

Shoestring Astronomy

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Handcontroller Modification Guidance

Revision 2.0

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We often get asked if there is a way to modify a certain handcontroller to add an ST-4 compatible guide port. Handcontrollers come in so many different designs that this can be a hard question to answer for all cases. However, almost all handcontrollers do have one thing in common: they use normally open pushbutton switches to actuate movement in each direction.

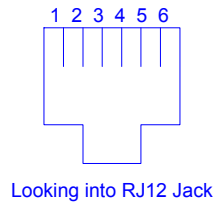
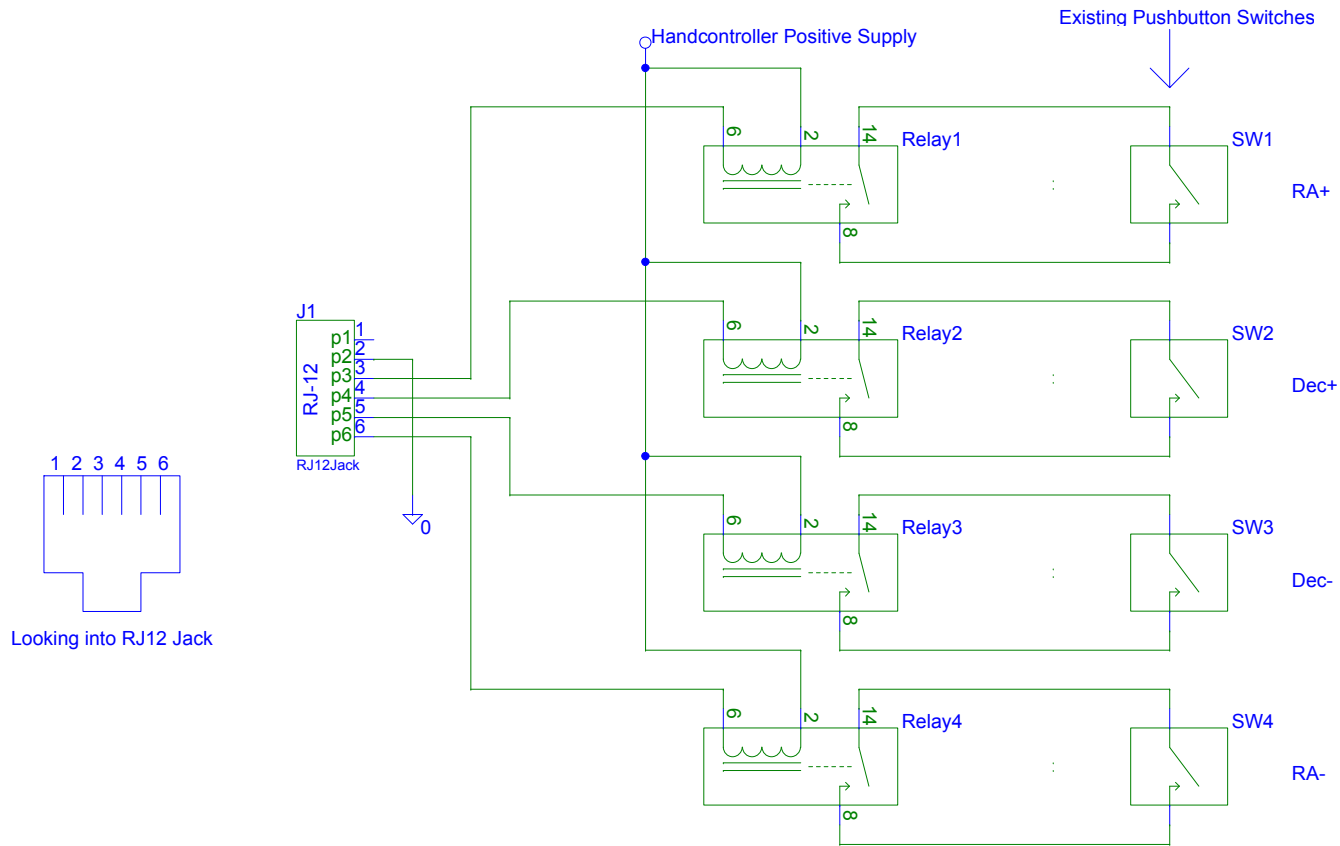
Using this common fact, it is possible to add an autoguide port to almost any handcontroller by putting normally open relays in parallel with each pushbutton switch and possibly some additional drive circuitry. If you are only planning on using a GPUSB to guide your mount, then you can use the simpler modification shown in schematics GP1 or GP2. This is because the GPUSB is capable of driving relay coils up to 40mA. If you are planning on using the GPINT-PT or any other source to guide your mount, you should use the schematics shown in either GP3 or GP4. This schematic includes a transistor to drive the relay coils.

Another important factor is the voltage that your handcontroller runs on. You will need to deduce which traces on the printed circuit board of your handcontroller are the supply node and the ground node. You should trace from the positive and negative terminals of the battery or supply jack to locate these nodes. If in doubt about the supply voltage, use a voltmeter between these two nodes to measure the supply voltage. Depending upon this voltage, you will need relays that are appropriate. The parts list on each schematic recommends relays for two supply voltage ranges.

In addition, some handcontrollers use SPST switches while others use DPST switches. Thus, you will need to use a relay configuration that matches your switch configuration. For SPST switches, use either schematic GP1 or GP3. For DPST switches, use schematic GP2 or GP4.

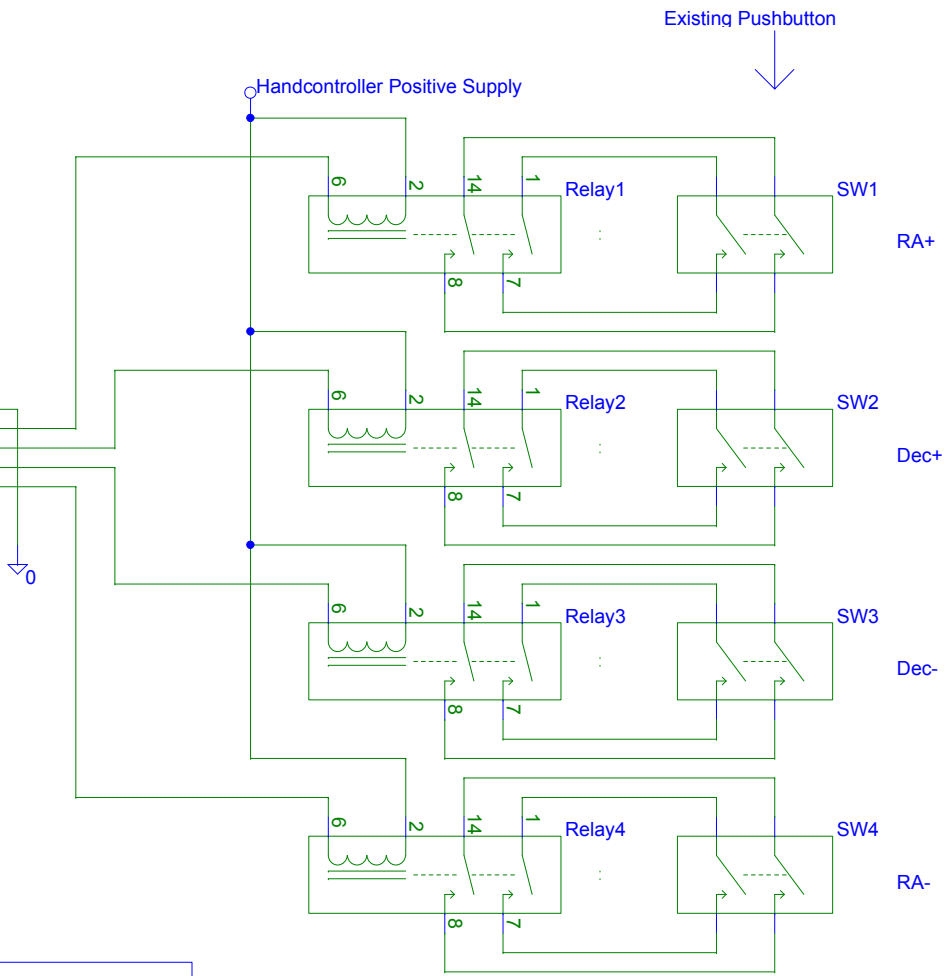
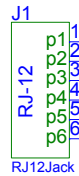
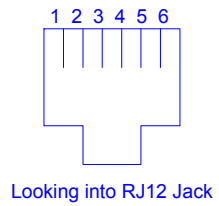
Schematic Decision Matrix	Existing Pushbutton Switch Configuration	
	SPST Switches	DPST Switches
To be used with:		
GPUSB only	GP1	GP2
GPINT-PT or other autoguiders	GP3	GP4

If you choose to modify your handcontroller, you do so at your own risk. If there is still a warranty on your handcontroller, making this modification will void the warranty. Proceed with caution.



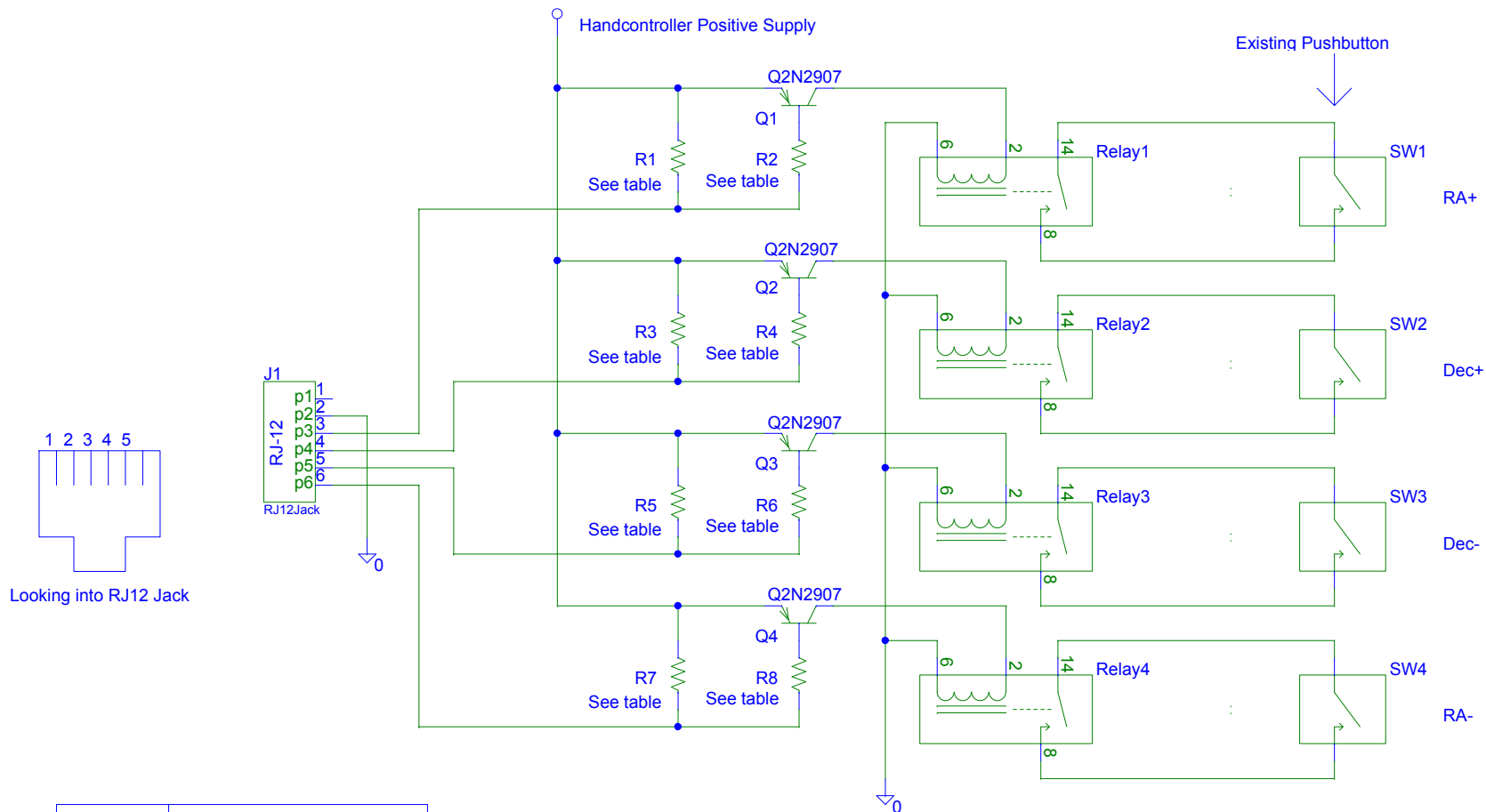
	DigiKey Part Numbers	
Supply Voltage	4 to 10 Volt	10 to 20 Volt
J1	A31422	A31422
Relays	HE101	HE103

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Title: GP1			
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DigiKey Part Numbers		
Supply Voltage	4 to 10 Volt	10 to 20 Volt
J1	A31422	A31422
Relays	HE123	HE109

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Size: A	Document Number: GP2	REV: A
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	DigiKey Part Numbers	
Supply Voltage	4 to 10 Volt	10 to 20 Volt
J1	A31422	A31422
Relays	HE101	HE103
Resistor	5.1KEBK	12KEBK
Transistor	497-2910-5	497-2910-5

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Title:

GP3

Size:
A

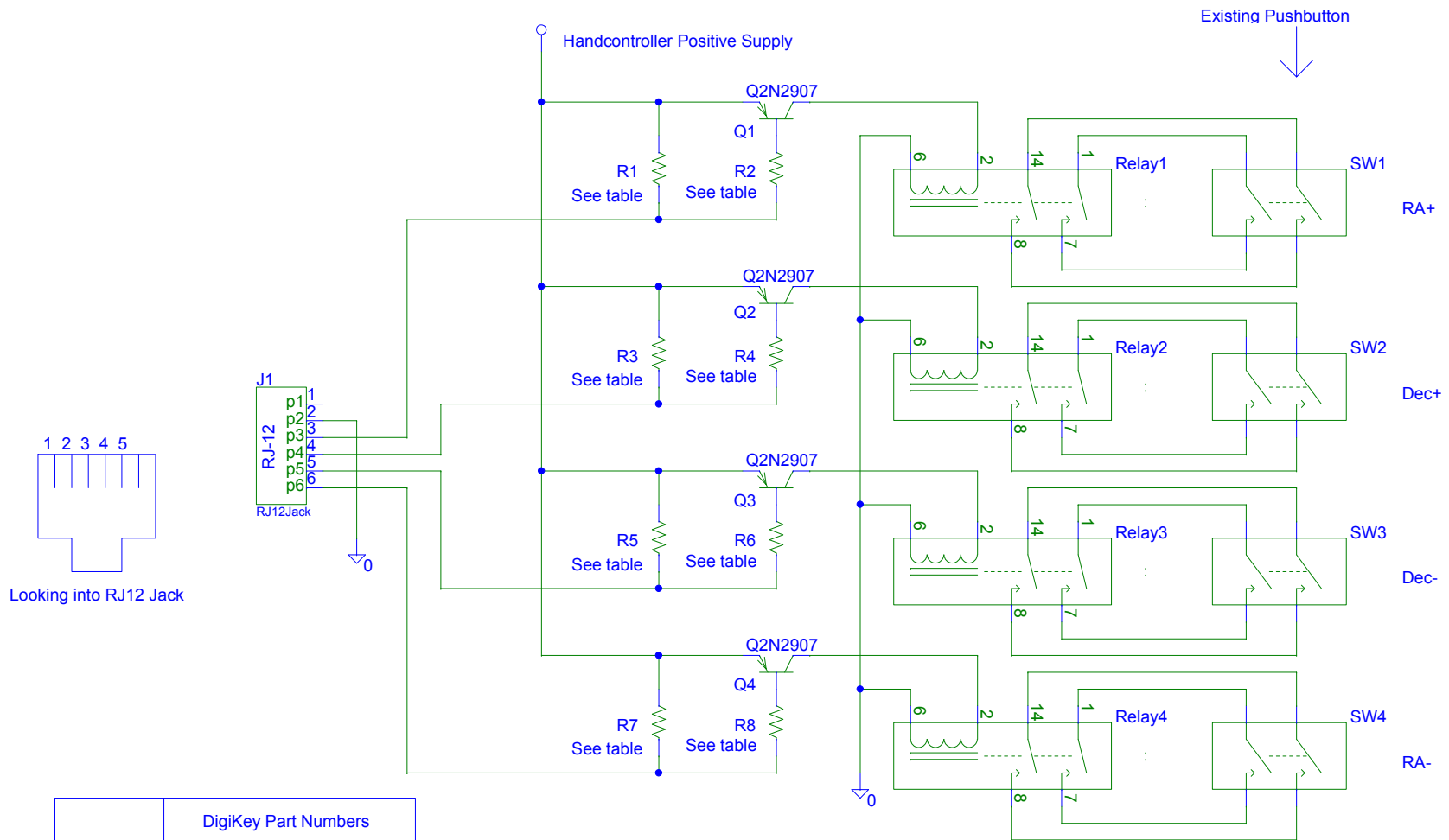
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GP3

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Date: July 21, 2007

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