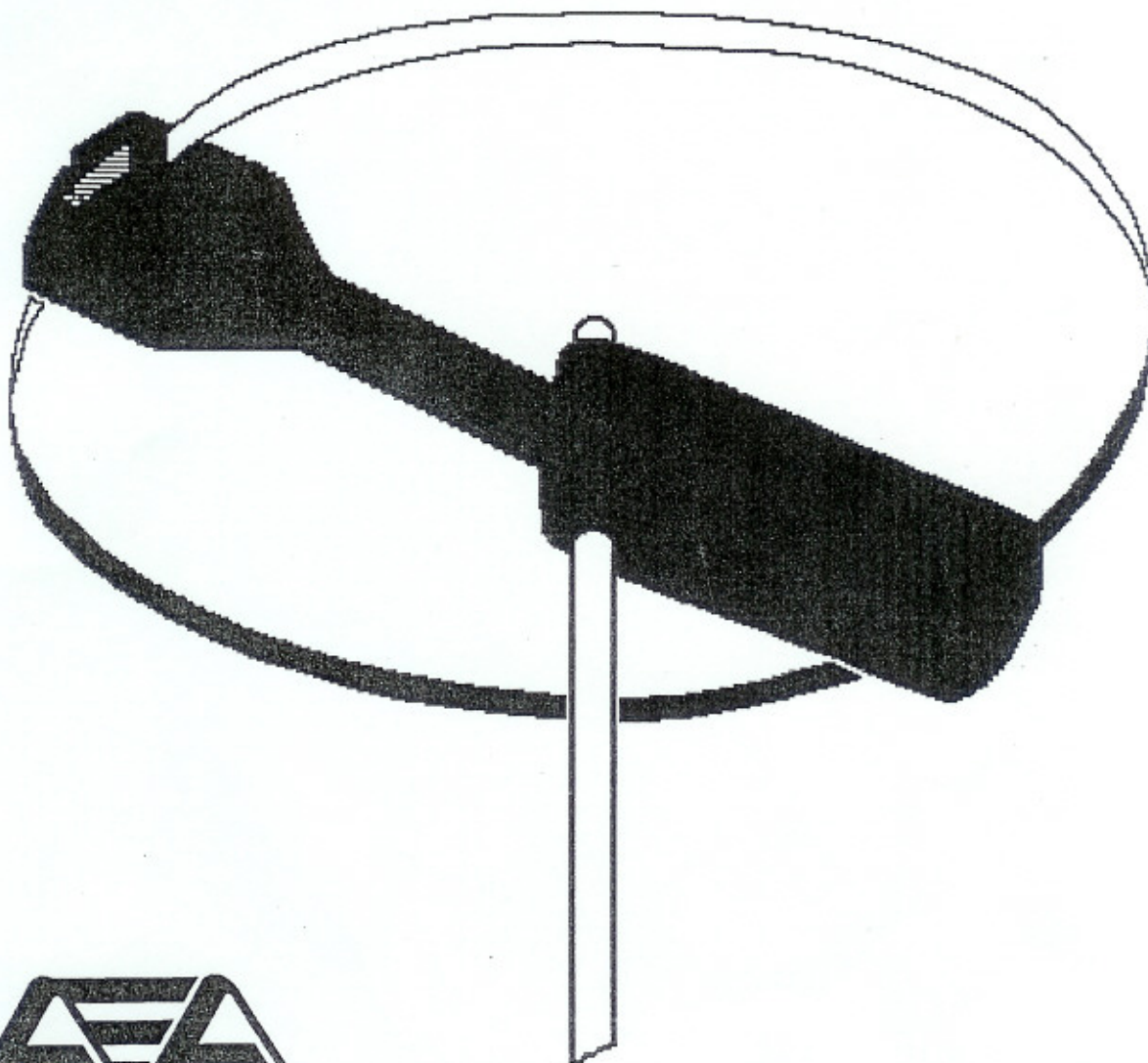


***IsoLoop™ 10-30 HF Antenna
LC-2 Loop Controller***

Operating Manual



Advanced Electronic Applications, Inc.

FOREWORD

Congratulations on your purchase of the AEA IsoLoop™ antenna. It will provide you with surprising performance in a compact and lightweight package.

To fully enjoy the benefits of the IsoLoop, please read this manual carefully before operating the antenna. If you have questions, I encourage you to contact an AEA authorized dealer or one of our technical support representatives at:

Advanced Electronic Applications, Inc.
P.O. Box C2160, 2006-196th St. S.W.
Lynnwood, WA 98036-0918
Tel: (206)775-7373
FAX: (206)775-2340
Telex: 6972496 AEA INTL UW
CompuServe User ID 76702, 1013

73,

C. Mike Lamb, N7ML
President
Advanced Electronic Applications, Inc.

TABLE OF CONTENTS

Features	2
Theory of Operation	3
Specifications	3
Unpacking Instructions	3
Mounting the IsoLoop	4
Hook-up	6
Biological Cautions	7
Operation	7
Troubleshooting and Service	8
Packing List	9
LC-2 Schematic Diagram	10
LC-2 Parts Pictorial	11
Warranty	12
Notes	13

1. FEATURES

The IsoLoop is a tuned loop antenna and consists of a band of aluminum (acting as a radiating inductor) with a stepping-motor-driven tuning capacitor mounted in series with the band. The LC combination is made to resonate at the chosen operating frequency. The loop has very high Q and the bandwidth is quite narrow, resulting in attenuation of any harmonics from the user's transmitter, or strong local signals from any adjacent transmitter.

Tuning is accomplished by controlling the stepping motor from a small remote control box called the LC-2 Loop Controller. It allows forward/reverse direction and speed control of the motor. An audio level indicator consisting of an array of 4 LEDs coupled with a sensitivity control pot allows easy visual tuning of the loop at resonance. An optional frequency indicator kit is also available and may be added to the LC-2 at any time. Call (206)774-1722 for price and order information.

The IsoLoop is small in size, and is useful in limited-space applications such as apartments or attics. It may be easily carried to remote locations.

Figure 1 shows that the IsoLoop may be mounted in either the horizontal (1b and c) or vertical (1a) plane. Vertical mounting allows the antenna pattern to be rotated with a rotator to "null" interfering signals. When mounted in the horizontal plane, the pattern is omni-directional. Ground radials are not necessary and the impedance is approximately 50 ohms when tuned to a chosen frequency — an additional antenna tuner is not necessary.

The IsoLoop design results in the loop antenna being *isolated* or decoupled from the feedline so the feedline does not become part of the radiating structure and distort the pattern. (This is the source of the "IsoLoop" name.) Another benefit is that the operator does not have RF in his operating environment — his (and the neighbor's) equipment is less likely to be interfered with.

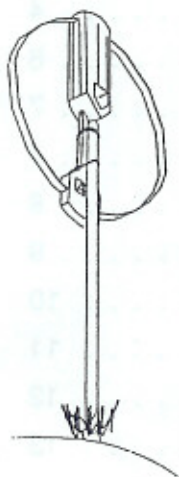


Fig. 1a

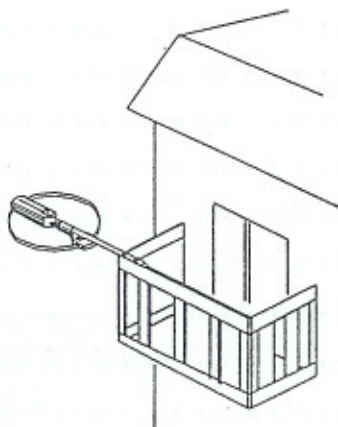


Fig. 1b

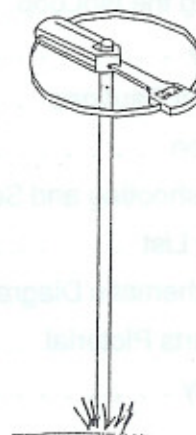


Fig. 1c

2. THEORY OF OPERATION

The IsoLoop antenna consists of a radiating LC series combination and resonates at the chosen operating frequency. It is inductively coupled to a shielded primary loop which is driven by the feedline from the radio. The main loop has very high Q and the bandwidth is quite narrow — approximately 10-100 kHz depending on the band.

The IsoLoop is an antenna where bandwidth has been traded off for efficiency, and as such, the gain of the antenna is comparable to that of a dipole. It works much better than a dipole at heights lower than a half-wave, and works much better indoors. It does not have quite the gain of a dipole in free-space, but most of us are not able to mount a dipole high enough to achieve free-space performance.

3. SPECIFICATIONS

Frequency Coverage	10 to 30 MHz
Nominal Impedance (tuned)	50 ohms
Power Rating	150 watts
VSWR	Less than 1.4:1 (no nearby objects)
Temperature Range	0 to 150 degrees Fahrenheit operating -50 to 150 degrees Fahrenheit storage
Dimensions	43" round, 38.8" housing
Max. Mast Outside Diameter	2"
Shipping Weight	18 pounds
Coax Connector	UHF (SO-239)
Gain	Approximately that of a dipole

4. UNPACKING INSTRUCTIONS

CAUTION: Band is compressed for shipping and may pop out like a spring if released. Remove loop from box. Carefully remove restraint from aluminum band and bend to circular shape if necessary (*Note that the antenna's performance will not be significantly affected if the loop is out of round*). Release the control cable. Unbox the LC-2. Connect power to the LC-2 and connect the control cable from the antenna to the LC-2. Turn on the LC-2 and press one arrow key at a time to verify that the stepper motor is turning. This is indicated by a buzzing sound inside the large end of the antenna housing. The antenna is now ready for mounting.

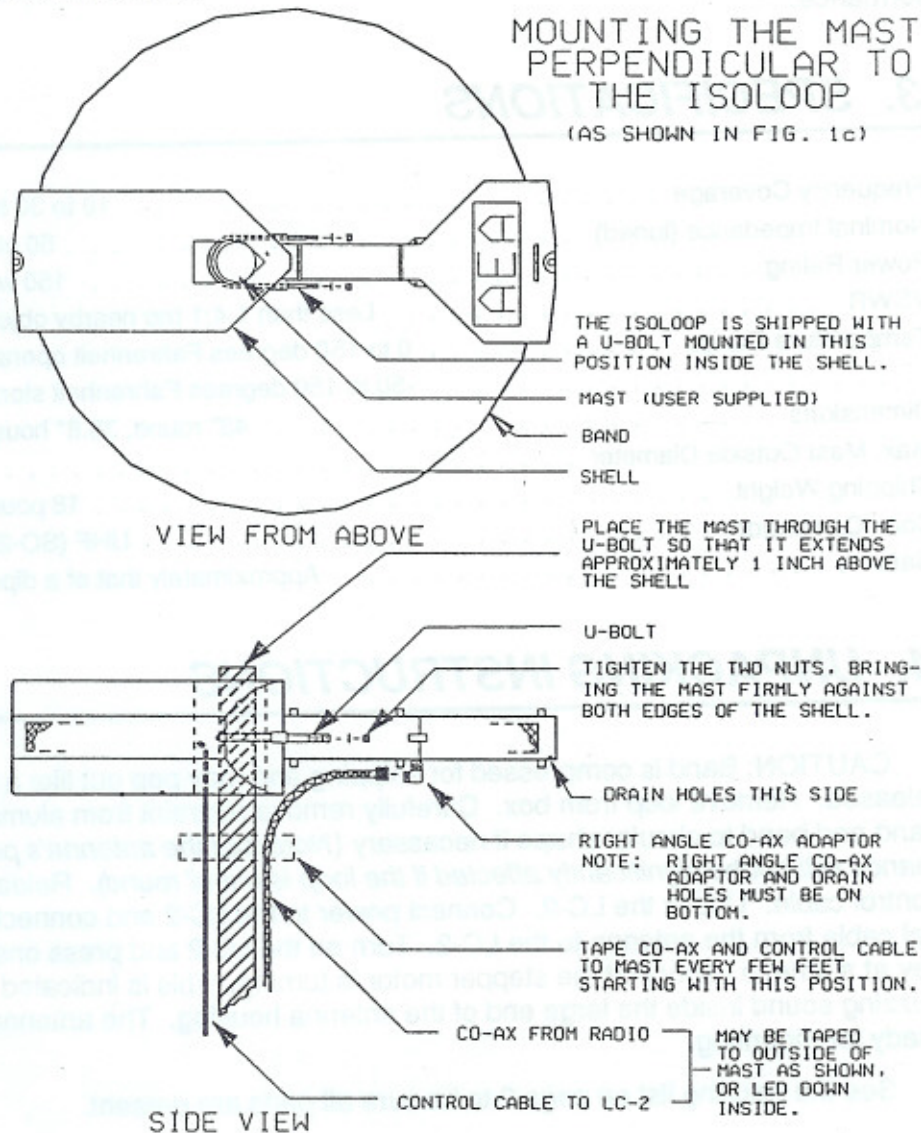
See the packing list on page 9 to be sure all parts are present.

5. MOUNTING THE ISOLOOP

After you have followed the unpacking instructions of the IsoLoop, you need to select a site to install the antenna. You may wish to first mount the IsoLoop antenna on a temporary mast (before you mount it somewhere less accessible) in order to familiarize yourself with its operation.

There are two basic ways the IsoLoop can be mounted to the mast. The result is either horizontal or vertical polarization.

Figure 2 shows the mounting method used for the installation shown in figure 1c. Figure 3 shows the mounting method used for the installation shown in figures 1a and 1b.

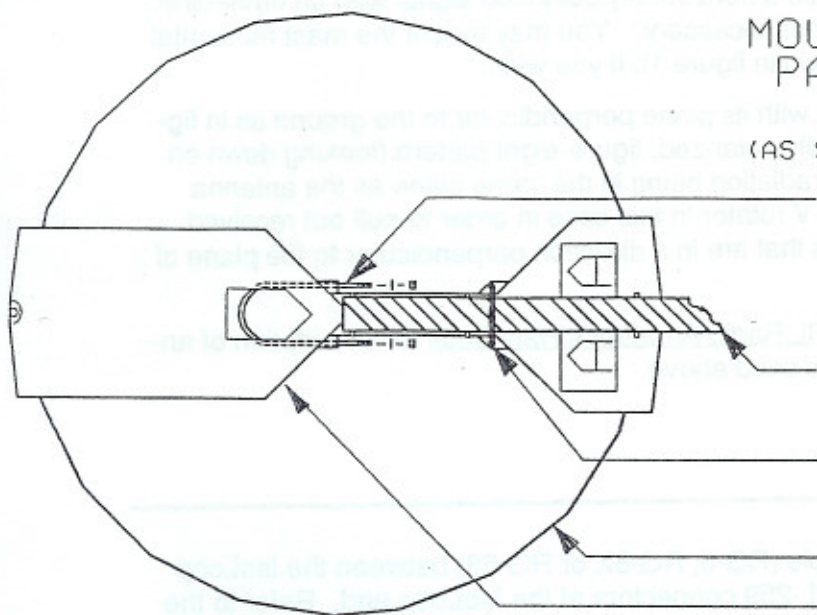


NOTE: SUPPLIED WORM CLAMP IS NOT USED FOR THIS CONFIGURATION

Fig. 2

MOUNTING THE MAST PARALLEL TO THE ISOLOOP

(AS SHOWN IN FIG. 1a AND 1b)



VIEW FROM ABOVE

REMOVE U-BOLT FROM THIS POSITION INSIDE SHELL BY UNSCREWING THE 2 NUTS AND WASHERS. THEN WORK THE U-BOLT UP THROUGH THE OPENING IN THE SHELL.

MAST (USER SUPPLIED)

REPOSITION U-BOLT IN THESE HOLES, AND USING THE NUTS AND WASHERS PREVIOUSLY REMOVED, ASSEMBLE AS SHOWN BELOW.

BAND

SHELL

BUTT MAST AGAINST SHELL BEFORE TIGHTENING U-BOLT OR ADDING WORM CLAMP.

PLACE WORM CLAMP IN THIS POSITION.

PLACE U-BOLT AROUND MAST AND THROUGH HOLES IN SHELL AS SHOWN. PLACE WASHER AND NUT (2) ON OPPOSITE SIDE AND TIGHTEN.

TAPE CO-AX AND CONTROL CABLE TO MAST EVERY FEW FEET STARTING WITH THIS POSITION.

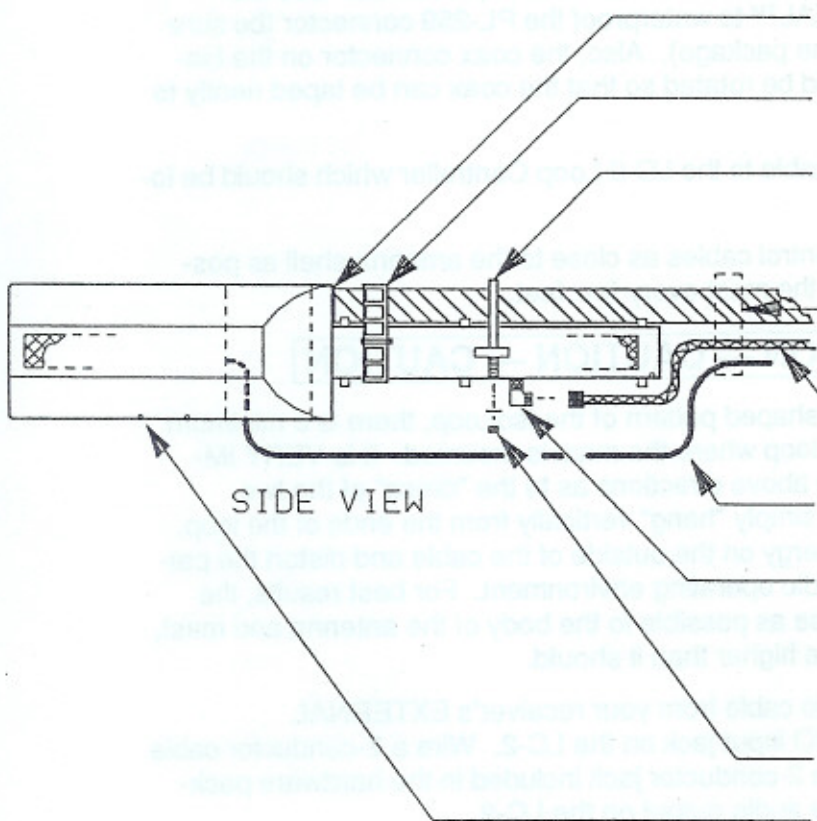
CO-AX FROM RADIO }
CONTROL CABLE TO LC-2 }
TAPES TO OUTSIDE OF MAST.

ADJUST RIGHT ANGLE CO-AX ADAPTOR AS SHOWN.

NOTE: RIGHT ANGLE CO-AX ADAPTOR AND DRAIN HOLES MUST BE ON BOTTOM.

WASHER AND NUT

DRAIN HOLES THIS SIDE



SIDE VIEW

Fig. 3

If you mount the antenna such that its plane is parallel to the ground as in figures 1b and 1c, it will radiate a horizontally polarized signal with an omni-directional pattern, and a rotor is not necessary. You may mount the mast horizontally to a balcony railing as shown in figure 1b if you wish.

If you mount the antenna with its plane perpendicular to the ground as in figure 1a, it will radiate a vertically polarized, figure-eight pattern (looking down on the antenna) with maximum radiation being in the same plane as the antenna loop. You may use a small TV rotator in this case in order to null out received noise or interference sources that are in a direction perpendicular to the plane of the antenna loop.

You may refer to the [ARRL Radio Amateur's Handbook](#) for description of antennas and some of the terms used above.

6. HOOK-UP

Install 50 ohm coaxial cable (RG-8, RG-8X or RG-58) between the IsoLoop and your transceiver. Use PL-259 connectors at the IsoLoop end. Refer to the [ARRL Radio Amateur's Handbook](#) for proper techniques for installing a PL-259, as this step is critical to proper operation of the IsoLoop antenna. Use the enclosed packet of COAX SEAL™ to waterproof the PL-259 connector (be sure to follow the instructions on the package). Also, the coax connector on the IsoLoop is directional, and should be rotated so that the coax can be taped neatly to the mast.

Attach the motor control cable to the LC-2 Loop Controller which should be located adjacent to your radio.

Run the RF (coax) and control cables as close to the antenna shell as possible. Tape them securely to the mast every few feet.

CAUTION — CAUTION — CAUTION

Because of the doughnut shaped pattern of the IsoLoop, there is a minimum field point in the center of the loop where the mast is mounted. It is VERY IMPORTANT that you follow the above directions as to the "dress" of the two cables. If they are allowed to simply "hang" vertically from the ends of the loop, they will pick up significant energy on the outside of the cable and distort the pattern and carry RF into your radio operating environment. For best results, the cables need to be kept as close as possible to the body of the antenna and mast, otherwise, your VSWR may be higher than it should.

Hook up the supplied audio cable from your receiver's EXTERNAL SPEAKER output to the AUDIO input jack on the LC-2. Wire a 2-conductor cable to a monitor speaker using the 2-conductor jack included in the hardware package. Connect this cable to the audio output on the LC-2.

7. BIOLOGICAL CAUTIONS

Presently, there is not significant data on the hazards of long-term exposure to signals transmitted in the 10 to 30 MHz range. Some scientists do have concern and are studying the problem. It is always good practice to place any transmitting antenna as far away from humans as practical — you should try to maintain at least a 10 foot spacing.

CAUTION — CAUTION — CAUTION

Locate the IsoLoop so that NOTHING, especially living beings can come in physical contact with it under any transmit conditions. RF arcing and burns may result if the antenna is touched when transmitting, particularly at high power conditions.

The IsoLoop is a very high-Q device and as a result the RF circulating currents and the RF voltages may be quite high. DO NOT TOUCH THE ANTENNA WHILE TRANSMITTING !!!

8. OPERATION

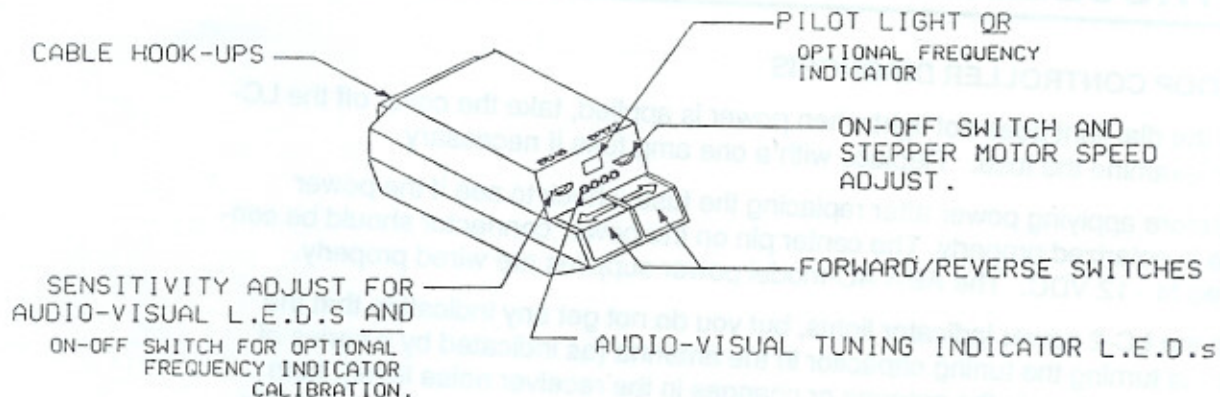


Fig. 4

Turn your transceiver on and tune the receiver to a frequency in the 10 to 30 MHz range.

Turn the SPEED control of the LC-2 to the inside (see Figure 4). As the switch clicks, the LEDs should flash. Just beyond the switch click is the high speed position. Further rotation to the left or inside will decrease the speed of the stepper motor.

With the volume control in your receiver turned up so you can hear receiver noise, press one of the arrow keys. You will notice an increased noise level as the antenna tunes through resonance. The LED array on the front of the LC-2 will light during resonance as well. The noise will peak and subside very quickly.

- The sensitivity of the LEDs can be adjusted by turning the "SENS" knob on the left side. Just beyond the switch click is maximum sensitivity. Further rotation to the right will decrease sensitivity to audio noise.

After hearing the noise peak, turn the speed control to a lower speed and alternate pressing the arrow keys until you arrive at the peak noise point. If you wish to transmit, use lowest possible power and adjust for minimum SWR.

You should be able to realize 1.2 to 1.5 to 1 VSWR if the antenna is in "free space" - i.e. not in an attic or near a house wall where it might become two to one or worse. However, the net effect of a non-perfect VSWR is to cause some of the power to be lost in the cable. You will find that antenna performance (measured by the ability to hear and be heard), is not very sensitive to VSWR differences — it is much more sensitive to correct tuning. In addition, your transceiver may not "like" the reflected power associated with a high VSWR. **If you have to locate the antenna near metallic objects, you may want to adjust the primary loop closer or farther from the aluminum band for minimum SWR on your favorite frequency.** The primary loop is the length of coax located in the small part of the antenna shell, and its position can be adjusted by first separating the two halves of the antenna shell, then moving the primary loop to a different notch.

9. TROUBLESHOOTING AND SERVICE

LOOP CONTROLLER DIAGNOSIS

If the dial light does not light when power is applied, take the cover off the LC-2 and examine the fuse. Replace with a one amp fuse if necessary.

Before applying power after replacing the fuse, check to see if the power cable is polarized properly. The center pin on the power connector should be connected to +12 VDC. The AEA AC-model power supplies are wired properly.

If the LC-2 power indicator lights, but you do not get any indication that the motor is turning the tuning capacitor in the antenna (as indicated by a series of audible pulsations in the antenna or changes in the receiver noise level), then you will need to take the housing apart to expose the tuning capacitor assembly.

Remove the three 1/4" clamp screws and remove the top half of the housing. (The lower half has drain holes).

Operate the arrow keys on the LC-2 and see that the center part of the tuning capacitor rotates. If the motor turns, but the capacitor doesn't, the gear may be jammed, loose, or slipping.

RETURN TO FACTORY PROCEDURE

If the IsoLoop must be sent in for repair, we will give you a Return to Manufacturer Authorization (RMA) number over the telephone. This number allows us to better track your unit with our computer, so we can tell you its exact status at any moment.

If you send it by UPS, it must be sent to the street address — not the post office box number. The street address is:

AEA, Inc.
2006 196th St. SW
Lynnwood, WA 98036
USA

We will need your STREET address for UPS return — be sure to send it.

UPS Brown takes seven to eight days, Blue takes two to three days. Red is an overnight service and is expensive. Send the antenna in a way that it can be traced if we cannot verify receipt of shipment. We suggest UPS or insured postal shipment.

If the antenna is still under the original owner's warranty, AEA will pay the cost of the return shipment. The current policy is that it will be returned UPS Brown if received Brown or by US Mail; returned UPS Blue, if received Blue or by any overnight service; or returned as the owner states in his letter if he furnishes the return cost for the method he selects.

If the IsoLoop is out of warranty, it will be returned by UPS Brown COD unless: 1) It was received UPS Blue/Red in which case it will go back UPS Blue COD, or 2) If you designate billing to VISA or MASTERCARD, or 3) you enclose personal check endorsed not to exceed \$100, or 4) you specify some other method of return.

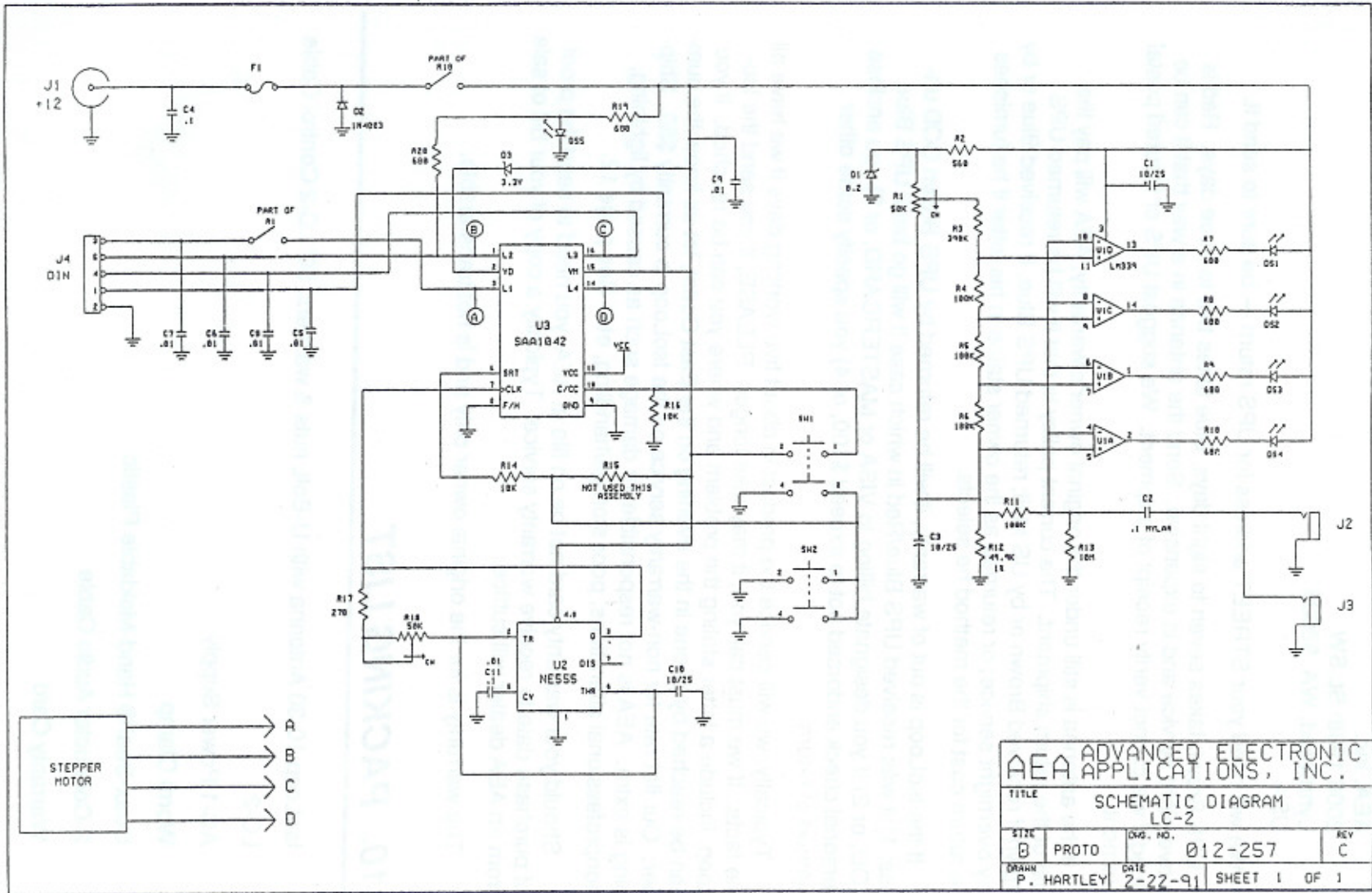
Typically, we will service the product in about five working days if we have all the facts. If we must call you, it may take longer. PLEASE, if you send the IsoLoop, include a letter stating the problem and where you can be reached. If you can be reached by phone in the evening on the East Coast, let us know the number. Our flat rate for non-warranty service on the IsoLoop is currently \$50. Shipping is extra. AEA is not responsible for damage such as caused by lightning, nonprofessional alterations, poor storage/handling, etc. See page 12.

Should your warranty card not be on file at AEA, you need to send the proof of purchase date to receive warranty service. Typically a copy of your bill of sale from an AEA dealer will suffice.

The warranty is for the original owner only and is not transferable.

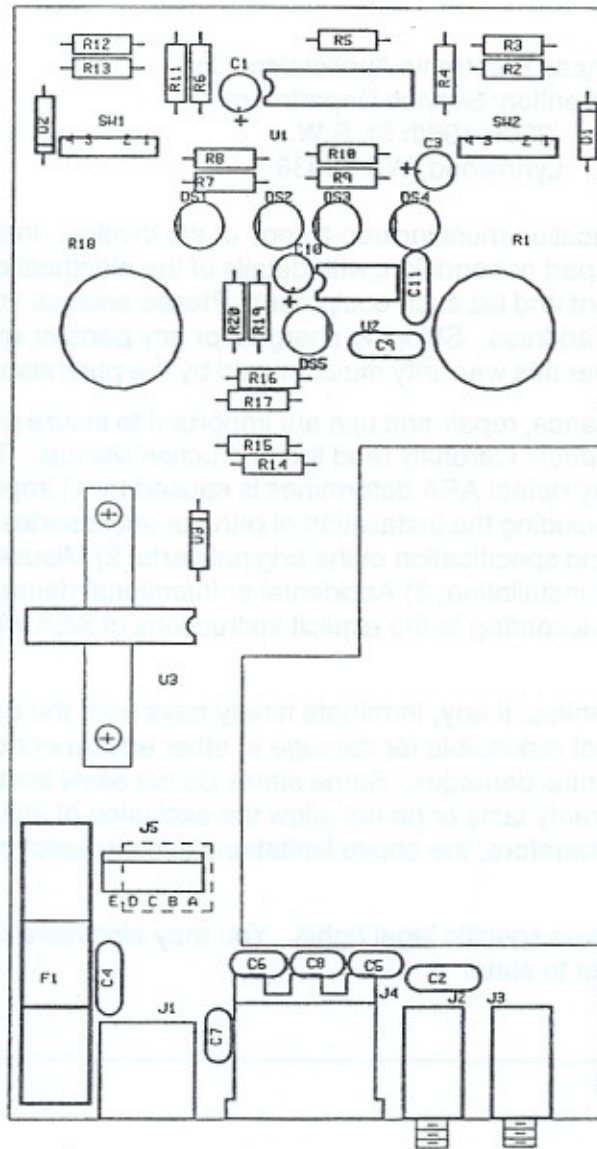
10. PACKING LIST

IsoLoop 10-30 Antenna with U-Bolt, nuts & washers; 50' LC-2 Control Cable
LC-2
AC-1 Power Supply
Worm Clamp
Coax-Seal ® Hand-Moldable Plastic
2-Conductor Audio Cable
Warranty Card



11. LC-2 SCHEMATIC DIAGRAM

12. LC-2 PARTS PICTORIAL



13. WARRANTY

LIMITED WARRANTY

ADVANCED ELECTRONIC APPLICATIONS, INC. warrants to the original purchaser that this product shall be free from defects in material or workmanship for ninety days from the date of original purchase. In order to obtain warranty service: 1) Complete and mail the warranty registration card within 10 days to Advanced Electronic Applications, Inc., and 2) Send written notification to the address below or telephone as soon as possible after discovering a possible defect:

Advanced Electronic Applications, Inc.
Attention: Service Department
2006-196th St. S.W.
Lynnwood, WA 98036

The written notification must include a copy of the invoice. Include a description of the defective part or condition, with details of the electrical connections to associated equipment and list such equipment. Please enclose your name, phone number, and address. Shipping charges for any parts or units submitted for replacement under this warranty must be paid by the purchaser.

Correct maintenance, repair and use are important to insure proper performance from this product. Carefully read the Instruction Manual. This warranty does not apply to any defect AEA determines is caused by 1) Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specification of the original parts; 2) Misuse, abuse, neglect, or improper installation; 3) Accidental or intentional damage. The field installation of circuits according to the explicit instructions of AEA will not nullify this warranty.

All implied warranties, if any, terminate ninety days from the date of original purchase. AEA is not responsible for damage to other equipment or property or any other consequential damages. Some states do not allow limitations of how long an implied warranty lasts or do not allow the exclusion of incidental or consequential damages, therefore, the above limitations and exclusions may not apply to you.

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

