SB017, SB108, SB020
Quick Start Guide

Scon Technologies
399A Road 773
Guntown, MS 38849

WWW.SCONCON.COM

Scon SB Products Description

Scon SB products are small microcontroller based PC boards specifically designed to drive RC type servos for robotic applications. A SconScript language interpreter is built into the Scon SB's microcontroller. Scon SBs contain a generous flash memory space for program storage; various inputs and additional outputs for non-servo devices. For programming, setup and download, these products communicate with PCs or other devices using standard RS-232 serial ports. To keep the size small, the serial connector may be a special type requiring a cable or adaptor to connect to the PC.

Scon SB products are designed to be powered by batteries and require as little as 5.5 volts DC. This allows the use of the same battery supply for both the servos and the controller. Scon SB products' separate power and servo connections may be tied together and powered from a single source if it is of sufficient in capacity. Large high power servos and fast digital servos require substantial short term current and in those cases, separate servo power is recommended.

The servo connectors are standard three pin with .1 inch spacing arranged with the ground (common) on the outside of the PC board; center is the power pin; and the pulse pin on the inside. On most Scon SBs the signal lead has a series resistor to protect the microcontroller in case of reverse connection or short circuit. SB products generate standard RC PWM servo pulses of 5 volts and a pulse width of between 0 and 6.5 milliseconds, specified in .1 microsecond units, accuracy is better than 1/2 microsecond.

Non-servo inputs and outputs are addressed in the Scon language starting with input 1 and output 1. SB Devices may have none or several inputs and outputs. Inputs on a three input Scon SB product will be inputs 1, 2 and 3. Scon language supports 254 inputs and 254 outputs. "Output 1 on" will enable output 1 and "Output 1 off". "Output 15 on" will enable the onboard LED in most Scon SB's.

Scon SB setup and downloading of programs is done using PScon, a Windows XP based program. PScon allows control of the Scon SB while it's running, including enabling motors, setting speed and position data.

SconScript programs are written with a text editor. PScon is then used to convert the text into the required format, and download it to the Scon SB board. Once the program is downloaded, the SB board can run the program without connection to the PC.

PScon also has other tools. The Position Manager allows live servo movement to facilitate creating positions and motions. Once all servos are at the desired rotations, simply click to store all the rotations in a Scon position memory element. After that, anytime that element is referenced with a move, all servos will rotate to those rotations. The Position Manager also allows stepping forward or backwards through position elements moving all or some servos to the set rotations with just a mouse click. This makes building movements easy. The speed editor allows viewing and changing speed elements. For the advanced user, the memory editor allows access to the first 256 bytes of the processor ram and/or EEPROM.

Once programs are loaded, Scon SBs can be controlled by one of four methods: PC control, onboard pushbutton control, or input pin activation. Additionally, and any device that contains a serial port can control various run oriented functions. This includes calling subroutines, allowing stamp like devices to control Scon very effectively.

For Further information please read the documentation provided on the install CD, or go on line at www.sconcon.com

Using PScon

PScon is a Windows XP compatible program that controls and downloads programs into a Scon SB product.

Setup of PScon:

PScon is the PC compatible program that controls Scon products. PScon runs under Windows XP and requires one serial port. Quality USB to serial converters may be used.

To setup PScon, run the install.exe file provided on the install disc, USB stick, or download. Refer to "Install Issues" at the end of this manual for Trouble Shooting.

If a Com port error occurs when PScon runs, refer to "Com Port Issues" in the "Trouble Shooting" section.

Once the serial port is functioning, verify that the Scon product is properly working by Selecting "Send Command" from the Setup and Tools drop down menu. Click the Request Version button and Scon will report back the version number. This verifies proper communication.

The default file locations are set in the System Setup screen from the Setup and Tools dropdown. Default locations are all set to C:\Irunner, a required directory that contains the parameters. The default Scon and temporary file locations can be changed if desired.

Board Setup:

Select "Board Setup" from the Setup and Tools dropdown. The parameters are read when the display loads; clicking "Get Parameters" will re-load the parameters.

First, check the box for each servo that is to be used. All servos will receive a pulse and may be directly controlled; however, the Scon engines will only update and move the servos that are checked as "Active Servos". If a servo is selected and not present, movement information will be generated for that servo. If a value is read for a servo that is not present it may appear that the board is not working when it is actually generating data for the servo that is not there. This could take over a minute to complete for a long slow move. This is why it is best to un-check the non-present servos in the "Active Servos" box.

"Report Controls" should be on in most cases. This causes the Scon board to generate reports that are read by PScon for display on the Main Control as Line number etc. This can be turned off to allow the Scon board to have more processing resources such as using the Memory Editor

while Scon is in the run mode (not recommended) or faster speed calculations. The default value of 8 in the "Report Rate" box will cause data to be sent several times per second.

Program & Position storage should be set to "Separate". If "Common/Packed" is set, positions for each instruction must be placed in the element immediately following the instruction. Non-move instructions waste a blank element after each instruction. This is a future option with limited functionality.

Run Controls selects the Start/Stop control method. PScon is always able to control Scon. If "Run on Power up" is selected, the board will execute "Run at line 0" as soon as power is applied. If "Push Button Control" is selected, the on-board push-button will toggle Scon into and out of the run mode. If "Hardware Control" is selected, Input 1 will start the board and Input 2 will stop the board. Line 0 is the start point for hardware and pushbutton control. Note: any combination of controls may be selected.

The "Pulse Width Limits" section limits the minimum and maximum pulse width that the board will generate. This is to protect the hardware and servos. Select the "Use limit controls" box to enable pulse limits. The values are in 10,000 microsecond units. Recommended defaults are 22500 (2.25 Milliseconds) for maximum and 9000 (.9 Milliseconds) for minimum. The same pulse limits apply to all servos.

Once all parameters have been set, click "Store Parameters", this will store the values into the board processors eeprom memory. At this point, the board continues to run with the old values. Power cycling the board or clicking the "Reload from EEPROM" button will reset the board and load the new values.
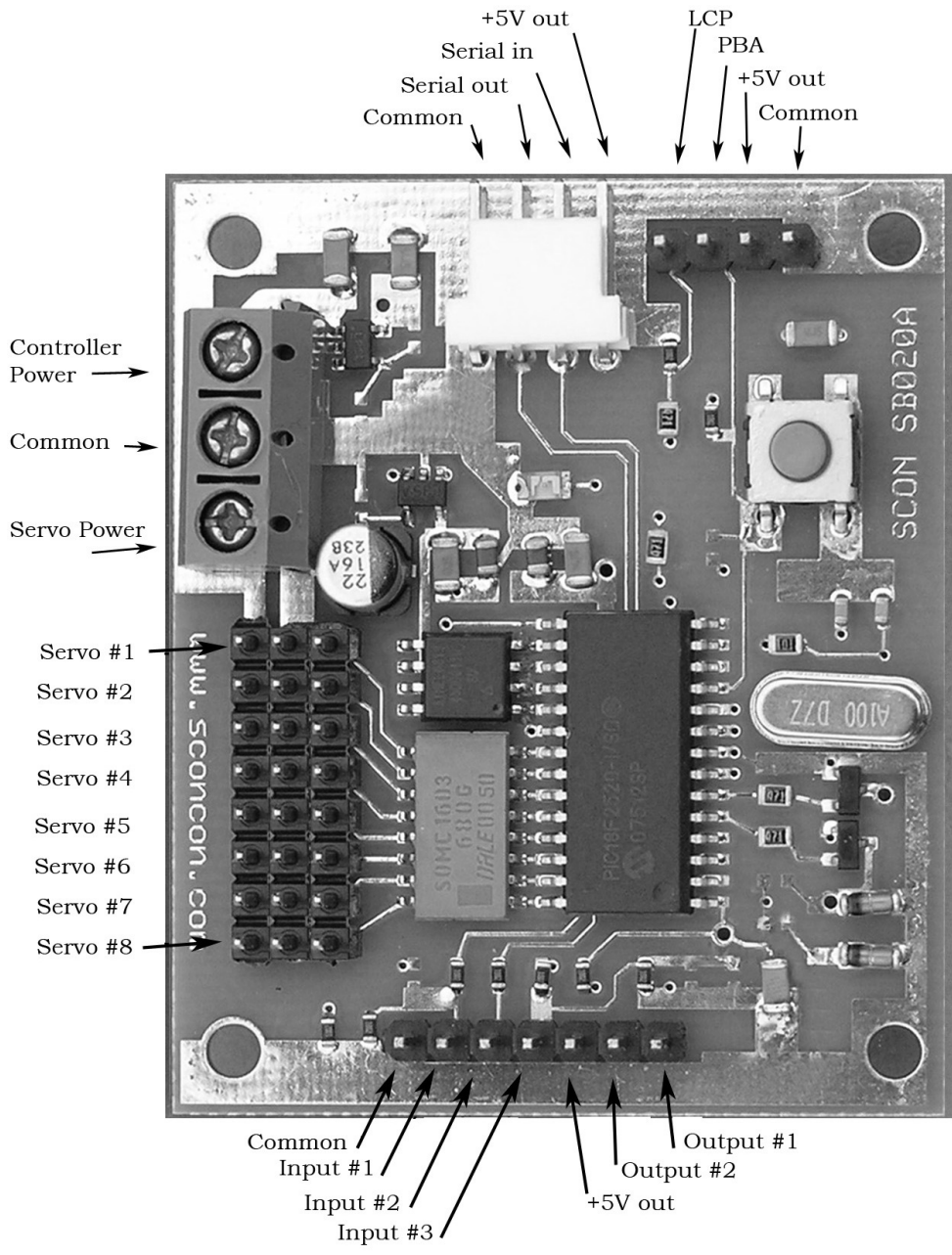
NOTE: If memory value become damaged or corrupted or changed inadvertently the Scon board product may be reset to factory default functions. This is accomplished by holding down the on-board pushbutton while the board is powered up. This does not erase the Sconscript program, use the Flash Tools dropdown to erase the flash memory.

Flash memory
When a Scon file is downloaded, the onboard flash memory is overwritten with the new data; only the elements that are used in the new program will be written to. This allows downloading small sections while leaving blocks of subroutines in memory. This is desirable due to the required flash load time on large programs. It also allows commonly used subroutines to be left as part of the program.

The entire flash memory may be erased if desired. Select "Flash tools" from the setup and tools menu, and then click "Erase flash memory".

The "Flash tools" utility also allows reading and writing Scon's flash memory. For reading, a page address range must be selected. Each page contains 16 elements. The entire range of pages (0-2047) may be selected; however reading the entire flash memory may take several minutes. Writing will take longer due to the flash memory write cycle. The flash file name is listed on the "Flash tools" utility screen. Scon flash file format specifies a page address for each page to be written so only what is read into the file will be written back into Scon with a flash write. This is an excellent tool for reading and writing positional data blocks or "cloning" Scon modules.

+5V out
Serial in
Serial out
Common

LCP
PBA
+5V out
Common

Controller Power

Common

Servo Power

Servo #1
Servo #2
Servo #3
Servo #4
Servo #5
Servo #6
Servo #7
Servo #8

www.sconcon.com

SCON SB020A

Common
Input #1
Input #2
Input #3
+5V out
Output #2
Output #1

Note: Certian inputs and outputs may not be present on all devices, consult the manual for the particular board.

Trouble Shooting

Install Issues:

PScon.exe is a complete program that will run on most PC's without full installation. However it does require mscomm32.ocx (the serial port driver) to be installed in the windows system path. This will be done automatically by the install utility if used.

If a problem occurs during installation, copy mscomm32.ocx into the computers Windows system directory, then click on PScon to run it without a full install.

PScon requires one directory (C:\irunner) for data files. The directory will be created automatically when PScon runs the first time.

Com Port Issues:

If a serial port error occurs the first time the program runs; the pre-set default serial port may not be present on the computer. To set or change the serial port from the main screen "Main Control", select the "Setup and Tools" dropdown menu then "System Setup". Set the port to the desired port number, the baud rate should be 057600, parity n, length 8, and stop bits 1. The parameters MUST be saved BEFORE selecting "Re-Connect Com port". If the error occurs again, try selecting port numbers until the correct port is located. The comport number can be located using Windows Desktop or Start tab by right clicking "My Computer", selecting "Properties", and then "Hardware", and then "Device Manager", and then "ports (COM & LPT)". This will list all of the ports present on the computer. Once a valid port is selected, PScon will run without error even if the Scon board is not present. However; the Scon board must be plugged into the selected port to operate properly.

Program Run Errors / Issues:

PScon does not list many errors. If the program does not work as expected check the Scon program carefully. Misspelled keywords may be ignored.

Stack underflow or overflow errors can be caused by a misspelled "call" or "return" keyword or by calling or looping more than the supported stack memory allows.
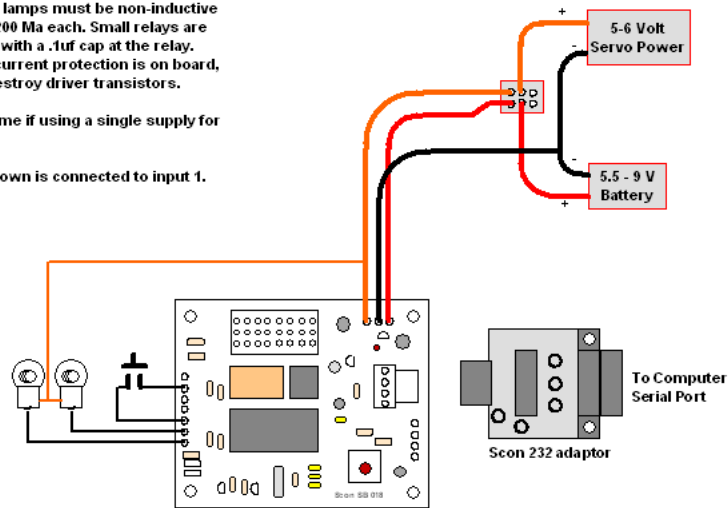
Connection diagram for SB018 & SB020

I/O Connections Using Servo Power Source for outputs

Load shown as lamps must be non-inductive
and less than 200 Ma each. Small relays are
OK if bypassed with a .1uf cap at the relay.
NOTE: No over-current protection is on board,
overload will destroy driver transistors.

Connect the same if using a single supply for
servo power.

Push button shown is connected to input 1.

5-6 Volt
Servo Power

5.5 - 9 V
Battery

To Computer
Serial Port

Scon 232 adaptor

Scon SB 018

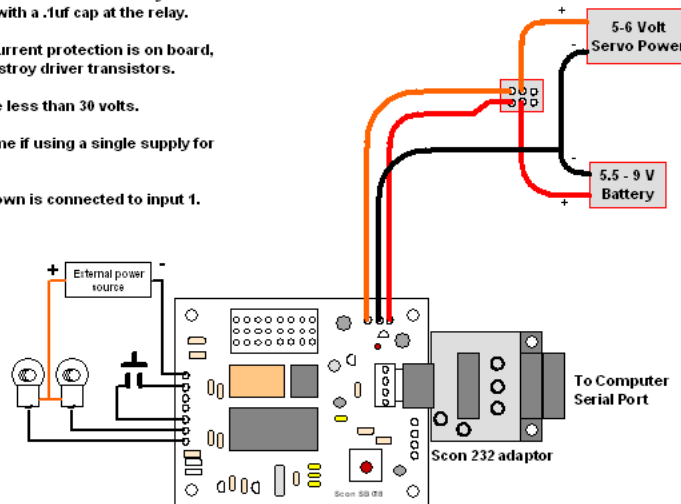## I/O Connections Using External Power Source for outputs

Load shown as lamps must be non-inductive
and less than 200 Ma each. Small relays are
OK if bypassed with a .1uf cap at the relay.

NOTE: No over-current protection is on board,
overload will destroy driver transistors.

Voltage must be less than 30 volts.

Connect the same if using a single supply for
servo power.

Push button shown is connected to input 1.

External power
source

5-6 Volt
Servo Power

5.5 - 9 V
Battery

To Computer
Serial Port

Scon 232 adaptor

Scon SB 018

Standard Specifications

Power	5.5-12 VDC, 100 ma, plus servo requirements
Outputs	8 pwm 1 - 6,400 microseconds (.001 - 6.4 Milliseconds) specified to .1 microseconds
Outputs	Not present on all devices – 2 open collector 200ma 16V max
Inputs	Not present on all devices – 3 DC input 10K load 5 Volt
Input/Output	Not present on all devices – 1 Configurable as 5VDC 10K input or 5 Volt 25ma output
Input	Not present on all devices – DC in 10K 5V normally high control input (Pushbutton)
Accuracy	Better than ½ microsecond
Firmware	Sconscript interpreter and / or Slave IO generator
Memory	512K Bytes off processor Scon language program storage for 32,000 16 byte Elements
Interface	Logic level serial
Connectors	.1" spacing 3-square pin standard RC servo format
Baud rate	57,600 BPS

Scon SB's generate very accurate industry-standard positive going servo pulses and are ideal for robotic applications and servo testing.

Interface is logic level serial and the board requires Scon232 level translator to interface to RS-232 serial ports. In addition to the easy-to-use mouse button driven position manager in PScon, SM's respond to Scon's short 9-byte command set as well as its 64-byte long commands. This provides plenty of flexibility for using SM's as slave servo drivers in Robotic and other applications. Short commands may operate on a single servo, while it is possible to move all 8 servos with a single 64 byte command.

The power circuit in SM's is similar to Scon SB products and utilizes a very low dropout regulator so that the board can be powered with less than 5.5 volts.

High servo load conditions may require a separate servo power source. If desired, a 9V battery may be used to power the Scon board if the servo power is separate. For most applications, a single 6 Volt battery or 4 AA batteries are used and the servo and logic power can be tied together and run with a strong single battery.

The Scon SB digital input and output routines are included in most firmware, however hardware drivers and input buffers are not present on the boards. These surface mount components may be populated from the SB schematic available online if desired.

For Further information please consult the documentation on the install CD, or on line

Scon Technologies   399A Road 773 Guntown, MS 38849   WWW.SCONCON.COM