

A VIBRATION SIGNAL CONDITIONING

SYSTEM FOR THE 1980's

by

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ABSTRACT

A market survey of instrumentation engineers in vibration testing laboratories has revealed an urgent need for computerizing the control of charge amplifiers used in multichannel data acquisition systems. Digital control will increase dynamic range of the measurement system, and assure that the most recent gain setting of each amplifier is documented. The Series 2780 Multichannel System described in this paper will meet these needs and thereby improve the accuracy and reliability of data acquisition systems.

INTRODUCTION

Many large vibration testing laboratories were surveyed regarding vibration instrumentation needs for the 1980's. These facilities typically employ 30 to 100 channels of dynamic data per test and are currently using manually controlled charge amplifiers with analog meters. Operating personnel record amplifier range, transducer sensitivity and filter setting, and they monitor the meters for overrange conditions during the test. Each of the facilities surveyed had acquired computer-based shaker control systems, but none had extended computer control to their vibration data acquisition systems.

In two-thirds of the facilities visited, it is necessary for the charge amplifiers to operate independently of the shaker control system. One-third of the facilities preferred to have the charge amplifiers under control of the minicomputer which controls the shaker. To meet the needs of both groups the survey showed that a computer controlled signal conditioning system must provide:

1. A record of the most recent gain settings of all amplifiers on a non-volatile storage device.
2. A hard-copy record of each amplifier gain setting from beginning to end of test.
3. Automatic scanning of data amplitude levels while the test is in progress, the scanned amplitudes being automatically compared to pre-programmed high and low acceptance levels. When out-of-limit conditions occur, the operator must be notified and a quick method of range change implemented.
4. Analog outputs for tape recorders and real time analyzers.

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to all tests (such as output full scale voltage and high and low auto scale limits). These parameters are easily entered automatically each time a test is performed, and then only non-standard parameters need be manually keyed in.

A calibration mode provides a reference calibration to tape recorders and frequency analyzers.

Operation errors such as an unprogrammed rack and absence of a cassette are indicated by a warning light on the Dynamic Status Indicator Panel.

Amplifier overrange, amplifier excessive common mode voltage, and peak overrange are continually monitored and the operator notified by a warning light with the printer identifying each amplifier that is in trouble so that appropriate action may be taken.

A clock is included that displays MO-DAY-HRS-MIN-SEC so that time is recorded on the cassette and printed out each time an event or change occurs. This permits correlation with the data tape during data reduction.

SUMMARY

Computer-controlled charge amplifiers are the next logical step in automating vibration testing, be it in the environmental test lab or on operational tests. The ENDEVCO Series 2780 Multichannel Amplifier Control System gives the test engineer a state-of-the-art amplifier that can be controlled by MAC's dedicated microcomputer controller or by the laboratory's own mini-computer. Herein lies one of the fundamental benefits of MAC, the vibration signal conditioning system for the 1980's.

Digital Cassette Recorder

Automatically records for gain settings and gain changes for continuous and permanent documentation of the entire test. You can rerun the test under the same conditions by programming the amplifiers from the cassette.

Real Time Clock

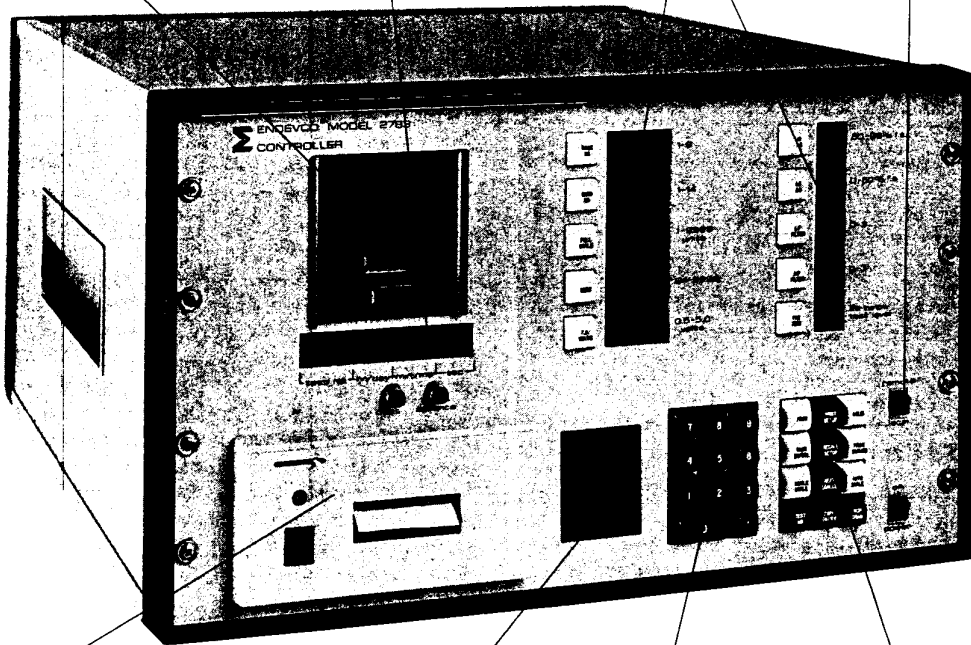
Displays test number and time. Alternately displays day/month and hour/minute/second.

Parameter Control and Display Panel

Addresses individual amplifiers and displays their programmed and controlled parameters.

Remote Capability (Option)

Enables you to control the 2783's microcomputer from an external computer.



Printer

Provides a hard copy of original amplifier gain settings and all changes, as well as the time they occurred during a test. Also prints time out-of-range conditions occur.

Diagnostic Status Indicator

Assists you in troubleshooting problems by alerting you immediately to system conditions.

Numeric Keyboard

Enables you to enter numeric settings as the controller sequences through each setup step.

Operational Control Panel

Provides program manipulation functions.