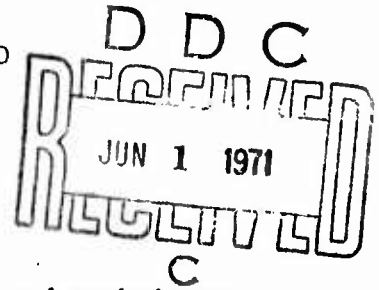


26 April 1971

Materiel Test Procedure 7-3-085
Aviation Test Board

US ARMY TEST AND EVALUATION COMMAND
COMMODITY SERVICE TEST PROCEDURE

HELMETS (AVIATION)



1. OBJECTIVE

This document provides existing test methods and techniques necessary to determine the degree to which aviation helmets meet the requirements of the Materiel Need (MN) or Technical Characteristics (TC's), and whether or not these items are suitable for Army use.

2. BACKGROUND

a. Requirements exist for Army aviation crewmember helmets for the primary purpose of affording the wearer with protection from head injury during routine and emergency situations.

b. Aviation helmets are usually manufactured from laminated and bonded materials which are formed into high impact resistant head enclosing shells. Within the shell, energy absorbing liners are provided and strap suspension system or sizing pads with which to obtain the proper fit and feeling of balance for the individual crewmember.

c. Retractable and adjustable visors provide additional protection to the wearer from the effects of radiation, glare, windblast, and rotor blown dust. In the event of aircraft fire, the helmet and visor will shield the upper face, eyes, and head from direct contact with flames and will grant, in many cases, additional time to safely land the aircraft or escape from a disabled aircraft on the ground.

d. In addition to the various forms of physical protection described above, the helmet's acoustic absorption characteristics must be effective in sufficiently attenuating the high sound pressure levels (SPL)* commonly found in or around Army aircraft. Successful attainment of this requirement will prevent or reduce a recognized health hazard and, at the same time, provide an improved communications environment through reduced masking noise at the crewmember's earphones.

e. The helmet's service test must provide realistic conditions and sufficient opportunities to evaluate the helmet suitability for flight

*According to Army Technical Bulletin, TB MED 251, protective measures should be employed by personnel who are exposed to broadband noise in excess of 92 db SPL (re 0.0002 dyne. cm²) in the octave-band 150-300 Hz and 85 db SPL in the five octave band between 300 Hz and 9600 Hz.

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personnel use in Army aircraft under a wide range of operational and training flights.

3. REQUIRED SUPPORT

- a. Measuring tools to determine dimensions, weights, and time.
- b. Test subjects with appropriate MOS.
- c. Photographic equipment.
- d. Sizing and fitting facilities.
- e. Data reduction (forms, questionnaires) personnel.
- f. Inspection (pretest and post-test) personnel.
- g. Control helmet(s) type(s).

4. REFERENCES

- A. Army Technical Bulletin TB MED 251.
- B. USATECOM Regulation 70-23, Research and Development: Equipment Performance Reports (EPRs).
- C. USATECOM Regulation 70-24, Research and Development: Documenting Test Plans and Reports. (As implemented by USAAVNTBD Pamphlet 705-1.)
- D. USATECOM Regulation 385-6, Safety: Verification of Safety of Materiel During Testing.
- E. USATECOM Regulation 700-1, Quality Assurance: Value Engineering.
- F. USATECOM Regulation 108-1, Photographic Coverage. (As implemented by USAAVNTBD Memo 108-1).
- G. USATECOM Regulation 750-15, Maintenance of Supplies and Equipment: Maintenance Evaluation During Testing. (As implemented by USAAVNTBD Memo 750-2.)
- H. MTP 7-3-090, Rescue Equipment, Aircraft Crash.
- I. MTP 7-3-500, Physical Characteristics.
- J. MTP 7-3-501, Personnel Training.
- K. MTP 7-3-506, Safety.
- L. MTP 7-3-507, Maintenance.
- M. MTP 7-3-510, Human Factors.
- N. Human Engineering Laboratories HEL Standard S-1-63B.

5. SCOPE

5.1 SUMMARY

a. The evaluation of aviation helmet suitability for crew-member protection is only one element of the overall service test requirement. Additional elements of the service test must address maintenance considerations, safety aspects, donning and removing characteristics, compatibility with personal equipment, and suitability of the helmet from the human factors standpoint.

b. To quantitatively evaluate these elements, service tests are conducted under operational conditions by personnel representative of those who will wear the helmet in actual aviation operations and with current Army aircraft. The service test will record the observations of supervisory test personnel together with those of appropriate specialists called upon to comment on the helmet. Test personnel will be interviewed and their observations and recommendations will be recorded by questionnaire and correlated with other similar information and with the still and motion pictures taken during testing.

c. The data collected during the service test will be reviewed to obtain subjective and numerical indicators which characterize the helmet operational suitability. Tabulations, charts, and other graphic displays will be employed to present these indicators. Evaluation of test data will include comparisons with desired performance criteria and with the performance indicators obtained from the use of standard (test control) helmets employed in similar or identical mission roles.

5.1.1 Preparation for Test

This section provides guidance for test project planning, facility and equipment requirements, and preparation for test personnel training and familiarization.

5.1.2 Test Conduct

The following tests are provided by this document:

a. Arrival Inspection and Physical Characteristics -- Procedures for an evaluation of the helmet arrival condition and for determining the helmet dimensions and weight.

b. Functional Suitability -- This section provides procedures for evaluation of the areas listed below:

- 1) Donning and removing.
- 2) Protection to the wearer.
- 3) Compatibility with the aviation environment.
- 4) Operational suitability.
- 5) Communications suitability.

c. Durability -- An evaluation of the helmet characteristics to withstand wear under normal conditions of handling and usage.

d. Maintenance -- Evaluation carried out throughout the conduct of the test in which maintenance actions resulting from testing are noted and reported. Personnel required, tools and equipment, availability of repair parts, suitability of maintenance instructions, mean time to repair, and mean time between failures are evaluated and recorded.

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e. Human Factors -- An evaluation of the man-item interface to determine the adequacy of helmet design and performance characteristics related to the physical and psychological effect of the helmet on the wearer.

f. Safety -- An evaluation of the helmet safety characteristics including noise suppression and glare reduction.

5.1.3 Test Data

This section details the data to be collected and recorded while completing the procedures of 6.2, TEST CONDUCT.

5.1.4 Data Reduction and Presentation

This section provides instructions for evaluating and displaying the data recorded and collected during testing.

5.2 LIMITATIONS

This MTP is intended to be used as a basic guide when preparing test plans for aviation helmets. Suitability for Army use criteria and attendant test procedures shall be determined in response to specific Materiel Need (MN), or TC requirements.

6. PROCEDURES

6.1 PREPARATION FOR TEST

The project officer should follow Reference 4.C. with respect to plans and reports of tests. Certain planning information specifically applicable to aviation clothing is provided by the following paragraphs.

6.1.1 Test Planning

6.1.1.1 Test Criteria

The project officer shall select test criteria which will adequately satisfy the officially stated objectives for service testing of aviation helmets. Efforts should include, as a minimum, the following actions:

- a. Review the test directive.
- b. Study the MN or TC's.
- c. Review authorized sources of criteria such as --
 - 1) Designated test directive references.
 - 2) Helmet specifications, or drafts thereof.
 - 3) Special instructions accompanying the test directive.

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d. Review authorized criteria inputs from cooperating agencies such as --

- 1) United States Army Aeromedical Research Laboratory (USAARL).
- 2) United States Army Aviation School.
- 3) United States Army Board for Aviation Accident Research (USABAAR).

e. Study helmet engineering test data, recommendations, and conclusions, as applicable.

f. Prepare schedules and coordinate with appropriate levels of command as necessary to obtain appropriate test subjects. See 6.1.2 Helmet Issue.

6.1.1.2 Required Equipment, Facilities and Personnel

Arrange for the items listed under Section 3, REQUIRED SUPPORT, and for special consultants, e.g., aeromedical specialists, etc., or other personnel required during the service test. Schedule photographic coverage required; see Reference 4.E.

6.1.2 Helmet Issue

Select appropriate test subjects whose regular duties, TDY assignments, and/or training commitments will afford an overall usage schedule of maximum helmet exposure to appropriate aviation operational environment within the time frame allocated for the service test. Consider, as a minimum, the following elements:

a. Select test subjects of the occupational specialty for which the helmet is intended. Personnel whose head sizes are within the median, fifth, and ninety-fifth percentiles should be represented in the test subject group.

b. Obtain measurements of each test subject head. Convert these measurements to sizing requirements to insure proper helmet selection and fitting. Outfit each helmet for final fitting by the individual crewmember. Consult Human Engineering Laboratories manual HEL STANDARD S-1-63B, pages 12 through 15. Fit of the helmet should be checked by a qualified flight surgeon to determine if fitting instructions and procedures are adequate.

c. Photograph representative test subjects wearing the helmet prior to operational usage, as appropriate.

6.1.3 Familiarization

a. Consult appropriate sections of MTP 7-3-501, Personnel Training, and familiarize test personnel and test subjects with the helmet,

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accessories, and procedures of the service test. Accomplish, as a minimum, the following actions:

- 1) Familiarize personnel with specific evaluation objectives.
- 2) Acquaint flight personnel and/or other applicable test subjects with questionnaires, forms, etc., which are required during the operational evaluation of helmet.
- 3) Demonstrate the recommended technique for donning and removing the helmet, as applicable. Illustrate the use of all adjustments.

b. Familiarize appropriate personnel with MTP 7-3-519, Photographic Coverage, applicable to the required coverage.

6.2 TEST CONDUCT

6.2.1 Arrival Inspection and Physical Characteristics

6.2.1.1 Arrival Inspection

a. Inspect shipping containers for evidence of damage. Photograph damage as appropriate.

b. Examine container markings and record those which identify contents, indicate quantity, and helmet size.

c. Unpack the helmet container(s) and inventory the contents against the Basic Issue Item List (BIIL) and external container markings which identify contents. Submit Equipment Performance Reports where differences in inventory lists and contents are found to exist.

d. Confirm suitability of helmet for test as demonstrated by freedom from variations in workmanship, damage or defect. Perform a complete operational check of each helmet. Damage and/or material defect(s) shall be photographed and reported by EPR.

e. Confirm that the communications accessories are standard Army items.

6.2.1.2 Physical Characteristics

Consult MTP 7-3-500, Physical Characteristics, and perform the following:

a. Measure:

- 1) Helmet dimensions -- diameter, outer, inner, etc.
- 2) Helmet chin strap -- maximum and minimum length.
- 3) Communications cable length and type of connector(s).
- 4) Visor dimensions.

b. Determine by trial fittings on various standard size head-forms the range of head sizes, ideally from the 5th to the 95th percentile, the helmet will accommodate. Record this information.

- 1) Record visor lens type, e.g., clear, neutral gray, gold coated, etc.
- 2) Weigh the various size helmets with and without communications accessories.
- 3) Photograph the helmet and accessories.

6.2.2 Functional Suitability

6.2.2.1 Donning and Removing

a. Observe and photograph test subjects donning the helmet. Evaluate, as a minimum, the following:

- 1) Degree of interference caused by communications accessories, e.g., microphone boom, earphone cushions, cordage, etc.
- 2) Flexibility of shell and various liners to allow helmet spreading for donning.
- 3) Ease of adjusting chin straps, ear pad pressure, microphone boom, visor, etc., for comfort and minimum interference.
- 4) Ease of donning when wearing aircrewmen's corrective spectacles.

b. Observe and photograph test subject removing the helmet. Evaluate, as a minimum, the following:

- 1) Ease with which straps, adjusting string, cordage, and fasteners can be released for rapid and convenient removing.
- 2) Ease with which helmet can be flexed by the wearer to allow spreading of the shell for easy removing.
- 3) Suitability of visor retracting device and lock during the removing process.

c. Record the time required to don and remove the helmet under routine and emergency conditions, as applicable.

6.2.2.2 Protection of the Wearer

a. Issue the helmet to personnel (See 6.1.2 Helmet Issue) who are pilots and crewmembers of various Army fixed and rotary-wing aircraft. Evaluate, as a minimum, the following:

- 1) Helmet security and protection afforded under all operating conditions.

- 2) Tinted visor capability to reduce glare without reducing vision.
- 3) Visor usefulness in protecting the crewmember's eyes from rotor or propeller blown dust and dirt.
- 4) Distortion, clearances, and problems associated with visor use while wearing aircrewmen's corrective spectacles.

b. Employ the helmets as alternate headgear during the evaluation of rescue subsystems or equipment, as appropriate. When making this evaluation, determine as a minimum, the degree of protection provided by the helmet from flames or other crash conditions. See MTP 7-3-090, Rescue Equipment, Aircraft Crash.

6.2.2.3 Compatibility with the Aviation Environment

a. Evaluate the helmet compatibility with standard items of flight clothing and the following items of personal equipment:

- 1) Personnel armor.
- 2) Oxygen and protective masks.
- 3) Communications equipment (not installed in or on the helmet).
- 4) Ejection seat.
- 5) Compatibility with spectacle type glasses.

b. Evaluate the helmet compatibility with all inventory aircraft. Record any evidence that attached helmet accessories (straps, cords, etc.) had a tendency to catch or snag on objects in the aircraft. In particular, evaluate the helmet characteristics which could interfere with crewmember entrance to, or exit from, the aircraft under routine and emergency conditions.

c. Evaluate any possibility of the helmet preventing or interfering with the crewmember in turning his head while at assigned and alternate duty stations.

d. Photograph, where possible, findings of the evaluations of a. through c. above.

6.2.2.4 Operational Suitability

Evaluate the following features of the helmet, as a minimum, under conditions identical to those described in paragraph 6.2.2.2 a.

a. Effect of the helmet and components on crewmember peripheral vision.

b. Helmet stability characteristics, e.g., tendency of the

helmet to rotate, i.e., not follow quick turns of the crewmember's head and/or a distribution of helmet weight which requires a conscious effort by the crewmember to maintain a feeling of head balance.

c. Ease of visor and chin strap adjustment in flight with one hand (with and without gloves).

d. Communications cordage length to allow freedom of crewmember movement within the cockpit.

6.2.2.5 Communications Suitability

a. Evaluate the reception qualities of the helmet mounted earphones and the effectiveness with which external aircraft noise is reduced by ear cushion design and helmet acoustic characteristics. Interview a representative number of crewmembers immediately following flights in which the test helmet was utilized. As a minimum, determine the following:

- 1) Degree of background noise noted when receiving on the interphone and various air-to-ground radio circuits, as applicable.
- 2) Received voice clearness and general understandability of received voice messages as compared with crewmembers wearing standard protective helmets.
- 3) Understandability of code signals (such as TACAN identification codes) in comparison with the standard helmet.

b. Evaluate the voice transmission qualities of the microphone as influenced by helmet mounting and available range of adjustment. Interview crewmembers and ground radio station operators to determine any difference between the transmission quality of the test helmet microphone and that provided by the standard protective helmet.

c. Request that US Army Aeromedical Research Laboratory perform the following tests:

- 1) Determine real-attenuation characteristics of the helmets by the standard ASA real-ear attenuation test method.
- 2) Determine the quality of the earphones in the laboratory with the aid of a standard artificial ear coupled in order to obtain precise frequency and amplitude responses.
- 3) Determine the quality of the microphone in the laboratory with the aid of a standard artificial mouth so that precise near and far field response may be determined.

6.2.3 Durability

a. At the completion of the service test, inspect each helmet that was exposed to normal handling and usage during training and operational flights. In particular, observe for, as a minimum, the following:

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- 1) Condition of visor (look for scratches, loss of anti-glare coatings, etc.).
- 2) Earphone cushion wear.
- 3) Shell appearance, e.g., cracks, scratches, etc.
- 4) Communications cordage fraying at helmet interface and at plug connectors.
- 5) Carrying bag condition, as applicable.

b. Photograph helmets representative of worst case and minimum wear.

6.2.4 Maintenance

a. Determine the suitability of the helmet maintenance characteristics and maintenance test package. Consult references 4.G. and 4.L. and prepare a program which emphasizes the following:

- 1) Maintainability.
- 2) Reliability.
- 3) Tools and test equipment.
- 4) Technical manuscripts and manuals.

b. Include in the maintenance subtest the preparation of the following charts:

- 1) Maintenance and Reliability Analysis Chart.
- 2) Parts Analysis Chart.
- 3) Special Tool Analysis Chart.
- 4) Maintenance Package Literature Chart.

6.2.4.1 Maintainability

a. List and provide complete details of occurrences for scheduled maintenance without downtime and unscheduled maintenance with minimum downtime (minor adjustments).

b. List and provide complete details of occurrences for unscheduled maintenance involving excessive downtime and/or requiring replacement or repair of components.

6.2.4.2 Reliability

Reliability will be determined during the service test by performing the following:

- a. Maintain an accurate log of the accumulated hours of use.
- b. For each maintenance action, record the following:
 - 1) Conditions which indicated the problem.

- 2) Components or feature involved and method used to determine cause.
- 3) Damage caused to associated components due to the failure.
- 4) Repair procedures followed, personnel, material, and tools required.
- 5) Elapsed time since last malfunction.

c. From the times recorded, calculate the mean time between failure (MTBF), the mean time to repair (MTTR), and availability (A). (See Appendix A).

6.2.4.3 Tools and Test Equipment

Determine, through utilization, whether or not common and special tools and test equipment are suitable for the intended purpose and maintenance level and if the special tools provided (or specified) are excessive.

6.2.4.4 Technical Manuscripts and Manuals (Maintenance Portions)

Perform the following:

- a. Review the maintenance literature and instructions for accuracy and completeness.
- b. Note the presence of lists of recommended repair parts, tools, test equipment, and procedures for alignment, calibration and troubleshooting.

6.2.4 Human Factors

Human factors evaluations shall be conducted simultaneously with all service test evaluations. Consult MTP 7-3-510, Human Factors. The helmet service test plan shall be evaluated to ensure that ample opportunities are provided to demonstrate the suitability of the man-item interface. Evaluate the following:

- a. Degree of user acceptability and physical comfort, to include thermal, or discomfort (see USAARL Report No. 69-1, User Evaluation of Two Aviators Protective Helmet) --
 - 1) While donning or removing.
 - 2) In normal flight operations.
- b. User reaction to helmet noise suppression characteristics.
- c. Ease of visor and chin strap adjustment with one hand (with and without gloves).

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d. Psychological reaction of the user to the helmet based on appearance, feeling of balance, smell, or other physical characteristics.

6.2.6 Safety

a. Throughout the service test, observe the helmet being worn and identify those characteristics which presented a potential hazard or were directly or indirectly the cause of any hazard. Consult MTP 7-3-506, Safety, and Reference 4.C. Evaluate, as a minimum, the following:

- 1) Adequacy of antiglare provisions of the visor to prevent eye injury or strain.
- 2) Suitability of the noise suppression characteristics of the helmet and earphone cushion combination for the prevention of health hazards.
- 3) Adequacy of the protective shell in the prevention of crewmember head injury during normal and emergency situations.
- 4) Capability of the retention system to retain the helmet under decelerative forces that might be experienced during a crash sequence.
- 5) Supporting structures for the earpieces are designed so that they do not impose discomfort of weight, concentrated pressures, or metal contact with the skin.

b. Provide recommendations for additions to safety aspects of the helmet and accessories.

c. Photograph, where possible, any hazard involving the helmet.

6.3 TEST DATA

6.3.1 Arrival Inspection and Physical Characteristics

6.3.1.1 Arrival Inspection

Record:

a. Markings which appear on shipping container(s) and degree of compliance with MIL-STD-129 or other governing documents.

b. The results of inventories conducted against the BIIL, container markings, maintenance test package inventory list, and/or packing lists. Note number of EPRs submitted.

c. Status of received helmets and accessories with respect to suitability for service test, e.g., freedom from serious defects.

6.3.1.2 Physical Characteristics

Record:

- a. Helmet dimensions (inches).
- b. Helmet chin strap length (inches).
- c. Communications cable length (inches).
- d. Electrical connectors, types used.
- e. Visor dimensions.
- f. Maximum and minimum sizes obtainable (from 5th to 95th percentile).
- g. Visor lens description and color.
- h. Helmet weight with and without accessories (ounces).

6.3.2 Functional Suitability

6.3.2.1 Donning and Removing

Record:

- a. Noted instances of difficulty in donning due to interference from helmet straps, the microphone boom, earphone cushions, communications cordage, etc.
- b. Flexibility adequacy of helmet shell as aid to donning.
- c. Ease of adjustment for fit and comfort.
- d. Ease with which helmet was removed, including:
 - 1) Visor retracting and locking mechanism.
 - 2) Flexibility of shell during removing.
- e. Time to don including adjustment(s).
- f. Time to remove.

6.3.2.2 Protection to the Wearer

Record:

- a. Details of issue, including:
 - 1) Number of helmets issued.
 - 2) Time utilized in each type of aircraft crewmember

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- function (pilot, copilot, etc.) (hours).
- 3) Number of control helmets issued by type.

b. Crewmember comments on buffet protection in flight.

c. Crewmember comments on:

- 1) Tinted visor glare protection suitability.
- 2) Visor protection from windblast and/or blown dust and dirt.

d. Data obtained when the helmet is used in aircraft rescue subsystems or equipment evaluations, as applicable.

6.3.2.3 Compatibility with the Aviation Environment

Record:

a. Suitability of helmet to interface with standard items of personal equipment such as --

- 1) Personnel armor.
- 2) Oxygen and protective masks.
- 3) Communications equipment.
- 4) Ejection seat(s).
- 5) Corrective spectacles.

b. Suitability of helmet compatibility with Army aircraft (by type). Include, as a minimum, the following data.

- 1) Any evidence of helmet and/or accessories being caught by parts of the aircraft.
- 2) Ease with which the crewmember is able to enter and leave the aircraft without interference with overhead components or fuselage parts.

c. Any evidence that the crewmember had to exercise caution when turning his head at normal or alternate duty station(s) in the aircraft.

6.3.2.4 Operational Suitability

Record:

a. Suitability of crewmember's peripheral vision when wearing the helmet during the day and at night.

b. Stability characteristics.

c. Ease of adjusting the helmet visor and chin strap in flight with one hand with and without gloves.

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d. Communications cordage suitability with respect to freedom of motion within the cockpit. Also note tendency of the cord(s) to kink during use and thereby reduce their effective length.

6.3.2.5 Communications Suitability

Record:

a. Crewmember's comments regarding background noise level opposed to the control helmet. Indicate the aircraft type and describe other conditions present at the time which influenced overall noise.

b. Suitability of received voice communications with test helmet and compared with control helmet.

c. Suitability of code signals received while wearing the test helmet compared with the control helmet.

d. Suitability of microphone mounting as demonstrated by quality of ground received voice communications.

6.3.2.6 Appearance

Record:

Qualified observer's opinion of appearance of helmet opposed to the control helmet. Include crewmember's comments on this subject.

6.3.3 Durability

Record the condition of the helmet following operational usage. Include, as a minimum, the following data:

a. Condition of the visor (presence of scratches, loss of antiglare coatings, etc.).

b. Condition of earphone cushions, liner(s), sizing provisions, etc.

c. Shell condition.

d. Condition of carrying bag.

6.3.4 Maintenance

Record:

a. Maintainability

1) Maintenance operations performed.

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- 2) Personnel and time (manhours and clock hours) and tools required.
- 2) MTTR.
- b. Reliability
 - 1) Total operating time of the equipment.
 - 2) Time since last failure.
 - 3) MTBF.
- c. Availability. (See Appendix A)
- d. Tools and Test Equipment (Special tools required).
 - 1) Tools or test equipment required but not provided.
 - 2) Excess tools provided.
 - 3) Recommendations for changes to tools or test equipment allowances for system.
- e. Technical Manuscripts and Manuals
 - 1) Procedures found to be inaccurate or incomplete.
 - 2) Missing lists or procedures for specific maintenance tasks.

6.3.5 Human Factors

Record:

- a. Degree of user physical acceptability, to include comfort or discomfort.
- b. User reaction to helmet noise suppression characteristics.
- c. Ease of visor or chin strap adjustment with one hand (with and without gloves).
- d. Psychological reaction(s) of the user to the appearance of the helmet, feeling of balance, smell, or other physical characteristics.

6.3.6 Safety

Record:

- a. Adequacy of antiglare provisions of the visor for day and night operations.
- b. Suitability of noise suppression characteristics in preventing a health hazard.

- c. Adequacy of the protective shell in the prevention of crewmember head injury during normal and emergency situations.
- d. Any recommendations for improving the safety characteristics of the helmet.
- e. Forces applies in three directions as described in National Research Council Report entitled "Head Protection for the Military Aviator" dated August 1969 and whether or not the helmet was retained.

6.4 DATA REDUCTION AND PRESENTATION

- a. All data will be summarized using tabulations and/or charts, as appropriate.
- b. Photographs shall be identified, and where possible, correlated with appropriate narrative descriptions.
- c. Analyze the data to determine the degree of compliance with the specific requirements of the MN or TC's.
- d. Conclude the presentation with a summarization of suitability of the helmet for Army use.

APPENDIX A
RELIABILITY CALCULATIONS

I. MEAN TIME BETWEEN FAILURES (MTBF):

MEAN TIME BETWEEN FAILURES is the total operating time divided by the total number of chargeable system failures occurring during the total test period.

II. Inherent Availability (A_i).

The probability that a system or equipment when used under stated conditions, without consideration for any scheduled or preventive maintenance, in an ideal support environment (i.e., available tools, parts, manpower, manuals, etc.), shall operate satisfactorily at any given time. A_i excludes ready time, preventive maintenance downtime, supply downtime, and waiting or administrative downtime. It may be expressed as --

$$A_i = \frac{MTBF}{MTBF + MTTR}$$

where

MTBF = Mean-time-between failure; and MTTR =

MEAN TIME TO REPAIR: that portion of the total unscheduled maintenance time which is expended to correct chargeable system failures divided by the total number of chargeable system failures occurring during the total test period.

III. Achieved Availability (A_a).

The probability that a system or equipment when used under stated conditions in an ideal support environment (i.e., available tools, parts, manpower, manuals, etc.), shall operate satisfactorily at any given time. A_a excludes supply downtime and waiting or administrative downtime. It may be expressed as --

$$A_a = \frac{MTBM}{MTBM + \bar{M}}$$

where

MTBM = mean-time-between maintenance; is the total operating time, divided by the total preventive (scheduled) and corrective (unscheduled) maintenance actions occurring during the total test period and

$\bar{M}$ = Mean active maintenance downtime resulting from both preventive and corrective maintenance actions.

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13. ABSTRACT Procedures are provided for determining the functional suitability of aviation helmets. Protective features and compatibility with airborne communication systems are discussed.			

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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