Metal Photo Service, Inc.

MPS

www.mtlphoto.com

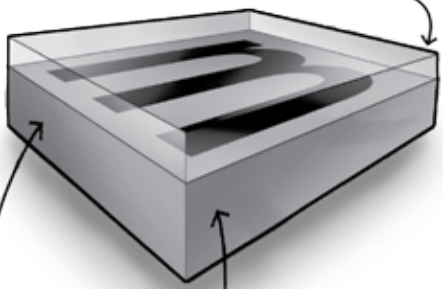
We print on almost anything!

For high performance anodized aluminum identification plates including **bar code labels** and **UID plates.**

Because durability really matters

introduction

anodic layer
the glass-clear, sapphire-hard anodized layer resists chemicals, paint, abrasion and dirt.



sealed image
black graphics are metallic silver particles that hold up to extreme heat and sunlight exposure.

aluminum layer
the rigid aluminum base will not peel, crack or delaminate.

Virtually every new product and assembly has a requirement to carry some identifying or other information. This requirement is usually fulfilled by attaching a plate or label to the product or assembly or by marking directly on its surface. Attached plates are known as identification plates, nameplates, tags, labels and placards among others.

This manual discusses issues relevant to the design of identification plates made of high performance anodized, photosensitized aluminum, hereinafter referred to as **Metalphoto**.

Identification plates made of **Metalphoto** are clearly differentiated from those produced on other substrates in two important ways - first, **Metalphoto** identification plates are defined as the ***most durable of aluminum identification plates*** by GPI, the National Association of Graphic and Product Identification Manufacturers, Inc. Second, they offer the ***highest graphic resolution capability*** of any metallic substrate.

Physical characteristics of **Metalphoto** identification plates include an impervious, clear anodic surface and photographically produced silver metal graphics. This combination of features provides maximum sunlight and heat resistance and superior abrasion and chemical resistance.

Proper design of an identification plate requires attention to many details and options. This manual will help to guide you through some of the most important of those as they pertain to your application. Within this guide the word “shall” indicates a requirement

Government & Industry

specifications

Industry Specifications & Studies

Boeing Commercial Aircraft Company
Boeing Process Specification BAC5875
Fabrication of Aluminum Markers, Instrument Panels, Drawer Front Panels and Fabrication of Metal and Plastic Appliques

Lockheed Martin
Fabrication of UID Nameplates of Aircraft Items
LMA-PN010

Honeywell, Inc.
Satellite Systems Operations
Metalphoto approved for use on Space Station
Memorandum A3-J024-M-9501786
Laboratory Case 161311

SAE Technical Paper Series 2000-01-2437
Special requirements for Crew Interface Labels on the International Space Station
Stephen Gray & Fernando Ramos - Boeing

UL & CSA

Underwriter Laboratories
Marking and Labeling Systems PGDQ2
Marking and Labeling System Material Component PGGU2.MH26206

U.S. Government Specifications & Studies

Department of Defense
Commercial Item Description
A-A-50271 Class 2-Composition C

Department of Defense
MIL-A-8625F
Anodic Coatings for Aluminum & Aluminum Alloys
Type II Class 1 (unprocessed or clear)
Class 2 (processed)

Department of Defense
MIL-STD-13231
Standard Practice
Marking of Electronic Items

Department of Defense
MIL-DTL-15024F
Identification of Equipment|
Type G - Foil - Type H - Plate

Department of Defense
MIL-STD-130M
Identification Marking of U.S. Military Property

Department of Defense
MIL-P-19834B
General Specification for Plates
Identification or Instruction, Metal Foil, Adhesive Backed

Department of Navy
Laboratory evaluation of label plate materials and attachment methods considered for use on LPD-17 CARDIVNSWC-TR-62-00-05 June 2000

NASA, Johnson Space Center, Texas
Space Station Inventory Label
Specification - SSP 50007

United States Federal Government
Federal Specification GGP-455B(3)
Type I (Grade A&B) Class 1 or 2

Performance

characteristics

20 Year Outdoor Durable
Resistant to Sunlight, Wind, Water and Saltwater
Withstands Chemicals, Fire, Rust and Abrasion

More detailed information available at www.mtlphoto.com

Characteristic	Result
Abrasion Resistance	No pronounced image loss, degradation or reduced readability after 7000 cycles of an abrading wheel.
Acid Corrosion	No deterioration or image degradation after 24 hours in 3% nitric acid.
Heat Resistance	No legibility loss or degradation when subjected to 1000°F.
Salt Spray Corrosion	No deleterious effect after a 720-hour salt spray (fog) test. 2,6 “very good” corrosion resistance after 113 days seawater exposure.
Accelerated Light and Weather Resistance	No pronounced deterioration of legibility after 400-hour carbon arc weatherometer exposure.
Accelerated Oxygen Aging	No discoloration or fading after 96 hours/300 psi/70°C oxygen bomb aging.
Stain Resistance	No black fading when plates are exposed to tincture of iodine.
Cleaning Resistance	No deleterious effect when tested with alkaline cleaners (MIL-C-87937 or equivalent) for aircraft surfaces.
Low Temperature Resistance	No deleterious effects or image fade after 1 hour at -50°F. No impairment of legibility upon exposure at -67°F.
Organic Solvent Resistance	No softening, staining or noticeable fade after 24-hour exposure to: JP-4 fuel, gasoline, mineral spirits, methyl ethyl ketone, turpentine, turbine and jet fuel, kerosene, xylol, acetone, toluol, heptane, trichlorethylene, MIL-H-5606 hydraulic fluid and MIL-L-7808 jet engine oil.
Fungus Resistance	Visual reading of “0” per ASTM-G21.
Thermal Shock	No deterioration after 3 cycles between -65°C and 125°C.
Moisture Resistance	No deterioration after 10 humidity cycles per MIL-STD-202, method 106.

Telescope
Override

spectrum
by ELCAN
1240-01-533-0939
SER 903215-10-13403
WTY05/09

LinkBelt

METALPHOTO® DURABILITY CHARACTERISTICS for SO354® XHT

SPECIFIC CHARACTERISTIC	TEST CONDITION	EFFECT
Exterior Exposure	Black and silver image exceeds 400 hr. Weatherometer Test GG-P-455b, estimated equivalent to 20 yr. exposure	No effect
Abrasion Resistance	Taber Abraser with CS17 wheel, a total of 1000 gm. load, 7000 cycles	Slight dulling of surface
Temperature Resistance		1200°F
Salt Spray	5% at 95°F for 700 hrs.	No Corrosion
Chemical Resistance		
MII-S-3136 111 Hydrocarbon Fluid	1 hr. immersion	No Effect
MIL-L-5161C-Turbine and jet engine fuel	1 hr. immersion	No Effect
JP-4 Fuel	72 hr. immersion	No Effect
Kerosene	12 hr. immersion	No Effect
Skydrol (Hydraulic Fluid)	24 hr. immersion, at both room temperature and boiling point.	No Effect
Methyl Ethyl Ketone (MEK)	24 hr. immersion	No Effect
Ethyl Acetate	24 hr. immersion	No Effect
Xylol	72 hr. immersion	No Effect
Heptane	72 hr. immersion	No Effect
Ethyl Alcohol	72 hr. immersion	No Effect
Ferric Chloride	10% solution, 16 hr. immersion	No Effect
Ammonium Hydroxide	10% solution, 16 hr. immersion	Slight dulling
MIL-P-21563 soap solution	16 hr. immersion	No Effect
MIL-C-25179 AIN in heptane	25% solution, 1 min. immersion (cleaning solution)	No Effect
Sulfuric Acid	10% solution, 24 hr. immersion	No Effect
Phosphoric Acid	1% solution, 12 hr. immersion	No Effect
Nitric Acid	3% solution, 72 hr. immersion	No Effect
TSP (Trisodium Phosphate)	1% solution, 40 hr. immersion	No Effect
Sodium Hydroxide	1% solution, 1 hr. immersion	Not Recommended (surface attack)

SPECIFICATION	PUBLICATION	DETAIL	DESCRIPTION
GG-P-455b	Federal Specification	Type I, Grade A or B Class 1 & 2	Photosensitive anodized aluminum impregnated with silver compounds printable on one or two sides - all finishes and thicknesses.
MIL-P-15024D	Military Specification	Type H & G	Totally anodized aluminum with characters integrated into the anodized layer photographically using sliver compounds.
MIL-P-19834B	Military Specification	Type I or II, Style III or IV	Metalphoto .003" thick plates with the proper adhesive applied meets or exceeds all of the performance requirements of this spec.
MIL-P-514D	Military Specification	Composition C	Photosensitive aluminum plates, grade and class as specified in federal specification GG-P-455b.
Industrial Commercial Products	Original Equipment Panel Fronts Nameplates	Metalphoto Products	Material shall be Metalphoto. Image (black on silver or silver on black shall be sealed into the anodized layer with photosensitive silver compounds: colors other than black may be imbedded by resist or screen process.

*Metalphoto®, Camcode® and SO354® are registered trademarks of Horizons Incorporated.

Note: Users must test Metalphoto products in the specific environment anticipated. Camcode does not warrant performance of its materials in any environment.

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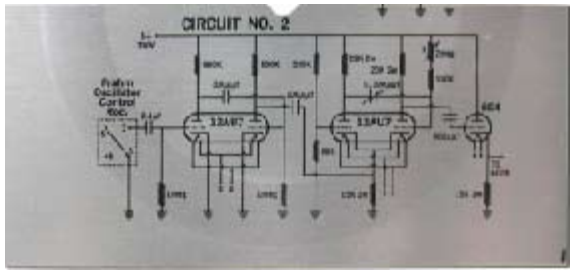
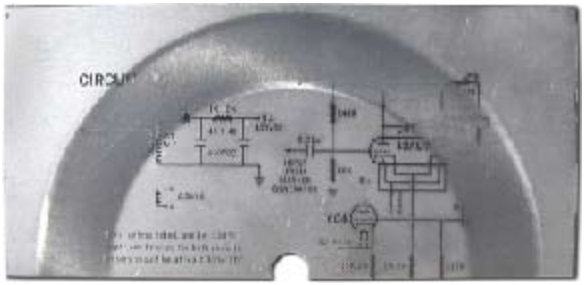
abrasion resistance

These samples were tested identically on a Taber Abraser, 1,000 gram total load, 7,000 cycles, CS-17 wheel.

Metalphoto

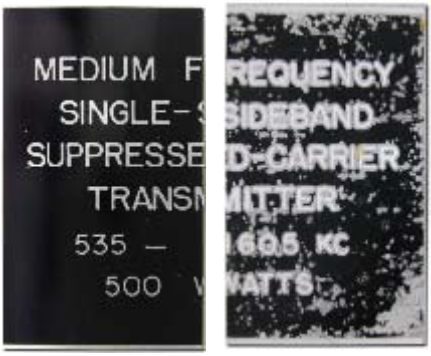


Etched



acid resistance

Metalphoto **Etched**



Specimens were immersed simultaneously for 72 hrs. in a solution of dilute nitric acid (3.5% solution).

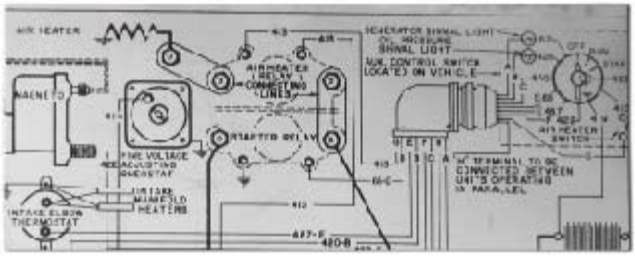
weathering resistance

Specimens were exposed simultaneously for 180 days to outdoor weather conditions.

Metalphoto **Etched**

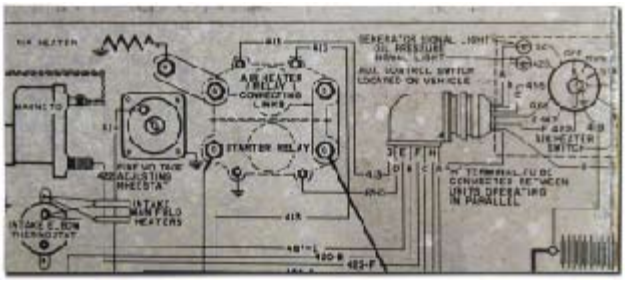
salt spray corrosion resistance

Metalphoto



250 hrs., 5% NaCl salt spray test as set in Federal Specification QQM-151A. Both specimens were tested simultaneously.

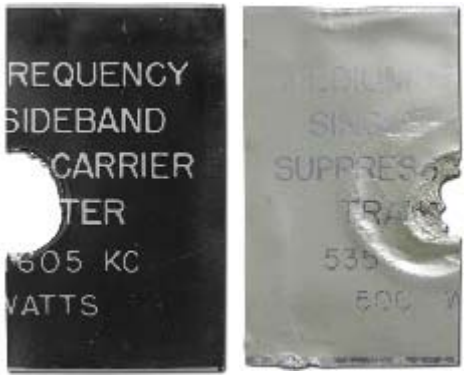
Etched



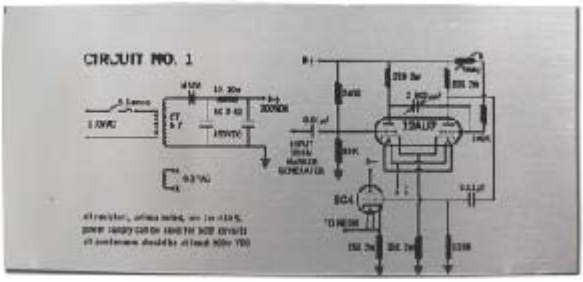
heat resistance

Specimens were heated simultaneously to a temperature of 1,000°F., one minute in a laboratory muffle type furnace. When cool, each sample was heated with a propane torch in a localized area until the aluminum melted.

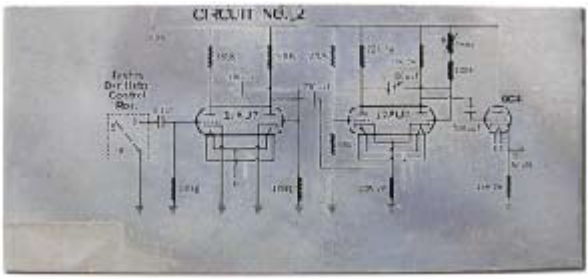
Metalphoto **Etched**



cleaning solution resistance



Metalphoto



Specimens were immersed simultaneously in 1% water solution of Solilax for 72 hrs..

Etched

info & durability

Finishes, Sizes & Thicknesses

	Matte Non-reflective with dull finish	**Satin** Semi-gloss medium reflective material	**#4** Brushed to resemble a stainless steel finish	**Gloss** Highly reflective mirror-like
Sizes	8″x 10″ ,10″x 12″ 12″x 20″,20″x 24″ 20″x 40″,24″x 40″	8″x 10″ ,10″x 12″ 12″x 20″,20″x 24″ 20″ x 20″,20″x 40″ 24″x 40″	10″x 12″,12″x 20″ 20″x 24″,24″x 40″	10″x 12″,12″x 20″
Thicknesses	.003″,.005″,.008″ .012″,.020″,.032″ .039″,.063″,.090″ .125″	.003″,.005″,.008″ .012″,.020″,.032″ .039″,.063″,.090″ .125″	.032″,.063″ .090″,.125″	.020″

Durability

Test Conditions		***Finished Plate Characteristics***				
Results Key ***Excellent*** ● ***Acceptable*** ◉ ***Not Recommended*** ○		Black & Aluminum Image Intensified	Black on Gold* Background Image Intensified	Black & Aluminum Not Image Intensified	Black on Gold* Background Not Image Intensified	Additional Background or Selective Colors
Abrasion Resistance - Taber abraser with CS17 wheel, 1000 gram load for 7000 cycles.		●	●	●	●	●
Solvent/Fuel Resistance - Extended immersion in alcohol, kerosene, JP-4 jet fuel, hydraulic fluid, MEK and other organic solvents at room temperature.		●	●	●	●	●
Temperature Resistance - Oven tested for one hour	between 400°F and 750°F	●	●	●	●	○
	between 750°F and 1000°F	●	●	◉	◉	○
Ultraviolet Light Resistance - 400 hour weatherometer test. ***Recognized equivalent of 20 years outdoor*** exposure.		●	●	●	●	○
Salt Spray/ Immersion Resistance	Salt spray testing with a 5% NaCl solution at 90°F for 700 hours.	●	○	◉	○	◉
	Immersed plates in sea water at ambient temperature for an extended period of time avoiding galvanic coupling.	●	○	●	○	●
Chemical Resistance	Acid - 24 hour immersion at room temperature in 3% solutions of nitric acid, sulfuric acid and ferric chloride.	●	●	●	●	●
	Base - 24 hour immersion at room temperature in 3% solution of Clorox.	◉	◉	◉	◉	◉
	Base - 24-hour immersion at room temperature in 3% solutions of sodium or ammonium hydroxide.	○	○	○	○	○

Note - Users must test Metalphoto in the specific environment anticipated. Metalphoto does not warrant performance of its materials in any environment.
*Includes Sunfast and Classic Gold Products.

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