

Model 3116-V3A

16-Channel, 16-bit D/A Converter

User's Manual

November, 2001

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Lockport, Illinois
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*****Special Option*****

Model 3116-S002

16-channel, 16-bit D/A Converter

March 14, 2002

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Model 3116-S002

*****Special Option*****

Model 3116-S002

The Model 3116-S002 is the same as the Model 3116-V2A/V3A except that it is modified so a timeout will occur if the 3116 doesn't receive communication for 15 seconds, then the 3116 will output 0 volts on all output channels.

Model 3116

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SCHEMATIC DRAWING #122241-C-6229

See Reply Card Following Warranty

WARRANTY

RMF:KPG/rem(WP)

16-channel, 16-bit D/A Converter

ADVANCE INFORMATION

© 1991, 1992
(Rev. Apr. 92)

FEATURES

- Sixteen independent analog outputs
- ± 10 volt output
- 16-bit resolution (one part in 65536)
- 12 milliampere drive capability
- Low drift
- Single Gain and Offset adjustments
- 2-pole Bessel output filter on each channel
- Power-on reset to zero volts

APPLICATIONS

- Industrial process control
- Laboratory automation
- Drives gauges or indicators
- PID loop control

GENERAL DESCRIPTION

The Model 3116 is a single-width CAMAC module with 16 differential output voltage channels. The maximum output of each channel of the 3116 is rated at ± 10 volts, at a maximum 12 milliamperes. Output signal levels can be resolved to 16 bits (one part in 65536) with better than 14-bit accuracy. The settling time for a 20 volt output step is 2 milliseconds.

Data values for each channel are written to a 16-bit wide, 16-word dual-ported memory. The memory is sequentially scanned, and the values are applied to a single, 16-bit Digital-to-Analog converter circuit. The DAC output is then multiplexed to 16 high-precision sample-and-hold circuits, the outputs of which are fed through a 2-pole, active low-pass Bessel filter before being brought to the front panel connector. Since the voltage outputs of all circuits are accurate to within 500 μ V, only one Gain and one Offset potentiometer are needed to adjust the DAC. All channels are updated every 2.3 ms. The nominal cutoff frequency of each filter is set at 400 Hz.

Based on the position of an on-board strap option, data may be written and read in either offset binary or two's complement format. During power-on, the module goes into a sequence of zeroing the memory contents. This sequence lasts approximately 50 microseconds, and any attempt to read or write the memory during this time results in a Q = 0 response.

The output signals are available at a 36-contact, high-density rectangular connector on the module's front panel. This connector mates directly with KineticSystems' Model 5944 connector and Model 5855-Series of cable assemblies. The 3116 front panel also contains an N LED which flashes whenever the module is addressed.

FUNCTION CODES

Command	Q	Action
F(0):A(i) RD1	1	Reads the data memory contents for channel i.
F(16):A(i) WT1	1	Writes the data memory contents for channel i.

Notes: i can range from 0 to 15 for channels 1 to 16.
X = 1 for all valid addressed commands.
Q = 0 during power-on initialization sequence.



SPECIFICATIONS

Item	Specification
Number of channels	16 differential pairs
Full-scale output	- 10 volts to + 10 volts
Resolution	16 bits (one part in 65536)
Linearity error	$\pm 0.003\%$
Monotonicity	Monotonic to 14 bits
Absolute accuracy	500 μ V typical
Channel tracking	500 μ V typical
Output impedance	0.1 Ω
Output current	± 12 milliamperes
Output protection	Can withstand short circuit to ground
Settling Time	2 milliseconds to 0.003% of Full Scale for a 20 volt change
Channel latency for voltage change	2.3 ms

POWER REQUIREMENTS

+ 6 volts — 700 mA
+ 24 volts — 75 mA
- 24 volts — 75 mA

ORDERING INFORMATION

Weight: .63 kg. (1 lb. 4 oz.)

Model 3116-V3A — 16-bit, 16-channel D/A Converter
Accessories — Model 5944-Z1A Mating Connector
Model 5855-Series Cable Assemblies

3116

MODULE CONNECTIONS

Output signals are available at the 36-contact, high-density rectangular connector P1 on the 3116 front panel. This connector mates directly with the KineticSystems' Model 5944 Connector and Model 5855-Series of cable assemblies. Refer to Figure 1 (page 4) for connector pinout.

STRAP OPTIONS

3116-V3A data may be written and read in either offset binary or two's complement format. There are two on-board straps used to select the desired format. See Figure 2 (page 5) for strap locations and configuration.

MODULE CALIBRATION

The 3116 module is shipped from the factory calibrated for an output range of ± 10 Volts. If for any reason it becomes necessary to recalibrate the module, the procedure for D/A offset and gain adjustments is as follows:

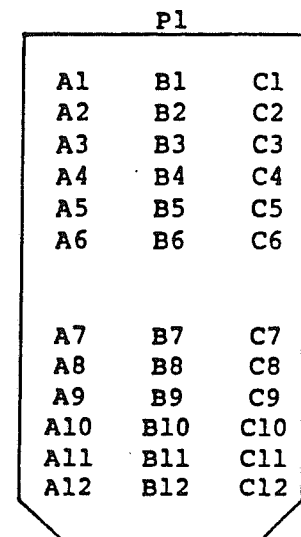
OFFSET ADJUSTMENT

Set channel one data memory contents to negative full scale (i.e., 8000 HEX when strapped for two's complement). Set the data memory contents of the remaining channels for an output of zero volts. (Data of zero when strapped for two's complement.) Adjust the offset potentiometer (see Figure 2, page 5) for exactly -10.00000 Volts at channel one's output.

GAIN ADJUSTMENT

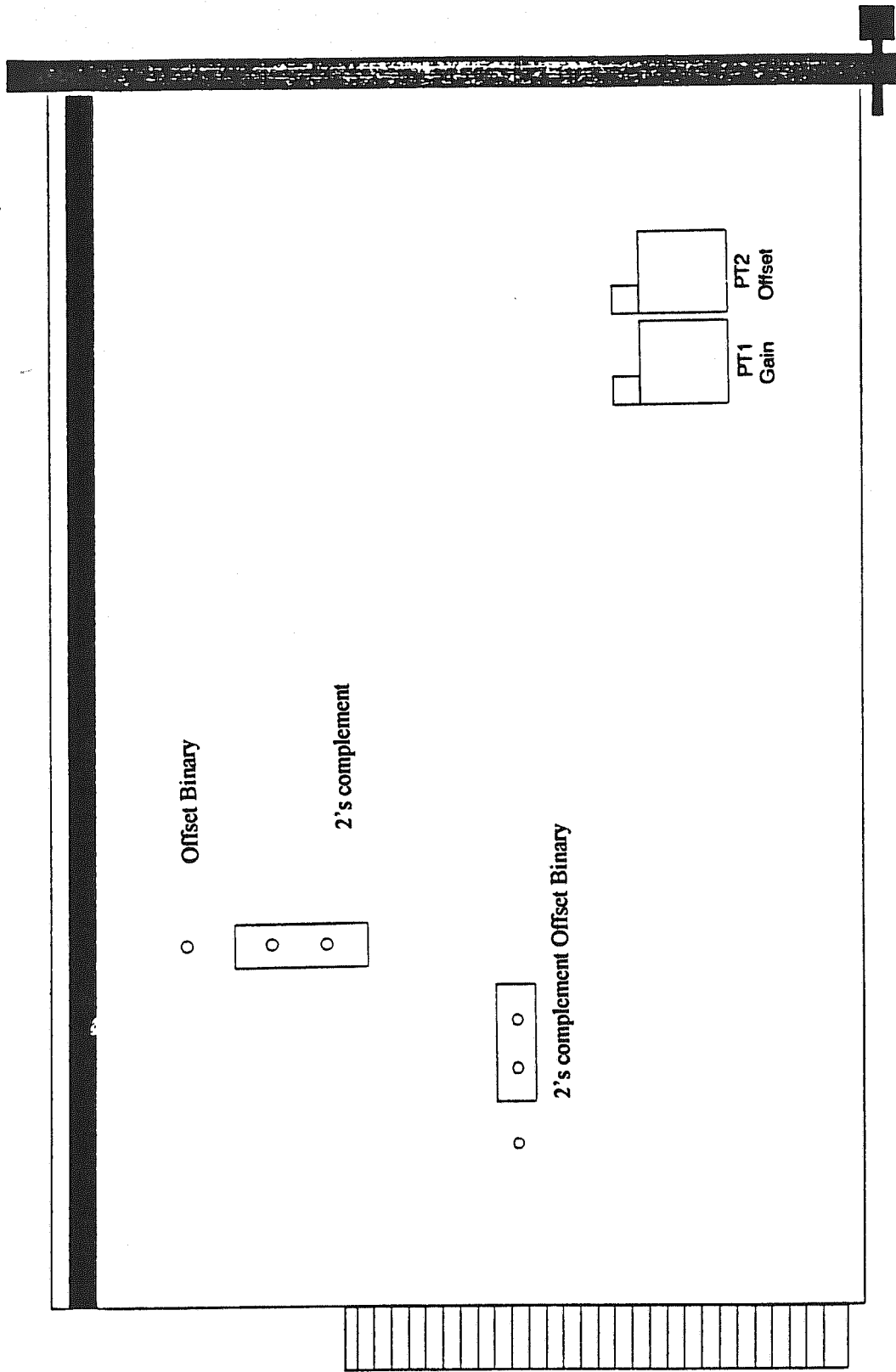
Set channel one data memory contents to positive full scale. (i.e., 7FFF HEX when strapped for two's complement.) Adjust the gain potentiometer (see Figure 2, page 5) for exactly +9.99969 Volts at channel one's output. Changes in the gain adjustment may affect the offset; therefore, it is advisable to recheck the calibration for both offset and gain.

PIN NO.	NOMENCLATURE
A1	CHANNEL 1 SIGNAL (OUTPUT)
A2	CHANNEL 1 RETURN (OUTPUT)
A3	CHANNEL 2 SIGNAL (OUTPUT)
A4	CHANNEL 2 RETURN (OUTPUT)
A5	CHANNEL 3 SIGNAL (OUTPUT)
A6	CHANNEL 3 RETURN (OUTPUT)
A7	CHANNEL 4 SIGNAL (OUTPUT)
A8	CHANNEL 4 RETURN (OUTPUT)
A9	CHANNEL 5 SIGNAL (OUTPUT)
A10	CHANNEL 5 RETURN (OUTPUT)
A11	CHANNEL 6 SIGNAL (OUTPUT)
A12	CHANNEL 6 RETURN (OUTPUT)
B1	CHANNEL 7 SIGNAL (OUTPUT)
B2	CHANNEL 7 RETURN (OUTPUT)
B3	CHANNEL 8 SIGNAL (OUTPUT)
B4	CHANNEL 8 RETURN (OUTPUT)
B5	CHANNEL 9 SIGNAL (OUTPUT)
B6	CHANNEL 9 RETURN (OUTPUT)
B7	CHANNEL 10 SIGNAL (OUTPUT)
B8	CHANNEL 10 RETURN (OUTPUT)
B9	CHANNEL 11 SIGNAL (OUTPUT)
B10	CHANNEL 11 RETURN (OUTPUT)
B11	CHANNEL 12 SIGNAL (OUTPUT)
B12	CHANNEL 12 RETURN (OUTPUT)
C1	CHANNEL 13 SIGNAL (OUTPUT)
C2	CHANNEL 13 RETURN (OUTPUT)
C3	CHANNEL 14 SIGNAL (OUTPUT)
C4	CHANNEL 14 RETURN (OUTPUT)
C5	CHANNEL 15 SIGNAL (OUTPUT)
C6	CHANNEL 15 RETURN (OUTPUT)
C7	CHANNEL 16 SIGNAL (OUTPUT)
C8	CHANNEL 16 RETURN (OUTPUT)
C9	DIGITAL GROUND
C10	DIGITAL GROUND
C11	DIGITAL GROUND
C12	DIGITAL GROUND



Front Panel Connector

FIGURE 1 - 3116 CONNECTOR PINOUT



3116 Strap Locations

FIGURE 2

WARRANTY

KineticSystems Company, LLC warrants its standard hardware products to be free of defects in workmanship and materials for a period of one year from the date of shipment to the original end user. Software products manufactured by KineticSystems are warranted to conform to the Software Product Description (SPD) applicable at the time of purchase for a period of ninety days from the date of shipment to the original end user. Products purchased for resale by KineticSystems carry the original equipment manufacturer's warranty.

KineticSystems will, at its option, either repair or replace products that prove to be defective in materials or workmanship during the warranty period.

Transportation charges for shipping products to KineticSystems shall be prepaid by the purchaser, while charges for returning the repaired warranty product to the purchaser, if located in the United States, shall be paid by KineticSystems. Return shipment will be made by UPS, where available, unless the purchaser requests a premium method of shipment at their expense. The selected carrier shall not be construed to be the agent of KineticSystems, nor will KineticSystems assume any liability in connection with the services provided by the carrier.

The product warranty may vary outside the United States and does not include shipping, customs clearance, or any other charges. Consult your local authorized representative or reseller for more information regarding specific warranty coverage and shipping details.

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Products will not be accepted for credit or exchange without the prior written approval of KineticSystems. If it is necessary to return a product for repair, replacement or exchange, a Return Authorization (RA) Number must first be obtained from the Repair Service Center prior to shipping the product to KineticSystems. The following steps should be taken before returning any product:

1. Contact KineticSystems and discuss the problem with a Technical Service Engineer.
2. Obtain a Return Authorization (RA) Number.
3. Initiate a purchase order for the estimated repair charge if the product is out of warranty.
4. Include a description of the problem and your technical contact person with the product.
5. Ship the product prepaid with the RA Number marked on the outside of the package to:

KineticSystems Company, LLC
Repair Service Center
900 North State Street
Lockport, IL 60441

Telephone: (815) 838-0005
Facsimile: (815) 838-4424
Email: tech-serv@kscorp.com