INTERFACION PTY LTD

ACN: 614 858 990

QED – PL4
OWNERS MANUAL

Proudly made in Ballarat, Victoria, Australia

QED image is for illustration purposes only

QED INTRODUCTION

Congratulations on your purchase of the QED 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

DOCUMENT CHANGE CONTROL

Date Document Revised	Version
25 January 2021	V0.1 (initial PL4)
2 March 2021	V0.2 (for review)
2 March 2021	V1.0
14 April 2021	V2.0 (inclusion of PowerBank start process & new legs info)
15 July 2021	V2.1 (amended sections dealing with GAIN)

TABLE OF CONTENTS

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.

Note: The start procedure for the PowerBank version is described in Step 4 in START UP.

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

Use the ◆ button to TOGGLE between menu item select and menu item adjustment.

Press and hold the ◆ button to TURN OFF the detector.

Use the ⏚ button to either return to the MGB Value or to perform an automatic Ground Balance.

Click on this YouTube link to view an explanation of the QED Control Panel functions.

START UP	
	Note: As the QED is marketed in various configurations, these steps are indicative only.
Step 1	Connect a suitable coil.
Step 2	Depending on which power option you have, connect either: • The Battery Pack power cable, or • The PowerBank USB Power Cable
Step 3	Connect the headphones to the QED audio out Connector/Jack
Step 4	To turn the QED PL4 on, do as follows: • ***For the Lithium Battery Pack version*** turn Detector ON by pressing the▲ BUTTON. • ***For the PowerBank version*** turn Detector ON by: 1. First pressing the on Button on the side of the Cuff (as shown here), then press the QED▲ BUTTON. 2. The PowerBank will turn off after about 15 seconds – (*this is normal so don't worry*) 3. Re-press the QED▲ BUTTON and the PL4 will start and stay on until you turn it off.
Step 5	Scroll through adjustment menu item numbers by pressing either▲▼ buttons. When on the required adjustment menu item number press the ◆ button
Step 6	INCREASE variable using▲ or DECREASE using▼
Step 7	To return to variable menu press the ◆ button.
Step 8	To turn detector OFF, press and hold the ◆ button and current adjustment settings will be saved.
Step 9	To reload Factory Default Settings, • Set the Gain to any number other than 001; or set Mode to any Mode other than 003 • Turn the detector OFF • Then PRESS and HOLD the▼ button while pressing the▲ button. • Check Gain, if set to 001 (or Mode is 003), then the Factory Reset has been successful.

MENU OPTIONS

1: Manual Ground Balance	**6: Static Magnetic Fields (SMF)**
2: Threshold B (Bias)	**7: Bat TMR**
3: Threshold A (Volume)	**8: Pitch**
4: Gain	**9: Synchronous Mains Rejection (SMR)**
5: Mode	**10. Track (Note: not yet implemented)**

FACTORY DEFAULTS

Setting		Range	Factory Default
Manual Ground Balance		001 - 300	150
Threshold B (Bias)		001 – 099	050
Threshold A (Volume)		001 – 090	030
Gain		001 – 010 001 - 064	001
Mode	Gold Detecting in Mineralised Ground	001 – 010	003
	Beach Mode	011	003
Static Magnetic Fields (SMF)		001 – 100	050
Battery		Displays: ~5.98v – 9.99v	
Pitch		001 – 050	025
Synchronous Mains Rejection (SMR)		001 – 200	107
Track ***(not yet implemented)***		-	-

QUICK START GUIDE

For people new to the QED, use the following Quick Start Guide to start detecting as quickly as possible without having to understand all of the available settings and when/why to use them.

When you feel confident in using the QED and wish to adjust the various QED settings based on coil size, ground conditions, a nd target type (small; all; large) to name a few, then refer to the Advanced Setup Guide.

Step	***Description***
Perform a ***Factory Reset***	▪ First, adjust MGB to something other than the factory default of 150 ▪ PRESS and HOLD the ▼ button, then press the ▲ button, then release both buttons. ▪ Ensure the MGB is now set to factory default of 150

> ***Tip:***
> ***Once you have performed a factory Reset, the QED may be noisy if your THS-B NULL point is not near the factory default of 50. In this case, adjust THS-B until quiet.***

THS B	***Set to NULL*** ***Find your "NULL" by raising and lowering Threshold B and taking note of the numbers as per the following procedure:*** ▪ Start by raising THRESHOLD B with the ▲ button until the THRESHOLD B starts to get to a tolerable volume level (e.g. 054). ▪ Then lower THRESHOLD B with the button ▼ until you get the same volume level (e.g. 044). ▪ The above example range is 054 to 044 = 10. ▪ Half of 10 is 5. ▪ Adjust up by 5 to 049, which is NULL
Ground Balance	***MGB*** ***Ensure no metal targets are under the coil before you perform a MGB*** ***From approximately 6"-12", slowly move the coil towards the ground and take note of the audio tone as the coil is in the DOWNWARD motion:*** ▪ If the audio on the downward motion is a LOW tone, then you will need to increase the MGB until quiet ▪ If the audio on the downward motion is a HIGH tone, then you will need decrease the MGB until quiet
THS A	***Start at Factory Default (030) and increase until a (slight) threshold is heard***

> ***Tip:***
> ***Once you have adjusted the detector to suit, leave the detector in the MGB adjustment setting so that you can quickly adjust the GB whilst you are detecting.***

Target Response	***Get a* 5c coin and a $2 coin and set them approximately 60 cm apart.** ▪ Swing over the 5c coin and you will get a ***high*** then ***low*** target response ▪ Swing over the $2 coin and you will get a ***low*** then ***high*** target response **Learn to recognise these different signals as they will assist you in performing the MGB and in addition indicate the size of the target under the coil. These coins are very similar in size but are either side of the ground balance (detection) hole, thus give a different response.**
Notes	

CONTROL COMMANDS

TURN THE DETECTOR ON ***Note:*** ***Refer to START UP – Step 4 for a description of how to start the QED PL4 with the either the Battery Pack or the 15000mAh PowerBank***	Ensure the battery power lead is connected to the lead socket on the control box PRESS the ▲ once to turn the detector on. ***Note: The detector serial Number appears on the screen for a fraction of a second after switch on***
CYCLE THROUGH MAIN MENU OPTIONS	PRESS either the ▲ Button or the ▼ button to toggle through the Main Menu options (1-9)
TOGGLE BETWEEN A MENU ITEM NUMBER OR ADJUST VARIABLE ***Tip:*** ***To quickly get back to the MGB adjustment screen from any setting, momentarily push the AGB button.***	Pressing the ◆ button toggles between displaying the menu item number (e.g "01" for MGB) or a variable adjustment number (e.g. 150 for the MGB number). ***Note:*** • ***Two digits indicates the menu item number*** • ***Three digits indicates variable adjustment mode***
INCREASE OR DECREASE A VARIABLE (e.g. GRD BAL)	Press the ▲ button to increase a variable number Press the ▼ button to decrease a variable number
TURN THE DETECTOR OFF	PRESS and HOLD the ◆ button for three seconds
FACTORY RESET ***Tip:*** ***Before doing a Factory Reset (FR) set THS-A to anything but 030 before the detector is turned off.*** ***Once the detector has been reset, if THS-A is 030 then the FR has been done correctly.***	***Note: The factory reset can only be performed with the detector switched OFF*** PRESS and HOLD the ▼ button, then press the ▲ button for 2 seconds, then release both buttons. ***Note: The Factory Reset will set your THS-B to 050, which may not be your THS-B NULL point and as a result the QED may be noisy. If this is the case, simply adjust THS-B to NULL to quieten your QED before readjusting other settings***
YouTube Reference	Click on this YouTube link to see how to use the QED control Panel

MENU CONTROLS

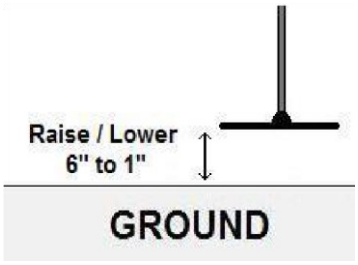
1: MANUAL GND BAL (MGB)

Setting range 001-300
Factory preset at 150

Description

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.



Tip:

The ▲ or ▼ buttons can either be:

- ***Held in if there is a large difference between the ground and the current ground balance setting, or***
- ***incrementally adjusted to achieve the MGB.***

MGB Prerequisites:

- ✓ *Before trying to MGB, swing the coil over the ground to make sure there are no metal targets under the coil, and*
- ✓ *Wait until the audio settles/recovers before lowering the coil to the ground.*

The **Manual Ground Balance** procedure is as follows:

- Select Menu Item 01 (MGB), then press the ◆ button to open the MGB setting.

There are two methods to determine which direction to MGB (either up or down):

1. Perform an AGB and note which direction the AGB moves, either up or down from the current MGB number, or
2. From approximately 6", slowly move the coil towards the ground and take note of the audio tone as the coil is in the DOWNWARD motion:
   - If the audio on the downward motion is a LOW tone, then you will need to increase the MGB
   - If the audio on the downward motion is a HIGH tone, then you will need decrease the MGB

MGB Process

1. If you need to go ***up*** to MGB, then hold the ▲ button depressed whilst very slowly bobbing the coil up and down until the QED is quiet. It is very important to wait for the audio to recover during the bobbing motion before continuing to bob the coil.
2. If you need to go ***down*** to MGB, then hold the ▼ button depressed whilst very slowly bobbing the coil up and down until the QED is quiet. It is very important to wait for the audio to recover during the bobbing motion before continuing to bob the coil.
3. When the tone has faded to a minimum, the detector will be ground balanced.
4. You may need to incrementally adjust the MGB either up or down a few clicks to achieve the final (perfect) GB.

YouTube Reference	Click on this YouTube link to see how to Manually Ground Balance (MGB) the QED.
Unable to Ground Balance	If the Ground Balance (GB) is too difficult to achieve or after setting the Ground Balance the detector becomes noisy for no apparent reason: 1. Try to GB by adjusting the MODE to between 006 – 010 as this will help reduce the feedback from hot mineralization pockets of ground 2. Furthermore, keeping the search coil 1 inch off the ground when detecting can help stabilize the detector at the cost of losing some **sensitivity** on some targets ***Note: Higher Mode settings can reduce the audio response on very small targets***
Rechecking Ground Balance whilst detecting ***Tip:*** ***This method is the reverse of the normal MGB process, as using this method you will need to raise the MGB if you get a high tone and lower the MGB if you get a low tone.*** ***This is because you are listening for the tone as you raise the coil, not lowering the coil.***	To recheck the ground balance, tilt/lift the coil at the end of each left/right swing as you are detecting and take note of the audio response: 1. If there is no response, then continue detecting as the detector is Ground Balanced. 2. If there is a RISING response, use the ▲ button to increase the MGB a couple of clicks (at a time) until the audio response is reduced to a minimum. 3. If there is a DIPPING response, use the ▼ button to decrease the MGB a couple of clicks (at a time) until the audio response is reduced to a minimum.
YouTube Reference	Click on this YouTube link to see how to Recheck the Ground Balance whilst detecting.
Notes	

ADVANCED GROUND BALANCE (MGB) TECHNIQUE

Description

Tip:

A (real) Target will not be 'balanced' out by the +-20 method, even if going +-30 (or more) to determine the status of a target response.

There are now two methods to determine whether to dig a target:

1. +- 20 Method

When detecting extremely variable ground there is a method to prevent wasting time digging "ground noises".

1. While swinging the coil take note of the response to determine either rising or falling pitch.
2. If the **pitch rises**, toggle the MGB DOWN 20 counts (or UP 20 counts if the **pitch falls)** then swing over the patch again.

If the signal has diminished, has moved or has disappeared then don't bother digging, it's a ground noise.

Restore MGB to previous value and continue detecting.

2. AGB Method

This method used the Automatic Ground Balance process over the target.

If as you bob the coil down over the target whilst holding in the AGB button two things may occur:

1. MGB will move to the extremes of the MGB values (e.g. to 001 or to 300). ***This indicates a metal target.***
2. The QED will ground balance out the target.

   If the signal has diminished, has moved or has disappeared then don't bother digging, it's a ground noise.
3. Restore MGB to previous value and continue detecting.

Notes

AUTO GND BAL (AGB)	*Setting range 1-300* *Factory preset at 150*
Description ***Tip:*** ***Always set THS-B to NULL to perform an AGB*** ***Tip:*** ***You may get a better response by adjusting THS-A to a high number***	The **Auto Ground Balance** (AGB) Button  is used to perform an Auto Ground Balance (AGB): • Ensure no metal targets are under the coil before you perform a AGB • Hold the coil about 15" off the ground, press and hold the AGB button while lowering the coil in a very fast motion. • The AGB Button MUST be released before the coil touches the ground. ***Note: This procedure may need to be repeated a few times for the AGB to ground balance the QED and it works better in more highly mineralised ground where significant feedback from the coil is experienced.*** ***Note: Do not hit the search coil with the ground surface as this can produce unexpected results when trying to ground balance the detector.***
YouTube Reference	Click on this YouTube link to see how to Auto Ground Balance the QED.
Notes	

2. THRESHOLD B – (THS-B) (BIAS)	*Setting range 001-099* *Factory preset at 050*
History of THS-B and NULL	To explain what THS-B NULL is, I need to first explain what the Ground Balance is actually doing. The Mineralised ground in our goldfields produces a reaction in the detector the same as a target response. However, this base response can be neutralised (NULLED) by performing a Ground Balance, whereby this mineralised response is effectively nulled out until you get no response from the ground. This sets the detector up to be able to detect responses from targets that are either side of the ground balance point (i.e. rising or falling pitch target responses). When you ground balance the QED, you listen for the response when you lower the coil to the ground, if it's a rising (high) pitch (in other words a short time constant response) you lower the MGB towards the GB NULL point (and vice versa if the response is a falling (low) pitch) until you get no response from the ground in either direction. The QED is then said to be "ground balanced" (i.e. the ground is NULLED). When the QED is ground balanced, targets with a short time constant (small targets) will then produce a rising (high) pitch target response and long-time constant targets (large targets - roughly 2.5 g or larger) will produce a falling (low) pitch response, this equates to either side of the ground balance point. Now back to THS-B. In the very early QED development days, Howard found that temperature changes caused the GB NULL point to drift, so introduced an adjustment to compensate for this drift. This adjustment in those early days was called "NULL". Further experimentation with this adjustment, Howard found that by adjusting "UNDER NULL" resulted in enhanced target response to short time constant (small) targets, and "ABOVE NULL" resulted in enhanced target response to long time constant (large) targets. The further either under or over NULL, the greater the enhancement, until you could go no further either way as a result of the noise being introduced. Howard was on to something unique, and as a result the THS-B adjustment was born as a user adjustable setting. When the QED was first released this adjustment was called "BIAS", because you were able to bias the QED from NULL for better (enhanced) target response for either small or large targets or adjust to NULL for standard responses to small or larger targets. In later releases this feature was renamed to THS-B, with the "B" meaning "BIAS".

2. THRESHOLD B – (THS-B) (BIAS)

Setting range 001-099

Factory preset at 050

Description

Threshold Definition

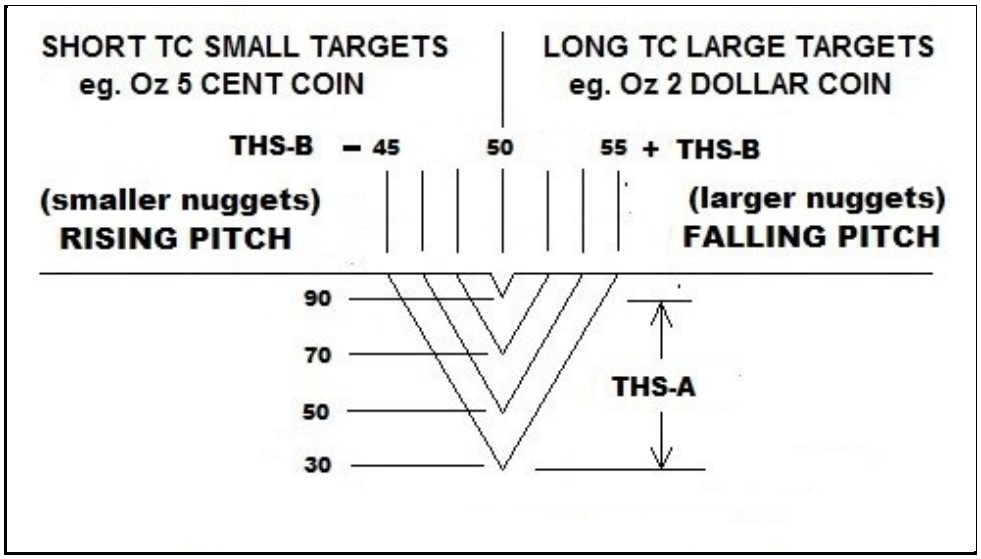
Threshold is the audible audio floor that is set just above 'silent', so that the operator can hear a threshold just above the prevailing external conditions (wind noise, ground conditions, etc)

A small target will produce a rising pitch signal and a large target will produce a falling pitch signal.

THS-B can be used to provide selective ("BIASED") enhancement for either small (rising pitch) or large (falling pitch) targets.

THS-B (Bias) is used to set a 'hair trigger', such that less signal strength is needed to produce a good audible signal.

Note: THS-A (All) does the same thing but affects both large and small (falling & rising pitch) targets equally.



Lowering THRESHOLD B will accentuate rising pitch targets (generally a small target).

- When prospecting for fine gold, fit a small coil and adjust THRESHOLD B accordingly to suit the coil using a known specimen target.

Raising THRESHOLD B will accentuate falling pitch targets (usually large targets).

- When prospecting for larger specimens fit your selected coil and adjust THRESHOLD B to suit your selected coil.

Note: THS-B can change overtime depending on temperature.

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

2. THRESHOLD B – (THS-B) (BIAS)	*Setting range 001-099* *Factory preset at 050*
Navigating to Threshold B	Select Menu Option 02, then press the  button to open the Threshold B setting.

Threshold B NULL Position	Locating the "NULL Position" is determined by raising and lowering Threshold B and taking note of the numbers as per the following procedure:
	• Start by raising THRESHOLD B with the ▲ button until the THRESHOLD B starts to get to a tolerable volume level (e.g. 58).
	• Then lower THRESHOLD B with the ▼ button until you get the same volume level e.g. 044.
	  ○ The above example range is 058 less 044 = 14.
	  ○ Halve the 14, which becomes 7.
	  ○ Add 7 to 044 = 051.
	51 is then the THRESHOLD B NULL position in this example.

YouTube Reference	Click on this YouTube link to see how to set Threshold B to NULL
Small Search Coils ***Tip:*** ***Use a test target of say 0.2g. If the 0.2g is louder and more noticeable after lowering THS-B, then BIAS has been achieved for better detection on smaller targets*** ***Tip:*** ***When searching for small targets: use a small coil, a THS-A of ~030, a gain of about halfway, with the THS-B set below NULL until a slight threshold is created.***	When using small coils for small (tiny) targets, set the THS-B to an acceptable audio level **below** the NULL position. From the NULL position, decrease THRESHOLD B with the ▼ button until an acceptable threshold volume is created (i.e. not too noisy) This will boost target responses for smaller targets in the ground. **Process:** • If a small coil is fitted, test the THS-B out with a small target. • Swinging the coil over it will produce a *rising pitch response*. • Lower the THS-B by one count at a time and note the improvement in detection distance. • Keep lowering THS-B until the background audio is at an acceptable level. ***Note: If THS-A is high then just a change of 001 or 002 on THS-B will make the QED too sensitive/unstable.***

2. THRESHOLD B – (THS-B) (BIAS)	*Setting range 001-099* *Factory preset at 050*
Medium Search Coils	Once the NULL position has been located, leave THS-B at the NULL position to achieve a good even target response on both smaller and larger targets in the ground. Raise THS-A (Menu Item #3) to create desired audio threshold volume.
Large Search Coils ***Tip:*** ***Use test target of approx. 0.2g. If the 0.2g is faint or undetectable, then BIAS has been achieved for better detection on larger targets.***	Once the NULL position has been located, increase THS-B with the ▲ button until the desired threshold volume is created. This will boost target responses for larger targets in the ground.
Notes	

3: THRESHOLD A – (THS-A) (VOLUME)	*Setting range is 001-090* *Factory preset at 050*
Description THS-A increases the sensitivity to all targets, regardless of size. ***Tip:*** ***The more Threshold B can be adjusted below NULL, then better small target detection will be achieved, therefore a low Threshold A is advisable when hunting for small targets***	The THS-A setting, in conjunction with the THS-B setting, controls the detector's audio signal. THS-A increases the audible threshold for ***all*** targets (both rising and falling pitch). Best results can be achieved by using a selected coil and MODE to suit either large or small targets by either: • Setting THS-A low and using an appropriate THS-B to set the audio threshold, or • Setting THS-B to NULL and use THS-A to create desired threshold ***Note: As THS-A is increased, the usable THS-B range will decrease.*** ***Note: If using headphones then you can keep THS-A low and listen to the pitch change as it starts to work at a lower target signal level than volume change.*** ***The pitch change is unaffected by any setting of THS-A.***
Adjusting Threshold A	Select Menu Option 03, then press the  button to open the Threshold A setting, then either: • Increase THS-A with the ▲ button. • Decrease THS-A number with the ▼ button
YouTube Reference	Click on these YouTube links to see some Youtube videos relating to THS-A. • ***THS-A and THS-B relationship*** • ***QED Setup Comparison*** • ***QED – THS-B with small gold and small coil***
Notes	

4: GAIN	*Setting range is:* • *For Pre Gain update: 001-010* • *For Post Gain Update: 001-064* *Factory pre-set at 1*
Description	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.*** ***Note:*** ***The new GAIN of 64 has the same maximum gain as before the GAIN Update, for example the new GAIN of 064 equals a GAIN of 010 on the pre-GAIN update. What the '64' gain gives you is finer control of your GAIN setting.*** ***Take this example as a way of explaining the difference:*** • ***If you were able to dial in a gain of 006 and not 007, then with the '64' gain you may be able to dial in 042, which is equal to ~6.5 on the old gain. Noting that every little bit of gain that you can squeeze in increases your performance.***
Adjusting Gain	Select Menu Option 04, then press the  button to open the GAIN setting, then either: • Increase the GAIN number with the ▲ button, or. • Decrease the GAIN number with the ▼ button.
YouTube Reference	Click on this YouTube link to see how Gain works.
Notes	

5: MODE	*Setting range is:* ○ *001-10 (Gold)* ○ *011 (Beach)* *Factory preset at 003*
Description ***Tip:*** ***Use the lowest MODE number the ground will allowG*** ***Tip:*** ***If the ground is very hot or changeable don't hesitate to increase MODE to 10 as testing has shown that doing so has little impact to detection distance (<30%)***	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, e.g. • **MODE 001** has the shortest sample delay and provides the best performance in less mineralized ground with a small coil on small targets. • **MODE 010** is best used in extremely mineralized ground to help reduce ground feedback noises at the cost of losing some smaller targets. ***Note: Some coils may require increased MODE if adjusting the DELAY cannot achieve GROUND BALANCE.*** 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/tiny gold in shallow ground with MODE setting 001 to 005. • Use medium coils for small and large targets setting mode to suit the coil and the ground. • Use LARGE coils for large deep gold with MODE settings say 005 to 010
Beach Mode	Mode 011 is used for beach detecting and operates with ***no*** ground balance and all targets produce a rising pitch signal. • Wet sand: increase MGB from default until quiet • Dry sand: decrease MGB from default until quiet

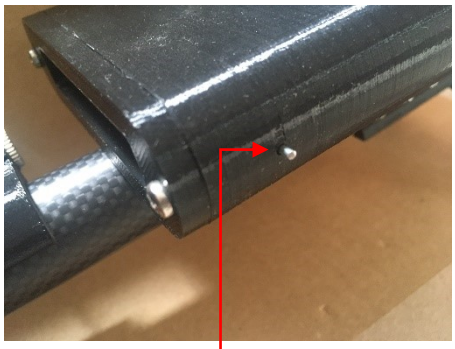
Adjusting Mode	Select Menu Option 05, then press the  button to open the MODE setting, then either: • Increase the MODE setting with the ▲ button. • Decrease the MODE setting use the ▼ button. ***Note: The detector needs to be Ground Balanced after mode has been changed.*** ***Note: Threshold B and other settings should be set after MODE has been configured.*** ***Note: Higher MODE numbers are more susceptible to EMI.***
Youtube Reference	Click on this YouTube link to see how Mode works.
Notes	

6: SMF (STATIC MAGNETIC FIELDS)	*Setting range is 001-100* *Factory preset 050*
Description	SMF is the interaction of your coil's movement through the Earth's Magnetic Field. As a search coil is swung through the Earth's magnetic field (Static Magnetic Field), an undesirable signal (voltage) is generated in the search coil particularly when detecting vertically up the sides of banks or cuttings. The SMF value is used to adjust/cancel this Static Magnetic Field. The bigger the coil and the faster the swing speed the bigger the problem. The factory pre-set setting of 050 is used to minimize this signal. Further, if as a result of the ageing of the 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	Select Menu Option 06, then press the  button to open the SMF setting, then either: • Increase the SMF setting with the ▲ button. • Decrease the SMF setting use the ▼ button.
YouTube Reference	The SMF YouTube Video is coming soon.
Notes	

7: QED PL4 Battery Power	
Description	Three different types of battery Power can be used with the QED PL4, these are: 1. **A single 4 pack** of 18650 lithium batteries that have been manufactured commercially to fit the PL4 short Cuff; 2. **Two 4 packs** of the above 4 pack that fit into the longer cuff made expressly for the double battery pack, and 3. **A 15000 mAh Mobile Power Bank** that fits into a cuff that has been purpose built for the Power Bank.
The single 4 Pack	
Two 4 Packs	Two of the above 4 packs are fitted to a specially designed (longer) cuff.

Mobile Power Bank	The Mobile Power Bank is a 15000mAh Power Pack, with two USB(A) outlets and a USB(C) outlet. It comes with an included USB-A to USB Type C cable for charging. The Manual for the Power Bank can be found here.   Watch this YouTube Video relating to this Power Bank

The Power Bank fitted to the Cuff, *showing the (silver) PowerBank "on" Button located on the side of the Cuff.*



The LED Charge indicators

Battery Pack Care

Warning:

Battery life

If you are not going to use your QED for even a few months I advise that you remove the fuse to prevent slow discharge to a point where the Battery Packs cannot be recovered.

It is advised to charge the QED batteries every few months

Warning:

Temperatue

The lithium batteries used have a maximum stated temperature of 50° C, so do not leave in your car uncovered on a hot day

Individual 18650 lithium-ion batteries

- Can be charged up to 4.2V and down to between 2V and 3V depending on the cell's specification for cut-off voltage.
- To be safe, never discharge lower than 3.0V unless you know your cell's specification.

QED Battery Packs

The QED displays the battery range from ~5.98 - 9.99 Volts

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

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

Note: When the battery is nearly flat a decimal point appears on the screen. If the operator shuts down when the decimal point appears then current settings will be saved.

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

Charging Li Ion Batteries ***Warning:*** Never charge Lithium Ion batteries unattended.	To charge the batteries, you should use a balanced Lithium Ion charger as is supplied with the QED. If it's been charging for some time and you're wondering how it's going, simply turn your QED on, choose number '07 – batt Tmr' and check the battery voltage. If it's in the 8s it won't be long before it's charged. Once you have checked the battery voltage, always turn the QED off as it will take longer to charge if left on (as the coil transmit is active). This procedure can be carried out as often as you need during the charge cycle.
Notes	

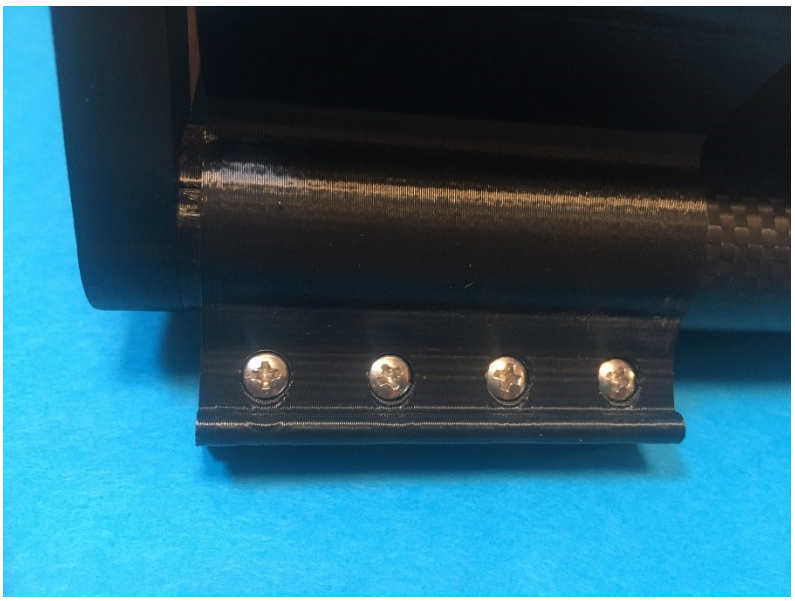
8: PITCH	*Setting range 001-050* *Factory preset at 025*
Description	The PITCH setting is used to set the Audio Pitch to the Operator's preference.
Adjusting Pitch	Select Menu Option 08, then press the  button to open the PITCH setting, then either: • Increase the PITCH setting with the ▲ button. • Decrease the PITCH setting use the ▼ button. Take note of the desired number as "Factory Defaults" will reset the value to 025.
YouTube Reference	Click on this YouTube link to see how to set the Pitch.
Notes	

9: SMR (SYNCHRONOUS MAINS REJECTION)	*Setting range 001-200* *Factory preset at 107*
Description	SMR allows adjustment of the cycle time of the detector to precisely adjust the cancellation of single phase 50Hz mains signals. • 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.
YouTube Reference	The SMR YouTube Video is coming soon.
Notes	

10: TRACK	
Description	The “Track” feature is not yet implemented
Notes	

QED PL4 CUFF ASSEMBLY	
YouTube Reference	Watch this YouTube Video before adjusting or assembling your QED PL4. 

QED PL4 CUFF ASSEMBLY

Cuff Assembly Adjustment Instructions	When adjusting the Cuff on the shaft is is very important to undo or tighten the bolts shown in the photo below ***half a turn each until*** all are completely undone or fully tightened. ***Do not completely undo or tighten each bolt completely before adjusting the next.***  One way to ensure that the bolts are being tightened evenly is to look at the amount of thread protruding out of the nuts at the back – they should be the same on each bolt (see photo below). 

PL4 Legs

Rotating the legs	The PL4 legs fit around the top shaft behind the cuff as shown in the photos below and use a wing nut to tighten into the desired position. To rotate the legs: 1. Undo the wing nut 2. Rotate to desired position 3. Tighten the wing nut.  

LOWER SHAFT

Changing a Lower Shaft	The lower shaft can be removed easily, making it an easy job to change coils if you have each coil on a separate lower shaft. 1. To change the lower shaft: 2. Rotate the lower shaft 'twist lock' clockwise to undo the 'Twist Lock' 3. Once fully undone, separate the lower shaft as per the second photo 4. To refit, place the lower shaft into the middle section such that the coil bolt is aligned at 90° to the Cuff Assembly and twist the 'Twist Lock' anti-clockwise until tight.  

FITTING A COIL

Fitting a Coil

To fit a coil to the QED PL4 Lower Shaft:

1. Undo the Coil bolt and remove, ensuring you keep the two provided coil spacers and the spacer located inside the shaft
2. Fit the two spacers
3. Align the inner spacer

> ***Tip:***
>
> ***At this point push the coil bolt through to align everything before fitting to coil, then once aligned remove bolt.***

4. Place assembled Lower Shaft end into the coil lugs
5. Fit coil bolt and tighten.

FITTING A COIL

Coil Attachment Spacers

Showing spacer inside shaft

FITTING A COIL

Coil Fitted to Shaft

FERRITE EMI SUPPRESSORS

A ferrite is included in the base package.

The ferrite is to be fitted the coil to meet the Australian EMI compliance laws.

One ferrite EMI suppressor needs to be fitted to the search coil plug end (the end inserted into the detectors control box) for each coil intended to be used with the detector.

Note: ***If you require additional ferrites for coils, contact the QED supplier/distributor.***

PL4 Fuse

PolyFuse	The PL4 has a PolyFuse (electronic fuse) located inside the control box, which will “blow” when required. It will however automatically reset once it has cooled down. The PolyFuse does not need to be replaced.

STANDARD HEADPHONES

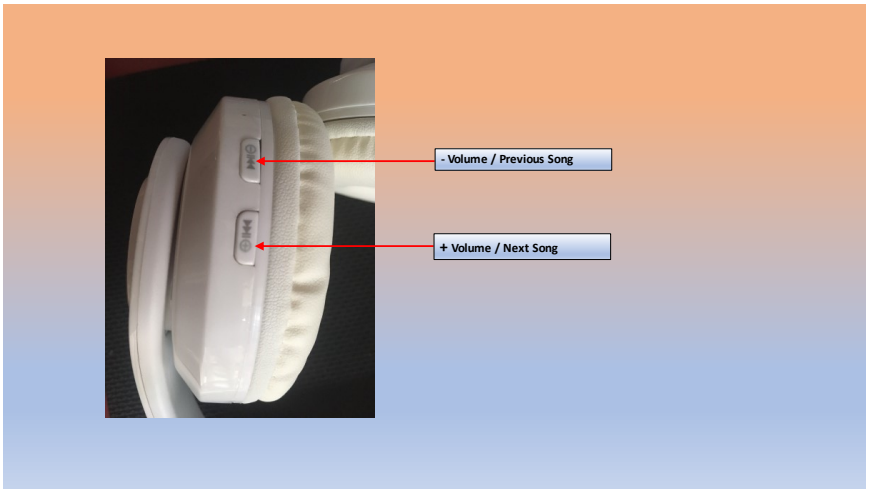
The B39 Bluetooth Headphones that come standard with the PL4 are shown in the photo below. Included in the Headphone box will be a charging cable and a cable to connect the Headphones to the QED.

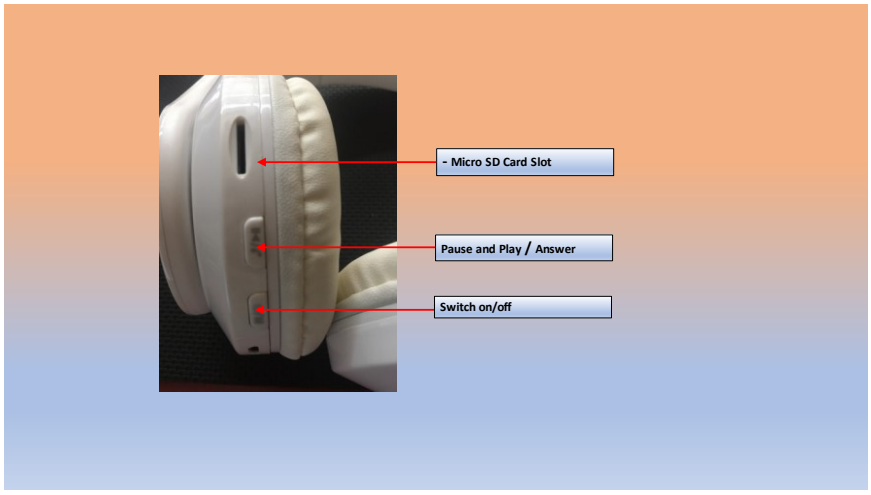
Unpacking the Headphones	The headphones will be in the folded (storage) configuration as in the photo below when you unpack them from the box. Simply unfold each 'arm' until it clicks into place (as shown in the top photo) and they are now ready to use. 

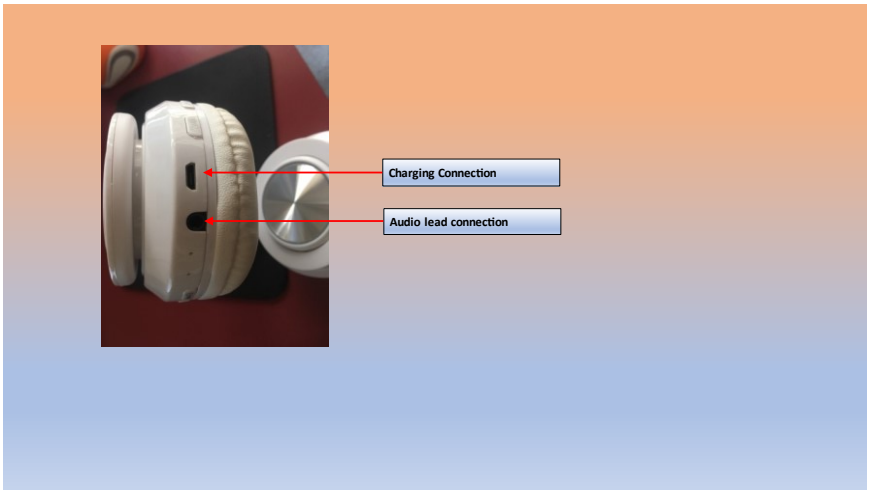
Pairing and Connection	1. Keep the distance between the mobile phone/Bluetooth Transmitter and the headset to within 1 M; the closer the better 2. Press and hold the On/Off button for a few seconds to initiate pairing at which time the red and blue lights will be flashing 3. Enable Bluetooth on your mobile phone and select “B39” to connect 4. After connecting the Headphone blue light remains steady. 5. After pairing is successful, the headset will remember the ‘pairing’ and will automatically connect when close.
Connecting to the QED	1. Plug the supplied 3.5mm plug jack cable into the Headset Audio Jack, then connect the other end into the QED Audio “out” connection 2. Turn the Headphones on  

Charging	1. Connect the supplied charging cable to a standard USB Charger 2. Connect the other end to the Headphones charging port 

Headphone Buttons







SEARCH COIL TYPES

The QED detector can be used with the following coil types:

- MONO coils,
- DD (Double D) coils.

The QED works with the above coil types without the need to change any settings, however when changing to a DD coil, you should always check your THS-A; THS-B, Gain and Mode to see whether you can wring out even more performance from the QED.

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

Note: ***The new Concentric Coils (CC) do work on the QED, but do not achieve the same performance as they do on the Minelab GPX range of detectors, so best to not use them with the QED.***

ADVANCED SETUP GUIDE

The suggested settings below can help you optimise the QED for the type of detecting you are doing at the time, including setup for different target size, ground conditions, EMI, etc.

For example, if you are after small gold using a small coil or if you are looking for any gold or looking just for larger targets using a large coil.

Step	*Small Coil*	*Medium/Large Coil*
Turn the detector **ON**		
Mode	**001 – 005** • ***dependent on ground conditions but as low as possible***	***005 – 010*** • ***dependent on ground conditions but as low as possible***
THS-B	• ***Find your THS-B Null and leave in NULL***	• ***Find your THS-B Null and leave in NULL***
Ground Balace	• ***MGB***	• ***MGB***
THS A	**Low (~030)**	***Start at Default (030) and increase to achieve desired threshold***
THS B	• ***NULL for all targets*** • ***lower than NULL to enhance small target response***	• ***NULL for all targets*** • ***Higher than NULL to enhance large target response***
GAIN	**As high as prevailing EMI conditions and Ground Type allow**	
PITCH	**Adjust to preferred signal response.**	
SMR	**Default (107)** Adjust **SMR** to null out external EMI interference if detected. ***Note: The Default value of 107 should work in most instances and only change if non-random rhythmic EMI is present.***	
SMF	**Default (050)**	
Re-Ground Balance	• ***MGB***	

Tip:
Once you have adjusted the detector to suit, leave the detector in the MGB adjustment setting so that you can quickly adjust the GB whilst you are detecting.

Notes	

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 5c and a $2 Australian coin.
- Set:
  - MODE to 001
  - GAIN to 001
  - THS-A (Volume) to 030, and
  - THS-B (Bias) to NULL.
- 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 air depth and target response:
  - 5c: High / low
  - $2: Low / High
- Reduce THS-B below NULL until the threshold audio signal volume is as high as tolerable and swing coil over the 5c coin. You will notice that the target response is sharper (higher pitch) when compared with the previous signal response and you will get significantly more depth than at NULL. T
- Increase THS-B above NULL until the threshold audio signal volume is as high as tolerable and swing coil over the $2 coin. You will notice that the large target response will be enhanced and you will get significantly more depth than at NULL, and note that you will lose some depth on the 5c coin.
- Set THS-B to NULL and raise THS-A until the threshold audio signal volume is as high as tolerable.
- Swing over both targets again and note the target response and air depth, especially when compared with the THS-A at 030 and as far UNDER or OVER NULL as you can get.
- Increase MODE and GB then repeat entire procedure and taking note of which MODE number gave the best result.

QED SETUP PROCEDURE

QED Setup

The first thing I do is to go for a walk without the detector to check the ground looking for ground depth, mineralisation levels, ground cover, etc.

So if a lot of bedrock is showing through, then the ground will be relatively shallow, or if as I found recently - a lot of vertical 20' shafts with no rock showing in the shaft for about 5' and no bedrock showing, then the ground will be deep, probably too deep. This result determines coil size.

If there is a lot of highly mineralised quartz lying around - the real red stained and fractured type (this can be found in the Victorian gold fields in abundance, especially north of Ballarat, less red and more shiny south of Ballarat), then the area will be highly mineralised, especially if you can pick up the whole world with your magnet. This knowledge will help in setting up the QED later. From experience, not all highly mineralised areas are the same. For example, the quartz at Tibooburra is far less red but with black flecks aplenty, similarly the FNQ Forsyth area is much the same.

Again if there is a lot of undergrowth, then a perhaps a medium/large round coil will be difficult to use, so an elliptical may be a better choice and the size dependent on the outcome from your ground depth analysis.

Walk back to the car to get the mighty QED ready for setup based upon the above determinations.

1. Perform a factory reset (FR), so Gain 001, THS-A 030, Mode 003 and THS-B 050

2. Set MODE: This step is coil dependent - so set Mode accordingly, 001 for small coils, higher for larger coils. E.g. My 11" elite likes mode 003 in mineralised areas, can get it to 002 in less mineralised areas. My 15 round EVO - Mode 005, around the same for the 20" NF.

3. Check your THS-B NULL number and set to NULL.

4. Perform an MGB - if you can't get a good GB, go up a mode until you can achieve a good GB.

QED SETUP PROCEDURE

The next steps are dependent on the coil chosen and what you are going to detect.

Small coil/mullock heaps

1. Drop THS-B until the QED gets noisy, then back up until quiet (probably around 6 under NULL)
2. Increase Gain until noisy, then back down until quiet (or to a point where you are happy with the threshold).
3. Detect very slowly

Small coil/general detecting

1. Same as above, or
2. Raise THS-A to a point where it gets noisy, then back down until quiet
3. Lower THS-B from NULL until the QED gets noisy, then back up until quiet (probably around 1/2 under NULL)
4. Increase Gain until noisy, then back down until quiet (or to a point where you are happy with the threshold) - try to hold the highest possible gain. I generally am able to use a gain of about midway (or thereabouts) in the Vic GT, even higher with the x-coil.

Medium to (small) large coils - shallowish ground

1. Raise THS-A to a very high (075/085) point until it gets noisy, then back down until quiet - try to hold the highest possible THS-A.
2. Set THS-B to NULL or lower THS-B until the QED gets noisy, then back up until quiet (probably around 1/2 under NULL).
3. Increase Gain until noisy, then back down until quiet (or to a point where you are happy with the threshold) - try to hold the highest possible gain.

<table>
<tr><th colspan="2">QED SETUP PROCEDURE</th></tr>
<tr><td></td><td>

large coils - deep ground

1. Raise THS-A to a point where it gets noisy (very high - 075/085, then back down until quiet - try to hold the highest possible THS-A.
2. Set THS-B to NULL, or above NULL to a point where it gets noisy, then back down until quiet probably around 1/2 above NULL
3. Increase Gain until noisy, then back down until quiet (or to a point where you are happy with the threshold) - try to hold the highest possible gain. I generally am able to use a gain of about midway (or thereabouts) in the Vic GT.

If it's a bad EMI day

Instead of using a high/very high THS-A, reduce THS-A to 030 and use THS-B, either:

1. As low as you can tolerate under NULL (with small/medium size coils), or
2. As high as you can tolerate above NULL with medium/large coils.

</td></tr>
<tr><td>YouTube Reference</td><td>

Watch these Youtube Videos showing how to set and use your QED.

- QED Normal Setup
- High/Low; Low/High Target Responses
- Swing Speed
- Not Ground balancing out a metal target
- QED Setup Comparison
- Ground Noise with the QED

</td></tr>
</table>

QED YOUTUBE AND WEB RESOURCES

Videos by Goldman

Click on this YouTube Link to go to Goldman's YouTube Channel

Additional Web Resources

Facebook

Simply request to join

https://www.facebook.com/groups/2879566565451218/?ref=share

Official Web Site

- **QED Manual** ***(Download the QED Manual from here)***

- **QED Training YouTube Videos**

  http://www.qedmetaldetectors.com.au/videos

Gold Prospecting Forum

Request to join.

This is where the QED Tip are published. They are not published anywhere else.

http://australianelectronicgoldprospectingforum.com/

QED YouTube Channel

https://www.youtube.com/channel/UCCRTukijBOTackaon2JwImQ/featured

Goldman YouTube Channel

https://www.youtube.com/channel/UCu4yiQk1UUilnMfGFqfaxfg

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 Ground Balance method is based on the published papers or lapsed patents of the early pioneers Eric Foster, Poole, 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 No.: 10,181,720 B1, dated 15 Jan 2019 by Dave Emery and is used under license.

Click here to read the Dave Emery Patent.

Average current consumption 400mA, 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

Manufacturer's Warranty

The QED control box/boxes have a 5-year retrospective Manufacturer's warranty, which commences from the original purchase date and is transferable.

The control box/boxes warranty covers parts and labour.

Note: ***Software updates are cost-free to units within the warranty period, however the QED Detector owner is responsible for all transport costs to and from the QED Manufacturer (INTERFACION PTY LTD).***

Manufacturer's Warranty excludes:

The shaft, speaker and batteries (if supplied), are not included in the Manufacturer's warranty.

The control box/boxes Manufacturer's warranty does not cover damage caused by:

- Over or reverse voltage supply
- Alterations
- Accident
- Neglect
- Abuse
- Misuse
- Water ingress, or
- Unauthorised modification/service.

Warning: do not open control box as it may contain lead.

Coil(s)

The coil(s) supplied with the QED at the original purchase date of the QED detector are warranted by the coil manufacturer, not the QED Manufacturer (INTERFACION PTY LTD).

Manufacturer's Warranty Claim:

The QED Detector owner is responsible for all transport costs to and from the QED Manufacturer (INTERFACION PTY LTD).

Before returning a detector for Manufacturer's warranty repair, email qedmetaldetectors@gmail.com to get the postal address for INTERFACION PTY LTD and to describe the suspected problem.

This manual may be updated over time.

QED TIPS

Coil Choice

Your coil size choice on any given session indicates what you are looking for. For example, if you decide to use a Sadie, 8" commander, 9" elite then you are looking for relatively shallow targets, which are mostly small gold (rising pitch). Of course if the small coil is waved over a shallow big bit (falling pitch) then you're in luck.

It's unlikely that you are patch hunting with a small coil, therefore using THS-B below NULL will accentuate the small targets, especially the really small bits that another well known brand and model excels at, but which when set up correctly, the QED and one of the above coils will find the same targets.

You could use a relatively highish THS-A (070 plus) with a THS-B as far below as you can (you'll maybe only get 2 -3) below NULL or a medium THS-A setting (035-065), with THS-B way below NULL to achieve similar results.

If you are using a medium sized coil (11" to 14"), then by definition you are sacrificing the really small gold in preference to finding bigger gold at greater depth so you are looking for any gold in range of the coil. You SHOULD still use THS-B below NULL with highish THS-A (060-090) as most gold in this range will be smallish bits, with hopefully many larger bits. Note that the 'A' in THS-A is for ALL gold, so should be used high, with THS-B (just below NULL) to accentuate smallish gold and to increase depth.

With large coils (18" +) then you are definitely looking for big gold at depth (and sacrificing small gold) so a really, really high THS-A (075-090), high Gain (max if possible) with THS-B above NULL (you'll maybe only get one above) is the way to go.

In all of the above scenarios:

- Constantly check your Gain with the view of increasing it when you can.
- You can only go as high with THS-A as the ground will allow, ditto with the THS-B below or above NULL
- the Trick is to setup without the QED being noisy but still with maximum allowable performance.

THS-B

SMALL COIL
Lowering THS-B below NULL accentuates rising pitch targets.

Just as importantly, it also increases depth; the more you can lower THS-B below NULL, the more depth you will get. The depth increase is significant.

Even if you are using very high THS-A settings, which by itself increases depth, you will get even more depth if you can lower THS-B as well, even if it's only by 1.

By doing so you will be utilising one of the QEDs greatest features, the ability to dial in maximum performance when needed.

The one disadvantage of accentuating rising pitch targets by lowering THS-B is that it will also accentuate rising pitch ground noises. So if you are in an area with lots of rising pitch ground noises, then it's best to use THS-B much closer to NULL and much higher THS-A settings.

LARGE COILS
The same applies when using medium to large coils, where you will be using very high THS-A settings. If you can increase THS-B above NULL by just 1, you will get greater depth

I urge you all to try these types of settings as you will be amazed how much extra depth you will achieve.

THS-B and rising pitch targets

As we all know, lowering THS-B below NULL accentuates rising pitch targets, that is small gold; shotties, etc.

But it also accentuates other non-desirable rising pitch targets like hot rocks and rising pitch ground noises.

So if you are in an area which is prone to lots of rising pitch hot rocks and/or lots of rising pitch ground noises, then raise THS-A (say from 030 to 050; or from 050 to 070; or higher), then set THS-B to just under NULL or at NULL.

The QED will be less sensitive to rising pitch targets and you may miss the really small ones, but it will not be pinging off as much over hot rocks, etc. creating a more harmonious detecting experience.

Other strategies to reduce the effect of hot rocks and or highly variable ground is to GB over the hot area and see if you can detect without further GB changes over the surrounding ground.

Raising the coil a little more above the ground can also help to reduce the effects of hot rocks and/or ground noises.

Factory Preset Values and THS-B

Once you do a factory preset, all setting values will reset to their default values, including THS-B.

050 is the default factory preset for THS-B, but be aware that 050 is not necessarily the THS-B NULL point (for your QED).

If your QED THS-B NULL is not 050, then it may be noisy detecting using the factory preset values until you adjust THS-B to your normal 'detecting' setting.

I have seen QEDs with their NULL at 044, so doing a factory reset with THS-B at 050 will most definitely create noise as 050 is way above the QED's NULL.

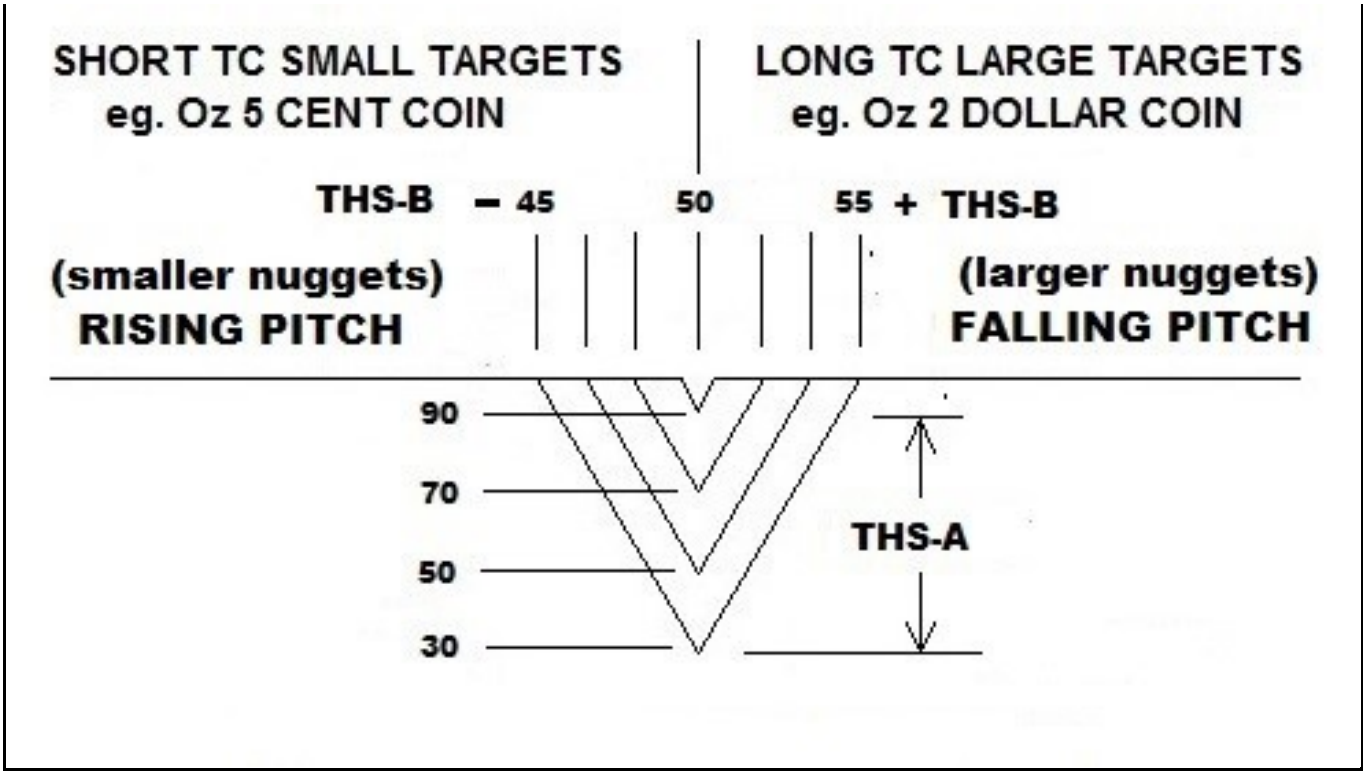
Just something to be mindful of when you are out and about finding gold in our fantastic goldfields.

THS-A and THS-B relationship

With THS-A set to near max or at max (090), then the useable THS-B band has decreased to perhaps 1 (no more than 2, and it would be noisy) either side of null.

Conversely, with low THS-A, then the useable THS-B is around 5-6/7 either side of null.

The following diagram shows this relationship:



This is how the QED can be set up right on the edge of max performance, either looking for small stuff (biased very low) or looking for bigger stuff (high bias), or at NULL using THS-A (high) looking for any targets.

The A in THS-A means 'all targets'. Once the above is understood (with the appropriate Mode, and Gain), then you are well on your way to utilising the full potential of the QED.

BTW, near max (or max) THS-A, is another way of finding the THS-B null point, as the least noisy THS-B point is null.

Ground noise identification with the latest 2019 upgrade

For those with the upgrade, the +/- 4 method to determine whether your signal is a ground noise is still a valid process, HOWEVER, now instead of +/- 4, you really need to move the MGB about 20 either way. It's the same principle with which way to go (up or down) as before.

In my testing, a ground noise signal will start to diminish after about 12 clicks, however will definitely diminish after 20 clicks, I now sometimes go +/- 30 just to be sure.

QED and EMI

If you are suffering from EMI when out and about in the goldfields (i.e. getting unwanted wavy type responses with the coil stationary), then:

1. Drop THS-A down to around 030, and then
2. Drop THS-B as far below NULL as you can get.

A medium/high/very high THS-A (say anything above ~045) will pick up more EMI than when at ~030.

So when you drop to A=030, and you drop B as far as you can below NULL you will find that the effects of EMI will be much less and you'll be able to detect more or less normally.

If you still get some EMI coming through, then increase THS-B more towards NULL.

This works for atmospheric generated EMI. Of course, if you have an electric drill operating very nearby, then no amount of setting changes will eliminate it.

Ground Balancing with the latest 2019 upgrade

For those lucky QED owners with the latest 2019 upgrade, there are two methods to initially determine whether to go up in numbers or down to GB.

1. Listen for the tone as you lower the coil to the ground and determine whether it is:
   - A high (rising) pitch, in which case you'll need to go down in numbers, or
   - A low (falling) pitch, in which case you'll need to go up in numbers
2. Use the AGB to determine which way it wants to go, up or down in numbers
   - Once you've got the direction, then very, very slowly bob the coil whilst depressing the appropriate (up or down) button.
   - You will notice that it will get quieter and quieter as you approach GB, at the quietest point release the button.
   - Bob the coil to check the GB and if needed incrementally adjust to get a perfect GB.

Manual Ground Balance (MGB)

Two things to remember when performing a MGB:

1. Always allow the audio to recover before moving the coil back down to the ground, and
2. MGB slowly; take your time and you will get a much more precise ground balance, for example, the minelab ground balance (bobbing) speed is way, way too fast and you will probably not be able to ground balance. Slow it down; find the rhythm based on the audio recovery time and you will find the MGB works perfectly.

QED factory Default Setting

The factory default settings have been designed to put you in a 'safe' position:

- if you get into difficulty (e.g. either messed the settings up or it's very noisy for no reason), or
- If you have on purpose set the QED up 'on the edge' using most of the settings available to push the limits and you want to quickly get back to some sort of standard for all settings.

The manual has a quick start guide (for beginners) that starts from the factory default position and suggests adjustment of only two settings:

- THS-A up from default (030) until a threshold is heard, and
- Adjusting gain up from default (001) as high as is possible given the prevailing ground conditions and EMI.

You can successfully detect using factory pre-sets, but I would at least do as the quick start guide suggests, with the addition of setting Mode appropriately and setting THS-B appropriately.

Not forgetting the all-important GB.

QED and powerlines

One of the QEDs big advantages over other detectors is its ability to operate directly under single phase powerlines without interference.

The SMR (Synchronous Mains Rejection) default value of 107 has been designed to eliminate single phase 50 hz main signals. SMR is menu option 09.

If you do get some EMI under single phase power lines, then adjust SMR to null out 50hz mains EMI that is off frequency.

SMR can also be used to null out other sources of rhythmic EMI (e.g. microwave towers, 2-way radio transmissions, etc). So if you know you are in an area where these are a problem, then try adjusting SMR to see whether you can null the resulting EMI.

I have tested this myself (powerlines) on numerous occasions and I can tell you that this feature really works.

This feature is unique to the QED and is a feature that Howard designed into the QED from the very start of the design.

If you do adjust SMR, then don't forget to reset it to the factory default setting (107) after you have finished detecting under/near the powerlines, otherwise you will find that your QED is noisy when next you are out detecting.

QED Fuse

The QED fuse will blow

1. If the input voltage goes over 10 volts, and
2. If the battery polarity is reversed

I strongly advise that the batteries are not removed unless you need to change them. This prevents damaging the battery terminals, and also eliminates the possibility of putting them back in the wrong way around.

When turning the QED on just press the UP button once quickly.

- If there is a fault with the coil the detector will try to shut down immediately but if the button is pressed for too long the fuse will blow.

Note: ***For the PL3, the glass fuse will blow***

For the PL4, the polyfuse inside the control box will blow, but will reset automatically once it cools down

Rising vs falling pitch targets

When determining a 'dig target' or a 'non dig target', the following is offered:

1. Falling pitch with a high/large detection distance, then dig every time
2. Rising pitch with a high detection distance would be suspicious as rising pitch targets are typically small, which would not normally offer a high/large detection distance

Be suspicious, but be wary of not digging targets.

Couple the rising pitch and high target response analysis with the double dip response normally associated with a ferrous object that's long and thin (e.g.: a nail or piece of wire), bearing in mind that the double dip will occur when moving the coil along the length of the above object, single target response when moving at right angles to the length of the object. So, test the suspicious targets from all angles. If rising pitch and high target response and a double dip, then be very suspicious.

take your time to evaluate the suspicious targets, then armed with your informed target analysis, either dig or walk away.

Of course always do a visual, it's amazing what you can see when you really look; Tin, foil, etc are often just a look away. Next try the magnet (if you have one), then do as per the above.

Targets with a long and narrow profile

Targets with a long and narrow profile (e.g. nails, wire, etc) will give a double tone when detected along their length, but a single target response when moving at right angles to the length of the object

So when you get a signal, always check it at 90 degrees to the original angle and if either one gives

a double dip, walk away in confidence. Then using the tip above "**Rising vs falling pitch targets**", determine whether to dig the target or not.

Worth noting that you will get a single tone when a nail is vertical.

The thinking is that when it is lying horizontally it couples one side of the coil to the other distorting the field and causing the wobble.

Audio Recovery

Just to state the obvious, always wait until the audio (fully) recovers before swinging back over a target.

It is amazingly easy to swing back too soon and thus not get the expected signal response on the way back over the target.

Next time you are out, experiment with the above and you will see what I mean.

It is very important to swing over the target in both directions and past the target so that the target is no longer under the influence of the coil.

This will also allow the double tone indicator or wire/nails to be heard.

Beach Mode

Not a great deal has been said about beach mode (mode 016 pre-update; 011 post update), so I offer the following advice:

Even though beach mode has no ground balance, the MGB still works but in a more internally simplistic manner, so can be used to quieten the QED as follows:

Start at MGB of 150, then

- Wet sand: increase MGB from default until quiet
- Dry sand: decrease MGB from default until quiet

If any other users have used the QED on sand or at the beach, then please add your tips here so that others can benefit from your experience.

THS-B NULL Variance

The THS-B NULL setting can vary by as much as 5 from a very hot day (approx 30+C) to a very cold day (approx. 10 C), so it's most important to find your NULL point each time you are out detecting.

As the box warms up, especially from a cold day, the THS-B NULL point may move, so check it again after around 30 minutes just to be sure.

In addition, THS-B NULL may vary between QEDs, meaning that your mate's QED NULL could be a different number to your own on the same day at the same place.

So for both of the above reasons, we should all refer to our THS-B setting as relative to NULL. For example, use '2 below NULL'; 3 above NULL, etc, rather than using a hard number like 045.

For some fellow QED owners 045 is NULL, whereas for others it could be 5 below NULL.

By referring to it this way will ensure that anyone wanting to try out someone else's settings will be able to set up correctly and hopefully find a bit of yellow.

Abnormally Noisy QED

There are a number of things to check if your QED appears to be abnormally noisy:

- Check and clean your coil plug both on the coil side and the QED side. Any dust in either can cause unwanted noise.
- Ensure that the coil plug is 'done up tight' so that no movement can occur within the plug.
- Ensure that your batteries are clipped solidly into place as any movement can cause unwanted noise.
- Check fuse security to ensure that the fuse is securely mounted.
- Check your audio jack connection(s) to ensure your connection is tight and 'clicks' in solidly.
    - This applies equally to the large audio plug (into the QED itself) and if you are using one, the small audio plug connection into the audio plug adapter.
    - For example, my audio plug adapter (small to large) fit became sloppy and caused all sorts of noise issues when out last week. New plug adapter and all is quiet again.

Checking/adjusting Ground Balance on the fly whilst detecting

An easy and fast way to check and adjust the ground balance on the fly is a worthwhile tool to have in your arsenal. Once you get used to it, it can save you a lot of time.

It is as simple as swinging the coil in an upwards direction at the end of your swing, like a pendulum, to check the GB. This is contrary to good detecting practice where for even/maximum detecting distance a full flat swing from side to side is essential.

So from time to time to check the GB while you are detecting, swing the coil up at the very end of your swing and take note of any pitch change:

1. If you are still in GB, the detector will remain quiet, so keep detecting
2. If you get a rising pitch, adjust the MGB up until the detector is back in GB
3. If you get a falling pitch, adjust the MGB down until the detector is back in GB

It's worth noting that for this to work effectively and quickly for you, the QED should be in the MGB adjust setting whilst you are detecting. I always set it back to this position after adjusting anything so that I am ready to adjust the MGB while I am detecting. A quick way to do this is to momentarily push the AGB button - this sets the QED back to the MGB adjust setting from any setting.

The above 'on the fly' GB method is a quick and effective method to check/adjust the GB without stopping to perform the standard MGB process, which takes more time.

it's also worth noting that the 'on the fly' MGB adjustment direction is the reverse of the standard MGB process, which is based on the pitch as you LOWER the coil to the ground.

Ground Balance Leeway

In some ground here in the Victorian Golden Triangle, you can achieve proper GB anywhere in a 50 click range, whereas other areas (i.e. Maryborough, Western Australia), the GB needs to be spot on

Rising Pitch Targets

In very mild to mild ground, for rising pitch (small) targets use the highest GB number where the QED is still in GB. This will enhance detection distance for rising pitch targets.

Falling Pitch Targets

in very mild to mild ground, for falling pitch (large) targets use the lowest GB number where the QED is still in GB. This will enhance detection distance for falling pitch targets.

Changing Mode

After changing the Mode always perform a GB.

The following tables shows quite clearly how much the GB changed from mode 1 through to mode 15. Note that these figures were obtained with the QED prior to the 2019 upgrade.

Mineralised Ground			
QED with 11" Commander			GB'd
THS-B	GAIN	MODE	Reading
50	1	1	156
THS-A	1	3	138
50	1	15	128

Mineralised Ground			
QED with 12" EVO			GB'd
THS-B	GAIN	MODE	Reading
50	1	1	146
THS-A	1	3	132
50	1	15	122

BTW, the GB number is just a number for your reference, there is no mineralised ground scale like the Richter scale for earth quakes

Detection Hole

The QED has a:

- Rising pitch for short time constant (TC) targets (one side of the detection hole) and
- falling pitch for long TC targets (the other side of the detection hole).

The hole typically occurs where the ground has a similar TC to the target, which will generate a poor or fluffy target response and a loss of depth.

This can be simulated at home by using alfoil folded into a few layers and to end up at about 8"

square. Put the detector on an outside table, with the coil in a vertical position and setup the detector as follows: (*Note figures for pre 2019 QED Upgrade*) MGB: 100; THS-B: 050; THS-A: 030; Gain: 001; Low Mode (e.g. the lowest Mode for your coil; I used 003 with my coil).

Bring the alfoil square up to the coil and note the response and detection distance. it will produce a falling pitch target response and I was getting about 14" with the 11" elite. If it produces a rising pitch, it's too small, so start again and make your alfoil square larger.

Cut about 5 mm off of one end and retest. Keep doing this and at some point, the detection distance will start to fall and produce a wavering (fluffy) target response - this is the detection hole. Now cut off a very small portion and retest. Keep doing this until the target response once again becomes clear and positive, but this time it will be a rising pitch target response.

The QED detection hole is very narrow, but if you think that a target is in the 'hole', then change Modes and reground balance.

In the QED, changing the Mode moves the position of the detection hole (along the decay curve), thus will lift a fluffy sounding target out of the (previous Mode) detection hole.

A technique to ensure that nothing has been missed due to the 'hole' is to do a patch with a low Mode setting with a small coil, then switch to a large coil with a high Mode setting.

Most prospectors will never experience the detection hole, however if you do experience something akin to what's described above, you now know what it is and how to deal with it.

It is definitely worth noting that the Detection Hole in the latest QED with the 2019 upgrades – GB and DD coils – has become even more narrow, so there is less likely hood that you will ever experience the detection hole out in the field.

Low battery voltage

Warning

if the batteries are left in the QED for more than 3-4 months, they will go flat and will be unrecoverable. To prevent this, remove the fuse if you are going to store the QED for more than a few months.

People have been asking about the QED batteries and how long they may last, so I thought it was a good time to discuss the low battery operation of the QED.

To do this I have extracted and slightly edited the battery section from the manual above, as it says it all quite well and is as follows:

———

The QED displays the battery voltage in the 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 the rechargeable batteries, the detector will automatically turn off when a low battery voltage is detected.

When the battery reaches 6 volts a decimal point appears the RHS of the screen for a (very) short time before the detector switches off at 5.95 volts.

- If the operator shuts down when the decimal point appears the current settings will be saved.

- If the detector shuts off due to low battery voltage the current settings will NOT be automatically saved.

———

So when you are out and about detecting and you are getting to about the 8 hour mark, continually check your battery voltage and keep an eye out for that decimal point on the screen. The decimal point comes on no matter which screen you are on.

However it's probably best to turn the QED off (which saves your current settings) before your battery voltage drops to 6 volts, swap out the batteries for a fully charged set and continue detecting.

Charging Your QED

Just a little tip when charging your mighty QED.

If it's been charging for some time and you're wondering how it's going, simply turn your QED on, choose number '7 - batt' and check the battery voltage. If it's in the 8s it won't be long before it's charged.

Once you have checked the battery voltage, always turn the QED off as it will take longer to charge if left on (as the coil transmit is active).

This procedure can be carried out as often as you need during the charge cycle.

Charging Your QED battery extender pack

If you have the battery extender pack attached and connected to the QED, and the batteries are 'flat' after having been used to their detecting capacity, then be aware that when being charged by the standard (supplied) charger, the charger will get quite hot and stop charging.

After it has cooled sufficiently, the charging cycle will recommence.

Nothing to worry about, but obviously it will take longer to charge than anticipated.

NOTES