Sears
SPORTS CENTER

METAL DETECTOR

TR/Discriminator

MODEL NO.
321.596430

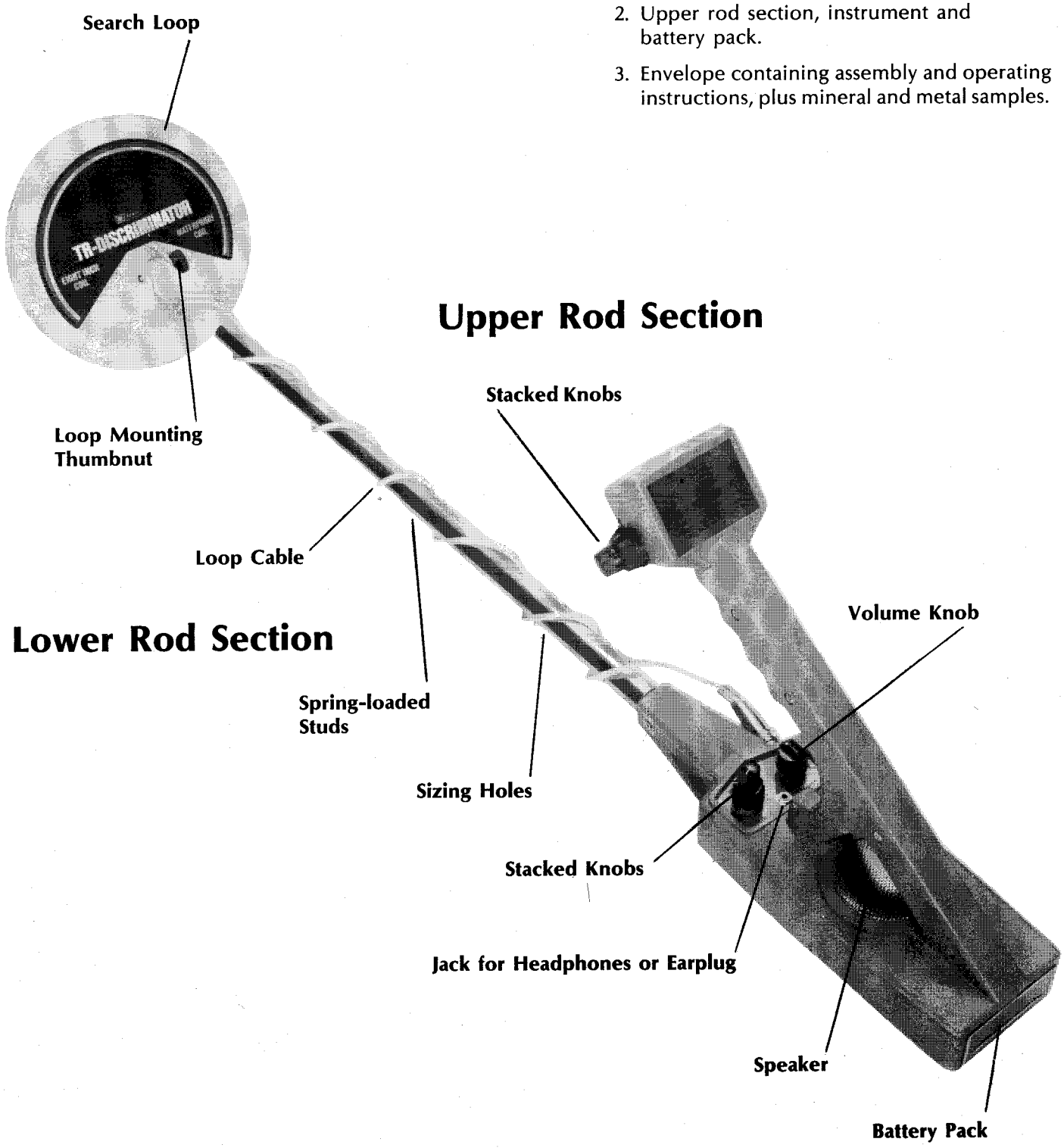
- assembly
- control description
- trouble shooting
- operating procedures
- maintenance

OWNER'S MANUAL

Discriminator
Patent No. 4024468

Check the Contents of Your Metal Detector Kit

1. Lower rod section, search loop, protective cover and loop cable attached.
2. Upper rod section, instrument and battery pack.
3. Envelope containing assembly and operating instructions, plus mineral and metal samples.



Assembly Instructions

1 Disconnect the loop cable from the upper rod section. Notice that it slides out easily, without twisting. *(Illustration A)*

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2 Grasp the lower rod section in your left hand and the upper rod section in your right hand. Align the two rod ends and insert the lower section into the upper section until it stops, about one-half inch. *(Illustration B)*

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3 With your left hand, depress the two spring-loaded studs at the end of the lower rod section and push the lower section gently into the upper section until the *first* pair of matching holes in both sections is lined up. The spring will then automatically force the studs through the holes, locking the two sections together.

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4 Now wrap the loop cable around and up the rod toward the instrument — do not wrap it too tightly — and plug the cable end into the instrument. It fits only one way and slips in easily, so there's no need to force it. *(Illustration C)*

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5 Finally, check the tightness of the loop mounting thumbnut. *(Illustration D)* It should be *finger tight.* If it's too tight, the loop will not adjust to different angles. If it's too loose, the loop may not stay in position.

NOTE: The length of the rod may be shortened for more comfortable use or for use in confined areas. To shorten the rod, depress the two spring-loaded studs and push the lower section further into the upper section until the *second* or *third* pair of matching holes are lined up. Again, the spring will automatically lock the two sections together. You will probably need to take up the slack in the loop cable after you've shortened the rod. To do so simply disconnect the cable, make additional wraps around the rod, and reconnect it.

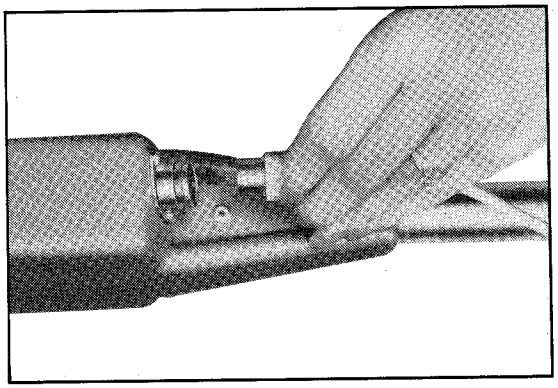


Illustration A

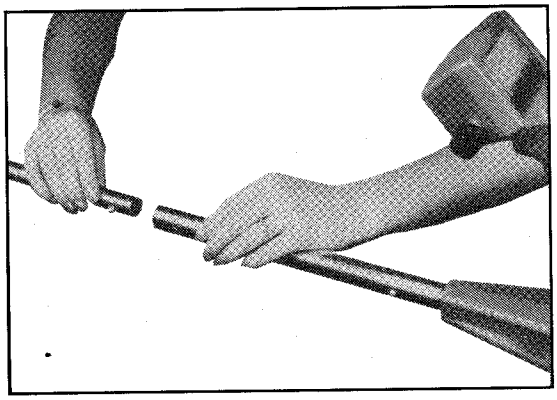


Illustration B

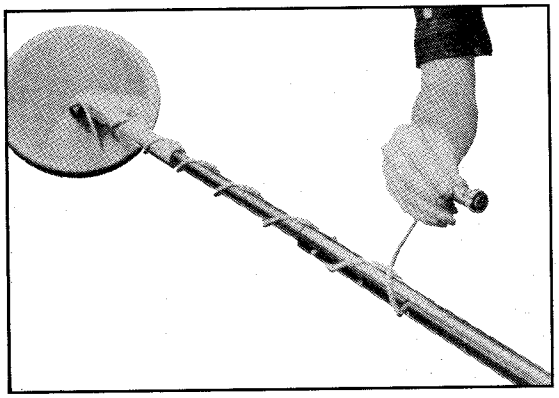


Illustration C

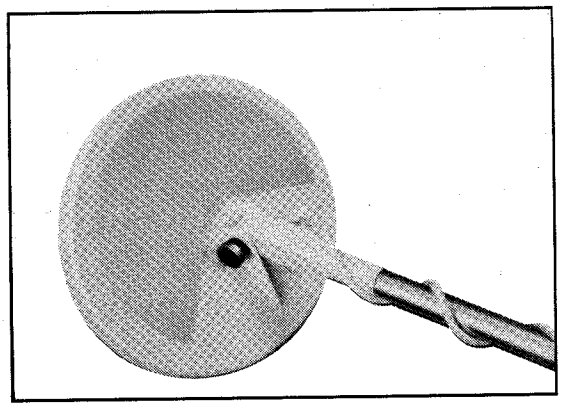


Illustration D

Operating Instructions

Familiarizing Yourself with Your Detector

Grasp the handle of your detector, letting the loop rest on the floor or ground. Notice that the instrument panel has two main knobs. *(Illustration E)* The one on the left is marked *Tuner* and has arrow markings for MINERAL and METAL.

The knob on the right is marked *Power* with a position for "Off" and an arrow marked for *Volume*. Between these two knobs is a small jack (hole) into which you can insert the plug on headphones or an earplug.

The *Power* knob has two functions: it turns the instrument off and on, and it adjusts the volume of sound coming from the speaker or headphones. The *Tuner* knob adjusts to help detect either MINERAL or METAL objects.

At the end of the instrument handle is another knob. *(Illustration F)* This is the *Discriminate* knob, and it helps eliminate unwanted junk items like bottle caps and tin foil.

At the back of the instrument case is a plate which you can press in and slide down. *(Illustration G)* Behind it is the battery pack and the battery pack compartment. On the back side of this plate are the model and serial numbers of your detector.

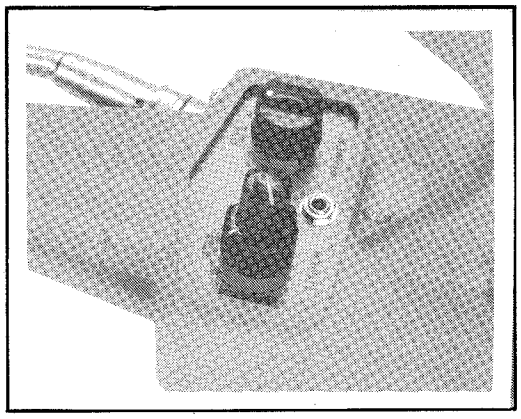


Illustration E

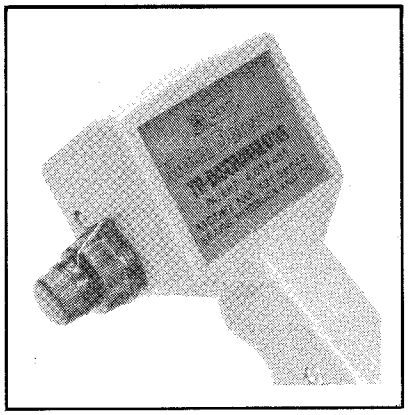


Illustration F

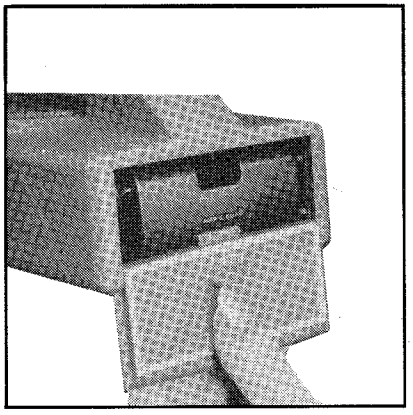


Illustration G

How To Tune Your Detector

Your new detector will help you locate buried metal or mineral objects, and the discriminator circuit 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), 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 all are METALS.

Follow these steps for METAL Tuning:

1. 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. Turn the *Large Tuner* knob all the way to the right (clockwise) until it stops. Note that both these controls have both *coarse* and *fine* adjustments.
3. Next, raise the loop *just slightly* (about ½-inch) off the ground. Turn the *Power* knob all the way to the right (clockwise) *(Illustration)* The "click" you hear tells you the instrument is on and the circuit is energized. At this point, you may also hear a *very faint tone* coming from the speaker; this is simply a *residual sound* and can be ignored.
4. Turn the *Large Tuner* knob back to the left (counter-clockwise) until you hear a loud tone. Now turn the *small* knob back to the right (clockwise) until the tone *almost* goes away completely. At this point, there should be a *faint tone* coming from your speaker. Take care, however, not to confuse it with the *residual sound* mentioned above.
5. Lower the loop *flat* on the ground again. The tone should decrease in volume or disappear completely. You are now ready to begin searching in the METAL setting.

(**Note:** 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 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 intances, these reactions will interfere with your ability to locate buried objects.)

Follow these steps for MINERAL Tuning:

1. 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. Turn the *Large Tuner* knob all the way to the left (counter-clockwise) until it stops.
3. Next, with the loop still *flat* on the ground, turn the *Power* knob all the way to the right (clockwise). The "click" you hear tells you the instrument is on and the circuit is energized. At this point, you may also hear a *very faint tone* coming from the speaker; this is simply a *residual sound* and can be ignored.
4. Turn the *Large Tuner* knob back to the right (clockwise) until you hear a loud tone. Now turn the *small* knob back to the left (counter-clockwise) until the tone *almost* goes away completely. At this point, there should be a *faint tone* coming from your speaker. Take care, however, not to confuse it with the *residual sound* mentioned above.
5. Raise the loop *just barely* (about ½-inch) off the ground. The tone should decrease in volume or disappear completely. You are now ready to begin searching in the MINERAL setting.

(**Note:** If you are searching an area of rough terrain (a plowed field for example), it may not be possible to tune your instrument with the loop *flat* on the ground. In such cases, you should tune the instrument 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.)

Discriminate Operation

The Discriminate function will help eliminate small *junk* items (bottle caps, tin foil, gum wrappers, nails and the like). It will also eliminate 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.)

If you are searching for coins, rings or jewelry on a beach or in a park then you will probably want to use the Discriminate function to help you eliminate both the small *junk* items and the ferrous objects.

On the other hand, if you're searching on an old Civil War battlefield for relics (swords, cannonballs, rifles and the like), then you would not want to use the Discriminate function, as that 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.

Follow these steps to tune your detector for searching in the Discriminate function:

1. Follow Steps 1 through 4 for tuning in the METAL setting. You should note here that the Discriminate function will not work in the MINERAL setting.

2. Now, holding the loop as steady as possible, turn the *Small Tuner* knob one full turn to the left (counter-clockwise). The tone coming from the speaker should increase in volume.

3. Next, begin turning the *Small Discriminate* knob to the right (clockwise) until the *faint tone* is regained.

4. Lower the loop *flat* on the ground and your detector is now ready for searching in the Discriminate function. At this point, the tone 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 instrument 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 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.)

With your instrument tuned in this manner, it should automatically discriminate against such items as bottle caps and small nails. You can, however, increase the amount of discrimination by advancing the *Small Discriminate* control *just slightly* further to the right (clockwise), and readjusting the *Small Tuner* knob to the left (counter-clockwise) until you hear a *faint tone* when the loop is *just slightly* off the ground.

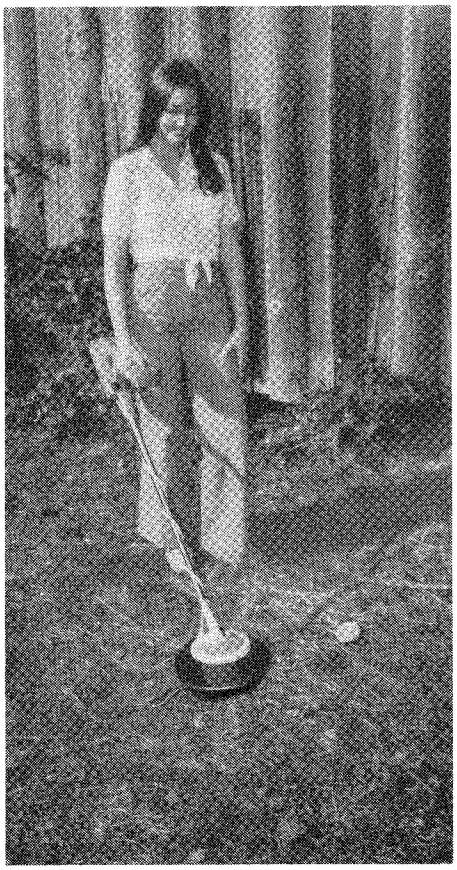
For example, by setting the *Discriminate* knob *just slightly* further to the right (clockwise), you can discriminate against pull tabs and foil. You should note, however, that at this point you will also discriminate against such objects as nickels and rings. By turning the *Discriminate* knob even 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 *Discriminate* knob needs to be turned in order to eliminate various types of MINERAL 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.

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.

Practice Makes Perfect



Here are a couple of ideas to help you sharpen your "shooting" skill:

1. Place a small object (your sample coin), a medium-sized object (a tin can lid will do nicely), and a large object (a frying pan from the kitchen) out on your lawn. Leave a few feet between them. Following the instructions above, tune your instrument. Pass the loop over each object, noting how much the volume increases or decreases as you move from object to object. *(Illustration)*

2. Take two quarters. Place one on top of the grass. A few feet away, dig a small hole no more than two inches deep and bury the other coin. Tune your instrument and pass the loop over the coin on the surface, then over the buried coin. Note how the volume increases or decreases as you move from one to the other.

3. Plant a "test garden." To get better acquainted with the various kinds of buried objects, bury some metal items at known depths. Make sure your test garden is located where you can get to it easily. It's best to make a map of the area, showing what is buried and its depth. Your test garden will help you practice and will also provide a handy method of periodically checking the performance of your instrument.

Periodically Readjusting the Sensitivity

It is a good policy to periodically adjust the tuning slightly. As you become more experienced with your new detector you will begin to notice, just by differences in the tone you hear, whether the tuning needs to be adjusted. Remember, a properly tuned instrument insures that maximum sensitivity is maintained.

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)* 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.*

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.

What Will Your Instrument Detect?

Silver, lead, copper, bottle caps, tin foil, gold, cartridge cases, rings, aluminum foil, brass and tin cans are some of the highly conductive metal objects that will cause a response in your speaker, headphones or earplug. Your instrument, however, will not detect sticks, rags, bones, paper, wood or other non-metallic objects.

The longer many metal objects have been buried, the better you may be able to detect them. A chemical reaction between such objects as silver or copper coins and the surrounding soil often creates a "halo" effect. This "halo" may cause your detector to register a much larger increase in volume than might otherwise be expected for a small coin. The "halo" can actually help you detect better. In fact, if the "halo" is strong enough, your instrument may continue to register even after you have dug up the coin!

Proper Care of Your Detector

1 **CLEANING.** Both the loop and rod are waterproof and can be cleaned with fresh water and a mild cleanser. After cleaning, dry the instrument thoroughly. *Caution! Never raise the wet loop above the level of the instrument case. The instrument case is not waterproof and water may run down the rod into the case, damaging the electronic components.*

2 **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 instrument if you operate it in the rain, as water may get into the instrument case.

3 **SALT WATER.** Salt water is very corrosive! After your detector has been exposed to salt water, rinse it thoroughly in fresh water, being careful not to let the loop rise higher than the level of the instrument case. Then wipe it with a cloth dampened with fresh water and dry it thoroughly.

4 **STORAGE.** If you plan to store your instrument for any length of time, unsnap the battery pack, remove it from the instrument and take the batteries out of the holder. Whenever your instrument is not in use turn the *Power* knob all the way to the left until it clicks off.

Batteries

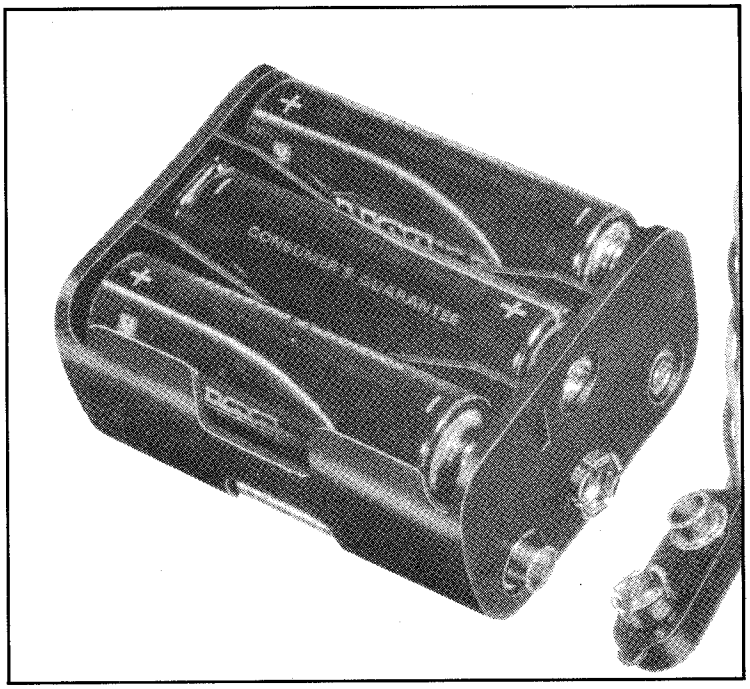
Batteries are the lifeblood of your instrument. Your battery pack holds six 1½ volt AA penlight batteries. AA penlight batteries are readily available at drug and grocery stores everywhere. Any brand of battery will work well, although the alkaline energizer will probably last longer.

To change batteries, first remove the battery pack from the back of the instrument. Before you remove any of the individual batteries, examine the pack and compare it with the illustration shown here. Note the exact position of each battery and the position of the battery lead snaps. Your instrument will not work unless the batteries are properly installed and the battery lead is properly connected.

Each battery has a positive end (+) 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 the negative (-) symbols clearly marked.

To replace the batteries, simply match the plus (+) and minus (-) symbols on the new battery and the plus (+) and minus (-) symbols on the battery slot and 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. *(Illustration)*

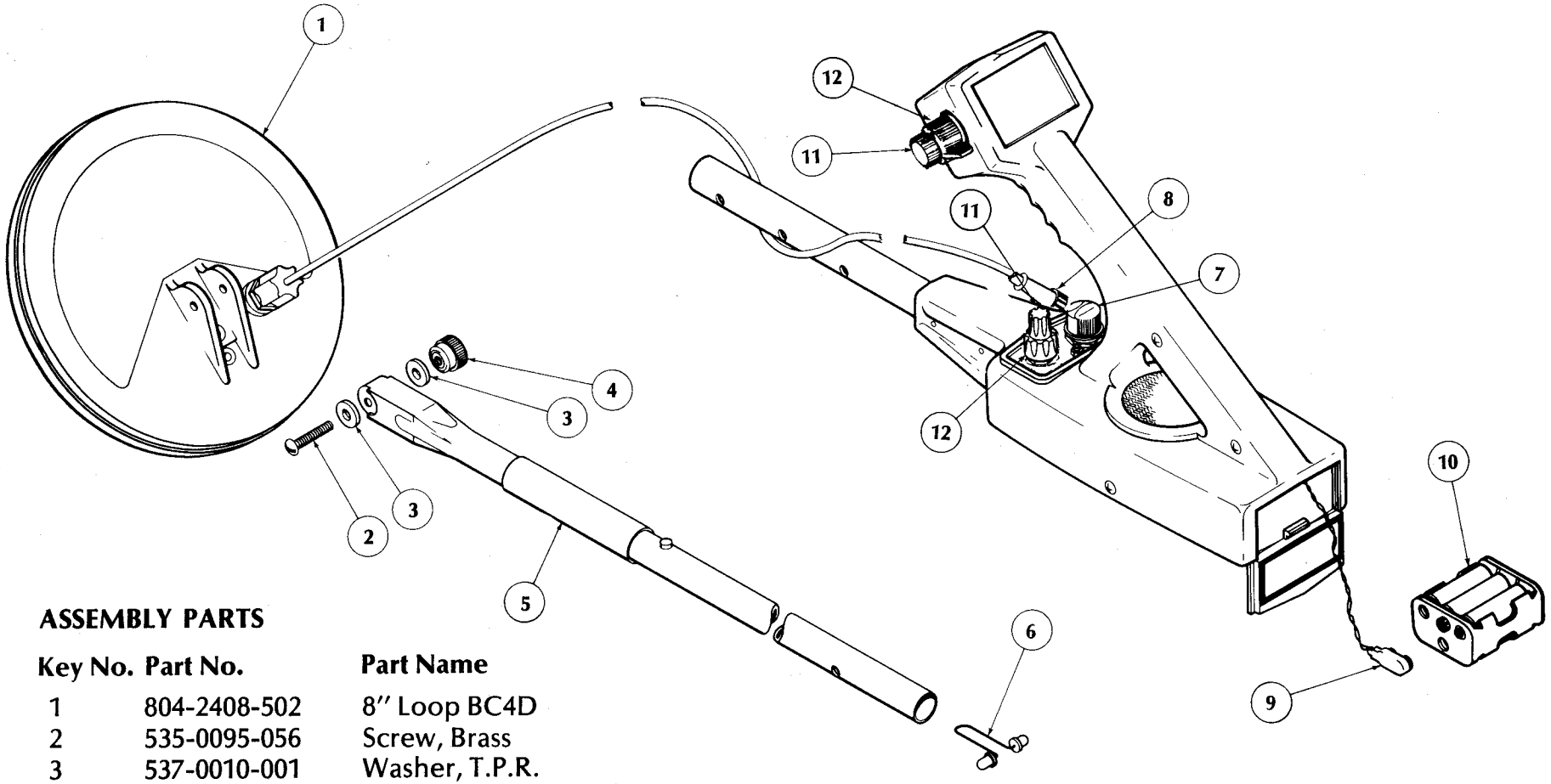


Generally speaking, your batteries need replacing when the volume becomes weak and the instrument loses sensitivity.

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 a day of "shooting." This gives you a chance to take a break and it gives the 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 BC4D
2	535-0095-056	Screw, Brass
3	537-0010-001	Washer, T.P.R.
4	402-0004	Thumbnut No. 516
5	501-2007	Clevis Isolator
6	500-2111	Spring, Latch 2B
7	402-0019	Knob
8	801-5077	Plug, D1N-5 Pin
9	520-0017	Connector, Battery 9V Black
10	523-0005	Holder, Battery 9V Black
11	402-0017	Knob, Small
12	402-0018	Knob, Large

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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
2. Part Number
3. Part Name
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

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