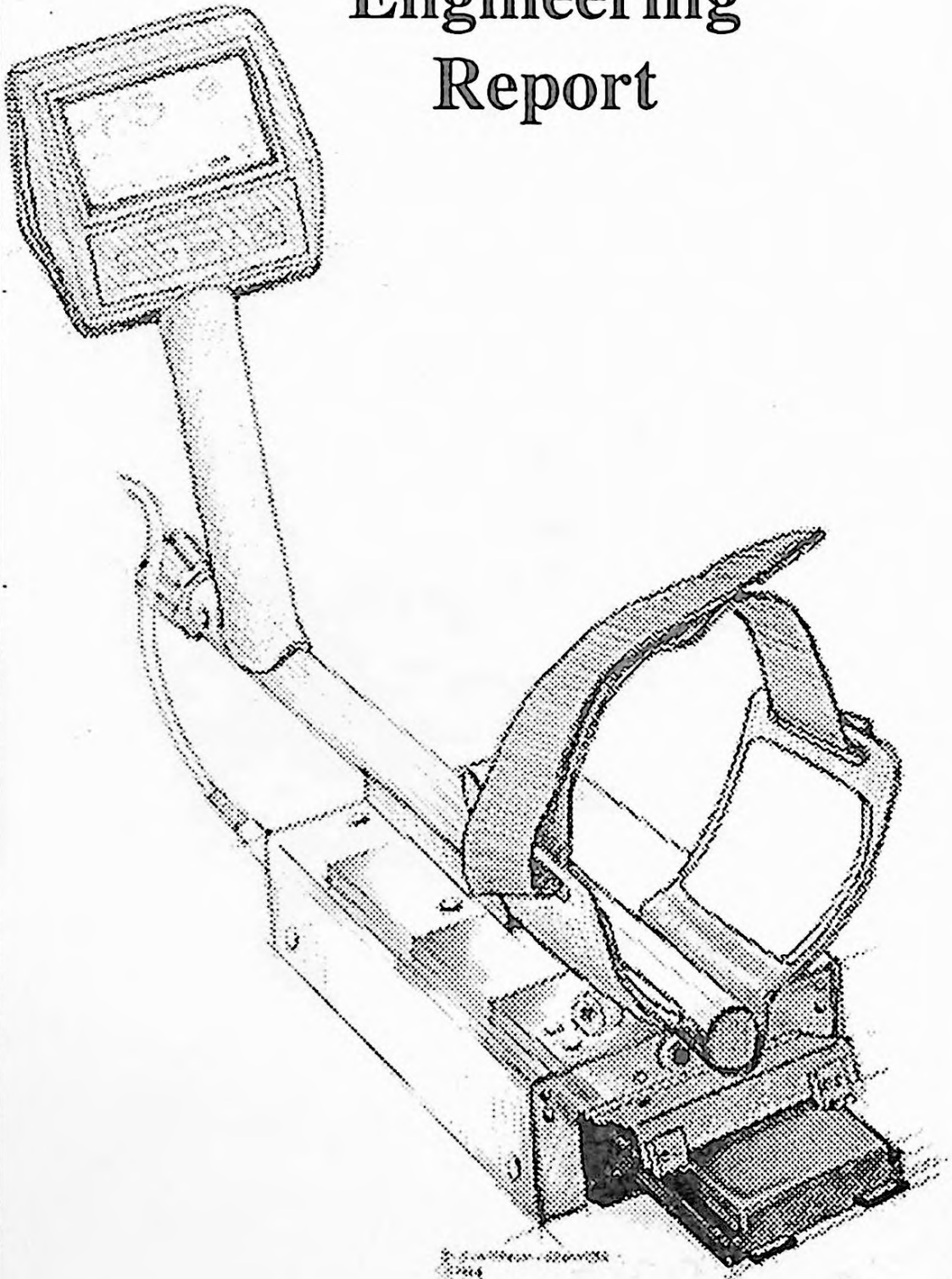
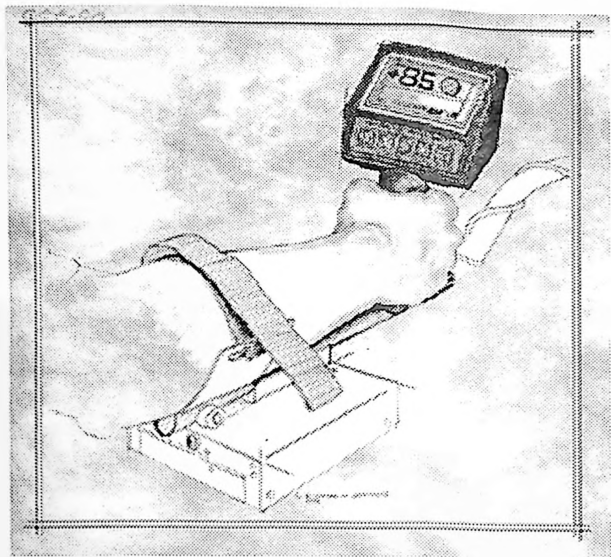


\$2.00

Spectrum XLT

Engineering Report





"We wanted to offer all the information technologically available about the target, beyond just a "canned" display indication. Multiple phase angles, dynamic phase responses...but in an easy to understand format (SignaGraph™). We also desired a large easy to read display, small lightweight package, increased battery life, and of course, improvements in performance at every opportunity. Not a small order given the formidable performance and success of the previous Eagle Spectrum. That is the concept behind the Spectrum XLT. You be the judge of our success".

*Mark Rowan
XLT Design Engineer*



Designing a new detector is a team approach at White's, and the inspiration for our new Spectrum XLT started at the very top. The XLT is the result of Ken White's years of experience with metal detectors, as an avid outdoorsman and treasure salvor. Ken brought together his top-notch Engineering, Marketing, and Distribution team to design the XLT for you, the user. The results? A top-of-the-line detector that is easier to read, simple to use, small and light, with better discrimination, and provides more information about the target.

"Don't change it to make it different. Change it to make it better." Our customers talked, we listened, and we set our course to move from Eagle Spectrum to Spectrum XLT.

"Yes, it needs to be smaller and lighter, but performance comes first." We knew we couldn't compromise. Our goal of XLT at four pounds wouldn't mean a thing if the end result couldn't stack up to the Eagle Spectrum. So we built on the Spectrum's standard - adding a Coin Preset Program, more Custom Programs, and a multitude of adjustments that enhance depth and sensitivity.

"I want numbers that I can see while I sweep. And I don't want to have to wear my glasses." We made the V.D.I. numbers BIG, then partnered them with an ICON "picture" of the target, SignaGraph™, and the best audio discrimination system on the market.

"I hunt in the rain. I need a detector that's as moisture resistant as possible." XLT's all-new display is "tenon-grooved gasketed" for superior water resistance. And the case is a common sense, wrapover design built for all-weather hunting.

"Give me the ability to view my entire hunting program and all settings with ease." Now it's yours. With the push of a single pad, scroll through Preset or Custom Programs to review your settings.

"Above all, it has to work as good or better than the Spectrum I have now." Were we able to do all this? You wouldn't be reading this if we hadn't!

So ,What's so Different About the Spectrum XLT?

With so many metal detectors on the market, that is a good question to ask. Eagle Spectrum, from inception was a dream of giving the user a better look at what was in the ground, and it does! The desire was to offer a much smaller/light weight Spectrum, larger easier to read display, more factory and custom programs, more battery life, simple intuitive operating systems, and as always improve performance at every opportunity.

*** Easy To Use** - The new Spectrum XLT weighs in at a counter balanced four pounds, has on-the-box instructions, five ready to go factory programs, four custom programs, on-screen instructions, and an even simpler menu system to make learning and using a breeze.

***Light & Balanced** - Not a single component escaped the scrutiny for size and weight reductions, nor for performance. The physical design of the XLT is as much a marvel as the electronics. The counter balance makes it feel even lighter. White's powered top-of-the-line instruments with "C" batteries for twelve years. The switch to a new system was not taken lightly. The XLT's twelve volt system offers 41% more power (30% increased hunting time) all in a slimmer lighter package!

***Easy To Read** - The new Spectrum XLT display is 50% larger, offers bigger bolder graphics, expanded SignaGraph™, and viewing angle adjustment.

*** Target I.D. System** - Is a four part system that allows the operator to electronically examine every target. . . .before you dig it!

***First** - White's famous audio discriminator

***Second** - V.D.I. (Visual Discrimination Indication) target reference numbers, optional three digits.

***Third** - Probable target icons including trash. Readable while you're still sweeping the loop!

***Fourth** - The expanded SignaGraph™ gives you graphic patterns that become the "signature" of the target.

So what's different? Read on, and thank you for your interest in the all new Spectrum XLT.

Spectrum XLT Software

INTUITIVE, simple, and works the same way every time. Spectrum XLT software is the link between the pushpads and the circuit board. With a push of a pad, load an entire program of adjustments to the circuit board, (Preset Program) or individually change the performance characteristics of one or more of the functions of the Spectrum XLT circuits. It's like being an engineer, change your detector to suit your needs, not in the lab. . . . but in the field with the push of a pad.

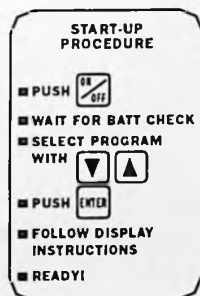
Spectrum XLT "memory" allows the user to design, and name, four completely custom programs, and "store" these settings for future use "EEPROM" (*Electronically, Erasable, Programmable Read Only Memory*).

Spectrum XLT Power

XLT's electronics are based on the powerful full-filter, complete ground balance, full discrimination circuits that have performed so well in White's top-of-the-line-detectors. The Spectrum XLT allows the user to "balance" this raw detecting power by adjusting the transmit and receive signal strength plus the motion (AC) and non-motion (DC all-metal) sensitivity.

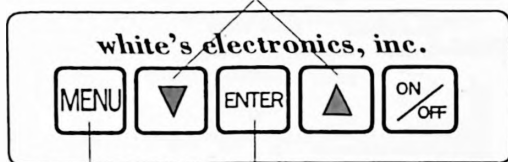
The Spectrum XLT has an all new twelve volt rechargeable battery system that will give years of trouble-free service. Through the use of modern battery chemicals the age-old problem of nicad "memory" has been all but eliminated.

Spectrum XLT Pushpads



Big, easy, and works the same way every time!

Scrolls up and down the menus



Activates your choice Selects

Spectrum XLT uses 5 big thumb-sized pads to control all of its functions. These oversized pads "snap" and "beep" when they are pressed.



When pressed, turns on the instrument, and starts the battery check sequence.



When pushed, "Scrolls" the pointer up and down the selections from all the available options. Also returns the detector from the search mode to the last used adjustment screen.



When pushed, brings up the menus.



When pushed, activates your selection.

Spectrum XLT Shortcuts (Other Keypad Options)

COIN PROGRAM - Squeeze & release TRIGGER after battery check.

TO SCROLL - After BAT. √, use ARROWS to scroll all the settings.

AIR/GND BAL - When searching, press ENTER to re-AIR/GND BAL.

GROUND BALANCE ONLY - Hold TRIGGER, and press ENTER.

BAT. √ - When searching, hold TRIGGER, and press ARROW down.

REVERSE DISPLAY - At BAT. √, press ARROWS light/dark display.

BACKLIGHT - When searching, hold TRIGGER, press MENU.

VIEW ANGLE - When searching, hold TRIGGER, press ARROW up.

Spectrum XLT Menus

Spectrum XLT menus are arranged in a logical "tree" system that allows you to scroll around at your own pace, and return with the push of a pad.

If you want you can keep pressing the ARROW controls and scroll through all the options one by one. You can ENTER any adjustment you desire, to develop your own custom program. The menu for each category will appear at specific points to allow skipping to sections which interest you.

Custom settings can be saved in one of the four custom positions (Custom 1-4). You can name these programs so that their purpose will always be clear. Up to sixteen digit names using all common letters and symbols are available. Custom programs are kept in memory for up to ten years, regardless of battery power.

Spectrum XLT Display

Spectrum XLT uses a true graphics liquid crystal display (8,192 pixels) backlit with an electro-luminescent lamp. This true graphics display is 50% larger than displays used on previous Spectrums. This display was chosen to allow our engineers to program for the needs and the wants of our customers, and not be locked into a pre-printed and therefore limiting pre-screened display. Furthermore, the LCD fits the requirement of being easy to read in all light conditions and temperature ranges (Viewing Angle adjustment), and provide big bold graphics and text.

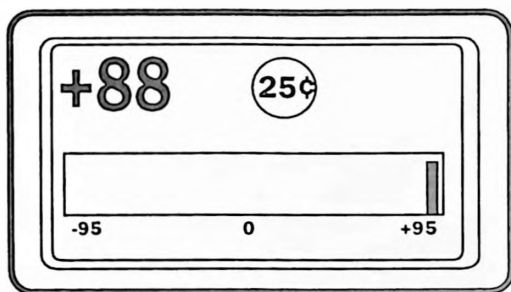
Spectrum XLT Graph

At the heart of the Spectrum XLT is the new bigger, bolder SignaGraph™. The display provides several pieces of information about the target. First of all, at the top of the display there is a V.D.I. number. This V.D.I. reference number corresponds to the chart painted on the top right-hand side of the control box, and the discriminate feature. A consistent V.D.I. number that is in a desirable area of the chart is a vote for digging the target. The V.D.I. sensitivity feature allows the selection of a third digit V.D.I. number allowing even greater target resolution.

Also at the top of the display, possible target identities will be shown as target ICONS (graphic representation of target type). One or more icon may appear.

There is significance to icon appearance, as well as their order of appearance. A fairly consistent icon of a desirable target is another vote to dig the target.

The SignaGraph™ at the bottom of the display, along with the audio signal and depth indication, provided final votes as to whether or not the target should be dug.



Sweep the loop over the target several times and look at the SignaGraph™. The SignaGraph™ automatically clears itself so that it doesn't fill with non-current information. An operator has limited time to look at the SignaGraph™. If you want to look at the information again, sweep the loop over the target several times. The fading of the SignaGraph™ information can be slowed or increased for operator preference. This is completed in the Pro Options, under Display.

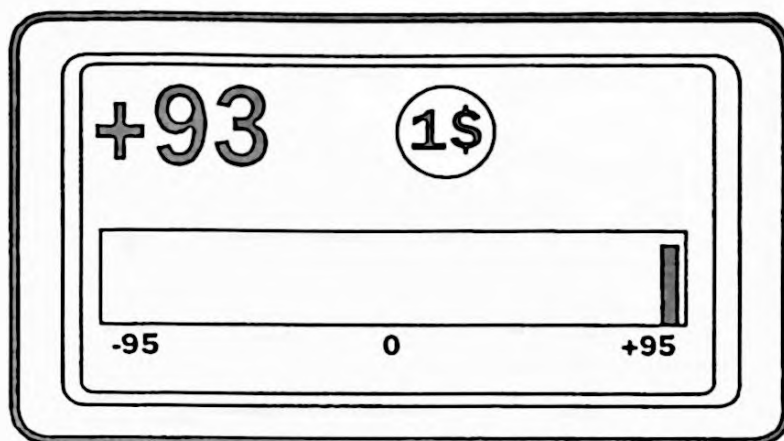
Valuable targets will show up on the positive side of the chart. The positive area of the chart is the section located to the right of zero.

In ideal conditions, coins produce only one or two bars. Trash produces several bars, usually on both sides of 0.

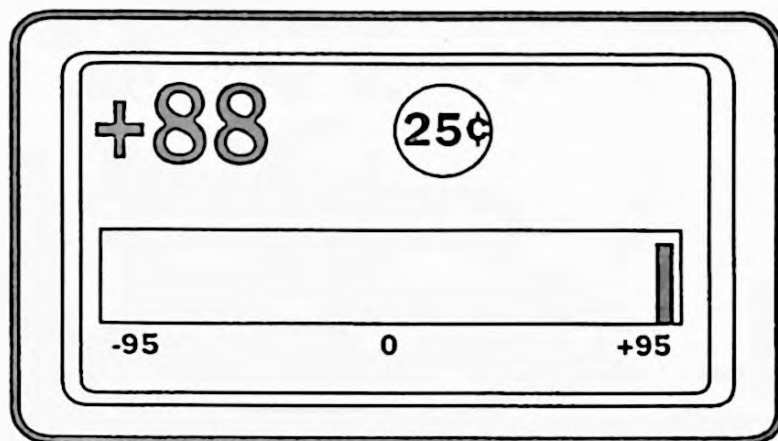
In less than ideal conditions, coins may produce a wider pattern of bars. Trash produces a recognizably different pattern than valuable targets.

One of the most visual benefits of the Spectrum graph is the ability to show a *smear* pattern on iron targets that often fool the other methods of identification. An iron target will likely show definite bars on both the negative and positive sides of the Spectrum graph, often *smearing* all the way across the entire chart. Valuable targets should not produce such obviously wide Spectrum patterns. In very bad ground conditions, a good target may have a few small bar segments in the negative area due to mineralization, however the pattern will show a grouping of mostly positive bars.

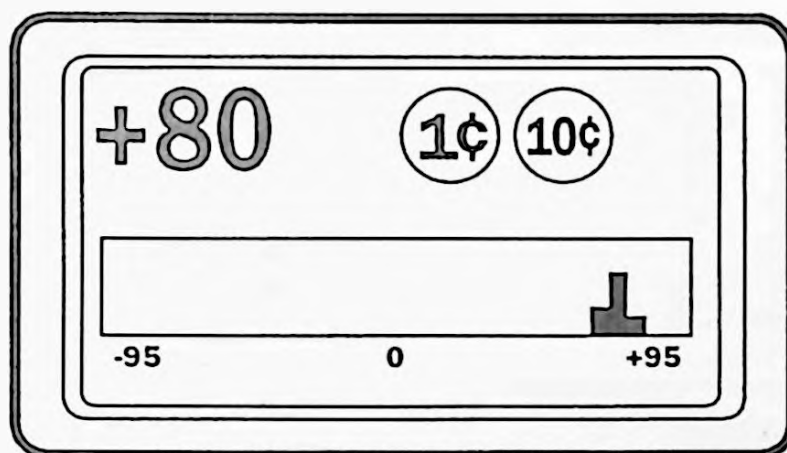
 Spectrum XLT Sample Targets



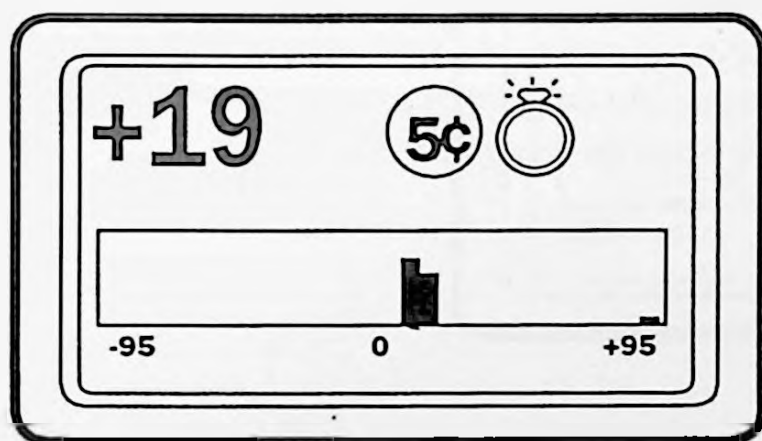
Good Target



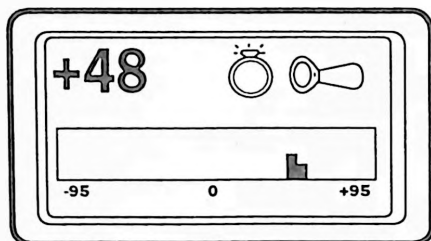
Good Target



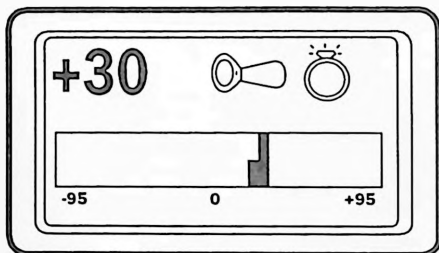
Good Target



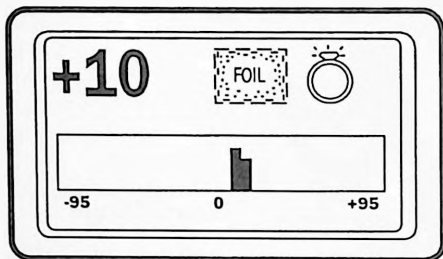
Good Target



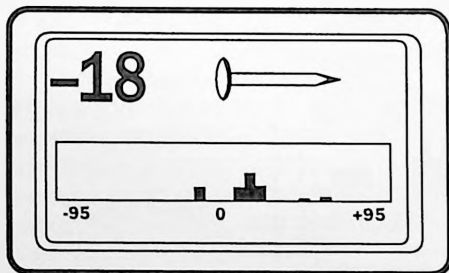
**Most Likely
a Ring, Possible
Pull Tab.**



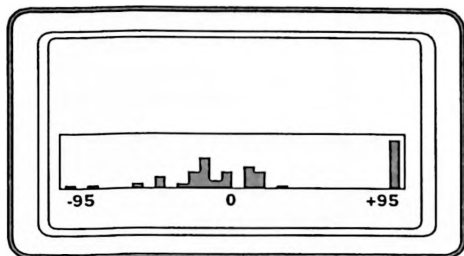
**Most Likely
a Pull Tab,
Possible Ring.**



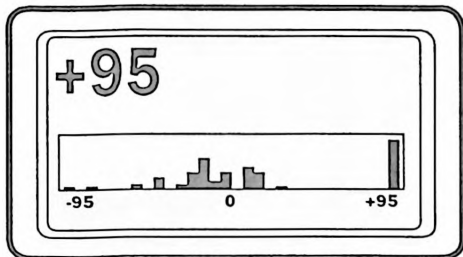
**Most Likely
Foil, Possible
Ring.**



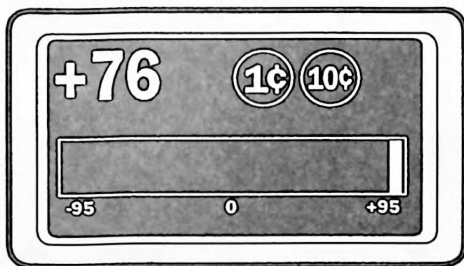
**Iron, Visual
DISC Off,
or - 18
Accepted.**



**Iron, Rejected
Targets Show
Only
SignaGraph™
When Visual
DISC Is ON.
Note Smear
Pattern**



**Iron, Visual
DISC Off,
or - 95
Accepted. Note
Smear Pattern.**



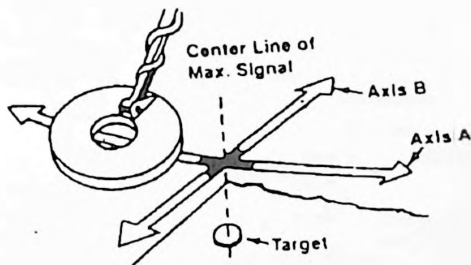
**Light On Dark
Display Option.**

The SignaGraph™ has proved to be a very valuable tool. You will find it doesn't take long to become acquainted with the "signature" of good and bad targets. Each type of target will have a unique pattern. With very little practice, recognizing these patterns becomes second nature.

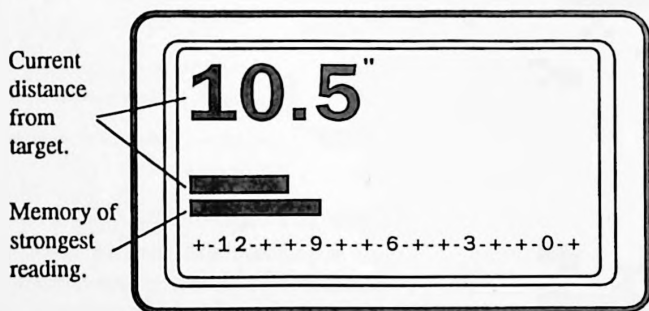


Spectrum XLT Pinpointing & Depth

Once the decision has been made to dig, move the loop off to one side of the target area, squeeze and hold the TRIGGER on the handle, and "X" the loop over the spot where you believe the target to be.



While the TRIGGER is being held, the loop doesn't need to be moving to detect the target, the loop may be moved slowly over the area. The display will indicate depth in inches, and will also show a memory of the strongest reading to aid in pinpointing exactly where to dig. The shallowest reading on the depth display, the loudest sound coming from the speaker, and the two bars lining up with each other, indicates the center of the target. Once pinpointing is complete, release the TRIGGER.

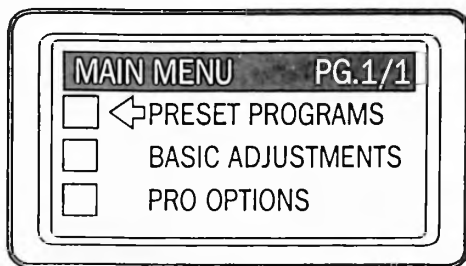


Target depth can be another important factor when considering digging a target. Deep targets are more likely to be valuable.



Spectrum XLT Main Menu

Spectrum XLT Main Menu allows selection with the arrow pushpads of Preset Programs, Basic Options, or Pro Options.



Continuing to press the Arrow pushpads, every option that is available can be viewed in sequence. ENTER accesses the highlighted item, indicated by the flashing pointer. This is a point-and-shoot menu system (point with the arrow, shoot with enter).



Spectrum XLT Preset Program Menu

The Spectrum XLT comes with five Preset Programs installed in the permanent memory "ROM" (*Read Only Memory*), and four easy-to-use custom programs. With a push of the "ENTER" pad you may select a program with the up and down keys, and press ENTER. That's it. You are off and hunting with a well-designed program that is suited for your particular hunting. Each program offers particular settings the operator can use, or modify if desired. Regardless of how extensive these modifications, upon the next turn on, the factory programs will always return to the original settings. If a preset program is modified, and you want to keep it for future use, save it in a custom program position. You can even give it a name of your choosing! Custom programs are saved for up to ten years even with the battery removed.

There are nine different **Programs** to choose from. Each program selects the features desirable for its purpose.

Coin selects general purpose settings. It discriminates (rejects), most common junk items like nails, foil, pull tabs, and hot rocks; and responds to most coins, and some items of jewelry. It is a good program to become familiar with the Spectrum XLT, and use in lawns, parks, and playgrounds, where lots of trash rejection is desired. It may, however, discriminate (reject too much) for some hunters.

Coin & Jewelry offers settings similar to Coin & Jewelry. However, provides less discrimination (less trash rejection). Less discrimination is desirable because of the high degree of variance found in jewelry alloys. More digging must be acceptable in the area being searched. Coin & Jewelry is also a good program to use in lawns, parks, and playgrounds, if less discrimination and more jewelry is desired, or for those who wish to rely more on their interpretation of the display. Turn ON Mixed Mode in the BASIC ADJUSTMENTS, and turn ON VCO in the PRO OPTIONS, to create an advanced general purpose or relic program.

Jewelry & Beach offers settings similar to Coin & Jewelry. However, some of the Pro Options are changed to deal with salt water, and other aspects of beach use.

Relic offers even less discrimination than Jewelry & Beach. It responds to all types of metals except small iron items such as nails, and some stainless steel. Brass, lead, aluminum, as well as copper, silver, and gold, will all respond with a good solid sound. Ferrous (iron), such as large nails, weapons, and cannon ball fragments, will also respond. This program is suitable for a variety of searching needs, when the desire is to hear all significant targets and separate ferrous/non-ferrous by display indications.

Prospecting does not discriminate at all with the audio tone. That is to say, all metals respond with a *beep* from the speaker. However, the display will show a V.D.I. number only for metals that could be gold. By only digging targets that produce a V.D.I. number, many iron targets may be avoided when prospecting.

Custom Program 1-4 is a place to save your own special program. When one of the standard programs is selected, and then modified, you may want to save your settings by following a simple SAVE or NAME sequence.

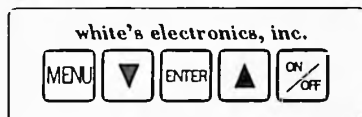
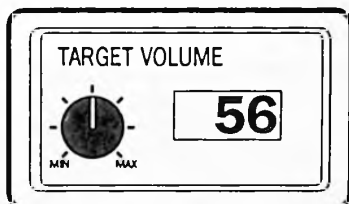
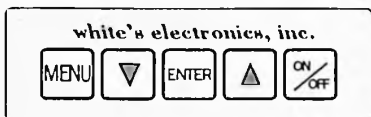
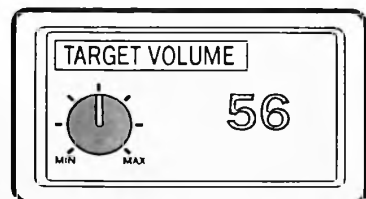
Spectrum XLT Basic Adjustments

With the push of a pad, select from ten basic adjustments. Simple for even the novice to customize the Spectrum XLT. All the adjustments you would expect to find on any top-of-the-line detector, and more!

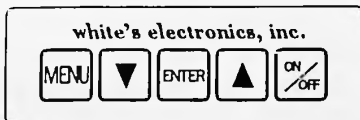
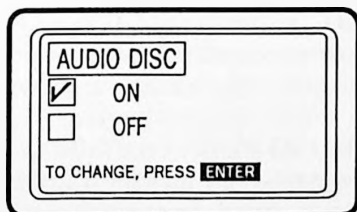
Select an adjustment with the ARROW controls, and press ENTER. The number designating the current level is shown on the right side of the display. To the left the graphic knob indicates the relationship of the current setting to minimum and maximum levels.

Use the arrow controls to select the level you desire.

Press MENU, then use the ARROWS to continue viewing and or adjusting other features, or squeeze and release TRIGGER to begin searching.



Some adjustments are simply ON/OFF. Select them with the ARROW controls and then use the ENTER control to turn ON/OFF.



Spectrum XLT Basic Adjustments

TARGET VOLUME - How loud a target beeps when detected. Select the loudest comfortable level, lower with headphones, higher without.

AUDIO THRESHOLD - The slight hum or background sound heard continuously during searching. Select the lowest level you can still hear.

tone (AUDIO FREQUENCY) - Selects the frequency or pitch of sound the detector produces. If you have trouble hearing high frequencies select low tone levels, if you have trouble hearing low frequencies select high tone levels.

AUDIO DISCRIMINATION - The ability to reject trash, different or no sounds for different types of targets. Use ON for trash rejection, OFF for detection of all types of metals.

SILENT SEARCH - The ability to operate without the threshold or background hum. If the constant background noise bothers or distracts you, select silent search.

MIXED-MODE - DC non-discriminate mode, working simultaneously with AC discrimination mode. Advanced operators gain extra depth by monitoring the all metal, and discriminate channels simultaneously.

A.C. SENSITIVITY - Degree the instrument is responsive to signals in the discriminate modes. Reduced levels improve stability in difficult conditions, increased levels improve depth if stability can be maintained.

D.C. SENSITIVITY - Degree the instrument is responsive to signals in non-discriminate modes. Lower settings for better pinpointing shallow targets, higher settings for greater all metal or pinpointing depth.

BACKLIGHT - Used in dark conditions to light the display improving visibility. Use only when needed, and only as brightly as needed, for acceptable display visibility. Will reduce battery life.

VIEWING ANGLE - Adjusts the display for low or high temperature visibility. Cold weather use higher levels, warm weather lower numbers, for greater display contrast.

Spectrum XLT Pro Options

There are five Pro Options menus to select from. Each of these menus offer options which relate to the menu title, and offer minute adjustments to the FUNCTION and performance. Each of these option menus are easy to access with the pushpad. . . . Self-Prompting Quick and Simple!

Pro Option adjustment procedures are identical to the Basic Adjustments. Settings can be stored in a custom program for future use.

Spectrum XLT Pro Options Overview

AUDIO

RATCHET PINPOINTING - Pinpoint feature, automatically de-tunes for center location.

S.A.T SPEED - Self Adjusting Threshold or Auto-tune, automatically maintains threshold.

TONE I.D. - Assigns each V.D.I. target number it's own special tone or sound.

V.C.O. - Pinpoint or non-discriminate feature, increases pitch or tone with target strength.

ABSOLUTE VALUE - Bigfoot or Goldfoot loop accessories only.

MODULATION - Motion modes produce the same, or different volume, based on target depth.

G.E.B./TRAC

AUTOTRAC - Automatically updates Ground Balance during searching.

TRAC VIEW - TRACK appears on right side of display during AUTO TRAC adjustments.

AUTOTRAC SPEED - Dictates when AUTO TRAC adjusts Ground Balance.

AUTOTRAC OFFSET - Positive or negative AUTO TRAC (over, or under kill).

TRAC INHIBIT - Prevents tracking the ground during target detection.

COARSE G.E.B. - (Manual Ground Balance) Coarse viewing, or overriding automatic.

FINE G.E.B. - (Manual Ground Balance) Fine viewing, or overriding automatic.

DISCRIMINATION

DISC. EDIT - Change V.D.I. (target reference numbers) accepted (detected), or rejected (discriminated) status.

BLOCK EDIT - Speeds EDIT, dragging ACCEPT or REJECT with ARROW controls.

LEARN ACCEPT - Target samples can be used to show or teach ACCEPT discrimination.

LEARN REJECT - Target samples can be used to show or teach REJECT discrimination.

RECOVERY SPEED - Speeds target responses, so close together targets each respond.

BOTTLECAP REJECT - How strongly the instrument rejects, or breaks up on iron.

DISPLAY

VISUAL DISC. - Rejected V.D.I. numbers and ICONS, do not appear on display.

ICONS - Graphic display representation of metal targets. ON/OFF.

V.D.I. SENSITIVITY - Response intensity to produce a display indication, & 3rd V.D.I. digit.

D.C. PHASE - Measurement of ground, or metal target, during pinpointing.

GRAPH AVERAGING - Emphasizes common or predominate SignaGraph™.

GRAPH ACCUMULATING - SignaGraph™ information collects over multiple loop passes.

FADE RATE - Clears or fades non-current SignaGraph™ information (bars).

SIGNAL (TRANSMIT, RECEIVE)

TRANSMIT BOOST - Selects the intensity of the signal transmitted from the loop.

TRANSMIT FREQUENCY - Alters operating frequency to avoid interference.

PREAMP GAIN - Selects the intensity of the signal received from the loop.

Spectrum XLT Detailed Pro Options

With Pro Options you can customize virtually every aspect of the Spectrum XLT.

Spectrum XLT Audio

RATCHET PINPOINTING	ON/OFF
S.A.T. SPEED	0 - 10
TONE I.D.	ON/OFF
V.C.O	ON/OFF.
ABSOLUTE VALUE	ON/OFF
MODULATION	ON/OFF

Ratchet Pinpointing - Pinpointing feature, automatically detunes for easy target center locating. Use ON until experienced at pinpointing.

S.A.T. Speed - Self Adjusting Threshold or auto-tune smooths the THRESHOLD, OFF (0), or ON (1-10). Higher numbers for bad ground, lower for milder ground.

Tone I.D. - Used in the discriminate or motion modes. Each V.D.I. target number has its own audio frequency, or pitch. Use for expanded audio target information

V.C.O (Voltage Controlled Oscillator) - The stronger the response the higher the pitch of the sound. An excellent aid in pinpointing. Can be used in combination with Mixed Mode.

Absolute Value - Enhances the performance of speciality loops such as the *Bigfoot*, and *Goldfoot* designs.

Modulation - Allows the depth of the target to dictate the volume of the response. Deep targets are immediately recognized.

AUTOTRAC	ON/OFF
TRAC VIEW	ON/OFF
AUTOTRAC SPEED	1 - 20
AUTOTRAC OFFSET	-10 - +10
TRAC INHIBIT	ON/OFF
COARSE G.E.B.	0 - 255
FINE G.E.B.	0 - 255

Autotrac - Allows the instrument to automatically readjust the ground balance setting during searching. (Automatic Ground Balance) Use the ON setting for most search conditions.

Trac View - Offers a way to observe Auto-tracking. Use when experimenting with different Trac Speeds.

Auto Trac Speed - Dictates when AUTO TRAC adjusts Ground Balance. It is recommended to achieve some tracking at least every fifth sweep of the loop.

Auto Trac Offset - Positive or negative AUTO TRAC (over, or under kill). Advanced operators can hedge performance by offsetting ground balance.

Trac Inhibit - Prevents tracking the ground during target detection. On for most conditions, off for prospecting.

COARSE G.E.B. - (Manual Ground Balance) Coarse viewing, or overriding automatic. Specific settings work well for specific conditions.

FINE G.E.B. - (Manual Ground Balance) Fine viewing, or overriding automatic. Specific settings work well for specific conditions.



Spectrum XLT Discrimination Menu

DISC. EDIT	-95 - +95
BLOCK EDIT	-95 - +95
LEARN ACCEPT	ON/OFF
LEARN REJECT	ON/OFF
RECOVERY SPEED	1 - 40
BOTTLECAP REJECT	1 - 20

Edit - Allows for changing which targets are accepted (detected), or rejected, (discriminated out) within the current Program you are using. Choose to accept or reject from 95 negative numbers (iron) and 95 positive (non-iron) V.D.I. numbers.

Block Edit - Allows the EDIT process to be completed in bulk, EDIT is fine, BLOCK EDIT is coarse.

Learn Accept/Learn Reject - Allows specific metal samples to show or teach the discriminator what metal targets you desire accepted or rejected.

Recovery Speed - When a metal is detected, it takes a fraction of a second to process the signal before it can respond to another metal target. The time it takes to process is adjustable.

Bottlecap Rejection - Allows the operator to adjust how strongly the instrument rejects iron. Improves iron audio discrimination.



Spectrum XLT Display Menu

VISUAL DISC.	ON/OFF
ICONS	ON/OFF
V.D.I. SENSITIVITY	1 - 99
D.C. PHASE	ON/OFF
GRAPH AVERAGING	ON/OFF
GRAPH ACCUMULATING	ON/OFF
FADE RATE	0 - 14

Visual Discrimination - Eliminates both the V.D.I. number and the icon, "IRON, FOIL, PULL TAB, etc.", of rejected targets from indicating on the display. Reduces display information to accepted targets.

Icons - Graphic display representation of metal targets, ON/OFF. Off speeds remaining display information.

V.D.I. Sensitivity - Controls the intensity (strength) of the target signal required to activate the display indications.

D.C. Phase - Allows for measurement of either the ground mineralization, or the phase (V.D.I. reference number) of a specific metal target during pinpointing.

Graph Average - Average does not continue to gather all information. It averages the information received, and shows the information on the SignaGraph™.

Graph Accumulate - Allows the SignaGraph™ to continually gather information. This gathering of information continues from one sweep of the loop to the next.

Fade Rate - Allows past information to automatically fade from the Spectrum graph.



Spectrum XLT Engineering Note

*Using Spectrum XLT Modes: Accumulate, Average, and Fade
by Mark Rowan*

"Although the SignaGraph™ display format has been well received, there seems to be some confusion regarding the option (average accumulate, and fade) and how to use them. Perhaps a more detailed explanation is called for.

The default (preset) condition is Accumulate/Average/Fade, the fade rate being fairly slow. With each sweep over the target, several attempts are made to assign it a V.D.I. number. Each reading (There may be only one or two, or as many as six or eight readings per sweep) is reported to the user as a vertical bar on the SignaGraph™. (NOTE: If all eight read-

ings are the same, the user will only see one bar). In Accumulate mode, these bars are not "cleared out" or "blanked" on subsequent sweeps, but continue to "build up" in the display so that the user sees the entire history of multiple passes over the target. Squeezing the trigger will clear the display if it gets too cluttered, or if the user chooses to move to a different target with those of the second one. However, continually having to squeeze the trigger can be a nuisance -- this is where Fade comes in. If a certain period of time elapses with no new target responses, the vertical bars will be shortened by one increment. Eventually, they will disappear from the display. Notice, however, that if a new response comes along quickly enough, the Fade timer is reset (this is necessary to prevent readings from beginning to fade before the user has even had time to see them). Thus, if the Fade rate is slow and the user is sweeping the loop fairly quickly, no fading will occur until he stops swinging the loop or moves away from the target. If he is working a trashy area or has his sensitivity cranked up to the noise threshold, the Fade out may be disabled entirely. This is the justification for the Fade Rate control. If the fade rate is increased, the user can find a level at which Fading will reliably occur, but which is not too fast for his personal taste or his style of hunting.

If the Accumulate control is turned off, the instrument is in the "single-sweep" mode. Each sweep of the loop causes the display to be cleared, and only those readings made during the current pass over the target to be shown. The primary advantage of this is that it reduces the chance for readings from two different targets to be confused with each other.

If the Fade rate is set to 0, fading is disabled and display bars will remain indefinitely.

Average mode is entirely different than either the Accumulate or "single-sweep" mode of operation. When Averaging is turned off (the default in all preset programs have Averaging on) the vertical height of the display bar is an indication of the strength of the signal when that reading was taken. With Averaging, however, the height of the bar represents a running total of the number of readings that have occurred at that point on the display.

For example, if you pass the loop several times over a gold ring and get readings of 1, 10, 40, 10 10, -20, and 10, the display will show a tall bar at the place corresponding to 10 on the display, and very short bars at the positions corresponding to -10, 0, and 40. If the count exceeds the vertical resolution of the display, the bar remains at its maximum height and all other bars in the display are reduced by one increment, eventually disappearing from the display.

The usefulness of this is that if the error in the V.D.I. readings is random (such as that caused by electromagnetic interference or irregular loop motion), it will eventually average out and the display will "lock on", showing a single prominent segment at the correct point on the display. Unfortunately, there is a catch. Iron and foil targets which mimic coins will also appear to "lock on"; the smearing one would normally expect will be suppressed somewhat. However, in the hands of a skilled user this should be a very useful feature.



Spectrum Signal (transmit, receive)

TRANSMIT BOOST	ON/OFF
TRANSMIT FREQUENCY	1 - 7
PREAMP GAIN	1 - 15

Transmit Boost- Selects the intensity of the signal transmitted from the loop. Use OFF if persistent OVERLOAD appears on display.

Transmit frequency - 4 = the normal 6592.5 Hz operating frequency. 1 = 6027.5 Hz. 2 = 6204.7 Hz. 3 = 6392.7 Hz.
5 = 6805.2 Hz. 6 = 7032.0 Hz. 7 = 7274.5 Hz.

Operating frequency is the frequency the detectors transmit and receives its signal. By shifting to a different frequency interference can be avoided from detectors operating nearby.

Preamp gain (signal balance) - Selects the intensity of the signal received from the loop. Can be used to promote stability and performance.



An Engineer's Guide to the Spectrum XLT

by Mark Rowan

Some time ago, I had a conversation with an avid treasure hunter whose instrument of choice was White's Eagle II SL 90. He described to me a technique with which he could discern pull tabs from rings, nickels, and other desirable targets by listening for some subtlety in the audio response. Then he asked me, "If I can do this, why can't you program the Eagle's microprocessor to do it?" My response was, "If you can do it yourself, why would you want the microprocessor to do it for you?" I mention this as a means of illustrating what I consider to be the metal detector designer's fundamental dilemma, which is, as Prince Hamlet might have phrased it, "To beep or not to beep". More specifically, if you're faced with a target at some depth in badly mineralized ground and the detector has a hard time getting a solid reading on it, what do you do? If you design your detector to ignore the target, and then someone comes along with their *El Cheapo* brand detector and digs the target, which just happens to be a \$10 gold piece -- you're in big trouble. If, on the other hand, your customers find that they're spending most of their time chiseling through eight inches of hardpan and finding bent nails and wads of aluminum foil, you're not much better off. The point I was trying to make with the gentleman who had devised the clever pull tab discriminating scheme was, that if you put too much of that kind of "intelligence" into your metal detector, there are always going to be those targets that you miss because the machine got fooled.

Which brings me, of course, to the newest White's model, the Spectrum XLT. The Spectrum XLT has all of the features, performance, and flexibility of previous members of the Eagle series, plus a new display which makes the instrument remarkably easy to use. It also makes use of a new way of displaying information about targets -- the "SignaGraph™" or "Phase Spectrum Analyzer" -- which shows the operator everything that we currently know how to display about the characteristics of metallic objects in the ground. In this way, we have gone a long way towards addressing the dilemma I mentioned earlier. The Spectrum XLT is a very "smart" detector, but it is also an "honest"

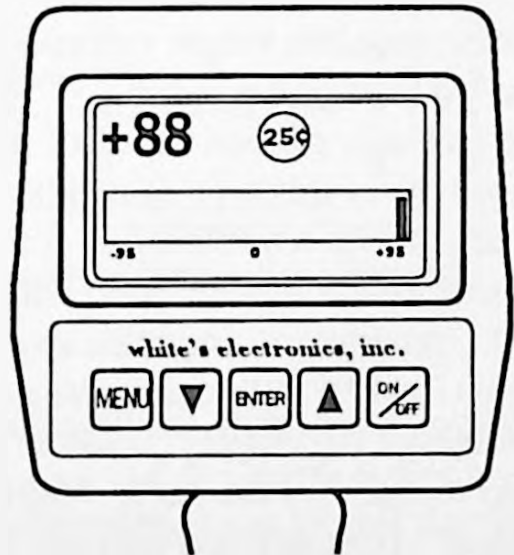
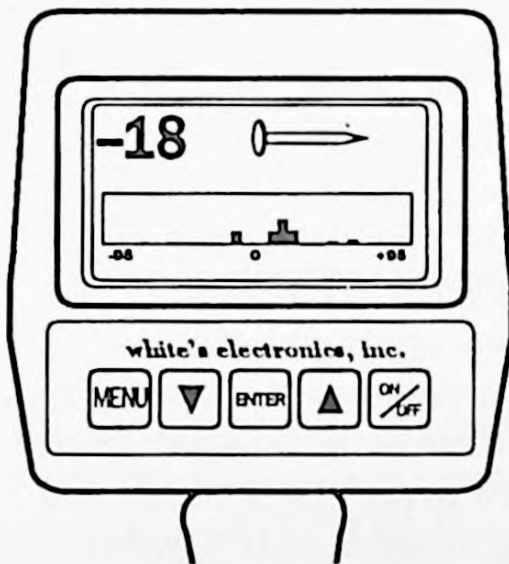
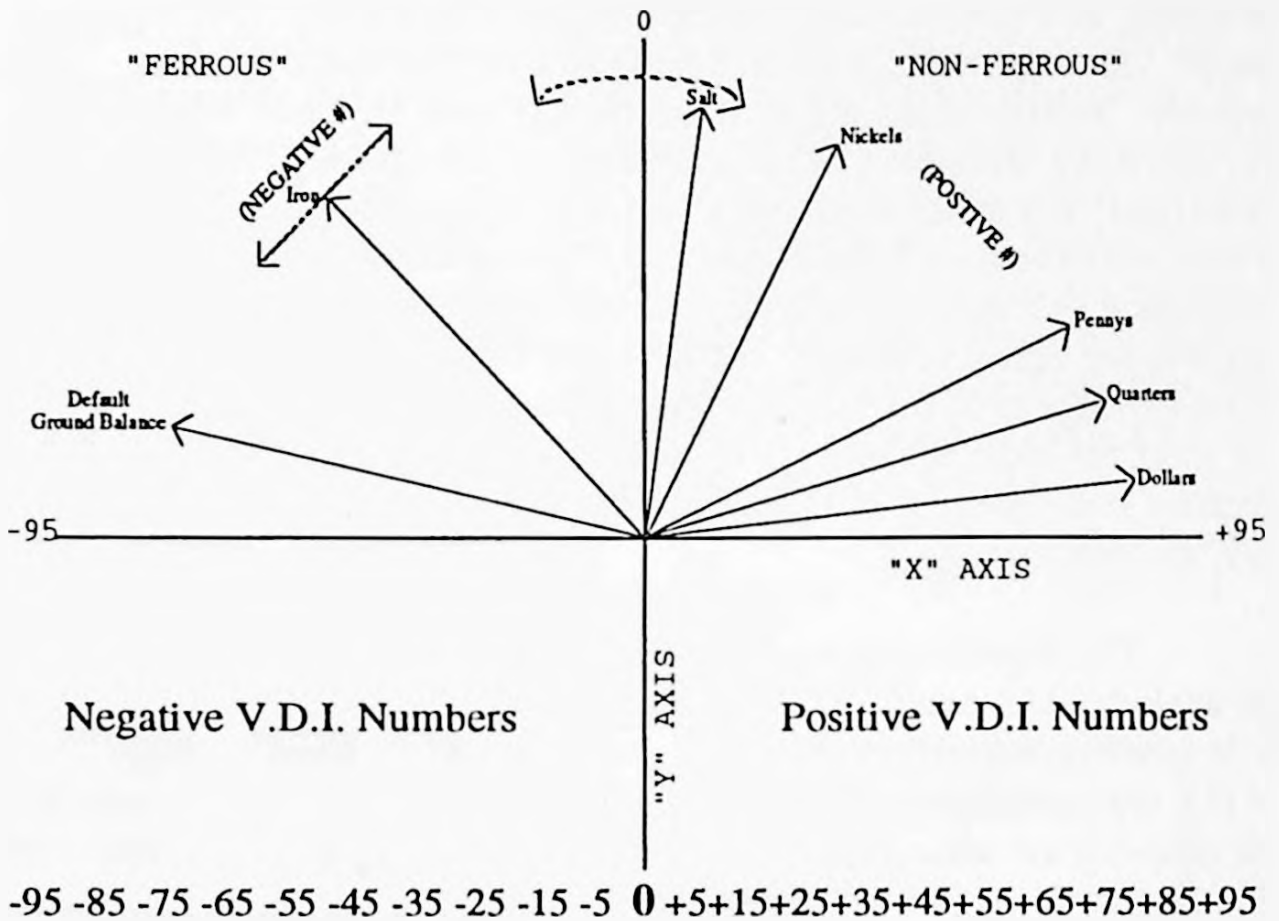
one. Having done the best it can to determine the probable identity of a target, the Spectrum XLT gives you all of the information you need to make your own decision (human beings are, despite what you might have heard, still a whole lot smarter than computers) to dig, or not to dig.

Before I begin to describe in some detail what the SignaGraph™ is and how it works, I should emphasize that you don't need to know how it works in order to use it effectively, and that the best way to learn how to use it, . . . is in the field. In a very short time you will begin to recognize certain display patterns as being characteristic of certain types of targets. I should also point out that even if you ignore the SignaGraph™ altogether, this instrument still has the audio discriminator, V.D.I. number, that its predecessors had, plus the icons, and some significant improvements in terms of weight, physical size, and ease of operation.

For many years, White's has built detectors which identify targets based on a V.D.I. number (V.D.I. stands for Visual Discrimination Indicator) which characterizes metallic objects according to their size, shape, and composition.

The V.D.I. scale on the Spectrum XLT runs from -95 to +95. Large positive numbers typically indicate objects which are good electrical conductors; for example, silver dollars will come in at 92. Smaller positive numbers usually indicate objects which, because of their size, shape, or composition, are not as conductive; nickels will read about 20, and aluminum foil may come in near 5. Large negative numbers are typical of targets which are readily magnetized, but which conduct electricity poorly or not at all. Some sands or soils which have a high concentration of ferromagnetic minerals may read -93. Metals containing iron have both magnetic and conductive properties, which causes them to spread over a wide area of the scale, although most typically iron objects will fall in the range -30 to -75. (See Phase Chart)

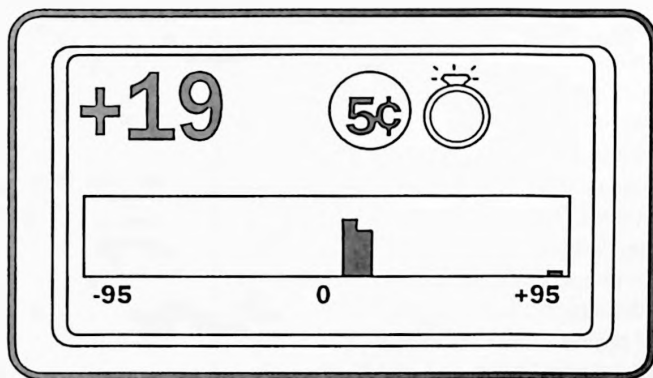
PHASE CHART



The V.D.I. reading is an excellent way to determine the identity of most commonly occurring targets, although I might mention in passing that the only 100% reliable discriminator is called a shovel. However, as a famous metal detector engineer once said, "Life is grossly unfair" (actually, there is no such thing as a famous metal detector engineer, and life really is fair, it just doesn't want anybody to know). For one thing, the signal which a detector receives back from even moderately mineralized ground is typically much stronger than the signal it receives from the targets buried in it. This makes determining an accurate V.D.I. number for a target at any substantial depth a very challenging business indeed. Furthermore, some targets will cause an abrupt change in V.D.I. response during the course of a single pass under the loop; the most notorious of these are the dreaded bottlecap and the dreaded small piece of foil near the surface in bad ground. Enter, as they say, the Spectrum XLT.

The SignaGraph™ is very similar in some respects to the familiar analog V.D.I. meter. The display is calibrated from left to right in V.D.I. units, from -95 to +95. When the loop is passed over a target, a V.D.I. determination is made, and a vertical bar is placed at the appropriate place on the scale; near the right end of the scale, say, for a reading of 78. So far, this is just what an analog V.D.I. meter would do. At this point, the similarity ends. An analog meter can indicate only one value at a time; with the SignaGraph™, up to 30 readings can be displayed simultaneously. Also, the vertical height of the bars in the display has significance; the height can either be used to indicate signal strength or a running total of the number of readings at that point on the scale (the operator may choose which of these two indications is to be used). The advantage of this type of display format becomes evident when the loop is passed over a bottlecap or some other flat, thin iron object. Although the instrument may respond with a loud, clear audio output, and the V.D.I. readout may register a value near the upper end, the SignaGraph™ will tend to "smear out"; numerous segments will appear throughout the display, many or most of them in the negative (typically iron) range. Try the same things with a coin, and you won't see the "smear"; typically you will see 1-3 bars grouped closely together near the top end of the scale. If any smearing does occur, as it might on a deep coin in bad ground, the more accurate readings will stand taller in the display and will tend to persist from sweep to sweep.

Another unique advantage of the Spectrum XLT is the ability to make use of information gathered during the course of multiple sweeps of the loop. For years, clever detectorists have realized that by passing the loop over the target repeatedly and mentally keeping track of the range over which readings appear, and the most frequently occurring numbers within that range, they can achieve the highest possible accuracy on really tough targets. The Spectrum XLT performs this operation automatically. The standard mode of operation is the so-called "Graph Averaging" mode, in which a continuous count is kept of the number of readings that fall into a particular slot in the graph. This might also be a good time to mention that more than one V.D.I. determination is made during the course of a sweep; sometimes as many as 6 or 8 readings will be taken during a single pass, so it only takes a couple of sweeps for the effect of averaging to become significant. What you will see in the field will be a single bar on the display which will "grow" until it stands out prominently above the other bars on the display.



Although it is not necessary to adjust them, there are a number of controls that allow you to customize the way that the graph is displayed. It can be set up to clear itself on each sweep of the loop, if you find that too much information is persisting in the display for too long. Or, you can configure it to let the vertical bars fade slowly out of view. Even the rate at which this fading takes place is adjustable. If you don't want to be

bothered with any of that, then don't be. The factory preset settings should work just fine for almost anyone. For those of you who want to know an explanation of Accumulate, Average, and Fade, one is included in this Guide.

If all of this sounds confusing or mysterious to you, allow me to put your mind at ease. The Spectrum XLT is one of the simplest-to-operate detectors you will ever use. I shall describe just how and why it is so easy to use momentarily; but before I finish talking about the SignaGraph™, I want to say it one more time-- you don't need to be a Nobel Prize candidate to figure out what the display is telling you. The usual response from somebody seeing it for the first time is something like: "Okay, I get it now. Now leave me alone and let me hunt!"

What is it that makes the Spectrum XLT so easy to use? The key is something that is known in the software business as a "menu-driven interface". To implement that, we have used what is known in the display business as "A True Graphics Display". What all of this means to you, the user, is that all of the controls and options are listed clearly in plain English on the display. A flashing arrow appears on the screen next to one of those options; you can move the arrow up or down with the two "arrow" keys on the 5-key touchpad. When the arrow is next to the control you are interested in, you push the ENTER key. That is everything you need to know to run this machine. If you are like me and you hate reading instruction manuals, I believe I can safely guarantee that you will be able to operate the Spectrum XLT successfully your first time out without ever having to open the cover -- although the manual should be extremely helpful if you want to fine-tune the performance of your detector by adjusting any or all of a rather lengthy list of professional options. Incidentally, another name for this method of running a machine is the "point-and-shoot" method; you point at what you want, then "shoot" with the ENTER key to make it happen. Finally, for those in a hurry, there are a number of "shortcuts" designed to make accessing commonly used features as fast as possible.

What makes the Spectrum XLT even easier to use are the factory preset programs (like those in previous Eagles) which you can load with just a few simple keystrokes, following the prompts in the display. These programs configure the machine automatically so that the beginner

or casual treasure hunter can expect a great deal of success over a broad range of conditions.

Any attempt on my part to detail all of the advanced features and controls which the Spectrum XLT has to offer would probably leave me with blisters on both of my typing fingers. Suffice it to say that all of the features we have had in previous state-of-the-art detectors are here in this one, plus several new ones. Most of the features are there because somebody asked for them -- the moral of the story being, keep those cards and letters coming, and we will continue trying our best to give you the kind of detector you really want.

Mark Rowan is a Senior Engineer for White's Electronics, Inc. Mark holds degrees in General Science, and Electronics Engineering Technology, and is a graduate of the University of Oregon. His background includes satellite communications and RF test and measurement instrumentation.

Mark now resides in Lebanon, Oregon with his wife and two children.





White's Electronics, Inc.
1011 Pleasant Valley Road
Sweet Home, OR 97386 USA
Distribution: 1-800-547-6911
Factory: 1-541-367-6121
FAX: 1-541-367- 2968
E-Mail: whites@halcyon.com