MIL-C-51387A(EA)
14 November 1979
SUPERSEDING
MIL-C-51387(EA)
29 July 1974

MILITARY SPECIFICATION

CIRCUIT CARD ASSEMBLY

This specification is approved for use by US Army Armament Research and Development Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers one type of circuit card for the ABCA-M42 alarm unit.

2. APPLICABLE DOCUMENTS

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

STANDARDS

FEDERAL

Fed-Std-123 - Marking for Domestic Shipment (Civil Agencies).

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-252 - Wired Equipment, Classification of Visual and Mechanical Defects for.
MIL-STD-810 - Environmental Test Methods.

FSC 6665

: Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research and Development Command, Attn: DRDAR-TSC-S, Aberdeen Proving Ground, MD 21010 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

DRAWINGS AND TECHNICAL DATA PACKAGE LIST (TDPL)

US ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

CHEMICAL SYSTEMS LABORATORY

TDPL 5-15-4805 - Circuit Card Assembly.

(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 Materials and components.

3.1.1 Materials. All materials cited on TDPL 5-15-4805 or on the subsidiary drawings shall conform to the specifications listed thereon, or to the specific characteristics set forth on the drawings and in this specification.

3.1.2 Components. All components of the circuit card assembly shall conform to the specifications and drawings listed on TDPL 5-15-4805 and subsidiary drawings.

3.2 Manufacture and assembly. The circuit card assembly shall be manufactured and assembled as specified on Drawing D5-15-4805.

3.3 Resistance/current.

3.3.1 Current across points P and R (in both directions). When tested as specified in 4.4.4.1, the current measured between points P and R, in each direction, shall be 0.20 $\pm$ 0.05 milliamperes (ma).

3.3.2 Resistance across points H and B. The resistance measured between points H and B shall be greater than 100,000 ohms with the plus lead of the measuring instrument applied to point H when tested as specified in 4.4.4.2.

3.4 Leakage current. With 6.0 $\pm$ 0.1 volt direct current (vdc) applied at points B and H, the leakage current between points B and H shall not exceed 10.0 microamperes when tested as specified in 4.4.4.3.

3.5 Performance. With the circuit card engerized by 6.0 ± 0.1 vdc applied at points H and B, and a 6.0 ± 0.5 vdc alarm signal applied to the circuit card, the following indications of acceptable performance shall appear when the circuit card is tested as specified in 4.4.4.4.

(a) A current of 100 ± 30 milliamperes (ma) shall be present through pin H when 6.0 ± 0.5 vdc is applied to points P and R regardless of polarity. A waveform shall be present at point C when this 6.0 ± 0.5 vdc is applied and the waveform shall have a period 500 ± 100 milliseconds (msec).

(b) A currrent of 640 ± 120 ma shall be present through pin H when 6.0 ± 0.5 vdc is applied to points P and R, regardless of polarity, and a load of 4.0 ± 0.4 ohms is applied between points M and B. A waveform shall be present at point M when this 6.0 ± 0.5 vdc is applied and the waveform shall have a period of 1.6 ± 0.3 msec.

3.6 Operation at low temperature. When tested as specified in 4.3.3.1, the circuit card shall meet the requirements of 3.5 when the circuit card is at a temperature of -40° ± 5°F (-40° ± 2.8°C).

3.7 Operation at high temperature. When tested as specified in 4.3.3.2, the circuit card shall meet the rrequirements of 3.5 when the circuit card is at a temperature of 120° ± 5°F (48.9° ± 2.8°C).

3.8 Operation after vibration. When tested as specified in 4.3.3.3, the circuit card shall meet the requirements of 3.5 after exposure to the vibration environment described in MIL-STD-810, method 514, procedure VIII, curve Y (6,000 miles) (9,656 kilometers). The circuit card shall exhibit no physical deterioration after vibration.

3.9 Preproduction. Prior to the start of regular production, a pre-production sample of circuit card assemblies shall be produced in accordance with this specification for examination and test (see 4.3).

3.10 Workmanship. The workmanship of the current card assembly shall be in accordance with MIL-STD-252.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsiblity for inspection.

4.1.1 Contractor's responsibility. 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.

4.1.2 Objective evidence. The contractor shall provide objective evidence acceptable to the contracting officer that the requirements of 3.1 and section 5 for which specific inspection has not been provided in this specification have been satisfied.

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

(a) Preproduction inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 Preproduction inspection.

4.3.1 Sample. A preproduction sample of eight circuit card assemblies shall be manufactured using the same methods, materials, equipment, and processes as will be used during regular production.

4.3.2 Inspection procedures.

4.3.2.1 For examination. The preproduction sample of circuit card assemblies shall be examined in accordance with the classification of defects 4.4.3.3.

4.3.2.2 For test. The preproduction sample of circuit card assemblies shall be tested in accordance with 4.3.3 and 4.4.4.

4.3.3 Tests. Tests shall be conducted as follows:

4.3.3.1 Operation at low temperature. Install an adapter cable between the circuit card under test and the circuit card tester as shown on figure 1; this cable may be any convenient length that will permit the circuit card to be placed in a temperature test chamber while it is connected to the circuit card tester outside the chamber. Place the circuit card in a test chamber already at the temperature required by 3.6 and permit it to remain undisturbed at that temperature for at least 1 hour. Then, subject the circuit card to the performance tests described in 4.4.4.4. The performance criteria of 3.5 must be met. Warm the circuit card to room ambient temperature.

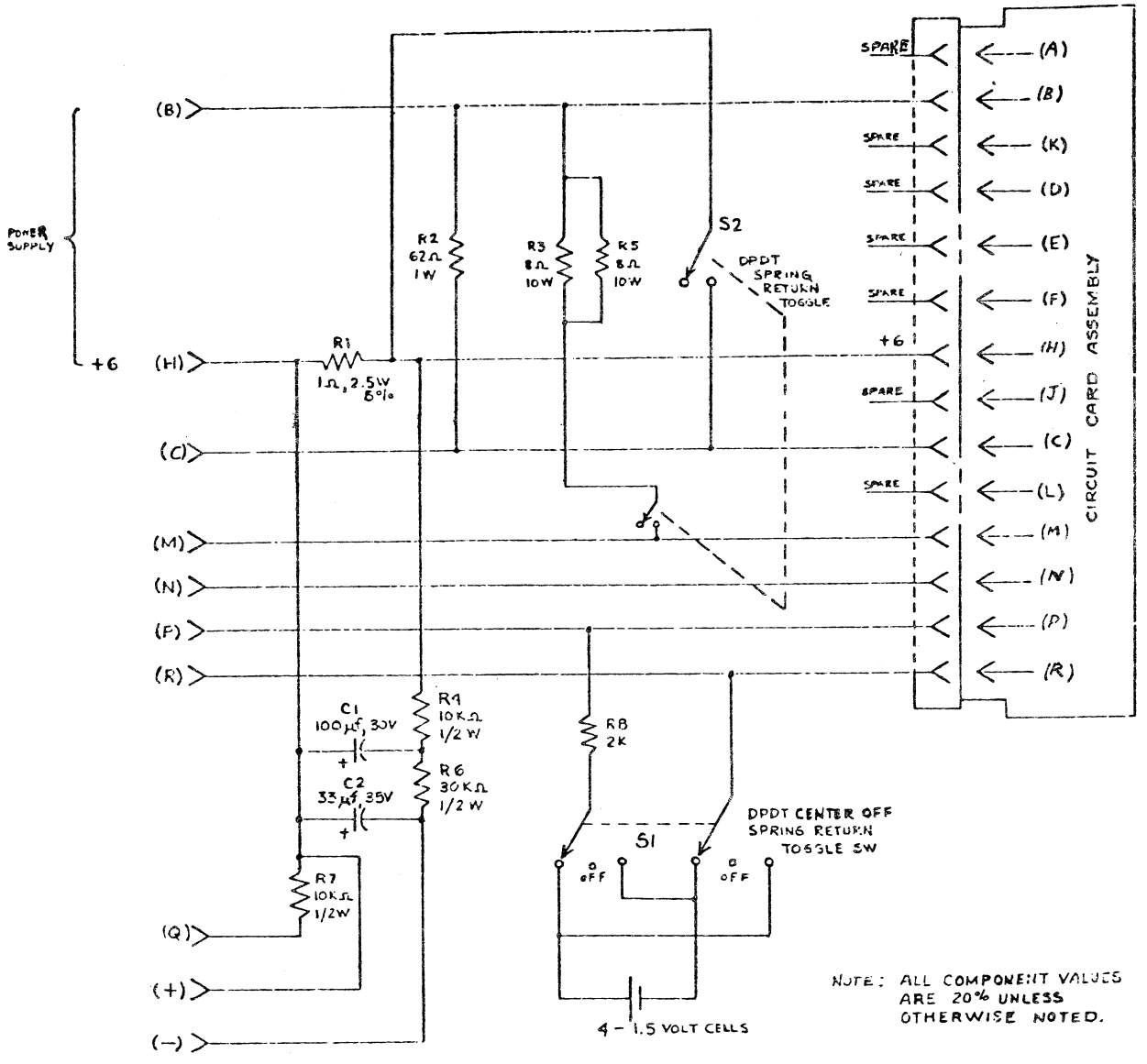


Figure 1. Circuit card tester

4.3.3.2 Operation at high temperature. Install an adapter cable between the circuit card under test and the circuit card tester shown on figure 1; this cable may be any convenient length that will permit the circuit card to be placed in a temperature test chamber while it is connected to the circuit card tester outside the chamber. Place the circuit card in a test chamber already at the temperature required by 3.7 and permit it to remain undisturbed at that temperature for at least 1 hour. Then, subject the circuit card to the performance tests described in 4.4.4.4. The performance criteria of 3.5 must be met. Cool the circuit card to room ambient temperature.

4.3.3.3 Operation after vibration. Install the circuit card onto the vibration test fixture shown on figure 2. No electrical connections need be made; the circuit card need not be operated during the vibration test. Mount the vibration test fixture onto a vibration exciter, and subject the circuit card to the vibration environment required by 3.8. After vibration, subject the circuit card to the performance tests described in 4.4.4.4. The performance criteria of 3.5 must be met. Examine the card for evidence of physical deterioration.

4.3.4 Acceptance/rejection criteria. The circuit card assembly shall comply with the examination and tests specified in 4.3.2 to be acceptable. The contractor shall obtain written approval from the contracting officer prior to proceeding with regular production.

4.4 Quality conformance inspection.

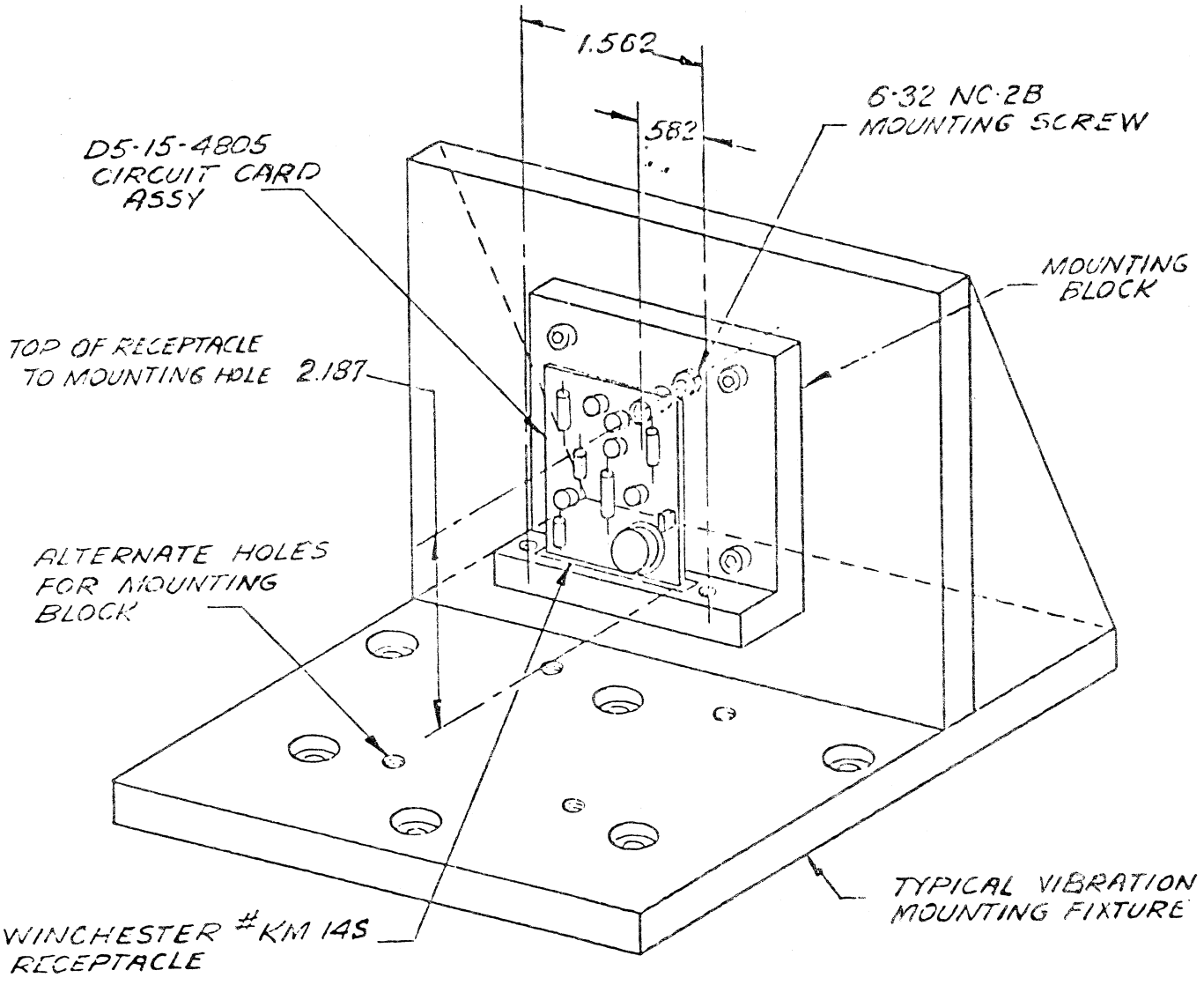
4.4.1 Lotting. A lot shall consist of the circuit card assemblies offered for acceptance at one time which have been produced by one manufacturer, at one plant, from the same material, under essentially the same manufacturing conditions.

4.4.2 Sampling for examination and for resistance and leakage current tests. Sampling shall be conducted in accordance with MIL-STD-105.

4.4.3 Inspection procedures.

4.4.3.1 For examination and for resistance and leakage current tests. Sample circuit card assemblies shall be examined and tested in accordance with the classification of defects 4.4.3.3 and MIL-STD-105.

4.4.3.2 For performance test. Each circuit card assembly shall be tested for performance in accordance with 4.4.4.4.



MAT'L : ALUMINUM
TOL. = ±.005

Figure 2. Circuit card vibration test fixture

4.4.3.3 Classification of defects.

(a) Circuit card assembly (Dwg D5-15-4805).

Categories	Defects	Acceptance standards
Critical:	None defined	
Major:	AQL 1.0 percent defective	
101	Workmanship (applicable defects listed as Major in MIL-STD-252, see 3.10)	
102	Resistance across points P and R	4.4.4.1
103	Resistance across points H and B	4.4.4.2
104	Leakage current	4.4.4.3
Minor:	AQL 4.0 percent defective	
201	Workmanship (applicable defects listed as Minor in MIL-STD-252, see 3.10)	
	AQL 6.5 percent defective	
202	Workmanship (applicable defects listed as Control in MIL-STD-252, see 3.10)	

4.4.4 Tests. Tests shall be conducted as follows:

4.4.4.1 Current across points P and R (in both directions). Install the circuit card assembly in the circuit card tester shown in figure 1. Connect a 1000 ohm ± 5 percent resistor, a 6.0 ± 0.1 VDC power supply and a milliammeter having a ± 5 percent accuracy in series with pins P and R and measure the current. Reverse the connections to pins P and R and again measure the current. Both measurements shall be within the limits specified in 3.3.1.

4.4.4.2 Resistance across points H and B. Install the circuit card assembly in the circuit card tester shown in figure 1. Connect an ohmmeter of suitable range with an accuracy of ± 2° of arc on the R X 1 scale and 1.5° of arc on the RX 100 and RX 10K scale, to test points H and B with the plus lead of the ohmmeter connected to test point H and measure the resistance between these points. The measurement must be as specified in 3.3.2. NOTE: A capacitor is being charged during this measurement. Allow the ohmmeter to stabilize before reading. The 6.0 ± 0.1 vdc power supply should not be connected to pin H and B during this test.

4.4.4.3 Leakage current. Connect a direct current power supply that has an output capable of being varied between 0.0 vdc and 6.0 vdc to the circuit card tester shown in figure 1. Connect the minus terminal of the power supply to test point B. Connect the plus terminal of the power supply, through a microammeter of suitable range with an accuracy of 2.0 percent full scale deflection, to test point Q. Turn on the power supply and adjust the output to 0.0 vdc. Install the circuit card assembly in the circuit card tester. While monitoring the microammeter, increase the output of the power supply to 6.0 ± 0.1 vdc. The current indicated by the microammeter must be within the limits specified in 3.4. NOTE: A capacitor is being charged during this measurement. Allow the microammeter to stabilize before reading.

4.4.4.4 Performance.

(a) Connect a direct current power supply that has an output capable of being varied between 0.0 vdc and 6.0 vdc to the circuit card tester shown in figure 1. Connect the positive terminal of the power supply to test point H, and the negative terminal of the power supply to test point B. Turn on the power supply and adjust the output to 0.0 vdc. Connect a suitable oscilloscope to the circuit card tester. Connect the positive terminal of the oscilloscope to test point C, and the negative terminal to test point B. Turn on the oscilloscope and adjust it as required for the expected display (e.g., vertical sensitivity of two volts per centimeter, sweep speed of 100 milliseconds per centimeter, and sync selector at internal ac slow). Connect a differential voltmeter which has an input resistance of at least 10.0 megohms to the + and - terminals of the circuit card tester. Install a circuit card assembly in the circuit card tester. Increase the output of the power supply to 6.0 ± 0.1 vdc. Move switch S1 to first one extreme position, and then to the other extreme position. The current and the waveform required by 3.5(a) must be present when switch S1 is in either extreme position, and must not be present when S1 is released. NOTE: Current in milliamps is read out directly on the millivolt scale of the differential voltmeter.

(b) Disconnect the oscilloscope signal terminal from test point C, and connect it to test point M. Adjust the oscilloscope for the expected display (e.g., sweep speed to 500 microseconds per centimeter, and sync to internal automatic). Move switch S2 to its ON position. The current and waveform required by 3.5(b) must be present when switch S2 is in the ON position, and must not be present when switch S2 is released. NOTE: Current in milliamps is read out directly on the millivolt scale of the differential voltmeter.

5. PACKAGING

5.1 Unit packing, packing and marking for interplant shipment (see 6.3). The circuit card shall be packaged and packed to provide adequate protection from physical damage from the supply source to the first receiving activity for immediate use or further processing. Shipping containers shall be in compliance with the rules and regulations applicable to the mode of transportation. Marking shall be in conformance with FED-STD-123 and shall include the contractors name, address and contract number.

5.2 Repair parts. When this item is being procured for storage and issue as a repair part, preservation, unit packing, packing and marking shall be as specified on the packaging data sheet which is identified by its National stock number.

6. NOTES

6.1 Intended use. This circuit card assembly is used to complete a function as a subassembly in the Alarm Unit, Chemical Agent Automatic Alarm: M42.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Preproduction.

(1) Time allowed for contractor submission of samples for Government test and evaluation after award of contract.
(2) Name and address of test facility and shipping instructions when testing is performed by the Government.
(3) Time required for the Government to notify the contractor whether or not to proceed with production.

6.3 Interplant shipment. Packaging and packing for interplant shipment is for supplies and material that do not enter the military supply system. Typical interplant shipments are shipments from a vendor to a contractor, or from a contractor to a military arsenal or plant.

6.4 International interest. Certain provisions of this specification are the subject of international standardization agreement QSTAG 251. When amendment, revision, or cancellation of this specification is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

Custodian:

Army - EA

Preparing activity:

Army - EA

Project No. 6665-A405

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MIL-C-51387A

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