

ENGINEERING ORDER

EO SERIAL NO. 490977
SH 1 OF 1

MODEL All	PRODUCTION EFFECTIVITY None	EO TYPE Changed Drawing	AUTHORITY PRO5216B	EO SERIAL NO. <u>490977</u> SH 1 OF 1	
AFF GROUP 3M11 ----- MP&S	DESIGN EFFECTIVITY	PARTS MADE DISPOSITION RECORD <input checked="" type="checkbox"/> USE <input type="checkbox"/> REWORK <input type="checkbox"/> SCRAP <input type="checkbox"/>	CCN L9XBH137	RELEASED BY L. Totten	DATE 7-17-03
CHANGE CLASSIFICATION MAJOR CLASS 1 <input type="checkbox"/> MINOR CLASS 2 <input checked="" type="checkbox"/>	DOCUMENTS AFFECTED NONE <input type="checkbox"/> NOTED <input type="checkbox"/>	INTERCHANGEABILITY IMPACT NONE <input type="checkbox"/> 1-WAY <input type="checkbox"/> 2-WAY <input type="checkbox"/>	CAD DRAWING <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO CMI	PREPARED BY M. Schachte EXT 5639 DATE	
DOCUMENT	REV	TITLE	NEXT ASSY	APPROVED BY	DATE
HP 8-5	AB	Identification of Detail Parts and Assemblies			
				CUST SUPPORT	
				DQE	
				MP&S	
				MFG	
				QUALITY ASSUR	
				STRESS	
				SYS ENGR	
				DESIGN	
				AH-64	
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REASON CODE 05	REASON FOR EO To allow suppliers 12 months to implement the manufacturer CAGE Code.
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EO SERIAL NO. 490977

REFERENCE DOCUMENTS 489343

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
T	Released on EO 434275	09/08/93	
U	Released on EO 441060	04/05/95	
-SS1	Released on EO 451177	12/20/95	
V	Released on EO 455714	11/18/97	
V/1	Released on EO 473216	04/26/99	
W	Released on EO 480305	08/21/00	
Y	Released on EO 486014	08/06/02	
AA	Released on EO 489343	03/27/03	
AB	Released on EO 490977	07/17/03	

SCOPE: This process specification establishes the requirements and procedures for identification marking of detail parts and assemblies. Identification marking includes part numbers, serial numbers, and other identification markings specified on the engineering drawing, manufacturing planning sheet, and purchase order.

CHANGES: See revised text.

Change bars indicate technical changes only.

PREP		<i>The Boeing Company,</i> Mesa 5000 East McDowell Road Mesa, Arizona 85215-9797			
APPD					
		TITLE IDENTIFICATION OF DETAIL PARTS AND ASSEMBLIES			
					SIZE
		A	02731	HP 8-5	AB
					SHEET 1 OF 14

Summary of Changes & Reasons:

- 1.2 - Revised the implementation paragraph.
Reason: To allow suppliers 12 months to implement
the manufacturer CAGE Code.

1. SCOPE

1.1 Scope. This process specification establishes the requirements and procedures for identification marking of detail parts and assemblies. Identification marking includes part numbers, serial numbers, and other identification markings specified on the engineering drawing, manufacturing planning sheet, and purchase order.

1.2 Implementation. This revision contains technical changes and shall be implemented as follows:

a. In-house - Boeing Mesa:

1. Shop option #1: Within 60 days of the issue date.

NOTE

During the 60 day period, shop may build/test hardware to the old process or the revised process (either is acceptable). No later than 60 days after the issue date hardware shall be built/tested to the revised process.

2. Shop option #2: Established by a production "cut-in" process that determines when to effectively implement the change, based on the complexity of the change, Work In Process (WIP), training, or new equipment required, etc.

NOTE

Not to exceed 9 months from the issue date of the specification change.

This option is only applicable if a production cut-in assessment process is in place.

- b. At other Boeing components/facilities. Established by a production "cut-in" process that determines when to effectively implement the change, based on the complexity of the change, Work In Process (WIP), training, or new equipment required, etc.

NOTE

Not to exceed 9 months from the issue date of the specification change.

- c. At suppliers/processors/co-producers. Unless a specific specification revision is called out in the purchase order, use the revision in effect on the date of the purchase order.

NOTE

A specification revision issued after the purchase order date may also be used if it offers a benefit to the supplier, processor, or co-producer.

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- d. Implementation of manufacturer CAGE Code. HP 8-5, Revision Y, paragraph 3.2.1 limited suppliers to using the manufacturer CAGE Code instead of any supplier identification. Within 12 months from the issue date of HP 8-5, Revision AB, all suppliers shall use the manufacturer CAGE Code in part identification.

1.3 Classification. Identification markings shall be classified as follows.

1.3.1 Type I. With the exception of Class 10 (bag and tag), Type I identification markings are permanent and are intended for use during the entire life of the identified part or assembly. Type I identification markings shall be as specified in Table I.

Table I. Type I Identification Markings

Class	Identification
1	Impression stamping
2	Electric vibrator marking or dot peening
3	Ink marking ¹
3A	Ink marking with protective coating ¹
4A ²	Identification plates
4B ²	Identification tapes
5	Decals
6	Raised cast or molded characters
7	Electrochemical etch marking (black or white)
8	Electric discharge pencil marking
9	Metal band (hose assemblies)
10	Bag and tag (small parts)
11	Paint marking (stencil, silk screen, and paint)
12	Laser marking
13	Cocure marking of composite parts
NOTES:	
1. See 3.1.3.1.	
2. If A or B is not called out for Class 4, either one may be used.	

1.3.2 Type II. Type II identification markings are temporary and are intended for ready removal without affecting the identified part or assembly.

2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents, of the issue in effect on the date of invitation for bid or request for proposal, form a part of this specification to the extent specified herein. The requirements of this specification shall meet or exceed the requirements of Government documents listed herein.

SPECIFICATIONS

Military

MIL-V-173	Varnish, Moisture- and Fungus-Resistant (for Treatment of Communications, Electronics, and Associated Equipment)
MIL-M-43719	Marking Materials and Markers, Adhesive Elastomeric, Pigmented, General Specification for

STANDARDS

Military

MIL-STD-130	Identification Marking of U.S. Military Property
A-A-3097	Adhesives, Cyanacrylate, Rapid Room Temperature Curing, Solventless

2.1.1 Copies of specifications, standards, drawings, and other publications required by suppliers in connection with specified procurement functions should be obtained from the procuring activity or as directed by the contracting officer.

2.2 Nongovernment documents. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bid or request for proposal shall apply. In case of conflict between these documents and this specification, the requirements of this specification shall prevail.

SPECIFICATIONS

The Boeing Company, Mesa

HMS 8-1010	Nameplates, Aluminum Foil
HMS 8-1169	Ink, Marking
HMS 16-1068	Adhesive, Epoxy, Paste Type
HMS 20-1267	Manufacturing Materials

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HP 4-96	Electrochemical Stencil Etching
HP 8-8	Serialization of Parts and Assemblies, and Numbering for Material Control
HP 8-15	Identification by the Silk Screen Method
HP 8-21	Stenciling
HP 9-25	Degreasing
HP 15-10	Application of Decalcomanias
HP 15-17	Identification Plates, Aluminum Foil, Application of
HP 16-25	Bonding of Metallic and Nonmetallic Materials with Structural Epoxy Adhesives

STANDARDS

The Boeing Company, Mesa

HS184	Tape, Identification
HS4367	Plate, Identification
HS4709	Nameplate, General, Pressure-Sensitive
HS4951	Plate, Identification

OTHER PUBLICATIONS

American Society for Testing and Materials

ASTM D 3955	Standard Specification for Electrical Insulating Varnishes
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2.2.1 Unless otherwise specified by the contracting officer, The Boeing Company, Mesa (Boeing Mesa) documents should be obtained from the Boeing Mesa Materials, Processes, and Standards (MP&S) Department. Other industry documents should be obtained from the originating activities. Technical society and technical association documents are generally available for reference from libraries, and are also distributed among applicable technical groups and Federal agencies.

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3. REQUIREMENTS

3.1 General requirements.

3.1.1 Equipment. Equipment required to accomplish the identification marking requirements specified herein shall include, but shall not be limited to, suitable stamps, pads, tapes, and tags. Equipment specified in the documents referenced in Section 2 shall also be required.

3.1.2 Materials. Materials required to accomplish the identification marking requirements as specified herein shall include, but shall not be limited to, the materials specified in documents referenced in Section 2 and the following:

- a. Aluminum nameplates (HMS 8-1010).
- b. Crayons (HMS 20-1267/1163).
- c. Marking inks. Sources approved for supplying marking inks are listed in Boeing Mesa Approved Vendors List HMS 8-1169.
- d. Polyester wrap (HMS 20-1267/1708).

3.1.3 Selection. Unless otherwise specified, the type and class of identification marking shall be as specified on the engineering drawing. When the engineering drawing does not specify a particular type or class and the part is of adequate size to ink stamp, Type I, Class 3 shall be used. When the engineering drawing does not specify a particular type or class and the part is of inadequate size to legibly ink stamp, the parts may be bagged, boxed, or wired together and tagged (Type I, Class 10).

3.1.3.1 Provisions for small parts. When the engineering drawing specifies Type I, Class 3, the parts are of inadequate size or geometry to legibly ink stamp, and the parts are not serialized, the parts may be bagged, boxed, or wired together and tagged (Type I, Class 10).

3.1.4 Permanence.

3.1.4.1 Type I identification markings. Type I identification markings shall be permanent for the normal life expectancy of the part or assembly on which they are applied, and shall be capable of withstanding the environments required of the part or assembly.

3.1.4.2 Type II identification markings. Temporary identification markings shall be readily removed from the part before the manufacturing of parts or assemblies is completed. Identification marking may be accomplished by marking the container or the part using temporary ink, tags, tape, or crayon. If removable tags are used for identification marking, tags and wire shall be compatible with the part or assembly and subsequent processing.

3.1.4.2.1 Durability. Type II identification markings shall be capable of withstanding the handling and processing to which the part or assembly will be subjected, and shall be removable without affecting the surface on which the marking is applied. Suitable temporary inks are specified in HMS 8-1169.

3.1.4.3 Manufacturing options.

3.1.4.3.1 In-process identification. During processing, permanent identification methods may be used in lieu of temporary marking provided the identification has no deleterious affect on the part and will be completely removed during manufacturing. For in-process serialization and traceability requirements, refer to HP 8-8.

3.1.5 Marking location. Permanent identification markings shall be located as specified on the engineering drawing.

3.1.5.1 Type I, Class 3 and Class 3A. When no location is specified for Type I, Class 3 (ink marking) or Class 3A (ink marking with protective coating), the identification markings shall be placed on any surface that will not interfere with subsequent assembly. For example, adhesively-bonded components shall not be ink-stamped on the bond surface.

3.1.5.2 Type I, Classes 1, 2, 4 through 9, and 11 through 13. When no location is specified, the location is optional as long as it is visible.

3.1.6 Character size. The characters shall be legible (see 3.1.8) and the minimum height of individual characters shall be 0.050 inch (1.27 mm).

3.1.7 Damage. Identification markings shall not cause damage or disfigurement to the part or assembly being marked, and shall not interfere with fit or function. Identification markings shall not adversely affect the life of a part or assembly.

3.1.8 Legibility. The required identification (see 3.2.1) shall be easily readable.

3.2 Requirements.

3.2.1 Required identification. Except for source control or specification control items, all components, subassemblies, and assemblies shall be individually identified with the part number (see 6.3.1), the manufacturer CAGE code (see 6.3.2) preceded by the letters MFR, and date of manufacture. The date of manufacture may be defined as the date the parts are identified per manufacturing planning. Other identification shall be added as specified by the engineering drawing, manufacturing planning sheets, or purchase order.

3.2.1.1 Source control and specification control items. Source control and specification control items shall be identified as specified on the engineering drawing, or procurement specification. When the engineering drawing does not specify a Type and Class, Type I, Class 3A shall be used.

3.2.1.2 Additional information. When additional information is placed on a part, and there is no provision stated for location or class (i.e., a name plate is placed on a part, yet the MC number is also required), the identification shall be placed as close to the required information as possible, as long as it does not interfere with subsequent assembly. The additional information shall be per Type I, Class 3A.

3.2.2 Type I (permanent markings).

3.2.2.1 Class 1 (impression stamping), Class 2 (electric vibrator or dot peening), and Class 8 (electric discharge pencil marking). Impression stamping, electric vibrator, dot peening, or electric discharge pencil marking shall only be used when specifically required and when the marking location is specifically designated by the engineering drawing. When required, the impression stamp shall be hammered with sufficient force to provide a legible impression. Dot peening shall be performed by a computerized marking system with a maximum depth of 0.005 inch (0.13 mm). The equipment manufacturer's instructions shall be followed to ensure that legible marks are produced. When possible, backup blocks shall be used to eliminate distortion or cracking parts or assemblies. Under no circumstances shall the characters protrude through or distort the opposite side of the part or assembly.

3.2.2.2 Class 3 (ink marking). The following requirements shall be met for ink marking:

- a. Inks shall conform to the requirements of HMS 8-1169, Type I.
- b. The character size shall be sufficient to provide a legible marking and shall be suitable for the size of the part (see 3.1.6).
- c. The color of the ink shall contrast with the background color of the part or assembly.
- d. Surfaces to be ink marked shall be cleaned prior to application.
 1. Scuff sand composite substrates as required, within the limitations of the fabrication process specification. After final sand, solvent wipe with appropriate material as allowed by fabrication process specification.
 2. Bare surfaces shall be hand-cleaned in accordance with HP 9-25, Type I, Class 3 using the appropriate material. Air-dry prior to application of ink.
 3. Painted surfaces shall be hand-cleaned in accordance with HP 9-25, Type I, Class 3 using HMS 20-1267/2078 material. Air-dry prior to application of ink.

- e. Permanent ink markings (HMS 8-1169, Type I) shall be dried at ambient temperature for 1 hour minimum prior to handling, testing, or further processing; e.g., application of protective coatings. Videojet ink should be dried for 2 minutes minimum at ambient temperature.
- f. A protective coating may be applied to all ink markings as described in 3.2.2.2.1.b; however, all parts designated as Flight Safety parts shall have the protective coating applied.

3.2.2.2.1 Class 3A (ink marking followed by protective coating).

This type must be used when called out on the engineering drawing. It is intended to be used when the identification is subjected to long-term exposure, erosion, or solvents not specified by HMS 8-1169.

- a. Apply ink marking as specified in 3.2.2.2.
- b. After the ink is dry, apply a thin coating of one of the following materials:
 - 1. MIL-V-173, Composition I. Amber, one-component, moisture-resistant, fast cure (tack-free in 6 hours; full cure in 48 hours at ambient temperature).
 - 2. HMS 20-1267/1624. Clear, two-component, erosion-resistant, (tack-free in 1 hour; full cure in 24 hours at ambient temperature).
 - 3. HMS 16-1068, Class 8B. Clear, two-component, moisture-resistant, fast cure (tack-free in 20 minutes; full cure in 4 hours at ambient temperature).
 - 4. A-A-3097, Type I, Class 2. Clear, one-component, with or without an activator (tack-free in 2 minutes; full cure in 5 minutes at ambient temperature).

3.2.2.3 Class 4 (identification plates and tapes). The following requirements shall be met:

- a. Plates:
 - 1. General. Identification plate characters must be applied prior to attachment. Characters may be impression stamped or applied using dot-peening equipment.
 - 2. Metallic and nonmetallic plates without self-adhesive. These plates shall be attached by means of screws, rivets, or bonding in accordance with HP 16-25. These plates shall be controlled by the engineering drawing or by a Boeing Mesa standard part (HS) drawing. Plates attached by rivets or screws shall be edge-sealed with adhesive epoxy (HMS 16-1068, Class 8B) applied in accordance with HP 16-25. Plates applied by bonding shall have a full fillet of adhesive around the perimeter of the plate.

b. Tapes and plates with pressure sensitive adhesive:

1. Identification. Metallic or nonmetallic tapes shall be identified by engraving, electric vibrator, impression stamping, thermal transfer printing, typewriter, wire marking tape (HMS 20-1267/2293), or Videojet prior to affixing tapes to the parts or assemblies. When identification marking is specified by the engineering drawing, and is applied by typewriter, the following provisions shall be met:
 - (a) Metallic tapes shall be covered with a protective coating conforming to MIL-V-173 (see ASTM D 3955), Composition I; HMS 16-1068, Class 8B; HMS 20-1267/1624; or A-A-3097, Type I, Class 2.
 - (b) Nonmetallic tapes (except wire marking tape (HMS 20-1267/2293) shall be protected by one full wrap of HMS 20-1267/1624, as required.
 - (c) When applicable, tubing may be identified using HS184, Critchley tape, in lieu of HS4367 foil plate where specified. Tape shall be of the same system type and be identified with the same flow direction arrows and information as the HS184 flow tape specified on the engineering drawing.
2. Application: Application shall be as follows:
 - (a) Metallic tapes shall be attached in accordance with HP 15-17, and as specified in 3.2.2.3.b.1.(a).
 - (b) Nonmetallic tapes shall be attached as follows:
 - (1) Remove protective backing
 - (2) Apply tape firmly to surface of part as directed on engineering drawing. Using a plastic roller or similar device, roll over the surface of the tape to firmly affix tape to part.
 - (3) When required, apply cover as specified in 3.2.2.3.b.1.(b).
3. Metallic foil tapes and plates with self-adhesive (e.g., HS4367-4, HS4367-5, HS4709, or HS4951). Aluminum foil tapes and plates shall be applied in accordance with HP 15-17.

3.2.2.4 Class 5 (decals). Decals shall conform to MIL-M-43719, and shall be applied in accordance with HP 15-10.

NOTE

Wire marking tape (HMS 20-1267/2293) shall only be used for electrical assemblies.

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NOTE

Class 4 identification marking (see 3.2.2.3) may be used to replace Class 5 for prototype manufacturing.

3.2.2.5 Class 6 (raised-cast or molded characters). The location and size of raised-cast or molded characters shall be as specified on the engineering drawing. The characters shall be raised a minimum height of 0.063 inch (1.6 mm) above the part surface.

3.2.2.6 Class 7 (electrochemical etch marking). Electrochemical etch marking shall be performed in accordance with HP 4-96. Unless specifically designated by the engineering drawing, the depth shall be sufficient to provide a legible mark on the finished component, but shall not exceed 0.0005 inch (0.013 mm). Depending on the color of the surface, the etch may be either black or white to contrast with the substrate. Any surface that will receive a subsequent treatment; e.g., anodize or paint, shall be etched prior to such treatment.

3.2.2.7 Class 9 (metal band). Identification marking shall be applied to metal bands before attaching to the part.

3.2.2.8 Class 11 (paint marking). Paint marking shall be as specified on the engineering drawing. Class 11 is also applicable to parts and assemblies where markings are applied using a stencil (see HP 8-21) or silk screen (see HP 8-15) and paint; e.g., control panels.

3.2.2.9 Class 12 (neodymium yttrium aluminum garnet [Nd:YAG] laser marking). A laser process schedule shall be required for all parts. When necessary, raised metal or burrs on machined surfaces resulting from laser marking shall be removed by light stoning to allow satisfactory functioning of the part or assembly. Parts or assemblies that require treated or plated surfaces shall be marked with the laser marking method prior to application of the finish. The depth of the laser marking shall be in accordance with MIL-STD-130.

3.2.2.10 Class 13 (cocure marking of composite parts). Cocure marking of composite parts is an acceptable alternative to ink marking (Class 3) on composite parts. The marked area shall not be covered by primer or a topcoat. Identification marking shall be applied by either cocuring an ink-marked release ply or scribed aluminum tape into the laminate. Scribed aluminum tape shall be used only in conjunction with fiberglass or aramid (Kevlar) laminates.

3.3 Environmental, health, and safety. Equipment, materials, solutions, and emissions (if applicable) shall be controlled, handled, used, and disposed of in accordance with all local, State, and Federal government safety, health, and environmental affairs (SHEA) regulations.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.

4.1.1 Suppliers. Unless otherwise specified in the contract or work order, suppliers shall be responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, suppliers may use their own facilities or any commercial laboratory acceptable to Boeing Mesa. Boeing Mesa reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure that materials and services conform to prescribed requirements.

4.1.2 In-house. Boeing Mesa Quality Assurance (QA) shall be responsible for determining the organization/department that will perform the inspection process(es) specified herein. Boeing Mesa QA will perform audits, as necessary, to ensure compliance with requirements of this specification when QA is not performing the inspection process(es).

4.2 Method of inspection. Identification markings shall be visually inspected in accordance to the applicable sampling plan to ensure conformance to the requirements of Section 3.

5. PREPARATION FOR DELIVERY

Not applicable.

6. NOTES

6.1 Intended use. The procedures and requirements for identification marking of detail parts and assemblies established by this specification are intended for use in the manufacture of aircraft, ordnance, and ground support equipment.

6.2 General information.

6.2.1 Recommended equipment for permanent marking (Type I). Equipment specified in Table II is considered suitable for meeting the requirements of this specification. Other equipment may be used provided the requirements of this specification are met.

Table II. Recommended Equipment for Permanent Marking (Type I)

Class	Equipment Name	Manufacturer's Designation	Manufacturer
2	Electric pencil and dot peen	Vibro-Tool	Burgess Vibrocrafter Grayslake, IL 60030
		Monode PMS 2001	Monode Marking Products Mentor, OH 44060
7	Electrochemical etcher	Mark 300-A	Marking Methods, Inc. Alhambra, CA 91802
8	Electric discharge pencil	EM 60 and EM 120	H.P. Preis Engraving Machine Company Hillside, NJ 07205

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6.3 Definitions.

6.3.1 Part Number. A part number is a combination of numbers or letters that defines a unique item. It may or may not include a dash. At Boeing Mesa, a part number typically consists of an eleven digit, basic drawing number followed by a dash and then up to a three digit number resulting in a unique part number.

Example: 7-311421039-7 = Part number
 7-311421039 = basic drawing number
 -7 = unique identification number
 7-6R2431001-001 = part number, drawing number
 7-6R2431001 = basic drawing number, design family
 -001 = unique identification number

6.3.2 CAGE code. The commercial and Government entity code is a five-character code listed in cataloging handbook H4/H8, which is assigned to commercial and government activities that manufacture or develop items, or provide services or supplies for the US Government.

7. APPROVED SUPPLIERS

Not applicable.