



METAL DETECTOR

TR/Discriminator

MODEL NO.
321.596420

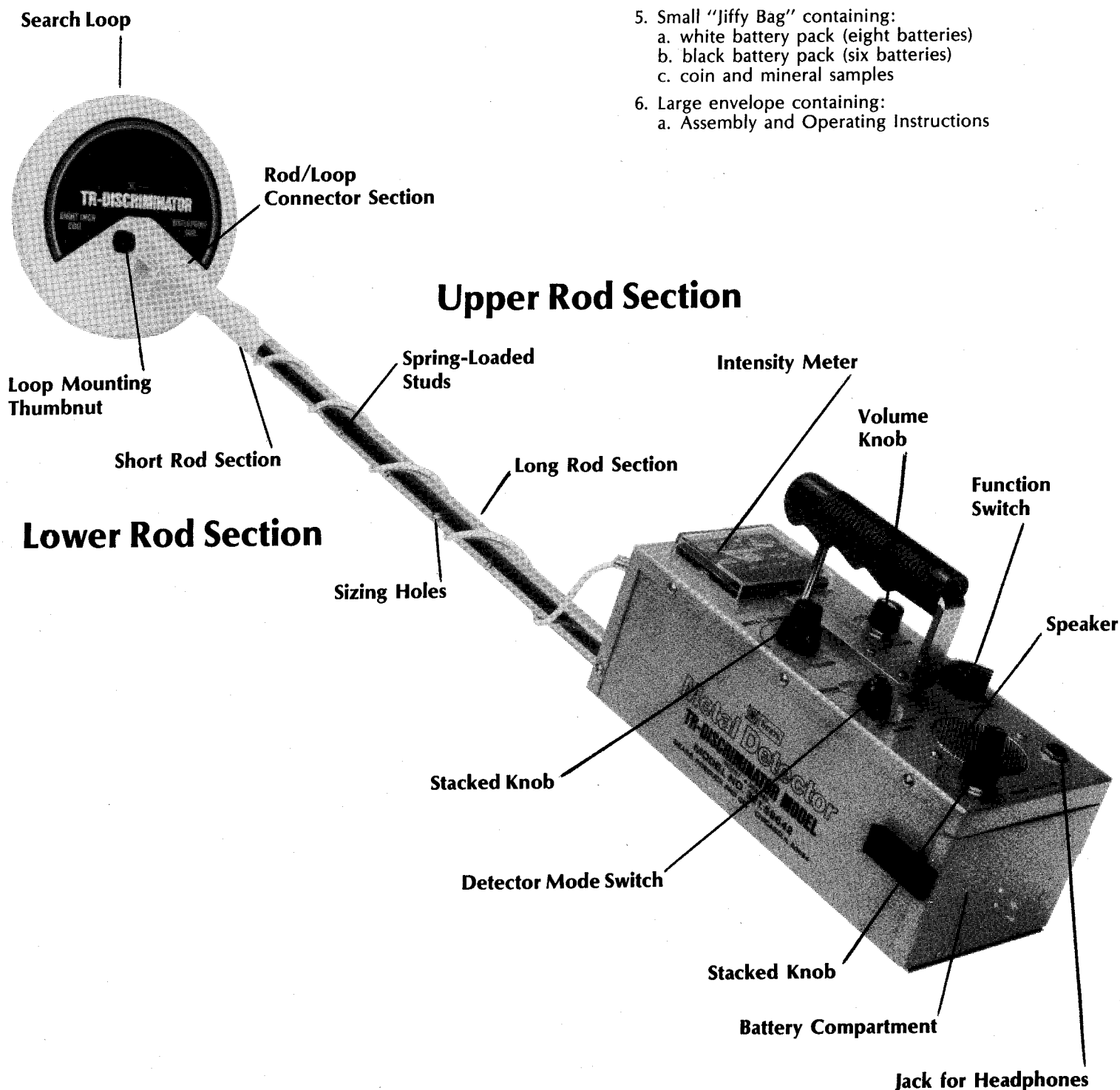
- assembly
- control description
- trouble shooting
- operating procedures
- maintenance

OWNER'S MANUAL



Check The Contents of Your Metal Detector Kit:

1. Two brass-colored metal rod sections
 - a. short section
 - b. long section
2. Plastic rod/loop connector section,
3. Search loop, with protective cover and loop cable attached
4. Instrument
5. Small "Jiffy Bag" containing:
 - a. white battery pack (eight batteries)
 - b. black battery pack (six batteries)
 - c. coin and mineral samples
6. Large envelope containing:
 - a. Assembly and Operating Instructions



Assembly Instructions

1. ASSEMBLE the TWO ROD SECTIONS together as shown in illustration A.

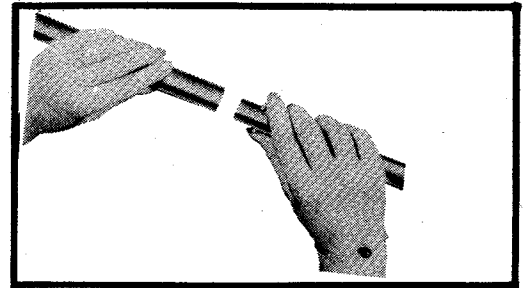


ILLUSTRATION A

2. REMOVE the TWO PLASTIC WASHERS from the LOOP as shown in illustration B.

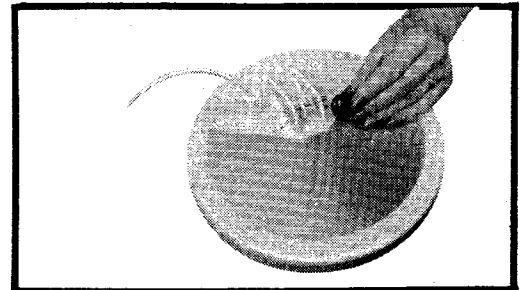


ILLUSTRATION B

CAUTION: DO NOT EVER TIGHTEN THE WATERPROOF CABLE FITTING ON THE LOOP!

3. PLACE the TWO WASHERS in the depressions ON the PLASTIC ROD and CONNECT to the LOOP as shown in illustration C.

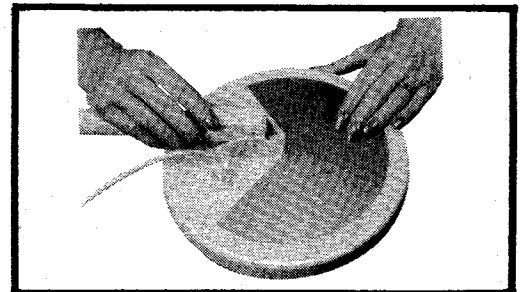


ILLUSTRATION C

4. REINSTALL BOLT and THUMBNUIT.

5. CONNECT the PLASTIC ROD to the SMALL METAL ROD SECTION as shown in illustration D.

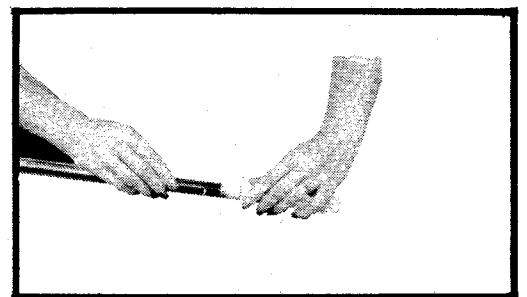


ILLUSTRATION D

ASSEMBLY [CONT.]

6. CONNECT COMPLETE ROD to INSTRUMENT as shown in illustration E.

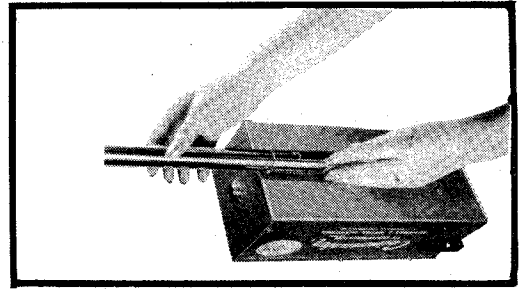


ILLUSTRATION E

7. WRAP the CABLE around the ROD as shown in illustration F.

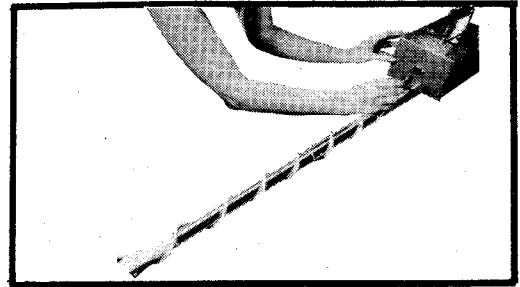


ILLUSTRATION F

8. CONNECT the LOOP CABLE to the top of the INSTRUMENT as shown in illustration G. (small slot up)

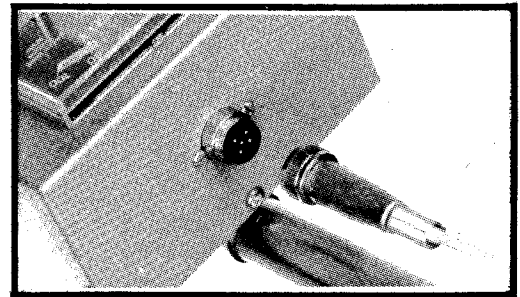


ILLUSTRATION G

9. CONNECT BATTERY CONNECTORS to the BATTERY PACK TERMINALS and INSTALL as shown in illustration H. Be sure to connect BLACK to BLACK and WHITE to WHITE.

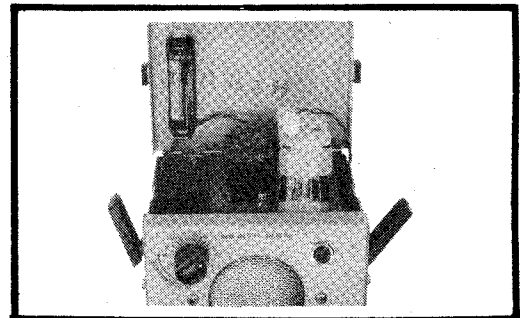


ILLUSTRATION H

Operating Instructions

Familiarizing Yourself With Your Detector

Function Switch: This switch has four positions. "Off/1-Cell" is the position to use when you want to turn the detector off, or when you want to check the condition of one of your batteries. "Bat. Ck. 9" is the position to use when you want to check the condition of your small black battery pack. "Bat. Ck. 12" is the position to use when you want to check the condition of your large, white battery pack. And "Operate" is the normal operating position of the switch.

Intensity Meter: This meter has two purposes. The signal from the loop goes to both the speaker *and* to the meter. You can listen for telltale sounds of a buried object *and* you can watch for them on the meter. Secondly, this meter is also used to test your two battery packs or individual batteries.

Metal/Mineral Knob: These two stacked knobs are used to tune the detector for either metal or mineral searching. One full turn of the bottom knob produces 10 full turns of the small top knob. The large bottom knob is for coarse tuning the small knob for fine tuning.

Volume Knob: This control is used to increase the volume of sound coming from the speaker. The arrow marked "Increase" shows the correct direction to turn the knob to make the sound louder.

Detector Mode Switch: This switch has three positions used for selecting the operational mode of the detector. "Norm" is the position for standard detector activity. "Auto" is the position for detecting with automatic tuning compensation for changing ground content. And "Disc." is the position for Discriminate operation.

Discriminate Knob: This control will allow you to select different amounts of discrimination when the Detector Mode Switch is set in the "Disc." position. The two stacked knobs are the same type as used for the Metal/Mineral control, large for coarse and the small knob for fine adjustments.

Speaker: The round, brass-colored grill near the back of the instrument case covers the speaker.

Jack: This is the hole into which you can insert the plug on headphones or an earplug.

How To Tune Your Detector

Your new detector will help you locate buried metal or mineral objects, and the discriminator circuit available on some models will help you decide on whether or not to dig them up.

Tuning your instrument properly is extremely important, as you would expect, considering how versatile it is. Read the following instructions carefully and practice the various tuning procedures until you can do them without looking at this manual.

One more thing: Always tune your instrument out-of-doors. That way you won't get unwanted interference from metal objects used in the construction of your home.

Normal Tuning

This tuning is used to detect buried ferrous or non-ferrous objects. Ferrous objects are those that contain *mostly* iron. We call them MINERALS. Sometimes these objects are metallic (nails, horseshoes, etc.) and sometimes they are not (black sand for prospecting).

Non-ferrous objects are those that contain *little* or *no* iron. We call them METALS. Gold, silver, and copper coins, brass, lead and platinum are all METALS.

Follow these steps for METAL TUNING:

1. Set the Detector Mode Switch to "Norm." Then, while standing, let the loop rest *flat* on the ground. Do not force it, however; simply let the weight of the instrument hold the loop against the ground.
2. Now, turn the Large Discriminate knob all the way to the left (counter-clockwise) until it stops.
3. Next, turn the Metal/Mineral knob all the way to the left (counter-clockwise) until it stops.
4. Now raise the loop *just slightly* (about ½-inch) off the ground. Turn the Function Switch to the "Operate" position and adjust the Volume knob to the right (clockwise) until you hear a comfortable level of sound coming from the speaker.
5. Holding the detector as steady as possible, turn the Large Metal/Mineral knob to the right (clockwise) until the tone disappears. Now turn the small knob back to the left (counter-clockwise) until a *faint* tone appears. (*Illustration 1*)

6. Lower the loop *flat* on the ground again, and you are now ready to begin searching in the METAL setting. At this point, the tone coming from your speaker should decrease in volume or disappear completely.

(**Note:** If you are searching in an area of rough terrain—a plowed field for example—it may not be possible to search with the loop *flat* on the ground. In such cases, you should search with the loop *just barely* off the ground, after tuning your instrument with the loop *slightly above* the level at which you intend to search. It is important to note here that if the loop is raised above the height at which the detector was tuned, a loud tone may be emitted from the speaker. Yet, if the instrument is tuned with the loop higher than *necessary*, this may result in unneeded loss of detection depth. In both instances, these reactions will interfere with your ability to locate buried objects.)



Illustration I

Follow these steps for MINERAL Tuning:

1. Set the *Detector Mode Switch* to "Norm." Then, while standing, let the loop rest *flat* on the ground. Do not force it, however; simply let the weight of the instrument hold the loop against the ground.
2. Now, turn the *Large Discriminate* knob all the way to the left (counter-clockwise) until it stops.
3. Next, turn the *Large Metal/Mineral* knob all the way to the right (clockwise) until it stops.
4. With the loop still *flat* on the ground, turn the *Function Switch* to the "Operate" position and adjust the *Volume* knob to the right (clockwise) until you hear a comfortable level of sound coming from the speaker.
5. Now turn the *Large Metal/Mineral* knob to the left (counter-clockwise) until the tone disappears. Turn the small knob back to the right (clockwise) until a *faint* tone reappears.
6. Raise the loop *just barely* (about 1/2-inch) off the ground, and you are ready to begin searching in the MINERAL setting. At this point, the tone coming from your speaker should decrease in volume or disappear completely.

(**Note:** If you are searching in an area of rough terrain—a plowed field for example—it may not be possible to tune your detector with the loop *flat* on the ground. In such cases, you should tune the instrument with the loop *just barely* off the ground, and then search with the loop *slightly above* that level. It is important to note here that if the loop is lowered below the height at which the detector was tuned, a loud tone may be emitted from the speaker. Yet, if the instrument is tuned with the loop higher than *necessary*, this may result in unneeded loss of detection depth. In both instances, these reactions will interfere with your ability to locate buried objects.)

Automatic Tuning

This detector mode provides automatic tuning compensation for changing content of the ground while searching in METAL or MINERAL settings. This feature allows an operator to search an area with greater speed than possible in the Normal mode.

To avoid a loss of sensitivity, however, you should *keep the loop in motion*, utilizing a faster sweeping action than necessary in the Normal mode. Otherwise, the detector may automatically "fine tune" itself on a buried object.

Follow these steps for Automatic Tuning:

1. Follow Steps 1 through 5 for **Normal Tuning**. At this point a *faint* tone should be coming from the speaker.
2. Now set the *Detector Mode Switch* to the "Auto" position and readjust the *Metal/Mineral* knob for a *faint* tone again.
3. You are now ready to begin searching in the "Auto" mode.

(**Note:** In this mode, you should search with the loop at the same height it was when the instrument was tuned. In addition, a *faint* tone should be coming from the speaker.)

Using Your Detector in the Discriminate Mode

Once you have located a buried object using either the Normal or Automatic modes, you can use your Discriminate mode to help decide whether or not to dig it up. The Discriminate function built into this detector will identify small *junk* items (bottle caps, tin foil, gum wrappers, nails and the like). It will also identify ferrous objects regardless of size. Remember, a ferrous object is one made *mostly* of iron (belt buckles, cannonballs, chunks of scrap iron, tin cans and the like).

You should note, also, that you can actually search an area in the Discriminate mode, and we shall discuss those techniques shortly.

If you are searching for coins, rings or jewelry on a beach or in a park, then you would probably want to use the Discriminate mode to help you eliminate both the small *junk* items and ferrous objects. On the other hand, if you're searching on an old Civil War battlefield for relics (swords, cannonballs, rifles and the like), or if you are prospecting, then you would not want to use the Discriminate mode as it eliminates these ferrous objects, as well as the *junk* items.

To simplify matters in this section, we will consider both the small *junk* items and ferrous objects as BAD.

You can determine if a buried object is GOOD or BAD by following these steps:

1. Locate an object with your detector tuned in the METAL setting. You should note here that the Discriminate operation will not work in the MINERAL setting.
2. Set the *Detector Mode Switch* to the "Disc." position, and hold the loop *just slightly* (about ½-inch) off the ground *along side* the spot where you located the object. At this point, a loud tone should be coming from the speaker.
3. Now turn the *Large Discriminate* knob to the right (clockwise) until you just hear a *faint* tone again. Lower the loop *flat* on the ground; the tone should decrease or disappear completely.
4. Sweep the area where you detected the object. If you hear a *sharp bleep* or an increase in the volume of the tone, then the object is GOOD. If you do not hear this change in tone, then the object is BAD and probably a bottle cap or small nail.

(Note: The object could be BAD even if you did hear a *sharp bleep* or an increase in the volume of the tone. You can determine this by increasing the amount of discrimination as described below.)

Adjusting Discrimination

With your instrument tuned as explained above, it will discriminate against such items as bottle caps and small nails. You can, however, increase the amount of discrimination by advancing the *Small Discriminate* knob very *slightly* to the right (clockwise), and readjusting the *Metal/Mineral* knob to the left (counter-clockwise) until you hear a *faint tone* when the loop is *just slightly* off the ground.

For example, by setting the *Small Discriminate* knob *just slightly* further to the right (clockwise), you can discriminate against pull tabs and foil. You should note, however, that at this point you will also discriminate against such objects as nickels and rings. By turning the *Small Discriminate* knob even further to the right (clockwise), you can rule out larger items like aluminum screw caps, tin cans and large chunks of iron. But at the same time, you will eliminate most single coins.

Generally, you can determine through practice just how far the *Small Discriminate* knob needs to be turned in order to eliminate various types of BAD objects. You should, therefore, avoid turning it further than absolutely necessary, as this will result in discriminating against other objects for which you may be searching.

After you have identified the type of object you have located, decided whether or not to dig, and are finally ready to resume searching, you should retune your instrument in either the Normal or Automatic mode.



Illustration J

Searching With Your Detector

To locate hidden or buried objects with a properly tuned detector, systematically sweep the loop from side to side across the area you are working. (*Illustration J, page 7*) The larger the diameter of your loop, the more area you can cover in a single sweep and the faster you can search an area. For example, with an eight-inch loop you should take four-inch steps, moving the loop ahead the same amount after each sweep. For maximum performance when searching, you should always try to keep the loop at a constant level and as close to the ground as possible, *following the tuning instructions described earlier in this manual.*

Once you have located an object, you can stop the sweeping movement and use your loop to pinpoint its exact location. When operating your detector in the Automatic mode, however, you must remember that the instrument will automatically adjust its tuning to compensate for changing ground content. Thus, if you stop sweeping the loop over an object, the “Auto” feature will actually *tune out* the object itself. In addition, the faster you sweep the loop, and the smoother and more even your motion, the greater depth of detection your instrument will have in this mode.

Another factor affecting the performance (depth of detection) of your detector *in all operating modes* is the amount of mineralization present in a search area. Generally, the Normal mode works best in areas of light mineralization, while the “Auto” feature tends to work better in areas of higher mineralization. This is because the automatic tuning feature of the “Auto” mode quickly compensates for changing ground content. Regardless of the detector mode in which you search an area, you should always remember that the higher the mineralization present, the less depth of detection your instrument will have.

To determine the amount of mineralization in a search area, follow these steps:

1. Tune your detector in the Normal mode for the METAL setting, *keeping the loop flat on the ground* throughout the entire process. At this point, a *faint* tone should be coming from the speaker.
 2. Now quickly raise the loop and listen to the tone:
 - a) If the tone *does not change*, then there is no mineralization present.
 - b) If the tone becomes *very loud*, then high mineralization is present.
 - c) If the tone *increases only slightly*, then low mineralization is present.
- (**Note:** After checking for mineralization, you may find it necessary to retune your instrument prior to searching an area.)

As previously mentioned, you can also search an area with your detector in the Discriminate mode. Like the Normal operating mode, the Discriminate function tends to work best in areas of light mineralization and in areas where the ground is relatively smooth and even, thereby allowing you to search the loop *flat* on the ground or *just barely* (about ½-inch) above it.

Should you decide to search an area with your detector in the Discriminate mode, use the same searching procedures as described above. *But first, tune your instrument as follows:*

1. Follows Steps 1 through 5 for tuning in the METAL setting of the Normal mode. Remember, the Discriminate function will not work in the MINERAL setting.
2. Holding the loop as steady as possible, set the *Detector Mode Switch* to the “Disc.” position. A loud tone should now be coming from the speaker.
3. Finally, turn the *Large Discriminate* knob slightly to the right (clockwise) until you hear a *faint* tone again, and then lower the loop *flat* on the ground. At this point, the tone should decrease or disappear completely.
4. You are now ready to begin searching with your detector in the Discriminate mode. It should automatically eliminate BAD objects as previously described.

(**Note:** You should remember that if you are searching in an area of rough terrain—a plowed field for example—it may not be possible to search with your loop *flat* on the ground. In such cases, you should search with the loop *just barely* off the ground, after tuning your instrument *slightly* above the level at which you intend to search. Remember, also, that if the loop is raised above the height at which the detector was tuned, a loud tone may be emitted from the speaker. Yet, an unneeded loss of detection depth may occur if the instrument is tuned with the loop higher than necessary.)

All in all, the depth to which your instrument will detect may depend on a number of factors: 1) The degree of mineralization in the ground. The less mineralization, the deeper it will detect. 2) The height of the loop during tuning and searching. The lower the loop, the deeper it will detect. And, 3) How carefully your detector is tuned. The more accurate the tuning, the deeper it will detect.

Finally, it is a good policy to periodically stop and readjust the tuning of your instrument slightly. As you become more experienced, however, you will begin to notice—just by differences in the tone you hear—whether or not the tuning needs to be adjusted.

Listen for the Tone

The tone coming from the speaker of your detector will tell you where objects are located. When you hear a sharp *bleep* or an increase in the volume of the tone, the loop is over an object. When the volume decreases or goes away completely, the loop has passed away from an object. Generally, the volume will be loudest when the center of the loop is directly over an object. An exception to this rule, however, is a coin buried *on edge*. In this case, the volume will be loudest when the *edge of the loop* passes over the coin, thus causing a *double sound* when detected.

Finally, large or small increases in volume of the tone are usually caused by one of three things: 1) the size of the object; 2) how deeply the object is buried; or 3) a combination of the two. Normally the larger the object, the greater the increase in volume. Thus, a single coin—deeply buried—may cause only a slight increase in volume, while a large object—buried just as deeply—may cause a much larger increase.

Watch the Meter

The indicator needle on the *Intensity Meter* is extremely sensitive to change. It will give a visual reading at the same time the speaker gives a sound reading. Increases in sound will be matched by increases in the meter reading.

This is most helpful when locating small objects, as many people have difficulty in distinguishing slight differences in the volume of the tone. If the needle is bouncing back and forth as you pass the loop over a suspected area, then most probably an object is there. If the needle doesn't budge, then your ears may be have played a trick on you.

So, keep an eye on that meter; it could be very important. (*Illustration K*)

Proper Care Of Your Detector

The following are precautions you should take to protect your instrument from harm, insure its long life, and avoid nullifying the warranty.

Cleaning: The loop and rod or probe are waterproof. They can be cleaned with fresh water and a mild cleanser. After cleaning, however, dry the instrument thoroughly. *Caution!* The instrument case is not waterproof, and water—if allowed to enter it—may damage electronic components.

Weather Conditions: Protect your detector from excessively cold weather. Freezing can damage the electronic components, the case and/or the batteries. Excessive heat can also damage the instrument. Never leave it in the sun. It's best to lay it in the shade when temporarily not in use. If it's left in a car on a hot day, cover it with a blanket or something similar to protect it from the direct rays of the sun, and then leave the windows slightly open to permit ventilation. Needless to say, protect your detector if you operate it in the rain, as water may get into the instrument case.

Salt Water: Salt water is very corrosive! Immediately after your detector has been exposed to salt water, rinse it thoroughly with fresh water, being careful not to allow water to enter the instrument case. Then wipe it with a cloth dampened with fresh water and dry it thoroughly.

Storage: If you plan to store your detector for any length of time, unsnap the battery pack, remove it from the instrument and take the batteries out of the holder. Whenever your detector is not in use, turn the *Power knob* all the way to the "Off" position.

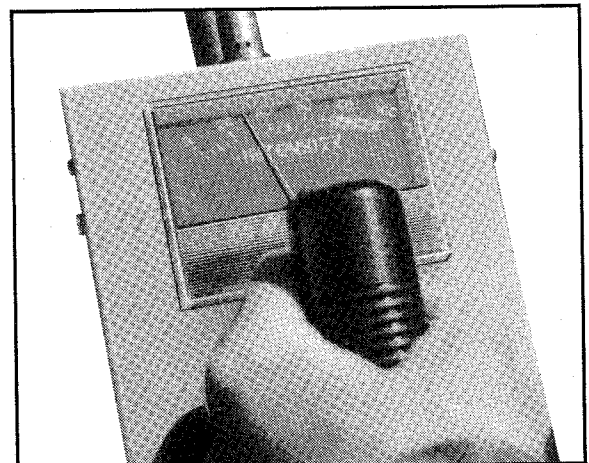


Illustration K

Batteries

Batteries are the lifeblood of your instrument. Your white battery pack holds eight 1½-volt AA penlight batteries. Your black battery pack holds six 1½-volt AA penlight batteries. (*Illustration L*) These are available at drug and grocery stores almost everywhere. Any brand will work well, although many "shooters" recommend the alkaline type for longer life.

To change batteries, first remove the battery pack from the instrument. Before you remove any batteries examine the pack. Note the exact position of each battery and the position of the battery lead snaps. Your detector will not work unless the batteries are properly installed and the battery lead is properly connected.

Each battery has a positive (+) and a negative (–) end. The plus (+) and minus (–) symbols are clearly marked on all batteries. Remove one of the batteries from the battery pack. Notice that the slot from which it was removed also has the positive (+) and negative (–) symbols clearly marked.

To replace the batteries, simply match the plus (+) and minus (–) symbols on the new battery with the plus (+) and minus (–) symbols on the battery snap, and then snap the new battery into place.

The battery lead snaps must also be matched to the button snaps on the pack—plus (+) to plus, minus (–) to minus—before you reconnect the power cable.

Your detector is designed so that you can test (1) the full white battery pack, (2) the full black battery pack, or (3) each battery, one at a time.

1. To test the full white battery pack:

- a. Set the *Power* switch to the "Bat. Ck. 12" position.
- b. Turn the *Volume* knob all the way to the right, in the direction of the arrow, so that the volume of sound coming from the speaker is as loud as it can be. Adjust the *Metal/Mineral* knob if necessary.
- c. Observe the *Intensity Meter*. Notice the area on the dial which has the words "Bat. Check" printed on it. If the indicator needle moves into that area and stays there for three or four seconds, your pack is in good condition. If it does not move into the "Bat. Check" area, or it moves there for only a second and then drops back down, your pack is weak.
- d. If your pack is weak you will have one or more weak batteries. See the instructions below for testing a single battery.

2. To test the full black battery pack:

- a. Set the *Power* switch to the "Bat. Ck. 9" position.
- b. Follow the steps listed above for testing the white pack.

3. To test a single battery:

- a. Open the battery access door at the rear of your instrument case by unsnapping the side latches.
- b. Remove the white battery pack (if it is the pack that tested as being weak), or the black battery pack (if it is the weak pack).
- c. Now, remove a single battery from the weak pack.
- d. Notice that the battery access door has a receptacle designed to hold one battery. Match the positive (+) end of the battery with the positive (+) end of the receptacle and press the battery into place. (*Illustration M*)
- e. Observe the indicator needle on the *Intensity Meter*. If it moves into the Bat. Check area and stays there three or four seconds, the battery is good. If the needle fails to move into the area or drops out of it after a second, the battery is weak and should be discarded.
- f. Repeat this entire procedure to test each individual battery in the weak pack. When you have located all the weak batteries and discarded them, snap new ones in their place and replace the battery pack in its proper position in the battery pack compartment.

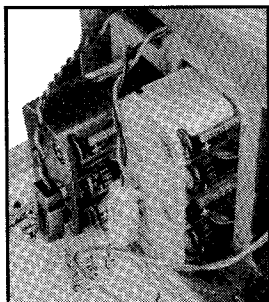


Illustration L

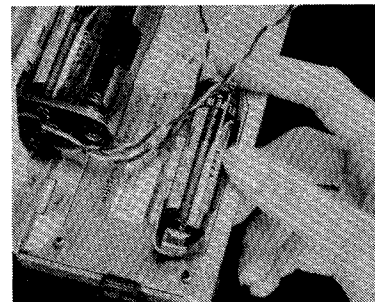
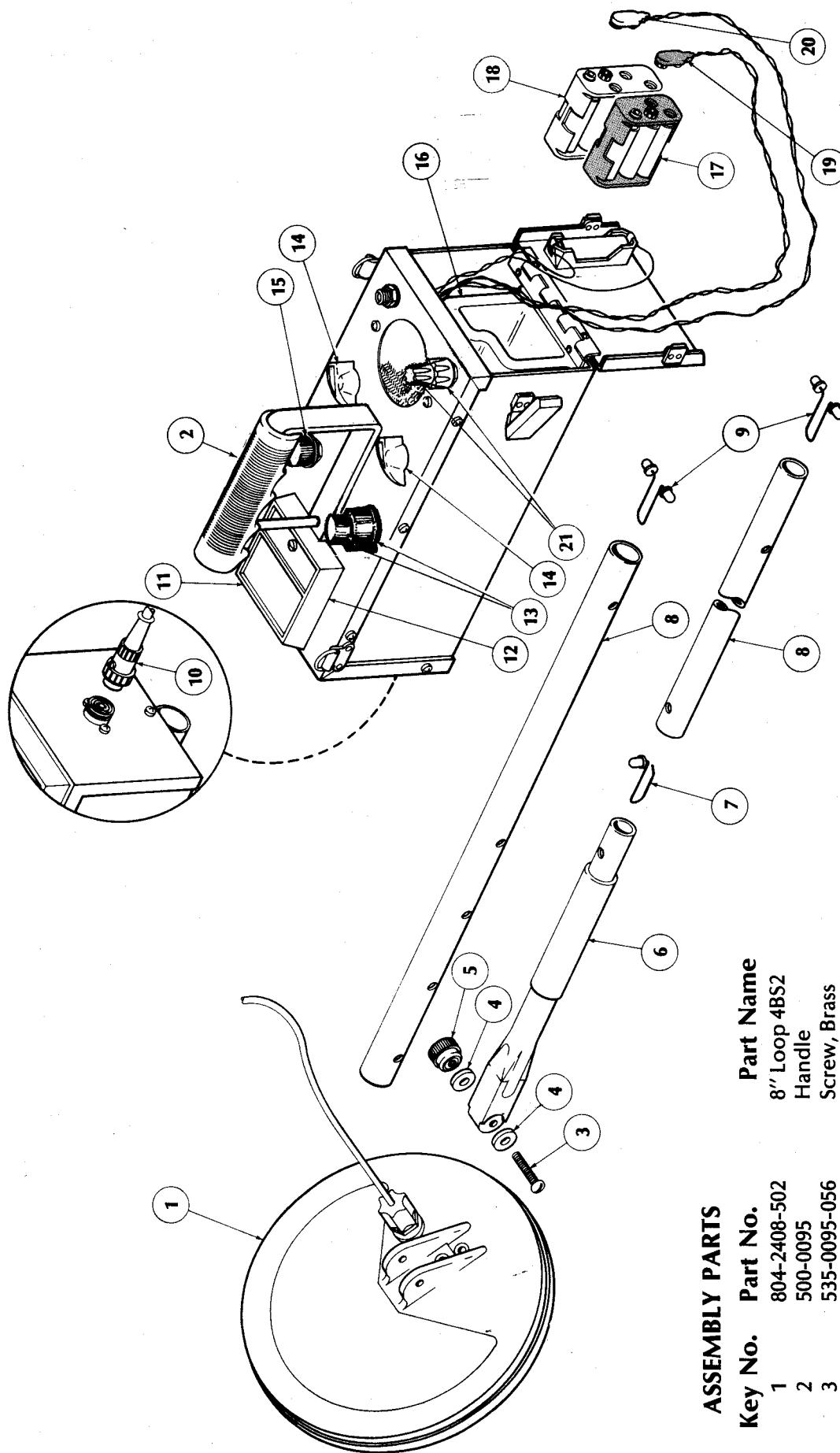


Illustration M

Prolonged use of your detector will cause a severe drain on your batteries. It's best to turn the power off from time to time during the day of "shooting". This gives you a chance to take a break and it gives your batteries a rest. In a few minutes both you and your batteries will be ready to go again.

If you plan to store your detector for several weeks or more, it would be wise to keep the batteries in the refrigerator. Doing so will prolong their lives. Also, it's a good idea to carry an extra battery pack and some spare batteries with you on outings.

Illustrated Parts Listing



ASSEMBLY PARTS

Key No.	Part No.	Part Name
1	804-2408-502	8" Loop 4BS2
2	500-0095	Handle
3	535-0095-056	Screw, Brass
4	501-0010	Washer T.P.R.
5	402-0004	Thumbnut No. 516
6	501-2007	Clevis Isolator
7	500-2113	Spring, Latch 1B
8	801-7002	Rod, Extension
9	500-2111	Spring, Latch 2B
10	520-0165	Plug, Screwlock S2
11	400-0025	Meter, CM4
12	400-0020	Cover, Meter
13A	402-0009	Knob, Small
13B	402-0010	Knob, Large
14	402-0007	Knob, Black Ponter
15	402-0020	Knob

16	501-0009	Compartment, Holder, Battery
17	523-0005	Holder, Battery 9V Black
18	523-0006	Holder, Battery 12V White
19	520-0017	Connector, Battery 9V Black
20	520-0018	Connector, Battery 12V White
21A	402-0017	Knob, Small
21B	402-0018	Knob, Large



SPORTS CENTER

**MODEL NO.
321.596420**

- assembly
- control description
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- maintenance

OWNER'S MANUAL

METAL DETECTOR

TR/Discriminator

When requesting service or replacement parts for your *Sears Metal Detector*, always refer to the serial number plate for the instrument *Model Number*.

All parts listed herein with a part number may be ordered through SEARS, ROEBUCK and CO.

When ordering parts by mail, selling prices will be furnished on request, or parts will be shipped at prevailing prices and you will be billed accordingly.

When ordering parts, always include the following information:

- | | |
|-----------------|--------------|
| 1. Model Number | 3. Part Name |
| 2. Part Number | 4. Quantity |

FULL ONE YEAR WARRANTY

If, within one year from the date of purchase, this metal detector fails due to a defect in materials or workmanship, simply return it to the nearest Sears store throughout the United States and Sears will repair it free of charge.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

SEARS, ROEBUCK and CO.
Sears Tower, BSC 41-3
Chicago, IL 60684