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QED – *PL2* OWNERS MANUAL



Proudly made in Ballarat, Victoria. Australia

QED image is for illustration purposes only

QED -PL2 INTRODUCTION

Congratulations on your purchase of the QED-PL2 Pulse Induction metal detector. The QED has been engineered specifically to make your prospecting experience more rewarding.

Whenever you purchase any new technology, there is no point in just looking at it, or putting it away in the wardrobe. You need to explore all the new functions and settings to maximize your understanding and the potential of the device.

If you are an experienced operator, you may find the settings to be different to anything you have previously used. Whether you are a first timer or an experienced operator, your confidence will develop as you master the QED.

Read these instructions carefully to master the QED's full potential. Be confident to alter and adjust your settings over known targets until you have a working understanding of the detector's potential and character.

This detector has an expansive range of possible settings, and as you become familiar with all the functions you will maximize your potential to find gold or relics in even the harshest ground.

Happy hunting

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START UP

As the QED is marketed in various configurations, these steps are indicative only.

Step 1: Connect a suitable coil.

Step 2: Insert Batteries or connect Battery Pack.

Step 3: Turn Detector ON by pressing the ▲ BUTTON.

Turn ON the remote SPEAKER pressing the button at side of the speaker housing.

Step 4: Scroll through adjustment menu item numbers by pressing either ▲▼ buttons.
When on the required adjustment menu item number press ◀▶ button.

Step 5: INCREASE variable ▲ or DECREASE ▼

Step 6: To return to variable menu press ◀▶ button.

Step 7: To turn detector OFF, press and hold ◀▶ button and current adjustment settings will be saved.

Step 8: To reload **Factory Default Settings** turn the detector **OFF**, then PRESS and HOLD ▼ button while pressing ▲ button.

NAVIGATING THE CONTROL INTERFACE



The display is an all lighting conditions 3 Digit LED Backlit LCD display.

▲ The ▲ button Triangle image on the control box is the TURN ON BUTTON and INCREASE ADJUSTMENT button.

▼ The ▼ button Triangle image on the control box is the DECREASE ADJUSTMENT button.

◀▶ TOGGLE between menu Item Select and Menu Item Adjust.
Press and hold the button to TURN OFF the detector.

INPUT CONNECTIONS



Stereo Headphone 6.00 mm socket with 3.5 mm adaptor supplied.

10v MAX 



Power lead socket with negative earth.

Note the detector is designed to run a battery voltage of 10 Volts maximum and 6 Volts minimum.

MENU OPTIONS

1: Manual Ground Balance
2: Threshold B (Bias)
3: Threshold A (Volume)
4: Gain
5: Mode

6: Static Magnetic Fields
7: Battery
8: Pitch
9: Synchronous Mains Rejection

CONTROL COMMANDS

TURN THE DETECTOR ON

Ensure the battery power lead is connected to the power lead socket on the control box.
PRESS the ▲ Button, once to turn on the detector.

CYCLE THROUGH MAIN MENU OPTIONS

PRESS either the ▲ Button, or the ▼ Button to toggle through the Main Menu Options (1 to 9)

TOGGLE BETWEEN A MENU ITEM NUMBER OR ADJUST VARIABLE

PRESSING the ◀▶ Button toggles between displaying menu item number or a variable adjustment.
A single central digit is the menu item number.
Three digits indicates variable adjust mode.

INCREASE OR DECREASE A VARIABLE (eg. GND BAL)

PRESS the ▲ Button to Increase a variable number.
PRESS the ▼ Button to Decrease a variable number.

TURN THE DETECTOR OFF

PRESS & HOLD the ◀▶ Button for 3 seconds.

FACTORY RESET

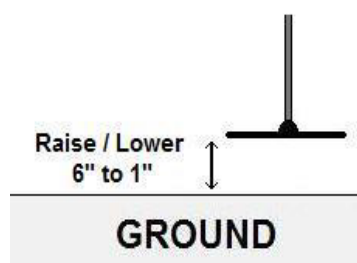
NOTE: The Factory Reset can only be performed with the detector switched OFF

PRESS & HOLD the ▼ Button then PRESS the ▲ Button for 2 seconds, then release the ▲ Button.

MENU CONTROLS :: MANUAL GND BAL

1: MANUAL GND BAL (MGB)


(Setting range is 1-200 with Factory preset at 100)



Note: Do not hit the search coil with the ground surface as this can produce unexpected results when trying to ground balance the detector.


The detector will respond to the natural mineralization of the soil and provide the operator with false signals. It is necessary to Ground Balance the detector to only register the signals generated by metal targets.


The Ground Balance procedure is as follows.

Turn ON the detector; PRESS the  button on menu option number 1 to open the MGB (Manual Ground Balance) setting.

Very slowly RAISE and LOWER the search coil up and down from the ground surface – approximately 6” inches down to 1” above the ground and repeat.

Take note of what the audio does as the coil is in the DOWNWARD MOTION.

If the audio on the downwards motion is a LOW tone/pitch increase the MGB by pressing the  button.

If the audio on the downwards motion is a HIGH tone/pitch decrease the MGB by pressing the  button.

When the tone has faded to a minimum, the detector will be ground balanced.

UNABLE TO GND BAL

If the ground balance is difficult to achieve or after setting the ground balance the detector becomes noisy for no apparent reason. Try a MODE setting 6 to 15 as this will help reduce the feedback from hot mineralization pockets of ground.

Furthermore keeping the search coil 1” off the ground can help stabilize the detector at the cost of losing some **sensitivity** on some targets.

Higher Mode settings can reduce audio response on very small targets.

ADVANCED MANUAL GROUND BALANCE TECHNIQUE

When detecting extremely variable ground there is a method to prevent wasting time digging "ground noises". While swinging the coil take note of the response to determine either rising or falling pitch.

If the **pitch rises**, toggle the GB DOWN 4 counts (or UP 4 counts if the **pitch falls**) then swing over the patch again. If the signal has diminished or has disappeared then don't bother digging, it's a ground noise. Restore GB to previous value and continue detecting.

AUTO GROUND BALANCE FUNCTION (AGB)

Setting range 1-200 with Factory preset at 100

Note: Do not hit the search coil with the ground surface as this can produce unexpected results when trying to ground balance the detector.

When the tone has faded to a minimum, the detector will be ground balanced.

1 Hold the coil about 15" off the ground, press and hold the AGB button while lowering the coil

2 The AGB Button MUST be released when the coil is about 3" from the ground.

This first procedure is always required if the current GB setting is far different from the current ground.

3 Take note of which direction (up or down) of the Ground Balance number changed.

4 For minor GB adjustments press and hold the AGB button and bob the coil up and down to the ground.

5 If a minor precision adjustment is required use the manual GB procedure aided by Procedure 3.

If the audio on the downwards motion is a LOW tone/pitch increase the GND BAL by pressing the ▲ Button.

If the audio on the downwards motion is a HIGH tone/pitch decrease the GND BAL by pressing the ▼ Button.

MENU CONTROLS :: THRESHOLD B – (BIAS)

2: THRESHOLD B (BIAS)

(Setting range is 1-99 with Factory preset at 50)

Note: BIAS can change slightly overtime depending on temperature.

When the detector is Ground Balanced the audio volume will be very low.

Lowering the BIAS will accentuate rising pitch targets (generally a small target) When prospecting for fine gold fit a small coil and adjust the BIAS accordingly to suit the coil using a known specimen target.



Raising the BIAS will accentuate falling pitch targets (usually large targets) When prospecting for larger specimens fit your selected coil and adjust the BIAS to suit your selected coil.

NAVIGATING TO BIAS


PRESS the  button on Option Menu Item # 2, to open the BIAS setting

BIAS NEUTRAL POSITION

Locating the “Neutral Position” which is determined by raising and lowering the BIAS and taking note of the numbers.

Start by raising BIAS with  button until it the BIAS starts to get to a certain volume level e.g. 58. Then lower the BIAS with  button until you get the same volume level e.g. 44. The example range is 58 less 44 = 14. Halve the 14, which becomes 7. Add 7 to 44 = 51.

SMALL SEARCH COILS


Once the neutral position has been located, decrease the BIAS with the  button until a slight threshold volume is created. This will boost target responses for smaller targets in the ground.

Use a test target of say 0.2g. If the 0.2g is louder and more noticeable, then BIAS has been achieved for better detection on smaller targets.

MEDIUM SEARCH COILS

Once the neutral position has been located, leave the BIAS at the neutral position to achieve a good even target response on both smaller and larger targets in the ground. Raise VOLUME (Menu Item #3) to create desired audio threshold volume.

LARGE SEARCH COILS

Once the neutral position has been located, increase the BIAS with the  button until the desired threshold volume is created. This will boost target responses for larger targets in the ground.

Use test target of approx. 0.2g. If the 0.2g is faint or undetectable, then BIAS has been achieved for better detection on largertargets.

MENU CONTROLS : THRESHOLD A - (VOLUME)

3:THRESHOLD A (Volume)

(Setting range is 1-90 with Factory preset at 50)

The VOLUME control in conjunction with the BIAS controls the detector's audio signal. Best results can be achieved by using a selected coil and MODE to suit either large or small targets, setting VOLUME low and using an appropriate BIAS to set the audio Threshold or setting BIAS to neutral and use VOLUME to create desired threshold

ADJUSTING VOLUME

PRESS the  button on Option Menu Item # 3 to open the VOLUME setting

Increase the VOLUME number with the  button.

Decrease the VOLUME number with  button

MENU CONTROLS :: GAIN

4: GAIN

(Setting range is 1-10 with Factory pre-set at 1)


GAIN amplifies target response, ground & mineral noises and EMI.

GAIN only marginally improves detection depth. For better depth penetration use a larger search coil.


Set GAIN as high as possible. If ground becomes noisy or impossible to detect or recognize a target in audio, check ground balance or reduce GAIN until stable.

Note: Ensure that GAIN is re-checked often, usually after a Ground Balance as mineralized ground may allow a higher GAIN setting depending on the prevailing ground conditions.

ADJUSTING GAIN

PRESS the  button on Option Menu Item # 4 to open the GAIN setting

Increase the GAIN number with  button.

Decrease the GAIN number with  button

MENU CONTROLS :: MODE

5: MODE


(Setting range is 1-15 with Factory preset at 3)

The MODE function matches the search coil to the detector's receive circuitry. If the mode is increased the sample delay time is also increased which decreases detection distance on tiny targets but also improves ground handling ability. Some search coils may need a higher or lower mode number to run better in certain grounds, with good target response.


ADJUSTING MODE

In order for MODE to work correctly the detector first needs to be Ground Balanced. See Page 6 on how to ground balance.

Note: BIAS and other settings should be set after MODE has been configured.

PRESS the  button on Option Menu Item #5 to open the MODE setting.

Increase the MODE setting with the  button.

Decrease the MODE numbers use  button.

MODE 1 has the shortest sample delay and provides the best performance in less mineralized ground with a small coil on small targets.

Note: Some coils may require increased MODE if adjusting the DELAY cannot achieve GROUND BALANCE.

MODE 15 is best used in extremely mineralized ground to help reduce ground feedback noises at the cost of losing some smaller targets.

NOTE :

Use the lowest MODE number the ground will allow.

If the ground is very hot or changeable don't hesitate to increase MODE to 15.

Note higher MODE numbers are more susceptible to EMI.

MENU CONTROLS :: SMF

6: SMF


STATIC MAGNETIC FIELDS

(Setting range is 1-100 with Factory preset 50)

As a search coil is swung through the Earth's magnetic field

(Static Magnetic Field) an undesirable signal is generated in the search coil particularly when detecting vertically up the sides of banks or cuttings. The factory pre-set setting is 50 is used to minimize this signal. Further, if as a result of the ageing of electronic components the SMF cancellation can be adjusted. To adjust SMF use a large coil and swing the coil vertically as when detecting vertical creek banks. Adjust SMF up or down to minimize any signal fluctuation.

ADJUSTING SMF

PRESS the  button on Option Menu Item # 6 to open the SMF setting.

Increase the SMF number with  button.

Decrease the SMF number with  button

MENU CONTROLS :: BATTERY

7: BATTERY

Displays the battery range from ~5.98 - 9.99 Volts

The detector is designed to run on a battery voltage of **10 Volts maximum** and 6 Volts minimum.

To protect rechargeable batteries, the detector will automatically turn off when the battery voltage is below 6 Volts.

Note: If the detector shuts off due to low battery then current settings will NOT be automatically saved.

Further, the **REMOTE SPEAKER** if fitted, needs to be turned **ON/OFF** independently. The speaker contains **3/AAA** batteries that can be replaced after carefully separating the speaker body and speaker base.

MENU CONTROLS :: PITCH

8: PITCH

(Setting range 1-50 with Factory preset at 25)

To alter the Audio Pitch to the Operator's preference

INCREASE the **PITCH** number with ▲ button.

DECREASE the **PITCH** number with the ▼ button.

This usually only need to be done when the Operator is happy with the setting.

Take note of the desired number as "Factory Defaults" will reset the value to 25.

MENU CONTROLS :: SMR

9 : SMR

SYNCHRONOUS MAINS REJECTION

Setting range is 1-200 with Factory preset at 107. Adjusting SMR can be used to null out 50Hz mains EMI that is off frequency.

It may also be used to null out other rhythmic EMI sources from microwave towers, 2/way radio transmissions or similar sources of disturbance.

FERRITE EMI SUPPRESSORS



Included in the base package are 2x ferrite EMI suppressors as required by Australian Law. One ferrite EMI suppressor needs to be fitted to the search coil plug inserting into the detectors control box for each coil intended to be used with the detector.

SEARCH COIL TYPES

The QED detector can be used with most MONO coils but is likely to perform poorly with a DD search coil.

The typical round MONO coil will produce an inverted cone shaped energy field generally providing greater sensitivity and depth than a standard DD coil.

An elongated MONO coil however will generally produce a deeper but narrower energy field than a circular coil of similar dimensions.

SET UP YOUR DETECTOR

- A. Turn the detector **ON** and **Ground Balance** the detector using either the **MGB** (Manual Ground Balance) or the **AGB** (Auto Ground Balance) procedures as described in MENU CONTROLS.
- B. Select the appropriate level of MODE setting reflecting the size of coil to be used, the target size, soil depth and level of soil mineralization anticipated.

Use SMALL coils for fine gold in shallow ground with MODE setting #1 to #8.
Use LARGE coils for large deep gold with MODE settings say #8 to #15

- C. Note function **SMF** (Static Magnetic Fields) is available when detecting vertical faces such as creek banks. Refer to MENU CONTROLS for details.
- D. Select **THRESHOLD B (BIAS)** and adjust settings.
- E. Select **THRESHOLD A (VOLUME)** and adjust settings.
- F. Select **GAIN** and adjust to amplify target signals.
- G. Adjust **PITCH** to preferred signal response.
- H. As required, adjust SMR to null out external EMI interference if detected. (Default value of #107 should work in most instances and only change if non random rhythmic EMI is present).

HOW TO SEARCH THE GROUND

Turn the detector **ON** and **GROUND BALANCE**, then complete the set up procedure as shown above.

Lower the detector coil to the ground and move slowly forward, swinging the detector from side to side parallel but just clear of the ground.

Sweep the coil in a wide arc without lifting the coil at the end of each arc. Overlap each swing over the previous arc to ensure you do not miss any targets.

When a target is identified swing the coil over the target in one direction, then repeat again at right angles to confirm target and location. A good target will produce a clear repeatable signal.

Dig out your target and remember to refill your excavation on completion.

FINE TUNING EXERCISE

An exercise to show how Threshold A (Volume) and Threshold B (Bias) work/interact.

Attach a small coil, 8" diameter or less.

Obtain a small shotgun pellet or similar size nugget and a \$1 Australian coin.

Set **MODE** to 1, **GAIN** to 4 **THS-A (Volume)** to 30 and **THS-B (Bias)** to around 50.

Ground Balance the detector.

Make certain there are no metal targets in the ground and place the 2 targets about 3 feet apart.

Swing over both targets and note the signals.

Reduce **THS-B** until the threshold audio signal volume is as high as tolerable and swing coil over both targets again.

Increase **THS-B** through and past the null point (around 56) until the threshold audio signal volume is as high as tolerable and swing coil over both targets again.

Set **THS-B** to null point (around 50) and raise **THS-A** until the threshold audio signal volume is as high as tolerable.

Swing over targets again.

Increase **MODE** and repeat entire procedure and taking note of which **MODE** number gave the best result.

TECHNICAL SPECIFICATIONS

A single channel Pulse Induction metal detector using a differential integrator as the null summation / averaging means to null the ground and static magnetic fields.

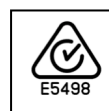
The method is based on the published papers or lapsed patents of the early pioneers Eric Foster, Chapman and Howells and more recently the lapsed patent of Dr. George Paltoglou and Australian Innovation Patent AU2010101019.

The front end blocking circuitry is US Patent Pending by Dave Emery and is used under license.

Average current consumption 450mA, voltage limits 6v min to 10v max.

Audio PWM VCO & VCA.

Digitization method Bipolar Integrating (200uS) ADC
Display, 3 digit LED Backlit Transflective LCD
EMI Compliance # E5498



MANUFACTURER'S WARRANTY

If within one year (12 months) from the original date of purchase, if the QED detector PCB fails due to a genuine fault, INTERFACION Pty Ltd will repair or replace parts at its option.

Manufacturer's Warranty Claim:

- Simply return the control box to the Dealer where you purchased it.
- The unit must be accompanied by a detailed explanation of the symptoms of the failure.
- You must provide proof of date-of-purchase before the unit can be serviced.

Note: Manufacturer Warranty is transferable, which covers one year from the original purchase date, regardless of the owner. Software updates are cost-free to units within the warranty period.

Manufacturer's Warranty excludes:

Any accessory items such as batteries, search coils, straps, cords, shafts, nuts / bolts, external speaker and arm rest, or third-party accessories, shipping/handling costs are not covered by the Manufacturer's Warranty.

Manufacturer's Warranty is voided if damage has been caused by over-voltage batteries or batteries incorrectly fitted with reversed polarity, any accident, misuse, neglect, abuse, alterations, modifications, unauthorized service, or prolonged exposure to heat, corrosive compounds, water, including salt water. **Warning: do not open control box as it may contain lead.**

Note: All transport costs will be the customer's responsibility. Manufacturer's Warranty does not cover postal, courier charges or any transport cost to and from customers, service centre or dealers.

This manual may be updated over time.

NOTES

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