IV. Main Circuit Board Assembly

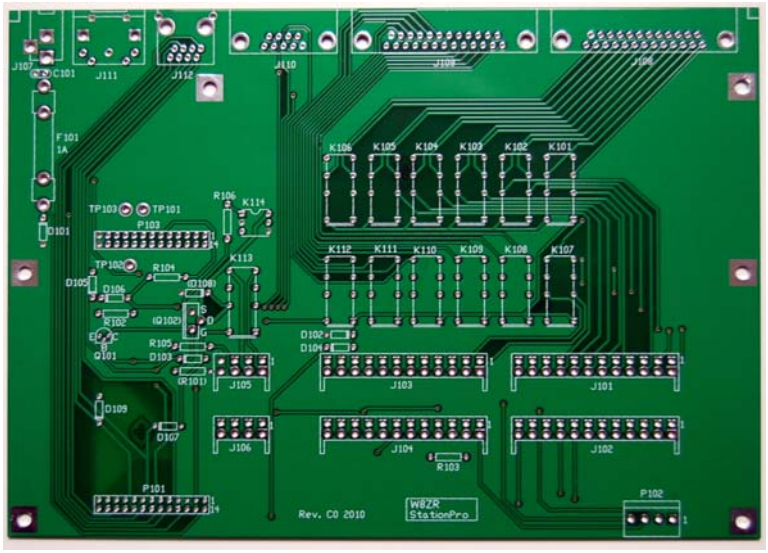
Identify the main circuit board, pictured below, and collect all of the components in the following list. (Refer to the master parts list for additional details about each component.) Note that all components will install on the *top* side of the circuit board.

Main Circuit Board Components

C101	0.1µF	Capacitor 50V epoxy dipped ceramic, qty 1
D101–D107, D109	1N4005	1A/600PIV diode, qty 8
F101	Fuse Clips	PCB mount fuse clips, qty 2
F101	Fuse	Fuse 1Amp 3AG, qty 1
J101-J104	Connector	Molex 0.156" 12-pin top-entry female header, qty 4
J101-J104	Header	Molex 0.156" 12 pin male header, qty 4
J105, J106	Connector	Molex 0.156" 4-pin top-entry female header, qty 2
J105-J106	Header	Molex 0.156" 4 pin male header, qty 2
J107	Connector	2.5mm DC pwr jack, PCB side entry, qty 1
J108, J109	Connector	D-Sub 25 pin male, PCB side entry, qty 2
J110	Connector	D-Sub 9 pin female, PCB side entry, qty 1
J111	Connector	DIN 5 pin female PCB side-entry, qty 1
J112	Connector	RJ45 8pin PCB side-entry, qty 1
K101–K113	Relay	P&B/Tyco V23105, DPDT, qty 13
K114	SS Relay	Clare Optomos PLA140 solid state relay, qty 1
P101, P103	Connector	Molex 26 pin (2x13), 0.100" male header, qty 2
P102	Connector	Molex 4-pin 0.156" PCB male w/locking clip, qty 1
Q101	2N3906	PNP gen purpose transistor, qty 1
R102, R103	2.2 KΩ	Resistor, 5% carbon film, 1/4 W (red-red-red), qty 2
R104, R105, R106	1000 Ω	Resistor, 5% carbon film 1/4W (brown-black-red), qty 3

****** Parts for optional amp relay keying circuit (delete K114, R106 if used) ******

(R101)	4.7 KΩ	Resistor, 5% carbon film 1/4W (yellow-violet-red), qty 1
(D108)	1N4005	1A diode, qty 1
(Q102)	IRF610PBF	MOSFET power transistor, qty 1

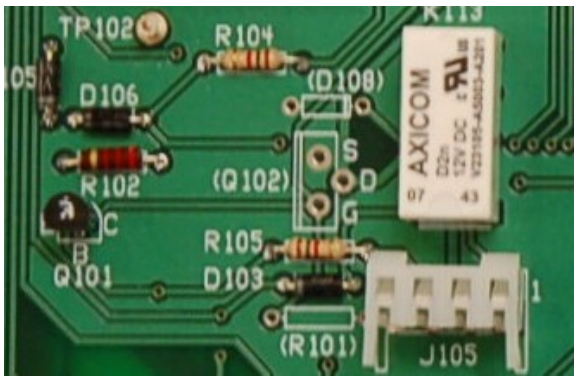


StationPro Main Circuit Board – Top View

(1) The main circuit board has provisions for a “default” amplifier keying circuit and an “alternate” amplifier keying circuit, and the builder must choose which circuit to use. The default circuit (rated at 400V @ 250 mA, AC or DC of either polarity) is recommended for nearly all applications. The alternate circuit (rated at 3.5A, 200V, positive polarity only), should only be used for keying very high current, positive voltage relays. CHOOSE ONLY ONE CIRCUIT! Now install the selected components, as illustrated below:

Note the white dot on K114. Be sure to get the orientation right when you install this component.

Default Amp Keying Circuit: Install K114 and R106 (brown-black-red). Make sure the notch on K114 is aligned with the notch on the silk-screened outline. Note the white dot near pin 1. K114 looks like a 6-pin IC.



R101, D108, and Q102 should NOT be installed if the default keying circuit is selected.

Alternate Amp Keying Circuit: Install D108, Q102 and R101 (yellow-violet-red). Match the band on D108 to the circuit board pattern, and bend the leads on Q102 so they line up with the holes in the circuit board. Position Q102 about 1/4 in. above the board. Note that the silkscreened component IDs for these parts are in parentheses.

(2) Install the remaining 1/4 watt resistors, making sure the resistor bodies are flat against the circuit board and that color codes are aligned in the same direction:

R102, R103	2.2 KΩ	(red-red-red)
R104, R105	1 KΩ	(brown-black-red)

(3) Install the remaining 1N4005 diodes at D101-D107 and D109 and the 0.1 µF blue dipped epoxy capacitor at C101. Make sure the diodes bands are oriented as shown on the silkscreened legends, and take care not to confuse the value of the capacitor with others that look the same. A "102" marking indicates a 1000 pF value, a "103" marking indicates a .01 µF value, and a "104" marking indicates a 0.1 µF value.

(4) Install the 2N3906 transistor Q101, taking care to get the orientation correct. Bend the leads to align them with the holes on the circuit board. The transistor should sit about 1/4" above the board.

(5) Install the thirteen relays K101-K113. Begin by soldering two opposing pins on each relay so you can make sure the relay bodies seat flat against the circuit board. Then solder the remaining pins. Solder these one at a time, or you'll never get them positioned properly.

Be certain not to miss any pins when you solder the thirteen relays to the circuit board

(6) Referring to the photos below, identify the four 12-pin Molex female connectors you will install at J101-J104 and the two 4-pin Molex female connectors to be installed at J105 and J106. Now identify the 12 pin and 4 pin straight male headers whose pins will mate with these connectors.

12 pin Molex 0.156" female PCB connector and matching 12 pin header

As shown below, push a matching male header into each of the six connectors (long pins go into the connector), making sure the headers are seated fully into the connectors. Now solder the pins of all six Molex connectors (NOT the header pins) to the main circuit board (56 pins in all). **Be sure you orient the connectors to the silkscreened outline on the circuit board, and be sure the connector pins go into the round holes in the circuit board and not the square holes.** *(Hint: Solder an end pin on each connector first, so you can make certain the connector bodies are seated flat against the main circuit board. Then solder the remaining pins.)* Leave the headers plugged into the connectors; they will be soldered into the microcontroller circuit board in a later step.

(7) Install the Molex 0.156” 4-pin male connector (with locking clip) at P102.

The Molex 0.156” male connector with locking clip installs at P102

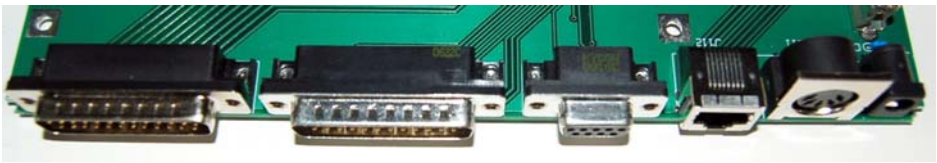
(8) Install the fuse clips at F1. *(Hint: Insert the 1A fuse into the clips to hold them in place and to make sure you don’t install the clips backwards.)*

Insert the 1A fuse into the fuse clips before soldering them to the circuit board.

(9) Install the two 26 pin (2x13) male headers at P101 and P103. Solder two end pins first on each header to make certain the body of the header is flat against the circuit board. Then solder the remaining pins. Clean off the flux with alcohol and then check the solder joints with a magnifying glass to make sure there are no solder bridges between pins.

26 pin male headers install at P101 and P103.

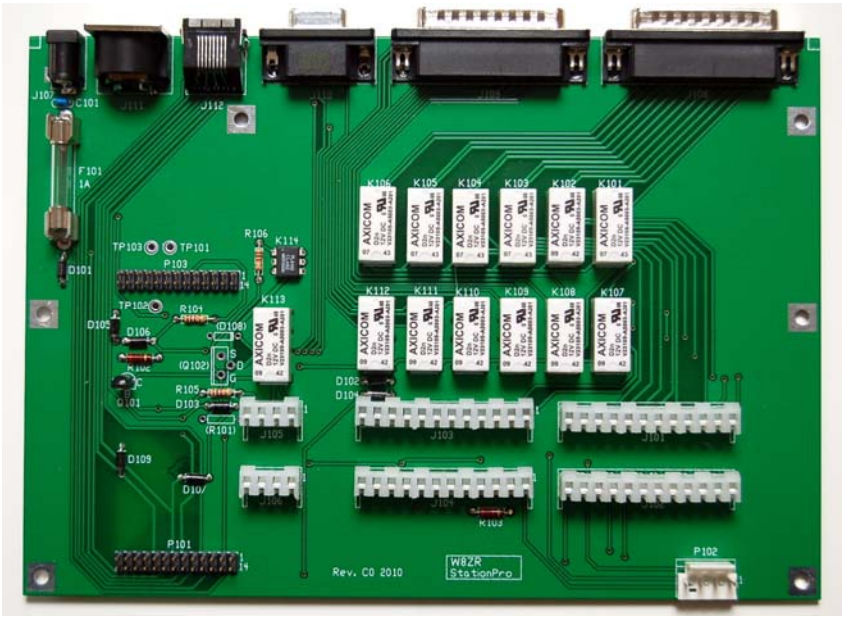
(10) Install the six connectors J107-J112 along the rear edge of the circuit board. (See photo, below.) Make absolutely certain the connectors are seated flat against the board before soldering the pins; otherwise, they won’t fit properly into their rear panel cutouts. As before, inspect each solder joint with a magnifying glass to look for cold solder joints and solder bridges. Some of the connectors have metal mounting tabs, and these should be soldered to the ground plane on the board. *Hint: It takes extra heat to solder pins and tabs to the ground plane of the circuit board. Be sure to use a large enough soldering iron and make certain that solder has flowed onto the ground plane.*



From left to right, J108, J109, J110, J112, J111, J107

(11) Clean the flux from the circuit board with isopropyl alcohol and Q-tips and then inspect each solder joint using a magnifying glass. Look especially closely at the multipin connectors along the rear edge of the circuit board and the two 26 pin headers.

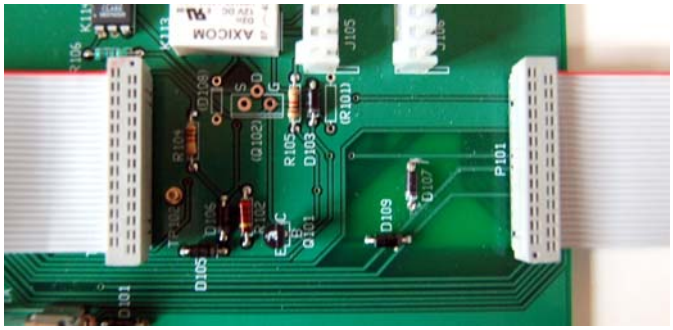
(12) With a pair of wire cutters, cut out 1/8" notches at each rear corner of the circuit board. Note that the outline of the notches is silkscreened on the board. These notches allow the circuit board to clear the side brackets on the enclosure.



Note the notch cutouts silkscreened on the rear corners of the main printed circuit board

(13) Install 1/2" No.6 threaded standoffs at the six locations (five along the sides, and one behind J112, the 8-pin RJ45 jack) on the bottom side of the circuit board. Use a 6-32 x 1/4" machine screw and a #6 internal lockwasher under each screw head. Tighten the screws securely.

(14) Plug six-inch 26-conductor flat ribbon cables into headers P101 and P103. As shown below, orient the cables so that one flat cable emerges out of header P101 toward the front edge of the circuit board, while the cable from P103 points toward the rear edge of the circuit board. Important: Make certain the connectors are aligned properly with their mating pins on the headers, and are not inadvertently offset. Leave the other ends of the cables free.



Be certain the ribbon cables are not not accidentally offset from the pins in their mating connectors

(15) Set aside the main circuit board. Note that if you selected the default amplifier keying circuit, then no components are installed at (R101), (Q102), and (D108).