

W-A-450/1  
August 28, 1990

FEDERAL SPECIFICATION  
COMPONENTS FOR INTERIOR ALARM SYSTEMS,  
BALANCED MAGNETIC SWITCHES

This specification is approved by the Commissioner,  
Federal Supply Service, General Services  
Administration, for the use of all Federal agencies.

The complete requirements for procuring the switches  
described herein shall consist of this document and the latest  
issue of W-A-450/GEN.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers balanced magnetic  
switches (BMS) for use in interior alarm systems. The two major  
components of the BMS are: Switch Assembly (Alarm Switch and  
Housing) and Actuating Magnet Assembly (Actuating Magnets and  
Housing)

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

W-A-450/GEN Components for Interior Alarm Systems

(Activities outside the Federal Government may obtain copies  
of the Federal Specifications, Standards and Handbooks as  
outlined under General Information in the Index of Federal  
Specifications and Standards and at the prices indicated in the  
Index. The Index, which includes cumulative monthly supplements  
as issued, is for sale on a subscription basis by the  
Superintendent of Documents, U.S. Government Printing Office,  
Washington, DC 20402).

(Single copies of the specification and other Federal  
Specifications required by activities outside the Federal  
Government for bidding purposes are available without charge from  
Business Service Centers at the General Services Administration  
Regional Offices in Boston, New York, Washington, DC, Atlanta,  
Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los

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FSC 6350

W-A-450/1

Angeles, and Seattle, WA.)

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in the agencies.)

Military Standards:

MIL-STD-810 Environmental Test Methods and Engineering Guidelines

(Copies of Military Specifications and Standards required by contractors in connection with specification procurement functions should be obtained from the procuring activity or as directed by the contracting office.)

3. REQUIREMENTS 1/4" to 1/2"

*of about 1/2"*

3.1 Operation. The BMS shall function properly when installed with separations between the faces of the switch housing and magnet housing of between 6.4 mm and 25.4 mm. For any gap in this range, the alarm condition shall not be transmitted when the magnet housing is moved away from the switch housing less than 6.35 mm. The alarm condition shall be transmitted when the magnetic housing is moved away from the switch housing (12.7 mm or more. The alarm condition shall be transmitted if magnetic field deviations at the alarm switch exceed normal levels when in the installed no-alarm state. In cases where the assembly cover is removable for adjustments or installation, a separate alarm circuit shall transmit tamper alarms when the switch assembly cover is disturbed.

3.2 Switch assembly.

3.2.1 Switch assembly enclosure. The switch assembly shall be housed in an enclosure having either a removable cover arranged to provide ready access for mounting, wiring, and adjustment of the biasing magnet(s), or be completely sealed. In the case where the cover is removable, mounting holes shall be provided in the bottom of the enclosure in positions which are sufficiently displaced from all internal parts and the enclosure sides, when all internal parts and wiring are in place. No external hardware or fasteners except the cover fasteners shall be used.

3.2.1.1 Magnet alignment markings. Magnet alignment markings of field adjustable models shall be provided on the enclosure. These markings shall be permanent and obvious.

W-A-450/1

3.2.1.2 Removable cover. The cover of field adjustable models shall be flanged to prevent access to the interior, and shall not provide any opening between the cover and the enclosure of more than 1.6 mm when the cover is seated. An internal tamper switch shall be provided to be activated when the cover is removed. The tamper contacts shall be in the non-tamper position when the cover is in place and shall be activated when the cover is moved not less than 1.6 mm or more than 6.4 mm from the normally closed position and before the cover flanges disengage from the housing. The tamper switch shall be constructed of corrosion resistant materials and operate smoothly to prevent jamming.

3.2.1.3 Terminals. On field adjustable models, captive, screw-type terminals shall be provided for interconnecting wiring. Terminal screws shall be capable of being backed out a minimum of 2.5 mm and shall be non-magnetic. The terminals shall be protected by the housing and covered to prevent access without removal of the cover.

3.2.1.4 Weather resistance. The enclosure shall be suitable for exterior applications and protect the contents from exposure to weather. An armored cable or fittings shall be provided for interconnecting wiring using standard 12.7 mm rigid conduit. Two holes shall be provided for the attachment of standard 12.7 mm rigid conduit. One hole shall be sealed by a removable plug to prevent access to the interior. The plug shall not be removable from the exterior of the enclosure. The enclosure shall be constructed of metal at least 1.6 mm minimum thickness.

3.2.2 Switch. The switch shall consist of a hermetically sealed reed switch or equivalent. Switch contacts shall be protected against over current conditions which may cause the contacts to weld together and cease functioning. The switch shall be mounted in the enclosure in a manner that will prevent damage from impacts which do not damage the enclosure. Switch cover plates shall be provided to prevent breaking of the reed switch during installation or maintenance. Protection from moisture and dust shall be provided. Circuit cards (if any) shall be uniformly coated for protection from moisture. The switch shall be a single-pole, double throw. The normally open contacts shall be closed when the actuating magnet is in position and shall open when in the alarm state. ]

3.2.2.1 Connections. Terminals shall be provided to connect the alarm switch for either "normally closed" or "normally open" operation, and switch impedances shall be as follows:

W-A-450/1

<u>Operation</u>	<u>Impedance, No-Alarm State</u>	<u>Impedance, Alarm State</u>
Normally Closed	greater than 100,000 ohms	less than 50 ohms
Normally Open	less than 50 ohms	greater than 100,000 ohms

3.2.3 Magnet mounting. On field adjustable models, the magnet(s) shall be held in place by a positive-acting screw down type clamp that shall prevent the magnet(s) from being displaced by the application of shock, and which can be loosened to permit adjustment of the magnet(s) at installation. A biasing magnet(s) may be provided to facilitate adjustment of the operation within the limits specified in 3.1.

### 3.3 Actuating magnet assembly.

3.3.1 Actuating magnet enclosure. The enclosure shall be suitable for exterior application and protect the contents from exposure to weather. It shall be constructed of metal at least 1.6 mm thick.

3.3.1.1 Field adjustable models. The actuating magnets shall be mounted in an enclosure with a removable cover arranged to provide ready access for mounting. Mounting holes shall be provided in the bottom of the enclosure in positions which remain accessible when all internal parts are in place. No external hardware or fasteners except the cover fasteners shall be used.

3.3.1.2 Nonadjustable models. Nonadjustable models shall have sealed magnet enclosures. Tamper-resistant hardware should be used for mounting so as not to compromise switch security.

3.3.2 Actuating magnets. The actuating magnets shall be suitable to achieve the operating conditions specified in 3.1. Two or more actuating magnets shall be used. The magnets shall be firmly mounted such that they will not be displaced by the application of shock or damaged from impacts which do not damage the enclosure. Opening of the enclosure shall initiate an alarm.

3.4 Size and weight. The size and weight of each major component shall be the minimum practicable, consistent with meeting the requirements of this specification.

3.5 Interchangeability. Major components shall be fully interchangeable within each manufacturer's model to facilitate maintenance by replacement. Individual items shall not be hand picked for fit or performance. All interface requirements, electrical and physical, for each major component, shall be

W-A-450/1

specified and clearly documented. Interconnections, mounting hardware, selectable options, test points and any other features which might require referencing in operation, installation or maintenance documentation shall be marked so they may be uniquely identified in such documentation. Parts and hardware employed, in so far as possible, shall be military or commercial standards, which may reasonably be procured or for which substitute parts can be readily selected. Reliance shall not be placed on any unspecified dimension, rating or characteristic.

3.6 Maintainability. The BMS shall be designed and constructed in such a manner as to minimize maintenance and repair time. To the maximum extent practicable, items shall be of modular, unitized type construction. Components shall be so arranged and assembled that they are readily visible and accessible to maintenance personnel. The BMS shall be capable of being maintained in the field by a radio mechanic (Government Occupational Job Code 823.281 or equivalent military job code) who has not received specialized training. Field maintenance will consist of troubleshooting and isolation of failures to the major component level and replacement of the defective component. Preventive maintenance shall be required.

3.7 Lifecycle testing. The switch shall be capable of not less than 1,000,000 operations under a load of 250 milliamperes (mA) driven from a 48 Vdc source. Contact resistance shall not change by more than +20% from the initial reading.

3.8 Accelerated lifecycle testing. Contact resistance shall not change by more than +20% with an activation of the contacts after completing a high temperature test of 10 days at 185 degrees Fahrenheit. The switch assembly may be cooled to the maximum operating temperature (see 3.9) prior to operating the contacts.

3.9 Temperature testing. The switch shall be capable of operating throughout the temperature range of -20 degrees F, to +130 degrees F. Contact resistance shall not change more than +20% after testing to the above limits as per MIL-STD-810, Environmental Test Methods and Engineering Guidelines.

#### 4. QUALITY ASSURANCE PROVISIONS

This section not applicable to this document.

#### 5. PREPARATION FOR DELIVERY

This section not applicable to this document.

#### 6. NOTES

W-A-450/1

6.1 Intended Use. The Balanced Magnetic Switch is installed on any rigid, operable opening through which access may be gained to the protected room, building or enclosure. The operable opening, such as a door or window, by its construction, constitutes a physical barrier to unauthorized entry. The BMS detects the change in position of the operable opening when such movement or change exceeds 12.7mm in any direction (See 3.1). The BMS consists of two components: the first containing the actuating magnet(s) is installed on or in the moveable member of the operable opening, the second containing the switch function and the biasing magnet(s) (if any) is installed on or in a fixed member of the operable opening, such as the lintel or door jamb adjacent to the first actuating component.

Preparing Activity

GSA-FSS