

GS8 / GS12 General Purpose Ignition Systems

User Manual



1. INTRODUCTION.....	2
Features.....	2
3. INSTALLATION.....	3
3.1. General Information.....	3
3.1.1 Igniter Installation and location.....	3
3.1.2 Ignition Coil location.....	3
3.1.3 Wiring Harness.....	3
3.1.4 HT Lead recommendations.....	4
3.1.5 Timing Disc and Engine Position Sensor installation.....	4
3.1.5.1 Installing the Timing Disc.....	4
3.1.5.2 Dual Timing Disc installation.....	4
3.1.5.3 Inductive Engine Position Sensors.....	5
3.1.5.4 Hall-effect Engine Position Sensors.....	5
3.1.5.5 Single / Dual Timing Disc options.....	5
3.1.6 Igniter L.E.D. display.....	6
3.2. SparkZ GUI Software Installation.....	7
3.2.1 Communications software.....	7
3.2.2 Minimum requirements.....	7
3.2.3 Installing the new GillShell software.....	7
3.2.4 Running the SparkZ GUI program.....	8
3.2.5 The SparkZ GUI Configuration Facility.....	8
3.2.6 The SparkZ GUI “Monitor” Screen.....	9
3.2.7 The SparkZ “Ignition Control Maps” Screen.....	10
3.2.8 The SparkZ “Diagnostics” Screen.....	11
4. The SPARKZ HELP DIRECTORY.....	13
4.1 The SparkZ Help Directory Contents.....	13
5. WIRING DIAGRAM (Igniter Connector Pin-out arrangement).....	14
Appendix 1 – GS8 / GS12 Wiring Diagram.....	15
Appendix 2 – Wiring for Dual Pickup Sensor operation.....	16
Appendix 3 – GS8 / GS12 Igniter Assembly.....	17
Appendix 4 – Standard Gill Timing Disc and Sensor Installation.....	18

1. INTRODUCTION

The Gill GS8 / GS12 Ignition Systems are primarily targeted at diesel to gas engine conversions (non-wasted spark) with up to 8 cylinders (GS8) or 12 cylinders (GS12), static and non static, vehicles, gensets, compressors etc.

The GS8 / GS12 System consists of the following components:

Igniter module;
Wiring harness;
Ignition coils;
Engine Position Sensor;
Timing Disc;
Programming Software;
and this Operating Manual.

2. Features

Eight or twelve coil drive outputs which permit the following configurations:

2,3,4,5,6 and 8 cylinder operation with one coil per cylinder. (GS8)

2,3,4,5,6,8,10 and 12 cylinder operation with one coil per cylinder. (GS12)

- Programmable ignition control maps.
- Ignition suppression and fuel cut off on over-rev.
- Digital input or analogue input (e.g. over temperature).
- Programmable ignition and fuel cut off rpm limits.
- Progressive rpm limiting.
- Programmable global timing retard for dual fuel operation.
- Programmable Timing correction for EPS positioning errors.
- Programmable nominal dwell times.
- Dwell period versus Battery voltage compensation.
- Operates with TPS or MAP sensor.
- Optional Controlled shutdown on ignition off.
- Built-in diagnostic LED lamps.
- Timing disc to Pickup gap Monitor.
- Optional Spark voltage and duration Monitor.
- Malfunction Indicator Lamp output.
- Configurable Speed Output signal.
- Operates with universal timing disc geometry.
- Operates with crank / cam sensor configurations.
- Can be configured for alternative Timing Discs and Engine Position Sensors.
- Controlled access SparkZ GUI software.
- Operates with Gill SM60 ignition coils.

3. INSTALLATION

Prior to installing the GS8 or GS12 system, please ensure that all relevant components have been supplied, especially that the correct number of ignition coils and the correct timing disc is present.

3.1 General Information

The GS8 can be configured for 2, 3, 4, 5, 6 and 8 cylinder engines, the GS12 for up to 12 cylinder engines: this is a programmable option as the same standard Gill timing disc is used for all configurations. The cylinder firing angles are equal 120° for 6 and 90° for 8 cylinders respectively, for example. Other firing patterns and Timing discs can be accommodated – refer to Gill Sensors & Controls for advice.

On the wiring diagram the coils are numbered in Igniter firing order, NOT the engine firing order. Ensure that the coil HT leads are wired to the correct cylinders in the correct firing order.

3.1.1 Igniter Installation and location

It is strongly advised to mount the Igniter away from sources of heat and excessive vibration for optimum reliability.

If installed in the engine compartment, mount the igniter low down and away from exhaust pipes and hot air from radiators.

If the Igniter is to be installed remote from the engine, and therefore the ignition coils, ensure the wiring harness is of sufficient length – please contact Gill Instruments if an extended wiring harness is required.

Note: the Igniter is designed for **NEGATIVE EARTH** battery operation only.

Gill recommends a torque setting of 11.0Nm (8.0 lbf.ft) for the fixing bolts.

3.1.2 Ignition Coil location

Ensure that the coils are securely mounted and that the mounting flanges are not stressed. Keep the coils away from direct contact with the engine cylinder head or exhaust manifold, preferably using rubber mountings for resistance to any vibration-induced damage.

The coils should be installed as close as practicable to the engine to avoid long HT cable length.

Gill recommends a torque setting of 8.0Nm (5.5 lbf.ft) for the fixing bolts and a maximum of 2Nm (1.5 lbf.ft) for the brass low-tension terminal nuts.

Always use a 5mm ring termination for wiring to these terminals and fit the supplied spring washers.

Note: It is most important that the coil low-tension connection polarity is correct or premature coil failure could result.

Coils will withstand only short periods of operation with reversed LT connections.

Gill advises that this warning be included in your engine service literature.

The centre low-tension terminal on SM100 coils MUST be securely connected to an engine ground or premature coil failure will occur.

3.1.3 Wiring Harness

Ensure that the wiring is correctly fitted into the Igniter connector header (see the Wiring Diagram in Appendix 1 for details).

Also ensure that the wiring loom is suitably clipped along its length for security.

Avoid installing the wiring loom too close to the Ignition coils to ensure freedom from any possible electrical interference effects.

3.1.4 HT Lead recommendations

Gill recommends the use of spark plugs with a built in interference suppressor and carbon core HT leads with suitable coil and spark plug caps. It is preferable to maintain the same length of HT lead to each spark plug with this type of lead as their resistance varies with length.

Do not exceed a total nominal resistance of 20kohm (plug plus cap plus lead).
It is the responsibility of the user to choose the correct types of spark plugs, caps and HT leads in order to meet EMC (interference) emission regulations.

3.1.5 Timing Disc and Engine Position Sensor installation

The correct installation of the Timing Disc(s) and Engine Position Sensor(s) (EPS) is critical for reliable operation of the Gill GS8 / GS12 Ignition System.
Refer to Appendix 4 for the standard Gill Timing Disc and Engine Position Sensor Drawing.

3.1.5.1 Installing the Timing Disc

The standard configuration for the GS8 / GS12 timing disc is for it to be fitted to the camshaft or other half crankshaft speed shaft.

The disc should normally rotate anti-clockwise in the direction of the arrow; for clockwise rotation reverse the disc so the arrow is on the inner face.

To time the system, set the engine to TDC on cylinder 1 (firing) then align the scribed TDC line on the disc with the centre of the Engine Position Sensor "pin".

The clearance between the EPS and timing disc (for the standard Gill 90mm (3½") disc) should be set as follows:

For the Standard Gill Inductive Pickup: - 1.5mm to 2.0mm, ideally 2.0 mm (0.080").

For the Gill Threaded Inductive pickup: - 0.5mm to 1.00mm, ideally 0.75mm (0.030").

For the Gill Push-in Inductive pickup: - 0.5mm to 1.00mm, ideally 0.75mm (0.030").

It is essential that both radial and sideways run out of the disc is less than 0.2mm each way and the total of sideways run out and end float must not exceed 0.5mm with the Engine Position Sensor mounted centrally to the timing disc as shown in drawing 1470 -K -014 (Appendix 4).

The timing disc is supplied as standard with a centre-mounting hole of 10mm diameter.

The disc should be securely fitted to the mounting shaft, if necessary using additional means of ensuring it cannot move, e.g. keyway or dowelling accordingly.

Gill recommends a torque setting of 11.0Nm (8.0 lbf.ft.) for the fixing bolts.

Contact Gill for advice on non-standard disc designs.

3.1.5.2 Dual Timing Disc Installation

Where an installation uses a crankshaft mounted (Primary) timing disc in conjunction with a camshaft mounted (Secondary) timing disc, the installation requirements are as above.

Where the Primary and / or Secondary Engine Position Sensors are Hall-effect type, the sensor manufacturer's specifications for disc peg or vane clearance and alignment must be adhered to.

3.1.5.3 Inductive Engine Position Sensors

The standard Gill Engine Position Sensor (EPS) is a conventional inductive unit. It is polarity sensitive; if connected in reverse the engine may not run at all, or if it does, it will experience substantial timing errors and is likely to misfire. Refer to the drawing 1470-K-014 (Appendix 4) for the correct alignment with the timing disc and the disc "pegs".

It is important to mount the EPS rigidly so that it cannot be affected by vibration, to ensure reliable performance of the Ignition system. The wires from the EPS must be run close together, but should not be run with other wiring over large distances. Screened twisted pair wiring is recommended for lengths over 2 metres. Gill does not recommend sensor cable lengths over 5 metres.

3.1.5.4 Hall effect Engine Position Sensors

Where the Engine Position Sensor is of the Hall-effect type the sensor manufacturer's specifications for sensor mounting, disc clearance and alignment must be adhered to. The wiring arrangement for Hall effect sensors is shown in Appendix 2.

Contact Gill for advice on alternative Engine Position Sensors.

3.1.5.5 Single / Dual Timing Disc options

The GS8 will operate with the following Engine Position Sensor arrangements to provide normal "non-wasted spark" operation:

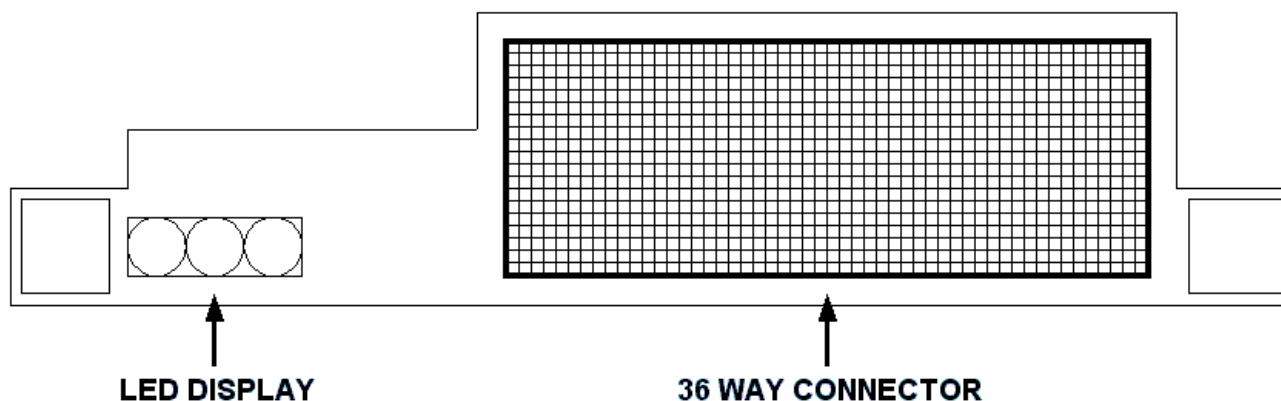
1. Camshaft disc, Inductive sensor
2. Camshaft disc, Hall-effect sensor
3. Crankshaft disc, Inductive sensor + camshaft disc, Hall-effect sensor
4. Crankshaft disc, Hall-effect sensor + camshaft disc, Hall-effect sensor

The wiring for Dual Timing Disc operation is shown in Appendix 2.

For "wasted spark" operation (on two stroke engines) the following arrangements are available:

1. Crankshaft disc, Inductive sensor
2. Crankshaft disc, Hall-effect sensor

3.1.6 IGNITER LED DISPLAY



The LED display next to the Igniter 36 way connector shows the following information:

Left –

This LED will flash to indicate that there is power to the Igniter.
 1 flash every 3 seconds shows the Igniter is in Standby Mode.
 If this is not occurring, there is no power to the Igniter.
 1 flash every second shows the igniter is Enabled and in Operating Mode.

Centre –

This LED will remain lit when the Igniter has successfully synchronised to the timing disc.
 If at any time this LED is not lit it indicates that the igniter has not received adequate signals from the Engine Position Sensor.
 If at any time this LED is lit with the Igniter powered up but with the engine stopped, the Igniter processor has been corrupted and has reverted to the factory default configuration (8 cylinder operation using a 24-2 peg timing disc).
 Contact Gill for advice.

Right –

This LED indicates that there is Igniter microprocessor activity.
 When the Spark Gap Monitor feature is enabled this LED will go out if the reported spark voltage or duration values are outside the specified limits. Clicking on the “Reset status flags” button will relight the LED.

3.2 SPARKZ GUI SOFTWARE INSTALLATION

This topic covers programming requirements and steps involved to install and run the SparkZ Graphical User Interface (GUI) software.

3.2.1 Communications Software

The system is supplied with a Windows® based **GillShell** software CD, which includes the **SparkZ** Graphical User Interface software, designed to run on an IBM PC or equivalent.

According to the specification required, **SparkZ** can enable the user to adjust the timing curve and other programmable information within the igniter and also to download operational information from the igniter.

A 9 way D type connector is fitted in the wiring loom. This should be connected to the COM 1 or COM 2 port of the user's PC (via a standard comms cable – not supplied).

3.2.2 Minimum requirements

Processor	133 MHz or higher
RAM	32Mb minimum
Hard disc	16Mb free space (minimum)
CD drive	Must be fitted
Floppy disc	Must be fitted
Display	VGA or higher
Mouse	Must be fitted
Keyboard	Must be fitted
Serial port	Must be fitted (COM1 & COM2 supported)
Operating systems	Windows 95, Windows NT or Windows 98, Windows 2000, Windows XP

When connected to an Igniter, the GillShell program will identify the type of Igniter and automatically run the relevant GUI software.

3.2.3 INSTALLING THE NEW GILLSHELL SOFTWARE

1. Follow normal Windows® procedure to remove any existing Gill GUI software - (Start – Settings – Control Panel – Add / Remove programs).
2. Load the GillShell Installation CD into the PC.
3. Click on Start – Run – Browse – locate the "GillShell" CD icon and click on it.
4. Click on the Setup icon that appears in the window. Click on Open, and then click on OK.
5. Follow the Wizard Instructions.

NOW INSTALL THE 'SPARKZ GUI CONFIGURATION' DISC

After installing the GillShell software, the SparkZ "GUI CONFIGURATION" disc should be installed if necessary.

1. Load the 1.44MB floppy disc into the PC.
2. Click on Start – Run – Browse – locate the "3 1/2" floppy" disc icon and click on it.
3. Click on the Setup.exe. icon that appears in the window. Click on Open, and then on OK.
4. Follow the Wizard instructions.

When an Igniter is connected to the PC, GillShell will detect which type of Igniter is present and automatically run the appropriate software.

3.2.4 Running the SparkZ GUI program

Click on Start – Programs – GillShell, and click on the SparkZ tab to run the program. Alternatively, “Drag and Drop” the SparkZ tab to create a desktop icon ‘shortcut’ on your PC as required. Then double click on this SparkZ GUI icon ‘shortcut’ to run the program.

Note: It is not necessary to connect the igniter to be able to run the SparkZ GUI software program. This is to enable users to familiarise themselves with the operation and programming procedures before installing and programming the system.

We also recommend you read the SparkZ GUI Help Directory to familiarise yourself with the SparkZ GUI software and the Igniter's features and functionality.

3.2.5 SparkZ GUI Configuration Facility

The SparkZ GUI works with what are called “GUI Configuration Files” (“GCF”), that are pre-programmed by Gill and supplied on a 1.44MB floppy disc.

If no GCF is installed, then the SparkZ GUI is “read only” with only Monitoring, “Image” download capability.

The SparkZ GUI can be modified for the available Igniter programmability to suit the requirements of the Engine / Installation Manufacturer (“The Customer”)

This means that the Manufacturer can have all the programming features relevant to their requirements whereas their Field Engineers or End Users can be limited to a “Read Only” capability, for example.

This ensures that the Ignition system’s parameters can only be altered or modified by the Engine / Installation Manufacturer or their Authorised Agents.

Each customer has a unique “Customer Identification Number” associated with these “GCF” files.

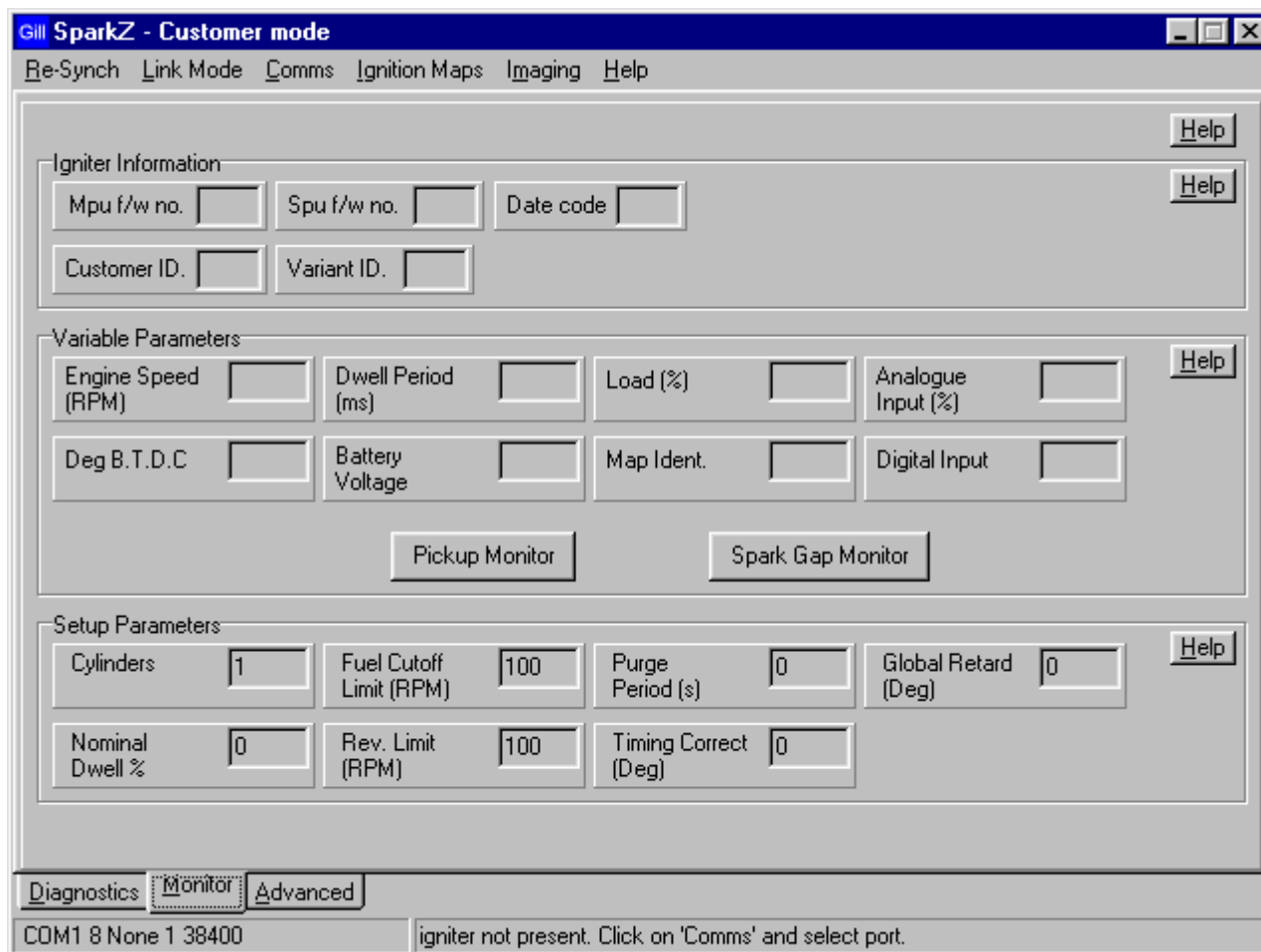
This means that only Gill or the Customer can access the relevant SparkZ GUI programmability for their Ignition systems.

The Customer Identification Number is displayed on the SparkZ GUI “Monitor Screen” page.

The SparkZ GUI will then operate according to the GCF configuration supplied.

Contact Gill for further information on the GUI Configuration facility.

3.2.6 The SparkZ GUI Monitor Screen



When the SparkZ GUI software program is opened, the above screen will appear after a few moments. Note the command line at the bottom of the screen identifies if there is communication with the Igniter.

If there is a communication problem with the Igniter, follow the Command line instruction to select the Comms tab and select the alternative Comms Port.

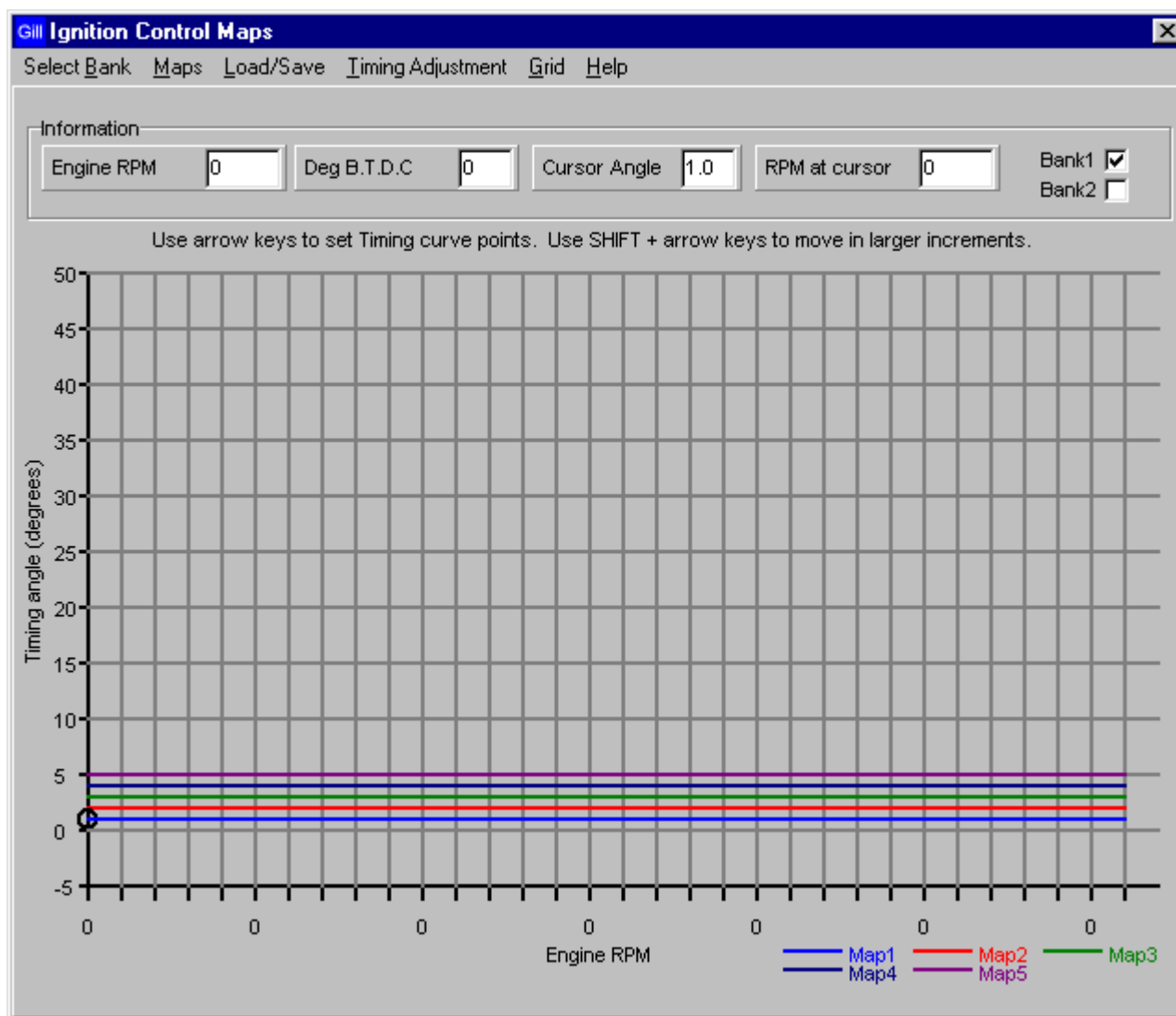
The Tabs "Re-Synch" and "Link Mode" only function when an Igniter is present and connected.

Note: The "Advanced" tab at the bottom of the screen is only displayed, with the required programming facilities, according to the GUI Configuration Disc supplied.

Refer to the SparkZ GUI Help Directory for the list of programmable Igniter functions.

(Note: The Spark Gap Monitor feature is optional on the GS8 and GS12)

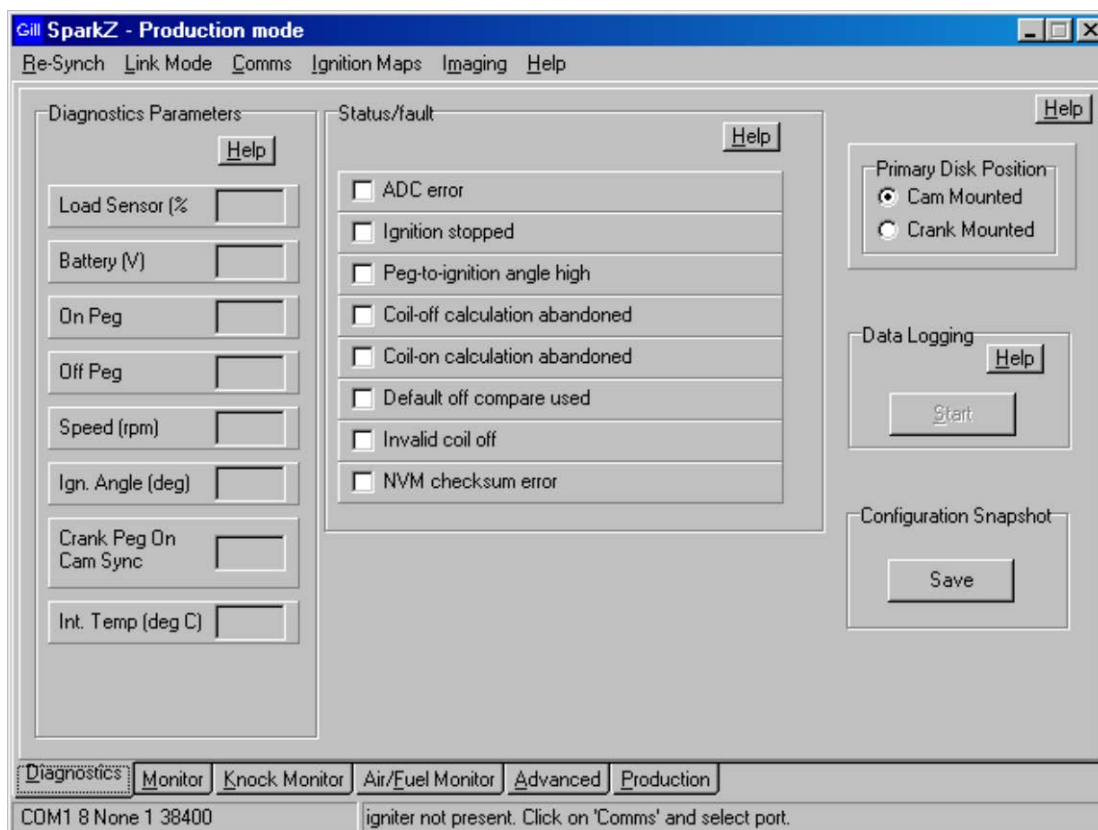
3.2.7 The SparkZ Ignition Control Maps Screen



Refer to the SparkZ GUI Help Directory for advice on using the Ignition Control Maps Screen.

Ignition Control (Timing curve) maps can be always be downloaded into a GS8 or GS12 igniter, but Timing curve adjustment is only available according to the GUI Configuration Disc supplied.

3.2.8 The SparkZ Diagnostics Screen



“Diagnostics Parameters” Panel

The readings displayed in this Panel are generated by the Igniter from various inputs.

Load sensor (%)	A value related to the output from a Throttle Position or MAP sensor.
Battery (V)	A value related to the power supply voltage.
On Peg	A reading of the timing disc pegs used for igniter processing.
Off Peg	A reading of the timing disc pegs used for igniter processing.
Speed (rpm)	The rpm value generated by the Igniter.
Ign. Angle (deg)	The calculated ignition advance angle.
Crank peg on Cam synch.	This shows which primary timing disc peg is used when the secondary timing disc signal is received, in dual timing disc operating mode.
Int.Temp (deg C)	The actual internal temperature of the Igniter module. It must not exceed 85 deg C.

This information is primarily for Gill use only.

“Status / Fault” panel

The Status / Fault check boxes display, if ticked, possible errors reported by the Igniter. When running a Data Log (see “Data Logging” below), the information is stored as a code number.

“Data Logging” panel

Running a Data Log will assist in locating a possible ignition system malfunction on an engine.

To run a Data Log, click on the Data Logging panel “Start” button, name and select a suitable location for the resulting data log file, click on the “save” button and the Data Log run will start.

Click on the “stop” button to end the Data Log run.

The Data Log file can be then be retrieved from the chosen location and forwarded to Gill Instruments for analysis as required. A “Configuration Snapshot” should also be forwarded at the same time (see below).

“Primary Disc Position” panel

This reports the position of the Primary Timing Disc as configured in the Igniter; either on the Camshaft or the Crankshaft.

“Configuration snapshot” panel

When an igniter configuration is being developed, a “snapshot” can be taken of the igniter settings.

Click on the “Save” button, name and save the file accordingly and forward to Gill for confirmation as to its suitability for an installation.

4. THE SPARKZ GUI HELP DIRECTORY

This comprehensive Help Directory can be accessed either by clicking on the Help buttons when using the SparkZ program or by clicking on START – PROGRAMS – GILLSHELL and then clicking on the SparkZ Help tab.

4.1 SparkZ GUI Help Directory Contents

The Contents list displays all the Help files associated with the operation of the Gill GS8 or GS12 Ignition System.

It is strongly recommended that you read through all the Topics to thoroughly familiarise yourself with the features and functions of the Igniter and it's associated components.

The main screens are divided into separate operating "Panels" to simplify access to the relevant Help pages.

Click on the Menu 'Help' Tab on any screen to access the Help page for that screen.

Right clicking on a drop-down Tab, Information Panel Tab, or underlined Topic heading will access the associated Help page.

- Introduction
- Installation
- Igniter LED Display
- Monitor Screen
- Monitor Screen Tabs
- Imaging
- Comms
- Igniter Information Panel
- Variable Parameters Panel
- Set Up Parameters Panel
- Ignition Maps
- Ignition Maps Tabs
- Load Map Table
- Ignition Maps Information Panel
- Diagnostics Screen
- Diagnostic Parameters Panel
- Diagnostic Status / fault Panel
- Data Logging Panel
- Controlled Shutdown
- Wiring Diagram (Igniter connector pinout arrangement)

(Note: When the GillShell GUI software has been installed, the SparkZ Help Directory can be accessed by clicking on Start – Programs – GillShell and then select the SparkZ Help Directory Tab. This will enable the use of the facility without having to run the SparkZ GUI program.)

5. WIRING DIAGRAM (Igniter Connector Pin-out arrangement)

Note that Pin 1 is located at the bottom right hand side of the Igniter connector (when viewed from the front). Pins are numbered right to left in each row.

Pin	Description	Comment
1	Battery +ve	Permanent power in (+31V maximum)
2	Battery -ve	0V (power ground)
3	Battery -ve	0V (power ground)
4	Sensor Supply	+5 Volt DC for external sensors (eg load)
5	Sensor Ground	0V for sensors and switches
6	Pickup Ground	Inductive Pickup -
7	Pickup Input	Inductive Pickup +
8	Hall sensor 2	Secondary disc Hall sensor input
9	Global Retard / Map Set	Switch to ground to activate
10	Hall sensor 1	Primary disc Hall sensor input
11	System Enable	Igniter Enable Supply (See note below)
12	Ignition Inhibit	Switch to ground to activate
13	Coil A	
14	Coil G	
15	Coil B	
16	Coil H	
17	Coil C	
18	Coil I	
19	Spare	
20	Analogue Input	Temperature Sensor (Thermistor input)
21	Load Sensor	TPS or MAP sensor signal input
22	Spare	
23	RS232 TX	
24	RS232 RX	
25	Coil D	
26	Coil J	
27	Coil E	
28	Coil K	
29	Coil F	
30	Coil L	
31	Malfunction Indicator Lamp	
32	Power relay	
33	Fuel Valve	
34	Speed signal	e.g.Tachometer
35	Not used	
36	Not used	

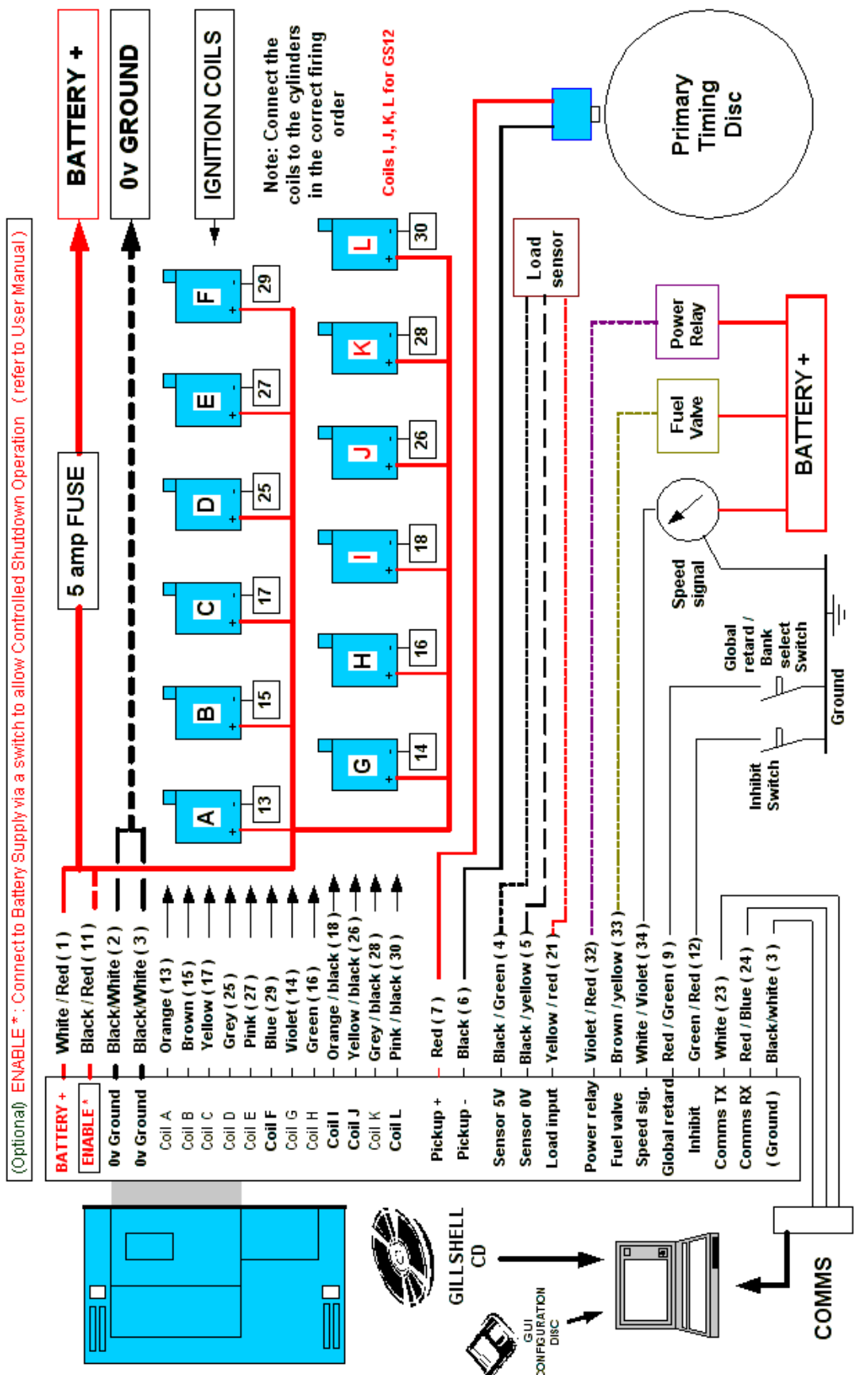
IMPORTANT NOTE:

Pin 11 System Enable – This **MUST** be connected to the DC power supply if the engine is **NOT** wired for Controlled Shutdown.

Pins 31, 32, 33 and 34 should have their loads connected between the connector pin and V+ supply voltage.

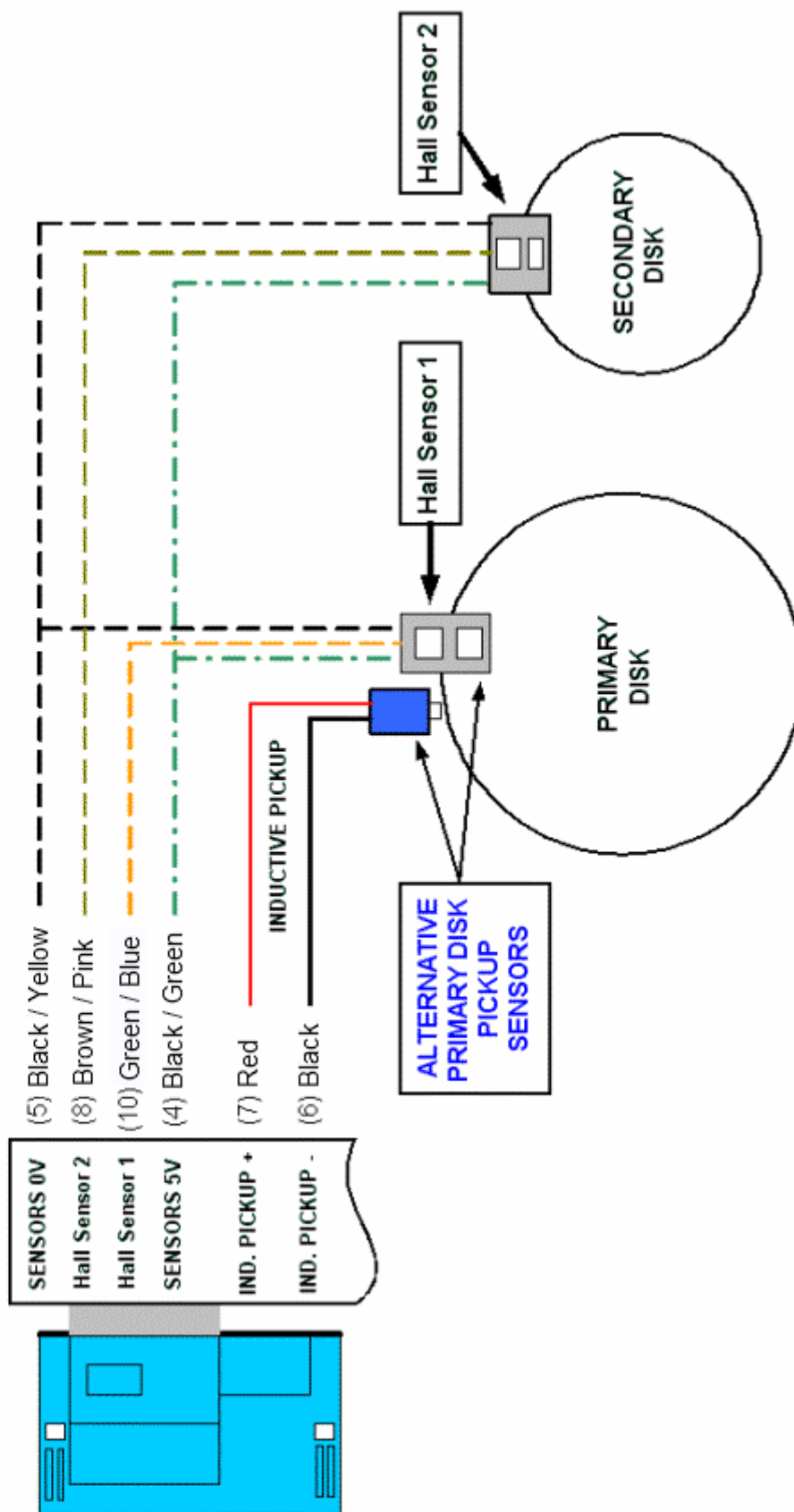
Appendix 1 – GS8 / GS12 Wiring Diagram

GILL GS8 / GS12 WIRING DIAGRAM

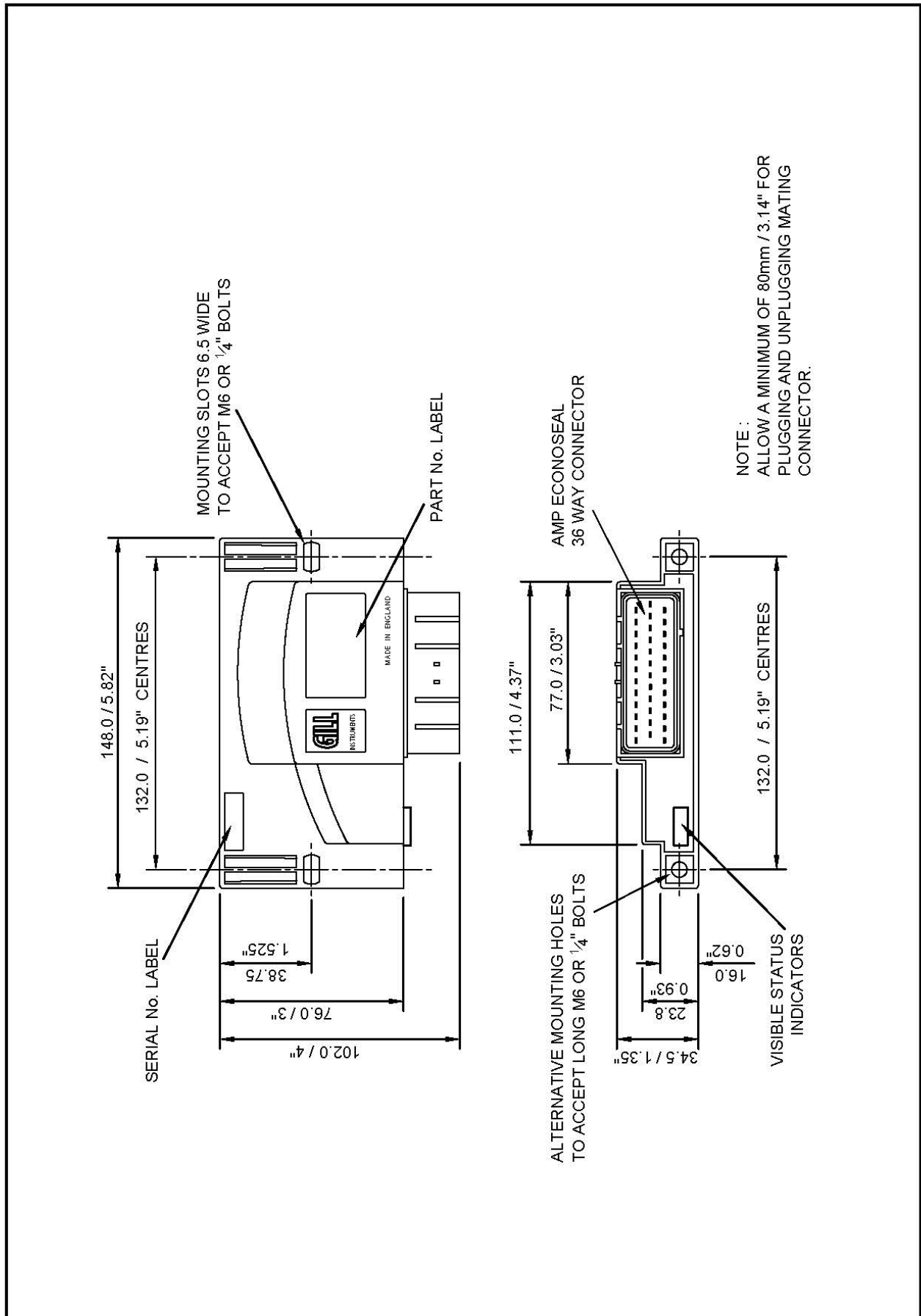


Appendix 2 - Wiring diagram for Dual Pickup Sensor Operation

GILL GS8 / GS12 - Wiring for Dual Pickup Sensor operation



Appendix 3 – GS8 / GS12 Igniter Assembly



Appendix 4 – Standard Gill Timing Disc

