

LDG Electronics External Meter Serial Communications Protocol Specification



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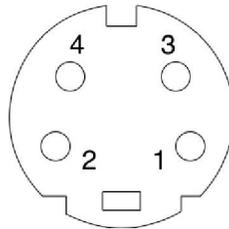
INTRODUCTION

LDG pioneered the automatic, wide-range switched-L tuner in 1995. From its laboratories in St. Leonard, Maryland, LDG continues to define the state of the art in this field with innovative automatic tuners and related products for every amateur need.

Congratulations on selecting an LDG Electronics automatic tuner with external meter jack. The AT-1000ProII and AT-600ProII tuners¹ feature a 4-pin mini-DIN jack for connection to the LDG Electronics M1000 or M600 external meter. The tuner communicates with the meter via a TTL-level serial link. The external meter, in turn, sends requests to the tuner over this serial link. Some additional commands are built into the command protocol that allow you to build your own tuner-to-PC interface, and will allow your PC to control the AT-1000ProII or AT-600ProII tuner.

HARDWARE INTERFACE

The AT-1000ProII and AT-600ProII tuners have a 4-pin DIN jack on the rear panel, which normally connects to the M-1000 or M-600 external meter. This jack supplies 12VDC and ground, and also provides TTL-level serial communications at 38,400 bits per second. The pinout of the jack is as follows (looking into the jack on the rear of the panel):



	<i>Name</i>	<i>Description</i>
1	+12VDC	Power to the meter
2	GND	Ground
3	METERRX	RX from meter
4	METERTX	TX to meter

The serial data protocol over the METERRX and METERTX lines is 38,400 bits per second, 8 data bits, one stop bit, no parity. However, the signal level on these lines is TTL (0 to 5VDC), and if operation with a standard PC is required, the levels must be converted to RS232 (+/- 9VDC) first. Typically, a Maxim MAX232 or Exar SP232 level conversion chip can be used. A

¹ Additional LDG Electronics tuners may include this feature in the future. This document serves to describe the protocol used in all 4-pin meter cable equipped LDG tuners.

Upon being woken up, and having received a valid command byte, the tuner, in return, will respond with a single byte acknowledgement of the command when the command is complete, with the exception of the SYNC command, which sends a multi-byte synchronization string.

The list of commands and their responses is given in the following table.

<i>Command Character</i>	<i>Name</i>	<i>Description</i>	<i>Response(s)</i>	<i>Meaning</i>
A	Toggle Antenna	Toggle between Ant1 and Ant2	1 2	Antenna 1 is selected Antenna 2 is selected
T	Memory Tune	Begin a memory tuning cycle	T M F	<ul style="list-style-type: none"> • Good tune (<1.5:1) • Tune OK (1.5-3:1) • Tune Failed
F	Full Tune	Begin a full tuning cycle	T M F	<ul style="list-style-type: none"> • Good tune (<1.5:1) • Tune OK (1.5-3:1) • Tune Failed
P	Pass thru	Bypass the tuner	P	• Tuner is in bypass
C	CPU-controlled Tuning	Enter fully automatic tuning mode	A	Automatic Tuning Selected
M	Manually-controlled Tuning	Enter manual (semi-auto) tuning mode	M	Manual Tuning Selected
Z	Sync	Request that the AT1000ProII send a Sync string	Sync String (See text)	The sync string can be used by the PC software to ensure that the receive buffer is in sync with the transmissions from the tuner.

The tuner listens for commands on the meter port, and responds to them when received. All commands are single characters, but must be preceded by a wakeup character, in order to bring the tuner's CPU out of sleep. For example, to toggle the selected antenna, send a space (ASCII code 32), followed by the letter "A" (ASCII code 65). The currently selected antenna will toggle, and the newly selected antenna selection will be returned.

In the case of memory tuning, for example, send a space followed by the letter "T", and the tuner will begin a tuning cycle. When the tuning cycle is complete, one of three letters will be sent in response. The letter "T" means tuning succeeded, and the match was less than 1.5:1

SWR. The letter “M” means that tuning succeeded, but the match was between 1.5 and 3.0:1 SWR. The letter “F” means tuning failed for some reason, either failure to find a good match, or perhaps because RF was lost before the tuning cycle could complete.

The **Sync** request (Space followed by “Z”), asks the tuner to transmit a specific string of characters. This can be used by a PC program to determine when it is in sync with the characters coming from the tuner’s meter port. The specific string sent is “000000000000000AzAz”. That’s fifteen zeroes followed by “AzAz”.

TIMING

Be sure to allow at least 200 milliseconds after the receipt of any acknowledgement from the tuner before sending another command from the PC.

SOFTWARE

LDG Electronics does not provide any software for controlling the AT-1000ProII or AT-600ProII via the meter port. This manual is provided as a guide for writing your own control software.

However, it is possible to control these tuners without having to write a single line of code. Because all the commands are single characters of plain ASCII, it is possible to use a simple serial terminal emulator package, such as HyperTerminal² or Indigo³, to control the tuner. Simply connect at 38,400 baud, 8 data bits, no parity, one stop bit, no handshaking, and just type a space, followed by the desired character on the keyboard you wish to send. For example, to toggle antennas, simply hit spacebar, followed by the capital A key, and the antenna relay should click, and the tuner should respond with either “1” or “2”, depending on which antenna becomes selected. Note that the tuner’s CPU returns to sleep in a short period of time, so you may need to hit the space bar and the letter “A” more quickly, so that the “A” is received while the CPU is still awake.

PRODUCT FEEDBACK

We encourage product feedback! Tell us what you really think of your LDG product. In a card, letter, or email (preferred) tell us how you used the product and how well it worked in your application. Send along a photo or even a schematic or drawing to illustrate your narrative. We like to share your comments with our staff, our dealers, and even other customers at the LDG website:

<http://www.ldgelectronics.com/>

² *HyperTerminal* and *HyperACCESS* are available from <http://www.hilgraeve.com/>

³ *Indigo* is available from <http://www.shadeblue.com/>