

 **DAVINCI**
G L I D E R S

DUET

for TANDEM

REV. 4

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Davinci Products Inc.
53 Sinchon-gil, Okcheon-myeon, Yangpyeong-gun, Gyeonggi-do, South Korea. (12505)
Tel. +82(0)10-9799-3472 Fax. +82(0)10-9799-3472
sales@dv-gliders.com , info@dv-gliders.com

Congratulations!

Thank you for choosing the DUET.
The DUET has been designed for professional tandem pilots who want to share their most fantastic moments.

This manual will help you to get all information about your glider. We strongly recommend that you read this manual carefully in order to be aware of any general limitations, performance characteristics, take off and flight characteristics, landing procedures, dealing with emergency situations and general maintenance.

This is information about the design of the DUET, advice how to use it best and how to care for it to ensure it has a long life. We hope that the DUET will give you a lot of satisfactory flying times.

-DAVINCI GLIDERS TEAM-

WARNING!

THIS IS NOT TRAINING MANUAL. ATTEMPTING TO FLY THIS OR ANY OTHER PARAGLIDER WITHOUT PROPER INSTRUCTION FROM A CERTIFIED PROFESSIONAL INSTRUCTOR IS EXTREMELY DANGEROUS TO YOURSELF AND BYSTANDERS.

DAVINCI GLIDERS are carefully manufactured and inspected at the factory. Please use the glider only as described in this manual.

Do not make any modifications to the glider.
As with any sport – without taking the necessary safety precautions, paragliding can be dangerous.

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1. Technical DATA

DUET			41
<i>CELLS</i>	NUMBER		54
	CLOSED		10
<i>FLAT</i>	AREA	m ²	41.1
	SPAN	m	14.8
	ASPECT RATIO		5.4
<i>PROJECTED</i>	AREA	m ²	35.2
	SPAN	m	11.8
	ASPECT RATIO		3.94
<i>FLATTENING</i>		%	14
<i>CORD</i>	MAX	m	3.49
	MIN	m	0.13
	AVER	m	2.78
<i>LINES</i>	HEIGHT	m	8.99
	MAIN		2+1/4/3/2
<i>RISERS</i>	NUMBER	4	A+A'/B/C/D
	TRIMS	mm	110
	ACCELERATOR		No
<i>WEIGHT RANGE</i>	MIN-MAX	KG	120-212
<i>CERTIFICATION</i>	EN-926-1/2 LTF	KG	EN-B
<i>GLIDER WEIGHT</i>		KG	6.7

2. Materials DATA

CANOPY	FABRIC CODE	SUPPLIER
UPPER SURFACE	Skytex 38/32	PORCHER IND
BOTTOM SURFACE	Skytex 32	PORCHER IND
PROFILES	32 Hard	MYUNGJIN TEX
DIAGONALS	32 Hard	MYUNGJIN TEX

SUSPENSION LINES	FABRIC CODE	SUPPLIER
UPPER CASCADES	PPSL 160/120	LIROS
UPPER MIDDLE CASCADES	PPSL-200/160	LIROS
LOWER MIDDLE CASCADES	PPSL-160	LIROS
MAIN	7343-420/280	EDELRID
UPPER/MIDDLE STABLE	PPSL 120	LIROS
MAIN STABLE	6843-160	EDELRID
UPPER BRAKE	DSL 70	LIROS
UPPER MIDDLE BRAKE	PPSL-120	LIROS
LOWER MIDDLE BRAKE	PPSL-200	LIROS
MAIN BREAK	7850X-240	EDELRID

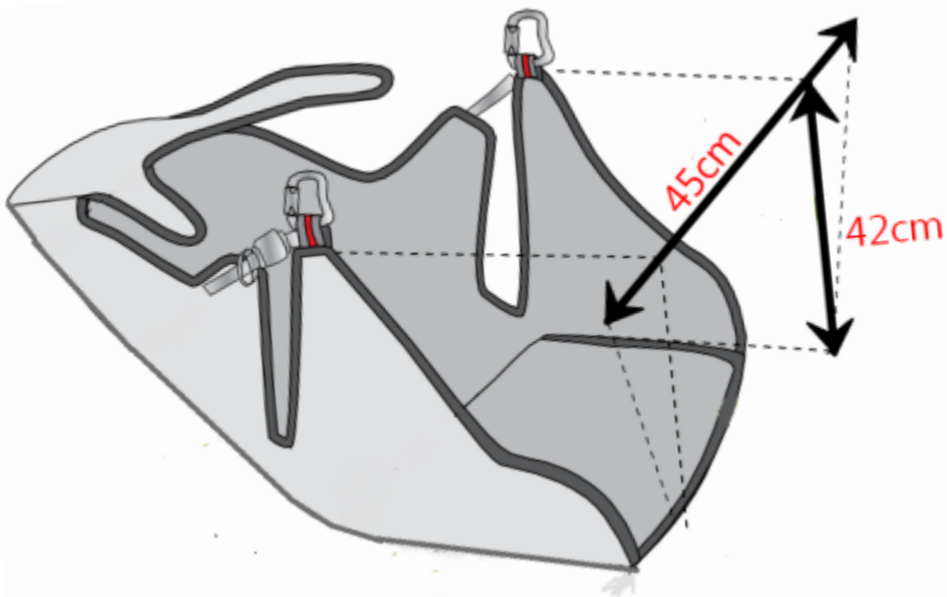
RISERS	FABRIC CODE	SUPPLIER
MATERIAL	WEBBING 20MM	GUTH&WOLF GMBH
PULLEYS	RIELY	LW RILEY PTY LTD

3. Introduction and Pilot Target

The DUET is a tandem paraglider suitable for both commercial and entering of tandem flying. You must be in possession of the appropriate licence and insurances to fly with passengers.

The DUET has been classified as EN-B and LTF-B. The glider has been type-tested for "one-and two-seated" use. During type-testing the DUET was tested with a 'GH' type harness. The setup shown on the below picture.

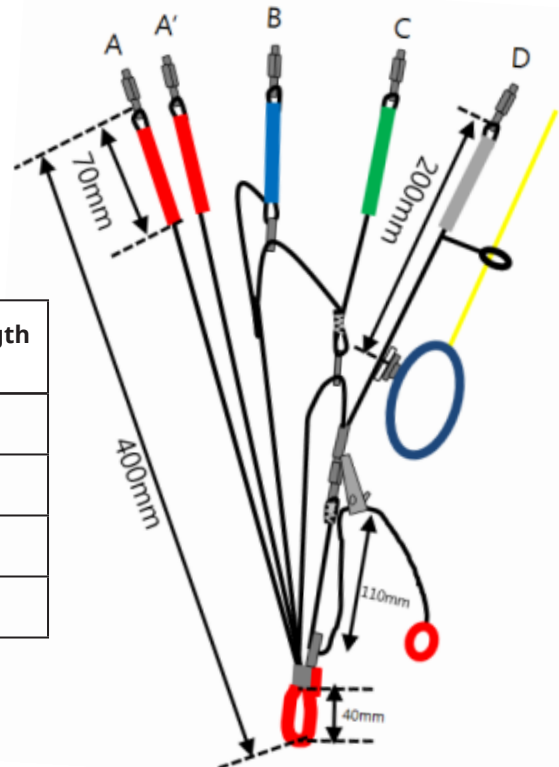
- You must do not*
- Be flown with more than the maximum certified total weight
 - Be towed with a tow line tension in excess of 200kg



4. Risers

DUET has 4 risers. The A riser has a red cover to easy identification. There is another line with red mailon. There is A' and is for the big ears.

	Standard [mm]	Trim opened [mm]	Travel length [mm]
A	400	400	0
B	400	427	27
C	400	482	82
D	400	510	110



5. Lines

They come in different diameters of Kevlar and Dyneema with sheathed cover. They must to be inspected every 100 hours maximum.

In case of Brake lines, it was cut a little longer, so every pilot can adjust it according to his personal taste.

But you must always leave 10cm before the brakes line starts acting in order to avoid trailing edge deformation when the wing is fully trim opened. In case the brake handle comes loose during flight or any brake lines is cut you can use the D riser softly for directional control instead of brake line.

6. Trimmers

The DUET is supplied with a trim riser set. The 'neutral' or standard position is when the trimmers are pulled all the way down and A/B/C/D riser lengths are equal. We recommend performing landing and take-off with the trimmers closed. With the trimmers closed, the DUET will reliably inflate without any overshooting.

As a result, the take off characteristics are very smooth, straightforward, easy, forgiving and require no special skills.

You can be accelerated in flight using the trimmers which make low angle of attack and increase the flying speed. DUET trimmers provide you with more satisfying flight on windy days.

We advise you to use this trimmers carefully and do not use in turbulent and strong thermal conditions. During full trim condition should be meet the dynamic reaction flight of the wing in case of collapse.

7. Pre-flight check

To know yourself with the glider it is a good idea to perform practice inflations and ground handling in advance.

You should have no difficulties flying the DUET for the first time in suitable conditions, but as with all new equipment.

When you have the new glider, the below points should be inspected.

- Check the lines are clear and not twisted.
- Connection points between the glider and harness.
- All harness buckles are closed.
- The Karabiners are fully closed and not damaged.
- The sewing, condition of the lines and connection of the lines are right
- Internal damage to ribs and diagonal ribs.
- Damage to the top and bottom panels and seams between panels.

8. Take-Off

DUET has easy inflation behaviour at the forward/reverse launch because of its super light glider weight. To get the right wing shape for the take-off, pull the brake until the canopy shows at the perfect banana shape on the flat ground. While inflating the DUET, you should hold both of the A risers on your hands. Smoothly and gradually inflate the wing. It does not need excessive energy and you feel the lift force very fast. It does not tend to over-shooting characteristics and provides a leisurely launch time with your passenger. We recommend to take off with closed trimmers.

9. In flight characteristics

DUET has the best glide performance in a normal trim position with no any brakes. In strong thermals and turbulence, we recommend to gently pull both brakes to increase stability without trim released.

To familiarize yourself with the DUET your first turns should be gradual and progressive.

To make efficient and coordinated turns with the DUET first look in the direction you want to go and check that the airspace is clear. Your first input for directional change should be weight-shift, followed by the smooth application of the brake until the desired

bank angle is achieved. To regulate the speed and radius of the turn, coordinate your weight shift and use the outer brake.

In the unlikely event that a brake line releases from the brake handle or breaks, the glider is manoeuvrable using the D-risers. By pulling gently on the D-risers it is possible to steer the glider and land safely.

Alternative Steering:

In the unlikely event, that a brake line releases from the brake handle, or breaks, or the brake-lines are tangled up, the glider is manoeuvrable using the rear-risers. By pulling gently on the rear-risers, it is possible to steer the glider and land safely. Don't pull the rear-risers too much, to avoid a deep stall!

10. Deflations

In spite of the DUET has great stability of the flight, strong turbulence or piloting error may cause a portion of the wing suddenly to be a deflation.

10.1 Asymmetric collapse

Asymmetric collapse usually happens when the pilot has not foreseen this possible reaction of the wing.

Asymmetric collapses should be controlled by weight shifting away from the collapse and applying enough brake to control your direction. And you should use the brake to re-inflate the glider.

10.2 Frontal collapse

DUET does not come out the symmetrical front collapse by itself. It has high internal pressure with its well designed profile. However a symmetric collapse may occur in strong turbulent condition, but it could be fast recovered, if you apply the brake down to 15 to 20cm. Release the brake lines, you may recover to the normal flight.

10.3 Full stall

Full stall can occur when you fully pull the both brakes enough long time. To recover to the normal flight you must release both brakes. After this usually comes a front dive with a possible front deflation. An asymmetric recovery (one control released faster than the other) from a full-stall can cause a big dynamic collapse. The full-stall is a hazardous manoeuvre and not recommended as it requires very high forces.

The available brake travel before stalling the wing depends on the size and the flight weight. For the DUET it has minimum of 65cm travel length at maximum total-load. Those numbers are just a rough indication. (The publication of the brake travel is claimed by the EN 926-2.)

It would be dangerous to use the brake travel according to those numbers, because it is not practicable to measure the brake travel during flight, and in turbulences the stall might occur with less brake travel. If you want to use the whole brake travel of your glider safely, it is necessary to do many intended spins and full stalls to get a feeling for the stall behaviour.

10.4 Deep stall

It is possible for gliders to enter a state of deep stall. This can be caused by several situations including; a very slow release from a B-line stall; flying the glider when wet; or after a front/symmetric deflation.

When you meet this situation you should fully raise up the both brakes and push the A-risers forwards or release the trims symmetrically to regain normal flight.

10.5 Asymmetrical stall

It can take place when you pull one of the brakes too hard, or while spiraling at a small speed in turbulence you increase the angle of attack. Rotation in the asymmetrical stall is called negative spiral. This is one of the most dangerous flying situations. In order to get out of asymmetrical stall, just release the brakes. There may follow side thrust forward with a following wing collapse.

10.6 B stall

We do not recommend a B stall with the DUET. This techniques is generally very hard to use with DUET by the high force needed to pull down the B lines.

10.7 Cravat

In case a cravat should occur from an asymmetric collapse or other manoeuvres, it is important to keep your flying direction by applying some brake on the opposite side and weight shift.

You can also use strong deep pumps on the brake to the cravated side. If a pull of the break line is unsuccessful, pulling the stable line which is the outermost line on the B-riser may work.

If you can not do it and the rotation is increasing, you must use the parachute.

11. Descent Techniques

11.1 Big ears

Sink rate can be decreased in a controlled way by folding both wing tips. While holding the brakes you should symmetrically pull the outermost A-risers.

In order to return to the normal flight, you should release the A-risers and pull the brake short times until wing tips regain pressure.

Spiraling is not permitted with big ears, because of the increased load on the remaining lines so that they can be physically deformed.

11.2 Spiral dive

When you hold one sided brake down for a long time, the glider goes into a fast sharp turn and loses a lot of height. The sink rate could be more than 15 m/sec. To get out of the spiral dive you must release the inner brake and use the outside brake to manage your sink rate. Mind that DUET may take one more turn after releasing the brake.

12. Special Flying

12.1 Towing

The DUET does not experience any problem when being towed. Only qualified personnel should handle the qualified equipment to carry out this operation. The wing has to be inflated in the same way as in normal flight.

12.2 Acrobatic flight

The DUET HAS NOT been designed for acrobatic flight and we DO NOT recommend continued use in this type of flight. We consider acrobatic flight to be any form of piloting that is different to normal flight. To learn safely how to master acrobatic manoeuvres you should attend lessons which are carried out by a qualified instructor and over water. Extreme manoeuvres take you and your wing to centrifugal forces that can reach 4 to 5g.

Materials will wear more quickly than in normal flight. If you do practice extreme manoeuvres we recommend that you submit your wing to a line revision every six months.

13. Landing

We recommend to land with trimmers to the normal slow position. Don't use the sharp turns or radical maneuvers.

When you are 1-2m over the ground, you should face into wind and pilot and passenger standing upright and ready to run if necessary. Finally you may pull the brakes smoothly for minimize vertical speed.

Don't hit the ground by your overtake the glider.

If you in windy condition, as soon as you touch the ground you have to turn around with your passenger to face the glider and move towards it during full pulling break symmetrically.

14. Packing your DUET

The DUET need be folded cell to cell to keep the plastic reinforcement at the leading edge lie flat on each other and don't get bent. Try to pack your DUET as loosely as the packing bag allows, because every fold weakens the fabric.

Avoid packing the glider where it is wet or abrasive conditions (sand, asphalt pavement, concrete)

15. Maintenance and cleaning

Cleaning should be carried out with only pure water. If the glider comes in contact with salt water, clean thoroughly with fresh water. Do not use solvents of any kind, as this may remove the protective coatings and destroy the fabric.

16. Caring tips

- Do not expose your glider to the sun any longer than necessary
- Keep it away from water and other liquids
- Do not let the front edge hit the ground
- Keep your glider away from fire
- Do not put anything heavy on your glider, do not pack it in a rucksack too tightly.
- Regularly inspect the canopy, lines, risers and harness. If you find any defects, contact your dealer or the manufacturer. Do not attempt to repair the paraglider by yourselves.
- If you detect a damaged line, inform the dealer or manufacturer about the line number according to the line plan
- Keep your DUET in a bag in a dry well-ventilated place under neutral temperature and humidity conditions
- If you do not use the glider, then once a month you should unpack it, ventilate it well, and then pack it back in the bag

17. Warrantee

The producer guarantees the correctness of the declared characteristics and the paraglider's normal performance for two years after the purchase date. The producer conducts special, and after warranty repairs and maintenance at the owners' request for an extra price. The warrantee does not cover misuse or abnormal use of the materials.

We recommend to inspect your paraglider (including checking suspension line strength, line geometry, riser geometry and permeability of the canopy material) one time at two years, or every 100 hours of flying time (whichever comes first); Those inspection must be made by manufacturer, importer, distributor, dealer or other authorised persons. The checking must be proven by a stamp on the certification sticker on the glider as well in the manual book.

18. Respecting nature and environment

Finally, we would ask each pilot to take care of nature and our environment. Respect nature and the environment at all times but most particularly at take-off and landing places. Respect others and paraglider in harmony with nature.

Do not leave marked tracks and do not leave rubbish behind. Do not make unnecessary noise and respect sensitive biological areas.

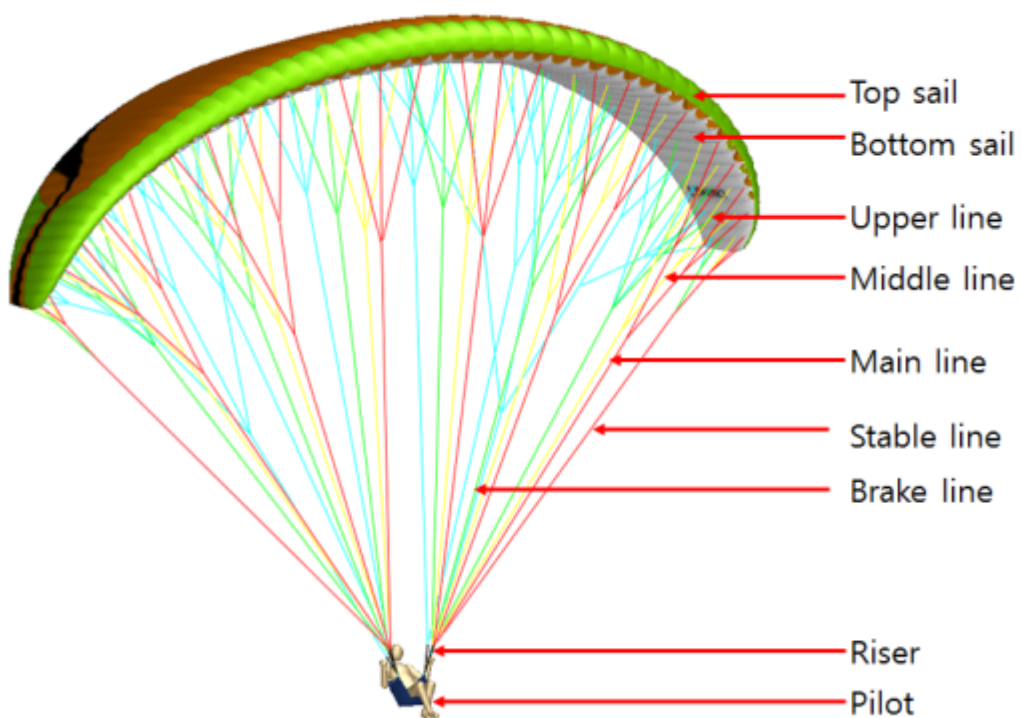
The materials used on a paraglider should be recycled. Please send old Davinci gliders back to us Davinci Gliders offices. We will undertake to recycle the glider.

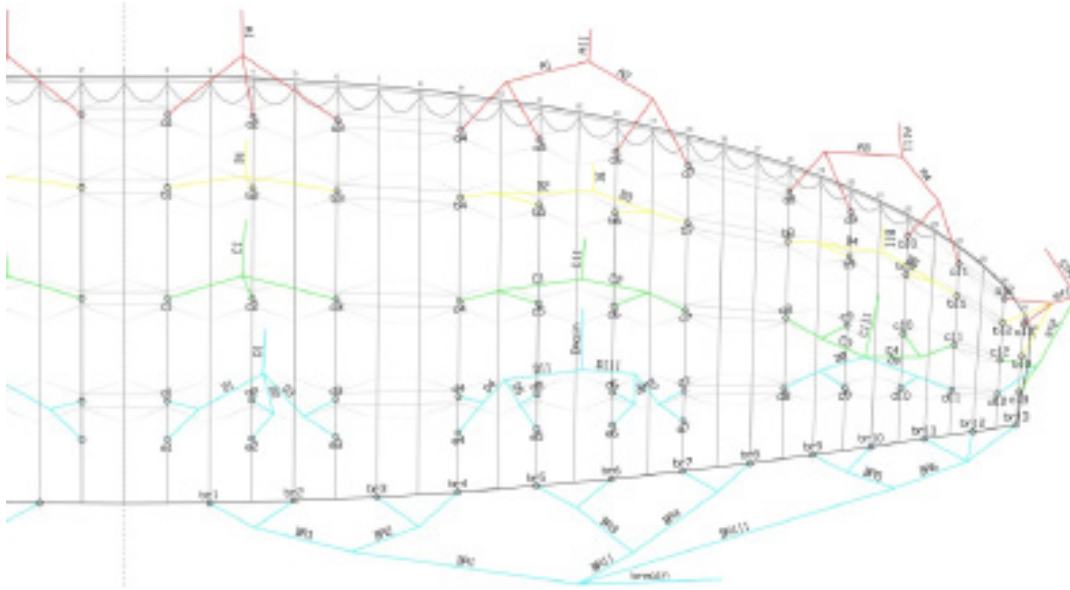
Checked line sheet(with riser)

The measured values at the lower surface of the tailing edge, cll depth and spacing of the articulation points were determined under tensile load of 50N.

	A	B	C	D	E	Brake
1	9016	8929	8969	9120	9185	9890
2	8933	8838	8870	9022	9083	9525
3	8969	8880	8921	9079	9136	9256
4	8930	8857	8900	9063	9120	9130
5	8853	8779	8818	8970	9021	8941
6	8831	8756	8800	8957	9005	8806
7	8860	8802	8857	9011	9052	8750
8	8692	8660	8715	8796		8783
9	8552	8531	8583	8655		8688
10	8410	8409	8462	8540		8630
11	8304	8323	8379	8455		8600
12(STABLE)	8124	8080	8120	8195		8500
13(STABLE)	7977	8020	8075			8445

Overview





Name	Manufacturer	Name	Manufacturer	Name	Manufacturer	Name	Manufacturer	Name	Manufacturer	Name	Manufacturer
a1	PPSL 160	b1	PPSL 160	c1	PPSL 160	d1	PPSL 120	e1	PPSL 120	br1	DSL70
a2	PPSL 160	b2	PPSL 160	c2	PPSL 160	d2	PPSL 120	e2	PPSL 120	br2	DSL70
a3	PPSL 160	b3	PPSL 160	c3	PPSL 160	d3	PPSL 120	e3	PPSL 120	br3	DSL70
a4	PPSL 120	b4	PPSL 120	c4	PPSL 120	d4	PPSL 120	e4	PPSL 120	br4	DSL70
a5	PPSL 120	b5	PPSL 120	c5	PPSL 120	d5	PPSL 120	e5	PPSL 120	br5	DSL70
a6	PPSL 120	b6	PPSL 120	c6	PPSL 120	d6	PPSL 120	e6	PPSL 120	br6	DSL70
a7	PPSL 120	b7	PPSL 120	c7	PPSL 120	d7	PPSL 120	e7	PPSL 120	br7	DSL70
a8	PPSL 120	b8	PPSL 120	c8	PPSL 120	d8	PPSL 120			br8	DSL70
a9	PPSL 120	b9	PPSL 120	c9	PPSL 120	d9	PPSL 120	Dmain	A7343-280	br9	DSL70
a10	PPSL 120	b10	PPSL 120	c10	PPSL 120	d10	PPSL 120			br10	DSL70
a11	PPSL 120	b11	PPSL 120	c11	PPSL 120	d11	PPSL 120	at1	PPSL 120	br11	DSL70
a12	PPSL 120	b12	PPSL 120	c12	PPSL 120	d12	PPSL 120	at2	PPSL 120	br12	DSL70
a13	PPSL 120	b13	PPSL 120	c13	PPSL 120					br13	DSL70
						D1	PPSL 160	STM	A6843-160		
						D2	PPSL 160			BR1	PPSL 120
A1	PPSL 200	B1	PPSL 200	C1	PPSL 160	D3	PPSL 160			BR2	PPSL 120
A2	PPSL 200	B2	PPSL 200	C2	PPSL 160	D4	PPSL 160			BR3	PPSL 120
A3	PPSL 160	B3	PPSL 160	C3	PPSL 160	D5	PPSL 160			BR4	PPSL 120
A4	PPSL 160	B4	PPSL 160	C4	PPSL 160	D6	PPSL 160			BR5	PPSL 120
						D7	PPSL 160			BR6	PPSL 120
AI	A7343-420	BI	A7343-420	CI	A7343-280	D8	PPSL 160				
AII	A7343-420	BII	A7343-420	CII	A7343-280	D9	PPSL 160			BRI	PPSL 200
AIII	A7343-280	BIII	A7343-280	CIII	A7343-280					BRII	PPSL 200
						DI	A7343-280			BRIII	PPSL 200
						DII	PPSL 160				
						DIII	PPSL 160			BRI	7850X-240



Serial Number	
Date of Production	
Dealer	
Date of sales	
Check and repair information	