TeleFlow™ 2-Run (TF2RUN) Load & Menus

Bristol Babcock

D4088 Issue: March, 2001

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For technical questions regarding the TeleFlow 2-Run ACCOL load, other **ACCOL products, Open BSI Utilities**, as well as Bristol's **Enterprise Server®/ Enterprise Workstation®** products, **call (860) 945-2286.**

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Who Should Read This Document?

This document is intended to be read by EGM 3530 TeleFlow™ users who are using the standard software accompanying the TeleFlow™ .

It assumes that the TeleFlow™ has been installed, and that all network cabling has been connected and tested.

EQUIPMENT APPLICATION WARNING

The user should note that a failure of this instrument or system, for whatever reason, may leave an operating process without protection. Depending upon the application, this could result in possible damage to property or injury to persons. It is suggested that the purchaser review the need for additional backup equipment or provide alternate means of protection such as alarm devices, output limiting, fail-safe valves, relief valves, emergency shutoffs, emergency switches, etc. If additional information is required, the purchaser is advised to contact Bristol Babcock.

This document assumes familiarity with the following subjects:

- The requirements of their particular process or application.

- ACCOL programming. Anyone modifying the TeleFlow™ 2-run (TF2RUN) software should be an *experienced* ACCOL programmer. For more information, consider attending an ACCOL training class. Also see *An Introduction to ACCOL* (document# D4056), the *ACCOL Workbench User Manual* (document# D4051), and the *ACCOL II Reference Manual* (document# D4044).

- Universal Operator Interface (UOI) software. Anyone attempting to modify the 2-run TeleFlow™ menus must be familiar with the UOI software tools. See the *UOI Configuration Manual* (document# D5074) and the *UOI Operator Manual* (document# D5075) for details.

Table of Contents

Chapter 1 - Introduction

What is the TeleFlow™ 2-Run (TF2RUN) ACCOL Load and Menus?

The TeleFlow™ 2-Run (TF2RUN) ACCOL Load and Menus is a collection of software files on the TeleFlow™ diskette. They are used in conjunction with the TeleFlow™ EGM 3530 Electronic Gas Measurement Computer, and fall into two distinct categories:

- **TeleFlow 2-Run ACCOL (TF2RUN) Load**. This ACCOL load contains ACCOL modules specifically configured to perform various natural gas calculations using an expanded I/O setup supporting 2 meter runs. It is discussed in detail in Chapter 4 of this manual.

- **TeleFlow 2-Run (TF2RUN) Menus**. A collection of menus, which may be run using UOI on the PC, which are specifically configured to collect and display data from the TeleFlow 2-Run (TF2RUN) ACCOL Load. These menus are discussed in detail in Chapter 3 of this manual.

Modifying or Replacing the TeleFlow 2-Run ACCOL Load & Menus

The TeleFlow is a downloadable ACCOL device, therefore, the TeleFlow 2-Run ACCOL Load can be modified or replaced with another compatible ACCOL load. (See *Appendix A* for some notes about modifying the TeleFlow 2-Run ACCOL Load.) For example, if the TeleFlow 2-Run ACCOL Load does not fit your particular application, you may modify the .ACC file in ACCOL Workbench software (available separately from Bristol Babcock,) re-build the ACL file, and download it into the TeleFlow. For more information on ACCOL Workbench, see the *ACCOL Workbench User Manual* (document# D4051).

Be aware, also, that the TeleFlow 2-run Menus are closely tied to the TeleFlow 2-Run ACCOL Load. If you modify the standard load, or create a different load, you will need to modify the associated menus, using the UOI programming tools (available separately from Bristol Babcock). For more information on UOI, see the *UOI Configuration Manual* (document# D5074).

Chapter 2 - Installing the Software

Installing UOI in DOS

Follow the instructions in the *UOI Configuration Manual* (document# D5074).

Installing the TeleFlow 2-Run Menus

Copy the files TF2RUN.UML, TF2RUN.UCL, and TF2RUN.UHL into your UOI Installation directory.

ATOOLS.INI

If desired, certain configuration parameters for communications, etc., can be pre-configured in an ATOOLS.INI file. See the *UOI Configuration Manual* (document# D5074) and the *ACCOL II Reference Manual* (document# D4044) for details.

Downloading the TeleFlow 2-Run ACCOL (TF2RUN) Load

The TeleFlow 2-Run ACCOL load may be loaded from the TeleFlow diskette using the "**Download ACL to ACCOL Node**" poke point on the System Setup Menu. See Chapter 3 for details.

Chapter 3 - Using the TeleFlow 2-Run Menus (TF2RUN)

Overview

The TeleFlow 2-Run Menus (TF2RUN) is a collection of menus which are displayed on a personal computer (PC) to allow a user to configure and monitor a TeleFlow EGM 3530 Electronic Gas Measurement Computer running the TF2RUN.ACL 2 meter run ACCOL load. Depending upon the active security level, the TF2RUN menus allow the user to:

- Sign-on to the TeleFlow
- Change the PC communication setup parameters
- Download an ACCOL load file
- Invoke menus to configure the TeleFlow for operation
- Read current gas flow data for 2 meter runs, and totals for the station.
- Set the date and time in the TeleFlow
- Change the network address of the TeleFlow
- Collect and display the Daily, Periodic, 15 Minute, and Audit Logs

PC Function Key Usage When Using UOI

The UOI program uses the PC function keys (keys [F1]...[F8]), the [Ins] key, arrow keys, and the [Page Up] key as follows:

[F2]	Call up a help screen, if one is available.
[F3]	Examine signal details or advance to the next display.
[F4]	Back out to the previous menu level.
[F5]	Toggle Manual Inhibit/Enable.
[F6]	Back up one menu page.
[F7]	Toggle Control Inhibit/Enable.
[F8]	Move forward to another menu page.
[Ins]	The Insert key will activate a menu poke point (☺) or complete a change in signal value.
[Page Up]	This key clears a displayed field - key is used prior to making value changes.
Arrow keys	Used to move between poke points.

Throughout UOI, if a particular poke point is used to toggle between two selections, the active selection appears capitalized, and the inactive selection appears in lowercase letters. For example, "**color/MONOCHROME**" indicates that MONOCHROME is the active selection.

Starting the UOI Program

The following command will start UOI:

UOI *xxx*

where *xxx* is the optional local address. If the local address is not entered here, the Communication Setup Menus must be used to define it, or it must be pre-defined in the ATOOLS.INI file. **NOTE: If connected to the local port, any address is valid.**

For example: UOI 1

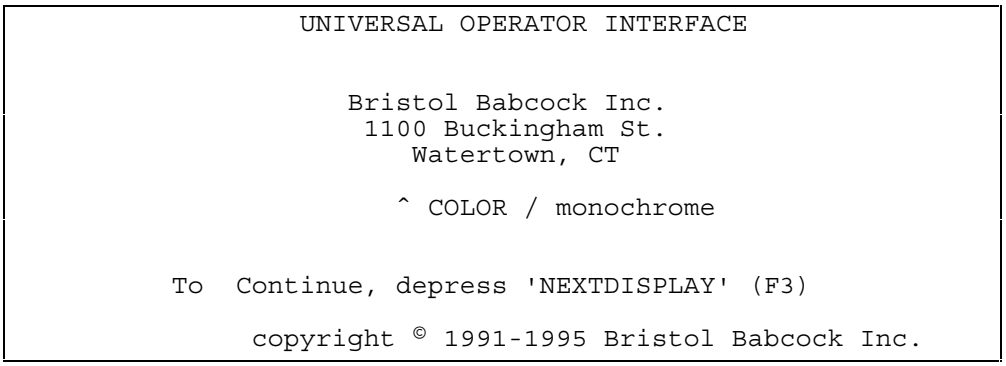
starts UOI and configures it to communicate with a local address of 1.

Setting the Local Address and Communication Parameters Up In Advance

If desired, much of the start-up routine for UOI can be automated. For example, the local address, communication parameters, modem information, and even the username and password can be specified, in advance, in the ATOOLS.INI file, thereby simplifying the start-up process for the operator. See Chapter 2 for information on the ATOOLS.INI file, as well as the '*ATOOLS.INI*' section of the *ACCOL II Reference Manual* (document# D4044).

Chapter 3 - Using the TeleFlow 2-Run Menus (TF2RUN)

UOI Startup Menu

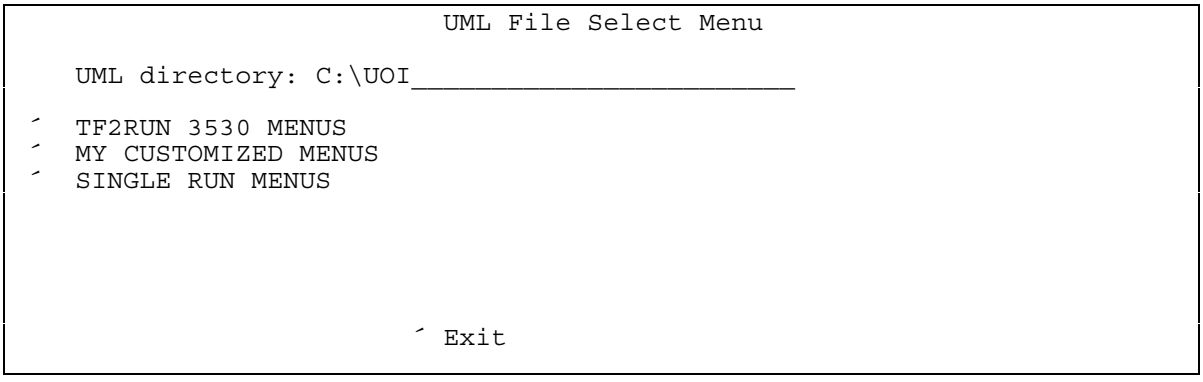


The first menu to appear, typically, is the UOI Startup Menu. If you are using a monochrome monitor, toggle the COLOR/monochrome poke point, by pressing the [Ins] key, otherwise leave it at the default, which is for color monitors.

Press the [F3] key to bring up the next display. If you have only one set of UOI menus (UML files) you will go to the Sign-On Menu (see page 3-4), otherwise, you will go to the UML File Select Menu (see page 3-3).

UML File Select Menu

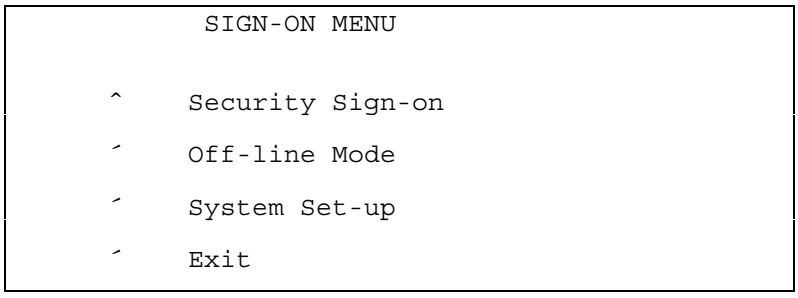
If you have more than one set of menus (UML files) in the UOI installation directory on your PC, this menu is accessed from the Startup Menu (see page 3-3) by pressing [F3]. Otherwise, you can call it up from the "**Select Menu Specification File**" poke point on the System Set-up Menu (see page 3-5).



Since you want to use the 2-run TeleFlow menus, you should always choose the TF2RUN 3530 MENUS poke point. (This will activate the files TF2RUN.UCL, TF2RUN.UML, and TF2RUN.UHL.)

Chapter 3 - Using the TeleFlow 2-Run Menus (TF2RUN)

Signing On to the TeleFlow (Sign-On Menu)



The Sign-On Menu provides poke points for signing onto UOI, calling up the off-line menus, configuring the communications system, and exiting from UOI.

Typically, this menu will appear after the Startup Menu. If there were multiple UML files to choose from, however, the UML File Select Menu appears first (see page 3-3).

If you want to use the off-line configuration menus (which do not require connection to the TeleFlow) but, as a consequence, do NOT allow any access to live data, choose the "**Off-Line Mode**" poke point, and skip to page 3-67.

If you intend to use on-line mode, which is the most common arrangement, you may need to change the system communications setup first. To do so, move the cursor to the "**System Set-up**" poke point, and press [Ins]. Follow the directions on page 3-5 to change the system setup.

If the system setup does not need to be changed, you may sign on as follows:

1. Move the cursor to the "**Security Sign-On**" poke point and press [Ins]. UOI will read all the allowed names and passwords from the TeleFlow into the PC, and then display a prompt for an operator name.

2. When the "**Enter Operator Name**" prompt appears at the bottom left of the screen, type in the operator name and press [Ins]. UOI will compare the name to those read from the TeleFlow and either accept or reject the name. The factory default name is SYSTEM. (Be sure to use the [Ins] key, not [Enter]. If the name is correct, you will be prompted for the password).

3. When the "**Password**" prompt appears, type in the password. The default password for SYSTEM is 666666. To maintain security, the password characters will not be visible as they are typed. Press [Ins] to enter the password; UOI will compare it to the one associated with the accepted name and either accept or reject the password.

NOTE:

The security level associated with your username/password (or security code) will determine which functions are accessible within UOI. Certain menus shown in this manual will NOT be visible for those users who have signed on at less than the highest security level.

Once you have signed on successfully, you will see one of two menus, depending upon your security level. Users signed on at security level 1, 2, or 3 will see the Station Main Menu (see page 3-9). Users signed on at security level 4, 5, or 6 will see the On Line System Menu (see page 3-24).

Using the System Setup Menu

This menu may be accessed through the "**System Set-up**" poke point on the Sign-on Menu (see page 3-4).

```
                    SYSTEM SET-UP MENU

          ´    Select Menu Specification File

          ´    Download ACL to ACCOL Node

          ´    Reconfigure Communications Set-up

          ^    Exit
```

The "**Select Menu Specification File**" poke point calls up the UML File Select Menu (see page 3-3).

The "**Download ACL to ACCOL Node**" poke point allows you to download an ACCOL Load File (.ACL) to the attached TeleFlow (provided that communications have already been successfully established.)

The "**Reconfigure Communications Set-up**" poke point activates the BBI Tools Communications Setup Menus, which allow communications to be configured. (see page 3-6).

Establishing Communications with the TeleFlow

```
                    BBI TOOLS COMMUNICATIONS SETUP MENU
                       HELP (F2 Key) Available

ACTIONS

    ^   Identify Local Node - Node Attached to PEI Hardware

    ´   Identify Global Node - Target node is not Local Node

    ´   Define Local Link - Baud Rate, Port, Modem Usage

    ´   Issue Node Routing Table / Time Sync

STATUS


    Local Node Address:   127
    Baud Rate: 9600     Timeout:  1 Seconds     Comm Port: COM1:
    NO MODEM

Press NEXT DISPLAY Key (F3) to enter program with Comm System as defined
```

The address of the TeleFlow must be specified in UOI. The address and other parameters are entered via the Communication Setup Menus discussed in this section. Either local or global communications are supported.

> NOTE
>
> Certain communications setup parameters may, if desired, be pre-defined in a text file called ATOOLS.INI. See Chapter 2 for more information; also see the *'ATOOLS.INI'* section of the *ACCOL II Reference Manual* (document# D4044).

Initiating Local Communications

If your computer is directly connected to the TeleFlow Local Communications Port, proceed as follows:

- Move the cursor to the "**Identify Local Node**" poke point, then press [Ins]. The BBI Tools Local Communications Setup Menu will appear (see below). This menu page allows the operator to reconfigure the Local Address, Local Node Name and the Expanded BSAP Group Address (0-127 default is 0). This menu also provides a poke point for examining the NETTOP File (to aid in node name determination).

```
            BBI TOOLS LOCAL COMMUNICATIONS SETUP MENU
                    HELP (F2 Key) Available


___1  Local Address of Node attached to PEI/NM Hardware

____  Local Node Name - Not always required - see HELP

___0  Expanded BSAP Group Number


´     Examine Nettop file (to aid node name determination)



              Press BACK DISPLAY Key (Function Key 4)
              to return to the main communications menu.
```

- Type in the local address (1 is the factory default), press [Ins], then press [F4]. The following message will be displayed at the lower left corner of the menu: **'Time Sync/NRT Sent'**. This message indicates that the PC's time and networking information have been sent to the TeleFlow.

Initiating Global Communications

If you are communicating through the network (global communications), use this procedure:

- The UOI program will communicate globally through the master node of a network to any 33XX node which is a slave to a lower level node. Select the "**Identify Global Node**" poke point. The BBI Tools Global Communications Setup Menu will appear (see below). Specify the 33XX's node name as it appears in the NETTOP files. Note: A NETTOP File poke point is provided for examining the NETTOP files.

```
            BBI TOOLS GLOBAL COMMUNICATIONS SETUP MENU
                    HELP (F2 Key) Available


____  Global Target Node Name

´     Examine Nettop file (to aid node name determination)



              Press BACK DISPLAY Key (Function Key 4)
              to return to the main communications menu.
```

After entering the node name, press [F4] .

Setting The Baud Rate, Port & Modem Usage Parameters

The PC Serial Port is set to 19200 baud through COM1 by default. To change the default communications port or the baud rate, select the "**Define Local Link**" poke point and press [Ins]; the BBI Tools Communications Port Setup Menu (shown below) will appear.

```
              BBI TOOLS COMMUNICATIONS PORT SETUP MENU
                       HELP (F2 Key) Available

Selected Baud Rate: 9600  BAUD      Timeout: _1 Seconds

    ´ 150 BAUD          ´ 1200 BAUD         ´  9600 BAUD
    ´ 300 BAUD          ´ 2400 BAUD         ´ 19200 BAUD
    ´ 600 BAUD          ´ 4800 BAUD         ´ 38400 BAUD

Selected Comm Port: COM1:                   3308 Node Type: ´ yes/NO

 ^ COM1: ´ COM2: ´ COM3: ´ COM4:      Download Retry: _5

Modem: NO MODEM

    ´ None  ´ BBI FSK/HEADBAND  ´ UDS 202S/D  ´ HayesSmart  ´ Help


                Press BACK DISPLAY Key (Function Key 4)
                to return to the main communications menu.
```

Use the poke points on this menu to change the port and baud rate selections as required. '19200 baud' and 'No Modem' are the default settings and should always be used with the TeleFlow.

When entries on this screen are complete, press [F4] to return to the BBI Tools Communications Setup Menu (see page 3-6). Press [F3] to change all the settings in the PC to the new settings. UOI will then attempt to communicate with the TeleFlow . If communications are successfully established, the Sign-On Menu will appear on the screen (see page 3-4).

Station Main Menu (Security Levels 1,2, or 3)

For users successfully signed on at security level 3 or below, the Station Main Menu is the first menu to appear.

```
        STATION M A I N  M E N U



     ^  RUN 1 MAIN MENU
     ´  RUN 2 MAIN MENU


   ´  Sign-off and Exit
```

The poke points at the bottom of the menu allow access to meter-run-specific data on the Run *x* Main Menus.

Run *x* Main Menus (Security Level 1, 2, or 3)

These menus (specific to either Run 1 or Run 2) display certain data for the meter run, and also include poke points to call up logs, plot trend data, or view alarms.

```
RUN 1    M A I N    M E N U

Meter type             TURB              Meter Factor       1.0  PPACF
DP In Use               0.00  INH2O      SP In Use         0.00  PSIG
Temp In Use             0.00  DEGF
Flow Rate/Hr               0  MSCFH      Flow Rate/Day                0  MSCFD
Uncorr Volume Tdy          0  MACF       Uncorr Volume Ydy            0  MACF
Volume Today               0  MSCF       Volume Yesterday             0  MSCF
Backflow Today          0.00  MINS       Backflow Yesterday        0.00  MINS

Orifice Diameter       2.000  INCHES     Pipe Diameter            4.026  INCHES
Gravity               0.6000             Heating Value           1000.0  BTU/CF
CO2 Content           0.0000  MOLE%      N2 Content              0.0000  MOLE%


´  Log Utilities      ´  View Alarms
´  Plot Trend Data    ´  Maintenance      ´  Sign-off and Exit
```

The poke points function as follows:

Log Utilities Calls up the Run *x* Log Utilities Menu. (See page 3-10)

Plot Trend Data	Calls up a trend plot of P, DP, and T data for this run. (See page 3-11 for details).
View Alarms	Calls up the Run *x* Alarm Status Information Menu (see page 3-14).
Maintenance	Calls up the Maintenance Operations Menu (see page 3-17).

Run *x* Log Utilities Menu (All Security Levels)

Log Collect, Convert and Display functions are all included on the Log Utilities Menu. The Log Utilities Menu is accessible to level 1,2, and 3 users by selecting the "**Log Utilities**" poke point on the Run *x* Main Menu (see page 3-9), or to level 4 and above users by selecting the appropriate "**Run *x* Logs**" poke point on the Station Log Utilities Menu (see page 3-36) or the "**Log Collection**" poke point on the appropriate Run *x* Function Menu (see page 3-37).

```
        RUN 1          LOG UTILITIES MENU

  Meter ID is: RSP1                        ^  View/Change Drive/Directory


                                    COLLECT  CONVERT  DISPLAY

  Combo Log                            ´        ´        ´
    (Daily, Periodic, Trend, Audit, Config)

  Daily Log                            ´        ´        ´

  Hourly Log                           ´        ´        ´

  Trend Data Log                       ´        ´        ´

  Alarm/Event Log                      ´        ´        ´

                          ´  Sign-off and Exit
```

This menu presents the user with a matrix of menu poke-points describing what functions may be performed. In addition, the user may change the default disk drive on the log select menus via the "**View/Change Drive Directory**" poke point. It should be noted that "Combo" Logs include the 15 Minute Trend Data.

COLLECT Poke Points: Collects a specific log and appends it to an existing file in binary format.

CONVERT Poke Points: Converts collected binary data to ASCII format, and stores it in an ASCII Text File on disk.

DISPLAY Poke Points: Displays text from the ASCII text file on the screen.

The Meter ID is used as the file name for all log binary and text files.

Trend Plot (All Security Levels)

Trend plots of DP (differential pressure), P (static pressure), and T (temperature) data can be displayed for security levels 1 through 3 users by selecting the "**Plot Trend Data**" poke point on the Run *x* Main Menu (See page 3-9) or for level 4 and above users by selecting the "**Plot Trend Data Run *x***" poke point on the Run *x* Current Gas Flow Information Menu (see page 3-39).

The screen plot will appear similar to the figure on the next page. When the plot is initially called up on the screen, UOI will attempt to show all of the available data. Depending upon your application, this may result in too much data being compressed in too small an area. To adjust this, use the "**Zoom In**" poke points, to concentrate on a smaller portion of the plot; this may make the plot easier to read.

The Trend Data plot includes three traces, one for differential pressure (DP) one for pressure (P) and a third for temperature (T). Individual traces can appear in a variety of styles and/or colors. In the plot above, the DP trace uses squares, the P trace uses circles, and the T trace uses a line.

There are several poke points included with each screen plot, which may be used to alter the way data is presented.

SHIFT PAGE LEFT

This poke point shifts the period for data being plotted *back* in time, to show *older* data.

SHIFT COLUMN LEFT

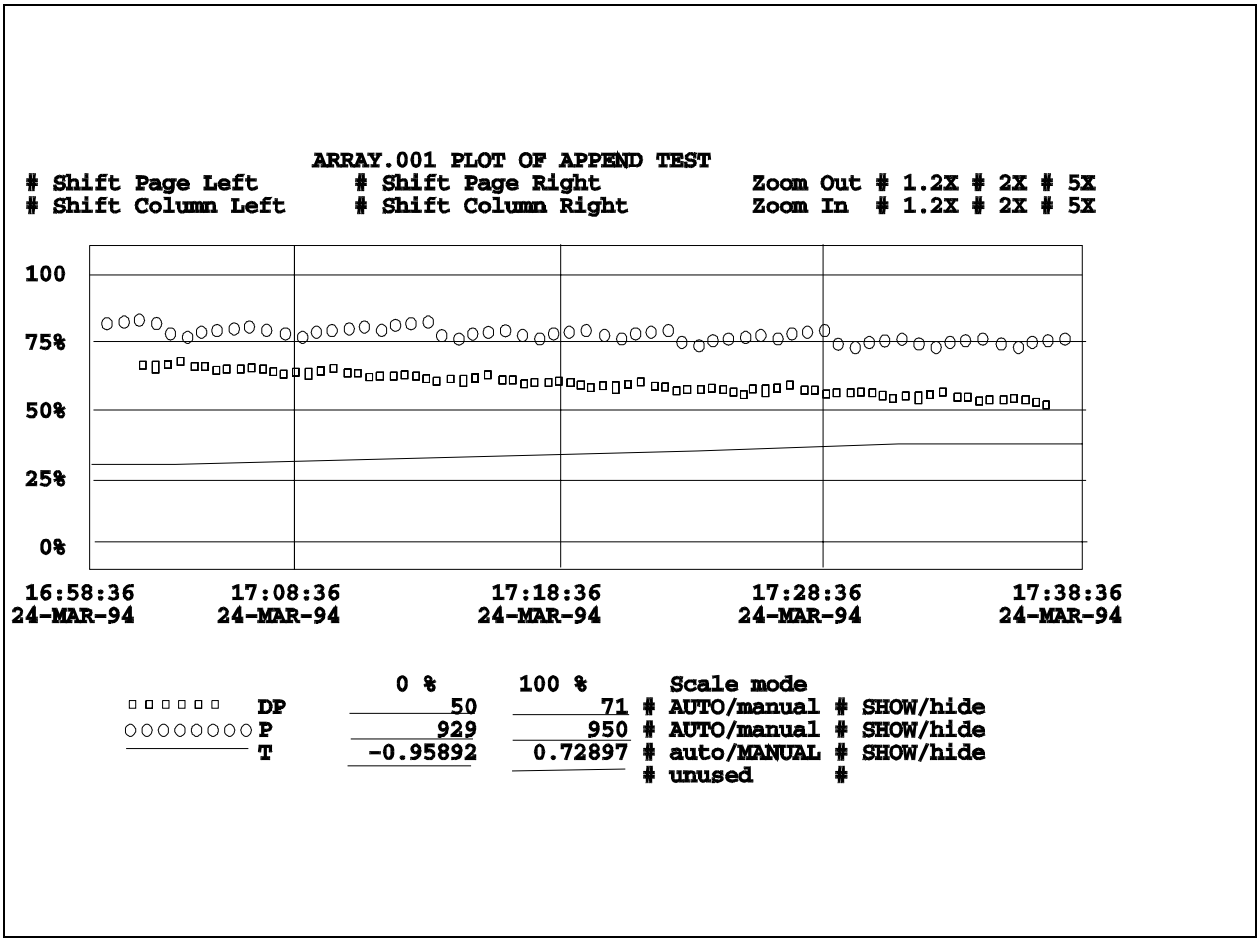
This poke point performs the same function as SHIFT PAGE LEFT, except in smaller increments.

SHIFT PAGE RIGHT

This poke point shifts the period for data being plotted *forward* in time, to show *more recent* data.

SHIFT COLUMN RIGHT

This poke point performs the same function as SHIFT PAGE RIGHT, except in smaller increments.



ZOOM OUT 1.2X, 2X, 5X

The "**zoom out**" poke points increase the number of data points which will be displayed on the plot, but compresses the amount of space between data points. Zooming out results in a longer time-scale of data points being displayed in a given area of the screen.

ZOOM IN 1.2X, 2X, 5X

The "**zoom in**" poke points decrease the number of data points which will be displayed on the plot, but increases the amount of space between data points. Zooming in makes it easier to examine individual data points in the plot.

SCALE MODE: AUTO/MANUAL

The "**Scale Mode**" poke point toggles the mode used to determine the 0% and 100% scale values for an individual trace on the plot. Each trace has its own

scale mode poke point. If there are less than 4 traces for this plot, the word 'unused' will appear next to the extra poke point(s.)

When AUTO is selected, the word AUTO is capitalized, and manual is shown in lowercase letters. When MANUAL is selected, the word MANUAL is capitalized, and the word auto is shown in lowercase letters.

AUTO
The 0% value is automatically set to the value of the *smallest* data value for this trace currently being displayed on the screen. The 100% value is automatically set to the value of the *largest* data value for this trace currently being displayed on the screen. These values are displayed in the 0% and 100% fields at left, and are dynamically updated if the SHIFT poke points are used to call up different time scales of data. AUTO mode ensures that the trace for a particular signal will never go above the 100% line, or below the 0% line on the screen.

MANUAL
Manual mode requires the operator to enter 0% and 100% data values for each individual poke point. Data values which are outside the 0 and 100% range defined by these values may not be visible on the screen, depending upon how far above or below the range, the value has gone.

SHOW/HIDE
Each trace has its own SHOW/HIDE poke point, which is used to turn on/off the display of a particular trace on the plot. When SHOW is selected, the trace will appear. When HIDE is selected, the trace is omitted from the plot.

Run *x* Alarm Status Information Menus (All security levels)

These displays allow the user to view alarms which have been generated at the TeleFlow. They are accessible for users with security level 1 to 3 from the "**View Alarms**" poke point on the appropriate Run *x* Main Menu (see page 3-9), or for users with security level 4 and above from the "**Alarm Status and Configuration**" poke point on the Run *x* Functions Menu (see page 3-37).

The Alarm Status Information Menu consists of three pages. Page 1 presents current alarm data for various TeleFlow functions and measurements.

```
RUN 1  ALARM STATUS INFORMATION   Page 1 of 3


 DIFF PRESS              ALARM          STATIC PRESS           ALARM

 FLOWING TEMP            ALARM          FLOW RATE              OKAY


 BACKFLOW                   CLEAR_      ME CE AE
 LOW DP CUTOFF              ACTIVE      ME CE AE
 BACKFLOW ALARM DELAY        ___10 SECS

 TRANSMITTER FAILURE        CLEAR_      ME CE AE
 SENSOR CHECKSUM            OK____      ME CE AE

 AGA8 CALC ERROR            OFF___      ME CE

    PRESS F8 TO CONFIGURE ALARMS
```

To enable (E) or inhibit (I) a Manual (M), Control (C) or Alarm (A) Status Bit (associated with page 3 of the Alarm Configuration Menu), press [F3] (with the cursor on the highlighted state associated with the logical signal in question, i.e., Low DP Cutoff, Backup Battery, AGA8 Calc Error or Self-Check Failure. The menu which appears will allow the user to examine and change signal details.

Pages 2 and 3 provide analog alarm configuration information. They allow the user to configure alarm deadbands and alarm limits. To change an alarm configuration deadband or limit value, enter the new value directly on the display (page 2 or 3) or press [F3] (with the cursor set on the highlighted value in question). The menu which appears will allow the user to examine/change signal details.

Run 1 uses the integral transducer thus the Run 1 menus show alarms related to the transducer which do not appear on menus for the other run.

TRANSMITTER FAILURE The integral transducer is not responding to data requests.

SENSOR CHECKSUM The on-board serial EEPROM containing compensation data has undergone a data change.

```
RUN 1 ALARM CONFIGURATION  Page 2 of 3

                          DIFFERENTIAL          STATIC
                            PRESSURE          PRESSURE      TEMPERATURE


 CURRENT VALUE           ___0.00 INH2O    ___0.00 PSIG     ___0.00 DEGF

 LOW ALARM DEADBAND      ___3.00 INH2O    __10.00 PSIG     ___3.00 DEGF
 LOW ALARM               __10.00 INH2O    _100.00 PSIG     __50.00 DEGF
 LOW LOW ALARM           ___0.00 INH2O    ___0.00 PSIG     __32.00 DEGF

 HIGH ALARM DEADBAND     __10.00 INH2O    __50.00 PSIG     __10.00 DEGF
 HIGH ALARM              _250.00 INH2O    1500.00 PSIG     _150.00 DEGF
 HIGH HIGH ALARM         _300.00 INH2O    2000.00 PSIG     _250.00 DEGF



  PRESS F8 FOR MORE ALARMS           USE PgUp TO CLEAR FIELD
```

```
RUN 1 ALARM CONFIGURATION  Page 3 of 3

                              FLOW RATE

 CURRENT VALUE                ____0.00 MSCFH

 LOW ALARM DEADBAND            __50.00 MSCFH
 LOW ALARM                    _____0.0 MSCFH
 LOW LOW ALARM                _____0.0 MSCFH

 HIGH ALARM DEADBAND           __50.00 MSCFH
 HIGH ALARM                   __3000.0 MSCFH
 HIGH HIGH ALARM              __5000.0 MSCFH


            USE PgUp TO CLEAR FIELD
```

Deadbands and Limits:

- A deadband is a 'no detect' zone around the alarm limit to prevent multiple alarms if the signal oscillates at the threshold of the alarm limit.

- Low Alarm, Low Low Alarm, High Alarm and High High Alarm limit data fields represent the alarm setpoints. **Note: When configuring an alarm signal,**

provide an adequate non-alarm zone to ensure that the signal is not in a continuous alarm state.

An alarm condition occurs when the signal value exceeds the alarm limit. The alarm remains activated until the signal returns to the non-alarm range defined by the alarm limits and deadbands.

By default, signals that are in the alarm state are displayed on the LCD Display. Alarms may be inhibited from appearing on the LCD Display via the "**ALARM DISPLAY**" poke point on the Station Configuration and Inputs/Outputs Menu (see page 3-27).

Run *x* Maintenance Operations Menu (Requires Security Level 1, 2, or 3)

The Run *x* Maintenance Operation Menu is accessible from the "**Maintenance**" poke point on the Run *x* Main Menu (see page 3-9).

```
RUN 1    MAINTENANCE OPERATIONS MENU


^  Transmitter 1 Calibration

´  Perform Plate Change


´  Sign-off and Exit
```

The Maintenance Operations Menu provides three poke points; "**Transmitter Calibration**" which activates the Verify/Calibrate menus, (see page 3-18), "**Perform Plate Change**" which activates the Orifice Plate Change Menu (see page 3-17), and "**Sign-Off and Exit**".

The first two poke points activate their related menus after first setting signals in the load to ON; these signals are set OFF when the related menu is exited. This is done to provide a log record of maintenance activity.

Run *x* Orifice Plate Change

When "**Perform Plate Change**" is selected, the DP, P, and T inputs are 'frozen' at their present value. They are 'unfrozen' when the menu is exited. The following notification is displayed.

```
          RUN 1     ORIFICE PLATE CHANGE

      The DP, SP, and T values have been Frozen to their current
      values. These values will be Unfrozen upon exiting from
      this menu.

      When the Orifice Plate has been changed, enter the new value
      for the Orifice Plate Diameter below and then exit this
      menu.

_____________________________________________________________________

          Orifice Plate Diameter:  __2.000  INCHES
```

Transmitter x Calibration Menus (Any security Level)

The Transmitter Calibration/Verification Menu is accessed from the "**Transmitter Calibration**" poke point on either the Run *x* Functions Menu (see page 3-37) or the Maintenance Operations Menu (see page 3-17). This menu allows the user to verify calibration procedures, to perform calibration procedures, and to configure Damping & Mode Control.

Selection of a verification poke point automatically turns the calibration mode signal ON and invokes the appropriate Verification menu. When the calibration mode signal is turned ON, the TeleFlow automatically freezes the DP, P, and T variables at there current value. Verification Menus are identical except for the variable being verified.

The Calibration Menus have been customized to aid the Technician or Engineer who is performing or checking TeleFlow calibration. A Help Menu can be accessed by pressing [F2]. The Help Menu displayed is dependent upon the screen you are in when you press the [F2] key.

The Damping and Mode Control Menu provides access to the DP Floating Point Damping Enable/Disable feature and the DP Floating Point Damping Time constant.

Verification

The Verification menus for DP, P, and T are virtually identical except for the variable being verified. Only the DP Verification menu will be described in this document.

The Verification menu contains the procedure describing how to perform the verification process. The live value for the variable being processed is displayed below the procedure. The verification procedure consists of applying a known test value to the variable being verified and waiting for the live value to stabilize. The [Enter] key is used to indicate that this has occurred.

When the [Enter] key is pressed, the user is prompted to enter the test value applied to the input. Entering the applied value causes an Audit/Event record to be written to the TeleFlow. This Audit/Event record contains an indication of which variable is being verified, the applied test value, and the actual live value.

The user may apply as many test values as needed.

```
                TRANSMITTER CALIBRATION / VERIFICATION

              VERIFICATION PROCEDURES:

               ( Verify Differential Pressure (DP) Calibration

               ( Verify Static Pressure (P) Calibration

               ( Verify Temperature (T) Calibration

              CALIBRATION PROCEDURES:

               ( Calibrate Differential Pressure (DP)

               ( Calibrate Static Pressure (P)

               ( Calibrate Temperature RTD (T)

               ( Damping and Mode Control
```

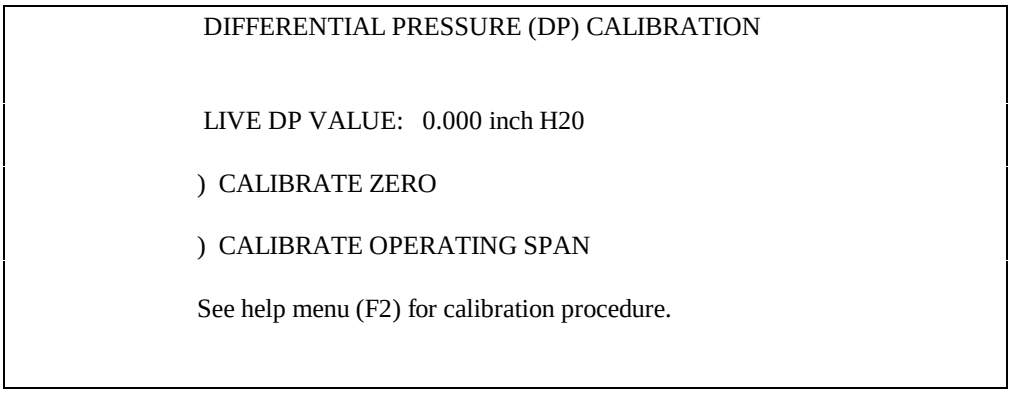
```
          VERIFY DIFFERENTIAL PRESSURE INPUT CALIBRATION

      Procedure:

1 - Apply test value to DP, when live value is steady press ENTER.
2 - Enter the test value applied.
3 - Repeat steps 1 & 2 as required. (Typically, use test values of
    0, 50, 100, 80, 20, 0 percent of scale.)

_____________________________________________________________________

       DP Live Value: __________    ________

       Apply a test value to DP, when live value is steady press ENTER

      See help menu (F2) for verification procedure.
```

Calibration of Differential Pressure

The differential pressure sensor of the transmitter is checked and calibrated as follows:

1. Vent the HI and LO input ports of the DP body to atmosphere to obtain a 0% differential.

2. Move the cursor to the "**CALIBRATE ZERO**" poke point and observe the "**LIVE DP VALUE**".



3. Once the reading in the "**LIVE DP VALUE**" has stabilized, press the [Ins] key to calibrate the DP Zero.

4. Connect a precision test pressure source (±.025%) to the HI port.

5. Apply a pressure to the HI port that is 15% to 100% of the transmitter's pressure range.

   Example 1

   If the differential range of the TeleFlow is 0 to 150 in H_2O, 100% of the range would be equivalent to 150 inH_2O. Any differential pressure (as-low-as 22.5 inH_2O) could be used.

6. Move the cursor to the "**CALIBRATE OPERATING SPAN**" poke point.

7. Observe the "**LIVE DP VALUE**" field and note the applied pressure.

8. Once this value has stabilized, press the [Ins] key.

9. Type in the applied pressure value in response to the prompt and press the [Ins] key. Zero and Operating Span calibration is complete.

   Note: All linearization has been performed at the factory and is not required.

Calibration of Static Pressure

Static pressure calibration is performed with a test pressure applied to the HI and LO port of the DP body (the SP sensor is connected to the HI side of the DP body). This procedure is nearly identical to that described above for the Differential Pressure except that the test pressure source must be capable of providing up to the maximum value of the SP sensor (500 or 2000 psi types). The "**CALIBRATE ZERO**" poke point identified in the Static Pressure (SP) Calibration Menu is checked with no pressure applied, while the "**CALIBRATE OPERATING SPAN**" poke point is checked with pressures from 15% to 100% of the upper range limit of the SP sensor.

STATIC PRESSURE (SP) CALIBRATION

LIVE SP VALUE: 0.000 PSI

☺ **CALIBRATE ZERO**

☺ **CALIBRATE OPERATING SPAN**

See help menu (F2) for calibration procedure.

Calibration of RTD Temperature

TEMPERATURE CALIBRATION OF RTD

☺ **SELECT DISPLAY UNITS**

LIVE READING: +76.031 Degrees F

☺ **CALIBRATE ZERO (AT 100 OHMS)**

☺ **CALIBRATE OPERATING SPAN**

☺ **ADJUST LIVE READING**

See help menu (F2) for calibration procedure.

1. Disconnect the regular RTD sensor and connect a 100 Ohm (± .025%) precision resistor across the RTD terminals (which is equivalent to 32°F).

2. Move the cursor to the "**CALIBRATE ZERO**" poke point.

3. Observe LIVE T VALUE.

4. When LIVE T VALUE stabilizes press [Ins] key to calibrate the RTD Zero.

5. Disconnect the resistor of step 1 and connect a 140 Ohm (± .025%) precision resistor across the RTD terminals (which is equivalent to 220°F).

6. Move the cursor to the "**CALIBRATE OPERATING SPAN**" poke point.

7. Observe LIVE T VALUE.

8. When LIVE T VALUE stabilizes press [Ins] key to calibrate the RTD Operating Span.

9. If after re-connecting the unit to the process it is determined that the number in the LIVE T VALUE field does not correlate with that measured by an external process monitoring device, offset compensation may be performed. Select the "**ADJUST LIVE READINGS**" poke point and press [Ins]. This allows a linear shift of the RTD temperature span, e.g., if at 68°F the Live

Reading value is 68.5°F, the error is .5°F. To correct this error enter 68° at the prompt.

Damping And Mode Control (Requires Security Level 4 or higher)

The TeleFlow's firmware provides output damping selections which can be set on the Damping and Mode Control Menu.

DAMPING AND MODE CONTROL

) DP Floating Point Damping: enabled/DISABLED

) DP Floating Point Damping Time: 0.6 Secs

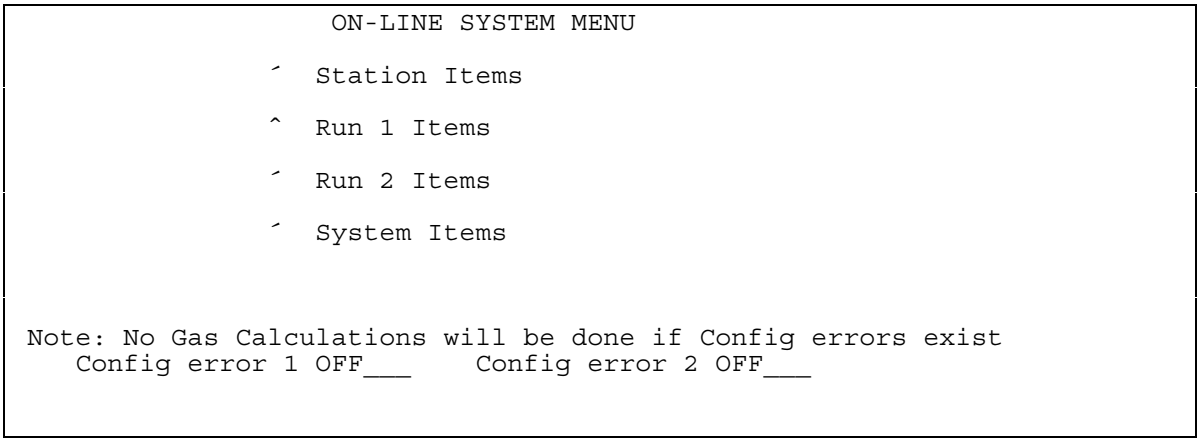
The "**DP Floating Point Damping Time**" controls the rate at which the output responds to a given change of input. It is used to slow down the output response to a rapid or oscillatory change of the measured variable. The indicated value changes 63% of the difference between the "present measured pressure" and the "present indicated pressure" in one damping time period. It would take 5 times the DP Floating Point Damping Time for the "present indicated pressure" to equal the "present measured pressure" (if a change in the "present measured pressure" didn't occur). An increase in the DP Floating Point Damping Time results in an increase in smoothing the input data.

Using the On-Line System Menu (Security Levels 4, 5, or 6)

For users who have successfully signed on at Security Level 4 or above, the On-Line System Menu will be the first menu to appear.

The On-Line System Menu provides access to both station menus and run-specific menus. In general, Station Menus contain summary information about the entire station, such as flow totals, or configuration data which is common to both meter runs; Run Menus, contain more detailed information about either one of the two independent meter runs, Run 1 or Run 2.

Details on the individual functions/menus accessible from the On-Line System Menu will be discussed in the remainder of this chapter.



Station Items — this poke point calls up the Station Menu. (See page 3-25). NOTE: The Station Menu should NOT be confused with the Station Main Menu used at lower security levels).

Run *x* Items — these poke points call up the Run *x* Functions Menu for either Run 1 or Run 2. (See page 3-37).

System Items — this poke point calls up the System Status and Control Menu. (See page 3-55).

Station Menu (Security Level 4, 5, or 6)

```
                STATION MENU

     ^  Current Gas Data

     ´  Configuration and Inputs

     ´  Alarm Status and Configuration

     ´  Run Switching

     ´  PID Control

     ´  Log Collection
```

The Station Menu contains poke points which allow access to data which is common to the entire station (both runs).

Current Gas Data	Calls up the Station Instantaneous Gas Flow Readings Menu (see page 3-26).
Configuration and Inputs	Calls up the Station Configuration and Inputs/Outputs Menu (see page 3-27).
Alarm Status and Configuration	Calls up the Station Alarm Status Information Menus (see page 3-29).
Run Switching	Calls up the Run Switching Menu (see page 3-31).
PID Control	Calls up the Station PID Flow Controller Menu (see page 3-32).
Log Collection	Calls up the Station Log Utilities Menu (see page 3-36).

Current Gas Flow Information - Station Summary (Security 4,5, or 6)

To see a summary of gas flow information for the entire station, including station flow totals, call up the Station Instantaneous Gas Flow Readings Menu, accessible via the "**Current Gas Data**" poke point on the Station Menu (see page 3-25).

```
STATION           INSTANTANEOUS GAS FLOW READINGS

                    RUN1              RUN2              STATION
 METER TYPE      ORIF              ORIF
 DIFF PRES         0.00 INH2O        0.00 INH2O
 STAT PRES         0.00 PSIG         0.00 PSIG
 TEMP              0.00 DEGF         0.00 DEGF

 FLOW RATE           0.00 MSCFH        0.00 MSCFH        0.00 MSCFH
 FLOW RATE           0.00 MSCFD        0.00 MSCFD        0.00 MSCFD
 ENERGY RATE         0.00 MMBTUH       0.00 MMBTUH       0.00 MMBTUH

 VOLUME CURR            0.0               0.0                0.0 MSCF
 ENERGY CURR            0.0               0.0                0.0 MMBTU
 VOLUME TODAY           0.0               0.0                0.0 MSCF
 ENERGY TODAY           0.0               0.0                0.0 MMBTU
 FLOW TIME            0                 0      MINS

 NOMINATION ENABLE   DISABL            DISABL
 NOMINATION TOTAL             0.0               0.0
```

Station Configuration and Inputs/Outputs Menu (Security Level 4, 5, or 6)

These menus allow the user to view/set certain configuration constants, and to configure auxiliary analog inputs and discrete inputs/outputs. The first page is accessed via the "**Configuration and Inputs**" poke point on the Station Menu (see page 3-25). The second and third pages are accessible by pressing the [F8] key.

```
STATION CONFIGURATION AND INPUTS/OUTPUTS  Page 1 of 3
UNIT ID  9999_________________  METER ID 1  Unnamed1   METER ID 2  Unnamed2
CALCULATION INTERVAL  ____30   CONTRACT HOUR _____7  (Common to both runs)
ALARM LCD DISPLAY     OFF___   DISPLAY RATE _____2    RUN 1 PRIMARY CLEAR
LOAD DATE   27-Feb-2001 09:40   VERS: 0001   FILE: TF2RUN
LOAD ID  ATF2R2       VERS  10.20
POWER INPUT 1           12.24 VOLTS   POWER INPUT 2          0.16 VOLTS
SYSTEM VOLTAGE          12.24 VOLTS   BACKUP BATTERY         3.45 VOLTS
PC BOARD TEMPERATURE      85.00 DEGF
 PRESS F8 FOR AUXILIARY INPUTS                      USE PgUp To CLEAR FIELD
```

Configurable items on this menu include:

Unit ID	This is a name used to identify this station.
Meter ID 1, Meter ID 2	These are names used to identify each of the two individual meter runs.
Calculation Interval	This specifies the length of the sleep time period used by the TeleFlow. The longer the sleep time, the less power is consumed.
Contract Hour	This specifies the hour (on a 24 hour clock) at which a 'gas day' begins.
Alarm Display	Enables/disables the showing of alarms on the LCD display. LCD display sequences begin with date and time, then the local ID and group number, then alarms (if Alarm Display is enabled), then the signals contained in List 50. If there are many alarms, considerable time will elapse before the main signals are shown, therefore many users choose to leave Alarm Display disabled.

Display Rate	When signals (including alarms) are displayed on the LCD display (see above), this is the rate (in seconds) at which the display is refreshed.
Run 1 Primary	Establishes either Run 1 (default) or Run 2 as the primary run for PID and run switching functions.

The remaining two pages allow configuration of the auxiliary analog inputs and the discrete inputs/outputs.

```
STATION ANALOG INPUTS

 INPUT 1      ___0.00
 ZERO         ___0.00    SPAN         _100.00
 INPUT 2      ___0.00
 ZERO 2       ___0.00    SPAN 2       _100.00
 INPUT 3      ___0.00
 ZERO 3       ___0.00    SPAN 3       _100.00
 INPUT 4      ___0.00
 ZERO 4       ___0.00    SPAN 4       _100.00
 INPUT 5      ___0.00
 ZERO 5       ___0.00    SPAN 5       _100.00


 PRESS F8 FOR DISCRETE I/O SIGNALS       USE PgUp To CLEAR FIELD
```

All analog inputs are 1 to 5 volt inputs with 5% overrange except Input 1 which has 300% overrange, i.e. up to 16 volts can be applied.

```
 DISCRETE INPUTS/OUTPUTS  Page 3 of 3


 DISCRETE  INPUT 1      OFF___          DISCRETE  INPUT 2        OFF___
 DISCRETE OUTPUT 1      OFF___          DISCRETE OUTPUT 2        OFF___


 ** OUTPUTS 3,4 ARE RUN2 PID, 5 IS RUN 1 SAMPLER, 7 IS RUN 2 SAMPLER **
 **      8 IS RUN SWITCH ON, 9 IS RUN SWITCH OFF                      **

 DISCRETES   DIO 3  DIO 4  DIO 5  DIO 6  DIO 7  DIO 8  DIO 9  DIO 10
           OFF    OFF    OFF    OFF    OFF    OFF    OFF    OFF
                                OFF___         OFF___ OFF___ OFF___

        USE PgUp To CLEAR FIELD
```

Station Alarm Status Information Menu (Security Level 4, 5, or 6)

These menus allow you to configure alarm limits and deadbands for station-related alarms. The first page is accessed by the "**Alarm Status and Configuration**" poke point on the Station Menu (see page 3-25), the remaining pages are called up via the [F8] key.

```
STATION      ALARM STATUS INFORMATION

  STATION FLOW RATE      OKAY            SYSTEM VOLTAGE         OKAY
  INPUT 1                OKAY            INPUT 2                OKAY
  INPUT 3                OKAY            INPUT 4                OKAY
  INPUT 5                OKAY
  BACKUP BATTERY         OKAY          CLEAR_      ME CE AE
  BATTERY OVERCHARGE     OKAY          CLEAR_      ME CE AE

   PRESS F8 TO CONFIGURE ALARM LIMITS
```

SYSTEM VOLTAGE
The supply voltage (= Greater Power Source, PWR1 or PWR2) to the TeleFlow is monitored internally and this reading will indicate ALARM if the voltage falls below 6 volts (default) or OKAY when the voltage rises above 6.5 volts (default). These limits are user configurable (see the second page of the menu).

BACKUP BATTERY
The internal RAM backup battery on the CPU board is tested every 4 seconds or the calculation interval, whichever is slower. If the voltage is less than 3.0 volts then this reading will indicate ALARM, otherwise it reads OKAY.

BATTERY OVERCHARGE
Indicates that the charging software has detected an overcharge condition.

INPUT
Indicates the status of the Analog Input. If the value of the auxiliary input falls outside the limits for high alarm and low alarm, set on the second page, this reading will indicate ALARM.

SELF CHECK FAIL
If in FAIL, this indicates a major failure of RAM, a stack overflow, or a firmware checksum failure.

For a description of alarm limits and deadbands, see the Run *x* Alarm Status Information Menus (see page 3-14).

```
STATION ALARM CONFIGURATION  Page 2 of 3

                                  FLOW            SYSTEM
                                  RATE            VOLTAGE


 CURRENT VALUE                ____0.00 MSCFH    _12.24 VOLTS

 LOW ALARM DEADBAND            _100.00 MSCFH    __0.50 VOLTS
 LOW ALARM                    _____0.0 MSCFH    __5.75 VOLTS
 LOLO ALARM                   _____0.0 MSCFH    __5.50 VOLTS

 HIGH ALARM DEADBAND           _100.00 MSCFH    __0.50 VOLTS
 HIGH ALARM                   __6000.0 MSCFH    _16.00 VOLTS
 HIHI ALARM                   _10000.0 MSCFH    _16.50 VOLTS


  PRESS F8 FOR OTHER ANALOG INPUTS?      USE PgUp TO CLEAR FIELD
```

```
STATION ALARM CONFIGURATION  Page 3 of 3

 ANALOG INPUTS
                1         2         3         4         5

 VALUE        ___0.00   ___0.00   ___0.00   ___0.00   ___0.00

 LOW DBAND    ___3.00   ___3.00   ___3.00   ___3.00   ___3.00
 LOW ALARM    ___10.0   ___10.0   ___10.0   ___10.0   ___10.0
 LOLO ALARM   ____0.0   ____0.0   ____0.0   ____0.0   ____0.0

 HIGH DBAND   __10.00   __10.00   __10.00   __10.00   __10.00
 HIGH ALARM   __100.0   __100.0   __100.0   __100.0   __100.0
 HIHI ALARM   __150.0   __150.0   __150.0   __150.0   __150.0


    USE PgUp TO CLEAR FIELD
```

Run Switching Menu (Security Level 4, 5, or 6)

This menu specifies conditions at which run-switching of the two meter runs should occur. Run switching requires that run 2 be enabled. (Run 1 is always enabled.) The Run Switching menu is accessed via the "**Run Switching**" poke point on the Station Menu (see page 3-25).

```
                  RUN SWITCHING  (Run 2 must be enabled)

  Run Switch Function  OFF___        Run 2 Enable  OFF___

  Run 1 Primary  ON____

                             RUN 1            RUN 2
  Meter Type                 ORIF__           ORIF__
  Dp Full Scale  INH2O       _300.0           _300.0
  DP High Switch INH2O       __80.0           __80.0
  DP Low Switch  INH2O       __20.0           __20.0
  Turbine Max Freq. Hz       ___0.0           5000.0
  Turbine High Switch Hz     2000.0           2000.0
  Turbine Low Switch Hz      __10.0           __10.0
  Secondary Run Switch       OFF___
  Secondary stuck flag       OFF___
```

The primary run DP switch points control the point at which the secondary run is switched in or out. With Run 1 Primary (and Run 2 shut-in) then when the Run 1 DP or frequency exceeds the Run 1 High Switch point, the second run is switched on. The Run switch function then ignores the inputs for 10 seconds while the system settles. Should run 1 DP drop below the Low Switch point, Run 2 is switched out, and inputs are ignored for 10 seconds.

If Run 2 is Primary, the action is reversed.

Station PID Flow Controller Menu (Security Level 4, 5, or 6)

The PID Controller is utilized in the TeleFlow for Flow Rate Control.
This menu is accessible from the "**PID Control**" poke point on the Station Menu (see page 3-25).

```
                  STATION PID FLOW CONTROLLER

 ENABLE                  DISABL
 SETPOINT              _______0.0 MSCFH
 GAIN                    __1.00
 INTEGRAL                __1.00 R/MIN
 DERIVATIVE              __0.00 MINS
 DEADBAND                __1.00 %STPT
 SPAN                  ____5000.0 MSCFH
 VALVE TRAVEL TIME       _30.00 SECS
 PRESSURE OVERRIDE (set one or both to enable override)
   MAXIMUM               _____0 PSIG
   MINIMUM               _____0 PSIG
 PRESSURE TAP LOCATION RELATIVE TO THE VALVE UPSTRM
 PID OUTPUT MODE         PULSE_          ANALOG OUT   0.00 %

 STATION FLOW RATE           0.0 MSCFH             0  MSCFD

   RUN 1 DATA  ^     RUN 2 DATA  ´             USE PgUp TO CLEAR FIELD
```

The Station PID controller uses the Run 1 PID controller and its related Raise/Lower outputs and/or the analog output. The main difference is that the station PID uses the sum of the individual run flow rates as its process variable.

ENABLE
Pressing the [PageUp] key and then pressing the [Ins] key will clear the Enable/Disable reading and the following prompt will appear at the bottom of the menu: **DO YOU WISH TO TURN THIS SIGNAL TO ITS ENABLED (TRUE) STATE?** If so, press the [Ins] Key again. If you do not want the PID Flow Controller enabled, type 'N'. It is recommended that GAIN, INTEGRAL and DERIVATIVE adjustments be checked before turning a controller ON.

WARNING!

Do not turn the ENABLE selection ON without first checking the external process control loop. The initial values displayed on the PID Menu may drive some critical processes beyond the extremes of safe limits. This could result in fire, explosion, property damage, and injury to persons. When setting the menu parameters, make sure the associated process is observed and protected.

SETPOINT
This field contains the operating point at which the flow rate is to be controlled. The setpoint units are MSCFH with a default setting of 1000 MSCF per Hour. To change the Setpoint value, press the [Page Up] key to clear the display and then type the desired value. Once the new value has been typed in, press the [Ins] key.

GAIN
The GAIN controls the amount of output change resulting from a change of the measured variable. The default value of 1.00 is typically used as a starting point; final gain is usually less. To change the Gain, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

INTEGRAL
The INTEGRAL determines the time it will take the PID to correct an error in the measured variable. The number of times the output is adjusted in a given time period is specified in seconds. An entry of 60 seconds can be used as a starting point; this would provide one (1) repeat per minute. To change the Integral setting, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

DERIVATIVE
DERIVATIVE compensates for a rapidly changing measured variable. The time is specified in seconds (SECS) and most applications will use a setting of zero (0). To change the Derivative value, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

DEADBAND
The DEADBAND provides a means of specifying a 'window' in which the variable does not affect the output. This entry is in percent (%) of the SETPOINT signal. As an example, a 5% entry would mean that the controller output must exceed the present setpoint by 5% before the output is changed. To change the Deadband value, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

SPAN
This entry sets the SPAN for the PID CONTROLLER in (MSCFH). The controller uses this value (default = 5000 MSCFH) to convert the actual flow rate to percent for use by the PID controller; therefore, this value should be set as closely as possible to the expected operating maximum. To change the Span value, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

VALVE TRAVEL TIME
Valve Travel Time is the amount of time it takes a Control Valve to go from being fully open to fully closed (or from fully closed to fully open). The default value is 30 Seconds. To change the value of the Valve Travel Time, press the PAGE UP [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

PRESSURE OVERRIDE (SET ONE OR BOTH TO ENABLE OVERRIDE)
When the PID controller is active in flow-control mode, it will adjust a pressure valve to maintain the established flow rate setpoint. Pressure override is used in situations where full line pressure should not be applied to the downstream equipment or in circumstances where too low of a pressure should not be allowed.

A Maximum and Minimum pressure can be configured which set the PID controller to switch to pressure control mode whenever the line pressure attempts to go outside the defined limits. The pressure override mode becomes active when either or both limits are set to a non-zero value.

PRESSURE TAP LOCATION
The Pressure Tap location is specified as either upstream (UPSTRM) or downstream (DNSTRM) with respect to the control valve. The action of the override controller depends on the configured Tap location. When the pressure tap is configured as Downstream of the control valve, pressure will rise as the valve opens to increase the flow rate. Increasing demand will cause the valve to open more. Should conditions occur that cause the pressure to exceed the maximum pressure limit, the override will take control and close the valve to

maintain the configured maximum pressure. Should the valve attempt to close and reduce pressure below the configured maximum pressure, the override will take control to maintain the minimum pressure. When the pressure tap is configured as Upstream, the action is reversed, i.e., when the maximum pressure is exceeded the valve will open to lower the pressure. When the minimum pressure is exceeded the valve will be closed.

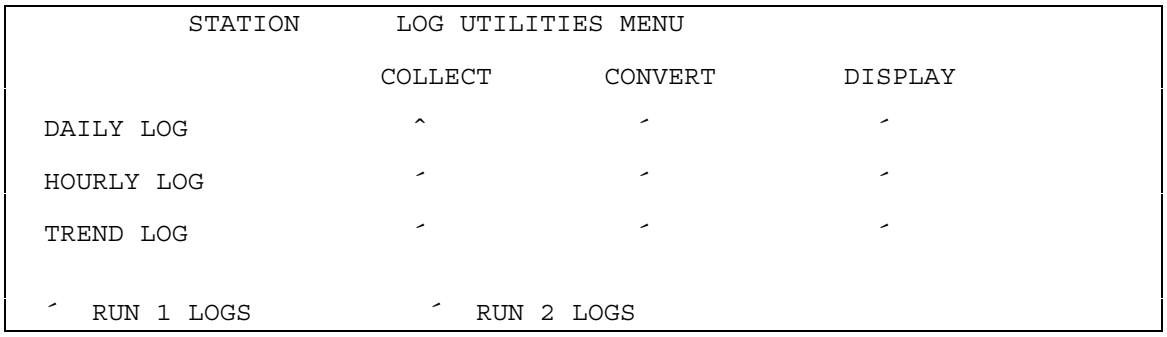
Users are cautioned to test the regular override controller actions to verify correct valve movement for all expected conditions.

PID OUTPUT MODE
The type of output module the PID3TERM module is feeding into. If an analog output ANOUT module is used, you must specify 'ANALOG'; the current percentage value of full scale will be displayed under **ANALOG OUT**. If a pulse duration output PDO module is used, you must specify 'PULSE'. To change the mode, use the [PgUp] and [Ins] keys as discussed earlier.

STATION FLOW RATE
The Flow Rate value is Read Only data; it is the presented in both MSCFH and MSCFD.

Station Log Utilities Menu (Security Level 4, 5, or 6)

Log Collect, Convert and Display functions are all included on the Station Log Utilities Menu. The Station Log Utilities Menu is accessible by selecting the "**Log Collection**" poke point on the Station Menu (see page 3-25).This menu presents the user with a matrix of menu poke-points describing what functions may be performed.



COLLECT Poke Points: Collects a specific log and appends it to an existing file in binary format.

CONVERT Poke Points: Converts collected binary data to ASCII format, and stores it in an ASCII Text File on disk.

DISPLAY Poke Points: Displays text from the ASCII text file on the screen.

RUN *x* Logs Poke Points: Call up the Run *x* Log Utilities Menu, from which additional logs, specific to either Meter Run 1, or Meter Run 2, can be collected, converted, and displayed.

The Unit ID (entered on the first page of the Station Configuration and Inputs/Outputs Menu, see page 3-27) is used as the file name for all station log binary and text files.

Run *x* Functions Menus (Security Level 4, 5, or 6)

The Run *x* Functions Menus allow access to various configuration and live data for either the Run 1 or Run 2 meter runs. They are accessible via the "**Run 1 Items**" or "**Run 2 Items**" poke points on the On-Line System Menu (see page 3-24).

```
                RUN 1 FUNCTIONS MENU

       ´  Current Gas Data

       ´  Live inputs

       ´  Configuration -- Meter type is   ORIF__

       ´  Transmitter Calibration

       ´  Alarm status and Configuration

       ´  PID/Sampler Control    ´  Gas Composition

       ´  Log Collection         ´  Nomination
```

The poke points/fields on the menu perform the following functions:

Current Gas Data	Calls up the Run *x* Current Gas Flow Information Menu for the appropriate meter run (see page 3-39).
Live Inputs	Calls up the Run *x* Live Inputs Menu for the appropriate meter run (see page 3-41).
Configuration	Allows the meter type to be specified, and calls up the Run *x* Orifice Configuration Menu or Run *x* Turbine Configuration Menu, depending upon the value of the meter type specified; either 'ORIF' for orifice (see page 3-42) or 'TURB' for turbine (see page 3-43).
Transmitter Calibration	Calls up the Run *x* Transmitter Calibration/Verification Menu (see page 3-18).
Alarm status and Configuration	Calls up the Run *x* Alarm Status Information Menus (see page 3-14).
PID/Sampler Control	Calls up the Run *x* PID Flow Controller / Sampler Control Menu (see page 3-45).

Gas Composition	Calls up the Run *x* Gas Composition Menu (see page 3-41).
Log Collection	Calls up the Run *x* Log Utilities Menu (see page 3-10).
Nomination	Calls up the Run *x* Nomination Menu (see page 3-49).

Run *x* Current Gas Flow Information Menu (Security Level 4, 5, or 6)

To see current gas flow information for a particular meter run, call up the Run 1 (or Run 2) Current Gas Flow Information Menu.

This menu is accessible from the "**Current Gas Data**" poke point on the Run 1 (or Run 2) Functions Menu (see page 3-37).

```
RUN 1        CURRENT GAS FLOW INFORMATION

         ^   Gas Flow Readings

         ´   Volume, Energy and Flow Time

         ´   Flow Equation Components

         ´   Gas Composition

         ´   Plot Trend Data Run 1
```

Selecting an item from this menu will access a more detailed menu for the indicated information.

Run *x* Instantaneous Gas Flow Readings Menu

The Run *x* Instantaneous Gas Flow Readings Menu is accessible from the "**Gas Flow Readings**" poke point on the Run *x* Current Gas Flow Information Menu. It provides the following flow readings:

DIFFERENTIAL PRESSURE (INH2O)
STATIC PRESSURE (PSIG)
TEMPERATURE (DEGF)
FLOW STATUS (IB.IFF)
HEATING VALUE (BTU/CF)
TOTAL FLOW RATE (MSCFH) & (MSCFD)
TOTAL ENERGY RATE (MMBTUH)
HOURLY VOLUMES FOR THIS HOUR & PREVIOUS HOUR (MSCF)

Run *x* Volume, Energy and Flow Time

The Volume, Energy and Flow Time Menu is accessible from the "**Volume, Energy, and Flow Time**" poke point on the Run *x* Current Gas Flow Information Menu. This menu provides the Flow Time, Backflow Time, Volume Total, Energy Total and Nomination Quantities for Today and Yesterday, as-well-as the monthly volume, energy and running totals.

Run *x* Flow Equation Components

This menu is accessible from the "**Flow Equation Components**" poke point on the Run *x* Current Gas Flow Information Menu (see page 3-39).

It provides Read Only access to the Flow Equation components. The TeleFlow supports AGA3/NX-19 1985, and AGA3/AGA8 1992. Components for both are shown on this menu. When '1985 AGA3/NX-19' is selected, the AGA8 METHOD and AGA8 GROSS METHOD lines are meaningless.

```
RUN 1       FLOW EQUATION COMPONENTS

         1992 AGA3 / AGA8                      1985 AGA3 / NX-19
             ENABLED                               DISABLED

    CD(FT)              0.600000          C' Factor          _____0.00
    Ev                  0.000000          Fpv                 0.000000
    Y                   0.000000          Fpb                 0.000000
    Flow Extension      ____0.00          Ftb                 0.000000
    Zs                  1.000000          Ftf                 0.000000
    Zb                  1.000000          Fb                 _____0.00
    Zf                  1.000000          Fg                  0.000000
                                          Fr                  0.000000
                                          Fa                  0.000000

              Flow Equation Selected      1992__
              Beta Ratio                0.496668
              Flow Orifice Diameter     __1.999 INCHES
              Flow Pipe Diameter        __4.024 INCHES
```

Run *x* Gas Composition Menu

This menu is accessible (for Read access only) from the "**Gas Composition**" poke point of the Run *x* Current Gas Flow Information Menu.

```
RUN 1   Gas Composition       Sum of percents     0.00

    N2              0.0000           NPENTANE              0.0000
    CO2             0.0000           IPENTANE              0.0000
    H2S             0.0000           NHEXANE               0.0000
    WATER           0.0000           NHEPTANE              0.0000
    HELIUM          0.0000           NOCTANE               0.0000
    METHANE        89.0000           NNONANE               0.0000
    ETHANE          5.0000           NDECANE               0.0000
    PROPANE         4.0000           OXYGEN                0.0000
    NBUTANE         0.0000           CARB MONOX            0.0000
    IBUTANE         0.0000           HYDROGEN              0.0000
    ARGON           0.0000

    HEATING VALUE   1000.0  BTU/CF   HEATING VALUE SOURCE  FIXED
    GRAVITY          0.6000           GRAVITY TYPE          REAL
    VISCOSITY    0.0000069  LB/FTS   ISENTROPIC COEFF        1.30
    AGA8 METHOD     GROSS            AGA8 GROSS METHOD     GCN
```

Run *x* Live Inputs Menu (Security Level 4, 5 or 6)

The Run *x* Live Inputs Menu is accessible from the "**Live Inputs**" poke point on the Run *x* Functions Menu. This menu indicates whether Calibration Mode is ON/OFF and provides the mechanism for manually overriding an input value.

```
RUN 1 LIVE INPUTS  Page 1 of 1

 CALIBRATION MODE     OFF___
                            DIFFERENTIAL          STATIC
                              PRESSURE           PRESSURE     TEMPERATURE

 OVERRIDE STATUS             OFF              OFF              OFF
 LIVE INPUT VALUE               0.00 INH2O       0.00 PSIG        0.00 DEGF
 INPUT VALUE IN USE          ___0.00 INH2O    ___0.00 PSIG     ___0.00 DEGF

 TRANSMITTER SPAN            _300.00 INH2O    2000.00 PSIG      300.00 DEGF

 PULSE INPUT          __________0        PULSE FREQUENCY         ___0.00 HZ
 SCALED PULSES CURR   _______0.00        SCALED FREQUENCY     _______0.00
 SCALED PULSES TODAY  _______0.00        SCALED PULSES YDAY   _______0.00
 SCALED PULSES ACCUM  __________0.0      SCALE FACTOR           ___1.000

                     USE PgUp To CLEAR FIELD
```

Run *x* Orifice Configuration Menu (Security Level 4, 5 or 6)

The Run *x* Orifice Configuration Menu allows definition of various orifice parameters for the meter run. It is accessible from the "**Configuration**" poke point on the Run *x* Functions Menu when "**ORIF**" is selected as the meter type.

NOTE: The Run 2 menu differs slightly, because it includes a poke point for enabling the Run 2 meter run.

```
RUN 1 ORIFICE CONFIGURATION  Page 1 of 2     ^   CONFIGURATION READ/WRITE

METER ID             RSP3____
PIPE DIAMETER         __4.026 INCHES ORIFICE DIAMETER        __2.000 INCHES
PIPE MATERIAL          CARBON        ORIFICE PLATE MATERIAL  STEEL_
PIPE REF TEMP          _68.00 DEGF   ORIFICE PLATE REF TEMP  _68.00 DEGF
TAP LOCATION           UPSTRM        TAP TYPE                FLANGE
LOW DP CUTOFF VALUE    __0.25 INH2O

GRAVITY                0.6000        GRAVITY TYPE            REAL__
HEATING VALUE          1000.0 BTU/CF HEATING VALUE SOURCE    FIXED_
AGA8 METHOD            GROSS_        AGA8 GROSS METHOD       GCN___
AGA3 METHOD            1992__
NITROGEN CONTENT      _0.0000 MOLE%  CO2  CONTENT           _0.0000 MOLE%

BASE PRESSURE PB       14.730 PSIA   BASE TEMPERATURE TB     60.000 DEGF
BAROMETRIC PRESSURE    14.730 PSIA   PULSE SCALE FACTOR      __1.00 PPU


PRESS F8 FOR MORE CONSTANTS                 USE PgUp TO CLEAR FIELD
```

```
RUN 1  CONFIGURATION  Page 2 of 2     ^   CONFIGURATION READ/WRITE

 BREAK LOG ON CHANGE   DISABL          TREND DATA LOG         ENABLE

 BACKFLOW DELAY         ____10 SECS


       USE PgUp TO CLEAR FIELD
```

CONFIGURATION READ/WRITE This poke point calls up the Read/Write Configuration Menu (see page 3-44).

BREAK LOG ON CHANGE When ON, the load will 'close out' all Run 1 archives and start new ones whenever a configuration value changes. Logs are closed out at one minute intervals, i.e. multiple changes during a minute cause only one log break.

TREND DATA LOG When ON, enables entries into the trending archive.

Run *x* Turbine Configuration Menu (Security Level 4, 5 or 6)

The Run *x* Turbine Configuration Menu allows definition of various orifice parameters for the meter run. It is accessible from the "**Configuration**" poke point on the Run *x* Functions Menu when "**TURB**" is selected as the meter type.

NOTE: The Run 2 menu differs slightly, because it includes a poke point for enabling the Run 2 meter run.

```
RUN 1 TURBINE CONFIGURATION  Page 1 of 2        ^   CONFIGURATION READ/WRITE

 METER ID             RSP3____
 METER FACTOR          __1.000 PPACF
 TURBINE MAX FREQ       ___0.0        LOW CUTOFF FREQ        _10.00 HZ

 GRAVITY                0.6000        GRAVITY TYPE            REAL__
 HEATING VALUE          1000.0 BTU/CF HEATING VALUE SOURCE    FIXED_
 FPV SOURCE             AGA8__
 AGA8 METHOD            GROSS_        AGA8 GROSS METHOD       GCN___
 NITROGEN CONTENT      _0.0000 MOLE%  CO2  CONTENT           _0.0000 MOLE%

 BASE PRESSURE PB       14.730 PSIA   BASE TEMPERATURE TB     60.000 DEGF

 PRESS F8 FOR MORE CONSTANTS                        USE PgUp TO CLEAR FIELD
```

```
RUN 1  CONFIGURATION  Page 2 of 2     ^   CONFIGURATION READ/WRITE


 BREAK LOG ON CHANGE   DISABL           TREND DATA LOG         ENABLE

 BACKFLOW DELAY         ____10 SECS



       USE PgUp TO CLEAR FIELD
```

BREAK LOG ON CHANGE When ON, the load will 'close out' all Run 1 archives and start new ones whenever a configuration value changes. Logs are closed out at one minute intervals, i.e. multiple changes during a minute cause only one log break.

TREND DATA LOG When ON, enables entries into the trending archive.

Read/Write Configuration Menu (Security Level 4, 5 or 6)

The Read/Write Configuration Menu is accessible from the "**Configuration Read/Write**" poke point on either the Run *x* Orifice Configuration Menu (see page 3-42) or the Run *x* Turbine Configuration Menu (see page 3-43).

```
RUN 1           READ/WRITE CONFIGURATION MENU

-------------------------------------------------------------------
  USE THESE POKE POINTS TO:
    READ A CONFIGURATION INTO A FILE ON THE PC
    WRITE A CONFIGURATION FILE FROM THE PC TO THE DEVICE
    VIEW A CONFIGURATION FILE ALREADY READ.

  THE CONFIGURATION FILE WILL BE NAMED   RSP3    .
-------------------------------------------------------------------------------

  ^  View or Change Drive/Directory


        ´   Read Configuration From Device
        ´   Write Configuration Into Device
        ´   View the Configuration File
        ´   Select a Configuration File
```

Use the Read/Write Configuration Menu to:

1. Read a TeleFlow configuration into a file on the PC.

2. Write a configuration file from the PC to the TeleFlow.

3. View a configuration file already read.

NOTE: Before saving a configuration, make sure that the METER ID is *unique*, because the METER ID is used as the base name of the configuration file.

Run *x* PID Flow Controller/Sampler Control (Security Level 4, 5 or 6)

The PID Controller is utilized in the TeleFlow for Flow Rate Control.

This menu is accessible from the "**PID/Sampler Control**" poke point on the Run *x* Functions Menu (see page 3-37).

```
RUN 1    PID FLOW CONTROLLER / SAMPLER CONTROL

 Nomination: function   DISABL   status      OFF___

 ENABLE                 DISABL           SAMPLER FUNCTION     DISABL
 SETPOINT          _______0.0 MSCFH      SAMPLER VOLUME       _100.0 MSCF
 GAIN                   __1.00           SAMPLER PULSE WIDTH   __1.0 SECS
 INTEGRAL               __1.00 R/MIN
 DERIVATIVE             __0.00 MINS
 DEADBAND               __1.00 %STPT     DP INPUT       0.00  INH2O
 SPAN                  ____5000.0 MSCFH  SP INPUT       0.00  PSIG
 VALVE TRAVEL TIME      _30.00 SECS      TEMP INPUT     0.00  DEGF
                                         FLOW RATE          0.0 MSCFH
 PRESSURE OVERRIDE (set one or both to enable override)
   MAXIMUM              _____0 PSIG
   MINIMUM              _____0 PSIG
 PRESSURE TAP LOCATION RELATIVE TO THE VALVE UPSTRM
 PID OUTPUT MODE       PULSE_           ANALOG OUT   0.00 %


            USE PgUp TO CLEAR FIELD
```

Nomination Function and Status
These signals are provided here only to indicate that Nomination is active and/or is using the PID, in which case changes to PID parameters will affect nomination quantities. (see page 3-49).

WARNING!

Do not turn the ENABLE selection ON without first checking the external process control loop. The initial values displayed on the PID Menu may drive some critical processes beyond the extremes of safe limits. This could result in fire, explosion, property damage, and injury to persons. When setting the menu parameters, make sure the associated process is observed and protected.

ENABLE
Pressing the [PageUp] key and then pressing the [Ins] key will clear the Enable/Disable reading and the following prompt will appear at the bottom of the menu: **DO YOU WISH TO TURN THIS SIGNAL TO ITS ENABLED**

(TRUE) STATE? If so, press the [Ins] Key again. If you do not want the PID Flow Controller enabled, type 'N'. It is recommended that GAIN, INTEGRAL and DERIVATIVE adjustments be checked before turning a controller ON.

SETPOINT
This field contains the operating point at which the flow rate is to be controlled. The setpoint units are MSCFH with a default setting of 1000 MSCF per Hour. To change the Setpoint value, press the [Page Up] key to clear the display and then type the desired value. Once the new value has been typed in, press the [Ins] key.

GAIN
The GAIN controls the amount of output change resulting from a change of the measured variable. The default value of 1.00 is typically used as a starting point; final gain is usually less. To change the Gain, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

INTEGRAL
The INTEGRAL determines the time it will take the PID to correct an error in the measured variable. The number of times the output is adjusted in a given time period is specified in seconds. An entry of 60 seconds can be used as a starting point; this would provide one (1) repeat per minute. To change the Integral setting, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

DERIVATIVE
DERIVATIVE compensates for a rapidly changing measured variable. The time is specified in seconds (SECS) and most applications will use a setting of zero (0). To change the Derivative value, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

DEADBAND
The DEADBAND provides a means of specifying a 'window' in which the variable does not affect the output. This entry is in percent (%) of the SETPOINT signal. As an example, a 5% entry would mean that the controller output must exceed the present setpoint by 5% before the output is changed. To change the Deadband value, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

SPAN
This entry sets the SPAN for the PID CONTROLLER in (MSCFH). The

controller uses this value (default = 5000 MSCFH) to convert the actual flow rate to percent for use by the PID controller; therefore, this value should be set as closely as possible to the expected operating maximum. To change the Span value, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

VALVE TRAVEL TIME
Valve Travel Time is the amount of time it takes a Control Valve to go from being fully open to fully closed (or from fully closed to fully open). The default value is 30 Seconds. To change the value of the Valve Travel Time, press the PAGE UP [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

PRESSURE OVERRIDE (SET ONE OR BOTH TO ENABLE OVERRIDE)
When the PID controller is active in flow-control mode, it will adjust a pressure valve to maintain the established flow rate setpoint. Pressure override is used in situations where full line pressure should not be applied to the downstream equipment or in circumstances where too low of a pressure should not be allowed.

A Maximum and Minimum pressure can be configured which set the PID controller to switch to pressure control mode whenever the line pressure attempts to go outside the defined limits. The pressure override mode becomes active when either or both limits are set to a non-zero value.

PRESSURE TAP LOCATION
The Pressure Tap location is specified as either upstream (UPSTRM) or downstream (DNSTRM) with respect to the control valve. The action of the override controller depends on the configured Tap location. When the pressure tap is configured as Downstream of the control valve, pressure will rise as the valve opens to increase the flow rate. Increasing demand will cause the valve to open more. Should conditions occur that cause the pressure to exceed the maximum pressure limit, the override will take control and close the valve to maintain the configured maximum pressure. Should the valve attempt to close and reduce pressure below the configured maximum pressure, the override will take control to maintain the minimum pressure. When the pressure tap is configured as Upstream, the action is reversed, i.e., when the maximum pressure is exceeded the valve will open to lower the pressure. When the minimum pressure is exceeded the valve will be closed.

Users are cautioned to test the regular override controller actions to verify correct valve movement for all expected conditions.

FLOW RATE
This value is Read Only data; it is the current Flow Rate.

SAMPLER FUNCTION
The Sampler Function will not operate if PID is enabled. The Sampler Function enables pulsing of Discrete Output #1 after a determined volume of gas has flowed. Pressing the [Page Up] key and then pressing the [Ins] key will clear the Enable/Disable displayed state of the Sampler Function and the following prompt will appear at the bottom of the menu: **DO YOU WISH TO TURN THIS SIGNAL TO ITS ENABLED (TRUE) STATE?** If so, press the [Ins] Key again; if not, type 'N'.

SAMPLER VOLUME
The volume of gas which must pass before a pulse is generated is called the Sampler Volume. This value is in MSCF with a default of 100 MSCF. To change the Sampler value, press the [Page Up] key to clear the display and then type the desired value. Once this value has been typed, press the [Ins] key.

SAMPLER PULSE WIDTH
The Sampler Pulse Width is the amount of time (in seconds) that the Discrete Output #1 will remain ON when a pulse is generated. The default value is 1 second. To change the value of the Sampler Pulse Width, press the [Page Up] key to clear the display. Type the desired value. Once this value has been typed, press the [Ins] key.

DP INPUT
DP INPUT is the measured differential pressure.

SP INPUT
SP INPUT is the measured static pressure.

TEMP INPUT
TEMP INPUT is the measured temperature.

PID OUTPUT MODE
When the PID is to be used with external analog devices (such as valve positioners) the analog mode should be used and the external device should be wired to the analog output.

If raise/lower control is used the output mode should be pulse and the external device should be wired to discrete outputs 1 and 2 (3 and 4 for run 2).

When raise mode is selected, the analog output will be proportional to the current flow rate in percent of the set SPAN.

The type of output module the PID3TERM module is feeding into. If an analog output ANOUT module is used, you must specify 'ANALOG'; the current percentage value of full scale will be displayed under **ANALOG OUT**. If a pulse duration output PDO module is used, you must specify 'PULSE'. To change the mode, use the [PgUp] and [Ins] keys as discussed earlier.

ANALOG OUT
The current value of the analog output in percent.

Run *x* Nomination Menu (Requires Security Level 5 or 6)

The nominations feature is accessible from the "**Nomination**" poke point on the Run *x* Functions Menu (see page 3-37). It provides the user with the ability to set the TeleFlow to allocate precise amounts of gas flow during specific periods of time. These periods are called **nomination periods**. A nomination period may be set for any duration of time (not to exceed one month). The volume to be delivered (nominated) during a nomination period is the **target**. The target may be specified in terms of volume or energy. The user sets a nomination period by keying in the desired day of the month and hour to begin the period and the desired day of the month and hour to end the period. The **daily nomination** feature is used if the user desires the same start/stop times every day. A TeleFlow programmed with a daily nomination, will ignore the programmed start and end day numbers and will perform the nomination in question at the same time once per day.

```
RUN 1 NOMINATION for Station FERN STREET      Meter RSP3

 !!! NOTE:  ^  VERIFY/SET Time and Date   (do before making new entries)
 -------------------- NOMINATION CONTROL --------------------------
    Main function      DISABL      Stop mode             OPEN__
    Quantity units     MCF___      Daily only mode       OFF___
    Control mode       FAST__      Alarm at a level of   100.0 %
    Status             OFF___
 ------------------ CURRENT Nomination Period - in progress --------
  Start: day ____0 hour ____7       Stop: day ____0 hour ____7
  Target value _________0.0 MCF     Amount delivered          0.0 MCF
  Percent elapsed time   0.0        Percent delivered   0.0

 --- NEXT Nomination Period - Enter before Current Stop time is reached
--
  Start: day ____0 hour ____7       Stop: day ____0 hour ____7
  Target value _________0.0 MCF

 --- LAST Nomination Period - Stored Data from Previous Nomination -----
-
  Start: day     0 hour     0       Stop: day     0 hour     0
  Target value          0.0         Amount delivered            0.0
                                    Percent delivered   0.0
```

The delivery of the nominated quantity (volume or energy during the nomination period) may be performed via one of the two unique schemes listed below.

The fast approach
The fast approach method permits full flow of gas through the meter in order to arrive at the target (volume or energy) as quickly as possible without regard to the programmed end time.

The PID method
The PID method calculates the time remaining in the nomination period and the remaining volume/energy required by the nomination, and establishes an initial PID setpoint value. The PID controller is enabled and a new setpoint is calculated every 15 minutes based on remaining time and quantity to be delivered so that the last nominated quantity is delivered at the ending nomination time.

The user programs the TeleFlow to either close the valve upon reaching the target or leave it in its last position.

Nomination Operation

Enabling the Nomination Function

The nomination function runs once per calculation cycle after the volume and energy accumulations have been updated by the TeleFlow. To setup and enable this feature follow the steps below.

1. Setup of the nominations feature depends on the desired control mode selection, i.e., the Fast approach mode or PID mode. The default control mode for nomination is the Fast approach mode. If the desired control mode is the Fast approach mode, proceed to step 2; however, if the desired control mode selection is the PID mode, you must first program all the PID tuning parameters such as gain and integral. DO NOT enable the PID flow control algorithm or the TeleFlow will automatically disable nomination. When properly configured the TeleFlow will automatically enable the PID flow control algorithm during nomination periods. When the Run *x* PID Flow Controller/Sampler Control Menu (see page 3-45) has been configured and the nominations feature has been enabled, return to the Run *x* Functions Menu (see page 3-37).

2. Select the Run *x* Nomination Menu (see page 3-49) via the "**Nomination**" poke point on the Run *x* Functions Menu (see page 3-37). The operator should select the VERIFY/SET Time and Date poke point prior to making new entries.

A description of the menu entries in the Run *x* Nomination Menu is as follows:

NOMINATION CONTROL - This section of the Run *x* Nomination Menu provides the following six areas for nomination setup/selection:

Main function
The Main function selection is used to enable/disable the nomination function. If this signal is set to the disable state, nomination will not occur.

Quantity units
The Quantity units selection is used to set the target units as MCF or MMBTU.

Control mode
Control mode provides for the selection of either the Fast approach or PID modes of nomination operation.

Stop mode
The Stop mode selection allows the user to automatically have the valve closed, i.e., shut-in on stop mode, or left in the last position upon reaching the target (or programmed end period).

Daily only mode
The Daily only mode selection provides for enabling/disabling the daily nomination mode of operation. When Daily mode is enabled, only the programmed start and end hours are used by the TeleFlow; the days are ignored. If nomination is left enabled, the nomination calculation executes every day, starting and stopping at the configured hours.

Alarm at a level of
The 'Alarm at a level of' setting can be configured as percentage of Volume (MCF) or Energy (MMBTU). This feature allows the TeleFlow to provide an alarm (logical nomination alarm) or indication to an operator or computer that a specified amount of target has been reached. The number entered (1 to 100) sets the percentage at which the logical nomination alarm will occur. If the dialout on nomination signal is set (see page 3-58), the TeleFlow will initiate a phone dialout according to the normal operation of the dialout feature.

Status
The Status signal is an output of the nominations algorithm that indicates whether there is currently a nominations period in progress. The user may change the state of this signal to end an in-progress nomination immediately, or to start the next period immediately (see '*Manually Starting/Ending a Nomination Period*' on page 3-54).

CURRENT NOMINATION PERIOD - This section allows the operator to view the following information associated with a nomination which is currently in progress:

Select: day/hour
The actual time and day of the month when the current nomination period started is displayed. This may be the programmed time or the time at which an operator manually started a period.

Stop: day/hour
The programmed end time and day of the month at which the current nomination period will end. If using the Fast approach mode, the period may end sooner, i.e., when the target is reached. If using the daily nomination feature, the stop date (day) will show 0 to indicate that only the hour matters.

Target value
The Target value provides the value of Volume/Energy to be delivered during this period.

Amount delivered
The Amount Delivered reading provides the actual amount of volume/energy delivered so far during this period.

Percent elapsed time
This signal shows the percentage of time which has elapsed for the current nomination period, e.g., 4 hours into a 100 hour nomination period would cause this value to be 4.0.

Percent delivered
This signal provides the percentage of target delivered to this point in the current nomination period.

NEXT NOMINATION PERIOD - This section allows the operator to set/view the following parameters associated with the next nomination which is to be programmed (has been programmed): *Note: New entries must be made prior to the ending of the current nomination period.*

Select: day/hour
The actual start day of the month (1-31) and start hour (0-23) when the next nomination period is to start is displayed or entered. The start day is ignored if the daily nomination feature is enabled.

Stop: day/hour
The actual stop day of the month (1-31) and stop hour (1-23) when the next nomination period is to end is displayed or entered. The stop day is ignored if the daily nomination feature is enabled.

Target value
The Target value provides (is used to set) the value of Volume/Energy to be delivered during the next nomination period.

LAST NOMINATION PERIOD - This section allows the operator to view information associated with the last nomination period which was completed. The information displayed remains valid until the next time a nomination period ends (when the information is upgraded to reflect the new "last" nomination period. The start and end times stored here indicate the actual time that the nomination period ended, which is not necessarily the programmed time (because of the time required to close/open valves or complete other actions). The days are valid even if the daily nomination mode is active.

3. Program all the configuration items for the NEXT Nomination Period such as start and stop times and target value.

4. Set the desired parameters for NOMINATION CONTROL such as Quantity units, Control mode, Stop mode, Daily only mode, and 'Alarm at a level of' and then set the Main function signal to the Enable State.

5. If a radio or modem is to be used in conjunction with a "logical nomination alarm," access the Radio Communications Setup Menu (see page 3-55) via the "**Radio and Modem Control**" poke point on the System Status and Control Menu (see page 3-55) and set parameters as required.

Beginning a Nomination Period

When no nomination period is in progress, the TeleFlow compares the *next* start date and time to the current time. If the date and time match (or time only for the daily nomination mode), a new period is begun. The current time is copied into the CURRENT START signals, and the next target is copied into the current target. The accumulators for the current period are zeroed and the current stop time is set to the next start time. If the PID mode is selected, a new flow setpoint is calculated and stored in the setpoint signal. The PID setpoint is recalculated every 15 minutes and whenever any parameter is changed.

Ending a Nomination Period

If the 'shut-in on stop' mode is in use, the current period end will end when the target accumulation is reached. At this time, the TeleFlow attempts to close the control valve. If PID control is being used, the setpoint is set to 0.0, the current cycle will ramp down accordingly. When the flow rate reaches 0.0, the current cycle accumulations and the actual end time are copied into the LAST signals. If the valve fails to close, the volume will continue to accumulate until until the programmed end time. If the shut-in on stop mode is not in use, the nomination period continues until the programmed end time.

Changing the Nomination Target

To change the target of the next period, the user should change the NEXT TARGET signal. If the operator wishes to change the target of a current period already in progress (re-nominate), the CURRENT TARGET should be changed to the new value which reflects the total amount to be targeted for the period.

Manually Starting/Ending a Nomination Period

When no period is in progress, the user can immediately begin the NEXT period by setting the Status signal to the ON state. The current start time will reflect the time that the user started the cycle. The target and stop times used will be those of the NEXT period. The user may immediately end a nomination period which is in progress by setting the Status signal to the OFF state. The current time will be stored as the LAST stop time.

System Status and Control Menu (Requires Security Level 4, 5, or 6)

The System Status and Control Menu allows the user to configure communication functions such as the serial port and radios, as well as the local address and EBSAP group number. Security configuration is also configured via this menu. The System Status and Control Menu is accessible from the "**System Items**" poke point on the On-Line System Menu (see page 3-24).

```
              SYSTEM STATUS AND CONTROL

        ^  Set Date and Time
        ´  Serial Port Setup
        ´  Radio and Modem Control
             ---------------
        ´  Special Functions
        ´  Security Maintenance
             ---------------
        ´  Sign-off and Exit
```

Set Date and Time — Allows you to set the TeleFlow's date and time. (See page 3-61).

Serial Port Setup — Allows you to configure the TeleFlow's serial ports. (See page 3-60).

Radio and Modem Control — Allows you to set configuration parameters for radios. NOTE: Dial-up is NOT YET SUPPORTED. (See page 3-55).

Special Functions — Allows you to reset the hardware, configure the local address, change the EBSAP group number, and configure the charge regulator. (See page 3-61).

Security Maintenance — Allows you to configure usernames and passwords for the system. (See page 3-64).

Radio Communications Setup Menu (Requires Security Level 4, 5, or 6)

The Radio Communications Set-up Menu is accessible for users by selecting the "**Radio and Modem Control**" poke point on the System Status and Control Menu (see page 3-55).

Hourly and Local set-up columns are provided to facilitate Hourly (timed) or Local control of the TeleFlow radio. Radio Enable is implemented by providing control of the Auxiliary Power Output.

ENABLE
Is used to enable Hourly or Local control of the radio. Enabling the Hourly radio scheduling causes the TeleFlow to automatically turn on the radio (via the auxiliary power output) once per hour. Enabling the Local turn-on causes the TeleFlow to immediately turn on the radio, and then reset the enable signal (back to the disable state). To Enable either feature, place the cursor on the appropriate selection and press the [Page Up] key followed by pressing the [Ins]. Select Y from the following message: Do you wish to turn this signal to its Enable (TRUE) state? Y/N

REMAIN ACTIVE FOR
Is the amount of time that the radio will be enabled (at the selected time), i.e., the 'Enabled Time', before it will shutoff due to the lack of a received radio poll.

TIMEOUT IF NO COMM AFTER
Is the amount of time that the radio will remain enabled after successful communications have been established and completed. The TeleFlow radio will remain active for the time period specified under "**TIMEOUT IF NO COMM AFTER**" before shutting down. If during this period another message is received, the radio will remain active.

```
RADIO COMMUNICATIONS SETUP

                          HOURLY          LOCAL
ENABLE                    DISABL          DISABL
REMAIN ACTIVE FOR         ___120 SECS     ___120 SECS
TIMEOUT IF NO COMM AFTER  ____20 SECS     ____20 SECS

POLL ENABLE START HOUR    _____0          POLL ENABLE END HOUR  ____24
START OFFSET INTO HOUR    ____60 SECS
START OFFSET MINUTES           0          START OFFSET SECONDS       0
POLL TIME PER NODE        ____26          POLL TIME PER GROUP   _____5
AUXILIARY POWER OUTPUT DEFAULT  OFF___
RTS DELAY MODE            TIMER_          RTS TRANSMIT DELAY    ___0.0
MSEC
-------------------------------------------------------------------------
RADIO SENSING             DISABL
START HOUR                   ___0         END HOUR              __24
TURN ON RADIO EVERY       _____1 SECS     KEEP RADIO ON FOR  ___300 MSEC
-------------------------------------------------------------------------
RADIO SHUTDOWN   OFF___
  PRESS F8 FOR MODEM DIAL SETUP
```

START OFFSET MINUTES & START OFFSET SECONDS
These are calculated variables which specify the time (On Time) within each hour that the radio will be enabled. This time is derived as follows: On Time = [(Time Per Node x (Local Address -1)) + (Time Per Group x Group Number) + Start Offset Into Hour]. If the minutes is set to 12 and the seconds is set to 42, the radio will be turned on at 12 minutes and 42 seconds after the hour. These signals may be control inhibited for testing purposes. If the user control inhibits these signals, the user-entered time will determine when the radio is turned on, and the calculated values will be ignored by the TeleFlow.

POLL ENABLE START HOUR & POLL ENABLE END HOUR
Specifies the 0 to 23 hour time period within which the TeleFlow radio Hourly Enable feature will be active. The radio will be enabled once per hour within this time period.

These signals may be used to permit polling only during a specific time frame (such as daylight or normal office hours) each day. This will save the power required to turn on the radio when polling is desired.

START OFFSET INTO HOUR
Specifies a user supplied offset which is used when computing the radio 'On Time'. The Start Time Offset is one of the factors used to calculate the 'On Time' (see **START OFFSET MINUTES** & **START OFFSET SECONDS**).

POLL TIME PER NODE
Sets the duration of time (in seconds) allocated for communications per node. The Poll Time Per Node time is one of the factors used to calculate the 'On Time' (see **START OFFSET MINUTES** & **START OFFSET SECONDS**).

POLL TIME PER GROUP
Sets the duration of time (in seconds) allocated for communications per group. The Poll Time Per Group time is one of the factors used to calculate the 'On Time' (see **START OFFSET MINUTES** & **START OFFSET SECONDS**).

AUXILIARY POWER OUTPUT DEFAULT
Determines if the TeleFlow's Auxiliary Power Output is set ON or OFF when power is initially applied to the TeleFlow. This allows radios to be powered up initially and then turned off after a 'no comm' interval.

RTS DELAY MODE (Network Port)
Select either TIMER or CTS.

RTS TRANSMIT DELAY (Network Port)

Set the Delay Time when the mode is TIMER.

RADIO SHUTDOWN
Is used to force a radio to turn-off. When the host issues this command, the remote will keep the radio on just long enough to reply back to the master. Issue this command to save battery power at a remote TeleFlow. This is the last command you can send to a remote unit.

RADIO SENSING
Radio sensing allows a user to activate the radio for very short time intervals (specified in milliseconds under **LISTEN**) every so many seconds (specified in seconds under **INTERVAL**) to 'sense' a valid BSAP message on the radio's carrier frequency. If a message is not detected, the radio is deactivated. If a message is detected, the radio is left activated until it responds, after which it remains ON for another **LISTEN** time interval. If no more valid messages are detected, the radio returns to 'sense' mode. This mode allows the system to use as little energy as possible to detect traffic throughout the day. Energy usage depends on the activation time and activation rate (**INTERVAL**). Assuming a 1 watt radio then a 200 millisecond listening period every 5 seconds is equivalent to .04 watts. Users can configure the Interval and Rate (Listening period) to suit their energy needs. Radio Sensing occurs between the **START HOUR** and **END HOUR** specified by the operator.

Modem Configuration And Dial-Out Setup Menu (Requires Security Level 4, 5, or 6)

(MODEM CONFIGURATION & DIALING NOT CURRENTLY SUPPORTED)

The Modem Configuration and Dial-Out Setup Menu provides for modem communications and dialing setup. This menu is accessed by pressing [F8] from the Radio Communications Setup Menu (see page 3-55).

If the internal 9600 bps modem is installed, this menu can be used to configure automatic dial-out when an alarm occurs.

Enable the conditions at which dial-out should occur, enter the primary and alternate phone numbers (example: 860-945-2200), then set Dial Enable to Enable.

The equipment at the location being dialed MUST be able to recognize the call as coming from a remote and then must be able to poll for alarm information from the TeleFlow.

```
MODEM AND DIAL-OUT SETUP

   DIAL ENABLE              OFF
   MODEM INITIALIZATION
_____________________________________________
   PRIMARY PHONE NUMBER     _____________________
   ALTERNATE PHONE NUMBER   _____________________
   DIAL ATTEMPTS PER HOUR   T  (3 TRIES PER ATTEMPT)

   -------------------  DIAL-OUT CONDITIONS -----------------------

 LOW FLOW CUTOFF ALARM    OFF___       BACKFLOW ALARM           OFF___
 TRANSMITTER FAILURE      OFF___       RAM BATTERY LOW ALARM    OFF___
 FLOATING POINT ERROR     OFF___       SELF-CHECK FAILURE       OFF___
 DIFF PRESSURE ALARM      OFF___       STATIC PRESSURE ALARM    OFF___
 TEMPERATURE ALARM        OFF___       FLOW RATE ALARM          OFF___
 BATTERY VOLTAGE ALARM    OFF___       AUXILIARY INPUT ALARM    OFF___
 BATTERY OVERCHARGE ALARM OFF___       NOMINATION ALARM         OFF___
```

DIAL ENABLE
After the rest of this menu has been set up, set this signal to ENABLE to activate automatic dial-out.

MODEM INITIALIZATION
This string has been set to a default value for the internal 9600 bps modem, but it can be revised if necessary.

PRIMARY PHONE NUMBER
This is the number that will be called first when automatic dial-out is triggered by an enabled alarm condition. If three tries are unsuccessful, the secondary number is called.

ALTERNATE PHONE NUMBER
This number is called if the primary number cannot be reached. If three tries are unsuccessful, calling stops.

DIAL ATTEMPTS PER HOUR
Regardless of the number of enabled alarms that have occurred, the system will not attempt to call out each hour more than the number of times specified here, (i.e., 3 tries per attempt specified). This number is thus used to manage the energy drain from a battery powered system by limiting the number of times per hour that the modem can be 'awakened' to its full-power mode.

Alarms not reported in one hour will be reported in the next hour.

Serial Port Setup Menu (Requires Security Level 4, 5, or 6)

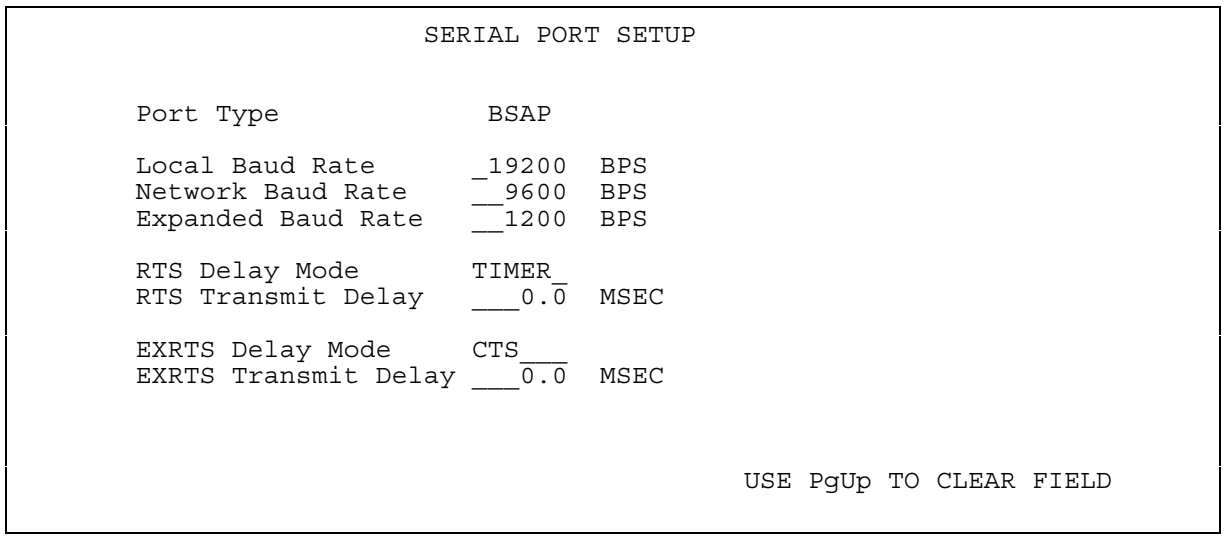
The Serial Port Setup Menu is accessible from the "**Serial Port Setup**" poke point on the System Status and Control Menu.

PORT TYPE
Network Port communications protocol; BSAP.

LOCAL BAUD RATE
The baud rate of the Local Port.

NETWORK BAUD

The baud rate of the Network Port.



RTS DELAY MODE (Network Port)
Select either TIMER or CTS.

RTS TRANSMIT DELAY (Network Port)
Set the Delay Time when the mode is TIMER.

Set Time Menu (Requires Security Level 4, 5 or 6)

The Set Time Menu (not shown) allows the user to set the time in the TeleFlow. The time in the PC is sent to the TeleFlow on command. **Note: Make sure that the current time in the PC is correct before invoking this function.**

Special Functions Menu (Requires Security Level 4, 5, 6)

The Special Functions Menu is accessed from "**Special Functions**" poke point of the System Status and Control Menu (see page 3-55).

```
        SPECIAL FUNCTIONS MENU

         ^  Reset Hardware
         ´  Change Local Address
         ´  Change Group Number
         ´  Charge Regulator Set-up
```

The Special Functions Menu is used to perform certain configuration tasks which may be necessary, such as resetting the TeleFlow hardware to its default conditions, or changing the local address of the unit. This menu provides the following selections:

Reset Hardware

Select this poke point to call up the Reset Node Menu. This menu allows you to Reset the TeleFlow to factory default conditions. When a Hardware Reset occurs all stored (archived) data (input and setup) are lost.

Change Local Address

Select this poke point to change the TeleFlow node address used for local (PC to TeleFlow) or (TeleFlow to BSAP Network) communications. The factory default address is 1. NOTE: There are no address switches in the TeleFlow; the address may only be changed by this poke point. Address changes are usually required when the TeleFlow is placed in a network as a slave node to other Bristol Babcock devices, such as a DPC 3330. Address changes only affect the Network Port; the

Local Port answers any address.

Change Group Number

The group Number is used with the Expanded BSAP Communications option. The value of this number may be from 1 to 127. The Group Number only affects the Network Port.

Charge Regulator Set-up (Requires Security Level 4, 5 or 6)

The Charge Regulator Setup Menu is accessible from the "**Charge Regulator Setup**" poke point on the Special Functions Menu (see page 3-61). It is used to configure the charging characteristics of the battery used in conjunction with the Solar Panel option. Factory default settings are shown in the figure for this menu. Configuration of the battery charge parameters may be accomplished as follows:

To disable the battery charge regulator, place the cursor on Enable and press the [Page Up] key followed by pressing the [Ins] key. Select N from the following message: Do you wish to turn this signal to its Disable (FALSE) state? Y/N.

REGULATOR DELAY
Is the time that the charge regulator stays active for after reaching the hysteresis voltage.

NOMINAL BATTERY VOLTAGE
Should be set to 6 or 12 volts depending on the battery installed in the TeleFlow. Changing this value from 12 to 6 volts will cause the charge voltage value to change from 14.4 to 7.2 volts and the Temperature Coefficient to change from 20 to 10 mv/deg.

CHARGE VOLTAGE
Is a pre-set battery voltage level. When the voltage exceeds this level, the charge regulator will turn on the solar panel shunt to divert solar panel current away from the battery. The charge voltage is specified for an ambient temperature of 77°F. This value will change as the value of the NOMINAL BATTERY VOLTAGE changes.

TEMPERATURE COEFFICIENT
Is the change in CHARGE VOLTAGE with ambient temperature. The value (negative) is expressed in mv/deg (F) and will be 20 mv/deg (default) for a 12 volt battery and 10 mv/deg (default) for a 6 volt battery. These defaults will be set automatically when the NOMINAL BATTERY VOLTAGE is set.

Note: These values affect the "Threshold Voltage," i.e., the battery voltage level at which the charge regulator becomes active (connects a load to dissipate excess energy produced by the solar panel). An increase in the "Threshold Voltage" occurs with a decrease in temperature, and vice-versa. The Threshold Voltage ($V_{THRESHOLD}$) is calculated by the TeleFlow firmware according to the following equation:

$$V_{THRESHOLD} = V_{77} - (V_{TC} \cdot (T_{BOARD} - 77)$$

where:

$V_{THRESHOLD}$ is the temperature compensated threshold voltage.

V_{77} is the threshold voltage at 77° F (25° C) = 14.4V (12V Battery) or 7.2V (6V Battery).

V_{TC} is the temperature coefficient = 20mV (12V Battery) or 10mV (6V Battery).

The temperature coefficient is always negative (when temperature increases, the threshold voltage descreases). The temperature coefficient is entered as a positive value; so it is subtracted in the formula.

T_{board} is the TeleFlow CPU board temperature in degrees F. 77 is subtracted from this number to normalize the equation to 0 degrees F.

```
                    CHARGE REGULATOR SET-UP


 WARNING!! The following parameters are related to the battery charge
           regulation system. Modification of these parameters should
           only be performed by personnel knowledgeable of the battery
           system installed.


   CHARGE REGULATOR              ENABLE
   REGULATOR DELAY               __30.0  MINS
   NOMINAL BATTERY VOLTAGE       12VOLT



   CHARGE VOLTAGE                __14.4 VOLTS
   TEMPERATURE COEFFICIENT       __20.0 MV/DEG
```

If the calculated threshold voltage is greater than the ceiling voltage, the ceiling voltage is substituted. The ceiling voltage helps guard against overvoltage which might occur at cold temperatures. Every second, the battery voltage is compared to the threshold voltage. If the battery voltage exceeds the threshold voltage, the

regulator becomes active. Under normal conditions, the threshold voltage is reached only when the battery is at or near full charge.

The regulator goes from active to inactive when any of the following conditions occur:

a) The delay period elapses after the battery voltage has dropped below the hysteresis voltage.
b) The battery voltage drops below the floor voltage.
c) The user disables the charge regulator.

Table 3-1 Charge Regulator Set-Up Assignment

Term	6V	12V	Changed By
Regulator enabled	Yes	Yes	User
Threshold Voltage (@ 77° F)	7.2V	14.4V	User, 6/12 Switch
Hysteresis voltage	Threshold - (0.5V)	Threshold - (1V)	Fixed
Delay period	30 Min.	30 Min.	User
Temperature coefficient	10mV/°F	20mV/°F	User, 6/12V Switch
Floor voltage	6.5V	13.0V	Fixed
Ceiling voltage	8.5V	16V	Fixed

Security Maintenance (Requires Security Level 4, 5, or 6)

The Signal Passcode Management Menu is accessible from the "**Security Maintenance**" poke point on the System Status and Control Menu (see page 3-55). It lists all the security codes which were read from the TeleFlow and provides poke point functions to:

- Transfer security codes from this display to the TeleFlow.
- Transfer security codes from this display to a PC file named SECAMS.DAT.
- Read a PC security file SECAMS.DAT into this display.
- Read the security codes from the TeleFlow and display them.

A security code consists of a name /password/ access-level combination. The TeleFlow is shipped with a default security code of name=SYSTEM, password=666666, access=6. New security codes are entered on this display.

Entering Security Codes

Up to 16 security codes can be stored in the TeleFlow. The codes are typed into fields of this display as required. By selecting the "**Write Node**" poke point and pressing the [Ins] key, the entire contents of the display will be transferred to the TeleFlow. To modify a user entry, move the cursor to a blank line under the USER NAME column, type in the user name, and press [Ins]. Then, move the cursor over to the PASSCODE column, type in the desired password, and press [Ins]. Move the cursor to the ACCESS column and enter the appropriate access level. Repeat this procedure for each code entry.

Access Levels

Six security levels are provided, however, security levels 1 to 3 have essentially identical access, and security levels 4 to 6 have identical access.

Security Code Storage

All security codes are stored in the TeleFlow, not the PC, so each TeleFlow can have a unique set of personnel who are permitted access. Use the "**Write Node**" poke point to write the codes from the display to the TeleFlow.

In cases where a number of TeleFlow units will store the same name/ password /access combinations, the created table can be saved in a PC file and recalled at the next site for storage in the TeleFlow, thus eliminating the need to retype. For example, one 'master' table can be created and saved on the PC at one site, and then called up at each individual TeleFlow site, modified as needed and then stored in the TeleFlow. Use the Write File point to write the security codes to a PC file.

Security Code Maintenance

Security codes are read from the TeleFlow at sign-on time and then displayed. To retrieve codes from a PC file use the "**Read File**" poke point; the codes will be read from the PC file into the display. Codes can be read from the TeleFlow to the display using the "**Read Node**" poke point.

The Signal Passcode Management Menu includes the following poke points:

READ NODE
Use this to read the security codes from the TeleFlow and display them.

READ FILE
Read the SECAMS.DAT file and display the security codes.

WRITE NODE
Write the present display contents to the TeleFlow to store them.

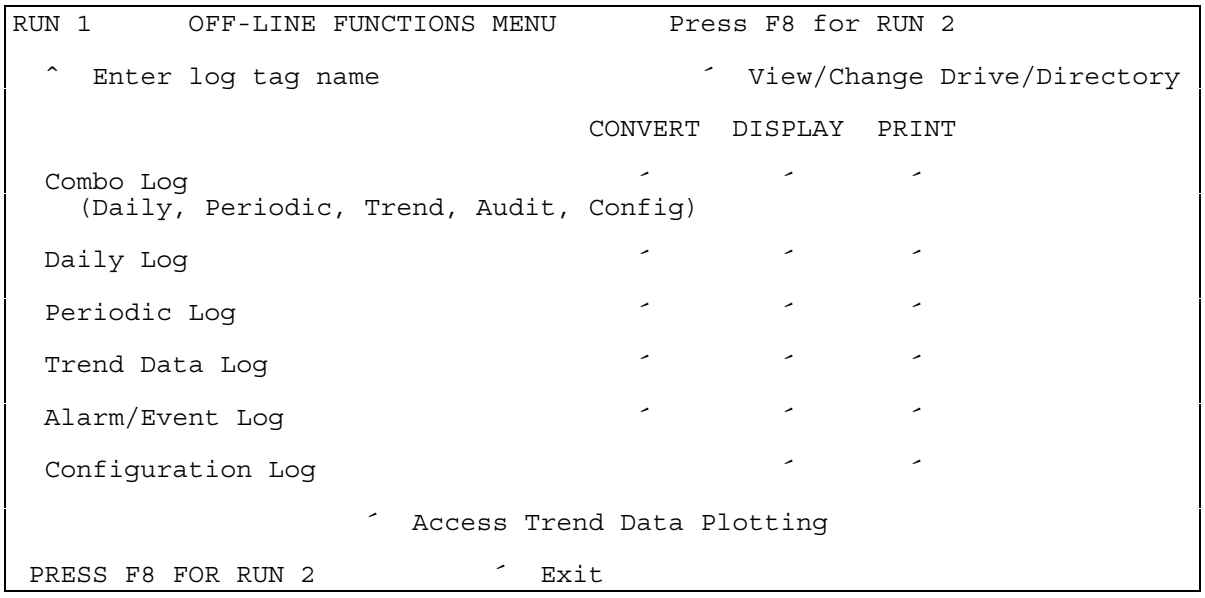
WRITE FILE
Write the present display contents to a SECAMS.DAT file in the PC.

```
                  SIGNAL PASSCODE MANAGEMENT
                    Signals in device:  2
 ´ Read Node     ´ Read File      ´ Write Node      ´ Write File

 USER      NAME    PASSCODE ACCESS  USER      NAME    PASSCODE ACCESS
  1      __________  _______    _    17     __________  _______    _
  2      __________  _______    _    18     __________  _______    _
  3      __________  _______    _    19     __________  _______    _
  4      __________  _______    _    20     __________  _______    _
  5      __________  _______    _    21     __________  _______    _
  6      __________  _______    _    22     __________  _______    _
  7      __________  _______    _    23     __________  _______    _
  8      __________  _______    _    24     __________  _______    _
  9      __________  _______    _    25     __________  _______    _
 10      __________  _______    _    26     __________  _______    _
 11      __________  _______    _    27     __________  _______    _
 12      __________  _______    _    28     __________  _______    _
 13      __________  _______    _    29     __________  _______    _
 14      __________  _______    _    30     __________  _______    _
 15      __________  _______    _    31     __________  _______    _
 16      __________  _______    _    32     __________  _______    _
```

Run *x* Off-Line Functions Menu

The Run *x* Off-line Functions Menu is accessed from the "**Off-Line Mode**" poke point on the Sign-On Menu (see page 3-4). Off-Line Mode is intended to provide users a way to perform necessary data conversions (binary log files to ASCII files), to allow display of ASCII files on the screen, and to allow the printing of ASCII log data collected from many different TeleFlow's at a single PC.

Users would collect logs from many TeleFlow's, and leave thelogs in their binary format to conserve disk space. These log binary files (each having a unique METER ID name) would then be transferred to a central PC. Using the Run *x* Off-Line Functions Menu, each log file is selected by Meter ID name, and its contents are converted to ASCII for display on the screen or printing, as necessary. Trend logs can also be plotted via this menu.



Chapter 4 - TeleFlow 2-Run ACCOL (TF2RUN) Load

Overview

The TeleFlow 2-Run load (TF2RUN) is a an ACCOL load (ACL file) that is intended for use in the EGM 3530 TeleFlow. This ACCOL load will compute gas flow rate, energy rate and volume and energy totals for two Orifice meter runs -*or*- two Turbine meter runs, -*or*- a mix of one orifice and one turbine meter run each. Flow calculations and data storage will be done according to the requirements of Chapter 21 of the *American Petroleum Institute Manual of Petroleum Measurement Standards* (MPMS).

The TeleFlow 2-Run load supports the following functions for each run:

- Gas flow calculations per AGA3 (1985) or AGA3 (1992) for an Orifice meter.
- Gas flow calculations per AGA7 (1985) for a Turbine meter.
- Compressibility (Z_f and Z_b) per AGA8Detail or AGA8Gross when AGA3 (1992) is used.
- Supercompressibility (F_{pv}) per NX-19 when AGA3 (1985) is used.
- Energy (Btu/ft^3) per AGA5 or from a fixed value.
- PID control.
- Sampler pulse output on expanded DIO#5 (run 1) and DIO#7 (run 2) with rate proportional to volume for odorant injection or gas sampling.
- A Daily Archive file containing at least 35 days of Daily historical information.
- A Periodic Archive file containing at least 35 days of Hourly historical information.
- A Trend Archive file containing 8 days of 15 minute trend information (can be disabled).
- Backflow detection and alarming.
- Nomination settings and alarming.
- Input sampling, averaging and Extension calculation every second.
- Configurable 5, 15, 30, and 60 second calculation interval. (Common to both

runs)

- Pulse counting and scaling.

The TeleFlow 2-Run load supports the following functions for the station:

- Totalized flow-rate, volume, and energy.
- Run switching of the secondary run via DIO #9 and DIO #10.
- Analog output proportional to station total flow rate or primary run PID output.
- Configurable automatic dial-out on alarm occurrence (NOT YET SUPPORTED)
- Support of a local 2 line display and single push-button.
- Local, Network, and Expanded communications.
- Hourly and Daily Archives of total volume and energy.
- Trend Archive of flow rate.
- An Audit Trail holding 400 events and 400 alarms for a total of 800 entries.
- Control of an external radio.
- Battery charge regulator.

IMPORTANT:

The EGM 3530 only supports a subset of the ACCOL module library thus some ACCOL modules will not operate. See the '*Hardware and Software Requirements*' section of the *ACCOL II Reference Manual* (document# D4044) to find out which modules are supported.

In addition, the EGM-3530 will not provide some functions that are common in Bristol products; among these are Communication Statistics, Crash Blocks, On-line Diagnostics, Task slip information, and Task rate information.

This load assumes the presence of an integral three-variable transducer and an external three-variable 3508-30B *even for turbine installations* in which case the DP reading is ignored. There is no provision for selecting gauge transmitters in turbine applications.

Chapter 4 - TeleFlow 2-Run ACCOL (TF2RUN) Load

This ACCOL load supports 2 meter runs, either Orifice, Turbine, or mixed. The main structure of the ACCOL load is made up of six ACCOL tasks (see table). Run 2 gas calculations, nomination, PID, and other functions only execute if run 2 has been enabled. When both runs are active, one may be designated as 'primary'; the primary run gains control of the single analog output, and its DP is used when making run switch decisions.

ACCOL Task Number	Task Rate	Purpose of this task
1	1 second	Gas calculations for both meter runs. Collects 'live' DP, P, and T input and status data from the internal sensor conditioning circuitry and from the external 3508 TeleTrans transmitter. In accordance with MPMS requirements, these are averaged over the configured calculation interval for use in the flow calculations; averaging is 'flow-dependent' in that it only occurs when the DP value is above a configured 'cutoff' level.
2	1 second	PID control for run 1.
3	1 second	PID control for run 2.
4	1 second	Nomination for run 1.
5	1 second	Nomination for run 2.
6	1 second	AGA8 calculations for both runs.

When Using Orifice Meters:

The live DP and P values are used to compute an Extension value (the square root of the product of the live DP and P) every second; Extension values are summed over the Calculation interval, which can be configured at 5, 15, 30, or 60 seconds. The interval is configured by the user to obtain the best balance of power consumption and calculation rate. The calculation interval is common to both runs. If a calculation is not scheduled the task completes and the hardware re-enters sleep mode. Flow rate for Run 1 is always calculated; Run 2 calculations are done only if the run has been enabled.

A full flow rate calculation is done at the end of a Calculation interval; the interval defaults to five seconds whenever certain conditions are active (see **Conditions Which Force A 5-second Calculation Interval** below). Averaged input values for the interval are used in the FPV, AGA8Detail, or AGA8Gross modules to obtain gas compressibility factors. These are then used in an AGA3 (1985 or 1992) equation to compute the flow rate in MSCF per hour for each run. The Extension used in the AGA3 calculation is an average Extension for the Calculation interval obtained by summing the Extensions computed every second during the interval

and dividing by the number of Extension values summed. The Extension sum is then cleared and averages are reset for another Calculation interval.

When Using Turbine Meters:

The DP reading is ignored, and the live P and T values are used to compute a Correction Factor (CF) every second; these are summed over the Calculation interval, which can be configured at 1, 2, 5, 15, or 60 seconds. A 'delta' count of Actual Cubic Feet (ACF) is multiplied by CF to produce a corrected volume (CV). The change indicated by CV is divided by the calculation interval to produce a flow rate. Flow rate for Run 1 is always calculated; Run 2 calculations are done only if the run has been enabled.

A full flow rate calculation is done at the end of a Calculation interval; the interval defaults to five seconds whenever certain conditions are active (see **Conditions Which Force A 5-second Calculation Interval** below). Averaged input values for the interval are used in the FPV, AGA8Detail, or AGA8Gross modules to obtain gas compressibility factors. These are then used in an AGA3 (1985 or 1992) equation to compute the flow rate in MSCF per hour for each run. The Extension used in the AGA3 calculation is an average Extension for the Calculation interval obtained by summing the Extensions computed every second during the interval and dividing by the number of Extension values summed. The Extension sum is then cleared and averages are reset for another Calculation interval.

Conditions Which Force A 5-second Calculation Interval

There are several conditions, which force the Calculation interval to be 5 seconds:

1. When the Local communications port is in use.

2. When the LCD Display is active (i.e. scrolling data for the operator).

3. When PID flow control is active and the flow rate is not within 2% of the setpoint.

In addition to the input signal averages for the Calculation interval, another set of input averages is maintained for each full log period (hour or 15 min) and day; these averages are stored in the Archive for that log.

Process Analog Inputs: Differential Pressure (DP), Static Pressure (P), Temperature (T)

Orifice Metering:

When performing Orifice Metering, the process inputs used for the Gas Flow computations are Differential Pressure (DP), Static Pressure (P), and Temperature (T). For Run 1, the DP, P, and T come from the internal, multivariable sensor. Each second, these values are acquired from the internal sensor using an XMTR_Interface Module and placed in the 'live data' signals.

Some users require a downstream static pressure and connect the integral sensor to the pipeline such that the physical downstream pressure tap is connected to the 'high' side of the sensor and the upstream tap is connected to the 'low' side. This connection allows the sensor to read downstream static pressure but because the higher pressure is on the 'low' sensor side a negative DP reading is returned. This negative reading is made positive internally when the run 1 Tap location is set to 'downstream'.

For run2 another XMTR_Interface module collects DP, P and T from an external 3508 transmitter connected to the IOEXP communication port and TIB. Communication with the external 3508 TeleTrans is done at 1200 bps and requires approximately 480 milliseconds to obtain a set of data. The ACCOL load is designed to allow calculations to proceed while data is being read from the 3508.

When the run 2 Tap location is set to 'downstream' the negative DP reading is made positive.

Turbine Metering

The process inputs used for the Gas Flow calculations for each run are Static Pressure (P), and Temperature (T). For run 1 the P and T come from the internal multivariable sensor; DP is ignored. Each second, these values are acquired from the internal sensor using a XMTR_Interface module and placed in the 'live data' signals.

For run2 another XMTR_Interface module collects DP, P and T from an external 3508-30B transmitter connected to the IOEXP communication port and TIB. Communication with the external 3508 is done at 1200 bps and requires approximately 480 milliseconds to obtain a set of data. The ACCOL load is designed to allow calculations to proceed while data is being read from the 3508. The DP reading is ignored.

Input Averaging

The process inputs DP, P and T 'live data' values are averaged over the configured Calculation interval; the average is a 'flow-dependent time-weighted' value in accordance with MPMS requirements. The averages are calculated for the periods of time when the DP is above the user configured Cutoff level. When there is no flow for the entire Calculation interval, straight arithmetic averages are calculated for the Static Pressure and Temperature. At the end of each Calculation interval the calculated averages are stored in the 'in-use' signals and used to calculate flow rate and volume.

Separate averages of DP, P, and T are maintained for each log and the day.

Input Override and Calibration Mode

The 'in use' signals can be 'frozen' at their current value by setting their standard ACCOL Control Inhibit (CI) on. When an 'in-use' signal (DP, P, or T) is in 'CI' mode, the 'live data' signal continues to reflect the current value from the internal sensor, however, the 'in-use' signal is no longer updated and remains 'frozen' at its current value. Input averaging continues to be performed using the 'in-use' value rather than the 'live data' value.

While the 'in-use' signals are in CI mode the Operator can enter an 'Override' value into the signal for use in the input averaging and Gas Flow calculation.

When the Calibration Mode signal (CALIB..) is set ON the DP, P, and T 'in-use' signals are also 'frozen' but they are not placed in 'CI' mode.

Input Alarms

The process inputs DP, P, and T are alarm signals with the following default alarm limits:

	Low	High	LowLow	HighHigh	LDb	HDb
DP	10	250	0	300	3	10
P	100	1500	0	2000	10	50
T	50	150	32	250	3	10

Digital Inputs

There are 2 discrete input points DI1 and DI2 on the main board; these are free for general use and can be used as alarm inputs or monitoring inputs. The default alarm condition is the ON state, i.e. the alarm occurs when the input enters its ON state. These inputs are read once a second using a DIGIN module.

Digital Outputs

The main board discrete outputs DO1 and DO2 are used by the run 1 PID control, when run 1 Flow control is enabled; they are driven by a PDO module that uses two outputs:

DO 1 - Raise pulse output.
DO 2 - Lower pulse output.

The IOEXP board DIO points 3 to 10 are used as follows:

When run 2 Flow control is enabled, a PDO module uses the following outputs:

DIO 3 - Raise pulse output.
DIO 4 - Lower pulse output.

When run 1 Sampler output is enabled, a PDO module uses the following:

DIO 5 - Pulse output based on volume (to drive an external totalizer or sampler).
DIO 6 - unused.

When run 2 Sampler output is enabled, a PDO module uses the following:

DIO 7 - Pulse output based on volume (to drive an external totalizer or sampler).
DIO 8 - unused.

When run switching is used on the secondary run, the control points are:

DIO 9 - Open the run
DIO 10 - Close the run

Sampler logic has a default volume of 100 mscf and uses a default pulse width of 1 second. PID Flow control logic requires varying pulse widths from .1 sec to 30 sec in width with .1 sec resolution. PDO modules are used for all pulse outputs.

Both Flow control and Sampler output can be active at the same time.

Auxiliary Analog Inputs

There are five analog inputs, one on the Main board and four on the Expanded board. The main board 1 to 5 volt input can be used as an alarm or monitoring input. Signals are provided that allow this input to be scaled into other units.

The default scaling is:

Zero = 0.0 %
Full scale = 100.0 %

Default alarm limits are:

Low 10
High 100
Lo-lo 0
Hi-hi 150
LDb 3
HDb 10

This input is updated once each calculation interval and stored in the Periodic and Daily Archive.

This input's circuitry is designed so that the Zero value (above) will be read when 1 volt is applied to the input and the Full Scale value will be read when 5 volts is applied i.e., the reported Auxin value is 0.00 when 1 volt is applied and 100.0 when 5 volts is applied. Voltages up to 16 volts can be applied to the input but the Auxin reading will be an 'off scale' value, i.e., 10 volts will produce an Auxin of 200.0%, 15 volts will produce 300.0%.

A second Auxin.2 is obtained using AIN#2 on the IOEXP board.

Of the three remaining Expanded board analog inputs, two will be used for pressure transmitter monitoring when external pressure override is enabled in the PID routines, the fourth input will be available for monitoring purposes.

Analog Output

The Analog output on the IOEXP board is used by the Primary run for either flow recording or PID use; the default is flow recording, in which case the Analog output is proportional to the flow rate in percent of the configured Max Flow Rate for the Primary run (Run1 is the default primary run). This output is driven by the PID controller of the primary run if the run's PID has been set for Analog mode.

Pulse Input

Two inputs are available (one on the main board, one on the IOEXP board) that accept pulses at rates up to 5,000 Hz. Counts are read using a HSCOUNT module which reports a raw pulse total and frequency value. These counters can be configured as either plain pulse counters or Turbine meter counters.

For plain pulse counting a configurable scaling factor can be used to convert pulses into other units i.e., if each pulse is the equivalent of 5 gallons, a scaling factor of 5 converts the total to gallon units. The frequency and total can be read in 'raw' units (counts and Hertz) and also in scaled units. Default pulse scaling factor is 1.0.

For Turbine meter usage an additional meter factor (in units of pulses-per-ACF) and maximum turbine frequency must be configured.

Communication Port Assignments

PORT #1 - Pseudo-slave local port, 19200 bps.
PORT #2 - BSAP or MODBUS network port, 9600 bps.
PORT#3 - IOEXP port to the external TIB/3508, 1200 bps.

These ports differ from typical ACCOL load port usage in that their baud rate can be changed on-line. The Network and Expanded port RTS/CTS mode and delay time can also be changed on-line.

Communication Port Usage

The Local port is used for local configuration and data collection. It typically connects to a PC or Laptop that is running a user-interface software package such as the Universal Operator Interface (UOI) or Open BSI's Dataview.

The Network port is generally used for data collection via standard BSAP Remote Database Access (RDB) requests or Bristol Peer-to-peer messages coming from another Bristol device such as a Data Concentrator. The load will define the port as 'bi-lingual' so that it will recognize either BSAP or MODBUS messages.

For Bristol Peer-to-peer data collection, a number of defined lists are provided (see the end of this chapter) as well as Slave modules for each list. This port can also be used for data collection or configuration by software such as Open BSI, UOI, or other third party BSAP protocol-based communication systems. It can also be used for Local or Remote download of ACCOL load files.

For MODBUS access a list will provide the map of MODBUS registers to ACCOL signals; the assignments remain to be specified.

The Expanded port is used to collect DP, P and T from the external 3508 TeleTrans Transmitter.

Gas Flow Calculations

Orifice meters:

For each run, calculations based on either the 1985 or 1992 AGA3 standard can be selected. Calculations based on the 1985 standard are suitable for both Flange and Pipe taps. Calculations based on the 1992 standard only use Flange taps. AGA3 calculations are performed at the end of the configured Calculation interval.

Some configured values will be tested for 'reasonableness' and limited to certain ranges as follows. When these values are outside the allowed limits flow calculations will not be done and an alarm will be registered. The requirements are:

Orifice diameter must be less than .8 and greater than .1 of the Pipe diameter.
Specific gravity must be between .4 and 1.0.
Viscosity must be between .0000040 and .0000080.
Isentropic exponent must be between 1 and 2.

Turbine meters:

Calculations are based on the 1985 AGA7 standard.

The Calculation interval is user configurable at 5, 15, or 60 seconds. Under certain conditions the Calculation interval is forced to 5 seconds. These conditions are:

- The Local Communications port is in use (DCD asserted).
- The LCD Display button has been pushed and the unit is scrolling the Display List.
- The unit is in 'charge regulation' mode
- The flow control is active and not close to the setpoint.

Super-compressibility (F_{pv}) and Compressibility (Z_s, Z_b, Z_f)

When the 1985 AGA3 calculation is selected, the Supercompressibility ($F_{pv)}$ value is calculated using the NX-19 equations. When the 1992 AGA3 calculation is used the Flowing (Z_f) and Base (Z_b) compressibility factors are calculated using either the AGA8Detail or AGA8Gross module. The AGA8Gross module provides either the G,C,N or HV, G, C modes.

A signal will be provided in the load that is the sum of all the gas component percentages used by AGA8Detail. This signal will be available for use by UOI menus to display a current total of all components so that users can verify that the sum is close to 100%.

If the Base Pressure or Base Temperature differ from Standard conditions (14.73 psia, 60 degF), and the 1992 AGA3 calculation is in use, an AGA8Detail or AGA8Gross module will be executed to calculate standard compressibility Z_s for the defined gas composition. The calculation of Z_s will be done once per minute or whenever a related gas constant changes.

Flow Rates

Orifice meters:

Gas flow-rate for each run calculated in mscf/hr using an AGA3Term module if the 1985 calculation is selected, otherwise the AGA3Iter module (1992 calculation) is used. Because of MPMS requirements the Extension value is supplied to these modules externally.

Turbine meters:

CV and AV are computed based on count differences, then the resulting volume change is divided by a time interval to obtain a flow rate. Smoothing will be applied to eliminate 'jerkiness' at slow pulse rates. Smoothing basically provides a filter with a long delay, so the flow rate will not exactly follow a changing pulse rate.

Flow rate in mscf/hr is converted to mscf/day and is available for reading. The 'per

run' rates are summed to produce station total rate. If the Analog output usage is 'flow rate' the rate is scaled by the configured Max Rate and the analog output is proportional to the rate.

Flow Rate Alarm

The flow rate signal is an alarm signal with default alarm limits (in mscf/hr):

Low	0
High	3000
Lo-lo	0
Hi-hi	5000
LDb	50
HDb	50

Flow Volume Totals

At the end of each Calculation interval the volume for that interval is added to totals for the hour, day, current month and 'running' total volume for the run. At the end of each hour, day, and month the accumulated volume for the run for that period is stored in an Archive file and the total cleared for the next period. The running total is not cleared; it accumulates to 10 million units (mscf, mmbtu) at which point it rolls over to zero and continues accumulating.

The individual run totals are summed to produce station totals for the hour,day,month, and running times. The station running total also rolls over at 10 million units.

Hourly and Daily volume totals are also stored in ACCOL signals so they can be extracted for display on menus.

Averaged Extension (Orifice Meter ONLY)

The average value of the Extension (square root of the product of process DP and absolute Static Pressure) is computed for each log period and for the day and saved in an archive. This average is maintained separate from the value used in calculating the flow volume for a Calculation interval.

Back Flow Time

Flow rate calculations are not done when a run is in Backflow state, but the time

spent in a Back Flow condition is totaled for the current and previous day and an alarm is generated if the condition exceeds a user-specified limit.

As each input sample is processed, the DP reading is examined to see if a Back Flow condition is present. (i.e. DP is less than 0.0 and the absolute value of DP is greater than the DP Cutoff). If a Back Flow condition is detected, a Back Flow timer is started. If the Back Flow condition remains in effect for a user configured number of seconds, a Logical Alarm signal is turned 'ON'.

The amount of time during which a Back Flow condition has been detected for the run for the current day is accumulated in an Analog signal. At the end of the contract day, the value in this signal is transferred into the previous day's Back Flow Time signal and the signal is set to 0.0. All intervals of Back Flow are accumulated, independent of the alarm state. (i.e. short durations of Back Flow, less than Back Flow timer, are accumulated even though the Back Flow Alarm is not turned 'ON'.)

Gas Energy Calculations

Gas flow volume for a Calculation interval is converted to energy in MMBTU (i.e. DekaTherms; a DekaTherm is 10 million Btu) by multiplying by a Heating value in BTU/cu.ft. and dividing by 10 million; the Heating value can come from a fixed value or from an AGA5 calculation. The energy for the interval is summed to produce an energy total in MMBTU for the each hour and day, and for the current month.

Flow rate is converted to energy rate in MMBTU/hr.

Low-Flow Cut-OFF

The 'input in-use' Differential pressure is always compared to a CUTOFF signal set in inches of water. When the DP value drops below the value of the CUTOFF signal, flow calculation will cease and the calculated flow-rate will be zero. Default cutoff is 0.25 inH_2O.

Turbine meter cutoff is set in Hertz.

Flow Time

While the DP is above the Cutoff limit the unit will accumulate a flow-time count in minutes for the hour and day. In a backflow condition a separate backflow time is accumulated.

Archive Files

Periodic Archive - Run 1 and 2

Each run has a periodic archive with a 1 hour interval. At the end of a defined period the information shown below is written into the archive file.

DATE/TIME	
LOCAL SEQUENCE NUMBER	
GLOBAL SEQUENCE NUMBER	
AVERAGE DP	INH2O
AVERAGE STATIC PRESSURE	PSIG
AVERAGE FLOWING TEMP.	DEGF
FLOW TIME	MINS
AVERAGE EXTENSION	
ACCUMULATED VOLUME	MSCF
ACCUMULATED ENERGY	MMBTU
AVERAGE AUXILIARY INPUT	%

Run 2 has a similar archive except that Auxiliary input 2 is stored.

Daily Archive - Run 1 and 2

At the end of every day the information shown below is written into a daily archive file.

DATE/TIME	
LOCAL SEQUENCE NUMBER	
GLOBAL SEQUENCE NUMBER	
AVERAGE DP	INH2O
AVERAGE STATIC PRESSURE	PSIG

AVERAGE FLOWING TEMP.	DEGF
FLOW TIME	MINS
AVERAGE EXTENSION	
ACCUMULATED VOLUME	MSCF
ACCUMULATED ENERGY	MMBTU
AVERAGE AUXILIARY INPUT	%

Run 2 has a similar archive except that Auxiliary input 2 is stored.

Trend Archive - Run 1 and 2

If the Trend log is enabled then every 15 minutes the live (not averaged) input values are written to a trend archive as shown below.

DATE/TIME	
LOCAL SEQUENCE NUMBER	
GLOBAL SEQUENCE NUMBER	
DIFF. PRESSURE	INH2O
STATIC PRESSURE	PSIG
FLOWING TEMP.	DEGF

Run 2 has a similar archive.

Station Daily and Hourly Archive

At the end of every day and hour the information shown below is written into a Station hourly and daily archive file.

DATE/TIME	
LOCAL SEQUENCE NUMBER	
GLOBAL SEQUENCE NUMBER	
VOLUME TOTAL	MSCF
ENERGY TOTAL	MMBTU

Station Trend Archive

At the end of every 15 minutes the information shown below is written into a trend archive file.

DATE/TIME

LOCAL SEQUENCE NUMBER	
GLOBAL SEQUENCE NUMBER	
RUN 1 FLOW RATE	MSCFH
RUN 2 FLOW RATE	MSCFH
STATION FLOW RATE	MSCFH

Log Break

When the Log Break option is enabled, an archive log-break will occur when the Orifice plate size or other flow-related constants are changed.

Flow Control

Flow control on either run is achieved using PID control; the PID on each run can operate in either Raise/Lower mode or Analog mode, but because there is only one analog output, only the primary run can use it; simultaneous Raise/Lower operation is allowed.

Raise/lower Flow-rate control is achieved using the PID3TERM module in combination with a PDO module. The Flow Controller uses a FLOW SETPOINT signal and the calculated flow rate signal as inputs to the PID3TERM module, the output of which is fed to a PDO module to generate raise/lower pulses on the discrete outputs (Raise on DO#1, Lower on DO#2).

If the PID is configured to operate in Analog mode the PID output is scaled, as necessary, and applied to the Analog output on the expanded board. If the analog output is not used for PID control it is set in proportion to the Station flow rate (sum of both runs).

Default PID settings are:

Gain	1
Integral	1 repeat/min
Derivative	0 mins
Deadband	0
Valve travel	30 secs
Pulse width	1 sec
Max rate	5000 mscf/hr

Run 2 flow control Raise/Lower operation uses IOEXP outputs (Raise on DIO#3, Lower on DIO#4).

The PID can be selected to operate in 'station' mode, in which case the PID #1 process variable is the total station flow rate (sum of both runs).

Run Switching

Either run can be configured as the 'Primary' run automatically making the other run the 'Secondary' run. If Run switching is enabled, the Secondary run is switched in or out based on the DP value of the Primary run. Switching is done using discrete outputs DIO #9 (open) and DIO #10 (close).

If the Primary run is an Orifice meter, the Secondary run is switched in when the Primary run DP exceeds a configured 'High DP 'value (default 80 inH_2O). Once a run is switched (in or out) the run switch thresholds are ignored for a 10 second time interval while the system pressures settle. After that interval the thresholds are tested every second. The Secondary run will be switched out only when BOTH the Primary and Secondary run DP's fall below configured 'Low DP' values (default 20 inH_2O). Turbine meter run switching is done similarly using the Primary run Turbine frequency and configured high and low switch points (default 4000 Hz and 100 Hz).

Radio Control

Radio control is accomplished using a SYS_3530 module to gain access to the Teleflow intrinsic radio control functions, i.e., it is not done using ACCOL modules.

Two radio control functions are available: Scheduling and Sensing (also called 'Fast radio'). Radio Scheduling is used to conserve battery power by allowing the radio to be powered up for a short time every day in expectation of receiving a message from a remote 'host' during that time.

If Radio Scheduling is enabled the system will turn on the radio at a defined time (an hour of the day) and keep it on for a defined length of time, usually in the order of minutes. A user-configured 'listen' timer is also started so that if no messages are received while the timer is running the radio will turn off to save power. The radio can also be activated manually for testing via the local port. Radio power is controlled using a system signal that turns an auxiliary power output on or off.

If Radio Sensing is enabled the system will turn the radio on at a defined time (an hour of the day) and begin a sequence in which the radio is turned on every so many seconds but for 'listen' time intervals less than 1 second. It continues this sequence until the defined 'stop' hour is reached. If a message is received while the

radio is on the system will keep the radio on, process the message and respond. After every response the radio remains on for one more 'listen' time, after which it is shut off.

Both radio control functions can be active simultaneously.

Modem Dial-Out (THIS FUNCTION IS NOT YET SUPPORTED)

This feature makes use of the ACCOL Slave Auto-dial function. When DIALOUT is enabled, and a trigger condition is satisfied, the load will automatically dial a phone number (the modem option must be installed) held in the Dial List. The number of the Dial list is held in system signal #DIAL.001. Up to 13 different trigger conditions can be armed to initiate the call. Program logic examines the state of the signal associated with an 'arm' signal and, if it is in an Alarm state, sets the Dial Enable signal in the Dial List to a non-zero value, thereby initiating the dialing. The dial commands sent to the modem (i.e. initialization, phone number) are defined by signals in the Dial list.

The use of the modem dial out function implies that the called device has been set up to 'know' that it should poll for alarms after it answers the call and then hang-up.

Dialing logic will dial the first phone number three times and then dial a second number three times, the combination constituting one 'dial-attempt'. To conserve power the maximum number of attempts per hour is two; this value can be configured up to 9 by the user.

Battery Charge Control

The SYS_3530 module is used to access the intrinsic Battery Charger control functions. Signals are provided to allow charge regulator setup and control for either a 6 or 12 volt battery. Should the charge regulator detect battery overcharge an alarm occurs and the auxiliary output is set ON to connect an external load (if one is connected) and drain charge from the battery.

Power and Load Status Alarms

The SYS_3530 module is used to access the intrinsic TeleFlow power monitoring signals. The main voltage value will be held in an alarm signal with default limits (in Volts) as follows:

Low 5.75
High 16.0
Lo-lo 5.5
Hi-hi 16.5
LDb .5
HDb .5

A number of 'load status' logical alarms are provided as follows:

Load Status Alarms:	**Cause of Alarm:**
Backflow alarm	Backflow is detected
Low DP (cutoff)	DP cutoff level detected
Backup battery	Low RAM backup battery
External battery overcharge	Excess voltage going into the external battery
System self-check	System problem
EEPROM checksum	FLASH memory problem
Sensor checksum	Compensation has changed

Audit/Event Log

An EAUDIT module (in Task 0) is set up to collect both alarms and events, with event signals defined by the signals in list 23. The module is defined with enough space for 800 alarms and events, and the module operates such that 400 alarms and 400 events are kept separate until the Audit log is collected. This design prevents a toggling alarm or event from filling the entire alarm/event log buffer to the exclusion of all other entries.

LCD Display Update

A Keyboard Module in Task 0 references List 50. Signals in that list appear in the display when the 'Activate Display' button is pressed but they do not 'scroll'. The user must repeatedly press the Activate button to display the next signal, after which the signal will remain on the display until the display shuts off to save power.

Signal Data Lists For Internal Use and Remote Access

Some signal lists are used by the load, others are provided to support the gathering of gas data by a Bristol master node using Peer-to-peer messages via the Network port. The system Task 0 (non-executing task) contains Slave modules dedicated to the Network-accessible lists; the assigned Point codes are shown where needed.

LIST 10 Full Configuration - Run 1 and Station

Firmware revision (progrev)
Unit ID
Meter ID 1
Alarm report format
Alarm report format 1
Display alarms
Flow equation
Base pressure
Base temperature
Pipe material
Orifice material
AGA8 Method
AGA8 Gross Method
Contract hour
Pipe diameter
Pipe ref temperature
Tap location
Tap type
Orifice diameter
Orifice ref temperature
Low DP cutoff
DP Full scale pressure
DP Pressure zero
SP Full scale pressure
SP Pressure zero
Temperature full scale
Temperature zero
Rate lo-lo
Rate lo
Rate hi
Rate hi-hi
Rate hi deadband
Rate lo deadband

DP lo-lo
DP lo
DP hi
DP hi-hi
DP hi deadband
DP lo deadband
SP lo-lo
SP lo
SP hi
SP hi-hi
SP hi deadband
SP lo deadband
Temp lo-lo
Temp lo
Temp hi
Temp hi-hi
Temp hi deadband
Temp lo deadband
Batt lo-lo
Batt lo
Batt hi
Batt hi-hi
Batt hi deadband
Batt lo deadband
Barometric pressure
Specific heat ratio
Heating value fixed
Heating value source
Specific gravity
Gravity type
Viscosity
CH4 percent
N2 percent
CO2 percent
C2 percent
C3 percent
H2O percent
H2S percent
H2 percent
CO percent
O2 percent
IC4 percent
NC4 percent
IC5 percent

NC5 percent	
C6 percent	
C7 percent	
C8 percent	
C9 percent	
C10 percent	
HE percent	
AR percent	
Sampler enable	
Sampler volume - MSCF	
Sampler pulse width - SEC	
Flow controller enable	
Flow setpoint	
Flow deadband	
Gain	
Integral	
Derivative	
Max flow rate	
Valve travel time	
Flow calculation interval	
Log Break on change	
Trending log enable	
Network Baud Rate	
Network RTS/CTS mode	
Network RTS delay	
Auxiliary power default	
Radio scheduling enable	
Radio listen time	
Radio comm. timeout	
Radio start hour	
Radio stop hour	
Radio local comm. time	
Radio local timeout	
Radio time per node	
Radio time per group	
Radio minute offset into hour	
Nomination enable	Off/On
Nomination unit	MSCF/MMBTU
Nomination mode	
Nomination stop mode	Fast/PID
Nomination Daily mode	Off/On
Nomination Alarm dialout	Off/On
Nomination Alarm percent	0 - 100
Next start date	

Next start hour
Next stop date
Next stop hour
Demand enable
Demand interval
Demand duration
Demand start hour
Demand end hour

LIST 11 Calculated Data - Run 1 - point 1

Flow Rate
Beta Ratio
Ev
Cd
Zs
Zb
Zf
Y
Extension
C-prime

LIST 12 Configuration #1 - Run 1 - point 2

Meter ID 1	
Flow Equation	1985/1992
Log Break option	
Heat Value source	
Gravity type	
AGA8 Method	Gross/Detail
AGA8 Gross Method	
Orifice Diameter	.250" to 31"
Pipe Diameter	2" to 31"
Specific Gravity	
Heating Value	
Barometric Pressure	
Base Pressure	
Base Temperature	
Flowing Viscosity	
Ratio of Specific Heat	
Tap Location	
Tap Type	
DP Cutoff	

LIST 14 Controller - Run 1 - point 3

Sampler Enable	On/Off	
Sampler Volume	0 - 10000 MCF	
Sampler Duration	1.0 Secs	
Flow Rate Control	Off/On	
Setpoint	0 MSCF	
Deadband	0	
Gain	0-100	
Integral	0-60 RPTS/Min	1
Derivative	0-60 Min	0
PID Output	Analog/Pulse	
Valve Travel Time	1-30 SEC	30
Maximum Flow Rate	5000 MSCF	5000
Nomination enable	Off/On	
Nomination unit	MSCF/MMBTU	
Nomination mode	Fast/PID	
Nomination stop mode	Open/Shut	
Nomination Daily mode	Off/On	
Nomination Alarm dialout	Off/On	
Nomination Alarm percent	0 - 100	
Next start date		
Next start hour		
Next stop date		
Next stop hour		

LIST 15 AGA8 Gross Config - Run 1

Specific Gravity	
Heating Value	
CO2 content	
Nitrogen content	
AGA8 Gross Method	GCN/HV
Gravity type	

LIST 16 AGA8 Detail Gas composition - Run 1

Methane
Nitrogen
CO2
Ethane
Propane

H2O
H2S
H2
CO
O2
I-Butane
N-Butane
I-Pentane
N-Pentane
Hexane
Heptane
Octane
Nonane
Decane
Helium
Argon

LIST 17 AGA3 1985 Factors - Run 1

Flow Rate
Beta Ratio
Fpb
Ftb
Fg
Ftf
Fa
Fr
Y
Fb
Fpv
C-prime
Extension

LIST 18 Communication configuration

Network baud rate
Network CTS/RTS mode
Network RTS delay
Aux power default
Radio sched enable
Radio on-time
Radio listen time
Radio start hour

Radio end hour
Local on-time
Local listen time
Node time
Group time
Offset into hour
Demand enable
Demand interval
Demand duration
Demand start hour
Demand end hour
Dialout on an Alarm enable
Dial on Cutoff enable
Dial on Backflow enable
Dial on Transmitter fail enable
Dial on Backup battery low enable
Dial on Fl.Pt error enable
Dial on Selftest error enable
Dial on DP alarm enable
Dial on SP alarm enable
Dial on TF alarm enable
Dial on Flow rate alarm enable
Dial on Battery alarm enable
Dial on Auxiliary input alarm enable
Dial on Charger alarm enable
Dial on Nomination alarm enable

LIST 19 AGA8 Detail Gas Composition - Run 2

See List 16 for details.

LIST 20 Live Data - Run 1

Diff pressure
Static pressure
Temperature
Flow rate

LIST 21 Rate and Volume - Run 1 - point 4

Flow rate
Energy rate
Daily flow rate
Flow time today

Volume today
Energy today
Flow time yesday
Volume yesday
Energy yesday
Volume this month
Energy this month
Volume last month
Energy last month
Volume totalizer
Energy totalizer
Scaled frequency
Scaled pulses today
Scaled pulses yesterday
Scaled pulses total

LIST 22 Inputs - Run 1 - point 5

Diff pressure
Static pressure
Temperature
Total pulses
Pulse Frequency
PC board temperature

LIST 23 Yesterday - Run 1 (Stored by Archive)

Julian Time
Local Sequence Number
Global Sequence Number
Volume
Extens
Flow Time
DP
SP
Ftemp
Energy
AI.1

LIST 24 Last Hour - Run 1 (Stored by Archive)

Julian Time
Local Sequence Number
Global Sequence Number
Volume

Extens
Flow Time
DP
SP
Ftemp
Energy
AI.1

LIST 25 Yesterday - Run 2 (Stored by Archive)

Julian Time
Local Sequence Number
Global Sequence Number
Volume
Extens
Flow Time
DP
SP
Ftemp
Energy
AI.1

LIST 26 Last Hour - Run 2 (Stored by Archive)

Julian Time
Local Sequence Number
Global Sequence Number
Volume
Extens
Flow Time
DP
SP
Ftemp
Energy
AI.1

LIST 27 Inputs - Run 2 -point 11

Diff pressure
Static pressure
Temperature
Total pulses
Pulse Frequency
PC board temperature

LIST 28 -Inputs - Station - Point 12

Firmware rev
Calculation Interval
Contract Hour
System Power
Power Inp1
Power Inp2
Backup Battery
AI
AI.2
AI.3
AI.4
AI.5
DI.1
DI.2
DI.3
DI.4
DI.5
DI.6
DI.7
DI.8
DI.9
DI.10
DO.3.SET
DO.4.SET
DO.5.SET
DO.6.SET
DO.7.SET
DO.8.SET
DO.9.SET
DO.10.SET

LIST 40 Full Configuration - Run 2

Meter ID 2
Flow equation
Base pressure
Base temperature
Pipe material
Orifice material
AGA8 Method
AGA8 Gross mode
Pipe diameter
Pipe ref temperature
Tap location
Tap type
Orifice diameter
Orifice ref temperature
Low DP cutoff
DP Full scale pressure
DP Pressure zero
SP Full scale pressure
SP Pressure zero
Temperature full scale
Temperature zero
Rate lo-lo
Rate lo
Rate hi
Rate hi-hi
Rate hi deadband
Rate lo deadband
DP lo-lo
DP lo
DP hi
DP hi-hi
DP hi deadband
DP lo deadband
SP lo-lo
SP lo
SP hi
SP hi-hi
SP hi deadband
SP lo deadband
Temp lo-lo
Temp lo

Temp hi
Temp hi-hi
Temp hi deadband
Temp lo deadband
Barometric pressure
Specific heat ratio
Heating value fixed
Heating value source
Specific gravity
Gravity type
Viscosity
CH4
N2
CO2
C2
C3
H2O
H2S
H2
CO
O2
IC4
NC4
IC5
NC5
C6
C7
C8
C9
C10
HE
AR
Sampler enable
Sampler volume
Sampler pulse width
PID Flow controller enable
Flow setpoint
Flow deadband
Gain
Integral
Derivative
Max flow rate
Valve travel time
Log Break on change

Trending log enable	
Expanded Baud Rate	
Expanded RTS/CTS mode	
Expanded RTS delay	
Nomination enable	Off/On
Nomination unit	MSCF/MMBTU
Nomination mode	Fast/PID
Nomination stop mode	Open/Shut
Nomination Daily mode	Off/On
Nomination Alarm dialout	Off/On
Nomination Alarm percent	0 - 100
Next start date	
Next start hour	
Next stop date	
Next stop hour	

LIST 41 Calculated Data - Run 2 - point 7

Flow Rate
Beta Ratio
Ev
Cd
Zs
Zb
Zf
Y
Extension
C-prime

LIST 42 Configuration #1 - Run 2 - point 8

Meter ID 2	
Log Break option	
Heat Value source	
Gravity type	
AGA8 Method	Gross/Detail
AGA8 Gross Method	GCN/HV
Flow Equation	1985/1992
Orifice Diameter	.250" to 31"
Pipe Diameter	2" to 31"
Specific Gravity	
Heating Value	

Barometric Pressure
Base Pressure
Base Temperature
Flowing Viscosity
Ratio of Specific Heat
Tap Location
Tap Type
DP Cutoff

LIST 44 Controller and Sampler - Run 2 - point 9

Sampler Enable	On/Off	
Sampler Volume	0 - 10000 MCF	
Sampler Duration	1.0 Secs	
Flow Rate Control	Off/On	
Setpoint	0 MSCF	
Deadband	0	
Gain	0-100	
Integral	0-60 RPTS/Min	1
Derivative	0-60 Min	0
Valve Travel Time	1-30 SEC	30
Maximum Flow Rate	5000 MSCF	5000
Nomination enable	Off/On	
Nomination unit	MSCF/MMBTU	
Nomination mode		
Nomination stop mode	Fast/PID	
Nomination Daily mode	Off/On	
Nomination Alarm dialout	Off/On	
Nomination Alarm percent	0 - 100	
Next start date		
Next start hour		
Next stop date		
Next stop hour		

LIST 45 AGA8 Gross Config - Run 2

Specific Gravity
Heating Value
CO2 content
Nitrogen content
AGA8 Gross Method
Gravity type

LIST 46 AGA8 Detail Gas composition - Run 2

Methane
Nitrogen
CO2
Ethane
Propane
H2O
H2S
H2
CO
O2
I-Butane
N-Butane
I-Pentane
N-Pentane
Hexane
Heptane
Octane
Nonane
Decane
Helium
Argon

LIST 47 AGA3 1985 Factors - Run 2

Flow Rate
Beta Ratio
Fpb
Ftb
Fg
Ftf
Fa
Fr
Y
Fb
Fpv
C-prime
Extension

LIST 48 Live Data - Run 2

Diff pressure
Static pressure
Temperature
Flow rate

LIST 49 Rate and Volume - Run 2 - point 10

Flow rate
Energy rate
Daily flow rate
Flow time today
Volume today
Energy today
Flow time yesday
Volume yesday
Energy yesday
Volume this month
Energy this month
Volume last month
Energy last month
Volume totalizer
Energy totalizer
Scaled frequency
Scaled pulses today
Scaled pulses yesterday
Scaled pulses total

LIST 50 LCD Display list

Meter ID
System power
Diff pressure 1
Flowing pressure 1
Temperature 1
Daily flow rate 1
Flow time today 1
Volume today 1
Volume yesterday 1
Volume running total 1
Meter ID 2
Diff pressure 2

Flowing pressure 2
Temperature 2
Daily flow rate 2
Flow time today 2
Volume today 2
Volume yesterday 2
Volume running total 2
Station flow rate
Station volume today

Appendix A
Modifying the TeleFlow 2-Run ACCOL Load

Modifying or Replacing the TeleFlow 2-Run ACCOL Load & Menus

The TeleFlow is a download-able ACCOL device, therefore, the TeleFlow 2-Run ACCOL Load can be modified or replaced with another compatible ACCOL load.

For example, if the TeleFlow 2-Run ACCOL Load does not fit your particular application, you may modify the .ACC file in ACCOL Workbench software (available separately from Bristol Babcock,) re-build the ACL file, and download it into the TeleFlow . For more information on ACCOL Workbench, see the *ACCOL Workbench User Manual* (document# D4051).

NOTE:

The TeleFlow only supports a subset of the ACCOL module library thus some ACCOL modules will not operate. See the '*Hardware and Software Requirements*' section of the *ACCOL II Reference Manual* (document# D4044) to find out which modules are supported.

In addition, the EGM-3530 will not provide some functions that are common in Bristol products; among these are Communication Statistics, Crash Blocks, On-line Diagnostics, Task slip information, and Task rate information.

Be aware, also, that the TeleFlow 2-Run Menu System (TF2RUN) is closely tied to the TeleFlow 2-Run ACCOL Load. If you modify the 2-run load, or create a different load, you will need to modify the menus using the UOI program (available separately from Bristol Babcock). For more information on UOI, see the *UOI Configuration Manual* (document# D5074).

Another restriction on modifying the ACCOL load is that the communication ports and process I/O boards must be configured consistently with the design of the TeleFlow. Table 1-1, below, shows the required port configuration; Table 1-2, shows the required process I/O configuration.

Table 1-1 Process I/O Board Options

I/O Slot Number	Process I/O Board Name	Syntax in ACC File *PROCESS-I/O section
1	Digital Input Board with 2 or 10 points (or no board installed)	DI2 DI10 - required expansion board
2	Digital Output Board with 2	DO2

Appendix A
Modifying the TeleFlow 2-Run ACCOL Load

I/O Slot Number	Process I/O Board Name	Syntax in ACC File *PROCESS-I/O section
	or 10 points (or no board installed)	DO10 - requires expansion board
3	Analog Input Board with 1 or 5 points (or no board installed)	AI1 AI5 - requires expansion board
4	High Speed Counter Board with 1 or 2 points (or no board installed)	HSC1 HSC2 - requires expansion board
5	Analog Output Board with 1 point (or no board installed)	AO1

Table 1-2 Communication Port Options

PORT	Port Type	Baud Rate	Notes
A	Pseudo Slave	300 - 38,400	Asynchronous Local Port
B	Slave or Custom	300 - 38,400	Asynchronous Network Port
C	Master	300 - 38,400	Asynchronous Expanded I/O Port

NOTES ON POWER CONSUMPTION:

Assuming the Local Port is unused, the Network port is inactive, and the LCD display is inactive, the 3530 will enter 'sleep' mode if it is not currently executing an ACCOL task.

The larger the ACCOL load, the longer it takes to execute, and the longer the unit 'stays awake'. Load functions should be scheduled to run only when needed. This means using logical signals as flags to control execution. Load tasks should be carefully partitioned to execute only when necessary, so that maximum 'sleep' time is obtained, thereby reducing power consumption.

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DOCUMENT NUMBER: D4088
TITLE: *TeleFlow 2-Run (TF2RUN) Load & Menus*
ISSUE DATE: March, 2001

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RRF - 3/2001

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