

iScan Software

VERSION 6.0

THIS SOFTWARE IS REQUIRED FOR PROGRAMMING SCANNER FUNCTIONS

KEEP THIS MANUAL IN A SAFE PLACE FOR FUTURE REFERENCE!

Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual can result in serious injury or death or damage to equipment.

Scanners that can use this software:

PART NUMBER	TYPE	AREA OF USE	DEFAULT FACTORY CONFIGURATION
04004999-MB	iS3-MB	NEC CLASS I/DIV 2	Fully Programmable – Must Be Configured Prior to Use
04005000-MB	iS3-MB	NEC CLASS I/DIV 2 IECEX Zone 2	Fully Programmable – Must Be Configured Prior to Use
04004999-SB	iS3-SB	NEC CLASS I/DIV 2	Limited Programmability
04005000-MB	iS3-SB	NEC CLASS I/DIV 2 IECEX Zone 2	Limited Programmability
2653-271-11	iS2-SB	NON-HAZ	Limited Programmability
2653-271-05	iS2-SB	HAZ	Limited Programmability
2653-271-12	iS2-MB	NON-HAZ	Fully Programmable – Must Be Configured Prior to Use
2653-271-62	iS2-MB	NON-HAZ-FO	Fully Programmable – Must Be Configured Prior to Use
2653-271-06	iS2-MB	HAZ	Fully Programmable – Must Be Configured Prior to Use

Contact Technical Support +1.866.821.5504 with any questions.

For a list of relevant patents and trademarks, please see <http://www.chenronics.com/legal-notice>.

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1 Safety Information

IMPORTANT SAFETY INFORMATION

Read All Instructions before Using

The instructions provided in this manual have been prepared to serve as a general guide. It is intended for use by qualified personnel with knowledge of Equipment of this type. It is not intended to cover all possible variations in equipment or to provide for specific operating problems which may arise.

You are responsible for adhering to all warnings or cautions provided in this Manual.

In addition to any general safety measures provided in this Manual, you must comply with all current national, state, local and company safety regulations at all times.

Safety Symbols used in this manual comply with ISO 3864.



Indicates a hazard with a high level of risk which, if not avoided will result in death or serious injury.



Indicates a hazard with a medium level of risk which, if not avoided could result in death or serious injury.



Indicates a hazard with a low level of risk which, if not avoided will result in minor or moderate injury.

2 Customer Support

For Technical Support

Inside USA Call: 866.821.5504

Outside USA Call: +1.607.334.5531

Website: <http://www.chentronics.com/products/support/>

3 Single User Software Agreement

PLEASE READ THIS SINGLE USER SOFTWARE AGREEMENT ("AGREEMENT") CAREFULLY. BY INSTALLING THIS SOFTWARE UPGRADE, YOU ACCEPT A BINDING CONTRACT BETWEEN YOU AND CHENTRONICS CORPORATION, ("CHENTRONICS"), AND AGREE TO BE BOUND BY THE TERMS HEREIN.

This Agreement accompanies the Chentronics Flame Scanner and its applicable configuration and/or display software ("Software"). The term Software also shall include any upgrades, modified versions or updates of the Software, licensed to you by Chentronics. Please read this Agreement carefully. At the end, you will have the choice of either accepting this Agreement and continuing to install the Software or returning the scanner equipment, with its supporting Software, subject to a restocking charge for returning equipment which may have been customized for a specific application and/or for equipment which is no longer considered new.

IMPORTANT ----- DO NOT USE THE INFORMATION OBTAINED FROM THE SOFTWARE FOR ANY CONTROL OR SAFETY RELATED FUNCTIONS. THE INFORMATION OBTAINED FROM THE SOFTWARE IS SOLELY FOR INFORMATIONAL PURPOSES AND IS INTENDED FOR DISPLAY PURPOSES ONLY. FOR FURTHER INFORMATION CONSULT THE APPLICABLE SCANNER USER MANUAL

1. Function and Purpose of the Software.

The sole purpose and function of the Software is to provide a mechanism for adjusting the Chentronics Flame Scanner to suit the application and/or to provide a means for displaying scanner operational information.

2. License Grant.

Chentronics grants you a non-exclusive, royalty free, limited license to Use one copy of the Software. "Use" means storing, loading, installing, executing or displaying the Software. You may not modify the Software or disable any licensing or control features of the Software.

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5. No Disassembly or Decryption.

You may not disassemble or decompile the Software without prior written consent from Chentronics. You may not decrypt the Software.

6. Transfer.

This license will automatically terminate upon any transfer of the Chentronics Flame Scanner product with its Software to a third party without receiving prior written authorization for the transfer from Chentronics. Upon transfer, you must deliver the Software, including any copies and related documentation, to the transferee. The transferee must accept the terms of this Agreement as a condition to the transfer.

7. Termination.

Chentronics may terminate your license upon notice for failure to comply with any terms of the Agreement. Upon termination, you must immediately destroy the Software, together with all copies, in any form.

8. Export Requirements.

You may not export or re-export the Software or any copy or adaptation in violation of any applicable laws or regulations.

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To the extent that the Software and documentation are being used in support of a contract with the United States Government, Chentronics asserts that the Software and documentation have been developed entirely at private expense and, therefore, are provided as "Commercial Computer Software" or "Restricted Computer Software" as defined in the following clauses: FAR § 27.405-3, Commercial computer software, FAR § 227-14, Rights in Data—General, FAR § 227-19, Commercial Computer Software License (DEC 2007), DFARS § 252.227-7014, Rights in Noncommercial Software and Noncommercial Computer Software Documentation (FEB 2014), and any other applicable FAR or DFARS clause. Chentronics

is responsible for (1) providing adequate documentation to verify the funding sources of the development of the Software and documentation and (2) supplying the Software and documentation with any markings necessary to limit the rights acquired by the Government. The Government may obtain only those rights provided by the Chentronics standard Software agreement for the product or the applicable FAR or DFARS clause.

10. Governing Law.

This Agreement shall be governed by and interpreted in accordance with the laws of the State of New York. Venue for any action arising out of this Agreement, including breach whether sounding in contract, tort or otherwise, shall be commenced and maintained exclusively in the state or federal courts located in New York, New York. YOU WAIVE, TO THE FULLEST EXTENT PERMITTED BY LAW, ANY RIGHT YOU MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY SUIT, ACTION, CLAIM OR PROCEEDING RELATING TO THE AGREEMENT.

11. Warranty.

The Software is delivered to you "AS IS" and Chentronics makes no warranty as to its use or performance. CHENTRONICS DOES NOT AND CANNOT WARRANT THE PERFORMANCE OR RESULTS YOU MAY OBTAIN BY USING THE SOFTWARE OR DOCUMENTATION. CHENTRONICS MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE.

12. Design.

Chentronics reserves the right at any time to discontinue the manufacture of any model or make changes in design to add improvements to products or Software without incurring any obligations to furnish or install the same on products previously manufactured. All data and dimensions provided in bulletins are to be considered reasonably accurate at the time of printing. Where exact dimensions and data are required Chentronics can provide certified drawings and specification sheets to reflect the product specifications at the time of manufacture.

13. Severability.

In the event any provision of this Agreement is held by a tribunal of competent jurisdiction to be unenforceable or otherwise contrary to the law, the remaining provisions of this Agreement will remain in full force and effect.

14. Successors and Assigns.

This Agreement shall be binding on, inure to the benefit of, and be enforceable by the parties and their respective heirs, successors and valid assigns.

15. Survival.

The provision addressing the limitation of liability and all other provisions which by their nature are intended to survive, shall survive the expiration or termination of the license or Agreement.

16. LIMITATION OF LIABILITY.

(A) IN NO EVENT SHALL CHENTRONICS BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOSS OF PROFITS, REVENUES OR OTHER ECONOMIC LOSSES, WHETHER ARISING UNDER WARRANTY/GUARANTEE, CONTRACT, NEGLIGENCE (INCLUDING NEGLIGENT MISREPRESENTATION), STRICT LIABILITY, INDEMNIFICATION, OR ANY OTHER CAUSE OR COMBINATION OF CAUSES, INCLUDING ANY THEORIES OF CONCURRENT LIABILITY ARISING FROM A DUTY OF CARE BY OPERATION OF LAW OR OTHERWISE NOTWITHSTANDING ANY FUNDAMENTAL BREACH OR FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. (B) IN NO EVENT SHALL THE OVERALL CUMULATIVE LIABILITY OF CHENTRONICS EXCEED ONE HUNDRED DOLLARS (\$100.00). (C) YOUR REMEDIES ARE LIMITED TO THOSE REMEDIES EXPRESSLY STATED IN THIS AGREEMENT; AND, THESE REMEDIES SHALL NOT FAIL THEIR ESSENTIAL PURPOSE BECAUSE YOU ARE LIMITED TO THE EXCLUSIVE REMEDIES AS STATED HEREIN. (D) THESE LIMITATIONS SHALL APPLY NOTWITHSTANDING ANY FUNDAMENTAL BREACH OR FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY.

4 General

4.1 Product Description

iScan Software is designed for communication with the iScan series of Flame Scanners. The “MB” models of iScan allow a high degree of user programmability, including networking of multiple scanners. The “SB” models are pre-programmed for automatic operation, intended for single burner applications where flame discrimination and network communications are not required. iScan Software is compatible with both series of scanners and can be a useful tool for monitoring scanner performance.

4.2 Definitions

FLICKER – Flicker Frequency refers to the modulation of flame intensity due micro-explosions of the fuel.

FORT – Flame On Response Time - the period of time from flame intensity rising above the user adjustable threshold to flame relay contacts closed.

TFVRT - Total Flame Failure Response Time - the period of time between the loss of a sensed flame and the signal indicating the absence of flame.

MFVRT – Marginal Flame Failure Response Time – period of time from flame intensity falling below the user adjustable threshold to the flame relay contacts open.

EASI - *Electronically Assisted Sight Indicator* – refers to the red LED (Light Emitting Diode) located on the back of the Non-hazardous Area Models, that flashes to indicate flame intensity. When no flame is present the LED blinks approximately 1 time per second. When a flame is present the LED’s blink rate increases proportional to the flame intensity. At optimal sighting and scanner gain, the LED blinks at approximately 30 times per second. If the LED is on solid or off the scanner is faulted and should not be used.

ROL – Ring of Light – multi-colored LED status indication on the back of the iScan3 model scanners.

GAIN – When a signal is amplified, GAIN is the ratio of the amplified signal relative to the original.

DISCRIMINATION – is the ability to distinguish between multiple flames. An example of good discrimination is when the scanner is able to recognize the difference between a pilot flame on one burner, to that of a main fuel flame on another burner.

4.3 System Requirements

4.3.1 Operating Systems

This version of iScan Software is compatible with the following operating systems:

- Microsoft Windows XP (SP3 32-bit)
- Microsoft Vista (32 and 64-bit)
- Microsoft Windows 7 (32 and 64-bit)
- Microsoft Windows 8 (32 and 64-bit)
- Microsoft Windows 10 (32 and 64-bit)

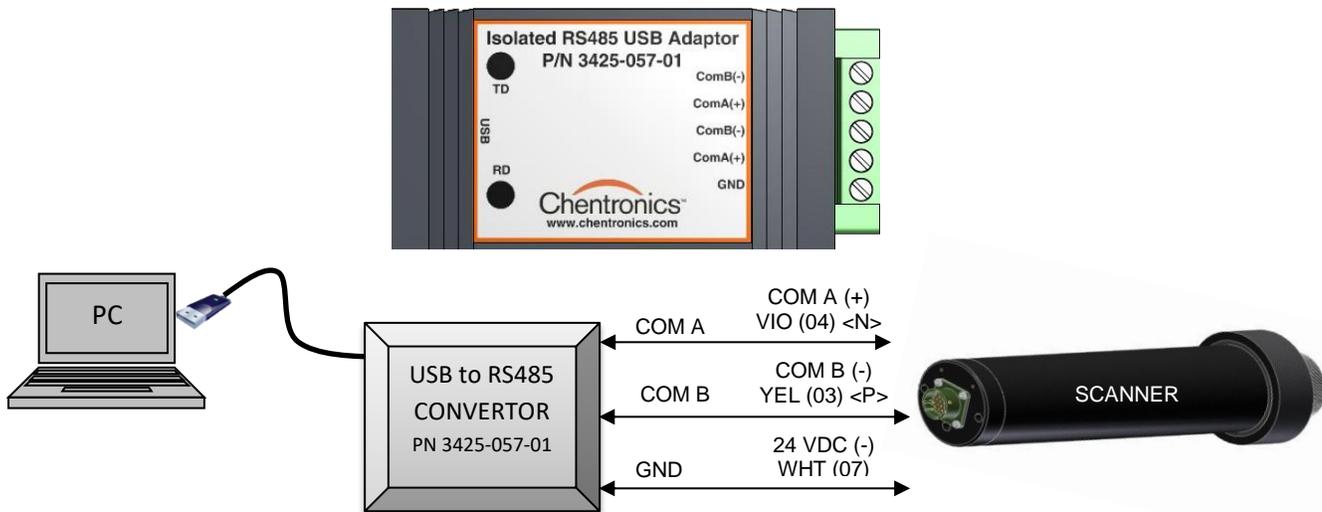
4.3.2 Scanner Compatibility

SCANNER PART NUMBER	USER PROGRAMMABLE FEATURES (with iScan Software)						
	4-20 mA SIGNAL MAPPING	4-20 mA Calibrate	4-20 mA Gain	FLAME RELAYS SERIES –or– INDEPENDENT	RESPONSE TIME (FLAME ON)	MULTIPLE SETUP FILES	RESPONSE TIME (FLAME OFF)
04004999-MB	YES	YES	YES	YES	YES	YES	YES
04005000-MB	YES	YES	YES	YES	YES	YES	YES
04004999-SB	YES	YES	YES	YES	NO	NO	NO
04005000-SB	YES	YES	YES	YES	YES	YES	YES
2653-271-12	YES	YES	YES	YES	YES	YES	YES
2653-271-62	YES	YES	YES	YES	YES	YES	YES
2653-271-06	NO	YES	YES	NO	YES	YES	YES
2653-271-11	NO	YES	NO	YES	NO	NO	NO
2653-271-05	NO	YES	NO	NO	NO	NO	NO

4.3.3 USB to RS-485 Converter Kit 07005113

NOTE: The iScan USB to RS-485 Converter Kit is required for communication between scanner(s) and a PC. It includes the USB Adaptor, USB cable and CD with drivers and instructions.

The RS485/USB Adaptor provides direct connection from the RS485 bus to a USB port. Up to 127 scanners (with repeaters every 30 scanners) may be connected to one network up to 4000 ft (1200 m) long. Refer to APN-17000000 for wiring instructions. The kit contains software and installation instructions if needed however iScan Software installation incorporates the USB Adaptor installation.



5 iScan Software

5.1 Getting Started

NOTE: iScan MB Models must be configured with iScan Software prior to operation. Factory settings, by design, are intended to force the user to go through initial setup.

iScan Software is used to set the proper gain, flicker setting, threshold and timers for the application. It must be installed on the PC using the “Setup” program provided. Download the latest software at:

<https://www.chentronics.com/literature-support/>

5.2 Graphics Display Settings

iScan Software is best viewed using small font size in the display settings in Windows. For best results, the display settings should be set to the smallest size. The display settings can be adjusted before or after iScan Software installation. Below are some tips for various operating systems on how to adjust the display settings.

Windows XP – Control Panel > Display > Appearance Tab > Font size: select Normal

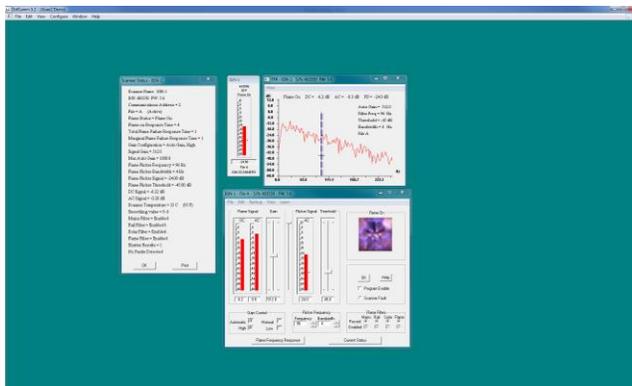
Windows 7 – Control Panel > All Control Panel Items > Display: select Smaller – 100%

Windows 8 – Control Panel > All Control Panel Items > Display: slide select to Smaller

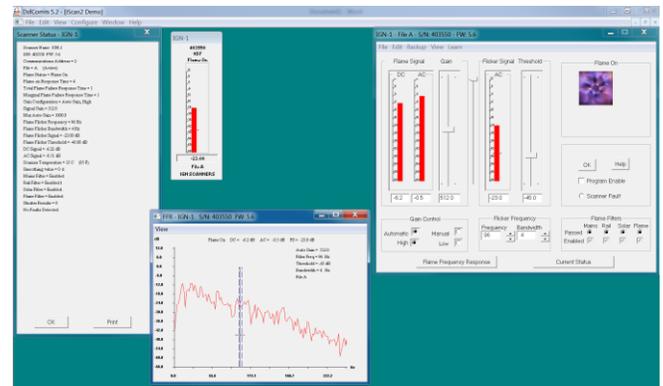
Windows 10 – Start > Settings > System > Display: change size of text, apps and other items to 100%

Below are examples of a graphics display with properly sized fonts and a graphics display showing the effects that can be caused by selecting too large a font size.

Proper Display Settings (Small Fonts)



Improper Display Settings (Large Fonts)



If the PC’s settings are not optimal, iScan Software will display the red warning in the startup splash screen. Close iScan Software, adjust the display settings, and re-launch iScan Software. The graphics display will improve.

5.3 Installation

Step 1: Exit all programs before installing iScan Software.

Step 2: Install the latest version of iScan Software from the Chentronics' website at:

<https://www.chentronics.com/literature-support/>

Download the files to the PC first. The program will not install from the website. Using an internet browser navigate to the support website listed above. Follow the instructions to obtain the latest version of iScan Software. Download the folder to the PC's desktop. Open the folder and run the "Setup" program and follow the instructions.

Step 3: When the program is run for first time, it will take the user through the steps x through y below as part of the setup.

NOTE: *These settings can be changed later from the Setup menu.*

Step 4: The "Setup" program installs iScan Software and creates a iScan Software icon on the Windows Desktop.

Step 5: Connect the USB Adaptor to a PC and make sure that the COMM port is correctly identified.

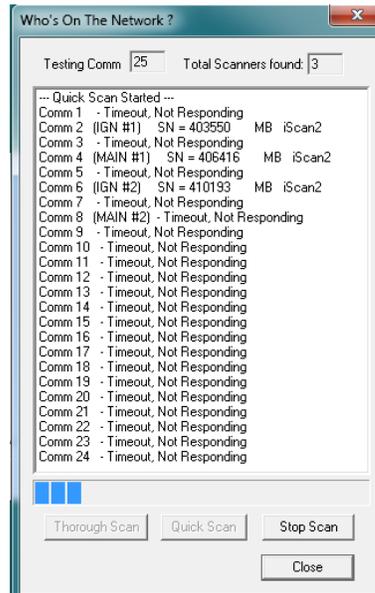
Step 6: Use the iScan Software icon to start the program. The main iScan Software window will appear.

Step 7: The Setup Notice window will pop up instructing the user to "ensure that your device [USB Converter] is connected to your computer via USB". Click OK. iScan Software will guide the user through getting the PC's Comm Port configured correctly.

Step 8: When the Comm Port has been configured, iScan Software will open a Password window prompting the user to "Enter Password". This password is used to enable configuration changes (refer to paragraph 5.6) so be certain to remember it. After entering a password, click OK, the Password window will pop up again prompting the user to "Enter Password Again". Click OK.

Step 9: Connect one scanner to the converter.

Step 10: Open the iScan Software and select View > Who's On The Network. There are two options: Thorough Scan and Quick Scan. The Thorough Scan attempts to communicate with each address five times before trying the next address while the Quick Scan attempts each address only once and then moves to the next address.



Step 11: If there is no response, open the PC's Device Manager:

Step 11 a: Control Panel > System > Device Manager > Ports (COM & LPT)

Step 11 b: Look for "RS-485 Isolated Port (COMn)" where n is the port number the PC has assigned to the USB Converter. Note that number.

Step 11 c: In the main iScan Software window select Setup > Communications. A Communications Setup pop up will appear. Using the up/down arrow select the port number that matches what was noted in **Step 11 b**. Click OK.

Step 11 d: Repeat **Step 10** above. If there is still no response contact Customer Support for assistance.

5.4 Network Addresses

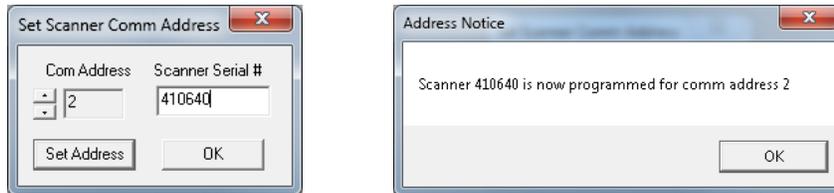
Each iScan flame scanner is shipped with its Comm Address set to "1". Each scanner needs to be configured to its own unique communications address (1–127) before communication can be established with all scanners on the network. Make a list of communication addresses, scanner names, and scanner serial numbers. The scanner name is a user selectable description (limited to nine characters). The scanner serial number is a six (6) digit number located on a bar code label on the scanner housing.

NOTE: Start with COMM Address set to 2 to avoid conflict when a spare unit is placed in the network. Number the remaining scanners consecutively thereafter.

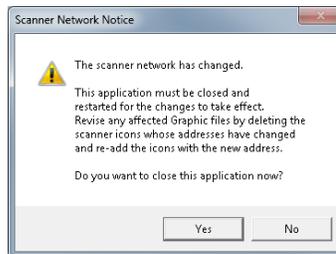
A sample list of Network Addresses is shown below:

COMM Address	Scanner Name	Serial Number
COMM 2	Burner A1	510640
COMM 3	Burner A2	610429
COMM 4	Burner B1	410419
COMM 5	Burner B2	603550

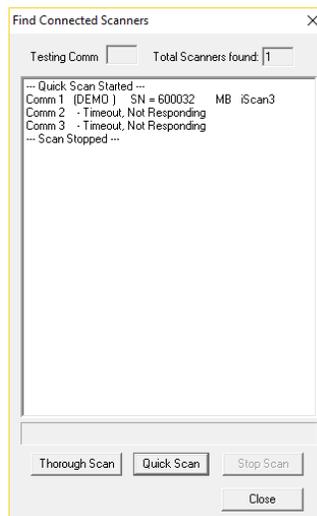
Set the Comm Address for each scanner by using the Setup > Scanner Address command from the main program menu. Enter the Comm Address and corresponding Scanner Serial Number and click on Set Address.



Once all addresses are set click OK, the program will prompt for restart, Click YES:



Confirm that each scanner has been configured for the correct Comm Address by selecting Scanner Status / Find Connected Scanners and comparing to the generated list. There are two options: Thorough Scan and Quick Scan. The Thorough Scan attempts to communicate with each address five times before trying the next address while the Quick Scan attempts each address only once and then moves to the next address.



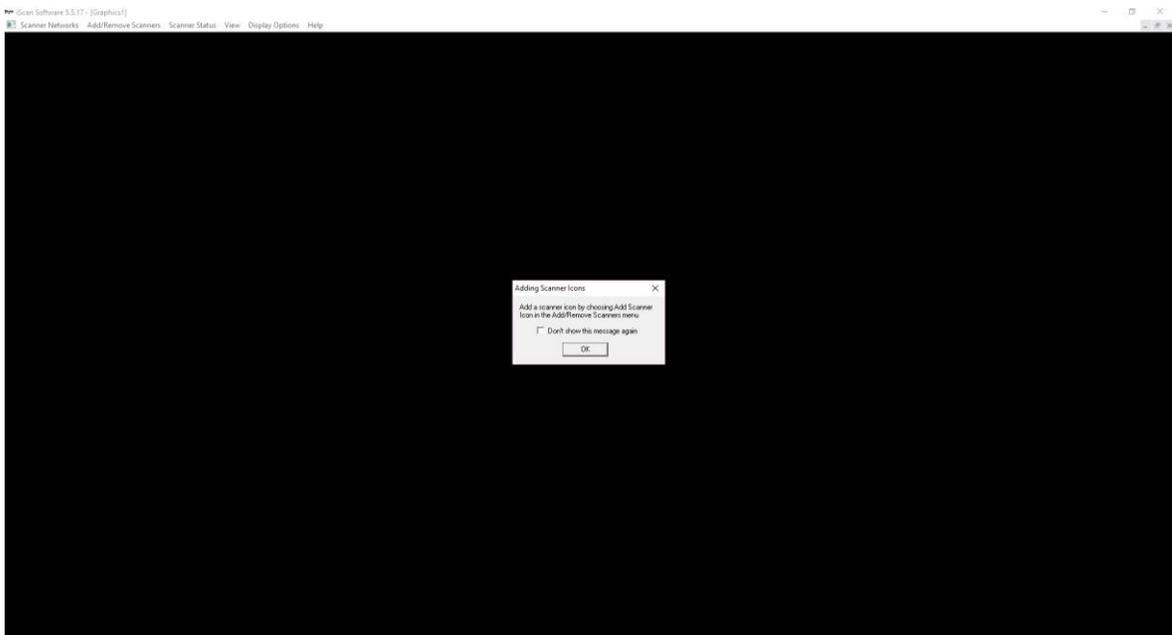
5.5 Graphics Files Setup and Functionality

Graphics files are used to create and store groupings of scanner icons. This allows the user to setup each scanner and monitor status. Assign unique names to each scanners icon. When a scanner is moved or replaced, the graphics file(s) should be updated to reflect changes.

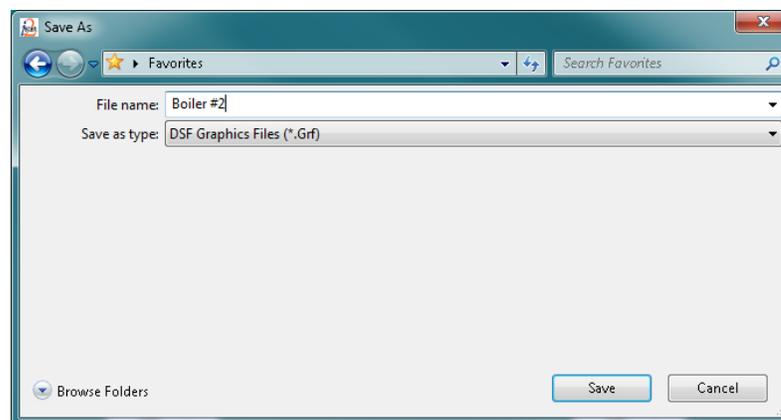
A graphics file could be created for each boiler, burner deck, corner elevation, pilot or main flame scanner groupings, etc. If there is not enough room in one graphics file to display all the scanner icons, then multiple graphics files may be created. The refresh rate of the icons is depends on the number of icons so more icons results in slower updates.

To create a new graphics file:

Step 1: Scanner Networks / New from the main menu. The new graphic file will appear.



Step 2: Name the graphics file by selecting Scanner Networks file / Save As from the Main Menu, typing in a name such as “Boiler #2”, and select Save. The name of the graphics file will appear in the title bar.

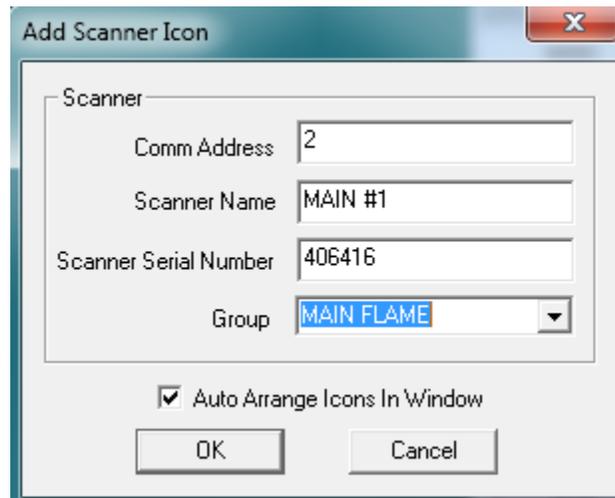


5.5.1 Populate the Graphics File with Scanner Bar Graph Icons

Scanner icons permit access to individual flame scanners on the network for configuration, monitoring, real-time flame status and displaying data. To create a new Scanner Icon:

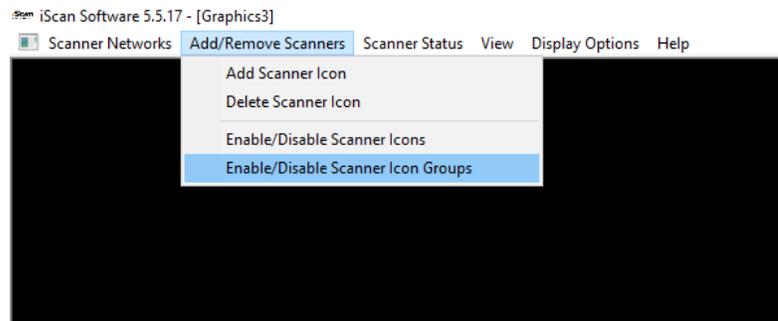
Step 1: Make sure the graphics file where the scanner icon will be stored is open.

Step 2: Select Add/Remove Scanners / Add Scanner Icon from the menu. The Add Scanner Icon dialog box will open.



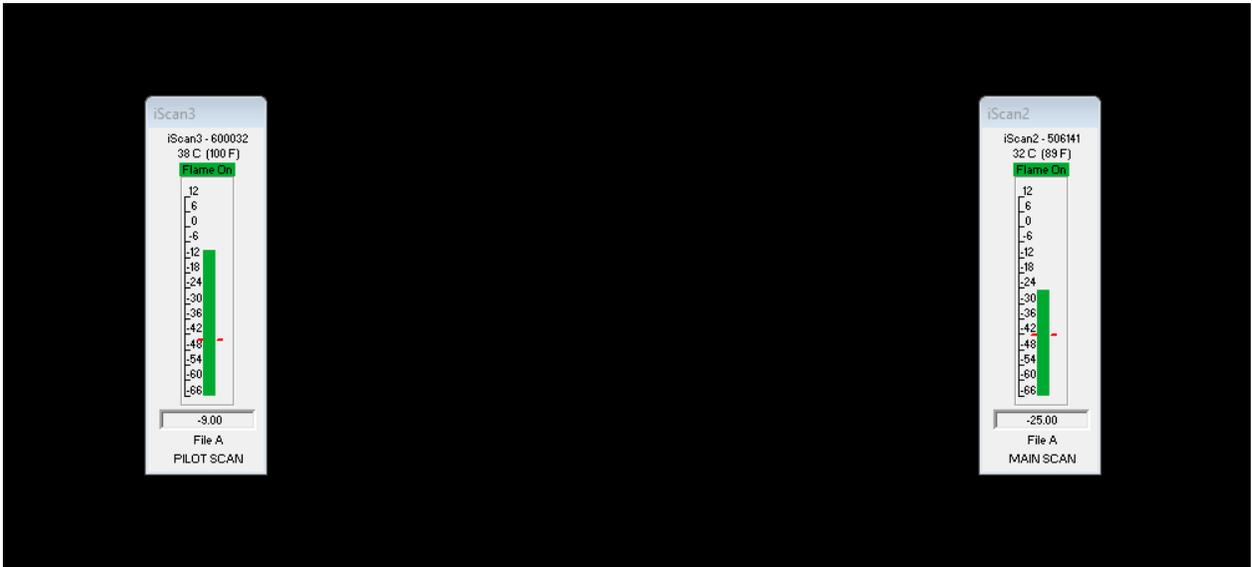
Step 3: Enter the Comm Address, the Scanner Name, Scanner Serial Number and Group Name. Note, there is an Auto Arrange Icons In Window checkbox in the dialog box. Checking this will evenly space the icons in the window.

GROUPS allow for organizing Icons for prioritized viewing. Examples could be a group for the Main Flame Scanners and another for Igniters Scanner. Level A, B, C, & D Scanners, Corner 1,2,3,4



Step 4: Select OK. A new scanner icon will appear in the graphics file window.

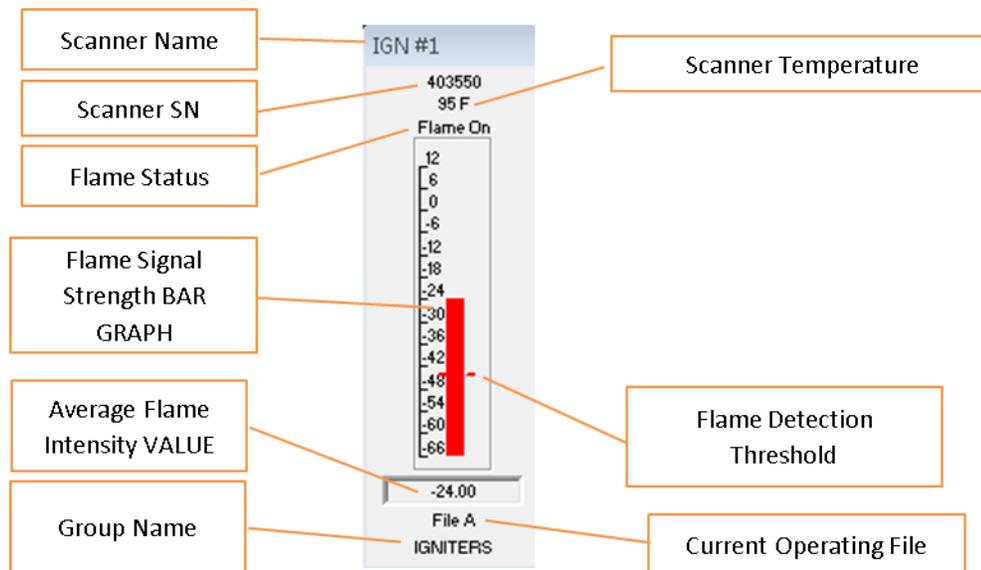
Step 5: Repeat steps 2-4 creating additional scanner icons for each scanner to be added to the graphics window. Repeat steps 1 and 2 from paragraph 5.5 until all the scanners on the network appear in at least one graphics file. Save the graphics files using Scanner Networks> Save (Save As initial creation) in the pulldown menu.



These icons have ISCAN Graphics Files (*.Grf) extension associated with them.

5.5.1.1 Scanner Bar Graph Icon Features

The Scanner Bar Graph Icon displays information from the scanner. The information includes the real-time Flame Signal Strength, Flame Status, Flame Detection Threshold and Scanner Temperature along with other information. If the Flame Signal Strength is above the Flame Detection Threshold set-point the Flame Status will indicate "Flame On" and the bar graph will be red. If the Flame Signal Strength is below the Flame Detection Threshold set-point the flame status will indicate "Flame Off" and the bar graph will be blue. At the top of the Icon is the Scanner Name and Serial Number. For additional options double-click inside a scanner icon and a menu will appear.



NOTE: To change the temperature display from Fahrenheit (°F) to Celsius (°C), go to Main menu and select Configuration and Display.

5.5.2 Setup / Program Window

The SETUP/PROGRAM menu provides more detailed information and access to change the scanner's configuration settings. To open the Setup / Program window double click or right click inside the Scanner Bar Graph Icon which opens the menu selections shown below, select Setup / Program.

The diagram illustrates the process of accessing the Setup/Program window. A yellow arrow points from the 'Click ON Bar Graph to' instruction to the 'Setup/Program' menu. Below, a screenshot of the 'DEMO - File A - S/N: 600032 - FW: 6.0' window is annotated with labels for various controls and status indicators.

Labels on the left side of the window:

- Gain Limiter
- Raw AC Signal
- Raw DC Signal
- Gain Adjust
- Flicker Signal Level (Relay) Trigger-point
- Gain Set Point
- Gain Controls

Labels on the right side of the window:

- Flame Status
- Flame Flicker Signal
- Threshold Adjust
- Program Enable
- Fault Status
- Logic Status

Window Content:

The window displays the following information and controls:

- Flame Signal:** DC and AC signal graphs with values: DC [-6.3, 0.0], AC [467.0].
- Flicker Signal:** AC signal graph with value: -11.0.
- Threshold:** Threshold Adjust slider with value: -45.0.
- Flame On:** Visual flame image.
- Status:** Settings Locked (selected), Temperature: 38 C (100 F), Fault (selected).
- Gain Control:** Automatic (selected), Manual, High, Low.
- Flicker Frequency:** Frequency: 26, Bandwidth: 12.
- Process Signal Logic:** Mains, Rail, Solar, Flame (all checked).
- Buttons:** Disable Programming, Flame Frequency Response, Detailed Status.

From the Setup / Program window there are four setup parameters that can be adjusted. Details on how to setup a scanner are covered in paragraph 0.

- **Gain** – This can be an automatic or a manual adjustment.
- **Threshold** – This is a manual adjustment.
- **Flicker Frequency** – This is a manual adjustment.
- **Bandwidth** – This is a manual adjustment.

The Flame Status displayed on the upper right indicates the flame status. If the Flame Flicker Signal strength is above the Flicker Threshold (and no Process Signal Logic fail) an animated flame appears in the window with the accompanying text “Flame On”. Otherwise the window is dark with the accompanying text “Flame Off”.

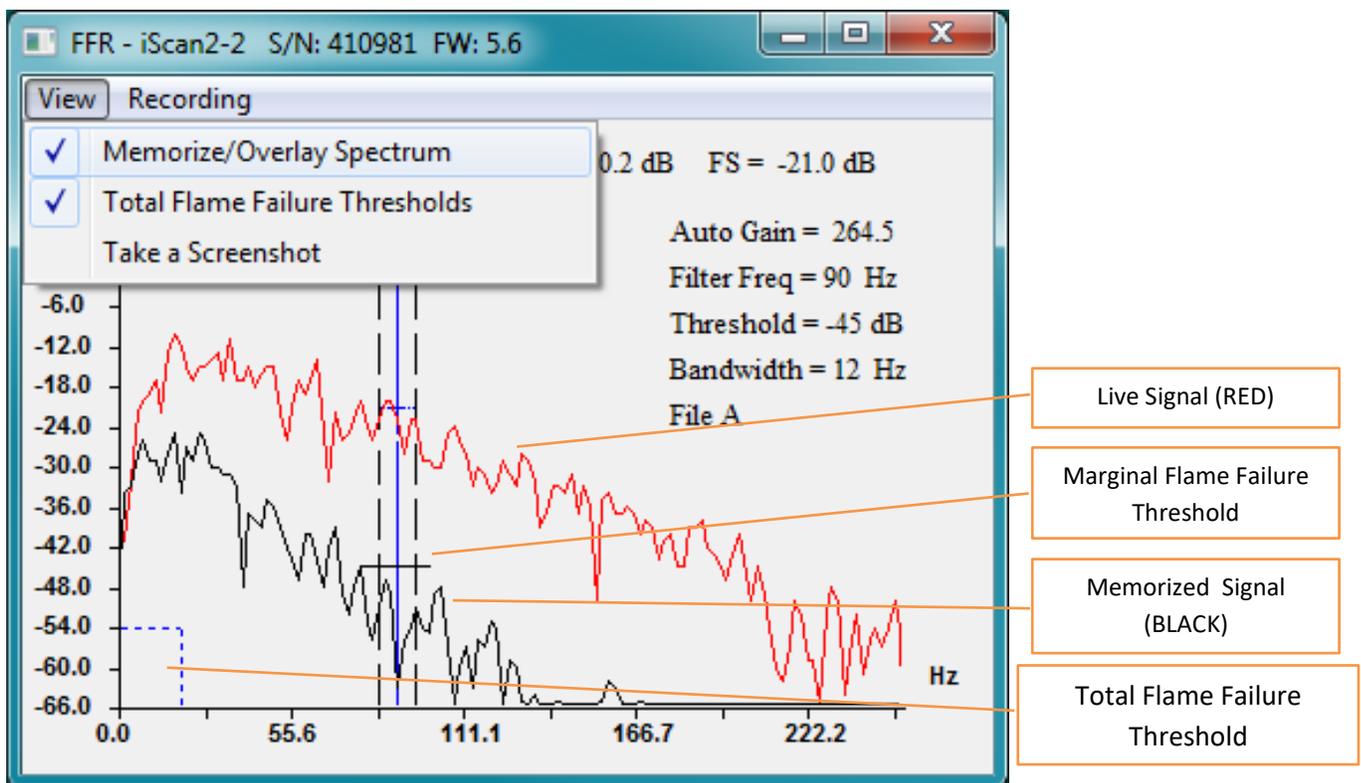
5.5.3 Flame Frequency Response Window

The Flame Frequency Response window provides multiple features for Viewing and Recording flame flicker frequency and amplitude. The Flame Frequency Response window (shown below) can be opened directly from the Scanner Bar Graph Icon or from the Setup/Program window by clicking on the Flame Frequency Response button in the lower left.

5.5.3.1 View

Three features are accessible by clicking on the “View” menu located on the top left which are listed below. Black (memorized) and the Red will still be displaying the current (live) signal. The Acceptable Flicker Signal Zone displays the Frequency (solid blue line) bounded by the Bandwidth (dashed black line).

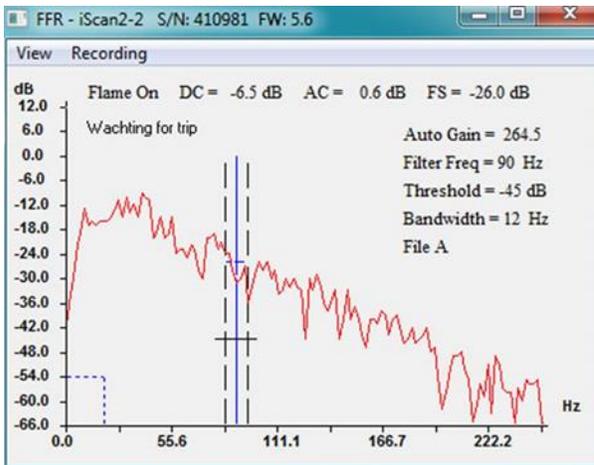
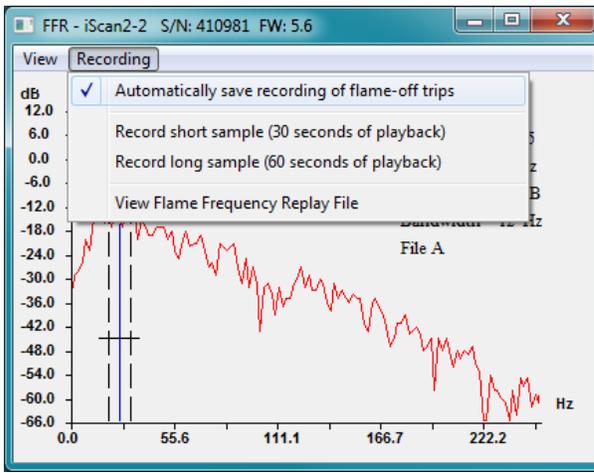
1. Memorize / Overlay Spectrum will freeze the current flicker frequencies for comparison to different settings or a background flame source. See more about that in paragraph 0. The black (memorized) and the red (live) signal are displayed. The Acceptable Flicker Signal Zone displays the Frequency (solid blue line) bounded by the Bandwidth (dashed black line).
2. Total Flame Failure Thresholds displays a dashed blue box in the lower left. Inside that region the scanner will NOT detect a flame. The settings are fixed and cannot be adjusted.
3. Take a Screenshot is for diagnostic purposes. It does a screen capture that can be pasted into an email or saved elsewhere for reference.



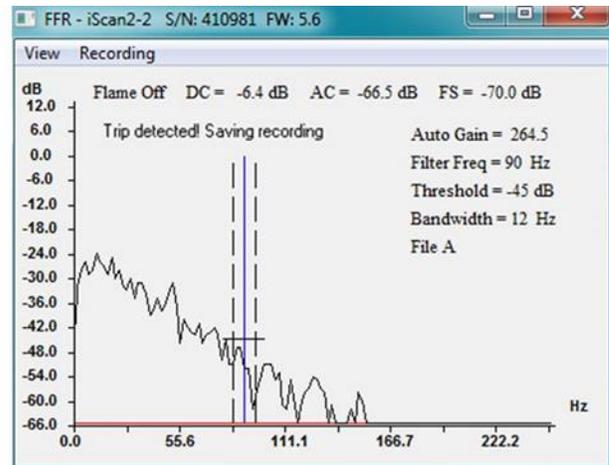
5.5.3.2 Recording

Four features are available by clicking on the “Recording” menu:

1. Automatically save recording of flame-off trips. When selected, a check mark appears and “Watching for trip” will flash while monitoring. When a trip occurs (flame relay opens), “Trip detected! Saving recording” will appear. 30 seconds of flame frequency data prior to and 30 seconds after the trip will be save to a file. Files are stored in Documents > iScan Software Flame Signal Recordings on the PC hard drive and are date/time stamped (24 hour format), i.e. FlameOffTrip 2016-05-02-181502.fsr.



Watching for trip will flash when enabled as it awaits the flame relay to open

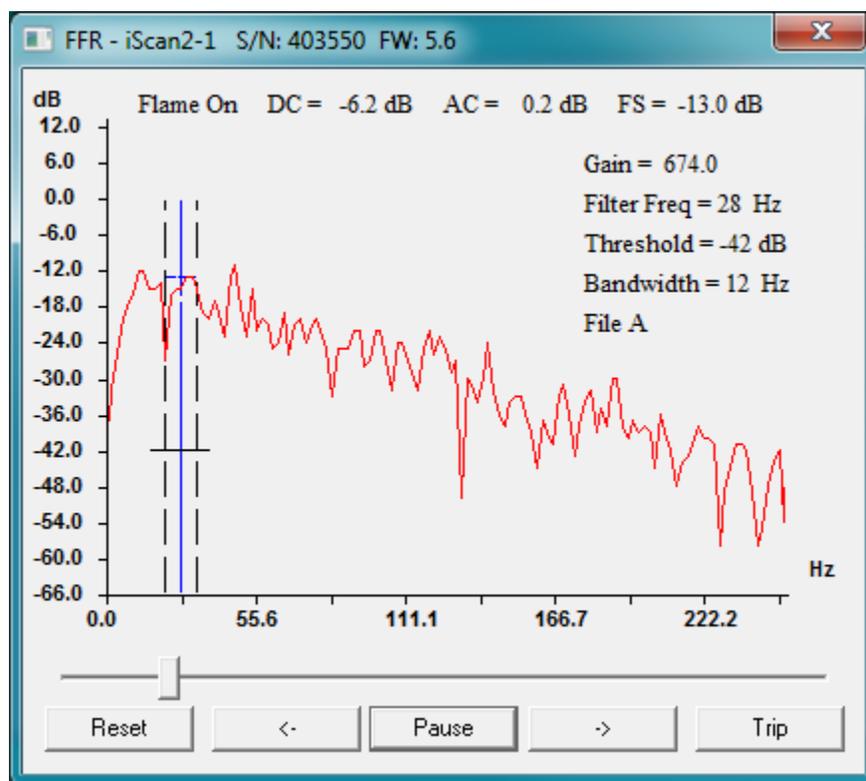


Once a trip is detected, **Trip detected Saving recording** will flash while iScan Software compiles and saves...

- Record short sample (30 seconds of playback): records 30 seconds of Flame Frequency data. Files are stored in Documents > iScan Software Flame Signal Recordings on the PC hard drive and are date/time stamped (24 hour format), i.e. FlameRecording30sec 2016-05-02-182216.fsr.
- Record long sample (60 seconds of playback): records 60 seconds of Flame Frequency data. Files are stored in Documents > iScan Software Flame Signal Recordings on the PC hard drive and are date/time stamped (24 hour format), i.e. FlameRecording60sec 2016-05-02-182551.fsr.

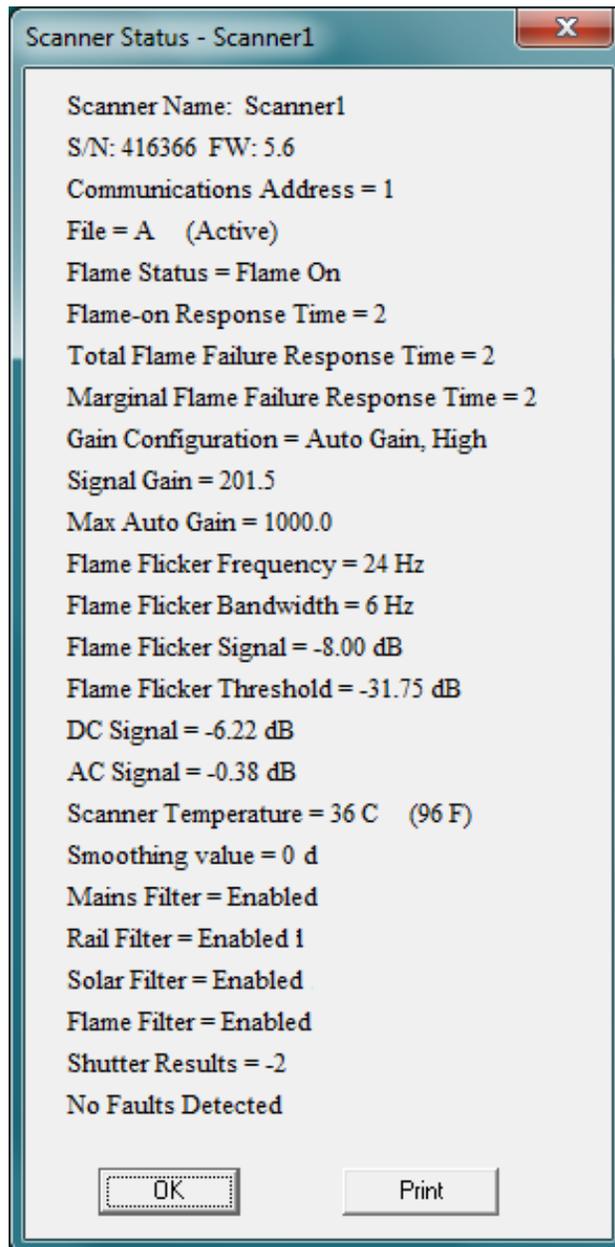
Note: During for both Record short sample and Record long sample it may appear to take longer than the stated 30 or 60 seconds. This is normal and depends on PC speed, number of bargraph icons displayed and length of communication bus wiring.

- View Flame Frequency Replay File: launches a iScan Software viewer which plays back recorded files. Note that .fsr files can only be played in iScan Software player.



5.5.4 Current Status Window

The Current Status window (shown below) can be opened directly from the Scanner Bar Graph Icon or from the Setup/Program window either by clicking on the Current Status button in the lower right or by navigating the pull-down menu View > Current Status. It contains scanner identification information, current scanner settings and current status.



NOTE: *If Remote File Select is Enabled, only selected file's setting are available in the Current Status window. Select Print to print a copy of the scanner file selected. Select View Faults to view a description of any scanner faults. If No Faults Detected is displayed, there are no faults.*

5.5.5 Opening Existing Graphics Files

Once a graphics is built, saved and closed, each subsequent time it is opened there will be an initialization period during which a popup will appear indicating Initializing Communication... will appear. This period is dependent on the response time of the network when updating the bar graph icons and how many icons are on the graphic. If there are only a few scanners in the graphics file, the Initializing Communications popup may open and close so fast it won't be seen. That doesn't indicate a problem.

5.5.6 Scanner Communication Errors

It is possible that one or more scanners will lose communication for a brief period of time or permanently. This can be caused by a wiring issue, a scanner configuration issue (multiple scanner having the same address), a faulty scanner or interference. iScan Software continually attempts refresh the Scanner Bar Graph Icon. It does this by sending a request and then waiting for a response. There is a finite amount of time iScan Software waits. If that time expires iScan Software moves on attempts to refresh then next scanner. iScan Software will attempt to refresh five times, if no response is received the Scanner Bar Graph Icon will show TOUT in the lower box where the Flame Flicker Signal Strength is normally displayed. Since timeouts slow down communication to all scanners, iScan Software will skip any scanner that has timed out. iScan Software will attempt to re-establish communication with timed out scanners once every two minutes. If the scanner responds it will be refreshed in a rotation along with the other scanners. There is a manual refresh that will override the two minute wait and try to re-establish communication on the next refresh cycle. To manually refresh a scanner, right click on the icon and Refresh Connection.

5.6 Scanner Configuration for Optimal Flame Discrimination

Flame Discrimination is the ability to distinguish between multiple flames. An example of good discrimination is when the MB scanner is able to recognize a pilot flame on burner #1 versus a main flame on burner #2 in the background. The status of the main (background) flame does not affect the ability to detect the pilot flame (ON or OFF). The scanner has programmable parameters to optimize discrimination. iScan Software has automated Learn routines to assist in configuration as well as the ability to manually configure MB scanner models -06, -12 and -62. The SB scanner models, -05, -05-4, -11 and -11-4 are not user configurable except for the 4-20 mA Settings and the Relay Configuration. Scanners models -12 and -62, both MB, support as many as four unique configurations (referred to as File A, File B, File C and File D) for different operating conditions while the -06 model, also MB, supports up to two different configurations (File B and File C only). SB scanner do not support File Selection. Each set of scanner configuration settings are stored internally in the scanner's non-volatile memory. These setup files should be saved locally after setup is complete. They have a .iScan file extension.

There are four setup parameters that can be adjusted to optimize flame discrimination. Each one is described below with its effect on discrimination.

NOTE: *The Program mode must be enabled to make changes to the flame scanner's configuration settings. To enable, check the box next to Program Enable in the Setup / Program window. A password prompt will popup. Enter the password created when iScan Software was installed.*

In iScan Software, the Program Enable mode has a time out feature that automatically disables itself after two hours. The Program Enable mode is also disabled by de-selecting the Program Enable check box (check mark will disappear) or by exiting the Setup / Program window.

NOTE: *The -SB, -05, -05-4, -11 and -11-4 models have default settings established to minimize setup and can NOT be adjusted in the field with the exception on the 4-20 mA Settings and Relay Configuration. Only -06, -12 and -62 MB models are fully configurable.*

5.6.1 Configurable Parameters

5.6.1.1 Gain

Gain is the level the raw flame signal is amplified prior to processing. Adjusting the gain increases or decreases the scanner's perceived intensity of the flame. Gain can be in Automatic (default for SB) or Manual mode (default for MB). There are two ranges that can be set for gain. High (3.5 dB to 1000 dB) or Low (0.3 dB to 100 dB). The gain should be selected such that when the flame is present, the AC value should be 0 dB +/- 1 dB. If the gain required to detect a flame is greater than 75 dB then the High range should be used.

The Automatic mode will self-adjust the gain such that when the flame is present, the AC value will be 0 dB +/- 1 dB. In Manual mode the gain must be adjusted using the Gain Adjust slide bar. A numeric value for gain is displayed in the box below the Gain Adjust slide bar. Maximum gain can be limited by using the Gain Limiter slide bar just to the right of the gain.

5.6.1.2 Threshold

Threshold refers to the level the Flicker Signal must exceed for the scanner to declare “Flame On”. The Threshold is adjusted by moving slide bar up and down. The default Threshold is -45 dB.

5.6.1.3 Flicker Frequency

The Flicker Frequency is the point where the flame signal is evaluated against its Threshold. Flicker Frequency appears in the Flame Frequency window as the solid blue line and is in the unit Hz (Hertz). The range of adjustment is from 8 Hz (lower frequency limit is 2X the bandwidth) to 252 Hz in 2 Hz increments. To adjust the Flicker Frequency, use the up/down arrows to the right of the display box.

5.6.1.4 Bandwidth

The Bandwidth is the range of frequencies above and below the Flicker Frequency over which the flame’s energy is summed to determine the Flicker Signal strength. Narrowing the Bandwidth decreases the total energy while widening the Bandwidth increases the total energy. The Bandwidth is also in Hz. The range of adjustment is from 4 Hz to 32 Hz. Bandwidth must always be less than half the Flicker Frequency. To adjust the Bandwidth, use the up/down arrows to the right of the display box.

5.6.2 Automatic Flame Discrimination

To simplify the flame discrimination configuration of the iScan flame scanner, the iScan Software has a “Learn” feature to automatically determine the optimum flame scanner settings to discriminate between the target burner flame signal and the background radiation signal. This is a two-step process involving the Learn / Flame-On and Learn / Flame-Off procedures described below.

5.6.2.1 Learn “Flame ON”

Step 1: Operate the target burner at its minimum flame signal strength condition. This may be at the minimum main fuel firing rate, maximum flue gas re-circulation or with only the pilot in service.

NOTE: *To ensure that only the target burner flame is being monitored, all other burners shall be out of service. If this is not possible, then tests must be carried out by switching target burner “On and Off” to ensure that scanner is detecting target burner flame and not background. The setup will be incorrect if these steps are not followed.*

Step 2: Select Settings > Set Active File and select the configuration file where learned data will be stored. Skip this step if “Remote File Selection” feature is used.

Step 3: Select Learn - Flame-On from the menu. This selection runs the iScan Setup Wizard that automatically determines the optimum gain and analyzes the flame-on signal.

- a. The iScan Software Setup Notice window will appear. Select Yes to continue.
- b. Step through the Wizard changing the flame response time settings if required.

NOTE: *For applications with grate firing, “Flame On” time can be increased to 3-4 seconds. However, the selected time will result in an equal reduction from the ignition proving time.*

- c. Select Learn to start the analysis of the flame.

Notice that the Wizard first learns gain by forcing the gain into automatic mode. If the selected High or Low gain range is not correct then the Wizard will go through a second iteration and repeat the process. The optimum gain is achieved when the Flame Signal AC signal is 0 dB. When gain selection is complete, the Wizard will start analyzing the Flame-On conditions.

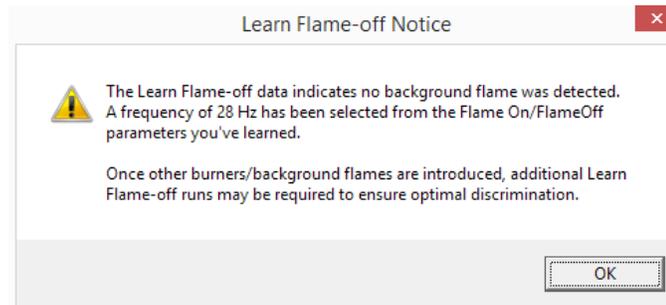
- d. When the Flame-On learn process is complete, select OK. The iScan Software will then prompt you to learn the Flame-Off conditions. Select OK.

5.6.2.2 Learn “Flame OFF”

Step 1: Turn the target burner “Off”. Turn all other burners “On” to full firing rate to maximize the background radiation signal. It may not be possible to turn all remaining burners (mills) to full load. In that case fine tuning of the setup results will be necessary. With the maximum background, and the target burner off, and the iScan indicates Flame OFF, there is no need to Learn Flame-off so skip Step 2.

Step 2: Select Learn / Flame-off from the menu. This selection runs the iScan Software Setup Wizard that automatically analyzes the flame-off signal. A comparison with the flame-on signal analysis then determines the recommended flicker frequency, bandwidth, and threshold settings. The Setup Notice window will appear. Select Yes to continue.

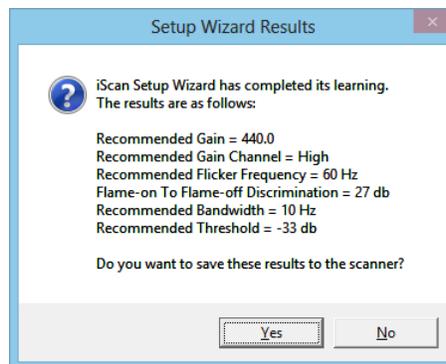
NOTE: For proper discrimination, all other burners should be at the full firing rate. If Learn “Flame Off” is run with all other burners off (or even just adjacent burners off) iScan Software has a built in protection that detects that forces the frequency to 28 Hz. The following popup will be displayed is iScan Software detects this condition.



5.6.2.3 Confirmation

When the flame-off learn process is complete, select OK and the Setup Results window will appear showing the recommended settings. The discrimination level (27 dB in the example above) can be converted to a numeric ratio using the table below. If the discrimination is 6 dB (ratio of 2) or greater, select Yes to save the results to the active file from the Setup / Program window using Backup > Save Scanner File. iScan Software inserts the scanner serial number into the file name and sets the extension as a iScan File (*.dsf). Additional information can be embedded in the file name such as File A.

dB of Flame Difference	6	9	12	15	18	21	24	27	30
Ratio of Flame Signals	2	2.8	4	6	8	12	16	23	32



NOTE: If the discrimination is less than 6 dB (ratio of 2), the scanner may need to be re-aimed or relocated.

Confirm that the learned flame discrimination settings work by performing a Flame Discrimination Test at various loads including at maximum load using as many burners as possible.

NOTE: *The setup procedure described above automatically determines the gain required for the flame conditions that exist during the Learn / Flame-On process. If there is a large variance between the low fire flame conditions (or igniter flame) and high fire flame conditions, there is a possibility of a scanner fault by violating the “Rail Logic”. If this occurs, use the Multiple Fuels feature or the Remote File Select feature to cover the set point differences. When the minimum acceptable flame-on condition occurs the 4-20 mA output is at 7.5 mA, or when flame signal remains above the detection threshold.*

5.6.3 Manual Flame Discrimination



Manual Discrimination configuration setup should only be done by qualified personnel. Improper setup could result in death or serious injury.

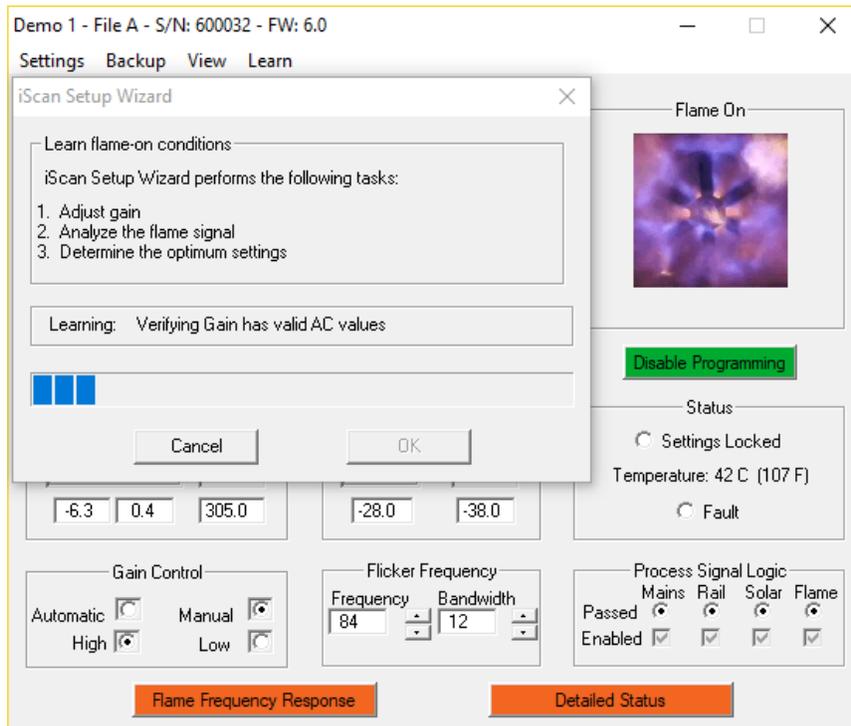
This section describes how to manually configure the scanner to discriminate between the target burner flame and the background radiation flames. Manual configuration is useful when boiler or plant operating conditions (load changes) do not allow for an automatic configuration.

NOTE: *Select the burner that will be subjected to most radiation from the surrounding burners. Results obtained from the test can be used as a starting point for other burners. Usually, very little adjustment is required if the first burner selected is the most difficult one.*

Step 1: Select Settings > Set Active File and select the configuration file where learned data will be stored. This step is not necessary if remote file selection feature is used.

Step 2: Determine the minimum burner flame signal.

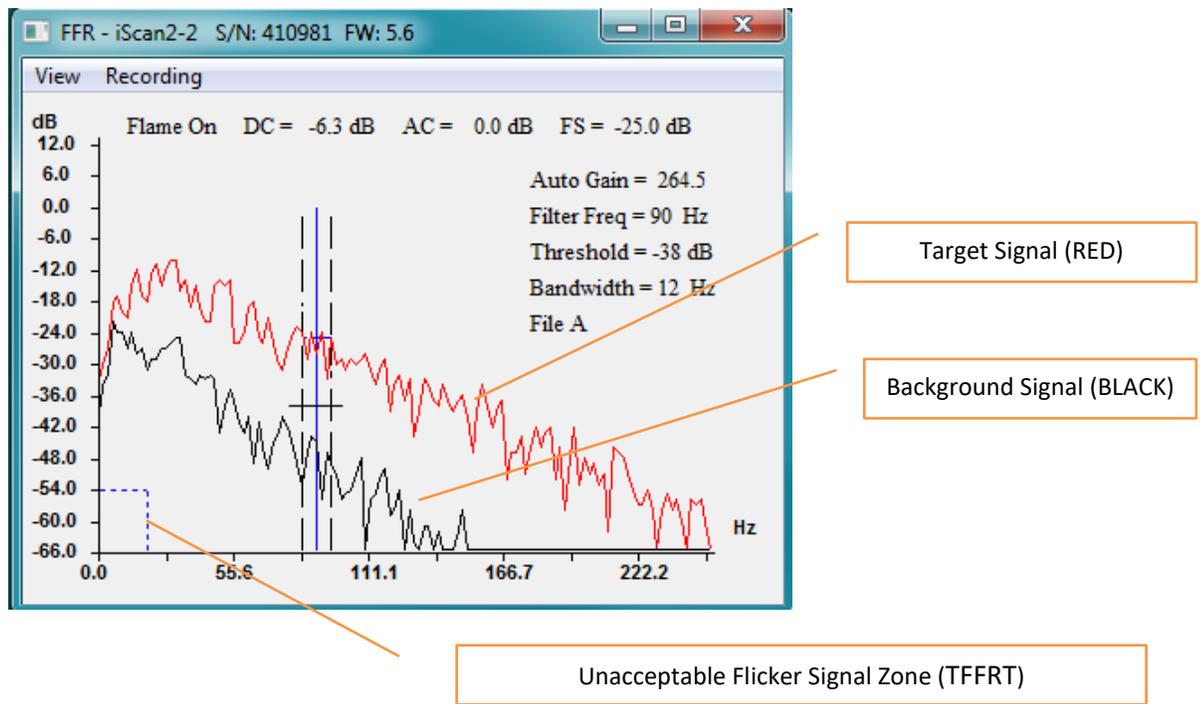
- a. Operate the target burner at its minimum firing condition. This may be at minimum main fuel firing rate, maximum fuel gas recirculation or with only the igniter in service. The Learn / Gain command can be used to determine the best gain, as it automatically analyzes the flame and determines the optimum gain for given conditions. If this feature is used, the gain will return to manual mode after required gain is determined.



- b. Repeat tests to ensure that scanner is “seeing” igniter flame and not background flames.
- c. Use the Flame Flicker Frequency window to view the burner flicker characteristics. Use View> Memorize/Overlay Spectrum to memorize the flicker response for the target burner. The memorized response will be black while the active response is in red.

Step 3: Create the maximum background radiation by putting in service as many burners as conditions permits. Make a note of the boiler load.

The Flame Flicker Response window superimposes the target burner’s flicker frequency characteristics in red while the memorized response in black shows the background signal. The blue dashed box on the lower left of the chart shows an unacceptable flicker signal zone where the scanner will not detect a flame. This region is known as TFFRT is bounded by the region where the flicker frequency is less than 20 Hz or the level is below -54 dB.



Step 4: Determine the flicker frequency setting by comparing the background and target burner flame characteristics. Select the flicker frequency that provides maximum separation between the target burner and the background. Generally better separation occurs at frequencies above the 26 Hz default. When adjusting the Frequency in the Flicker Frequency box the Bandwidth should also be adjusted. Once a Flicker Frequency is selected adjust the Bandwidth according to the following table.

Recommended Flicker Frequency Bandwidth Settings

Frequency (Hz)	< 30	30 – 50	50 – 70	70 – 90	> 90
Bandwidth (Hz)	12	16	20	24	32

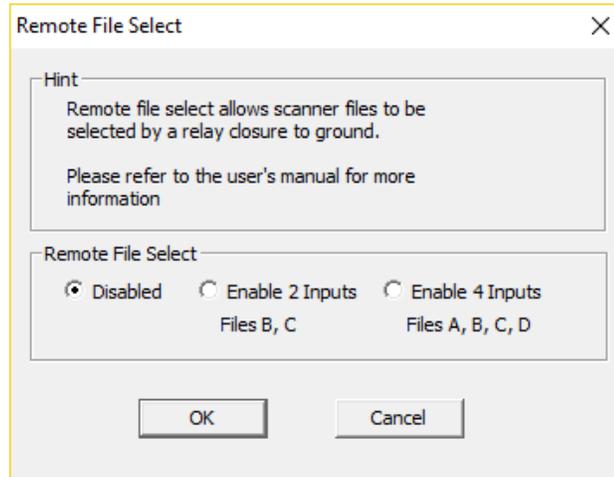
Step 5: After the setup is complete, turn the burner “Off” to ensure that scanner indicates “no flame” condition. Turn the target burner on and ensure that the scanner indicates flame on conditions with minimum firing or igniter only in service.

Step 6: Save the results to the active file from the Setup / Program window using Backup > Save Scanner File. iScan Software inserts the scanner serial number into the file name and sets the extension as a iScan File (*.dsf). Additional information can be embedded in the file name such as File A.

Step 7: Repeat for each configuration File created.

5.6.4 Remote File Select (RFS)

The scanner is capable of operating from different File configurations for different conditions. The File configurations can be selected by manipulating File Select inputs on the scanner. The -06 models only support two File Selects (Files B or C) while the -MB, -12 and -62 models support either two File Selects (Files B or C) or Four Input File Selects (Files A, B, C or D) that can be changed remotely from the Burner Management System (BMS). Remote file select is only intended to be used when more than one configuration is required to maintain proper flame detection and discrimination for different operating conditions of the burner. To configure the scanner to monitor the remote files select inputs, from the Setup / Program window use Settings > Remote File Select to open the following window... Select the appropriate option and click OK.



Do not enable Remote File Select unless relay contacts are wired to the scanner (MNL-ISCANMB, MNL-iScan3 for scanner wiring details). If the proper connections are not in place the scanner will consider this a “fault” and will de-energize the flame relay.

5.6.5 Multiple Fuels

This feature is useful when there is a large variation of flame signal strength over the range of operating conditions. This can occur if multiple fuels are being fired or just from the natural variation between the pilot and main flames.

The gain is usually set such that the AC signal strength is 0 dB at the minimum flame signal strength condition. If the gain is fixed and the maximum signal strength is more than 12 dB greater than the minimum signal strength, then the Rail Logic will de-energize the flame relay.

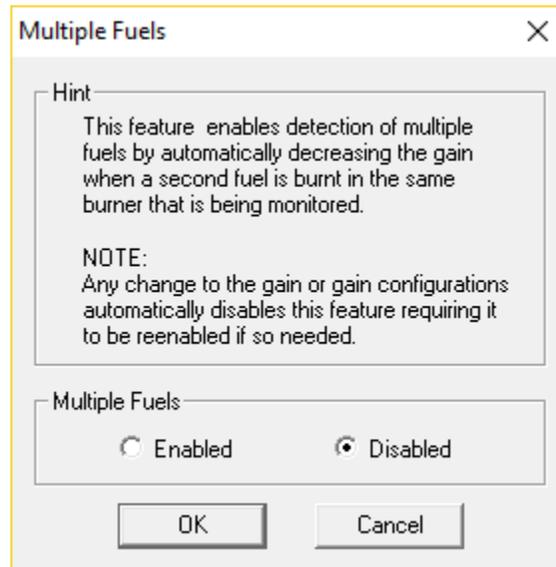
When the Multiple Fuels feature is enabled, if the AC signal is greater than 0 dB then the internally the scanner operate the gain level automatically to maintain the level at 0 dB in the same manner as Auto Gain mode works thus preventing a Rail Logic failure from occurring. If the AC signal falls below 0 dB then the scanner uses the user defined gain.

Two things to note about the Multiple Fuels feature:

1. It only operates in Manual Gain mode.
2. The Gain levels displayed in the Setup/Program window show the user defined gain setting. If the scanner manipulates the gain internally the Gain level display is not updated to reflect a change.

Select Enabled or Disabled as appropriate and click OK.

NOTE: Only use when Gain is set to Manual. Any change to the gain configuration settings automatically disables this feature.



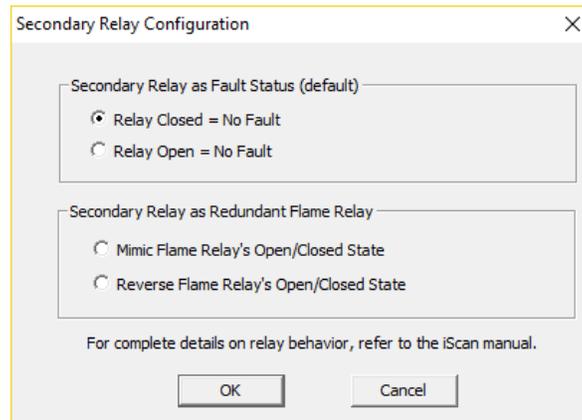
5.6.6 Flame/Fault Relay Configurations

The scanner relays serve as the safety critical input to the Burner Management System (BMS). The Flame Relay's main function is to provide a contact closure to indicate flame status. Flame Relay, noted in MNL-ISCANMB/MNL-iScan3 as FLAME RELAY #1, contacts closed indicates flame detected while Flame Relay contacts open indicates absence of flame or a scanner fault. Non-hazardous area scanner models (-11, -12 and -62) have a second relay, noted in MNL-ISCANMB/MNL-iScan3 as FLAME RELAY #2, that can be configured to act as an independent Fault Relay or as a redundant Flame Relay. When configured as independent relays, Fault (redundant Flame) Relay contacts closed indicates flame detected while Fault (redundant Flame) Relay open indicates absence of flame or a scanner fault. When configured as redundant relays, Fault Relay contacts closed indicates no fault while Fault Relay contacts open indicates a scanner fault.

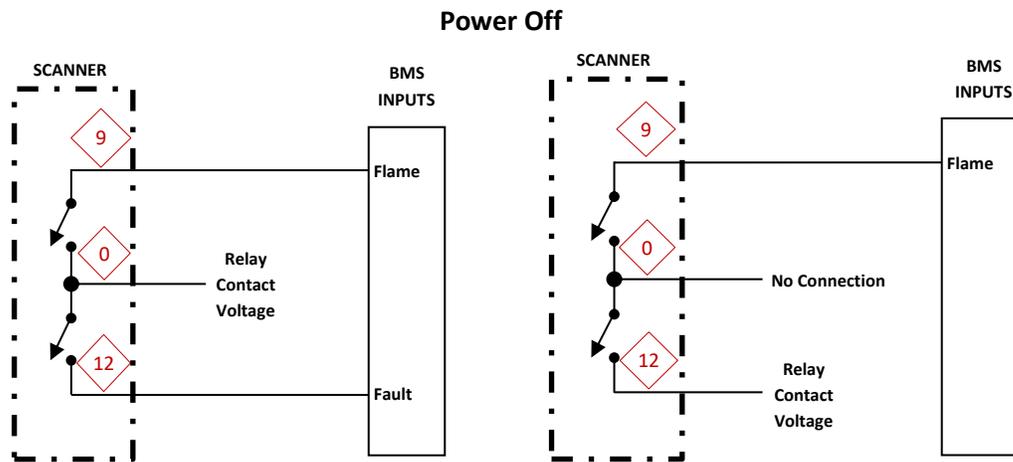
This section does NOT apply to iScan2 -05 or -06 models.

From the Setup / Program window select Settings > Configure Relays to open the window shown below. Select the appropriate configuration and click OK.

NOTE: *iScan Software disables the Relay Configuration selection while the scanner is in Flame On mode.*



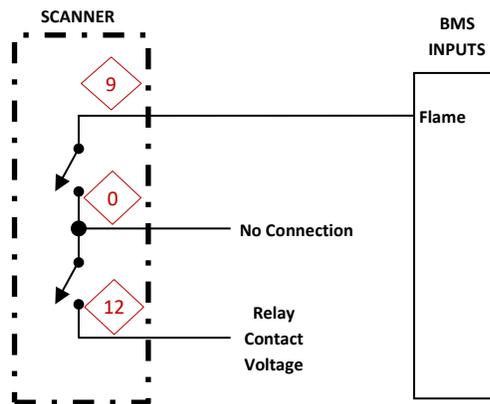
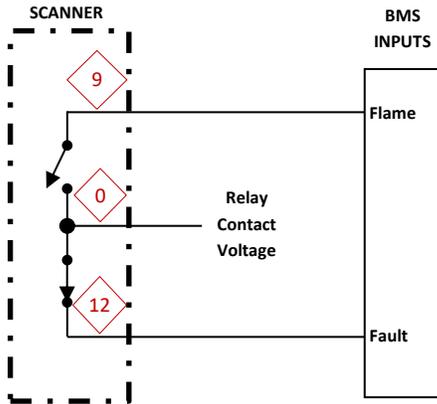
The diagram below on the left depicts wiring for independent relay configuration and the diagram below on the right depicts wiring for redundant relay configuration. Refer to MNL-ISCANMB / MNL-iScan3 for relay contact ratings.



Independent Relay Configuration

Redundant Relay Configuration

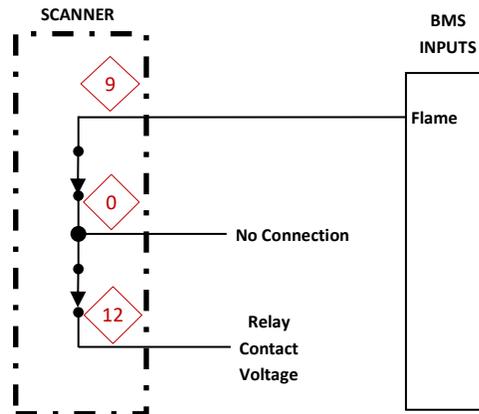
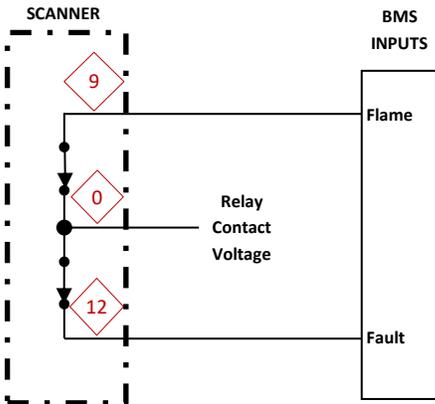
Power On – Flame Off – No Fault



Independent Relay Configuration

Redundant Relay Configuration

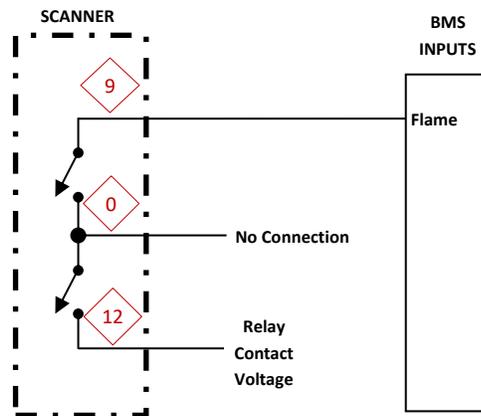
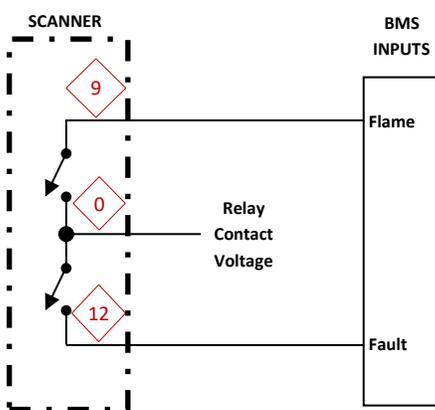
Power On – Flame On – No Fault



Independent Relay Configuration

Redundant Relay Configuration

Power On - Fault



Independent Relay Configuration

Redundant Relay Configuration

5.6.7 Process Signal Logic

The scanner incorporates four Process Signal Logic that perform additional checks on the flame signal to ensure that extraneous sources do not result in a false indication of flame. If any Logic is not satisfied, the flame relay will be de-energized and iScan Software will remove the Passed indication from the corresponding Logic in Setup / Program window. All process signal logic are enabled when the flame scanner system is in operation.

Mains

The Mains Logic requires that the flicker signal is not dominated by a 50, 60, 100, or 120 Hz signal. This Logic prevents the flame scanner relay from being energized by an incandescent lamp or ac power line noise.

Rail

The Rail Logic requires that the AC signal be below +12dB threshold. This Logic prevents the flame scanner from operating in saturation.

Solar

The Solar Logic prevents the flame relay from energizing due to solar radiation. This feature prevents the flame scanner from being adversely effected from the sun when installed outdoors in a very bright sunny area.

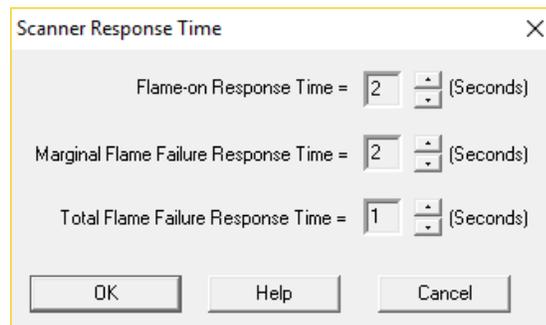
Flame

The Flame Logic examines the flicker frequency content comparing to the expected characteristics evident in all flame signals.

NOTE: Process Signal Logics are NOT user configurable.

5.6.8 Scanner Response Time

The scanner has three response times which can be changed to work with various applications. These times are defined in paragraph 4.2. To change them within the Setup / Program window select Settings > Response Time >



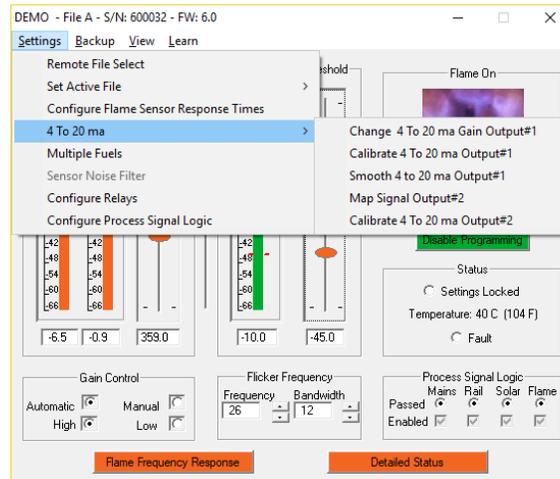
1. Flame On Response Time – ranges from 1 to 4 seconds in 1 second increments
2. Total Flame Failure Response Time– ranges from 1 to 4 seconds in 1 second increments
3. Marginal Flame Failure Response Time^{Note} – ranges from 1 to 6 seconds in 1 second increments



Changing the Response Times can have serious consequences and should only be done by qualified personnel. Improper setup could result in death or serious injury.

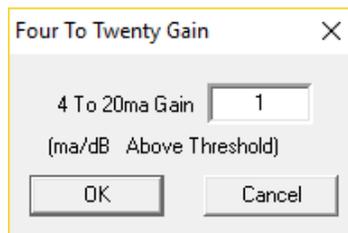
5.6.9 4 To 20 ma Settings

Hazardous area scanner models -05 and –06 have a single 4 To 20 ma output whereas the non-hazardous area scanner models -11, -12 and -62 have two 4 To 20 ma outputs. To view/change them within the Setup / Program window select Settings > 4 To 20 ma >



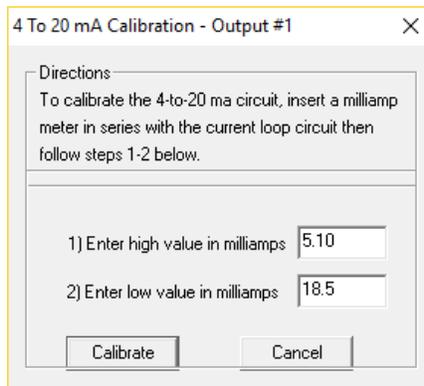
The following five options appear:

1. Change 4 To 20 ma Gain Output#1 – 4 To 20 ma Output#1 indicates the current flame signal strength. The gain is adjustable. Please refer to MNL-ISCANMB for details.

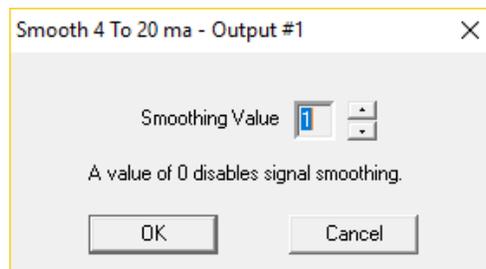


NOTE: Setting the 4 To 20ma Gain to 0 will limit 4 To 20ma Output#1 (Flame Strength) to 7.5 mA.

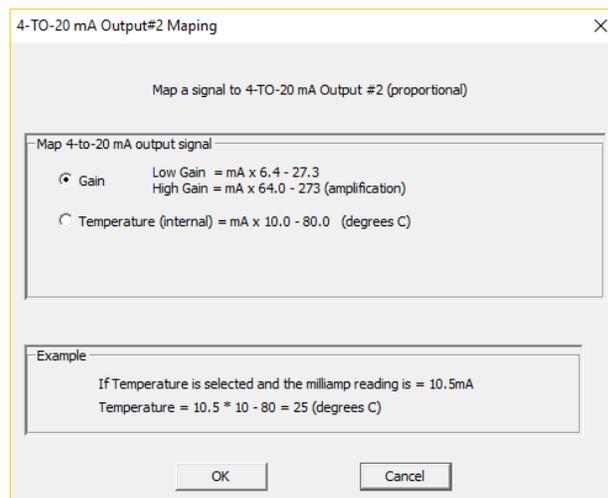
2. Calibrate 4 To 20 ma Output#1 – selecting this option requires a milli-ammeter be connected between the 4 To 20 ma Output#1 and the scanners DC- (Wire #7). iScan Software will guide the user through the calibration procedure.
 - a. Edit / 4 To 20 / Calibrate 4 To 20 mA Output #1. The flame scanner’s 4–20 mA outputs have been factory calibrated under ideal conditions. Actual field conditions may cause the actual output to be slightly different. If required, the flame scanner’s 4–20 mA output can be calibrated following the steps below:
 - b. Insert a current meter into the 4–20 mA output #1 current loop.
 - c. Select Settings / 4 To 20 / Calibrate 4 To 20 mA from the Setup/Program window. The scanner will immediately send out an arbitrary high and low signal.
 - d. Watch the current meter and record the high and low current readings (in mA) into the input boxes on the calibration screen. Select Calibrate.



- Smooth 4 To 20 ma Output#1 – smoothing is only available on scanners with firmware version 5.6 and beyond. The output is averaged over the last 10, 20, 30, 40 or 50 samples to reduce drastic fluctuations due to flame intensity variations. Use the up/down arrows to select 0-5. 0, which is the default, disables smoothing. 1, 2, 3, 4, 5 are for 10, 20, 30, 40, 50 samples averaged respectively.



- Map Signal Output#2 – 4 To 20 ma Output#2 can be configured to indicate Gain or Temperature.

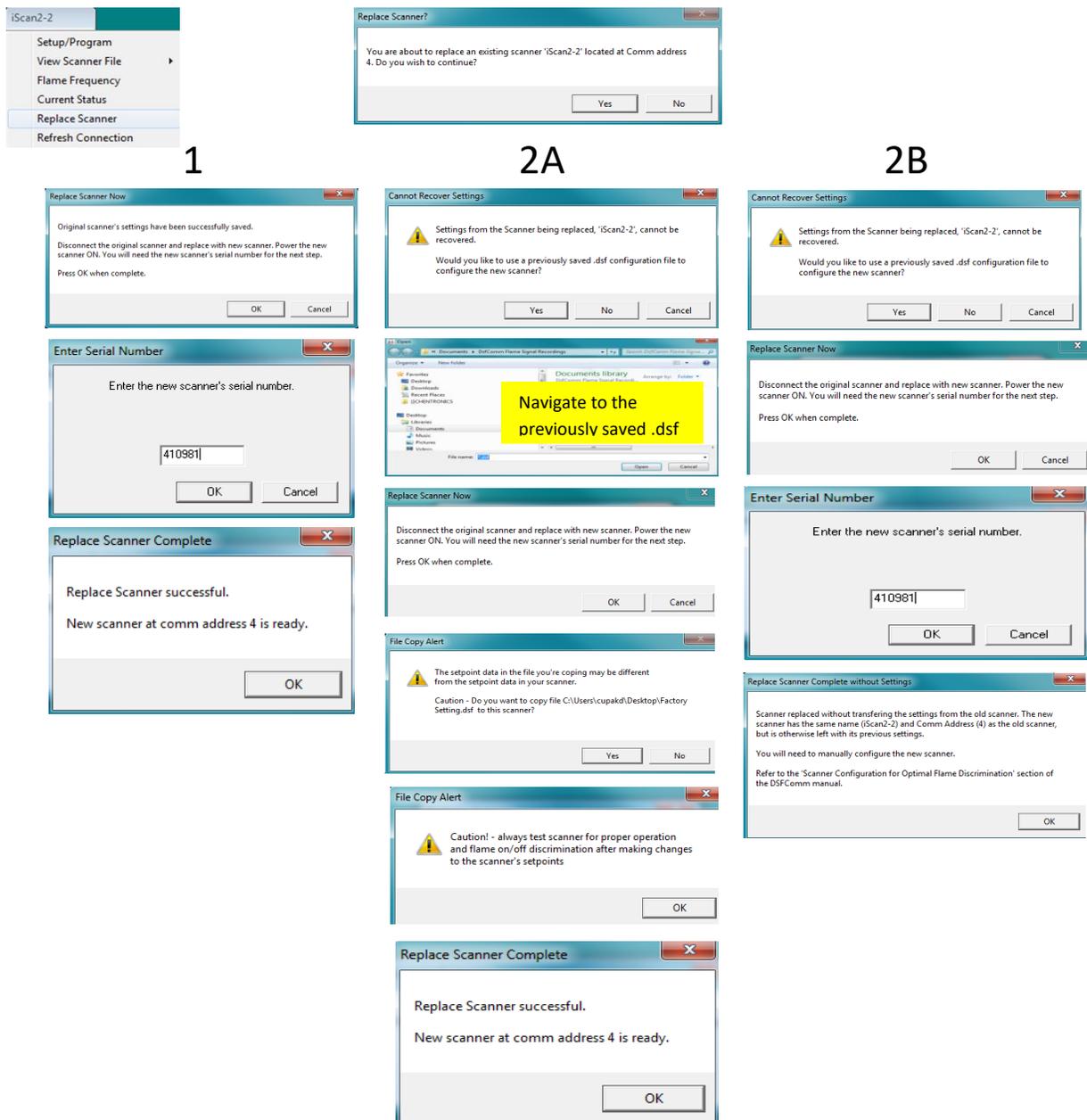


- Calibrate 4 To 20 ma Gain Output#2- selecting this option requires a milli-ammeter be connected between the 4 To 20 ma Output#2 and the scanners DC- (Wire #7). iScan Software will guide the user through the calibration procedure, same as the calibration for Output #1.

5.6.10 Replacing a Scanner

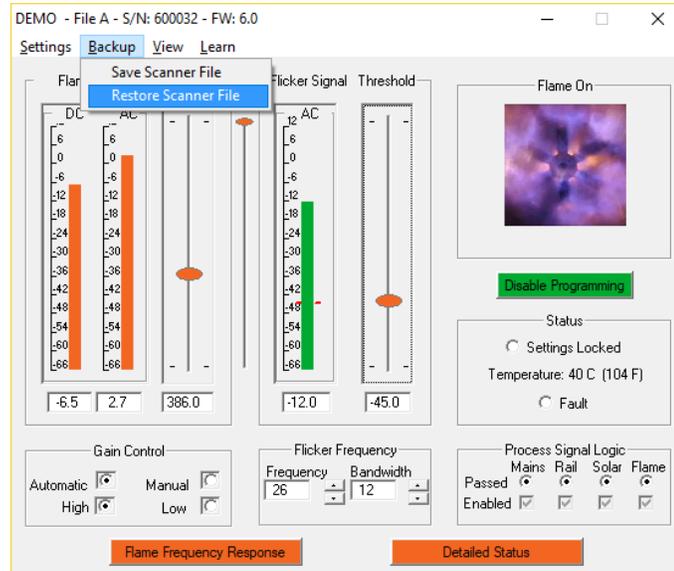
If for any reason a scanner needs to be replaced, iScan Software provides a means to walk the user step by step replacement procedure. From the bargraph icon, select Replace Scanner. iScan Software will present a series of user prompts.

1. If the scanner is still powered on and communicating with iScan Software, Replace Scanner will follow the flow shown in Path 1 below.
2. If the scanner cannot be powered on or cannot communicate with iScan Software Replace Scanner will follow either Path 2A or Path 2B depending on whether the .dsf file from the scanner being replaced is available.
 - 2A. If the .dsf file is available Replace Scanner will prompt the user for the location and complete the process as shown in Path 2A.
 - 2B. If the .dsf file is not available then the Replace Scanner will set the scanner address after the serial number is entered but the configuration process will have to be repeated. This is shown in Path 2B.



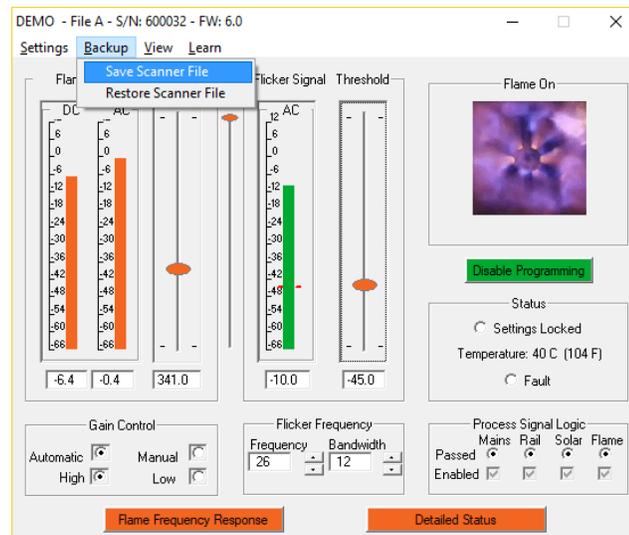
5.6.11 Restoring Scanner Settings

To manually replace a scanner, to copy settings to additional scanners or to restore settings to a scanner, use the Backup feature. From the Setup / Program window using Backup > Restore Scanner File. Select the appropriate .dsf file from the navigation window that iScan Software opens.



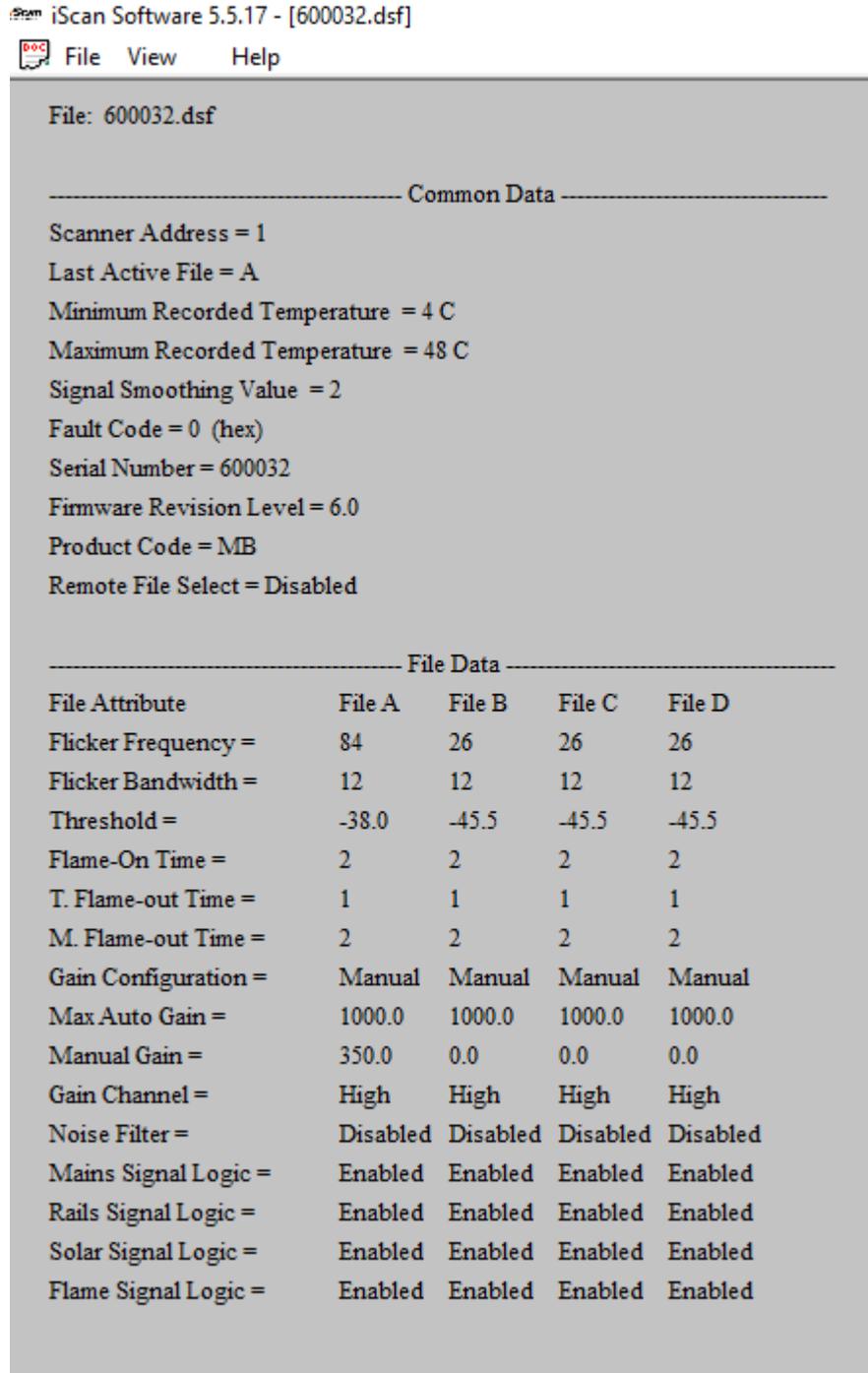
5.6.12 Saving Scanner Settings

After configuring a scanner to desired operating conditions, Chentronics strongly recommends saving the configuration to disk. To save the scanner configuration, saving a .dsf file, from the Setup / Program window use Backup > Save Scanner File. Use the navigation window to select an appropriate location and file name. iScan Software automatically include the scanner serial number in the name however additional identifying information can be included. Chentronics also recommends storing a back up copy in a safe location not on the PC connected to the scanner(s).



5.6.13 Viewing Scanner Settings

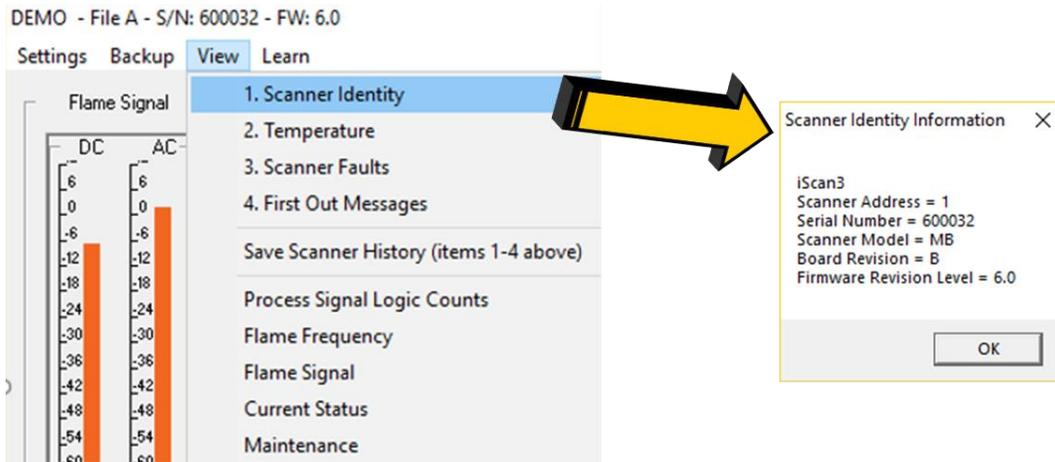
iScan Software provides the ability to view a text version of a .dsf file. From the Main iScan Software window select File > Open and navigate to a .dsf file. The following window will open displaying the entire contents of the .dsf file.



5.7 Status, Errors and Diagnostics

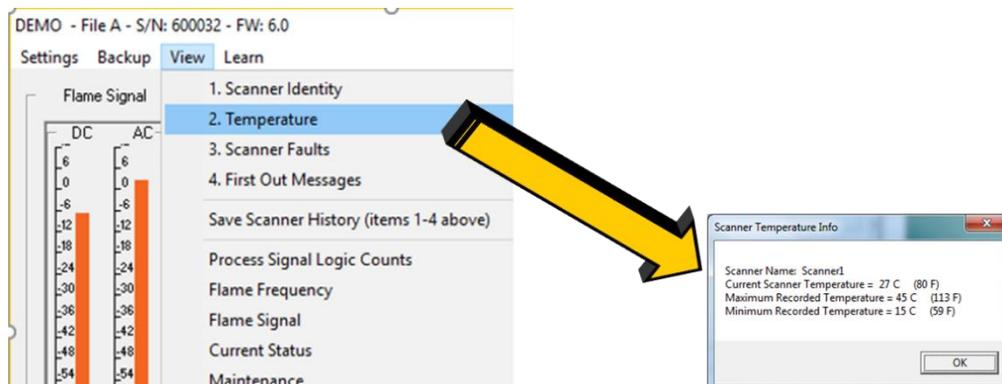
5.7.1 Scanner Identity

This command displays the COMM Address, Serial Number, Product Code, Board Revision (FW version 5.7 and Above) and Firmware Revision Level of the scanner.



5.7.2 Temperature

This command displays the current, maximum and minimum temperatures recorded. Exceeding specific temperatures will cause the scanner to shut down. Please refer to paragraph 5.7.10. iScan2 Firmware versions 5.5 and earlier record only the maximum temperature the scanner is exposed to while operational. Firmware versions 5.6 and beyond record a maximum and a minimum temperature. The initial value for the Maximum Recorded Temperature (for firmware version 5.6 and above) is set to be 45°C (113°F) while the initial value for the Minimum Recorded Temperature is set to 15°C (59°F).



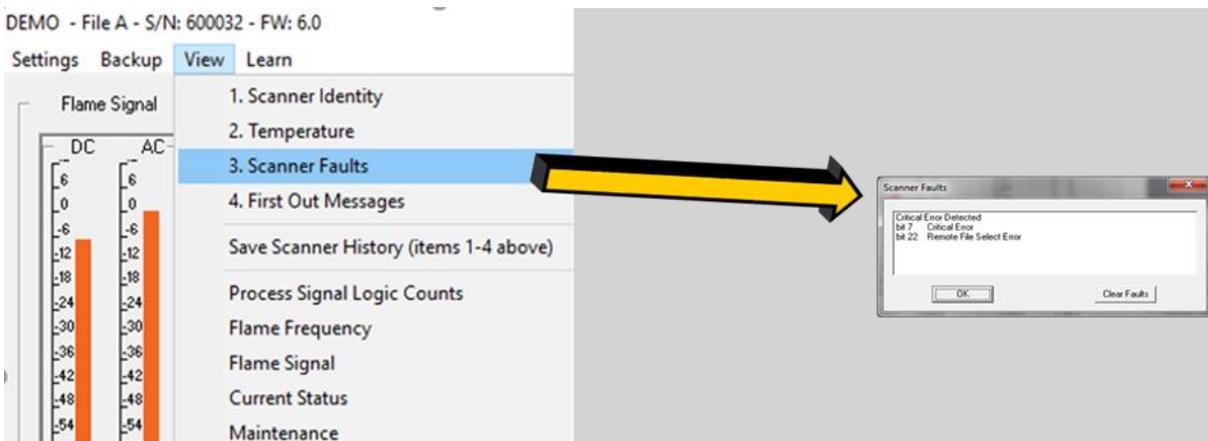
iScan3:

Scanner Temperature Info					
Scanner Name: DEMO			Max Recorded Temperature: 48 C (118.4 F)		
Current Temperature: 39 C (102.2 F)			Min Recorded Temperature: 4 C (39.2 F)		
Mode	Internal Temperature (T_{INT})	4-20 Output Setting	Indicator Light Setting	Relay Operation	DSFComm Status
Normal	$T_{INT} \leq 95^{\circ}\text{C}$	Normal (4-20 mA)	Normal	Normal	Normal
Warning	$95^{\circ}\text{C} < T_{INT} < 100^{\circ}\text{C}$	Normal (4-20 mA)	Alternate left half yellow 0.5s / right half yellow 0.5s	Normal	1) Over-temp indication on scanner icon 2) Fault bit 19 set (over-temp) 3) Event is logged in log file
Fault	$100^{\circ}\text{C} < T_{INT} \leq 105^{\circ}\text{C}$	2mA steady	Blink yellow 0.5s on 0.5s off	Relays Open and will not Close	1) Flame Out indication 2) Fault bit 7 set (Critical Fault)
Disable	$T_{INT} > 105^{\circ}\text{C}$	1mA steady	Yellow Solid	Relays Permanently Open and will not Close	1) Fault bit 31 set (Disable Scanner) 2) Scanner is permanently disabled. Do not attempt to clear this fault by any means. Dispose of the scanner

5.7.3 Scanner Faults

Scanner Fault is an indicator that comes on if any fault condition is present in the scanner. From the Setup / Program window Select View > Scanner Faults. The Scanner Faults window appears. A list of all the faults appears in the Scanner Faults window. Click on the Clear Faults button to clear the faults. If the fault condition has been resolved the faults will be cleared returning the scanner to functional operation.

NOTE: Reference the Error Code Table in paragraph 5.7.13 System Errors.

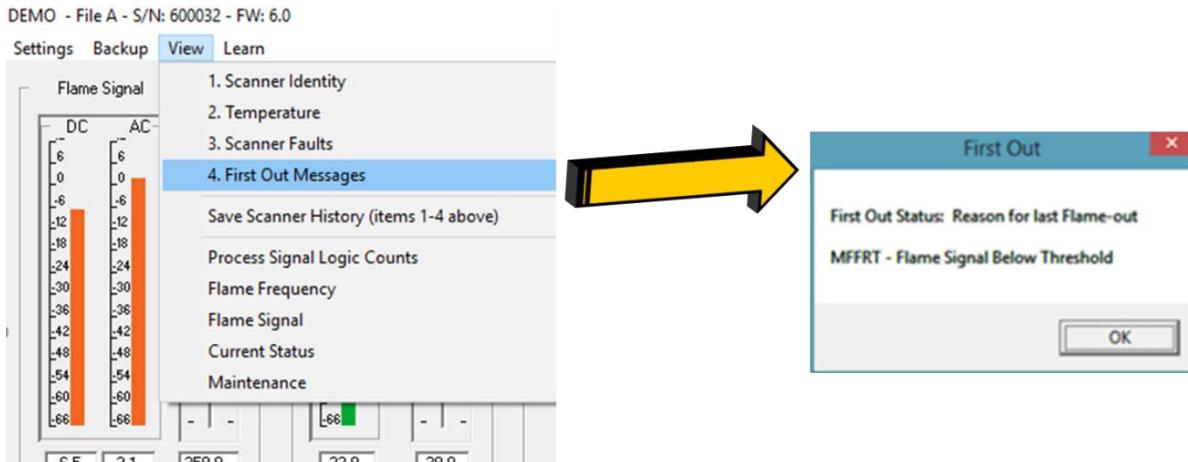


5.7.4 Flame Out Alarm: First Out Message

This command displays the reason for the last flame out.

5.7.4.1 For iScan2 FW Version 5.6 and Earlier

For iScan2 FW Version 5.6 and earlier the scanner store a single First Out Message in volatile memory. If the scanner is power cycled, the First Out Reason is lost. To view the First Out Message, from the Setup / Program window, View > First Out Messages.

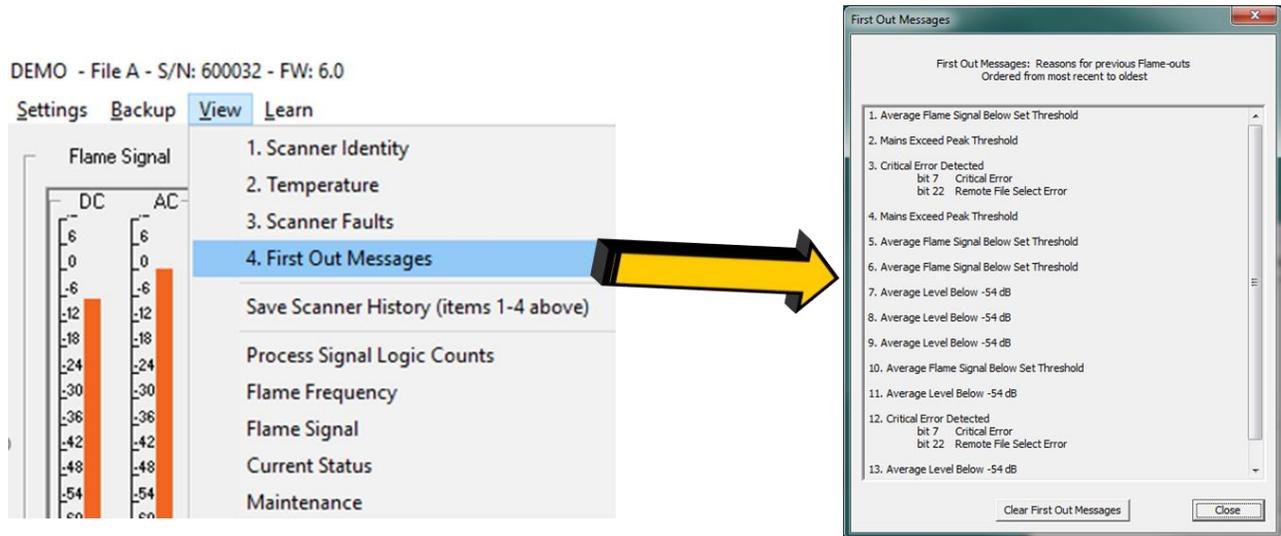


The First Out Message will list one of the following causes:

- Marginal Flame - Flame signal below flame on threshold.
- Total Flame Failure - Flame signal below total flame failure thresholds.
- Violation of any one of the Process Signal Logic:
 - Power Mains Signal Detected (50/60 or 100/120 Hz).
 - Flame Signal at Maximum or Rail Condition.
 - Strong Solar-Like signal.
 - Non 1/f Flame-Like Signal
- Critical Fault in Scanner.

5.7.4.2 For iScan2 FW Version 5.7 and Above

For iSca2 FW version 5.7 and all iScan3's the scanner stores up to 25 First Out Message in non-volatile memory so they are available until cleared. To view the First Out Message, from the Setup / Program window, View > First Out Messages. iScan2 FW Version 5.7 and iScan3 also has expanded First Out cause definitions (see table below for details). After 25 First Out causes have been stored, each subsequent event will overwrite the oldest First Out. To clear the buffer, use the Clear First Out button in the First Out Messages window.



FIRST OUT CAUSES	FIRST OUT MESSAGES
Total Flame Failure	Average Level Below -54 dB
Rail Logic Violation	AC Average exceeds AC Avg Max
Rail Logic Violation	DC Average exceeds DC Avg Max
Mains Logic Violation	Band Pass within 4 Hz of Main and Main Exceeds 20 Hz Level
Mains Logic Violation	Mains Exceed Peak Threshold
Flame Logic Violation	Level at 40 Hz < Level at 200 Hz + Offset
Flame Logic Violation	Flame Signature Mismatch
Flame Logic Violation	Flame Peak Exceeds Max Frequency
Flame Logic Violation	Flame Frequency Slope Too Flat
Solar Logic Violation	Gain Exceeds MAX Solar Gain
Solar Logic Violation	Average Frequency Exceeds Solar Freq MAX
Marginal Flame Failure	Average Flame Signal Below Set Threshold
Noise Logic Violation	Sensor Noise Exceeds Threshold
Critical Error(s)	Refer to Paragraph 5.7.13 System Errors for Fault Code

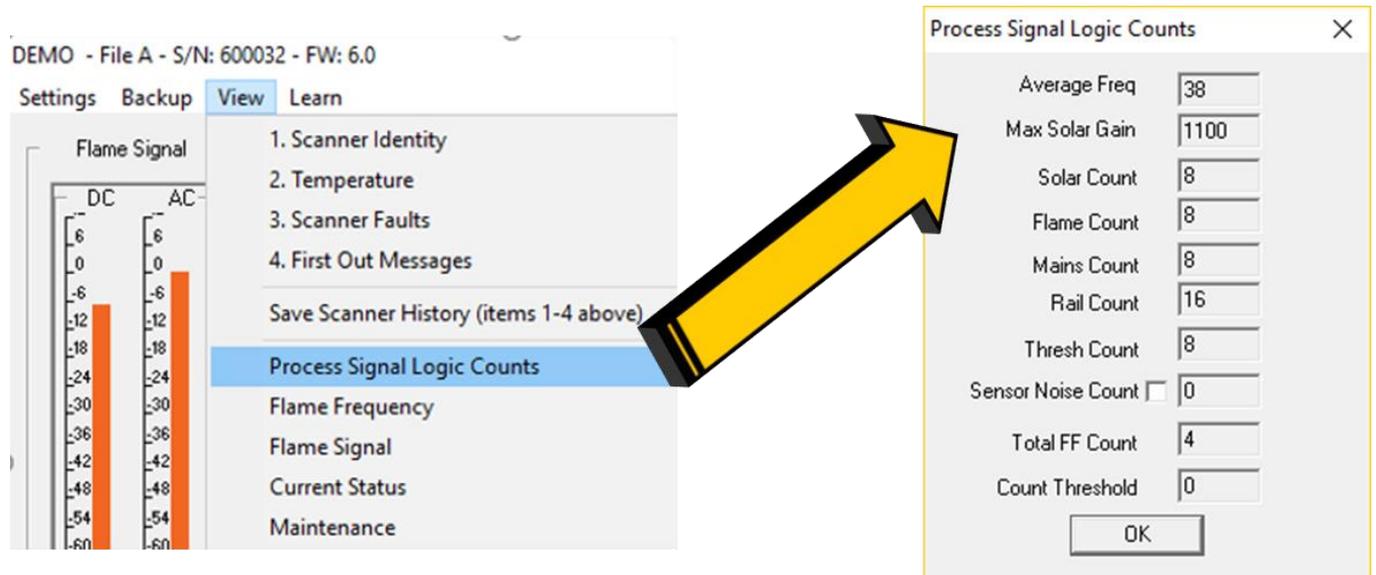
Contact Chentronics Customer Support (see paragraph 2 for contact information) for assistance with scanner trips.

5.7.5 Save Scanner History

In the Setup / Program window select View > Save Scanner History (items 1-4 above) to create a text file of the scanner's history that includes information described in paragraphs 5.7.1 thru 5.7.4.

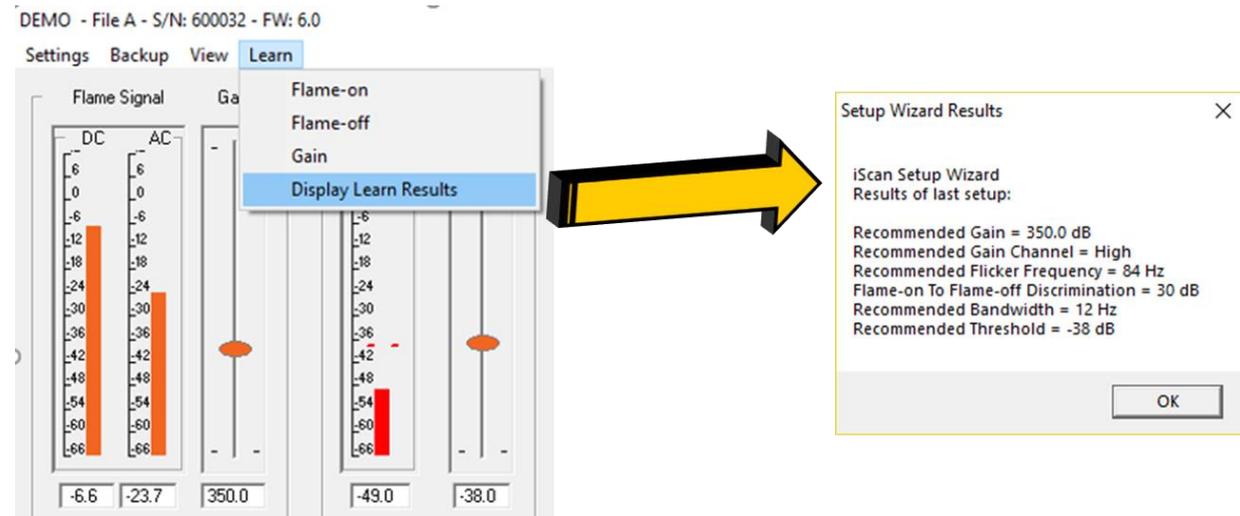
5.7.6 Process Signal Logic Counts

This command displays diagnostic information.



5.7.7 Last Learned Configuration Results

This command displays the last results of the learn process.



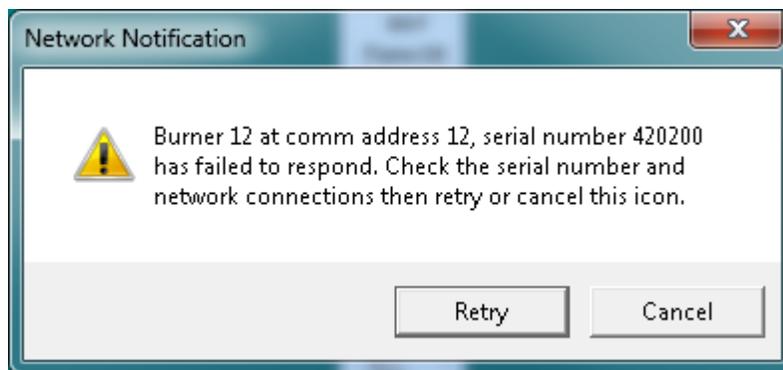
5.7.8 EASI (Electronically Assisted Sight Indicator)

Non-hazardous Area Models iScan2 (-11, -11-4, -12 and -62 models) have an Electronically Assisted Sight Indicator (LED) that can be used to aid in scanner sighting and basic troubleshooting:

LED STATUS	MEANING
Off	Power to the scanner is off (contacts open).
Blinking Slow (Once per second)	The scanner is operational and flame is off (flame relay de-energized, contacts open).
Blinking Fast (Greater than twice per second)	The scanner is operational and flame is on (flame relay energized, contacts closed). Blink rate increases as the Flicker Signal increases relative to the set Threshold.
Steady On	The scanner has faulted (flame relay de-energized, contacts open). Also a scanner temperature > 95°C results in Steady On.

5.7.9 Network Notification Error

Check each entry to make sure the Comm Address matches to the scanner serial number assigned of the scanner. iScan Software will scan the network to confirm the scanner at each assigned Comm Address responds. If the scanner serial number is not found the iScan Software will pop up the window shown below indicating that scanner was not found.



5.7.10 Over Temperature Protection Alarm

The iScan2 & 3 have internal temperature sensor to detect exposure to high temperatures that can affect reliability and the ability to detect loss of flame. There are three thresholds of temperature detection along with the corresponding response listed below:

iScan2

TEMPERATURE	SCANNER RESPONSE
internal temperature $\leq 95^{\circ}\text{C}$	Normal Operation
$95^{\circ}\text{C} < \text{internal temperature} \leq 100^{\circ}\text{C}$	<ol style="list-style-type: none"> (1) Over-temp indication on scanner icon in iScan Software (2) Fault bit 19 (Over-temp) set (3) Event is logged in log file (4) 4-to-20 ma output set at 2 ma (5) EASI LED (non-hazardous area scanners) is on solid (6) Flame Relay indicates Flame Status and Fault Relay (non-Haz area models) Remains Closed
$100^{\circ}\text{C} < \text{internal temperature} \leq 105^{\circ}\text{C}$	<ol style="list-style-type: none"> (7) Flame Relay Opens (8) Flame out indication in iScan Software (9) Fault bit 7 (Critical Error) set
Internal temperature $> 105^{\circ}\text{C}$	<ol style="list-style-type: none"> (10) Fault bit 31 set (11) Scanner in Permanently DISABLED. Do NOT attempt to clear this fault bit by any means. Dispose of the scanner.

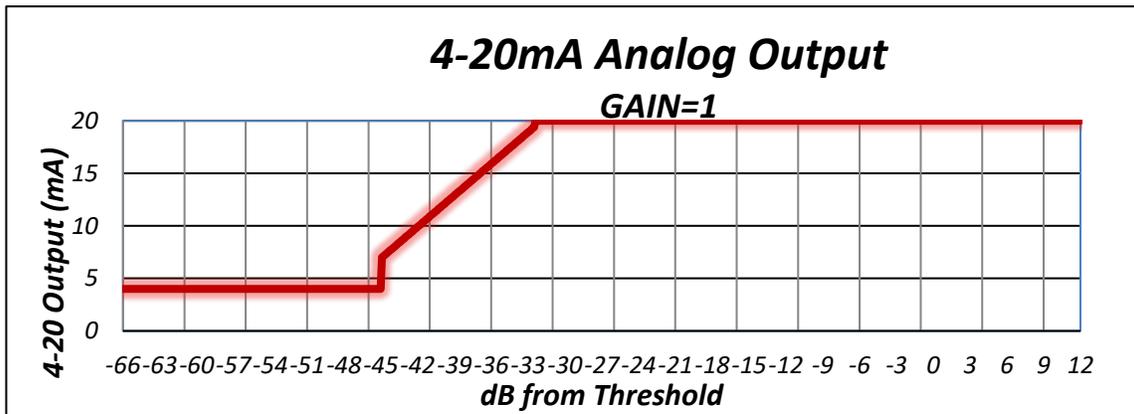
iScan3

Mode	Internal Temperature (T_{INT})	4-20 Output Setting	Indicator Light Setting	Relay Operation	DSFComm Status
Normal	$T_{INT} \leq 95^{\circ}\text{C}$	Normal (4-20 mA)	Normal	Normal	Normal
Warning	$95^{\circ}\text{C} < T_{INT} < 100^{\circ}\text{C}$	Normal (4-20 mA)	Alternate left half yellow 0.5s / right half yellow 0.5s	Normal	<ol style="list-style-type: none"> 1) Over-temp indication on scanner icon 2) Fault bit 19 set (over-temp) 3) Event is logged in log file
Fault	$100^{\circ}\text{C} < T_{INT} \leq 105^{\circ}\text{C}$	2mA steady	Blink yellow 0.5s on 0.5s off	Relays Open and will not Close	<ol style="list-style-type: none"> 1) Flame Out indication 2) Fault bit 7 set (Critical Fault)
Disable	$T_{INT} > 105^{\circ}\text{C}$	1mA steady	Yellow Solid	Relays Permanently Open and will not Close	<ol style="list-style-type: none"> 1) Fault bit 31 set (Disable Scanner) 2) Scanner is permanently disabled. <p>Do not attempt to clear this fault by any means. Dispose of the scanner</p>

5.7.11 Analog Output (4-20 mA) Internal Error

Internal scanner fault indication can also be obtained via the 4-20 mA output #1. When power is applied to the scanner, the 4-20 mA signals will read above 4 mA. However, if there is an internal failure (does not include a configuration failure) or the internal temperature is $> 95^{\circ}\text{C}$, the output will be around 2 mA. This is an important feature to keep in mind when designing the 4-20 mA indication.

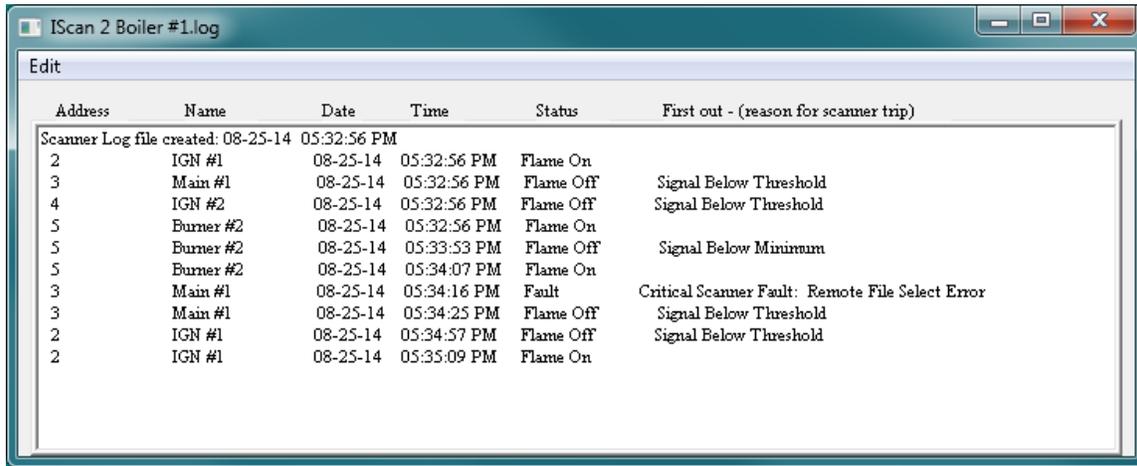
The 4-20 mA analog output #1 is used to represent flame intensity processed with the scanner's set points. When the flame signal is above the flame on threshold setting and the flame relay is energized, the analog output current will be greater than or equal to 7.5 mA. The 4-20 mA analog output #1 increases proportionally as the Flicker Signal level increases relative to the set Threshold until it reaches a maximum of 20 mA.



5.7.12 Log Files (.log)

Log Files (.log) contain a running history of a specific scanner, detailed data (reason for scanner trip) is recorded and time stamped whenever the flame relay opens.

To create a log file, open iScan Software, Select Setup > Log File > Enable at Program Start.



The screenshot shows a window titled "IScan 2 Boiler #1.log" with a standard Windows-style title bar (minimize, maximize, close buttons). The window content is a text-based log file with a header row and several data rows. The header row is: Address, Name, Date, Time, Status, First out - (reason for scanner trip). The data rows are as follows:

Address	Name	Date	Time	Status	First out - (reason for scanner trip)
Scanner Log file created: 08-25-14 05:32:56 PM					
2	IGN #1	08-25-14	05:32:56 PM	Flame On	
3	Main #1	08-25-14	05:32:56 PM	Flame Off	Signal Below Threshold
4	IGN #2	08-25-14	05:32:56 PM	Flame Off	Signal Below Threshold
5	Burner #2	08-25-14	05:32:56 PM	Flame On	
5	Burner #2	08-25-14	05:33:53 PM	Flame Off	Signal Below Minimum
5	Burner #2	08-25-14	05:34:07 PM	Flame On	
3	Main #1	08-25-14	05:34:16 PM	Fault	Critical Scanner Fault: Remote File Select Error
3	Main #1	08-25-14	05:34:25 PM	Flame Off	Signal Below Threshold
2	IGN #1	08-25-14	05:34:57 PM	Flame Off	Signal Below Threshold
2	IGN #1	08-25-14	05:35:09 PM	Flame On	

5.7.13 System Errors

ERROR MESSAGE	POSSIBLE CAUSE	REMEDIES
Cyclic Redundancy Check (CRC)	Communication signal is corrupted.	Check communications wiring and configuration. Check for proper grounding. Check that the communication bus is wired per Wiring Instructions section in MNL-ISCANMB/SB.
Port Error Communications Port Error!	This error will appear if more than one copy of <i>iScan Software</i> is running.	Check Windows Taskbar to see if more than one copy of <i>iScan Software</i> is running. Close all but one copy of <i>iScan Software</i> .
	The requested port was not available.	Check the personal computer for available ports. Check the communications setup for the correct port.
Port Error Communications Thread Error!	The requested port was not available.	Check the personal computer for available ports. Check the communications setup for the correct port.
Timeout	Scanner not responding.	Check communications wiring and configuration. Check that scanner is powered on and that the communication bus is wired per Wiring Instructions section in MNL-ISCANMB/SB.
Bit 1: Instruction Execution Error		Processor chip fault or FW has been corrupted.
Bit 2: EEPROM CRC Error		Processor chip fault or FW has been corrupted.
Bit 3: EEPROM Read Error		Processor chip fault or FW has been corrupted.
Bit 4: EEPROM Write Error		Processor chip fault or FW has been corrupted.
Bit 5: CPU RAM Error		Processor chip fault or FW has been corrupted.
Bit 6: SRAM Error		Processor chip fault or FW has been corrupted.
Bit 7: Critical Error	Indicates that a critical error occurred. The specific errors (Bit 0-15) will be listed. Critical errors will	Critical errors not listed in this table, requires user to contact the factory. Errors listed below can be resolved as prescribed.

	cause the scanner to default to a flame-off state.	
Bit 8: Upper Block EEPROM CRC Error		Processor chip fault or FW has been corrupted.
Bit 9: Addressing Error - SRAM		Processor chip fault or FW has been corrupted.
Bit 10: Clock Timing Error		Processor chip fault or clock oscillator fault.
Bit 11: Hi/Lo Gain Error		Processor chip fault or FW has been corrupted.
Bit 12: Shutter Fail Check	Failing sensor or can be caused by a grounding problem.	If the earth ground is not connected properly then environmental noise can trigger this fault when the scanner is functioning properly. Clear Faults can be used to clear this but if the fault occurs repeatedly then either the wiring needs to be checked or the scanner may need to be replaced.
Bit 13: Flame Relay Ground Circuit Error	Wiring error.	Check wiring.
Bit 14: Interrupt Execution Error		Processor chip fault or FW has been corrupted.
Bit 15: A/D Error		Processor chip fault or gain circuit fault.
Bit 16: DC Flame Signal Error	May indicate that the flame signal is too strong.	Use an orifice to reduce the flame signal to the scanner.
Bit 17: Hi Neg Analog Power Error		Hardware fault.
Bit 18: Hi Neg Analog Power Error		Hardware fault.
Bit 19: Over-temp Warning	Internal temperature of the scanner is greater than design limit. > 95C	Check that the scanner purge air supply meets design requirements. Provide shield or other means of external cooling. This fault will clear on its own when the internal temperature returns to below 95°C.

Bit 20: Under-temp Error	Internal temperature of the scanner is less than design limit. Can occur with outdoor installations in cold environments with the scanner powered off.	Apply power for several minutes allowing scanner to warm up.
Bit 21: Program Execution Error	Possible problem with the remote file select wiring.	Processor chip fault or FW has been corrupted.
Bit 22: Remote File Select Error	Possible problem with the remote file select wiring.	Correct wiring problem. Disable the Remote File Select if not used.
Bit 23: Relay Error	Relay PWM Error.	Refer to relay ratings and correct fault. Recycle power to scanner.
Bit 24: Watchdog Timer Error		Hardware fault.
Bit 25: Serial RX Buffer Overflow		Communication.
Bit 26: EEPROM Write Timeout Error		Processor chip fault or FW has been corrupted.
Bit 27: Serial File Select Error	Remote file select enabled without proper wiring.	Check Remote File Select settings and wiring.
Bit 28: High AC Offset Error	High AC offset Error.	Use an orifice to reduce flame signal. Recycle power to scanner.
Bit 29: Low AC Offset Error	Low AC offset Error.	Use an orifice to reduce flame signal. Recycle power to scanner.
Bit 30: Critical Memory Access Fault	Critical error. Includes bits 3-6 and 9. This error will cause the scanner to default to a flame-off state.	This fault cannot be cleared by cycling power however it can be cleared using Clear Faults. If this occurs persistently then either there is grounding issue or the scanner is intermittent and should be replaced.
Bit 31: Over Temperature Lock Out Fault	Scanner temperature exceeds 105°C. This error will cause the scanner to default to a flame-off state.	The scanner is permanently disable and cannot be used again. Dispose of the scanner.