

# Multi-Channel High Performance Data Acquisition System and Digital Servo Controller Module

## OVERVIEW

The VDSP31 is a VXI based, multi-channel data acquisition system and digital servo control module. The VDSP31 offers a complete solution for high performance closed loop applications. The VDSP31 has been designed to solve specific problems related to the control of hydraulic actuators. Signal conditioning modules can be combined on a per channel basis to configure the VDSP31 for load or displacement feedback. The VDSP31 comes with application firmware that will control up to eight hydraulic actuators. Custom application firmware can be developed using the VDSP31 Software Development Kit (**SDK**) and then downloaded to the VDSP31 over the VXI backplane. The VDSP31 is a SCPI compliant device. SCPI commands can be sent to the local serial port or over the VXI backplane.

## PROCESSING RESOURCES

- VXI message based intelligent slave device
- Processor A: 32 MHz TMS320C31 DSP control engine
- Processor B: OPTIONAL 32 MHz TMS320C31 DSP
- Up to 128K X 32 bit zero wait state SRAM for CPU A
- Up to 2 M of SRAM between the VXI and CPU A
- Up to 4 Megabit EPROM using one socket
- Up to 32 Kilobytes E2PROM
- One asynchronous serial port RS232C
- Watch dog health and safety output

## SIGNAL CONDITIONING MODULES

The VDSP31 baseboard module can be equipped with a variety of signal conditioning modules. These modules can be mixed and matched on a per channel basis. A maximum of Eight (8) modules of any type can be installed on the VDSP31 baseboard.

## APPLICATIONS

- High performance A/D, D/A Data Acquisition
- P.I.D. Closed Loop Controls
- Digital Servo and Linear Actuators Controls

**VDSP-31 VXI DATA ACQUISITION SYSTEM**

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## LOAD CELL AND STRAIN GAUGE MODULE

- Instrumentation amplifier +/- 10v input with active guard shield
- Software programmable gains of 1,2,4,8,100,200,400 and 800
- Software programmable output offset to +/- 10v
- 100 KHz 16 bit A/D
- Instrumentation amplifier output routed to front panel connector

## EXCITATION MODULE

- Voltage power amplifier +/- 10v output
- Remote excitation sense compensates for cable loss
- Software programmable remote shunt via local relay
- 100 KOhm +/- 0.1 % calibration resistor
- Software programmable excitation output +/- 10v
- 10 us 16 bit D/A
- Calibration relay interlocked with valve driver
- Excitation current monitor

## LVDT MODULE

- LVDT synchronous demodulator with built-in excitation
- Supports half-bridge and series opposed LVDT types
- Jumper programmable AC excitation frequency range 2 - 20 KHz
- Software programmable output offset to +/- 10v
- Software programmable gain 1,2,4 or 8
- 100 KHz 16 bit A/D
- LVDT demodulator output routed to front panel connector
- Excitation voltage and current monitor
- The VDSP31 baseboard module can hold Eight (8) modules

## VALVE DRIVER MODULE

- Current power amplifier up to +/- 100 milliamp output
- Jumper selectable current ranges
- Jumper selectable voltage or current output mode
- 10 us 16 bit D/A
- Valve current monitor

## DIGITAL I/O

- Four (4) TTL non-isolated inputs per channel 32 total
- Four (4) TTL non-isolated outputs per channel 32 total

## FRONT PANEL

- Four (4) channel analog signal monitor outputs on miniature BNC connectors
- P1 connector analog I/O signals for channels 1 - 3
- P2 connector analog I/O signals for channels 4 - 8
- P3 connector digital I/O signals for channels 1 - 8
- P4 diagnostic serial port
- P5 trigger and clock
- Reset push-button (recessed)
- Four (4) status LED's

## FIRMWARE

- Eight channel 1 KHz PID control loop or user defined control law(s)
- AC function generator with programmable frequency, phase and amplitude
- DC haver-sine endpoint ramping
- Random spectrum endpoints with block repeat
- Host spectrum downloads "on the fly"
- Use resident firmware or download custom software over the VXI backplane
- Adaptive control loop for cyclic applications
- Dual load cell feedback mode
- Fault Locator System (*FLS*<sup>TM</sup>) checks excitation and valve connections for opens or shorts.
- Programmable valve dither generator
- All On Point (*AOP*<sup>TM</sup>) load status for NULL pacing applications
- Flexible triggering system accepts inputs from front panel, internal pacer, or VXI backplane

# VDSP31 FUNCTIONAL BLOCK DIAGRAM

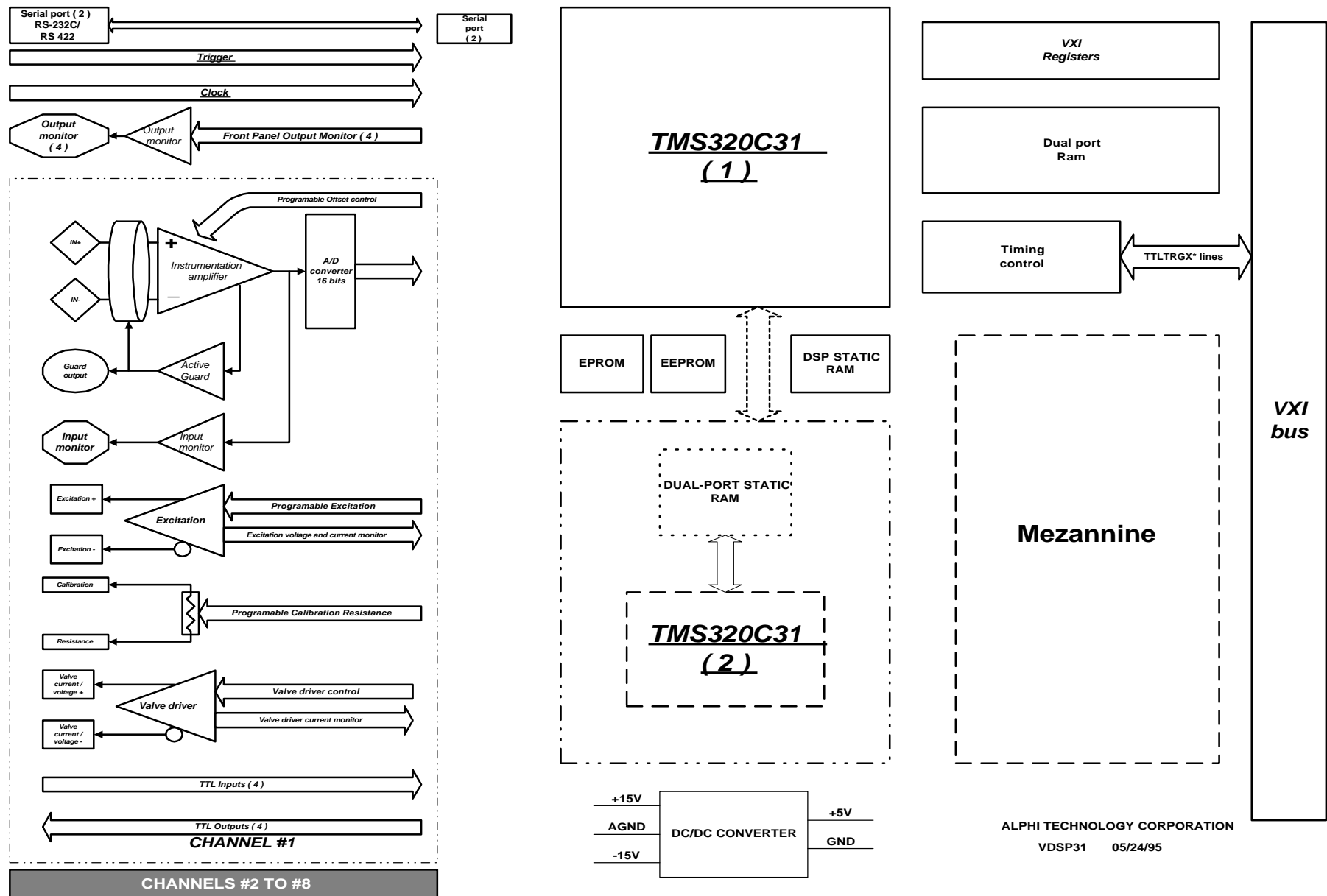


Figure 1

# VDSP31 SOFTWARE COMPONENTS

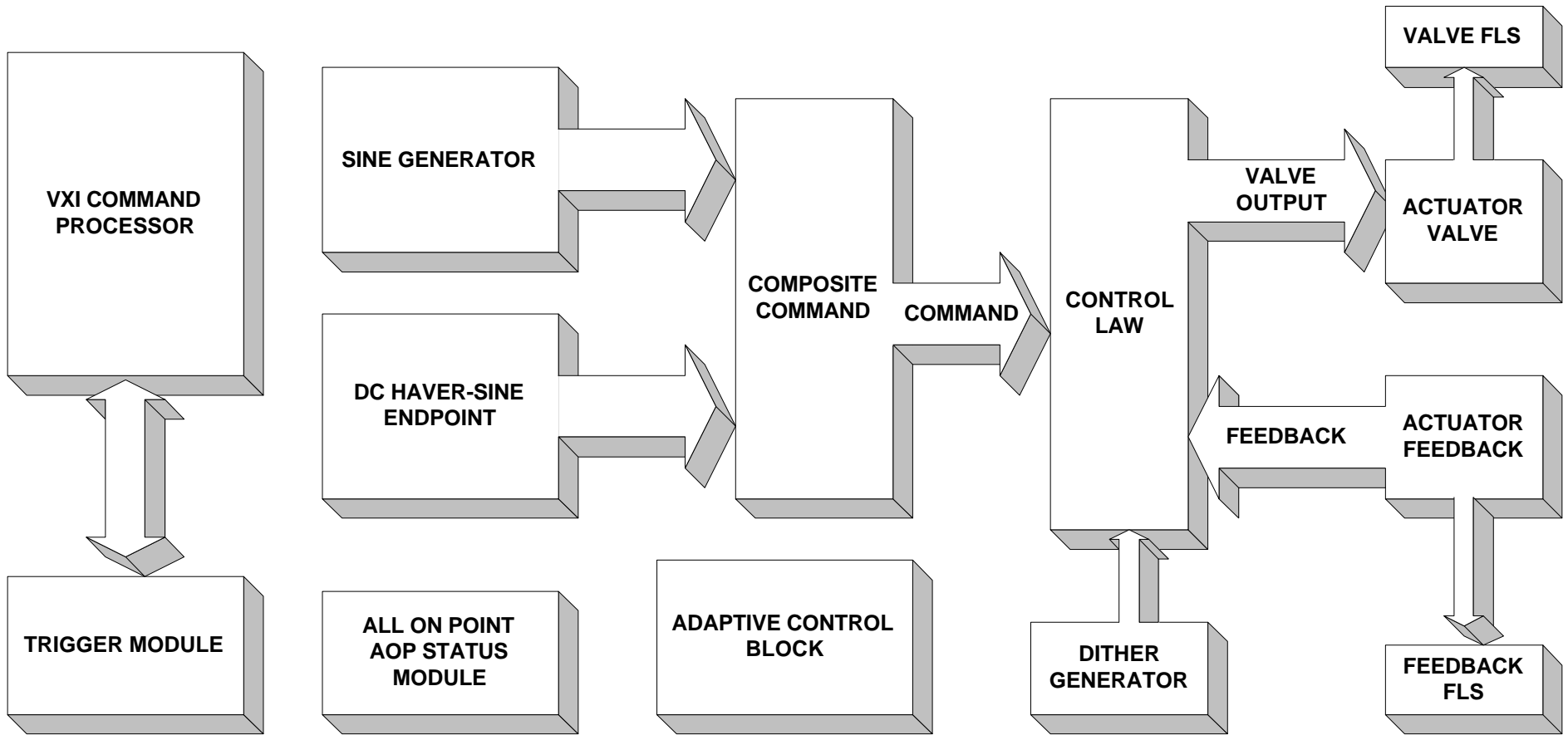


Figure 2

# LOAD FEEDBACK STRAIN GAUGE AND BRIDGE AMPLIFIER MODULE

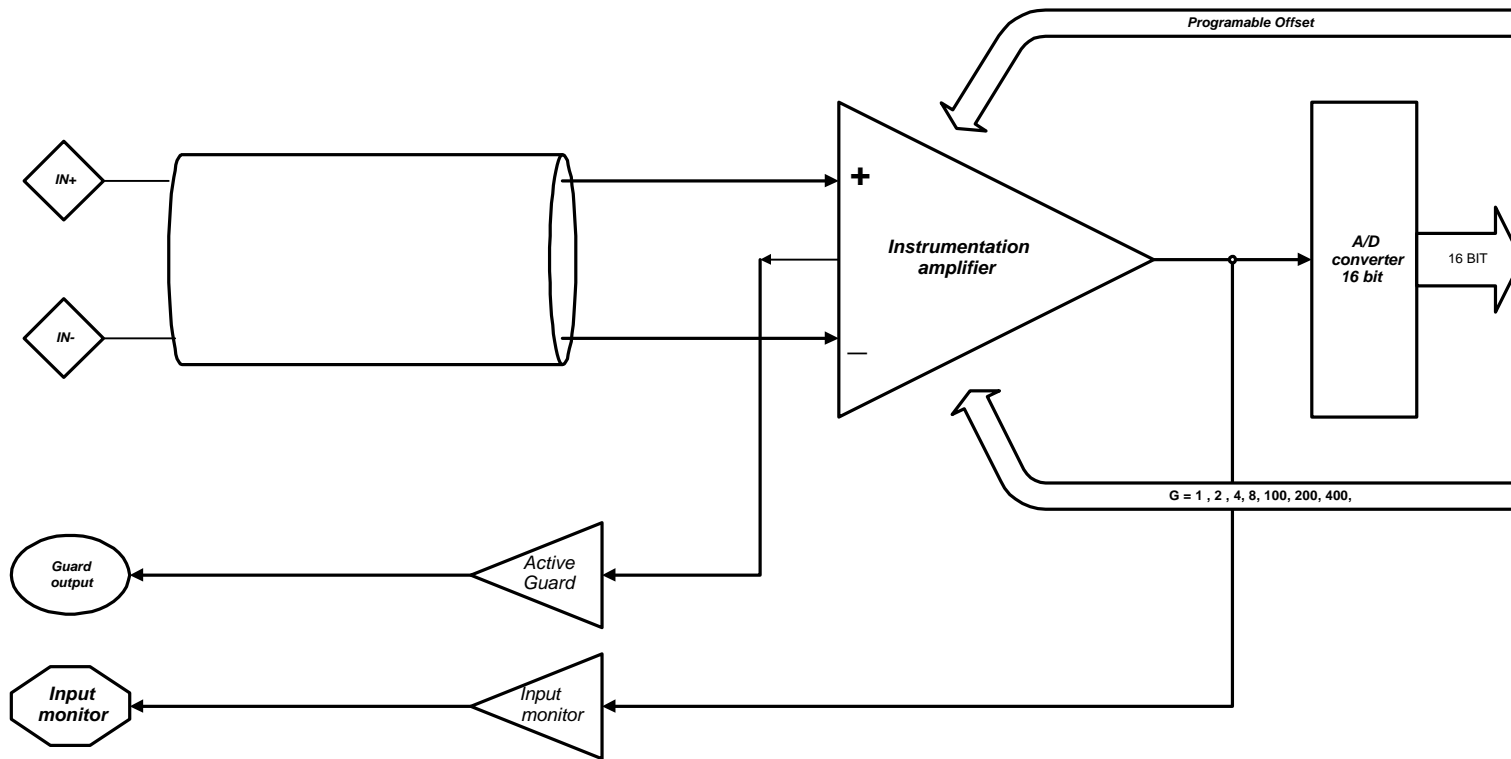


Figure 3

# STRAIN GAUGE AND BRIDGE DC EXCITATION MODULE

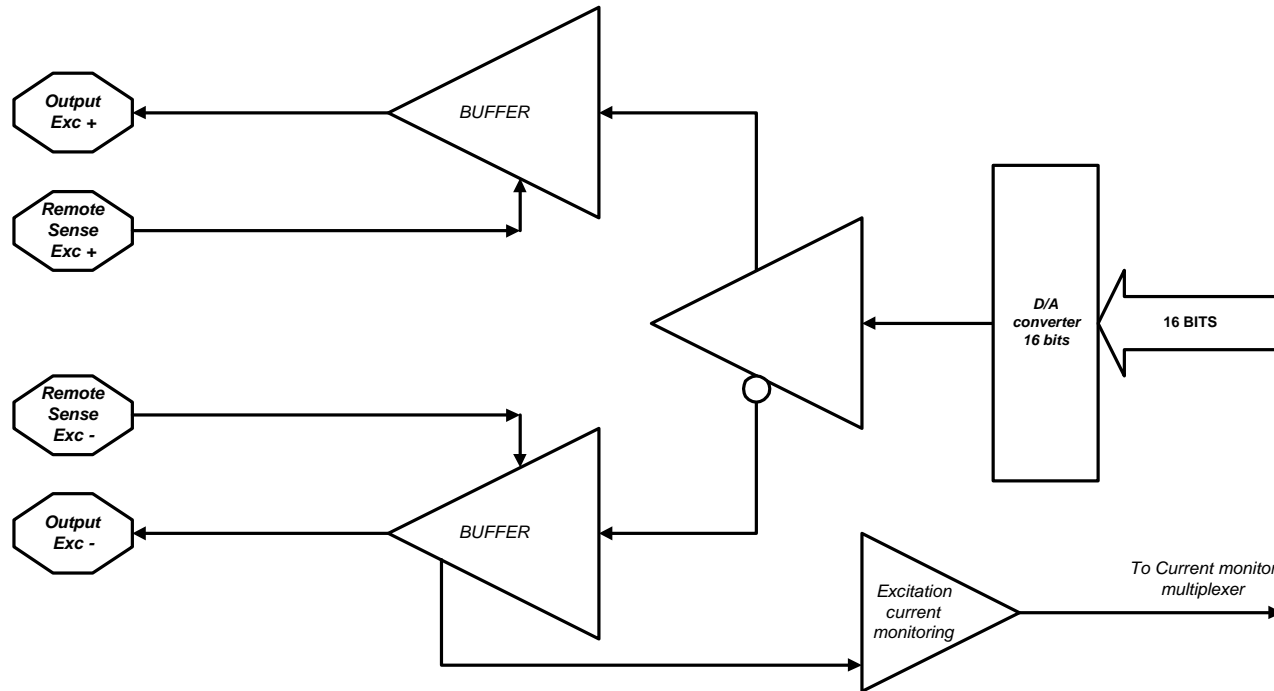


Figure 4

# DISPLACEMENT FEEDBACK LVDT HALF BRIDGE CONFIGURATION

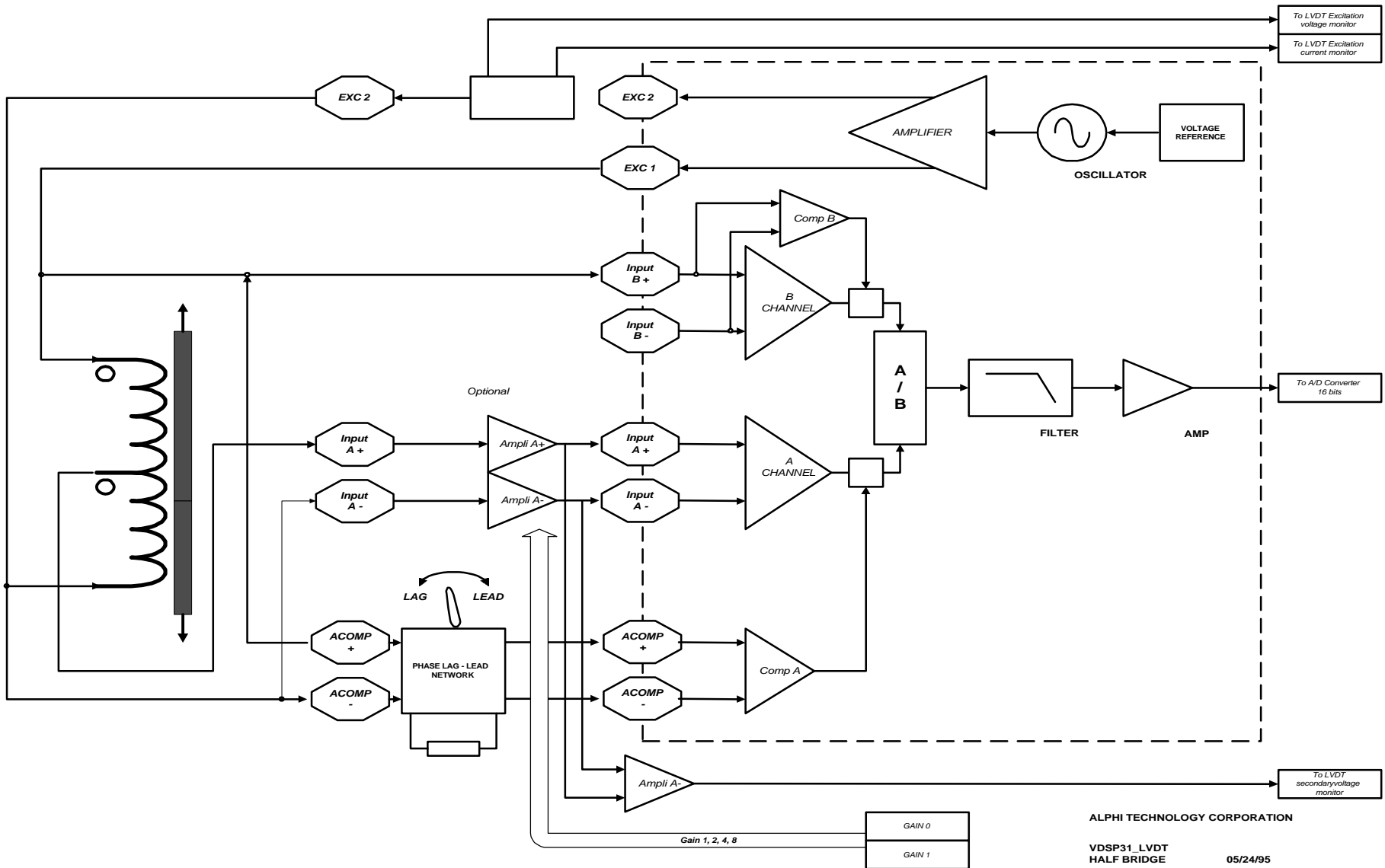
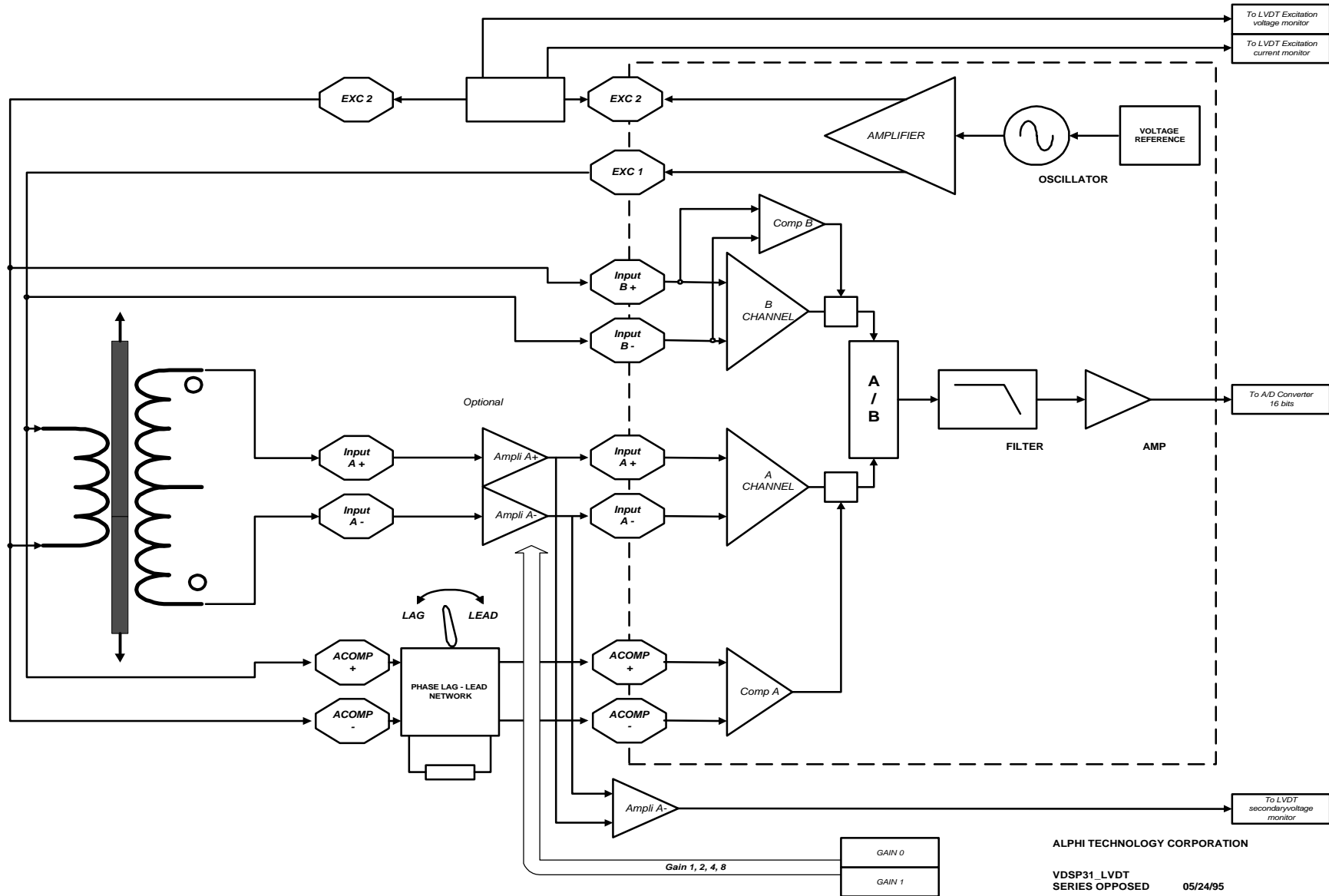


Figure 5

# DISPLACEMENT FEEDBACK LVDT SERIES OPPOSED CONFIGURATION



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VDSP31\_LVDT  
SERIES OPPOSED 05/24/95

Figure 6



# VALVE DRIVER MODULE

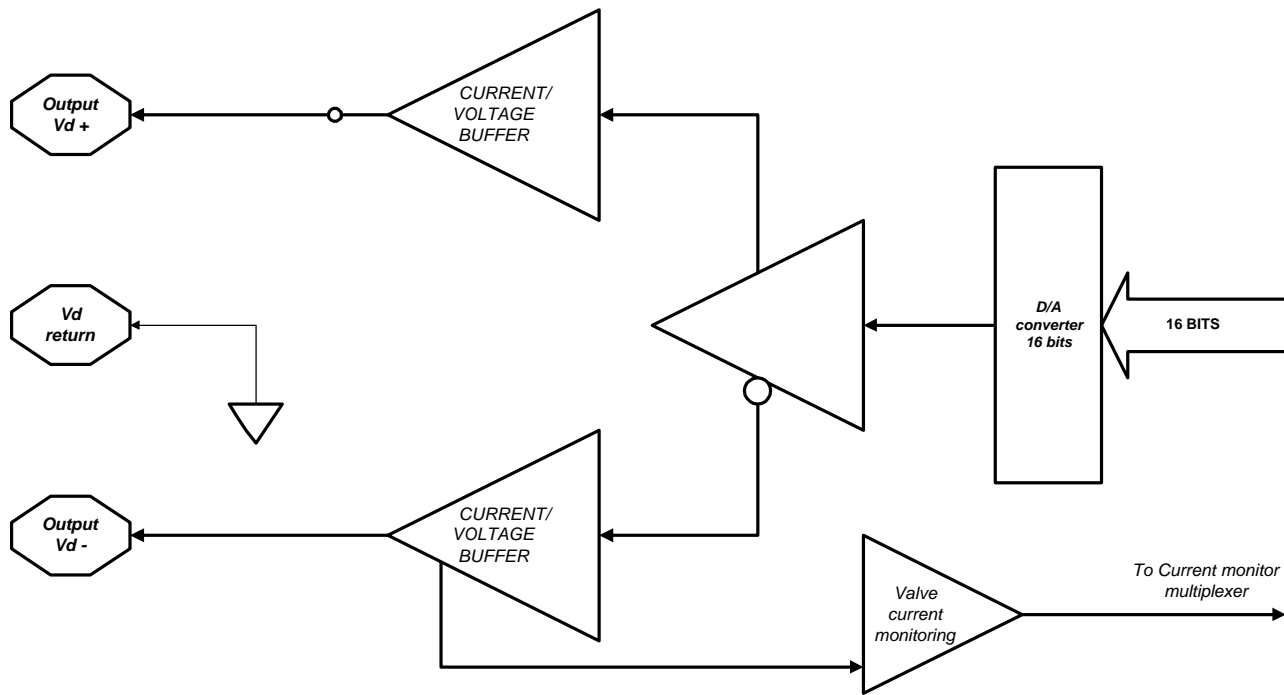
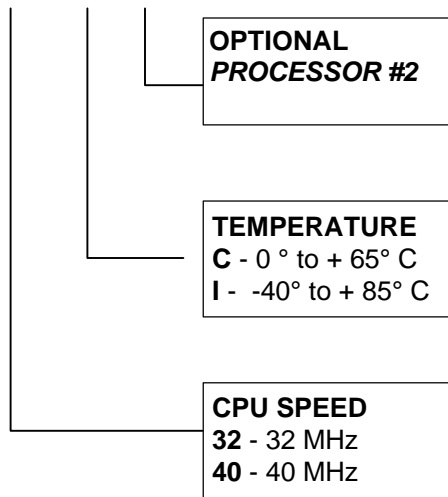


Figure 7

## ORDERING INFORMATION

### VDSP31 BASEBOARD MODULE

#### VDSP31 - 32 - C - P2



### VDSP31 BASEBOARD ACCESSORIES

VDSP31-SC-LVDT	LVDT INPUT MODULE
VDSP31-SC-BRIDGE	BRIDGE AMPLIFIER INPUT MODULE
VDSP31-SC-EXC	BRIDGE EXCITATION OUTPUT MODULE
VDSP31-SC-VALVE	VALVE DRIVER OUTPUT MODULE
VDSP31-TB-ANALOG	ANALOG TERMINAL BLOCK
VDSP31-TB-DIGITAL	DIGITAL TERMINAL BLOCK

### VDSP31 SOFTWARE TOOLS AND DOCUMENTATION

VDSP31-SDK	VDSP31 SOFTWARE DEVELOPMENT KIT
VDSP31-MAN	VDSP31 MANUAL SET

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360-1-001-4100-REV.B