

# Weigand Application Note

## Revision History

Revision	Date	Description	Author
1	24/03/2005	Initial release	IL
2	24/03/2005	Edited	SB

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## 1. Introduction

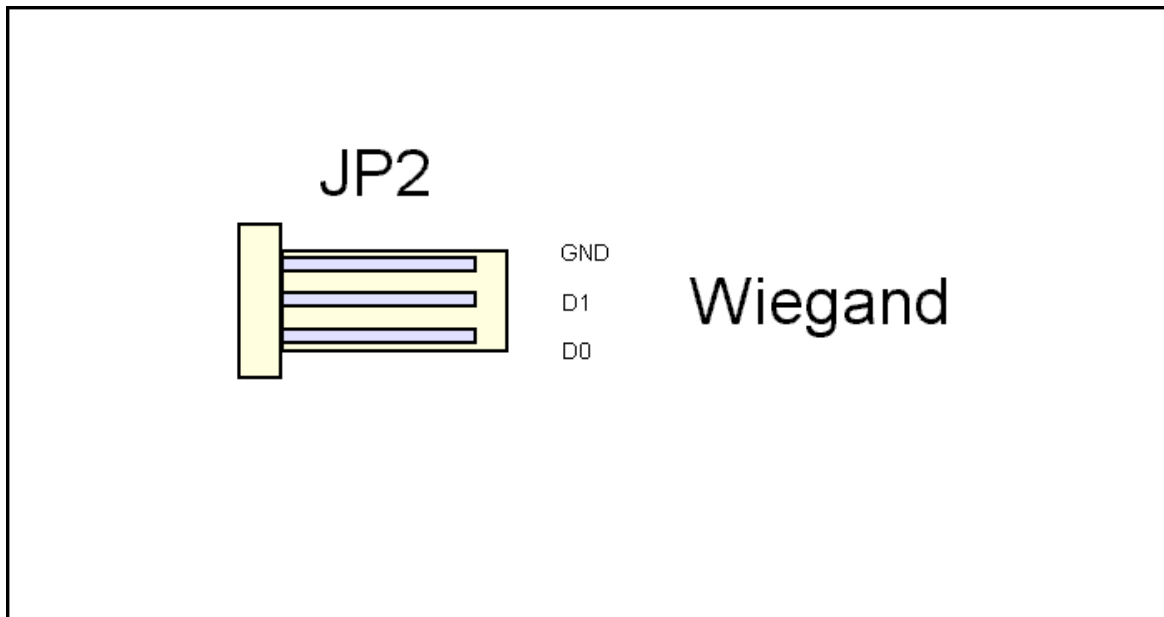
The ACTAtek is capable of sending Weigand data that meets the Security Industry Association's (SIA's) Weigand Reader Interface Standard.

Weigand is a commonly used interface between readers and control panels designed for access control, security, time and attendance, and other related industries.

## 2. Weigand Connections

ACTAtek can be connected to virtually any control panel that conforms to Weigand format standards. All connections between the ACTAtek and control panel are made through a 3-pin connector (JP2). Please refer to the below table and figure for wiring instructions.

<i>Pin</i>	<i>Function</i>
1	Ground
2	Data 1
3	Data 0

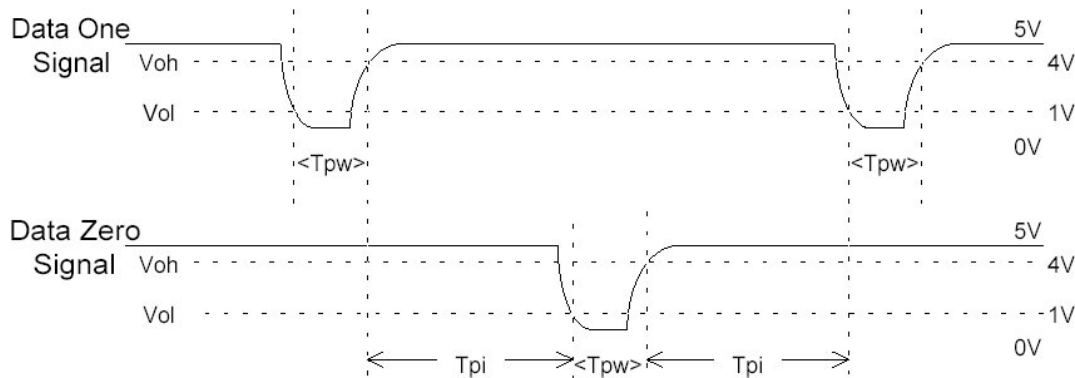


### 3. Data Signals

Drawing 2 displays the timing pattern for data bits sent by ACTAtek to access control panel. This timing pattern falls within the Weigand guidelines as prescribed by the SIA's Access Control Standard Protocol for the 26-Bit Weigand Reader Interface (a Pulse Width time between 20µs and 100µs, and a Pulse Interval time between 200µs and 20ms).

The Data 1 and Data 0 signals are held at logic high levels (above the  $V_{oh}$  level) until the ACTAtek is ready to send a data stream. The ACTAtek places data as asynchronous low-going pulses (below the  $V_{ol}$  level) on the Data 1 or Data 0 lines to transmit the data stream to the access control panel (the "saw-teeth" in Drawing 2). The Data 1 and Data 0 pulses will not overlap or occur simultaneously. The following table provides the minimum and maximum allowable pulse width times (the duration of a pulse) and pulse interval times (the time between pulses) for ACTAtek.

<b>Symbol</b>	<b>Description</b>	<b>ACTAtek Typical Time</b>
$T_{pw}$	Pulse Width Time	50µs
$T_{pi}$	Pulse Interval Time	2ms



**4. Weigand Formats**

**4.1 26-Bit Weigand Format**

The composition of the open de facto 26 Bit Weigand industry standard contains 8 bits for the facility code and 16 bits for the ID number field. Mathematically, these 8 facility codes allows for a total of just 256 (0 to 255) facility codes, while the 16 ID number bits allow for a total of only 65,536 (0 to 65,536) individual ID's within each facility code. Due to the mathematical limitations of the 26-bit Weigand format, code duplication may occur.

<b>Abbreviation</b>	<b>Definition</b>
D	Data bit
E	Data bit used for even parity comparison
FC	Facility code
LSB	Least significant bit – used for odd parity comparison
MSB	Most significant bit – used for even parity comparison
O	Data bit used for odd parity comparison

The ACTAtek sends 26 bits of Weigand data in the order listed in Drawing 3.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
M	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	L
S																									S
B																									B

Of the 26 bits sent, the most significant bit (MSB) and the least significant bit (LSB) are stripped off and used for parity checking of the remaining 24 bits (see Drawing 4). The MSB parity is checked for even parity with the upper 12 data bits. The LSB parity bit is checked for odd parity with the lower 12 data bits.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
M	E	E	E	E	E	E	E	E	E	E	E	E														L
S													0	0	0	0	0	0	0	0	0	0	0	0	S	
B																									B	

That is,

**MSB = 0 if number of '1' is even**

**MSB = 1 if number of '1' is odd**

**LSB = 0 if number of '1' is odd**

**LSB = 1 if number of '1' is even**

If either even or odd parity checks fail in the controller, the data should be ignored. If both even and odd parity checks pass, the remaining 24 bits are separated into two groups: the facility code and the card identification code. Drawing 5 shows the breakdown of data bits.

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
F	F	F	F	F	F	F	F	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

The first eight data bits (bits 2 through 9) are processed as the Facility Code and the last sixteen bits (bits 10 through 25) are processed as the card's identification code value. The current ACTAtek firmware combines the facility code value with the card identification code value to generate the card identification number used by the Doors access control program.

**Example**

if a Smart card is presented to an ACTAtek, and the Wiegand 26 bits output is enabled, the following data streams will be sent out.

Say, the card has the unique serial number 6630A2C5. The output data streams will be

*Data stream 1:*

1	0	0	0	0	0	0	0	1	0	1	1	0	0	1	1	0	0	0	1	1	0	0	0	1
M	F C							6	6	3	0	L												
	E E E E E E E E E E										0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0													

Number of '1' (bit 2 through 13) is 3, thus MSB is **1**. Similarly, LSB is **1** as number of '1' (bit 14 through 25) is 4.

*Data stream 2:*

1	0	0	0	0	0	0	0	1	1	0	1	0	0	0	1	0	1	1	0	0	0	1	0	1	0
M	F C							A	2	C	5	L													
	E E E E E E E E E E										0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														

Number of '1' (bit 2 through 13) is 3, thus MSB is **1**. Similarly, LSB is **0** as number of '1' (bit 14 through 25) is 5.

**4.2 40-Bit Weigand Format**

ACTAtek provides options of 40 bit Weigand output data in addition to the 26 bit pattern. The composition of the 40 Bit Weigand format contains 32 bits for the ID number field and 8 bits for the checksum byte.

<i>Byte0</i>	<i>Byte1</i>	<i>Byte2</i>	<i>Byte3</i>	<i>Byte4</i>
SNR0	SNR1	SNR2	SNR3	Checksum

Checksum = SNR0 **XOR** SNR1 **XOR** SNR2 **XOR** SNR3

**Example**

If a Smart card is presented to an ACTAtek, and the Weigand 40 bits output is enabled, the following data streams will be sent out.

Say, the card has the unique serial number 6630A2C5. The output data streams will be

0	1	1	0	0	1	1	0	0	0	1	1	0	0	0	0	1	0	1	0
6				6				3				0				A			

0	0	1	0	1	1	0	0	0	1	0	1	0	0	1	1	0	0	0	1
2				C				5				3				1			

Checksum = 0x66 **XOR** 0x30 **XOR** 0xA2 **XOR** 0xC5 = 0x31

## 5. Enable Weigand

The Weigand output of ACTAtek by default is disabled. Users are required to select the appropriate Weigand output through the web interface of ACTAtek. The specific Option is located under Terminal Settings → Terminal Setup → WEIGAND Output.

For example, a 26 bits Weigand output is selected as the following diagram.

The screenshot displays the 'Terminal Setup' configuration page in the ACTAtek web interface. The left sidebar contains a navigation menu with categories: Terminal, User Administration, Access Control, Terminal Settings, and Tools. The 'Terminal Settings' section is expanded, showing 'Terminal Setup' as the active page. The main content area is divided into several sections: Network Settings, Fingerprint Related Setting, and Miscellaneous. In the Miscellaneous section, the 'WIEGAND Output' is configured to '26-bit', with '40-bit' and 'Disable' options also visible. Other settings include IP Address (192.168.1.163), Subnet Mask (255.255.255.0), and Language (English). The page footer indicates it is 'Powered by Hectrix Ltd.'.

Section	Parameter	Value
Network Settings	Terminal ID	0
	Serial Number	00111DFFFFFF
	Terminal Description	ACTAtek
	IP Address	Static IP Address: 192.168.1.163
Network Settings	Subnet Mask	255.255.255.0
	Default Gateway	192.168.1.254
	DNS Server	192.168.1.254
Fingerprint Related Setting	Security Level (for Automatch)	Normal
Miscellaneous	Auto IN/OUT	Disable
	Log Unauthorized Event	Disable
	Relay Delay	8 (1-20)
	Door Bell	Disable
	Network Camera	Manufacturer: Axis, Model: Axis 2100
	WIEGAND Output	26-bit
	Language	English
	Webserver Port	80 (80 - 9999)
	Buttons: Submit, Reset	
	Footer: Powered by Hectrix Ltd.	



## 6. Weigand output criteria

Notice that the Weigand output can ONLY be enabled when a **MIFARE** card is presented to the ACTAtek. No data streams are sent out if ACTAtek is accessed by the PIN code or Fingerprints.

Weigand data streams will be sent out whether the authentication is successful or not.

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