	c2	C1	CI	
5	c3			
6	c4	C2		cmain
8	c5	C3		
10	c6			
12	c7	C4		
14	c8		CII	
16	c9	C5		
18	c10			
20	c11			
22	st3	ST2		

D - LINES				
Rib	Total	Total	Total	Total
1				
2	864			
3	811			
5	781			
6	803			
8	1067			
10	1065			
12	1021			
14	957			
22	162			

Checking

6676
6621
6565
6585
6532
6558
6421
6355
5787

Rib	D - LINES			
2	DSL 70			
3	DSL 70			
5	DSL 70			
6	DSL 70			
8	DSL 70			
10	DSL 70			
12	DSL 70			
14	DSL 70			
22	DSL 70			

Rib	D - LINES			
2	d1			
3	d2			
5	d3			
6	d4			
8	d5			
10	d6			
12	d7			
14	d8			
22	st4			

BR - LINES				
Rib	Total	Total	Total	Total
r 2	50	1699		
r 4	50	1413	1411	
r 6	50	1360		2286
r 8	50	1085	1538	
r 10	50	1133		
r 12	50	936	1965	
r 14	50	899		
r 16	50	877	735	
r 18	35	819		1214
r 20		193		1883
r 21		176	1306	

Checking

7277
6989
6934
6788
6834
6663
6624
6581
6521
6466
6447

Rib	BR - LINES			
r 2	DSL 70			
r 4	DSL 70	DSL 70		
r 6	DSL 70		TSL 140	
r 8	DSL 70	DSL 70		
r 10	DSL 70			
r 12	DSL 70	DSL 70		DSL 380
r 14	DSL 70			
r 16	DSL 70	DSL 70		
r 18	DSL 70		DSL 70	
r 20	DSL 70			
r 21	DSL 70	DSL 70		

Rib	BR - LINES			
r 2	br1			
r 4	br2	BR1		
r 6	br3		BRI	
r 8	br4	BR2		
r 10	br5			br5.1
r 12	br6	BR3		
r 14	br7			
r 16	br8	BR4		
r 18	br9		BRII	brmain
r 20	br10			
r 21	br11	BR5		

# Size S

**Line LENGTH**

A - LINES		Total	Total	Total	Total
Rib					
1	2	660			
2	3	611	1720	2066	
3	5	610			
4	6	640	1673		2471
5	8	1466	2849		
6	10	1499			
7	12	1388	2063		
8	14	1302		3242	
9	16	1139	2114		
10	18	1059			
11	20	1362			
12	22	222	1008		

B - LINES		Total	Total	Total	Total
Rib					
1	2	588			
2	3	539	1720	2066	
3	5	536			
4	6	569	1673		2468
5	8	1395	2849		
6	10	1436			
7	12	1334	2063		
8	14	1261		3242	
9	16	1118	2114		
10	18	1047			
11	20	174	1180	4815	
12	22	213			

C - LINES		Total	Total	Total	Total
Rib					
1	2	831			
2	3	773	1573	2058	
3	5	748			
4	6	775	1545		2468
5	8	1059	3271		
6	10	1064			
7	12	1021	2427		
8	14	956		3242	
9	16	967	2339		
10	18	882			
11	20	188			
12	22	156	1085		

D - LINES		Total	Total	Total	Total
Rib					
1	2	918			
2	3	863			
3	5	834			
4	6	857			
5	8	1134			
6	10	1163			
7	12	1081			
8	14	1015			
9	22	191			

IR - LINE:		Total	Total	Total	Total
Rib					
r.2	50	1790			
r.4	50	1494	1474		
r.6	50	1437		2388	
r.8	50	1153	1608		
r.10	50	1202			
r.12	50	998	2052		1975
r.14	50	980			
r.16	50	938	768		
r.18	35	876		1288	1967
r.20		220			
r.21		200	1364		

Checking  
6882  
6831  
6783  
6811  
6756  
6787  
6670  
6581  
6469  
6387  
6162  
6025

Checking  
6810  
6759  
6709  
6740  
6685  
6724  
6615  
6540  
6448  
6375  
6150  
6014

Checking  
6906  
6846  
6793  
6818  
6771  
6804  
6666  
6599  
6518  
6431  
6164  
6034

Checking  
6989  
6932  
6875  
6896  
6842  
6889  
6722  
6654  
6067

Checking  
7618  
7320  
7261  
7111  
7158  
6981  
6941  
6898  
6834  
6774  
6752

**Line TYPE**

A - LINES				
Rib				
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 160	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 275
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70			
22	DSL 70	DSL 70		

B - LINES				
Rib				
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 120	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 200
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70	DSL 70	PPSL 120	
22	DSL 70			

C - LINES				
Rib				
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 120	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 200
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70			
22	DSL 70	DSL 70		

D - LINES				
Rib				
2	DSL 70			
3	DSL 70			
5	DSL 70			
6	DSL 70			
8	DSL 70			
10	DSL 70			
12	DSL 70			
14	DSL 70			
22	DSL 70			

BR - LINES					
Rib					
r.2	DSL 70				
r.4	DSL 70	DSL 70			
r.6	DSL 70		DSL 140		
r.8	DSL 70	DSL 70			
r.10	DSL 70				
r.12	DSL 70	DSL 70		DSL 350	
r.14	DSL 70				
r.16	DSL 70	DSL 70		DSL 140	
r.18	DSL 70		DSL 70		
r.20	DSL 70				
r.21	DSL 70	DSL 70			

**Line NAME**

A - LINES					
Rib					
2	a1				
3	a2	A1	AI		
5	a3				
6	a4	A2			amain
8	a5	A3			
10	a6				
12	a7	A4			
14	a8		All		
16	a9	A5			
18	a10				
20	a11				
22	st1	ST1			

B - LINES					
Rib					
2	b1				
3	b2	B1	BI		
5	b3				
6	b4	B2			bmain
8	b5	B3			
10	b6				
12	b7	B4			
14	b8		BII		
16	b9	B5			
18	b10				
20	b11	B6	STI		
22	st2				

C - LINES					
Rib					
2	c1				
3	c2	C1	CI		
5	c3				
6	c4	C2			cmain
8	c5	C3			
10	c6				
12	c7	C4			
14	c8		CII		
16	c9	C5			
18	c10				
20	c11				
22	st3	ST2			

D - LINES					
Rib					
2	d1				
3	d2				
5	d3				
6	d4				
8	d5				
10	d6				
12	d7				
14	d8				
22	st4				

BR - LINES					
Rib					
r.2	br1				
r.4	br2	BR1			
r.6	br3		BRI		
r.8	br4	BR2			
r.10	br5				
r.12	br6	BR3			br5.1
r.14	br7				
r.16	br8	BR4			
r.18	br9		BRII		bmain
r.20	br10				
r.21	br11	BR5			

# Size M

## Line LENGTH

A - LINES				
Rib	Total	Total	Total	Total
1	2	706		
2	3	656	1790	2150
3	5	656		
4	6	687	1741	2572
5	8	1549	2985	
6	10	1583		
7	12	1489	2147	
8	14	1380		3373
9	16	1210	2200	
10	18	1126		
11	20	1441		
12	22	254	1049	

B - LINES				
Rib	Total	Total	Total	Total
1	2	631		
2	3	581	1790	2150
3	5	570		
4	6	612	1741	2569
5	8	1474	2985	
6	10	1517		
7	12	1412	2147	
8	14	1337		3373
9	16	1188	2200	
10	18	1112		
11	20	204	1228	5011
12	22	245		

C - LINES				
Rib	Total	Total	Total	Total
1	2	887		
2	3	827	1637	2142
3	5	803		
4	6	831	1808	2569
5	8	1127	3404	
6	10	1185		
7	12	1096	2526	
8	14	1029		3373
9	16	1041	2430	
10	18	952		
11	20	218		
12	22	184	1129	

D - LINES				
Rib	Total	Total	Total	Total
1	2	978		
2	3	921		
3	5	892		
4	6	916		
5	8	1208		
6	10	1236		
7	12	1159		
8	14	1089		
9	22	220		

BR - LINES				
Rib	Total	Total	Total	Total
r 2	50	1947		
r 4	50	1610	1534	
r 6	50	1524		2485
r 8	50	1220	1672	
r 10	50	1288		
r 12	50	1058	2138	
r 14	50	1022		2015
r 16	50	991	799	2047
r 18	35	939		1319
r 20		298		
r 21		250	1419	

Checking  
7183  
7131  
7082  
7111  
7056  
7088  
6965  
6874  
6757  
6871  
6437  
6294

Checking  
7108  
7056  
7005  
7038  
6981  
7022  
6908  
6831  
6735  
6657  
6424  
6283

Checking  
7211  
7149  
7096  
7122  
7073  
7109  
6971  
6902  
6818  
6727  
6438  
6302

Checking  
7298  
7239  
7181  
7203  
7148  
7176  
7030  
6958  
6336

Checking  
7972  
7833  
7545  
7381  
7427  
7245  
7207  
7153  
7099  
7049  
7028

## Line TYPE

Rib	A - LINES			
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 160	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 275
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70			
22	DSL 70	DSL 70		

Rib	B - LINES			
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 120	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 200
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70	DSL 70	PPSL 120	
22	DSL 70			

Rib	C - LINES			
2	DSL 70			
3	DSL 70	PPSL 120	PPSL 120	
5	DSL 70			
6	DSL 70	PPSL 120		PPSL 200
8	DSL 70	PPSL 120		
10	DSL 70			
12	DSL 70	PPSL 120		
14	DSL 70		PPSL 200	
16	DSL 70	PPSL 120		
18	DSL 70			
20	DSL 70			
22	DSL 70	DSL 70		

Rib	D - LINES			
2	DSL 70			
3	DSL 70			
5	DSL 70			
6	DSL 70			
8	DSL 70			
10	DSL 70			
12	DSL 70			
14	DSL 70			
22	DSL 70			

Rib	BR - LINES			
r 2	DSL 70			
r 4	DSL 70	DSL 70		
r 6	DSL 70		DSL 140	
r 8	DSL 70	DSL 70		
r 10	DSL 70			
r 12	DSL 70	DSL 70		DSL 330
r 14	DSL 70			
r 16	DSL 70	DSL 70	DSL 140	
r 18	DSL 70		DSL 70	
r 20	DSL 70			
r 21	DSL 70	DSL 70		

## Line Name

Rib	A - LINES			
2	a1			
3	a2	A1	AI	
5	a3			
6	a4	A2		amain
8	a5	A3		
10	a6			
12	a7	A4		
14	a8		All	
16	a9	A5		
18	a10			
20	a11			
22	st1	ST1		

Rib	B - LINES			
2	b1			
3	b2	B1	BI	
5	b3			
6	b4	B2		bmain
8	b5	B3		
10	b6			
12	b7	B4		
14	b8		BI	
16	b9	B5		
18	b10			
20	b11	B6	STI	
22	st2			

Rib	C - LINES			
2	c1			
3	c2	C1	CI	
5	c3			
6	c4	C2		cmain
8	c5	C3		
10	c6			
12	c7	C4		
14	c8		CI	
16	c9	C5		
18	c10			
20	c11			
22	st3	ST2		

Rib	D - LINES			
2	d1			
3	d2			
5	d3			
6	d4			
8	d5			
10	d6			
12	d7			
14	d8			
22	st4			

Rib	BR - LINES			
r 2	br1			
r 4	br2	BR1		
r 6	br3		BRI	
r 8	br4	BR2		
r 10	br5			
r 12	br6	BR3		br5.1
r 14	br7			
r 16	br8	BR4		bmain
r 18	br9		BRII	
r 20	br10			
r 21	br11	BR5		



# Size ML

## Line LENGTH

A - LINES				
Rib	Total	Total	Total	Total
1	2	750		
2	3	698	1857	2230
3	5	700		
4	6	732	1806	
5	8	1629	3077	
6	10	1664		2668
7	12	1547	2227	
8	14	1454		3500
9	16	1275	2282	
10	18	1191		
11	20	1515		
12	22	285	1088	

B - LINES				
Rib	Total	Total	Total	Total
1	2	673		
2	3	621	1857	2230
3	5	620		
4	6	655	1806	
5	8	1551	3077	
6	10	1595		2665
7	12	1487	2227	
8	14	1409		3500
9	16	1255	2282	
10	18	1176		
11	20	234	1274	5199
12	22	275		

C - LINES				
Rib	Total	Total	Total	Total
1	2	937		
2	3	876	1698	2222
3	5	852		
4	6	881	1699	
5	8	1190	3532	
6	10	1228		2665
7	12	1159	2621	
8	14	1090		3500
9	16	1102	2522	
10	18	1009		
11	20	248		
12	22	211	1171	

D - LINES				
Rib	Total	Total	Total	Total
1	2	1032		
2	3	973		
3	5	944		
4	6	969		
5	8	1271		
6	10	1302		
7	12	1224		
8	14	1152		
9	22	248		

BR - LINES				
Rib	Total	Total	Total	Total
r 2	50	2033	1591	
r 4	50	1685		2578
r 6	50	1596	1735	
r 8	50	1283		
r 10	50	1332		
r 12	50	1100	2217	
r 14	50	1063		2095
r 16	50	1032	829	
r 18	35	977		2124
r 20		282		
r 21		260	1472	

## Line TYPE

Rib	A - LINES			
Checking				
7470	2	DSL 70		
7416	3	DSL 70		
7367	5	DSL 70		
7397	6	DSL 70	PPSL 120	PPSL 160
7344	8	DSL 70	PPSL 120	
7377	10	DSL 70		PPSL 275
7250	12	DSL 70	PPSL 120	
7155	14	DSL 70		PPSL 200
7034	16	DSL 70	PPSL 120	
6945	18	DSL 70		
6702	20	DSL 70		
6552	22	DSL 70	DSL 70	

Rib	B - LINES			
Checking				
7393	2	DSL 70		
7339	3	DSL 70	PPSL 120	PPSL 120
7287	5	DSL 70		
7320	6	DSL 70	PPSL 120	
7266	8	DSL 70	PPSL 120	
7308	10	DSL 70		PPSL 200
7190	12	DSL 70	PPSL 120	
7110	14	DSL 70		PPSL 200
7011	16	DSL 70	PPSL 120	
6930	18	DSL 70		
6688	20	DSL 70	DSL 70	PPSL 120
6540	22	DSL 70		

Rib	C - LINES			
Checking				
7498	2	DSL 70		
7435	3	DSL 70	PPSL 120	PPSL 120
7382	5	DSL 70		
7409	6	DSL 70	PPSL 120	
7360	8	DSL 70	PPSL 120	
7396	10	DSL 70		PPSL 200
7256	12	DSL 70	PPSL 120	
7185	14	DSL 70		PPSL 200
7098	16	DSL 70	PPSL 120	
7003	18	DSL 70		
6702	20	DSL 70		
6559	22	DSL 70	DSL 70	

Rib	D - LINES			
Checking				
7589	2	DSL 70		
7528	3	DSL 70		
7470	5	DSL 70		
7493	6	DSL 70		
7437	8	DSL 70		
7466	10	DSL 70		
7317	12	DSL 70		
7243	14	DSL 70		
6594	22	DSL 70		

Rib	BR - LINES			
Checking				
8288	r 2	DSL 70		
7938	r 4	DSL 70		
7847	r 6	DSL 70		DSL 140
7680	r 8	DSL 70	DSL 70	
7727	r 10	DSL 70		
7525	r 12	DSL 70	DSL 70	
7486	r 14	DSL 70		DSL 390
7431	r 16	DSL 70	DSL 70	
7374	r 18	DSL 70		DSL 140
7322	r 20	DSL 70		
7298	r 21	DSL 70	DSL 70	

## Line Name

Rib	A - LINES			
2	a1			
3	a2	A1	AI	
5	a3			amain
6	a4	A2		
8	a5	A3		
10	a6			
12	a7	A4		
14	a8		All	
16	a9	A5		
18	a10			
20	a11			
22	st1	ST1		

Rib	B - LINES			
2	b1			
3	b2	B1	BI	
5	b3			bmain
6	b4	B2		
8	b5	B3		
10	b6			
12	b7	B4		
14	b8		BII	
16	b9	B5		
18	b10			
20	b11	B6	STI	
22	st2			

Rib	C - LINES			
2	c1			
3	c2	C1	CI	
5	c3			cmain
6	c4	C2		
8	c5	C3		
10	c6			
12	c7	C4	CII	
14	c8			
16	c9	C5		
18	c10			
20	c11			
22	st3	ST2		

Rib	D - LINES			
2	d1			
3	d2			
5	d3			
6	d4			
8	d5			
10	d6			
12	d7			
14	d8			
22	st4			

Rib	BR - LINES			
r 2	br1			
r 4	br2	BR1		
r 6	br3		BRI	
r 8	br4	BR2		
r 10	br5			br5.1
r 12	br6	BR3		
r 14	br7			
r 16	br8	BR4		bmain
r 18	br9		BRII	
r 20	br10			
r 21	br11	BR5		