

## TABLE OF CONTENTS

### ADDENDUM

#### 13.5 STARTING WITH SERIAL #U06081

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0.	Introduction -----	2
2.0.	Operation of Measurement Keys -----	3
	2.1 Over Range -----	3
	2.2 Diagnostics -----	3
	2.3 Zero -----	3
	2.4 Span -----	4
	2.5 Range Limits -----	5
	2.6 Span Values -----	5
	2.7 Outputs -----	6
3.0	New Functions -----	7
	3.1 Auto Start Up -----	7
	3.2 Alarms On/Off -----	8
	3.3 Offset & Gain -----	9
	3.4 Calibrate The Analog Outputs -----	9
	3.5 Save Data Archiving Time -----	13
	TABLE A -----	14
	3.6 User Digital Outputs -----	16
	TABLE B -----	17
	TABLE C -----	18
4.0.	Changes To Existing Functions -----	20
	4.1 Saved or Outside Limits -----	20
	4.2 Calibration Deviations -----	21
	4.3 Flow Zero or Span Gas -----	22
	4.4 Reset Calibration Values -----	22
	TABLE D -----	23

## 13.5 Starting With Serial Number U06081

### 1.0 INTRODUCTION

The Model 600D NDIR Series of instruments starting with Serial Number U06081 have several new Hardware and Software features.

The Hardware includes the use of a new memory system, isolation of the analog output signals and 15 relays that are used to buffer the many new digital output signals that are now available. **SEE TABLE D**

The available digital signals consist of a SERVICE group, which can be used to externally monitor a number of conditions for preventative maintenance and diagnostics.

A second STATUS group, is provided to define the operation of the instrument such as Spanning, Zeroing, Calibrating and the current Range (1, 2, 3, 4, AUTO)

Many of the various signals are duplicated because an NDIR instrument can consist of up to three different channels.

The Software includes modifications to existing functions, changes to the Measurement screen, additional Short-Cut Keys and several New Functions that are listed as follows:

- **MEASUREMENT**

<b>Over Range</b>	<b>888888</b>
<b>Diagnostics</b>	<b>F3</b>
<b>Zero</b>	<b>F5</b>
<b>Span</b>	<b>F6</b>
<b>Range Limits</b>	<b>F8</b>
<b>Span Values</b>	<b>F9</b>
<b>Outputs</b>	<b>F10</b>

Note: The operator can use these Short-Cut Keys or continue to use existing procedures.

- **NEW FUNCTIONS**

<b>Auto Startup</b>	<b>F5, F7, F7</b>
<b>ALARMS</b>	<b>F5, F7, (Use F6 to toggle ON/OFF)</b>
<b>Offsets&amp; Gains</b>	<b>F4, F3, F5</b>
<b>D/A Calibration</b>	<b>F5, F7, F8</b>
<b>Save Data Archiving Time</b>	<b>F5, F7, F1, F5 (ENTER to change record time)</b>
<b>User Digital Outputs</b>	<b>F5, F9</b>

- **Modifications**

<b>Saved/Not good</b>	<b>F4, F2, F1 or F2 (To flow Zero or Span Gas)</b>
<b>Re-Set Calibration Values</b>	<b>F4, F5</b>

## 2.0 OPERATION OF MEASUREMENT KEYS

Note: USE the F1 & F2 Keys to view the complete list of menu items, from the MEASUREMENT screen

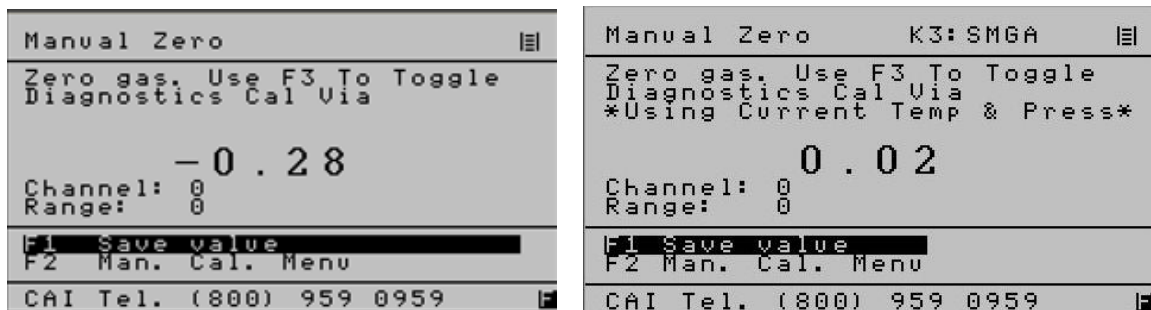
### 2.1 Over Range 888888

In the MEASUREMENT mode only, any value that exceeds the "range" by more than 10% will be displayed as 888888.

### 2.2 Diagnostics Use F3 to toggle between MEASUREMENT and DIAGNOSTIC

### 2.3 Zero: From the MEASUREMENT screen, select the required channel and range then press F5.

Note: For instruments with Zero Solenoid(s) select Calibration by Valves. (**Main, F5, F2, F4**)



2 Versions

Zero Gas will be enabled and the observed results can be used to evaluate instrument performance

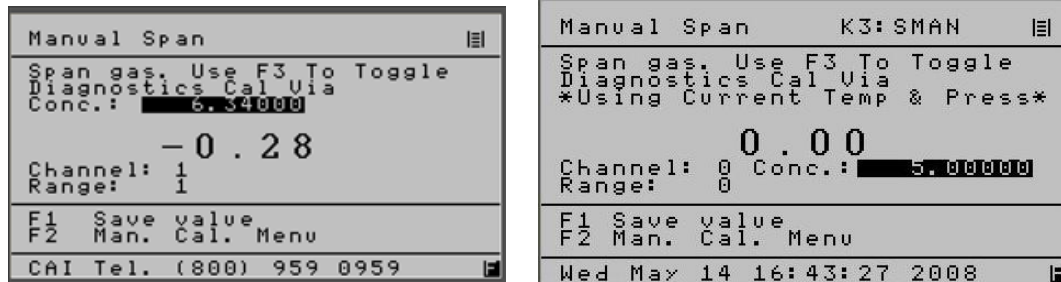
Press **F3** to toggle to the Diagnostic screen for additional information

Press **F1** to save the value and complete a ZERO calibration for this channel and range.

Press **MAIN, F1** to return to the MEASUREMENT screen to select other channels and ranges and repeat the process or press **F2** to return to the Manual Calibration screen

**2.4 Span:** From the MEASUREMENT screen, select the required Channel and Range then press **F6**.

Note: For instruments with Span Solenoid(s) select Calibration by Valves (**Main, F5, F2, and F4**).



2 Versions

Span Gas for Channel1 and Range 1 will be enabled and the observed results can be used to evaluate instrument performance.

Press **F3** to toggle to the Diagnostic screen for additional information

Press **F1** to save the new value and complete the SPAN calibration for this Channel and Range.

Note: The span gas value used for this channel and range is highlighted and can be changed if necessary. Use the Enter key and the numeric keys as required.

Press **MAIN, F1** to return to the MEASUREMENT screen to select other Channels and Ranges and repeat the process or **F2** to return to the Manual Calibration screen.

## 2.5 Range Limits: (F8) From the MEASUREMENT screen;

```

Setup
Upper range limits [%/ppm]
*** MUST be ASCENDING ***
Range1: 16.00
Range2: 20.00
Range3: 0.00
Range4: 0.00
*Do NOT Exceed Max Range*

[CO2] CO O2
+ change channel

CAI Tel. (800) 959 0959

```

```

Setup K2: SMAN
Upper range limits [%/ppm]
*** MUST be ASCENDING ***
Range1: 16.00
Range2: 0.00
Range3: 0.00
Range4: 0.00
Maximum Range Limit: 16.000
F1 Save: new autorange Up/Down

[CO2] CO O2
+ change channel

Wed May 14 16:48:50 2008

```

2 Versions.

The Channels and Ranges are factory defined and application specific. Consult California Analytical if any changes are required.

Use the ← → keys to observe the other Channels.

## 2.6 Span Values: F9 From the MEASUREMENT screen

```

Setup
Span gas conc. range limits
Range1: 6.34000 16.00
Range2: 0.00000 20.00
Range3: 0.00000 0.00
Range4: 0.00000 0.00

[CO2] CO O2
+ change channel

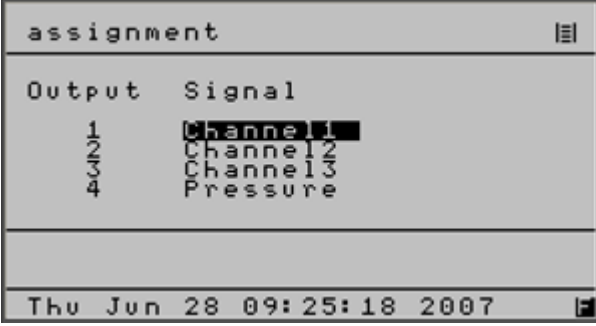
Thu Jun 28 09:23:18 2007

```

Use the ← → keys to select the desired Channel and the ↑ to select the Range  
 Note: The span gas value used for this channel and range is highlighted and can be changed if necessary.

Use the **Enter** key and the **NUMERIC** keys as required.

## 2.7 Outputs: F10 From the MEASUREMENT screen



Output	Signal
1	Channel 1
2	Channel 2
3	Channel 3
4	Pressure

Thu Jun 28 09:25:18 2007

Use this screen to define the signals and their location that will be monitored by a remote reordering device.

Use the ↓ to select the desired Output. Press Enter to select  
Use the ↓ to select the desired Signal. Press Enter to select

Use this screen to define the signals and their location that will be monitored by a remote reordering device.

**SEE TABLE D**

## 3.0 NEW FUNCTIONS

## 3.1 Auto Start Up: (Main, F5, F7, F7)

Auto Startup			
•Auto Startup	:	On	
•Wait for [min]	:	1	
•Access Level	:	1	
•Remote/Manual	:	Manual	
		Ch1	Ch2 Ch3
•Calibrations	:	1	1 1
•Startrange	:	1	1 1
MAIN SAVE			
BACK SAVE			
Mon Jan 01 01:40:07 2001			

All key analyzer parameters are stored in a secure memory location and retained when power is removed

In the event of an unexpected power failure it may be desirable to change some parameters until an operator can resume control.

This screen may be used to establish several desirable special instrument start-up parameters that define how the analyzer recovers from loss of AC power

When enabled this screen will define the following:

**Wait:** The time delay in minutes before proceeding. If **zero** is selected the instrument will not start until all temperature warnings are cleared

**Calibrations:** The number of attempts to complete a successful calibration as required in the operator defined Deviation Tables.  
If calibration is not successful the instrument will continue reporting results using the last completed calibration.  
The analyzer can be configured use the previous calibration by selecting zero Calibrations.

**Starting Range:** When all defined actions are completed the analyzer will return to the Measurement Screen and to the range specified.

**Access Level:** The user level at Start Up

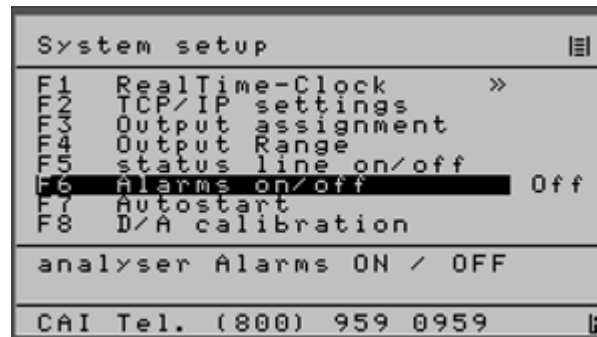
**Remote/Manual:** Put the analyzer in either "Remote" or "Manual" at Start Up

### 3.2 Alarms On/Off: (Main, F5, F7)

All key analyzer parameters are stored in a secure memory location and retained when power is removed. In the event of an unexpected power failure it may be desirable to change some parameters until an operator can resume control.

This screen may be used to establish several desirable special instrument start-up parameters that define how the analyzer recovers from loss of AC power.

When enabled this screen will define the following...



Use **F6** to toggle ON/OFF

The instrument has an extensive library of error messages that will aid in the identification of various anomalous events and are displayed at the bottom of the screen. These messages will assist in Diagnostics and indicating the need for preventative maintenance

This screen provides an **option** to disable these messages during initial start-up or as may be desired for a particular application.

### 3.3 Offset & Gain (Main, F4, F3, F5)

Offset and Gain		
Zero/ Span applied correction		
	Offset	Gain
Range1:	0.00	1.00
Range2:	0.00	1.00
Range3:	0.00	1.00
Range4:	0.00	1.00
[CO2 ]	CO	O2
← to select channel		
CAI Tel. (800) 959 0959		

This screen can be used to provide an additional means to display calibration deviations.

Use ← → keys to change channel.

The OFFSET is the value stored during zero calibration.

The GAIN is the value stored during span gas calibration using the operator defined calibration gas.

An increasing or decreasing change to the OFFSET or GAIN when used in conjunction with "Deviations" will provide insight to both short and long term changes to system performance

### 3.4 Calibrate The Analog Outputs: Main, F5, F7, F8 D/A Calibration Main, F5, F7, F3 Output Assignment

- **Overview**

The 600D NDIR Series of instruments are designed to provide analog outputs that can be configured as 0-1 VDC, 0-5 VDC, 0-10 VDC, 4-20 mA, or 0-20 mA.

With this version the outputs can also be configured to include an additional 1.0 volt and 5.0 volt output and a **calibration** capability.

The outputs can be calibrated to exactly match the results obtained on a PLC, Recorder, Data Logger or other remote recording device that may be connected to the analyzer.

The operator will first select the **OUTPUT ASSIGNMENT (Main, F5, F7, F3)** screen and choose the output that is to be calibrated. By selecting "calibrate" as the output all outputs of interest may be selected. When calibration is completed, the operator will return the outputs to their original assignment

The **D-A CALIBRATION** screen will then be used to complete the calibration procedure.

```

output scaling  K1: SMGA  |  |
-----|-----|-----|
Calibrate D/A Outputs   |
Output Offset Gain      |  mA
-----|-----|-----|
  1   1.8000   0.7000
  2   1.8000   0.7000
  3   1.8000   0.7000
  4   1.8000   0.7000
**Set Output-F3-Calibrate**
-----|-----|-----|
MAIN / BACK SAVE
FS F1: 0% F5: 100%
-----|-----|-----|

```

This screen provides a section that is used to record the zero signal corrections (zero offset) and a second area to record the 100% signal corrections (Gain) for each of the four output signals that may be defined to develop a voltage or current signal..

Since this is a Digital to Analog conversion, the calibration will require the completion of a simple “trial and error” procedure. The operator will observe the results of a “zero” or “span” (Gain) signal generated by the analyzer to the remote recording device and select a correction factor. The operator will save this value and then observe the results on attached the remote recording device.

The process of selection and saving for “zero” and “span” will be repeated until a satisfactory calibration is achieved. For 0-1VDC, 0-5VDC, 0-10VDC and a 0-20 mA outputs the Offset and Gain values are independent and do not interact. With the 4-20 ma output, the Offset “zero” and Gain “span” values interact and may require a few more trials.

The following is a table of typical values:

OUTPUT	OFFSET	GAIN
0-20 ma	0.000	0.927
4-20 ma	1.820	0.740
0-1 V	1.300	0.820
0-5 V	1.100	0.820
0-10 V	1.050	0.820

- Procedure

3.4.1 From the Main Menu press **F5, F7, F3**, to obtain following screen:

Output	Signal	mA
1	Channel1	
2	Channel2	
3	Channel3	
4	Flow1	

**Main, F5, F7, F3**

3.4.2 Use the  $\uparrow$  to highlight the outputs that require calibration.

3.4.3 Press enter to provide access to all the menu of signals that are available. (Real Time). Channel 1, Channel 2, Calibration, Sample pressure, etc.)

3.4.4 Select Calibration and press **ENTER** to complete the selection

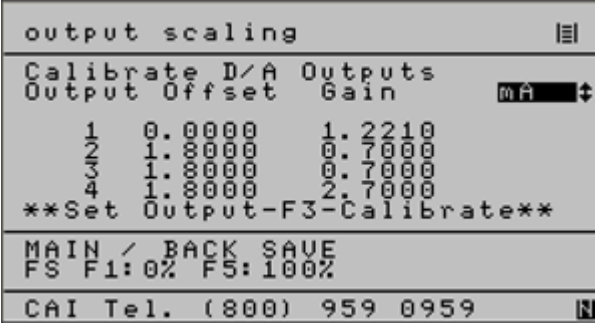
Output	Signal
1	Calibrate
2	Channel2
3	Channel3
4	Flow1

CAI Tel. (800) 959 0959

Note: Any or all of the four outputs can be selected for calibration  
This screen will not be used again until calibration has been completed.

3.4.5 Press **BACK** to return to the SYSTEM SETUP screen (**F5, F7** from the main menu)

3.4.6 Press **F8** to obtain the following screen:



```
output scaling
-----
Calibrate D/A Outputs
Output Offset Gain
1 0.0000 1.2210
2 1.8000 0.7000
3 1.8000 0.7000
4 1.8000 2.7000
**Set Output-F3-Calibrate**
MAIN / BACK SAVE
FS F1: 0% F5: 100%
CAI Tel. (800) 959 0959
```

**MAIN, F5, F7, F8**

3.4.7 Use the  $\uparrow$  to select the desired output press **ENTER**

3.4.8 Press **F1** to select a ZERO signal and observe the results on the remote device

3.4.9 Change the offset value press **BACK** to save the new value.

3.4.10 Press **F8** to return to the D-A Calibration screen and note the results on the remote device.

3.4.11 Repeat steps 3.4.8 thru 3.4.10 until a satisfactory ZERO calibration is achieved.

3.4.12 Complete steps 3.4.8 thru 3.4.10 for each of the remaining outputs that require calibration.

3.4.13 Press **F5** to produce a full scale (100%) signal

3.4.14 Use the arrow keys to position the cursor at the require GAIN value

3.4.15 Observe the results on the remote device and make a correction to the GAIN value for the output of interest. Press **BACK** to save this new value

3.4.16 Press **F8** to return to the D-A calibration screen

3.4.17 Observe the results on the remote device and repeat steps change the GAIN value by repeating steps 3.4.14 thru 3.4.16 as needed for each output.

3.4.18 Return to the OUTPUT Assignment screen **F5, F7, F3** from the main menu and change the output signals from CALIBRATE to their original values as defined in step 3.4.1.

### 3.5 Save Data Archiving Time (F5, F7, F1, F5)

Archive Time is the Time in seconds between each set of data points. If “zero” no data is stored in the SEC data files. The SEC data files are in .CSV format for direct import into Excel. CAI can provide the tools necessary to download these files.



Use ENTER to change recording time

**SEE TABLE A**

**TABLE A****600D SERIES NDIR DATA ARCHIVE FILES**

Time,  
Date,  
Month,  
Year,  
Error Index,  
TimeStamp,  
Pressure,  
Temperature,

Name,  
Concentration,  
Detector Volts,  
Range,  
Auto / Manual,  
Span Value,  
Offset,  
Gain,  
Sample Pressure,  
Sample Flow,  
Sample EPC Volts,  
Detector Temperature,  
Meas Mode,  
Local / Remote,

If 2 Channel this data is added

Name,  
Concentration,  
Detector Volts,  
Range,  
Auto / Manual,  
Span Value,  
Offset,  
Gain,  
Sample Pressure,  
Sample Flow,  
Sample EPC Volts,  
Detector Temperature,  
Meas Mode,  
Local / Remote,

**TABLE A (cont)****600D SERIES NDIR DATA ARCHIVE FILES**

If 3 channel this data is added

Name,  
Concentration,  
Detector Volts,  
Range,  
Auto / Manual,  
Span Value,  
Offset,  
Gain,  
Sample Pressure,  
Sample Flow,  
Sample EPC Volts,  
Detector Temperature,  
Meas Mode,  
Local / Remote,

### 3.6 User Digital Outputs

- **Overview**

The 600D NDIR Series of instruments have 15 solid state, optically coupled, isolated relays that can be programmed by the operator to indicate the status of numerous signals.

The available digital signals consist of a SERVICE Group that can be used to externally monitor a number of conditions to aid in preventative maintenance and diagnostics. **SEE TABLE B & D**

A second STATUS group is provided and is used to define the operation of the instrument such as Spanning, Zeroing, Calibrating, and the current Range (1, 2, 3, 4 AUTO) etc. **SEE TABLE C & D**

The individual output signals can be operator selected and set to a **HOLD** or **CLEAR** mode.

In the **HOLD** mode an activated signal is retained until the operator returns to the **Digital Output Screen** and selects the appropriate output signal and performs a manual CLEAR. After performing a Clear Operation, the operator must press **F2** again to put the outputs back onto **HOLD** mode.

User DO I	K2: STBY	IEI
1	Off	
2	Off	
3	Off	
4	Off	*****
5	Off	*Set Unused *
6	Off	*Channels Off*
7	Off	*****
F2	Hold / Clear	Hold
F1 8 to 15 DO's		
MAIN/BACK to SAVE		

In the **Clear** Mode the signal will automatically change when the microprocessor detects that the noted condition no longer exists.

User DO II	K2: SMAN	IEI
8	Off	
9	Off	
10	Off	
11	Off	*****
12	Off	*Set Unused *
13	Off	*Channels Off*
14	Off	*****
15	Off	
F1 1 to 7 DO's		
MAIN/BACK to SAVE		
Check Ch1: Temp.		

The operator can select from the following the desired **SERVICE** or **STATUS** groups that are to be digitally monitored.

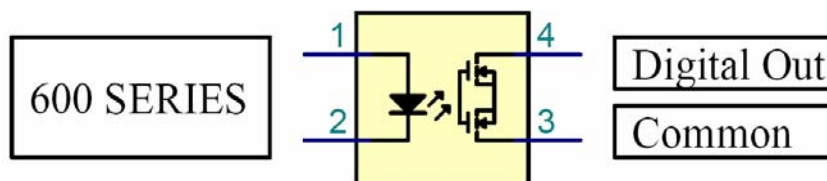
**TABLE B**

<b>Index</b>	<b>Service Group</b>	<b>User DO Screen Display</b>
0		
1	Flow 1 Failure	F1
2	Flow 2 Failure	F2
3	Flow 3 Failure	F3
4	Extern Analog 1 Failure	E1
5	Extern Analog 2 Failure	E2
6	Pressure Failure	P
7	Temperature Failure	T
8	Channel 1 is not calibrated	1NC
9	Channel 2 is not calibrated	2NC
10	Channel 3 is not calibrated	3NC
11	Ch1: Low conc. Warning	1LoC
12	Ch2: Low conc. Warning	2LoC
13	Ch3: Low conc. Warning	3LoC
14	Ch1: High conc. Warning	1HiC
15	Ch2: High conc. Warning	2HiC
16	Ch3: High conc. Warning	3HiC
17	Ch1: Temperature!	1DT
18	Ch2: Temperature!	2DT
19	Ch3: Temperature!	3DT
20	Ch1: EPC failure	1EV
21	Ch2: EPC failure	2EV
22	Ch3: EPC failure	3EV
23	Ch1: Range overflow	1OR
24	Ch2: Range overflow	2OR
25	Ch3: Range overflow	3OR
26	Ch1: ADC Range Overflow	1AU
27	Ch2: ADC Range Overflow	2AU
28	Ch3: ADC Range Overflow	3AU
29	Ch1: ADC Range Underflow	1AO
30	Ch2: ADC Range Underflow	2AO
31	Ch3: ADC Range Underflow	3AO
32	dummy text for RTC	Off
33	<b>General Alarm</b>	<b>G</b>
35	<b>1 Cal Alarm</b>	<b>1CA</b>
36	<b>2 Cal Alarm</b>	<b>2CA</b>
37	<b>3 Cal Alarm</b>	<b>3CA</b>
34	<b>In Remote</b>	<b>R</b>

**TABLE C**

<b>Index</b>	<b>STATUS GROUP</b>	<b>User DO Screen Display</b>
38	1 AutoRange	1AR
39	1 Range 1	1R1
40	1 Range 2	1R2
41	1 Range 3	1R3
42	1 Range 4	1R4
43	1 In Calibrate	1C
44	1 In Zero	1Z
45	1 In Span	1S
46	1 In Sample	1Sa
47	2 Auto Range	2AR
48	2 Range 1	2R1
49	2 Range 2	2R2
50	2 Range 3	2R3
51	2 Range 4	2R4
52	2 In Calibrate	2C
53	2 In Zero	2Z
54	2 In Span	2S
55	2 In Sample	2Sa
56	3 Auto Range	3AR
57	3 Range 1	3R1
58	3 Range 2	3R2
59	3 Range 3	3R3
60	3 Range 4	3R4
61	3 In Calibrate	3C
62	3 In Zero	3Z
63	3 In Span	3S
64	3 In Sample	3Sa

Typical Relay



These contacts (3, 4) will drive continuously up to 500 MA using a customer voltage supply that does not to exceed 60 VDC.

- **Operation**

Use (**Main, F5, F9**) to select the first eight outputs

Use the ↑ to select the desired output

Press ENTER and use ↓ to select desired item

Press ENTER to save selection

NOTE: The 600D NDIR has 14 user selectable isolated digital outputs from the list of 64 in **TABLE B & C**

```

User DO I          K2: STBY  |
-----|-----
1  Off
2  Off
3  Off             *****
4  Off             *Set Unused *
5  Off             *Channels Off*
6  Off             *****
7  Off
F2 Hold / Clear   Hold
-----|-----
F1 8 to 15 DO's
MAIN/BACK to SAVE
  
```

Press **F1** to observe the remaining seven outputs  
Program as desired per the above

```

User DO II         K2: SMAN  |
-----|-----
8  Off
9  Off
10 Off
11 Off            *****
12 Off            *Set Unused *
13 Off            *Channels Off*
14 Off            *****
15 Off
-----|-----
F1 1 to 7 DO's
MAIN/BACK to SAVE
-----|-----
Check Ch1: Temp.
  
```

## 4.0 CHANGES TO EXISTING FUNCTIONS

## 4.1 Saved or Outside Limits

During Manual Calibration the following screens will be displayed to indicate the instruments response to the value of the zero or span gas using the amount that the operator defined in the deviation table.

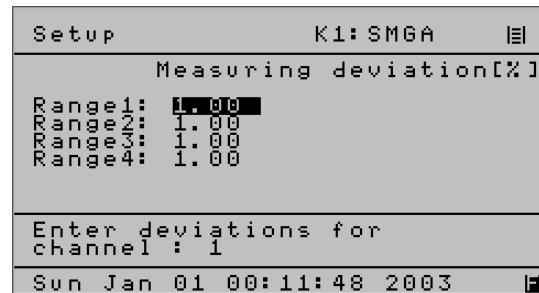
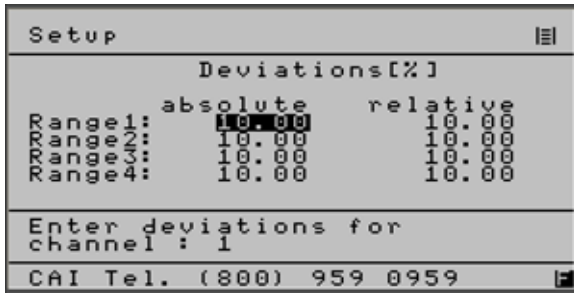
Manual Zero	K1:SMAN	Manual Span	K2:SARE
Zero gas. Use F3 To Toggle Diagnostics Cal Via *Using Current Temp & Press* ***Saved Current*** 0.00		Span gas. Use F3 To Toggle Diagnostics Cal Via *Using Current Temp & Press* Outside Deviation Limits 0.02	
Channel: 0 Range: 0		Channel: 0 Conc.: 5.00000 Range: 0	
F1 Save value F2 Man. Cal. Menu		F1 Save value F2 Man. Cal. Menu	
Wed May 14 16:42:09 2008		CAI Tel. (800) 959 0959	

The Above is shown using Zero and Span Cal

From Measurement use: **F5 “zero” or F6 “span”**  
From Main Menu use: **F4, F2, F1 “zero” or F2 “span”**

4.2 Calibration Deviations.

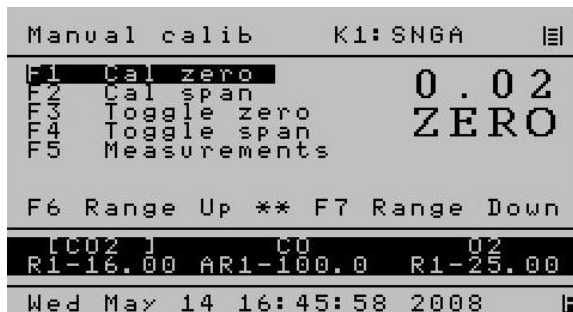
MAIN, F5, F2, F2 Deviations, F3 Measuring Deviations.



Note: These screens are used by the operator to define the maximum acceptable limits of the Zero and Span gas for both Manual and Automatic Calibrating.

4.3 Flow Zero or Span

Some analyzers have the above and the ability to flow Zero and Span Gas.

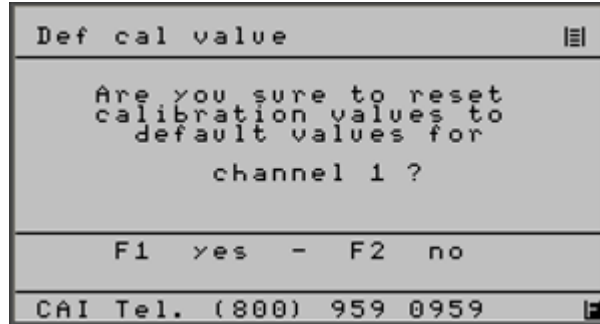


The above is shown using Zero/SPAN Gas

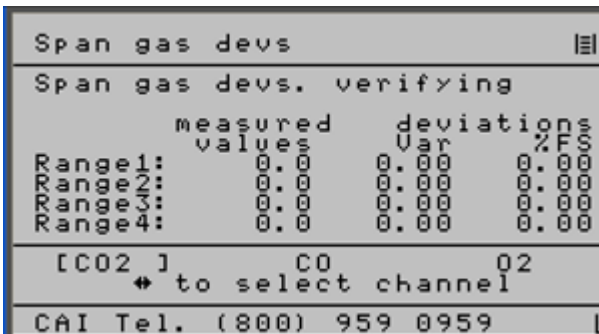
- From Cal Screen use: **F2 or Main or Back**
- From Main Menu use: **F4, F2**

**4.4 Reset Calibration Values**

When the re-set calibrations value function is used all recorded deviations will be set to zero

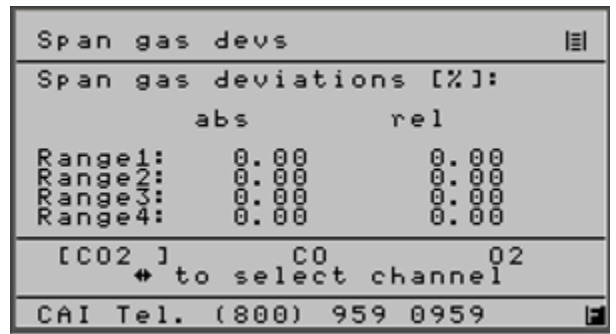


**MAIN, F4, F5**



**Main, F4 F3, F4**

(Used to observe Auto Cal Results)



**Main, F4, F3, F2**

(Used to observe Manual Cal results)

The above are the new deviations after the operator elects to re-set the calibration values

## TABLE D

### 600D NDIR SERIES I/O CHART

#### 28 PIN MAIN CONNECTOR ASSIGNMENTS

AO = Analog Output, OC= Open Collector, SV = Solenoid Valve TTL = Transistor Logic

OPTO I/O	Signal Type	601 Analog	602 Analog	603 Analog	Levels
ALG 1		pin #	pin #	pin #	
COM	A Output	1 GND (Isolated analog)	1 GND (Isolated analog)	1 GND (Isolated analog)	<b>Isolated AI</b> 1v,5v,10v,mA
0	A Output	2 User Defined AO-1	2 User Defined AO-1	2 User Defined AO-1	
1	A Output	3 User Defined AO-2	3 User Defined AO-2	3 User Defined AO-2	
2	A Output	4 User Defined AO-3	4 User Defined AO-3	4 User Defined AO-3	
3	A Output	5 User Defined AO-4	5 User Defined AO-4	5 User Defined AO-4	
<b>DIG 1</b>		<b>Digital</b>	<b>Digital</b>	<b>Digital</b>	
COM	D Output	6 GND (Digital)	6 GND (Digital)	6 GND (Digital)	TTL-low true
0	D Output	7 Sense Auto Range	7 Sense Auto Range	7 Sense Auto Range	
1	D Output	8 Sense Range 1	8 Sense Range 1	8 Sense Range 1	
2	D Output	9 Sense Range 2	9 Sense Range 2	9 Sense Range 2	
3	D Output	10 Sense Range 3	10 Sense Range 3	10 Sense Range 3	
4	D Output	11 Sense Range 4	11 Sense Range 4	11 Sense Range 4	TTL-low true
5	D Input	12 Set Auto Range	12 Set Auto Range	12 Set Auto Range	
6	D Input	13 Control Range 1	13 Control Range 1	13 Control Range 1	
7	D Input	14 Control Range 2	14 Control Range 2	14 Control Range 2	
8	D Input	15 Control Range 3	15 Control Range 3	15 Control Range 3	
9	D Input	16 Control Range 4	16 Control Range 4	16 Control Range 4	
10	D Input	17 Auto Cal	17 Auto Cal	17 Auto Cal	
11	D Input	18 Calibrate	18 Calibrate	18 Calibrate	
12	D Input	19 Zero	19 Zero	19 Zero	
13	D Input	20 Span	20 Span	20 Span	
14	D Input	21 Sample	21 Sample	21 Sample	
15	SPARE				
<b>DIG 2</b>					
0	D Output	22 Zero Gas Flow	22 Zero Gas Flow	22 Zero Gas Flow	<b>OC (24vdc if internal SV)</b> <b>OC (24vdc if internal SV)</b> <b>OC (24vdc if internal SV)</b>
1	D Output	23 Span Gas Flow	23 Span Gas Flow	23 Span Gas Flow	
2	D Output	24 Sample Gas Flow	24 Sample Gas Flow	24 Sample Gas Flow	
3	D Output	25 Local/Remote	25 Local/Remote	25 Local/Remote	TTL-low true
4	D Output	26 Read Cal Mode	26 Read Cal Mode	26 Read Cal Mode	
5	D Output	27 Reserved	27 Reserved	27 Reserved	
6	D Output	28 Reserved	28 Reserved	28 Reserved	

**TABLE D**  
**600D NDIR SERIES I/O CHART**

**28 PIN AUXILLARY CONNECTOR ASSIGNMENTS**

OPTO I/O	Signal Type	601/602/603 Analog		LEVELS
ALG 1	Spare	pin #		
COM	A Input	1	GND (analog)	
4	A Input	2	External Analog 1	0-10V
5	A Input	3	External Analog 2	0-10V
6	A Output	4	<b>GND (Isolated analog)</b>	
7	D Output	5	<b>Relay RTN 1</b>	<b>9,10,11,12 use RTN 1</b>
<b>DIG 3</b>	<b>Alarms</b>	<b>Digital</b>		<b>Alarms go OPEN when present</b> <b>Status go CLOSED when active</b>
COM	D Output	6	<b>Relay RTN 2</b>	<b>13,14,15,16 use RTN 2</b>
0	D Output	7	<b>Relay RTN 3</b>	<b>17,17,19,20 use RTN 3</b>
1	D Output	8	<b>Relay RTN 4</b>	<b>21,27,28 use RTN 4</b>
2	D Output	9	<b>User Defined NO Relay 1</b>	
3	D Output	10	<b>User Defined NO Relay 2</b>	
4	D Output	11	<b>User Defined NO Relay 3</b>	
5	D Output	12	<b>User Defined NO Relay 4</b>	
6	D Output	13	<b>User Defined NO Relay 5</b>	
7	D Output	14	<b>User Defined NO Relay 6</b>	
8	D Output	15	<b>User Defined NO Relay 7</b>	
9	D Output	16	<b>User Defined NO Relay 8</b>	
10	D Output	17	<b>User Defined NO Relay 9</b>	
11	D Output	18	<b>User Defined NO Relay 10</b>	
12	D Output	19	<b>User Defined NO Relay 11</b>	
13	D Output	20	<b>User Defined NO Relay 12</b>	
14	D Output	21	<b>User Defined NO Relay 13</b>	
15	D Output	22	<b>Reserved Do Not Connect</b>	
<b>DIG 2</b>				
7	D Input	23	Spare	
8	D Input	24	Spare	
9	D Input	25	Spare	
10	D Input	26	<b>Set Remote</b>	
11	D Output	27	<b>User Defined NO Relay 14</b>	
12	D Output	28	<b>User Defined NO Relay 15</b>	