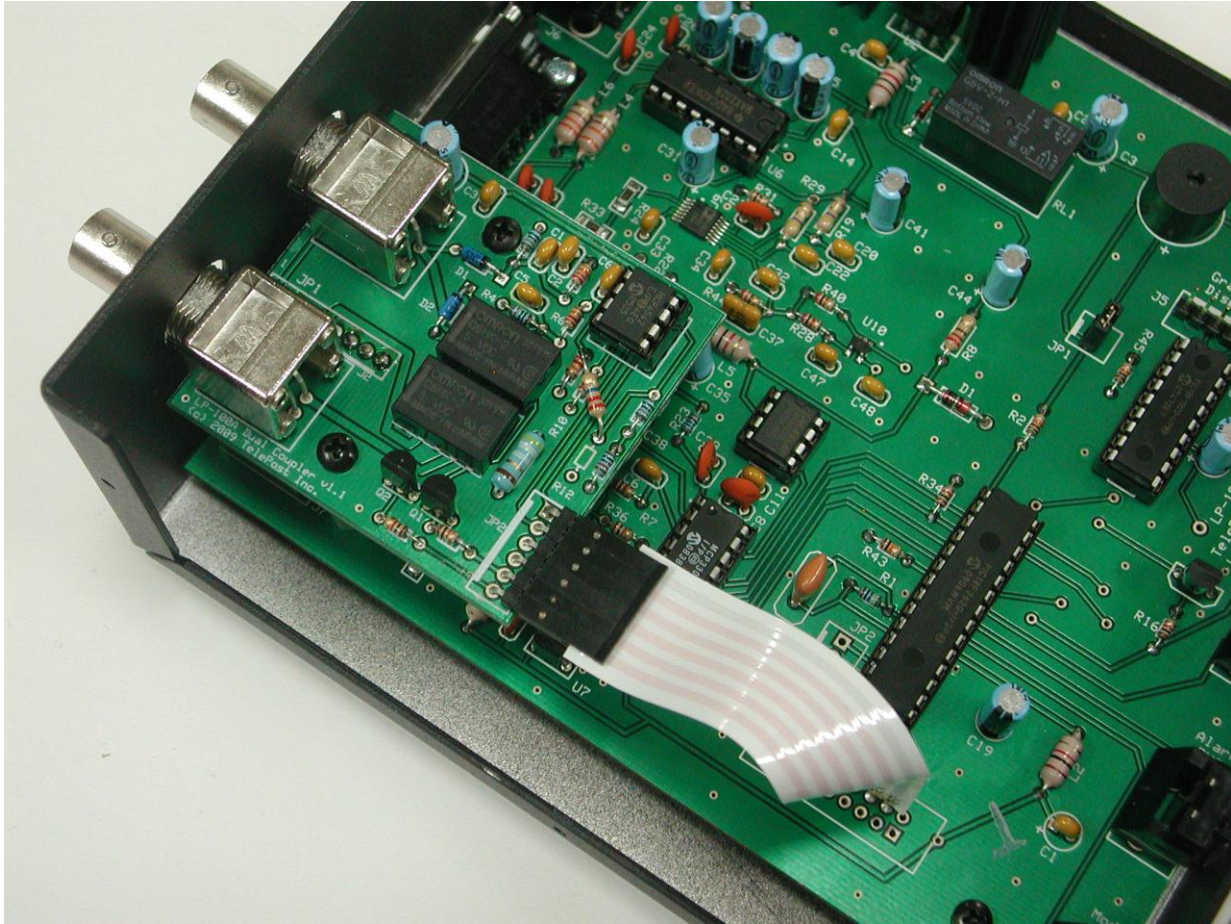


LP-100A

Dual Coupler Option



Assembly Manual
October 2012
TelePost Incorporated
Rev. A9

Parts List - Subject to change without notice. Pictures shown at end of parts list.

QTY	Part No.	Description
2	D1,2	1N5711 Schottky diode
2	D3,4	1N4148 Diode
2	R1,2	Resistor, 1k 5% 1/8W, br-blk-red Fig. 1
4	R3,6,8,10	Resistor, 22.1k 1% 1/8W, red-red-br-gold-br Fig. 1 (5% part may be substituted)
3	R4,5,9	Resistor, 100k 1% 1/8W, br-blk-blk-or-br Fig. 1
1	R7	Resistor, 220, 1% 1/8W, red-red-blk-blk-br Fig. 1 5% part may be substituted
1	R11	Resistor, 49.9 1% 1/2W, yel-wh-wh-gold-br Fig. 1
1	R12	Resistor, 22M 5% 1/4W, red-red-blu Fig. 1
1	U1	Comparator Chip, MCP6542 Fig. 2 (MCP6042 may be substituted)
3	C1,3,5	Monolithic Capacitor, 0.1uF (Marked as 104) Fig. 3
2	C2,6	Monolithic Capacitor, 1uF (Marked as 105) Fig. 3
1	C4	Electrolytic capacitor, 10UF 35V Fig. 4
2	Q1,2	NPN Transistor, 2N4401 Fig. 5
1	J3	6-pin SIL header Fig. 6
1		IC Socket 8-pin Fig. 2
2	J1,2	BNC Connector Fig. 7
1	JP1	8-Conductor x 2" Ribbon Cable Fig. 6
1	JP2	6-pin Right Angle Header and 6-Conductor x 3" Ribbon Cable Fig. 6 (May be supplied as 6-pin Straight Header and 4" Ribbon Cable)
2	RL1,2	Omron G6HK-2-DC5 or Axicom FP2 Fig. 8
2		7/8" Standoff, Male/Female Fig. 9
2		4-40 x 1/4 Black Machine Screw Fig. 9
1	PCB	Daughtercard Fig. 10

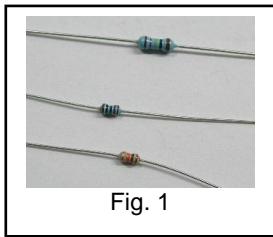


Fig. 1

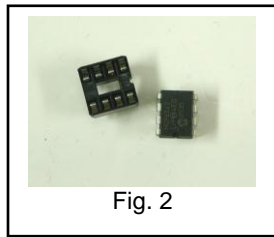


Fig. 2

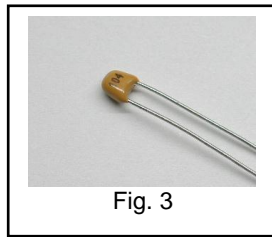


Fig. 3

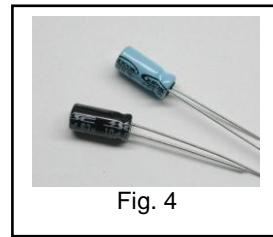


Fig. 4

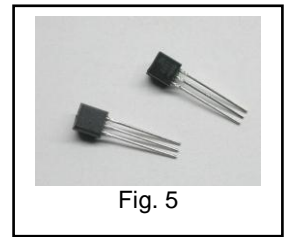


Fig. 5

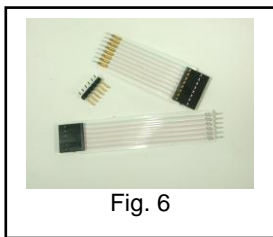


Fig. 6



Fig. 7

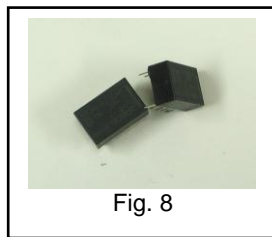


Fig. 8

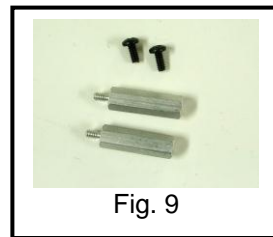


Fig. 9

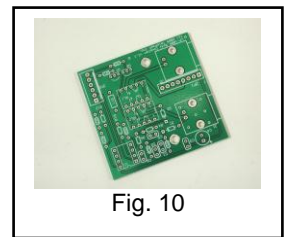


Fig. 10

If you ordered an assembled board, the parts list is provided only for reference. You can skip to the final assembly section. If you ordered a full kit, you should check all parts before starting to allow you to start the process of obtaining replacement parts as soon as possible. It is also a good idea to sort the parts in advance. Since it can be difficult to discern the color codes on the blue 1% resistors, you should verify all resistor values with an ohmmeter.

Assembly

Full kit assembly overview (do not start assembly yet).

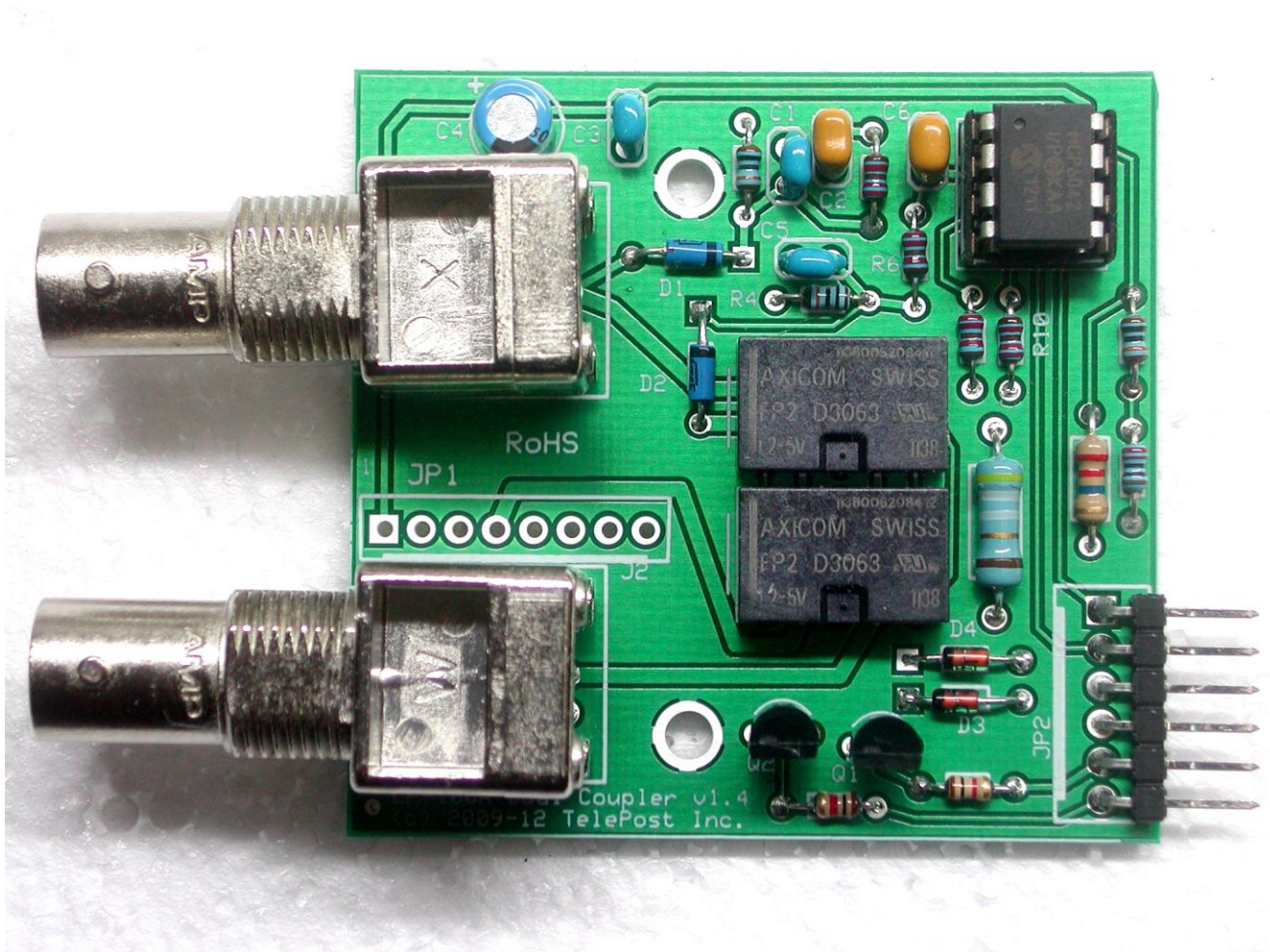
Note: The dual coupler daughtercard is designed to be installed in the LP-100A only. With a lot of work, it can be installed in an LP-100 which has been upgraded to LP-100A using the Display Upgrade Kit, but it would require cutting traces and running small coax cables to the main PCB as opposed to using the 8-pin ribbon cable supplied. This is because the LP-100 does not have the mating 8-pin header. Also, some early LP-100As did not have holes on the rear panel for the extra BNC connectors. You will need to drill new holes, or contact TelePost about a new enclosure bottom. We try to verify the need for this at order time.

Assembly will roughly follow this order. This ensures that the shortest parts are installed first so that the PCB will lie flat as you work. Detailed instructions for each step will follow.

Installation of diodes
Installation of 1/8W resistors
Installation of 1/2W resistor
Installation of R12
Installation of 8-pin socket
Installation of relays
Installation of JP2
Installation of 0.1uF caps

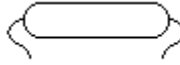
Installation of transistors
Installation of C4
Installation of J1, J2
Installation of 1x8 ribbon cable
Installation of standoffs
Installation of daughtercard
Installation of 1x6 ribbon cable
Installation of U1 and checkout

For reference, here is a picture of the completed daughtercard.



It is recommended that you print this manual to allow for easy reference while building, and to allow you to check off the steps as you complete them. Make sure your work area is static-free to avoid damage to the parts. It is also advisable to wear an anti-static wrist band. Of course, power should be removed from the LP-100A before starting installation.

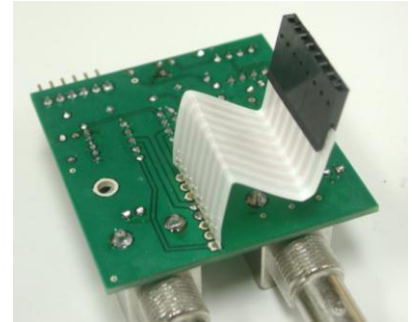
Assembly Cont'd

- ❑ Install D1, 2, 3, 4.
- ❑ Install Resistors R1, 2, 1k 5% 1/8W, br-blk-red.
- ❑ Install Resistors R3, 6, 8, 10, 22.1k 1% 1/8W, red-red-br-gold-br. 5% part may be supplied (red-red-or).
- ❑ Install Resistors R4, 5, 9, 100k 1% 1/8W, br-blk-blk-or-br.
- ❑ Install Resistor R7, 220, 1% 1/8W, br-red-blk-blk-br.
- ❑ Install Resistor R11, 49.9 1% 1/2W, yel-wh-wh-gold-br. You may want to form the leads slightly to fit the holes, by bending the ends as shown to the right.A diagram of a resistor with two leads. The leads are bent outwards and then back inwards, forming a shape similar to a '3' or a '9' on each side, to fit into a hole on a PCB.
- ❑ Install Resistor R12, 22M 5% 1/4W, red-red-blu.
- ❑ Install 8-pin IC socket at U1. Orient the socket to match the silk screen.
- ❑ Install RL1, 2. Orient as shown in the picture on page 3.
- ❑ Install the header at JP2.
- ❑ Install C1, 3, 5... Monolithic Capacitor, 0.1uF.
- ❑ Install C2, 6... Monolithic Capacitor, 1.0uF.
- ❑ Install the two 2N4401 transistors. Orient them to match the silk screen, with the flat side toward the outside of the PCB.
- ❑ Install 10uF electrolytic cap at C4.
- ❑ Install BNC connectors at J1, 2. You will need about 800F (412C) to get the solder to flow on the ground posts.

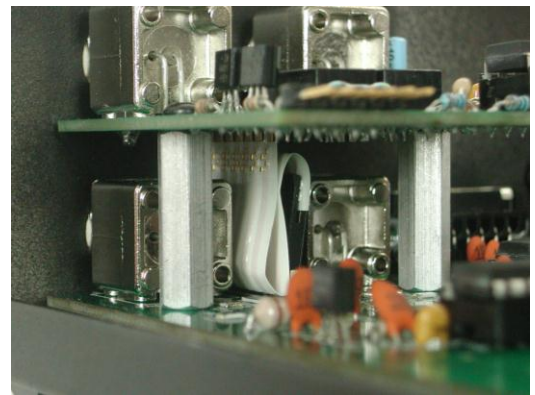
Assembly Cont'd

Final Assembly

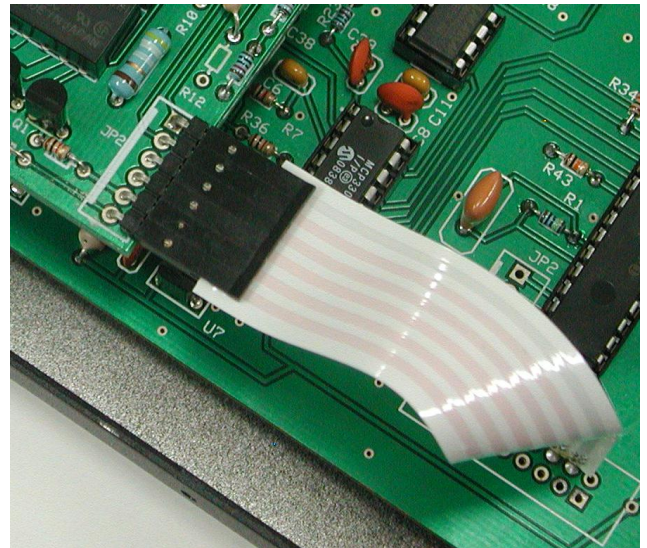
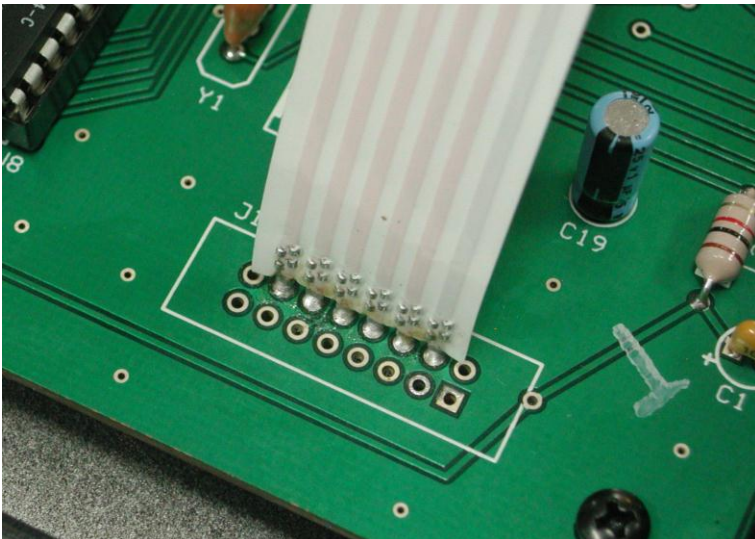
- ❑ Install the 8-conductor ribbon cable on the underside of the PCB at JP1. Orientation of the dark wire in the cable doesn't matter for this particular installation. Bend the cable in a "Z" pattern as shown. This will make it easier to mate with the header on the main LP-100A PCB when installing the daughtercard.
- ❑ Install the 7/8" standoffs. One is installed at the left rear corner of the main LP-100A PCB by removing the existing black screw. The other is installed on the underside of the daughtercard, at the hole near D1 and R1. Use one of the 1/4" black machine screws provided for this. Ideally, this standoff would be installed on the main PCB first, using a #4 nut, but it is difficult to remove the main PCB to access the underside without damaging the power switch when removing the keycap. For this reason, I have decided that not attaching the standoff the main PCB makes more sense. It allows installation without removing the main PCB, and provides enough support for the daughtercard.



- ❑ Remove the jumpers on JP3 on the main LP-100A PCB.
- ❑ Install the daughtercard. This is a little tricky, but if you take your time, you will be OK. Here is a picture showing the detail of how the daughtercard looks after installation. The ribbon cable has enough play in it to allow you to start the connector onto the header before inserting the BNC connectors into the rear panel holes. Once the daughtercard is above the header, you can use a small needle nose pliers or a small screwdriver to seat the connector fully. Be careful to make sure that the threaded end of the second standoff is seated in the hole on the main PCB.
- ❑ Use the second 1/4" black machine screw to hold the board into place on the standoff that was installed earlier on the main PCB.

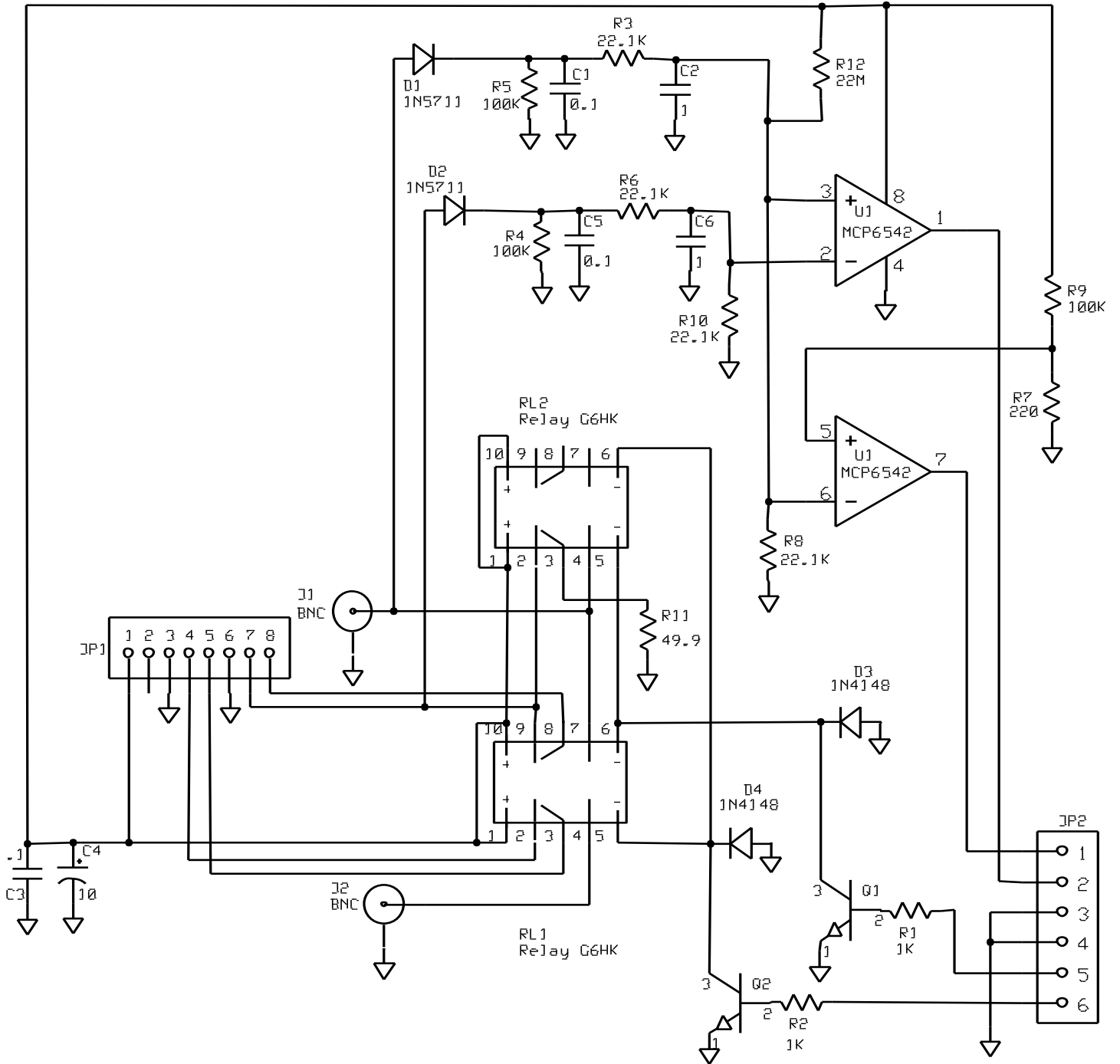


- ❑ Install the 6-conductor ribbon cable at J1 on the main PCB as shown. For convenience, this can be done from the top. Make sure that you position it as shown, with the gray trace on the ribbon facing the front of the PCB.



- ❑ Plug the other end of the ribbon cable into JP2 on the daughtercard. Make sure that the gray trace is connected to pin 1 of JP2, as shown.
- ❑ Do not install U1 yet. You will proceed to installation of the firmware first.

Schematic



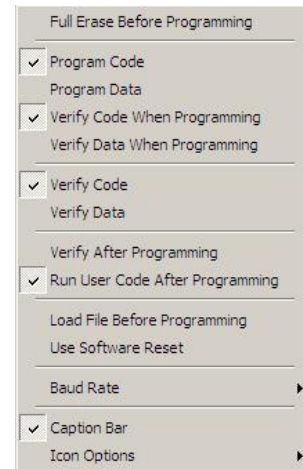
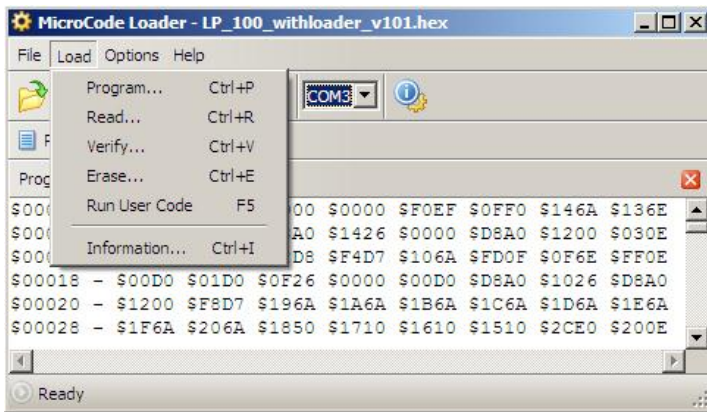
Software

Flashing the new firmware.

To start with, download the latest firmware from the TelePost website. The latest firmware can be found at the bottom of the page, <http://www.telepostinc.com/LP-100-Update.html> The version number will be v1.2.1.3 or newer. There have been several versions uploaded recently. Save this hex file in a convenient folder on your PC.

Locate MCLoader. If you can't find it, email TelePost for a new copy, which will be sent to you via email. MicroCode Loader works with the MCLoader bootstrap loader program installed on your PIC. It allows the user to easily update the firmware in the LP-100A. Before attempting to flash new firmware, make sure the connection between the LP-100A and PC is solid. You can do this by running the VCP program. Once you have verified a good connection, close VCP.

Start MCLoader. It will look like the picture on the left (but without the additional menu on top). If you see data in the white window, it is the hex data from a previous programming session. This data goes with the filename shown in the blue bar at the top of the program, next to the name MicroCode Loader. Click on the File menu, and select Open. Navigate to the new hex file you downloaded and unzipped earlier, and open it. The name in the blue bar will change to the new filename, and the data in the white window will change.



Click on the Options menu and verify that your settings match those of the picture on the right. It is important that the check marks match the picture, or you could wind up replacing your CAL settings.

Click on the Load menu, and select Program from the popup menu as shown above. This will start the programming process. The first thing you will see will be a message to reset the microcontroller. To do this, simply turn the LP-100A off and back on. The message will be replaced with a progress bar showing that programming is underway. When the process is finished, the LP-100A will start back up with the new firmware.

Final checkout.

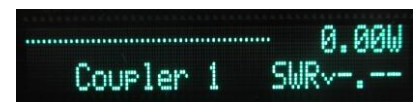
Enter Setup mode and scroll down to the Dual Coupler Option screen, shown to the right. Press the Up button to enable the dual coupler option. The screen should now say "Installed". Return to the main operating mode. You will now see the telltale up/down arrows next to the SWR letters to indicate which channel is active.



Press the Peak/Avg./Tune button and hold for ½ second. The display will change to a status display of the dual coupler selection. The firmware defaults to "Auto-Sense", but you will briefly see a display which says "Coupler 1". Press and hold again and it will change to "Coupler 2". Pressing and holding again will display "Auto-Sense". You should hear a click and the arrow will switch to up. This verifies the basic operation of the daughtercard. Then power down the LP-100A.



Install U1 on the daughtercard, paying attention to orientation as shown on the silk screen. Power the LP-100A back up. To check "Auto-Sense" operation, you will need to install both couplers and transmit alternately to each to verify that coupler selection is happening automatically, as evidenced by the relay clicking and arrow positioning.



About multi-multi contest stations...

In all installations of the dual coupler option, the idle coupler will still receive power from whatever antenna is connected to it, even if it is tuned to a different band than the antenna connected to the active coupler. In a SO2R setup, the picked up energy will always be lower than the transmit power, so the meter can easily detect which coupler is the active one. In the case of a multi-multi contest station, energy from other transmitters will be picked up by the idle coupler, and if that power is more than about 1/2W, it could be higher than the power received by the active coupler during speech pauses or breaks in CW keying. Of course, the amount of energy depends in part on the quality, and placement of bandpass and notch filters to protect the receivers.

To eliminate the possibility of relay chatter during this scenario, a simple change to the sensitivity of the power detectors on the daughtercard can be made. This is a simple hardware modification, and would require changing a few resistors. Contact the factory for details if you need to make this change.