

## Service manual



## INTRODUCTION

## Service Manual

The latest version of service manual is available at: www.macpara.com/en/service-manual

## Technical inspections

Full inspection is recommended every 24 months, if not advised otherwise by the inspecting person due to current paraglider condition.

Paragliders in commercial use (training and tandem flights) should be undergoing Full Inspection every 12 months (excluding first 24-month period after purchase).

Technical inspection is carried out by the manufacturer or authorised person.

## TECHNICAL DATA

| High Performance EN-C <br> Size |  | Elan 2 <br> $22(\mathrm{XS})$ | Elan 2 <br> $24(\mathrm{~S})$ | Elan 2 <br> $26(\mathrm{M})$ | Elan 2 <br> $28(\mathrm{~L})$ | Elan 2 <br> $30(\mathrm{XL})$ | $\left.\begin{array}{c}\text { Elan 2 } \\ \hline\end{array} \mathrm{XXL}\right)$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |

*pilot equipped $=$ weight naked + cca. $15-20 \mathrm{Kg}(33-44 \mathrm{lbs})$

## MANUAL FOR PARAGLIDER CHECKS

## Check-intervals

All paragliders used in flight must be checked at least every 24 months. For paragliders used by paragliding schools the period is 12 months.

## Personnel authorised to carry out checks

Training course by manufacturer is the basis for permission to carry out paraglider checks.

## Identification of glider

An identity sticker with details of certification and serial number is attached to the glider.

## Components of the check

## Porosity

The porosity should be checked with a porosity meter (JDC). Compare the resultant data with the producer's manual.
Porosity measures should be taken on at least three points of both the top and bottom surface. The first point should be placed $20-30 \mathrm{~cm}$ from leading edge in the middle of canopy. Second and third points are placed left and right from first measure point at $25 \%$ of the span. One additional measurement should be made on the top surface of the wing tip.
The identified time should be higher than 30 second (JDC). In the event of the result being less than 30 seconds, the result of the check is a fail.

## Overall strength check

The check of canopy strength should be made with a Bettsometer (B.M.A.A approved Patent No. GB 2270768 Clive Betts Sales). On the top and bottom surfaces make small holes with a needle at the Aline attachment points. The exact verification should be made in accordance with the Bettsometer user manual.

## Line strength check

Line strengths should be as specified in accordance with the certification requirements. One main line should be taken from each array and have its strength checked with a tension-meter.
Required strengths should be higher than:

- $A+B$ main lines $x$ measured value $>8 \times$ maximum take-off weight and higher then 800 kg for the $\mathrm{A}+\mathrm{B}$ arrays.
- $C+D$ mean lines $x$ measured value $>6 \times$ maximum take-off weight and higher then 600 kg for the $\mathrm{A}+\mathrm{B}$ arrays.
Replacements for damaged lines must be with new original lines. Line lengths are taken from the lines data page.


## Full line length measurement

Lines should be separated and each line measured under a tension of 5 kg . Measurement is made from the line karabiner to the canopy`s surface in according to the method of certification. Measurement of brake lines is made from the knot on swivel to upper loop of galery line. The lenght of bunching line is not included. Rib numbering begins in the middle of canopy and leads to the wing tip. Measured full lengths should be documented in the inspection record and are compared with certified full line lengths protocol. Lengths should not differ by more than 10 mm . The opposite sides should be checked for symmetry.

## Canopy line-attachment points check

Attachment points should be checked for damage and stretching. Defects, loops and flares should be repaired.

## Canopy fabric check

Ribs, diagonal ribs, top and bottom surface should be checked. Any damage to sewing or tears to the fabric, which could influence flying characteristics must be repaired.

## Lines

All lines should be checked for tears, breaks any damage to the sheath or signs of wear. Special attention should be paid to the sewing of the line loops. Damaged lines must be replaced.
The results should be documented in the inspection record.

## Connector check

All line carabineers, trimmers (if used), speed systems and pulleys should be inspected for visible damage. Open or improperly secured connectors should be secured in accordance with the producers recommendations.

## Risers

Both risers should be checked for tears, signs of wear or any damage and measured with a pull of 5 daN strength. Measured data should be documented in the inspection record. The difference must not be higher then 5 mm when compared to specified lengths.

## Final check

The glider sticker and check sticker must be inspected for readability and correctness. The check must be documented with date, signature and stamp on the canopy and in the user manual.


## LINE PLAN - ELAN 2



## LENGTH OF LINE - ELAN 2-22

Mentioned line lengths are marked on stretched lines that are pulled under 5 kg . The real length measured from one loop to other loop differs in according to type of the line, its diameter and type of processing method (sewing or splicing). When replacing a line always compare the symmetry with opposite side.


## LENGTH OF LINE - ELAN 2-24

Mentioned line lengths are marked on stretched lines that are pulled under 5 kg . The real length measured from one loop to other loop differs in according to type of the line, its diameter and type of processing method (sewing or splicing). When replacing a line always compare the symmetry with opposite side.


Dynema/Polyester A-7850-200

## LENGTH OF LINE - ELAN 2-26

Mentioned line lengths are marked on stretched lines that are pulled under 5 kg . The real length measured from one loop to other loop differs in according to type of the line, its diameter and type of processing method (sewing or splicing). When replacing a line always compare the symmetry with opposite side.


## LENGTH OF LINE - ELAN 2-28

Mentioned line lengths are marked on stretched lines that are pulled under 5 kg . The real length measured from one loop to other loop differs in according to type of the line, its diameter and type of processing method (sewing or splicing). When replacing a line always compare the symmetry with opposite side.


Dynema/Polyester A-7850-200

## LENGTH OF LINE - ELAN 2-30

Mentioned line lengths are marked on stretched lines that are pulled under 5 kg . The real length measured from one loop to other loop differs in according to type of the line, its diameter and type of processing method (sewing or splicing). When replacing a line always compare the symmetry with opposite side.


Dynema/Polyester A-7850-200

## LENGTH OF LINE - ELAN 2-33

Mentioned line lengths are marked on stretched lines that are pulled under 5 kg . The real length measured from one loop to other loop differs in according to type of the line, its diameter and type of processing method (sewing or splicing). When replacing a line always compare the symmetry with opposite side.


Dynema/Polyester A-7850-200

Elan 2-22 (XS)

| Center | A | B | C | Brakes |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 6892 | 6816 | 6925 | 7215 |
| 2 | 6850 | 6774 | 6877 | 6930 |
| 3 | 6850 | 6778 | 6932 | 6850 |
| 4 | 6757 | 6687 | 6861 | 6725 |
| 5 | 6801 | 6734 | 6776 | 6700 |
| 6 | 6669 | 6609 | 6794 | 6580 |
| 7 | 6510 | 6457 | 6839 | 6485 |
| 8 | 6433 | 6393 | 6671 | 6435 |
| 9 | 6430 | 6400 | 6505 | 6470 |
| 10 | 6086 | 6054 | 6413 | 6390 |
| 11 | 5998 | 6032 | 6406 | 6265 |
| 12 | 5968 | 5977 | 6120 | 6280 |
| 13 |  |  | 6027 | 6185 |
| 14 |  |  |  | 6150 |
| 15 |  |  |  | 6230 |

Elan 2-28(L)

| Center | A | B | C | Brakes |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 7681 | 7596 | 7718 | 8110 |
| 2 | 7634 | 7548 | 7664 | 7790 |
| 3 | 7634 | 7553 | 7729 | 7700 |
| 4 | 7529 | 7451 | 7649 | 7555 |
| 5 | 7579 | 7503 | 7551 | 7530 |
| 6 | 7431 | 7363 | 7574 | 7395 |
| 7 | 7252 | 7192 | 7624 | 7285 |
| 8 | 7168 | 7123 | 7433 | 7230 |
| 9 | 7165 | 7131 | 7246 | 7270 |
| 10 | 6776 | 6740 | 7145 | 7185 |
| 11 | 6677 | 6715 | 7138 | 7045 |
| 12 | 6643 | 6653 | 6814 | 7060 |
| 13 |  |  | 6710 | 6955 |
| 14 |  |  |  | 6910 |
| 15 |  |  |  | 7005 |

Elan 2-24 (S)

| Center | A | B | C | Brakes |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 7107 | 7029 | 7141 | 7490 |
| 2 | 7064 | 6985 | 7092 | 7195 |
| 3 | 7064 | 6989 | 7150 | 7115 |
| 4 | 6967 | 6896 | 7076 | 6980 |
| 5 | 7013 | 6943 | 6988 | 6955 |
| 6 | 6877 | 6815 | 7007 | 6835 |
| 7 | 6712 | 6657 | 7053 | 6730 |
| 8 | 6633 | 6592 | 6879 | 6680 |
| 9 | 6631 | 6599 | 6707 | 6720 |
| 10 | 6274 | 6241 | 6612 | 6640 |
| 11 | 6183 | 6218 | 6606 | 6510 |
| 12 | 6152 | 6161 | 6309 | 6525 |
| 13 |  |  | 6214 | 6425 |
| 14 |  |  |  | 6385 |
| 15 |  |  |  | 6470 |

Elan 2-26 (M)

| Center | A | B | C | Brakes |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 7394 | 7312 | 7430 | 7785 |
| 2 | 7349 | 7266 | 7378 | 7480 |
| 3 | 7349 | 7271 | 7439 | 7390 |
| 4 | 7248 | 7173 | 7362 | 7250 |
| 5 | 7296 | 7223 | 7269 | 7230 |
| 6 | 7154 | 7089 | 7290 | 7100 |
| 7 | 6982 | 6925 | 7338 | 6995 |
| 8 | 6901 | 6858 | 7156 | 6940 |
| 9 | 6898 | 6865 | 6976 | 6980 |
| 10 | 6525 | 6491 | 6879 | 6895 |
| 11 | 6430 | 6467 | 6872 | 6760 |
| 12 | 6397 | 6407 | 6562 | 6775 |
| 13 |  |  | 6462 | 6675 |
| 14 |  |  |  | 6630 |
| 15 |  |  |  | 6725 |

Elan 2-30 (XL)

| Center | A | B | C | Brakes |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 7932 | 7844 | 7970 | 8400 |
| 2 | 7883 | 7794 | 7914 | 8070 |
| 3 | 7883 | 7800 | 7983 | 7975 |
| 4 | 7775 | 7694 | 7900 | 7825 |
| 5 | 7826 | 7748 | 7798 | 7800 |
| 6 | 7673 | 7603 | 7822 | 7660 |
| 7 | 7488 | 7426 | 7874 | 7545 |
| 8 | 7402 | 7355 | 7675 | 7490 |
| 9 | 7399 | 7364 | 7482 | 7530 |
| 10 | 6995 | 6958 | 7378 | 7445 |
| 11 | 6893 | 6932 | 7371 | 7300 |
| 12 | 6858 | 6868 | 7035 | 7315 |
| 13 |  |  | 6927 | 7205 |
| 14 |  |  |  | 7160 |
| 15 |  |  |  | 7255 |

Elan 2-33 (XXL)

| Center | A | B | C | Brakes |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 8255 | 8163 | 8295 | 8840 |
| 2 | 8204 | 8111 | 8236 | 8465 |
| 3 | 8204 | 8117 | 8308 | 8360 |
| 4 | 8091 | 8006 | 8222 | 8210 |
| 5 | 8145 | 8063 | 8114 | 8180 |
| 6 | 7985 | 7911 | 8141 | 8050 |
| 7 | 7792 | 7727 | 8195 | 7920 |
| 8 | 7703 | 7654 | 7987 | 7865 |
| 9 | 7699 | 7663 | 7785 | 7915 |
| 10 | 7278 | 7239 | 7678 | 7830 |
| 11 | 7171 | 7212 | 7670 | 7665 |
| 12 | 7134 | 7145 | 7319 | 7680 |
| 13 |  |  | 7179 | 7555 |
| 14 |  |  |  | 7505 |
| 15 |  |  |  | 7615 |

## Main lines



## Brakes line

## Standard system



Raff system


## RISER



## Slower

## Riser lengths Elan 2

|  | A | A1 | B | C |
| :---: | :---: | :---: | :---: | :---: |
| Trim-position | 525 | 525 | 525 | 525 |
| Accelerated | 370 | 370 | 425 | 525 |

The lengths are measured from the main attachment point to the lower edge of rapid links.

Riser


## Fabric

(PORCHER SPORT, Rue du Ruisseau B.P. 710,38290 ST. QUENTIN FALLAVIER, FRANCE) Top Sail / Bottom Sail - Leading Edge - SKYTEX 38 E25A - 100\% nylon 6.6 , 33 Dtex, $38 \mathrm{~g} / \mathrm{m}^{2}$

Top Sail - Trailing Edge - SKYTEX 32 E3W - 100\% nylon $6.6,33 / 22$ Dtex, $32 \mathrm{~g} / \mathrm{m}^{2}$
Bottom Sail - SKYTEX 27 E71A - 100\% nylon 6.6 , 22 Dtex, $27 \mathrm{~g} / \mathrm{m}^{2}$
Main ribs, Diagonals - SKYTEX 32 E29A - $100 \%$ nylon 6.6 , $33 / 22$ Dtex, $32 \mathrm{~g} / \mathrm{m}^{2}$
Ribs - SKYTEX 32 E29A - 100\% nylon 6.6 , $33 / 22$ Dtex, $32 \mathrm{~g} / \mathrm{m}^{2}$
Reinforcement main ribs - W382 Polyester $180 \mathrm{~g} / \mathrm{m}^{2}$
Reinforcement Ribs - W382 Polyester $180 \mathrm{~g} / \mathrm{m}^{2}$

## Lines

(EDELMAN+RIDDER+CO. Achener Weg 66, D-88316 ISNY IM ALLGEAU, GERMANY)
Upper lines, Stabilo, Brake lines , -C - Aramid 8000/U-070, Breaking Load 70 kg
Upper lines-A,-B,-C, Middle cascade-A,-B,-C - Aramid 8000/U-090, Breaking Load 90 kg
Brake lines -Aramid 8000/U-090, Breaking Load 90 kg
Upper lines -A,-B,-C, Middle cascade-C - Aramid 8000/U-130, Breaking Load 130 kg
Wing tip line - Aramid/Polyester A-7343-090, Breaking Load 090 kg
Main brake line - Dynema/Polyester A-7850-200, Breaking Load 200 kg
(ROSENBERGER TAUWERK, GERMANY)
Main lines A1,A2,A3,B1,B2,B3,C1,C2,C3 - Dynema/Polyester PPSL 191,Breaking Load 191 kg (For Elan 2-30 and 33)
Main lines A2,A3,B2,B3 - Dynema /Polyester PPSL 200, Breaking Load 200 kg

## Attachment straps

(STUHA a.s., DOBRUSKA, Opočenská 442, 51801 Dobruška CZECH REPUBLIC) STAP-POLYESTERBRIDLE 13 mm , Breaking Load 70 kg

## Risers

(Cousin Trestec, 8 rue Abbé Bonpain 59117 Wervicq-sud France, FRANCE) Aramid-Polyester 345512 mm Breaking Load 1100 kg

Thread
(AMANN SPONIT Itd, Dobronická 635, 14825 PRAHA 4, CZECH REPUBLIC)
Lines-SYNTON 60, Main lines-SERABOND 60, Canopy-SYNTON 40, Riser-SYNTON 20

## Rapid links

(ELAIR SERVIS, Axmanova 3913/9,767 01 KROMERIZ, CZECH REPUBLIC) NIRO TRIANGLE 200 - Max. Load 200 kg

## Rigifoils

(MERKUR SLOVAKIA s.r.o.,Kamenné pole 4554/6,031 01 Liptovský Mikuláš, SLOVAKIA) Rigifoils - Nylon 1,6 mm, 2,3 mm

