

# Model 2350A Gas Chromatograph Controller



**DANIEL**®

**EMERSON**  
Process Management

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# Model 2350A Gas Chromatograph Controller

Upgrade Your Gas Chromatograph  
to optimize performance...

2350A Explosion Proof with  
Optional Keypad / Display



## Open up the Power of your Chromatograph with the Model 2350A Controller

As a leading worldwide supplier of on-line gas chromatographs, Daniel has built a reputation on equipment reliability and long-term performance. Now you can economically upgrade and extend the performance of your current Danalyzer system with Daniel's Model 2350A GC controller and MON 2000 Windows™ based software. This package allows you to take advantage of the latest in digital electronics and Windows™ PC software to improve your equipment performance for many years to come. Here are just some of the features and benefits that you will realize:

### ENERGY MEASUREMENT

#### Small Errors Add Up!

A measurement error as small as 0.1% CV means over \$21,000 per year\* of lost and unaccounted for energy!

- example based on 20 MMSCFD of volume @ 1030BTU/SCF, at a price of \$3.00 per MM BTU

### INCREASED PROCESSING POWER

- Full choice of ISO 6976-1995 or GPA 2272-2000 (release 2) calculation methods and parameters
- Provides hourly, daily, weekly, monthly, or variable (0-167 hours) averages
- Archives up to 254 item averages, holds over 3 months of standard four minute runs - with expandable archiving capabilities
- Trend archived variables graphically on a PC or printer

### INCREASED OPERATING EFFICIENCIES

- Three to eight field-configurable serial ports support 4 user-selectable versions of modbus protocols to simplify communication between flow computers, PLC's, DCS's and SCADA systems.
- Optional ethernet card to provide industry standard network connectivity using MODBUS/TCP protocol. This allows access to the gas chromatograph via corporate intranet or the internet.
- Eliminates strip chart recorders, printers, portable service panels or workstations
- No proprietary network protocols or data highways
- User-friendly laptop/PC software cuts technician time and training costs as much as 50%
- Optional internal modem board; fully functional from MON 2000 software with remote off-site access connected to dedicated serial port
- Three levels of security; configurable to read only or read/write for third party access to GC data
- Full Windows™ 95, 98, 2000, NT or XP functionality with MON 2000 PC software
- Includes modbus polling functions for GC's, ultrasonic meters or flow computers
- Internet ready...download MON 2000 enhancements directly from our Daniel website and e-mail chromatograms for peer review

### IMPROVED SYSTEM PERFORMANCE

- Advanced 16-bit analog-to-digital converters for improved resolution
- Improved lower detectable limits for trace TCD component analysis with second GC
- Four (4) user configurable auxiliary analog inputs which could be used for second GC in parallel chromatography and five (5) digital inputs/outputs; monitor alarms and peripheral devices directly
- Supports parallel chromatography for advanced applications; ie: BTU and trace H<sub>2</sub>S (2-30 ppm range, minimum detectable limit 2-ppm). C9+ extended analysis with optional hydrocarbon dewpoint calculation.

# With MON 2000 software to optimize Gas Chromatograph performance !

## THE DANIEL 2350A CONTROLLER SYSTEM HARDWARE

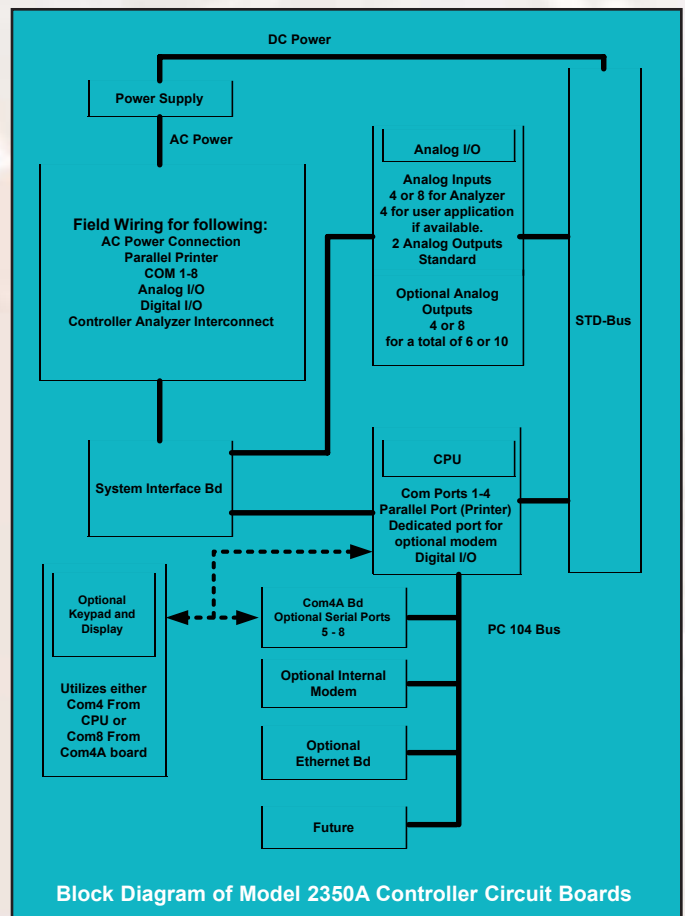
Three colored LED status indicators are located on the front panel - green (indicating operation), yellow (indicating unacknowledged alarms), and red (indicating current alarms requiring operator action). The 2350A boards are mounted in a passive card cage with ribbon cable connectors to enable STD (32-bit) bus communications. The CPU has a PC 104 Bus for easy addition of serial ports, modem, ethernet card etc. The controller performs all signal processing, calculations, instrument control, communications and data storage. The GC electronics (pre-amp board and decoder board) electrically interface to the controller the same as the older 2251 controllers - so retrofitting units in the field is simple and straightforward. Furthermore, cutouts for the panel-mount version are the same as the 2251/2551 panel cutouts, additional hardware modifications are not required. Additional space is required in the rear of the panel to accommodate the card cage and termination board. Controller-mounting options allow the controller to be located remotely from the GC or as an integral part of the GC in the field.

## INCREASED DIAGNOSTIC CAPABILITY

- On-screen chromatograms via PC, eliminates the need for chart recorders
- Archives, event, and maintenance logs with time/date stamped analysis and configuration changes
- Extensive chromatogram "Overlay" and "Zoom" functions with MON 2000 software. Troubleshooting by direct comparison of historical chromatograms
- Zoom on baseline to improve peak integration for improved energy measurement

## CONTROLLER ELECTRONICS OPTIONS

- High Speed Internal Modem - direct dial to your Gas Chromatograph and configure or interrogate it remotely with MON 2000 software.
- Analog Outputs (4-20mA) - User configurable. 2 standard, 4 or 8 additional.
- Keypad and Display - Full 18 button keypad with Liquid Crystal Display (LCD) and LED backlighting.
- Additional Memory - Uses disk on chip 16MB for historical data storage - memory expandable 576 MB.



# MON 2000 WINDOWS™ BASED SOFTWARE

Mon 2000 software is a menu driven, Windows™-based software package designed from the DOS version of MON. It will operate the entire family of Daniel 2350 gas chromatographs via any PC running Windows™ 95, 98, 2000, NT or XP. MON 2000 software allows the user to take complete control of a Daniel Chromatograph either locally or remotely. MON 2000 gives the technician the tools to improve performance of older chromatographs; improved chromatography improves energy measurement accuracy.

## FILE COMPATIBILITY IS ASSURED,

previous 2350 applications (\*.bin files) and chromatograms (\*.cgm files) also run in MON 2000. Because it was developed from its DOS predecessor with expanded context, sensitive on-line help, training requirements should be minimized.

## SIMPLIFIED TROUBLESHOOTING CHROMATOGRAM COMPARISON (FIG. 1)

- Virtually unlimited possibilities for advanced troubleshooting and analysis
- Compare chromatograms (up to 8) to simplify troubleshooting or overlay multiple chromatograms to spot a trend
- Check the original calibration against the last calibration

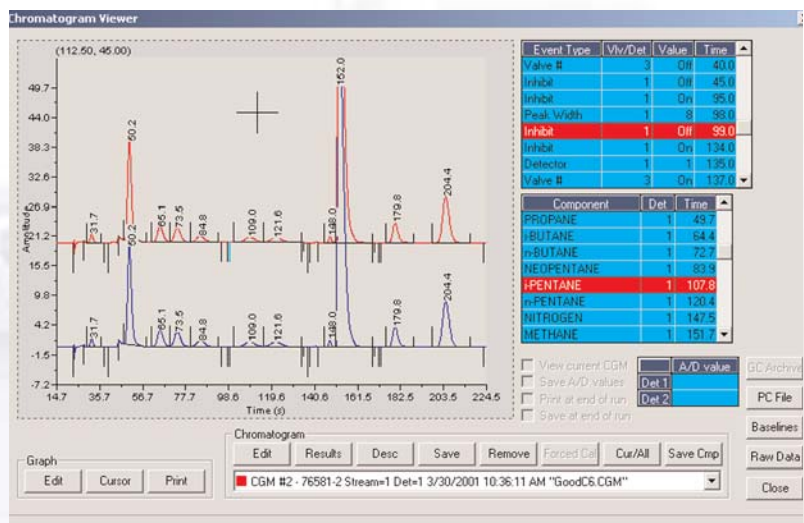
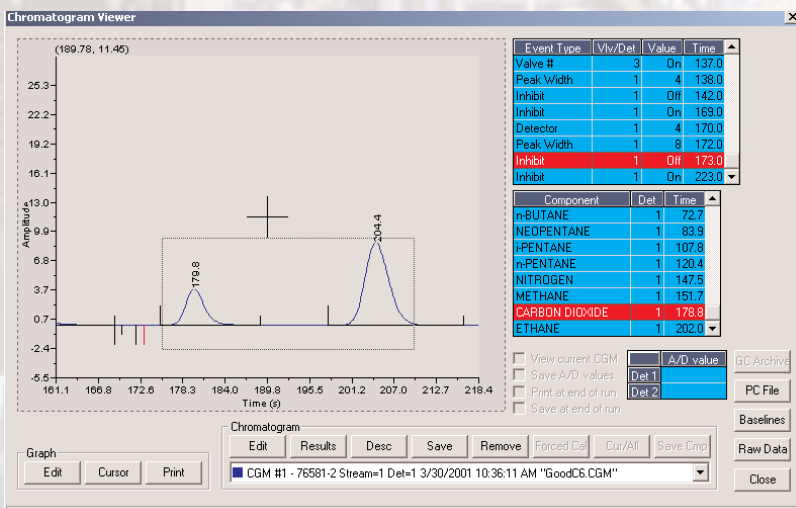


Fig. 1



## ADVANCED FUNCTIONS (FIG. 2)

- Zoom functions to optimize peak integration
- Current chromatogram on screen, last analysis and calibration data stored in 2350A
- Unlimited storage of chromatograms to PC hard drive
- Timed events, peak integration parameters, and chromatograms on one screen
- Trending of any component or calculated value from archived data in the 2350A Controller

Fig. 2

2350A Rack Mount Controller with Optional Keypad / Display



### MODBUS POLLING FUNCTIONS (FIG. 3)

- Continuous polling for analytical data
- Data acquisition and reporting functions for multiple GC's
- Hard-wired or remote access via modem
- Addressable for up to 32 modbus slaves on a RS-485 or RS-422 network or point-to-point as RS-232
- Flexible Windows™-based configuration
- Set up polling for continuous operation or determine the polling intervals from 1 second to 24 hours
- Import/export data effortlessly with Windows™ functionality
- Save data in text file (.txt), Excel file (.xls) or internet-ready HTML (.htm) file formats

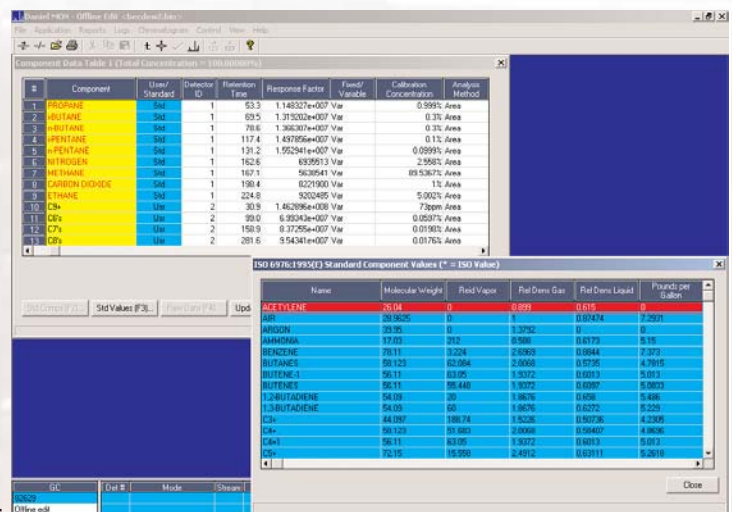
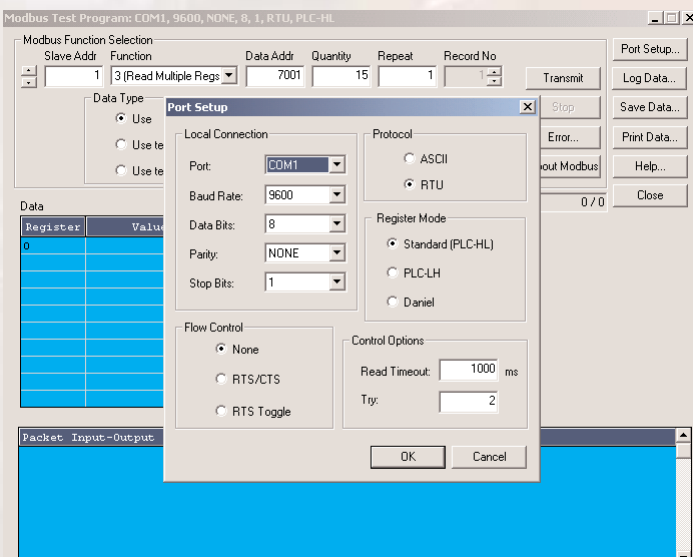


Fig. 4

### INTERNET READY...

Access the worldwide web from within MON 2000 and ...

- Download future enhancements directly from Daniel's website
- Register on-line via Daniel's website and receive new release information
- E-mail chromatogram files (\*.cgm) for peer review. Compressed binary file size of less than 25k make chromatogram files ideal for e-mail. All raw data, analytical data, timed events and component retention times are all contained in one small \*.cgm file as an e-mail attachment.



### LATEST MEASUREMENT STANDARDS (FIG. 4)

- New GPA 2145 (Revision 2) physical properties (energy content and related calculations) are included as standard components to bring users up to date with recent standards
- ISO 6976-1995 applications meet European requirements for energy measurement with full choice of calculation methods
- Manual entry of alternate physical constants allowed (but tagged as "User" for GC audit purposes)
- Hydrocarbon dewpoint calculations are an option for the extended C9+ analysis. Using PR or RKS equations of state and latest physical property data.

Fig. 3

# 2350A Controller Design Specifications

**Electrical Power:** 115 VAC +/- 15% @0.55 a, 50/60 Hz; 230 VAC +/- 15% @ 0.275 A, 50/60 Hz

**Communications:** Com 1: RS 232 or RS 422 DB 9 or field terminations  
Com 2: RS 232 or RS 485 DB 9 or field terminations  
Com 3: RS 232 or RS 485 field terminations  
Com 4: RS 232 or RS 485 (RS 422 when Com 3 is RS 232 only)  
Optional Com4A board for additional Serial Ports (5,6,7,8)  
Optional internal modem connected to dedicated serial port  
Optional ethernet network interface card

**Analog Inputs:** Detector 1-4 ea. filtered with transient protection dedicated to the GC auto-ranging pre-amp. 16 bit A/D resolution.  
Detector 2 - 4 ea. filtered with transient protection for optional inputs from other devices or for use with a second auto-ranging pre-amp from a second GC detector. 16 bit A/D resolution.

**Analog Outputs:** 2 outputs standard, 4-20 ma with software calibration.  
Optional: 4 or 8 additional outputs, 4-20 ma with software calibration.  
250  $\Omega$  load standard  
750  $\Omega$  load using external 24V source

**Digital Inputs:** 1 GC alarm, optically isolated with transient protection. 5 user alarms, optically isolated, with transient protection.  
12 volt standard, max. 24V external

**Digital Outputs:** 5 digital outputs can be used for alarms, optically isolated, with transient protection.  
30VAC 500mA max.

**Keypad Display:** Optional 18 keys/8 lines x 41 characters. Uses Com4 or Com8 depending on serial port options.

**Parallel Port:** 1 parallel port available for printed reports.

**Internal Modem:** Optional 300 to 33.6k baud field configurable.

**Detector Inputs:** TCD, FID, FPD, single or dual pre-amp inputs.

**Transient Protection:** C.E. tested and certified to the highest levels (3 & 4) of the European IEC 801 STD.

**Physical Environment:** Operating range @ 0° to 130°F (-18° to 55° C), storage range @ -40° to 185° F (-40° to 85° C) Humidity 0-95% RH non-condensing

**Mounting Options:** Integral/field mount - X-proof - 60 lbs (27.21 Kg) NEMA 4X, IP 65 19; rack-mount - 25 lbs (11.34 Kg); Panel mount retrofit - 22lbs (9.98 kg)

**System Memory:** 16 MB Disk on a chip storage for all historical data (expandable up to 576 MB historical storage space)

**Chromatogram Storage:** Last run for each stream and last cal for each method. Additional chromatogram storage in MON 2000 software running on a laptop.

**Methods:** 4 timed event tables, 4 component tables freely assignable to each stream.

## **Safety Classification:**

### **2350A Explosion Proof Controller**

UL, CSA and CENELEC listed for use in Class I, Groups C and D; Class II, Groups E, F and G hazardous locations in both the US and Canada. Certified to EEx d IIB T6 to standards EN 50014 and EN 50018 for potentially explosive atmospheres Parts 1 and 5.

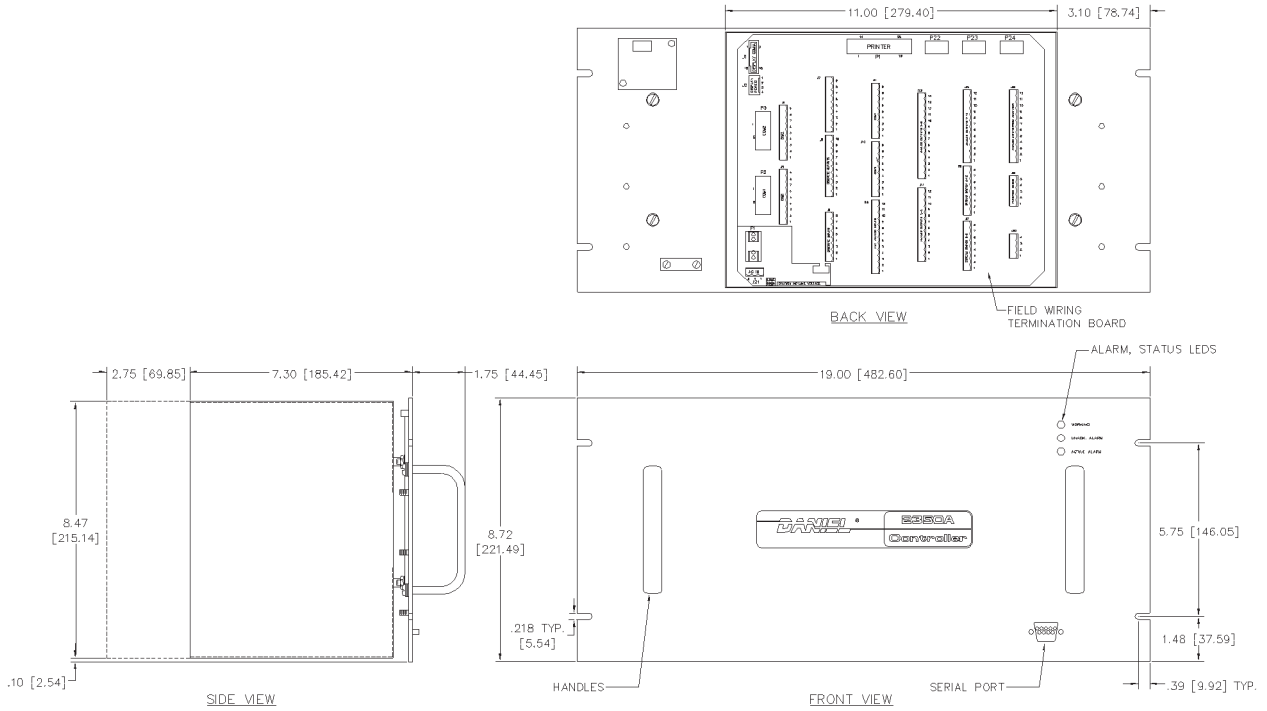
### **2350A Rack Mount Explosion Proof**

CSA certified for General Purpose Area Certification. IP65. Nema 4X - Meets, Nema 250, enclosure for electrical equipment (1000 V maximum), for type 4X.

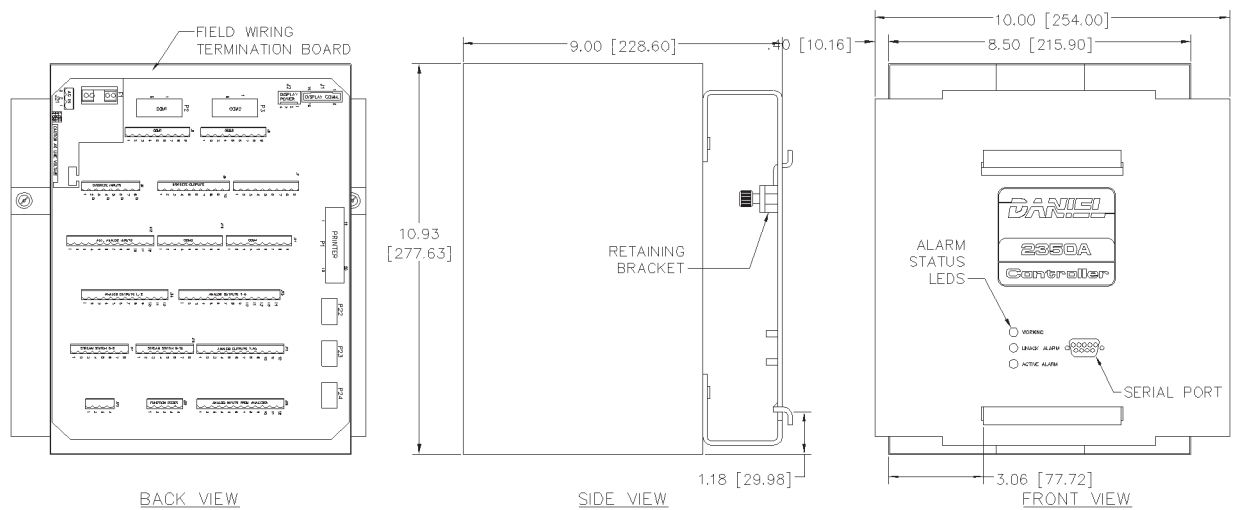
ATEX certified.

# 2350A Controller Mounting Options - Outlines and Dimensionals

## 19" Rack Mount



## Panel Mount 2251 / 2551 Retrofit



# Option Selector for the DANIEL 2350A Controller

Note: Each 2350A Controller includes one registered copy of MON 2000 PC software

## 2350A + Enclosure # - Language # - Comm Ports # - Optional Serial Ports # - Factory Configuration #

**Example: 2350A-11010**, Denotes a 2350A controller with an Explosion Proof w/ keypad - UL/CSA (NPT entries) enclosure, English language, Communication Port #3 = RS 485, Port #4 = RS485, Com4A board, Standard C6+ application

### Enclosure:

- \*1 - X-Proof - UL/CSA (NPT entries) w/ keypad
- \*2 - X-Proof - Cenelec (Metric entries) w/ keypad
- 3 - 19" Rack Mount
- 4 - Panel Mount (2251/2551 Retrofit) no keypad
- \*5 - 19 " Rack Mount with Keypad/Display
- 6 - X-Proof no Keypad/Display (NPT)
- 7 - X-Proof no Keypad/Display (Metric)

### Language:

- 0 - N/A (keypad not used)
- 1 - English
- 2 - French

\* **Note: Keypad / Display option uses either Serial Port 4 or 8**

### Communication Ports

- (Ports #1 & #2 configured RS 232) standard
- 0 - COMM # 3 = RS 485, COMM #4 = RS 485
  - 1 - COMM # 3 = RS 232, COMM #4 = RS 232
  - 2 - COMM # 3 = RS 485, COMM #4 = RS 232
  - 3 - COMM # 3 = RS 422, COMM #4 = RS 232

### Optional Serial Ports

- 0 - No Com4A Board
- 1 - With Com4A Board

### Factory Configuration:

- (Application)
- 0 - None - User Configuration
  - 1 - Application installation requires 2251 configuration report at time of order

## OPTIONAL DANIEL 2350A CONTROLLER ACCESSORIES

- 2-9-2350-002 Free-standing rack, for mounting of 2350A rack-mount controller and a printer
- 2-9-2350-120 Bench-mount bracket, for securing a 2350A rack-mount on a bench  
Wall-mount bracket, for securing a 2350A EXP on a wall
- 2-9-9020-699 External US Robotics desktop modem

## STANDARD GC APPLICATIONS

(App. files loaded on floppy disk)

- Standard C6+ application (4 min)
- Existing 2251 application requires 2251 configuration report at time of order
- Standard C6+ application (12 min)
- Standard C9+ application (5 min) with optional hydrocarbon dewpoint calculation
- Standard C6+ with trace H<sub>2</sub>S (4 min)
- Fast C6+ Application (2 min)
- Model 1000 mercaptans and total sulphur application (12 min)

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