CHAPTER 1

MAGAZINES AND MAGAZINE SPRINKLER SYSTEMS

LEARNING OBJECTIVES

Upon completing this chapter, you should be able to do the following:

1. Recall the types and designations of shipboard magazines, and the security measures and inspection criteria associated with shipboard magazines.
2. Describe the purpose and functioning of shipboard magazine sprinkler systems. Identify the primary components of magazine sprinkler systems, including various control valves, gauges, and alarm systems.

MAGAZINES

In this chapter we will discuss only shipboard magazines and their sprinkler system. For information on shore magazines, refer to *Mineman, Volume 3.*

A *magazine* is any compartment, space, or locker used, or intended to be used, for the stowage of explosives or ammunition of any kind. A term always associated with a magazine is *magazine area.* A magazine area includes the magazine itself and any spaces or passages containing magazine entrances intended to be used for the handling and passing of ammunition. It also includes areas adjacent to explosive stowages, including loaded ammunition lighters, trucks, and railroad cars, where special safety measures are required.

Magazines are physically located for ease of receiving and issuing explosives, the best obtainable protection (security), and the most favorable stowage conditions.

MAGAZINE TYPES

There are several types of magazines on ships; among these are primary, ready-service, missile, locker, and chemical. Each type is designed specifically for a particular type of ammunition. In this TRAMAN, we will limit our discussion to primary magazines and ready-service magazines.

Primary Magazines

Primary magazines are designed as ammunition stowage spaces, generally located below the main deck and usually below the waterline. They are adequately equipped with insulation, ventilation, and sprinkler systems and are provided with fittings so they may be locked securely. Primary magazines can accommodate a vessel's complete allowance of ammunition for peacetime operation.

Ready-Service Magazines

Ready-service magazines are spaces physically convenient to the weapons they serve. They provide permanent stowage for part of the ammunition allowance. Normally they are equipped with insulation, ventilation, and ammunition sprinkler systems, and are secured by locking. The combined capacities of the primary and ready-service magazines are normally sufficient to hold the ship's allowance for war and emergencies.

Regardless of its type, each magazine is marked by a label plate showing its compartment number and the type of ammunition it is designed to contain.

MAGAZINE DESIGNATIONS

Magazines are designated according to the type of explosive they contain. Recall from above that each

magazine is usually designed to hold only one type of explosive. Based on this assumption, a magazine may have any one of the following designations:

- Powder magazine
- Fixed-ammunition magazine
- Small arms magazine
- Warhead locker
- Projectile magazine or room
- Bomb magazine
- Missile magazine
- Fuze magazine
- Detonator locker
- Pyrotechnic magazine or locker

While stowing only one type of ammunition in a magazine is desirable, it is not always possible, due to space limitations. Therefore, in certain situations prescribed by the operational commander, more than one type of ammunition can be stowed in a magazine. However, the mix cannot include pyrotechnics that have been removed from their containers or fuzes and detonators that are not integral parts of the ammunition. These items must be stowed according to the current instructions related to the particular items.

Where mixed stowage of ammunition is necessary, precautions should be taken to make sure the various types of ammunition are segregated within the magazine and that each type is suitably marked for ready identification. *Ammunition Afloat*, NAVSEA OP-4, provides answers to specific questions concerning stowage requirements.

MAGAZINE SECURITY

In peacetime, all magazines, explosives lockers, ready-service lockers, and areas such as ammunition hoists leading into magazine spaces are kept closed and locked, except when they are opened for inspection, ventilating purposes, testing, or authorized work. These spaces are not entered unnecessarily and are opened only when authorized by the weapons officer. The weapons officer is responsible for making sure that the spaces are locked when they are not being used.

The only thing that may be stored in a magazine is the material it was designed to hold. A magazine may not be used to store empty paint cans or grease cans, oily waste rags, or similar fire hazards. Additionally, the only personnel allowed to be in a magazine are those who have business there.

The commanding officer (CO) is the custodian of all magazine keys. The CO may, however, designate certain persons under his or her command to have custody of duplicate keys. The designated individual will use the duplicate keys each morning to inspect the magazines and take magazine temperatures.

MAGAZINE INSPECTIONS

Every ship has requirements for periodic (daily, weekly, monthly, bimonthly, quarterly, semiannual, or annual) inspections of its magazines and their contents. These inspections should follow the appropriate 3-M Systems maintenance requirement cards (MRCs) and other source publications such as *Ammunition Afloat*, NAVSEA OP-4.

A magazine is considered to be in satisfactory condition if an inspection shows that it meets the requirements listed on applicable MRCs. Daily inspection requirements usually include checking the general condition and cleanliness of the space. Less frequent inspections (monthly, quarterly, and so on) normally require a more detailed check of specific magazine conditions and equipment. The inspector should understand each 3-M inspection requirement completely and should follow it to the letter. Doing so not only ensures a safe ammunition storage area but also fulfills the requirements of periodic inspections, such as the explosive safety inspection (ESI). ESI inspectors use the same inspection criteria as those listed on your MRCs.

The most frequently conducted magazine inspection is, obviously, the daily inspection. The main purpose of a daily magazine inspection is to check and record space temperatures. Temperature is the most important factor that affects powder and propellant stability. Because of the importance of maintaining proper temperatures in magazines, we will spend the next few pages discussing how and why temperatures are taken, recorded, and evaluated.

Magazine Temperatures

Temperature readings normally are taken once a day. The exact time may vary, but on most ships the readings are taken in the morning (around 0800 for example). A special maximum and minimum thermometer is used. (Sometimes it's called a high-low thermometer.) Figure 1-1 illustrates a typical maximum and minimum thermometer.

Every magazine or locker will have at least one such direct-reading thermometer, located where maximum space temperature variations normally occur. It will be installed so that it is readily accessible for taking readings and for resetting the index pointers.

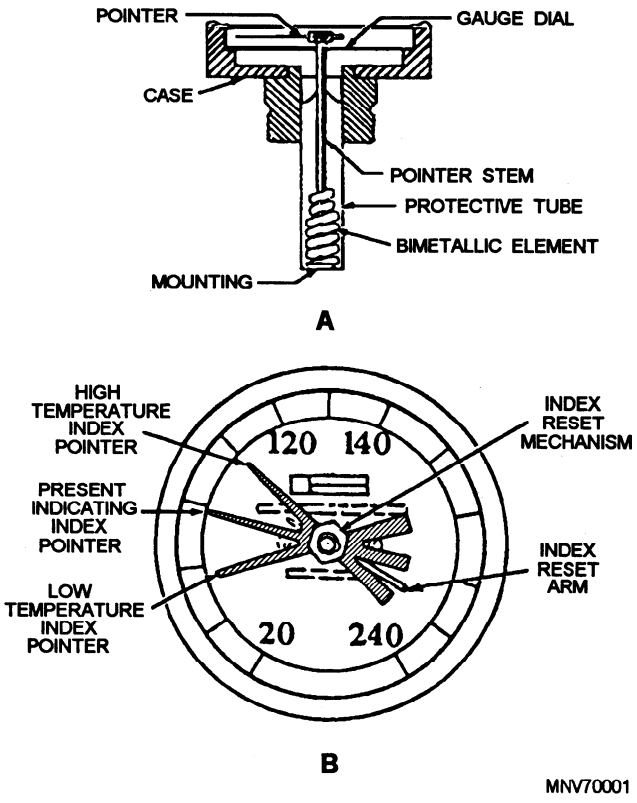

Figure 1-1.—Bimetallic maximum and minimum thermometer: A. Internal components; B. Dial face and pointers.

View A of figure 1-1 shows the internal components of the device. The temperature-sensitive element is a single-helix low-mass coil. The coil fits closely inside the thermometer stem. The bimetal element is carefully sized and aged for lifetime stability, and is covered with a fluid to assure good heat transfer. The fluid also permits maximum speed of response and reduces pointer oscillations caused by outside vibrations. The case and stem are made from stainless steel for strength and anticorrosion purposes.

View B of figure 1-1 illustrates the dial face of the thermometer. It is 3 inches in diameter, with a plastic window to protect the index pointers. The index reset arm is on the outside of the window and is used to reset the high-low pointers. Temperature graduations on our example are marked off in 20-degree increments. The approximate readings on this thermometer are 100°F, high; 78°F, present; and 55°F, low. If you are assigned the duty of taking magazine temperature readings, you should record the high, low, and present temperatures and then reset the high and low pointers in line with the present pointer. As temperature rises during the day, the present pointer will push the high pointer up the scale. As temperature falls during the night, the present pointer will reverse direction and push the low pointer down the scale. As the sun comes up, the present pointer will move back up the scale. Thus, the inspector will see three different temperature readings that reflect the temperature variations throughout a 24-hour period.

The 45-degree spread between the high and low pointers in our example is a bit large, but is used for clarity. Check the temperature requirements for the magazine you are inspecting and have the magazine air-conditioning (A/C) or ventilating system turned on if the temperature rises into the high zone. The optimum temperature should be around 70°F. If the A/C system is not working, artificial cooling (fans, blowers) may have to be used.

The bimetallic maximum and minimum thermometer in figure 1-1 is becoming the standard thermometer in shipboard magazines. However, you may come across a different model with only a maximum (high) index pointer and a reset knob. This type of thermometer is acceptable. The older liquid-in-glass (tube) mercury high-low thermometer is no longer authorized for shipboard use. If you see one of the mercury units in a magazine, notify your supervisor.

Records of Magazine Temperature Inspections

Like other maintenance procedures, magazine inspections have records that must be maintained. The most common written records are the daily magazine temperature report form and the magazine temperature record (fig. 1-2). 3-M Systems records may also be considered as records of magazine inspections.

The magazine temperature record is a card posted in each magazine. Each day, the inspector enters the maximum and minimum temperatures for the previous 24 hours in that magazine, The card is replaced every month, and the old one is turned over to the weapons officer.

The daily magazine temperature report summarizes the results of magazine inspections for the whole ship. This form includes not only spaces for entering the highest and lowest magazine temperatures, but also for reporting the condition of the magazines and their ventilating devices, and (under REMARKS) for miscellaneous, nondaily routine work.

The daily magazine temperatures are transferred from the record cards to a magazine log that is a permanent record of all magazine temperatures. A separate section of the magazine log is usually set aside to record the results of the monthly sprinkler system tests.

MAGAZINE SPRINKLER SYSTEMS

Sprinkler systems are used for emergency cooling and fire fighting in magazines, ready-service rooms, and ammunition- and missile-handling areas. A magazine sprinkler system is a network of pipes secured to the overhead and connected by a sprinkler system control valve to the ship's continually pressurized saltwater firemain. The pipes are fitted with sprinkler head valves arranged so the water forced through them showers all parts of the magazine or ammunition- and missile-handling areas.

A modern sprinkler system can wet down all exposed bulkheads at the rate of 2 gallons per minute per square foot and can sprinkle the deck area at the rate of 4 gallons per minute per square foot. Magazine sprinkler systems are designed to completely flood their designated spaces within an hour. To prevent unnecessary flooding of adjacent areas, all compartments equipped with sprinkler systems are watertight. Upper deck-handling and ready-service

A

MAGAZINE TEMPERATURE RECORD
5ND GEN 90 (REV 11-48)

COMPARTMENT	THERM. NO.	MONTH
A 304 M	279	APRIL

DATE	MAXIMUM	MINIMUM	INITIAL
1	84	72	RAC
2	82	70	RAC
3			
4			
5			
6			
29			
30			
31			

P & PO N or Va 11-2-48 99014 (J c 8) 8M

B

DAILY MAGAZINE TEMPERATURE
DD, DE CLASSES

NOTE: To be submitted to O. O. D. by 1130 daily

U.S.S.	DATE
T. F. TREMENDOUS	1 APR 93
MAXIMUM 84°	IN A-304-M
MINIMUM 69°	IN A-204-M

INSPECTED MAGAZINE'S CONDITION
OK

INSPECTED MAGAZINE VENTILATION CONDITION
OK

INSPECTED SMOKELESS POWDER SAMPLES CONDITION
OK

CONDUCTED WEEKLY TEST OF MAGAZINE SPRINKLER SYSTEMS
DATE 1 APR 93

REMARKS: TEST OF MAGAZINE SPRINKLER SYSTEMS SATISFACTORY

SIGNATURE (GMC or GM in Charge)	SIGNATURE (Gunnery Officer)
L. Barber	B G Brown

DESLANT FORM 8000-7 (Rev. 11/5.5)

MNV70002

Figure 1-2.—A. The magazine temperature record; B. Daily magazine temperature report.

rooms are equipped with drains that limit the maximum water level to a few inches. Magazines are completely enclosed; if flooded, they would be exposed to the full firemain pressure. The firemain pressure on most ships is considerably higher than the pressure magazine bulkheads could withstand; therefore, magazines are equipped with exhaust ventilators located in the bulkhead near the overhead. An exhaust ventilator is a pipe with a check valve that permits pressure release (usually to topside). Since the diameter of the pipe is large enough to allow water to flow out as fast as it flows in, no excess pressure can build up in the magazine compartment. On newer ships, magazines are also equipped with small, capped drainpipes located in the bulkhead near the deck. The caps may be removed in the adjacent compartment to drain flooded magazines.

Shipboard magazine sprinkler systems are hydraulically- controlled saltwater/seawater-operated systems. There are two basic types of sprinkler systems—the dry-type and the wet-type. In the dry-type system, water is not delivered to the sprinkler heads until the system is activated. In the wet-type system, water is continually available at the sprinkler heads and is sprayed in the magazine when heat activates the sprinkler head. Both types may be found on some ships. However, the wet-type system is being discontinued. Therefore, we will cover only the dry type. Technical information on both types is contained in *Magazine Sprinkler System*, NAVSEA S9522-AA-HBK-010.

A dry-type magazine sprinkler system consists basically of three subsystems. The first subsystem is the loop of piping and valves that delivers firemain water to the sprinkler heads. The second subsystem is the hydraulic control system. This system uses firemain water, through smaller piping, to operate the control valves in the first subsystem. The third subsystem is the thermopneumatic system. This system provides automatic control of the hydraulic control system. A manual valve is installed in the hydraulic control system to activate the main sprinkler control valve in case the automatic system is inoperative or slow to respond. We discuss all of these subsystems, along with the magazine sprinkler control valve and the alarm system, below.

As you read about each area of the sprinkler system, you may wish to refer to figure 1-3, which shows how the system components are related. Pay particular note to the legend list for the symbols. In addition to the orifices and valves, this figure also identifies the OPEN and CLOSE loops of the operating pressure circuit.

MAGAZINE SPRINKLER CONTROL VALVES

Magazine sprinkler control valves (commonly referred to as main valves) are globe-type valves, normally closed but designed to open wide when actuated, to supply seawater to the sprinkler system. They are diaphragm operated and open at a minimum system operating pressure of 40 psi.

The diaphragm-operated control valve (fig. 1-4) is held closed by the combination of firemain pressure acting against the valve disk and valve spring force acting against the upper diaphragm washer. When the hydraulic control system is actuated, pressurized seawater from the firemain enters the diaphragm chamber and pushes (via the diaphragm) against the bottom of the upper diaphragm washer. The bottom surface area of the upper diaphragm washer is larger than the surface area of the valve disk. This difference in surface areas allows the water pressure in the diaphragm chamber to create a lifting force greater than the closing force created by the spring and pressure on the valve disk. As a result, the valve disk is lifted and water is allowed to flow through the valve. When the control system is secured, the operating pressure is bled from the diaphragm chamber and the valve is closed by the force of the valve spring.

The control valve may be actuated either automatically or manually. We will discuss automatic actuating first, followed by manual actuation.

AUTOMATIC (THERMOPNEUMATIC) CONTROL SYSTEM

The automatic control system is designed to actuate the magazine sprinkler system in response to both a rapid rise in temperature (caused by an active fire) and the reaching of a preset temperature (caused by a smoldering fire). The thermopneumatic elements, which monitor the temperature of the magazine and activate the sprinkler system, generate a pneumatic signal in response to thermal action. The pneumatic signal can be either a sudden increase or decrease in air pressure.

The automatic control system consists of heat-sensing devices (HSDs), transmission lines (Rockbestos®- or Rockhide®-covered copper tubing), circle seal check valves, and a pneumatically released pilot (PRP) valve.

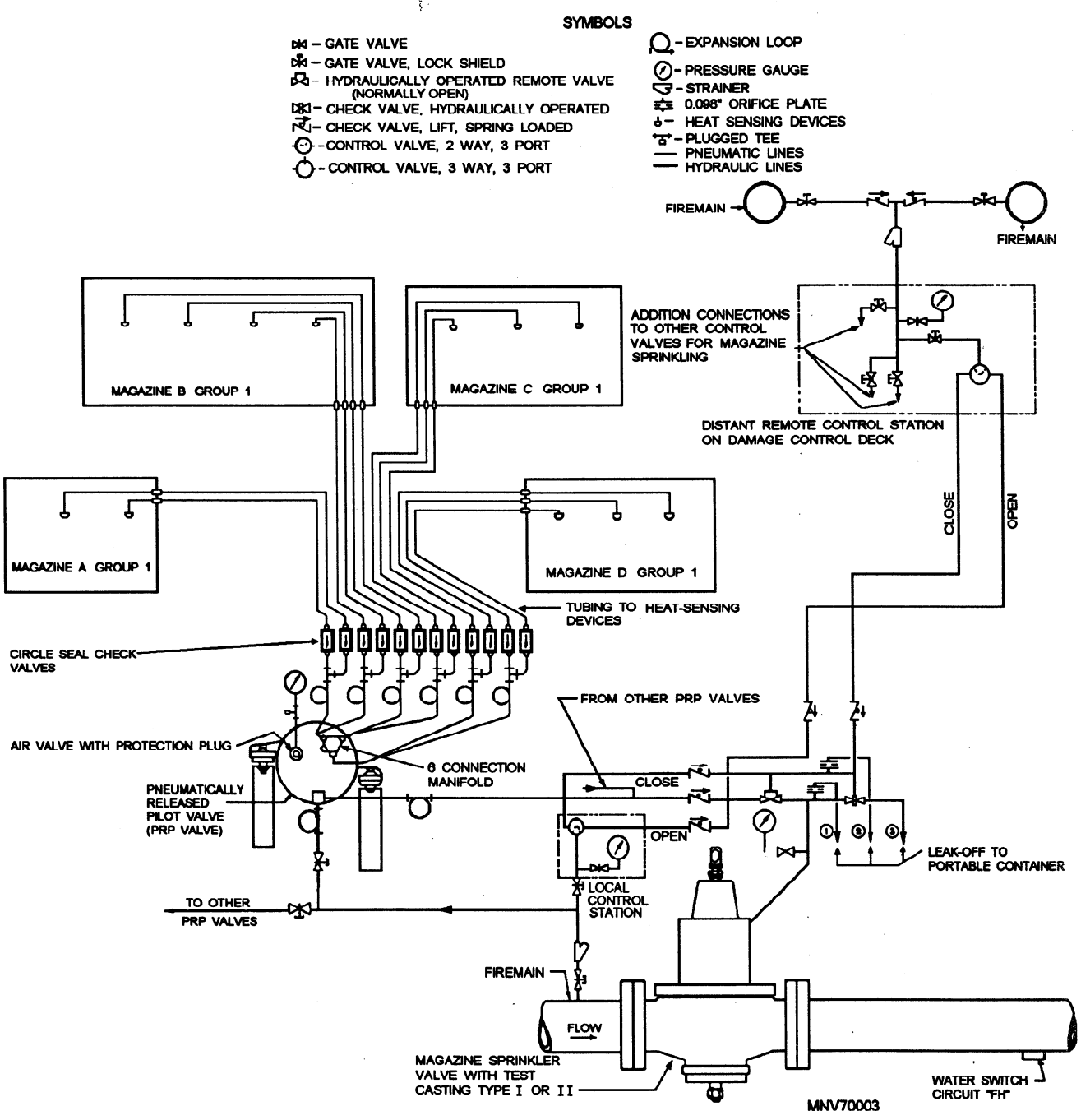

Figure 1-3.—Hydraulic (SW) and thermopneumatic control systems for magazine sprinkler valves.

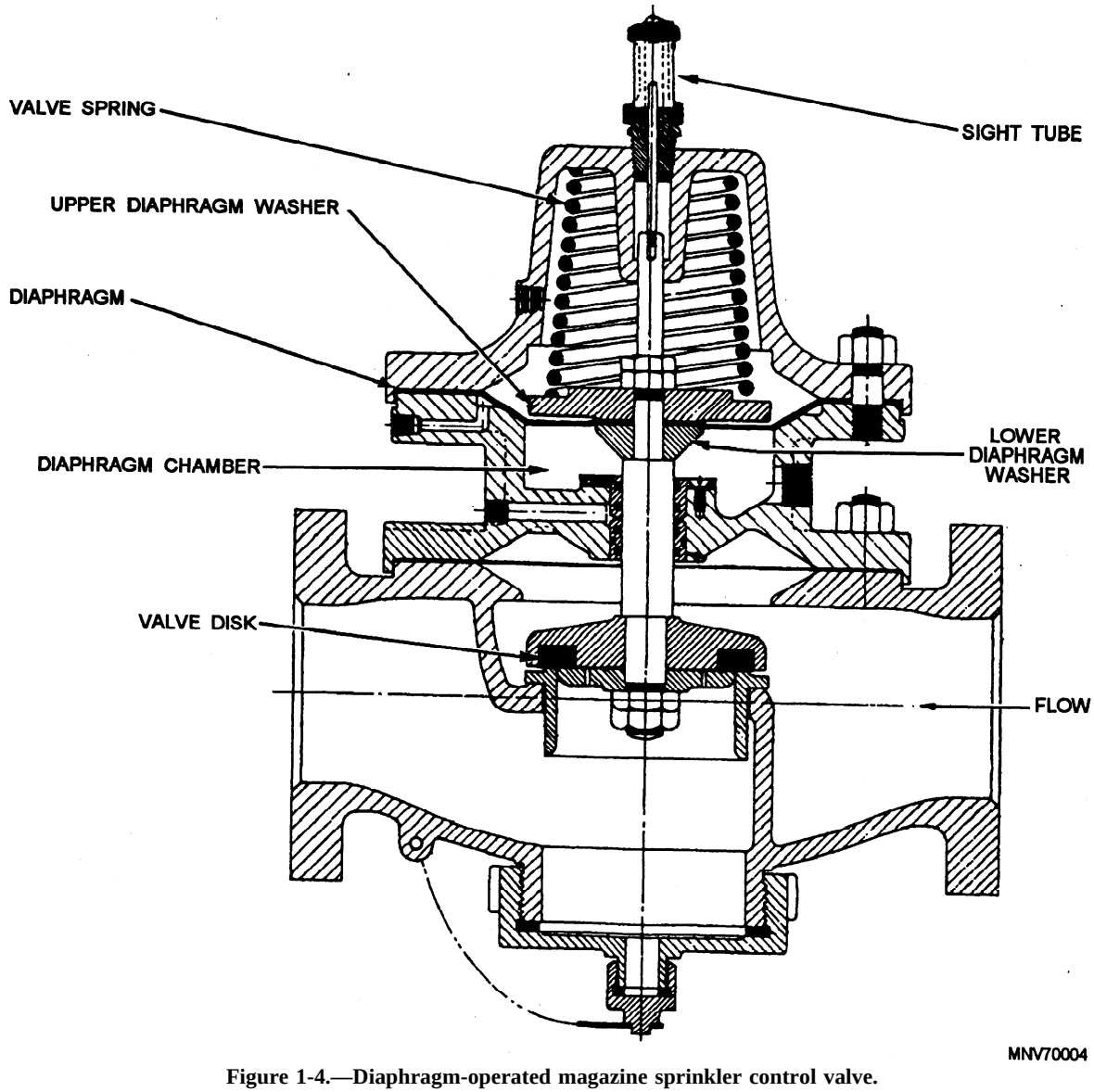

Figure 1-4.—Diaphragm-operated magazine sprinkler control valve.

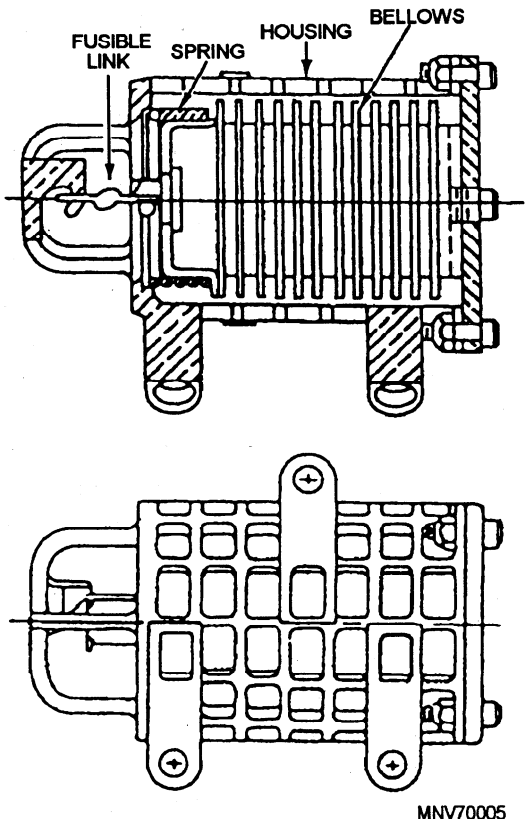

Figure 1-5.—Heat-sensing device (HSD).

Heat-Sensing Device (HSD)

The HSD (fig. 1-5) is a thin-walled, air-filled, spring-loaded bellows designed to create a pressure in response to either a rapid or slow rise in temperature.

The spring and bellows are held in the compressed/expanded positions, respectively, by a fusible link that connects the bellows to the HSD housing. The fusible link is designed to part when the link temperature reaches 160°F (23°F).

HSDs are mounted on the overhead of the protected space and are connected to the manifold of the PRP valve by individual 1/8-inch transmission lines. A circle seal check valve is installed in each transmission line.

If an active fire occurs in the protected space, heat from the fire will be transferred to the air within the bellows, causing the air to expand and create a pressure. This pressure will be transmitted to the rear of the release diaphragm of the PRP valve, thereby creating the differential pressure necessary to trip the valve.

If a smoldering fire occurs, the pressure within the bellows will increase too slowly to trip the PRP valve. Therefore, the temperature will continue to increase. If it reaches 1 60°F (±3°F), the fusible link in the end of the collet will part, removing the restraint holding the bellows. The bellows will collapse under the tension of the spring and create a pressure impulse that will be transmitted to the rear of the release diaphragm of the PRP valve. This pressure impulse will create the differential pressure necessary to trip that valve.

Transmission Lines

The lines that connect the thermopneumatic elements to the PRP are called *transmission lines* and are Rockbestos®- or Rockhide®-covered seamless copper tubing.

Vented Check Valve

The vented check valve (fig. 1-6) is a brass, spring-loaded check valve designed to check against a rapid change of air pressure in one direction and to open when air pressure is applied in the other direction. One vented check valve is installed in eachtransmissionline (above the PRP, with a maximum of 12 per PRP) from an HSD

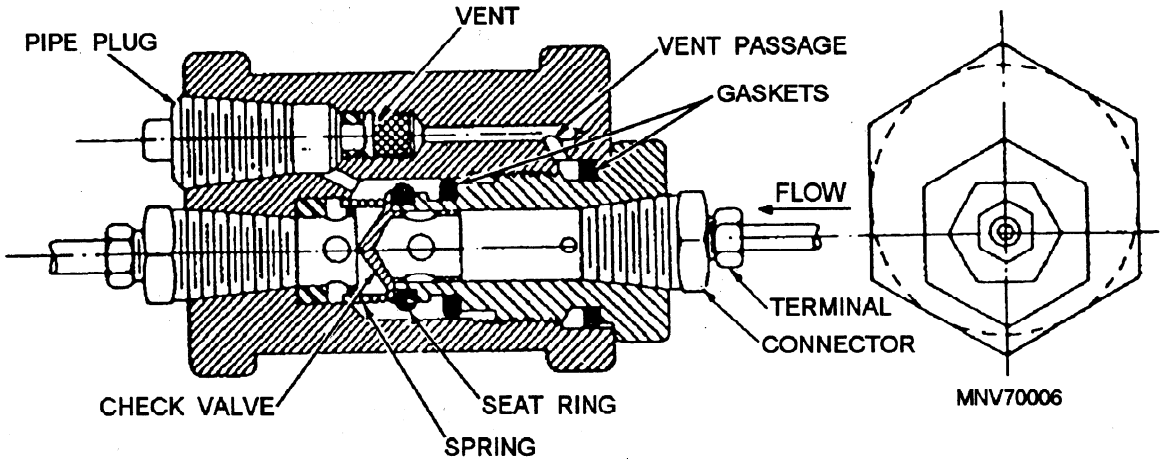

Figure 1-6.—Vented check valve.

with the direction-of-flow arrow pointing toward the PRP. Since the PRP manifold contains only six ports for transmission tubing connection, systems requiring seven or more HSDs will Tee together vented check valves, starting with the seventh check valve. The check valves prevent the rapid increase in air pressure created in an individual HSD from pressurizing the entire system. The check valve body contains a vent installed in a bypass around the main valve. The vent permits a slow backflow of air to equalize system pressure in response to normal changes in ambient temperature.

Pneumatically Released Pilot (PRP) Valve

The PRP valve (fig. 1-7) is a normally closed spring-loaded pilot valve that opens automatically to actuate the magazine sprinkler system in response to a pneumatic signal from one or more thermopneumatic elements.

The main components of the PRP valve are the operating mechanism, the compensating vent, and the pilot valve. The operating mechanism and the compensating vent are housed in a circular bronze case. The pilot valve is mounted on the front of the case and is installed in a 3/8-inch line that connects the firemain to the sprinkler system hydraulic control system piping. The PRP valve case is provided with shock mounts and brackets for fastening to a bulkhead.

The operating mechanism consists of a spring-loaded operating lever operated by a release diaphragm through a series of linkages and levers. The rear of the release diaphragm is connected to the tubing from the HSDs. The front of the release diaphragm is open to the interior of the PRP valve case. When the PRP valve is set, the operating lever is cocked to hold the valve closed. A sudden or gradual increase in pressure transmitted from one or more HSDs will move the diaphragm, releasing the operating lever. As the operating lever moves, it causes the seat holder to move away from the seat, thereby permitting seawater to enter the hydraulic control system piping and actuate the sprinkler system.

The PRP valve is equipped with a compensating vent that leaks off the slight increases or decreases of pressure within the HSDs caused by normal temperature fluctuations in the protected compartment. This leakoff of slow pressure changes equalizes the pressure on both sides of the release diaphragm and prevents inadvertent tripping of the PRP valve. The compensating vent is calibrated at the factory and should not be adjusted by ship's force.

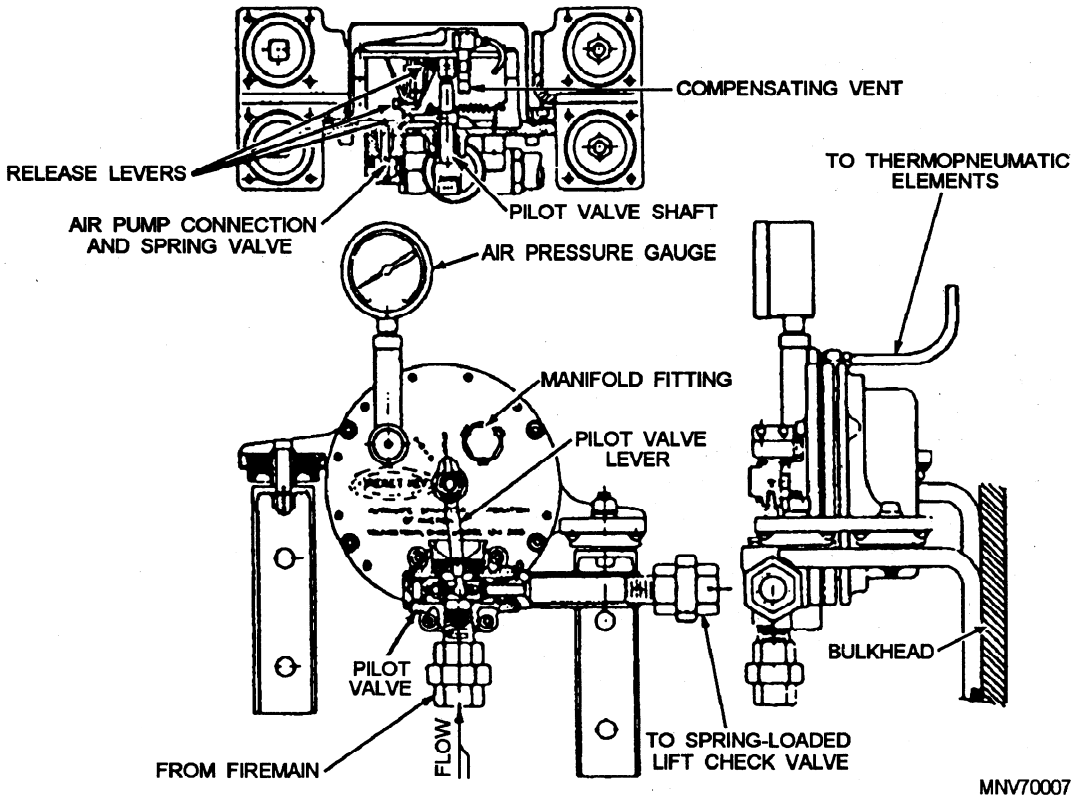

Figure 1-7.—Pneumatically released pilot (PRP) valve.

The rate-of-rise circuit is designed to trip the PRP valve and actuate the sprinkler system when sufficient heat is absorbed by the HSDs to create a definite pressure within the circuit over a given period of time. This pressure acts against the rear of the release diaphragm to create the pressure differential necessary to trip the PRP valve. Adifferential pressure of at least 8 ounces per square inch across the release diaphragm is necessary to trip the PRP valve.

NOTE

The gauge mounted on the front of the PRP valve indicates the pressure within the entire system-not the differential pressure. At times the gauge may indicate a positive pressure within the system. This is a normal condition caused by expansion of air within the system due to an increase in ambient temperature. The pressure indicated on the gauge exists on both sides of the PRP valve release diaphragm.

HYDRAULIC CONTROL SYSTEM

The hydraulic control system operates the valves in the dry-type magazine sprinkler system. It uses seawater from the firemain to actuate the magazine sprinkler control valve.

The hydraulic control system (which is better known as the operating pressure circuit) consists of the control system piping, a manual control valve, a hydraulically-operated remote-control valve, spring-loaded lift check valves, and a hydraulically-operated check valve (normally used with the diaphragm-operated magazine sprinkler valve) or a power-operated check valve (normally used with the piston-operated magazine sprinkler valve).

Operating Pressure Circuit (Control System Piping)

The operating pressure circuit is used to open and close the sprinkler control valves. It connects the manual control valves, the hydraulically-operated components of the control system, and the magazine sprinkler valve. The operating pressure circuit is divided into an OPEN loop and a CLOSE loop. The OPEN loop transmits operating pressure from the OPEN port of the manual control valve(s) to the operating chamber of the magazine sprinkler valve and the inlet of the hydraulically-operated check valve via the hydraulically-operated remote control valve. The CLOSE loop transmits operating pressure from the CLOSE port of the manual control valve(s) to the operating pressure connections of the hydraulically-operated remote control valve and the hydraulically-operated check valve.

Manual Control Valve

The manual control valve is a rotary disk plate-type valve installed to permit rapid hydraulic operation of the magazine sprinkler valve. Most systems allow manual sprinkler activation and securing from either a local operating station or a remote station. This application uses the three-way, three-position manual control valve (fig. 1-8). Applications that do not incorporate a remote manual control station or an automatic control feature use a three-way, two-position manual control valve.

A locking device, in the form of a key, is installed in the control valve handle to prevent accidental operation of the sprinkler system. The locking key is secured to the handle with a single-strand lead-wire seal and fastened to the valve cover by a safety chain.

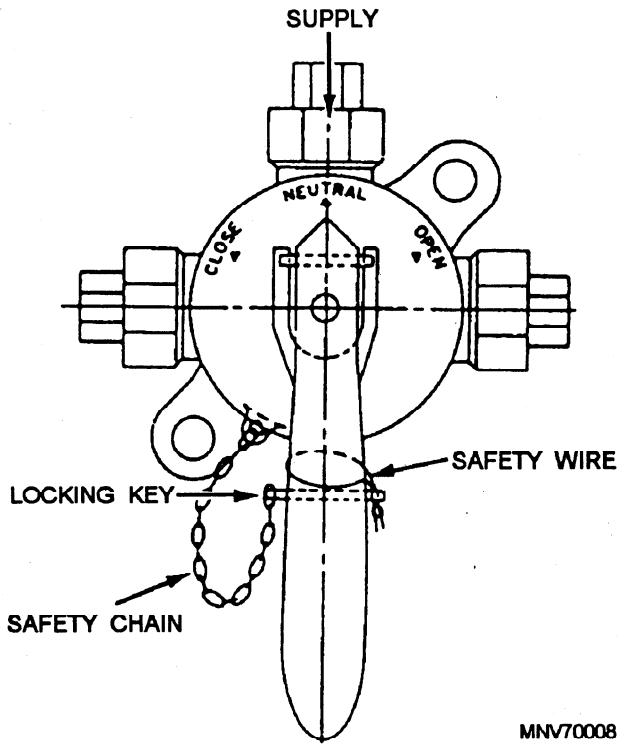

Figure 1-8.—Manual control valve.

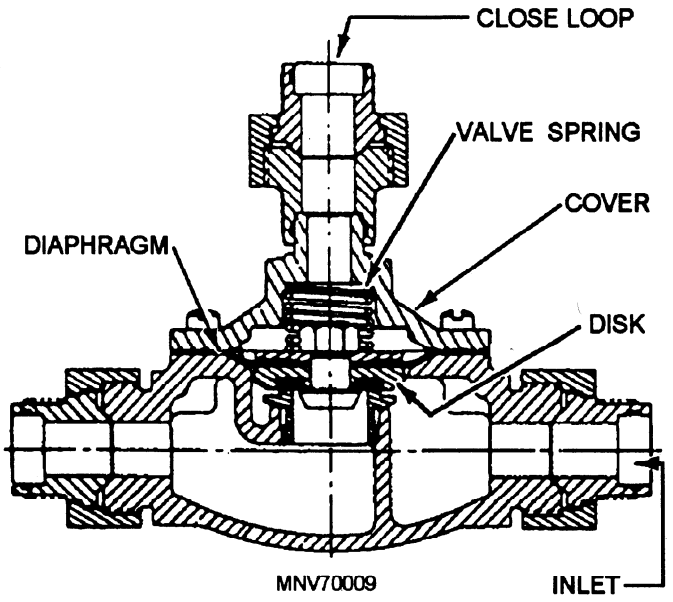

Figure 1-9.—Hydraulically-operated remote control valve.

Hydraulically-Operated Remote Control Valve

The hydraulically-operated remote control valve (fig. 1-9) is a diaphragm-operated, globe-type valve that is opened by operating pressure acting against the underside of the disk and closed by operating pressure acting on the top of the diaphragm. The purpose of this valve is to permit the magazine sprinkler valve to be secured from an operating station other than the one from which it was actuated. Additionally, this valve permits the magazine sprinkler valve to be secured from any control station when it has been actuated automatically.

Spring-Loaded Lift Check Valve

This valve (fig. 1-10) is a spring-loaded, diaphragm-operated lift check valve that closes tightly against reverse flow and opens wide to permit flow in the normal direction. Spring-loaded lift check valves permit the control system to be operated from more than one control station by preventing backflow through the other stations.

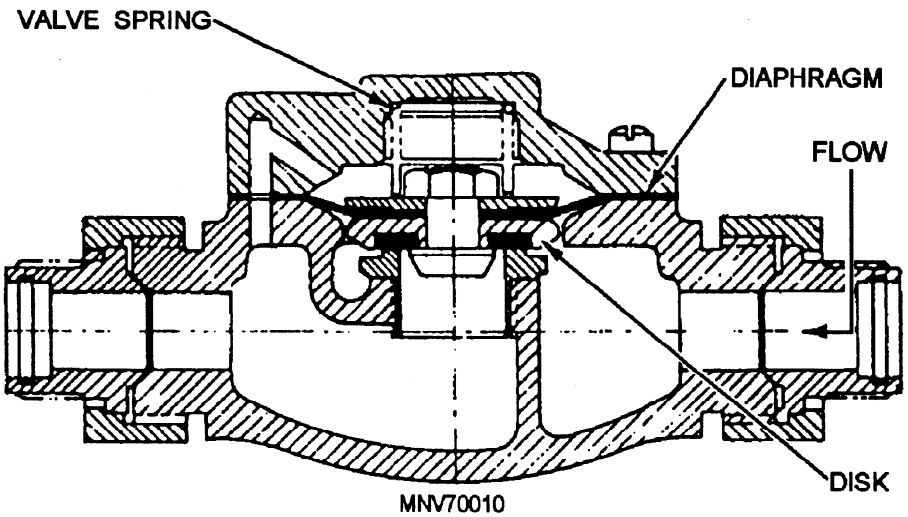

Figure 1-10.—Spring-loaded lift check valve.

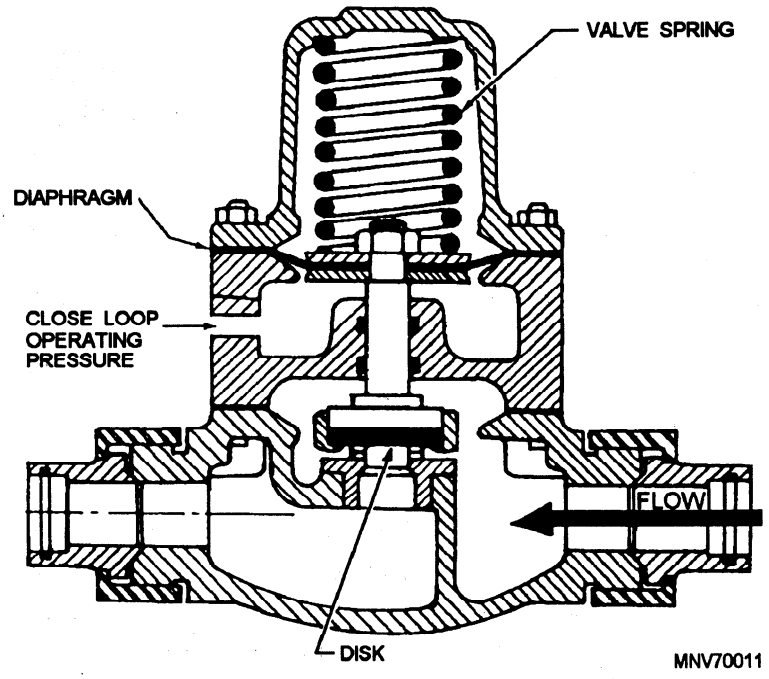

Figure 1-11.—Hydraulically-operated check valve.

Hydraulically-Operated Check Valve

The hydraulically-operated check valve (fig. 1-11) is a normally closed, diaphragm-operated, globe-type check valve that is opened by operating pressure in the CLOSE loop acting against the underside of the diaphragm. This valve permits the operating pressure to be vented from the diaphragm chamber of the magazine sprinkler valve, thereby permitting that valve to close rapidly and completely.

Orifices

Two 0.098-inch orifices are installed in the control system piping to prevent a buildup of pressure in the piping due to leakage past a control system component. The orifices also vent operating pressure from the control system piping when the manual control valve is returned to the NEUTRAL position. Orifice No. 1 is installed in the OPEN loop upstream from the hydraulically- operated check valve. Orifice No. 2 is installed in the CLOSE loop adjacent to the operating pressure connection of the hydraulically-operated check valve. When the control system is actuated, there will be a steady flow of water from orifice/drain line No. 1 and no flow from orifice/drain line No. 2. When the control system is secured, there will be a steady flow of water from orifice/drain line No. 2 and a diminishing flow from orifice/drain line No. 1. When the manual control valve is returned to the NEUTRAL position, the operating pressure is vented from the CLOSE loop via orifice/drain line No. 2, thereby permitting the hydraulically-operated check valve to close.

MAGAZINE ALARM SYSTEMS

Several types of warning devices or systems are used on board ship. One of them is the alarm system activated by the water switch (fig. 1-12) on the dry side of the sprinkler system main (group) control valves. This alarm is designated *FH* and indicates by sound or light that the main control valve is open or leaking.

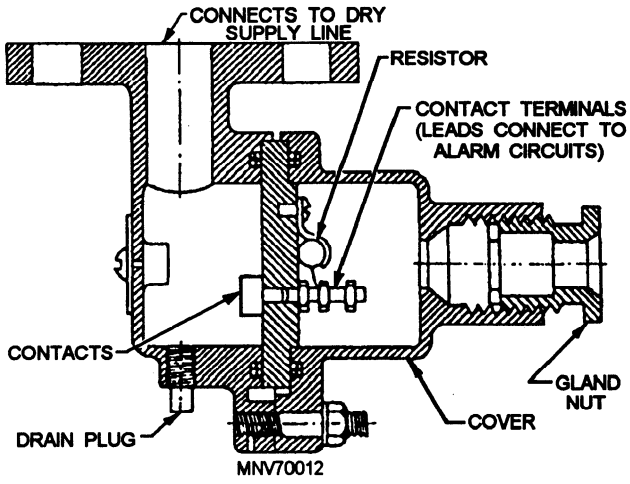

Figure 1-12.—FH alarm sensor.

Another type of alarm is the flooding alarm, designated *FD,* that incorporates a float switch located near the deck. As water accumulates on the deck, the float rises, making a set of contacts and sounding an alarm. If the sprinkler system is actually activated, both alarms should sound within seconds of each other.

Another type of alarm system, designated the *F* alarm, is actuated by heat. This alarm sounds when the temperature in an ammunition stowage area rises to 105°F. The sounding of this alarm allows the temperature to be reduced before sprinkling becomes necessary.

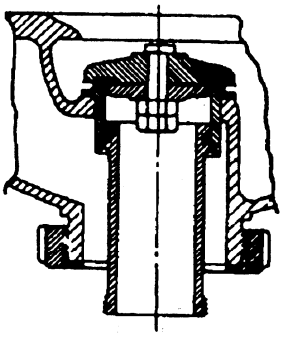

Figure 1-13.—Test casting installed in a magazine sprinkler control valve.

SYSTEM TESTING

Each sprinkling system must be tested regularly to be sure that it operates properly. During the test, all components that should operate during an actual use are tested. This is a major test that, if not conducted properly, could cause damage to both equipment and careers. Therefore, if you participate in a sprinkling system test, follow the approved testing procedures exactly. The proper officials (weapons Officer, DC Central, OOD, etc.) should have been notified, and the appropriate tag out procedures should have been completed. We will not discuss the specific procedures, but we do need to briefly discuss the use of the test casting.

Look back at the magazine sprinkler control valve in figure 1-4. If the system is tested without somehow blocking the flow of water through the valve, firemain water will flow rapidly into the magazine distribution piping and will probably damage the stores in the magazine. To allow the valve to be tested without wetting the magazine, the manufacturers of the control valve developed a special plug, called the *test casting.* The test casting is simply a bypass attachment that allows system water to flow out of the bottom of the control valve, rather than through its normal exit port. Before the control valve is tested, the bottom cap of the valve is removed and the test casting is screwed, hand tight, into the bottom of the valve seat, as shown in figure 1-13. As long as the test casting is properly installed, no water will flow into the magazine during the system test.

If you are assigned to install a test casting, be sure to install the correct casting. Your ship will have the same number of test castings as it does sprinkler system control valves because each valve comes from the manufacturer with its own test casting. Test castings are not interchangeable. When a valve is received on board a ship, the valve and its test casting are both stamped with the same, unique number. Be sure the test casting you install has the same identification number as the valve you plan to test.