



MET 30+

Metal Detectors
Operating Manual

MET 30+

Operating Manual

(Q875-0143/ENG Issue 2)

Models Covered

Met30+ VFD & Touch Screen
Software Version 4.xx

Supplied By: _____

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Amendments

Lock Inspection Systems seek to update manuals to include new features and improvements whenever possible. The revision history is intended to highlight advances from previous issues of this document.

Revision History		
Issue	Date	Reason For Issue
1	2 nd January 2007	Initial release.
2	12 th January 2010	Page 29 Section 5.5.7 amended.

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1. GENERAL

The instructions given in this manual have been written clearly and briefly to enable an easy understanding of the actions necessary to operate this equipment.

In order to ensure trouble-free and reliable service it is strongly recommended that operators of the equipment are provided with this manual in order to familiarise themselves with the controls and procedures.

2. HEALTH AND SAFETY

2.1 Health and Safety at Work etc. Act

The Purchaser shall comply with the instructions and information of this manual, and it is strongly advised that all personnel associated with this equipment be made familiar with the information contained herein.

It is essential that the personnel engaged on the operation of the plant be competent and experienced in the work, and that they comply with the statutory requirements and regulations, including the provisions of the Health and Safety at Work Act, and any amendments that may become legal requirements.

Note: For installation of the MET 30+, 1f, 3f range of metal detectors refer to the Installation Manual.

3. INTRODUCTION

This is the operating manual for the MET 30+ 1f and 3f range of metal detectors including horizontal, pharmaceutical, waferthin, vertical-fall and pipeline, with VFD or Touch Screen displays.

The MET 30+ detector uses the latest developments in digital signal processing ensuring complete product integrity. The detector is able to store up to 100 sets of automatic product set up values in memory.

The MET 30+ detector is capable of detecting and rejecting ferrous, non-ferrous and non-magnetic stainless steel.

A penetrating electromagnetic field is generated within the detector head, and any metallic contaminant within the detector specification will distort the electromagnetic field and be detected no matter how deeply embedded in the product.

On detection a reject relay is activated, this relay is used to switch the automatic reject device, which rejects the contaminated product.

3.1 Detection Sensitivity

The sensitivity of a metal detector is governed mainly by the size of the aperture through which the product is passed and is particularly dependent upon the minimum dimension of that aperture. Therefore, in order to obtain a high sensitivity on a given product, the aperture size should be kept as small as convenient while allowing sufficient clearance around the product to prevent blockages.

To overcome discrepancies due to the shape of a metal sample, sensitivities are always quoted in terms of diameters of spherical samples. This is referred to as 'Spherical Sensitivity'.

3.2 Detection Envelope

The MET 30+ detector software creates a detection envelope after an automatic setup is performed, it uses this envelope as a means of detecting metallic contaminants. For a signal from a metallic contaminant to operate the detection relay it must produce a vector signal large enough to pass through the periphery of the detection envelope. (See fig 1a and 1b).

You can alter the sensitivity of the detector by increasing or decreasing the dimensions of the envelope, known as the width and height. Increasing the envelope size decreases the sensitivity and decreasing the envelope size increases the sensitivity. It is found that in the majority of cases altering the width of the envelope is all that is required to increase or decrease the sensitivity.

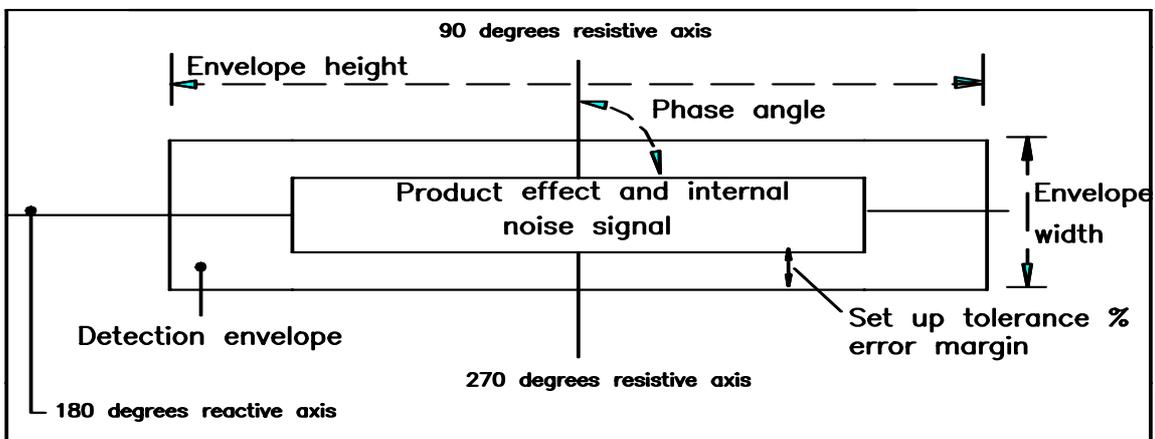


Fig 1a Metal detection envelope.

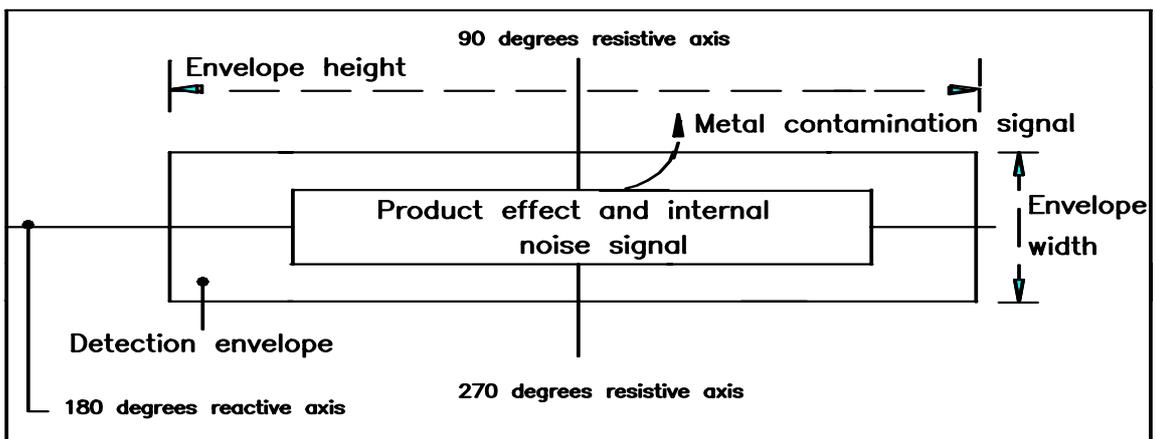


Fig 1b Metal detection envelope with a metal contamination signal shown breaking out of the detection envelope.

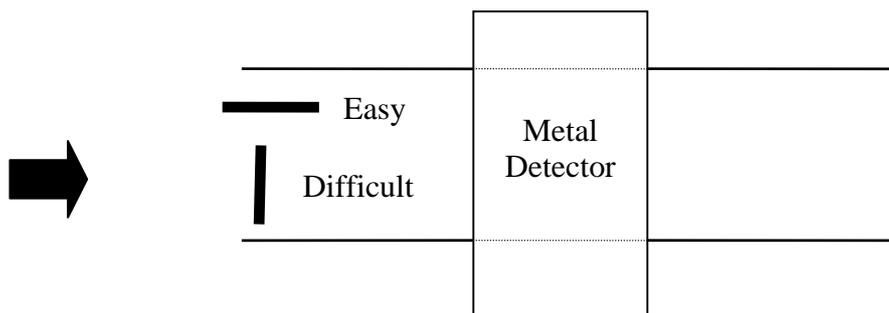
3.3 Orientation Effects

If a wire sample of a particular metal is passed through the aperture, it will be readily detected if the diameter of the wire is equal to or greater than the 'spherical sensitivity' of the metal detector to the same metal.

When the diameter of the wire becomes less than the 'spherical sensitivity' the orientation effects will be noticed. The wire will be detected more easily with its long axis presented one way into the aperture than it will be when presented in another (See figure 1c).

Figure 1c shows that when a piece of non-ferrous or stainless steel wire points in the direction of travel, it is in the most difficult position to detect, and when pointing 90° to the direction of travel, it is in the least difficult position. For ferrous wires, the situation is reversed.

FERROUS



NON FERROUS

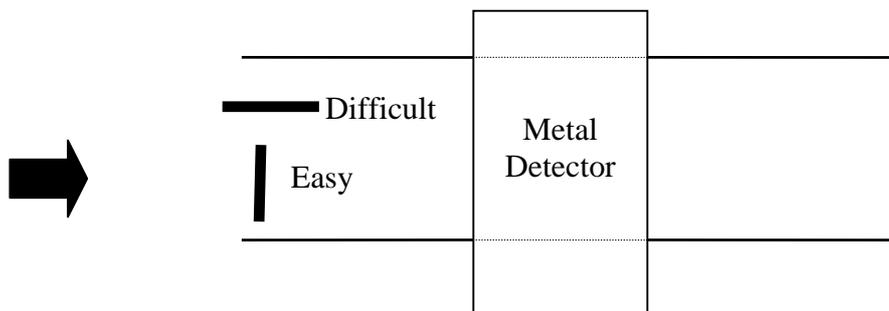


FIG 1c Orientation Effect

3.4 Sensitivity Gradient

Sensitivity is higher around the peripheries of the aperture and somewhat lower through the central axis of the aperture. Quoted sensitivities are always given for the least sensitive area of the aperture, that being along the central axis of the aperture.

3.5 Product Effect

Some products can produce electrical signals when passed through the metal detector aperture thus making it appear as though there is contamination present. This is because the product is electrically conductive due to various factors such as moisture, salt, metallic oxide content, packaging etc.

If there is product effect seen during the automatic setup of a product, the detector will automatically set an envelope around the product effect signal. This will ensure that the product effect signals are ignored during production thus preventing false detection.

If a product has any effect then the resulting detection envelope will be bigger, this bigger envelope will therefore result in a decrease in sensitivity of the detector.

3.6 Scope Of This Manual

Below is a summary of the information contained in each section of the manual:

Setting up the machine

A description of the user interface to the detector (display and keypad) is in this section. Following this is a test to make sure that the basic system is working correctly. This is followed by details of how to set up the system for a particular product, including detection parameters and timer types.

Using the software

A complete reference to the software. Every option in the software is described.

Operation Chart

Block diagram of the MET 30+, 1f and 3f menu system.

Troubleshooting Guide

A list of common problems that may be encountered and possible solutions.

Sample test guide

Detail sample test instructions.

Printer

Detail printer instructions.

Touch Screens

For the MET 30+ range of metal detectors equipped with a 'Touch Screen' display there are a number variations in operation, and additional features which take advantage of a larger display. Touch Screen users should consult the 'Touch Screen Displays' section of this manual.

Glossary

A list of terms specific to metal detectors, and their meanings.

4. SETTING UP THE MACHINE

The detector and reject system (if fitted) should now be completely installed. The aim of this section is to describe how to set up the detector for a particular product, including automatic setting of detection parameters and calibration of timers for accurate rejection.

For more detailed explanation of the software, please consult the 'Using The Software' section of this manual. If problems are encountered during setup, read the troubleshooting section of the manual.

4.1 Detector Display and Keypad

Switch on the detector, but not the conveyor (if fitted). The display should look similar to that shown below.

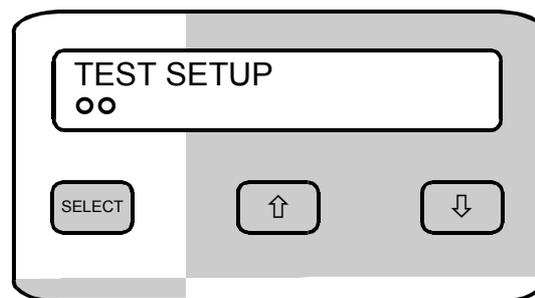


Figure 1 : VFD Detector display and keypad

The display has two lines of 20 characters, and after power on or reset, the top line shows the current product name and the bottom line shows a "bargraph". The bargraph can be used to see how good a product setup is, the circles show the size of signal being detected, the more circles the larger the signal. Solid circles indicate that metal has been detected. Hollow circles indicate product effect or metal contamination that is not large enough to trigger the metal detector. If many hollow circles are displayed each time a product passes then the detector may be at risk from false triggering. When no signal is detected two circles will be displayed on the bargraph to indicate that the detector is actively looking for metal.

The keypad has three keys, labelled from left to right: **SELECT**, **↑**, **↓**. If at any time it is required to reset the unit, all three buttons on the keypad should be pressed simultaneously. This causes the unit to reset as though it has just been switched on.

4.2 Initial Test

Every detector is shipped with test samples - small pieces of conveniently packaged metal with which to test the detector. Before the detector is shipped, it is set up to see these samples without false triggering (false triggering is when the detector indicates that it has seen metal when none is present, and is due to electrical noise, vibration, large product effect, etc.). This setup is stored on the detector under the name "TEST SETUP".

With the detector switched on, check the bargraph to make sure that the machine is not false triggering. If the detector starts to false trigger, consult the trouble-shooting guide.

Pass the test samples through the aperture. The detector is least sensitive in the centre of the aperture, so the best test is to pass the sample through the centre of the aperture. When passing test samples, make sure that hands, rings, watches etc. are kept away from the aperture. If the detector does not see the test samples consult the trouble-shooting guide.

4.3 Product Setup

The aim of this subsection is to get the metal detector to learn the characteristics of a particular product. In order to do this, some product samples will be required. The description of how to use the software is kept deliberately brief in this subsection, for more detail see the next section in the manual: 'Using the software'.

Press **SELECT** on the keypad, you should be asked to enter a security code. The factory default setting for this is 2000, so enter the code and display should then show:

TPRCSrEDoex
Do Sample Test

Press **↑** four times, then **SELECT** to choose setup product. Press **SELECT** again to choose "New product", and then type in the product name. Use the **↑** and **↓** keys to change the current letter, and when this is correct press **SELECT** to move to the next letter. When the product name is finished, press **SELECT** again to accept it. The display should now show:

➔	Automatic
	Manual

It is not recommended to do a manual set-up, this is primarily for testing by service engineers.

Once the **SELECT** key is pressed to start the automatic setup, product will need to be passed continuously until the setup is finished, otherwise the detector will be unable to learn the product's signal correctly. While passing the product make sure that no metal goes near the aperture, particularly watches, rings etc.

Press **SELECT**, the display should show:

Gain = High	
Pass product	1

Keep passing product until the display shows something similar to the following:

Met30+ 1f		Met30 + 3f		
W=100	H= (32000)	W=100	H= (32000)	
G=H	P= 0.0°	G=H	P= 0.0°	F=H

Press **SELECT** to return to the display showing the product name and bargraph. The detector should now be setup to ignore the signal from the product, but still see metal. Pass the product through the aperture and make sure that the detector does not trigger. If it doesn't, move on to the next subsection: 'Timer setup'. If the detector does trigger on the product read the notes below.

Notes on automatic setup

The detector will usually be able to set itself up automatically, however the following points should be borne in mind. Products can have different effects depending on their temperature, moisture content and packaging. Orientation of product can also affect product effect, e.g. if a setup is done with products passed lengthways, a product passed widthways may be rejected.

If the product varies a lot, or the environment is electrically noisy, then the sensitivity of the detector may need to be reduced. In order to do this read about 'product detection envelope', 'Height adjustment' and 'Width adjustment' in the next section of the manual.

4.4 Timer Setup

Note: The reject timer configuration for a pharmaceutical, waferthin, vertical fall and pipeline system are correctly configured in the factory and should not be amended.

Every product has a timer associated with it. This timer is responsible for deciding when the reject mechanism should be activated after metal contamination has been detected by the software.

When a new product is created the timer values for the previous product are copied into the new product. If the new product is a different size to the previous one, it may be necessary to adjust some of the timer values. The values can be changed in the 'Adjust reject timer' option in the 'Using The Software' section of this manual. Please read this before proceeding.

There are two parts to this:

1) Timer configuration: The first is to tell the detector what sort of system is connected to it, i.e. whether it is variable speed and whether there is a product gating photocell or not. To tell the detector about the system connected to it, enable the relevant timer inputs and adjust their polarities according to the instructions in the subsection entitled 'Configure system' in the 'Using The Software' section of this manual. This should already be set up if the conveyor and reject mechanism has been supplied by Lock.

2) Timer values: The second step is to set the correct timer values to reject the correct product as follows:

Press **SELECT**. As before you should be asked to enter the security code. The factory default setting for this is 3000. Using the  and  keys the reject timer menu is available under (r) Adjust reject timer. The timer configuration menu is available by selecting the (e) Engineering setup menu and scrolling through the available options until (c) Configure system is found.

There are two basic situations with regard to setting timer values: either there is a synchronising photocell, or there isn't. Other variations will be discussed later.

4.4.1 No Synchronising Photocell (Applicable for Pharmaceutical, waferthin, vertical fall and pipeline systems)

Only two parameters are used in this situation: delay time and reject time.

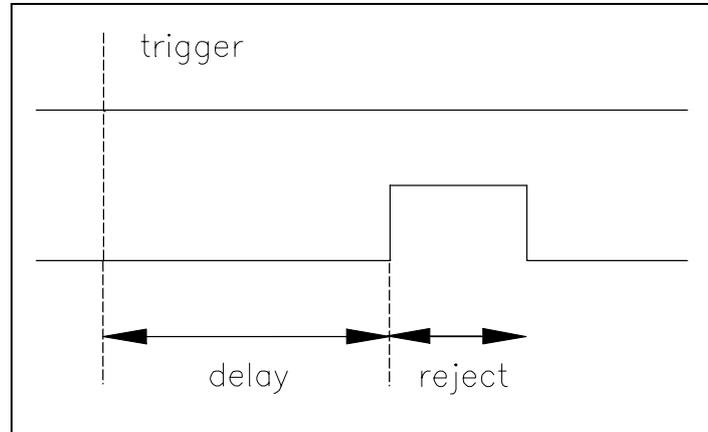


Figure 2 : No Synchronising Photocell

When the detector detects metal it generates a trigger pulse. This starts a delay timer. When the delay timer expires the reject relay is activated. The time for which the reject relay remains active for can be changed by adjusting the reject time. If there are many triggers, the reject relay will be activated after the correct delay, for each trigger. For an immediate reject, set the delay time to 0.00.

4.4.2 Synchronising Photocell (Applicable for conveyerised systems only)

This system uses a photocell to make sure that the contaminated product is in the correct position with respect to the reject mechanism. Four parameters are used in this situation: delay and reject time as before, plus a photocell delay time and an enabling alarm time.

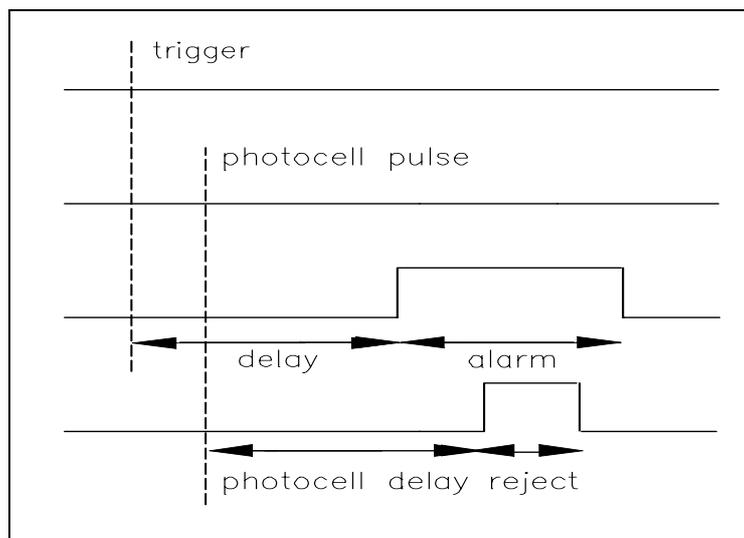


Figure 3 : Synchronising Photocell

When the detector generates a trigger a delay timer is started as for the "no synchronising photocell" situation. When the delay timer expires an enabling alarm timer is started. The reject mechanism will only activate while this alarm timer is active. As each product passes along the belt it breaks the synchronising photocell beam and generates a photocell pulse. A photocell delay timer is then started. If this expires and the product was uncontaminated then the alarm timer will not be active so nothing happens. However if the product was contaminated then, when the photocell delay timer expires, the alarm timer should be active. In this case the reject relay is activated.

In order to set this timer up, set the delay time to 0.01s and the alarm time to something large, e.g. 10.0s. Set the reject time, 0.2s is typical for an air-blast or pusher reject. Pass a contaminated product (which only just triggers a reject) and adjust the photocell delay until the reject mechanism operates at the correct time to reject the product, i.e. if the reject mechanism activates too late then reduce the photocell time, and vice versa. Note that a 'R' is shown in the top right hand corner of the display when a reject is triggered.

Once the reject and photocell delay times have been set up, the delay and alarm times need setting. If these times are not correct then good product preceding or following the contaminated product may be rejected as well.

Attach a metal sample to the back of the product and pass the product through the metal detector. The product should be rejected. Increase the delay time by 0.1s and pass the product again. Keep doing this until the product is not rejected. Decrease the delay time by 0.15s to allow a safety margin. (If the system has a variable speed conveyor decrease the taco pulses by 2 to allow a safety margin.)

To set the alarm time a similar procedure is performed. This time the metal sample should be placed on the front of the product, and the alarm time decreased until the product is not rejected. To speed up the process, adjust the alarm time in large steps initially, e.g. 10s, 5s, 2s, 1s. Increase the alarm time by 0.15s (or 2 delay pulses) to allow a safety margin.

4.4.3 Variable Speed Conveyors

For variable speed conveyors, the timers work in exactly the same way, except that the delay time, and where applicable the photocell delay time, are measured in tacho pulses, i.e. these values are based on distance travelled rather than time elapsed.

5. USING THE SOFTWARE

This section of the manual describes what the software does and how to use it. It is intended mainly for reference and is not meant to describe how the software would typically be used, or why certain options are required.

5.1 Power up

When the unit is switched on it will display the product name and bargraph. This is called the normal running display.

TEST SETUP ●●

Pressing the \uparrow or \downarrow keys will cycle the display through the product setup, status and back to the bargraph. None of the information can be modified at this level.

Pressing the \uparrow key will first show a screen showing the reject and product counts (Standard), or reject counts and type of reject (Pharmaceutical only): S = Size of signal, P = Phase of signal.

Met30+ Standard		Met30 + Pharmaceutical	
Prod count:	31473	S	92 P 45.0
Rej count:	12	Rej count:	12

The next screen to be displayed shows detection parameters:

Met30+ 1f		Met30 + 3f		
W=100	H= (32000)	W=100	H= (32000)	
G=H	P= 0.0°	G=H	P= 0.0°	F=H

W is the width, H the height and P the phase (θ) used for detection as shown on the diagram below. **Note:** width and height refer to characteristics of the electrical signal from the product, and have nothing to do with the physical dimensions of the product.

The height value is shown in brackets if height-checking is disabled, i.e. the height is not being used for detection and the product detection envelope is open-ended.

The other figure displayed is the gain (G) and there are two gain settings with code version V4.xx, i.e. High and Low. With all other code versions the maximum Gain of the system is 15. If the product effect is large, the gain will be reduced.

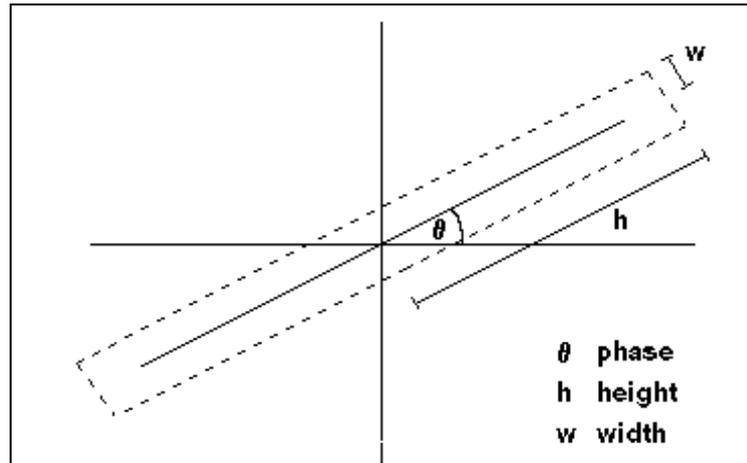


Figure 4: Product detection envelope

By simultaneously pressing **SELECT** and \uparrow the following engineering displays are shown. (\uparrow and \downarrow key's can be used to cycle through the displays.)

The first screen shows version information:

30+ V4.xx	csum =1234
89235/1 95x38	1 MHZ

The top line of the display shows the version number stored in the EPROM and the checksum of the EPROM. The bottom line shows the detector id string. This is free format text and would typically be used to show the serial number of the head, its frequency etc.

The next screen shows Machine type (For lock service engineers only):

Pharmaceutical	
Intermediate	VFD

The top line of the display shows the machine type. The bottom line shows the selected software filter and display type (VFD, ELD or LCD displays).

The next screen shows timer parameters:

Ph,DI =	2.50,	2.00s
Al,Rj =	5.00,	0.35s

The abbreviations have the following meanings:

- Ph = Photocell delay time.
- DI = Delay time (from trigger to start of alarm time).
- Al = Alarm time (time during which delayed photocell pulses will cause rejects to occur).
- Rj = Reject time.

The exact form of the display varies with system configuration. If a variable speed conveyor is being used all timer values apart from reject time will be displayed as a number of tacho pulses (pul). If the system has no photocell then photocell delay time and alarm time have no meaning, so they will not be displayed.

The way timers work and how to set them up is explained in the subsection entitled 'timer setup'.

The next screen shows the systemchek time (**only if configured**).

Syschek time	5.00s
--------------	-------

The next screen shows the NOISE TEST option.

NOISE TEST :- Press 'SEL' Key

Pressing the **SELECT** key initiates a Noise Test. A message is displayed asking the user to wait. After a short time the data is displayed as detection parameters and is updated continuously.

The next screen shows the test-tacho function (**only if tacho is configured**).

The test-tacho function allows you to view the tacho sensor pulses on a variable speed conveyor system. The conveyor must be switched ON for this display to show the correct information.

Sec 5	Pul 0
Pulses/Sec	0

By pressing the **↑** key you can reset the display to zero and by pressing the **↓** key you can display the pulses/sec.

5.2 Security Codes

Four security codes are used by the software, in increasing order of security these are: operator, supervisor, engineer and Lock. When the unit is supplied they are set to a default code but this can be altered by the user. They are:- OPERATOR 1000, SUPERVISOR 2000 and ENGINEER 3000. The Lock code is for use by Lock Inspection service engineers and contains machine configuration and debug options.

On pressing **SELECT** from the normal running display (where the product name and bargraph are displayed), the following screen is shown:

Enter security code: 0

Entering the operator code allows access only to the operator functions (changing product, sample test and print report).

Entering the supervisor code allows access to supervisor functions in addition to operator functions and so on. If any of the four security codes have the same value, then the software will allow access in line with the highest level security code. For example, if the supervisor and engineer codes were the same then entering this code would allow access to the engineering options (as well as the supervisor options).

The security code will remain active for a set time after the last key press.

5.3 Operator Menu

The lowest level menu looks like:

Test	Product
Print	Exit

Use the  and  key's to select an option shown by the first letter flashing then the **SELECT** key to select it.

5.3.1 Test

This option allows a test of the metal detection sensitivity to be done. Firstly the software asks for a PIN (personal identification number):

Enter PIN number: 1234

After the PIN is entered the user has nine seconds to pass the metal sample. If the detector fails to detect metal in this time it displays the message "TEST FAILED", and waits for the **SELECT** key to be pressed and returns to the TEST menu. If metal has been detected then "TEST PASSED" is displayed and waits for the **SELECT** key to be pressed before returning to the TEST menu.

5.3.2 Product

This menu item allows different product setups to be chosen. On selecting this menu item a product name and number are displayed. The / keys may be used to scroll through the list of available products. When the desired product is displayed press **SELECT** to set up the metal detector for that product.

5.3.3 Print

This menu allows you to send a report to the serial port for printing if the 'Print on demand' option has been set in the engineering option. If 'Print on event' has been selected the report is sent to the serial port as soon as the test has been done. If the 'Print' option is selected when 'Print on event' is used then 'Printing on event' is displayed and it waits for the **SELECT** key before returning to the menu. To return to the bargraph the **SELECT** and  keys must be pressed. When the 'Print on demand'

option is used the 'Print' option is selected by the \uparrow or \downarrow keys then the **SELECT** key. When this is done the display shows 'Printing report' and '**SELECT** to end print'. Pressing the **SELECT** key stops the print out. The report can be re-printed by selecting the 'Print' option again. No reports can be cleared from this menu.

5.3.4 Exit

Select this to return to the normal running display.

5.4 Supervisor Menu

The supervisor menu looks like:

TPRCsrEDoex
Do sample test

The display is shown with one of the letters flashing, the text will change depending on which letter is selected. The \uparrow key cycles the letter to the left and the \downarrow key to the right. The letters have the following meanings:

T = Do sample test	P = Select product	R = Print report
C = Clear counts	S = Setup product	r = Adjust reject timers
E = Edit product	D = Delete product	o = Operator's code
e = Engineering setup	x = Exit.	

5.4.1 Do Sample Test (T) :

Same as Test option in the operator menu.

5.4.2 Select Product (P) :

Same as Product option in the operator menu.

5.4.3 Print Report (R) :

Same as the Print option in the operator menu but this time when the reports have been printed Clear records ? No is displayed. The default is "No" but this can be changed to "Yes" by either the ' \uparrow ' or ' \downarrow ' key. The **SELECT** key is then pressed and returns to the supervisor menu.

5.4.4 Clear Counts (C) :

Use this option to clear the reject and product counts to zero. Note that product counting is only reliable for a product that completely breaks the photocell light beam once.

5.4.5 Setup Product (S) :

The display initially requests selection between set up for a new product or adjustment of an old product. Use  to move the position of the arrow and **SELECT** to confirm the selection.

 New product Adjust old product

5.4.5.1 New Product

If "New product" is selected, a product name must be entered. This is done by scrolling through the alphabet with the  keys. When the desired character appears on the display press **SELECT**. The sequence of selectable characters is as follows:

ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789. /#<◆

If a mistake is made press the  keys until a '<' is displayed and then press **SELECT**, to move back to the previous character. When the full name has been entered press **SELECT** with the diamond '◆' displayed, to finish name entry. Product names may be up to 20 characters in length.

5.4.5.2 Adjust Old Product

If "Adjust old product" is selected scroll through the list of products and select one, in the same way as the product option in the operator menu.

5.4.5.3 Automatic/Manual Setup

After choosing a name for a new product setup or selecting an old product to adjust, a choice is displayed between doing an automatic or a manual setup:

 Automatic Manual

It is not recommended to do a manual setup, this is primarily for testing by service engineers. Press **SELECT** to proceed with an automatic product setup and the display should change to:

Gain = High Pass product 1

The product should then be passed through the aperture, as it would be during production, until the setup parameters are displayed. Various messages are displayed while the automatic setup is taking place, as an indication of what the software is doing.

Once the setup is complete the parameters are displayed:

Met30+ 1f		Met30 + 3f		
W=100	H= (32000)	W=100	H= (32000)	
G=H	P= 0.0°	G=H	P= 0.0°	F=H

Press **SELECT** to return to the normal running display. The automatic setup is now complete.

5.4.6 Adjust Reject Timer (r) :

This option allows adjustment of all basic timer parameters: delay time, reject time, photocell delay time and alarm time.

Each parameter is adjusted in turn. If the system does not have a photocell for aligning product with the reject mechanism then the photocell delay time and alarm time are not available for adjustment.

If the system is variable speed then the delay time and photocell delay time are measured in pulses instead of hundredths of a second.

While in this option, the letter 'R' is displayed in the top right corner of the screen when a reject occurs.

5.4.7 Edit Product (E) :

Displays the edit sub-menu.

Met30+ 1f	Met30 + 3f
EWHPGx	EWHPGFx
Edit product name	Edit product name

This allows the name and parameters of the current product to be altered. The letters have the following meanings :

E = Edit product name	W = Product width	H = Product height
P = Product phase	G = Adjust gain	F = Switch frequency
x = Exit		

5.4.7.1 Edit Product Name (E) :

The current name will be displayed and can be amended. This is done by scrolling through the alphabet with the **↑/↓** keys. When the desired character appears on the display press **SELECT**. The sequence of selectable characters is as follows:

ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789. /#<◆

If a mistake is made press the  keys until a '<' is displayed and then press **SELECT**, to move back to the previous character. When the full name has been entered press **SELECT** with the diamond '◆' displayed, to finish name entry. Product names may be up to 20 characters in length.

5.4.7.2 Width Adjustment (W) :

The display will show something similar to that shown below:

Width =	00100
●●	

The width can be changed by pressing the  and  keys. Use the bargraph to see how close to false triggering the detector is.

5.4.7.3 Height Adjustment (H) :

This option allows adjustment of the "height" of the detection envelope (see the diagram of the 'Product Detection Envelope' earlier).

Height checking=off
●●

Use  keys to switch between using the height or not for metal detection. Press **SELECT**. Now adjust the height as necessary:

Height =	32000
●●	

5.4.7.4 Phase Adjustment (P) :

Phase =	175.2° (176.1°)
●●	

The phase can be adjusted by using the  keys. The angle in brackets represents the phase of the current product (if this can be reliably measured).

5.4.7.5 Adjust Gain (G) :

There are two gain settings High and Low. If the product effect is large, the gain will be reduced.

5.4.7.6 Switch Frequency (F) : Menu only available on 3f

Switch frequency Low

The frequency can be changed to Low, Medium and High using the / keys.

5.4.7.7 Exit (x) :

Selecting the 'x' option returns to the supervisor menu.

5.4.8 Delete Product (D) :

On entering this option you will be asked which product setup to erase:

Erase product: 1 PILLS

The / keys scroll through the list of products that can be deleted. Note that the TEST SETUP cannot be deleted.

When the product to be deleted has been chosen, press **SELECT**. Confirmation will be asked for. If "NO" is selected then no action is taken and the option is exited. If the current product is deleted the detector will switch to running the TEST SETUP.

5.4.9 Operator's Code (o)

This allows the operator's access code to be changed, the  and  keys select each number and the **SELECT** key sets it. The new code will over-write the old one.

5.4.10 Engineering Setup (e) :

Can only be entered by using the Engineer security code.

5.4.11 Exit (x) :

Exit the Supervisor menu and returns to the Bargraph.

5.5 Engineers Menu

When the engineer's code is entered the supervisor menu is displayed. All options are available except the Lock Engineer. Selecting 'e' enters the menu.

ScvTCPselx
Engineering displays

The letters have the following meanings:

S = Sample test reminder c = Configure system v = Vibration setup

T = Set System Clock C = Communication setup P = Printer setup

s = Supervisor's code e = Engineer's code l = Lock Engineering Menu

x = Exit

5.5.1 Sample Test Reminder (S):

This allows a timer to be set which will set an alarm after a duration of time set by the user. When this procedure is entered the \uparrow or \downarrow key is used to choose if the timer is to be used or not and the **SELECT** key to confirm. If the timer is enabled the time delay before the alarm is entered in the range of 1-1000 minutes. After the time has expired the warning relay is activated. After a further 20 minutes (adjustable in Lock engineering menu in the range of 1-999 minutes) the fault relay is activated and the display changes to indicate that the sample test is overdue. The display is reset by the **SELECT** key.

This optional feature is detailed in the 'Sample Test' section of this manual.

5.5.2 Configure System (c) :

This option also has a sub-menu:

Inputs	Syschek
Aux.	Exit

The first option (**Inputs**) allows all the timer (except T6) inputs to be enabled or disabled, and their polarities to be changed.

T= <input type="radio"/> _0	G= <input type="radio"/> ->0	R= <input checked="" type="radio"/> _0
P= <input type="radio"/> _1	A= <input type="radio"/> -1	X

The letters represent the different timer inputs:

- T Tacho (for variable speed conveyors)
- G Gating photocell (used to detect position of product on the belt)
- R Reject systemchek (to check that reject mechanism operated)
- P Product systemchek (to check that rejected product entered the bin)
- A Auxiliary input (e.g. bin full, air failure etc.)
- X Exit (select this to exit this option)

The hollow circles indicate that the input is disabled, and the solid circles indicate enabled inputs. An underscore ('_') indicates an active-low input, while a dash ('-') indicates an active-high input. Active high or low should be chosen such that the

usual value of the input (as shown by the 0 or 1) is low (0), and when the photocell is blocked the input should go high (1). The 'Gating Photocell' (G) can also be changed to trigger of the leading or trailing edge of the pulse. A ('>') indicates a leading edge trigger and a ('<') indicates a trailing edge trigger.

On entry to the option the letter 'T' will be flashing. Use the  keys to scroll the list of timer inputs. When the desired input is flashing, press **SELECT**. The input can now be disabled/enabled by pressing the  or  key. Press **SELECT** to allow adjustment of the polarity (active high/low).

Change the polarity so that the timer input is 0 when the photocell isn't blocked. Press **SELECT**. To exit this option press the  keys until 'X' is flashing and press **SELECT**.

Syschek allows the systemchek time to be changed. This is only relevant when one or both systemcheks are enabled in Option Inputs.

When the reject relay is activated two timers are started, one for the product systemchek and one for the reject systemchek. If a signal from the relevant systemchek photocell is not received within the "systemchek time" then the fault relay is activated, and will remain activated until the detector is reset.

Aux. allows the fifth timer input (CN13 on the power supply) to be used in a variety of applications, for example as an air failure detector or bin full sensor.

To use this facility proceed as follows: first enable the auxiliary input in option Inputs. Then select option Aux. Select the message that most clearly describes what the input is being used for, by using the  and  keys to change the message and **SELECT** to accept it.

Now select the "Aux. active time". This is the length of time for which the auxiliary input needs to be high (active) continuously before the software drives the output relay. For a "bin full" sensor the active time might be a couple of seconds. Press **SELECT** when the correct time has been chosen.

Finally, choose which output relay to drive. Use the  and  keys to change the relay and **SELECT** to confirm the choice. Although there is a choice of five options for which relay to drive (including none), the two most useful are: warning (e.g. for bin full) and fault (e.g. for air failure). Note that timer T6 cannot be assigned any options.

5.5.3 Vibration Setup (v) :

When the MET 30+ metal detector leaves the factory, the Test Setup phase angle is set to same angle as vibration and calibrated to 0 degrees.

This option enables adjustment of this angle, which may be required if some of the metal detector components have to be repaired. When this option is set the following is displayed:



While these symbols are on the display a ferrite rod must be passed through the detector's aperture. The bottom line shows a bargraph, which can be used to see how good the size of signal from ferrite is being detected. A minimum of ten circles is required for correct vibration setup.

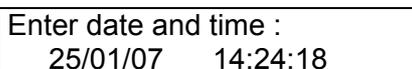
When the following display is shown the vibration angle will have been re-calibrated to zero.



To confirm vibration angle pass the ferrite rod through the aperture and the phase angle displayed in brackets should read around zero. The displayed phase angles of all the products set up in the machine will have values relative to the new zero vibration angle and will NOT need adjustment. To exit press SELECT

5.5.4 Set System Clock (T):

The display shows the current date (DD/MM/YY) and time (HH:MM:SS):



Initially the date will be high-lighted. Use the \uparrow/\downarrow keys to change the date. Press **SELECT** to move onto the month and adjust this as necessary. Pressing **SELECT** again will allow the year to be changed, then the hours and then the minutes.

5.5.5 Communications Setup (C) :

On selecting this, a sub-menu is displayed:



The first option allows communication parameters to be changed for Port A, which is the RS232 port. Firstly, the baud rate needs to be selected. Press \uparrow/\downarrow until the correct baud rate is displayed and then press **SELECT**. Each setting is selected in the same way and includes the following allowed values, with the factory default setting shown in bold:

Baud Rate	300, 600, 1200, 2400, 4800, 9600 , 19200, 38400
Parity	'N'one, 'E'ven, 'O'dd
Data Bits	6, 7, 8
Handshake	'H' (Enabled), '-' (Disabled)

Note: that different cables and sockets will be required for RS422/485 as opposed to RS232. The second option allows adjustment of communications parameters for port B and works in exactly the same way as for port A. The exception is that port A is dedicated to RS232 and port B is a dedicated RS422/485 (multi-drop), which also ignores handshaking.

The third 'Det Id' option on the communications menu allows the detector ID to be changed. This is used to address the detector in multi-drop network applications (i.e. 'Datachek' data management software).

5.5.6 Printer Setup (P) :

This option allows you to set up the serial port and the type of printer options. There are two serial ports on the Met 30+. The first called A which is set to RS232. The second port called B which is a dedicated RS422/485 (multi-drop). The two options are cycled with the  or  keys and set by the **SELECT** key. The three printer options are also cycled with the  or  keys and set by the **SELECT** key. The three options are:

'Printing disabled' i.e. No printer output.

'Print on demand' i.e. printer output when selected from the menu.

'Print on event' i.e. prints when a reject or setup is done.

When a printout is selected a type of printer is asked for, this is also cycled by the  or  keys and set by the **SELECT** key. The types are:- '80 column printer', '40 column printer', '40c column printer' (compact) and '20 column printer'. The **SELECT** key sets the type and returns to the engineer's menu.

5.5.7 Supervisor's Code (s):

This allows the supervisor's access code to be changed, the  and  keys select each number and the **SELECT** key sets it. The new code will over-write the old one.

5.5.8 Engineer's Code (E):

This option allows you to change the engineer's access code. This is done in exactly the same way as changing the supervisor's code described earlier.

5.5.9 Lock Engineering (l)

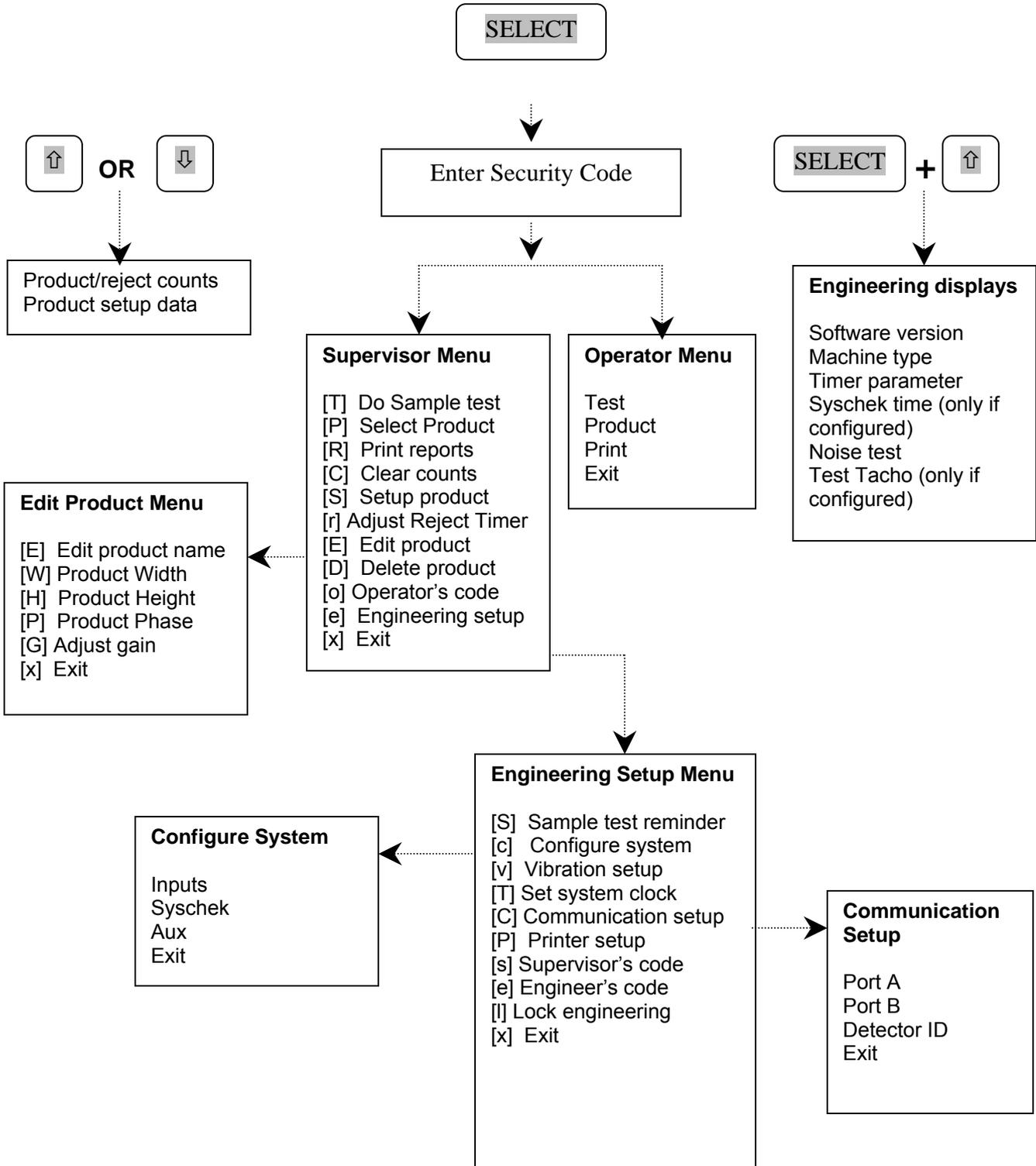
Can only be entered by Lock engineers using a code.

5.5.10 Exit (x) :

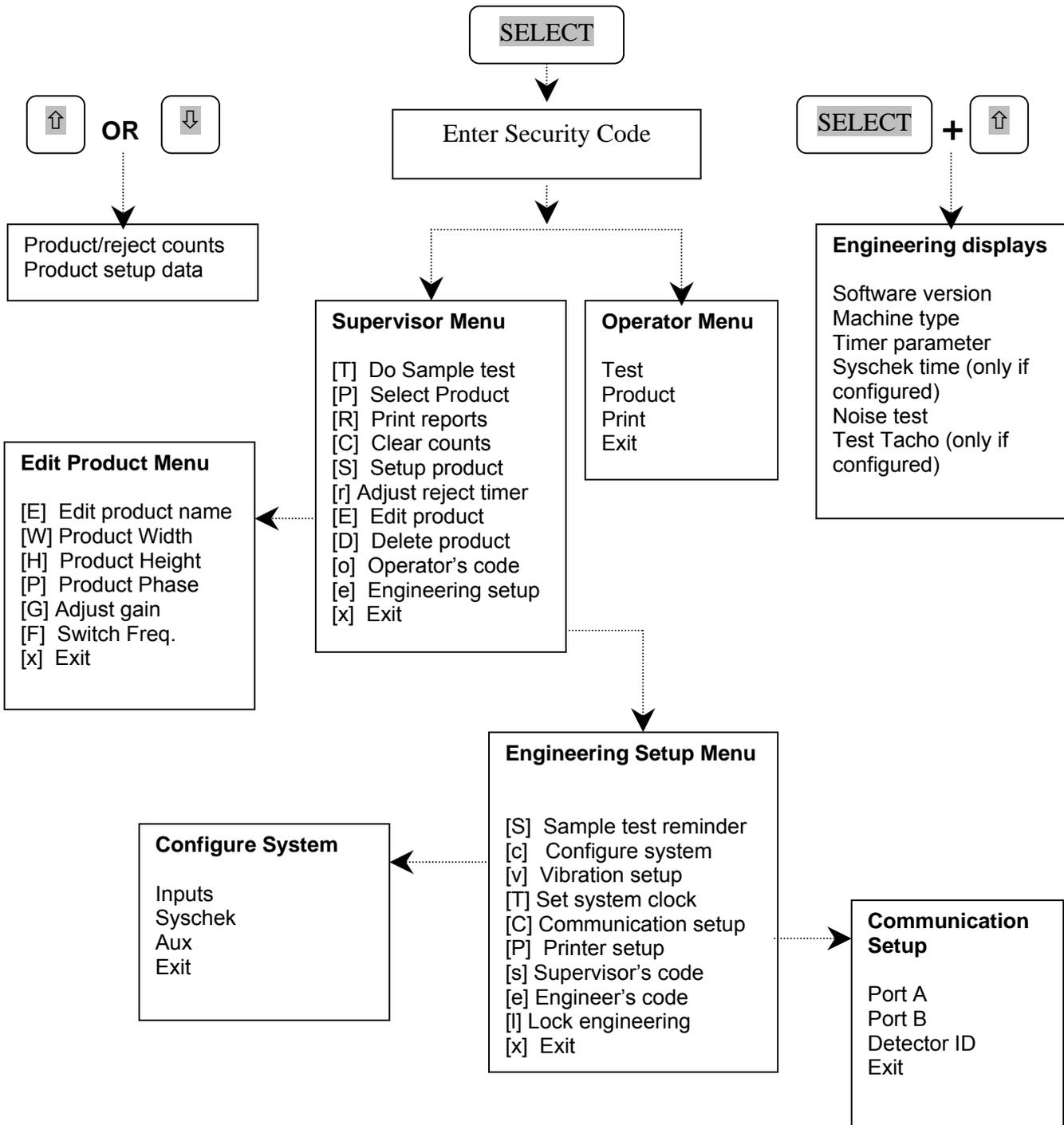
Returns to the supervisor's menu.

6. OPERATION CHART

6.1 Met30 + 1f System Menu



6.2 Met30 + 3f System Menu



7. SAMPLE TEST

As high-resolution detectors are sensitive devices that may drift with changes in environment, it is prudent to have an organised procedure for physically checking the system. A known test sample, shipped with each detector, should be inserted into an identified fresh sample of the product and passed through the detector. It should be detected and accurately rejected. This will ensure that the detector timing devices and auto reject mechanism are functioning correctly. If specifications include ferrous and stainless, both should be used for the test. On a long product, the metal test piece should be positioned at the leading and then the trailing edge to ensure the product will be rejected under all circumstances.

The Lock metal detector's provide the 'Sample test reminder' facility to ensure regular testing takes place, while the printer facility provides a hard record of the frequency and details of the test.

This document describes the operation of the 'Sample test reminder'; details of the printer operation are given in the guide to using printers with Lock Inspection Systems metal detectors.

7.1 Operation

The operation of the sample test reminder facility is shown in the 'Sample Test Flowchart' Section. This shows the messages given on the detector's display, the lights on the tower (if fitted), the state of the detector and the events/operator activities to change from one state to another.

The 'Sample Test Flowchart' shows the normal state of the detector, i.e. the product under test and bargraph are on the display, the green lamp is on indicating normal operation.

When the sample time elapses (reference #2), normal operation continues but the display changes to "SAMPLE TEST DUE <SELECT>" and the orange lamp turns on. The detector will continue functioning normally until either the **SELECT** key is pressed or the 20 minute timeout elapses (Adjustable by Lock Engineers). If the timeout timer elapses then the red lamp is turned on, and the belt will stop, provided that the fault relay has been configured to stop the conveyor (see the installation manual).

In either case (reference #3), "Do sample test <SELECT>" is displayed. The detector cannot now be used until the sample test is executed successfully.

If the **SELECT** key is pressed (reference #4) the operator is asked to enter a P.I.N. number by the message "Enter P.I.N.:". This number is recorded in the metal detection sensitivity test report (see the printer guide), which also provides evidence of the time when the test was run and the phase and size of the test sample detected.

When the operator has entered his P.I.N. number, the operator has 10 seconds in which to pass a test sample (reference #5). The display shows "Pass test sample" and a figure, which will count down from 9 to 1.

If the detector fails to detect a metal sample and the count times out (reference #7), the red light is turned on and the reject is activated with the display showing "Test failed! <SELECT>". When **SELECT** is pressed the operator is asked to repeat the test. The detector cannot be used again until there is a successful test.

On completion of a successful test (reference #6) the blue and orange lamps are illuminated and the display shows "Test passed <SELECT>".

Pressing **SELECT** enables normal operation to be completed.

7.2 Recommended action on failing test

If the standard test sample is not detected, the product setup and reject timers should be checked and adjusted as required - refer to the 'Product Setup' and 'Troubleshooting' sections of this manual. If this should occur, all production since the previous testing should be considered as suspect and possibly contaminated.

7.3 Engineering setup

The sample test reminder is set up from the engineer's menu which is accessed by inputting the engineer's code and selecting 'e' by use of **↑/↓/ SELECT** keys, when the following is seen on the display:

TPRCsrEDex Engineers menu

The 'S' option should be selected from the engineer's menu:

ScvTCPselx Sample test reminder

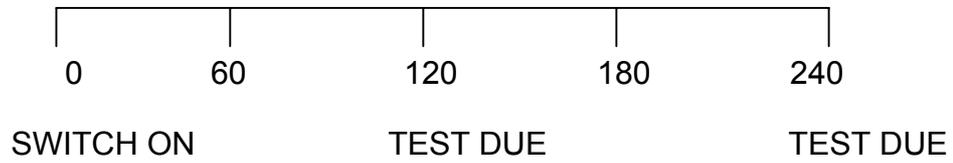
Sample test reminder 'on' should be chosen by use of the **↑/↓/ SELECT** keys when the display shows:

Sample test reminder on

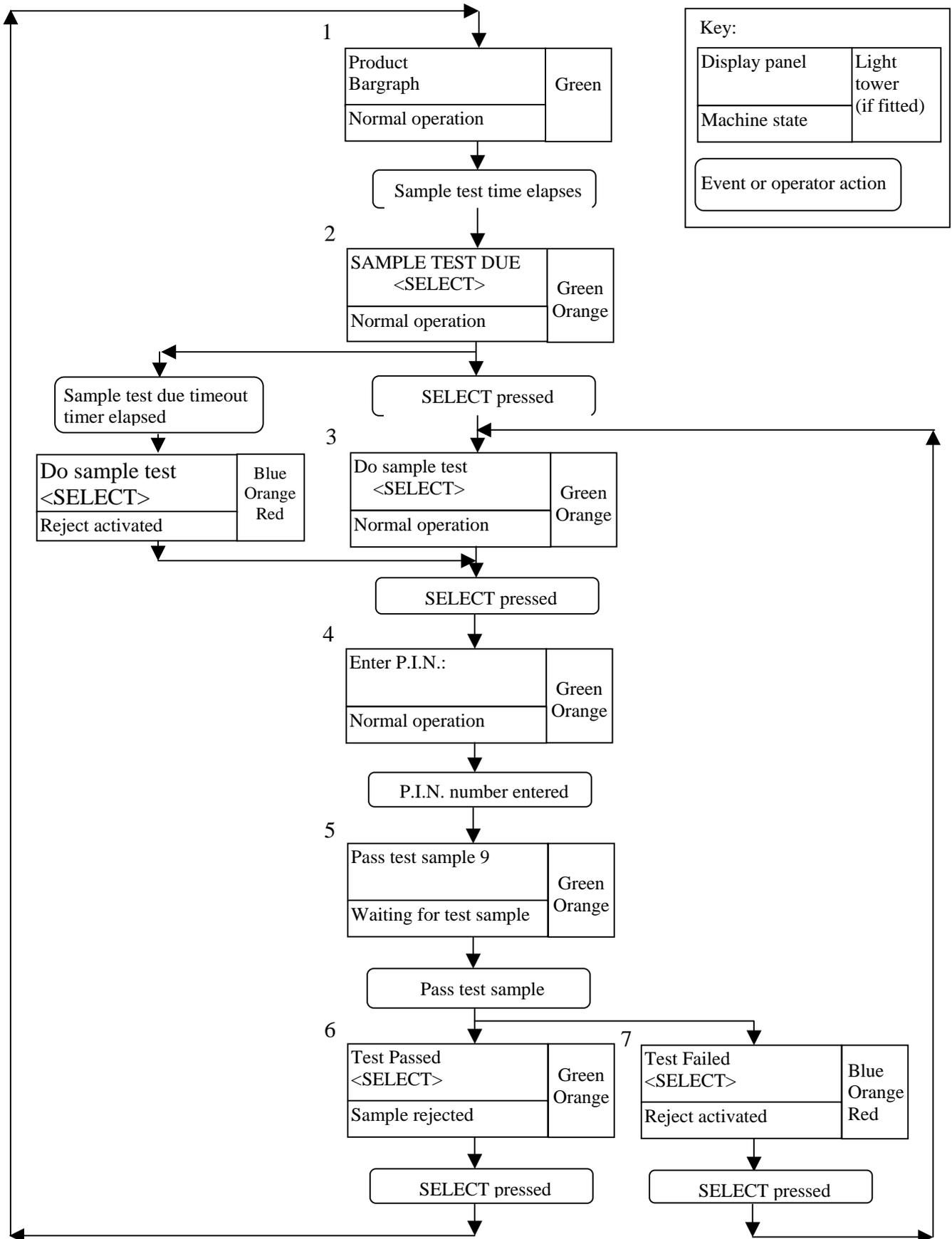
After pressing **SELECT** the sample test reminder delay display can be adjusted in minutes.

Sample test reminder 0120

Therefore the machine is now set up to be tested at 120 minute intervals from powering up:



7.4 Sample test flowchart (Typical)



8. PRINTER

This document describes how a printer can be used to provide a record of the operation of a Lock Inspections Systems MET 30+ of metal detector.

The following information is available from the printer output:

- Product and reject counts.
- The metal detector product settings.
- Reject reports.
- Metal detection sensitivity test reports.
- Fault/incident reports.

The product and reject counts enable a record to be kept of the number of products tested and the number of products rejected.

The product settings give the name, gain, height, width, phase and timer values for every product that has been setup in the detector.

There is a reject report for every product in which metal is detected. This report gives the time of the detection, the product being tested and the size and phase angle of the signal detected.

The metal detection sensitivity test reports give a record of the time when a test sample was passed through the detector, the PIN number of the operator who performed the test, whether the test was successful and the size and phase angle of the test sample.

The fault/incident reports give the time and details of any faults/incidents that have occurred on the detector.

Two modes of operation are available, "Printing on Demand" and "Printing on Event". Printing on demand saves all the reports in the detector, and they can be printed at any time by either the operator or supervisor, with only the supervisor having the authority to clear the reports. When printing on event is selected, all reports are printed as they occur provided the printer is switched on and connected. If this is not the case, the reports will be discarded.

Note: Met 30+ Touch Screen models can also list reports to the full screen - See the 'Touch Screen Display - Reports Display' section of this manual.

The recommended printers are:

- EPSON LX-300: Lock part no: Q638-0004
 Cable: Lock part no: 148A3222

- Martel MCP9810: Lock part no: Q638-0002
 Cable: Lock part no: 148A3221

- Paper rolls MPS101/M58: Lock part no: Q831-0005

8.1 Print Modes

8.1.1 Printing on Event

When printing on event, all reports are output to the printer port as they occur. The output to the printer would be similar to:

```

02/01/07 8:00:15 PRODUCT B                      S 25 P 2.1
02/01/07 8:03:23 PRODUCT B                      S 71 P 76.3
02/01/07 8:05:39 product selected [2] PRODUCT A
02/01/07 8:07:48 PRODUCT A                      S 227 P 102.3
02/01/07 8:07:55 PRODUCT A                      S 51 P 71.9
02/01/07 8:10:08 PRODUCT A                      S 21 P 2.1
02/01/07 8:14:21 PRODUCT A                      S 24 P 3.4
02/01/07 8:18:27 PRODUCT A                      S 21 P 2.1
02/01/07 8:26:50 PRODUCT A                      S 75 P 78.5
02/01/07 8:28:17 PRODUCT A                      S 24 P 0.2
02/01/07 8:56:35 test started
02/01/07 8:56:35 operator 0000
02/01/07 8:56:38 test passed
02/01/07 8:56:43 PRODUCT A                      S 3386 P 12.8

```

S = Size of signal P = Phase of signal

8.1.2 Printing on Demand

When printing on demand, all reports are stored in a buffer memory in the detector which can be printed at any time from either of the operator's or the supervisor's menus. After printing, there is an option on the supervisor's menu to clear the buffer. If the buffer, which has the capability of holding approximately 1200 reports, overflows then the oldest reports are discarded and an incident report of "Messages lost" is entered.

The recommended procedure in this mode is:

- At fixed time intervals, print reports from supervisor's menu.
- Clear reports.
- Clear product and reject counts.

8.1.2.1 Operator's Menu

The following is displayed from the operator's menu:

Test	Product
Print	Exit

Selecting "Print" will result in a display as follows:

Set up printer or PC on port A <SELECT>
--

Press **SELECT** if the printer is connected and switched on.

8.1.2.2 Supervisor's Menu

Moving the cursor to 'R' on the supervisor's menu will result in a display as follows:

TPRCSrEDoex
Print Report

Selecting "Print report" will result in a display as follows:

Set up printer or PC on port A <SELECT>
--

Press **SELECT** if the printer is connected and switched on. When printing is complete, the supervisor will be presented with the following display:

Print report
Clear records? No

The **↑** key should be pressed to give the message "Clear records? Yes" and the **SELECT** key pressed. The product and reject counts should then be cleared by moving the cursor to the 'C' option, which will result in the following display:

TPRCSrEDoex
Clear counts

Pressing **SELECT** results in the following display:

Reset reject and Product counts? No
--

The **↑** key should be pressed to give the message "Reset reject and product counts? Yes" and the **SELECT** key pressed.

8.1.3 Typical Output

The output from the printer gives a summary of the metal detector's status and product setup, followed by a list of reports. A report consists of a time stamp and a message.

A typical printout is as follows:

Lock Inspection Systems
Product and status report at *02/01/07 9:42:31*

Id string of detector – 89235/1 95x38 1MHZ
Current product - PILLS

Reject count - 12

Product settings:

<i>Name</i>	<i>gain</i>	<i>height</i>	<i>width</i>	<i>phase</i>	<i>delay</i>	<i>reject</i>
<i>0 TEST SETUP</i>	<i>H</i>	<i>(500)</i>	<i>100</i>	<i>0.0</i>	<i>1.00s</i>	<i>0.50s</i>
<i>1 PRODUCT A</i>	<i>H</i>	<i>(150)</i>	<i>120</i>	<i>13.4</i>	<i>1.00s</i>	<i>0.50s</i>
<i>2 PILLS</i>	<i>H</i>	<i>(710)</i>	<i>100</i>	<i>95.0</i>	<i>0.32s</i>	<i>0.50s</i>
<i>3 CAPSULES</i>	<i>H</i>	<i>(800)</i>	<i>105</i>	<i>58.4</i>	<i>1.00s</i>	<i>0.50s</i>

-- End of product settings --

```

02/01/07 8:00:15 PRODUCT A           S 156 P 68.0
02/01/07 8:03:23 PRODUCT A           S 200 P 76.3
02/01/07 8:05:39 product selected [2] PILLS
02/01/07 8:07:48 PILLS                 S 227 P 130.3
02/01/07 8:07:55 PILLS                 S 51 P 37.9
02/01/07 8:10:08 PILLS                 S 221 P 2.1
02/01/07 8:14:21 PILLS                 S 224 P 3.4
02/01/07 8:18:27 PILLS                 S 121 P 2.1
02/01/07 8:28:17 PILLS                 S 324 P 0.2
02/01/07 8:56:35 test started
02/01/07 8:56:35 operator 0000
02/01/07 8:56:38 TEST FAILED
02/01/07 8:56:44 test started
02/01/07 8:56:44 operator 1234
02/01/07 8:56:49 test passed
02/01/07 8:56:43 PRODUCT A           S 127 P 12.8

```

8.2 Reports

8.2.1 Reject Reports

8.2.1.1 Reject Report

A reject report occurs whenever metal is detected.

Format: {time-stamp} {Product name} {size} {phase angle}

8.2.1.2 Reject count

A new report for product and reject counts is created before the counts are cleared.

Format: {time-stamp} {Product count} {number} {Reject count} {number}

8.2.2 System Reports

8.2.2.1 Restart

A report is given each time the system is re-started.

Format: {time-stamp} System restarted - {Product name}

8.2.2.2 Product setup

A report is given each time a product is setup.

Format: {time-stamp} Product setup [{Product number}] {Product name}

8.2.2.3 Product Selected

A report is given each time a product is selected.

Format: {time-stamp} Product selected [{Product number}] {Product name}

8.2.2.4 Name Change

A report is given each time a product's name is changed.

Format: {time-stamp} Product name changed from {Product name} to {Product name}

8.2.2.5 Message(s) Lost

If in Print on Demand mode and the buffer fills, the messages lost is given.

Format: {time-stamp} {number} message(s) lost

8.2.3 Sample Test Reports

8.2.3.1 Test Started

A report is given when a sample test is run.

Format: {time-stamp} test started

8.2.3.2 Operator Pin Number

When a sample test is run, the operator is requested to input a PIN number.

Format: {time-stamp} operator {PIN number}

8.2.3.3 Test Passed

A report is given to indicate that the detector has detected the test sample. This is followed by a reject report for the test sample.

Format: {time-stamp} test passed

8.2.3.4 Test Failed

If the test sample is not detected within 9 seconds of the sample test start, a failure report is given.

Format: {time-stamp} test failed

8.2.3.5 Test Timeout

If the 'Sample test reminder' facility is enabled, a report is given if the sample test has not been completed successfully in the prescribed time.

Format: {time-stamp} test failed

8.2.4 Fault Reports

8.2.4.1 Balance Fault

The detector has failed to balance the head - call Lock Inspection.

Format: {time-stamp} Fault - BALANCE FAULT

8.2.4.2 Photocell Error

One of the photocells has been blocked for a longer time than specified in the blocked photocell delay (set from the engineer's menu). Remove the blockage or increase the photocell delay.

Format: {time-stamp} Fault - PHOTOCELL ERROR

8.2.4.3 Reject System Failed

The reject check is enabled and the reject system has failed to operate. Check the reject system.

Format: {time-stamp} Fault - REJECT SYSTEM FAIL

8.2.4.4 No Reject into Bin

Note: This feature is only applicable to conveyorised systems.

The system reject check is enabled and the photocell has not detected a product entering the reject bin within the delay specified.

Format: {time-stamp} Fault - NO REJECT INTO BIN

8.2.4.5 Auxiliary Input Failed

Note: Not used on the Pharmaceutical detector.

The auxiliary input has been activated. This can have several uses and results in one of the following messages:

Format: {time-stamp} Fault - AUXILIARY INPUT FAIL

Format: {time-stamp} Fault - AIR FAILURE

Format: {time-stamp} Fault – BLOCKAGE

Format: {time-stamp} Fault - FLAP FAULT

Format: {time-stamp} Fault - BIN FULL

Format: {time-stamp} Fault - BELT STOPPED

8.3 Engineering Setup

Using the engineer's menu, the engineer should set up the following

8.3.1 Communication Setup

Select Port A

9600 baud

N parity

8 8 data bits

H Handshaking (Some records may be lost if not set)

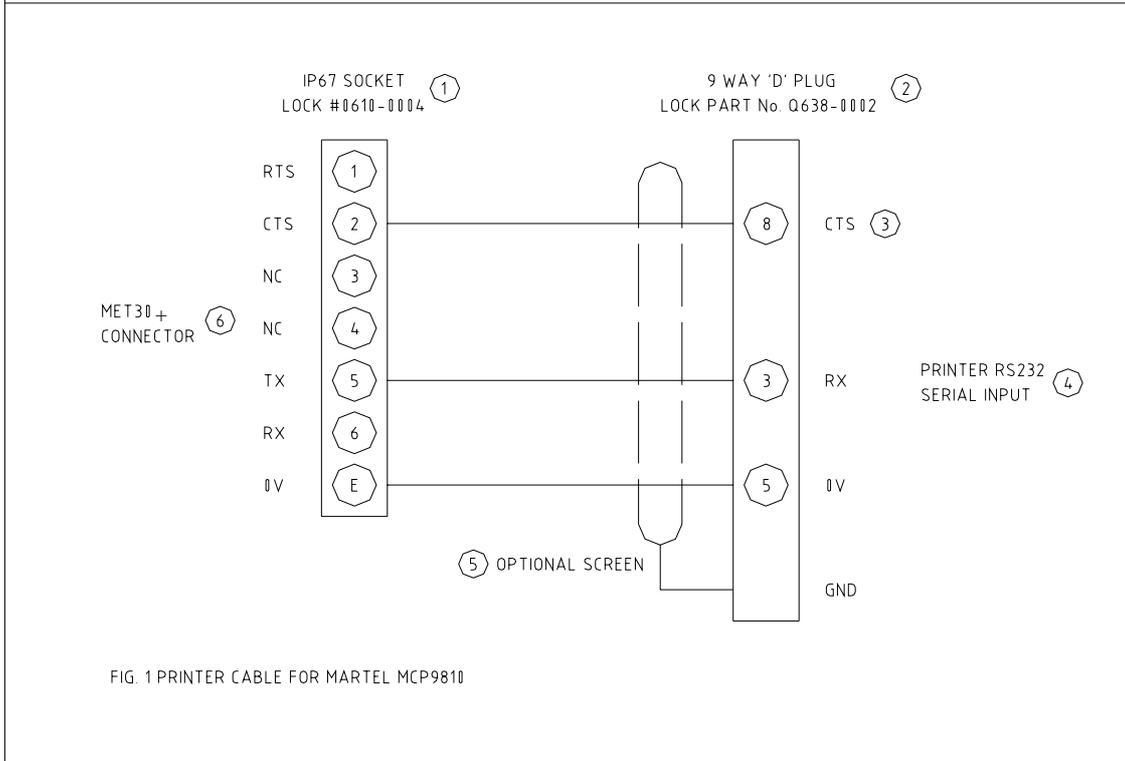
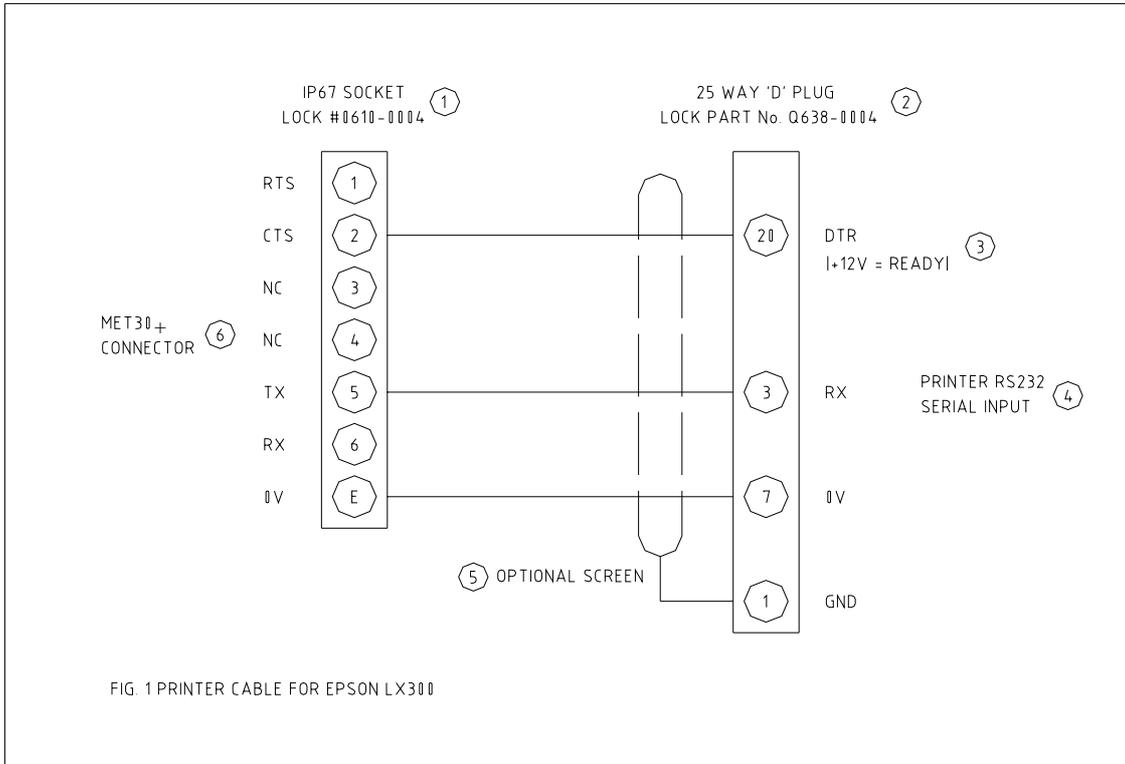
8.3.2 Printer Setup

Select 'Printing on Demand' or 'Printing on Event' as required.

Select 80 column for the Epson printer.

Select 40C for the Martel printer.

8.4 Printer Cable Diagrams



9. TOUCH SCREEN DISPLAYS

The display should look similar to that shown below.

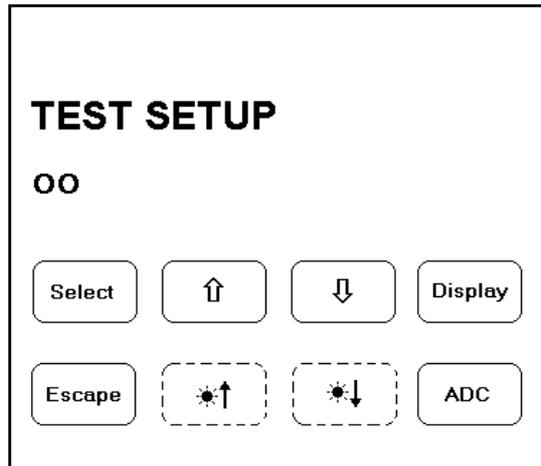


Figure: Touch screen detector display

The touch sensitive screen displays six keys in its standard mode of operation. Labeled from left to right, on the top row is **SELECT**, **↑**, **↓**, **DISPLAY** with **ESCAPE** and **ADC** on the bottom row. Pressing the **ADC** key will launch the ADC screen, described in the 'ADC Screen' section of this manual. Pressing the **ESCAPE** key will cause the current state to revert back to the initial bargraph screen.

Touching the **DISPLAY** key is equivalent to simultaneously pressing the **SELECT** and **↑** keys on the standard (non touch screen) keypad, and will show the engineering displays.

The dotted buttons show the contrast controls that are only available on metal detectors equipped with LCD displays. Pressing the **[*↓]** button decreases the display contrast and pressing **[*↑]** increases the contrast.

9.1 ADC Screen

If the ADC button is pressed and the engineers security code is entered when requested, the display should resemble the following figure:

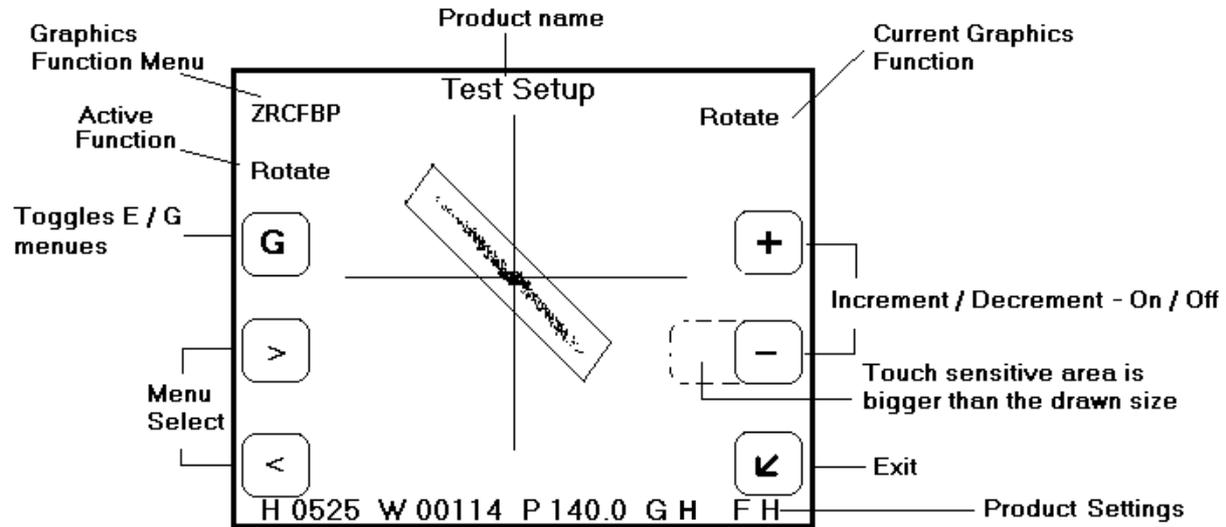


Figure : ADC display in graphics menu mode ('F H' only shown for 3F)

The ADC display shown above demonstrates the menu and display options available to an Engineer or Supervisor level user. In the centre of the display is shown the product detection envelope, and a plot of points representing the signal from the metal detector. The currently selected product name is shown at the top, and the detection parameters shown at the bottom are height(H), width(W), phase(P), gain(G) and frequency(F). The two sets of functions that can be used on this screen are graphics (ZRCFBP) or editing (WCHPGNF / WCHPGN). If an Operator level pass code had been entered then the settings would be view only, and the editing menu would not be available. The figure above shows the graphics menu as ZRCFBP, where the letters have the following meanings:

Z = Zoom In/Out

R = Rotate phase

C = Clear display

F = Flash mode

B = Bar graph display

P = Phase angle zoom

Below the letter menu is the currently selected function ('Rotate' in the figure), and below that the top left hand button toggles between the graphics and editing menus. The label of this button will toggle between [G] or [E] each time it is pressed to indicate the Graphics or Editing menu. The menu selection keys [<] and [>] will cycle the selection along the letter menu. The right hand side of the screen shows the keys that modify settings or display properties. The labels of the modify keys depend on which type of function is currently selected. Note that although the keys are drawn small to maximise the screen area for plotting, their touch sensitive area is bigger for easier operation.

If the supervisor or engineer code was originally entered when the ADC screen was selected, and the settings have been changed then pressing the [↵] key will exit the

ADC screen, and produce the confirmation prompt shown in the figure below.

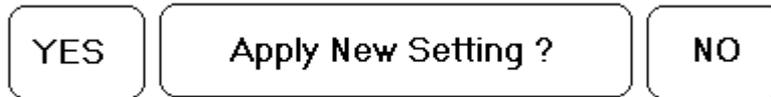


Figure : Showing the ADC 'Apply' confirmation message

Press **[NO]** to abandon any changes made and reset the metal detector product settings back to their original values. Press **[YES]** to keep any changes and continue operating with these settings. If the operator level pass code was entered when the ADC screen was selected, then this confirmation message will not appear

9.1.1 Graphics menu functions (ZRCFBP)

The graphics menu can be displayed by pressing the menu toggle key. The graphics letter menu is shown as 'ZRCFBP' and its functions are described as follows:

9.1.1.1 Zoom display (Z) :

The display is magnified by pressing **[+]** to increase the scale, or condensed by pressing **[-]** to decrease the scale. Each time this is done the detection envelope and previous signal trace is redrawn at the new size. Note that not every point on the previous plot may be re-drawn. A single press will result in a step of one scale interval. Continual presses will cause increasingly larger steps.

9.1.1.2 Rotate detection envelope (R) :

The phase angle will be increased by pressing **[+]** or decreased by pressing **[-]**. Each press will cause a step of 10°. This option is meant for a fast but crude positioning of the detection envelope, but for a precise amendment of the phase angle the Edit menu should be used instead, described below in the 'Phase Adjustment (P)' section.

9.1.1.3 Clear display (C) :

Pressing either **[✓]** or **[✗]** will wipe all plotted signal from the ADC display.

9.1.1.4 Flash mode (F) :

The flash signal plotting mode can be turned on by pressing **[✓]** or turned off by pressing **[✗]**. The default mode is 'off' which continually draws the ADC trace over the top of any previous plot and so allows an historical picture to build up indefinitely. By turning on the ADC flash plotting mode, the display will be continually cleared after each product passes, displaying the last product signal briefly before returning to a clear display.

9.1.1.5 Bar graph display (B) :

The bar graph mode can be turned on by pressing [✓] or turned off by pressing [✕]. When in the bar graph mode the line of settings at the bottom of the display are replaced by a small version of the bargraph.

9.1.1.6 Phase Angle Zoom (P) :

The product signal is rotated to the product phase angle and the height and width are zoomed independently so that the product signal fits onto the display. This mode of display is useful for product signals where the height is much larger than the width.

9.1.2 Edit menu functions 'WCHPGN' / 'WCHPGNF' (3F)

Pressing the menu toggle key will show the editing letter menu WCHPGFN. The letters have the following meanings:

- | | | |
|---|--------------------------------|------------------------------|
| W = Width adjustment | C = Height check on/off | H = Height adjustment |
| P = Phase adjustment | G = Gain adjustment | N = Edit product name |
| F = Select Frequency
(Met30 +3F only) | | |

An example of the ADC screen showing the editing menu is shown in the figure below.

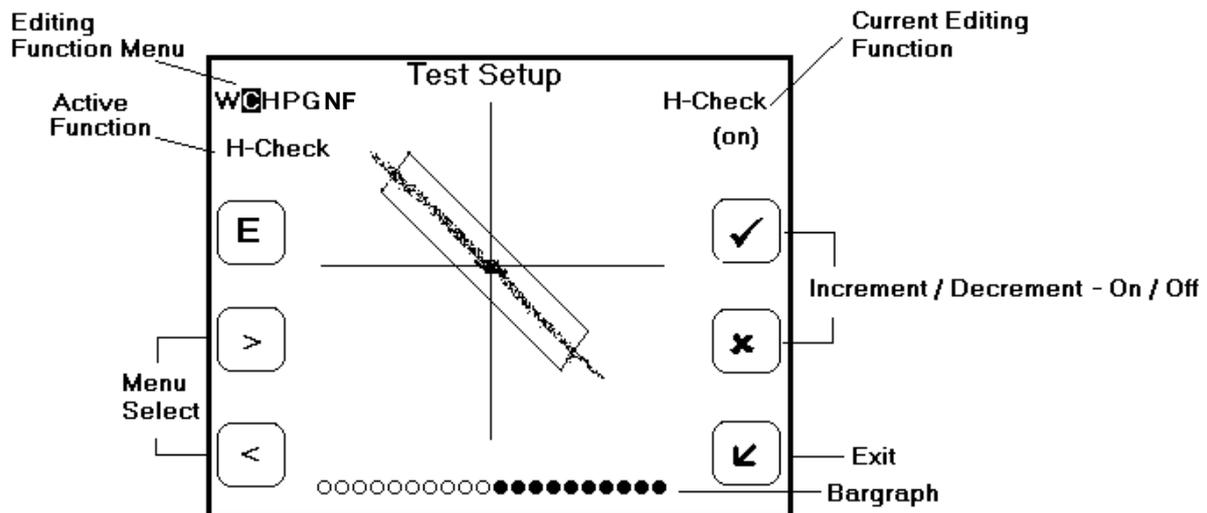


Figure : ADC display in edit menu mode(Including bargraph display).

9.1.2.1 Adjust detection envelope width (W) :

The product settings width will be increased by pressing **[+]** or decreased by pressing **[-]**. A single press will result in a step of one. Continual presses will cause increasingly larger steps.

9.1.2.2 Height checking (C) :

Pressing **[✓]** will enable height checking. Pressing **[✗]** will turn height checking off. Note that when height checking is disabled, the option to adjust height ('H' on the letter menu) will be skipped and height cannot be adjusted.

9.1.2.3 Height adjustment (H) :

The products height setting will be increased by pressing **[+]** or decreased by pressing **[-]**. A single press will result in a step of one. Continual presses will cause increasingly larger steps.

9.1.2.4 Phase adjustment (P) :

The products phase angle setting will be increased by pressing **[+]** or decreased by pressing **[-]**. A single press will result in a step of 0.1°. Continual presses will cause increasingly larger steps.

9.1.2.5 Gain adjustment (G) :

The products gain setting will be increased by pressing **[+]** or decreased by pressing **[-]**.

9.1.2.6 Change product name (N) :

Pressing either **[+]** or **[-]** will bring up the full screen alphanumeric 'qwerty' keyboard and allow amendment of the product name. The figure below shows the full screen keyboard :

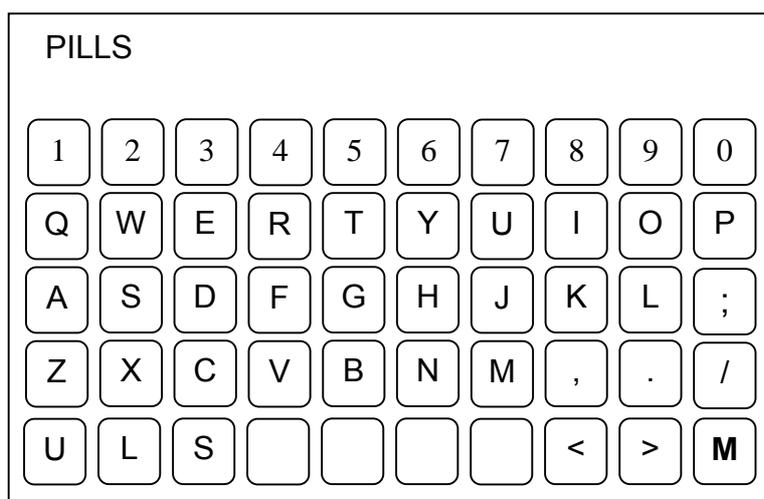


Figure : Name editing keyboard

The full screen keyboard, shown in the figure, can be used to edit an existing product name. On the bottom row of keys, use the [U], [L] keys to type Upper and Lower case letters, and use the [S] key for special characters. (Pressing each of these keys changes the characters displayed on the keyboard.) To amend the name, move to the left or right with the [<] and [>] keys. Press the [M] key to store the name and return to the ADC display.

9.1.2.7 Select Frequency (F) (Met 30+3F only) :

The frequency can be changed to Low, Medium or High by pressing [+] or [-] keys.

9.2 Reports Display

Metal detectors equipped with a touch screen display allow all event reports, and the status report, to be viewed on the screen. Only stored reports can be viewed, so the print mode must be set to 'Print On Demand' (See the printing section of this manual). The reports display screen is accessed from any of the printing menu options available on the Operator, Supervisor or Engineer menus (see the 'Printing' section of this manual). For example the operator can view reports on screen as follows:

The following is displayed from the operator's menu:

Test	Product
Print	Exit

Selecting 'Print' will result in a display as follows:

Set up printer or PC on port A <SELECT>
--

Press  /  and the 'Display' option will be shown:

Display

Press **SELECT** to enter the reports display that will start by listing the status report and current products, followed by the event reports as follows:

Lock Inspection Systems						
Product and status report at 12/08/05 12:22:31						
Id string of detector – 89235/1 95x38 1MHZ						
Current product – PILLS						
Product count – 11245						
Reject count – 12						
Product settings:						
	Nm	gain	height	width	phase	delay
0	TEST SETUP	15	(500)	100	0.0	1.00s
1	PRODUCT A	15	(150)	120	13.4	1.00s
2	PILLS	15	(710)	100	95.0	0.32s
--End of product settings --						
    						

Figure: Reports display showing status report

The figure above shows the reports display and keypad, where the , , , , 

 = Exit

 = Scroll Up

 = Scroll Down

 = Pan Left

 = Pan Right

The reports display shows a 'window' onto the full page printout, which is too big to fit the screen, therefore the , , , 

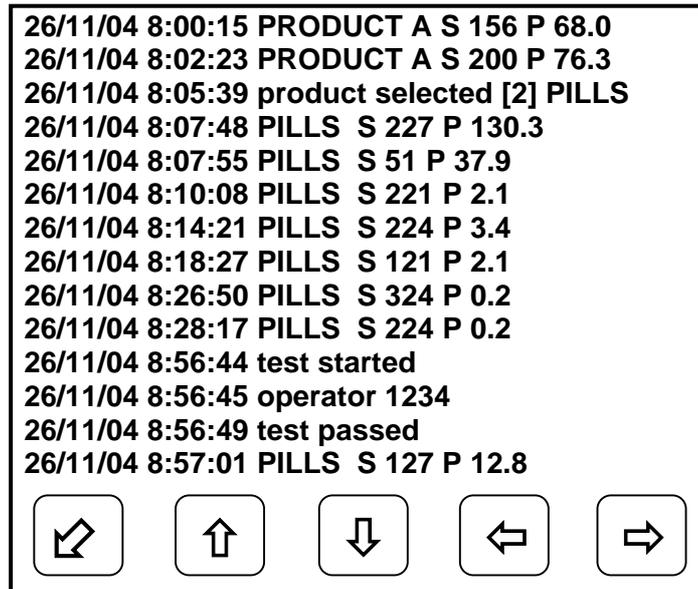


Figure: Reports display showing event reports

Touching the  'Exit' key will close the ADC display and return to the initial bargraph display. If the 'Reports Display' was initially accessed by a Supervisor or Engineer level user, then an option to clear all reports from memory will first be displayed as follows:

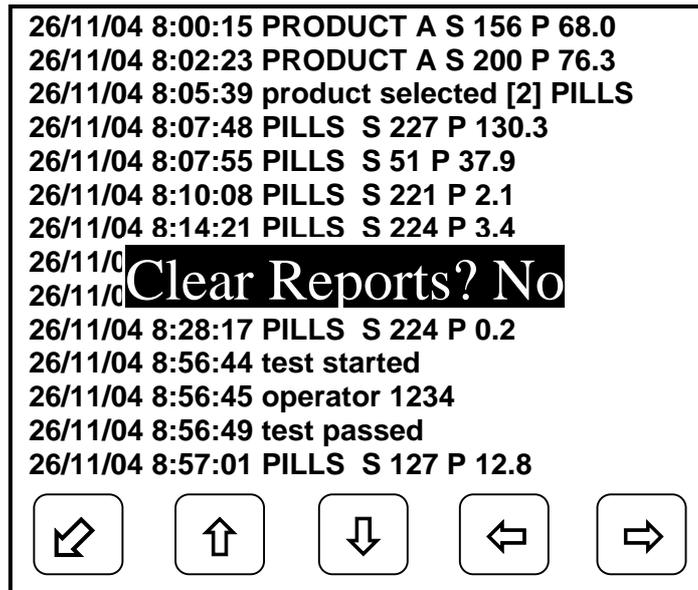


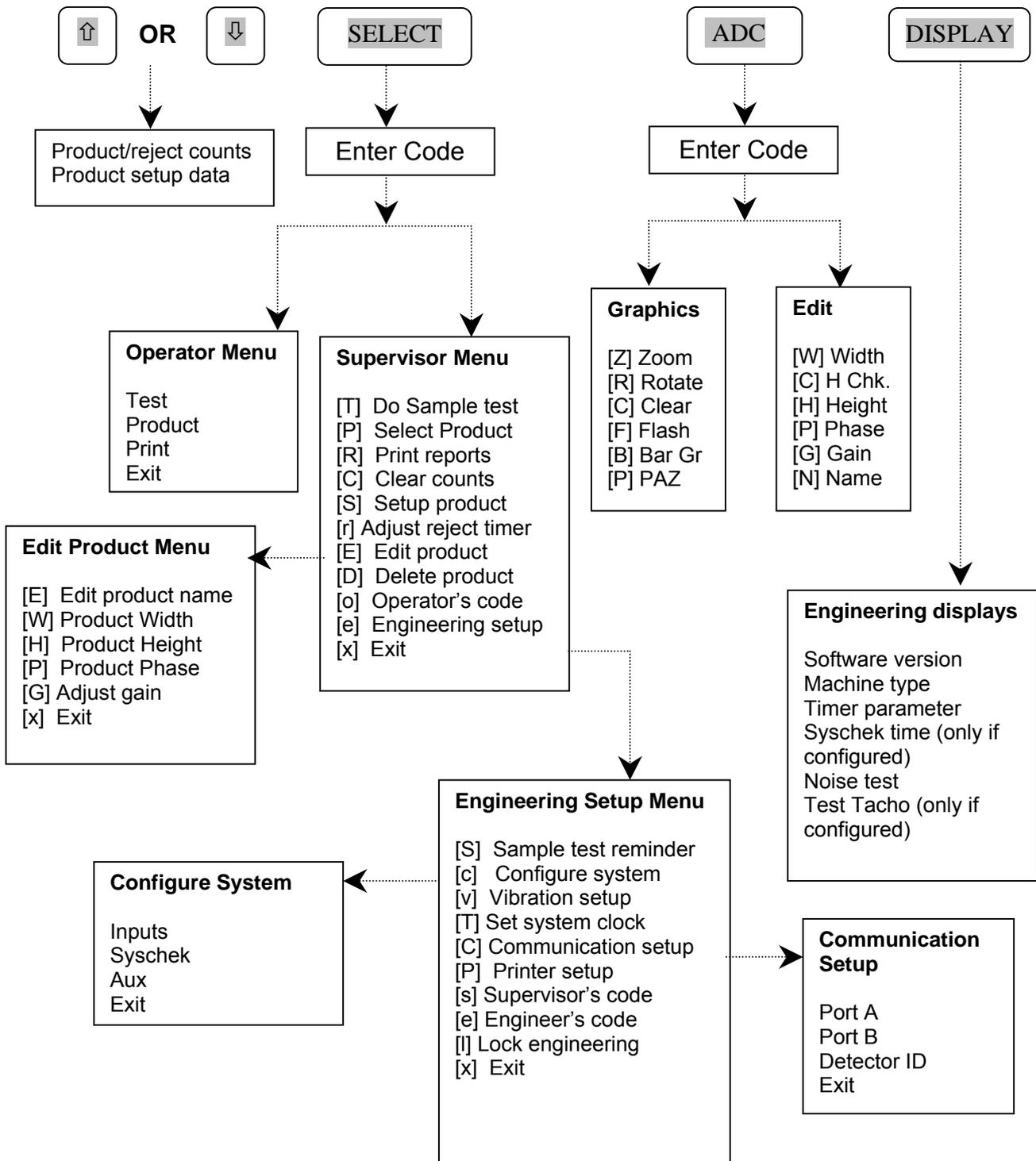
Figure: Reports display showing clear reports question

The figure shows the 'Clear Reports?' question displayed and the default answer 'No'. The '[Up]', '[Down]', '[Left]', '[Right]' keys can all be used to toggle the answer 'No / Yes', and pressing the '[Checkmark]' key will confirm the answer. If 'Yes' is chosen then all the stored reports will be cleared from memory.

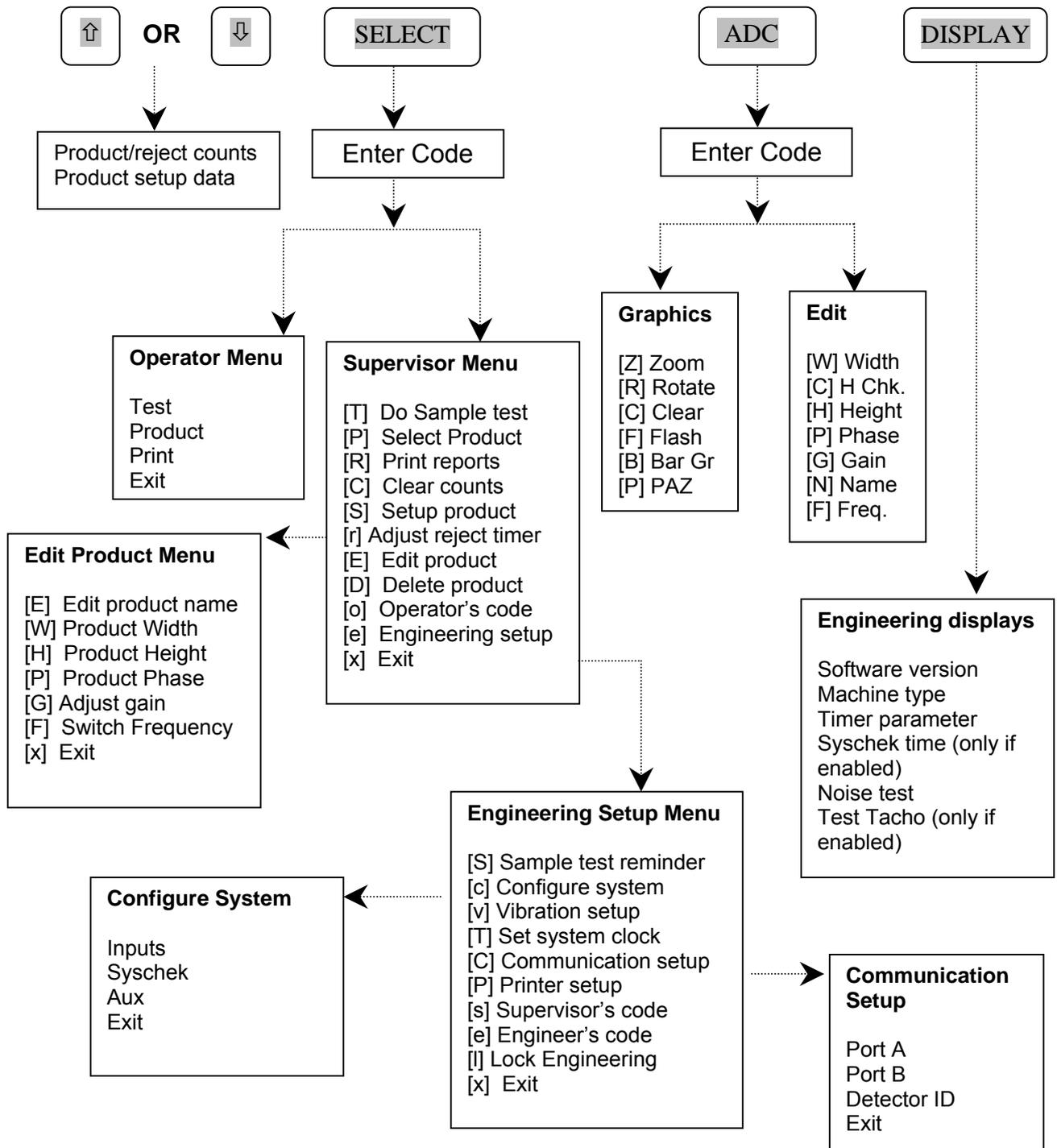
9.2.1 Reports Storage Capacity

When the 'printing on demand' mode is set, all reports are stored in a buffer memory in the metal detector. If the buffer, which has the capability of holding approximately 1200 reports, overflows the oldest reports are discarded and an incident report of "Messages lost" is entered.

9.3 Met30 + 1f System Menu (Touch Screen)



9.4 Met30 + 3f System Menu (Touch Screen)



10. TROUBLESHOOTING GUIDE

The aim of this section is to list common problems and possible solutions. The fault finding section of the Installation Manual should also be consulted.

10.1 False Triggering/Poor Sensitivity

This is the most common problem with metal detectors. There are many possible reasons for it, so the first thing to do is to narrow down the source of the problem. To do this, select the "TEST SETUP" preset and pass the test sample provided through the metal detector. Now read the relevant paragraph below:

10.2 Fails to detect test sample

The detector is now less sensitive than when it left Lock Inspection. An engineer should check that the power supply cables are wired correctly. If everything appears to be OK call Lock.

10.3 Detects sample but false triggers

There are many possible reasons for this, below is a list of possible causes:

Components guiding/transferring products through the metal detector should be clean and contain no metal. Sometimes metal becomes embedded in the guiding/transferring components causing the head to trigger at regular intervals. Under no circumstances should metal fasteners be used in guiding/transferring components.

Moving metal in the metal-free-zone - there must be no metal in the metal-free zone. Consult the Installation manual.

Earth loops - all metal items must be securely bonded to each other or insulated. Intermittent metal-to-metal contacts can often cause problems.

Electrical interference - all high-current cables should be routed well away from the detector and its cabling.

11. GLOSSARY

11.1 Aperture

The hole in the metal detector through which product passes.

11.2 Bargraph

On the bottom line of the detector's display, after power on or reset, a line of circles is displayed. The more circles, the larger the signal from the product. Solid circles indicate that metal has been detected, while hollow circles indicate product effect or noise.

11.3 Test Setup

This product setting is set up at the factory to detect the standard test sample provided with the detector, without false triggering. By selecting TEST SETUP and passing the standard test sample it is possible to see if the basic sensitivity of the detector has reduced since it left the factory. If it sees the sample but false triggers, then the environment is noisier (see *noise* below) than when the detector was initially set up.

11.4 False Triggering

False triggering is when the detector indicates that it has seen metal when none is present. This can mean that good product is incorrectly rejected.

11.5 Metal-Free Zone

Any metal that moves near to the aperture may be detected by the metal detector. This could result in false triggering. To prevent this, there should be a metal-free zone around the detector aperture i.e. an area where no metal is present.

11.6 Noise

In connection with metal detectors, noise usually refers to electrical noise, sometimes called interference. Noise is unwanted signal picked up by the metal detector, sometimes resulting in false triggering or reduced sensitivity. Noise can be generated by unsuppressed solenoids, inverters, earth loops, high-current-carrying cables, welding equipment operating nearby etc.

11.7 Noise Test

This is a fault diagnosis test, it is an automatic setup which can be carried out in the event of a fault occurring on the detector. The auto setup values should be noted and then passed to the Lock when calling for assistance.

11.8 Product Effect

Some products have a signal, which can be seen by the metal detector - this is called the product effect. Its effect, in some cases, is to partially mask the signal from metal contamination resulting in a lower sensitivity. Product effect can be caused: by small amounts of metal in the product's recipe e.g. iron-fortified cereals, vitamin

tablets or packaging materials e.g. metallised film or recycled cardboard as well as salt content and fat content.

11.9 Sensitivity

The smallest size of metal contaminant that can be reliably detected without false triggering. If the detector is too sensitive, unwanted rejection of good product will take place. If the detector is not sensitive enough, metal contamination may be missed. Sensitivity can be changed in the software by changing the product parameters.

11.10 Systemchek

A means of verifying that the reject mechanism has operated when required to do so (reject systemchek) or that the contaminated product has entered the reject bin (product systemchek). It is controlled by one or two photocells connected to the PSU and settings in the software.

11.11 Test Sample

When a metal detector is shipped by Lock, a test sample is sent with it. This is a small piece of metal embedded in plastic or a laminated card. This can be used to test the basic sensitivity of the metal detector, i.e. the sensitivity of the detector without compensating for product effect.

11.12 Trigger

When the metal detector detects metal. It is indicated by the bargraph showing solid circles, and the reject count incrementing.

11.13 VFD – Vacuum Fluorescent Display

The standard metal detector has a three key membrane and a VFD display. The VFD display is a bright two-line character display.

11.14 ELD – Electroluminescent Display

A 320 x 240 Quarter VGA graphics display with touch screen interface. The EL display features Lock Inspection Systems ADC graphic's software, which provides operation and maintenance staff with an on-screen diagnostic tool.



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