

**LTR-GPS Satellite Synchronizer**

# Installation & Setup Guide



**THIS EQUIPMENT COMPLIES WITH FCC  
CLASS-A REQUIREMENTS  
PURSUANT SUBPART J OF PART-15**

**This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

WARNING: Changes or modifications to this product not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a business installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

**This Class A digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe A est conforme a la norme NMB-003 du Canada.**

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# Contents

- Welcome ..... 1**
  - Package Contents
  - Specifications
- Configure Settings ..... 3**
  - Time Zone
  - Daylight Savings
  - ASCII Output (optional)
- Install the Antenna ..... 5**
- Connect Slave Devices ..... 10**
  - LTRx-512 Master Clocks
  - LTR0 and DWA-S (Sonachron)
  - DDC Series Digital Wall Clocks
- Warranty ..... 12**

## CHAPTER 1

# Welcome

Lathem's LTR-GPS is a Global Positioning Satellite receiver using 12-channels to access the accurate date and time signal transmitted each second by 24 satellites in geosynchronous orbit around the globe.

The package includes an amplified GPS Antenna, which must be mounted out-doors or beneath a roof sky-light, facing skyward. An integrated cable links the Antenna to the LTR-GPS Receiver Module, which should be mounted in-doors.

The Receiver Module verifies and reformats the received satellite data, and offers multiple synchronization protocol outputs:

The RS-485 Output can directly synchronize up to 31 Lathem time products, up to 4000ft away, over a single twisted-pair from a user-provided Cat-3 or Cat-5 cable. The length of cable and number of synchronized devices can be further increased using Lathem's "SWIFT485+" RS-485 Converter / Repeater.

An included RS-232 interface provides a periodic "Time Stamp" transmission, "MM-DD-YYYY HH:MM:SS cr", for use by computing systems having custom software to incorporate accurate date and time records in their applications: 9600, N, 8, 1. Use of this option requires Lathem cable, Part No. SAE0370, to be ordered separately.

Simple DIP-Switch set-up enables the installer to specify Local Time Zone, Daylight Savings Time corrections, and output formats. An LED indicator shows Signal Reception / Protocol Mode.

The LTR-GPS may receive its power from an LTRx-512-series Master Clock, using 2<sup>nd</sup> cable pair, if the distance is less than 200ft; else, power is provided locally by a 9vAC Power Adapter.

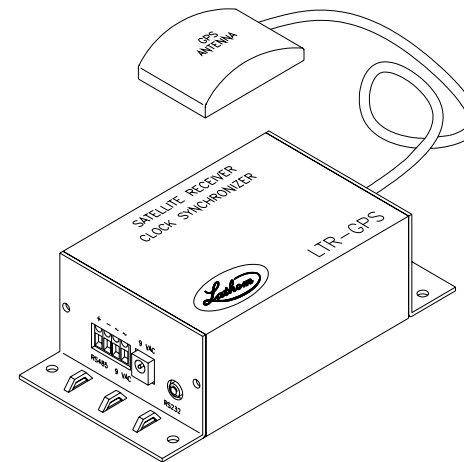
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***The LTR-GPS package includes the following:***

- LTR-GPS Satellite Synchronizer
- 115vAC, 2.7w, 50/60Hz Power Adapter
- Active GPS Antenna with 25ft. Cable
- Antenna Mounting Bracket and Hardware

***LTR-GPS Specifications:***

- Size / Weight      3.25"x 2"x6.6" / 1 lb.
- Power:              6-12vAC/DC, 300mA (max)
- Certificates:      FCC Part-15, ICES003



***Model numbers of the devices supported by LTR-GPS:***

LTR-0	Master Clock
DWA-S	Sonochron
LTR4-512	Master Clock
LTR8-512	Master Clock
LTR8-512M	Master Clock w/ Modem
DDC2-RS	2" Digital Wall Clock 115v
DDC2-RS-24	2" Digital Wall Clock 24v
DDC4-RS	4" Digital Wall Clock 115v
DDC4-RS-24	4" Digital Wall Clock 24v

CHAPTER 2

# Configure Settings

1. Remove the two Philips-head screws on each end of the unit. Gently flex apart and lift the cover to expose the circuit board inside.
2. Locate the 8-position **DIP switch** and hold the unit on a table so that the switch numbers can be viewed in the following order:

SWITCH 1	SWITCH 2	SWITCH 3	SWITCH 4	SWITCH 5	SWITCH 6	SWITCH 7	SWITCH 8	
Adjust Plain Text Output for Time Zone, DST	Standard / Custom Protocols	Enable DST (U.S.)	Time Zone					

3. Set **Time Zone** switches 4-8 for the code representing the offset from GMT (Greenwich Mean Time) of your location. For installations in the U.S., Canada and Mexico, the codes are as follows:

Time Zone	Country	Offset	SWITCH 4	SWITCH 5	SWITCH 6	SWITCH 7	SWITCH 8
Greenwich Mean Time		0 Hrs.	Closed	<b>OPEN</b>	<b>OPEN</b>	Closed	Closed
Atlantic Time	CAN	-4 Hrs.	Closed	<b>OPEN</b>	Closed	Closed	Closed
Eastern Time	US, CAN, MEX	-5 Hrs.	Closed	Closed	<b>OPEN</b>	<b>OPEN</b>	<b>OPEN</b>
Central Time	US, CAN, MEX	-6 Hrs.	Closed	Closed	<b>OPEN</b>	<b>OPEN</b>	Closed
Mountain Time	US, CAN, MEX	-7 Hrs.	Closed	Closed	<b>OPEN</b>	Closed	<b>OPEN</b>
Pacific Time	US, CAN, MEX	-8 Hrs.	Closed	Closed	<b>OPEN</b>	Closed	Closed
Alaska	US	-9 Hrs.	Closed	Closed	Closed	<b>OPEN</b>	<b>OPEN</b>
Hawaii	US	-10 Hrs.	Closed	Closed	Closed	<b>OPEN</b>	Closed

4. Set Daylight Savings Time switch 3 according to the following table to enable U.S. rules: 2:00AM first Sunday in April and last Sunday in October:

Daylight Savings	SWITCH 3
Enable	<b>OPEN</b>
Disable	Closed

5. **Switch 2 is used for custom ordered protocols only.** This should normally be left in the **OPEN** position.
6. If using the **RS232 port** (requires cable # SAE0370, sold separately) to transmit a plain text “time stamp”, **OPEN** switch 1 to select Local Time transmission. Close switch 8 to transmit GMT.

RS-232 Time Stamp	SWITCH 1
Local Time	<b>OPEN</b>
G.M.T.	Closed

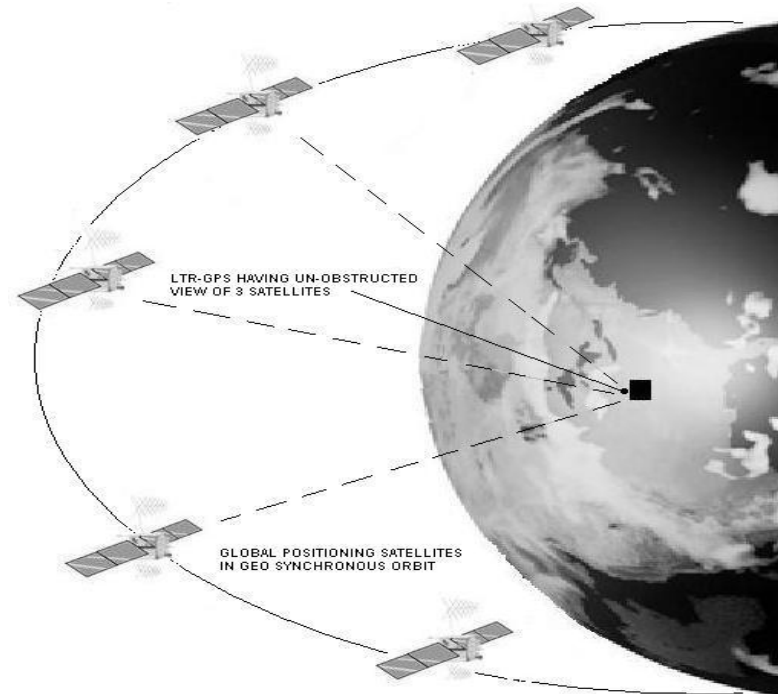
Format for ASCII output: **“MM-DD-YYYY HH:MM:SS cr”**.  
 Communications Port Settings: **9600, N, 8, 1**

7. Re-align and gently flex apart the cover to replace it over the chassis, making sure that the circuit board connectors protrude through the appropriate side cut-outs. Secure the cover with the four (4) screws previously removed.

## CHAPTER 3

# Install the Antenna

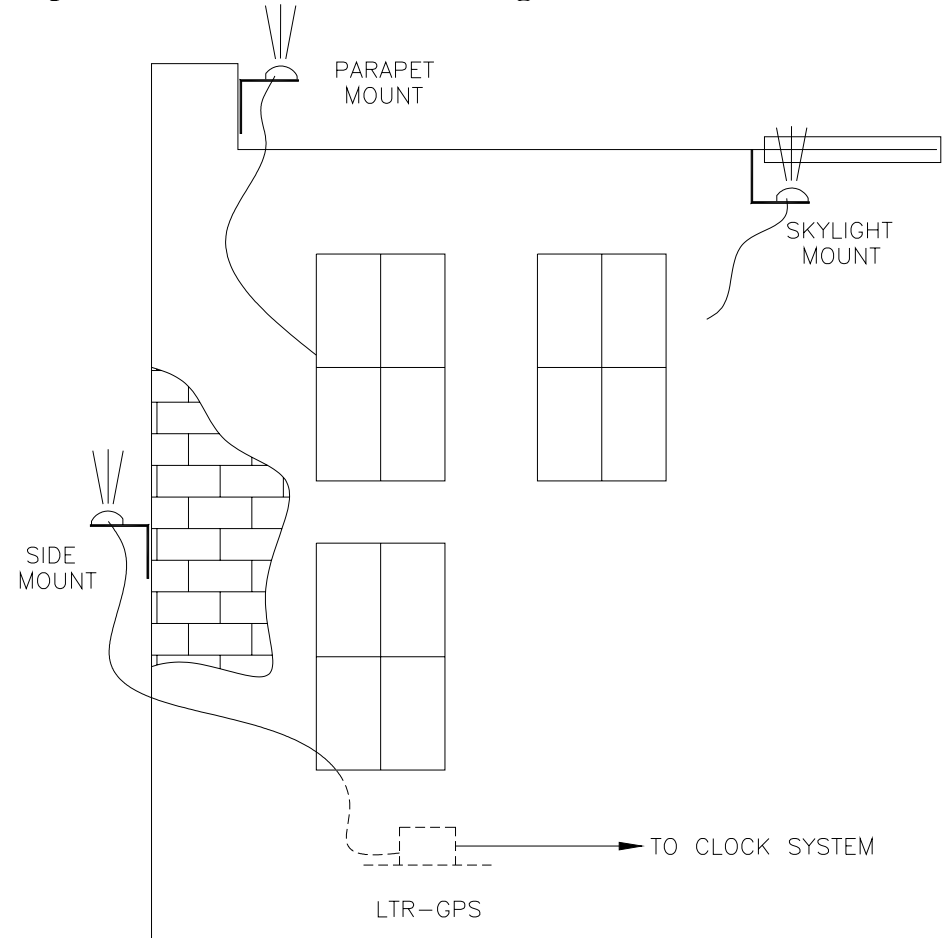
The antenna must be installed in a position that will have line of sight with three satellites.



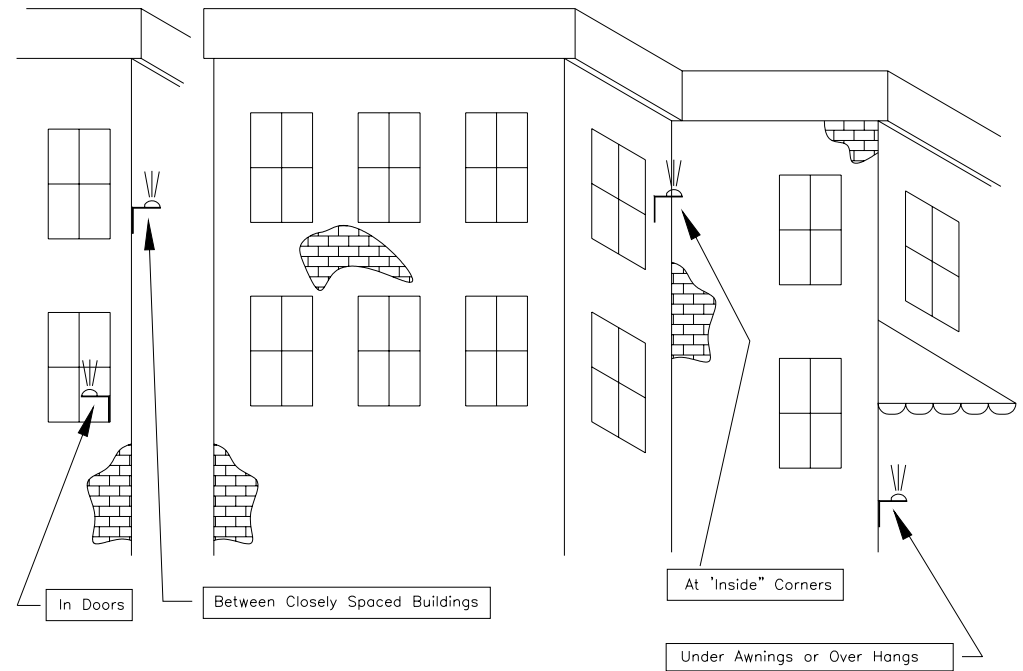


After setting the LTR-GPS switches, then mount the active antenna. Locate the antenna at the highest elevation possible, with a wide view of unobstructed, open sky. If possible, avoid mounting the antenna on the north side of a building, which might block exposure to satellites.

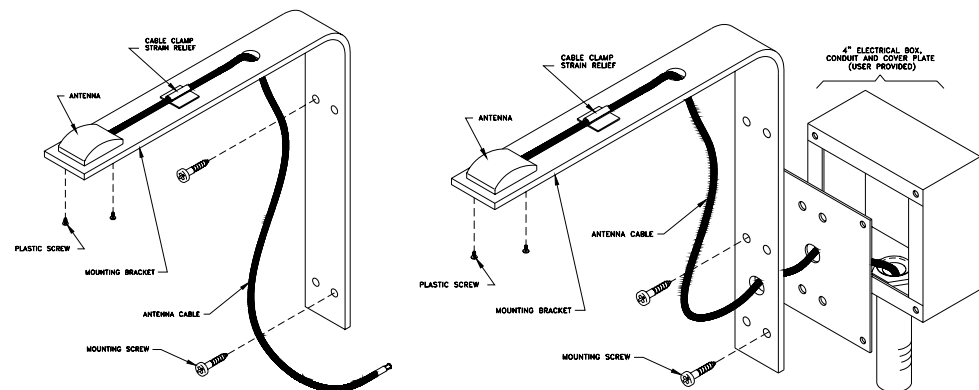
**Proper locations for antenna mounting:**



**Avoid these locations when mounting antenna:**



1. Using two (2) supplied screws, attach the satellite antenna to the mounting bracket. Do not over-tighten the screws.



2. If you have Lathem's Installation Kit (P/N GPS-INSTALL-TOOLS sold separately), then connect the 9v battery plug to the LTR-GPS' power jack and the piezo beeper to the exposed shunt pins: Red to (+) and Black to (-). Connect the antenna cable to the LTR-GPS Module. Hold the antenna in its intended mounting position. If the antenna has exposure to the GPS satellites, within three (3) minutes the LED will flicker and the beeper will 'chirp' once per second. Afterwards, the LED should start flashing once per minute, and the beeper will 'beep' for 1-second. These signals confirm proper antenna placement and system functionality, prior to anchoring the antenna bracket.
3. One method is to attach the bracket-mounted antenna to the **outside** of your building or on the roof's parapet with antenna facing skyward and unblocked by architectural impediments. An alternate method is to mount the antenna indoors, beneath a "skylight" window. Do not mount the antenna directly on the roof surface where it might get submerged by storm water. Its enclosure is rain-proof when properly installed, but is not designed for submersion.
4. Insert supplied nylon tie-wrap through raised loop of the plastic clamp at the end of the unit (**Fig. 1**). **Do NOT close the tie-wrap** yet. If plastic cable clamps are not already secured to the LTR-GPS unit, then attach where shown in **Fig.1** by peeling off protective paper backing and adhering to the metal surface with firm pressure. Allow the adhesive to set for 5 minutes before securing the cables.



Fig. 1 - LTR-GPS Unit

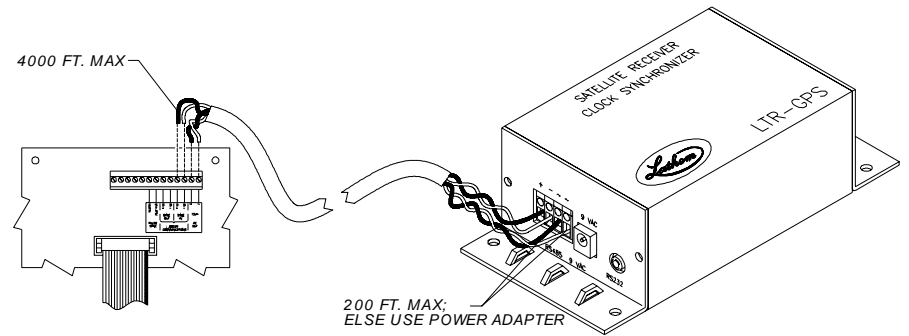
5. Mount the LTR-GPS unit to an **indoor** surface within the 25 foot antenna cable length using four (4) screws and anchors if needed (not supplied). ***Do not attempt to extend this Cable.***
6. Plug the antenna cable into the antenna jack on the LTR-GPS unit and secure the cable in the plastic clamp for strain relief (**Fig.1**).
7. If the LTR-GPS will not be powered by an LTRx-512 Master Clock, then insert the plug from the wall wart power adapter into its mating jack. Plug the power adapter into a nearby AC outlet. Verify that the red LED indicator flashes “on” during initial power-up.
8. Observe the LED indicator on the LTR-GPS unit for 3 minutes until a satellite signal is received, upon which the light should start blinking each second. A brighter flash should occur approximately every 16-seconds. The LED not flashing as described above indicates that the antenna is disconnected, that the antenna is improperly positioned, or that power is not supplied to the unit.

## CHAPTER 4

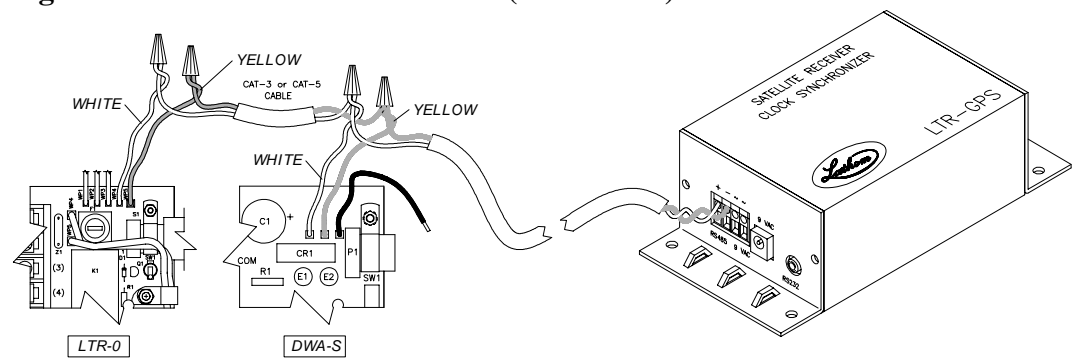
## Connect Slave Devices

1. Connect a category 3 or 5 cable to the terminal block using a small, flat-blade screwdriver. Connect one of the four twisted-pairs of the cable to the D+/D- terminals on the LTR-GPS unit. This provides synchronization commands to the Lathem slave devices. Connect the other end of the selected pair to the SYNC\_IN D+/D- terminals of a Lathem LTRx-512-series master control (Fig.2) or to Lathem DDCx Series digital wall clocks (Fig.4). Be sure to maintain consistent polarity of the D+/D- signals. If the LTR-GPS will be powered by a Lathem master control within a 200 foot proximity, then connect another twisted-pair to the terminals marked '~' on both devices (Fig.2).
2. Secure the power and data cables to the LTR-GPS unit using the tie-wraps (Fig.1). Connect the data cable(s) to Lathem slave time display devices to be controlled. The twisted-pair data cable can supply data for 31 (max) devices located within 4,000 feet. Simply daisy-chain the twisted-pair from slave to slave, maintaining consistent polarity for the D+ / D- signals. ***A Lathem SWIFT485+ RS-485 Bus Repeater allows for more than 31 devices or cable lengths beyond 4,000 feet.***
3. Connect the Lathem slave devices using the twisted pair from the RS485 cable according to the User Manual instructions for each device.
4. If the LTR-GPS will be connected to an LTRx-512 master control that is already in operation, then the master will not immediately recognize the signal from the LTR-GPS. It will start recognizing the GPS signal within 15 minutes past midnight or after power-up. To accelerate the recognition process, the installer may power-off / power-on the Master by carefully removing the front panel and toggling the internal power switch, or by briefly disconnecting the Master from its AC power source. **BE CAREFUL: HAZARDOUS VOLTAGES ARE PRESENT.**

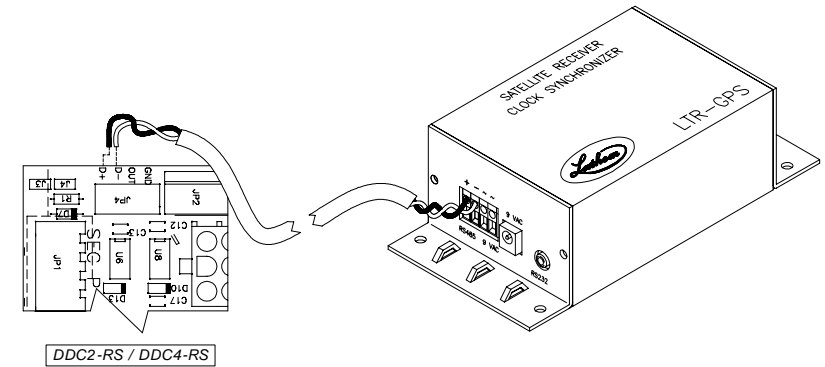
**Fig.2 - Connect to LTRx-512 Master Clock**



**Fig.3- Connect to LTR-0 or DWA-S (Sonachron)**



**Fig.4 - Connect to DDC Series Digital Wall Clock**



# Warranty

## **Limited One-Year Limited Warranty**

Lathem warrants the hardware products described in this guide against defects in material and workmanship for a period of **one year** from date of original purchase from Lathem or from an authorized Lathem reseller. The conditions of this warranty and the extent of the responsibility of Lathem Time Corporation (“Lathem”) under this warranty are listed below.

1. This warranty will become void when service performed by anyone other than an approved Lathem warranty service dealer results in damage to the product.
2. This warranty does not apply to any product which has been subject to abuse, neglect, or accident, or which has had the serial number altered or removed, or which has been connected, installed, adjusted, or repaired other than in accordance with instructions furnished by Lathem.
3. This warranty does not cover dealer labor cost for removing and reinstalling the machine for repair, or any expendable parts that are readily replaced due to normal use.
4. The sole responsibility of Lathem under this warranty shall be limited to repair of this product, or replacement thereof, at the sole discretion of Lathem.
5. If it becomes necessary to send the product or any defective part to Lathem or any authorized service dealer, the product must be shipped in its original carton or equivalent, fully insured with shipping charges prepaid. Lathem will not assume any responsibility for any loss or damage incurred in shipping.
6. **WARRANTY DISCLAIMER AND LIMITATION OF LIABILITY:** Except only the limited express warranty set forth above, the products are sold with no expressed or implied warranties of any kind, and the implied warranties of merchantability and fitness for a particular purpose are hereby expressly disclaimed. No warranties are given with respect to products purchased other than from Lathem or an authorized Lathem reseller and any such products are purchased "as is, with all faults." In no event will Lathem be liable for any direct, indirect, special, incidental or consequential damages arising out of or in connection with the delivery, use or inability to use, or performance of this product. In the event any limited remedy given herein shall be deemed to have failed of its essential purpose, Lathem's maximum liability shall be to refund the purchase price upon return of the product.
7. Proof of date of purchase from Lathem or an authorized Lathem reseller is required for warranty service on this product.
8. This Warranty grants specific legal rights. Additional legal rights, which may vary by locale, may also apply.
9. Should any difficulties arise with the performance of this product during warranty, or with any Lathem authorized service centers, contact Lathem Time at the address below.

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