

# Appendix B:

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## Command Tables

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\*Command tables are not included for Commands 0, 7, 8, and 9.

# Command 1 - CHANNEL SETUP

• Parameter values marked with asterisks are initial defaults.

| Channel                | Operation                                    | Post-Processing                   | Stat Samples                |
|------------------------|----------------------------------------------|-----------------------------------|-----------------------------|
| 0 Clears all channels. | —                                            | —                                 | —                           |
| * 1 Channel 1          | 0 Clears the selected channel.               | * 0 None                          | —                           |
| 2 Channel 2            | * 1 Auto-ID                                  | 1 $d/dt$                          | —                           |
| 3 Channel 3            | 2 Voltage ( $\pm 10V$ )                      | 2 $d/dt, d^2/dt^2$                | —                           |
|                        | 3 Current                                    | 3 Statistics                      | 2 to 512 Samples used (*10) |
|                        | 4 Resistance                                 |                                   |                             |
|                        | 5 Period                                     |                                   |                             |
|                        | 6 Frequency                                  |                                   |                             |
|                        | 7 Temperature (Celsius)                      |                                   |                             |
|                        | 8 Temperature (Fahrenheit)                   |                                   |                             |
|                        | 9 Light                                      |                                   |                             |
|                        | 10 Voltage (0 to 5V)                         |                                   |                             |
| 4 SONIC Channel        | 0 Clears the SONIC channel.                  | * 0 None                          | —                           |
|                        | * 1 Auto-ID                                  | 1 $d/dt$                          | —                           |
|                        | 2 Meters                                     | 2 $d/dt, d^2/dt^2$                | —                           |
|                        | 3 Feet                                       | 3 Statistics                      | 2 to 512 Samples used (*10) |
| 5 DIG IN Channel       | 0 Clears the digital input channel.          | —                                 | —                           |
|                        | * 1 Active                                   |                                   |                             |
| 6 DIG OUT Channel      | <b>Number of Data Elements</b>               | <b>Data Elements</b>              |                             |
|                        | 0 Clears the digital output channel.         | 0 to 15 Output data element value |                             |
|                        | 1 to 22 Number of output data elements (* 1) | (* 0)                             | —                           |

• Channel = 1, 2 or 3, Operation = 5, 6

| Trigger Threshold                                               | Trigger Edge                                                                                                                       |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| $\pm 10$ Set input voltage (* 1) threshold value of -10 to +10. | * 0 Rising edge to rising edge<br>1 Falling edge to falling edge<br>2 Rising edge to falling edge<br>3 Falling edge to rising edge |

## Command 2 - DATA TYPE AND DISPLAY SETUP

| Data Display CH | Data Type                                |
|-----------------|------------------------------------------|
| * 0             | Data display for lowest numbered channel |
| 1               | Channel 1 (CH1) data                     |
| 2               | Channel 2 (CH2) data                     |
| 3               | Channel 3 (CH3) data                     |
| 4               | SONIC channel data                       |
| 5               | DIG IN channel data                      |

- When Data Type = 1

| REG Xdata                              | REG Ydata                             | Xdata Post-Processing | Ydata Post-Processing |
|----------------------------------------|---------------------------------------|-----------------------|-----------------------|
| * 0 Highest channel of data send order | * 0 Second channel of data send order | * 0 None (raw data)   | * 0 None (raw data)   |
| 1 Channel 1 (CH1) data                 | 1 Channel 1 (CH1) data                | 1 $d/dt$              | 1 $d/dt$              |
| 2 Channel 2 (CH2) data                 | 2 Channel 2 (CH2) data                | 2 $d^2/dt^2$          | 2 $d^2/dt^2$          |
| 3 Channel 3 (CH3) data                 | 3 Channel 3 (CH3) data                |                       |                       |
| 4 SONIC channel data                   | 4 SONIC channel data                  |                       |                       |
| 5 Recorded time data                   | 5 DIG IN channel data                 |                       |                       |

## Command 3 - SAMPLE AND TRIGGER SETUP

| Sample Time               | Number of Samples                                                   | Record Time                                                       |
|---------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------|
| 0.001 to 16000<br>(* 0.5) | -1 Real-time data sampling.<br>1 to 512 Number of samples<br>(* 20) | * 0 Off<br>1 Absolute time recording<br>2 Relative time recording |

\* 1 A sample time to 0.5 should be used whenever an external clock is specified as the clock source.

| Trigger Source             | Trigger Threshold                                                                    | Trigger Edge                      | Clock Source                                                                                                                        |
|----------------------------|--------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 0 Off                      | —                                                                                    | 0 Falling edge<br>* 1 Rising edge | * 0 Timer (sampling time)<br>1 [TRIGGER] key<br>2 CH1 ( $\pm 10V$ )<br>3 CH2 ( $\pm 10V$ )<br>4 CH3 ( $\pm 10V$ )<br>5 DIG IN clock |
| * 1 Manual ([TRIGGER] key) |                                                                                      |                                   |                                                                                                                                     |
| 2 CH1 ( $\pm 10V$ )        | $\pm 10$ (V)                                                                         |                                   |                                                                                                                                     |
| 3 CH2 ( $\pm 10V$ )        | $\pm 10$ (A)                                                                         |                                   |                                                                                                                                     |
| 4 CH3 ( $\pm 10V$ )        | (default = 1)                                                                        |                                   |                                                                                                                                     |
| 5 CH1 (0-5V)               | 1 to 100 (k $\Omega$ )                                                               |                                   |                                                                                                                                     |
| 6 CH2 (0-5V)               | 0 to 5 (V)                                                                           |                                   |                                                                                                                                     |
| 7 CH3 (0-5V)               | (default = 1)                                                                        |                                   |                                                                                                                                     |
| 8 DIG IN clock             | —                                                                                    |                                   |                                                                                                                                     |
| 9 DIG IN 4-bit data        | 0000 - 9999 (D3-D0)<br>0 : LOW<br>1 : HIGH<br>2 - 9 : Don't care<br>(default = 0001) |                                   |                                                                                                                                     |

| Clock Threshold                                                      | Clock Edge                        | Prestore Data %           | Filter                                                                                                                                                                                     |
|----------------------------------------------------------------------|-----------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\pm 10V$<br>$\pm 10A$<br>(default = 1)                              | 0 Falling edge<br>* 1 Rising edge | 0 to 100<br>(default = 0) | * 0 No filtering<br>1 5-point S-G smoothing<br>2 9-point S-G smoothing<br>3 17-point S-G smoothing<br>4 25-point S-G smoothing<br>5 3-point median filtering<br>6 5-point median filtering |
| When a clock source (2, 3, or 4) is specified for an analog channel. |                                   |                           |                                                                                                                                                                                            |

# Command 4 - CONVERSION EQUATION SETUP

| Equation Number              | Equation Type                                                  | Units Display     | Constants                                                  |
|------------------------------|----------------------------------------------------------------|-------------------|------------------------------------------------------------|
| * 0 Clears all equations.    | * 0 Clears equation selected by the equation number parameter. | * 0 None          |                                                            |
| 1 Equation 1 (Channel 1)     | 1 Polynomial                                                   | 1 °F (Fahrenheit) | Specifies the constants used by the conversion equation* 1 |
| 2 Equation 2 (Channel 2)     | 2 Mixed polynomial                                             | 2 °C (Celsius)    |                                                            |
| 3 Equation 3 (Channel 3)     | 3 Power                                                        | 3 K (Kelvin)      |                                                            |
| 4 Equation 4 (SONIC channel) | 4 Modified power                                               |                   |                                                            |
|                              | 5 Logarithmic                                                  |                   |                                                            |
|                              | 6 Modified logarithmic                                         |                   |                                                            |
|                              | 7 Exponential                                                  |                   |                                                            |
|                              | 8 Modified exponential                                         |                   |                                                            |
|                              | 9 Geometric                                                    |                   |                                                            |
|                              | 10 Modified geometric                                          |                   |                                                            |
|                              | 11 Reciprocal logarithmic                                      |                   |                                                            |
|                              | 12 Steinhart-Hart                                              |                   |                                                            |

\* 1 Notes on inputting constants for polynomials

Polynomial: Input constants in sequence, from n = 0 to 9. Input 0 for constants that are not used.

Mixed polynomial: Input constants in sequence from m = 4 to 1, and n = 0 to 4. Input 0 for constants that are not used. Input of zero for constants can be skipped if all remaining constants are not used.

## Command 5 - DATA RANGE SETUP

| Channel Select                     | Data Select *1                                          | Data Begin                | Data End                  |
|------------------------------------|---------------------------------------------------------|---------------------------|---------------------------|
| *0 Current send channel            | *0 Raw data (Filtered data when data filtering is on.)  | 1 to 512<br>(default = 1) | 0 to 512<br>(default = 0) |
| 1 Channel 1 (CH1 - analog channel) | 1 $d/dt$ (Filtered data when data filtering is on.)     |                           |                           |
| 2 Channel 2 (CH2 - analog channel) | 2 $d^2/dt^2$ (Filtered data when data filtering is on.) |                           |                           |
| 3 Channel 3 (CH3 - analog channel) | 3 Raw data (Filter setting is ignored.)                 |                           |                           |
| 4 Channel 4 (SONIC channel)        | 4 $d/dt$ (Filter setting is ignored.)                   |                           |                           |
| 5 Channel 5 (DIG IN channel)       | 5 $d^2/dt^2$ (Filter setting is ignored.)               |                           |                           |
| 6 Recorded time data               |                                                         |                           |                           |

\*1 0, 1, and 2 is filtered data only when Command 3 specifies filtering.

\*2 0 selects the final sample.

## Command 6 - MULTIMETER MODE SETUP

| Set / Reset                          | Channel Select     | Operation               |
|--------------------------------------|--------------------|-------------------------|
| 0 Returns to the Communications Mode | *1 Channel 1 (CH1) | *1 Auto-ID              |
| *1 Enters the Multimeter Mode        | 2 Channel 2 (CH2)  | 2 Voltage ( $\pm 10V$ ) |
|                                      | 3 Channel 3 (CH3)  | 3 Current               |
|                                      |                    | 4 Resistance value      |
|                                      |                    | 5 Period                |
|                                      |                    | 6 Frequency             |
|                                      | 4 SONIC channel    | *1 Auto-ID              |
|                                      |                    | 2 Meters                |
|                                      |                    | 3 Feet                  |
|                                      | 5 DIG IN channel   | —                       |