Slip Ring Connection Board
Version 1.0
User's Manual

Document Revision: 1.0
8/21/2010

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Overview

The Slip Ring Connection Boards provide an easy way to connect the body of your astromech droid to the head (dome, in many cases) using a 24 conductor slip ring. One board is used on each end of a 24 conductor slip ring with the wires soldered into D-type subminiature 25 pin female (DB25) connectors. The board breaks out the signals passed through the slip ring such that servo signals and power can be directly connected at either end. The board is basically split into two "lanes" so that it is possible to send two different voltages and power two different banks of servos in the dome (often needed given the amount of current drawn by servos).

The Slip Ring Connection Board uses a standard right angle 25 pin male D-type subminiature (DB25) connector for connecting at either end of the slip ring. This means that the slip ring wires need to be terminated using a female DB25 solder cup connector on both ends. Using the female connector on the wire terminated end is the most robust because if a male pin gets damaged; it is much easier to simply replace the Slip Ring Connection Board than to replace the connector on the slip ring.

The power lanes use standard two-terminal screw connectors and the servo and signals use 3-pin 0.1 inch center male header connectors. This makes it easy to wire the head (dome) and body of the droid. Servos can be simply plugged into the slip ring connection board in the head (dome), and 3 wire extension cables (female-female header connectors) can be used to connect servos or other signals in the body.

Document Revision History

Revision 1.0: 8/21/2010 (Scott Gray)

- Initial Release (Scott Gray)

References

http://www.jedicontrol.com - Home page of the J.E.D.I. Controller and Displays that contains all the documentation and any updates or further reading material

http://www.astromech.net – THE place to find anything and everything about building your droid. Slip Ring Connection Board information will be here as well.

http://www.superdroidrobots.com/product_info/RC.htm - Information about R/C basics

www.easyrc.com/radiosystems/index.html - For more definitions, including a discussion on types of servos and batteries

Acronyms

There are a few acronyms that may be used in this reference manual. Some are listed here for reference.

DI	Digital Input – used for switches and other discrete inputs
DOUT	Digital Output – used for communicating to other effects
FLD	Front Logic Display – The two displays on lower front of dome
JEDI	Joystick Enhanced Droid Input
LCD	Liquid Crystal Display – display for status, debug – not visible on droid
LD	Logic Display – displays on dome front and back
MIC	Microphone
MP3	Compressed media format for music, sounds
PIR	Passive Infra-Red (sensor)
R/C	Remote Control
RLD	Rear Logic Display – display on back of dome
SPST	Single Pole, Single Throw – on/off type switch

Glossary

There are many terms used in this reference manual that may be unfamiliar. Some are listed here for reference.

Servo – Servos are DC motors with built-in gearing and electronic feedback control loop circuitry for positioning actuator arms (called servo arms) based on a supplied input. A servo contains an electric motor and is the "muscle" that controls droid features such as opening and closing doors, moving the Holo-Projectors, etc. Depending upon their intended use, there are a wide variety of servo types. For a more detailed look at servos, including the different types and how to hook them up, see the reference section.

Slip Ring Connection Board Interfaces

The Slip Ring Connection Board interfaces the following:

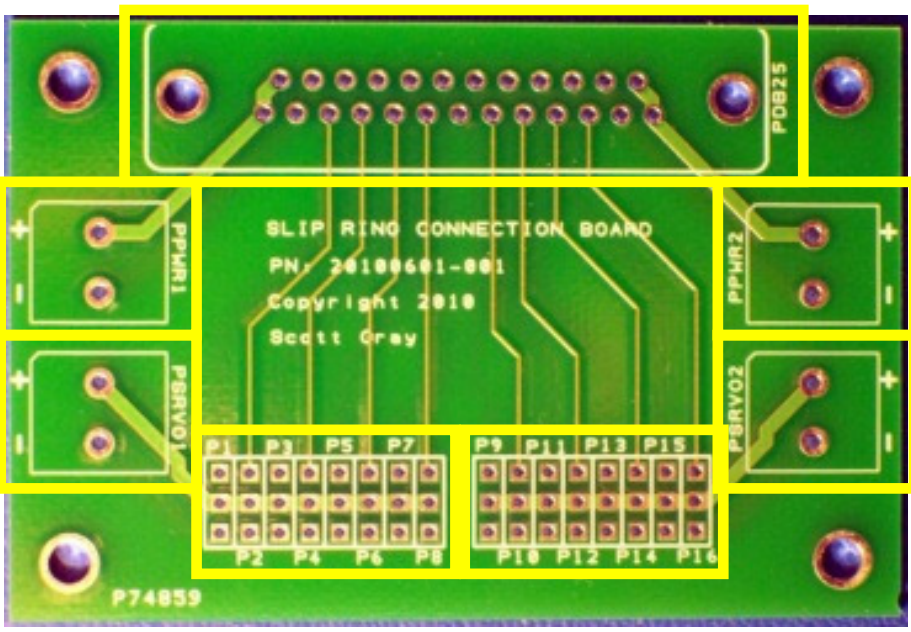
- Slip Ring – through the DB25 male right angle connector
- Power 1 – Power lane 1 connection for passing battery or other regulated voltage to dome
- Power 2 – Power lane 2 connection for passing battery or other regulated voltage to dome
- Servo Power 1 – Servo power lane 1 connection for powering first bank of 8 servos in the dome; unconnected in the body
- Servo Power 2 – Servo power lane 2 connection for powering second bank of 8 servos in the dome; unconnected in the body
- 16 servos or signals – 16 signals passed through slip ring. Each signal goes to a dedicated 3 pin header connector that has power supplied by either Servo Power 1 or 2.

Not all of these connections are required for a droid, and it is up to the individual to decide how best to apply the interfaces.

On the next page is a picture of the Slip Ring Connection Board with the connectors identified. Each of the connectors is discussed in the next section.

Slip Ring Connection Board Connectors

24 Signal Slip Ring Connection
D-Subminiature Right Angle
25 pin connector PDB25



Power Lane 1 PPWR1

Servo Power 1 PSRVO1

Power Lane 2 PPWR2

Servo Power 2 PSRVO2

P1 – P8
Servo or Signal Connections
1 - 8

P9 – P16
Servo or Signal Connections
9 - 16

Note: Pin 1 is always the innermost pin on the board for the header connectors.

Slip Ring Connection Board Connector Definitions

The Slip Ring Connection Board has a plethora of connectors as described below.

PDB25 – Slip Ring DB25 Connector

Pin	Description
PwrPwr1	Power Lane 1 positive power connection #1
PwrPwr1	Power Lane 1 positive power connection #2
PwrGND1	Power Lane 1 ground connection #1
PwrGND1	Power Lane 1 ground connection # 2
PwrPwr2	Power Lane 2 positive power connection #1
PwrPwr2	Power Lane 2 positive power connection #2
PwrGND2	Power Lane 1 ground connection #1
PwrGND2	Power Lane 1 ground connection # 2
Sig1	Servo or other signal pass-through slip ring
Sig2	Servo or other signal pass-through slip ring
Sig3	Servo or other signal pass-through slip ring
Sig4	Servo or other signal pass-through slip ring
Sig5	Servo or other signal pass-through slip ring
Sig6	Servo or other signal pass-through slip ring
Sig7	Servo or other signal pass-through slip ring
Sig8	Servo or other signal pass-through slip ring
Sig9	Servo or other signal pass-through slip ring
Sig10	Servo or other signal pass-through slip ring
Sig11	Servo or other signal pass-through slip ring
Sig12	Servo or other signal pass-through slip ring
Sig13	Servo or other signal pass-through slip ring
Sig14	Servo or other signal pass-through slip ring
Sig15	Servo or other signal pass-through slip ring
Sig16	Servo or other signal pass-through slip ring
NC	No Connect – Unused pin – **THIS IS PIN 7 ON DB 25 CONNECTOR!!!**

This is the DB25 connector that interfaces to the 24 circuit slip ring. One pin is unused and that pin is the only pin that is not connected through the 24 conductor slip ring.

IMPORTANT NOTE: DO NOT CONNECT A WIRE TO PIN 7 (MIDDLE PIN OF LONG ROW) ON DB25 CONNECTOR WHEN SOLDERING YOUR SLIP RING WIRES! THIS IS THE ONE PIN TO SKIP!

Sixteen signals are passed straight through the slip ring. The rest are used for the two power "lanes" and have 2 circuits in parallel for each power signal. If only one voltage is going to be passed, then the two power lanes can simply be shorted together.

PPWR1 – Power Lane #1 Input/Output Connector

Pin	Description
-	Ground (connect to ground wire from battery or to DC/DC converter power supply)
+	Positive Power Rail of Power lane #1 (connect to battery or regulated voltage source in body or use in the dome as required)

This connector supplies the first power lane to the dome. This may be used to provide the battery voltage to the dome to be converted using a DC/DC converter to a lower voltage for servos, or may be used directly depending upon the application. Alternatively, a regulated +5V or +6V may be passed to the dome through the power lane connectors and used directly.

PPWR2 – Power Lane #2 Input/Output Connector

Pin	Description
-	Ground (connect to ground wire from battery or to DC/DC converter power supply)
+	Positive Power Rail of Power lane #2 (connect to battery or regulated voltage source in body or use in the dome as required)

This connector supplies the second power lane to the dome. This may be used to provide the battery voltage to the dome to be converted using a DC/DC converter to a lower voltage for servos, or may be used directly depending upon the application. Alternatively, a regulated +5V or +6V may be passed to the dome through the power lane connectors and used directly.

PSRVO1 – Servo Power Input #1 Connector

Pin	Description
-	Ground (connect to ground wire from DC/DC converter power supply
+	+5 or +6 Volts for powering up to 8 servos

This connector supplies the power for the first lane of 8 servos/signals (connectors P1 - P8). The power is independent of the rest of the board. The +5V or +6V source must be well regulated (such as the J.E.D.I. +5V or +6V DC/DC Converter power supply) and MUST be connected with correct polarity. Connection with reverse polarity (+5V/+6V and ground swapped) will cause permanent damage to the servos. It is recommended to connect the battery +V wire (+9V to +24V for the J.E.D.I. DC/DC Converter) through a fuse or circuit breaker (1A minimum, 6A maximum), then a single pole, single throw (SPST) switch (6A minimum), then to a +5V or +6V power supply. The +5V/+6V wire from the servo power supply should then be directly connected (no fuse or switch) to this connector. The ground (- wire) from the battery should be directly connected to the servo +5V/+6V power supply ground input. The ground output connection on the servo +5V/+6V power supply should be connected directly to this connector.

Note that this connector is not used in the body of the droid, as power is not routed through the slip ring connector.

PSRVO2 – Servo Power Input #2 Connector

Pin	Description
-	Ground (connect to ground wire from DC/DC converter power supply
+	+5 or +6 Volts for powering up to 8 servos

This connector supplies the power for the second lane of 8 servos/signals (connectors P9 – P16). The power is independent of the rest of the board. The +5V or +6V source must be well regulated (such as the J.E.D.I. +5V or +6V DC/DC Converter power supply) and MUST be connected with correct polarity. Connection with reverse polarity (+5V/+6V and ground swapped) will cause permanent damage to the servos. It is recommended to connect the battery +V wire (+9V to +24V for the J.E.D.I. DC/DC Converter) through a fuse or circuit

breaker (1A minimum, 6A maximum), then a single pole, single throw (SPST) switch (6A minimum), then to a servo +5V or +6V power supply. The +5V/+6V wire from the servo power supply should then be directly connected (no fuse or switch) to this connector. The ground (- wire) from the battery should be directly connected to the +5V/+6V power supply ground input. The ground output connection on the servo +5V/+6V power supply should be connected directly to this connector.

Note that this connector is not used in the body of the droid, as power is not routed through the slip ring connector.

P1 to P16 – Servo/Signal Header Connectors

Pin	Description
Sig	Servo signal or other signal
GND	Ground
+Vsrvo	+5 or +6 Volts

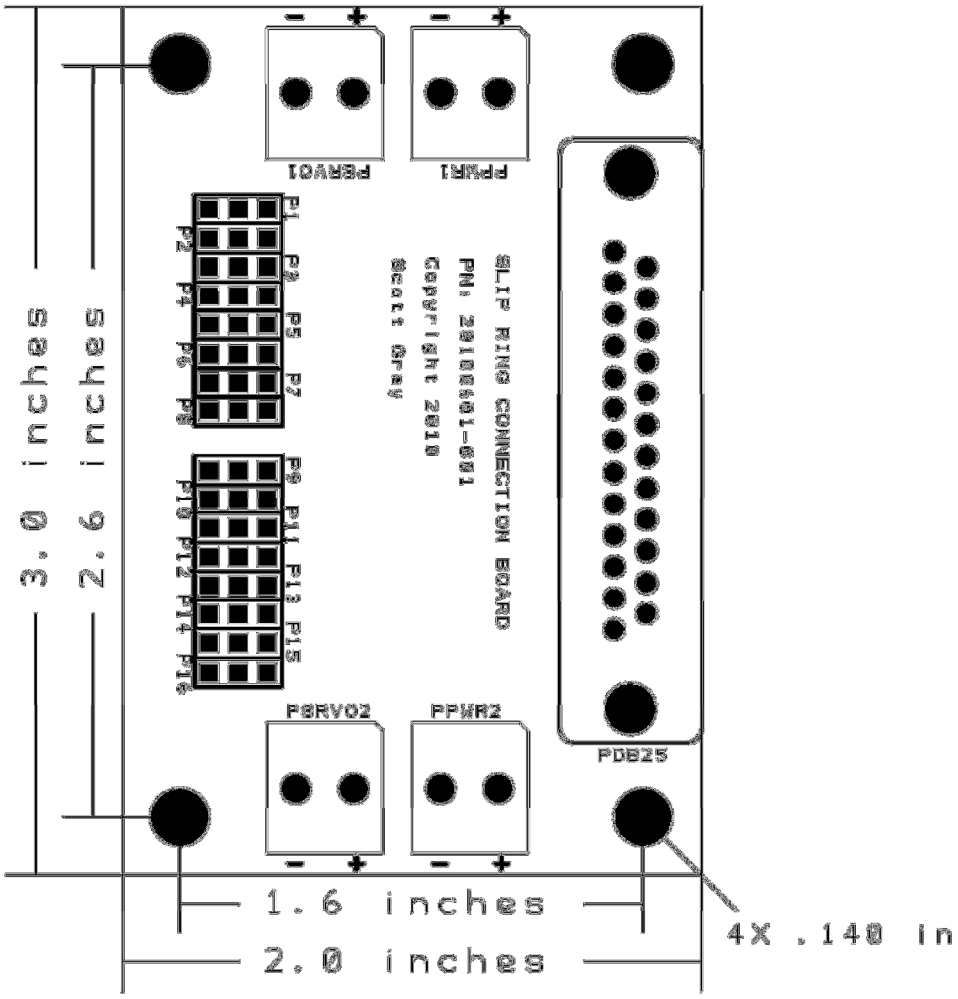
These connectors provide the pass through servo signals or other signals such as serial connections. Note that only the signals themselves are passed through the slip ring and not the power or ground connections. The power and ground for the first eight connectors P1 to P8 comes from the connector J??? in the dome. The power and ground for connectors P9 to P16 comes from the connector J??? in the dome. This allows for the power for the servos to be generated in the dome from battery power which reduces the number of wires needed to supply current through the slip ring.

Schematics

The schematics for the Slip Ring Connection Board are available in PDF format from the J.E.D.I. Control website.

Slip Ring Connection Board Dimensions

These are the dimensions for version 1.0 of the board.



Warranty and Repair Policy

DOA
If a purchased assembled component is determined to be Dead On Arrival within 15 days of date of delivery, it will be repaired free of charge. Shipping/duty/taxes will be reimbursed for sending component back for repair. Since all assembled components will be tested prior to shipment, this situation should be rare.

90 Day Good Faith Warranty
Warranty is limited to 90 days from the date of delivery for purchased assembled components that fail under normal operating conditions. The components will be repaired at a price of $25.00 plus parts cost and shipping/duty/taxes. Normal operating conditions does not include incorrect battery polarity; mechanical excessive stresses due to mishandling, dropping, or bending; mechanical or electrical modifications; excessive electrical stresses including using incorrect fuse or breaker values, incorrect sensor connections, incorrect or too large of motors on high current outputs, Electro-Static Discharge (ESD), shorting damage; excessive thermal stresses due to improper ventilation or cooling, submersion in any fluid; and any unauthorized repairs.

I give no other warranty; either expressed or implied, and disclaim all other warranties, including warranties for merchantability, fitness, or infringement. This warranty is not transferable. In no event shall my liability exceed the buyer's purchase price, nor shall I be liable for any indirect or consequential damages, injury, or death incurred through the use or misuse of these components.

Note that these components assume the user is reasonably experienced with electronics and is aware of ESD and can take proper precautions and can connect fuses, LEDs, motor controllers, motors, solenoids, relays, servos, sensors, and power without causing damage. If you have no or little experience, make sure you get help from someone with experience in these matters, or do not attempt to use these components. I will not be responsible for components that are damaged due to any circumstance including ESD, incorrect wiring, or failure to READ and UNDERSTAND all the documentation provided about the components BEFORE hooking things up and turning on the power. Please double check all of your wiring prior to attaching a battery! If you have any questions, e-mail me and I will try and respond promptly.

Legal Stuff

Pricing, hardware specifications, and software for these components can and will change without notice and I will not be liable for any changes.