SKR300 Service Manual

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1. Introduction

The SKR300 is an automatic visible laser that can be used for levelling, vertical alignment, plumbing and squaring.

The SKR300 laser has these advanced features:

- Automatic self-levelling in both horizontal and vertical modes
- Choice of beams: rotation plane, scanning, chalk line, single point or constant squaring
- Square shot that's left / right adjustable

a. SKR300 Specifications

Operational range (diameter)	1,000 ft. (300m) with detector
levelling range	5.7° or 10%
levelling accuracy horizontal & vertical	30” or 3/16” at 100 ft. or 10mm at 100m (5 mm cone)
Chalk line accuracy	10 mm at 30 m
Plump/square laser spot	10 mm at 100 m
Scanning angle	10° to 48°
Power	2 x (LR20 or D) alkaline batteries or rechargeable batteries
Battery life	160 hours with alkaline batteries 40 hours with rechargeable batteries
Battery charging time	15 hours
Rechargeable batteries	Ni-cad
Rotation speed	60 to 530 rpm
Weatherproof	Rain and dustproof (IP64)
Laser beam	635nm <2mW (Class IIIR)
Size	6” x 6 ½” x 6 ¾” (15 x 16 x 17 cm)
Weight	3 lbs / 1.3 kg
Operating temperature	- 10° to + 50°C.
Storage temperature	- 20° to + 60°C.
Tripod mount	Standard 5/8 - II
Remote control	Build-in receiver

b. Specifications

LDR180

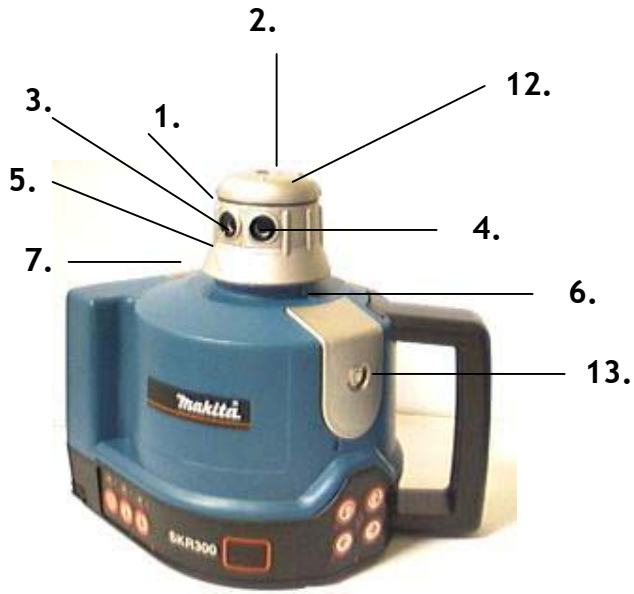
Operational Range	500 ft. (150m)
Accuracy	Coarse 5mm / Fine 2mm
Capture window	2.5” (4cm)
Sound	3 different tones high, normal and mute
Displays	LCD (front and back)
Power	9v alkaline battery (LR6)
Battery life	50 hours
Weatherproof	IP64
Size	6 x 3” x 1” (14.5 x 7 x 2.5 cm)
Weight	0.5 lbs / 0.3 kg
Tripod mount	Standard 5/8 - II
Remote control	Build-in receiver

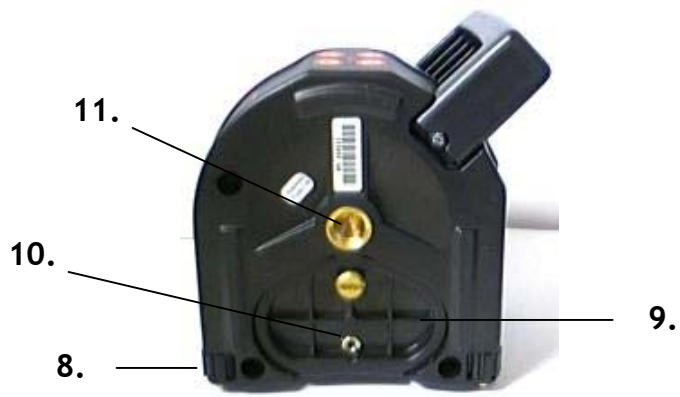
TL25

Operational Range	30m interior (150 ft.) / 15m exterior
Power	1,5v alkaline battery (AA)
Battery life	16 hours
Weatherproof	IP61
Size	3.3 ” x 2” x 0.8” (85 x 50 x 20 mm)
Weight	45 g

Overview

1. Rotating head
2. Plumb / square laser beam aperture
3. Laser beam aperture
4. Laser chalk line aperture
5. Arrow (align with 90° index mark)
6. 90° index mark (X1,X2,Y1,Y2)
7. Retractable foot for vertical setup
8. Adjustable feet for vertical setup
9. Batteries (rechargeable or alkaline)
10. Jack for rechargeable battery
11. 5/8 – 11 mount
12. Top cover
13. Vial for vertical rough levelling





Keypad overview

14. Laser rotation control to the left + speed control & scanning direction

    Save calibration data

15. Laser rotation control to the right + speed control & scanning direction

    Change calibration axis

16. Decrease scanning angle. In vertical mode, move plane to the right

    Move beam down

17. Increase scanning angle. In vertical mode, move plane to the left

    Move beam up

18. Capture window for remote control
19. Manual mode light / Z Axis calibration indicator
20. Manual / Automatic
21. H. I. Alert light / Y Axis calibration indicator
22. H. I. Alert (Tilt)
23. Battery low light / X Axis calibration indicator
24. On / Off

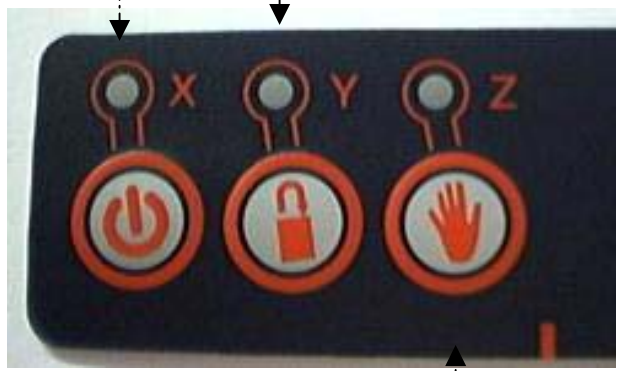
2. Operation

On / Off Key

Press the On/Off key to switch the laser on or off. It will start automatic levelling.

Tilt Key

Tilt: H.I. – Alert mode. Will work only when selected. The Tilt function is also known as the H.I. (Height of Instrument) Alert. This feature stops the laser automatically if the laser is jarred or moved. This function is only available in Automatic mode. Press the Tilt key after turning the instrument on. The H.I. Alert feature is ON (H.I. light blink) after the instrument has self-leveled for 30 seconds.



If the laser is disturbed, the head will stop rotating, laser beam shut off and the H.I. light will be solid on. You have to restart the instrument and check the reference.

Works with 3 beams mode (Normal, Chalk Line, Scanning).

Automatic / Manual Key

Auto : Automatic levelling.
Default mode when laser is switched on

Man : Manual use.

The SKR300 laser is always in the automatic self-levelling mode (auto) when turned on. Once the instrument has self-leveled, the laser head will start rotating.

You can choose to have constant rotation by using the Manual mode. This way, the beam will rotate even if the instrument is not leveled. The red light above the Auto / Manual button will blink to indicate the instrument is in manual mode.

2a. Horizontal Setup

The SKR300 can be used directly on the ground or mount on a standard tripod (5/8-11).

Press the On/Off key to switch the laser on. It will start automatic levelling.

To stop the rotation, press once on opposite direction Left (14) or Right (15).

When the head stop briefly press 14 or 15 to move the laser beam to a specific point.

You can also manually spot the beam by rotating the laser head with your hand.

To adjust the rotation speed, press Left (14) or Right (15) continuously according to the direction you wish.

2b. Vertical Setup

Flip the retractable foot. Place the instrument in vertical position, resting on this foot. Use the adjustable feet to rough level the laser to adjust the top bubble vial in order to achieve best accuracy for long distance.

Press the On/Off key to switch the laser on. It will start automatic levelling.

2c. Using the Laser Chalk Line

Hold the head and rotate the top cover (12) so that the beam comes out the laser line aperture (4). This gives a precise and stable laser line for viewing at short distances. You can move the line by rotating the head manually or by using the remote control.

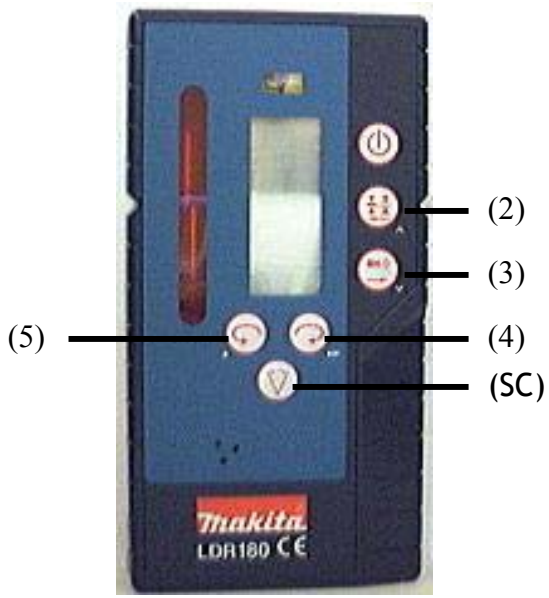
Note : The LDR180 detector will not work with the chalk line

2d. Using the Scanning

Turn the laser on, press (SC) or simultaneously (14),(17) to start scan.

Press (4) or (5), (14) or (15) to aim the scan.

To adjust the scanning angle (10° to 48°), press (2) or (3), (17) or (16).



2e. Power

When the battery power is low, the laser head will stop rotating, the On/Off led indicator (23) blink and then stay on.

Recharge battery pack or replace both alkaline batteries at the same time.

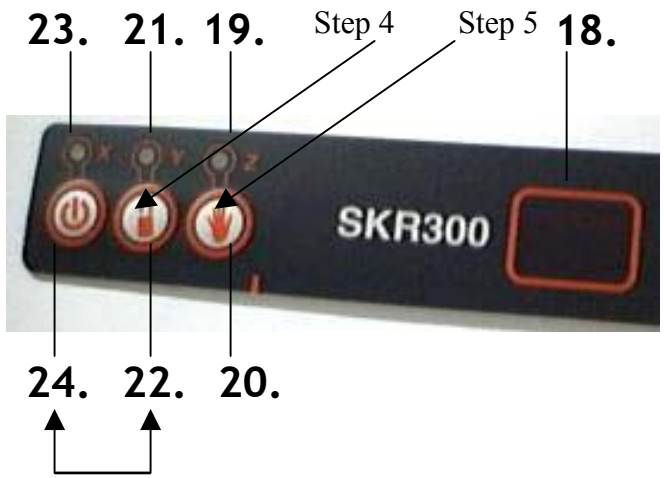
The SKR300 can be charged while working. If electricity is available on the job site, simply plug in the charger and keep on working.

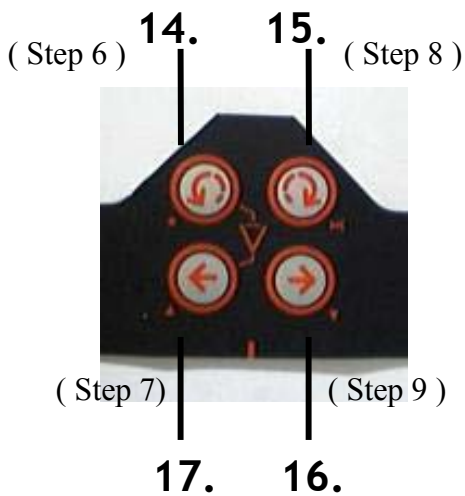
2f. Self-test mode

For burn-in and movement test only.

1. Press and hold H.l. tilt (22)
2. Press On / Off (24) once to switch on the SKR300
3. Wait until LED X,Y, Z stays on, then release H.l. tilt
4. Press H.l. tilt (22) once
5. Press Auto / Man (20) once
6. Press “Turn Left” (14) once
7. Press “UP” (17) once
8. Press “Turn Right” (15) once
9. Press “Down” (16) once

The laser beam should be on and the head will turn and levelling motors will move to end of X,Y axis. The test will not stop until power off.



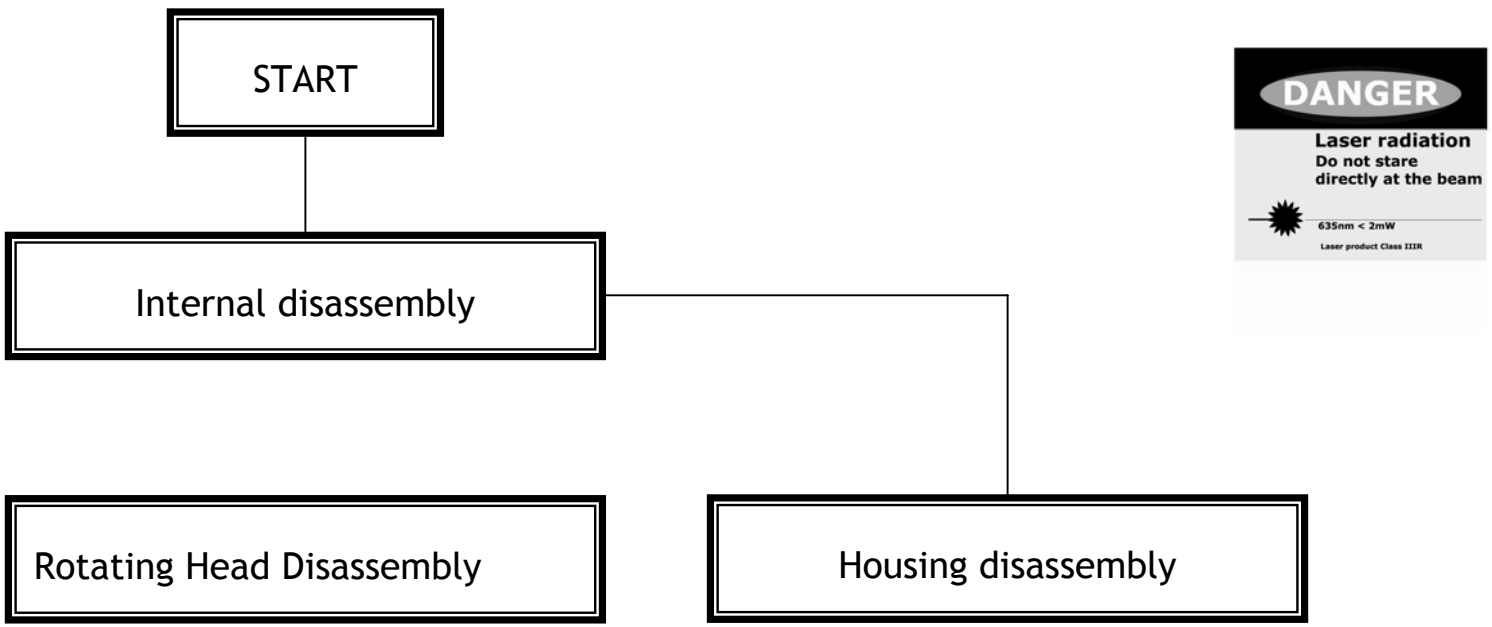


3. Disassembly

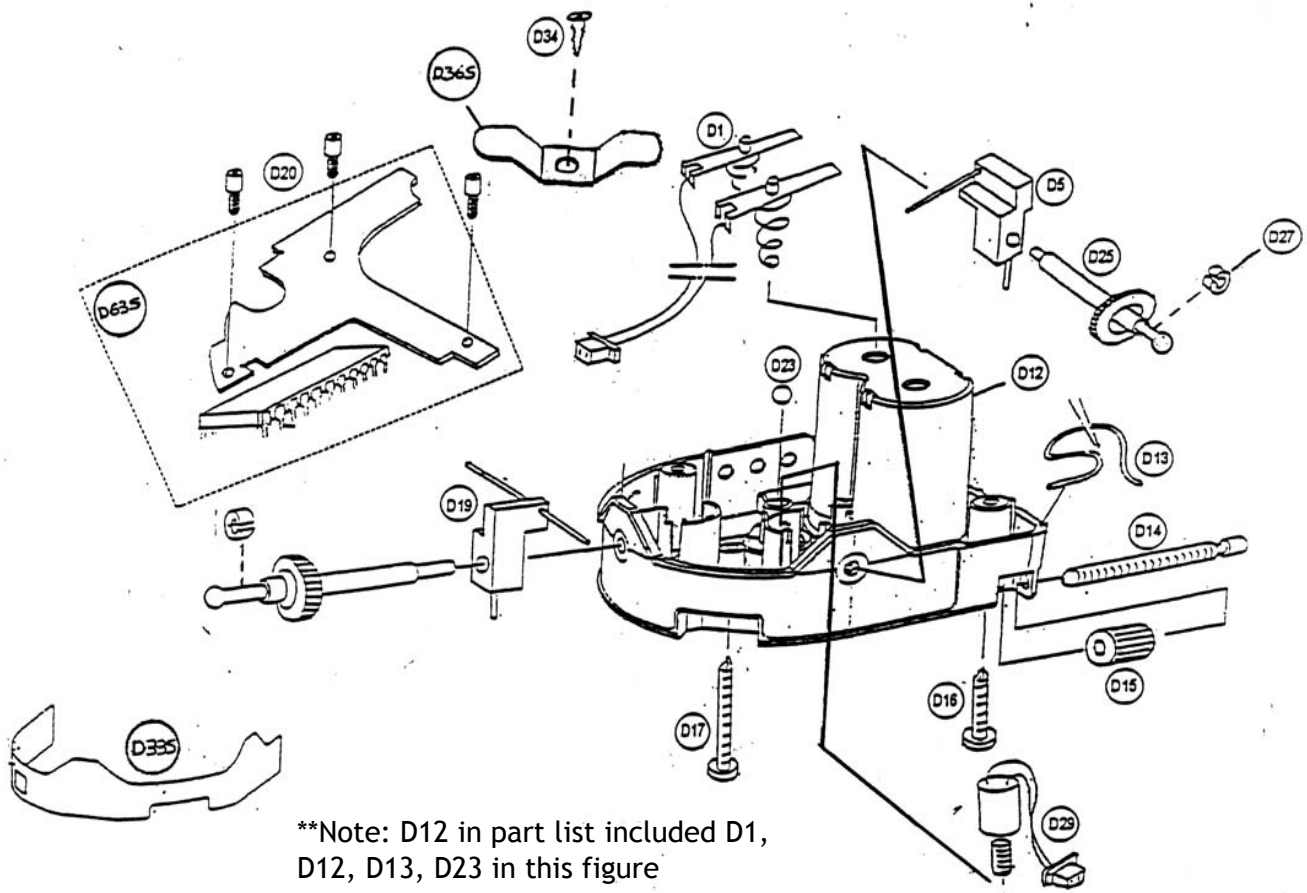
CAUTION: AVOID staring or looking directly into the laser light.

SKR300 is a laser diode, class IIIR product. When adjusting, care must be taken to meet IIIR requirements.

Following page is a flow chart showing the order of disassembling the SKR300, but before disassembling, take out the batteries.



3a. Remove Lower Housing Assembly



**Note: D12 in part list included D1, D12, D13, D23 in this figure

a) Remove screw (D17) to remove the handle (B10)

b) Remove three screws (D16) to release the lower housing assembly

c) Laying the upper housing aside. Be careful not to damage all the cables and connectors

Remove X / Y motor

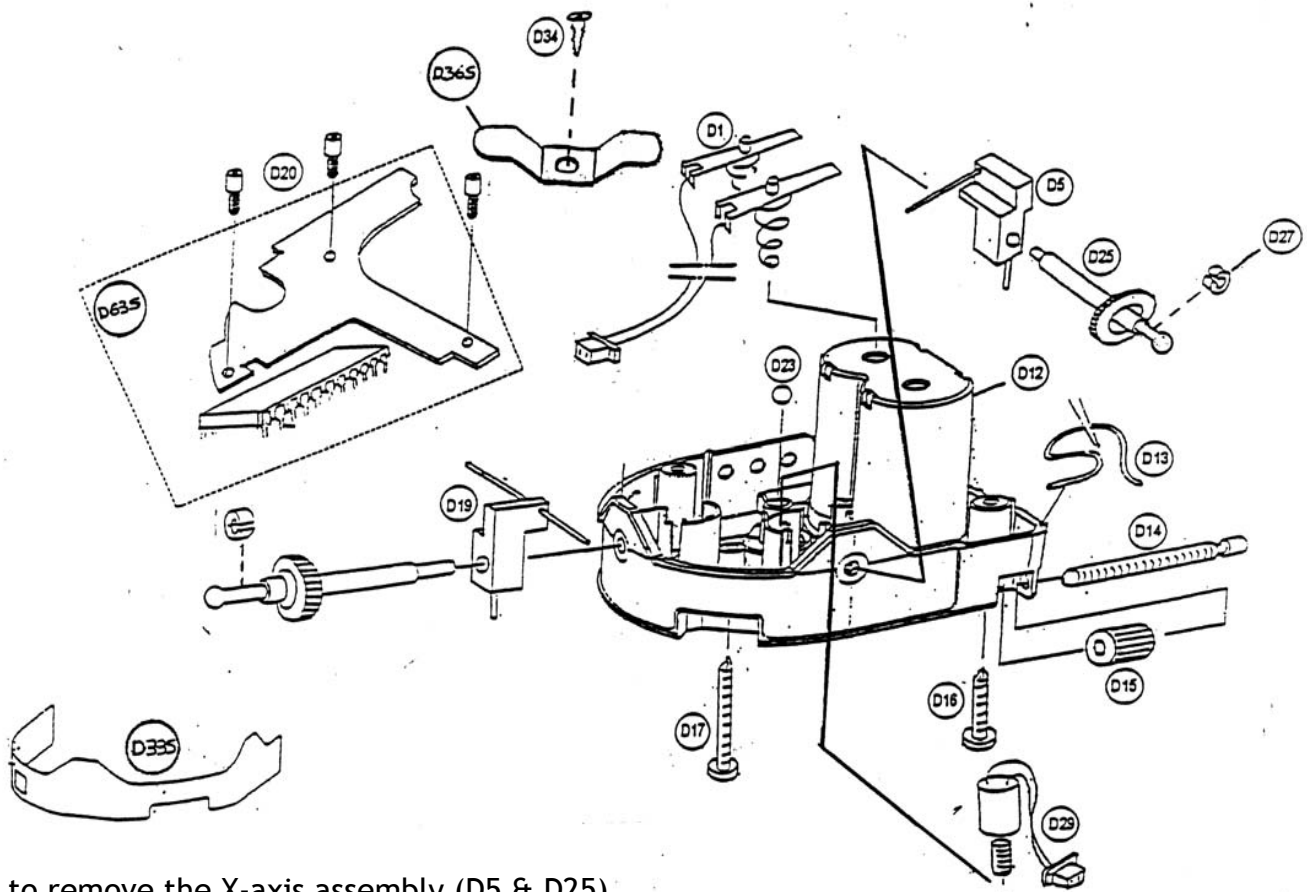
a) Remove screw D34 and release motor brace D36S

b) Disconnect X / Y motor connector from PCB

c) Remove X / Y motor

d) Reverse steps c) – a) to place new motor

3b. Remove PCB



a) Remove plastic sleeve (D27) to remove the X-axis assembly (D5 & D25)

b) Remove plastic sleeve (D27) to remove the Y-axis assembly (D19 & D25)

c) Unplug all the connectors by using a tweezers / small flat screw driver to unlock the inter-lock of connectors

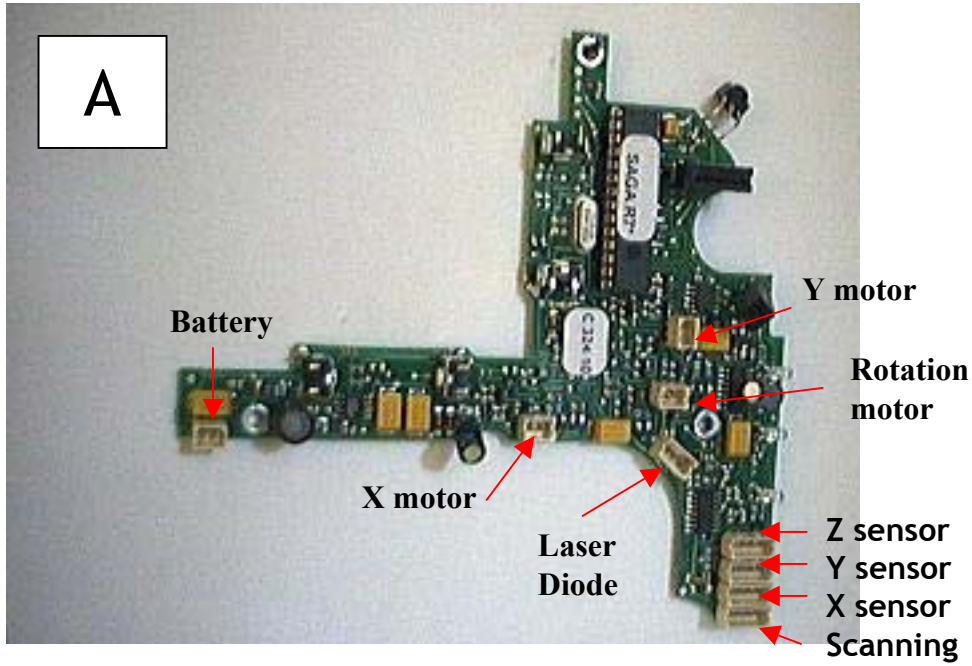
d) Unlock and unplug keypad flat cable*

e) Remove 3 screws (D20) to release PCB

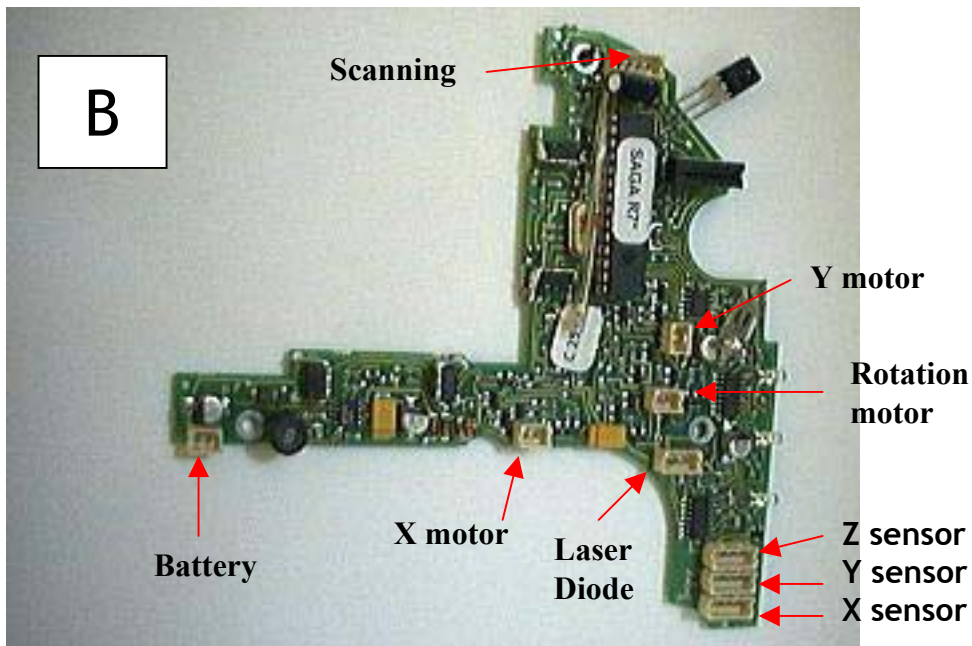
* NOTE : Twist the keypad flat cable a bit for easier plug back

3c. Two versions PCB

A : New version.
With this board you can change the keypad without remove the PCB.



B : Old version



3d. Inner Module

Replace Inner module

a) Remove Lower housing assembly

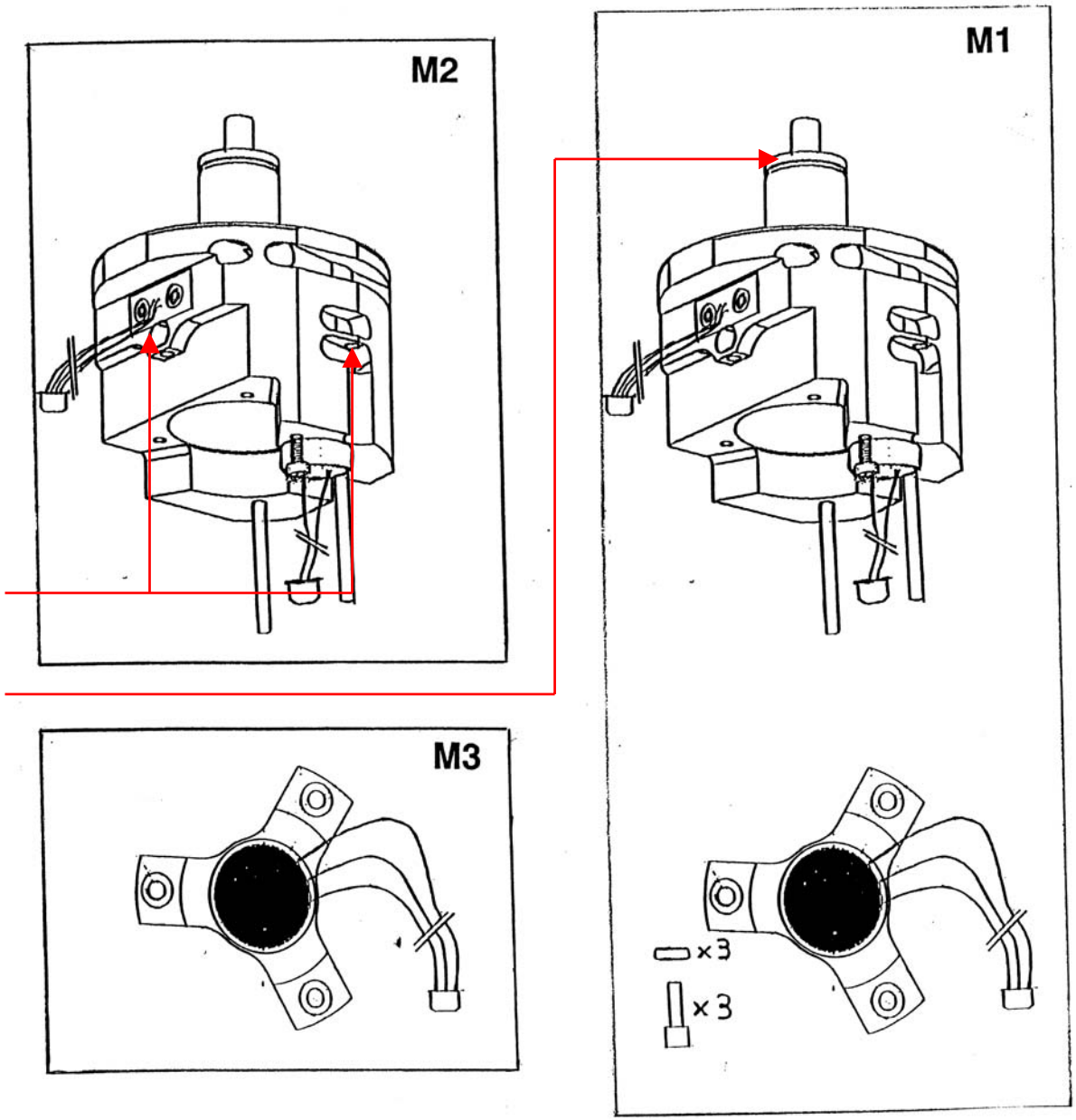
b) Remove Rotating head assembly

c) Un-hook X and Y adjusting spring

d) Remove Locating ring by snap ring pliers

e) Remove Inner module

f) Reverse steps d) to a) to put in new Inner module



3d. Inner module

Caution: Calibration required. Please make sure you have proper tools and qualify engineer to perform the calibration. The SKR300 can be out of specification without calibration.

Replace Laser diode

a) Unlock 3 screws to remove laser diode from Inner Module

b) Check the 3 o-rings under the laser diode are in good condition

c) Place the new laser diode on top of the o-rings

d) Slightly tighten 3 screws back

e) Place the Inner Module on calibration diode base as shown

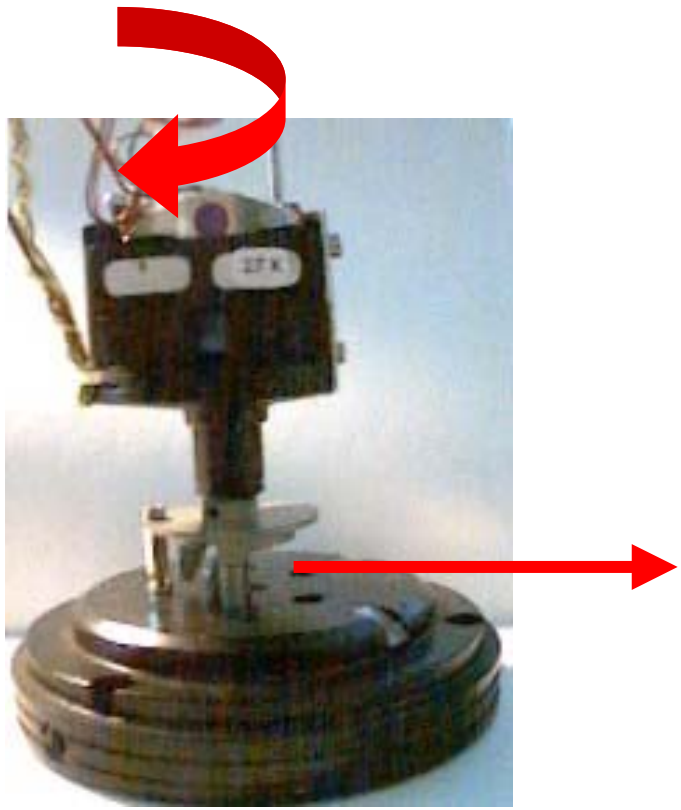
e) Connect 3v battery to the laser diode and project the spot to about 30 meters away

f) Slowly rotate the Inner module clockwise

g) The laser spot should drawing circle following the rotation of Inner module

h) Tighten corresponding screw to minimize the circle

i) Add small amount of thread lock on screws after calibration



4. Rotating Head disassembly

a) Remove 2 screws (A1) by 2.5mm Hexagonal wrench to release the head cover (A13)

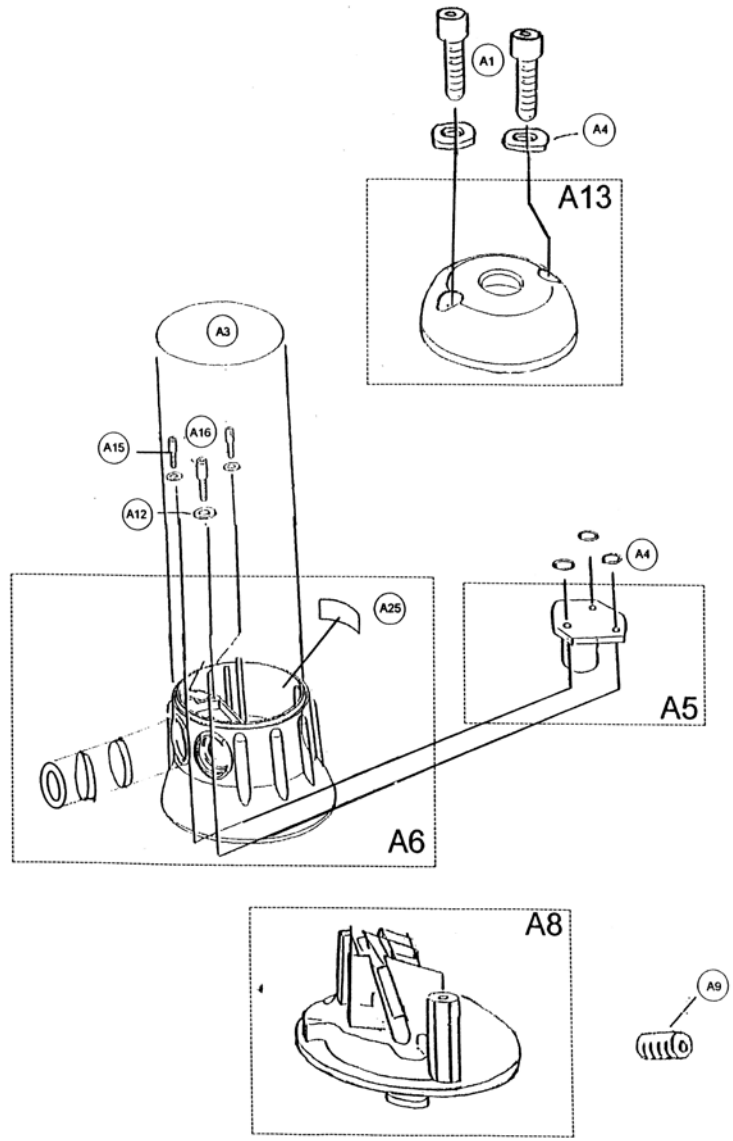
b) Head body (A6) now can be removed

Replace head mirror

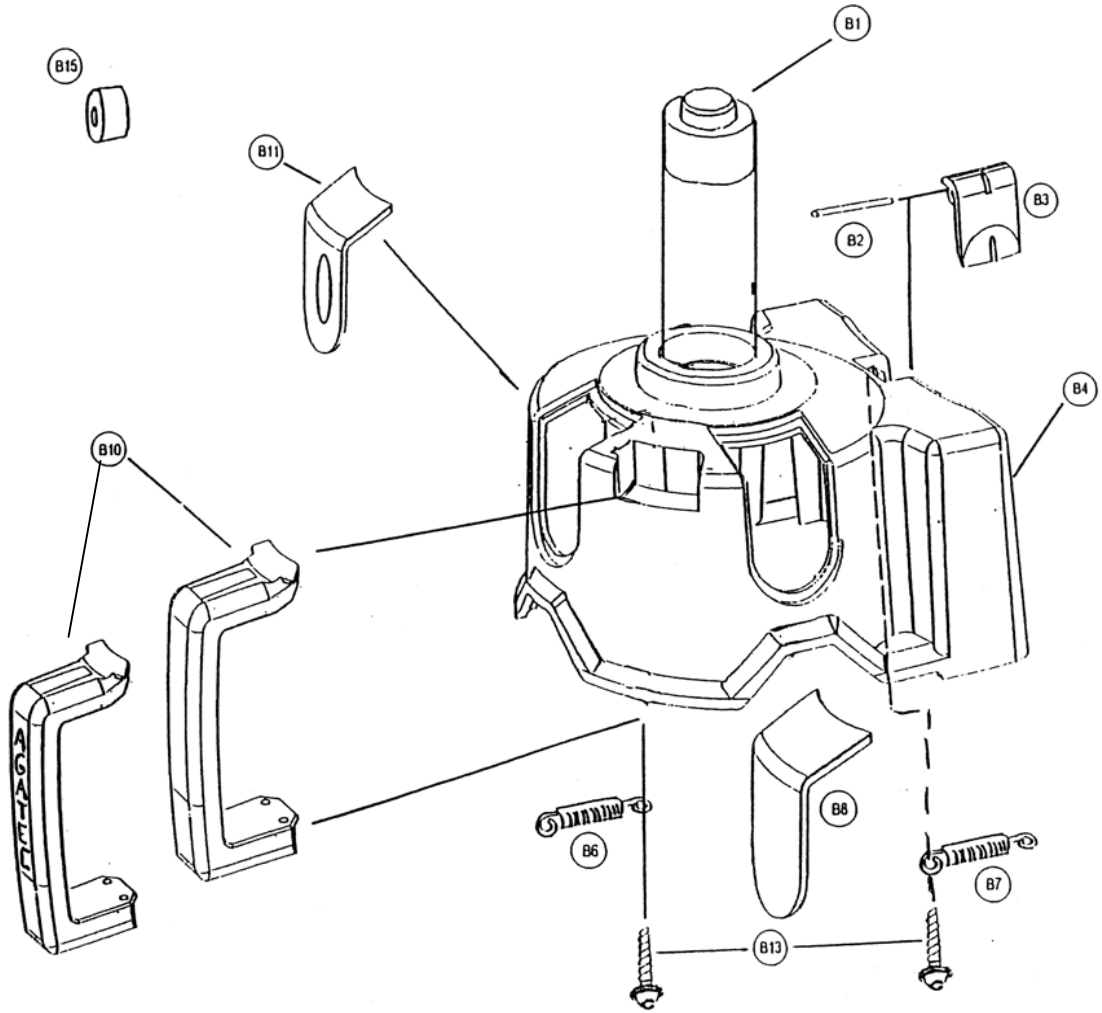
c) Use a 1.5mm hexagonal wrench to unlock the head mirror lock screw (A9)

d) Hold the side of head mirror (A8) and pull upward to remove head mirror. Be careful not to touch the glass surface.

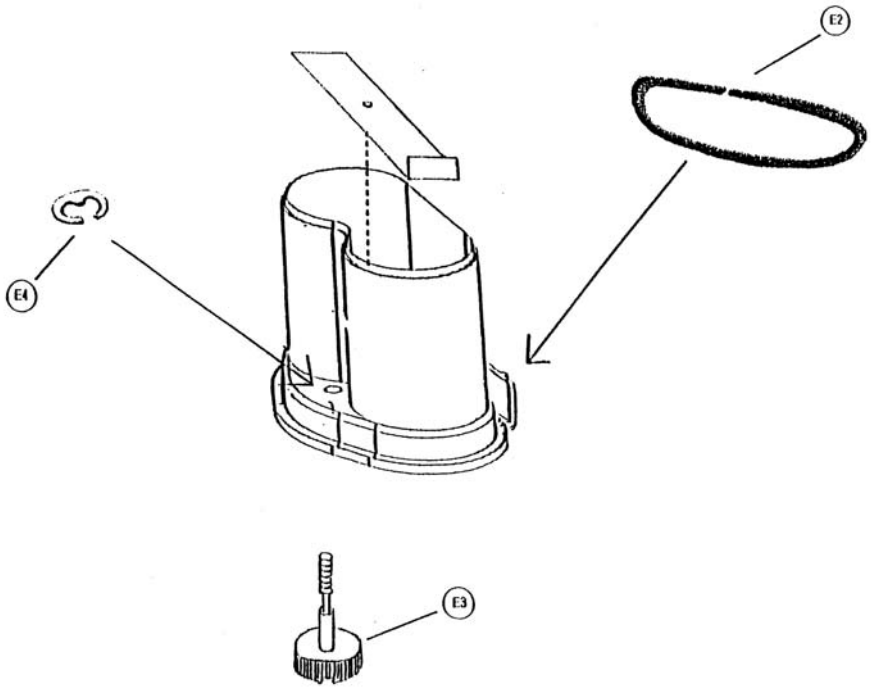
c) Clean and apply small amount of SPG35SL to the o-ring before assemble the rotating head.



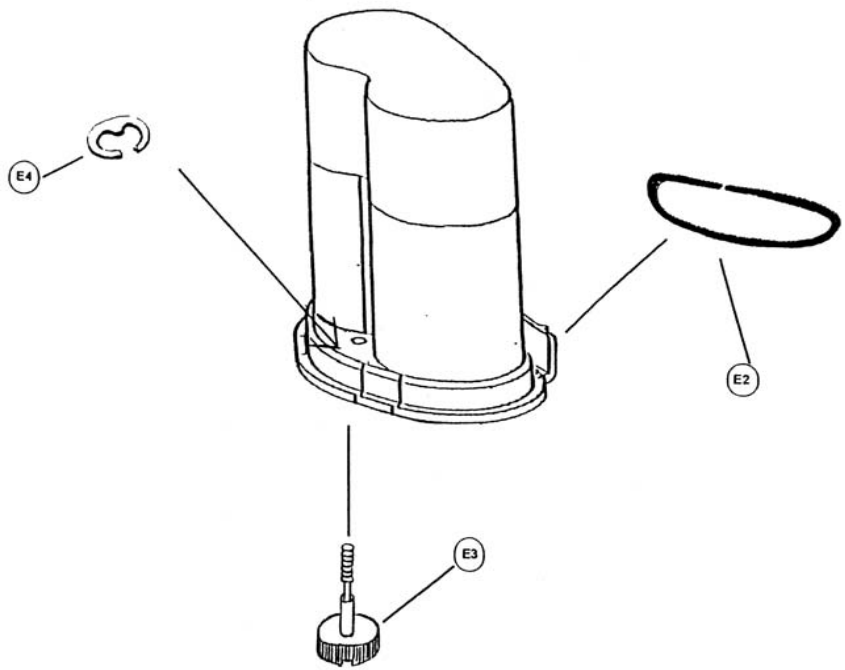
5. Housing disassembly



6. Battery pack



Alkaline
Battery Pack



Rechargeable
Battery Pack

7.LDR180 detector disassembly

a) Remove 6 caps (item no. 5)

b) Remove 6 screws (Item no. 21) by cross screwdriver

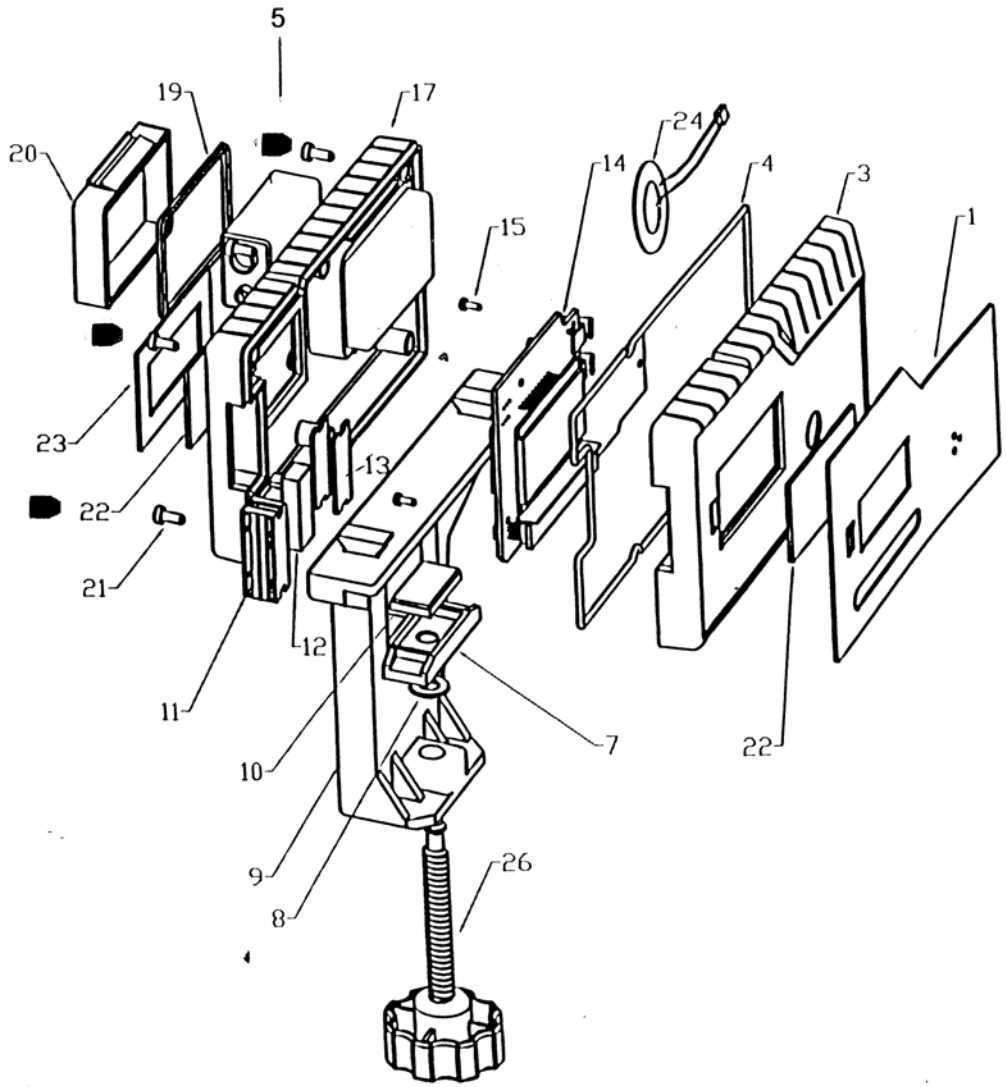
c) Removes back cover

d) Unplug buzzer connector

e) Remove 3 screws (Item no. 15) to remove PCB

f) Clean and apply small amount of SPG35SL on waterproof seal before cover the case back

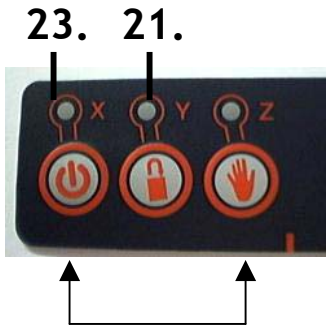
d) Reverse steps e) - a) to put back

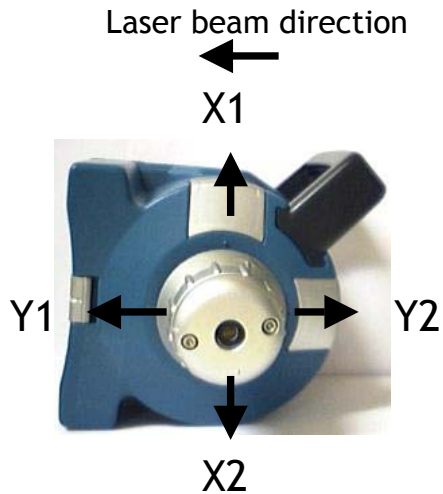


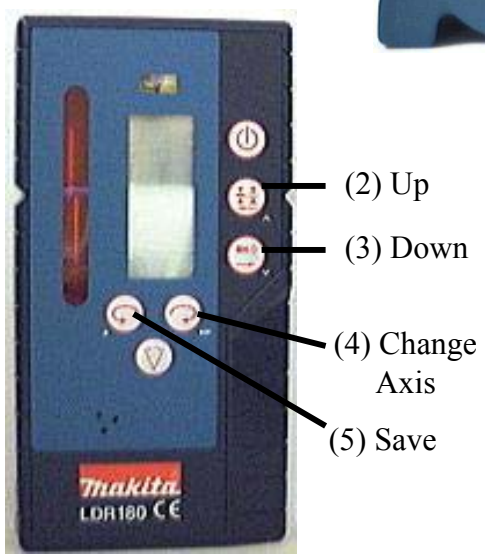
8. Calibration

8a. X Axis Calibration

1. Turn the laser off before switching to calibration mode.
2. Simultaneously press two laser keys, On / Off and Auto / Man.
3. Release On / Off key.
4. The X LED (23) blink 3 times, then the Y LED (21) stays on. Release the Auto / Man key.
5. The X LED (23) blink rapidly (indicate the laser is levelling),then blink slowly (ready to be calibrated on X axis).
6. Place the laser on a flat surface 30m from a wall, with X1 is facing the wall.
7. After it's level, mark the location of the beam (X1).
8. Rotate the laser 180°. After it's level, mark the location of the beam (X2).
9. If the two marks are less than 6mm apart (0.010%) then jump to **Y Axis**.
10. Mark the spot that's halfway between the two marks.
11. With X2 facing the marks, bring the laser beam up or down to the center mark by using (2) or (3) on the detector or remote.
12. Next, check **Y axis**.

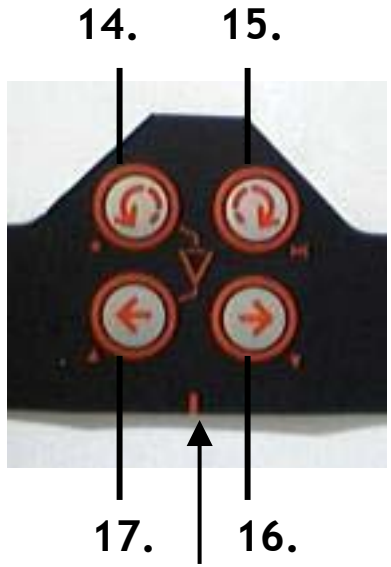






8b. Y Axis Calibration

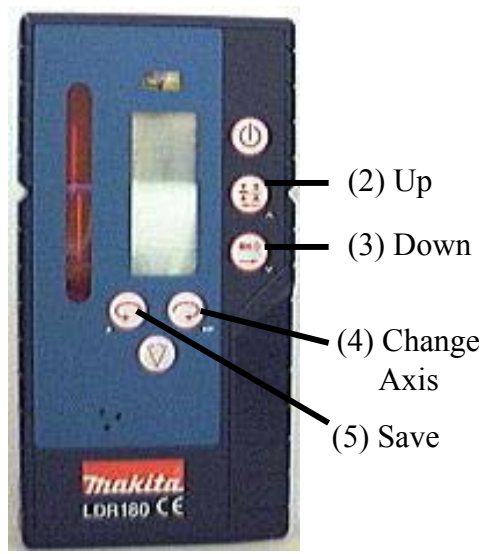
1. Press (4) on detector or remote to pass on Y axis calibration. The Y LED blink rapidly, then slowly (indicate that the laser is ready to be calibrated on this axis).
2. Repeat X Axis Steps 5 to 8 to mark (Y1), (Y2).
3. If the two marks are less than 3mm apart (0.010%) then jump to Saving the calibration.
4. Mark the spot that's halfway between the two marks.
5. With Y2 facing the marks, bring the laser beam up or down to the center mark by using (2) or (3) on the detector or remote.



Y1

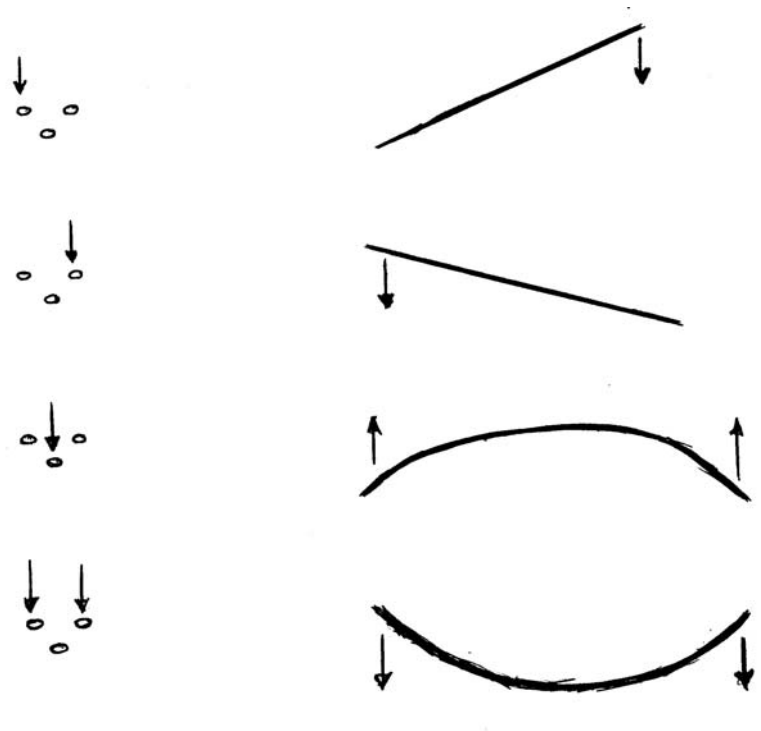
Saving the calibration

The laser is now calibrated in the X and Y axis. Press (14) on keypad or (5) on detector or remote to save calibration data. If you don't wish to save the calibration, press the On / Off key (24) on the laser.



Chalk line Calibration

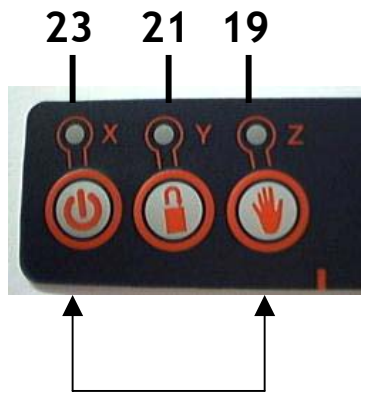
1. Remove head top cover.
2. Rotate the head body to chalk line mode.
3. Project the line to a wall 10 meters away.
4. Check if the chalk line is within 5mm margin by rotating the laser head slowly.
5. Adjust the 3 screws to minimize the error.



8c. Z axis Calibration

Vertical checking

1. Place laser in vertical mode, on a flat surface about 3m away from a plumb line (at least 3m long).
2. Use the adjustable feet to rough level the laser to adjust the top bubble vial (13).
3. Turn the laser on. Stop the rotation so that the beam is a point.
4. Hold the laser head and move the beam up and down the entire length of the plumb line by hand. If the beam is slanted, and not vertical like the plumb line, the Z axis needs calibration.



Vertical calibration

1. Place laser in vertical mode, turn the laser off before switching to calibration mode.
2. Simultaneously press On / Off and Auto / Man.
3. Release On / Off key.
4. The X LED (23) blink, then the Y LED (21) stays on. Release the Auto / Man key.
5. The Z LED (19) blink rapidly, then slowly (indicate laser is ready to be calibrated in Z axis).
6. Move the beam until it's vertical and parallel to the plumb line using (2) or (3) on the detector or remote.

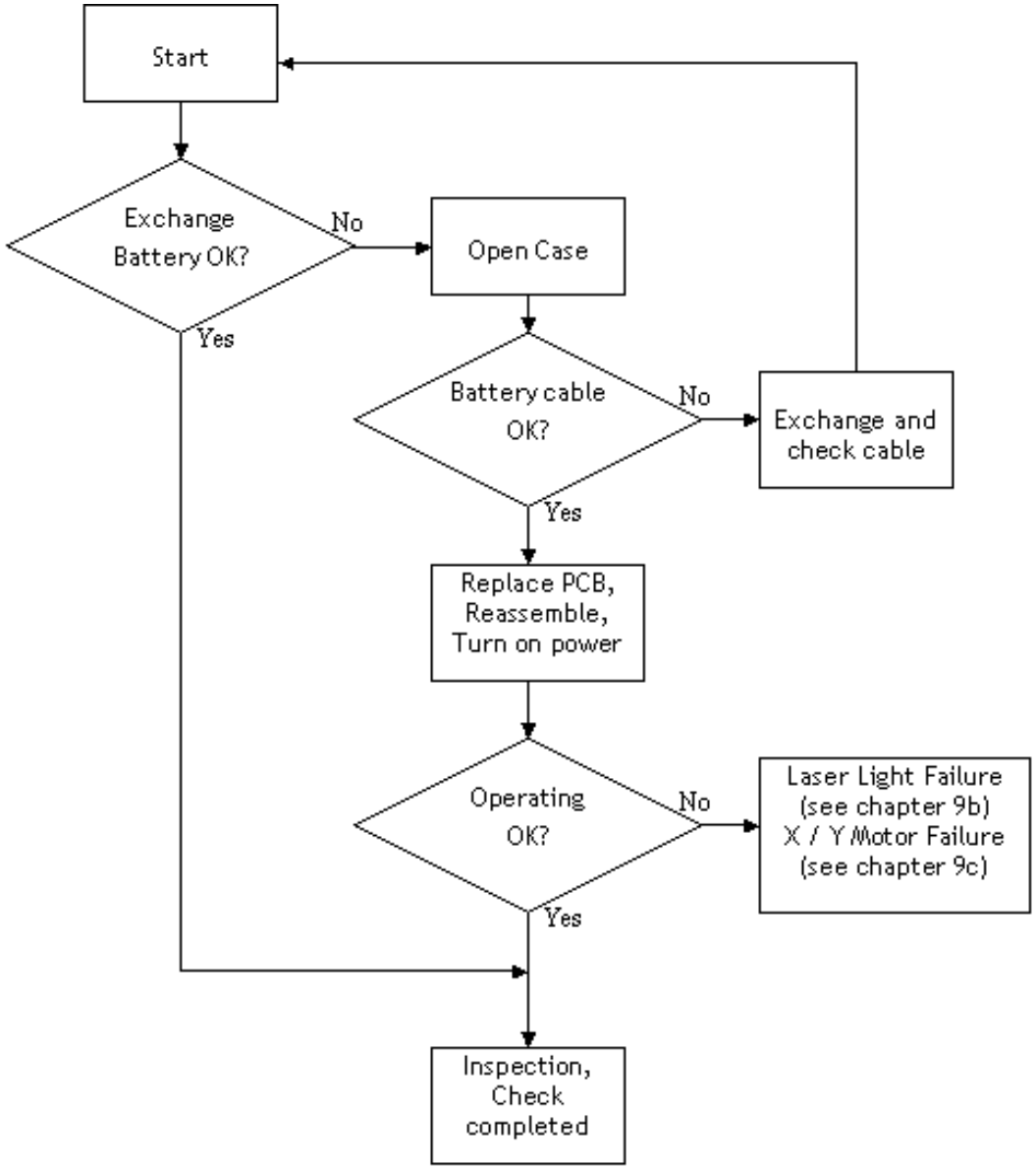
Saving the calibration

The laser is now calibrated in Z axis. Press (14) on laser or (5) on detector or remote to save the calibration data. If you don't wish to save the calibration, press the On / Off key on the laser.

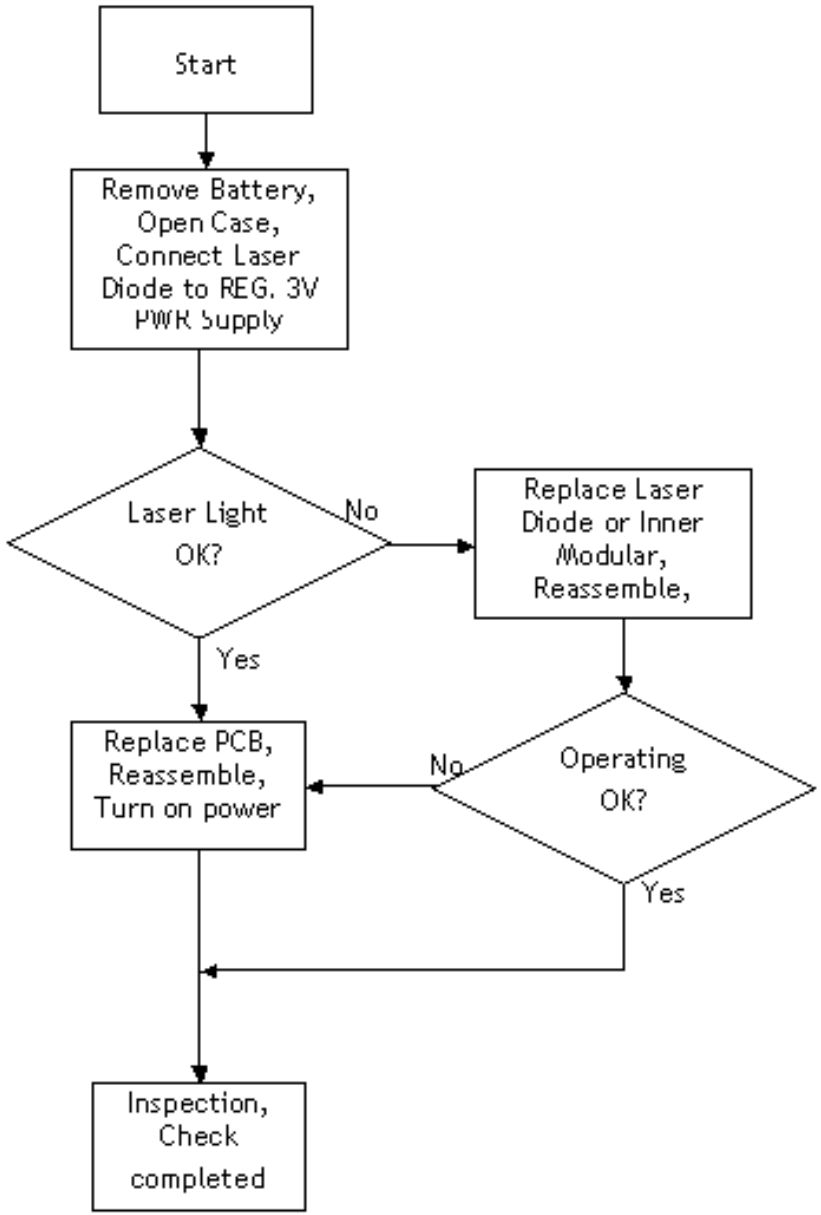
9. Troubleshooting

Phenomenon	Parts to investigate
Laser Light and Motor Failures	Battery, Battery Cable, PCB, Laser diode, Motor
Laser Light Failure	Laser diode, PCB
Dim Laser Light	Laser diode, PCB
Motor Failure	Battery, X / Y Motor, PCB
Excessive Rotation Noise	X / Y Motor, Inner Modular
Accuracy out of Specification	Calibration, Inner Modular
Laser frequently re-levelling	Check PCB IC vision is SAGA R6 or above

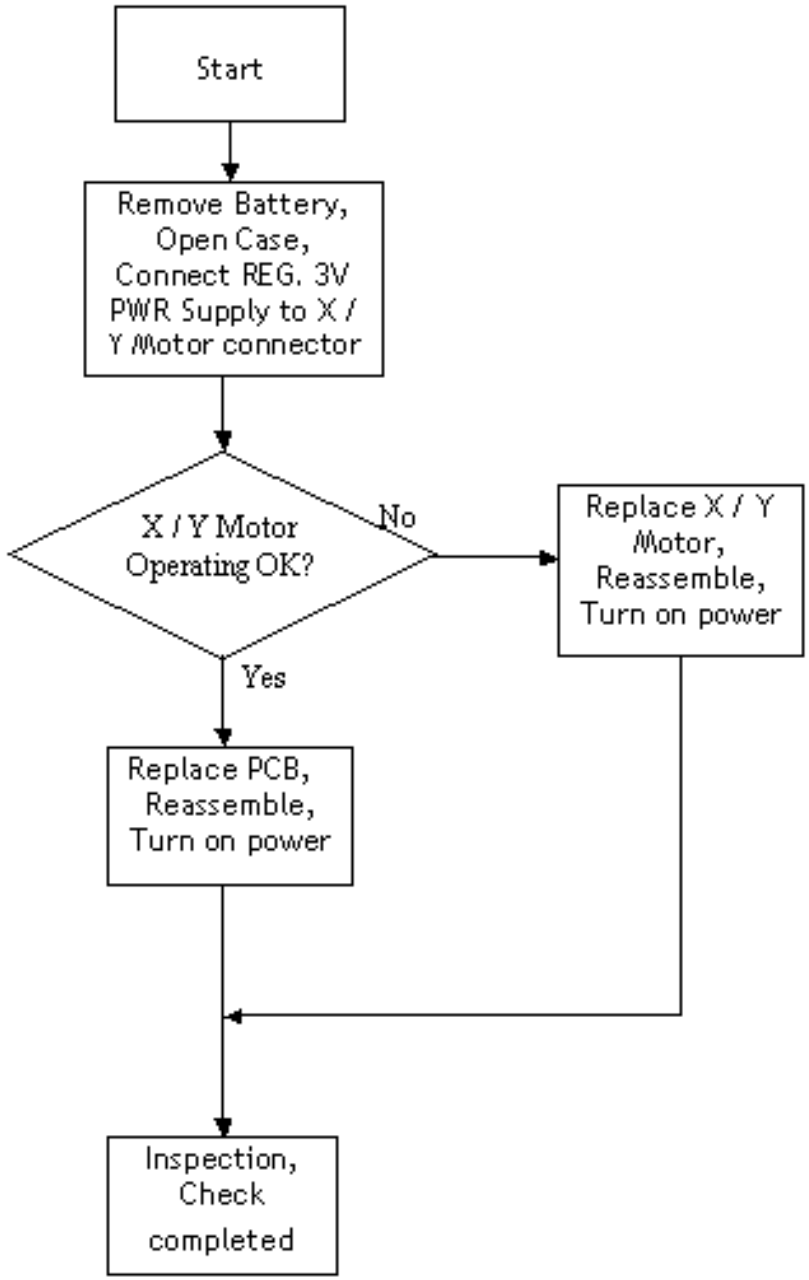
9a. Laser Light and Motor Failures



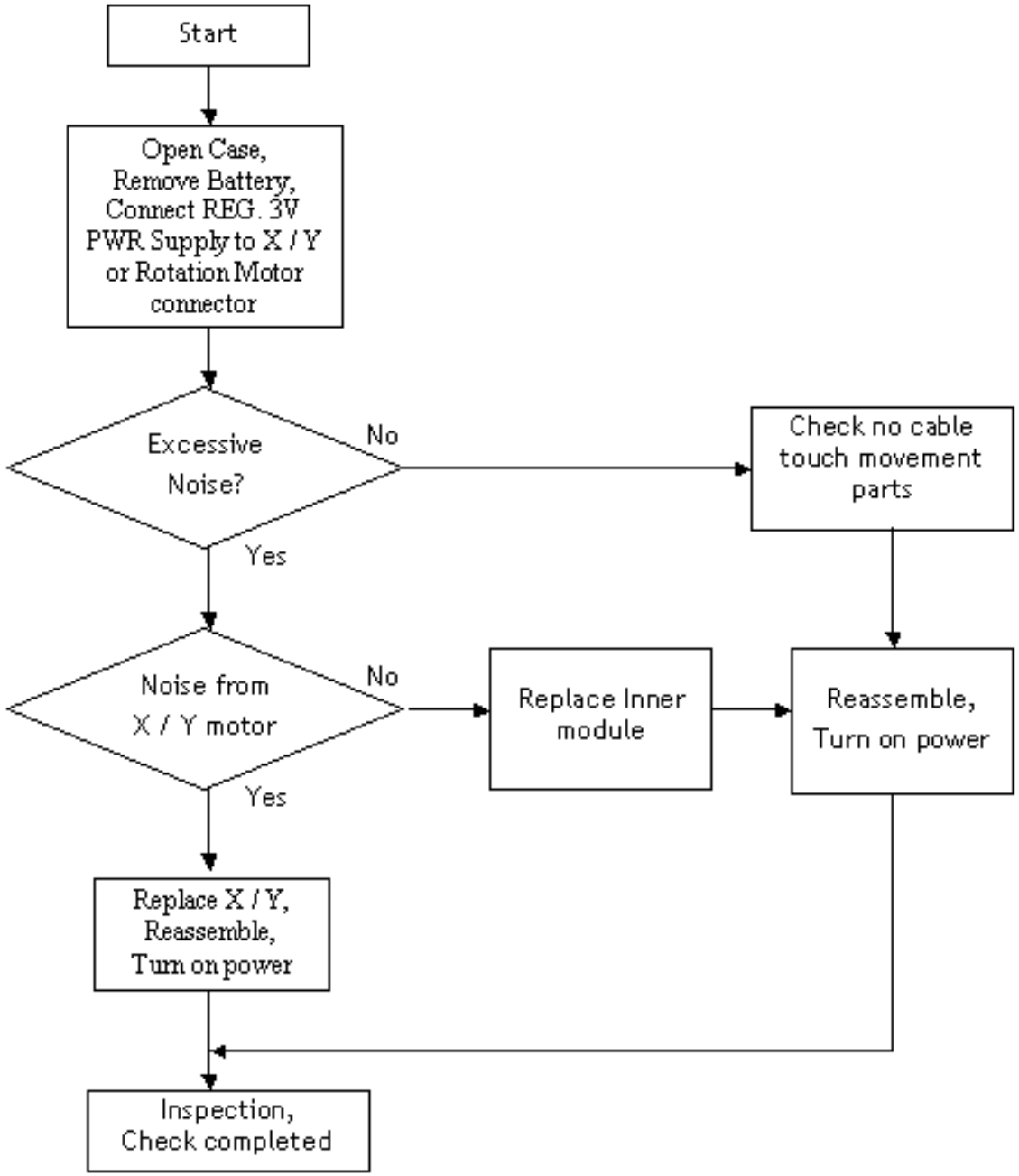
9b. Laser Light Problem



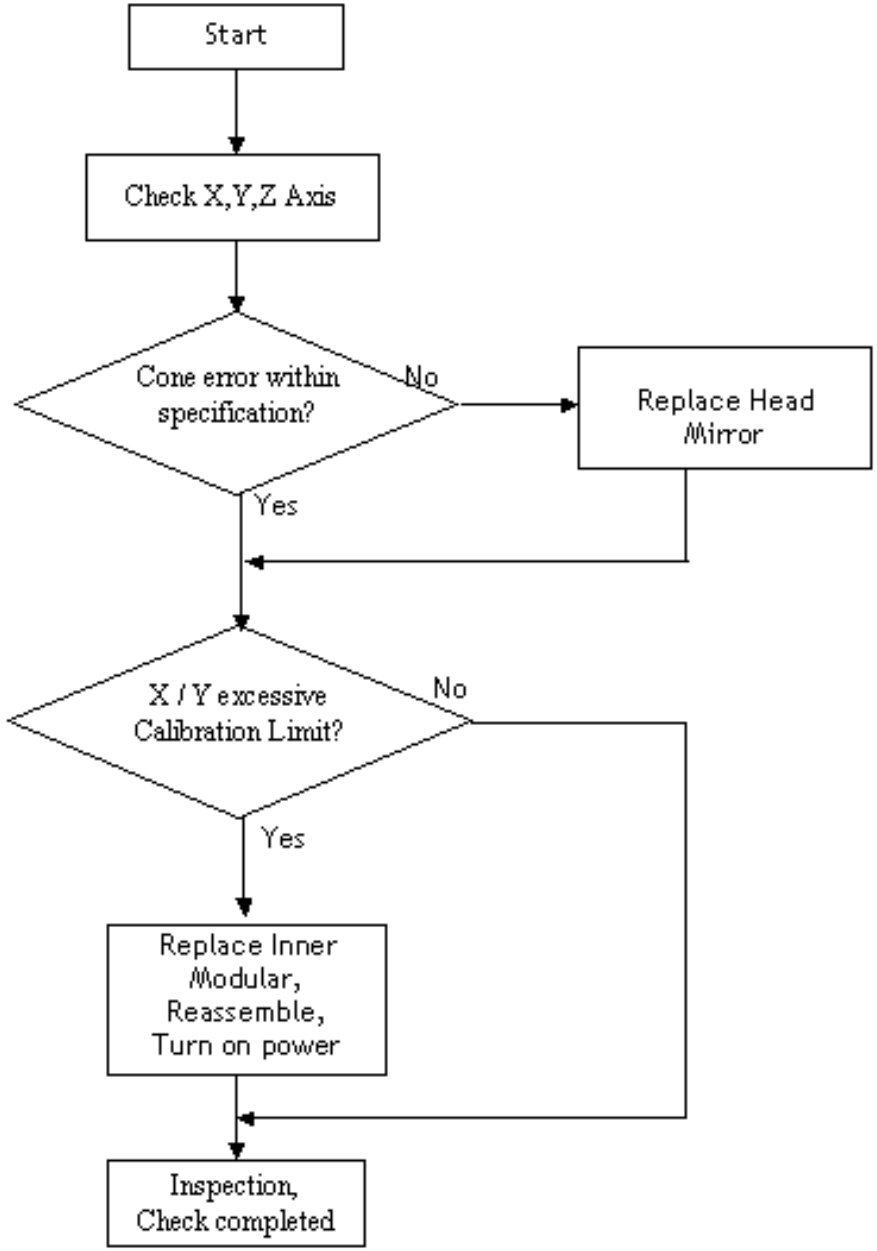
9c.
X / Y Motor Failure



9d. Excessive Rotation Noise



9e. Accuracy out of Specification



10. Spare Parts List

A - Rotating Head

Code	Ref.	Description	Batch	Prices
A1	0.122.00	Screw M3 x 8 TCHC stainless steel	10	2,10
A3	0.124.00	O - ring diameter 41	10	3,20
A4	0.125.00	O - ring diameter 2.9	10	1,00
A5	0.126.00	Line generater assembly	1	6,93
A6	CT.000.05	Makita head body section HV silver	1	10,50
A8	T.000.00	HV head support with mirrors	1	42,00
A9	0.129.00	Screw M3 x 3 STHC	10	2,10
A12	0.130.00	Washer M2.5 (2.7 / 6 / 0.5)	10	1,00
A13	CO.002.05	Makita head cover HV silver	1	1,80
A15	0.132.00	Screw M2.5 x 6 TCHC	10	3,20
A16	0.133.00	Screw M2.5 x 8 TCHC	10	2,80
A25	0.137.00	Lead weight	10	1,05

B – Body of laser with handle

Code	Ref.	Description	Batch	Prices
B1	0.105.00	Bearing diameter 17	1	13,66
B2	0.106.00	Pin diameter 3 x 28	10	6,30
B3	0.107.0A	Silver horizontal support	1	1,50
B4	0.103.05	Upper body with MAKITA printing	1	6,00
B6	0.110.00	Adjusting spring for automatic laser X axis	10	6,70
B7	0.111.00	Adjusting spring for automatic laser Y axis	10	6,70
B8	0.112.0A	Silver X axis window	1	2,00
B10	0.114.02	Black plastic handle	1	2,10
B11	0.115.0A	Silver Y axis window with vial	1	2,00
B13	0.117.00	Screw 25 x 6 for spring contact battery	10	1,00
B15	0.119.00	Round vial diameter 12	1	1,82

D - Base of Automatic laser

Code	Ref.	Description	Batch	Prices
D1	0.200.00	Battery contact assembly	1	8,19
D5	0.204.00	Transverse X axis assembly	1	9,66
D12	SO1.001.02	Black base with inserts, battery contacts, ball & seal	1	15,50
D13	0.142.01	Tubular seal (50 + 20 cm)	1	1,00
D14	0.213.00	Threaded axle	10	10,50
D15	0.214.02	Black height adjusting wheel assembly	10	6,30
D16	0.215.50	Screw 50 x 25 Flat end	10	2,50
D17	0.216.00	Screw 50 x 50	10	3,80
D19	0.218.00	Transverse Y axis assembly	1	9,30
D20	0.219.00	Screw 25 x 10	10	1,10
D23	0.222.00	Metal ball diameter 6mm	10	2,10
D25	0.237.10	Automatic axle assembly with sphere	1	1,78
D27	0.239.00	Plastic ring (sectioned)	10	1,00
D29	0.241.00	Motorised levelling assembly	1	22,96
D33S	0.245.15	Keyboard auto SKR300	1	14,10
D34	0.215.00	Screw 50 x 25	10	2,50
D36S	0.248.20	Motor brace with notch	1	1,00
D63S	0.244.11	Automatic PLB assembly HV	1	56,83

M – Inner body

Code	réf.	Description	Standard Replacement *	Prices
M1	M1.500.20	Inner module 2mW	134,00	172,00
M2	M1.500.00	Inner module without diode	75,00	116,00
M3	0.163.20	Laser diode 635/2 assembly		57,00
	0.122.00	Screw M3 x 8 TCHC	Batch : 10 pcs	2,10
	0.186.00	O-ring D3.3 x 2.4 – 70sh	Batch : 10 pcs	1,00

** Defective item must be returned*

E - Battery pack

Code	Ref.	Description	Batch	Prices
E2	0.142.01	Tubular seal (50 + 20 cm)	1	1,00
E3	0.302.00	Un-removable screw	10	4,90
E4	0.303.00	Securing ring	10	1,00
E7	PP.000.02	Black battery pack	1	3,50

E - Rechargeable Battery pack

Code	Ref.	Description	Batch	Prices
E2	0.142.01	Tubular seal (50 + 20 cm)	1	1,00
E3	0.302.00	Un-removable screw	10	4,90
E4	0.303.00	Securing ring	10	1,00
E7	PA.000.02	Black rechargeable battery assembly	1	16,00

LDR180 detector include remote control

Code	Ref.	Description	Batch	Prices
1	CR.001.05	LDR180 Receiver keypad Makita	1	11,00
3	CR.003.00	Upper body section	1	1,52
4	CR.004.00	Waterproof seal	10	9,90
5	CR.005.00	Cap for receiver M3 screw	10	1,00
11	CR.011.00	Magnet housing	10	1,50
12	CR.012.00	Magnet	10	3,00
13	CR.013.00	Magnet plate	10	1,00
14	CR.014.00	Electronic circuit assembly	1	75,00
15	CR.015.00	M2 Screw	10	4,90
17	CR.017.00	Lower body section	1	1,52
19	CR.019.00	Detector gasket	10	1,50
20	CR.020.00	Battery cover	1	2,29
21	CR.021.00	M3 screw	10	1,50
22	CR.022.00	Plastic window	1	1,00
23	CR.023.05	LDR180 receiver rear overlay Makita	1	2,15
24	CR.024.00	Buzzer assembly	1	1,80
	CR.025.00	LDR180 Bracket	1	7,00

11. Tools

1. Screwdrivers
2. Tweezers
3. Lens tissue
4. Snap ring pliers (10~50mm)
5. IC extractor tool
6. Hexagonal wrench 1.5mm, 2.0mm, 2.5mm
7. Electrolube SPG353L
8. Calibration diode base (reference : 5.011.00 – see page 18)