

INCH POUND

FNS/PD 96-18
November 1, 1996

PURCHASE DESCRIPTION

AIRCREW INTEGRATED HELMET SYSTEM, HGU-56/P (AIHS)

This purchase description is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This document covers the HGU-56/P Helmet Assembly and subassemblies.

1.2 Classification. The HGU-56/P Helmet Assembly and Helmet Shell subassemblies should be of the following sizes (see 6.2):

Helmet Assembly:	XX-Small	Helmet Shell Subassemblies:	Small
	X-Small		Medium
	Small		Large
	Medium		X-Large
	Large		
	X-Large		

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

- L-P-378 - Plastic Sheet and Strip, Thin Gauge, Polyolefin
- DDD-L-20 - Label: For Clothing, Equipage, and Tentage (General Use)
- PPP-B-636 - Boxes, Shipping, Fiberboard
- PPP-C-1752 - Poly Foam

MILITARY

- MIL-B-121 - Barrier Paper, Grease Proof, Waterproofed, Flexible
- MIL-L-35078 - Loads, Units; Preparation of Semiperishable Subsistence Items; Clothing, Personal Equipage; General Specification For
- MIL-V-43511 - Visor, Flying Helmet, Polycarbonate
- MIL-H-43925 - Helmet, Performance Requirements
- MIL-C-46168 - Coating, Aliphatic Polyurethane, Chemical Agent Resistant
- MIL-H-49198 - Headset, Microphone Kit
- MIL-M-49199 - Microphones, Linear, General Specifications for
- MIL-H-49225 - Headset Microphone Kit MK 896A/AIC (Components of)
- MIL-C-83409 - Coatings, Visor, Polycarbonate, Flying Helmet

STANDARDS

MILITARY

- MIL-STD-100 - Engineering Drawing Practices
- MIL-STD-129 - Marking For Shipment and Storage
- MIL-STD-130 - Identification Marking of U.S. Property
- MIL-STD-147 - Palletized Unit Loads
- MIL-STD-662 - Ballistic Acceptance Test Method For Personal Armor Material
- MIL-STD-973 - Configuration Management
- MIL-STD-1189 - Bar Code Symbolology, Standard Department of Defense
- MIL-STD-1472 - Human Engineering Design Criteria For Military Systems Equipment and Facilities
- MIL-STD-2073 - Material Procedure For Development and Application of Packaging Requirements

(Unless otherwise indicated, copies of Federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building #4, Section D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

JOINT COMMITTEE ON PRINTING (JCP) PUBLICATIONS

Government Paper Specification Standards

(Copies may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

DRAWINGS

U.S. ARMY NATICK RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER

1680-ALSE-101	- Helmet Assembly
1680-ALSE-201	- Visor Assembly, COBRA
1680-ALSE-110	- Vision Restricting Visor
1680-ALSE-120-2	- Lens, Inner, 2-Notch
1680-ALSE-121-2	- Lens, Outer, 3-Notch
1680-ALSE-162	- Modification Kit, Communication Equipment
1680-ALSE-255	- Bag, Flyer's Helmet
1680-ALSE-239	- Adapter Kit, Mask
93A8487	- M-170 Adapter
94C8766	- Mask Microphone Adapter
93A8639	- Intercommunication Unit

(Copies of drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI S12.6-1984 - Methods For The Measurement of The Real-Ear Attenuation of Hearing Protectors
- ANSI Z90.1b-1979 - Specification For Protective Headgear For Vehicular Users
- ANSI B46.1-1985 - Surface Roughness
- ANSI/ASQC Z1.4 - Sampling Procedures and Tables For Inspection by Attributes

(Copies should be obtained from the American National Standards Institute, 11 W. 42nd Street, New York, NY 10036-8002.)

- FNS/PD 97-05 - Aircrew Protective Laser Lens Purchase Description

(Applications for copies should be addressed to Defense Personnel Support Center, DPSC-FNS, 2800 S. 20th St., Phila., PA 19145.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS

- ASTM-D-1974 - Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes
- ASTM-D-3951 - Standard Practice for Commercial Packaging
- ASTM-D-5118 - Standard Practice for Fabrications Practices
- ASTM-D-5472 - Standard Practice for Methods of Tape, Package, and Waterproof, Pressure Sensitive Adhesive, Packaging Paper (For Carton Sealing)
- ASTM-D-5486 - Standard Specification For Pressure-Sensitive Tape Packaging, Box Closure & Sealing

(Applications for copies should be addressed to American Society For Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.)

- TM-1-8415-216-12&P - Operator's & Aviation Unit Maint. Manual Including Repair Parts & Special Tools List

(Applications for copies should be addressed to Defense Personnel Support Center, DPSC-FNS, 2800 S. 20th St., Phila., PA 19145.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3, 6.2, and 6.4).

3.2 Samples

3.2.1 Standard color samples. Unless otherwise specified, standard samples for color shall apply (see 6.3).

3.3 Materials and components. Materials and components shall be as specified on the applicable drawings and as specified herein (see 3.3.1). For materials or components for which it is stated "or equal", if the contractor proposes to use an item considered to be equal to the material or component specified, prior to its use the contractor shall furnish a sample of the material or component, with supporting data to the contracting officer for subsequent evaluation by the responsible military agency. The supporting data required shall prove the functional equivalence and design compatibility of the item proposed to be used.

3.3.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.3.2 Adhesives. The adhesives shall be applied to the helmet components in a manner that will not degrade the liners or affect the finish of any helmet component.

3.3.2.1 Rubber edging. The adhesive for bonding the rubber edging of the helmet shall meet the bonding requirements specified.

3.3.3 Standards of manufacture. Materials and components utilized in the fabrication of the HGU-56/P Helmet Assembly and its modular components shall be as specified on the applicable drawings and parts lists and shall meet all applicable referenced specifications and requirements.

3.3.4 Workmanship (Visual & Mechanical). The workmanship shall be in accordance with high grade practices for the processes involved. The assembly shall be clean, free from sharp edges and burrs. All components, assemblies, and subassemblies shall be in accordance with the quality requirements of section 4 of this document.

3.3.5 Preproduction sample. Preproduction samples designated herein as first article samples of the HGU-56/P Helmet Assembly shall be tested as specified in section 4 prior to the regular production to demonstrate the adequacy and suitability of the contractor's tooling, processes, and procedures of fabrication.

3.3.6 Instruction manual. The instruction manual shall be furnished by the contractor with each helmet. The manual shall be placed into the suspension of the completed helmet. The printing, collation, folding, and stitching of the manual shall be in accordance with the standard sample (see 6.3). The cover shall be antique white book paper conforming to JCP-A-100, 140 pound weight basis 25 by 38 inches per 1000 sheets (see 4.1.2). The text paper shall be white offset book paper conforming to JCP-A-60, 120 pound weight basis 25 by 38 inches per 1000 sheets (see 4.1.2).

3.3.7 Identification label. Each helmet shall have a permanent type identification label applied in a permanent manner to the interior surface of the helmet shell located to the rear of the right ear cavity adjacent to the cut out in the helmet liner. The label shall be white, approximately 1 by 2 inches in size, and the characters shall be black, 3/32 inch high minimum. The label shall have the following information:

Nomenclature
Size
Stock No.
Contract No.
Lot No.
Contractor's Name

3.3.7.1 Identification labels and markings on components. When specified on the applicable drawings, components shall have identification labels or markings, as applicable. Unless otherwise specified on the applicable drawings, the identification label for textile components shall conform to type IV, class 5 of DDD-L-20, except the lot number shall be included in the label contents. For components other than textile, the identification label or marking shall be as specified on the applicable drawing.

3.4 Prime item definition. The HGU-56/P helmet shall be a stable, comfortable helmet capable of modular mounting of alternate visor assemblies for use of specific helmet mounted sighting, display, and night vision devices by rotary wing air crew in various mission scenarios.

3.5 Major component list. The HGU-56/P Helmet Assembly shall be comprised of the following major subassemblies and components:

Shell Subassembly	Lining, Helmet, Shock Absorbing
Dual Visor Assembly	Communications Components
Thermoplastic Liner	Earcup Assembly
Retention Assembly	

3.6 Design and construction. The design and construction of the helmet shall be as specified herein, and as shown on drawing 1680-ALSE-101 through 1680-ALSE-106 and specified in accordance with MIL-STD-130.

3.6.1 Stitching. All stitching shall be as specified on the applicable drawings and as specified herein.

3.6.2 Thread tension. Thread tension shall be maintained so that there will be no loose stitching resulting in loose bobbin or top thread, or excessively tight stitching resulting in puckering of the materials sewn. The lock shall be embedded in the materials sewn.

3.6.3 Repairs of type 301 stitching. Repairs of type 301 stitching shall be as follows:

a. When a thread break or bobbin run-out occurs during sewing, the stitching shall be repaired by restarting the stitching a minimum of 1/2 inch back of the end of the stitching. 1/

b. Any thread break or two or more consecutive skipped or runoff stitches noted during inspection of the item (in-process or end item) shall be repaired by overstitching. The stitching shall start a minimum of 1/2 inch in back of the defective area, continue over the defective area, and continue a minimum of 1/2 inch beyond the defective area onto existing stitching. Loose or excessively tight stitching shall be repaired by removing the defective stitching, without damaging the materials, and restitching in the required manner. 1/

1/ When making the above repairs, the ends of the stitching are not required to be backstitched.

3.6.4 Automatic stitching. Automatic machines may be used to perform any of the required stitch patterns provided the requirements for the stitch pattern, stitches per inch, size, and type of thread are met, and at least three or more tying, overlapping, or back stitches are used to secure the ends of the stitching.

3.6.5 Thread ends. All thread ends shall be trimmed to a length of not more than 1/4 inch.

3.6.6 Setting of eyelets and grommets. A hole shall be prepunched to receive the eyelet and grommet. The hole shall be smaller than the outside diameter of the eyelet or grommet barrel so that the barrel must be forced through the hole. The eyelets and grommets installed in the chinstrap and earcup retainer shall meet the performance requirements specified in 3.7. The hole shall not be punched in the setting operation with the eyelet or grommet barrel. The eyelets and grommets shall be securely clinched without splitting and in a manner that will prevent rotation of the eyelets and grommets freely within the webbing, detachment of the eyelets and grommets from the webbing, or cutting of the adjacent material (see 3.7). The minimum inside diameter of the eyelet hole after clinching shall be as specified on the applicable drawing. Unless otherwise specified, the washer may be on either side of the components on which installed.

3.6.7 Setting of snap fasteners. A hole shall be prepunched to receive the button and eyelet components of the snap fasteners. The hole shall be smaller than the outside diameter of the button and eyelet barrels so that the barrel must be forced through the hole. The hole shall not be punched in the setting operation with the button or eyelet barrel. The fasteners shall be securely clinched without cutting the adjacent materials, such that the ends of the barrels of the button and eyelet components are completely rolled back (see 3.7).

3.6.8 Fusing of ends of nylon webbing. Unless otherwise specified, all ends of nylon webbing shall be fused. The apparatus used to fuse the webbing ends shall be capable of providing sufficient heat to provide a smooth edge with the cut ends of the webbing all fused together. Fusing of the webbing ends shall be accomplished prior to being assembled for stitching.

3.6.9 Dipping of ends of elastic webbing. All ends of elastic webbing shall be dipped in a melted mixture of 50 percent beeswax and 50 percent paraffin to a depth of $3/16 \pm 1/16$ inch. Temperature of the melted mixture shall be $180^{\circ} + 20^{\circ}\text{F}$. The dipped ends shall have a smooth and even appearance.

3.6.10 Finish

3.6.10.1 Hardware. Hardware components specified to be finished black on the applicable drawings shall be uniformly coated and free from flaking.

3.6.10.2 Helmet shell. The entire exterior surface of the helmet shell shall be coated with the coating specified on drawing 1680-ALSE-101. The coating shall be either air-dried or force-dried prior to attachment of rubber edging and screws. The dried finish shall be uniform in color and luster over the entire exterior surface of the shell. The final finish shall be free of sags, runs, wrinkles, blistering, or other defects either of improper application or of cure of the coating.

3.6.11 Assembly of helmet. The helmet and helmet components shall be assembled as specified on the applicable drawings and as specified below. The contractor is not required to follow the assembly instructions in the exact sequence shown.

3.6.11.1 Visor assembly. the front edge of the visor housing shall not project below the lower bound edge of the helmet. the space between the visor and the housing shall be sufficient to enable the visor to be raised and lowered without touching the housing except at the left and right edges $3/4$ inch maximum from edges of visor. If interface does occur, the specified spacers shall be used.

3.6.11.2 Communications assembly

- a. Use headset microphone kit, MK 896A/AIC of MIL-H-49225
- b. Insert female connector into connector retainer clip with bottom edge of connector even with bottom edge of retainer clip. Clinch prongs on retainer clip securely around connector.
- c. Attach connector retainer clip on helmet shell using retainer clip plate and mounting screws as shown on drawing 1680-ALSE-101
- d. Attach the cord-strain relief clip to helmet shell as shown in view E, drawing 1680-ALSE-101
- e. Route microphone wire through helmet shell from inside to outside as shown on drawing 1680-ALSE-101. Insert grommet enclosing wire into helmet shell and seat fully.
- f. Position shrinkable tubing over connector and retainer clip and apply sufficient heat to

- shrink tubing firmly around connector and retainer
- g. Install earcups in earcup retainer
 - h. When installing suspension band assembly, route wires between suspension assembly and liner just above the suspension screws, as shown in the rear view and top view of drawing 1680-ALSE-101
 - i. Attach microphone boom on helmet shell as shown on drawing 1680-ALSE-101. Insert male connector into female connector.

3.7 Performance

3.7.1 Coating adhesive. All surfaces of the helmet assembly and its component subassemblies finished in accordance with MIL-C-46168 shall not show evidence of lifting of any square when tested as specified in 4.7.1.

3.7.2 Impact protection. When tested in accordance with 4.7.2, the Helmet Assembly (w/Dual Visor Assembly) shall limit peak headform deceleration to 150 G in the crown and 175 G in the headband area when subjected to impact velocities of 4.88 m/sec and 6.0 m/sec respectively.

3.7.3 Ear impact protection. When tested in accordance with 4.7.3 the Helmet Assembly (w/Dual Visor Assembly) shall limit peak headform deceleration to 150G when subjected to an impact velocity of 6.0 m/sec in the earcup area.

3.7.4 Helmet shell penetration resistance. When tested in accordance with 4.7.4 the maximum helmet shell tear length shall be 5 cm.

3.7.5 Acoustic attenuation. When tested in accordance with 4.7.5, the Helmet Assembly shall meet the minimum attenuation requirements of Table I.

TABLE I. ACOUSTIC ATTENUATION VALUES

Frequency (Hertz)	125	250	500	1000	2000	3150	4000	6300	8000
Attenuation (Decibels)	17	14	20	21	26	38	37	44	42

3.7.6 Helmet restoration. When tested in accordance with 4.7.6, the helmet chin strap shall withstand a 1950 Newton tension load for two minutes and shall not elongate more than 3.8 cm from a preload of 110 Newtons.

3.7.7 Visors

3.7.7.1 Class 1 and 2 visor lenses. Class 1 and 2 visor lenses shall be hard-coated on both sides in accordance with MIL-C-83409 and shall meet all requirements of MIL-V-43511 after coating application.

3.7.7.2 Laser visor lenses. Laser visor lenses shall meet the requirements of FNS/PD 97-05.

3.7.8 Communication. Standard communications requirements shall be in accordance with MIL-H-49225. TEMPEST secured headset assemblies requirements shall be in accordance with the following:

- 1) Earphones and Cord Assembly
- 2) Earphone and Cord Assembly requirements of MIL-H-49198
- 3) Microphone Assembly requirements of MIL-M-49199/1 (CR), 31 August 1994

3.7.9 Weight. When tested in accordance with 4.7.9, the weight of the size "M" HGU-56/P Helmet Assembly (W/Dual Visor Assembly) shall not exceed 1.4 kilograms.

Configuration to be weighed:

Helmet Assembly	1680-ALSE-101-4
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Less:

Headboard Pad Fitting Set	1680-ALSE-109-10
Pads, Earcup Spacer	1680-ALSE-111-1
Mounting Kit, ANVIS: V1 & V2	1680-ALSE-292-1

3.8 Repairs. Except as otherwise specified herein, repairs are not allowed to be made to the helmet.

3.8.1 Shell repairs. Slight surface imperfections not greater than 1 ply deep, 1/8 inch wide, or 1/2 inch in length shall be filled. Shells having defects greater than 1 ply deep, 1/8 inch wide, or 1/2 inch long shall be scrapped.

3.9 Replacement of defective components. During the spreading, cutting, and manufacturing process, textile, leather, and polyurethane components having material defects, dimensional defects, or damages that are classified as defects in 4.5 and 4.6 shall be removed from production and replaced with non-defective components.

4. VERIFICATION

4.1 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for assuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to assure compliance with all dimensional requirements.

4.1.2 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3)
- b. Quality conformance inspection (see 4.4)

4.3 First article inspection. When a first article is required (see 6.2), it shall be evaluated in accordance with Table II, examined for the defects listed in 4.6, and shall be tested for the characteristics in Table IV. First article samples shall be in accordance with the sampling provisions of Table III. The presence of any defect or failure of any test shall be cause for rejection of the first article.

4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be in accordance with ANSI/ASQC Z1.4.

4.5 Component and material inspection. All component parts and materials shall be inspected and tested in accordance with the applicable production drawings or referenced specifications. Verification may be accomplished either by contractor, inspection test, vendor certification/test or independent test verification. Attention shall be given to the Quality Assurance Provisions (QAPs) specified on each drawing. The contractor may elect to accomplish critical or major requirements verification in-process or other component items using Statistical Process Control (SPC) techniques approved by the Government representative responsible for final acceptance.

TABLE II. FIRST ARTICLE TESTING

CHARACTERISTIC	REQUIREMENT PARAGRAPH	TEST METHOD PARAGRAPH	TYPE OF INSP./TEST
Coating Adhesion	3.7.1	4.7.1	Test
Impact Protection	3.7.2	4.7.2	Test
Ear Impact Protection	3.7.3	4.7.3	Test
Shell Penetration Resistance	3.7.4	4.7.4	Test
Acoustic Attenuation	3.7.5	4.7.5	Test
Helmet Retention	3.7.6	4.7.6	Test
Visors - Class 1 & 2	3.7.7.1	4.7.7.1	Insp & Test
Laser Visor Lenses	3.7.7.2	4.7.7.2	Insp & Test
Communications	3.7.8	4.7.8	Insp or Similarity

TABLE II. FIRST ARTICLE TESTING (continued)

CHARACTERISTIC	REQUIREMENT PARAGRAPH	TEST METHOD PARAGRAPH	TYPE OF INSP./TEST
Weight	3.7.9	4.7.9	Test
Workmanship (Visual & Mech.)	3.3.4	4.6	Inspection

TABLE III. SAMPLING FOR FIRST ARTICLE TESTING

Coating Adhesion	2 helmets per size
Impact	1 sample unit per size <u>1/</u>
Earcup Impact	2 units per size M and L only
Shell Penetration	2 shells of a size representative of the helmet patterning and lay-up to be used on the HGU-56/P helmets
Acoustic Attenuation	1 evaluation <u>2/</u>
Helmet Retention	2 units each size
Visors (Class 1 & 2)	2 per MIL-V-43511
Visors (Laser)	Per FNS/PD 97-05
All "Inspections"	Per drawing QAPs

1/ Each sample unit consists of 4 helmets, two each for hot and ambient impacts.

2/ One each evaluation will consist of combining evaluations for helmet sizes shall be:

Minimum amount of test subjects per size:

XXS	One subject for any one size
XS	One subject for any one size
S	One subject for any one size
M	Two subjects
L	Two subjects
XL	One subject

**TABLE IV. WORKMANSHIP (VISUAL/MECHANICAL
FOR FABRICATED COMPONENTS, SUBASSEMBLIES, AND MATERIALS)**

Examine	Defect	Classification		
		Critical	Major	Minor
Webbing	Any hole, cut, or tear: (applicable nylon webbing)		X	
	Edges scalloped, not firmly & tightly woven or frayed edge		X	
	Ends not fused or dipped as required			X
	Needle chews:			
	Up to 1/8 inch in length			X
	More than 1/8 inch in length		X	
Polyurethane Foam	Any cut, hole, deep wrinkle, tear, or splice			X
Hardware, General	Broken or malformed		X	
	Corroded areas, burrs or sharp edges			X
	Finish omitted or not as specified, where required			X
	Any required component improperly installed causing failure to serve intended purpose	X		
Eyelets and grommets	Clinched excessively tight, cutting material, or causing distortion to the degree that mounting hardware will not pass through hole		X	
	Grommet insecurely clinched to the degree that grommet can be rotated freely within the material		X	
	More than one split in the eye or grommet	X		
Open seams	One-half inch or less		X	
	More than 1/2 inch:			
	On seams around periphery of openings for earcups (two seams each opening) & seams (applicable earcup retainer)		X	
	On all seams other than above			X

NOTE: A seam shall be classified as open when one or more stitches joining a seam are broken or when two or more consecutive skipped stitches or runoffs occur.

TABLE IV. WORKMANSHIP (VISUAL/MECHANICAL
FOR FABRICATED COMPONENTS, SUBASSEMBLIES, AND MATERIALS) cont.

Examine	Defect	Classification		
		Critical	Major	Minor
Runoffs (see open seams)				
Seams and stitch type	Wrong seam or stitch type		X	
Stitch tension	Loose, resulting in loose top or bobbin thread, i.e. thread does not lie flush with material			X
	Tight, resulting in puckering of material			X
Stitches per inch	One less than min. specified			X
	Two or more stitches less than minimum specified		X	
	Two or more stitches in excess of maximum specified			X
Thread breaks, skipped stitches or runoffs	Overstitched less than required by drawing			X
NOTE: Thread breaks or two or more consecutive skipped stitches or runoffs not overstitched shall be classified as open seams.				
Stitching ends	Not secured as specified			X
Box-x stitching	Around periphery of stitch pattern:			
	Row omitted where single row is required or both rows omitted where double row is required		X	
	Row omitted where double row is required			X
	Diagonal row or rows omitted			X
Bartacks	Any omitted		X	
	Stitching loose, incomplete, or broken			
	On bartacks other than above		X	
	On bartacks on yoke straps		X	

TABLE IV. WORKMANSHIP (VISUAL/MECHANICAL
FOR FABRICATED COMPONENTS, SUBASSEMBLIES, AND MATERIALS) cont.

Examine	Defect	Classification		
		Critical	Major	Minor
Components and assembly	Any required component or operation omitted (unless otherwise classified herein)	X		
	Any component misplaced or not assembled as specified		X	
	Number of folds at ends of webbing, where required, less than number specified			X
Cleanliness	Grease, oil, or other stains clearly noticeable; thread ends not trimmed throughout as specified			X
Color of textile components	Color of any textile component not as specified			X
Identification markings	Omitted, incorrect, illegible, or location not as specified		X	
Formed TPL Layer	Material not as specified		X	
	Protrusions not formed as specified		X	
	Thickness of formed layer not as specified		X	
	Protrusion array not as specified			X
	Holes or tears in layer		X	
TPL Layer Assembly	Improper assembly of layers		X	
	All layers not fused completely by spot weld		X	
	Holes or tears at spot welds more than 1/16"		X	
	Punch holes not as specified			X
	Cut holes missing		X	
	Not trimmed as specified			X
TPL Cover Components	Materials not as specified		X	
	Patterns not as specified		X	
	Colors not as specified			X

**TABLE IV. WORKMANSHIP (VISUAL/MECHANICAL
FOR FABRICATED COMPONENTS, SUBASSEMBLIES, AND MATERIALS) cont.**

Examine	Defect	Classification		
		Critical	Major	Minor
TPL Cover Assembly	Thread not as specified			X
	Stitching not as specified			X
	Thread color not as specified			X
	Holes, cuts, or tears		X	
	Open seams (joining stitches broken or skipped)		X	
	Seam not as specified		X	
	Loose stitching (thread does not lie flush)			X
	Tight stitching (material pucker)			X
	Either or both labels missing		X	
	Wrong label			X
	Label printing not as specified			X
Exterior surface of shell	Any delamination, tear, cut, hole or crack		X	
	Any dent, nick, or gouge		X	
	Not smooth			X
	Any pinhole			X
	Any pimple			X
	Any unauthorized repair		X	
Exterior, finish coating of shell	Omitted		X	
	Thin film (shell showing through)			X
	Finish not applied prior to attachment of other hardware		X	
	Finish marred or partially: removed by adhesive			X
	applied to helmet components			X
	Any orange peel, run, or sag			X
	Tacky surface			X
	Any ridge or streak			X
	Any scuffed area or scratch			X
	Color not uniform		X	
	Any dirt, grease, stain, or paint smudge		X	
	Poor adhesion		X	

4.6 Workmanship (Visual and mechanical, end item). Each end item shall be visually inspected for workmanship visual defects. The workmanship defects are (as a minimum) specified in Table V. Any major defect found shall be reworked or replaced in the deliverable units.

TABLE V. WORKMANSHIP (VISUAL/MECHANICAL FOR END ITEM)

Examine	Defect	Classification		
		Critical	Major	Minor
Visor knob	Plastic knob(s) color not as specified			X
	Plastic knob(s) cracked		X	
	Does not function properly or does not slide freely in visor housing		X	
	Pin on the knob assembly does not engage into the detente spacer		X	
Visor housing	Cracked or chipped		X	
	Distorted		X	
Shell edge beading	Any cut, tear, or hole		X	
	Not fully positioned over edge of helmet shell in any specific area & 1/4 inch or longer in length:			
	1/16 inch up to 1/8 inch			X
	More than 1/8 inch		X	
	Any area not adhered to shell greater than 1/2 inch in length and 1/8 inch in width		X	
	Several unadhered areas the total length of which is 2 inches or more in length or any two unadhered areas less than 1/2 inch apart		X	
	Adhesive extends beyond edge of beading more than 1/16 inch for more than 1/4 inch at one or more places			X
	Ends not butted together;			
	Open 1/16 inch up to 1/8 inch			X
	Open more than 1/8 inch		X	
	Not one piece			X

TABLE V. WORKMANSHIP (VISUAL/MECHANICAL FOR END ITEM) cont.

Examine	Defect	Classification		
		Critical	Major	Minor
Earcup assembly:	(Examine components w/earpad, earphone & earcup cushion removed)			
Earcup	Cracked, chipped, broken, or dented		X	
	Surface not smooth			X
	Flange not securely adhered to earcup around entire periphery		X	
	Backing hook fastener: omitted		X	
	Cut, tear, or hole		X	
	Not adhered to earcup as specified in drawing		X	
Earcup hook fastener	Loose greater than 1/16"		X	
	Any component omitted		X	
	Any cut, tear, hole, or deep wrinkle or insufficient seal bond		X	
Earpad	Any heat seal not complete		X	
	Distorted due to misalignment of components during heat sealing operations		X	
	Any hole (except vent hole)		X	
	Any cut, blister, bubble, tear, abraded area, or crack		X	
	Not smooth			X
	Vent holes mislocated or not in the quantity specified			X
Chin strap and earcup retainer/nape strap	Any hole, cut, tear or frayed edge		X	
	Scalloped edges, not firmly and tightly woven			X
	Needle chews:			
	Up to 1/8 inch in length			X
	More than 1/8 inch in length		X	
	Hardware broken or malformed:			
	On chin strap	X		
	Corroded areas, burrs, or sharp edges		X	
	Finish on hardware, where required, omitted or not as specified			X

TABLE V. WORKMANSHIP (VISUAL/MECHANICAL FOR END ITEM) cont.

Examine	Defect	Classification		
		Critical	Major	Minor
Chin strap and earcup retainer/nape strap (cont.)	Any required hardware component improperly installed: On chin strap On nape strap On earcup retainer	X X	X	
Seams & stitching (applicable chin strap & retainer/nape strap)	Stitching defects shall be scored same as specified in 4.5			
Energy	Any patched area (voids or tears filled)		X	
Absorbing liner	Surface not smooth Not to density		X	X
HEADSET ASSEMBLY				
General (Cordset)	Any wire cut, cracked, or abraded Any hardware component: Corroded Omitted Not attached as specified Any component omitted Grommet in shell enclosing microphone lead not fully seated		X X X X	X X
Earphones	Wires not routed as specified Grommets enclosing earphone wires in earcup not seated properly Set screws not securely tightened in earphones		X X	X
Boom support swivel	Broken or deformed Locking screw will not loosen assembly or tighten		X X	
Components and assembly-general	Any operation not performed properly Any component omitted or not attached as specified unless otherwise classified herein		X X	

TABLE V. WORKMANSHIP (VISUAL/MECHANICAL FOR END ITEM) cont.

Examine	Defect	Classification		
		Critical	Major	Minor
Components and assembly-general cont.	Color of any component not as specified			X
	Any hardware component not finished as specified unless otherwise classified herein			X
TPL assembly	Not proper size		X	
Identification marking	Omitted, incorrect, or illegible			X
	Not firmly attached or location not as specified			X
Cleanliness	Any grease, oil, adhesive stain, etc. clearly noticeable		X	

4.7 Test methods

Sampling levels for end item testing. The sampling levels for end item testing shall be as specified in table VI.

TABLE VI. SAMPLING LEVELS

Characteristic	Requirement Paragraph	Test Method	Sample Level
Adhesion of finish	3.7.1	4.7.1	<u>1</u> /
Impact protection	3.7.2	4.7.2	<u>2</u> /
Ear impact protection	3.7.3	4.7.3	<u>1</u> /
Acoustic attenuation	3.7.5	4.7.5	<u>1</u> / <u>3</u> /
Helmet retention	3.7.6	4.7.6	<u>1</u> /

All other performance parameters do not require end item lot testing unless otherwise specified in a component part specification. Component part dimensional characteristics will be in accordance with drawing QAPs.

1/ One unit per every 500 deliverable or fraction thereof.

2/ Two units for each impact parameter per every 500 deliverable units or fraction thereof. Ambient and hot conditioning will be the only impact parameter evaluated.

3/ Acoustic attenuation testing will be limited to sizes S, M, & L helmets. Other size helmets shall be inspected to drawing requirements and tested by similarity, since test subject pools for the largest and smallest helmets may be difficult to obtain.

4.7.1 Coating adhesive. With a scribe held at approximately a 30 degree angle, three parallel lines, 0.0625 inch apart, shall be cut on the painted surface of the painted shell. These lines shall be crossed at right angles with three parallel cuts, 0.0625 inch apart, forming four squares. Sufficient pressure shall be applied on the scribe to cut completely through the painted surface. Lifting of any of the squares shall constitute failure to pass this test.

Tests shall be performed on four randomly selected sites of the helmet shell and a minimum of one randomly selected site on the visor housing. Helmets used for adhesion testing may be used for impact evaluations.

4.7.2 Helmet impact tests. Helmet impact tests shall be performed in accordance with the impact test method specified in American National Standards Institute (ANSI) Z90.1-1979 with the following exceptions:

- 1) Impact shall be single impacts only.
- 2) Drop velocity shall be:
 - a. Crown area = 4.88 m/sec
 - b. Headband area = 6.00 m/sec
- 3) Department of Transportation B, C, D headforms will be used for the appropriate size helmets. The drop assembly weight can be 10.1 lbs for the B size headform in lieu of 8.9 lbs as specified in DOT 218 (10-1-78).
- 4) Impacts will be tested at high temperature and ambient temperatures only.

The crown and headband area will be defined as shown in Figure 1. Test equipment set-up will be as shown in Figure 2.

4.7.2.1 Testing shall begin immediately after removal from the conditioning equipment. For any environmental tests, the helmet assembly shall not be out of the conditioned environment for more than five (5) minutes. If testing exceeds this time limit, the helmet assembly shall be returned to the conditioning environment for a minimum of 15 minutes before being withdrawn.

4.7.2.2 The test helmet shall have the liner custom fit to the appropriate size headform. The liner shall be fitted in accordance with TM 1-8415-216-12&P fitting procedures.

4.7.2.3 The entire test system shall be calibrated before and after each series of tests by impacting a standardized calibrating medium utilizing an appropriate drop height. At least three such impacts shall be recorded before and after testing. If the post-test average of the three impacts differs from the pre-test average by more than 10%, the entire test series must be considered void and repeated.

4.7.2.4 Additionally, a velocity reading shall be taken at impact from the calculated drop height to determine if adjustments must be made to the drop height to obtain the required impact velocity (compensation for tower drag).

4.7.2.5 The impact helmet shall be custom fit to the test headform to ensure a firm fit of the helmet to the headform at the target areas.

4.7.2.6 The test unit shall be affixed to the test headform so that the Forehead Reference Point (FRP) is 2.125 inches above and parallel to the basic plane of the test headform.

Crown area peak deceleration = 150 G's
Drop velocity (FPS) = 16 ft/sec (4.88 m/sec)

Headband area peak deceleration = 175 G's
Drop velocity (fps) = 19.7 ft/sec (6.0 m/sec)

4.7.2.7 The helmet shall be secured to the headform and support arm by its retention system (chin strap and nape strap) so as to maintain the position described in 4.7.2.6 during the fall.

4.7.2.8 The offset distance between the outside of the helmet and the headform shall be measured at each impact site. The offset distance is the distance between the outer shell surface of the helmet and the headform's surface. To determine this distance:

a) Measure the distance from the fixture base to the anvil.

b) Place the helmet assembly onto the headform and position as described in 4.7.2.6. Lower the helmeted headform onto the flat anvil and remeasure the distance from the fixture base to the flat anvil. This is the offset position.

c) The offset distance shall be obtained by subtracting the zero position from the offset position (step b from step a).

4.7.2.9 The headform shall be rotated to another impact site after each impact site has been impacted. These steps are then repeated for each of the remaining impact sites.

4.7.2.10 Two helmets shall be used for impact testing. One helmet shall be used to impact the crown, front, and rear impact sites; the second helmet shall be used to impact the crown and left and right impact sites.

4.7.3 Ear impact protective. The impact attenuating capability of the earcup area of the helmet subassembly shall be tested in a similar manner to the basic shell and liner structure stated in 4.7.2 with the following exceptions:

a. A modified ANSI size "C" headform as detailed in Figures 3 and 4 is to be used. This headform is identical to the existing size "C" ANSI model with the exception that the ear region has been extended downward 2.8 cm in the ear region as shown. The drop assembly weight is 5.2 kg.

b. The appropriate size helmet shall be fitted to the modified "C" headform so that the helmet is centered laterally on the headform, i.e., the earcups shall be fitted with an equal number of fitting pads on each side. The number of fitting pads will be such that a uniform and approximately 50 percent compression of the earseal results on each side more nearly simulating the as worn condition.

c. The earcups shall be located as for normal wear in the helmet, but care shall be exercised to place their centroid at the asterisk location shown in Figure 3.

d. The headform point of impact (asterisk of Figure 3) shall be positioned as shown to be tangent to the flat anvil.

e. The earphones shall be included in the test item configuration.

f. The drop velocity shall be 6.0 m/s.

g. The peak headform deceleration shall not exceed 150 G.

h. Impact testing to be performed as ambient conditions only.

4.7.4 Shell penetration resistance. A helmet shell tear penetration test shall be performed in accordance with the following procedure. The impactor drop mass is 5.0 ± 0.1 kg, and the drop height is 1.52 ± 0.05 meters. Tear length which exceeds 5 cm shall be cause for rejection. The impactor shall be fabricated as shown in Figure 5 and Figure 6 and utilized on an appropriate drop test fixture.

4.7.5 Acoustic attenuation. Acoustic attenuation of the helmet assembly shall be tested in accordance with American National Standards Institute (ANSI) Method S12.6-1984.

4.7.6 Helmet retention. A strap retention test shall be performed in accordance with paragraph 11.1 of ANSI Z90.1b-1979, except that a 1950 Newton tension equivalent shall be gradually applied to the device and retained by the chin strap for not less than two minutes. The chin strap

shall not elongate more than 3.8 centimeters and shall be preweighted per ANSI Z90.1b-1979. The preweight shall be 110N (25lbs) in lieu of 50 lbs.

4.7.7 Visors

4.7.7.1 Class 1 and class 2. Visors shall be tested in accordance with the optics, impact, visual characteristics of MIL-V-43511. All optics and ballistic tests shall be performed after the application of the hard-coating.

4.7.7.2 Laser visors. Laser visors shall be tested and inspected in accordance with the provisions of specification FNS/PD 97-05.

4.7.8 Communications. Verification shall be accomplished by inspection to drawing requirements or vendor certifications or test reports.

4.7.9 Weight. The helmet assembly, as specified in 3.7.9, shall be weighed to the nearest 0.01 lbs on an electronic balance or equivalent scale to produce the accuracy needed.

4.8 Quality conformance inspection. Sampling for inspection shall be in accordance with ANSI/ASQC Z1.4 except where otherwise indicated.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order. When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

6.1 Intended use. The HGU-56/P helmet is for use by rotary wing aircrew personnel.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this document.
- b. Size of helmet required (see 1.2).
- c. When a first article is required (see 3.1, 4.3, and 6.4).
- d. When initial production lot examination is not required (see 4.5).
- e. If size of initial production lot of items listed in 4.5 is other than specified.

f. Quantities of the following assemblies required:

- 1) Shell subassembly
- 2) Dual visor assembly
- 3) Visor assembly: COBRA
- 4) Lens, inner
- 5) Lens, inner, 2-notch
- 6) Lens, outer
- 7) Lens, outer, 3-notch
- 8) Bag, Flyer's Helmet
- 9) Adapter kit, mask

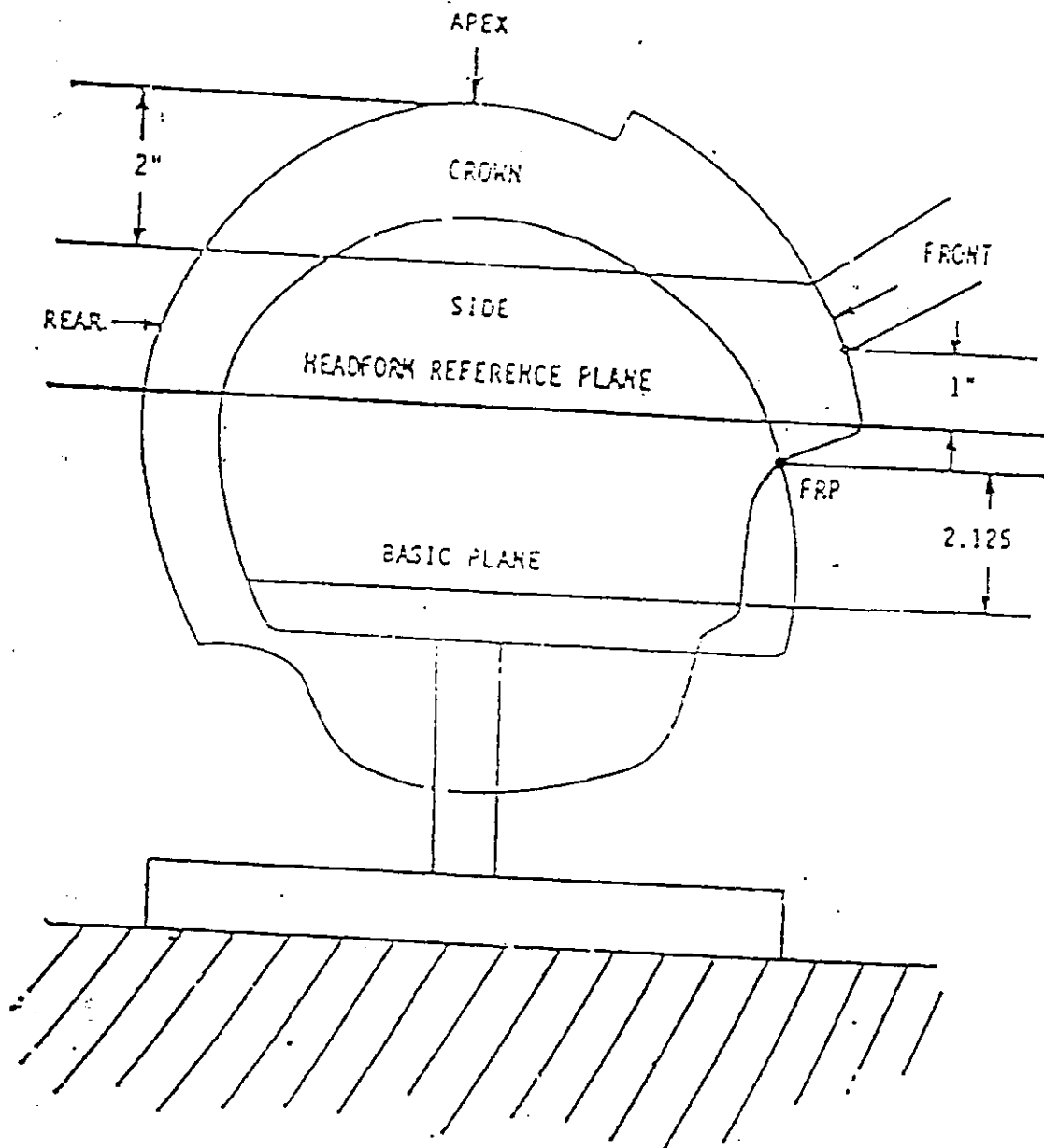
6.3 Samples. For access to samples, address the contracting activity issuing the invitation for bids.

6.4 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in all acquisition documents, regarding arrangements for selection, inspection, and approval of the first article.

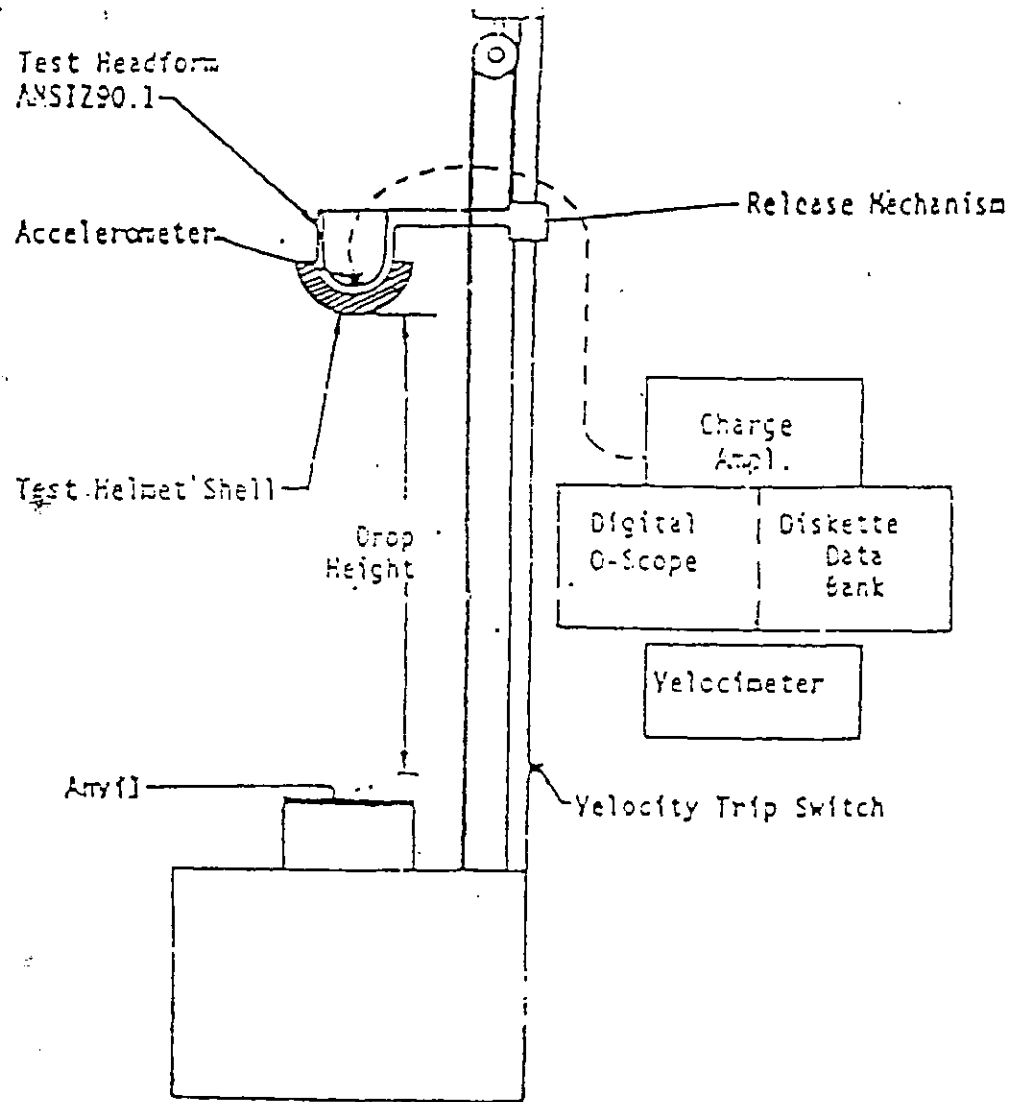
6.5 Certification of sound attenuation and impact resistance testing laboratories. Certification may be obtained from the U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL 36362. Certification will be based on comparison of test results from the contractor's laboratory with the results of verification tests performed by the Aeromedical Research Laboratory and by inspection of contractor's laboratory facilities and procedures if considered necessary.

6.6 Subject term (key word) listing

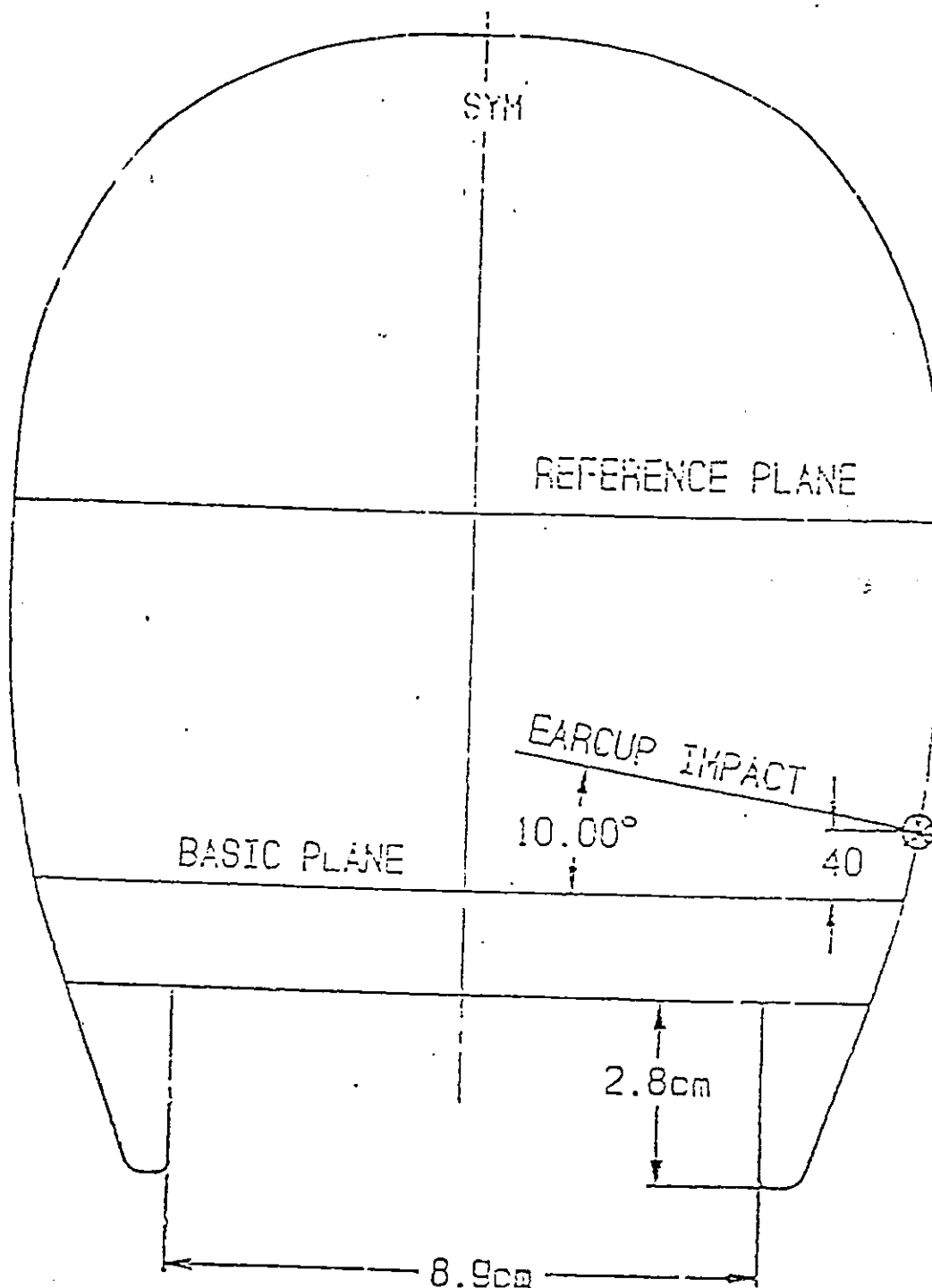
Flight helmets
Headgear
Helmet



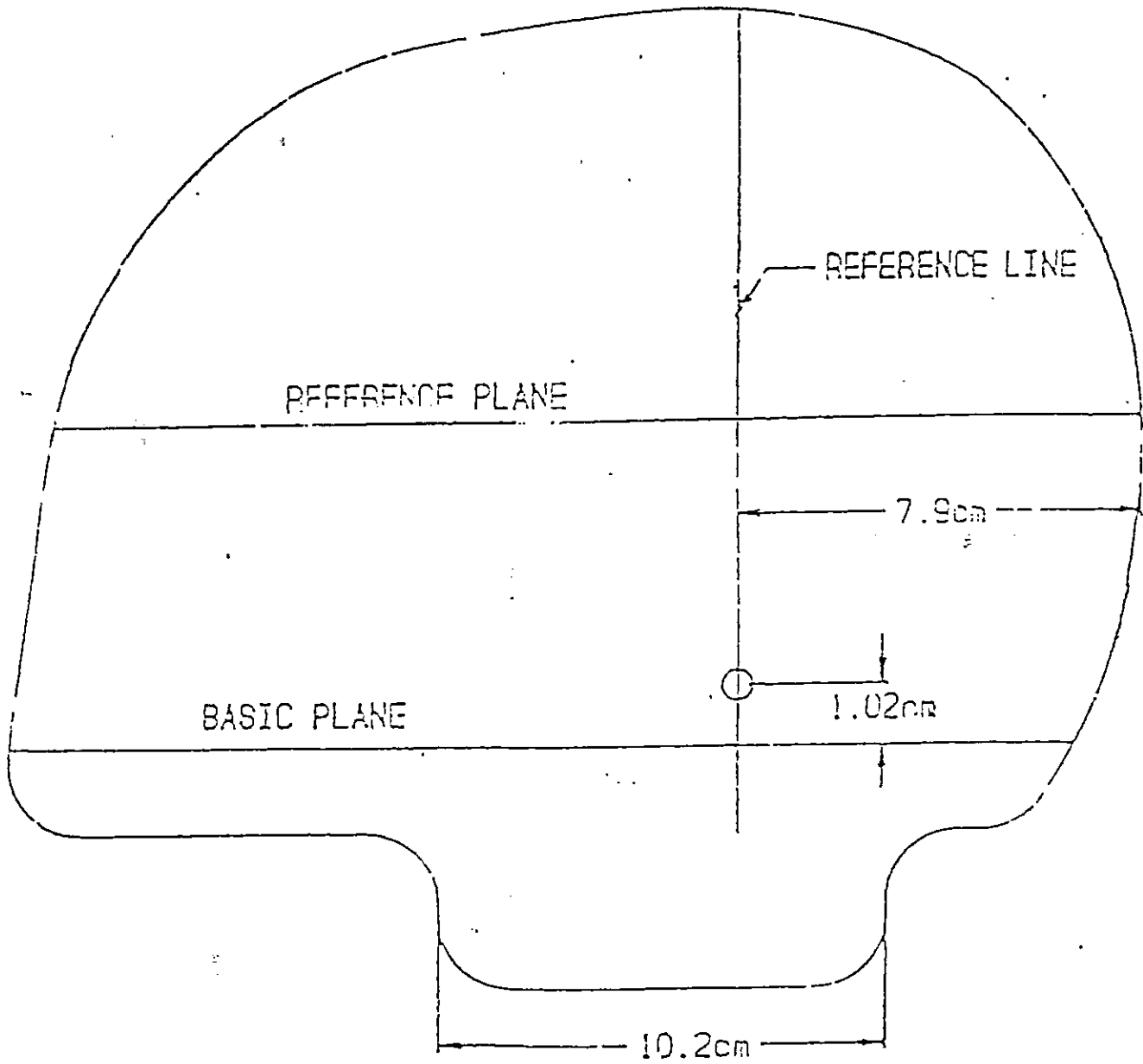
HELMET IMPACT LOCATIONS
FIGURE 1



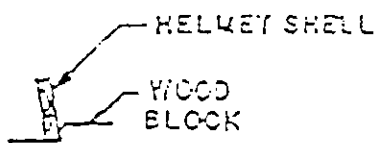
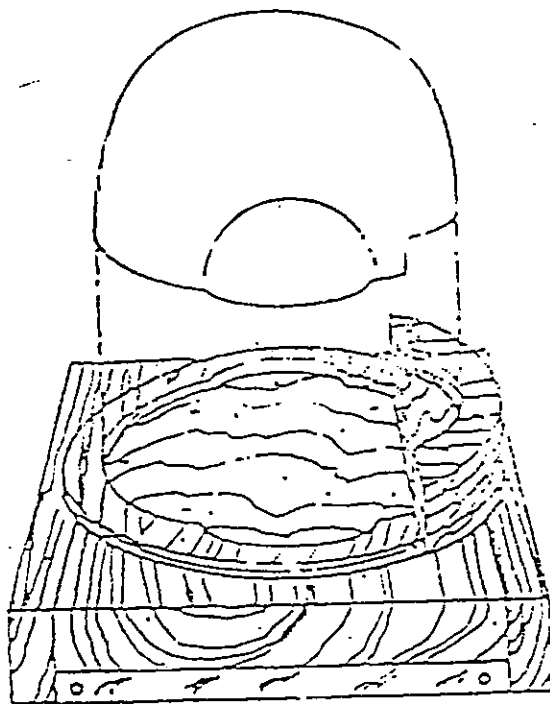
MONORAIL IMPACT TEST SETUP
FIGURE 2.



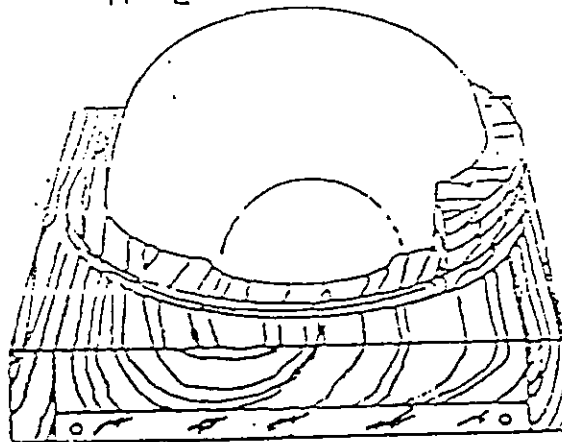
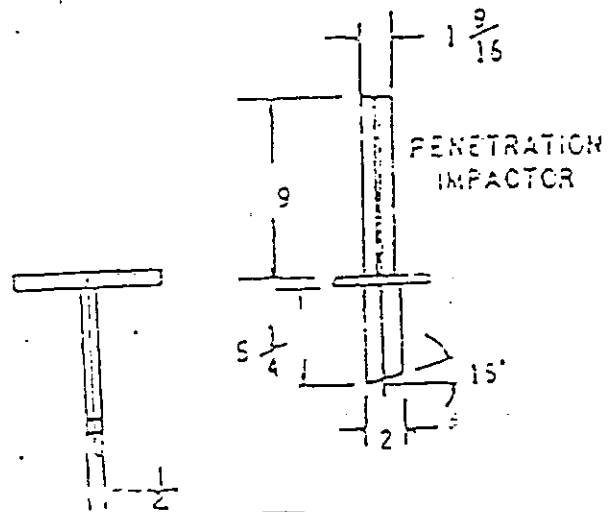
ANSI SIZE "C" MODIFIED HEADFORM
FIGURE 3



ANSI SIZE "C" MODIFIED HEADFORM
FIGURE 4

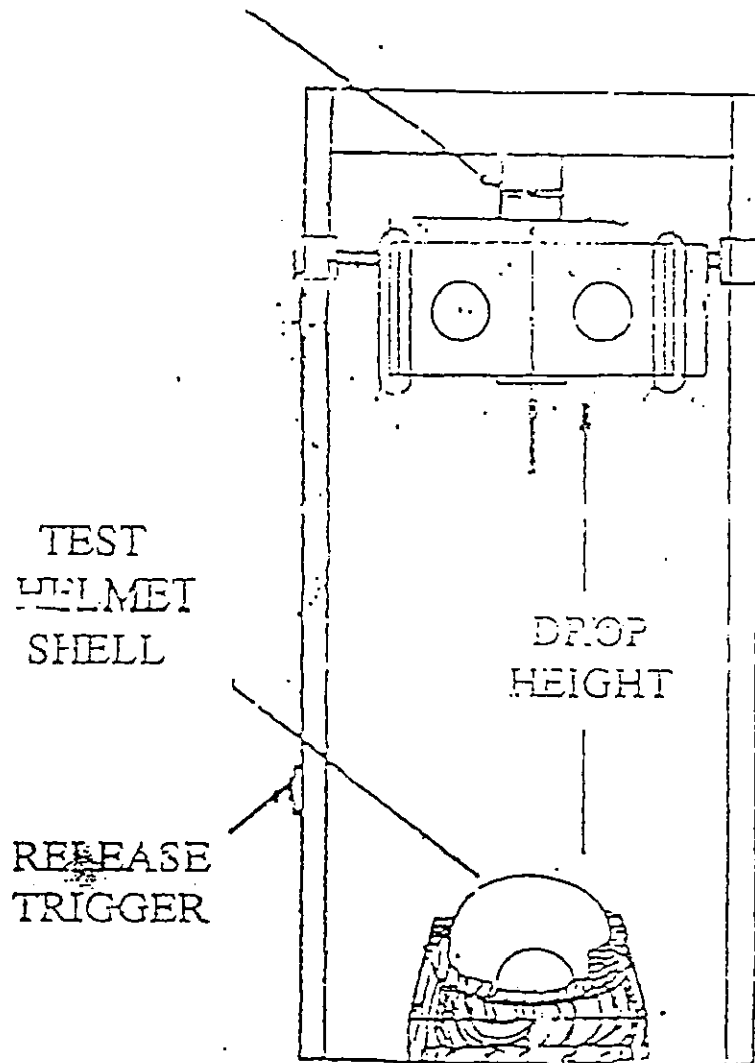


VIEW A



PENETRATION TEST SET-UP
TEAR PENETRATION HOLDING FIXTURE AND PENETRATION IMPACTOR
 FIGURE 5.

RELEASE
MECHANISM



TEAR PENETRATION IMPACT TEST TOWER
FIGURE 6.