

**SPA KITDASH 2.3**  
**OPERATING AND INSTRUCTION MANUAL**

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## **OVERVIEW AND FEATURES:-**

The SPA Kitdash is a combined analogue speedo, tacho, fuel gauge, temperature gauge (x2), pressure gauge (x2) and warning light cluster for standard road cars. The speedo and tacho needles are driven by stepper motors for high accuracy and stability, and the LCD display is used to show mileage, trip mileage, fuel, temperatures and pressures (scrolling display). It is also used to display the dashes menu settings.

Here are some features of the SPA Kitdash system:-

Stepper motor driven needle

Quartz microprocessor accuracy

Changing colour needle with shift points

External 3 stage shift lamp or shift steering wheel (optional)

Backlit LCD

Blue backlit dials

Adjustable brightness on the Dials and LCD display for day and night

Tacho suitable for all electrical ignition systems

Alarm system and warning light for sensors

Fuel level indication (standard level sensor)

2x temperature channels (standard or SPA thermistor sensor)

2x Pressure channels

Odometer

Trip mileometer (resettable)

Maximums stored in memory (resettable)

Multi-segment tank calibration

## **DISPLAY AND MENU SYSTEM:-**

When the SPA Kitdash is switched SPA Kitdash and version number is displayed on the LCD display, and you will see the needles drive back to the stop pins drive forward to the zero marks. The tachometer will now register engine RPM and road speed. Pressing the red button after this for more than 4 seconds will reset any stored trip mileage on the LCD to zero. Single clicking the button will scroll the screen through the 4 channels in the sequence Pressure 1, Temperature 1, Pressure 2, Temperature 2.

The various settings are factory pre-set to standard parameters, but these can be easily adjusted in the menu system. All settings are stored for many years without any power needed.

To access the Kitdash display menu, hold down the red button while switching on the power. On the display you will see **Demo mode** on the LCD display, now release the button. If you now press the red button momentarily again you will see the display change to the next menu option, keep doing this to familiarize yourself with them. A brief sequential view of options and their meaning is shown below:-

Display shows:

What it does:

<b>Demo mode</b>	Set the demo mode on/off
<b>Recall maximums</b>	Recalls stored maximums for speed/rpm and channels 1-4
<b>Zero maximums</b>	Clears the maximums memory to zero
<b>Temperature sel</b>	Select temperature units
<b>Pressure sel</b>	Select Pressure units
<b>Channel setup</b>	Set the symbols and alarms for screens
<b>Alarm refresh</b>	Set the alarm refresh time period
<b>Mileage units</b>	Set odometer/trip meter units
<b>Pressure offsets</b>	Zero pressure sensors
<b>LCD Day</b>	Set the LCD brightness for day use (lights off)
<b>LCD Night</b>	Set the LCD brightness for night use
<b>Dial Day</b>	Set the Dial brightness for day use (lights off)
<b>Dial Night</b>	Set the Dial brightness for night use
<b>Contrast</b>	Set the LCD display contrast (light and dark).
<b>Shift point 1</b>	Set the RPM setting to light shift light 1.
<b>Shift point 2</b>	Set the RPM setting to light shift light 2 and magenta needle.
<b>Shift point 3</b>	Set the RPM setting to light shift light 3 red needle.
<b>Shift flash</b>	Set the shift lights/needle to flash on shift point 3
<b>Flash time</b>	Set the time limit for shift light/needle flash
<b>Sensor B value</b>	Set the the kitdash to the temperature senders.

<b>Sensor RT2 value</b>	As above.
<b>Low fuel set</b>	Set the Low fuel warning setting
<b>Tank Res empty</b>	Set fuel tanks empty resistance for calibration.
<b>Tank Setup</b>	Calibrate the kitdash to your tank sensor.
<b>Fuel avg time</b>	Set the fuel tank sensor averaging time (antislosh)
<b>Cylinders</b>	Set the cylinders of your engine.
<b>Trigg points</b>	Set the number of magnets used to trigger the wheel speed sensor.
<b>Circumference</b>	Set the tyre circumference of the road wheel triggering the sensor.
<b>Eng access</b>	For engineering access only (code locked)
<b>Restart dash</b>	Exit the menu system and restart the kitdash.

Press again and the menu will go back to **Demo mode**.  
Here is a detailed breakdown of the Kitdash menu options:-

**Demo mode:** When set to **On** this cycles the tachometer and speedometer needles and displays fake channel values on the screen. The shift lights and needle work according to the menu settings, and the odometer and trip meter accumulate mileage in the demo but these are not stored. Press and hold down the red button. After 2 seconds, the current setting will be displayed. Single click to change the setting. To return to the menu, leave the button for 4 seconds.

**Recall maximums:** Puts the dash into recall maximums mode. Press and hold down the red button. After 2 seconds, the needles will move to display maximum recorded Speed, RPM and the display will show maximums for channel 1. Click the button to scroll and see maximums for the other channels. Leave the button for 4 seconds and you will return to the menu system.

**Zero maximums:** Use this to clear all the stored maximums to zero so it is ready to record new ones. Press and hold down the red button. After 2 seconds, the display shows ---Cleared---. After 4 seconds you will be returned to the menu system.

**Pressure sel:** Selects the pressure unit for PSI, Bar or KGCM. Press and hold down the red button. After 2 seconds, the current setting will be displayed. Single click to change the setting. To return to the menu, leave the button for 4 seconds.

**Temp sel:** Selects the temperature units for degrees Centigrade or Fahrenheit. Press and hold down the red button. After 2 seconds, the current setting will be displayed. Single click to change the setting. To return to the menu, leave the button for 4 seconds.

**Channel setup: NOTE: It may be useful to set the units in Pressure sel and Temp sel (above) first.**

**Changing the units will enter factory default values for all alarms in all 4 channels in the alarm sub-menu.**  
If you don't want your custom alarm values overwritten with the factory default values then change the units first.

This is a sub menu system for setting up the four scrollable channels. The screen displays channels in order:- pressure 1, Temperature 1, Pressure 2, Temperature 2. These can be assigned any two letters in the alphabet, and any alarm setting. EG OP for channel one would indicate oil pressure, with an under pressure alarm of 25 PSI. The alarm is indicated by the letters flashing. There are 2 special exceptions. If a channel is set to **BP** (for boost pressure) a bar graph will appear as well as the digits. In this case the alarm setting is for the overboost value and the bar graph is scaled to this value. If a channel is set to **NU** for not used, then this channel is skipped in the display and its alarm setting is ignored. If any channel is unused (not connected) it should be set to **NU**.

To access **Channel setup**, press and hold down the red button. After 2 seconds **Pressure 1** is displayed. Single click to change to the channel you wish to **Channel setup**. Leave the button for 4 seconds and then Alarm sub menu is displayed. To view and change the alarm setting press and hold for 2 seconds, or just click to move on to the next sub menu item which is Letter 1. To view or change letter 1 (the first letter for the channel show on the display) press and hold the button. After 2 seconds the current setting is displayed. You can now click to select any letter A-Z. The setting for Letter 2 is the same. After the letter 2 sub menu, you are returned to the channels setup menu so you can setup the other channels if you wish to.

**Alarm refresh:** This sets the refresh time for any active alarms. The screen will change to the channel with an active alarm after this time period. See the section on alarms for more information. Press and hold down the red button. After 2 seconds, the current alarm refresh number will be displayed. Single click to increment (10 seconds at a time), or press and hold again for 2 seconds and the number will count up quickly. When the number reaches 500 (seconds) it will go back to 10. To return to the menu, leave the button for 4 seconds.

**Mileage units** Sets the odometer and trip meter to Kilometres or Miles. Press and hold down the red button. After 2 seconds, the current setting will be displayed. Single click to change the setting. To return to the menu, leave the button for 4 seconds.

**Pressure offsets:** This is a sub menu system for reading the sensors output (in volts) and zeroing the pressure sensors. Press and hold down the red button. After 2 seconds **Pressure 1** will be displayed. Single click to change to **Pressure 2** if required. Leave for 4 seconds and the display changes to **Read and zero** with a 4 digit number below representing the mV output of the sensor (for testing or diagnostic use). Press and hold the button for 2 seconds to zero the sensor at the current pressure (shown by display changing to ----). Pressure sensors should always be zeroed at atmospheric pressure.

**LCD Day:** Sets the brightness of the LCD when the lights are switched off (sensed from the lights on wire) Press and hold down the red button. After 2 seconds, the current brightness number will be displayed. Single click to increment (lighten) the LCD backlight, or press and hold again for 2 seconds and the brightness number will count up quickly. When the number reaches 64 it will go back to 1 (dark). To return to the menu, leave the button for 4 seconds.

**LCD Night:** Sets the brightness of the LCD when the lights are switched on (sensed from the lights on wire) Press and hold down the red button. After 2 seconds, the current brightness number will be displayed. Single click to increment (lighten) the LCD backlight, or press and hold again for 2 seconds and the brightness number will count up quickly. When the number reaches 64 it will go back to 1 (dark). To return to the menu, leave the button for 4 seconds.

**Dial Day:** Sets the brightness of the Dial when the lights are switched off (sensed from the lights on wire) Press and hold down the red button. After 2 seconds, the current brightness number will be displayed. Single click to increment (lighten) the Dial backlight, or press and hold again for 2 seconds and the brightness number will count up quickly. When the number reaches 64 it will go back to 1 (dark). To return to the menu, leave the button for 4 seconds.

**Dial Night:** Sets the brightness of the Dial when the lights are switched on (sensed from the lights on wire) Press and hold down the red button. After 2 seconds, the current brightness number will be displayed. Single click to increment (lighten) the Dial backlight, or press and hold again for 2 seconds and the brightness number will count up quickly. When the number reaches 64 it will go back to 1 (dark). To return to the menu, leave the button for 4 seconds.

**Contrast:** Press and hold down the red button. After 2 seconds, the current contrast number will be displayed. Single click to increment (lighten) the contrast, or press and hold again for 2 seconds and the contrast number will count up quickly. When the number reaches 16 it will go back to 1 (dark). Note that the contrast also effects the viewing angle, and vice versa. To return to the menu, leave the button for 4 seconds.

**Shift point 1,2,3:** This routine is used to enter the shift points for the engine being used. When the engine RPM exceeds this shift point number, then the appropriate lamp on an optional shift lamp box will light. Also the tachometer needle changes colour These are:-

**Shift point 1** - green led, needle = blue

**Shift point 2** - yellow led, needle = magenta

**Shift point 3** - red led (very bright), needle = bright red

Press and hold down the red button, after 2 seconds the current shift point will be displayed in 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 19999 it will scroll back round to 0010. To exit the routine, release the button for more than 4 seconds and it will return to the menu, or switch off the instrument.

**Shift flash:** Set this **On** to enable the shift 3 light and needle to flash when rpm is over the **Shift point 3**. Press and hold down the red button. After 2 seconds, the current setting will be displayed. Single click to change the setting. To return to the menu, leave the button for 4 seconds.

**Flash time:** Sets the duration time of the flash. IE if the rpm is over **Shift point 3** setting for 10 seconds, and **Flash time** is set to 2, the shift 3 light and needle will flash for 2 seconds and then stay on until the rpm drops below **Shift point 3**.

**Sensor B value:** This routine (and the next RT2 value routine) is used to calibrate the SPA dash to the temperature sender that your vehicle uses. The default B value for SPA sensors is 3977. These values can usually be found from the manufacturers specification sheet. If this is not available, the value can be calculated from your manufacturers specification tables (contact SPA for details). All thermistor based temperature sender can be used with the SPA dash by using this routine (and the following RT2 value routine) to calibrate it. Press and hold down the red button, after 2 seconds the current Sensor B value will be displayed and the display will show **Adj Hundrds**. To change the number, press the red button momentarily to increment 100 at a time, or press and hold and the display will count up quickly. When the display reaches **8000** it will scroll back round to **0100**. When this has been set correctly, release the button. After 4 seconds the display will change to. To change the number, press the red button momentarily to increment it one at a time, or press and hold and the display will count up quickly. When the display reaches **XX99** it will roll over to **XX00** and the hundreds (XX) will increase by **1**. To exit the routine, release the button for more than 4 seconds and it will return to the menu.

**Sensor RT2 value:** This routine (and the preceding B value routine) is used to calibrate the SPA dash to the temperature sender that your vehicle uses (see above). RT2 represent the resistance value of the sensor at 100 degrees C. The default RT2 value for SPA sensor is 318.

To set this value, press and hold down the red button, after 2 seconds the current RT2 value will be displayed. To change the number, press the red button momentarily to count it up one at a time, or press and hold and the display will count up quickly. When the display reaches 500 it will scroll back round to 10. To exit the routine, release the button for more than 4 seconds and it will return to the menu.

**Low fuel set:** Press and hold down the red button, after 2 seconds the current Low fuel set point will be displayed. To change the number, press the red button momentarily to count it up one at a time, or press and hold and the display will count up quickly. When the display shows 100 it will scroll back round to 01. To exit the routine, release the button for more than 4 seconds and it will return to the menu.

**Tank Res empty:** Set the resistance for when the tank is empty. Press and hold down the red button, after 2 seconds the current Tank Res empty setting will be displayed. To change the number, press the red button momentarily to count it up one at a time, or press and hold and the display will count up quickly. When the display shows 300 it will scroll back round to 1. To exit the routine, release the button for more than 4 seconds and it will return to the menu. Reverse type tanks sensors (where zero or low ohms = zero volume) are detected automatically, but a tank empty resistance of more than 50 Ohms is not compatible.

**Tank setup:** This is a sub-menu system used to calibrate the kitdash to the tank sensor that your vehicle is using. Data is entered in pairs (litres and resistance) for up to 5 segments, so non-linear or oddly shaped tanks can be mapped. After entering the resistance for tank empty (above) Segment 1 should be setup for the next tank capacity segment, finishing with Segment 5 for tank full.

Press and hold down the red button, after 2 seconds the display will show **Segment 1**. You must enter data in segment 1 at least. Other segments can be ignored if not needed, but they need to be set to zero. After 4 seconds the display will change to show the sub menu **Segment volume**. If you wish to view or alter this setting, press and hold down the button for more than 4 seconds and the current Segment volume for that segment will be displayed in Litres. To change the number, press the red button momentarily to count it up one at a time, or press and hold and the display will count up quickly. When the display reaches 250L it will scroll back round to 0. To exit the routine, release the button for more than 4 seconds and it will return to the segment submenu Segment volume. Now click and the display will change to **Segment Ohms**. Press and hold to access this as above and enter the number for the tank resistance at that same segment. Segment number is shown on the

display in case you forget. After this is set, click to return to the **Tank setup** menu where you can enter further segments if you wish. If you have a linear tank and do not need the segments, enter the full capacity data in segment 1, and make sure the others are set to zero. EG For a 35L tank, Segment 1 volume = 35L, Segment 1 Ohms = 10, all other segments for volume and ohms are set to 0.

**Fuel avg time:** Press and hold down the red button, after 2 seconds the current Fuel average time setting will be displayed in seconds. To change the number, press the red button momentarily to count it up one at a time, or press and hold and the display will count up quickly. When the display shows 60 it will scroll back round to 01. To exit the routine, release the button for more than 4 seconds and it will return to the menu.

**Cylinders:** Press and hold down the red button. After 2 seconds, the current cylinders setting will be displayed. Single click to increment the cylinders up, or press and hold again for 2 seconds and the cylinders will count up quickly. When the number reaches 16 it will go back to 1. To return to the menu, leave the button for 4 seconds.

**Trigg points:** Press and hold down the red button. After 2 seconds, the current trigger points setting will be displayed. Single click to increment the trigger points up, or press and hold again for 2 seconds and the trigger points will count up quickly. When the number reaches 99 it will go back to 1. To return to the menu, leave the button for 4 seconds.

**Circumference:** This routine is used to enter the rolling circumference of the tyre being used.

Since the whole accuracy of the speedo hinges in the accuracy of this data it is important to learn how to use it. It can also be used to "Trim" the speedo to take into account external errors and to cater for differential ratio's when measuring from prop shafts.

PLEASE NOTE: If the speedo is not calibrated and the sensor not set correctly, the speedo may record incorrect distance on the odometer. Correct operation is important since the odometer cannot be reset.

1) General calibration procedure:- Measure the exact circumference of the tyre at its centre. This circumference is now entered in two parts, Adjust centimetres and Adjust millimetres.

Press and hold down the red button, after 2 seconds the current circumference will be displayed in millimetres and the display will show ADJ CM. To change the number, press the red button momentarily to increment it 10cm (100mm) at a time, or press and hold and the display will count up quickly. When the display reaches **4000** it will scroll back round to **0100**. When this has been set correctly, release the button. After 4 seconds the display will change to ADJ MM. To change the number, press the red button momentarily to increment it one at a time, or press and hold and the display will count up quickly. When the display reaches **XX99** it will roll over to **XX00** and the centimetres (XX) will increase by **1**. To exit the routine, release the button for more than 4 seconds and it will return to the menu.

2) Special calibration:- If you require to trigger off a target with 10 teeth, then set the trigger points number to **10** in the Trigg points menu.

If the target is running at wheel RPM then simply enter the tyre circumference as described above. However if the target is driving a differential, then using a calculator, divide the circumference of the tyre by the ratio of the differential, and enter this value as the circumference, as described at the beginning of this section.

If you require to trim the accuracy of the speedo because for example the differential ratio is not accurately known, and you have determined that the speedo is reading say 2% high, then using a calculator, subtract 2% off the currently stored circumference value and enter this new value as described in the at the beginning of this section. The speedo will then read 2% lower than previously.

**Eng access:** This is for engineering access only (code locked)

**Restart dash:** Press and hold down the red button. After 2 seconds, the display will show - - -. When you release the button, then the kitdash will restart (the same as when you switch it on).

**Alarm system:-**

The pressure channels have under alarms, and the temperature channels have over alarms. Active alarms are indicated by their 2 letter channel indicator flashing, and also flash the red alarm warning indicator.

The screen will 'snap' or change to show the channel that has triggered the alarm. However it is not locked to that channel, you may scroll to another channel afterwards. Each time a *new alarm* becomes active, this makes the

screen snap to the alarm channel. If you then scroll to another channel, the screen will not go back to the active alarm channel unless it goes inactive and then later becomes active again.

To avoid forgetting about an active alarm after you have scrolled away for it, the **Alarm refresh** causes any active alarm to be refreshed after a time, so that the screen snaps to it again to alert the user. This time period is reset whenever a new alarm becomes active, and while the active alarm channel is on the screen.

If more than one alarm is currently active, then the one on the highest screen number has priority IE Pressure 1 is lowest priority, Temperature 2 is highest priority.

Pressure alarms are disabled when the engine is not running (zero rpm). Also any channel with its letters set to **NU** will not trigger an alarm.

### **SPECIFICATIONS:-**

INPUT VOLTAGE:	6.5 - 16.0 VOLTS ONLY
CONSUMPTION:	600 mA(max) @ 14 VOLTS
FUSE:	20mm glass 1A FAST(F).
STORAGE:	EEPROM
WEIGHT:	495g
SIZE	196mm x 100mm x 42mm DEEP
AMBIENT TEMPERATURE:	0 - 50°C
TACHO ACCURACY:-	0.05%
SPEEDO ACCURACY:-	0.05% TYPICAL

### **ABSOLUTE MAXIMUM RATINGS:-**

INPUT VOLTAGE:	16 VOLTS
ODOMETER	999999 Miles/KM

### **INSTALLATION, DO'S & DON'TS :-**

#### **DO'S**

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

DO ensure that the speedo cable is not run next to the tacho cable or any power cable, try to run it next to the chassis.

#### **DONT'S**

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.

### **SPEEDO SENSOR INSTALLATION, DO'S & DON'TS :-**

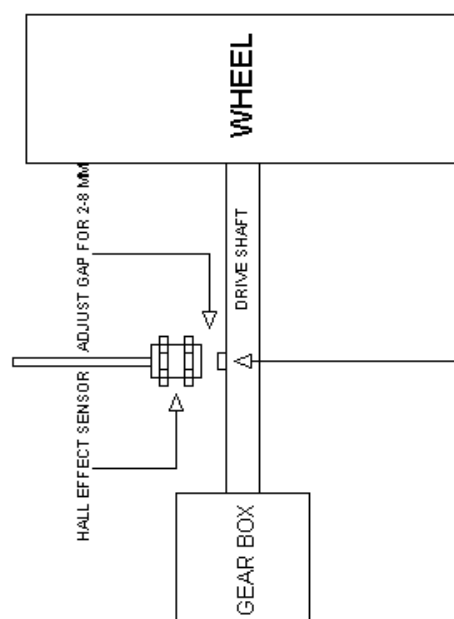
#### **DO'S**

DO ensure that the sensor is pointing toward the south pole end of the magnet, not the middle.

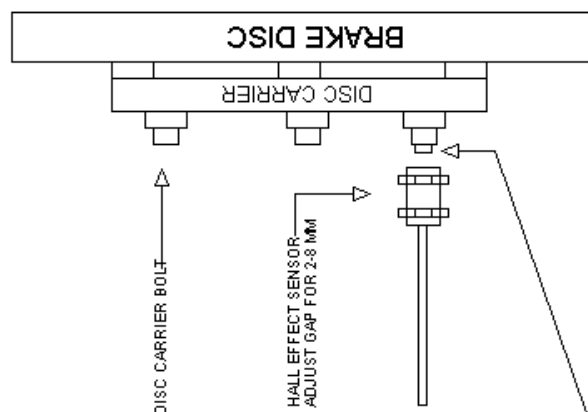


## SPEEDO SENSOR INSTALLATION GUIDE

### TYPICAL CAR INSTALLATION



### TYPICAL MOTORCYCLE INSTALLATION



DISC MAGNET

GLUE WITH NORTH POLE  
FACING DOWN\* ON THE DRIVESHAFT  
USE EPOXY GLUE TO FIX,  
EG ARALDITE OR PERMABOND.

\* MARKED BY DIMPLE OR RED PAINT

DO ensure that the sensor is aligned with the end of the magnet when the suspension is under normal load (not jacked up).

## APPENDIX

### TACHO IGNITION CONNECTION

DO NOT make any kind of connection to the HT leads or spark plugs, this voltage is highly destructive and will likely stop the engine firing properly.

Do use a tacho output if this available, and this may be the only option on some ignition systems. They do vary in there operation however. Some do not like being loaded down to earth (EG Nissan Micra), in this case you

need to connect the red wire to +12v batt, and the black wire to tachometer output. If there is no tachometer output available or coil connection available, you may be able to connect the inductive pickup output from the distributor, if the system has one.

### **SPEEDO SENSOR**

The speedo sensor can only trigger off the south pole of a suitable magnet. The supplied disc magnet is intended to allow gaps of around 2-5mm to ease installation. Other (disc) magnets can be supplied for gaps up to 18mm if required.

**SPA DASH CONNECTOR PIN DETAILS**

PIN NUMBER	FUNCTION
1	TACHO + (10K OHM LOAD ISOLATED)
2	TACHO -
3	PRESSURE 2 SIGNAL
4	PRESSURE 1 SIGNAL
5	BATT -
6	BATT + (1A(F) FUSED)
7	TEMPERATURE 2 SIGNAL
8	+5v
9	EARTH
10	EARTH
11	SPEEDO SENSOR + (RED)
12	SPEEDO SENSOR SIGNAL (BLACK)
13	SPEEDO SENSOR - (SCREEN)
14	TRIP/MENU SWITCH (+)
15	TRIP/MENU SWITCH (EARTH)
16	NU
17	TEMPERATURE 1 SIGNAL
18	FUEL LEVEL SENSOR
19	NU
20	OIL WARNING (EARTH FEED)
21	BRAKE WARNING (EARTH FEED)
22	ALTERNATOR WARNING
23	HIGH BEAM INDICATOR (+12V FEED)
24	LIGHTS ON INDICATOR (+12V FEED)
25	LEFT INDICATOR (+12V FEED)
26	RIGHT INDICATOR (+12V FEED)
27	NU
28	NU

# KITDASH 2.3

