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# Model 6516

# 16-Chan. 4-Input Narrowband Digital Receiver VME Board



## General Information

The Model 6516 is a general purpose multichannel digital receiver VME board which accepts digitized data at sampling rates up to 50 MHz. It may be configured with up to 16 channels of narrowband receivers to perform frequency down-conversion, lowpass filtering, and decimation of the sampled output.

The receiver output signals are delivered through front panel C40 comm ports for implementing DSP functions on Pentek C40 DSP processor modules.

Receiver tuning, filter and FIFO control is available from the VMEbus. The FIFO output data may also be read over the VMEbus.

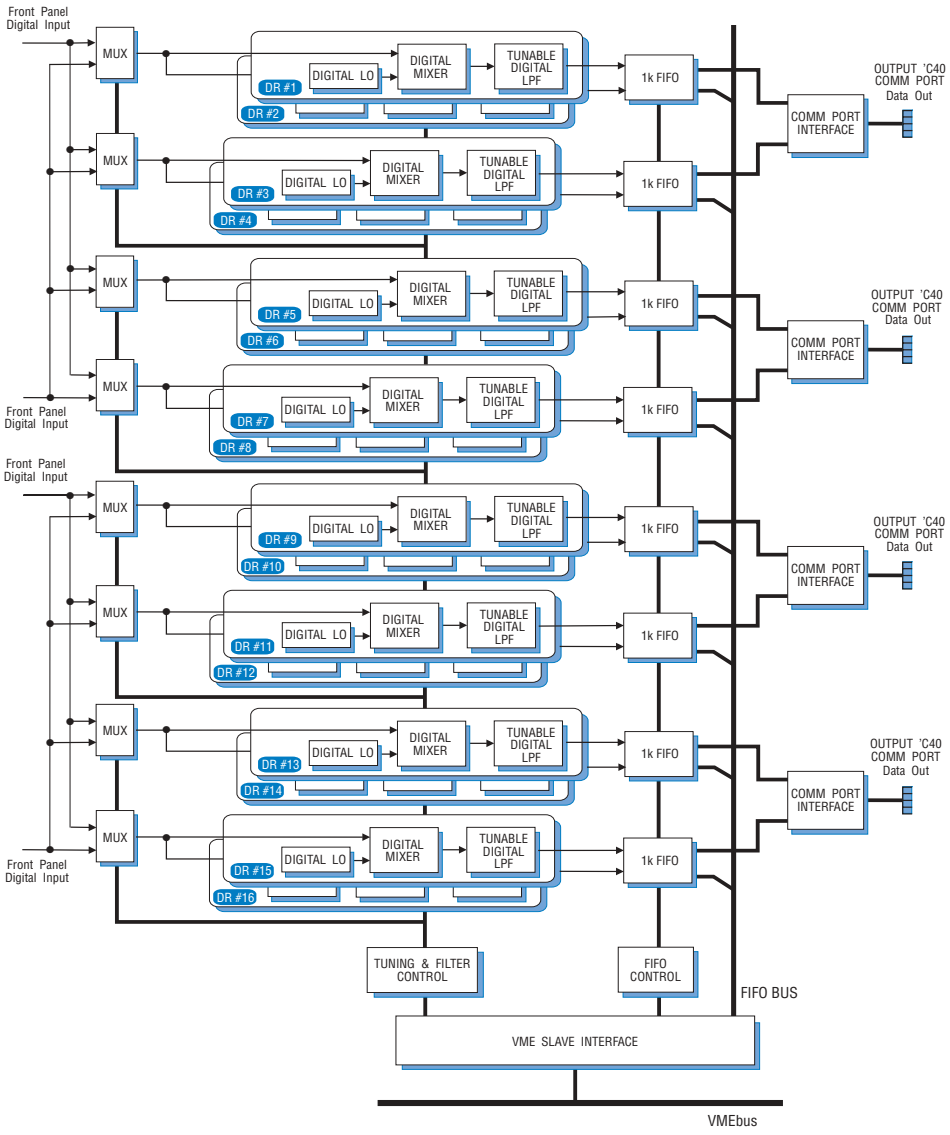
## Operating Principle

The unit utilizes highly integrated digital receiver chips containing a tunable digital local oscillator, a mixer and a tunable low pass output filter. The local oscillator frequency and the output filter cutoff frequency in each section are independently programmable over the VMEbus interface providing extremely flexible and agile operation.

Model 6516 uses the Intersil HSP50016 receiver chip.

*[Continued on next page]*

## Block Diagram, Model 6516




## Features

- Sampling rates to 50 MHz
- Four TTL or FPDP inputs
- Four C40 comm port data outputs
- Tuning control over the VME interface
- Dynamic range greater than 100 dB
- 0.006 Hz tuning resolution
- FIFO buffering
- Compatible A/Ds available, Series 64xx

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# Model 6514
# Model 6516

# 16-Chan. 2-Input Narrowband Digital Receiver VME Board
# 16-Chan. 4-Input Narrowband Digital Receiver VME Board

## Applications

These VME boards provide an effective way to create multichannel digital signal processing and analysis systems for selected frequency bands. Since they downconvert selected bands, they make it economically feasible to perform DSP functions such as FFT spectrum analysis on RF signals.

Typical applications include frequency-division multiplexed communications systems, modem modulation schemes, and analysis of many forms of radar signals.

## Ordering Information

| Model | Description |
|---|---|
| 6514 | 16-Channel 2-Input Digital Receiver VME board |
| **Options:** | |
| -008 | FPDP inputs |
| -012 | ECL diff. inputs |
| -021 | 16 ksample FIFOs |
| 6516 | 16-Channel 4-Input Digital Receiver VME board |
| **Options:** | |
| -008 | FPDP inputs |
| -021 | 16 ksample FIFOs |

## Flexible Input Connections

Parallel digital input data samples from two sources (Model 6514) or four sources (Model 6516) are accepted on a front panel multipin connector with TTL or, optionally, ECL or FPDP level compliance. Each receiver channel employs a two-input multiplexer which independently selects two of these input data sources.

The VMEbus interface is used to program operating modes, tuning frequencies and decimation bandwidths.

## Specifications, Model 6514

**Narrowband Receivers:** 16
**Receiver type:** Intersil HSP50016
**Digital input format:** two independent inputs; each input with 16-bit words, 2's complement; one sample clock line
**Input level:** TTL single-ended; optionally ECL differential (option -012)
**Sampling rate:** DC to 50 MHz max. (TTL); DC to 70 MHz max. (option -012 ECL)
**Data input connector:** 80-pin flat ribbon cable 0.025" pitch (3M)
**Input multiplexers:** each receiver channel can independently select one of two front panel inputs under program control
**Tuning range:** DC to $f_s/2$ (35 MHz for $f_s = 70$ MHz)
**Tuning resolution:** $f_s/2^{33}$ (~0.008 Hz for $f_s = 70$ MHz)

## Specifications, Model 6516:

**Narrowband Receivers:** 16
**Receiver type:** Intersil HSP50016
**Digital input format:** four independent inputs; each input with 16-bit words, 2's complement; one sample clock line
**Input level:** TTL single-ended; optionally FPDP (option -008)
**Sampling rate:** DC to 50 MHz max.
**Data input connector:** 80-pin flat ribbon cable 0.025" pitch (3M)
**Input multiplexers:** two groups of eight receiver channels each; each group can independently select one of two front panel inputs under program control
**Tuning range:** DC to $f_s/2$ (25 MHz for $f_s = 50$ MHz)
**Tuning resolution:** $f_s/2^{33}$ (~0.006 Hz for $f_s = 50$ MHz)

## Specifications, Both Models

**Local oscillator**: direct digital synthesizer; single frequency CW and sweep (chirp) up/down modes; CW frequency is equal to $F*f_s/2^{33}$, where F is a 32-bit binary integer and $f_s$ is the input sample rate
**Low pass filter:** decimating 121-tap FIR, programmed by 15-bit integer R, from 16 to 32,768; nominal output Nyquist bandwidth $f_N = f_s/4R$; output sampling rate is $f_s/4R$ for complex outputs and $f_s/2R$ for real outputs
**Filter response:** ±0.04 dB passband ripple; –3 dB bandwidth = $0.56f_N$; –100 dB stop bandwidth = $0.8f_N$
**Real mode:** consecutive 16-bit real output samples at sampling rate $f_s/2R$
**Complex mode:** 16-bit I and Q output samples at sampling rate $f_s/4R$ per complex pair
**Data FIFOs:** 1k x 16 expandable to 16k x 16 bits per channel pair, VME interrupts for full, half-full and empty
**Comm port outputs:** four total, each comm port handles four channels; byte serial with four bytes per 32-bit longword described below
**Real mode packing:** packed (two 16-bit samples from first channel pair packed in 32-bit longword, followed by two 16-bit samples from second channel pair packed in 32-bit longword); unpacked (four 16-bit samples from four channels in four 32-bit longwords)
**Complex mode packing:** packed (two 16-bit I samples from first channel pair packed in 32-bit longword, followed by two 16-bit I samples from second channel pair packed in 32-bit longword, followed by two more 32-bit longwords with respective Q samples); unpacked (four 16-bit I samples packed in two consecutive 32-bit longwords, followed by four 16-bit Q samples packed in two consecutive 32-bit longwords)
**VME interface:** slave A32, D32, I(1-7)
**VME data outputs:** unpacked only (one 16-bit sample in each 32-bit longword)
**Control registers:** memory-mapped over the VMEbus; receiver chip control registers (includes local oscillator, filter decimation, real/complex mode, etc.), input multiplexer control, and channel synchronization control
**Power:** 5.1 A at ±5 V
**Size:** standard 6U VMEbus board, single slot; board 160 mm (6.3 in.) x 233.5 mm (9.2 in.), panel 0.8 in. wide

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