Piezoelectric-accelerometer-installation Verification Techniques

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The dynamic testing (vibration and/or shock) of large structures typically involves many channels of accelerometers. The expense of conducting such a test dictates that considerable care be exercised in the verification of each data channel. Three areas which are checked frequently are channel identity vs. measurement location, isolation from ground and the fact that the channel is alive and well.

Visual inspection of cable ID, cable routing and transducer location has traditionally been used to initially verify the transducer installations. This requires a lot of time, very thorough labeling, etc. Once this is done, the transducer is 'tapped' or squeezed and the data-system output is checked to verify that a response occurred on the correct channel. This approach has limitations in that the tap test excites neighboring transducers expecially when checking a triaxial installation. The squeeze test produces low-level outputs, thus amplifier-gain changes are often made and then forgotten about. The verification of ground isolation normally is accomplished by lifting the data-system single-point ground and noting the absence of spurious grounds. This leaves a lot to be desired in that it does not reveal shorts between transducers nor does it expedite finding an inadvertent ground once its presence has been realized.

A solution to this situation is illustrated in Fig. 1. The clamp-on current transformer is shown being used in a reversal of its normal role. The excitation of the accelerometer/charge amplifier circuit with the current transformer will not produce a change in amplifier output *unless* there is a ground in the accelerometer-amplifier loop. With this same installation in effect, one can now intentionally ground the accelerometer and verify that both the channel identification and amplifier/data-system response is correct.

This approach to data-system verification has significantly reduced setup time and has certainly enhanced the confidence in a newly assembled test system. The equipment to perform such checks is readily available in most test laboratories except for the clamp-on current transformer which is available from Fluke or Keithey. A home-made version can be fabricated from two transformer 'C' cores, one of which should be wrapped with 100 turns of #24 copper wire. The 100-Hz oscillator should be adjusted for a nominal output of 5-v RMS. Thus, the implementation of this approach should be quite simple and inexpensive for most investigators.

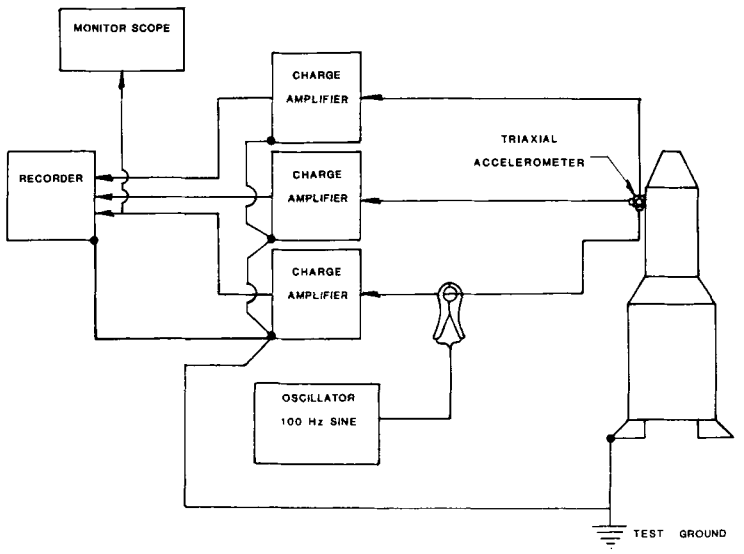

Fig. 1—*The clamp-on current transformer can be used to quickly and independently verify individual accelerometer data channels*