Procurement Catalog

# AD-VANCE MAGNETICS, INC.

Email: sales@advancemag.com
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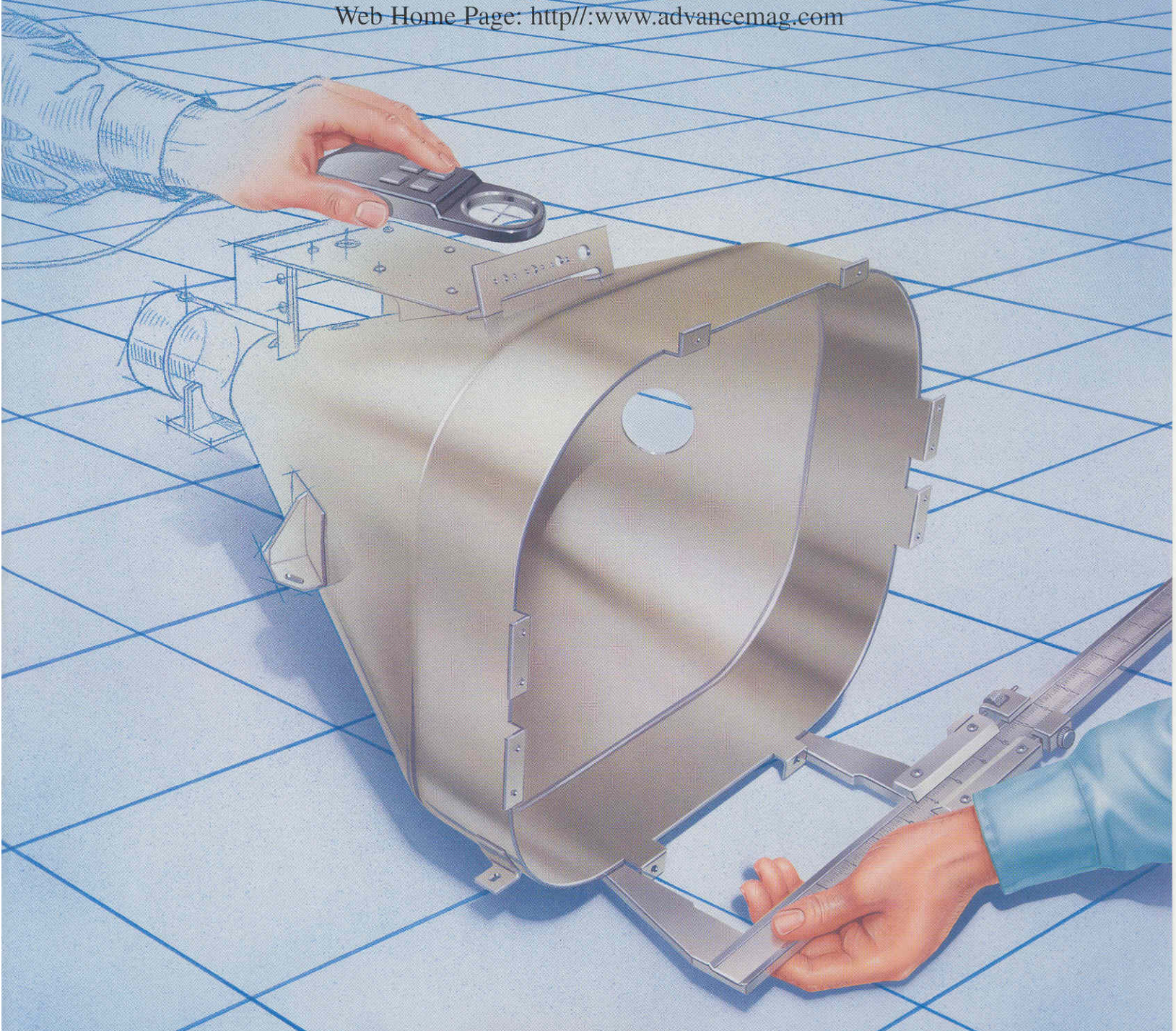
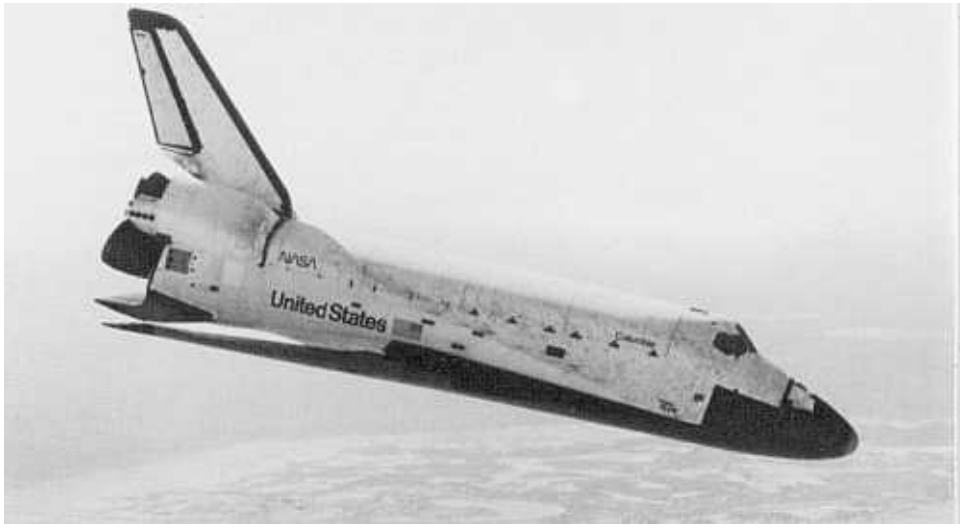


AD-MU AD-VANCE MAGNETICS INC. SHIELDING

*The Problem Solving*
*Magnetic Shielding Specialists*

# High Tech . . . Space Age Technology. . . Magnetic Shielding For Today and Tomorrow . . .




*Magnetic shielding products have applications in a variety of different fields. The NASA Space Program used customized magnetic shields aboard each space shuttle.*

## Contents

### Procurement Catalog:



### Engineering Catalog:



*Please FAX or mail us your company letterhead with your request for the Engineering Catalog. FAX (219) 223-2524*

# The Need for Magnetic Shielding

*By Richard D. Vance, President*
*Ad-Vance Magnetics, Inc., Rochester, Indiana 46975*

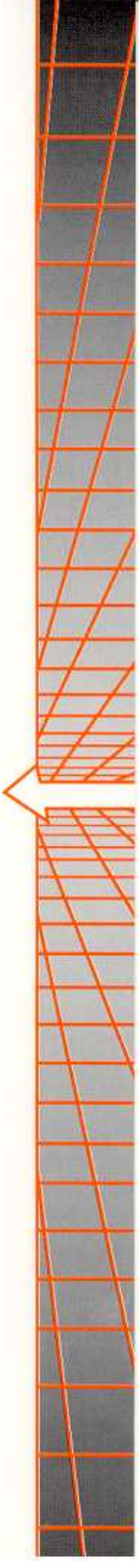
Without magnetic shielding, much of today's sophisticated electronic gear would be larger, less efficient and in some magnetic environments, impossible to function at all. As components are made more sensitive and packaging more dense, susceptibility to electromagnetic interaction increases dramatically, even in the best engineered layouts.

Electro-magnetic interference can originate from various sources. These could include permanent magnets or electromagnets, coil components such as transformers, solenoids and reactors, AC or DC motors and generators, and cables carrying large DC or AC current at power frequencies. In many cases, even the normal earth's magnetic field can affect proper functioning.

To assure optimum performance, stray magnetic fields must be directed around critical electronic components as a rock in a river diverts running water. This is accomplished by a magnetic shield of high permeability (indicative of the ability of a material to carry a flux) which provides a low reluctance path guiding the magnetic flux around the critical area. Field intensities encountered will usually be under 10 oersteds, and field frequencies from DC to 800 Hertz, although AD-MU alloys are effective at much higher frequencies.

Shielding is accomplished by placing a material with a permeability much greater than one between the field source and the sensitive components affected. Such material must be conductive to prevent passage of electric fields and highly permeable to prevent passage of magnetic fields. Shielding materials commonly used have permeabilities from 300 to over 500,000 depending on flux density.

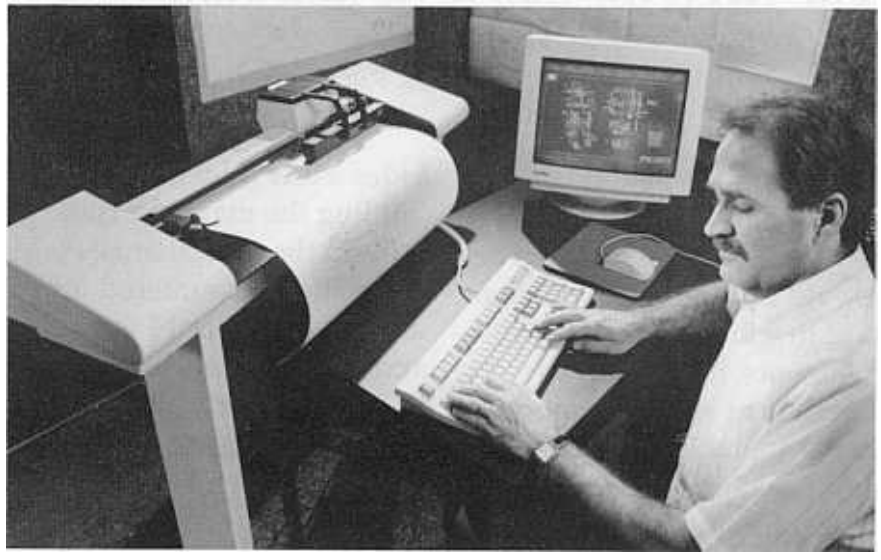
Low frequency magnetic shield effectiveness is directly proportional to shield thickness because the shield's reluctance to magnetic flux is inversely proportional to its thickness. It is essential to minimize joints or air gaps which can reduce shielding effectiveness not only by enabling magnetic interference to leak through but significantly affecting the path's reluctance, resulting in a lower effective permeability. The degree of shielding achieved by a given total thickness of material can be increased by dividing it into two or more concentric shields separated by at least the thickness of the material. In such case, a medium permeability material should be used for one layer and a high permeability material for the other layer. The lower permeability material should be located closest to the field source. Thus the medium permeability laminae act as a buffer that sufficiently diverts the magnetic field to enable the lower reluctance (higher permeability) material to attain the required attenuation. When the external field is strong enough to cause the medium permeability material to approach saturation, an additional diverting shield of low permeability high flux carrying capability may be needed. At H.F., shielding by enhancing skin effect offers a much greater shielding from a thin layer.



# Solving Magnetic Shielding Problems has been the Main Focus for Ad-Vance Magnetics for over 23 years.

As the industry's oldest, largest, and most experienced exclusive manufacturer of magnetic shielding, Ad-Vance's capabilities range from the routine to the most sophisticated. Over 90% of all magnetic shield designs have been fabricated at Ad-Vance Magnetics' facilities throughout the years.

Magnetic shielding engineered and produced by Ad-Vance has applications in many diversified fields. These world-wide areas include: industrial, military, laboratory, and consumer, as well as applications within the aerospace industry.



*We now have design CAD 2 with plotter. Our CAD system is compatible with IGES, DXF and HPGL files. Our modems make it very convenient for transmitting drawings. This is especially useful when time is critical and there are design changes on a product that is in process or where design assistance is desired on new concept drawings.*

What sets Ad-Vance Magnetics apart from others is top of the line engineering talent. This is evidenced in the company's involvement in the majority of all magnetic shield designs. From concept to manufactured product, two key elements of focus are quality and service. Consistently finding solutions to magnetic shielding problems has guided Ad-Vance Magnetics to continued leadership in the industry.

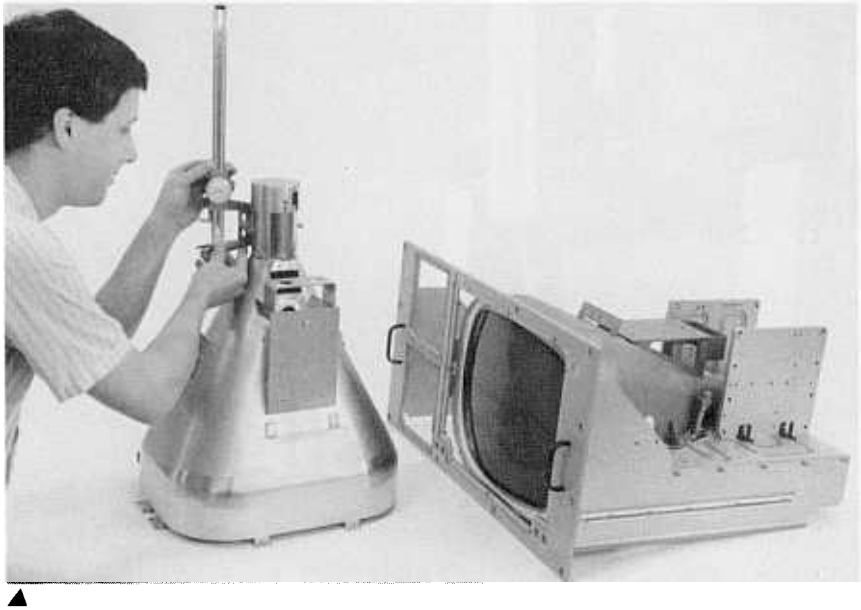
Ad-Vance Magnetics offers a variety of assistance in solving magnetic shielding problems. Often, a customer's initial choice in approaching an

*Ad-Vance Magnetics, Inc. President Richard D. Vance (standing) and staff members discuss elements from Design Engineering through Production with emphasis on quality and service. This hands-on approach is taken to thoroughly discuss each element of every project.*

electromagnetic compatibility problem is a telephone consultation with the appropriate Ad-Vance Magnetics' personnel. A second form of assistance involves laboratory testing. When a customer product is brought in for evaluation, Ad-Vance Magnetics has the technology and test equipment to perform measurements and prescribe shielding techniques. On-site assistance and evaluation is also available to the customer.

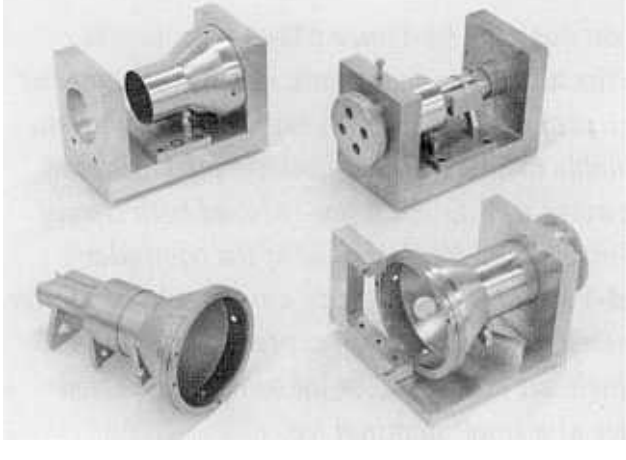
Magnetic shielding techniques are more valuable and cost efficient in the design and prototype stages. Over 90% of all past and present magnetic shield designs have been created and fabricated at Ad-Vance Magnetics. Substantial savings in your shielding costs can be realized by combining our industry leading engineering expertise with existing tooling. Our engineers will recommend the proper magnetic shielding alloy, the most suitable configuration and type of construction for maximum shielding effectiveness. Cost considerations are also always taken into account.

▲ *Manual inspection on a 19" color monitor shield by trained individuals with calibrated equipment. Equipment is calibrated to MIL-STD 45662.*



▲ *A large 17" CRT AD-MU-80 magnetic shield for a shipboard display and a completed CRT assembly shown in the rack mount.*

▼ *Shown are three tight tolerance assembly fixtures and the completed AD-MU-80 magnetic shield which is used on a 4" CRT for a HUD display.*



### How To Hold Down Shield Costs

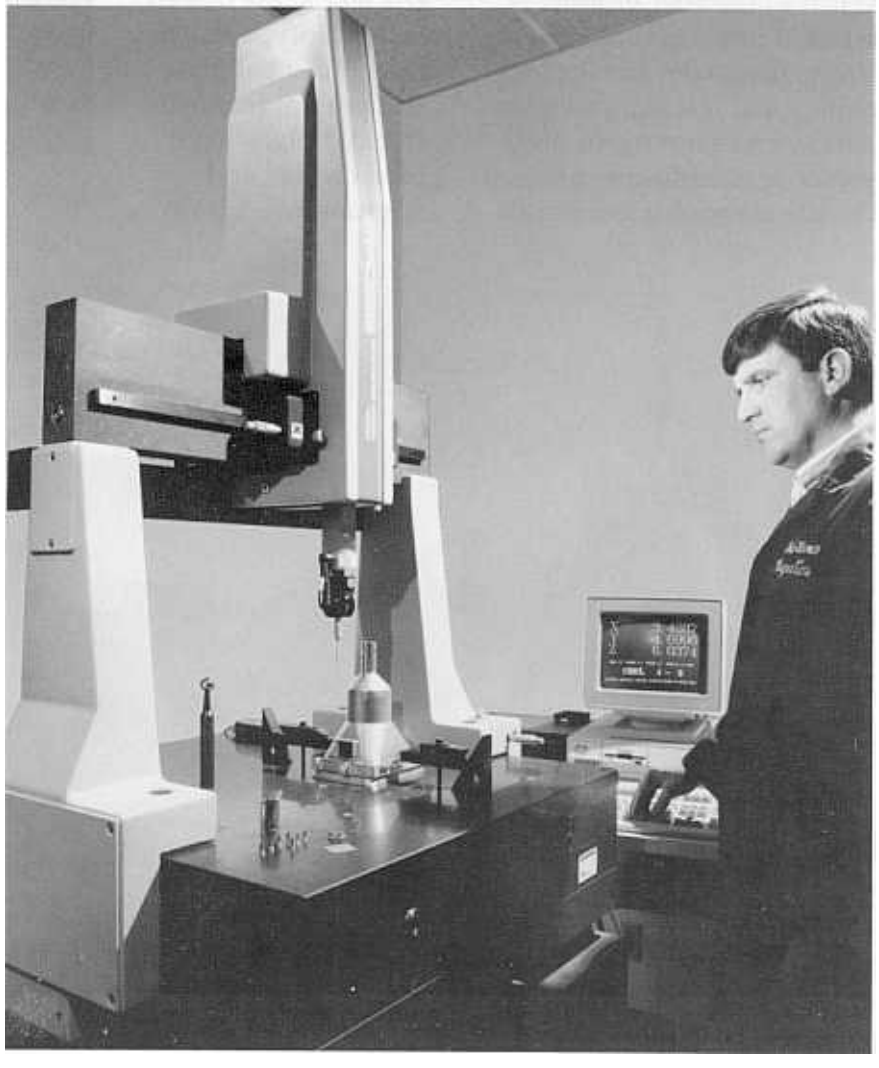
Avoid overdesigning. Ad-Vance's Engineering Department will help you obtain the maximum amount of shielding you need to accomplish your objective for minimum cost. By avoiding overly tight tolerance, unnecessary conformal shapes, elaborate mounting, or too thick of material, cost reductions can be realized. And, of course, since over 90% of past and present magnetic shield designs have been fabricated in Ad-Vance's facility, use of existing tooling also can help cut your shielding costs significantly.

# Ad-Vance Magnetics has a Tradition of Commitment to Superior Quality Control Measures. These Measures are Complemented by a Coordinate Measuring Machine (CMM).

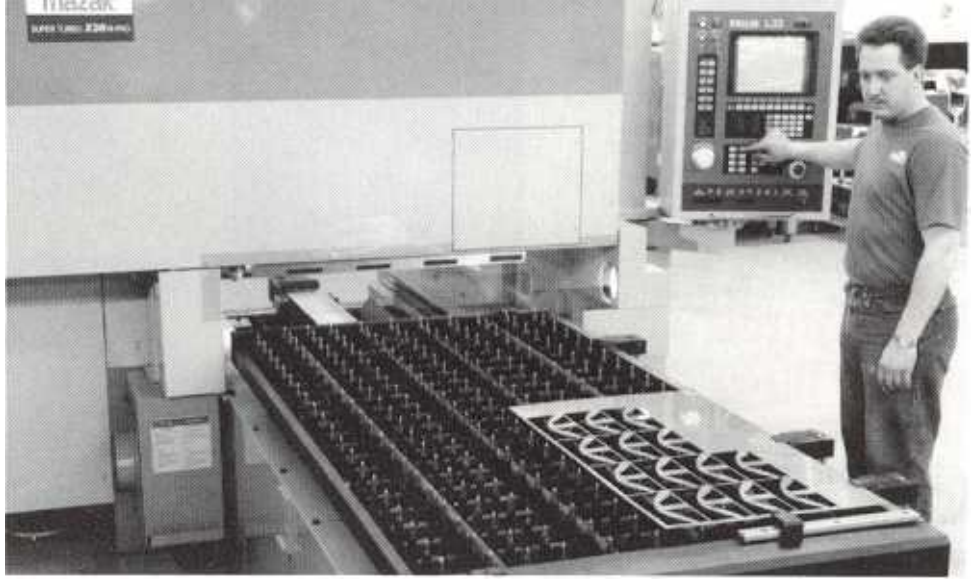
Some of the CMM's features include:

- Measuring Capacity - X, Y and Z plane X - 20", Y -16", Z - 12".
- Measuring Accuracy/ Repeatability in all three planes (X, Y, Z) is .00006.
- Calibrated to ANSI/ASME B89.1.12M-1985. Methods for performance evaluation of coordinate measuring machines.
- Air bearings to eliminate friction for precise positioning and measurement.
- Updated Probe Head from a TP1 head to a PH8 TP2 probe head for added versatility in our applications.
- Renishaw PH8 Head is a medium size swivel head for manual orientation in the horizontal and vertical axis.
- TP2 - 5 Way Touch Probe is the markets' leading probe gauge for measuring in the X, Y and Z plane.
- Computer is an IBM PS/2. With the capability of this system, we can update and add programs as needed. Ref: CAD, or statistical process control (SPC).

With increasingly stringent quality requirements and tight tolerances, the addition of the CMM enhances Ad-Vance Magnetics' leadership in the industry.



*With the emphasis on quality, Ad-Vance Magnetics, Inc. is proud to introduce the use of our coordinate measuring machine (CMM). With the use of the CMM in all aspects of inspection, it has become a valuable tool. With the machine capabilities of measuring in three axis (X, Y & Z), it has reduced both timely set-ups and cost of inspection. With the aid of the computer driven program, Ad-Vance Magnetics, Inc. can supply computer generated documentation, with readings expressed in tenths of thousandths of an inch, on individual or lot sample inspected parts to the customer at a small nominal fee.*



# CNC $CO_2$ Laser Processing Machine

Ad-Vance Magnetic's laser path system has many outstanding features designed to maximize productivity, efficiency, quality and profitability. Primary features include:

**Programming**
Fast programming, using the world's first 32-bit interactive CNC system designed specifically for use with a laser processing machine.

**Set Up**
Set up time, effectively reduced to zero by innovative software functions.

**High-Speed Processing**
Ultra high-speed processing, thanks to the 32-bit microprocessor.

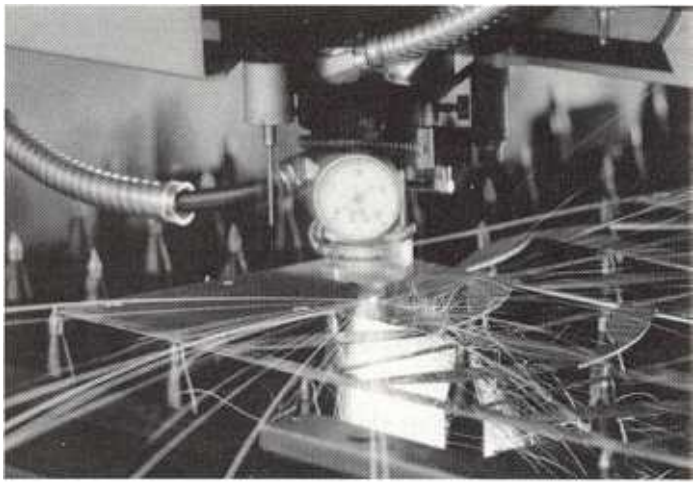
**Precision Processing**
Highly accurate processing, made possible by mechanical parts built to micron tolerances.

**Productivity**
Original mechanical systems which increase operating efficiency and productivity.

**Resonator**
Stable cutting of all materials and thicknesses as a result of a laser resonator with a rated output of 1500 W (2000 W optional) and peak output of 3000 W (4000 W optional) in the super pulse mode.

**Factory Automation**
Can be expanded to a FMC or FMS at later date in response to changing production requirements.

▲ *With our state-of-the-art laser path system, we can take an idea and turn it into a reality. Set-up costs are drastically reduced through interactive, conversational programming via a 32-bit CNC unit. The laser torch is positioned at high speed, torqued by ball screws, with precise repeatability.*



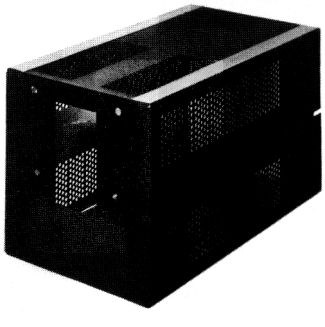
*The non-contact profiler on the laser enables the torch to work slightly above the work-piece, which eliminate tool marks. The laser path can optimize material utilization due in part to the ability of the .008" laser beam to be programmed to pin point accuracy. Either oxygen or nitrogen can be used as the cutting gas, depending on the material and edge quality requirements. The digital touch-probe sensor, turret punch and laser path work hand-in-hand to provide a solution for almost any fabricating challenge. Pre-punched holes can be synchronized with laser cutouts to micron tolerances for multi-process operations.*

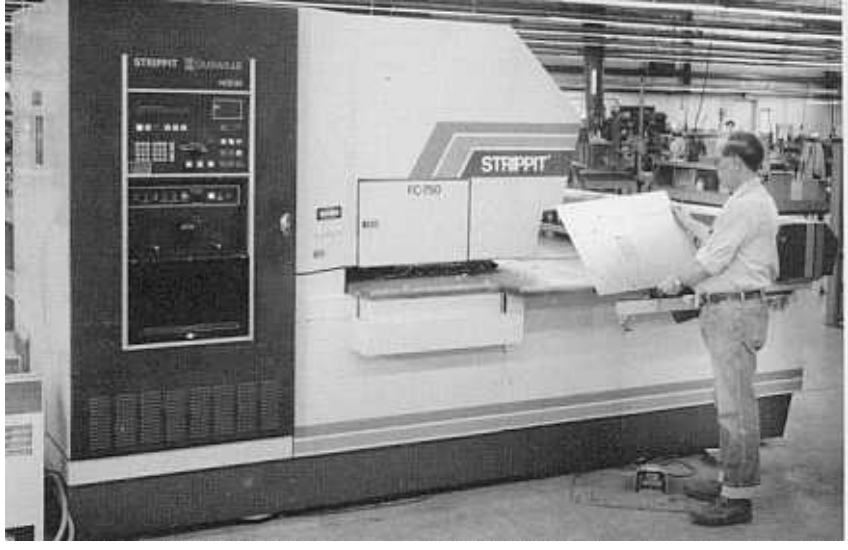
# CNC Turret Punch Press

Our CNC Turret Punch Press machine is a time-saving highly efficient 10 gauge 20 metric ton capacity, numerically controlled punching machine with a rapid positioning 20 station turret.

CNC control capability increases product quality, and provides absolute precision; repeatability to ±.005 accuracy. (±.002 accuracy not unusual).

From prototype quantities to tens of thousands offered depending on your part configuration.






*The machine's controlling computer has full capabilities of editing and deleting program data and for program search and substitution. It has a memory storage capability of 99 programs with instant recall.*

For Example: Electronic Dust Cover — 3,984 hits in only 10.6 minutes with absolute machine accuracy vs. approximately 56 minutes average time on the old manual turret duplicator press with less accuracy/repeatability.

Additional data to help you evaluate how Ad-Vances' CNC Turret Punch Press can reduce costs on your punched products:

- Round, square, obround, rectangular or linear and contour nibbling configurations to your requirement.
- Tool sizes from .050" to 3.500" diameter.
- Blank size capability up to 30" wide x 40" long but can be programmed to any additional desired length.

**Quality:** CNC Turrent Punch Press permits faithful reproduction of engineering data and insures precision parts with accurate repeatability.

**Economy:** Customer can (1) evaluate prototype parts with minimum tooling costs (2) omit hard tooling costs (3) reduce inventory.

**Delivery:** Excellent! Plus (1) parts for production before hard tooling can be made (2) swift turnaround on parts when material is supplied by customer.

**Quantity:** 1 to 1,000s.

"The tighter the tolerances, the higher the reject rate" applies to human error. Our unit is not prone to distractions, as is even the most competent employee.

Option of blank parts, scrap slugs or slug parts, scrap blank.

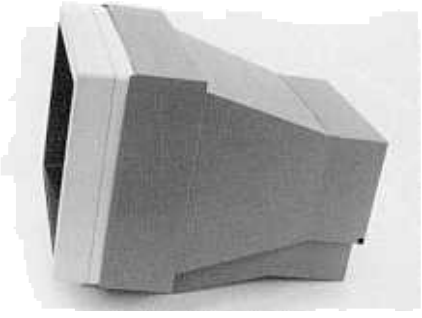
Special tooling is available.

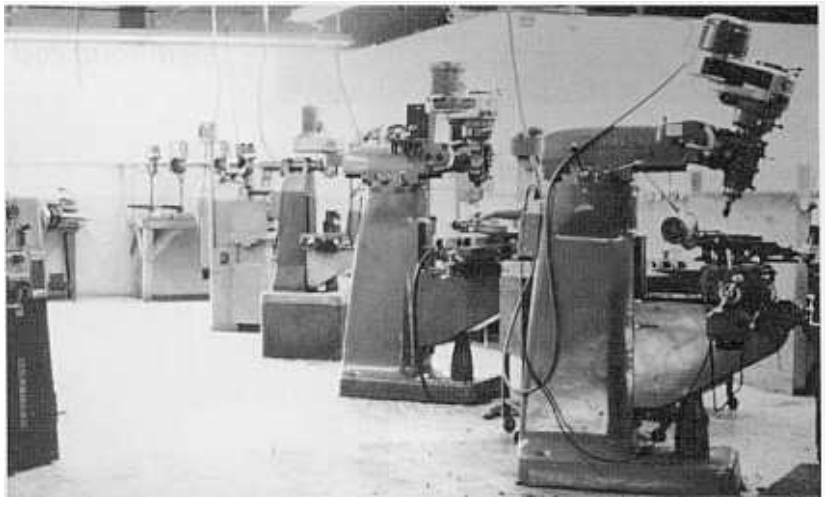
# CNC Shear & Other Precision Equipment

▲
*CNC shear with precision squaring arm, power precision front gaging and electronic probe gaging back stop. For precision cutting from thin gage foil materials to .135" mild steel.*

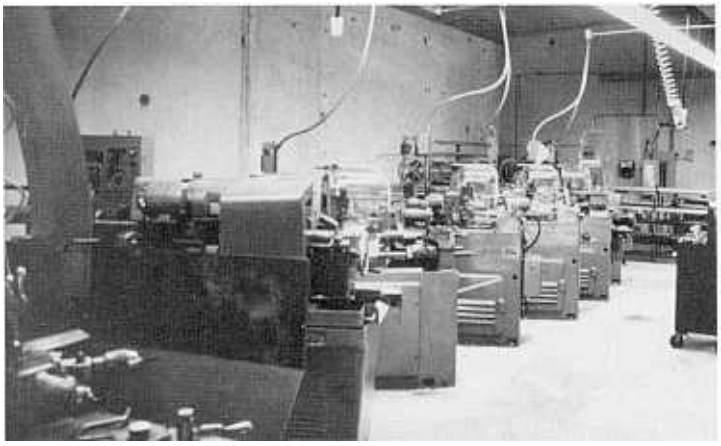
*A magnetic shield enclosure for a color CRT monitor. With proper Ad-Vance Magnetics, Inc. design techniques, these type enclosures can operate in fields as high as 300 miligauss AC magnetic fields and 5 gauss DC magnetic fields.*

▼





▲
*Precision Milling Machines, Vertical and Horizontal. Lathes, Engine Turret and Chuckers.*

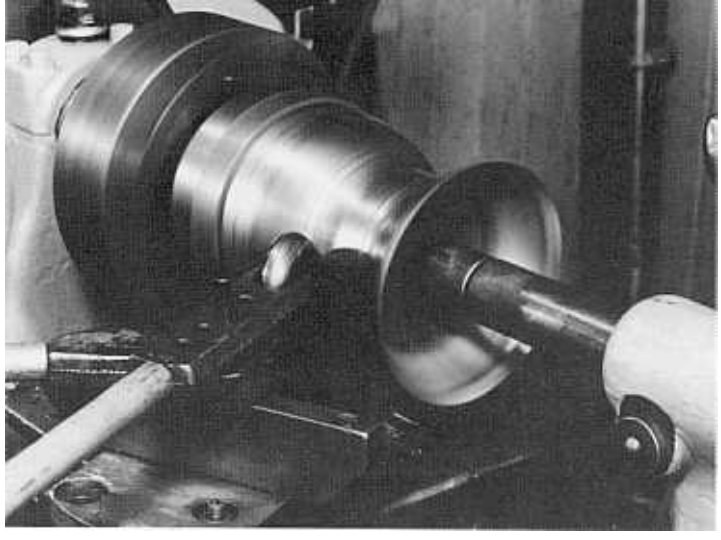


▲
*Automatic Screw Machines, Brown & Sharps, and Traubs. Capacity to 1" diameter. These machines can hold tolerances within .0005.*

*A closer look at heliarc welding shows mounting brackets being attached to a CRT shield where maximum mechanical strength is required.*

▼

▲
*The compound draw and trim die producing tape data protector, P/N TDP 116R15P*



▲
*A typical application of metal spinning shows the shield being "shaped" into the required configuration. This technique is utilized in a great range of sizes and in many instances produces significant cost savings.*

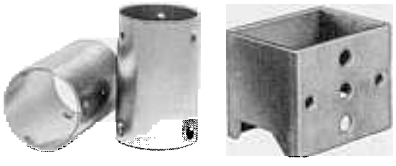
*One of many hand forming stations showing the roll forming of a conical shield component.* ▶

*Custom Magnetic Shield for Fibre Optic CRT utilized in a "Graphics Printer". There is one on each space shuttle.* ▶

# Magnetic Shields any Size or Shape, Already Tooled-Up ... No Tooling Costs for You

Tell us your needs, very likely you can use one of the pre-tooled shields or one can be modified to give you exactly what you require.

Ad-Vance Magnetics is tooled for hundreds of magnetic shields components. Take advantage of the immense quantity of tooling available. We keep it all on hand to help reduce your costs and to serve you faster. Only a few of the hundreds of pre-tooled shields can be shown because of space limitations.



Small Transformer Shields

Storage Tube Shield

High Permeability Double Cylinder Shield for Rock Magnetism Studies

Hydroformed CRT Shield & Storage Tube Shield

Scan Converter Shield

CRT Shield

CRT Deflection Yoke & Neck Shield ("L" locking)

Motor Shields

Video Recorder Head Assembly Shield

Tape Data Protector P/N TDP116R15P

Loaded Single Reel Tape Data Protector Drops 4 Feet to Concrete Surface Without Tape Damage

Special 5-Layer PM Shield

Ad-Mu Cassette Protector

Electron Microscopic Shield (Intermediate shield of 3 piece assembly)

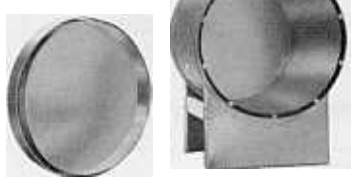
Radar Display Tube Shield

Presidential Model Tape Data Protector

Magnetic Isolation Chamber

Geo-Magnetic Investigation Chamber

Movable Multi-Layer Controlled Magnetic Environment Chamber



# AD-MU Alloys Protect Permanently

1. *AD-MU alloys will not saturate when properly used.*
2. *No excessive loss of permeability from shock.*
3. *Relatively stable permeability characteristics are exhibited after final anneal avoiding the expense and inconvenience of regularly repeated annealings.*
4. *Minimal retentivity is displayed by AD-MU alloys for any alloy of a given permeability.*

## Electrical Characteristics

Typical DC Magnetic Properties for AD-MU Shielding Alloys

| | Material | Initial Permeability at 40 gauss | Permeability at 100-200 gauss | Maximum Permeability | Saturation Induction gauss | Coercive Force oersteds |
|---|---|---|---|---|---|---|
| High Permeability | AD-MU-80 | 75,000 | 100,000 | 300,000 | 8,000 | 0.015 |
| | AD-MU-78 | 60,000 | 43,000 | 250,000 | 7,600 | 0.01 |
| Med. Permeability | AD-MU-48 | 11,500 | 20,000 | 130,000 | 15,500 | 0.05 |
| Low Permeability | AD-MU-00 | *300 | 1,300 | 3,000 | 22,000 | 1.00 |

*Unannealed State

## Typical Physical Properties of AD-MU Alloys

*(Forming Temper – Not Annealed)*

| | AD-MU-80 | AD-MU-78 | AD-MU-48 | AD-MU-00 |
|---|---|---|---|---|
| Density ($lb/in^3$) | 0.316 | 0.305 | 0.294 | 0.283 |
| Thermal Expansion Coefficient/ °F(68°-212°F) | $7.0x10^{-6}$ | $7.5x10^{-6}$ | $4.6x10^{-6}$ | $7.6x10^{-6}$ |
| Thermal Conductivity (BTU/in/$ft^2$/hr/°F) | 136 | 115 | 90 | — |
| Electrical Resistivity (ohm-cir mil/ft) | 349 | 331 | 290 | — |
| Curie Temperature (°F) | 845 | 761 | 932 | — |

## Typical Mechanical Properties of AD-MU Alloys

*(Forming Temper – Not Annealed)*

| | AD-MU-80 | AD-MU-78 | AD-MU-48 | AD-MU-00 |
|---|---|---|---|---|
| Tensile Strength ($lbs/in^2x10^3$) | 90 | 85 | 85 | 45 |
| Yield Strength ($lbs/in^2x10^3$) | 35 | 30 | 40 | 30 |
| Modulus of Elasticity ($lbs/in^2x10^3$) | 32.0 | 30.0 | 24.0 | 29.5 |
| Elongation in 2" (%) | 40 | 30 | 25 | 30 |
| Hardness (rockwell B) | 62/75 | 64/74 | 59/68 | 65 |

# General Guidelines for Fabricating with AD-MU Sheet Stock

## Press Brake and Roll Forming

AD-MU-80, 78, and 48 are similar to stainless steel in forming characteristics. AD-MU-00 will work like cold rolled steel.

## Punching

All AD-MU sheet stock is supplied in a temper suitable for drawing and spinning. In this condition, the material can be punched if proper die clearances are maintained. Of course, good tooling practices must be followed.

## Drawing

AD-MU sheet stock may be drawn using either standard hard tooling or hydraulic forming techniques, keeping in mind that they exhibit degrees of work hardening. The technique chosen will depend on part configuration, drawing limitations, and tooling cost.

## Spinning

Spinning operations may be performed using conventional tooling. Severe reductions in drawing or spinning nickel alloys require an intermediate heat treatment because of their work hardening characteristics.

## Welding

Butt seam welding, using an electric arc in an inert atmosphere of argon or helium, is recommended. When a filler is required, strips of the same alloy should be used to avoid changing the magnetic properties of the seam. This type of welding is not practical with materials less than .020" thick. Thinner gauges may be welded successfully with electron beam or laser equipment. Spot welding may be used if sufficient overlapping of seams is provided. All welding should be performed before the final magnetic heat treatment.

## Heat Treating AD-MU-80, 78 and 48

To relieve all strains and restore the material to a soft condition suitable for further drawing, spinning, or forming operations, anneal for not more than one hour at 1450°/1600°F. Since high nickel alloys readily absorb carbon, sulphur, oxygen and other contaminants from combustion furnace gases, it is necessary that this process be performed in a controlled atmosphere. Cooling must be performed in the protective environment, however, the rate of cooling is not critical.

Annealing for optimum magnetic properties should be done in a vacuum atmosphere with a dew point below - 60°F. Parts should be held at a temperature of 2050°/2150°F for 1 hour minimum. AD-MU-80 and AD-MU-78 can be cooled at the rate of 500°F per hour. AD-MU-48 should be cooled in the furnace at the rate of 200°F per hour down to 800°F. Cooling may be accelerated after this point.

## Heat Treating AD-MU-00

This alloy may be stress relieved by annealing at 1650°/1700°F for one hour and cooled as rapidly as possible without quenching. Magnetic annealing, when necessary, is accomplished at the same temperature. The optimum cooling rate is less than 50°F per hour. However, economics prohibit this very slow cooling rate so some compromise must be made. Both anneals should be performed in a vacuum atmosphere.

## Finishing

Shields made exclusively from AD-MU-80, 78 or 48 may be used in a normal indoor environment without further treatment. AD-MU-00 oxidizes quite readily so must be protected from the atmosphere. All standard commercial and military finishes may be applied to all the AD-MU alloys. When applying a plated finish over AD-MU-80, 78, or 48 the part must be pretreated, such as a copper flash or nickel strike. Chromate-treated cadmium or Zinc platings shall not be applied to parts that will operate in temperatures above 160°F.

## Ask Us

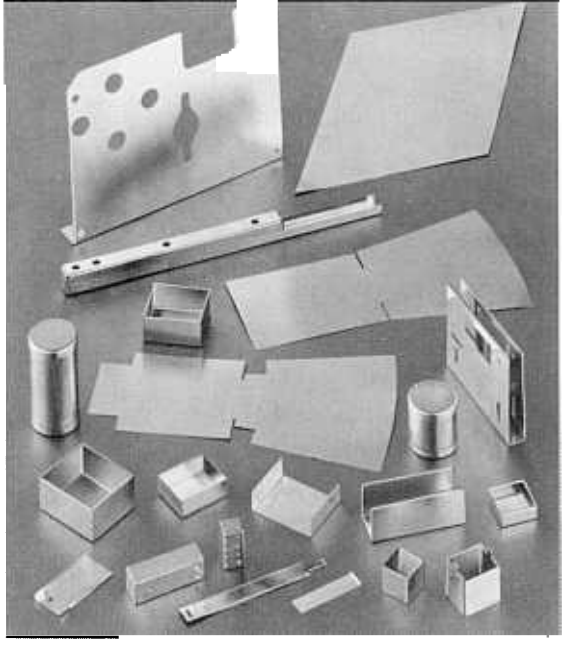
Ad-Vance Magnetics is fully equipped to perform all the foregoing operations and to supply shields to your specifications. Our Engineering Department can give you more specifics in any of these areas which interest you. Contact us; we will be more than happy to assist you.

### Heat Treating

Heat treatment, under exact and controlled conditions, is a necessary final process to attain optimum magnetic properties of shielding alloys.

Our PS-071883-HT is a heat treat specification engineered by Ad-Vance Magnetics. This specification meets the requirements of Naval Air Systems Command Drawing No. 201AS107, and the individual requirements of a multitude of our customers.

# AD-MU Foils are Supplied in a Full Magnetic Annealed Condition



*A variety of AD-MU foil Configurations*

## Just Cut AD-MU Foils to the Exact Shape You Need.

These Time-Saving High and Low Permeability Foils offer convenient, economical magnetic shielding. In many applications, their use can eliminate the costs of designing and manufacturing prefabricated shields. Foil shielding is also useful in hard-to-get-at places. In addition, it permits more compact assemblies accomplished by placing magnetically reacting components closer together with no performance degradation.

The foils exhibit useful ductility, so are readily hand trimmed to your desired outline on an ordinary cutting board, or with shears. They are then easily hand formed around the structure or component to be shielded. Simple adhesive tape can be used to hold them in place. They have already been properly heat treated so are ready for immediate use.

## When to use AD-MU Foils

Experimental or Production Applications offer optimum opportunities to take advantage of the convenience and cost savings from using foil shielding. The amount of shielding needed in an application can be quickly and easily determined by trial/error at a savings of many days' time and frustration. Single or multiple layers can be used until the desired shielding level is attained.

When shielding requirements dictate using a combination alloy shielding system, the low permeability AD-MU-00 foil should be positioned closest to the field source. Such an arrangement would tend to increase the flux density shielding capabilities. This is accomplished by the low permeability AD-MU-00 foil diverting the major portion of the field, permitting the high permeability AD-MU-80 foil to operate in a lower reluctance mode.

In a number of individual research applications, this hand-cut, hand-formed foil magnetic shield solves the entire shielding problem. In other experimental applications and in various production applications, pre-fabricated shields might be more advantageous.

For example, on the production line, unanticipated magnetic fields may be discovered that affect the performance of the component or system being manufactured or assembled. The convenience of foil shielding may be employed for a quick, effective solution, holding downtime to minutes or hours instead of days or weeks.

## Foil Shields vs. Fabricated Shields

Once foil shielding is functioning satisfactorily in either experimental or production applications, the economics are evaluated. The cost of foil shielding for that particular application is compared to the cost of a fabricated shield. In larger quantities, a fabricated shield could be less costly. Just contact the Engineering Department. Our Magnetic Shielding Specialists will gladly submit quotations based on both approaches for your final decision.

## Adhesive-Backed Foil

AD-MU high and low permeability magnetic shielding foils can be furnished with a double faced pressure sensitive adhesive backing. The adhesive bonds to glass tubes, instruments, or components being shielded. Available in the same lengths, widths and thicknesses as foil without adhesive backing.

Double-faced adhesive used on AD-MU foil meets military specification UU-T-91, Type II.

# AD-MU Sheet Stock Available for Immediate Delivery

## Order Low, Medium & High Permeability Stock As Required

For the convenience of those desiring to design and manufacture prefabricated magnetic shields in-house, AD-MU sheet stock is quickly obtained and easily worked. It may be formed by bending, stamping, drawing, finishing, etc. on ordinary sheet metal working equipment. It can be finished by plating, MIL spec painting, etc.

**How to Choose the Correct Alloy for Your Application**

For Low Permeability Requirements, use AD-MU-00.

For Medium Permeability Requirements, use AD-MU-48.

For High Permeability Requirements, use AD-MU-80 and AD-MU-78. AD-MU-80 is recommended for uniformity of residual fields on sensitive applications, such as scanning electron microscopes.

**Multi-Layer Shielding**

Many shielding problems are optimumly solved by using a combination of alloys. AD-MU engineers are specialists in magnetic shielding. Call our Engineering Department when you need help.

**Heat Treating**

**CAUTION:** For optimum magnetic shielding characteristics, shields MUST BE HEAT TREATED AFTER COMPLETION of all forming, welding, and machining operations. Our Engineering Department will gladly guide you in using the necessary heat treating procedure.

## Mechanical Specifications for AD-MU Foils

| Foil Type | Lengths | Thicknesses in Inches | Stock Widths in Inches* |
|---|---|---|---|
| High Permeability AD-MU-80 Foil and AD-MU-78 Foil | From 1 Foot to 100 Foot | .002 | 4 |
| | | .004 | 4<br>15 |
| | | .006 | 4<br>15 |
| | | .010 | 4<br>15 |
| Low Permeability AD-MU-00 Foil | From 1 Foot to 100 Foot | .004 | 4<br>15 |

*Special Slit Widths Available.

## Mechanical Specifications for AD-MU Sheet Stock

| Sheet Type | Dimensions in Inches | Thicknesses in Inches |
|---|---|---|
| High Permeability AD-MU-80 | 16.5 x 120<br>24 x 120<br>30 x 120 | .014<br>.020 |
| High Permeability AD-MU-78 | 16.5 x 120<br>24 x 120<br>30 x 120 | .025<br>.030 |
| Medium Permeability AD-MU-48 | 16.5 x 120<br>24 x 120<br>30 x 120 | .040<br>.050 |
| Low Permeability AD-MU-00 | 30 x 120 | .062 |

For calculation assists in designing magnetic shields, please see the Engineering Manual for a reprint of an Electronic Design article.

# For Decades of Faultless Protection of Magnetic Tape Data During Storage or Transport.

Prevent distortion, partial erasure, or degradation of irreplaceable or valuable data recorded on magnetic tapes used in aerospace, commercial, broadcast, industrial and military applications. Types of recorded data might include: research, management, engineering, financial, telemetry, numerical control, computers, entertainment, production, medical, inventory, survey, personnel, and communications.

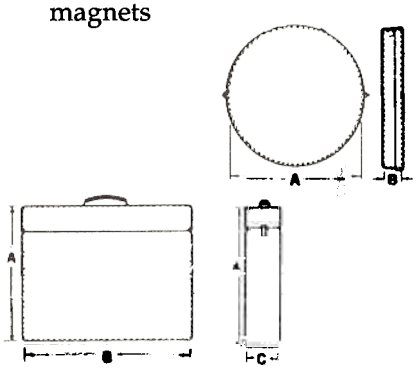
## You May Not Know It!

Damage to precious recorded data could occur in various ways without your knowing it, during ordinary supposedly safe storage or during routine transport. Some of these hidden hazards include accidental exposure to unexpected magnetic environments, such as:

- Local severe electrical storms
- EMP
- Airline transport
- Ambient magnetic pollution
- Passing of nearby radiating electronic and electrical gear or equipment
- Power generating equipment

Other unforeseen hazards might encompass:

- Carelessness by unheeding or uninformed personnel
- Deliberate vandalism with powerful permanent magnets




## AD-MU Tape Data Protectors Assure Fidelity of Valuable Tapes

1 Assure fidelity of vital recorded information by keeping data on magnetic tapes free from distortions caused by unforeseen external magnetic fields.

2 Minimize erasure accidents during safekeeping or transport.

3 Discourage and deter the covert saboteur or vandal.

4 Excellent insurance against possible expensive, or irreplaceable losses.

## Inexpensive Insurance in these Uncertain Times

Proven AD-MU Tape Data Protectors and Cassette Tape Data Protectors provide inexpensive insurance against such hidden hazards. Satisfied customers include all branches of the armed forces, NASA, and numerous private firms as well as other governmental organizations. There is not a single reported instance in which tapes enjoying such secure protection have ever been affected by stray magnetic fields. The investments in such tapes have remained uniformly safe from harm.

### Padlocked for Ultimate Security

All square/rectangular cases have a sturdy latch which may be padlocked for complete security.

#### 8 Round Sizes

| PART NO. | A INCHES | B INCHES |
|---|---|---|
| TDP 72R07 | 7 1/4 | 3/4 |
| TDP 72R15 | 7 1/4 | 1 1/2 |
| TDP 86R07 | 8 5/8 | 3/4 |
| TDP 96R13 | 9 5/8 | 1 3/8 |
| TDP 106R08 | 10 5/8 | 7/8 |
| TDP 106R15 | 10 5/8 | 1 1/2 |
| TDP 106R15 | 11 5/8 | 1 1/2 |
| TDP 116R15P | *See drawing of Part #P/N TDP 116R15P on page 17.* | |

Made of AD-MU-00 .030" thick with protective .125" polyurethane foam liner in both top and bottom.

#### 10 Square/Rectangular Sizes

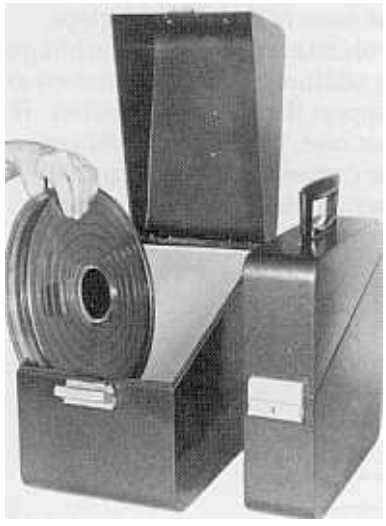
| PART NO. | A INCHES | B INCHES | C INCHES |
|---|---|---|---|
| CTDP 25S40 (Cassette) | 5/8 | 4 1/8 | 2 5/8 |
| TDP 2 | 12 | 12 | 3 1/4 |
| TDP 5 | 12 | 12 | 7 3/4 |
| TDP 75S50 | 7 1/2 | 7 1/2 | 5 |
| TDP 97S30 | 9 3/4 | 9 3/4 | 3 |
| TDP 97S70 | 9 3/4 | 9 3/4 | 7 |
| TDP 117S17 | 11 3/4 | 11 3/4 | 1 3/4 |
| TDP 117S32 | 11 3/4 | 11 3/4 | 3 1/4 |
| TDP 117S77 | 11 3/4 | 11 3/4 | 7 3/4 |
| TDP 117S150 | 11 3/4 | 11 3/4 | 15 |

Made of AD-MU-00 .050" thick. Finished in durable textured enamel.

# These New Models Are Fit for a President

EDP tapes are luxuriously cradled in polyurethane foam lining. Comfortable carrying handles. Convenient lift cover makes all tapes completely, instantly accessible. Easy open, maximum security safety hatch. Lock provided.

Capacity: 5 (Model TDP-5) and 2 (Model TDP-2) standard EDP 10.5"x0.5" tapes. Also accommodates tapes enclosed in locking belts. Handsome, Prestigious Tape Data Protectors are carried with quiet pride by management or other personnel.

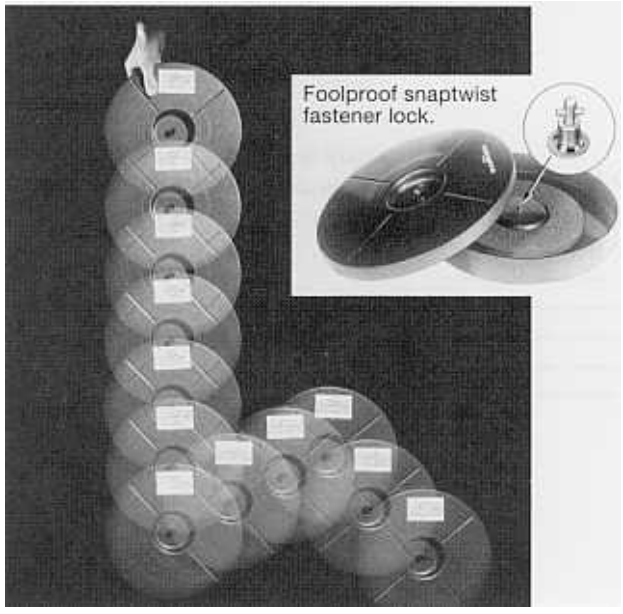


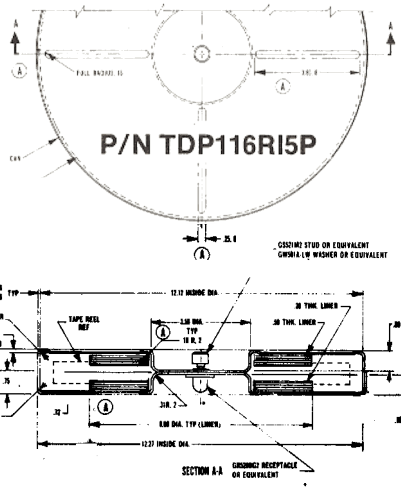
*Model CTDP-25S40 AD-MU Cassette Protectors. Impervious even to rough postal abuse, these sturdy .050" thick Protectors with styrofoam padding provide maximum physical as well as magnetic protection for reference data recorded on cassette tapes.*


*Type CTDP 052478-G Protective Case houses up to an unprecedented 36 3M or similar Data Cartridge Type DC100A 3-9/16"x2-5/8"x3/4" cassette tapes.*

## A New Low Cost Approach to Individual Tape Protection

This shield is designed for maximum magnetic and physical protection of a single reel of tape up to 1" wide maximum. Extremely low cost. Foolproof snaptwist fastener lock. Ultra rugged construction due to its unique configuration.



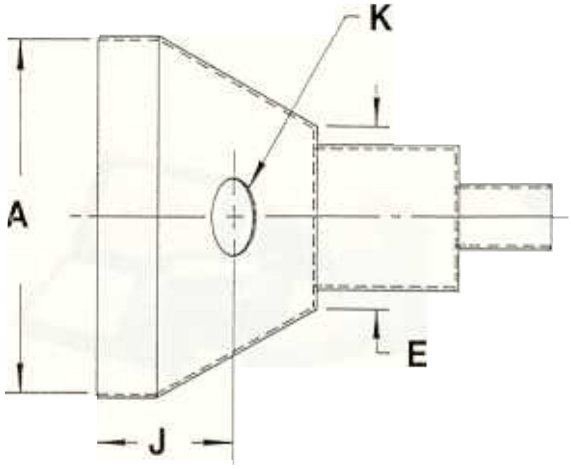

| | |
|---|---|
| **MATERIAL:** | AD-MU-00 .030" thick. Polyurethane foam lining. |
| **FINISH:** | Baked textured enamel inside and out in blue-gray color with final semi-gloss finish over chromate primer. |
| **CONSTRUCTION:** | Both parts formed of one-piece providing total interchangeability. |
| **MAGNETIC ANNEAL:** | Per material requirement after fabrication. |

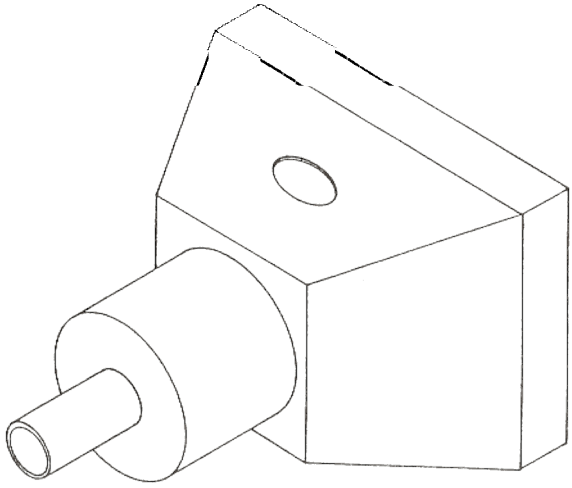
# CRT Shields Increase CRT Performance

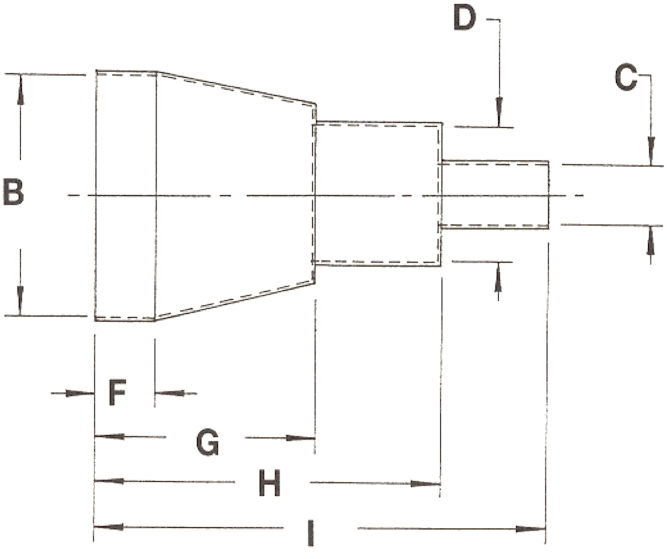
AD-MU CRT shields eliminate the reactive effects on the electron beam which are caused by external magnetic fields. Such effects result in loss of resolution and distortion of the display.

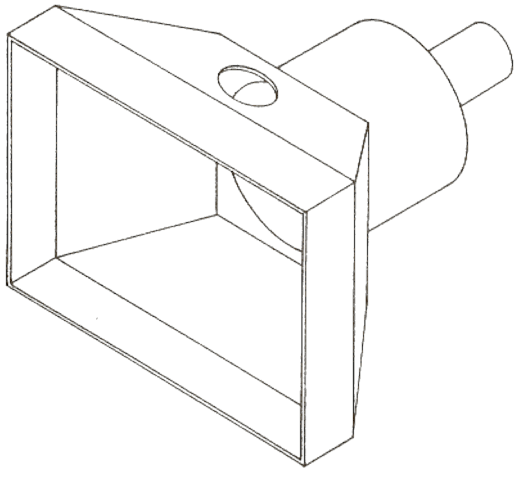
The shields also have the structural integrity to serve as a support system for the CRT, since they ideally enclose the entire tube except for the display area. Should the mass of the glass envelope prohibit employing this technique, an additional structural system to support the CRT may be used. In that case, the shield should cover the carrier too. This is especially useful if the CRT is subject to excessive G loads.

The extensive experience of our Engineering Department can be of great help to you in designing and manufacturing the best type of shield for your application. Contact Ad-Vance Magnetics' engineers for assistance.





**GENERAL NOTES:**

1) Basic tolerances: ±.030.
2) Dimensions are in inches.
3) Finish: Full magnetic anneal after fabrication to achieve optimum magnetic properties.
4) Additional holes and/or bracketry to be specified.

**NOMENCLATURE:**

Material type: AD-MU-_____
Material thickness: 0._____
Dimensions:

| | |
|---|---|
| A: _____ | G: _____ |
| B: _____ | H: _____ |
| C: _____ | I: _____ |
| D: _____ | J: _____ |
| E: _____ | K: _____ |
| F: _____ | |

**CRT SHIELD APPLICATION**
(Rectangular design with square plate to round yoke.)
Designed for Tube # _____
Part Number _____

*You may wish to copy this page, add your own dimensions and forward to Ad-Vance Magnetics for immediate quotation. Or phone if more convenient.*

**AD-VANCE MAGNETICS**
625 Monroe Street
Rochester, Indiana 46975
(219) 223-3158
FAX (219) 223-2524

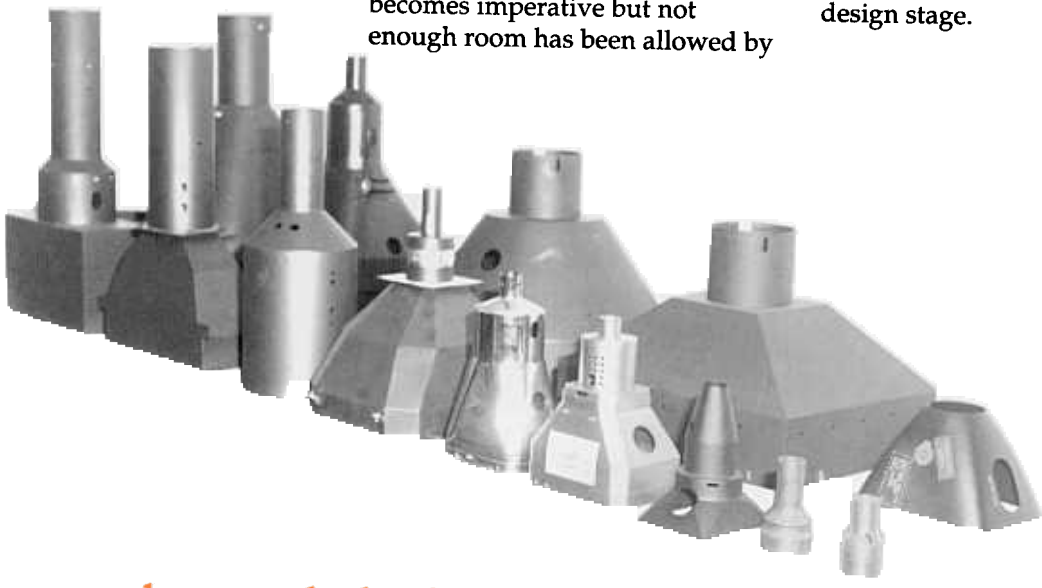
# Custom Fabricated CRT Shields
## Made from high permeability AD-MU-80 or AD-MU-78

Simple bend and/or roll forming, metal spinning, deep drawing (hydroforming), heliarc fusion welding per MIL-STD-2219.

CRTs can't function optimally while magnetic fields interfere. However, during the design stage, insufficient space too often is left for a magnetic shield.

Magnetic field interference usually is discovered when the completed assembly is tested. Shielding becomes imperative but not enough room has been allowed by the designer. Jamming some shielding into the inadequate neck area helps but doesn't produce the full performance desired.

Avoid trouble; leave enough space for the proper shield during the design stage.



# Custom Fabricated Shields For Components and Systems

Any specified configuration or shielding requirement — from the simplest component to the most complex system, Ad-Vance Magnetics can design and fabricate an AD-MU shield incorporating your magnetic shielding performance requirements.

These include magnetic isolation chambers, shields for low field research, magnetic shielding components required in systems (such as CRT's), transformers, motors, tachometers, reed relays and computers, dewars for cryogenic research, various test chambers, video cameras, scan converter tubes, photomultiplier tubes, storage tubes, aircraft weather radar display tubes, etc.

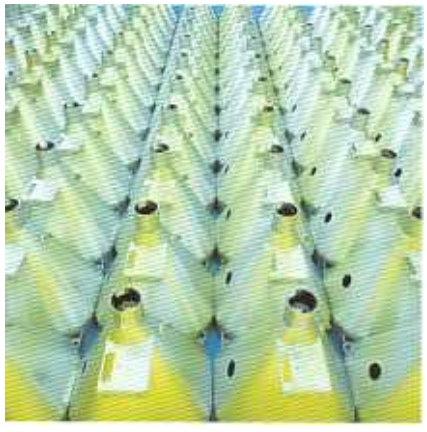
Lasting shielding protection is provided because AD-MU alloys do not saturate when properly used, will not suffer excessive permeability loss from shock, and display minimum retentivity. Accordingly, there is no need for repeated time consuming, costly re-annealings.

# The Industry's Oldest, Largest, and Most Experienced Exclusive Manufacturer of Magnetic Shielding

Ad-Vance engineers have solved a variety of magnetic shielding problems. In addition, substantial cuts in shielding costs are possible by using our existing tooling. From simple components to complex systems, we offer:

- Design and consultation
- AD-MU shielding alloys
- In-house toolroom for manufacturing magnetic shields
- Custom fabricated CRT shields
- Heat treating for optimum magnetic shielding characteristics

*Give Ad-Vance Magnetics a call today!*



*The Ad-Vance Magnetics production facility and corporate offices are centrally located in the midwest.*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