



Quin Systems Limited

PTS Toolkit 2000

PC Utility software for PTS systems

Introductory Guide

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(MAN412)

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Software Versions

This manual reflects the following software versions.

- PTS Toolkit 2000 Software version 2.1 or higher
- PTS systems with firmware V1.9.1 or higher

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Quin Systems Limited
Oaklands Business Centre
Oaklands Park
Wokingham
Berkshire
RG41 2FD

Telephone: +44 (0) 118 977 1077
Facsimile: +44 (0) 118 977 6728
E-Mail: support@quin.co.uk

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Introduction

PTS Toolkit 2000 consists of a suite of six PC based tools and utilities to help program, maintain and diagnose a Quin PTS system.

**PTS Editor**

For writing PTS programmes

**PTS Terminal**

For communicating with a PTS system via serial, modem or Ethernet

**PTS 'Scope**

For tuning and monitoring a PTS system graphically

**Q-Drive Setup**

For configuring and tuning a Q-Drive

**Motion Generator**

Graphic motion design

**Operators Panel Editor**

Graphic panel configuration and programming

This introductory guide has an overview of each of these six PC based programs, showing what they are used for and what their “feature highlights” are.

Each program has Windows help – use this to find out what a particular dialog or menu option does.

Q-Drive Setup is to be used in conjunction with MAN431 – Q-Drive Installation Manual.

Some important information on serial cables and “hardware handshaking” between PC and PTS systems is listed in this manual, on pages 9 and 10.

To get the best out of a PTS system, and PTS Toolkit, Quin recommend training on what the PTS system is and how it works.

Requirements for PTS Toolkit 2000

PTS Toolkit 2000 requires Windows '95 '98, NT or 2000. Recommended: a Pentium class processor, 120MHz or above, 16MB RAM and 6MB disk space free for installation. A CD drive is required for installation.

PTS Toolkit 2000 uses many modern Windows features such as “Drag and Drop” and “OLE”. Therefore a PC which is over 5 years old is unlikely to be able to run the Toolkit successfully, as it would struggle with many other modern Windows programs.

Installing PTS Toolkit 2000

Switch the computer on and start Windows as usual.

Place the CD in the CD drive of the computer.

If “AutoPlay” is enabled then the CD will start automatically. Choose “Install” and follow the on-screen instructions.

If “AutoPlay” is disabled then navigate to the CD drive (using “My Computer”) and execute the program “TK2K.EXE” that can be found in the root directory (folder) of the CD. Choose “Install” and follow the on-screen instructions.

Once installation is complete please reboot the computer. PTS Toolkit 2000 is then ready for use.

Additional items can be installed from, or used on the CD. Choose "Manuals etc." from TK2K on the CD. This feature requires a Web Browser (such as Internet Explorer) to be installed on the PC.

Extras on the CD


The PTS Toolkit 2000 CD includes more than just the installation system for the six PC programs. Also included are all PTS manuals, release notes and other utility software for use with a PTS system.

All PTS manuals are available in Adobe PDF format. This requires the Adobe PDF viewer which is also on the CD. These manuals can be copied onto the PC for use, or can be accessed straight off the CD.

PTS systems are shipped with PTS Toolkit 2000 CD, this manual, and the installation manual for the particular PTS hardware. No other manuals are included in paper format. If you require copies of manuals on paper you can either print them directly from the CD or order them using a copy of the form below:

Ordering PTS Reference Manuals

Please photocopy this page and FAX or post to Quin Systems Ltd, along with appropriate order:

Shipping Address:			
Manual	MAN no.	Qty	Price Each
PTS Reference Manual	MAN533		£5.00
Motion Generator	MAN520		£5.00
Quin Mini Operators Panel	MAN517		£5.00
Quin Operators Panel	MAN512		£5.00
Modbus Interface Software	MAN526		£5.00
Data Highway Interface Software	MAN527		£5.00
Profibus Interface Software	MAN537		£5.00
DeviceNet Interface Software	MAN538		£5.00

PTS Editor



The Quin PTS Editor is designed to make PTS programme writing easier and faster. As well as supporting all the common features of a text editor it has features specifically for PTS language files, such as syntax colouring.

Feature highlights:

- Syntax colouring
- Syntax checking
- PTS Reference
- Smart formatting
- Spotting duplicate sequences, maps, profiles and tables.
- Comparing PTS programmes
- Download to a PTS

PTS Editor Overview

PTS Editor is a text editor. You can type text in, use cut, copy and paste to re-arrange the text, use undo and redo to avoid mistakes and perform find and replace throughout the PTS programme. If you are familiar with other text editors (such as Windows® Notepad or Wordpad) you will be able to use the PTS Editor straight away. If you've never used a text editor before then here are a couple of quick pointers:

- You type text in using the RETURN (also called ENTER) key to start a new line.
- New text will appear to the left of the cursor (flashing vertical bar |) – you can move this around using the arrow keys or the mouse. This lets you *insert* text anywhere – so you can go back over what you have written and add more at any time
- The BACKSPACE key deletes text to the left of the cursor (flashing vertical bar |). The DELETE key deletes to the right of the cursor.
- Some keys are for getting around your document quickly – the HOME key takes you to the beginning of the line, the END key takes you to the end of the line, PAGE UP and PAGE DOWN move you up or down a page. Press the CTRL key and the left or right arrow key at the same time and you will jump to the end/beginning of a word.
- Don't worry if you get in a mess, try the UNDO system to get back to where you started.
- Advanced options include OVERWRITE - the INSERT key toggles between insert mode (how you would normally work) and overwrite mode when anything you type overwrites what you have already written. You can tell you're in overwrite mode by the block cursor and the word OVR in the status bar. Also if you select text (using the mouse or holding the SHIFT button down whilst using the arrow keys) any new typing replaces this selection.
- Remember you're writing PTS code! So the format of what you write needs to be correct for a PTS system – the Editor will help you with this by using syntax colouring and syntax checking.
- Experiment! By learning menus and shortcuts (key presses to get places quickly) you can very quickly become an expert at using this Editor and create PTS programme code efficiently.

PTS Programme Editor is a multiple document editor – you can edit many PTS programmes at once, all in the same Editor. This will save screen space and means you can compare files alongside each other easily. It is also possible to split a document into two panes (one above the other). This allows you to compare different parts of the same PTS programme - use the View menu, Split option.

PTS Programme Editor also supports 'drag and drop' and other up to date Windows features to make working with files easier.

During writing a PTS programme context sensitive help and syntax colouring and checking make sure that what you write is right first time.

Once a PTS programme has been written you can check for duplicate sequences and such like, format the text neatly for a PTS system and even download the code through PTS Terminal.

Feature Highlights

These features make PTS Programme Editor different and an efficient tool for writing PTS programmes:

Syntax colouring. By colouring what you type using the rules of PTS code you can easily see what bits of your program do what. The addition of colour brings the text alive – numbers and variables stand out from commands, syntax doesn't clutter the flow of the code and comments are easy to spot. For example putting a # (comment) symbol at the beginning of a line means PTS ignores the whole line – easy to spot when the line is a different colour from other lines!

Syntax checking. PTS Editor can check your PTS code as you type. This means that you need never create PTS code with syntax errors in it – because if you do it's underlined for you to see! This saves valuable time and gives you the chance to produce 'right first time' code. PTS syntax checking is provided using PTS version V1.9.1.1 as a baseline. If you are writing for a different PTS version some PTS commands might not be understood by the Editor, but there is an option to avoid this, see the options dialog. Need to spot syntax errors in a programme file? Press **F2** to jump to the next error (if any).

PTS Reference. Help on any feature of PTS code is just a key press away! The whole PTS reference manual has been turned into a Windows help file – just press the **F1** key and the Editor will open this reference manual and go to the page closest to what you are typing at the moment. This is invaluable when trying to remember the options for commands such as LW. There is also help on standard syntax errors – click with the right mouse button over any syntax error and choose the menu option to explain the error for you. This electronic version of the reference manual is further enhanced with hot links between topics and extra explanation of PTS error messages.

Smart formatting. When you have written some PTS code you often need to print it out to keep a permanent record. Not only does PTS Editor show you page breaks (dotted lines on the screen) but it can format your text to make it clearer to read. This formatting includes making all PTS code UPPERCASE, removing unnecessary spaces from inside PTS code and making sure that sequences don't split across printed pages unless they really need to. When printed out PTS Editor adds text telling you if a sequence continues on the next page – vital because PTS doesn't have pages!

Spotting duplicate sequences, maps, profiles and tables. A PTS programme can get quite long. As well as being able to quickly jump to any line or sequence (see the Goto dialog) the PTS Editor can spot duplicate definitions of sequences, maps, profiles and tables. Without this feature you can accidentally re-use a sequence number and never know, as PTS will just overwrite the old sequence with the new one.

Comparing PTS programmes. Maintaining a PTS system often means making modifications to the PTS programme over a period of time. The danger is that you lose track of what has been changed. Or maybe you need to check that what's in the PTS system is what you wrote. PTS Editor can compare two files (perhaps your PTS programme and an upload, LA, from the PTS system) and tell you where the differences are. This comparison is not based on the text, but on the PTS code – so irrelevant differences such as SO1 and SO1:1 are ignored, but relevant differences are detected and reported.

Download to a PTS. Once a programme is written it needs downloading through PTS Terminal. However it is probably going to change during testing – so you can download straight from the Editor through the Terminal, and not just the whole file, but individual sequences, or even line at a time. This connection to the PTS means you can work from your programme file on the PC and ensure that your comments are up to date as you make changes during testing.

PTS Terminal



The Quin PTS Terminal is the tool you use to connect a PC to a PTS system to programme and diagnose the PTS system. PTS Terminal supports a standard serial port connection, connection via a modem and Ethernet (TCP/IP) if the PTS is so equipped.

Feature Highlights:

- Connect via Serial Port, Modem or Ethernet (TCP/IP)
- Large scroll back buffer and automatic LOG file
- Syntax colouring
- Download of PTS programmes, Operators Panel code and plain text
- Upload of PTS programmes (LA) Parameter grid
- What you've typed displayed on status bar

PTS Terminal Overview

PTS Terminal is the PC program used to programme and diagnose a PTS system. All PTS systems require some form of 'terminal' program (a program that sends and receives text characters, allowing the user to read what the PTS sends and type characters into the PTS) for you, the user/programmer/technician to interact with them to:

- Programme the PTS system
- Configure and install the PTS system
- Maintain and diagnose the PTS system

PTS Terminal is not required for a PTS system to work controlling a machine – once programmed a PTS system should work from a stored PTS programme through a HMI (Human Machine Interface) such as an Operators Panel.

Getting Started

To talk to a PTS system you will need some hardware – maybe just a standard PTS serial cable to connect to your PC. Once this is connected you choose the menu option 'Connect' from the File menu in PTS Terminal (there is also a button for this on the toolbar). If this is the first time you've used PTS Terminal then you will be asked questions about how to connect to the PTS system, see the Connect dialog for more information. If you've used PTS Terminal before you will be able to choose a connection you previously defined.

PTS Terminal will use the connection method you have specified and will confirm that the PTS is switched on and working. A special dialog box will report the progress of this – watch what this says and you should be able to sort out any problems (such as PTS not switched on, or using the wrong serial port).

Talking to a PTS system

Once you are connected to a PTS system you will see the 'prompt'. This is an indication of the state of the current motor channel you are looking at (see the PTS reference manual for a fuller explanation). Simply typing in characters will allow you to talk to the PTS system, try VN<return> for example. Now you can programme the PTS system.

What Terminal doesn't do

PTS Terminal does not programme a PTS system for you; it merely acts as a conduit or tool. Remember to save your programme in the PTS system (SP), and make notes of all the settings. It is best to write a PTS programme file using PTS Editor and make sure you never make a change to PTS through the terminal that you don't also make in this programme file. PTS Terminal should NOT be used as an Operators Interface to a PTS system. Rather it is a programming tool – much better HMI's exist which are safer and easier for an operator to use.

Feature Highlights

These features make PTS Terminal an efficient tool for programming and diagnosing PTS systems:

Connect via Serial Port, Modem or Ethernet (TCP/IP) All PTS systems support programming via an RS232 serial port, and PTS Terminal will use a PC serial port to connect to this. It is also possible to use modems to connect to a 'remote' PTS system. PTS Terminal supports modem dialling through the Windows Telephony system – meaning that dialling codes and modem settings are greatly simplified. If your modem works to connect to the Internet (for example), PTS Terminal will be able to use it to talk to a PTS system correctly equipped with a modem. Some PTS systems (e.g. the Machine Controller) now support Ethernet using the TCP/IP protocol. PTS Terminal can use TCP/IP to connect to a suitably equipped PTS system, all you need is a network card and networking software installed on the PC (the necessary software comes free with Windows).

Large scroll back buffer and automatic LOG file PTS Terminal remembers up to 32000 lines of PTS communications. This should give you plenty of room to look back over what you've been doing to keep track of what's happening. Additionally PTS Terminal also *automatically* logs all this to disk (no line limit imposed). These log files are kept for 7 days and then deleted. So if you need to check something out, or provide evidence of something you're not sure about, you can open these log files (in Notepad for example) and print out the relevant section.

Syntax colouring PTS Editor provides syntax colouring to help you write PTS programmes easily and quickly; PTS Terminal uses the same colouring technique to help you spot important information – for example, by default, PTS errors are coloured red (and should beep at you as well). This syntax colouring helps you separate the different sorts of information that a PTS system products.

Download of PTS programmes, Operators Panel code and plain text Key to programming a PTS system is downloading a PTS programme from the PC to the PTS. The Terminal has a very powerful download system. When downloading PTS code (and to a recent version of PTS) each line will be checked to ensure it downloads properly, and then the whole download also checked (this uses ED and SY on the PTS). In this manner once a download is complete without any errors you can be sure everything went from the PC to the PTS system intact. Other download options are provided for dealing with other file types such as Operators Panel data. Download works whatever connection is used between the PC and the PTS – whether it is serial, modem or Ethernet.

Upload of PTS programmes (LA) PTS systems can list the PTS programme stored within them using the LA function. PTS Terminal uses this function to provide the reverse of the download mechanism. Once you have chosen what should be uploaded the data is extracted from the PTS system and then stored on disk. This provides a neat solution to taking an exact copy of a working machine's programme to use in a disaster recovery procedure.

Parameter grid When working with many PTS motor channels it can get confusing remembering the configuration of them all. The parameter grid lets you see, at a glance, the configuration of PTS parameters you choose, across each PTS motor channel. This can be used for motor tuning (display KP, KF, KV and KA for example) or configuration (display CW, EW, LW etc.) or diagnosis (display SB, ML, variables, motor status).

What you've typed displayed on status bar As you type characters into a PTS system they can sometimes get 'lost' – the unit outputs messages and the display scrolls up. PTS Terminal displays what you type, along with the PTS prompt, on the status bar. This is especially useful for spotting when PTS is asking a question '?' (e.g. you type KP<return>) – a quick glance at the status bar will warn you not to type in a command, but to enter a value or press RETURN again.

Right mouse button menu A very useful 'time saving' feature is the menu you get if you click in the Terminal window with the RIGHT mouse button (assuming you haven't swapped the buttons around in the Windows Control Panel) – this includes options like recently type commands (two clicks, a mouse move and press the ENTER key to re-send an entire command line).

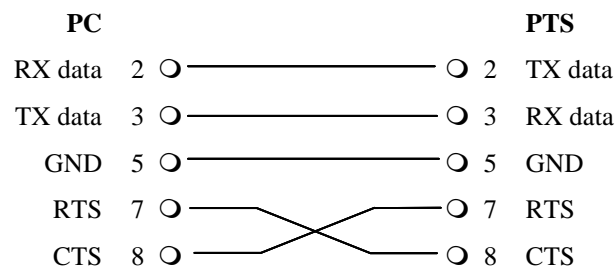
Serial Port Connections

The standard method of connecting a PTS and PC is via a serial cable. These can be bought from Quin Systems, part number XXX.

This section details wiring these cables, and particular notes concerned with hardware handshaking. There are details for some connectors not found on newer PTS equipment, but included here for completeness.

PC (female 9 pin sub-D type) to PTS (male 9 pin sub-D type)

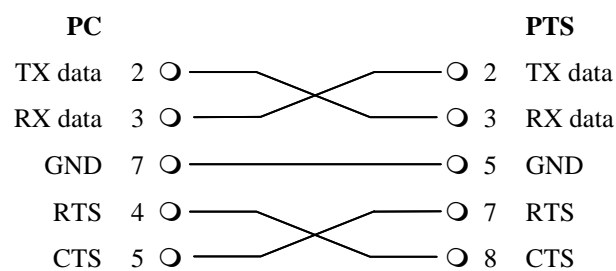
This cable suits the majority of installations.



Note: RTS/CTS only required for hardware handshaking, see later in section.

PC (female 25 pin sub-D type) to PTS (male 9 pin sub-D type)

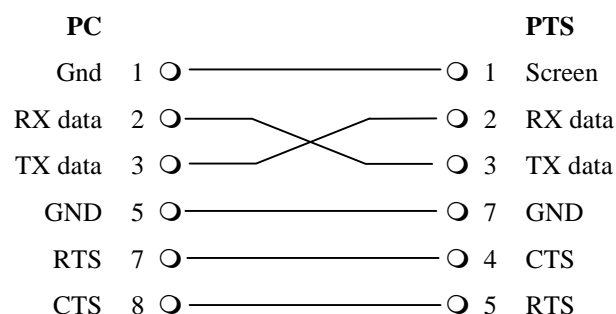
This can be found on some PC's (note PC pins not in numerical order)



Note: RTS/CTS only required for hardware handshaking, see later in section.

PC (female 9 pin sub-D type) to PTS (male 25 pin sub-D type)

This can be found on old PTS systems (note PTS pins not in numerical order)



Note: RTS/CTS only required for hardware handshaking, see later in section.

Handshake Selection on Quin PTS systems

Most PTS systems use software (XON/XOFF) handshaking – and this is the manner in which they are shipped from Quin Systems. PC's can also use this method and PTS Terminal uses this by default.

Hardware handshaking is a method to add robustness to the communications between the PTS and PC, and is often used for long cable runs and in noisy environments.

MiniPTS 1+1, Q-Drive 1+1/MAP , MiniPTS 2+1/3, PTS Mk2 (CPU360), Mini Machine Controller and Machine Controller

These products use software to permit hardware handshaking on the serial ports. To enable hardware RS232C handshake use command CF to set port A to RS232 with hardware handshake, then power off and back on with the CTS pin 8 held high (do this by starting PTS Terminal first, opening the “connection”, connecting the serial cable, and then turn the PTS on).

To change back to software handshake: power on with CTS off will revert to software handshake; use command CF to set port A to RS232, software handshake.

MiniPTS 4.

This product requires a link between pins 1 and 2 of jumper J11 on the MiniPTS SRV-4 board (see MAN505) to enable hardware handshake. Power on with CTS pin 8 held high (do this by starting PTS Terminal first, opening the “connection”, connecting the serial cable, and then turn the PTS on).

To change back to software handshake: remove link.

IMPORTANT NOTE

PTS systems can “hang” (stop working) if left for long periods of time with hardware handshaking enabled. This is NOT recommended.

Please remove/reset to software handshaking once you have finished programming/diagnosing the PTS system.

As a *temporary* measure pins 7 and 8 of the 9 pin sub-D type port A can be linked together on the PTS system.

PTS 'Scope



The Quin PTS 'Scope is designed to provide live graphical motion information about the performance of a PTS system. This is invaluable not only for tuning motors but also for all aspects of configuring and diagnosing a PTS system in action.

By default many of the features of 'Scope are turned off. This is because 'Scope is a chargeable extra in PTS Toolkit 2000. The tuning features are standard and can be used without this extra "key".

Feature Highlights:

- Works with any PTS system
- Live display of motion information as the PTS system works
- Fine data mode for high resolution information
- Motor tuning
- All scales and settings configurable
- Pan and zoom + cursors to examine data
- Export to Microsoft® Excel or Word (for example)

PTS 'Scope Overview

This is more than a software simulation of an oscilloscope. It is specifically designed to display motion information produced by a PTS system (called trace data, TR) in a graphical interactive format.

PTS Terminal provides the 'conduit' to a PTS system – so 'Scope can work with a nearby PTS over a serial port, throughout a factory using Ethernet or across the world using modems or the Internet. This means you can watch a machine move from thousands of miles away! (invaluable for machine support).

What can 'Scope show?

PTS trace information can show time dependent information, such as (there are others available in PTS):

Motor Demand Position Where the motor is supposed to be

Motor Actual Position Where the motor actually is

Motor Position Error The difference between the first two

Motor Demand Velocity How fast the motor should be moving

Motor Actual Velocity How fast the motor is moving

Binary data: Input groups 1 – 5 and Output groups 1 – 4. Display of all binary input and output groups that exist on the PTS system

There is the capability to display any *four* of these signals at one time, across all the PTS channels. Motor tuning limits you to a single PTS channel, the full 'Scope does not have this limit.

How fast can 'Scope show it?

PTS 'Scope can work in two main ways. Press the record button on the toolbar and choose continual tracing. PTS 'Scope displays the information you have chosen as fast as PTS can send it out (TR instruction). This is live, immediate data and can be at a resolution of 20 samples per second (serial port) or up to 100+ samples per second (Ethernet). Stop the 'Scope and press the record button again, this time choosing how many samples to trace. PTS now samples the information 256 times per second and then sends the data to the PC (TR<n> instruction). This means the 'Scope has a resolution of better than 4ms. Combining these two methods allows you to monitor a machine effectively – see an overall trend or picture, and examine the detail closely.

How much data?

PTS 'Scope buffers data on the PC (up to 20000 lines) so this is a lot of data! The pan and zoom features allow you to look around this data quickly and efficiently. The actual quantity of data available might be limited by the PTS system when using the buffering approach (TR<n> in PTS terms).

What can you do with the data?

First you can listen to the heartbeat of a machine – compare the 'Scope to a stethoscope allowing you to detect and monitor the motions of your machine. This means motor tuning, nonlinear mapping alignment, registration and many other motion related issues.

Cursors provide the ability to perform analysis – compare times and values just by clicking on the traces. {when you click the nearest point is highlighted and a vertical line drawn}. Zoom and pan around the data to look for anomalies. For example you might monitor a digital input and compare it with the motor position to check that a cyclic machine is maintaining register, or if not, why not.

The data itself can be exported to Microsoft® Excel (as a CSV file or via the clipboard – use Paste Special in Excel) or to Microsoft® Word (as a Windows meta-file, a line drawing or picture). So reports can be produced and analysis performed. Printing the data provides a permanent record of a machines performance.

Advanced uses of PTS 'Scope

Use 'Scope to prove a machine performs to specification. Use 'Scope to show a machine working (save the data to PC disk and then re-load it later). Perform diagnostics on a 'broken' machine. Check for machine wear (take a 'trace' every maintenance visit and compare them).

Feature Highlights

PTS 'Scope has many features for handling motion information graphically.

Motor Tuning

Built into PTS 'Scope is a PTS motor tuning system. A motor stimulus generator lets you move a motor (forwards, forwards and pause, backwards and forwards). Then use the 'Scope to trace position error, demand and actual velocity (a good choice for motor tuning) whilst altering the PTS control loop gains. This is a simple and effective tool to quickly perform empirical motor tuning. This can be performed whilst commissioning a machine, or even when a machine is running – don't use the stimulus, just monitor the motor performance and fine tune the gains.

Fully Configurable Display

You can set scales, colours, line widths, line types, digital trace size and type, cursor labels and the timebase. You can use cursors to examine the data and perform analysis, zoom in and out, pan left and right and autoscale the data. Important display information has been carefully selected and placed on toolbars so that you can see, at a glance, how the 'Scope is set up.

Full Screen

By turning off the toolbars and title bar (see the view menu) with the 'Scope 'maximised' (filling the whole screen) you can turn the PC screen into a large oscilloscope to your PTS system – very useful for presentations! Also remember that all 'Scope settings are saved in DAT files so you can easily present different images – just load the DAT file and then press record.

'Scope can record data or listen for data.

Record means that the 'Scope issues the PTS commands to set the trace data running and then displays the results. Listen is even more powerful (and only available with the additional 'Scope features unlocked) – the 'Scope monitors the PTS system for trace information and then displays it. This means that you can trigger the trace data from within the PTS, perhaps at a certain point in a cycle or even from a motor error. To summarise:

1. Live data display (TR) either triggered from the PC (record) or the PTS (listen)
2. Buffered data display (TR<n>) either triggered from the PC (record) or the PTS (listen)
3. Logged data display (LG and DG, using the listen mode)

Q-Drive Setup



Quin Q-Drives contain a number of configuration parameters. Q-Drive setup software lets you change these settings, and tune the motor performance. This software should be used in conjunction with MAN431, Q-Drive Installation Manual.

Note: As this software is used to configure and tune equipment with dangerous voltages and the risk of damage or death great care should be taken. Please ensure that there is a method of removing the dangerous voltages from the Q-Drive and stopping the motor independently of the PC software. When the motor is attached to machinery care should be taken that inadvertent use of the PC software does not cause damage to the machinery.

Feature highlights:

- Parameters grouped according to function
- Load/Save parameters to PC disk
- Resolver shift angle detection
- Graphical tuning of current and speed loops

Q-Drive Setup Overview

Feature Highlights

Motion Generator



Motion Generator forms the “brain” behind dynamically generated non-linear maps and profiles for PTS. The PC based version of this tool lets you graphically design motions and create the “shape” information needed for the PTS based version to work from.

Feature highlights:

- Graphical design and analysis of complex motions
- Polynomial segment type for flexibility
- PTS sequence parser and variable evaluator
-

Motion Generator Overview

Feature Highlights

Operators Panel Editor



Quin Operator Panels form excellent tightly integrated man-machine interfaces to the PTS system. They can be configured within the PTS system itself, or using this PC based tool. By providing a graphical view of the panel menus and functions it is easy to develop and change a particular operators panel configuration file.

Feature highlights:

- Graphical “tree” view of Operators Panels
- Supports all Quin panels and versions
-

Operators Panel Editor Overview

Feature Highlights

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