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SUPERSEDING
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MILITARY SPECIFICATION

WEIGHT AND BALANCE SYSTEM, AIRCRAFT, INTEGRAL A/A32H-8

This specification is approved for use by the Department of the Air Force and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers a weight and balance system, designated A/A32H-8, suitable for use in Type C-130 aircraft. The system is to be mounted in the aircraft and become a part of the flight vehicle. No ground equipment nor external ground power is required to operate the system.

1.1.1 In use on the ground, the weight and balance system shall weigh the aircraft (including fuel and payload) arid display both its total weight and center-of-gravity. The center-of-gravity shall be displayed as a percent of the mean aerodynamic chord (MAC) of the aircraft.

2. APPLICABLE DOCUMENTS

2.1 Issues of Documents. The following documents of the issue in effect on the date of invitation for bids, or request for proposal, form a part of this specifications to the extent specified herein:

SPECIFICATIONS

FEDERAL

QQ-P-416	Plating, Cadmium (Electrodeposited)
MMM-A-132	Adhesives, Heat Resistant, Airframe Structural; Metal-to-Metal
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-636	Boxes, Shipping, Fiberboard

MILITARY

MIL-P-116	Preservation-Packaging, Methods of
MIL-E-5400	Electronic Equipment, Airborne, General Specification for
MIL-C-5541	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-T-6053	Tests, Impact, Shock Absorber, Landing Gear, Aircraft
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specification for

MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-F-14072	Finishes for Ground Signal Equipment

STANDARDS

FEDERAL

FED-STD-595	Colors

MILITARY

MIL-STD-100	Engineering Drawing Practices
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of US Military Property
MIL-STD-143	Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-461	Electromagnetic Interference Characteristics Requirements for Equipment
MIL-STD-470	Maintainability Program Requirements (For Systems and Equipments]
MIL-STD-471	Maintainability Verification/Demonstration/Evaluation
MIL-STD-704	Electric Power, Aircraft, Characteristics and Utilization of
MIL-STD-781	Reliability Tests: Exponential Distribution
MIL-STD-785	Reliability Program for Systems and Equipment Development and Production
MIL-STD-810	Environmental Test Methods
MIL-STD-831	Test Reports, Preparation of
MIL-STD-882	System Safety Program for Systems and Associated Subsystems and Equipment; Requirements for
MIL-STD-889	Dissimilar Metals
MS24264	Connectors, Receptacle, Electrical Flange Mount, Miniature
MS24266	Connectors, Plug, Electrical - Straight, Miniature

HANDBOOKS

AFSC DH 1-6	System Safety

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Preproduction. This specification makes provisions for preproduction testing.

3.2 Components. The weight and balance system shall consist of the following major components:

Quantity	Item Name
1 each	Weight and balance computer
4 sets each	Main axle sensing assemblies consisting of:
	4 each adapter, sensor assembly 4 each sensor assembly, dual 4 each preload assembly, sensor
2 sets each	Nose axle sensing assemblies consisting of:
	2 each adapter, sensor assembly 2 each sensor assembly, single 2 each preload assembly, sensor

3.3 Standards and specifications. Standards and specifications for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.4 Parts and materials

3.4.1 Electronic parts. The selection of electronic and electrical parts and the application thereof shall be in accordance with MIL-E-5400, except that successful completion of the system preproduction and reliability tests shall constitute the required approval of all nonstandard electronic and electrical parts. Approval of nonstandard parts shall not be required prior to use in the preproduction and reliability test samples.

3.4.1.1 Documentation of nonstandard parts. All requirements for nonstandard electronic parts shall be defined by the contractor's parts drawings in sufficient detail to insure control of all the mechanical and electrical characteristics pertinent to the design and performance requirements specified herein,

3.4.1.2 Production changes. If at any time after successful completion of the preproduction and reliability tests it becomes necessary to make changes to the approved nonstandard electronic parts, or to substitute a new nonstandard part for an approved part, the new or changed part shall be approved by the procuring activity.

3.4.2 Fungusproof materials. Materials that are nutrients for fungi shall not be used where it is practical to avoid them. Where used and not hermetically sealed, they shall be treated with fungicidal agents acceptable to the procuring activity. However, if they are to be used in a hermetically sealed enclosures, fungicidal treatments will not be necessary.

3.4.3 Metals. Metals shall be of the corrosion-resistant type or treated to resist corrosion due to fuels, salt fog, or atmospheric conditions likely to be met in storage or normal service.

3.4.3.1 Dissimilar metals. Unless protected against electrolytic corrosion by means of protective coating or hermetic sealing, intimate contact of dissimilar metals shall be avoided. Dissimilar metals are defined in MIL-STD-889.

3.4.4 Adhesives. Adhesives employed to support the axle-mounted assemblies shall meet the criteria of MMM-A-132 appropriate to nonstructural application.

3.4.4.1 Adhesives designation. Any nonstandard adhesive which is supplied as part of the initial or field installation kit shall be identified by the contractor part number in accordance with MIL-STD-130.

3.4,5 Protective treatment, When materials are used in the construction of the weight and balance system that are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service usage, they shall be protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. The use of any protective coating that will crack, chip, or scale with age or extremes of climatic and environmental conditions shall be avoided.

3.4.6 Deleterious fumes. As installed in the weight and balance system and under the conditions specified herein, maerial's shall not liberate deleterious fumes.

3.5 Design and construction. The weight and balance system shall be designed and constructed to withstand the strains, shocks, and vibrations incident to shipping, storage, and normal service. The use of shockmounts on the weight and balance computer of the system will be optional.

3.5.1 Measuring and displaying capabilities. The weight and balance system shall be designed to automatically measure and display the gross weight (in pounds) and the center-of-gravity (as a percent of MAC) of a Type C-130 aircraft in response to a manual command from an operator anytime the aircraft is statically resting on its landing gear. All system components shall be designed to be so mounted in the aircraft as to become an integral part of the flight vehicle. The weight and balance system shall incorporate a capability for the aircraft loadmaster to zero the weight Bias control adjustment during aircraft flight.

3.5.2 Calibration. The weight and balance system shall be designed to be calibrated by the manufacturer before delivery at the time of installation in a period not exceeding 3 hours. Calibration checks shall not be required by ground maintenance personnel at intervals of less than 180 days. (See 3.7.1.8)

3.5.3 Power supply. The weight and balance system shall be designed to operate as specified herein from any single-phase, 115-V, 400-Hz power source meeting the applicable requirements of MIL-STD-704.

3.5.4 Power consumption. The total power consumption of the weight and balance system at nominal line voltage shall not exceed 100w. The power factor shall be not less than 0.86.

3.5.5 Temperature compensations

3.5.5.1 Ambient temperature compensation. Provisions shall be incorporated in the design of the weight and balance system, and components thereof, for such ambient temperature compensation as may be deemed necessary to meet the requirements specified herein.

3.5.5.2 Transient temperature compensation. The weight and balance system shall be designed to eliminate errors from transient temperatures as experienced after hard braking or cold soaking at altitude.

3.5.6 Insulation resistance and dielectric strength. System wiring and connectors shall be isolated from ground as required for proper systems function.

3.5.7 Reliability. The weight and balance system shall have a minimum mean-time-between-failure (MTBF) of 150 hours for a 1/2 hour mission at a confidence factor of 0.90. The contractor shall conduct a reliability program in accordance with MIL-STD-785.

3.5.8 Maintainability, The weight and balance system shall be designed for maintainability in accordance with MIL-STD-470. The mean maintenance downtime shall not exceed 30 minutes; and the maximum downtime shall not exceed 120 minutes, not including calibration time. The ration of operating time to downtime shall be not less than 500 to 1.

3.5.9 Soldering. Soldering shall be accomplished in accordance with MIL-STD-454.

3.5.10 Screw threads. Unless otherwise specified, the threads of all machine screws shall conform to MIL-S-7742.

3.5.11 Safety. As a minimum, system safety shall be accomplished in accordance with paragraphs 5.4.1, 5.6, 5.8.2.1, and 5.9 of MIL-STD-882. Additionally, Section 4E of AFSC DH 1-6 shall be applied during the design phase.

3,6 Performance.

3.6.1 Computing capability. When mounted in equipment designed to simulate actual use in Type C-130 aircraft, the weight and balance system shall be capable of computing the following:

a. Gross weight to within ±1.0 percent of the true value at any operating temperature, and

b. The percent MAC to within 1.0 MAC percent readout,

3.6.2 Resolution. The gross weight readout shall indicate a discernible change of the proper polarity for an incremental change in aircraft weight of 100 pounds minimum. The MAC readout shall indicate a descernible change of the proper polarity for an incremental change in fore-and-aft weight moment of 400 foot-pounds minimum.

3.6.3 Environmental conditions. The weight and balance system shall be capable of withstanding exposure to the following environmental conditions and shall be capable of satisfactory performance under such conditions:

a. Ambient temperatures ranging from 062° to +85°C during storage and -54° to +71°C during operation; temperature gradients incident to service use such as hard braking

b. Relative humidity up to 100 percent

c. Pressures ranging from 30 to 3.44 inches Hg (approximately 50,000 feet altitude)

d. Shocks incident to service use such as assault landings (i.e., rates of descent up to 10 fps)

e. Vibration incident to service use

f. Fungus growth as encountered in tropical climates

g. Exposure to salt sea atmospheres

h. Exposure to sand and dust atmospheres.

3.6.3.1 Operation in explosive atmosphere. The weight and balance system shall be capable of operating in the presence of an explosive atmosphere without creating an explosion.

3.7 Details of components

3.7.1 Weight and balance computer. All computing, switching, and displaying functions and all power supply functions shall be incorporated in the weight and balance computer. The display and control elements on the face of the computer shall be as shown on figure 1.

3.7.1.1 Outline and mounting dimensions of computer. The maximum outline dimensions and the mounting dimensions and tolerances for the weight and balance computer shall be as shown on figures 1 and 2.

3.7.1.2 Conditioning and combining input signals. The weight and balance computer shall be capable of conditioning and combining the input signals from the sensing assemblies (see 3.7.2) to obtain five resultant signals which are proportional to the weights on the individual axles of the aircraft. From these resultant signals, the computer shall compute and display (in continuous digital form) both the gross weight of the aircraft and the percent MAC based on the specified dimensional parameters for the Type C-130 aircraft. The computer shall also provide the power supply required to excite the sensing assemblies.

3.7.1.3 Digital display. The digital display of the gross weight and percent MAC shall be comprised of digits nominally 3/8 inch high. The display shall be designed to be easily readable in direct sunlight, and internal lighting shall be so provided that the display can be easily read under nighttime conditions.

3.7.1.4 Solid-state design. The computer shall be a solid-state device, except that the use of electromechanical devices such as servo drives, counters, and choppers is deemed advisable in order to meet the accuracy and digital display requirements. Semiconductor or electromechanical devices shall be used exclusively in lieu of vacuum tube devices. All semiconductor devices shall be silicon types.

3.7.1.5 Self-check provisions. Circuitry shall be incorporated into the computer for providing a self-check of the system condition upon manual command. The self-check provisions shall check all system aspects as completely as possible, and a visual signal shall be provided to indicate that the system is functioning properly.

3.7.1.6 Plug-in units. All amplifiers, power supplies, and digital indicator assemblies shall be plug-in units.

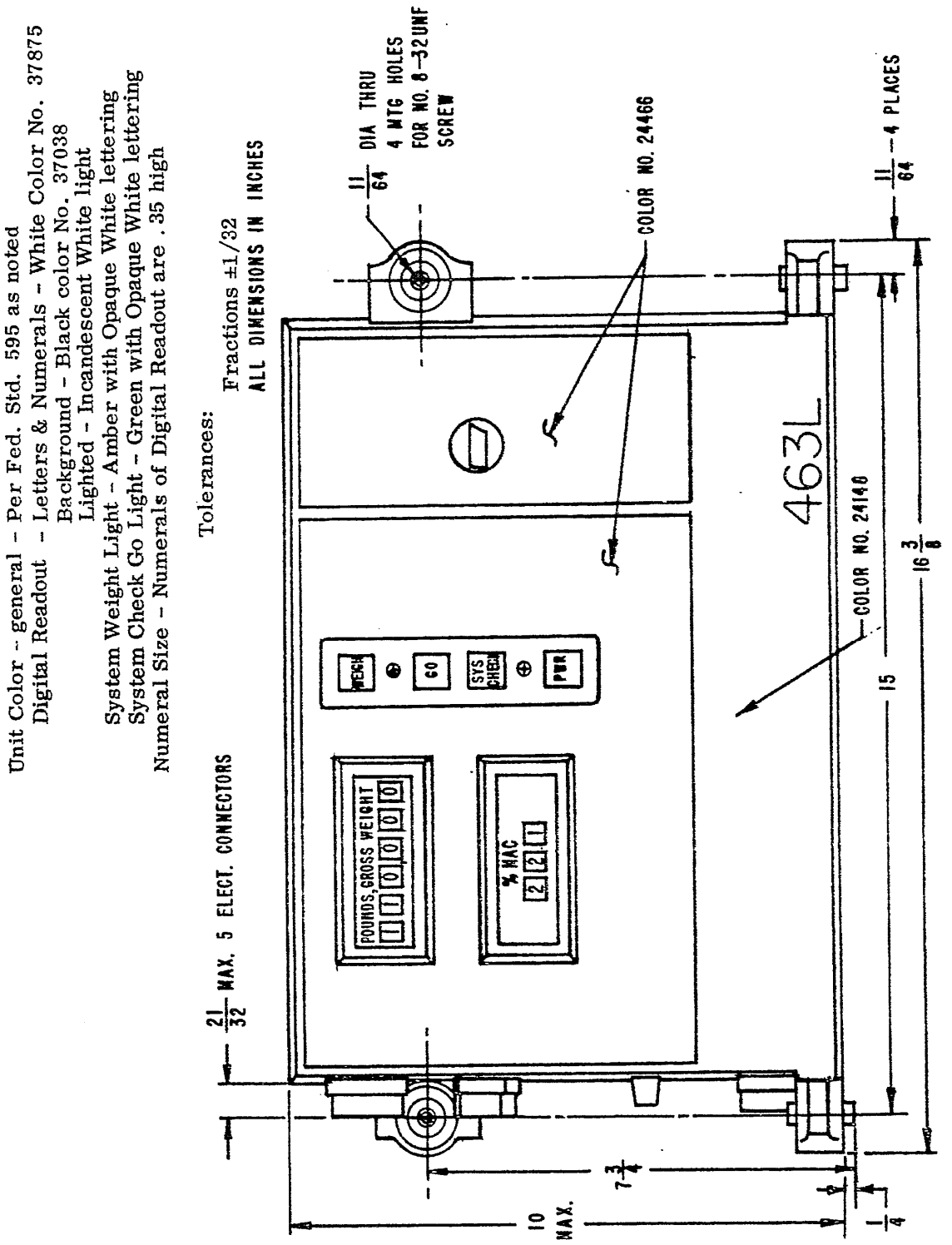

FIGURE 1. Front view of weight and balance computer.

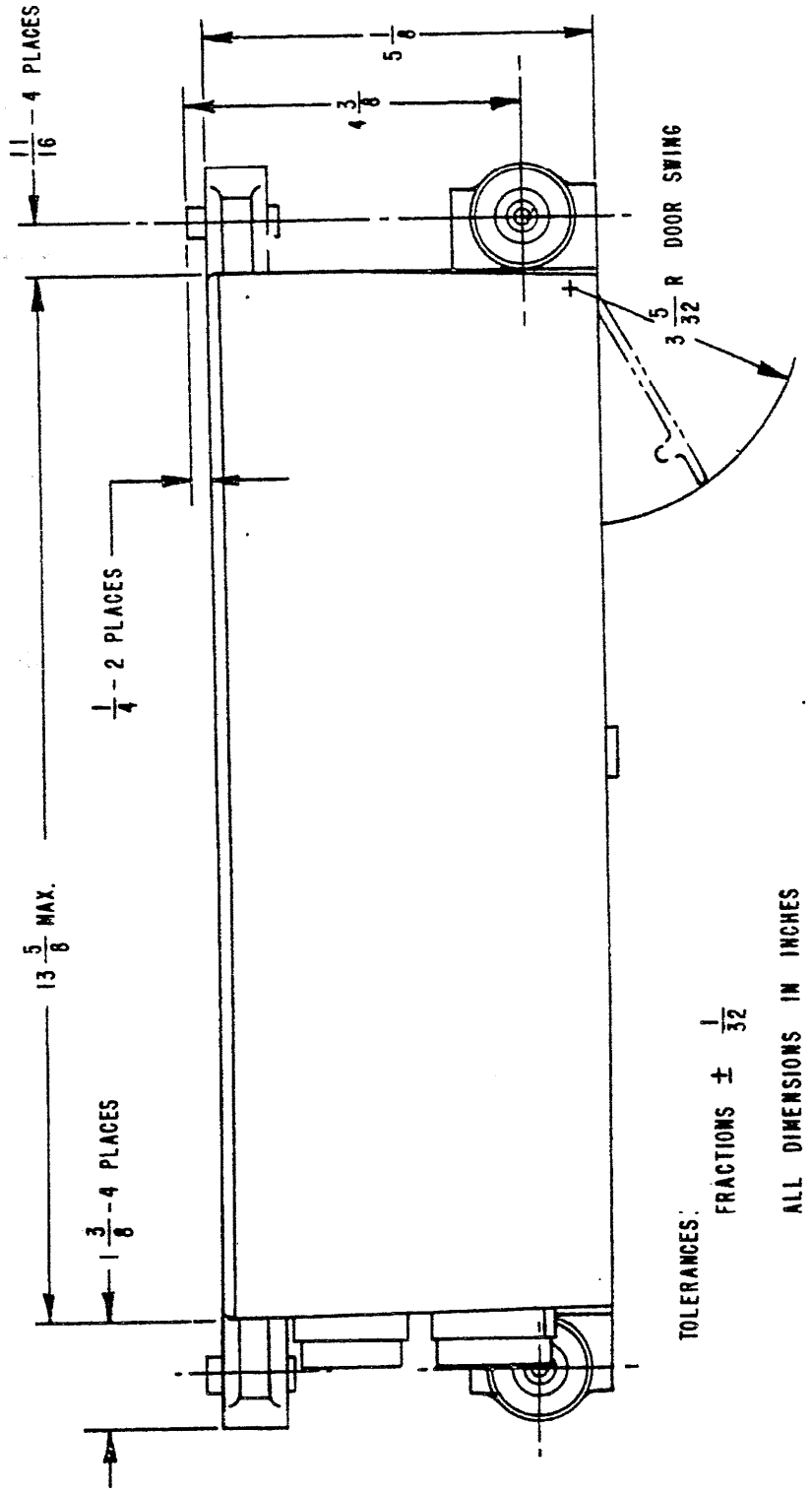

FIGURE 2. Top view of weight and balance computer.

3.7.1.7 Operating controls. All controls required for routine operation of the weight and balance system shall be located on the front face of the computer as shown on figure 1. These controls shall provide the operating functions specified in table I.

Table I. Operating controls.

Control Designation	Type of Control	Function
SYSTEM POWER	Latching switch - push-on/push off	Switches system power on and off
WEIGH	Momentary switch - push-on	Switches system operation from standby mode to weighing mode
SYSTEM CHECK	Momentary switch - push-on	Provides a self-check of the interconnect cabling and the weight and balance computer operation and calibration
GO light	Momentary switch - Press-to-test	Provides a means of testing the GO light to detect a bulb failure

3.7.1.8 Calibrating controls. All adjustment controls required to calibrate the weight and balance system (e.g. bias controls, balance controls, and gain controls) shall be located behind an access door on the face of the computer as shown on figure 1.

3.7.1.9 Computer interchangeability. The weight and balance computer shall be so designed that by means of presetting the calibrating controls specified in 3.7.1.8 to correspond to the correct settings established for a particular system by the initial calibration, any computer may be interchanged with any similar computer without the loss of system accuracy or the necessity of recalibrating the system in a particular aircraft. Any plug-in component within the computer shall also be interchangeable with any similar plug-in component without the loss of system accuracy or the necessity of recalibrating the system.

3.7.1.10 Slope compensation. The weight and balance computer shall automatically compensate for runway or ramp slope conditions. The computer readout shall display percent MAC corrected to a level aircraft attitude for slope conditions up to ± 3 degrees.

3.7.1.11 Electrical connectors. The weight and balance computer shall have five electrical connectors affixed as shown on figure 3. The connectors shall be labeled J1 through J5 as shown on figure 3.

3.7.1.12 Test point provisions. All of the power, bias, and signal voltages required to drive the digital indicators within the weight and balance computer, and all of the connections required to provide the capability of controlling the weight and balance computer from a remote location, shall be brought out of the computer through a suitable connector (see 3.7.1.11). This connector shall serve as a test equipment connector.

3.7.2 Sensing assemblies. The nose and main axle sensing assemblies shall be designed to be mounted permanently in the axles of a Type C-130 aircraft. All axle-mounted assemblies shall be constructed of corrosion-resistant material using the dimensional tolerances and rugged construction normally associated with landing gear components.

3.7.2.1 Main axle sensing assemblies. The assemblies to be employed for holding and preloading the sensors in a Type C-130 main axle shall be designed to fit in the axle without the need for structural modification of the axle. When installed, they shall be anchored in place so as to be immovable when the axle is subjected to any or all of the environmental conditions specified under 3.6.3.

3.7.2.2 Nose axle sensing assemblies. The assemblies to be employed for holding and preloading the sensors in a Type C-130 nose axle shall be designed to fit in the axle without the need for structural modification of the axle. When installed, they shall be anchored in place so as to be immovable when the axle is subjected to any or all of the environmental conditions specified under 3.6.3.

3.7.2.3 Dimensions of sensing assemblies. The dimensions of the various main axle sensing assemblies and nose axle sensing assemblies shall be established by the system manufacturer as suitable for permanent installation in Type C-130 aircraft axles by such means as specified in the installation handbook. The sensing assemblies shall be marked and supplied according to their suitability for installation in particular models of Type C-130 aircraft.

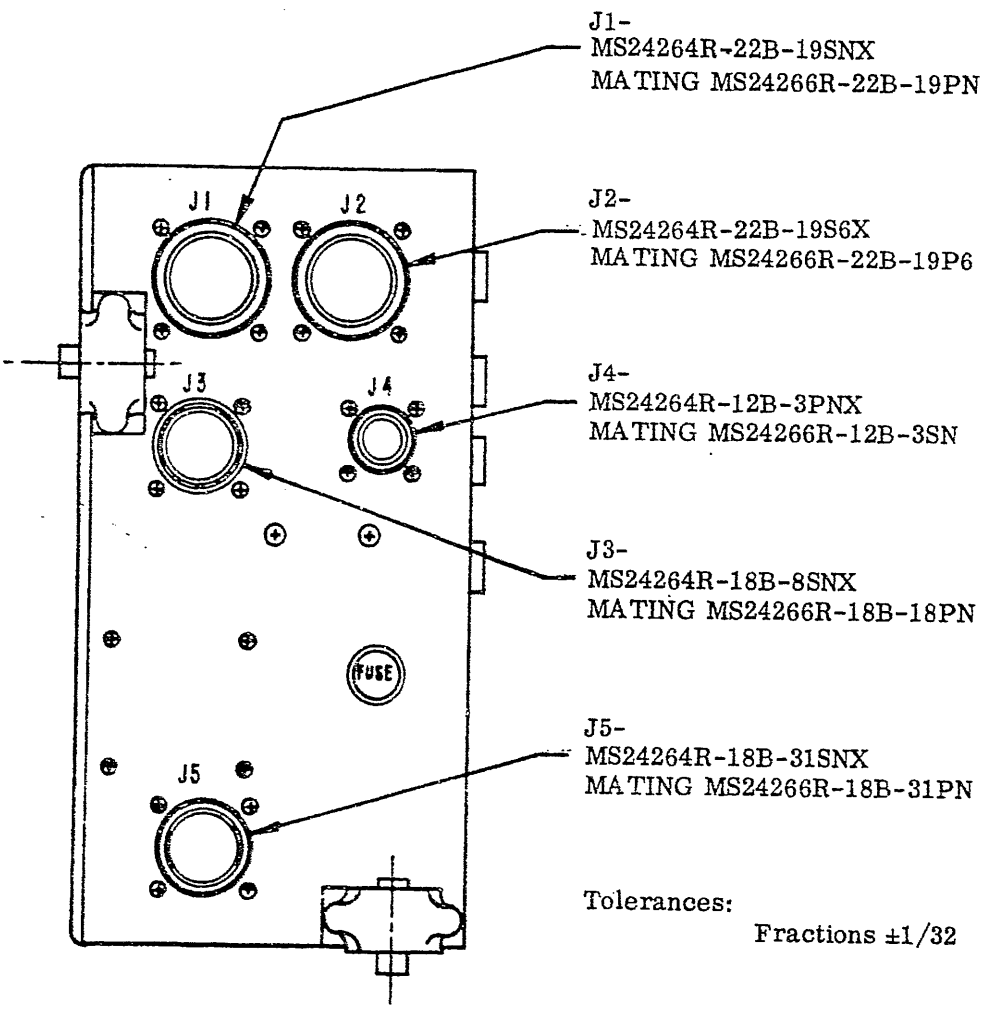

FIGURE 3. Side view of weight and balance computer.

3.7.2.4 Sensor assembly terminations. Each sensor assembly shall be equipped with color-coded wire lead terminations conforming to the functional coding specified in table II. Each lead shall be of AWG No. 20 stranded wire or larger and shall be at least 12 inches long.

Table II. Functionsal coding of wire lead terminations.

Lead	Function
Red	Positive side of sensor power supply
Yellow (See note)	Sensor output signal
Black	Negative side of sensor power supply

Note: One required on each single sensor assembly, two required on each dual sensor assembly.

3.7.2.5 Sensors. Each individual sensor shall exhibit a linear output-voltage-versus-deflection characteristic with the proper load impedance (i.e., an impedance which simulates the input circuitry of the computer) connected to the output terminal and the proper excitation voltage (i.e. , a voltage which simulates the excitation voltage supplied by the computer) applied between the input terminals.

3.7.2.6 Sensor assembly interchangeability. All dual sensor assemblies (main axle) and single sensor assemblies (nose axle) shall be so designed as to be interchangeable in their designated locations in any Type C-130 aircraft axles. Thus, it shall be possible to install each sensor assembly in place of a corresponding assembly in any previously calibrated weighing system without requiring recalibration of the system or the axle concerned with the new sensor assembly.

3.8 Electromagnetic interference. The weight and balance system shall meet the electromagnetic interference limits specified in MIL-STD-461,

3.9 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of MIL-STD-100 shall govern the manufacturer's part numbers and changes thereto.

3.10 Dimensions. Dimensions of the weight and balance computer and sensing assemblies of the weight and balance system shall be as specified in 3.7.1.1 and 3.7.2.3.

3.11 Weight. The weight of the complete weight and balance system, excluding cabling, shall not exceed 100 pounds. Cable weight shall be minimized.

3.12 Finishes and protective coatings

3.12.1 Finish and color of computer. The weight and balance computer shall be finished in accordance with MIL-E-5400, except that the exterior color shall be selected in accordance with FED-STD-595 and approved by the procuring activity.

3.12.2 Stainless-steel parts. All stainless-steel parts shall be passivated in accordance with MIL-F-14072.

3.12.3 Aluminum alloy parts. Aluminum alloy parts shall be covered with an anodic film conforming to MIL-A-8625, or treated with a chemical film in accordance with MIL-C-5541.

3.12.3.1 Small holes and case inserts need not be anodized.

3.12.3.2 When abrasion resistance is a factor, chemical films in accordance with MIL-C-5541 shall not be used in lieu of anodizing.

3.12.4 Steel parts. Steel parts shall be cadmium plated where practicable in accordance with QQ-P-416, type II or III as applicable, and of a class that is adequate to achieve the degree of protection required.

3.13 Identification of product. Equipmnet, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

3.14 Workmanship. The weight and balance system, including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Particular attention shall be given to the neatness and thoroughness of wiring, soldering, brazing, painting, riveting, and machine screw assemblies and to freedom from burrs and sharp edges on parts.

3.14.1 Dimensional tolerances. Dimensions and tolerances not specified shall be held as close as is consistent with good shop practicers. Where dimensions and tolerances may affect the interchangeability, operation, or performance of the weight and balance system, they shall be held or limited accordingly.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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.

4.2 Classification of tests. The inspection and testing of the weight and balance system shall be classified as follows:

a. Preproduction testing . . . . . See 4.4

b. Quality conformance inspection . , . . . See 4.5.

4.3 Test conditions

4.3.1 Standard atmospheric conditions. Whenever the pressure and temperature conditions for a particular test are not definitely specified, the test is to be conducted at standard atmospheric pressure (approximately 29.92 inches Hg) and at standard room temperature (approximately +25°C). When tests are conducted at atmospheric pressures or room temperatures differing significantly from the above values, proper allowance shall be made for the deviations from the standard conditions.

4.3.2 Attitude. The weight and balance computer shall be leveled to within ±0.1° in the pitch attitude during testing.

4.3.3 Voltage input. Unless otherwise specified (see 6.2), the weight and balance system shall be tested with 115 ± 2V ac, 400 ± 5 Hz, single-phase voltage applied.

4.4 Preproduction testing (see 6.2).

4.4.1 Test sample. The test sample shall consist of at least one complete weight and balance system representative of the production equipment (see 4.4.3.1 and 4.4.3.2). The samples shall be identified with the manufacturer's part numbers and such other information as required by the procuring activity.

4.4.2 Test report and test sample for the procuring activity. When the tests are conducted at a location other than the laboratory of the procuring activity, the following shall be furnished to that activity:

a. Three copies of a test report in accordance with MIL-STD-831

b. When specified (see 6.2), the sample which was tested,

4.4.3 Preproduction tests. The preproduction tests shall consist of all the tests described under 4.6.

4.4.3.1 Test sequence and grouping

4.4.3.1.1 One sample. If only one weight and balance system is to be used for preproduction testing. the tests shall be conducted in the following sequence:

a. Individual tests . . . . . See4.6.1 thru 4.6.8

b. Voltage and frequency extremes test . . . . . See 4.6.9

c. power consumption test . . . . . See 4.6.10

d. Dielectric strength test . . . . . See 4.6.11

e. Electromagnetic interference test . . . . . See 4,6.16

f. Temperature exposure and operation test . . . . . See 4.6.17

g. Vibration test.... . . . . See 4.6.19

h. Shock test . . . . . See 4.6.18

i Humidity test . . . . . See 4.6.15

j. Fungus test . . . . . .See 4.6.14

k. Explosion test . . . . . See 4.6.20.

4.4.3,1.2 Two or more samples. If two or more weight and balance systems are to be used for preproduction testing, it shall be permissible to divide the tests specified in 4.4.3.1.1(b) through 4.4.3.1.1(k) into two-or more groups, and then conduct each of these groups of tests on one system only - provided:

a. The individual tests specified in 4.6.1 through 4.6.8 are conducted on all sample systems

b. The temperature exposure and operation test specified in 4.6.17 and the humidity test specified in 4.6.1.5 are conducted on the same system, and

c The temperature test precedes the humidity test.

4.5 Quality conformance inspection. The quality conformance inspection shall consist of the following:

a. Individual tests . . . . . See 4.5.1

b. Sampling tests . . . . . See 4.5.2

4.5.1 Individual tests. Each weight and balance system shall be subjected to the following tests:

a. Examination of product . . . . . See 4.6.1

b. Insulation resistance test . . . . . See 4.6.2

c. Proper connection . . . . . See 4.6.3

d. Computer gain and linearity . . . . . See 4.6.4

e. MAC computation . . . . . See 4.6.5

f. Gross weight computation . . . . . See 4.6.6

g. Digitalizing speed test . . . . . See 4.6.7

h. Overall system gain and linearity . . . . See 4.6.8

4.5.2 Sampling tests. Two weight and balance systems selected at random from the first 50 and one selected at random from each remaining 100 (or fraction thereof) on each contract shall be subjected to the following tests:

a. Individual tests . . . . . See 4.6.1 thru 4.6.8

b. Dielectric strength test . . . . . See 4.6.11

c. Temperature operation test . . . . . See 4.6.12

d. Vibration error test . . . . . See 4.6.13

4.5.2,1 Rejection and retest. When an item selected from a production run fails to meet the specification, weight and balance systems still on hand or later produced shall not be accepted until the extent and cause of failure have been determined and appropriately corrected. The contractor shall explain to the Government representative the cause of failure and the action taken to preclude recurrence. After correction, all of the tests shall be repeated.

4.5.2.2 Individual tests may continue. For production reasons, individual tests or other sampling plans may be continued pending the investigation of a sampling test failure. But final acceptance of weight and balance systems on hand or produced later shall not be made until it is determined that all items meet all the requirements of the specification.

4.5.2.3 Defects in items already accepted. The investigation of a test failure could indicate that defects may exist in weight and balance systems already accepted. If so, the contractor shall fully advise the procuring activity of all defects likely to be found and the method of correcting them.

4.6 Test methods

4.6.1 Examination of product. Each weight and balance system shall be inspected to determine compliance with the requirements specified herein with respect to materials, workmanship, and marking.

4.6.2 Insulation resistance test. The insulation resistance from all external case-isolated connector pins to the case of the weight and balance computer shall be tested with a megohmmeter. The minimum insulation resistance shall be 20 megohms at 100V dc. The insulation resistance from all leads of each sensor to the sensor body shall also be tested with a megohmeter. The minimum insulation resistance shall be 200 kilohms at 100V dc.

4.6.3 Proper connection. Where specified as properly connected, the weight and balance computer and all associated sensor assemblies or their equivalent shall be connected to a test console. The sensor assemblies shall be securely mounted in a deflection fixture. Power shall be applied to the system and a warmup time of 5 minutes minimum allowed before tests are begun.

4.6.4 Computer gain and linearity tests. The weight and balance computer shall be properly connected. The following tests shall then be conducted:

4.6.4.1 Gross weight gain and linearity. The gain and linearity of each weighing channel shall be tested by introducing prescribed simulated input increments calibrated in equivalent pounds and determining that the gross weight readout of the weight and balance computer changes by the same increments within $\pm$ 0.2 percent or $\pm$ 100 pounds, whichever is greater. The simulated input increments shall be at least 4,000 pounds per increment.

4.6.4.2 MAC channel gain and linearity. With a simulated total input to the weight and balance computer equivalent to 80,000 pounds gross weight and 23.0 percent MAC, the gross weight and MAC bias calibrating controls shall be adjusted to give correct readouts within ± 50 pounds gross weight and ±0.05 percent MAC. The right-rear and left-rear simulated inputs shall then be increased by 9,955 pounds each; and the MAC readout shall be observed to increase to 30.0 ±0.3 percent readout. Next, the right-rear and left-rear simulated inputs shall be increased by 5,600 pounds each; and the nose simulated inputs shall be increased by 8,900 pounds. For this condition, the MAC readout shall be observed to decrease to 16.0 ± 0.3 percent readout. Finally the rear main simulated inputs shall be decreased by 1,610 pounds each, the front main simulated inputs shall be increased by 13,940 pounds each, and the nose simulated input shall be decreased by 4,650 pounds. For this condition, the MAC readout shall be observed to increase to 23.0 ± 0.3 percent readout.

4.6.5 MAC computation. The weight and balance computer shall be properly connected. Simulated input signal conditions corresponding to 16 percent, 23 percent, and 30.0 percent MAC shall be set up. The computer shall read out these values within ±1 percent of the true value or ±0.3 percent MAC, whichever is greater.

4.6.6 Gross weight computation. The weight and balance computer shall be properly connected. Simulated input signal conditions corresponding to 80,000; 100,000; 120,000; 140,000; and 160,000 pounds gross weight shall be set up. The computer shall read out these values within ±0.5 percent of the true value.

4.6.7 Digitalizing speed test. The weight and balance computer shall be properly connected, and simulated input signals shall be applied to cause the computer to read out a gross weight of 120,000 pounds and a percent MAC of 16.0 percent. With the WEIGH switch released, the inpuyt signal condition shall be changed to correspond to a gross weight of 160,000 pounds and a percent MAC of 30.0 percent. When the WEIGH switch is again depressed, the average digitalizing speed at the gross weight readout shall be at least 5,000 pounds per second until the gross weight reading reaches a value that is within ±3,000 pounds of the final value. The average digitalizing speed at the MAC readout shall be at least 5 percent MAC per second until the percent MAC reading reaches a value that is within ±3 percent MAC of the final value.

4.6.7.1 Gross weight step function. With the WEIGH switch depressed and both indicators at a null condition, a gross weight step function input shall be introduced by abruptly changing the input signal condition by ±2,000 pounds. The gross weight indicator shall be observed to stay in the slow mode of operation over this excursion, and the time required to reach the final gross weight reading shall be 4.8 ±2.0 seconds.

4.6.7.2 MAC function. With the WEIGH switch depressed and both indicators at a null condition, a MAC function shall be introduced by abruptly changing the input signal condition to correspond to a ±2.5 percent MAC increment at a gross weight level of 120,000 ±500 pounds. The MAC indicator shall be observed to stay in the slow mode of operation over this excursion; and the time required to reach the final MAC reading shall be 5.0 ±2.0 seconds.

4.6.8 Overall system gain and linearity. The weight and balance system shall be properly connected. The 10 sensors shall be incrementally loaded to simulate five incremental gross weight steps of at least 20,000 pounds each, and the gross weight readout on the weight and balance computer shall be observed. The computer shall read out the gross weight increments within a tolerance of ± 1.0 percent.

4.6.9 Voltage and frequency extremes tests. The tests specified in 4.6.5 and 4.6.6 shall be conducted with system voltages at the four possible combinations of voltage and frequency extremes specified in MIL-STD-704. The tolerances specified in 4.6.5 and 4.6.6 shall apply.

4.6.10 Power consumption test. The weight and balance system shall be properly connected. The power consumption at nominal line voltage shall be determined. With the system in the standby mode, the power consumption shall not exceed 40w. The WEIGH switch shall then be depressed, and power consumption shall not exceed 90w in this operating mode.

4.6.11 Dielectric strength test. The dielectric strength from all external case-isolated connector pins to the case of the weight and balance computer shall be tested at a voltage level of 500 ac for a period of 10 seconds. There shall be no breakdown in insulation as a result of this test.

4.6.12 Temperature operation test. The weight and balance computer shall be properly connected and tested for low temperature operation in accordance with MIL-STD-810, method 502.1. While at the low temperature condition, power shall be applied for at least 5 minutes and the tests specified in 4,6,5 and 4.6.6 shall be conducted. The tests specified in 4.6.5 and 4,6.6 shall then be repeated at the high temperature condition. The test limits shall be two times those specified in 4.6.5 and 4.6.6 for both the high and low temperature conditions.

4.6.13 Vibration error test. The weight and balance computer shall be properly connected and subjected to vibration in accordance with MIL-STD-810, procedure I, category b.1, method 514.2. For a simulated input condition corresponding to 80,000 pounds gross weight and 23 percent MAC, the computer shall exhibit no deviations in gross weight greater than ±500 pounds and no deviations in MAC greater than ±0.6 percent MAC while exposed to the vibration.

4.6.14 Fungus test. The weight and balance computer and typical sensor assemblies shall be subjected to a fungus test in accordance with MIL-STD-810, method 508.1. The fungus test may be waived if certification of the use of nonnutrient materials is provided to the procuring activity (see 6.2).

4.6.15 Humidity test. The weight and balance computer and typical sensor assemblies shall be subjected to a humidity test in accordance with MIL-STD-810, procedure I, method 507.1. The system shall show no evidence of corrosion which could result in system failure. Following this test, the computer shall be subjected to and shall satisfactorily meet the tests specified in 4.6.5 and 4.6.6, except the test limits shall be two times that specified.

4.6.16 Electromagnetic interference test. The weight and balance system shall be tested for electromagnetic interference in accordance with MIL-STD-461 over a frequency range from 14 kilohertz (KHZ) to 10 gigahertz (GHZ) for radiated interference and 30 Hz to 100 megahertz (MHZ) for conducted interference. Conducted susceptibility shall be tested over a range of 30 Hz to 20 GHz.

4,6.17 Temperature exposure and operation test. The weight and balance computer shall be tested in accordance with MIL-STD-810. Prior to the temperature test, the computer shall be subjected to a simulated altitude of 50,000 feet for 5 minutes. Where operating tests are required, the tests specified in 4.6.5 and 4.6.6 shall be conducted, except that the tolerances shall be increased two times over those specified in 4.6.5 and 4.6.6.

4.6.18 Shock test. The weight and balance computer shall be subjected to a shock test in accordance with MIL-STD-810, procedure I, method 516.2. Following the shock test, the computer shall be subjected to and shall satisfactorily meet the tests specified in 4.6.5 and 4.6.6 and shall be within two times the specified limits.

4.6.18.1 One each complete set of main axle sensing assemblies for models A, B, and E of Type C-130 aircraft and one each complete set of nose axle sensing assemblies for models B and E of the Type C-130 aircraft shall be subjected to typical drop tests in accordance with MIL-T-6053 when mounted in an actual aircraft axle. Each wheel assembly shall receive a series of 25 drops of 10 feet per second maximum at a static load equivalent weight of 30,000 pounds per main wheel and 10,000 pounds per nose wheel. There shall be no failure during this test nor shift in weight readout in excess of ±500 pounds after initial stabilization.

4.6.19 Vibration test. The weight and balance system shall be properly connected and tested in accordance with MIL-STD-810, procedure I, category b.1, method 514.2. When applicable, part 4 testing shall be accomplished. Fixed-wing aircraft shall be tested in accordance with curve C or D depending upon the mounting location designated by the procuring activity. The weight and balance system shall be powered, but not operated, while being subjected to the required vibration. Upon completion of all required vibration-cycles, the weight and balance system shall be operated and subjected to the tests specified in 4.6.5 and 4.6.6 and tolerances of twice those specified shall be allowed.

4.6.20 Explosive atmosphere test. The weight and balance computer shall be subjected to MIL-STD-810, procedure I, method 511.1, except that the test shall be limited to room atmospheric pressure only.

4.6.21 Reliability test. A reliability demonstration test shall be performed on two complete weight and balance systems selected at random from the first 10 systems produced. The test shall demonstrate 150 hours MTBF in accordance with MIL-STD-781 utilizing test level E and the performance requirements specified herein, except that the vibration level shall be 1g and any shock mounts (see 3.5) which are an integral part of the design need not be removed. Test time on each system shall be a minimum of 330 hours for a total test time of 660 hours.

4.6.21.1 At 4.4 times MTBF or a total test time of 660 hours, an accept decision shall be reached if zero failures (see 6.4.1) have occurred. A reject decision shall be reached if eleven or more failures have occurred. If an accept or reject decision cannot be reached at this time, the test shall continue for 8.5 times MTBF, or a total test time of 1,275 hours. At this time, 10 failures or less shall constitute an accept decision, 11 failures or more shall constitute a reject decision. Between 660 hours total test time and 1,265 hours total test time, an accept decision may be reached at any time the test results fall within the accept region shown on figure 4.

4.6.21.2 Detailed test procedures based on the above requirement shall be submitted to the procuring activity at least 60 days prior to the reliability test.

4.6.21.3 Reporting procedure shall be in accordance with MIL-STD-781,

4.6.21.4 Temperature survey shall be in accordance with MIL-STD-781.

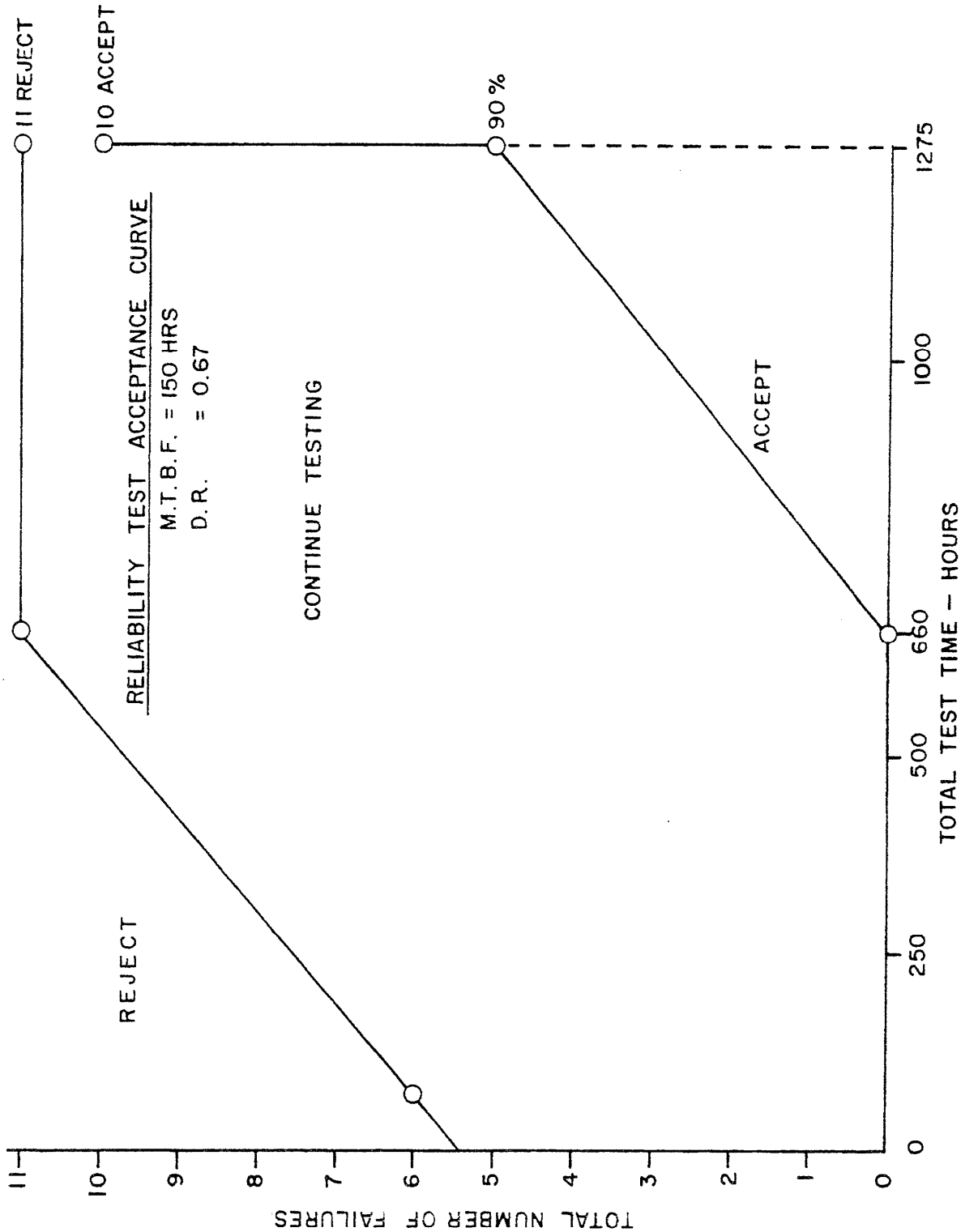

FIGURE 4. Reliability test acceptance curve.

4.6.21.5 In the event a rejection decision is reached during the reliability test, the contractor shall submit proposed corrective action to the procuring activity within 10 days for approval, modify the equipment under test to the proposed configuration, and at the option of the contractor rerun or continue the reliability test until an accept decision is reached in accordance with the reliability requirements specified herein. If equipment modification is required to successfully complete the reliability test, all equipments produced shall be modified to the approved configuration.

4.6.22 Maintainability demonstration. The verification testing of the maintainability characteristics of the weight and balance system shall be in accordance with MIL-STD-471. The mean maintenance downtime and the ratio of downtime to operating time shall be expressed at the 90 percent confidence level with 85 percent accuracy for organizational maintenance.

5. PACKAGING

5.1 Preparation for delivery, Unless otherwise specified in the individual contract, the following shall apply:

5.2 Preservation and packaging. Preservation and packaging shall be level A or C as specified (see 6.2).

5.2.1 Level A. The system shall be preserved and packaged in accordance with MIL-STD-794 and Method IIB of MIL-P-116. The items shall be blocked and braced as required within the exterior container conforming to PPP-B-636 weather-resistant type, if weight permits, otherwise PPP-B-601 overseas type should be utilized.

5.2.2 Level C. The system shall be preserved and packaged in a manner that will provide protection against corrosion, deterioration or physical damage so that serviceability is assured during shipment from supply source to the first receiving activity. This level may be the contractor's commercial practice provided the latter meets the criteria for this level as defined in MIL-STD-794.

5.3 Packing. Packing shall be level A, B or C as specified (see 6.2).

5.3.1 Level A. Unit container is shipping container.

5.3.2 Level B. Unit container is shipping container (see 5.2.1 above].

5.3.3 Level C. The system shall be packed in exterior type shipping containers in a manner that will insure safe transportation at the lowest rate to the point of delivery, and shall meet as a minimum, the requirements of carrier rules and regulations. This level may be the contractor’s commercial practice provided the latter meets criteria for this level as defined in MIL-STD-794.

5.4 Marking. In addition to the standard marking requirements of MIL-STD-129, level C/C packs containing item(s)/equipment intended for immediate use at destination shall be conspicuously marked as follows on two opposite sides of the exterior container in letters as large as space permits:

FOR IMMEDIATE USE
DO NOT STORE IN THIS PACK

6. NOTES

6.1 Intended use. The A/A32H-8 weight and balance system is intended for use in the Type C-130 aircraft to provide a digital display of the gross weight in pounds and the center-of-gravity as a percent of the Mean Aerodynamic Chord.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of this specification

b. When voltage input is to be other than as specified in 4.3.3

c. Location and conditions for preproduction testing (see 4.4)

d. When the sample which was tested is to be furnished (see 4.4.2)

e. If the fungus test may be waived (see 4.6.14)

f. Applicable levels of preservation and packaging, and packing required (see section 5)

6.3 Data. Data generated by this document is not deliverable unless specified on the Contract Data Requirements List (DD Form 1423) referencing the appropriate data item description in the military departments' Authorized Data List (ADL). The data produced by this specification is as follows:

a. Test report as specified in 4.4.2

b. Detailed test procedures as required by 4.6.21.2.

6.4 Definition. For the purpose of this specification, the following definition will apply:

6.4.1 Failure. A failure is defined as the inability of the weight and balance system to meet the tests specified in 4.6.5 and 4.6.6 when a tolerance of two times that specified is applied.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/ vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

   ☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

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