AccuLine PRO
LASER LEVELS

40-6620 & 40-6625

Self Leveling Laser Marker

SERVICE MANUAL

Main Instrument →

← Bracket

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Two Modules

The **40-6620** and the **40-6625** instruments are built the same.
The instructions in this manual are the same for both instruments.

There are a few differences:
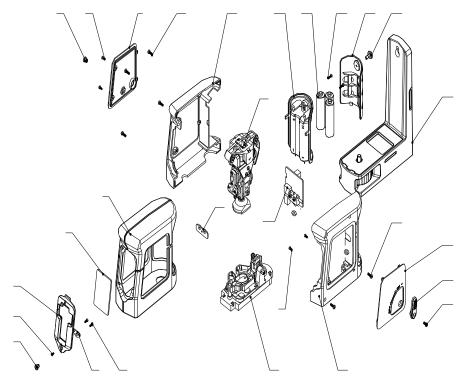1.   The laser diode for the 40-6620 has a maximum output of < 1mW.   The 40-6625 has a stronger maximum output of < 5mW.
2.   The name plate on the side of the instrument is different (as in above picture).
3.   The front bezel (window frame) has a different color (as in above picture).
4.   The battery cover is also a different color.

1. Overall Instrument Assembly

Item	JLT Part #	Description	Qty	Item	JLT Part #	Description	Qty
1	AP1713	Plastic Screw	2	14	AP1635	#4 Main Circuit Board	1
2	AP1714	Cross Sunk Screw (M2x5)	1	15	AP1636	Base	1
3	AP1715	Window Frame	1	16	AP1637	Front Housing	1
4	AP1716	Connecting Plate #2	1	17	AP1446	Cross Semi-sunk screw M2.5x6	1
5	AP1628	Cross Plate Self-tapping Screw (ST2 2x4x5)	2	18	AP1638	On-Off Switch	1
6	AP1629	Glass	1	19	AP1639	Front Cover	1
7	AP1630	Rubber Jacket	1	20	AP1640	Bracket	1
8	AP1475	Cross Plate Screw M2x5	4	21	AP1641	Battery Cover Screw (Plastic)	1
9	AP1631	Back Cover	1	22	AP1642	Battery Cover	1
10	AP1493	Cross Plate Screw M2.5x8	6	23	AP1491	Cross Plate Screw (M2x8)	2
11	AP1632	Back Housing	1	24		AA batteries	3
12	AP1633	Core Module	1	25	AP1643	Battery Case	1
13	AP1634	Connecting Plate #1	1	26	AP1562	Hexagon Nuts (M2), not shown in diagram	2

General Assembly Instructions

1. Join the Core Module (12) together with the Base (15) by pushing the shaft of the Pendulum (see part 12-19 of Section 2.1) through the side opening of the Locking Ring (see part 15-4 of Section 2.2).   Make sure that the Locking Ring is in the 'unlock' (higher) position by turning the brass pin of the Crank Shaft (see 15-6 of Section 2.1).   The Locking Ring will bend upwards slightly as the Pendulum is squeezed between the Locking Ring and the bottom piece of the Base.   Then turn the Crank Shaft again to lower the Locking Ring so that the Pendulum "locks" in place.

2. Slide unit built in Step 1 into the <u>Front Housing</u> (16) and secure with two of the Cross Plate Screws (10).

3. Insert the <u>#4 Main Circuit Board</u> (14) into the slots in the Front Housing (16).

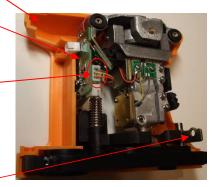**4.** Connect <u>3-wire plug</u> from #3 Alarm Circuit Board (see part 12-11 of Section 2.1).

Fig. 1 B

5. Insert the <u>Connecting Plate #1</u> (13) into the slot provided in the Front Housing (16).

6. Now attach the Back Housing (11) to the unit thus far completed using four of the Cross Plate Screws (10). Make sure that the #4 Main Circuit Board (14) and the Connection Plate (13) slide into their matching slots in the Back Housing.

7. Put the Rubber Jacket (7) on.   This will cover the entire instrument.

8. Before attaching the Battery Case (25), make sure that the Hexagonal Nuts (26) are in place.   The nuts are inserted into small side slots near the top of each side of the housing part (11 & 16).   The Rubber Jacket (7) will need to be <u>partially removed</u> to expose the slots for inserting the nuts.

Attach Battery Case plug here

Slot for inserting nut
(slot also found on opposite housing)

Fig. 1 C

9. Now connect the 2-wire plug from the Battery Case (25) into the #4 Main Circuit Board (14).   See Electronic Connection figure in Section 3 for further help.

10. Attach the Battery Case (25) by first inserting the bottom part to catch hold of the main housing.   Then pivot the top part toward the housing and secure with the two Cross Plate Screws (23).   Using a small flat-headed screwdriver, be sure the edge of the Rubber Jacket fits snugly under the edge of the Battery Case.

11. Locate the smaller circuit board which is attached by 3 wires to the #4 Main Circuit Board (14). [This smaller circuit board has a small red light wired onto it.   There is also an on-off switch for the alarm.]   Use the two Self-tapping screws to secure the circuit board to the Front Cover (19).
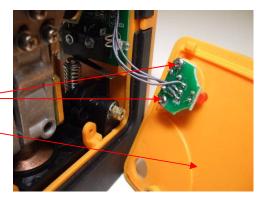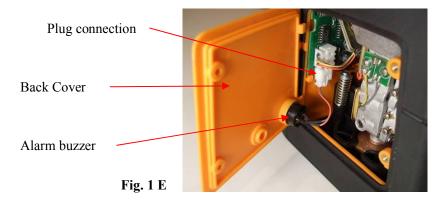

Fig. 1 D

12. Attach the Front Cover by inserting the top part to catch hold of the main housing.   Then pivot the cover down and snap into place.   Now secure the cover using two Cross Plate Screws (8) through the <u>inside</u> of the housing.

13. Connect the 2-wire plug from the alarm buzzer in the Back Cover (9) to the #4 Main Circuit Board (14). (See Electronic Connection figure in Section 3 for further reference.)
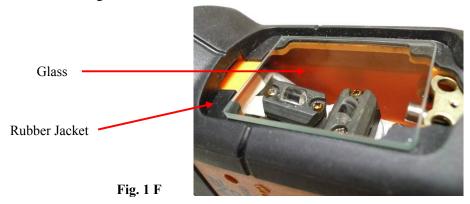
Plug connection

Back Cover

Alarm buzzer

Fig. 1 E

14. Attach the Back Cover (9) to the housing by first inserting the left side to catch hold of the housing.   Then pivot the cover and secure with two Cross Plate Screws (8).

15. Attach one of the Plastic Screws (1) to the Back Cover (9).

16. Make sure that the Connecting Plate (4) is attached to the inside of the Window Frame (3) using two Cross Plate Tapping Screws (5).

17. Clean the Glass (6) and place it within the designated area marked on the Rubber Jacket (7) at the laser-exiting side of the housing.
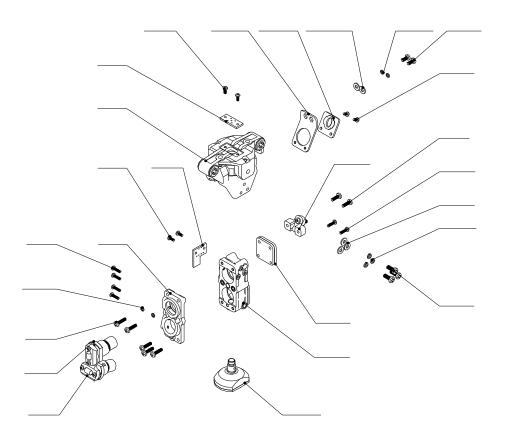
Glass

Rubber Jacket

Fig. 1 F

18. Then insert the top part of the Window Frame (3) and pivot down to secure with the Cross Sunk Screw (2). Cover the hole with one of the Plastic Screws (1).

19. Attach the On-Off Switch (18) using the Cross Semi-sunk Screw (17).

20. Insert the three AA Batteries (24) into the Battery Case (25) making sure the positive (+) end of the batteries are all pointing upward.

21. Finally, close the Battery Case (25) with the Battery Case (22).   Secure the case using a flat-head screwdriver (or a coin) to screw the Battery Cover Screw (21).

The instrument can be <u>dis</u>assembled using the reverse order described above.

2.0 Component Assembly

2.1   Core Module Assembly (AP1633)

Item	JLT Part #	Description	Qty	Item	JLT Part #	Description	Qty
12-1	AP1644	Vertical Laser Unit	1	12-12	AP1449	M2.5x6 Cross Plate Screws	2
12-2	AP1645	Horizontal Laser Unit	1	12-13	AP1653	M2x3 Cross Plate Screws	2
12-3	AP1572	M2.5x10 Cross Plate Screws	7	12-14	AP1493	M2.5x8 Cross Plate Screws	3
12-4	AP1491	M2x 8 Calibration Screws	4	12-15	AP1647	M2x5 Cross Plate Screws	2
12-5	AP1646	Laser Adjustment Plate	1	12-16	AP1654	Alarm Base	1
12-6	AP1647	M2x5 Cross Plate Screws	4	12-17	AP1655	Weight Block	2
12-7	AP1648	#1 Laser Circuit Board	1	12-18	AP1656	Base	1
12-8	AP1649	Gimbal Module	1	12-19	AP1657	Pendulum	1
12-9	AP1650	#2 Connecting Circuit Board	1	12-20	AP1658	M3 lock washers	3
12-10	AP1651	Alarm Bracket	1	12-21	AP1516	M3 flat washers	5
12-11	AP1652	#3 Alarm Circuit Board	1	12-22	AP1573	M2.5 lock washers	4

Regarding General Assembly of Core Module

NOTE OF CAUTION

This module should not be assembled by anyone other than professional service technicians with appropriate equipment. Cutting the hairspring wires or any other wires is NOT recommended.

If repairs / replacements are needed for this module, it is recommended to send the unit to the appropriate repair facility. Call the main office of Johnson Levels for further information.

2.2 Base Assembly (AP1636)

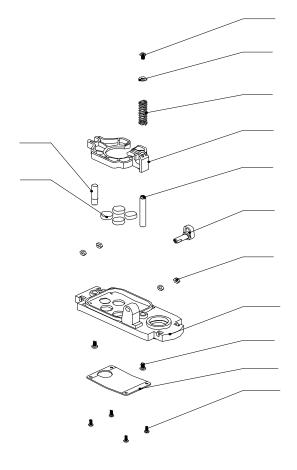| Item	JLT Part #	Description	Qty
15-1	AP1449	M2.5x6 Cross Plate Screw	3
15-2	AP1659	M7 Washer	1
15-3	AP1660	Compression Spring	1
15-4	AP1661	Locking Ring	1
15-5	AP1662	Pin	1
15-6	AP1663	Crank Shaft	1
15-7	AP1664	Guidance Pin	1
15-8	AP1665	Magnets: 10 mm x 4 mm	4
15-9	AP1538	M2.5 Hexagon Nuts	4
15-10	AP1666	Base	1
15-11	AP1667	Magnet Base	1
15-12	AP1548	ST2.2 x 6.5 Self-tapping Screws	4

Fig. 2 G

General Assembly Instructions

1. Arrange the four Magnets (15-8) on the concave side of the Magnet Base (15-11) so that they will align with the matching holes in the Base (15-10).   Push the Magnet Base (15-11) to the bottom of the Base (15-10) and secure with four Self-tapping Screws (15-12).

2. Slide the four Hexagon Nuts (15-9) into the matching slots in the Base (15-10).

3. Put the brass pin of the Crank Shaft (15-6) through the hole on the Base (15-10).   Note: The brass pin needs to have grease applied before placement.

4. Attach the Guidance Pin (15-7) using one of the Cross Plate Screws (15-1).

5. Attach one of the Cross Plate Screws (15-1) with the Washer (15-2) to one end of the Pin (15-5).   Slide the Compression Spring (15-3) onto the other end of the Pin and then feed the end of the Pin through the matching hole in Locking Ring.   Align the Locking Ring (15-4) on the Base (15-10) and use a Cross Plate Screw (15-1) to secure from the bottom of the Base (15-10).   See Fig. 2 H.
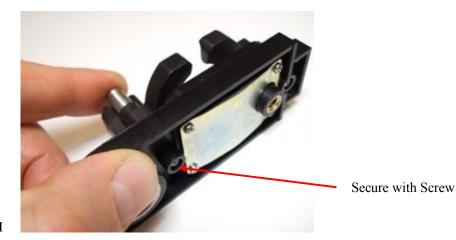
Secure with Screw

Fig. 2 H

The Base assembly can be <u>dis</u>assembled using the reverse order described above.   If the screw (15-1) does not come out from the Pin (15-5), try first removing the screw at the other end [under the Base (15-10)].   Caution: Hold the top part of the spring in place while taking the screw out (see Fig. 2 H).

2.3 Bracket Assembly (AP1640)

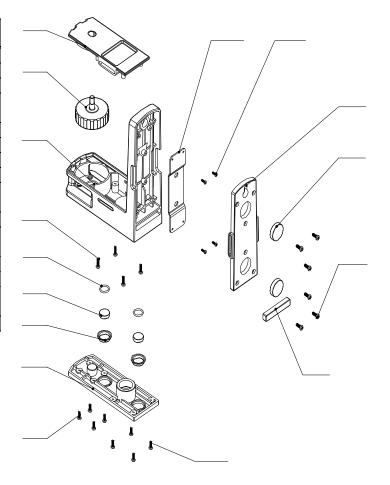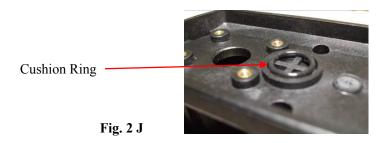| Item	JLT Part #	Description	Qty
20-1	AP1668	Cover Board #2	1
20-2	AP1669	Fastening Knob	1
20-3	AP1670	Bracket	1
20-4	AP1558	Cross Plate Tapping Screw ST 2x9.5	6
20-5	AP1672	Cushion Rings	1
20-6	AP1673	Magnet 14x4	2
20-7	AP1674	Magnet Holders	2
20-8	AP1675	Cover Board #3	1
20-9	AP1493	Cross Plate Screw M2.5x8	6
20-10	AP1676	Rubber Pad	1
20-11	AP1677	Cross Plate Tapping Screw ST2.9x8	6
20-12	AP1678	Magnet 20x5	2
20-13	AP1679	Cover Board #1	1
20-14	AP1548	Cross Plate Tapping Screw ST 2.2x6.5	4
20-15	AP1680	Magnet Plate	1

Fig. 2 I

General Assembly Instructions

1. Place the Fastening Knob (20-2) into the body of the Bracket (20-3) with the brass screw pointing up.

2. Place the Cover Board #2 (20-1) on top of the Bracket (20-3) by inserting the end near the Fastening Knob (20-2) to catch the edge of the Bracket.   Then pivot the board down into the matching space and use four of the Cross Plate Tapping Screws (20-4) to secure from underneath.

3. Hold the Bracket (20-3) upside down and place the two Cushion Rings (20-5) on the circles inside the Bracket.

Cushion Ring

Fig. 2 J

4. Then put the Magnets (20-6) inside the Magnet Holders (20-7) and place on top of the Cushion Rings (20-5).

Magnets inside Magnet Holders

Fig. 2 K

5. Place the Cover Board #3 (20-8) and match the holes for the Magnet Holders (20-7). Secure the Cover Board using two of the Cross Plate Tapping Screws (20-4) in the screw holes furthest from the Fastening Knob. Use the six Cross Plate Screws (20-9) for the remaining 6 screw holes.

6. Place the Magnet Plate (20-15) in the upright portion of the Bracket (20-3) and secure using the four Cross Plate Tapping Screws (20-14).

7. Place the two Magnets (20-12) where the matching holes of the Cover Board #1 (20-13) will be placed.

8. Place the Cover Board #1 (20-13) on the Bracket. Slide the Magnets to match the holes. Secure the cover board using the six Cross Plate Tapping Screws.

9. Insert the Rubber Pad (20-10) in the matching slot in the Bracket (20-3).

The assembly can be disassembled using the reverse order described above.

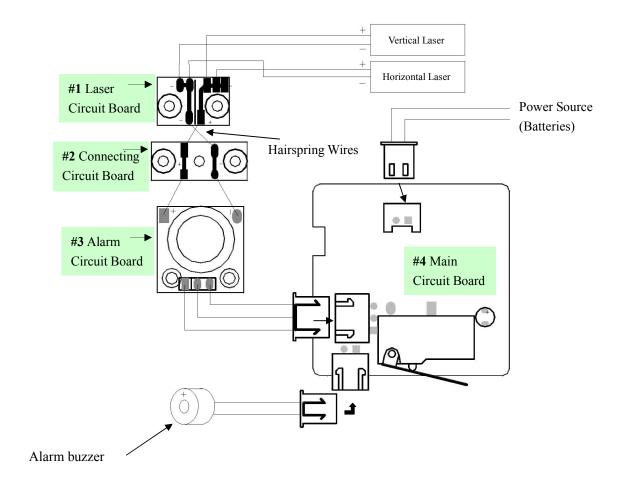# 3.0 Electrical Connections

See NOTE OF CAUTION in section 2.

Vertical Laser

Horizontal Laser

#1 Laser Circuit Board

Power Source (Batteries)

Hairspring Wires

#2 Connecting Circuit Board

#3 Alarm Circuit Board

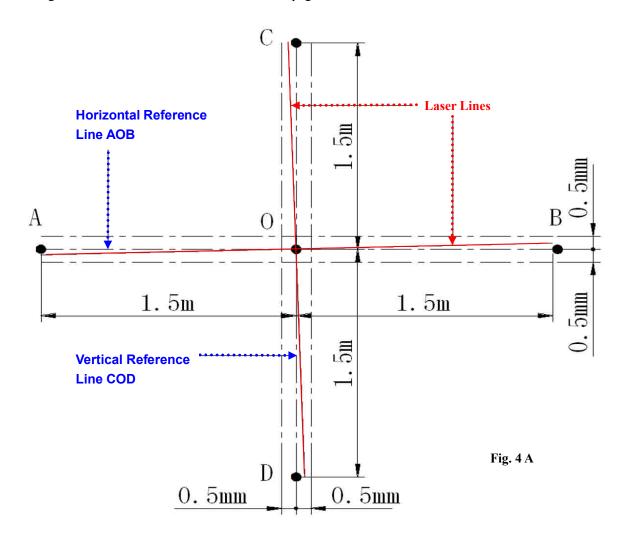**#4** Main Circuit Board

Alarm buzzer

Fig. 3 A

4.0   Calibration

Calibration is a process used to correct for accuracy and/or functional errors above and beyond those stated in published specifications.   While Manual-leveling, Self-leveling, and Automatic-leveling (motor driven) devices have different mechanisms that require calibration, there are similarities with optics that are consistent regardless of the leveling mechanism.   **This service manual discusses calibration specific to the <u>40-6620</u> & <u>40-6625</u>.** *All accuracy checking and calibration adjustments described below must be made while laser instrument is secured on a leveled platform.*

4.1 Checking Accuracy

Note diagram below and follow instructions on next page.

Fig. 4 A

A true and correct reference standard must first be established:

1. Use a wall surface 5 meters (16.5 feet) away from the level platform which supports the laser instrument.

2. Establish and mark a level horizontal line and a plumb vertical line as Reference Lines.   The horizontal reference line is named AOB, while the vertical reference line is named COD.

   NOTE: *Point "O" should share the same height as the laser output source of the instrument.*

3. Mark lines on both sides of each reference line that are 0.5 mm from the lines.   (see Fig. 4 A)

4. Now check the accuracy of the lasers against the reference.

If the laser lines are within the range created by the lines drawn 0.5 mm out from the reference lines, the laser instrument is operating within the accuracy specification of the instrument.

[Accuracy specification is the same for both the _40-6620_ Self-leveling Laser and the _40-6625_ Self-leveling Laser: **+1/8"/35 ft. (+ 3mm / 10m)**.]

If accuracy does <u>not</u> fall within specification, continue to review the following sections and make the needed calibration adjustments.

4.2 Calibration Adjustments

There are three types of error described in the following sections:

    4.2.1   **Linearity (or curvature) error.**

    4.2.2   **Oblique error.**

    4.2.2   **Height error.**

When making adjustments with the errors described below, a pair of screws must be turned in

a certain manner.   One of the screws needs first to be loosened slightly.   The other screw then needs to be tightened by an equal amount.   Continue loosening one screw and tightening the other (or go in the reverse direction) depending on the adjustment needed.   When adjustment is completed, make sure both screws are tight.

NOTE: When all accuracy checks and needed corresponding calibrations have been made, it may be necessary to adjust the position of the alarm (see section 5.0).
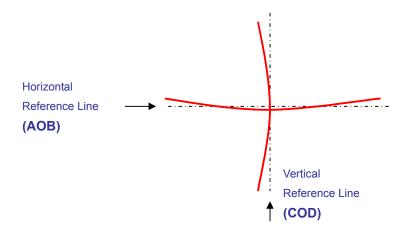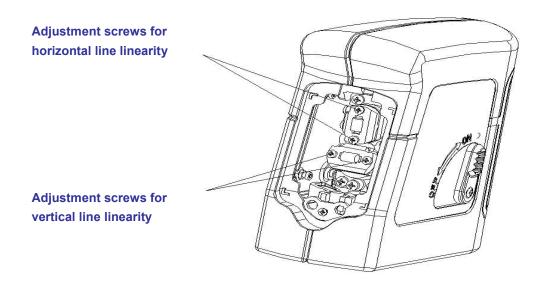
4.2.1 Linearity (or curvature) error.

Either the horizontal or vertical line is not straight (i.e. there is curvature).

Fig. 4 B   Linearity (or curvature) error

Horizontal
Reference Line
(AOB)

Vertical
Reference Line
(COD)

Adjustment required: Adjust the needed screws in the diagram below depending on which laser lines show curvature.

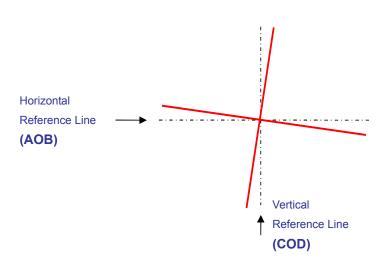**Adjustment screws for horizontal line linearity**

Adjustment screws for vertical line linearity

4.2.2 **Oblique error.** Either vertical or horizontal line is not plumb.

Fig. 4 C   Oblique Error

Horizontal
Reference Line
(AOB)

Vertical
Reference Line
(COD)

Adjustment required: If the laser lines are perpendicular to each other and only a small adjustment is needed, adjust the hexagonal nut shown in diagram using a hexagonal wrench key (2.5 mm). The nut can be accessed by removing the Plastic Screw (item 1 in Figure 1 A). If further adjustment is needed, remove the Back Cover (item 9 in Figure 1 A) and adjust using screws indicated in diagram below.

Adjustment screws for the oblique horizontal line

Adjustment screws for the oblique vertical line

Hexagonal nut for adjusting both horizontal line and vertical line oblique in the same direction
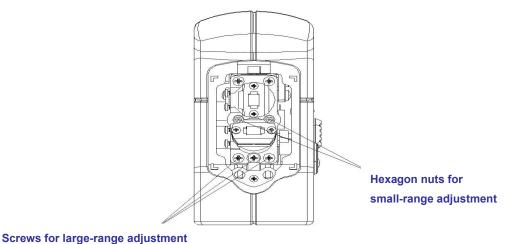
4.2.3   Height error.   Point "O" <u>does</u> share the same height as the laser output source of the instrument, but the height of the laser height needs to be corrected.

Fig. 4 D   Height Error

Horizontal
Reference Line
(AOB)

Reference point "**O**"

Vertical
Reference Line
(COD)

Adjustment required: First attempt the small error adjustment using a hexagonal wrench key (2.5 mm). The horizontal laser line needs to match the reference line (AOB).   If further adjustment is needed, use the three screws indicated in the figure below.   The middle screw needs to be loosened first.   Then move the horizontal laser line toward the reference line by either tightening or loosening the two outer screws.   Then secure the adjustment be tightening the middle screw.   If needed, make small adjustments again using the hexagonal nuts.

**Hexagon nuts for
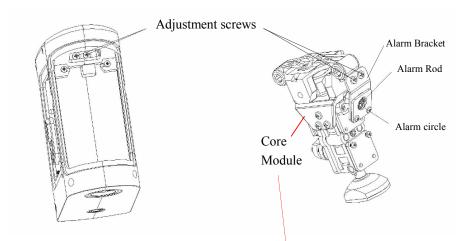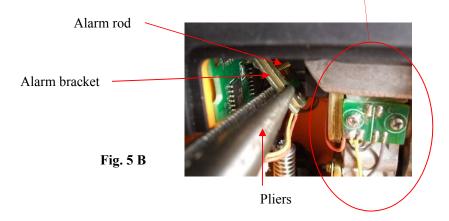small-range adjustment**

Screws for large-range adjustment

5.0   Alarm Adjustment

After one or more calibrations have been completed, if may be necessary to adjust the alarm range:

1. Remove the Battery Cover, batteries, and Battery Case (items 22, 23, & 25 in Fig. 1 A).   The adjustment screws can now be accessed through the instrument housing.

2. Open the Back Cover (see Fig. 1 E).

3. Slightly loosen the two adjustment screws (see Fig. 5 A below) so that the Alarm Bracket can be adjusted.

4. Using a needle-nose pliers grasp the Alarm Bracket and move it so that the Alarm rod it is basically centered within the Alarm circle (see Fig. 5 A).   *Note: Keep the adjustment screws snug so that the Alarm Bracket will move only with the pliers.*

Fig. 5 B

5. After Alarm rod is centered, tighten the adjustment screws and replace the Battery Case, batteries, and Battery Cover.

6.0   Troubleshooting Guide (see Section 3 for visual display of circuit boards)

No.	Symptom	Cause	Corrective Action
1	Failure to start (instrument does not turn on).	No power.	Check power source and/or batteries.
		POWER switch does not work.	Replace POWER switch.
		#4 Main Contol circuit board does not work.	Replace circuit board.
		Wires are disconnected or broken.	Check wires and repair.
2	No laser	Hairspring is cut or broken.	Replace the hairspring or resolder new ends.
		#4 Main Contol circuit board does not work.	Replace circuit board.
		Horizontal Laser Unit is broken.	Replace Laser Unit.
		Vertical Laser Unit is broken.	Replace Laser Unit.
4	No "Beyond range" alarm and Laser is working.	Alarm buzzer not working.	Replace Alarm Buzzer.
5	No "Beyond range" alarm and Laser is NOT working.	#4 Main Contol circuit board does not work.	Replace circuit board.
6	No light from power indicator lamp. No flash while in low power strength.	#4 Main Contol circuit board does not work.	Replace circuit board.