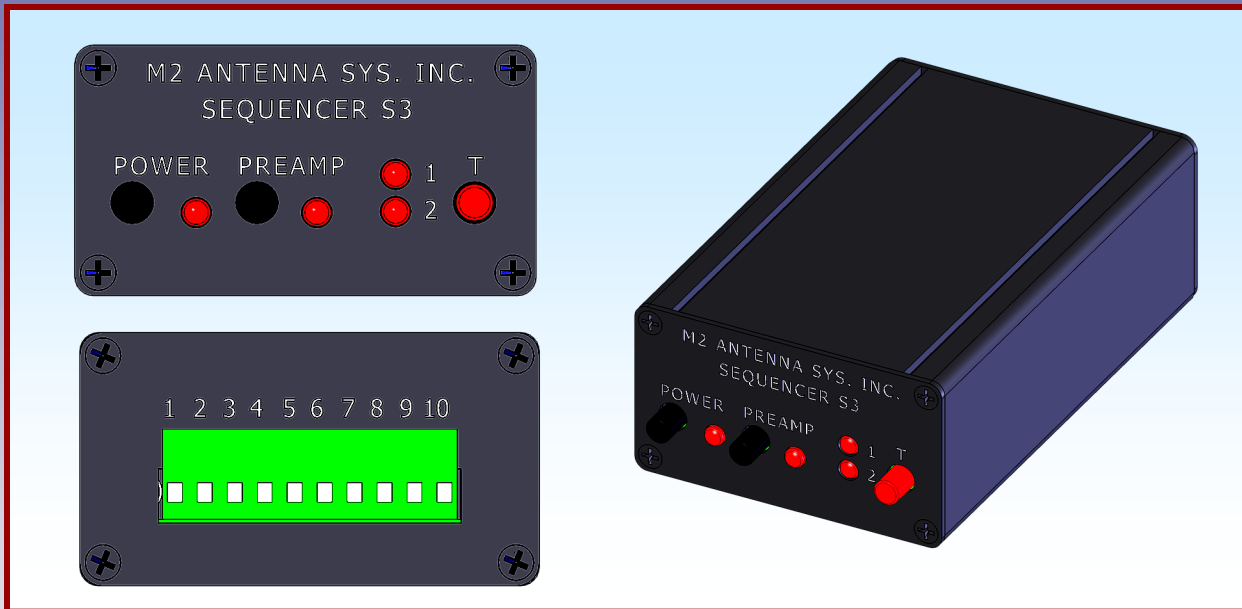




M2 Antenna Systems, Inc. Model No: S3 Sequencer

Operating Instructions



OVERVIEW

INSTALLATION

TROUBLESHOOTING

ADDENDUM

WARRANTY

PLEASE READ BEFORE USE AND SAVE

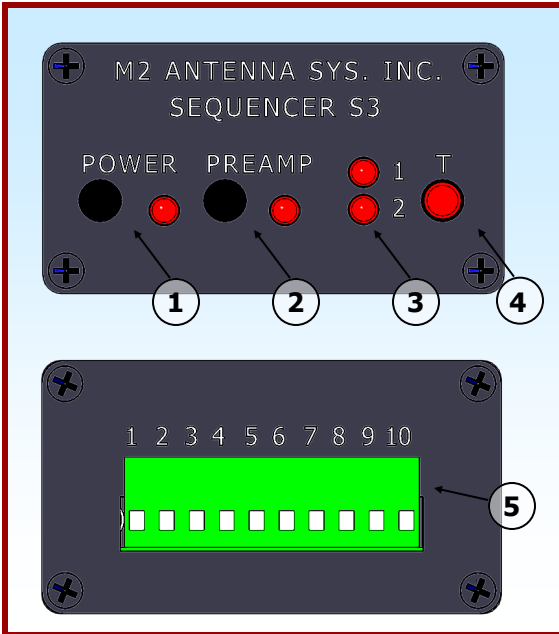
M2 Antenna Systems, Inc. 4402 N. Selland Ave. Fresno, CA 93722
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06/01/15
Rev.00

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OVERVIEW



MAJOR COMPONENTS

1. **Power Switch and LED.** Applies power to the S3 Sequencer. The LED provides a positive indication of power.
2. **Preamp Power Switch and LED.** Turns power on and off to the Preamp. The LED provides a positive indication. Sequencer power must be On in order to power the preamp.
3. **Sequencer Stage Indicators (1/2).** LED's provide an indication that a particular sequencer stage is keyed. *Note: There is no indication for the Zero Delay output.*
4. **Test Switch.** Momentary contact switch that activates the built-in Test feature of M2 Antenna Systems preamps.
5. **Connector J1.** This plug is the input and output connector through which all connections to the sequencer are made. Screw terminals in the plug allow for easy connection to a variety of cables and easy disconnection.

THEORY OF OPERATION

A sequencer is a device that, given a discrete input, provides sequential time-delayed outputs to various devices, and when the input is removed, likewise shuts off those outputs in time-delayed reverse order.

WHY USE A SEQUENCER?

Weak-signal communications, particularly at VHF and above, sometimes require performance that cannot be delivered by a transceiver alone. Often, a low noise preamplifier (LNA), a power amplifier (PA) and sometimes a transverter are needed to afford the extra edge necessary for terrestrial, Earth-Moon-Earth (EME) and satellite communications. It is vital to provide extra transmit-receive (T/R) isolation and switching with enough time delay to ensure that an ill-timed burst of power doesn't destroy sensitive equipment. A sequencer is the "brains" of a weak-signal station.

HERE'S HOW IT WORKS

Receive (Unkeyed)

During receive, with power on (controlled by SW1), the sequencer is in the unkeyed state. Preamp power is controlled by SW2 and passes directly to J1, pin 5. Both sequencer and preamp power are current protected by a 1A fuse at F1.

Transmit (Key Down/Key Up)

A ground at Q2 (optionally, via a +2 to 12 V at Q1) causes Q2 to conduct, placing +10.5V at the collector which charges timing capacitor C4, the rate of which is determined by the RC time constant of R9 and R10. JP2 shorts R10, shortening the RC time constant, providing selectable timing. The charge voltage of C4 is seen at the input of U1, which acts as a 10 step analog to digital converter, triggering sequential outputs as the charge builds. Discrete outputs from U1 trigger relay outputs via Q4 and Q5. When unkeying, the discharge curve of C4 provides the timing to sequentially shut off Q5 and Q4. The contacts of K1 and K2 provide either a ground or +12V signal, selectable by JP3 and JP4. Jumpers JP5 and JP6 select the output logic of normally open (NO) or normally closed (NC). Additionally, Zero-Delay output from the collector of Q3 provides a buffered pass-through of the keying signal to key a transverter.

Test

When using an M2 Antenna Systems, Inc. preamplifier with the built in test feature, the Test button activates the onboard noise test as an aid to testing and troubleshooting your antenna system.

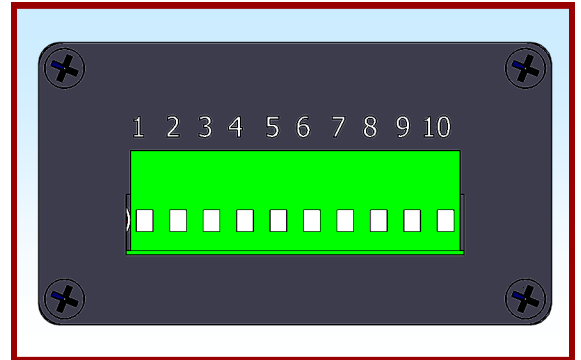
INSTALLATION

CONNECTOR INFORMATION

Connector (J1) Description

Pin	Description
-----	-------------

- | | |
|----|--|
| 1 | Power — +11 TO 18 VDC, 1 A max. |
| 2 | TX In — Jumper selectable "PTT" input—Ground / +2-12VDC. |
| 3 | GND — Return for power and controls. |
| 4 | GND — Return for power and controls. |
| 5 | Preamp Power — +12 VDC supply voltage for pre-amp. Switched and fused (via F1). |
| 6 | Preamp Test — Activates noise test function on M2 Antenna Systems, Inc. preamplifiers. |
| 7 | Preamp Key — First sequencer output stage. Output can be either Normally Open or Normally Closed, and can be either ground or +12VDC. |
| 8 | Amplifier Key — Second sequencer output stage. Output can be either Normally Open or Normally Closed, and can be either ground or +12VDC (jumper selectable.) |
| 9 | GND — Return for power and controls. |
| 10 | Zero-Delay Output — Open collector output to switch a transverter or other device with no delay. |



INSTALLATION

CONFIGURATION DETAIL

JP1 Input Type

Used to select the type of keying from your rig. +12V will work as low as 2 V.



**GROUND
TO TX**

**+ 12VDC
TO TX**

Jumper Settings

CAUTION:

EVALUATE YOUR SYSTEM AND SET THE JUMPERS ACCORDINGLY OR DAMAGE TO YOUR EQUIPMENT MAY OCCUR.

Suggested initial settings are indicated in gray. Your requirements may differ.

JP2 Delay Adjust

Sets the timing between stages. (Times are Key to TX/Unkey to RX)



**35/85
mS**

**50/120
mS**

JP3/4 Output Type

Use to select the type of keying to your amp/preamp.



GROUND

+ 12VDC

JP5/6 Output Logic

Use to select the type of keying to your amp/preamp.

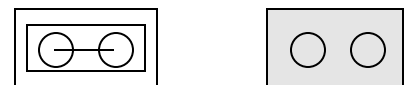


NO

NC

JP7 0-Delay Limit

Bypass or include a current limiting resistor on the 0 Delay Output.



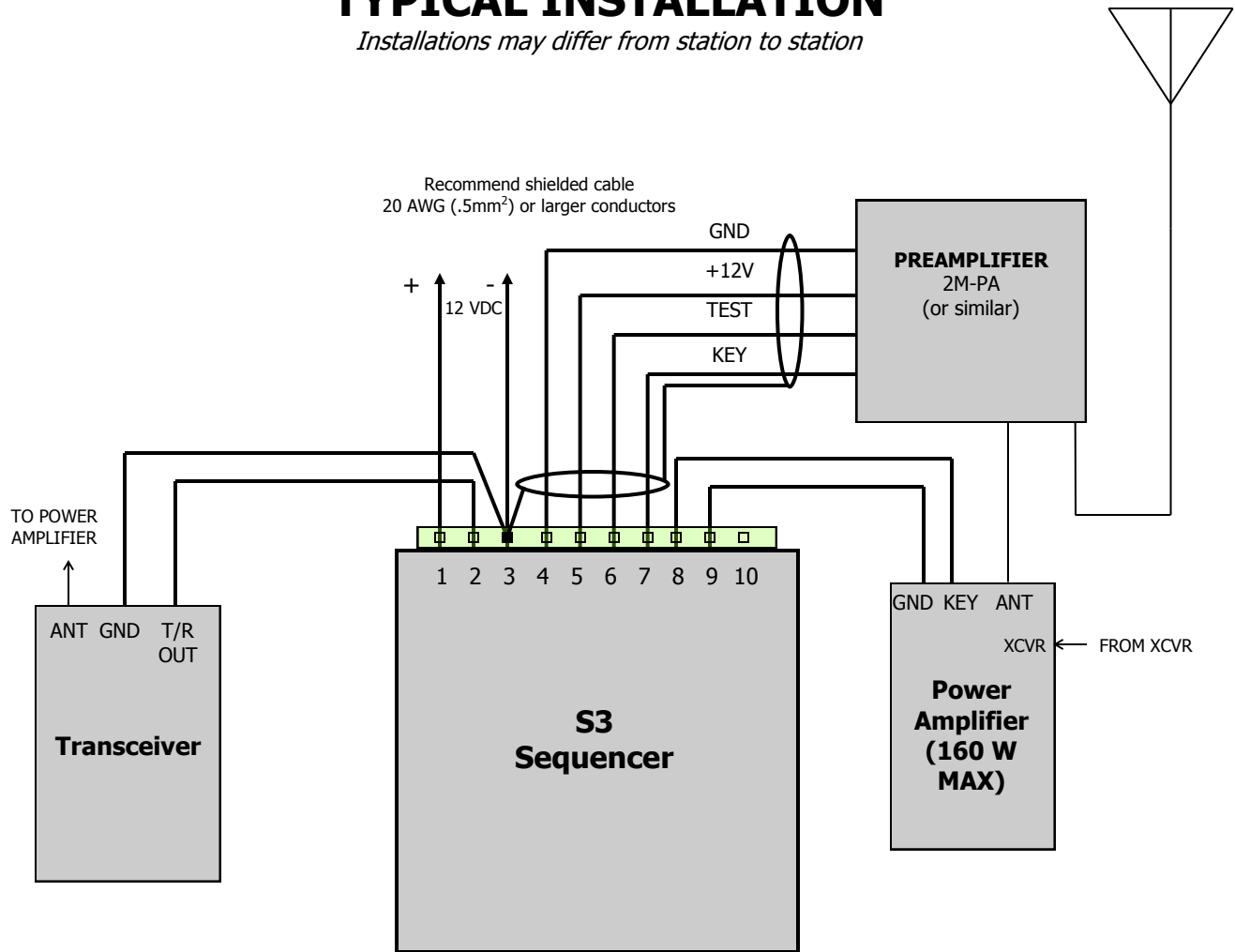
0 Ω

680 Ω

INSTALLATION

TYPICAL INSTALLATION

Installations may differ from station to station



INSTALLATION CONSIDERATIONS

- **WARNING:** SAFETY IS ALWAYS A PRIORITY! ALWAYS OBSERVE APPROPRIATE ELECTRICAL SAFETY PRECAUTIONS WHEN INSTALLING ANTENNAS AND RELATED EQUIPMENT.
- **WARNING:** THIS DEVICE IS NOT DESIGNED TO SWITCH OR BE ACTUATED BY HIGH VOLTAGES, SUCH AS THOSE FOUND IN OLDER TUBE EQUIPMENT. RELAYS OR OTHER ISOLATION DEVICES MAY BE REQUIRED TO PREVENT DAMAGE TO THIS SEQUENCER AND SERIOUS INJURY TO YOU.
- **CAUTION:** THE USE OF LIGHTNING PROTECTION DEVICES ON ALL CABLES ENTERING ANY BUILDING IS STRONGLY ENCOURAGED. CONSULT LOCAL ELECTRICAL CODES FOR INSTALLATION REQUIREMENTS.
- This device is not weather resistant. Use only indoors or in an area protected from moisture and extreme conditions.
- It is recommended that you use a SHIELDED control line with at least 20 AWG (.5 mm²) or larger conductors.
- Thoroughly research the interconnection and time delay requirements of your station equipment, and configure your sequencer appropriately per this section.
- Refer to the above block diagram for an example of a typical terrestrial weak signal VHF/UHF station. For satellite, EME and higher power stations, additional equipment and a different layout will be required.

TROUBLESHOOTING

TROUBLESHOOTING GUIDE

Problem	Possible Cause	Solution
PWR LED does not light when the PWR Button is depressed	12 VDC not reaching J1	Verify +12 VDC at P1/Pin 1. Check PS.
	F1 is blown	Replace F1.
Sequence LED's show no activity when the key line is actuated	JP1 set incorrectly or not at all	Check setting of JP1. Refer to "Configuration Detail" in the Installation section of this manual.
	Signal not reaching J1.	Check connection at P1/Pin 2.
	Q1 defective	Check Q1. Replace Q1 if necessary.
	Q2 defective	Check Q2. Replace Q2 if necessary.
Sequencer actuates, but will not key devices (amp, preamp, transverter, etc)	Faulty connection to P1	Verify wiring from P1 to devices.
	JP3-JP6 settings	Check setting JP3-JP6. Refer to "Configuration Detail" in the Installation section of this manual.
	Q4/Q5 bad	Check Q4/Q5. Replace if necessary.
0-Delay Output will not key device.	Q1 not pulling low enough	Place jumper on JP7 to bypass the current limiting resistor.

Still don't see what you are looking for?

This guide is not all-inclusive, as there is just no way to predict every failure. However, we will be more than happy to provide any assistance we reasonably can. Please see "Support, Service and Returns" below.

SUPPORT, SERVICE AND RETURNS

If you have followed the provided troubleshooting steps and your product is still not performing as specified, please contact us for further technical support. You may email us any time, or call between 8:00 am and 4:00 pm Pacific Time (UTC -7 / -8). Our contact information is:

M² Antenna Systems, Inc.
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Email: sales@m2inc.com

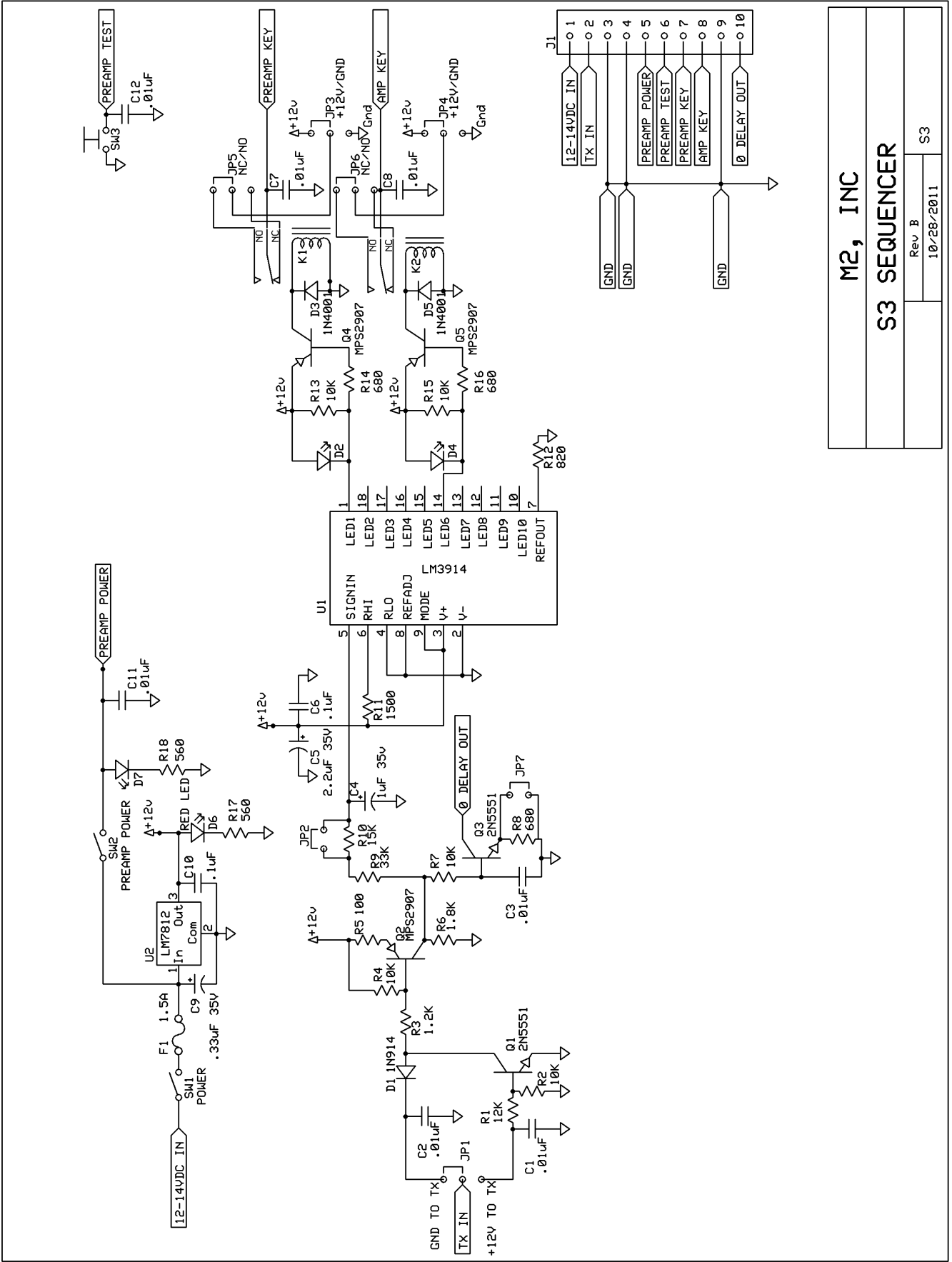
When writing, please include the following:

- Your name and contact information
- The product you are writing about
- A synopsis of the problem
- The troubleshooting steps you have already taken

Should you require factory service, we will be happy to provide you with a Return Authorization. If the item is outside the warranty period, an estimate of the repair costs will be provided once the item has been examined by a technician.

Contacting us before returning any products to our factory will not only prevent lost items, but also expedite their repair.

TROUBLESHOOTING



M2, INC	
S3 SEQUENCER	
Rev B	S3
10/28/2011	

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TROUBLESHOOTING

ADDENDUM

PARTS LIST

DESCRIPTION.....	QTY
S3 SEQUENCER.....	1
CONNECTOR PLUG, 10 POSITION.....	1
FUSE, 32V 1A	1
USER MANUAL.....	1

ADDENDUM

SPECIFICATIONS

Model	S3
Power Requirements	+11 to +18 V DC, 1A Max
Enclosure Size (W x H x D)	3.07 x 1.69 x 4.72 in/78 x 43 x 120 mm
Color	Black
Input.....	GND or +2-12VDC to TX (jumper selectable)
Sequenced Outputs	3 (2 relay, 1 open collector)
Relay (Pin 7&8) V_{MAX}	50 VDC/VAC
Relay (Pin 7&8) I_{MAX}	1A
Relay (Pin 7&8) Output	Normally Open/Normally Closed, GND or +12VDC
0 Delay (Pin 10) V_{MAX}	15 VDC
0 Delay (Pin 10) I_{MAX}	41 mA @ 15VDC / 600 mA @ 1 VDC (open collector)
Timing, Key-down to TX (avg).....	50 mS or 35 mS (jumper selectable)
Timing, Key-up to RX (avg).....	120 mS or 85 mS (jumper selectable)
Controls.....	PWR, Preamp PWR, Preamp Test
Indicators	LED: PWR, Preamp PWR, Relay 1 Out, Relay Out 2

ADDENDUM

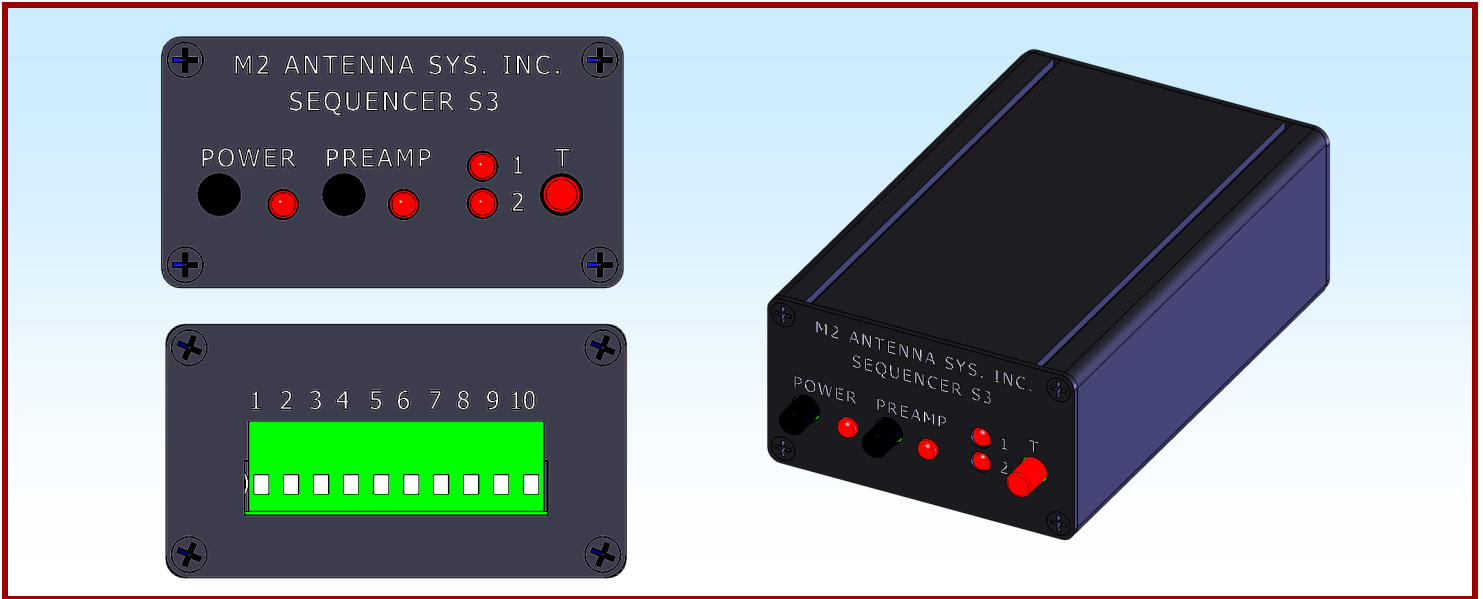
NOTES:

ADDENDUM

NOTES:

WARRANTY INFORMATION

12 MONTH LIMITED WARRANTY



This warranty gives you specific legal rights. You may also have other rights which will vary from state to state or province to province.

M2 warrants the **S3 Sequencer** against defects in material and workmanship for a **period of 12 months** from date of purchase. During the warranty period, **M2** will, at its option, either repair or replace products or components which prove to be defective. The warranty shall not apply to defects or damage resulting from:

- Improper or inadequate maintenance by user
- Improperly prepared installation site
- Unauthorized modifications or misuse
- Accident, abuse, or misapplication
- Normal wear

M2 specifically does not warrant this product for any direct, indirect, consequential, or incidental damages arising from the use or inability to use the product. Some states or provinces do not allow the exclusion or limitation of liability for consequential or incidental damages so the above limitation may not apply.

In the event repair or replacement are necessary, purchaser shall contact M2 for return authorization. In many cases this contact can simplify and expedite the repair/replacement process and help reduce costs and downtime.

The purchaser shall be responsible for packing the product properly for return and for charges to ship the product to **M2**. Always include with the shipment a statement detailing the problem or failure and any other pertinent observations. Insuring the product for shipment is recommended. Use the original packing materials whenever possible. **M2** is responsible for charges (**in the United States**) to return the repaired or replaced product only where warranty service is involved.

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