THE GOLFWORKS®

Operating Instructions For:

The Maltby Laser Frequency Machine

Code: **MA2014**

The new Maltby Laser Frequency Machine is built around a high precision electronic chronograph that times the period of oscillation of the shaft with great accuracy. This same technology is used in other industries where high speed motion measuring is required. The stable circuit design in this unit is designed to achieve the accuracy needed when measuring the frequency of a golf club or shaft.

The processing power is based on a Pic 16 microchip with over clocking to 20 Mhz, which speeds up the processing power as well as improves accuracy on the period count.

The use of a laser to saturate the receiver to physically count the oscillation of the shaft also improves accuracy. This shortens the receivers rise time. Rise time refers to the time it takes the detector to sense the shaft passing through. If the shaft is clamped properly and the shaft is put in motion in a consistent manner, frequency readings will be extremely accurate.

The Maltby Laser Frequency Machine comes with:

- **Qty 1 AC Adaptor**
- **Qty 1 Quick Turn clamp handle and one Allen wrench**
- **Qty 1 205 gram shaft tip weight**
- **Qty 4 base adaptors with bolts (Fig. 1)**

Fig. 1

SET UP AND OPERATION

1. The Analyzer should be bolted down to a stable workbench or cabinet top. If using the 4 base adaptors (provided), the analyzer can be positioned anywhere that is convenient for the user. The adaptors are designed to raise the unit up, allowing the club or shaft to be pulled down sufficiently to obtain a reading and without the head hitting the workbench surface (Fig. 2). An alternative is to position the unit at the end of a workbench (Fig 3). In this position the base adaptors are not necessary.

2. The Maltby Design Professional Frequency Analyzer comes with an AC adaptor. The Adaptor is required for the unit to operate. The adaptor plugs into the left side of the unit. After plugging the adaptor into the unit, plug the adaptor into a normal wall outlet. The unit is now ready for operation.

Fig. 2

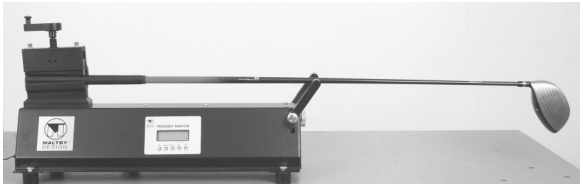
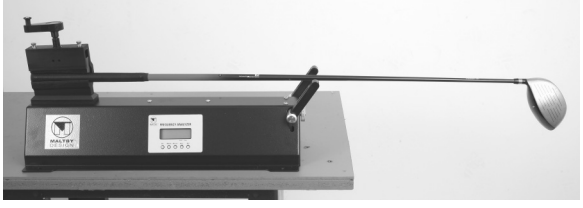


Fig. 3



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SHIPPING CODE **MM**

3. To turn the unit on, simply press the "On" button on the front panel. Five "8's" will appear for a few seconds (Fig. 4), then the LCD will change to "rEAdy" (Fig. 5). Press the "Mode" button and five "0's" will appear (Fig. 6). This mode registers readings to 5 digits (example:265.50). Press the "Mode" button again and three "0's" will appear (Fig. 7). The three digit mode registers readings in 3 digits (example: 265). Once the mode is selected, the unit is ready for operation.

Note: The frequency analyzer has an automatic shut off feature. If the unit is not used for a period of approximately 1 minute, it will automatically shut off. If this occurs, simply push the "ON" button again and wait for the "rEAdy" to appear on the LCD. Press the "Mode" button and the unit is again ready for operation.

The frequency analyzer comes with a single bolt clamping system that is quick and easy to use. The knob itself has an automatic clutch feature that prevents you from over-tightening the clamp onto a shaft or grip. There is also an easy grab attachment that slips over the knob and is secured by tightening the two Allen screws (Fig. 8a, 8b).

MEASURING A FINISHED GOLF CLUB

1. Once the Frequency Analyzer is secured to a work surface and plugged in, it is ready for operation. To place a complete club with grip in the machine, make sure the clamp is widened to accept the club. The clamping mechanism has a feature that prevents the clamp from jamming if widened to far. The clamp can be widened a sufficient amount without opening the clamp all the way.

Important note: It is recommended the club be placed in the analyzer as shown in Fig. 9a by sliding the shaft in from the front of the clamp, then sliding the club laterally to the right to position the grip in the clamp (see Fig. 9b). Tighten the clamp (Fig. 9c) until the clutch mechanism prevents the clamp from tightening any further. You will hear a ratcheting sound to indicate the clamp has tightened as far as it will go. The clutch mechanism is designed to prevent over tightening and provides a consistent clamp pressure from club to club. The proper position is achieved when the top crown line of the grip is in line with the edge of the clamp (see Fig. 9d).

2. If the club is clamped properly, the clubs shaft should be lined up between the two vertical posts on the right side of the analyzer (Fig. 10). It may be necessary to adjust the posts by loosening the silver knob on the right hand side of the analyzer (Fig.11a). Once the knob is loosened, adjust the posts so the shaft is directly between the laser ports on the top end of the vertical posts (Fig. 11b, 11c).

Fig.4

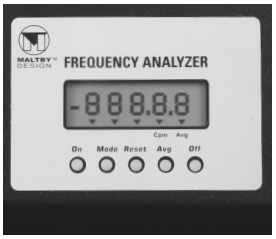

Fig. 5

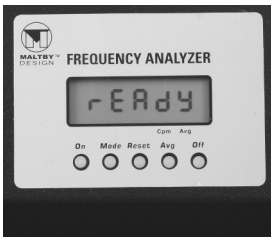

Fig. 6

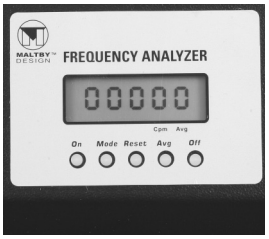

Fig. 7

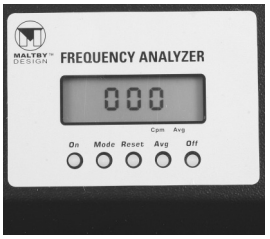

Fig. 8a

Fig. 8b

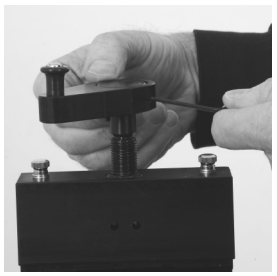

Fig. 9a

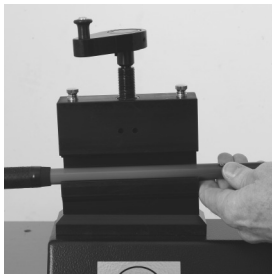

Fig. 9b

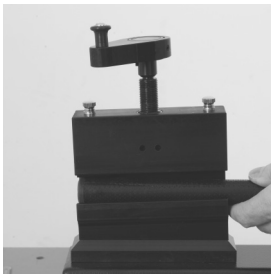

Fig. 9c

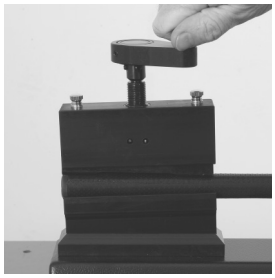

Fig. 9d

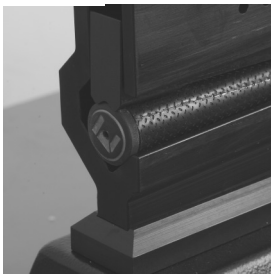

Fig. 10

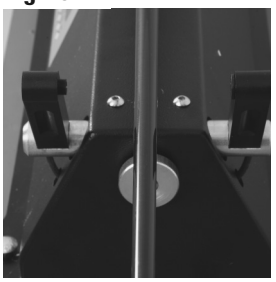

Fig. 11a

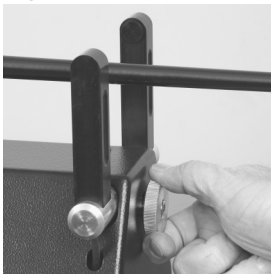

Fig. 11b

Fig. 11c

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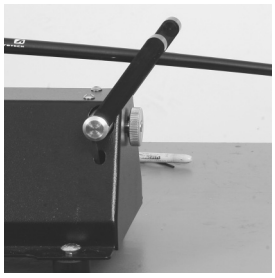
3. Turn the machine on as described in Setup and Operation. Once the unit is turned on, the display will cycle through "88888" and then read "rEAdy". Press the "Mode" button and set the display to read either "00000" or "000" (5 digit or 3 digit mode). The unit is now ready for reading. Pull the club head end of the club straight down approximately 2" below the laser ports (Fig. 12). Release the club head and the club will oscillate between the two posts. The laser should be visible and the shaft should be passing vertically through the laser beam. The frequency reading of the shaft will appear on the LCD readout after only a few seconds.

Fig. 12



4. It is recommended that several readings be taken on each club or shaft measured. For the second and subsequent readings, simply hit the button marked "Reset", then load the shaft (pull down approx. 2") and begin the oscillation again. After several readings are taken, you can hit the "Avg" button and the average reading for all the readings for that particular club will appear.

NOTE. If any readings are out of the normal range or seem odd, take more readings until you see a consistency. Example: 255, 256, 254 is a set of consistent readings. 255, 153, 256 is a set of readings showing an errant reading in the set. In the second example, it is recommended to check to be sure the shaft is securely clamped and the analyzer is securely bolted down to the work bench. If the unit and the shaft are secure, take another set of readings. Your goal should be three consistent readings.

The Maltby Design Frequency Analyzer is designed with a program to recognize a large variance in two successive readings. When this occurs, "b run" will appear on the LCD screen. When "b run" appears, simply hold down the average button until "Clear" appears on the LCD screen. Hit reset and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings. The analyzer is also designed to alert the user that a bad oscillation has occurred. A bad oscillation will prevent the unit from getting a good frequency reading. When this occurs, "OSC" will appear on the LCD screen. If this occurs, simply hold down the average button until "Clear" appears on the LCD screen. Hit "Reset" and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings.

5. To remove the gripped club from the clamp, first loosen the clamp. Next, slide the club to the left until the grip is completely clear of the clamp. Then, simply pull the club out of the clamp from the front (towards you).

Measuring A Shaft Only

1. One of the great features of the Maltby Design Frequency Analyzer is the ability to measure raw shafts, without grips or heads attached. Measuring shafts in this manner gives a comparative measurement that helps one compare the relative stiffness of shafts before they are installed into clubs.

To measure a raw shaft, position the shafts butt end all the way to the end (left side) of the clamp (Fig.13). Tighten down the clamp until the clutch begins to ratchet. Again, the ratcheting sound indicates the clamp is tightened as far as it will go. This feature is designed to prevent over tightening of the clamp on the shaft.

Fig. 13

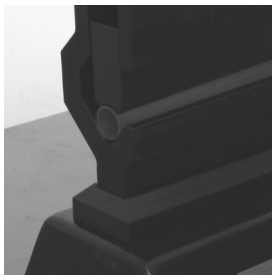


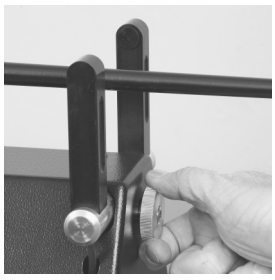
Fig. 14

2. The Maltby Design Frequency Analyzer comes with a 205 gram weight that is designed to be placed over the tip end of the shaft. The weight has a bore that is 50 mm deep and 10.35 mm (.407") in diameter. This weight will accommodate most all shafts available today.

Before a reading on a raw shaft can be taken, the weight must be installed on the tip of the shaft (Fig.14). Be sure the shaft goes all the way to the bottom of the weight, the full 50 mm depth. The knob of the weight should be positioned on the top side of the weight. To secure the weight on the shaft, simply tighten down the plastic knob in the weight. **Do not over tighten.** Tighten firmly to prevent the weight from coming loose during the oscillation of the shaft.

Fig. 15

Fig. 16a



3. Once the weight is secured to the tip end of the shaft, be sure the shaft is positioned properly between the laser posts. If the shaft is clamped properly, it should be lined up between the two vertical bars on the right side of the machine (Fig.15). Be sure the shaft lines up between the two laser ports located in the vertical posts. If adjustment of the posts is needed, loosen the silver knob on the right hand side of the machine (Fig.16a) and adjust the posts until the shaft is directly between the laser ports (Fig.16b, 16c).

Fig. 16b

Fig. 16c

4. Turn the machine on as described in Setup and Operation. Once the unit is turned on, the display will cycle through "88888" and then read "rEAdy". Press the "Mode" button and set the display to read either "00000" or "000" (5 digit or 3 digit mode). The unit is now ready for reading. Pull the shaft tip end with the weight attached down approximately 2" (Fig.17). Release the shaft. The shaft will oscillate between the posts. The laser should be visible and the shaft should be passing vertically through the laser beam. The frequency reading of the shaft will appear on the LCD readout after only a few seconds.

5. It is recommended that several readings be taken on each club or shaft measured. For the second and subsequent readings, simply hit the button marked "Reset", then load the shaft (pull down approx. 2") and begin the oscillation again. After several readings are taken, you can hit the "Avg" button and the average reading for all the readings for that particular club will appear.

NOTE: If any readings are out of the normal range or seem odd, take more readings until you see a consistency. Example: 255, 256, 254 is a set of consistent readings. 255, 153, 256 is a set of readings showing an errant reading in the set. In the second example, it is recommended to check to be sure the shaft is securely clamped and the analyzer is securely bolted down to the work bench. If the unit and the shaft are secure, take another set of readings. Your goal should be three consistent readings.

The Maltby Design Frequency Analyzer is designed with a program to recognize a large variance in two successive readings. When this occurs, "b run" will appear on the LCD screen. When "b run" appears, simply hold down the average button until "Clear" appears on the LCD screen. Hit reset and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings. The analyzer is also designed to alert the user that a bad oscillation has occurred. A bad oscillation will prevent the unit from getting a good frequency reading. When this occurs, "OSC" will appear on the LCD screen. If this occurs, simply hold down the average button until "Clear" appears on the LCD screen. Hit "Reset" and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings.

Measuring The Tip Frequency of a Shaft

Measuring the tip frequency or tip stiffness of a shaft can also be accomplished with the Maltby Design Frequency Analyzer. Measuring the frequency of the tip of a shaft simply gives another comparative measurement that the club maker can use when evaluating shafts. The procedure for measuring the tip of a raw shaft is as follows:

1. To measure the tip frequency of a golf shaft, it is recommended that the tip end of the shaft be clamped at 3.5". This measurement is taken from the front of the clamp or the right hand side of the clamp as you face the analyzer. You can mark this position on the front of the clamp using a piece of tape and a marker (Fig.18a). Once you have the 3.5" reference marked, place the shaft tip in the machine and tighten the clamp until you hear the ratcheting sound, indicating the shaft is tightened securely in the clamp (Fig. 18b).

2. Once the shaft tip is securely clamped, slide a 50 gram grip on the butt end of the shaft. This can best be done by splitting a grip from the mouth of the grip to the butt cap (Fig. 19). The grip can be a used grip as long as it weighs 50 grams. To be sure the grip is properly placed on the shaft, push firmly on the butt end of the grip.

Note: The purpose of the 50 gram split grip on the butt of the shaft is to give the shaft a weighted load, allowing the shaft to oscillate at a countable rate in the tip clamped position.

3. If not already done, be sure the analyzer is on and the LCD readout has either the "000" or "00000" showing.

4. To obtain the tip frequency reading, pull down on the grip end of the shaft approximately 2" and release (Fig.20). To repeat, simply push the "Reset" button and repeat the process. It is recommended that several readings are taken to ensure accuracy. Once several readings are taken, hit the "Avg" button for the average frequency reading of the set of readings.

Fig. 17

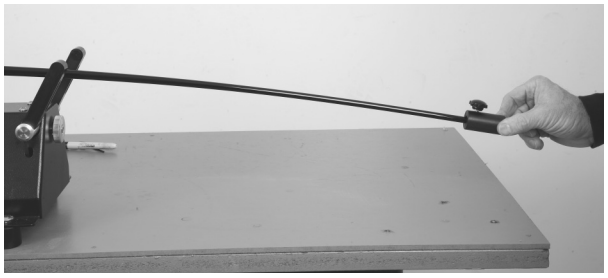


Fig. 18a

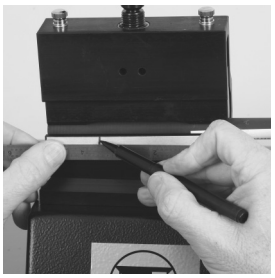


Fig. 18b

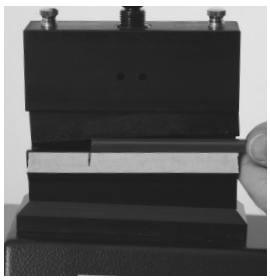
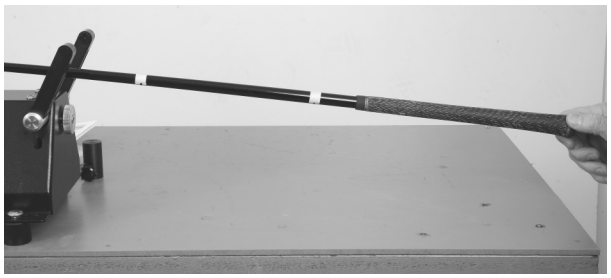


Fig. 19

Fig. 20



NOTE: If any of the readings are out of the normal range or seem odd, take more readings until you see a consistency. Example: 300, 299, 301 is a set of consistent readings. 300, 172, 298 is a set of readings showing an errant reading in the set. In the second example, it is recommended to check to be sure the shaft is securely clamped and the analyzer is securely bolted down to the work-bench. If the unit and the shaft are secure, take another set of readings. Your goal should be three consistent readings.

The Maltby Design Frequency Analyzer is designed with a program to recognize a large variance in two successive readings. When this occurs, "b run" will appear on the LCD screen. When "b run" appears, simply hold down the average button until "Clear" appears on the LCD screen. Hit reset and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings. The analyzer is also designed to alert the user that a bad oscillation has occurred. A bad oscillation will prevent the unit from getting a good frequency reading. When this occurs, "OSC" will appear on the LCD screen. If this occurs, simply hold down the average button until "Clear" appears on the LCD screen. Hit "Reset" and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings.

Measuring Raw Shaft Zone Frequency (Zone A, Zone B)

Zone Frequency measuring is a method of measuring different sections of a raw golf shaft for the purpose of identifying the flex distribution of the shaft or the variations in stiffness throughout the entire length of the shaft. Combining the Zone A and Zone B frequency readings with the normal butt end frequency and tip end frequency readings of a shaft gives you four data points of reference and creates a real flex distribution profile of a shaft.

WOODS

1. From the butt end of the shaft, measure a point 12" down from the butt and make a mark on the shaft (Fig.21). A wax pencil, felt tip pen or tape can be used. The 12" measurement will be referenced as the Zone A measurement.

2. Clamp the shaft into the frequency analyzer with the 12" mark lined up with the front of the clamp (right hand side) (Fig.22).

3.Place the 205 gram weight on the tip end of the shaft. Be sure the tip end of the shaft is completely to the bottom of the bore of the tip weight. Secure the weight on to the tip by tightening the tip weight screw.

4. If not already done, be sure the frequency analyzer is on and the LCD readout has either "000" or "00000" showing.

5. Once the weight is secured to the tip end of the shaft, be sure the shaft is positioned properly between the laser posts. If the shaft is clamped properly, it should be lined up between the two vertical bars on the right hand side of the machine (Fig. 23). Be sure the shaft lines up between the two laser ports located in the vertical posts (see Fig. 24). Note the laser ports and posts are adjustable and can be rotated to line up the shaft if necessary (see Fig 25a, 25b).

6. Pull the shaft tip end with the weight straight down approximately 2" (see Fig. 26). Release the shaft. It should oscillate between the posts. The laser should be visible and the shaft should be passing vertically through the laser beam. The frequency reading of the shaft will appear on the LCD readout after only a few seconds.

7. It is recommended that several readings be taken on each club or shaft measured. For the second and subsequent readings, simply hit the button marked "Reset", then load the shaft (pull down 2") and begin the oscillation again. After several readings are taken, you can hit the "Avg" button and the average reading for all the readings for that particular club will appear.

Note: If any readings are out of the normal range or seem odd, take more readings until you see a consistency. Example: 290,291,289 is a set of consistent readings. 290,171, 291 is a set of readings showing an errant reading in the set. In the second example, it is recommended to check to be sure the shaft is securely clamped and the analyzer is securely bolted down to the workbench. If the unit and shaft are secure, take another set of readings. Your goal should be three consistent readings.

Fig. 21

Fig. 22

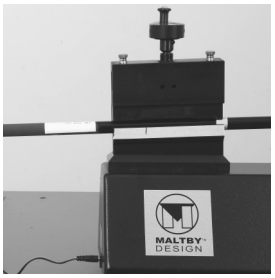


Fig. 23

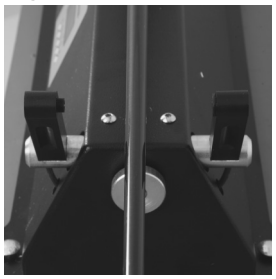


Fig. 24

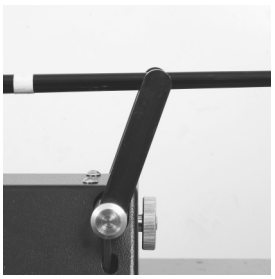


Fig. 25a

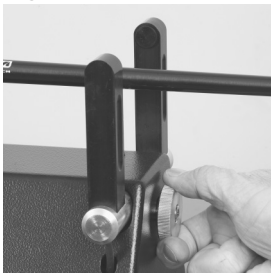
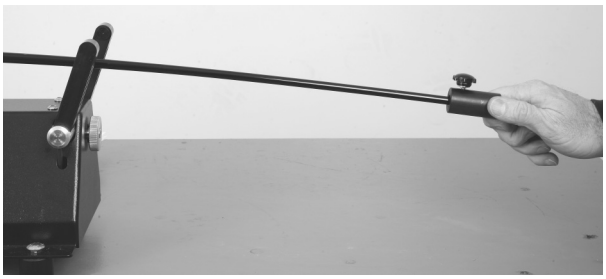


Fig. 25b

Fig. 26



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8. To measure the Zone B reading of a Wood shaft, remove the tip weight and remove the shaft from the frequency analyzer. Measure from the butt of the shaft to a point 20" down from the butt. Place a mark at the 20" point using a wax pencil, felt tip pen or tape (see Fig 27).

9. Clamp the shaft into the frequency analyzer with the 20" mark lined up with the front of the clamp (right hand side) (see Fig.28).

10. Place the 205 gram weight on the tip end of the shaft. Be sure the tip end of the shaft is completely to the bottom of the bore of the tip weight. Secure the weight on to the tip by tightening the tip weight screw.

11. If not already done, be sure the frequency analyzer is on and the LCD readout has either "000" or "00000" showing.

12. Once the weight is secured to the tip end of the shaft, be sure the shaft is positioned properly between the laser posts. If the shaft is clamped properly, it should be lined up between the two vertical bars on the right hand side of the machine (Fig.29). Be sure the shaft lines up between the two laser ports located in the vertical posts (see Fig.30). Note the laser ports and posts are adjustable and can be rotated to line up the shaft if necessary (see Fig. 31a, 31b).

13. Pull the shaft tip end with the weight straight down approximately 2" (Fig 32). Release the shaft. It should oscillate between the posts. The laser should be visible and the shaft should be passing vertically through the laser beam. The frequency reading of the shaft will appear on the LCD readout after only a few seconds.

14. It is recommended that several readings be taken on each club or shaft measured. For the second and subsequent readings, simply hit the button marked "Reset", then load the shaft (pull down 2") and begin the oscillation again. After several readings are taken, you can hit the "Avg" button and the average reading for all the readings for that particular club will appear.

NOTE: If any readings are out of the normal range or seem odd, take more readings until you see a consistency. Example: 330,329,331 is a set of consistent readings. 330,190,331 is a set of readings showing an errant reading in the set. In the second example, it is recommended to check to be sure the shaft is securely clamped and the analyzer is securely bolted down to the workbench. If the unit and shaft are secure, take another set of readings. Your goal should be three consistent readings.

The Maltby Design Frequency Analyzer is designed with a program to recognize a large variance in two successive readings. When this occurs, "b run" will appear on the LCD screen. When "b run" appears, simply hold down the average button until "Clear" appears on the LCD screen. Hit reset and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings. The analyzer is also designed to alert the user that a bad oscillation has occurred. A bad oscillation will prevent the unit from getting a good frequency reading. When this occurs, "OSC" will appear on the LCD screen. If this occurs, simply hold down the average button until "Clear" appears on the LCD screen. Hit "Reset" and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings.

Fig. 27

Fig. 28

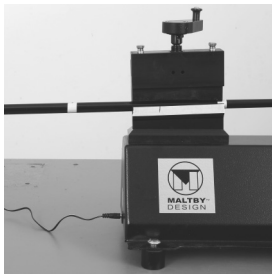


Fig. 29

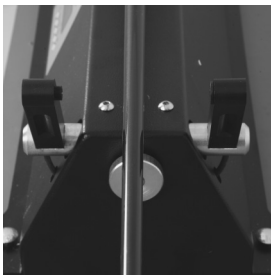


Fig. 30

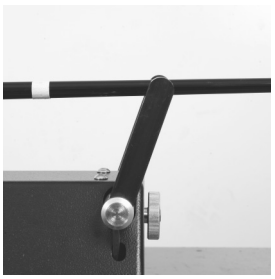


Fig. 31a

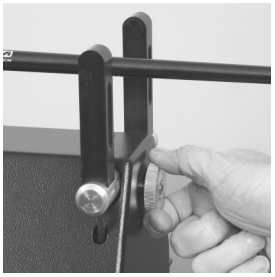
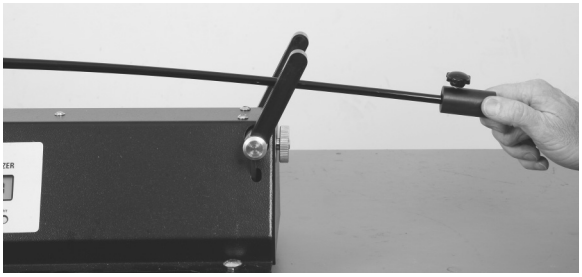


Fig. 31b

Fig. 32



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IRONS

1. From the butt end of the shaft, measure a point 7.5" down from the butt and make a mark on the shaft. A wax pencil, felt tip pen or tape can be used (see Fig. 33). The 7.5" measurement we will refer to as the Zone
A measurement.

2. Clamp the shaft into the frequency analyzer with the 7.5" mark lined up with the front of the clamp (right hand side) (see Fig. 34).

3. Place the 205 gram weight on the tip end of the shaft. Be sure the tip end of the shaft is completely to the bottom of the bore of the tip weight. Secure the weight on to the tip by tightening the tip weight screw.

4. If not already done, be sure the frequency analyzer is on and the LCD readout has either "000" or "00000" showing.

5. Once the above 4 steps are done (steps 1,2,3,4), follow the same procedures as listed under the Wood section, for obtaining the Zone A frequency of an iron.

6. To measure the Zone B reading of an Iron shaft, remove the tip weight and remove the shaft from the frequency analyzer. Measure from the butt of the shaft to a point 15" down from the butt. Place a mark at the 15" point using a wax pencil, felt tip pen or tape (see Fig. 35).

7. Clamp the shaft into the frequency analyzer with the 15" mark lined up with the front of the clamp (right hand side) (see Fig.36).

8. Place the 205 gram weight on the tip end of the shaft. Be sure the tip end of the shaft is completely to the bottom of the bore of the tip weight. Secure the weight on to the tip by tightening the tip weight screw.

9. If not already done, be sure the frequency analyzer is on and the LCD readout has either "000" or "00000" showing.

10. Once the above 4 steps are done (steps 6,7,8,9) Follow the same procedures listed under the wood section for obtaining the Zone B frequency of an iron shaft.

Fig. 33

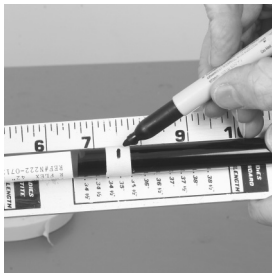

Fig. 34

Fig. 35

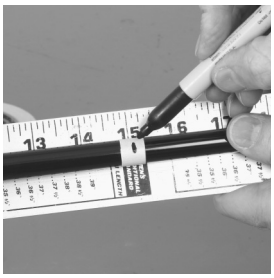

Fig. 36

Reminder:

The Maltby Design Frequency Analyzer is designed with a program to recognize a large variance in two successive readings. When this occurs, "b run" will appear on the LCD screen. When "b run" appears, simply hold down the average button until "Clear" appears on the LCD screen. Hit reset and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings. The analyzer is also designed to alert the user that a bad oscillation has occurred. A bad oscillation will prevent the unit from getting a good frequency reading. When this occurs, "OSC" will appear on the LCD screen. If this occurs, simply hold down the average button until "Clear" appears on the LCD screen. Hit "Reset" and the mode setting will appear (either "00000" or "000"). The unit is once again ready to take readings.