



Fyrite®  
**iNSIGHT PLUS**

POWERED BY  
**Tune-Rite™**  
SOFTWARE

## Tune-Rite™ Software Operation Manual



Tune-Rite™ Patent Pending

Run		Nat Gas	
6.0	O <sub>2</sub> (%)	9.0	
325	T-Stk (°F)	425	
0	CO (ppm)	100	
Menu		Save	

Tune-Rite Results	
Overfired	
Burner	
Heat Exchanger	
Filter	
List	Analyze

Run		Nat Gas	
O <sub>2</sub>	8.5 %	CO	110 ppm
Eff	Analyzing... 0 %	CO <sub>2</sub>	7.0 %
T-STK	500 °F		
Print	Menu	Save	

Checklist	
<input checked="" type="checkbox"/>	Gas Pressure
<input checked="" type="checkbox"/>	Cracked Heat Ex
<input checked="" type="checkbox"/>	Dirty Burner
<input checked="" type="checkbox"/>	Flame Impingement
Print	Save

<b>BACHARACH</b>	
BACHARACH, Inc. Insight Plus SN: AB1234	
=====	
As Found Condition:	
Time:	03:45:21 PM
Date:	04/09/14
Fuel:	
Nat. Gas	
O <sub>2</sub>	8.5 X
CO	339 ppm
Eff	76.0 X
CO <sub>2</sub>	7.0 X
T-Stk	500 °F
T-Air	80.0 °F
EA	61.0 X
CO (O)	571 ppm
As Left Condition:	
Time:	07:09:28 PM
Date:	04/09/14
Fuel:	
Nat. Gas	
O <sub>2</sub>	8.0 X
CO	14 ppm
Eff	76.8 X
CO <sub>2</sub>	7.3 X
T-Stk	490 °F
T-Air	80.0 °F
EA	55.0 X
CO (O)	23 ppm
Service Checklist	
Time:	07:09:57 PM
Date:	04/09/14
<input checked="" type="checkbox"/>	Gas Pressure
<input checked="" type="checkbox"/>	Cracked Heat Ex
<input checked="" type="checkbox"/>	Dirty Burner
<input checked="" type="checkbox"/>	Flame Impingement
<input checked="" type="checkbox"/>	Burner Debris

P/N: 0024-9504

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Product Leadership • Training • Service • Reliability

## **Table of Contents**

<b>SECTION 1. INTRODUCTION</b> .....	<b>3</b>
<b>SECTION 2. SAFETY</b> .....	<b>4</b>
2.1. Conventions .....	4
2.2. Safety Precautions .....	5
2.3. Data Ranges .....	6
<b>SECTION 3. TUNE-RITE™ BASICS</b> .....	<b>7</b>
3.1. Supported Appliances and Fuel Types .....	7
3.2. Typical Combustion Process Review .....	8
3.3. The Tune-Rite™ Integration.....	9
<b>SECTION 4. USING TUNE-RITE™</b> .....	<b>12</b>
4.1. Introduction .....	12
4.2. Selecting Fuel Type and Accessing Tune-Rite™ .....	12
4.3. Furnace/Boiler Light-Off .....	14
4.4. Sample Smoke Test (Oil-Fired Appliances Only) .....	14
4.5. Tune-Rite™ Draft Analysis.....	17
4.6. Tune-Rite™ Combustion Analysis .....	20
4.7. Custom Reporting .....	28
<b>SECTION 5. REFERENCE, SERVICE, AND SUPPORT</b> .....	<b>31</b>

## **List of Figures**

Figure 1-1. Fyrite® INSIGHT® Plus Reporting Package Kit .....	3
Figure 3-1. Typical Combustion Analysis Flowchart .....	8
Figure 3-2. Accessing Tune-Rite™ from the Main Menu.....	9
Figure 3-3. Tune-Rite Process Map Integration .....	10
Figure 4-1. Fuel Selection Screens for Supported Fuel .....	13
Figure 4-2. Fuel Selection Screens for Unsupported Fuel .....	13
Figure 4-3. Cycling Through Tracking Options .....	16
Figure 4-4. Sample Printout Showing Service Checklist .....	30

## **List of Tables**

Table 2-1. Default “In Range” Data Ranges Used During Analysis .....	6
Table 4-1. Tune-Rite™ Menu Navigation Keys .....	12
Table 5-1. Reference Material Part Numbers .....	31

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## Section 1. Introduction

Thank you for purchasing a Bacharach Fyrite® INSIGHT® Plus. Your new combustion analyzer provides a suite of features and functionality to simplify the combustion analysis process. These features and functions are detailed in the Fyrite® INSIGHT® Plus manual that is included with your instrument.



**Figure 1-1. Fyrite® INSIGHT® Plus Reporting Package Kit**

Fyrite® INSIGHT® Plus is a next-generation combustion analyzer that integrates Bacharach's new Tune-Rite™ combustion analysis assistant into the feature-rich, state-of-the-art programming of the traditional Fyrite® INSIGHT® Plus.

Bacharach's Fyrite® Tune-Rite™ help system provides:

- A “when-you-need-it” solution that is integrated with the Fyrite® INSIGHT® Plus
- Guidance based on live data and typical characteristics of the combustion appliance
- An additional layer of diagnostic thoroughness to the traditional combustion analysis process
- Additional comfort and confidence for the service technician
- A detailed, customizable, and value-added service report for the customer

Tune-Rite™ is a non-intrusive combustion analysis assistant offering as much

help as the technician chooses. It is integrated into the Fyrite® INSIGHT® Plus interface and provides feedback and diagnoses throughout the entire combustion analysis process if requested.

- It tells you when the combustion appliance is ready for analysis.
- It reviews combustion test results based on the appliance type, fuel type, and various live readings.
- It identifies possible causes and recommends ways to correct problems and improve overall combustion efficiency.
- It provides tools allowing you to track your progress through the analysis and troubleshooting process.
- It includes a reporting feature enabling you to build then print a customized summary report of your analysis, including “as found”, “as left”, and service checklist data.

It is a help *and* training tool that’s as useful to the seasoned HVAC veteran as it is to the novice technician.

## **Section 2. Safety**

### **2.1. Conventions**

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**WARNING:** A warning statement denotes a potential hazard associated with the use of this equipment. Failure to follow this information could result in serious personal injury or death.

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**CAUTION:** A caution statement indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. Caution statements may also be used to alert against unsafe practices.

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**IMPORTANT:** An important statement provides emphasis of an important feature, operation, etc. Failure to follow this information could void your warranty, result in improper operation, or cause equipment damage.

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**NOTE:** A note statement provides emphasis of a feature, operation, practice, etc.

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## 2.2. Safety Precautions

For important information on proper operation and operator safety, read and follow the contents of this manual. Failure to do so can result in serious injury, death, or property damage.



**WARNING:** Only trained technicians should use a combustion analyzer. Failure to adjust the appliance to specifications recommended by the appliance manufacturer can cause it to malfunction and result in serious injury, death, or property damage.



**WARNING:** Failure to prevent combustion by-products such as CO gas from leaking into the living space can create hazardous conditions that could result in serious injury, death, or property damage.



**WARNING:** Tune-Rite™ screens help to optimize the combustion efficiency of a heating appliance while reducing flue gas emissions such as soot and CO. Before using the analyzer, read and follow the INSIGHT® Plus instruction manual. ALWAYS refer to the appliance manufacturer's instructions before servicing the appliance. Where the appliance manufacturer's recommendations are in conflict with the analyzer's screens, operating values, or instructions, the appliance manufacturer's recommendations take precedence and should always be followed.



**WARNING:** After making appliance adjustments, always rerun the combustion analysis using the analyzer to confirm that the appliance is operating within the appliance manufacturer's recommendations.

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**2.3. Data Ranges**



**WARNING:** The probable causes in the help screens are based on the appliance type and typical operating values. The operating values programmed in the analyzer are typical but not comprehensive.

CO recommendations are based on 100 ppm CO. Local rules and regulations always take precedence. Where applicable, smoke tests (in fuel oil applications) and draft tests (for all fuels) should be performed prior to combustion tests.

The operator should compare the appliance manufacturer’s operating values to the analyzer’s default values to ensure that analyzer results are applicable to the appliance under test. Review Table 2-1 for a list of default values used during the analysis.

**Table 2-1. Default “In Range” Data Ranges Used During Analysis**

Fuel	Appliance Type		Default “In Range” Data Ranges			
			O <sub>2</sub> (%)	T-Stack (°F)	CO (ppm)	Draft-Stack (inwc)
NG	Furnace	Atmospheric Draft (70%)	6 to 9	375 to 550	< 100	-0.01 to -0.05
NG		Fan Induced Draft (80%)	6 to 9	325 to 425	< 100	-0.01 to -0.05
NG		Condensing (90%)	5 to 9	< 125	< 100	n/a
NG	Water Heater		5 to 9	380 to 580	< 100	-0.01 to -0.05
Oil <sup>1</sup>	Boiler	Flame Retention	3 to 6	350 to 500	< 100	-0.02 to -0.05
Oil <sup>1</sup>		Non-Flame Retention	5 to 9	400 to 600	< 100	-0.02 to -0.05

1 – Fuel type “Oil” includes Oil #2, Oil #4, Oil # 6, and B5.

## Section 3. Tune-Rite™ Basics

### 3.1. Supported Appliances and Fuel Types

The Fyrite® INSIGHT® Plus instrument is useful in analyzing the combustion process in a wide variety of applications. (For a complete list of features and applications, refer to your Fyrite® INSIGHT® Plus combustion analyzer manual.) Tune-Rite™ focuses exclusively on the gas-fired furnaces, gas-fired water heaters, and oil-fired boilers listed below.

Supported Appliance Types are shown below.

- Natural gas (NG) 70% efficient atmospheric furnaces
- Natural gas (NG) 80% efficient induced furnaces
- Natural gas (NG) 90% high-efficiency/condensing furnaces
- Natural gas (NG) water heaters (standard and FVIR)
- Flame retention oil boilers (>80% efficient)
- Non-flame retention oil boilers (<75% efficient)

Supported Tune-Rite™ Fuel Types are shown below.

- Natural gas
- Oil #2
- Oil #4
- Oil #6
- B5

Refer to your Fyrite® INSIGHT® Plus manual for the locations of sampling points on your combustion appliance.



**IMPORTANT:** Review the appliance manufacturer's recommendations for the combustion device being tested, and be aware of accepted practices of the local jurisdiction before introducing sampling holes into exhaust pipes or ducts.



**WARNING:** To prevent dangerous exhaust gases from leaking into the space, be sure to completely and securely seal any sampling holes made in the exhaust pipes or ducts.

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### 3.2. Typical Combustion Process Review

In a typical combustion process (see Figure 3-1), the following steps usually take place:

- Initial light-off of the combustion appliance
- The system warms up to the point when a steady-state condition is reached. If steady-state is not reached, the combustion appliance may require major tuning, major repairs, or replacement.
- For oil-fired appliance, a smoke test is performed.
- A draft test is performed to verify proper draft in the system.
- Combustion variables (O<sub>2</sub>, CO, CO<sub>2</sub>, ambient temperature, stack temperature, etc.) are analyzed to determine efficiency and proper operation.
- Out-of-range values are indicative of less-than-optimal combustion, and may indicate hardware problems and even safety issues.
- Further investigation may occur and adjustments may be made to the combustion equipment.
- Combustion variables are re-evaluated.
- Additional adjustments may be made until the combustion appliance is operating within the appliance manufacturer’s recommended guidelines. If this state is never reached, major repairs may be required, the appliance manufacturer’s associated documentation may need to be referenced, or a full system replacement may be warranted.

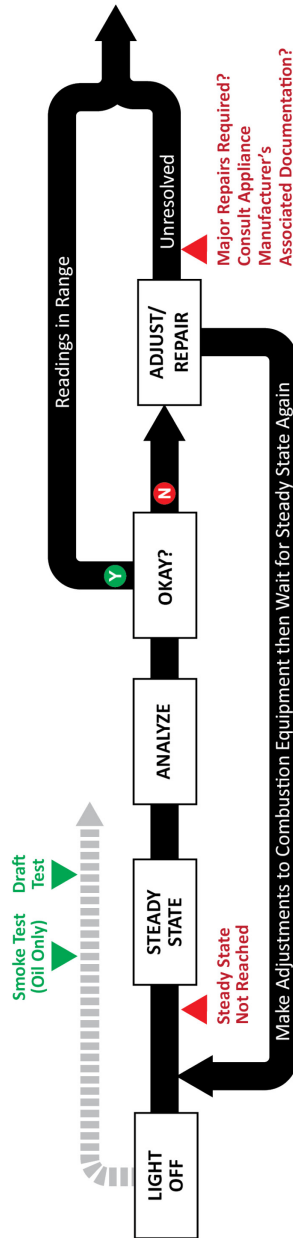


Figure 3-1. Typical Combustion Analysis Flowchart

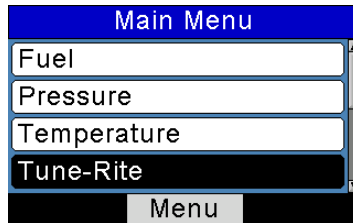


Technology can be used to simplify this process. The Fyrite® INSIGHT® Plus combustion analyzer provides precise live readings of critical combustion data during this process. To determine if the combustion appliance is operating properly and within the appliance manufacturer's recommended specifications, the HVAC technician must still refer to the following.

- Industry experience to *evaluate* the combustion data
- Familiarity with the combustion appliance
- Familiarity and understanding of the operation of the analyzer

### 3.3. The Tune-Rite™ Integration

Tune-Rite™ provides an integrated “when-you-need-it” solution that offers guidance based on live data and typical characteristics of the combustion appliance. It gives an additional layer of diagnostic thoroughness to the traditional combustion analysis process, while offering additional confidence to the service technician.



**Figure 3-2. Accessing Tune-Rite™ from the Main Menu**



**WARNING:** Be aware of operating limits associated with the combustion appliance you are analyzing. Tune-Rite™ provides general tuning and efficiency recommendations based on the type of appliance and fuel you are using (as well as combustion data). However, always follow the operating instructions and guidelines from the appliance manufacturer for details on precise operating limits.

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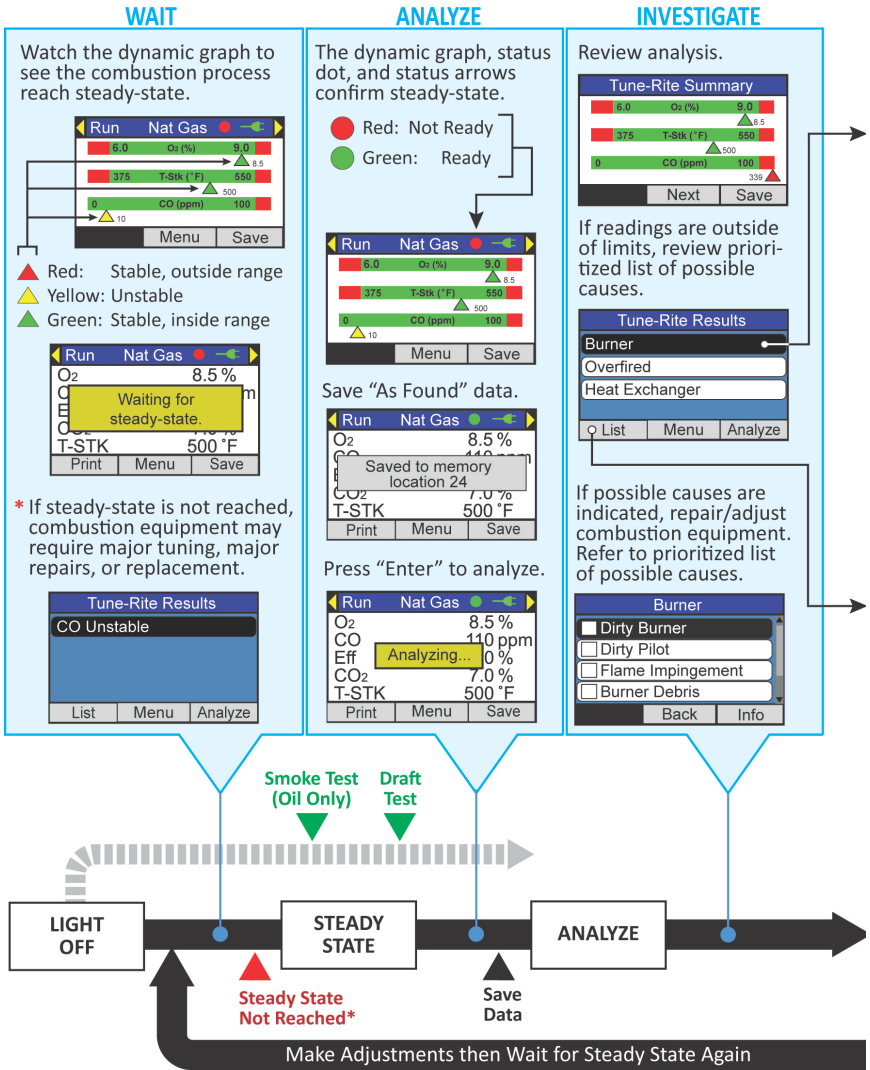


Figure 3-3. Tune-Rite Process Map Integration

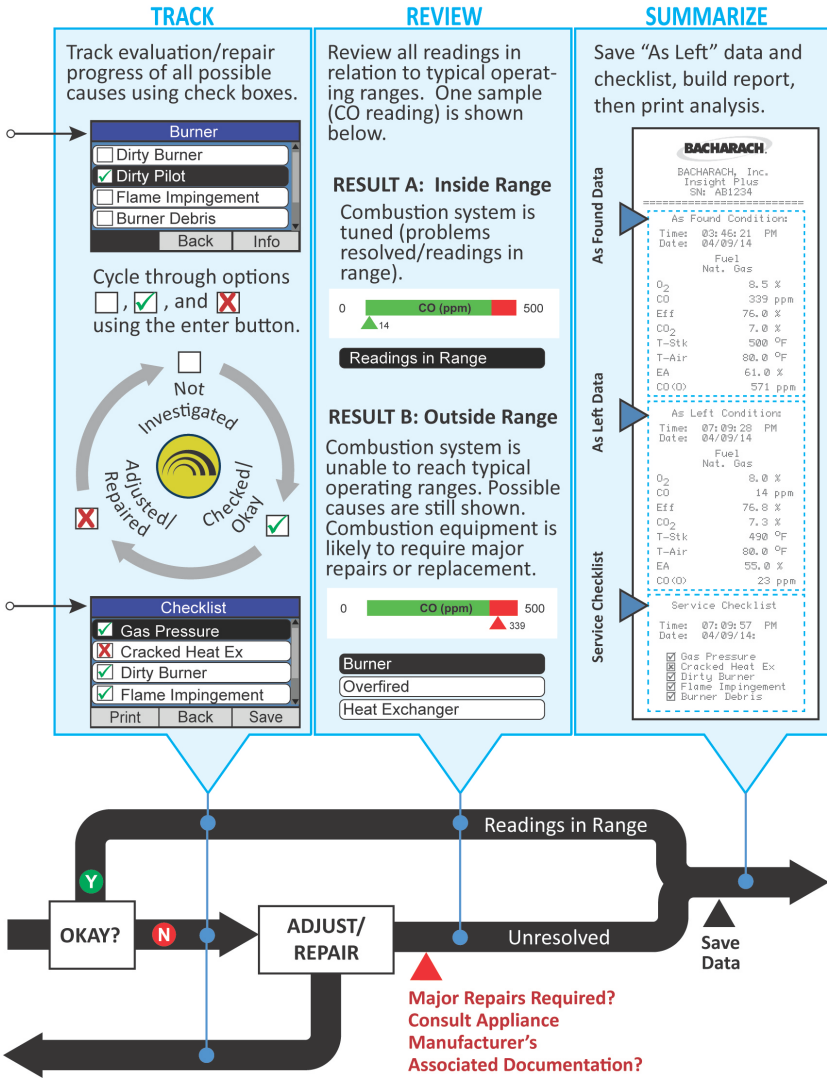



Figure 3-3. Tune-Rite Process Map Integration (Continued)

## Section 4. Using Tune-Rite™

### 4.1. Introduction

Using the Tune-Rite™ combustion analysis assistant is similar to using the Fyrite® IINSIGHT® Plus combustion analyzer. If you are already familiar with the INSIGHT® Plus, using the Tune-Rite feature will be very intuitive as the screens and menu structure are very similar. Below is a review of the basic menu navigation keys, which also apply to navigation within the Tune-Rite™ screens.


**Table 4-1. Tune-Rite™ Menu Navigation Keys**

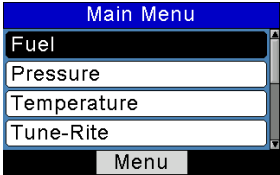
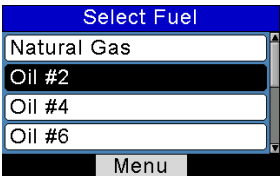
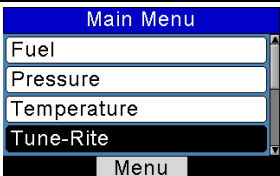
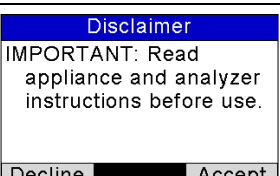
Key Name	Symbol	General Navigation Function
Arrow Keys	▲, ▼, ◀, ▶	Up, down, left, and right movement within a screen or between screens
Enter Key		Proceed; perform the selected action
Escape Key	<b>ESC</b>	Go back

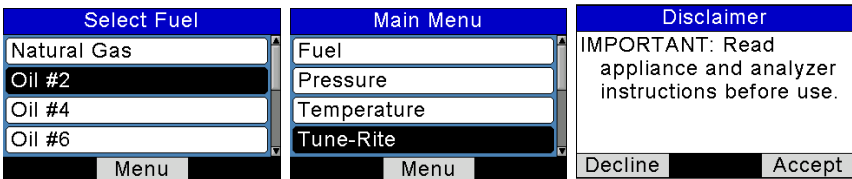
If you are new to using the Fyrite® INSIGHT® Plus, please refer to the INSIGHT® Plus manual for details on combustion analyzer operating instructions, menus, complete navigation instructions, and important warnings.

Multiple fuel types, appliance types, and combustion readings could produce many Tune-Rite™ recommendations. This section shows only a small sampling of those options in order to familiarize the operator with Tune-Rite™ behavior and intuitive operation.

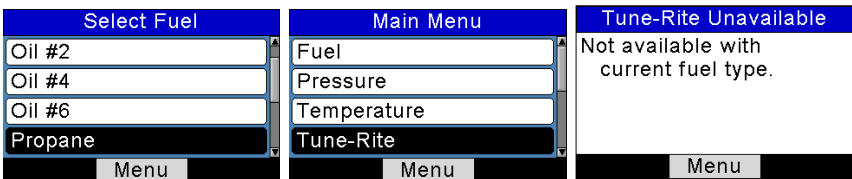
### 4.2. Selecting Fuel Type and Accessing Tune-Rite™

Step	Description
1	<p>Turn on the Fyrite® INSIGHT® Plus combustion analyzer and wait for it to complete its initialization and warm-up procedure. Refer to the INSIGHT® Plus Instruction Manual P/N: 0024-9487 for details.</p> 

Step	Description	
2	From the Main Menu of the Fyrite® INSIGHT® Plus, select the Fuel option and press the Enter key (⏎). This displays the Select Fuel menu.	 <p>Main Menu</p> <ul style="list-style-type: none"> <li>Fuel</li> <li>Pressure</li> <li>Temperature</li> <li>Tune-Rite</li> </ul> <p>Menu</p>
3	From the list of fuel types in the Select Fuel menu, select the fuel type for the combustion appliance you are testing (see Figure 4-1 below and Supported Tune-Rite™ Fuel Types on page 7).	 <p>Select Fuel</p> <ul style="list-style-type: none"> <li>Natural Gas</li> <li>Oil #2</li> <li>Oil #4</li> <li>Oil #6</li> </ul> <p>Menu</p>
4	From the Main Menu, use the up and down arrow keys (▲, ▼) to select the Tune-Rite™ option, then press the Enter key (⏎).	 <p>Main Menu</p> <ul style="list-style-type: none"> <li>Fuel</li> <li>Pressure</li> <li>Temperature</li> <li>Tune-Rite</li> </ul> <p>Menu</p>
5	Read and accept the disclaimer that is displayed. If you selected a fuel that is unsupported by Tune-Rite™, an error is displayed when you attempt to access Tune-Rite™. Refer to Figure 4-2 below.	 <p>Disclaimer</p> <p>IMPORTANT: Read appliance and analyzer instructions before use.</p> <p>Decline Accept</p>



**Figure 4-1. Fuel Selection Screens for Supported Fuel**



**Figure 4-2. Fuel Selection Screens for Unsupported Fuel**


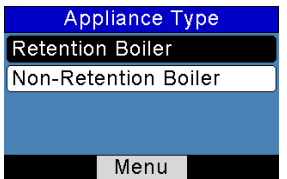

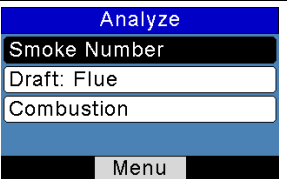
### 4.3. Furnace/Boiler Light-Off

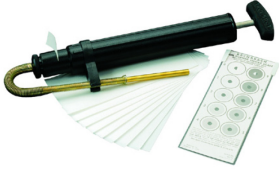
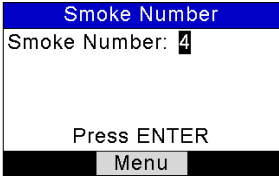
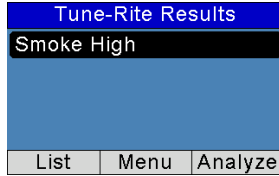
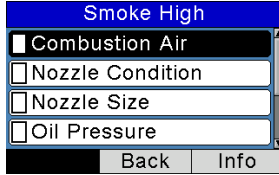

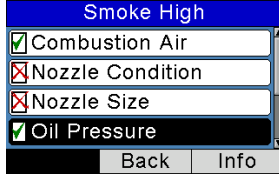
If the combustion appliance you are testing is new or is shut off (i.e., “cold”), be sure to start the appliance according to the appliance manufacturer’s instructions so that it can warm-up and the process can begin to reach steady-state conditions (which usually takes about 5-10 minutes).

### 4.4. Sample Smoke Test (Oil-Fired Appliances Only)

If the combustion appliance you are testing uses oil as a fuel, it is important to perform a smoke test. Excessive smoke from oil combustion is indicative of a serious combustion process problem, and can also be harmful to people and bad for sensitive combustion analysis equipment like the INSIGHT® Plus. A smoke test is used to ensure that the oil-fired system is at least adequately “coarsely” tuned to warrant finer detailed tuning using the combustion analyzer.

A smoke test is a mechanical test that samples the combustion gas by drawing it through a white paper filter. Visual comparison of the combustion gas residue against standard smoke level samples shows the operator if the combustion system is significantly out of tune and in need of coarse tuning before the combustion analyzer should be used.

Step	Description	
1	After setting the fuel type (oil) and accepting the disclaimer, select the oil boiler type and press Enter (  ). <ul style="list-style-type: none"> <li>• Boiler with flame retention burner head (&gt;80% efficient)</li> <li>• Boiler with non-flame retention burner head (&lt;75% efficient)</li> </ul>	
2	Select Smoke Number from the Analyze menu and press Enter (  ). The Smoke Number screen is displayed and a Smoke Number is requested.	

Step	Description
3	<p>Use a True Spot® Smoke Tester to sample the oil burners' combustion gas. Compare the sample with the smoke chart to determine the smoke number.</p> 
4	<p>Enter the oil burner's smoke number. Based on the smoke number value that you enter, you <i>may</i> be asked if oil is seen on the paper, to which you will enter either Yes or No.</p> 
5	<p>Tune-Rite™ results are displayed. In this case a "Smoke High" result is displayed. Press Enter (⏏) to see the checklist of possible items to check for a high smoke condition.</p> 
6	<p>Review the checklist using the up and down arrow keys (▲, ▼) to navigate through the list.</p> 
7	<p>Inspect, adjust, and/or repair the appliance based on safety guidelines, local regulations, the appliance manufacturer's recommendations, and system guidance from Tune-Rite™. Refer to INSIGHT® Plus Instruction Manual for further safety details.</p> 
8	<p>As you inspect, repair, and adjust the combustion appliance, track your progress by cycling through options using the Enter key (⏏). Refer to Figure 4-3 below.</p> 

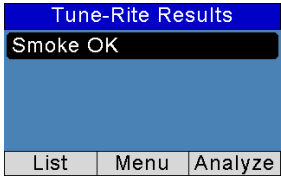
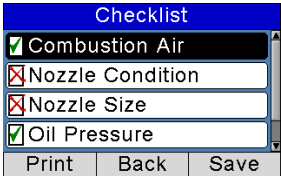
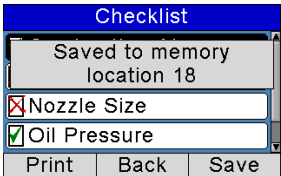


Cycle through options , , and  using the enter button.

Figure 4-3. Cycling Through Tracking Options

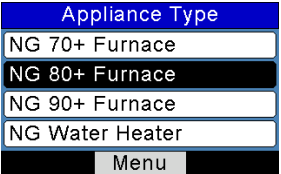
Step	Description	
9	Press the Back key (F2) to go back to the results screen. Then press the Analyze key (F3) to re-analyze.	
10	Select the Smoke Number option from the Analyze menu. The Smoke Number screen is displayed and a Smoke Number is requested.	
11	Use a True Spot® Smoke Tester to sample the oil burners' combustion gas. Compare the sample with the smoke chart to determine the smoke number.	
12	Enter the oil burner's new smoke number after repairs and adjustments have been made.	
13	Check the smoke test paper for signs of oil residue and enter the appropriate response.	

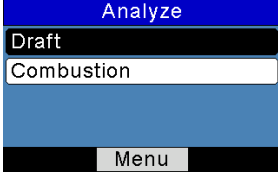
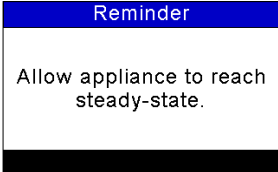
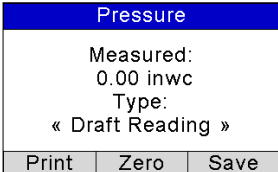


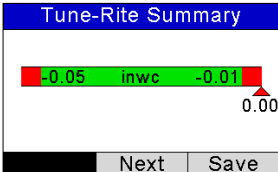
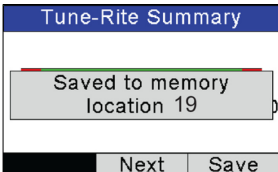

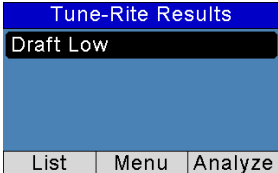


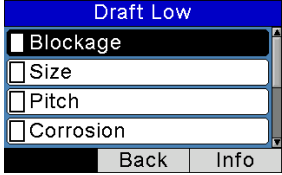

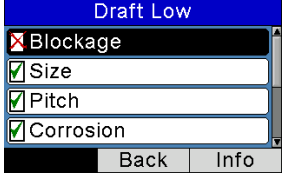
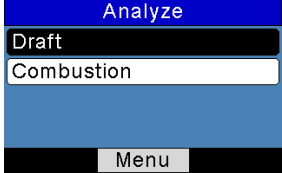
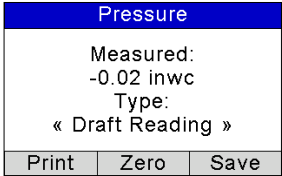
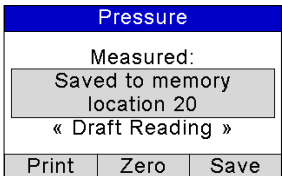

Step	Description	
14	The adjustments have reduced the high smoke condition to an acceptable range. Select the Analyze option (F3) to return to the Analyze menu.	
15	Select the List option (F1) to review what you investigated and the adjustments you made.	
16	Select the Save option (F3) to save this service checklist for printing later.	

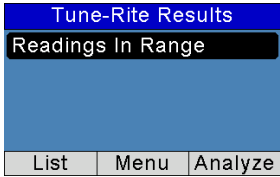
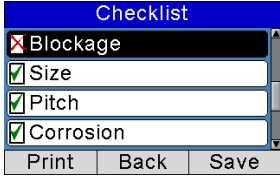
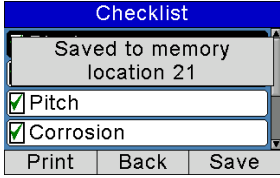
## 4.5. Tune-Rite™ Draft Analysis

Ensuring the appliance under test has proper draft is vital in the combustion analysis process. You can directly measure the draft/venting data using the INSIGHT® Plus (refer to the INSIGHT® Plus manual) and evaluate the data yourself, or you can have Tune-Rite™ automatically evaluate the draft data of the combustion appliance.

Step	Description	
1	After setting the fuel type (natural gas in this example) and accepting the disclaimer, select the appliance type: <ul style="list-style-type: none"> <li>• NG 70+ (atmospheric)</li> <li>• NG 80+ (induced)</li> <li>• NG 90+ (high-efficiency/condensing)</li> <li>• NG Water Heater.</li> </ul> Appliance type will vary based on fuel selection.	

Step	Description	
2	Select the draft option from the Analyze menu. Note that the number of options in this screen and their names will vary based on the selected fuel type and appliance type.	
3	A steady-state reminder message is displayed. Be sure that a steady-state condition is reached before taking venting or draft measurements.	
4	The draft measurement from the INSIGHT® Plus is displayed.	
5	Press the Enter key (  ) to analyze using Tune-Rite™.	
6	Tune-Rite™ results are displayed. Press Next ( <b>F2</b> ) to see the Tune-Rite Results screen.	
7	Press the Save key ( <b>F3</b> ) to save draft data (to be used as your “as found” draft data when you build your service checklist and report).	
8	In this case, a “Draft Low” message is displayed. Press Enter (  ) to see the list of possible causes for this condition.	

Step	Description	
9	Review the list of possible causes. Note that the list may scroll off the screen, so you may need to use the arrow keys (▲, ▼) to navigate through the list.	
10	Inspect, adjust, and/or repair the appliance based on safety guidelines, local regulations, the appliance manufacturer’s recommendations, and system guidance from Tune-Rite™. Refer to INSIGHT® Plus Instruction Manual for further safety details.	
11	As you inspect, repair, and adjust the combustion appliance, track your progress by cycling through options using the Enter key (↵). Refer to Figure 4-3 on page 16.	
12	Go back and re-analyze. Select the Draft option from the Analyze menu and press the Enter key (↵).	
13	The updated draft measurement from the INSIGHT® Plus is displayed.	
14	Press the Save key (F3) to save this draft data (to be used as your “as left” draft data when you build your service checklist and report).	
15	Press the Enter key (↵) to re-analyze using Tune-Rite™.	



Step	Description	
16	The adjustments have corrected the low draft condition. The draft reading is now within an acceptable range.	
17	Select the List option (F1) to review what you investigated and the adjustments you made.	
18	Select the Save option (F3) to save this service checklist for printing later.	

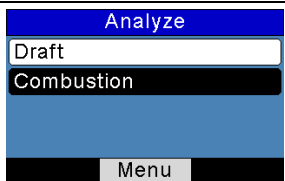
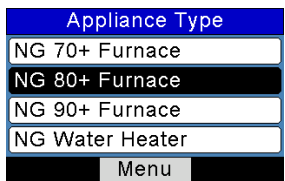
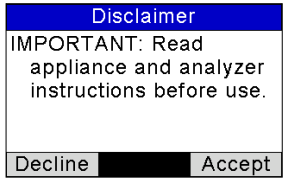
#### 4.6. Tune-Rite™ Combustion Analysis


You can directly measure combustion data using the INSIGHT® Plus (refer to the INSIGHT® Plus manual) and evaluate the results yourself, or you can have Tune-Rite™ automatically analyze the combustion data and make recommendations for repairs and any appropriate optimization.

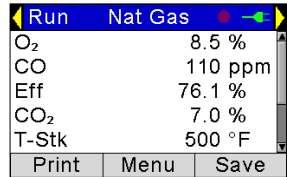
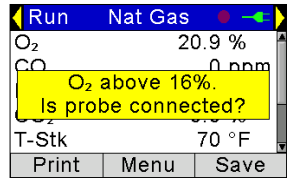
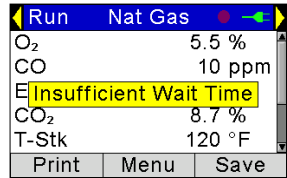
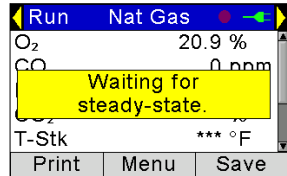


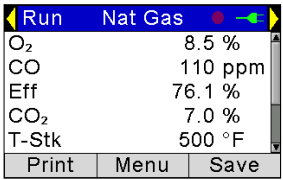
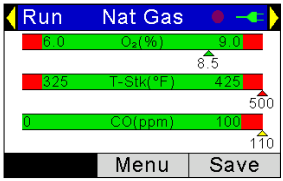
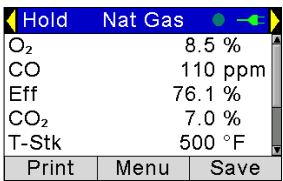
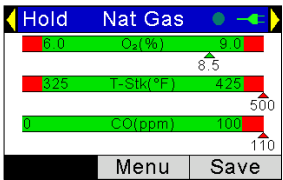

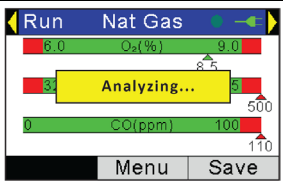
**IMPORTANT:** Possible cause recommendations and range-of-operation values provided during combustion analysis testing assume the combustion appliance is running in high-fire mode.

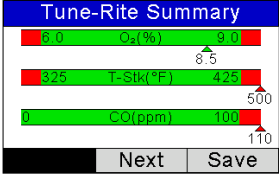
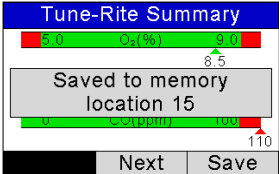
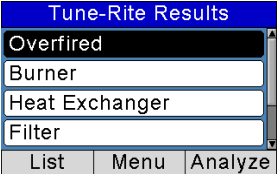
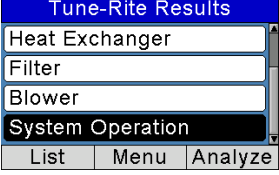
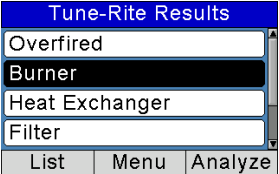
Step	Description
<p>1</p>	<p>After setting the fuel type (Natural gas in this example) and accepting the disclaimer (<b>F3</b>), select the NG appliance type from the list and press Enter (  ).</p> <ul style="list-style-type: none"> <li>• NG 70+ Furnace (atmospheric)</li> <li>• NG 80+ Furnace (induced)</li> <li>• NG 90+ Furnace (high-efficiency/condensing)</li> <li>• NG Water Heater.</li> </ul> <p>Note that the appliance types displayed will vary based on the selected fuel.</p>
<p>2</p>	<p>Select the Combustion option from the Analyze menu and press Enter (  ) to initiate the analysis. Note that the number of options in this screen and their names will vary based on the selected fuel type and appliance type.</p>



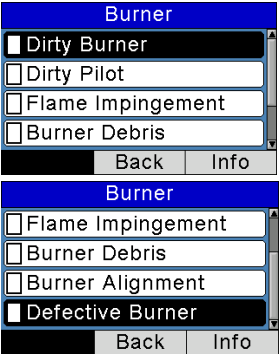
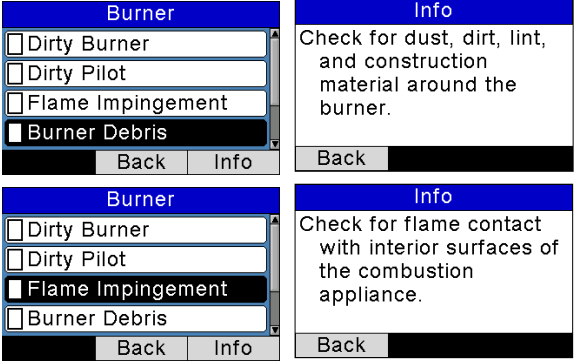
Step	Description
3	<p>The steady-state reminder message <b>Waiting for steady-state.</b> is displayed briefly. In addition, the red dot (●) in the upper right portion of the screen indicates that combustion readings have not yet reached a steady-state condition.</p> <p>If you attempt to initiate a Tune-Rite™ combustion analysis (by pressing the Enter key  ) <i>before</i> steady state is reached, an <b>Insufficient Wait Time</b> message is displayed briefly. (Note that this popup indicates that the analyzer has insufficient data to make a steady-state determination – unlike the similar terminology in the Results screen which relates to the appliance wait time.)</p> <p>Similarly, if you attempt to initiate a Tune-Rite™ combustion analysis with a combustion oxygen level above 16%, a message is displayed to warn you that the analyzer’s probe may not be connected: <b>O<sub>2</sub> above 16%. Is probe connected?</b></p> <p><b>NOTE:</b> Remember that ambient “air” contains approximately 21% O<sub>2</sub>. Flue gas usually contains less than 16% O<sub>2</sub>. So, your analyzer will not perform a combustion analysis (or an efficiency calculation, or a number of other calculations) until the O<sub>2</sub> reading is 16% or lower.</p>

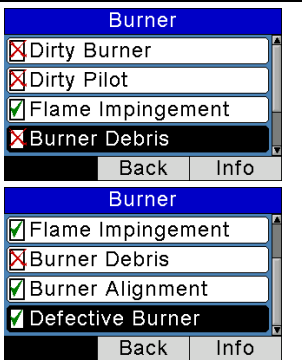
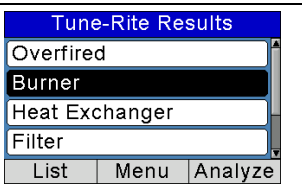
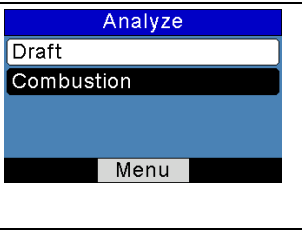
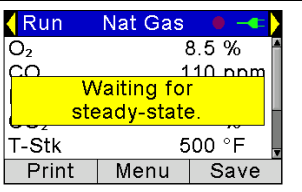


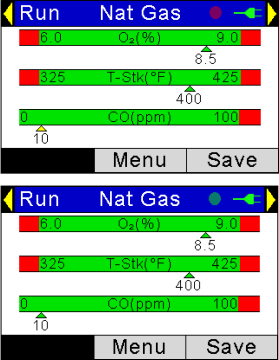
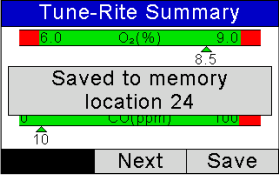
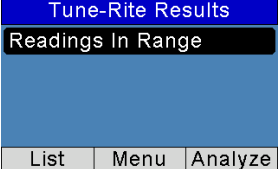
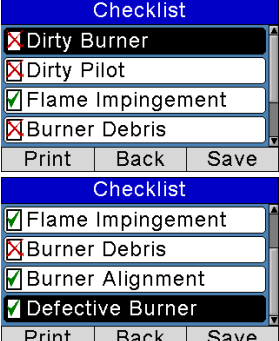
Step	Description	
4	<p>Press the left and right arrow keys (◀, ▶) to scroll through different display types. As combustion readings begin to reach steady state condition, you may notice that those readings will begin to settle into stable values.</p> <p>Though individual values may be <i>stable</i> (that is, they are no longer displayed with a yellow pointer [▲] on the dynamic graph display), they <i>may</i> or <i>may not</i> be within the acceptable operating range for the selected fuel and appliance type (green pointer [▲] for <i>within</i> range, red pointer [▲] for <i>outside</i> the acceptable range).</p>	 
5	<p>After a sufficient wait time has elapsed and after Tune-Rite confirms the stability of <i>all</i> combustion parameters, the round steady-state dot changes from red (●) to green (●).</p> <p>Notice that the previously unstable CO reading (yellow pointer ▲) has changed to a red pointer (▲), indicating stability, but an operating range that is not acceptable (similar to the T-Stack value, which is also out of range in this example).</p>	 
6	<p>Press the Enter key (⏏) to analyze the combustion data using Tune-Rite™.</p>	
7	<p>An <b>Analyzing...</b> message is displayed temporarily showing that Tune-Rite™ is analyzing the combustion data to determine possible causes for the out-of-range conditions.</p>	

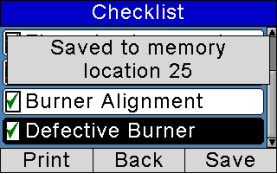
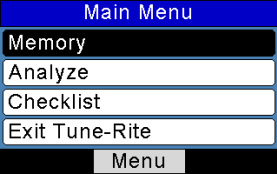
Step	Description	
8	<p>When the analysis is complete, the <b>Analyzing...</b> message disappears, and the bar graph summary screen is displayed.</p> <p>Press the Save key (<b>F3</b>) to save this steady-state snapshot (“as found” data) for use later in the custom report to show the conditions <i>before</i> any corrective actions were performed.</p>	 <p><b>Tune-Rite Summary</b></p> <p>8.0 O<sub>2</sub>(%) 9.0 8.5 325 T-Stk(°F) 425 500 0 CO(ppm) 100 110</p> <p>Next Save</p>  <p><b>Tune-Rite Summary</b></p> <p>8.0 O<sub>2</sub>(%) 9.0 8.5 Saved to memory location 15 0 CO(ppm) 100 110</p> <p>Next Save</p>
9	<p>From the Tune-Rite Summary screen, press the Next key (<b>F2</b>) to show the Tune-Rite Results screen. It provides a prioritized list of possible causes for the out-of-range conditions.</p> <p>Possible causes may span several screens (as indicated by the scroll bar on right side of the display).</p>	 <p><b>Tune-Rite Results</b></p> <p>Overfired Burner Heat Exchanger Filter</p> <p>List Menu Analyze</p>  <p><b>Tune-Rite Results</b></p> <p>Heat Exchanger Filter Blower System Operation</p> <p>List Menu Analyze</p>
10	<p>Use the up and down arrow keys (<b>▲</b>, <b>▼</b>) to highlight the possible cause that you want to investigate. Press the Enter key (<b>⏎</b>) to get a prioritized checklist of items to inspect and evaluate.</p>	 <p><b>Tune-Rite Results</b></p> <p>Overfired Burner Heat Exchanger Filter</p> <p>List Menu Analyze</p>



Step	Description	
11	<p>Checklist items may span several screens (as indicated by the scroll bar on right side of the display).</p> <p>Use the up and down arrow keys (▲, ▼) to highlight the current checklist item under investigation.</p>	 <p>The first screenshot shows a 'Burner' checklist with four items: Dirty Burner, Dirty Pilot, Flame Impingement, and Burner Debris. 'Dirty Burner' is selected. The second screenshot shows the same checklist with 'Defective Burner' selected. Both screens have 'Back' and 'Info' buttons at the bottom.</p>
12	<p>Press the Info key (F3) to get a brief description of the highlighted checklist item. Press Back (F1) to return.</p>	 <p>The first screenshot shows the 'Burner' checklist with 'Burner Debris' selected. To its right is the 'Info' screen with the text: 'Check for dust, dirt, lint, and construction material around the burner.' The second screenshot shows the 'Burner' checklist with 'Flame Impingement' selected. To its right is the 'Info' screen with the text: 'Check for flame contact with interior surfaces of the combustion appliance.' Both 'Info' screens have a 'Back' button at the bottom.</p>

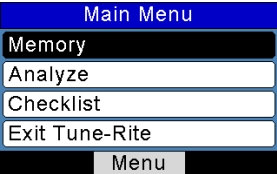
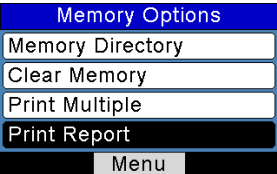
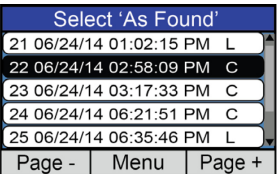
Step	Description	
13	<p>Inspect, adjust, and/or repair the appliance based on safety guidelines, local regulations, the appliance manufacturer’s recommendations, and system guidance from Tune-Rite™. Refer to the INSIGHT® Plus Instruction Manual for further safety details.</p> <p>As you inspect, evaluate, and repair the appliance, track your progress through the checklist.</p> <p>For each item selected, press the Enter key (↵) repeatedly to cycle through three evaluation options:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Not Investigated</li> <li><input checked="" type="checkbox"/> Checked/Okay</li> <li><input checked="" type="checkbox"/> Adjusted/Repaired</li> </ul>	
14	<p>After making adjustments and/or repairs, press the Back key (F2) to return to the Tune-Rite Results screen.</p>	
15	<p>Press the Analyze key (F3) to re-analyze the combustion process to see the effects of the repairs and adjustments. Use the arrow keys (▲, ▼) to highlight Combustion, and then press Enter (↵) to start the combustion analysis again.</p>	
16	<p>As before, the analyzer will ensure that combustion values have reached steady state after your adjustments and/or repairs. The <b>Waiting for steady-state.</b> message is displayed</p>	

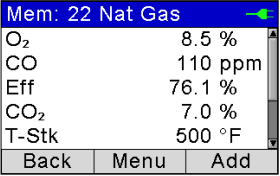
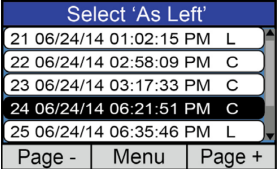
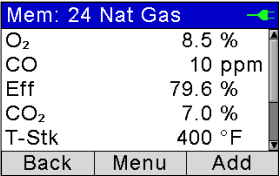
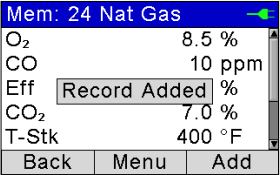
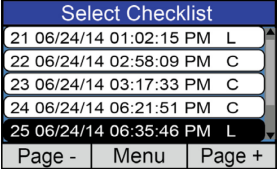
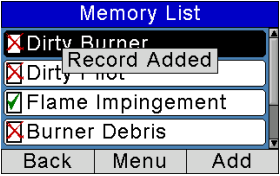
Step	Description	
17	<p>As the combustion appliance reaches steady state, the status dot will change from red (●) to green (●).</p> <p>In this example, note that the combustion values all appear to be within recommended ranges, therefore the pointers are all shown in green (▲), i.e., within range, after steady state is reached.</p>	
18	<p>With repairs completed and combustion values within acceptable ranges, press the Save key (F3) to save this steady-state snapshot ("as left" data) for use later in the service checklist to show the conditions <i>after</i> adjustments were performed.</p>	
19	<p>Press the Next key (F2) to show the new Tune-Rite™ results from the adjustments that were made. Tune-Rite™ confirms that combustion readings are within range.</p>	
20	<p>Press the List key (F1) to view the combustion checklist. Use the up and down arrows (▲, ▼) to view the entire list.</p>	


Step	Description	
21	<p>Press the Save key (F3) to save the checklist for use later to show what investigations were made and what corrective actions were performed.</p> <p>Then press the Back key (F2) to return to the Menu.</p> <p><b>NOTE:</b> Checklist tracking marks remain active until you exit Tune-Rite™. Tracking marks are <i>only</i> cancelled when you exit Tune-Rite™.</p>	 

### 4.7. Custom Reporting

Prepare for your final report: You should record data throughout the troubleshooting process for use later in the reporting phase.

Step	Description	
1	<p>Select the Memory option from the Main Menu and press Enter (↵).</p>	
2	<p>Use the arrow keys (▲, ▼) to select the Print Report option, and then press Enter (↵).</p>	
3	<p>Using the up and down arrow keys (▲, ▼), select the desired "As Found" combustion item then press Enter (↵) to view that record's data to confirm. Use the date/time stamp and the record's suffix to identify the desired record to add (L=checklist data, C=combustion record, T=temperature data, and P=pressure data).</p>	

Step	Description	
4	Review the combustion data as the correct “As Found” data, then press the Add key ( <b>F3</b> ) to add that “As Found” record to the print report, or press Back ( <b>F1</b> ) to select a different combustion record for the report.	
5	Using the up and down arrow keys ( <b>▲</b> , <b>▼</b> ), select the desired “As Left” combustion item then press Enter ( <b>↵</b> ) to view that record’s data to confirm.	
6	Review the combustion data as the correct “As Left” data, then press the Add key ( <b>F3</b> ) to add that “As Left” record to the print report, or press Back ( <b>F1</b> ) to select a different combustion record for the report.	 
7	Using the up and down arrow keys ( <b>▲</b> , <b>▼</b> ), select the desired Checklist record then press Enter ( <b>↵</b> ) to view that checklist to confirm. Press the Skip key ( <b>F2</b> ) to create a report without the checklist.	
8	Review the checklist to confirm it is the correct one (you may have saved other checklists in the analyzer’s memory), then press the Add key ( <b>F3</b> ) to add that checklist to the print report, or press Back ( <b>F1</b> ) to select a different checklist for the report.	

Step	Description	
9	<p>Turn on and align your printer, then press Enter (  ) to print the final report. A sample printout is shown in Figure 4-4. Note that the sample printout does not reflect all of the sample screens shown in this section. Your printout will reflect the data you save and the records you choose for your printout.</p>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p style="background-color: #0000FF; color: white; padding: 2px;">Print Report</p> <p style="margin-top: 10px;">To Print Press ENT</p> <p style="background-color: #808080; color: white; padding: 2px; margin-top: 10px;">Done</p> </div>

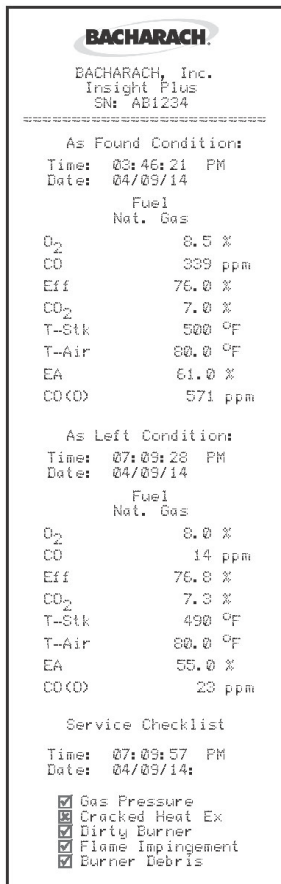


Figure 4-4. Sample Printout Showing Service Checklist

## Section 5. Reference, Service, and Support

Refer to the following documents for additional reference material about the Fyrite® INSIGHT® Plus, Tune-Rite™, and combustion process terminology. On the web, visit [www.Tune-Rite.com](http://www.Tune-Rite.com).

**Table 5-1. Reference Material Part Numbers**

Reference Material Title	Part Number
Tune-Rite™ Quick Start Guide	0024-9505
Tune-Rite™ Reference Guide and Glossary	0024-9507
True-Spot® Smoke Tester Instructions and Parts List	0021-9012
Fyrite® INSIGHT® Plus Instruction Manual	0024-9487

Service and technical support can be obtained by contacting one of the following Bacharach Service Centers.

### United States

Bacharach, Inc.  
 621 Hunt Valley Circle  
 New Kensington, PA 15068  
 Phone: 724-334-5051  
 Fax: 724-334-5723  
 Email: [help@MyBacharach.com](mailto:help@MyBacharach.com)

### Canada

Bacharach of Canada, Inc.  
 20 Amber Street Unit #7  
 Markham, Ontario L3R 5P4  
 Phone: 905-470-8985  
 Fax: 905-470-8963  
 Email: [support@BachCan.ca](mailto:support@BachCan.ca)





World Headquarters

621 Hunt Valley Circle, New Kensington, Pennsylvania 15068

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