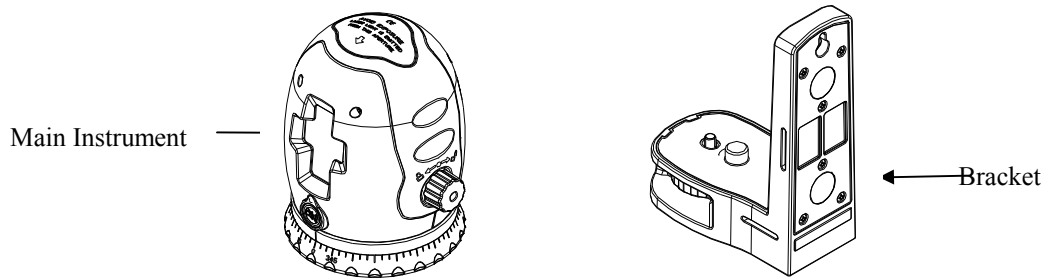




## 40-6640

# Self Leveling Laser Marker

## SERVICE MANUAL



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# 1. Overall Instrument Assembly

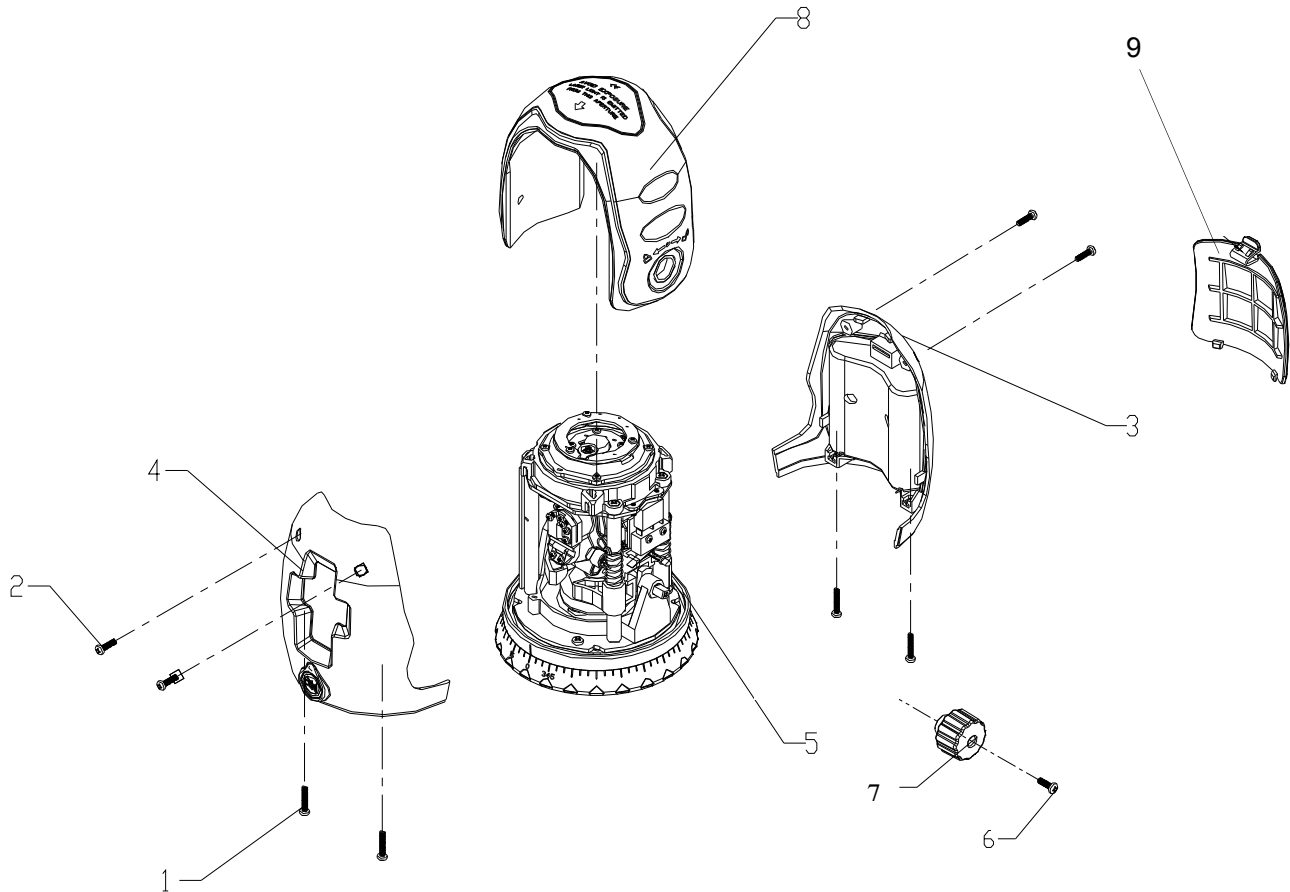


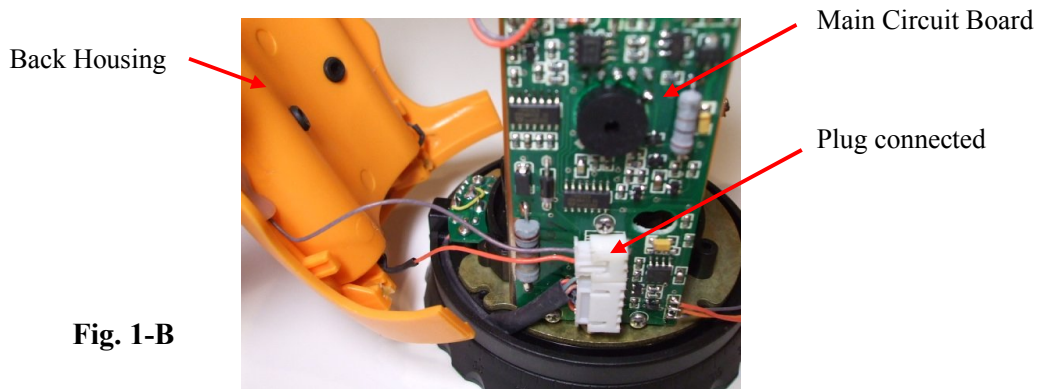
Fig. 1-A

Item	JLT Part #	Description	Qty
1	AP1682	Cross Plate Screw M2.5x14	4
2	AP1572	Cross Plate Screw M2.5x10	4
3	AP1681	Back Housing	1
4	AP1683	Front Housing	1
5	AP1684	Central Unit (see Sec. 1.1)	1
6	AP1572	Cross Plate Screw M2.5x10	1
7	AP1685	On-Off Turn Knob	1
8	AP1686	Rubber Jacket	1
9	AP1687	Battery Cover	1

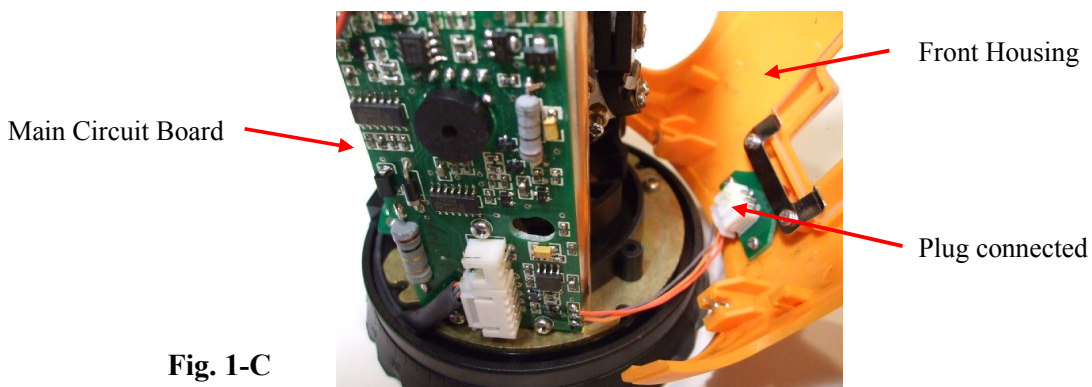
## General Assembly Instructions

[Note: Refer to section 3.0 for information on electrical connections.]

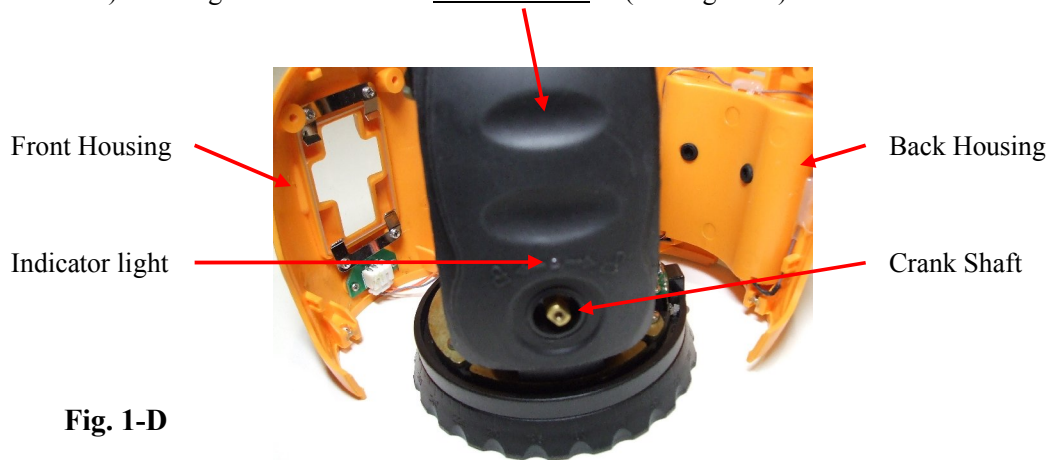
1. Connect the battery compartment plug from the Back Housing (3) to the Main Circuit Board. (See Fig. 1



2. Connect the plug coming from the Main Circuit Board to the Alarm Switch Circuit Board located on the inside of the Front Housing (4). (See Fig. 1 C.)



3. Before moving the Front and Back Housing units in place, position the Rubber Jacket (8) over the instrument so that the matching hole is located over the Crank Shaft and the on-off indicator light (from the Power Switch Circuit Board) is through a smaller hole in Rubber Jacket. (See Fig. 1 D.)



**Fig. 1-D**

4. Now bring both Front and Back Housing units together over the edges of the Rubber Jacket. Use the four Cross Plate Screws (2) to secure the units. [Note: It may be necessary to use a thin nail placed into the screw holes to center the nuts found inside the instrument so that a straight path is achieved for the screws.]

5. Holding the instrument up-side- down, further secure the housing units using the four Cross Plate Screws (1). Rotate the bottom portion of the base in order to locate the screw holes through the access hole. Drop the screws into the hole and screw into housing units until tight. [Note: It may be necessary to use a thin nail placed into the screw holes to center the nuts found inside the instrument so that a straight path is achieved for the screws.]

**The instrument can be disassembled using the reverse order described above.**

## 1.1 Central Unit Assembly(AP1684)

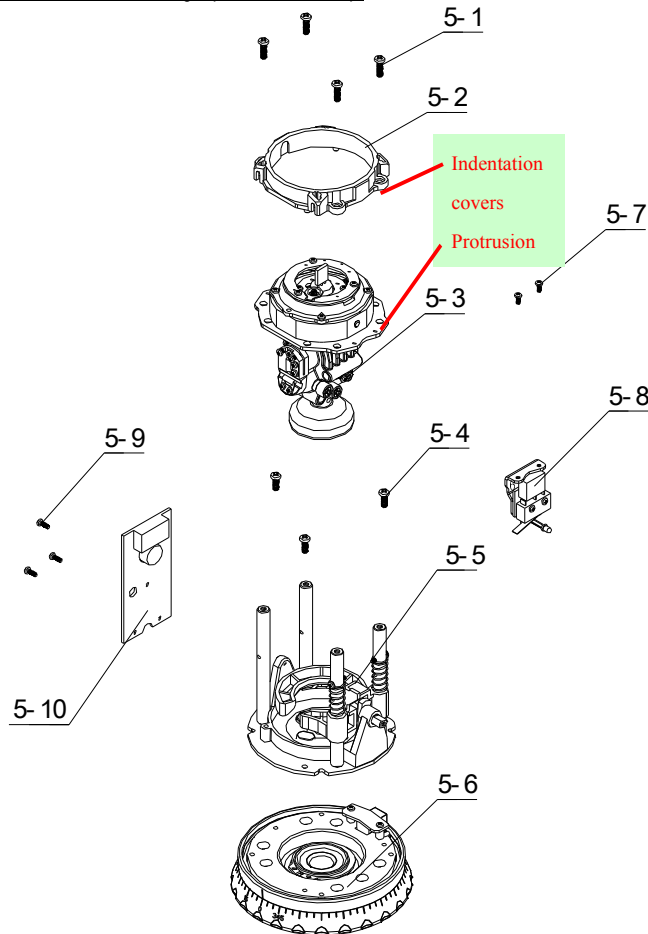
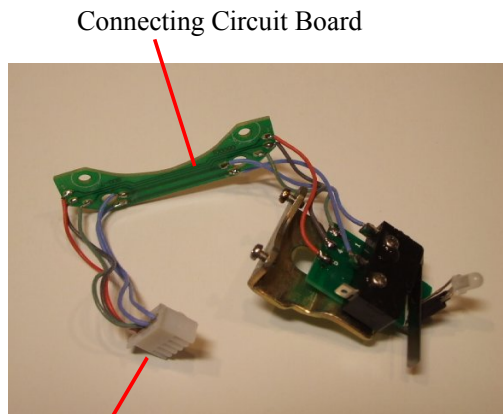


Fig. 1-1-A

Item	JLT Part #	Description	Qty
5-1	AP1513	Cross Plate Screws M3×8	4
5-2	AP1688	Support Seat Ring	1
5-3	AP1689	Core Module	1
5-4	AP1690	Cross Plate Tapping Screws ST2.9×10	3
5-5	AP1691	Base Plate Module	1
5-6	AP1692	Platform Module	1
5-7	AP1475	Cross Plate Screws M2×5	2
5-8	AP1693	On-Off Switch Assembly (includes Circuit Boards #3 and #7) [Fig. 1-1-B.]	1
5-9	AP1548	Cross Plate Tapping Screws ST2.2×6.5	3
5-10	AP1694	Circuit Board #1 (Main)	1
5-11	AP1516	M3 Flat Washers (NOT shown in diagram)	4
5-12	AP1695	Cross Plate Tapping Screws ST2.2×5 (shown in Fig. 1-1-G)	3

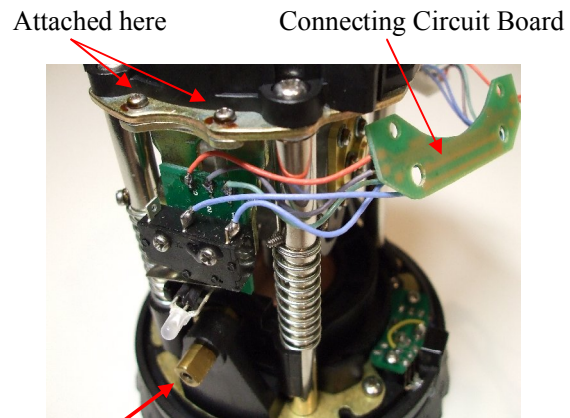
## General Assembly Instructions

1. Attach Base Plate Module (5-5) to Platform Module (5-6) using the three Cross Plate Tapping Screws (5-4).
2. Snap on the Support Seat Ring (5-2) making sure that the inside indentation fits over the protrusion of the Gimbal ring. Using the four Cross Plate Screws (5-1) attach the Support Seat Ring [together with the Core Module (5-3)] onto the four Support Pillars (see Fig. 2-2-A) of the Platform Module (5-6). Place Flat Washers (5-11) on top of Support Pillars so that the Core Module will rest on top of washers. The arm of the pendulum (bottom piece of Core Module) must be forced through the Locking Ring (see Fig. 2-2-A).
3. Attach the On-Off Switch Assembly (5-8) [see Fig. 1-1-B for view of complete assembly] by first attaching the switch portion of assembly using the two Cross Plate Screws (5-7). See Fig. 1-1-C for view of switch portion attached. This portion of assembly is oriented directly above Crank Shaft (item 5-5-7 of Fig. 2-2-A).



**Fig. 1-1-B**

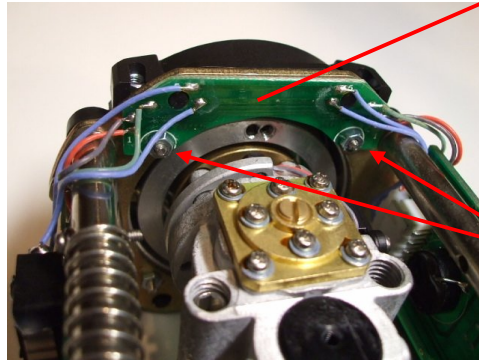
Plug



**Fig. 1-1-C**

Crank Shaft

4. Now attach the connecting circuit board to the underside of the supporting plate of the Core Module (5-3). The two bolts on the underside must first be removed and then used to attach the circuit board. See Fig. 1-1-D.

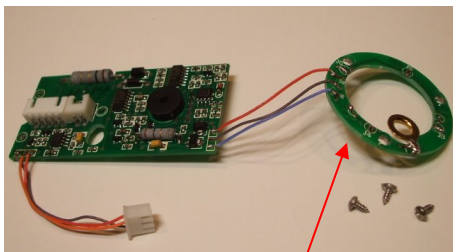


Nuts for securing circuit board

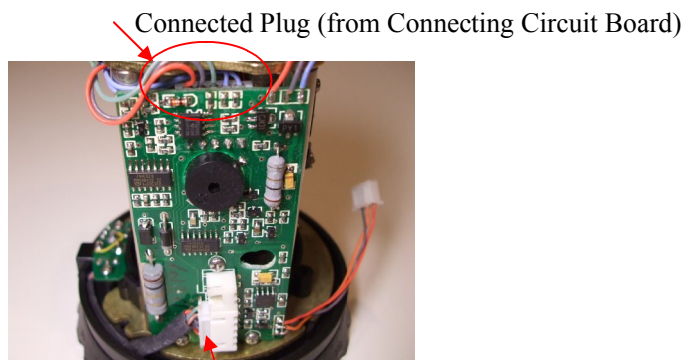
**Fig. 1-1-D**

5. Connect plug (Fig. 1-1-B) to the top connection on found on the back side of the Main Circuit Board (5-10). See Electrical Connections figure in Section 3 for further help.

6. First connect the plug from the A/C Receptor Circuit Board (item 5-6-9 of section 2.3) to the middle front connection of the Main Circuit Board. Then attach the Main Circuit Board (5-10) to the Base Plate Module (5-5) using the three Cross Plate Tapping Screws (5-9). See Fig.1-1-F. Also see Electrical Connections figure in Section 3 for further help.



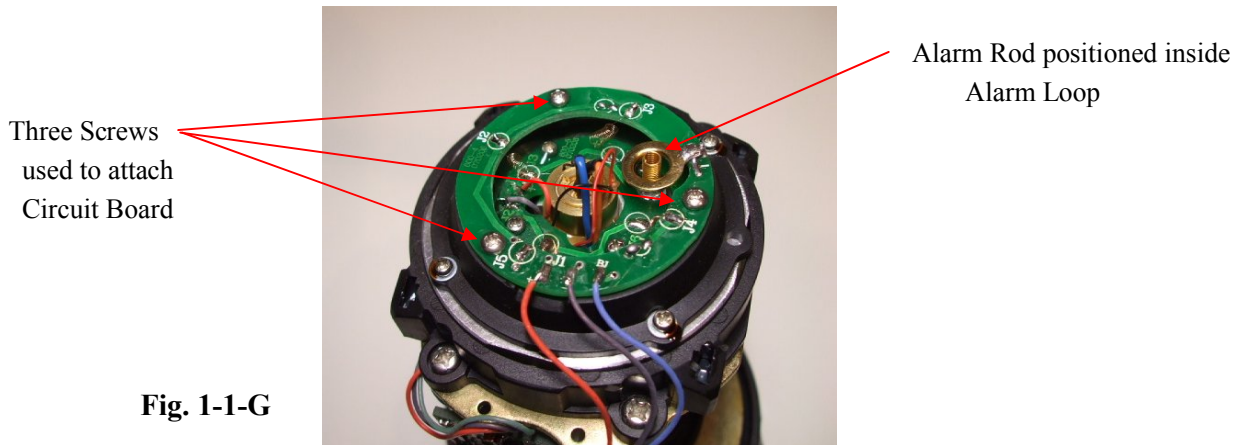
**Fig. 1-1-E**



**Fig. 1-1-F**

Connected Plug from  
A/C Receptor Circuit Board

7. Now attach the Alarm Loop Circuit Board to the top of the Support Seat Ring (5-2) using the three Cross Plate Tapping Screws (5-12). The alarm loop must fit around the alarm rid. See Fig. 1-1-G.



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



## **2.0 Component Assembly**

### **2.1 Core Module Assembly**

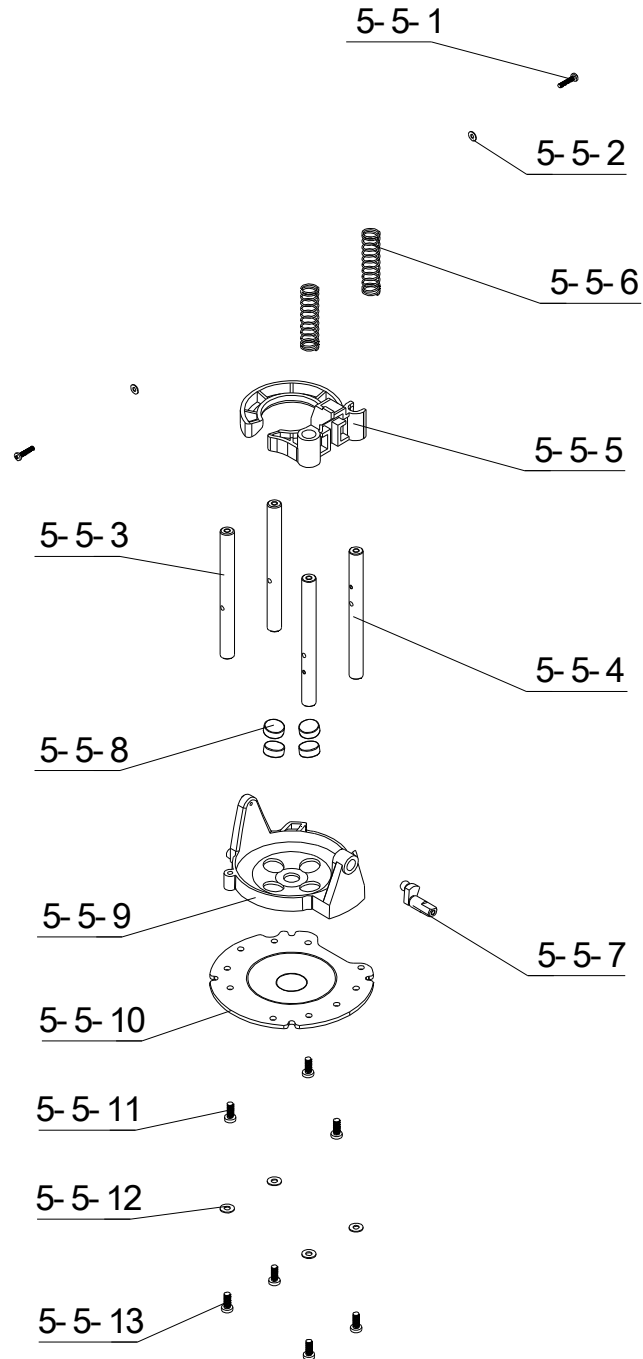
#### **Regarding General Assembly of Core Module**

#### **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 Plate Module Assembly (AP1691)**



**Fig. 2-2-A**  
**See parts list on next page**

Item	JLT Part #	Description	Qty
5-5-1	AP1696	Cross Plate Screws M2x10	2
5-5-2	AP1697	M2 Lock Washers	2
5-5-3	AP1698	Support Post Type A (w. 1 hole through side of post)	2
5-5-4	AP1699	Support Post Type B (w. 2 holes through side of post)	2
5-5-5	AP1700	Locking Ring	1
5-5-6	AP1701	Compression Springs	2
5-5-7	AP1702	Crank Shaft	1
5-5-8	AP1703	Magnets: 10 mm x 4 mm	4
5-5-9	AP1704	Fixture Support	1
5-5-10	AP1705	Base Plate	1
5-5-11	AP1677	Cross Plate Tapping Screws ST 2.9x8	3
5-5-12	AP1658	M3 Lock Washers	4
5-5-13	AP1513	Cross Plate Screws M3x8	4

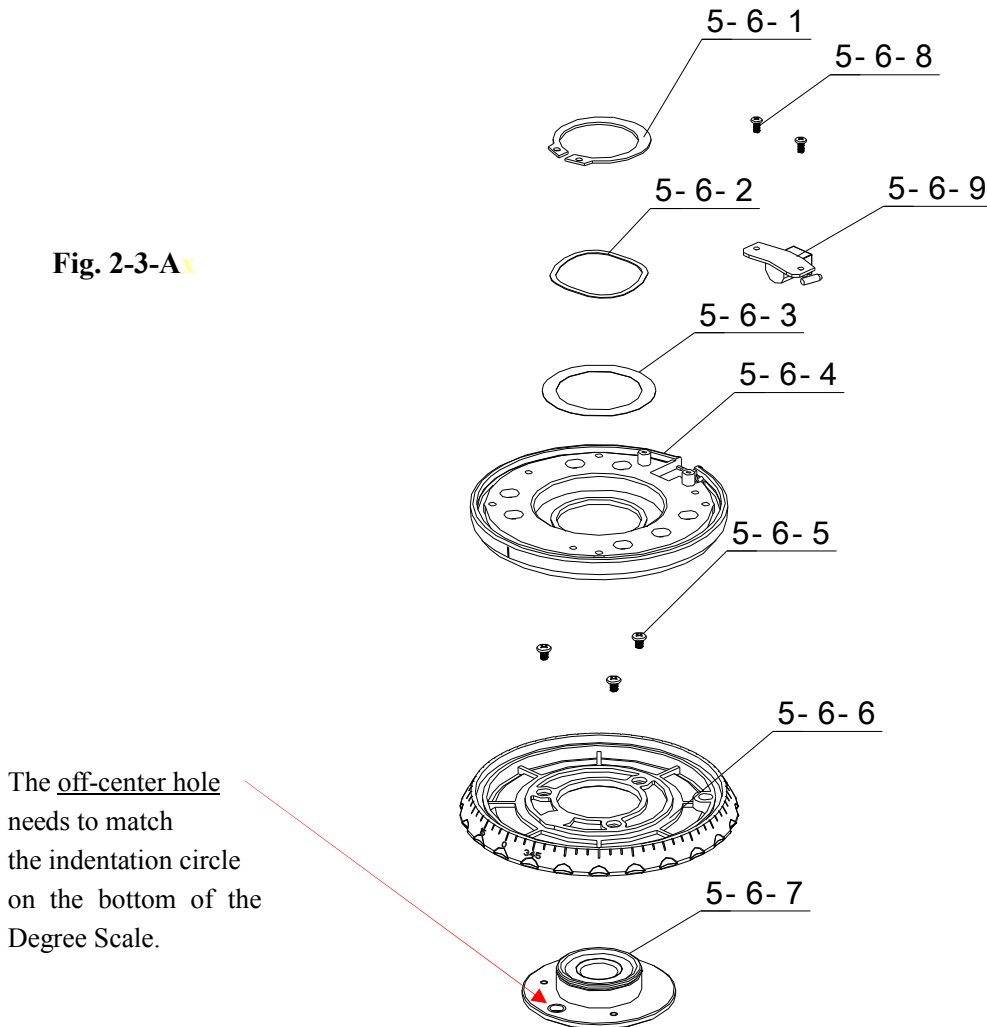
## General Assembly Instructions

1. Attach Support Post Type B (5-5-4) to Base Plate (5-5-10) using Cross Plate Tapping Screws (5-5-13). Make sure that concave impression of plate is facing up with indentation of plate to the right side of the two posts (when looking down upon the plate).
2. Attach Support Post Type A (5-5-3) to other remaining holes in Base Plate (5-5-10) using Cross Plate Tapping Screws (5-5-13).
3. Insert Crank Shaft (5-5-7) through inside the matching opening in Fixture Support (5-5-9). Make sure that grease is applied to Crank Shaft. Set Crank Shaft in uppermost position.
4. Place Fixture Support (5-5-9) onto Base Plate (5-5-10) so that it fits among the four support posts. The Crank Shaft should be oriented between the two Type B Support Posts (5-5-4). Secure the Fixture Support from below the Base Plate using the three Cross Plate Tapping Screws (5-5-11).
5. Place the four Magnets (5-5-8) in the four matching openings of the Fixture Support (5-5-9). The magnets will attach themselves to the Base Plate (5-5-10) below.
6. Place Locking Ring (5-5-5) down upon Type B Support Posts (5-5-4). Make sure that Locking Ring fits in place with Crank Shaft (5-5-7).
7. Slide the two Compression Springs (5-5-6) over each of the Type B Support Posts (5-5-4). Push the Compression Springs down far enough to insert the Cross Plate Screws (5-5-1) and Lock Washers (5-5-2). Screw both screw in all the way and then release the Spring.

**The Base Plate Module can be disassembled using the reverse order described above.**

## 2.3 Platform Module Assembly (AP1692)

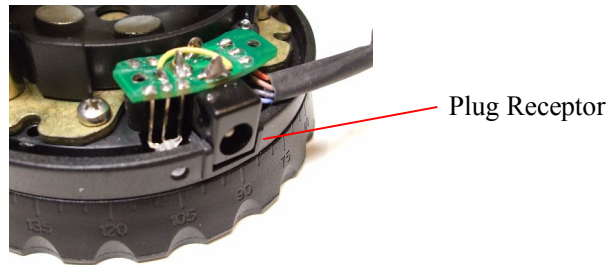
Fig. 2-3-Ax



Item	JLT Part #	Description	Qty
5-6-1	AP1706	Lock Ring	1
5-6-2	AP1707	Wave-form Gasket	1
5-6-3	AP1708	Gasket	1
5-6-4	AP1709	Rotation Platform	1
5-6-5	AP1616	Cross Plate Screws M2.5x5	3
5-6-6	AP1710	Degree Scale	1
5-6-7	AP1711	Bottom Axle (metal)	1
5-6-8	AP1548	Cross Plate Tapping Screws ST2.2x6.5	2
5-6-9	AP1712	#2 A/C Receptor Circuit Board	1

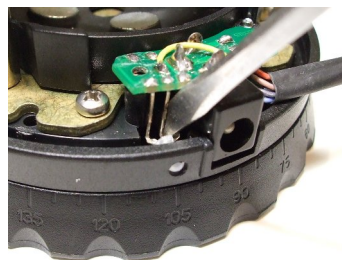
## General Assembly Instructions

1. Using three Cross Plate Screws, attach the Bottom Axle (5-6-7) into the bottom of the Degree Scale (5-6-6).
2. Place the Rotation Platform (5-6-4) onto the Bottom Axle (5-6-7). Place the Gasket (5-6-3) and then Wave-form Gasket (5-6-2) onto the Bottom Axle. Attach Lock-Ring (5-6-1) using ring pliers to secure all parts.
3. Attach #2 A/C Receptor Circuit Board by first inserting only the tip of indicator bulb into matching hole in Rotation Platform (5-6-4). Apply a little grease on the indicator bulb before inserting. Then pivot the circuit board downward so that the A/C plug receptor is matching the slot in the Rotation Platform. Make sure that the receptor is flush with outside of Base. (See Fig. 2-3-B).



**Fig. 2-3-B**

4. Then gently place 1/8-inch flat head screwdriver between the second and third wire prong and gently leverage the indicator light forward until it protrudes out from the hole in the Rotation Platform. (See Fig. 2-3-C.)



**Fig. 2-3-C**

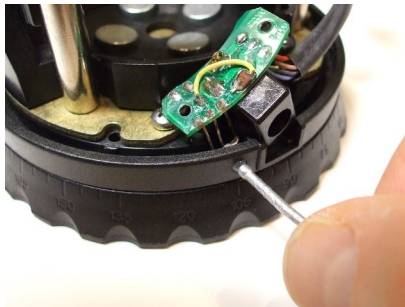
5. Then push plug receptor down and attach #2 A/C Receptor Circuit Board (5-6-9) using two Cross Plate Screws (5-6-8). (See Fig. 2-3-D.) Make sure that wires are fit into inside groove along edge of Rotation Platform.



**Fig. 2-3-D**

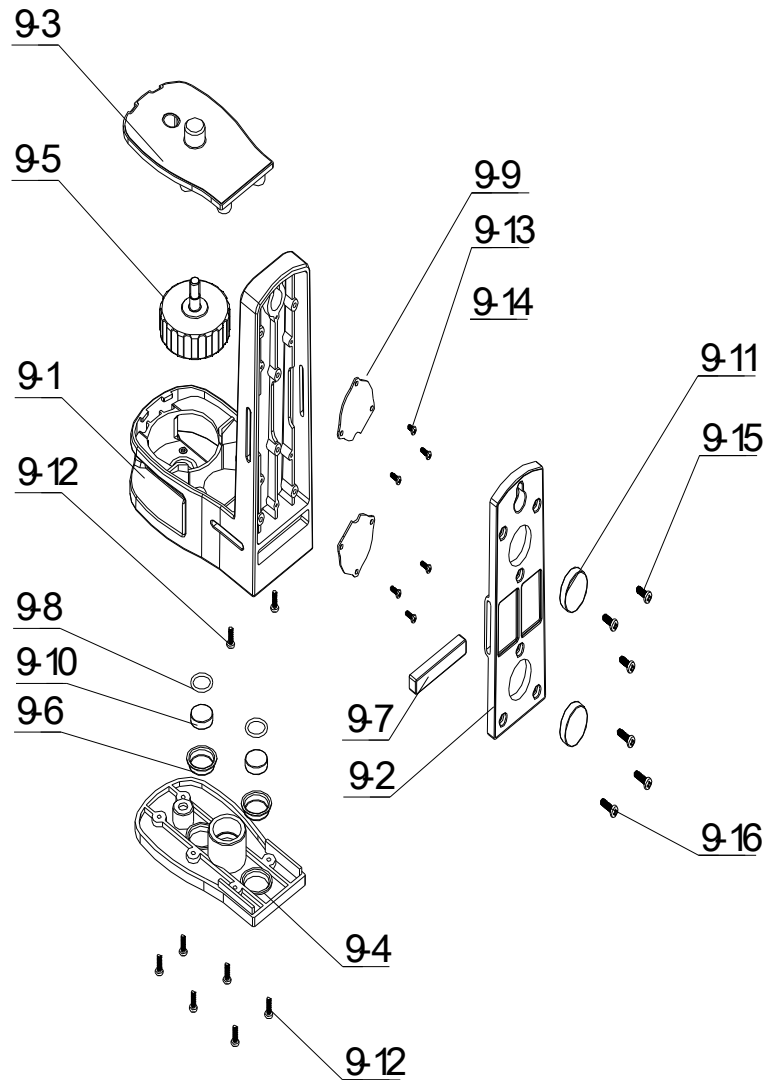
The Base assembly can be disassembled using the reverse order described above.

[NOTE: To remove the A/C Receptor Circuit Board, remove Cross Plate Screws (5-6-8) and gently lift the power plug receptor out while indicator light is still in place. Then gently use a small nail head to push the indicator light until it releases from the hole. (See Fig. 2-3-E.)



**Fig. 2-3-E**

**2.4 Bracket Assembly (40-6356)**



**Fig. 2-4-A**  
**See Parts List on next page.**

Item	JLT Part #	Description	Qty
9-1	AP1717	Bracket	1
9-2	AP1718	Cover Board #1	1
9-3	AP1719	Cover Board #2	1
9-4	AP1720	Cover Board #3	1
9-5	AP1721	Fastening Knob	1
9-6	AP1722	Magnet Holders	2
9-7	AP1723	Rubber Pad	1
9-8	AP1724	Cushion Rings	1
9-9	AP1725	Magnet Plate	2
9-10	AP1726	Magnet 14x4	2
9-11	AP1727	Magnet 18x4	2
9-12	AP1493	Cross Plate Screw M2.5x8	6
9-13	AP1728	Cross Plate Tapping Screw ST2.2x4.5	1
9-14	AP1548	Cross Plate Tapping Screws ST2.2x6.5	5
9-15	AP1677	Cross Plate Tapping Screws ST2.9x8	3
9-16	AP1729	Cross Plate Tapping Screws ST2.9x9.5	3

## General Assembly Instructions

**NOTE:**

This bracket unit is similar to the bracket of the instrument 6620 (or 6625). Refer to that service manual for instructions.



## 3.0 Electrical Connections

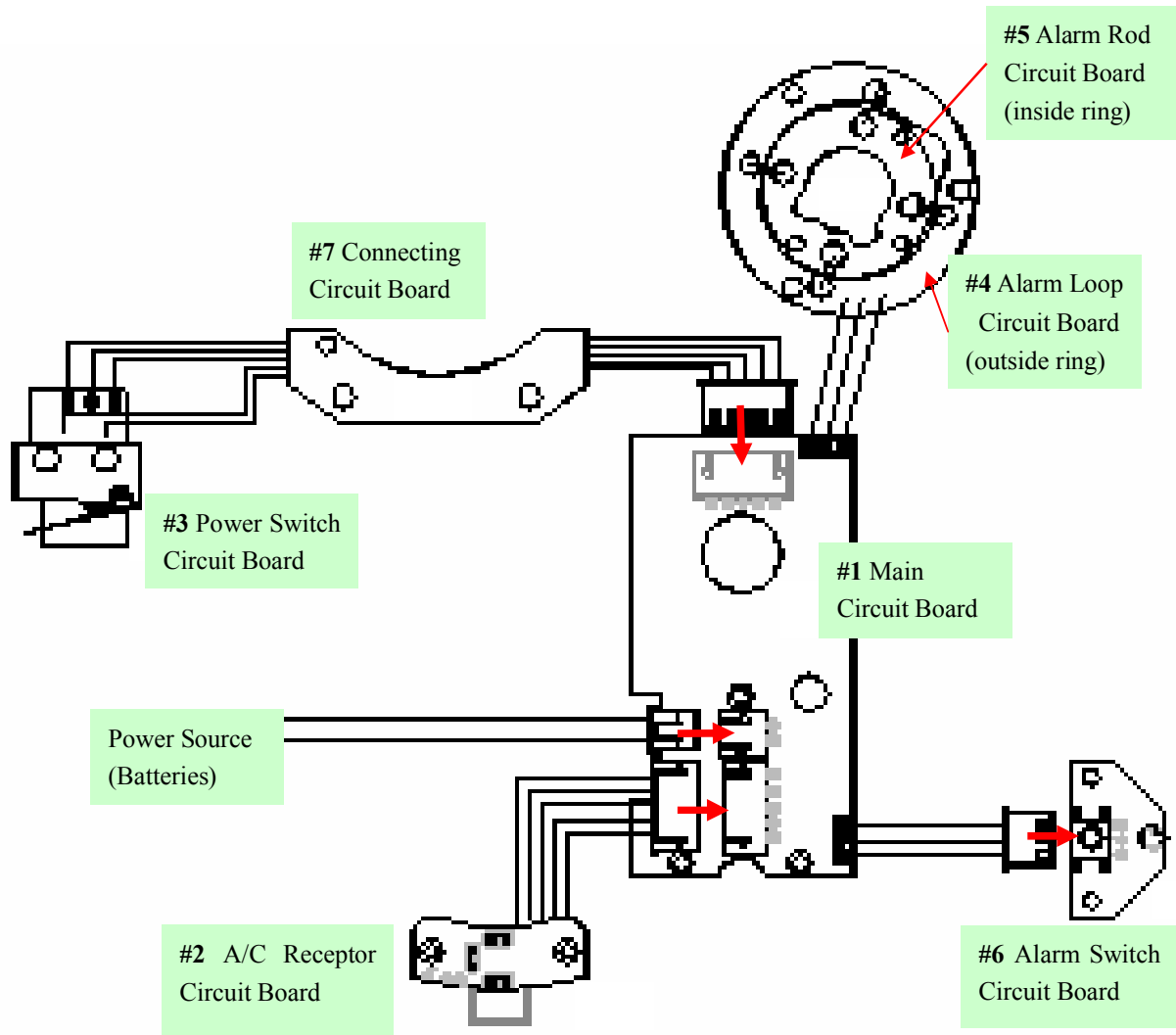


Fig. 3-A

## 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 40-6640.**

*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.

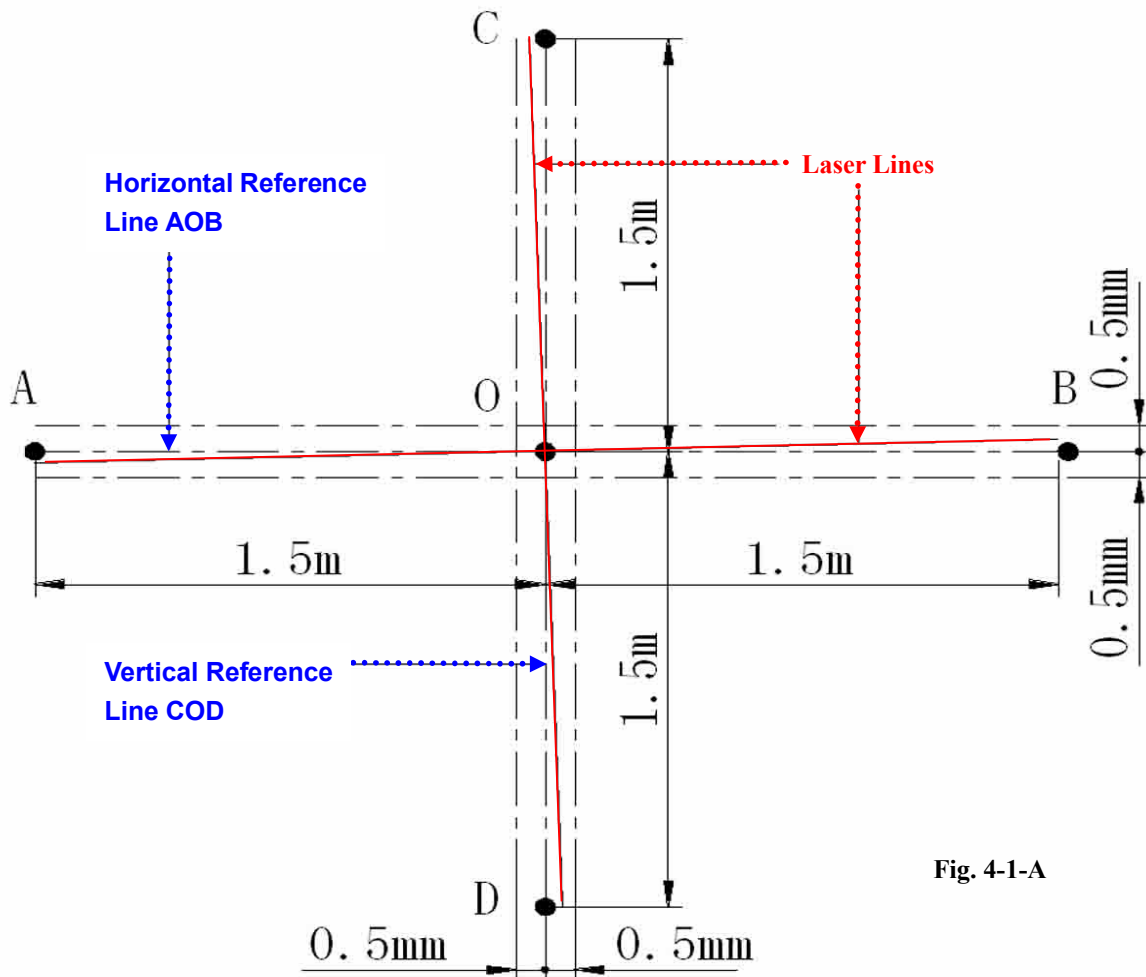


Fig. 4-1-A

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. 4-1-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 the 40-6640 Self-leveling Laser:  $\pm 1/8''/35 \text{ ft. } (\pm 3\text{mm} / 10\text{m}).$ ]

If accuracy does not 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.**
- 4.2.3 **Height error.**

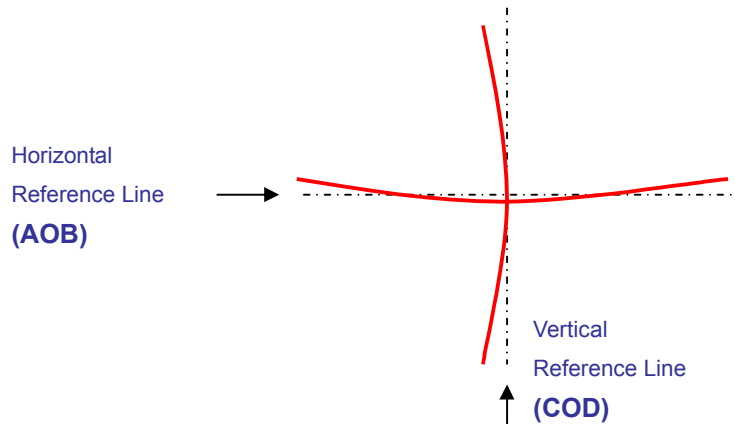
When making adjustments with the errors described below, a pair of screws must be turned in a certain manner. One of the screws needs first to be loosened slightly. The other screw then needs to be tightened by an equal amount. Continue loosening one screw and tightening the other (or go in the reverse 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. 4-2-A Linearity (or curvature)



**Adjustment required:** Adjust the needed screws in the diagram below depending on which laser lines show curvature. [NOTE: The housing needs to be removed. For the vertical linearity adjustment, the Main Circuit Board will also need to be detached to provide access to the screws.]

Fig. 4-2-B  
for horizontal linearity

Adjustment screws

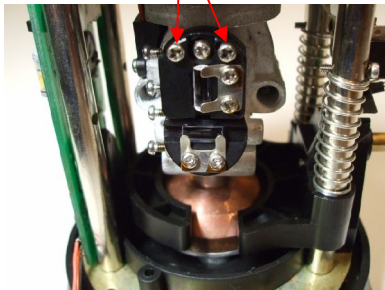
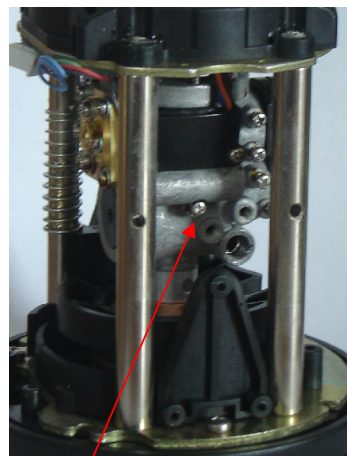


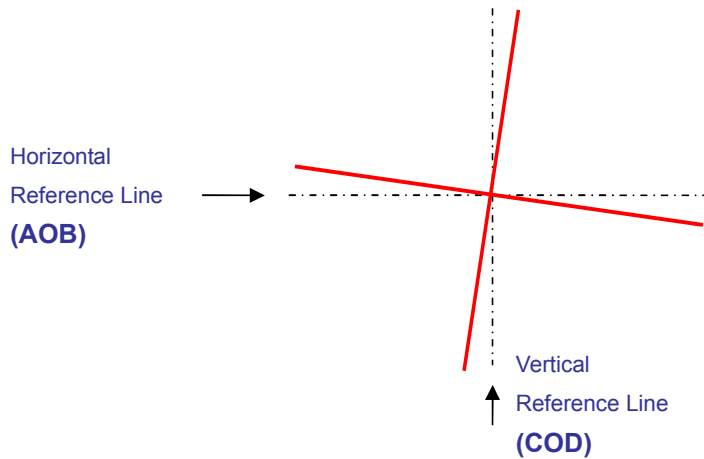
Fig. 4-2-C  
for vertical linearity



Adjustment screws  
- other screw is on other side

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

**Fig. 4-2-D Oblique Error**

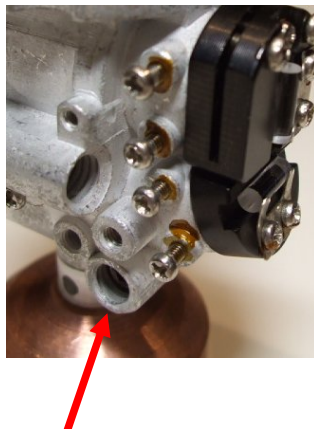


**Adjustment required:**

If the laser lines are perpendicular to each other and only a small adjustment is needed, adjust the hexagonal nut shown (Fig. 4-2-E) using a hexagonal wrench key (3 mm).

NOTE: The nut can be accessed by removing the Plastic Screw (see Fig. 4-2-F and 4-2-G).  
The outer housing on the instrument does NOT need to be removed.

**Fig. 4-2-E**



Hexagonal Nut (found inside hole)

**Fig. 4-2-F**



Remove plastic screw to provide access

**Fig. 4-2-G**

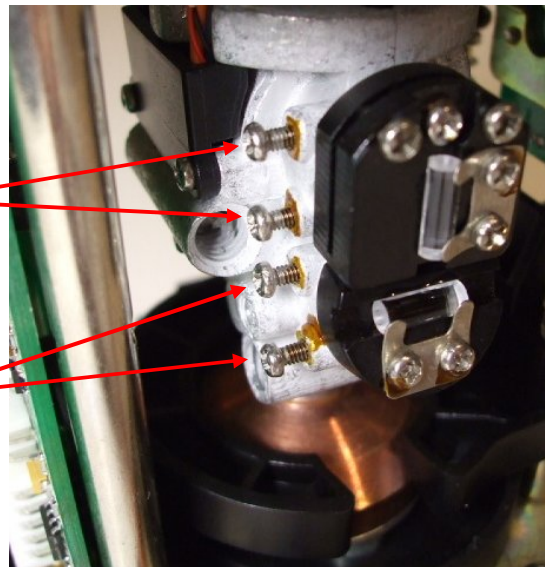


Use 3 mm hexagonal wrench key

If the lines are not perpendicular to each other or a larger adjustment is needed, the housing needs to be removed. The Main Circuit Board will also need to be detached to provide access to the screws. Adjust the appropriate screws indicated in figure below.

Screws for horizontal error

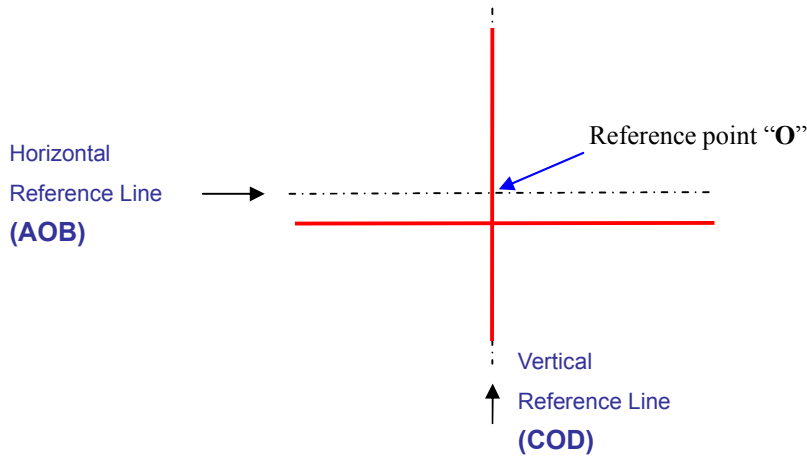
Screws for vertical error



**Fig. 4-2-H**

**4.2.3 Height error.** Point “O” does 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**

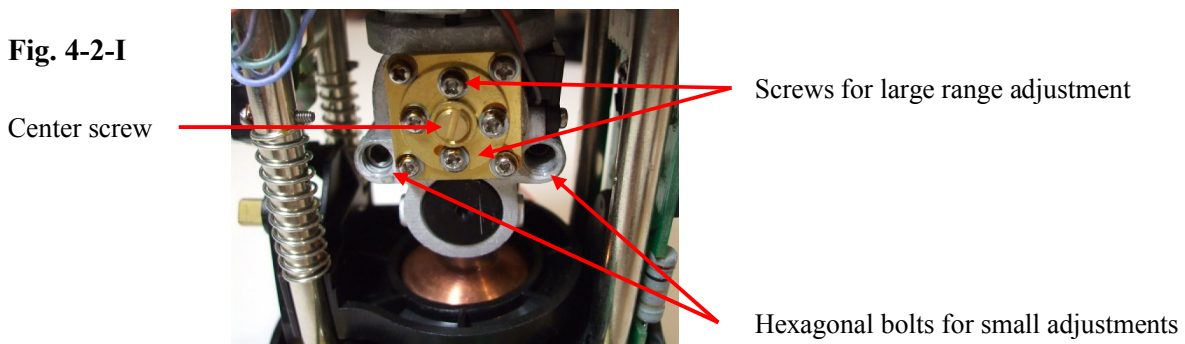


**Adjustment required:**

First attempt a small error adjustment using a hexagonal wrench key (3 mm). Adjust the horizontal laser line until it matches the reference line (AOB).

If further adjustment is needed, use the two screws indicated in the figure below. The middle screw needs to be loosened first only by little. Then move the horizontal laser line toward the reference line by either tightening or loosening the two outer screws. Then secure the adjustment by tightening the middle screw. If needed, make small adjustments again using the hexagonal nuts.

**Fig. 4-2-I**

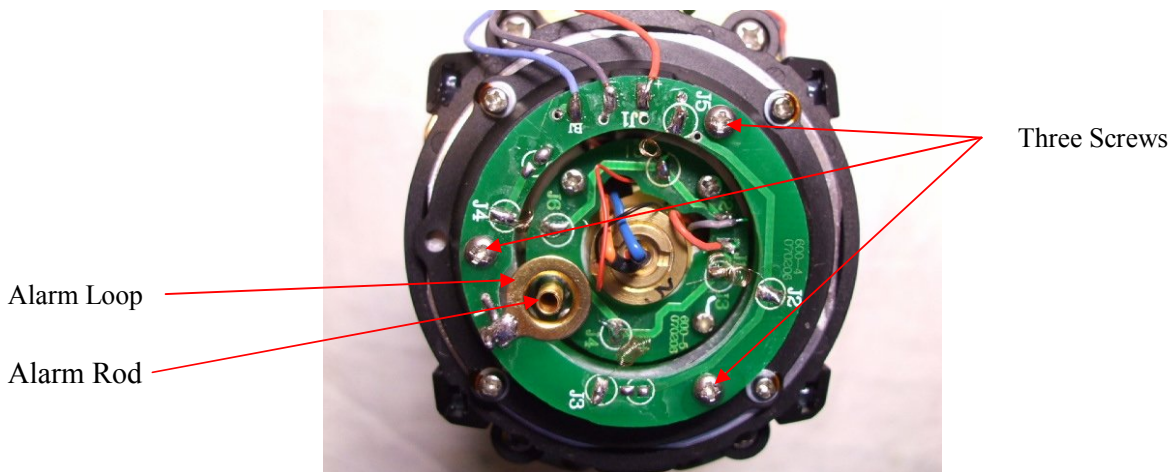


## 5.0 Alarm Adjustment

After one or more calibrations have been completed, it may be necessary to adjust the alarm range. If the alarm rod is not centered within the alarm loop, make adjustments as follows:

1. Remove all housing to clearly view the top portion of Central Unit Assembly (see Fig. 5-A).
2. Loosen the 3 screws on the Alarm Loop Circuit Board (outer ring) and move the circuit board until the alarm rod is centered inside the alarm loop. Tighten the screws and attach all housing.

**Fig. 5- A Top view of Central Unit Assembly**



**NOTE:**

If alarm rod needs to be further centered beyond adjusting the outer circuit board, the inner circuit board (holding alarm rod) can be loosened and adjusted. This will help only for minimal further adjustment.

[As a final alternative, the loop can be manually forced to center over the rod. **CAUTION:** This should be done only in limited manner and very carefully to avoid breaking the solder connection. If connection is broken, soldering must be done to repair the alarm loop attachment.]



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

No.	Symptom	Cause	Corrective Action
1	Failure to start using batteries  (instrument does not turn on).	Low batteries.	Recharge or replace batteries.
		On-Off Switch does not work.	Replace On-Off Switch Assembly
		Wires are disconnected or broken.	Repair connecting wires.
		#1 Main Contol circuit board does not work.	Replace circuit board.
2	Failure to start using A/C adapter  (instrument does not turn on).	Wires are disconnected or broken.	Repair connecting wires.
		#2 A/C Receptor Circuit Board does not work.	Replace circuit board.
3	Power is on but indicator light above On-Off Turnknob is not working	Connecting wires between circuit boards #3, #7, and #1 are broken	Repair connecting wires.
		LED of circuit board #3 is damaged	Replace LED
		#1 Main Contol circuit board does not work.	Replace circuit board.
4	Indicator light of A/C Receptor Circuit Board is not working	Connecting wires between circuit boards #1 and #2 are broken	Repair connecting wires.
		LED of circuit board #2 is damaged	Replace LED
		#1 Main Contol circuit board does not work.	Replace circuit board.

5	No laser	Hairspring wire is broken	Replace the hairspring wire
		Connecting wires between circuit boards #1 and #4 are broken	Repair connecting wires.
		Core connection wire to laser is cut	Replace the connection wire
		#1 Main Contol circuit board does not work.	Replace circuit board.
		Laser light source is broken	Replace the laser
6	No buzzer (when instrument is tilted beyond tolerance)	Buzzer is broken	Replace buzzer
		#4 Alarm Loop Circuit Board is loose or not aligned properly	Adjust and tighten circuit board
		Connecting wires between circuit boards #1 and #4 are broken	Repair connecting wires.
		#1 Main Contol circuit board does not work.	Replace circuit board.
7	On-Off keypad for Alarm Switch does not work	Connecting wires between circuit boards #1 and #6 are broken	Repair connecting wires.
		#6 Alarm Switch circuit board does not work.	Replace circuit board.
		#1 Main Contol circuit board does not work.	Replace circuit board.
8	On-Off keypad indicator light for Alarm Switch does not work	See reasons listed in above (No. 7)	Repair accordingly
		LED of circuit board #2 is damaged	Replace LED