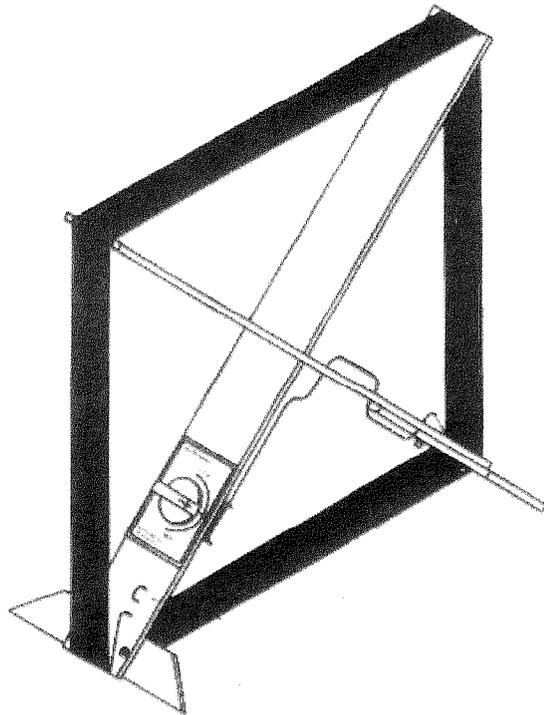


## AM Radio Loop Antenna Plans

*Hear what you've been missing!*



Published by MTM Scientific, Inc.

P.O. Box 522 Clinton, MI 49236

<http://www.mtmscientific.com>

## **Construction Details: AM Loop Antenna**

MTM Scientific, Inc. P.O. Box 522 Clinton, MI 49236

The AM Loop Antenna is a fun project, and you will probably want to get right at it! The large sheet of plans is almost self-explanatory, and the smaller plan sheets have more detail than you probably want to know! Please read these short instructions *first*, to avoid common mistakes, and understand the general order of assembly.

### **Getting Started: Collecting Materials & Tools**

The following parts are needed to build the AM Loop Antenna:

#### **Parts List: AM Loop Antenna**

- 1) Two pieces, Red Oak, 2ft x .25in x 2.5in. (Lowe's, Home Depot, etc.)
- 2) One piece, Red Oak, 2ft x .25in x 1.5in. (Lowe's, Home Depot, etc.)
- 3) Enameled Magnet Wire, 90ft, 22 Ga.
- 4) Air Variable Capacitor, 365 pf, extra long shaft.
- 5) Tuning knob, .25in shaft.
- 6) Tuning dial plate (see instructions).
- 7) The following hardware, all with #6-32 threads:
  - a. 4 pieces flat head screws .75in long (Leg Mount)
  - b. 2 pieces flat head screws .375in long (Capacitor Mount)
  - c. 1 piece round head screw, .125" long (Wire Eyelet Mount)
  - d. 1 piece miniature type solder eyelet (End Wire Attach)

You will also need wood stain, soldering supplies, and wood glue. With regard to special tools... you will need 3 drill bits (1/16", 3/16" and 5/16"), a counter-sinking bit, miter saw, wood file, general hand tools and sandpaper.

### **Construction Begins!**

Construct the AM Loop Antenna as follows:

- 1) Using scissors, carefully cut out the templates for the wood pieces from the large sheet of plans.
- 2) Use the paper templates as a marking guide for the saw cuts, drilled holes and bevels. The arm's end notches can be made with a

hacksaw. The bevels on the support feet can be made with a wood file, or a 3" wide belt sander. Do not neglect to countersink the drilled holes as indicated. Sand the wood pieces lightly and stain as desired.

- 3) Glue together the two Arms (Tuning & Standard) as indicated by the plans. Note: Fixture the arms squarely before the glue sets.
- 4) Wind 15 turns of copper wire onto the arms. Start by threading the wire through the 3 small holes in the Tuning arm. Wind counter-clockwise, as shown on the large plan sheet. Try to maintain a constant winding tension of about 5 pounds.
- 5) After the last turn of wire, thread the end through the 3 small holes in the Standard Arm. Strategically placed dabs of hot melt adhesive will prevent the wire ends from working loose.
- 6) Attach the variable capacitor to the tuning arm. Handle the capacitor carefully to avoid damage to the thin metal plates.
- 7) Solder the starting wire lead to a solder lug on the capacitor. Attach the miniature solder eyelet to the end wire. The eyelet is attached to the capacitor's metal frame using the smallest screw.
- 8) Attach the support feet as shown on the plans. Note that the bevels on the feet provide an unobstructed path for the turns of wire.
- 9) The faceplate and tuning knob complete the construction. The paper dial plate in the plans can be laminated for an especially sharp looking dial.

The Loop Antenna is now ready for use, per the user instructions.

### *Notes & Comments*

It requires special care to wind the wire turns smoothly and with constant tension, for a good-looking antenna. This is really a matter of personal preference, as the antenna performance is not materially affected.

The support feet for the antenna have a small amount of play in the mounting holes, and can be adjusted level on a flat surface.

A large drill bit can be used for a countersinking bit, but be careful not to drill clear through the hole!

# AMDX1000: AM LOOP ANTENNA INSTRUCTIONS

MTM Scientific Inc. P.O. Box 522 Clinton, MI 49236

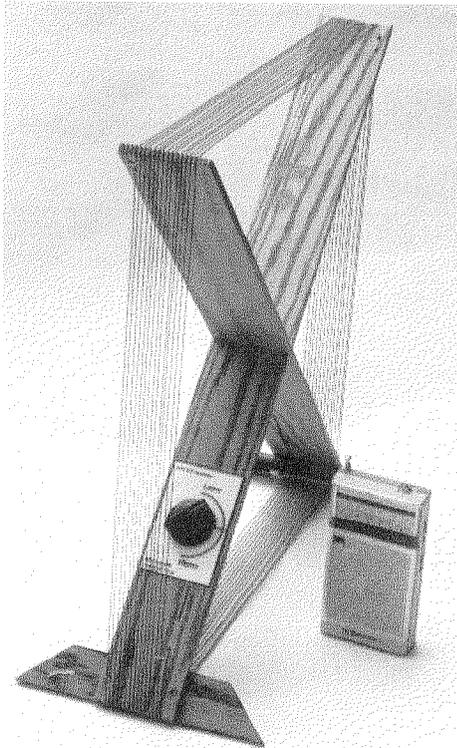
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## Introduction

The AMDX1000 loop antenna is designed to increase the reception range and quality of any portable AM Radio. The antenna does not require an external power source and wired connections between the antenna and radio are not required.

## How to use the AMDX1000

Any portable AM radio can be used with the loop antenna....



**Photo 1: View of the AMDX1000 loop antenna in use.**

Digitally tuned radios are easier to use, but dial tuned radios work just as well. A radio powered by batteries is especially convenient. The radio's built-in antenna should not be extended. The radio should be positioned relative the antenna as shown in Photo 1.

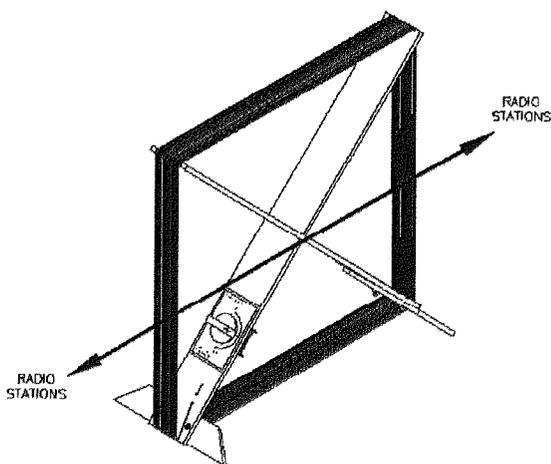
The loop antenna is a directional antenna. The radio station reception will change, depending on the direction the antenna is pointing. For example, aligning the antenna in a North-South direction will maximize reception of radio stations which are both North *and* South of the listener, while minimizing stations to the East and West. (See Figure 1 on the next page.)

First time users should begin by tuning the AM radio to a weak (but audible) local station. Next, slowly rotate the tuning dial on the loop antenna, while listening carefully. During antenna tuning the radio reception will suddenly improve! You will quickly get a feel for the sensitivity of the adjustment.

Successful operation is a repetition of the same 3 basic things:

- 1) Point the antenna,
- 2) Tune the radio, and
- 3) Tune the antenna.

An especially fun demonstration is the following: Tune the AM radio to a dead spot on the band and turn the volume up high. Carefully adjust the loop antenna dial and listen for new radio stations. You will be surprised by what you hear!



**Figure 1:** Radio Stations along the axis of the antenna are received best.

### *DXing AM Stations*

DXing is the hobby of listening for distant radio stations, and it dates back to the earliest days of radio. According to Federal regulations, only a limited number of AM radio stations are allowed to broadcast with full power (50 KW) at night. These AM radio “powerhouse” stations make excellent targets for long distance reception using the

Location	Call	Frequency
Atlanta, GA	WSB	750
Chicago, IL	WGN	720
Cleveland, OH	WWWE	1100
Denver, CO	KOA	850
Des Moines, IA	WHO	1040
Detroit, MI	WJR	760
Fort Worth, TX	WBAP	820
Los Angeles, CA	KNX	1070
Louisville, KY	WHAS	840
Nashville, TN	WSM	650
New York, NY	WABC	770
Pittsburgh, PA	KDKA	1020
Salt Lake, UT	KSL	1160
St. Louis, MO	KMOX	1120

**Table 1:** Examples of High Power AM Radio Stations in the U.S.A.

loop antenna. Table 1 is a representative sampling of AM powerhouse stations in the United States of America. Of course, you will need to determine the approximate heading from your location, in order to point and aim the loop antenna at them.

### *Simply Put...How does this work?*

The AM Loop antenna uses the principle of electrical resonance. The copper wire windings form an inductor, and the aluminum plates attached to the tuning dial form a variable capacitor. The inductor and capacitor form a parallel tuned circuit with a specific resonant frequency. Properly tuned, the frequency of loop antenna resonance and the radio station broadcast frequency are equal.

For example, WABC in New York (at dial 770) broadcasts at a

frequency of 770,000 Hertz. When carefully tuned, the loop antenna will resonate at exactly that same frequency.

A resonant electric circuit, such as the loop antenna, oscillates in harmony with the electrical impulses from the radio station. The antenna's oscillations can reach relatively large amplitude. In essence, the loop antenna becomes a selective local repeater of the distant radio station's signal.

Portable AM radios contain an internal ferrite core antenna. The internal antenna strongly couples to the loop antenna oscillations when they are physically close together. Of course for reception, the radio must also be tuned to the same frequency as the loop and the radio station.

This is an admittedly simple explanation for the operation of the loop antenna. You may enjoy reading more about antennas in some of the excellent publications from the American Radio Relay League (ARRL).

### Hints, Tips & Ideas

You will quickly become expert at using the loop antenna. Here are a few hints, tips and ideas...

- A 'Lazy-Susan' type rotating tabletop is great for aiming the antenna and radio together, as a pair.
- Prepare and maintain a log of radio stations received. It will become a valuable listening aid.
- Your favorite radio stations can be marked on the brass dial plate with a felt tip pen.

### Care and Maintenance

The loop antenna is designed to provide years of trouble free service. Should the wire windings ever be damaged, they can be rewound using #22 Gauge magnet wire. Should the plates of the capacitor ever be damaged, a replacement capacitor can be ordered from MTM Scientific, Inc.

### Additional Sources of Information

The American Radio Relay League, 225 Main Street, Newington, CT 06111 is a great Amateur Radio organization with many interesting and useful publications. Write for a list.

The World Radio TV Handbook, or 'WRTH' is a comprehensive annual listing (in book form) of broadcast stations, including AM Radio. It's available at bookstores.

Founded in 1933, the **National Radio Club, Inc.** is the world's largest and oldest Medium Wave DX club. Contact them at: NRCL, P.O. Box 164, Mannsville, NY 13661

*Technical Data*

**AM Radio DX Loop Antenna**

Model..... AMDX1000

Tuning Range... 550-1700 KHz

Size..... 18" x 18" x 8"

Weight..... 2 pounds

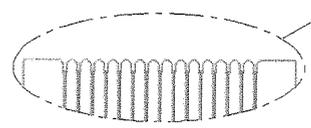
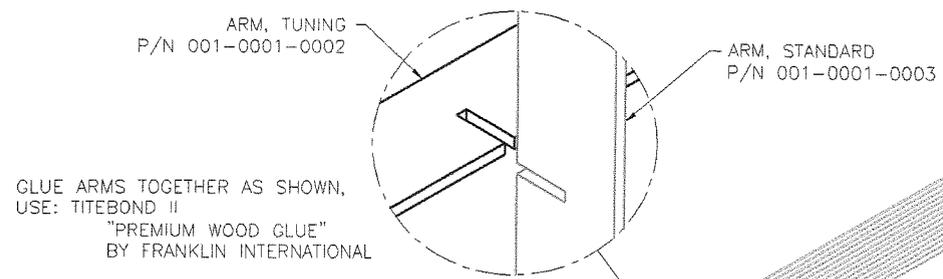
Wire..... 83 ft, 22 Ga

Frame..... Red Oak

*Contact us at:*

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522, Clinton, MI 49236

REVISION HISTORY				
REV.	ECO #	DESCRIPTION	DRAWN BY	DATE
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15 TURNS, 22 GAUGE COPPER  
MAGNET WIRE, FORMVAR INSULATION  
WINDING TENSION: 5 POUNDS

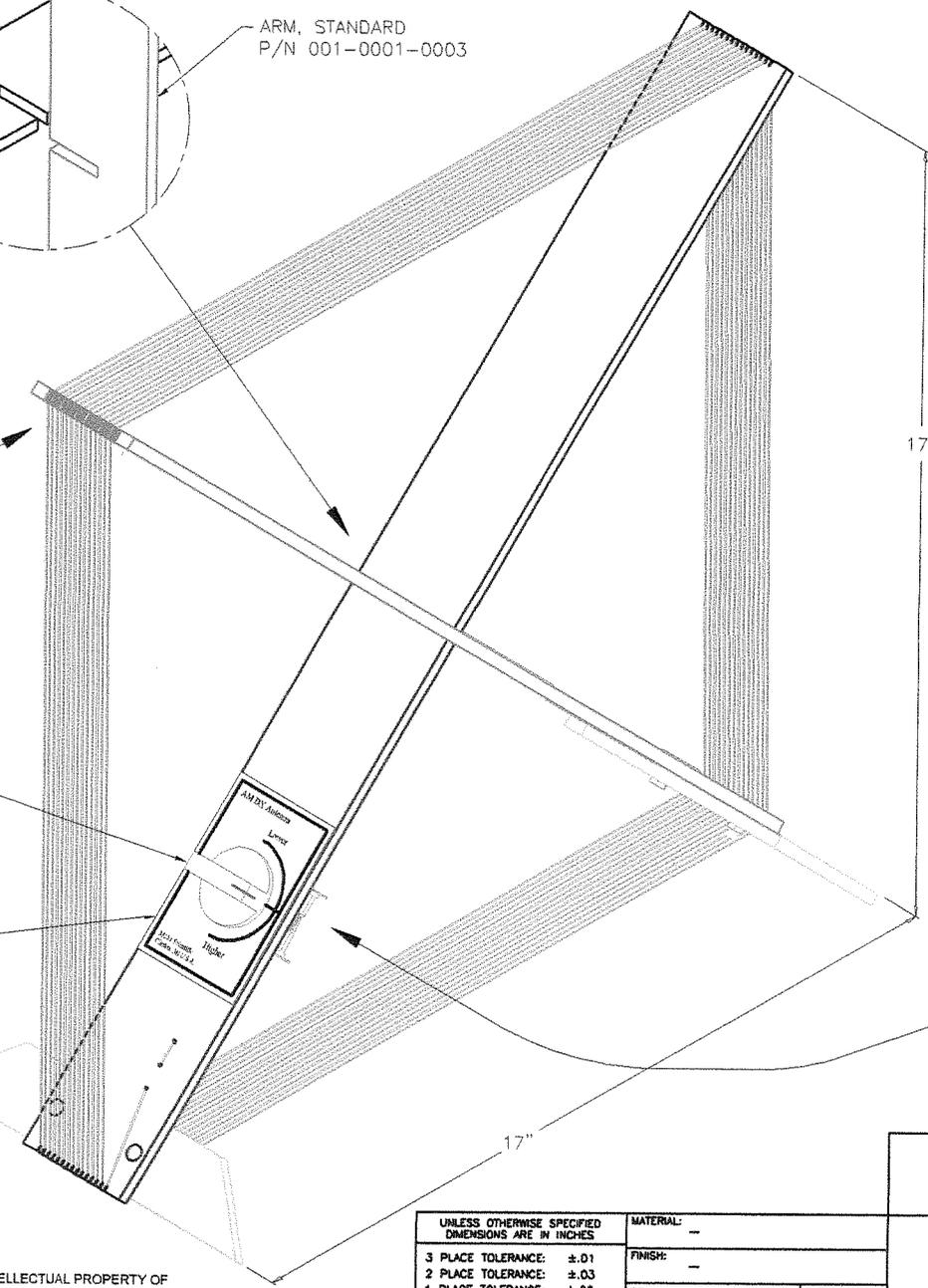
POINTER CONTROL KNOB  
DAVIES  
P/N 1520X

FACE PLATE  
P/N 001-0001-000\_

2X SUPPORT FOOT  
P/N 001-0001-0004

HARDWARE:  
4X #6-32 x 3/4"  
FLAT HEAD SCREWS, SS  
4X #6-32 FLAT WASHER  
4X #6-32 NUT, SS

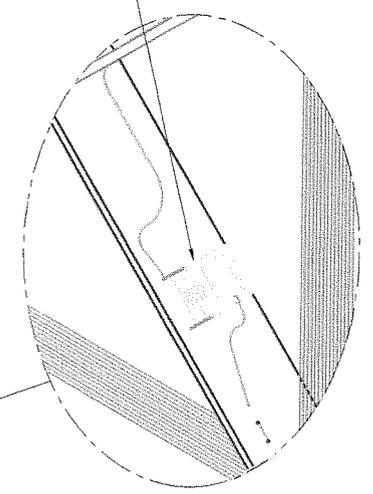
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FINISH ON ALL WOOD PARTS  
MINWAX  
210B "GOLDEN OAK"

VARIABLE AIR CONDENSER  
OREN ELLOTT PRODUCTS INC.  
EDGERTON OHIO  
P/N X480-1 N-50  
(MODIFIED/SPECIAL)

HARDWARE:  
2X #6-32 x 1/4"  
FLAT HEAD SCREWS, SS



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
3 PLACE TOLERANCE:	±.01
2 PLACE TOLERANCE:	±.03
1 PLACE TOLERANCE:	±.08
FRACTIONAL TOLERANCE:	±1/32
ANGULAR TOLERANCE:	±2°
SURFACE FINISH:	SANDED

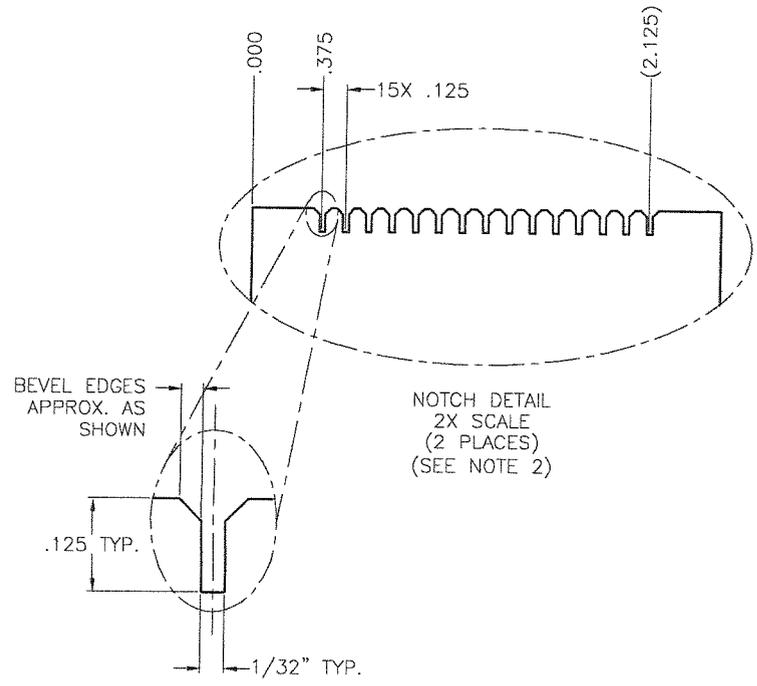
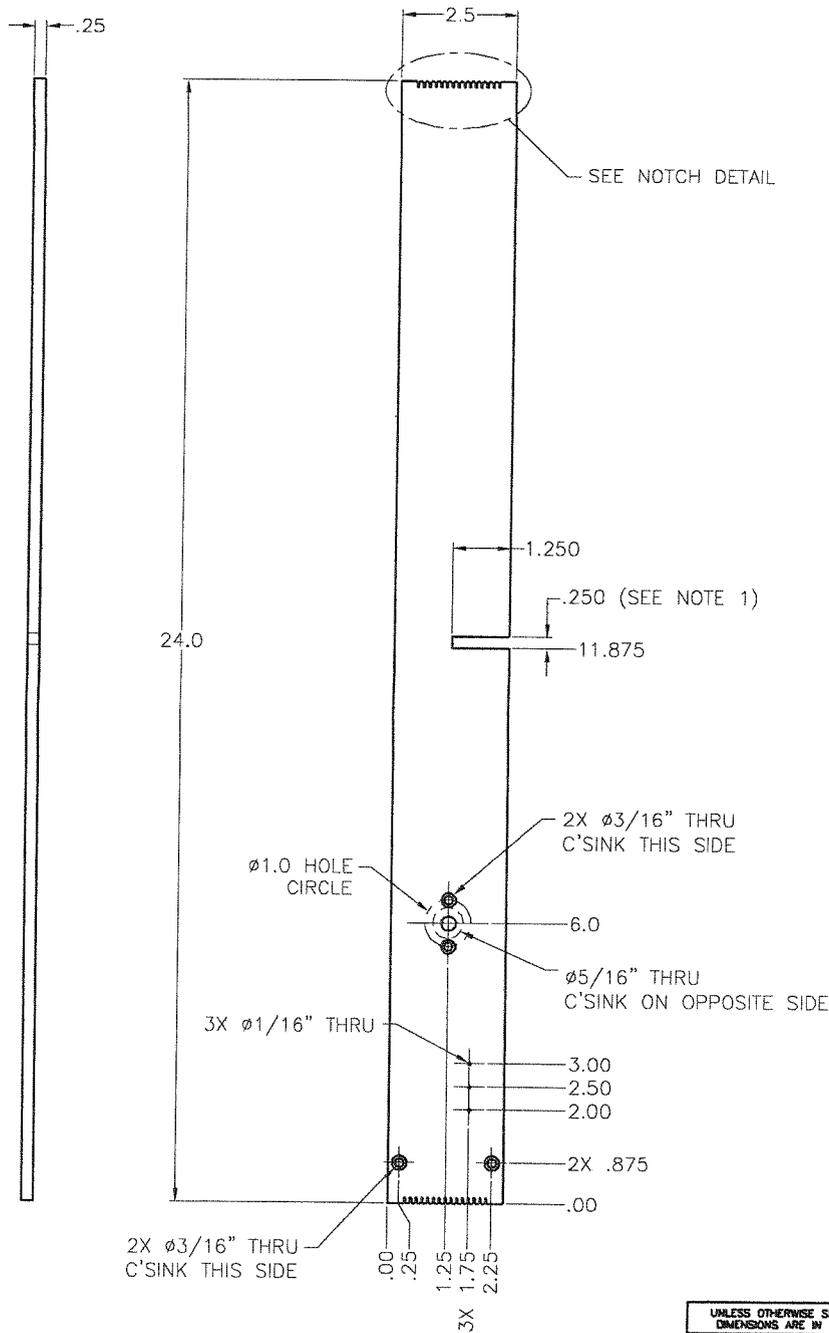
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DATE:	

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Email: MTM@MTMScientific.com

**ASSEMBLY,  
AM LOOP ANTENNA**

SIZE	DWG. NO.	REV.
A	001-0001-0001	-
SCALE	N/A	SHEET 1 OF 1

REVISION HISTORY				
REV.	ECO #	DESCRIPTION	DRAWN BY	DATE
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- NOTES:
1. TO SNUGLY MATE WITH 001-0001-0003
  2. UNIFORMITY OF NOTCH SIZE AND DEPTH IS DESIRED, TOLERANCES MAY DEVIATE. INQUIRE.

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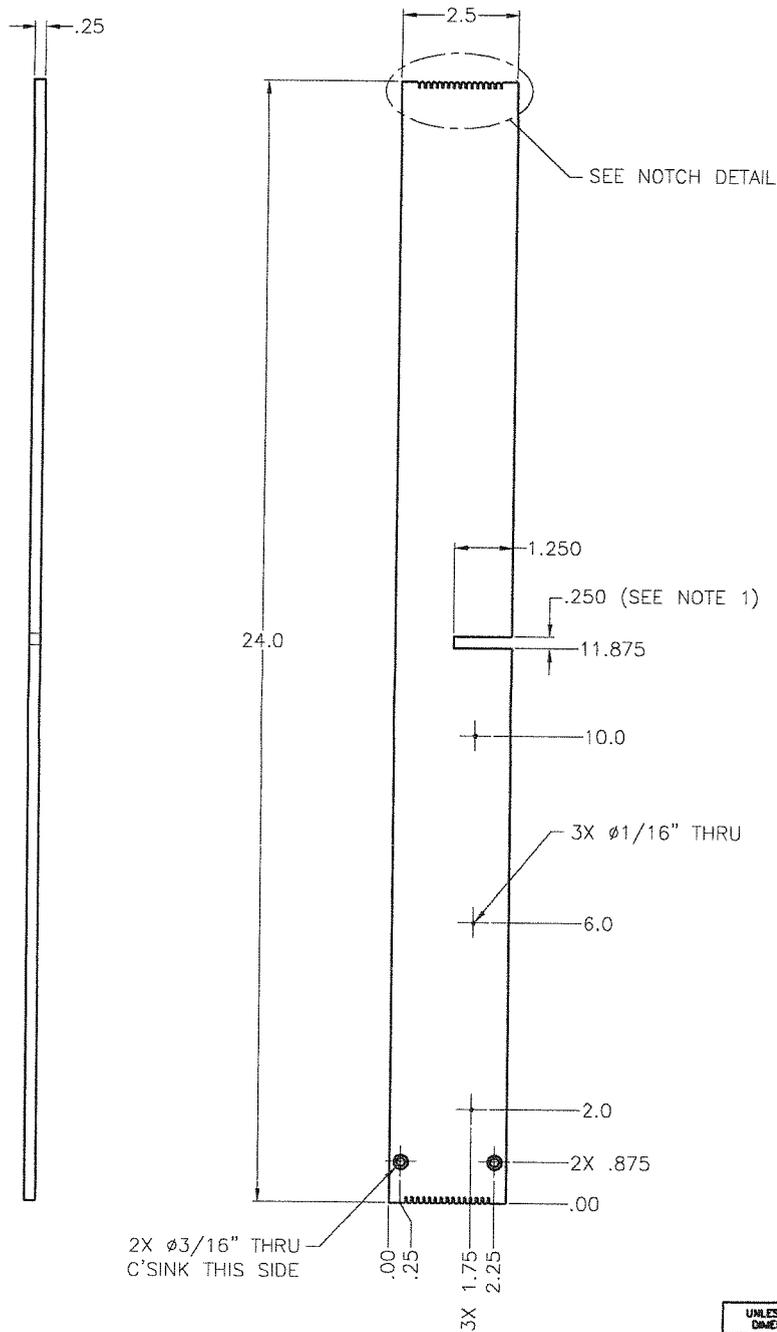
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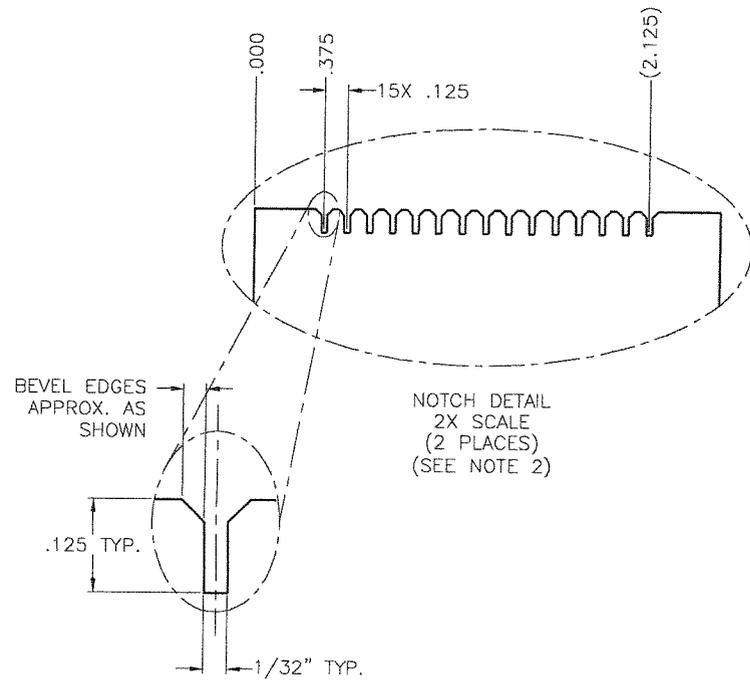
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SCALE .25X		SHEET 1 OF 1

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2 PLACE TOLERANCE: ±.03
1 PLACE TOLERANCE: ±.06
FRACTIONAL TOLERANCE: ±1/32
ANGULAR TOLERANCE: ±2°
SURFACE FINISH: SANDED

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CHECKED BY:	DATE:

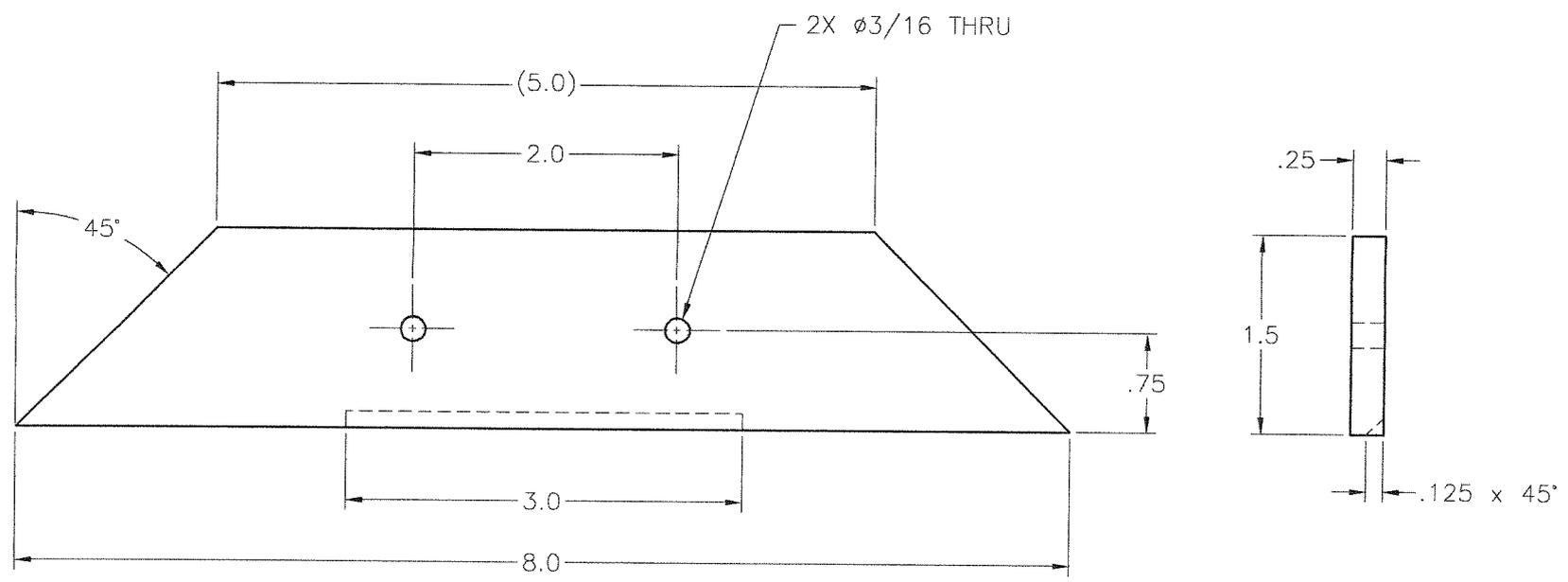
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**ARM, STANDARD,  
AM LOOP ANTENNA**

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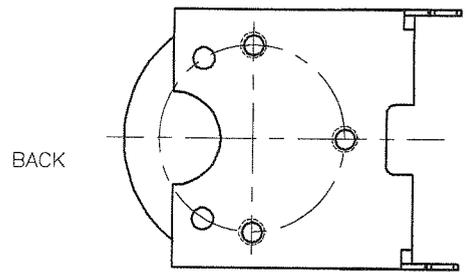
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CHECKED BY:	DATE:

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 Email: MTM@MTMScientific.com

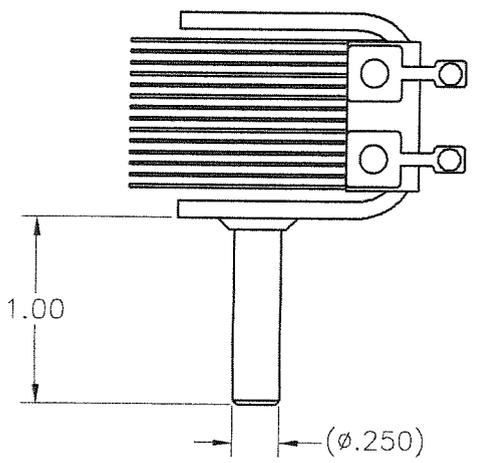
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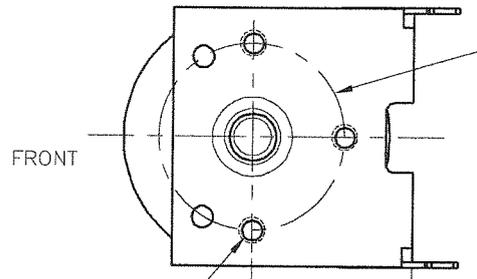


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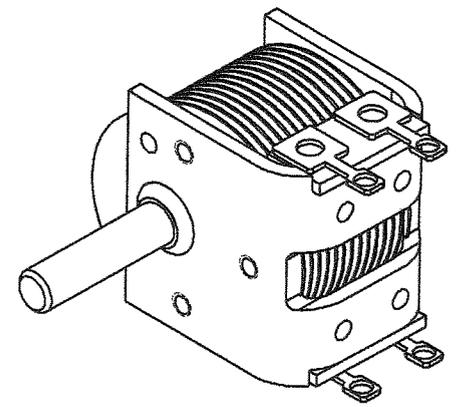


(2X R 17/32 HOLE CIRCLE)

FRONT

6X #6-32 TAPPED HOLE

(.875)



- NOTES:
1. OREN ELLIOTT PRODUCTS INC. P/N N-50 CONDENSER X480-1 (MODIFIED AS SHOWN)
  2. DIRECT DRIVE.
  3. NO TRIMMERS.
  4. COUNTER-CLOCKWISE ROTATION.
  5. SPECIAL SHAFT LENGTH AS SHOWN.
  6. ADDITIONAL TAPPED HOLES AS SHOWN.

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 Email: MTM@MTMScientific.com

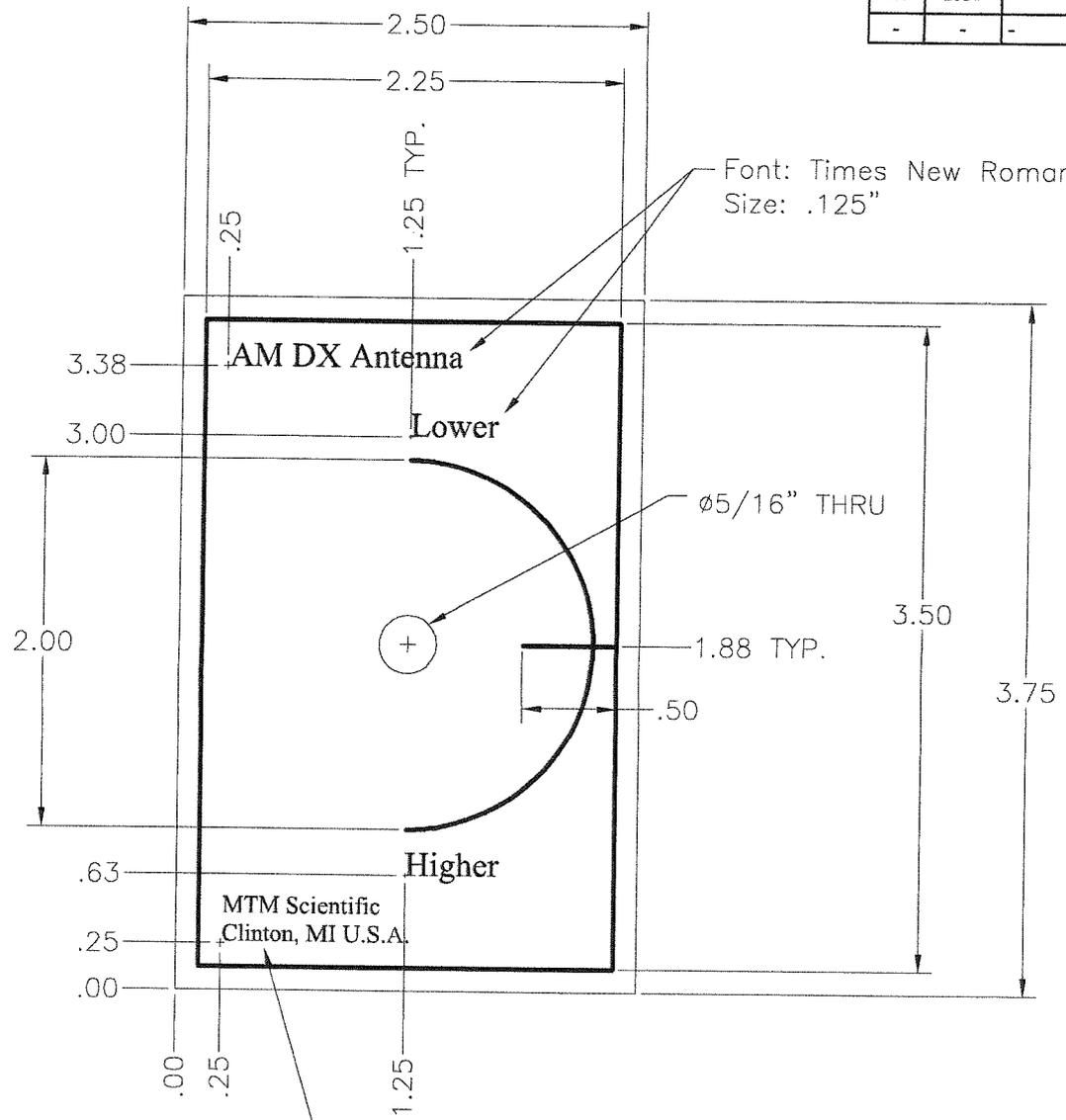
VARIABLE CAPACITOR (MODIFIED),  
 AM LOOP ANTENNA

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		SHEET 1 OF 1

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ANGULAR TOLERANCE: ±1°	CHECKED BY:
SURFACE FINISH:	DATE:

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Font: Times New Roman  
Size: .09"

- NOTE:
1. GRAPHICS: ETCHED AND FILLED IN WITH BLACK.
  2. USE 3M468 ADHESIVE ON BACKSIDE.

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ANGULAR TOLERANCE: ±1°		CHECKED BY:	
SURFACE FINISH:		DATE:	

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**FACE PLATE (BRASS),  
AM LOOP ANTENNA**

SIZE	DWG. NO.	REV.
A	001-0001-0007	-
SCALE 1X	SHEET 1 OF 1	

