# *TeleFlow™ Standard ACCOL Load*

*(NOTE: This manual was formerly entitled 'TeleFlow™ Standard ACCOL Load and Menus', TMS menus are now documented in appendices of the TeleFlow hardware manual.)*

**Bristol Babcock**
**D4087 Issue:     December, 2000**

# Request for Additional Instructions

Additional copies of instruction manuals may be ordered from the address below per attention of the Sales Order Processing Department. List the instruction book numbers or give the complete model, serial or software version number. Furnish a return address that includes the name of the person who will receive the material. Billing for extra copies will be according to current pricing schedules.

## A Few Words About Bristol Babcock

For over 100 years, Bristol has been providing innovative solutions for the measurement and control industry. Our product lines range from simple analog chart recorders, to sophisticated digital remote process controllers and flow computers, all the way to turnkey SCADA systems. Over the years, we have become a leading supplier to the electronic gas measurement, water purification, and wastewater treatment industries.

On off-shore oil platforms, on natural gas pipelines, and maybe even at your local water company, there are Bristol Babcock instruments, controllers, and systems running year-in and year-out to provide accurate and timely data to our customers.

## Getting Additional Information

In addition to the information contained in this manual, you may receive additional assistance in using this product from the following sources:

## Contacting Bristol Babcock Directly

Bristol Babcock's world headquarters are located at 1100 Buckingham Street, Watertown, Connecticut 06795 USA. Our main phone numbers are:

**(860) 945-2200**
**(860) 945-2213** (FAX)

Regular office hours are Monday through Friday, 8:00AM to 4:30PM Eastern Time, excluding holidays, and scheduled factory shutdowns. During other hours, callers may leave messages using Bristol's voice mail system.

## Telephone Support - Technical Questions

During regular business hours, Bristol Babcock's Application Support Group can provide telephone support for your technical questions.

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

For technical questions about the TeleFlow unit, and other **Network 3000 hardware  call (860) 945-2502.**

**For technical questions about ControlWave call (860) 945-2244 or (860) 945-2286.**

For technical questions regarding Bristol's **OpenEnterprise** product, **call (860) 945-2501** or e-mail **openenterprise@bristolbabcock.com**

You can e-mail the Application Support Group at: **bsupport@bristolbabcock.com**

The Application Support Group also maintains a bulletin board for downloading software updates to customers. To access the bulletin board, dial (860) 945-2251 (Modem settings: 14.4K baud maximum, No parity, 8 data bits, 1 Stop bit.)

For assistance in interfacing Bristol Babcock hardware to radios, contact Communication Technologies in Orlando, FL at (407) 629-9463 or (407) 629-9464.

**Telephone Support - Non-Technical Questions, Product Orders, etc.**

Questions of a non-technical nature (product orders, literature requests, price and delivery information, etc.) should be directed to the nearest regional sales office (listed below) or to your local Bristol sales office or Bristol-authorized sales representative.

| U.S. Regional Sales Offices | Principal International Sales Offices: |
|---|---|
| Northeast (Watertown) (860) 945-2262 | Bristol Babcock Ltd (UK): (441) 562-820-001 |
| Southeast (Birmingham) (205) 980-2010 | Bristol Babcock, Canada: (416) 675-3820 |
| Midwest (Chicago) (630) 571-6052 | Bristol Meci SA (France): (33) 2-5421-4074 |
| Western (Los Angeles) (909) 923-8488 | Bristol Digital Sys. Australasia Pty. Ltd. 61 8-9455-9955 |
| Southwest (Houston) (713) 685-6200 | BBI, S.A. de C.V. (Mexico) (525) 254-2131 |

Please call the main Bristol Babcock number (860-945-2200) if you are unsure which office covers your particular area.

## Visit our Site on the World Wide Web

For general information about Bristol Babcock and its products, please visit our site on the World Wide Web at: www.bristolbabcock.com

## Training Courses

Bristol Babcock's Training Department offers a wide variety of courses in Bristol hardware and software at our Watertown, Connecticut headquarters, and at selected Bristol regional offices, throughout the year. Contact our Training Department at (860) 945-2343 for course information, enrollment, pricing, and schedules.

# Who Should Read This Document?

This document is intended to be read by EGM 3530-xx 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™ standard ACCOL load 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 use the standard TMS 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™ Standard ACCOL Load?

The TeleFlow™ Standard ACCOL Load is included on the TeleFlow™ diskette. This ACCOL load contains ACCOL modules specifically configured to perform various natural gas calculations using a standard I/O setup. It is discussed in detail in Chapter 2 of this manual.

The TeleFlow™ Standard ACCOL Load is used in conjunction with the TeleFlow Menu System (TMS) menus (discussed below), and the TeleFlow™ EGM 3530 Electronic Gas Measurement Computer.

For information on the TeleFlow™ Electronic Gas Measurement Computer, see the CI-3530-xx hardware manual for your particular TeleFlow™ model.

## What Are the TMS Menus?

The **TeleFlow Menu System (TMS)** menus, which may be run on the PC, are specifically configured to collect and display data from the TeleFlow Standard ACCOL Load. These menus are discussed in detail in Appendix F of the appropriate TeleFlow™ hardware manual.

## Modifying or Replacing the TeleFlow Standard ACCOL Load

The TeleFlow is a download-able ACCOL device, therefore, the TeleFlow Standard ACCOL Load can be modified or replaced with another compatible ACCOL load. (See *Appendix A* for some notes about modifying the TeleFlow Standard ACCOL Load.) For example, if the TeleFlow Standard 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 Menu System (TMS) is closely tied to the TeleFlow Standard ACCOL Load. If you modify the standard load, or create a different load, you will need to modify the menus which make up TMS, using the UOI program (available separately from Bristol Babcock). For more information on UOI, see the *UOI Configuration Manual* (document# D5074).

# Chapter 2 - TeleFlow Standard ACCOL Load

## Overview

The TeleFlow Standard load 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 a single Orifice meter run. 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 Standard load supports the following functions:

.   Gas flow calculations per AGA3 (1985) or AGA3 (1992) for an Orifice 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.

.   Raise/Lower flow rate control using a PID3TERM module and two Discrete outputs.

.   Pulse output on DO#1 with rate proportional to volume for odorant injection.

.   An Audit Trail holding 200 events and 200 alarms for a total of 400 entries.

.   A Daily Archive file containing 35 days of Daily historical information.

.   A Periodic Archive file containing 35 days of Hourly historical information.

.   A Trend Archive file containing 8 days of 15 minute trend information (can be disabled).

.   Support of a local 2 line display (LCD) and single push-button.

.   Local and Network communications.

.   Backflow detection and alarming.

.   Nomination alarm settings.

.   Input sampling, averaging  and Extension calculation every second.

# Chapter 2 - TeleFlow Standard ACCOL Load

- Configurable 1, 2, 5, 15, and 60 second calculation interval.

- Pulse counting and scaling.

- Configurable automatic dial-out on alarm occurrence.  (NOT YET SUPPORTED)

- Control of an external radio.

- Battery charge regulator.

---

NOTE:

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.

---

The main task of the TeleFlow Standard Load executes every second and 'wakes up' the hardware (out of low-power mode) and collects 'live' Differential Pressure (DP), Static Pressure (P) and Temperature (T) input data and status data from the internal sensor conditioning circuitry. In accordance with the API MPMS, Chapter 21 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.

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 added over the Calculation interval, which can be configured at 1, 2, 5, 15 or 60 seconds. The interval is configured by the user to obtain the best balance of power consumption and calculation rate. If a calculation is not scheduled the task completes and the hardware re-enters sleep mode.

At the end of a Calculation interval a full flow calculation is performed. 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.  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.

There are several conditions, which force the Calculation interval to be 1 second as follows.

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.

4. When the Network Port is active (Carrier Detect is high)

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

The process inputs used for the Gas Flow computations are Differential Pressure (DP), Static Pressure (P), and Temperature (T).  The DP and P come from the internal, multivariable sensor; the Temperature is measured by an RTD probe. Each second, these values are acquired from the internal sensor and placed in the 'live data' signals.

### 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 period (hour or 15 min) and the day.

# Chapter 2 - TeleFlow Standard ACCOL Load

## 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 CALIB (Calibration mode) signal is set ON all the DP, P, and T 'in-use' signals are simultaneously 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

Inputs 1 and 2 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 updated once a second.

## Digital Outputs

The discrete outputs are shared by the Flow control and Sampler function.

When Flow control is enabled:
DO 1  - Raise pulse output.
DO 2  - Lower pulse output.

When Sampler output is enabled:
DO 1 - Pulse output based on volume (to drive an external totalizer or sampler).
DO 2 - general-purpose output.

Sampler logic has a default volume of 100 mscf and a default pulse width of 1 second.

Flow control has priority for the discrete outputs so that if both Sampler output and Flow control are enabled, Sampler will be shut off and Flow control will use the outputs.

## Auxiliary Analog Input

This input is scaled for 1 to 5 volts, but up to 16 volts can be applied; it can be used as an alarm or monitoring input. Signals are provided that allow this input to be scaled into other units. Voltages higher than 5 volts are scaled accordingly, i.e. 10 volts=200%, 15 volts=300%, etc.

The default scaling is:

Zero          =    0.0 % (1 volt input)
Full scale    = 100.0 % (5 volts input)

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.

## Pulse Input

This input accepts pulses at rates up to 5,000 Hz and keeps a running pulse total and frequency value. A scaling factor can be configured to convert pulses into other units i.e., if each pulse is the equivalent of 5 gallons a scaling factor of 5 makes the total be in 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.

# Chapter 2 - TeleFlow Standard ACCOL Load

## Communications Port Assignments

PORT #1 - Pseudo-slave local port, 19200 bps.
PORT #2 - BSAP network port, 9600 bps.

The baud rate and the RTS/CTS delay may be changed on-line.

### Communication Port Usage

The Local port is used for local configuration and data collection. It usually connects to a PC or Laptop that is running a user-interface software package like TMS or UOI. The Local port will respond to any address; therefore it CANNOT be used in a multi-drop connection. Only the Network port can be multi-dropped (with the necessary external RS-485 converters).

The Network port is used generally for data collection via Bristol Peer-to-peer messages coming from another Bristol device such as a Data Concentrator; for this kind of data collection a number of defined lists are provided 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, TMS, or other third party BSAP protocol based communication systems. The Network port will not respond to messages unless its DCD input is high.

## Gas Flow Calculations

Either the 1985 or 1992 AGA3 calculations can be selected; 1985 calculations are suitable for both Flange and Pipe taps; 1992 calculations only use Flange taps. AGA3 calculations are performed at the end of the configured Calculation interval. (Note: Maximum power conservation is achieved by using the longest calculation cycle.)

The Calculation interval is user configurable at 1, 2, 5, 15, or 60 seconds. Under certain conditions the Calculation interval is forced to 1 second. These conditions are:

The Local Communications port is in use.

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 Super-compressibility ($F_{pv}$) 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.

If the Base Pressure or Base Temperature differ from Standard conditions (14.73 psia, 60 $^{\circ}$F) 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

Gas Flow-rate is 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.

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

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' totalized volume. At the end of each hour, day, and month the accumulated volume for that period is stored and

the total cleared for the next period. The running total is not cleared; it accumulates to 10 million at which point it rolls over to zero and continues accumulating.

## Averaged Extension

The average value of the Extension ( square root of the product of process DP and absolute Static Pressure) is computed for each log period (hour or 15 min) and for the day and saved in an archive. This average is maintained separately from the value used in calculating the flow volume for a Calculation interval.

## Back Flow

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 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 the 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 'live' 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 inches of $H_2O$.

## 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

The interval is 1 hour. At the end of the interval, the information shown below is written into a periodic archive file. If log break is enabled, these values are written when a configuration value changes.

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             %

### Daily Archive

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         %
```

## Trend Archive

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
```

## Log Break

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

## Flow Control

Raise/lower Flow-rate control is achieved using a PID3TERM 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 generates raise/lower pulses on the discrete outputs (Raise on DO#1, Lower on DO#2).

Default 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 |

## Radio Control

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 a period 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, should it be in an Alarm state, sets a non-zero value into the Dial Enable signal in the Dial List to start the call. The dial

# Chapter 2 - TeleFlow Standard ACCOL Load

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

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 a shunt regulator is activated which deactivates the solar panel, thereby preventing an overcharge condition.

## Power and Load Status Alarms

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:

| | |
|---|---|
| Backflow alarm | backflow is detected |
| Low DP (cutoff     ) | Dp below cutoff |
| Backup battery | low RAM backup battery |
| External battery overcharge | excess voltage into the external battery |
| AGA8 Calculation error | final value is approximate |
| Floating-point math error | |
| System self-check | system problem |
| Sensor conversion | conversion error |
| Sensor checksum | compensation has changed |

## Audit/Event Log

The 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 400 alarms and events, and the module operates such that 200 alarms and 200 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.

## Gas Data Lists For Master Node Access

Data lists are provided to support the gathering of gas data from a master node via the Network port using Bristol peer-to-peer messages. The associated slave point number is shown. Lists without slave points can only be read using Open BSI DataView.

### LIST 10 Full Configuration

Firmware revision (progrev)
Unit ID
Meter ID
Meter number
Alarm report format
Alarm report format 1
Display alarms
Flow equation
Base pressure
Base temperature
Pipe material
Orifice material
AGA8 Method
AGA8 Gross mode
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

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
Flow controller enable
Valve limit
Flow setpoint
Flow deadband
Gain
Integral
Derivative
Max flow rate
Valve travel time
Flow calculation interval
Periodic log interval
Break on change
Trending log enable
RTS/CTS mode
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 - Slave Point 1

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

## LIST 12 Configuration #1 - Slave Point 2

Orifice Diameter          .250" to 31"     0
Pipe Diameter            2" to 31"       0
Specific Gravity
Heating Value
Barometric Pressure
Base Pressure

Base Temperature
Flowing Viscosity
Ratio of Specific Heat
Tap Location
Tap Type
Dp Cutoff

## LIST 13 Configuration #2 - Slave Point 3

Firmware version (progrev)
Meter Number
Flow Equation                    1985/1992
Calculation Interval
Contract Hour
Logging Interval
Break Log option
Heat Value source
Gravity type
AGA8 Method
AGA8 Gross Mode

## LIST 14 Controller - Slave Point 4

Sampler Enable                   On/Off
Sampler Volume                   0 - 10000 MCF
Sampler Duration                 1.0 Secs
Flow Rate Control                Off/On
Valve Limiting                   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

# Chapter 2 - TeleFlow Standard ACCOL Load

Next start hour
Next stop date
Next stop hour

## LIST 15 AGA8 Gross Config

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

## LIST 16 AGA8 Detail Gas composition

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

Flow Rate
Beta Ratio
Fpb

Ftb
Fg
Ftf
Fa
Fr
Y
Fb
Fpv
C-prime
Extension

**LIST 18 Communication configuration**

Network port baud rate
CTS/RTS mode
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

# Chapter 2 - TeleFlow Standard ACCOL Load

Dial on Auxiliary input alarm enable
Dial on Charger alarm enable
Dial on Nomination alarm enable

## LIST 20 Live Data

Diff pressure
Static pressure
Temperature
Flow rate
Operator change

## LIST 21 Rate and Volume - Slave Point 5

Flow rate
Flow rate @ Std
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 totalizer
Energy totalizer
Volume last month
Energy last month
Scaled frequency
Scaled pulses today
Scaled pulses yesterday
Scaled pulses total

### LIST 22 Inputs - Slave Point 6

Diff pressure
Static pressure
Temperature
System power volts
Power input 1 volts
Power input 2 volts

Backup battery volts
PC board temperature
Auxiliary input
Total pulses
Pulse Frequency
DO#1
DO#2
DI#1
DI#2

**LIST 50 LCD Display list**

Meter ID
System power
Aux input
Diff pressure
Flowing pressure
Temperature
Daily flow rate
Flow time today
Volume today
Volume yesday
Volume totalizer

# Appendix A
# Modifying the TeleFlow Standard ACCOL (TSA) Load

## Modifying or Replacing the TeleFlow Standard ACCOL Load & Menus

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

For example, if the TeleFlow Standard 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 Menu System (TMS) is closely tied to the TeleFlow Standard ACCOL Load. If you modify the standard load, or create a different load, you will need to modify the menus which make up TMS, 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 |
|---|---|---|
| 1 | Digital Input Board with 2 or 10 points (or no board installed) | DI2 DI10 |
| 2 | Digital Output Board with 2 or 10 points (or no board installed) | DO2 DO10 |

| 3 | Analog Input Board with 1, 4, 5, or 8 points (or no board installed) | AI1 AI4 AI5 AI8 |
| 4 | High Speed Counter Board with 1, 2, or 3 points (or no board installed) | HSC1 HSC2 HSC3 |
| 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 | 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.

# READER RESPONSE FORM

Please help us make our documentation more useful to you! If you have a complaint, a suggestion, or a correction regarding this manual, please tell us by mailing this page with your comments. It's the only way we know we're doing our job by giving you correct, complete, and useful documentation.

DOCUMENT NUMBER: <u>D4087</u>
TITLE: *TeleFlow Standard ACCOL Load*
ISSUE DATE: <u>December, 2000</u>

COMMENT/COMPLAINT:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

<u>Mail or FAX this page to:</u>
Bristol Babcock Inc.
1100 Buckingham Street
Watertown, CT 06795
FAX#: (860) 945-2213
Attn: Technical Publications Group, Dept. 610                     RRF - 12/2000

**Bristol Babcock Inc.**

an FKI company

1100 Buckingham Street
Watertown, CT 06795
Telephone: (860) 945-2200