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SUPERSEDING
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MILITARY SPECIFICATION

AIR CONDITIONER: SPLIT-PACKAGE, 208-VOLT, 3-PHASE, 400-HERTZ, AC, 18,000 BTU/HR COOLING, 30,000 BTU/HR HEATING

This specification is approved for use within the USA Belvoir Research, Development, and Engineering Center, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. The specification covers a split pack air conditioner with a nominal cooling capacity of 18,000 British thermal units per hour (Btu/hr) and a nominal heating capacity of 30,000 Btu/hr. (Remote control cables, 13221E9145, and power cables are not part of this air conditioner, but must be provided by the contractor for contractor operation and testing of the air conditioner.)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

L-P-378	- Plastic Sheet and Strap, Thin Gauge Polyolefin.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 4120

BB-F-1421	- Fluorocarbon Refrigerants.
QQ-S-781	- Strapping, Steel, and Seals.
PPP-B-601	- Boxes, Wood, Cleated-Plywood.
PPP-B-636	- Boxes, Shipping, Fiberboard.

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MIL-P-116	- Preservation, Methods of.
MIL-V-173	- Varnish, Moisture-and-Fungus-Resistant, (for Treatment of Communications, Electronic, and Associated Equipment).
MIL-P-514	- Plates, Identification, Instruction and Marking, Blank.

STANDARDS

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	- Marking for Shipment and Storage.
MIL-STD-130	- Identification Marking of US Military Property.
MIL-STD-461	- Electromagnetic Emission and Susceptibility Requirements for the control of Electromagnetic Interference.
MIL-STD-462	- Electromagnetic Interference Characteristics, Measurement of.
MIL-STD-810	- Enviromental Test Methods.
MIL-STD-889	- Dissimilar Metals.
MIL-STD-1472	Human Engineering Design Criteria.
MIL-STD-1474	Noise Limits for Army Materiel.

2.1.2 Other Government documents and drawings. The following other Government documents and drawings form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DRAWINGS

ME

TA13221E9100	- 18,000 BTUH Split Package Air Conditioner, 18,000 BTUH Cooling, 30,000 BTUH Heating, 208V, 3 Phase, 400 Hertz.
13221E9111	Remote Control Assembly.
13221E9145	- Cable Assembly, Remote.
13225E8259	- Set, Maintenance, Air Conditioner, 18,000 BTUH, Split-Pack.

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

2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR CONDITIONING ENGINEERS, INC. (ASHRAE)

16 - Method of Testing for Rating Room Air Conditioners.

(Application for copies should be addressed to the American Society of Heating, Refrigerating, and Air Conditioning Engineers Inc., 1791 Tullie Circle NE, Atlanta, Ga 30329.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

S1.13 - Method for the Measurement of Sound Pressure Levels.

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3951 - Standard Practice for Commercial Packaging.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103d.)

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

Rule 442 - Usage of Solvents.

(Application for copies should be addressed to the South Coast Air Quality Management DIstrict, 9150 East Flair Drive, El Monte, CA 91731.)

AMERICAN WELDING SOCIETY, INC. (AWS)

ANSI/AWS D1.1 - Structural Welding Code - Steel.
ANSI/AWS D1.2 - Structural Welding Code - Aluminum.

(Application for copies should be addressed to the American Welding Society, Inc., 550 N.W., LeJune Road, Miami, FL 33135.)

SOCIETY OF AUTOMOTIVE ENGINEERS

SAE Handbook.

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15086.)

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

Standard 210 - Standard for Unitary Air Conditioning Equipment, 1966.

(Application for copies should be addressed to the Air Conditioning and Refrigeration Institute, 1815 N Fort Myer Drive, Arlington, VA 22209.)

(Non-Government standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The split-package air conditioner shall be in accordance with TA13221E9100 and associated lists, and as specified herein. The air conditioner shall be connected for operation on 208-volt, 3-phase, 4-wire, 400-Hertz electrical power. The weight of the air conditioner including the remote control assembly and the fresh air duct and with a full charge of refrigerant and oil shall be not more than 370 pounds. The air conditioner must be used with a remote control assembly, 13221E9111 a power cable, and one or more remote control cables, 13221E9145. (A -1 or a -3 cable must be used if only one cable is used.) The air conditioner must be compatible with the set, maintenance, 13225E8259.

3.1.1 Drawings. The drawings forming a part of this specification are end product drawings. The contractor is responsible for preparing his own shop drawings. Where tolerances could cumulatively result in incorrect fits, the contractor shall provide tolerances within those prescribed in the drawings to insure correct fit, assembly, and operation of the air conditioner. No deviation from the prescribed dimensions or tolerances is permissible without prior approval of the contracting officer.

3.2 First article. Unless otherwise specified (see 6.2), a sample shall be subjected to first article inspection (see 4.3 and 6.3). Any changes or deviations of air conditioners from the approved first article during production will be subject to the approval of the contracting officer. Approval of the first article will not relieve the contractor of his obligation to furnish air conditioners conforming to this specification.

3.3 Material. Material shall be as specified herein and on the applicable drawings. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification.

3.3.1 Material deterioration prevention and control. The air conditioner shall be fabricated from compatible materials, inherently corrosion resistant or treated to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable operation and storage environment to which the air conditioner may be exposed.

3.3.2 Dissimilar metals. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion. Dissimilar metals and methods of protection are defined and detailed in MIL-STD-889.

3.3.3 Identification of materials and finishes. The contractor shall identify the specific material, material finish or treatment for use with component and subcomponent, and shall make information available upon request to the contracting officer or designated representative.

3.3.4 Recovered materials. For the purpose of this requirement, recovered materials are those materials which have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished from virgin raw materials. The components, pieces and parts incorporated in the air conditioner may be newly fabricated from recovered materials to the maximum extent practicable, provided the air conditioner produced meets all other requirements of this specification. Used, rebuilt or remanufactured components, pieces and parts shall not be incorporated in the air conditioner.

3.4 Performance characteristics.

3.4.1 Capacity. The air conditioner shall have cooling capacities of not less than the capacities shown in table I when operating at an altitude of 3000 feet above sea level and on 208-volt, 3-phase, 400-Hertz (Hz) electrical power with the evaporator fan operating against a 0.40-inch water gage (wg) static pressure external to the air conditioner and with the fresh air intake blocked.

TABLE I. Cooling capacities.

Condition	Condenser Air Inlet Temperature Dry Bulb (°F)	Evaporator Air Inlet Temperature Dry Bulb (°F)	Wet Bulb (°F)	Sensible Cooling Capacity % of Total Net Cooling Capacity	Minimum Total Net Cooling Capacity (Btu/hr)
A	120	92	67	60 or higher	16,000
B	110	92	73	60 or higher	18,000

3.4.2 Operating temperatures. The air conditioner shall be capable of functioning as follows:

a. Start and operate in cooling mode without damage during pull down after stabilization at 160 °F and with initial evaporator inlet air of 160 °F and a condenser inlet air of 120 °F.
b. Start and operate in heating mode in ambient temperatures as low as minus 50 °F and as high as plus 70 °F.
c. Start and operate at the conditions specified in 3.4.1.
d. Start and operate in the cooling mode for one hour with 125 °F air entering the condenser and 92 °F return air.

3.4.3 Operating pressures. With the air conditioner operating as specified in 3.4.1 and 3.4.2 the condensing and suction pressure shall be as follows:

Operating condition per 3.4.1, table I, condition A.
Condensing pressure - 435 psig max.
Suction pressure - 53 psig min.

3.4.4 Evaporator airflow. The evaporator airflow shall be not less than 525 and not more than 575 cubic feet per minute (cfm) when the evaporator fan is operating against 0.40-inch wg static pressure external to the air conditioner, and with the fresh air intake sealed.

3.4.5 Power consumption. The total power consumption and the power factor shall be as specified in table II when the air conditioner is operating as follows:

a. Cool mode (cool - cooler) under conditions of 3.4.1.
b. Cool mode (cool - warmer) under conditions of 3.4.1.
c. Low heat mode (low heat - warmer) under conditions of 3.4.6.
d. High heat mode (high heat - warmer) under conditions of 3.4.6.

TABLE II. Power consumption.

Condition	Maximum Power Consumption	Minimum Power Factor
a	5.85 kW	0.50 lagging
b	4.87 kW	0.45 lagging
c	6.5 kW	0.94 lagging
d	10.0 kW	0.94 lagging

The unit shall be able to operate with voltage variations of ±10 percent or -5 percent or with frequency variations of ±12 Hz.

3.4.6 Heating. With all heaters operating in the high heat mode in an ambient temperature of 75 +0 -5 °F, the heating capacity shall be not less than 30,000 Btu/hr. In the low heat mode the heating capacity shall not be less than 18,000 Btu/hr. Electric potential from the air conditioner case to ground shall be not more than 1 volt. Power consumption shall be not more than as specified in 3.4.5.

3.5 Reliability. The specified Mean-Time-Between-Failure (MTBF) shall be 1440 hours when tested as specified in 4.5.3.14. Cleaning of the air filter shall be permitted.

3.6 Salt fog. When subjected to the test specified in 4.5.3.12 the air conditioner shall show no evidence of deterioration, corrosion, or change in tolerance limits of any internal or external parts which could prevent the unit from meeting operational requirements and shall show no evidence of peeling of paint, malfunctioning, refrigerant leaks, rough operation, electrical shorts, unusual pressure or other irregular operation.

3.7 Rain. When subject to the tests specified in 4.5.3.9, the air conditioner shall operate without functional damage or impairment of operation. There shall be no penetration of water from the evaporator section to the dry side of the inclosure or into any electrical component or connection that could result in an electrical short, cause damage from rust or corrosion, or become a hazard to personnel.

3.8 Refrigerant system. The refrigeration system shall be of the vapor cycle type employing refrigerant conforming to BB-F-1421, type 22 and shall be furnished with a full charge in the system. The moisture content in the system shall be not more than 25 parts per million (ppm) by weight in the liquid phase. Refrigerant flow to the evaporator shall be controlled by the liquid solenoid shutoff valve and the evaporator thermal expansion valve. When the predetermined temperature is attained within the refrigerated space, the thermostat shall close the liquid solenoid shutoff valve and stop the flow of refrigerant to the evaporator. The discharge bypass valve in the bypass system shall open and bypass the refrigerant hot gas to the compressor suction and maintain a compressor inlet pressure of not less than 53 psig. An additional expansion valve in the bypass system shall permit a flow of liquid refrigerant to enter the compressor suction line to cool the gas going to the compressor motor windings. The entire refrigerant system shall withstand pressures up to 490 psig without deformation of any components or any detectable leaks.

3.9 Electrical controls. Some of the electrical controls used with this air conditioner are in the remote control assembly, 13221E9111. The remote control assembly and a proper remote control cable, 13221E9145 (-1 or -3) as well as a proper power cable are needed to perform the required testing (see 4.5.3.16). Electrical controls shall provide automatic control of the air conditioner. Electrical controls shall consist essentially of a mode selector switch,

conditioned-air thermostat, high pressure cutout switch, and low pressure cutout switch. The run indicator light shall light when the mode switch is in any running mode.

3.9.1 Mode selector switch. The mode selector switch, which is located on the remote control assembly (13221E9111), shall control operation of the air conditioner as follows:

a. When the switch is in the "OFF" position and with power connected to the air conditioner, all components of the air conditioner with the exception of the crankcase heater shall be inoperative. The crankcase heater shall be thermostatically controlled independent from the selector switch.
b. When the switch is in the "COOL" position, the evaporator fan motor and the condenser fan motor shall start and operate. After a time delay, the compressor motor shall start and operate. All electrical heaters (except the compressor crankcase heater) shall be de-energized when the air conditioner is operating on the cooling cycle.
c. When the switch is in the "LO-HEAT" position the evaporator fan motor shall start and operate, and when heat is required, one bank of electrical heaters shall be energized.
d. When the switch is in the "HI-HEAT" position the evaporator fan motor shall operate, and one bank of heaters shall be energized continuously. When more heat is required than one bank of heaters can provide, both banks of electrical heaters shall be energized. The compressor and condenser fan motor shall not operate when the air conditioner is operating in the heating mode.

3.9.2 Conditioned-air thermostat. The conditioned-air thermostat shall control the cooling and heating temperatures automatically within ± 2.5 °F of the midpoint temperature between 60 °F and 90 °F by regulating the action of the liquid solenoid shutoff valve and one bank of electrical heaters. The temperature control is located on the remote control assembly 13221E9111.

3.9.3 High pressure cutout switch. The high pressure cutout switch in the air conditioner shall be set to stop the compressor when the condensing pressure reaches 480 psig ± 10.

3.9.4 Low pressure cutout switch. The low pressure cutout switch in the air conditioner shall be set to stop the compressor when the suction pressure reduces to 15 psig $\pm$ 5.

3.10 Electromagnetic interference. The electromagnetic interference emission characteristics of the air conditioner shall conform to MIL-STD-461A, Notice 4, when tested as specified in 4.5.3.16 (see 6.6). Emmissions having a duration not exceeding 1 second are exempt.

3.11 Noise level. When operating in maximum cool, the air conditioner's steady state noise levels shall not exceed:

a. Evaporator side. 75 dB(A), category E, MIL-STD-1474.

b. Condenser side. 85 dB(A), category D, MIL-STD-1474. Exception: Should the condenser side noise level exceed 85 dB(A), the minimum distance at which the 85 dB(A) level occurs shall be determined by test, and noise hazard warnings shall be attached to both sides of the condenser section. Noise warnings shall be as described in MIL-STD-1474 except that the last three words shall be changed to "Hearing protection required within ___ feet.", the distance being 4 feet greater than the 85 dB(A) distance measured.

3.12 Human factors and safety.

3.12.1 Human factors engineering. The air conditioner shall be operable and maintainable by 5th percentile female through 95 percentile male soldiers (see MIL-STD-1472, 5.6) who wear clothing appropriate to hot (90 to 120 °F) through basic cold (-5 to -25 °F) climates.

3.12.2 Safety. The air conditioner shall have automatic safety controls to protect against overpressure, overheating, and electrical overcurrent. Safety shall be in accordance with the applicable drawings and 3.20.

3.13 Wiring. Wiring shall be secured in compact harnesses and attached to frame members with insulated clamps at close intervals to insure a neat and orderly cable run. Cable and wires shall not be spliced at any point throughout the length of their runs. Wiring shall not be attached to panels or other components that require removal during maintenance, except for actual electrical connections to components. Electrical isolators shall be used between all wiring and metal components to prevent abrasive action to wire insulation.

3.14 Evaporator compartment. The air leakage of the evaporator compartment shall be not more than 35 scfm when the evaporator compartment is subjected to an internal pressure of 1.2 inch wg with the evaporator air discharge, return air, and condensate drains closed, and with an adapter attached to the fresh air intake to introduce the pressurizing air.

3.15 Mobility. The air conditioners shall be capable of being transported, without damage, by military van or truck on level track cross-country at variable speeds up to 20 miles per hour when mounted in accordance with installation instructions. Testing for this requirement will be by specified vibration and shock tests.

3.16 Fungus and moisture resistance. The electrical circuitry, including all components and connections except as specified below, shall be protected from the effects of fungus growth and moisture by an overall treatment with a varnish conforming to MIL-V-173, composition as specified in 3.16.1, with 1 percent copper 8-quinolinolate (by weight) based on the nonvolatile content of the varnish:

a. Components or circuit elements that are inherently fungus or moisture resistant which are hermetically sealed need not be treated.
b. Components or circuit elements whose functions will be adversely affected by the varnish coating shall not be treated.

When used, the varnish shall be applied by spray, brush, or a combination of both to give a dry-film thickness of not less than 1 mil to component or element surfaces previously cleaned and prepared so that the surfaces are free from all foreign matter which would interfere with adherence or function of the varnish.

3.16.1 Composition. Composition I shall be used unless composition II must be used in order to comply with local air pollution regulations in the application of the varnish. When composition II is used, the contractor shall provide evidence to the Government that the use of composition II is required, and shall certify that the composition II material complies with Rule 442 - South Coast Air Quality Management District.

3.17 Maintenance.

3.17.1 Maintenance ratio. The air conditioner shall have a maintenance ratio of not more than 0.01 when tested as specified in 4.5.3.17. Maintenance ratio is defined as the ratio of the total active maintenance man-hours required (scheduled and unscheduled) to the total operating time. Man-hours for repair of replaced components and scheduled before and after operation checks are excluded. A maintenance schedule shall be furnished prior to the start of any testing. Not more than 25 percent of repairs shall require maintenance at the general support level.

3.17.2 Scheduled maintenance. The air conditioner shall not require scheduled maintenance more often than every 1250 hours of operation when tested as specified in 4.5.3.17.

3.18 Identification marking. The air conditioner and its components shall be identified in accordance with MIL-STD-130. The marking shall be applied to the air conditioner and to each component on plates conforming to MIL-P-514, type I, style 3, compositon C, of type 1, grade A, class 1 material. Plates shall be attached and located where they are both visible and legible. Items unsuitable for marking shall be tagged, or tagged and bagged.

3.19 Instruction plates. Each air conditioner shall be equipped with instruction plates or diagrams, including warnings and cautions, describing any special or important procedures to be followed in assembling, operating or servicing the air conditioner. Instruction plates shall conform to MIL-P-514, type III, composition C, of type 1, grade A, class 1 material. Plates shall be attached and located where they are both visible and legible.

3.20 Workmanship.

3.20.1 Metal fabrication. Metal used in fabrication shall be free from kinks and sharp bends. The straightening of material shall be done by methods that will not cause injury to the material. Corners shall be square and true. All bends shall be made with controlled means to insure uniformity of size and shape. Precaution shall be taken to avoid overheating. Heated steel shall be allowed to cool slowly. External surfaces shall be free of burrs, sharp edges and corners, except when sharp edges or corners are required or where they are not detrimental to safety.

3.20.2 Bolt connections. Boltholes shall be accurately formed and shall have the burrs removed. Washers or lockwashers shall be provided where necessary. Matching thread areas securing bolts conforming to SAE J429 or capscrews shall be of sufficient strength to withstand the tensile strength of the bolt. All fasteners shall be correctly torqued and shall have full thread engagement.

3.20.3 Riveted connections. Rivets shall fill the holes completely. The upset rivet heads shall be full, neatly made, concentric with the rivet holes, and in full contact with the surface of the member, and shall be in accordance with SAE J492.

3.20.4 Welders and welding.

3.20.4.1 Welders. Before assigning any welder to manual welding work covered by this specification, the contractor shall obtain certification that the welder has passed qualification tests as prescribed by either of the following listed codes for the type welding operations to be performed and that such qualification is effective as defined by the particular codes:

ANSI/AWS D1.1, Structural Welding Code - Steel.
ANSI/AWS D1.2, Structural Welding Code - Aluminum.

Certification shall be made available for review by the contracting officer or designated represenative. Contractors who make only horizontal welds need not qualify welders for "all position welding". Subject to approval by the Government, contractor's standard welder qualification may be substituted in lieu of the above codes provided that the contractor's procedure is equivalent to the above codes. The contractor shall be responsible for determining that automatic welder equipment operators are capable of producing quality welds.

3.20.4.2 Welding. The surfaces of parts to be welded shall be free from oxide, scale, paint, grease, oil, or any other foreign matter. Immediately before welding, oxide shall be removed by an abrading or a chemical process. Grease and oil shall be removed by wiping with a solvent such as acetone. All surfaces shall be dried after cleaning. Welds shall transmit stress without permanent deformation or failure when the parts connected by welds are subjected to proof and service loadings. Complete and uniform penetration and fusion of the metals shall be obtained on all welds. All welded parts shall be free from cracks and other imperfections that may reduce the effectiveness of the part. Work shall be positioned for flat welding whenever possible.

3.20.5 Brazing. During the brazing operation a small amount of nonoxidizing gas shall be continously bled through the refrigerant lines to prevent internal oxide scaling. Care shall be exercised, during the brazing operation, to protect all components from deformation and damage. The quantity of brazing alloy and flux used shall be no more than that required to make the joint. Flux shall not be present in the refrigerant system and heavy beads and fillets of braze material shall be avoided.

3.20.6 Jigs and fixtures. Shop-fabricated components shall be assembled in steel jigs or frames and joined while held in position. Jigs and frames shall minimize distortion.

3.20.7 Interchangeability. All parts having the same part number shall be functionally and dimensionally interchangeable. Interchangeable parts are defined as two or more parts possessing such functional and physical characteristics as to be equivalent in performance and durability and capable of being exchanged one for the other without alteration of the parts themselves of adjoining parts except for adjustment and without selection for fit or performance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. The contractor is responsible for providing remote control cables and power cables necessary to perform the required contractor testing (see 3.9). Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, or purchase order the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Disassembly inspection. Failure of any test or examination of the first article shall be cause for disassembly, in the presence of a Government representative, of the first article to the extent necessary to determine the cause of the failure. Each disassembled part shall be examined in detail for compliance with this specification and referenced drawings in regard to materials, dimensions, tolerances, and workmanship. Parts not complying with such requirements shall be rejected and shall be cause for rejecting the first article.

4.1.3 Parts and components. Parts and components detailed on the drawings shall be inspected in accordance with Quality Assurance Provision (QAP) shown on the drawings. The drawings specify the characteristics requiring QAP inspection, the sampling plan, and the basis for acceptance and rejection (see 6.4).

4.1.4 End Item Final Inspection Requirement (EIFIR). Each air conditioner shall be inspected in accordance with the applicable EIFIR specified on the drawings. One copy of the completed EIFIR shall be shipped with each inspected air conditioner (see 6.5.2).

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

a. First article test (see 4.3).
b. Quality conformance inspection (see 4.4).
c. Inspection of packaging (see 4.6).

4.3 First article test. When specified (see 3.2 and 6.2), five first article air conditioners will be selected by the Government from the air conditioners being produced by production tooling and in production facilities and will be examined as specified in 4.5.1 and subjected to the tests marked "X" in the first article column of table III to determine conformance to the requirements of this specification.

4.4 Quality conformance inspection.

4.4.1 Examination. Each air conditioner shall be examined as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.4.2 Tests. Each Air conditioner shall be subjected to the tests marked "X" in column 3 of table III. Failure of any test shall be cause for rejection.

4.5 Inspection schedule.

4.5.1 Examination. Each air conditioner shall be examined for the following defects:

101. Nonconformance to the drawings (see 3.1.1).
102. Weight not as specified (see 3.1).
103. Refrigerant not as specified (see 3.11).
104. Electrical circuitry not protected from the effects of moisture and fungus growth (see 3.16).
105. Installation of wiring not as specified (see 3.16).
106. Treatment and painting, defects such as blisters, thin spots, lumps, scratches, runs, sags or not as specified on drawings.
107. Parts or components missing or not as specified (see 3.1.1, 3.9, 3.12.1, 3.13).
108. Any part (or component) not in accordance with QAP requirements as shown on the drawings (see 6.5.1).
109. Workmanship not as specified (see 3.20).
110. Identification marking not as specified (see 3.18).
111. Electromagnetic interference suppression not as specified (see 3.10).
112. Instruction and identification not as specified (see 3.18, and 3.19).
113. Materials not as specified (see 3.3).
114. Materials not resistant to corrosion and deterioration, or treated to be resistant to corrosion and deterioration for the applicable storage and operating environments (see 3.3.1).
115. Dissimilar metals as defined in MIL-STD-889 are not effectively insulated from each other (see 3.3.2).

116. Contractor does not have documentation available for identificatrion of materials, material finishes, or treatment (see 3.3.3).
117. Used, rebuilt or remanufactured components, pieces, or parts incorporated in the air conditioner (see 3.3.4).
118. Safety not as specified (see 3.12.2).

4.5.2 Test schedule. The test schedule is contained in table III.

TABLE III. Test schedule.1/

Test Seq	First Articles 1	2	3	Qual Conf	Test	Test para	Req para
1		2		3	4	5	6
1	X	X	X	X	Refrigeration system pressure.	4.5.3.2.1	3.4.3
2	X	X	X	X	Examination.	4.5.1	3.1, 3.3, 3.13, 3.16, 3.16.1, 3.18, 3.19, 3.20
3	X	X	X	X	Controls.	4.5.3.3	3.9
4	X	-	-	-	Refrigerant moisture content.	4.5.3.4	3.8
5	X	-	-	-	Electromagnetic interference.	4.5.3.17	3.10
6	X	X	X	X	Evaporator compartment air leakage.	4.5.3.6	3.14
7	X	-	-	-	Cooling capacity and airflow.	4.5.3.5	3.4.1, 3.4.4
8	X	-	-	-	Heating.	4.5.3.7	3.5.6
9	-	X	-	-	High temperature operation.	4.5.3.8	3.4.2
10	-	X	-	-	Rain.	4.5.3.9	3.7
11	-	X	-	-	Salt-fog.	4.5.3.10	3.6
12	X	X	-	X	Run-in.	4.5.3.11	3.4, 3.5
13	X	X	-	X	Refrigeration system leak.	4.5.3.2.2	3.8
14	-	-	X	-	Functional.	4.5.3.12	3.9
15	-	-	X	-	Operational.	4.5.3.13	3.4, 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.5, 3.8
16	-	-	X2/	-	Realibility	4.5.3.14	3.5
17	X	-	-	-	Noise level.	4.5.3.18	3.11
18	X	X	X	-	Maintenance evaluation.	4.5.3.17	3.17

1/ Perform inspection marked "X".

2/ Furnish three air conditioners for reliability test.

4.5.3 Tests. Remote control cables and power cables required for testing shall be provided by the contractor (see 3.9).

4.5.3.1 Conditions. Unless otherwise specified herein, tests shall be conducted at rated voltage and 400 Hertz electrical power. The frequency tolerances for all tests shall be plus or minus 1 percent. Unless otherwise specified herein, no braces, sealing materials, tiedown devices, or other items that are not inherently a part of the operating air conditioner shall be employed. Unless otherwise specified herein, no alinement of components, addition of refrigerant, or other servicing shall be performed on the production model or production air conditioners after testing of the air conditioner has been initiated. Components subject to atmospheric corrosion shall not be treated with any treatment such as grease or oil in order to meet test requirements. Capacity, airflow, and evaporator compartment air leakage tests shall be conducted utilizing the instruments, apparatus, tolerances, and procedures specified in American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standards, as indicated in the specific test paragraph. If desired, the instruments, apparatus, and procedures specified in ARI Standard 210 may be utilized for the airflow and evaporator compartment air leakage tests. Prior to the capacity tests, thermocouples shall be installed at the thermal expansion valve bulb, quench valve bulb, quench valve discharge line, bypass valve discharge line, liquid line at the expansion valve inlet, and hot gas compressor discharge line. After installation, the thermocouples shall be completely insulated to prevent ambient temperatures from affecting the temperatures obtained from them. In addition to the data required by the applicable ASHRAE standards, temperatures obtained from the above thermocouples shall be recorded at the same times that the ASHRAE data are recorded. These temperatures shall be used in the event of capacity test failures to trouble-shoot the refrigeration systems. Run-in tests shall be conducted utilizing instruments in the ASHRAE Standards specified herein. The test chamber(s) shall be located within a controlled environment so that the chamber(s) is not affected by sudden change in outside climatic conditions during a test run.

4.5.3.2 Refrigerant system pressure and leakage.

4.5.3.2.1 Refrigerant system pressure. Charge the refrigerant system to 425 psig, +5 -0 psig with dry nitrogen containing refrigerant gas detectable with halogen-sensitive electronic leak detector (General Electric Type H-2 or equal). Reduce the pressure to 300 psig, plus or minus 5 psig. Calibrate the leak detector for the type of gas and percentage of mixture employed and set the detector to indicate a leakage rate of 0.5 ounce per year (except 0.1 for first article units only) corrected to the percentage of the mixture. Check the entire refrigerant system for leaks. One or more of the following shall constitute failure of this test:

a. Permanent deformation of any component in the refrigerant system.
b. Any detectable refrigerant leak.

4.5.3.2.2 Refrigerant system leakage. Test for leakage at room ambient temperature (70 °F or above) with a halogen-sensitive electronic leak detector (General Electric Type H-2 or equal). Calibrate the leak detector for the type of

gas and set the detector to indicate a leakage rate of 0.5 ounce per year (except 0.1 for first article units only). Check the entire refrigerant system for leaks. A detectable leak shall constitute failure of this test.

4.5.3.3 Controls. With power connected to the air conditioner, position the mode selector switch in the off position. Determine that the air conditioner components are, with the exception of the crankcrase heater, inoperative. Position the selector switch in the Cool position and the conditioned air thermostat for Cooler. Immerse the return air thermostat sensor in water or air having a temperature of 70 +15 or -5 °F. Determine that the evaporator and condenser fan motors are energized and operating and the heaters are off. After a time delay, determine that the compressor motor has started and is operating. Determine that there is refrigerant flow through the liquid solenoid shutoff valve to the expansion valve and not through the discharge bypass valve. Immerse the conditioned air thermostat bulb in water or air at a temperature of 70 +15 or -5 °F and position the conditioned air thermostat for Warmer. Determine that the compressor motor and evaporator and condenser fan motors are energized and operating. Determine that there is no refrigerant flow through the liquid solenoid shutoff valve to the expansion valve and that the discharge bypass valve maintains suction pressures of not less than 53 psig. Position the selector switch in the High Heat position and the conditioned air thermostat for Warmer. Immerse the conditioned air thermostat bulb in water or air having a temperature of 80 +5 or -15 °F. Determine that the evaporator fan motor is energized and operating and the compressor motor and condenser fan motor are off. Determine that both banks of heaters are energized and operating. Position the conditioned air thermostat for Cooler. Determine that one bank of heaters is energized and operating, and the other bank of heaters is off. Position the selector switch in the Low Heat position. With the conditioned air thermostat bulb still immersed in water or air at a temperature of 80 +5° F or -15 °F, position the conditioned air thermostat for Warmer. Determine that one bank of heaters is energized and operating and the other bank of heaters is off. Position the conditioned air thermostat for Cooler. Determine that both banks of heaters are off. Nonconformance to 3.8, 3.9.1, and 3.9.2 shall constitute failure of this test.

4.5.3.3.1 High pressure cutout switch. The high pressure cutout switch shall be bench tested prior to installation in the air conditioner, and shall be tested in the air conditioner as follows:

a. Prior to installation in the air conditioner, bench test the high pressure cutout switch. Using dry nitrogen, increase the pressure to the switch until it opens (cuts out). Record the pressure at which the switch opens. Repeat this test procedure two more times. Cutout pressures not within those specified herein shall constitute failure of this test.
b. Subsequent to the bench test, the high pressure cutout switch shall be tested in the air conditioner with the air conditioner operating in the cooling mode. With the compressor operating, press the high pressure switch reset button. The compressor shall cease to operate. Failure of the compressor to cease operating at the time the reset button is pressed shall constitute failure of this test.

4.5.3.3.2 Low pressure cutout switch. Electrically connect a continuity meter to the pins of the low pressure switch. The meter shall show a closed circuit. Connect a low pressure gage to the suction service valve. Bleed the gas from the unit while constantly monitoring the suction pressure and continuity meter. The continuity meter shall show an open circuit when the suction pressure reduces to the low pressure specified in 3.9.4. Subsequent to this test, charge the unit with refrigerant only. This test may be performed at the end of the pressure and leak test, 4.5.3.2.1 and 4.5.3.2.2 and prior to charging the unit.

4.5.3.3.2.1 Basis of failure. The following shall constitute failure of this test:

a. The continuity meter indicating an open circuit prior to charge bleedoff.
b. Failure of the continuity meter to show an open circuit when the suction pressure reduces to the low pressure specified.

4.5.3.4 Refrigerant moisture content. After not less than 1 hour of continuous operation on the cooling cycle in an ambient temperature of not less than plus 95 °F, shut down the air conditioner. After an additional period of 1 hour, withdraw a sample of approximately 1 pound of refrigerant from the low-pressure side and determine the moisture content by one of the methods specified in BB-F-1421 or by the Karl Fischer methods. A moisture content of more than 25 ppm shall constitute failure of this test.

4.5.3.5 Cooling capacity and airflow. Test the air conditioner for cooling capacity as prescribed in ASHRAE 16 but at the capacity rating conditions specified in 3.4.1. Provision for control of external static pressure as specified in 3.4.1 must be used during this testing. Test the evaporator fan for airflow as prescribed in ASHRAE 16 but at the conditions specified in 3.4.1, condition B. Insulating or sealing material that is not inherently a part of the air conditioner shall not be employed. Nonconformance to 3.4.1, 3.4.4, and 3.4.5 shall constitute failure of this test.

4.5.3.6 Evaporator compartment air leakage. Seal the evaporator-air-discharge and return-air openings and plug the condensate drains. Attach a duct equipped with an air circulating and measuring device to the fresh air opening (see 3.14) on the air conditioner. Seal the connection between the air conditioner and duct to prevent external air leakage. Other sealing that is not a part of the air conditioner shall not be permitted except as required for instrumentation lines. By means of the air-circulating device, subject the evaporator compartment to a static pressure of 1.2 inch wg and maintain the pressure for not less than 5 minutes while measuring the airflow leak in accordance with airflow measuring methods in ASHRAE 16. Nonconformance to 3.14 shall constitute failure of this test.

4.5.3.7 Heating. The test shall be conducted in an ambient temperature of 75 +0 -5 °F. Prior to recording any data, operate the air conditioner with the mode selector switch in the High Heat position and the conditioned air

thermostat set for Warmer for a period of not less than 2 hours. Repeat this test with the mode selector switch in the low heat position. Calculate the heating capacity utilizing the following equation:

QH = 3.414 X W

where QH = Heating capacity in Btu/hr.

W = Power input (watts)

Measure the power input (watts) to the air conditioner and the electric potential (volts) from the air conditioner casing to ground. Nonconformance to 3.4.5 and 3.4.6 shall constitute failure of this test.

4.5.3.8 High temperature operation. Subject the air conditioner to a temperature of plus 120 +3 -0 °F for a period of 4 hours. After completion of the exposure period, operate the air conditioner in the cooling mode for a period of not less than 1 hour in an ambient temperature of plus 120 +3 -0 °F with air at plus 120 +3 -0 °F entering the evaporator and condenser. Also start and operate the air conditioner for not less than one hour in an ambient temperature of 125 +3 -0 °F with evaporator return air at 92 +3 -0 °F. Inability of the air conditioner to start and operate, or nonconformance to 3.4.2 and 3.4.3 shall constitute failure of this test.

4.5.3.9 Rain.

4.5.3.9.1 Test method. The air conditioner shall be installed on a shelter with the evaporator section flush with the outside opening of the enclosure. The test facility, equipment and instrumentation shall be as prescribed in MIL-STD-810, method 506, Rain, except test time and rate shall be as shown in table IV, and unit shall operate in cooling mode during complete test. The depth of rainfall shall be measured near the surface of the test unit by a U. S. Weather Bureau type gage. Operating mode shall be maximum Cool. Heat may be applied in the test inclosure if required to simulate normal operating conditions. Carefully seal mating point between test unit and inclosure to insure no leakage. Visually inspect unit following test.

TABLE IV. Rain test rates.

Test time with 40 mph winds 1/ (minutes)	Average rainfall rate (inches/hour)
1 followed by	20 minimum
5 followed by	6.6

TABLE IV. Rain test rates. (cont'd)

Test time with 40 mph winds 1/ (minutes)	Average rainfall rate (inches/hour)
10 followed by	3
60 followed by	4
120	0.36

1/ Each of the three exposed sides

4.5.3.9.2 Basis of failure. One or more of the following shall constitute failure of the rain test.

a. Evidence of water leaking or blowing into the enclosure.
b. Malfunction of components from an electrical short or water effect during operation.
c. Nonconformance to 3.7.

4.5.3.10 Salt fog. Subject the air conditioner to test method 509, procedure I of MIL-STD-810 except that pH of the salt solution shall be measured electrometrically only; magnesium chloride shall not be used in preparing the test items, and both evaporator inlet and outlet shall be sealed tightly during the salt fog exposure. Do not operate the air conditioner during exposure. Evaporator inlet and outlet shall be sealed tightly during the salt fog exposure. Prior to this test and after the exposure period, operate the air conditioner in accordance with 4.5.3.3 to determine function of the controls. Nonconformance to 3.6 shall constitute failure of this test.

4.5.3.11 Run-in.

4.5.3.11.1 Run-in performance. Install ducts on the evaporator return air openings, evaporator-air-discharge opening and condenser air inlet opening of each air conditioner. Each duct shall be not less than 12 inches long and of the same cross sectional dimensions as the respective openings. Equip each duct with a thermocouple grid to measure average entering and leaving air temperatures to the evaporator and entering air to the condenser. Measure the evaporator air wet bulb temperature by psychrometer device located in the test chamber. Operate the air conditioner for not less than 1 hour in the high heat mode at any temperature above 65 °F. During the last 10 minutes of heater operation, record items a, c, and g in table VI. Then continue to operate the unit for not less than 1 hour in the cooling mode while maintaining the supply voltage to the air conditioner within plus or minus 5 percent. The air

temperature entering the evaporator return and condenser inlet shall be as specified in table V. After stabilization, three sets of the data specified in table VI shall be recorded and averaged during the last 30 minutes of operation (every ten minutes). After completion of the above, operate the air conditioner in an ambient temperature between 100 and 120 °F for a total period of 3 hours in the cooling mode, in cyclic operation of 55 minutes "ON" and 5 minutes "OFF". After completion of the 3 hour operation, continue operating the air conditioner in the cooling mode for not less than an additional 3 hours while maintaining the supply voltage to the air conditioner within ±5 percent and temperature of the air entering the evaporator return and condenser inlet as specified in table VII. After stabilization, three sets of the data specified in table V shall be recorded and averaged during the last 30 minutes. During the last 10 minutes of operation, record the power input (watts) to the air conditioner. After completion of the 30 minutes operation period, conduct the refrigerant system leak test as specified in 4.5.3.2.2.

4.5.3.11.2 Run-in performance curves. Not less than 15 units shall be used to establish acceptance curves. Data obtained in accordance with 4.5.3.11.1 shall be used by the contractor to select one high and one low unit which then shall be capacity tested at condition B of 3.4.1. If any high or low limit air conditioner fails to meet minimum requirements of 3.4.1 it shall be replaced by the next low or high unit and that unit tested. Operate the high and low air conditioner continuously in the cooling mode for not less than 1 hour under each of the conditions specified in table V. After stabilization, four sets of data specified in table VI shall be recorded and averaged for each of the conditions in table V during the last 30 minutes (every 10 minutes). Establish high and low limits of acceptance 1/ for production units by plotting the following curves from data specified in table VI:

a. Average evaporator entering dry bulb temperature versus average temperature differential between evaporator inlet and outlet air temperatures for each of the condenser entering temperatures recorded.
b. Average evaporator entering dry bulb temperature versus kilowatt power input for each of the condenser entering temperatures.
c. Average evaporator entering dry bulb temperature versus suction pressure for each of the condenser entering temperatures.
d. Average evaporator entering dry bulb temperature versus discharge pressure for each of the condenser entering temperatures.
e. Average temperature rise from the evaporator return air to the discharge air in the high heat mode.

TABLE V. Temperature conditions for run-in performance curves.

Location	Temperature Condition I	Condition II	Condition III	Condition IV
Evaporator return.	89 °F ± .5	95 °F ± .5	89 °F ± .5	95 °F ± .5
Condenser inlet.	107 °F ± .5	113 °F ± .5	113 °F ± .5	107 °F ± .5
(Evaporator return and condenser inlet: Dry coil state all conditions.)				

TABLE VI. Data required for run-in performance curves.

a. Dry bulb temperature of air entering the evaporator, °F.
b. Wet bulb temperature of air entering the evaporator, °F.
c. Dry bulb temperature of air leaving the evaporator, °F.
d. Dry bulb temperature of air entering the condenser, °F.
e. Condensing pressure, psig.
f. Suction pressure, psig.
g. Power consumption of the air conditioner, watts.

1/ Provide for a 3% tolerance on temperature differentials, 2 psi on suction pressure and 3 psi on discharge pressure.

TABLE VII. Temperature conditions for run-in performance.

Location	Temperature
a. Evaporator return.	Dry bulb: 92 ±3 °F.
b. Evaporator return.	Wet bulb: dry coil condition.
c. Condenser inlet.	Dry bulb: 110 ±3 °F.
d. Condenser inlet.	Wet bulb: dry coil condition.

4.5.3.12 Functional. Place the air conditioner in any ambient temperature between 65 and 85 °F. Position the mode selector switch in the Off position with power connected. Determine that all the air conditioner components, with the exception of the crankcase heater, are inoperative. Position the mode selector switch in the Cool position and the thermostat at Cooler. Determine

that the evaporator and condenser fan motors are energized and operating, and after a short time delay that the compressor is energized and operating. Determine that there is decrease in temperature of the evaporator air discharge by monitoring the discharge air with a thermometer every 60 seconds for a total of 5 minutes. Position the thermostat for Warmer. Determine that the air conditioner is in the bypass mode by again monitoring the evaporator air discharge with a thermometer every 60 seconds for a total of 5 minutes. The temperatures of the air should rise. Repeat the above operations not less than two more times. Inability of the air conditioner to cool and bypass shall constitute failure of this test.

4.5.3.13 Operational. Place the air conditioner in any ambient temperature between 65 and 85 °F. Install sheet metal ducts on the evaporator return-air inlets and evaporator-air-discharge openings. Each duct shall be not less than 24 inches long and of the same cross sectional dimensions as the respective openings. Equip each duct with two dry-bulb thermometers located in the duct 18 inches from the front of the air conditioner and equally spaced over the cross section of the duct at fixed locations so as to give average entering and leaving air temperatures. Connect instrumentation to measure voltage and amperage input to the air conditioner. Operate the air conditioner with the selector switch in the Cool position and the thermostat set for cooler for not less than 2 hours. During operation, perform the following:

a. Visually observe the refrigerant sight glass to ascertain that the air conditioner has a full dry charge (clear sight glass with a green dot in center).
b. Examine for abnormal operation, such as excessive noise, misalinement of components or any irregular operation.
c. Record air temperature, evaporator inlet and outlet, dry bulb, ° F.
d. Record volts, amperes, and watts input to air conditioner. One or more of the following shall constitute failure of this test:

(1) Inability to operate.
(2) Abnormal operation.
(3) Low refrigerant charge.
(4) Air temperature drop between evaporator inlet and outlet less than 17 °F.
(5) Power draw in the cooling mode more than as specified in 3.5.5.

4.5.3.14 Realiability. The air conditioners shall be tested as specified herein for a total test time of 5600 hours. The Government shall be the authorized scorer of failures. The occurrence of six or more failures, or nonconformance to 3.5 shall constitute failure of this test.

4.5.3.14.1 Test facility. Install the air conditioners in a test chamber consisting of two rooms. One room shall function as an indoor room and shall maintain the evaporator return air temperature as specified in figure 1 within ±5 °F. The second room shall function as an outdoor room and shall maintain the

condenser return air temperature as specified in figure 1 within ±5 °F. These temperatures shall be maintained on a 24-hour cyclic basis as shown in figure 1 throughout the reliability test.

4.5.3.14.2 Operation. All air conditioner controls (rotary switch, and thermostat) shall be operated manually or automatically. If automatic means are used, they shall not interrupt the control circuit but shall physically operate the air conditioner control components. The controls shall be positioned as shown in table VIII.

TABLE VIII. Control positions for reliability test.

Mode	Time	Control	Control Position
Heating	0030 to 0130	Rotary switch	High heat
Heating	0030 to 0100	Thermostat	Extreme clockwise
Heating	0100 to 0130	Thermostat	Extreme counterclockwise
Bypass	0130 to 0400	Rotary switch	Cool
Bypass	0130 to 0400	Thermostat	Extreme clockwise
Cooling	0400 to 2100	Rotary switch	Cool
Cooling	0400 to 2100	Thermostat	Extreme counterclockwise
Bypass	2100 to 2330	Rotary switch	Cool
Bypass	2100 to 2330	Thermostat	Extreme clockwise
Off	2330 to 0030	Rotary switch	Off

4.5.3.14.3 Data. The following shall be monitored and recorded throughout the test as required to determine that normal air conditioner operation is being maintained and to identify problems in event of failure or malfunction:

a. Voltage.
b. Current.
c. Power.
d. Frequency.
e. Refrigerant pressures.

(1) Suction.
(2) Discharge.

f. Refrigerant temperatures.

(1) Compressor discharge.
(2) Liquid line.
(3) Suction line (at compressor).

g. Air temperatures.

(1) Evaporator return (db).
(2) Evaporator discharge (db).
(3) Condenser return (db).

h. Abnormal operation (visual and audio observation).
i. Sight glass observation (clear or bubbles, color or dot).
j. Identification of unit.
k. Initials of technician.
l. All failures.
m. Time of day of failure.
n. Action taken if failure occurs.

4.5.3.14.4 Failure criteria. A failure is defined as any malfuction for which corrective action cannot be deferred until the next scheduled organizational preventive maintenance check, provided corrective maintenance action can be performed at the organization level with available tools. Corrective action is not deferrable if the malfunction causes or may cause inability to commence operation of the unit, cessation of operation of the unit, or degradation of performance capability of the air conditioner below the levels required for the accomplishment of its mission functions. Malfunctions will not be counted as "failures" for reliability purposes if detected and corrected during initial inspection. Malfunctions resulting from operational or maintenance errors will not be counted. A malfunction shall be considered to have occurred if the following happens:

a. Air temperature difference across the evaporator coil lower than 17 °F when the air conditioner is in the cooling mode.
b. Current draw is greater than 26.0 amps when the air conditioner is in the cooling mode.
c. Current draw is greater than 28.0 amps when the air conditioner is in the heating mode with the thermostat in the extreme warmer position.

d. Current draw does not decrease when the air conditioner is in the heating mode and the thermostat is changed from the extreme warmer position to the extreme cooler position.
e. Temperature at the evaporator discharge does not increase when the air conditioner is put into the heating mode.
f. The sight glass is not clear when the air conditioner is in the cooling mode.
g. The discharge pressure is greater than 375 psig when the air conditioner is in the cooling mode.
h. The suction pressure is lower than 53 psig when the air con- ditioner is in the cooling mode.
i. The suction pressure is lower than 53 psig when the air con- ditioner is in the bypass mode.
j. The evaporator discharge temperature does not increase when the air conditioner is changed from the cooling mode to the bypass mode.
k. Any abnormal operation occurs as determined by visual and audible observation.

4.5.3.15 Tilted operation. Operate the air conditioner on cooling mode for a period of not less than 12 hours at the following conditions:

Temperature: 70 to 80 °F db
Relative humidity: 70 percent minimum

During this test, operate the air conditioner with the bottom at a slope of 10 degrees from the horizontal. Each of the four bottom edges and each bottom corner shall be raised, in turn, to form the 10 degree slope and the unit operated for 3 hours in each position. Nonconformance to 3.7 shall constitute failure of this test.

4.5.3.16 Electromagnetic interference. The air conditioner shall be tested in accordance with MIL-STD-461A, Notice 4 and MIL-STD-462A, Notice 3 for CE04 (conducted interference: 50 KHz - 50 MHz) and RE02 (radiated interference, broadband, 14 KHz - 1GHz figures 5 and either 13 or 18 as applicable). The contractor shall provide shielded remote control and power cables for this test (see 3.9). The contractor shall furnish the contracting officer a test plan and test report as required by MIL-STD-461. Disapproval of the test report shall constitute failure of this test.

4.5.3.17 Maintenance evaluation. The maintenance ratio shall be computed during first article testing. All maintenance actions required during first article testing shall be assessed to determine conformance to 3.17.1. Nonconformance to 3.17.2 shall constitute failure of this test.

4.5.3.18 Noise level. To determine the noise level for the air conditioner evaporator and condenser sides use the following test procedure:

a. Assemble the air conditioner in the horizontal configuration. Install through a partition of construction sufficiently heavy to not contribute resonant noise amplification. The fresh air intake complete with filter shall be in place during this test.

b. Set air conditioner into partition as follows:

(1) Evaporator side test: With no more than 2 inches of the side surfaces extending into the inside room where measurements are to be taken.
(2) Condenser side test: With not more than 4 inches of the side surfaces extending into the partition.

c. Evaporator side readings may be made in an anechoic room or a non-reverberant room not less than 21 cubic meters (750 cubic feet) volume. No wall surface perpendicular to the mounting partition shall be less than 4 feet from the center line of the air conditioner.
d. Condenser side readings may be made outdoors, in an anechoic room or in a non-reverberant room of not less than 85 cubic meters (3000 cubic feet) volume. No wall surface perpendicular to the mounting partition shall be less than 4 feet from the center line of the air conditioner.
e. Microphone locations shall be at a height from the floor equal to the location of the air conditioner bottom surface and:

(1) Evaporator side test: Located one meter from the cool air outlet face of the air conditioner. Take three readings; one at the air conditioner centerline, the other two at points one meter to either side of the centerline.
(2) Condenser side test: Located two meters from the condenser air discharge surface of the air conditioner. Take three readings; one at the centerline, the other two at points two meters to either side of the centerline.

f. Data shall be collected with equipment and methods as described in ANSI S1.13 for laboratory type methods.
g. Sound level readings shall include one set of data to record the background level and one set of data with the air conditioner running in the maximum cool mode.
h. Test result for each side shall be the average of the three readings for that side corrected for the effect of background noise.

4.5.3.18.1 Evaporator side test result greater than 75 db(A) shall constitute test failure. Condenser side test result greater than 85 db(A) shall require the contractor to apply warning labels in accordance with the exception in 3.11 for all units produced under this contract.

4.6 Inspection of packaging.

4.6.1 Quality conformance inspection of pack.

4.6.1.1 Unit of product. For the purpose of inspection, a complete pack prepared for shipment shall be considered a unit of product.

4.6.1.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.6.1.3 Examination. Samples selected in accordance with 4.6.1.2 shall be examined for the following defects. The AQL shall be 1.0 percent defective.

119.	Materials, methods, and containers not as specified for level A or B. Each incorrect material, method, or container shall be considered one defect.
120.	Canvas cover not placed over condenser side of air conditioner as specified for level A or B.
121.	Technical publications not placed in envelope and contained with air conditioner as specified for level A or B.
122.	Remote control assembly not placed in separate box or box not sealed as specified for level A or B.
123.	Air conditioner not preserved in accordance with the referenced document for commercial packaging.
124.	Shipping container not of a size allowing clearance required for level A or B.
125.	Air conditioner not secured as specified for level A or B.
126.	Remote control assembly box not secured as specified for level A or B.
127.	Strapping not as specified for level A.
128.	Air conditioner not packed in accordance with the referenced document for commercial.
129.	Marking missing, illegible, incorrect or incomplete for level A, B, or commercial.

5. PACKAGING

5.1 Preservation. Preservation shall be level A, level B, or commercial as specified (see 6.2).

5.1.1 Level A. The air conditioner shall be preserved in accordance with MIL-P-116, method IIa. Prior to enclosing the air conditioner in the barrier material, the canvas cover for the condenser side of the unit shall be snapped in place. The technical publications shall be placed in a paper or plastic envelope and placed within the method IIa pack.

5.1.1.1 Remote control assembly. The remote control assembly shall be placed within a close- fitting box conforming to PPP-B-636, W5c, or W6c, style optional. The box shall be closed and sealed as specified for method V in the appendix to the box specification.

5.1.2 Level B. The air conditioner shall be enclosed within a bag fabricated from not less than 0.003 inch gage material conforming to L-P-378. The canvas cover and technical publications shall be prepared as specified in 5.1.1. After the air conditioner has been secured to the base of the box specified in 5.2.1 or 5.2.2 the bag shall be sealed by heat sealing or tape.

5.1.2.1 Remote control assembly. The remote control assembly shall be prepared as specified in 5.1.1.1.

5.1.3 Commercial. Each complete air conditioner shall be preserved in accordance with ASTM D 3951.

5.2 Packing. Packing shall be level A, level B, or commercial as specified (see 6.2).

5.2.1 Level A. Each complete air conditioner, preserved as specified in 5.1, shall be packed in a box conforming to PPP-B-601, overseas type, style I or J. The box shall be of a size to allow a two inch clearance on each side, top and end. The air conditioner shall be secured through the barrier material to the bottom of the box with a minimum of four bolts, utilizing the corner boltholes provided in the bottom of the air conditioner. The box shall be modified with skids in accordance with the box specification except that the skids shall be located so that the bolts securing the air conditioner to the box pass through the skids. Bolt heads shall be counter-sunk into the bottom of the skids. The box containing the remote control assembly shall be secured to the air conditioner inside the barrier material in a manner to prevent damage to the barrier material. Box closure and strapping shall be in accordance with the appendix to the box specification. Strapping shall conform to QQ-S-781, class 1, type I or IV, finish B.

5.2.2 Level B. Each complete air conditioner, preserved as specified in 5.1, shall be packed as specified in 5.2.1 except the box shall be domestic type. Box closure and strapping shall be in accordance with the appendix to the box specification.

5.2.3 Commercial. Each complete air conditioner, preserved as specified in 5.1, shall be packed in a container in accordance with ASTM D 3951.

5.3 Marking.

5.3.1 Levels A and B. Marking for levels A and B shall be in accordance with MIL-STD-129, and the special marking specified in 5.3.3.

5.3.2 Commercial. Marking for commercial packaging shall be in accordance with ASTM D 3951, and the special marking specified in 5.3.3. Shipping weight and cube data shall be marked on each container.

5.3.3 Special marking. Each shipping container shall be marked to indicate that the air conditioners shall remain in the operating position during shipment and storage. Special markings shall consist of arrows and the words "THIS END UP". Special marking shall be placed within the upper third of each side of the shipping container in black letters not less than 3 inches high.

6. NOTES

6.1 Intended use. The air conditioners covered by this specification are intended for use in cooling, dehumidifying, heating, and circulating air for portable shelters or vans in accordance with equipment and personnel requirements.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Date of issue of DoDISS applicable to this contract and exceptions thereto (see 2.1.1).
c. Time frame and number of air conditioners required for submission of first article (see 3.2).
d. When the Government will conduct any or all of the first article examination and tests. When the Government will conduct some but not all of the first article examination and tests, the contracting officer should specify which examination and tests will be conducted by the Government and which examination and test shall be conducted by the contractor (see 3.2).
e. Degree of preservation and packaging required (see 5.1 and 5.2).
f. When the remote control assembly (13221E9111) is NOT to be furnished as a part of the air conditioner.

NOTE: This air conditioner will not operate without a remote control assembly (13221E9111), an appropriate power cable, and at least one remote control cable (13221E9145-1 or -3).

6.3 First article. When a first article inspection is required, the items should be preproduction models. The first article should consist of five units. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, tests, and approval of the first article test results and disposition of the first article.

6.4 Quality Assurance Provisions (QAP). The contracting officer should require the contractor to maintain records of all QAP inspections. A suggested paragraph is as follows:

"The contractor shall maintain complete records of all examinations and tests performed to verify the requirements of classified QAP characteristics. The records shall include as a minimum, lot size, sample size, drawing requirements, actual measurement, number and type of deficiencies found, quantity rejected, corrective action taken when applicable."

6.5 Definitions.

6.5.1 Quality Assurance Provisions (QAP). A QAP is a contractual requirement that supplements Section 4 of the specification. QAP indicates the minimum requirements which must be inspected on the product drawings to verify the design objectives of the product and assure interchange- ability of repair parts.

6.5.2 End Item Final Inspection Requirement (EIFIR). An EIFIR is a check list of quality characteristics prepared by the Government which the contractor must follow during his final inspection of the completed end item to verify complete and functional conformance to contract requirements prior to submission for final acceptance.

6.6 Electromagnetic interference.

a. These air conditioners have been previously qualified (with the exception of automatic switching transients in the radiated mode

which did not satisfy this requirement) to MIL-STD-461A, Notice 4, and MIL-STD-462, Notice 3, as specified in Section 3 and 4 of this specification. Subsequent notices or revisions should not be made applicable to a procurement contract.

b. The contracting officer should include the following in acquisition documents:

(1) Notices or revisions other than those listed below are not applicable:

MIL-STD-461A, Notice 4.
MIL-STD-462, Notice 3.

(2) Bidders are cautioned against failing to properly take into consideration the radio frequency interference suppression/ electromagnetic interference characteristics requirements for the end items in preparing their bids.

The foregoing are performance requirements only. Specific drawings which may be incorporated therein are intended as an example of a method which was successful in the past. Since each offeror has latitude in selecting electrical components within the requirements of the drawings and specifications, and the electromagnetic emission and suppression characteristics may differ from those previously used, the Government does not expressly or impliedly warrant that performance requirements will be met if such drawings are followed and reliance upon such drawings is at the contractor's own risk.

6.7 Subject term (key word) listing.

Air conditioner, alternating current
Air conditioner, 18.000 Btu/hr cooling
Air conditioner, split-package
Air conditioner, 30,000 Btu/hr heating
Air conditioner, 208 volt, 3 phase, 400-Hertz

6.8 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Army - ME

Preparing activity:
Army - ME

Project 4120-A306

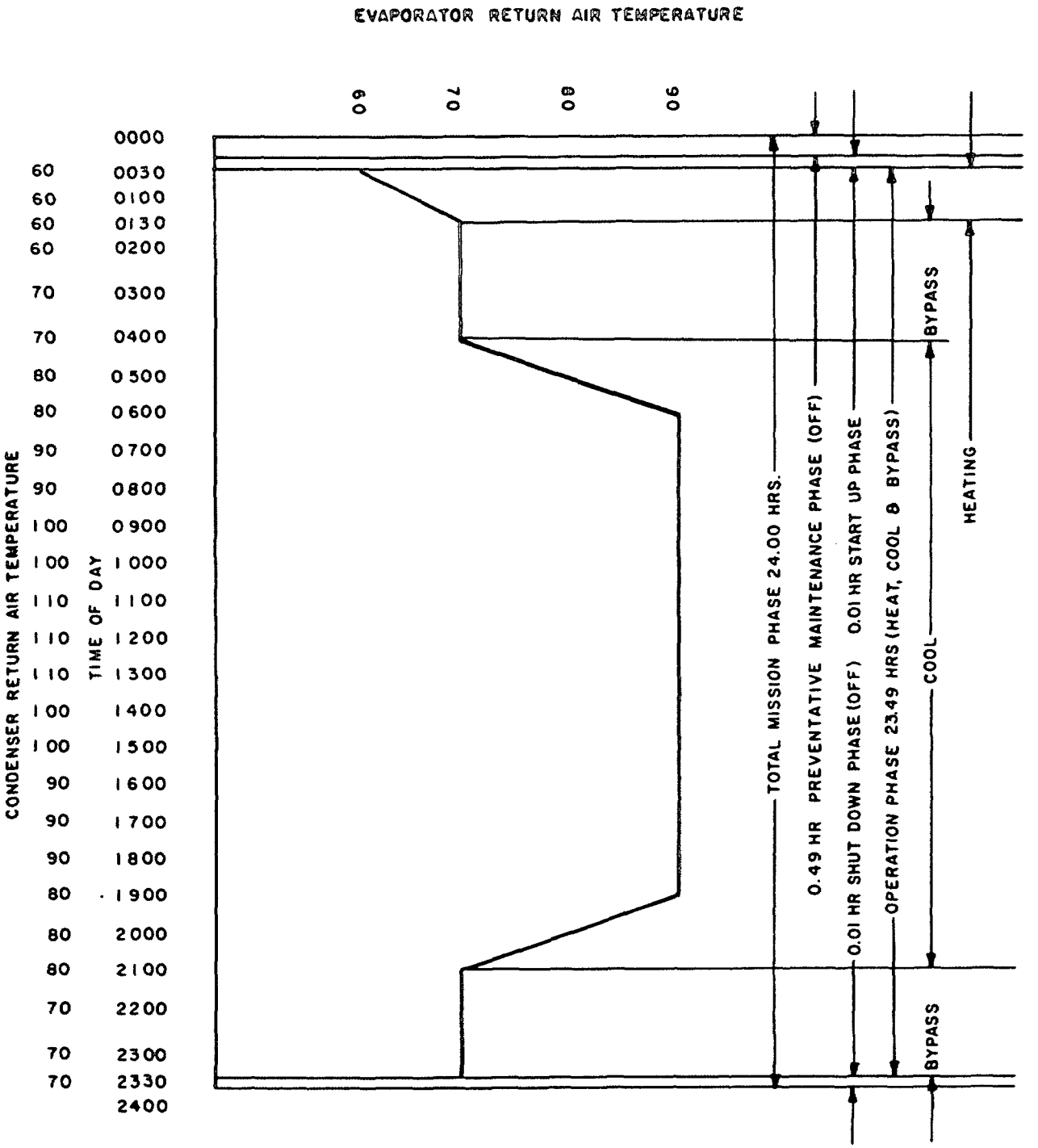

FIGURE 1. Standardized test profile.

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