



**UL Listed**

**Dimensions:** 12 1/4"H x 8 3/8"W x 3 1/8"D  
31,1cm H x 21,3cm W x 7,9 cm D

**Weight:** 8 lbs. (3,6 kg.)

**Enclosure:** 18 Gauge - Cold Rolled Steel

**Power Input:** 12VAC, 20VA, 60Hz

**Operating Voltage:** 6VDC

**Typical Current:** 20mA

**Alarm Current:** 25mA

**Contact Ratings:** Alarm Relay and  
Tamper Switch  
1.0 Amp at 28VDC  
0.1 Amp at 130VDC

The Model VSA is a sound detection system listed by Underwriters' Laboratories, Inc. for the primary protection of reverberant and non-reverberant vaults such as bank and mercantile vaults.

Where U.L. certification is required, the VSA system must be installed in compliance with U.L. 681. Including at least one manual initiating device in the vault and connection of the VSA to a U.L. listed control unit.

The VSA amplifier unit is housed in a tampered steel cabinet with provisions for conduit connections.

The standby battery provides in excess of 80 hours operation in the event of a power failure. An external low voltage plug-in transformer maintains the battery at a fully charged state.

The amplifier unit provides SPDT alarm relay contacts and provisions for 1 to 10 microphones to be connected into the supervised microphone circuit.

The VSA contains a DC differential balance control which is adjusted so that the impedance of the external microphone circuit is balanced with the internal

impedance of the differential circuit. The VSA will alarm if the external impedance of the microphone circuit increases or decreases.

The microphones are available in surface mount (Model PSM) or flush mount (Model PSM-F). Audio signals detected in the vault enclosure are fed to the amplifier unit where the sensitivity control determines the sound level necessary to alarm the unit.

The Models PSM-T (surface mount) and PSM-FT (flush mount) are microphones with a built-in test sounding device. One PSM-T or PSM-FT must be used in every application.

An alarm indicator light and test switch are provided for system testing by the subscriber. Terminals are provided for remote subscriber and/or central station testing.

The Model APC (Accumulating Pulse Counter) is a plug-in option which allows the system to alarm after receiving a set number of pulses during a 10 minute time frame. The pulse counter has an adjustable range of 1 to 9 pulses (see page 4).

**INSTALLATION - SEE FIGS. 1, 2, 3 AND 4**

**NOTICE** System must be balanced in order to set up in normal.

1. Mount VSA amplifier unit. (See Fig. 7 Suggested Wire Routing.)
2. Connect BLACK battery lead to NEGATIVE battery post.
3. Connect RED battery lead to POSITIVE battery post.
4. Plug in transformer to unswitched 110VAC outlet and apply 12VAC to terminals 1 and 2 of VSA amplifier.
5. Mount microphones and wire according to installation drawing (see Figs. 1, 2, 3, and 4).  
**Note:** A PSM-T or PSM-FT (microphone with built-in test sounding device) must be used in every installation.

6. See Fig. 1 for connection of remote test unit Model PTU-B and/or central station test unit if applicable.

**Note:** Install jumper across terminals 12 and 13 if PTU-B is not used. Maximum of 10 microphones on each VSA amplifier. Microphone circuit not to exceed 1000 ft. of #22 gauge 2 conductor shielded cable. Maximum loop resistance 1000 ohms. Battery must be charged for 48 hrs. before putting unit into service.

**BALANCE ADJUSTMENT**

**NOTICE** System must be fully installed with all wires connected.

1. Adjust sensitivity to full CCW position.
2. Monitor balance adjustment jacks on circuit board with volt meter set on 10VDC scale.
3. Jumper terminals 4 and 5 on VSA unit. Note meter reading (4.2 to 5.2 volts).
4. Remove jumper from terminals 4 and 5.
5. Adjust balance control to half of previous voltage reading (2.1 to 2.6 volts)

6. If balance control will not adjust to this reading, check wiring for open shorts or grounds.

**SENSITIVITY ADJUSTMENT**

1. Adjust the SENSITIVITY control to approximately 1/3 scale.
2. Strike the vault surface with a plastic mallet and adjust the SENSITIVITY control to provide desired protection.

**CAUTION:** EXTREME CARE SHOULD BE EXERCISED SO THAT THE PROTECTED SURFACES ARE NOT MARRED OR DAMAGED WHILE PERFORMING THE ATTACK TESTS.

**TESTING**

Pressing test button on front of VSA amplifier applies test signal to sounding device in PSM-T or PSM-FT, causing the VSA to go into the alarm condition, which is indicated by a RED LED adjacent to the test button (RED LED will not indicate when sensitivity is set at 2 or below).

If system will not test properly, increase sensitivity control setting until reliable manual tests are obtained.

Verify that reliable tests are obtained at remote test unit Model PTU-B and/or from central station test unit if utilized.

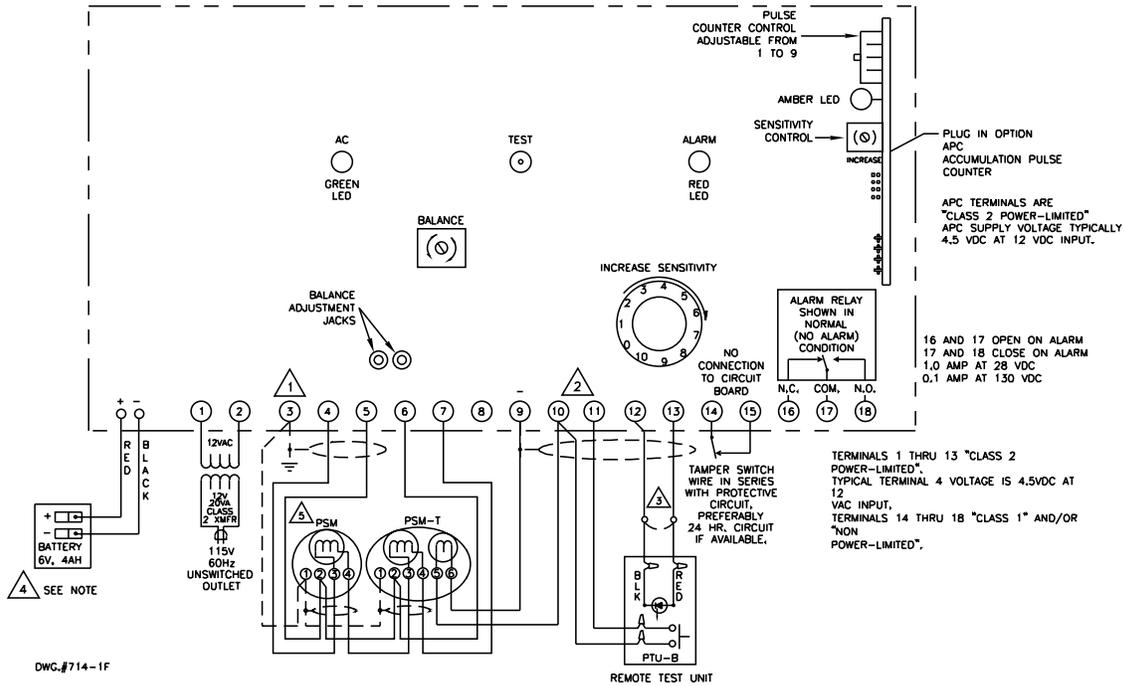
The subscriber must be instructed to test the system each time the alarm is set per instructions on front of VSA amplifier unit.

**TROUBLE SHOOTING**

1. VSA stuck in alarm - check balance, check battery, and check wiring. With wires removed from terminals 4,5,6, and 7, resistance across wires should meter:  
4 and 7: 40-50 ohms for every microphone  
5 and 6: less than 10 ohms
2. Can not balance circuit: check wiring, make sure all wires and microphones are connected to terminals 4,5,6, and 7.

FIG. 1

VSA INSTALLATION

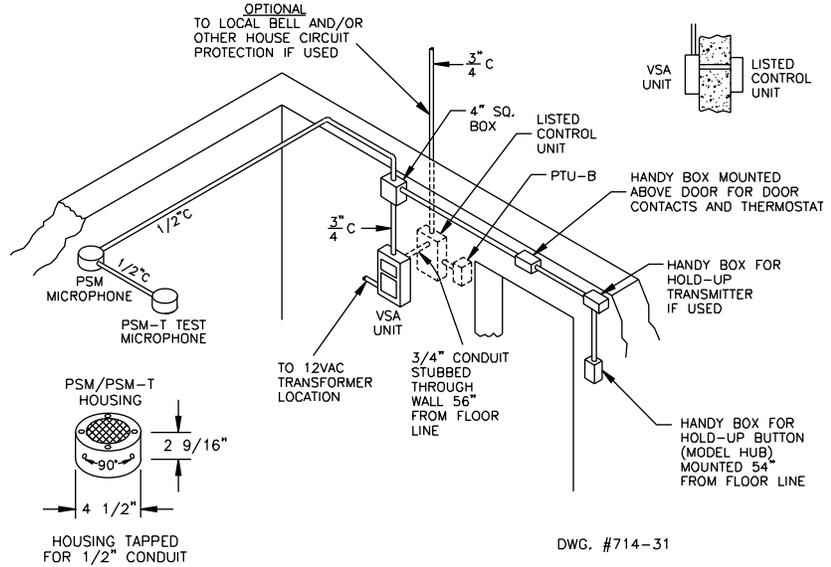


- 1. GROUND TERMINAL 3 TO COLD WATER PIPE AND USE SHIELDED CABLE (2 WIRE SHIELDED BELDEN 8761 OR EQUIVALENT) FOR PICKUP LOOP TO PREVENT FALSE ALARM DUE TO "RF" INTERFERENCE. CONNECT SHIELD TO TERMINAL 3.
- 2. CENTRAL TEST STATION: DRY CONTACT CLOSURE ACROSS TERMINALS 10 AND 11 WILL INITIATE TEST. NOT APPLICABLE IF APC IS USED.
- 3. JUMPER TERMINALS 12 AND 13 IF REMOTE TEST UNIT MODEL PTU-B IS NOT USED, IF PTU-B IS USED, CONNECT WITH #22 AWG 4 CONDUCTOR SHIELDED CABLE.
- 4. BATTERY - DESIGN LIFE, 4 YEARS. MARK DATE ON BATTERY AND CHARGE FOR 48 HOURS BEFORE PUTTING INTO SERVICE. ONLY ELPOWER - EP640, POWER SONIC CORP. - PS642, PANASONIC - LCR6V4P, EAGLE PITCHER - CFM6V4.6 MAY BE USED ON UL LISTED INSTALLATIONS. LOW BATTERY MAY BE DETECTED AT 5.3 VDC OR LOWER. UNIT FUNCTIONS NORMALLY TO LOW BATTERY ALARM LEVEL.
- 5. MAXIMUM NUMBER OF MICROPHONES - 10. LOOP 1000 FT. #22 AWG SHIELDED CABLE. (SEE FIG. 7 SUGGESTED WIRE ROUTING)

**NOTICE** The system must be balanced after installation in order to set up in normal. See balance instructions on page 1.

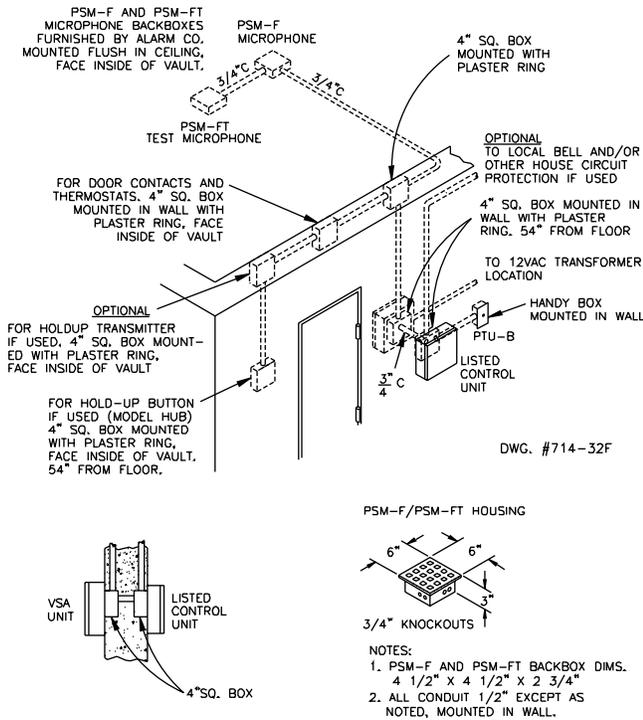
FIG. 2

VSA SOUND ALARM SURFACE MOUNTED MICROPHONES



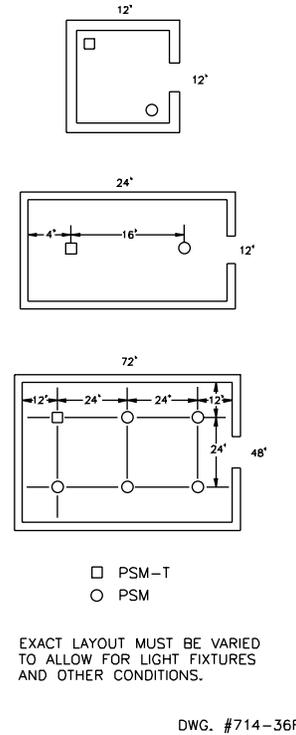
**VSA SOUND ALARM FLUSH MOUNTED MICROPHONES**

**FIG. 3**



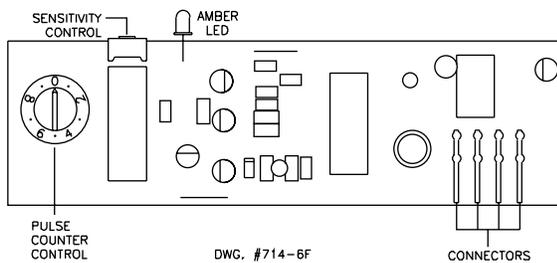
**TYPICAL MICROPHONE LAYOUTS**

**FIG. 4**



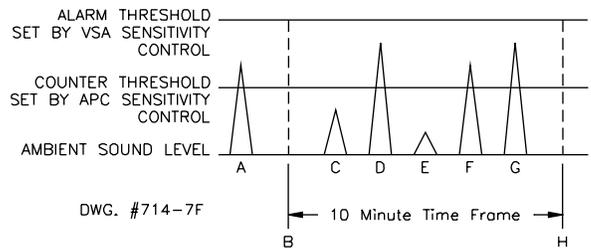
**MODEL APC ACCUMULATION PULSE COUNTER**

**FIG. 5**



**FIG. 6**

**EXAMPLE**



The Accumulation Pulse Counter, Model APC, is a plug-in option designed for applications where extraneous sound levels penetrating the vault environment may cause false alarms.

The function of the APC option is to allow the system to detect and accumulate sound energy over a period of time and to cause an alarm condition when sufficient energy has been detected. When used with the APC, the purpose of the VSA is to detect a single noise of high energy content. For this reason, the APC should be adjusted such that it is more sensitive than VSA. An amber LED on the APC indicates when a noise pulse has been counted.

The pulse counter control is adjustable from 1 to 9. This adjustment determines the number of pulses required, during a 10 minute time frame, to alarm the unit.

Point A - Pulse level exceeds counter threshold and accumulates.  
Point B - New 10 minute time frame starts. Previous pulses erased.  
Point C - Pulse below counter threshold does NOT accumulate.  
Point D - Pulse accumulates  
Point E - Pulse does NOT accumulate  
Point F and G - Pulses accumulate  
Point H - 10 minute time frame ends with 3 pulses accumulated.

If pulse counter was set at 3 or below, the unit would have alarmed. If pulse counter was set at 4 or above, no alarm would have been received and the 3 accumulated pulses erased.

IF A SINGLE PULSE EXCEEDS THE ALARM THRESHOLD THE UNIT WILL ALARM.

**APC SENSITIVITY ADJUSTMENT**

1. Set the VSA sensitivity control to 0.
2. Set the APC pulse counter switch to the desired number (1 thru 9).
3. Install the APC and produce the minimum noise level which the APC is to detect. Adjust the APC sensitivity such that the yellow LED light blinks each time this noise is produced (disregard the red alarm light at this time).
4. Unplug and remove the APC.
5. Produce the minimum noise level at which the VSA should alarm and set the VSA sensitivity control such that the red alarm LED comes on each time this noise is produced. This noise level should be much more intense than that used to set the APC sensitivity.
6. Re-install the APC.

**TESTING**

Slowly pulse the noise used to adjust the APC sensitivity control until the VSA indicates alarm (illuminated red LED) on the VSA unit. The counter in the APC is now reset to 0.

Slowly pulse this noise again. When the number of pulses equals the switch setting on the APC, the VSA will indicate alarm. This verifies that both the VSA and APC are operating properly at the desired noise level.

**ORDERING INFORMATION**

VSA-S Vault Sound Alarm System (Surface Mount) consists of:

Qty.	Comp. No.	Description
1	2000103	VSA - Amplifier with housing
1	5270080	Transformer 12V, 20VA
1	5130080	Battery 6V, 4 AH
	2000008	PSM - Microphone (Surface Mount) (45 ohm impedance)
1	2000041	PSM-T - Microphone with Test Sounding Device

**Additional Items Available:**

Qty.	Comp. No.	Description
1	2000008	PSM - Microphone (Surface Mount)
1	2000034	PSM-F - Microphone (Flush Mount) (Includes back box)
1	5090008	Back Box for PSM-F
1	2020121	PTU-B - Remote Test Unit
1	5090033	Back Box for PTU-B
1	2009103	VSA - Less housing/PCB only
1	2000106	APC - Accumulation Pulse Counter
*	2020130	HUB-M - Single Action hold up Button
*	2020132	HUB-T - Double Action hold up Button

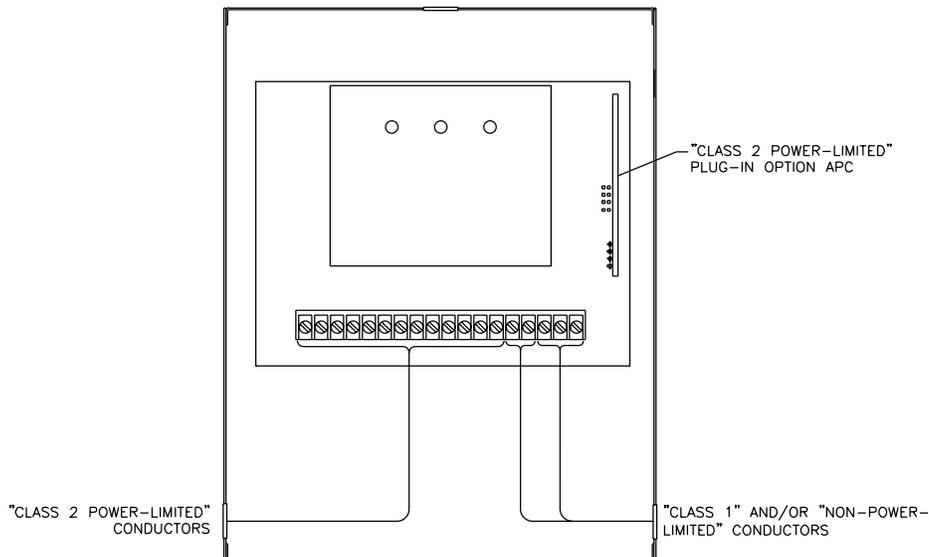
**Note:** \* - At least one of either hold up button is required in the vault for U.L. installation.

FIG. 7

**SUGGESTED WIRE ROUTING**

- THIS DEVICE CONTAINS "CLASS 2 POWER-LIMITED" CONDUCTORS AND MAY CONTAIN "CLASS 1" AND/OR "NON POWER-LIMITED" CONDUCTORS.
- ALL CIRCUITS POWERED BY THIS UNIT ARE "CLASS 2 POWER-LIMITED".
- ALL FIELD WIRING CONNECTED TO THIS PANEL MUST MAINTAIN A SPACING OF 1/4" BETWEEN ALL "CLASS 2 POWER-LIMITED" CONDUCTORS AND "CLASS 1" AND/OR "NON POWER-LIMITED" CONDUCTORS.
- THE ENCLOSURE IS PROVIDED WITH MULTIPLE CABLE ENTRY OPENINGS SO THAT "POWER-LIMITED" CONDUCTORS CAN BE SEGREGATED FROM "CLASS 1" AND/OR "NON POWER-LIMITED" CONDUCTORS.

**NOTE:**  
IF "CLASS 2 POWER-LIMITED" CONDUCTORS ARE USED FOR THE RELAY TERMINALS AND/OR THE TAMPER CIRCUIT, THE "CLASS 2 POWER-LIMITED" CONDUCTORS SHOULD USE THE CABLE ENTRY OPENINGS ON THE LEFT SIDE OF THE ENCLOSURE. "CLASS 1" OR "NON POWER-LIMITED" CONDUCTORS SHOULD USE THE CABLE ENTRY OPENINGS ON THE RIGHT SIDE OF THE ENCLOSURE.



DWG. #714-8F