Model 3665-Z1A

4-channel Frequency Counter

INSTRUCTION MANUAL

April, 1994

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

Model 3665-S001

Four-channel Frequency Counter

February, 1993

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

Model 3665-S001

The Model 3665-S001 is the same as the Model 3665-Z1A but has the 50Khz input filter removed. This allows the 3665 to count input frequencies up to 200 Khz.

SCK:rem
February 24, 1993

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

Model 3665-S005

Four-channel Frequency Counter

March, 1994

Special Option

Model 3665-S005

The Model 3665-S005 is the same as the Model 3665-Z1A except that the two terminating resistors for Channel 1 TTL Input have been removed. This resistor combination was a 220 ohm to +5 volts and a 330 ohm to GROUND.

SCK:rem
March, 1994

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

Model 3665-S006

Four-channel Frequency Counter

May, 1994

Special Option

Model 3665-S006

The Model 3665-S006 is the same as the Model 3665-Z1A except it has been modified with 9 LEMO connectors on the front panel. The negative side of analog inputs are tied to approximately 2.5 Volts to simulate TTL inputs.

SCK:rem
May, 1994

Special Option

Model 3665-S007

Four-channel Frequency Counter

October, 1994

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

Model 3665-S007

The Model 3665-S007 is the same as the Model 3665-Z1A except that the 220Ω/330Ω termination networks on the four TTL frequency inputs have been removed.

SCK:rem
October, 1994

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

Model 3665-S009

Four-channel Frequency Counter

November, 1995

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

Model 3665-S009

The Model 3665-S009 is the same as the Model 3665-Z1A except with pull-up/pull-down resistors removed on all 4 channels.

SCK:rem
November, 1995

CONTENTS

SCK:KJC:rem(WP)

4-channel Frequency Counter

Counts from 0.6 Hz to 50 kHz without changing ranges

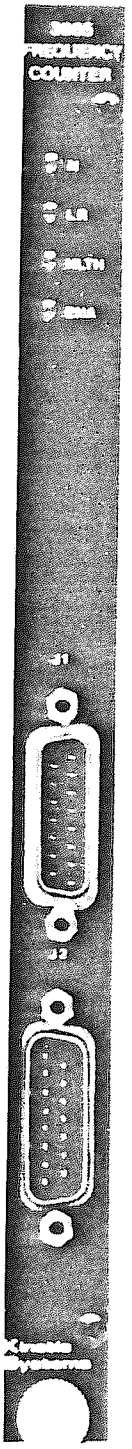
3665

Features

- **Four frequency counter channels**
- **Frequency range from 0.059 Hz to 50,000 Hz**
- **Selectable input ranges: 100 mV to 10 V (p-p) and 1 V to 20 V (p-p)**
- **Differential inputs for high noise immunity**
- **Selectable observation window from one millisecond to 1.024 seconds**
- **Precision time base (±1 ppm, 50° to 120° F)**

Typical Applications

- **Jet aircraft engine testing**
- **Measurement of shaft speeds**
- **Pulse train monitoring**
- **Frequency measurement**



General Description *(Product specifications and descriptions subject to change without notice.)*

The 3665 is a single-width CAMAC module that provides four frequency measurement channels. This counter module can be used to monitor a variety of pulse sources. Moreover, its unique circuitry allows the monitoring of a wide range of frequency (0.059 Hz to 50,000 Hz) without changing any module settings. For example, the RPM of an aircraft engine shaft can be monitored at full speed as well as when it coasts to a stop. Differential input circuits are used to provide high noise immunity.

The input pulse stream for each channel is sampled during a user-selectable observation window. This window period is programmable from one millisecond to 1.024 seconds, and the selection is common to all channels. At the end of each window period, 24 bits of data representing the time base count from the master clock as well as 24 bits representing the number of whole periods observed, are stored in the current value table (CVT) for that channel. If the period of the input pulse stream is longer than the window period, the window remains "open" until one whole period of the input signal is observed. If enabled, a LAM may be generated when any of the time base counters overflow. The CVT "scratchpad" memory can be read at any time from the Dataway, with the data from the latest observation being read. The frequency is calculated by the host computer using the following formula:

Frequency = clock rate x whole input periods / time base counts

The clock rate for the module is programmable to provide a tic rate of 1 MHz or 10 MHz with a clock accuracy of ±1 part per million (±0.0001%) over a temperature range from 50° to 120° Fahrenheit. The availability of the two 24-bit values (whole input period count and time base count) allows the module to monitor a wide range of pulse rates without changing any of the programmable settings. The counting accuracy depends on the time base accuracy as well as the monitoring resolution. The longer the observation window, the higher the accuracy. A 10 mS observation window will result in an accuracy of approximately ±0.01% with a 1 MHz clock and ±0.001% with a 10 MHz clock. A 100 mS window will provide accuracies an order of magnitude better.

The differential input range is selectable on a channel-by-channel basis (100 millivolts to 10 volts, peak-to-peak, or 1 volt to 20 volts, peak-to-peak).

A separate input connector is provided for a "health check" signal, if desired. The input circuitry can be switched under program control from each of the channels to that connector, providing a test of the operating characteristics of that channel.

Function Codes

Command		Q	Action
F(0)·A(0)	RD2	1	Reads Current Value Table and increments Address.
F(1)·A(0)	RD2	1	Reads Configuration register.
F(1)·A(14)	RD2	1	Reads LAM Request register.
F(8)·A(15)	TLM	LR	Tests for presence of LAM Request.
F(9)·A(0)	CL1	SCAN	Stops scanning and resets Current Value Table Address register.
F(10)·A(0)	CLM	1	Clears LAM Status bits.
F(11)·A(0)	CL2	1	Resets Current Value Table Address register.
F(17)·A(0)	WT2	1	Writes Current Value Table Address register.
F(17·A(1)	WT2	$\overline{\text{SCAN}}$	Writes Configuration register.
F(17)·A(13)	WT2	1	Writes LAM Mask register.
F(23)·A(12)	SC2	1	Selectively clears LAM Status bits.
F(24)·A(0)	DIS	1	Disables LAM Request.
F(24)·A(1)	DIS	1	Disables continuous scanning.
F(25)·A(0)	XEQ	$\overline{\text{SCAN}}$	Initiates a single scan operation.
F(26)·A(0)	ENB	1	Enables LAM Request.
F(26)·A(1)	ENB	1	Enables continuous scanning.
F(27)·A(0)	TST	LS	Tests for the presencce of a LAM source.
F(27)·A(1)	TST	$\overline{\text{SCAN}}$	Tests for scanning active.
Z·S2	ZED		Initializes the module, clears Current Value Table and LAM's.

Notes: 1. X = 1 for all valid addressed commands.
2. SCAN = Scanning Active.
3. $\overline{\text{SCAN}}$ = Scanning Inactive.
4. LS = LAM source pending.
5. LR = LAM Request pending

Ordering Information

Model 3665-Z1A Frequency Counter, 4 channels

CAMAC COMMANDS

The following is a list of CAMAC commands that the 3665 responds to. Each command in the list generates a CAMAC X-response of one.

Command	Q	Action
F(0)A(0)	1	Read Current Value Table and Increment Address
F(1)A(0)	1	Read Configuration Register
F(1)A(12)	1	Read LAM Status Register
F(1)A(14)	1	Read LAM Request Register
F(8)A(15)	LR	Test For LAM Request
F(9)A(0)	SCAN	Stop Scanning and Reset Current Value Table Address Register
F(10)A(0)	1	Clear LAM Status Bits
F(11)A(0)	1	Clear Current Value Table Address Register
F(17)A(0)	1	Write Current Value Table Address Register
F(17)A(1)	/SCAN	Write Configuration Register
F(17)A(13)	1	Write LAM Mask Register
F(23)A(12)	1	Selectively Clear LAM Status Bits
F(24)A(0)	1	Disable LAM Request
F(24)A(1)	1	Disable Continuous Scanning
F(25)A(0)	/SCAN	Execute Single Scan
F(25)A(1)	1	Clear Module
F(26)A(0)	1	Enable LAM Request
F(26)A(1)	1	Enable Continuous Scanning
F(27)A(0)	LS	Test For LAM Source
F(27)A(1)	/SCAN	Test For Scanning Active

Notes:

1. X = 1 for all valid commands
2. SCAN = Scanning active
3. /SCAN = Scanning inactive
4. LS = LAM Source pending
5. LR = LAM Request pending

CAMAC Command Descriptions

F(0)A(0) -- Read Current Value Table and Increment Address

The F(0)A(0) command is used to read the data contained in the Current Value Table (CVT). A Q-response of 1 is always generated for this command. After the data at the addressed location has been read, the CVT address register is incremented.

The first entry in the Current Value Table contains the Status Word. Refer to the Current Value Table section (page 6) of this manual for further information on the Status Word. The next eight entries in the CVT contain the Period Count and Tic Count values for each of the four channels. Refer to the Current Value Table section (page 6) of this manual for a detailed description of the CVT. After the Tic Count data for channel 4 has been read, the Current Value Table Address Register is automatically reset to zero, thus pointing to the Status Word.

F(1)A(0) -- Read the Configuration Register

The F(1)A(0) command is used to read the contents of the Configuration Register. A Q-response of 1 is always generated for this command. Refer to the Configuration Register section (page 9) of this manual for further information.

F(1)A(12) -- Read the LAM Status Register

The F(1)A(12) command is used to read the contents of the LAM Status Register. A Q-response of 1 is always generated for this command. Refer to the LAM Structure section (page 11) of this manual for further information.

F(1)A(14) -- Read the LAM Request Register

The F(1)A(0) command is used to read the contents of the LAM Request Register. A Q-response of 1 is always generated for this command. The four bits in this register indicate which channel generated the LAM. Refer to the LAM Structure section (page 11) of this manual for further information.

F(8)A(15) -- Test for LAM Request

The F(8)A(15) command is used to test for the presence of a LAM Request. If a LAM is pending when this command is executed, a Q-response of 1 is generated. A Q-response of 0 is generated if a LAM Request is not pending.

F(9)A(0) -- Stop Scanning and Reset CVT Address Register

The F(9)A(0) command is used to stop the 3665 from scanning and reset the CVT Address Register. A Q-response of 1 is generated for this command only when scanning is enabled. If this command is executed while scanning is disabled, a Q-response of 0 is generated. After this command is executed, the 3665 must be re-enabled for scanning.

F(10)A(0) -- Clear LAM Status Bits

The F(10)A(0) command is used to clear all four of the LAM Status bits. A Q-response of 1 is always generated for this command. If it is necessary to clear the LAM Status bits individually, the Selective Clear LAM Status Bit command may be used. Refer to the LAM Structure section (page 11) of this manual for further information.

F(11)A(0) -- Reset CVT Address Register

The F(11)A(0) command is used to reset the CVT Address Register to zero. A Q-response of one is always generated for this command.

F(17)A(0) -- Write CVT Address Register

The F(17)A(0) command is used to write the CVT Address Register. A Q-response of 1 is always generated for this command. After this command is executed, the CVT Address Register points to the requested entry in the CVT. Legal write data values for this command are 0 through 8.

F(17)A(1) -- Write Configuration Register

The F(17)A(1) command is used to write data into the Configuration Register. This register may only be written while scanning is disabled. If this command is executed while scanning is enabled, the command is ignored and a Q-response of 0 is returned. A Q-response of 1 is generated if the command is executed when scanning is disabled. This register is reset to zero on power-up and after a CAMAC Initialize (Z) cycle. Refer to the Configuration Register section (page 9) of this manual for further information.

F(17)A(13) -- Write LAM Mask Register

The F(17)A(13) command is used for writing to the LAM Mask Register. A Q-response of 1 is always generated for this command. This register is used to enable or disable a particular LAM Source from generating a LAM Request. This register is reset to zero on power-up and after a CAMAC Initialize (Z) cycle.

F(23)A(12) -- Selectively Clear LAM Status Bits

The F(23)A(12) command is used to selectively clear the LAM Status bits. A Q-response of 1 is always generated for this command. The data associated with this command corresponds to the LAM Status bits to be cleared. To clear LAM Status bit one, data of one is used with this command. To clear both LAM Status bits one and two, data of 3 is used with the command. Refer to the LAM Structure section (page 11) of this manual for further information.

F(24)A(0) -- Disable LAM Request

The F(24)A(0) command is used to disable all LAM Requests. A Q-response of one is always generated for this command. The LAM Requests are always disabled on power-up and a CAMAC Initialize (Z) cycle.

F(24)A(1) -- Disable Scanning

The F(24)A(1) command is used to disable the 3665 from scanning the input channels. A Q-response of one is always generated for this command. Scanning is disabled on power-up and a CAMAC Initialize (Z) cycle.

F(25)A(0) -- Execute Single Scan

The F(25)A(0) command is used to initiate a single scan of the input channels. This command returns a Q-response of one as long as the 3665 is not scanning. If this command is executed while the 3665 is in the process of scanning, a Q-response of zero is generated.

F(25)A(1) -- Clear Module

The F(25)A(1) command is used to initialize the internal circuitry of the 3665. The current value table is cleared, LAM requests cleared, and scanning is stopped. The module will appear as if a CAMAC Initialize (Z) cycle occurred.

F(26)A(0) -- Enable LAM Request

The F(26)A(0) command is used to enable the generation of a LAM Request upon the occurrence of a LAM Source. A Q-response of one is always generated for this command. A LAM Request is generated if a LAM Source is pending AND the corresponding LAM Mask bit is set to a one AND the LAM Request is enabled. The LAM Request is disabled on power-up and a CAMAC Initialize (Z) cycle.

F(26)A(1) -- Enable Scanning

The F(26)A(1) command is used to enable the 3665 for scanning. A Q-response of one is always generated for this command. Once scanning is enabled, the 3665 starts converting the input channel data into frequency measurements.

F(27)A(0) -- Test for LAM Source

The F(27)A(0) command is used to test for the presence of a LAM Source. If a LAM Source is pending when this command is executed, a Q-response of one is returned. A Q-response of zero is generated when this command is executed and a LAM Source is not pending.

F(27)A(1) -- Test for Scanning Active

The F(27)A(0) command is used to test for scanning activity within the 3665. If this command is executed and the 3665 is currently scanning, a Q-response of zero is returned. If the 3665 is not scanning and this command is executed, a Q-response of one is generated.

CURRENT VALUE TABLE

The Current Value Table (CVT) is composed of the Current Value Table Status Word (CVTSW) and eight information words, two for each channel. The two entries for each channel include the Period Count and the Tic Count. These two entries are used for the calculation of the input frequency. The following diagram shows the locations of the status word and the four channels' Period Count and Tic Count.

ADDRESS	CURRENT VALUE TABLE DATA
0	STATUS WORD
1	CHANNEL 1 PERIOD COUNT
2	CHANNEL 1 TIC COUNT
3	CHANNEL 2 PERIOD COUNT
4	CHANNEL 2 TIC COUNT
5	CHANNEL 3 PERIOD COUNT
6	CHANNEL 3 TIC COUNT
7	CHANNEL 4 PERIOD COUNT
8	CHANNEL 4 TIC COUNT

The Current Value Table (CVT) is read by executing an F(0)A(0) command addressed to the 3665. The data word returned for this command is dependent on the Current Value Table Address Register (CVTAR). This register points to the CVT entry that is to be accessed. After the F(0)A(0) command is executed, the CVT Address Register is automatically incremented, which then points to the next sequential location in the CVT. After all elements in the CVT have been read (i.e., the address register is 8), the CVT Address Register is automatically reset to zero.

The CVT Address Register can be written by executing an F(17)A(0) command to the 3665 with the data set equal to the desired CVT address to be read. Legal write data values are from 0 to 8. An F(11)A(0) command may be executed which resets the CVT Address Register to zero.

Circuitry on the 3665 prevents a channel's entry in the CVT from being updated while the data is in the process of being read. For example, if channel 3 Period Count word has been read from the CVT, but the Tic Count word has not been read, the CVT is not updated until channel 3 Tic Count word has been read. This is done to prevent erroneous data readouts from the CVT.

The first entry in the CVT is the Current Value Table Status Word (CVTSW). This word contains two bits which define the current operating parameters of the 3665. There are also two bits for each channel which reflect the channels status.

Bit 16 of this word indicates the current operating mode of the 3665. If this bit is read as a one, it indicates that all channels of the 3665 are scanning the Health signal input. If this bit is a zero, each channel of the 3665 is scanning the individual channel inputs.

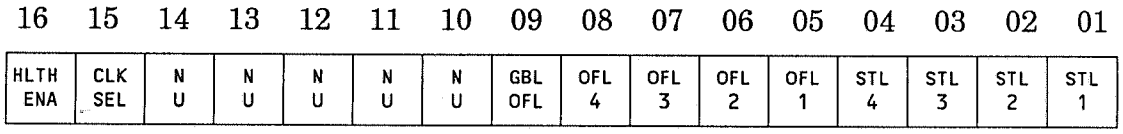
Bit 15 of the CVTSW reflects the Tic rate of the 3665. If the bit is read as a one, the Tic rate is 1 Megahertz (1 microsecond cycle). A zero for this bit indicates that the 10 Megahertz (100 nanosecond cycle) Tic rate is in use. The 10 Megahertz rate can measure signals greater than .59 Hz, while the 1 Megahertz rate can measure signals greater than .059 Hz.

Bit 9 of the CVTSW is set whenever either of bits 8 through 5 are set in the CVTSW. This bit may be tested by software to determine if any overflow condition has occurred.

Bits 8 through 5 are set whenever an individual channel overflow condition occurs. An overflow condition occurs when the Tic Counter exceeds a count of 16,777,215 (FFFFFF Hex).

(.59 Hz for 10 MHz Clock Rate) This overflow condition indicates that the Tic rate should be reduced.

Bits 4 through 1 are set to a one when a particular channels' data is stale. Stale data refers to CVT data that has been read by CAMAC once and has not been updated in the CVT since the last CAMAC read operation. After channel data has been updated in the CVT, the corresponding Stale data bit is reset to 0. The following diagram shows the bit layout of the Current Value Table Status Word (CVTSW).



Bit	Mnemonic	Function
16	HLTH ENA	**HEALTH ENABLE.** This bit is read as a one when the Health signal input is being scanned by all channels. If this bit is read as a zero, the 3665 is scanning the individual channel inputs.
15	CLK SEL	**CLOCK SELECT.** This bit is read as a 1 when the selected Tic rate is 1 Megahertz. A zero is returned for this bit if the Tic rate is 10 Megahertz.
14:10	NU	**NOT USED.** These bits are not used and read as zeros.
09	GBL OFL	**GLOBAL OVERFLOW.** This bit is returned set to a one whenever either of bits 8 through 5 are set in the CVTSW.
08:05	OFL4:OFL1	**OVERFLOW 4 THROUGH 1.** These bits are set to a one whenever an individual channel overflow condition occurs.
04:01	STL4:STL1	**STALE DATA 4 THROUGH 1.** These bits are set to a one when an individual channels' data has been read and are then reset to zero when a subsequent CVT update occurs for that channel.

Current Value Table Address Register

The Current Value Table Address Register (CVTAR) is used to point to the desired Current Value Table (CVT) entry that is to be accessed by a subsequent read operation. The CVTAR is written by using the F(17)A(0) command addressed to the 3665. Data associated with this command may range in value from 0 to 8, since there are only nine entries in the CVT. The CVTAR is a write-only register.

The CVTAR is automatically incremented at the end of every CVT read operation {F(0)A(0)}. After a read operation to the CVT at address 8, the CVTAR is automatically reset to zero. An F(11)A(0) command executed to the 3665 resets the CVTAR to zero. The following diagram shows the bit layout for the Current Value Table Address Register.

16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	ADR 4	ADR 3	ADR 2	ADR 1

Bit	Mnemonic	Function
16:05	NU	**NOT USED.** These bits are not used and should be written as zeros.
04:01	ADR04:ADR01	**ADDRESS 4 THROUGH 1.** These write-only bits are used to specify the CVT address that is to be accessed on subsequent CVT read operations. The data written to this register must be less or equal to 8. Values greater than 8 may cause erratic readout of the CVT.

CONFIGURATION REGISTER

The Configuration Register is used to define the operation parameters of the 3665. Selections in this register include the sampling clock tic rate, a health check enable, and the sampling window interval. This register is written by executing an F(17)A(1) command addressed to the 3665 and may only be written when the 3665 is not enabled for scanning. The Configuration Register may be read by executing an F(1)A(0) command. The following diagram shows the bit layout of the Configuration Register followed by a description of the bits.

16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01
HLTH ENA	CLK SEL	NU	NU	NU	NU	WSEL 10	WSEL 09	WSEL 08	WSEL 07	WSEL 06	WSEL 05	WSEL 04	WSEL 03	WSEL 02	WSEL 01

Bit	Mnemonic	Function
16	HLTH ENA	**HEALTH ENABLE.** This bit is used to enable and disable the input health signal. Setting this bit to a one routes the Health input to each of the four channels. When this bit is set to a zero, the four individual inputs are routed to the corresponding channels. This bit is cleared on power-up.
15	CLK SEL	**CLOCK SELECT.** This bit is used to select the Tic clock rate used to make the frequency measurement. Setting this bit to a one selects Tic

		clock rate of 1 Megahertz (1 microsecond cycle). A Tic clock rate of 10 Megahertz is obtained when this bit is set to zero. This bit is cleared on power-up.
14:11	NU	**NOT USED.** These bits are not used and read as zeros.
10:00	WSEL10-WSEL00	**WINDOW SELECT 10 THROUGH 00.** These bits are used to select sampling window size. This selection ranges from 1 millisecond to 1.024 seconds. The incremental step size for these selections is one millisecond. Valid Data Values for these bits are 0 to 1023. NOTE: A value of 0 indicates a 1.024 second window. A value of 1 indicates a 1 mS window.

FRONT PANEL

The 3665 front panel contains two 15 position "D-type" connectors and four LEDs. The two connectors are used for connecting the analog inputs to the module along with connections to the TTL outputs from the module. The LEDs provide a visual representation of various module functions.

Front Panel LEDs

N -- The "N" LED flashes any time the 3665 module is addressed. The LED is one-shot extended to 500 milliseconds.

LR -- The "LR" LED is illuminated any time the 3665 has a LAM Request pending.

ENA -- The "ENA" LED is illuminated as long as the 3665 is enabled for scanning.

HLTH -- The "HLTH" LED is illuminated when the Health input signal is enabled.

Front Panel Connectors

The two front panel mounted connectors provide the mechanism for connecting the 3665 to the input channels. The 15 position connector J1 contains the input signals for the four channels. Each channel input has a +, -, and shield connection. The second connector, J2, contains TTL input and output signals, as well as the +, -, and shield connections for the Health signal.

The J2 connector contains 6 TTL input signals. The External Start signal is used to enable the 3665 for scanning. The External Start signal must be a low going TTL pulse with a minimum pulse width of 200 nanoseconds. This signal provides the same functionality as the F(26)A(1) CAMAC command. The second TTL input, External Window Clock, is used to define

the window sampling period for frequency measurements. A strap selection on the 3665 must be made in order to use the External Window Clock signal.

The J2 connector also contains 5 TTL level output signals. Four of the signals are the conditioned input channels. These signals are labeled Conditioned In 1 through 4. The last output is the window clock output, labeled WINDOW CLOCK OUT.

The following chart shows the pinouts for the J1 and J2 connectors.

CONNECTOR J1 (15 position Female)			
Pin 1	Channel 1 +	Pin 9	Channel 3 +
Pin 2	Channel 1 -	Pin 10	Channel 3 -
Pin 3	Channel 1 Shield	Pin 11	Channel 3 Shield
Pin 4	Ground	Pin 12	Ground
Pin 5	Channel 2 -	Pin 13	Channel 4 +
Pin 6	Channel 2 +	Pin 14	Channel 4 -
Pin 7	Channel 2 Shield	Pin 15	Channel 4 Shield
Pin 8	Ground		

CONNECTOR J2 (15 position Male)			
Pin 1	Health Input +	Pin 9	Conditioned IN 3
Pin 2	Health Input -	Pin 10	CH4 TTL IN
Pin 3	Health Input Shield	Pin 11	Conditioned IN 4
Pin 4	CH1 TTL IN	Pin 12	START
Pin 5	Conditioned IN	Pin 13	GROUND
Pin 6	CH2 TTL IN	Pin 14	Window Clock Out
Pin 7	Conditioned IN	Pin 15	External Window CLK
Pin 8	CH3 TTL IN		

ANALOG INPUTS

The differential analog inputs to the 3665 must be bipolar. The 3665 measures the frequency of the Analog Inputs from one zero crossing point to the next zero crossing. When a 3665 input channel is configured for the 1 volt to 10 volt range, a ±300 millivolt hysteresis is built in for preventing false zero crossing. For the 100 millivolt to 1 volt range, the hysteresis is ±30 millivolts. If the input signal to measure does not cross zero (unipolar signal), the + or - signal may be tied to an external reference. For example, if the 3665 is required to measure a 0 to +10 volt input, the - input signal could be connected to a +5 volt signal which causes the 3665 to recognize a zero crossing.

LAM STRUCTURE

The 3665 can generate a LAM from one of four sources. Each channel may generate a LAM when the Tic Counter overflows. The Tic Counter for a given channel overflows when the Tic Count for a sampling window period exceeds 16,777,215 (FFFFFF hex). This overflow condition indicates that the Tic Clock rate should be reduced.

The following is a list of CAMAC commands used to monitor and control LAMs.

F(0)A(0) At CVT Address Zero___Read CVT Status Register
F(1)A(12)_____Read LAM Status Register
F(1)A(14)_____Read LAM Request Register
F(8)A(15)_____Test For LAM Request
F(10)A(0)_____Clear LAM Status Bits
F(17)A(13)_____Write LAM Mask Register
F(23)A(12)_____Selectively Clears LAM Status Bits
F(24)A(0)_____Disable LAM Request
F(26)A(0)_____Enable LAM Request
F(27)A(0)_____Test For LAM Status

LAM Status Register

The LAM Status Register is a 16-bit read-only register which provides access to the four channel overflow LAM Status bits. The LAM Status bits may also be read in the Current Value Table Status Word location. Refer to the Current Value Table section (page 6) of this manual for additional information. A bit read back as a one indicates that the corresponding channel has overflowed. These bits are cleared on power-up, a CAMAC Initialize (Z) cycle, a Clear LAM Status command, and a Selective Clear LAM Status command. The following diagram shows the bit layout for the LAM Status Register.

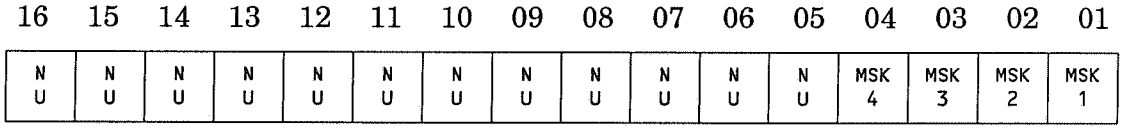
16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01
NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	OFL 4	OFL 3	OFL 2	OFL 1

Bit	Mnemonic	Function
16:05	NU	**NOT USED.** These bits are not used and read as zeros.
04:01	OFL4-OFL1	**OVERFLOW 4 THROUGH 1.** These bits represent the overflow bits for the individual channels.

LAM Mask Register

The LAM Mask Register is used to specify which of the four LAM sources are to generate a LAM Request. If a LAM Source is to assert a CAMAC LAM, it must first be masked on the LAM Mask Register. A LAM Source is masked on by writing the corresponding LAM Mask bit

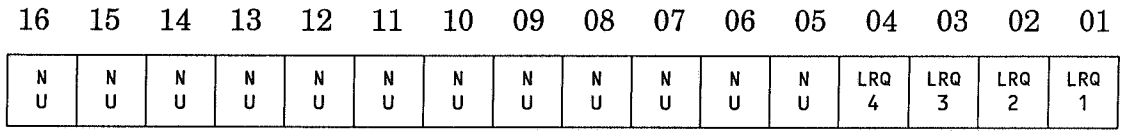
to a one. The LAM Mask Register is written with a F(17)A(13) command. Each bit position in the LAM Mask Register corresponds to the same LAM Status bit in the LAM Status Register. The LAM Mask Register is reset to zero on power-up and a CAMAC Initialize (Z) cycle. The following diagram shows the bit layout for the LAM Mask Register.



Bit	Mnemonic	Function
16:05	NU	**NOT USED.** These bits are not used and should be written as zeros.
04:01	MSK4:MSK1	**MASK 04 THROUGH MASK 01.** These write-only bits are used to enable/disable the generation of a LAM Request by the corresponding LAM Status bits.

LAM Request Register

The LAM Request Register is used to determine the source of a CAMAC LAM generated by the 3665. A CAMAC LAM is asserted when LAM Requests are enabled AND a LAM Status bit is true AND its corresponding LAM Mask bit is enabled (set to a one). The LAM Request Register is a read-only register which is accessed by executing an F(1)A(14) command addressed to the 3665. The LAM Request Register is cleared on power-up, a CAMAC Initialize (Z) cycle, an F(10)A(0) command, and a selective clear operation to the individual LAM Status bits. The following diagram shows the bit layout for the LAM Request Register.



Bit	Mnemonic	Function
16:05	NU	**NOT USED.** These bits are not used and read as zeros.
04:01	LRQ4:LRQ3	**LAM REQUEST 4 THROUGH 1.** These read-only bits indicate which channel overflow is generating a CAMAC LAM Request. If LRQ3 is read as a one, it indicates that channel 3 has overflowed AND its corresponding LAM Mask Register bit is set to a one.

Miscellaneous LAM Commands

The 3665 provides six additional commands used to control and monitor LAMs. Two of the commands are used to test for LAM Sources/Requests, two are used to enable/disable LAM Requests, and the remaining two are used to clear the LAM Sources.

Enable/Disable LAM Requests

LAM Requests are enabled by executing an F(26)A(0) command to the 3665. After execution of this command, the 3665 is capable of generating a CAMAC LAM. A LAM is generated if a LAM Source is asserted AND its corresponding LAM Mask bit is set to a one AND LAM Requests are enabled. Once LAM Requests are enabled, they may be disabled by executing an F(24)A(0) command to the 3665.

LAM Test Commands

Two commands are available for testing the states of the LAM Request and the LAM Status signals. The F(8)A(15) command is used to test the state of the LAM Request signal. A Q-response of one is generated for this command if a LAM Request is pending. If a LAM Request is not pending when this command is executed, a Q-response of zero is returned.

The F(27)A(0) command is used for testing for the assertion of the LAM Status signal. The LAM Status signal is the logical OR of all the LAM Status bits. The LAM Status signal is asserted when any of the four channel overflow conditions exist. If the F(27)A(0) command is executed and the LAM Status signal is asserted, a Q_response of one is generated. A Q-response of zero is generated for this command if the LAM Status signal is not asserted.

Clear LAM Source Commands

Two commands are provided for clearing the LAM Status bits. These clear operations do not affect the LAM Mask Register bits or the LAM Request enable. The F(10)A(0) command is used to clear all four of the LAM Status bits. The F(23)A(12) command is used to selectively clear the LAM Status bits. For this command, the CAMAC write data is set equal to the LAM Status bits that are to be cleared. For example, to clear LAM Status bit 3, the CAMAC write data would be set to 4. To clear both LAM Status bits 1 and 2, the CAMAC write data would be set to 3.

3665 STRAP LOCATION

Window Strap

When in the "INT" position, the 3665 uses an Internal Window Interval.

When in the "EXT" position, the 3665 uses an External Source, which is input through the EXT-WND Pin on the Front Panel Connector.

Polarity

When in the "H" position, the true state of the Input Signal is used for calculating frequency.

When in the "L" position, the inverse of the Input Signal is used for calculating frequency.

Gain

When in the "A to B" position, a gain of one is selected which gives the 3665 a 1 volt to 10 volt Peak-to-Peak range.

When in the "B to C" position, a gain of 10 is selected which gives the 3665 a 100 millivolt to 1 volt Peak-to-Peak range.

Term

When in the "A to B" position, the Input Signal is terminated with a 100 ohm resistor across the positive and negative signal input line.

When in the "B to C" position, the Input Signal is unterminated.

Input Levels

When in the "A" position, the analog zero crossing inputs are measured. To select the TTL inputs, place the strap in the "T" position.

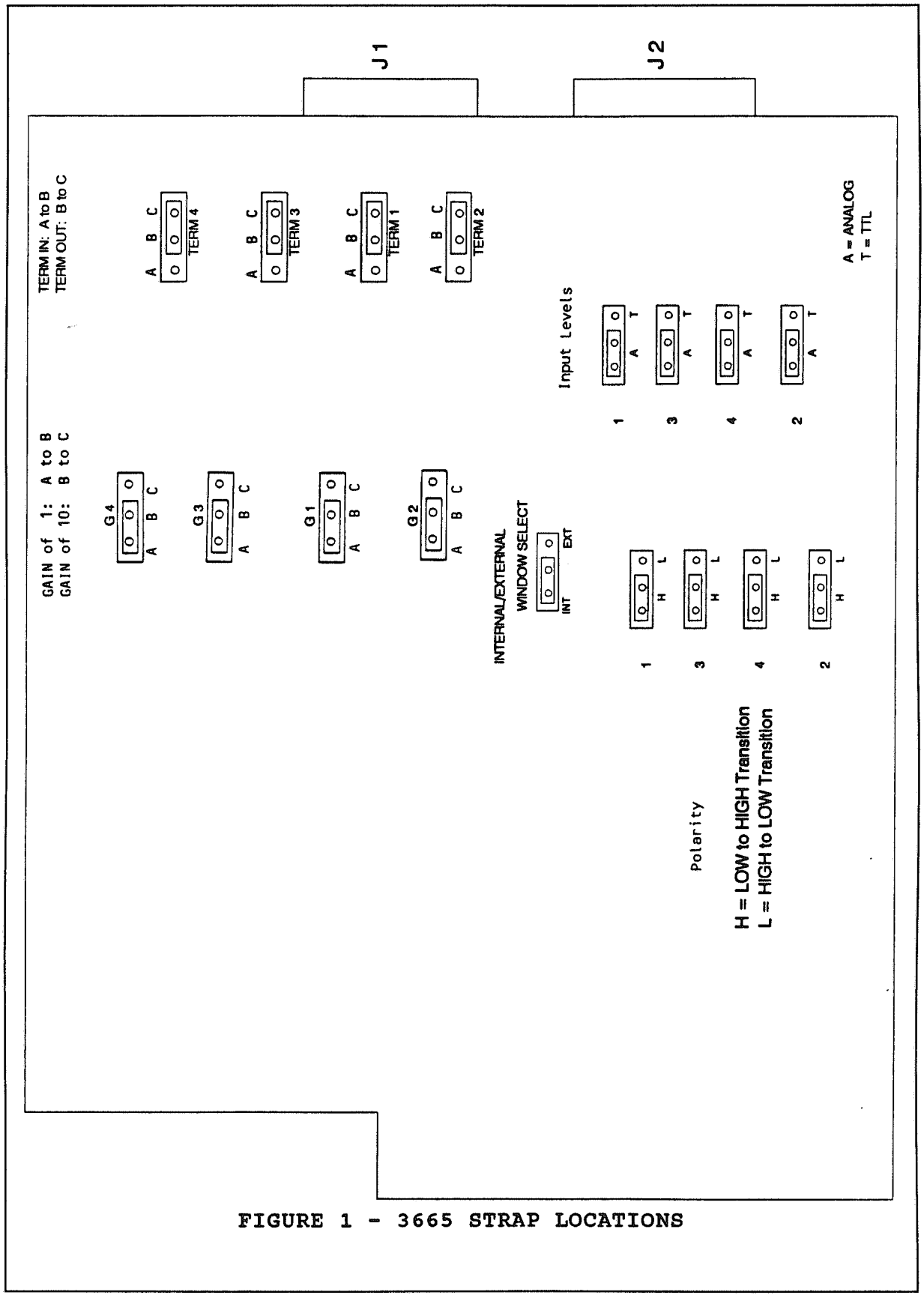


FIGURE 1 - 3665 STRAP LOCATIONS

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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