Robotics Control Board RCB

Technical Data

DS-RCB

Features

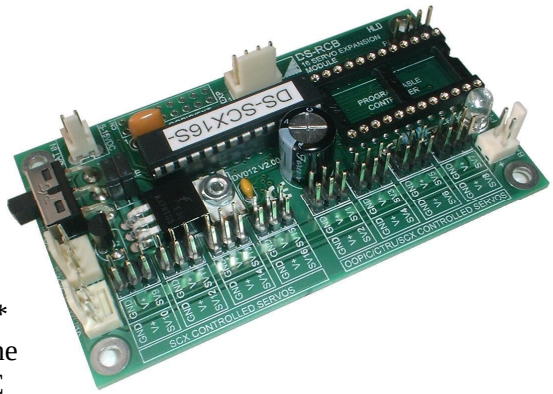
- **Sixteen servo control with the supplied DS-SCX16S IC via I²C or serial interface.**
- **Form factor identical to OOPic embedded control module (51mm x 89mm high quality PCB).**
- **Eight servo connection, control and battery supply for the OOPic or OOPic II.***
- **I²C expansion header.**
- **BASIC Stamp™ / OOPic-C high-quality (24pin) socket, with programming connector, for eight or sixteen servo control.**
- **On-board 5Volt 3Amp regulator for servo power with enable linking.**
- **Battery out power delivery connector.**
- **Servo power switch allows servos to be disabled during programming etc.**
- **Power ON indicator.**
- **Secondary 5V supply for DS-SCX16S and external I²C peripherals e.g. DS-WCM, DS-LCDDn, DS-GPM etc.**
- **RS232 network connectors for simple PC control.**

Description

The DS-RCB was developed to provide a simple solution to the requirements of servo controlled robotic and control projects.
The following control configurations are supported:

- Eight servos driven from an external OOPic or OOPic II.*
- Sixteen servos driven from the supplied DS-SCX16S via I²C or serial (i.e. PC port).
- Eight or sixteen servos driven from a BASIC Stamp or compatible controller.
- Combinations of the above.

The DS-RCB provides a servo power regulator capable of supplying 5V @ 3A to the connected servos from an external battery pack of 7.2 to 15V and features a disable link to allow the use of low voltage battery packs of 3.6 to 4.8V.
A servo power control switch is provided to allow the servos to be disabled and battery power is indicated with an on-board power indicator.



An optional connection and fixing kit DS-FKT3 provides all the necessary cables and mechanical fixings needed to connect to the OOPic controller range and provides external battery connections for Tamiya and PP3 snap connector style battery packs.

Applications

The DS-RCB is primarily intended to aid in the simple construction of robotic and control projects in education or by the hobbyist.
Up to nine DS-RCB boards may be connected to a single OOPic to allow the control of a maximum 144 servos.

INTERFACE MODULES

Selection Guide

Description	Part Number
Robotics Control Board	DS-RCB
Low profile fixing and connection kit	DS-FKT3
8 servo I2C or serial controller IC	DS-SCX8S-n
16 servo I2C or serial controller IC	DS-SCX16S-n

OOPic is a registered trademark of Savage Innovations. * Optional pin header must be fitted.
BASIC Stamp is a registered trademark of Parallax Inc.

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Power connections

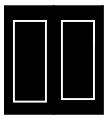
The DS-RCB requires an external supply from a battery pack or mains adaptor of 3.6 to 15V DC which when connected illuminates the LED indicator marked 'PWR'.
A switch, marked 'POWER', is provided to allow the power to the servos to be switched on or off.

The on-board servo regulator provides a clean regulated 5V supply for the connected servos at a maximum current of 3 Amps, the following table indicates if the regulator needs to be enabled or disabled dependant on supply voltage:

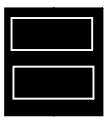
Status	Battery pack/supply voltage
Disabled	3.6V to 4.8V
Enabled	7.2V to 15V

The servo regulator is enabled or disabled with an on-board double link marked 'REG ENABLE' which can be configured as follows:

Enabled: REG ENABLE

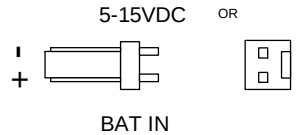


Disabled: REG ENABLE



Refer to the voltage rating of the servos you wish to use before configuring the servo regulator.

Connection of the external supply - battery / mains adaptor - to the DS-RCB module is through a two (2) pin horizontal or vertical header marked 'BAT IN'.
When viewed from above the positive (+) and negative (-) pins are as follows:



The battery supply from this connector is directly available for use by other devices such as the DS-WCM (Wireless Control Module), DS-GPM (Global Positioning Module) via a two (2) pin vertical header marked 'BAT OUT'.

Note: The input voltage from the battery / supply must be more than 6V DC to allow the DS-SCXnS controller IC to function correctly.

OOPic connector (optional)

The DS-RCB is fitted with an 8+8 pin horizontal header that conforms to the OOPic and OOPic II expansion connector format.
This header allows OOPic IO pins configured with the oServo object to control the servos connected to SV1 to SV8 or the first four IO pins configured with the oA2D object to read analogue sensors connected to SV1 to SV4. The header also conveys the I^2C, RS232 (TTL levels) and battery power from / to the connected OOPic or OOPic II.
The following table lists the OOPic IO pins, RCB servo number / connection and the header pin numbers:

Pin	OOPic	RCB	Pin	OOPic	RCB
1	LSDA	SDA	2	GND	BAT-
3	LSCL	SCL	4	Power	BAT+
5	Reset		6	I/O 15	RxD
7	I/O 1	SV1	8	I/O 14	TxD
9	I/O 2	SV2	10	I/O 13	
11	I/O 3	SV3	12	I/O 12	SV8
13	I/O 4	SV4	14	I/O 11	SV7
15	I/O 5	SV5	16	I/O 10	SV6

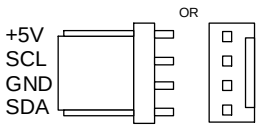
The following code can be used on the OOPic or OOPic II to configure and position two servos connected to SV1 and SV2:

```
Dim SV1 As New oServo
Dim SV2 As New oServo

Sub Main ()
'Set up servo outputs
SV1.IOline = 1              'Set servo 1 on IO 1
SV1.Center = 22             'Set servo 1 centre pos
SV1.Operate = cvTrue        'Enable servo output
SV2.IOline = 2              'Set servo 2 on IO 2
SV2.Center = 22             'Set servo 2 centre pos
SV2.Operate = cvTrue        'Enable servo output
'Output first position then second after 2 seconds
do
SV1 = 5                     'Set servo 1 to first pos
SV2 = 5                     'Set servo 2 to first pos
oopic.delay = 200           'Wait 2 seconds
SV1 = 63                    'Set servo 1 to second pos
SV2 = 63                    'Set servo 2 to second pos
oopic.delay = 200           'Wait 2 seconds
loop                        'Loop forever
End Sub
```

I^2C connector

The I^2C interface from the DS-SCXnS socket and the DS-RCB generated 5V regulated supply (100mA max.) is available on a four (4) pin horizontal or vertical header marked 'I2C EXP', pinned as follows:



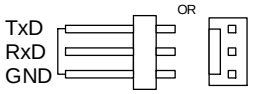
This connection is fully compatible with the DS-WCM (Wireless Control Module), DS-LCDD2 (LCD I^2C display module), DS-GPM (Global Positioning Module) and can also be used to power these modules.

DS-SCX16S servo IC

The DS-RCB is fitted as standard with the DS-SCX16S servo control IC which allows an external I^2C or serial device to control sixteen (16) connected servos with speed control, soft-start, global enable and positioning complete verification.
A DS-SCX16S-0 is supplied as standard, but if more DS-RCB boards are daisy chained on the same serial or I^2C bus then seven additional addresses, suffix '-1' to '-7' can be fitted (available separately) to provide control of a maximum 128 servos!
See the DS-SCXnS datasheet for more information.
NOTE: The DS-SCX16S must be removed when using a 24pin controller or external OOpic.

RS232 network connectors

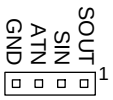
The RCB is fitted with two three (3) pin headers marked 'RS232 NETWORK' both being pinned as follows:



These headers allow a RS232 device such as a PC or PalmTop and further RCB modules to be daisy-chained together.
A 3pin to 9pin D cable is available (P.n. DS-R232CAB) which should be used to connect to a standard Personal Computer (PC) AT type RS232 COM port.

CONTROLLER socket

The DS-RCB is fitted with a 24pin IC socket compatible with the BASIC Stamp, OOPic-C and many other STAMP formatted controllers. A four (4) pin header marked 'PROG' is provided to facilitate the programming of the inserted controller, pinned as follows:



IO lines P0 to P7 are connected to SV1 to SV8, P8 to P15 are connected to SV9 to SV16.
Power for the controller is derived from the external supply input and is applied to the 'Vin' pin.
For more information please see the relevant controller documentation.

NOTE: The DS-SCX16S must be removed when using a 24pin controller.

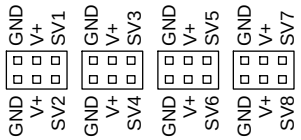
Servo connections

The DS-RCB is fitted with sixteen (16) servo connections compatible with the Futaba type pin configuration. This configuration is also compatible with the following servo manufacturers:

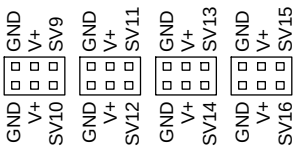
- Hitec
- Conrad
- Graupner/JR
- Microprop

If you are using *Simprop, Multiplex* or *Robbe* type servos then a connector adaptor cable will need to be employed.
The servo connections are broken into two (2) groups of eight (8) pin headers, pinned as follows:

Bank 1 (SV1 to SV8) marked
'OOPIC/CTL/SCX CONTROLLED SERVOS'



Bank 2 (SV9 to SV16) marked
'SCX CONTROLLED SERVOS'



Each servo output consists of three (3) pins GND, V+ & SVn with most servos complying with the standard colour code of BLACK, RED & YELLOW respectively.

Note : Mis-connection of servos is not normally fatal but double check connections before power application.

Electrical Characteristics **(T_A = 25°C Typical)**

Parameter	Minimum	Maximum	Units	Notes
Supply Voltage (VBAT)	3.8	15	V	1
Supply Current (Servo power OFF)	8.5	10	mA	2
Supply Current (Servo power ON)	11.5	2800	mA	3
Supply Voltage (on-board VCC)	4.75	5.5	V	
Supply Current (on-board VCC)	5	95	mA	4
RS232 RX data input level	-15	+15	V	5,6
RS232 TX data output level	0.8	VCC	V	5,6
RS232 speed	-	9600	bps	5,6
I^2C speed	-	400	kHz	5

Absolute Maximum Ratings

Parameter	Minimum	Maximum	Units	Notes
Supply Voltage (VBAT)	-0.5	+30	V	7
Supply Current (VBAT)	0	3	A	

Environmental

Parameter	Minimum	Maximum	Units
Operating Temperature	0	70	°C
Storage Temperature	-10	80	°C
Humidity	0	80	%
Dimensions	Length 98mm, Width 64mm, Height 14.5mm		
Weight	30g		
Immunity & emissions	EMC compliance to 89/336/EEC		

Notes:
1.V BAT below 6V requires that the servo regulator be disabled (see above) and no DS-SCXnS fitted.
2.Values given are for VBAT of 9V and DS-SCX8S IC not fitted and fitted.
3.Values given are for VBAT of 9V and servos being not driven and driven.
4.Value given is based on maximum and minimum loading.
5.Only applicable when DS-SCXnS IC fitted.
6.Only applicable when DS-R232CAB fitted.
7.Value given is with servo regulator enabled.

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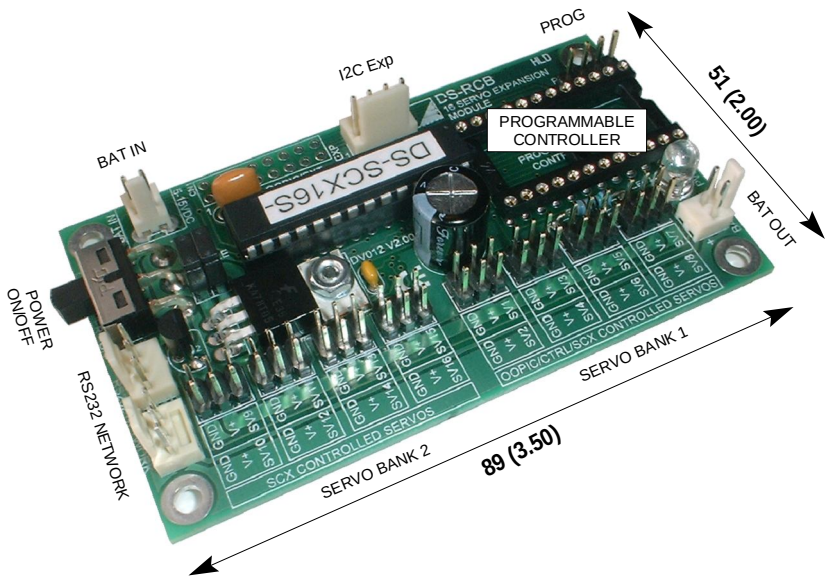
Mechanical Specifications – Units millimetres (inches)

Note: Build may be different to that shown



WEEE Consumer Notice

This product is subject to Directive 2002/96/EC of the European Parliament and the Council of the European Union on Waste of Electrical and Electronic Equipment (WEEE) and, in jurisdictions adopting that Directive, is marked as being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal/public waste. Please utilise your local WEEE collection facilities in the disposition and otherwise observe all applicable requirements. For further information on the requirements regarding the disposition of this product in other languages please visit www.designersystems.co.uk

RoHS Compliance

This product complies with Directive 2002/95/EC of the European Parliament and the Council of the European Union on the Restriction of Hazardous Substances (RoHS) which prohibits the use of various heavy metals (lead, mercury, cadmium, and hexavalent chromium), polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE).

Declaration of Conformity

Apparatus name / model number DS-RCB

Conformity via Generic Standard EN50081-1
Generic Standard EN50082-1

Conformity criteria For use only within commercial, residential and light industrial applications

We certify that the apparatus identified above conforms to the requirements of Council Directive 89/336/EEC & 73/23/EEC

Signed. **Date** 1/6/02

Having made this declaration the CE mark is affixed to this product, its packaging, manual or warranty.

Manufacturer Designer Systems, 15 Andrew Place, Truro, Cornwall TR1 3HZ, United Kingdom

Description of apparatus Robotic interface peripheral