PT-11p
Automatic Antenna Tuner
Manual Version 2.3G

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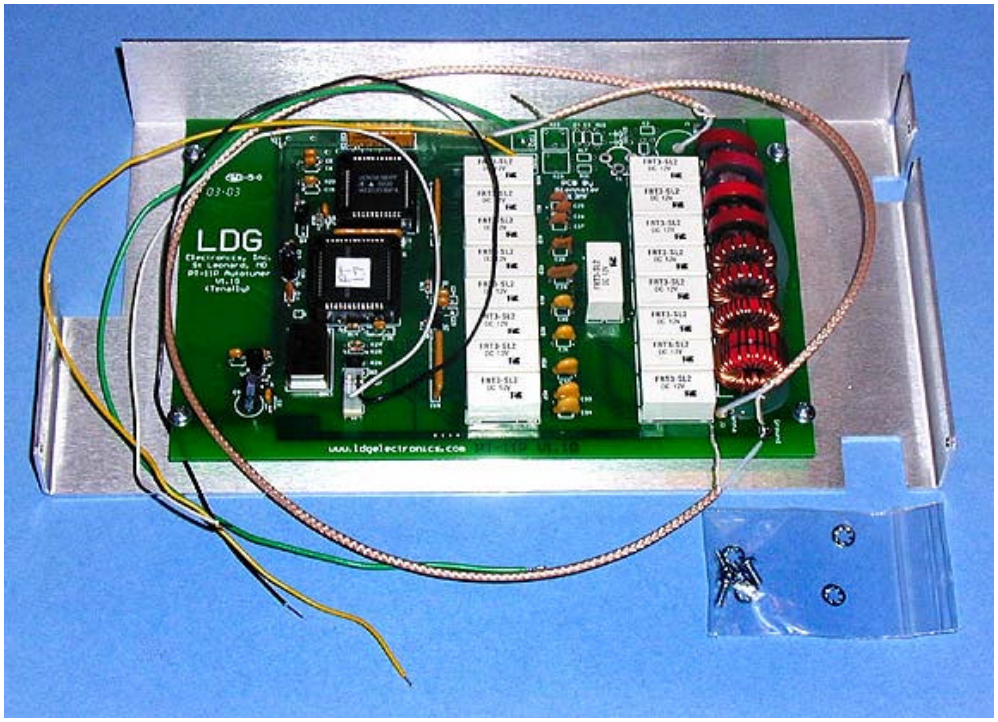
LDG ELECTRONICS

Introduction:

Congratulations on selecting the PT-11P tuner for your Ten-Tec Pegasus transceiver. This tuner, when installed, will be fully integrated with your transceiver, and will be controlled by the same PC user interface. Your PT-11P will quickly and automatically match an amazing variety of antennas.

Features:

- Covers 1.8 to 30.0 MHz continuously
- Tunes 6 to 800 ohm loads, 10:1 SWR using a switched "L" network tuning circuit
- Inductor range: to 20 uH
- Capacitor range: to 2700 pF
- Tuning time: 0.1 to 5 seconds, 3.0 seconds typical
- Can be used with Dipoles, Verticals, Vees, Beams or virtually any coax-fed antenna within its performance range
- 240 Tuning memories (with appropriate software, not included)
- Optional external balun available for longwires or antennas fed with twinlead



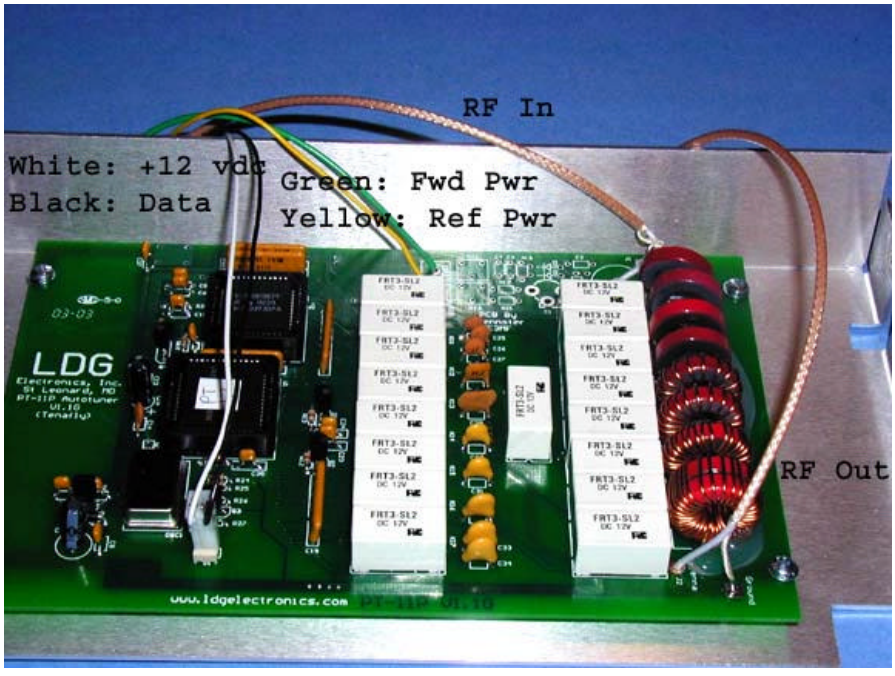
Installation Overview:

You will install your PT-11P inside the case of your Pegasus transceiver. Installation is straightforward, and within the ability of anyone with basic soldering and electronic assembly skills. Simply follow the step-by-step directions, referring to the accompanying illustrations. Work patiently, read through each step completely before proceeding and check your work often.

Your workplace should be uncluttered, well lighted and well ventilated, and protected from static discharge. A grounded static mat is ideal, but you should at least be able to touch a ground point (light switch, water pipe, etc) from time to time to avoid static buildup.

Your PT-11P comes from the factory pre-assembled, pre-calibrated and pre-mounted in its shield assembly. You will mount the unit in your transceiver above the DSP board and solder coax RF cables, power and serial control wires into place. This will involve removing, modifying and replacing two of the circuit boards in your Pegasus. Both coax cables will feed through the wire passageway in the bottom of the PT-11P shield assembly. The +12 vdc wire (White), Forward SWR (Green) and Reverse SWR (Yellow) wires will feed up past the speaker and attach to the RF board on the opposite side of the radio from the PT-11P. The Data wire (Black) attaches directly to the DSP board beneath the PT-11P. The following table summarizes PT-11P wires and their connections:

Wire Use	PT-11P Connection	Pegasus Connection	Length	Color
Reflected Power	**TP1**	**IF Board "REF" pin**	**13"**	**Yellow**
Forward Power	**TP2**	**IF Board "FWD' pin**	**13"**	**Green**
+12 volts DC	**J1, Pin 1**	**IF Board White header**	**11 ½" to 12"**	**White**
Data	**J1, Pin 2**	**DSP Board DB9, Pin 3**	**13" to 14"**	**Black**
RF In (to tuner)	**Transmitter J1**	**Filter Board T1**	**17" to 18"**	**Coax**
RF Out (From tuner)	**Antenna J2**	**Chassis mount SO-239**	**7 ½" to 8"**	**Coax**



A word about power levels

Your PT-11P is custom designed for the Pegasus transceiver and its power levels. LDG does not recommend using the PT-11P in any other application. If you choose to do so, never exceed 125 watts peak power input to the tuner. A minimum of 0.1 watts is required to activate the tuner.

Required Tools:

You will need a few basic electronic assembly tools to install your PT-11P:

- Small soldering iron, 25-40 watts (a temperature-controlled iron is preferred)
- Rosin-core or other solder intended for electronic assembly (NEVER use acid core solder for electronic assembly)
- "Solder Wick" solder removal material, or "solder sucker" desoldering tool
- Small flat-blade and cross-point screwdrivers
- Small pliers
- Small wire cutters

A few words about soldering and desoldering:

In several installation steps, you will be instructed to "tack solder" a wire. This refers to soldering a wire end to a pad on the PC board where there is no hole. Simply hold the wire against the pad, heat with your soldering iron, and apply a small amount of solder. Hold the wire in place until the colder cools. It will help to tin the wire first, flowing solder onto the wire before soldering it into place.

In installing your PT-11P, you will desolder four connections on your Pegasus; you must remove the excess solder from these connections. You have two options: Solder Wick or a "Solder Sucker" tool. Solder Wick is a metal braid impregnated with rosin. Place the end of the Solder Wick against the connection to be unsoldered and heat the wick with your soldering iron; the wick will conduct the heat to the solder connection. As the solder melts, the wick will absorb it; cut off and discard the used end of the wick and continue until all excess solder is removed.

A "Solder Sucker" is a spring-loaded vacuum syringe with a heat-resistant tip. Cock the spring plunger, and press the tip against the connection along with your soldering iron. When the solder melts trigger the Solder Sucker; the spring-loaded syringe will pop up, drawing the molten solder into the tip. Do this with care, as the jolt of the spring could dislodge your soldering iron. Practice a few times with a cold iron to get the feel of it.

Installation:

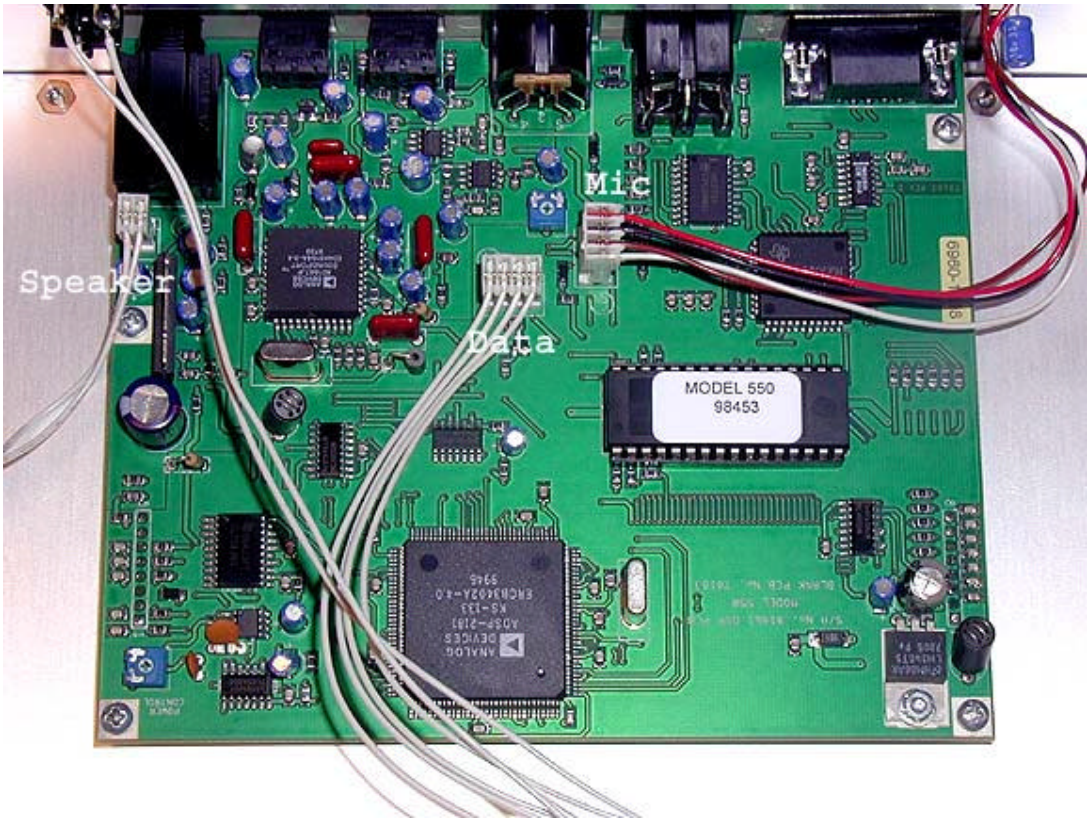
Step 1: Disassemble the transceiver

Turn off your transceiver and disconnect all external connections from the front and back panels. Remove the small screws that hold the case on; there are two Phillips screws, one on each side near the bottom, and eight slot-head screws in the back. Place these

screws in a container for safekeeping; you will use them to reassemble the transceiver later. Carefully remove the transceiver cover and set it aside. Throughout the installation, the Pegasus speaker cone will be fully exposed; it is quite delicate -- be careful not to damage it.

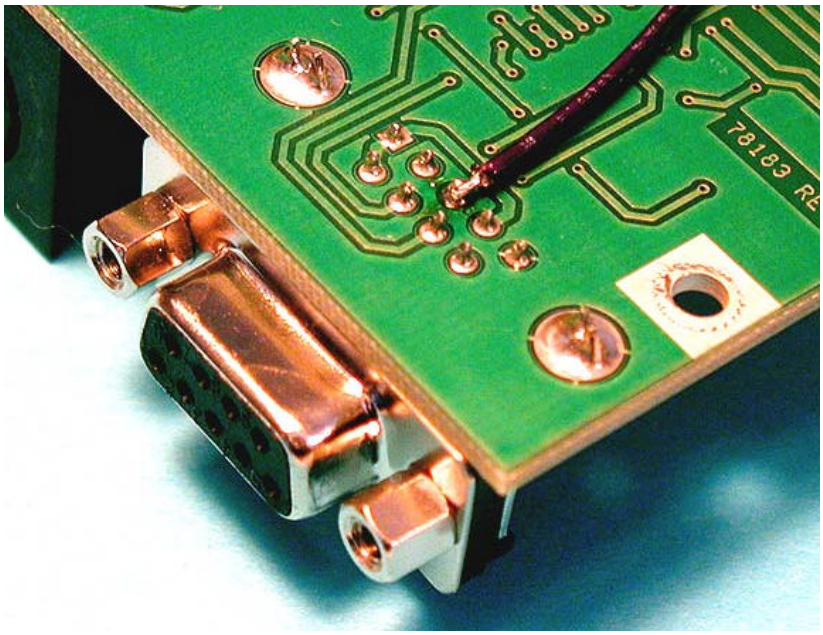
Step 2: Remove the Pegasus DSP board

Locate the Pegasus DSP board (see photo below); this board contains the Pegasus front panel connectors. Unplug the three connectors from this board; they are labeled “2” (speaker), “4” (control lines) and “6” (mic connector). Remove the four screws that hold the DSP board to the chassis. Locate the two header connectors under the DSP board that connect it to the chassis; they are marked with thin rectangles on the top of the board near the back of the board (away from front panel). Remove the DSP board from the chassis by gently pulling up on the corners of the board with the header connectors.



Step 3: Attach the control wire from the PT-11P

Locate pin three on the DB-9 connector on the DSP board; it’s the center pin of the row that has 5 pins (see illustration). Locate the Black 14” control wire from the PT-11P header (you may want to unplug the Black (and White) wire from the PT-11P; note the orientation of the connector so you can replace it later after the PT-11P is installed). Solder this wire to pin three of the DB-9 connector. Carefully inspect your solder connection for solder “bridges” that short to other pins on the connector, or to the ground plane on the PC board.



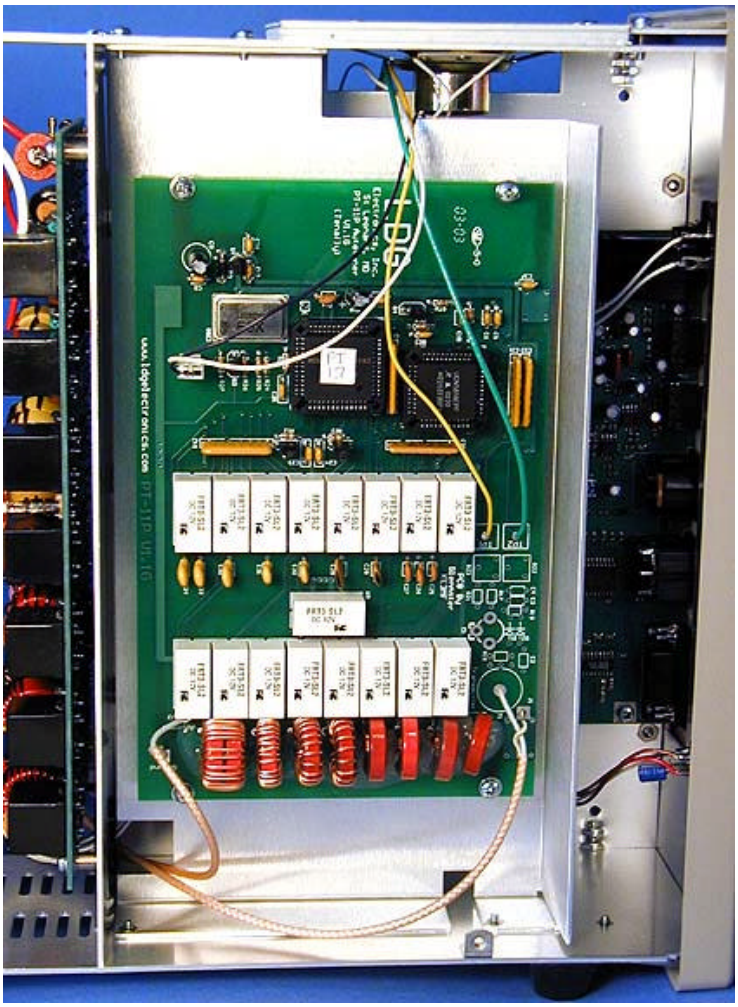
Step 4: Reinstall the DSP board

Replace the DSP board onto the Pegasus chassis. Route the black wire you connected in Step 3 under the DSP board so it exits by the speaker. Carefully align the two DSP board header connectors and press the board onto them; you may need to look through the top and bottom vents to see the headers. It may be easier for you to install one header, then *very* gently pull the DSP board toward the other header to line it up. It will be easiest if you insert the header nearest the speaker first. Be sure that all header pins are aligned and inserted; you can tell if you're off by one or two pins because the mounting screw holes on the board will not line up correctly with the chassis mounts. Replace the four DSP board mounting screws, and re-insert the three plugs (speaker, control and mic).

Step 5: Install the PT-11P onto the Pegasus chassis

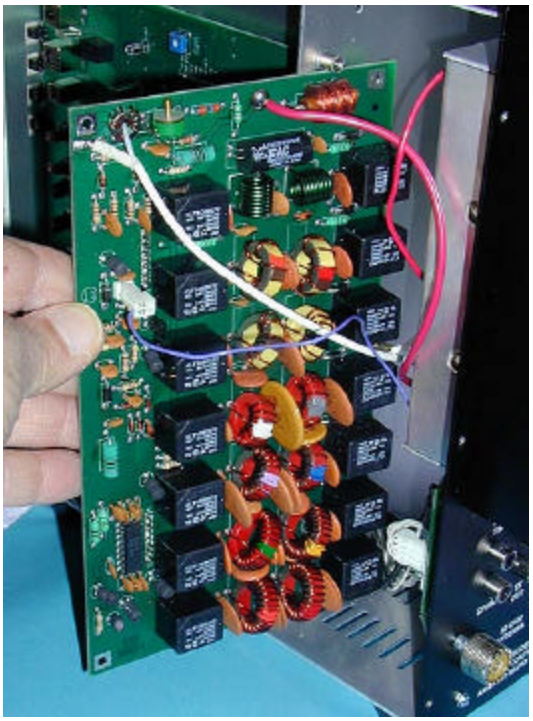
You will now install the PT-11P onto the Pegasus chassis. Orient the PT-11P so that the large notch in the bracket goes toward the speaker, and the two smaller notches go toward the bottom of the radio.

Place the tuner into the Pegasus chassis as shown, shield first with the PC board facing you (away from the center of the Pegasus). Attach the tuner to the Pegasus chassis with the four 4-40x3/8 machine screws and lockwashers provided. These screws go through the existing slots in the top and bottom chassis rails; screw them loosely into the threaded inserts in the tuner shield. The threaded inserts on the bottom of the tuner bracket are spaced such that they fit only one pair of holes in the bottom Pegasus chassis rail. Make sure the tuner bracket is placed at the top of the slot used to mount the bracket (toward you, away from the center of the Pegasus; see illustration) When the tuner bracket is correctly positioned, tighten the four bracket-mounting screws; do not over-tighten.



Step 6: Remove present coaxial cable from Pegasus

Locate the low-pass board; it faces to the rear of the Pegasus. Remove the four screws holding the low-pass board to the chassis. Locate the two header connectors that couple the low-pass board to the RF board (part number 81862). Grasp the board near these headers and gently lift the low-pass board free. Slide the low-pass board out to the left (facing the board), easing it past the RF board headers and over the black coax cable that runs along the bottom of the chassis. There are several wires connected to the low-pass board, but they have enough slack to allow you to move the board far enough out to work on it.



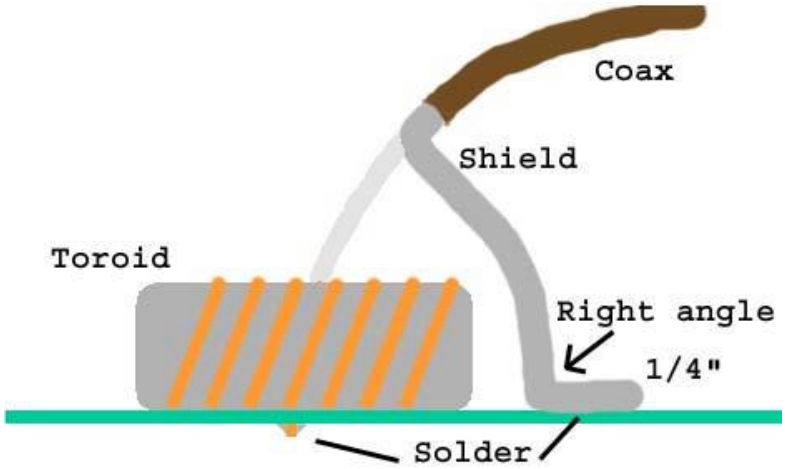
Locate the coaxial cable that leads from transformer T1 on the Pegasus low-pass board to the SO-239 coaxial socket on the back of the radio. T1 is a small black toroid on the upper left of the low-pass board (there may be a green stripe around the outside of the toroid). You may need to rotate the board slightly to gain better access to T1. Using solder wick or a “solder sucker” desoldering tool, carefully unsolder this cable from T1 and from the SO-239 coaxial socket on the back panel of the Pegasus; unsolder both the center conductor and the shield. Remove and discard this wire; you will replace it with wires to and from the PT-11P tuner. However, save the protective sleeve from the SO-239 shield end of the cable; you will reuse it when you connect the coax cable from the PT-11P to the SO-239.

Step 7: Attach input coax to PT-11P

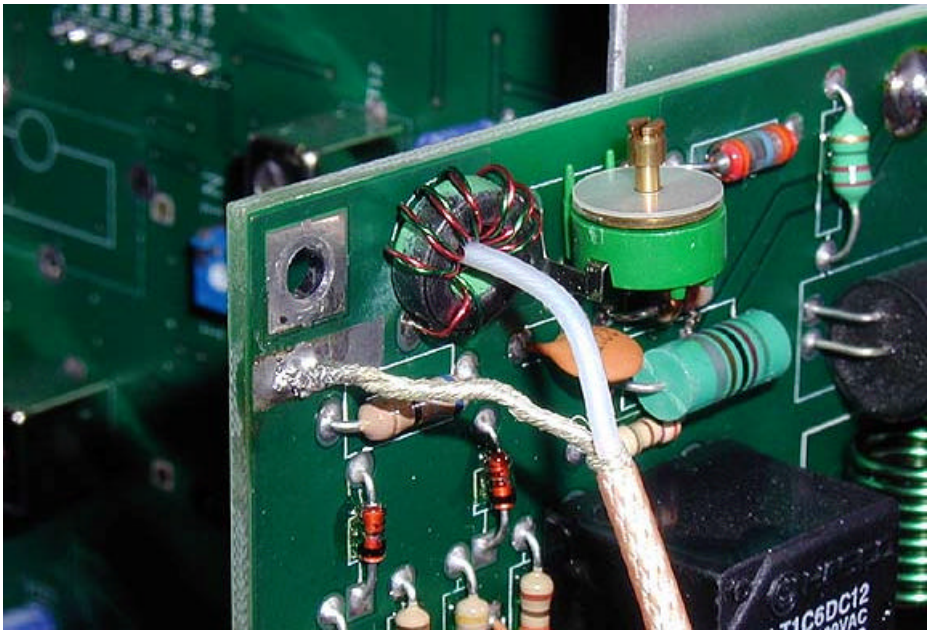
Locate the PT-11P input coax cable (17”-18”). Pass the free end of this cable through the access hole in the Pegasus chassis (see illustration). Pay special attention to lead dress; do not interfere with any other wiring on the Pegasus chassis.

Solder the PT-11 input coax cable (both center conductor and ground shield) to transformer T1 on the Pegasus board (see illustration). This is the same T1 from which you removed the coax in Step 6. Insert the center conductor through the hole and solder on the foil side of the board.

Bend the coax shield braid to make a 90-degree angle with the PC board, ¼” in length. Tack solder the shield to the PC board on the solder pad next to the corner screw. Once attached, pull any slack in the coax back into the tuner compartment.

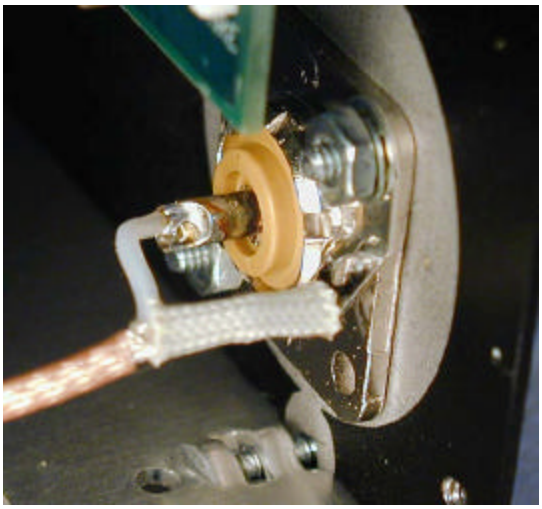


Carefully replace the low-pass filter board on the RF board header connectors and press together. Re-attach the low-pass filter board with its four original screws.



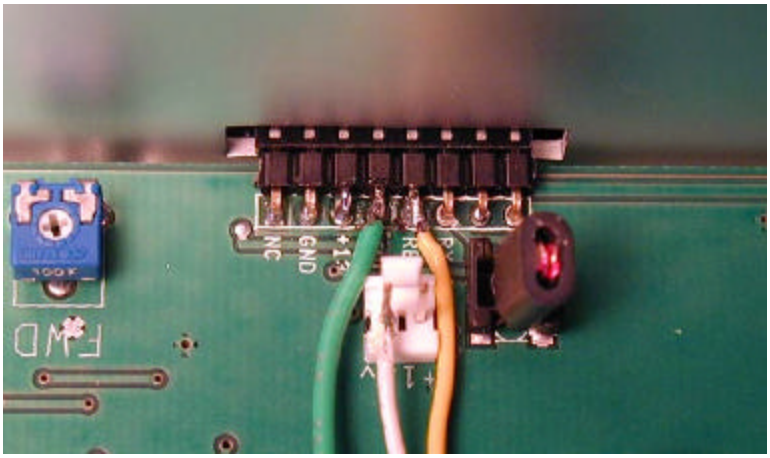
Step 8: Attach output coax cable

Solder the PT-11P output coax cable (7” – 8” inches long) center conductor to the center pin of the SO-239 coax connector on the Pegasus back panel. You may find it easier to remove the screws holding the SO-239 connector and then rotate the connector until the tiny solder cup in the center pin is oriented up for easy soldering. When you have finished soldering, line up the connector mounting holes and replace any hardware you removed. Place the saved piece of sleeving over the ground braid and solder that lead to the ground lug near the SO-239 connector.



Step 9: Wire routing and attachment

Route the White, Green and Yellow wires from the PT-11P past the speaker and down into the compartment containing the RF board (on the opposite side of the radio from the PT-11P). Locate the connector closest to the potentiometer labeled “FWD”. Tack solder the Yellow wire to the pin marked “REF”. Tack solder the Green wire to the pin marked “FWD”. Tack solder the White wire to the White header pin furthest from the coil. This header is located in front of the connector you soldered the green and yellow wires to. You will be working in close quarters here, so take your time and be especially careful. Inspect your work closely, making sure you left no solder bridges.



Step 10: Reassembly

Carefully check all your work, especially looking for solder bridges or splashes. Make sure no wires will be excessively bent or pinched when the case is reassembled. Replace the Pegasus outer case using the original screws. The screws that go in the back of the case are self-tapping sheet metal screws; be careful to catch the existing thread before tightening – don’t force the screws.

Congratulations! Your Pegasus transceiver is now equipped with a fully automatic internal antenna tuner of amazing flexibility and usefulness.

Operation

Power up your Pegasus transceiver and the computer you use to run the control program in the usual manner. Open the “Settings” panel and select “Transmitter” settings. Locate the “Bypass Tuner” checkbox near the bottom of the window, and make sure it is unchecked (you only have to do this once; the software will retain the setting thereafter). The TUNE button on the Pegasus user interface now controls the PT-11P tuner.

Be sure a suitable antenna or dummy load is connected to the Pegasus antenna port. Click the TUNE button at any time the transceiver is in receive mode; the transceiver will transmit a carrier and the PT-11P will begin an automatic tuning cycle. You will hear the tuning relays as the tuner searches for a match; they make a fairly loud buzzing sound. The tuning cycle will automatically end in a few seconds; the transceiver will revert to its previous mode and power level, and you are ready to transmit. You can observe the achieved SWR by setting the meter on the user interface to SWR.

Your PT-11P features latching relays, which hold the tuned configuration indefinitely, even when you power down the transceiver. The last tuned state will still be retained at the next power-up.

Enhanced software

Your PT-11P is designed to operate satisfactorily with the standard Ten Tec software that came with your Pegasus transceiver. Using this software, you can begin a tuning cycle by clicking the “TUNE” button on the user interface, as described above. However, several third-party developers make software for the Pegasus that uses functionality in the PT-11P that is not supported by the standard software. While LDG neither sells nor supports this enhanced software, our experience with it leads us to suggest that you consider it. With a simple software upgrade, you can significantly enhance your PT-11P’s functionality. Using this software, you can record tuner settings for bands and frequencies of interest, and recall them in about 0.1 seconds, far faster than a normal PT-11P tuning cycle.

The following developers market enhanced software for the Pegasus that supports all PT-11P features, including tuner memories and automatic band setup:

N4PY Software (http://www.ralags.com/n4pdy)

Callsign Software, WA1EYP (http://www.callsignsoftware.com)

W3EWL Software (http://www.w3ewl.com/Pegasus)

Ten Tec (http://www.tentec.com/Pegdload.htm). Check this site for upgrades to the standard Pegasus software.

A word about tuning etiquette

Be sure to pick a vacant frequency to tune. With today's crowded ham bands, this is often difficult. However, do your best to avoid interfering with other hams as you tune. The PT-11P's very short tuning cycle, usually only a few seconds or so, minimizes the impact of your tuning transmissions.

Care and Maintenance

Your PT-11P tuner is essentially maintenance-free; just be sure to observe the power limits discussed earlier in this manual. As with any modern electronic device, your PT-11P can be damaged by temperature extremes, water, impact or static discharge.

Technical Support

We are happy to help you with your PT-11P. Telephone technical support is available at 410-586-2177 weekdays from 9 am to 5pm Eastern Time. Inquiries by Fax at 410-586-8475 are welcome, and prompt e-mail support is available at ldg@ldgelectronics.com.

Warranty and Service

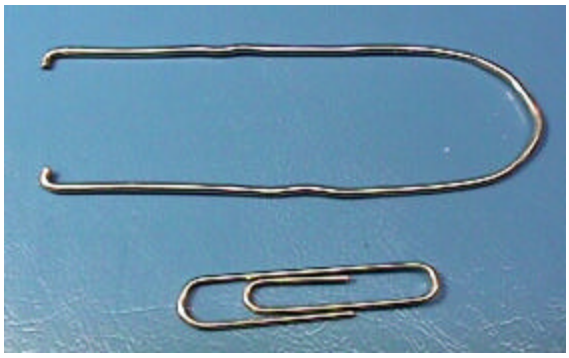
You PT-11P is warranted against defects in parts or workmanship for one year from purchase. This warranty applies to the original purchaser only; it is not transferable. A copy of the receipt showing the purchaser's name and the date of purchase must accompany units returned for warranty service. All returns must be shipped to us pre-paid; we will not accept units with postage due. A return form is provided on our web site for your convenience.

If you need to return your PT-11P to us for service, package it carefully, keeping in mind that we will re-use your packaging to return the unit to you. A self-addressed return-shipping label, while not required, will help insure speedy and accurate delivery of your repaired unit. Include a full description of the problem, along with your name, address and a phone number or e-mail address where we can reach you with any questions. Repairs average about 3 to 6 weeks.

We will be glad to service your PT-11P after the warranty period. We will notify you of repair charges by phone or e-mail, and bill you after repairs are completed.

Firmware upgrades

From time to time we will release upgraded firmware for the PT-11P, refining operation and adding features. Your PT-11P is not field programmable; you will have to remove the present chip and replace it with the upgrade chip. To remove the chip you will need an appropriate tool. A PLCC extraction tool is ideal, but if you don't have one you can fashion a substitute from an ordinary paperclip. Straighten the paper clip, then bend it into a "U" shape. Use pliers to bend the last 1/8" of each end toward the center (see illustration).



The extraction tool fits into opposite corners of the 68HC11 socket; the bent ends will lift the chip from beneath. Unplug the Pegasus transceiver, touch a ground point to avoid static discharge damage, and remove the Pegasus case. Insert the tool and pull gently and evenly on both sides to extract the chip. Press the upgrade chip into the socket, observing the small diagonal corner key. Replace the Pegasus case; your upgraded PT-11P is ready to use.

You will return the old processor chip to LDG; upgrades will be sold by exchange only. The processor chips are recycled and reprogrammed to minimize future upgrade costs. Upgrades are expected to cost about $10-$20 with chip exchange, and will be announced on our web site when available.

Feedback

If you have an idea to improve our software or hardware, please send us a description. If we incorporate your idea in the PT-11P, we'll send you a free upgrade as a “thank you”.

We encourage everyone who uses the PT-11P to contact us (card, letter or e-mail preferred) telling us how well it works for you. We are also always looking for photographs of our products in use; we frequently place such pictures on our Web site (www.ldgelectronics.com).