# LIGHTWAVE ATLANTIS

## ELECTROACOUSTIC GUITAR

Featuring the Optical Pickup System

## USER MANUAL

LIGHTWAVE SYSTEMS

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## ELECTROACOUSTIC GUITAR

### FOREWORD

Thank you and congratulations for your purchase of a LightWave Atlantis. We would also like to welcome you as a member of the growing number of LightWave enthusiasts.

Your Atlantis couples decades of master luthiery and instrument design with the cutting-edge of modern pickup technology—the LightWave Optical Pickup System—LightWave's exclusive, patented infrared pickup technology. Featuring extraordinary playability and exquisite tone, your Atlantis is a fine musical instrument that will provide many years of enjoyment and musical performance. Engineered for the rigors of the road, the demands of the modern recording studio, and long, comfortable hours of playing, your Atlantis is designed to become a direct extension of your creativity.

Please follow these simple guidelines for usage and care, and you will enjoy your Atlantis for years to come.

We are always interested in your thoughts about your LightWave guitar and about your music. We encourage you to contact us with your comments and suggestions on how we can continue to serve you in the future.

Please visit our website at www.lightwave-systems.com for product update information and other news about LightWave Systems and our growing line of products.

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## 1. DESIGN CONCEPTS

### LightWave Optical Pickup System

Atlantis is the first guitar ever offered with LightWave's exclusive pickup technology, the LightWave Optical Pick-up System, that uses infrared light technology to sense string vibration for a rich, natural, amplified acoustic guitar sound without the feedback of mics or the harshness of piezos.

Unlike piezo pickups that sense the vibration of the bridge rather than the strings, which produces that strident, quacky sound, the Atlantis LightWave Optical Pickup literally 'sees' the string, delivering a smooth, natural acoustic sound, rich in harmonic content. Piezos also have very poor attack characteristics, while the LightWave Optical Pickup has extreme sensitivity and wide dynamic range, capable of detecting all of the subtle nuance and articulation of the player's style.

### The Voice of the String™

What you will hear is extraordinary: the sound of the strings, the sound of the instrument, and most importantly, the sound of your playing. You will notice a whole new sensitivity in the interaction between your fingers, the strings and the instrument, that will create a new palette of subtle nuances and unique tonalities. Playing big, open chords, close intervals, complex voicings, and harmonics on your Atlantis will be a revelation. You will hear an openness, transparency and dimensionality unlike anything you have previously experienced.

**Natural Acoustic Guitar Sounds**

Since the output of the LightWave Optical Pickup is pure and transparent, you will be hearing the natural sound of the guitar, as opposed to the inherent sonic anomalies of conventional pickups.

Atlantis' controls are simple. One volume knob with a pull-up tone switch is all that is needed. The LightWave Optical Pickup does the rest, delivering true acoustic sound at any volume level. At last, acoustic guitar players can effortlessly compete with drums, bass and electric guitars and fit comfortably into any live mix.

For demos and studio recording, there is no better pickup technology than the LightWave Optical Pickup. Noise-free and natural sounding, simply plug in for the ultimate acoustic guitar tracks with no need for noise reduction or excessive equalization.

Constructed of premium tonewoods with a chambered body and soundhole, the excellent natural acoustic resonance of Atlantis makes it ideal for unamplified casual playing or serious practicing and composition.

Simple, elegant, groundbreaking. Designed for all guitar players, regardless of musical style, Atlantis is the next generation 'go-to' guitar and the guitar industry's most significant breakthrough in many years.

## 2. QUICK START

**Plug In and Play**

- The red Status LED on the bridge acts as a power-on indicator, and as a fuel gauge for the battery charge. Plug in a standard 1/4" guitar cable to the 1/4" Output Jack of Atlantis. This will turn on the circuit and activate the Status LED. When the LED is brightly lit it indicates that there is a sufficient charge to play the instrument.

- In the event that the battery pack has not been charged sufficiently prior to playing, the instrument can be played while plugged into the charger unit, without sonic penalty. The battery pack will continue to charge while you are playing.

- If you are plugging into an amplifier, use the Active input if there is a choice between Passive and Active. When plugging into a recording or mixing console, use the console's 1/4" Line Input jack, or split off the instrument output from your monitor amp rig with a D.I. box.

- The Atlantis has natural, acoustic sound characteristics, so it is suggested that you begin with all of your external EQ controls in a neutral, flat position. This will allow you to hear the actual sound of the instrument prior to making any tonal adjustments. The Atlantis is compatible with all typical guitar preamp, amplifier, and signal processing gear.

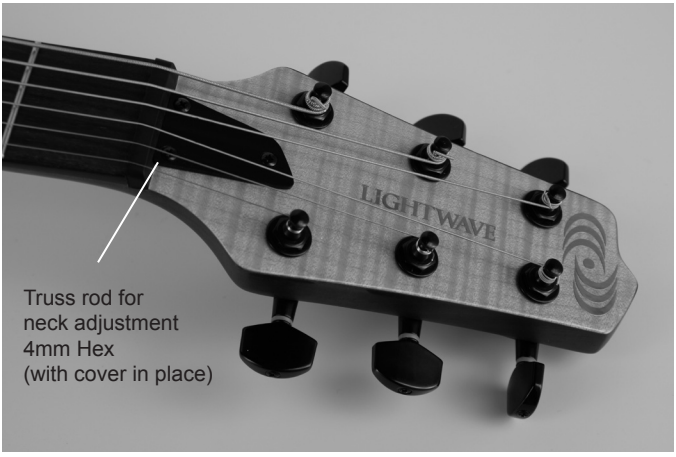
- The Atlantis electronics are powered by a rechargeable12-volt NiMH Battery Pack. (Please read section

4.3, the Battery Pack Advisory). The battery pack must have at least a partial charge to begin playing. This battery pack is specifically designed for the Atlantis, and cannot be substituted. Spare or replacement battery packs may be obtained from your Authorized LightWave Dealer, or directly from LightWave Systems.

## 3. SETUP

### 3.1 Neck Adjustment

Atlantis is equipped with a truss rod for neck relief adjustments. Always perform this adjustment before proceeding to set up the playing action and the LightWave Pickup System. It is not recommended that you adjust the truss rod if you do not have prior experience adjusting truss rods on other instruments. Improper adjustment of the truss rod can make the instrument difficult to play or cause the strings to buzz. Improper adjustment, or overtightening, can even break the truss rod. If you are unfamiliar with truss rods and instrument setup, please consult a reputable guitar tech. Tightening the truss rod adjuster (clockwise) will flatten the fingerboard, and loosening the truss rod (counterclockwise) adds relief to the fingerboard.




**Headstock**

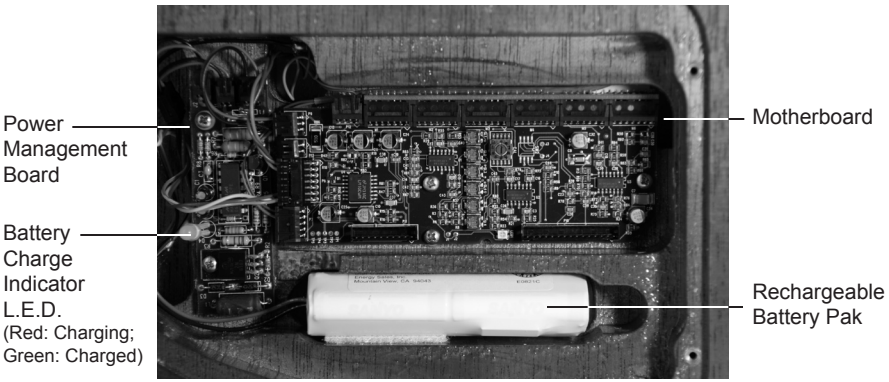
### 3.2 Action Adjustment

Atlantis comes from the factory with the action set at an average height that is typical and comfortable for most players. Lowering, or raising the action height requires careful shaping of the saddle. It is not recommended that you perform this work unless you are completely familiar with this kind of procedure. Please consult a reputable guitar tech.

Re-adjusting the saddle height, or changing string gauges, will require realigning the optics (see section 3.3, Optics Alignment). Merely exchanging a fresh set of identical strings (the same gauge and brand) usually will not require realigning the optics.

### 3.3 Optics Alignment

The following setup procedure is performed in order to align the centerline of the optics with the center of the




**Electronics in Rear Cavity (cover removed)**

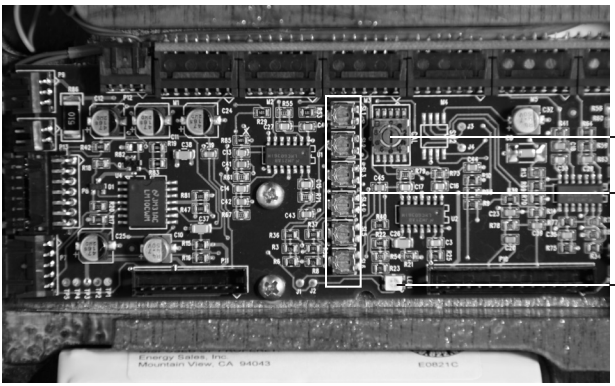
strings. This will provide maximum output, as well as accommodate string bending and related playing techniques. This operation can be done by ear, or electronically. In either case, remove the bridge cover, turn on the guitar, and adjust the position of the optics by turning the 9/64” hex adjustment screw on the two ends of the pickup baseplate. It is a three-step process:

First, adjust the highest string; then the lowest; and then go back and re-trim the highest string. This can be done by ear, or using the visual indication of the centering LED on the Motherboard in the electronics cavity.

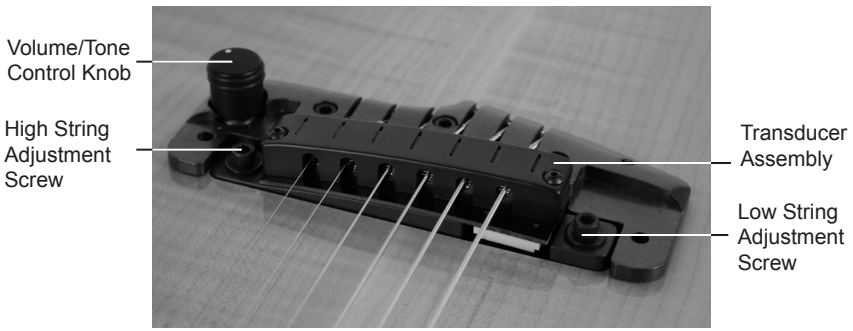
**Adjusting by ear:** with the instrument plugged into an amplifier, raise and lower the pickup baseplate, listening for the “sweet spot”, where the sound output is loudest. Do this three times, alternating between the high-string and low-string ends of the baseplate, in the order above (string 1; then string 6; then string 1 again).

**Adjusting electronically:** select the string to be calibrated, by turning the miniature rotary selector switch on the Motherboard (use a ~2mm flat screwdriver). If your guitar has the HexFX option, the rotary switch will be hidden under the HexFX daughterboard. Lift straight up on the daughterboard to temporarily move it out of the way. The switch positions are numbered to correspond with the strings, with position 1 being the highest string. When the correct string is selected, the red/green LED on the Motherboard indicates the position of the optics. LED ‘green’ indicates that the optics are below the string, and must be raised (counterclockwise turn of the adjustment screw). LED ‘red’ indicates that the optics are above the string, and must be lowered (clockwise turn of the adjustment

screw). At the optimum adjustment point, the LED will go out, indicating that the optics are centered. Adjust slowly, so as not to turn the adjustment screw too far in either direction, which will result in moving out of the adjustment range. Do this three times, in the order mentioned above (string 1; then string 6; then string 1 again). After the strings have been set up, turn the rotary switch back to its zero position, so the alignment LED will not light during normal play.




**Closeup of Motherboard Showing Optics Alignment**



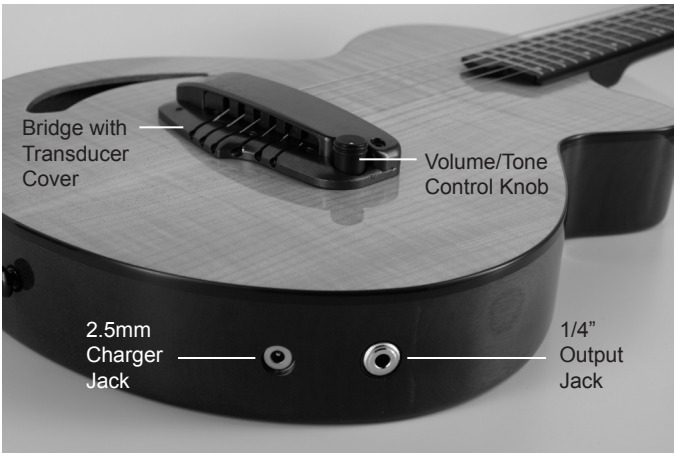

**Bridge with Transducer Cover Removed**

### 3.4 Individual String Volume Adjustment

After proper optics setup, the output of each string can be adjusted for overall string-to-string balance using the corresponding trimpots on the Motherboard. These are the six miniature trimpots in a row, across the center of the Motherboard, labeled ‘SL1’ through ‘SL6’. ‘SL1’ designates the highest-pitch string. Full output is at the end of clockwise rotation of the trimpot, and is recommended for optimum performance.

To adjust: Plug the guitar into an amplifier, to be able to listen while playing. Start with all six string trimpots at the full up position, and balance the string levels by turning down the louder strings until the string outputs sound equally loud. The trimpot adjustment range is 10 dB.

## 4. CONTROLS AND POWER



### 4.1 Controls and Jacks

- **Volume Control:** Makes the overall signal louder or softer. Full rotation clockwise results in an output level comparable to most existing active-pickup guitars. Turning down the control does not alter the sound quality; just the level. The taper of the volume control is custom designed to accommodate making small adjustments near full volume easier.

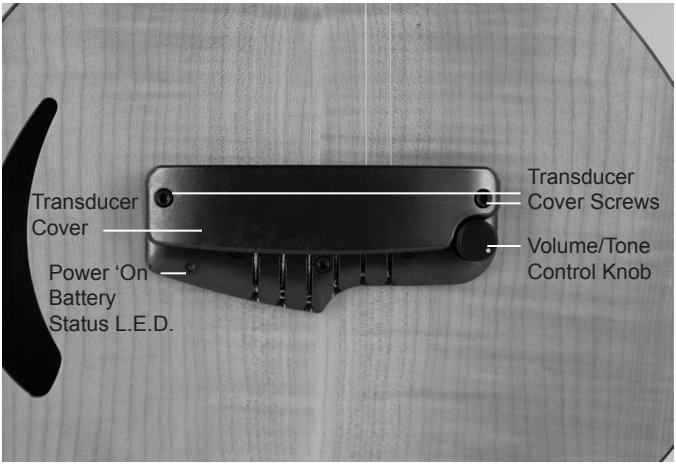
- **Pull-up Tone Switch:** Pulling up on the Volume Control knob affects the overall bass / treble balance, to provide a choice of richer tone with more bass, or a leaner tone. This switched tone choice is independent of the position of the Volume Control.

- **Output Jack:** Plugging in a standard 1/4" cable powers the LightWave Optical Pickup System. This turns the pickup system on: for normal playing, for optical setup, or for use of the 13-pin HexFX output. The cable should be unplugged when the instrument is not in use, to avoid unnecessary battery drain.

- **Charger Jack:** Insert the LightWave wall charger into this 2.5mm jack to recharge the internal battery pack, or to play using AC power. The rapid-charge system will fully recharge a drained battery pack in about 1.5 hours, even while playing. Playing time on a fully charged battery is about 16 hours. (Also see Battery Pack Advisory 4.3, below).

- **Status LED:** The red LED, located on the bridge, should illuminate when a 1/4" plug is inserted into the output jack. The LED brightness dims as the battery pack

charge is used, acting as a fuel gauge. When this LED goes out, you are playing on ‘reserve’, and should plug in the charger as soon as possible. With the charger plugged in, the guitar may continue to be played normally, and will achieve a full charge even while playing.




**Bridge with Transducer Cover**

### 4.2 Power and Charging

The Atlantis electronics are powered by an internal rechargeable12-volt NiMH Battery Pack. (Please read this entire Battery Pack Advisory, below.) This battery pack is specifically designed for the Atlantis, with internal protection , and cannot be substituted. Spare or replacement battery packs may be obtained directly from LightWave Systems. (Contact information below.)

The Atlantis will play for approximately 16 hours on a full charge. As the battery pack reaches the lower end of its charge capacity, the Status LED will dim, and when it goes out completely, you have reached the ‘reserve’, and should plug in the charger as soon as possible.

Recharging a fully drained battery pack takes about 1.5 hours.

After plugging in the charger, the charge LED on the back of the guitar should light red; and when the battery pack is fully charged, that same LED should turn green. (If the charge LED does not come on, then the battery pack is not being charged.) After the charge LED has turned green, the battery pack is fully charged, and will stay in trickle charge mode until you unplug the charger.

It is normal for the battery pack itself and other areas inside the electronics cavity to get warm during the charging cycle. Overheating (‘hot’ to the touch) should not occur; but, the LightWave battery system is protected against this, and would safely shut down the battery supply if some fault occurs.

### 4.3 Battery Pack Advisory

The Atlantis is delivered with the NiMH battery pack already installed, and will likely have only a partial charge when you receive it. The guitar may be immediately played, if the Status LED lights when the output cable is plugged in, but the full battery pack capacity will likely not be realized.

All NiMH batteries require several cycles of complete charge / discharge to restore full capacity after a lengthy storage. To be assured of a full-capacity pack and optimal playing time, follow these steps:

1. Plug in the Battery Charger, to charge the battery completely. This will take 1.5 hours or less.

2. Unplug the Charger.

3. Plug a guitar cable into the 1/4" Output Jack, and leave the instrument turned on for at least 16 hours, to discharge the battery pack completely.

- Repeat the above steps (1 through 3) several times. This will re-condition the battery pack, to be able to deliver its full capacity.

- This conditioning should be done a couple of times a year, or when the instrument playing time seems to be diminishing, or if the instrument has been unused for a long duration.

The playing time on a fully charged battery is about 16 hours. The instrument can be played while it is charging. Even a brief charge will extend the playing time noticeably.

The battery pack should last for hundreds of charge cycles, but then may need to be replaced. This is a custom pack, designed specifically for the LightWave Optical Pickup System, and includes internal protection to prevent thermal or electrical overload. Use only authorized LightWave battery packs when a replacement is

necessary. Attempting to use a different battery pack may compromise safety, and will void the warranty coverage.

### 4.4 Instrument Maintenance

After you have finished playing, thoroughly wipe the entire instrument, including the strings, with a clean, soft cloth. Avoid exposing the instrument to any chemical or substance that might mar the finish. Avoid prolonged exposure to direct sunlight, or sources of excessive temperature or humidity. Large changes in average temperature and humidity may call for an adjustment to the neck's truss rod to compensate.

## 5. HexFX EDITION

LightWave guitars equipped with the HexFX option have a 13-pin DIN output jack and the deck controls to enable playing through and controlling MIDI converters, hex DSP processing devices, and string fanout boxes. The LightWave output signals and deck controls on these instruments are fully compatible with the 'GK' standards for existing MIDI-ready guitars.

- **13-Pin Output Jack:** This is the standard connection for plugging in a 13-pin cable (not supplied) made by other manufacturers. The LightWave's individual string signals, and the single output present at the 1/4" output jack, are routed through the connector pins, in standard pinout configuration.

- **HexFX Volume:** This control knob function may differ, depending on the device connected at the far end of the cable; typically it affects the loudness of the MIDI-converted or hex-DSP signals only.

- **Master Volume:** The loudness of the instrument's single output (present at the 1/4" output jack) which is also routed through the 13-pin cable, is still controlled by the Master Volume knob. The signal at the 1/4" jack is present simultaneously with the one routed through the 13-pin cable, and can be used at the same time, or not. If it is not used, a 1/4" cable or dummy plug must still be inserted, to power up the LightWave Optical Pickup System.

- **Blend Switch:** This three-position toggle switch determines the sound that is output by the device connected at the far end of the 13-pin cable. In the center position, both the instrument output and the output of that device will be heard. In the 'up' position, only the instrument output will be heard. In the 'down' position, only the output of the connected device will be heard.

- **S1 / S2 Switch:** This three-position switch (with spring return-to-center action) functions as the Up / Down pushbuttons seen on 'GK'-style devices, and its functions may differ depending on the device connected at the far end.

LightWave guitars omit the 'hex power on' LED seen on some other 'GK'-style hex pickups, since the LightWave 13-pin output does not rely on getting power from the device connected at the far end. Rather, the LightWave

13-pin output is powered by the same internal battery pack that runs the rest of the pickup system. This LightWave design enables, for example, simple individual string fanout without needing to connect to an active 13-pin device at the far end.

# 6. APPENDIX

## 6.1 HexFX Daughterboard DIP Switch Settings

On the underside of the HexFX Daughterboard, there is a six-position DIP switch. The six slide switches on the unit are labeled '1' through '6'; their 'ON' position is toward the center of the HexFX Daughterboard. This switch comes set correctly from the factory for MIDI converters and hex DSP devices, and normally does not require any changes. However, if the settings are accidentally changed, or if the 13-pin output is to be used without a MIDI or DSP device, the functions are as follows:

Slide switches 1 thru 6 = individual string outputs conditioned for MIDI converter or hex DSP (OFF), or unconditioned for simple fanout (ON). If the instrument is played through a MIDI converter or hex DSP device, these switches must be in the 'OFF' positions, or else the connected device will not operate correctly. No damage will result in the wrong position, but the connected device will not perform properly.

If the individual string outputs are ‘fanned’ (e.g. to distribute them to different destinations), these switches must be in the ‘ON’ position to hear the normal LightWave pick-up sound. No damage will result in the wrong position, but the string outputs through the 13-pin connector will be severely attenuated and lack bass response.

Note that the bridge control for Volume will have no effect on the individual string outputs through the 13-pin connector. The bridge volume control only affects the single combined signal at the 1/4” output jack, and on its assigned pin in the 13-pin connector.

## 7. TIPS AND TROUBLESHOOTING

### 7.1 Tips

Atlantis is a guitar with an active pickup system, so the output can be plugged into a wide range of device loads without affecting tonal response. The minimum recommended load is 10K Ohm, typical of a mixing board Line input. The Atlantis is not designed to be directly connected into a low-impedance microphone input; a D.I. box should be used for that purpose. Connection to a passive D.I. box will neither dull the treble, as happens with passive magnetic pickup guitars, nor thin the bass response, as with passive piezo pickup guitars. The Atlantis’ output will not properly drive headphones directly.

The LightWave optical pickup system is a very neutral and high- fidelity transducer of the guitar's acoustic sound. For your initial experiences with the Atlantis, we can recommend less extreme tone control/EQ settings than you may be used to. In fact, if the guitar is being played through a P.A. system, or an amp rig with an inherently wide and smooth response, you may want to try leaving the EQ flat.

The Atlantis is sensitive to bright light entering the pickup from the direction of the neck. Try to avoid pointing the headstock of the guitar directly at bright light sources.

The LightWave optical pickup system is very revealing of the choice of strings. If you have preferences here, be sure to try several; as small sonic changes due to the strings will be heard clearly through the 1/4" output jack. Experiment.

### 7.2 Troubleshooting

**Problem:** When the guitar cable is plugged in, the Power LED does not light, and no sound is heard.
**Solution 1:** Be sure the cable is a 'TS' (Tip / Sleeve) cable, and not a 'TRS' (Tip / Ring / Sleeve) cable.
**Solution 2:** Plug in the battery pack charger and try again. Check the back of the guitar for the 'Charge Status' LED to have lit red.

**Problem:** The sound is very weak or disappearing.
**Cause:** Battery pack near being fully-drained.
**Solution:** Check the Status LED in the bridge to see if it is out, or very dim. If so, the battery pack needs recharging.

(You can continue to play with the charger unit plugged in, and the battery pack will still charge).

**Problem:** One or more strings sound softer than the others.
**Cause:** Optics out of alignment, or string trimpots need adjusting.
**Solution 1:** Did you just adjust the action, or change string gauges? If so, the optical setup may have to be re-done. Check the condition of the optical setup (see 3.3: Optics Alignment). If it is out of alignment, perform the optical setup procedure.
**Solution 2:** If not, check the sound of the guitar while it is unplugged, and notice whether a suspect string also has low output acoustically. If it does, change that string, or compensate by adjusting the individual string loudness trimpots. (See Motherboard illustration, section 3.4).

**Problem:** Battery pack charge is consumed quickly.
**Cause:** Battery pack capacity reduced because of disuse for an extended period, and needs refreshing.
**Solution:** Fully charge and discharge the battery pack several times to restore its capacity. (See 4.2 Battery Pack Advisory).

**Problem:** Battery pack will not charge or hold a charge.
**Cause 1:** Poor connection between battery pack and other internal circuitry.
**Solution 1:** Make sure the charger unit is plugged firmly into the charger jack, and that the battery pack is plugged into the Power Management Board.
**Cause 2:** Battery pack life is exhausted. (Should last for several hundred charge cycles).

**Solution 2:** Replace battery pack with a new one, available from LightWave Systems.

For other problems you may encounter that you cannot resolve or that are not listed here, please contact your authorized LightWave Systems retailer where you purchased your Atlantis, or contact LightWave Systems directly. (See contact information in this manual).

## 8. WARRANTY

If you purchased your Atlantis guitar in the USA, your LightWave Atlantis and Optical Pickup Electronics are covered by the LightWave Systems Limited Warranty. Please refer to the Warranty Registration Information and terms sheet included with this manual for detailed information regarding the warranty. To allow us to better serve your needs, please fill out the Warranty Registration Information and send it to LightWave Systems.

For warranty coverage outside the USA, please consult the LightWave Systems dealer or distributor where you purchased your guitar.

Specifications subject to change without notice.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