



OPERATING INSTRUCTIONS
FOR
SSH-3/FBA-13
SEISMIC SCRAM AND TRIP SYSTEM

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KINEMATRICS, INC.
222 Vista Avenue
Pasadena, California 91107
(213) 795-2220

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1.0 GENERAL DESCRIPTION

Each seismic scram instrument is comprised of two packages: a model FBA-13 triaxial accelerometer and a model SSH-3 electronics package. The two items are interconnected by an electrical cable.

The FBA-13 accelerometer senses accelerations, in three mutually perpendicular axes, caused by earthquake motions; and produces electrical voltages proportional to these accelerations. In the SSH-3, these output voltages are compared to reference voltages proportional to the scram acceleration set points. When the acceleration for any axis reaches or exceeds the scram set point, an output relay is actuated. Each of these three relays has double pole, single throw, normally closed contacts. The contacts open and stay open as long as the acceleration exceeds the set point plus an additional ten seconds.

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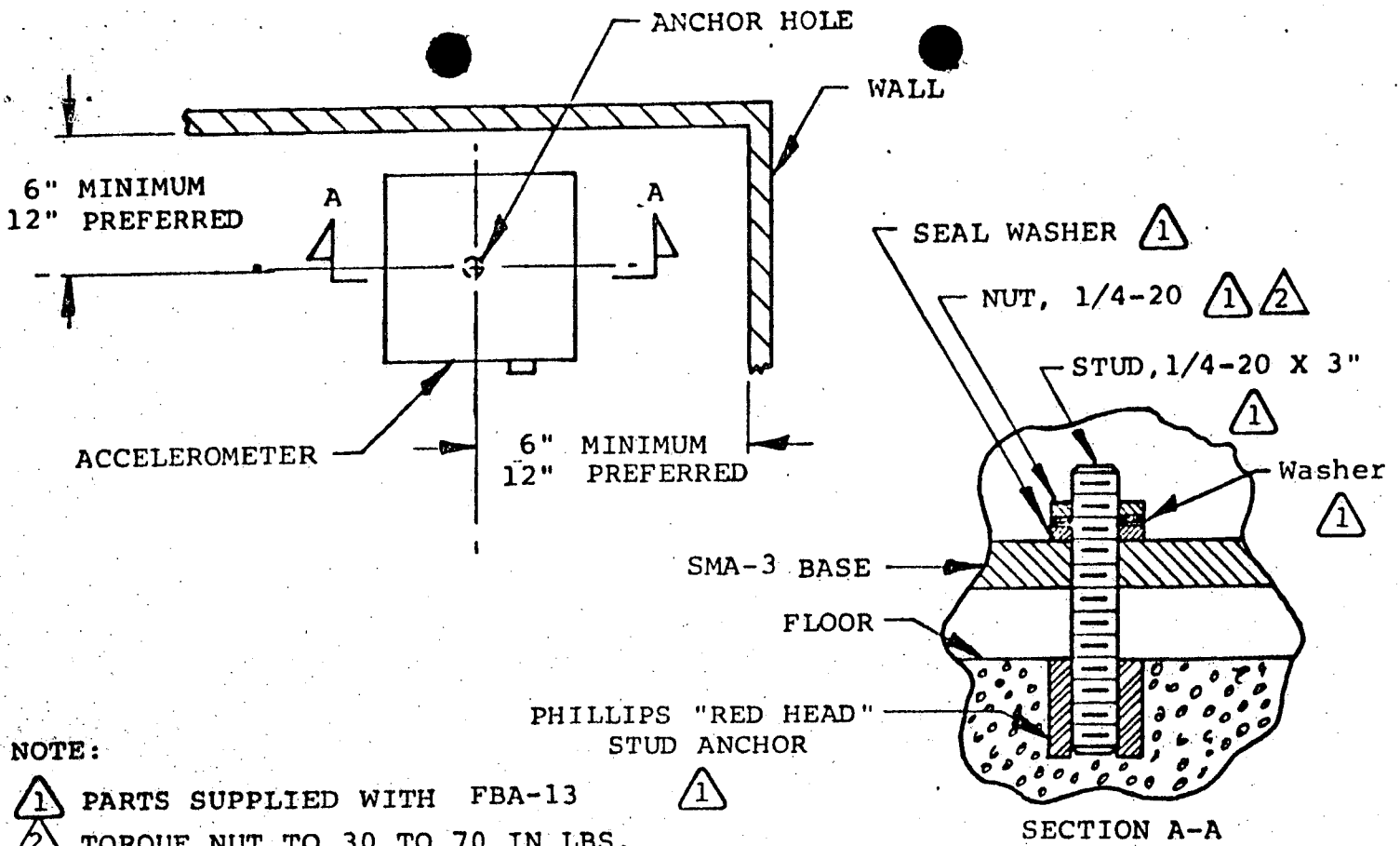
2.0 INSTALLATION & MOUNTING

2.1 For the FBA-13

The steps for unpacking and installing the FBA-13 are as follows:

1. Remove the accelerometer from its shipping container.
2. Open the accelerometer package by means of the latches at each end. Examine the various components for obvious damage, such as loose screws, etc., since long distance shipments occasionally do cause this sort of damage.
3. For permanent installation, the accelerometer package must be bolted to the floor or other structural member. It has a single hole in the base for a $\frac{1}{4}$ " bolt. The accessory kit includes a concrete anchor, a $\frac{1}{4}$ -20 stud, washer, and nut, and a seal-type washer to attach the package to the floor. Details of the installation are shown in Figure 1.
4. Under normal conditions, the floor will be sufficiently level so that leveling will not be required. However, if required, one or more common washers can be inserted under the appropriate base casting pad to achieve the desired degree of leveling, which need not be more accurate than 1° to 2° .
5. The accelerometer package must be oriented so that the longitudinal, L, axis is parallel to the plant North-South axis which was assumed in the seismic analysis.

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INSTALL ANCHOR AS SHOWN BELOW

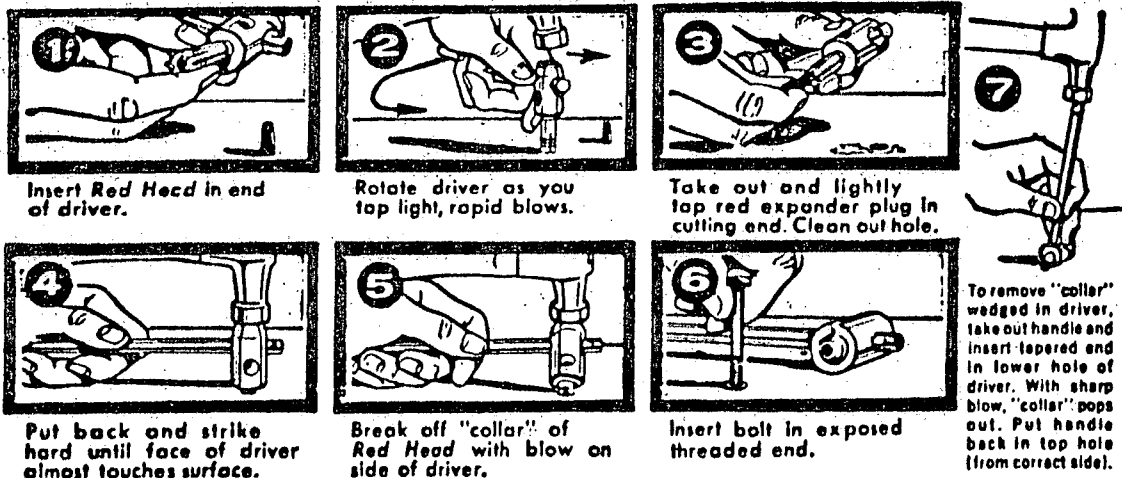


FIGURE 1
INSTALLATION OF FBA-13

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2.2 For the SSH-3

The steps for unpacking and installing the SSH-3 are as follows:

1. Remove the electronics package from its shipping container.
2. Unscrew the four screws in the lid and remove the lid. Examine the various components for any obvious damage. Particularly, assure that both batteries are properly clamped and that all four circuit boards are fully inserted. Reinstall the lid.
3. For permanent installation, the electronics package must be bolted to the floor or a convenient pedestal. Use four $\frac{1}{4}$ "-20 bolts to attach this package to the mounting surface. Torque the bolts to 30 to 70 in.- lbs. (Note: the levelness and orientation of the electronics package are of no importance.)

3.0 ELECTRICAL CONNECTIONS

All of the electrical connections are shown in Figure 2.

3.1 Interconnection of FBA-13 & SSH-3

The two packages are to be interconnected by a cable assembly in accordance with drawing 101165.

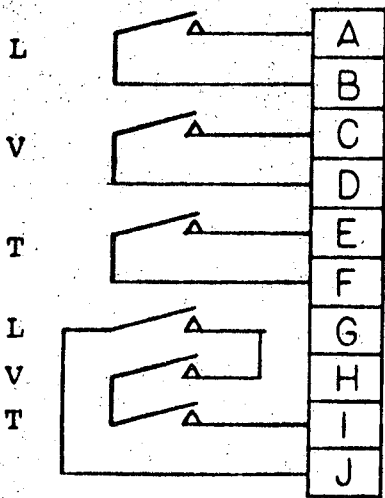
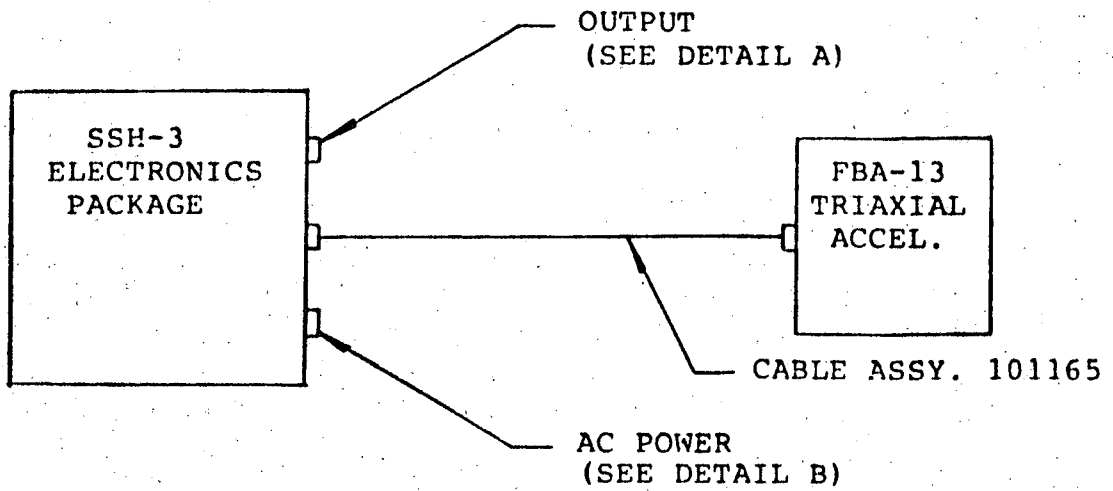
3.2 AC Connections

Connect 120Vac power to the AC POWER connector, as shown in Figure 2.

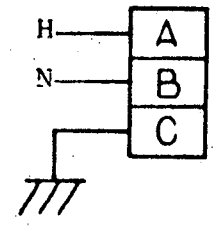
3.3 Output

Connect from the OUTPUT connector to the plant protection system as required. Ordinarily only the contacts brought out to pins I & J are used for connection to the plant protection system. Pins A thru F are normally used only for test purposes.

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DETAIL A



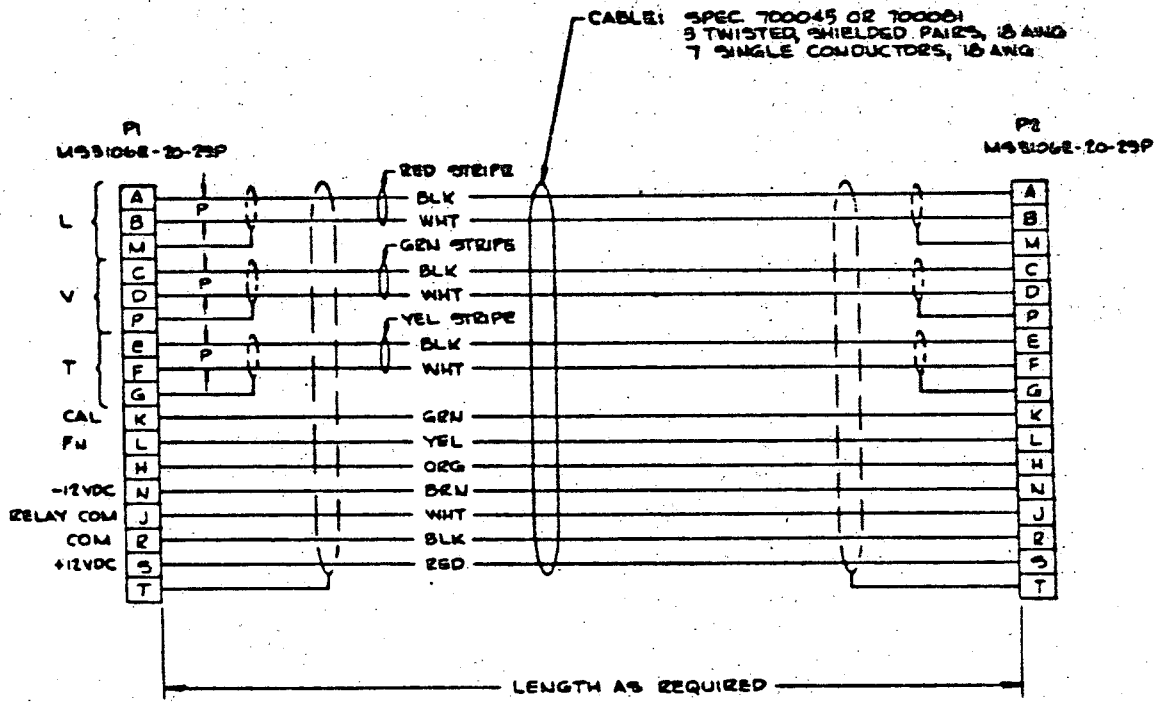
DETAIL B

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ELECTRICAL CONNECTIONS

FIGURE 2

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ZONE		REVISIONS		DATE	APPROVED
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DO NOT SCALE THIS DRAWING				CONTRACT	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES				DRAWN BY	DAY 8-6-71
BREAK SHARP EDGES .015 MAX				CHECKER	NELSON 6-4-76
TOLERANCES					
FRACT	XX	XXX	ANGLES	DESIGNER	
± 1/64	± .010	± .005	± 0°30'	PROJECT ENGINEER	W. R. M. 6-4-76

KINEMATICS, INC.		
CABLE ASSY. - ACCELEROMETER		
SIZE	101165	RLV
C		C
SCALE	WEIGHT	SHEET 1 OF 1

THE DIMENSIONS ON THIS DRAWING REPRESENT APPROXIMATE TYPICAL DIMENSIONS ONLY AND SHALL NOT BE CONSIDERED AS A BASIS FOR CONSTRUCTION OR REPRODUCTION OF THIS DRAWING.

4.0 ADJUSTMENTS & OPERATION

See Figure 3 for general arrangement of the FBA-13 and SSH-3.

4.1 Battery Voltage

At the SSH-3, check the battery voltages as follows: Push the BATT switch toward + BATT.; the BATTERY VOLTAGE meter should read at least 12 Vdc. Push the BATT switch toward - BATT.; the BATTERY VOLTAGE meter should read at least 12 Vdc.

Note: At installation, the battery voltages may be lower than 12 Vdc until the AC power has been connected for 30 hours. If either battery is less than 12 Vdc after AC power has been connected for 30 hours, the battery should be replaced.

4.2 Accelerometer Adjustment

At the FBA-13, after the accelerometer package is installed and the accelerometer connected to the electronics package, it is necessary to balance the output of each accelerometer:

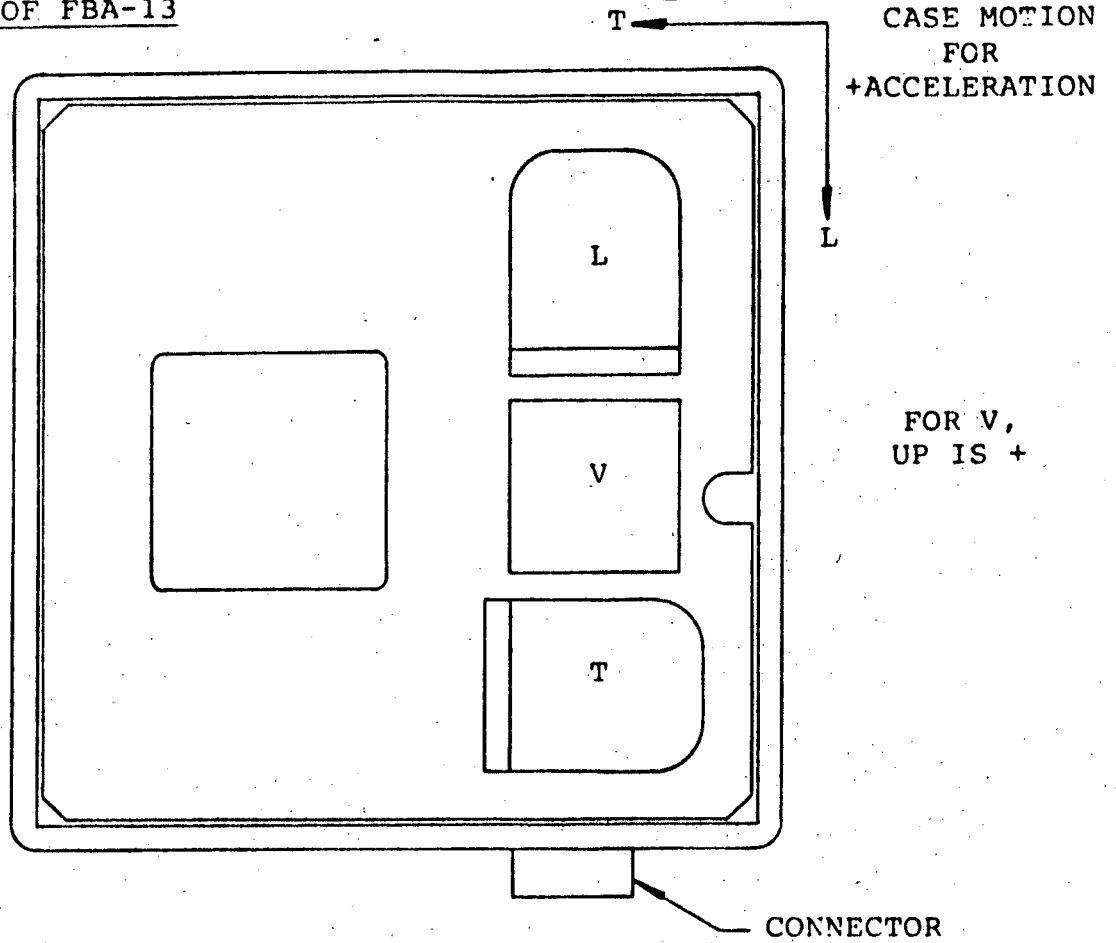
Measure the "zero" output voltage with a digital voltmeter. Connect the DVM as shown in Figure 4 to the accelerometer circuit board (E-Z hook leads are highly recommended for connecting to the circuit board).

The voltage so measured must be less than 25 mV. If it is more than 25 mV, adjust the centering of the goldplated capacitor plates as shown until the voltage is less than 25 mV. The adjustment should be made very carefully; a slight touch on the screwdriver will change the output a few tens of millivolts.

4.3 Full Operation

The seismic scram instruments are now operational and ready to respond to an earthquake.

ARRANGEMENT OF FBA-13



ARRANGEMENT OF SSH-3

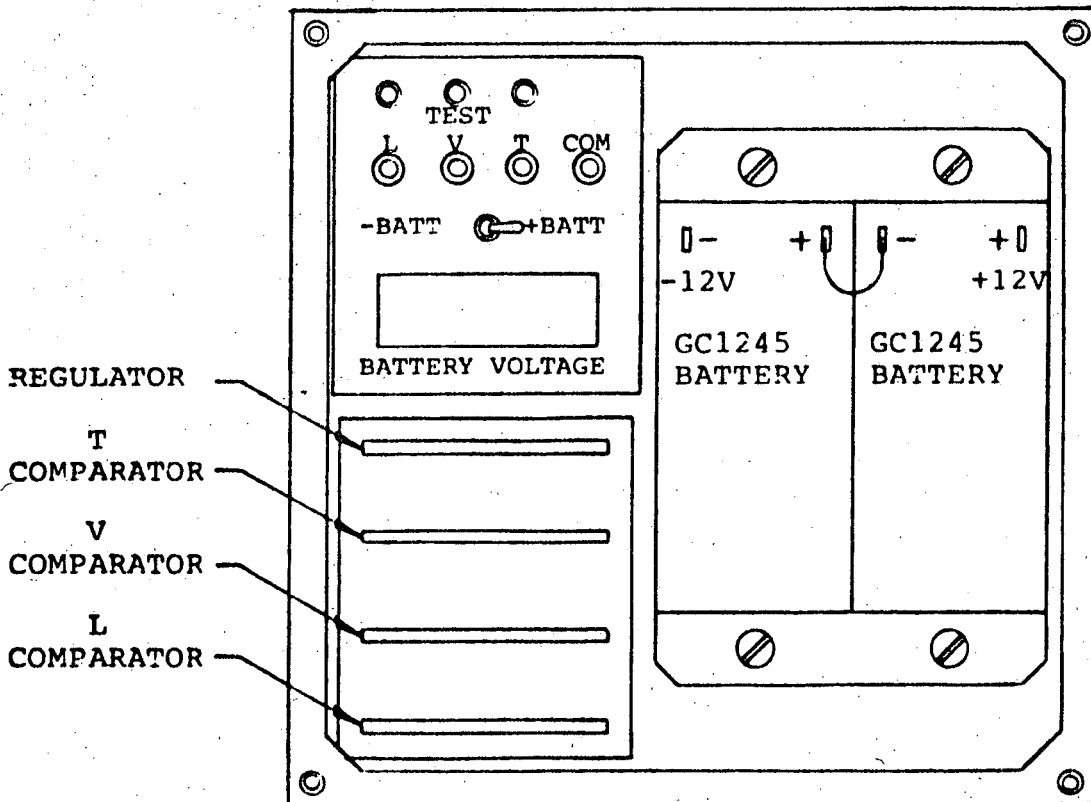
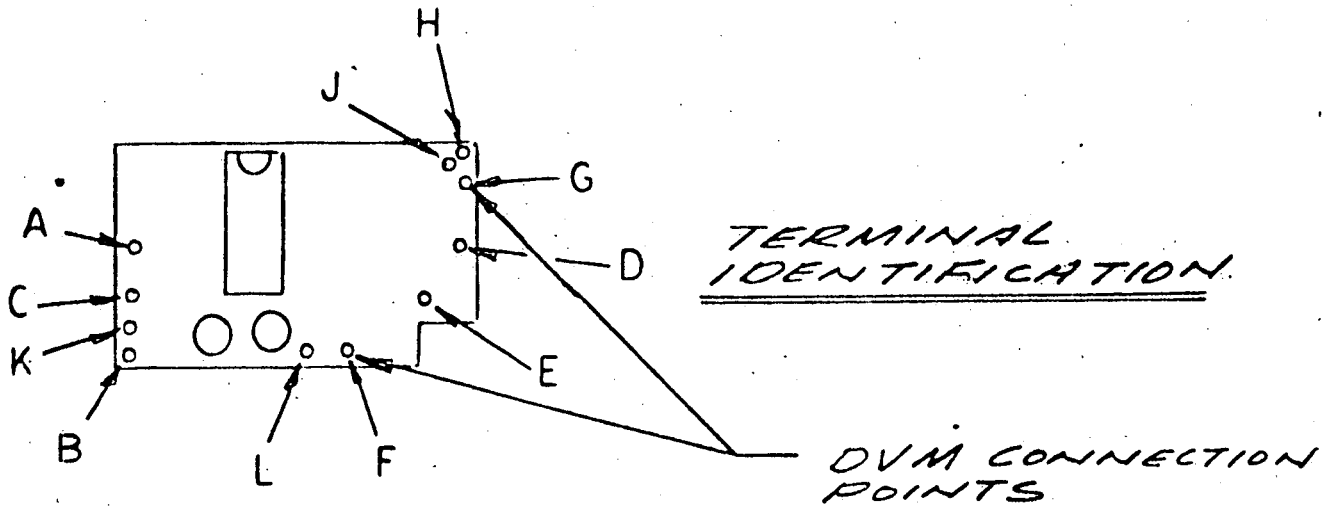


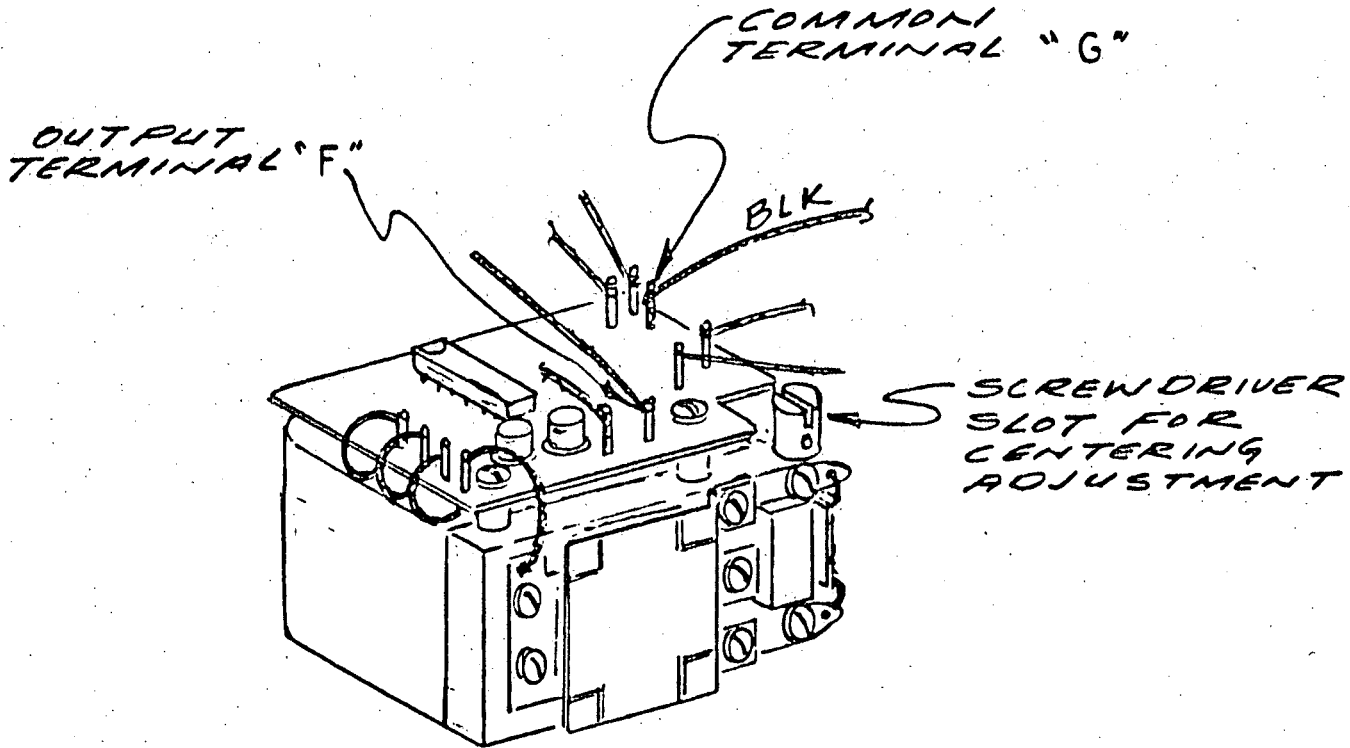
FIGURE 3

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TERMINAL IDENTIFICATION

DVM CONNECTION POINTS



BALANCING THE ACCELEROMETER OUTPUT

FIGURE 4

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5.0 TESTS AND CALIBRATION

The seismic scram instruments can be tested by means of switches and jacks inside the SSH-3 Electronics Package.

5.1 Functional Test

To verify proper connections and general operation of the seismic scram instruments, the following test should be conducted:

1. Using an ohmmeter, verify that, at the OUTPUT connector:
 - pin A to pin B is closed,
 - pin C to pin D is closed,
 - pin E to pin F is closed,
 - and pin I to pin J is closed.

- 2a. Momentarily depress TEST switch L.
Verify that:
 - pin A to pin B is open,
 - pin C to pin D is closed,
 - pin E to pin F is closed,
 - and pin I to pin J is open.

- 2b. Wait 15 seconds, then verify:
 - pin A to pin B is closed,
 - and pin I to pin J is closed.

- 3a. Momentarily depress TEST switch V.
Verify that:
 - pin A to pin B is closed,
 - pin C to pin D is open,
 - pin E to pin F is closed,
 - and pin I to pin J is open.

- 3b. Wait 15 seconds, then verify:
 - pin C to pin D is closed,
 - and pin I to pin J is closed.

- 4a. Momentarily depress TEST switch T
Verify that:
 - pin A to pin B is closed,
 - pin C to pin D is closed,
 - pin E to pin F is open,
 - and pin I to pin J is open.

- 4b. Wait 15 seconds, then verify:
 - pin E to pin F is closed,
 - and pin I to pin J is closed.

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5.3 Calibration

It is possible to measure the set points of the SSH-3 by using an FC-1 Field Calibrator.

1. For the FC-1, turn switch to ON, and measure its BATT voltage, E_b .
2. Set the FC-1 SENSOR dial to 0.00; set the FC-1 ACCELERATION dial to 0.00.
3. Connect the black plug of the FC-1 into the COM jack of the SSH-3; and connect the red plug of the FC-1 into the L jack of the SSH-3.
4. Connect an ohmmeter to the SSH-3 OUTPUT connector pins A and B.
5. Gradually increase the FC-1 ACCELERATION dial until the ohmmeter indicates that the connection between pins A and B opens; record the dial reading, A, with a decimal point after the number in the window.
6. Calculate the set point:

$$S.P. = \frac{(A)(E_b)}{(10.00)(S)}$$

Where S.P. = set point in g's.

A = reading of FC-1 ACCELERATION dial (eg. 3.54)

E_b = FC-1 battery voltage (eg. 6.27v)

S = acceleration sensitivity of FBA-13 accelerometer (eg. 2.50v/g)

7. Repeat steps 2 thru 6, for V using pins C & D, and for T using pins E & F.

6.0 SERVICE AND MAINTENANCE

The Seismic Scram Instruments require essentially no maintenance. The SSH-3 has rechargeable batteries, and the built-in battery charger will keep the batteries from discharging.

Once a month, the battery voltages, both plus and minus should be checked. If either battery is less than 12 Vac, the battery should be replaced.

Once every six months, the seismic scram instruments should have a functional test as described in paragraph 5.1.

Every eighteen months, or whenever there is a convenient outage or refueling, the balance of three accelerometers in the FBA-13 should be measured and adjusted if greater than 25 mV, as described in paragraph 4.2. Also at this time, the calibration of the set points should be checked as described in paragraph 5.3.

Every three years, both batteries should be replaced.

7.0 PARTS LISTS

7.1 Accessory Parts

The following parts are furnished as accessories:

For the FBA-13:

Connector, MS3106F-20-29P
Stud, P/N 700018-24
Stud Anchor, Phillips S14
Thred Seal, Parker 7500- $\frac{1}{4}$
Washer, Flat, $\frac{1}{4}$ inch
Hex Nut, $\frac{1}{4}$ -20
Desiccant, P/N 700049

For the SSH-3:

Connector, MS3106F-20-29P
Connector, MS3106F-20-3S
Connector, MS3106F-18-1S
Desiccant, P/N 700049

7.2 Service and Maintenance Parts

The following parts may be ordered for service and maintenance:

Batteries, P/N GC1245-1, 2 required
Model FC-1 Field Calibrator

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