United Electronic Industries

The High-Performance Alternative

UEI-815-A-32
(supports all UEI-800/815 series boards)

Jumper Setting

Release: June 1, 2000

Revision: 0

Configuring the UEI-815-32-A

   Before you attach analog and digital panels to the UEI-815-32-A, you must decide on the appropriate configuration of the board in your application. The following items are configurable on the UEI-815-32-A:

- I/O address selection of the UEI-815-32-A in IBM's I/O address map.
- Interrupt request line selection.
- Analog input channel expansion
- Analog input multiplexer selection (Single-ended, pseudo-differential, or differential inputs).
- Analog input range selection ($\pm 5V$, $\pm 10V$, $0-10V$).
- Analog-to-digital (A/D) data output coding selection (twos complement or binary)
- Scan cycle selection (32 single-ended/16 differential channels, 16 single-ended/8 differential channels, or 8 single-ended channels).
- Increased DMA sample throughput selection (during collect and scan modes)
- Analog output range selection (unipolar or bipolar).
- Digital-to-analog (D/A) data output coding selection (twos complement or straight binary).
- Analog output sensing selection (local or remote).

   The UEI-815-32-A boards are shipped from UEI in a preconfigured state. Table 2-1 lists the default configuration of the UEI-815-32-A.

Table 2-1 Default Configuration of UEI-815-32-A

Selection	UEI Default Configuration	AD default Configuration
I/O Address Map Selection	300H	300H
Interrupt Request Level	IRQ2	IRQ2
Input Multiplexer Configuration	32 channels, single-ended	16 channels, single-ended
Analog Input Range	Bipolar, $\pm 10V$	Bipolar, $\pm 10V$
A/D data Coding	Twos complement	Twos complement
Scan Cycle	32 single-ended	16 single-ended/8 differential
DMA Transfer Speed	Normal sample throughput rate (ADC OVERRUN ERROR reported)	Normal sample throughput rate (ADC OVERRUN ERROR reported)
Analog Output Range	Bipolar, $\pm 10V$	Bipolar, $\pm 10V$
D/A Data Coding	Twos Complement	Twos Complement
Analog Output Sensing	Local	Local

   If the UEI default-configured selections are appropriate, no additional configuration is required and you can attach analog and digital I/O panels to the UEI-815-15-A and install UEI-815-32-A into your computer.
   If any of the UEI default configurations are not appropriate, you must use DIP switch S1 and/or jumpers on the board to change the configuration. Refer to figure 1-1 for the location of the DIP switch and the jumpers.
   Note that jumpers on the UEI-815-32-A board contain varying numbers of posts with labels such as AB, ABC, ABCD, and so on. You can insert the jumper clip on two consecutive posts of a jumper, such as post A to post B (AB position) or you can place the jumper clip on one post only without letting it make contact with any other post (OPEN position)
   The following section describe how to reconfigure the UEI-815-32-A board using DIP switch S1 and the jumpers on the board
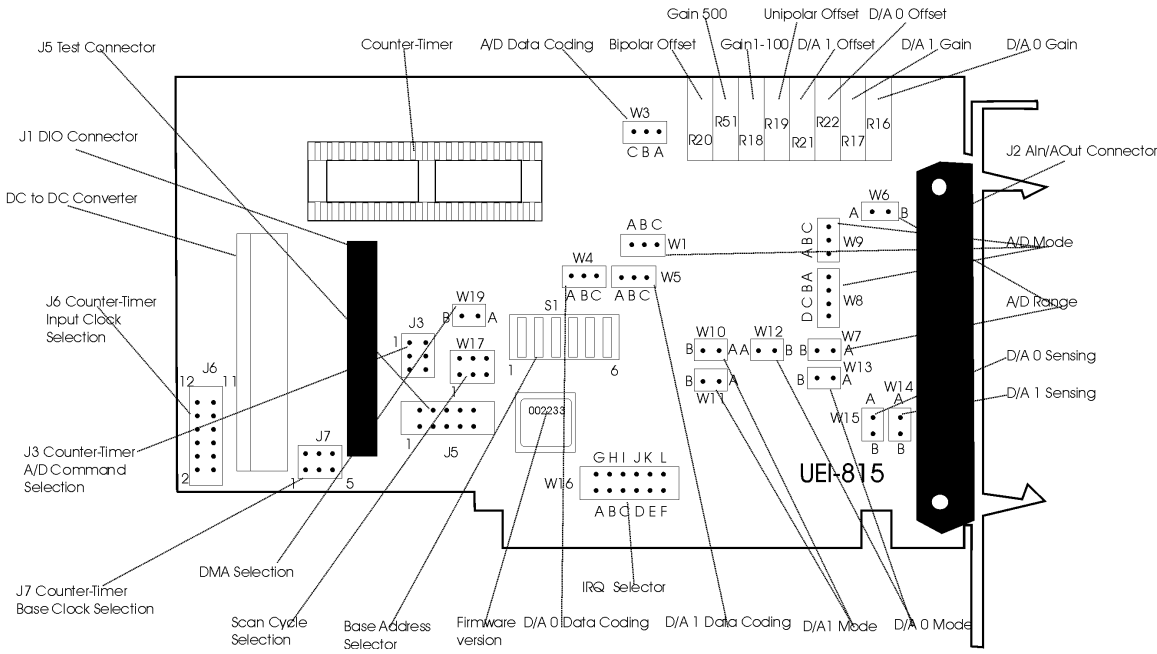
Figure 1-1. Uei-815-32-A Jumper setting

## Base Address Selection
(Compatible wit RTI-800/815)

NOTE
If your computer contains any boards not
Supplied by UEI, verify the I/O
address location of the boards before
configuring the I/O address of the UEI-815-32-A
to ensure that a bus conflict does not exist.

I/O address configuration is required to select a location for the UEI-815-32-A 16-byte I/O address map in the I/O space of the IBM PC, PC/XT, or PC AT. The individual I/O address (200H to 3F0H) is divided into 16-byte segments of absolute address.

The UEI default setting for the UEI-815-32-A is **300H**. If address location 100H is not used, you do not need to reconfigure the I/O address. If, however, this address location is in use, you must reconfigure the I/O address (a second I/O address choice might be location 340H). Any areas already in use cannot be used as the I/O address location of the UEI-815-32-A.

You select an I/O address by configuring DIP switch block S1, shown in figure 2-1.
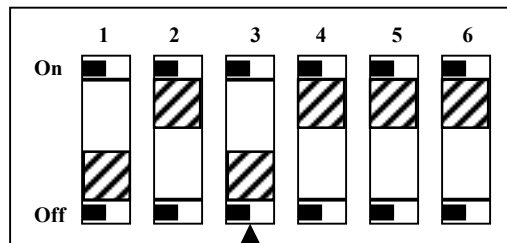
This switch is not used

3-3

Figure 2-1. DIP Switch Bock S1

DIP switch block S1 contains six switches, labels 1 through 6. Note that switch 3 is not used. Table 2-3 lists the appropriate DIP switch positions for each I/O address location for the UEI-815-32-A between 200H to 3FCH.

Table 2-3. I/O Map Address Locations per DIP Switch Placement

DIP Switch Position						Base Address (in Hex)
1	2	3	4	5	6	
ON	ON	Not Used	ON	ON	ON	200H
ON	ON	Not Used	ON	ON	OFF	210H
ON	ON	Not Used	ON	OFF	ON	220H
ON	ON	Not Used	ON	OFF	OFF	230H
ON	ON	Not Used	OFF	ON	ON	240H
ON	ON	Not Used	OFF	ON	OFF	250H
ON	ON	Not Used	OFF	OFF	ON	260H
ON	ON	Not Used	OFF	OFF	OFF	270H
ON	OFF	Not Used	ON	ON	ON	280H
ON	OFF	Not Used	ON	ON	OFF	290H
ON	OFF	Not Used	ON	OFF	ON	2A0H
ON	OFF	Not Used	ON	OFF	OFF	2B0H
ON	OFF	Not Used	OFF	ON	ON	2C0H
ON	OFF	Not Used	OFF	ON	OFF	2D0H
ON	OFF	Not Used	OFF	OFF	ON	2E0H
ON	OFF	Not Used	OFF	OFF	OFF	2F0H
OFF	ON	Not Used	ON	ON	ON	300H
OFF	ON	Not Used	ON	ON	OFF	310H
OFF	ON	Not Used	ON	OFF	ON	320H
OFF	ON	Not Used	ON	OFF	OFF	330H
OFF	ON	Not Used	OFF	ON	ON	340H
OFF	ON	Not Used	OFF	ON	OFF	350H
OFF	ON	Not Used	OFF	OFF	ON	360H
OFF	ON	Not Used	OFF	OFF	OFF	370H
OFF	OFF	Not Used	ON	ON	ON	380H
OFF	OFF	Not Used	ON	ON	OFF	390H
OFF	OFF	Not Used	ON	OFF	ON	3A0H
OFF	OFF	Not Used	ON	OFF	OFF	3B0H
OFF	OFF	Not Used	OFF	ON	ON	3C0H
OFF	OFF	Not Used	OFF	ON	OFF	3D0H
OFF	OFF	Not Used	OFF	OFF	ON	3E0H
OFF	OFF	Not Used	OFF	OFF	OFF	3F0H

- UEI Default Configuration

IRQ Selector
Interrupt Request Line Selection
(Incompatible with RTI-800/815)

The interrupt request line selection is required only when you want the UEI-815-32-A to break into (or interrupt) the computer's microprocessor to speed up the data acquisition processing time of the microprocessor.

During a single analog input operation, the application program uses the microprocessor to read data. You can program the microprocessor to check, UEI-815-32-A is ready for data transfer (signaled by DONE FLAG bit of the STATUS/CONTROL byte). If the UEI-815-32-A is not ready, the microprocessor leaves the UEI-815-32-A and continues with its other functions.

You can use the interrupt request line selection to flag the following operating conditions of the UEI-815-32-A:

- An A/D conversion is complete.
- The terminal count is reached as a result of a DMA transfer of converted data.
- An A/D conversion overrun condition occurs.

These interrupt conditions are enabled in software by writing to the STATUS/CONTROL byte (BASE+0). The UEI default configuration of the interrupt request line selection for the UEI-815-32-A is **IRQ2**. This interrupt accesses system interrupt 2 in the IBM PC and PC/XT and system interrupt 9 in the IBM PC AT (software redirected to interrupt 2). If interrupt line IRQ2 is free (that is, no peripheral IBM computer options are using this line), you do not need to select another interrupt request line. If interrupt line IRQ2 is in use, you must select another interrupt request line.

To a select an interrupt request line, configure jumper W16 shown in Figure 1-2. You can configure only one interrupt request line at a time.

Figure 1-3. Jumpers for selecting A/D Mode
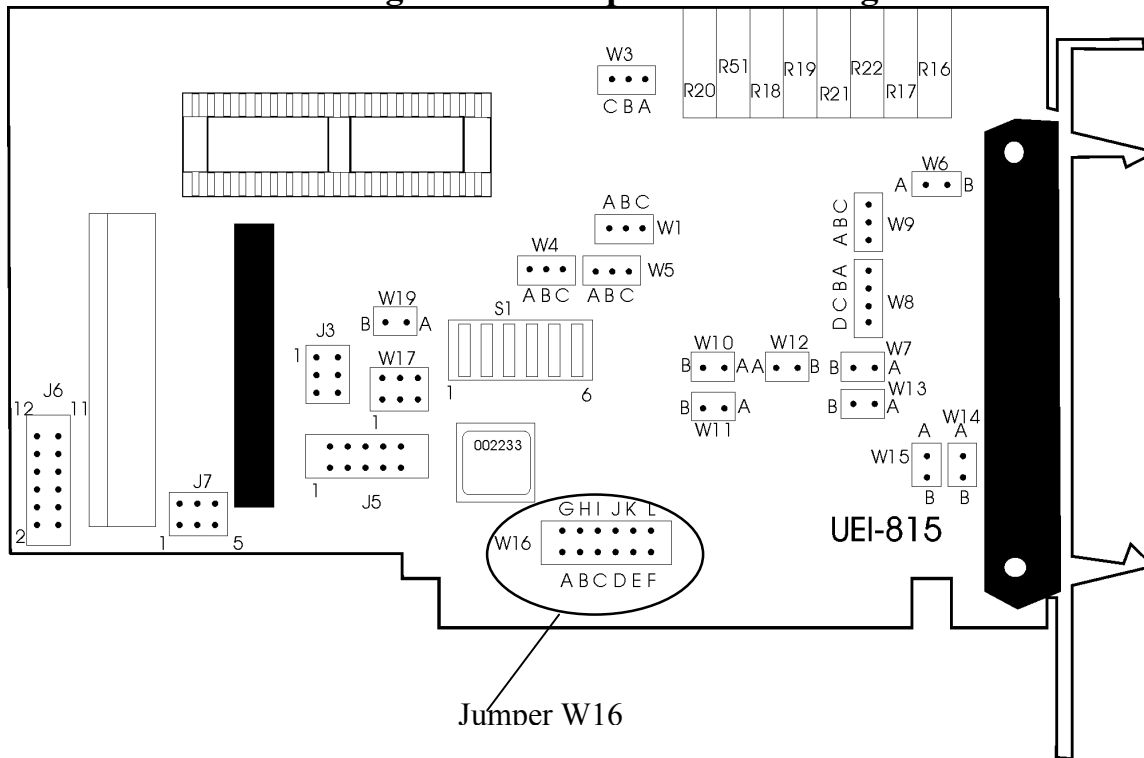

Jumper W16

Figure 1-2. Jumpers for selecting the Interrupt Request Line

Table 2-6 lists all of the potentially free and reserved interrupt requests lines. Review the table and select an interrupt request line that is free in your computer.

Table 2-6. Interrupt Request Line Selection

Interrupt Request Line	Description	UEI-815-32-A Jumper Configuration	RTI-815 Jumper Configuration
IRQ2	Currently not in use	W16 AG	W16 FL
IRQ3	Asynchronous communications (secondary), SDLC communications, BSC (secondary)	W16 BH	W16 AG
IRQ4	Asynchronous communications (primary), SDLC communications, BSC (primary)	W16 CI	W16 BH
IRQ5	Fixed disk drive adapter board (parallel port 2 in IBM AT).	W16 DJ	W16 CI
IRQ6	Floppy Disk drive board(parallel port 1 in IBM AT).	W16 EK	W16 DJ
IRQ7	Printer	W16 FL	W16 EK

Note

▆▆▆▆ - UEI default configuration. This is IRQ9 in the IBM PC AT;IRQ2 in the IBM PC, PC/XT.

Analog Input Channel Expansion

UEI-815-32-A doesn't support this option, because already has 32 Analog Input channels (already upgraded).

A/D Mode.
Analog Input Multiplexer Configuration Selection.
(Incompatible with RTI-800/815)

You can configure the analog input multiplexers on the UEI-815-32-A as single-ended, pseudo-differential, or differential inputs. The configuration that you should select depends on your application. Keep the following considerations in mind when choosing your configurations:

- Single-Ended – The single ended configuration is best suited for use with relatively high-level signals (greater then 1V full-scale) and in situations where the input signals originate close to the UEI-815-32-A. The single-ended input configuration uses single-pole switching to select the desired input signal and maximizes the available number of input channels. This configuration provides no rejection of common-mode noise and measures all inputs with respect to the local analog common ground.
- Pseudo-differential – The pseudo-differential configuration is useful in applications where it is necessary to reduce the effects of interchassis offsets or other errors common to all input signals. Unlike the single-ended configuration, the pseudo-differential input configuration measures the input signals with respect to a common point at their source. It is still necessary that all signals have a common terminal, but the effects of voltage differences between the local common and the signal common are eliminated, and noise pickup in signal cables is reduced to some extent. The signal sources can be farther from the input multiplexer than is desirable with the single-ended configuration and the full complement of input channels is still available. Bias current errors still exist if high source resistances are used
- Differential – The differential configuration is useful in any application involving low-level input signals, high source resistance, or significant amounts of common-mode noise, which might result from long signal cables. Use of the differential mode is most effective in reducing the effects of

noise and bias current, but sacrifices channel capacity. If you use differential configuration, the number of available input channels is reduced from maximum 32(16) to a maximum 16(8)
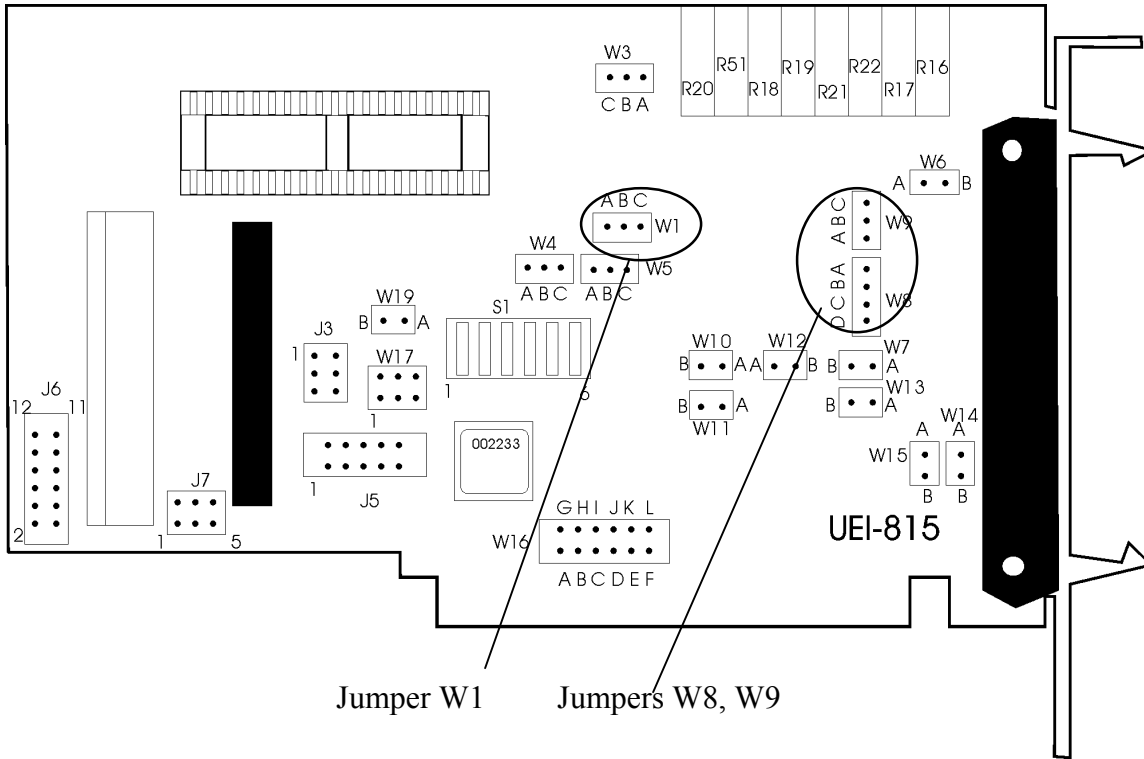To configure the A/D mode use jumpers W1, W8, W9, shown in figure 1-3.

Figure 1-3. Jumpers for selecting A/D Mode

Table 2-7 lists the jumper configurations for selecting the configuration of the A/D.

Table 2-7. A/D Mode Configuration

A/D Mode	Number of input channels	UEI-815-32-A Jumper Configuration	RTI-800/815 Jumper Configuration
Single-Ended	32	W9 AB W8 AB W1 AB	W9AB W8 AB W8 CD W1 AB
Pseudo-differential	32	W9 AB W8 CD W1 AB	W9 AB W8 CD W1 AB
Differential	16	W9 BC W8 BC W1 BC	W8 BC W8 BC W1 BC

Note

- UEI default configuration.

Analog Input Range Selection.
(Incompatible with RTI-800/815)

You can configure the input range of the analog input channels as either Unipolar (0 to +10V) or bipolar ($\pm$5 or $\pm$ 10V). You select the input ranges by configuring jumpers W6 and W7, shown in Figure 1-4.
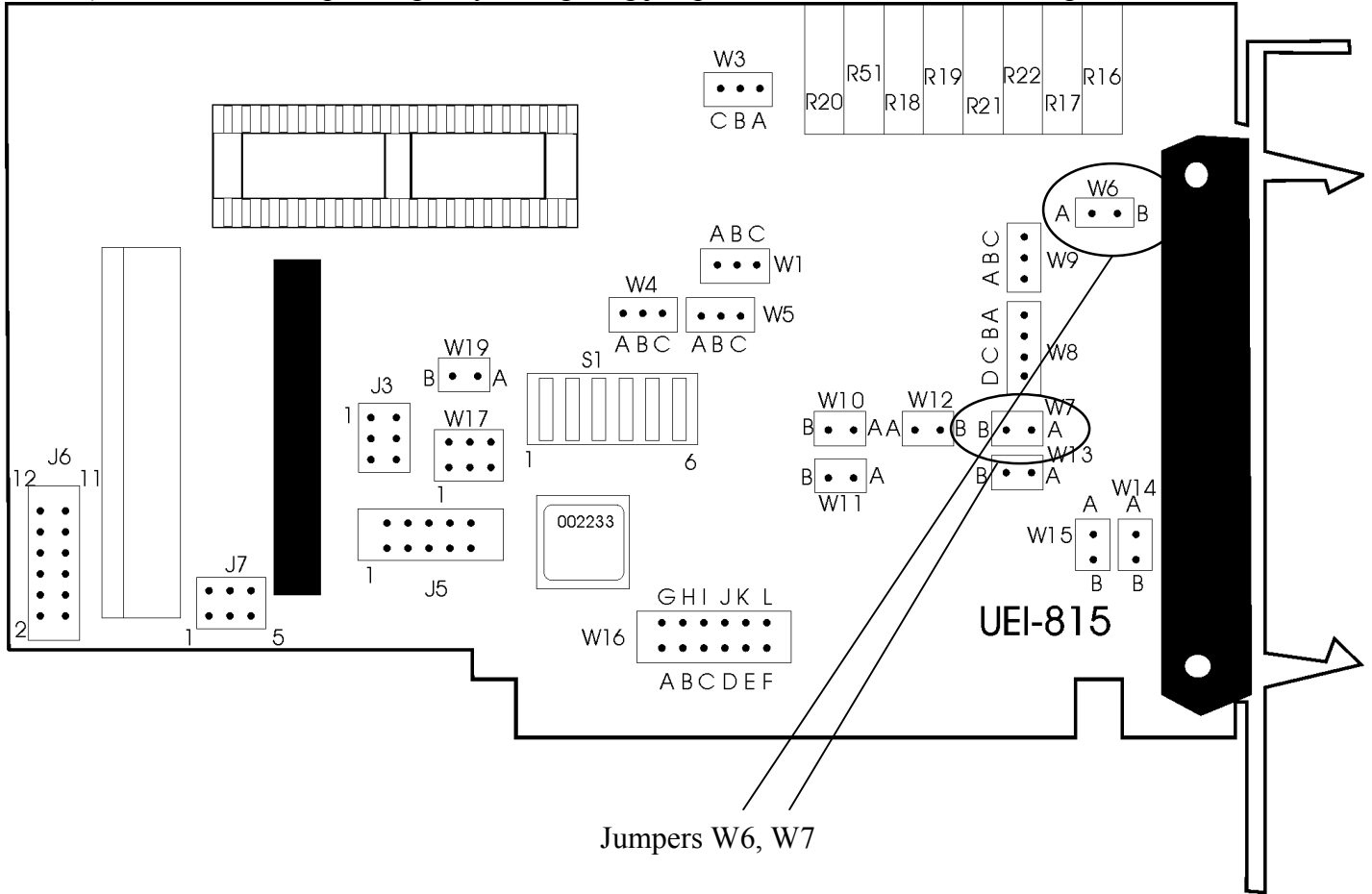

Figure 1-4. Jumpers for selecting A/D Range

Table 2-8 lists the jumper configurations for each analog input range.

Table 2-7. A/D Range Configuration

Mode	Input Range	UEI-815-32-A Jumper Configuration	RTI-800/815 Jumper Configuration
Unipolar	0 to +10V	W6 Open W7 AB	W6 BC W7 AB
Bipolar	$\pm$5V	W6 Open W7 Open	W6 BC W7 BC
Bipolar	$\pm$ 10V	W6 AB W7 Open	W6 AB W7 BC

Note

- UEI default configuration.

A/D Data Coding Selection

(Incompatible with RTI-800/815)

You can configure the analog input channels on the UEI-815-32-A for either straight binary or twos complement data coding by configuring jumpers W3, shown in Figure 1-5.
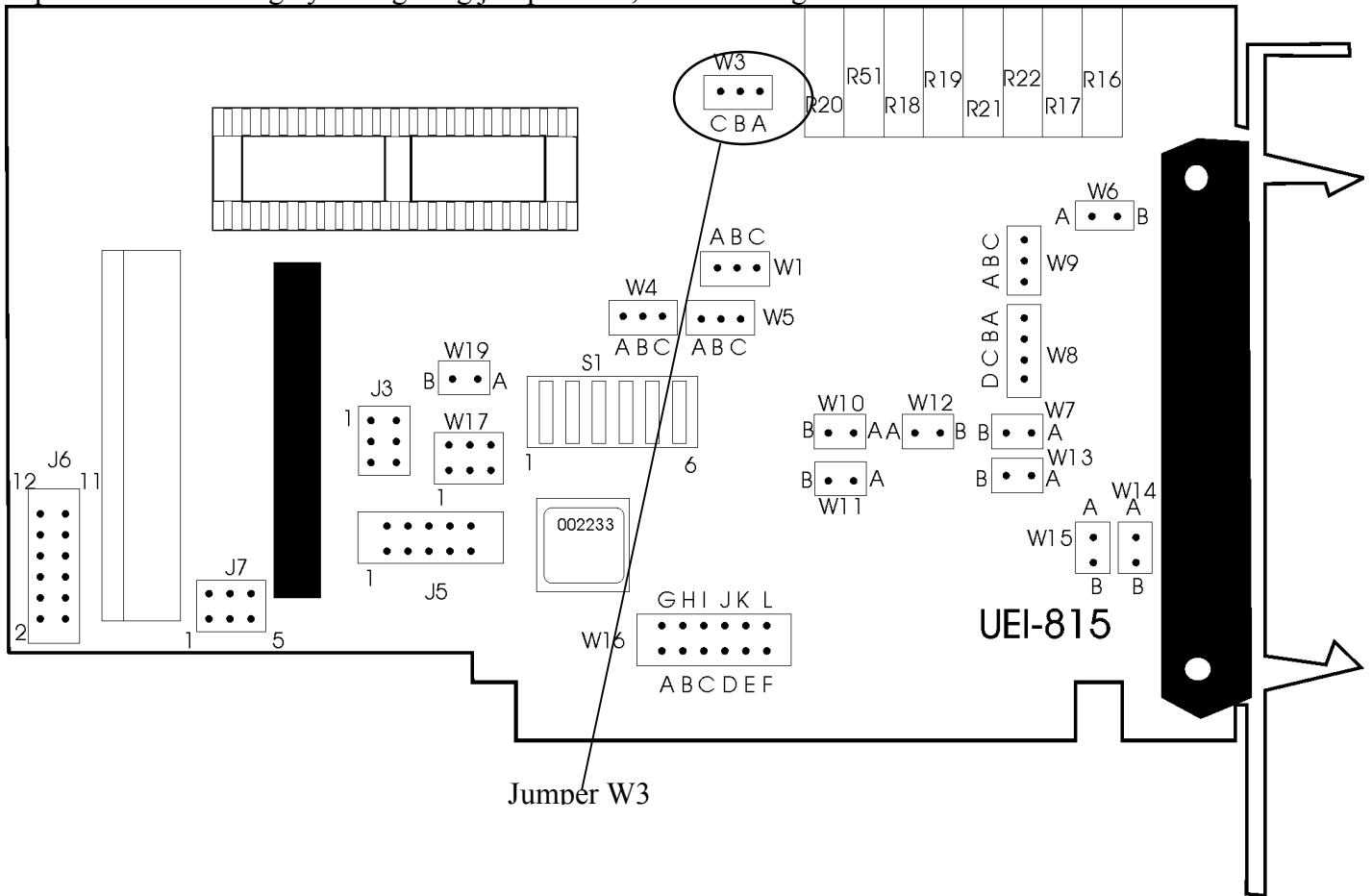

Jumper W3

Figure 1-5. Jumpers for selecting A/D Data Coding

Table 2-9 lists the jumper configuration for each A/D coding selection.

NOTE
When using straight binary coding with a
bipolar input range, the data coding is
effectively offset binary.

It is recommended that you do not operate the
board with a combination of the unipolar mode
and twos complement dada coding.

Table 2-9. A/D Data Coding Selection

Mode	UEI-815-32-A Jumper Configuration	RTI-800/815 Jumper Configuration
Twos Complement	W3 AB	W2 BC W3 AB
Straight Binary	W3 BC	W2 AB W3 BC

Note

                    - UEI default configuration.

Scan Cycle Selection
(Incompatible with RTI-800/815)

The scan cycle jumpering selection specifies the number of input channels that the UEI-815-32-A reads during a scan operation. In scan operation. The scanning wraps around to channel 0 once the UEI-815-32-A reads the last channel in the jumper-selected range. Depending on the analog input capacity of the UEI-815-32-A and the configuration of jumper W17, shown in Figure 1-1, you can instruct the UEI-815-32-A to perform the following scan cycles:

- Scan channels 0 through 32 (single-ended) or channels 0 through 15 (differential), wrap around to channel 0, and repeat the scan sequence.
- Scan channels 0 through 15 (single-ended) or channels 0 through 7 (differential), wrap around to channel 0, and repeat the scan sequence.
- Scan channels 0 through 7 (single-ended mode only), wrap around to channel 0, and repeat the scan sequence.

Note that configuring jumper W17 prevents you from reading data from a channel outside the scan sequence. For example, if the UEI-815-32-A is configured for scan channels 0 through 7, you cannot read channels 8 through 31.
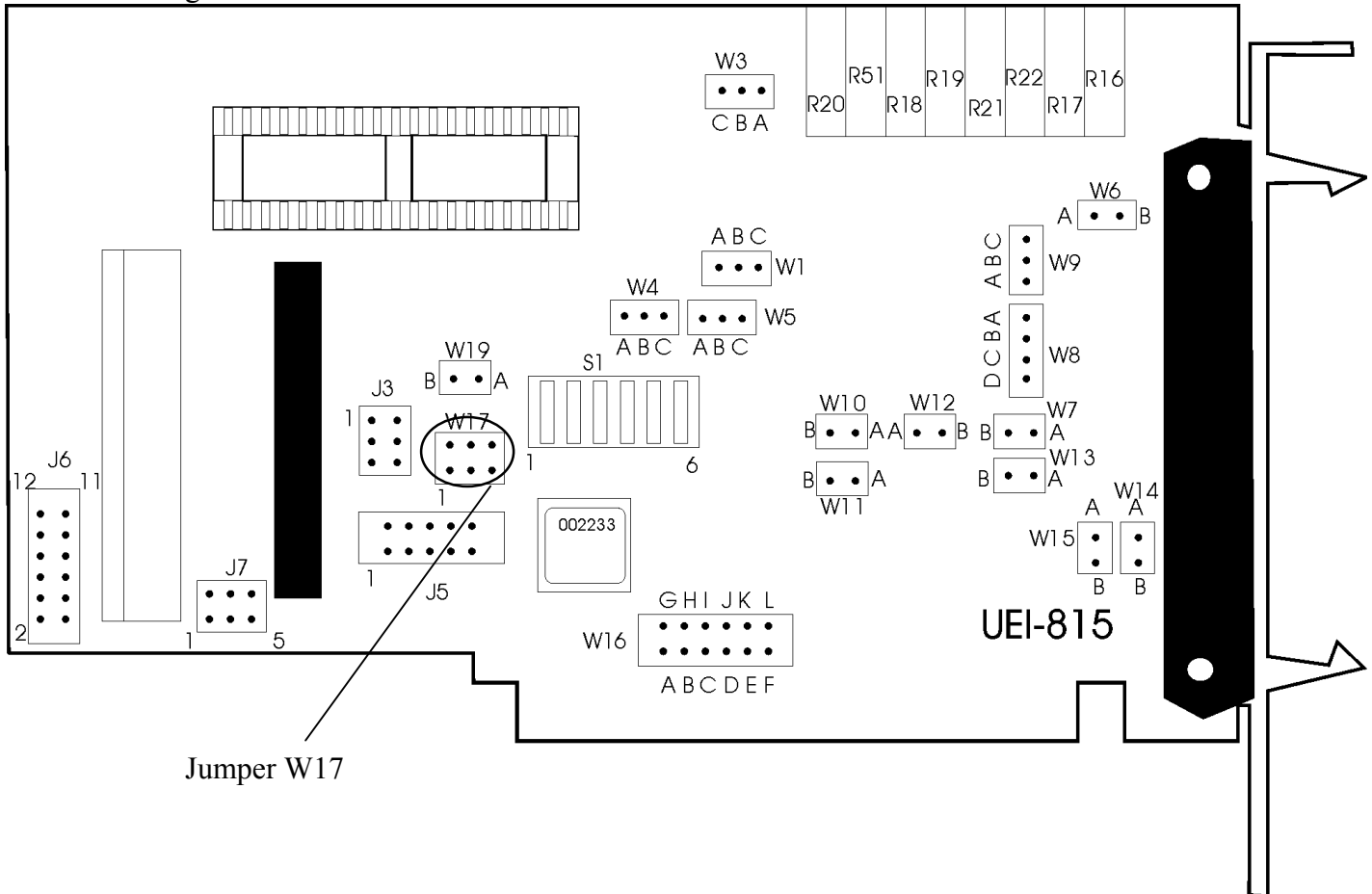

Jumper W17

Figure 1-6. Jumpers for Scan Cycle Selection

Table 2-9 lists the jumper configurations for selecting the scan cycle. The range of the channels specified in the scan cycle is used with the analog input range selections outlined in Table 2-8.

Table 2-9. Scan Cycle Selection

Mode	UEI-815-32-A Jumper Configuration	RTI-800/815 Jumper Configuration
Scan Cycle of 0 to 31 single-ended input channels or 0 to 15 differential input channels	W17 1-2	W17 AB W18 AB
Scan cycle of 0 to 15 single-ended input channels or 0 to 7 differential input channels	W17 3-4	W17 BC W18 AB
Scan Cycle of 0 to 7 single-ended input channels	W17 5-6	W17 BC W18 BC

Note

- UEI default configuration.
- RTI-800/815 default configuration

DMA throughput selection.

(Incompatible with RTI-800/815)

Using jumper W9, shown in Figure 1-7, you can configure UEI-815-32-A to increase the DMA throughput speed of transferring converted data over the data bus during collect and scan operations.
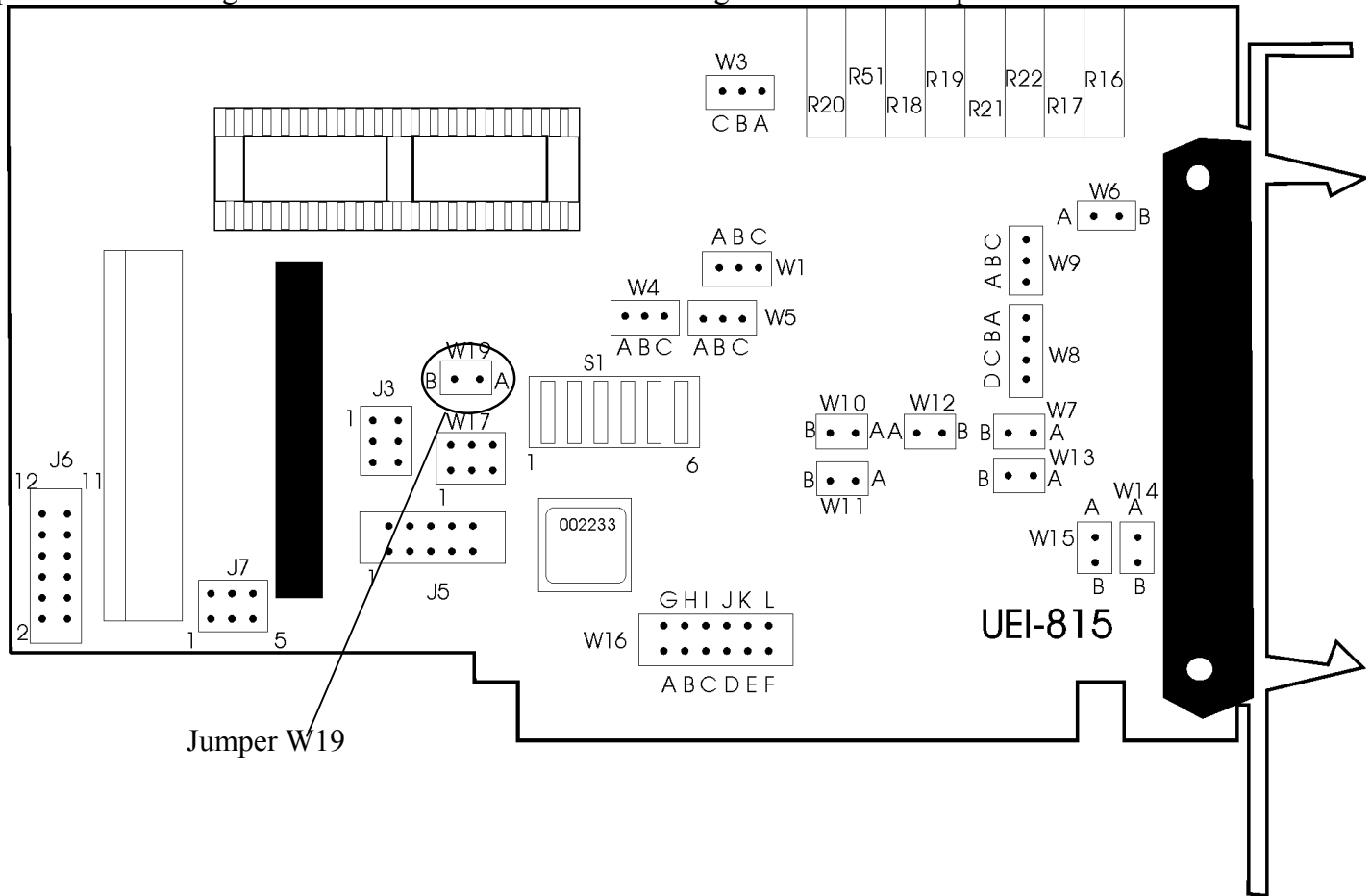

Figure 1-7. Jumpers for DMA Throughput Selection

Table 2-11 lists the jumper configurations for selecting DMA throughput.

Table 2-11. DMA Throughput Selection

Mode	UEI-815-32-A Jumper Configuration	RTI-800/815 Jumper Configuration
ADC overrun error reported	W19 Open	W19 BC
ADC overrun error disabled	W19 AB	W19 AB

Note

- UEI default configuration.

If you configure W19 as open, an ADC OVERRUN ERROR is reported if an A/D conversion begins before the DMA circuitry reads the two bytes of A/D data from the UEI-815-32-A.

If you configure jumper W19 in the AB position, the ADC OVERRUN ERROR is disabled during DMA transfers.

Analog Output Range Selection
(Compatible with RTI-800/815)

You can configure the output range for each analog output channel on the UEI-815-32-A as either unipolar (0 to ±10V) or bipolar (±10V) using jumpers W10,W11,W12,W13, shown in Figure 1-8.

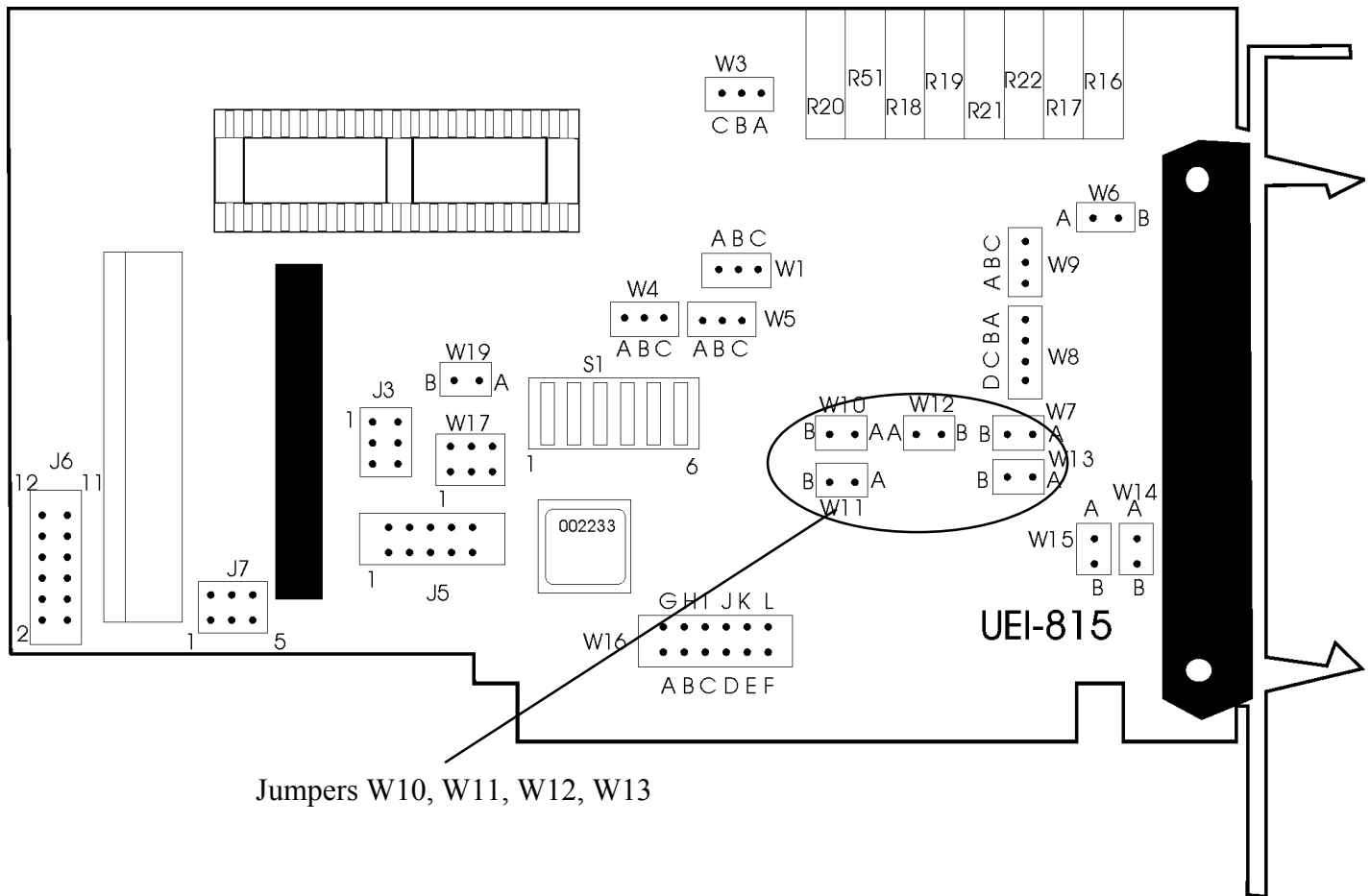

Jumpers W10, W11, W12, W13

Figure 1-8. D/A Range Selection

Note that when the DAC for a specified channel is configured for straight binary data coding (as discussed in the DIGITAL-TO-ANALOG OUTPUT DATA CODING SELECTION section that follows this discussion), the analog output channel resets to either 0V (unipolar operation mode) or –10V (bipolar operation mode) after system power-up or reset. If the DAC is configured for twos complement data coding, the analog output channel resets to 0V (assuming bipolar operation).)

Table 2-13 lists the analog output range jumper configuration for each analog output channel.

Table 2-13. Analog Output Range Selection

Analog Output Channel	Mode	Range	UEI-815-31-A Jumper Configuration	RTI-815 Jumper Configuration
Channel 0	Unipolar	0 to +10V	W12 Open W13 Open	W12 Open W13 Open
	Bipolar	±10V	W12 AB W13 AB	W12 AB W13 AB
Channel 1	Unipolar	0 to +10V	W10 Open W11 Open	W10 Open W11 Open
	Bipolar	±10V	W10 AB W11 AB	W10 AB W11 AB

Note

[ ] - UEI default configuration.

Digital-To-Analog Data Coding Selection
(Compatible with RTI-800/815)

You can configure each analog output channel on the UEI-815-32-A for either straight binary or twos complement data coding by configuring jumpers W4 and W5, shown in Figure 1-9.
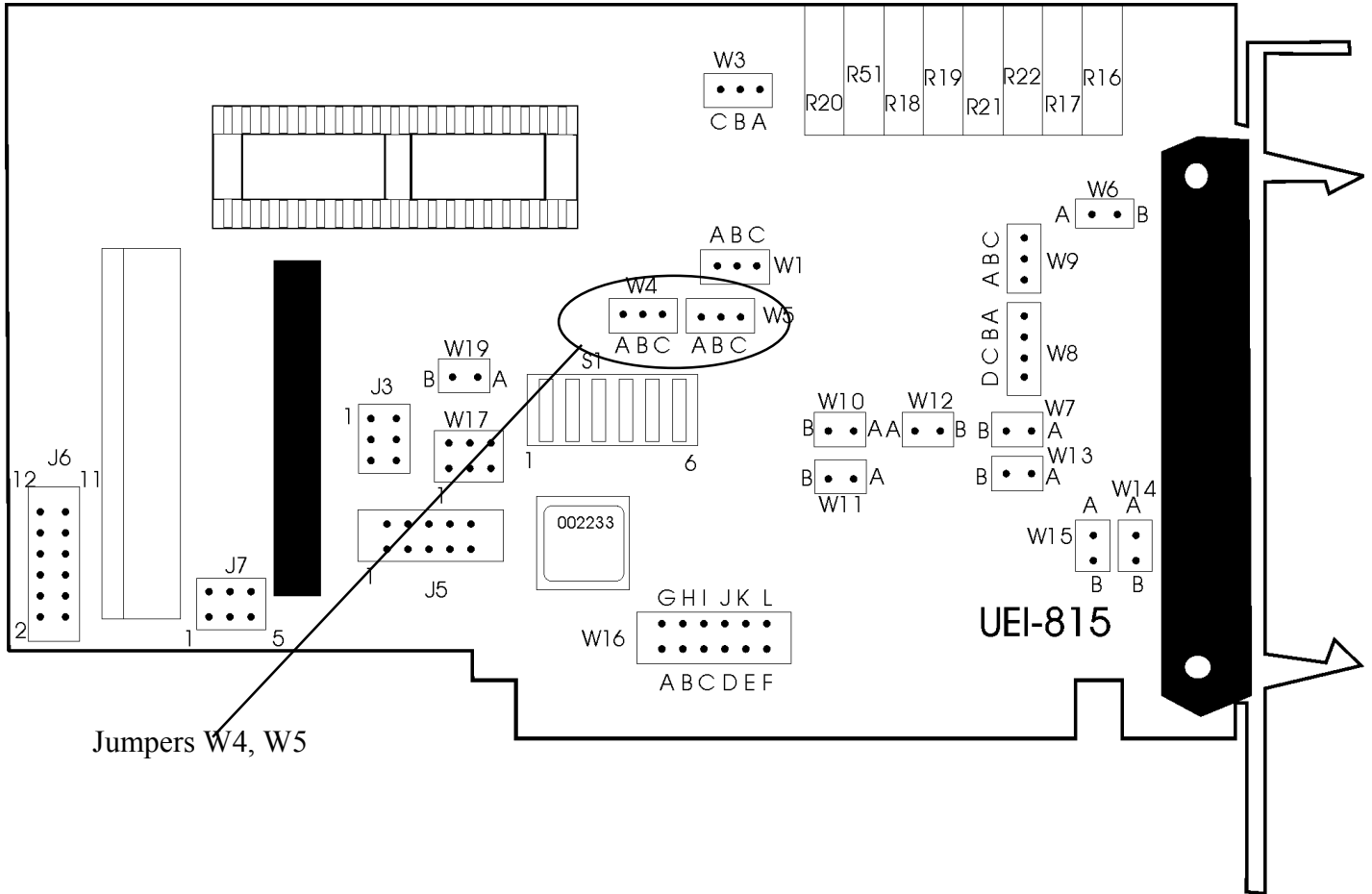
Jumpers W4, W5

Figure 1-9. D/A Data Coding Selection

Table 2-14 lists the D/A output data coding jumper configuration for each analog output channel.

NOTE

*When using straight binary coding with a
bipolar input range, the data coding is
effectively offset binary.*

*It is recommended that you do not operate the
board with a combination of the unipolar mode
and twos complement dada coding.*

Table 2-14. D/A Data Coding Selection

Analog Output Channel	Data Coding	UEI-815-31-A Jumper Configuration	RTI-815 Jumper Configuration
Channel 0	Straight Binary	W4 BC	W4 BC
	Twos Complement	W4 AB	W4 AB
Channel 1	Straight Binary	W5 BC	W5 BC
	Twos Complement	W5 AB	W5 AB

Note

- UEI default configuration.

Analog Output Remote Sensing Selection
(Compatible with RTI-800/815)

In applications where the load is located a few hundred feet from the UEI-815-32-A and a voltage drop occurs in the output line, you may require analog output remote sensing. You can compensate for this voltage drop by enabling the remote sensing line of the analog output channel and connecting the line to the load. Remote sensing can eliminate up to a few hundred millivolts of line loss.

The UEI-815-32-A is shipped from UEI with analog output channels 0 and 1 configured for local sensing. To enable the remote sensing line, reconfigure jumpers W14 and W15, shown in the Figure 1-10.
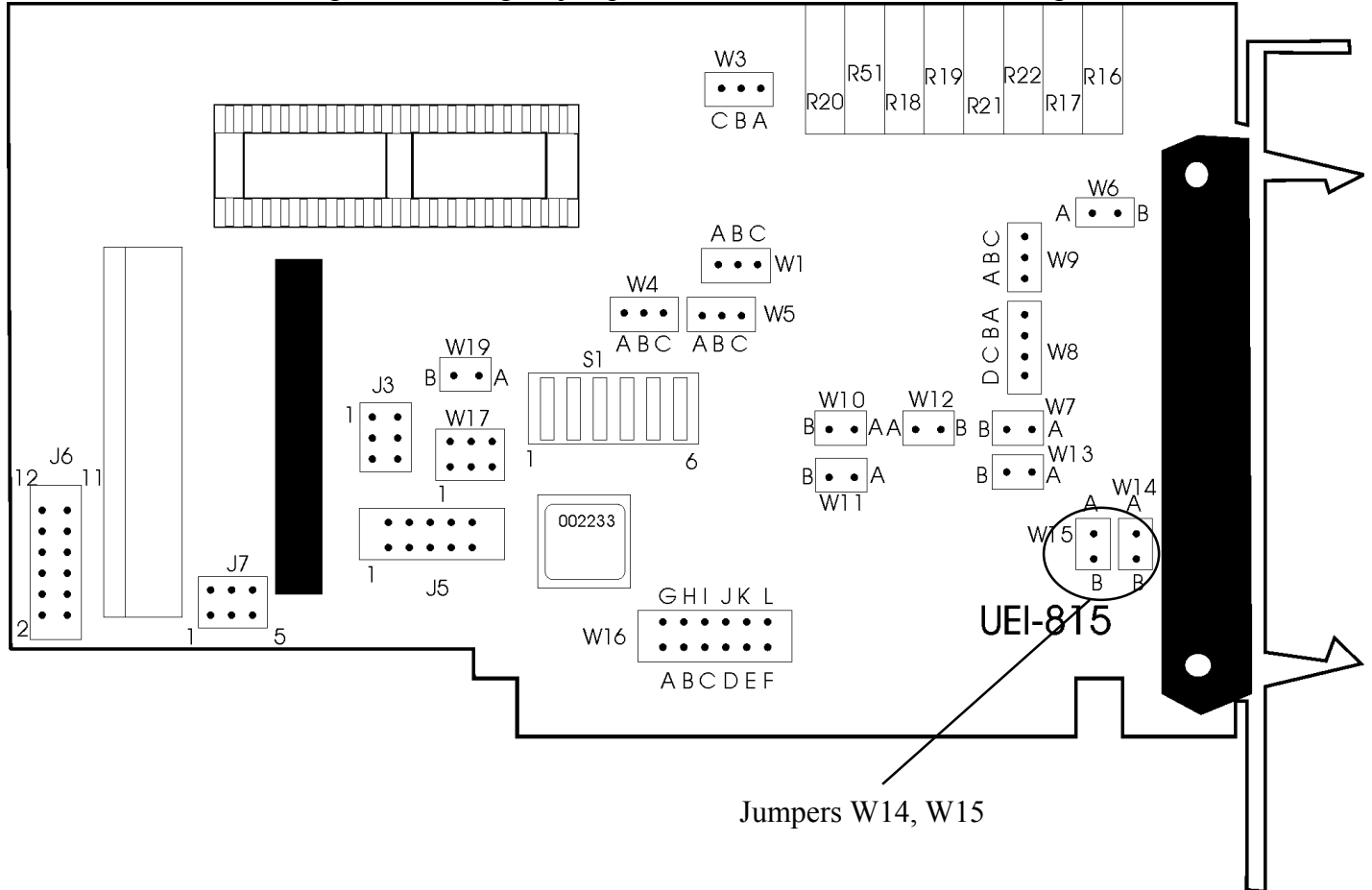
Jumpers W14, W15

Figure 1-10. D/A Sensing Selection

Table 1-15 lists the remote sensing jumper setting for each analog output channel.

Table 2-14. D/A Sensing Selection

Analog Output Channel	Mode	UEI-815-31-A Jumper Configuration	RTI-815 Jumper Configuration
Channel 0	Local Sensing	W15 AB	W15 AB
	Remote Sensing	W15 Open	W15 Open
Channel 1	Local Sensing	W14 AB	W14 AB
	Remote Sensing	W14 Open	W14 Open

Note

■ - UEI default configuration.

Counter Timer setting
(Incompatible with RTI-800/815)

You can configure the Counter Timer output to convert A/D command for one of the Counter-Timer channel by configuring jumper J3, shown in Figure 1-11.
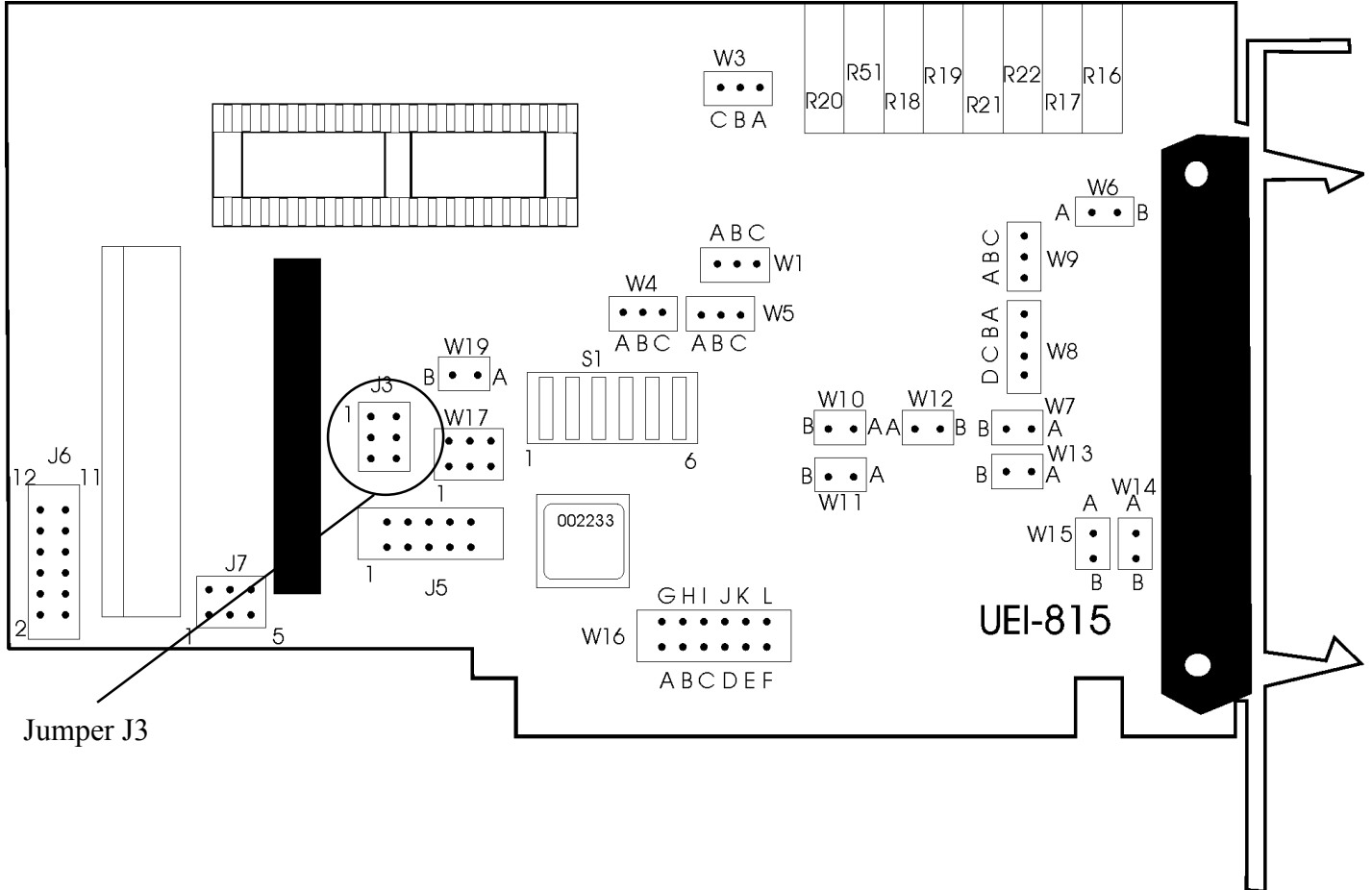

Jumper J3

Figure 1-11. Counter-Timer Setting

Table 2-15 lists the channels of the Counter-Timer that can be used for A/D conversion command.

Table 2-14. Counter-Timer setting

Counter-Timer channel	UEI-815-31-A Jumper Configuration	RTI-815 Jumper Configuration
Counter 0	J3 1-2	
Counter 3 AD9513 only	J3 3-4	
Counter 4 AD9513 only	J3 5-6	

Note

■ - UEI default configuration.

You can configure the Counter Timer source clock selection by configuring jumper J6, shown in Figure 1-12.
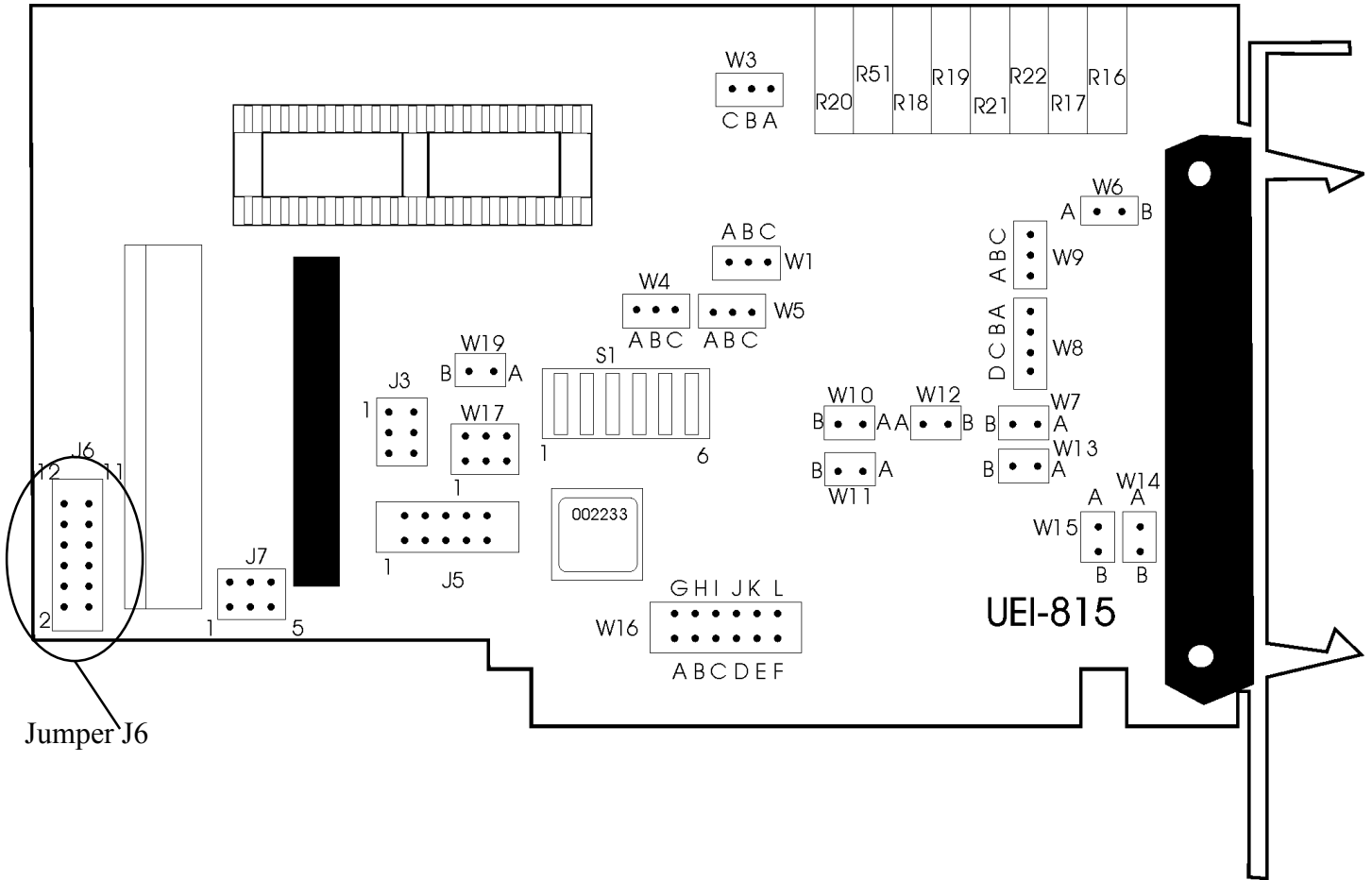

Figure 1-12. Counter-Timer Source Clock Selection

Table 2-16 lists the Counter-Timer clock selection jumper setting.

Table 2-16. Counter-Timer source clock selection

Counter-Timer channel	Type of clock signal	UEI-815-31-A Jumper Configuration	RTI-815 Jumper Configuration
Counter 0	Internal Base Clock	J6 1-2	
	External Clock	J6 7-8	
Counter 1	Internal Base Clock	J6 3-4	
	External Clock	J6 9-10	
Counter 2	Internal Base Clock	J6 5-6	
	External Clock	J6 11-12	

Note

- UEI default configuration.

You can configure the Counter Timer input clock selection by configuring jumper J7, shown in Figure 1-13. Only one jumper must be installed at the time.
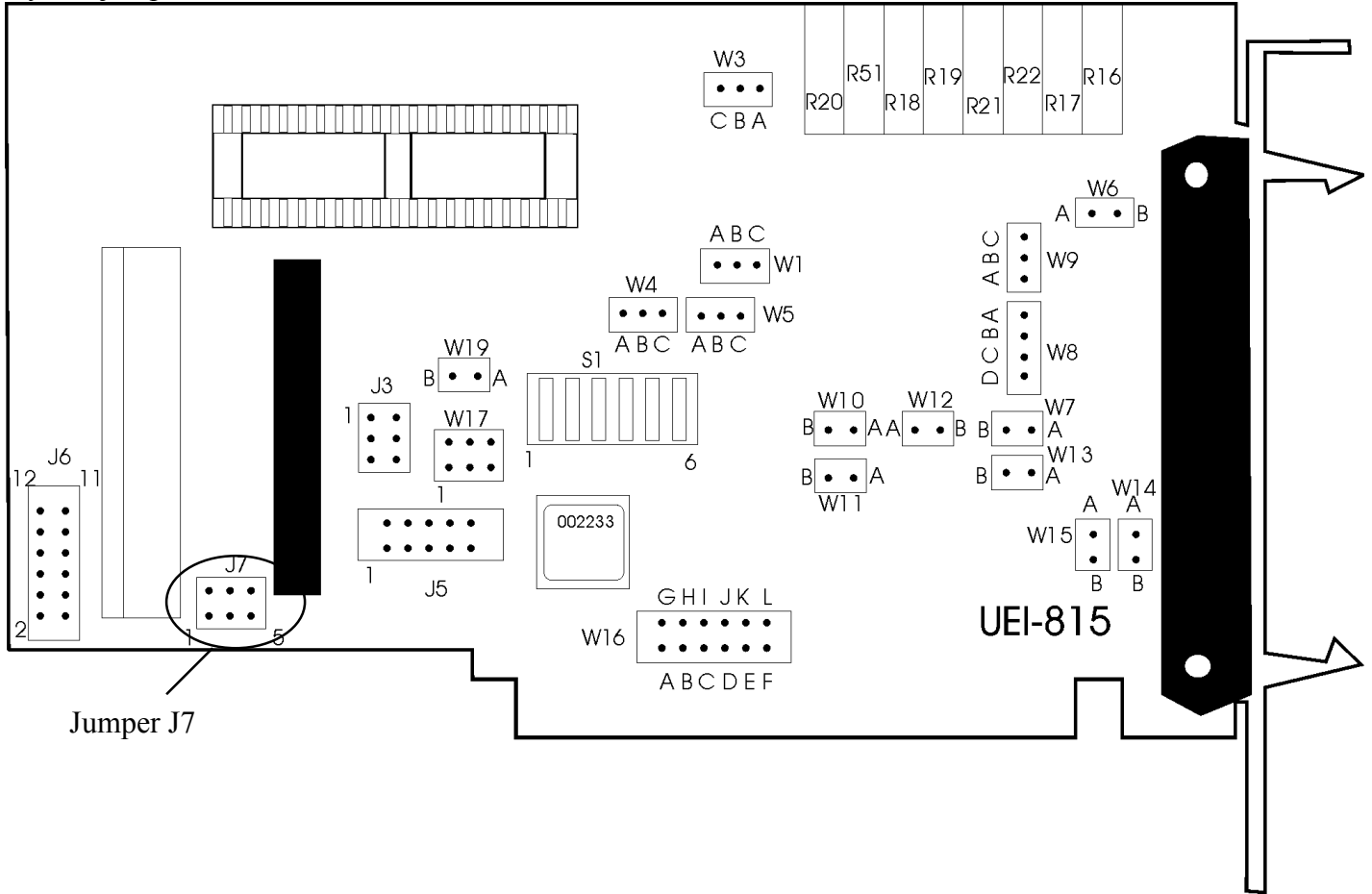

Figure 1-13. Counter-Timer Input Clock Selection

Table 2-17 lists the Counter-Timer input clock selection jumper setting.

Table 2-17. Counter-Timer Input Clock Selection

Base Clock Speed	UEI-815-31-A Jumper Configuration	RTI-815 Jumper Configuration
1 MHz	J7 1-2	
5 MHz	J7 3-4	
16.5 MHz	J7 5-6 (Reserved)	

Note

▇ - UEI default configuration.

Note
Jumper J5 is reserved and for testing purposes only. Do not install any jumpers on it.

UEI
2000