SPA DESIGN

MICROPROCESSOR

3 STAGE SHIFT LIGHT MANUAL
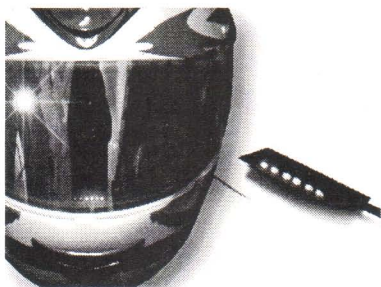
S P A

D E S I G N

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INSTRUMENT FEATURES

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- ❑ DIGITAL FILTERING FOR EASY CONNECTIONS TO ANY SYSTEM.

- ❑ DIGITAL SETTING OF SHIFT POINTS

- ❑ BUILT IN DIGITAL TACHOMETER

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- ❑ MAXIMUM RPM RECALL

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- ❑ PROGRAMMABLE BUTTON OPTION, RECALL+MENU ETC

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- ❑ PROGRAMMABLE SHIFT POINTS

Please follow the installation and fitting instructions carefully, and refer to the diagram on the following pages. Please ensure that the shift lights can be clearly seen. If you wish to test this before a full install, please use the 'Set up' (demo) mode in the menu system to flash the lights (see Menu in operating instructions).

There are only four wires to connect, any connection to the coil should be satisfactory but the one on the following pages is suggested.

INSTALLATION, DO'S & DON'TS: -

DO'S

DO ensure that the front of the instrument is protected if it is likely to get any water spray on it.

DON'TS

DO NOT allow cables to run through sharp edged apertures without protection.

DO NOT fix the cables next to or onto any surface likely to exceed 80 degrees Centigrade.

The display head is mounted with Velcro any position desired including the steering wheel. Please make sure the surface is clean and free from grease or oil before fixing the adhesive backed Velcro.
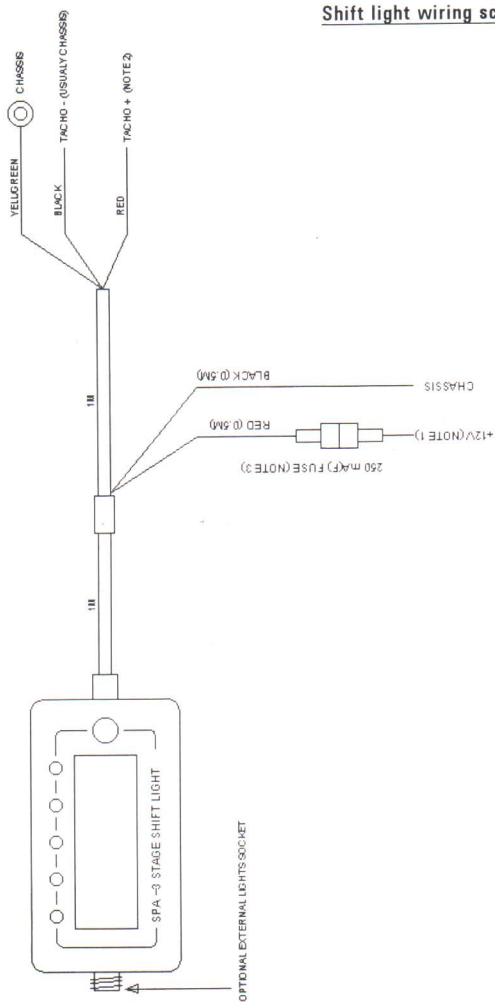
If you are using the in-helmet light kit, switch to demo mode and adjust the shift lights to a position that suits. If you are mounting on the helmets cheek pad, Velcro spacers are available to mount the lights higher (closer to eye level) if required.

In demo mode you can adjust the brightness, flashing, and timeout options without having to start the engine. Switch the demo mode off when you have finished. All menu functions operate including the engine logs in setup mode, except for the peak recall, which is temporarily simulated.

Please note that motorcycles may require a plug in lead extension kit if a socket connection is required behind the rider.

Shift light wiring schematic

YELL/GREEN — CHASSIS

BLACK — TACHO - (USUALY CHASSIS)

RED — TACHO + (NOTE 2)

1M

BLACK (0.5M) — CHASSIS

RED (0.5M) — +12V (NOTE 1)

250 mA(F) FUSE (NOTE 3)

1M

SPA –3 STAGE SHIFT LIGHT

OPTIONAL EXTERNAL LIGHTS SOCKET
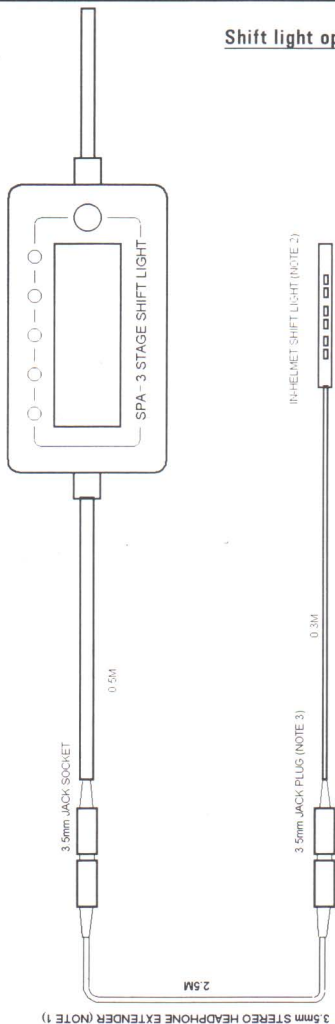
NOTE 1: USE AUXILIARY OR IGNITION +12V SO POWER GOES OFF WITH THE SWITCH
NOTE 2: CONNECT TO THE TACHO OUTPUT OF ECU, OR THE COIL (USUALY NEG ATIVE SIDE)
NOTE 3: NEVER REPLACE THE FUSE WITH A DIFFERENT RATING.

Shift light optional (In-helmet) schematic

SPA- 3 STAGE SHIFT LIGHT

IN-HELMET SHIFT LIGHT (NOTE 2)

0.5M

0.3M

3.5mm JACK SOCKET

3.5mm JACK PLUG (NOTE 3)

2.5M

3.5mm STEREO HEADPHONE EXTENDER (NOTE 1)

NOTE 1 FOR MOTORCYCLES REQUIRING A REAR OF RIDER CONNECTION AN EXTRA EXTENSION WILL BE NEEDED
I.E. THE CABLE JUNCTIONS ARE FROM COCKPIT/HANDLEBARS - REAR OF SEAT - RIDERS HELMET

NOTE 2 THIS CAN BE MOUNTED ON THE CHEEK PAD, OR ON THE CHIN GUARD REFLECTING OFF THE VISOR

NOTE 3 FOR MOTORCYLES THE JACK PLUG SHOULD BE FIXED TO THE RIDERS JACKET COLLAR FOR SAFTEY
ALTERNATIVELY THE LEAD SHOULD PASS INSIDE THE BACK OF THE RIDERS JACKET

When the instrument is first switched you will see **SLi** and **3.1** displayed momentarily before RPM is displayed as x1000.

Pressing the red button* after this will recall any stored maximum RPM on the display.

As the engine revs rise, the shift lights will come on sequentially at there programmed shift points. If the menu option 'flash' is set to on, then all the lights will flash when the Red shift point is reached. Also when the Red light has been on for longer than the menu option 'Shift time' period then all the lights will go off, until the revs drop below the Red shift point again.

While the engine rpm is above the programmed engine log set points, then these engine logs store the accumulated time the engine rpm was above their respective set points.

The SPA shift light can optionally drive external shift lights, or the in-helmet shift light with an optional kit.

The SPA shift light settings are shipped according to factory default setting, but these can be easily customized to your own needs (see menu system section). All the settings are stored in the shift lights memory; these are not lost once the power has been switched off.

*The button function can be programmed to access the menu, and/or reset peaks, in addition to recall of maximum rpm.

To access the SPA shift light menu, you can either hold down the red button while you switch on the power, or if the menu is configured for button access (factory default), press and hold down the red button for more than 5 seconds during normal operation. On the display you will see **tSt** on the LCD display. Now release the button. If you now press the button momentarily again you will see the display change to the next menu option. Keep pressing the button to familiarize yourself with the menu items. A brief sequential view of options and there meaning is shown below: -

Display shows:	*What it does:*
tSt	Used for SPA factory test.
dL1	**d**isplay engine **L**og **1** time.
dL2	**d**isplay engine **L**og **2** time.
dL3	**d**isplay engine **L**og **3** time.
rtP	**R**eset **P**eak, IE reset stored maximum RPM to zero.
bon	**B**acklight **on** or, **b--** = **B**acklight off
bri	set the **Bri**ghtness of the Backlight
S1b	set the red **S**hift led **B**rightness.
S2b	set the yellow **S**hift led **B**rightness.
S3b	set the green **S**hift led **B**rightness.
FSL	**F**lash the **S**hift **L**ights **on** or **off**
Sti	set the **S**hift lights **ti**meout time
SEt	**SEt**up Demo mode on or off

MENU SYSTEM

rL1	**R**eset engine **L**og **1** to zero.
rL2	**R**eset engine **L**og **2** to zero.
rL3	**R**eset engine **L**og **3** to zero.
SF1	set the RPM **S**hi**F**t point one (green led)[*].
SF2	set the RPM **S**hi**F**t point two (yellow led)[*].
SF3	set the RPM **S**hi**F**t point three (red led).
Lr1	set **L**og **r**PM threshold for engine log **1**.
Lr2	set **L**og **r**PM threshold for engine log **2**.
Lr3	set **L**og **r**PM threshold for engine log **3**.
CyL	set the number of engine **C**y**L**inders routine.
vLo	**vLo** = Tacho **v**oltage input **Lo** (normal) or, **vhi** = Tacho **v**oltage input **hi**gh (magneto).
Lb	set the low battery alarm set point.
SFU	set the switch function of the red button.
ret	Use this to exit the menu and return to normal shift light operation

Press again and the menu will go back to **tSt**.

A detailed breakdown of the shift light menu options is shown on the following pages: - Please note, do not switch off after changing a setting, as it may not be implemented. Go to the **rEt** option after changing a setting, or at least click onto one more menu before switching off.

tSt This is used by SPA during production. If you really want to see what it does, Press and hold down the red button. After 2 seconds the LCD lights up all segments and the LED's come on dim. To return to the menu, click the button.

dL1/2/3 (Display engine log 1/ 2/ 3) Press and hold down the red button. After 2 seconds, the engine log will display hours, release the button. After another 2 seconds delay, engine log minutes will be displayed, then after another 2 seconds engine log seconds will be displayed.

bon Press and hold down the red button. After 2 seconds, the backlight setting will change to **b--** (no backlight).

bri Press and hold down the red button. After 2 seconds, the current brightness number will be displayed.

Single click to increment (brighten) the LCD backlight. When the number reaches 15 it will go back to 0 (dark). To return to the menu, leave the button for 4 seconds.

S1b/S2b/S3b (Green/Amber/Red Shift brightness) Press and hold down the red button. After 2 seconds, the current brightness number will be displayed.
Single click to increment (brighten) the LED, when the number reaches 4 it will go back to 1 (dim). To return to the menu, leave the button for 4 seconds. Please note that for the in-helmet shift light, you must keep Green on full brightness, and the Red brightness must set higher than the Amber brightness.

FSL (Shift light flashing mode on or off). This will flash all the shift lights quickly when shift point 3 (red) is reached. Press and hold down the red button, after 2 seconds the display changes to the current selection. Single click to change the selection, then leave the button for 4 seconds to return to the menu.

Sti (Shift lights timeout) When shift light 3 (red) has been on for more than the **Sti** time, the lights switch off until the rpm goes back down below shift point 3. This is to avoid eyestrain or distraction on optional in-helmet shift lights, due to the lights being close to the face (especially when flashing). Press and hold down the red button. After 2 seconds, the current Time out number in seconds will be displayed. After the number reaches 60, it will roll back to 1. To return to the menu, leave the button for 4 seconds.

SEt This is or setting the shift light into demo mode. This is ideal for adjusting the brightness, flashing, and timeout options without having to start the engine. Press and hold down the red button, after 2 seconds the display changes to the current selection. Single click to change the selection, then leave the button for 4 seconds to return to the menu.

Please note:-

Engine logs will accumulate in this mode. Also if the factory set SF1/2/3 default values are changed, the shifts lights may not operate in demo mode. These values are SF1 7200, SF2 7600 and SF3 8000.

rtp(RESET PEAKS):- Press and hold down the red button, after 2 seconds the display shows ---. The stored maximums are now reset to zero. This should be done before any new maximums are to be stored.

rL1/rL2/rL3 (Reset engine log 1/2/3):- Press and hold down the red button, after 2 seconds the display shows ---. The stored engine log 1 time is now reset to zero.

CyL (SET CYLINDERS):- Press and hold down the red button, after 2 seconds the current cylinders will be displayed. To change the number, press the red button momentarily to increment it one at a time, or press and hold down and the display will count up quickly. When the display reaches 16 it will scroll back round to 1.

For certain types of ignition systems, that is ones that have more than one ignition coil per engine, it will be necessary to set the cylinders to a different number than the engine has. If you are using a tacho output from the ignition amplifier box, some systems (like the Ford coil less) give half the ignition pulses and so cylinders would be set to 2.

Also most motorcycles use an ignition coil per pair of cylinders, so a 4 cylinder engine would need to be set to 2 on the shift light since it will only see half the number of ignition pulses.

VLo Sets the sensitivity to voltage from the coil. Set to **vLo** for normal voltage input or **vhi** for magneto driven coils. Press and hold down the red button. After 2 seconds, the setting will change.

SF1,2,3(SET SHIFT RPM):- This routine is used to enter the rpm shift points for the engine being used. When the engine RPM exceeds this shift point number, then the appropriate lamp will light. These are:-

SF1 - green led

SF2 - yellow led

SF3 - red led (very bright)

Press and hold down the red button, after 2 seconds the current shift point will be displayed as x1000 RPM. To change the number, press the red button momentarily to count it up one hundred RPM at a time, or press and hold and the display will count up quickly. When the display shows 39.90 it will scroll back round to 00.10. To exit the routine, leave the button for 4 seconds.

NOTE: In practice, you may find that when you look at your Maximum RPM recall, that you have over shot your highest shift point due to human reaction time, so you may wish to decrease your shift point(s) to compensate for this and increase the efficiency of your gear shifting further. EG if you set the shift point to 7,900 but your maximum RPM recall was 8,200 then set your shift point to 7,700 to compensate for your reaction time.

Lr1/Lr2/Lr3 (Log rpm set point 1/2/3). This sets the rpm threshold for the engine log. Any time the engine rpm above this rpm setting; the time is accumulated in the log.
Press and hold down the red button, after 2 seconds the current shift point will be displayed as x1000 RPM. To change the number, press the red button momentarily to count it up one hundred RPM at a time, or press and hold and the display will count up quickly. When the display shows 39.90 it will scroll back round to 00.10. To exit the routine, leave the button for 4 seconds.

Lb (low battery) Press and hold down the red button. After 2 seconds, the current low battery warning set point will be displayed. Single click to increment up, or press and hold again for 2 seconds and the set point will count up quickly. When the set point number reaches the 15.0 it will go back to 10.0. To return to the menu, leave the button for 4 seconds.
SFU (Switch function) Press and hold down the red button. After 2 seconds, the display will show the current selection for the switch function (what happens when you hold down the red button in normal shift light operation). These are in sequence **rMU** (recall maximums and after 5 seconds access the menu), **rCL** (recall maximums only) and **rrS** (recall maximums and after 5 seconds reset maximums). Single click to change the current selection. To return to the menu, leave the button for 4 seconds.

rEt Press and hold down the red button. After 2 seconds, the display will show ··· . Release the button and the shift light will restart normally.

SPECIFICATIONS

INPUT VOLTAGE	7.0-16 VOLTS
CONSUMPTION	@ 12 VOLTS; 7mA
	(33mA backlit, 60mA full shift)
FUSE	20mm glass 250mA Fast(F).
ACCURACY:-	0.05%
CALIBRATION:-	DIGITAL
DATA STORAGE:-	EEPROM
WEIGHT:-	120g INCLUDING CABLES ETC
SIZE:-	62mm x 30m x 25mm DEEP
CABLE LENGTHS:-	IGNITION LEAD – 2M
	POWER SUPPLY 1M + 0.5M

ABSOLUTE MAXIMUM RATINGS:-

INPUT VOLTAGE -	28 VOLTS (Pulse only)
ENGINE SPEED -	39,990 RPM
INSTRUMENT TEMPERATURE	-20 to 70 degrees C