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SC 1754B (Sp)

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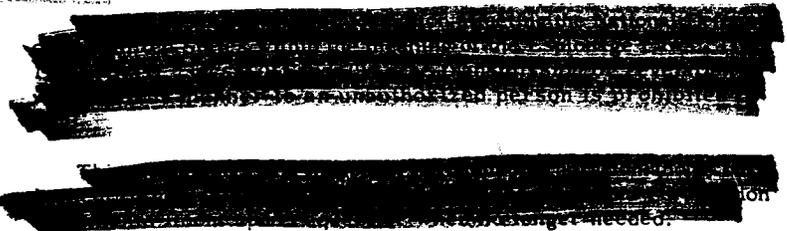
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PRODUCTION SPECIFICATION  
FOR  
LOADING TESTER (T-21A)

JULY 18, 1952

Supersedes SC-1754A (Sp)

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SANDIA CORPORATION

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PRODUCTION SPECIFICATION  
FOR  
LOADING TESTER (T-21A)

SC-1754B (Sp)

July 18, 1952

A. APPLICABLE SPECIFICATIONS AND DRAWINGS

A-1. The following specifications form a part of this specification unless specific exceptions are made herein.

SANDIA CORPORATION SPECIFICATION

CPS-3, Commercial Packaging Specification for Electrical Test Carrying Cases with or without Electrical Test Set.

A-2. Sandia Corporation Drawings. The following drawings shall form a part of this specification:

<u>Drawing Number</u>		<u>Quantity</u>
NX 105147	Unit Sub-Assembly, T-21A	1
NX 578384	Case Assembly, T-21A	1
* 577924	Cable Assembly CT-528	1
* 577936	Cable Assembly CT-530	1
* 577906	Cable Assembly	2
* 806806	Bolt	8
* 804086	Washer-Lock	8
* 804957	Knob-Instrument	2

\* Items in the quantities indicated by the column to the right shall be shipped with the T-21A as loose parts.

A-3. Precedence. The order of the following indicates precedence whenever their requirements are in conflict.

- a. Contract
- b. Drawings
- c. This Specification
- d. Reference Specifications

B. PURPOSE AND SCOPE

B-1. This specification covers the manufacturing information needed to build the T-21A and the mechanical and electrical requirements that it must meet.

C. MATERIAL AND WORKMANSHIP

C-1. Approved Materials. The materials for each part shall be as specified herein. Where a definite material is not specified, a suitable material shall be used. Acceptance or approval of any constituent material shall not be construed as a guarantee of the acceptance of the finished product.

C-2. Substitution. If the manufacturer desires to substitute for a specified or previously approved material or fabricated part, he shall submit to the procuring agency, a request together with evidence to substantiate his claim that such a substitution is suitable. At the discretion of the procuring agency, test samples may be required to prove the suitability of the proposed substitution. No substitution may be made without the written approval of the procurement agency.

C-3. Solder and Solder Flux.

C-3a. Cleaning. All joints shall be clean before solder is applied. Only a Non-Corrosive Cleaner may be used when a cleaner is required.

C-3b. Soldering Flux. Only rosin, rosin and alcohol, or equivalent plastic rosin mixture may be used as a flux for soldering or for cleaning soldering irons. No acid or other corrosive material shall be used in any mixture.

C-3c. Soldering. Soldering shall be done so that good electrical and mechanical connections are obtained. There shall be no "Cold Joints." Sufficient heat shall be applied to the joint so that solder flows freely and completely over the joint. No damage to adjacent parts shall result from soldering operations.

C-4. Workmanship. The complete assembly shall be manufactured and processed in a careful and workmanlike manner in accordance with good shop and manufacturing practices. The workmanship shall be satisfactory to the procuring agency.

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D. GENERAL REQUIREMENTS

D-1. Description. The T-21A is a piece of test equipment used for checking the operation of the MC-1 or MC-3. It contains switching circuits to operate either MC-1 or MC-3 with the proper time delays and it indicates when the MC-1 or MC-3 has operated.

D-2. Storage Conditions. During storage the T-21A may be subjected to seasonal variations of temperature between - 20° F and + 140° F and relative humidities from 0 to 100 percent during storage for up to five (5) years. Upon being withdrawn from storage, the T-21A shall be examined for failure, and shall be capable of normal operation in accordance with the requirements of this specification.

D-3. Environmental Requirements. The requirements specified in the following paragraphs are mandatory requirements. It is considered that the design of the T-21A is such that when all electrical and mechanical specifications are met, the T-21A, will be capable of meeting these detail requirements. It is not necessary that units be tested for compliance to these requirements according to any specific sampling plan or rate. The manufacturer should assure himself to his own satisfaction that the product complies with these requirements. Units may be tested at random by Sandia.

D-3a. Equipment Non-Operating. The T-21A shall be capable of withstanding the following environmental conditions when contained in its case with the lid closed.

(1). Barometric Pressure. The T-21A shall be placed in a chamber and the internal absolute pressure reduced to 11 inches of mercury  $\pm$  5 percent and the ambient temperature reduced to - 40° F  $\pm$  5°. The equipment shall be stabilized at that pressure and temperature for a period of one-half hour. When the Unit returns to normal room temperature and pressure, it shall be examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

(2). High Temperature. The T-21A shall be placed within a chamber and the internal temperature of the chamber shall be raised to + 170° F  $\pm$  5° with an internal relative humidity of not more than 10 percent. The source of heat for the chamber shall be arranged in such a manner that radiant heat shall not fall upon the test specimen.

The total volume occupied by a single item of equipment, or by several items, shall not exceed 50 percent of the internal volume of the test chamber. The T-21A shall be maintained at + 170° F for a period of 10 hours. Then the equipment shall be allowed to return to room temperature, examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

(3). Low Temperature. The T-21A shall be placed in a test chamber and cooled to and maintained at a temperature of - 65° F ± 5° for a minimum of 10 hours. The temperature of the equipment shall be allowed to return to normal room temperature, and then the T-21A shall be examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

(4). Vibration. The case containing the T-21A shall be secured to a vibration table and vibrated in three mutually perpendicular directions with the frequency varying between 10 and 50 cycles per second ± 2 percent at a total excursion of 0.06 inch ± 5 percent for a period of 45 minutes in each plane. The frequency in this test shall vary uniformly from 10 to 50 cycles per second and return to 10 cycles per second in approximately one minute. Upon completion of this test, the equipment shall be examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

(5). Shock. The equipment shall be given shock tests in the following manner.

(5)a. Drop Edgewise Test. The T-21A in its case shall be supported at one end of the base on a sill six inches in height placed at right angles to the longitudinal axis of the base. The opposite end of the case shall then be raised and allowed to fall on a concrete or similarly hard platform from heights of 6, 12, 18, 24, 30 and 36 inches successively. This test shall be applied to each end of the case. If the size of the case and the location of the center of gravity are such that drop tests cannot be performed from all the prescribed heights, the greatest attainable height shall be the height for succeeding drops until a total of six drops have been performed. Upon completion of this test the equipment shall be examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

(5)b. Drop Cornerwise Test. In addition to the six inch sill used in the Drop Edgewise Test above, a six inch block shall be placed under one corner of the supported end of the case containing the T-21A, so that, when allowed to fall, the case shall hit on just one corner of the opposite end of the base. The opposite end of the case shall then be raised and allowed to fall on a concrete, or other hard surface, from heights of 6, 12, 18, 24, 30 and 36 inches successively. The height shall be measured from the lowest corner to the raised end. The test shall be applied to all four bottom corners of the case. If the size of the case and the location of the center of gravity are such that drop tests cannot be performed from all the prescribed heights, the greatest attainable height shall be the height for succeeding drops until a total of six drops have been performed on each corner. Upon completion of this test, the equipment shall be examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

(5)c. Tipover Test. The case, containing the T-21A, shall be stood on its base and then shall be tipped over in such a manner that it comes to rest in a horizontal position after falling freely and striking a concrete or other hard surface. This test shall be repeated until the T-21A has been tipped over on front, back, and both sides. Upon completion of this test, the equipment shall be examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

D-3b. Equipment Operating. The T-21A shall be capable of withstanding the following conditions when contained within its case with the lid removed and all associated cables attached.

(1). Barometric Pressure. The T-21A shall be placed in a chamber and the internal pressure reduced to 21 inches of mercury  $\pm$  5 percent, and the ambient temperature reduced to  $0^{\circ}$  F  $\pm$   $5^{\circ}$ . The equipment shall be stabilized at this pressure and temperature for a period of two hours. The equipment shall be capable of normal operation, in accordance with the requirements of this specification twice during the test, and upon completion of the test.

(2). Temperature and Humidity. Place the T-21A in a chamber and reduce the temperature to  $0^{\circ}$  F  $\pm$   $5^{\circ}$  and maintain this temperature for 10 hours, then raise the temperature to  $+130^{\circ}$  F  $\pm$   $5^{\circ}$ , and maintain this temperature for a period of 10 hours. The relative humidity at  $+130^{\circ}$  F shall be 95 percent (wet bulb  $\pm$   $2^{\circ}$  F and the dry bulb  $\pm$   $1^{\circ}$  F to produce the relative humidity specified). The relative humidity at other temperatures need not be controlled. The equipment shall be examined for failures and shall be capable

of normal operation, in accordance with the requirements of this specification, once every two hours during the test, and upon completion of the test.

(3). Vibration. The case containing the T-21A shall be secured to a vibration table and vibrated in three mutually perpendicular directions with the frequency varying between 10 and 55 cycles per second  $\pm$  2 percent at a total excursion of 0.03 inch  $\pm$  5 percent for a period of 45 minutes in each plane. The frequency in this test shall vary uniformly from 10 to 55 cycles per second and return to 10 cycles per second in approximately one minute. Upon completion of this test, the equipment shall be examined for failures, and shall be capable of normal operation in accordance with the requirements of this specification.

#### E. DETAIL REQUIREMENTS

The detail requirements are as specified on the drawings and in this specification.

E-1. Functional Requirements. All T-21A components shall operate in proper operating sequences as well as correct operating times. With reference to Partial Schematic Drawing Number 106567, the following requirements shall be met.

E-1a. Operation of Relays, Circuit Breakers, and Switches. The opening or closing operation of every relay, circuit breaker, and switch shall be checked for correct operation.

E-1b. Power-On-Test. With a power supply of 28-v DC connected to the T-21A input connector, the following items shall be checked.

(1). Indicator Lights. The operation of each indicator light shall be checked. Push in to test.

(2). Time Delay Circuit. The time delay for the relay K101 shall be  $3.75 \pm 0.5$  minutes with input power supply maintained at 28  $\pm$  1-v DC.

E-2. Continuity Test. With a suitable method, a point to point continuity test shall be made in accordance with the schematic, except those circuits already tested in E-1. This continuity test shall include a continuity test of all associated cables.

E-3. Insulation Resistance Test. The insulation resistance of the wiring and connectors shall be measured with a megohm bridge, megger, or by other approved methods at a potential between 100 and 500-v DC with an electrification time not to exceed two minutes. The insulation resistance shall not be less than 50 megohms when measured between each circuit and the case with all remaining insulated circuits connected to the case.

E-4. Dielectric Strength. Voltage breakdown shall not occur when an alternating potential of 500-v AC rms 60 cycle, is applied between each circuit and the case with all remaining insulated circuits connected to the case.

F. METHODS OF TESTING, SAMPLING AND INSPECTION

F-1. Inspection. If an authorized representative is assigned by the procuring agency, he may be present at the point of manufacture during testing to determine compliance with the requirements of this specification.

F-2. Test Facilities at the Place of Manufacture. The manufacturer shall have available and maintain all necessary facilities and equipment at the point of manufacture for making all tests of Section "E" of this specification. The test equipment shall be adequate in quantity to enable the inspection to keep up with production. The test equipment shall be of sufficient accuracy and quality to permit performance of the required tests.

F-3. Test Conditions. Unless otherwise specified, all measurements, tests, and calibrations shall be made, for the complete section "E" with the equipment at an ambient temperature of  $+ 77^{\circ} F \pm 5^{\circ}$  and at ambient humidity and pressure.

F-4. Test Records. When they are required by the procuring agency, records shall be made of all measurements required in all tests of this specification. The records shall be submitted to the procuring agency with the tested units.

F-5. Production Tests. Production tests shall be conducted by the contractor on each unit to determine whether the equipment is meeting the requirements of Section "E" of this specification. The proposed production test procedure and a list of required test equipment shall be prepared by the contractor and submitted to the procuring agency for approval.

F-6. Quality Assurance Tests. Quality Assurance Tests shall be conducted by the procuring agency at a point designated by the agency and on the basis of a sampling rate agreed upon by the procuring agency and the contractor. These tests shall be of such scope as to determine whether the equipment meets the requirements of Sections "D" and "E" of this specification.

G. PACKING, PACKAGING, AND MARKING FOR SHIPMENT

G-1. The T-21A shall be shipped individually in its own container with loose parts as listed in Section A-2 of this specification. Packaging shall be according to Sandia Corporation Commercial Packaging Specification for Electrical Test Carrying Cases with or without Electrical Test Set, CPS-3.

H. NOTES

H-1. Copies of joint Army-Navy specifications and Federal specifications may be obtained upon application to the Superintendent of documents, Government Printing Office, Washington 25, D. C. When requesting copies, give number, title, and the date.

H-2. Copies of Army-Navy aeronautical specifications may be obtained upon application to the Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. When requesting copies, give number, title, and the date.

H-3. Copies of Bureau of Ordnance specifications may be obtained upon application to the Bureau of Ordnance, Navy Department, Washington 25, D. C. When requesting copies, give number, title, and the date.

H-4. Copies of Sandia Corporation specifications may be obtained upon application to the procuring agency or its authorized representative. When requesting copies, give number, title, and the date.

H-5. Copies of Sandia Corporation drawings may be obtained upon application to the procuring agency or its authorized representative. When requesting copies, give number, title, and the date.

H-6. Copies of requests, requisitions, schedules, contracts, and orders may be obtained upon application to the procuring agency. When requesting copies, give number, title, and the date.

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