

NOTICE

The new ThermoConnect communication software for Windows is now shipping with this analyzer in place of the old PCIP Personal Computer Interface Program for DOS. Any references to PCIP in the manual should be ignored. Documentation for ThermoConnect may be found in the online help included with the ThermoConnect program.

The old PCIP DOS software is still available for download from the Thermo Electron Corporation web site at:

<http://www.thermo.com/teisw>



TVA-1000B
TOXIC VAPOR ANALYZER

INSTRUCTION MANUAL
P/N BK3500

THERMO ELECTRON CORPORATION
ENVIRONMENTAL INSTRUMENTS
27 FORGE PARKWAY FRANKLIN MASSACHUSETTS 02038

(866) 282-0430 Toll Free
(508) 520-0430 International
(508) 520-1460 Fax

www.thermo.com/eid
thermo@thermoei.com

3Nov2003

© 2001 Thermo Electron Corporation. All rights reserved. Thermo Electron Corporation, *question everything*, and *Analyze. Detect. Measure. Control* are trademarks of Thermo Electron Corporation. All other product names and logos are the property of their respective owner.

Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.

TVA 1000B
Toxic Vapor Analyzer

November 3, 2003

Overall Table of Contents For Manual P/N BK3500

<u>DOCUMENT</u>	<u>DESCRIPTION</u>
MI 611-185	TVA-1000B Toxic Vapor Analyzer, Operation, Configuration, and Maintenance
MI 611-187	TVA-1000 Toxic Vapor Analyzer PC Software
MI 611-186	PC Interface Program (PCIP) Software for Interfacing a PC and a TVA-1000B Toxic Vapor Analyzer
MI 611-183	CENTURY TVA-1000 ToxicVaporAnalyzer 11.8 eV PID Lamp Capsules (Part No. CR01 IYZ)
PL 611-139	TVA-1000B Toxic Vapor Analyzer - Parts List
Appendix A	Warranty
Addendum	Importing TVA-1000B Files into Microcoft Excel via the PCIP Software

TVA-1000B
Toxic Vapor Analyzer
Operation, Configuration, and Maintenance

Style AA



Contents

Figures	vii
Tables	viii
General Instructions	ix
Introduction	1
Overview	1
Instrument Functions	2
Using the Instrument	2
Standard Specifications	3
External Influences	5
Product Safety Specifications	6
Theory of Operation	7
Flame Ionization Detection (FID)	7
Benefits of Flame Ionization Detection	8
Photoionization Detection	8
Benefits of Photoionization Detection	8
Dual Detectors	9
Benefits of Dual Detectors	9
Concentration Calculation and Calibration	10
Hardware	11
Instrument Connections	11
Analog Outputs	12
Instrument Sidepack Display	12
Instrument Sidepack Keypad	13
Probe Connections	15
BASIC Probe Display	15
BASIC Probe Keys	16
Enhanced Probe Display	17
Enhanced Probe Keys	17
Startup and Familiarization	19
Quick Start Procedure	19

Display Menus	21
Main Menu Structure	21
Control Menu	23
Setup Procedure	23
Passcode Protection	24
Calibration	24
Scenario 1	24
Scenario 2	25
Scenario 3	25
Calibration Configuration	26
Detector Counts	28
Defining the Span Gas Concentration(s)	29
Defining the Response Factor	30
Alarm Levels	35
Log Methods	38
Hardware Configuration (Barcode Reader/Probe Display)	44
User Identification Number	45
Date	45
Time of Day	46
User Options	46
Information Menu	47
PC Link/Memory	47
Run Mode	54
Accessing the Run Menu	55
Using the Enhanced Probe	57
The Enhanced Probe and the RUN Mode	57
Auto Logging with the Enhanced Probe	58
VOC Logging with the Enhanced Probe	58
FE (Fugitive Emissions) Logging with the Enhanced Probe	58
Additional Component Information	61
Maintenance	63
Removable, Renewable Parts	63
Normal Operating Maintenance	64
Battery and Battery Charger	64
Hydrogen Gas Tank	65
Servicing the PID Cartridge	66
Servicing an FID Cartridge	67
Cleaning the FID Detector Cap	68
Replacing the Flame Arrestor	68
Cleaning the FID or PID Detector Cavities	69
Replacing Watertrap Probe Filter and O-Rings	70
Cleaning or Replacing a Sintered Metal Filter	70
Replacing Sample Line	71

Troubleshooting	73
Warning Messages	76
Accessories.....	79
Telescoping Extension Option	79
Activated Charcoal Filter Adapter	79
Appendix A: Text Data Formats	81
Route List File Format	81
Sample Route List File	82
Configuration File Format	82
Sample Configuration File	83
Calibration File Format	84
Sample Calibration File (Dual Detectors)	85
Logged Data File Format (Upload Only)	85
Sample Logged Data File (FE format)	86
Sample Logged Data Files	87
Index.....	93

Figures

1	Analyzer Sidepack	1
2	Typical Flame Ionization Detector	7
3	Typical Photoionization Detector	9
4	TVA-1000B Dual Detector Configuration	10
5	TVA-1000B Instrument Connections	11
6	Keypad	14
7	Sample Probe Assembly	15
8	TVA-1000B BASIC Probe Display	16
9	TVA-1000B Enhanced Probe Display - Menu Mode	17
10	PID Lamp Cleaning Kit	67
11	Watertrap Probe Assembly - Filter and O-Ring Replacement	70
12	Sintered Metal Filter - Cleaning or Replacing	70
13	Replacing Sample Line	72
14	Telescoping Extension Option	79
15	Activated Charcoal Filter Adapter	80

Tables

1	Specifications	3
2	External Influences	6
3	Product Safety Specifications	6

General Instructions

Thermo Electron Corporation designs, manufactures, and tests its products to meet many national and international standards. However, for these products to operate within their normal specifications, you must properly install, use, and maintain these products. The following instructions must be adhered to and integrated with your safety program when installing, using, and maintaining Thermo products.

- ◆ Read and save all instructions prior to installing, operating, and servicing the product.
- ◆ If you do not understand any of the instructions, contact your Thermo representative for clarification.
- ◆ Follow all warnings, cautions, and instructions marked on and supplied with the product.
- ◆ Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- ◆ To ensure proper performance, use qualified personnel to operate, update, program, and maintain the product.
- ◆ When replacement parts are required, ensure that the qualified service technician uses replacement parts specified by Thermo. Unauthorized substitutions may result in fire, electrical shock, other hazards, or improper operation of equipment.
- ◆ Except when maintenance is being performed by qualified personnel, ensure that all equipment doors are closed and protective covers are in place, to prevent electrical shock and personal injury.

Introduction

NOTE: References in this manual to BASIC and enhanced probes do not apply to Leak Tracker users.

Overview

The TVA-1000B Toxic Vapor Analyzer, illustrated in the figure below, is an advanced-design, portable, organic/inorganic vapor monitor for the gas survey industry. This analyzer uses either a flame ionization detector (FID), or both an FID and a photoionization detector (PID).

The vapor concentration may be read immediately on either of two displays — one mounted directly on the hand-held sample probe and the other on the instrument sidepack itself. Vapor concentration can be displayed on both displays in parts per million (ppm), parts per billion (ppb), or percent concentration (%). The data displayed may also be collected and saved in analyzer memory and downloaded to a personal computer for analysis.

Through the sidepack keyboard, or DataManager probe assembly, you can choose the mode of operation, select concentration units for the display, set alarm thresholds, select data collection mode, and change setup (configuration) parameters.

This unit is shipped with the battery installed. The unit is ready for operation upon completion of setup, calibration, and charging.

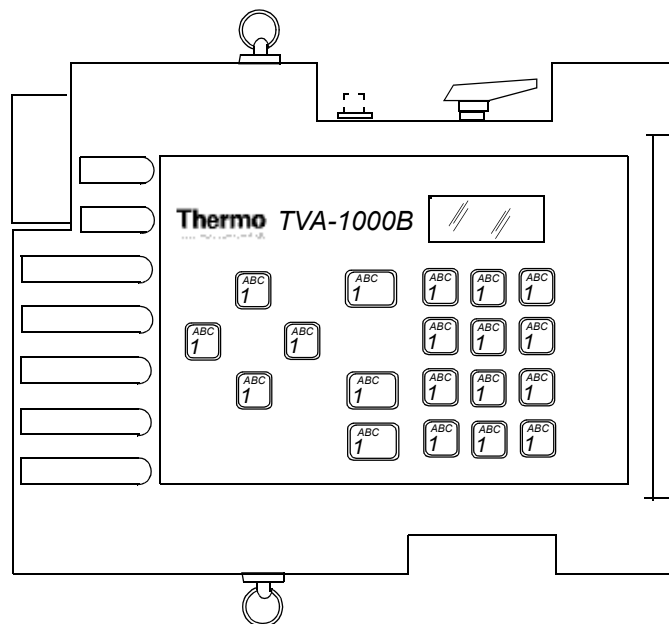


Figure 1. Analyzer Sidepack

Instrument Functions

This analyzer functions in any of four modes:

- ◆ RUN
- ◆ SETUP
- ◆ INFO
- ◆ PC LINK/MEMORY

In the RUN mode, the instrument automatically displays its measured values in units of ppm, ppb, or %. The RUN mode may be operated either as *survey only*, in which the instrument displays measured values but does not store any data, or *survey and log*, in which the instrument displays measured values and also stores the information in memory.

In SETUP mode, you can enter or select operational parameters, such as calibration values, alarm levels, operator ID, datalogging method and interval, date, and time. This may be performed locally by using the analyzer keypad or remotely by using the RS-232 connection to a personal computer (PC).

In INFO mode, you can review operational parameters entered or selected in SETUP mode as well as instrument serial number, battery status, etc.

In PC LINK/MEMORY mode, you can download data stored within the TVA-1000B to a PC for analysis and printing, upload route list, calibration, and configuration parameters from a PC to the TVA-1000B, or clear data memory.

Each of the four modes is explained in detail later in this document.

Using the Instrument

While operating this instrument in the field, you normally carry the TVA-1000B at your side, using the shoulder strap. With the pump on, detector(s) on, and the unit warmed up, you monitor the area of concern. As soon as the instrument analyzes a sample, the probe displays concentration of the vapor. The display on the sidepack duplicates the vapor concentration on the probe display. Using the BASIC probe, you can toggle the display between detector types by pressing the DET button on the probe, log the survey data by pressing the LOG button, and backlight the LCD display by pressing the lamp button. An optional enhanced probe for Fugitive Emissions (FE) monitoring applications allows you to select options from special menus. These probe types will be detailed later in this document.

WARNING: Do not connect/disconnect any electrical device (such as battery charger, analog output, personal computer, or auxiliary port device) to the instrument in an area classified as hazardous due to the presence of flammable vapors.

Standard Specifications

Table 1. Specifications

Item	Specification
Accuracy	<p><i>PID Instrument</i> — $\pm 25\%$ of reading or ± 2.5 ppm, whichever is greater, from 0.5 to 500 ppm. Accuracy listed is achieved using isobutylene with a 1-point calibration in the range from 100 to 300 ppm (including drift) at the temperature and humidity of the calibration.</p> <p><i>FID Instrument</i> — $\pm 25\%$ of reading or ± 2.5 ppm, whichever is greater, from 1.0 to 10,000 ppm. Accuracy listed is achieved using methane with a 1-point calibration in the range from 100 to 500 ppm (including drift) at the temperature and humidity of the calibration.</p>
Repeatability	<p><i>PID Instrument</i> — $\pm 1\%$ at 100 ppm of isobutylene</p> <p><i>FID Instrument</i> — $\pm 2\%$ at 100 ppm of methane</p>
Analog Output	Two analog output signals, 0 to 2 V dc, proportional to the count output from each detector.
Dynamic Range	<p><i>PID Instrument</i> — 0.5 to 2,000 ppm of isobutylene</p> <p><i>FID Instrument</i> — 1.0 to 50,000 ppm of methane</p>
Linear Range	<p><i>PID Instrument</i> — 0.5 to 500 ppm of isobutylene</p> <p><i>FID Instrument</i> — 1.0 to 10,000 ppm of methane</p>
Minimum Detectable Level	<p>The minimum detectable level is defined as two times the peak-to-peak noise.</p> <p><i>PID Instrument</i> — 100 ppb of benzene</p> <p><i>FID Instrument</i> — 300 ppb of hexane</p>
Response Time using close area sampler	<p><i>PID Instrument</i> — Less than 3.5 seconds for 90% of final value, using 100 ppm of isobutylene</p> <p><i>FID Instrument</i> — Less than 3.5 seconds for 90% of final value, using 10,000 ppm of methane</p>
Recovery Time using close area sampler	<p><i>PID Instrument</i> — Less than 5.0 seconds to return to 10% of base line, using 100 ppm of isobutylene</p> <p><i>FID Instrument</i> — Less than 5.0 seconds to return to 10% of base line, using 10,000 ppm of methane</p>
Response Time using telescoping wand extender	<p><i>PID Instrument</i> — Less than 5.0 seconds for 90% of final value, using 100 ppm of isobutylene</p> <p><i>FID Instrument</i> — Less than 5.0 seconds for 90% of final value, using 10,000 ppm of methane</p>
Recovery Time using telescoping wand extender	<p><i>PID Instrument</i> — Less than 5.0 seconds to return to 10% of base line, using 100 ppm of isobutylene</p> <p><i>FID Instrument</i> — Less than 5.0 seconds to return to 10% of base line, using 10,000 ppm of methane</p>

Table 1. Specifications (Continued)

Item	Specification
Response Time using charcoal filter adapter	<i>PID Instrument</i> — Less than 20 seconds for 90% of final value, using 100 ppm of isobutylene <i>FID Instrument</i> — Less than 20 seconds for 90% of final value, using 10,000 ppm of methane
Recovery Time using charcoal filter adapter	<i>PID Instrument</i> — Less than 20 seconds to return to 10% of original value, using 100 ppm of isobutylene <i>FID Instrument</i> — Less than 20 seconds to return to 10% of original value, using 10,000 ppm of methane
Data Storage Interval	<i>Auto Mode</i> — 1 per second to 1 per 999 minutes, user selectable <i>VOC or FE Mode</i> — 2 to 30 seconds, user-selectable
Sample Flow Rate	1 liter/minute, nominal, at sample probe inlet
Battery	The battery can be fully charged in less than 16 hours. The battery operating time is 8 hours minimum at 20° (32°F). Use of the backlight on the probe display shortens battery life. The battery is replaceable by removing the bottom cover of the instrument. <i>(WARNING: Do not replace battery in an area classified as hazardous due to presence of flammable gases or vapors.)</i>
Battery Charger	The battery charger is a separate unit capable of operating the analyzer while simultaneously charging the internal battery. An adapter cable is provided to charge the battery separate from the analyzer. The charger can charge a fully discharged battery in a maximum of 16 hours. Charging takes longer if performed while the instrument is operating. Two types of chargers are available, one for 120 V ac, 50/60 Hz and another for 230 V ac, 50/60 Hz. <i>(WARNING: Do not operate battery charger in an area classified as hazardous due to presence of flammable gases or vapors.)</i>
PID Lamp Life	Greater than 2000 hours for 10.6 eV lamp, with normal cleaning
FID Life	Greater than 2000 hours
Audio Output Level	Greater than 75 dB at 3 feet
Gas Cylinder Capacity	<i>Pressure</i> — 15.3 MPa at 25°C (2200 psi at 77°F) maximum <i>Empty</i> — 85 cc (5.19in ³)
Hydrogen Supply Operating Time	Greater than 8 hours of continuous operation, starting from a cylinder charged up to 15.3 MPa (2200 psi)
Enclosure Description	The analyzer enclosure and front panel are made from a chemically resistant thermoplastic material. The approximate dimensions are 343 x 262 x 81mm (13.5 x 10.3 x 3.2 in). The enclosure is designed to provide environmental protection.

Table 1. Specifications (Continued)

Item	Specification
Electrical Interface Connections	Mating female connectors for Analog Output, RS-232 Interface (Host), and Battery Charger are provided on the side of the analyzer case below the keypad.
Mechanical Connections	Mechanical connections for Sample Input and for Vent Outlet are provided on the side and bottom surfaces.
Portability	The analyzer is designed to be carried by a removable shoulder strap. The strap, which is provided with every instrument, does not hinder the user when viewing or using the analyzer front panel. The strap is designed to support the probe when the instrument is not in use and to carry accessory tools.
Tool Kit	An accessory tool kit is provided with each instrument. The kit contains special tools for accessing the battery and removing the detector capsules.
Approximate Mass	<i>Analyzer (PID plus FID):</i> <i>PID only</i> —4.8 kg (10.5 lb) <i>FID only</i> —4.8 kg (10.5 lb) <i>Dual</i> — 5.2 kg (11.9 lb) <i>Probe Assembly:</i> <i>Standard Probe</i> — 0.55 kg (1.1 lb) <i>Enhanced Probe</i> —0.79 kg (1.75 lb)

External Influences

This product is intended for use in indoor and outdoor environments as a portable instrument carried by a user, as specified in the following table. The same environmental conditions also apply to the sample stream being monitored.

Table 2. External Influences

External Influence	Reference Operating Conditions	Normal Operating Conditions	Operative Limits	Transportation and Storage Limits
Ambient Temperature	23±2 °C 73±2 °F	0 to +40°C 32 to 104 °F	0 and +50°C 32 and 122 °F	-20 to +60°C -4 and 140 °F
Ambient Pressure	860 to 1060 mbar	70 to 108 kPa		20 to 108 kPa
Relative Humidity	50%±10%	FID: 20 to 95% PID: 20 to 70% noncondensing	15 and 95% noncondensing	0 to 100%
Radiated Susceptibility	None		30 V/m 27 to 500 MHz	
Conducted Susceptibility		Not Applicable, Battery Operated		
Conducted Emission		Not Applicable, Battery Operated		
Radiated Emission			80 dB μ V 0.15 to 30 MHz	
ESD Sensitivity			>6000 Volts	
Battery Charger Supply Voltage	120 or 230 ±1% Vac	120 or 230 +15%, -10% Vac		Not Applicable
Battery Charger Supply Frequency	50/60 Hz ±0.5 Hz	47 to 63 Hz	47 and 63 Hz	Not Applicable

Product Safety Specifications

Table 3. Product Safety Specifications

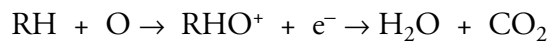
Testing Laboratory, Types of Protection, and Area Classification	Conditions of Classification	Electrical Classification Code
FM: intrinsically safe for Class I, Division 1, Groups A, B, C, and D	Temperature Class T4	FAZ
CENELEC: intrinsically safe for Zone 1 and Zone 2, (EEx ib d IIC)	Temperature Class T4	EBZ

*Enhanced probe and DataManager not CENELEC certified as of publication date

Theory of Operation

Flame Ionization Detection (FID)

A Flame Ionization Detector (FID) measures organic compounds by utilizing a flame produced by the combustion of hydrogen and air. When hydrocarbons in the sample are introduced to the detection zone, ions are produced by the following reaction:



where

R = carbon compound

A collector electrode with a polarizing voltage is also located within the detector chamber, and the ions produced by this reaction are attracted to it. As the ions migrate towards the collector, a current is produced which is directly proportional to the concentration of hydrocarbons introduced to the flame. This current is then amplified and sent to a microprocessor and/or analog readout device.

The FID has a wide dynamic range. The effective dynamic range can be further expanded by use of a dilutor kit which reduces very high volatile organic compounds (VOC) concentrations to within the dynamic range (or even linear range) of the analyzer. The dilutor kit can also be used to enrich oxygen deficient samples by adding ambient air that is rich in oxygen (20.9% usually). Low oxygen can affect the characteristics of the hydrogen flame, causing readings to be artificially elevated and possibly extinguishing the flame. As a general rule of thumb, greater than 16% oxygen is required to support the flame. If underground gases or samples in gas bags are to be measured by an FID, it is advised that the dilutor be used to combat the problem.

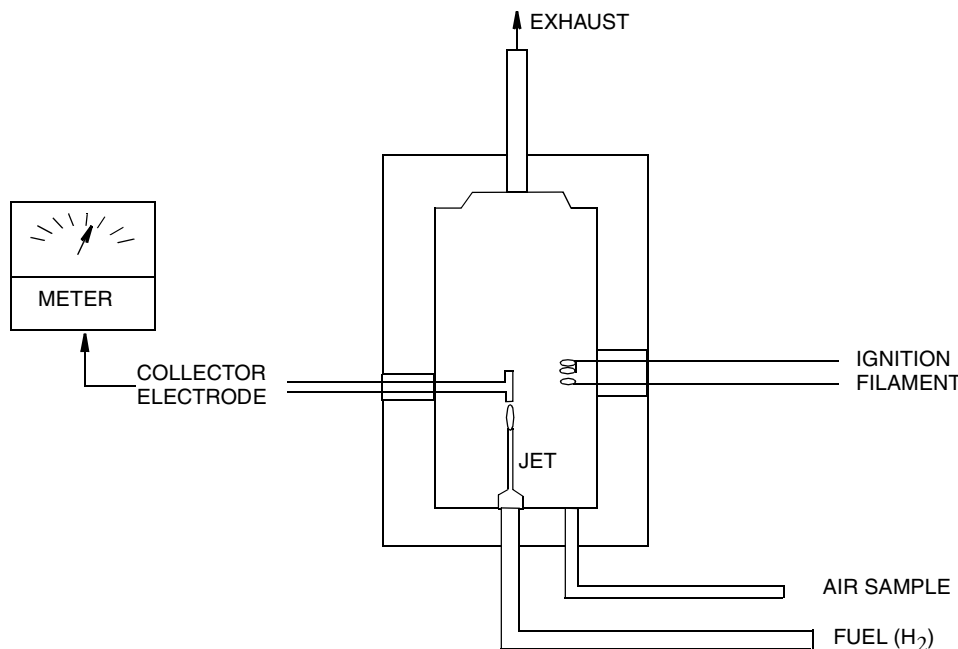


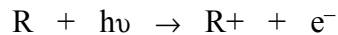
Figure 2. Typical Flame Ionization Detector

Benefits of Flame Ionization Detection

- ◆ Wide dynamic and linear range
- ◆ High sensitivity to hydrocarbon vapors (including methane)
- ◆ Very stable and repeatable response
- ◆ Virtually unaffected by ambient levels of CO, CO₂, and water vapor

Photoionization Detection

A Photoionization Detector (PID) consists of an ultraviolet (UV) lamp of a specific energy and an ionization chamber. Compounds passing through the chamber are excited by photons of UV energy and ionized according to the following equation:



where

R = most organic/inorganic compounds

These ions are attracted to a collecting electrode, producing a current proportional to the concentration of the compound.

Whether or not a compound can be detected by a PID depends upon the energy required to remove an electron from the compound (its ionization potential). If the lamp energy is greater than the compound's ionization potential, the PID will detect it. The standard lamp in the TVA-1000B is 10.6 eV. Other lamps (9.6 and 11.8 eV) are also available. The 11.8 eV lamp permits detection of many compounds not ionized by the standard lamp.

NOTE: Refer to MI 611-183 for information and guidance on proper use of the 11.8 eV lamp.

Because of its smaller dynamic range (0-2000 ppm), the PID is not the detector of choice for measuring high concentrations of vapors. A PID is also more susceptible to interference from water vapor than a FID. However, as a PID does not require hydrogen or oxygen, it is the detector of choice when fuel is limited or unavailable, or when ambient oxygen concentrations are low. The PID is also very sensitive to aromatic and chlorinated compounds, and can even measure some inorganic compounds that the FID does not detect at all (ammonia, carbon disulfide, carbon tetrachloride, chloroform, ethylamine, formaldehyde, and hydrogen sulfide, to name a few).

Benefits of Photoionization Detection

- ◆ High sensitivity to aromatics, unsaturated hydrocarbons and chlorinated hydrocarbons
- ◆ Ability to measure some inorganic gases
- ◆ Very simple operation
- ◆ No support gases required
- ◆ Non-destructive detector allows sample to be recovered

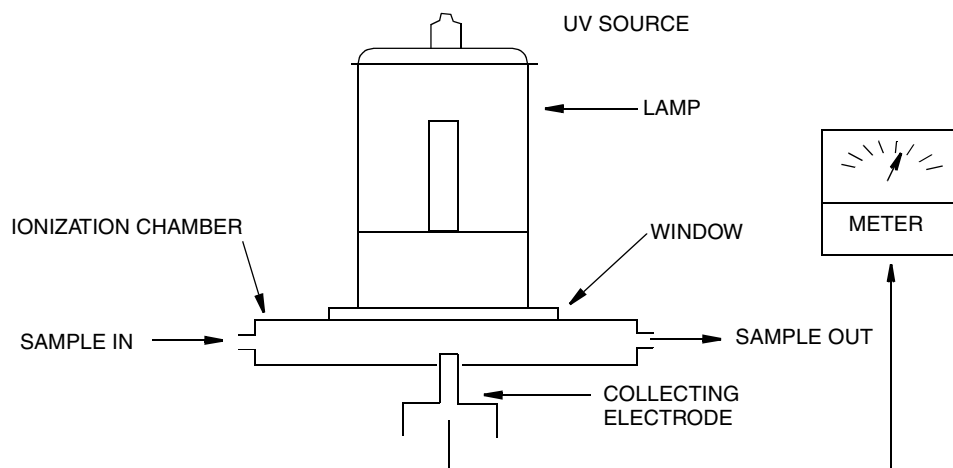


Figure 3. Typical Photoionization Detector

Dual Detectors

The benefits of each individual detector are very clear: both the FID and the PID have their advantages and disadvantages. However, with either detector alone, the number of organic and inorganic vapors that one can detect is limited by the measurement capabilities of that detector.

With the TVA-1000B, users can obtain complete information about more organic and inorganic vapors more quickly and easily than with single detector technology alone.

Since both detectors may be displayed and logged simultaneously, the relative response of the two detectors may give some clues about the identity of the compound being measured. For instance, the PID does not respond to methane at all, but the FID responds very well. A high FID reading with virtually no PID response might indicate the presence of methane. Consequently, PIDs respond very well to some inorganic gases that FIDs cannot detect. A high PID reading with no FID reading might suggest the presence of an inorganic compound. With readings from both detectors readily available, the TVA-1000B can help a user make decisions about the type of compound present and which detector reading to use.

Benefits of Dual Detectors

- ◆ Cost-effective packaging
- ◆ Detector response ratios can help characterize compounds
- ◆ Enhanced analytical capability derived from simultaneous detection

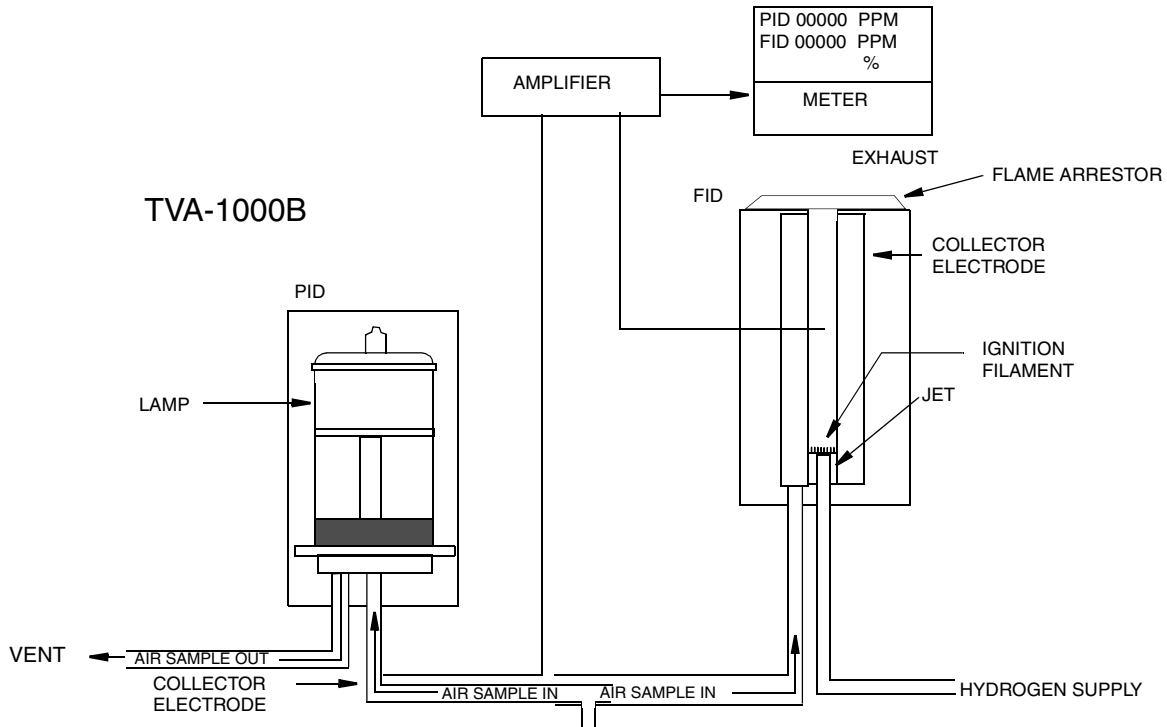
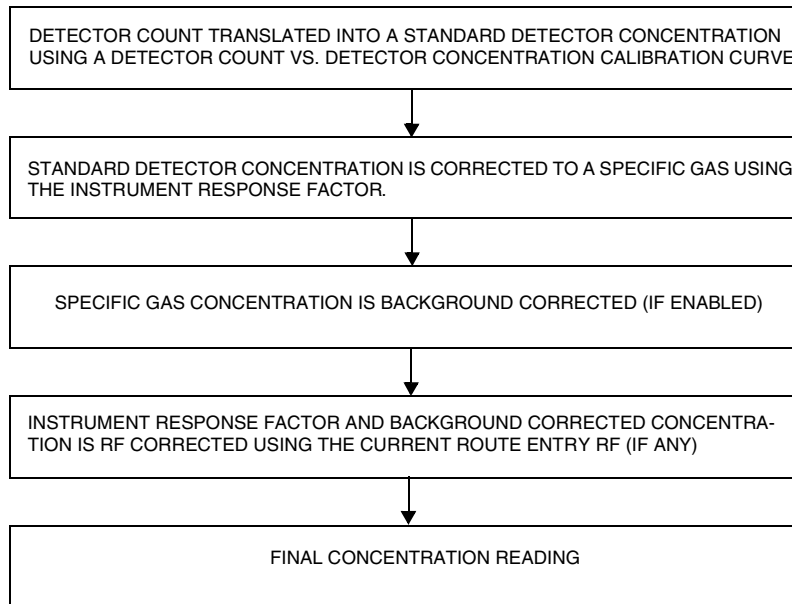


Figure 4. TVA-1000B Dual Detector Configuration

Concentration Calculation and Calibration

The concentration calculation is defined as the process that transforms a detector count into a displayed final concentration. The process is as follows:



Hardware

NOTE: A TVA-1000B may be configured in any of several different packaging arrangements. The configuration described in this document is for the BASIC probe and carrying case.

Instrument Connections

There are six external instrument connections on the TVA-1000B, as shown in the figure below. The umbilical attached to the probe consists of two connections, an electrical cable with locking connector and a sample line with locking fitting. A connector for a serial tag reader (i.e., a laser barcode reader) is located next to the hydrogen on/off valve. These three connections are located on the side of unit above the display.

Three additional connections — analog output, battery charger input, and RS-232 interface — are located on the opposite side of the unit, below the keypad. All mechanical connections are keyed for easy orientation.

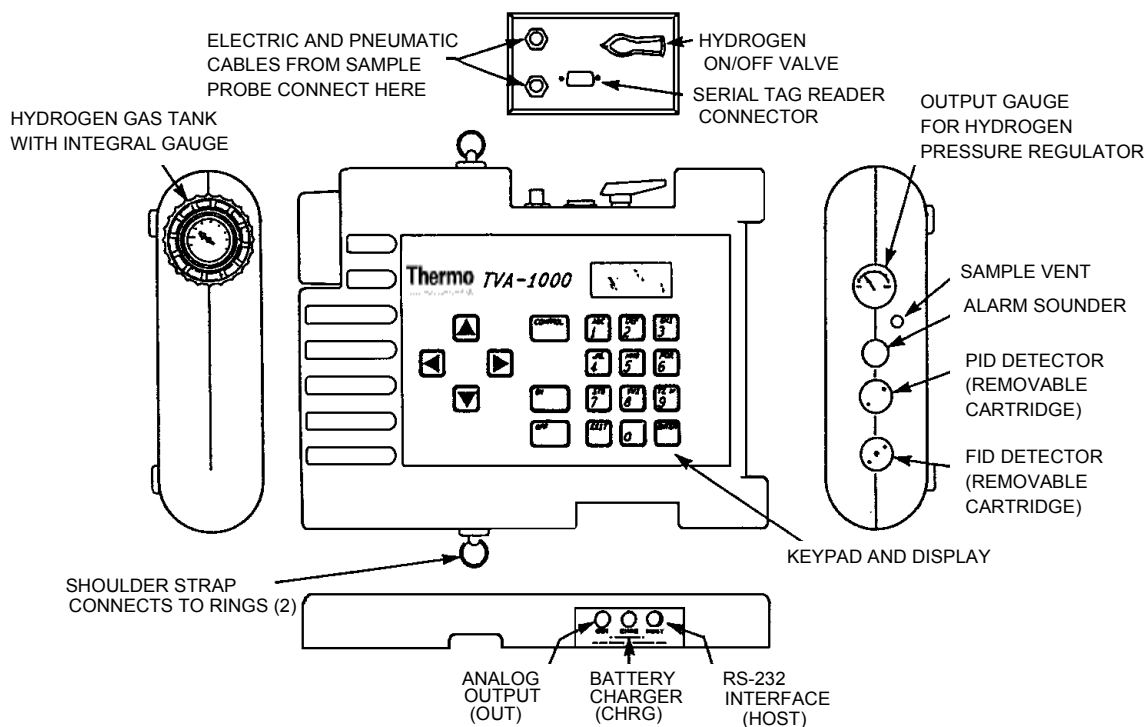


Figure 5. TVA-1000B Instrument Connections

WARNING: To prevent a potential explosion, never connect or disconnect any devices to the analog output, battery charger, or RS-232 interface ports in an area classified as hazardous due to presence of flammable gases or vapors.

WARNING: To prevent a potential explosion, do not operate the instrument with the PID or FID detector caps removed.

Analog Outputs

The TVA-1000B has two analog output signals, one for each detector (FID and PID). The analog output cable has a single plug at the instrument end and four individual banana plugs at the output end. The orange plug is the FID output, the blue plug is the PID output. The two black plugs are connected to a common ground.

It is important to note that these outputs are *non-calibrated outputs* which are proportional to the raw count output signal from each detector. The outputs are *not* proportional to the PID and FID dynamic ranges of 0-2000 and 0-50000 ppm.

To calibrate these outputs, it is necessary to measure the output voltage at the time of gas calibration. When zero gas is introduced to the unit, measure the output voltage for each detector (this is the zero output voltage). When the span gas is introduced to the unit, measure the output voltage for each detector (this is the span output voltage).

The output voltage for any other concentration can be calculated with the following formula:

$$V_x = V_o + C_x [(V_s - V_o)/(C_s)]$$

where:

V_x = Output voltage at the concentration of interest

C_x = Concentration of interest

V_s = Span output voltage

C_s = Span concentration

V_o = Zero output voltage

Instrument Sidepack Display

The liquid crystal display (LCD), in the instrument sidepack, as shown in the figure that follows, has four 16-character lines for three types of displays (MENU, ENTRY, and RUN). In *menu* displays, the whole screen is normally dedicated to the menu. In *entry* displays, the screen provides prompts and instructions for inputting new data. The normal *run* display consists of the live measurement data on lines 1 and 2 and menu items on lines 3 and 4. Other display information appears as you page through various menus.

In menu displays, the whole screen is normally dedicated to the menu.

```

MAIN MENU
  1 = RUN
  2 = SETUP  3 = INFO
  4 = PCLINK/MEMORY
  
```

MENU DISPLAY

In entry displays, the screen provides prompts and instructions for entering new data.

```

ENTER LOW CEIL:
FID: 000.00 PPM
UP/DN = NEXT UNIT
ENTER = ACCEPT
  
```

ENTRY DISPLAY

The normal run display consists of the live measurement data in Lines 1 and 2 and menu items on lines 3 and 4.

```

PID: 0.50 PPM
FID: 2.50 PPM
TAG: BLD _____
PRESS CHAR KEY
  
```

RUN DISPLAY

Other display information appears as you page through various menus.

Instrument Sidepack Keypad

The keypad, as shown on the following page, has 19 keys, some of which are dual function. When you press a key, the screen displays the selection. When you make a selection that creates or changes a parameter, you must then press the ENTER key. The left/right arrow keys move the character entry position. The up/down keys make page selections or switch from ppm, ppb, or % to another reading.

The following figure and table show the functions of all keys.

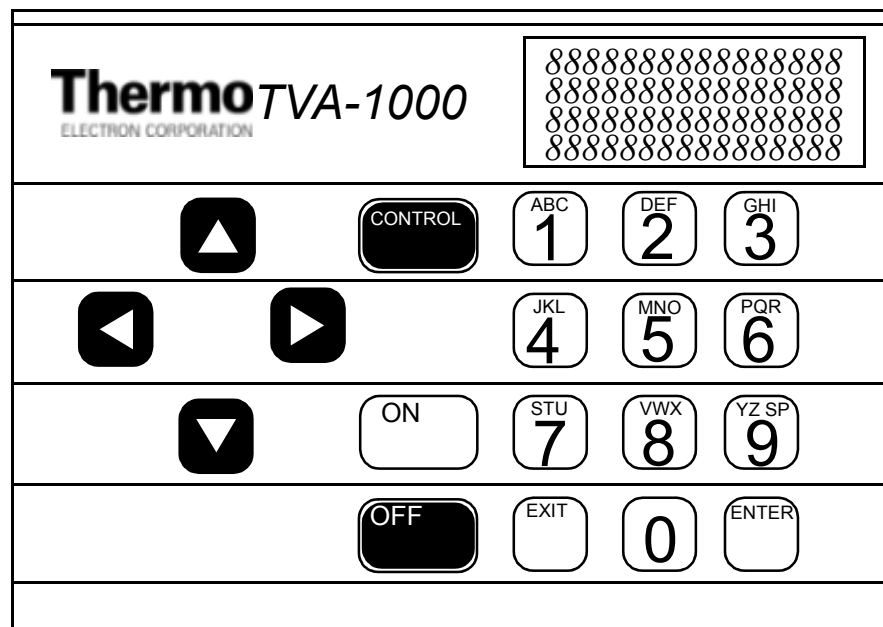


Figure 6. Keypad

NOTE: To activate OFF, CONTROL, EXIT, and ENTER functions, press and HOLD the key for approximately 1/2 second.

Key	Function
ON	The ON key enables power from the battery to the instrument.
OFF	The OFF key disables power from the battery to the instrument.
CONTROL	The CONTROL key is multi-function and is used to turn the pump, PID, and FID on or off, and to ignite the FID.
EXIT	The EXIT key clears any entry made in error or bypasses information that you do not want to change, and clears error or warning screens.
ENTER	The ENTER key has three functions: <ol style="list-style-type: none"> 1. Press ENTER if you have typed one or more characters and wish to keep that information. 2. Press ENTER to respond to a menu question. 3. Press ENTER instead of the LOG key on the standard probe to initiate logging.
Left/Right Arrows	The left and right arrow keys move character entry positions.
Up/Down Arrows	The up and down arrow keys make page selections or scroll through options in SETUP entry screens.

Key	Function
Alphanumeric	<p>The alphanumeric keys enable you to type letters or numbers into various menus. If a display asks for a number only, simply press the desired key. Two steps are required to type an alphanumeric character. First, press the key with the desired letter or number. The screen then displays a selection prompt at the bottom in which 1 = first letter, 2 = second letter, 3 = third letter, and 0 = number. Press the appropriate key to execute the selection. Three uses:</p> <ul style="list-style-type: none"> ◆ Select menu options ◆ Enter numbers, 0-9, using single keystroke ◆ Enter alphanumeric data, A-Z, 0-9, SPACE, using 2 keystrokes per character

Probe Connections

The sample probe assembly is a hand-held device that enables you to take vapor samples at precise locations. It connects to the instrument by means of an umbilical. The umbilical has two quick-disconnect fasteners (one electrical, one sample line) at the instrument end. Use the slide-on connector, located at the forward end of the probe, to attach various sampling devices. The operator keypad and measurement display are also located on the handle, as shown in the following diagram.

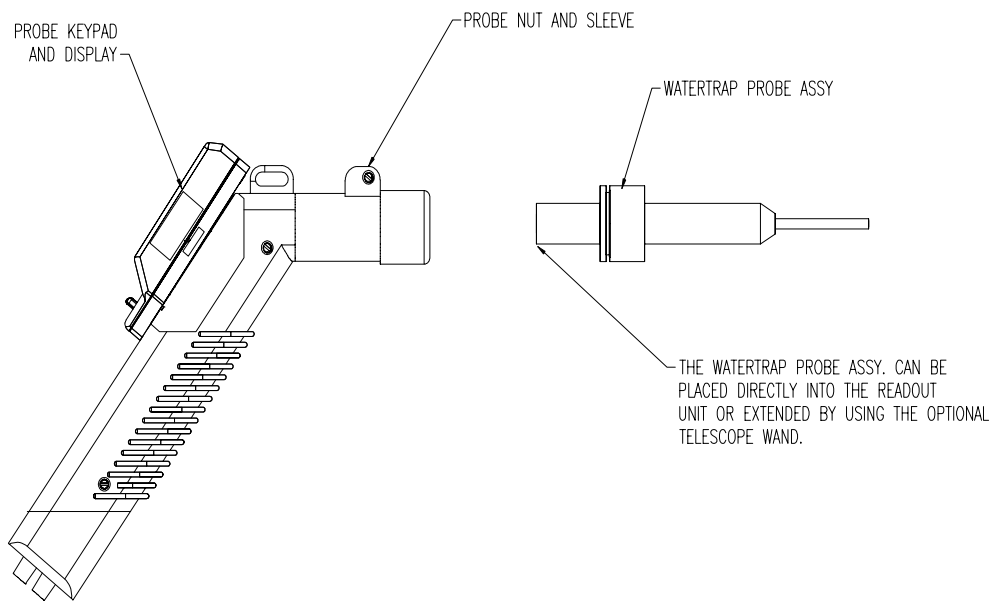


Figure 7. Sample Probe Assembly

BASIC Probe Display

The BASIC sample probe has a 4-character LCD display, as shown below, that displays measurement information. The display also contains an overrange indication, expressed as “>” when active. Three measurement unit types — ppm, ppb, or % — (selected during setup) are displayed to the right of the measurement data. Only those units selected during setup, however, are visible during survey.

A segmented analog bargraph that represents a logarithmic scale for the total analyzer range appears below the digital display. This display, which may be backlit under low light conditions, is active only in the RUN mode. In all other modes, it displays *OFF*.

The measured value display area is used to flash logging prompts during survey and log mode. In addition, errors on the sidepack are indicated by “Err” on the probe. Errors are cleared by using the LOG key.

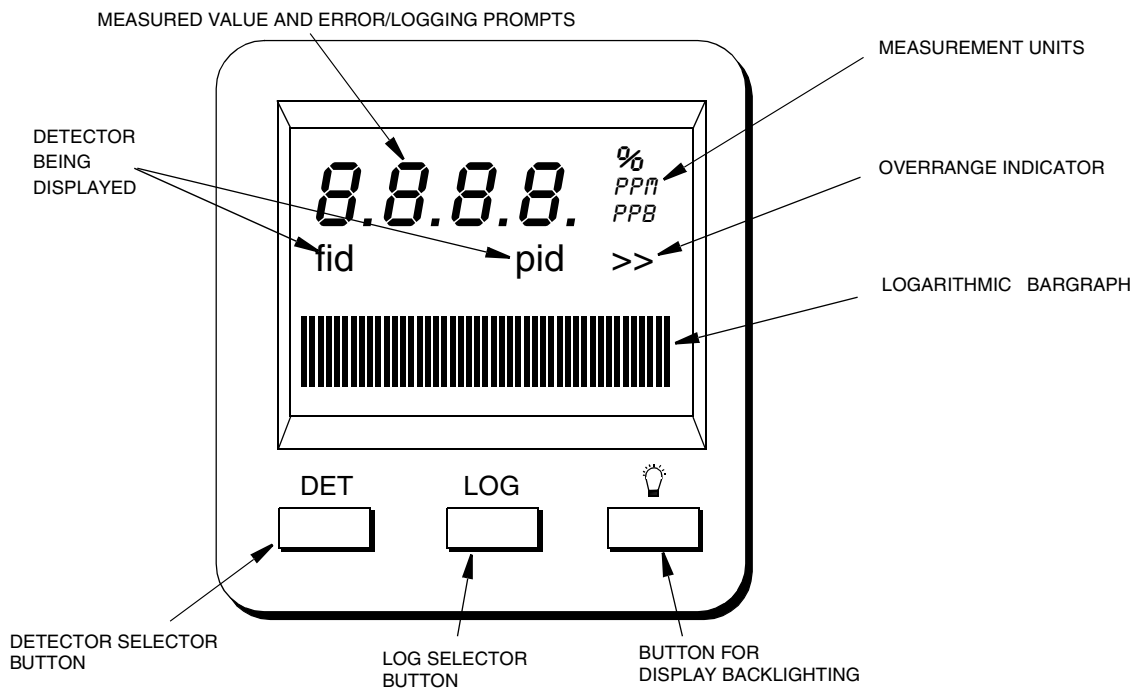



Figure 8. TVA-1000B BASIC Probe Display

NOTE: Use of the backlight draws additional power from the battery and will shorten the runtime of the TVA-1000B.

BASIC Probe Keys

The BASIC probe keypad has three keys. The keys are labeled with DET, LOG, and a lamp symbol.

Key	Function
DET	Press and release this key to select the display of either the FID or the PID readings in the RUN mode. Press and hold this key (approx. 2 seconds) to cancel selected logging modes.
LOG	Press and release this key to start the datalogging feature. Survey information is then automatically stored in the analyzer memory. The selection in SETUP/Log must be AUTO or VOC. Press and release this key to clear a sidepack error when the display reads “ Err”.
Lamp Symbol 	Press this key to turn the backlight for the probe display on or off. You should use it only during low light conditions as it draws additional power from the battery and thus shortens instrument run time.

Enhanced Probe Display

The enhanced probe also has an LCD screen which displays the basic measurement information. Unlike the BASIC probe, the enhanced probe display is larger (8 line x 20 character display) and is capable of providing several menu-driven functions. These MENU selections allow the user to start a datalogging application, switch detectors, ignite the FID, and perform a background scan. In Fugitive Emissions monitoring applications, the MENU selections also allow the user to step through a tag route, search for a selected tag, start a logging event, log repair data, etc. The display, which may be backlit under low light conditions, is active only in the RUN mode. In all other modes, the display is OFF.

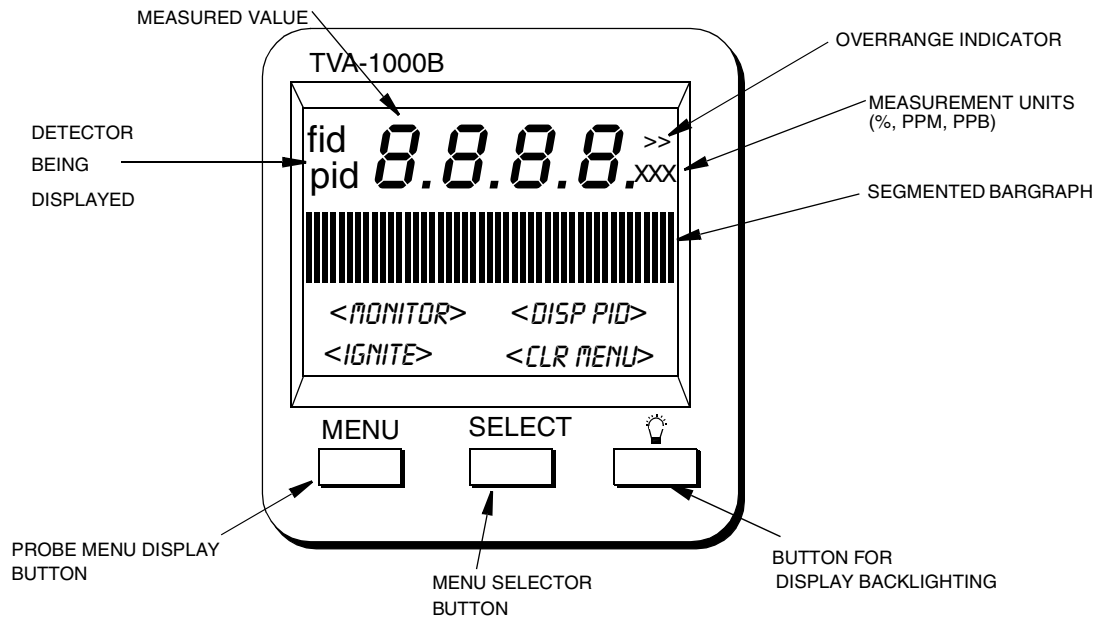



Figure 9. TVA-1000B Enhanced Probe Display - Menu Mode

NOTE: Use of the backlight draws additional power from the battery and will shorten the runtime of the TVA-1000B.

Enhanced Probe Keys

The enhanced probe has three keys, labeled MENU, SELECT, and a lamp Symbol. MENU and SELECT are multi-functional.

Key	Function
MENU	Press and release this key to show the probe display menu or to move to the next menu option. Press and hold this key (approx. 2 seconds) to toggle the info screen on/off.
SELECT	Press and release this key to select the highlighted menu option.
Lamp Symbol 	Press this key to turn the backlight for the probe on or off. As it draws additional power from the battery and thus shortens instrument run time, use it only during low light conditions.

Startup and Familiarization

This section shows you how to start the instrument and become familiar with the keypad and display by demonstrating the top level menu structure.

To begin, connect the sample probe (electrical and sample line connections) to the appropriate receptacles on the TVA-1000B, calibrate the instrument per the procedure beginning on page 25, and then follow the procedure described on the next page.

NOTE: If the unit is on but not yet set up/configured, it uses factory default values. To make the instrument function with your specific parameters, follow the setup procedures described under Display Menus in this manual.

The procedure below is a quick start guide for starting up your unit. We strongly recommend that you read the entire manual before using the analyzer for its intended operations.

Quick Start Procedure

Before starting the unit, perform the following steps:

1. Charge battery.
2. Connect sample probe.
3. Fill/install hydrogen tank (FID versions).
4. Open the hydrogen valve (FID versions).

To start the unit, execute the following procedure:

1. Press ON.
2. Press CONTROL.
3. Press 3 to ignite.
4. Press 2 = Setup.
5. Press 1 = Calibrate
6. Press 2 = Span Concentration.
7. Enter Span Concentration for calibration gas being used and press ENTER to accept.

NOTE: If PID only, enter concentration of isobutylene. If FID only, enter concentration of methane. If dual, enter concentration of both gases.

8. Press 3 = Zero.
9. Press 1 = Both.
10. Challenge analyzer with zero gas sample.

11. Press ENTER = start.
12. Wait to stabilize.
13. Press ENTER to accept.
14. Press 4 = Span.
15. (PID 1st) Press 2 = PID.
16. Press ENTER = start.
17. Challenge analyzer with isobutylene span gas and wait for readings to stabilize.
18. Press ENTER to accept.
19. Press 4 = Span.
20. Press 3 = FID.
21. Press ENTER = Start.
22. Challenge analyzer with methane span gas and wait for readings to stabilize.
23. Press ENTER = Accept.
24. Press 5 = Response Factor.
25. Confirm that Response Factor says “RF0:DEFAULT”
26. Press EXIT 2 times to main menu.
27. Press 1 = Run.

You are now in the survey mode.

NOTE: To perform more sophisticated operations, you will need to read the rest of the manual .

To power down this instrument, simply press and hold the OFF key. With FID versions, you must also shut off the gas valve to avoid depleting the tank supply.

Display Menus

Main Menu Structure

The display on the TVA-1000B analyzer is a menu-driven device. The various menu prompt you to select or enter information. With various key strokes, you can accomplish all necessary setup (configuration) and operational tasks.

Whenever you turn on the TVA-1000B, the Main menu screen display is the first usable display to appear. It contains selections that move you to all other menus. When you press the appropriate number key, as described below, the desired menu and the associated display or menu appear automatically.

<i>MAIN MENU</i> <i>1=RUN</i> <i>2=SETUP 3=INFO</i> <i>4=PCLINK/MEMORY</i>

Menu Selection	Function
1 = RUN	Use this selection to assign tags to specific surveys and to view/log analysis of organic/inorganic compounds
2 = SETUP	This menu contains configuration procedures and menu structure for performing calibrations, entering ID numbers, setting alarm levels, selecting log modes, entering response multipliers and setting time/date.
3 = INFO	This is a view-only menu structure that allows you to display various information.
4 = PCLink/Memory	Use this menu to download/upload information to/from a personal computer, to perform a remote SETUP from a personal computer, or to clear memory.

Once you are familiar with the various menus and know where to enter specific information, you may want to use a short cut method of tracking the menu structure. The following figure shows the complete menu structure for the TVA-1000B Analyzer.

Warning messages and meanings can be found in the Troubleshooting section of this manual (see "Warning Messages" on page 76).

1

RUN

2

SETUP (Passcode Protected)

- 1. CALIBRATION**
 - CONFIG
 - NUMBER SPAN POINTS
 - BACKGROUND CORRECT
 - ACCEPT MODE
 - SAVE MODE
 - RF CALC MODE
 - SPANCONC (Enter Span Gas Conc.)
 - ZERO (CALIB)
 - SPAN (CALIB)
 - RESPONSE FACTOR
 - CHANGE
 - NAME
 - VALUE
 - ACCEPT
 - BACKGROUND (CONC UPDATE)
 - 2. ALARMS**
 - STEL
 - LOW CEILING
 - HIGH CEILING
 - 3. LOG**
 - NONE
 - AUTO
 - VOC/FE
 - VOC
 - FE
 - CUSTOM
 - 4. PASSCODE**
 - NEW PASSCODE
 - ENABLE
 - DISABLE
 - 5. HARDWARE**
 - PROBE DISPLAY
 - BASIC
 - ENHANCED
 - DATAMANAGER
 - BARCODE READER
 - SELECT READER
 - NONE
 - HP SMART WAND
 - PSC LASER
 - INITIALIZE READER
 - 6. OTHER**
 - USER ID
 - DATE
 - TIME
 - USER OPTIONS
 - KEY CLICK
 - DISPLAY DELAY

3

INFO

4

PCLINK/MEMORY

- 1. PC LINK**
 - CHANGE TYPE
 - ESTABLISH LINK
- 2. CLEAR ROUTE & LOGGING MEMORY**

Control Menu

The Control menu is used for turning the sampling pump on and off, turning the PID lamp and FID on and off, and for initiating gas ignition of FID. The menu has four options:

- 1 = Turn Pump ON/OFF
- 2 = Turn FID ON/OFF
- 3 = Ignite FID
- 4 = Turn PID OFF/ON

Selecting Option 1 toggles the pump on or off.

Selecting Option 2 toggles the FID on or off. In the RUN mode, when the FID is off, dashes will appear instead of a reading and all FID alarms are overridden.

Selecting Option 3 initiates the FID flame ignition sequence, which momentarily turns on the ignite coil and simultaneously turns off the pump.

Selecting Option 4 toggles the PID on or off. In the RUN mode, when the PID is off, dashes will appear instead of a reading, and all PID alarms are overridden.

After running the initial startup diagnostic, the Control menu can be accessed at any time.

Setup Procedure

Setup (configuration) of the TVA-1000B is the most important step in obtaining accurate gas samples. During setup, you must set four parameters, as follows:

1. Calibration Settings
2. Alarm Levels
3. Date (year/month/day) (Set once only.)
4. Time of Day (Set once only.)

NOTE: Time may be set only if the date is within the valid range of 1980 to 2037.

You may also set the following parameters:

1. Log Methods
2. Type of Probe Display or Barcode Reader
3. Compound Names and Response Factors
4. Reader Type and Port Initialization (if used)
5. User Identification Number
6. Optional Settings (Calibration Passcode, Key Click, Display Delay, Calibration Mode)

Each parameter is explained in detail in the following.

Passcode Protection

The TVA-1000B Setup Menu can be passcode protected. This option allows you to protect the setup parameters from anyone who is not familiar with your 6-digit passcode. If this feature is enabled, you need to enter your passcode each time you choose to display the SETUP menu.

A selection in the SETUP menu entitled “Passcode” allows you to administer the passcode protection feature. From the SETUP menu, choose option #4 (Passcode). The TVA-1000B will give you three choices:

1. New Passcode

This selection allows you to enter and/or change the 6-digit calibration passcode. You may use any characters from the alphanumeric keypad in your passcode. You must then verify the passcode to make sure you have entered it properly.

2. Enable

This selection allows you to activate the passcode protection feature. Once this feature is activated, you must enter your passcode whenever you request access to the SETUP menu. *Once passcode protection has been enabled and you exit the SETUP menu, the option can only be disabled by entering the passcode to gain access to the SETUP menu again. REMEMBER YOUR PASSCODE!*

3. Disable

This selection allows you to deactivate the passcode protection feature. Once this feature is deactivated, you have unlimited access to the SETUP menu without entering a passcode.

NOTE: In the event you inadvertently forget your passcode, contact TEI for assistance.

Calibration

The use of multipoint calibration and multiple response factors/curves with the TVA-1000B must be fully understood before employing these features. To help explain these TVA-1000B capabilities, three scenarios follow:

Scenario 1

To maximize standard accuracy, it is highly recommended that you calibrate with methane for the flame ionization detector and isobutylene for the photoionization detector. Almost all published response factors for FIDs and PIDs are based upon methane and isobutylene, respectively. By employing a *multipoint calibration* for these compounds, you will improve the accuracy of each detector over the *entire dynamic range*. Response factors/curves can then be employed for correcting the detector's response to different compounds. However, once a *multipoint calibration* has been employed, any *response curve* must characterize only the relative response at each concentration, excluding curvature of the calibrated compound. Thus, use of both multipoint calibration and response curves at the same time is difficult, and is not recommended.

Scenario 2

If, for example, you want to measure several different compounds over wide concentration ranges, it is best to use a *single-point calibration* and then enter *response curves* for each specific compound (up to 9 response factors/curves can be entered into the analyzer).

Scenario 3

If, instead, you want to measure in direct readings (response factor = 1) for one specific compound with maximum accuracy over a wide range of concentrations, perform a *multipoint calibration* with the specific compound. Up to 9 span points (plus zero) can be entered for each detector. The use of a response curve is thus unnecessary as the detector is already reading the direct PPM for that specific compound.

CAUTION: *If you use multipoint calibration or a gas other than methane or isobutylene and then apply response factors/curves (that have been generated with reference to a single point methane/isobutylene calibration), the resulting measurements will probably be incorrect.*

To provide the specified accuracy, the instrument must be calibrated at the beginning of each workday. To reach the CALIBRATION menu from the MAIN MENU, choose 2 = Setup and 1 = Calib. When you reach the CALIBRATION menu, you will see the following selections:

CALIBRATION MENU	
1=CFG	2=SPANCONC
3=ZERO	4=SPAN
5=RF	6=BACKGND

The steps involved in calibrating the TVA-1000B are as follows:

1. Configure the calibration variables (*Cfg*).
2. Define the span concentrations to be used (*SpanConc*).
3. Zero the instrument using either a zero gas or clean ambient air (*Zero*).
4. Calibrate the reference point(s) using known span gases. The TVA-1000B can be configured for as many as nine (9) different span gas values (*Span*).
5. **Optional:** Set instrument response factors if necessary (*RF*).
6. **Optional:** Take background reading (*Backgnd*).

NOTE: *Prior to performing calibration, the instrument must be on and warmed up for approximately 30 minutes. The pump must be ON, the PID lamp must be ON, and the FID must be ignited throughout the warm-up period.*

Calibration Configuration

Before you calibrate the TVA-1000B for the first time, you may want to customize certain calibration settings. Once you have configured these settings, you don't need to set them again every time you calibrate unless you want to change one.

In order to set your calibration options from the CALIBRATION menu, choose menu selection #1 (Cfg). This will produce the following CAL CONFIG MENUS which can be scrolled through by using the Up and Down arrows:

Cal Config MENU
1=Number Span Pt.
2=Backgnd corrct

Up/Dn=More

Cal Config MENU
1=Accept Mode
2= Save Mode

Up/Dn=More

Cal Config MENU
1=RF calc mode

Up/Dn=More

Number Span Pt

This selection allows you to determine the number of span points that will be used to calibrate your TVA-1000B. Choosing this selection will produce the following screen:

PID: 1
FID: 1

Span Pts. 1=Both
2=PID 3=FID

From this screen, you may choose which detector you wish to set the number of span points for. Choosing one of these selections produces the following screens:

FID only

Number Span Pts:
FID: 1

Select: 1 to 9

PID only

Number Span Pts:
PID: 1

Select: 1 to 9

FID/PID

Number Span Pts:
P&F: 1

Select: 1 to 9

From these screens, press the number of span points that you wish to use. Both detectors can have up to 9 span points each, and they do not necessarily need to have the same number of span points.

Background Correct

This selection allows you to choose whether or not to apply background correction to the detector readings displayed and logged in memory. If you choose to apply background correction, the last background reading stored in memory will be subtracted from the measured reading. This corrected reading will be the value displayed and the value logged. Choosing this selection from the CAL CONFIG MENU produces the following display:

```
BACKGRND CORRECT:
  OFF
1=BOTH  2=NONE
3=PID   3=FID
```

The second line of the display shows what option is currently selected. You can change this option by choosing any one of the menu selections. You may choose to apply correction to FID, PID or both detectors.

NOTE: A default background value of 0 is stored in memory until a background reading is taken.

Cal Accept Mode

This selection allows you to choose whether or not calibrations will be automatically accepted. Choosing this selection from the CAL CONFIG MENU produces the following display:

```
CAL ACCEPT MODE:
  AUTO
1=MANUAL 2=AUTO
```

The second line of the display shows what option is currently selected. If “Manual” is chosen, the instrument will display the detector count during calibration and prompt the user to decide when to accept the calibration value. If “Auto” is chosen, the instrument will automatically determine the value to be stored and when to do it.

Cal Save Mode

This selection allows you to choose whether or not the TVA-1000B will automatically save an accepted calibration. Choosing this selection from the CAL CONFIG MENU produces the following display:

```
CAL SAVE MODE:
  AUTO
1=MANUAL 2=AUTO
```

The second line of the display shows what option is currently selected. If “Manual” is chosen, after a calibration value has been accepted the instrument will prompt the user to decide whether to save the calibration value or repeat the calibration (1 = Yes or 2 = Again?). If “Auto” is chosen, the instrument will automatically store the accepted calibration value without prompting the user.

RF Calc Mode

This selection allows you to choose how response factor correction will be applied to the reading. Choosing this selection from the CAL CONFIG MENU produces the following display:

RF calc Mode:
Factor
 1=*Factor* 2=*Curve*

The second line of the display shows what option is currently selected. If “Factor” is chosen, the TVA-1000B will use a single constant response factor which is multiplied by the reading. If “Curve” is chosen, the TVA-1000B will use a two constant equation. For more information, refer to the section of the manual on “Response Factors.”

Detector Counts

Detector counts are the raw, unscaled detector output values associated with a gas measurement performed by the FID or the PID. Before a detector reading is displayed or recorded, the detector signal is converted from analog to digital. The result is a raw number, or A/D counts. When a detector is calibrated, the detector counts for the zero gas and each of the span gases are saved in memory. These detector counts are then used as reference points for calculating the concentration values to be displayed or stored.

When calibrating the TVA-1000B in the “Manual” accept mode, the counts from the last calibration (Zero or Span) are displayed before the calibration process is initiated. Once the calibration process is initiated, the live detector counts are then displayed. You can refer to these counts as an indication of when the reading has stabilized, or as a means of tracking the repeatability of your calibrations.

You can also use these counts as an indication of the success of a calibration. The “zero” counts are the counts expected when a zero gas is applied to the detector. The span counts are the counts expected when a span gas of known concentration is applied to the detector. Finally, the detector sensitivity can be calculated by subtracting the zero counts from the span counts and dividing by the span gas concentration. Use the following general observations as a guideline:

Detector	Zero Counts	Detector Sensitivity
FID	<5000	160-260 counts/ppm Methane
PID (10.6 eV lamp)	2000-8000	3500-6000 counts/ppm Isobutylene
PID (11.8 eV lamp)	2000-20,000	300-900 counts/ppm Isobutylene

Example: A TVA-1000B FID is calibrated with zero air and a 100 ppm Methane in air span gas. The counts observed for the zero are 2895 and the counts observed for the span are 27395. The span sensitivity is thus 245 counts/ppm $[(27395-2750)/100 \text{ ppm}]$. Since both of these values (2895 zero counts and 245 detector sensitivity) are within the acceptable range, the calibration is a good calibration. Examples of a bad calibration include unusually high zero counts, or unusually low detector sensitivity. These problems can often be attributed to poor calibration gases, contaminated sampling accessories, a faulty detector capsule, or failure to follow the proper calibration procedure. For more information, consult the “Troubleshooting” guide in this manual or contact TEI for assistance.

Defining the Span Gas Concentration(s)

NOTES:

1. *The span gas concentration is the known concentration of the gas standards used to calibrate your TVA. Methane in air is the recommended calibration standard for the FID, and Isobutylene in air is the recommended calibration standard for the PID. Other gases may be used if desired.*
 2. *If your instrument is equipped with dual detectors, you may choose to calibrate the PID and FID separately or together.*
 3. *If your instrument is configured for multiple span points, be sure to set the concentration for ALL span points.*
-

1. From the CALIBRATION menu display, press 2=SpanConc. The upper display (or two displays if the unit is a dual detector version) will display the concentration value of your span gas (expressed as ppb, ppm, or %) as of the last calibration:

FID only

```

FID: 100 PPM

SPAN GAS CONCENT
ENTER=NEW CONC
    
```

PID only

```

PID: 100 PPM

SPAN GAS CONCENT
ENTER=NEW CONC
    
```

FID/PID

```

PID: 100 PPM
FID: 100 PPM

SPAN CONC 1=BOTH
2=PID     3=FID
    
```

If the TVA-1000B is configured for multiple calibration points, the span gas concentration values for Point #1 will be displayed. The Up and Down arrow keys can be used to scroll through the span gas concentration values for other points:

FID only

```

FID: 100 PPM

SPAN Pt 1 (UP/DN)
ENTER=NEW CONC
    
```

PID only

```

PID: 100 PPM

SPAN Pt 1 (UP/DN)
ENTER=NEW CONC
    
```

FID/PID

```

PID: 100 PPM
FID: 100 PPM

SPAN Pt 1 (UP/DN)
1=BOTH 2PID 3FID
    
```

- To change a span gas concentration value, choose the detector(s) of interest if using a dual detector analyzer, or press ENTER if using a single detector analyzer. The following display will appear:

FID only

```

ENTER SPAN CONC:
FID: 000000 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

PID only

```

ENTER SPAN CONC:
PID: 000000 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

FID/PID

```

ENTER SPAN CONC:
P&F: 000000 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

Use the up and down arrow keys to select the measurement units (% , ppm, or ppb) and the decimal point position. There are 5 selections to choose from:

Range	Display	Units
5	DD.DD	%
4	DDDDDD	ppm
3	DDDD.D	ppm
2	DDD.DD	ppm
1	DDDDDD	ppb

The range of the instrument is determined by your selection of measurement units and decimal point placement. In the run mode, the instrument will auto range upward only to select the optimum range for displaying measurement information. For example, if you entered a value in Range 3 and the measured value changes to a high value, the instrument will automatically switch to range 4. If it increases further, it will switch to Range 5. *Auto-ranging will not switch ranges beyond the span gas range in the downward direction.*

After you have selected the measurement units and decimal point placement, use the keypad to enter the concentration value. Press ENTER to accept this value and store it in the TVA's memory.

- If your TVA-1000B is a dual detector analyzer, you may repeat the procedure for the second detector. If your TVA-1000B is configured for more than one span point, you may use the Up/Dn arrow keys to select the next span point and repeat the procedure.
- When the last gas concentration value has been entered, you can return to the CALIBRATION menu, by pressing the EXIT key.

Defining the Response Factor

Although the FID and PID are calibrated with span gases of known concentration (usually Methane and Isobutylene, respectively), both detectors respond to many different compounds with differing levels of sensitivity. In order to adjust the analyzer reading from "ppm of Methane" or "ppm of Isobutylene" to ppm of the compound of interest, a correction factor must be applied to the reading. This correction factor is also known as a *Response Factor*. You can choose from up to nine (9) user-defined response factors, or use the default response factor of 1.00. Each response factor can be assigned a 9-character alphanumeric name.

The TVA-1000B uses one of two different response factor formats: a Multiplier or a Curve.

Response Factor Multiplier

A *response factor multiplier* is defined as follows:

$$\text{Response Factor} = \frac{\text{Actual Concentration}}{\text{Measured Concentration}}$$

Example: If 100 ppm of a compound produces an FID response of 50 ppm on an analyzer calibrated with Methane, then the FID response factor would be 2.00 (100/50).

When using a response factor multiplier to correct a TVA-1000B reading, the analyzer multiplies the reading by the response factor and displays the corrected reading. As in the example give above, if a 50 ppm reading is obtained by the TVA-1000B, the analyzer would automatically multiply 50 times 2.00 to get the actual concentration of 100 ppm.

Response Curve

Response factors can change as concentration changes. The response factor for a compound determined at 500 ppm may not be the same as the response factor determined at 10,000 ppm. By using a *response curve*, you can characterize a compounds response over a broader range of concentrations. If the actual concentration is plotted as *Y* vs. *X* (measured concentration), the resulting curve can be represented by the rational equation

$$Y = \frac{AX}{\left(1 + \frac{BX}{10000\text{ppm}}\right)}$$

When using the RF Calc Mode “curve”, the terms A and B are entered into the TVA-1000B. A represents the response factor multiplier at very low concentrations and B represents a change to the response for every percent concentration increase.

The curve can only be defined by collecting response data at several different concentrations and using a xy math spreadsheet to calculate the “best-fit” polynomial expression.

NOTE: Once the response curve has been fit, the calibration gas concentrations and number of span points should not be changed without readjusting the curve fit.

To define and/or choose a response factor, choose 5=RF from the CALIBRATION menu. The following display will appear:

RFD: DEFAULT UP/DN=NEXT RF ENTER=ACCEPT

The top line shows the currently active response factor. If no response factor is applied, the currently active response factor will be the factory DEFAULT (1.00 for FID methane and 1.00 for PID isobutylene). The name and value of the default response factor cannot be

changed. You can scroll through the other response factors by using the Up and Down arrow keys. The other response factor names will show as you scroll through them:

```
RF1: HEXANE
UP/DN=NEXT RF
1=CHANGE
ENTER=ACCEPT
```

If you would like to activate a different response factor, press ENTER=Accept. The TVA-1000 will show an ACCEPTED message. If you would like to modify the response factor name or numbers, press 1=Change:

FID only

```
RF1: HEXANE
PID: 1.00
1=NAME 2=NUMBERS
```

PID only

```
RF1: HEXANE
FID: 1.00
1=NAME 2=NUMBERS
```

FID/PID

```
RF1: HEXANE
PID: 1.00
FID: 1.00
1=NAME 2=NUMBERS
```

If you would like to change the name assigned to the response factor, press 1=Name. If you would like to change the response factor value, press 2=Numbers. If you choose 1=Name, the following display will appear:

```
ENTER NAME:
RF1: -----
PRESS CHAR KEY
```

Use the alphanumeric keypad to enter a compound name for the response factor. Press enter when you are finished.

If you choose 2=Numbers, the following display will appear:

FID only

```
RF1: HEXANE
PID: 00.00
ENTER=ACCEPT
```

PID only

```
RF1: HEXANE
FID: 00.00
ENTER=ACCEPT
```

FID/PID

```
RF1: HEXANE
P&F: 00.00
ENTER=ACCEPT
```

Use the keypad to enter a new response factor and press ENTER to store it in instrument memory.

NOTES:

1. The TVA-1000B will not accept a response factor of 00.00.
 2. If a response curve is used, the TVA-1000B will prompt you to enter two numbers.
-

Zero Reference Point Calibration

1. From the CALIBRATION menu display, press 3=Zero.

NOTES:

1. The following sequence shows the procedure when the TVA-1000B is configured with both Cal Accept mode and Cal Save mode = Auto. If either mode is Manual, an extra confirmation is required at the appropriate step.
 2. If your instrument is a dual detector type (PID and FID), you can zero the PID and FID separately, both together, or one in zero gas and one in clean ambient air. To do so, follow the same procedure. However, it is suggested that you zero both detectors together.
-

If you press 3=Zero, the display will show:

FID-only

FID:	0
ZERO CAL:	
ENTER=START	

PID-only

PID:	0
ZERO CAL:	
ENTER=START	

PID/FID

PID:	0
FID:	0
ZERO CAL: 1=BOTH	
2=PID 3=FID	

2. To perform the actual ZERO procedure for an

FID-only:

Press ENTER

APPLY ZERO GAS	
FID	
ENTER=START	
EXIT=CANCEL	

or PID-only:

Press ENTER

APPLY ZERO GAS	
PID	
ENTER=START	
EXIT=CANCEL	

or PID/FID:

Press 1, 2, or 3

APPLY ZERO GAS	
AT SAMPLE INLET	
ENTER=START	

3. Apply the zero gas to the probe at ambient pressure (using a clean and labeled gas sampling bag) and then press ENTER.

FID	0
FID	
ZERO GAS	
EXIT=CANCEL	

PID	0
PID	
ZERO GAS	
EXIT=CANCEL	

PID	0
FID:	0
WAIT FOR ZERO	
EXIT=CANCEL	

The instrument analyzes the zero sample.

FID	0
FID	
ACCEPTED	

PID	0
PID	
ACCEPTED	

PID	0
FID:	0
- ACCEPTED -	

The ACCEPTED message appears for a short time and is then replaced by the normal CALIBRATION menu.

When the ACCEPTED message disappears and the CALIBRATION menu appears, the ZERO reference value is stored. This value is stored in non-volatile memory until the next calibration is performed. The date and time of this calibration are stored and can be accessed through the INFO menu.

NOTE: For optimum accuracy, re-zero the FID every time the hydrogen supply valve is turned on.

Span Reference Point(s)

To set the span reference point, execute the procedure described below. Note that the procedure is the same as that for setting the zero reference except that a span gas is used instead of a zero gas. The procedure is:

1. From the CALIBRATION MENU display, press 4=Span.

NOTES:

1. The following sequence shows the procedure when the TVA-1000B is configured with both Cal mode and Cal Save mode = Auto. If either mode is Manual, an extra confirmation is required at the appropriate step.
 2. If your instrument is a dual detector type (PID and FID), you can set the span reference for the PID and FID separately, both together, or one in one type of calibration gas and one in another type of gas. To do so, follow the same procedure.
 3. If multiple span points are used, repeat the following procedure for each and every span point.
-

When you press 4=Span, the display will show:

FID-only

```

FID    7654321
SPAN P1 (UP/DN)
ENTER=NEW CALIB
```

PID-only

```

PID    7654321
SPAN P1 (UP/DN)
ENTER=NEW CALIB
```

PID/FID

```

PID    7654321
FID    7654321
SPAN P1 (UP/DN)
1=BOTH 2PID 3FID
```

If more than one reference span gas concentration has been configured, pressing the Up/Dn keys will allow you to scroll through all defined reference gas concentration points.

- To perform the actual SPAN calibration (for example at 100 ppm):

FID-only:
Press ENTER

or

PID-only:
Press ENTER

or

PID/FID:
Press 1, 2, or 3

```

APPLY SPAN GAS
FID: 100.00 PPM
ENTER=START
    
```

```

APPLY SPAN GAS
PID: 100.00 PPM
ENTER=START
    
```

```

APPLY SPAN GAS
100.00 PPM
ENTER=START
    
```

- Apply the appropriate span gas to the probe at ambient pressure (using a clean and labeled gas sampling bag) and then press ENTER.

```

FID 7654321
FID: 100.00 PPM
WAIT FOR SPAN
EXIT=CANCEL
    
```

```

PID 7654321
PID: 100.00 PPM
WAIT FOR SPAN
EXIT=CANCEL
    
```

```

PID 7654321
FID 7654321
WAIT FOR SPAN
EXIT=CANCEL
    
```

The instrument analyzes the span sample.

```

FID 7654321'
-ACCEPTED-
    
```

```

PID 7654321
-ACCEPTED-
    
```

```

PID 7654321
FID 7654321
-ACCEPTED-
    
```

When only one reference span gas concentration is used, the ACCEPTED message appears for a short time and is then replaced by the normal CALIBRATION menu.

When the ACCEPTED message disappears and the CALIBRATION menu appears, the SPAN reference value is stored. This value is stored in non-volatile memory until the next calibration is performed. The date and time of this calibration are stored and can be accessed through the INFO menu.

- If more than one reference span gas concentration has been defined, the span calibration display returns. Move to the next concentration point (Up/Dn keys) and repeat steps 2-3 above until each reference gas concentration point has been calibrated.

Alarm Levels

The TVA-1000B is supplied with three user-configurable alarms — HI Ceiling, Low Ceiling, and STEL (short term exposure limit). When any of these alarms is exceeded, an alarm message appears on the sidepack display and probe display (enhanced version only) and an alarm tone is generated. Press EXIT to acknowledge the alarm message and sounder. Once acknowledged, the display returns to the live measurement with an upper case letter representing the alarm or alarm combination appearing to the right of the display. The three types of user configurable alarms are:

Alarm Type	Description
Low Ceiling:	This alarm is a warning that a lowest level threshold has been exceeded. Once acknowledged, the letter L appears to the right of the live measurement for the appropriate detector.
High Ceiling:	This alarm is a warning that a second, higher level, threshold has been exceeded. Once this alarm is acknowledged, the letter H appears to the right of the live measurement for the appropriate detector.
STEL:	The Short Term Exposure Limit alarm indicates that measurements averaged over a 15-minute interval have exceeded the set alarm limit. Once this alarm is acknowledged, the letter S appears to the right of the live measurement for the appropriate detector.

The three alarm messages appear on the instrument display as follows:

Low Ceiling

```
ALARM!
LOW CEILING
ALARM EXCEEDED!
EXIT=CLR
```

High Ceiling

```
ALARM!
HIGH CEILING
ALARM EXCEEDED!
EXIT=CLR
```

STEL Level

```
ALARM!
STEL ALARM LEVEL
EXCEEDED!
EXIT=CLR
```

NOTE: To display and change the alarm menus, the instrument must be ON but does not have to be warmed up.

Accessing the Alarm Menu

1. From the MAIN menu display, press 2=Setup.
2. From the SETUP menu display, press 2=Alarms and follow the procedures for the appropriate alarm settings:

STEL Level Alarm

1. From the ALARM LEVELS display, press 1=STEL. The previous alarm settings for STEL alarm are then displayed, as follows.

FID-only

```
FID: 80.00 PPM
STEL ALARM
ENTER=NEW VALUE
```

PID-only

```
PID: 80.00 PPM
STEL ALARM
ENTER=NEW VALUE
```

PID/FID

```
PID: 80.00 PPM
FID: 80.00 PPM
STEL: 1=BOTH
2=PID 3=FID
```

- To change the alarm level to a new value, press ENTER on a single detector instrument or 1, 2, or 3 on a dual detector instrument and see:

FID-only

```

ENTER STEL:
FID: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

PID-only

```

ENTER STEL:
PID: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

PID/FID

```

ENTER STEL:
P&F: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

Use the up and down arrow keys to select %, PPM, PPB, and decimal point position, then type the numeric value for the alarm level desired.

- Press ENTER to store new values into instrument memory.
- Press EXIT to return to the ALARM LEVELS without making a change.

Low Ceiling Alarm

- From the ALARM LEVELS display, press 2=Low Ceiling. The previous alarm settings for the Low Ceiling alarm are then displayed, as follows.

FID-only

```

FID: 80.00 PPM
LOW CEILING ALARM
ENTER=NEW VALUE

```

PID-only

```

PID: 80.00 PPM
LOW CEILING ALARM
ENTER=NEW VALUE

```

PID/FID

```

PID: 80.00 PPM
FID: 80.00 PPM
LOW CEILING: 1=BOTH
2=PID 3=FID

```

- To change the alarm level to a new value on a single detector instrument, press ENTER; on a dual detector instrument, press 1, 2, or 3, and see:

```

ENTER LOW CEIL:
FID: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

```

ENTER LOW CEIL:
PID: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

```

ENTER LOW CEIL:
P&F: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT

```

Use the up and down arrow keys to select %, PPM, PPB, and decimal point position, and then type the numeric value for the alarm level desired.

- Press ENTER to store the new values into instrument memory.
- Press EXIT to return to the ALARM LEVELS.

High Ceiling Alarm

1. From the ALARM LEVELS display, press 3=High Ceiling. The previous alarm settings for the High Ceiling alarm are displayed.

FID-only

```
FID: 80.00 PPM
HIGH CEILING ALARM
ENTER=NEW VALUE
```

PID-only

```
PID: 80.00 PPM
HIGH CEILING ALARM
ENTER=NEW VALUE
```

PID/FID

```
PID: 80.00 PPM
FID: 80.00 PPM
HIGH CEILING: 1=BOTH
                2=PID 3=FID
```

2. To change the alarm level to a new value, press ENTER on a single detector instrument or 1, 2, or 3 on a dual detector instrument and see:

```
ENTER HIGH CEIL:
FID: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT
```

```
ENTER HIGH CEIL:
PID: 000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT
```

```
ENTER HIGH CEIL:
P&F:000.00 PPM
UP/DN=NEXT UNIT
ENTER=ACCEPT
```

Use the up and down arrow keys to select %, PPM, PPB, and decimal point position, and then type the numeric value for the alarm level desired.

3. Press ENTER to store the new values into instrument memory.
4. Press EXIT to return to the ALARM LEVELS display.

Log Methods

Selecting the LOG mode not only identifies the way in which data is stored in instrument memory but also governs the way the RUN mode works. Four possible choices in the LOG mode are available. Each is explained below.

Option	Description
1. NONE	Selecting <i>None</i> means that no logging action takes place at all. When the instrument is in the RUN mode, you can only display readings.
2. AUTO	When you select and configure the AUTO method, the RUN mode functions automatically once an action is initiated. You choose an automatic logging rate between 1 second and 999 minutes, type a tag* identifier, and start the instrument. You initiate automatic sampling by either pressing the LOG key on the probe or the ENTER key on the instrument. From that point on, the instrument automatically logs the reading of the sample at the end of each count-down and continues to do so until the battery goes low or you press the EXIT key.

Option	Description
3. VOC	The VOC method of sampling is a manual means of triggering a sample/log. Once configured for VOC, the RUN mode prompts you to type a tag* identifier. After you enter the tag, the instrument stands ready until you press either the LOG key on the basic probe or the ENTER key on the instrument. Once LOG is initiated, the instrument counts down. Samples are taken over that count down and the highest reading achieved, or average (or last) reading is logged in memory and displayed on both displays. The stored values are cleared by pressing either the LOG key on the basic probe or the ENTER key on the instrument. Each VOC log must be done manually and individually.
4. F.E.	The F.E. method of sampling is a manual means of triggering a sample/log using a pre-configured monitor route file which has been downloaded and stored in instrument memory. The F.E. method requires use of the optional enhanced FE probe. You choose a sample time of between 2 and 30 seconds and you choose to log either the highest reading or average (or last) reading achieved during the sample time. Once configured for F.E. and the RUN mode entered, the FE probe menu screen guides you through the monitor route, displaying each pre-configured tag identifier in sequential order. A SEARCH function is available at the probe menu to allow you to find tags that are out of order. The probe display prompts you to confirm the tag* identifier, after which the instrument stands ready until you either select LOG from the probe or press the ENTER key on the instrument. Once initiated, the instrument begins a count down, sampling over the configured sample time. The reading sampled during the countdown is displayed on both displays and you are given the option to save the reading in memory or to select LOG again. The stored values are cleared by selecting LOG on the probe display or by pressing ENTER on the instrument. Each F.E. log must be done individually and manually.

*Tags may be entered manually or via a reader.

The RUN mode displays (as governed by the LOG selection) are:

NONE

AUTO, VOC, or F.E.

<p><i>PID: 80.00 ppm</i></p> <p><i>FID: 80.00 ppm</i></p> <p><i>Exit=Stop</i></p>

or

<p><i>PID: 80.00 ppm</i></p> <p><i>FID: 80.00 ppm</i></p> <p><i>Logging: 10 sec</i></p> <p><i>Exit=Stop</i></p>

NOTE: To display and change the log menu, the instrument must be ON but does not have to be warmed up.

Accessing the LOG Menu

1. From the MAIN MENU display, press 2=Setup.
2. From the SETUP MENU display, press 3=Log. The following display will appear:

```

LOG MODE
  NONE
1=NONE  2=AUTO
3=VOC/FE 4=CUSTOM
  
```

The previous log selection is displayed on the second line. Follow the procedure below to set the log mode.

Log None

1. From the LOG MODE Menu, press 1=None.

```

LOG MODE
AUTO, RATE=5 SEC
1=NONE  2=AUTO
3=VOC/FE 4=CUSTOM
  
```

Press 1=None to display this message briefly. The screen then returns to the SETUP menu.

```

  NONE

-ACCEPTED-
  
```

Log Auto

From the LOG MODE Menu, press 2=Auto. The previous log selection is then displayed on the second line of the screen.

```

LOG MODE
  NONE
1=NONE  2=AUTO
3=VOC/FE 4=CUSTOM
  
```

Press 2=Auto to display this message.

```

ENTER LOG RATE:
AUTO, RATE=000SEC
UP/DN=SEC↔MIN
ENTER=ACCEPT
  
```

2. Use the up and down arrow to select minutes (min) or seconds (sec). Then, type the appropriate time interval desired for the automatic sampling.
3. Press ENTER and, after a brief message of acceptance, the automatic sampling is ready to be used in the RUN Mode.

NOTE: To allow for STEL calculations in the personal computer utility, the log rate value must be less than 90 seconds. If a log rate greater than 90 seconds is selected, a warning message will appear. Press EXIT to bypass this message and proceed.

In the LOG AUTO mode, data is logged in the format described below:

1. Every time RUN mode is entered a new header is created.
2. Data is logged periodically, at the user-entered log rate, in the following format:

Date	Time	PID (PPM)Alarms		FID (PPM) Alarms	
7/28/93	11:20:57:00	187.1	L	157.1	L
7/28/93	11:21:29:00	436.6	H	519.6	L
7/28/93	11:21:54:00	708.4	LH	847.0	LH
7/28/93	11:22:19:00	300.7	L	381.9	L
7/28/93	11:22:36:00	223.8		265.1	

Approximately 9500 data samples may be taken with a single header.

Log VOC

1. From the LOG MODE Menu, press 3=VOC/FE, then 1=VOC.

LOG MODE
 AUTO, RATE=12 SEC
 1=NONE 2=AUTO
 3=VOC 4=FE

Press 3, then 1 to display this message.

ENTER SAMPLING:
 VOC, TIME=00s, MAX
 UP/DN=NEXT TYPE
 ENTER=ACCEPT

2. Press the Up/Dn arrow keys to choose the type of sampling to be used (Max, Avg, Smp).
 - a. Max=the maximum reading obtained during the log interval.
 - b. Avg=the average reading obtained during the log interval.
 - c. Smp=the last reading obtained during the log interval.
3. Type the appropriate time interval desired for VOC sampling.
4. Press ENTER, and, after a brief message of acceptance, the VOC method of logging is now ready to be used in the RUN Mode.

NOTE: The allowable Sample Time range is 2-30 seconds. If a Sample Time of less than 2 seconds or greater than 30 seconds is selected, a warning message will appear and you will be required to re-enter the Sample Time.

In the LOG VOC mode, data is logged in the format described below:

1. Every time RUN mode is entered a new header is created.
2. Data is logged in the following format whenever you press the LOG button:

Date	Time	PID (PPM) Alarms	FID (PPM) Alarms	Tag
7/28/93	11:20:57:00	187.1 L	157.1 L	TAG1
7/28/93	11:21:29:00	436.6 H	519.6 L	TAG2
7/28/93	11:21:54:00	708.4 LH	847.0 LH	TAG3
7/28/93	11:22:19:00	300.7 L	381.9 L	TAG4
7/28/93	11:22:36:00	223.8	265.1	TAG5

Approximately 4500 data samples may be taken.

Log F.E.

1. From the LOG MODE menu, press 3=VOC/FE, then 2=FE. The previous log selection is then displayed on the second line of the screen.

```

LOG MODE
LOGGING=VOC, TIME=05s,
MAX
1=NONE    2=AUTO
3=VOC/FE 4=CUSTOM
  
```

Press 3=VOC/FE, then 2=FE to display this message.

```

ENTER SAMPLING:
FE, TIME=00s, MAX
UP/DN=NEXT TYPE
ENTER=ACCEPT
  
```

2. Press the Up/Dn arrow keys to choose the type of sampling to be used (Max, Avg, Smp).
 - a. Max = the maximum reading obtained during the log interval.
 - b. Avg = the average reading obtained during the log interval.
 - c. Smp = the last reading obtained during the log interval.
3. Type the appropriate time interval desired for F.E. sampling.
4. Press Enter, and, after a brief message of acceptance, the F.E. method of logging is now ready to be used in the RUN mode.

NOTE: The allowable Sample Time range is 2-30 seconds. If a Sample Time of less than 2 seconds or greater than 30 seconds is selected, a warning message will appear and you will be require to re-enter the Sample Time.

Log Custom

The TVA-1000B has several pre-designed logging methods. However, if you find that you would prefer to log data in a different fashion, you can use Custom logging to create your own log type. The TVA-1000B will prompt you through a series of questions which will assist you in setting the various logging options. The end result is a logging method which collects data the way you want it to.

The following variable settings can be configured when designing a Custom log method:

1. Log data type

This setting allows you to choose the format in which data will be saved. The choices are as follows:

- a. None.
- b. Auto – Data stored in a fashion similar to Auto logging for download to the *TEI datalogging software only* (tag, calibration information, Detector Counts, time/date, alarms).
- c. VOC – Data stored in a fashion similar to VOC logging for download to the *TEI datalogging software only* (Tag, Calibration Information, Detector Counts, time/date, alarms).
- d. FE – Data stored in a fashion similar to FE logging for download to FEMS or via the Text protocol.

2. Sample time

This setting allows you to adjust the sampling interval.

3. Log time units

This setting allows you to choose the units for the sample interval (seconds or minutes).

4. Log sample type

This setting allows you to choose the way in which sample readings are collected over the sample rate or interval. The choices are as follows:

- a. *Last sample* — the last reading obtained within the sample interval is stored
- b. *Max* — the maximum reading obtained within the sample interval is stored
- c. *Avg* — the average reading obtained over the sample interval is stored

5. Log unit lock

This setting allows you to decide whether to enable auto-ranging or lock the TVA-1000 units to one of three choices: ppb, ppm, or %.

6. Log auto repeat

This setting allows you to determine whether the TVA-1000B should automatically cycle through logging events (auto repeat ON) or pause for a user command before logging (auto repeat OFF).

7. Log save accept

This setting determines whether the TVA-1000B prompts the user before saving a logged reading (Manual) or automatically saves the reading without a user prompt (Auto).

8. Tag active

This setting determines whether or not you want to assign tags to logged readings. If you wish to assign tags, choose ON. If you wish to skip tagging, choose OFF.

9. Route active

This setting determines whether the logging should follow a pre-loaded route list of tags. If you wish to upload a list of tags to the TVA-1000B and follow that list while logging, choose ON. If you do not wish to use routing, choose OFF.

10. Barcode reader

This setting determines whether the barcode reader is used merely to enter tags (Enter tag) or if it is required to verify that the user has read a tag in the monitoring route (Verify tag).

Hardware Configuration (Barcode Reader/Probe Display)

NOTE: To select a barcode reader or probe display, the instrument must be ON but does not have to be warmed up.

The TVA-1000B must be configured to operate with the appropriate barcode reader and probe display. To select which accessories to use:

1. From the MAIN menu display, press 2 = Setup.
2. From the SETUP menu display, press 5 = Hardware. The Hardware menu will appear:

```

HARDWARE MENU
1=PROBE DISPLAY
2=BARCODE READER
  
```

To select a probe display:

1. From the HARDWARE menu, choose 1 = Probe display. The PROBE DISPLAY menu will appear:

```

PROBE DISPLAY
BASIC
1=BASIC
2=ENHANCED
  
```

2. The second line of the display shows the currently configured display type. To choose the basic probe display, press 1. To choose the Enhanced FE probe display, press 2.

To select a barcode reader:

1. From the HARDWARE menu, choose 2 = Barcode reader. The BARCODE menu will appear:

```

BARCODE MENU
NONE
1=SELECT READER
ENTER=INITIALIZE
  
```

- The second line of the display shows the currently configured barcode scanner type. To select a reader, press 1. The BARCODE READERS menu will appear:

<p style="text-align: center;"> <i>BARCODE READERS</i> <i>1=NONE</i> <i>2=HP SMART WAND</i> <i>3=PSC LASER</i> </p>
--

- To choose no reader, press 1. To choose the HP Smart Wand, press 2. To choose the PSC laser scanner, press 3.
- To initialize a reader, ensure that the reader is plugged into the 9-pin reader port and securely fastened in place. From the BARCODE menu screen, press ENTER=Initialize. The message “Barcode reader initialization in progress” will appear. A successful initialization will result in an “Initialization Complete” message. If the reader is not properly connected or if an incorrect model is connected, a “WARNING: Barcode reader not found” message will appear.

***WARNING:** Not all readers are approved for use in areas classified as hazardous due to the presence of flammable gases or vapors. Contact TEI for more information.*

User Identification Number

***NOTE:** To set the User ID number, the instrument must be ON but does not have to be warmed up.*

- From the MAIN menu display, press 2=Setup.
- From the SETUP menu display, press 6=Othr.
- From the OTHER SETTINGS menu, press 1=User ID.
- From the User ID prompt, press ENTER.
- Use the keypad to type your user ID.
- Press ENTER to store the user ID into memory.

Date

***NOTE:** To set the correct date, the instrument must be ON but does not have to be warmed up. Date entries earlier than Jan. 1, 1980 or later than 2037 are invalid.*

- From the MAIN menu display, press 2=Setup.
- From the SETUP menu display, press 6=Othr.
- From the OTHER SETTINGS menu, press 2=Date.
- The next screen reads the current date. If OK, press EXIT or ENTER to change. EXIT returns to the OTHER SETTINGS menu. ENTER prompts you to type

the correct date. Do so by typing month/day/year, and then press ENTER to store the date in memory. The display then returns to OTHER SETTINGS.

Time of Day

NOTE: To set the correct time, the instrument must be ON but does not have to be warmed up. The date must be within the valid range of 1980 to 2037.

1. From the MAIN menu display, press 2=Setup.
2. From the SETUP menu display, press 6=Othr.
3. From the OTHER SETTINGS menu, press 3=Time.
4. The next screen reads the current time. If it is OK, press EXIT or ENTER to change. EXIT returns to the OTHER SETTING Menu, ENTER prompts you to type the correct time. Do so by typing hour/minute/second. Then press ENTER to store the time in memory. The display then returns to OTHER SETTINGS.

User Options

Key Click

If the key click is on, a chirp is heard every time a key is pressed.

NOTE: To select key click on/off, the instrument must be ON but does not have to be warmed up.

1. From the MAIN MENU display, press 2=Setup.
2. From the SETUP MENU display, press 6=Othr.
3. From the OTHER SETTINGS Menu, press 4=User Options.
4. From the USER OPTION Menu, press 1=Key Click.
5. From the Key click Menu, press 1=On or 2=Off. The screen displays the previous selection. When a new selection is made, the display returns to USER OPTIONS.

Display Delay

This function determines the length of time that temporary messages remain on the screen.

NOTE: To select the display delay, the instrument must be ON but does not have to be warmed up.

1. From the MAIN menu display, press 2=Setup.
2. From the SETUP menu display, press 6=Othr.
3. From the OTHER SETTINGS menu, press 4=User Options.

4. From the USER OPTION menu, press 2=Display Delay.
5. From the Display Delay menu, press 1=Short, 2=Medium or 3=Long. The screen displays the previous selection. When a new selection is made, the display returns to USER OPTIONS.

NOTE: "Short" is approximately 0.5 sec, "Medium" is approximately 1.5 seconds, and "Long" is approximately 3.5 seconds.

Information Menu

The information menu is a view-only list of 14 items/parameters existing in the instrument. No changes may be made in this menu. Enter the INFO Menu from the MAIN menu by pressing 3=Info. Use the up/down keys to page through the list.

The parameters/items you may view are:

- ◆ Model: TVA-1000B
- ◆ S/N DDDDDDDDDDDDD
- ◆ Date
- ◆ Time
- ◆ Memory: how much is free to use
- ◆ Reader: Serial reader is found or not found
- ◆ Ver: Current Software Version No.
- ◆ PID span calibration: Date and time of last calibration
- ◆ FID span calibration: Date and time of last calibration
- ◆ PID zero calibration: Date and time of last calibration
- ◆ FID zero calibration: Date and time of last calibration
- ◆ Det: PID, FID, or both
- ◆ Pump: On or Off
- ◆ Bat: Battery voltage listed, OK or low

NOTE: To view calibration information, you must return to the calibration menu in SETUP. Press EXIT to return to MAIN menu.

PC Link/Memory

WARNING: *The RS-232 port is not approved for use in areas classified as hazardous due to the presence of flammable gases or vapors.*

This menu allows you to link the TVA-1000B to a personal computer (PC) through the RS-232 communications port or to clear existing route or log memory within the instrument.

To enter the PCLINK/MEMORY menu from the MAIN menu, press 4=PCLink/Memory. The following display will appear:

```
PCLINK/MEMORY
1 = PC Link
2 = Clear Route &
   Logging Memory
```

Choosing 2 = Clear Route & Logging Memory will erase any downloaded routes or any logged data stored in TVA-1000B memory. A warning that “You are about to clear all memory” will appear and must be acknowledged before the TVA-1000B will clear its memory. *Be absolutely sure that you wish to clear memory before choosing this action.* Once memory is cleared, it cannot be retrieved.

Choosing 1 = PCLink will allow you to either change the TVA’s communications protocol, or begin to send or receive data. One of the following displays will appear:

```
PCLINK
Type=FEMS
1=Change Type
2=Send 3=Receive
```

```
PCLINK
Type=Foxboro
1=Change Type
2=Establish Link
```

```
PCLINK
Type=Text - Manual
1=Change Type
2=Send 3=Receive
```

```
PCLINK
Type=Text - Auto
1=Change Type
2=Establish Link
```

The second line of the display shows the type of communications protocol the TVA-1000B is currently set to use. Choosing 1 = Change type will allow you to select a new communications protocol:

```
PCLINK TYPE
Type=Foxboro
1=Foxboro
2=FEMS 3=Text
```

Choosing 1 = TVAPC will configure your TVA-1000B to communicate with the Foxboro TVA-1000 Datalogging software. Choosing 2=FEMS will allow your TVA-1000B to communicate with Envirometrics’ F.E.M.S. (Fugitive Emissions Monitoring Software). Choosing 3=Text will allow your TVA-1000B to output data in a straight ASCII text format to a serial printer, terminal emulation software, or the PCIP software supplied with your TVA-1000B. This ASCII format can be read and understood by many commercially available spreadsheets and data management software packages. If you choose Text mode, you will also need to select whether the communications will occur automatically (if your software is set up to automatically command the TVA-1000B; e.g., the PCIP) or manually (if you need to send commands from the keypad).

TEI TVA-1000B Software Link

NOTE: If you are using a multipoint calibration curve, you cannot download your data to the PC via the Foxboro TVA-1000 software. Use the text transfer mode to download to an ASCII file.

1. Connect the cable between the PC serial port and the RS-232 port of the TVA-1000B (marked HOST).
2. Enter the PC LINK menu and change the link type (1 = Change type) to TVAPC. If the link type is already set to Foxboro, proceed to the next step.
3. From the PC LINK menu, choose 2 = Establish link. The following display will appear:

PC LINK STATUS
Waiting for PC
Request ...
Exit=Cancel

For more information about the TVA-1000A Datalogging software, refer to MI 611-187, *PC Software*.

F.E.M.S. Software Link

Receive

Before the TVA-1000B can be used in FE logging mode, a previously configured route file must be created in F.E.M.S. and downloaded to the instrument's memory. Use the following instructions to download a route to the TVA-1000B from F.E.M.S.:

1. Connect the cable between the PC serial port and the RS-232 port of the TVA-1000B (marked HOST).
2. Enter the PC LINK menu and change the link type (1 = Change type) to F.E.M.S. If the link type is already set to F.E.M.S., proceed to the next step.
3. Before attempting to download, be sure that F.E.M.S. is configured to operate with the TVA-1000B:

File/Preferences Window: Datalogger set to "Foxboro TVA-1000B"

Monitor Run/Communications Window: 9600 baud, 8 data bits, 1 stop bit, no parity

If these parameters are already properly set, proceed to the next step.

4. Follow the F.E.M.S. instruction manual to create a monitoring route for downloading to the TVA-1000B.
5. When F.E.M.S. instructs you to set the datalogger so that it is ready to accept data, choose 3=Receive from the PC LINK menu. A warning will appear informing you

that the new route will erase any existing route. Once you have acknowledged this warning by pressing ENTER, the following display will appear:

```

PC LINK STATUS
  WAITING FOR PC
  CONNECTION ...
  EXIT=CANCEL
  
```

NOTE: Do not place the TVA-1000B into this wait mode until F.E.M.S. instructs you to. Doing so will cause the TVA-1000B and F.E.M.S. handshaking to fail.

6. Now that the TVA-1000B is waiting to receive data, click on OK at the F.E.M.S. window, instructing F.E.M.S. to begin the download.
7. Once F.E.M.S. has finished sending the route to the TVA-1000B, the TVA-1000B display will read “PC data transfer successfully completed” and return to the PC LINK menu.

Send

Once the TVA-1000B has been used to collect fugitive emissions data in the FE monitoring mode using a F.E.M.S. created route, the data can then be uploaded to the PC. Use the following instructions to upload data from the TVA-1000B to F.E.M.S.:

1. Connect the cable between the PC serial port and the RS-232 port of the TVA-1000B (marked HOST).
2. Enter the PC LINK menu and change the link type (1=Change type) to F.E.M.S. If the link type is already set to F.E.M.S., proceed to the next step.
3. Before attempting to upload, be sure that F.E.M.S. is configured to operate with the TVA-1000B:

File/Preferences Window: Datalogger set to “Foxboro TVA-1000B”

Monitor Run/Communications Window: 9600 baud, 8 data bits, 1 stop bit, no parity

If these parameters are already properly set, proceed to the next step.

4. When F.E.M.S. instructs you to set the datalogger so that it is ready to send data, choose 2 = Send from the PC LINK menu. The following display will appear:

```

PCLINK STATUS
  WAITING FOR PC
  CONNECTION ...
  EXIT=CANCEL
  
```

NOTE: Do not place the TVA-1000B into this wait mode until F.E.M.S. instructs you to. Doing so will cause the TVA-1000B and F.E.M.S. handshaking to fail.

5. Now that the TVA-1000B is waiting to send data, click on OK at the F.E.M.S. window, instructing F.E.M.S. to begin the upload.
6. Once the analyzer has finished sending the data to F.E.M.S., the TVA-1000B display will read “PC data transfer successfully completed” and return to the PC LINK menu.

Text Transfer

The TVA-1000B is also capable of data transfer to an IBM PC running software to emulate a terminal. The data is formatted as readable ASCII text.

The following information can be *uploaded* from the TVA-1000B to the PC:

- a. Route List
- b. TVA-1000B Configuration
- c. TVA-1000B Calibration Parameters
- d. Logged Data

The following information can be *downloaded* from a PC to the TVA:

- a. Route List
- b. TVA-1000B Configuration
- c. TVA-1000B Calibration Parameters

Two control modes are supported:

- a. Manual – the user requests a specific text upload or download at the TVA-1000.
- b. Auto – the TVA-1000B performs a specific text upload or download as requested by a control character received from the IBM PC. The TVA-1000B stays in this mode until canceled by the user at the TVA-1000B or by a control code from the IBM PC.

Communications

A commercially available PC communications software package is required to establish a link with the TVA-1000B. Examples of such packages include PROCOMM PLUS and Windows Terminal. The following settings should be used:

Baud Rate: 9600
Data Bits: 7
Stop Bit: 1
Parity: Odd
Flow Control: XON/XOFF

The data can be uploaded from the TVA-1000B to a file, a terminal screen or a serial printer. Data can also be downloaded to the TVA-1000B. Downloaded files must follow the format prescribed in this manual precisely to ensure proper data transmission.

Text Data Formats

Messages to be uploaded and downloaded must be written in straight ASCII text and must contain blank spaces between text, not tabs.

For more information on Text Data Formats, see Appendix A.

Downloading Data from the PC to the TVA-1000B (Manual)

1. Connect the cable between the PC serial port and the RS-232 port of the TVA-1000B (marked HOST).
2. Enter the PC LINK menu and change the link type (1 = Change type) to Text-Manual. If the link type is already set to Text, proceed to the next step.
3. From the PC LINK menu, choose 3 = Receive.
4. The TVA-1000B will warn you that new data will automatically erase old data. Once you have acknowledged this warning, the following screen will appear:

PC LINK STATUS
 WAITING FOR PC
 TO SEND DATA ...
 EXIT=CANCEL

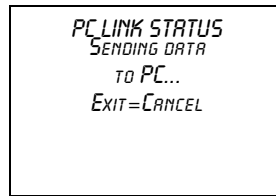
5. Following the instructions from your PC software package, command the PC to send the appropriate file.
6. When the text transfer is complete, the TVA-1000B display will read “PC data transfer successfully completed.”

NOTE: For more information about sending data with your communications software, consult your software users manual.

Uploading Data from the TVA-1000B to the PC (Manual)

1. Connect the cable between the PC serial port and the RS-232 port of the TVA-1000B (marked HOST).
2. Enter the PC LINK menu and change the link type (1 = Change type) to Text-Manual. If the link type is already set to Text, proceed to the next step.
3. Prepare your PC communications software so that it is ready to receive data. For more information, consult your PC communications software users manual.
4. From the PC LINK menu, choose 2 = Send.
5. The TVA-1000B will ask you what data you wish to send (Route, Configuration, Log data, or Calibration). Select the data that you wish to transmit.

- The following screen will appear:



- When the text transfer is complete, the TVA-1000B display will read “PC data transfer successfully completed.”

NOTE: For more information about receiving data with your communications software, consult your software users manual.

Auto Upload/Download

NOTE: Text-Auto is used to communicate with the PCIP software shipped with your unit. For more information, refer to MI 611-186.

- Connect the cable between the PC serial port and the RS-232 port of the TVA-1000B (marked HOST).
- Enter the PC LINK menu and change the link type (1 = Change type) to Text-Auto. If the link type is already set to Text-Auto, proceed to the next step.
- Prepare your PC communications software so that it is ready to send or receive data. For more information, consult your PC communications software users manual.
- From the PC LINK menu, choose 2 = Establish Link.
- The following screen will appear:



- Follow the instructions included with your software package to send control messages and data to the TVA. Commands to upload data will trigger the TVA-1000B to send the appropriate information to the PC. Commands to download data will trigger the TVA-1000B to wait to receive information from the PC. The following table illustrates which control keys command which activities:

Activity	Information	Auto Control Key
Upload to PC from TVA	Route List	CTRL-E
Upload to PC from TVA	TVA-1000B Configuration	CTRL-G
Upload to PC from TVA	TVA-1000B Calibration	CTRL-L
Upload to PC from TVA	Logged Data	CTRL-D

Activity	Information	Auto Control Key
Download from PC to TVA	Route List	CTRL-R
Download from PC to TVA	TVA-1000B Configuration	CTRL-F
Download from PC to TVA	TVA-1000B Calibration	CTRL-B
Download from PC to TVA	Any of the above	CTRL-Y
Abort the current transfer	N/A	CTRL-A
Terminate link	N/A	CTRL-T

7. After any transfer, the TVA-1000B may then be commanded to perform another transfer. When you are finished transferring data, a CTRL-T command should be sent (or press the EXIT key on the sidepack) to terminate the connection. The TVA-1000B will then display a “Connection terminated” message and return to the PCLink menu.

NOTE: For more information about sending or receiving data with your communications software, consult your software users manual.

Run Mode

How the instrument functions in the RUN mode is governed by the selection made in the SETUP/LOG menu. The LOG menu selects how data is stored in the instrument memory. There are four possible choices in the LOG mode as defined in “Log Methods” on page 38.

The TVA-1000B performs accurately only after it has been properly set up (configured).

The three RUN mode displays (as governed by the *LOG Selection*) are:

NONE

```
PID: 80.00 PPM
FID: 80.00 PPM
EXIT=STOP
```

AUTO, VOC, or F.E.

```
PID: 80.00 PPM
FID: 80.00 PPM
SAMPLING: 10 SEC
EXIT=CANCEL
```

If your instrument is equipped with an FID, you should turn the red hydrogen supply valve to ON and wait 2-3 minutes before entering the RUN mode. Upon entering the RUN mode, the pump will automatically turn ON and the FID will ignite.

NOTE: For best performance, prior to entering the RUN mode, the instrument must be ON, warmed up for approximately 15 minutes, and display the main menu. The pump must also be ON throughout the warmup period. If the instrument is FID equipped, and the FID is to be used, the flame must be ignited throughout the warmup period. If the instrument is PID equipped and the PID is to be used, the lamp must be ON throughout the warmup period.

Accessing the Run Menu

From the MAIN MENU display, press 1=Run.

Run: Log None

Whenever the TVA-1000B is in the RUN mode with *Log None* as the logging selection, the instrument operates as a survey tool only. The readings on the probe display and instrument display show the live reading for the samples at that time. No logging action is taking place. Any alarms that are set will function normally.

```
PID: 225.PPM
FID: 225.PPM

EXIT=STOP
```

Run: Log Auto

Whenever the TVA-1000B is in the RUN Mode with *Log Auto* as the logging selection, the instrument operates as an automatic survey tool that logs its readings into memory at an interval selected in the Setup Menu. After the 1=Run key is pressed, the first screen viewed is the one shown at the right. The tag information should be typed in before starting or a tag read with the barcode scanner. The tag may be left blank if desired.

```
PID: 225.PPM
FID: 225.PPM

PRESS CHAR KEY
```

Type the tag information in the space provided or scan a tag with the reader. Once the tag information is entered, press the ENTER Key. The screen then changes to the next display.

```
PID: 225.PPM
FID: 225.PPM
TAG: BLDG 19
PRESS CHAR KEY
```

The instrument is now ready to start logging. The screen displays live readings and the tag name. However, no logging takes place until you press either the LOG key on the basic probe or the ENTER key on the instrument.

```
PID: 225.PPM
FID: 225.PPM
BLDG 19
ENTER=START LOG
```

Press ENTER or the LOG key on the basic probe to start the automatic logging. The instrument counts down from the time selected in the SETUP/Log Menu and stores the reading at the end of the count down. For instance, if 12 seconds was selected as the logging time, the instrument will count down from 12 and display 11,10,9,8,7,6,5,4,3,2,1,store. The instrument logs into memory either the highest, average, or last reading during the countdown.

```
PID: 225.PPM
FID: 225.PPM
SAMPLING: 11SEC
EXIT=STOP
```

This action continues until the instrument shuts down due to low battery or the EXIT key is pressed.

Run: Log VOC

Whenever the TVA-1000B is in the RUN mode with *Log VOC* as the logging selection, the instrument operates as a manual survey tool that logs its readings into memory whenever you initiate logging. When the 1=Run key is pressed, the first screen viewed is the one shown on the right. The tag information should be typed or a tag read with the bar-code scanner. The tag may be left blank if desired.

```
PID: 225.PPM
FID: 225.PPM

PRESS CHAR KEY
```

Enter the tag information in the space provided (up to 10 characters) or scan a tag with the reader. Once the tag information is entered, press the ENTER key. The screen then changes to the next display.

```
PID: 225.PPM
FID: 225.PPM
TAG: BLDG 19

PRESS CHAR KEY
```

The instrument is now ready to start logging. The screen displays live readings and the tag name but no logging takes place until you press either the LOG key on the basic probe or the ENTER key on the instrument.

```
PID: 225.PPM
FID: 225.PPM
TAG: BLDG 19
ENTER= START LOG
```

Press ENTER or LOG to start the VOC logging sequence. After the instrument counts down for the time selected in the SETUP/Log menu, the word *Save* appears. When confirmed, the instrument logs into memory either the highest average or last reading achieved during the countdown sample. After the information is stored into memory, the display returns to live measurements and prompts for a new tag. Each VOC log must be done manually and individually.

```
PID: 225.PPM
FID: 225.PPM
SAMPLING: 9SEC
EXIT= STOP
```

Run: Log F.E.

Whenever the TVA-1000B is in the RUN mode with Log F.E. as the logging selection, the instrument logs its readings based on a pre-configured route file.

NOTE: The operation of the Log F.E. mode is menu driven from the hand-held probe display and requires the use of the optional TVA-1000B Enhanced F.E. Probe.

The procedure for using the TVA-1000B for Fugitive Emissions monitoring involves the following four steps:


1. Create a monitoring route using a Fugitive Emissions personal computer software program.
2. Download the route file to the TVA-1000B.
3. Log readings by following the monitoring route shown on the TVA-1000B display.
4. At the end of the monitoring route, upload the logged readings to the personal computer.

Using the Enhanced Probe

This probe/display allows you to perform menu-driven operational/datalogging functions from the handheld unit and reduces the need to access the sidepack keypad.

*NOTE: In order to use the Enhanced Probe, be sure that the **HARDWARE** setting in the **TVA-1000B SETUP** menu is properly configured.*

There are three buttons on the Enhanced Probe which allow you to interact with the TVA-1000B:

- ◆ MENU – Used to cause the menu to appear on the bottom of the probe display and to step through the available selections
- ◆ SELECT – Used to choose the currently highlighted menu selection; e.g., “LOG”.
- ◆ Light Bulb Icon  – Used to turn the display backlight on and off

The Enhanced Probe and the RUN Mode

1. From the MAIN menu, press 1 = RUN.
2. The enhanced probe display will display the detector reading (FID or PID) at the top and an analog bargraph on the bottom. Press the MENU key on the Enhanced probe display to show the Opening menu:

FID 5.70 PPM
ENTER LOGGING MODE
- [] IGNITE - [] OTHER DET
- [] BACKGROUND - [] EXIT

The highlighted menu item is the item surrounded by brackets. Pressing the MENU key will cause the brackets to move from menu item to menu item. When you reach the menu item you wish to choose, press SELECT. The Opening menu items are as follows:

Menu Item	Function
Enter logging mode	Enters FE, VOC, or Auto logging mode, allowing you to enter tags, toggle through route files, log data, etc. If no logging is selected in the SETUP menu, then this selection does not appear.
Ignite	Ignites FID. This selection does not appear in PID-only models.
Other det	Toggles between FID and PID reading. This selection does not appear in single detector models.
Background	Records a new background reading.
Exit	Clears the menu and returns to the Bargraph display.

Auto Logging with the Enhanced Probe

1. In the RUN mode, press the MENU key to cause the menu to appear. Select “Enter logging mode.”
2. Use the sidepack or barcode reader to enter a tag, or simply select “Accept” to enter a blank tag.
3. Choose “Start log sampling” to begin Auto logging.
4. The Enhanced probe will display the countdown and continue to log until EXIT is selected at the probe or the sidepack keypad.
5. Once EXIT is selected, you may enter another tag and begin logging again or exit from the RUN mode.

VOC Logging with the Enhanced Probe

1. In the RUN mode, press the MENU key to cause the menu to appear. Select “Enter logging mode.”
2. Use the sidepack or barcode reader to enter a tag, or simply select “Accept” to enter a blank tag.
3. Choose “Start log sampling” to begin Auto logging.
4. The Enhanced probe will display the count down for the interval selected in the SETUP menu and freeze on the reading to be saved (either the Maximum, Average, or Last Reading).
5. You may choose to save the reading (SAV), repeat the reading for the same tag (AGAIN), or return to the previous menu (EXIT).
6. Once you have saved a reading, you may enter another tag and begin logging again or exit from the RUN mode.

FE (Fugitive Emissions) Logging with the Enhanced Probe

In FE logging, you follow a preconfigured route list consisting of component records for equipment to be monitored. You should first download a route to the TVA-1000B's memory before entering the RUN mode. For more information on downloading routes, see the PCLink section of the “Display Menus” chapter.

In the RUN mode, press the MENU key to cause the menu to appear. Select “Enter logging mode.” The following display will appear on the Enhanced probe:

```

FID 5.70 PPM
TAG: 12345
EQP: PMP SIZE: 2.500
MAX: 1000
550 PPM LASTLOG
START LOG SAMPLING
-NEXT -PREV -EXIT

```

In addition to the concentration display at the top, the FE mode shows several fields which have been filled in by the downloaded route. The TVA-1000B starts at the first record in the

route and displays the component tag number (Tag), equipment type (Eqp), equipment size (Size), and leak definition (Max). If a reading has already been logged into memory for this record, it will also be displayed followed by the words “LastLog.”

Route Entry Response Factor

A secondary response factor correction is based on the response factor associated with the current route entry. This secondary correction adjusts the concentration reading for different component measurements in the same route.

For example, let a route contain two entries, one for propane and one for methane. Assume that propane has only half the detector response of methane. If each route location has a leak of 100 ppm, a single response factor based on methane would produce a concentration reading of 100 ppm for methane, but only 50 ppm for propane. The addition of a secondary response factor allows each entry to be corrected for detector sensitivity. Thus, if the secondary response factor is 1.0 for methane and 2.0 for propane, both route samples will read correctly as 100 ppm.

Only the linear correction mode is used for the secondary route response correction:

$$\text{Linear:} \quad \text{FinalConc} = \text{RouteRF} \times \text{BackConc}$$

The secondary RouteRF is downloaded to the instrument as part of each route entry. This factor is applied to both detectors, as it is expected that when operating in this mode, only one detector will be used. Entries inserted by the instrument default to a RouteRF of 1.0.

Navigating the Route File

Selecting “Next” from the first logging mode screen will allow you to step to the next record in the route. Selecting “Prev” will allow you to step to the previous record in the route. You can also enter a tag via the keypad or barcode scanner and the TVA-1000B will automatically skip to that tag if it is contained within the route. If the tag is not contained within the route, a “TAG NOT FOUND” message will appear and you will be given the option to “Insert” that tag into the route or “Exit.”

Logging Data

Once you have reached the correct tag for the component you wish to monitor, you may select “Start log sampling” to begin recording data. The TVA-1000B will display the readings from both detectors and begin counting down for the time interval selected in the SETUP menu. The countdown is shown on the last line of the display:

```

FID 100.0 PPM
TAG: 12345
EQP: PMP SIZE: 2.500
MAX: 1000
    65.5 PFD
    100.0 FID
SAMPLING: 5 5 EXIT
  
```

Once the countdown is complete, the TVA-1000B display will freeze on the reading to be logged and indicate if it is a leak (i.e., if the reading of the active detector exceeds the indicated leak rate). You will be given several options:

```

FID 100.0 PPA
TAG: 12345
EQP: PMP SIZE: 2.500
MAX: 1000
100.0 FID NoLeak
      - REPAIR
Sav -AGAIN -EXIT
  
```

If you choose “Sav”, the TVA-1000B will store the reading in memory (replacing any previously logged readings for that Tag) and proceed to the next component record in the route. If you choose “Again,” the TVA-1000B will repeat the countdown and obtain a new reading. If you choose “Exit” the TVA-1000B will return to the previous screen.

Repair Menus

If the reading obtained during the logging interval exceeds the leak definition, the TVA-1000B will indicate that it is a leak by printing “Leaker!” If you wish, you may record what part of the component is leaking and what action was taken as a first attempt at repair. Choose “Repair” instead of “Sav” and the TVA-1000B will proceed to the Repair menus:

```

FID 100.0 PPA
LEAK SOURCE: N/A
REPAIR METHOD: N/A
SELECT LEAK SOURCE
-SELECT REPAIR MTHD
-EXIT
  
```

The two lines below the reading show the currently selected leak source and repair method. Choosing “Select leak source” will allow you to record what part of the component is leaking by choosing from a list of leak sources (Valve Bonnet, Compressor Seal, Downstream Flange, Valve Packing, Pump Seal, Upstream Flange). Choosing “Select repair method” will allow you to record what method was used for the first attempt at repair (Place Cap, Gun Pack Valve, Place Plug, Repack Valve, Replace Gasket, Replace, Seal Job, Steam Seal, Tighten Bonnet, Tighten Cap, Tighten Flange, Tighten Packing, Tighten Plug, Wash Seal). Choosing “Exit” will return you to the previous display.

If you choose a leak source and repair menu, be sure to select “Sav” when you return to this menu so the reading and repair information will be saved in memory before proceeding to the next component record.

Additional Component Information

Displays containing additional information about the component and the TVA-1000B status are available from the handheld unit. If you *press and hold* the MENU key for approximately 2 seconds, the Enhanced display will present an INFO page:

```
FID 5.70 PPM
TAG: 12345
EQP: PMP SIZE: 2.500
LOC: PLANT1 STATION2
REAGENT FEED PUMP DOWN-
STREAM OF VESSEL
17:33:51 Pg -EXIT
```

The INFO page overwrites the bottom four lines of the record with other fields such as Location (Loc) and Description (the two lines below the location). The Location field contains the Area and the Subarea where the component is located. The Description field displays up to 40 characters of additional information about the component. Selecting “Pg” at the bottom of the display will step you through other INFO pages containing information such as Run ID, Record number, number of points logged, number of leakers found, number of repairs performed, pump status, free memory, barcode reader status, etc. Selecting “Exit” will return you back to the normal component record.

Maintenance

Removable, Renewable Parts

WARNING: *Parts replacement and maintenance should not be performed in areas classified as hazardous due to presence of flammable gases or vapors. Opening of the analyzer is not recommended under any circumstances, due to the intrinsic safety rating of the analyzer. Violation of this policy could void the warranty of this product. (Extended Service Plans are available; contact Thermo Authorized Service for further information.)*

Thermo suggests that you return the entire instrument to the factory or an authorized service center once a year for cleaning, testing, and calibration. Opening the TVA-1000B instrument case could void the warranty.

From time to time, you must remove and renew several components of the TVA-1000B analyzer. Some components may be replaced as normal maintenance functions performed by operating personnel. Other components, however, should be replaced only by personnel thoroughly trained and familiar with the analyzer instrument and its applications.

The components that may be maintained or replaced by operating personnel as part of normal operation are:

1. **Battery** – you may charge the battery in or out of the instrument or replace it with a charged battery.
2. **Hydrogen Tank** – remove the tank to refill it.
3. **PID Cartridge** – remove and clean frequently. Replace when needed.
4. **FID Cartridge** – remove and clean frequently. Replace when needed.
5. **Optional Close Area Sampler** – replace if probe tip is clogged or damaged.
6. **Filter Cups** (in the sidepack assembly) – clean/replace frequently.
7. **Water Trap Probe** – replace membrane if worn or damaged.
8. **Optional Charcoal Filter Adapter** – replace charcoal frequently.
9. **Sample Line Tubing** – replace when dirty.
10. **Sample Line Fitting** – replace if damaged.
11. **FID End Cap and Flame Arrestor** – remove and clean frequently. Replace when required.
12. **FID Cavity** – clean periodically.
13. **PID cavity** – clean periodically.

WARNING: *Never change an electrical component in an area classified as hazardous due to presence of flammable gases or vapors.*

Normal Operating Maintenance

The items described in this section may be performed as normal operating procedures.

Battery and Battery Charger

WARNING: *Do not remove or install batteries and do not use the battery charger in any area classified as hazardous due to the presence of flammable gases or vapors.*

The nickel cadmium battery, supplied with the unit, lasts for a minimum of eight hours of continuous use at 20 °C. Extreme heat or cold and/or use of the backlight, however, will shorten that time.

A battery charger with cable is shipped with the instrument. You do not have to remove the battery for charging. Simply plug the output of the charger into the mating connector marked CHRG in the instrument. Then, insert the charger plug into the appropriate wall outlet. A green power indicator is ON when the charger is operating. A yellow indicator is activated when the charger is connected to the instrument and the instrument is ON. Normal charge time for a fully discharged battery is approximately 16 hours, or two hours of charge for every hour of use.

Indicator Light	Condition	Indication
Green	ON	Charger is plugged in and operating.
Green	OFF	Charger is not plugged in.
Yellow	ON	Charger is connected to the TVA-1000B and the TVA-1000B is ON while the charger is operating (i.e., trickle charging).

Do not leave the battery on charge for extended periods (greater than 96 hours). If you wish to remove the battery from the TVA-1000B for charging or swapping with a spare battery, turn the instrument off. Using the special tool supplied with the accessory kit, unscrew the screw on the battery compartment cover on the rear of the instrument and remove the battery cover. As the battery pack fits snugly in the instrument housing, use care in removing the battery pack and its internal connector. As you remove the battery pack, note the location of the battery connector. When re-inserting the battery pack in the instrument, be sure to push the connector into the same location, so that it does not interfere with placement of the battery pack.

To charge the battery outside of the unit, use the adapter supplied in the accessory kit.

Hydrogen Gas Tank

FID instruments are supplied with an 85cc hydrogen gas tank. This tank, which may be pressurized to 2200 psi maximum at 25°C, will provide 8 hours operation when fully charged. The tank has an integrally mounted high pressure gauge that can be easily read when the tank is in or out of the instrument. Install the tank in the instrument by inserting it into the receptacle on the left side and tightening (left hand threads, tighten counterclockwise) until the rubber tank boot is flush with the instrument sidepack and a slight resistance is felt. *Do not overtighten.*

Fuel Refilling Procedure

WARNING: *A safe refill operation means there are no hydrogen leaks. Before any valves are opened, use a wrench to firmly tighten connections to the hydrogen supply tanks and the tank fill adapter. If escaping hydrogen is heard during the filling operation, close all valves and correct the leak before proceeding. Leak test with soapy water or equivalent.*

NOTES:

1. Use prepurified ZERO grade hydrogen (certified total hydrocarbons as methane <0.5 ppm recommended).
 2. The hydrogen filling assembly contains a flow-limiting safety device. Approximately two minutes are required to fill the tank.
-

CAUTION: *Do not fill hydrogen tank to a pressure greater than 15.2 MPa (2200 psig).*

Precautions in Handling and Storage

The major hazard associated with the handling of hydrogen is flammability. The following specific rules apply when handling hydrogen:

1. Never use cylinders of hydrogen in areas where flames, excessive heat, or sparks may occur.
2. Use only explosionproof equipment and sparkproof tools in areas where hydrogen is handled.
3. Ground all equipment and lines used with hydrogen.
4. Never use a flame to detect hydrogen leaks — use soapy water.
5. Do not store reserve stocks of hydrogen with cylinders containing oxygen or other highly oxidizing or combustible materials.
6. Store hydrogen tanks in a well ventilated area.
7. Follow all regulatory safety and labeling precautions when shipping hydrogen in the TVA-1000B.

NOTE: A bleeder assembly is provided in the tool kit to allow the hydrogen tank to be emptied for common carrier shipment. To use the bleeder, manually screw the bleeder onto the tank valve and allow the hydrogen to vent. This process will take about two minutes to complete.

CAUTION: Observe all hydrogen handling procedures listed above.

When transporting the instrument, remove the hydrogen tank and place it in its normal location in the carrying case.

To fill the tank, use the following procedure:

NOTE: All hydrogen fittings are left hand thread — do not overtighten.

1. Turn supply tank valve OFF.
2. Attach tank fill adapter to supply tank with valve OFF and with manifold valve on OFF position.
3. Attach TVA-1000B hydrogen tank to tank fill adapter. (Note left hand thread — *do not overtighten.*)
4. Open supply tank valve. Move fill adapter valve to FILL position.
5. Wait for TVA-1000B tank to fill. This may take 2 to 3 minutes because of flow restrictors in the tank and fill adapter.
6. Close fill adapter valve.
7. Remove TVA-1000B tank.
8. Close supply tank valve.
9. Remove tank fill adapter.

Always remove the tank from the instrument before storing in the instrument carrying case.

Servicing the PID Cartridge

To service the PID cartridge, use the following procedure:

1. Turn the instrument OFF.
2. Using the special spanner wrench provided with the instrument tool kit, unscrew the blue cap holding the PID cartridge in place.
3. Screw the special extractor tool provided with the accessory kit into the off-center hole in the cartridge. (Do not exceed three full turns. Refer to Figure 10.)
4. Remove the cartridge by pulling on the extractor. Unscrew the extractor from the cartridge. Clean or replace the cartridge.
5. To insert a new cartridge, reverse the procedure. Note that the standard 10.6 eV PID cartridge is marked with a blue band. Other energy level lamps are marked with different colors (not red).

For NORMAL periodic cleaning of a PID lamp window (other than an 11.8 eV lamp), use the following procedure:

1. Remove the cartridge from the instrument as described above.
2. Clean the lamp window using a cotton swab with isopropyl alcohol.
3. Using a heat gun, dry the cartridge for about 60 seconds to evaporate the alcohol. Reinsert the cartridge into the instrument.
4. Screw in the blue PID detector cap, using the special spanner wrench supplied with the tool kit. Do NOT overtighten cap.

In cases where the lamp window is severely coated, refer to the procedure below for using the optional PID lamp cleaning kit.

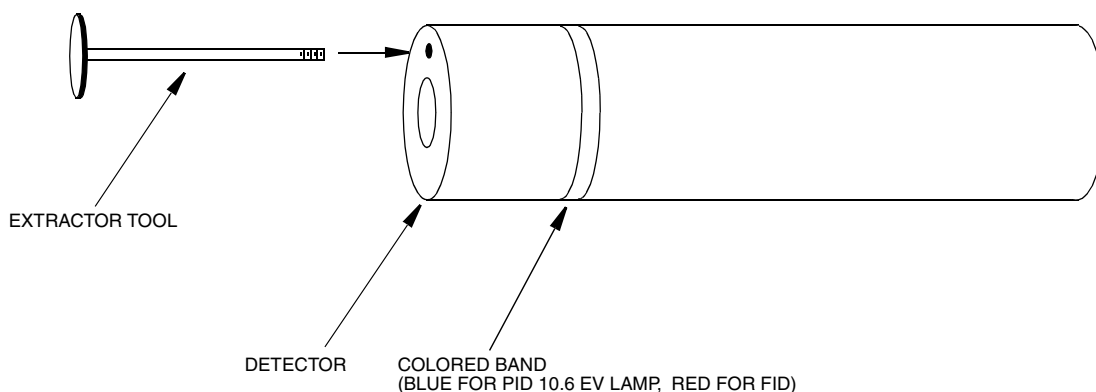


Figure 10. PID Lamp Cleaning Kit

To clean a PID lamp window with the optional PID lamp cleaning kit, use the following procedure:

1. Remove the cartridge from the instrument, as described above.
2. Clean the window of the lamp, using the materials supplied with the optional PID lamp cleaning kit. Follow the instructions included with the cleaning kit, being careful never to touch the window with your fingers.
3. When the cartridge is dry (dry at 40°C to 55°C for 1 hour), screw the extractor into the cartridge and re-insert it into the instrument.
4. Screw in the blue PID detector cap, using the special spanner wrench supplied with the tool kit. *Do NOT overtighten cap.*

NOTE: Refer to MI 611-183 on proper cleaning techniques for an 11.8 eV lamp.

Servicing an FID Cartridge

To remove the FID cartridge, use the following procedure;

1. Close the hydrogen supply valve on the side of the instrument. Turn the instrument off.
2. Using the special spanner wrench provided with the instrument tool kit, unscrew the red cap holding the FID cartridge in place.

3. Screw the special extractor tool provided with the accessory kit into the off-center hole in the cartridge (see Figure 10).
4. Remove the cartridge by pulling on the extractor. Unscrew the extractor from the cartridge. Clean or replace the cartridge.
5. To insert a new cartridge, reverse the procedure. Note that a FID cartridge is marked with a red band.

To clean an FID cartridge, you will need a cotton swab and some isopropyl alcohol. Dip the swab into the isopropyl alcohol and insert it into the center of the cartridge. Swab the surface until clean and discard the swab. Take care not to touch the igniter coil, which is located close to the end of the capsule opposite the threaded hole used to remove capsule. Then dry the cartridge in an oven at 45°C to 55°C for one hour. When dry, re-insert the cartridge into the instrument, reversing the removal procedure. *Do NOT overtighten cap.*

CAUTION: *Do not allow any contact with the igniter coil during cleaning.*

Cleaning the FID Detector Cap

To clean the FID detector end cap, use the following procedure:

1. Close the hydrogen supply valve on the side of the instrument and turn off the power.
2. Using the special spanner wrench provided with the tool kit, unscrew and remove the FID red detector cap.
3. Clean the cap using the isopropyl alcohol followed with a deionized or distilled water rinse. Blow out carefully with compressed dry air.
4. Replace the cap.

Replacing the Flame Arrestor

The flame arrestor, located in the center of the red FID end cap, can be either cleaned or replaced. To replace the flame arrestor, use the following procedure:

1. Close the hydrogen supply valve on the side of the instrument and turn off the power.
2. Using the special spanner wrench provided with the tool kit, unscrew and remove the FID red detector cap.
3. Remove spring.
4. Place the detector cap on a flat surface, face up.
5. Place a screwdriver through the center hole of the end cap, resting on the flame arrestor.
6. Strike the end of the screwdriver with a hammer to drive the old flame arrestor out of the end cap.
7. Remove the old flame arrestor.

8. Turn the end cap over so the red outer surface lies flat and the gray surface faces up.
9. Place the new flame arrestor in the center hole.
10. Place a screwdriver on the newly installed flame arrestor.
11. Strike the end of the screwdriver with a hammer to secure the new flame arrestor in place.
12. Replace the spring.
13. Replace the detector cap on the unit.

Cleaning the FID or PID Detector Cavities

1. Close the hydrogen supply valve on the side of the instrument. Turn the instrument off.
2. Using the special spanner wrench provided with the tool kit, unscrew the cap holding the respective detector cap.
3. Using the special extractor tool provided with the tool kit, screw the extractor into the cartridge.
4. Remove the cartridge by pulling on the extractor. Unscrew the extractor from the cartridge.
5. Carefully clean the inside of the detector cavity using a cotton swab and isopropyl alcohol. Be sure to clean the high voltage contacts along the side of the cavity. Be especially careful around the detector signal collector probe at the rear of the cavity (and the thermocouple probe in the FID).
6. Dry the inside of the cavity using a low heat gun.
7. Insert the cartridges into their respective cavities by reversing the procedure. Note that the cartridges must be rotated to properly locate the key tabs.

CAUTION: Do not intermix the detector cartridges.

Replacing Watertrap Probe Filter and O-Rings

To replace the filter, use the following procedure:

1. Unscrew the bottom housing from the top housing.
2. Remove filter.
3. Place new filter into cavity of top housing.
4. Filter can be inserted in either direction into top housing.
5. Screw bottom housing into top housing.

To replace the o-rings, use the following procedure:

1. Unscrew the bottom housing from the top housing.
2. Remove filter.
3. Remove o-ring from either top housing groove or bottom housing groove or both as necessary.
4. Place new o-ring in groove of housing. Make sure o-ring is seated properly in groove.
5. Repeat for other housing if necessary.
6. Place filter into top housing.
7. Screw bottom housing into top housing..

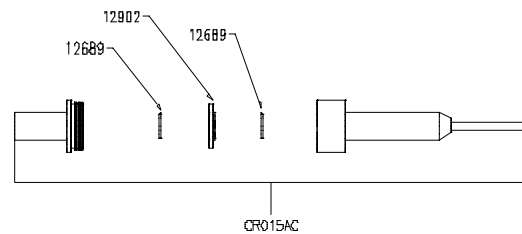


Figure 11. Watertrap Probe Assembly - Filter and O-Ring Replacing

Cleaning or Replacing a Sintered Metal Filter

To remove the sintered metal filter cup from the optional close area sampling assembly, simply unscrew the cap from the sampler and tip the assembly so that the filter falls out. The same filter cup and spring are also located behind the sample line quick connect at the sidepack assembly. To remove, unscrew the quick connect so that the filter falls out. The internal spring will not fall out. Refer to the assembly diagram below.

You may clean the filter by immersing it in isopropyl alcohol or equivalent solvent and/or swabbing the surface with a Q-tip or cotton swab. After thoroughly cleaning the surface of the filter, place the filter in an oven and dry it at 40 °C to 55 °C for one hour. You can then re-insert the filter into the sampling assembly (with the closed end of the filter in first) and screw in the cap.

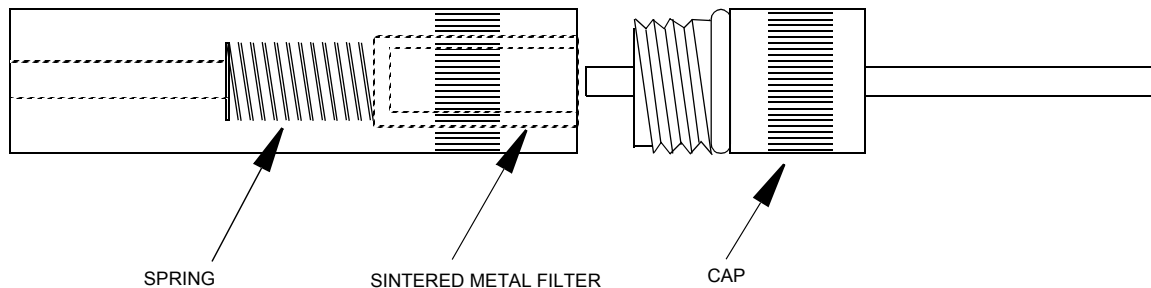


Figure 12. Sintered Metal Filter - Cleaning or Replacing

Replacing Sample Line

To replace the sample line, refer to Figure 12 below and execute the following procedure:

1. Loosen the probe nut and remove the sampling assembly by pulling it free from the probe assembly.
2. Insert a thin rod through the hole in the side of the probe fitting adapter. You will use this rod to pull the adapter and tubing from the probe assembly.
3. Remove the tubing from the quick-connect fitting by pressing firmly on the ring at the back of the fitting (a tool may be necessary) while pulling on the tubing.
4. At the base of the probe handle, gently push the tubing into the probe. At the same time, use the rod to pull the probe fitting adapter and tubing forward from the probe assembly. When the adapter fitting is fully exposed, cut the tubing from the fitting and pull the remainder of the tubing back through the probe assembly until it is completely out of the probe.
5. Cut a new piece of tubing about three inches longer than the old tubing.
6. Insert new tubing through the bottom protective covering (where you connect to the analyzer), and slowly feed the tubing through toward readout handle.
7. Once the tubing exits the top protective covering, insert the new tubing into the probe handle and carefully push it through to the other end. When the tubing is in position, cut the end square and push it over the barbed adapter fitting. (Heating the tube end may aid in fitting the tubing over the adapter.)
8. Grasp the tubing below the probe assembly handle and pull it back through the probe assembly until the adapter fitting is properly seated in the probe assembly.
9. Cut the other end of the tubing to the proper length and insert it into the end of the quick-connect fitting. (Allow 5/8-inch of tubing inside the fitting.)

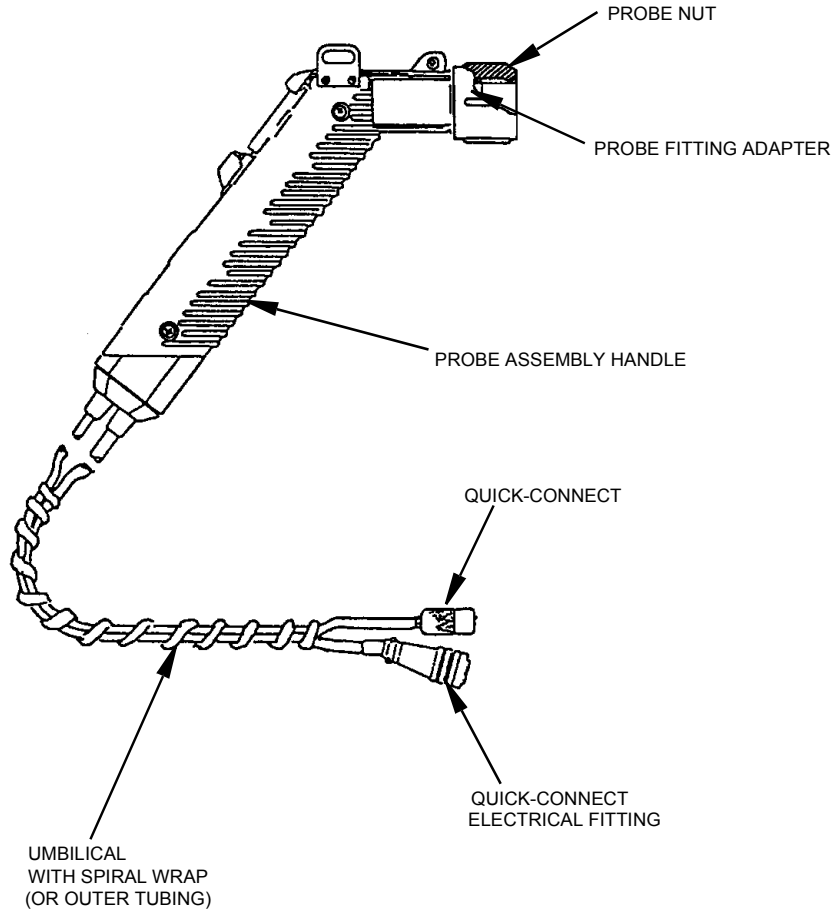


Figure 13. Replacing Sample Line

Troubleshooting

Problem	Possible Reason	Solution/Action
Unit will not turn on	Battery charge low	Charge battery.
	Bad battery connection	Ensure proper battery connection.
	Bad battery	Replace battery.
	Blown fuse or faulty keypad	Contact TEI authorized service center.
Pump won't turn on	Defective pump Faulty keypad	Contact TEI authorized service center.
Low pump flow	Clogged sample intake	Clean/replace filter cups. Clean/replace sample line. Clean/replace flame arrestor.
	Pump fault	Contact TEI authorized service center.
Keypad will not respond	Faulty keypad	Contact TEI authorized service center.
Probe display blank or probe buttons will not respond	Faulty probe/display assembly	Replace probe/display assembly. Contact TEI authorized service center.
FID won't ignite	Insufficient sample flow	Turn pump on. Clean/replace filter cups. Clean/replace flame arrestor.
	Hydrogen valve off	Turn on hydrogen supply valve and allow 1-2 minutes before igniting.
	Insufficient hydrogen supply (<500 psi)	Check hydrogen gauge on supply tank. Refill tank if necessary.
	Hydrogen leak	Check low pressure hydrogen output gauge. If <10.5 psi, contact TEI authorized service center.
	Broken igniter	Inspect igniter coil on FID capsule for breakage. If broken, replace capsule.
	Dirty igniter contacts	Inspect/clean igniter contacts (NOT igniter coils).
	Battery charge low	Charge battery pack.

Problem	Possible Reason	Solution/Action
FID noisy	Water/contamination in the detector chamber Erratic pump flow Bad calibration	Clean/replace FID capsule and flame arrestor. Clean/replace filter cups. Clean/replace flame arrestor. Ensure proper calibration.
Unable to calibrate FID	FID flame out Span concentration not properly set Cal gases contaminated Sample line/filter cups contaminated FID capsule contaminated or faulty Contaminated hydrogen tank Internal detector fault or contamination	Ignite FID. Input correct span gas concentration at CAL menu. Use clean cal gases and sampling equipment. Clean/replace sample line. Clean/replace filter cups. Clean/replace FID capsule. Replace hydrogen tank. Contact TEI authorized service center.
Excessive hydrogen consumption (<8 hours of run time for 2200 psi hydrogen)	Insufficient hydrogen pressure Leaking hydrogen tank Internal hydrogen leak	Refill tank. Replace tank. Contact TEI authorized service center.
Flameout problems	Sample hydrocarbon content too high Insufficient oxygen in the sample (<14%) FID capsule contamination Insufficient sample flow	Use dilutor kit to achieve concentration within the dynamic range of the TVA. Use dilutor kit to dilute sample with air containing sufficient oxygen. Use PID for measurements. Clean/replace FID capsule. Clean/replace filter cups. Clean/replace flame arrestor.
Moisture at FID flame arrestor <i>NOTE: Normal operation produces some moisture. If performance is affected, attempt these solutions.</i>	Insufficient sample flow Insufficient warmup time	Clean/replace filter cups. Clean/replace flame arrestor. Allow 15-20 minutes warmup.

Problem	Possible Reason	Solution/Action
PID lamp not operating	Bad PID lamp	Replace PID capsule.
PID noisy	Bad PID lamp Dirty PID window Erratic pump flow Bad calibration	Replace PID capsule. Clean PID window. Clean/replace filter cups. Clean/replace flame arrestor. Ensure proper calibration.
Unable to calibrate PID	Pump not on PID lamp not on Span concentration not properly set Cal gases contaminated Sample line/filter cups contaminated PID window dirty or capsule contaminated or faulty Internal detector fault or contamination	Turn pump on. Turn PID lamp on. Input correct span gas concentration at CAL menu. Use clean cal gases and sampling equipment. Clean/replace sample line. Clean/replace filter cups. Clean PID window. Replace PID capsule. Contact TEI authorized service center.
Slow response time	Insufficient sample flow Sampling non-volatile compounds	Clean/replace filter cups. Clean/replace flame arrestor. Clean/replace sample line. Contact TEI Applications Laboratory.
High background readings	High ambient concentration Zero drift/improper calibration Sample line contamination Detector capsule contamination	N/A. Ensure proper zero/span calibration. Clean/replace sample line. Clean/replace filter cups. Clean/replace FID capsule. Clean PID window. Replace PID capsule.

Warning Messages

Message	Description
<pre> WARNING BATTERY POWER IS LOW. EXIT=CLR </pre>	<p>This display occurs whenever the battery has reached a low level (approximately 6.0 V). It indicates that approximately 15 minutes of operating time remain. Press EXIT to return to the operating display. The lower right corner of all displays now show ± (blinking). If you continue to operate after the warning is displayed, the unit will eventually shut off automatically. To restart after an auto shut down, you must first recharge or replace the battery. Note that collected data is not lost</p>
<pre> WARNING PUMP MUST BE ON TO SELECT MODE. EXIT=CLR </pre>	<p>This display occurs when the pump is not on for a function that requires the pump to be on.</p>
<pre> WARNING LOGGER MEMORY IS ALREADY FULL. EXIT=CLR </pre>	<p>Log memory is full. You cannot continue to log any entries until you have transferred the log memory to a PC or have cleared log memory. The instrument will, however, continue to operate.</p>
<pre> WARNING FID FLAMEOUT! IGNITE AGAIN. EXIT=CLR </pre>	<p>This display appears whenever the FID flame is extinguished. Press EXIT to clear, then CONTROL key and 2 to ignite. This warning is active only in RUN and CALIBRATE modes. In the RUN mode, once the alarm is acknowledged, a flashing F appears on the sidepack display and the probe display flashes.</p>
<pre> WARNING PID LAMP NOT OPERATING EXIT=CLR </pre>	<p>This message indicates that the PID lamp activity is low. Check lamp and re-zero the PID. This warning is active only in RUN and CALIBRATE modes. In the RUN mode, once the alarm is acknowledged, a flashing P appears on the sidepack display and the probe display flashes.</p>
<pre> WARNING LOG RATE TOO SLOW FOR PC STEL CALC EXIT=CLR </pre>	<p>This message appears whenever you enter a log rate value greater than 90 seconds. The data sampling rate is too low for valid STEL calculations in the PC. Press EXIT to bypass the warning.</p>

Message	Description
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><i>WARNING</i> <i>LOG RATE</i> <i>INVALID!</i> <i>EXIT=CLR</i></p> </div>	<p>This message appears whenever you enter a log rate of zero. To correct the problem, enter a log rate other than zero.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><i>WARNING</i> <i>ENTRY IS</i> <i>INVALID!</i> <i>EXIT=CLR</i></p> </div>	<p>This message appears whenever you enter a value equal to zero (except for alarm levels). To correct the problem, enter numbers other than zero.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><i>WARNING</i> <i>BAD CALIBRATION</i> <i>PARAMETERS!</i> <i>EXIT=CLR</i></p> </div>	<p>This warning display appears during calibration if the current zero calibration value equals or exceeds the span calibration value. To correct the problem, perform a re-zero, a re-span, or both.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><i>HARDWARE FAILURE</i></p> </div>	<p>This message appears as a result of a self-test failure. Return the instrument to the factory for service.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><i>WARNING</i> <i>PID LAMP MUST BE</i> <i>ON TO CONTINUE</i> <i>EXIT=CLR</i></p> </div>	<p>The PID has been turned OFF. To continue, use the Control Menu to turn the PID on.</p>

Accessories

Telescoping Extension Option

To use an optional telescoping extension, loosen the probe nut and unplug the sampling assembly. Next, insert the telescoping wand and tighten the probe nut. Then, insert the appropriate sampling assembly into the other end of the extension unit and tighten the retaining nut.

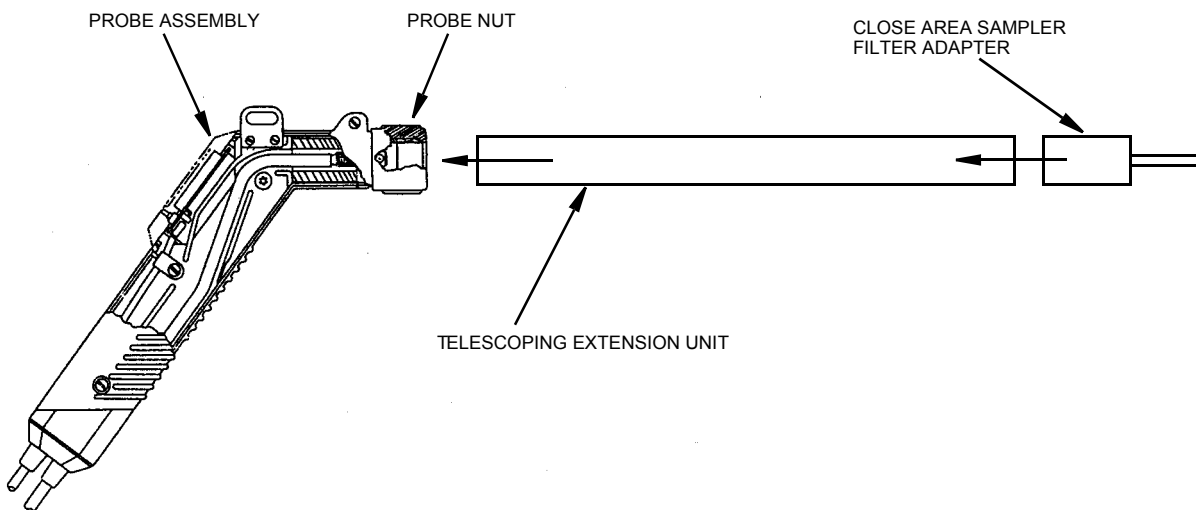


Figure 14. Telescoping Extension Option

Activated Charcoal Filter Adapter

The Activated Charcoal Filter Adapter is an accessory that can be installed or attached to the end of the standard probe or to the end of a telescoping extension. The filter is typically filled with activated charcoal which acts as an adsorbent and effectively filters out organic vapors other than methane or ethane.

A screw cap on the probe end may be removed for refilling the filter with activated charcoal or other filtering medium.

Applications of the filter include:

1. Obtaining a clean air sample for zero baseline check and adjustment.
2. Rapid screening of methane and non-methane organic vapors.
3. Selective screening for natural gas surveys.

The charcoal filter adapter fits directly into the telescoping wand.

The life of the filter depends on the time in use, the types of compounds, and concentrations of the compounds being filtered. Under typical industrial air monitoring conditions, the filter will last for many days of continuous sampling.

To replace charcoal in a charcoal filter, use the following procedure:

1. Remove the sampling assembly from the probe by loosening the probe nut and pulling the sampling assembly free from the probe.
2. Unscrew the cap from the sampling assembly. This will expose the end of the charcoal filter cartridge. See diagram below.
3. Tip the cartridge up and empty the charcoal from the cartridge.
4. Clean the inside of the cartridge with a cotton swab dipped in isopropyl alcohol.
5. Dry the cartridge thoroughly.
6. Re-fill the cartridge with new “dust-free” charcoal of the type specified for the filter.
7. Apply Teflon tape to the male threads of the charcoal cartridge and screw on the cap.
8. Re-insert the sampling assembly into the probe and tighten the probe nut.

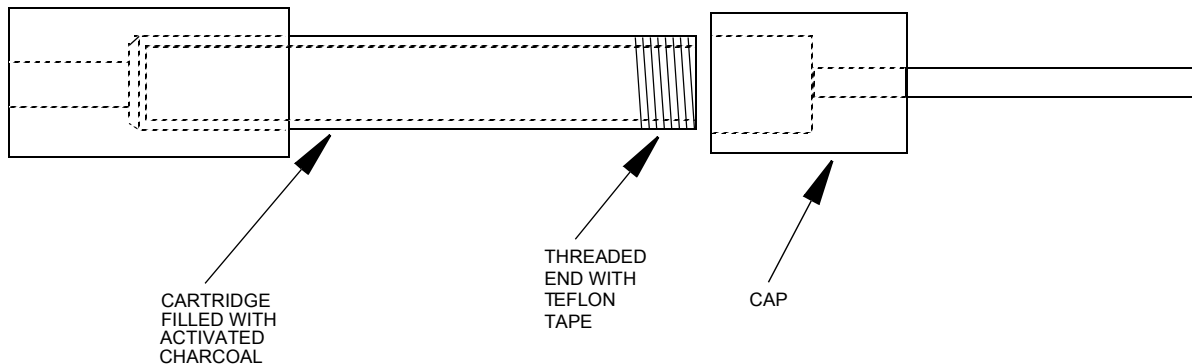


Figure 15. Activated Charcoal Filter Adapter

For information on additional accessories, such as calibration kits, enhanced probes, barcode readers, optional energy lamps (PID), or dilutor kits, please contact The Foxboro Company.

Appendix A: Text Data Formats

Route List File Format

The *route list* format is as follows:

Format	Comments
ROUTE LIST<CR><LF>	Title, not processed
VER=x.x	x=0-9
RUN ID=aaaa<CR><LF>	a=0-9, A-Z, a-z
<CR><LF>	Blank line, not processed
<CR><LF>	Blank line, not processed
<route entry header line 1>	See route entry header below: not processed
<route entry header line 2>	See route entry header below: not processed
<route entry header line 3>	See route entry header below: not processed
<route entry 1>	See route entry below
<route entry 2>	
<route entry 3>	
<route entry n>	
<CR><LF>	Blank line, not processed
END<CR><LF>	Marks end-of-text

The first eight lines of the route list constitute the *route header*. The last three lines of the route header are composed of text column headers (route entry header lines 1 and 2) and an underline of dashes (route entry header line 3). The route entry headers are specified below by specification of header text for lines 1 and 2 and starting position (all other characters blank spaces, not tabs). Line 3 is a dash character '-' for all route entry characters except the delimiter (space instead).

The *route entry header* format is as follows:

Start	Header Line 1	Header Line 2
0		TAG
17		AREA
26		SUBAREA
35	LEAK	RATE
41	RESP	FACT
46	EQP	TYP
50	EQUIP	SIZE
57	DESCRIPTION	
105	<CR>	
106	<LF>	

The remaining lines in the route list are *route entries*. Each route entry consists of tag, area, subarea, leak rate, response factor, equipment type, equipment size, and description.

The *route entry* format is as follows:

Byte	Length	Item	Format
0	16	Tag	text
16	1	delimiter	space
17	8	Area	text
25	1	delimiter	space
26	8	Subarea	text
34	1	delimiter	space
35	5	Leak rate	floating point
40	1	delimiter	space
41	4	Response factor	floating point
45	1	delimiter	space
46	3	Equipment type	text
49	1	delimiter	space
50	6	Equipment size	text
56	1	delimiter	space
57	48	Description	text
105	1	<CR>	0DH
106	1	<LF>	0AH

NOTE: Downloaded route entries may be terminated any time after the tag by the <CR><LF>. Partial text entries are processed as ending in trailing spaces. Partial number entries are processed as if complete. The default value for fields not included in the entry are:

<u>Field</u>	<u>Default</u>
Area	all spaces
Subarea	all spaces
Leak rate	0.0
Response factor	1.0
Equipment type	all spaces
Equipment size	all spaces
Description	all spaces

Sample Route List File

```
ROUTE LIST
VER= 1.00
RUN ID=0001
```

TAG	AREA	SUBAREA	LEAK RATE	RESP FACT	EQP TYP	EQUIP SIZE	DESCRIPTION
1	AREA1	SUBAREA1	0	1.00	N/A	1.00	DESCRIPTION 1
2	AREA2	SUBAREA2	0	1.00	BON	0.50	DESCRIPTION 2
3	AREA3	SUBAREA3	0	1.00	CSL	1.75	DESCRIPTION 3
4	AREA4	SUBAREA4	0	1.00	DFL	10.00	DESCRIPTION 4
5	AREA5	SUBAREA5	0	1.00	PKG	5.50	DESCRIPTION 5
6	AREA6	SUBAREA6	0	1.00	PSL	0.25	DESCRIPTION 6
7	AREA7	SUBAREA7	0	1.00	RPL	950.50	DESCRIPTION 7
8	AREA8	SUBAREA8	0	1.00	VLV	0.25	DESCRIPTION 8
9	AREA9	SUBAREA9	0	1.00	FLG	0.75	DESCRIPTION 9
10	AREA10	S-AREA10	0	1.00	FLG	0.75	DESCRIPTION 10
11	AREA11	S-AREA11	0	1.00	VLV	0.75	DESCRIPTION 11
12	AREA12	S-AREA12	0	1.00	PRV	1.50	DESCRIPTION 12
13	AREA13	S-AREA13	0	1.00	VLV	0.75	DESCRIPTION 13
14	AREA14	S-AREA14	0	1.00	CMP	0.00	DESCRIPTION 14
15	AREA15	S-AREA15	0	2.00	VLV	0.75	DESCRIPTION 15
16	AREA16	S-AREA16	0	5.00	VLV	0.75	DESCRIPTION 16
17	AREA17	S-AREA17	0	.001	VLV	1.50	DESCRIPTION 17
18	AREA18	S-AREA18	0	.01	FLG	1.50	DESCRIPTION 18
19	AREA19	S-AREA19	0	0.01	FLG	0.75	DESCRIPTION 19
20	AREA20	S-AREA20	0	.1	VLV	0.75	DESCRIPTION 20
21	AREA21	S-AREA21	5000	00.1	VLV	0.75	DESCRIPTION 21
22	AREA22	S-AREA22	99999	1	VLV	0.75	DESCRIPTION 22
23	AREA23	S-AREA23	10000	10	VLV	0.75	DESCRIPTION 23
24	AREA24	S-AREA24	40000	100	FLG	0.50	DESCRIPTION 24
25	AREA25	S-AREA25	50	1000	VLV	0.75	DESCRIPTION 25

END

Configuration File Format

The configuration format is as follows (options are separated by a '|'):

```
Format
CONFIGURATION<CR><LF>
VER=X.X<CR><LF>
<CR><LF>
<CR><LF>
MODEL=XXXXXXXXXX<CR><LF>
SERIAL NUMBER=ididididid<CR><LF>
DETECTOR=PID|FID|PID&FID<CR><LF>
OPERATOR ID=opopopopop<CR><LF>
<CR><LF>
LOGGING<CR><LF>
-----<CR><LF>
LOG MODE=NONE|AUTO|VOC|FE|CUSTOM<CR><LF>
LOG AUTO REPEAT=OFF|ON<CR><LF>
LOG UNIT LOCK=OFF|PPB|PPM|PERCENT<CR><LF>
LOG SAVE MODE=MANUAL|AUTO<CR><LF>
LOG STORAGE FORMAT=NONE|FOXAUTO|FOXVOC|FEVOC<CR><LF>
LOG SAMPLE TIME=nnnnn<CR><LF>
```

```

LOG SAMPLE TIME UNIT=SEC|MIN<CR><LF>
LOG DATA STORED=SAMPLE|AVERAGE|MAXIMUM<CR><LF>
BARCODE VERIFY=OFF|ON<CR><LF>
ROUTE ACTIVE=OFF|ON<CR><LF>
TAG ACTIVE=OFF|ON<CR><LF>
<CR><LF>
CALIBRATION<CR><LF>
-----<CR><LF>
CAL AUTO ACCEPT=OFF|ON<CR><LF>
CAL AUTO SAVE=OFF|ON<CR><LF>
CAL UNIT LOCK=OFF|PPB|PPM|PERCENT<CR><LF>
CAL NUM SPAN POINTS (PID)=n<CR><LF>
CAL SPAN PT 1 (PID)=ffffff PPB|PPM|PERCENT<CR><LF>
CAL SPAN PT n (PID)=ffffff PPB|PPM|PERCENT<CR><LF>
CAL NUM SPAN POINTS (FID)=n<CR><LF>
CAL SPAN PT 1 (FID)=ffffff PPB|PPM|PERCENT<CR><LF>
CAL SPAN PT n (FID)=ffffff PPB|PPM|PERCENT<CR><LF>
BACKGROUND CORRECTION (PID)=OFF|ON<CR><LF>
BACKGROUND CORRECTION (FID)=OFF|ON<CR><LF>
<CR><LF>
RESPONSE FACTORS<CR><LF>
-----<CR><LF>
SELECTED=n<CR><LF>
MODE=FACTOR|CURVE<CR><LF>
RF1 (PID) nnnnnnnnnn xx.xx + yy.yy<CR><LF>
RF9 (PID) nnnnnnnnnn xx.xx + yy.yy<CR><LF>
RF1 (FID) nnnnnnnnnn xx.xx + yy.yy<CR><LF>
RF9 (FID) nnnnnnnnnn xx.xx + yy.yy<CR><LF>
<CR><LF>
ALARMS<CR><LF>
-----<CR><LF>
HIGH (PID)=ffffff PPB|PPM|PERCENT<CR><LF>
LOW (PID)=ffffff PPB|PPM|PERCENT<CR><LF>
STEL (PID)=ffffff PPB|PPM|PERCENT<CR><LF>
HIGH (FID)=ffffff PPB|PPM|PERCENT<CR><LF>
LOW (FID)=ffffff PPB|PPM|PERCENT<CR><LF>
STEL (FID)=ffffff PPB|PPM|PERCENT<CR><LF>
<CR><LF>
USER OPTIONS<CR><LF>
-----<CR><LF>
BARCODE READER=NONE|HP|PSC<CR><LF>
DIGITAL DATA LOGGING=NONE|FID&PID|PPM<CR><LF>
DISPLAY DELAY=SHORT|MEDIUM|LONG<CR><LF>
KEY CLICK=OFF|ON<CR><LF>
PC LINK TYPE=FOXBORO|FEMS|TEXT-MANUAL|TEXT-AUTO<CR><LF>
PROBE=BASIC|ENHANCED<CR><LF>
<CR><LF>
END<CR><LF>

```

NOTES:

1. Lines containing information on uninstalled detectors (PID) or (FID) are not output.
 2. Spaces are allowed in names and other text fields entered by the user.
 3. Number fields are right justified, leading spaces.
 4. The second detector repeats the RF names. During download, the last RF name encountered is used.
-

Sample Configuration File

```

CONFIGURATION
VER= 1.00

MODEL=TVA-1000B
SERIAL NUMBER=000007156962
DETECTOR=PID&FID
OPERATOR ID=USERID

LOGGING
-----
LOG MODE=NONE
LOG STORAGE FORMAT=NONE
LOG SAMPLE TIME=0
LOG SAMPLE TIME UNIT=SEC
LOG DATA STORED=SAMPLE
LOG UNIT LOCK=OFF
LOG AUTO REPEAT=OFF
LOG SAVE MODE=MANUAL
TAG ACTIVE=OFF
ROUTE ACTIVE=OFF
BARCODE VERIFY=OFF

CALIBRATION
-----

```

```

CAL AUTO ACCEPT=OFF
CAL AUTO SAVE=OFF
CAL UNIT LOCK=OFF
BACKGROUND CORRECTION (PID)=ON
BACKGROUND CORRECTION (FID)=ON

RESPONSE FACTORS
-----
SELECTED=0
MODE=FACTOR
RF0 (PID)=DEFAULT      1.00  0.00
RF1 (PID)=-----      1.00  0.00
RF2 (PID)=-----      1.00  0.00
RF3 (PID)=-----      1.00  0.00
RF4 (PID)=-----      1.00  0.00
RF5 (PID)=-----      1.00  0.00
RF6 (PID)=-----      1.00  0.00
RF7 (PID)=-----      1.00  0.00
RF8 (PID)=-----      1.00  0.00
RF9 (PID)=-----      1.00  0.00
RF0 (FID)=DEFAULT      1.00  0.00
RF1 (FID)=-----      1.00  0.00
RF2 (FID)=-----      1.00  0.00
RF3 (FID)=-----      1.00  0.00
RF4 (FID)=-----      1.00  0.00
RF5 (FID)=-----      1.00  0.00
RF6 (FID)=-----      1.00  0.00
RF7 (FID)=-----      1.00  0.00
RF8 (FID)=-----      1.00  0.00
RF9 (FID)=-----      1.00  0.00

ALARMS
-----
STEL (PID)=  0.00 PPM
LOW (PID)=  0.00 PPM
HIGH (PID)=  0.00 PPM
STEL (FID)=  0.00 PPM
LOW (FID)=  0.00 PPM
HIGH (FID)=  0.00 PPM

USER OPTIONS
-----
PROBE=BASIC
BARCODE READER=NONE
KEY CLICK=OFF
DISPLAY DELAY=MEDIUM
PC LINK TYPE=TEXT-AUTO
DIGITAL DATA LOGGING=NONE

END
    
```

Calibration File Format

The calibration header format is as follows:

Format	Comments
CALIBRATION DATA<CR><LF>	Title, not processed
VER=x.x<CR><LF>	x=0-9
<CR><LF>	Blank line, not processed
<CR><LF>	Blank line, not processed
<detector calibration>	PID if available, see below
<detector calibration>	FID if available, see below
END<CR><LF>	Marks end-of-text

The *calibration data* format is as follows (note: from 1 to 9 span gas points are allowed):

```

ddd CALIBRATION:<CR><LF>
<CR><LF>
CALIB      KNOWN      CALIB      MEASURED<CR><LF>
TYPE      CONC      DATE/TIME      CALIB VALUE<CR><LF>
-----
ZERO      aaaaaa uuu  dd mmm yy hh:mm:ss  bbbbbbbb COUNTS ffffffff<CR><LF>
SPAN1     aaaaaa uuu  dd mmm yy hh:mm:ss  bbbbbbbb COUNTS ffffffff<CR><LF>
.         .         .         .         .         .         .
.         .         .         .         .         .         .
SPANn     aaaaaa uuu  dd mmm yy hh:mm:ss  bbbbbbbb COUNTS ffffffff<CR><LF>
<CR><LF>
<CR><LF>
where:
  ddd = detector type
  "FID"
  "PID"

  aaaaaa = gas concentration, floating point, right justified,
           leading spaces

  uuu = concentration units:
  "PPB", parts-per-billion
    
```

```

"PPM", parts-per-million
"%", percent
dd = day of calibration, 01-31
mmm = month of calibration, Jan-Dec
yy = year of calibration, 00-99

hh = hour of calibration, 00-23
mm = minute of calibration, 00-59
ss = second of calibration, 00-59

bbbbbbbb = detector reading for calibration gas, integer,
           right justified, leading spaces

fffffff = count status:
"OK", no errors
"DET OFF", detector reading invalid
"DET FAIL", detector failed, not invalid
"OVERFLOW", A/D overflow, not invalid
"UNDERFLOW", A/D underflow, not invalid or A/D overflow

n = span gas number, 2-9

```

Sample Calibration File (Dual Detectors)

```

CALIBRATION DATA
VER= 1.00

```

PID CALIBRATION:

CALIB TYPE	KNOWN CONC	CALIB DATE/TIME	MEASURED CALIB VALUE
ZERO	0 PPB	01 JAN 80 00:00:00	0 COUNTS OK
SPAN1	0 PPB	01 JAN 80 00:00:00	0 COUNTS OK

FID CALIBRATION:

CALIB TYPE	KNOWN CONC	CALIB DATE/TIME	MEASURED CALIB VALUE
ZERO	0 PPB	01 JAN 80 00:00:00	0 COUNTS OK
SPAN1	0 PPB	01 JAN 80 00:00:00	0 COUNTS OK

```

END

```

Logged Data File Format (Upload Only)

The logged data format is as follows:

Format	Comments
LOGGED DATA<CR><LF>	Title, not processed
VER=x.x<CR><LF>	x=0-9
<CR><LF>	Blank line, not processed
<logged data record 1>	See below
.	
.	
<logged data record n>	
<CR><LF>	Blank line, not processed
END<CR><LF>	Marks end-of-text

The logged data record is different for each data storage type. A header is printed whenever the data storage type changes. The data type records are:

```

<Auto logging record>
<VOC logging record>
<FE logging record>

```

Auto logged header and data, single detector:

```

<CR><LF>
AUTO DATA tttttttttttttt<CR><LF>
  DATE      TIME      CONCENTRATION<CR><LF>
-----
dd mmm yy  hh:mm:ss  xxxxxx uu ffffffff<CR><LF>

```

Auto logged header, dual detector:

```
<CR><LF>
AUTO DATA tttttttttttttttt<CR><LF>
  DATE      TIME      PID CONCENTRATION      FID CONCENTRATION<CR><LF>
-----
dd mmm yy  hh:mm:ss  xxxxxx uuu ffffffff  xxxxxx uuu ffffffff<CR><LF>
```

VOC logged header and data, single detector:

```
<CR><LF>
VOC DATA<CR><LF>
  DATE      TIME      TAG      CONCENTRATION<CR><LF>
-----
dd mmm yy  hh:mm:ss  tttttttttttttt  xxxxxx uuu ffffffff<CR><LF>
```

VOC logged header and data, dual detector:

```
<CR><LF>
VOC DATA<CR><LF>
  DATE      TIME      TAG      PID CONCENTRATION      FID CONCENTRATION<CR><LF>
-----
dd mmm yy  hh:mm:ss  tttttttttttttt  xxxxxx uuu ffffffff  xxxxxx uuu ffffffff<CR><LF>
```

FE logged header and data:

```
<CR><LF>
FE DATA
  DATE      TIME      TAG      DET      CONCENTRATION      BACKGROUND      LEAK      REPAIR<CR><LF>
-----
RRRRR<CR><LF>
dd mmm yy  hh:mm:ss  tttttttttttttt  ddd xxxxxx uuu ffffffff  xxxxxx uuu ffffffff  LLL
```

where:

ttt... = tag

xxxxxx = concentration, floating point, right justified, leading spaces

uuu = concentration unit:

- "PPB"
- "PPM"
- "% "

fffffff = data status:

- "OK", no errors or alarms
- "DET_OFF", detector not valid
- "DET_FAIL", detector failed, not "INVALID"
- "OVERFLOW ", A/D overflow, not "DET_FAIL"
- "UNDERFLOW", A/D underflow, not "OVERFLOW"
- "HIGH ALARM", high alarm, no STEL, not "UNDERFLOW"
- "LOW ALARM", low alarm, no high alarm or STEL, not "UNDERFLOW"
- "STEL ALRM", STEL alarm, no low or high alarm, not "UNDERFLOW"
- "HIGH&STEL", high alarm and STEL, not "UNDERFLOW"
- "LOW&STEL ", low alarm and STEL, no high alarm, not "UNDERFLOW"

ddd = detector:

- "PID"
- "FID"

Sample Logged Data File (FE format)

LOGGED DATA
VER= 1.00

FE DATA DATE	TIME	TAG	DET	BACKGROUND	CONCENTRATION	LEAK	LEAK SOURCE	REPAIR METHOD
18 APR 96	08:53:42	1	PID	0.00 PPM OK	67675 PPM OK	LEAKER!	N/A	N/A
FE DATA DATE	TIME	TAG	DET	BACKGROUND	CONCENTRATION	LEAK	LEAK SOURCE	REPAIR METHOD
18 APR 96	09:15:28	19	PID	1208 PPM OK	1056 PPM OK	LEAKER!	N/A	N/A
FE DATA DATE	TIME	TAG	DET	BACKGROUND	CONCENTRATION	LEAK	LEAK SOURCE	REPAIR METHOD
18 APR 96	17:26:20	3	FID	0.00 PPM OK	6.33 PPM OK	LEAKER!	N/A	N/A

FE DATA DATE	TIME	TAG	DET	BACKGROUND	CONCENTRATION	LEAK	LEAK SOURCE	REPAIR METHOD
18 APR 96	17:49:59	18	FID	0.00 PPM OK	1.94 PPM OK	LEAKER!	N/A	N/A

END

Sample Logged Data Files

Auto Format, Both PID and FID

LOGGED DATA
VER= 1.00

AUTO DATA DATE	MAN 3 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	01:19:32	0.00 % OK	0.00 % OK	0 PPB OK	10 PPB OK
09 MAR 96	01:20:02	0.00 % OK	0.00 % OK	0 PPB OK	6376 PPB OK
09 MAR 96	01:20:32	0.00 % OK	15.00 % OVERFLOW	0 PPB OK	15.00 % OVERFLOW
09 MAR 96	01:21:02	0.00 % OK	0.02 % OK	0 PPB OK	199 PPM OK
09 MAR 96	01:21:32	0.00 % OK	0.18 % OK	0 PPB OK	1843 PPM OK

AUTO DATA DATE	MAN 4 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	01:35:13	0.00 % OK	0.01 % OK	0 PPB OK	637 PPB OK
09 MAR 96	01:35:43	0.00 % OK	3.08 % OK	0 PPB OK	14.96 % OK

AUTO DATA DATE	MAN 4 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	01:39:06	0.00 % OK	0.01 % OK	0 PPB OK	635 PPB OK
09 MAR 96	01:39:36	0.00 % OK	3.04 % OK	0 PPB OK	14.93 % OK
09 MAR 96	01:40:06	0.00 % OK	0.18 % OK	0 PPB OK	15.00 % OVERFLOW

AUTO DATA DATE	BARCODE TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	02:49:47	0.01 % OK	7.30 % OK	101 PPM OK	-96 PPM OK
09 MAR 96	02:50:17	0.01 % OK	0.00 % OK	101 PPM OK	-96 PPM OK
09 MAR 96	02:50:47	0.01 % OK	0.00 % OK	101 PPM OK	200 PPM OK
09 MAR 96	02:51:17	0.01 % OK	0.02 % OK	101 PPM OK	200 PPM OK

AUTO DATA DATE	BARCODE TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	03:03:52	0.01 % OK	7.39 % OK	101 PPM OK	-96 PPM OK
09 MAR 96	03:04:22	0.01 % OK	0.00 % OK	101 PPM OK	-96 PPM OK
09 MAR 96	03:04:52	0.01 % OK	0.00 % OK	101 PPM OK	201 PPM OK
09 MAR 96	03:05:22	0.01 % OK	0.02 % OK	101 PPM OK	201 PPM OK

AUTO DATA DATE	BC2 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	03:19:44	0.01 % OK	0.02 % OK	101 PPM OK	201 PPM OK
09 MAR 96	03:20:14	0.01 % OK	0.02 % OK	101 PPM OK	201 PPM OK

AUTO DATA DATE	BC4 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	03:35:41	0.00 % OK	0.00 % OK	0 PPB OK	606 PPM OK
09 MAR 96	03:36:11	0.00 % OK	0.00 % OK	0 PPB OK	606 PPM OK
09 MAR 96	03:36:41	0.00 % OK	0.00 % OK	0 PPB OK	606 PPM OK

AUTO DATA DATE	1 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	03:53:21	0.00 % OK	0.00 % OK	0 PPB OK	128 PPB OK

AUTO DATA DATE	1 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	03:55:28	0.00 % OK	0.18 % OK	0 PPB OK	3.13 % OK

AUTO DATA DATE	2 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	03:57:38	0.00 % OK	0.00 % OK	0 PPB OK	6395 PPB OK
09 MAR 96	03:58:08	0.00 % OK	0.00 % OK	0 PPB OK	6396 PPB OK

AUTO DATA DATE	11 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	04:28:54	0.00 % OK	0.02 % OK	0 PPB OK	201 PPM OK
09 MAR 96	04:29:14	0.00 % OK	3.23 % OK	0 PPB OK	3.13 % OK

AUTO DATA DATE	6 TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
09 MAR 96	04:31:34	0.00 % OK	3.13 % OK	0 PPB OK	3.13 % OK
09 MAR 96	04:31:54	0.00 % OK	0.18 % OK	0 PPB OK	3.12 % OK

AUTO DATA 4						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
09 MAR 96	04:32:40	0.00 % OK	0.18 % OK	0 PPB OK	3.14 % OK	
AUTO DATA 6						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
09 MAR 96	05:45:51	0.00 % OK	8.99 % OK	0 PPB OK	561 PPB OK	
09 MAR 96	05:46:11	0.00 % OK	26.94 % OK	0 PPB OK	109 PPB OK	
AUTO DATA 7						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
09 MAR 96	05:48:36	0.00 % OK	8.93 % OK	0 PPB OK	1457 PPB OK	
AUTO DATA 15						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
09 MAR 96	05:59:57	5.39 % OK	4.47 % OK	45 PPB OK	112 PPB OK	
AUTO DATA 19						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
09 MAR 96	23:59:33	3.37 % OK	0.02 % OK	28 PPB OK	1 PPB OK	
09 MAR 96	23:59:53	3.37 % OK	0.24 % OK	28 PPB OK	11 PPB OK	
AUTO DATA 20						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	00:55:09	10.10 % OK	7.19 % OK	28 PPB OK	60 PPB OK	
10 MAR 96	00:55:29	10.10 % OK	6.07 % OK	28 PPB OK	101 PPB OK	
AUTO DATA 20						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	00:58:48	10.10 % OK	7.98 % OK	28 PPB OK	20 PPB OK	
AUTO DATA 23						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	01:46:29	0.00 % OK	**.**% OK	112 PPB OK	560 PPB OK	
10 MAR 96	01:46:49	0.00 % OK	88.13 % OK	112 PPB OK	1980 PPB OK	
AUTO DATA 23						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	01:51:41	0.00 % OK	67.78 % OK	112 PPB OK	6020 PPB OK	
AUTO DATA DET OFF						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	02:01:29	0.00 % OK	----- DET OFF	0 PPB OK	256 PPB OK	
10 MAR 96	02:01:49	0.00 % OK	----- DET OFF	0 PPB OK	----- DET OFF	
10 MAR 96	02:02:09	0.00 % OK	----- DET OFF	0 PPB OK	256 PPB OK	
10 MAR 96	02:02:29	0.00 % OK	14.76 % OK	0 PPB OK	256 PPB OK	
AUTO DATA DET OFF						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	02:07:11	0.00 % OK	14.76 % OK	0 PPB OK	----- DET OFF	
10 MAR 96	02:07:31	0.00 % OK	14.76 % OK	0 PPB OK	256 PPB OK	
AUTO DATA FLOW-TEST						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	02:37:13	0.00 % OK	5.19 % DET_FAIL	0 PPB OK	658 PPB OK	
10 MAR 96	02:37:33	0.00 % OK	30.71 % OK	0 PPB OK	20 PPB OK	
10 MAR 96	02:37:53	0.00 % OK	5.04 % DET_FAIL	0 PPB OK	14 PPB OK	
AUTO DATA FLOW-TEST						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	02:43:10	0.00 % OK	5.21 % DET_FAIL	0 PPB OK	658 PPB OK	
10 MAR 96	02:43:30	0.00 % OK	30.68 % OK	0 PPB OK	15 PPB DET_FAIL	
AUTO DATA FLOW-TEST						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	02:45:39	0.00 % OK	5.21 % DET_FAIL	0 PPB OK	658 PPB OK	
10 MAR 96	02:45:59	0.00 % OK	30.67 % OK	0 PPB OK	12 PPB DET_FAIL	
10 MAR 96	02:46:19	0.00 % OK	5.08 % DET_FAIL	0 PPB OK	12 PPB DET_FAIL	
AUTO DATA FLOW-TEST						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	02:57:38	0.00 % OK	-1.27 % UNDERFLOW	0 PPB OK	18 PPB OK	
10 MAR 96	02:57:58	0.00 % OK	5.33 % OK	0 PPB OK	-142 PPB UNDERFLOW	
10 MAR 96	02:58:18	0.00 % OK	-1.27 % UNDERFLOW	0 PPB OK	-142 PPB UNDERFLOW	
AUTO DATA FLOW-TEST						
DATE	TIME	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION	
10 MAR 96	03:01:27	0.00 % OK	**.**% OVERFLOW	0 PPB OK	1420 PPB OK	
10 MAR 96	03:01:47	0.00 % OK	**.**% OK	0 PPB OK	1458 PPB OVERFLOW	

10 MAR 96	03:02:07	0.00 %	OK	**.** %	OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
10 MAR 96	03:02:27	0.00 %	OK	-1.27 %	UNDERFLOW	0 PPB OK	1458 PPB OVERFLOW
AUTO DATA ALARM-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	03:30:16	0.00 %	OK	30.69 %	LOW_ALARM	0 PPB OK	256 PPB OK
10 MAR 96	03:31:16	0.00 %	OK	30.68 %	LOW_ALARM	0 PPB OK	657 PPB LOW_ALARM
10 MAR 96	03:32:16	0.00 %	OK	14.67 %	OK	0 PPB OK	657 PPB LOW_ALARM
10 MAR 96	03:33:16	0.00 %	OK	57.01 %	HIGH_ALARM	0 PPB OK	657 PPB LOW_ALARM
10 MAR 96	03:34:16	0.00 %	OK	83.68 %	HIGH_ALARM	0 PPB OK	1299 PPB HIGH_ALARM
10 MAR 96	03:35:16	0.00 %	OK	30.66 %	LOW_ALARM	0 PPB OK	1172 PPB HIGH_ALARM
10 MAR 96	03:36:16	0.00 %	OK	14.70 %	OK	0 PPB OK	1172 PPB HIGH_ALARM
10 MAR 96	03:37:16	0.00 %	OK	**.** %	HIGH_ALARM	0 PPB OK	256 PPB OK
AUTO DATA 25							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	03:44:40	0.00 %	OK	**.** %	HIGH_ALARM	0 PPB OK	-142 PPM UNDERFLOW
10 MAR 96	03:45:40	0.00 %	OK	**.** %	HIGH_ALARM	0 PPB OK	1458 PPM OVERFLOW
AUTO DATA STEL-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	04:16:46	0.00 %	OK	30.69 %	STEL_ALARM	0 PPB OK	256 PPB OK
AUTO DATA STEL-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	04:30:30	0.00 %	OK	26.95 %	OK	0 PPB OK	563 PPB OK
10 MAR 96	04:35:30	0.00 %	OK	26.95 %	OK	0 PPB OK	563 PPB OK
10 MAR 96	04:40:30	0.00 %	OK	26.96 %	STEL_ALARM	0 PPB OK	563 PPB STEL_ALARM
AUTO DATA STEL-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	06:38:45	0.00 %	OK	30.68 %	STEL_ALARM	0 PPB OK	256 PPB OK
AUTO DATA STEL-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	06:46:30	0.00 %	OK	26.96 %	OK	0 PPB OK	563 PPB OK
10 MAR 96	06:51:30	0.00 %	OK	26.95 %	OK	0 PPB OK	563 PPB OK
10 MAR 96	06:56:30	0.00 %	OK	26.96 %	OK	0 PPB OK	563 PPB OK
10 MAR 96	07:01:30	0.00 %	OK	26.96 %	STEL_ALARM	0 PPB OK	563 PPB STEL_ALARM
AUTO DATA STEL-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	07:11:18	0.00 %	OK	0.00 %	OK	0 PPB OK	563 PPB OK
10 MAR 96	07:16:18	0.00 %	OK	0.00 %	OK	0 PPB OK	563 PPB OK
10 MAR 96	07:21:18	0.00 %	OK	0.00 %	OK	0 PPB OK	563 PPB STEL_ALARM
AUTO DATA MIX-ALM-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	07:33:36	0.00 %	OK	**.** %	OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
AUTO DATA MIX-ALM-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	07:34:44	0.00 %	OK	**.** %	OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
AUTO DATA MIX-ALM-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	07:36:11	0.00 %	OK	**.** %	LOW&STEL	0 PPB OK	1421 PPB HIGH_ALARM
AUTO DATA MIX-ALM-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	07:37:30	0.00 %	OK	6.73 %	STEL_ALARM	0 PPB OK	1421 PPB HIGH&STEL
AUTO DATA MIX-ALM-TEST							
DATE	TIME	PID BACKGROUND		PID CONCENTRATION		FID BACKGROUND	FID CONCENTRATION
10 MAR 96	07:38:41	0.00 %	OK	6.73 %	STEL_ALARM	0 PPB OK	-140 PPB STEL_ALARM
10 MAR 96	07:39:06	0.00 %	OK	----	DET_OFF	0 PPB OK	-140 PPB STEL_ALARM
10 MAR 96	07:39:31	0.00 %	OK	----	DET_OFF	0 PPB OK	-140 PPB STEL_ALARM

END

Auto Format, FID Only

LOGGED DATA
VER= 1.00

AUTO DATA 6							
DATE	TIME	FID BACKGROUND		FID CONCENTRATION			
18 APR 96	15:42:12	0 PPB OK		560 PPB OK			
18 APR 96	15:42:32	0 PPB OK		111 PPB OK			

```

AUTO DATA 20
  DATE      TIME      FID BACKGROUND      FID CONCENTRATION
-----
18 APR 96  15:51:19      6 PPB OK              60 PPB OK
18 APR 96  15:51:39      6 PPB OK              100 PPB OK
18 APR 96  15:51:59      6 PPB OK              20 PPB OK
    
```

END

Auto Format, PID Only

LOGGED DATA
VER= 1.00

```

AUTO DATA 6
  DATE      TIME      PID BACKGROUND      PID CONCENTRATION
-----
17 APR 96  18:55:33      0.00 % OK            8.99 % OK
17 APR 96  18:55:53      0.00 % OK            27.02 % OK

AUTO DATA 20
  DATE      TIME      PID BACKGROUND      PID CONCENTRATION
-----
17 APR 96  19:06:41      2.02 % OK            7.19 % OK
17 APR 96  19:07:01      2.02 % OK            6.08 % OK
    
```

END

VOC Format, Both PID/FID

LOGGED DATA
VER= 1.00

```

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
07 MAR 96  14:10:02  BARCODE      160 PPM OK            -2.39 PPM OK            160 PPM OK            1322 PPM OK
07 MAR 96  14:13:55  BC2          160 PPM OK            323 PPM OK              160 PPM OK            2.31 % OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
07 MAR 96  14:48:49  15          256 PPB OK            502 PPB OK              112 PPB OK            112 PPB OK
07 MAR 96  14:53:01  16          640 PPB OK            1255 PPB OK             280 PPB OK            280 PPB OK
07 MAR 96  14:57:23  17          0 PPB OK              31.30 PPM OK           0 PPB OK              1 PPB OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
07 MAR 96  15:25:15  18          0 PPB OK              595 PPB OK              2 PPB OK              18 PPB OK
07 MAR 96  15:27:55  19          0 PPB OK              5513 PPB OK             2 PPB OK              30 PPB OK
07 MAR 96  15:29:36  20          4 PPB OK              55.14 PPM OK            17 PPB OK             180 PPB OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
07 MAR 96  17:45:18  21          0 PPB OK              621 PPB OK              6 PPB OK              5 PPB OK
07 MAR 96  17:52:29  22          0 PPB OK              6398 PPB OK             56 PPB OK             56 PPB OK
07 MAR 96  17:54:22  25          0 PPB OK              383 PPM OK              56.00 PPM OK          200 PPM OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
08 MAR 96  10:32:24  21          0 PPB OK              633 PPB OK              6 PPB OK              6 PPB OK
08 MAR 96  10:33:18  22          0 PPB OK              6327 PPB OK             56 PPB OK             55 PPB OK
08 MAR 96  10:34:34  25          0 PPB OK              383 PPM OK              56.00 PPM OK          200 PPM OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
08 MAR 96  11:07:55  MAX          0 PPB OK              8.46 % OK               0 PPB OK              17 PPB OK
08 MAR 96  11:13:25  MAX          0 PPB OK              196 PPM OK              0 PPB OK              1294 PPB OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
08 MAR 96  11:38:35  AVERAGE      0 PPB OK              8.43 % OK               0 PPB OK              572 PPB OK
08 MAR 96  12:30:34  AVERAGE      0 PPB OK              389 PPM OK              0 PPB OK              14 PPB OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
08 MAR 96  12:53:12  SAMPLE        0 PPB OK              -24 PPB OK              0 PPB OK              -60 PPB OK
08 MAR 96  12:58:03  SAMPLE        0 PPB OK              74.37 PPM OK           0 PPB OK              109 PPB OK

VOC DATA
  DATE      TIME      TAG      PID BACKGROUND      PID CONCENTRATION      FID BACKGROUND      FID CONCENTRATION
-----
08 MAR 96  13:15:12  FLOW-TEST     0 PPB OK              0 PPB DET_FAIL          0 PPB OK              658 PPB OK
08 MAR 96  13:17:18  FLOW-TEST     0 PPB OK              200 PPM OK              0 PPB OK              16 PPB DET_FAIL
08 MAR 96  13:24:00  FLOW-TEST     0 PPB OK              0 PPB DET_FAIL          0 PPB OK              16 PPB DET_FAIL
08 MAR 96  13:27:18  FLOW-TEST     0 PPB OK              -48 PPB UNDERFLOW      0 PPB OK              16 PPB OK
    
```

08 MAR 96	13:29:23	FLOW-TEST	0 PPB OK	0 PPB OK	0 PPB OK	-142 PPB UNDERFLOW
08 MAR 96	13:31:13	FLOW-TEST	0 PPB OK	-48 PPB UNDERFLOW	0 PPB OK	-142 PPB UNDERFLOW
08 MAR 96	13:34:16	FLOW-TEST	0 PPB OK	15.00 % OVERFLOW	0 PPB OK	1442 PPB OK
08 MAR 96	13:35:33	FLOW-TEST	0 PPB OK	14.47 % OK	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	13:36:29	FLOW-TEST	0 PPB OK	15.00 % OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	13:37:26	FLOW-TEST	0 PPB OK	-48 PPB UNDERFLOW	0 PPB OK	1458 PPB OVERFLOW

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
08 MAR 96	13:59:33	ALARM-TEST	0 PPB OK	200 PPM LOW_ALARM	0 PPB OK	258 PPB OK
08 MAR 96	14:00:48	ALARM-TEST	0 PPB OK	200 PPM LOW_ALARM	0 PPB OK	659 PPB LOW_ALARM
08 MAR 96	14:07:00	ALARM-TEST	0 PPB OK	6286 PPB OK	0 PPB OK	659 PPB LOW_ALARM

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
08 MAR 96	14:12:58	ALARM-TEST	0 PPB OK	3.10 % HIGH_ALRM	0 PPB OK	659 PPB LOW_ALARM
08 MAR 96	14:16:20	ALARM-TEST	0 PPB OK	8.44 % HIGH_ALRM	0 PPB OK	1300 PPB HIGH_ALARM
08 MAR 96	14:22:13	ALARM-TEST	0 PPB OK	200 PPM LOW_ALARM	0 PPB OK	1172 PPB HIGH_ALARM
08 MAR 96	14:26:30	ALARM-TEST	0 PPB OK	6285 PPB OK	0 PPB OK	1172 PPB HIGH_ALARM
08 MAR 96	14:28:39	ALARM-TEST	0 PPB OK	14.90 % HIGH_ALRM	0 PPB OK	258 PPB OK

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
08 MAR 96	03:24:02	STEL-TEST	0 PPB OK	201 PPM STEL_ALARM	0 PPB OK	257 PPB OK
08 MAR 96	03:45:34	STEL-TEST	0 PPB OK	74.11 PPM STEL_ALARM	0 PPB OK	563 PPB STEL_ALARM

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
08 MAR 96	04:28:03	STEL-TEST	0 PPB OK	73.77 PPM STEL_ALARM	0 PPB OK	565 PPB STEL_ALARM

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
08 MAR 96	04:37:50	STEL-TEST	0 PPB OK	6281 PPB OK	0 PPB OK	658 PPB OK
08 MAR 96	04:43:14	STEL-TEST	0 PPB OK	6281 PPB OK	0 PPB OK	658 PPB OK
08 MAR 96	04:48:19	1	0 PPB OK	6282 PPB OK	0 PPB OK	658 PPB STEL_ALARM
08 MAR 96	04:55:39	STEL TEST	0 PPB OK	6283 PPB OK	0 PPB OK	658 PPB STEL_ALARM

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
08 MAR 96	05:11:38	MIX-ALM-TEST	0 PPB OK	15.00 % OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	05:13:52	MIX-ALM-TEST	0 PPB OK	15.00 % OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	05:21:59	MIX-ALM-TEST	0 PPB OK	15.00 % OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	05:24:00	MIX-ALM-TEST	0 PPB OK	14.71 % HIGH&STEL	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	05:33:04	MIX-ALM-TEST	0 PPB OK	-48 PPB DET_FAIL	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	05:39:27	MIX-ALM-TEST	0 PPB OK	-48 PPB UNDERFLOW	0 PPB OK	1438 PPB LOW_ALARM
08 MAR 96	05:45:37	MIX-ALM-TEST	0 PPB OK	---- DET_OFF	0 PPB OK	1440 PPB LOW_ALARM

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION	FID BACKGROUND	FID CONCENTRATION
08 MAR 96	06:05:06	MIX-ALM-TEST	0 PPB OK	15.00 % OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	06:07:04	MIX-ALM-TEST	0 PPB OK	15.00 % OVERFLOW	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	06:08:09	MIX-ALM-TEST	0 PPB OK	14.12 % HIGH&STEL	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	06:10:37	MIX-ALM-TEST	0 PPB OK	-48 PPB DET_FAIL	0 PPB OK	1458 PPB OVERFLOW
08 MAR 96	06:17:43	MIX-ALM-TEST	0 PPB OK	-48 PPB UNDERFLOW	0 PPB OK	1445 PPB LOW_ALARM
08 MAR 96	06:18:20	MIX-ALM-TEST	0 PPB OK	---- DET_OFF	0 PPB OK	1446 PPB LOW_ALARM

END

VOC Format, FID Only

LOGGED DATA
VER= 1.00

VOC DATA

DATE	TIME	TAG	FID BACKGROUND	FID CONCENTRATION
18 APR 96	16:40:57	8	0 PPB OK	1436 PPB OK

VOC DATA

DATE	TIME	TAG	FID BACKGROUND	FID CONCENTRATION
18 APR 96	17:01:29	19	2 PPB OK	30 PPB OK

END

VOC Format, PID Only

LOGGED DATA
VER= 1.00

VOC DATA

DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION
17 APR 96	19:17:02	8	0 PPB OK	600 PPM OK

VOC DATA				
DATE	TIME	TAG	PID BACKGROUND	PID CONCENTRATION
17 APR 96	19:38:36	20	4 PPB OK	55.03 PPM OK

END

Index

A

Activated Charcoal Scrubber 79

Alarm Levels 36

Alarms

 Accessing the Alarm Menu 37

 High Ceiling Alarm 39

 Low Ceiling Alarm 38

 STEL Level Alarm 37

B

Battery and Battery Charger 64

C

Calibration

 Span Reference Point 35

 Zero or Background Reference Point 34

Concentration Calculation and Calibration 10

Control Menu 21, 48

D

Date 46

Display Delay 47

Display Menus 21

E

External Influences 5

F

FID Cartridge 67

H

Hydrogen Gas Tank 65

Hydrogen Tank

 Fuel Refilling Procedure 66

 Precautions in Handling and Storage 65

I

Information Menu 48

Instrument Connections 11

Instrument Display 12

Instrument Functions 2

Instrument Keypad 13

K

Key Click 47

L

- Log Methods 39
 - Accessing the LOG Menu 41
 - Log Auto 41
 - Log None 41
 - Log VOC 42

M

- Main Menu Structure 21
- Maintenance 63

N

- Normal Operating Maintenance 64

P

- PID Cartridge 66
- Probe Connections 15
- Probe Display 15
- Probe Keypad 16, 17

R

- Removable, Renewable Parts 63
- Replacing Probe Tubing 70
- Route Entry Response Factor 60
- Run Mode 55
 - Accessing the Run Menu 56
 - Log Auto 56
 - Log None 56
 - Log VOC 57

S

- Safety Specifications 6
- Sintered Metal Probe Filter 69
- Standard Specifications 3

T

- Telescoping Extension 79
- Time of Day 47

U

- User Identification Number 46
- User Options 47
- Using the Instrument 2

Instruction

MI 611-187
June 1996

**TVA-1000
Toxic Vapor Analyzer
PC Software**

F.E.C. is a trademark of Fugitive Emissions Control, Inc.
Teflon is a trademark of E.I. duPont de Nemours and Co.

Copyright 1996 by Thermo Environmental Instruments Inc.
All rights reserved

Contents

Figures.....	v
PC Software	1
Overview	1
Running the TVA-1000 PC Program	1
Hardware and Software Configuration	2
Installation	2
5.25-Inch or 3.5-Inch Diskette Installation	2
Startup	2
Sequence of Operations — Startup	3
PC Analysis Functions	4
Data File	5
Process Data	10
Calculate	14
Utilities	16
Exit	20
PC Utility Functions	20
New Directory	21
Variables	22
Maintain Blocks	23
Delete File	24
Reorganize Files	25
Toggle Color	25
Exit	25
Index	27

Figures

1	TVA-1000 Main Menu Screen	4
2	Data File Menu	5
3	Download Data Window	5
4	Select Data Window	7
5	Filename Sequence	8
6	Serial Number Sequence	8
7	Date Sequence	9
8	Select Save Block Window	9
9	Process Data Menu	10
10	View Header Window	11
11	Enter Header Text Window	11
12	Display Data Window	12
13	Print Data Window	12
14	Typical Printout	13
15	Export Data Window	14
16	Calculate Window	15
17	Recalculate Window	15
18	Utilities Menu	16
19	Create New Directory Option	17
20	Change Program Variable Data Window	17
21	Change Setup Window	18
22	Logging Screen (Press F7)	19
23	PID/FID Screen (Press F6)	19
24	Utilities Main Menu	21
25	New Directory Menu	22
26	Change Variable Menu	22
27	Maintain Blocks Option	23
28	Delete File Option	24
29	Reorganize Files Option	25

PC Software

Overview

The TVA-1000 on-board datalogger can communicate with a PC using several methods:

- ◆ A fugitive emissions software package designed to operate with the TVA-1000 (such as F.E.M.S.)
- ◆ A communications software package capable of text transfer of ASCII files
- ◆ The TVA-1000 PC Software supplied with your unit

This chapter is devoted to discussing the TVA-1000 PC Software. For more information about the operation of other packages, refer to the instruction manual supplied with the software. For more information about uploading and downloading information to and from the TVA-1000, refer to the PCLink section of “Display Menu” in MI 611-185.

NOTE: The TVA-1000 PC Software is not designed to accept data generated using multipoint calibration curves. If you are using more than one span point for calibration of your TVA, you may not use the TVA-1000 PC Software to download data. Instead, use the PCIP software (see MI 611-186) or another communications software package and the text transfer method (or your fugitive emissions software package if it is designed to operate with the TVA-1000).

TVA-1000 PC software is a direct support tool to the TVA-1000. It is uniquely configured to match the data format of the TVA-1000 and is not applicable to any other instrumentation. The purpose of the software is to provide you with a complete set of tools to display, analyze, and print reports from the information collected by the TVA-1000. It also provides a mechanism for remote configuration of the TVA-1000 instrument. The user interface is designed so that all functions can be implemented quickly with a minimum number of key strokes and operations.

The software provides two means of invoking a function. The first is to use the keyboard cursor keys or space bar to point to a desired function and then press ENTER to invoke the function. An alternative, which gives a direct and faster response, is to type the highlighted letter of the particular function. This has the same effect as pointing with the cursor and pressing ENTER, but requires fewer keystrokes.

Running the TVA-1000 PC Program

Before attempting to run the TVA-1000 PC program for the first time, please refer to the following installation instructions for use with a hard disk system. You cannot run the program from the installation disk.

Hardware and Software Configuration

The TVA-1000 PC Software requires the following minimum PC hardware and software configuration:

- ◆ IBM 286 or higher or 100% compatible with at least 640KB RAM available with DOS 3.3 or higher.
- ◆ 5.25 inch or 3.5 inch diskette drive.
- ◆ Hard disk with at least 1 megabyte of free disk space for the software. Disk space requirements for the data will vary.
- ◆ EGA or VGA adapter card and EGA or VGA monitor.
- ◆ RS-232 serial port.
- ◆ 80-column printer.

Installation

The TVA-1000 PC software is distributed on one high density 5.25 inch diskette or one 720KB 3.5 inch diskette. Installation procedures for both are listed below.

5.25-Inch or 3.5-Inch Diskette Installation

After booting up your PC:

1. Insert the TVA-1000 PC Software Installation Disk 1 into a diskette drive and make that drive the current drive.
2. Start the installation process by typing `install [source]: [target]:` and press ENTER. In most PCs, the source drive is a: or b: and the target drive is c:.

Example: `install a: c:`

This initiates the installation process. The install procedure creates a subdirectory called \TVA in the target drive of your PC and installs the software and parameter files and the initial data files in that directory. If you wish to create additional data file directories, please refer to the Utility Menu described later in this chapter.

3. You may now remove the installation disk from the diskette drive and start up the program by selecting the PC Analysis Menu.

Startup

Note that the TVA directory contains two executable files, TVA.EXE and UTILITY.EXE. The TVA file is the main PC analysis program and the UTILITY file is the program that permits you to perform housekeeping and file manipulation functions.

To run the PC analysis functions, select the drive and directory containing the executable files, type TVA, and then press ENTER.

Similarly, to run the utility program, select the drive and directory containing the executable files, type UTILITY, and press ENTER.

Sequence of Operations — Startup

To use the system, you should first configure system variables — set the title, set the data directory path, and set the serial communication port. After this operation, you can download data from the instrument to your PC.

The procedure for configuring the system is:

1. Invoke the ANALYSIS program (type TVA and press ENTER). The main ANALYSIS menu will appear.

NOTE: If the c: drive was not the installed drive, an error message may appear. Ignore it and continue.

2. From the Main Analysis menu, select UTILITIES. A dialog box will appear.
3. Select VARIABLES. A dialog box will appear with three options: TITLE, DIRECTORY, and COM PORT.

TITLE is the name you want for your data. DIRECTORY is the full pathname of your data directory. COM PORT is the PC serial communication port you are using to transmit data from the analyzer to your PC.

4. Enter data for setting the variables and then press ESC twice. This returns you to DOS.

You can now prepare to download data from the TVA-1000 instrument to your PC. The procedure for downloading data is as follows:

1. Connect the cable between the PC and the RS-232 serial port of the instrument.
2. Turn on the TVA-1000 instrument and set the mode to PC/LINK.
3. Start the TVA program (type TVA and press ENTER).
4. From the main Analysis menu, select Data Files. This opens a dialog box with three options, Download Data, Select Data, and Select Save Block.
5. Select the Download Data option. This opens a window in which you can assign a new filename or select an existing file to which the incoming data will be appended. (The screens and options are described in detail later in this section.) After you have made your entries, press ENTER to start the download process.
6. As the downloading process proceeds, messages appear on your screen. When finished, a DOWNLOAD COMPLETE . . . PRESS ANY KEY message appears. Press a key to return to the menu. You are now ready to perform other data analysis operations, as described later in this section.

CAUTION: Do not interrupt the download process for any reason because interruption may corrupt your files.

NOTE: Error messages will appear on the PC screen if the transfer is not successful.

PC Analysis Functions

This PC Analysis menu provides the tools for you to download data from the instrument and to process the information in various ways.

From the DOS prompt, change to the drive and directory where your TVA-1000 program is installed. To begin, type TVA. The first screen you will see after the program loads is the TVA-1000 main menu screen, shown below. A description of each option follows the screen.

TEI		Analysis Menu	
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Data Files Process Data Calculate Utilities Exit </div>			
File : TEST1		2147155968 bytes remaining on the disk	

Figure 1. TVA-1000 Main Menu Screen

Option	Function
Data File	Opens the data file window. This option allows you to download data from the TVA-1000 to the PC software database and to select a data file or a save block for processing.
Process Data	Opens the process window. With this option, you can print or display data downloaded from the TVA-1000.
Calculate	This option displays the results of calculated functions based on current parameters (MIN, MAX, AVG, STEL, TWA).
Utilities	Opens the utilities window. Through this option, you can create a data directory, select variables, configure the analyzer, and toggle screen color.
Exit	Opens the exit window. This window gives you the option to terminate the program or exit temporarily to DOS and resume the program later.

The bottom left of the analysis menu screen shows the name of the current file. This filename identifies the file that will be the source of data for all subsequent processing and analysis. Only one file can be active at any given time.

The bottom right of the screen shows how much unused disk space is left. This same box is also used by the program for messages.

The top left of the screen contains the title you assigned when you set the system variables on startup.

Data File

The Data File functional group is your main access to the TVA-1000 files on your PC. The screen below shows the pull-down menu available when the data file option is selected.

TEI		Analysis Menu	
<div style="border: 1px solid black; padding: 2px; width: fit-content;"> Data Files Process Data Calculate Utilities Exit </div>			
<div style="border: 1px solid black; padding: 2px; width: fit-content;"> DownLoad Data Select Data Select Save Block </div>			
File : TEST1		2147155968 bytes remaining on the disk	

Figure 2. Data File Menu

Download Data

When the Download Data command is invoked, a window opens as shown below, prompting you for a filename that will receive the downloaded data. The filename field initially contains a default value, the current filename. You can overwrite it by typing in another filename. If you wish to use the default, just press ENTER. Pressing <F1> opens a pull-down window showing a list of filenames available in the current directory with the first file highlighted. Pressing ESC returns you to the previous window.

TEI		Analysis Menu	
<div style="border: 1px solid black; padding: 2px; width: fit-content;"> Data Files Process Data Calculate Utilities Exit </div>		<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">— DOWNLOAD FILE —</p> Current Directory C:\TVA\ Output Filename TEST1 Hit F1 for list <div style="border: 1px solid black; height: 100px; width: 100%;"></div> </div>	
<div style="border: 1px solid black; padding: 2px; width: fit-content;"> DownLoad Data Select Data Select Save Block </div>			
File : TEST1		2147155968 bytes remaining on the disk	

Figure 3. Download Data Window

The Download File window and several other windows have the Window Options box, which permits you to perform the standard actions described in the following table.

Key	Function
ESC	Allows you to enter the item manually
PgUp	Displays the previous set of items
PgDn	Displays the next set of items
Home	Displays the first set of items
End	Displays the last set of filenames
ENTER	Allows you to select the highlighted item

You can move the highlighted bar up and down the list using the cursor keys or space bar and activate your selection by pressing ENTER.

As an alternative, you can select an item by pressing the key for the first character of the item you wish to select. Unlike the menu windows, however, this simply highlights that item and does not actually select it. Press ENTER to execute your selection. The reason this differs from the menu windows is that the list may contain more than one item with the same first character. If so, the highlighted bar moves to the *first* item with that character — which may or may not be your choice. Use the cursor keys or space bar to move the highlighted bar further.

After selecting a filename from the list or manually keying in an existing filename, the Download Data window comes up. If you enter a new filename, the next window shown is displayed.

The Download Data window lets you decide whether to append data to the existing file or select a different filename. The *Append* option allows you to begin downloading the data immediately; the *Select Another* option (or pressing ESC) returns you to the download data window, in which you can enter a new filename.

Before proceeding with the download operation, make sure that the analyzer instrument is on and in the PC/Link mode. Also, make sure the cable connection between the analyzer and the PC is installed. If using a TVA-1000B, the PC LINK type must be “Foxboro.”

To begin downloading the data from the Download Data window, select *Continue*. To specify a different filename, choose *Select Another* or press ESC.

The following message then appears to signal that the program is starting the download process:

```

Ready to receive data.
Make sure analyzer is attached and online.
... FILE DOWNLOAD IN PROGRESS...
..... DO NOT INTERRUPT.....

```

The following message appears when downloading is done:

```

DOWNLOAD COMPLETE. Press ANY KEY.

```

Pressing any key returns you to the data file window.

CAUTION: Do not interrupt the download or data processing for any reason because interruption may corrupt your files.

Select Data

This option allows you to select a specific set of data for processing.

When *Select Data* is invoked, the window shown below opens. This window allows you to select the sequence in which you wish the list of stored data files to appear. Choosing the first option, *Filename Sequence*, gives you the screen shown at the top of the next page. Choosing the second option, *Serial # Sequence*, gives you the screen shown at the bottom of the next page. The third option, *Date Sequence*, gives you the screen on the following page. Pressing ESC returns you to the previous window.

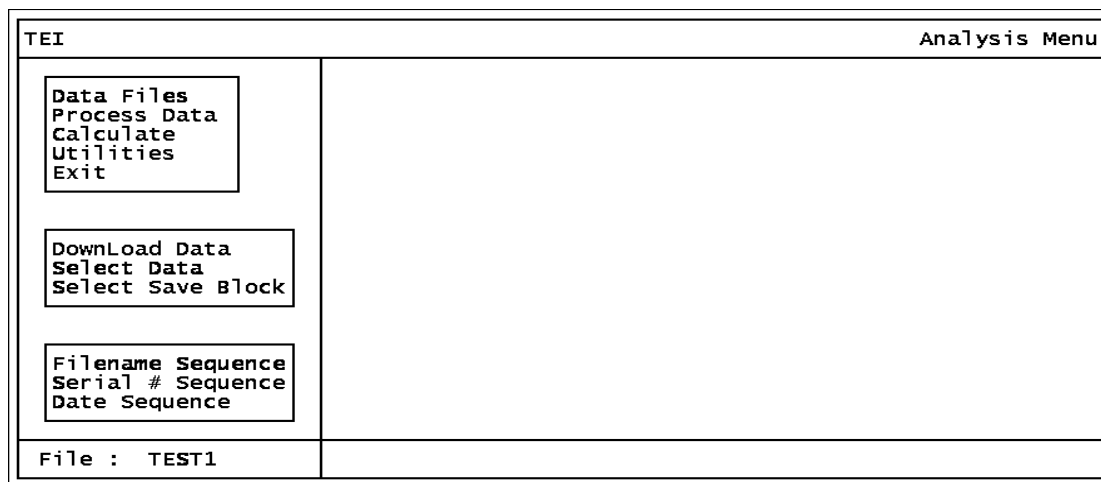


Figure 4. Select Data Window

Each time data is downloaded from the instrument to the PC, a new file is created. Within each file, a new header is created every time the instrument is placed in the RUN mode.

The sequence options are:

1. **Filename Sequence.** Selecting this option sorts files in the database alphabetically by filename.
2. **Serial # Sequence.** Selecting this option sorts files in the database by analyzer serial number.
3. **Date Sequence.** Selecting this option sorts files in the database by date of the last update of the file.

NEW HEADERS WITHIN FILE

TEI	Analysis Menu
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Data Files Process Data Calculate Utilities Exit </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> DownLoad Data Select Data Select Save Block </div> <div style="border: 1px solid black; padding: 2px;"> Filename Sequence Serial # Sequence Date Sequence </div>	<p style="text-align: center;">SELECT DATA FOR PROCESSING</p> <pre> top Filename Serial Number Date Time Log RFI1 000015868326 06/08/00 11:08:42:00 A 000015868326 06/08/00 11:10:02:00 V TEST1 000015868326 06/08/00 11:08:42:00 A 000015868326 06/08/00 11:10:02:00 V end PgUp-prev page Home-top of list Enter-select PgDn-next page End -end of list Esc -cancel </pre>
File : TEST1	

Figure 5. Filename Sequence

TEI	Analysis Menu
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> Data Files Process Data Calculate Utilities Exit </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> DownLoad Data Select Data Select Save Block </div> <div style="border: 1px solid black; padding: 2px;"> Filename Sequence Serial # Sequence Date Sequence </div>	<p style="text-align: center;">SELECT DATA FOR PROCESSING</p> <pre> top Ser Serial Number Filename Date Time Log 000015868326 RFI1 06/08/00 11:08:42:00 A TEST1 06/08/00 11:08:42:00 A RFI1 06/08/00 11:10:02:00 V TEST1 06/08/00 11:10:02:00 V end PgUp-prev page Home-top of list Enter-select PgDn-next page End -end of list Esc -cancel </pre>
File : TEST1	

Figure 6. Serial Number Sequence

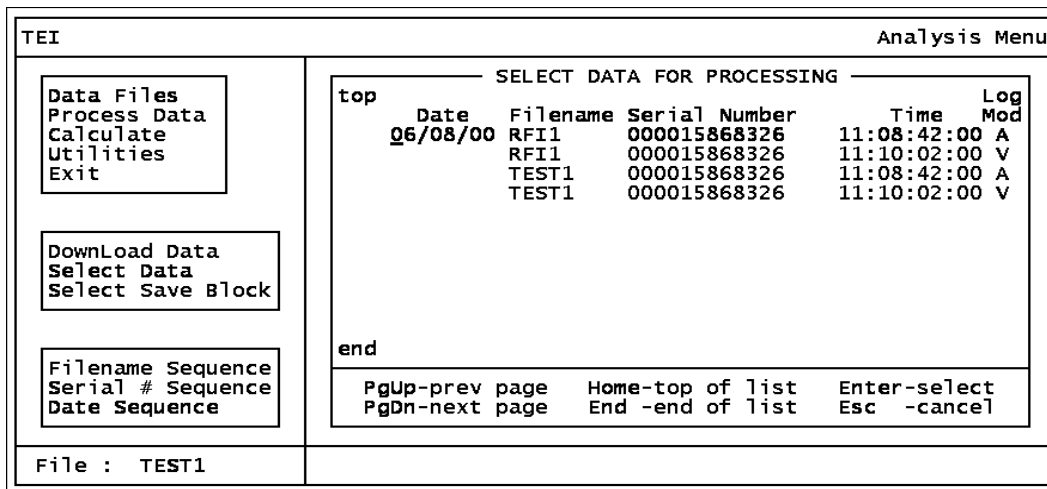


Figure 7. Date Sequence

Select Save Block

A *save block* is a name that you can assign to a set of data within a file. Using a save block, you can choose parameters pertaining to a specific set of data, such as Date and Time From and To, allowing you to process a subset of data.

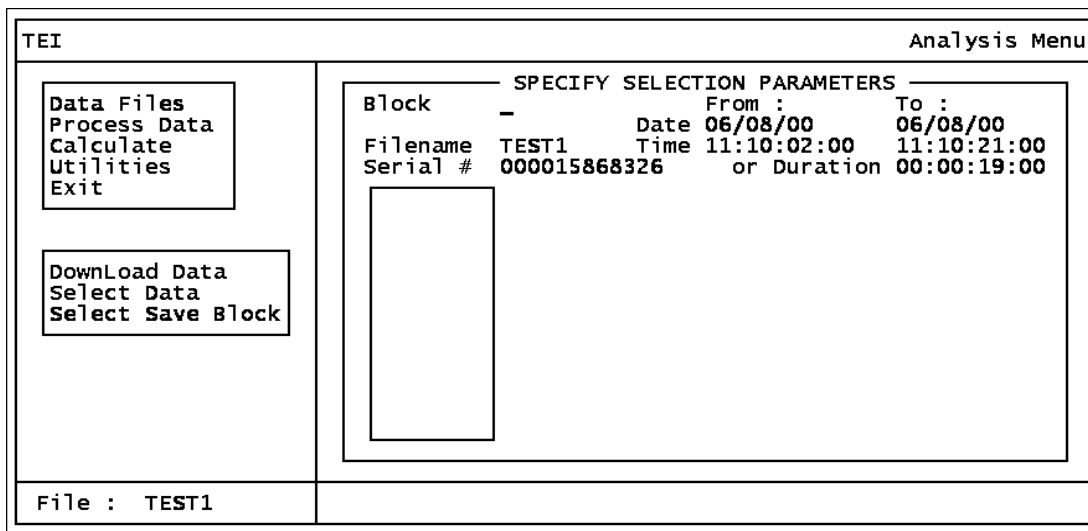


Figure 8. Select Save Block Window

When you invoke the Select Save block command, a window opens that allows you to enter a save block name, as shown above. The save block field is blank each time the screen shows up. Press <F1> to open a pull-down window showing a list of filenames available in the current directory with the first file highlighted. A window Options box also appears with a list of available commands for moving around in the list of filenames. Press ESC to return to the previous window.

Data can be selected by start and stop time/date or by start time/date and duration.

Select block data by entering the FROM date and time and the TO date and time. As an alternative, you can enter all 0's for the TO time and then enter the DURATION. (The software then calculates the TO time by adding the DURATION to the FROM time.) Use the TAB key to move from field to field.

After you enter a save block name or select one from the list, the program allows you to change the date, time, or duration parameters. After you make an entry, a dialog box with two options, *Confirm* and *Redo*, appears. Choosing *Redo* or pressing ESC allows you to change the parameters again. *Confirm* changes the parameters and brings you back to the data file window.

Process Data

The Process Data group of functions is your means of printing or displaying data obtained from your TVA-1000. The screen below displays the menu of available options.

TEI		Analysis Menu	
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> Data Files Process Data Calculate Utilities Exit </div>			
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> View Header Display Data Print Data Export Data </div>			
File : TEST1		2147155968 bytes remaining on the disk	

Figure 9. Process Data Menu

View Header

When this option is selected, the complete set of header data is displayed as shown below in the upper screen. Press F7 to display the data logging status of the data block. Press F8 to switch between PID and FID data. Press F9 to enter header text as shown in the lower screen. Press F10 to print header and text data.

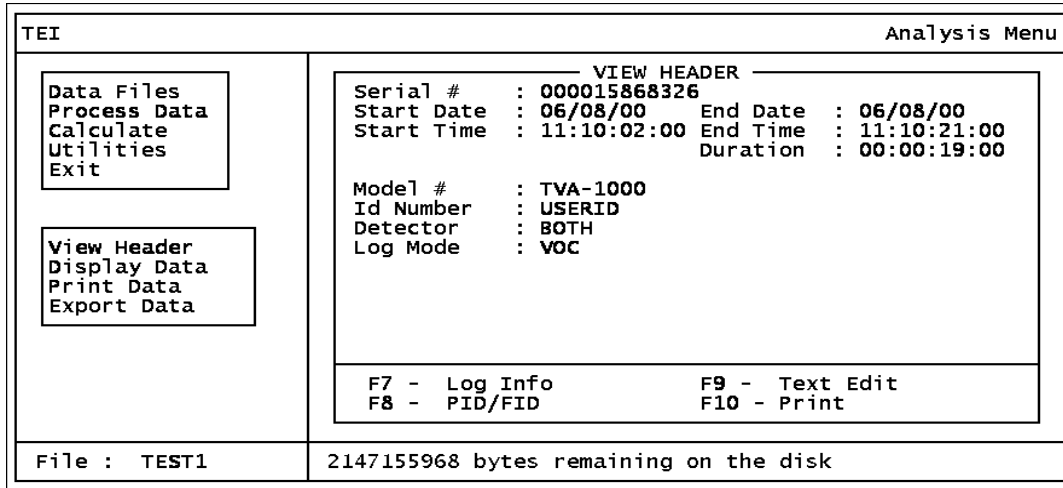


Figure 10. View Header Window

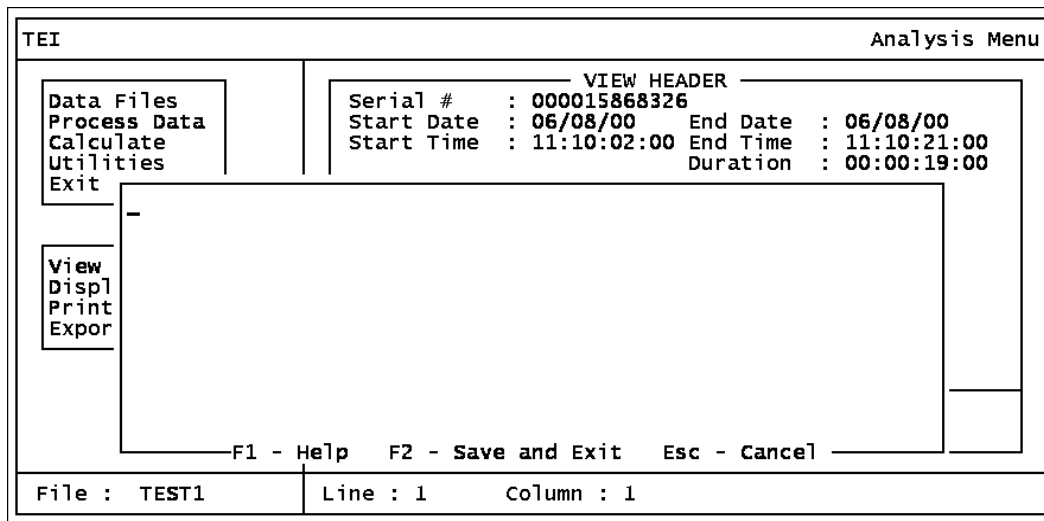


Figure 11. Enter Header Text Window

NOTE: Header text appears only on printed page under header.

Display Data

When this option is selected, the complete set of data covered by the current parameters is displayed 13 lines at a time as shown in the screen below. You can move around the data by using the following keys:

- ◆ PgUp displays the previous page of data,
- ◆ PgDn displays the next page of data,
- ◆ HOME displays the first page of data,

- ◆ END displays the last page of data,
- ◆ ENTER works the same way as PgDn.

The top left corner of the display shows the word *top* if you're at the top of the list. The bottom left corner of the display will show the word *end* if you are at the end of the list. Both corners will show the word *more* if you're neither at the top nor the end of the list. Pressing ESC returns you to the Process Data window. The alarm levels refer to the alarm levels shown in the header (L=Low Ceiling, H=High Ceiling, S=STEL).

```
TEI Analysis Menu
----- DISPLAY DATA -----
top
Date      Time      PID (PPB)  ALARM      FID (PPB)  ALARM      Tag
06/08/00  11:10:02:00  0          0          0          0          LOC
          11:10:21:00  0          0
end

PgUp - previous page      Home - top of list
PgDn - next page          End - end of list

File : TEST1
```

Figure 12. Display Data Window

Print Data

Choosing this option displays the window shown below. However, before that window comes up, the following message appears at the bottom of the current screen:

Selecting records for processing

The message remains until the selection process is complete.

```
TEI Analysis Menu

Data Files
Process Data
Calculate
Utilities
Exit

View Header
Display Data
Print Data
Export Data

----- PRINT DATA -----
Serial #   : 000015868326
Start Date : 06/08/00      End Date  : 06/08/00
Start Time : 11:10:02:00  End Time  : 11:10:21:00
                        Duration : 00:00:19:00

Model #    : TVA-1000
Id Number  : USERID
Detector   : BOTH
Log Mode   : VOC

Prepare printer and press ENTER when ready or
hit ESC to cancel...

File : TEST1
```

Figure 13. Print Data Window

Before starting, make sure that the printer is connected and turned on.

Pressing ENTER from the window gives the following message:

```
..... PRINTING IN PROGRESS.....
..... Press ESC KEY TO CANCEL.....
```

Pressing ESC will give you the following message:

```
Print Cancelled. Press Any Key...
```

The following message appears when printing is done:

```
FINISHED PRINTING. Press ANY KEY...
```

Hitting any key returns you to the Process Data window.

The following figure shows a typical printout of logged data.

```

FOXBORO                                     Page : 1
Detailed Data Listing                       08/05/93

Header Information :
Serial Nbr   : 0000000A01F4                Filename   : TEST15
Start Date  : 07/28/93                     End Date   : 07/28/93
Start Time  : 11:20:57:00                  End Time   : 11:22:36:00

Selection Parameters :
Save Block   :                               To       : 07/28/93
Date From   : 07/28/93                     To       : 11:22:36:00
Time From   : 11:20:57:00                  Duration  : 00:01:39:00

  Date      Time      PID (PPM) Alarm   FID (PPM) Alarm   Tag
  -----  -
07/28/93  11:20:57:00    187.1           L       157.1           L
          11:21:29:00    436.6           L       519.6           L
          11:21:54:00    708.4          LH       847.0          LH
          11:22:19:00    300.7           L       381.9           L
          11:22:36:00    223.8           L       265.1           L

```

Figure 14. Typical Printout

Export Data

Choosing this option permits you to create an ASCII text file containing data in a form that can be easily read by other utility programs for post processing.

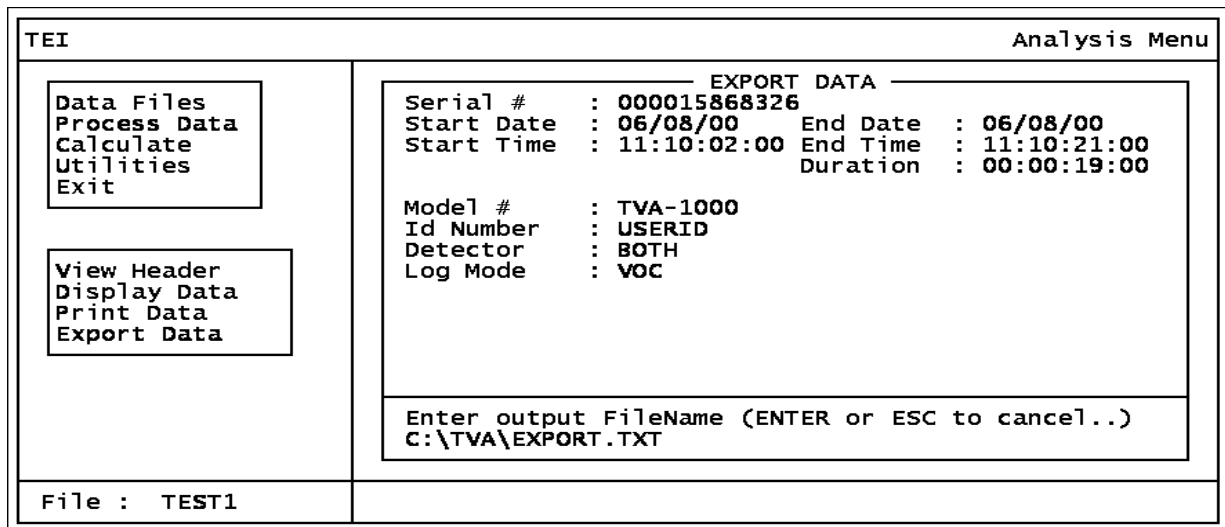


Figure 15. Export Data Window

When this screen appears, type in a name for the file, including the complete pathname. Press ENTER to start exporting the file.

Pressing ENTER from the window displays the following message:

```

..... EXPORT IN PROGRESS.....
..... Press ESC KEY TO CANCEL.....
    
```

Pressing ESC will give you the following message:

```

Export Cancelled. Press Any Key...
    
```

The following message appears when printing is done:

```

FINISHED EXPORTING. Press ANY KEY...
    
```

Hitting any key returns you to the Process Data window.

Calculate

The *calculate* functional group displays the results of computations on the data based on your specified parameters. Choosing this option gives you the screen shown below. To change the parameters, press F9. If you specify a new set of parameters, the program re-calculates, which generally takes some time. Pressing F10 prints the results from the screen. Pressing ESC returns you to the main menu screen.

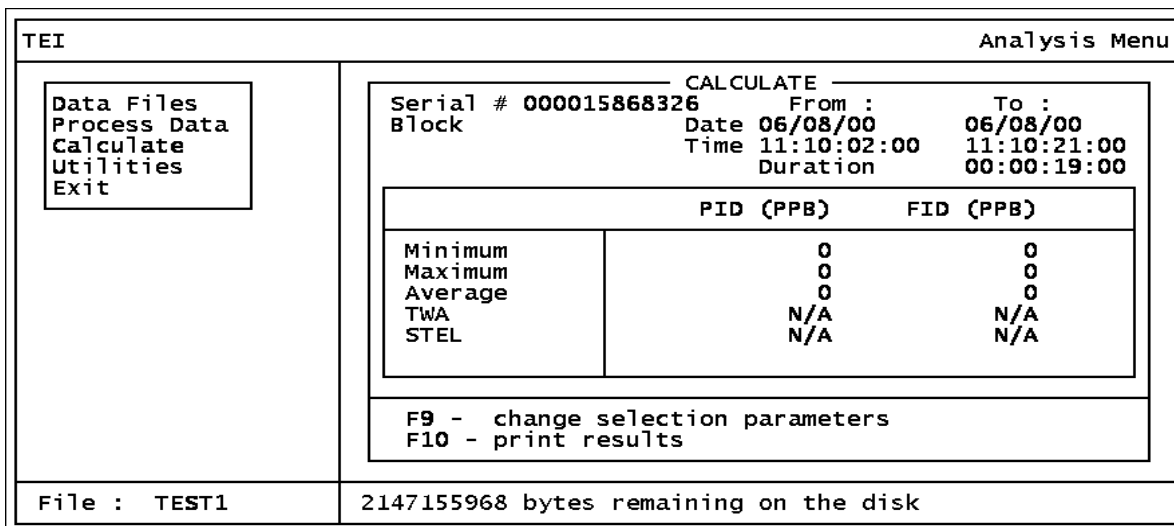


Figure 16. Calculate Window

The calculated data is defined as follows:

- Minimum: Minimum value in the data block.
- Maximum: Maximum value in the data block.
- Average: Average value for the data block.
- TWA: Time-weighted average for a 8-hour period. If less than 8 hours of data is available, N/A (Not Applicable) is displayed.
- STEL: Maximum recorded Short Term Exposure Level (average value in a 15-minute window). If the data block is less than 10 minutes, N/A is displayed.

Pressing F9 displays the screen below. This screen permits you to select a block. (Press F1 for a list). Pressing ENTER causes the program to recalculate and display new values.

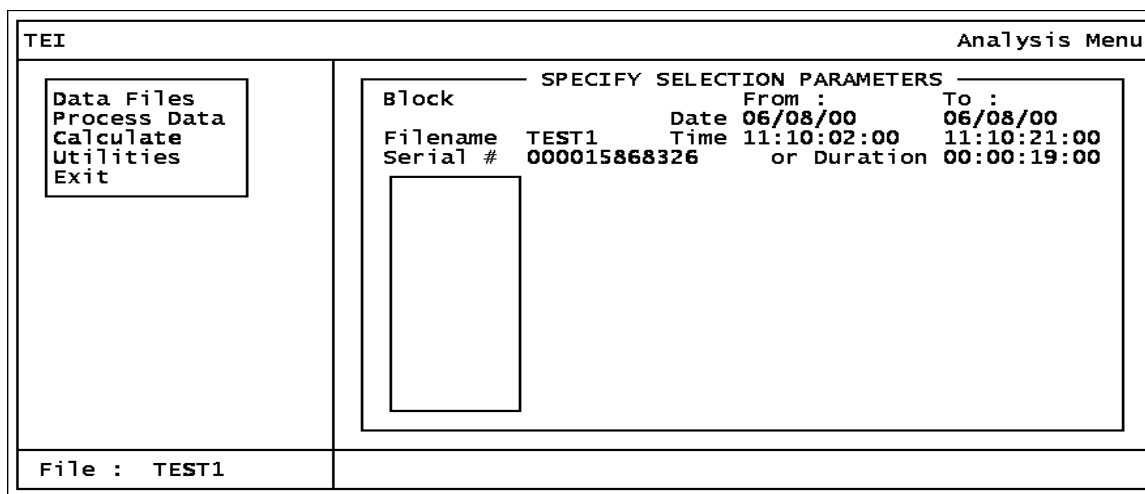


Figure 17. Recalculate Window

Utilities

This option gives you the capability to create a new directory, change TVA-1000 setup parameters, program variables, and toggle the screen color from full color mode to a simpler color mode.

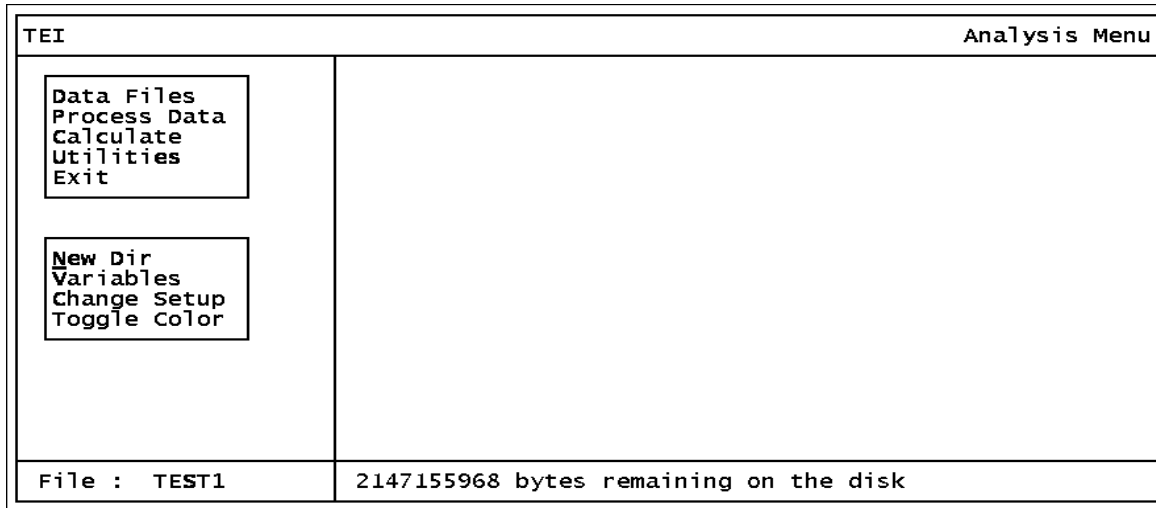


Figure 18. Utilities Menu

New Directory

Selecting this option enables you to create a new data directory, using the screen shown below. The TVA-1000 PC software will create a new directory with your specified directory name and will also create standard database files in the new directory. Note that in entering the directory name, you should not type a trailing backslash — the program adds it automatically.

After you type in the new directory name (with complete pathname), a dialog box with two options, *Confirm* and *Redo*, appears. Selecting *Confirm* actually creates the new directory and files and returns you to the utilities window. Selecting *Redo Options* lets you enter a different directory name.

After you create a new directory, you must select *Variables* and then enter the name of the new directory in order to use it.

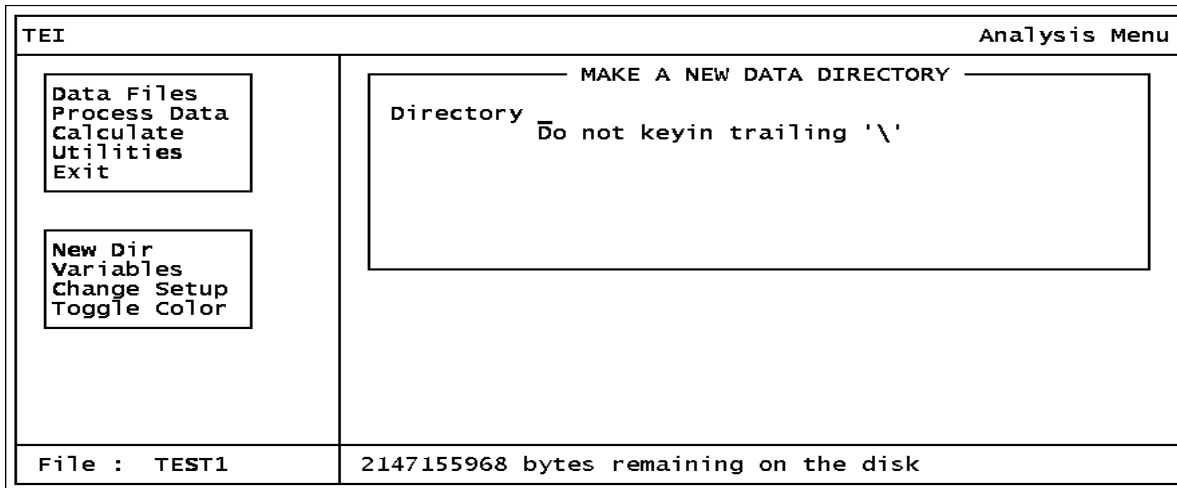


Figure 19. Create New Directory Option

Variables

Choosing this option displays the window shown below. Overwrite any current value by typing in a new value and press ENTER. After pressing ENTER for the last variable, a dialog box with two options, *Confirm* and *Redo*, appears. Choosing *Confirm* executes your changes. Choosing *Redo* lets you enter the changes again.

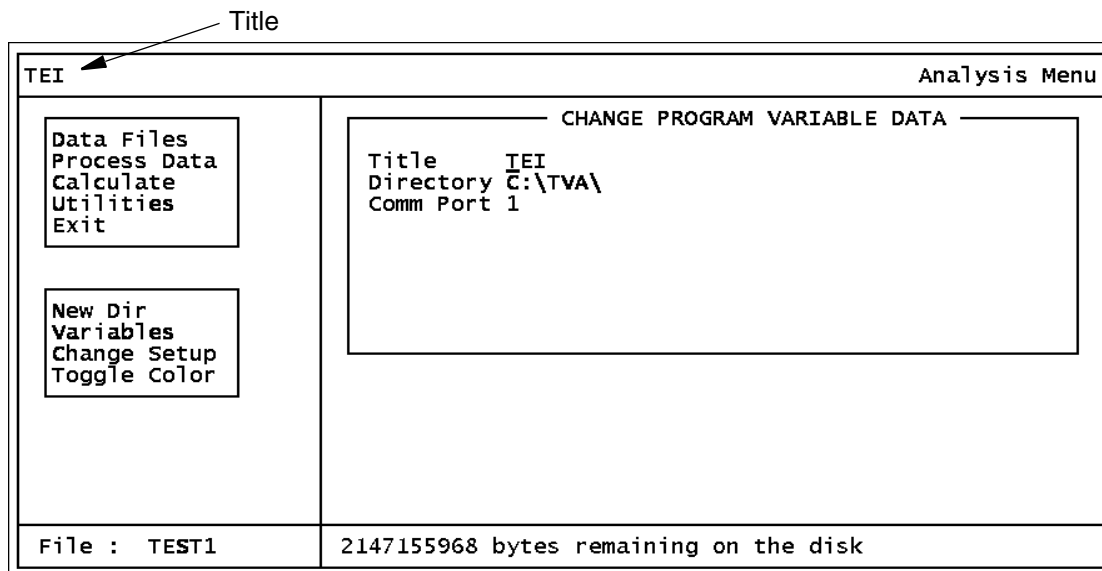


Figure 20. Change Program Variable Data Window

The three variables are defined as follows:

1. *Title*: This is the name you assign to your data, project, plant, etc. It is displayed in the upper left corner of every screen.
2. *Directory*: This is the full place-name of your data directory. Make sure you have created the directory before you try to enter it in this screen.
3. *Comm Port*: This is the serial port on your PC to which the analyzer is connected.

Change Setup

Use this function to configure the analyzer remotely from a PC. Before using this function, be sure that the analyzer is connected to the PC and that it is in the PC/Link mode.

Choosing this function displays the window shown below. You can choose one of four options:

1. Type in a known name under which setup parameters have been previously saved (up to eight characters).
2. Press F1 to select from a list of names.
3. Press F2 to retrieve current values from the instrument.
4. Press F3 to create a new configuration file.

After the setup values have been retrieved from the saved file or from the analyzer or after you initialize them by pressing F3, the screen shown at the top of the next page appears. This screen allows you to change any of the setup parameters displayed, validating each entry as you type it in. Where applicable, a pop-up menu listing valid values such as the one shown below for the *Units* parameter is provided. A cursor, highlighting the current field, can be moved up or down by the ENTER or arrow keys. Hitting F4 is the same as retyping the old value for the highlighted setup field. To indicate that a pop-up menu is available for the highlighted field, the message *Press F1 for list* is displayed beside a highlighted field.

After changing the setup parameters, you can execute any of the following actions:

1. Press F2 and save the parameters under the old name.
2. Press F3 and save the parameters under another name or a new name.
3. Press F5 and send the parameters to the instrument, thus changing the instrument settings.
4. Press ESC and then type *Y* to cancel all changes and return to the utilities window.

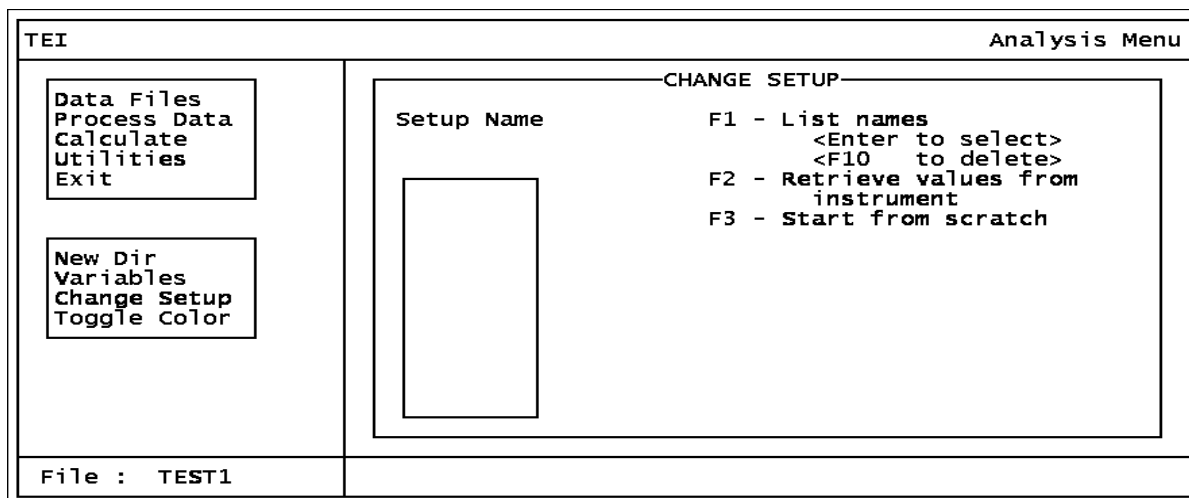


Figure 21. Change Setup Window

TEI		Analysis Menu	
<div style="border: 1px solid black; padding: 2px; width: fit-content;"> Data Files Process Data Calculate Utilities Exit </div> <div style="border: 1px solid black; padding: 2px; width: fit-content;"> New Dir Variables Change Setup Toggle Color </div>	Log	Old	New
	Detectors : BOTH Operator Id : USERID Logging Mode : VOC Logging Rate : 002 Units : SECONDS Key Click : OFF Display Delay : MEDIUM	BOTH 1234 AUTO 010 SECONDS OFF MEDIUM	BOTH 1234 AUTO 010 SECONDS OFF MEDIUM
F2 - save as <none> F3 - save as F4 - restore value		F5 - transmit setup F6 - PID/FID F7 - Logging	
File : TEST1			

Figure 22. Logging Screen (Press F7)

TEI		Analysis Menu	
<div style="border: 1px solid black; padding: 2px; width: fit-content;"> Data Files Process Data Calculate Utilities Exit </div> <div style="border: 1px solid black; padding: 2px; width: fit-content;"> New Dir Variables Change Setup Toggle Color </div>	PID	Old	New
	Zero/Bg Indicator : Z Zero/Bg Gas Counts : 0000000000 Span Gas Counts : 0000000000 Calibration Value : 000000 Units : PPB Response Factor : 01.00 Alarm Level Low : 000.00 Units : PPM Alarm Level High : 000.00 Units : PPM Alarm Level STEL : 000.00 Units : PPM	Z 0000000000 0000000000 000000 PPB 01.00 000.00 PPM 000.00 PPM 000.00 PPM	Z 0000000000 0000000000 000000 PPB 01.00 000.00 PPM 000.00 PPM
F2 - save as <none> F3 - save as F4 - restore value		F5 - transmit setup F6 - PID/FID F7 - Logging	
File : TEST1			

Figure 23. PID/FID Screen (Press F6)

As noted in the preceding screens, you can use the function keys to perform the following operations:

Key	Function
F2	Saves the current configuration as <new>. To save the new setup, assign a new name and press F3. You can then press ESC and C (Change Setup), F1, and select your new name to bring up the screen with your new setup data.
F3	Displays a dialog box in which you enter a filename of a file in which the current setup data will be saved.
F4	Restores the previous value to a data entry item.
F5	Transmits the current setup information over the serial line to the analyzer.
F6	Selects FID or PID detector screen.
F7	Selects the logging parameter screen.

Toggle Color

Selecting this option allows you to switch back and forth between a full-color mode and a simpler color mode.

Exit

This option allows you to leave the TVA-1000 PC ANALYSIS program.

Return to DOS

Before returning to DOS, you can save current settings. *Save Settings* gives you the option to save the current filename and parameters into the TVA-1000 configuration and then return to the DOS prompt. If you select *Do Not Save*, current settings are discarded and the values in effect when you started the program are retained (except for user-modifiable variables).

PC Utility Functions

To run the Utility Menu program, first return to DOS and select the TVA directory. At the DOS prompt, type **utility** and press ENTER. This invokes the utility program.

The first screen you see after the program loads is the main menu screen, shown below. The table following the screen describes each option.

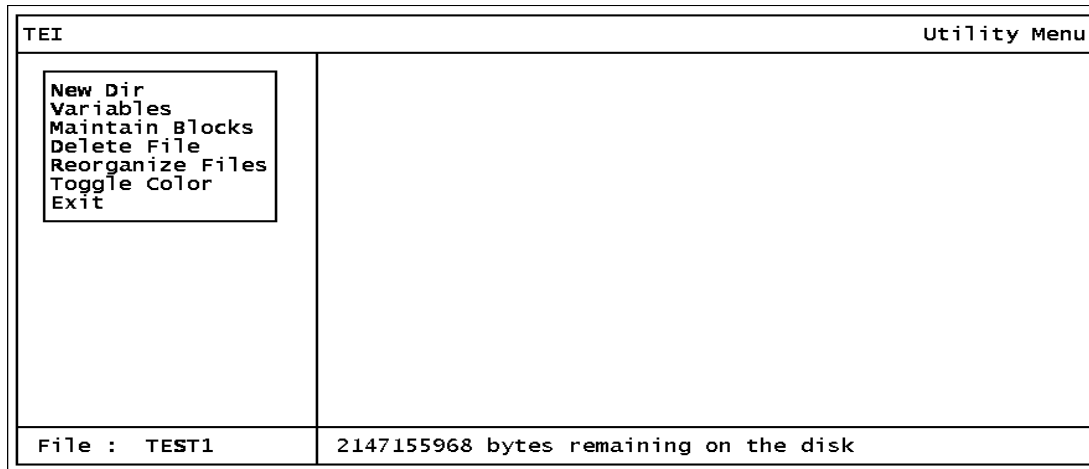


Figure 24. Utilities Main Menu

Key	Function
New Dir	This option allows you to create a new data directory.
Variables	This option allows to change the current data directory and select the serial port.
Maintain Blocks	This option allows you to rename, copy, or delete save blocks.
Delete File (see note)	This option allows you to delete an existing data file from the current directory.
Reorganize Files	This option allows you to rename, copy or rebuild a file to improve performance.
Exit	Opens the exit window. This window gives you the option to terminate the program or exit temporarily to DOS and resume the program.

*NOTE: This is the **only method** you should use for deleting a data file. Do not use the DOS Delete command.*

The bottom left of the Utility Menu screen shows the current file. This filename indicates the database that you selected using the Analysis Menu program. The bottom right of the screen shows how much disk space is left. This same box will also be used by the program for messages. Note that you cannot delete or rename the current file current save block.

New Directory

Selecting this option enables you to create a new data directory, using the screen shown below. The software creates a new directory with your specified directory pathname and also creates standard database files in the new directory. After you type in the new directory name, a dialog box appears with two options, *Confirm* and *Redo*. *Confirm* actually creates the new directory and associated files and returns you to the main menu. *Redo Options* lets you enter a different directory name.

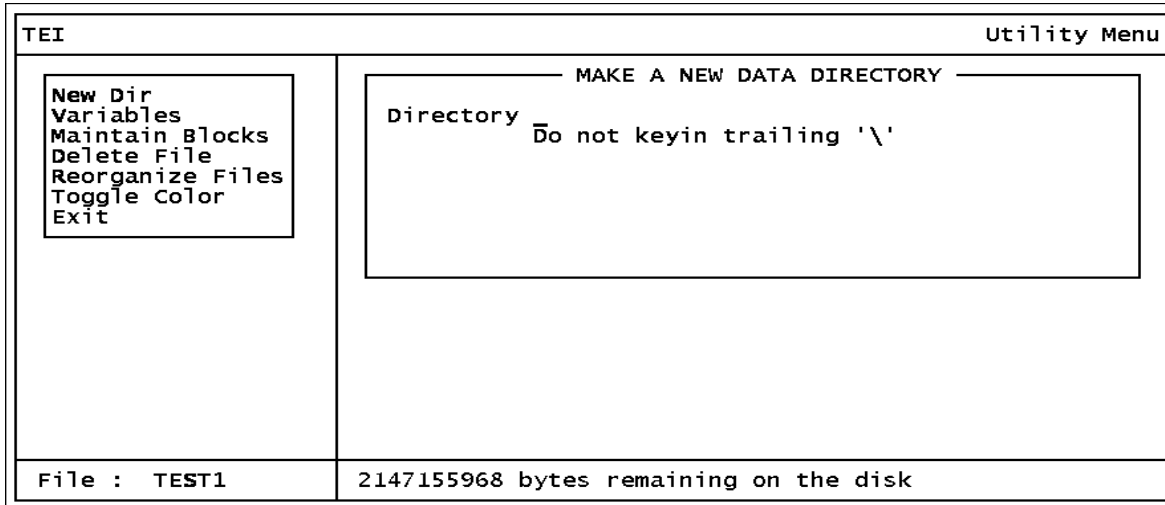


Figure 25. New Directory Menu

Variables

Choosing this option permits you to change the working data directory, enter a new screen title, and set the communication port, using the screen shown below.

The default value of directory is the current directory. You can overwrite any values by typing in a new value and pressing ENTER. This action brings up a dialog box with two options, *Confirm* and *Redo Options*. *Confirm* executes the changes and returns you to the utility window. *Redo Options* allows you to make more changes.

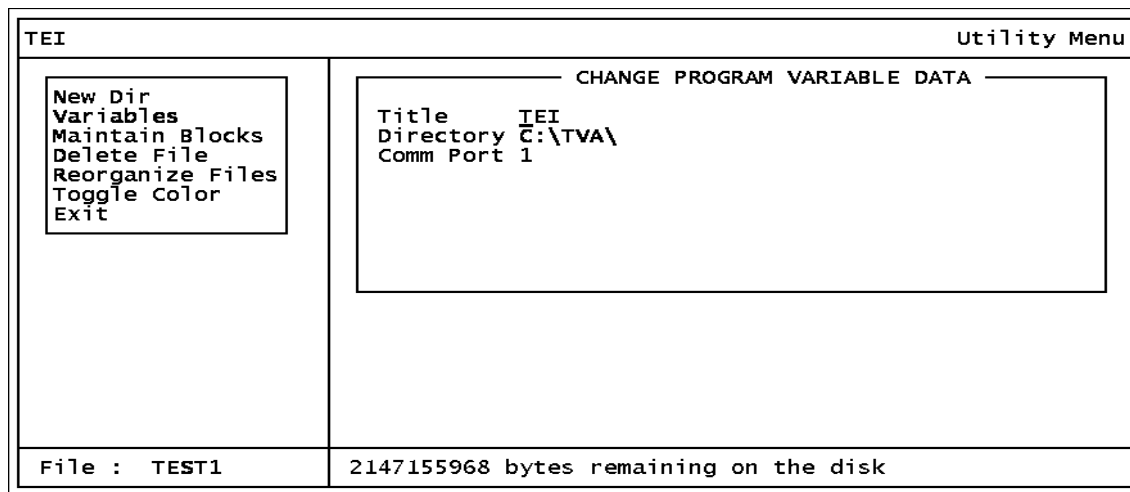


Figure 26. Change Variable Menu

The three variables are defined as follows:

1. *Title*: This is the name you assign to your data, project, plant, etc. It is displayed in the upper left corner of every screen.

2. *Directory*: This is the full pathname of your data directory. Make sure you have created the directory before you try to enter it in this screen.
3. *Comm Port*: This the serial port on your PC to which the analyzer is connected.

Maintain Blocks

This option allows you to rename, copy, or delete Save Blocks created with the Analysis utility. When you invoke the Maintain Blocks command, a window opens allowing entry of a save block name, as shown in the screen below. The save block field is blank each time the screen appears. Pressing F1 opens a pull-down window that shows a list of filenames available in the current directory — with the first file highlighted. Pressing ESC returns you to the previous window.

NOTE: You cannot rename the currently selected block.

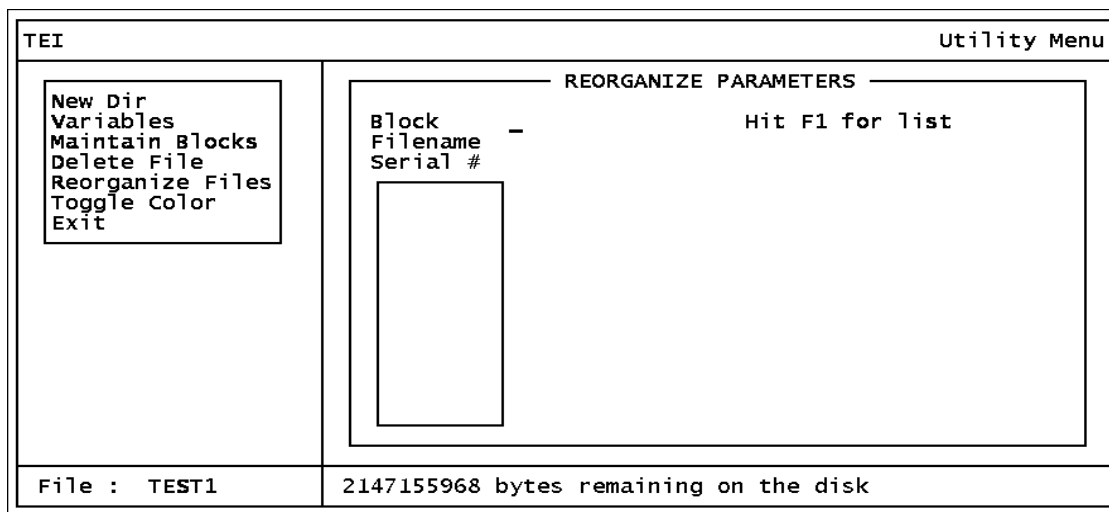


Figure 27. Maintain Blocks Option

Note that the *Maintain Blocks* window and several other windows display the *Window Options* box. The actions you may perform when this box is displayed, are:

Key	Function
ESC	Allows you to enter the item manually
PgUp	Displays the previous set of items
PgDn	Displays the next set of items
Home	Displays the first set of items
End	Displays the last set of filenames
ENTER	Allows you to select the highlighted item

You can move the highlighted bar up and down the list by using the cursor keys or space bar.

You may also press the key corresponding to the first character of the item you wish to select. Unlike the menu windows, however, this simply highlights that item and does not actually select it. To select an item, press ENTER. The reason for this is that more than one item on the list may have the same first character. If so, the highlighted bar moves to the first item with that character, which may or may not be your choice. Use the cursor keys or space bar to move the highlighted bar further.

After typing in a save block name or selecting one from the list, a dialog box with three options, *Rename*, *Copy*, and *Delete*, is displayed. If you choose *Rename* or *Copy*, you are asked to type in a new save block name. (Note, however, that you cannot rename the current block.) Pressing ENTER will rename or copy the current save block to the new save block. The following message then appears:

Save Block Renamed or
Save Block Copied

Choosing *Delete* displays another dialog box with two options, *Confirm Delete* and *Redo Options*. Choosing *Confirm Delete* deletes the save block and the following message appears:

Save Block Deleted

Choosing *Redo Options* takes you back to save block name entry.

Delete File

Choosing this option (see note below) gives you the window shown below which allows you to type in a filename to be deleted. Pressing <F1> opens a pull-down window showing a list of filenames available in the current directory with the first filename highlighted. Pressing ESC returns you to the previous window. After typing in a filename or selecting one from the list, a dialog box with two options, *Delete File* and *Select Another* appears. Choosing *Delete File* deletes the file and *Select Another* returns you to filename entry.

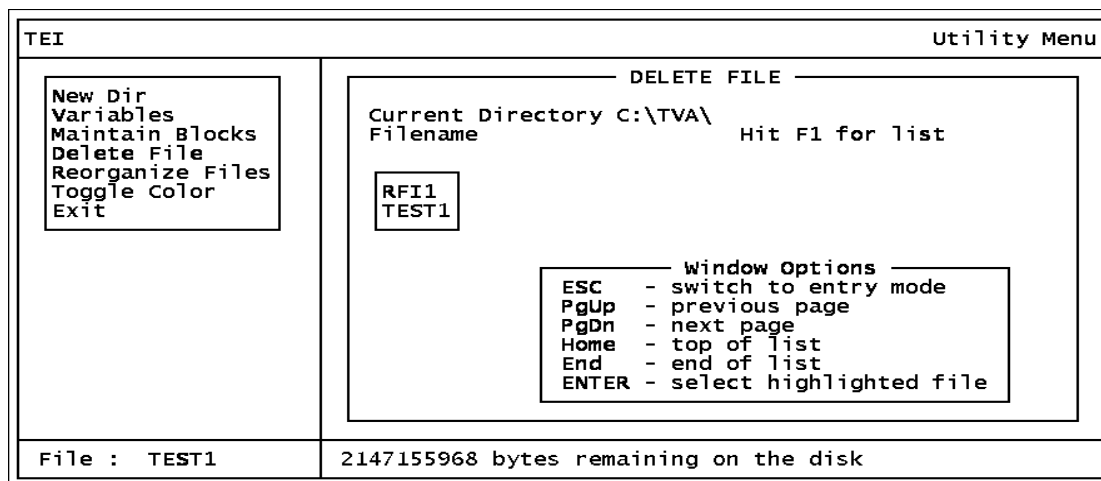


Figure 28. Delete File Option

NOTE: This is the only method you should use for deleting a data file. Do not use the DOS Delete command.

Reorganize Files

Choosing this option gives you the window shown below, which allows you to type in a filename to be reorganized. Pressing F1 opens a pull-down window showing a list of filenames available in the current directory with the first filename highlighted. Pressing ESC returns you to the previous window. After typing in a filename or selecting one from the list, a dialog box with three options, *Rename*, *Copy*, and *Rebuild* appears. If you choose *Rename* or *Copy*, you are asked to type in a new filename. Pressing ENTER renames or copies the current file to the new filename. The following message then appears:

File Renamed or
File Copied

Choosing *Rebuild* re-indexes and rebuilds your file. The following message appears when this process is done:

File Rebuild Completed

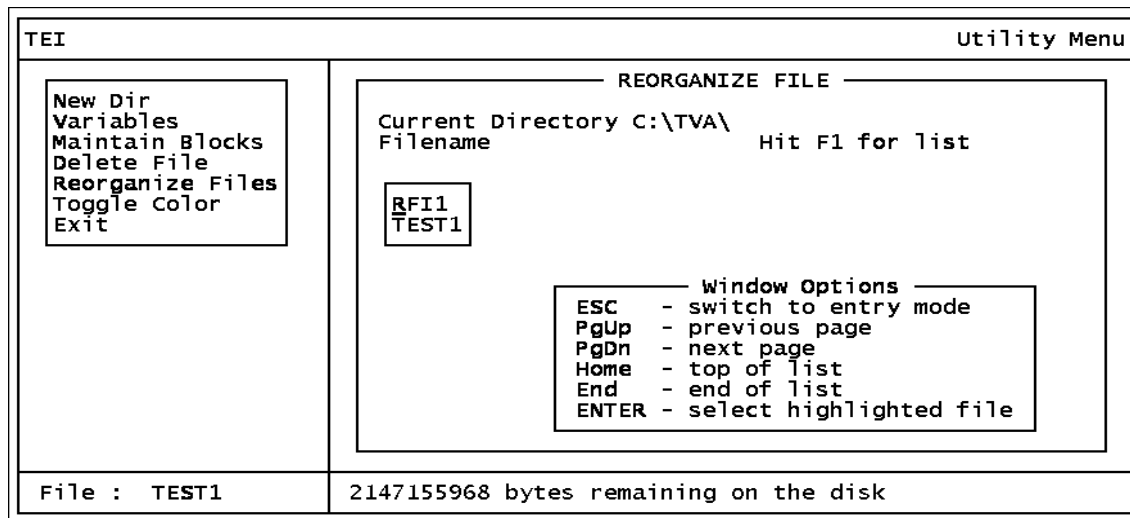


Figure 29. Reorganize Files Option

Toggle Color

Selecting this option allows you to switch between a full-color mode and a simpler color mode.

Exit

This option allows you to leave the Utility Menu program. Selecting this option displays a dialog box with two options, *Return to DOS* and *Shell to DOS*.

Index

H

Hardware and Software Configuration 2

I

Installation 2

P

PC Analysis

 Calculate 14

 Change Setup 18

 Data File 5

 Display Data 11

 Download Data 5

 Exit 20

 Functions 4

 New Directory 16

 Process Data 10

 Return to DOS 20

 Select Data 7

 Select Save Block 9

 Shell to DOS 20

 Toggle Color 20

 Utilities 16

 Variables 17

 View Header 10

PC Software 1

 Overview 1

 Running the TVA-1000 PC Program 1

 Startup 2

PC Utility

 Delete File 24

 Exit 25

 Functions 20

 Maintain Blocks 23

 New Directory 21

 Reorganize Files 25

 Toggle Color 25

 Variables 22

Instruction

MI 611-186

June 1996

**Personal Computer Interface Program (PCIP)
Software for Interfacing a PC and an Analyzer**

MI 611-186 – June 1996

TVA-1000 is a trademark of Thermo Environmental Instruments Inc.

Copyright 1996 by Thermo Environmental Instruments
All rights reserved

Contents

- Figures..... v

- Getting Started..... 1
 - Loading the PCIP Software 1
 - Configuring Your System 1
 - Connecting Your PC to the TVA-1000B Analyzer 4
 - Starting the PCIP Program 4

- Overview 7

- Reference Documents 7

- PCIP Functions 7
 - Using the PCIP Software Package 8
 - Main Menu Screen 9
 - PCIP Configuration Screen 10
 - HELP Screen 11
 - File Menu Screen 12
 - File Receive Screen 13
 - File Send Screen 14
 - Typical File Edit Screen 15

- Examples 17
 - Receiving a File 18
 - Sending a File 20
 - Error Detection/Correction 21
 - Mock Calibration File 23
 - Mock Configuration File 24
 - Mock Route File 25

- Index 27

Figures

1	Microsoft Diagnostic Screen 1	1
2	Microsoft Diagnostic Screen 2	2
3	Microsoft Diagnostic Screen 3	2
4	Microsoft Diagnostic Screen 4	3
5	Microsoft Diagnostic Screen 5	3
6	Main Menu Screen	4
7	PCIP Configuration Screen	5
8	System Setup	7
9	Main Menu Screen	9
10	Configuration Screen	10
11	Typical HELP Screen	11
12	File Menu Screen	12
13	File Receive Screen	13
14	File Send Screen	14
15	Typical File Edit Screen	15
16	Mock Calibration File – Screen 1	23
17	Mock Calibration File – Screen 2	23
18	Mock Configuration File – Screen 1	24
19	Mock Configuration File – Screen 2	24
20	Mock Configuration File – Screen 3	24
21	Mock Route File – Screen 1	25
22	Mock Route File – Screen 2	25

Getting Started

Loading the PCIP Software

The TVA-1000B PC Interface Package software consists of files distributed on one 3.5-in diskette. The main files are:

- ◆ pcip.exe Executable program file
- ◆ pcip.cfg Configuration file
- ◆ pcip.hlp Help file
- ◆ pcip.def Instrument definition file

The program can be executed from Windows or directly from DOS.

The load procedure is as follows:

1. On your PC (or network), create a directory for the PCIP software on your working drive. You may also want to create a different directory to hold the various data files for your application. If not, you can use the same directory for both PCIP and data files.
2. Insert the distribution diskette into your diskette drive.
3. Copy all files from the distribution diskette to your new PCIP directory. This completes the load procedure.

Configuring Your System

Before attempting to run the PCIP software, check the configuration of serial ports on your PC, using the following procedure (for DOS Version 3.1 or greater):

1. Close your files and exit from Windows.
2. Change to your root directory by typing `cd:\<Enter>`.
3. Type `MSD`. The following screen, or something similar, appears.

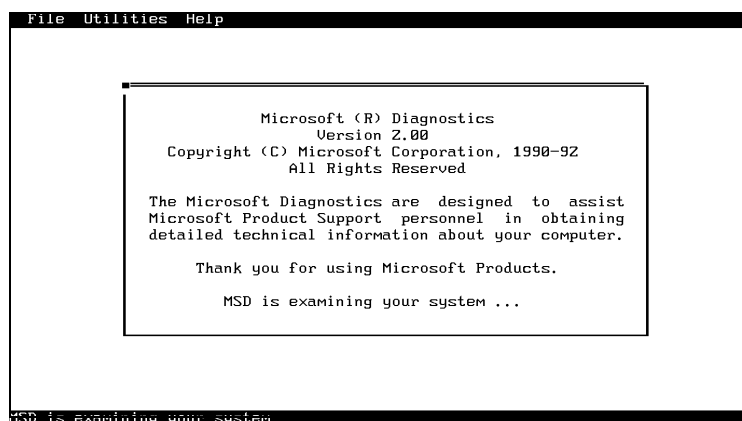


Figure 1. Microsoft Diagnostic Screen 1

NOTE: In order for the analyzer and a personal computer to communicate, the PC must be equipped with a serial port configured with its own unique IRQ (interrupt request). If, for example, you will be using COM2 with an IRQ of 3, no other device can share this interrupt.

The next screen appears automatically.

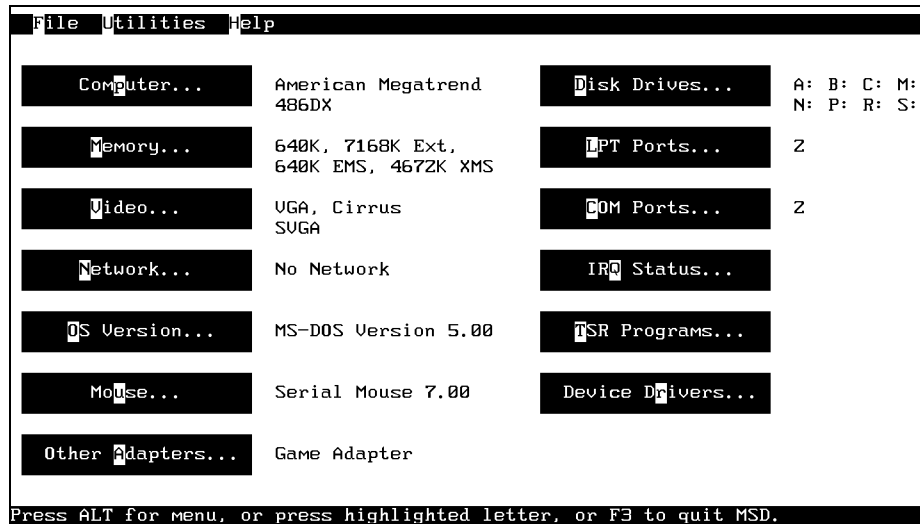


Figure 2. Microsoft Diagnostic Screen 2

- Click on Com Ports (or type “C”). This displays the status of your serial COM ports, as shown in the next screen.

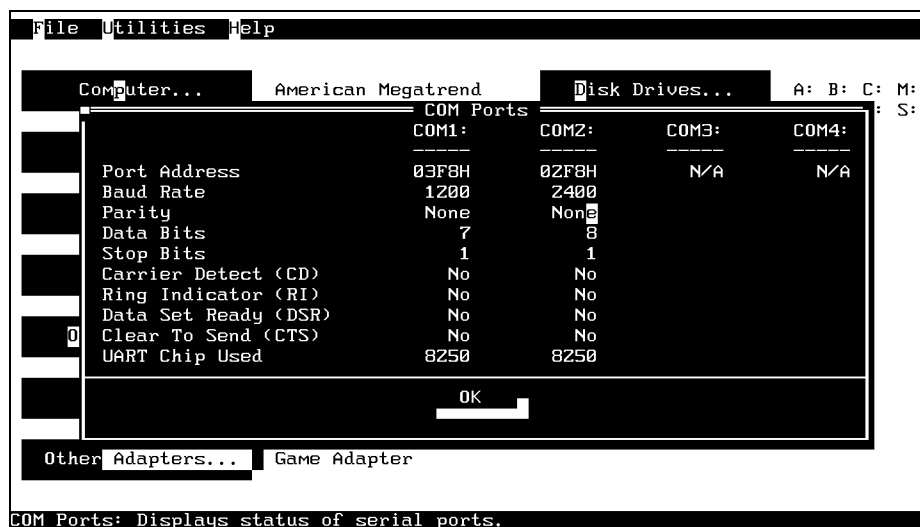


Figure 3. Microsoft Diagnostic Screen 3

- Note the parameters for your serial ports. The PCIP configuration must be set to match these settings.

6. When ready to leave the screen, click on OK. The following screen then appears.

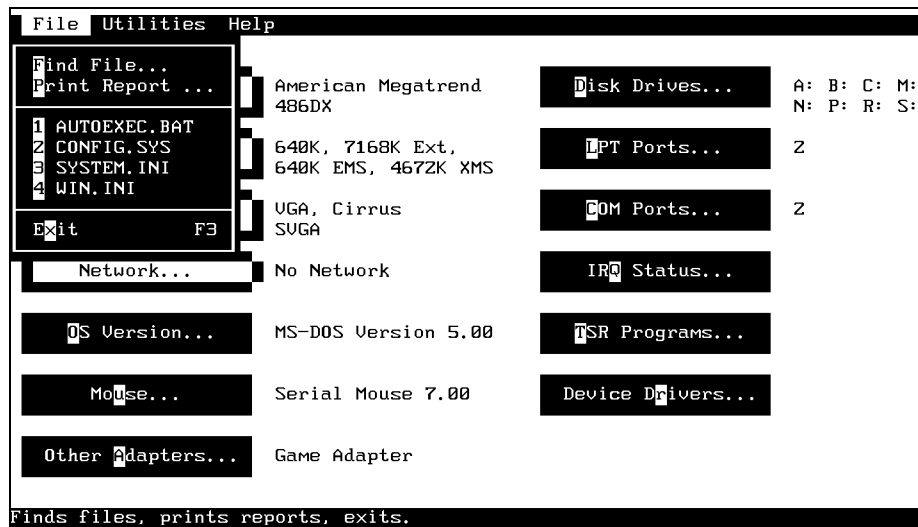


Figure 4. Microsoft Diagnostic Screen 4

7. Check on the configuration status of the interrupt requests by clicking on IRQ Status (or type "Q"). The following screen then appears:

IRQ	Address	Description	Detected	Handled By
0	2B12:0000	Timer Click	Yes	win386.exe
1	2971:18CD	Keyboard	Yes	GRAB.EXE
2	2169:0057	Second 8259A	Yes	Default Handlers
3	2169:006F	COM2: COM4:	COM2:	Default Handlers
4	2313:3B08	COM1: COM3:	COM1: Serial Mouse	MOUSE.COM
5	027F:0DC2	LPT2:	Yes	NI5210\$
6	2169:00B7	Floppy Disk	Yes	Default Handlers
7	CE2F:0B5E	LPT1:	Yes	LPT3
8	2169:0052	Real-Time Clock	Yes	Default Handlers
9	F000:EED2	Redirected IRQ2	Yes	BIOS
10	2169:00CF	(Reserved)		Default Handlers
11	2169:00E7	(Reserved)		Default Handlers
12	2169:00FF	(Reserved)		Default Handlers
13	F000:EEDB	Math Coprocessor	Yes	BIOS
14	2169:0117	Fixed Disk	Yes	Default Handlers
15	F000:9152	(Reserved)		BIOS

Figure 5. Microsoft Diagnostic Screen 5

This screen shows the devices assigned to each IRQ level. In the example shown, IRQ3 is shared by COM2: and COM4: (but no device is connected to COM4:). If you plan to use COM2: for the connecting a PC to the analyzer, *no other COM port may be use* IRQ 3:. If the interrupt is shared, the port will not function until the second COM port is reconfigured. Reconfiguring a serial device usually requires setting of DIP switches on a serial port or similar card. If you do not have immediate access to an installation manual for your serial port card, call an experienced PC technician for assistance.

8. To exit from this screen, click on OK (or press ENTER).
9. To exit from MSD, pull down the File menu and click on Exit (or press F3).

Connecting Your PC to the Analyzer

Connect a serial cable between the serial port on the PC and the analyzer. See the instruction manual for the analyzer for the correct cable and how to connect it.

Starting the PCIP Program

To run PCIP from DOS, use the following procedure:

1. Type <pathname>**pcip** and press <Enter>.

To start PCIP from Windows Program Manager, do the following:

1. Pull down the File menu, Select Run, type <pathname>**pcip**, and press <Enter>.

(You can also start PCIP from File Manager by double-clicking on **pcip.exe**.)

The Main Menu Screen appears as shown in Figure 6.

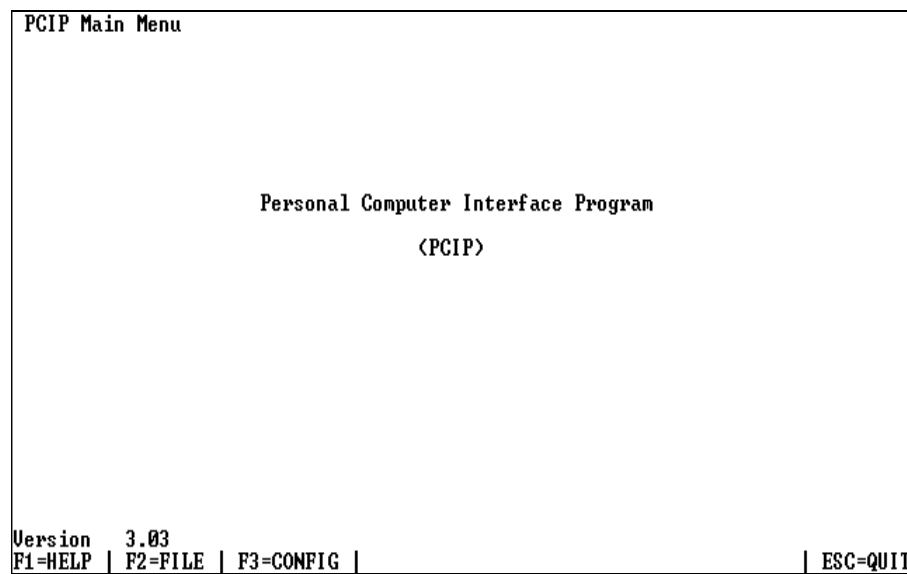


Figure 6. Main Menu Screen

2. Press F3. The PCIP Configuration Screen then appears as shown in Figure 7.

```
PCIP Configuration

User options
-----
Error beep .....▶ On
Startup file path..... current directory
Editor tab size ..... 8
Serial port:..... COM1
  Address ..... 3F8
  Interrupt..... 4
  Baud rate..... 9600

F1=HELP | ↑=SELECT FIELD | SPACE=CHANGE FIELD | F9=SAVE CONFIG | ESC=CANCEL
```

Figure 7. PCIP Configuration Screen

3. Use the arrow keys to move to the Serial Port field. If the indicated port is the same as that to which you connected the cable, press <ESC> to exit the screen and proceed to the next step. If the indicated port is different from the port to which you connected the cable, press <SPACE>. This changes the port name, and permitting you to select a different port.
 - a. To select a different port, press <Space> repeatedly until the correct port name appears.
 - b. Press F9 to save the selection.
 - c. Press <ESC> to exit the screen and return to the Main Menu.
 - d. To exit from the PCIP program, press <ESC>. Then press Y in answer to the “Are you sure?” prompt.

This completes the startup procedure. You are now ready to run the program with your analyzer.

Overview

The PC Interface Program (PCIP) software permits you to transfer files between analyzer and PC in either direction, using a system setup such as that shown in Figure 8. The analyzer is connected to a PC by means of a serial cable.

The purpose of the PCIP software is to download test results from analyzer to PC for editing, analysis, printing, and storage. A second use is to upload configuration, setup, and test parameters from PC to analyzer or to restore configuration parameters following a loss of data in the analyzer.

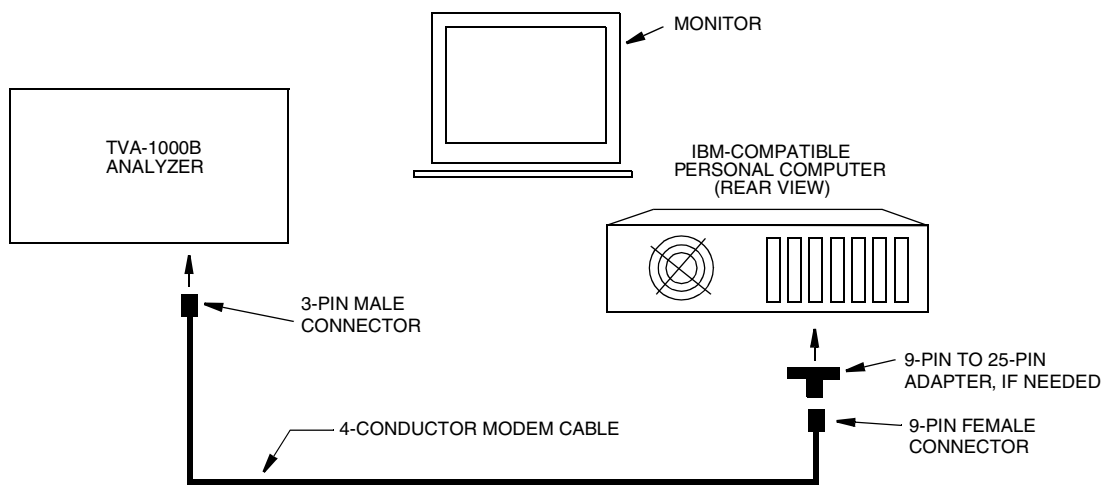


Figure 8. System Setup

PCIP Functions

Using the PCIP software, you can perform the following basic functions:

- ◆ Configure the PCIP software
- ◆ Store and recall files (Logged Data, Calibration, Configuration, or Route files)
- ◆ Edit files
- ◆ Transfer files in either direction between analyzer and PC
- ◆ Detect errors in file transfers
- ◆ View Help screens

Using the PCIP Software Package

To transfer files between analyzer and PC, you must turn on the analyzer and put it in the PC LINK mode, using the following procedure:

At the analyzer —

1. Press ON. This turns on power for the analyzer and displays the Main Menu.

```

MAIN MENU
1=RUN
2=SETUP 3=INFO
4=PCLINK/MEMORY
  
```

2. With the Main Menu displayed, press 4. This selects the PCLINK/MEMORY mode.

```

PCLINK/MEMORY
1 PC LINK
2 CLEAR ROUTE &
LOGGING MEMORY
  
```

3. Press 1. This selects the PC LINK mode.

```

PCLINK
TYPE=TEXT-AUTO
1=CHANGE TYPE
2=ESTABLISH LINK
  
```

4. Verify that the type selected is appropriate for the planned transfer activity. (Text-Auto provides a data file in text format. FEMS format provides a transfer file compatible with FEMS software. Foxboro format provides a transfer file compatible with old version Foxboro PC software.)

If the display shows the acceptable type, press 2 to establish the link. If the display shows something else, press 1 to change the type.

At the PC, do the following:

1. Execute the PCIP program, as follows:
 - a. To start from Windows Program Manager, select RUN and type:
`<pathname>pcip<Enter>`
 As an alternative, switch to File Manager and double-click on `pcip.exe`.
 - b. To start from DOS, change directory to `pcip` (or other directory in which the `pcip` files are located) and type `pcip <Enter>`.

The Main Menu screen then appears as shown in Figure 9.

Main Menu Screen

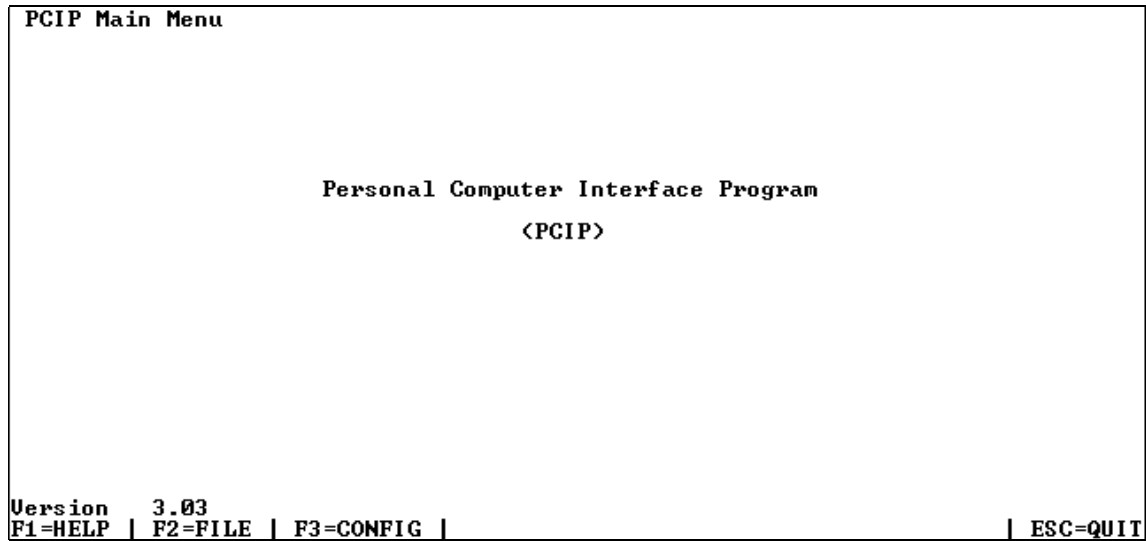


Figure 9. Main Menu Screen

The Main Menu screen displays the current version of the software in the lower left corner and the names of the functions keys at the bottom of the screen. The function keys available with this screen are:

Key	Description
F1=HELP	Displays a description of the software and the functions of each key
F2=FILE	Displays the FILE MENU screen.
F3=CONFIG	Displays the CONFIGURATION MENU screen.
ESC=CANCEL	Exits the screen and displays an “Are you sure? Y/N” prompt.

PCIP Configuration Screen

```

PCIP Configuration

User options
Error beep.....▶ On
Startup file path..... current directory
Editor tab size ..... 8
Serial port:..... COM1
  Address..... 3F8
  Interrupt..... 4
  Baud rate..... 9600

F1=HELP | ↑↓=SELECT FIELD | SPACE=CHANGE FIELD | F9=SAVE CONFIG | ESC=CANCEL

```

Figure 10. Configuration Screen

The Configuration screen displays the current configuration parameter settings and the names of the functions keys at the bottom of the screen. The function keys available with this screen are:

Key	Description
F1=HELP	Displays a description of the software and the functions of each key
↑↓=SELECT FIELD	Moves the highlight up or down to select the field.
SPACE=CHANGE FIELD	Changes the setting for the highlighted field. For discrete options, press repeatedly to step through the options.
F9=SAVE CONFIG	Saves the current configuration parameter selections.
ESC=CANCEL	Exits the screen. Displays an “Are you sure? Y/N” prompt if unsaved changes exist.

HELP Screen

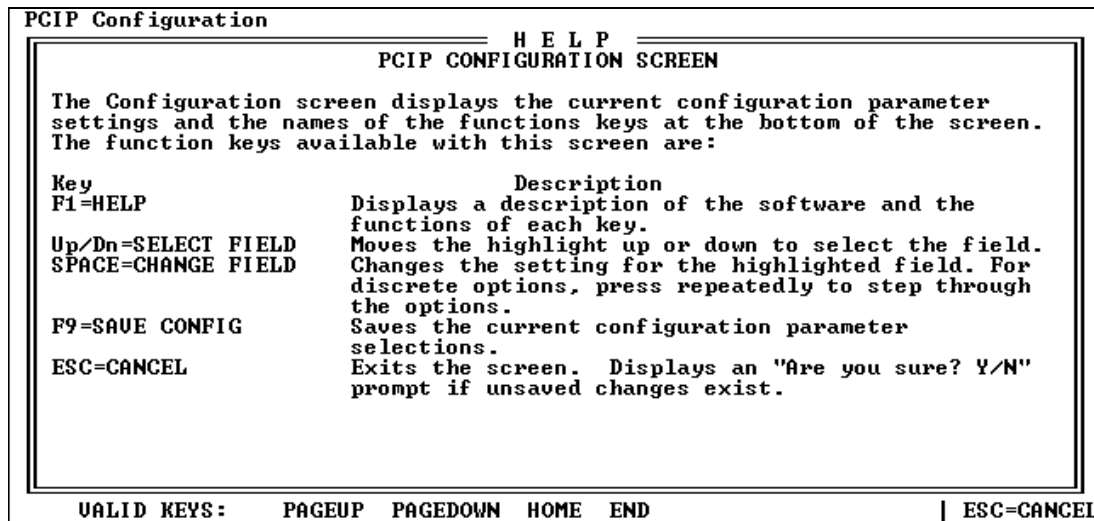


Figure 11. Typical HELP Screen

The HELP screen displays an overview of the software and the various screens. Use PageUp/ PageDn, Home, and End keys to scroll through the various help screens. Names of the active function keys appear at the bottom of the screen. The function keys available with this screen are:

Key	Description
PAGEUP	Pages the display to the next help screen.
PAGEDOWN	Pages the display back to the previous help screen.
HOME	Jumps the display back to the first help screen.
END	Jumps the display forward to the last help screen.
ESC=CANCEL	Exits the screen and displays an "Are you sure? Y/N" prompt.

File Menu Screen

```

PCIP File Menu
Current directory: C:\PCIP
  <directory>
  > .-
  PCIP.CFG          94      06-06-00    09:18am
  PCIP.DEF         449      03-21-97    10:57am
  PCIP.ERR          71      06-13-00    10:57am
  PCIP.EXE        322,591    06-06-00    08:52am
  PCIP.HLP         10,588    06-06-00    08:37am
  TEXT.TXT          1,591    06-12-00    10:56am

Current file: C:\PCIP\.-\
TO SELECT FILE: ↑ ↓ PAGEUP PAGEDOWN HOME END OR TYPE FILENAME <ENTER>
F1=HELP | F2=EDIT |           | F5=RECEIUE | F6=SEND |           | ESC=CANCEL

```

Figure 12. File Menu Screen

The File Menu screen displays the current file selection in the lower left corner and the names of the functions keys at the bottom of the screen. You can select a different file either by moving the highlight to a different file or by typing a new filename (with path) and then pressing <Enter>. The function keys available with this screen are:

Key	Description
F1=HELP	Displays the HELP file.
F2=EDIT	Opens the selected file for editing.
F5=RECEIVE	Sets the system to import a file from the analyzer and calls the File Receive Menu screen.
F6=SEND	Sets the system to export a file to the analyzer and calls the File Send Menu screen.
ESC=CANCEL	Exits the screen and returns to the Main Menu.
text	Enters a pathname.

File Receive Screen

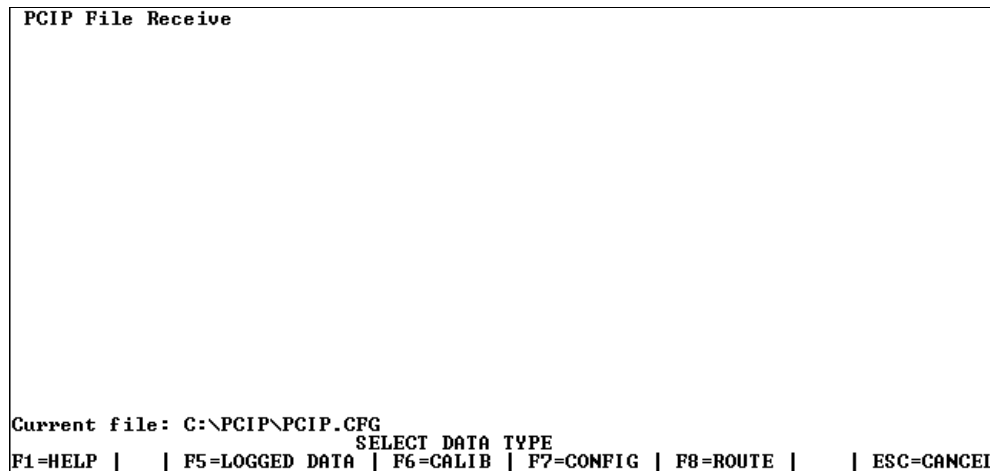


Figure 13. File Receive Screen

The File Receive screen displays the currently selected file, a prompt to select the data type of the file, and the names of the active function keys at the bottom of the screen. The function keys available with this screen are:

Key	Description
F1=HELP	Displays a description of the software and the functions of each key
F5=LOGGED DATA	Selects LOGGED DATA as the data type for the selected file.
F6=CALIB	Selects CALIBRATION data type for the selected file.
F7=CONFIG	Selects CONFIGURATION data type for the selected file.
F8=ROUTE	Selects ROUTE data type for the selected file.
ESC=CANCEL	Exits the screen and returns to the File Menu screen.

File Send Screen

```

PCIP File Send

----- T R A N S F E R   C O M P L E T E -----
Current file: G:\PCIP\TEXT.TXT
Sending file: [████████████████████████████████████████] 100%
Transfer complete - Press any key

```

Figure 14. File Send Screen

The File Send screen displays the currently selected file, a prompt to select the data type of the file, and the names of the active function keys at the bottom of the screen. The function keys available with this screen are:

Key	Description
F1=HELP	Displays a description of the software and the functions of each key
ESC=CANCEL	Exits the screen and displays an “Are you sure? Y/N” prompt.

Typical File Edit Screen

```

PCIP Edit File - TEXT.TXT                               Row:1   Col:1   INS
CONFIGURATION
UER= 1.00

MODEL=TUA-1000B
SERIAL NUMBER=000015868326
DETECTOR=PID&FID
OPERATOR ID=USERID

LOGGING
-----
LOG MODE=UOC
LOG STORAGE FORMAT=FOXUOC
LOG SAMPLE TIME=2
LOG SAMPLE TIME UNIT=SEC
LOG DATA STORED=MAXIMUM
LOG UNIT LOCK=OFF
LOG AUTO REPEAT=OFF
LOG SAVE MODE=MANUAL
TAG ACTIVE=ON
ROUTE ACTIVE=OFF
BARCODE VERIFY=OFF

CALIBRATION
F1=HELP | F2=CHAR TOGGLE | F3=JUMP | F5=LINE COPY/PASTE/DEL | F9=SAVE | ESC=QUIT

```

Figure 15. Typical File Edit Screen

This screen displays the contents of a file for editing – and the names of the active function keys at the bottom of the screen. Use the arrow keys, PageUp, PageDown, Home/End keys to move the cursor within the file. Edit the file by typing new text in the normal way (and using Ins/Del, BackSpace, and Delete keys as needed). The function keys available with this screen are:

Key	Description
F1=HELP	Displays a description of the software, the screens, and the functions of each key
F2=CHAR TOGGLE	Displays the FILE MENU screen.
F3=JUMP	Selects the JUMP menu screen, which permits you to jump to errors in the file. The errors are identified in the <filename>.err file.
F5=LINE COPY/PASTE/DEL	Selects the a menu that permits you to select keys that copy a line, paste an item, or delete a selected item.
F9=SAVE	Saves the edited file.
ESC=QUIT	Exits the screen and displays an “Are you sure? Y/N” prompt.
text	Change content of the file.

Examples

The following pages contain examples and tutorials for typical functions performed with the PCIP software package, such as “Downloading a File”, “Uploading a File”, and “Correcting Errors in a Downloaded File.” Examples of typical configuration, calibration, and route files are also included.

Receiving a File

To transfer a file of any type from the analyzer to the PC (after you have set up the system and established the link at the analyzer in the PC LINK mode), do the following:

Action

1. Select a file to be received. To do this –
 - a. Select a file from a directory, or
 - b. Type a filename (with path).
 Press ENTER.

Screen Display

```

PCIP File Menu
Current directory: C:\PCIP
  <directory>
  ..
  PCIP.CFG          94      06-06-00   09:18am
  PCIP.DEF         449      03-21-97   10:57am
  PCIP.ERR          71      06-13-00   10:57am
  PCIP.ERE        322,591    06-06-00   08:52am
  PCIP.HLP         10,588    06-06-00   08:37am
  TEXT.TXT          1,591    06-12-00   10:56am

Current file: C:\PCIP\..\
TO SELECT FILE: ↑ ↓ PAGEUP PAGEDOWN HOME END OR TYPE FILENAME <ENTER>
F1=HELP | F2=EDIT | F5=RECEIVE | F6=SEND | ESC=CANCEL
    
```

2. Prepare analyzer by pressing 2 (Establish Link) in the PC Link menu.
3. Press F5. The File Receive screen appears.

```

PCIP File Receive

Current file: C:\PCIP\PCIP.CFG
SELECT DATA TYPE
F1=HELP | F5=LOGGED DATA | F6=CALLIB | F7=CONFIG | F8=ROUTE | ESC=CANCEL
    
```

4. Select Data Type for the file being received.

```

PCIP File Receive

Current file: C:\PCIP\PCIP.CFG
SELECT DATA TYPE
F1=HELP | F5=LOGGED DATA | F6=CALLIB | F7=CONFIG | F8=ROUTE | ESC=CANCEL
    
```


Sending a File

To send a file of any type from the PC to the analyzer (after you have set up the system and established a link at the analyzer in the PC LINK mode), follow a procedure similar to that for receiving a file, except select F6=SEND instead of F5=RECEIVE. The procedure, therefore, is as follows:

1. Select a file to be uploaded.
2. Press F6. The File Send screen appears.
3. Prepare analyzer by pressing 2 (Establish Link) in the PC Link menu.
4. Wait for transfer process to finish.
5. To view/edit the file, press F2.

If an error occurred, press F3 to jump from one error to another.

6. Edit the file to eliminate errors,
7. Press F9 to save the corrected file.

For an example of error detection and correction, refer to the example starting on the next page.

Error Detection/Correction

The following is an example that shows how the software detects errors in transmitted files, and how you can find and correct the errors.

Action

1. Select a file to be downloaded (received). To do this –
 - a. Select a file from a directory, or
 - b. type a filename (with path).

Screen Display

```

PCIP File Menu
Current directory: C:\PCIP
  <directory>
    PCIP.CFG      94      06-06-00    09:18am
    PCIP.DEF     449     03-21-97    10:57am
    PCIP.ERR      71     06-13-00    10:57am
    PCIP.EXE    322,591   06-06-00    08:52am
    PCIP.HELP   10,588   06-06-00    08:37am
    TEXT.TXT     1,591   06-12-00    10:56am

Current file: C:\PCIP\..
TO SELECT FILE: ↑ ↓ PAGEUP PAGEDOWN HOME END OR TYPE FILENAME <ENTER>
F1=HELP | F2=EDIT | F5=RECEIVE | F6=SEND | ESC=CANCEL
  
```

2. Press F6. The File Send screen appears.

```

PCIP File Send

-- -- TRANSFER IN PROGRESS -- --

Current file: C:\PCIP\TEXT.TXT
Sending file: [████████████████████] 33%
F1=HELP | ESC=CANCEL
  
```

3. Wait for file transfer process to finish.

```

PCIP File Send

-- -- TRANSFER COMPLETE -- --

Current file: C:\PCIP\TEXT.TXT
Sending file: [████████████████████] 100%
Transfer complete - Press any key
  
```

Action

Screen Display

- When complete, press any key.

This screen appears, with the file highlighted.

To view or edit this file, press F2.

```

PCIP File Menu
Current directory: C:\PCIP
  PCIP.CFG          94      06-06-00   09:10am
  PCIP.DEF          449     03-21-97   10:57am
  PCIP.ERR           71      06-13-00   10:57am
  PCIP.EXE        322,591    06-06-00   08:52am
  PCIP.HELP        10,588    06-06-00   08:37am
  TEXT.TXT          1,591    06-12-00   10:56am

Current file: C:\PCIP\.\
TO SELECT FILE: ↑ ↓ PAGEUP PAGEDOWN HOME END OR TYPE FILENAME <ENTER>
F1=HELP | F2=EDIT | F3=RECEIVE | F6=SEND | ESC=CANCEL
    
```

- Pressing F2 displays the file as shown in this screen. You may edit the file and use the function keys identified at the bottom of the screen.

If the analyzer software detected errors in the file, pcip creates a new file called PCIP.ERR. You can view this file by selecting the file and pressing F2, but better yet, press F3.

```

PCIP Edit File - TEXT.TXT          Row:1   Col:1   INS
CONFIGURATION
VER= 1.00

MODEL-TUA-1000B
SERIAL NUMBER=000015068326
DETECTOR=PID&PID
OPERATOR ID=USERID

LOGGING
-----
LOG MODE=UOC
LOG STORAGE FORMAT=FOXUOC
LOG SAMPLE TIME=2
LOG SAMPLE TIME UNIT=SEC
LOG DATA STORED=MAXIMUM
LOG UNIT LOCK=OFF
LOG AUTO REPEAT=OFF
LOG SAUE MODE=MANUAL
TAG ACTIVE=ON
ROUTE ACTIVE=OFF
BARCODE VERIFY=OFF

CALIBRATION
F1=HELP | F2=CHAR TOGGLE | F3=JUMP | F5=LINE COPY/PASTE/DEL | F9=SAUE | ESC=QUIT
    
```

- Pressing F3 enables you to jump directly to the errors in the original file, as shown in the next screen.
- Jump to errors and edit. Press F3.
- Correct the error and repeat Steps 6-8, as required.
- Press F9 to save the edited file.

```

PCIP Edit File - TEXT.TXT          Row:1   Col:1   INS
CONFIGURATION
VER= 1.00

MODEL-TUA-1000B
SERIAL NUMBER=000015068326
DETECTOR=PID&PID
OPERATOR ID=USERID

LOGGING
-----
LOG MODE=UOC
LOG STORAGE FORMAT=FOXUOC
LOG SAMPLE TIME=2
LOG SAMPLE TIME UNIT=SEC
LOG DATA STORED=MAXIMUM
LOG UNIT LOCK=OFF
LOG AUTO REPEAT=OFF
LOG SAUE MODE=MANUAL
TAG ACTIVE=ON
ROUTE ACTIVE=OFF
BARCODE VERIFY=OFF

CALIBRATION
F1=HELP | F2=CHAR TOGGLE | F3=JUMP | F5=LINE COPY/PASTE/DEL | F9=SAUE | ESC=QUIT
    
```

Mock Calibration File

The following is an example of a mock TVA-1000B calibration file (2 screens).

PCIP Edit File - CALIB1.TXT						Row:1	Col:1	INS
CALIBRATION DATA								
VER= 1.00								
PID CALIBRATION:								
CALIB TYPE	KNOWN CONC	CALIB DATE/TIME		MEASURED CALIB VALUE				
ZERO	0 PPB	20 SEP 95	12:04:23	3355392	COUNTS	OK		
SPAN1	5 PPB	20 SEP 95	12:15:04	3690931	COUNTS	OK		
SPAN2	0.25 PPM	20 SEP 95	12:15:45	4697549	COUNTS	OK		
SPAN3	0.64 PPM	20 SEP 95	12:10:11	6710784	COUNTS	OK		
SPAN4	20.00 PPM	20 SEP 95	12:16:25	12414950	COUNTS	OK		
SPAN5	100 PPM	20 SEP 95	12:12:08	15938112	COUNTS	OK		
SPAN6	800 PPM	21 SEP 95	08:00:03	21810048	COUNTS	OK		
SPAN7	2145 PPM	20 SEP 95	13:35:54	26172058	COUNTS	OK		
SPAN8	3.00 %	31 OCT 95	23:59:59	27514214	COUNTS	OK		
SPAN9	9.00 %	31 OCT 95	00:00:00	30534067	COUNTS	OK		
FID CALIBRATION:								
F1=HELP			F2=CHAR TOGGLE			F3=JUMP		
F5=LINE COPY/PASTE/DEL			F9=SAVE			ESC=QUIT		

Figure 16. Mock Calibration File – Screen 1

PCIP Edit File - CALIB1.TXT						Row:24	Col:1	INS
SPAN7	2145 PPM	20 SEP 95	13:35:54	26172058	COUNTS	OK		
SPAN8	3.00 %	31 OCT 95	23:59:59	27514214	COUNTS	OK		
SPAN9	9.00 %	31 OCT 95	00:00:00	30534067	COUNTS	OK		
FID CALIBRATION:								
CALIB TYPE	KNOWN CONC	CALIB DATE/TIME		MEASURED CALIB VALUE				
ZERO	0 PPB	20 SEP 95	12:04:23	420	COUNTS	OK		
SPAN1	5 PPB	20 SEP 95	12:15:04	3690931	COUNTS	OK		
SPAN2	0.25 PPM	20 SEP 95	12:15:45	4697549	COUNTS	OK		
SPAN3	0.64 PPM	20 SEP 95	12:10:11	6710784	COUNTS	OK		
SPAN4	20.00 PPM	20 SEP 95	12:16:25	12414950	COUNTS	OK		
SPAN5	160 PPM	20 SEP 95	12:12:08	16441421	COUNTS	OK		
SPAN6	800 PPM	21 SEP 95	08:00:03	21810048	COUNTS	OK		
SPAN7	2145 PPM	20 SEP 95	13:35:54	26172058	COUNTS	OK		
SPAN8	3.00 %	31 OCT 95	23:59:59	27514214	COUNTS	OK		
SPAN9	9.00 %	31 OCT 95	00:00:00	30534067	COUNTS	OK		
END								
F1=HELP			F2=CHAR TOGGLE			F3=JUMP		
F5=LINE COPY/PASTE/DEL			F9=SAVE			ESC=QUIT		

Figure 17. Mock Calibration File – Screen 2

Mock Configuration File

The following is an example of a mock TVA-1000B configuration file (3 screens).

```

PCIP Edit File - CONFIG1.TXT                               Row:1   Col:1   INS
CONFIGURATION
VER= 1.00

MODEL=TVA-1000B
SERIAL NUMBER=000007156962
DETECTOR=PID&FID
OPERATOR ID=USERID

LOGGING
-----
LOG MODE=NONE
LOG STORAGE FORMAT=NONE
LOG SAMPLE TIME=0
LOG SAMPLE TIME UNIT=SEC
LOG DATA STORED=SAMPLE
LOG UNIT LOCK=OFF
LOG AUTO REPEAT=OFF
LOG SAVE MODE=AUTO
TAG ACTIVE=OFF
ROUTE ACTIVE=OFF
BARCODE VERIFY=OFF

CALIBRATION
F1=HELP | F2=CHAR TOGGLE | F3=JUMP | F5=LINE COPY/PASTE/DEL | F9=SAVE | ESC=QUIT

```

Figure 18. Mock Configuration File – Screen 1

```

PCIP Edit File - CONFIG1.TXT                               Row:24  Col:1   INS
-----
CAL AUTO ACCEPT=OFF
CAL AUTO SAVE=OFF
CAL UNIT LOCK=OFF
BACKGROUND CORRECTION (PID)=OFF
BACKGROUND CORRECTION (FID)=OFF

RESPONSE FACTORS
-----
SELECTED=0
MODE=CURVE
RF0 (PID)=DEFAULT      1.00  0.00
RF1 (PID)=PROPANE     3.00  0.10
RF2 (PID)=HEXANE      1.00  0.00
RF3 (PID)=BUTANE      0.80  0.52
RF4 (PID)=METHANE     1.00  0.00
RF5 (PID)=AMYLOH     5.30 -51.02
RF6 (PID)=BNITRL     1.45 -26.65
RF7 (PID)=BROMOF      0.68  -2.69
RF8 (PID)=-----     1.00  0.00
RF9 (PID)=RF 9        1.00  0.00
RF0 (FID)=DEFAULT     1.00  0.00
RF1 (FID)=PROPANE     1.00  0.68
F1=HELP | F2=CHAR TOGGLE | F3=JUMP | F5=LINE COPY/PASTE/DEL | F9=SAVE | ESC=QUIT

```

Figure 19. Mock Configuration File – Screen 2

```

PCIP Edit File - CONFIG1.TXT                               Row:70  Col:1   INS
RF7 (FID)=BROMOF      6.71  1.74
RF8 (FID)=-----     1.00  0.00
RF9 (FID)=RF 9        1.00  0.00

ALARMS
-----
STEL (PID)= 10.20 %
LOW (PID)= 500 PPM
HIGH (PID)=2000.0 PPM
STEL (FID)= 10.20 %
LOW (FID)= 50.00 PPM
HIGH (FID)= 3.50 %

USER OPTIONS
-----
PROBE=BASIC
BARCODE READER=HP
KEY CLICK=OFF
DISPLAY DELAY=LONG
PC LINK TYPE=TEXT-AUTO
DIGITAL DATA LOGGING=NONE

END
F1=HELP | F2=CHAR TOGGLE | F3=JUMP | F5=LINE COPY/PASTE/DEL | F9=SAVE | ESC=QUIT

```

Figure 20. Mock Configuration File – Screen 3

Index

C

Calibration File 23
Configuration File 24
Configuring Your System 1
Connecting Your PC 4

E

Error Detection/Correction 21
Examples 17

F

File Edit Screen 15
File Menu Screen 12
File Receive Screen 13
File Send Screen 14

H

HELP Screen 11

L

Loading the PCIP Software 1

M

Main Menu Screen 9

P

PCIP Configuration Screen 10
PCIP Functions 7

R

Route File 25

S

Starting the PCIP Program 4

U

Using the Instrument 8

Using the PCIP Software Package 8

CENTURY[®] TVA-1000[™] Toxic Vapor Analyzer 11.8 eV PID Lamp Capsules (Part No. CR011YZ)

IMPORTANT NOTE: This document contains essential information about 11.8 eV PID lamp capsules. PLEASE READ ENTIRE DOCUMENT BEFORE USING AN 11.8 eV PID LAMP CAPSULE IN YOUR TVA-1000.

About 11.8 eV PID Lamps

The standard PID capsule supplied with the TVA-1000 contains a 10.6 eV lamp. This PID lamp capsule is suitable for detection of many of the most commonly encountered hydrocarbons, since their ionization potentials generally tend to fall below 10.6 eV. However, in cases where you need to detect a compound with an ionization potential between 10.6 eV and 11.8 eV, the 11.8 eV PID lamp capsule is required.

NOTE: It is important that you recognize the disadvantages of using an 11.8 eV PID lamp capsule prior to installing one in your TVA-1000.

With normal care and cleaning, a 10.6 eV PID lamp capsule should give you greater than 2000 hours of life. The 11.8 eV PID lamp capsule, however, is not so durable. Its expected life is much shorter (often less than 100 hours) and is much more dependent on environmental conditions and usage pattern. However, with proper care and use you can maximize the life of your 11.8 eV PID lamp capsule and prevent premature failure.

Because of the high energy UV radiation used by the 11.8 eV PID lamp capsule, the same magnesium fluoride material used in the 10.6 eV PID lamp capsule window is unsuitable. A special window material (lithium fluoride) is required in 11.8 eV PID lamp capsules to allow the short wavelength to pass through to the ionization chamber. Although lithium fluoride is one of the few materials that will transmit 11.8 eV photons, its crystal lattice is slowly eroded by the UV energy in a process called *solarization*. As the PID lamp capsule becomes solarized, the window changes to a yellowish color and transmission of the photons is reduced dramatically. Lithium fluoride is also a hygroscopic material, which means that it tends to absorb moisture. Absorption of moisture due to high humidity or contact with liquid water will severely degrade transmission, quickly reducing the usable life of the PID lamp capsule. The use of a WATERTRAP* probe (Part No. CR013EA) is strongly recommended to prevent ingestion of liquid water.

*Manufactured by INTEK Corporation South, Baton Rouge, LA. and A+ Corp., Prairieville, LA.

Care of 11.8 eV PID Lamp Capsules

Because of the aforementioned characteristics of 11.8 eV PID lamp capsules, the following precautions are recommended to prolong PID lamp capsule life:

1. Use an 11.8 eV PID lamp capsule only when necessary.

If a 10.6 eV PID lamp capsule or an FID is suitable for detection of the compounds of interest, it should be used preferentially. If you are using a dual detector TVA-1000 with an 11.8 eV PID lamp capsule, it is recommended that the PID lamp capsule be removed and stored properly when not required.

2. Avoid storing 11.8 eV PID lamp capsules where moisture can degrade the window.

The PID lamp capsule is shipped to you in a sealed container with a desiccant pack. When the PID lamp capsule is not in use, it is recommended that you return it to this container, or store it in a desiccator.

3. Avoid touching the PID lamp capsule window surface.

Moisture, oils and dirt from your fingertips can damage the window material.

4. Never allow the lamp to come in contact with liquid water.

Use of a WaterTrap probe (available through TEI, Part No. CR013EA) is highly recommended. Contact TEI for more information.

5. Regular cleaning of the window is suggested.

This window may be cleaned by gently polishing the surface with anhydrous alcohol on a cotton swab, followed by an anhydrous methanol or ethanol rinse. This should then be gently wiped with a soft tissue. Take care not to allow the alcohol to remain on the window surface as it will leave a film.

IMPORTANT NOTE: Anhydrous materials must be used as the window material (lithium fluoride) is extremely water soluble and will be damaged.

Warranty of 11.8 eV Lamp Capsules

Since the 11.8 eV PID lamp capsule is sold separately as a part, its warranty is limited to ninety (90) days after shipment, the same as on all parts sold by TEI. Please comply with the suggestions listed above to prolong the life of your PID lamp capsule. If your PID lamp capsule should fail within the warranty period due to manufacturing defect (and not due to abuse, misapplication, poor handling, or usage in excess of stated expected lifetime), TEI will replace the PID lamp capsule free of charge.

PARTS LIST

PL 611-139

November 2003

TVA-1000B CENTURY Portable Toxic Vapor Analyzer

Part Number	Description
510033-1	Sleeve, Handle Nut
510095-1	Charcoal Filter Adapter
620090	Filter Cup (pkg of 5)
B0164JV	Tubing, Teflon, 0.25 O.D. x 0.125 I.D.
CR011PF	Wand, Extension
CR011WC	Hydrogen Tank Assembly
CR011YY	Assembly, Capsule, PID 10.6 ev
CR011YZ	Assembly, Capsule, PID 11.8 ev
CR012BS	Probe, Standard
CR012DY	Shoulder Strap
CR012EK	Nut, Probe
CR012GM	Cap, PID Detector
CR012LZ	Battery Pack, 7.2V
CR012NL	Assy, Battery Compartment Door
CR012PS	Tool, Capsule Extractor
CR012PT	Tool, Spanner, Detector Cap
CR012PU	Tool Kit, Service
CR012QC	Sampler Spacer
CR012TA	Bleeder Assy
CR012TM	PID Cleaning Kit
CR012WJ	Hydrogen Fill Assembly
CR012XL	Transportation Case Assy (Standard)
CR012ZC	Battery Charger, 120 V ac, 50 or 60 Hz Operation
CR012ZD	Battery Charger, 230 V ac, 50 or 60 Hz Operation
CR012ZM	Cable, Analog
CR012ZN	Cable, PC Interface

Part Number	Description
CR013DF	Probe, Enhanced
CR013FM	Cap, RID Detector (Assy) FM
CR013GU	Assembly, Capsule, FID
CR013HH	Cap, RID Detector (Assy) CENELEC
CR013HS	Diskette, Programmed, 5 ¼"
CR013HT	Diskette, Programmed, 3 ½"
CR013KP	Flame Arrestor (pkg of 5)
CR013LV	Replacement Assy, Sample Line Fitting
CR015AC	Water Trap Probe
CR015DK	Water Trap Membrane
D0116RC	O-Ring
P0177EK	9-25 Pin Adapter
X0173QH	Key, Toolhead (Battery Door)
X0177BE	Protective Cap, H2 Tank
X0179CQ	Box, Plastic
X0179DF	Spring, Compensation (PID Cap)
X0179FB	Spring, Sampler

APPENDIX A

WARRANTY

Seller warrants that the Products will operate substantially in conformance with Seller's published specifications, when subjected to normal, proper and intended usage by properly trained personnel, for 13 months from date of installation or 12 months from date of shipment, whichever is less (the "Warranty Period"). Seller agrees during the Warranty Period, provided it is promptly notified in writing upon the discovery of any defect and further provided that all costs of returning the defective Products to Seller are pre-paid by Buyer, to repair or replace, at Seller's option, defective Products so as to cause the same to operate in substantial conformance with said specifications. Replacement parts may be new or refurbished, at the election of Seller. All replaced parts shall become the property of Seller. Shipment to Buyer of repaired or replacement Products shall be made in accordance with the provisions of Section 5 above. Lamps, fuses, bulbs and other expendable items are expressly excluded from the warranty under this Section 8. Seller's sole liability with respect to equipment, materials, parts or software furnished to Seller by third party suppliers shall be limited to the assignment by Seller to Buyer of any such third party supplier's warranty, to the extent the same is assignable. In no event shall Seller have any obligation to make repairs, replacements or corrections required, in whole or in part, as the result of (i) normal wear and tear, (ii) accident, disaster or event of force majeure, (iii) misuse, fault or negligence of or by Buyer, (iv) use of the Products in a manner for which they were not designed, (v) causes external to the Products such as, but not limited to, power failure or electrical power surges, (vi) improper storage of the Products or (vii) use of the Products in combination with equipment or software not supplied by Seller. If Seller determines that Products for which Buyer has requested warranty services are not covered by the warranty hereunder, Buyer shall pay or reimburse Seller for all costs of investigating and responding to such request at Seller's then prevailing time and materials rates. If Seller provides repair services or replacement parts that are not covered by the warranty provided in this Section 8, Buyer shall pay Seller therefore at Seller's then prevailing time and materials rates. ANY INSTALLATION, MAINTENANCE, REPAIR, SERVICE, RELOCATION OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCTS PERFORMED BY ANY PERSON OR ENTITY OTHER THAN SELLER WITHOUT SELLER'S PRIOR WRITTEN APPROVAL, OR ANY USE OF REPLACEMENT PARTS NOT SUPPLIED BY SELLER, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCTS.

THE OBLIGATIONS CREATED BY THIS SECTION TO REPAIR OR REPLACE A DEFECTIVE PRODUCT SHALL BE THE SOLE REMEDY OF BUYER IN THE EVENT OF A DEFECTIVE PRODUCT. EXCEPT AS EXPRESSLY PROVIDED IN THIS SECTION 8, SELLER DISCLAIMS ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, WITH RESPECT TO THE PRODUCTS, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE PRODUCTS ARE ERROR-FREE OR WILL ACCOMPLISH ANY PARTICULAR RESULT.

ADDENDUM

**IMPORTING TVA-1000B FILES INTO MICROSOFT EXCEL VIA
THE PCIP SOFTWARE**

Importing TVA-1000 B Route Files into Microsoft Excel via PCIP Software

1. Load or Run Excel click **file open**
2. Double-click filename (i.e. C:\TVATEXT.TXT)
3. *Import wizard:*
 - a) **Delimited** Starting at row 1 File Origin DOS/OS/2 **Next**
 - b) **Other** Text Qualifier = **none** **Next**
 - c) **Text** **Finish**
4. Highlight Col A Row 5 to bottom of file (including END)
5. **Data Text to Columns**
6. *Convert Text to Columns wizard:*
 - a) Fixed Width **Next**
 - b) Remove column line at center of “Area” by double-clicking line
 - c) Move each column line to the beginning of the following field
 - d) Delete the extra line in the middle of the “Description” column
 - e) Change each column to **Text** format and enter **Finish**
7. Set width of each column as follows:
 - a) Col: A-17 B-9 C-9 D-6 E-5 F-6 G-5 H-48
(use **Format, Column Width** and type in the values)
8. **Save As** Formatted Text (Space Delimited) **Exit** or **Close File**
9. Go into PCIP software
 - a) Hit **F2** to list files. Highlight file and hit **F2** to display. Hit **F2** again to show all characters.
 - b) Go to row 2 - add a space immediately after ver= 1.00
 - c) Go to row 5 col 51 and hit **del** twice
 - d) Go to row 6 col 51 and hit **del** twice
 - e) Go to row 6 col 56 and hit **spacebar** twice
 - f) Go to row 7 col 51 and hit **del** twice
 - g) Go to row 7 col 57 and hit **spacebar** once and **hyphen (-)** once
10. Hit **F9** to save. Then either enter a new file name or hit **F9** to save with original file name.
11. Hit **Esc** and **F6** to send file to analyzer. Note, although it is unusual, if any errors occur during transfer, note the row and column of the error and review the file (using PCIP) for any misaligned data. You can insert and/or delete spaces as necessary and repeat step 10 and 11.

Note: Look in upper corner of screen for row and column.

Importing TVA-1000 B Datalog Files into Microsoft Excel via PCIP Software

Use PCIP software to send datalog file from analyzer to P.C

1. Load or Run Excel click **file open**
2. Double-click filename (i.e. C:\PCIP\TVA1log.TXT)
3. *Import wizard:*
 - a) **Delimited** Starting at row 1 File Origin DOS/OS/2 **Next**
 - b) **Other** Text Qualifier = **none** **Next**
 - c) **Text** **Finish**
4. Highlight Col A Row 1 to bottom of file (including END)
5. **Data Text to Columns**
6. *Convert Text to Columns wizard:*
 - a) Fixed Width **Next**
 - b) Move each column line to the beginning of the following field
 - c) Change first column to **date format DMY**, change TAG and the 1st columns of BACKGROUND and CONCENTRATION to GENERAL and the 2nd and 3rd columns of BACKGROUND and CONCENTRATION to **General**. Set LEAK, SOURCE and METHOD to **TEXT**. Finally, change TIME, DET test columns **Text** format and enter **Finish**
 - d) Highlight the top row of all columns. Enter **Format Columns Auto-fit Selection**
7. **Save As:** enter file name and hit **Return**

Thermo Environmental Instruments Inc.

_____IMPORTANT_____

IMMEDIATELY CHECK THIS SHIPMENT FOR BREAKAGE

Thermo Environmental Instruments cannot be held responsible for damages in shipment if these instructions are not followed.

IF THERE IS BREAKAGE

DO NOT discard packaging.

DO NOT return the instruments or supplies yourself.

UPS, Truck, or Air Freight Shipments:

- 1) LEAVE instruments or supplies in same shipping carton in which they were received.
- 2) DO NOT return the instruments or supplies yourself.
- 3) CONTACT the delivering carrier immediately. Request him to inspect the damage and to make an inspection report.
- 4) NOTIFY Thermo Environmental Instruments Inc. immediately, furnishing the purchase order number and the delivery number.
- 5) Following the freight carrier's instructions, return the unit to TEI. Upon receipt, we will assess the repairs required (or full replacement). You will be billed for the work required and you must submit the invoice to the freight carrier for payment (due to F.O.B. shipment conditions).

Parcel Post Shipments:

- 1) FILE claim with your Post Office.
- 2) FOLLOW 1, 2, 4, 5 above.

NOTE Unless the above procedures are followed and we are notified within 15 days, we cannot accept responsibility.

Thermo Environmental Instruments Inc.
8 West Forge Parkway, Franklin, MA 02038
Tel: 508-520-0430 Fax: 508-520-1460

TVA1000B Quick Start and Calibration Guide

1. Install filled hydrogen tank, attach probe/readout assembly, turn on analyzer and hydrogen supply valve.
2. Wait 4-5 minutes for proper hydrogen flow, then press **1 = Run**. The unit will ignite and display readings. If flame out message appears, clear the message (press **Exit**), wait another minute and repeat step 2. If the unit has not been properly calibrated, a bad calibration parameter error appears – go to step 3 below.
3. Press **Exit** until the Main Menu appears. Calibration can now be performed. For best results, allow unit to warm up for 20 minutes, then press **2 = Setup**.
4. Press **1 = Calib**.
5. Press **2 = SpanConc**.
6. Select the detector that the span concentration is for, then press the \uparrow or \downarrow arrow to select the correct unit of measure for the span gas. Enter the span calibration value, and press the **Enter** key. Repeat steps 5 & 6 for the second detector. Typically, the calibration gases are methane (FID) and isobutylene (PID).
7. Next zero the instrument. Press **3 = Zero** to start this process.
8. Press **1 = Both** for dual detector units, or **Enter** for single detector units.
9. Introduce zero gas (< 1 ppm total hydrocarbon) into the analyzer through the probe.
10. Press **Enter** to start (this assumes manual mode, the factory default).
11. Wait for minimal change in values (about 15 seconds). Typically, the sample is stable when the first 2 digits of the reading do not change for 4-5 seconds.
12. Press **Enter** to accept, then press **1** to save.
13. Next calibrate with the span gas. Press **4 = Span**.
14. Select the detector to be calibrated, and press **Enter** to start. Follow the screen prompts. Wait for the readings to stabilize (typically 10-15 seconds). Enter **1** to save and repeat steps 13 & 14 for the second detector.
15. Press **5 = RF** to verify proper response factor.
16. Confirm that response factor says “RF0: DEFAULT”. If not, set to this value.
17. Press **Exit** twice to return to MAIN MENU.
18. Press **1 = Run**.

This completes the primary calibration, and the instrument is in the survey mode.

Daily TVA-1000B Maintenance Procedure Checklist

I.D. Number: [_____]

Date: _____

- With pump off, orient analyzer so that sample line connections face down
- Remove from sidepack and visually inspect sample line fitting for blockage
- Check sidepack filter cup and probe filter cup or WATERTRAP Probe membrane. Replace as necessary and clean debris from sample line adapter fitting.
- Check sample line and readout cable for visible damage and contamination
- Calibrate analyzer in the manual mode and record the following after warm-up (or calibrate in the Auto mode and return to manual mode to record data):
 - FID:**
 - Zero counts _____ (should be < 5000 counts)
 - Span counts _____ (must = 175-250 counts/PPM Methane)
 - PID:**
 - Zero counts _____ (should be <20000 counts)
 - (10.6 eV)** Span counts _____ (must = 3500-6000 counts/PPM Isobutylene)

Example:
$$\frac{\text{Span Counts} - \text{Zero Counts}}{\text{Span Concentration (PPM)}} = \frac{25500 - 4100}{102 \text{ (PPM)}} = 210 \text{ Counts/ppm}$$

Note: If TVA-1000 is used in logging mode, this data is also included in header information. Retain this data for trend analysis. Although the values may change daily, the data can be a valuable resource for trend analysis.

At the end of the day or shift:

- Remove the FID endcap. Blow-out with dry air and replace insert if discolored
- Remove FID capsule. If visibly wet, shake-out excess water and let air-dry overnight
- Perform visual inspection for signs of damage

Weekly Maintenance Checklist:

- Replace sidepack and probe filter cups and clean sample line adapter fitting
- For all PID lamps except the 11.8 eV: Remove the PID capsule according to the instructions in the Maintenance section of the manual. Clean the lamp with a cotton swab and isopropyl alcohol. Dry the cartridge with a heat gun for 60 seconds to evaporate the alcohol. Reinstall the cartridge and cap. *Note: Refer to MI 611-183 in the instruction book on cleaning techniques for the 11.8 eV lamp.*
- Check and tighten strain-relief screws on readout assembly and screws securing three connectors on sidepack
- If possible, store the unit in a dry environment when not in use.