MILITARY SPECIFICATION

SWITCH, PRESSURE

This specification is approved for use by the US Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the performance and manufacture requirements for a pressure switch that senses hydraulic pressure and mechanically opens and closes an electric circuit at pre-set pressures without the use of solid state electronic components.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: DRSTA-GSS, Warren, MI 48090, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

FSC 5930

SPECIFICATIONS
FEDERAL

QQ-A-591	- Aluminum Alloy Die Casting.

MILITARY

MIL-M-14	- Molding Plastics and Molded Plastic Parts, Thermosetting.
MIL-P-14232	- Parts, Equipment and Tools for Army Materiel Packaging and Packing of.
MIL-C-45662	- Calibration System Requirements.
MIL-H-46170	- Hydraulic Fluid, Rust-Inhibiting, Fire-Resistant, Synthetic Hydrocarbon Base.

STANDARDS
MILITARY

MIL-STD-100	- Engineering Drawing Practices.
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 U.S. Military Property.
MIL-STD-193	- Painting Procedures, Tactical Vehicles.
MIL-STD-202	- Test Methods for Electrical and Electronic Component Parts.
MIL-STD-454	- Electronic Equipment, Standard General Requirements for.
MIL-STD-810	- Environmental Test Methods.
MIL-STD-889	- Dissimilar Metals.
MIL-STD-1246	- Product Cleanliness Levels and Contamination Control Program.

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein.

DRAWINGS
MILITARY

8724231	- Shell Assembly.
10905300	- Accumulator Assembly.
10951700	- Power Pack Control Assembly.
10959033	- Motor Endurance Test Cooling Device.
11637230	- Power Pack Control Assembly.
11655194	- Soldering, Electrical Connection for Electrical and Electronic Equipment, General Specification for.
11668642	- Motor Assembly.
11674112	- Power Pack Control Assembly.

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

3. REQUIREMENTS

3.1 First article (preproduction). When specified (see 6.2), the contractor shall furnish two or more switches under this specification, produced prior to the manufacture of the item in production quantity. Switches furnished under this specification shall be products which are represented by a preproduction sample that has been examined, tested, and has passed first article inspection (see 4.4). Approval of the first article sample by the Government shall not relieve the contractor of his obligation to supply switches that are fully representative of those tested and inspected as a first article sample. Any changes or deviations of the production units from the first article sample shall be subject to the approval of the contracting officer (see 4.4).

3.2 Initial production. Unless otherwise specified (see 6.2), initial production units shall be inspected and tested to specified requirements herein. During production, units shall be subjected to quality conformance inspections to assure continued conformance to specified requirements (see 4.4.2).

3.3 Materials. Materials shall be as specified on applicable standards, drawings, and specifications (see 6.2). Materials shall be free from defects which adversely affect performance or serviceability of the finished product. Exposed functional parts shall be fabricated from suitable resistant materials or treated to prevent corrosion. Exposed nonfunctional parts shall be painted white conforming to MIL-STD-193.

3.3.1 Dissimilar metals. Contact between dissimilar metals in conformance with requirement 16 of MIL-STD-454 shall not occur except for the completion of an electrical circuit. Separation of dissimilar metals shall be accomplished by providing insulation between mating surfaces. Dissimilar metals shall be protected from galvanic corrosion in accordance with requirements of MIL-STD-889.

3.3.2 Solder. Solder and soldering flux shall conform to requirement 5 of MIL-STD-454.

3.3.3 Cast parts. Switch housing shall be made of castings conforming to the applicable composition of QQ-A-591.

3.3.4 Phenolic parts. Molded phenolic parts shall conform to MIL-M-14.

3.4 Design and construction. Unless otherwise specified and where applicable, the pressure switch assembly shall conform to the requirements of MIL-STD-454.

3.4.1 Weight. Weight of the switch, excluding hydraulic fluid, shall not exceed 0.8 pound.

3.4.2 Interchangeability. Military standard parts shall be incorporated whenever possible. Commercial standard parts may be used provided they are interchangeable with military standard parts without modification in accordance with requirements of MIL-STD-100.

3.4.3 Springs. Mechanical springs shall not be used to transmit current.

3.4.4 Corrosion resistance. Exposed functional or interconnecting parts shall be fabricated from suitable corrosion resistant material or treated to prevent corrosion. The switch shall be capable of operating, after exposure to a 5 percent sodium chloride atomized spray, for a minimum period of 48 hours.

3.5 Performance.

3.5.1 Operating conditions. Unless otherwise specified, the switch shall meet the performance requirements of this specification under the following conditions.

Temperature	73 ± 18 Degrees Fahrenheit (^{o}F)
Pressure	28 ± 2.0/-4.5 inches of mercury (Hg)
Humidity	50 ± 30 percent
Voltage	27.5 ± 0.5 volts dc

3.5.2 Operating pressure. The switch shall operate within a range of 0-3000 pounds per square inch gage (psig) (see 4.6.2).

3.5.3 Operating fluid. The switch shall be completely compatible with hydraulic fluid as specified in MIL-H-46170 (see 4.6.3).

3.5.4 Actuation pressure. The electrical contacts in the switch shall close at a pressure of 950 ± 25 psig with decreasing pressure applied to the hydraulic port. At an ambient air temperature of 50^{o}F to 125^{o}F and with increasing pressure at the rate of 100 ± 25 psi per second applied to the hydraulic port, the electrical contacts shall open at a pressure 275 ± 25 psig greater than the closing pressure. At an ambient air temperature of 50^{o}F to minus (-)25^{o}F, the tolerance for the pressure differential shall be ± 50 psig. The tolerances for actuating pressures may be exceeded after exposure to shock of the magnitude in 3.5.18 if the change in characteristics attributable to the shock does not exceed 10 percent of the specified tolerances (see 4.6.18).

3.5.5 Rated current capacity. The switch electrical contacts shall have a minimum current capacity of 4 amperes, inductive load (see 4.6.18).

3.5.6 Insulation resistance. Insulation resistance shall not be less than 100 megohms at 500 volts direct current (vdc) between each terminal of the electrical connector and the case, and between the connector terminals when the switch is in the open condition with applied 1300 psig (see 4.6.18).

3.5.7 Voltage drop. Voltage drop shall be less than 0.15 volt at 10 amperes when the switch is in the closed condition (see 4.6.18).

3.5.8 Contact bounce. There shall not be contact bounce or flutter in excess of 3 milliseconds (ms) at any pressure between opening and closing (see 4.6.18).

3.5.9 Dielectric withstanding voltage. Isolation breakdown or dielectric failure and current leakage shall not exceed 0.1 milliampere when 1000 voltage root mean square (VRMS) is applied between terminals A and B with the switch open or when 1000 VRMS is applied between terminals A and B and the case (see 4.6.18).

3.5.10 Proof pressure. The switch shall withstand a proof pressure of 4450 plus 50 minus -0 psig applied for 5 minutes to the hydraulic port. There shall be no external leakage, permanent deformation, or permanent degradation of performance (see 4.6.17).

3.5.11 Endurance. The switch shall be capable of 225,000 cycles minimum when applied as shown in figures 1 and 2. A cycle is defined as beginning with a pressure of 1300 psig and decreasing to 900 psig and pressurizing to 1300 psig. Ten percent of all the cycles shall begin at 0 psig, increase to 1300 psig, and return to 0 psig for each cycle. Each subsequent drop to 900 psig shall be accompanied by the switch closing a circuit operating at 27.5 $\pm$ 0.5 vdc and 4 amperes. Subsequent to the 225.000 cycles of operation, the equipment shall be capable of meeting the requirements specified in 3.5.4, 3.5.6, 3.5.7, 3.5.8, and 3.5.9 (see 4.6.18).

3.5.12 Burst pressure. The switch shall withstand a burst pressure of not less than 7500 psig applied to the hydraulic port (see 4.6.19).

3.5.13 Temperature. The switch shall meet the performance requirements specified at ambient temperatures ranging between -25°F to 125°F and corresponding hydraulic oil temperatures ranging between -25°F and 250°F. The assembly shall not be damaged by storage conditions ranging between -65° to 160°F (see 4.6.10, 4.6.11).

3.5.14 Humidity. The switch shall be capable of operating in 100 percent relative humidity (see 4.6.12).

3.5.15 Waterproofness. The switch shall be capable of withstanding 6 psig while submerged in clear water at ambient temperature for two minutes without evidence of leakage. The switch assembly shall be submerged with the electrical connector capped, hydraulic pressure port sealed, and the uppermost surface of the switch assembly a minimum of 1 inch below the surface of the water. Switch assembly shall not be electrically operated during immersion (see 4.6.14).

3.5.16 Fungistatic materials. All non-metallic materials shall be inherently fungistatic or treated to resist fungus except when used for components of potted or otherwise moisture sealed assemblies (see 4.6.15).

3.5.17 Vibration. The switch shall be capable of withstanding the vibration profile per figure 3 for a period of 120 minutes (including resonance dwells of 20 minutes each) in each of the three mutually perpendicular axes, X, Y and Z as shown in figure 4 (see 4.6.20).

3.5.18 Shock (nonoperating). The switch shall be capable of withstanding exposure to three half-sine wave shocks of 40 ± 4 gravity unit (g) peaks for a mutually perpendicular axes X, Y, and Z as shown in figure 4 (see 4.6.21).

3.6 Protective finishes. All frontal exterior metal surfaces shall be painted. The index marks and their identification may be base metal. Surfaces shall be cleaned, conditioned, primed, and painted in accordance with application requirements of MIL-STD-193 for aluminum alloys.

3.7 Cleanliness. The switch shall meet cleanliness requirement of MIL-STD-1246, level 200 (see 4.6.22).

3.8 Identification and marking.

3.8.1 Method of marking. The military part number and serial number shall be permanently inscribed by etching, engraving, embossing, casting, or other approved permanent marking method. Marking shall be on the body of the assembly in the location shown on the pressure switch assembly drawing.

3.8.2 Identification. Identification markings shall conform to MIL-STD-130. The nameplate shall be firmly attached to the exterior of the switch in accordance with MIL-STD-130 and positioned as shown on the pressure switch drawing. The nameplate shall include the following information.

a. Manufacturer name, serial number, and date of manufacture.
b. Nominal voltage and current rating.
c. Class of insulation.
d. Military part number.
e. Federal stock number.

3.9 Workmanship. In addition to requirements specified on applicable MS or drawings, workmanship shall be of a quality level that assures a switch free from burrs, chips, dirt, sharp edges, scratches and other defects.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use any facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any 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 inspections. The inspection requirements specified herein are classified as follows:

a. First article (preproduction) inspection (see 4.4).
b. Initial production inspection (see 4.4.2).
c. Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Examinations and test shall be performed in still air temperature of 73° ± 18°F, barometric pressure of 28.5 + 2.0, - 4.5 inches of mercury and a relative humidity of 50 ± 30 percent (see 3.5.1). The pressure switch shall be tested at a voltage of 27.5 ± 0.5 vdc. Test currents shall be maintained automatically or manually at specified values.

4.3.1 Calibration of test equipment. Unless otherwise specified, test equipment accuracy shall be capable of measurement of 10 percent of product or test tolerance. Calibration of test equipment shall be conducted at intervals which serve to establish required accuracy. Records of calibration shall be made available to the Government. The Government inspector shall refuse to allow inspection where accuracy of test equipment has not been established to the satisfaction of the Government. Calibration of inspection and test equipment shall be in accordance with MIL-STD-45662.

4.4 First article (preproduction) inspection. The first article (preproduction) sample shall consist of two assemblies. The specimens, properly marked with identifying information, shall be representative of the units proposed to be furnished to the Government. Unless otherwise specified, first article inspection shall be done by the manufacturer under Government surveillance and shall consist of examination for the defects specified in 4.5.2.3 and testing as specified in table I.

4.4.1 First article inspection failure. Failure of any first article specimen to pass specified examinations or test shall be cause for refusal by the Government to conduct additional testing until the faults identified by tests have been corrected.

4.4.2 Initial production inspection. The Government activity shall select two assemblies from the first 10 switches produced under the production contract (see 6.2) for initial production inspection. Upon verification and validation of the inspection requirements, quality conformance inspection of the remainder of the production assemblies shall be as specified (see 4.4.2.1).

4.4.2.1 Initial production inspection failure. Failure of an initial production assembly, as a result of initial production inspection, shall result in the rejection of the pressure switch. The Government shall refuse acceptance of assemblies until additional testing reveals faults have been corrected.

TABLE I. Order of testing.

Sequence of tests	Paragraph number	First article sample		Initial production sample	
		1	2	1	2
Operating pressure	4.6.2	X	X	X	X
Operating fluid	4.6.3	X	X	X	X
Actuation pressure	4.6.4	X	X	X	X
Current capacity	4.6.5	X	X	X	X
Insulation resistance	4.6.6	X	X	X	X
Voltage drop	4.6.7	X	X	X	X
Contact bounce	4.6.8	X	X	X	X
Dielectric withstanding voltage	4.6.9	X	X	X	X
Design and construction	4.7	X	X	X	X
Weight	4.6.16	X	X	X	X
Waterproofness	4.6.14	X	X	X	X
Fungus resistance	4.6.15	X	X	X	X
Proof pressure	4.6.17	X	X	X	X
High temperature	4.6.10	X	X	X	X
Low temperature	4.6.11	X	X	X	X
Humidity	4.6.12	X	X	X	
Corrosion resistance	4.6.13	X	X	X	
Shock	4.6.21	X	X	X	X
Vibration	4.6.20	X	X	X	X
Endurance	4.6.18	X	X	X	
Burst pressure	4.6.19		X	X	

4.5 Quality conformance inspection.

4.5.1 Lot size. An inspection lot shall consist of all pressure switch assemblies of one type, from an identifiable production period, submitted at one time for acceptance.

4.5.2 Quality conformance examination.

4.5.2.1 Sampling for examination. Samples for quality conformance inspection shall be selected in accordance with MIL-STD-105.

4.5.2.2 Acceptable quality level. Pressure switch assemblies selected in accordance with 4.5.2.1 shall be examined to determine conformance to the following acceptable quality levels (AQL's) on the basis of percent defective:

Classification	AQL
Major	1.0
Minor	2.5

4.5.2.3 Classification of defects. For examination purposes, defects shall be classified as specified in table II.

TABLE II. Classification of defects.

Categories	Defect	Method of Inspection
Critical	None defined	
Major		
101	Improper materials (see 4.7.1).	Visual
102	Dimensions affecting interchangeability (see 4.7.2).	1/ SIE
103	Improper protective finish (see 3.6).	Visual
Minor		
201	Dimensions not affecting interchangeability (see 4.7.2).	Gage
202	Finish (see 3.6).	Visual
203	Improper identification marking (see 4.7.5).	Visual
204	Workmanship (see 4.7.4).	Visual

1/ SIE = Standard Inspection Equipment

TABLE III. Classification of tests.

Test	Requirements	100% acceptance	Control tests	Comparison tests
Operating pressure	3.5.2	4.6.2		
Operating fluid	3.5.3	4.6.3		
Actuation pressure	3.5.4	4.6.4		
Current capacity	3.5.5	4.6.5		
Insulation resistance	3.5.6	4.6.6		
Voltage drop	3.5.7	4.6.7		
Contact bounce	3.5.8	4.6.8		
Dielectric withstanding voltage	3.5.9	4.6.9		
High temperature	3.5.13	4.6.10	4.6.10	
Low temperature	3.5.13	4.6.11	4.6.11	
Humidity	3.5.14	4.6.12	4.6.12	
Corrosion resistance	3.5.15	4.6.13	4.6.13	
Waterproofness	3.5.16	4.6.14	4.6.14	
Fungus resistance		4.6.15	4.6.15	
Weight	3.4.1	4.6.16	4.6.16	
Proof pressure		4.6.17	4.6.17	
Endurance	3.5.11	4.6.18	4.6.18	4.6.18
Burst pressure	3.5.12	4.6.19	4.6.19	4.6.19
Vibration	3.5.18	4.6.20	4.6.20	4.6.20
Shock	3.5.19	4.6.21	4.6.21	4.6.21

TABLE III. Classification of tests - Continued.

Test	Requirements	100% acceptance	Control tests	Comparison tests
Cleanliness	3.7	4.6.22	4.6.22	
Materials, processes and parts	3.4	4.6.5.1		
Interchangeability	3.4.2	4.6.5.2		
Identification and markings	3.8	4.6.6		
Workmanship	3.9	4.6.7		

4.5.3 Quality conformance tests.

a. Acceptance tests (see 4.5.4).
b. Control tests (see 4.5.5).
c. Comparison tests (see 4.5.6).

4.5.3.1 Acceptance tests. Switch samples shall be selected in accordance with MIL-STD-105. Switch shall undergo tests specified in table II using the specified AQL of 2.5 on the basis of percent defective.

4.5.3.2 Acceptance test failure. Failure of pressure switch assemblies to pass acceptance tests shall be cause for rejection of failed units.

4.5.3.3 Disposition of rejected units. Pressure switches rejected as a result of testing specified in 4.5.3, may be repaired or reworked and resubmitted for examination and testing.

4.5.4 Control tests.

4.5.4.1 Control inspection. Control inspection assemblies shall be selected at the rate of one randomly selected assembly from each 200 units produced. Samples selected shall be examined from defects and subsequently tested as specified in table III.

4.5.4.2 Failure. Failure of a control test sample to pass any specified test shall be cause for the Government to refuse to accept subsequent lots until it has been proven, to the satisifaction of the Government, that the faults revealed by the test have been corrected.

4.5.5 Comparison tests.

4.5.5.1 Sampling for comparison tests. Switches shall be selected by the Government at any time during contract production periods.

4.5.5.2 Comparison testing. The Government may select switch assemblies at any time during the contract production period for testing in accordance with table III. Tests shall be conducted by the Government at a site selected or approved by the Government.

4.6 Methods of inspections and tests.

4.6.1 Test conditions. All examinations and tests, unless otherwise specified, shall be made in accordance with paragraph 3.5.1. Requirements of test conditions are listed in table II. The waterproofness test of 4.6.14 shall be performed prior to the operating pressure test specified in 4.6.2.

4.6.2 Operating pressure. The switch shall comply with the requirements of 3.5.2 and shall pass the performance of 4.6.4.

4.6.3 Operating fluid. The switch shall be tested using hydraulic fluid meeting the requirements of MIL-H-46170.

4.6.4 Actuation pressure. A 3000 psig pressure supply shall be connected to the pressure prot of the switch assembly. With the switch at ambient temperature and an ohmmeter connected across the switch contacts, 10 psig shall be applied to the pressure port and the ohmmeter shall indicate a closed circuit. Pressure shall be increased at a rate of 100 $\pm$ 25 psi per second until the ohmmeter indicates an open circuit. The switch opening pressure shall be noted and the pressure shall be slowly decreased until the ohmmeter indicates a closed circuit. The switch closing pressure shall be 950 $\pm$ 25 psig. The pressure shall be increased to 1300 psi and the ohmmeter and pressure indicator observed for an open circuit at 275 $\pm$ 25 psig above the closed circuit pressure. During the test of 4.5.11, while stabilized at the low temperature, the tolerance for the switch opening pressure shall be $\pm$ 50 psig. The tolerance for actuating may be exceeded after exposure to shock (see 4.6.21) if the pressure change does not exceed 10 percent. This test shall be performed five times.

4.6.5 Current capacities. A 30 vdc power source shall be connected to the switch and an inductive load of 4 amperes shall be placed in series with the switch contacts. The tests of 4.6.4 shall subsequently be performed. A voltmeter shall be used in place of the ohmmeter.

4.6.6 Insulation resistance. The switch shall be tested in accordance with method 302 of MIL-STD-202 using test condition B and shall meet the requirements of 3.5.6.

4.6.7 Voltage drop. The voltage across the switch shall be measured and shall indicate no greater than 0.15 vdc when no pressure is applied and a 30 vdc power source with a 10 ampere resistance load connected in series with the switch.

4.6.8 Contact bounce. The switch shall be connected per 4.6.7. The load shall be 1 ampere and an oscilloscope shall be connected across the load resistor. During actuation and deactuation of the switch (4.6.4), the oscilloscope shall be observed for any switch contact bounce or flutter. There shall be no evidence of contact bounce or flutter in excess of 3 ms.

4.6.9 Dielectric withstanding voltage. A potential of 1000 $\pm$ 10 VRMS 60 Hertz shall be applied for 60 seconds to those circuits specified in 3.5.9. There shall be no insulation breakdown, dielectric failure, or current leakage in excess of 0.1 milliampere.

4.6.10 High temperature. The switch shall undergo the high temperature test specified in MIL-STD-810, method 501, procedure II. Storage temperature of the switch shall be 160°F. At the conclusion of the storage temperature test, the switch shall be stabilized at 125°F and be subsequently tested in accordance with 4.6.4 through 4.6.8. The test shall then be tested at room temperature in accordance to 4.6.4 through 4.6.8.

4.6.11 Low temperature. The switch shall undergo the low temperature test specified in MIL-STD-810, method 502, procedure 1. Maintain the storage temperature at -65°F for a minimum period of 12 hours. At the conclusion of this time period, the switch shall be stabilized at -25°F and tested in accordance with 4.6.4 through 4.6.8. Performance degration at -25°F shall not exceed 7.5 percent. The switch assembly shall be returned to room temperature and tested in accordance with 4.6.4 through 4.6.8.

4.6.12 Humidity. The switch assembly shall be placed in a humidity chamber with the electrical connector and hydraulic port sealed and tested in accordance with MIL-STD-810, method 507, procedure II. At the conclusion of this test, subsequent testing shall be in accordance with 4.6.4 through 4.6.8.

4.6.13 Corrosion. The switch assembly shall undergo the corrosion resistance test specified in MIL-STD-810, method 509. At the conclusion of this test, the switch shall be subsequently tested in accordance with 4.6.4 through 4.6.8.

4.6.14 Waterproofness. To determine conformance to 3.5.15, the switch assembly electrical connector and hydraulic pressure port shall be capped, pressure port submerged in water at room temperature, and a pressure differential of 6 psi developed so that the internal air pressure of the switch exceeds the external pressure. The pressure differential shall be maintained for 2 minutes without evidence of leakage. Bubbles which are the result of entrapped air on exterior surfaces of the blower shall not be considered a leak. The switch assembly shall be subsequently tested in accordance with performance tests of 4.6.4 through 4.6.8.

4.6.15 Fungistatic materials. To determine conformance to 3.5.16, the switch assembly shall be tested as specified in MIL-STD-810, method 508. At the conclusion of this test, the switch shall be subsequently tested in accordance with 4.6.4 through 4.6.8.

4.6.16 Weight. The switch shall be weighed without hydraulic fluid and shall weigh less than 0.8 pound.

4.6.17 Proof pressure. A pressure of 4450 +50, -0 psig shall be applied to the inlet port for a period of 5 mintues. There shall be no evidence of external leakage or permanent deformation. After having returned to normal pressure, the switch shall be subsequently tested in accordance with the test specified in 4.6.4.

4.6.18 Endurance. The switch shall be tested at 225,000 cycles of operation at the conditions specified in 3.5.11. The cycle rate shall be 2 to 3 seconds on and 5 to 6 seconds off. The assembly shall be tested in accordance with 4.6.4, 4.6.7, 4.6.8, and 4.6.9, subsequent to the test specified above.

4.6.19 Burst pressure. A pressure of 7500 plus 300, minus 0 psig, shall be applied to the inlet port for a period of 5 minutes. The assembly shall withstand this pressure without bursting but need not be operable after the 7500 psig pressure application.

4.6.20 Vibration. The switch shall be subjected to the vibration test specified in MIL-STD-810, method 514.1, procedure VIII. The following tests shall also be conducted.

a. Test level shall conform to the vibration curve shown in figure 3. Time schedule shall be 120 minutes per axis (figure 4) including 20 minutes dwell time at each resonance.

b. Connections and instruments shall be attached to the switch to permit operation and testing as specified in c through g.

c. Conduct resonant frequency search along each axis at room temperature with input power applied over the frequency range of 5 to 500 Hz. A minimum of four resonant frequencies shall be identified in each axis for the resonant dwell test. If more than four resonant frequencies are present, the four most severe shall be identified.

d. The switch shall be placed in a 125°F ambient temperature chamber and 27.5 volts of power and 10 amperes shall be applied.

e. The switch shall undergo sinusoidal vibration cycling and resonant dwell tests at 125°F at test levels and time schedules specified in paragraph a. Throughout exposure to the vibration environment, there shall be no contact bounce or flutter in excess of three milliseconds between or at the switching pressures.

f. Switch tests specified in paragraphs d and e shall be repeated in an ambient temperature of -25°F.

g. At the conclusion of the sinusoidal vibration test specified in paragraph f, the switch assembly shall be returned to room temperature and subject to performance tests specified in 4.6 through 4.6.8.

4.6.21 Shock. The switch shall be mounted as specified in figure 4. Three half-sine wave pulses in both directions of 3 mutually perpendicular axes X, Y and Z shall be applied in accordance with MIL-STD-810, method 516, procedure I, for a total of 18 shock pulses. Peak amplitude shall be 40g ± 4g with a time duration of 18 + 3 milliseconds measured at the 10 percent amplitude points. There shall be no contact or flutter in excess of 3 milliseconds during shock testing. At the conclusion of this test, the switch shall undergo the performance tests of 4.6.4 through 4.6.8.

4.6.22 Cleanliness. At the conclusion of acceptance testing, the unit's internal cleanliness shall be established by providing input fluid rated at a cleanliness level of 200 of MIL-STD-1246. The flushing shall be maintained until a 100 ML sample of the effluent oil meets the particular count for level 200. Once level 200 has been achieved, the unit shall be drained of oil and sealed with a non-contaminating, tamper proof seal, adequately tagged and identified before preparation for delivery or storage processing.

4.7 Design and construction.

4.7.1 Materials, processes and parts. Unless otherwise specified the switch assembly shall conform to MIL-STD-454 requirements (see 3.4). The external connector shall be visually examined for mating with the sealing shell assembly per Drawing 8724231. Mounting shall be examined for conformance to applicable drawing. Certification shall be provided to determine that soldering conforms to MIL-STD-454, requirement 5 (see 3.3.2).

4.7.2 Interchangeability. To determine conformance to 3.4.2, a certification of compliance shall be provided verifying the switch assembly is in conformance with interchangeability requirements of MIL-STD-100.

4.7.3 Identification and markings. To determine conformance to 3.8, the switch shall be visually examined for conformance to MIL-STD-130.

4.7.4 Workmanship. To determine conformance to 3.9, each item of the inspection lot must be examined at all phases of testing and shall conform to MIL-STD-454, requirement 9.

5. PACKAGING

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking shall be in accordance with the packaging data sheet for the desired level of protection specified (see 6.2).

6. NOTES

6.1 Intended use. The switch assembly is intended for use on the M60A1 series tank to operate in conjunction with the powerpack control assembly. The following Military Drawings specify switch application: 10905300, 10951700, 10959033, 11637120, 1166842 and 11674112 (see 2.1.2).

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Qualification tests required (see 4.7.2), type of inspection required (see 6.3), and the activity responsible for testing and its facility.
c. First article, when required (see 3.1).

NOTE:
Switches subjected to tests which are destructive in nature, shall not be delivered for use as defined in 6.1 and shall be marked: DO NOT USE.

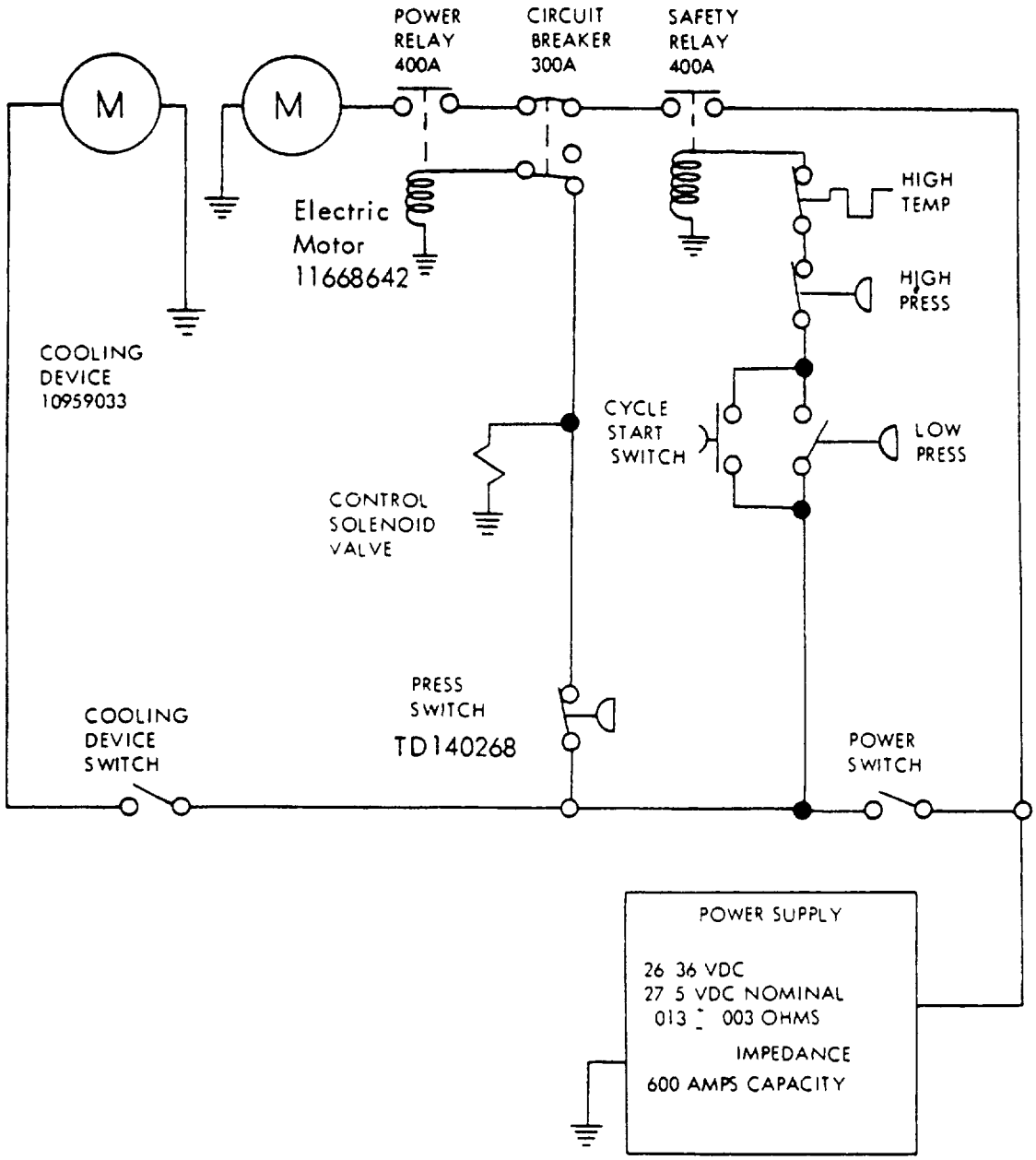
d. Selection of method and applicable level of preservation and packaging and level of packing of referenced specification (see 5.1).
e. Applicable stock number.
f. Additional components required to perform control tests.

6.3 First article. First article samples shall be tested and approved under appropriate provisions of 7-104.55 of the Defense Acquisition Regulation. The contracting officer should include specific instructions in all acquisition instruments regarding arrangements for examination, test, and approval of the first article (see 3.1).

Custodian:
Army - AT

Preparing activity:
Army - AT

Project No. 5930-A593



Figue 1. Typical Pressure Switch Electrical Schematic

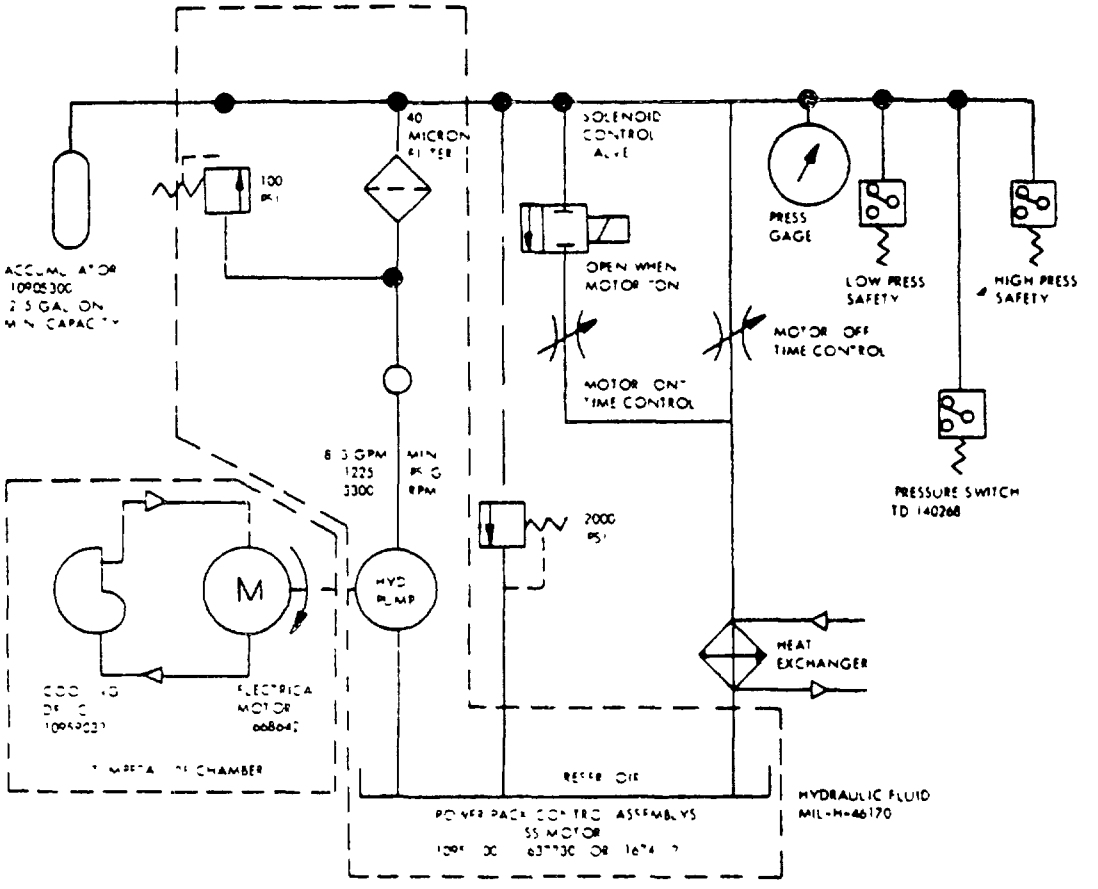


Figure 2. Typical Pressure Switch Hydraulic Schematic

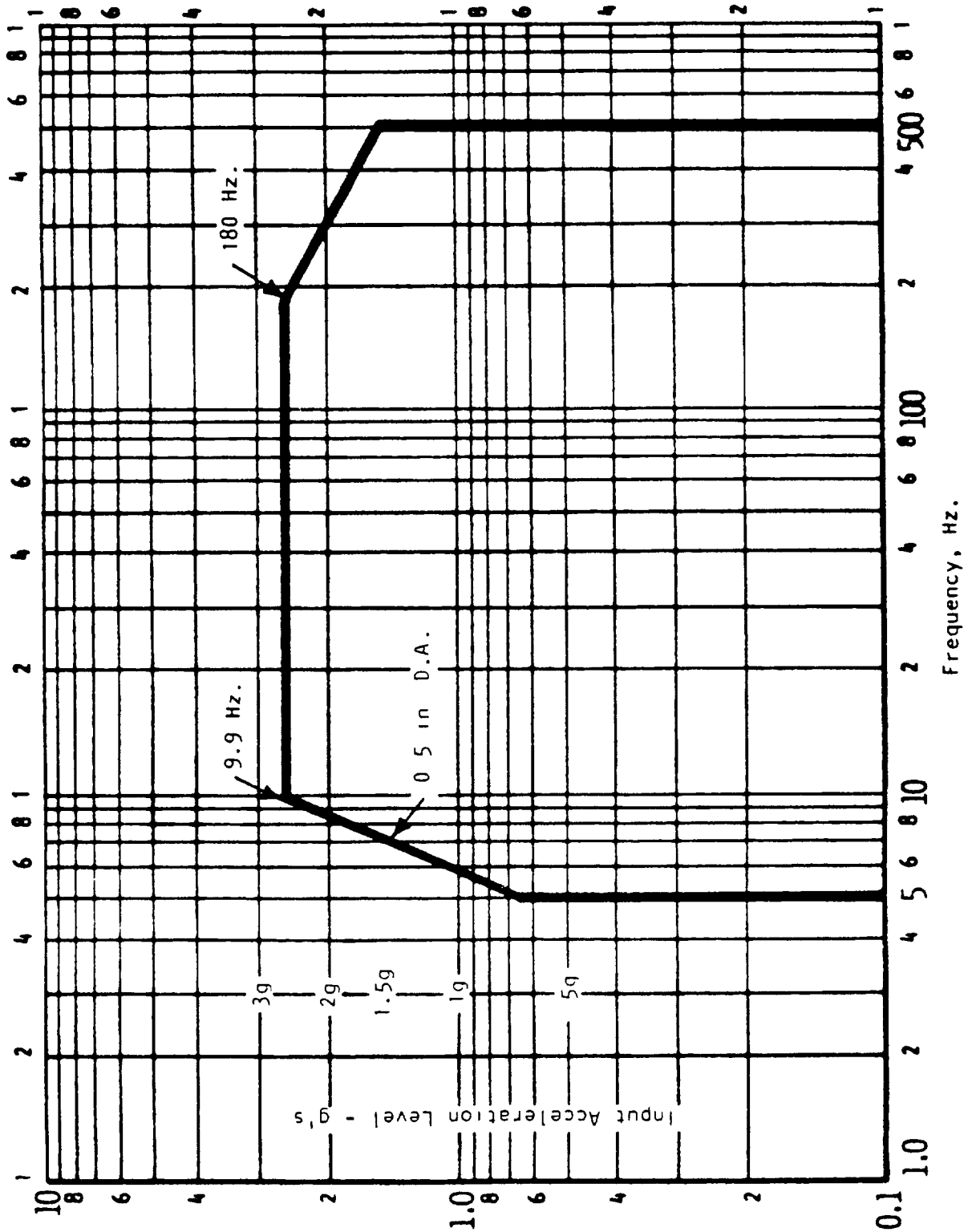


Figure 3. Vibration profile

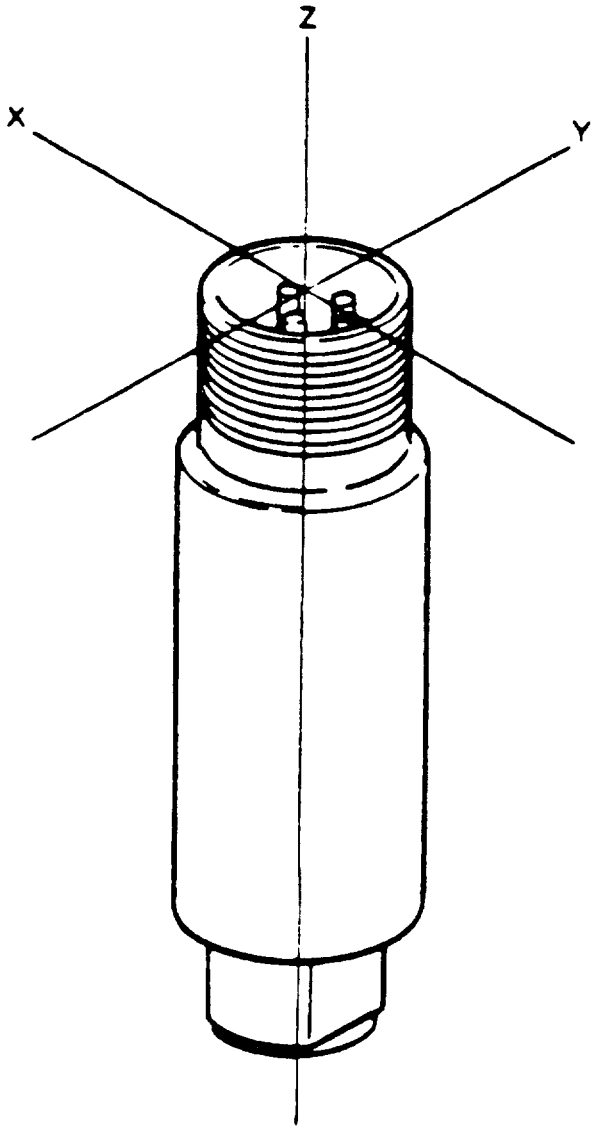


Figure 4. Shock and Vibration Axes