Instrument Configuration Utility
User's Manual

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Printing History
Edition 2.03, June 2004

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Do not install substitute parts or perform any unauthorized modification to SI products. Return the product to SI for service and repair to ensure that safety features are maintained.

Contents

Instrument Configuration Utility Functionality

The Instrument Configuration Utility (ICU) is used to configure, activate, calibrate and monitor digital instruments manufactured by Measurement Specialties. The block diagram on the next page shows some of the functional elements available in different instruments which can be manipulated by ICU:

Source Selector	Each channel in a Measurement Specialties digital instrument has a multiplexed input which allows it to be connected to any sensor in the instrument, test inputs, or the output of another channel.
Calibration and Application Parameters	Calibration and Application settings are stored in the instrument. User settings include output gain, offset, and filter settings.
Filter	The Digital Signal Processor (DSP) includes a programmable single pole filter. Multiple pole filters can be implemented by cascading the output of one channel into the input of another channel (see source selector above).
Result Selector	Each channel output can be assigned to any word position in the output frame. When more than one channel is assigned to a word position, the <n> channels will be subcommutated with each channel output in the word position every nth frame. A subframe counter is automatically included before the first subcommutated word when subcommutation is used. The result selector is part of the IRIG-106 formatter. See the IRIG-106 specification for additional details.
Aux TTL I/F	The Aux pin is a bi-directional digital I/O pin which can be programmed as in input to trigger a self-test, RCal, or measurement or as a IRIG-106 output pin.
IRIG 106 PCM Encoder	The IRIG-106 output can be encoded as NRZ, BiPhase, randomized NRZ, or randomized BiPhase. The IRIG-106 output can also be sent directly over the RS485 interface.
Carrier Frequency	The carrier frequency used by the optional transmitter
RS485 I/F	The RS485 interface will automatically synchronize to any BAUD rate from 9600 to 38400 BAUD. In addition, the default power-up BAUD rate can be set.

Instrument Configuration Utility Modes of Operation

The Instrument Configuration Utility (ICU) is actually four programs, each designed around the needs of an operator tasked with a specific instrumentation task:

On-line Configuration

Used when directly connected to a digital instrument to configure its settings and monitor its outputs. Application settings are password protected to prevent unauthorized changes.

Create Application File(s)

Used to create an Application file which can later be loaded into a digital instrument, ICU need not be connected to an instrument. Application files are password protected to prevent unauthorized modification of settings via Application files.

Active and/or Load Application File(s)

Used to load a valid Application file into a digital instrument and monitor its outputs. To provide traceability, Application file configurations cannot be modified. The Application password required to modify an instrument's application settings is encrypted before being stored in the Application file. Thus anyone can load a configuration file into the corresponding instrument without having access to the Application password.

Calibration

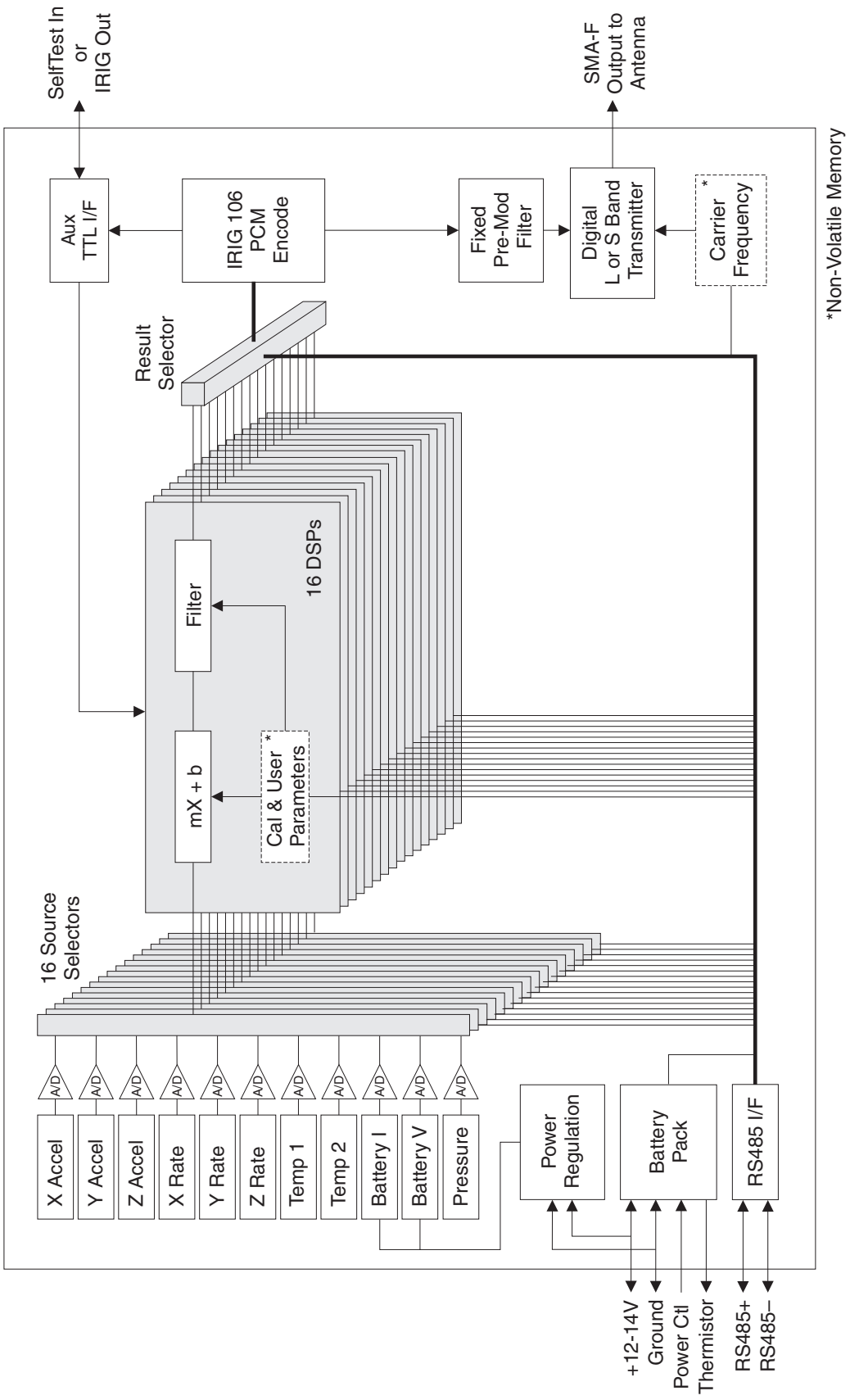
Two modes are provided, calibration and monitor. Calibration mode forces all channels to unity gain with a zero offset to allow input sensor calibration values to be determined. Correct calibration can be confirmed via Monitoring mode which uses the calibration and application defined gain and offsets to display results in the configured engineering units. Once calibrated, a Measurement Specialties digital instrument uses the calibration values to provide a calibrated output. Calibration values in each digital instrument are password protected to prevent unauthorized manipulation.

Receive Telemetry

Used to receive telemetry signals from a configured instrument. Select the correct default instrument , and load the application file for the transmitting instrument. Sampled data is displayed on the strip chart, and all of the received data can be saved to disk in comma separated variable (.csv) format.

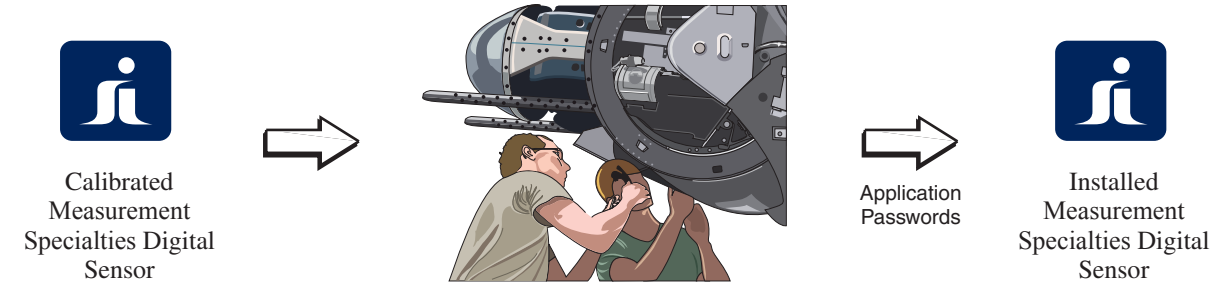
The following two pages show how the four operating modes are designed to be used in three different organizational structures.

Block Diagram



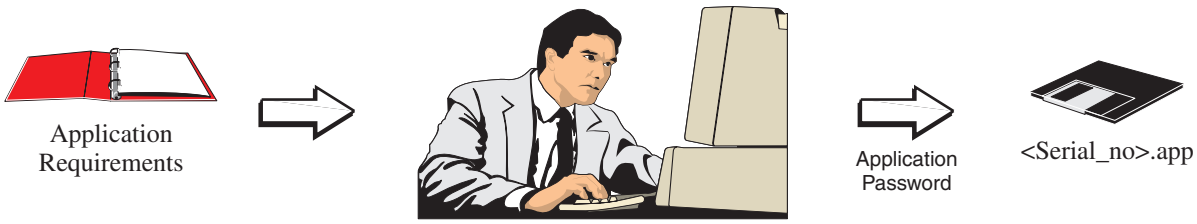
ICU Flow with Measurement Specialties Calibration

The simplest way to deploy a Measurement Specialties digital instrument is to use Measurement Specialties factory calibration and use *On-line Configuration* to configure the application settings:



***Use On-line Configuration* to Configure Instrument Settings**

In some enterprises, Configuration and Activation may involve more than one department. In this case ICU's *Create Application File(s)* and *Activate and/or Load Application File(s)* modes can be used as shown below to deploy an application:



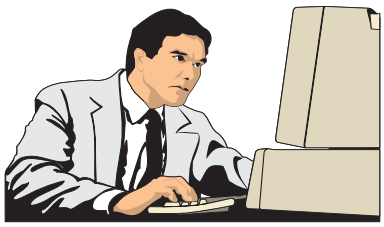
Use *Create Application File(s)* to Define Sensor Settings for Application

Use *Activate and/or Load Application File(s)* to Put Settings in Digital Sensor

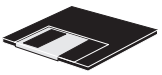
Customers with their own calibration lab can use all four ICU modes to deploy an application as shown on the next page:

ICU Flow with Customer Calibration

Application Requirements



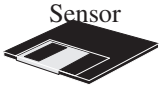
Application Password



<Serial_no>.app

Use *Create Application File(s)* to Define Sensor Settings for Application

Measurement Specialties Digital Sensor



<Serial_no>.app

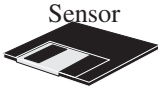
Configured Measurement Specialties Digital Sensor

Use *Activate and/or Load Application File(s)* to Put Settings in Digital Sensor

Configured Measurement Specialties Digital Sensor

Calibration Password

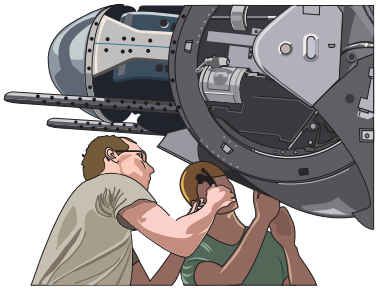
Calibrated Measurement Specialties Digital Sensor



<Serial_no>.cal

Use *Calibration* to Calibrate Digital Sensor to Application Settings

Calibrated Measurement Specialties Digital Sensor



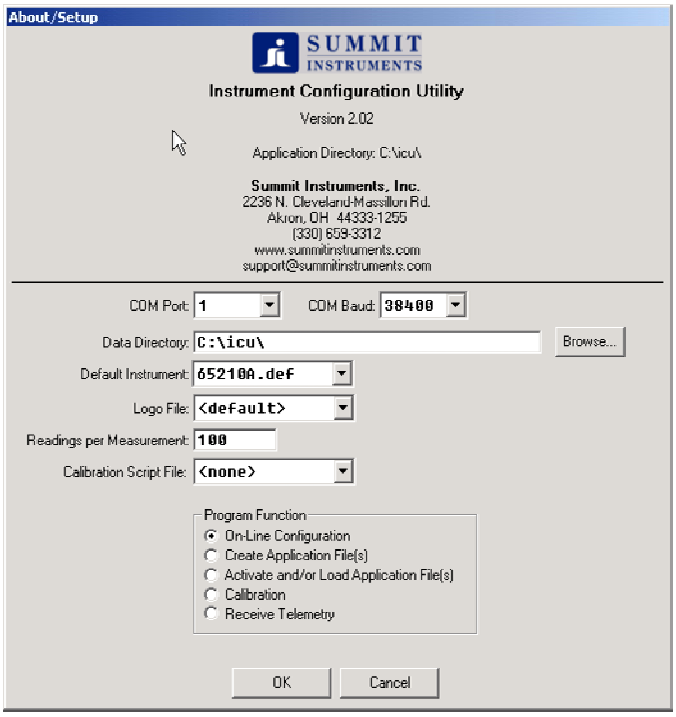
Application Passwords

Installed Measurement Specialties Digital Sensor

***On-line Configuration* can be used to Change Settings After Installation**

How to Select Mode of Operation

The **About/Setup...** dialog box is used to configure ICU to your application. Once ICU is configured, it can be used to configure your instrument. When ICU is run the first time, the **About/Setup...** dialog box is automatically displayed.

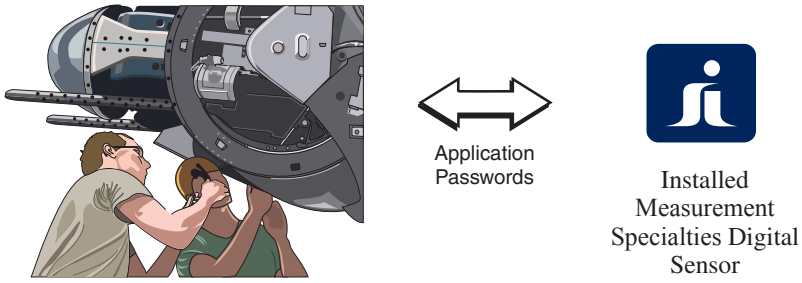


This dialog box can also be brought up later by clicking the **About/Setup...** button at the bottom center of the ICU screen.

The fields on the **About/Setup...** dialog box are detailed in the ***ICU Reference Manual***. The first time ICU is run you must set:

1 . the COM Port to be used to communicate with the instrument
2 . the Mode of Operation to be used. A brief description of the available modes follows.

On-line Configuration Overview

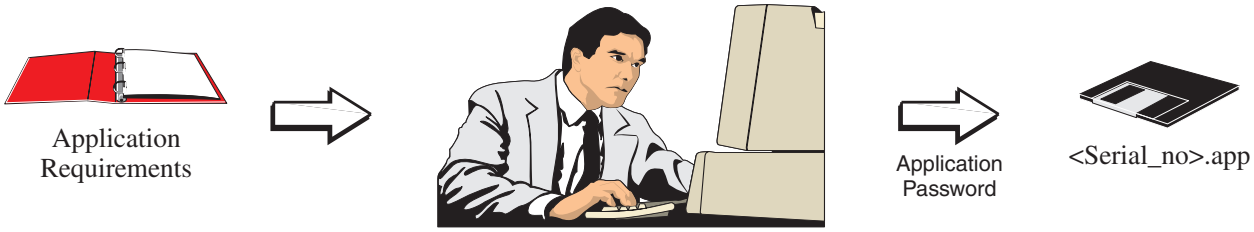


Application settings can be configured on-line using *On-line Configuration Mode*. This mode allows settings to be changed directly and reports of the instruments configuration to be generated. ICU will prompt for the Application password when settings are written to the instrument.

Settings in a connected instrument can configured by:

- Connecting a Digital Instrument to the computer and running ICU
- Selecting **On-line Configuration** in the **About/Setup...** dialog box
- Pressing the **Configure** button at the top of the ICU window
- Configuring the settings for each channel to the application's requirements
- Pressing the yellow **Write Values to Instrument** button at the bottom of the ICU display
- Respond as required to any notification dialog boxes which may be displayed

Create Application File(s) Overview



Application settings can be configured off-line and written to a file via *Create Application File(s)* mode. *Create Application File(s)* mode allows the designer of an application to provide a digital instrument configuration in a Application file to a technician who can then load the file into a digital instrument via *Activate And/or Load Application File(s)* mode. The Application password and serial number for a digital instrument are encrypted and saved in the Application file with the instrument's serial number by *Create Application File(s)* mode. This file, which is only valid for the specified instrument, can then be loaded into the instrument by a technician. Since the password in the file is encrypted, the technician can load the instrument settings without knowledge of the password and cannot obtain the password by looking at the contents of the file.

Application settings can be written to a file by:

- Selecting **Create Application File(s)** in the **About/Setup...** dialog box
- Pressing the **Application** button at the top of the ICU window
- Configuring the settings for each channel to the application's requirements
- Entering the serial number of the digital instrument being configured in the **File (.app)** box at the upper right of the ICU window (if a digital instrument is attached, the file name will default to the serial number of the attached instrument).
- Pressing the **Write** button in the upper right corner of the ICU window
- Responding as required to any notification dialog boxes which may be displayed
- Entering the Application password and pressing **OK** to write the application settings to the file

The application settings file (the digital instrument serial number followed by a .app extension) can now be copied from the ICU Data Directory defined in the **About/Setup...** dialog box and given to a technician for loading into a digital instrument.

Activate and/or Load Application File(s) Overview

Application settings can be configured off-line (without being attached to a digital instrument) and written to a file via ICU's *Create Application File(s)* mode. These settings can then be loaded from the file into a digital instrument by:

- Connecting a Digital Instrument to the computer and running ICU
- Selecting **Activate and/or Load Application File(s)** mode in the **About/Setup...** dialog box
- Placing the application file in the ICU Data Directory defined in the **About/Setup...** dialog box
- Connecting the digital instrument to be configured to the ICU COM port defined in the **About/Setup...** dialog box
- Pressing the **Activate** button at the top of the ICU window which will load the application file whose name matches the connected instrument's serial number into ICU. If the connected instrument's configuration does not match the configuration loaded in ICU the **Write Values to Instrument** will turn yellow
- Pressing the yellow **Write Values to Instrument** button at the bottom of the ICU display
- Responding as required to any notification dialog boxes which may be displayed

Calibration Overview

Calibration mode is used to calibrate and verify calibration of a Measurement Specialties Digital Instrument. Calibration requires access to NIST traceable stimuli and measurement instrumentation. Calibration requirements and recommendations, as well as a calibration procedure are provided after the descriptions of the calibration mode screens. Calibration mode is enabled by selecting Calibration in the **About/Setup...** dialog box.

Receive Telemetry Overview

Receive Telemetry is used to monitor and/or acquire data transmitted by a configured, installed and activated instrument. To use this mode:

- Connect a telemetry receiver that outputs received data to a PC com port
- Use **On-Line Configuration** mode or **Create Application File** mode to create an application file
- Set the Default Instrument in the **About/Setup...** dialog box
- Enable **Receive Telemetry** mode by selecting **Receive Telemetry** in the **About/Setup...** dialog box
- Press the **Receive** button at the top of the screen
- **Select** and **Read** the previously created application file
- Turn the Instrument on
- If data is to be saved to disk check the **Store Data** check box
- Use the **Begin Reception** button to start receiving data. Subsampled data will be displayed on the strip chart until the **Stop Reception** button is clicked

Calibrating Using ICU

Measurement Specialties Calibration Services

When your instrument is due for calibration, contact Measurement Specialties for recalibration. All of our instruments are supported on automated calibration systems for consistency and reliability.

Calibration Interval

Your instrument should be calibrated on a regular interval determined by the measurement accuracy requirements of your application. A yearly calibration interval is adequate for most applications. Accuracy specifications are warranted only if your instrument is regularly recalibrated at intervals of one year or less. Measurement Specialties does not recommend extending the calibration beyond two years for any application.

Calibration Password

Measurement Specialties digital instruments and sensors maintain a separate password for calibration values. The default password shipped from the factory is "**sical1**" (the password is case sensitive).

Warning

Record and keep passwords in a secure place! If a password is lost, the only way to restore access to the instrument is to send it back to Measurement Specialties.

Calibration Notes

Measurement Specialties digital instruments and sensors provide fields to store the Calibration Date/Time, Operator, and Temperature. ICU will automatically use the system date and time of the computer used to calibrate the instrument. Prior to writing calibration data to an instrument:

- Ensure that the computer's system date and time are set correctly
- Set the Calibration Operator field
- Set the Calibration Temperature field

These fields are displayed on the main page of ICU modes for easy verification of calibration interval.

Aborting or Interrupting Calibration

Calibration can be aborted at any time prior to writing calibration data to the instrument. Once calibration data for one channel is written to an instrument, calibration of the remaining channels should be completed without interruption. If a calibration is interrupted, all channels should be recalibrated when the calibration is resumed.

Calibration Requirements & Recommendations

- Provide as consistent an environment as possible while calibrating an instrument. The instrument should be allowed to warm up until stable prior to making measurement. Ideally the instrument should be calibrated at the temperature at which it is to be used. If this is not possible, an ambient temperature between 18°C and 28°C is recommended. All sensors in an instrument should be calibrated as close together in time as possible. The complete calibration of all sensors in a instrument should not be interrupted if possible. Calibration should be scheduled so that it will not be interrupted by breaks, lunch, etc.
- Since the time required to calibrate all the sensors in an instrument may consume the majority of the power available in an internal battery, the battery must be fully charged before starting calibration and instrument calibration should not be interrupted as delays will drain the battery.
- Should the battery fall below 30% of capacity during a instrument calibration, a battery monitor will pop up and calibration of the current sensor should be completed and written to the instrument, no additional sensors should be calibrated at this time. The instrument must then be powered down and recharged. When the battery is fully charged, calibration can be resumed.
- Under no circumstances should data be written to a instrument when the battery falls below 10% of capacity or when ICU's battery monitor is flashing. Writing data to an instrument when there is not enough power to complete the write may corrupt memory requiring its return to Measurement Specialties for repair.
- Carefully follow the "Calibration Procedure." The only step in this procedure that allows switching of instruments is step 8 after the instrument has been powered down. The procedure and ICU both assume that only one instrument will be calibrated at a time. Note that attempting to calibrate more than one instrument at a time can easily cause carefully acquired, NIST traceable, calibrations to be corrupted if the "Calibration Using ICU" procedure is not followed to the letter. It is for this reason that **Measurement Specialties does not support nor recommend manual calibration of more than one instrument at a time.**
- Use the automated calibration provided by ICU, carefully following each step of the script. Since it is easier to make a mistake when calibrating manually, manual calibration should only be used when automated calibration cannot be used.
- Run ICU on a personal computer capable of supporting communications to a instrument at 38400 BAUD. Most 750MHz and faster desktop computers should work. Many laptop and older desktop computers are unable to support ICU at 38400 BAUD. Running ICU at a slower BAUD rate can extend calibration time beyond the capacity of the battery.
- All equipment used in calibration must be installed, calibrated and operated within manufacturer's specification. In addition to being required if NIST traceability is desired, use of equipment outside of manufacturer's specifications and recommendations can corrupt measurements and the resulting calibration.

Calibration Procedure

Instruments should only be connected when ICU is in Idle mode. Connecting instruments in Calibration mode can corrupt calibrations, disable ICU's low battery monitor, and damage an instrument if it is written when the battery is low. Follow these steps:

1 Run ICU program.
2 If **Calibration** Button does not appear at top of ICU screen, click on the **About/Setup...** button at the bottom of the screen and set **Program Usage** to **Calibration**
3 Connect PC to instrument using cables supplied with programming kit.
4 Apply power to instrument.
5 Enter calibration mode by clicking the **Calibration** Button at top of ICU's screen, ICU will automatically set unity gain and zero offset and log this at the bottom of the screen.
6 Perform the following steps for each channel to be calibrated:
  6.1 Select the channel to be calibrated by clicking on the appropriate tab.
  6.2 For automated calibration (preferred method), click the **Run Calibration Script** button and follow the instructions. If manual calibration is required, acquire measurements at each stimulus point by repeating the following steps:
    6.2.1 Enter the value of stimulus that will be applied to the channel in the entry box labeled **"Stimulus:"**. This entry box is not displayed when a channel is not the first channel using a source or if the source is not a sensor.
    6.2.2 Apply the stimulus. This may involve orienting the sensor with respect to gravity, applying known centrifugal accelerations via a rate table, etc.
    6.2.3 Click the **Average <n> Samples** button located just below the graph (the number of samples to be averaged, <n>, is set in the **About/Setup...** dialog box). After averaging readings, ICU will:
      A. append the new measurement to the bottom of the **Cal Measurements** box
      B. compute a new offset and gain for sensor by fitting a least squares best fit (LSBF) straight line to the values in the **Cal Measurements** box. If the new gain cannot be computed (for example, when only one measurement point is taken), then the existing gain is retained. The **Write Values to Instrument** button turns yellow when either the new offset or gain value is different than those currently loaded in the instrument.
    6.2.4 If required, delete or edit calibration measurements in the **Cal Measurements** box.
    6.2.5 Click the **Calculate Input Sensor Cal Values** button to update ICU's gain and offset values to those calculated by the LSBF algorithm above. Since this usually changes the **Cal Measurements**, the **Write Values to Instrument** button will turn yellow.
    6.2.6 Click the **Write Values to Instrument** button to write the new calibration to the instrument. A pop up will ask for the calibration password to be entered. Enter the calibration password and click the OK button. Note that the calibration data will not be written to the instrument unless the calibration password is correctly entered.

7 After all sensors have been calibrated, **Monitor** mode can be used to confirm that the calibration was done correctly. This is required because **Calibration** mode forces unity gain, thus calibration changes cannot actually be observed in **Calibration** mode.

8 Click on the **Idle** button at the top of the screen when calibration and verification of the instrument is completed. A power pop-up dialog will be displayed if the instrument has a built-in battery, in this case tell ICU to power the instrument down. Disconnect instrument from PC. Go to step 3 if another instrument is to be calibrated.

Configuring Telemetry

Telemetry settings are displayed in all ICU operating modes. An instrument's telemetry frame is defined by:

- the Telemetry Settings on the **Main Tab**
- the IRIG portion of the Output Settings on each **Channel Tab**

If the IRIG telemetry is to be output on the **Aux Pin**, the **Aux Pin** must be set to **OUT IRIG**.

These settings are described here followed by a description of how these settings are used to build a telemetry frame. ICU also provides a telemetry report to simplify verification of an instrument's telemetry configuration.

Telemetry Frame

A telemetry frame consists of a Sync character followed by a number of data words:

Sync	Word1	Word2	Word3	Word4	...	Wordn

ICU sets the Sync character to the value recommended by the IRIG-106 specification and shown on the Telemetry Report. A channel is assigned to a specific word in the frame by using the Channel Tabs. In addition to channel data, some instruments allow a Counter and/or a CRC to be assigned to the last word(s) in a Frame.

There are several different ways to configure the IRIG frame. If every channel is assigned a unique IRIG word position, all channels can be transmitted at the same rate, once per major frame. Alternatively, supercommutation can be selected and each channel is repeated the programmed number of times in each frame.

Subcommutation and Supercommutation are provided when multiple channels are assigned to an IRIG word. This causes different channels to be transmitted at different rates, depending on how many channels are assigned to an IRIG word position.

When every channel is assigned to a unique IRIG word.

- **Simple frame setup**

  Comm ID set to a number of bits, ‘SUP, or ‘SU+’

Every channel is assigned to a unique IRIG word. Each channel is transmitted once every frame.

Sync	Word1	Word 2	Word 3
Sync	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3
:	:	:	:

- **Supercommutation**

  Comm ID set to ‘S*2,‘S*3’,‘S*4’,‘S*5’,‘S*6’,‘S*7’, or ‘S*8’ -

Every channel is assigned to a unique IRIG word, but ‘S*N’ is selected as the Comm ID. In this case each channel is transmitted N times per frame. This is more efficient than the previous case because the channel data is sent at N times the rate the sync, frame counter or CRC is sent. This reduces the overhead for sending framing information and more time is spent sending data. For example if ‘S*2’ is selected:

Sync	Word1	Word 2	Word 3	Word4	Word 5	Word 6
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn3
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn3
:	:	:	:			

When multiple channels are assigned to the one IRIG word:

- **Subcommutation**

  Comm ID is set to a number of bits

  A subcommutation counter is inserted before the first word with multiple channels assigned. The subcommutation counter starts counting at zero, is incremented by one for each subcommutated channel and resets to zero after the highest subcommutated channel is output. The channels are subcommutated by placing the channels in the word position in successive frames. Channels are assigned to frames in channel order. The Telemetry Report shows the

subcommutate counter value placed in the frame for each channel. The channel sequence for each subcommutated word is restarted when the subcommutate counter is zero.

Sync	Word1	Subcommute Counter	Word 3
Sync	Chn1	0	Chn2
Sync	Chn1	1	Chn3
Sync	Chn1	2	Chn4
Sync	Chn1	0	Chn2
Sync	Chn1	1	Chn3
Sync	Chn1	2	Chn4
:	:	:	:

- **Subcommutation** (with Supercommutation on a subframe)

  Comm ID is set to a number of bits

  If more than one IRIG word has more than one channel assigned, the sequence for a single word is restarted after the last channel assigned to the word is output. Thus, if a different number of channels are subcommutated on multiple words, the words with smaller numbers of channels will fill the remaining frames with a partial sequence. For example, if channel 1 is assigned to word 1, channels 2, 3, and 4 are assigned to word 2 and channels 5 and 6 are assigned to word 3, the following sequence is transmitted. One cycle through the commutation counter is a major frame.

Sync	Word1	Subcommute Counter	Word 3	Word 4
Sync	Chn1	0	Chn2	Chn5
Sync	Chn1	1	Chn3	Chn6
Sync	Chn1	2	Chn4	Chn5
Sync	Chn1	0	Chn2	Chn5
Sync	Chn1	1	Chn3	Chn6
Sync	Chn1	2	Chn4	Chn5
:	:	:	:	:

- **Supercommutation**

  Comm ID is set to SUP

This is similar to subcommutation except that there is only one sync per major frame. In this example channels 3,4 and 5 are assigned to IRIG word 3. The supercommutated channels (the ones that have a one to one mapping to an IRIG word) are repeated three times in the major frame.

Sync	**Word1**	**Word 2**	**Word 3**	**Word4**	**Word 5**	**Word 6**	**Word7**	**Word 8**	**Word 9**
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	Chn1	Chn2	Chn5
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	Chn1	Chn2	Chn5
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	Chn1	Chn2	Chn5
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	Chn1	Chn2	Chn5
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	Chn1	Chn2	Chn5
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	Chn1	Chn2	Chn5
:	:	:	:	:	:	:	:	:	:

- **Supercommutation plus**

  Comm ID is set to SU+

This is like SUP except that the supercommed channels (the ones that have a one to one mapping to an IRIG word) are repeated at the end of the frame. In this example channels 3,4 and 5 are assigned to IRIG word 3. The supercommed channels are repeated four times in the major frame.

Sync	**Word1**	**Word 2**	**Word 3**	**Word4**	**Word 5**	**Word 6**	...
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	...
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	...
Sync	Chn1	Chn2	Chn3	Chn1	Chn2	Chn4	...
:	:	:	:	:	:	:	

Word7	**Word 8**	**Word 9**	**Word 10**	**Word 11**
Chn1	Chn2	Chn5	Chn1	Chn2
Chn1	Chn2	Chn5	Chn1	Chn2
Chn1	Chn2	Chn5	Chn1	Chn2
:	:	:	:	:

Telemetry Channel Setup Example

The channels in an instrument often fall into requiring either a high update rate or a very slow update rate. For example, some channels may be dedicated to monitoring the environment in which an instrument is operating while the remaining channels are used to gather the test data. A good example would be an Inertial Measurement System with:

- three accelerometer channels
- three rate gyro channels
- two temperature channels
- one pressure channel
- one battery current channel
- one battery voltage channel
- Comm ID is 16
- CRC is set to 32
- Frame ID is set to 8

The accelerometers and rate gyros are used to gather the inertial test data and the remaining channels are used to monitor the "health" of the instrument making the test. Set the Channel Tabs as follows:

Chn	Source	ID	IRIG Word Position
1	Accelerometer 1	A1	1
2	Accelerometer 2	A2	2
3	Accelerometer 3	A3	3
4	Rate Gyro 1	G1	4
5	Rate Gyro 2	G2	5
6	Rate Gyro 3	G3	6
7	Temperature 1	T1	7
8	Temperature 2	T2	7
9	Battery Voltage	VB	7
10	Battery Current	IB	7
11	Pressure	P1	7

If the CRC and Counter are enabled on the Main Tab, the Telemetry Stream will be as follows:

Sync	Word 1	Word 2	Word 3	Word 4	Word 5	Word 6	Sub Count	Word 8	Count	CRC
Sync	A1	A2	A3	G1	G2	G3	0	T1	0	CRC
Sync	A1	A2	A3	G1	G2	G3	1	T2	1	CRC
Sync	A1	A2	A3	G1	G2	G3	2	VB	2	CRC
Sync	A1	A2	A3	G1	G2	G3	3	IB	3	CRC

Sync	A1	A2	A3	G1	G2	G3	4	P1	4	CRC
Sync	A1	A2	A3	G1	G2	G3	0	T1	5	CRC
Sync	A1	A2	A3	G1	G2	G3	1	T2	6	CRC
Sync	A1	A2	A3	G1	G2	G3	2	VB	7	CRC
Sync	A1	A2	A3	G1	G2	G3	3	IB	8	CRC
Sync	A1	A2	A3	G1	G2	G3	4	P1	9	CRC
:	:	:	:	:	:	:	:	:	:	:

Using the example above but changing to **Supercommutation**

- Set the **Comm ID** to **SUP**
  (Note this is one long frame broken up to fit on the page)

Sync	**Word 1**	**Word 2**	**Word 3**	**Word 4**	**Word 5**	**Word 6**	**Word 7**	
Sync	A1	A2	A3	G1	G2	G3	T1	...
:	:	:	:	:	:	:	:	

	Word 8	**Word 9**	**Word 10**	**Word 11**	**Word 12**	**Word 13**	**Word 14**	
...	A1	A2	A3	G1	G2	G3	T2	**...**
	:	:	:	:	:	:	:	

	Word 15	**Word 16**	**Word 17**	**Word 18**	**Word 19**	**Word 20**	**Word 21**	
...	A1	A2	A3	G1	G2	G3	VB	**...**
	:	:	:	:	:	:	:	

	Word 22	**Word 23**	**Word 24**	**Word 25**	**Word 26**	**Word 27**	**Word 28**	
...	A1	A2	A3	G1	G2	G3	IB	**...**
	:	:	:	:	:	:	:	

	Word 29	**Word 30**	**Word 31**	**Word 32**	**Word 33**	**Word 34**	**Word 35**	**Word 36**	**Word37**
...	A1	A2	A3	G1	G2	G3	P1	Count	CRC
	:	:	:	:	:	:	:	:	:

Changing Passwords

Two passwords are maintained in each Measurement Specialties digital instrument, a Calibration Password and an Activation Password. The Calibration Password is used to prevent unauthorized modification of calibration settings. With the exception of the settings which can be changed in **Activate and/or Load Application File(s)** mode, the Activation Password prevents unauthorized modification of non-calibration settings.
When shipped from Measurement Specialties, both Calibration and Activation passwords are set to: **si**
Each password can optionally be changed when writing values to an instrument. For example when new application values are written to an instrument, the following dialog box is displayed:

Checking the **Set New Password** box changes the dialog box to:

To change the password, the current Activation Password must be entered in the entry field above the check box and the new password must be entered into the **New Password** and **Verify New Password** entry fields. The password will be displayed as stars * when entered.

Warning

Record and keep passwords in a secure place! If a password is lost, the only way to restore access to the instrument is to send it back to Measurement Specialties.

Configuration Management

Whenever ICU is connected to a digital instrument, ICU will capture the instrument's configuration, including calibration, and write it to a file with a **.set** extension. See **ICU Reference Manual** for file naming conventions.

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