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MILITARY SPECIFICATION

DEMONSTRATION REQUIREMENTS FOR HELICOPTERS

This specification has been approved by the Naval Systems Command, Department of the Navy

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1. SCOPE

1.1 SCOPE. - This specification covers the general requirementsof NAVAIR (Naval Air system Command) for the demonstration of helicopters. These general requirements will be modified and amplified as required by contract addenda to this specification. The expression "demonstration" refers to all of the contractor's work (as applied to specific helicopter models and contracts) specified herein including modifications and amplifications contained in pertinent contractual documents. The modified and amplified requirements may limit the demonstration for a particular contract or helicopter model to only a limited number of tests to be performed at a single location and, also, may contain requirements for the demonstration of features and characteristics not included in this general specification.

1.1.1 CORRELATIVE PROVISIONS

1.1.1.1 GOVERNMENT RESPONSIBILITIES. - This document, in addition to covering contractor's demonstrate ion work, - delineates certain responsibilities of Governemnt officers concerning such work, and sets forth policy of NAVAIR on release for flight and on restrictions to be observed in subsequent operations.

1.1.1.2 USE OF DEMONSTRATION DATA BY BOARD OF INSPECTION AND SURVEY. - It is the policy of INSURV (the Board of inspection and Survey) to accept for trials purposes, data from any source provided that in the judgment of the activity conducting the trials, the data are valid and fully representative of the production article undergoing trials. Properly validated demonstration test data are of assistance to INSURV and thus decrease the time required for trials.

1.1.1.3 POLICY FOR COORDINATION OF' TEST AND EVALUATION. - It is the policy of NAVAIR to assign the responsibility for coordinating the demonstration of naval aircraft to the COMNAVAIRTESTCEN (Commander, Naval Air Test Center). Such phases of the demonstrations as fall within the purview of other activities will be assigned thereto by the NAVAIRTESTCEN (Naval Air Test Center). Likewise in the case of other test and evaluation projects assigned directly to COMNAVAIRTESTICEN by NAVAIR, he is authorized to assign portions or phases of these projects to other NAVAIR field activities at his discretion. (See 3.1.2)

1.1*1*4 POLICY ON RELEASE OF NAVAL AIRCRAFT FOR TRIALS AND FLEET USE. - NAVAIR Instruction 13100.7 contains the policy of NAVAIR concerning the release of naval aircraft for INSURV Acceptance Trials and for use by the Fleet.

1.2 PURPOSE OF DEMONSTRATION. - After an aircraft has been shop-completed in conformance with design specifications, evaluations and tests are needed to provide to NAVAIR assurance that desired design characteristics exist, or can be made to exist by changes and adjustments, prior to delivery of aircraft of the same design for fleet usage. These developmental tests and evaluations are performed by contractor's personnel. Performance of critical (i.e. potentially dangerous) tests are prereqisite to Navy pilots operating the aircraft to those critical limits. Included in these evaluations and tests are actions to:

(1) to determine that the helicopter can be safely operated by Navy pilots during trials to limits consistent with the contract desire limits for the helicopter without the occurrence of yielding excessive wear, malfunctions, or failure of the helicopter

(2) to obtain early basic information regarding the military potential of new models of helicopters and the operability of all their equipment

(3) to obtain quantitative information on safe limits for operation by Fleet pilots.

1.3 DURATION OF DEMONSTRATION. - The demonstration of a specific model of helicopter begins with the first contract work performed by the contractor in compliance with provisions of this general specification, (i.e. submittal of demonstration planning information, preparation of a helicopter for demonstration, or conference with representatives of the government concerning actual details of the specified demonstration, whichever occurs first) and ends with satisfactory completion by the contractor of all specified tests, submittal by the contractor of all required reports and data, and acceptance by the Government of all reports and data concerning the demonstration, that are required to be submitted for acceptance.

2 APPLICABLE DOCUMENTS

2.1 EFFECTIVE DATES OF DOCUMENTS. - The effective dates of documents referred to herein shall be as specified in applicable contract detail specification for the demonstration helicopters.

2.1.1 SPECIFICATIONS AND STANDARDS.- The following specifications and standards form a part of this specification to the extent specified herein and as qualified in the specific addendum to this specification; or in the contract detail specification:

SPECIFICATIONS AND STANDARDS
MILITARY

MIL-I-5072	Instrument Systems; Pitot-Statue Tube operated, Installation of
MIL-W-5088	Wiring, Aircraft; Installation of
MIL-E-5400	Electronic Equipment, Aircraft, general specification for
MIL-T-5422	Testing, environmental Electronic Equipment
MIL-T-5522	Test Procedure for Aircraft Hydraulic and Pneumatic systems, General
MIL-T-5842	Transparent Areas, Anti-icing, Defrosting and Defogging Systems, General Specification for
MIL-T-5955	Transmission System, VIOL-STOL, General Requirements for
MIL-L-6051	Electrical-Electronic System Compatibility and Interference Control Requirements for Aeronautical Weapon Systems, Associated Subsystems and Aircraft.
MIL-E-6059	Engines, Aircraft, Reciprocating, processes for Corrosion Protection, Preoiling and Ground operations of
MIL-I-6115	Instrument Systems; Pitot Tube and Flush Static Port Operated, Installation of
MIL-D-6728	Dampers, Engine Exhaust Flame and Glare
MIL-L-6730	Light- Equipment; Exterior, Installation of Aircraft (General Specification)
MIL-L-006730	Lighting Equipment; Exterior, Installation of Aircraft (General Specification)
MIL-E-7016	Electrical Load and Power Source Capacity; Analysis of
MIL-E-7080	Electrical Equipment; Piloted Aircraft Installation and Selection of; General Specification for
MIL-C-7188	Compasses, Pilot’s Standby, Installation of
MIL-M-7700	Manuals; Flight
MIL-C-7762	Compasses, Installation of
MIL-F-7872	Fire Warning system, continuous, Aircraft Test and Installation of
MIL-G-7940	Gages, Fuel Quantity, Capacitor Type, Installation and Calibration of
MIL-H-8501	Helicopter Flying and Ground Handling Qualities, Requirements for
MIL-A-8591	time Stores and Associated Suspension Equipment, General Design Criteria for
MIL-I-8670	Installation of fixed guns and associated equipment in naval aircraft.

2.1.1 (Cont)

MIL-I-8671	Installation of Droppable Stores and Associated Release Systems
MIL-I-8672	Installation and Test of Pyrotechnic Equipment in Aircraft, General specification for
MIL-I-8673	Installation and Test of Aircraft Flexible Weapons Systems.
MIL-I-8675	Installation: Aircraft armor
MIL-I-8677	Installation of Armament control systems and associated equipment in naval aircraft.
MIL-C-8678	Cooling Requirements of Power Plant Installation
MIL-T-8679	Test Requirements Ground, Helicopter
MIL-I-8683	Installation of Oxygen Equipment in Aircraft
MIL-I-8700	Installation and Test of Electronic Equipment in Aircraft, General Specification for
MIL-D-8706	Data and Tests Engineering Contract Requirements for Aircraft weapons systems.
MIL-D-8804	De-Icing System, Pneumatic Boot, Aircraft General Specification for
MIL-A-8806	Acoustical Noise Level in Aircraft; General Specification for
MIL-A-8860	Airplane Strength and Rigidity, General Spec. for
MIL-F-17874	Fuel Systems, Aircraft, Installation and Test of
MIL-R-18136	Reports; Format and General Requirements
MIL-C-18244	Control and Stabilization Systems: Automatic, Piloted Aircraft; General Specification for
MIL-L-18276	Lighting, Aircraft Interior, Installation of
MIL-H-18325	Heating and Ventilating Systems, Aircraft (General Specification for)
MIL-T-18606	Test Procedures for Aircraft Cabin Pressurizing and Air Conditioning System
MIL-T-18607	Thermal Anti-icing Equipment, Wing and Empennage
MIL-T-18847	Tank, Fuel, Aircraft, Auxiliary External, Design and Installation of
MIL-E-18927	Environmental Systems, Pressurized Aircraft, General Requirements for
MIL-O-19838	Oil Systems, Aircraft, Installation and Test Of
MIL-F-23447	Fire Warning systems, Aircraft, Radiation sensing Type, Test and Installation of
MIL-W-25140	Weight and Balance Control Data (For Airplanes and Rotorcraft)

AERONAUTICAL REQUIREMENTS

AR-56	Structural Design Requirements, Helicopters

2.1.1 (Cont)

STANDARDS

MIL-STD-250	Aircrew Station Controls and Displays for Rotary wing Aircraft
MIL-STD-704	Electric Power, Aircraft, Characteristics and Utilization of
MIL-STD-757	Reliability Evaluation from Demonstration Data
MIL-STD-800	Procedure for Carbon Monoxide Detection and Control in Aircraft
MIL-STD-850	Aircrew Station Vision Requirements for Military Aircraft
MIL-STD-877	Antenna Subsystems, Airborne, Criteria for Design and Location of
MIL-STD-14 (2	Human Engineering Design criteria for Military Systems Equipment and Facilities

STANDRD DRAWINGS

MS-33575	Dimensions, Basic, Cockpit, Helicopter

(When requesting specifications, refer to both title and number. Copies of this specification and applicable specification may be obtained upon application to the Commanding Officer, Naval Publications and Forms Centers 5801 Tabor Ave., Philadelphia, Pennsylvania, 19120 (Code 56).

2.1.2 PUBLICATIONS. -The following publications of the issue in effect on date of invitation for bids, form a part of this specification to the extent specified herein.

NAVAIR Instruction

13100.4	Navy Contract Demonstration Requirements; Administration of Documentation stemming from and relating thereto
13100.5	MIL-D-8708, Demonstration Requirements for Airplanes, and MIL-D-23222, Demonstration Requirments for Helicopters; the administration of
l3100.7	Release of Naval Aircraft for Trials and Fleet Use; Policy Regarding
13900.1A	Special Flight-Test instrumentation of the Naval Air Test Center; Accountability and handling procedures for

2.2 OTHER DOCUMENTS. - The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation forbids shall apply.

2.2 (Cont)

National Aeronautics and Space Administration

Technical Report No. 1235

Standard Atmosphere-Table and Data for altitudes to (Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D. C.)

American Society of Mechanical Engineers

ASA Y10.7 - 1954 American standard Letter Symbols for Aeronautic Sciences. (Copies of this ASME document may be obtained from American Society of Mechanical Engineers, West 39th Street, New York.)

Naval Air Test Center

might Test, Rotary Wing Manual (June 1959).

Naval Air Engineering Center

NAEC-ACEL Report 533 Anthropometry of Naval Aviators.

3. REQUIREMENTS

3.1 GENERAL

3.1.1 LOCATIONS FOR TESTS.- Throughout this specification, the expression "contractor's plant" refers to the contractor's flight-test facilities. Flight-test facilities other than the contractor's may be approved by test authority for particular demonstration tests. Unless such changes in locations for certain tests are so approved, all specified demonstration tests shall be performed at the contractor's plant except as follows:

(1) Dives and pull-outs with and without stores; flying qualities and performance; taxi, take-off. and landing; and hydrodynamic tests shall be performed at the NAVAIRTESTCEN. Shipboard suitability tests shall be performed by NAVAIRTESTCEN.

3.1.1 (Cont)

(2) Tests involving the carrying and release of guided missiles shall be performed at the NAVMISCEN (Naval Missile Center), Pt. Mugu, California.

(3) Armament tests shall be performed at a location specified by COM NAVAIRTESTCEN.

3.1.2 TEST AUTHORITY. - For purposes of this specification, a "Test Authority" is defined as the applicable NAVPRO (Naval Plant Representative), or the commander of an activity or facility which is assigned by NAVAIR or by COMNAVAIRTESTCEN under the policy set forth in this specification, to conduct and witness demonstrations and tests required to be performed under the terms of this specification or other applicable documents. Test Authorities shall witness or designate witnesses for the demonstrations and tests, and shall approve demonstration plans, instrumentation, data-reduction procedures, and all test methods and procedures for which detailed methods and procedures are not specified herein or in other applicable documents. For test authorities other than COM NAVAIRTESTCEN, the COM NAVAIRTESTCEN shall furnish instructions concerning the duties and responsibilities of test witnesses so that the actual performance of the tests, the collection of data during the tests, the decisions made during and subsequent to the tests, and the reporting and documentation of' test results will be consistent, comprehensive, and serve the best interests of the Government. Tests that are specified to be performed at one facility and that musts of necessity, be performed at some other facility, regardless of location, shall remain under the direction of the specified test authority.

3.1.3 HELICOPTER CONFIGURATION FOR DEMONSTRATION TESTS. - Except for the necessary addition of ballast to attain specified center-of-gravity locations, except for the necessary installation of special test instrumentation, and except as otherwise approved in writing by the test authority, or by the NAVAIR, helicopters employed in the performance of formal demonstration tests shall be identical, within production tolerances, to helicopters of the same contract which are to be delivered or have been delivered for trials and to the Fleet. No special installation or deletion of any kind shall be undertaken without the aforementioned specific written approval. The word "formal" in the first sentence of this paragraph refers to all demonstration tests, the results of which are intended to show that a design requirement has been met in the test or that

3.1.3 (Cont)

the design is suitable for fleet use, such as a test to demonstrate satisfactory operation of an item of equipment as part of the helicopter weapon system; a structural demonstration test to specified values of limit load factor, speed, altitude, and other pertinent parameters even though these values may differ from the design values; or a performance, or a flying-qualities demonstration test to demonstrate compliance with performance or flying-qualities design requirements. Distribution of variable and useful loading, and of ballast shall be satisfactory to test authorities during all demonstration tests including the contractor's development flight tests.

3.1.4 APPROVAL, QUALIFICATIONS, AND INSTRUCTIONS FOR CONTRACTOR'S PILOTS. - To eliminate unnecessary delay in the performance of the demonstration, and to safeguard the interests of the Government, skilled pilots who are experienced in flight testing and in the performance of all demonstration tests, and who are properly and adequately equipped to perform the required demonstrations, shall be employed in the performance of all demonstration testS. These pilots shall be satisfactory to NAVAIR and to test authorities concerned. Contractors shall instruct demonstration pilots thoroughly concerning the design, aerodynamic, structural (both static and dynamic), fUnCtional and reliability Mutations, and special or unusual characteristics of demonstration helicopters. These instructions shall be sufficiently thorough and timely as to minimize damage to or loss of demonstration helicopters because of factors which are known to or are under control of contractor's design or demonstration personnel including pilots. These requirements for instructions to pilots are intended in part to avert abnormal critical structural loads and helicopter responses resulting from sudden changes in power settings or control forces, the occurrence of retreating blade stall, etc.

3.1.4.1 FLIGHT EQUIPMENT FOR CONTRACTOR'S TEST PILOTS. - Flight equipment worn by Contractor test pilots shall be the same as flight equipment worn and used by personnel of the Naval Service for corresponding flight operations. The Contractor shall take necessary action to procure, through proper channels, items of Naval Service flight equipment that may be required by his test Pilots for the proper performance of helicopter demonstration tests. If, in the opinion of the contractor, standard Navy flight equipment is not adequate and safe for his test pilots, the facts of the case together with his recommendations shall be reported to NAVAIR.

3.1.5 RELEASE FOR FLIGHT AND OPERATING LIMIT. - Demonstration helicopters, other helicopters of the same model, and other new models of Navy helicopters shall not be operated by either contractor or Navy pilots prior to release for flight by NAVPRO after NAVAIR has authorized release for flight and, subsequently, Shall not be operated intentionally to limits more critical than those of 3.1.5.1 or 3.1.5.2 as applicable. In the determination of whether a planned limit of operation is or is not "more critical", consideration shall be given to but shall not be limited to the possibility that stalling an aerodynamic surface may cause structural responses which may not be encountered at the same load factor at a different speed, that sudden control movements may Impose more critical loads because of the rapidity of movement of the control, that varying degrees of stability may impose more critical helicopter responses in turbulent air or during deliberate maneuvers, and that rapid changes in power or thrust may Impose more critical helicopter responses than slower changes. Based on the extent to which the contractor has submitted contract design data, including the results of test and other investigations" required by pertinent contractual docments, and, usually, in direct reply to a formal request from the contractor via the NAVPRO, NAVAIR will initially authorize operating limits whiCh may be well inside {i.e., less critical than the full contract design limits. NAVAIR will, from time to time, authorize more critical operating limits until finally, if justified by prerequisite contract design data and other available information, the operating limits authorized by NAVAIR will be either the full limits for which the contract requires the helicopter to be (aerodymically, structurally, and functionally) designed, or the limits to which the helicopter must be operated in order that the contractor may comply with contract demonstration requirements. It is recognized that the NAVPRO and/or the contractor may possess additional information which may justify operating limits pursuant to 3.1.5.1 and/or 3.1.5.2 that will be more restrictive than those authorized by NAVAIR. Normally, the initial authorization by NAVAIR will be to the limits of "normal flying" which, for helicopter demonstration purposes, shall mean that:

(1) Normal takeoffs, hovering, and landings are authorized.

(2) Autorotation with power recovery only.

(3) For multi-engine helicopters, flights with one engine out, are authorized.

3.1.5 (Cont)

(4) Flying in normal attitude is authorized with the following Imitations:

(a) Normal load factors greater than 1.5 and less than 0.5 shall not be exceeded. The take-off gross weight shall not exceed 105% of the Basic Design Gross Weight.

(b) An angle of bank of 30° shall not be exceeded.

(c) Flight controls, power-plant controls, and other systems, innovations, and/or appurtenances shall not be rewed or operated so as to result in rapid or abrupt helicopter responses.

(d) (d) The speed in any direction at any altitude shall not exceed 0.8 times the maximum speed attainable at the Basic Design Gross Weight in sustained level flight at that altitude with normal-rated power or thrust, or the guaranteed cruise speed, whichever is greater.

After this initial authorization for release for flight has been granted, the NAVPRO shall release helicopters for operation to more critical limits at the contractor's plant* only after the NAVPRO has determined that all contractual prerequisites to such releases have been either complied with or waived by NAVAIR, and after NAVAIR has authorized such releases. Requests by contractors for release for first flight, for release for operation to more critical limits at the contractor's plant, and for release for tests at locations other than at the contractor's plant, shall summarize the status of all contractual prerequisites to the requested release unless the required status-of-completion information is contained in the Demonstration, Planning, and Progress Report submitted to NAVAIR; in which case the contractor's requests shall refer to sources of the necessary information.

3.1.5.1 OPERATING LIMITS FOR CONTRACTOR'S PILOTS. - The operating limits for contractors' flights shall not be more critical than any of the following:

(1) Those authorized by NAVAIR.

(2) Those authorized by the NAVPRO.

*and for tests at locations other than at the contractor' S plant,

3.1.5.1 (Cont)

(3) Those which the contractor has determined or deduced to be safe based on realistic consideration of all pertinent factors including but not limited to the following; results of analyses of the whole helicopter and its component parts from the aerodynamic, structural, and functional viewpoints; status of completion of tests which may by this specification or by any of the documents listed in paragraph 2 herein, be required to be completed as a prerequisite to certain flights; and review of observations made and data recorded during prior flights, reduced and extrapolated to the maximum extent practicable, except that test authorities are authorized to waive reduction and extrapolation of the recorded data for tests performed pursuant to this paragraph 3.1.5.2(3) under their authority, when in their opinion, reduction and extrapolation of the data are not necessary for safety prior to further flight testing. Such waivers to expedite flight testing shall not be construed to negate other provisions of this document relating to submittal of data.

operating limits permitted by (2) and (3), above, shall be not more critical than those for which satisfactory fatigue life and ultimate factor of safety of 1.5 have been proven both by tests that have been performed, and by stress or fatigue analyses that have been accepted by NAVAIR. In the event that such tests have not been Performed and/or appropriate stress or fatigue anslyses have not been accepted by the NAVAIR, the operating limits permitted by (2} and (31, above, shall be not more critical than those for which satisfactory fatigue life and a factor of safety of 2.0 have been proven by stress or fatigue analyses and other data that are acceptable to the NAVPRO.

3.1.5.2 OPERATING LIMITS FOR NAVY PILOTS. - Helicopters shall not be flown by Navy pilots prior to the issuance of operating limits by the NAVAIR. After issuance of such operating limits by the NAVAIR, the helicopters shall not be operated by Navy pilots during Acceptance Trials, during special tests and evaluation flights, or during Navy preliminary evaluations (NPE) to limits more critical than:

3.1.5.2 (Cont)

(1) As authorized by NAVAIR.

(2) As authorized by NAVPRO for flights performed at the contractor's plant.

3.1.6 FLIGHT MONITORING

3.1.6.1 MOVING PICTURE COVERAGE. Moving picture coverage of first flights, water landings, taxiing, and take-offs as applicable, shall be provided. Termination of this requirement will be by NAVPRO. Camera equipment will be furnished by the Government, if available.

3.1.6.2 TELEMETERING COVERAGE. - Telemetering coverage, when applicable, shall be provided as planned in the conference of 3.2.1 and approved in the Demonstration Instrumentation Report. The use of telemetering on other demonstration flights shall be at the discretion of the contractor as approved by test authorities. At the Instrumention and Test Planning Conferences required by 3.2.1, and prior to procurement and installation of telemetry equipment, the following shall be determined:

(1) Compatibility of proposed telemtering equipment with NAVMISCEN (Naval Missile Center) and NAVAIRTESTCEN ground equipment.

(2) Compliance with existing NAVAIRTESTCEN or NAVMISCEN telemetry standards as applicable.

(3) Incorporation of back-up source of power to assure continuity of transmission in the event of a power failure.

(4) The extent to which telemeteing coverage will be employed during demonstration flights witnessed by the test authorities.

3.1.6.3 CHASE AIRCRAFT. - Chase helicopters or aircraft shall be used for the first forward flight of a new model helicopter. For other flights at or near the contractor's plant, determination of whether or not chase aircraft are to be used shall be made by the NAVPRO. Chase aircraft will be provided by the test authority during tests and demonstrations which test authorities determine require chase aircraft.

3.1.7 HELICOPTER CHANGES AND ADJUSTMENTS. - Subsequent to release of helicopters for demonstration tests at NAVAIRTESTCEN, no replacements, alterations, changes, or adjustments other than those required by normal maintenance procedures shall be made unless approved by the COMNAVAIRTESTCEN and/or NAVAIR subject to the requirements specified below. When a replacement, alteration, change, or adjustment, which would not be required by normal maintenance procedures, becomes necessary, or appears to the contractor or the COMMAVAIRTESTCEN to be necessary, because of a dangerous or damaging occurrence (such as a violent response of the helicopter or control surface, or yielding, excessive wear, or failure of a region of the structure or excessive or unusual vibration), or because of any malfunction (such as the failure of an engines or of the transmission, or some other item of equipment necessary to continue to operate normally), or for any other reason during the tests at NAVAIRTESTCEN, the contractor shall submit Concurrently to NAVAIR and to the COMNAIRTESTCEN:

(1) A realistic technical evaluation of the significance of the disclosed design and construction deficiency, or other mason for the occurrence.

(2) A record of tests at the contractor’s plant which disclosed the deficiency or, if applicable, an explanation as to why the deficiency was not disclosed and/or reported during tests at the contractor's plant.

(3) Description of proposed corrective action including recommendation of interim operating restrictions for helicopters of the same design.

(4) Technical justification of proposed corrective action.

(5) Schedules for changes to contract design data and changes to helicopters consistent with the proposed corrective action.

(6) Engineering change proposal including tests to be repeated to satisfactorily demonstrate the changed helicopter.

3.1.8 FLIGHT PLAN RELEASE. - The contractor shall prepare flight plans covering tests and procedures to be followed by the flight crew during the demonstration, for approval by NAVPRO. The flight plans shall include operating

3.1.8 (Cont)

restrictions approved by NEVAIR or NAVPRO. The flight plan may cover more than one flight or extend beyond one day, provided the plan is not changed after release by the NAVPRO.

3.1.9 TEST INSTRUMENTATION

3.1.9.1 GENERAL. - The contractor shall determine the kind and amount of special flight-test instrumentation necessary to comply with the demonstration requirements of this specification. Pursuant to NAVAIR Instruction 13900.1A and by conferring with representatives of NAVAIRTESTCEN, the contractor shall make maximum utilization of government-furnished equipment (GFE) as is available at the time of the conference of 3.2.1 from the Special Flight Test Instrumentation Pool (SFTIP) at NAVAIRTESTCEN. All other required instrumentation shall be furnished by the contractor as contractor-furnished equipment ((CFE). The method of data acquisition, the number and type of recording devices, and the information required by items (1) thorough (4) of 3.19.2.1 for each demonstration shall be proposed by the contractor for NAVAIR approval and subsequent inclusion as an appendix to the addendum to this specification. NAVAIRTESTCEN participation in review and verification of suitability of the proposed instrumentation will be required.

3.1.9.2 INSTALLATION, CALIBRATION, AND MAINTENANCE. - The contractor shall titan and calibrate all aircraft instrumentation used in performing the demonstrations. All instruments and instrument systems shall be installed in accordance with the highest standards of mechanical and electrical installation practices. All tranducers and gages shall be properly located, shall be properly damped, shall have flat frequency response characteristics commensurate with the frequencies of excitation of the variable to be measured, and shall be properly mounted to assure valid measurement and freedom from extraneous excitations. The maximum time lag between any two or more channels requiring time correlation shall not exceed the time constant corresponding to the channel having the lowest flat frequency response requirement. The flat frequency response shall not be less than 60 CPS for all strain gages, accelerometers, pressure traducers, and displacement and velocity measuring instruments. Magnetic tape recorders, if installed and used on demonstration aircraft at NAVAIRTESTCEN, must be compatible with the existing ground station equipment at NAVAIRTESTCEN. Telemetry equipment, if installed, shall be in accordance with 3.1.6.2. Calibration of each transducer or gage installation shall be made through the

3.1.9.2 (Cont)

same signal conditioning equipment that will be installed on the demonstration aircraft, and shall be made to at least the maximum range of' excitation expected during the course of the demonstration. Calibration test data shall be obtained and recorded during both increasing and decreasing values of the pertinent parameter which the instrument is intended to measure, to assure repeatability and freedom from hysteresis. All strain gage installations on simple and complex structures shall be installed to minimize interactions or "cross-talk" during combined loadings; such interactions as do exist shall be properly accounted for during the calibration. Installation of strain gages which are impractical to calibrate shall be resorted to only if it can be shown, prior to such installation, that the computed loads from such installations are meaningful and useful, and provided further, that the methods of gage applications and load calculations from strain gage output, gage factor, and physical constants or the member are acceptable to the Test Authority. The instrumentation shall be operated and maintained by the contractor during the demonstration. If, during the course of the demonstration, it becomes apparent to the Test Authority that there is a change in the calibration of certain instruments, such instruments shall be recalibrated their recalibrations shall be witnessed and accepted in accordance with 3.1.9.4 and 3.1.9.5. A detailed description of all instruments and recording devices, methods Of calibration locations or instruments, and calibration data for each demonstration aircraft shall be submitted as separate appendices to the report required by 3.19.2.3. Such appendices shall be submitted at least two months prior to the time the aircraft is scheduled to arrive at the test site.

3.1.9.3 CHECK-CALIBRATIONS. - The contractor shall make previsions in the design of the recording system so that, where practicable and feasible, all contractor-installed demonstration instrumentation shall be check-calibrated by NAVAIRTESTCEN before commencing a demonstration at NAVAIRTESTCEN. Such cheek calibrations will be made through the helicopter recording system and ground station equipment, while vibrating and/or shock loading the recorder thru its mounts, by removing the recorder from the helicopter and suitably mounting the recorder on a test fixture. In lieu of vibrating the recorder during such check-calibrations and subject to concurrence by NAVAIRTESTCEN, the contractor may perform laboratory tests, witnessed by NAVAIRTESTCEN, to assure that the application of vibration and/or shock loading through the helicopter recorder mounts, will not degrade the demonstration data. The frequency and amplitude of vibration and/or shock loading of the mounts shall be that which simulates

3.1.9.3 (Cont)

the expected environment during the demonstration. In addition, for magnetic tape recording systems, dynamic response checks shall be made through the recording system and ground station equipment to assure (1) that freedom from extraneous noise or titrations exists, (2) that each channel has flat frequency response commensurate with the parameter to be measured, and (3) that the maximum time lag betweeb any two or more channels requiring time correlation does not exceed the time constant corresponding to the channel having the lowest flat frequency response requirement. Where such check-calibratiom show significant departures from previous calibrations, a complete re-calibration shall be made in accordance with 3.1.9.4 herein.

3.1.9.4 RE-cALIBRATIONS. - All demonstration instrumentation, if deemed practicable and feasible by the Test Authority, shall be re-calibrated every three months. The foregoing period of time may be increased or decreased by the Test Authority, depending on the number and type of flights scheduled for continuing or completing the demonstrations. All contractor-installed instrumentation shall be re-calibrated by the contractor at the conclusion of the demonstration. For demonstrations performed at NAVAIRTESTCEN, whenever re-calibration of instruments is required under the provisions of 3.1.9.2, 3.1.9.3, or 3.1.9.4, re-calibration of those instruments for which calibration facilities exist at NAVAIRTESTCEN shall be made by NAVAIRTESTCEN. All other re-calibration required by the aformentioned paragraphs shall be made by the contractor and shall be witnessed and accepted in accordance with the procedures of 3.1.9.5. The results of' all re-calibrations for each of the demostration aircraft shall be submitted as revisions to the calibration apppendices of the rEPort required by 3.19.2.1.

3.1.9.5 ACCEPTANCE AND WITNESSING PROCEDURES.- Formal acceptance, by representatives of the TEst Authority, of all instrumentation system installations for each demonstration aircraft shall be performed at the location at which the demonstration tests are to be performed, as specified in 3.1.1. In lieu thereof, and subject to the aPProval of COMNAVAIRTESTCEN, such acceptance may be performed at the contractor's facility, or other designated locations at least two weeks prior to delivery of the aircraft at the test location, to preclude serious delay in the contractor’s development program. Concurrent or prior to the foregoing acceptance of instrumentation installations, contractor calibrations of all instruments shall be witnessed by representatives of the Test Authority. The Test Authority may designate other

3.1.9.5 (Cont)

government representatives to witness instrumentation calibration in accordance with the previsions of 3.1.2. Such witnesses shall adhere to the following minimum requirements.

(1) Installation. - The installation of transducers and gages, and signal conditioning and recording systems shall be reviewed and inspected to assure:

(a) acceptable workmanship and proper location and mounting of all instruments and related systems;

(b) that the signal connditioning equipment does not have any deleterious effects on measurement accuracy and data reduction

(c) that magnetic tape recorders and telemetry equipment, if installed and intended to be used at NAVAIRTESTCEN, has been established as compatible with NAVAIRTESTCEN ground station equipment.

(2) Calibrations. - Where practicable, all calibrations shall be Witnessed to assure that valid calibrations are repeatable, that the instruments have no adverse hysteresis effects, and that each instrument is calibrated to at least the maximum value of the parameter expected to be attained during the demonstration.

(3) Acceptances. - The Test Authority's written acceptance of the instrumentation installation and calibrations shall be delivered to the contractor and acknowledged by the contractor prior to commencing the demonstration tests.

3.1.9.6 INSTRUMENTATION PACKAGE RECOVERY. - Provision shall be made for pilot jettisoning and subsequent recovery of the instrumentation records, or appropriate designed protection shall be provided for the instrumentation installations to withstand crash damage, in the event of loss of the helicopter.

3.1.9.7 REMOVAL OF TEST INSTRUMENTATION. - After completion of all demonstration tests specified herein, to the satisfaction of NAVAIRTESTCEN and NAVAIR and upon

3.1.9.7 (Cont)

request by NAVAIR, the contractor shall remove all special flight test instrumentation from those test helicopters as specified by term of the contract and restore those helicopters to the fleet delivery configuration.

3.1.10 REQUIREMENTS PRIOR TO FIRST FLIGHT. - Prior to first flight the contractor shall have;

(1) Submitted an acceptable Demonstration-Instrumentation Report. (3.19.2.1)

(2) Submitted the Demonstration, Planning and progress Report (3.19.2.2) material which is specified to be submitted concurrently with the Demonstration-Instrumentation Report.

(3) Submitted the Flight Stress Survey Report, the Vibration Report, and the Flight Endurance Program Report.

(4) Submitted those structural design data and performed those structural tests which contract Design Data Requirements specify shall be submitted or performed prior to release for flight.

(5) Submitted a report of estimated flying qualities in accordance with Contract Design Rata Requirements.

(6) Performed power-plant installation tests in accordance with Spec MIL-E-6059 and other related specfications for turbo-prop and turbo-jet engines.

(7) Performed fire-detecting-system tests in accordance with Spec MIL-F-7872 or MIL-F-23447, as applicable.

(8) Submitted acceptable weight-and-balance data in accordance with Spec MIL-W-25140 and weighed the aircraft.

3.1.10 (Cont)

(9) Satisfied theNAVPRO that safe egress from the aircraft will be practicable to accomplish under emergency flight situations.

(10) Obtained release for flight from the NAVPRO.

3.2 PLANNING CONFERENCES

3.2.1 INSTRUMENTATION CONFERENCE. - To facilitate accomplishment of all demonstrations and in accordance with the requirements of 3.1.9 the contractor shall confer with representatives of NAVAIRTESTCEN. The visits to NAVAIRTESTCEN concerning any tests shall start at least 12 months prior to the scheduled release of the first aircraft for flight to (1) provide satisfactory lead times for procurement of instrumentation which, at the time of the conference, may not be available as contractor-furnished equipment (CFE) or from the SFTIP as government-ftumished equipment (GFE), and (2) to facilitate compliance with other provisions of this specification.

3.2.2 CRUISE CONTROL TEStS PLANNING CONFERENCE. A preliminary conference shall be held at least 4 months prior to the fuel consumption tests. The contractor shall confer with NAVAIRTESTCEN to review preliminary test data already available, to establish the test methods, and to establish the data presentation format and data reduction procedures to be used in preparing the final flight performance data. Additional conferences between the contractor and NAVAIRTESTCEN shall be held as necessary to resolve problems as they arise during the flight test program. NAVAIR (AIR-5363) shall be advised prior to each conference.

3.2.3 PRE-NAVY PRELIMINARY EVALUATION CONFERENCE. - Not later than one week prior to the expected start of each phase of the evaluation, a CONference shall be called by NAVAIR at NAVAIRTESTCEN of representatives of the contractor, NAVPRO, NAVAIR, and NAVAIRTESTCEN. The conference is to review the results of all flight tests accomplished prior to that phase of the evaluation, and to review the extent to which pre-evaluation requirements have been completed, including the required operating flight envelopes. The contractor shall define the configuration of' the helicopter to be utilized during the evaluation phase.

3.2.4 POST-NAVY PRELIMINARY EVALUATION CONFERENCE. - Following receipt of the final NAVAIRTESTCEN Report of each phase of the evaluation a conference shall be called by NAVAIR at NAVAIR of representatives of the contractor, NAVPRO, NAVAIR-TESTCEN and NAVAIR. The conference is to establish disposition of corrective action and contractor or government responsibility of each deficiency reported by the evaluation team. Recommended Corrective action and possible alternatives along with schedules and product ion effectivity shall be provided by the contractor for each reported deficiency to facilitate review by NAVAIR for the purpose of determining which of the deficiencies must be corrected by the contractor prior to comencing the next evaluation phase.

3.2.5 PRE-STRUTURAL DEMONSTRATION CONFERENCE. - Not less than two weeks prior to the expected start of tests of 3.7.3 and 3.7.4 at NAVAIRTESTCEN, a conference will be called by NAVAIR at NAVAIRTESTCEN of representatives of the contractor NAVPRO, NAVAIR, and NAVIRTESTCEN concerned. The purpose of this conference shall be for Government personnel to select the critical control movements, positions and motions of appurtenances, and the operation of pilot-overiding flight control systems to be used during the tests based on a review of results of flight tests accomplished during the contractors developmental flights. Data to be reviewed at this conference shall have been submitted to the cognizant NAVPRO at least two weeks prior to the scheduled date of the conference for transmittal to other entities concerned.

3.2.6 PERFORMANCE TESTS CONFERENCE. - At least six months prior to the performance tests of paragraphs 3.8.3, representatives of the contractor shall confer with NAVAIRTESTCEN personnel to discuss the procedures and methods for reduction of data to be used by the contractor during these performance tests.

3.3.1 GENERAL/ - After first flight prior to initial delivery of helicopters for INSURV Acceptance Trials, Navy pilots designated by the COMNAVAIRTESTCEN will perform, normally in five phases, the NPE (Navy Preliminary Evaluation). A phase consists of one or more flights by the Evaluation Team and each phase will be terminated by COMNAVAIRTESTCEN. Phase I of the Navy Preliminary Evaluation shall be performed immediately subsequent to the inspection pursuant to 3.3.4.1, normally approximately 90 days after the contractor's first flight of the helicopter. Additional phases, as required, will be performed at times appropriately related to the development of the design by the contractor as the. allowable flight envelope is increased, or to evaluate changes incorporated in the helicopter to correct deficiencies, but, in general, shall be within four months of the preceding phase. The final phase will be just prior to initial delivery of helicopters for INSURV Acceptance Trails. The evaluation flights will be made at the contractor’s plant unless otherwise authorized by the COMNAVAIRTESTCEN.

3.3.2 PURPOSE. - The purposes of the Navy Preliminary Evaluation are as follows:

(1) To determine at the earliest possible opportunity, the combat potential and gross deficiencies of the helicopter and thereby, enable an estimate to be made of the degree to which operational requirements will be met.

(2) To highlight the need for and to allow early correction of deficiencies.

(3) To evaluate changes incorporated to correct deficiencies.

(4) To determine when the helicopter is suitable for INSURV Acceptance Trials.

3.3.3 CONTRACTOR'S RESPONSIBILITY. - The contractor shall configure the test helicopter for the NPE as approved for the contractor's demonstration, or as agreed upon between the contractor and the Test Authority during the pre-NPE conference. Recording instrumentation, if installed in the helicopter for the Contractor's flight tests, shall be in operation, but need not be specifically installed for the Navy Preliminary Evaluation unless specifically requested by COMNAVAIRTESTCEN. Cockpit instrumentation shall not be changed from that used by the contractor unless specifically requested by COMMNAVAIRTESTCEN. Requests for special instrumentation shall be so submitted that necessary installation and/or changes can be made prior to scheduled date for the NPE. The contractor shall have shown by flight, fatigue, mechanical citability, and vibration tests, and other analytical data, that within the allowable flight envelope, the helicopter is aerodynamically, structurally, and functionally safe for the tests to be performed by Navy pilots. The contractor shall install and evaluate the effects of modifications necessary to provide an adequate flight envelope for the Navy Preliminary Evaluation. The contractor shall furnish such services and

3.3.3 (Cont)

materials as are necessary to keep the helicopter(s) in satisfactory operation during the evaluation. The contractor shall provide services and instruction to acquaint Navy pilots with operation of equipment, operating techniques, special characteristics, handling qualities, emergency egress procedures, and other factors necessary to assure adequate safety during flights by Navy pilots. Data processing and reduction shall be provided as required by NAVAIRTESTCEN.

3.3.3.1 NPE AIRCRAFT UTIIIZATION SCOPE. - An aircraft assignment/NPE schedule shall be delineated in an appendix to each addendum to this specification approved for contract application.

3.3.4 REQUIREMENTS PRIOR TO NAVY PRELIMINARY EVALUATION. - The contractor shall have satisfied the responsibilities stated in 3.3.3 prior to any evaluation. The flight envelope required for the preliminary evaluation, shall be included in the first and subsequent Demonstration Planning and Progress Reports (3.19.2.2), with a summary of the substantiation data, to clearly show the progress of the demonstration. Prior to departure of the NAVAIRTESTCEN pilots for the evaluation, NAVAIR shall have authorized the NAVPRO to release the helicopter for evaluation flights and shall have informed the NAVPRO and the NAVAIRTESTCEN of the operating limits that have been established for flight by COMNAIRTESTCEN designated pilots during the Navy Preliminary Evaluation.

3.3.4.1 INSPECTION. - A complete inspection of the helicopter and components to be used during NPE shall have been accomplished prior to the Phase I Evaluation. The scope of this inspection shall be as approved by the COMNAIRTESTCEN during the pre-evaluation conference for that phase. The contractor shall perform the inspection under the supervision of the NAVPRO. The results of the inspection shall be reported to the NAVPRO.

3.3.5 PHASE I, NAVY PRELIMINARY EVALUATION

3.3.5.1 SCOPE OF EVALUATION, PHASE I. - For the information and guidance of the contractor in his preparation for the Navy Preliminary Evaluations Phase I shall consist of, but not necessarily be restricted to, the following:

3.3.5.1 (Cont)

(1) General. -

(a) Functional checks of all installed and operating equipment in the test helicopter (power-plant, flight-control, hydraulic, electrical, avionic, instrument, arnanebtm photographic, and other important Systems) for conformance with the design missions of the helicopter.

(b) Evaluation of equipment installations in each Cockpit.

(2) Handling Qualities. - Evaluation of longitudinal, lateral, and directional stability and control at basiC design gross weight and mid-cg as follows:

(a) Taxi, ground handling, and mechanical instability characteristics.

(b) Takeoff and landing Characteristics, including hovering, sideward and rearward flight, climb out,and and transition Characteristics.

(c) Hydrodynamic characteristics, including take-Off, hovering in ground effect, landings, taxiing, trim-angle limits, and spray characteristics as applicable.

(d) Hover, climb, cruise, maneuvering, descent, and autorotative characteristics, including effects of power, and configuration changes.

(e) Buffet, vibration, and noise characteristics in steady unaccelerated flight in 10 knot increments from hover to maximun permissible airspeed.

(f) Control characteristics with alternate and emergency system in operation as applicable.

(g) Other applicable item that may be specifically requested by NAVAIR.

3.3.5.1 (CONT)

(3) Performance. - Items of paragraph 3.8.3, item specified by NAVAIR in the addendum to this specification for the particular model helicopter at the basic design gross weight and normal c.g., and the following:

(a) V_{max} at sea level.

(b) Maximum rate of climb in forward flight at sea level with NRP.

(c) Power required to hover out of' ground effect at sea level.

(d] Rate of descent in steady state automation at various Combinations of forward speed and roter Speed.

(e) Mission profile and preliminary cruise control.

(f) Service ceiling with NRP.

(g) Other items not included above that are contract guarantees.

(4) Special Equipment. - All installed and operating special equipment such as photographic, armament, sonar, and rescue and cargo hoists, shall be tested or checked for safe and proper functioning, and ability to perform the mission intended within the limitations of the established flight envelope. The applicable functional tests listed in 3.3.5.2.8.2 and 3.3.5.2.9.2 shall be used as guides by COMNAVAIR-tESTCEN to accomplish the desired test program.

3.3.5.2 REQUIREMENTS PRIOR TO PHASE-I NAVY PRELIMINARY EVALUATION

3.3.5.2.1 FLYING QUALITIES . - The contractor shall have demonstrated safety of flight throughout the flight envelope under the following conditions:

(1) Takeoffs, hovering, landings, sideward and rearward flight, autorotative characteristics with power recoveries, one-engine-out landings for multi-engine, and autorotative landings for single-engine helicopters in accordance with tests (b), (c. 1 to 20 knots, c.2, c.3), (d), (f.1b) and (p) of Table 3.

3.3.5.2.1 (Cont)

(2) Longitudinal stability and control characteristics at representative forward and aft CG positions at the normal take-off gross weight in accordance with the applicable procedures of tests (e), (f.1a), (g.1), (h), (i), (j.1), (k), (1.1) and (n.1) of Table 3.

(3) Lateral Directional flying qualities in accordance with the procedures of tests (f.2 and f.3), (g.2 and g.3), (h), (i), (3.2), (k), (1.2), (1.3), (m), and (0) or Table 3.

(4) Dynamic stability in accordance with the procedures of tests (m.2, m3 and m4), Table 3.

(5) Vibration characteristics specified in 3.7.4.

3.2.5.2.2 REQUIRED FLIGHT ENVELOPE. - The powered flight envelope shall be at least that of normal flying as defined in 3.1.5, except that the maximum forward flight speed at any altitude from sea level to critical shall be at least the maximum obtainable at the basic design gross weight in sustained level flight at that altitude. with normal rated power.

3.3.5.2.3 ROTOR(S) STRESS SURVEY. - The helicopter contractor shall have performed a preliminary stress survey on the main rotor(s) and tail rotor (if installed) throughout the required envelopes the scope of which is defined in 3.7.6.

3.3.5.2.4 EMERGENCY ESCAPE SYSTEM. - The contractor shall have demonstrated by test that the escape system provided for the helicopter is adequate for personnel safety throughout the required flight envelope.

3.3.5.2.5 POWER PLANT SURYEY

3.3.5 .2.5.1 POWER PLANT VIBRATION SURVEY. - The aircraft contractor shall perform such flight and ground tests as may be necessary to collect the required vibration data on the power plant installation(s). Vibration data requested by the power plant manufacturer via NAVAIR shall be provided by the aircraft contractor to the manufacturer to permit his determining the extent to which vibration of the airframe/power plant combination may affect the power plant. The scope of the vibration survey and the data recorded stall be sufficient to facilitate evaluation of the static, dynamic, repeated-load, and durability design reliability of the power plant/airframe installation by the power plant manufacturer and by the Government. Instrumentation shall be sufficient to determine vibration characteristics of the power plant Installation at frequencies corresponding to all important forcing frequencies. Instrumentation installed internally in the pwer plant shall be installed by the power plant manufacturer. The aircraft contractor is responsible for the collection of all data. The power plant Vibration Test Plant Report shall be prepared by the air-contractor and submitted via the power plant

3.3.5.2.5.1 (Cont)

manufacturer to the NAVAIR for acceptance at least two months prior to performing the tests. Instrumentation necessary for these tests will be furnished by the Government, if available; otherwise the necessary instrumentation shall be furnished by the aircraft contractor. The results of the tests shall be submitted by the aircraft contractor via the power plant manufacturer to the NAVAIR, in the Power Plant Vibration Survey Report. The foregoing requirements apply both to contractor furnished power plants and to government furnished power plants. If the results of the survey as determined by NAVAIR indicate unsatisfactory vibration characteristics of the power plant installation, the Government will place the responsibility for correction in each specific case. The aircraft contractor shall repeat the survey as may be necessary to demonstrate correction of the unsatisfactory characteristics.

3.3.5.2.5.2 POWER PLANT INSTALLATION TEMPERATURE SURVEY. - The helicopter contractor shall perform flight and ground tests specified in Spec MIL-C-8678 to demonstrate that the power plant installation will meet the requirements of Spec MIL-C-8678 and spec MIL-T-8679. The results of these tests shall be submitted to NAVAIR for provisional acceptance pending completion of INSURV Acceptance Trials upon which final approval will be based. Instrumentation necessary for these tests will be furnished by the Government, if available, and shall be listed as part of the Demonstration Intrumentation Report required by paragraph 3.19.2.1.

3.3.5.2.5.3 COMPRESSOR INLET TURBINE OUTLET SURVEY. On turbine engine. installations, a static and total pressure survey shall be made at the compressor inlet. A total pressure survey shall also be made at the turbine outlets. These surveys shall be made for the takeoff, power-approach, rearward flight, maximum yaw to right and to left, hover in ground effect, hover out of ground effect, and level flight conditions for helicopter speeds from hover to V_{max}. Air flow shall also be determined for the foregoing conditions. Instrumentation for these surveys shall be in accordance with the recommendation of the engine manufacturer as approved or modified by NAVAIR.

3.35.2.6 LIMIT FLIGHT TIME FOR NPE HELICOPTERS. - The total number of flight hours accumulated on any one helicopter flown by NaVY pilots in an NPE evaluation shall not exceed one-half of the total number of flight hours accumulated on any one helicopter of the model used in the contractor’s develomental flight tests, unless otherwise approved in writing by NAVAIR.

3.3.5.2.7 PRELIMINARY MECHANICAL INSTABILITY TESTS. - Preliminary mechanical instability tests, the scope of which is defined in the Contract Design Data Requirements, shall have been performed and the data reported to NAVAIR.

3.3.5.2.8 ARMAMENT

3.3.5.2.8.1 STRUCTURAL SAFETY. - The helicopter contractor shall perform such ground tests and flight tests as are deemed safe by the contractor within the established flight envelope to to demonstrate the structural safety and adequacy of installation of all armament and associated equipment (Paragraph 3.11). The armament and associated equipment shall include, as applicable, guns, rockets, droppable stores, missiles, mounts, attachments, release equipment, control equipment, and bombing/navigation system. Simulated shapes of correct weight shall be used if service type equipment specified is not available.

3.3.502.8.2 FUNCTIONAL TESTs l - The helicopter contractor shall perform functional tests to the extent that suitable operational equipment is available to demonstrate safe and proper operation of the equipment tested. Ground functional tests shall include firing of guns, missiles, and rockets as applicable; arming and rearming; fit testing; release of all droppable stores (normal and emergency release); adequacy of safety devices; adequacy of handling equipment; adequacy of installation clearances; evaluation armament control items within the cockpit; and the operation of bombing/navigation system. Flight functional tests shall include further evaluation of armament control items within the cockpit; tests of release and control system; firing of guns, missiles and rockets as applicable; normal and emergency release of applicable stores; and the operation of bombing/navigation system.

3.3.5.2.9 PHOTOGRAPHIC

3.3.5 .2.9.1 STRUCTURAL SAFETY. - The helicopter contractor shall perform, as applicable, such ground tests and flight tests as are deemed safe by the contractor within the established flight envelope, to determine the structural safety and adequacy of titillations of all photographic and associated equipment (para. 3.16). The photographic and associated equipment shall include, as applicable, cameras, mounts, camera doors and windows, viewfinders, control equipment, spare photographic equipment, and pyrotechic illuminants. Simulated shapes of correct weight shall be used if service type equipment specified is not available.

3.3.5.2.9.2 FUNCTIONAL TESTS. - The helicopter contractor shall perform functional tests to the extent that suitable operational equipment is available to demonstrate safe and proper operation of the equipment tested. Ground fUnctional tests shall include check tests of the photographic equipment listed above, check for adequacy of handling equipment, and a check for adequacy of installation clearances. Flight functional tests shall include further checks for the photographic control equipment, mounts for cameras and related equipment, accessibility and suitability of camera control panel, and the viewfinder installation.

3.3.5.2.10 EQUIPMENT TESTS. - The gaseous products of combustion tests of 3.12.2.1 and the oxygen equipment tests of 3.12.2.3 shall have been performed satisfactorily, as applicable.

3.3.6 PHASE II AND SUBSEQUENT PHASES, NAVY PRELIMINARY EvALUATIoN

3.3.6.1 SCOPE OF EVLUATION. - For the information and guidance of the contractor in preparation for the Navy Preliminary Evaluation, the scope of Phase II and subsequent phases shall consist of:

(1) Re-evaluation of those characteristics that are affected by changes installed since completion Of Phase I.

(2) Evaluation of those items planned to be performed in Phase I that were not completed during that phase.

(3) Evaluation of the items of Phase I at critical combinations of helicopter weight and CG, incl- overweight characteristics.

(4) Evaluation of the helicopter for the expanded envelope and further investigation of characteristics not fully evaluated preciously.

3.3.6.2 REQUIREMENTS PRIOR TO EVALUATION. - Correction of all previous phase discrepancies reported as - mandatory in the NAVAIRTESTCEN NPE report shall have been accomplish unless otherwise specified by NAVAIR. The tests of 3.3.5.2.5 shall be performed to speeds up to at least V_H. The mechanical instability tests shall have been completed and the results submitted to NAVATR. The tests of 3.3.5.2 shall have been extended through the required envelope.

3.3.6.2.1 FLYING QUALITIES TESTS. - Contractor's flight tests shall have demonstrated safety-of-flight throughout the envelope of 3.3.6.2.2 for at least the conditions of 3.3.5.2.1 with the weight and c.g. envelope expanded to include critical conditions.

3.3.6.2.2 REQUIRED FLIGHT ENVELOPE. - The flight envelope shall be significantly extended over the previous Phase envelope, as determined by NAVAIR, and shall be at least speed to V_H (for Phase II) and load factors of 2g and Og, or 0.8 N_z, whichever is less, and zero G.

3.3.7 FINAL PHASE, NAVY PRELIMINARY EVALUATION

3.3.7.3 SCOPE OF EVALUATION, FINAL PHASE. - This phase shall consist of evaluation at critical combinations of helicopter weight and CG to determine that the helicopter is ready for INSURV. Acceptance Trials, including:

(1) Re=evaluation of those Characteristics that are affected by helicopter changes installed since completion of prior phases.

(2) Evaluation of helicopter to the limits of the flight envelope required for the INSURV Acceptance Trials of the item of Phase I (repeating only those items affected by the larger flight envelope).

(3) During the final phase, or whenever the first helicopter with all system installed and operating is in flight status, an evaluation of the helicopter weapons system installation shall be performed and shall include, but not necessarily be restricted to the following:

(a) Functional and accuracy checks of gun, bombsight, rocket-rack, guided-missile-launcher, fire-control, and other armament installations, systems, and equipment; and photographic, electrical, and electronic equipments.

(b) Flight tests of tracking characteristics and gunnery runs.

(c) Right tests of fire-control systems and firing runs at a suitable target.

(d) Flight tests of guided-missile-control system including launch and guidance to intercept or impact on a suitable target.

3.3.7.1 (Cont)

(e) Suitability of external stores and store drops. The quantity and types of stores shall be as specified in the addendum to this specification.

(f) Qualitative inspections of all antenna installations.

3.3.7.2 REQUIREMENTS PRIOR TO EVALUATION, FINAL PHASE. - All previous phase discrepancies reported as mandatory by NAVIRTESTCEN shall have been corrected unless otherwise specified by NAVAIR. The tests of 3.3.5.2 shall have been extended through the required envelope.

3.3.7.2.1 FLYING QUALITIES TESTS, FINAL PHASE. - The contractor shall have demonstrated safety-of-flight throughout the envelope of 3.3.7.2.2 for at Least the conditions or 3.3.5.2.1 except that the gross weights shall be all that are required by the contract detail specification, and the center of gravity limits shall be maximum forward and maximum aft.

3.3.7.2.2 REQUIRED FLIGHT ENVELOPE, FINAL PHASE. - The contractor shall have performed flights at his plant to the full limits specified for the tests of 3.7.3 and 3.7.4. unless otherwise authorized in writing by NAVAIR. Contractors' requests for such authorizations shall include discussion of the advantages to the Government, including changes in flight-test costs of such an authorization. The Contractor also shall have determined during developmental flight tests at his plant static longitudinal instability, desirable vibrational intensity, blade stall or other characteristics which limit the useful lift capabilities of the helicopter.

3.3.7.2.3 OTHER TESTS, FINAL PHASE. - The applicable armament demonstration specified under 3.11 and 3.3.7.1(3) above, and applicable equipment demonstrations of 3.12 shall have been performed.

3.4 BOARD OF I INSPECTION AND SURVEY TRIalS (INSURV)

3.4.1 GENERAL

3.4.1.1 CONFIGURATION OF HELICOPTERS. - All equipment and installations specified for the helicopters shall be installed and operable except in helicopters instrumented for special

4.1.1 (Cont)

tests in which the space or weight requirements for instrumentation may require the removal of certain equipment. In these special test helicopters, all applicable armament, electronic, equipment, and other item that influence aerodynamic characteristics or the center-of-gravity positions of the helicopters shall have been installed or simlated appropriately to represent helicopters scheduled for fleet delivery. The configurations of test helicopters shall be delineated in an appendix to each addendum to this specification approved for contract application.

3.4.2 REQUIREMENTS PRIOR TO INSURV ACCEPTANCE TRIALS AND FLEET DELIVERY OF LIMITED NUMBER OF HELICOPTERS

3.4.2.1 DEMONSTRATION TESTS. - The NPE Final Phase shall have been completed and all discrepancies reported there from corrected unless otherwise authorized by NAVAIR. The formal tests of 3.7, 3.8. 3.12 and 3.15 shall have been completed at NAVAIRTESTCEN. The tests of 3.7.4, a, c, and f shall have been performed on each individual helicopter to take part in the INSURV Acceptance Trials just prior to delivery for trials, and the data submitted in the Vibration Data report. The contractor shall have performed all tests required to demonstrate performance of the entire helicopter weapons system as defined by the applicable detail specification equipment specifications, and contract guarantees for conformance with the designated missions of the helicopter. The Avionics tests required to accumulate the data for report of paragraph 3.19.2.8 shall have been performed.

3.4.2.2 STRUCTURAL LABORATORY TESTS. - All laboratory tests included in the contract design data and test requirements of the applicable addendum to MIL-D-8706 shall have been performed to the limits specified therein and all test reports submitted.

3.4.2.3 REQUIREMENT PRIOR TO INSURV ACCEPTANCE TRIALS. - All formal demonstration tests to be performed at NAVAIRTESTCEN shall have been completed. The data of 3.4.2.1 shall have been submitted.

3.4.2.4 REQUIREMENTS PRIOR TO INSURV NUCLEAR WEAPON TRIALS. - All formal demonstration tests to be performed at NAVAIRTESTCEN and the tests of 3.11.6 shall be completed as applicable.

3.4.2.5 RELIABILITY AND MAINTAINABILITY. - The tests of 3.17 shall have been completed.

3.5 REQUIREMENTS PRIOR TO FIRST DELIVERIES TO OPERATIONAL TEST AND EVALUATION FORCE (OPTEVFOR), FLEET INTRODUCTION PROGRAM (FIP), AND/OR REPLACEMENT AIR GROUPS (RCVG).

3.5.1 FLIGHT MANUALS. - The contractor shall have submitted satisfactory Flight Manuals in accordance with Spec MIL-M-7700, containing complete descriptions of flight characteristics.

3.5.2 DYNAMIC COMPONENTS. - The contractor shall have submitted sufficient data to permit NAVAIR to assign retirement lives for all dynamic components of at least 1000 hours or as specified in the contract design data and test requirements of the applicable addendum to MIL-D-8706.

3.6 REQUIREMENTS PRIOR TO CONTINUED FLEET DELIVERIES. - The requirements of 3.4 and 3.5 shall have been completed, and all demonstration tests which are a part of this specification or the addendum thereto shall be completed and the reports thereof submitted.

3*7 STRUCTURAL DEMONSTRATION

3.7.1 GENERAL. - The structural demonstration consists of all tests and data obtained during the “duration of the demonstration” defined in 1.3 which are structurally significant in defining the strength, rigidity, and operating restrictions for the helicopter. The formal structural demonstration tests to be performed at NAVAIRTESTCEN shall consist of the tests of paragraphs 3.7.3 and 3.7.4.

3.7.1.1 GRADUAL APPROACH TO CRITICAL LIMITS. - All of the combinations of gross weight, configuration, center-of-gravity position, altitude, speed, load factor, and control motions required to be demonstrated during the tests of 3.7.3 shall be attained by the contractor at or near the contractor's plant prior to release of the helicopter for the corresponding tests at NAVIRTESTCEN. During these flights, critical limits shall be approached gradually in increments as approved by the cognizant test authority.

3.7.1.2 OPERATION OF APPURTENANCES. - During developmental flights at the contractor's plaint, appurtenances which can be put into continuous motion (such as rotation of radar antenna), or which can be extended or rotated to different positions (such as an extensible hoist or sonar), or which can be extended and retracted (such as an extensible ramp door or landing gear), shall be operated sufficiently to determine, by a combination of test data and calculations, the effects on helicopter loads and motions up to the limits required for structural design of the particular items. These determinations shall be discussed fully in the Demonstration-Planning and Progress-Report after which, selections will be made of the positions and motions of appurtenances required fOr dives and pull-outS, if such positions and motions are not specified in Table 2. During each flight and immdiately subsequent to each flight performed in compliance with the requirements of paragraph 3.7.2.2, the satisfactory operation of extensible ramp doors, or other appurtenances subjected to water loads as applicable, shall be demonstrated.

3.7.1.3 ALTERNATE GROSS WEIGHTS. - Alternate gross weights may be approved in writing by the test authority for any or all of the test conditions specified provided that conpliance is made with both of the following:

(1) The load factors attained and the magnitudes and distributions of weight employed are such that all parts of the helicopter will be loaded at least as critically as they would be loaded if the tests were made at the specified gross weights and center-of-gravity positions.

(2) The products of load factor times gross weight attained in dives and pull-outs are not lower in absolute value than those specified.

3.7.1.4 MAXIMUM SAFE LIMITS. - In the event that compliance with any particular test requirments, as initially specified in this specification or as supplemented by the pertinent addendum thereto, would result in an unsafe attitude being attained or an unsafe maneuver being performed, the authority conducting the demonstration may authorize an appropriate and equitable deviation from the specified test requirement. For the purpose of these demonstration tests, unsafe attitudes and maneuvers are those resulting in angles of bank or pitch greater than 60 degrees, or vibration levels at the pilots seat equal to ± 0.4G or 4 times the levels existing in steady unaccelerated flight at V_c, whichever is greater.

3.7.2 TAXI, TAKE-OFF, AND LANDING TESTS. - For the structural tests of this paragraph, the contractor shall provide and install instrumentation in accordance with 3.1.9 and to the extent necessary to comply with 3.19.2.5(8), including that necessary to determine the loads and/or accelerations acting on external store stations, and on power-plant installations. The tests of this paragraph in combination with the analysis of 3.19.2.5(8) are required to demonstrate that the helicopter has structural strength for the specified envelope of conditions for taxiing, take-off, and landing. The weight distribution, including ballast as may be necessary to attain the specified weight and loading configurations, shall be as approved by NAVAIR.

3.7.2.1 LAND-BASED AND SHIP-BASED HELICOPTERS. - Field taxi. including turning, braking and pivoting and field takeoff tests shall be performed at the maximum design gross weight, critical center of gravity position, and taxiing speeds up to the maximum safe speed. Each of the landing tests of Table I shall be performed with increasing severity until the sinking speed of column 4 is attained once, or alternatively until at least 80 percent of that sinking speed is attained six times. The foregoing tests shall be performed on prepared smooth concrete/macadam runways or taxiways and on unprepared soft-soil terrain equivalent to that specified for design and defined in an addendum to this specification. For the landing tests on the unprepared soft-soil terrain, the helicopter engine shall be shut down and rotor RPM reduced to zero with and without rotor brake application. After shut down the helicopter shall be started, taxied to undisturbed terrain, and a normal takeoff performed.

3.7.2.2 WATER BASED HELICOPTERS. - Taxi, take-off, and landing tests shall be as specified in the contract addendum to this specification.

3.7.3 DIVES AND PULL-OUTS. - The dives and pull-outs of Table 2 shall be performed using a single helicopter. The helicopter shall be inspected subsequent to each formal test or series of tests as approved by the test authority.

3.7.3.1 LOADING CONFIGURATION. - The loading configuration shall include all disposable item which are intended to be carried when the helicopter is performing its primary mission. If alternate missions require external stores, additional tests may be specified in the contract addendum to this specification. For each of the tests of Table 2:

(a) In the event that the specified load factor of tests a, c, i, and r cannot be attained at the specified gross weight under any of the variations of parmeters of 3.7.3.2 and 3.7.3.3, the test shall be repeated with the gross weight reduced such that the product of the SpeCified load factor times gross weight equals the maximun product of load factor times gross weight obtained during the contractor's developmental flight tests.

(b) The center-of-gravity position shall be at least the maximum aft position or maximum forward position (as applicable) for which limit strength is required.

3.7.3.2 TRIM CONDITIONS FOR DIVES AND PULL-OUTS. -

(a) Unless otherwise specified, the helicopter shall be trimmed in steady unaccelerated flight at the speeds specified for the test plus or minus 5 hots.

(b) The density altitude shall not exceed 3500 feet.

(c) Rotor RPM shall be the maximum or minimum power-cm or power-off rotor RPM as applicable per Table 2. Engine power shall be at maximum available power.

3.7.3.3 CONTROL MOVEMENTS. - Unless otherwise specified in Table 2, the dives and pullouts of 3.7.3 shall be obtained by the simultaneous deflection of cyclic-pitch control, collective-pitch control, and/or directional control in not more than

3.7.3.3 (Cont)

0.3 second to the required displacement, held for the time necessary to obtain the specified load factor, and returned in not more than 0.3 second to that displacement required for level coordinated flight. If the specified requirements are not met by use of these control motions, the sequencing, magnitude, and rates of control displacements shall be varied to determine the combination which results in fulfilling the test requirements or maximum attainable, whichever is less. Selection of specific parameters to be used during the Formal Demonstration at NAVAIRTESTCEN will be made during the pre-demonstration conference of 3,7.1.2.

3.7.3.3.1 OPERATION OF PILOT-OVERRIDING FLIGHT CONTROL SYSTEMS. - These requirements apply to systems which can move the control surfaces, including rotors, independently of the pilot, either by design for intended use or because of malfunction. The influence of such system on control-surface movements and helicopter flight characteristics in dives and pullouts shall be completely determined during tests of 3.7.1.1 or during other applicable tests. Whether the system is engaged or disengaged during each test of Table 2, shall be determined by the Government during the pre-demonstration conference of 3.7.1.2.

3.7.4 FLIGHT VIBRATION TESTS. - These tests are required to demonstrate compliance with vibration-comfort requirements and to demonstrate that the helicopter is free from excessive shake, vibration, or roughness affecting the capability of the helicopter to perform its missions, or affecting its structural integrity. Vibration pickups shall be installed at least at the stations specified below. Measurements shall be made in the indicated directions during steady Unaccelerated flight at airspeeds from O to VL in 20-knot increments and 0 to minus 30 knots in 10-knot increments. The rotor RPM during the tests shall cover the minimum to maximum permissible rotor RPMs in at least four approximately equal increments. Methods of data recording and data reduction shall be included or referenced in the report of vibration data for the following:

(a) Crew seats (lateral, vertical, and longitudinal)

(b) Rudder pedals (longitudinal)

(c) Heel troughs (vertical)

(d) Cyclic-control column (longitudinal and lateral)

3.7.4 (Cont)

(e) Collective-control column (in the direction of motion)

(f) Fore, mid, and aft cabin compartment (lateral and vertical)

(g) Primary longitudinal structural member in fuselage (vertical and lateral) at the approximate positions of maximum amplitude.

(h) Navigator's table and other work tables (longitudinal and lateral)

(i) A position representative of the primary load path from the rotor(s) to the fuselage (vertical, longitudinal, and lateral)

(j) Stabilizer tip (vertical and longitudinal) for symmetrical stabilizers, vertical both sides.

(k) Fin tip (lateral and normal to the primary structural members)

(l) Engines and external stores (a suitable number of pickups shall be used to determine the motions of the engines and external stores). Measurements performed in accordance with paragraph 3.3.5.2.5.1 may be coordinated with this requirement.

3.7.5 EXTERNAL CARGO SYSTEM. - THE contractor shall demonstrate, with specified external cargo load, the maximum safe airspeed limits to which the cargo can be carried, or the maximum safe load and airspeed combinations for towing, as applicable. At the maximum safe airspeed, emergency release of load shall be demonstrated.

3.7.6 FLIGHT STRESS SURVEY. - A flight stress survey shall be performed on critical components. This survey shall include the critical speeds and maneuvers in the required flight envelope, including transition into autorotations and landing flares, and steady rates of descent. Data shall be obtained to correlate

3.7.6 (Cont)

with design loads or stress for each condition selected in the Flight Loading Spectrum, and for other conditions which have been selected for fatigue analysis or tests of specific components. Prior to Phase I - NPE, sufficient data shall have been obtained to show that stress levels in critical components are acceptable levels with regard to structural fatigue. Instrumentation shall be sufficient to determine if resonances in critical components at frequencies corresponding to primary exciting forces are present. In addition, not necessarily concurrent with the above but not later than the start of INSURV Acceptance Trials, at least 25 hours of additional flight stress data from the performance of Simlated operational mission profiles shall be obtained. These data shall form a broader basis for re-assessment of preliminary fatigue life estimates and provide a source for periodic re-evaluation of component fatigue lives as a function of changes in mission serverity which may develop with operational experience.

3.7.7 FLIGHT ENDURANCE TESTS. - A minimum Of 250 hours of simulated mission profile and training flights in a single helicopter configured in accordance with 3.1.3, shall be performed. All equipment that will normally be operating during the helicopter's missions shall be operating during these tests except that scheduled flights need not be delayed because of the non-availability of equipment as approved by the test authority.

Table 1 Field Landings

1 Test	2 Gross Weight	3 Loading Configuration	4 Sinking Speed	5 Center of Gravity	6 Pitch Attitude at Touchdown	7 Roll Attitude at Touchdown	8 Fwd Speed at Touchdown Relative to the Ground
a	Basic Landing design gross weight	Optional	Not less than maximum design	Critical for forward gear	Not more than the maximum nose down plus 2°	Optional	Zero
b	Basic Landing design gross weight	Optional	Not less than maximum design	Critical for aft gear	Not less than the maximum tail down minus 2°	Optional	Zero
c	Basic Landing design gross weight	Optional	Not less than maximum design	Critical for forward gear	Not more than the maximum nose down plus 2°	Optional	Maximum design ±5 Knots
d	Basic Landing design gross weight	Optional	Not less than maximum design	Critical for aft gear	Not less than the maximum tail down minus 2°	Optional	Maximum design ±5 Knots
e	Basic Landing design gross weight	Optional	Not less than maximum design	Critical for aft gear	Not less than the maximum tail down minus 2°	Not less than 4°	Zero
f	Basic Landing design gross weight	Optional	Not less than maximum design	Critical for aft gear	Not less than the maximum tail down minus 2°	Not less than 4°	Maximum design ±5 Knots
g	Maximum design gross weight	Optional	Not less than maximum design	Optional	Optional	Optional	Zero
h	Maximum design gross weight	Optional	Not less than maximum design	Optional	Optional	Optional	Maximum design ±5 Knots
i	Basic Landing design gross weight	External Stores	Not less than maximum design	Optional	Optional	Optional	Maximum design ±5 Knots

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TABLE 2

DIVES AND PULL-OUTS

1 Test No.	2 Test Name	3 Required Load Factor	4 EAS to be attained in combination with the required load factor	5 Design Gross Weight	6 CG Position	7 Rotor RPM	8 Remarks
a_1	Symmetrical Pull-out	n_z	0.4 V_H	Basic	Aft	Max	
a_2				Max			
b_1			0.7 V_H	Basic	Aft		
b_2					Fwd		
c_1			V_H	Basic	Aft		
c_2				Max			
c_3				Basic		Min	
d_1			V_L	Basic	Aft	Max	Time for control displacements optional.
d_2					Fwd		
e_1	Rolling Pull-out	0.8 n_z	0.6 V_H	Basic	Aft	Max	Perform to left and to right. Initiate from a bank angle of not less than 45° and a load factor not greater than 1.5. The helicopter shall be rolled in a direction to reduce the angle of bank.
e_2						Min	
e_3				Max		Max	
f_1			V_H	Basic	Aft	Max	
f_2					Fwd		

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TABLE 2 (Cont'd)

DIVES AND PULL-OUTS

1	2	3	4	5	6	7	8
g	Steep Climbing Turn (Chandell)	$0.8n_z$	$0.4V_H$	Basic	Aft	Max	Perform an abrupt steep climbing turn using helicopter momentum for a faster rate of climb, gaining altitude and reversing direction of flight simultaneously. Heading shall have changed at least 180° during the maneuver.
h			$0.8V_H$				
i	Pushover	$-n_z$	$0.4V_H$	Basic	Aft	Max	
j_1			$0.8V_H$	Basic	Aft		
j_2				Max			
k	Quick Stop	Optional	V_H	Basic	Aft	Max	The controls shall be displaced to bring the helicopter to hover in the shortest possible distance. The altitude shall not change more than 10 ft.
l	Jump Take-off	n_z	Zero	Basic	Aft	Max	From the minimum collective-pitch control position, displace the collective-pitch control and hold until the required load factor has been attained.
m	Rolling	Optional	Max Possible Lateral, Min Possible Longitudinal	Basic	Aft	Max	Perform to the left and to the right. The cyclic-pitch control shall be moved to full displacement in the direction opposite to the flight directions and maintained until the lateral speed is reduced to zero.
n_1	Steady Heading Sideslip	Optional	At least V_H	Basic	Aft	Max	Perform to the left and to the right. Displace the directional control slowly until the rudder pedal stop is contacted or a rudder pedal force of 300 pounds is attained whichever happens first.
n_2						Min	
o	Dynamic Yaw	Optional	$0.8V_H$	Basic	Aft	Max	Perform to the left and to the right. Apply rudder pedal force of 180 pounds, or less if the rudder pedal stop is contacted, maintaining that force until the maximum overswing angle of sideslip is attained. Recovery shall be made by returning the directional control to the original position.
p			$0.5V_H$				

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TABLE 2 (Cont'd)

DIVES AND PULL-OUTS

1	2	3	4	5	6	7	8
q	Turn on a Spot	Optional	Zero	Basic	Aft	Max	Perform to the left and to the right. Apply rudder pedal force of 180 pounds, or less if the rudder pedal stop is contacted, maintaining that force until one complete turn or the maximum rate of turn is developed, whichever occurs first, and then apply 180 pounds of force or less if the rudder pedal stop is contacted, in the opposite direction until zero rate of turn is attained.
r	Autorotative Pull-out	n_z	$0.2V_H$	Basic	Aft	Max for Power-Off	With collective pitch at the minimum position attainable and with the vertical and forward airspeeds stabilized, maximum power shall be applied concurrently with movement of the controls.
s_1			$0.6V_H$	Basic	Aft		
s_2				Max			
t_1			V_H	Basic	Aft		
t_2				Max			

3.8 AERODYNAMIC DEMONSTRATION TESTS

3.8.1 GENERAL

3.8.1.1 GROSS WEIGHT AND CENTER-OF-GRAVITY POSITIONS. - The maximum aft and maximum forward center-of-gravity positions shall be the maximum positions that can be obtained with any service loading combination attainable as defined in Spec MIL-W-25140. The gross weight for a specified center-of-gravity position shall be approximately that corresponding to a service loading which would occur with the specified center-of-gravity position. Where neither the weight nor the center-of-gravity position is specified, a combination representative of planned service use of the helicopter shall be used.

3.8.2 FLYING QUALITIES

3.8.2.1 OPERATING FLIGHT ENVELOPE - Flying qualities tests shall consist of quantitative flight-test measurements demnonstrating compliance with selected requirements of Spec MIL-H-8501A which are outlined in Table 3. The terminology used in the table is that employed in Spec MIL-H-8501. Demonstration will ordinarily be required at two altitudes selected as the highest and the lowest altitude at which demonstration of each required maneuver is significant and practical.

3.8.2.2 CONFIGURATION. - Except where indicated, all demonstration tests shall be performed in the normal helicopter configuration, i.e., with stability augmentation, and powered or boosted control system operating.

3.8.2.3 MAXIMUM PERMISSIBLE SPEED ENVELOPE. - The flight characteristics shall be such as to permit the limits required for structural demonstration to be accomplished to the extent that those limits are included in contract structural design requirements.

3.8.3 PERFORMANCE - Demonstration of performance shall include those tests necessary to determine that the helicopter can meet the contract performance guaranteed items specified in the Detail Specification. The following items shall be included in the performance demonstration:

(1) At normal take-off weight, power required in level flight throughout the speed range shall be determined at sea level at three different rpm's closen

3.8.3 (Cont)

to show variation of power required with rpm. One of the rpm's chosen shall be rpm for normal rated power (NRP). At the rpm for NRP, power required in level flight throughout the speed range shall be determined at sea level for an overload weight if practicable, and a reduced weight chosen so as to show variation of power required with gross weight. Normal take-off weight plus and minus 10 percent is suggested.

(2) Maximum forward speed at normal take-off weight with NRP.

(3) Power required to hover at sea level at three different rpm's and three weights as called for under (1) above.

(4) At normal take-off weight and rpm for NRP required in level flight throughout the practicable speed range shall be determined at 5000 foot increments in altitude up to service ceiling.

(5) Hovering ceiling at normal take-off weight with NRP and with take-off power.

All performance demonstration items shall be performed out of ground effect. In connection with determination of performance, observation shall also be made regarding compliance with pertinent flying qualities design requirements which are not specifically required for demnstration under Table 3. Unless otherwise specified, all performance data shall be reduced to standard NASA atmospheric conditions.

TABLE 3 - Flying Qualities

TEST NO.	TEST NAME	
a.	Ground Handling Characteristics	It shall be demonstrated that: (1) the rotors can be safely started and stopped in winds up to 45 knots, any direction, 60 knots into wind for ship-based helicopters; (2) that a fixed position can be maintained on level paved surface without the use of brakes in 45 knot winds with rotors engaged; (3) that all ground operations including taxiing and pivoting can be performed without damage to rotor coning stops or contact between the blades and any part of the structure.
b.	Hover Characteristic	It shall be demonstrated that: (1) the helicopter is steady while hovering over a spot in still air and that the altitude can be maintained within plus or minus one foot with less than one inch movement of the longitudinal, lateral, and directional control and with less than plus or minus one-half inch movement of the collective control; (2) complete turns in each direction can be made while hovering over a given spot with the maximum over-load gross weight and power as required (in and out of ground effect) in a 35 knot wind.
c.	Take-off and Landing Characteristics	It shall be demonstrated that: (1) it is possible to take off and land in steady winds up to 45 knots and winds with gusts to 45 knots; (2) running take-offs (wheel gear) can be made up to ground speeds of 35 knots; (3) run-on landings can be made on a level paved surface up to ground speeds of 35 knots.
d.	Sideward Flight Characteristics	It shall be demonstrated that, from a hovering condition, it is possible to obtain steady, level, translational flight at a sideward velocity of 35 knots to both the right and the left with a positive control gradient throughout the sideward speed range, that a sufficient margin of control effectiveness is available, including at least adequate control to produce 10 percent of the maximum attainable hovering rolling acceleration shall remain at each end. Lateral control stick force shall not exceed seven pounds when the helicopter is trimmed for hovering. If normal service loading can result in significant asymmetry in lateral center-of-gravity locations, it shall be shown that the required sideward flight demonstration can be performed with the c.g. at the maximum practical asymmetric location.

TABLE 3- Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
e.	Quick Stop and Hover Characteristics	With the helicopter trimmed in steady, level, horizontal flight at maximum forward speed, it shall be demonstrated that it is possible readily and safely to bring the machine to a quick stop and hover. With the helicopter trimmed for hovering flight, it shall be possible to accelerate to maximum forward speed, maintaining approximately constant altitude. During the maneuvers, it shall be shown that the longitudinal control stick force does not exceed eight pounds.
f.	Control Margins	1. Longitudinal Control Margin - (a) With the heaviest service loading at which the maximum aft center of gravity is obtained, and after stabilizing the helicopter at maximum forward flight speed, it shall be demonstrated that a margin of forward cyclic control stick travel is available to produce a nose down pitching acceleration equal to 10 percent of the maximum attainable pitching acceleration in hover. This demonstration shall be repeated in autorotation at the maximum permissible forward speed of autorotation. (b) With the heaviest service loading at which the maximum forward center of gravity is obtained and after stabilizing the helicopter at the maximum rearward speed, it shall be demonstrated that a margin of aft cyclic control is available to produce a nose up pitching acceleration equal to 10 percent of the maximum attainable pitching acceleration in hover. This demonstration shall be repeated for autorotation at zero airspeed. 2. Lateral Control Margin - With a normal service loading resulting in the maximum asymmetrical lateral center of gravity location, it shall be demonstrated that for the most critical condition, a sufficient margin of control is available to produce a rolling acceleration equal to 10 percent of the maximum attainable hovering rolling acceleration.

TABLE 3-Flying Qualities (Cont)

TEST NO.	TEST NAME	
f.	(Cont)	3. Directional Control Margin - With the maximum over-load gross weight while hovering with a wind of 35 knots, it shall be demonstrated that sufficient control remains at the most critical azimuth angle relative to the wind, in oder that, when starting at zero yawing velocity at this angle, the critical direction results in a corresponding yaw displacement of at least 110 divided by the cube root of W + 1000 degrees in the first second, where W represents the maximum over-load gross weight of the helicopter in pounds.
g.	Control Force Gradient	1. Longitudinal Control Gradient - At all trim conditions and speeds from 30 knots rearward to maximum forward speed, a longitudinal control force gradient of one to two pounds per inch for the first inch of travel from trim shall be provided. It shall be demonstrated that the slope of the curve of stick force versus displacement is positive at all times. 2. Lateral Control Force Gradient - It shall be demonstrated that at the trim condition and speeds from hover to maximum forward speed a lateral force gradient of one half to two pounds per inch for the first inch of travel from trim is provided. The slope of the curve of stick force versus displacement shall be positive at all times and the slope for the first inch of travel from time shall always be greater than or equal to the slope for the remaining stick travel which shall be linear. 3. Directional Control Force Gradient - At speeds from hover to maximum rearward and to maximum forward, the directional control force gradient shall be demonstrated to be linear from trim position in both directions with a maximum force of 15 pounds.

TABLE 3 - Flying qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
h.	Control Forces and Control Breakout Forces	It shall be demonstrated that: (1) without retrimming, the control forces required to change from any trim and power condition to any other trim condition throughout the flight envelope do not exceed the value given in Table II of MIL-H-8501; (2) with the control trimmed for zero force, breakout forces including friction do not exceed the values given in Table II of MIL-H-8501.
i.	Control Force Coupling	It shall be demonstrated that: (1) the control are free from objectionable transient forces in any direction following a rapid deflection of any of the controls; (2) the force acting in a direction to resist the displacement does not at any time fall to zero; (3) a longitudinal control displacement shall not produce lateral control force in excess of 20 percent or pedal force in excess of 75 percent of the associated longitudinal force; (4) lateral control displacement shall not produce longitudinal control forces in excess of 40 percent or pedal force in excess of 100 percent of associated lateral force; (5) pedal displacement shall not produce longitudinal control forces in excess of eight percent or lateral control force in excess of six percent of the associated pedal force; (6) movement of the collective-pitch control shall not produce cyclic control force in excess of one pound; (7) for helicopters with power boosted or power operated controls there shall be no control force couplings.
j.	Trim Changes	1. Longitudinal Trim - It shall be demonstrated that starting at trim condition both at V_{max} and at hover, it shall be possible to maintain longitudinal trim with longitudinal control displacement of no more than three inches from initial trim position as the engine power or collective pitch or both are varied throughout the available range.

TABLE 3- Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
j.	(Cont)	2. Lateral Trim - It shall be demonstrated that starting at trim condition both V_{max} and at hover, it shall be possible to maintain lateral trim with a control displacement amounting to not more than one inch from the initial trim position as the engine power or collective pitch or both are varied either slowly or rapidly in either direction throughout the available range.
k.	Trimmability	It shall be demonstrated that: (1) it is possible in steady state flight to trim all control forces to zero; (2) the controls exhibit positive self-centering characteristics; (3) there is no stick "jump" when trim control is actuated.
l.	Control Power	1. Longitudinal Control Power - It shall be demonstrated that, when the helicopter is hovering in still air at the maximum overload gross weight, a rapid one-inch step displacement from trim of the longitudinal control shall produce an angular displacement at the end of one second which is at least 45 divided by the cube root of W + 1000 degrees for VFR, or 73 divided by the cube root of W + 1000 for IFR. When maximum available displacement from trim of the longitudinal control is rapidly applied, the angular displacement at the end of one second shall be at least 180 divided by the cube root of W + 1000 degrees. In the expressions W represents the maximum overload gross weight of the helicopter in pounds. 2. Lateral Control Power - It shall be demonstrated that when the helicopter is hovering in still air at the maximum overload gross weight, a rapid one-inch step

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
l.	(Cont)	displacement from trim of the lateral control shall produce an angular displacement at the end of one-half second of at least 27 divided by the cube root of W + 1000 degrees for VFR and 32 divided by the cube root of W + 1000 for IFR. When maximum available displacement from trim of the lateral control is rapidly applied at the conditions specified above, the resulting angular displacement at the end of one-half second shall be at least 81 divided by the cube root of W + 1000 degrees. In both expressions W represents the maximum overload gross weight of the helicopter in pounds. 3. Directional Control Power - It shall be demonstrated that when the helicopter is hovering in still air at the maximum overload gross weight, a rapid one-inch step displacement from trim of the directional control shall produce a yaw displacement at the end of one second which is at least 110 divided by the cube root of W + 1000 degrees. When maximum available displacement from trim of the directional control is rapidly applied at the conditions specified above, the yaw angular displacement at the end of one second shall be at least 330 divided by the cube root of W + 1000 degrees. In both expressions W represents the maximum overload gross weight of the helicopter in pounds.
m.	Control Response	1. It shall be demonstrated at hover and at V_{max} that the maximum rate of roll per inch of stick displacement does not exceed 20 degrees per second. 2. While hovering at the lightest normal service loading, it shall be demonstrated that following a sudden pedal displacement of one inch from trim, the yaw displacement does not exceed 50 degrees in the first second.
n.	Longitudinal Stability Characteristics	1. Static Stability -

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
n.	(Cont)	In the normal service loading corresponding to the most rearward center of gravity location, with throttle and pitch control set for level flight at 80 percent V_{max}, it shall be demonstrated that a rearward displacement of and pull force on the longitudinal-control stick is required to hold a decreased value of steady-forward speed and that a forward displacement and push force is required to hold an increased value of speed. 2. Dynamic Stability It shall be demonstrated at 80 percent V_{max} that following a longitudinal disturbance: (a) Any oscillation having a period of less than five seconds shall damp to one-half amplitude in not more than two cycles, and there shall be no tendency for undamped small amplitude oscillations to persist. (b) Any oscillation having a period greater than five seconds but less than ten seconds shall be at least lightly damped. (c) Any oscillation having a period greater than ten seconds but less than 20 seconds shall not achieve double amplitude in less than ten seconds. 3. Maneuver Stability - With the heaviest normal service loading at which the maximum aft center of gravity is obtained, freedom from excessive divergent tendencies as regards longitudinal stability and control in forward flight shall be demonstrated at maximum forward speed, at 80 percent V_{max}, and at a forward speed of 35 knots as follows: (a) After the longitudinal control stick is suddenly displaced rearward a sufficient distance to generate a 0.2 radian/sec pitching rate within two seconds, or a

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
n.	(Cont)	sufficient distance to develop a normal acceleration of one and one-half G within three seconds, whichever is less, and then held fixed, it shall be shown that the time history of normal acceleration shall become concave downward within two seconds following the start of the maneuver, and remain concave downward until the attainment of maximum acceleration as defined and illustrated in para. 3.2.11.1 of MIL-H-8501. 4. Effect of Artificial Disturbance When the longitudinal control stick is suddenly displaced rearward from trim a sufficient distance to generate a 0.2 radian/sec. pitching rate within two seconds and held for at least one half second and then returned to and held at the initial trim position, it shall be demonstrated that the normal acceleration shall not increase by more than one quarter G within ten seconds from the start of the disturbance. Further, during the subsequent nose-down motion (with the controls still fixed at trim) any acceleration drop below the trim value shall not exceed one quarter G within ten seconds after passing through the initial trim value.
o.	Lateral-Directional Stability	The helicopter shall possess positive, control-fixed and control-free directional stability, and effective dihedral in both powered and autorotative flight at all forward speeds above 60 knots, one half V_{max}, or the speed for maximum rate of climb whichever is the lowest. It shall be demonstrated that at these flight conditions with zero yawing and rolling velocity, the variations of pedal displacement and lateral control displacement and pedal and lateral control force with steady sideslip angle shall be stable (left pedal and right stick displacement for right sideslip) up to full pedal displacement in both directions, but not necessarily beyond a sideslip angle of 15 degrees at V_{max}, 45 degrees at the low speed determined

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
o.	(Cont)	above or beyond a sideslip angle determined by a linear variation with speed between these two angles. Between sideslip angles of plus or minus 15 degrees, the curve of pedal displacement and force and lateral control displacement and force plotted against sideslip angle, shall be approximately linear.
p.	Engine Out and Autorotative Characteristics	The engine failure and autorotative characteristics of the helicopter shall be thoroughly demonstrated for the normal gross weight and for the maximum gross weight condition as follows: (1) Multi-Engine Helicopters - For dual engine helicopters at the highest allowable normal and maximum gross weight - outside air temperature combinations compatible with power available, demonstrate the following while at all times maintaining adequate control margin and control power about all axes: (a) One Engine Out Characteristics - From steady state dual engine level flight conditions entry into single engine steady state descent shall be initiated at speeds of zero, V_{cruise}, and V_{max}. In addition, entry into single engine steady state descent while at military power in a steady state climb at $V_{best\ R/C}$ shall be demonstrated. All of these maneuvers shall be accomplished by abrupt closure of the throttle for one engine, followed after a delay of two seconds by the required movement of all the controls. Recorded data shall include time histories showing indication of throttle chop, torque for each engine, rotor speed, all control positions and forces, all attitudes and rates, heading, sideslip, altitude, rate of descent and indicates airspeed. It shall be shown that the control forces during transition to single engine descent do not exceed the values specified in Table II of Spec. MIL-H-8501. (b) One Engine Out Characteristics (Level Flight) - The transition from steady state dual engine level flight to steady state single engine level flight shall be initiated at speeds of zero, V_{cruise}, and V_{max}. In addition, transition into steady state single engine level flight from steady state dual engine climb at military power and $V_{best\ R/C}$ shall be demonstrated. All

TABLE 3 - Flying Qualifies (Cont)

TEST NO.	TEST NAME	DESCRIPTION
p.	(Cont)	of these maneuvers shall be accomplished by abrupt closure of the throttle for one engine, followed, after a delay of two seconds, by the required movement of all the controls. Recorded data shall include time histories of those parameters listed in (a). It shall be shown that the control forces during transition to single engine flight do not exceed the values specified in Table II of Spec. MIL-H-8501. (c) Single Engine Failure Height Velocity Diagrams - From the data obtained in (a) and other necessary data, and supported by demonstration of a sufficient number of one-engine-out landings following simulated power failure at various airspeeds, a curve of airspeed versus minimum altitude for safe single engine failure to landing shall be constructed between the maximum rearward and forward speeds. This curve shall include the steady state level flight single engine failure landings and single engine failure landings from military power while in climb. From the data obtained in (b) and other necessary data, and supported by demonstration of a sufficient number of transitions to single engine level flight following simulated power failure at various airspeeds, a line shall be constructed in the single engine failure height-velocity diagram denoting the flight continuation capability following single engine failure at the maximum combination of allowable gross weight and outside air temperature compatible with power available. Recorded data shall include data required in (a) as well as calibrated airspeed and ground speed at contact and landing normal load factor. Maneuvers and recorded data for (a) and (b), entries into single engine descent or level flight, shall be continued until the steady state condition is reached. For the single engine failure height-velocity (H-V) diagram the minimum number of landings shall be as follows: Steady State Level Flight. Low speed portion of H-V diagram. Perform landings from minimum height for safe landing at maximum rearward speed, zero, and two points along the "knee" of the curve (30-40 knots range). The maximum calibrated airspeed at ground contract shall not exceed 15 knots in zero wind.

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
p.	(CONT)	High Speed portion of H-V diagram. Perform at least two landings; at maximum speed and zero altitude; and at V_{max} and minimum height for safe landing. Military Power in Climb. Perform at least one landing from minimum height for safe landing at V_{best} R/C. The maximum calibrated airspeed at ground contact shall not exceed 15 knots in zero wind. (d) Autorotation entry after failure of second engine from single engine flight - From steady state single engine level flight conditions, entry into steady state autorotation shall be demonstrated at minimum and maximum single engine airspeeds. In addition, entry into steady state autorotation while at single engine military power, in a climb at V_{BEST} R/C. All of these maneuvers shall be accomplished by abrupt closure of the throttle for the second engine, followed after a delay of one second, by the required movement of the longitudinal, lateral and directional controls, and after a total delay time of two seconds, the required movement of the collective pitch control. Recorded data shall include time histories of those parameters listed in (a). (e) Autorotative entry after simultaneous dual engine failure. From steady state level flight conditions, entry into steady state autorotation shall be demonstrated at speeds of zero, V_{cruise} and V_{max}. In addition, entry into steady state autorotations shall be demonstrated while at military power in a climb at V_{best} R/C. All of these maneuvers shall be accomplished by abrupt closure of both throttles simultaneously, followed, after a delay of two seconds by the required movement of all the controls. Recorded data shall include time histories of those parameters listed in (a). (f) Height-velocity diagrams for autorotative landings following simultaneous dual or second engine failure - From data obtained in (d) and (e) and other necessary data, supported by at least three landings initiated at three specific airspeeds following

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
p.	(Cont)	simulated simultaneous dual or second engine failure, curves of airspeed versus minimum altitude shall be constructed for a range of entry airspeeds between maximum rearward and forward speeds. Maneuvers and recorded data for (d) and (e) (entries into autorotation) shall be continued until the steady state autorotation speed is reached. Recorded data for autorotation landings shall include continuation of time histories as specified above for autorotation entry and also the following additional time histories: calibrated airspeed and ground speed at contact and landing load factor. The maximum calibrated airspeed at ground contact shall not exceed 15 knots in zero wind. (2) Single Engine Helicopters - For single engine helicopters at the highest allowable normal and maximum gross weight/outside air temperature combinations compatible with power available, demonstrate the following while at all times maintaining adequate control margin and control power about all axes: (a) Entry into autorotation - From steady state level flight conditions entry into steady state autorotation shall be demonstrated at speeds of zero, V_{cruise}, and V_{max}. In addition, entry into steady state autorotation while at military power in a steady state climb at V_{best} R/C shall be demonstrated. All of these maneuvers shall be accomplished by abrupt closure of the throttle, followed after a delay of two seconds by the required movement of all the controls. Recorded data shall include time histories of those parameters listed in (1) (a). It shall be shown that the control forces during transition to autorotative flight do not exceed the values specified in Table II of Spec. MIL-H-8501. (b) Engine failure Height-Velocity diagram - From the data obtained in (a) and other necessary data, and supported by demonstration of a sufficient number of landings following simulated power failures at various airspeeds, a curve of airspeed versus minimum altitude for safe landings shall be constructed for a range of entry airspeeds between the maximum rearward and forward speeds. This curve shall include landings initiated from steady state level flight and from military power while in climb.

TABLE 3- Flying Qualities (Cont)

TEST NO.	NAME	DESCRIPTION
p.	(Cont)	Recorded data shall include data required in (a) as well as calibrated airspeed and ground speed at contact and landing load factor. Maneuvers and recorded data for (a) (entries into autorotation) shall be continued until the steady state autorotation speed is reached. For the minimum height for safe landing H-V diagram the minimum number of landings shall be as follows: Steady State Level Flight. Low Speed portion of H-V diagram. Perform landings from minimum height for safe landing at maximum rearward speed, zero, and two points along the "knee" of the curve (30-40 knots range). The maximum calibrated airspeed at ground contact shall not exceed 15 knots in zero wind. High speed portion of H-V diagram. Perform at least two landings: at maximum speed at zero altitude; and, at V_{max} and minimum height for safe landing. Military Power in Climb. Perform at least one landing from minimum height for safe landing at V_{best} R/C. The maximum calibrated airspeed at ground contact shall not exceed 15 knots in zero wing.

TABLE 3 - FLYING QUALITIES (Cont)

TEST NO.	TEST NAME	DESCRIPTION
p.	(Cont)	(3) Turns in Autorotative Flight - In autorotative flight at a forward speed not greater than 30 knots and at maximum forward speed for autorotation, it shall be demonstrated that 360-degree turns to the right and to the left can be made. Recorded data shall include the rate of turn, control positions, and the altitude required for completion of the 360-degree turn. (4) Minimum and Maximum Autorotative Speeds - In addition to the demonstration of the best speed range for autorotative descent, the minimum and maximum autorotative descent speed shall be determined and demonstrated. Recorded data shall include rate of descent, airspeed, and control positions. (5) Altitude Changes with Loss of Power - It shall be demonstrated that a loss of power with collective control fixed does not produce pitch, roll, or yaw attitude changes in excess of 10 degrees in two seconds except that, at speeds below that for best climb, 20 degree yaw in two seconds is acceptable. (6) Forward Speed Autorotative Touchdown - It shall be demonstrated that in autorotation at a touch down speed of 35 knots ground speed on level paved surface, with sheel or skid gear it is possible to bring the helicopter to a stop within 200 feet.
q.	Power Boosted or Power Operated Control Characteristics	For helicopters equipped with power boosted or power operated controls, it shall be demonstrated that the following can be met: (1) In trimmed level flight at hover and V_{max} out-of-trim conditions resulting from abrupt power, operated-control system failure shall be such that: (a) With controls free for at least three seconds, the resulting rates of yaw, roll, and pitch shall not exceed 10 degrees per second, and the change in normal acceleration shall not exceed plus or minus one-half G.

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
q.	(Cont)	(b) It shall be possible to continue level flight with zero sideslip with forces to operate the controls not exceeding 80 pounds for the directional control, 25 pounds for the collective and longitudinal controls, and 15 pounds for lateral control. (2) With power-operated control system off, it shall be possible to trim steady longitudinal, lateral, and directional control forces to zero under all the conditions and speeds within the flight envelope. (3) With power-operated control system off, the collective-pitch control shall not tend to creep, whether or not cyclic or directional controls are moved. (4) With the helicopter trimmed in steady level, flight at 40 knots under power-operated-control systems-failure conditions, it shall be possible without re-trimming to make a normal landing approach and landing with control forces not exceeding the limits given in (1) (b). (5) Engine failure or electrical system failure, or both, shall not result in primary power-operated-control-system failure. (6) Power-operated-control-system failure shall not result in failure of the trim systems. (7) For helicopters having two or more completely independent power-operated-control systems, the requirements of (1) shall be met upon failure of one of the complete systems during the period of transfer from one system to another. With the remaining system or systems, (2) shall apply and the rates of control motion attainable shall be such that safe operation of the helicopter is in no way compromised, and shall in no case, be less than 50 percent of the normal rates. In such operations, including the approach and landing specified in (4), the control forces shall not exceed the limits given in (1)(b).

TABLE 3 - Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
q.	(Cont)	(8) For helicopters having two or more completely independent power-operated control systems, all boost systems shall be rendered inoperative, and the flight control capability of the helicopter shall be demonstrated. The extent to which the helicopter is upset following complete boost failure, the ease or difficulty of restoring the helicopter to normal flight attitude, the problems of control forces required to maintain level flight with zero sideslip and the technique required for safe landings shall be determined. These tests shall be performed to explore the hover and forward-flight speed regime to determine safe operating limits.
r.	Automatic Stabilization or Stability Augmentation Equipment Characteristics	For helicopters equipped with automatic stabilization or stability augmentation equipment, the following shall be demonstrated: (1) With the automatic stabilization and control or stability augmentation equipment or both engaged, and from steady level flight for a period greater than 30 seconds, out-of-trim condition resulting from abrupt complete disengagement or from abrupt complete failure of the equipment, shall be such that with control free for three seconds following the disengagement or failure, the resulting rates of yaw, roll, and pitch shall not exceed 10 degrees per second and the change in normal acceleration shall not exceed plus or minus one-half G. If multiple, completely independent auto-stabilization and control systems are employed, this capability shall be demonstrated upon failure of one system. (2) From steady flight at hover and V_{max}, all automatic stabilization equipment shall be disengaged and the flight control capabilities shall be demonstrated. The extent to which the helicopter is upset following complete stabilization failure, and the ease or difficulty of restoring the helicopter to normal flight attitude shall be determined.
s.	Vibration Characteristics	Throughout the design flight envelope, the helicopter shall be free of objectionable shake, vibration, or roughness. It shall be demonstrated that the requirements of MIL-H-8501 item 3.7 are complied with.

TABLE 3 - Flying Qualities (Cont)

TEST NO.	TEST NAME	DESCRIPTION
t.	Stall Characteristics and Flight Envelope	The retreating blade stall characteristics and the adequacy of the flight envelope shall be demonstrated: 1. Stall Characteristics and Recovery Procedures The stall characteristics and the recovery procedures shall be demonstrated at 5,000 feet and 10,000 feet for the normal gross weight. The parameters which are used to define stall shall be thoroughly explained prior to the demonstration. Recorded data shall include airspeed, altitude, load factors, control motions, control system loads, attitudes, and vibrations. 2. Flight Envelope Adequacy The flight envelope that is recommended for operational use shall be demonstrated for the normal and maximum gross weight at 2,000, 6,000 and 10,000 feet density altitude as follows: (a) fly to the limit of the envelope for 1g flight and make steady state 15° bank turns to the right and left for at least 180° of turn. (b) fly to the limit of the envelope for a 30° bank turn and make steady state 45° bank turns to the right and left for 180° of turn. Recorded data shall include airspeed, altitude, load factors, bank angles, temperature, control motions, and vibrations.

3.9 HYDRODYNAMIC DEMONSTRATION TESTS

3.9.1 HABITABILITY. - It shall be demonstrated that the helicopter is capable of remaining seaworthy for a period of at least two hours in two foot waves with engines inoperative. The status of airframe structure and water proofing for these tests shall be representative of the production configuration. Doors and ports shall be closed.

3.9.2 TAKEOFFS AND LANDINGS

3.9.2.1 WEIGHTS AND LOADINGS. - Weights for basic sheltered water operation shall be the maximum for which takeoff from sheltered Water is practicable.

3.9.2.2 CALM-WATER TAKEOFFS.

(1) Tests shall be made in calm water, sea state 0, to demonstrate freedom from objectionable porpoising.

(2) Tests shall be made in calm water to demonstrate adequate" controllability with acceptable control forces.

3.9.2.3 CALM-WATER LANDINGS. - Tests shall be made in calm water to demonstrate freedom from objectionable skipping and abrupt or uncontrollable changes in trim.

3.9.2.4 LATERAL-DIRECTIONAL STABILITY AND CONTROL. - Tests shall be made in calm water to demonstrate freedom from imdq.sate lateral or directional stability and control during takeoffs and landings.

3.9.2.5 LOW-SPEED MANEUVERING. - Tests shall be made in calm water to demonstrate capability to perform simple turns to right and to left at low speeds (simulating approach for water-rescue operations).

3.l0 POWER-PLANT DEMONSTRATION

3.10.1 GENERAL. - The following delineation of power plant demonsration requirements is not intended to mean that the power plant demonstration data should be obtained as a separate test from structural and aerodynamic demonstrations

3.10.1 (Cont)

but rather, that the data should be obtained during those demonstrations, if at all possible. Any tests or demonstrations completed and properly witnessed by a test authority (3.1.2) in accordance with, but prior to the scheduled demonstration, shall be included in reports submitted in compliance with 3.19.

3.10.1.1 DEFINITION OF POWER. - The term “power" as used in this section shall be interpreted as the paremeter on which engine performance is based as follows:

Engine	Power Parameter
Reciprocating	Brake horsepower
Turbo-Shaft	shaft horsepower plus thrust or equivalent shaft horsepower
combination of power plants	Use parameters of each applicable engine involved

3.10.1.2 FLIGHT RESTRICTIONS. - NOne of the following tests shall be construed to require operation of the helicopter under structural condition exceeding the structural demonSt-ration requirements as listed in 3.7.

3.10.2 Engine POWER (Output TESTS. - These tests are conduted to determine any power discrepancies and to provide accurate information on power output for a more accurate preliminary evaluation of the helicopter.

3.10.2.1 Reciprocating Engines. - The level flight critical altitude(s) for intermediate power and normal-rated power (normal only if no intermediate rating assigned) shall be determined. The altitudes for full throttle, minimum couplinjg slip or closed waste gate position, as applicable to the particular engine in question, shall be determined. In the event that the measured performance does not meet specified values, complete data shall be forwarded to NAVAIR for Comments. Altitude values shall be based on standard pressure altitude as defined in NASA Technical Report Number 1235.

3.10.2.2 TURBO-SHAFT. - The equivalent shaft horsepower developed by the engine in level flight at an altitude of approximately 5,000 feet shall be determined. This shall

3.10.2.2 (Cont)

be done without exceeding either intermediate-rated RPM (normal if not intermediate rating assigned) or top index temperature (that temperature, turbine inlet or tail pipe which, for applicable power and RPM, is the maximum permissible. The power shall be obtained by torque-meter readings. The thrust shall be determined by measurement of change in momentum of the air passing through the engine at the sametime. If either the measured brake horsepower or the thrust is more than five percent above or below the engine predicted per-formance charts, corrected for installation effects, instructions shall be requested from NAVAIR. Turbine inlet and/or tail pipe temperatures shall be measured as required. Provision for measuring turbine inlet temperature shall be furnished by the engine manu-facturer.

3.10.2.3 COMBINATION POWER PLANT - On helicopters where combination of any of the above listed engines are Installed, all engines shall satisfy the foregoing requirements that are applicable. The powers and/or thrust shall be determined on each type of engine in accordance with the procedures set forth for each applicable engine in the foregoing paragraphs.

3.10.3 INTERMEDIATE RUNS. - Maximum continuous power shall be used where no intermediate rating is assigned. These tests shall establish sufficient high power operating the on the engines to insure that no excessive power-plant deficiencies will occur and no unusual hazard will exist in operation of the helicopter during the evaluation and trials. Engine operating instructions as approved by NAVAIR shall be followed.

3.10.3.1 RECIPROCATING ENGINES. - A total of one hour of intermediate power operation in periods of not less than 15 minutes Shall be accumulated. The total operating time shall be approximately equally divided between each of the following:

(1) Level flight below 2,000 feet.

(2) Level flight at each critical altitude.

(3) Climb at airspeed for maximum rate Of climb.

If torque meters are installed, they shall be used for control purposes. In the event that engine manifold pressures required for the attainment of the specified torquemeter horsepowers are more than two inches Hg in excess of those indicated in the performance charts released by NAVAIR.

3.10.3.1 (Cont)

complete data shall be forwarded to NAVAIR for comment before exceeding the two inch Hg tolerance. In instances where automatic manifold pressure regulations or automatic power conditions are supplied, the established cockpit. control positions shall be used in lieu of torquemeter control. In the event that the nature of the controls is such that critical altitudes in the conventional sense are not obtained, or if the contractor is uncertain thereto, advice shall be obtained from NAVAIR. Data obtained during the above tests shall include the following, as applicable.

(4) Condition of loading.

(5) Fuel and oil on board at start Of flight.

(6) Weight at start of flight.

(7) Fuel and oil on board at end of flight.

(8) Kind of fuel and oil used.

(9) At five minute intervals during the run:

(a) Standard pressure altitude.
(b) Air temperature at the above altitude.
(c) Indicated airspeed.
(d) Engine RPM.
(e) Engine manifold pressure.
(f) Carburetor air pressure
(g) Oil temperature (inlet and outlet).
(h) Engine Cylinder temperatures (heads and bases).
(i) Fuel pressure.
(j) coolant temperature.
(k) Carburetor entrance pressure (static).
(l) Torquemeter pressure (if applicable).
(m) Fuel flow.

3.10.3.2 TURBO-SHAFT ENGINES. - A total Of one hour Of intermediate-power operation in periods of not less than 15 minutes shall be accumulated. The total operating time shall be approximately equally divided between each of the following:

(1) Hoveering or level flight below 2,000 feet.

(2) Hovering or level flight above 5,000 feet.

3.10.3.2 (Cont)

(3) Climb at airspeed for maximum rate of climb.

Data obtained during the test shall include the following, as applicable.

(4) Condition of loading.

(5) Weight at start of flight.

(6) Fuel and oil on board at start of flight.

(7) Fuel and oil on board at end of flight.

(8) Kind of fuel and oil used.

(9) At five minute intervals during the run:

(a) Standard pressure altitude.
(b) Air temperature at above altitude.
(c) Airspeed indicator reading.
(d) Engine RPM.
(e) Tail pipe total gas temperature.
(f) oil pressure.
(g) Oil inlet and outlet temperature across heat exchanger.
(h) Rear bearing temperature.
(i) Fuel manifold pressure.
(j) Fuel flow.
(k) Air flow.
(l) Tail pipe total pressure.
(m) Compressor inlet total temperature.
(n) Compressor inlet total pressure.
(0) Exhaust nozzle position.
(P) Torquemeter reading.
(q) Temperature of primary structural members subjected to temperatures greater than 200°F.
(r) Main fuel pump inlet pressure.
(s) Main fuel pump discharge pressure.
(t) Emergency fuel pump discharge pressure.
(u) Turbine inlet temperature.
(V) Compressor discharge pressure.
(w) Engine control lever position.
(x) Time.
(y) Engine installation vibration data.
(z) Fuel temperature (into engine)

3.10.3.3 COMBINATION OF POWER PLANTS. - On helicopters where combinations of any of the above listed engines are installed, all engines shall satisfy the foregoing requirements that are applicable. In instances where the foregoing Requirements specify different altitudes of operation for a particular combination of engines, it will be acceptable to accumulate the required time on the booster engine(s) at the altitude required for the main engine(s) for purposes or combining test programs. Individual test program and data for each applicable engine as listed in the foregoing paragraphs shall apply.

3.10.4 TRANSMISSION OPERATION TESTS. - The contractor shall submit a proposed test program for the demonstration of the power transmission system. This test program shall be subject to the approval of NAVAIR. The purpose of this test is to demonstrate that the power transmission system is safe and adequate for the completion of all demonstration requirement tests and Navy evaluation tests.

3.10.4.1 CONTROL LEVERS. - Control/condition/power levers shall be free from automatic slippage under vibration. Sensitivity of controls shall be such that easy and accurate adjustments can be made over the entire speed or power range.

3.10.5 GROUND TEsTs. - Data listed in the applicable Sub-paragraphs of 3.10.3 shall be recorded for these tests. The thrust available at idle RPM shall not cause objectionable taxi speeds.

3.10.5.1 STARTING CHARACTERISTICS. - The following starts shall be performed:

(1) Automatic. - Three starts in accordance with the engine manufacturer’s specified starting procedure. On multi-engine helicopters, a total of three starts per engine shall be made on one side only.

(2) Emergency. - If a manual (emergency) control system is provided on the engines two starts on this control in accordance with the engine manufacturer's specified proocedure. On multi-engine helicopters, a total of two starts on each engine shall be made on one side only.

3.10.5.1 (Cont)

Data at one-half second intervals shall be recorded for starting characteristics.

3.10.5.2 STEADY STATE CHARACTERISTICS. - TesSts with the following control lever settings on the primary control and on the manual (emergency) control, if provided, shall be performed:

(1) Reciprocating Engines.

(a) Idle
(b) 40 perCent intermediate power
(c) 60 percent intermediate power
(d) 80 percent intermediate power
(e) 100 percent intermediate power
(f) 100 percent intermediate power to maximum power, if applicable.

(2) Turbo-shaft Engines

(a) Idle
(b) 75 percent intermediate RPM
(d) 85 percent intermediate RPM
(d) 95 percent intermediate RPM
(e) 100 percent intermediate RPM
(f) 100 percent intermediate RPM to maximum power, if applicable.
(g) Minimum Booster Engine Power
(h) Maximum Booster Engine Power

Data shall be recorded at five-second intervals, on multi-engine helicopters, data required for one side only. Tests after reaching specified power ratings, at each control lever setting, shall be of four-minute duration. A minimum of five data points, or sufficient. data to show control system transients shall be reported for the first minute of each test after reaching specified power ratings.

3.10.5.3 ACCELERATION CHARACTERISTICS. - Slow, intermediate and snap accelerations and decelerations shall be performed over the following ranges with the primary control and the manual (emergency) control, if provided.

(1) Reciprocating Engines

(a) Idle to 60 percent intermediate power.

3.10.5.3 (Cont)

(b) 60 percent to 100 percent intermediate power.
(C) Idle to 100 percent intermediate power.

(2) Turbo-shaft Engines

(a) RPM for power approach to intermediate power.
(b) RPM for power approach to maximum power.
(C) Idle to 100 percent intermediate power.
(d) Idle to maximum power.
(e) Normal rated to intermediate power.
(f) Intermediate to maximum power.
(g) Minimum power to maximum power.
(h) Minimum booster engine power to maximum booster engine power.

On multi-engine helicopters, required for two engines on one side only. This test shall be performed by starting with slow acceleration and deceleration rates then increasing to an intermediate rate and finally increasing to a snap rate (idle to Intermediate throttle advancement time second). Snap rate need not be perfomed with the manual control in (d), (e), (f), and (h). Data shall be recorded at one fourth second intervals. A minimum of 10 data points; (or sufficient data to show control system transients) shall be reported for each acceleration and deceleration.

3.l0.5.4 NOISE LEVEL MEASUREMENTS (TURBO-SHAFT). - With all engines operating at intermediate ratings noise level measurements shall be taken on the ground on one side of the helicopter only, at 30° intervals on 25 foot and 5O foot radii, on lines originating at the aft-most portion of tail pipe(s). Instrumentation action shall be reported in the Instrumentation Report Item (1) of 3.2.

3.10.6 ENGINE CHARACTERISTICS AT VARYING POWER LEVER SETTINGS

3.10.6.1 ALTITUDE IDLE SCHEDULE AT LOW AIRSPEEDS. - A low speed descent from service ceiling to 2000 feet pressure altitude with power lever in idle position (flight idle for turbo-shaft engines) shall be performed.

3.10.7 ALTITUDE POWER CONTROL PERFORMANCE

3.10.7.1 ACCELERATIONS AND DECELERATIONS. - Perform slow, intermediate and snap accelerations and decelerations through the following ranges at 3000 and 8000 feet pressure altitude. Data shall be recorded at one-fourth-second-intervals.

(1) Idle to 60 percent intermediate power or thrust.

(2) Idle to 100 percent intermediate power or thrust.

(3) 60 percent to 100 percent intermediate power or thrust.

(4) A simulated wave-off shall be performed and recorded at

(a) A pressure altitude of 5000 feet, and
(b) A pressure altitude of 5000 feet, from power approach RPM to intermediate RPM.

A soak time of not less than one minute for reciprocating engines and 15 seconds for turbo-shaft engines at the point of accelerations shall precede the power lever movement. A minimum of 10 data points (or sufficient data to show control system transients) listed in the applicable sub-paragraphs Of 3.10.3, shall be reported on one engine only during each acceleration and deceleration.

3.10.7.2 EMERGENCY PROTECTION. - If a manual (emergency) control is provided, switchovers from primary control to manual control during normal rated thrust or power level flight runs at 10,000 feet altitude to service ceiling shall be performed (on one engine only on multiple engine aircraft).

3.10.7.3 OPERATION WITH MISSILE FIRING. - When applicable, engine operation during gun, guided missile, and rocket firing, shall be demonstrated in accordance with 3.11.3, 3.11.4, and 3.11.5.

3.10.7.4 INFRARED RADIATION. - The contractor shall arrange for infrared radiation measurement in flight of the helicopter engine combustion with the cognizant infrared measuring activity in sufficient time to permit scheduling of a government aircraft equipped for measuring of infrared. This measurement shall not interfere with the demonstration, but shall be scheduled when level flight demonstrations at optional altitude are scheduled. The results of the demonstrate ion shall be reported.

3.10.7.5 ANTI-ICING. - Demonstrate that the engine-airframe combination operates satisfactorily through all altitudes and Mach number ranges within the design envelope of the helicopter, without adverse effect from ice-ingestion. Demonstrate that the anti-icing system will anti-ice to the design parameters.

3.10.8 AIR STARTS. - Three satisfactory air starts on one engine shall be demonstrated at the maximum altitude as set forth in the engine model specification. If starts cannot be made at this altitude the maximum altitude at which satisfactory air starts can be made shall be determined. Air starts shall also be demonstrated with manual (emergency) controls, if provided.

3.10.9 FUEL DUMPING. - Operation in flight of fuel dumping arrangements shall be demonstrated in accordance with MIL-F-17874. Fluids other than fuel may be used.

3.10.10 FUEL VENTING. - The fuel vent system and impingement tests shall be demonstrated in accordance with Spec MIL-F-17874 for compliance with the design requirements of the detail specification. Fuel Tank Venting shall also be demonstrated for adequacy in accordance with Spec MIL-F-17874. Fluids other than fuel may be used. Tests shall be demonstrated under the following conditions:

(1) sideward flight, left and right
(2) Climb
(3) Hover
(4) Rearward flight
(5) Automation
(6) Level flight at V maximum
(7) Ground taxi

3.10.11 FLAME DAMPING. - Satisfactory flare damping shall be demonstrated in accordance with the procedure outlined in Spec MIL-D-6728. All phases of flame damping effectiveness shall be reported with particular emphasis on hazards of night landing approach and takeoffs both for land and for aircraft carriers.

3.10.12 ROTOR BRAKES. - Rotor brakes shall be demonstrated to show compliance with contract requirements.

3.10.13 FUELING AND DEFUELING. - Fueling and defueling tests shall be conducted to determine compliance with the design requirements of the Detail Specification and of Spec MIL-F-17874.

3.10.14 ENGINE FUEL FEED. - Tests shall be conducted on the engine fuel feed system to determine compliance with the recuirements of Spec MIL-F-17874.

3.11 ARMAMENT DEMONSTRATION

3.11.1 GENERAL. - Firing of guns, launching of rockets or guided missiles, and/or dropping of stores shall not cause either the helicopter structure or stores that are retained to be damaged by blast of by debris such as links, casings, "pig-tail", or diaphragms. The time required to rearm shall be within the time specified in the detail specification or the applicable portions of the following specifications: MIL-A-8591, MIL-I-8670, MIL-I-8671, MIL-I-8672, MIL-I-8673, MIL-I-8675, and MIL-I-8677. Any tests or demonstrations completed and properly witnessed by a test authority (see 3.1.2) in accordance with, but prior to, the scheduled point of demonstration, shall be reported in reports submitted in compliance with 3.19.

3.11.2 ARMAMENT INSTALLATION. - All applicable armament demonstrations specified herein shall be performed unless reference can be made to an identical titillation which has been satisfactorily demonstrated by the contractor on a previous model. Also, any armament installation which represents a departure from existing design, that is, which embodies major features not used in at least one previous armament installation in a naval helicopter shall be satisfactorily demonstrated in flight.

3.11.3 GUNS

3.11.3.1 ATTACK, PATROL AND TRAINER HELICOPTERS. - The satisfactory operation of gun installations including accessories and directly associated equipment, shall be demonstrated. This demonstration shall include simulated operation, rearming, boresighting, and maintenance on the ground, and actual operation in the air. The ground demonstration shall further include ground firing for dispersion characteristics. Satisfactory air operation of the gun installation shall consist of firing two complete loads of ammunition in bursts of not less than 100 rounds or six seconds (whichever takes longer) from each gun, with all guns firing simultaneously, with three seconds maximum internal between bursts. In no case shall the burst exceed one normal load of ammunition per gun. Firing shall be performed under the following conditions.

(1) Altitude: The helicopter shall be flown through the following altitude cycle prior to firing:

3.11.3.1 (Cont)

(a) Climb to within 2000 feet of the design service ceiling (intermediate power) and remain at this altitude not less than five minutes.

(b) Descend to any altitude under 1000 feet and remain at this altitude not less than five minutes.

(c) Climb to within 2000 feet design service ceiling (intermediate power) and remain at this altitude for not less than 10 minutes and then commence firing.

(2) Speed: The first load shall be fired at a minimum stabilized level airspeed. The second load shall be fired Guning indicated airspeed within 0.8 V_{max} to V_{max}.

(3) Load Factor: The first load shall be fired at a normal load factor of me. The second load shall be fired at a normal load factor of $0.9n_z$ or 0.9 maximum safe load factor at the specified altitude.

(4) Gun gas concentration: At no time during the firing demonstration shall the gun gas concentration anywhere in the helicopter except in the blast tubes and the immediate ViCinity of the breech and vent plug, exceed 90 percent of the lower explosive limit as indicated on equipment approved by NAVAIR.

(5) Equipment operation: All applicable sighting equipment and radar Control equipment shall be operating satisfactorily throughout the firing demonstration.

(6) Engine operation: At no time during the firing demonstration shall the tail pipe temperature rise over the allowable transient over-temperature conditions specified by the engine manufacturer and indicated on appropriate aircraft instruments; and there shall be no evidence of compressor stall or engine flame-out, nor shall there be evidence of aircraft stability degradation demonstrated in accordance with 3.8.2.

3.11.3.1 (Cont)

(7) Airframe Drain and Vent EXits: At no time during the firing demonstration shall the airframe fuel, air or engine drains or vent exits be adversely affected by the operation of the guns.

3.11.4 ROCKETS. - The satisfactory operation of rocket installations shall be demonstrated. This demonstration shall included simulated operation, rearming, boresighting, and maintenance on the ground, and actual operation in the air. At no time during the rocket firing demonstration shall the tail pipe temperature rise over the allowable transient over-temperature conditions specified by the engine manufacturer and there shall be no evidenee of compressor stall or engine flame-out, nor shall there be evidence of aircraft stability or control degradation demonstrated in accordance with 3.8.2. Adequate air operation of air-to-air and air-to-ground rockets Shall consist of firing two complete loads of inert warhead rockets of each type required under the following conditions:

3.1l.4.1 AIR-TO-AIR ROCKETS

(1) Altitude: The helicopter shall be flown through the following altitude cycle prior to firing:

(a) Climb to within 2000 feet of the design service ceiling (intermediate power) and remain at this altitude not less than five minutes.

(b) Descend to any altitude under 7000 feet and remain at this altitude not less than five minutes.

(c) Climb to within 2000 feet of highest service ceiling and remain at this altitude for 10 minutes and then commence firing. The 10 minute dwell at altitude my be curtailed as necessary contingent on the amount of fuel available. (Highest service ceiling is defined as that ceiling obtained with the use of power augmentation when available.)

(2) Rocket gas: At no time during the required firing shall the rocket gas concentration exceed 90 percent of the lower explosive limit anywhere in the helicopter as indicated on equipment approved by NAVAIR. The rocket exhaust gas shall not impinge on any structural member. If this is impracticable, protection as necessary shall be provided, subject to NAVAIR approval.

3.11.4.1 (Cont)

(3) Equipment Operation: All applicable sighting equipment and radar control equipment shall be operating satisfactorily throughout the firing demonstration.

(4) Airframe Drain and Vent Exits: At no time during the required firing shall rocket exhaust impinge, enter, or adversely affect air fuel, or engine drains or vent exits.

3.11.4.2 AIR-TO-GROUND ROCKETS

(1) Altitude: The helicopter shall be flown through the following altitude cycle prior to firing:

(a) Climb to within 2000 feet of the design service ceiling (intermediate power) and remain at this altitude not less than five minutes.

(b) Descend to any altitude under moo feet and remain at this altitude not less than five minutes.

(c) Climb to within 2000 feet at design service ceiling (intermediate power) and remain at this altitude for not less than 15 minutes.

(d) Descend to within ground target range and then commence firing.

(2) Speed: the restrict shall be fired at a maximum stabilized level flight airspeed.

(3) Load factor: The first load shall be fired at a normal load factor of one "G". The second load shall be fired at a normal load factor of $0.9n_z$ or 0.9 maximum safe load factor at the specified altitude.

(4) Rocket gas: At no time during the required firing shall the rocket gas concentration exceed 90 percent of the lower explosive limit anywhere in the helicopter as indicated on equipment by NAVAIR. The rocket exhaust gas shall not impinge on any structural

3.11.4.2 (Cont)

member. If this is impractical, protection as necessary, shall be provided, subject to NAVAIR approval.

(5) Equipment operation: All applicable sighting equipment and radar control equipment shall be operating satisfactorily throughout the firing demonstration.

3.11.5 GUIDED MISSILES. - The satisfactory operation of the specified guided missile installation shall be demonstrated. This demonstration shall include loading, unloading, boresighting, maintenance, and all the necessary system preflight checks as well as actual operation in the air. Adequate air operation shall consist of launching two loads of specified missiles in such a manner that the missiles are not subjected to forces beyond those specified for the missile, and that the missiles are launched in the attitude and at the required altitude necessary for performance of their mission. Live missles less warhead shall be used in the demonstration, except that for demonstrations of jettisoning and safety of separation, inert missiles my be used. The exact configuration of the missiles (including warhead, telemetry, motor, etc.) shall be as specified in the addendum to this specification or as agreed upon between the contractor and NAVAIR. The first load shall be fired during indicated airspeed to V_{max}. Additional missile launchings to cover conditions found to be most critical the contractor's analysis may be required. Jetti soning shall also be demonstrated under conditions consistent with the class and mission of the helicopter. At no time during the missile firirg demonstration shall the tail pipe temperature rise over the allowable transient over-temperature conditions specified by the engine manufacturer, there shall be no evidence of compresssor stall or engine flame-out, shall there be any evidence of stability or control degradation demonstrated in accordance with 3.8.2.

3.11.6 DROPPABLE STORES

3.11.6.1 CONVENTIONAL STORES. - The satisfactory operation of applicable conventional store installations and release equipment associated therewith shall be demonstrated. Conventional stems include bombs, mines, torpedoes, flares, floatlights, sonobuoys, searchlights, fuel tanks, etc. This demonstration shall include loading, unloading within the time specified, and maintenance procedures as well as checking out the control and monitor

3.11.6.1 (Cont)

circuits on the ground and in the air for all delivery modes. Adequate air operation of conventional stores shall consist of dropping of one complete load of the stores specified in (7) below, under the following coalitions.

(1) Separation: Positive separation shall occur immediately upon actuation of the release system with no interference between the released store(s) and any part of the helicopter and adjacent stores, and with no damage to the released store or to the helicopter. The attitude of store (s) during separation shall be such that each store can perform its intended function and that it shall not hinder the pilot in the performance of appropriate escape maneuvers for the type of delivery performed.

(2) Release control: Both primary and emergency method of store release shall be demonstrated.

(3) (3) Structural integrity: No loss of the store, no evidence of deterioration, nor damage to the helicopter structure, adjacent stores or the store itself shall occur within the specified flight conditions.

(4) (4) Speed: The release of stores shall be demonstrated at the applicable maximumpermissible speed for the helicopter, or for the store, (whichever is less). The aximum release speed shall be reported.

(5) Altitude: For stores capable or being dropped from high altitudes, the release shall be accomplished at 2000 feet below the service ceiling after remaining at this altitude for 30 minutes. For other droppable stores (torpedoes, mines, flares, etc) the release shall be made at appropriate altitude below 3000 feet. The demonstration shall include store separations at the most critical air speed and load factor combination of the specified flight envelope of the helicopter store combination.

3.11.6.1 (Cont)

(6) Release tactics: A tactical release shall be demonstrated for each of the delivery modes planned for the individual helicopter. The flight tactics to be utilized for release of the various types of specified stores shall be in conformance with the mission and bomb control equipment of the individual helicopter. When specific tactics are not applicable sufficient releases may be required under varied conditions to afford an envelope of conditions of satisfactory release.

(7) Type of stores: One load each, unless otherwise stated in the addendum to this specification, consisting of heaviest, intermediate weight and lightest weight stores of a particular type shall be dropped for each demonstration of release tactics and bomb control equipment. Only inert stores shall be used.

(8) Helicopter guidance and stem release system: Satisfactory operation of the helicopter guidance and the store release system shall be demonstrated to the extent that the accuracy of' the store drop be within the limits specified in the contract and related specifications.

3.11.6.2 NUCLEAR WEAPONS . - Satisfactory operation of nucle-stem installations, including missiles with nuclear warheads, and the suspension and release equipment associated therewith shall be demonstrated as specified in the. addendum to this specification. The tests shall be performed in accordance with the applicable requirements of 3.11.5 and 3.11.6.1. Tests of nuclear weapons in addition to those specified in the addendum to this specification, and which are recommended by the Naval Air Special Weapons Facility, shall also be performed as approved by NAVAIR.

3.11.7 ARMMENT CONTROL. - Satisfactory operation of the armament control installations shall be demonstrated. The demonstrate ion shall include simulated operational checks and accessibility for servicing and removal, and including boresighting. Satisfactory air operation of armament controls shall be demonstrated in conjunction with applicable helicopter weapon demonstrations. The Airborne Monitor and Control System as applicable to Nuclear Weapons shall be installed with appropriate system resistance and power requirements as specified in the detail specification.

3.11.7.1 ACCURACY. - The contractor shall demonstrate satisfactory accuracy by expending specified ordnance at a suitable target or by use or release-point-in-space technique as required, using the installed helicopter weapons control system. The Armament Section of the Demonstration Addendum to this specification will specify the accuracy required for the particular helicopter involved. The method used to determine accuracy shall be acceptable to the test authority.

3.11.8 MISCELLANEOUS. - The satisfactory operation of miscellaneous armament installations shall be demonstrated. These miscellaneous installations include the following: armor, smoke screen equipment, target towing gear, chemical dispersal gear, magnetic airborne detection gear, etc. Installation and removal of special field conversion kits shall also be demonstrated as applicable. Any demonstrations completed and properly witnessed by a test authority (See 3.1.2) in accordance with, but prior to, the scheduled point of demonstration shall be included in reports submitted in compliance with 3.19.

3.12 EQUIPMENT DEMONSTRATUION REQUIREMENTS

3.12.1 GENERAL. - All specified equipment actually installed in, or specifically required for demonstration helicopters, shall be satisfactorily demonstrated on the ground or in flight as applicable, however, any demonstrations completed and properly witnessed by the test authority (3.1.2) in accordance with but prior to the scheduled point of demonstration shall be included in reports submitted in compliance with 3.19. Any request for specification deviations shall be made by the contractor prior to the completion of the pertinent flight test program

3.12.2 COCKPIT AND CABIN CONDITIONING

3.12.2.1 CONTAMINATION. - Ground and flight tests shall be performed to demonstrate the maximum permissible concentrate ion of any contaminant such as carbon monoxide, fuel vapor, gaseous products of combustion, oil mists, etc. The limits for carbon monoxide are specified in MIL-STD-800. The limits for concentration of fuel vapors are specified in MIL-H-18325. The limits for any other contaminant which causes a perceptible odor or irritation or interferes with risibility are specified in Spec MIL-P-18927.

3.12.2.2 AIR CONDITIONING. - Cockpit and cabin heating, ventilating and defogging shall be demonstrated to show compliance with Spec MIL-H-18325. The test procedure shall be as specified in Spec MIL-T-18606.

3.12.2.3 OXYGEN EQUIPMENT. - With the applicable oxygen system, gaseous or liquid filled to normal capacity, and with full operating equipment aboard, the helicopter shall be flown at the minimum and maximum operational altitudes at which oxygen is required. Under simulated tactical conditions at those altitudes, the oxygen system shall be evaluated to determine proper functioning in accordance with Spec MIL-I-8683, and also to determine adequate freedom of movement for performance of required duties.

3.12.2.4 ANTI-EXPOSURE SUIT SYSTEM. - When applicable, the anti-exposure suit air conditioning system shall be demonstrated to met the requirements of Spec MIL-E-18927. Maximum air flow at the specified differential pressure shall be measured in flight at altitudes from sea level to service ceiling of the helicopter and at engine power settings from idle to maximum cruise power. Maximum range of temperature control of the air delivered to the suit shall be evaluated. Operation of the flow control shall be assessed from the standpoint of convenience. With the appropriate member(s) and of the crew wearing anti-exposure suit(s) and necessary control system and equipment, the system shall be demonstrated to provide the required amount of ventilation pressurization air for both inflight and ground operating conditions. Servicing of the helicopter while on the ground in a ready condition, shall be demonstrated, when applicable.

3.12.2.5 ACOUSTICAL NOISE LEVEL. - It shall be demonstrated that the acoustical noise level in occupied spaces does not exceed the maximum allowable values listed in Spec MIL-A-8806. The entrance doors and cockpit enclosure movable sections shall be closed during the survey. Corrective action shall be taken by the contractor in cases where noise levels exceed allowable specification limits.

3.12.3 FIRE WARNING SYSTEM. - Ground and flight operation of the forewarning system shall be demonstrated to show compliance with Spec. MIL-F-7872 or Spec. MIL-F-23447, as applicable.

3.12.4 HYDRAULIC AND PNEUMATIC SYSTEMS. - Operation of all hydraulic and pneumatic system installations in the helicopter shall be demonstrated in accordance with Spec MIL-T-5522.

3.12.4.1 HYDRAULIC AND PNEUMATIC EXTERNAL POWER CONNECTIONS. - The accessibility and suitability of external hydraulic and pneumatic power connections shall be demonstrated.

3.12.5 ANTI-ICING SYSTEMS. - Anti-icing systems shall be demonstrated to show satisfactory operation in accordance with contract requirements.

3.12.5.1 THERMAL. - The system shall be demonstrated to show compliance with Spec MIL-T-18607.

3.12.5.2 PNEUMATIC. - The system shall be demonstrated to show compliance with Spec MIL-D-8804.

3.12.6 EXTERNAL MOVABLE EQUIPMENT. - Satisfactory operation of all movable external equipment items shall. be demonstrated at the design limits required for the operation of such items The time required for operation shall be reported.

3.12.7 LANDING GEAR SYSTEM

3.12.7.1 RETRACTION AND EXTENSION. - The following operations of the landing gear shall be satisfactorily demonstrated as applicable:

(1) Retracted and locked within time specified after takeoff.

(2) Extended and locked at 50% V_L.

(3) Emergency extension system in autorotative Condition Within 1000 feet of altitiude.

3.12.7.2 BRAKES. - Wheel brakes shall be demonstrated to show compliance with contract requirements.

3.12.8 ACCESSORY EQUIPMENT. - Satisfactory operation of all accessories aboard or required shall be demonstrated.

3.12.8.1 WINCHES/HOISTS. - Winches/hoists Shall be operated through at least six cycles at their maximum rated capacity. The operation of installed remote controls shall be satisfactorily demonstrated.

3.12.8.2 CARGO CARRYING AND HANDLING. - All cargo carrying, handling, and securing equipment shall be satisfactorily demonstrated to their respective rated capacities.

3.12.8.3 SECURING AND TOWING.- Securing and towing provisions shall be satisfactorily demonstrated at the direction of the NAVPRO.

3.12.8.4 EXTERNAL CARGO HOOK. - Satisfactory operation of the external cargo hook and remote controls shall be demonstrated at the direction of the NAVPRO.

3.12.9 EXTERNAL AUXILIARY FUEL TANKS. - Jettisioning of external auxiliary fuel tanks shall be demonstrated in the full, most critical partial full, and empty conditions with the helicopter in the primary external fuel tanks configuration. Unless otherwise specified, it shall be demonstrated that the tanks can be jettisoned at the following flight conditions:

(1) level flight; speed equal to 0.9 maximum forward carriage airspeed for aircraft/combination.

(2) conditions simulating autorotative flight.

(3) for multi-engine helicopters; flight conditions simulating a single engine failure.

The addition of other external stores to the helicopter may require additional jettison tests of the external fuel tanks. It shall be demonstrated that the tank will not hang up on the helicopter and the helicopter or adjacent stores will not be damaged. Liquids other than fuel may be used in fuel tanks for these tests.

3.12.10 PARACHUTE SURVIVAL EQUIPMENT ASSEMBLY. - It shall be demonstrated that adequate stowage previsions are made in seats or other accessible spaces for all required parachutes, para-rafts or other survival kits. Both ground and appropriate inflight demonstrations shall show that such stowage precludes loss or dislocation of equipment, does not interfere with flight operations, and facilitates utilization of equipment in emergencies. This demonstration shall include appropriate egress during simulated ditching and bailout conditions.

3.12.11 ESCAPE HATCHES. - A ground demonstration shall be made to show the ease with which escape hatches may be opened and to show the accessibility and adequacy of the opening to escaping personnel wearing apparel planned for use in the helicopter when in service.

3.12.12 HUMAN ENGINEERING, COCKPIT AND ESCAPE SYSTEM DESIGN. -

(1) In conducting the demonstrations under this paragraph, the sizes of personnel used shall include extremes at the upper and lower limits of the appropriate anthropmetric parameters specified in this and all other applicable documents. Anthropometric limits shall be the 3rd through 98th percentile man in accordance with NAEC-ACEL Report No. 533. The body dimensions of the pilots used shall be included in the test reports and shall include the following parameters:

3.12.12 (Cont)

(a) Stature
(b) Weight
(c) Sitting Height
(d) Eye Height Sitting
(e) Bideltoid Diameter
(f) Functional Reach
(g) Forearm Hand Length
(h) Elbow Rest Height
(i) Buttock-Knee Length
(j) Waist Circumference
(k) Buttock Circumference
(l) Shoulder Circumference
(m) Chest Depth
(n) Knee Height Sitting
(o) Hip Breadth Sitting
(p) Head Height

(2) The contractor shall demonstrated, or shall have demonstrated, that the aircraft meets the following requirements as applicable to the particulary aircrft:

All crew station seat arrangement, seat adjustment, plugs and connections shall be compatible with all services personnel flight equipment (including parachutes, anti-exposure suit, survival vest, floatation garment, body armor, etc.) planned for van in the aircraft when in actual service.

Aircrew station displays, dimensions, geometry, and location actumtion, and and accuracy of operating all controls essential to flight operations shall be is accordance with MIL-STD-250 and MS335575.

External visibility from the design are position shall conform to MIL-STD-850.

Emergency Escape. (See paragraphy 3.12.11).

3.12.13 ANTI-FOGGING AND RAIN REMOVAL SYSTEMS.- The systems shall be demonstrated to show satisfactory operation in accordance with contract requirements and to show compliance with Spec MIL-T-5842.

3.12.14 AUTOMATIC BLADE FOLDING. - The contractor shall demonstrate that it is possible to fold as well as unfold the blades in winds up to 45 knots, from any direction, in less than 30 seconds without supplimentary assistance.

3.13 ELECTRICAL DEMONSTRATION

3.13.1 GENERAL. - All applicable electrical demonstrations shall be performed by the contractor. Any demonstrations completed and properly attested by a test authority in accordance with, but prior to the scheduled point of demonstration, shall be included in reports submitted in compliance with 3.19.2.12.

3.13.2 PERFORMANCE. - The contractor shall demonstrate the performance of the complete electrical system. The demonstration, consisting of flight and ground tests, shall be adequate to determine the capability of the system to perform adequately the functions directed by the required missions of the helicopter. The contractor shall include a demonstration of the accessibility of units for test, adjustment, removal and handling for servicing. It shall be demonstrated that the installation meets the requirements of Spec MIL-E-7080 and MIL-W-5088.

3.13.2.1 TEMPERATURE. - The contractor shall demonstrate that the operating temperatures of all electrical power and conversion equipments are within the specification design limitations of this equipment as demonstrated in the qualification of the equipment. Operating temperatures shall be determined in the full rated output of the equipment or with loads which the contractor is applying to the equipment, whichever temperature is greater.

3.13.2.2 PRIME MOVER CAPACITY. - The contractor shall demonstrate that the prime mover has adequate capacity to maintain rated generator loads and overloads to specified limits of the applicable specifications.

3.13.2.3 POWER. - The generation and conversion of adequate electric power, or adequate electric power plus the excess power based upon the preliminary load analysis, whichever is greater, shall be demonstrated. The contractor shall also demonstrate that electric power at the terminals of bad equipment conforms to MIL-STD-704 by recording power characteristics at the terminals of at least ten representative load equipments. The above shall be demonstrated throughout the ground and inflight rotor RPM range and at maximum autorotative rotor RPM.

3.13.2.4 EMERGENCY POWER. - The contractor shall demonstrate that the emergency power available, and the alternate and emergency electrical circuits are adquate and satisfactory under all flight conditions of the helicopter. This demonstration shall include performance for voltage regulation, frequency regulation, and

3.12.2.4 (Cont)

wave form of the AC system and voltage regulation and ripple voltage content for the DC system.

3.13.2.5 PROTECTION. - The contractor shall demonstrate satisfactory performance of the fault protection system and detection equipment under all conditions.

3.13.2.6 VIBRATIONAL ENVIRONMENT. - The generator vibration environment, both frequency and amplitude, on the three major axes shall be recorded. The vibration pickups shall be installed on the generators as far from the generator mounting pad as practical. The weight of the pickups shall not exceed one percent of the generator weight.

3.13.2.7 LIGHTING. - The contractor shall demonstrate the interior and exterior lighting systems to show compliance with Spec MIL-L-18276 or Spec MIL-L-006730 as applicable.

3.14 AVIONICS DEMONSTRATION TESTS

3.14.1 PERFORMANCE. - The contractor shall demonstrate the performance of the complete avionics installation. The demonstration, consisting of flight and ground tests, shall determine the capability of the system to perform the functions dictated by the required missions of the helicopter. The avionics demonstration shall include a simulated operation evaluation using special test equipment as required and a demonstration of the accessibility or units for test, adjustment, removal and handling for servicing. The contractor shall combine as many avionics equipment test procedures as possible into a single flight operation in the interest of economy. The contractor shall demonstrate the compatability of operation of all flight and weapons system controls while wearing full flight equipment planned for use in the aircraft. The following characteristics and equipment shall be demonstrated in accordance with the missions enumerated in the addenda to this specification.

3.14.1.1 INTERFERENCE. - The contractor shall demonstrate that the electrical and electronic systems of the helicopter meet the requirements of Spec MIL-T-6051. Upon completion of the general acceptance evaluation, the helicopter shall be test flown at an altitude and airspeed commensurate with its mission capability, and all interferences noted during the ground evaluation shall be corrected prior to flight test. Any changes in the intensity of interference between the two tests shall be reported.

3.14.1.2 INTERCOMMUNICATION SYSTEM. - The contractor shall demonstrate that the intercommunication system meets the requirements of all applicable specifications, and performs satisfactorily over the entire mission capability of the helicopter.

3.14.1.3 TEMPERATURE AND VIBRATION. - The contractor shall demonstrate that the ambient temperature and vibration requirements in all compartments containing or with previsions to contain electronic equipment, do not exceed values specified in the specification requirements stated in the procurement documents for the individual equipment items. When not otherwise specified, the limits defined in Spec MIL-E-5400 shall apply.

3.14.1.3.2 (CONDENSATION. - The contractor shall demonstrate that air ducts to equipment are free of moisture after flights so that the proper operation of water separation, etc. is indicated. Any free mositure found inside equipment whether forced air cooled or not shall be reported. Equipment failures, either permanent or temporary in nature, resulting from moisture or high humidity shall be investigated and reported.

3.14.1.4 ANTENNAS. - The contractor shall demonstrate that the antennas as installed on the helicopter meet the requirements of Spec MIL-STD-877, and the specifications for the individual electronic equipment. The results of laboratory tests on mock-up and scale model radiation measurements shall be furnished for approval of the basic antenna design as early as possible. Flight demonstrations to substantiate model radiation patterns and other laboratory results shall be performed under conditions designed to prove the capability of the electronics system to fulfill the requirements of the helicopter mission. The demonstration shall show that:

(1) The azimuth and elevation coverage of antennas of the various configurations of the helicopter at the required frequencies, is satisfactory in accordance with the laboratory results.

(2) The gain of the antennas, with reference to the isotropic radiator, is adequate for accomplishment of the mission.

(3) Isolation between antennas and between electronics systems using a common antenna is such that no significant or unreasonable impairment of the operation of either system results.

3.14.1.4 (Cont)

(4) The mechanical operation of rotatable and other antennas having roving parts, and antennas with other controllable features, provides satisfactory operation and coverage.

3.14.1.5 NAVIGATION EQUIPMENT. - The contractor shall demonstrate that the installation and performance of the navigation equipment conform with applicable test specifications listed in the detail specification. The contractor shall further demonstrate satisfactory performance of the navigation equipment within the accuracies required by the mission of the helicopter, as well as satisfactory system integration, overall compatibility and indicator display under operational conditions. The accessibility of the navigational equipments for maintenance and field testing, as well as satisfactory maintenance techniques including "go" and "no go" type preflight performance checking, shall also be demonstrated.

3.14.1.6 IDENTIFICATION EQUIPMENT. - The contractor shall demonstrate that the operation of the identification equipment, including transponders, interrogator-responsors, coders, and decoders meets the requirements of the applicable specifications, and, that within the designed mission of the helicopter, the operation is satisfactory.

3.14.1.7 COMMUNICATIONS EQUIPMENT. - The contractor shall demonstrate that the installation and the performance of the communications equipment in accordance with applicable specifications. The contractor shall further demonstrate that the installed communication equipment and its performance are adequate for the accomplishment of the design missions of the helicopter, Accessibility of the communication controls for operation and readout, and the accessibility of the communications equipment for maintenance and field testing, as well as satisfactory maintenance technique including pre-flight "go" and “no go” performance testing, shall also be demonstrated.

3.14.1.8 RADAR AND INFRARED EQUIPMENTS. - The contractor shall demonstrate that the operation of all radar and/or infrared equipment is in accordance with applicable specifications. All radiation tests shall be conducted at properly instrumented facilities for control of position and flight path, in addition to electrical measurements. The contractor shall include,

3.14.1.8 (Cont)

within the designed mission of the helicopter, demonstration of satisfactory performance of all equipments in the following area:

(1) Detection and lock-on ranges, mapping capabilities acquisition features, and tracking methods employed at service altitude and at the lowest practicable altitude.

(2) Antenna stabilization in pitch, roll, and yaw to prescribed limits compared to an appropriate reference.

(3) Flight control and/or guidance integration.

(4) Accessory integration and compatibility.

(5) Countermeasures vulnerability.

(6) Antenna pattern coverage in the proper polarization field and the cross polarization field.

(7) Indicator display in the search and lock-on mode under all ambient light levels and flight tactics within the specified performance envelope.

(8) Dot flyability and snap-up features, if any.

(9) Counter-countermeasures-procedure and circuitry.

3.14.1.9 COUNTEMEASURES. - The contractor shall demonstrate that the operation of all countermeasures equipment is in accordance with the applicable specification. The contractor shall include, within the designed mission of the helicopter, demonstration of satisfactory performance of all equipments in the following areas where appropriate:

(1) Frequency spectrum coverage, including facilities for changing antennas and tuners.

(2) Detection ranges, azimuth coverages, and cross-over points.

(3) Analysis of signal characteristics, i.e. - pulse rate frequency, wave form, etc.

3.14.1.9 (Cont)

(4) Accuracy of bearing indication for direction finding, homing and localization of signal sources.

(5) Recording of signals and other required data for post flight analysis.

(6) Effectiveness of electronic jamming in the various modes and types of modulation.

(7) Mechanical dispersal of countermeasures confusion reflectors at required speeds and altitudes of the helicopter.

3.14.1.10 ASW EQUIPMENTS -The contractor shall demonstrate that the operation of the ASW equipment is in accordance with the applicable specifications. The contractor shall include, within the designed mission of the helicopter, demonstration of satisfactory performance in the areas of detection, classification and localization as applicable, to include the following:

(1) Detection ranges, mapping, navigation, and applicable acquisition features and tracking methods.

(2) Antenna stabilization characteristics in pitch, ro11, and yaw.

(3) System integration, conducted and radiant interference, and overall compatibility.

(4) Indicator displays in an operational environment.

3.14.1.11 RADIO RELAY REQUIREMENT. -The contractor shall demonstrate that the operation of the radio relay equipment is in accordance with the applicable specifications. The conttractor shall demonstrate satisfactory performance compatible with the designed mission of the helicopter. The equipment shall be capable of receiving and transmitting information at the required signal strengths. It shall provide the required data handling capabilities. The turn-around time shall be within specified limits. The specified modulation characteristics shall be obtained. Speech processing shall be provided as required. Relay squelch change control shall be provided as specified.

3.14.1.12 INDICATING EQUIPMENT. -The contractor shall demonstrate that the operation of all indicator equipment is in accordance with applicable specifications and that the operation is satisfactory.

3.14.2 INSTRUMENTS

3.14.2.1 PITOT AND PITOT STATIC SYSTEMS (ALTIMETER AND AIRSPEED INDICATOR). - The system shall be demonstrated to show compliance with Spec MIL-I-5072 or MIL-I-6115 as applicable.

3.14.2.2 AUTOMATIC PILOT. - The automatic pilot shall be demonstrated to show compliance with Spec MIL-C-18244.

3.14.2.3 FUEL QUANTITY GAGE SYSTEMS. - The system shall be demonstrated to show compliance with Spec MIL-C-7940.

3.14.2.4 COMPASS SYSTEMS. - The system shall be demonstrated to show compliance with Spec MIL-C-7188 and Spec MIL-C-7762.

3.14.2.5 ATTITUDE INDICATING SYSTEMS (REMOTE). - The system shall be demonstrated to show compliance with applicable contract requirements.

3.14.2.6 ENGINE POWER PARAMETER SYSTEMS. - The system shall be demonstrated to show compliance with applicable contract requirements.

3.14.2.7 PERFORMANCE. - The contractor shall demonstrate satisfactory operation of all flight and engine instruments in accordance with applicable specifications or procedure approved by NAVAIR.

3.14.2.8 ENGINE AND FLIGHT INSTRUMENT TRANSMITTER MOUNTINGS, TEMPERATURE AND VIBRATION LIMIT TESTS. - The airplane contractor shall perform flight and ground tests to demonstrate that the mounting provisions made for engine and flight instrument transmitters do not exceed the specified temperature and vibration limits of the transmitter.

3.15 SHIPBOARD SUITABLITY DEMONSTRATION REQUIREMENTS

3.15.1 GENERAL. - Shipboard suitability demonstration tests stall be performed by COMNAVAIRTESTCEN to show that the helicopter can meet shipboard suitability contract guarantees. The Government will furnish the facilities required for the demonstration, and will retain full control of the facilities during these tests.

3.16 PHOTOGRAPHIC DEMONSTRATION REQUIREMENTS

3.16.1 GENERAL. - The photographic equipment listed for installation and operation in the detail specification shall be demonstrated at altitudes and power settings specified in the addendum to this specification.

3.16.2 GROUND CHECK. - All the cameras, magazines, and associated equipment listed for installation in the detail specification for the helicopter shall be demonstrated to show:

(1) Adequate installation clearances including access for loading and unloading installed cameras, and/or magazines; testing, operation, end removal of units and components of photographic equipment.

(2) Rotability of cameras and or mounts, if specified.

(3) Functional checks of cameras, camera control systems, viewfinders and other installations, systems and equipment associated with photography.

(4) Operational checks of applicable flight line and/or bench-check equipment.

(5) Proper and safe operation of camera doors, related bomb bay doors and illumination release system.

(6) Adequate stowage and security of spare photographic equipment, if applicable.

(7) Suitability of handling equipment, if applicable.

3.16.3 FLIGHT CHECK. - The flight program shall demonstrate the following:

(1) Camera platform suitability.

3.16.3 (Cont)

(2) Satisfactory operation of the camera control system throughout the designed range of the camera control system, but within the design flight envelope of the helicopter, and for the cameras being installed.

(3) Suitability and operability of the viewfinder, oblique sights and/or other sighting equipment for properly positioning photographic targets.

(4) Adequacy of camera doors and windows to afford the camera a view unobstructed by the airframe, dirt, oil film, water condensation reflection or other deleterious effects.

(5) Suitability of camera compartment temperatures pressurization and vacuum supply; accessibility to and operability of doors, windows, cameras, and associated equipment as applicable.

(6) Usability of the photographs from all installed cameras operated in accordance with paragraph (2) above, including radar recording, and night photography as applicable.

(7) Adequacy of camera initiating, operating and indicator mechanisms of the camera control system.

(8) Adequacy of recording equipment, as applicable.

(9) Suitability of the automatic pilot to maintain photographic flight line requirements as applicable.

3.17 RELIABILITY AND MAINTAINABILITY DEMONSTRATION REQUIREMENTS

3.17.1 GENERAL. - The specified reliability and maintainability tests shall be performed to show that the helicopter can meet the reliability and maintainability guarantees. These tests shall be performed in combination with or, if necessary, in addition to aerodynamic, hydrodynamic, power plant, armaments equipment, electrical, avionics, shipboard suitability and photographic demonstration tests. Any reliability and maintainability demonstration

3.17.1 (Cont)

completed and properly witnessed by a test authority (see 3.1.2) in accordance with the approved test plan, but prior to the scheduled point of demonstration, shall be included in reports submitted in compliance with 3.19.2.21.

3.17.1.1 TEST PLAN. - To document the test conditions and the end points to be met during demonstration, a reliability and maintainability test plan shall be prepared and forwarded to COMNAVAIR (Attention: AIR-5205) via the cognizant NAVPRO. Authority to commence the demonstration test plan shall be submitted to the cognizant NAVPRO at least three months prior to the expected commencement date of the demonstration.

3.17.1.2 AIRCRAFT CHANGES. - Subsequent to release of aircraft for reliability and maintainability demonstration no changes shall be made unless approved by NAVAIR subject to the requirements of 3.1.7.

3.17.1.3 TEST FLIGHTS. - The specified mission profiles shall be flown for reliability demonstration. The maintenance generated by reliability demonstration shall be used for maintainability demonstration. The specified number of mission profile flights shall be flown for reliability and maintainability demonstration.

3.17.1.4 MAINTENANCE. - In-flight maintenance on equipment shall not be conducted during a test flight except when necessary to restore the aircraft to a minimm acceptable condition as specified for crew safety, or as permitted by established Navy operator maintenance procedures. All maintenance between flights shall be conducted by the maintenance crew which shall be limited to the quantities and equivalent skills specified. All support equipment used during the reliability and maintainability demonstration shall be those planned for use with the aircraft in its service “environment.

3.17.1.5 ACCEPTANCE CRITERIA. - The quantitative reliability and maintainability requirements have been met if the maximum permissible values of failure, downtime, and maintenance man-hours have not been exceeded. A serial number shall be assigned to each flight. At the completion of each flight the serial number of the aircraft, the result (success, failure, or censored), and the flight duration, shall be recorded. Prior to the next flight elapsed maintenance downtime at the organizational level shall be recorded for

3.17.1.5 (Cont)

corrective maintenance, turn-around, and readiness assurance test and inspection. During the demonstration a record shall be kept of the direct maintenance man-hours for corrective maintenance and preventive maintenance performed on the aircraft and the support equipment at the organization and intermediate levels. Only those data associated with uncensored flights shall be used in determining compliance with the qualitative reliability and maintainability requirements. A flight may be censored when the "no test" definition of MIL-STD-757 applies. However, if the number of censored flights exceeds 20% the quantitative requirements of the demonstration have not been met.

3.17.2 SUPPORT EQUIPMENT. - Demonstration of the compatibility between the Helicopter Weapon System and all recommended support equipment is required. Demonstration of performance, operability, reliability, and maintainability is required for all special equipment.

3.17.3 LOGISTIC SUPPORT. - Demonstration of logistic support characteristics shall be in accordance with WR-30. Output data from the Reliability and Maintainability Demonstration in 3.17.1 shall be used as a starting point for detection of maintenance support characteristics.

3.18 RESERVED

3.19 REPORTS

3.19.1 GENERAL

3.19.1.1 FORMAT AND GENERAL REQUIREMENTS. - Reports required herein shall conform with the format and general requirements of Spec MIL-R-18136 amplified as follows:

(1) Reports of test results shall describe how and to what extent the tests were observed by representatives of the Government.

(2) Revised material shall bear the same page numbers as the pages which are to be replaced, plus the word "revised" and the date of the revision. The revised subject matter shall be identifies Added pages shall bear the same number as the preceding page fallowed by a lower case letter unless the additional pages follow the last page of the report.

3.19.1.1 (Cont)

(3) Symbols, abbreviations, and units, if they do not appear in standard lists of airplane and helicopter nomenclature, or in documents listed in Paragraph 2, herein, pertaining to the material in the report, shall be defined in a separate table of definitions.

(4) Documents referred to in a report for clarity shall be limited to those known to be available in NAVAIR; otherwise the contractor shall furnish two copies of the reference documents to NAVAIR along with the material which refers to them.

(5) Reports shall be bound in flexible pronged metallic paper fasteners or other means which will facilitate removal, addition, or replacement of pages without resort to mechanical devices for disassembly and reassembly of the reports.

(6) Reports of more than 10 pages shall be indexed.

(7) Contents of the report of 3.19.2.5 shall be presented appropriately sectionalized so that all data concerning each principal category are submitted on consecutive pages that may be separated from the data concerning all other categories. This requirement does not apply to the index.

(8) The reports of 3.19.2.1 and 3.19.2.6 may be combined provided that the data of 3.19.2.6 are presented on consecutive pages that may be separated from all other contents of the combined reports.

(9) The reort of 3.19.2.7 may be combined with the report of 3.19.2.2 provided that the data of 3.19.2.7 are presented on consecutive pages that may be separated from all other contents of the combined reports.

(10) Reports covering development tests performed by the Contractor but which are not specifically required by this specification shall be prepared and submitted as specified herein.

(11) The reports of 3.19.2.14 and 3.19.2.15 may be combined with report of 3.19.2.5 provided that these data are each presented on consecutive pages that may be separated from all other contents of the combined reports.

3.19.1.2 ACTION ON REPORTS. - The planning for, progress of, and the data obtained during the entire demonstration shall be documented and submitted by the contractor via NAVPRO except as otherwise specified herein or in the addendum to this specification. All reports shall be submitted for action or information as specified in paragraph 3.19.3. Acceptance of contractor's reports, or revisions or additions thereto, and/or the waiving of compliance with a specified demonstration test by NAVAIR or by the COMNAVAIRTESTCEN, shall not, with respect to the rights of the Government under the correction of defects provisions of the contract, be construed to be a waiver of any failure of the contractor to comply with the guarantees set forth in the contracts or any failure to comply with the specifications or documents attached to or incorporated therein. (For distribution of reports, see 3.19.3).

3.19.1.3 RESPONSIBILITY FOR REPORTS AND DATA. -

3.19.1.3.1 NAVPRO. - It shall be the responsibility of Naval Plant Representatives Office to:

(1) Monitor the contractor's preparation and submission of all reports required by paragraph 3.19 of this specification to assure prompt submittal there of to the NAVAIR in accordance with established time schedules.

(2) Examine required demonstration reports for completeness and require the contractor to correct all data not conforming to applicable requirements and submit such revised data as a revision to the report at a later date. Complete reports and revisions shall be forwarded as soon as available.

(3) For those demonstrations for which the NAVPRO is the designated test authority, examine all demonstration reports for compliance with specifications and contract demonstration addenda, and verify the data as to accuracy and completeness.

(4) Endorse Demonstration Instrumentation Reports, and Performance Data-Reduction Reports to NAVAIR via COM NAVAIRTESTCEN for review and comment.

3.19.1.3.2 NAVAIRTESTCEN. - It shall be the responsibility, as applicable, of COM NAVAIRTESTCEN to:

3.19.1.3.2 (Cont)

(1) Review Demonstration Instrumentation Reports, Demonstration Planning Reports, and Performance Data-Reduction Reports, and forward one copy of each to the Commander, Naval Air System Command attention of the organizational code of the assigned project officer, with recommendation as to the suitability of each report.

(2) Submit a speedletter report summarizing the results of the Navy Preliminary Evaluation immediately after completion of each phase. This report shall be followed by a detailed report shortly thereafter.

(3) Review all demonstration reports forwarded via NAVAIRTESTCEN for acceptance and forward with appropriate cements and recommendations.

3.19.2 REQUIRED REPORTS

3.19.2.1 DEMONSTRATION INSTRUMENTATION REPORT. - This report shall be submitted via COM NAVAIRTESTCEN not later than three months prior to the last date at which it will be practical to install in demonstration helicopters, items or components of test instrumentation which must be installed therein during manufacture. The repot shall be sufficiently complete to indicate the need for the instrumentation in fulfilling the demonstration requirements, shall follow this format, shall be listed in accordance with applicable paragraph, and shall contain:

(1) Complete list of variables to be measured with each demonstration aircraft and the expected overall accuracy of measurement of each variable.

(2) *Complete list of Government Furnished Equipment.

(3) *Complete list of Contractor Furnished Equipment.

(4) Estimated dates for completing installation of instrumentation in each demonstration aircraft.

(5) Detailed description of all instrumentation and related systems and all available calibration data for each demonstration aircraft.

*These lists shall completely Identify the instrumentation as to purpose, function intended, location, and response characteristics required.

When requested, representatives of the contractor shall confer with government personnel at the NAVAIRTESTCEN to reach agreement on details that are determined to be necessary for inclusion in subsequent revisions to the report.

3.19.2.2 DEMONSTRATION PLANNING AND PROGRESS REPORT. - This report shall be submitted concurrently to NAVAIR and COM NAVAIRTESTCEN, and shall contain comprehensive, up-to-date infomation concerning the planning for the performance of the entire demonstration program as well as the relationships between demonstration and other "proof-of-design" requirements, and planned aircraft deliveries. The parts of the report containing the information specified in (1) through (6) below shall be submitted concurrently with the submittal of the Demonstration Instrumentation Report. Subsequently, at intervals not exceeding two months, additional and/or revised pages shall be submitted as may be necessary to furnish as much as possible of the information specified in (7) through (14) below, and to keep submittal material up-to-date. If, at the end of any two-month period, added and/or revised pages are not necessary to make the report up-to-date, a statement to that effect shall be submitted. The report shall include the following:

(1) A copy or facsimile of the applicable addendum to this specification or other contractual document which defines the demonstration.

(2) Planned dates for performance of proof-of-design tests and for submittal of contract design data, the performance of' and/or the submittal of which are contractual prerequisites for proceeding with various demonstration tests.

(3) Planned dates for performance of demonstration tests with each of the demonstration helicopters.

(4) Planned dates for evaluation by Navy pilots at the contractor's plant.

(5) Demonstration schedule for each phase of the demonstration (i.e., Structural, Aerodynamic, Hydrodynamic, etc.). This schedule shall describe in sufficient detail the tests that the contractor plans to perform in order to fulfill the demonstration requirements and also the paragraph relationship between tests and demonstration requirements.

(6) Schedule of delivery of helicopters for trials and to the fleet.

(7) Dates of actual performance of the various takeoff, flight, landing, and ground demonstration tests, including developmental flight tests.

(8) Operating limits for flight by the contractor's pilots and for flight by Navy pilots. If these limits differ from those applicable at the time of submittal of the previous periodic revision to the report, the added and/or revised pages shall summarize the basis for the changes.

3.19.2.2 (Cont)

(9) The following information as applicable to the design:

(a) All structural design gross weights.
(b) Aerodynamic and structural design envelopes and limits of helicopter gross weight versus center-of-gravity position.
(c) Level-flight and limit dive speeds.
(d) Landing sinking speeds for demonstration.
(e) Autorotative speeds, power-on and power-off, versus gross weight in basic, landing; and other pertient configurations.
(f) Demonstration parameters for the tests of Tables 1, 2, and 3 with indications, when the proposed parameters are different from those specified, whether the proposed parameters are limited by actual strength, control power, flight characteristics or other phenomenon.
(g) Planned flight envelopes for Navy Preliminary Evaluations.

(10) Summaries of safe boundaries of flight conditions performed during the contractors flight tests including, as a minimum, the following information:

(a) Information regarding the maximum and minimum load factors and air speeds, control displacemerit and times shall be presented in tabular form indicating the most severe maneuvers shown by flight tests to date that can be safely achieved.

(b) Information concerning control movements, operation of appurtenances, and operation of pilot-over-riding flight control system, that is to be discussed during the pre-structural demonstration conference of 3.2.5.

(11) Summaries of static and fatigue failures, excessive wear or other failures that occur in development flight helicopters. In addition, a maintenance history of dynamic components (e.g. pitch or flap bearings, bushings, or rotor blades, etc.) which have been changed on development helicopters, even though no failures have occurred, shall be included with reasons for the changes or unscheduled maintenance.

3.19.2.2 (Cont)

(12) Discussion of any required demonstration tests which the contractor has concluded cannot be performed in the manner or to the conditions specified, with amplifying information regarding design deficiencies involved or other reason for the contractor's conclusions; this information shall sumarize action taken or contemplated by the contractor to eliminate the deficiencies, and whether or not the contractor is able to solve pertinent design problems by the disclosed design deficiencies.

(13) Descriptions of helicopters which the contractor proposes to use in the performance of the structural and aerodynamic demonstrations, NPE'S, and INSURV trials. If structurally, aerodynamically, and functionally identical with helicopters delivered or planned to be delivered for trials and to the Fleet, a statement to that effect shall be submitted in writing in lieu of detailed descriptions; otherwise the structural, aerodynamic, and functional differences shall be completely described and the effects of these differences on the proof-of-design aspects of the structural demonstration shall be summarized. This applies particularly to special provisions in demonstration helicopter which are not to be in service helicopters, such as special cockpit control restrictors; special escape provisions; ballast in lieu of useful load; modification to standard stores mounts; approved engineering changes; and those affecting strength and rigidity, flying qualities, and/or performance.

(14) Report of the progress made and action planned including dates of incorporation of hardware changes in development helicopters arid helicopter which are to be delivered to INSURV trials, to OPTEVFOR/FIP/RCVG, or to the Fleet, to:

(a) Correct discrepancies disclosed during any phase of the Navy Preliminary Evaluation.

3.19.2.2 (Cont)

(b) Incorporate changes resulting from the contractor's developmental flight tests. or other tests.

(C) Investigate various aerodynamic, structural or functional characteristics of the helicopter not necessarily covered by specific test requirements, but which have been high-lighted as requiring further developmental flight test during NPE's, the contractor's flight tests, or other sources.

3.19.2.3 DAILY FLIGHT REPORTS. - Daily reports shall be submitted for at least the first 20 takeoff's and landings of each of the first two demonstration helicopter at which time they may be discontinued by the NAVPRO upon the contractor's requests or as otherwise directed by the NAVPRO. These reports shall be submitted within 48 hours after completion of flights, except when additional delay is essential to the presentation of the data. Reports shall be submitted as expeditiously as possible. These reports may be brief and informal, need not be forwarded by formal correspondence, and shall include the following information:

(1) Daily flight report number.
(2) Helicopter model designation.
(3) NAVAIR serial number.
(4) Contract number.
(5) Date of flight.
(6) Pilot's name.
(7) Duration of flight.
(8) Loading condition
(9) Gross weight
(10) Purpose of flight (and program if a series of flights are involved).
(11) Center-of-gravity location.
(12) Changes prior to flight.
(13) Discussion, including pilot observations concerning any phenomena encountered such as unusual or unexpected flight characteristics, yielding or failure of a region of the structure, vibratory characteristics, or any other unusual occurrence shall be included.
(14) Discussion, including pilot observations of the operation of the installed weapons system equipment.
(15) Enclosures (if any).

3.19.2.4 BI-WEEKLY SUMMARY REPORTS. - Bi-Weekly Summary Reports shall be submitted for the duration of the period the contractor has custody of the helicopter. These reports shall be brief and informal, arid shall not contain detailed quantitative data. They shall summarize briefly the purpose and results of the specific development and demonstration program being undertaken and shall discuss problem areas and proposed corrective action including time to make the correction. It is intended that these informal reports not exeed three to four pages of text. The summary report shall be forarded not later than three working days following the period being reported directly to NAVAIR showing code designation of cognizant MATACQ Aircraft Weapons System Project Officer, with information copies distributed in accordance with 3.1993.

3.19.2.5 DEMONSTRATION DATA REPORT. - This report shall be submitted periodically at intervals of not greater than two months, beginning with the first periodic revision of the Demonstration, Planning, and Progress Report submitted after the first helicopter has been flown. The data in the report at the time of submittal of each periodic revision shall be up to date with respect to all tests performed up to not later than one month prior to each periodic revision. If, at the end of any two-month period, added and/or revised pages are not required to comply with the intent of the foregoing sentence a statement to that effect shall be submitted. For tests performed in compliance with test requirements and procedures which are contained in documents listed in 2.1.1, and provided that the pertinent docments of 2.1.1 require the submittal of reports of the tests, the identity and date of submittal of the pertinent reports shall be included in lieu of including pertinent test data; otherwise the following information concerning demonstration tests peroformed shall be submitted to the extent that the various item of information listed below are applicable to the helicopter design and to the particular test perfomed:

(1) A discussion of how and to what extent the test was observed and accepted by representatives of the Government.

(2) Photographs showing basic features of the helicopters with and without external loading and equipment installed in flight, during takeoffs, and during landings.

(3) Pertinent data observed or recorded during the development flight tests. For the tests of 3.7, comparison shall be made of the values of all significant parameters employed in the definition of the tests with corresponding measured values including plotted time histories of all pertinent parameters from time of initiation of the

3.19.2.5 (Cont)

tests to complete recovery therefrom; such as: altitude, airspeed (EM), load factors, control forces and motions, angular acceleration, and attitudes, vibration characteristics, positions of trimming devices, rotor RPM, and blade motions. Data showing blade-to-fuselage clearances shall be obtained during critical maneuvers and landings, and during turn-up and shut-down in high winds.
A complete discussion, including pilot's comments of any limiting, unusual or unexpected aerodynamic, structural, or functional characteristics, or any other unusual occurence shall be included. For tests relating to flying qualities, only significant data for typical test conditions shall be presented. The data presented shall be sufficient to depict trends or to support stated conclusions. Summary data showing variation of important stability and control parameters with speed, altitude, etc. and comparisons with predicted derivatives, if available, shall be presented.

(4) Conditions of loading.

(5) Changes incorporated.

(6) All pertinent data obtained during performance demonstration tests shall be included in the Demonstration Data Report. Methods and procedures for determination or each performance item as well as related information such as airspeed position error, ambient temperature, engine thrust, etc, shall be adequately described. Methods and calculations used in the reduction of observed data to standard conditions, and in the adjustment of these data to specification conditions shall be presented.

(7) A compilation of the test points and methods employed in calibrating (to 110 percent of design limit or maximum expected values) all structural load, load factor, stress, or temperature-measuring devices.

3.19.2.5 (Cont)

(8) Quantative comparison of the results of dynamic analysis for predicting time histories of loads and motions for landing, takeoffs, and taxiing shall be made with typical time histories of loads and motions as measured in the tests of 3.7.2 and in the helicopter laboratory drop tests. Where necessary for making these quantitative comparisons, additional dynamic analysis shall be made for the initial conditions as measured in the tests of 3.7.2, including build-up tests. The analytical variation in the critical and in the maximum loads and accelerations with initial conditions shall be shown separately from the time histories and shall be compared with the loads and accelerations as measured in the demonstration tests, including the build-up tests, extrapolated if necessary, to the design envelope of conditions. The foregoing comparison shall. be shown in relation to the strength envelope of the helicopter, such envelope to be determined by a combination of analysis and static tests results. In addition, these comparisons shall be summarized to show that the helicopter has structural reliability for the design envelope of conditions specified.

(9) Supplemental information to demonstrate by a combination of test data and calculations that successful shipboard operation can be reasonably assured without airframe or helicopter configuration changes other than those scheduled for incorporation in all helicopters.

(10) Quantitative test results and a discussion of the methods used to determine the accuracy of the helicopter weapons systems, when applicable.

(11) Prior to each pre-NPE conference,a summary of the data substantiating that the helicopter is aerodynamically, structurally, and functionally safe througout the required flight envelope and scope of the evaluation specified herein. All data referenced in this summary (e.g. flying qualities, vibration data, stress survey data) shall have been submitted in the for review by the cognizant personnel prior to the pre-NPE conference.

3.19.2.6 PERFORMANCE DATA-REDUCTION REPORT. - A report describing data reduction methods to be used during the performance tests 3.8.3 shall be submitted to NAVAIR via COMNAVAIRTESTCEN not later than three months prior to performance demonstration.

3.19.2.7 GUARANTEED PERFORMANCE DATA REPORT. - This report shall be submitted via NAVAIRTESTCEN not later than one month prior to release of the helicopter for the performance demonstration tests of 3.8.3 or not later than one month prior to the release of the helicopter for INSURV Acceptance Trials, whichever is first, and shall summarize the individual and cumulative effects on contract performance guarantees for the performance demonstration helicopter of:

(1) Each change covered by change order or other contract document and all other pending changes which are " under negotiation but are not yet covered by final contractual action, including all changes each of which individually has been determined to have "negligible effects" on contract performance guarantees. NOTE: The ACCB (Aircraft Configuration Control Board) number (when known) and nature of change shall be indicated for each separately listed change.

(2) Any change is engine rating.

(3) Any overweight or underweight of government furnished equipment.

3.19.2.8 AVIONIC SYSTEMS DEMONSTRATION DATA REPORTS. - Submit for acceptance. These reports shall be submitted as soon as practicable but not later than 60 days prior to release of the helicopter for the INSURV electronic and armament trials. Data may be obtained during the Navy Preliminary Evaluations of 3.3. The reports shall include the following:

(1) Master electronic installation drawings, information on changes or modifications to the electronic configuration which are to be incorporated prior to

3.19.2.8 (Cont)

production delivery of the helicopter and pertinent corrections to the electronic section of the preliminary handbook of maintenance instructions.

(2) Description of the composite electronic system including antenna placements with a discussion of the design parameters and considerations which influenced the installation.

(3) Conformance test data which will provide evidence that electronic demonstrations were performed with representative equipments.

(4) A graphical presentation of the intercommunication system (ICS) audio power output analysis, covering the range of audio interphone control facilities available to the crew, including frequency response measurements, to show acceptable quality of audio response in the system

(5) Interference survey of the composite electrical and electronic systems with specific Interference sources indicated and a discussion of corrective measures taken. Procedures shall be in accordance with Spec MIL-I-6051.

(6) The flight performance of the identification system, including the accessory units and integration with other parts of the helicopter weapons system.

(7) A survey of the ambient temperatures and air flow at numerous appropriate positions within the electronic compartment, packages, and equipments with supporting data. Tests shall be conducted, where practicable, in accordance with Spec MIL-T-5422 or in an environment where the air pressure, air flows, air friction, temperature, humidity, etc., duplicate conditions at the service ceiling of the helicopter.

(8) Preliminary antenna radiation patterns. These radiation patterns shall be made in flight for all applicable antennas, with proper allowances made for cable losses and all significant propagation factors to assure repeatability and determination of absolute values of signal level.

3.19.2.8 (Cont)

Evaluations conducted with and without external stores shall be reported. A discussion of the operational envelope in terms of maximum ranges versus altitude at various frequencies shall be included. Ground facilities shall be completely described to allow comparisons with similar data obtained on other helicopter antenna system and with the model range antenna studies.

(9) Preliminary bearing accuracy curves of the navigational system including boundary limits for position-indicating equipment shall be presented to indicate the degree of compliance With the accuracy requirements of applicable specifications. For navigational type equipments normally used during penetrations, letdowns and instrument ladings, sufficient discussion of actual flights shall be included to clearly demonstrate distance and accuracy capabilities near the terminal stations as well as to maximum range altitude.

(10) A report of the flight performance and operational accuracy of the countermeasures systems at various ranges from appropriately described signal sources on the ground. This evaluation shall be made on representative frequencies within each frequency band covered by the antennas and equipment installed.

(11) The laboratory evaluation and flight test results showing the performance of the radar and/or fire control system shall be reported in graphic and/or statistical form where applicable. Comments on the operational capability shall also be reported.

(12) The flight performance and operational accuracy of the electronic altimeter system and an assessment of the adequacy of the system for the intended mission of the helicopter. Critical factors affecting the installation of the altimeters shall be reported in detail.

(13) The flight performance of the automatic control and stability augmention system.

3.19.2.8 (cont)

(14) A discussion of the flight performance of all electronic system during any of the simulated missions specified for the helicopter including a qualitative analysis of the overall system integration with details of any peculiarities that may exist which might affect the designed mission of the helicopter.

(15) The recommended maintenance and test procedures using standard or special contractor-furnished equipments. This shall include test setup, procedures, special handling equipment, bench check and line maintenance procedures as analyzed in a mm-hour maintenance time study. Any information regarding reliability or failure of components should also be reported. This report shall also include utilization and efficiency of any special test or auxiliary equipment to be supplied by the contractor.

(16) The instrumentaion used by the contractor and installed in the airframe during the electronics demonstration. These reports shall include a complete, detail description of the airborne electronic systems, terminal equipments, test conditions, and terrain over which tests were made. Reference shall be made to sections of the applicable specifications which governed the evaluations. The report shall contain comprehensive discussion of the results obtained and emphasize any operational limitations imposed by hardware design. Any contractor request for a waiver of the applicable specification or portions there of skill reference and be supported by the discussions contained in these reports. The discussion and data shall be sufficient to judge the validity of the conclusions reached by the contractor.

(17) The results of flight tests performed to confirm model measurements on antennas shall be reported and field-intensity measurements shall be referred to isotropic antenna signal level. The isotropic antenna signal level shall include a factor to

3.19.2.8 (Cont)

account for the gain due to ground-reflected signal. The manner in which the isotropic level is determined shall be described in the report.

3.19.2.9 MOVING PICTURE COVERAGE REPORT. - When significant events occur during the roving picture coverage, the film shall be processed and forwarded with complete flight data concerning the significant events to NAVAIR as soon as practicable.

3.19.2.10 POWER PLANT VIBRATION SURVEY REPORT. - See 3.3.5.2.5.1

3.19.2.11 COMPRESSOR INLET AND TURBINE OUTLET SURVEY REPORT. - See 3.3.5.2.5.3.

3.3.9.2.12 ELECTRICAL SYSTEM DEMONSTRATION DATA REPORT. - Submit for acceptance. This report shall be submit-ted as soon as practicable but not later than 60 days prior to release of the helicopter for INSURV electrical and electronic trials. Data my be obtained during the Navy Preliminary Evaluations of 3.3. The report shall include the following:

(1) up-to-date Copies of all electrical wiring diagrams showing cable designations and lengths.

(2) A description of the electrical system operation during normal, emergency, and ditching procedures.

(3) An electrical load analysis (AC and CD) compiled in accordance with Spec MIL-E-007016B(Aer). A description of the instrumentation and procedures used in conducting the analysis and measurements.

(4) Data, methods, and instrumentation pertaining to -the contractor's flight and ground evaluations of the capabilities of the electrical system as prescribed in a subparagraphs under 3.13. These reports shall contain comprehensive discussion of the results obtained and emphasize any operational limitations imposed by the system design. Any contractor request for a waiver of the applicable specifications Or portions thereof shall be referenced and supported by the discussions contained in these reports. The discussion and data shall be sufficient to judge the validity of the conclusions reached by the contractor.

3.19.2.13 HELICOPTER WEAPON SYSTEM ACCURACY REPORT. - Final (complete) report on the Helicopter Weapons System Accuracy Demonstration Tests (3.11.7.1) shall be submitted not later than at the conclusion of the Fleet Introduction Program (FIP). The report shall contain quantitative test results and a discussion of the methods used to determine the accuracy of the helicopter weapons system.

3.19.2.14 FLIGHT STRESS SURVEY RETORT. - This report shall be submitted for acceptance by NAVAIR. The initial submittal shall include test plans including flight regimes and maneuvers during which data shall be recorded, parameters to be measured, and methods of data reduction and statistical presentation. This submittal shall be made not less than three months prior to the last date at which it will be practical to install in the demonstration helicopter item or components of test instrumentation which must be installed during manufacture, but at least one month prior to first flight. Status reports and data obtained during the tests of 3.7.6 shall be submitted periodically at intervals not greater than two months. The final revision of the. flight stress survey with summary and conclusions shall be submitted not less than 3 months after the start of INSURV. Measured data shall be compared with those data used for design. The service life of the various dynamic components for the design flight loading spectrum shall be re-evaluated and updated based on the data obtained from the simulated mission flights. The recorded data shall be retained by the contractor as a data source for future use in redetermining the dynamic components' service lives for flight spectra other than the Design Flight Loading Spectrum. As operational use of an aircraft reveals increased or varied mission capabilities, this data source will enable re-evaluation of the dynamic components' service lives commensurate with new mission profiles.

3.19.2.15 VIBRATION REPORT. - This report shall be submitted for acceptance by NAVAIR. The initial submittal shall include test plans showing methods of data reduction and statistical presentation, and shall be submitted concurrently with the Flight Stress Survey Report of 3.19.2.14. Data obtained during the tests of 3.7.4 shall be submitted periodically at intervals not greater than two months. The final revision with summary and conclusions shall be submitted prior to INSURV-ITP.

3.19.2.16 FLIGHT ENDURANCE PROGRAM REPORT. - This report shall be submitted for acceptance by NAV.. The initial submittal shall include test plans showing the planned schedule of accumulation of flight hours. The initial submittal shall be at least one month prior to first flight Data obtained during the tests of 3.7.7 shall be submitted periodically at intervals not greater than two months. A history of all replacements, repairs, and unscheduled servicing of components and equipment, including reasons for such maintenance shall be included. The final revision with summary and conclusions shall be submitted prior to the completion of INSURV-ITP.

3.19.2.17 FORMAL STRUCTURAL DEMONSTRATION REPORT. - The contractor shall submit separate reports of each of the formal structural, performance, flying qualities and hydrodynamic demonstration tests performd at NAVAIRTESTCEN via COM NAVAIRTESTCEN to NAVAIR for acceptance. Data shall be as specified in 3.19.2.5.(3). Helicopter changes and adjustmnt shall be reported in accordance with 3.1.7.

3.19.2.18 FORMAL FLYING QUALITIES DEMONSTRATION REPORT. - The contractor shall submit a report of the formal flying qualities tests performed at NAVAIRTESTCEN to NAVAIR for acceptance.

3.19.2.19 INSTRUMENT SYSTEMS DEMONSTRATION REPORT. - submit for acceptance. This report shall be admitted as soon as practicable but not later than 60 days prior to release of the helicopter for INSUKV Acceptance Trials. The report shall encmpass demonstration accomplished in compliance with 3.14.2.

3.19.2.20 RELIABILITY AND MAINTAINABILITY DEMONSTRATION TEST PLAN. - see 3.17.1.1.

3.19.2.21 RELIABLITY AND MAINTAINABILITY DEMONSTRATION REPORT. - This report Shall be submitted for acceptance as soon as possible but not later than 60 days prior to release of the aircraft for INSURV Acceptance Trials. This report shall contain comprehensive discussion of the results obtained and emphasize any operational limitations imposed by the aircraft design. The report shall include data, a description of instrumentation, and methods pertaining to the flight evaluations of the capabilities of the aircraft as prescribed in 3.17. Any contractor request for waiver of the applicable specifications or portion there of shall be referenced d supported by the discussion contained in this report, The discussion and data shall be sufficient to judge the validity of the conclusions presented in the report.

3.19.3 MILITARY SPECIFICATION AIRCRAFT DEMONSTRATION REPORTS - DISTRIBUTION OF

Paragraph	Title	To:	Attn:	Action	Number & Kinds of Copies Each	Type of Report	Submittal Time and Remarks
3.19.2.1	Demonstration Instrumentation Report	NAVAIR	AIR-510	Accept.	4 Nonrepro.	Nonrecurring	As specified in 3.19.2.1
		(b)		Comment	5 "		
		(a) (c) (d) (k)		Info.	1 "		
3.19.2.2	Demonstration Planning & Progress Report	NAVAIR	AIR-510,530	Accept.	10 Nonrepro.	Recurring	Concurrently with 3.19.2.1 above and subsequently, at intervals not exceeding two months, additional pages and/or revised pages shall be submitted as necessary to keep report up to date. Portions of report accepted by cognizant NAVAIR Material Acquisition Divisions.
			AIR-531,532	"			
			AIR-533,536	"			
			AIR-537,539	"			
		Via COMNAVAIRTESTCEN					
		(b)		Comment	5 "		
		(a) (c) (d) (e)		Info.	1 "		
		(f) (g) (h) (i)		Info.	1 "		
		(j)		Info.	2 "		
3.19.2.3	Daily Flight Reports	NAVAIR	AIR-510,530	Info.	5 Nonrepro.	Recurring	Submittal for at least the first 20 takeoffs and landings of each demonstration helicopter. Reports may then be discontinued by NAVPRO at contractor's request. Shall be submitted to NAVAIR within 48 hours after completion of flights.
			AIR-531,532	"			
			AIR-533,536	"			
			AIR-537,539	"			
		(b)		"	5 "		
		(a) (c) (d) (j)		"	1 "		
3.19.2.4	Bi-Weekly Summary Reports	NAVAIR	AIR-510,530	Info.	5 Nonrepro.	Recurring	Submitted not later than three working days following the period being reported, for period when contractor has custody of helicopter. Quarterly index of test subject matter shall be submitted by end of the week following the end of the calendar quarter.
			AIR-531,532	"			
			AIR-533,536	"			
			AIR-537,539	"			
		(b)		"	5 "		
		(a) (c) (d) (j)		"	1 "		
3.19.2.5	Demonstration Data Report	NAVAIR	AIR-510,530	Accept.	10 Nonrepro.	Recurring	Submitted periodically at intervals not greater than two months, beginning with first revision of 3.19.2.2 above after first helicopter has flown. Portions of report accepted by cognizant NAVAIR Material Acquisition Division
			AIR-531,532	"			
			AIR-533,536	"			
			AIR-537,539	"			
		Via COMNAVAIRTESTCEN					
		(b)		Comment	5 "		
		(a) (c) (d) (e)		Info.	1 "		
		(f) (g) (h) (i)		"	1 "		
		(n)		"			

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3.19.3 (Cont)

Paragraph	Title	To:	Attn:	Action	Number & Kinds of Copies Each	Type of Report	
3.19.2.6	Performance Data Reduction Report	NAVAIR Via COMNAVAIRTESTCEN (b) (a)(c)(d)	AIR-5301	Accept. Comment Info.	3 Nonrepro. 3 " 1 "	Nonrecurring	At least 3 months prior to performance test of 3.8.3.
3.19.2.7	Guaranteed Performance Data Report	NAVAIR Via COMNAVAIRTESTCEN (b) (a)(c)(d)	AIR-5301	Accept. Comment Info.	5 Nonrepro. 3 " 1 "	Nonrecurring	This report shall reach NAVAIR at least one month prior to release of the helicopter for the performance demonstration tests of 3.8.3.
3.19.2.8	Avionics Systems Demonstration Data Report	NAVAIR Via COMNAVAIRTESTCEN (b) (a)(c)(d)	AIR-533	Accept. Comment Info.	5 Nonrepro. 3 " 1 "	Nonrecurring	At least 60 days prior to release for INSURV electronic and armament trials.
3.19.2.9	Moving Picture Coverage	NAVAIR	AIR-510	Info.	1 Copy	Nonrecurring	As soon as practicable following occurrence of significant events.
3.19.2.10	Power Plant Vibration Survey	NAVAIR Via COMNAVAIRTESTCEN (b) (a) (p)	AIR-530,536	Accept. Comment Info. Info.	3 Nonrepro. 1 " 1 " 2 "	Nonrecurring	Prior to NPE, Phase I.
3.19.2.10.1	Power Plant Vibration Test Plan	NAVAIR (a)(b) (p)	AIR-530,536	Accept. Info. Info.	3 Nonrepro. 1 " 2 "	Nonrecurring	At least 60 days prior to scheduled date of test.
3.19.2.11	Compressor Inlet and Turbine outlet Survey Report	NAVAIR (a)(b) (p)	AIR-536	Accept. Info. Info.	3 Nonrepro. 1 " 2 "	Nonrecurring	This report shall reach NAVAIR prior to NPE, Phase I.
3.19.2.12	Electrical System Demonstration Data Report	NAVAIR Via COMNAVAIRTESTCEN (b)	AIR-536	Accept. Comment	3 Nonrepro. 1 "	Nonrecurring	At least 60 days prior to initial INSURV electrical and electronic trials.

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3.19.3 (Cont)

Paragraph	Title	To:	Attn:	Action	Number & Kinds of Copies Each	Type of Report	Submittal Time and Remarks
3.19.2.13	Helicopter Weapon Systems Accuracy Report	NAVAIR (a) (b)	AIR-533	Info. Info. Comment	2 Nonrepro 1 " 3 "	Nonrecur-ring	Not later than at conclusion of Fleet Introduction Program (FIP)
3.19.2.14	Flight Stress Survey Report	NAVAIR (a)(b)	AIR-530	Accept. Info.	3 Nonrepro. 1 "	Recur-ring	As specified in 3.19.2.14.
3.19.2.15	Vibration Report	NAVAIR (a)(b)	AIR-530, 531	Accept. Info.	3 Nonrepro. 1 "	Recur-ring	As specified in 3.19.2.15.
3.19.2.16	Flight Endurance Program Report	NAVAIR (a)(b)	AIR-530	Accept. Info.	3 Nonrepro. 1 "	Recur-ring	As specified in 3.19.2.16.
3.19.2.17	Formal Structural Demonstration Report	NAVAIR Via COMNAVAIRTESTCEN (b) (a)(c)(d)(e) (f)(g)(h)(i) (n)	AIR-530	Accept. Comment Info. Info. Info.	2 Nonrepro. 1 " 1 " 1 " 1 "	Nonrecur-ring	Submit not less than 60 days after completion of tests.
3.19.2.18	Formal Flying Qualities Demonstration Report	NAVAIR Via COMNAVAIRTESTCEN (b) (a)(c)(d)(e) (f)(g)(h)(i) (n)	AIR-530	Accept. Comment Info. Info. Info.	2 Nonrepro. 1 " 1 " 1 " 1 "	Nonrecur-ring	Submit not less than 60 days after completion of tests.
3.19.2.19	Instrument System Demonstration	NAVAIR Via COMNAVAIRTESTCEN (b) (a)	AIR-5339	Accept. Comment Info.	3 Nonrepro. 1 " 1 "	Nonrecur-ring	As specified in 3.19.2.19.
3.19.2.20	Reliability and Maintain-ability Demonstration Test Plan	NAVAIR Via (a) (b)	AIR-5205	Approval Info.	2 Nonrepro. 1 "	Nonrecur-ring	As specified in 3.17.1.1

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3.19.3 (Cont)

Paragraph	Title	To:	Attn:	Action	Number & Kinds of Copies Each	Type of Report	Submittal Time and Remarks
3.19.2.21	Reliability and Maintainability Demonstration	NAVAIR Via COMNAVAIRTESTCEN (b) (a)	AIR-52051	Accept.	3 Nonrepro.	Nonrecurring	As specified in 3.17.1.
				Comment	1 "		
				Info.	1 "		

DISTRIBUTION CODE

(a) NAVPRO
(b) COMNAVAIRTESTCEN, Patuxent River, Maryland 20670
(c) Sr. Member INSURV, NAVAIRTESTCEN, Patuxent River, Maryland 20670
(d) COM,U.S. Naval Weapons Evaluation Facility, Kirtland Air Force Base, Albuquerque, New Mexico 87117
(e) NASA, Langley Field, Virginia
(f) NASA, Ames Research Center, Moffett Field, California 94022
(g) NASA, Lewis Research Center, Cleveland, Ohio
(h) NASA, Edwards High Speed Flight Station, Edwards Air Force Base, California
(i) Scientific and Technical Information Facility (ATTN: NASA Rep. (S-AK/DL) Box 5700, Bethesda, Maryland
(j) NAVAIRENGCEN, Johnsville, Warminster, Pa. 18974
(k) T&E Coordinator, NAVAIRTESTCEN, Patuxent River, Maryland 20670
(n) Test Authority
(o) Naval Missile Center, Pt. Mugu, California
(p) Power Plant Manufacturer

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4 QUALITY ASSURANCE PROVISIONS

4.1 INSPECTION. - The NAVPRO shall examine and evaluate all demonstration data other than daily flights reports for completeness and compliance with applicable specifications. Data not conforming to applicable requirements shall be returned to the contractor for revision prior to submittal to NAVAIR. The NAVPRO shall forward his comments on the data by endorsement on the contractor's forwarding letter at the earliest practicable date after receipt of data from the contractor.

5 DELIVERY

5.1 REPORTS. - Reports shall be delivered, in the quantities, within the times, and to the addressees, specified in 3.19.3 via the cognizant NAVPRO. Classified reports and related data shall be handled in accordance with existing security instructions.

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6.1 RESPONSIBILITY FOR APPLICABLE SPECIFICATIONS AND PUBLICATIONS. - NAVPRO are furnished copies of the latest issue of all applicable specifications and publications as they become available. The responsibility for ascertaining and following the revisions of specifications applicable to a specific contract rests with the contractor. Naval Plant Representative offices will inform contractors of the number and date of the latest issue of any specification upon request.

6.2 RESTRICTION ON USE OF DEMONSTRATION DATA AND REPORTS. - Demonstration data reports and related infomation shall not bear any notation limiting or restricting its use by the Government in any manner whatsoever.

6.3 DEVIATIONS. - Deviations from this specification shall not be permitted unless specified in addenda to this specification, in contract amendments or by other written authorization of NAVAIR.

6.4 REFERENCES, DEFINITIONS, AND SYMBOLS

6.4.1 GENERAL. - The definitions of some references, terms, and symbols used herein are given in this section. Definitions of symbols, and terms not included in this section shall conform with the definitions included in ASA Y10.7 - 1954 American Standard Letter Symbols for Aeronautical Sciences.

6.4.2 REFERENCES. - Any reference to "NAVAIR" herein shall mean the "Naval Air System Command". Any reference to "NAVPRO" herein shall mean the "Navy Plant Representative Office".

6.4.3 DEFINITIONS. - The following terms and symbols are defined for use or reference herein.

6.4.3.1 WEIGHTS

6.4.3.1.1 BASIC DESIGN GROSS WEIGHT. - The basic design gross weight shall be that weight specified in the detail specification for the flight or landing as the specific test under consideration may require.

6.4.3.1.2 MAXIMUM DESIGN GROSS WEIGHT. - The maximum design gross weight shall be that" weight specified in the detail specification for flight or landing as the specific test under consideration may require.

6.4.3.2 SPEEDS. - Speeds shall be in knots based upon the international nautical mile.

6.4.3.2.1 EQUIVALENT AIRSPEED (EAS).- The true airspeed multiplied by the square root of the density ratio at the altitude concerned.

6.4.3.3 DIVE. - The term "dive" in a broad sense refers to a flight executed for the purpose of demonstrating strength and rigidity.

6.4.3.4 EXTERNAL STORES. - The term "external stores" means any item, except streamed tow targets, mounted externally on and releasable from the helicopter during flight.

6.4.3.5 Limit. - The term Whit" used in such phrases as "limit load factor", "limit side load factor", and "limit dive speed" refers to the design limit specified in applicable design specifications.

6.4.3.6 MAXIMUM SAFE. - The expression "maximum safe load (or speed)" means the maximum load factor (or speed) at the specified speed (or load factor) which can be obtained without exceeding the specified limit strength or limits for satisfactory stability and control.

6.4.3.7 SYMBOLS AND ABBREVIATIONS. - The following symbols and abbreviations are used herein:

ASW	Antisubmarine-warfare
M	Mach number
n_y	Side load factor
n_z	Maximum symmetrical flight limit load factor (i.e. the upper boundary of the design V-$_n$ diagram).
$-n_z$	Minimum symmetrical flight limit load factor (i.e. the lower boundary of the design V-n diagram).
V_H	Maximum level flight speed specified for structural design.
V_L	Limit speed parameter in basic configuration specified for structural design.
V_c	Cruise speed as defined by the detail specification.
Vmax	Maximum level flight speed as limited by power.

6.5 ADDENDA TO THIS SPECIFICATION. - This specification shall be used as the standard form for the preparation of addenda by NAVAIR for specific model helicopters. Addenda shall conform to the following:

(1) Agree with this specification in paragraph arrangement, numbering, and headings, except that where a paragraph is listed in the addendum as “not applicable” or “not required" subsequent sub-paragraphs will be omitted provided numbering sequence is not affected.

(2) Unless paragraphs of addenda completely supersede corresponding paragraphs of this specification, paragraphs will be listed as "applicable” (with or without specific deviation or supplementary requirements), "not applicable", or "not reequired". General requirements or instructions will be designated as “applicable”, or “not applicable”, however, requirements for specific data or action shall be designated "required" or “not required” as applicable.

6.5 (Cont)

(3) Sub-paragraphs may be added as required.

(4) In cases of discrepancies between this specification and addenda, the addenda shall govern.

6.5.1 REVISION OF ADDENDA. - Revisions to addenda to this Specification will be prepared and promulgated by NAV. when such revisions have been officially approved within NAVAIR,

6.5.1.1 ADDENDA REVISION APPROVAL. - unpredictable changes to systems, mission requirements, etc., may dictate revision to basic demonstration requirements during the course of a demonstration program. In the event this occurs immediate action shall be initiated to obtain official NAVAIR approval of the proposed revision to avoid demonstration schedule disruption and resultant program delay.

6.6 DUPLICATION OF DATA. - Duplication of data shall be avoided. Data previously submitted under an addendum may be referenced when applicable to data subsequently submitted in same addendum.

6.7 REVISION OF DATA. - Data submitted under an addendum to this specification shall be revised whenever new information invalidates such data.

6.8 SECURITY CLASSIFICATION. - Classified data and reports shall contain the proper security classification on each page of reports, photographs, etc., in accordance with existing security regulations.

Project No. 1520-NO19

*U.S. GOVERNMENT PRINTING OFFICE: 1971-714-157/12249

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION

MIL-D-23222A(AS) DEMONSTRATION REQUIREMENTS FOR HELICOPTERS

ORGANIZATION *(Of submitter)*	CITY AND STATE

CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
		$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)*	DATE

DD, FORM 1 APR 63 1426

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Naval Air Systems Command
Washington, D.C. 20360

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